

# AD-1252 Thermal Dispersion Probe Airflow Measuring System

## Installation Instructions

Part No. 44-1122-2, Rev. E  
Issued July 25, 2014

Refer to the [QuickLIT website](#) for the most up-to-date version of this document.

### Applications

The AD-1252 Thermal Dispersion Probe Airflow Measuring System is an air-measurement device that uses thermal dispersion technology to measure the airflow velocity and temperature in duct and plenum applications. Insertion probes are typically installed in retrofit applications but may also be specified on new construction projects.

The product may be used in rectangular, oval, or round applications when installed in accordance with this installation manual. Use behind a rain hood, in front of an outside air damper, return air duct, downstream of a fan discharge, or in the exhaust duct.

### North American Emissions Compliance

#### United States

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

#### Canada

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

### Installation

**IMPORTANT:** Do not connect CAT5e cable to a router between the DMPR-RA002 Electronic Controller and thermal dispersion probes. Failure to connect the cables directly from the DMPR-RA002 Electronic Controller to the thermal dispersion probes may cause equipment damage.

**IMPORTANT:** In addition to these instructions, the installation contractor shall comply with all local and International codes and standards to ensure proper and safe installation.

The thermal dispersion probes and electronic controller ship in separate containers. Remove the thermal dispersion probes and the electronic controller from the shipping containers and inspect the devices for damage before installation.

#### Installing the Thermal Dispersion Probes

The sensor density is based on extensive lab testing to optimize the accuracy of the electronic controller. When installing the thermal dispersion probes, use the [Square Duct Mounting](#), [Round Duct Mounting](#), and [Oval Duct Mounting](#) sections to determine the proper spacing between each probe within the opening. Contact your local Johnson Controls® representative if you have questions regarding a particular application.



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

Disconnect the power supply before making electrical connections. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

#### **AVERTISSEMENT : Risque de décharge électrique.**

Débrancher l'alimentation avant de réaliser tout branchement électrique. Tout contact avec des composants conducteurs de tensions dangereuses risque d'entraîner une décharge électrique et de provoquer des blessures graves, voire mortelles.

**IMPORTANT:** Only a qualified service technician should install this system. To avoid unsatisfactory operation or damage to the product, strictly follow the instructions provided and do not substitute parts. Damage to the product resulting from not following the instructions or using unauthorized parts may be excluded from the manufacturer's warranty coverage.

## Mounting

### Square Duct Mounting

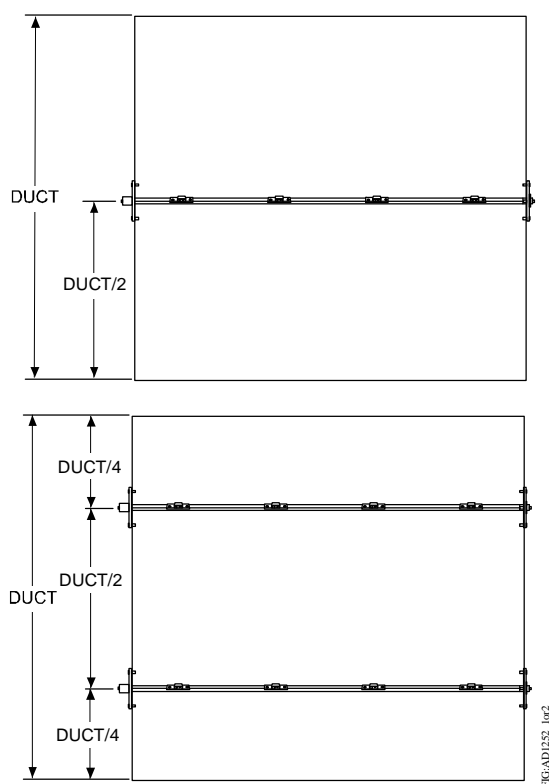


Figure 1: Rectangular Duct Mounting - One and Two Probe Configurations

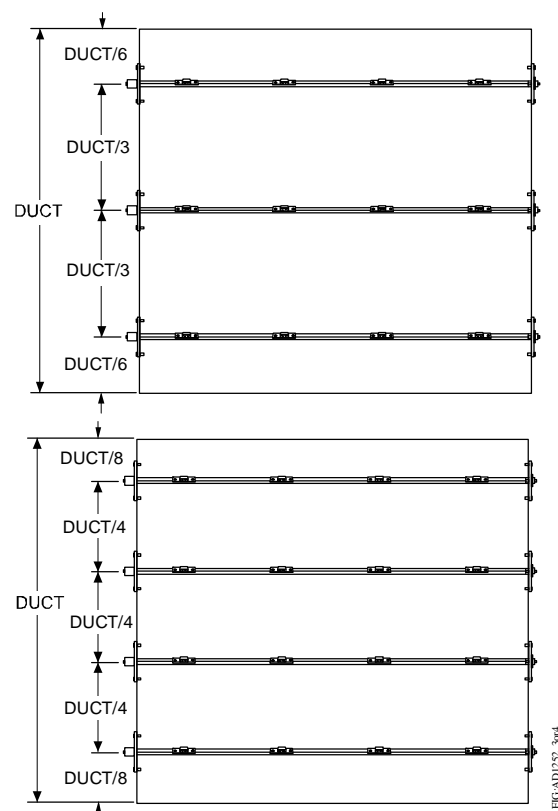


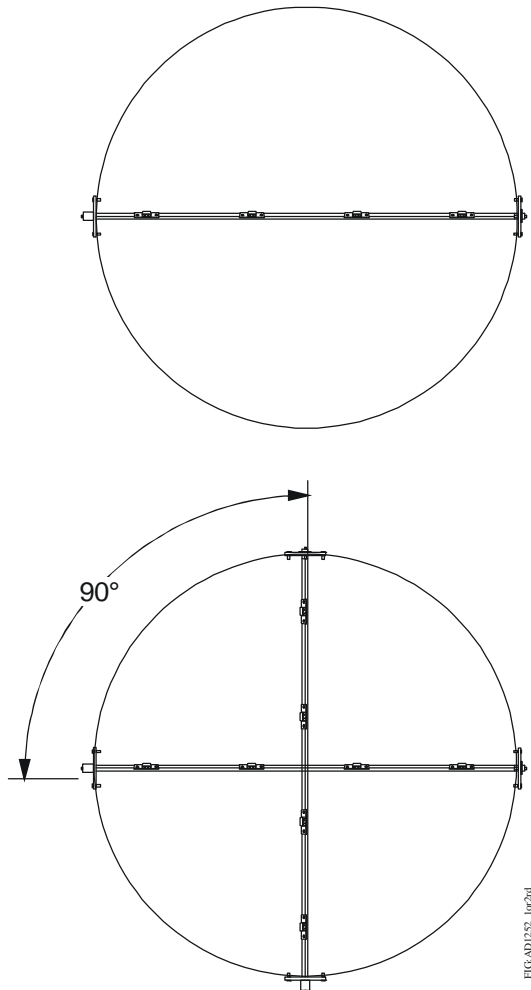
Figure 2: Rectangular Duct Mounting - Three and Four Probe Configurations

Table 1: Number of Probes/Sensors per Probe for Rectangular Duct Applications<sup>1</sup>

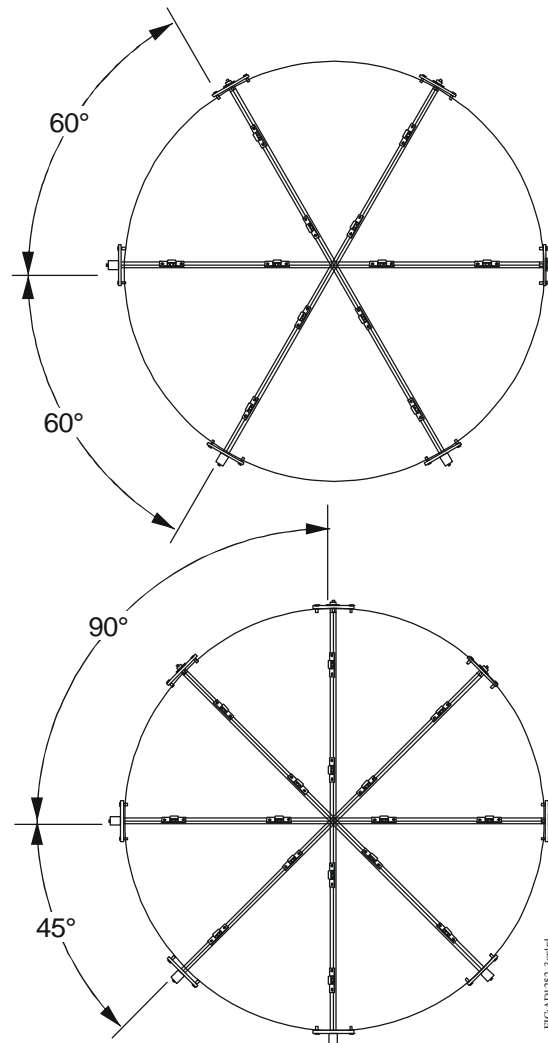
Duct Height, in.	Duct Width, in.									
	12	18	24	36	42	48	60	72	96	120
12	1/2	2/2	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
16	2/2	2/2	2/2	2/3	2/3	2/3	2/3	2/4	2/4	2/4
24	2/2	2/2	2/3	2/3	2/3	2/4	2/4	2/4	2/4	2/4
36	2/2	3/2	3/2	2/4	2/4	2/4	2/4	2/4	2/4	2/4
42	2/2	3/2	3/2	4/2	3/4	3/4	4/4	4/4	4/4	4/4
48	3/2	3/2	4/2	4/3	4/3	4/4	4/4	4/4	4/4	4/4
60	3/2	3/2	4/3	4/3	4/4	4/4	4/4	4/4	4/4	4/4
72	3/2	4/2	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4
96	4/2	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4
120	4/2	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4

1. The minimum size for rectangular duct applications is 8 x 8 in. (203 x 203 mm). Sizes less than 12 x 12 in. (304 x 304 mm) use the same number of probes and sensors as the 12 x 12 in. (304 x 304 mm) size.

## Round Duct Mounting



**Figure 3: Round Duct Mounting - One or Two Probe Configurations**



**Figure 4: Round Duct Mounting - Three or Four Probe Configurations**

**Table 2: Number of Probes/Sensors per Probe for Round Duct Applications <sup>1</sup>**

Duct Diameter, in.	No. of Probes/No. of Sensors per Probe
12	1/2
18	2/2
24	2/2
36	2/4
42	2/4
48	3/4
60	4/4
72	4/4
96	3/4
120	4/4

1. The minimum diameter size is 8 in. (203 mm). Round duct applications smaller than 12 in. (304 mm) use the same number of probes and sensors as the 12 in. (304 mm) size.

## Oval Duct Mounting

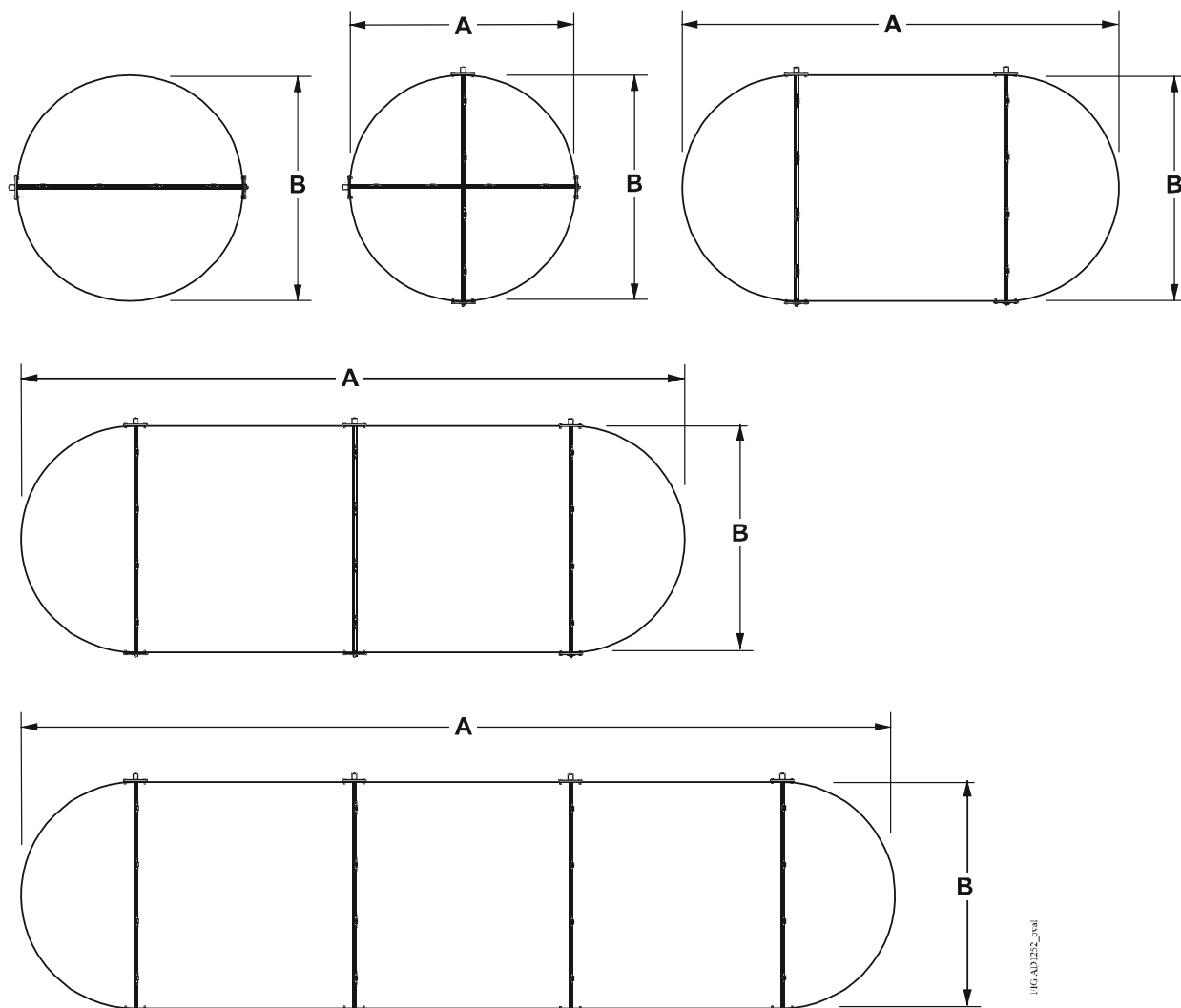


Figure 5: Oval Duct Mounting - Sensor Density Details

Table 3: Number of Probes/Sensors per Probe for Oval Duct Applications

Duct Height, in.	Duct Width, in.									
	12	18	24	36	42	48	60	72	96	120
12	1/2	1/2	1/3	1/3	3/2	3/2	4/2	4/2	4/2	4/2
18		2/2	1/3	1/3	3/2	3/2	4/2	2/4	2/4	2/4
24			2/2	2/3	3/2	3/2	4/2	2/4	2/4	2/4
36				2/4	3/3	3/3	4/3	2/4	2/4	2/4
42					2/4	3/3	4/4	4/4	4/4	4/4
48						3/4	4/4	4/4	4/4	4/4
60							4/4	4/4	4/4	4/4
72								4/4	4/4	4/4
96									4/4	4/4
120										4/4

## Location Considerations

**IMPORTANT:** The thermal dispersion probes may be installed in the vertical or horizontal plane of the duct. Use vertical installation for fan discharge applications. In vertical mount applications where moisture is possible, mount the multiplexer on the top. In horizontal mount applications, mount the probes so that the plastic sensor shrouds are on the bottom of the probe to minimize moisture accumulation. Accumulated moisture can affect the accuracy of the thermal dispersion probes. The minimum spacing between probes and filter banks is 6 inches (152 mm) in the direction of airflow. Probes must be upstream of filters. It is important that the probes or filters be sized so the seams of the filters do not sit directly in front of the sensors.

**IMPORTANT:** The DMPR-RA002 Electronic Controller enclosure cover is secured with six Phillips screws. Take care when mounting the electronic controller to ensure there is adequate clearance to remove the cover and make electrical connections in the top of the box.

Mount the DMPR-RA002 Electronic Controller inside of an air handling unit or place the electronic controller with similar control panels within the structure.

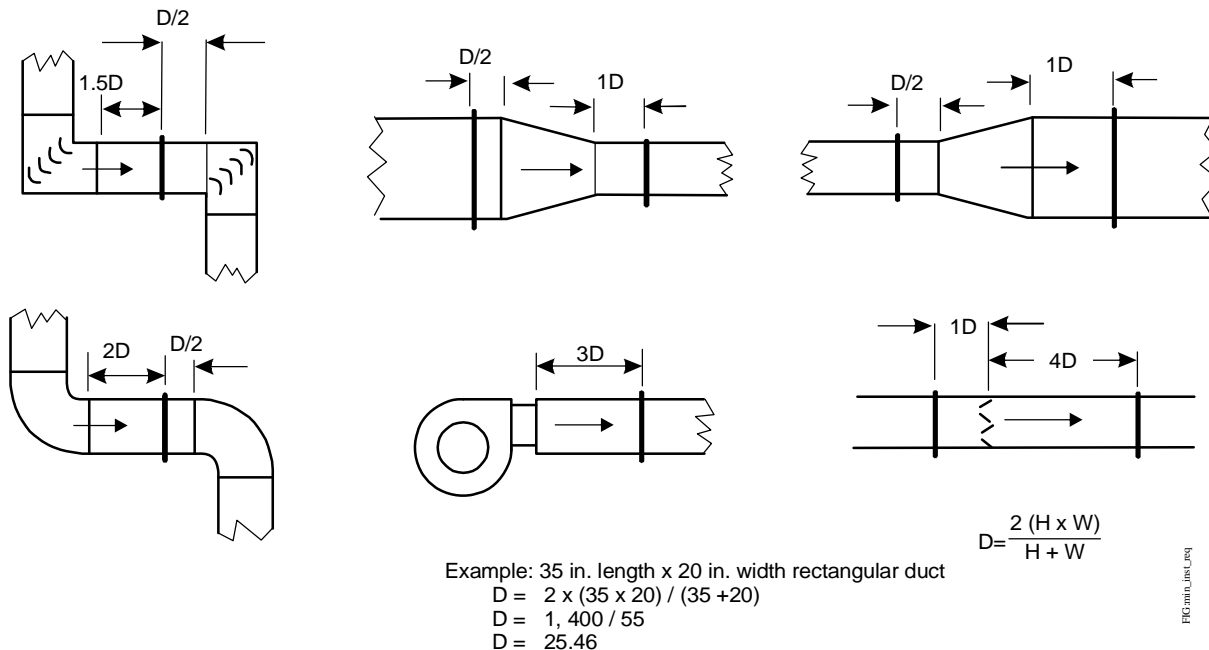
Do not install or store the electronic controller outdoors.

Mount the DMPR-RA002 Electronic Controller as close to the probes as possible. See Table 4 for cable length recommendations.

Mount the DMPR-RA002 Electronic Controller on a flat surface.

### Minimum Mounting Distances

Figure 6 represents applications for which the AD-1252 Thermal Dispersion Probe with Electronic Controller is most suitable. If your particular application is not shown, or if you do not have the space to observe the minimum distance, please contact your local Johnson Controls® representative for the best solution. The locations shown on these details represent the minimum clearance from most obstructions that create an airflow disturbance.



**Figure 6: Minimum Mounting Distances**

**Table 4: Cable Length Recommendations (Maximum)**

Number of Probes	Feet of Cable <sup>1</sup>
1	Up to 100 feet
2	Up to 50 feet for each probe
3	Up to 33 feet for each probe
4	Up to 25 feet for each probe

1. Cable lengths do not have to be equal.

### ***Installing the Thermal Dispersion Probes with Insertion Mounting***

1. Inspect the duct work and/or opening to ensure no obstructions or irregularities interfere with installation of the probes. See Location Considerations for probe mounting locations. See Figure 8 through Figure 11 for more information about three types of probe mounting.

**Note:** Ensure that adequate clearance exists at the installation site to permit installation and removal of the probes.

2. Based on information from Location Considerations, determine where you want to mount the probes and mark the hole locations on the outside of the duct or the plenum.
  - a. Mark a 3 in. (76 mm) hole (round or square) where you want to insert each probe.
  - b. Mark a 2 in. (50 mm) hole on the opposite side of the duct or plenum from the insertion hole.
  - c. Double-check the hole locations before proceeding to the next step.
3. Cut 3 in. (76 mm) and 2 in. (50 mm) diameter holes (one set of holes for each probe). For rectangular ducts, if the duct requires three probes, then make three 3 in. (76 mm) holes on one side and three 2 in. (50 mm) holes on the opposite side of the duct/plenum.
4. Use standoff brackets to mount probes onto the face of a damper (see Figure 10). When possible, install probes perpendicular to damper blades for best results.
5. Remove the mounting plates on the mounting stud end of the probe. Keep the nuts and washers for next step.
6. Holding the multiplexer end of the probe (the end with the black box on it), insert the mounting stud end of each probe into the 3 in. (76 mm) holes until the probe mounting stud extends through the 2 in. (50 mm) holes in the opposite side of the duct.

7. With the probes in place, go to the other side of the duct/plenum, and install the mounting plates onto the studs. With the stud centered in the 2 in. (50 mm) hole, place the mounting bracket over the stud, followed by the nut and washer. Tighten the nut and washer against the mounting plate. Do not over tighten.

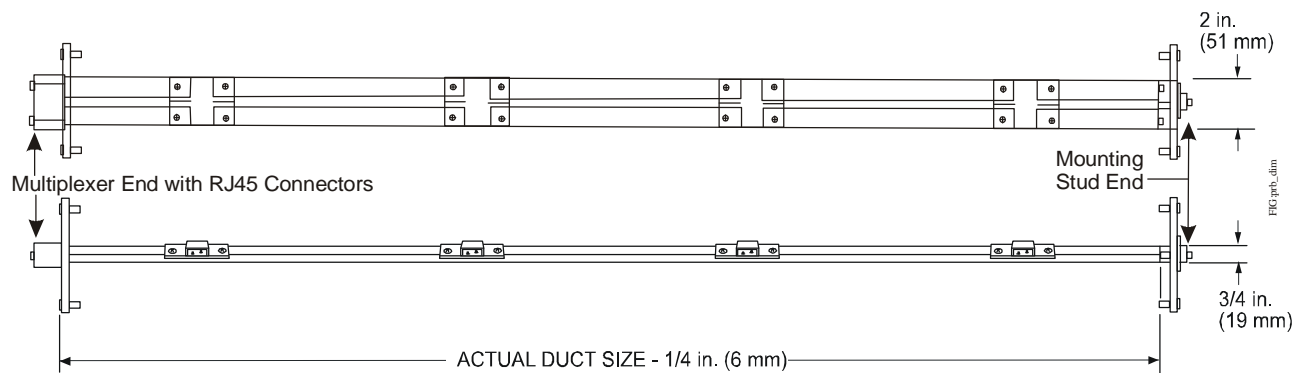
**Note:** Do not place screws in the four corner holes of the mounting plates in this step.

8. Measuring from the top or bottom of the duct/plenum, locate the center of each probe stud to the dimension indicated in Location Considerations. Once the stud is centered on the proper location, secure the mounting plate with four self-drilling screws. Repeat this step for each probe in the duct/plenum.

**IMPORTANT:** When multiplexers are exposed to the outdoor environment, you must use the National Electrical Manufacturers' Association (NEMA) Type 4 weathershield option. (See Figure 8.) Use appropriate moisture resistant conduit and connections. Use the two screws provided to secure closed the NEMA 4 cover.

9. Moving back to the opposite side of the duct/plenum, measure from the top or bottom as in the previous step to center the multiplexer box on the right dimension. The multiplexer box should be the same distance from the top of the duct/plenum as the center of the mounting stud on the opposite side (within 1/2 in. [12 mm]). Once the multiplexer box has been positioned, secure the mounting plate with four self-drilling screws.

**IMPORTANT:** Install the probes with the mounting plates square and without twisting or bending.



**Figure 7: Thermal Dispersion Probe (Hoods Shown on Top for Illustrative Purposes)**



**Figure 8: Probe with NEMA Type 4 Weathershield**



**Figure 10: Probe with Damper Stand-off Mounting Bracket**



**Figure 9: Probe with Standard Insertion Mounting Hardware (Hoods Shown on Top for Illustrative Purposes)**



**Figure 11: Probe with Internal Mounting Bracket**



## Installing the DMPR-RA002 Electronic Controller

1. Securely mount the electronic controller on a wall near the probes, leaving at least 12 in. (304 mm) above the electronic controller to allow removal of the cover. Use four field-supplied fasteners to mount the enclosure in an appropriate location. Use fasteners suitable for the wall material.
2. Remove the six Phillips head screws securing the cover.
3. Open the cover and remove the appropriate conduit plugs on the top of the electronic controller for connection of the field wires to the circuit board terminal blocks (Figure 12).
4. Wire the supply power and outputs. See [Wiring](#).

## Wiring

Whenever possible, use a dedicated transformer for each AD-1252 System. If you use dedicated transformers for multiple AD-1252 Systems, ensure that the transformer is rated with sufficient capacity for the total load of the connected probes, sensors, and other devices.

Errors in the load calculations can lead to problems. Wiring multiple low-voltage devices from a common transformer can result in lower-than-expected voltage at the device and higher-than-expected current draw when devices are connected a great distance from the power source.

Transformers for the DMPR-RA002 Electronic Controller are not required to be isolated from other devices. Isolation is only required to prevent electrical fluctuations due to intermittent high loads from causing problems with electronic devices.

See Figure 12 for supply power and output connections.

## Cable Specifications

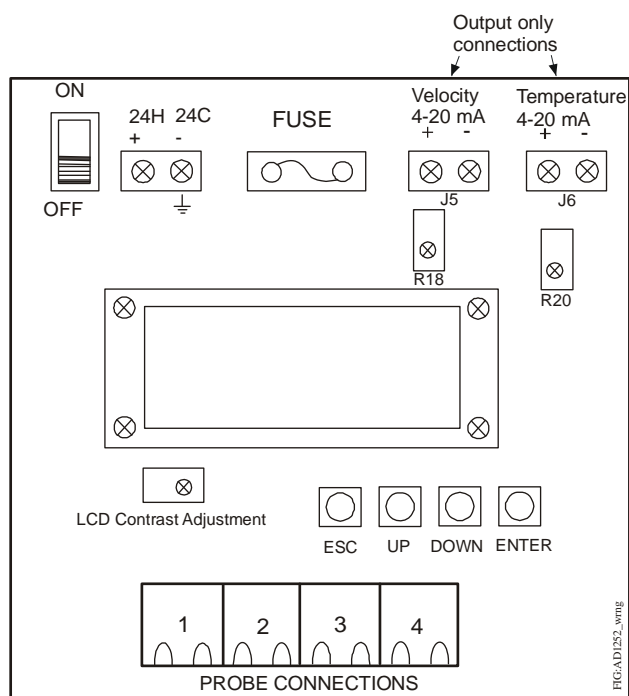
The AD-1252 System requires a shielded CAT5e, plenum rated, straight-through patch cable using simple pairing with the following specifications:

- Shielded CAT5e solid plenum cable
- four-pair shielded, twisted pair cable (see Table 5 for information about pin numbers and corresponding wire colors)
- 24 AWG solid bare copper conductor meets or exceeds CAT5e specification
- Teflon® insulated, plenum jacket
- CMP rated for use in any area used for air return, drop ceilings, air ducts, and in public buildings
- Compliant with EIA/TIA standards by ETL
- Canadian Standards Association listed

See Table 4 for cable length recommendations.

**Table 5: Pin Numbers and Corresponding Wire Colors**

Pin Number	Wire Color
1	White and Green
2	Green
3	White and Orange
4	Orange
5	White and Blue
6	Blue
7	White and Brown
8	Brown



**Figure 12: DMPR-RA002 Electronic Controller Wiring Diagram**

### Wiring Connections

Follow these steps to make wiring connections:

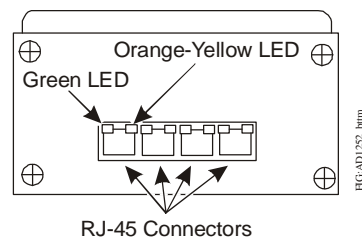
1. Connect the dedicated 24 VAC power transformer of appropriate rating to the DMPR-RA002 Electronic Controller. See Figure 12.
  - a. Connect 24 VAC hot to 24H + terminal.
  - b. Connect 24 VAC common to 24C - terminal.
  - c. Connect negative (-) terminal to earth ground.
2. Connect 4 to 20 mA velocity and temperature outputs from the electronic controller to a BAS controller. See Figure 12. Wiring from the 4 to 20 mA outputs to the BAS should be shielded, twisted pair cable of at least 22 AWG. Larger gauge wire may be required for long runs. All wiring must comply with applicable codes.

**Note:** The controller is 4 to 20 mA sourcing, **not** loop powered. See Table 6 for more information about probe locations and sensor assignment numbers.

**IMPORTANT:** Do not run the electronic controller wiring in the same conduit as AC power wiring or with wiring used to supply highly inductive loads, such as motors, contactors, and relays. Fluctuating, erratic, and inaccurate signal levels are possible when AC power wiring is present in the same conduit as the signal lines. Mount the controller and run the wiring away from variable frequency drives and broadcast antennas.

### Finishing the Installation

1. Connect a shielded CAT5e cable between the RJ45 connector on each probe (Figure 7) to an RJ45 connector on the electronic controller (Figure 13). Make sure that the metal shielded cable end is connected to the controller.



**Figure 13: DMPR-RA002 Electronic Controller, Bottom View**

2. Move the electronic controller's power switch (Figure 12) to the ON position.
3. Use the LCD Contrast Adjustment screw (Figure 12) to adjust the LCD contrast as desired:
  - Turn the screw clockwise to increase contrast.
  - Turn the screw counterclockwise to decrease contrast.
4. Use the Options menu to configure the electronic controller for your application. See [Finishing the Installation](#) for specific instructions.
5. After configuring the electronic controller, replace the cover.

## Setup and Adjustments

### Output Display Menu

Use UP and DOWN (Figure 12) to scroll through each sensor's velocity and temperature reading. Press ESC on the electronic controller to display the average velocity and temperature values.

### Options Menu

The Options menu allows the user to reset the controller to factory settings, temporarily deactivate the LCD screen, enable error indication, change units, adjust gain and offset, set the zero cutoff of the electronic controller, and adjust the output filter value. See Figure 14.

To access the Options menu, press and hold both ENTER and ESC on the electronic controller until the LCD screen clears.

To scroll through each of the menu options, press UP and DOWN on the electronic controller (Figure 12):

- RESET SETTINGS
- LCD ON/OFF
- ERROR INDICATION
- TEST SIGNAL
- UNITS
- GAIN
- OFFSET
- ZERO CUTOFF
- DISPLAY VELOCITY OUTPUT FORMULA
- SCALE VELOCITY mA OUTPUT SIGNAL
- ADJUST mA OUTPUT FILTER VALUE
- AUTO RESET
- TEMP DISPLAY

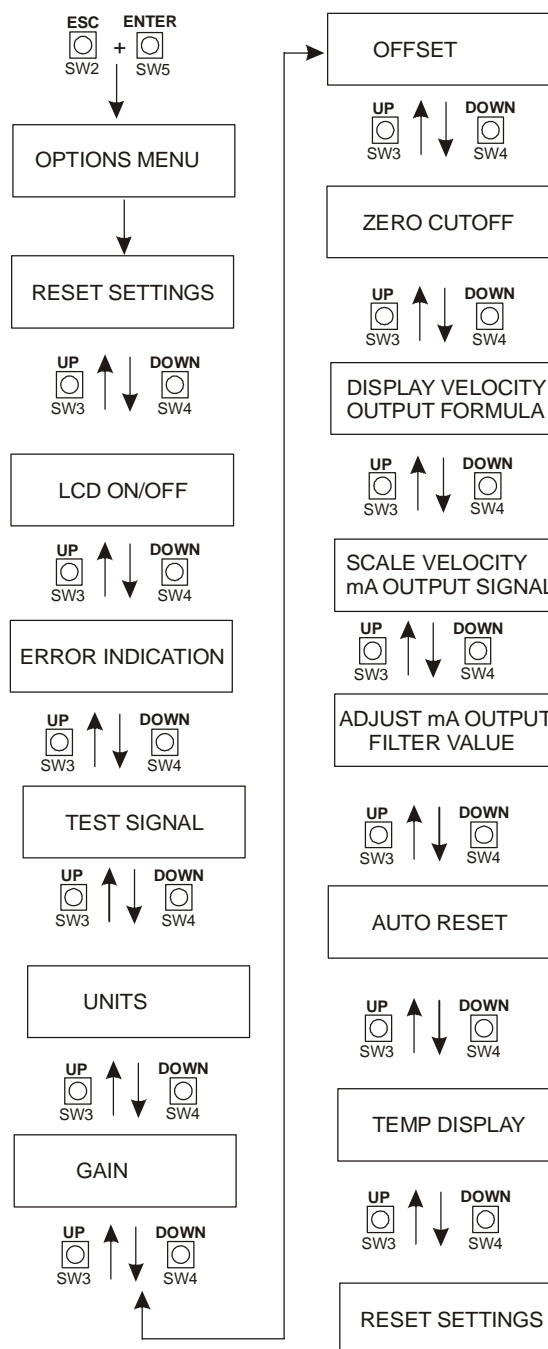


Figure 14: Options Menu

**IMPORTANT:** To accept changes to any menu item, press the ENTER button before pressing the ESC button to exit. If you are using firmware version 8.4 or higher, you return to the factory default or previous setting. If you are using a firmware version prior to 8.4, the values change to zero.

## RESET SETTINGS

This option submenu restores the electronic controller to the default factory settings. See Figure 15.

**Note:** If the controller has settings other than the default settings, you may want to make note of them before you reset the controller.

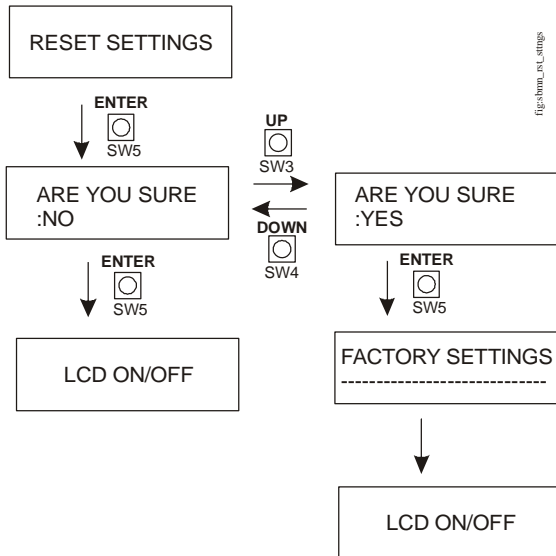


Figure 15: Reset Settings Submenu

## LCD ON/OFF

This option submenu turns the LCD screen on the electronic controller ON or OFF. See Figure 16.

**Note:** Pressing ESC, UP, DOWN, or ENTER reactivates the LCD screen.

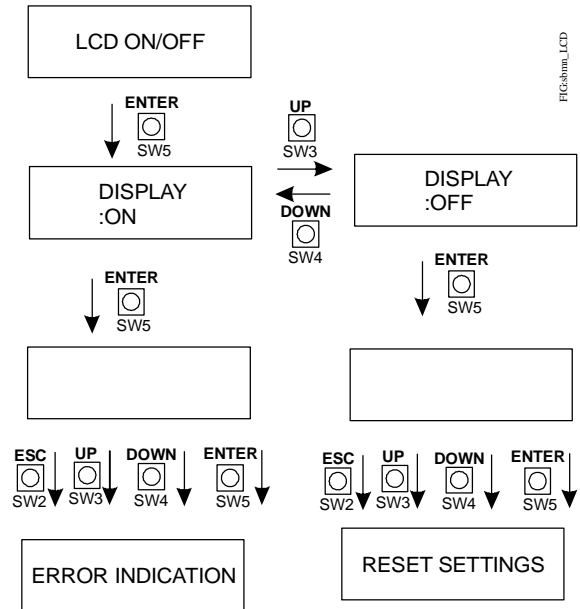


Figure 16: LCD ON/OFF Submenu

## ERROR INDICATION

This option submenu activates the error indication on the LCD screen. When an error occurs, the temperature appears as a lowercase letter f (degrees Fahrenheit). See Figure 17.

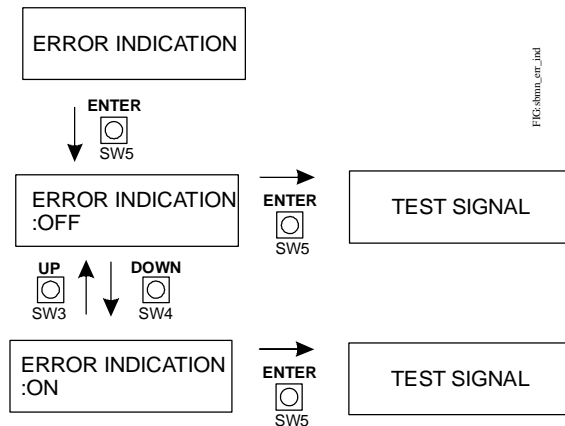


Figure 17: Error Indication Submenu

This option submenu outputs a fixed 4, 10, and 20 mA value to each output. This test checks the output signal from the DMPR-RA002 Electronic Controller for velocity and temperature. Make sure that a user is present at the BAS computer to verify that the appropriate test signal from the DMPR-RA002 Electronic Controller is reaching the BAS computer.

**Note:** Connect the BAS wiring and verify the test signal at the BAS and automation scaling have been correctly configured. If the test signal at the BAS does not produce expected results, disconnect the BAS wiring and verify the test signal at the controller with a multimeter. If the test signal at the controller is not correct, contact the factory for additional calibration procedure instructions.

The flowchart illustrates the sequence of screens and user inputs for the TEST SIGNAL menu. It begins with the 'TEST SIGNAL' screen, which leads to the 'SET TEST SIGNAL :NO' screen via the 'ENTER' key (SW5). From 'SET TEST SIGNAL :NO', the user can navigate to 'SET TEST SIGNAL :YES' using the 'UP' key (SW3) or return to 'TEST SIGNAL' using the 'DOWN' key (SW4). The 'SET TEST SIGNAL :YES' screen leads to the '4mA TEST SIGNAL HOLD ESC TO EXIT' screen via the 'ENTER' key (SW5). From '4mA TEST SIGNAL', the user can navigate to '10mA TEST SIGNAL HOLD ESC TO EXIT' using the 'UP' key (SW3) or return to '4mA TEST SIGNAL' using the 'DOWN' key (SW4). The '10mA TEST SIGNAL' screen leads to the '20mA TEST SIGNAL HOLD ESC TO EXIT' screen via the 'ENTER' key (SW5). Finally, each of the three test signal screens ('4mA', '10mA', and '20mA') leads to the 'UNITS' screen via the 'ENTER' key (SW5).

```

graph TD
    TS[TEST SIGNAL] -- ENTER SW5 --> STSN[SET TEST SIGNAL :NO]
    STSN -- UP SW3 --> STSY[SET TEST SIGNAL :YES]
    STSN -- DOWN SW4 --> TS
    STSY -- ENTER SW5 --> T4[4mA TEST SIGNAL HOLD ESC TO EXIT]
    T4 -- UP SW3 --> T10[10mA TEST SIGNAL HOLD ESC TO EXIT]
    T4 -- DOWN SW4 --> T4
    T10 -- ENTER SW5 --> T20[20mA TEST SIGNAL HOLD ESC TO EXIT]
    T20 -- ENTER SW5 --> UNITS1[UNITS]
    T4 -- ENTER SW5 --> UNITS2[UNITS]
    T10 -- ENTER SW5 --> UNITS3[UNITS]
  
```

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## UNITS

This option submenu sets the displayed velocity and temperature unit. To access this submenu, press ENTER. The LCD screen states UNIT SYSTEM. Use UP and DOWN to select SI or IU unit systems.

- Select SI for FPM or CFM with temperature in degrees Fahrenheit.

- Select UI for M/S or L/S with temperature in degrees Celsius.

Use UP and DOWN to scroll through the available units. Press ENTER to select the desired unit.

If CFM or L/S is selected, the area is requested on the LCD screen. Use UP and DOWN to adjust the area calculation. Press ENTER to accept the area value. See Figure 19.

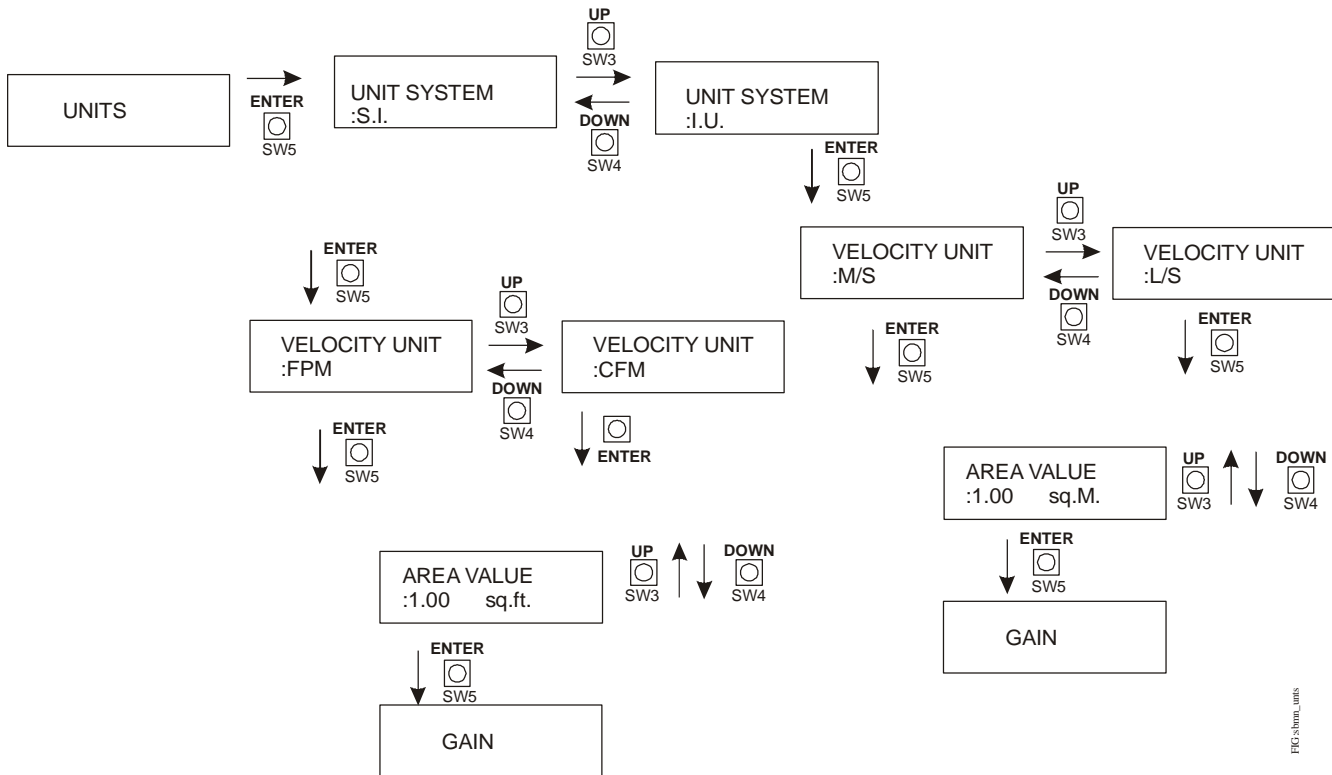


Figure 19: Units Submenu

FIG 19mm\_units

## GAIN

This option adjusts the gain for the average velocity calculation. Press ENTER from the Options menu to access the GAIN adjustment submenu. Use UP and DOWN to adjust the desired gain value (Range = 0 to 99). Press ENTER to accept the value. See Figure 20.

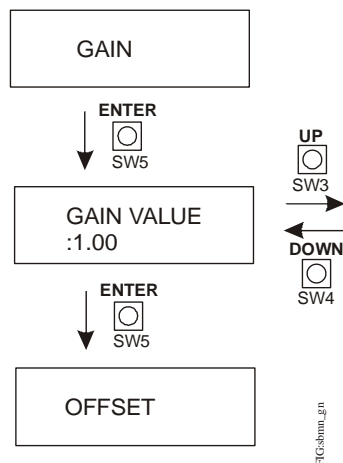


Figure 20: Gain Submenu

## OFFSET

This option adjusts the offset for the average velocity calculation. Press ENTER from the Options menu to access the OFFSET adjustment submenu. Use UP and DOWN to adjust the offset value (Range = 0 to 1000). Press ENTER to accept the value. See Figure 21.

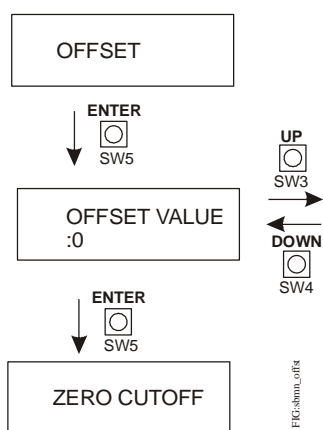


Figure 21: Offset Submenu

## Field Calibrating GAIN and OFFSET

### One-Point Field Compensation Using Gain Adjustment

Use this method for calibrating a device that is being controlled to a single flow rate setpoint (for example, minimum outside air flow or intended operating setpoint).

- Control the airflow to one fixed value during the calibration process.
- Set the fan speed, dampers, and VAV boxes (if possible) on the unit to a fixed speed or position when measurements are taken and record all setting.

Complete the following steps to calculate the gain for the controller.

1. Set the in controller values for gain equals 1.0 and the offset equals ZERO, and set to display CFM (L/S) or FPM (M/S), depending on what is measured. (FACTORY RESET sets Gain = 1, Offset = 0, and velocity units to F/M.) If the units displayed are for volume (CFM and L/S), make sure that the area calculation is correct for each respective area where measurements are being taken.
2. Record the flow rate displayed on the controller during the time that reference measurements are taken.
3. Record reference measurements of the flow rate. Make sure that the units (F/M, CFM, M/S, and L/S) are the same for all measurements. If the units are for volume (CFM and L/S), make sure that the area calculated is correct for each area where measurements are being taken.
4. Calculate the gain by dividing the value recorded in Step 3 by the value recorded in Step 2.
5. Set the gain in the controller to the value calculated in Step 4 above.
6. Make sure that the offset remains at 0.0.

### Two-Point Field Compensation Using Gain and Offset Adjustments

Use this method for calibrating a device that is controlling a flow across a range (for example, volume matching or high and low operating setpoints).

Select two airflow rates within the expected operating range. Do not select extremes that are outside expected normal operating conditions. For example, if winter design conditions are approximately 65% and summer design conditions are 95%, those two points would be calibration points.

Lock the fan speed, dampers, and set VAV boxes to known positions while measurements are taken and document all settings for future reference.

Complete the following steps to calculate the gain and offset for the controller. **Measurements must be made in feet per minute (FPM).** The display can be changed to (M/S) or CFM (L/S) when calibration is complete and will not change mA output values. Only displayed values change unless scaled output value is adjusted. This does not change gain and offset calibration settings.

1. Set the in controller values for gain equals 1.0 and offset equals ZERO, and set the controller to display FPM. (FACTORY RESET sets Gain = 1, Offset = 0, and velocity units to FPM.) If the units displayed need to be for volume (CFM and L/S), you can change the units that are displayed when calibration is complete and make sure that the area calculation is correct for the area where measurements are being taken.
2. Set the fan to a lower flow rate. (See the introduction above to identify two expected flow conditions.)
3. Record the FPM displayed on the controller during the time that reference measurements are being taken and time-average for improved calibration results.
4. Record reference measurement FPM. Make sure the units are FPM for all measurements.
5. Set the fan to a higher flow rate. (See the introduction above to identify two expected flow conditions.)
6. Record the FPM displayed on the controller during the time that reference measurements are being taken.
7. Record the reference FPM. Make sure that the units are FPM for all measurements. If the units are for volume (CFM and L/S), make sure that the area calculated is correct for each area where measurements are being taken.
8. Calculate the new gain for the controller.

$$\text{Gain} = \frac{(A - B)}{(C - D)}$$

A = Value calculated in Step 7.  
 B = Value calculated in Step 4.  
 C = Value calculated in Step 6.  
 D = Value calculated in Step 3.

FIG. gain

**Figure 22: Gain Value**

9. Calculate the offset for the controller.

$$\text{Offset} = (B - (E \times D))$$

B = Value calculated in Step 4.  
 D = Value calculated in Step 3.  
 E = Value calculated in Step 8.

FIG. offset

**Figure 23: Offset Value**

10. Enter the gain and the offset for the controller.

**Note:** If the offset is greater than the zero cutoff, adjust the zero cutoff to a value greater than the offset value to display zero during no flow conditions. The Controller displays negative offset values when off but will not output a negative voltage. If the units displayed need to be for M/S or for volume (CFM and L/S), you can change the units that are displayed when calibration is complete, and make sure that the area calculation is correct for the area where measurements are being taken.

### ZERO CUTOFF

**IMPORTANT:** For firmware versions earlier than version 8.5, use this function only when there is a known velocity to the probe. If you use this function when the probe sensors are measuring any airflow, the system uses that airflow value as the zero airflow velocity reference point and provides a zero output (4 mA).

This option submenu sets the zero velocity reference point. Ensure that there is no airflow to the probe sensors before accessing this submenu to set the zero velocity reference point.

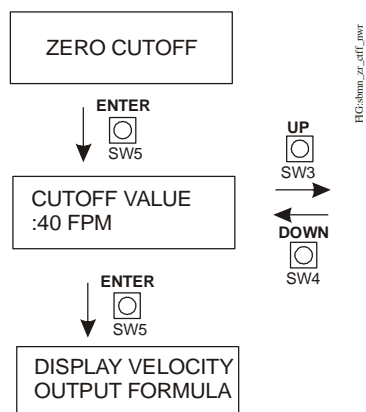
For firmware versions earlier than 8.5, the LCD screen displays ARE YOU SURE. Use UP and DOWN to scroll YES or NO. Press ENTER to accept the value.

Starting with firmware level 8.5, set the zero cutoff value by pressing the UP (increase) or DOWN (decrease) arrows.

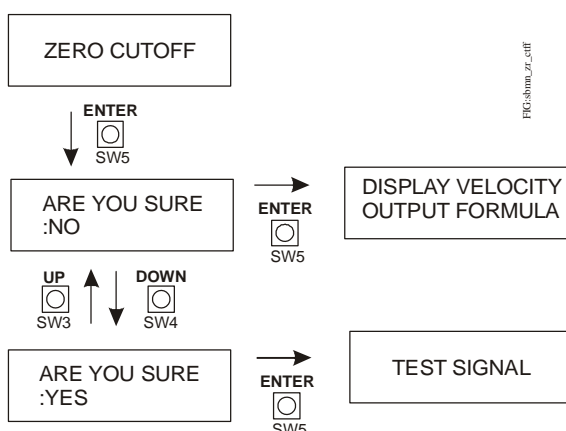
The calculated velocity indicates zero when it reaches the zero cutoff value.

**Note:** The factory default is 40 FPM.





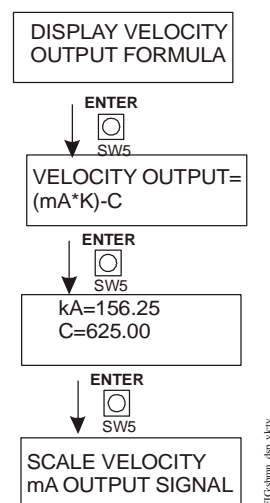
**Figure 24: Zero Cutoff Submenu, Versions 8.5 and later**



**Figure 25: Zero Cutoff Submenu, Versions Prior to 8.5**

## Display Velocity Output Formula

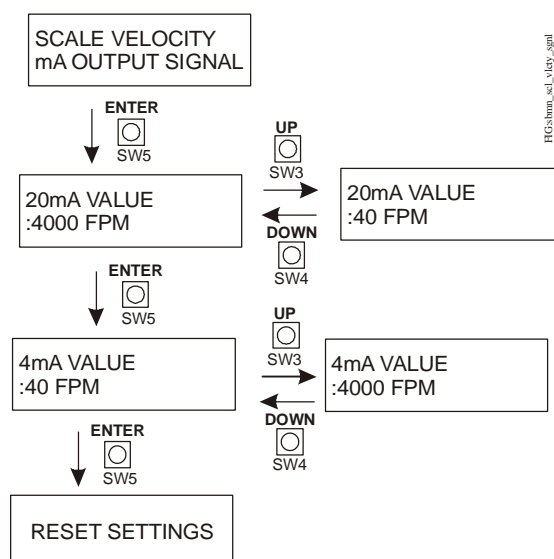
This option submenu displays the velocity output formula and the values of components of the formula. Use these components, along with the signal strength, to calculate the velocity output. See Figure 26.



**Figure 26: Display Velocity Output Formula Submenu**

## Scale Velocity mA Output Signal

This option submenu allows the user to improve the resolution of the output signals by changing the start and end points. The factory setting is 0 to 4,000 FPM. If the maximum system flow is 2,000 FPM, you can set the output so that 20 mA equals 2,000 FPM instead of 4,000 FPM. See Figure 27.



**Figure 27: Scale Velocity mA Output Signal Submenu with Velocity Unit: FPM Selected**

## Adjust mA Output Filter Value

This option submenu allows the user to adjust the mA filter value used to speed up or slow down the mA output rate. Use the default value of 0.35 for the majority of applications. Use an mA filter value of 0.5 when an instantaneous output signal is required for applications such as fan tracking. Decrease the value if the data is erratic.

The mA output filter responds to the air flow calculation and is applied to the 4 to 20 mA output signal only. As the value decreases, filtering increases. See Figure 28.

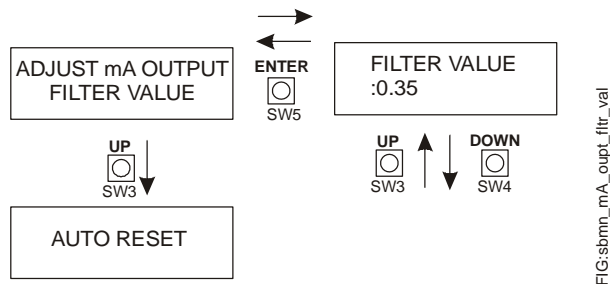


Figure 28: Adjust mA Output Filter Value Submenu

## Auto Reset

This option submenu allows the user to enable or disable the automatic reset function. See Figure 29.

Auto Reset is a software timer that triggers a system reset only if the main program encounters a fault condition or the software code execution encounters an endless loop. Auto Reset brings the system back from an unresponsive state into normal operation and eliminates the need for constant user monitoring of the software.

The default setting is ON. Set Auto Reset to OFF for troubleshooting. If normal operation is interrupted when Auto Reset is OFF, manually cycle power to the control to restore normal operation.

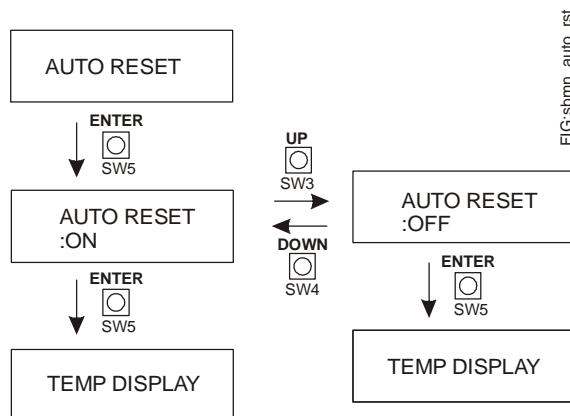


Figure 29: Auto Reset Submenu

## Temp Display

This option submenu allows the user to disable the temperature display. The default setting is ON. When the temperature display is OFF, the display only shows the air movement measurement. See Figure 30.

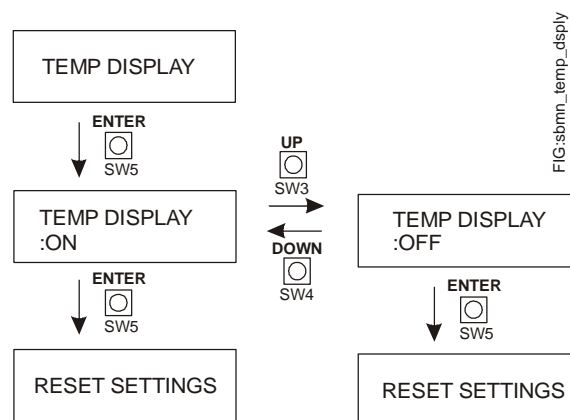


Figure 30: Temp Display Submenu

## Troubleshooting

During normal operation, two LEDs illuminate at the RJ45 connector on the DMPR-RA002 Electronic Controller. The left (green) LED indicates that the electronic controller has properly identified the probe. The right (amber) LED illuminates each time the electronic controller communicates with the connected thermal dispersion probe. See Figure 12.

If the right (amber) LED does not blink, reset the electronic controller by cycling the power switch OFF and then ON. See Figure 12.

If an error occurs with one of the sensors, an error indication displays on the LCD screen. The temperature appears as a lowercase letter f (degrees Fahrenheit).

Ensure that the product was installed correctly by using the following guidelines:

- Use the shortest possible distance between the control transmitter and the router or probes. See Table 4 for the maximum distances between the control transmitter and the router or the AD-1252 probes.
- For horizontal mount applications, ensure that the acrylonitrile butadiene styrene (ABS) sensor shrouds are on the bottom of the probe.
- Install duct-mounted products at locations as detailed in the installation instructions. All installations, especially in rain hoods and mixing boxes, must have consistent, representative air flow across all of the probes.
- If the airflow measuring device is located within 10 feet (3 m) of the intake louver or hood and the airflow rate is less than 200 FPM, consider relocating the airflow measuring device, resizing the opening, or adding a separate damper for the minimum outside air intake. Transient wind gusts can result in airflow indications of 100 FPM or more on outside air intakes even when the intake damper is closed.

- Ensure that power and data cables are a sufficient distance from high voltage power sources and motors to prevent interference. Conduit may be required.
- Ensure that there are no kinks, cuts, or crimps in the shielded CAT5e cables.
- Ensure there is no visible damage to the electronic controller.
- Ensure that the thermistors are clean, dry, and free from debris.

The output of individual sensors is viewable on the LCD screen. When the unit is powered on and displays velocity and temperature, press the UP or DOWN button to scroll through each sensor output.

See Table 6 for information about probe locations and sensor assignment numbers.

**Table 6: Probe Locations and Sensor Assignment Numbers**

Probe Location	Sensor Assignment Numbers
Left Input	1 through 4
Left Center Input	5 through 8
Right Center Input	9 through 12
Right Input	13 through 16

Use Table 7 to troubleshoot problems with the AD-1252 System.

**Table 7: AD-1252 System Troubleshooting (Part 1 of 3)**

Problem	Possible Cause	Corrective Action
The LCD screen displays the units without a velocity or temperature value or shows ID# # #.	The transmitter is in calibration mode.	<ol style="list-style-type: none"> <li>1. Press ESC and ENTER at the same time to enter the OPTIONS MENU.</li> <li>2. Press UP and DOWN at the same time to enter the FACTORY MENU. PROBE CALIBRATE appears.</li> <li>3. Press ENTER to access the CALIBRATION MODE submenu.</li> <li>4. Use UP and DOWN to set the CALIBRATION MODE to OFF.</li> <li>5. Press ENTER to return to the FACTORY MENU.</li> <li>6. Press ESC to return to normal operation.</li> </ol>

**Table 7: AD-1252 System Troubleshooting (Part 2 of 3)**

<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
<b>The LCD screen does not display below certain values.</b>	The ZERO CUTOFF value is set incorrectly.	<ol style="list-style-type: none"> <li>1. Record all settings for gain, square feet, offset, 20 mA and 4 mA values.</li> <li>2. Reset the electronic controller to factory settings.</li> <li>3. Ensure that the fan is off prior to setting ZERO CUTOFF.</li> <li>4. Reprogram other settings.</li> </ol>
<b>The LCD screen indicates ERROR! CHECK CAT5 CABLE AND RESET.</b>	The CAT5e connector cables are not terminated properly or the combined cable length is greater than 100 feet.	<p>Check the CAT5e communications cable termination.</p> <p>Connect only one probe at a time and cycle power between cable tests.</p> <p>Use the shortest practical cable length. The CAT5e cable must be a shielded, plenum rated, straight-through patch cable with simple pairing.</p> <p><b>Do not</b> use crossover cables or standard CAT5 pairing. See Table 5.</p>
<b>The LCD screen stops or freezes during startup. LCD screen shows -----</b>	The multiplex circuit is not programmed.	<p>Cycle power to the electronic controller.</p> <p>Check the amber communication lights on the bottom of the transmitter.</p> <p>If more than one amber LED flashes at the same time, the multiplexer circuit is not properly programmed. If this problem occurs, contact the factory.</p>
<b>The mA output has locked on a single value.</b>	The mA OUTPUT CALIBRATION function did not exit properly. 4 mA and 20 mA are set to 0. 4 mA and 20 mA have less than a 500 FPM difference. ESCAPE enters a zero value.	<ol style="list-style-type: none"> <li>1. Press ESC and ENTER at the same time to enter the OPTIONS MENU.</li> <li>2. Press UP and DOWN at the same time to enter the FACTORY MENU. PROBE CALIBRATE appears.</li> <li>3. Press UP or DOWN to scroll to the desired mA CALIBRATION submenu.</li> <li>4. Press ENTER to access the desired submenu.</li> <li>5. Press ENTER to accept each value and then press ESC.</li> </ol>
<b>The mA output appears to be moving very slowly. The output is not keeping up with the airflow.</b>	The mA filter value is set too low. The factory default is 0.35 mA.	Enter the OPTIONS MENU and increase the mA filter value (to 0.25, as an example). A value of 1.0 indicates no filtering.
<b>The mA output is constantly spiking high, then low.</b>	The mA filter value is set too high (greater than 1.0 mA).	Enter the OPTIONS MENU and decrease the mA filter value (to 0.25 mA, as an example). The factory default value is 0.35 mA.

**Table 7: AD-1252 System Troubleshooting (Part 3 of 3)**

<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
<b>The LCD screen indicates a large negative FPM and then cycles to a large positive FPM value (applies to older metal boxes only).</b>	Multiple probes are trying to communicate with the electronic controller at the same time. The probes are not communicating with the transmitter.	Cycle power to the control transmitter. Check the flashing lights. Only one yellow light should flash at a time and the lights must flash in sequence. If the transmitter box is metal, remove the bottom end plate and wrap electrical tape across the bottom. Replace the end plate so that it is insulated from the RJ45 connector.
	The RJ45 connector is shorting to the bottom cover.	1. Remove the bottom cover of the electronic controller. 2. Apply electrical tape around the RJ45 connector.
<b>The LCD screen goes blank or the electronic controller communicates with one probe and ignores the others.</b>	The transformer VA rating is too low.	Replace the existing transformer with a transformer with the proper VA rating. We recommend a dedicated transformer for each air measurement station. <ul style="list-style-type: none"> <li>• 4 probes with 4 sensors each - 50 VA minimum</li> <li>• 3 probes with 4 sensors each - 38 VA minimum</li> <li>• 2 probes with 4 sensors each - 26 VA minimum</li> <li>• 1 probe with 4 sensors - 14 VA minimum</li> </ul> Maximum VA is seen when there is no flow or a very low flow. As flow increases, VA decreases.
<b>The output data varies and is not consistent.</b>	The dampers are not sequenced properly.	Correct the sequence of operation.
<b>The transmitter locks up, and resetting the transmitter starts the operation.</b>	RF interference from local high output transmitters (ambulance/police) is at fault.	Shorten the CAT5e communications cable and if it is not shielded, use shielded cable or place in a conduit. Minimize any cable loops or coils.
<b>Erratic readings appear on the LCD.</b>	Interference is at fault.	Ground the shield of the RJ45 probe connectors at the bottom of the control transmitter to the (-) 4 to 20 mA temperature terminal at the top of the control transmitter box. This solution applies to units built prior to February 2011. In extreme cases, it may be necessary to mount the control transmitter in a grounded steel enclosure.
<b>Readings displayed are incorrect; the mA output does not match the LCD display.</b>	Firmware version 8.2 does not display values greater than 32,000 CFM.	Change the display to FPM or update the firmware to version 8.3 or greater.
<b>Degrees Fahrenheit is in lowercase letters (degrees fahrenheit) on the LCD screen.</b>	A sensor error is at fault.	Cycle through sensors to determine which sensor is not communicating.
<b>Every green LED light is on and only one or two probes are connected. The LCD screen operates with no probes connected. When probes are connected, the LCD screen is blank.</b>	Bad capacitors (C1 and C2) are at fault.	Return the transmitter for repair.

## Factory Menu

The factory menu is used to calibrate the sensors. Do not adjust the sensors by using this menu, unless you are directed to do so by a factory representative or Johnson Controls field technical support.

## Repair Information

If the AD-1252 Thermal Dispersion Probe Airflow Measuring System fails to operate within its specifications, replace the unit. For a replacement AD-1252 System, contact the nearest Johnson Controls representative.

## Maintenance

Twice a year, scroll through the velocity and temperature values using UP and DOWN (Figure 12). Remove the thermal dispersion probes and clean the sensor nodes if readings vary from normal readings.

**Note:** SuprClean™ Defluxer by MicroCare (MCC-SPR) can be used to clean the sensor nodes. You can find the product on the All-Spec Industries Web site located here: <http://www.all-spec.com/products/MCCSPR.html>.

Annually inspect the thermal dispersion probe in unfiltered outside air, return air, or exhaust air applications to ensure that the thermal dispersion probe is free of excessive buildup of lint, dust, or other airborne particulates.

To remove the electronic probes:

1. When the sensors are cool, remove the cover from the DMPR-RA002 Electronic Controller and turn the power switch off.

2. Unplug the shielded CAT5e cable from the RJ45 connector on the end of the thermal dispersion probe.
3. Remove the mounting screws from the mounting plates on both sides of the thermal dispersion probe. On the side with the RJ45 connector, remove the four Phillips screws securing the mounting plate.
4. Remove the lock nut and the washer from the mounting stud.
5. Slide the thermal dispersion probe out of the duct from the side with the RJ45 connector.
6. Wipe down the thermal dispersion probe with a damp cloth. Ensure that the sensor is on the bottom side of the probe during cleaning so any moisture encountered in the cleaning process will drain out of the probe and sensor.
7. Remove lint, dust, and other matter from the opening of the sensor shroud by blowing through the hole or using a soft bristle brush. Do not use high pressure air. Care must be taken not to bend the thermistors while cleaning. The leads of the thermistors are fragile and can break if bent.
8. Replace the thermal dispersion probe assembly in the duct by reversing Step 3 through Step 7.
9. When the sensors are dry, power on the unit.

## Replacement Parts

See Table 8 for AD-1252 Thermal Dispersion Probe Airflow Measuring System replacement part information.

**Table 8: AD-1252 Replacement Parts**

Code Number	Description
DMPR-KA001	Aluminum mounting brackets for mounting to an inlet of a damper
DMPR-KA002	Stainless steel mounting brackets for mounting to an inlet of a damper
DMPR-RA002	Controller
DMPR-RA021	10-foot shielded CAT5 cable
DMPR-RA022	20-foot shielded CAT5 cable
DMPR-RA023	30-foot shielded CAT5 cable
DMPR-RA024	40-foot shielded CAT5 cable
DMPR-RA025	50-foot shielded CAT5 cable

## Technical Specifications

### AD-1252 Thermal Dispersion Probe Airflow Measuring System

<b>Probe</b>	Airfoil shaped 2 x 3/4 in. 6063T5 aluminum
<b>Thermistor</b>	Bead-in-glass type
<b>Size Range</b>	8 x 8 to 120 x 120 in.
<b>Brackets</b>	0.080 Aluminum
<b>Installed Airflow Accuracy</b>	±2% of reading
<b>Repeatability</b>	±0.25%
<b>Measurement Units</b>	Inch-Pound (I.P.) or International System (S.I.)
<b>Sensor Distribution</b>	Equal Area
<b>Calibrated Range</b>	40 to 4,000 FPM (12 to 1,219 MPM)
<b>Temperature Sensor Accuracy</b>	±0.10° F
<b>Sensor Temperature Range</b>	-25 to 140°F (-32 to 60°C)
<b>Humidity Range</b>	0 to 99% RH, noncondensing
<b>Maximum Number Sensors</b>	16
<b>Power Requirement</b>	Dedicated 24 VAC transformer of appropriate VA rating is required.
<b>Power Consumption</b>	4 probes with 4 sensors: 65 VA; 3 probes with 4 sensors: 48 VA; 2 probes with 4 sensors: 35 VA; 1 probe with 4 sensors: 17 VA
<b>Transmitter Chassis</b>	0.080 Aluminum
<b>Output Signals</b>	4 to 20 mA standard, 2 to 10 VDC requires 499 ohm resistor across output terminals.
<b>Output Signal Adjustments</b>	Field adjustable offset/gain
<b>Display</b>	16x2 character LCD (airflow, temperature and diagnostics)
<b>Velocity Requirements</b>	Minimum 40 FPM (12 MPM) Maximum 4,000 FPM (1,219 MPM)
<b>Pressure Drop</b>	Four 48 in. (122 cm) long probes in 48 x 48 in. (122 x 122 cm) duct: 0.1 in. w.g.
<b>Approximate Weight</b>	Controller: 2.9 lb (1.32 kg) Sensor: 1 lb (0.45 kg)

*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.*



#### Building Efficiency

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