RUSKIN

Air Quality Solutions

Installation & Maintenance Manual

Remote **Ancillary** **Primary**

Model: TDP05K

Advanced Thermal Dispersion Airflow & Temperature Measuring Probe

II-TDP05K-917/Replaces II-TDP05K-617

TDP05K Advanced Thermal Dispersion Airflow & Temperature Measuring System

Installation Instructions

Refer to the Ruskin.com website for the most up-to-date version of this document.

APPLICATIONS

The TDP05K 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 can be installed in retrofit applications or specified on new construction projects.

This product may be used in rectangular, oval, or round applications when installed in accordance with this installation manual. This product is designed to be installed in almost any location that airflow needs to be measured. Measurements may be improved by following the placement guidelines in this document. When adequate space is not available, more probes and/or sensors are recommended.

Installation of the TDP05K Airflow Measuring System placed directly downstream of heating coils, cooling coils, or humidifiers is not recommended.

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: For ease of installation, a composite four-wire cable similar to Connect-Air part number W24182P-2306BL with communications and power in one cable is recommended. Alternatively, use a twisted shielded pair 24 AWG low capacitance wire communications cable and an 18 AWG power cable, which should be run in a separate conduit.

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.

Unpacking the TDP05K Advanced Thermal Dispersion Probe Airflow Measuring System

Remove the thermal dispersion probes from the shipping containers and inspect the devices for damage before installation. The shipping box may contain more than one probe. The remote display may also be in same box if it is ordered with air measurement station.

Note: Care should be taken to keep the primary and ancillary probes for each system together if there are multiple systems of the same size. Communication issues may occur if ancillary probes are switched between systems or there are duplicate probes with the same address on the same probe network.

Installing the Thermal Dispersion Probes

The sensor density is based on extensive lab testing to optimize the accuracy of the TDP05K Airflow Measuring System. When installing the thermal dispersion probes, use the *Rectangular Duct Mounting, Round Duct Mounting,* and *Oval Duct Mounting* sections to determine the proper spacing between each probe within the opening. Contact your local Ruskin® representative if you have questions regarding a particular application.

WARNING: Risk of Electric Shock

Disconnect power supply before making electrical connections. Contact with components carrying hazardous voltage can cause electrical 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.

Software Configuration Information for Commissioning:

After the installation described in this document is complete, please refer to the TDP05K Technical Bulletin for information regarding configuration options.

The Technical Bulletin document can be viewed or downloaded at this location:
http://www.ruskin.com/catalog/servefile/id/6767.
The Technical Bulletin document can also be accessed via this QR Code:

Mounting

Rectangular Duct Mounting

Figure 1: Rectangular Duct Mounting—One Probe Configuration

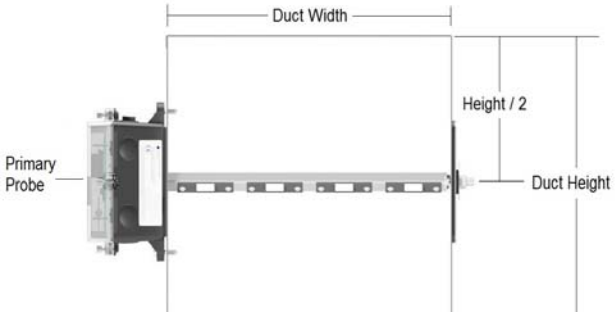


Figure 2: Rectangular Duct Mounting—Two Probe Configuration

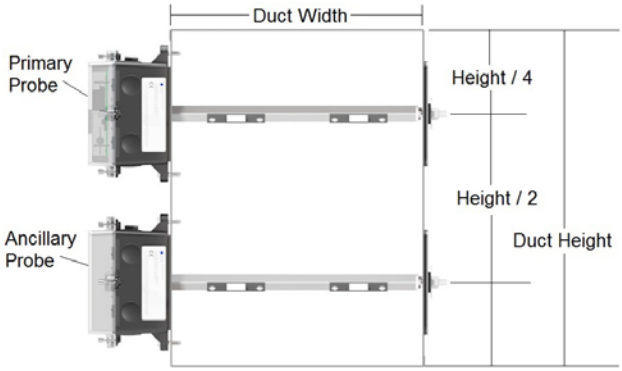
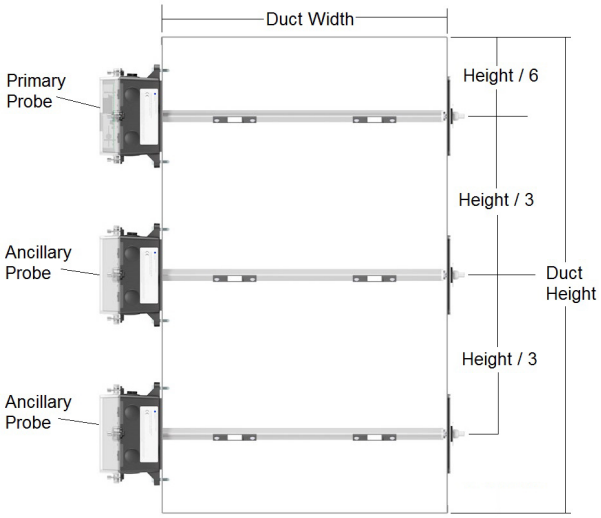
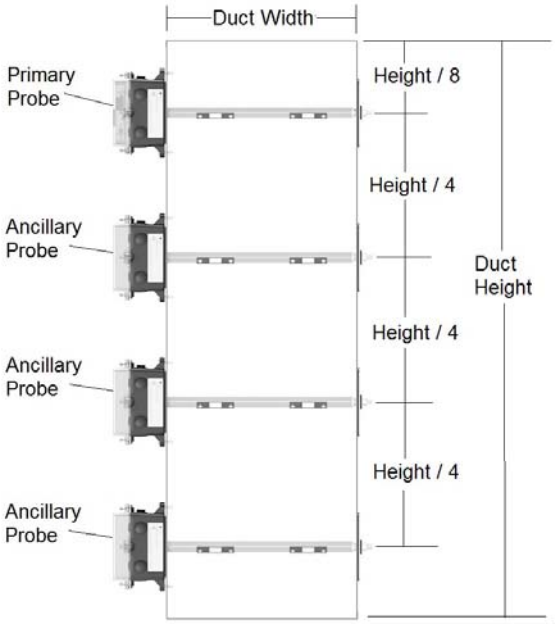


Figure 3: Rectangular Duct Mounting—Three Probe Configurations



Note: The primary probe should be installed in the most accessible location for the application.

Figure 4: Rectangular Duct Mounting—Four Probe Configuration



Wired Remote Primary

If the TDP05K Airflow Measuring Station was ordered with a wired remote primary as the display option, all the probes installed in the duct are ancillary probes and the wired remote primary can be installed up to 500 feet (152 meters) from the probes. All terminations of the probe network are the same as shown in this document.

Remote Display

If the TDP05K Airflow Measuring Station can be ordered with a remote display, the remote display duplicates the functions of the primary. The primary is always the interface point with the building automation system. The remote display can be installed up to 500 feet (152 meters) when wired, and up to 200 feet (61 meters) when configured for wireless operation. The remote display can be wired/configured as another ancillary device on the probe network.

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

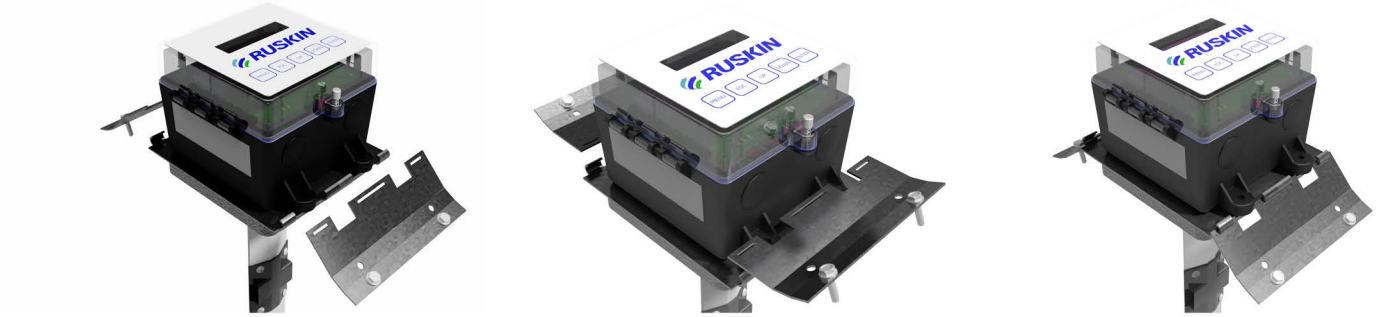
Duct Height "B"	Rectangular Duct Width "A" = Probe Length																			
	8" (203)	12" (305)	14" (356)	16" (406)	18" (457)	20" (508)	22" (559)	24" (610)	30" (762)	36" (914)	42" (1067)	48" (1219)	54" (1372)	60" (1524)	66" (1676)	72" (1829)	84" (2134)	96" (2438)	108" (2743)	120" (3048)
8" (203)	1/2	1/2	1/4	1/4	1/4	1/4	1/4	1/4	1/6	1/6	1/6	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
12" (305)	1/2	1/2	1/4	1/4	1/4	1/4	1/4	1/4	1/6	1/6	1/6	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
14" (356)	1/2	1/4	1/4	1/4	1/4	1/4	1/6	1/6	1/6	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
16" (406)	2/2	2/2	2/2	2/2	2/2	2/3	2/3	2/3	1/6	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
18" (457)	2/2	2/2	2/2	2/2	2/3	2/3	2/3	2/3	1/6	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
20" (508)	2/2	2/2	2/2	2/3	2/3	2/3	2/3	2/3	2/4	1/8	1/8	1/8	1/8	2/6	2/6	2/6	2/6	2/7	2/8	2/8
22" (559)	2/2	2/2	3/2	2/3	2/3	2/3	2/3	2/3	2/4	1/8	1/8	1/8	2/6	2/6	2/6	2/6	2/7	2/8	2/8	2/8
24" (610)	2/2	2/2	3/2	2/3	2/3	2/3	2/3	2/3	2/4	2/4	1/8	1/8	2/6	2/6	2/6	2/6	2/7	2/8	2/8	2/8
30" (762)	3/2	3/2	3/2	3/2	3/2	2/4	2/4	2/4	2/4	2/4	2/6	2/6	2/6	2/7	2/7	2/8	2/8	2/8	2/8	2/8
36" (914)	3/2	3/2	3/2	3/2	4/2	4/2	4/2	2/4	2/4	2/6	2/6	2/6	2/7	2/8	2/8	2/8	2/8	2/8	2/8	2/8
42" (1067)	3/2	3/2	4/2	4/2	4/2	4/2	4/2	4/2	2/6	2/6	2/7	2/7	2/8	2/8	2/8	2/8	2/8	2/8	2/8	2/8
48" (1219)	3/2	3/2	4/2	4/2	4/2	4/2	4/2	4/2	3/4	2/6	2/7	2/8	2/8	2/8	2/8	2/8	2/8	2/8	2/8	2/8
54" (1372)	4/2	4/2	4/2	4/2	4/2	4/2	3/4	3/4	3/4	2/7	2/8	2/8	2/8	2/8	2/8	4/4	2/8	2/8	2/8	2/8
60" (1524)	4/2	4/2	4/2	4/2	4/2	3/4	3/4	3/4	4/4	4/4	2/8	2/8	2/8	4/4	4/4	4/4	4/4	2/8	2/8	2/8
66" (1676)	4/2	4/2	4/2	4/2	4/3	3/4	3/4	3/4	4/4	4/4	4/4	2/8	2/8	4/4	4/4	4/4	4/4	4/4	2/8	2/8
72" (1829)	4/2	4/2	4/2	4/2	4/3	3/4	3/4	3/4	4/4	4/4	4/4	2/8	4/4	4/4	4/4	4/4	4/4	4/4	4/4	2/8
84" (2134)	4/2	4/2	4/2	4/2	4/3	3/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4
96" (2438)	4/2	4/2	4/2	4/2	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4
108" (2743)	4/2	4/2	4/2	4/2	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4
120" (3048)	4/2	4/2	4/2	4/2	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4

DETAIL A

Probe/sensor placement for rectangular applications

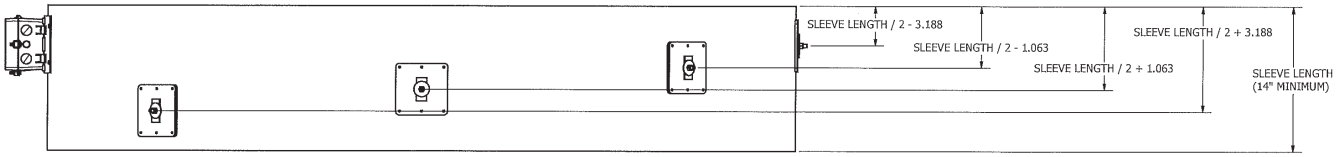
Round Duct Mounting

Attach Round Duct Hinge Plate to Round Duct Mounting Plate.



Round Duct Mounting Offset

When mounting 2 or more probes in a round duct, they must be offset from each other by at least 2 1/8 inches, in the direction of air flow to avoid mechanical interference.



Round Duct Mounting

Figure 5: Round Duct Mounting—One Probe Configuration

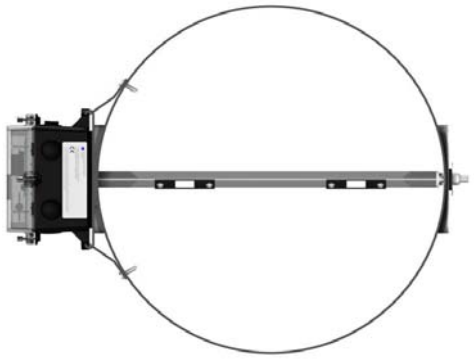
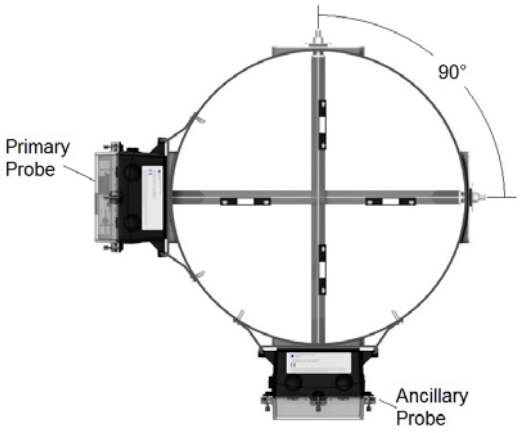


Figure 6: Round Duct Mounting—Two Probe Configuration



Note: The primary probe should be installed in the most accessible location for the application.

Figure 7: Round Duct Mounting—Three Probe Configuration

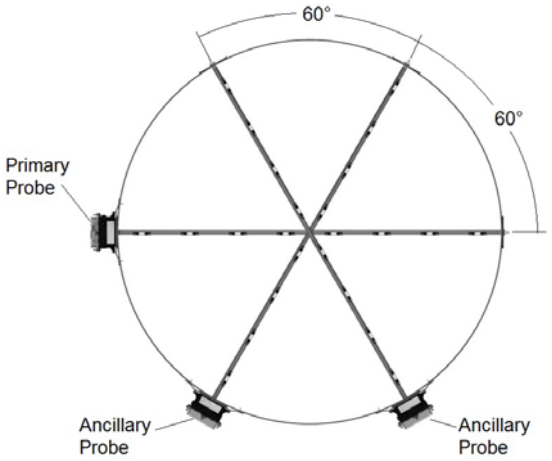


Figure 8: Round Duct Mounting—Four Probe Configuration

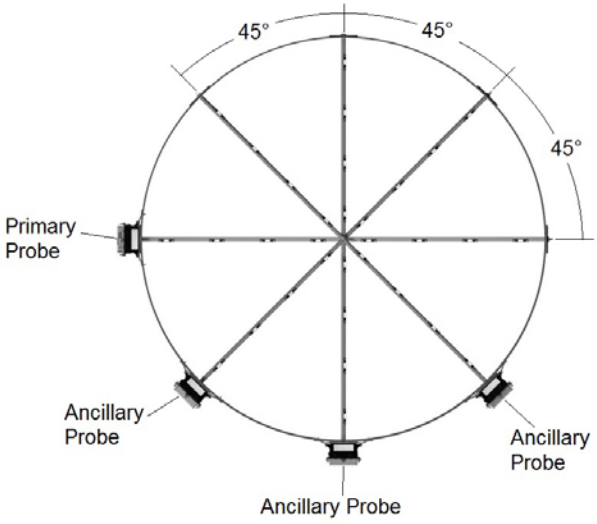


Table 2: Number of Probes / Sensors per Probe for Round Duct Applications

Duct Diameter, in. (mm)	No. of Probes / No. of Sensors per Probe	Figure Reference
8" (203)	1 / 2	Figure 5
12" (305)	1 / 2	Figure 5
14" (356)	2 / 2	Figure 6
20" (508)	2 / 4	Figure 6
42" (1067)	2 / 6	Figure 6
48" (1219)	2 / 8	Figure 6
60" (1524)	3 / 8	Figure 7
72" (1829)	4 / 8	Figure 8
120" (3048)	4 / 8	Figure 8

Oval Duct Mounting

Figure 9: Oval Duct Mounting—One Probe Configuration

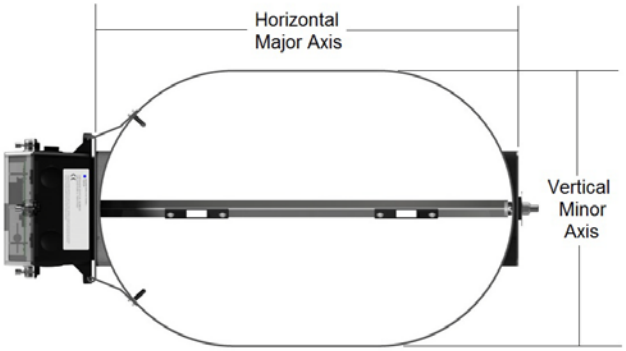


Figure 10: Oval Duct Mounting—Two Probe Configuration

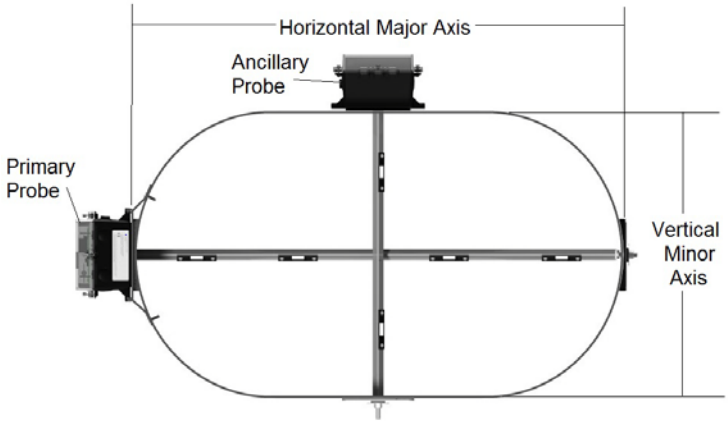
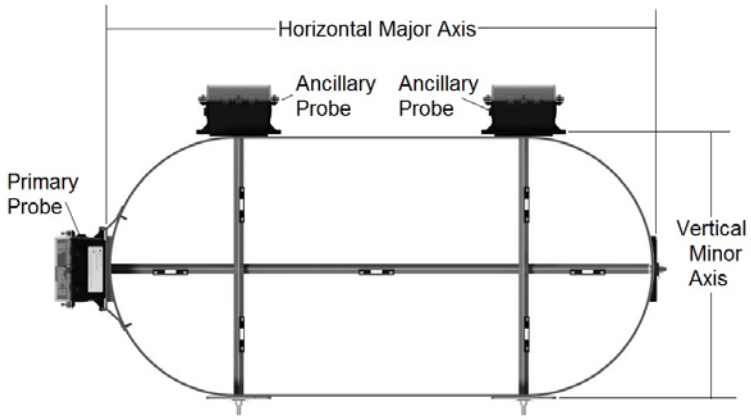


Figure 11: Oval Duct Mounting—Three Probe Configuration



Note: The primary probe is the longest probe for oval mounting. It should be installed in the most accessible location for the application.

Table 3: Number of Probes/Sensors per Probe for Oval Duct Applications—12 to 22 in. (305 to 559 mm)

Horizontal Major Axis, in. (mm)	Vertical Minor Axis, in. (mm)																					
	12 (305)			14 (356)			16 (406)			18 (457)			20 (508)			22 (559)					
14[1] (356)	H	1/1	16[1] (406)	H	1/2	18[1] (457)	H	1/2	21[1] (533)	H	1/3	25[2] (635)	H	1/2	28[2] (711)	H	1/2			
	V			V			V			V			V	1/2		V	1/2			
15[1] (381)	H	1/2	25[1] (635)	H	1/3	22[1] (559)	H	1/3	29[1] (737)	H	1/4	34[2] (864)	H	1/4	31[2] (787)	H	1/4			
	V			V			V			V			V	1/2		V	1/2			
28[1] (356)	H	1/3	34[1] (864)	H	1/4	32[1] (813)	H	1/4	37[1] (940)	H	1/5	42[3] (1,067)	H	1/3	44[3] (1,118)	H	1/3			
	V			V			V			V			V	2/2		V	2/2			
40[1] (356)	H	1/4	45[1] (1,143)	H	1/5	41[1] (1,041)	H	1/5	46[1] (1,168)	H	1/6	51[3] (1,295)	H	1/4	53[3] (1,346)	H	1/4			
	V			V			V			V			V	2/2		V	2/2			
53[1] (1,346)	H	1/5	55[1] (1,397)	H	1/6	51[1] (1,295)	H	1/6	53[1] (1,346)	H	1/7	64[3] (1,626)	H	1/5	60[3] (1,524)	H	1/5			
	V			V			V			V			V	2/2		V	2/2			
65[1] (1,651)	H	1/6	67[1] (1,702)	H	1/7	60[1] (1,524)	H	1/7	62[1] (1,575)	H	1/8	70[3] (1,778)	H	1/6	66[3] (1,676)	H	1/6			
	V			V			V			V			V	2/2		V	2/2			
75[1] (1,905)	H	1/6	74[1] (1,880)	H	1/7	69[1] (1,753)	H	1/8	71[3] (1,803)	H	1/5	80[3] (2,032)	H	1/6	72[3] (1,829)	H	1/7			
	V			V			V			V	2/2		V	2/2		V	2/2			
						79[1] (2,007)	H	1/8	78[3] (1,981)	H	1/6				79[3] (2,007)	H	1/8			
							V			V	2/2					V	2/2			
									81[3] (2,057)	H	1/6				85[3] (2,159)	H	1/5			
										V	2/2					V	2/4			

1. See Figure 9 for details.
2. See Figure 10 for details.
3. See Figure 11 for details.

Table 4: Number of Probes/Sensors per Probe for Oval Duct Applications—24 to 36 in. (610 to 914 mm)

Horizontal Major Axis, in. (mm)	Vertical Minor Axis																					
	24 (610)			26 (660)			28 (711)			30 (762)			32 (813)			34 (864)			36 (914)			
31[2] (787)	H	1/4	32[1] (813)	H	1/4	34[1] (864)	H	1/4	36[1] (914)	H	1/6	39[1] (991)	H	1/6	41[1] (1,041)	H	1/6	42[1] (1,067)	H	1/6		
	V	1/2		V	1/2		V	1/2		V	1/2		V	1/2		V	1/2		V	1/4		
43[2] (1,092)	H	1/6	42[1] (1,067)	H	1/6	44[1] (1,118)	H	1/6	46[1] (1,168)	H	1/6	45[1] (1,143)	H	1/6	43[1] (1,092)	H	1/6	49[1] (1,245)	H	1/8		
	V	1/2		V	1/2		V	1/2		V	1/4		V	1/4		V	1/4		V	1/4		
49[3] (1,245)	H	1/4	51[2] (1,295)	H	1/5	50[1] (1,270)	H	1/6	55[1] (1,397)	H	1/8	54[1] (1,372)	H	1/8	53[1] (1,346)	H	1/8	58[1] (1,473)	H	1/8		
	V	2/2		V	2/2		V	1/4		V	1/4		V	1/4		V	1/4		V	1/6		
55[3] (1,397)	H	1/5	57[2] (1,448)	H	1/6	56[2] (1,422)	H	1/7	61[2] (1,549)	H	1/8	63[2] (1,600)	H	1/5	59[1] (1,499)	H	1/8	64[1] (1,626)	H	1/8		
	V	2/2		V	2/2		V	2/2		V	2/2		V	2/4		V	1/6		V	1/8		
62[3] (1,575)	H	1/6	64[2] (1,626)	H	1/4	59[2] (1,499)	H	1/8	65[2] (1,651)	H	1/5	67[2] (1,702)	H	1/7	69[2] (1,753)	H	1/7	71[2] (1,803)	H	1/8		
	V	2/2		V	2/4		V	2/2		V	2/4		V	2/4		V	2/4		V	2/4		
68[3] (1,727)	H	1/7	67[2] (1,702)	H	1/5	69[2] (1,753)	H	1/5	71[2] (1,803)	H	1/6	70[2] (1,778)	H	1/8	72[2] (1,829)	H	1/8	74[2] (1,880)	H	1/5		
	V	2/2		V	2/4		V	2/4		V	2/4		V	2/4		V	2/4		V	2/6		
74[3] (1,880)	H	1/8	79[2] (2,007)	H	1/6	75[2] (1,905)	H	1/6	77[2] (1,956)	H	1/7	79[2] (2,007)	H	1/4	78[2] (1,981)	H	1/5	77[2] (1,956)	H	1/7		
	V	2/2		V	2/4		V	2/4		V	2/4		V	2/6		V	2/6		V	2/6		
81[3] (2,057)	H	1/5	83[2] (2,108)	H	1/6	78[2] (1,981)	H	1/7	80[2] (2,032)	H	1/4											
	V	2/4		V	2/4		V	2/4		V	2/6											
84[3] (2,134)	H	1/5				81[2] (2,057)	H	1/7														
	V	2/4					V	2/4														

1. See Figure 10 for details.
2. See Figure 11 for details.

Location Considerations

IMPORTANT: The thermal dispersion probes may be installed in the vertical or horizontal plane of the duct. In vertical mount applications, mount the control box on the top or the bottom of the opening. In horizontal mount applications, mount the probes so that the plastic sensor shrouds are on the bottom of the probe to minimize moisture accumulation in the extrusion. Intended applications are up to 99% non-condensing environments.

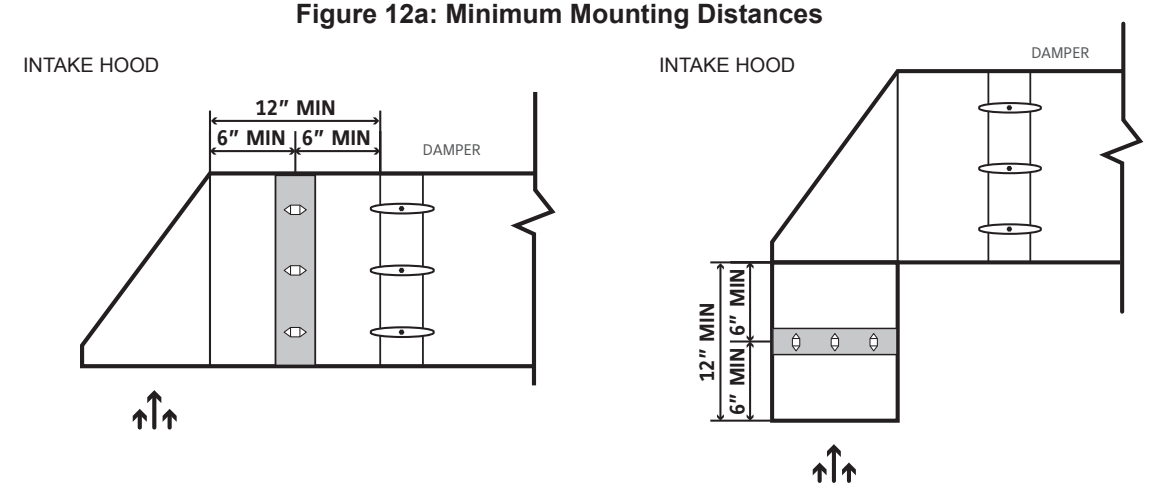
The minimum spacing between probes and filter banks is 6 inches (152 mm) in the direction of airflow. Probes should be upstream of filters. It is important that the probes or filters be positioned so the seams of the filters do not block or obstruct airflow through the sensors.

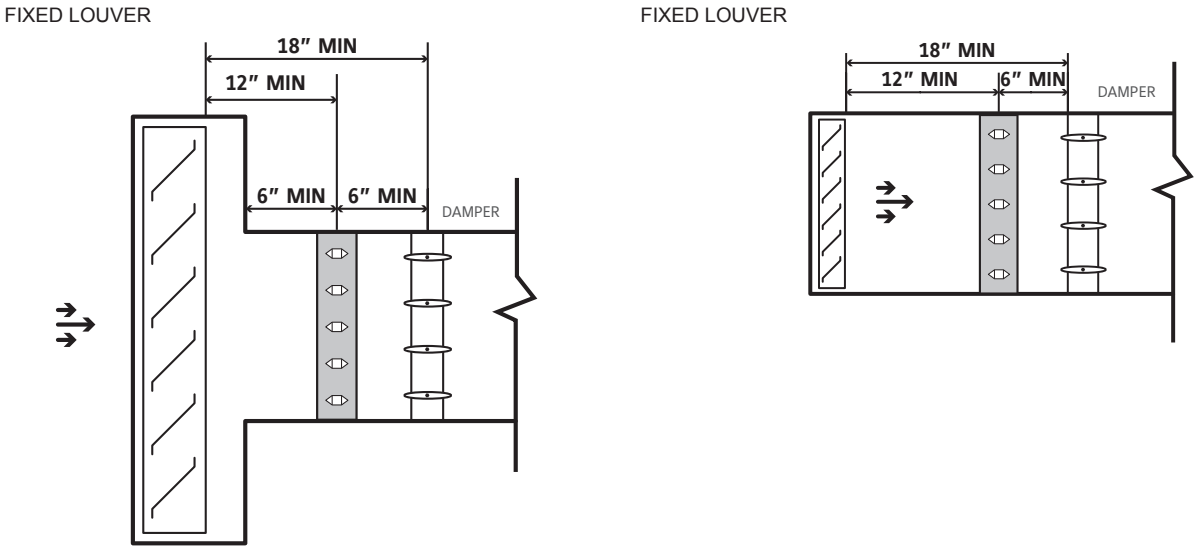
IMPORTANT: The probe enclosure cover is secured with three captive thumb screws. Take care when mounting the probes to ensure there is adequate clearance to open the cover and make electrical connections.

Minimum Mounting Distances

Figure 12 represents applications for which the TDP05K Airflow Measuring System is most suitable. If your particular application is not shown or if you do not have the space to observe the minimum distance, more probes and/or sensing points are recommended; contact your local Ruskin representative for the best solution. The locations shown on these details represent the minimum clearance from most obstruction that create an airflow disturbance.

Figure 12a: Minimum Mounting Distances

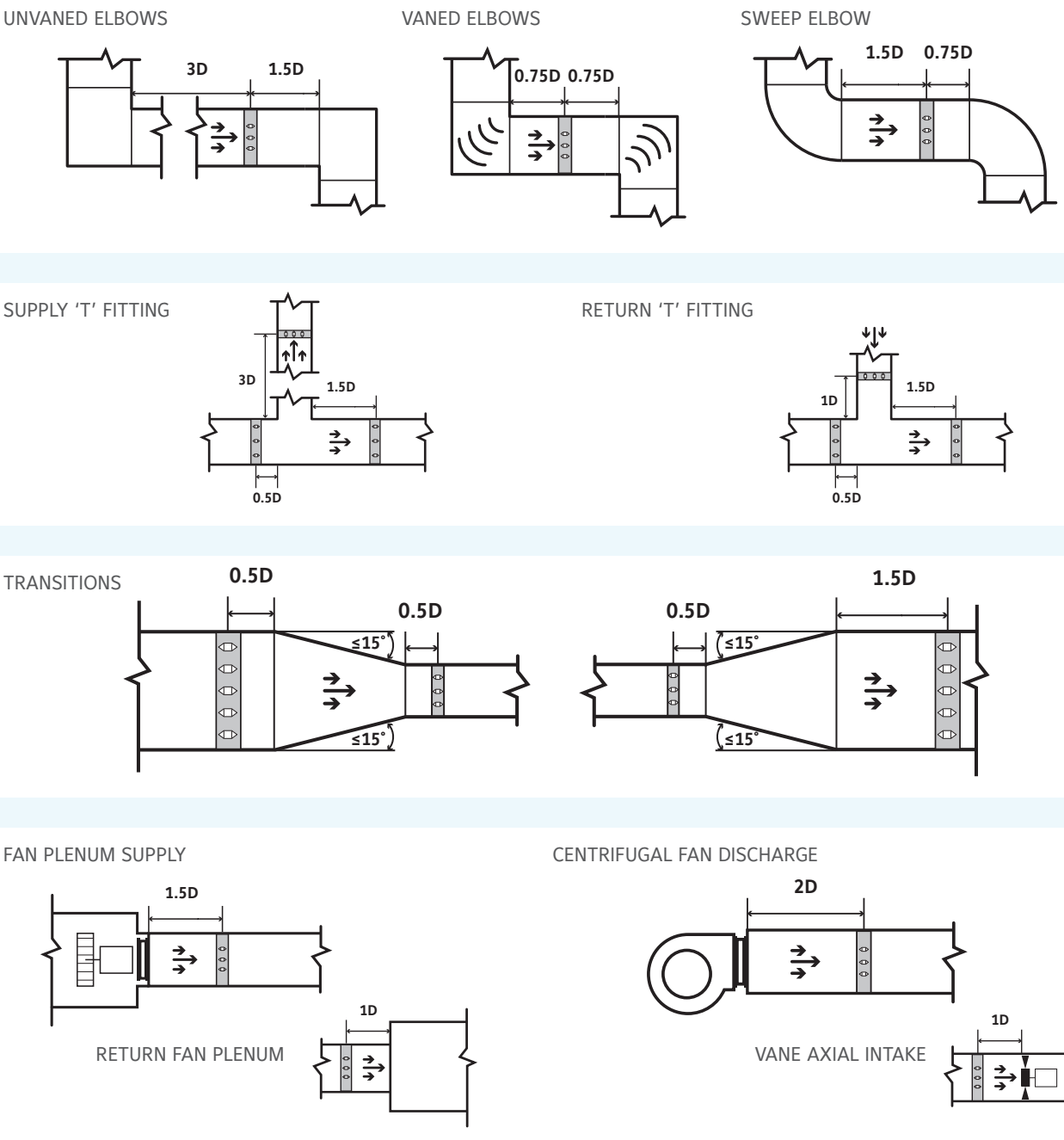




Minimum Mounting Distances

Figure 12 represents applications for which the TDP05K Airflow Measuring System is most suitable. If your particular application is not shown or if you do not have the space to observe the minimum distance, more probes and/or sensing points are recommended; contact your local Ruskin representative for the best solution. The locations shown on these details represent the minimum clearance from most obstruction that create an airflow disturbance.

Figure 12b: Minimum Mounting Distances



Installing the Thermal Dispersion Probes with Insertion Mounting

1. Inspect the duct work, opening, or both to ensure no obstructions or irregularities interfere with installation of the probes. See Figure 12, Figure 13, and Figure 14 for the appropriate probe mounting location, showing insertion and standoff mounting options.

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

2. Determine where 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) for each probe insertion.
   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. On the side of the duct where the box will be located, drill 3 in. (76 mm) holes at the correct heights to equally distribute the probes in the duct. Drill a 2 in. (50 mm) hole directly across from the 3 in. (76 mm) hole on the opposite side of the duct.
4. Remove the mounting plates on the mounting stud end of the probe. Keep the nuts and washers for next step.
5. Holding the box end of the probe, 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.
6. With the probes in place, go to the other side of the duct or plenum and install the mounting plates onto the studs. With the stud centered in the 2 in. (50 mm) hole, place the mounting plate over the stud, followed by the nut and washer. Tighten the nut and washer against the mounting plate. Do not overtighten.

   Note: Do not place screws in the four corner holes of the mounting plates in this step.
7. Verify the stud is located in the center of the 2 in. (50 mm) hole and secure the mounting plate with four self-drilling screws. Repeat this step for each probe in the duct or plenum.

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

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

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

Figure 13: Advanced Thermal Dispersion Probe (Side View)

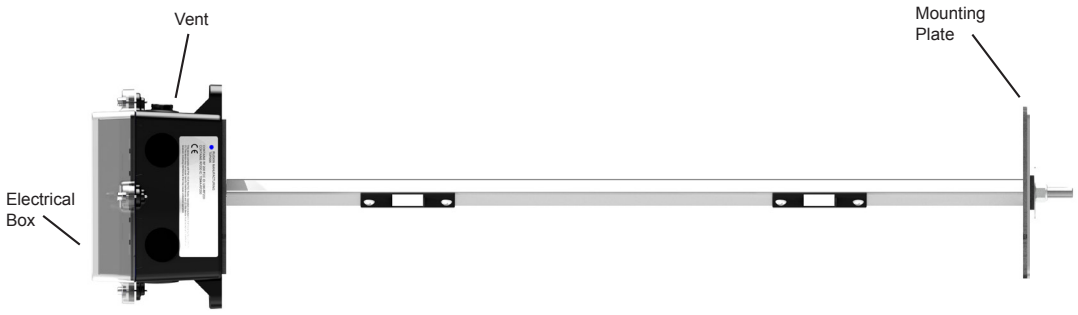


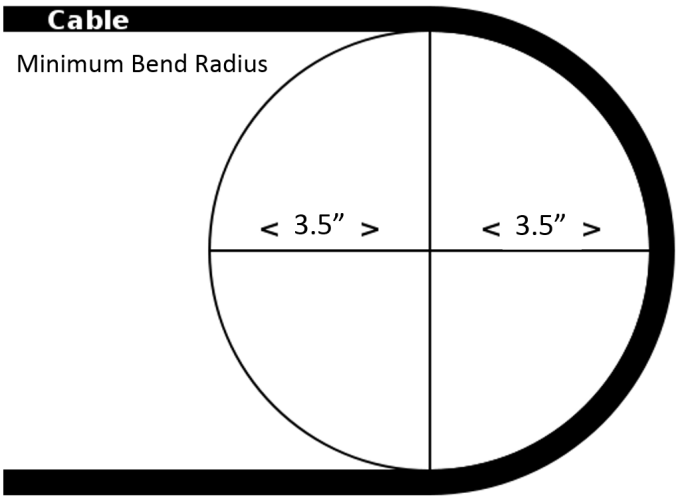
Figure 14: Probe with Damper Stand-off Mounting Bracket

Wiring

Cable Specifications

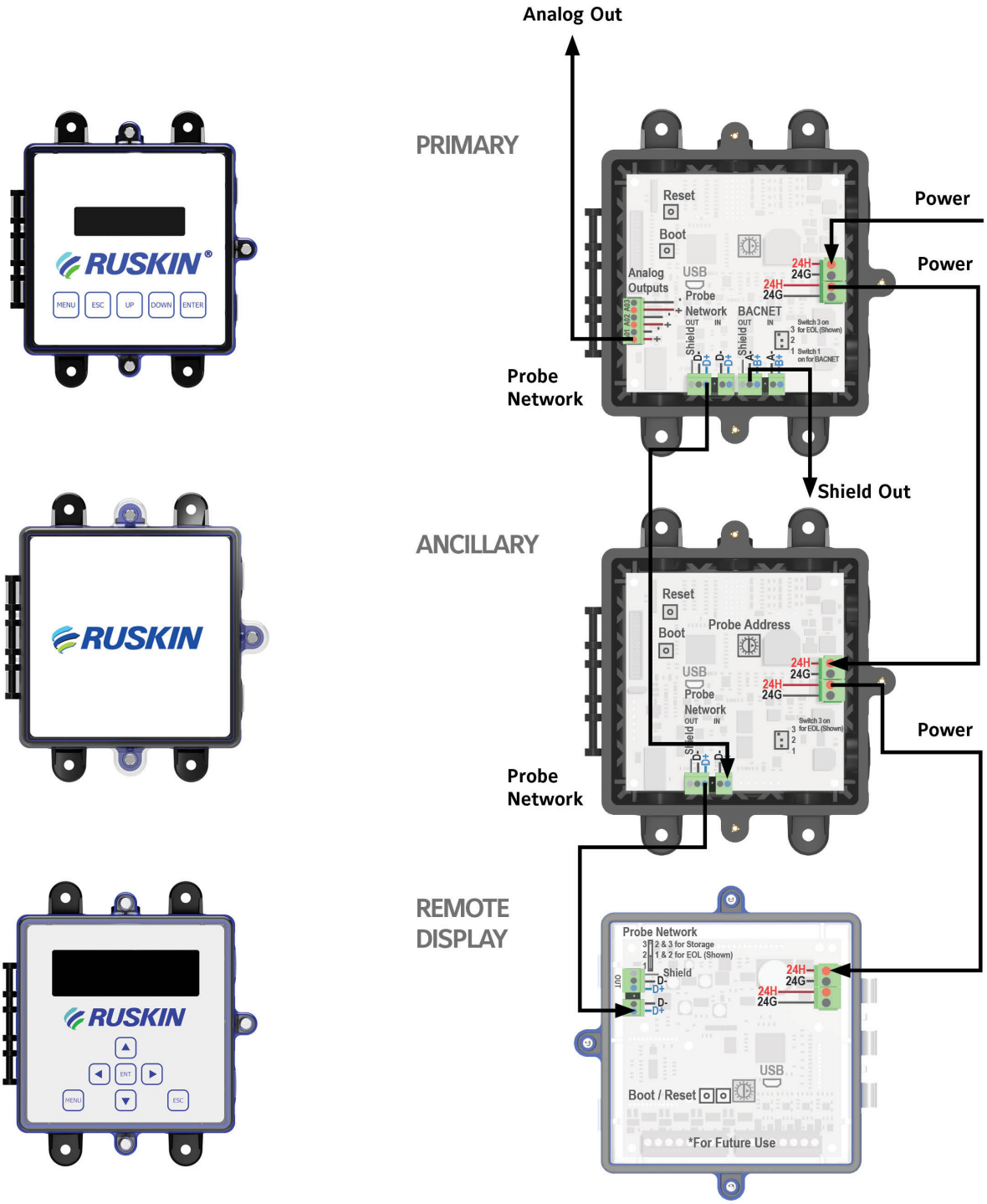
For ease of installation, a composite four-wire cable similar to Connect-Air part number W24182P-2306BL (or Belden part number 8723) with communications and power in one cable is recommended. Alternatively, use a twisted shielded pair 24 AWG low capacitance wire communications cable and an 18 AWG power cable.

Note:
Wires in an exposed or conduit installation must meet the wiring minimum bend radius of 3.5 in. (89 mm).



Wiring Connections

IMPORTANT: Do not run the probe wiring in the same conduit as other 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. Run the wiring away from variable frequency drives and broadcast antennas.



Sample Wiring Configuration

Primary Probe Wiring

IMPORTANT: The primary probe provides two 4 to 20 mA signals to building automation systems. Do not apply loop power to this probe. The system requires a two-wire power connection and separate two-wire connections for each analog output. Analog signal outputs are isolated from power.

Figure 15: Primary Probe Wiring

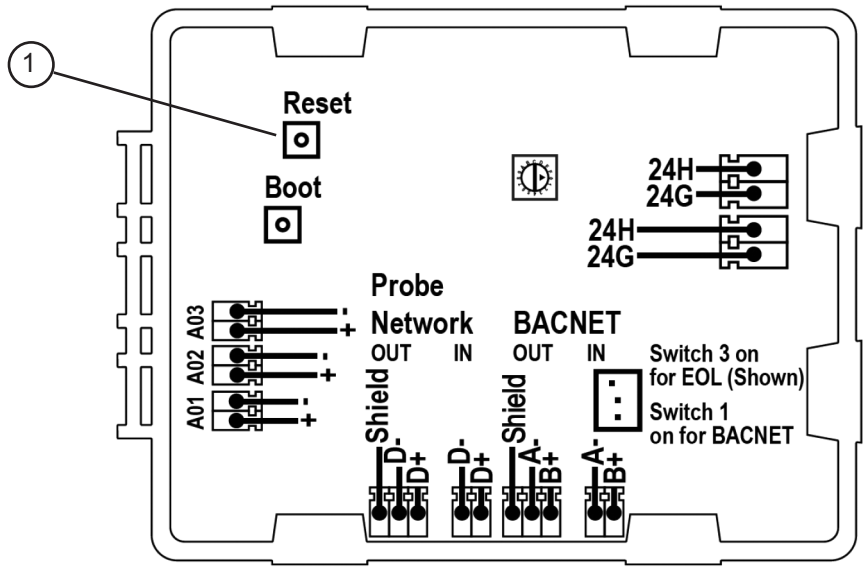


Table 5: Primary Probe Features

Callout	Feature	Description
1	**Reset**	Cycles power to the device without unplugging it

Analog Output

1. Carefully remove the top of the Phoenix Contact® screw terminal connector and insert the wires. Tighten the terminals and reconnect them to the controller board.
2. Connect the 4 to 20 mA analog flow output (A01: Pos and Com) and the 4 to 20 mA analog output factory default temperature (A02: temperature output) from the primary probe to a building automation system.

Note: The factory default flow output is A01. Either output A01 or A02 can be configured for temperature or flow, or both can be configured for temperature and/or flow.

Probe Network

Connect the Shield, D-, and D+ from the primary to the ancillary probe or remote display using the approved communications wire. A03 is not used at this time.

Note: The two D- and the two D+ connections are electrically identical.

BACnet® Output

1. Carefully remove the top of the Phoenix Contact screw terminal connector and insert the wires. Tighten the terminals and reconnect them to the controller board.
2. Connect the BACnet® output (A- and B+) from the primary probe to a BACnet network.

Note: The two A- connections and the two B+ connections are electrically identical."

3. Connect the shield wire from the primary probe to the Sh terminal.

Note: The Shield is connected on one end of each wire run and should never be connected on both ends of one wire.

Power

1. Carefully remove the top of the Phoenix Contact screw terminal connector and insert the wires. Tighten the terminals and reconnect them to the controller board.
2. Connect the 24 VAC power wires to the primary probe using 15 VA power (recommended).
3. Connect the 24 VAC hot wire to the primary probe terminal labeled 24H.
4. Connect the 24 VAC common wire to the primary probe terminal labeled 24G.

Note: The two 24H connections are electrically identical, and the two 24G connections are also electrically identical.

Ancillary Probe Wiring

Figure 16: Ancillary Probe Wiring

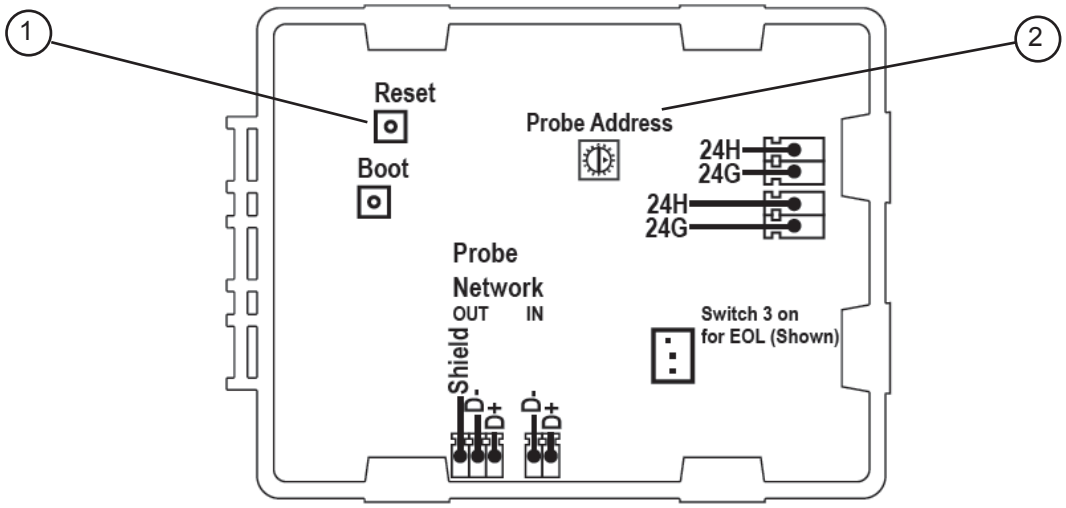


Table 6: Ancillary Probe Features

Callout	Feature	Description
1	**Reset**	Cycles power to the device without unplugging it
2	**Probe Address Rotary Switch**	Sets the address for each probe on probe network. The rotary switch is set at factory for each system. Note: Duplicate addresses are not allowed on probe network.

Network

1. Carefully remove the top of the Phoenix Contact screw terminal connector and insert the wires. Tighten the screw terminals and reconnect them to the circuit board.
2. Connect the probe network terminal from the primary probe to the probe network in terminal on the ancillary probe(s).
   a. The shield only connects on one end.
   b. Connect the 24 AWG black wire from the primary probe terminal labeled Network D- to the ancillary probe terminal labeled Probe Network D-.
   c. Connect the 24 AWG white wire from the primary probe terminal labeled Network D+ to the ancillary probe terminal labeled Probe Network D+.
3. Connect additional probes in a daisy-chain series.

Note: The last probe in each air measurement station must have the end of line (EOL) switch set for the probe network (switch 3 [see Figure 16]). If the primary probe output is connected to a BACnet network interface and the TDP05K Airflow Measuring System is the end of line in the BACnet network, set the BACnet switch to 1 ON (shown in the off position in Figure 16).

Power

Note: Each ancillary probe requires power and can be powered from the same transformer as the primary probe. Observe polarity to prevent a direct short. Two power connections are provided and are electrically the same. These connections can be used interchangeably to connect additional ancillary probes or the remote display.

1. Carefully remove the top of the Phoenix Contact screw terminal connector and insert the wires. Tighten the screw terminals and reconnect them to the circuit board.
2. Connect the 18 AWG copper red wire from the primary probe terminal labeled 24H to the ancillary probe terminal labeled 24H. Observe the polarity to avoid a direct short.
3. Connect the 18 AWG copper black wire from the primary probe terminal labeled 24G to the ancillary probe terminal labeled 24G.

Remote Display Wiring

Figure 17: Remote Display Wiring

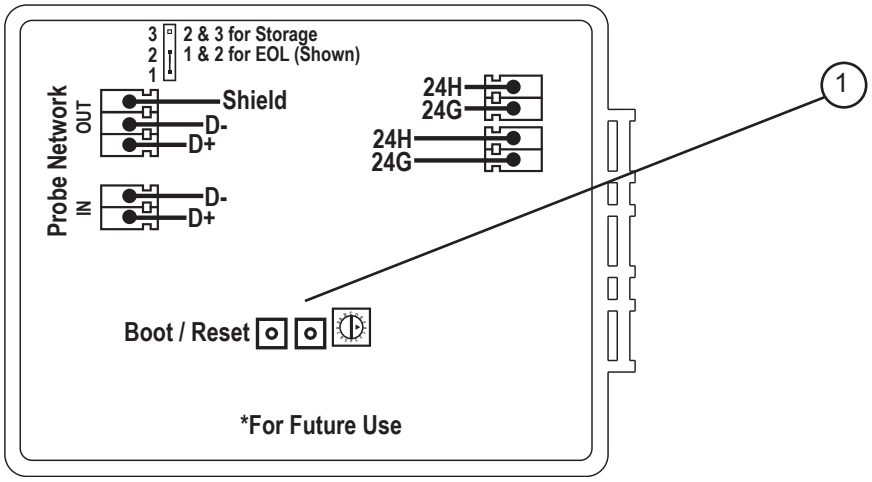


Table 7: Remote Display Features

Callout	Feature	Description
1	**Reset**	Cycles power to the device without unplugging it

Network

Note: When the wireless option is used for communication between the primary probe and the remote display, no network connection is required.

1. Carefully remove the top of the Phoenix Contact screw terminal connector and insert the wires. Tighten the screw terminals and reconnect them to the circuit board.
2. Connect the probe network out terminal from the primary probe to the probe network in terminal on the remote display.
   a. The shield only connects on the one end. ɔne
   b. Connect the 24 AWG black wire from the primary probe terminal labeled Probe Network D- to the remote display terminal labeled Probe Network D-.
   c. Connect the 24 AWG white wire from the primary probe terminal labeled Network D+ to the remote display terminal labeled Probe Network D+.
   d. If the remote display in each TDP05K Airflow Measuring System is the end of line on the probe network, install a jumper across EOL pins 1 and 2. If the remote display is not the end of the line in the probe network, retain the jumper on pins 2 and 3 for storage.

Power

Note: The remote display can be powered from any 24 VAC source and does not need to be physically wired to the primary probe when the wireless option is selected. However, when wired to the probe network, it is typically more convenient to use the recommended wire and to power from the last ancillary probe or the primary probe, depending on the available connections.

1. Carefully remove the top of the Phoenix Contact screw terminal connector and insert the wires. Tighten the screw terminals and reconnect them to the circuit board.
2. Connect the 18 AWG copper red wire from the primary probe terminal labeled 24H to the remote display terminal labeled 24H. Observe the polarity when providing power to multiple probes connected to the same transformer to avoid a direct short. The remote display can be connected to any 24 VAC transformer when using the wireless options and no physical connection to the primary probe or probe network is required.
3. When power is supplied from the primary probe or an ancillary probe on the probe network, connect the 18 AWG copper black wire from the primary probe terminal labeled 24G to the remote display terminal labeled 24G.

Note: The two 24H connections are electrically identical, and the two 24G connections are also electrically identical.

Completing the Wiring

When the primary and ancillary probes, remote display and network wiring are complete, apply power to the system. The version number is displayed followed by the number of probes found and total sensors. Confirm this information is correct for the air measurement system installed. If it is incorrect, check all probe network wiring and probe address dial settings.

Confirm that no two ancillary probes are set for the same address. Each probe address must be unique on the probe network to work correctly. The primary probe and remote display are hard-coded addresses and do not need to be changed or addressed. Confirm the connections are made to the probe network and are not to the BACnet or analog output connections on the primary probe. After the device warms up, the temperature and flow readings display.

Refer to the *TDP05K Advanced Thermal Dispersion Probe Air Flow Measuring System Technical Bulletin* http://www.ruskin.com/catalog/servefile/id/6767 for detailed configuration instructions.

Menu Structure

Refer to the *TDP05K Advanced Thermal Dispersion Probe Airflow Measuring System Technical Bulletin* http://www.ruskin.com/catalog/servefile/id/6767 for detailed configuration instructions.

Main Display (Normal Operation)

Line 1 displays the average temperature and line 2 displays the average velocity or volume.

Menu Button Selections

- Operator Menu
- Supervisor Menu

Operator Menu

The Operator Menu allows the user to view and change system parameters and variables.

Table 8: Operator Menu Options (Part 1 of 2)

Operator Menu Submenus (Actual Display Name)	Submenu Function	Submenu Selections
Enable Operator PIN (Enable Oper PIN)	Enables PIN protection for the Operator Menu	N/A
Change Operator PIN (Change Oper PIN)	Allows the user to update the PIN	N/A
Flow Configuration (Flow Config)	Allows system variable configuration	Duct Shape Duct Width Duct Height Duct Diameter Duct Area Site Elevation Relative Humidity Flow Units Output Lockout
Display Configuration (Display Config)	Select parameters for displayed data	Display Filter Display Units Display Flow Type Line 2 Parameters Line 2 Custom
Analog Output 1 Parameters (Output 1 Param)	Select Analog Output 1 parameters (flow, temperature, or none)	Analog Output 1 Parameters
Analog Output 2 Parameters (Output 2 Param)	Select Analog Output 2 parameters (flow, temperature, or none)	Analog Output 2 Parameters
Temperature Low Pass Filter (Temp LPF)	Selects amount of filtering applied to the analog output for temperature	Temperature Low Pass Filter
Flow Low Pass Filter (Flow LPF)	Selects amount of filtering applied to the analog output for flow	Flow Low Pass Filter
Analog Output Calibration (Output Cal Menu)	Spans the analog outputs for temperature and flow. Use the positive or negative offset if 4 mA output is not as expected.	Output 1 mA Offset Output 1 mA Low Span Output 1 mA High Span Output 2 mA Offset Output 2 mA Low Span Output 2 mA High Span Design Range Low Design Range High Temperature Range Low Temperature Range High

Table 8: Operator Menu Options (Part 2 of 2)

Operator Menu Submenus (Actual Display Name)	Submenu Function	Submenu Selections
Temperature Balance Menu (Temp Bal Config)	Selects an offset for the reported average temperature	Temperature Balance Enable Temperature Offset
K-Factor Configuration (KFactor Config)	Turns K-Factor on and off and allows configuration	K-Factor Enable? Calculate K-Factor? K-Factor Gain[1] K-Factor Offset[1] Number of Data Points[2] System at Point 1[2] Point 1 Velocity[2] System at Point 2[2] Point 2 Velocity[2] System at Point 3[2] Point 3 Velocity[2] Calculate K-Factor
Menu Inactivity Timeout (Menu Timeout)	Selects a time the device returns to normal operation and front panel backlight when no menu activity is detected	Menu Timeout
BACnet Configuration (Network Cfg)	Turns BACnet on and off and allows configuration	BACnet On/Off BACnet Instance BACnet Address BACnet Max Mast BACnet Baud Rate
BACnet Flow Alarm Configuration (Flow Alarm Cfg)	Turns high and low alarms on and off, allows alarm configuration	Alarm Low On/Off Alarm High On/Off Alarm Low Setpoint Alarm High Setpoint Alarm Deadband Alarm Delay
BACnet Temperature Alarm Configuration (Temp Alarm Cfg)	Turns high and low alarms on and off, allows alarm configuration	Alarm Low On/Off Alarm High On/Off Alarm Low Setpoint Alarm High Setpoint Alarm Deadband Alarm Delay

1. This submenu selection only appears when Calculate K-Factor is set to No.
2. This submenu selection only appears when Calculate K-Factor is set to Yes.

Supervisor Menu

The Supervisor Menu allows the user to enable or disable probes and/or individual sensors, scans all sensors for status updates, and performs diagnostics on alert conditions.

Table 9: Supervisor Menu Options (Part 1 of 2)

Supervisor Menu Submenus (Actual Display Name)	Submenu Function	Submenu Selections
Enable Supervisor PIN (Enable Supv PIN)	Enables PIN protection for the Supervisor Menu	N/A
Change Supervisor PIN (Change Supv PIN)	Allows the user to update the PIN	N/A

Table 9: Supervisor Menu Options (Part 2 of 2)

Supervisor Menu Submenus (Actual Display Name)	Submenu Function	Submenu Selections
Sensor Management (Sensor Mgmt)	Allows the user to scan the probe network to detect the installed probes and sensors. Allows for enabling and disabling the diagnostic status condition of the sensors.	Display Active Sensor Scan for Sensor Display Sensor Status Scan for Sensor Enable Sensors Disable Sensors Display Probe Status Display Probe Data
Reset Sensors (Reset Sensors)	Select parameters for displayed data	Reset Sensors
Factory Default (Factory Default)	Restores the device to the factory default settings	Factory Default

Troubleshooting

Use Table 10 to troubleshoot problems with the TDP05K Airflow Measuring System.

Table 10: TDP05K System Troubleshooting

Problem	Possible Cause	Corrective Action
Airflow readings do not match what T&B is reporting	Turbulant or Air flowing two directions through the plane of the air measurement station	Use Automatic Kfactor Configuration and use 1 point calibration if only gain is required. If flow is non-linear use two or three-point calibration feature
		Install additional probes to provide more sensing points.
No Diplay	No Power	Verify 24VAC power at power terminal. Make sure the ribbon cable is fully seated in the board's socket. Visually check to make sure membrain is pluged in to display board in lid.
Number of PROBES shown when power is applied is incorrect.	Probe network Not wired correctly or plug is plugged into the wrong port. Two Ancillary Probes may have the same addresses, look at rotary dial on ancillary probes.	Pin out is shield, minus, plus, shield, minus, plus. Look at drawings and make sure left and right are not swapped. AO, Probe Network and BACNET ports on the primary will all fit each other's plugs. Make sure connections are made to the correct point on the board
No BACnet communication with the BAS	Network wires terminated to incorrect point or wrong connector	Pin out is shield, minus, plus, shield, minus, plus. Look at drawings and make sure left and right are not swapped.
	Not Configured correctly	Verify configuration parameters match what is required to communicate with the BAS

Repair Information

If the TDP05K Advanced Thermal Dispersion Probe Airflow Measuring System fails to operate within its specifications, contact the nearest Ruskin representative

Maintenance

Twice a year, scroll through the velocity and temperature values using the UP and DOWN buttons. Inspect the thermal dispersion probes and clean the sensor nodes if the readings vary from normal readings.

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

Only remove the probes if inspection is not possible any other way. It may be possible to clean the sensors as installed through other access.

Follow these steps if direct inspection via other means is not possible and the probes must be removed:

1. Before cleaning the sensors, make sure the power to the TDP05K Airflow Measuring System is turned off or disconnected.
2. Remove the mounting screws from the mounting plates on both sides of the thermal dispersion probe.
3. Remove the lock nut and the washer from the mounting stud.
4. Slide the probe out of the duct from the side with the box.
5. Wipe down the 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.
6. Remove lint, dust, and other matter from the opening of the sensor shroud by blowing through the hole or using a soft brush. Do not use high pressure air at close range and avoid thermal shock. Care should be taken not to damage the thermistors while cleaning. Use distilled water if a solvent is necessary to remove dirt build-up on the sensors.
7. Replace the probe assembly in the duct by reversing Step 1 through Step 6.
8. When the sensors are dry, power on the unit.

Replacement Parts

See Table 11 for TDP05K Advanced Thermal Dispersion Probe Airflow Measuring System replacement part information.

Table 11: TDP05K Replacement Parts

Description
Remote display user interface
Wireless cards for the remote display and primary probe
One set of NEMA 4 plugs for knockouts (6 per set)
Cord grip and locking nut
One set of NEMA 1 nylon dust plus for knockouts (6 per set)
Replacement captive screw assembly

Technical Specifications

TDP05K Thermal Dispersion Probe Airflow Measuring System

Probe Material	2 x 3/4 in. (51 x 19 mm) 6063T6 high-yield extruded aluminum with acid-etch clear anodized finish
Thermistor	Thermistor pair in polyimide flex membrane sensor
Size Range	8 x 8 in. to 120 x 120 in. (20 x 20 cm to 305 x 305 cm)
Brackets	0.125 aluminum
Sensor Accuracy	Airflow: ±2% of reading and ±0.25% repeatability
Repeatability	±0.25%
Measurement Units	Inch-Pound (I.P.) or International System (S.I.)
Sensor Distribution	Equal area, Log-Tchebycheff or EK Log for round duct applications
Calibrated Range	0 to 5,000 FPM (0 to 1,523 MPM)
Temperature Sensor Accuracy	±0.10ºF (0.06ºC)
Sensor Temperature Range	-20 to 120°F (-29 to 49°C)
Transmitter Temperature Range	-20 to 120°F (-29 to 49°C)
Humidity Range	0 to 99% RH, noncondensing
Maximum Number Sensors	128
Power Requirement	24 VAC, 15 VA
Power Consumption	<10 VA for 2 probes with 8 sensors per probe and LCD display on primary probe.
Output Signals	4 to 20 mA standard, 2 to 10 VDC requires 499 ohm resistor across output terminals.
Output Signal Adjustments	Field adjustable offset and span
Display	16x2 character LCD (airflow, temperature, setup, and diagnostics)
Velocity Requirements	Minimum: 0 FPM (0 MPM) Maximum: 5,000 FPM (1,523 MPM)
Pressure Drop	Four 48 in. (122 cm) long probes in 48 x 48 in. duct: < 0.1 w.g. @ 1000 FPM
Approximate Shipping Weight	12 lb (5.4 kg) for TDP05K Airflow Measuring System with two probes

Measuring stations are tested at an AMCA Certified Laboratory using instrumentation and procedures in accordance with AMCA Standard No. 610-93, Airflow Station Performance.

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

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