MANUAL

AIRFLOW WING

CRC™

Measure What Matters.

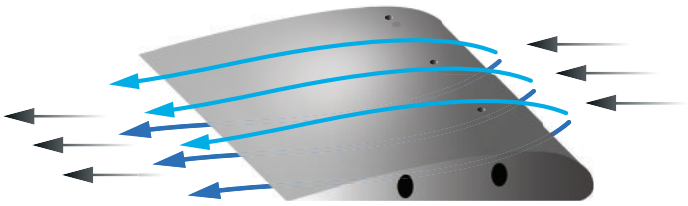
TABLE OF CONTENTS

IMPORTANT NOTES

The “Important Notes” header is used throughout this manual to callout important considerations that the reader should be aware of. Please take time to thoroughly read these sections.

PRODUCT OVERVIEW

The AFW uses CRC's patented airfoil probe design for precise, repeatable airflow measurement with passive, maintenance-free operation. Leveraging Bernoulli's principle, it resists airborne contaminants and includes a touchscreen transmitter for easy setup, commissioning, and real-time performance monitoring.



KEY FEATURES

AFW TRANSMITTER

- **Multi-Station Capability:** Supports up to four independent airflow measurement stations, reducing hardware and network demands.
- **Efficient Commissioning:** Intuitive touchscreen enables fast setup without external software or tools.
- **Integrated Diagnostics:** Onboard I/O and BACnet® diagnostics simplify configuration, troubleshooting, and system verification.
- **Versatile Communication:** Provides scalable analog outputs and BACnet® MS/TP, configurable via touchscreen.
- **Intuitive Interface:** High-resolution touchscreen delivers real-time airflow data for up to four stations, ensuring clear monitoring and operation.

AFW PATENTED WING

- **Patented Airfoil Design:** CRC's patented design generates a precise pressure differential for accurate, natural airflow measurement.
- **High Accuracy & Maintenance-Free:** Silicon-based, dead-ended sensing prevents contamination, ensuring long-term reliability without maintenance.
- **Debris-Resistant:** Indirect sensing, positioned outside the airflow path, prevents clogging common in pitot and thermal systems.
- **Exceptional Stability:** Provides consistent, repeatable measurements across varying airflow conditions.
- **Contaminant-Resistant:** Static pressure sensing, oriented perpendicular to airflow, eliminates lint, dust, and dirt buildup.
- **Wide Operating Range:** Delivers precise airflow feedback across both high-volume and low-flow applications.

APPLICATIONS

- Outside Air Intake
- Exhaust Air
- Return Air
- Fan Inlet
- Small Ducts
- Large Ducts
- Anywhere maintenance free precision airflow measurement is required

AIRFLOW WING

MANUAL

Insertion Mount

Internal/Standoff Mount

CHARACTERISTICS

Material of Construction	Probes	Anodized Aluminum Airfoil
	Mounting Hardware	Stainless Steel
	Transmitter	ABS Plastic
Probe Length		6 in to 120 in
Pneumatic Tubing		¼ in O.D
Install & Mounting		Insertion Mount
		Internal Mount
		Standoff Mount
		Remote Sensor

ENVIRONMENTAL LIMITATIONS

Operating Temperature	Transmitter	0 to 140 °F (-18 to 60 °C)
	Probes	-30 to 200 °F (-34 to 93 °C)
Storage Temperature	Transmitter	-22 to 158 °F (-30 to 70 °C)
Operating Humidity	Transmitter	10 to 90 % RH non-condensing

ELECTRICAL

Transmitter – Input Voltage	22 to 26 VAC; 50/60 Hz
Transmitter – Power Draw	18 VA

PERFORMANCE

Operating Velocity	50 to 2500 FPM
Commissioning	5 field adjustable offsets
Measurement Accuracy	2%

WIRING GUIDELINES

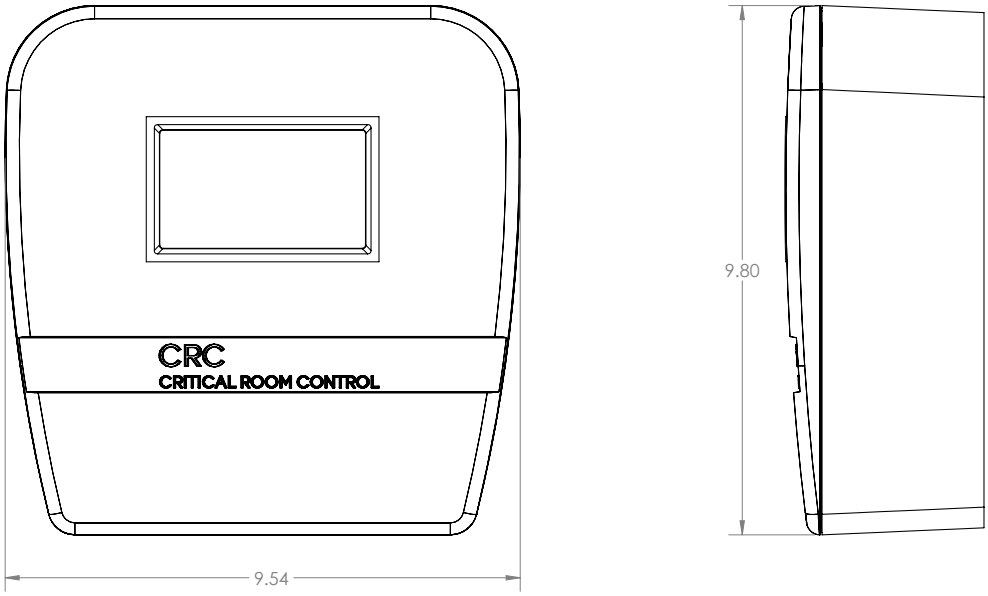
FLOW FEEDBACK	OUT / WHITE	0.5-4.5 VDC 0-0.5 inWC
GROUND	GND / BLACK	GND
POWER	5V / RED	5 VDC

Wire Connection	3 Conductor Stranded
Min Wire Gauge	22 AWG (0.6 mm)
Max Length	200 ft (61 m)
Preferred Color	Red/Black/White

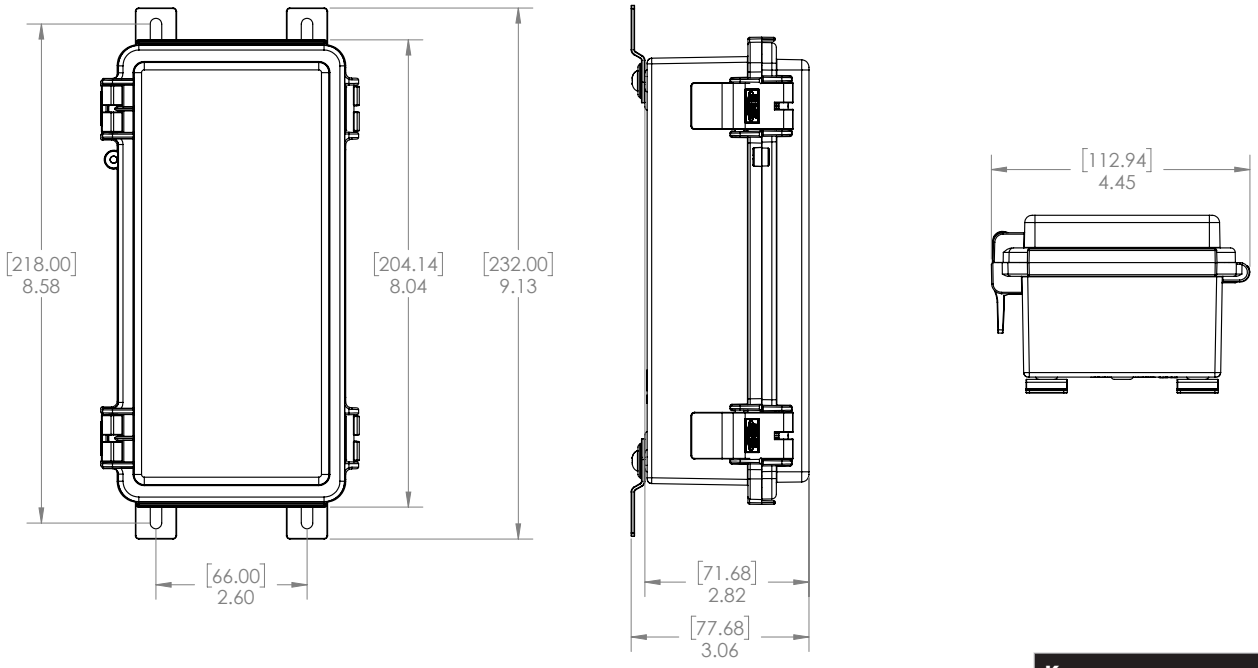
⚠ The tubing for the HI port and LO port connections should be as short as possible, equal length and diameter, equal temperature and path.

Dimensions

Transmitter



Remote Sensor (Optional)



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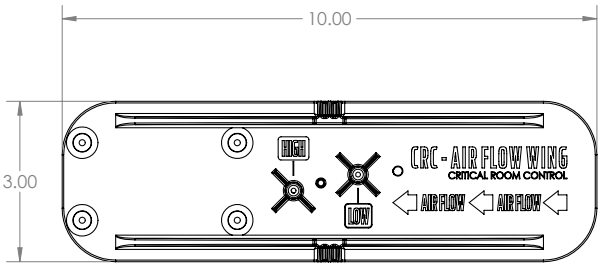
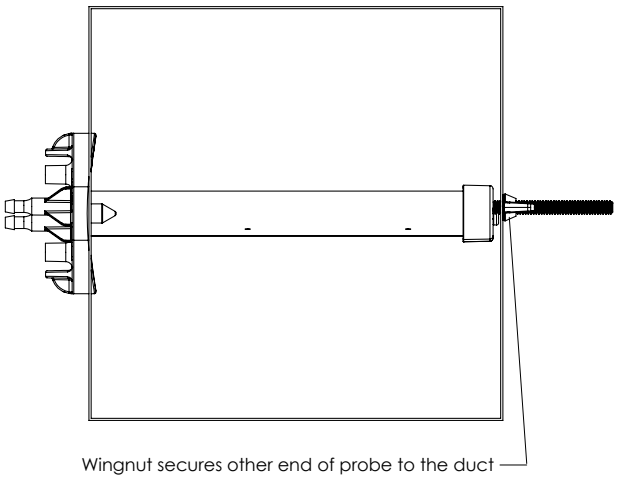
NO BRACKETS = INCHES (in)

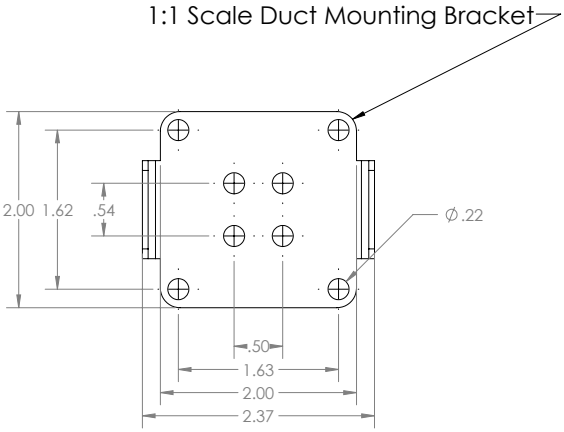
Dimensions

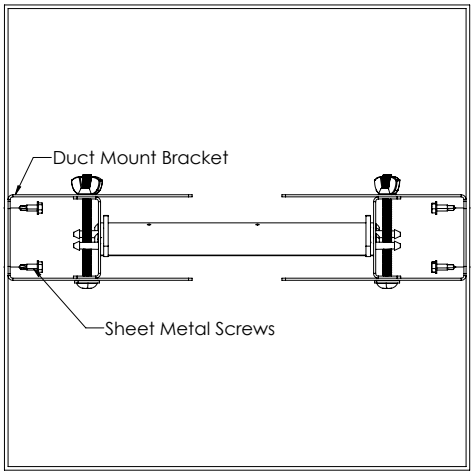
Insertion Mount



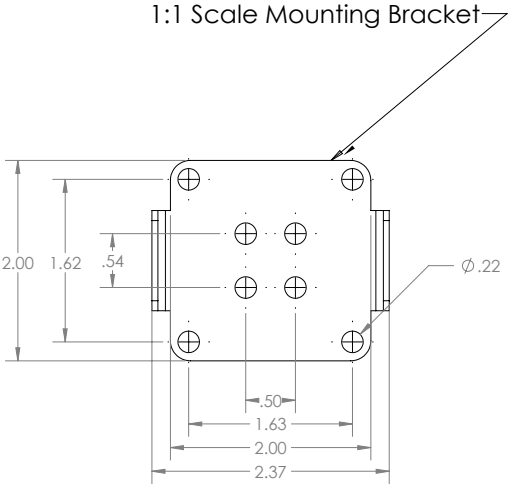


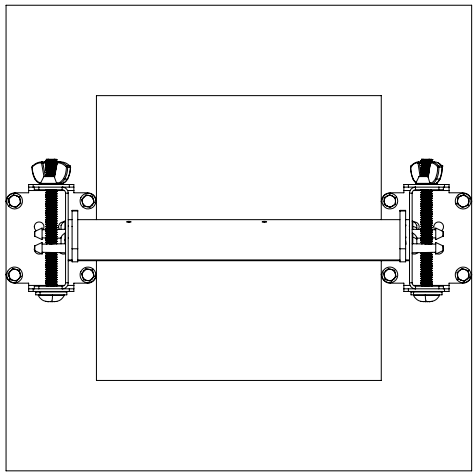
Internal Mount





Standoff Mount





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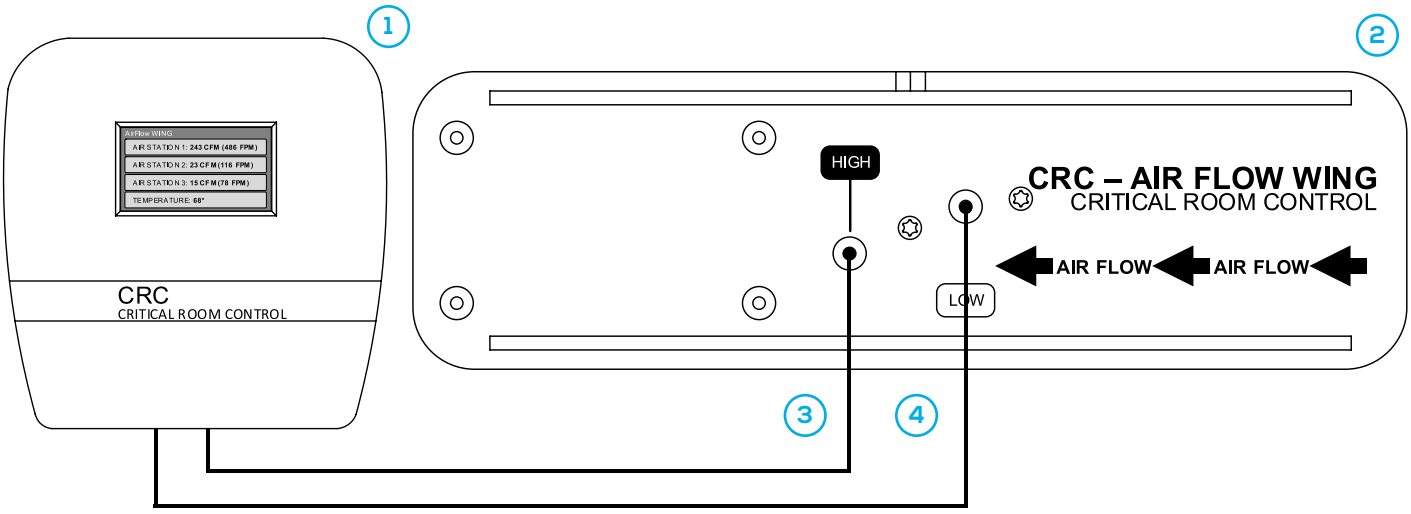
EQUIPMENT LAYOUT OPTIONS

AIRFLOW WING EQUIPMENT LAYOUT

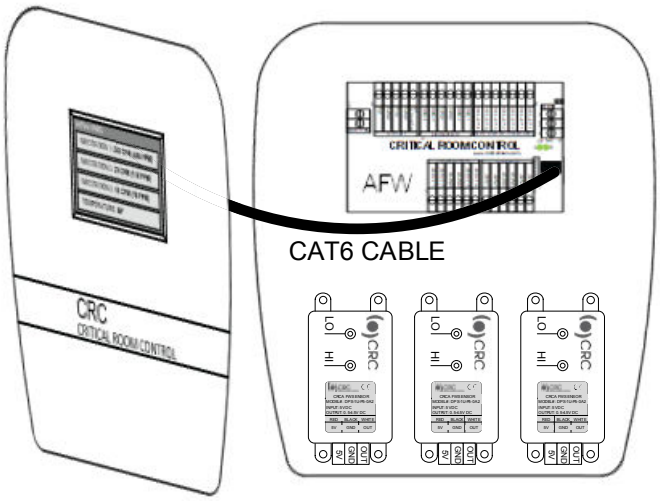


1. AFW-Transmitter
2. Insertion mount AFW-Probe (layout also applies to internal mount and standoff mount)
3. AFW HIGH/HI port with 1/4" pneumatic tubing connected to AFW-Transmitter
4. AFW LOW/LO port with 1/4" pneumatic tubing connected to AFW-Transmitter

AFW-TRANSMITTER LAYOUT DETAILS

Mounting the AFW-Transmitter

- AFW-Transmitter enclosure is UL94 HB rated
- Touchscreen is connected to I/O board with 3' Cat6 cable
- Mount through holes on back of enclosure
- Use a Philips screwdriver to remove the (2) screws located on the bottom of the enclosure, which attach the AFW-Transmitter cover to the backplate

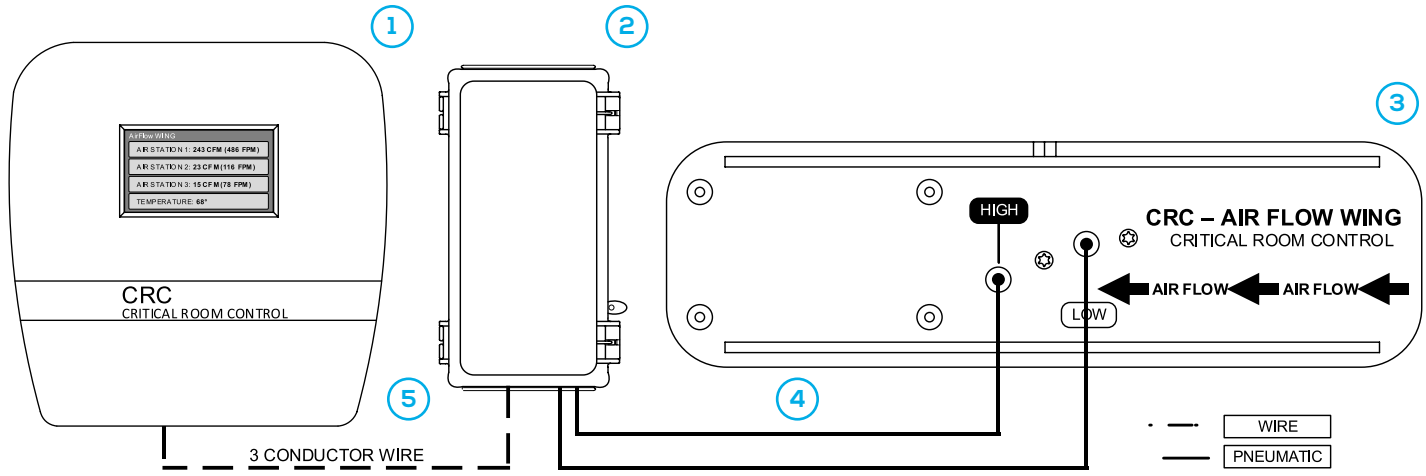


⚠ Do not excessively pull on the AFW-Transmitter cover. Doing so may result in damage to the RJ45 ports or the Cat 6 cable.

⚠ When attaching the AFW-Transmitter cover, ensure that the CAT 6 cable is not pinched or kinked, while still being connected to both the touchscreen and the I/O board.

EQUIPMENT LAYOUT OPTIONS

AIRFLOW WING EQUIPMENT LAYOUT WITH REMOTE SENSOR

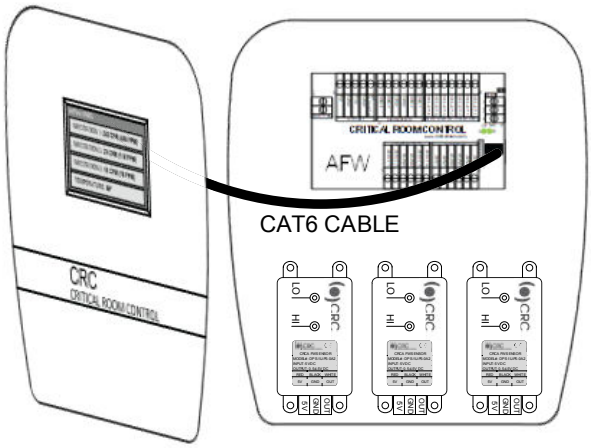


1. AFW-Transmitter
2. Remote mounted measurement sensor (AFW-Remote Sensor)
3. Insertion mount AFW-Probe (layout also applies to internal mount and standoff mount)
4. AFW HIGH/HI port and LOW/LO port with 1/4" pneumatic tubing connected to AFW-Remote Sensor
5. Airflow signal from AFW-Remote Sensor to AFW-Transmitter

AFW-TRANSMITTER LAYOUT DETAILS

Mounting the AFW-Transmitter

- AFW-Transmitter enclosure is UL94 HB rated
- Touchscreen is connected to I/O board with 3' Cat6 cable
- Mount through holes on back of enclosure
- Use a Philips screwdriver to remove the (2) screws located on the bottom of the enclosure, which attach the AFW-Transmitter cover to the backplate



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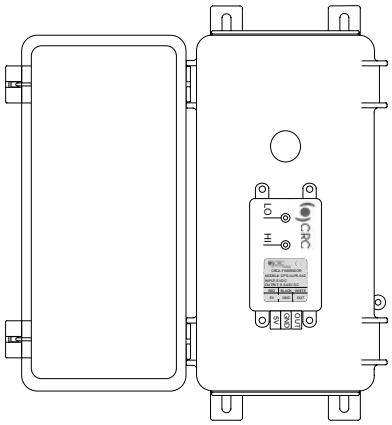


Mounting the AFW-Remote Sensor

- AFW-Sensor enclosure is UL94 HB rated
- AFW-Remote Sensor can be mounted in any location or orientation
- Enclosure uses a hinged door
- Mount through hole on back of enclosure
- (2) pre-punched conduit knockouts

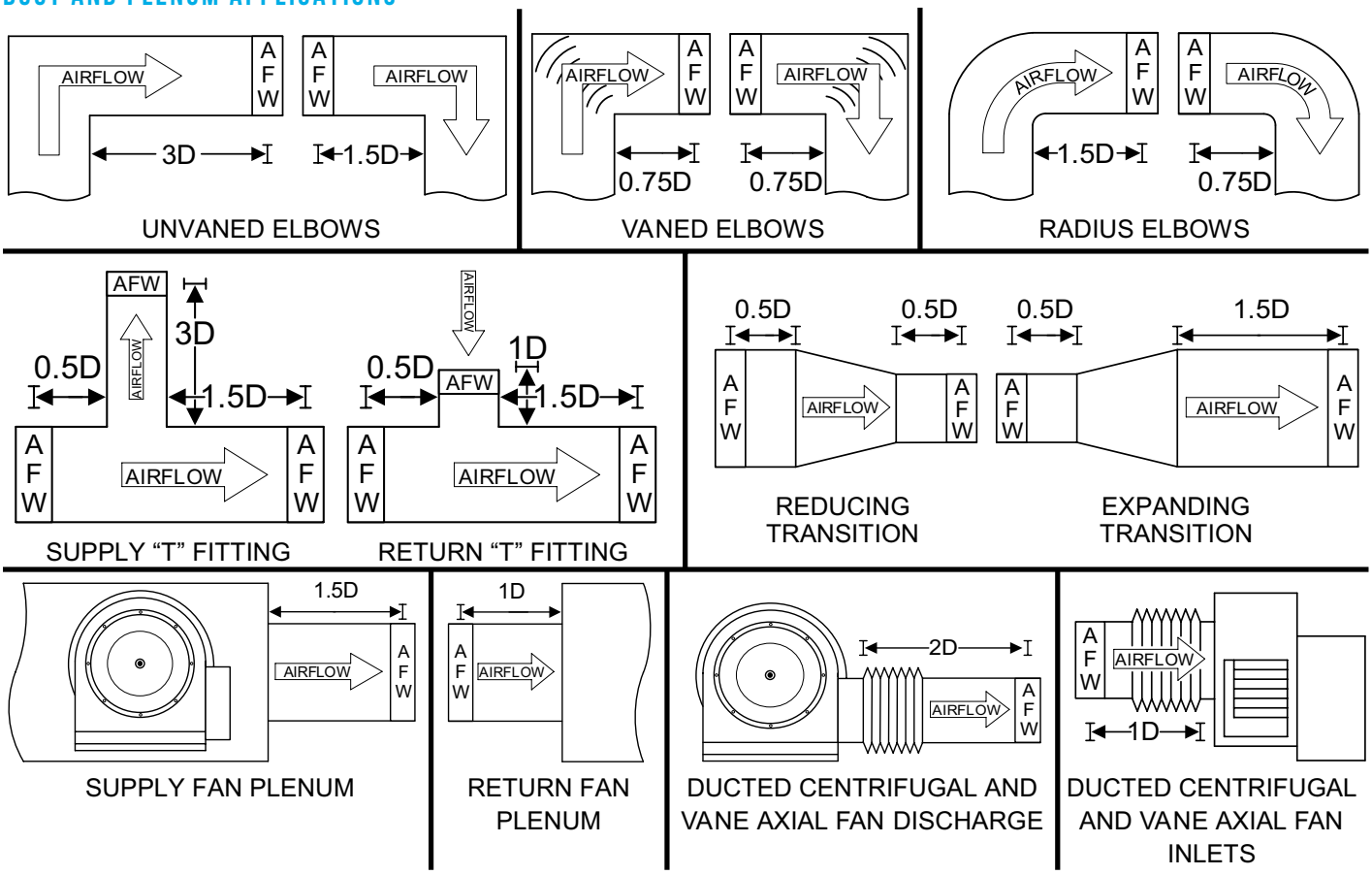
PLACEMENT GUIDE

⚠ Location of the AFW-Probe(s) is critical for proper performance. The location of the AFW-Probe(s) must comply with both the engineer's plans and AFW placement guidelines. Follow the instructions in the guide to determine the required placement of the probes associated with each measuring station.

⚠ Verify there is adequate clearance for installation and service.

⚠ To ensure accurate airflow measurements, the AFW-Probe(s) must be mounted level to the direction of airflow within the duct plane. Placing the probe(s) with any degree of tilt can cause errors in airflow measurement. Follow the step-by-step installation procedure for each type of mounting style to confirm the integrity of the installation.

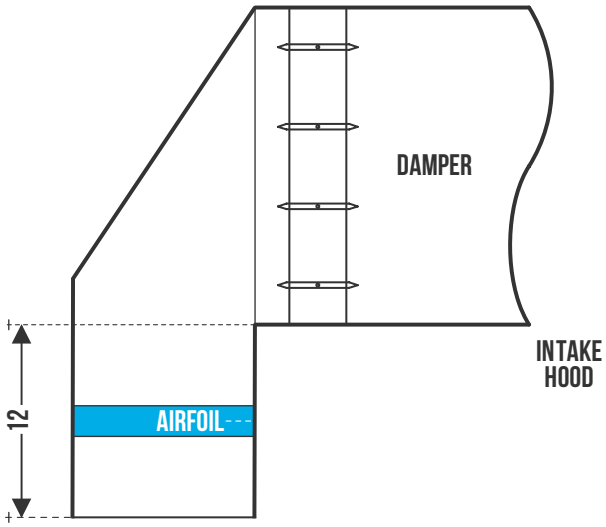
DUCT AND PLENUM APPLICATIONS

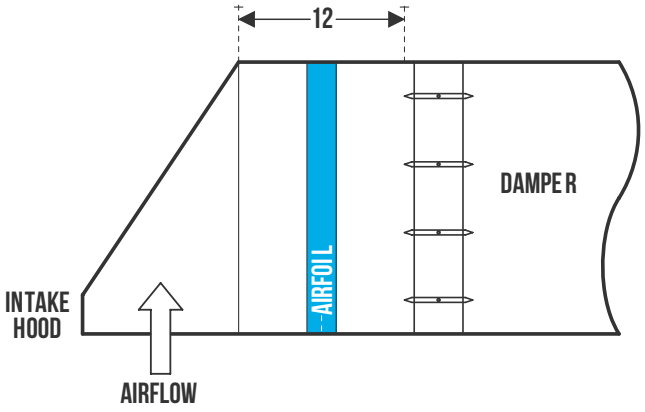


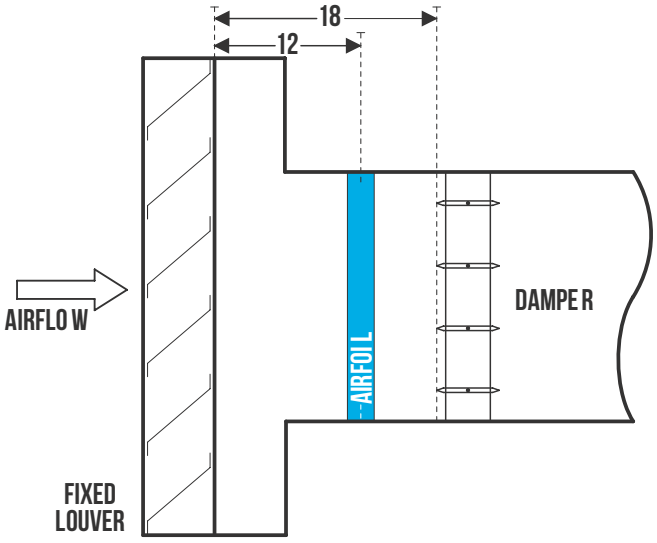
⚠ D = Minimum placement of the AFW-Probe in duct diameters

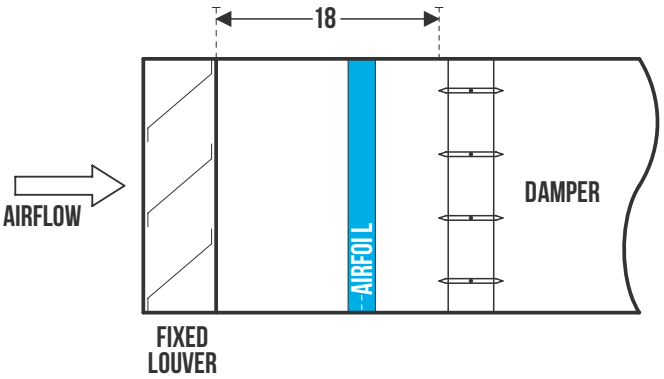
PLACEMENT GUIDE

HOOD, DAMPER AND LOUVER APPLICATIONS







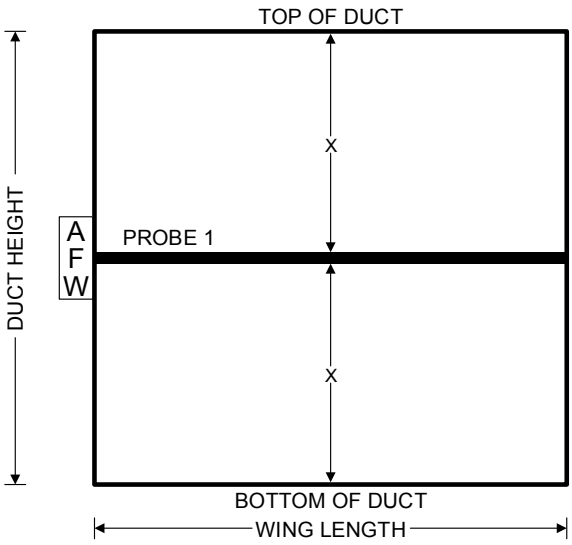


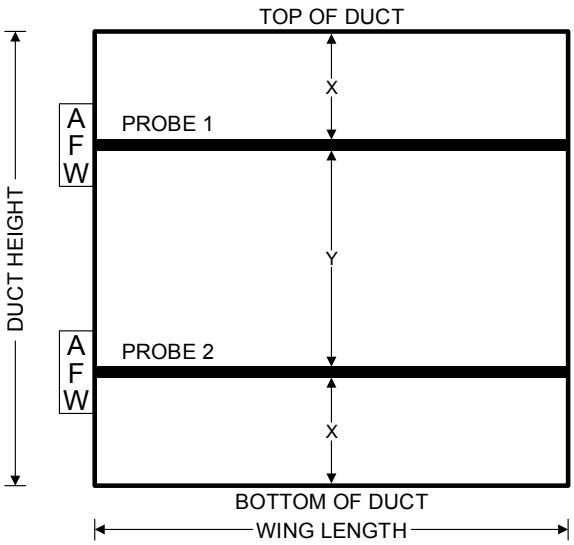
All measurements in inches

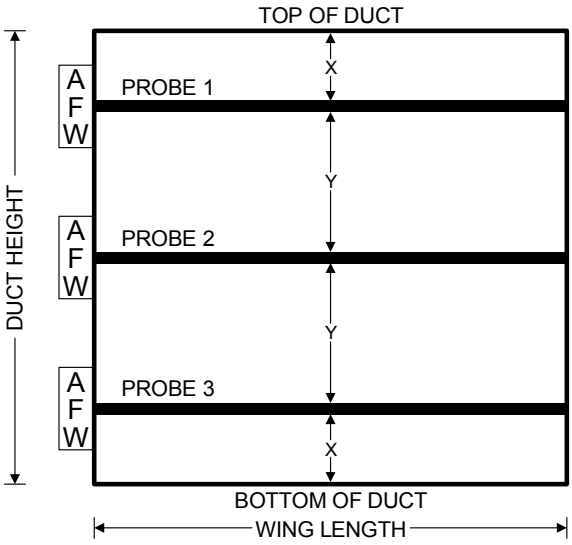
PLACEMENT GUIDE

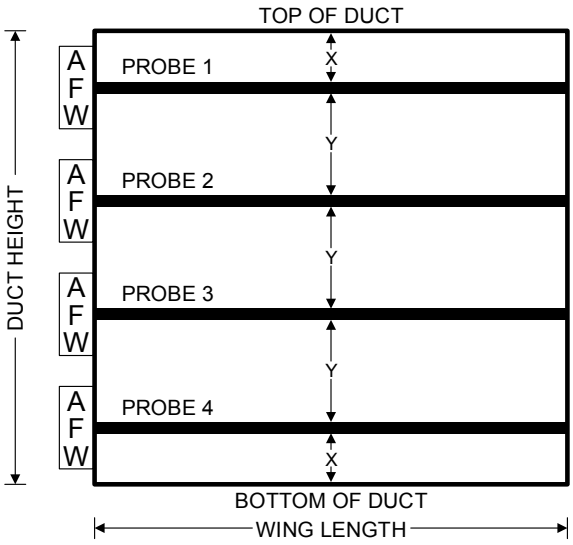
SQUARE / RECTANGULAR DUCT AFW-PROBE HORIZONTAL POSITIONING

SQUARE / RECTANGULAR DUCT HORIZONTAL AFW [PROBE] POSITIONING TABLE		
# OF AFW (probes)	X	X
1	$\frac{\text{Duct Height}}{2}$	N/A
2	$\frac{\text{Duct Height}}{4}$	$\frac{\text{Duct Height}}{2}$
3	$\frac{\text{Duct Height}}{6}$	$\frac{\text{Duct Height}}{3}$
4	$\frac{\text{Duct Height}}{8}$	$\frac{\text{Duct Height}}{4}$





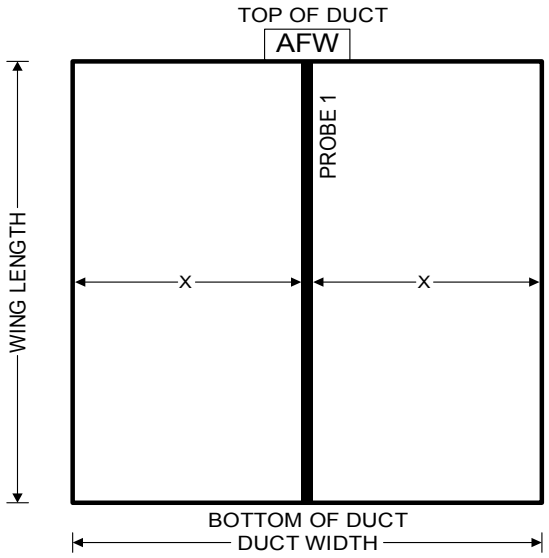


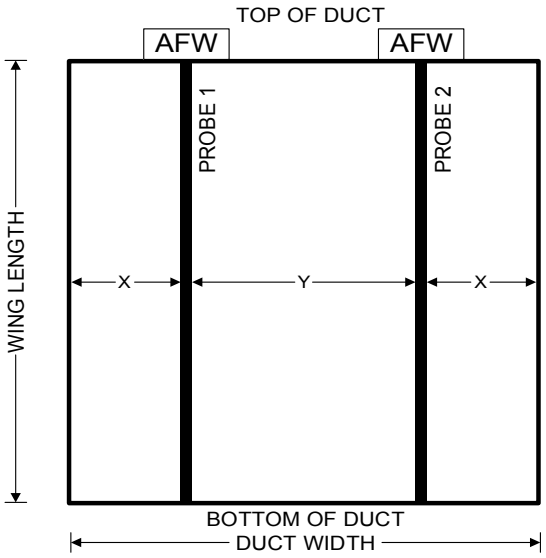


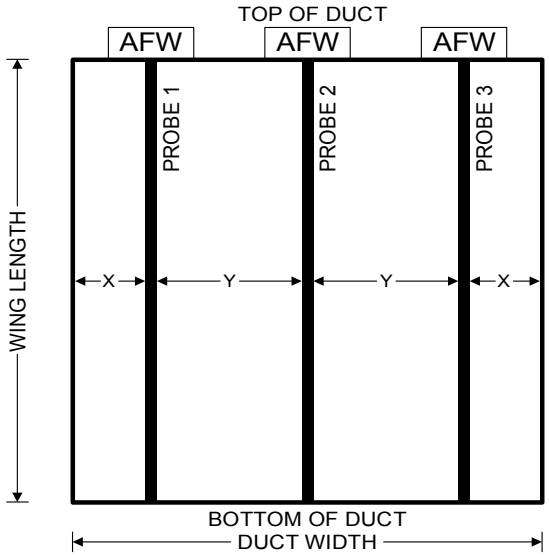
PLACEMENT GUIDE

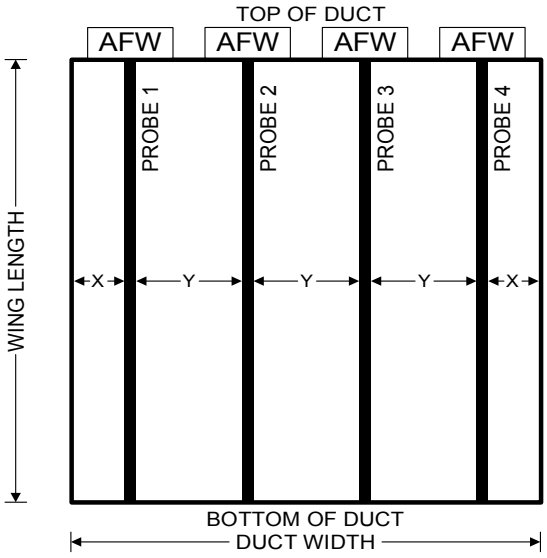
SQUARE / RECTANGULAR DUCT AFW-PROBE VERTICAL POSITIONING

SQUARE / RECTANGULAR DUCT VERTICAL AFW [PROBE] POSITIONING TABLE		
# OF AFW (probes)	X	Y
1	$\frac{\text{Duct Width}}{2}$	N/A
2	$\frac{\text{Duct Width}}{4}$	$\frac{\text{Duct Width}}{2}$
3	$\frac{\text{Duct Width}}{6}$	$\frac{\text{Duct Width}}{3}$
4	$\frac{\text{Duct Width}}{8}$	$\frac{\text{Duct Width}}{4}$









PLACEMENT GUIDE

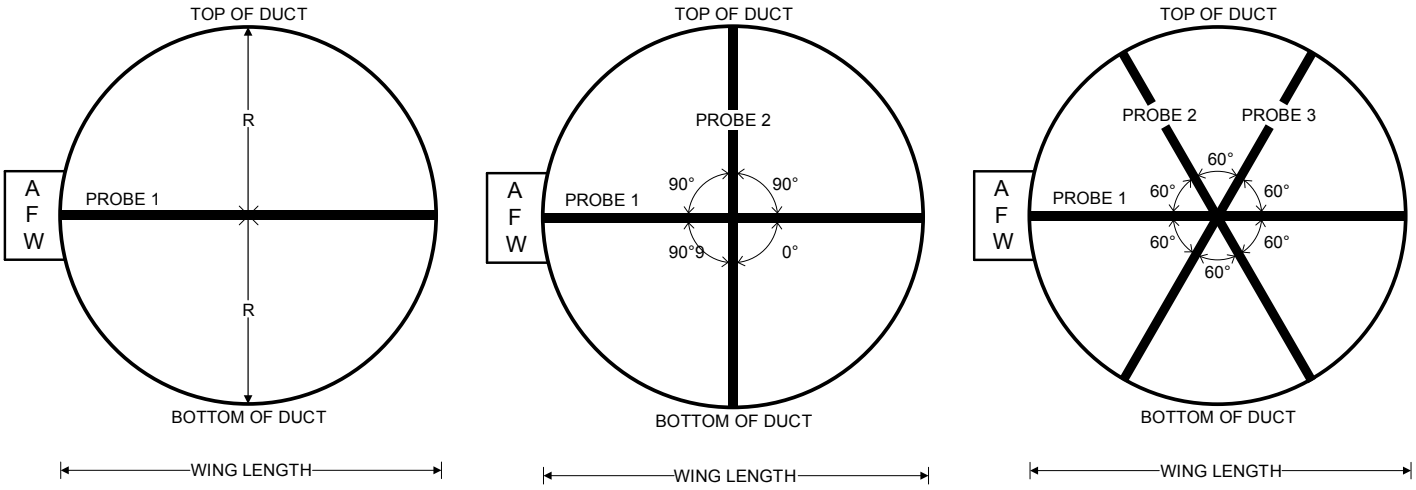
SQUARE/RECTANGULAR DUCT AFW-PROBE TABLE

The AFW Table for square/rectangular duct indicates the number of probes needed for any given duct width and height.

DUCT HEIGHT (inches)	AIRFOIL TABLE DUCT WIDTH & AIRFOIL LENGTH (inches)
6 – 22	1
24 – 36	2
40 – 72	3
78 – 120	4

PLACEMENT GUIDE

ROUND DUCT AFW-PROBE POSITIONING



When multiple AFW-Probes are required, each probe should be mounted 4" apart.

ROUND DUCT AFW-PROBE TABLE

The AFW Table for round duct indicates the number of probes needed for any given duct width and height.

DUCT DIAMETER (inches)	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	40	44	48	52	56	60	66	72	78	84	90	96	102	108	114	120
R (inches)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	22	24	26	28	30	33	36	39	42	45	48	51	54	57	60
# OF AFW (probes)	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3

INSTALLATION GUIDE

SAFETY PRECAUTIONS

1. Read all instructions prior to installing.
2. Installation work, including electrical wiring, must be done in accordance with all applicable codes and standards.
3. Installation work must include adherence to all fire ratings.
4. Wear proper protective eyewear, gloves and cloth-ing for working environment time.
5. The manufacturer is not responsible for personal injury or damage from improper installation, service or handling of product.
6. Deviation from the specifications and drawings can result in product damage, additional site work, and delays in system delivery.

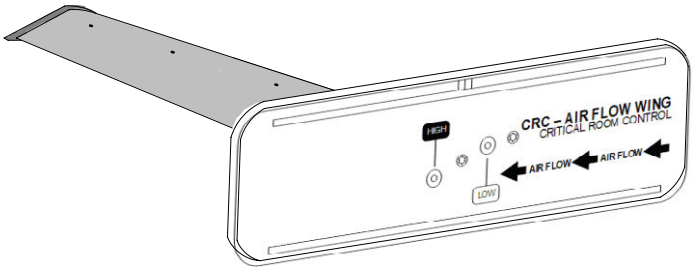
RECEIVING INSTRUCTION

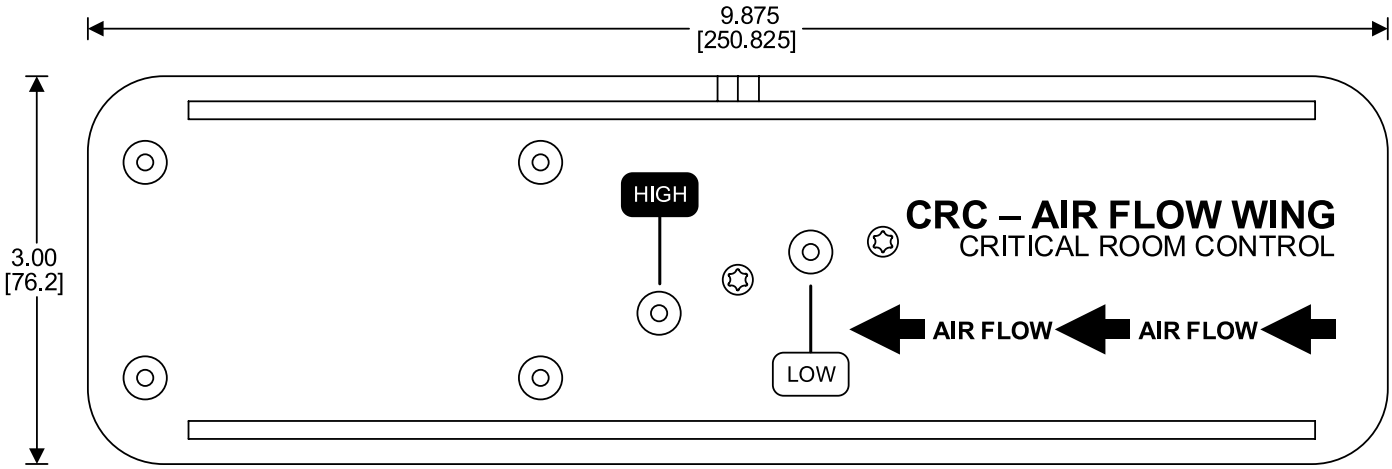
1. Thoroughly inspect all equipment for shipping damage. If any damage is found, write a complete and detailed description.
2. Immediately report any damage or loss to delivering carrier.
3. Notification can be given either in person or by phone.
4. Written confirmation must be mailed within 48 hours.

INSTALLATION GUIDE

AFW - INSERTION MOUNT

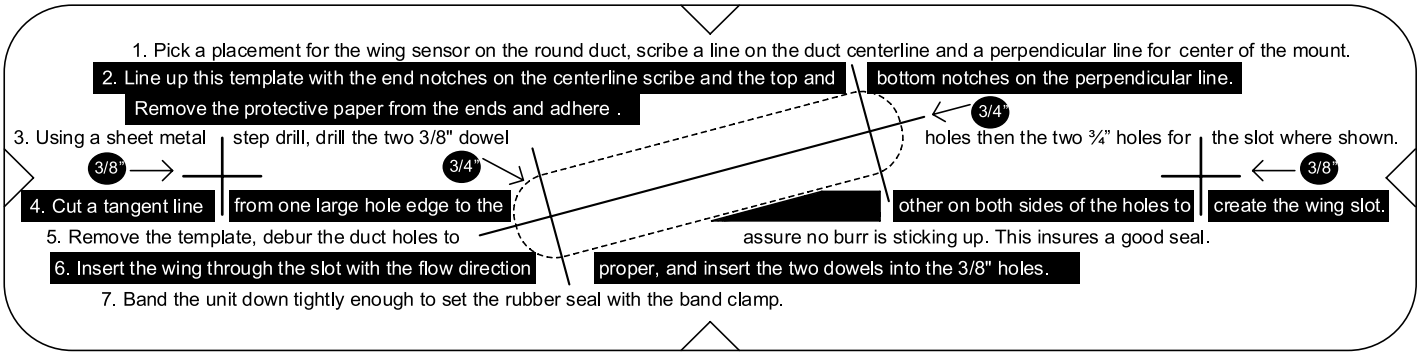
The AFW Insertion Mount is designed to be installed externally through the side wall of a duct or plenum. Every AFW Insertion Mount includes hardware for compression fit installation and screw tight fit installation. This section provides instructions for installation of the AFW Insertion Mount probes with both installation types





NO BRACKETS = INCHES (in)
[BRACKETS] = MILLIMETERS (mm)

MARKING AND PREPARATION



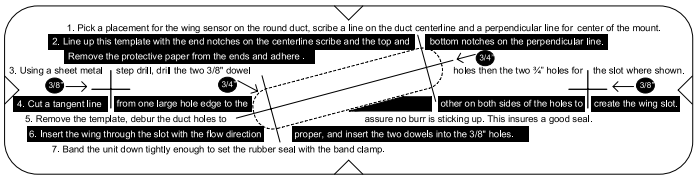
Follow the step-by-step procedure for the AFW Insertion Mount to ensure the AFW is mounted level to the direction of airflow within the duct plane.

INSTALLATION GUIDE

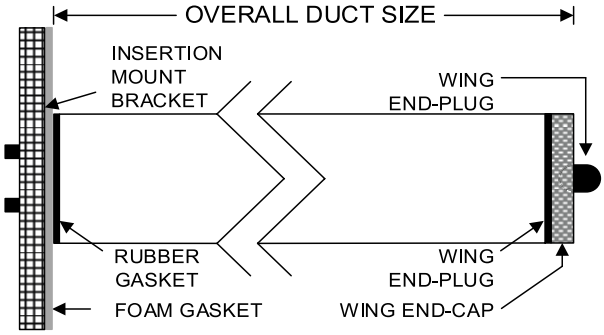
INSERTION MOUNT - COMPRESSION FIT

1. Refer to placement guide for probe placement in round, square, and rectangular duct.
2. Locate and scribe lines for probe location: one on the centerline of the verified location(s) and one perpendicular to the centerline to ensure the mount will be centered. When multiple probes are required, refer to guide for proper spacing.
3. Center install template on the horizontal scribe line using the end notches found on each end of the install template.
4. Center the install template on the vertical scribe line using the top/bottom notches.
5. Verify the install template is centered with the scribe lines and adhere template to the duct.
6. Drill two 3/8" holes as shown on template using a sheet metal step drill bit.
7. Drill two 3/4" holes on each end of wing oval slot shown on the center of the install template.
8. Cut opening between the 3/4" holes creating a clear opening for probe insertion.
9. Deburr the duct holes to create a flat mounting surface, allowing for a tight seal between the AFW and the duct.
10. Insert the probe through the slot, double check the probe is properly orientated in terms of flow direction, then fully insert both 3/8" dowels into the 3/8" holes drilled in Step 6.
11. Band the unit down tightly enough to set the rubber screw with the band clamp, or use provided sheet metal screws to secure probe plate to duct.

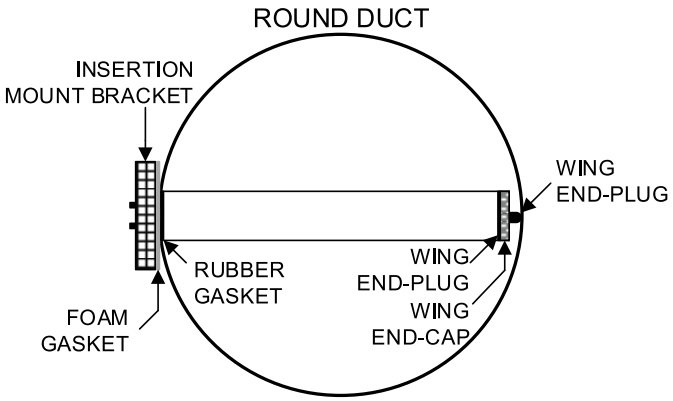
MOUNTING TEMPLATE



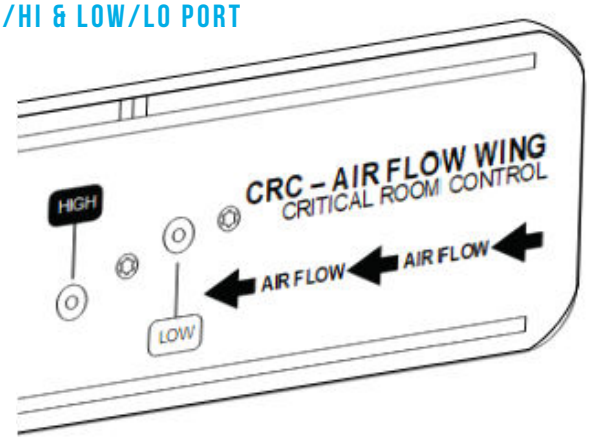
COMPRESSION FIT



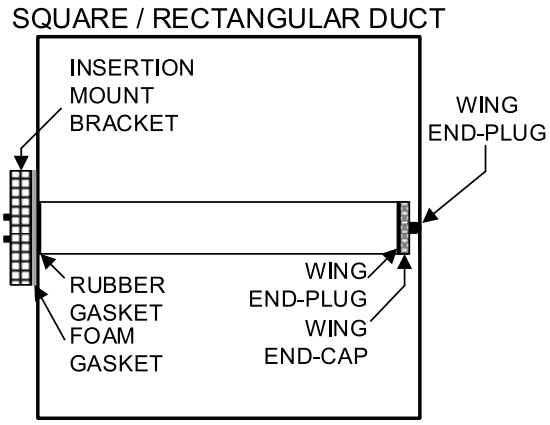
ROUND DUCT MOUNT



HIGH/HI & LOW/LO PORT



SQUARE DUCT MOUNT

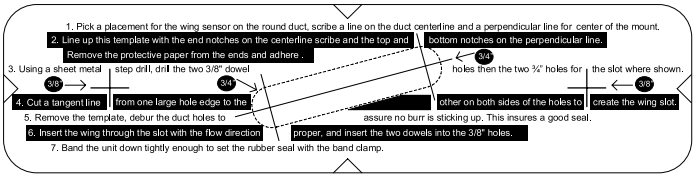


INSTALLATION GUIDE

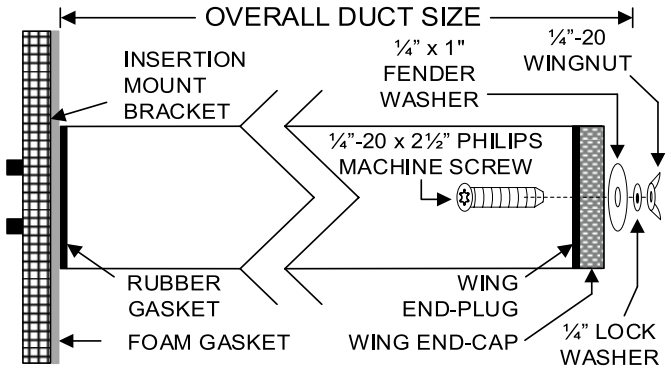
INSERTION MOUNT - SCREW TIGHT FIT

1. Refer to placement guide for probe placement in round, square, and rectangular duct.
2. Locate and scribe lines for probe location: one on the centerline of the verified location(s) and one perpendicular to the centerline to ensure the mount will be centered. When multiple probes are required, refer to guide for proper spacing.
3. Center install template on the horizontal scribe line using the end notches found on each end of the install template.
4. Center the install template on the vertical scribe line using the top/bottom notches.
5. Verify the install template is centered with the scribe lines and adhere template to the duct.
6. Drill two 3/8" holes as shown on template using a sheet metal step drill bit.
7. Drill two 3/4" holes on each end of wing oval slot shown on the center of the install template.
8. Cut opening between the 3/4" holes creating a clear opening for probe insertion.
9. Deburr the duct holes to create a flat mounting surface, allowing for a tight seal between the AFW and the duct.
10. Insert the probe through the slot, double check the probe is properly orientated in terms of flow direction, then fully insert both 3/8" dowels into the 3/8" holes drilled in Step 6.
11. Drill a 13/64" hole using a 13/64" sheet metal step drill to allow for a 4" -20 2-1/2 Philips machine screw to pass through the hole.
12. Secure probe with the provided fender washer, lock washer, and locknut to mount the AFW to the duct.

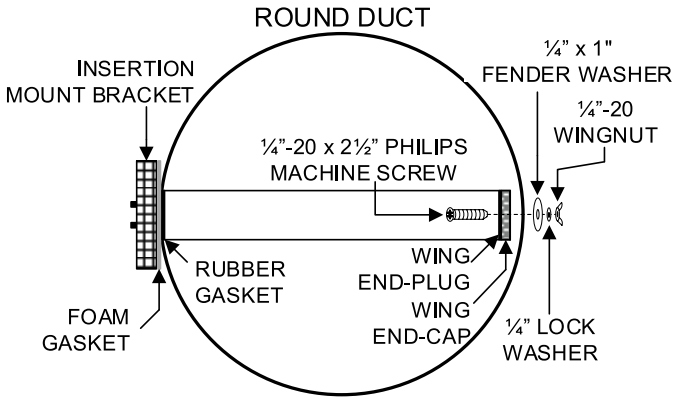
MOUNTING TEMPLATE



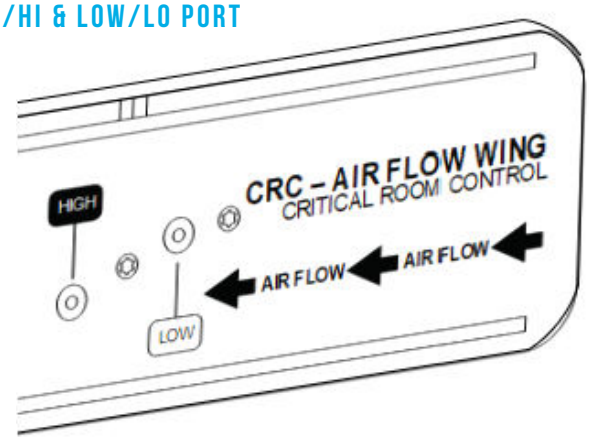
COMPRESSION FIT



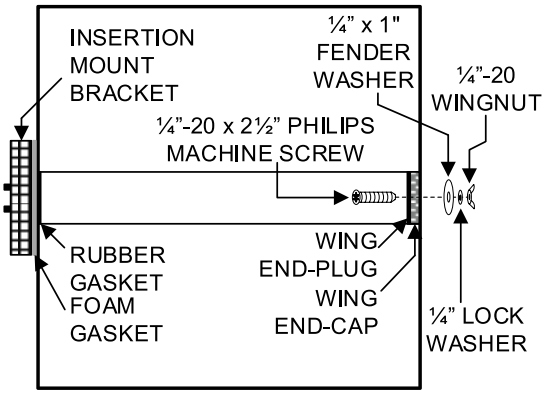
ROUND DUCT MOUNT



HIGH/HI & LOW/LO PORT



SQUARE DUCT MOUNT

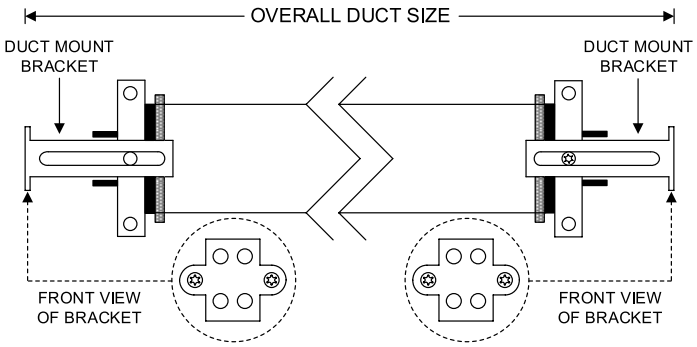


INSTALLATION GUIDE

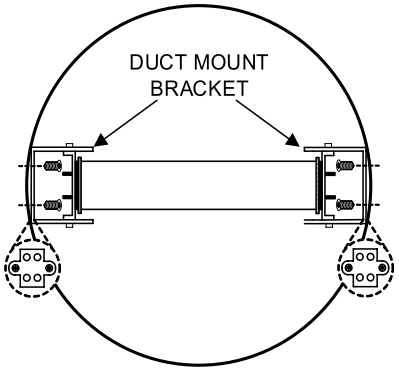
INTERNAL MOUNT

1. Refer to placement guide for probe placement in round, square, and rectangular duct.
2. The probe allows for field selection of pneumatic connection to the sensor ports on either end of the probe.
3. Determine which probe end will be used for pneumatic connection.
4. Verify the sensor ports on the unused end(s) of the probe(s) are capped.
5. Using the placement guide for round duct, or square / rectangular duct, locate and scribe two lines, one on each side of the inside of the duct for each probe.
6. Mounting brackets must be level in duct plane in direction of airflow to ensure AFW mounting angle and proper measurement.
7. Fasten duct mounting brackets to the inside of duct walls.
8. Use provided screws to attach AFW probe(s) to duct mounting brackets.

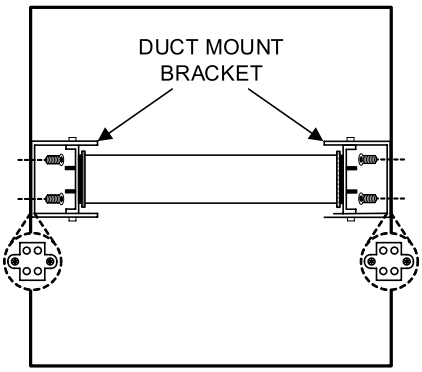
INTERNAL MOUNT



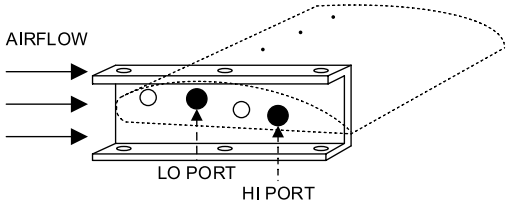
ROUND DUCT MOUNT



SQUARE DUCT MOUNT



HIGH/HI & LOW/LO PORT

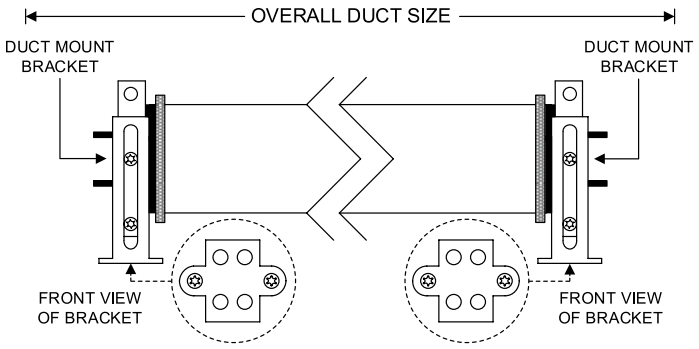


INSTALLATION GUIDE

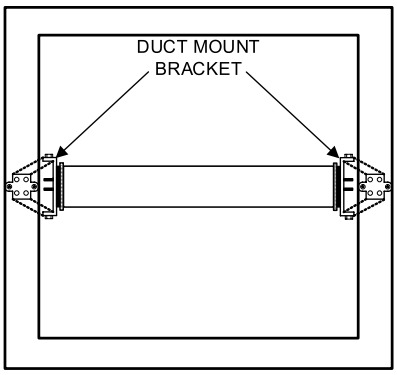
STANDOFF MOUNT

1. The probe allows for field selection of pneumatic connection to the sensor ports on either end of the probe.
2. Determine which probe end will be used for pneumatic connection.
3. Verify the sensor ports on the unused end(s) of the probe(s) are capped.
4. Using the placement guide for round duct, or square / rectangular duct, locate and scribe two lines, one on each side of the inside of the duct for each probe.
5. Mounting brackets must be level in duct plane in direction of airflow to ensure AFW mounting angle and proper measurement.
6. Fasten duct mounting brackets to the inside of duct walls.
7. Use provided screws to attach AFW probe(s) to duct mounting brackets.

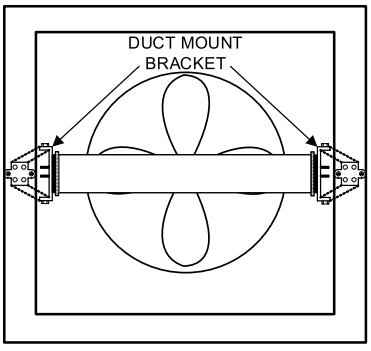
STANDOFF MOUNT



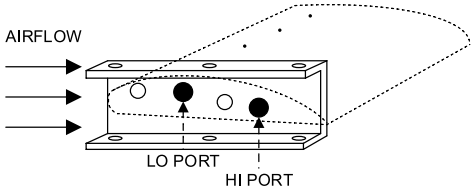
SQUARE DUCT MOUNT



FAN ARRAY

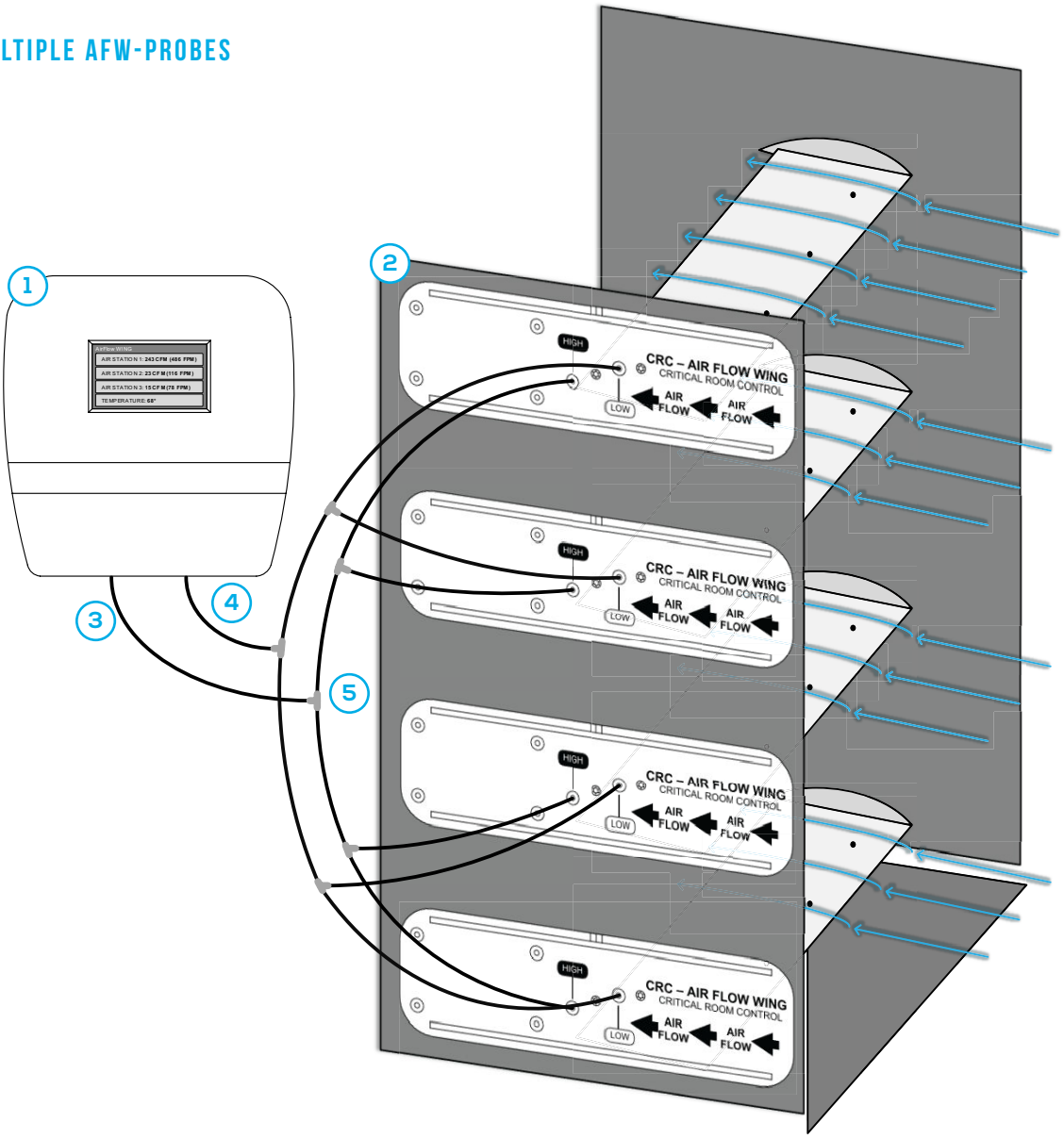


HIGH/HI & LOW/LO PORT



INSTALLATION GUIDE

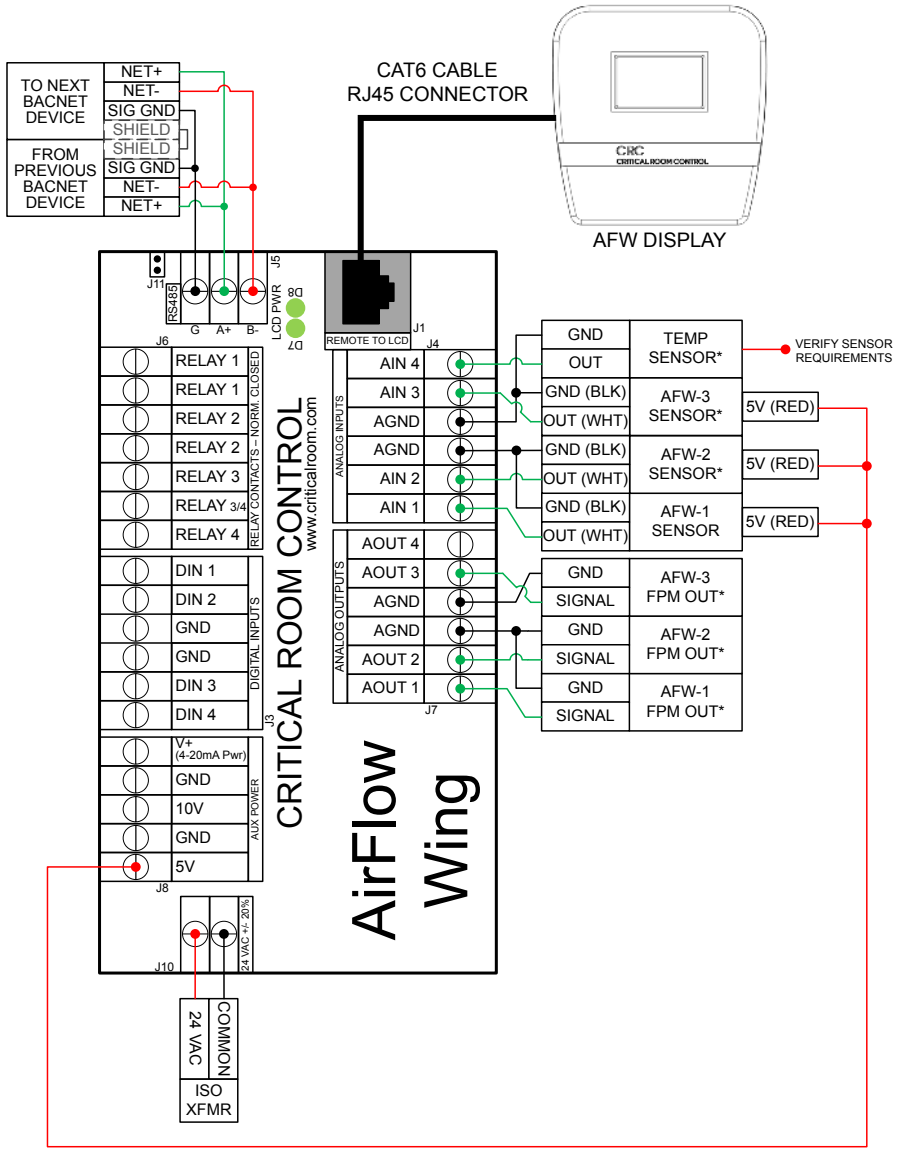
INSTALLING MULTIPLE AFW-PROBES



1. AFW-Transmitter (installation also applies to AFW-Remote Sensor)
2. Multiple insertion mount AFW-Probes for single measurement station (layout also applies to internal mount and standoff mount)
3. AFW HIGH/HI port with 1/4" pneumatic tubing connected to each AFW-Probe
4. AFW LOW/LO port with 1/4" pneumatic tubing connected to each AFW-Probe
5. T-connectors (provided with AFW-Probes) for field installation of pneumatic tubing.

WIRING GUIDE

AFW WITH THREE (3) MEASUREMENT STATIONS



* Optional field connections

⚠ Up to three airflow measurement stations can connect to the I/O board using AIN 1, AIN 2, and AIN 3. Input signal range: 0.5 to 4.5 VDC / 0.0 to 0.5 inWC.

⚠ Remote sensors must be field-wired to the I/O board if used.

⚠ Each airflow station outputs a velocity signal via AOUT 1, 2, and 3, with an output signal range of 0.0 to 10.0 VDC / 0 to 5000 FPM.

⚠ A temperature sensor can connect to AIN 4.

⚠ Requires 24 VAC power input (20 VA).

NETWORK INTEGRATION

BACNET MS/TP DETAILS

The AFW uses the BACnet® MS/TP protocol for communication with the building automation system. BACnet® allows owners and service providers to monitor, trend, alarm, troubleshoot and change parameters to verify that operating conditions are being met.

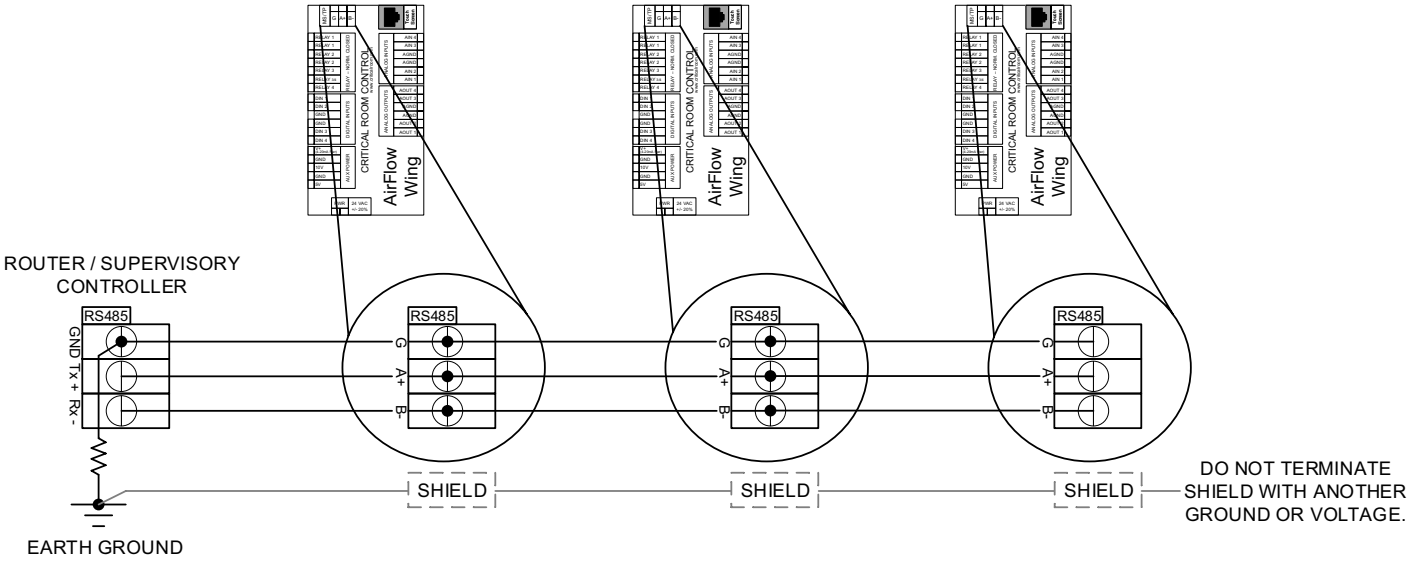
RS485 WIRING

Connecting to the RS485 network requires a three-wire conductor: positive, negative, and ground/common. Devices on an RS485 network are connected in a series circuit, or "daisy-chained."

An MS/TP EIA-485 network should use a three-wire shielded twisted pair cable with an impedance of 100-130 ohms. The capacitance between conductors should be less than 100 pF per meter. Both foil and braided shields are acceptable.

The maximum segment length is 4,000 feet using 18 AWG wire, with up to 32 nodes per segment. The network should not have T connections. Terminations of 120 ohms ±5% should be at each end of the segment, with no additional terminations at intermediate nodes.

TYPICAL BACNET WIRING AND NETWORK SETUP

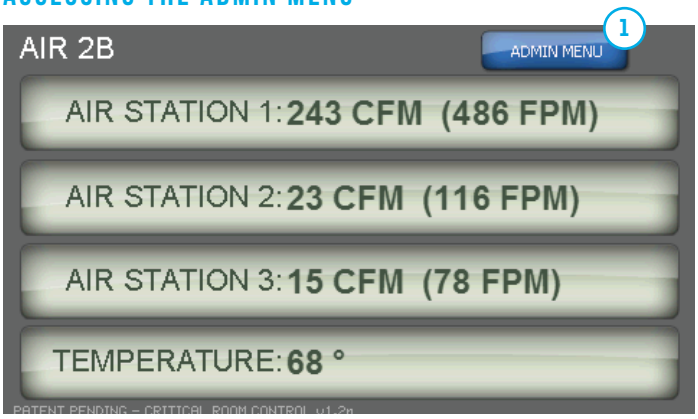


BACNET TABLE

Object	Point Name	Units	Range	Description	Write Setting
AV0	STATION 1 CFM	CFM	0-9999	Air Station 1 measured flow in Cubic Feet Per Minute (CFM)	Read Only
AV1	STATION 2 CFM	CFM	0-9999	Air Station 2 measured flow in Cubic Feet Per Minute (CFM)	Read Only
AV2	STATION 3 CFM	CFM	0-9999	Air Station 3 measured flow in Cubic Feet Per Minute (CFM)	Read Only
AV3	TEMPERATURE	°F	0-9999	Temperature measured in degrees F (°F)	Read Only
AV4	STATION 1 FPM	FPM	0-999999	Air Station 1 measured velocity in Feet Per Minute (FPM)	Read Only
AV5	STATION 2 FPM	FPM	0-999999	Air Station 2 measured velocity in Feet Per Minute (FPM)	Read Only
AV6	STATION 3 FPM	FPM	0-999999	Air Station 3 measured velocity in Feet Per Minute (FPM)	Read Only

QUICKSTART GUIDE

ACCESSING THE ADMIN MENU



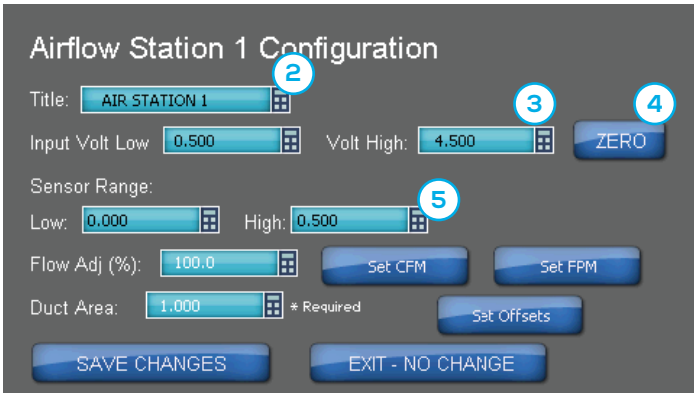
1 Touch top of screen and select ADMIN MENU

2 Administrative Menu - Access to setup parameters

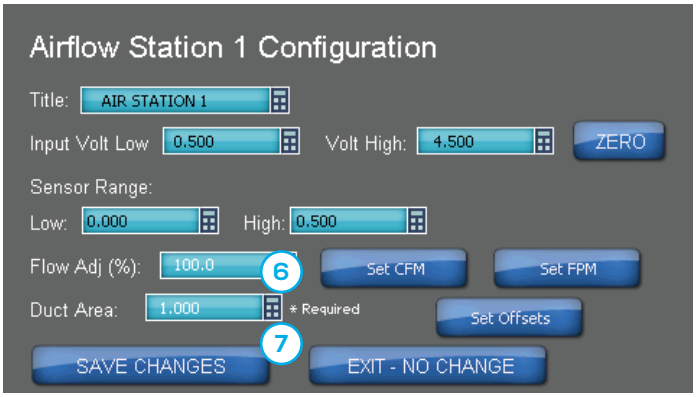
QUICKSTART GUIDE

MEASUREMENT STATION SETUP

1. Select Config Airflow for desired station to be configured (1,2,3)



2. Touch Title text box and enter desired name of airflow station
3. Verify sensor Input Volt Low and Volt High (0.5 to 4.5 VDC default)
4. Touch ZERO when measurement station has no airflow
5. Verify Sensor Range Low and High (0.0 to 0.5 "WC default)

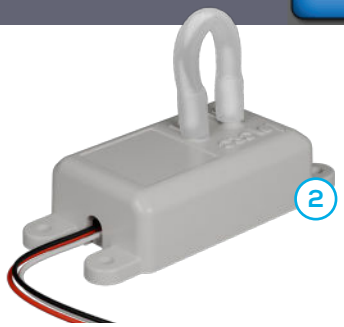


6. Enter the Duct Area of airflow station in square feet (sq ft.)
7. SAVE CHANGES

QUICKSTART GUIDE

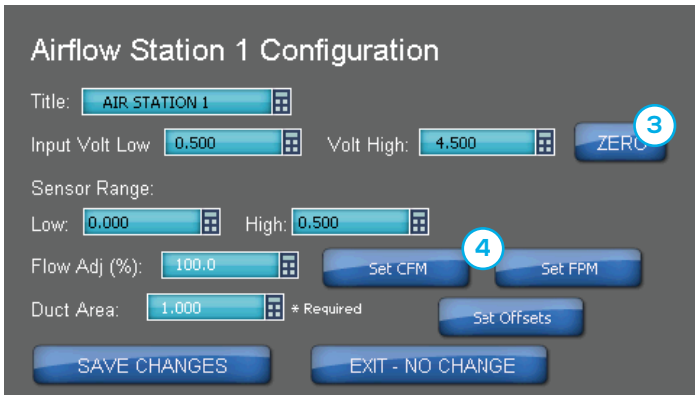
COMMISSIONING

1 Select Config Airflow for desired 1 station to be commissioned (1,2,3)



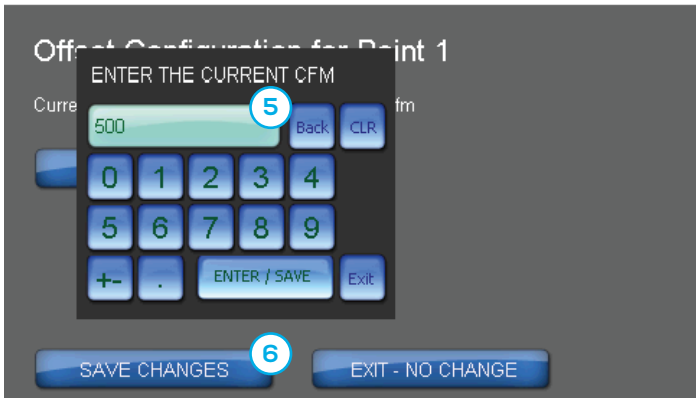
2 To zero the airflow station, find the station sensor. It may be located:
- Inside the AFW-Transmitter
- Inside the AFW-Remote Sensor

Then, shunt the HI and LO ports of the sensor with pneumatic tubing.



3 While the sensor is shunted, press the ZERO button
Note: Input Volt Low value may Change from 0.500

4 Press button for desired method of commissioning:
- Set CFM - Confirm station reading with CFM measurement
- Set FPM - Confirm station reading with FPM measurement



5 Based on commissioning method selection above:
- ENTER THE CURRENT CFM
- ENTER THE CURRENT FPM

⚠ Flow Adj (%) value may change from 100

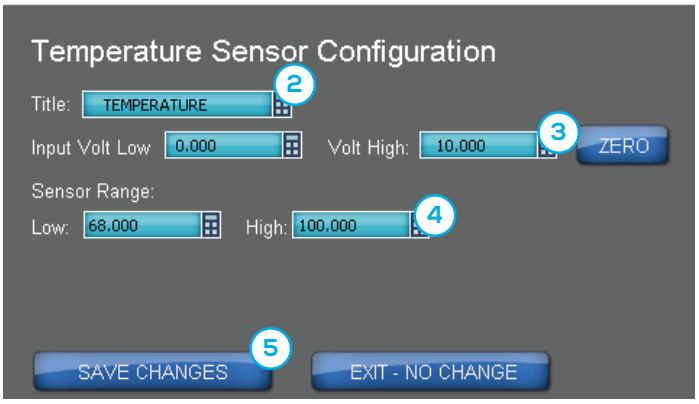
6 SAVE CHANGES

QUICKSTART GUIDE

TEMPERATURE SETUP

1. Select Temperature Set to configure temperature sensor

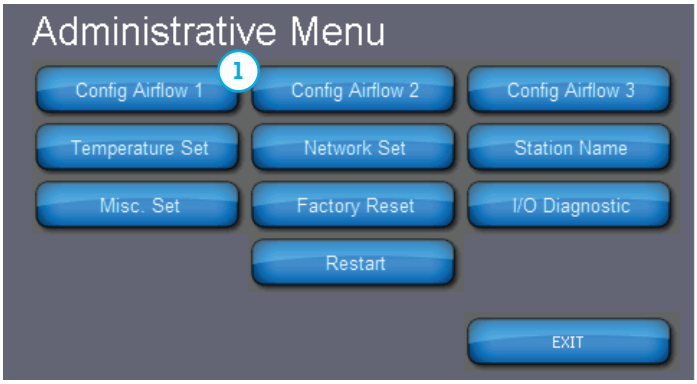
2. Changes to this value can negatively affect readings.



2. Touch Title text box and enter name of temperature sensor
3. Enter sensor Input Volt Low and Volt High
4. Enter Sensor Range Low and High
5. SAVE CHANGES

QUICKSTART GUIDE

SET OFFSETS - CHALLENGING LOCATIONS (OPTIONAL)

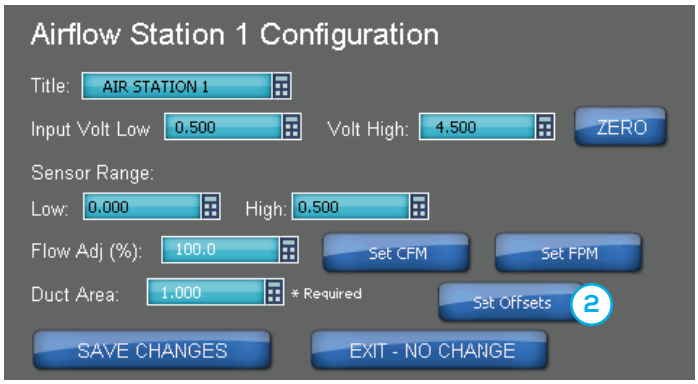


The AFW-Transmitter offsets are used when the AirFlow WING is installed in a challenging location.

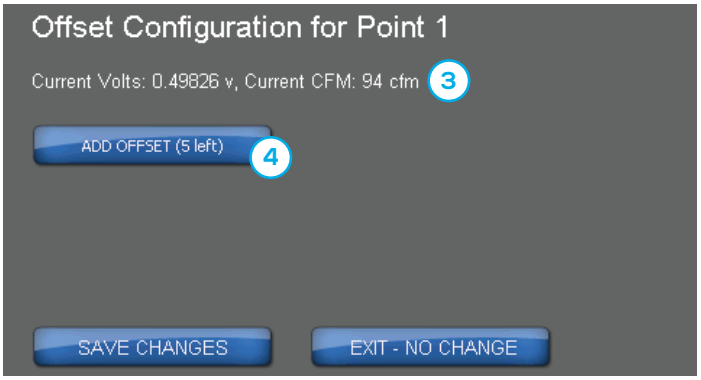
- The AFW-Transmitter has the ability to set up to five (5) unique offsets to the AirFlow WING flow profile
- The AFW-Transmitter will automatically scale each offset input

When an offset is entered, verify airflow measurement at multiple airflows (such as low, medium, and high airflow).

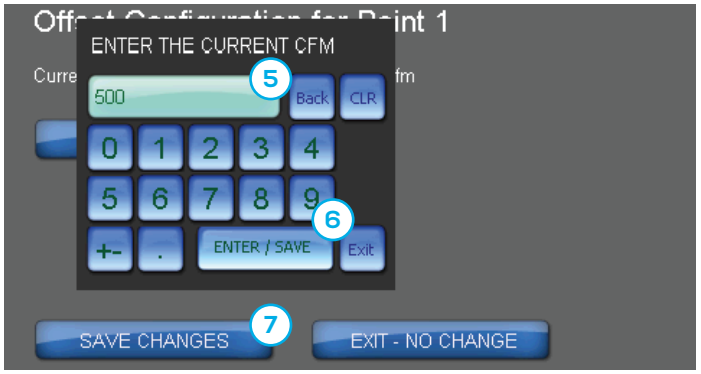
1. Select Config Airflow for desired station to be commissioned (1,2,3)



2. Select Set Offsets



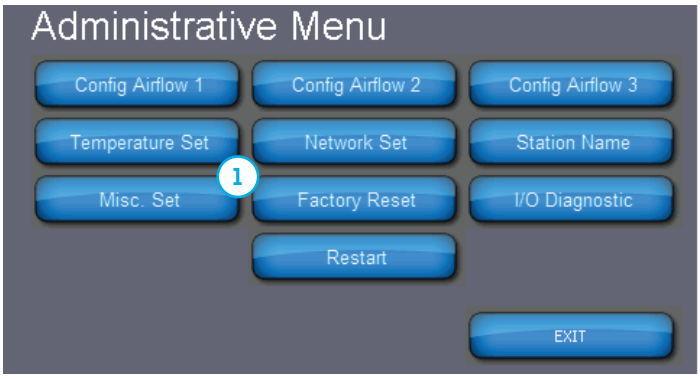
3. Display of Current Volts and Current CFM of measurement sensor
4. Select ADD OFFSET



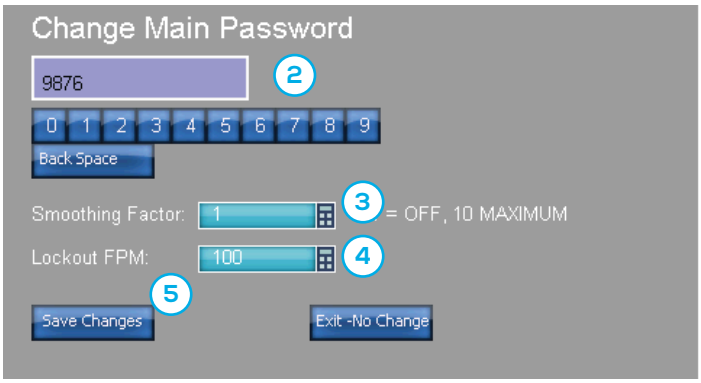
5. Measure CFM and ENTER THE CURRENT CFM in the box
6. Touch ENTER/SAVE to save the entry
   Repeat process for up to (5) unique offsets
7. SAVE CHANGES

QUICKSTART GUIDE

MISC SETUP



1. Select Misc. Set



2. Change Main Password by entering it in the box (####)
3. In Smoothing Factor box, enter value between 1 and 10 (5 default)

⚠ 1 = OFF, 10 = MAXIMUM Smoothing Factor

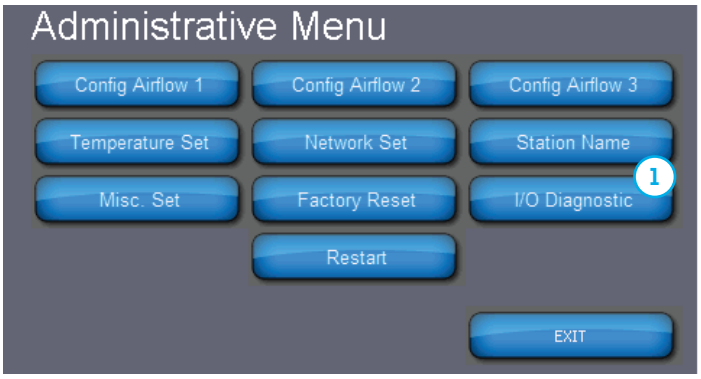
4. In Lockout FPM box, enter lockout value in Feet Per Minute (FPM)

⚠ Velocity less than entered value will register as 0 FPM/CFM

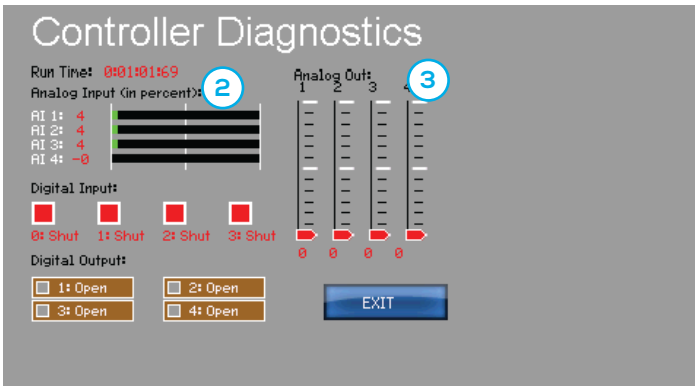
5. SAVE CHANGES

QUICKSTART GUIDE

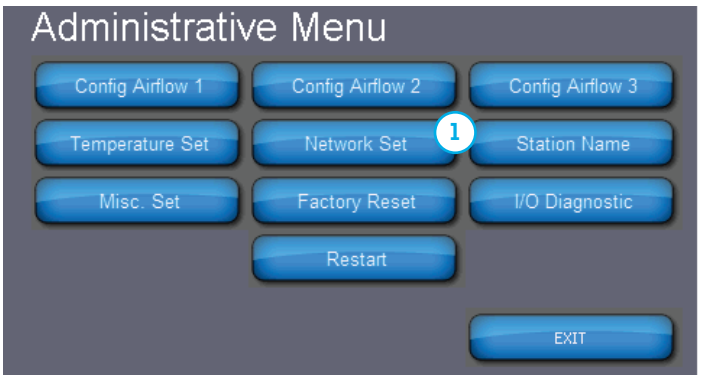
TRANSMITTER DIAGNOSTICS SCREEN



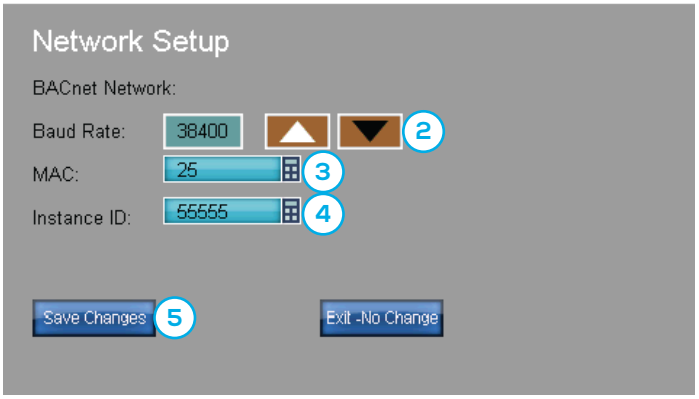
1. Select I/O Diagnostic



2. AI 1-3: Green bar indicates input (0-100%) from airflow sensor
   AI 4: Green bar indicates input (0-100%) from temperature sensor
3. Analog Out 1-4: Allows override of flow output signal (0-10 VDC) and is used to verify output signal is terminated at third party device



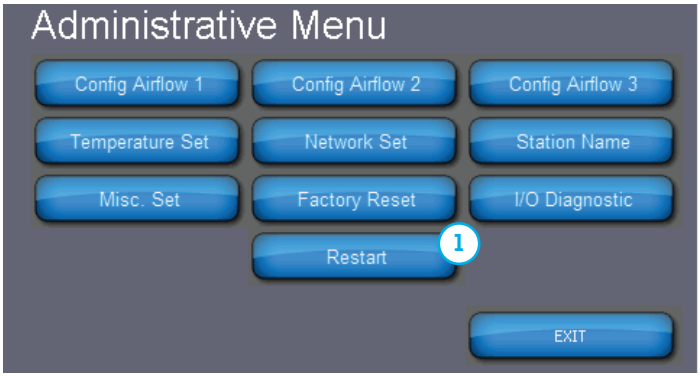
1. Select Network Set



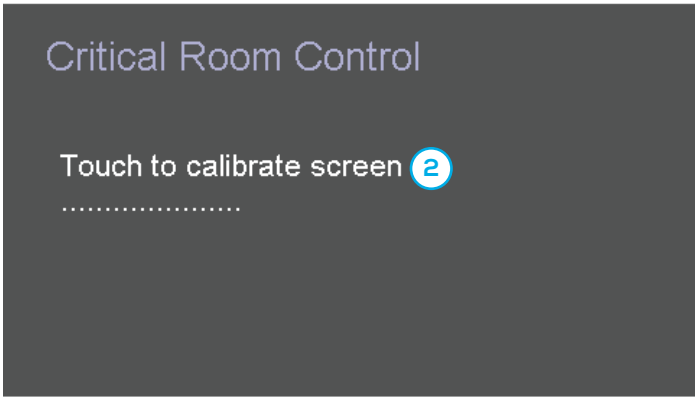
2. Select network Baud Rate using up/down arrows
3. Enter MAC address
4. Enter device Instance ID
5. Save Changes when parameters are complete

QUICKSTART GUIDE

TOUCHSCREEN CALIBRATION



1. Select Restart to restart transmitter and initiate touchscreen recalibration process



2. Touch the screen to start the touchscreen calibration procedure and follow prompts to complete recalibration process

NOTES

NOTES

criticalroom.com

Measure What Matters.

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Brown Deer, WI 53223

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