Air Quality Solutions

Installation, Operation, and Maintenance Manual

Models AiQ-TD-50C or AiQ-TD-60C

Models AiQ-TD-50 or AiQ-TD-60

AIRFLOW-IQ Series

Thermal Dispersion Technology

Models: AiQ-TD-xx, AiQ-TD-xxC

Contents

AIRFLOW-IQ Series
Thermal Dispersion Technology

Installation, Operation, and Maintenance Manual

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

INSPECTION

Unpacking and Installing the Airflow-IQ Electronic Airflow Measuring Station.

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's delivery receipt. A separate request for inspection by the carrier's agent should be made in writing.

Remove the Airflow-IQ unit from its shipping container and immediately inspect for content, rust, corrosion, and further damage. Care must be taken in handling the unit. Always handle the Airflow- IQ unit by its frame/casing. Do not lift unit by the damper blades, airflow measuring probes, jackshaft, or actuator (if applicable). Do not drop, drag, step on or apply excessive bending, twisting, or racking loads to the Airflow-IQ assembly. Improper handling or storage prior to installation of the unit will have adverse affects on the factory calibration and could result in cancellation of the warranty.

Inspect the adjacent ductwork and/or the opening where the Airflow-IQ unit will be installed for any obstructions or irregularities that might interfere with the probes, damper blades, or actuator. When mounted to adjoining ductwork, the ductwork should be supported in the area of the Airflow-IQ unit to prevent sagging and to ensure proper functionality of the unit. The AIRFLOW-IQ must be installed with the frame square and without twisting or bending. Unless specifically designed for a vertical blade application, the unit must be mounted with its damper blade axis in the horizontal plane. The damper blades, axles and linkage must be able to operate freely without binding.

The best location for the extended shaft or jackshaft must be determined before installing the damper. After the damper is installed the shaft location cannot be changed without removing the damper. The jackshaft, when included, will always be downstream of the damper. The AIRFLOW-IQ has a specific airflow inlet and outlet and must be installed in the correct orientation. **The airflow enters through the air measurement probe(s) and exits the unit from the damper frame side.**

IMPORTANT: Prior to installation, inspect the assembly to ensure that caulk is present between the damper frame and the adjacent casing/sleeve on all four sides of the damper. Caulking around the damper frame is required on either the upstream or downstream side of the damper to ensure low leakage performance of the assembly. Also ensure that the exterior longitudinal seams of the casing/sleeve are caulked to prevent airflow from passing into or out of the assembly, thereby affecting performance. Caulking around the perimeter of the damper frame and caulking the exterior longitudinal casing/sleeve seams are completed at the plant prior to shipment. If, after inspection, the caulking is incomplete or otherwise not satisfactory, the assemblies should be caulked in the field prior to installation.

After installing the unit in the ductwork or opening, caulk around the upstream and downstream ductwork connections to ensure that there is no leakage or bypass air around the Airflow-IQ assembly. The TDP05K probes are factory calibrated and tested in order to perform correctly in its job specific application. Refer to the wiring schematic and controls section of this document for necessary field power connections.

Once electrical power is applied, the Primary display will go through a start-up sequence during which it will identify and communicate with each airflow sensor. Once the start-up sequence has been complete, the Primary display will show the measured airflow rate, velocity, and ambient air temperature. Reasonable access must be provided to allow inspection and maintenance of the actuator, probes and damper. The sensor density is based on extensive lab testing to optimize the accuracy of the AIRFLOW-IQ Electronic Air Measuring Station. Contact your local Ruskin® representative if you have questions regarding a particular application.

AIRFLOW-IQ COMPONENTS

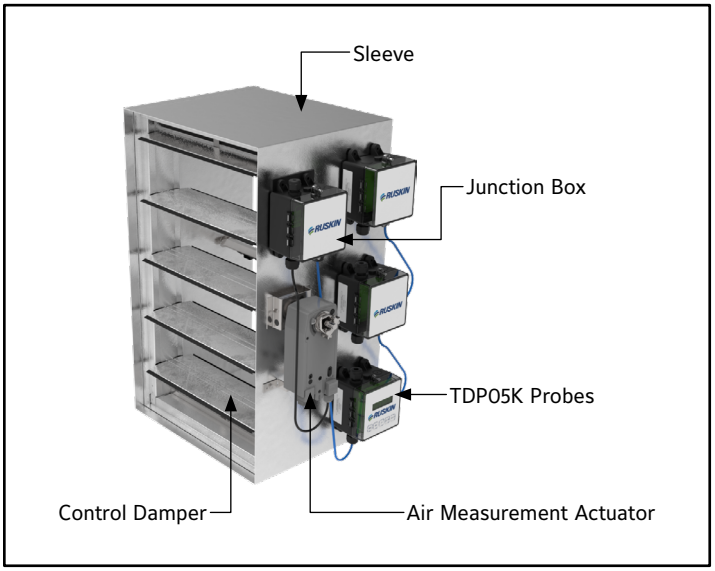


FIGURE 1: Model AiQ-TD-xxC Assembly

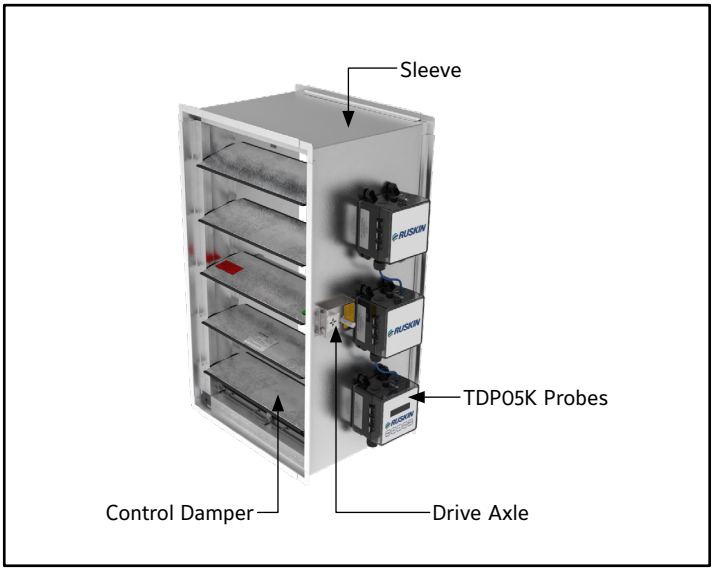


FIGURE 2: Model AiQ-TD-xx Assembly (Shown without Optional 24V Modulating Actuator)

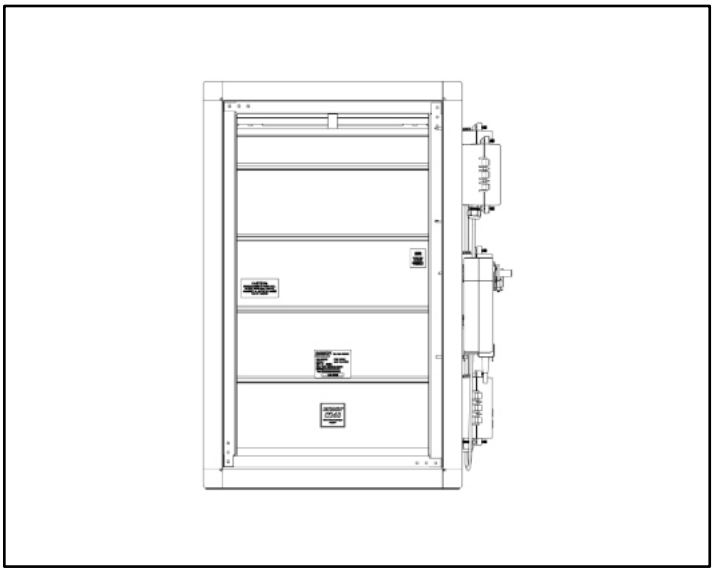


FIGURE 3: Control Damper mounted within Sleeve. Shown with Optional Rear Flange and viewing from Downstream of the Installation

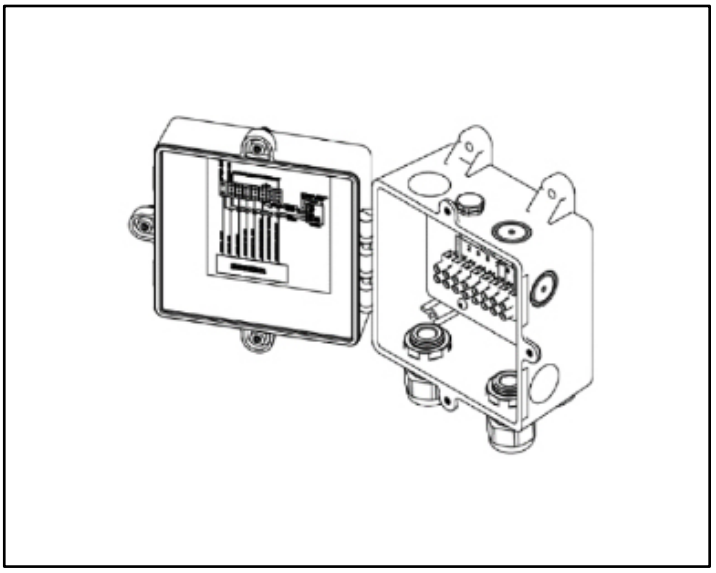


FIGURE 4: Factory-Mounted Junction Box. Includes Wiring Diagram on Internal side of Lid Cover.

AIRFLOW-IQ COMPONENTS

FIGURE 5: Air Measurement Actuator/ Controller. Spring Return Model VAFB24-BAC.

FIGURE 6: Air Measurement Actuator/ Controller. Maintain-Last-Command Model VAMB24-BAC

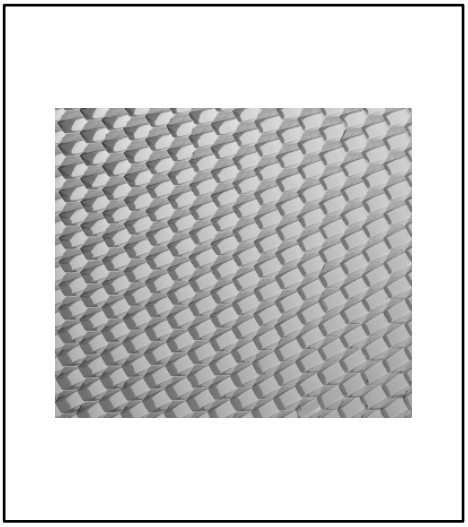


FIGURE 7: Honeycomb Airflow Straightener. (Available as an Option on all AiQ Models)

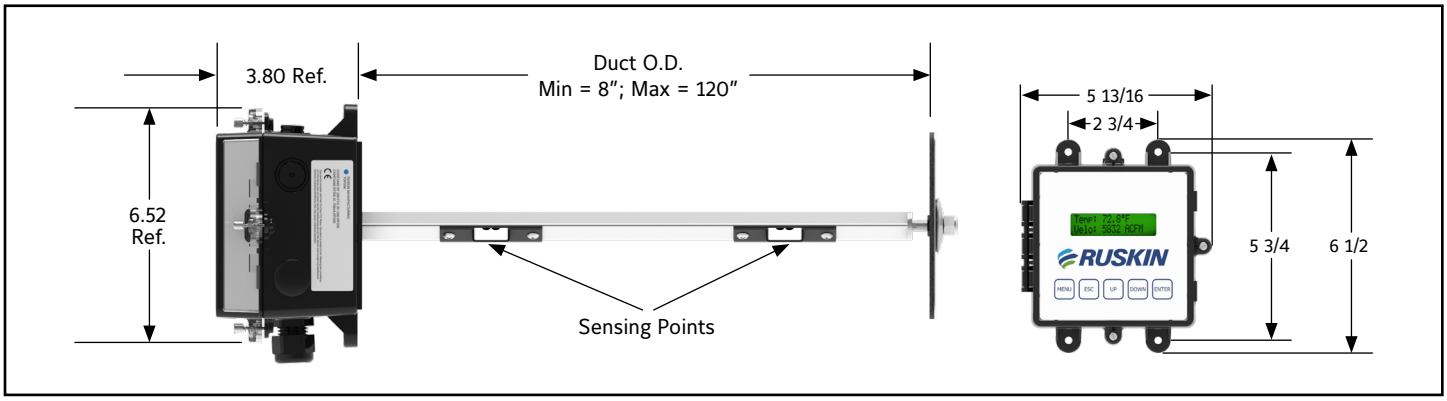


FIGURE 8: TDP05K Airflow & Temperature Measuring Probe and Face of Primary Monitor Box (User Interface)

AIRFLOW-IQ DIMENSIONS

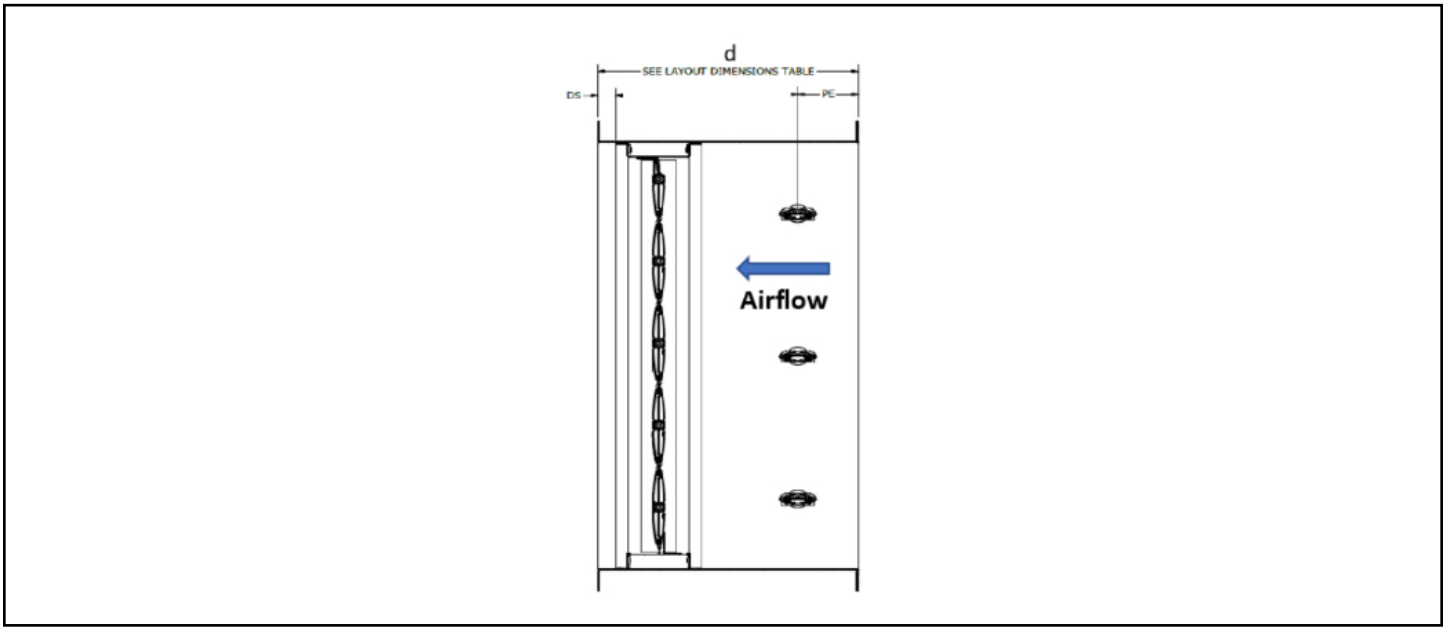


FIGURE 9: Airflow-IQ Dimensional Data

Airflow - IQ Model Name	Damper Model	Dimensions WITH Airflow Straightener				Dimensions WITHOUT Airflow Straightener			
		DS	PE	Single Section Units	Multi-Section Units	DS	PE	Single Section Units	Multi-Section Units
				d	d			d	d
AiQ-TD-50	CD50	1″	6″	18″	22.5″	1″	3.5″	15″	20″
AiQ-TD-50C	CD50	1″	6″	18″	22.5″	1″	3.5″	15″	20″
AiQ-TD-60	CD60	1″	6″	18″	22.5″	1″	3.5″	15″	20″
AiQ-TD-60C	CD60	1″	6″	18″	22.5″	1″	3.5″	15″	20″

TABLE 1: Airflow-IQ Dimensional Data

NOTE:

- Optional Airflow Straightener is installed within the sleeve/casing and upstream of the TDP05K Probes.
- Drawing displays the sleeve/casing with optional front (upstream) and rear (downstream) flange.

MOUNTING ORIENTATION

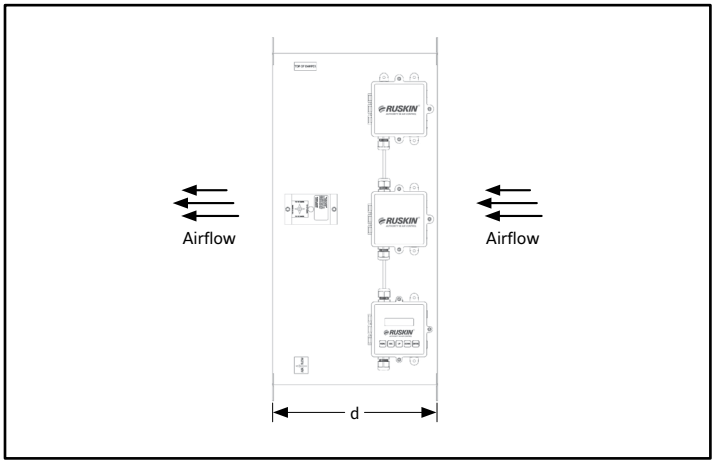


FIGURE 10: RIGHT HAND Mount.
(Shown with Optional Front and Rear Flanges)

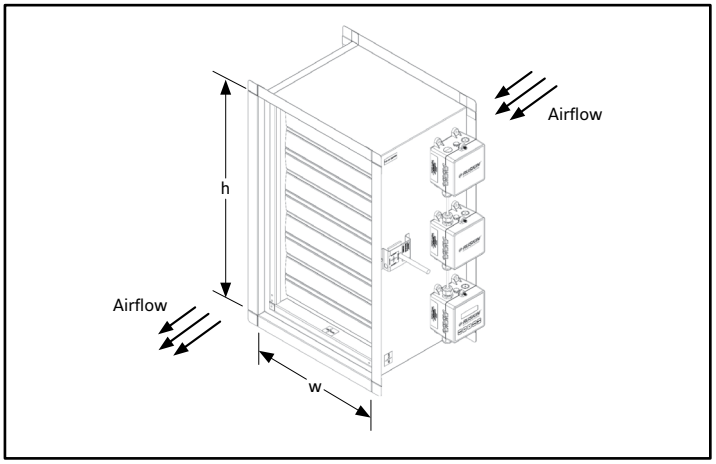


FIGURE 11: RIGHT HAND Mount Airflow enters through the TDP05K probes and exits through the control damper.
(Shown with Optional Front and Rear Flanges)

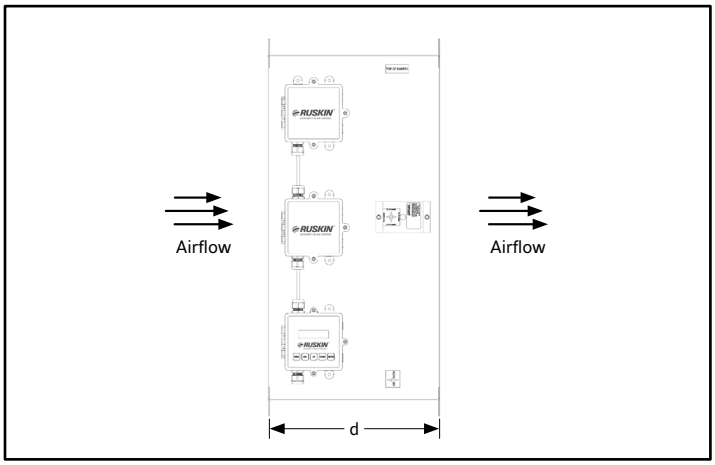


FIGURE 12: LEFT HAND Mount (Option)
(Shown with Optional Front and Rear Flanges)

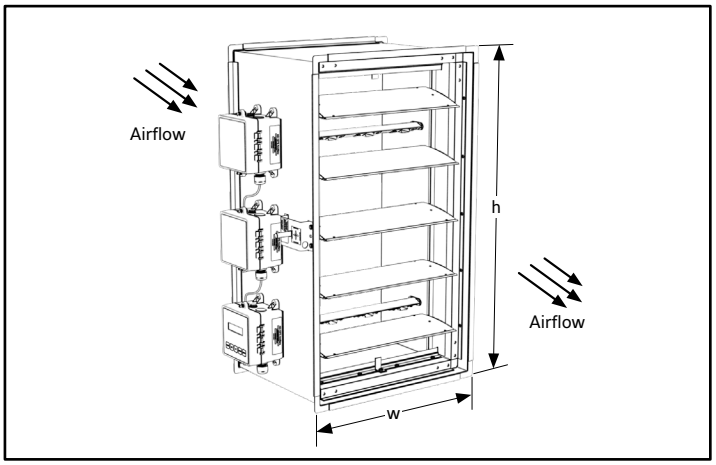


FIGURE 13: LEFT HAND Mount (Option)
(Shown with Optional Front and Rear Flanges)

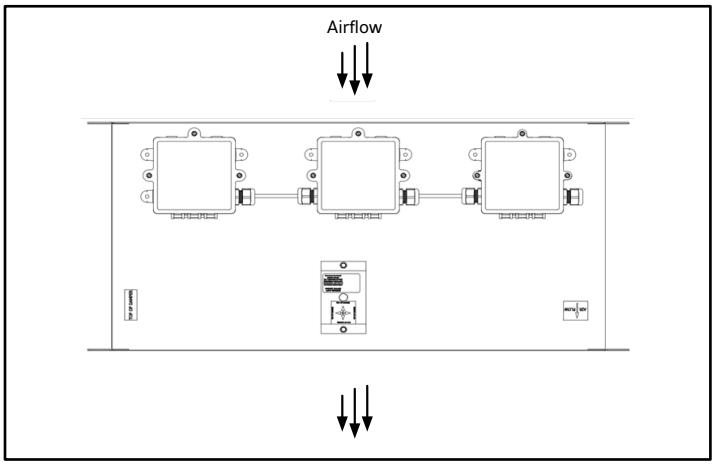


FIGURE 14: Vertical Airflow DOWN

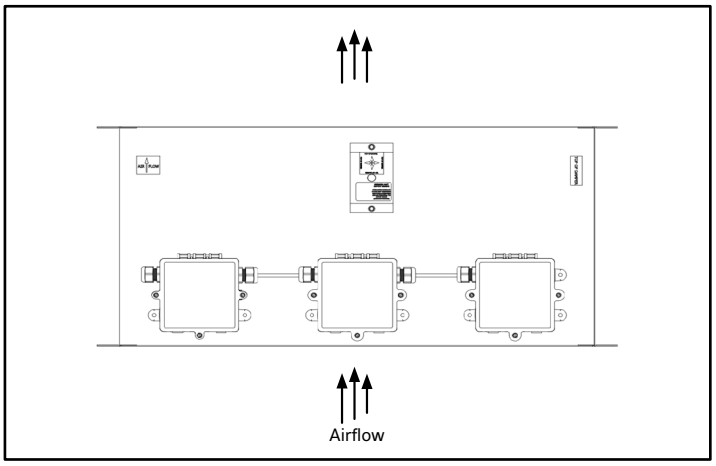


FIGURE 15: Vertical Airflow UP

NOTE:

- Mounting Orientation is derived from the perspective of viewing the Airflow-IQ unit from downstream of the installation (with airflow hitting you in the face).
- The unit is designed for both horizontal and vertical airflow applications.
- Consult Ruskin when Vertical Blade installations are required.

GENERAL ELECTRICAL INFORMATION

Connect-Air part number W24182P-2306BL with communications and power combined in one cable is included (factory wired) with the Airflow-IQ unit. This power/data cable is used to connect the TDP05K monitor boxes on each AiQ-TD-xx unit while also used to connect the TDP05K monitor boxes to the junction box on each model AiQ-TD-xxC. Alternatively, use of a twisted shielded pair 24 AWG low capacitance wire communications cable and an 18 AWG power cable can be utilized if the factory installed cabling must be replaced due to damage or misplacement.

NOTE: Do not kink the interconnection wires. In an exposed or conduit installation, the wiring minimum bend radius is 1.5 in. (38 mm). **See Figure 7.**

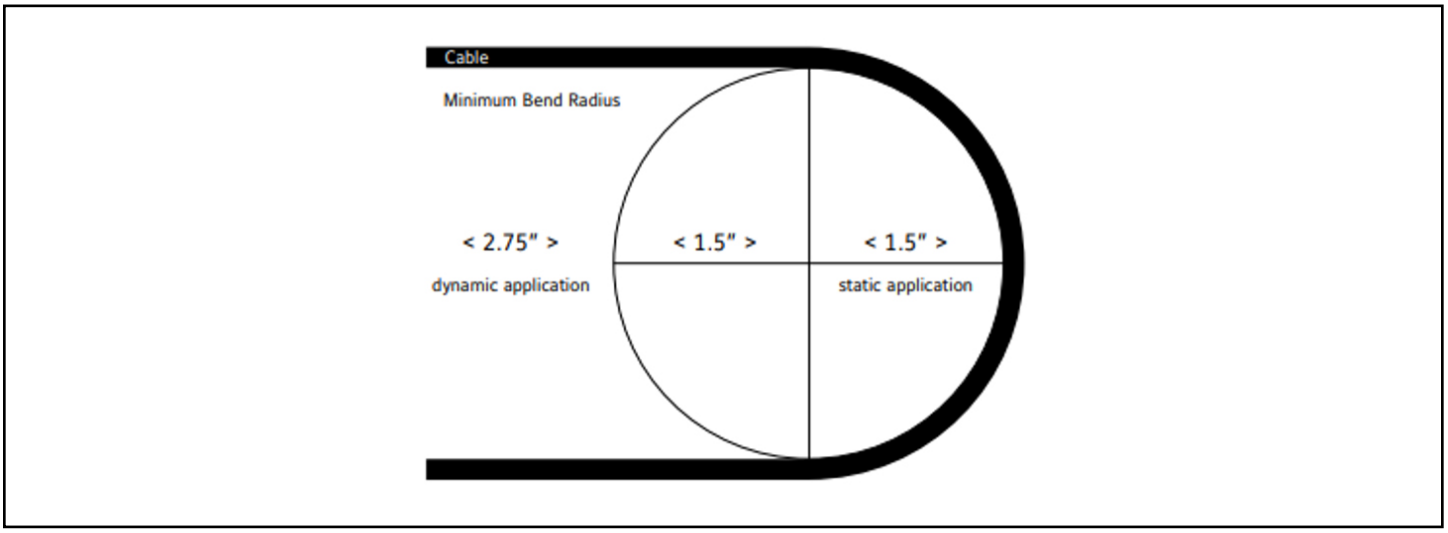


FIGURE 16: Wire - Minimum Bend Radius

If alternative wiring is used (other than Connect-Air part number W24182P-2306BL), do not run the communications wiring in the same conduit as AC power wiring or with wiring used to supply highly inductive loads, such as motors, contractors, and relays. Fluctuating, erratic, and inaccurate signal levels are possible when AC power wiring is present in the same conduit as the signal lines. Distance the wiring away from variable frequency drives and broadcast antennas.

CAUTION: All field wiring must be in accordance with Local, National, Fire, Safety & Electrical Codes. Power wiring, control (low voltage) wiring, disconnect switches and over- current protection must be supplied by the installer. Wire size should be sized per NEC requirements.

Check the electrical supply to be sure that it meets the Airflow-IQ electrical rating values defined below:

AIQ I&OM ELECTRICAL RATINGS TABLE

AIRFLOW-IQ MODELS	AIRFLOW-IQ COMPONENTS	*VOLTS	AMPS	WATTS (VA)
AiQ-TD-50	TDP05K Only	24.0	0.63	15.0
	TDP05K and Modulating Actuator(s)	24.0	Refer to Specific Actuator Model Data Sheet	
AiQ-TD-50C	TDP05K and VAFB24-BAC	24.0	0.98	23.5
	TDP05K, VAFB24-BAC, and AFB24-MFT (x1)	24.0	1.40	33.5
	TDP05K, VAFB24-BAC, and AFB24-MFT (x2)	24.0	1.81	43.5
	TDP05K, VAFB24-BAC, and AFB24-MFT (x3)	24.0	2.23	53.5
	TDP05K and VAMB24-BAC	24.0	0.96	23.0
	TDP05K, VAMB24-BAC, and AMB24-MFT (x1)	24.0	1.21	29.0
	TDP05K, VAMB24-BAC, and AMB24-MFT (x2)	24.0	1.46	35.0
	TDP05K, VAMB24-BAC, and AMB24-MFT (x3)	24.0	1.71	41.0
AiQ TD-60	TDP05K Only	24.0	0.63	15.0
	TDP05K and Modulating Actuator(s)	24.0	Refer to Specific Actuator Model Data Sheet	
AiQ-TD-60C	TDP05K and VAFB24-BAC	24.0	0.98	23.5
	TDP05K, VAFB24-BAC, and AFB24-MFT (x1)	24.0	1.40	33.5
	TDP05K, VAFB24-BAC, and AFB24-MFT (x2)	24.0	1.81	43.5
	TDP05K, VAFB24-BAC, and AFB24-MFT (x3)	24.0	2.23	53.5
	TDP05K and VAMB24-BAC	24.0	0.96	23.0
	TDP05K, VAMB24-BAC, and AMB24-MFT (x1)	24.0	1.21	29.0
	TDP05K, VAMB24-BAC, and AMB24-MFT (x2)	24.0	1.46	35.0
	TDP05K, VAMB24-BAC, and AMB24-MFT (x3)	24.0	1.71	41.0

TABLE 2: Electrical Ratings *VOLTS = 24 VAC ± 10%; 50/60 Hz or 24 VDC ± 10%

NOTE: The complete connection diagram and schematic wiring labels are located in the **FIELD CONNECTIONS** section within this document and on the inside lid of the Junction Box (for AiQ-TD-xxC models).

FIELD WIRING

Models AiQ-TD-xx: Analog BAS Integration *(Figure 16)*

Device wiring and junction box (provided by end user for models AiQ-TD-xx) installation is required by the field personnel. Install a conduit cord grip into a conduit knockout on the junction box.

Power Wiring

1. Install field wiring; 18 AWG (2 conductor) power cabling through a cord grip.
2. Connect the 24 V (COM) wire to the field provided wire nut within the Junction Box.
   a. 24 V (COM) power wire, TDP05K, and Modulating Damper.
3. Connect the 24 V (HOT) wire to the field provided wire nut within the Junction Box.
   a. 24 V (HOT) power wire, TDP05K, and Modulating Damper.

Airflow Reading Wiring

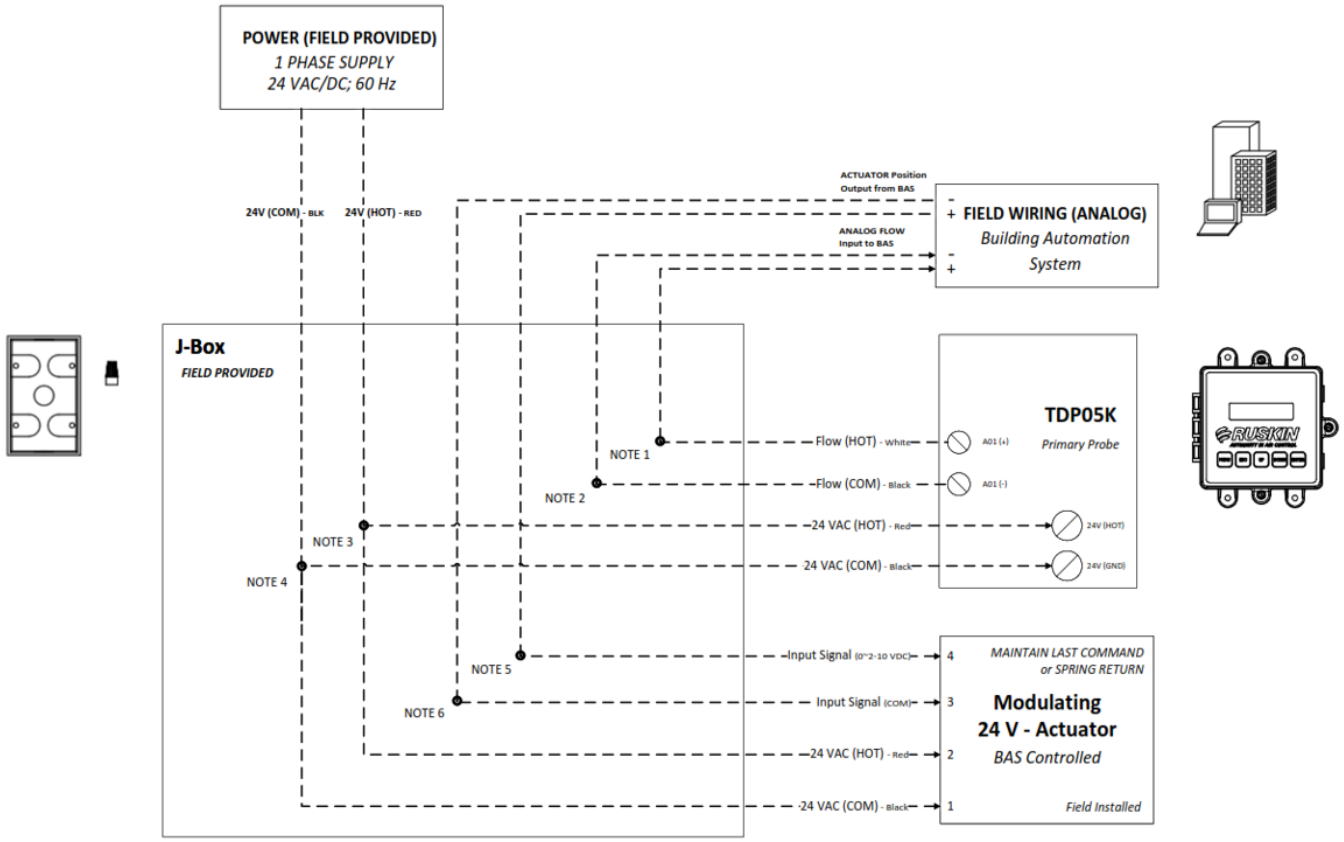
4. Using the new conduit cord grip. Install field wiring; 24 AWG (4 conductor; twisted shielded pair) low capacitance wire from the BAS.
   a. Connect the AO1 (COM; 2-10 VDC) wire from the TDP05K Primary to the BAS.
   b. Connect the AO1 (HOT; 2-10 VDC) wire from the TDP05K Primary to the BAS.

Note: The AO1 output is a standard 4 to 20 mA output from the TDP05K Primary Probe to a building automation system. To convert the output from 4-20mA to a 2-10VDC output, install a 500-ohm resistor across the + and - terminals of the A01 output.

Actuator Control Wiring

5. Using the same conduit cord grip defined in Step #4.
   a. Connect the Actuator Signal (COM; 0~2-10 VDC) to the BAS.
   b. Connect the Actuator Signal (HOT; 0~2-10 VDC) to the BAS.

ANALOG (BAS) - FIELD WIRING



NOTE:

1. Wire Nut #1: Airflow HOT (4-20mA or 2-10 VDC; with 500 ohm resistor installed across the Flow + and - terminals) wire under the same wire nut.
2. Wire Nut #2: Airflow COM (4-20mA or 2-10 VDC; with 500 ohm resistor installed across the Flow + and - terminals) wire under the same wire nut.
3. Wire Nut #3: 24 V HOT (Red) wires under the same wire nut.
4. Wire Nut #4: 24 V COM (Black) wires under the same wire nut.
5. Wire Nut #5: Actuator Position Signal HOT (0~2-10 VDC) wires under the same wire nut.
6. Wire Nut #6: Actuator Position Signal COM (0~2-10 VDC) wires under the same wire nut.

FIGURE 16: AIQ-TD-xx Analog Field Wiring

FIELD WIRING

Models AiQ-TD-xxC: Analog BAS Integration *(Figures 17a and 17b)*

The factory supplied/mounted junction box has a lid which is held in place with 3 captive screws. Loosen the captive screws on the Junction Box and open the Junction Box. Install a ½" conduit cord grip in the top left conduit hole on the Junction Box.

Power Wiring

1. Install field wiring; 18 AWG (2 conductor) power cabling through the cord grip.
2. Connect the 24 V (COM) wire to the Junction Box terminal labeled #1.
3. Connect the 24 V (HOT) wire to the Junction Box terminal labeled #2.

Control Wiring

4. Remove and discard the factory installed JUMPER wiring between terminals labeled #2 & #12 within the Junction Box.
5. Using the same conduit cord grip defined in Step #2, install field wiring; 24 AWG (2 conductor; twisted shielded pair) low capacitance wire.
6. Connect the 2-10 VDC (COM) wire to the Junction Box terminal labeled #10.
7. Connect the 2-10 VDC (HOT) wire to the Junction Box terminal labeled #12.

BAS Airflow Reading

8. Using the same conduit cord grip defined in Step #2, install field wiring; 24 AWG (2 conductor; twisted shielded pair) low capacitance wire.
9. Connect the 2-10 VDC (COM) wire to the TDP05K Primary Probe AO2 (-).
10. Connect the 2-10 VDC (HOT) wire to the TDP05K Primary Probe AO2 (+).

Note: The AO2 output *MUST* be configured for flow, as the factory default setting is temperature. The analog output is a standard 4 to 20 mA output from the Primary Probe to a building automation system. To convert the output from 4-20mA to a 2-10VDC output, install a 500-ohm resistor across the + and - terminals of the A02 output.

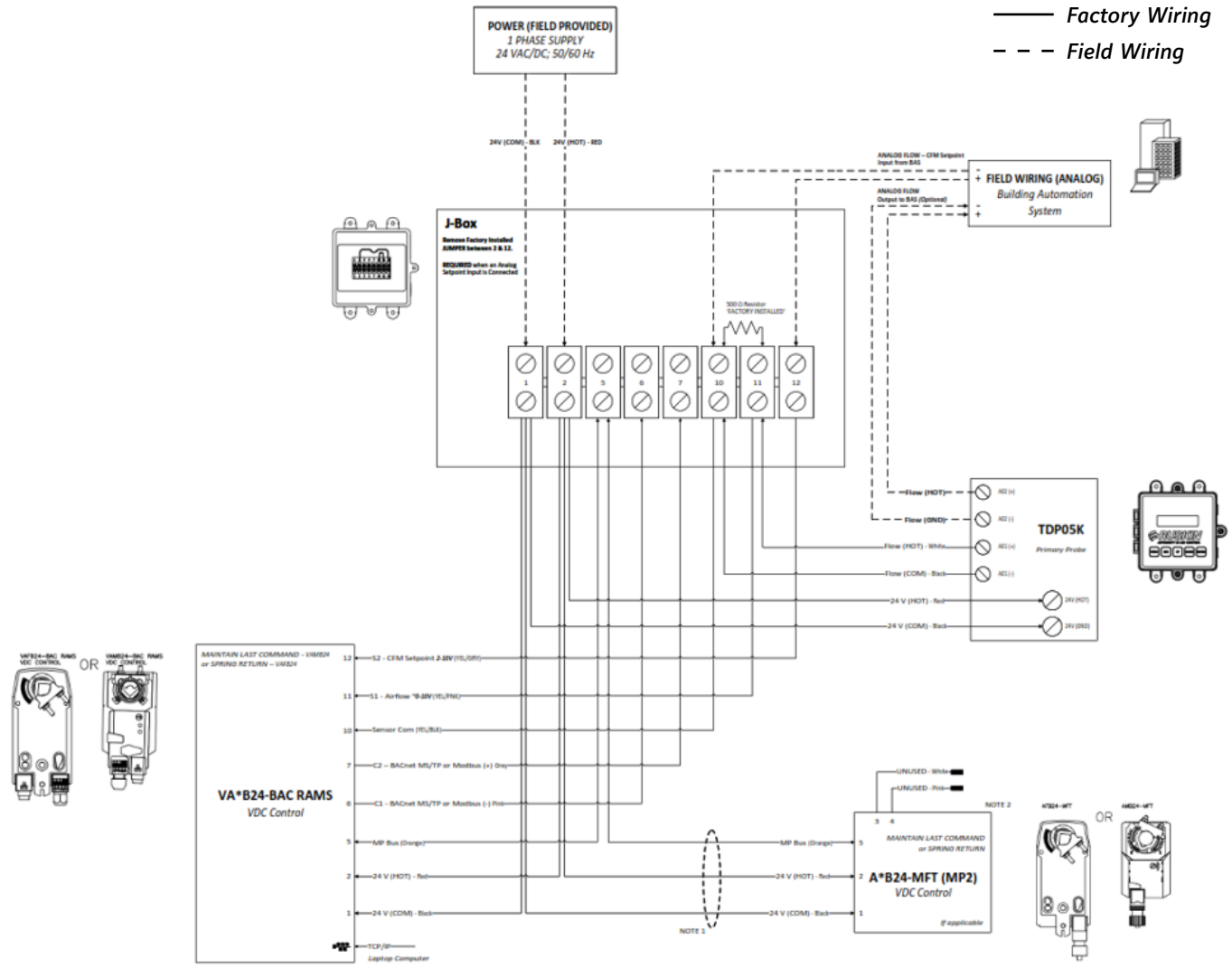
FIELD REQUIRED: Power applied; AO2 configuration under the Primary Probes menu.

> MENU > OPERATOR MENU > OUTPUT 2 PARAM > set to FLOW

Models AiQ-TD-xxC

*TDP05K Thermal Dispersion Airflow Measuring Probe, Model VA*B24-BAC Actuator, -MFT Actuator*

ANALOG (BAS) - FIELD WIRING



NOTE:

1. When -MFT Actuator quantity exceeds 1, refer to page 2 of 2.
2. Factory Configures: Belimo Address MP2.

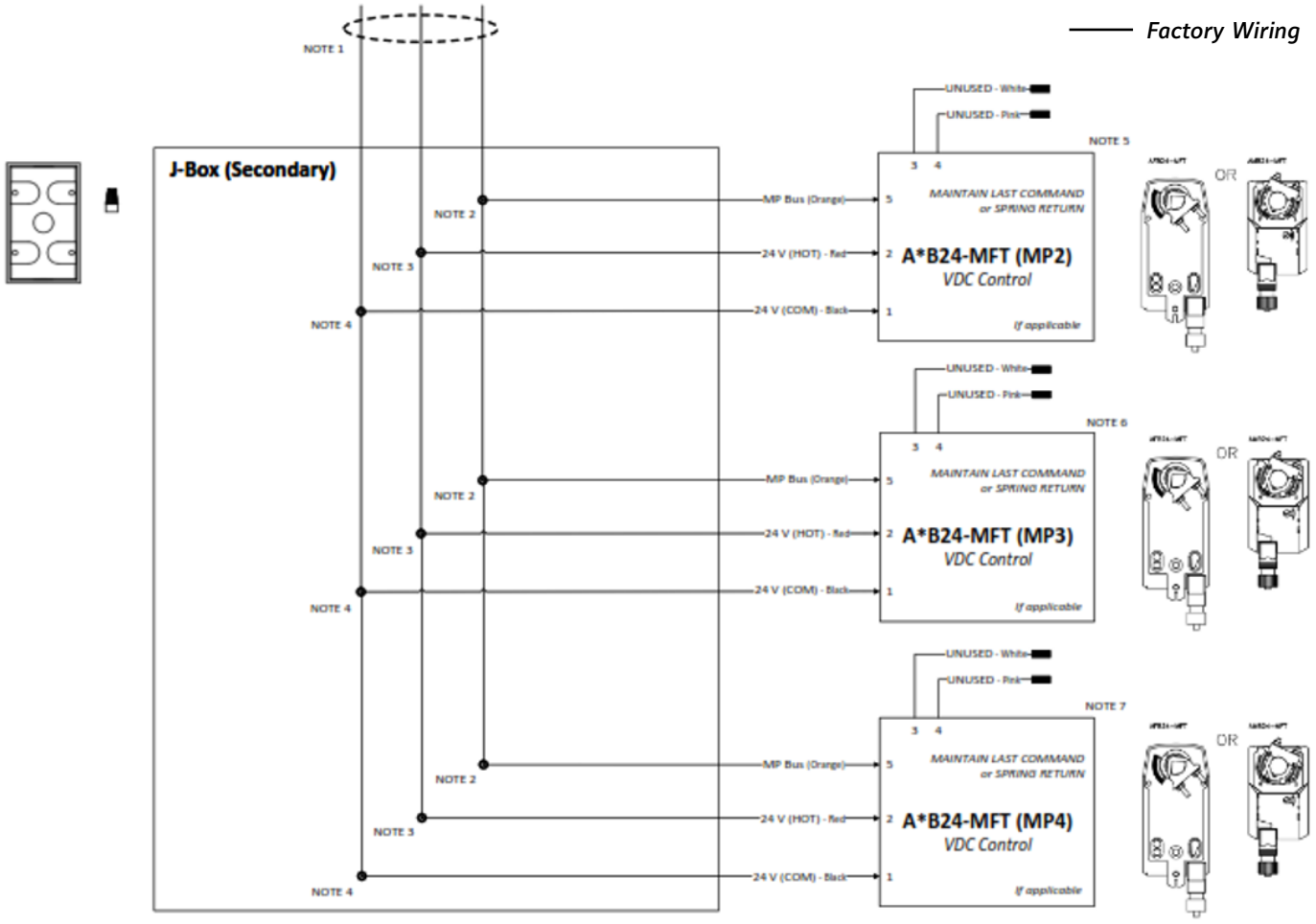
Page 1 of 2

FIGURE 17a: AIQ-TD-xxC Analog Field Wiring

Models AiQ-TD-xxC

*TDP05K Thermal Dispersion Airflow Measuring Probe, Model VA*B24-BAC Actuator, Multiple -MFT Actuators*

FACTORY WIRING



NOTE:

1. Secondary J-Box wiring to Primary J-Box Wiring, refer to page 1 of 2.
2. Wire Nut #1: MP BUS (Orange) wires under the same wire nut.
3. Wire Nut #2: 24 V HOT (Red) wire under the same wire nut.
4. Wire Nut #3: 24 V COM (Black) wire under the same wire nut.
5. Factory Configured: Belimo Address MP2.
6. Factory Configured: Belimo Address MP3.
7. Factory Configured: Belimo Address MP4.

Page 2 of 2

FIGURE 17b: AIQ-TD-xxC Analog Field Wiring

FIELD WIRING

Models AiQ-TD-xx: RS-485 (BACnet or MODBUS) BAS Integration *(Figure 18)*

Device wiring and Junction Box (provided by end user) installation is required by the field. Install a conduit cord grip into a conduit knockout on the Junction Box.

Power Wiring

1. Install field wiring; 18 AWG (2 conductor) power cabling through a cord grip.
2. Connect the 24 V (COM) wire to the field provided wire nut within the Junction Box.
   a. 24 V (COM) power wire, TDP05K, and Modulating Damper.
3. Connect the 24 V (HOT) wire to the field provided wire nut within the Junction Box.
   a. 24 V (HOT) power wire, TDP05K, and Modulating Damper.

Airflow Reading Wiring

4. Using the new conduit cord grip. Install field wiring; 24 AWG (4 conductor; twisted shielded pair) low capacitance wire from the BAS.
   a. Connect the RS-485 (B+) wire from the TDP05K Primary to the BAS.
   b. Connect the RS-485 (A-) wire from the TDP05K Primary to the BAS.

Note: If BACnet communications is required, the RS-485 communications MUST be configured for BACnet, as the factory default setting is Modbus RTU.

FIELD REQUIRED: Power applied, RS-485 configuration under the Primary Probe menu.

> MENU > OPERATOR MENU > NETWORK CFG > NETWORK TYPE set to BACnet MSTP

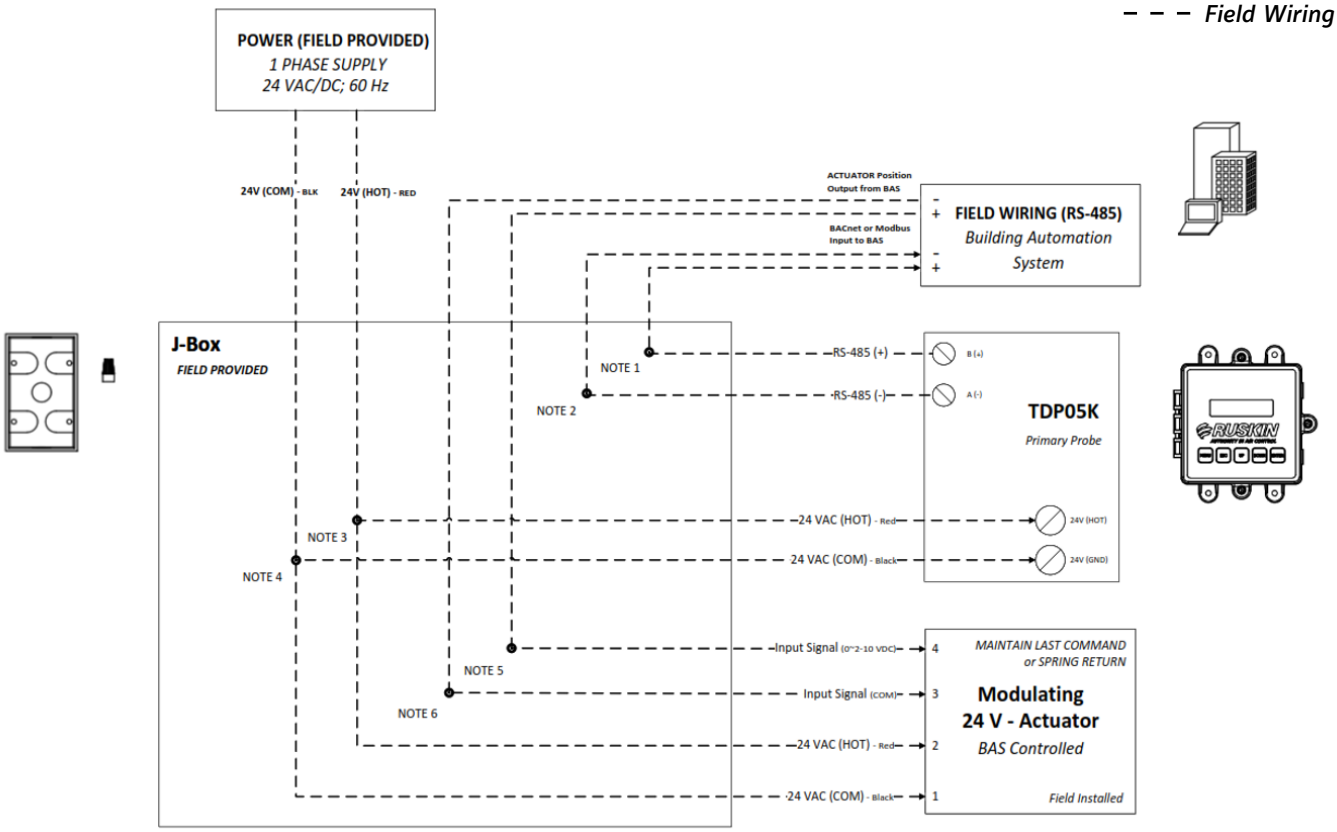
Actuator Control Wiring

5. Using the same conduit cord grip defined in Step #4.
   a. Connect the Actuator Signal (COM; 0~2-10 VDC) to the BAS.
   b. Connect the Actuator Signal (HOT; 0~2-10 VDC) to the BAS.

Models AiQ-TD-xx

TDP05K Thermal Dispersion Airflow Measuring Probe

BACnet or Modbus - FIELD WIRING



NOTE:

1. Wire Nut #1: Airflow (B+) RS-485 Communication wires under the same wire nut.
2. Wire Nut #2: Airflow (A-) RS-485 Communication wires under the same wire nut.
3. Wire Nut #3: 24 V HOT (Red) wires under the same wire nut.
4. Wire Nut #4: 24 V COM (Black) wires under the same wire nut.
5. Wire Nut #5: Actuator Position Signal HOT (0~2-10 VDC) wires under the same wire nut.
6. Wire Nut #6: Actuator Position Signal COM (0~2-10 VDC) wires under the same wire nut.

FIGURE 18: AIQ-TD-xx BACnet or Modbus Field Wiring

FIELD WIRING

Models AiQ-TD-xxC: RS-485 (BACnet or MODBUS) BAS Integration *(Figures 19a and 19b)*

The Junction Box lid is held in place with 3 captive screws. Loosen the captive screws on the Junction Box and open the Junction Box. Install a ½" conduit cord grip in the top left conduit hole on the Junction Box.

Power Wiring

1. Install field wiring; 18 AWG (2 conductor) power cabling through the cord grip.
2. Connect the 24 V (COM) wire to the Junction Box terminal labeled #1.
3. Connect the 24 V (HOT) wire to the Junction Box terminal labeled #2.

Control Wiring

4. Using the same conduit cord grip defined in Step #2. Install field wiring; 24 AWG (2 conductor; twisted shielded pair) low capacitance wire.
5. Connect the RS-485 (A-) wire to the Junction Box terminal labeled #6.
6. Connect the RS-485 (B+) wire to the Junction Box terminal labeled #7.

BAS Airflow Reading

7. Using the same conduit cord grip defined in Step #2. Install field wiring; 24 AWG (2 conductor; twisted shielded pair) low capacitance wire.
8. Connect the RS-485 (A-) wire from the Junction Box terminal labeled #6 to the BAS (-).
9. Connect the RS-485 (B+) wire from the Junction Box terminal labeled #7 to the BAS (+).

Note: If BACnet communications is required, the RS-485 communications *MUST* be configured for BACnet, as the factory default setting is Modbus RTU.

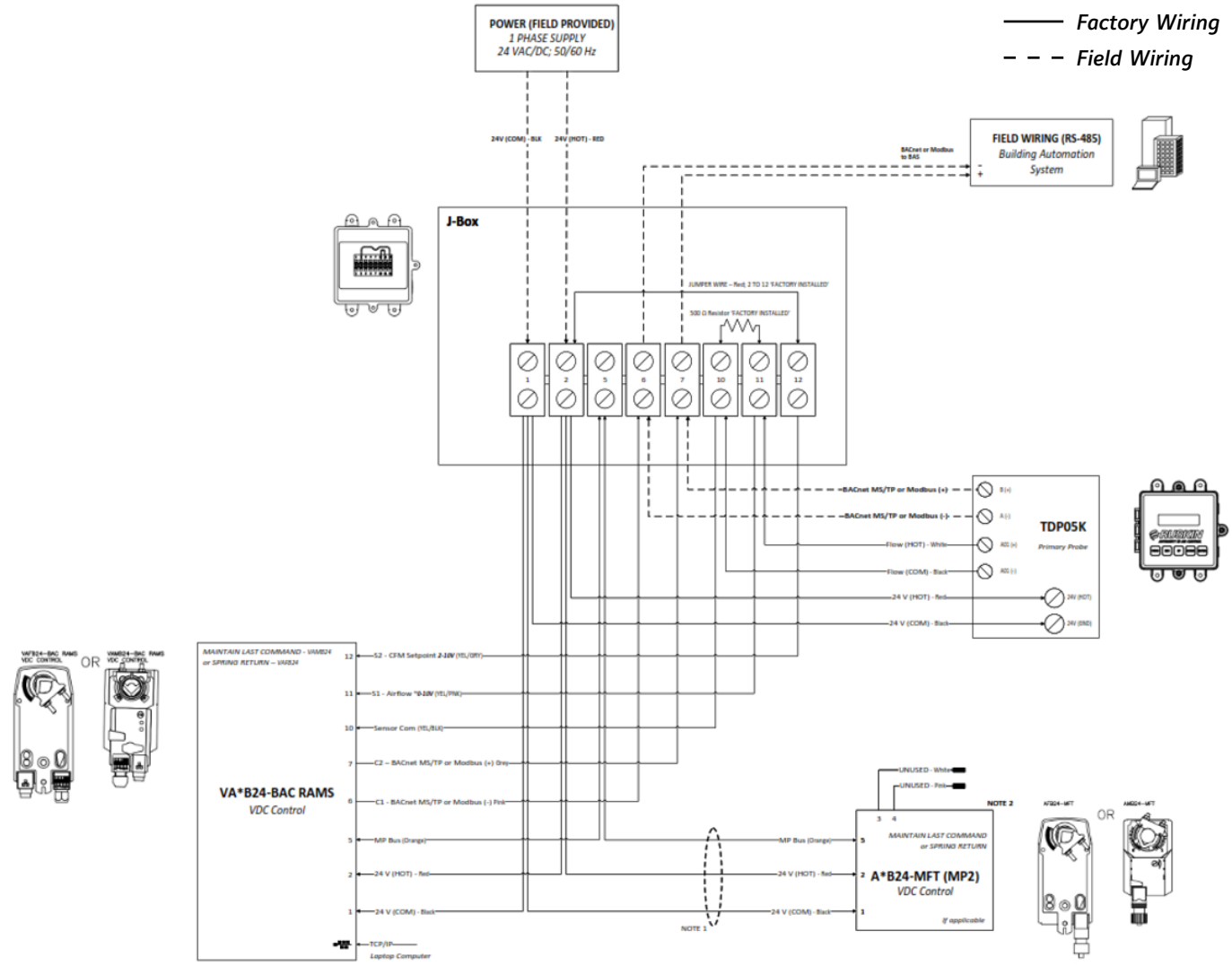
FIELD REQUIRED: Power applied, RS-485 configuration under the Primary Probe menu.

> MENU > OPERATOR MENU > NETWORK CFG > NETWORK TYPE set to BACnet MSTP

Models AiQ-TD-xxC

*TDP05K Thermal Dispersion Airflow Measuring Probe, VA*B24-BAC Actuator, -MFT Actuator*

BACnet or Modbus - FIELD WIRING



NOTE:

1. When -MFT Actuator quantity exceeds 1, refer to page 2 of 2.
2. Factory Configures: Belimo Address MP2.

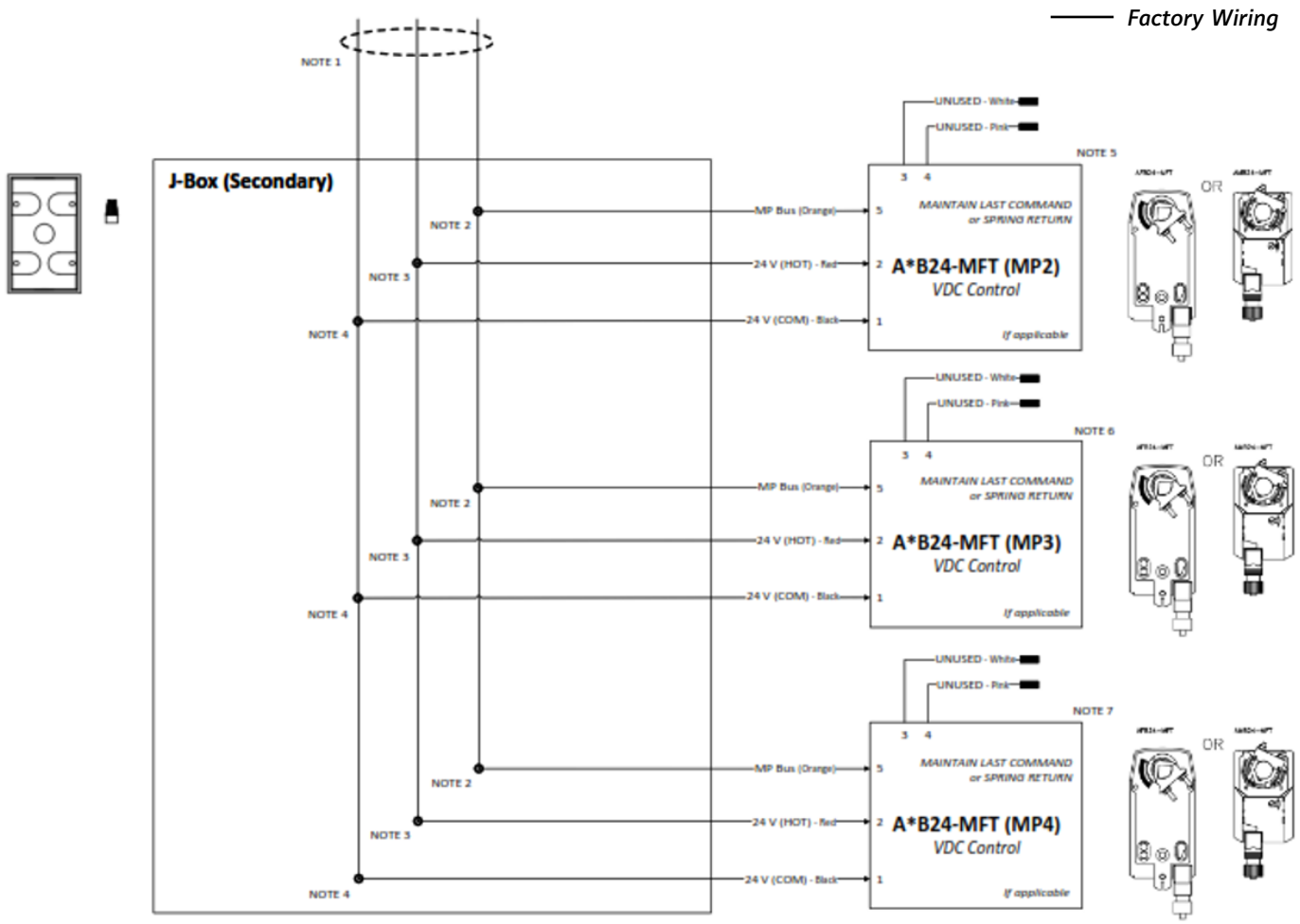
Page 1 of 2

FIGURE 19a: AIQ-TD-xxC BACnet or Modbus Field Wiring

Models AiQ-TD-xxC

*TDP05K Thermal Dispersion Airflow Measuring Probe, VA*B24-BAC Actuator, Multiple -MFT Actuators*

FACTORY WIRING



NOTE:

1. Secondary J-Box wiring to Primary J-Box Wiring, refer to page 1 of 2.
2. Wire Nut #1: MP BUS (Orange) wires under the same wire nut.
3. Wire Nut #2: 24 V HOT (Red) wire under the same wire nut.
4. Wire Nut #3: 24 V COM (Black) wire under the same wire nut.
5. Factory Configured: Belimo Address MP2.
6. Factory Configured: Belimo Address MP3.
7. Factory Configured: Belimo Address MP4.

Page 2 of 2

FIGURE 19b: AIQ-TD-xxC BACnet or Modbus Field Wiring

DEVICE CONFIGURATIONS

The **Airflow-IQ** airflow and temperature measurement station by DEFAULT is factory configured with an airflow range of 0 to 5,000 FPM and by DEFAULT the digital communications on the TDP05K Primary and VA*B24-BAC RAMS actuator (if applicable) is set to **Modbus RTU**, not BACnet.

Should a site require configurations other than the factory configured default values, the site owner and/or a controls contractor will be REQUIRED to make the appropriate configuration changes upon installation; configurations that align with the site's installation requirements.

All value changes, other than the factory default, should be recorded and left inside the TDP05K Primary enclosure for future reference.

TDP05K Primary Configurations

Configure the TDP05K Primary Probe by scrolling to the Output Calibration Menu and update the DESIGN RANGE HIGH to a round number at least 10% greater than the Maximum expected airflow through the installed air measuring station.

FIELD REQUIRED: Power applied; AO1 and AO2 configurations under the Primary Probe menu.

MENU > OPERATOR MENU > OUTPUT CALIBRATION MENU > DESIGN RANGE HIGH

Airflow IO Design Max FPM: **5,000**

SqFt Calculation: **SqFt = [Width (inches) x Height (inches)] / 144**

CFM Calculation: **Volume (CFM) = Velocity (FPM) * Area (SqFt)**

For Example: 24W x 24H = 4.00 SqFt x 5,000 FPM = **20,000 CFM**

If the Maximum expected CFM expected is 8,000 CFM through the SqFt opening, set the DESIGN RANGE HIGH to 8,000 x 110% = **8,800 CFM** / 4.00 SqFt = 2,200 FPM**.**

IMPORTANT: Ensure the calculated DESIGN RANGE HIGH does **NOT** exceed the maximum allowable through the air measurement station.

When the unit's DESIGN RANGE LOW is set to zero, the TDP05K analog output will produce a 4-20mA analog output. The 500-ohm factory installed resistor within the Junction Box at terminals labeled #10 and #11, across the air measurement actuator's S1 input. Result in a 2 VDC signal at zero flow and a 10 VDC signal at 8,800 CFM @ 4,000 FPM.

*VA*B24-BAC RAMS Actuator Configurations*

Configuring the VA*B24-BAC RAMS actuator requires **Logging ON** to it with a laptop using Google Chrome and a CAT5 cable plugged into the RJ-45 port on the actuator.

If the connection attempt FAILS, clear the Google Chrome internet 'Cache'

Google Chrome:
INTERNET SETTINGS > CLEAR BROWSING DATA > CACHED IMAGES & FILES

The connected laptop may require a fixed IP address in the same range as the actuator.
IP Address: 192.168.0.7
Subnet Mask: 255.255.255.0
Default gate way: 192.168.0.1

IMPORTANT: The IP address cannot be the same as the actuator.

*LOGGING INTO THE VA*B24-BAC RAMS ACTUATOR*

1. A successful connection will only take place after the “Green Status Light Flashes”

FIGURE 20: VA*B24-BAC RAMS - Status LED

Note: Make sure the laptop’s Wi-Fi is turned OFF to avoid a problem.

2. In the address bar at the top of Google Chrome type the following IP address.
   - IP address: **192.168.0.10:8080** or
   - URL: **http://belimo.local:8080/index.html**
3. The actuator Sign-In pop up will appear.
   a. Enter Username: **admin**
   b. Enter Password: **rusnimda**
   c. Select the ‘Sign in’ button shown.

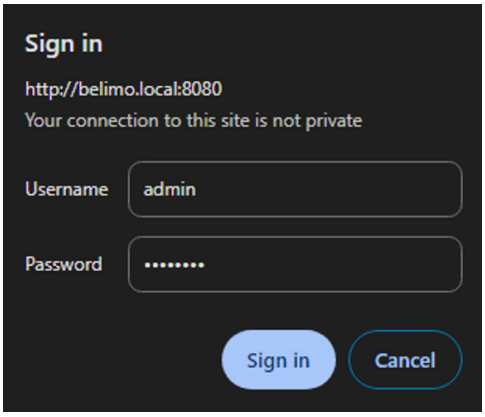


FIGURE 21: VA*B24-BAC RAMS - Sign In Display

The VAF*24BAC RAMS Actuator’s Max Control Airflow **MUST** align with the configuration settings applied to the TDP05K Primary.

As indicated in the example calculation under the TDP05K Primary configuration section above: If a Maximum expected CFM expected is 8,000 CFM through the SqFt opening. Set the Maximum Control Airflow **8,800 CFM** within the VAF*24BAC RAMS Actuator.

In this example and a **4.00 SqFt** air measurement station, the air measurement actuator would be configured for the values shown below:

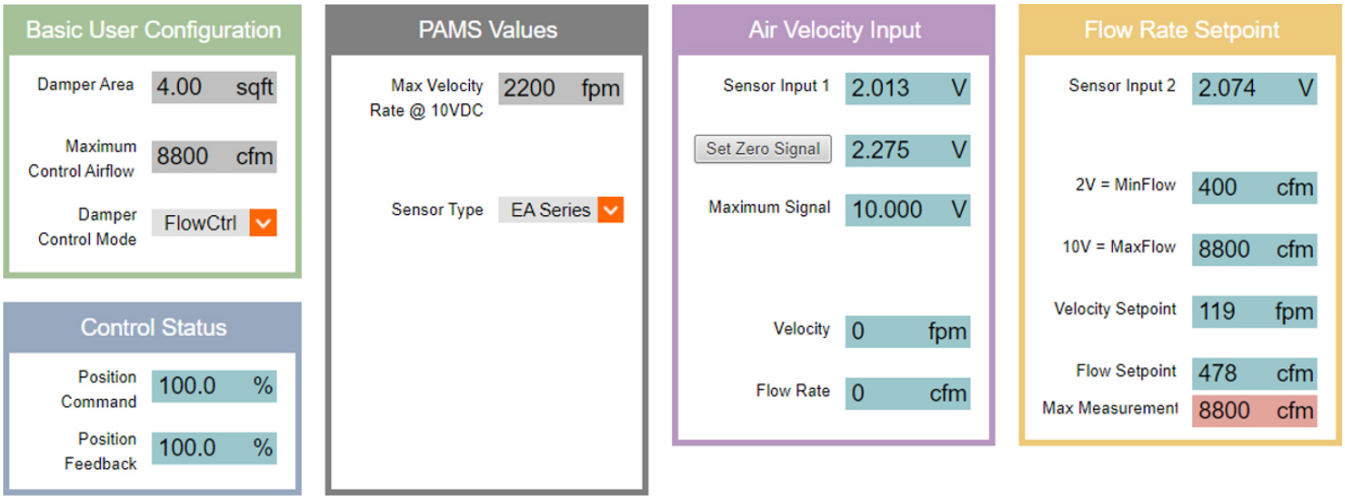


FIGURE 22: Configurations GUI (VA*B24-BAC Air Measurement Actuator)

In the BASIC USER CONFIGURATION box (Green box above)

ENTER:

Damper Area: **4.00** SqFt

Maximum Control Airflow (for this example): **8,800** CFM

Damper Control Mode: **FlowCtrl**

In the PAMS VALUES box (Grey box above)

ENTER:

Max Velocity Rate @ 10VDC: **2,200** FPM

Sensor Type: **EA Series**

In the AIR VELOCITY INPUT box (Purple box above)

At ZERO flow, Sensor Input 1 should around **2 VDC** (± 0.50 VDC).

CLICK the 'Set Zero Signal' to zero the signal input at this value.

Note:In the 'FLOW RATE SETPOINT' (Gold box above), the 2 VDC Flow Rate Setpoint is the Minimum airflow that can be controlled. *A setpoint or voltage less than 2 VDC applied to the actuator's Sensor Input 2 will disable the actuator and drive the damper to the closed position.*

If the installation application requires a setpoint command via an analog input. The factory installed jumper within the Junction Box at terminals labeled #2 and #12 should be removed.

IMPORTANT: BACnet Setpoint commands will override the analog value to the actuator's Sensor Input 2, and the jumper **MUST** be left in place.

DATE AND TIME SETTINGS: - Data Logging

The Date and Time settings for data logging should be set for the time appropriate time zone, installation location.

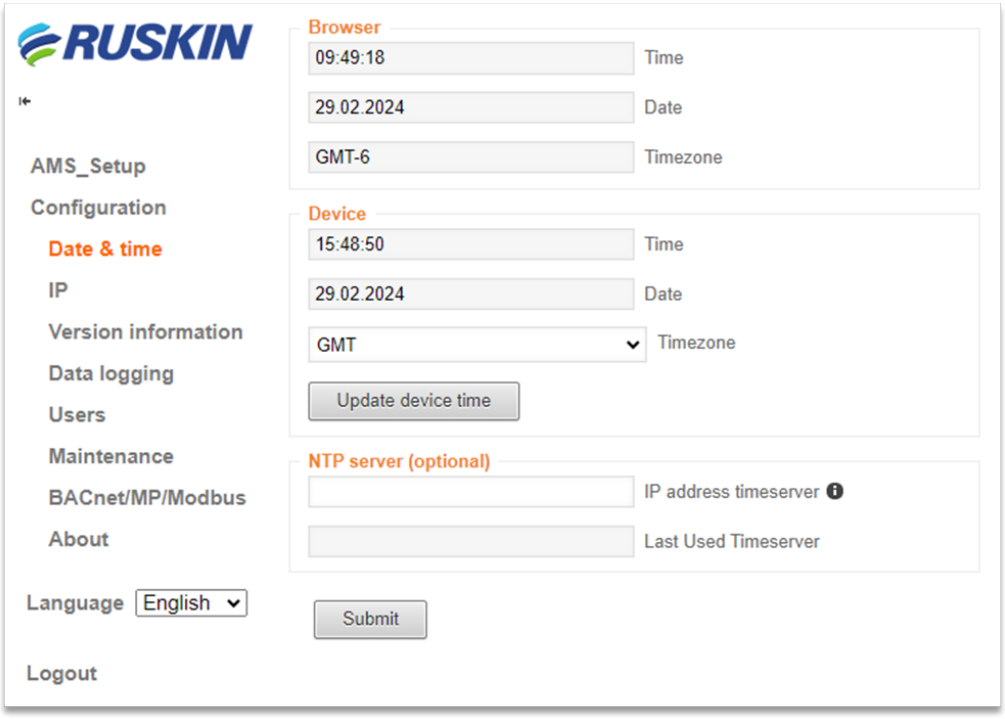


FIGURE 23: Date & Time Settings (VA*B24-BAC Air Measurement Actuator)

BACnet and Modbus Settings

When the installation application requires digital RS-485 communications, the BACnet or Modbus Settings need to align with the automation system, Address, Baud rate, Device Name, Etc.

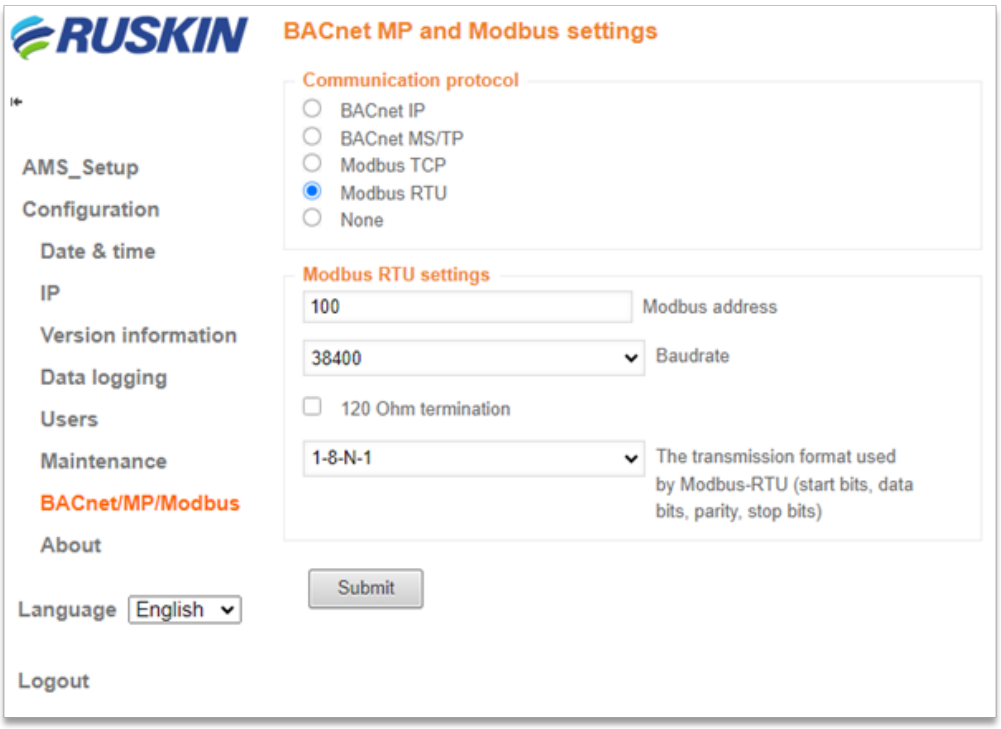


FIGURE 24: BACnet/Modbus Settings (VA*B24-BAC Air Measurement Actuator)

Post settings configuration: the below tables 'BACnet Objects' (Table 3) and 'Modbus Topology' (Table 4) are available via the Network interface. Either through the RJ-45 port (BACnet IP) or BACnet MS/TP & Modbus wires within the junction box at terminals labeled #6 and #7.

RUSKIN AIR MEASUREMENT ACTUATOR - BACnet OBJECTS LIST *(VA*B24-BAC RAMS)*

Name	Description	Type	Instance	Access	Units	Default	Details
RuskinAMS	Application Version	AI	1	R	no-units	-	-
AirflowSetpoint	Current Airflow Rate Setpoint	AI	2	R	cfm	-	-
Airflow	Current Airflow Rate	AI	3	R	cfm	-	-
AirVelocity	Current Air Velocity	AI	4	R	fpm	-	-
DamperPosition	Damper Position Feedback	AI	5	R	pct	-	-
DpReading	Differential Pressure Sensor Value	AI	6	R	inches-water	-	-
DamperArea	Damper Area	AV	1	R/W	square-feet	4	-
MaxControlAirflow	Maximum Controllable Airflow Rate	AV	2	R/W	cfm	5,000	-
Ka	Damper Ka Factor	AV	3	R/W	no-units	2,482	-
Factor1/m	Damper 1/m Factor	AV	4	R/W	no-units	0.5224	-
BACnetSetpoint	BACnet Control Setpoint	AO	1	C	percent	0	0-100%
EnableStatus	Damper Enabled Status (Safety)	BI	1	R	percent	-	off=alarm on=normal
DpSensorIndex	Pressure Sensor Range	MI	1	R	no-units	-	**1 = 0.10" wc** 2 = 0.25" wc 3 = 0.50" wc 4 = 1.00" wc 5 = 2.50" wc 6 = N/A (ES Sensor)
DamperMode	Damper Mode	MV	1	R/W	no-units	0	**1 = Flow** 2 = Position
SensorType	Pressure/Flow Sensor Type	MV	2	R/W	no-units	1	**1 = RUS-274 or RUS-275** 2 = AMS-8100 or AMS-8100LR 3 = DPT-IQ 4 = EA-Series
SetZeroSignal	Set Zero Signal	BV	1	R/W	no-units	0	0 = Normal 1 = Activate

TABLE 3: BACnet Objects

AI - Analog Input
AO - Analog Output
AV - Analog Value
BI - Binary Input
BV - Binary Value
MI - Multi-State Input
MV - Multi-State Value
R - Read-only
R/W - Read and Writable
C - Commandable (Contains Priority Array)

MODBUS TOPOLOGY *(VA*B24-BAC RAMS)*

Address Range: 1-247; Default **100**

Baud Rate Range: 9600, 19200, 38400, 76800, 115200; Default **38400**

Parity: 1-8-N-2, 1-8N-1, 1-8-E-1, 1-8-0-1; Default **1-8-E-1**

(Start bits - data bits - parity - stop bits)

Float Order: **ONLY implemented unsigned integer datatype**

Data

Bits: **8**

Stop Bits: Selectable **(1 or 2)**

Modbus Register Description								
Number	**Address**	**Name**	**Description**	**Units**	**Default**	**Scale**	**Access**	**Enumeration**
40001	0	Application Version		no_units	-	-	R	
40002	1	AirflowSetpoint	Current Airflow Rate Setpoint	CFM	-	-	R	
40003	2	Airflow	Current Airflow Rate	CFM	-	-	R	
40004	3	AirVelocity	Current Air Velocity	FPM	-	-	R	
40005	4	DamperPosition	Damper Position Feedback	%	-	-	R	
40006	5	DpReading	Differential Pressure Sensor Value	inWc	-	-	R	
40007	6	DamperArea	Damper Area	SqFt	4,000	0.001	R/W	
40008	7	Max Control Airflow	Maximum Controllable Airflow Rate	CFM	5,000	1	R/W	
40009	8	Ka-User	Damper Ka Factor	no_units	2,482	1	R/W	
40010	9	Factor1/m	Damper 1/m Factor	no_units	0.5224	0.0001	R/W	
40011	10	ModbusSetpoint	Modbus Control Setpoint	%	0	1	R/W	0-100%
40012	11	EnableStatus	Damper Enabled Status (Safety)	no_units	-	1	R	0 = Alarm 1 = Normal
40013	12	DPSensorIndex	Pressure Sensor Range	inWc	-	1	R	**0 = 0.10 inWc** 1 = 0.25 inWc 2 = 0.50 inWc 3 = 1.00 inWc 4 = 2.5 inWc 5 = N/A (EA Sensor)
40014	13	SensorType	Pressure/Flow Sensor Type	no_units	-	1	R/W	**0 = RUS-274 or RUS-275** 1 = AMS-8100 or AMS-8100LR 2 = DPT-IQ 3 = EA Series
40015	14	Damper Mode	Damper Mode	no_units	0	1	R/W	**0 = Flow** 1 = Position
40016	15	SetZeroSignal	SetZeroSignal	no_units	0	1	R/W	0 = None 1 = Reset

TABLE 4: Modbus Topology

Measuring stations are tested at an AMCA Registered 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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