AIRFLOW-IQ

Electronic Air Measuring Station & Ruskin High Performance Control Damper

RUSKIN
AUTHORITY IN AIR CONTROL

APPLICATION

The Ruskin AIRFLOW-IQ combines our ADVANCED THERMAL DISPERSION Air Measurement System model TDP05k with the industry's highest performance airflow control dampers. Air measurement and airflow control damper in one package. The Airflow-IQ is offered with the Ruskin Air Measuring Actuator which enables BACnet or Modbus and includes built-in Web server to facilitate field configuration using any web browser for your specific air measurement application. The AIRFLOW-IQ is also available with a modulating actuator of your choice to be controlled by others.

CONSTRUCTION & FEATURES

Airflow-IQ Casing	Airflow-IQ models include sleeved assemblies with options for various materials of construction and gauges. *Refer to specific model's Product Data Sheet for details.* Sleeve lengths are as follows: - 15" (381) sleeve length (d) for standard single section units without optional honeycomb airflow straightener. - 18" (457) sleeve length (d) for single section units with optional honeycomb airflow straightener included.
Sensor Circuit	Highly durable, water resistant, surface-mounted thermistors on a flexible polyimide substrate with heated and passive thermistors.
Sensor Distribution	Max 128 sensing points; up to 16 probes.
TDP05K Probes	Airfoil-shaped, Low Profile 2" x 3/4" (51 x 19) 6063T6 extruded aluminum with acid etch clear anodized finish.
TDP05K Mounting	**Models AiQ-TD-xxC:** Insertion Right Hand (RH) Mount (Standard). Available with Insertion Left Hand (LH) Mount. **Models AiQ-TD-xx:** Insertion Right Hand (RH) Mount (Standard). Available with Insertion Left Hand (LH) Mount or with Internal Mounted probes.
TDP05K Probe Accuracy	+/- 3%. Installed accuracy values are derived from testing the TDP05K in accordance with AMCA Standard 600, Figure 1. The TDP05K will provide this noted accuracy when Ruskin's placement guidelines are met or exceeded.
Building Automation Interface	**Models AiQ-TD-xxC** - The Airflow-IQ airflow and temperature measurement stations by DEFAULT is factory configured prior to shipping with an airflow range of 0 to 5,000 FPM. And by DEFAULT, the digital communications on both the TDP05K Primary and the VA*B24-BAC actuator are set to Modbus RTU. BACnet MS/TP automation interface is also available. If configurations other than the DEFAULT values are required, changes can be made upon installation by following the instructions noted in the Airflow-IQ Installation, Operation, and Maintenance Manual. - The air measurement actuator (VA*B24-BAC) accepts a CFM setpoint via a 0 - 10V Analog signal or a digital communication commanded value (BACnet or Modbus) which will modulate the control damper to maintain the desired Setpoint value. - Network interface includes • Damper position feedback • Velocity • Volume • Enable/Disable Status • Ability to toggle between Flow and Position Control - When the VA*B24-BAC actuator's network interface (BACnet, Modbus) is not used to communicate with the BAS, the Analog signal from the TDP05K Primary can be used across its A02 terminals (4-20mA or 2-10VDC) to communicate active flow values. NOTE: Analog Temperature output is not available when the analog interface option is used in place of the network interface with the automation system is selected.

Model AiQ-TD-50C shown with optional flanges; Right Hand (RH) Mount

Model AiQ-TD-50 shown with optional flanges & without optional 24VAC modulating actuator; Right Hand (RH) Mount

NOTE: Airflow enters through PROBE side and exits through DAMPER side

Ruskin AIRFLOW-IQ helps satisfy the requirements for minimum outside air as required by the following.

- ASHRAE 62.1, 90.1 and 189.1.
- California Title 24.
- International Mechanical Code (IMC).
- International Energy Conservation Code (IECC)d.

NOTE:
1. Values shown in ( ) are millimeters unless otherwise indicated.
2. Refer to installation manual for additional details.
3. Units are furnished actual size ordered.

CONSTRUCTION & FEATURES

Building Automation Interface	**Models AiQ-TD-xx:** - The TDP05K Primary interfaces with the BAS through: • Modbus RTU (DEFAULT), and BACnet MS/TP, or • Two 4-20mA outputs (2-10V with 500 ohm resistors included from factory) - The outputs are factory configured for airflow and temperature; and either output can be field configured for flow or temperature. NOTE: Modulating actuator would be directly controlled by the BAS via an analog signal.
Remote TDP05K Interface	**Models AiQ-TD-xxC:** Available with optional remote wired or remote wireless Graphical User Interface (GUI). **Models AiQ-TD-xx:** Available with optional remote wired primary, remote wired GUI, or remote wireless GUI. NOTE: For models AiQ-TD-xx, inclusion of the remote wired primary is necessary when Internal mounted probes are required.
Actuator(s)	**Models AiQ-TD-xxC:** The 180 in-lb (20 Nm) air measurement actuator includes integrated web server with two (2) analog inputs for flow sensing and receiving a DDC Setpoint. VAFB24-BAC is standard, spring return air measurement actuator model. With an available option VAMB24-BAC, non-spring return (maintain last position) actuator model. Single Point power requirement of 24VAC 50/60Hz or VDC, 20VA. **Models AiQ-TD-xx:** (Optional). Any 24VAC modulating, spring return or non-spring return type, factory or field installed, sized for the damper area. Refer to specific actuator information provided on a separate submittal for power requirements and input/output signal information.
Control Damper	Standard construction for control damper model selected. *Please refer to damper model's Product Data sheet for details.*
Velocity Requirements	Product Range: 0 to 5000 FPM (0 m/s to 25 m/s). Measured through face area of damper.
Operating Temperature	-20°F to 120°F (-29°C to 50°C).
Minimum Size	**Models AiQ-TD-xxC:** 12" w x 12" h (305 x 305) **Models AiQ-TD-xx:** 8" w x 6" h (203 x 152)
Maximum Size	**Models AiQ-TD-xxC:** 120" w x 120" h (3048 x 3048) **Models AiQ-TD-xx:** 120" w x 144" h (3048 x 3657)

Consult factory for special considerations.

AIRFLOW-IQ MODEL DESIGNATIONS

AiQ	-TD	-XX	X
Airflow-IQ Series Airflow Measuring Solution	Thermal Dispersion Technology; Ruskin model TDP05K	Control Damper Model	Air Measurement Actuator
AiQ	TD	**50** - Includes Model CD50 Control Damper **60** - Includes Model CD60 Control Damper	**(Blank)** - does NOT include factory-mounted RS-485 interface air measurement actuator **C** - Includes factory-mounted RS-485 interface air measurement actuator.

Example: Model AiQ-TD-50C

Description: Airflow-IQ series product utilizing TDP05K air measurement probes with a Ruskin model CD50 control damper in a common sleeve. Includes factory mounted RS-485 or Modbus interface air measurement actuator.

VARIATIONS (1 of 2)

AIRFLOW-IQ Models AiQ-TD-xx

- Custom density probe/sensor array.
- TYPE 4 rated TDP05K weather-resistant enclosures.
- Silicone damper blade seals.
- Stainless steel damper linkage & bearings.
- Honeycomb Airflow Straightener.
- Custom sleeve materials (304SS, 316SS, Aluminum, Galvanized).
- Available with Remote Wired Primary, Wired Graphic User Interface, or Wireless Graphic User Interface.
- 1.5" Mounting Flanges on inlet, outlet or both ends of the sleeve. Mounting holes and custom flanges available upon request.
- Left Hand (LH) mounting configuration.
- Internal Mounted TDP05K. When selected, the assembly will be provided with a Remote Wired Primary as Standard.
- Opposed damper blade action.
- Factory supplied & mounted 24VAC modulating actuator(s) are available as an option. Mounted internal or external to the airstream.

VARIATIONS (2 of 2)

AIRFLOW-IQ Models AiQ-TD-xxC

- Custom density probe/sensor array.
- TYPE 4 rated TDP05K weather-resistant enclosures.
- Silicone damper blade seals.
- Stainless steel damper linkage and bearings.
- Honeycomb Airflow Straightener.
- Custom sleeve materials (304SS, 316SS, Aluminum, Galvanized).
- Available with Wired Graphic User Interface or Wireless Graphic User Interface.
- 1.5" Mounting Flanges on inlet, outlet, or both ends of the sleeve. Mounting holes and custom flanges available upon request.
- Left Hand (LH) mounting configuration.
- Non Spring-Return Air Measurement Actuator model VAMB24-BAC.
- Parallel and Opposed damper blade actions available. Opposed blade action is recommended for Outside Air (OA) applications where Parallel blade action is recommended for Return Air (RA), Supply Air (SA), and Exhaust Air (EA) applications.

PRODUCT FEATURES & DATA

TDP05K Airflow and Temperature Measurement Probe Features

- Each TDP05K includes Modbus (Default), BACnet, and Analog Output communications.
- Lowest power consumption thermal dispersion device available.
- Tool-free setup with the primary probes Graphic User Interface (GUI).
- Standard cabling, no proprietary cables.
- Type 1 rated TDP05K monitor box enclosures
- Listings and Compliances:
  - UL Listed: UL 60730-1; UL 60730-2-9; UL 60730-2-15
  - UL Compliant: UL 60335-1; CAN/CSA-C22.2 No. 60335-1; UL 60335-2-40; CAN/CSA C22.2 No. 60335-2-40
  - FCC: Meets Part 15, Subpart B, Class A device requirements
  - CE: European Shipments Only
  - BACnet (BTL): Certified to BACnet Standard ISO 16484-5, Rev. 1.14.
- Airfoil shaped acid-etch clear anodized sensing probes featuring lower pressure drop and less noise.
- Highest density thermal dispersion sensing array up to 128 sensing points.
- Up to 8 moisture resistant flex sensor pairs per probe.
- BACnet or Modbus Low and High flow and temperature alarms.
- 16x2 character LCD (airflow, temperature, setup & diagnostics).
- Self-diagnostics utilizing artificial intelligence.
- The highest accuracy over the entire range of air flows results from probe sensing elements that are factory tested and calibrated.

VAFB24-BAC (Spring Return) & VAMB24-BAC (Non-Spring Return) Air Measurement Actuator Features (Model AiQ-TD-xxC only)

- Torque 180 in-lb.
- Ethernet 10/100 Mbit/s, TCP/IP, integrated Web server.
- Modbus RTU, BACnet MS/TP, BACnet IP
- Two analog inputs for flow sensing and receiving a DDC set point.
- Air Measurement actuators are configured at the factory prior to shipping. Should reconfiguration be required at the installation site, setup is available via integrated Web Server and Ethernet IP connection; directly to actuator using a web browser.
- Fail Safe Signal Interlock, drives damper closed on loss of signal.
- VAFB24-BAC Spring open or spring close on loss of power as required for application.
- Optional VAMB24-BAC Non-Spring Return (Maintain Last Position).
- 95 seconds open, less than 60 seconds spring close.
- NEMA 1 rated actuator housing
- Built in Data Logging.
- Control up to three additional actuators via MP-Bus.

VAFB24-BAC VAMB24-BAC

PRODUCT FEATURES & DATA

High Performance Ruskin Control Damper

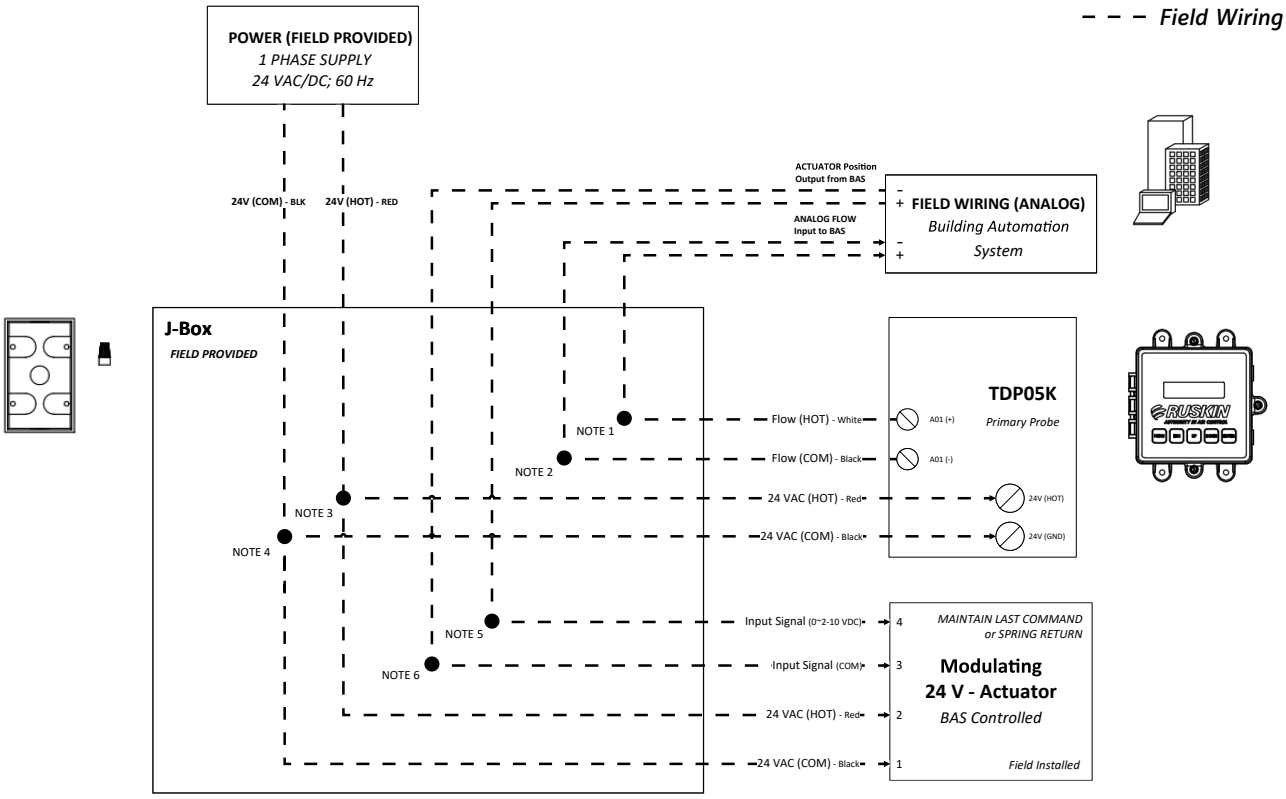
Model CD50

- Low Leak, **extruded aluminum damper** for higher velocity and pressure HVAC systems.
- Airfoil blade design for low pressure drop and reduced noise generation. Blades have an integral structural reinforcing tube running full length of each blade.
- Positive locking hexagonal axles, non-corrosive molded synthetic bearings, and shake-proof linkage for low maintenance operation.
- Blade edge seals are extruded double edge design and mechanically lock into the blade for superior sealing.
- Rated AMCA Class 1A leakage performance (less than 3.0 cfm/Sqft. @ 1.0" of static pressure). Meets International Energy Conservation Code (IECC) requirements.

Model CD60

- Low leak, **hot dipped galvanized steel damper** designed for high velocity and pressure HVAC systems.
- One-piece airfoil shaped blade design with one-piece interlocking frame design to reduce racking; no fasteners required.
- Positive lock axles, non-corrosive bearings, and shake-proof linkage for low maintenance operation.
- Rated AMCA Class 1A leakage performance (less than 3.0 cfm/Sqft. @ 1.0" of static pressure). Meets International Energy Conservation Code (IECC) requirements.

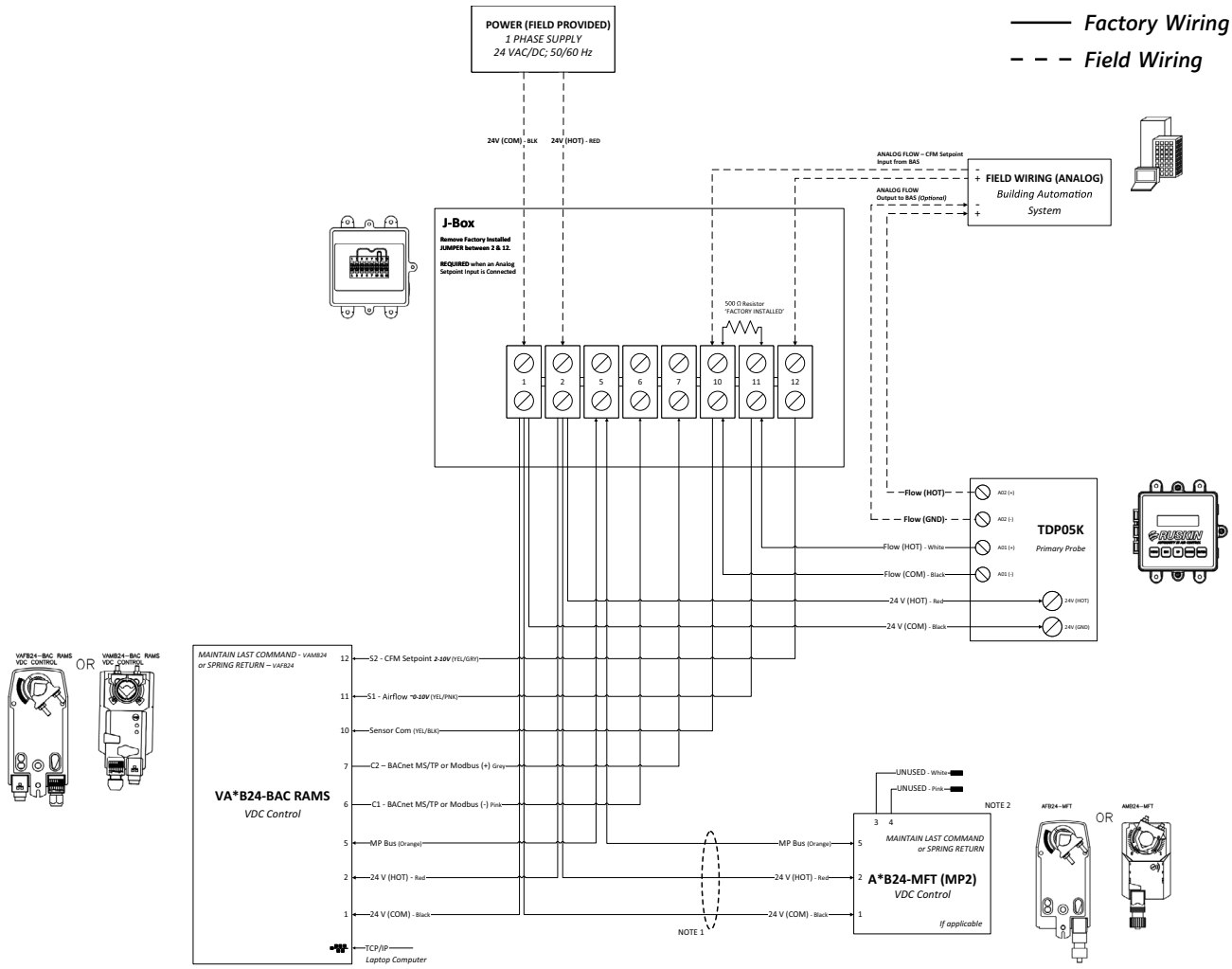
Models AiQ-TD-xx Analog (BAS) - Field Wiring



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.

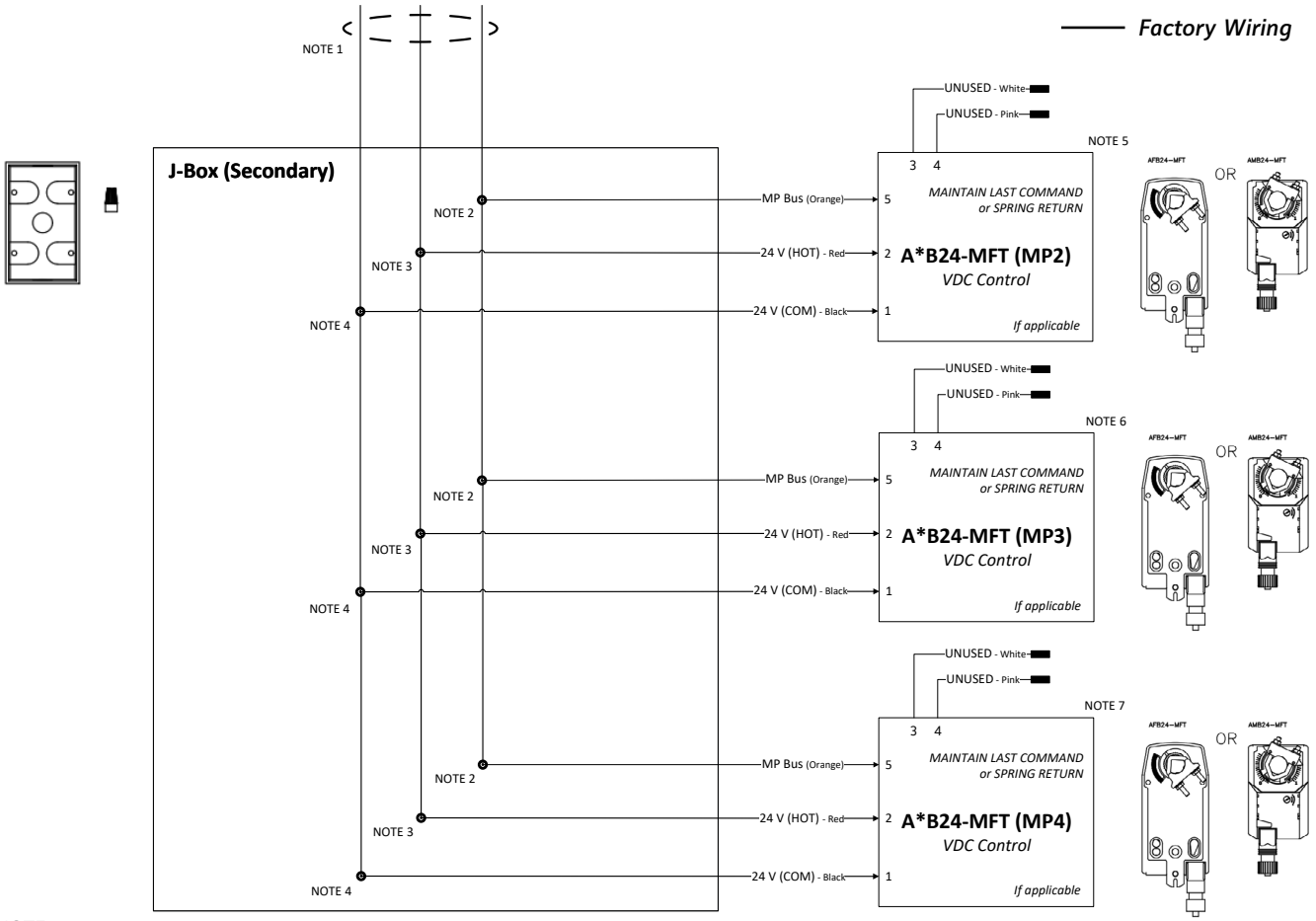
Models AiQ-TD-xxC Analog (BAS) - Field Wiring



NOTE:

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

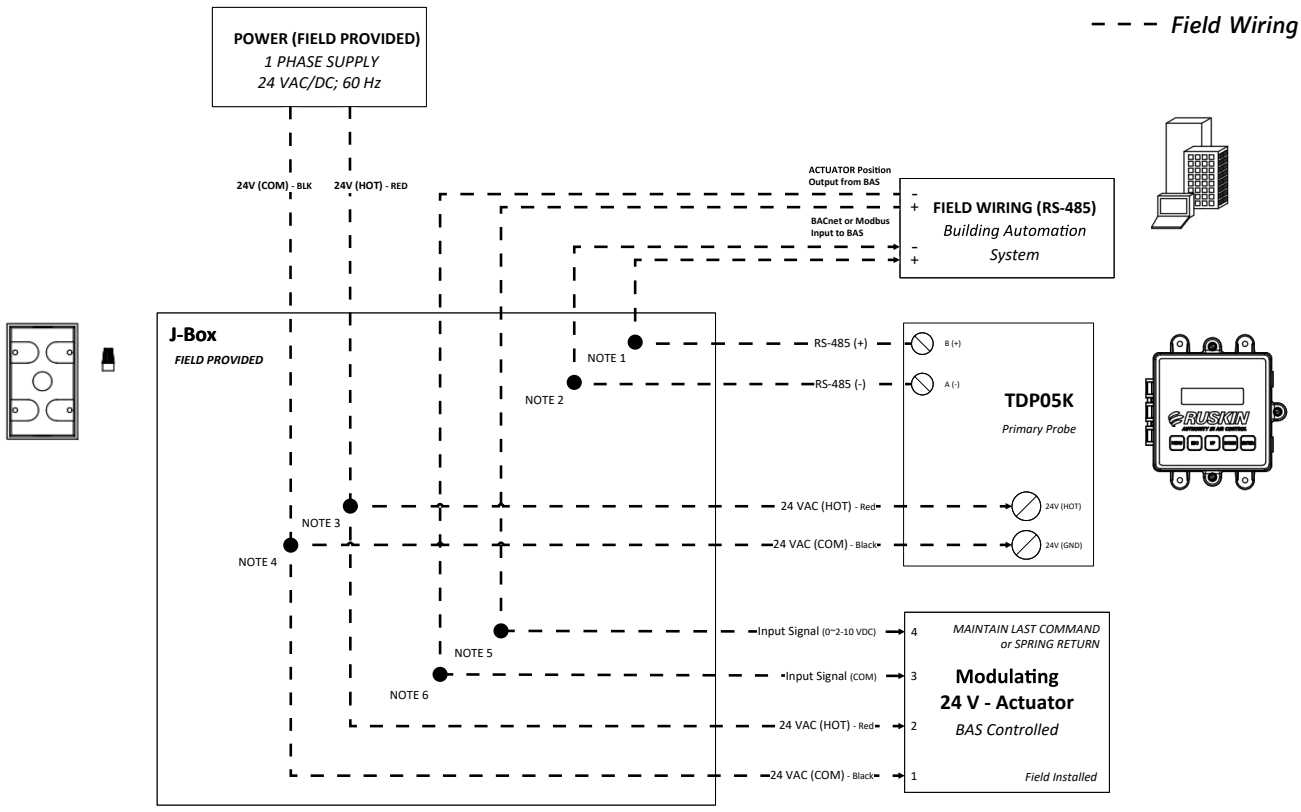
Models AiQ-TD-xxC Factory Wiring



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.

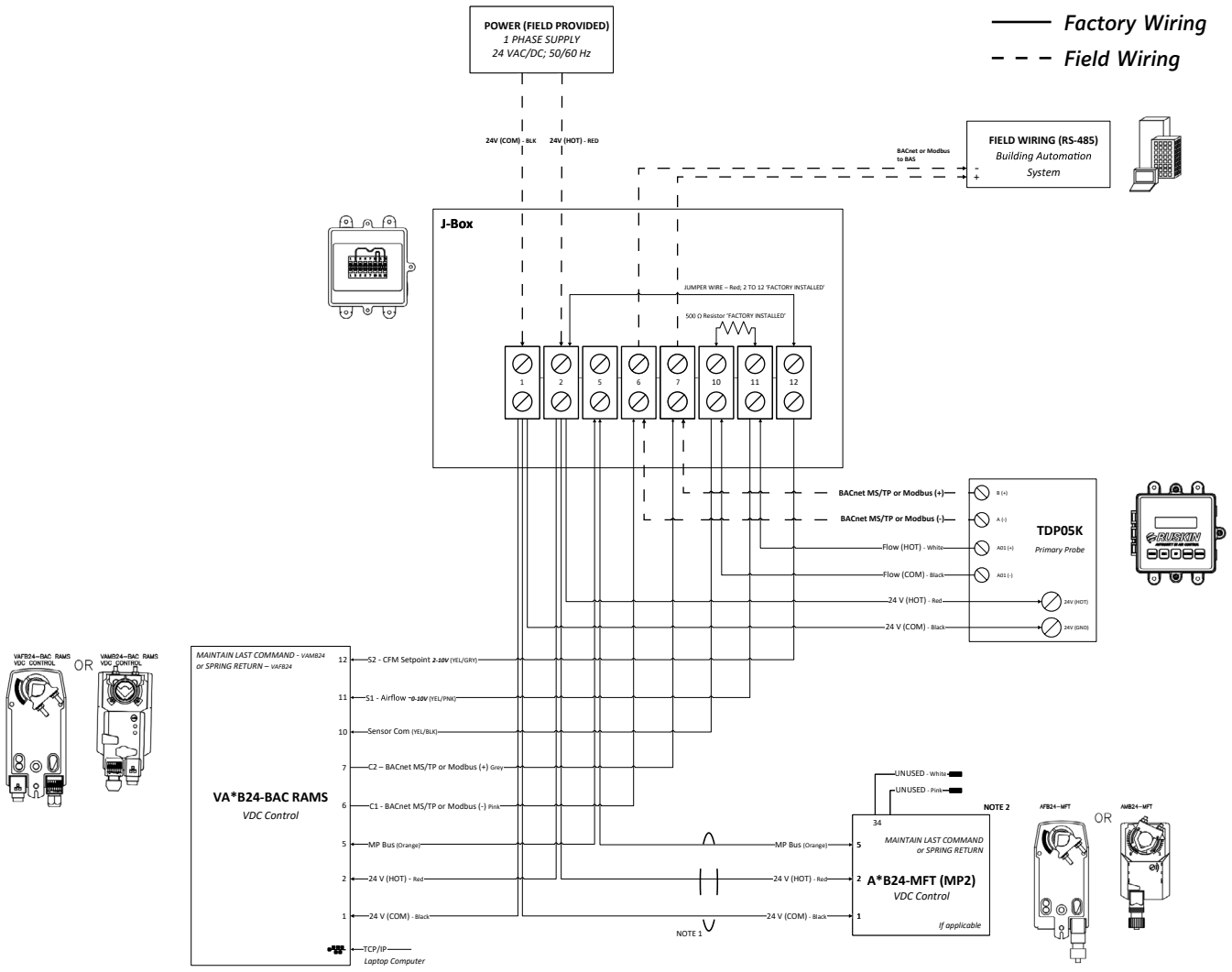
Models AiQ-TD-xx BACnet or Modbus - Field Wiring



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.

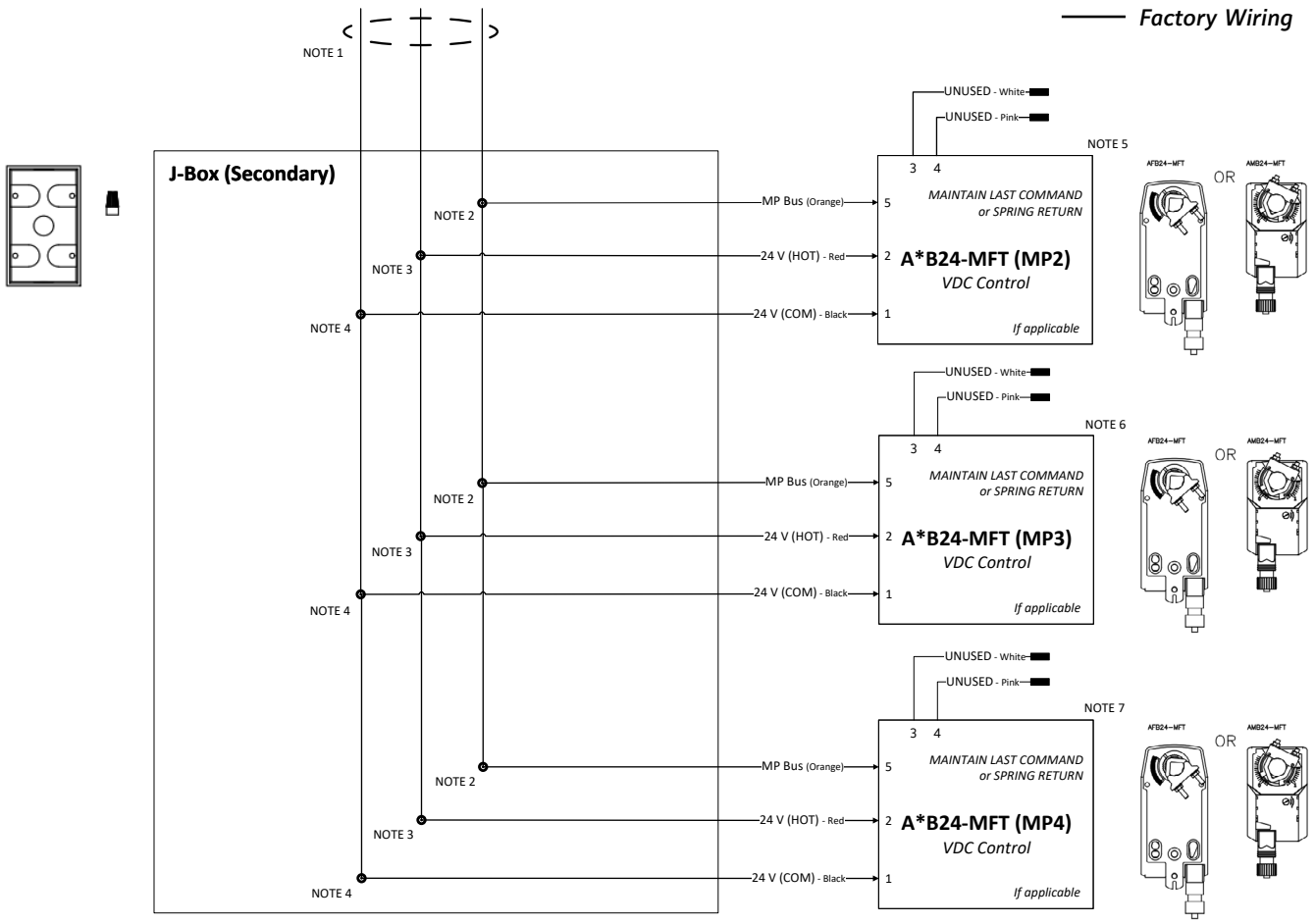
Models AiQ-TD-xxC BACnet or Modbus - Field Wiring



NOTE:

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

Models AiQ-TD-xxC Factory Wiring



NOTE:

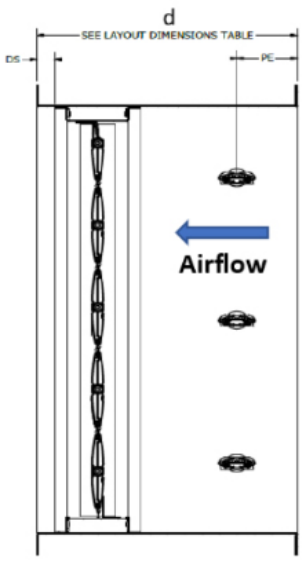
1. Secondary J-Box wiring to Primary J-Box Wiring, refer to page 1 of 2.
2. Wire Nut #1: MP BUS (Orange) wires under the same wire nut.
3. Wire Nut #2: 24 V HOT (Red) wire under the same wire nut.
4. Wire Nut #3: 24 V COM (Black) wire under the same wire nut.
5. Factory Configured: Belimo Address MP2.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

MODE OF OPERATION

Ruskin's air measurement actuator is the RS-485 interface and setup BAS device for the air measurement station. The actuator accepts a CFM SETPOINT via analog input S2 (terminal 12) or a RS-485 network commanded setpoint. The actuator will modulate the damper to maintain the airflow setpoint value. The AIRFLOW measurement from the TDP05K is connected to input S1 (terminal 11) of the actuator and represents a velocity air flow measurement. The active air measurement is reported based on the actuator's configuration, either the RS-485 or Modbus interface, or an analog output from the TDP05K to the building automation system. The Air Measurement actuator includes a WEB SERVER and can be reconfigured at the installation site using a web browser such as Google Chrome should values other than the factory defaults be required.

Direct position control or flow control via BACnet, Modbus, or Analog input are also possible using the setpoint input when the actuator is configured for position control in place of the factory default flow control.

AIRFLOW-IQ DIMENSIONAL DETAILS



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″

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

SUGGESTED SPECIFICATION

Furnish and install a thermal dispersion airflow measuring station with integral damper and controls. The electronic thermal dispersion type airflow and temperature measuring station (AFTMS) shall be capable of monitoring and reporting the airflow and temperature at each sensing point with up to 16 measuring probes containing 1 to 8 sensor points per probe. AFTMS shall include a primary probe that interfaces with the building automation system (BAS) using Modbus or BACnet protocol, or 4-20mA (2-10V with included 500ohm resistors) analog outputs reporting velocity and temperature measurements. Primary probe shall be capable of processing up to 128 (16 probes, 8 sensors/probe each) independent sensing points per AFTMS. Probe(s) shall be constructed of an airfoil shaped for low pressure drop and low noise, acid-etch clear anodized 6063T6 aluminum extrusion. Each sensing point shall consist of two surface mounted thermistors on moisture resistant flexible polyimide substrate with one thermistor for velocity and one for ambient temperature. Primary probe shall feature a 16 character x 2 line alphanumeric backlit LCD display as the user interface. Menu shall support digital offset/gain adjustment when necessary to match test and balance measurements. The air measurement system shall include continuous sensor/ transmitter diagnostics and activate a visual alarm if malfunctions are detected. Primary probe's user interface shall feature tool-free touch setup through a menu-driven display on a hinged enclosure with dust tight and when required, weather resistant, TYPE 1 rated housing. Primary probe's display shall be field configurable to display either I.P. or S.I. units. Factory calibration of thermal dispersion sensors shall be for the full range of velocities between 0 and 5,000 FPM. Proprietary cables are not acceptable. Factory wiring shall be completed using a factory -supplied, composite 4 wire cable similar to Connect Air W24182P-2306BL with communications and power in one cable. Primary Control Probe output shall be Modbus and BACnet compatible with a field adjustable 4-20 mA, or 2-10 VDC across a 500ohm resistor. All electronic components of the assembly shall be lead-free RoHS compliant. Air measurement performance and accuracy statements shall be based on tests and procedures performed in accordance with AMCA publications 610 and 611.

The assembly will require only a single point power connection for both the air measurement system and air measurement actuator and shall operate on a Class 2 24VAC or VDC low voltage supply.

The Airflow-IQ airflow monitoring and control system shall include a leakage class 1A control damper. The complete assembly shall be fabricated, assembled, and calibrated in an ISO 9001 certified facility following strict ISO calibration test procedures.

The airflow measuring and control system shall be programmed at the factory for RS-485 protocol as Default with capability to reconfigure to alternate job specific values upon installation.

The controller shall report flow and damper position feedback via Modbus RTU, BACnet MS/TP, or BACnet I/P network interface with the building automation system. (BAS) Installing contractor shall coordinate proper sizing and placement of the air measuring station with a qualified manufacturer's representative prior to installation. Air Measuring Stations shall be, in all respects, equivalent to a Ruskin Airflow-IQ Series model.

LINKS TO IMPORTANT DOCUMENTS

Document Title
Limited Warranty Document

RUSKIN®
AUTHORITY IN AIR CONTROL

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