RUSKIN

Air Quality Solutions

Installation & Maintenance Manual

Model: IAQ350XL

Air Measuring Louver with Integral Damper

II-IAQ350XL-818/
Replaces II-IAQ350XL-814

Table of Contents

! WARNING

THIS ACCESSORY IS TO BE INSTALLED BY A QUALIFIED SERVICE TECHNICIAN. TO AVOID UNSATISFACTORY OPERATION OR DAMAGE TO THE PRODUCT AND POSSIBLE UNSAFE CONDITIONS, INCLUDING ELECTRICAL SHOCK AND FIRE, THE INSTALLATION INSTRUCTIONS PROVIDED WITH THIS ACCESSORY MUST BE STRICTLY FOLLOWED AND THE PARTS SUPPLIED USED WITHOUT SUBSTITUTION. DAMAGE TO THE PRODUCT RESULTING FROM NOT FOLLOWING THE INSTRUCTIONS OR USING UNAUTHORIZED PARTS MAY BE EXCLUDED FROM THE MANUFACTURER'S WARRANTY COVERAGE.

! WARNING

DISCONNECT ELECTRICAL POWER PRIOR TO SERVICING THIS UNIT. FAILURE TO DO SO CAN RESULT IN ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

Product Application

The Air Measuring Louver (IAQ350XL) combines the functionality of a wind-driven rain louver, an air measuring station and a control damper. It is designed to be used in any outside air intake application that requires accurate airflow measurement at velocities between 275 and 2,024 feet per minute. Unit may be used in any building envelope (or air handler) penetration for intake air.

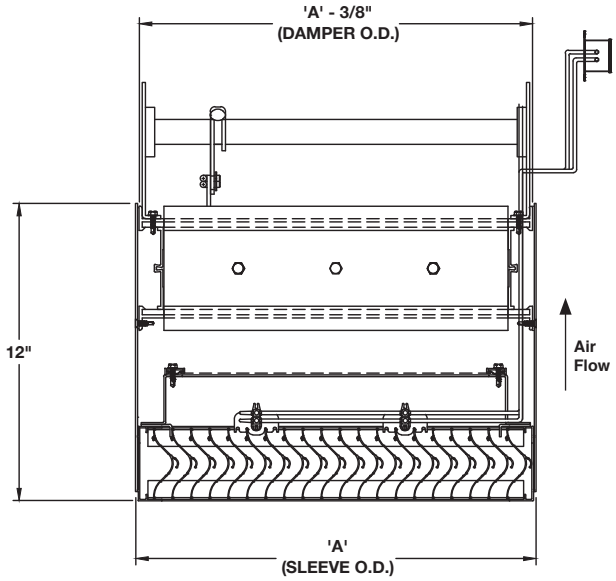
Key Features

- Wind-driven rain louver with integrated flow measurement station.
- Low leakage class 1A rated damper with airfoil blades for low pressure drop.
- Factory assembled measuring station and ultra low leak damper provides effective setpoint monitoring and adjustment with tight shut-off for unoccupied hours.
- Field selectable output signal is proportional to the CFM.

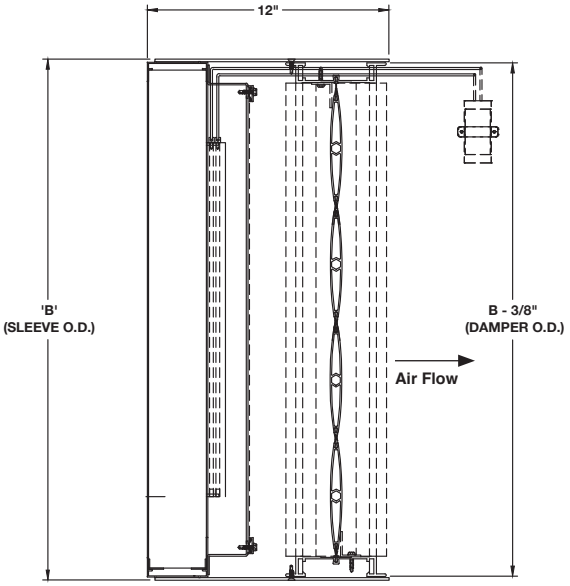
Key Benefits

- Contributes to earning required Indoor Environmental Quality (EQ) and Energy and Atmosphere (EA) LEED prerequisites.
- Save energy dollars by measuring the minimum ventilation airflow to within ±5% accuracy. Control the amount of unconditioned air into the space.
- Meet International Building Code (IBC) and International Energy Conservation Code (IECC) requirements.
- Maintain proper ventilation to dissipate dangerous indoor contaminants such as mold spores, bacteria and chemicals.
- Create a healthy indoor environment to reduce absenteeism, increase productivity, improve comfort and reduce the risk of litigation.

DIMENSIONAL DETAILS

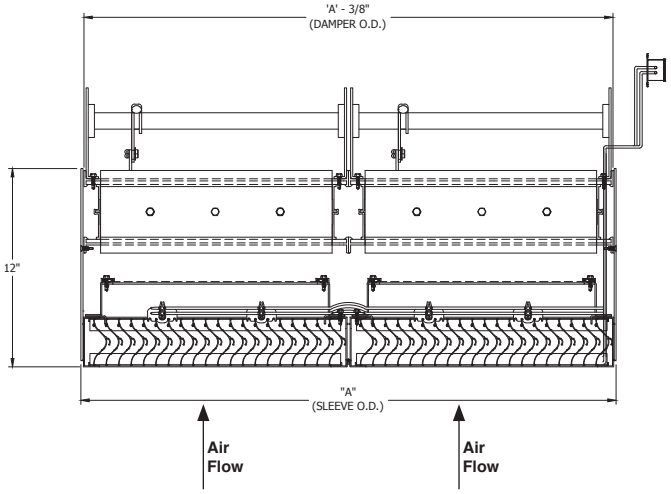


Plan View – Single Section

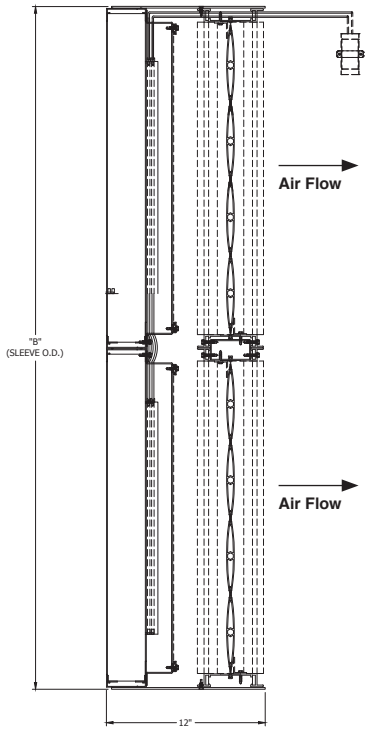


Side View – Single Section

TOTAL AIRFLOW MEASUREMENT



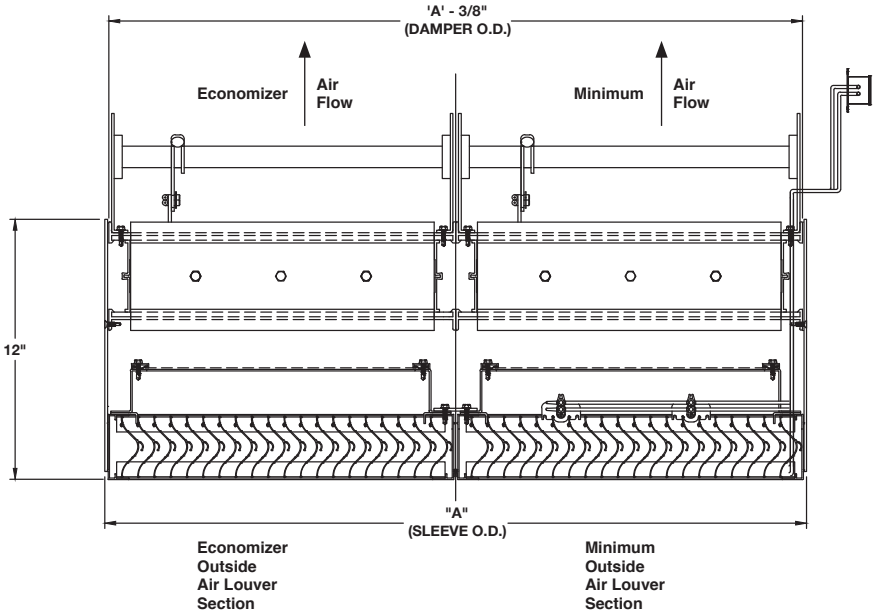
Plan View – Two Section Side by Side



Side View – Two Section Over Under

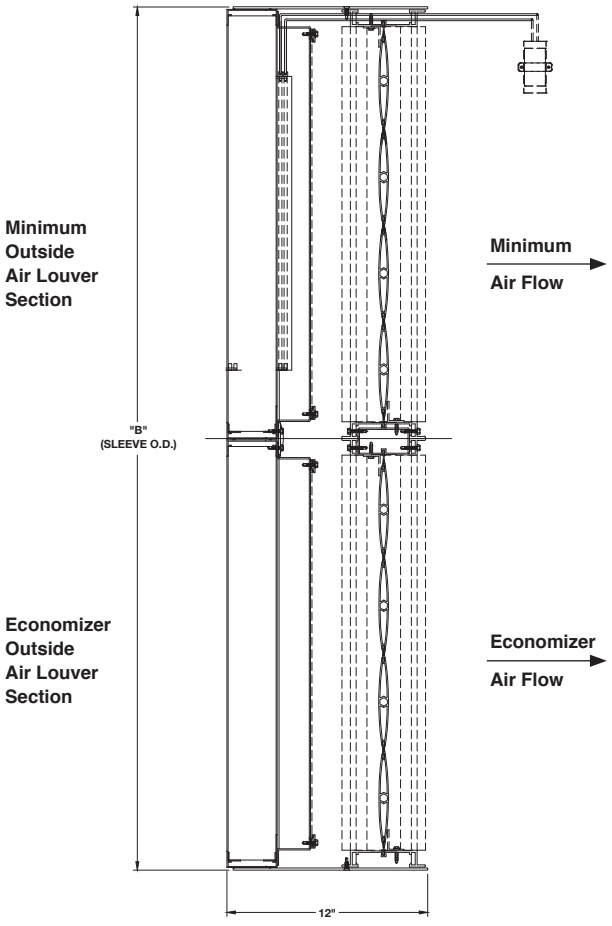
MAX-MIN ECONOMIZER APPLICATIONS

Minimum/Side by Side–
Partial Airflow Measurement
Plan View



Sections should be sized in proportion to the Min and Maxair flows, not necessarily 50/50.

Minimum Over/Under –
Partial Airflow Measurement
Side View



FREE AREA AND PRESSURE DROP

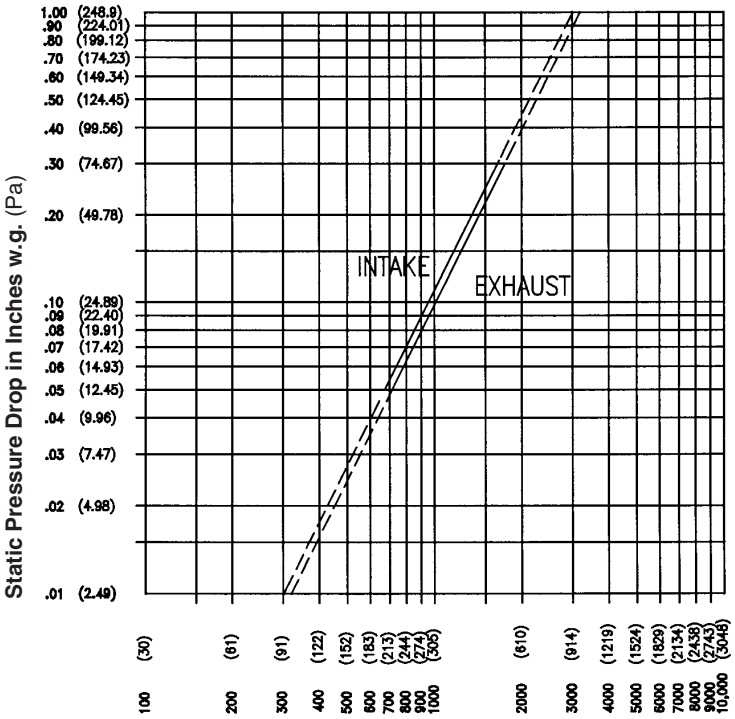
FREE AREA GUIDE

Free Area Guide shows free area in ft² and m² **for various sizes of AML3.**

Width – Inches and Meters

Height – Inches and Meters	**12** 0.30	**18** 0.46	**24** 0.61	**30** 0.76	**36** 0.91	**42** 1.07	**48** 1.22
18 0.46	**0.43** 0.04	**0.71** 0.07	**1.00** 0.09	**1.28** 0.12	**1.57** 0.15	**1.85** 0.17	**2.14** 0.20
24 0.61	**0.63** 0.06	**1.06** 0.10	**1.48** 0.14	**1.90** 0.18	**2.32** 0.22	**2.75** 0.26	**3.17** 0.29
30 0.76	**0.84** 0.08	**1.40** 0.13	**1.96** 0.18	**2.52** 0.23	**3.08** 0.29	**3.64** 0.34	**4.20** 0.39
36 0.91	**1.05** 0.10	**1.74** 0.16	**2.44** 0.23	**3.14** 0.29	**3.84** 0.36	**4.53** 0.42	**5.23** 0.49
42 1.07	**1.25** 0.12	**2.09** 0.19	**2.92** 0.27	**3.76** 0.35	**4.59** 0.43	**5.43** 0.50	**6.26** 0.58
48 1.22	**1.46** 0.14	**2.43** 0.23	**3.40** 0.32	**4.38** 0.41	**5.35** 0.50	**6.32** 0.59	**7.29** 0.68
54 1.37	**1.66** 0.15	**2.77** 0.26	**3.88** 0.36	**4.99** 0.46	**6.10** 0.57	**7.21** 0.67	**8.32** 0.77
60 1.52	**1.87** 0.17	**3.12** 0.29	**4.37** 0.41	**5.61** 0.52	**6.86** 0.64	**8.11** 0.75	**9.35** 0.87
66 1.68	**2.08** 0.19	**3.46** 0.32	**4.85** 0.45	**6.23** 0.58	**7.62** 0.71	**9.00** 0.84	**10.39** 0.97
72 1.83	**2.28** 0.21	**3.81** 0.35	**5.33** 0.50	**6.85** 0.64	**8.37** 0.78	**9.89** 0.92	**11.42** 1.06

PRESSURE DROP



Air Velocity in feet (meters) **per minute through Free Area**

Pressure Drop testing performed on 48” x 48” (1219 x 1219) unit.
Ratings do not include the effect of a bird screen.

The Free Area and Pressure Drop charts are a guide.
For exact free area calculations, consult Ruskin’s LEAD louver program at http://leads.ruskin.com/eula.aspx?ReturnUrl=%2fdefault.aspx and click on “Model Performance Data” then choose model AML3.
Input the overall Width, Height and expected Airflow.
The program will return the following information:
Free Area in Sq Ft.
Free Area Percentage
Free Area Velocity
Pressure Drop (In w.g.)

Louver Model	A (in)	B (in)	Free Area (sq ft)	Free Area Percentage	Free Area Velocity	Pressure Drop (In w.g.)
AML3	26.00	50.00	4.03	45%	1241.18	0.17

SEQUENCE OF OPERATION

For use on Ruskin AMS units with Transducer or AMS070V Controller

Option 1
Manual Balancing

The unit is installed in the outside air opening and furnished with a manual locking hand quadrant and a pressure transducer. Under flow, the transducer output is checked with a volt meter and compared to the pressure chart (P.A.M.S.). The damper is manually adjusted until the voltage output is equal to the desired CFM flow. The transducer output signal can be wired to the BAS to prove flow.

CFM can be determined by referencing the chart and utilizing the following formula below. Both Ka and l/m values are constants. See the PAMS chart provided with your unit for Ka and l/m for your specific unit.

CFM = (AREA * Ka) * PAMS (1/m)

Option 2
BAS Control

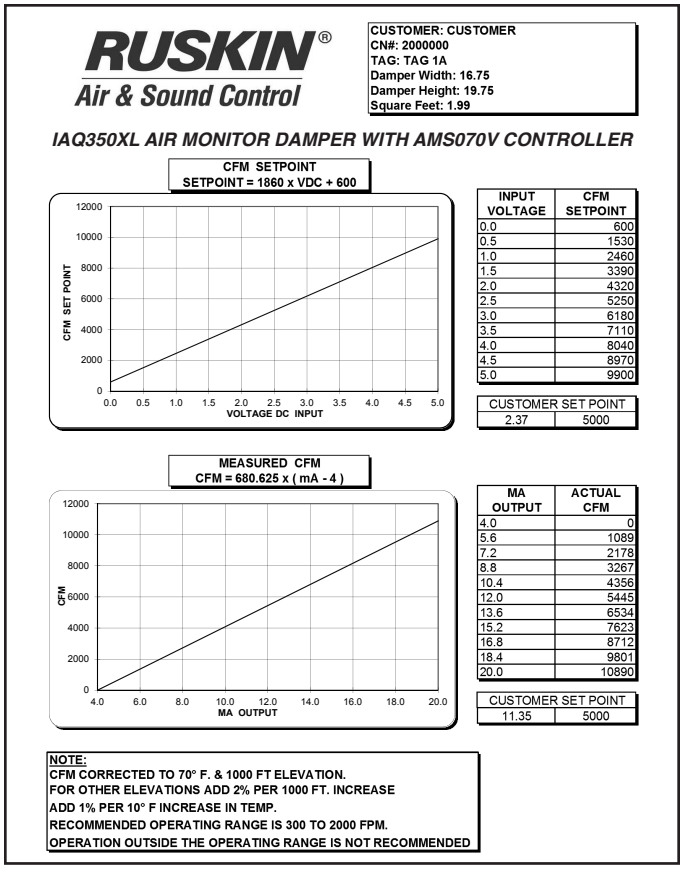
The unit is installed in the outside air opening and furnished with a transducer and a 24V modulating damper actuator. Under flow, the transducer output produces a voltage signal to the Building Automation System (BAS). The BAS calculates the CFM based on the formula and velocity pressure (P.A.M.S.). The BAS sends a control signal to the actuator to modulate to the desired CFM flow.

Option 3
Full Factory Controls

The air measurement station with included control damper is installed in an outside air opening in the building's envelope or in the supply, return or exhaust air ductwork or in an air handler. The air measurement station will be supplied with a corresponding actuator. The actuator will be driven by the AMS070V controller, based on the air measurement station's velocity pressure, to maintain a CFM set point value. The AMS070V controller will drive the damper actuator to maintain a measured CFM value equal to the input set point. Each air measurement station supplied with the AMS070V option will include an Input / Output (I/O) chart showing the input voltage (O-5VDC) corresponding to the range of air flows to be controlled. The I/O chart will also show the expected (4-20mA) analog output, corresponding to the range of air flows being measured and controlled. The AMS070V control panel is powered from 120VAC and can be interfaced with any building automation system. For additional details, for example how to drive the damper closed when the building or space is unoccupied, please reference the attached wiring diagram and the AMS070V catalog sheet at ruskin.com.

VOLTS	PAMS	CFM	FPM
0.1	0.01	1549.6	280.3
0.2	0.02	2253.0	407.6
0.3	0.03	2804.5	507.3
0.4	0.04	3275.9	592.6
0.5	0.05	3695.4	668.5
0.6	0.06	4077.7	737.6
0.7	0.07	4431.7	801.6
0.8	0.08	4763.0	861.6
0.9	0.09	5075.8	918.2
1	0.1	5373.0	971.9
1.1	0.11	5656.7	1023.3
1.2	0.12	5928.9	1072.5
1.3	0.13	6190.8	1119.5
1.4	0.14	6443.5	1165.6
1.5	0.15	6688.1	1209.8
2	0.2	7812.2	1413.1
3	0.3	9724.3	1759.0
4	0.4	11358.7	2054.7
5	0.5	12813.2	2317.8
6	0.6	14138.9	2557.6
7	0.7	15366.2	2779.6
8	0.8	16515.2	2987.4
9	0.9	17599.7	3183.6
10	1	18630.1	3370.0

Sample P.A.M.S. Chart
(P.A.M.S. Charts are job specific)

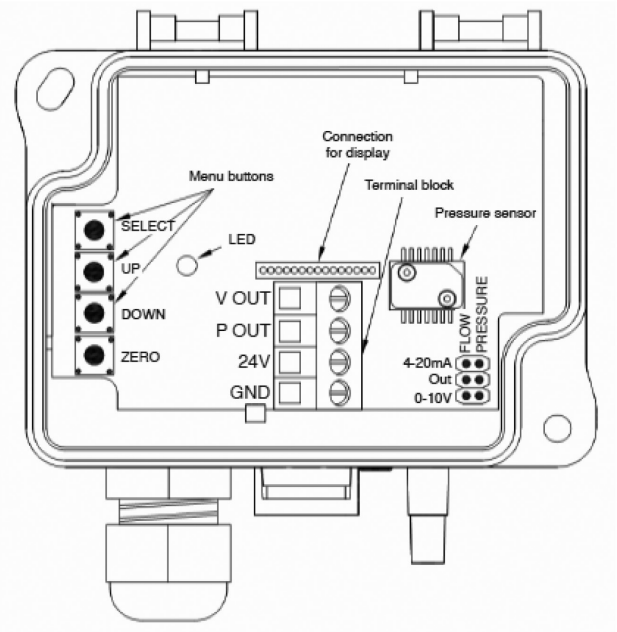


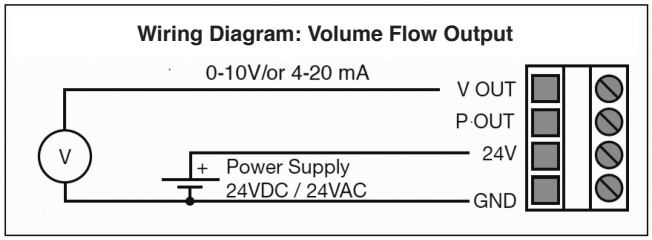
Sample Control Chart
(Charts are job specific)

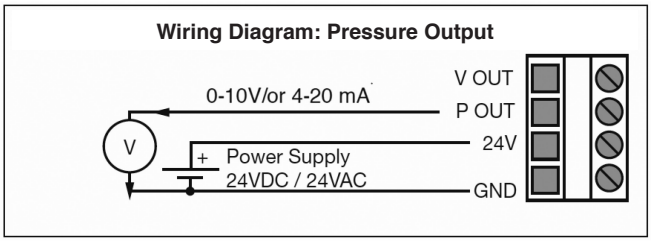
Notice: The IAQ350XL is available with multiple control solutions. If the IAQ350XL unit on your project has something other than the solutions specified in this document, consult your local representative or the company that provided this air measurement station.

The DPT-IQ transducer with two-line backlit display shows flow and pressure in either IP (English) or SI (Metric) units. Scalable, linear output can be either Voltage or mA signal.

Standard DPT-IQ Transducer Wiring Details

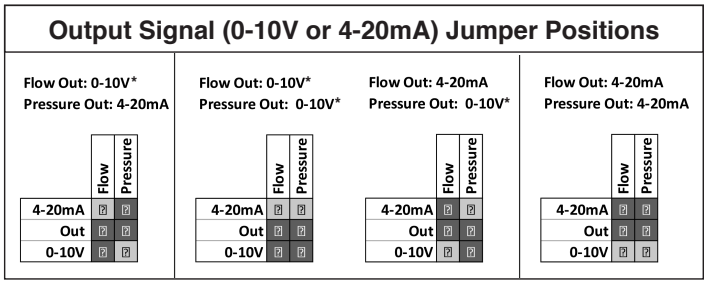






To configure the Output signals (0-10V or 4-20mA) for Pressure and Flow (Velocity or Volume), install jumpers on the 6-pin set of Output Jumpers for Flow and Pressure, located on the right side of the open device. The configuration options for jumpers are shown to the right.

For 0-5V, set jumpers same as for 0-10V and change selection in menu (Mode) to 0-5V.



For complete information concerning DPT-IQ installation, wiring, configuration and operation, consult the DPT-IQ Installation and Maintenance Manual on Ruskin.com

Controls

The IAQ350XL Air Measuring Station can be purchased with or without full factory controls. When purchased without factory controls the IAQ350XL will be shipped with a Ruskin low-pressure transducer. The standard transducer is a Ruskin DPT-IQ and is factory configured for 0-1.0 inwc corresponding to a 0-10VDC output. The transducer requires a power source of either 24 VDC or VAC ±10%. Optional transducers are also available.

The formula provided on the PAMS (Pressure Across Measuring Station) chart must be applied to convert the output from the low-pressure transducer into a CFM value. Each unit is provided with a PAMS chart developed specifically for that unit. Applying other formulas may result in greater air measurement error and unacceptable results.

When the optional AMS070V full factory controls are ordered the IAQ350XL unit will ship with floating damper actuators that are driven by two triac outputs from the controller. The AMS070V controller is factory programmed to the customer's specific requirements and accepts a 0-5V CFM setpoint input from the building automation system (BAS). The controller will produce a 4-20MA output signal corresponding to the actual air flow at any point in time. The controller will modulate the damper position to maintain the set- point CFM value. The controller is equipped with an internal pressure transducer that converts the differential pressure from the air measurement station into the measured air flow value. The AMS070V controller is housed in a 12" x 12" x 6" NEMA1 enclosure with a 120/208/240VAC to 24VAC transformer. Each controller is shipped with an input output chart showing the input and output scaling for that specific unit. Contact Ruskin with the control number to obtain the calibration charts for your specific unit.

Optional AMS070V Control Panel Installation

1. The controller enclosure should be mounted securely on an adjacent wall or attached to the air handling unit. The panel should be mounted within 100 feet of the IAQ350XL to assure proper pressure signal function. If the enclosure must be mounted more than 100 feet from the IAQ350XL, please consult your local Ruskin representative or the company that you purchased the device from.
2. Loosen the enclosure cover screws and remove the cover.
3. Remove the appropriate knock-outs for connection of the field wiring to the enclosure's terminal blocks.
4. Fasten the enclosure to the wall or flat surface using the four mounting holes in the back of the panel enclosure.

Wiring and Piping Connections

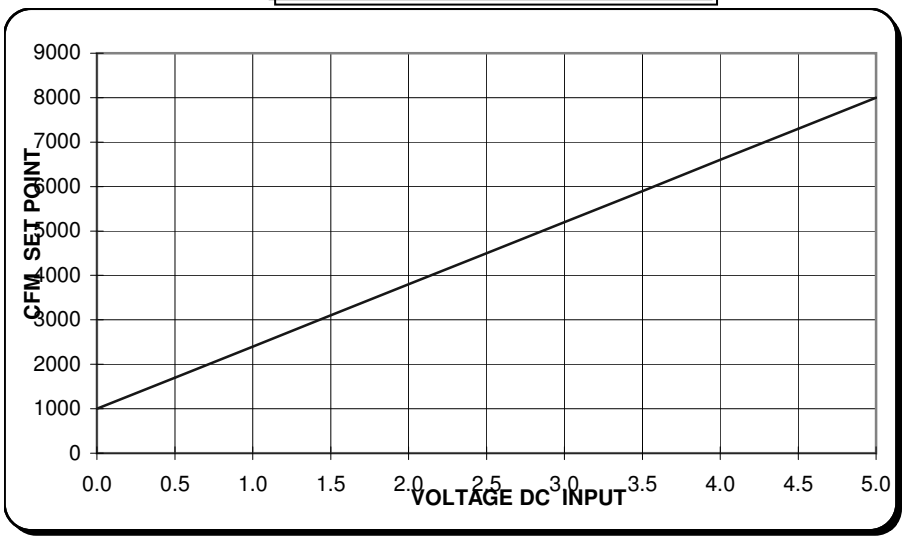
1. Connect 120/208/240VAC power supply to the IAQ350XL control panel L1 and L2.
2. Connect the three actuator wires as shown (see page 9). Connect the **black** (com) wire to controller terminal **24H**. Connect the **red** wire to controller terminal **24G** (com) terminal. Please note actuator wiring is as listed above, red 24G, black 24H.
3. Connect 0-5VDC signal from the BAS to UI (universal input) and common. Observe polarity.
4. Connect 4-20mA analog output AO and Common from the controller to the BAS system. Observe polarity.
5. Connect pressure tubing from the controller to the airflow sensing blade, connecting the low pressure port to the blade side nearest the damper and the high pressure port to the blade side nearest the louver.
6. Optional Un-Occupied signal – connect dry contact between DI and Comm. Close contact to drive damper closed when building is un-occupied. Open contact for normal operation.

RUSKIN®
Air & Sound Control

CUSTOMER: Ruskin Customer
CN#: 1234567
TAG: Air Measurement Station
Damper Width: 24
Damper Height: 24
Square Feet: 3.63

IAQ350XL AIR MONITOR LOUVER WITH AMS070V CONTROLLER

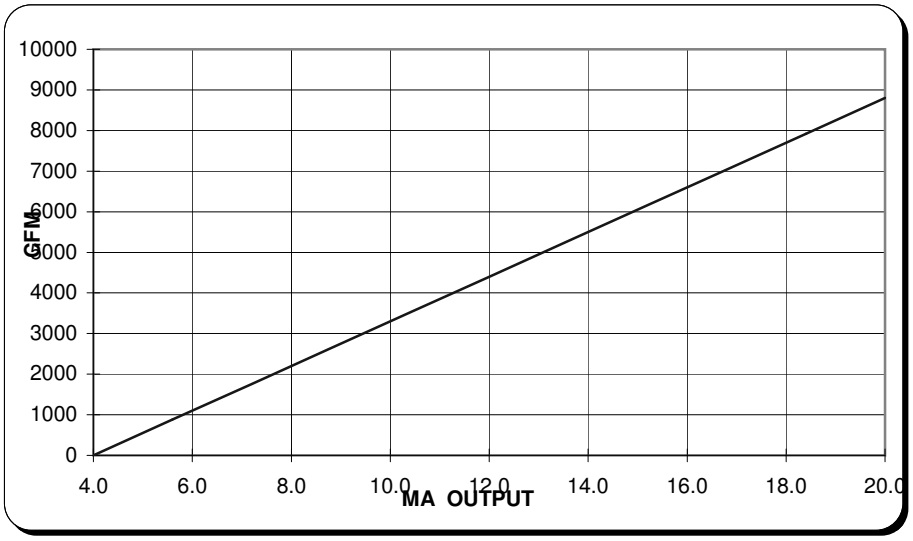
CFM SETPOINT
SETPOINT = 1400 x VDC + 1000



INPUT VOLTAGE	CFM SETPOINT
0.0	1000
0.5	1700
1.0	2400
1.5	3100
2.0	3800
2.5	4500
3.0	5200
3.5	5900
4.0	6600
4.5	7300
5.0	8000

CUSTOMER SET POINT	
2.14	4000

MEASURED CFM
CFM = 550 x (mA - 4)

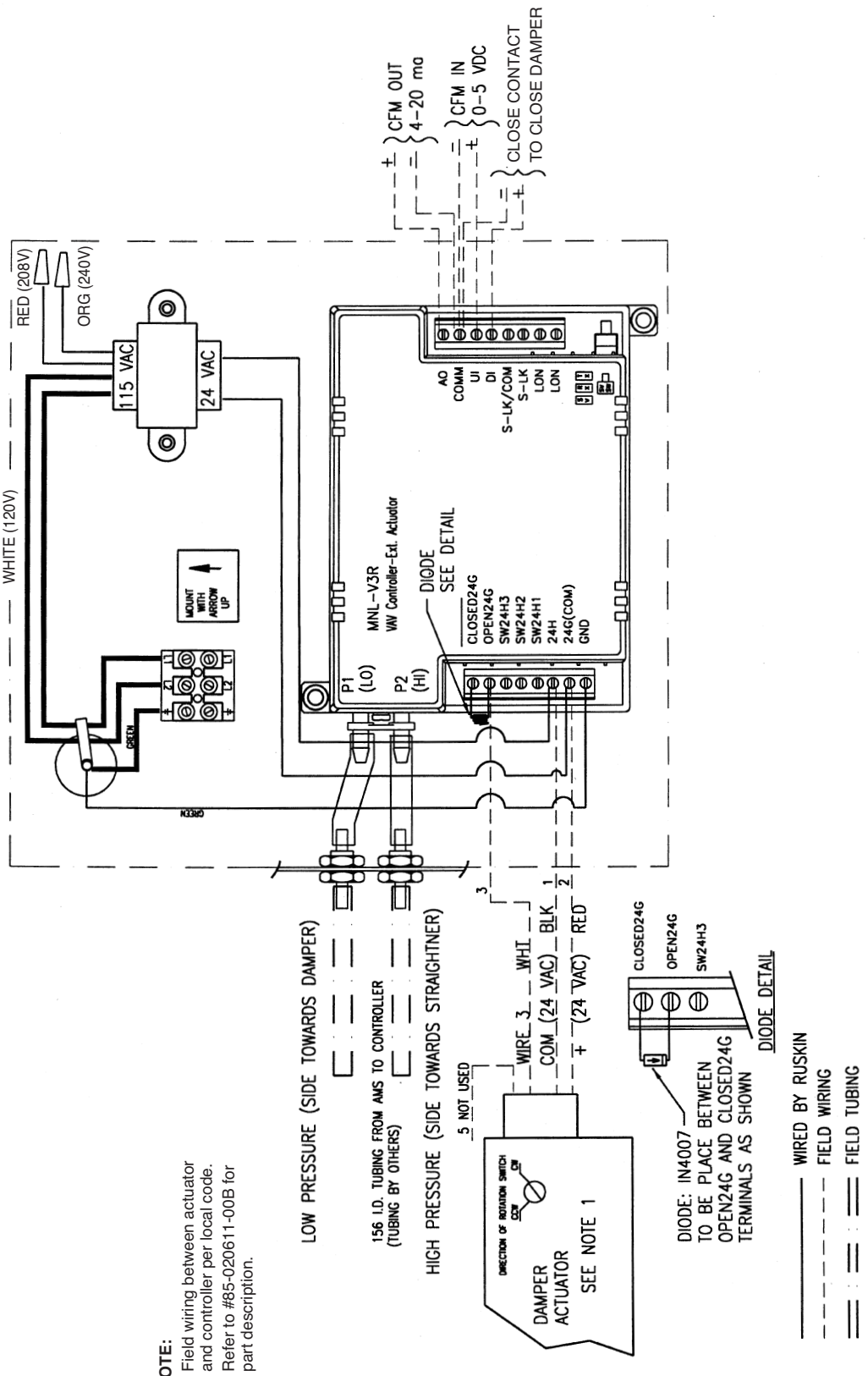


MA OUTPUT	ACTUAL CFM
4.0	0
5.6	880
7.2	1760
8.8	2640
10.4	3520
12.0	4400
13.6	5280
15.2	6160
16.8	7040
18.4	7920
20.0	8800

CUSTOMER SET POINT	
11.27	4000

NOTE:
CFM CORRECTED TO 70° F. & 1000 FT ELEVATION.
FOR OTHER ELEVATIONS ADD 2% PER 1000 FT. INCREASE
ADD 1% PER 10° F INCREASE IN TEMP.
RECOMMENDED OPERATING RANGE IS 300 TO 2000 FPM.
OPERATION OUTSIDE THE OPERATING RANGE IS NOT RECOMMENDED

AMS070V WIRING SCHEMATIC



NOTE:
1. Field wiring between actuator and controller per local code.
2. Refer to #85-020611-00B for part description.

Specifications

DPT-IQ Transducer (low pressure transducer)

Power	24VAC or VDC, +/- 10%
Outputs	0-5 VDC, 0-10 VDC or 4-20 mA
Enclosure	NEMA 3 ABS
Approvals	CE, EMC, RoHS, ETL, ANSI/UL
Operating Range	0-4.0” WC (0-1 kPa), 14°F to 122°F (-10°C to 50°C)

AMS810 Transducer (low pressure transducer)

Power/Output	7-45 VDC (4-20 mA Output)
	7-45 VDC or 12-32 VAC (0-5 VDC Output)
	13-45 VDC or 13-32 VAC (0-10 VDC Output)
Enclosure	IP66 rated polycarbonate
Approvals	NIST Certificate
Operating Range	0-2.5" WC (0-622 Pa), 32°F to 140°F (0°C to 60°C)

RU-274-R2-VDC Transducer (low pressure transducer)

Power	12-40 VDC or 12-35 VAC
Outputs	0-10 VDC (0-5 VDC field selectable)
Enclosure	Painted NEMA 4 (IP-65)
Approvals	AMCA Certified +/-5%
Operating Range	0-1” WC (0-250 Pa), 0°F to 175°F (-18°C to 80°C)

AMS070V Controller (optional)

Power	120/208/240 VAC
Inputs	0-5 VDC (CFM Setpoint) Pressure (low and high ports)
Optional	Dry Contact between DI and Comm to close damper
Outputs	4-20mA analog signal (CFM Measured)
Enclosure	Painted NEMA 1 Enclosure 12" x 12" x 6" Deep
Operating Range	-22°F to 140° F (-30°C to 60°C)
Memory	Nonvolatile EPROM

Maintenance

1. Semi-annually the damper tie-bar linkage and the jackshaft (if used) or extended shaft bearings should be lubricated with silicone free lubricant.

2. Damper blade axle bearings do not normally require lubrication.

3. When dampers are installed where they are exposed to heavy dust-laden air, frequent flushing of the damper axle bearings with water is recommended for extended bearing life.

4. Disconnect the sensing tubes between the damper and the pressure transducer or controller. Apply a clean pressurized air source to the air piping connections at the IAQ350XL frame in order to blow out the sensing ports in the fixed sensing blades of the IAQ350XL. **DO NOT connect this air source to the pressure transducer or control modules. This will damage the instruments.** Replace tubing to the equipment in reverse order of removal.

5. The louver blade section of the IAQ350XL and the air sensing blades should be annually inspected for particulate build-up. Use a damp cloth to wipe clean the sensing blade surface. Water may be used to clean and flush the louver blade section and the sensing blades of the IAQ350XL. Using pressurized air for purging the sensing blades of water is recommended.

RUSKIN
3900 Dr. Greaves Rd.
Kansas City, MO 64030
(816) 761-7476
FAX (816) 765-8955
www.ruskin.com