

# Honeywell Airflow Control Valves

## 23 36 00 AIR TERMINAL UNITS

### 23 36 16 VARIABLE-AIR-VOLUME UNITS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. This Section includes general requirements for Variable Air Volume Terminal Units used within heating, ventilating, and air conditioning (HVAC) systems.
- B. All air terminal units, unless specified otherwise elsewhere, shall be pressure independent venturi valves, providing pressure independence over its specified differential static pressure range.

##### 1.2 RELATED SECTIONS

- A. SECTION 23 09 13.13 – Actuators and Operators
- B. SECTION 23 09 13.33 – Control Valves
- C. SECTION 23 09 23 – Direct-Digital Control Systems for HVAC
- D. SECTION 23 09 33 – Electric and Electronic Control Systems for HVAC
- E. SECTION 23 09 93 – Sequence of Operations for HVAC Controls
- F. SECTION 26 05 00 – Common Work Results for Electrical

##### 1.3 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified. Verification that the approvals exist for all submitted products shall be provided with the submittal package. Products not currently offering the following approvals are not acceptable.

1. ISO 9001:2008
2. OSHPD 2013 CBC
3. ASCE 7-10
4. ICC-ES-AC-156
5. UL/cUL (E87741) listed under UL916 (Standard for Open Energy Management Equipment) with plenum rating.
6. CSA (LR95329-3) Listed.
7. Meets FCC Part 15, Subpart B, Class B (radiated emissions) requirements OSHPD 2013 CBC
8. RoHS Compliant

#### 1.4 SUBMITTALS

- A. See SECTION 01 30 00 – Administrative Requirements, for submittal procedures.
- B. See SECTION 23 09 23 “Submittals” for requirements applicable to this section, in addition to the requirements herein.
- C. Provide manufacturer's printed application and performance data including pressure, velocity, sound power level and temperature limitations on specified products.
- D. Venturi Valve Schedule, as provided by manufacture. Schedule shall include a separate line for each Venturi damper and a column for each of the damper attributes:
  - 1. Sequence Number
  - 2. Quantity
  - 3. Air Valve Identification Tag
  - 4. Serves
  - 5. Size
  - 6. Single /Dual
  - 7. Duct Size (in) – Height
  - 8. Duct Size (in) – Width
  - 9. Duct Area (sq ft)
  - 10. Minimum Flow (CFM)
  - 11. Maximum Flow (CFM)
  - 12. Static Pressure (“wc)
  - 13. Model Number
  - 14. Flange
  - 15. Actuator Type (Rotary Low-Speed /Linear Low-Speed)
  - 16. Actuator Model Number
  - 17. Comments

## 1.5 QUALITY ASSURANCE

- A. The venturi airflow control valve shall have an integral mechanical flow rate metering assembly and pressure independent regulator, with factory-calibrated position modulation controller. Flow control **accuracy shall be  $\pm 10\%$  or better.**
- B. The venturi airflow control valve shall respond within one second to a change in duct static pressure to maintain specified airflow setpoint.
- C. The venturi airflow control valve shall achieve maximum turndown ratio at the listed minimum operating differential pressure, maintaining rangeability from minimum to maximum device rated CFM (M<sup>3</sup>/HR). Devices that require duct static pressure to be increased to achieve maximum flow rate **shall not be accepted.**
- D. Alternate manufactures to be considered utilizing ASHRAE 130 minimum operating pressure as a rating for device minimum design pressure at required flow, **shall not be acceptable** based on minimum operating pressure alone. Technical data and the valve manufacture’s flow testing documentation from an independently owned **third-party testing** agency for each size valve and model across all flow ranges for the device **shall be required.**
- E. Alternate manufactures to be considered shall provide sound power level data testing documentation from an independently owned **third-party testing** agency for each size valve and model across all flow ranges for the device **shall be required.**
- F. The venturi airflow control valve shall maintain pressure independence regardless of loss of power. Electronically pressure independent or close loop flow measurement devices **shall not be accepted.**
- G. The manufacture shall designate the size and select the pressure independent venturi airflow control valve for each specific application and installation location, and as specified on drawings and /or in the sequence of operation.
- H. The manufacture shall create and provide a schedule, in compliance with and for the submittal process.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Provide factory-shipping cartons for each piece of equipment and control device. Maintain cartons through shipping, storage, and handling as required to prevent equipment damage. Store equipment and materials inside and protected from weather.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURES**

- A. Basis of Design Specified Manufacturer: Honeywell; Venturian™
- B. Acceptable Manufacturers: Alternate manufactures will be considered in accordance “or equal” provision specified in SECTION 01 62 00 – Product Options.

### **2.2 CONSTANT AIR VOLUME UNITS**

- A. General Requirements:
  - 1. Provide all airflow control valves not specified to be integral with other equipment.
  - 2. Airflow control valves meeting the following specifications shall be furnished and installed where shown on drawings, schedules, and /or as described in SECTION 23 09 93 - Sequence of Operations for HVAC Controls.
  - 3. Airflow control valves shall be installed in accordance with the manufacture’s current installation guidelines.
  - 4. Medium Pressure Operation:
    - a. The airflow control valve shall be capable of operation as described herein with a minimum static pressure, pressure drop across valve: 0.6 – 3.0” WC (150 – 750 Pa) for unit sizes 08” through 14”.
    - b. The airflow control valve shall not require additional duct lengths (inlet or outlet duct diameters) upstream of the valve or downstream to ducted outlets to ensure accuracy and /or pressure independence.
  - 5. Low Pressure Operation:
    - a. The airflow control valve shall be capable of operation as described herein with a minimum static pressure, pressure drop across valve: 0.3 – 3.0” WC (150 – 750 Pa) for unit sizes 08” through 14”.
    - b. The airflow control valve shall not require additional duct lengths (inlet or outlet duct diameters) upstream of the valve or downstream to ducted outlets to ensure accuracy and /or pressure independence.
  - 6. The airflow control valve construction shall be:
    - a. Unit casing shall be 16-gauge spun aluminum body with continuous welded seam.
    - b. Unit shaft and internal connection link shall be 316 stainless steel.
    - c. Unit shaft support brackets shall be galvanized steel (316 stainless steel Low-Leakage Shut-off Design Series).
    - d. Unit pivot arm shall be aluminum (303 /304 stainless steel Low-Leakage Shut-off Design Series).
    - e. Unit pressure independent spring and PPS slider shall be spring-grade stainless steel.

- f. Unit shaft bearing surfaces shall be polypropylene or polyphenylene sulfide composite.
- g. Unit seal wheel shall be polypropylene.
- h. Supply valve unit vapor barrier insulation shall be 0.375” (9.5 mm) flexible closed-cell polymer-based foam. Flame /smoke rating 25 /50 in conformance with ASTM E84.
- 7. Operating Range:
  - a. 32 – 122 °F (0 – 50 °C) ambient
  - b. 10 – 90% non-condensing RH
- 8.

**B. Standard Venturi Valve (Non-shut-off Design):**

- 1. Air control valves shall be provided for application as automatic modulating control in medium to high pressure and velocity systems (***Where Shown on Drawings***).
- 2. Airflow control valves shall be sized to meet flow /pressure requirements of the application:

Pressure Range	SIZE	Operating Range CFM (m³/hr) SINGLE	Operating Range CFM (m³/hr) DUAL
Medium	08”	70 – 700 (120 – 1185)	----
	10”	100 – 1000 (170 – 1695)	200 – 2000 (340 – 3390)
	12”	150 – 1500 (255 – 2545)	300 – 3000 (510 – 5090)
	14”	300 – 2500 (510 – 4245)	600 – 5000 (1020 – 8490)
Low	08”	70 – 500 (120 – 845)	----
	10”	100 – 550 (170 – 930)	200 – 1100 (340 – 1860)
	12”	150 – 1050 (255 – 1780)	300 – 2100 (510 – 3560)
	14”	300 – 1400 (510 – 2375)	600 – 2800 (1020 – 4750)

- 3. Unit casing leakage shall not exceed 0.24 CFM at 1.0” WC static pressure, high side leakage 0.52 CFM at 3.0” WC static pressure, for unit sizes 08” through 14”.

C. Low-Leakage Venturi Valve (Shut-off Design Series):

1. Low-Leakage control valve shall be provided for application as automatic modulating control in low to medium pressure and velocity systems (***Where Shown on Drawings***).
2. Airflow control valves shall be sized to meet flow /pressure requirements of the application:

Pressure Range	SIZE	Operating Range CFM (m³/hr) SINGLE	Operating Range CFM (m³/hr) DUAL
Medium	08"	70 – 600 (120 – 1015)	----
	10"	100 – 850 (170 – 1440)	200 – 1700 (340 – 2880)
	12"	150 – 1500 (255 – 2545)	300 – 2600 (510 – 4410)
	14"	300 – 2500 (510 – 4245)	600 – 3200 (1020 – 5430)
Low	08"	70 – 500 (120 – 845)	----
	10"	100 – 550 (170 – 930)	200 – 900 (340 – 1520)
	12"	150 – 1050 (255 – 1780)	300 – 1800 (510 – 3050)
	14"	300 – 1400 (510 – 2375)	600 – 2000 (1020 – 3390)

3. Unit casing leakage shall not exceed 0.12 CFM at 10.0" WC static pressure for unit sizes 08" through 14.
4. Unit shut-off leakage, the maximum expected airflow through the valve in the shut-off position, shall not exceed:
  - a. Leakage rate of 0.0050 CFM at 10.0" WC static pressure for Size 8".
  - b. Leakage rate of 0.0055 CFM at 10.0" WC static pressure for Size 10".
  - c. Leakage rate of 0.150 CFM at 10.0" WC static pressure for Size 12".

D. Neutralizer:

1. The Neutralizer shall be an add-on sound cancellation device specifically designed to be used with the Honeywell Venturian™ family of valves.
2. The Neutralizer shall consist of resonator chambers that are tuned to the output frequencies of the valve, reducing sound power levels over the entire sound spectrum, with significant High-frequency (1000, 2000, 4000Hz) attenuation.
3. The Neutralizer shall eliminate the need for silencers in supply and exhaust applications in low to medium pressure and velocity systems.
4. The neutralizer shall be furnished and installed where shown on drawings, schedules, and /or as described in SECTION 23 09 93 - Sequence of Operations for HVAC Controls.
5. The Neutralizer shall be installed in accordance with the manufacture's current installation guidelines.

E. Integral Venturi Valve Controller:

1. The Integrated Control Platform (ICP), configured with validated flow data at the OEM production facility, shall be factory pre-wired supplied with each VAV exhaust and supply venturi valve.
2. The ICP shall provide Input and Output points (minimum) for individually-commanded physical analog signal and monitoring:

TYPE	TERMINAL NUMBER	I/O	DISCRITION /FUNCTION	SIGNAL FORMAT	DEDICATED or AVAILABLE
Analog Input	1	IN 0	MicroSet MS2 or MS4, if present	BacTALK, default	Dedicated when MS4 used; otherwise available (Field Wired)
Analog Input	3	IN 1	Flow Command	2 – 10 Vdc, default	Dedicated when used; otherwise available (Field Wired)
Analog Input	4	IN 2	Valve vPot	0 – 5 Vdc	Always Dedicated (Factory Wired)
Binary Input	6	IN 3	Valve Flow Alarm (Differential Pressure Switch)	Dry Contact Open = Alarm	Dedicated when used; otherwise available (Factory Wired)
Binary Output	13	BO 0	Valve floating point actuator control CW (close)	24 vac Triac	Always Dedicated (Factory Wired)
Binary Output	15	BO 1	Valve floating point actuator control CCW (open)	24 vac Triac	Always Dedicated (Factory Wired)
Binary Output	16	BO2	Binary Output	24 vac Triac	Always Available (Field Wired)
Binary Output	18	BO 3	Binary Output	24 vac Triac	Always Available (Field Wired)
Analog Output	19	AO 0	vPot reference voltage	5 Vdc	Always Dedicated (Factory Wired)
Analog Output	21	AO 1	Flow Feedback	2 – 10 Vdc, default	Dedicated when used; otherwise available (Field Wired)
Analog Output	22	AO 2	Flow Alarm	2 – 10 Vdc, default, 10 = Alarm	Dedicated when used; otherwise available (Field Wired)
Analog Output	24	AO 3	Analog Output	0 – 10 Vdc, 2 – 10 Vdc, or 4 – 20 mA	Always Available (Field Wired)

3. Building Automation System Integration: The Integrated Control Platform (ICP) shall provide BACnet™ network points (minimum) for command and monitoring:

OBJECT INSTANCE	FUNCTIONAL DISCRIPTION	READ or WRITE	USED BY
AI-0	Connection for MicroSet MS2 or MS4, if present	Read	MS2 /MS4
AI-1	FLOW_COMMAND	Read /Write	Venturian
AI-2	VPOT_INPUT	Read	Venturian
AO-0	POT_REF_VOLT_OUT	Read	Venturian
AO-1	FLOW_FEEDBACK	Read	Venturian
AO-2	ALARM_OUT	Read	Venturian
AV-8	UNLOCK_CODE	Read /Write	Venturian
AV-19	SHUT_VOLTAGE	Read	Venturian
AV-36	MIN_FLOW_CLAMP	Read	Venturian
AV-37	MAX_FLOW_CLAMP	Read	Venturian
AV-56	NET_FLOW_COMMAND	Read	Venturian
AV-57	EFF_FLOW_CMD	Read	Venturian
AV-60	EFF_FLOW_FDBK	Read	Venturian
AV-61	SCALED_FLOW_CMD	Read /Write	Venturian
AV-62	CUSTOM_SCALE_VALUE	Read	Venturian
AV-66	MIN_VOLTAGE	Read	Venturian
AV-69	FLOW_CURVE_F	Read	Venturian
AV-70	FLOW_CURVE_E	Read	Venturian
AV-71	FLOW_CURVE_D	Read	Venturian
AV-72	FLOW_CURVE_C	Read	Venturian
AV-73	FLOW_CURVE_B	Read	Venturian
AV-74	FLOW_CURVE_A	Read	Venturian
AV-87	MIN_CLAMP_CURRENT_UNITS	Read	Venturian
AV-88	MAX_CLAMP_CURRENT_UNITS	Read	Venturian
AV-89	V_CORRECTION_FACTOR	Read	Venturian
BI-3	DP_SWITCH_INPUT	Read	Venturian
BO-0	VLV_CLOSE	Read	Venturian
BO-1	VLV_OPEN	Read	Venturian
BV-0	FLOW_ALARM	Read	Venturian
BV-3	JAM_ALARM	Read	Venturian
BV-9	FLOW_IN_LPS_OR_M3H	Read /Write	Venturian
BV-57	AO-1_VOLTAGE_SCALE	Read /Write	Venturian
BV-58	NET_FLOW_ENA	Read /Write	Venturian
BV-59	CUSTOM_SCALE_ENA	Read /Write	Venturian
BV-61	AI1_0.5_10VDC_MODE	Read /Write	Venturian
BV-62	INVALID_VPOT_VOLTAGE	Read	Venturian
BV-63	INVALID_FLOW_CMD_VOLT	Read	Venturian
BV-69	ENGLISH_METRIC	Read /Write	Venturian

- 4.



**PART 3 EXECUTION**

**3.1 INSTALLATION**

- A. Install materials in accordance with manufacturer’s instructions, and as detailed on the project drawing set.

**3.2 WARRANTY**

- A. Air control valves shall be warranted for a period of thirty (30) months from the date of installation when installed in accordance with manufacturer’s instructions.

**END OF SECTION 23 36 16**