

Tiered Solutions Base Upgradable Valves deliver exceptional performance for systems requiring airflow control be carried out by the Building Automation System (BAS). Each Tiered Solutions valve uses an analog command signal from the BAS to deliver the desired airflow for the zone's current conditions. Leveraging the accuracy and reliability of Phoenix Controls' venturi body design, each Tiered Solutions valve is fitted with either a high-speed smart actuator or a medium-speed actuator plus flow feedback module. Each actuator type requires a different method of BAS control. Smart actuators use scaled flow commands while medium-speed actuators with feedback modules use actuator-position commands. The later depends upon the BAS to develop control algorithms that generate actuator-position commands and do signal tuning to stabilize those commands.

All Tiered Solution valves generate scaled flow feedback signals for use by the BAS. This feedback signal is provided directly from a valve's smart actuator or from the external feedback module on valves with medium-speed actuators. For enhanced safety, a flow alarm can be generated by an optional factory-provided pressure switch.

This unique combination of a Phoenix Controls high-performance venturi airflow valve with smart actuator or medium-speed actuator/flow feedback module and optional pressure switch gives you the flexibility to choose your own control methods and rely on the valve to deliver the accurate and reliable performance your facility demands for safe operation and reduced energy costs.

## FEATURES

- Stable, accurate airflow with broad flexibility in BAS implementation of temperature and other zone controls.
- Proportional valve control via high-speed scaled flow commands or medium-speed actuator-position commands.
- Precise flow feedback signals for BAS use.
- One flow feedback module per each medium-speed single or multi-body valve.
- Fail to last position or, for smart actuator only, fail to normally open/closed via optional card inside housing.
- Flow alarm via optional pressure switch.
- Configuration tools with user-friendly graphical interfaces for easy customization of feedback signal or, for smart actuator only, command signal.
- Shut-off capability for all valve sizes.
- Low noise diffuser construction.



**Smart Actuator**

### OSHPD Certified

This device is certified for OSHPD Seismic Certification Preapproval per 2013 CBC, 2012 IBC, ASCE 7-10, and IEC-ES-AC-156. OSHPD Special Certification number OSP-0290-10.

### NVLAP Accreditation

All venturi valves are characterized on NVLAP Accredited Airstations, Lab Code 200992-0. NVLAP is administered by the National Institute of Standards and Technology (NIST).

### ISO

Phoenix Controls designs, develops, manufactures, and sells products, systems, and service to control the environment and airflow of critical spaces. Phoenix Controls is registered to ISO 9001:2015.

### Warranty

Phoenix Controls Warrants all venturi valves against defects in material and workmanship for a period of 5 years. All other equipment manufactured by Phoenix Controls, such as sash sensors, fume hood displays, and equipment supplied but not manufactured by Phoenix Controls is covered by a 3 year warranty.

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# SPECIFICATIONS

## Construction: Standard and Shut-off Valves (Designs A and S)

- 16 ga. spun aluminum valve body with continuous welded seam
- Valve bodies available as uncoated aluminum, with corrosion-resistant baked-on phenolic coating, or with PVDF (polyvinylidene fluoride) coating
- Shaft bearing surfaces: Polyphenylene sulfide (PPS) and either polypropylene (Construction A, B, and C) or PTFE \*Teflon (Construction D)
- Spring grade stainless steel spring and polyester or PPS slider
- Supply valves insulated with 3/8" (9.5 mm) flexible closed-cell polymer-based foam. Flame/smoke rating 25/50. Density is 1.5 lb/ft<sup>3</sup> (24.0 kg/m<sup>3</sup>)

## Construction: Low-leakage Shut-off Valves (Design L)

- Same construction as Valve Designs A and S plus:
  - Viton cone gasket

## Sound

Designed for low sound power levels to meet or exceed ASHRAE noise guidelines.

## Operating Range

- 32-122 °F (0-50 °C) ambient
- 10-90% non-condensing RH

## Performance

- Pressure independent over a 0.3"-3.0" WC (75-750 Pa) drop across valve
- Volume control accurate to ± 5% of airflow feedback signal
- No additional straight duct runs needed before or after valve
- Available in flows from:
  - High-speed smart actuators: 35-10,000 CFM (60-16,990 m<sup>3</sup>/hr)
  - Medium-speed actuators: 35-6,000 CFM (60-10,194 m<sup>3</sup>/hr)
- Response time to change in command signal:
  - Smart actuator: < 1 second
  - Medium-speed actuator: Dependent on BAS control loop timing
- Response time to change in duct static pressure: <1 second

## Smart High-Speed Actuator (Control Type T)

- Proportional with optional NO/NC failsafe capability
- Controlled by direct acting\*\*, scaled flow command
- Power: 24 Vac (±15%) @ 50/60 Hz
- Power Consumption (with or without failsafe)
  - Singles 35 VA, duals 50 VA, triples 85 VA, quads 100 VA

Note: All power consumption ratings are based on fully-loaded I/O.
- Flow Input/Output (defaults):
  - 2-10 Vdc flow command signal
    - Field installation of 500 ohm ¼ W resistor converts command signal to 4- 20 mA
  - 2-10 Vdc flow feedback signal
    - Scaled as detailed in Valve Scale Factors section
- Electrical connections to 10-pin terminal block
- Electronic overload protection
- Housing Material: UL94-5VA
- Valve Clamps: Mechanical clamping not available

## Medium-Speed Actuator (Control Types Q and S)

- Proportional, fail to last position
- Controlled by direct acting\*\*, actuator-position command
- Control signal types:
  - Control Type Q: 2 to 10 Vdc (field installation of 500 ohm ¼ W resistor converts it to 4-20 mA)
  - Control Type S: 0.5 to 10 Vdc
- Power: 24 Vac (±20%) @ 50/60 Hz
- Power consumption: Singles and duals 28 VA, triples and quads 56 VA
- Electrical connections to 3 ft (1m), 18 GA plenum rated cable pig-tail, crimped with ferrule ends
- Electronic overload protection
- Minimum full stroke\* time (\*= min to max flow position):
  - 3 seconds (singles and single-portion of triples)
  - 5 seconds (duals, dual-portion of triples, and quads)
- Housing:

- NEMA 2, IP54, UL enclosure Type 2

- Material: UL94-5VA

## Valve Clamps

The ability to mechanically clamp Q and S actuators is limited as shown below. Designate the need for factory-set mechanical clamps by entering an M in the *Min & Max Clamp* fields for the valve(s) on the Room Schedule Sheet. *If the two Clamp fields are empty, the valve will ship WITHOUT mechanical settings.*

Medium-Speed Actuators: Control Types Q and S			
Valve Size	Smallest Difference Between Minimum and Maximum Settings	Minimum Clamp Range (CFM)	Maximum Clamp Range (CFM)
108	50	35-345	700-35
110	50	50-460	1000-50
112	75	90-575	1500-90
114	150	200-2000	2500-200
210	200	100-1600	2000-120
212	200	180-1750	3000-200
312	Has two actuators; See 112 and 212 above		
412	Has two actuators; See 212 above for each		

## Flow Feedback Module

- Consists of factory-installed enclosure with flow feedback card
- Power: 24 Vac (±15%) @ 50/60 Hz or ±15 Vdc
- Power/Current Consumption: 1.5 VA or 35 mA
- Output (defaults):
  - 2-10 Vdc flow feedback signal
  - Scaled as detailed in Valve Scale Factors section
- Weight: > 6 oz.
- Enclosure
  - Dimensions: 6" x 3.2" x 1.9"
  - Material: Flame retardant polypropylene carbonate (PPC)
  - Color: Black

## Regulatory Compliance



**NOTE:** CE compliance not applicable to medium-speed actuators. For flow feedback cards to maintain CE compliance, input/output cable lengths in excess of 32.8 feet (10 meters) must be shielded.

- RoHS
- FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

- EU Contact Address:  
Pittway Tecnologica Srl  
Via Caboto 19/3  
34147 Trieste TS  
Italy

\*Teflon is a registered trademark of DuPont Company.

\*\* Direct acting: Flow increases or decreases as command increases or decreases, respectively.

# ORDERING GUIDE

**BSV A 1 14 M - A Q F H Z - PSL -**

## VALVE FAMILY

Note: Supply valves come standard with insulation and blocks.

BEV = Base upgradable exhaust valve  
BSV = Base upgradable supply valve

## VALVE CONSTRUCTION

A = Body and cone - uncoated aluminum; Shaft - uncoated 316 stainless steel (see Note 3)  
B = Body and cone with baked phenolic coating; PFA-coated 316 stainless steel shaft (see Note 3)  
C = Body, cone and hardware with baked phenolic/epoxy phenolic coating; PFA-coated 316 stainless steel shaft (see Note 3)  
D = Body, cone and hardware with PVDF coating; PFA-coated 316 stainless steel shaft (see Notes 1, 14)

## NUMBER OF VALVE BODIES

F = One with welded circular flanges: Single flanged (see Notes 2, 14)  
1 = One: Single no flange  
2 = Two, Dual: 10, 12, and 14-inch only (see Notes 1, 5, 14)  
3 = Three, Triple: 12 and 14-inch only (see Notes 1, 5, 14)  
4 = Four, Quad: 12 and 14-inch only (see Notes 1, 5, 14)

## VALVE SIZE

08 = 8-inch (7.88"/200 mm outer diameter); Single Only (see Note 3)  
10 = 10-inch (9.88"/251 mm outer diameter); Single and Dual Only  
12 = 12-inch (11.88"/302 mm outer diameter)  
14 = 14-inch (13.88"/353mm outer diameter) (see Notes 4, 5)

## FLOW/PRESSURE OPERATING RANGE

See Flow/Pressure Operating Ranges table on following page.  
M = Medium pressure: 0.6" to 3.0" / 150 to 750 Pa (see Notes 4, 6)  
L = Low pressure: 0.3" to 3.0" / 75 to 750 Pa (see Notes 6, 7, 8)

## VALVE OPTIONS

As required; list alphabetically, separated by dashes.

EVI = Exhaust valve with insulation and blocks (see Note 11)  
IBO = Insulation blocks only, no insulation (see Note 12)  
PSL = Pressure switch, low limit (see Note 6)  
REI = Remote electronics, indoor (see Notes 10, 13)  
SFB = Square flanges on both ends of bodies = 1  
SFD = Single square flange on discharge of bodies = 1, supply or exhaust (see Notes 1, 14)  
SFI = Single square flange on inlet of Bodies = 1, supply or exhaust (see Notes 1, 14)

## FAILSAFE POSITION

C = Normally closed; Control Type T Only  
O = Normally open; Control Type T Only  
Z = To last position

## VALVE ORIENTATION

H = Horizontal  
U = Vertical up (see Note 8)  
D = Vertical down

## VALVE CONTROLLER DESIGNATION

F = Flow feedback module, no command capability (see Note 9)  
N = No controller (see Note 10)

## CONTROL TYPE

Q = Rotary, medium-speed, proportional 2 - 10 Vdc electric actuator; IP54 (see Notes 5, 9)  
S = Rotary, medium-speed, proportional 0.5 - 10 Vdc electric actuator; IP54 (see Notes 5, 9)  
T = SMART, linear, high-speed, proportional 2 - 10 Vdc electric actuator (see Notes 10, 13)

## VALVE DESIGN

A = Conical shape diffuser  
L = Low Leakage Shut-off Valve (see Notes 1, 3, 4, 7)  
S = Standard Shut-off Valve (see Notes 1, 3, 8)

## NOTES:

- Valve Construction D: ONLY available in single-body valves (Number of Valve Bodies = F or 1) of Design A without square flanges (Options SFB, SFD, or SFI).
- For flange bolt-hole patterns refer to MKT-0061 Flanges For Single Body Valves.
- 8-inch shut-off valves (Design = L and S): ONLY available in Valve Construction A (uncoated).
- 14-inch medium pressure (Range = M), low leakage shutoff valves (Valve Design = L): NOT available.
- 14-inch valves with Control Types Q and S: ONLY available as singles (Number of Valve Bodies = F or 1).
- Pressure switch alarm set point: 0.3" WC for medium pressure and 0.2" WC for low pressure valves.
- Low pressure (Range = L), low leakage shut-off valves (Valve Design = L): NOT available in any size.
- Low pressure (Range = L), standard shut-off valves (Valve Design = S): NOT available as vertical up (Valve Orientation = U).
- Control Types Q and S:
  - REQUIRE flow feedback (Valve Controller Designation = F).
  - Can be mechanically clamped if desired; designate the need for these factory settings by placing an M in the Min and Max Clamp fields on the Room Schedule Sheet. If the two Clamp fields are empty, the valve will ship WITHOUT mechanical clamps (refer to Specifications / Valve Clamps for details.)
- Control Type T:
  - Is ONLY available with Valve Controller Designation N, since it has built-in flow feedback.
  - CANNOT have option REI.
  - Has no mechanical clamps.
- Valve Option EVI: ONLY available on exhaust valves (BEV); NOT available with IBO.
- Valve Option IBO: Available on exhaust and supply valves (BEV and BSV); NOT available with EVI.
- Valve Option REI, for Control Types Q and S only: Remote Electronics, Indoor Installations ONLY. The distance between the valve and its controller is limited to 150 feet (45.7 meters) of 22-gauge cable.
- Valve Options SFB, SFD, or SFI: Cannot be ordered with Valve Construction D, Number of Valve Bodies F, 2, 3 or 4, nor with each other.

# FLOW/PRESSURE OPERATING RANGE TABLE

Notes referenced in the tables below are detailed on page 3 under the Ordering Guide..

Valve Design	Pressure Range	Size	Operating Range in CFM (m <sup>3</sup> /hr)				Pressure Drop Across Valve
			Single	Dual	Triple	Quad	
A = Standard	M = Medium	08"	35-700 (60-1185)	-----	-----	-----	0.6-3.0" WC (150-750 Pa)
		10"	50-1000 (85-1695)	100-2000 (170-3390)	-----	-----	
		12"	90-1500 (155-2545)	180-3000 (310-5090)	270-4500 (465-7635)	360-6000 (620-10,180)	
		14"	200-2500 (340-4245)	400-5000 (680-8490) <i>(see Note 5)</i>	600-7500 (1020-12,735) <i>(see Note 5)</i>	800-10000 (1360-16,980) <i>(see Note 5)</i>	
	L = Low	08"	35-500 (60-845)	-----	-----	-----	0.3-3.0" WC (75-750 Pa)
		10"	50-550 (85-930)	100-1100 (170-1860)	-----	-----	
		12"	90-1050 (155-1780)	180-2100 (310-3560)	270-3150 (465-5340)	360-4200 (620-7120)	
		14"	200-1400 (340-2375)	400-2800 (680-4750) <i>(see Note 5)</i>	600-4200 (1020-7125) <i>(see Note 5)</i>	800-5600 (1360-9500) <i>(see Note 5)</i>	
L and S = Low Leakage and Standard Shut-off <i>(see Note 1)</i>	M = Medium	08" <i>(see Note 3)</i>	35-600 (60-1015)	-----	-----	-----	0.6-3.0" WC (150-750 Pa)
		10"	50-850 (85-1440)	100-1700 (170-2880)	-----	-----	
		12"	90-1300 (155-2205)	180-2600 (310-4410)	270-3900 (465-6615)	360-5200 (620-8820)	
		14" <i>(see Note 4)</i>	200-1600 (340-2715)	400-3200 (680-5430) <i>(see Note 5)</i>	600-4800 (1020-8145) <i>(see Note 5)</i>	800-6400 (1360-10860) <i>(see Note 5)</i>	
S = Standard Shut-off <i>(see Notes 1, 8)</i>	L = Low	08" <i>(see Note 3)</i>	35-400 (60-675)	-----	-----	-----	0.3-3.0" WC (75-750 Pa)
		10"	50-450 (85-760)	100-900 (170-1520)	-----	-----	
		12"	90-900 (155-1525)	180-1800 (310-3050)	270-2700 (465-4575)	360-3600 (620-6100)	
		14"	200-1000 (340-1695)	400-2000 (680-3390) <i>(see Note 5)</i>	600-3000 (1020-5085) <i>(see Note 5)</i>	800-4000 (1360-6780) <i>(see Note 5)</i>	