

# **APCO HIGH PERFORMANCE COMBINATION AIR VALVE (ASU)**

- **Design**
- **Operation**
- **Performance**



## Innovative Air Valve Technology

The APCO ASU Combination Air Valve introduces an innovative concept in air valve technology. Proven with extensive field experience on tough applications, the ASU valve has demonstrated improved performance, reduced maintenance and lower cost for overall reliability on clean fluids or sewage and dirty service applications.

The APCO ASU Combination Air Valve is single body combination valve available in sizes 1-6" as standard. Larger sizes on application.

## Unique, Multi-Stage Operation

The unique venting design provides varied and predictable air flow over a wide range of air release and air/vacuum conditions. A large diameter Air/Vacuum Disc provides high volume air flow for rapid venting during pipeline filling and allows high volumes of air to enter the pipeline during draining. During normal pipeline flow conditions, the dual-range air release design prevents air build up and resultant flow restrictions under changing conditions and through the full flow range.

## Universal Valve Design, Wide Operating Range & Low Pressure Sealing Down to 2 psi

Venting design and technology allows application on an almost universal range of flow conditions with effective sealing and operation available in two pressure ranges: 2 psi to 150 psi or 2 psi to 300 psi for high pressure service.

## Meets AWWA C-512 Performance Specifications

The ASU Combination Air Valve meets performance requirements of the AWWA C-512 standard "Air Valves for Water & Wastewater Service."



## All Stainless Steel Construction

The ASU Combination Air Valve is ideally suited to corrosive conditions with a 316 Stainless Steel body and float. Internal parts are corrosion resistant high strength stainless steel.

## Light Weight, Low Profile Body Design

The compact design of the ASU Combination Air Valve allows installation in piping systems with limited space and in vaults with low ceiling heights. Fabricated ASU construction meets full pressure class ratings and minimizes weight for ease of installation and for retrofit replacement of other air valves.

## Matched Inlet & Outlet Sizes

The equal size inlet and outlet area of the ASU valve fully meets the defined requirement of AWWA C-512 providing high capacity and a broad operating range. The ASU Combination air valve is available with flanged or threaded NPT inlet connections.



### **Reliability Without Constant Maintenance**

Clean interior design and the direct shaft mounted float eliminates troublesome linkages that can lead to frequent maintenance. The light weight, one-piece internal assembly can be easily lifted out of the valve body by the top cover.

The shape of the upper valve body creates an air compression chamber to limit fluid level and solids interference. The funnel shaped lower body reduces solids buildup on sewage or other services where solids may interfere with operation, yet it still allows for maximum outflow and self-cleaning.

For applications where standard practice calls for periodic maintenance, back flush ports are strategically located for ease of flushing with an optional back flush kit.

### **Larger Sizes, Higher Pressures**

Valves to 300 psi are available in sizes 1" through 4" with 150 psi valve sizes available through 6" as standard. Contact DeZURIK for information and recommendations on other sizes and pressures.

### **Float Shape Designed for Stability**

The unique float shape reduces the ballistic effect of high speed liquid flow into the valve, further adding to float stability. The float shaft is fully guided to provide smooth, long lasting operation.

### **No Troublesome Linkage**

Unique disc air release venting concept eliminates linkages that can foul on dirty service applications.

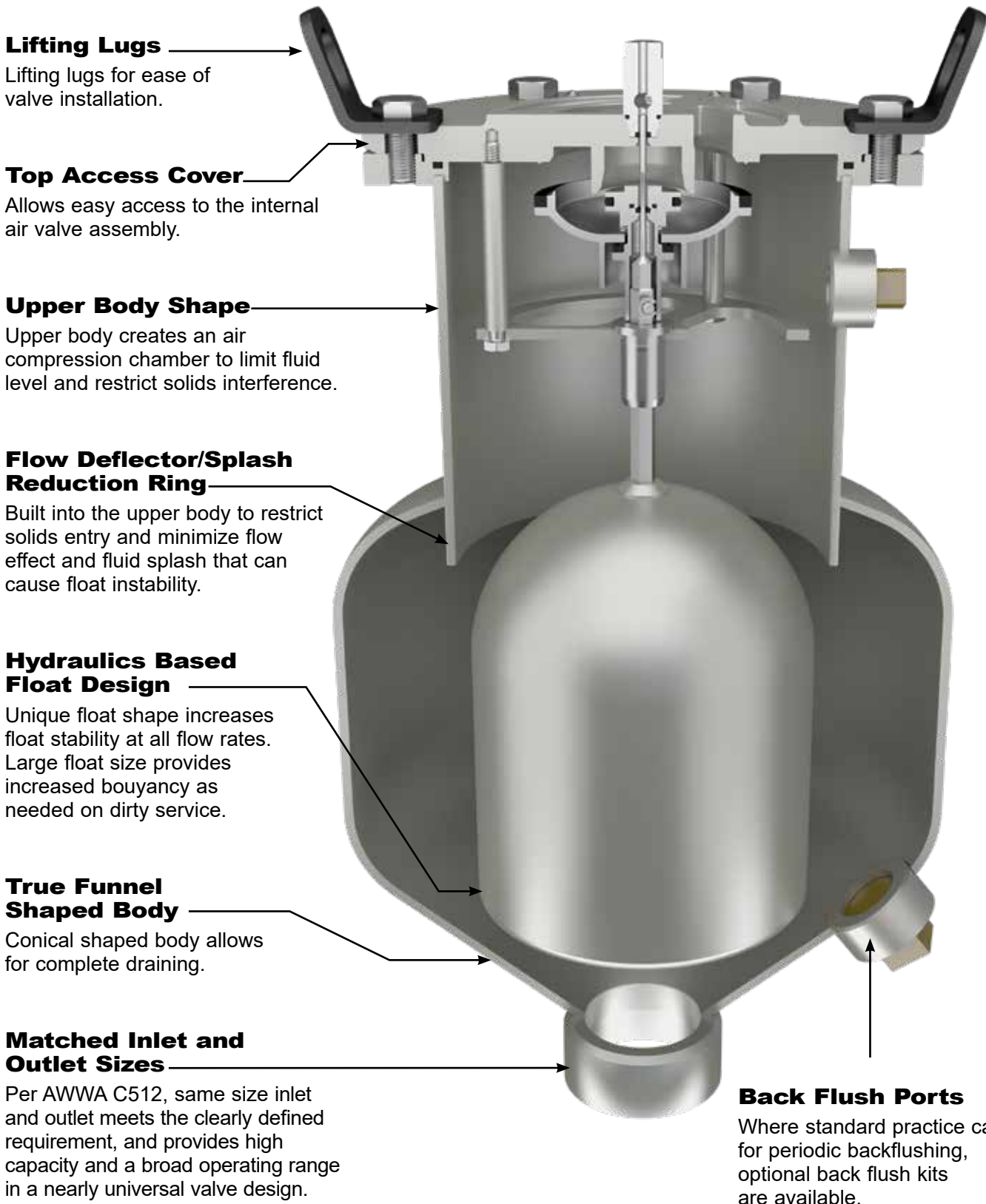


### **For Water/Wastewater or Industrial Service**

All materials and seals are proven as long life components for continuous duty service. Seals and all parts are suitable for use on water, wastewater or industrial media containing hydrocarbons, chemicals, solvents and volatiles. Recommendations available on application.

# Problem Solving Design for Improved Performance & Reliability on Dirty Service Applications

Innovative air release technology provides improved valve performance and operating capability with characteristics specifically designed to deal with clean fluids or media with the presence of grit, solids and grease.



# Multi-Stage Operation Provides Dual-Range Air Release

## High Capacity Multi-Stage Operation

Features high capacity air venting and inflow during filling and draining; dual range air release during normal pipeline flow conditions.

### Air/Vacuum Disc

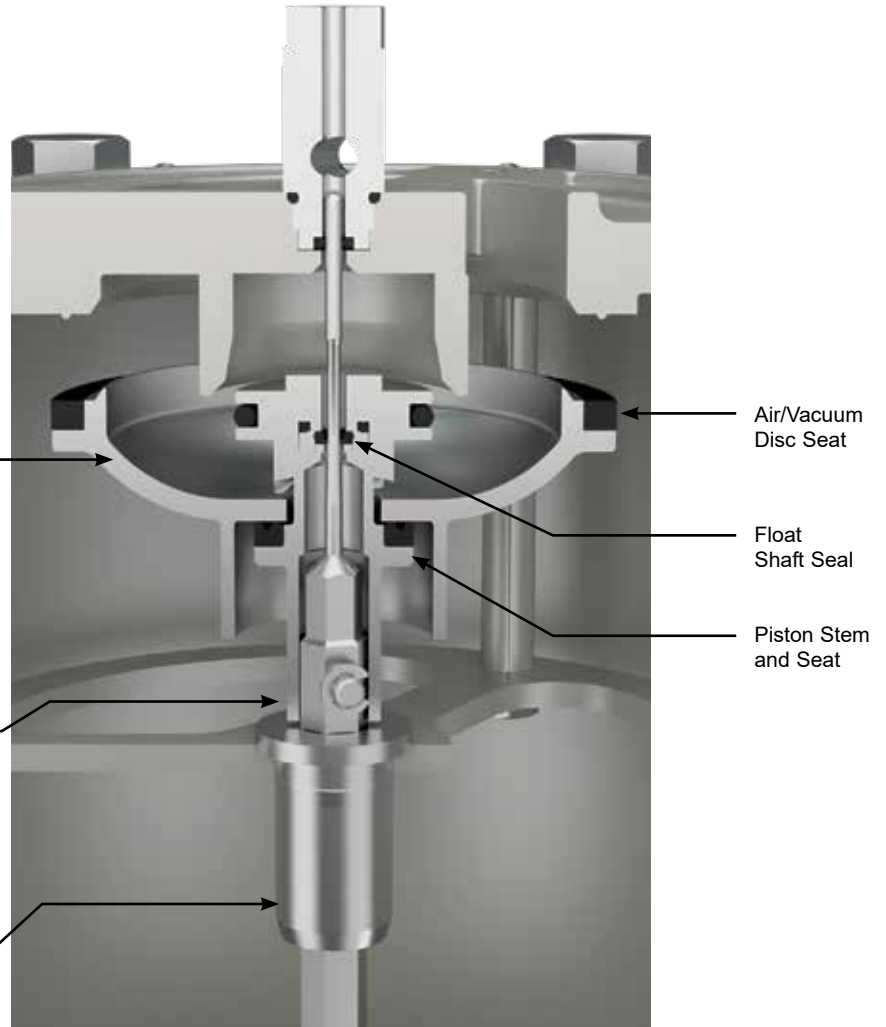
The unique Air/Vacuum Disc opens to assure high flow air venting during pipeline filling and for quick vacuum relief during pipeline draining.

### No Troublesome Linkage

The internal design of the ASU valve eliminates troublesome linkage that can trap solids and interfere operation and affect reliability

### Guided Float Shaft

The float shaft is fully guided to provide smooth, long-life operation. Guides prevent float misalignment and contact with the valve body.



## Outlet Configurations

ASU outlet configurations in all valve sizes are designed for full rated air flow.



### Standard Outlet - Threaded 90° Elbow

Furnished with pipe extension with drip line beyond the valve body.



### Optional Vertical Threaded Outlet (VTO)

Outlet is threaded to allow plant piping of discharge. The VTO must be specified.



### Optional Mushroom Cap (MRC)

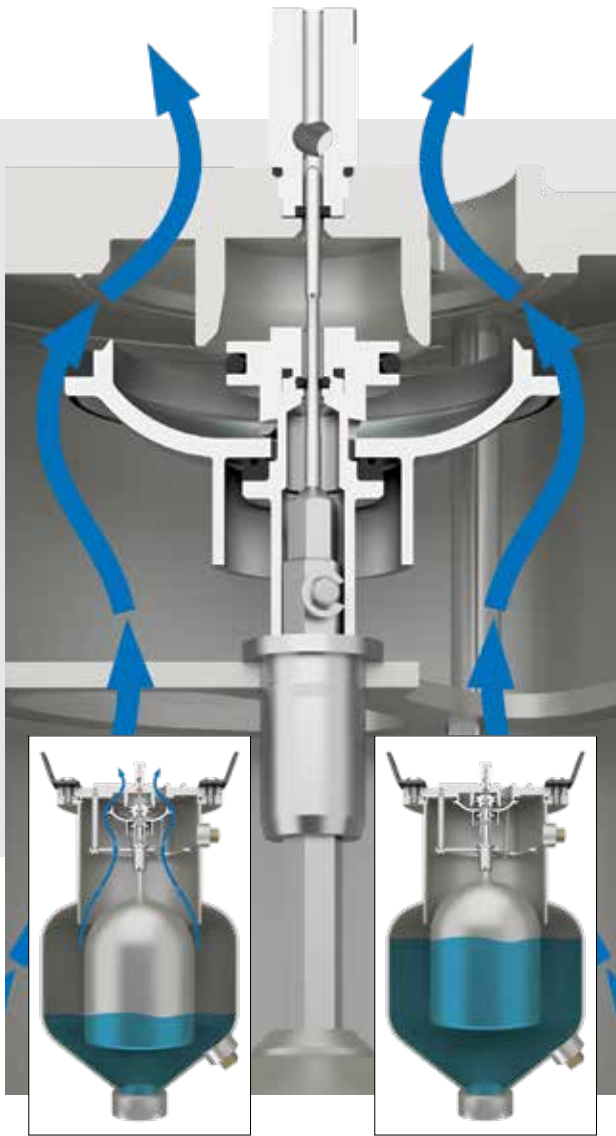
Screened vertical outlet keeps debris from entering the valve outlet. The MRC must be specified.

# Valve Operation

## Unique Combination Air Valve Technology

The patent pending design of the ASU Combination Air Valve features multi-stage air release operation and air/vacuum service provided by the Air/Vacuum Disc.

### Pipeline Filling



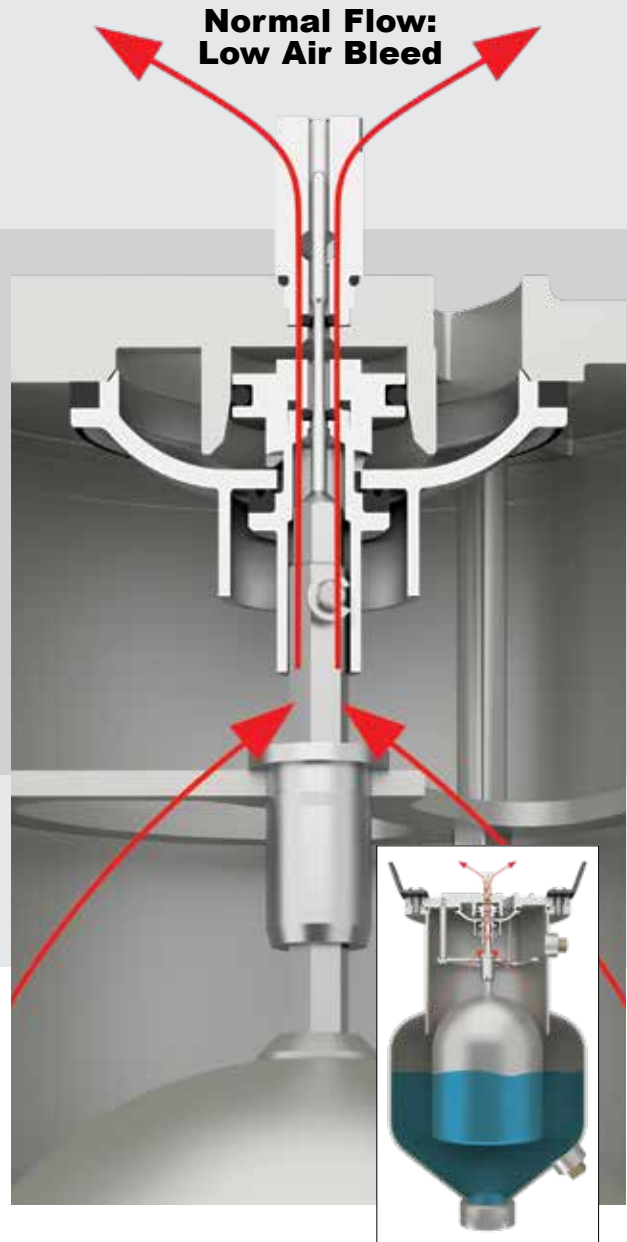
Pipeline Filling

Pipeline Full

During pipeline filling, the Air/Vacuum Disc remains open allowing high volumes of air to escape.

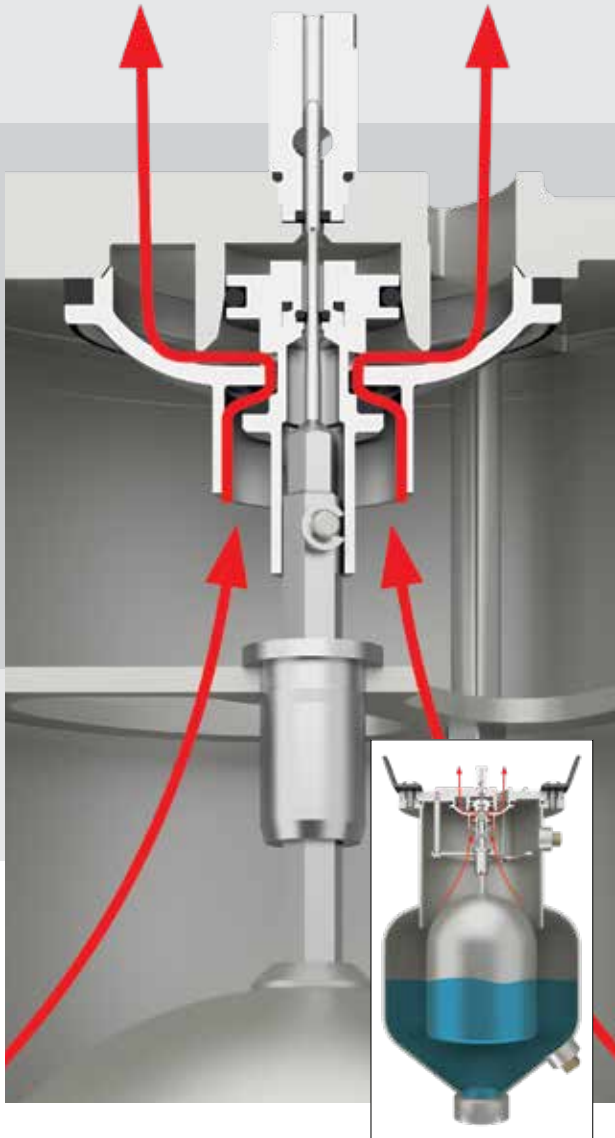
When the pipeline is full, fluid enters the valve which raises the float and lifts the Air/Vacuum Disc into the closed position. Valve is completely sealed; Air/Vacuum Disc seat, piston stem seat and float shaft seals are all in the closed position.

### Dual Range Air Release



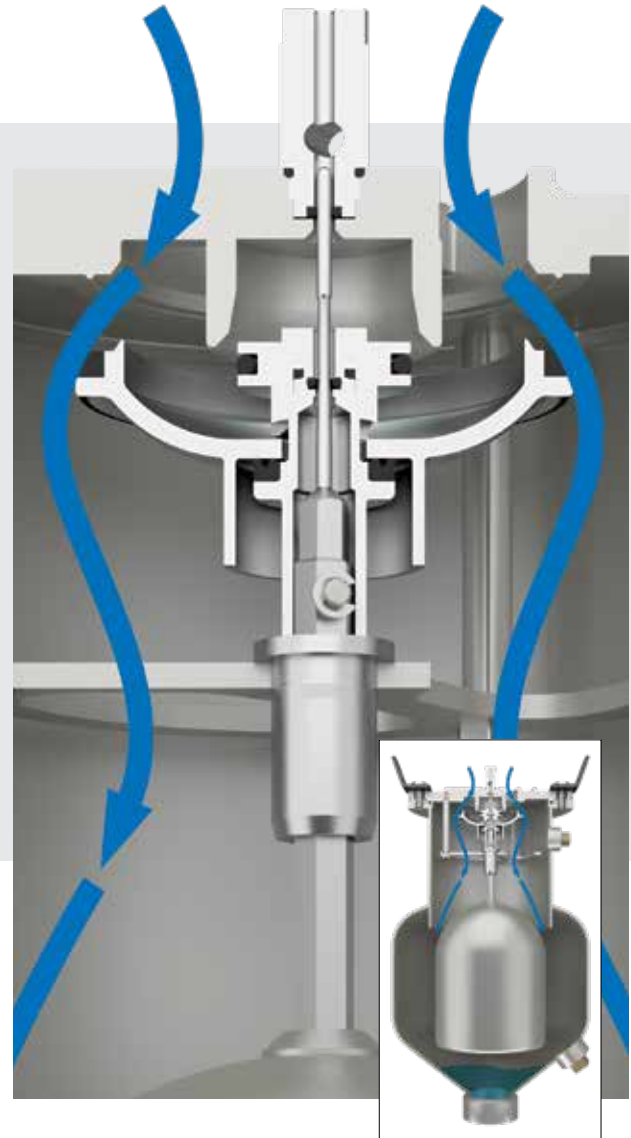
During normal system operation, air escapes from the fluid, collects at high points in the pipeline, and enters the valve. When enough air collects in the valve, it causes the float and float shaft to move down. In this minimal air release mode, the float position allows the valve to release a small amount of air past the float shaft seals. The released air is replaced by fluid entering the valve inlet, raising the float to the valve's closed position.

### Normal Flow: High Air Bleed



If a larger amount of air collects in the pipeline during normal operation and enters the valve, it causes the float and float shaft to move down even farther causing the upper part of the float shaft to seal off the piston chamber. Trapped air continues to accumulate in the piston chamber, causing a pressure imbalance. The piston moves down, allowing the valve to release a larger amount of air past the piston stem and seat.

### Pipeline Draining



When the pipeline is drained, or if a sudden break occurs, the valve quickly opens allowing high volumes of air to enter the pipeline. As fluid level in the valve drops, the float and float shaft move down, which allows the Air/Vacuum Disc to drop down, opening the pathway for high volume air to be pulled through the valve, reducing the risk of pipeline collapse due to excessive vacuum.

## Field-Proven Performance

The APCO ASU Combination Air Valve was developed with 2 years of design and development testing and extensive field experience. In the field, users were consistently impressed with the performance and improved reliability of the ASU, which far exceeded other valves previously installed in the same location.

The ASU resisted clogging from grease, grit and debris meaning less maintenance, improved system reliability with reduced cost.

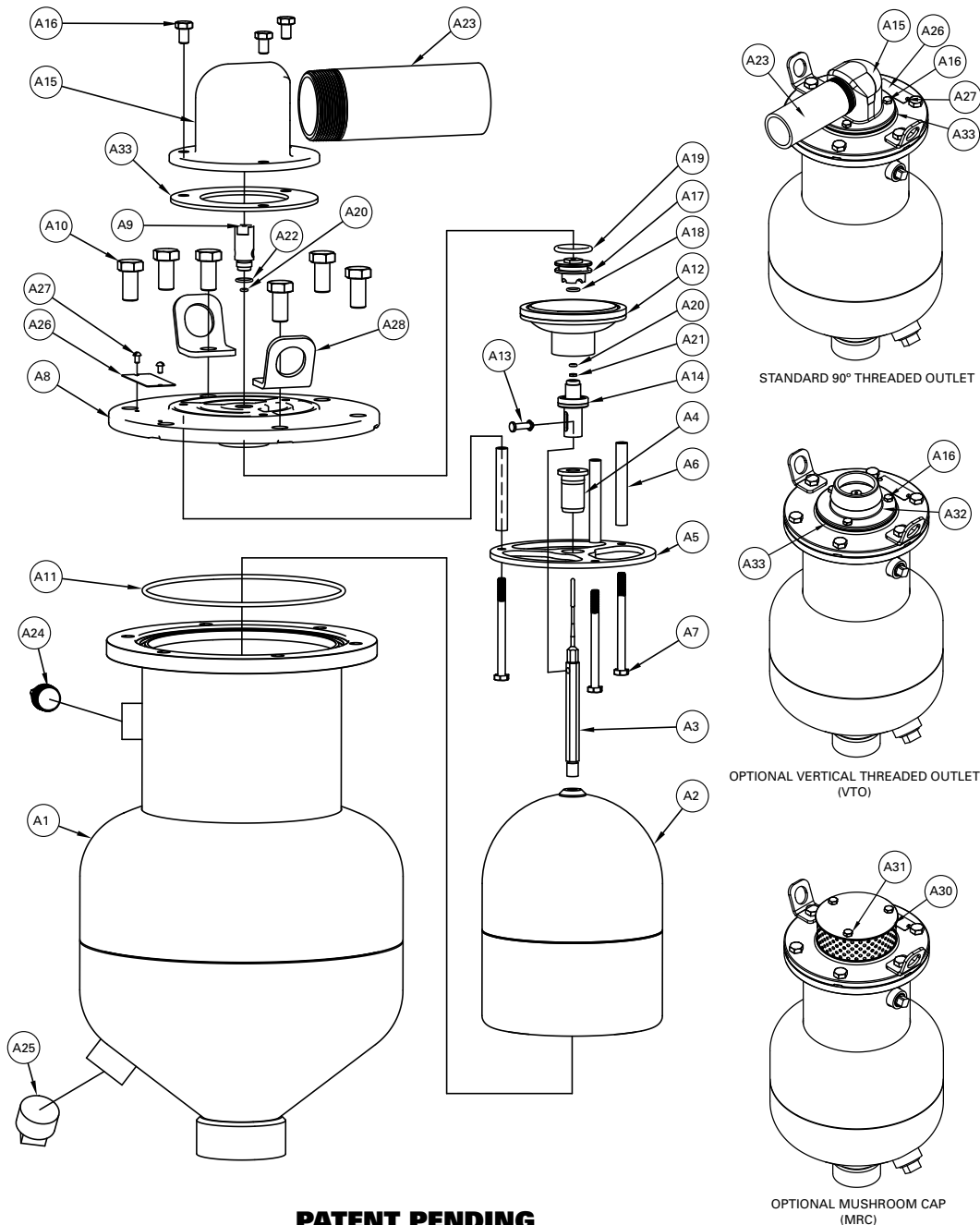




# Materials of Construction

Item	Description	Material
A1	Body	316 Stainless Steel, ASTM A240/A276
A2	Float	316 Stainless Steel, ASTM A240/A276
A3	Float Shaft	316 Stainless Steel, ASTM A276, Condition A
A4	Guide Bushing	Acetal Homopolymer or Copolymer (POM)
A5	Guide Mount	316 Stainless Steel, ASTM A240
A6	Stand Off Tube	316 Stainless Steel, ASTM A269 or A511
A7	Screw	316 Stainless Steel
A8	Cover	316 Stainless Steel, ASTM A351, Type CF-8M
A9	Upper Pressure Cap (CAV) Top Cap (SCAV)	Acetal Homopolymer or Copolymer (POM)
A10	Screw	316 Stainless Steel
A11	O-Ring	Acrylonitrile-Butadiene (NBR)
A12	Air/Vacuum Disc and Seat	316 Stainless Steel, ASTM A351, Type CF-8M, with Acrylonitrile-Butadiene (NBR) Seat
A13	Clevis Pin with Retainer	Stainless Steel, Type 18-8
A14	Piston Stem and Seat	17-4 PH Stainless Steel, Type 630, ASTM A564, Condition H1150 or H1150D, with Acrylonitrile- Butadiene (NBR) Seat
A15	Outlet	Acetal Homopolymer or Copolymer (POM)
A16	Screw	316 Stainless Steel

Item	Description	Material
A17	Piston	316 Stainless Steel, ASTM A276, Condition A
A18	O-Ring	Acrylonitrile-Butadiene (NBR)
A19	O-Ring	Acrylonitrile-Butadiene (NBR)
A20	O-Ring	Acrylonitrile-Butadiene (NBR)
A21	Backup Ring	Acetal Homopolymer or Copolymer (POM)
A22	O-Ring	Acrylonitrile-Butadiene (NBR)
A23	Pipe Extension	Polyvinylchloride (PVC)
A24	Plug	316 Stainless Steel (SCAV Only)
A25	Plug	316 Stainless Steel
A26	Data Plate	316 Stainless Steel
A27	Screw	316 Stainless Steel
A28	Lift Lug	304 Stainless Steel
A30	Outlet (MRC)	304 Stainless Steel
A31	Screw	316 Stainless Steel
A32	Outlet (VTO Option)	303 Stainless Steel
A33	Gasket	Acrylonitrile-Butadiene (NBR) & PVC Foam
A34	Lower Pressure Cap	Acetal Homopolymer or Copolymer (POM)



**PATENT PENDING**

# Valve Selection

## Applicable Standards

APCO ASU Combination Air Valves are designed and/or tested to meet the following standards:	
AWWA C-512	Meets performance specifications of AWWA C512 Air Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service
ASME B1.20.1	Pipe Threads, General Purpose, Inch
ASME/MSS-SP-114	Corrosion Resistant Pipe Fittings Threaded and Socket Welding Class 150
ASME B16.5	Pipe Flanges and Flanged Fittings
ASTM A-105 / SA-105	Dimensions conform to Standard Specification for Carbon Steel Forgings for Piping Applications

## Pressure Ratings (Ambient Temperatures)

Valve Size	Body Style	Pressure Rating
1.2-6" 25-150mm	SCAV	150 psi 1035 kPa
1-4" 25-100mm Threaded inlet	CAV	300 psi 2070 kPa
1-4" 25-100mm Flanged Inlet	CAV	275 psi 1900 kPa

Note: Higher pressures and larger sizes are available on application.

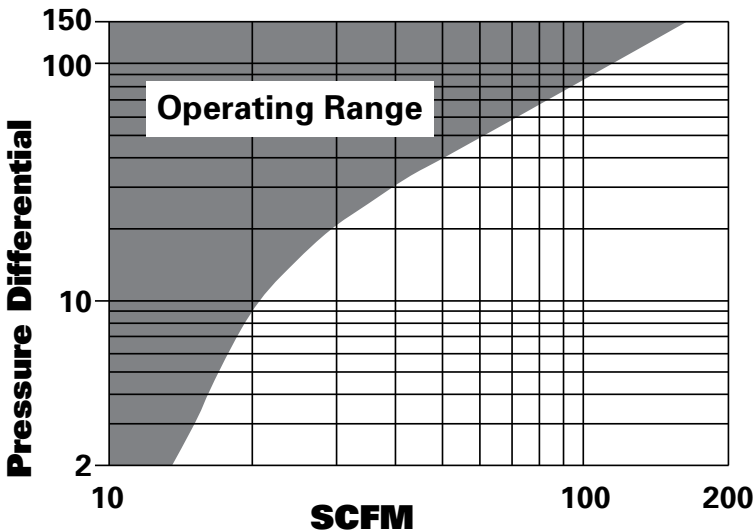
## Operating Range

Valve Size	Body Style	Pressure Rating
1.2-6" 25-150mm	SCAV	2-150 psi 14-1035 kPa
1-4" 25-100mm Threaded inlet	CAV	2-300 psi 14-2070 kPa
1-4" 25-100mm Flanged Inlet	CAV	2-275 psi 14-1900 kPa

## Maximum Temperature

Valve Size	Body Style	Pressure Rating
1-6" 25-150mm	SCAV & CAV	180° F 82° C

## Air Release Variable Venting Capacity



## Valve Weights Standard 90° Outlet

Valve Size	Flanged	Threaded
1" 25mm	—	41 18.5
1.2** 25mm	46.5	41 18.5
2" 50mm	47 21.5	41.5 19
3" 80mm	57.5 26	47.5 21.5
4" 100mm	61.5 28	47.5 21.5

## Vertical Outlet (VTO)

Valve Size	Flanged	Threaded
1" 25mm	—	43 19.5
1.2** 25mm	48.5	43 19.5
2" 50mm	48 22	42.5 19
3" 80mm	61 27.5	51 23
4" 100mm	63 28.5	49 22

## Mushroom Cap Outlet (MRC)

Valve Size	Flanged	Threaded
1" 25mm	—	42 19
1.2** 25mm	47.5 21.5	42 19
2" 50mm	47.5 21.5	42 19
3" 80mm	58 26.5	48 21.5
4" 100mm	62 28	48 21.5
6" 150mm	95 43	—

## Accessory Weights

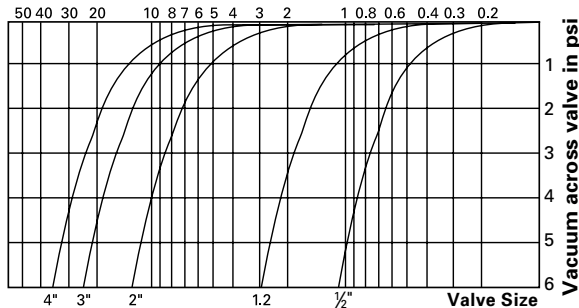
Valve Size	Double-Acting Throttling Device (DAT)	Backflush Attachment (BFK)
1" 25mm	4.17 1.90	5.15 2.37
1.2** 25mm	4.17 1.90	5.15 2.37
2" 50mm	6.65 3.00	5.15 2.37
3" 80mm	19.65 8.90	5.15 2.37
4" 100mm	23.73 10.80	5.15 2.37
6" 150mm	—	5.15 2.37

\* NOTE: Size 1.2 is a 1" valve with a 2" NPT Inlet and a 1" NPT Outlet.

## Performance Graphs For Air/Vacuum Valve

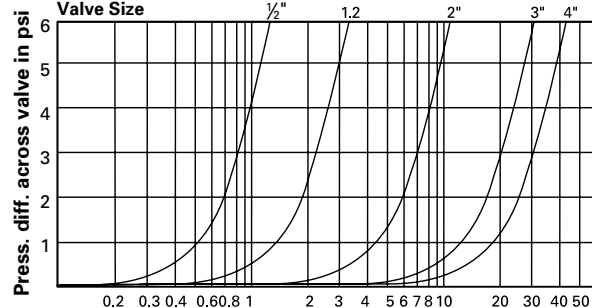
Graphs show air inflow/outflow through valve in standard cubic feet of free air per second (scfs). Curves shown are actual flow capacities at 14.7 psi barometric pressure and 70°F temperature based on actual test. These figures are not merely flow capacities across the orifice, but flow capacities across the entire valve. In the test set-up, air approach velocity is negligible, therefore actual flow capacity exceeds the values shown on chart.

### Inflow



NOTE: Size 1.2 is a 1" valve with a 2" NPT Inlet and a 1" NPT Outlet.

### Outflow



NOTE: Size 1.2 is a 1" valve with a 2" NPT Inlet and a 1" NPT Outlet.

## Ordering

To order, simply complete the valve order code from information shown. An ordering example is shown for your reference.

#### Valve Style

Give valve style code as follows:

ASU = Combination Air Valve

#### Valve Size

Give valve size code as follows:

##### SCAV

1.2	=	1"	(25mm)	1" Outlet with 90 degree elbow
2	=	2"	(50mm)	2" Outlet with 90 degree elbow
3	=	3"	(80mm)	3" Outlet with 90 degree elbow
4	=	4"	(100mm)	4" Outlet with 90 degree elbow
6	=	6"	(150mm)	6" Outlet with Mushroom Cap

##### CAV

1	=	1"	(25mm)	1" Outlet with 90 degree elbow
2	=	2"	(50mm)	2" Outlet with 90 degree elbow
3	=	3"	(80mm)	3" Outlet with 90 degree elbow
4	=	4"	(100mm)	4" Outlet with 90 degree elbow

Note: Size 1.2 is a 1" valve with a 2" NPT Inlet and a 1" NPT Outlet

#### Body Style

Give body style code as follows:

SCAV = Clean or Wastewater Service  
CAV = Clean Service

#### Inlet Connection

Give inlet connection code as follows:

##### SCAV

T1	=	Threaded Inlet NPT (1-4") (to 150 psi)
F1	=	Flanged Inlet ASME 150 (1.2-6")
NA	=	Not Required (used with VWB option only)

##### CAV

T1	=	Threaded Inlet NPT (1-4") (to 300 psi)
F1	=	Flanged Inlet ASME 150 (2-4") (to 275 psi)

#### Body Material

Give body material code as follows:

S2 = 316 Stainless Steel

#### Trim Combination

##### Orifice size

Give orifice code as follows:

R516 = 5/16" (SCAV body style only)  
H516 = 5/16" (CAV body style only)

##### Seat Material

Give seat material code as follows:

NBR = Acrylonitrile-Butadiene  
EPDM = Terpolymer of Ethylene Propylene & A Diene  
FKM = Fluoro Rubber

##### Disc/Float Material

Give disc/float material code as follows:

S2 = 316 Stainless Steel

##### Shaft Material

Give shaft material code as follows:

S2 = 316 Stainless Steel

##### Frame Material

Give frame material code as follows:

S2 = 316 Stainless Steel

#### Options

Give option code as follows:

DTR = DeZURIK Standard Certified Production Hydrostatic Shell & Seat Test Report  
VWB = Valve Without Body (must be used with NA Inlet Connection) (SCAV only)  
WW = Wastewater Service (CAV only)

Ordering Example: ASU,3,SCAV,F1,S2,R516-NBR-S2-S2-S2\*

#### Accessories

Give accessory code as follows:

BFK = Backflush Kit (SCAV only)  
DAT = Double Acting Throttling Device (1-4")  
MRC = Mushroom Cap (1-4") (Standard on 6" valves)  
VTO = Vertical Outlet (1-4")

Ordering Example (With Accessory Mounted):

ASU,3,SCAV,F1,S2,R516-NBR-S2-S2-S2\*MRC

# Options & Accessories

## Vertical Threaded Outlet (VTO)

The Vertical Outlet is threaded to allow plant piping of discharge. It is available as a complete valve assembly or as a separate item.

To order as part of a complete valve, add VTO to order code.



**Ordering Example:**

ASU,4,SCAV,F1,S2,R516-NBR-S2-S2-S2\*VTO

To order as a separate item, give order code from the table below.

Valve Size	Size	Order Code
1" 25mm	1" NPT	ACC*VTO-1
1.2" 25mm	1" NPT	ACC*VTO-1.2
2" 50mm	2" NPT	ACC*VTO-2
3" 80mm	3" NPT	ACC*VTO-3
4" 100mm	4" NPT	ACC*VTO-4

\* NOTE: Size 1.2 is a 1" valve with a 2" NPT Inlet and a 1" NPT Outlet.

## Mushroom Cap Outlet (MRC)

The Mushroom Cap prevents foreign debris from entering the valve outlet while providing wide openings for free expulsion and admittance of air.

The mushroom cap is standard on the 6" valve and, it is available as a complete valve assembly or as a separate item on 1-4" valves.



To order as part of a complete valve, add MRC to order code.

**Ordering Example:**

ASU,4,SCAV,F1,S2,R516-NBR-S2-S2-S2\*MRC

To order as a separate item, give order code from the table below.

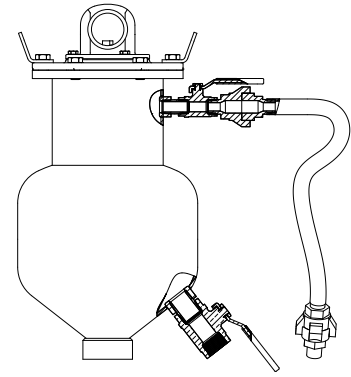
Order Code	Usage
ACC*MRC-ASU-SM	1", 1.2" or 2" ASU Valve
ACC*MRC-ASU-LG	3" or 4" ASU Valve

**Ordering Example:**

ACC\*MRC-ASU-SM

## Back Flush Attachment Kit (BFK)

The Back Flush Attachment Kit is recommended for periodic cleaning of grease and scum from the ASU-SCAV Combination Air Valve only. The Back Flush Attachment Kit is a separate item that includes two brass shut-off valves, 316 stainless steel piping, and 5 feet of hose with galvanized steel quick disconnect couplings. An isolation valve is required on the inlet port to isolate the valve while performing the back-flushing operation, but is not included. Contact DeZURIK for recommendations.



To order as a separate item, give order code ACC\*BFK-ASU

**Ordering Example:**

ACC\*BFK-ASU

# Options & Accessories (Cont.)

## Double Acting Throttling Device (DAT)

The APCO Double Acting Throttling Device (DAT) is designed to regulate and restrict air venting on the discharge orifice of the ASU Combination Air Valves. The DAT features an exclusive throttling air-out/full flow air-in design. On pump start, the device establishes a pressure load on the rising column of media to eliminate shock to the pump, controls and check valve. On pump stop, the DAT device automatically opens to allow full line, unrestricted air reentry to prevent a vacuum and water column separation in the pump. The DAT has a fusion coated epoxy coating. The DAT can be ordered as part of a complete valve, or as a separate item. The DAT is not a stand-alone device and cannot be installed directly to the pipeline. The DAT must be installed in the outlet port (top) of the ASU Combination Air Valve.



To order as part of a complete valve, add DAT to the order code.

**Ordering Example:**

ASU,4,SCAV,T1,S2,R516-NBR-S2-S2-S2\*DAT

To order as a separate item, give order code from the table below.

Valve Size	Order Code
1" 25mm	ACC*DATFB-ASU-1
1.2" 25mm	ACC*DATFB-ASU-1.2
2" 50mm	ACC*DATFB-ASU-2
3" 80mm	ACC*DATFB-ASU-3
4" 100mm	ACC*DATFB-ASU-4

**Ordering Example:**

ACC\*DATFB-4

## Valve Without Body (VWB)

All internal parts for the ASU-SCAV valve may be ordered as a complete assembly to be replaced into an existing body. Includes all parts except A1, A24 and A25. To order, use NA code for the Inlet Connection and add VWB in the option field



VWB shown with optional mushroom cap

**Ordering Example:**

ASU,4,SCAV,NA,S2,R516-NBR-S2-S2-S2,VWB\*

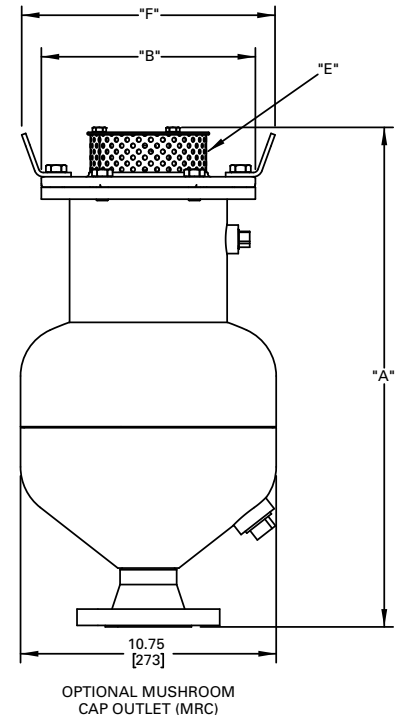
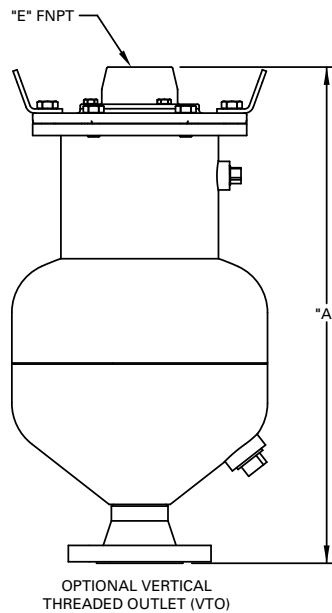
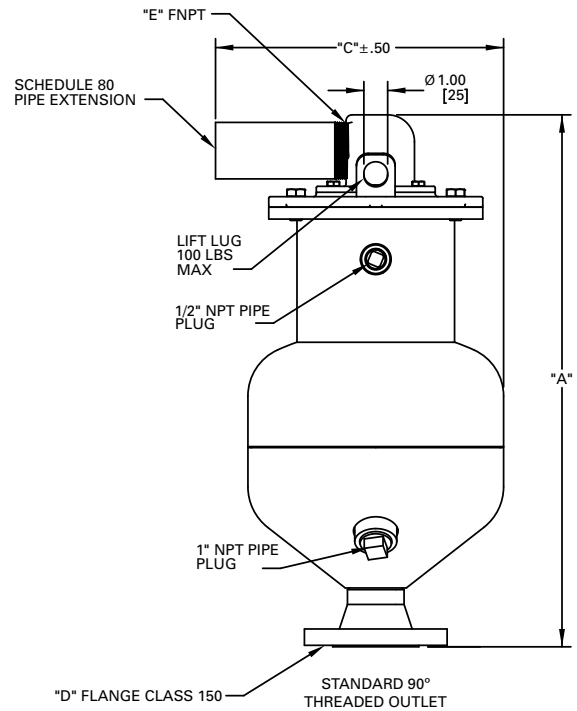
# Dimensions

## Flanged Inlet

Valve Size	Outlet Option	Inlet Size	Outlet Size	Dimensions				
				A		B	C	F
				SCAV	CAV			
1.2** 25mm	Standard	2"	1"	22.43 570	N/A	9.00 229	12.11 308	10.70 272
	VTO			20.92 531			N/A	
	MRC			21.37 543			N/A	
2" 50mm	Standard	2"	2"	22.43 570	21.39 343	9.00 229	12.11 308	10.70 272
	VTO			20.92 531	19.88 505		N/A	
	MRC			21.37 543	20.40 518		N/A	
3" 80mm	Standard	3"	3"	25.19 640	24.12 613	9.69 246	10.60 269	11.46 291
	VTO			22.55 573	21.49 546		N/A	
	MRC			22.69 576	21.50 546		N/A	
4" 100mm	Standard	4"	4"	25.08 637	24.00 610	9.69 246	10.60 269	11.46 291
	VTO			22.44 570	21.37 542		N/A	
	MRC			22.47 571	21.38 543		N/A	
6" 150mm	MRC	6"	6"	27 686	N/A	13.50 243	N/A	15.30 389

\* NOTE: Size 1.2 is a 1" valve with a 2" Flanged Inlet and a 1" NPT Outlet.

Inches  
Millimeters



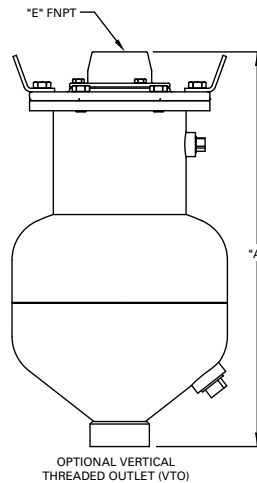
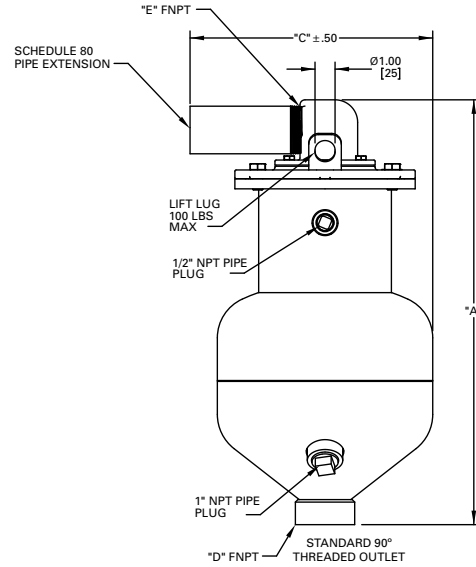
# Dimensions

## Threaded Inlet NPT

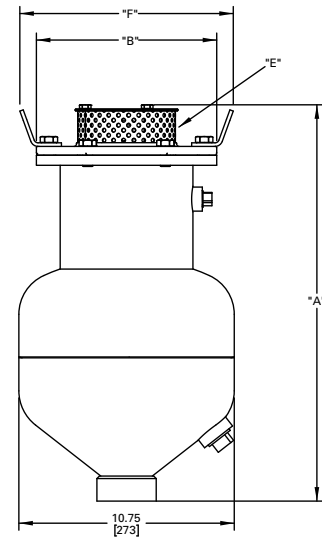
Valve Size	Outlet Option	Inlet Size	Outlet Size	Dimensions				
				A		B	C	F
				SCAV	CAV			
1" 25mm	Standard	1"	1"	N/A	20.46 520	9.00 229	12.11 308	10.70 272
	VTO				18.95 481		N/A	
	MRC				19.47 495		N/A	
1.2** 25mm	Standard	2"	1"	N/A	21.20 538	9.00 229	12.11 308	10.70 272
	VTO				19.70 500		N/A	
	MRC				20.14 512		N/A	
2" 50mm	Standard	2"	2"	N/A	21.20 538	20.58 523	12.11 308	10.70 272
	VTO				19.70 500	19.07 484	9.00 229	
	MRC				20.14 512	19.59 498	N/A	
3" 80mm	Standard	3"	3"	N/A	23.92 608	23.50 597	10.60 269	11.46 291
	VTO				21.28 541	20.87 530	9.69 246	
	MRC				21.43 544	20.88 530	N/A	
4" 100mm	Standard	4"	4"	N/A	23.92 608	23.39 447	10.60 269	11.46 291
	VTO				21.28 541	20.76 527	9.69 246	
	MRC				21.43 544	20.77 528	N/A	

\* NOTE: Size 1.2 is a 1" valve with a 2" NPT Inlet and a 1" NPT Outlet.

Inches  
Millimeters



OPTIONAL VERTICAL THREADED OUTLET (VTO)



OPTIONAL MUSHROOM CAP OUTLET (MRC)

### Sales and Service

For information about our worldwide locations, approvals, certifications and local representative:

Web Site: [DeZURIK.com](http://DeZURIK.com) E-Mail: [info@dezurik.com](mailto:info@dezurik.com)



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