



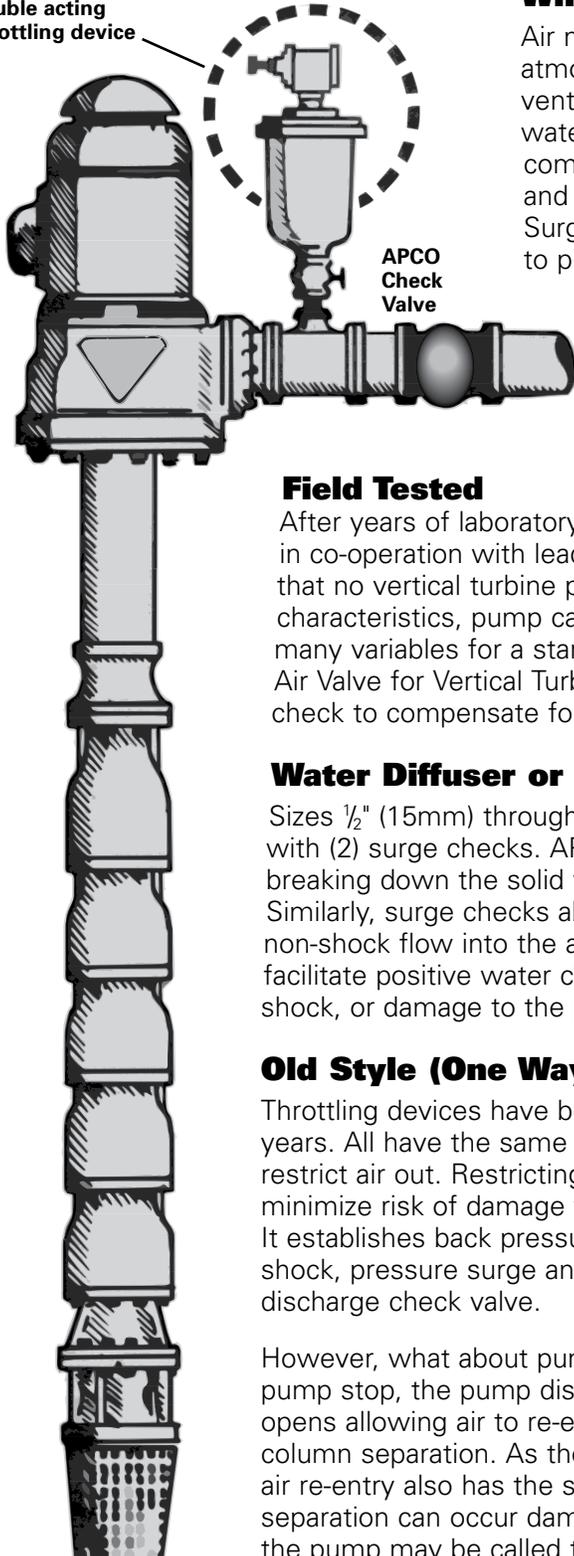
## **APCO AIR VALVES FOR VERTICAL TURBINE PUMPS**



**Series 140DAT**

# Air Valves for Vertical Turbine Pumps with Water Diffuser

Patented double acting throttling device



## Why use it

Air must be vented from the pump discharge column to the atmosphere and not forced into the water system. Without air venting, problems are certain to develop. Air entrapped in the water system will restrict water flow. This results in consumer complaints about air in the water and can cause pressure surges and water hammer with each pump start-up and shutdown. Surges and water hammer are the main cause for costly damage to piping and water system components.

## Where to use it

Install the Vertical Turbine Air Vacuum Valve on the pump discharge as close to the check valve as possible.

(See Bulletin 769: APCO Check Valve Guide)

## Field Tested

After years of laboratory and field testing, under actual operating conditions and in co-operation with leading vertical turbine pump manufacturers, we determined that no vertical turbine pump installations are identical. Instead, each has its own characteristics, pump capacity, efficiency, well depths and head conditions – all too many variables for a standard air/vacuum valve to satisfy. So, APCO developed an Air Valve for Vertical Turbine Pumps using a water diffuser, throttling device or surge check to compensate for the variables

## Water Diffuser or Surge Check

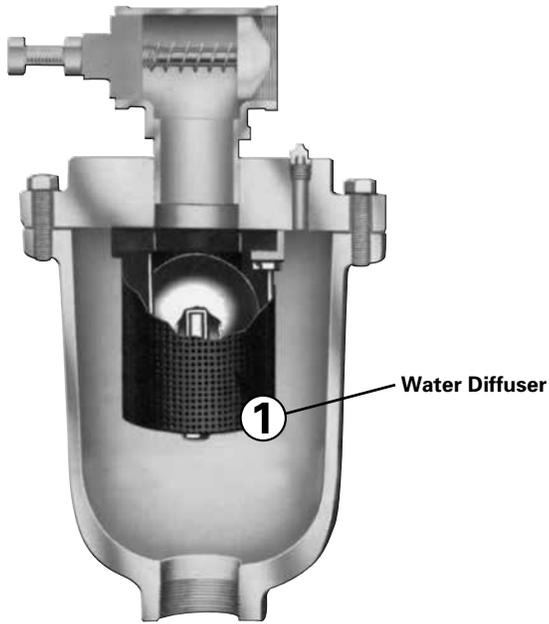
Sizes 1/2" (15mm) through 3" (80mm) are fitted with (1) water diffusers in larger sizes with (2) surge checks. APCO water diffusers perform much like water faucet strainers, breaking down the solid water column force into a smooth non-destructive flow. Similarly, surge checks absorb solid water column shock and break it down to smooth non-shock flow into the air valve. In this manner, the water diffuser and surge check facilitate positive water closure of the Vertical Turbine Air Valve without water hammer, shock, or damage to the pump, valves or other system components.

## Old Style (One Way) Throttling Device

Throttling devices have been used on Vertical Turbine Air Valves for more than sixty years. All have the same operational design weakness of one way flow regulation to restrict air out. Restricting air out is an excellent pump start procedure and helps to minimize risk of damage to pump, valves and piping, from shock with each pump start. It establishes back pressure on the rising column of water, thereby greatly reducing shock, pressure surge and hammer when the water column hits the closed pump discharge check valve.

However, what about pump stop procedure? Herein lies the design weakness. On pump stop, the pump discharge check valve closes and the Vertical Turbine Air Valve opens allowing air to re-enter the pump column to prevent vacuum and/or water column separation. As the old style throttling device was adjusted to restrict air out, air re-entry also has the same restriction. As a result vacuum and water column separation can occur damaging pump seals, packings, and gasketed joints. Additionally, the pump may be called to start while the column is still full putting a severe strain on the pump shaft, motors and electrical controls.

# Exclusive Double Acting Throttling Device



## APCO's Double Acting Throttling Device with Exclusive Throttling Air-Out/Full Flow Air-In Design Feature

Now, regardless of the amount of air throttling out, there is assured full line capacity air inflow on pump stop to positively prevent vacuum and water column separation in the pump. The Double Acting Throttling Device is highly recommended.

### Operation:

The Teflon tapered plug is pushed ahead into the throttle position by a very light weight stainless steel spring and it stays in this position due to the force of air being discharged from the pump suction on pump start. On pump stop, the tapered plug moves from its throttle air-out position to the full air-in position, due to negative pressure inside and atmospheric forces of air rushing in.

The desired tapered plug position for throttling air-out is regulated by turning the stainless steel adjusting screw. When satisfactory throttling of air is achieved, lock the adjusting screw in place with the stainless steel lock nut to prevent tampering.

Double Acting Throttling Devices are available for larger sizes as well.

Size	Model
$\frac{5}{15}$ "	141DAT
$\frac{1}{25}$ "	142DAT
$\frac{2}{50}$ "	144DAT
$\frac{3}{80}$ "	146DAT

Inch  
Millimeter

## Slow Closing Air Valves - How They Work

These air/vacuum valves have large orifices for exhausting air from deep well pump columns on pump start. They close when water enters the valve and remain closed until the water drains and the pressure drops to atmospheric. Then the valve immediately opens to allow air to re-enter the column to prevent vacuum or water column separation.

A Slow Closing Air Valve is a standard air/vacuum valve (3) mounted on top of surge check (2)

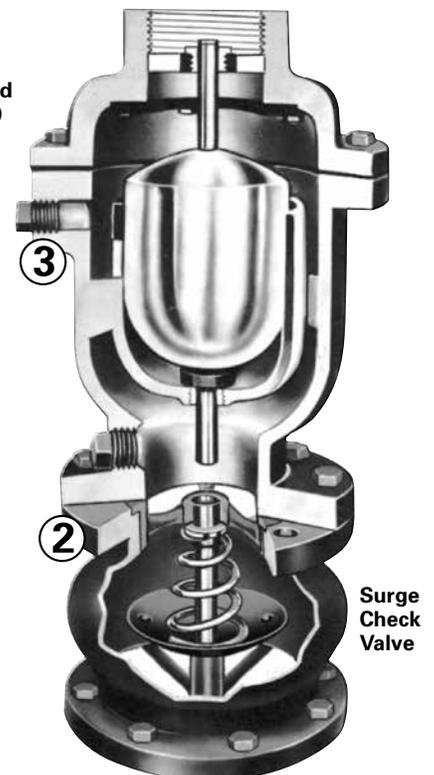
The Surge Check Unit operates on the differential between the kinetic energy in the relative velocity flows of air and water. The air passes through unrestricted, but when the water rushes into the Surge Check, the disc closes and slows the rate of water flow into the air valve by means of throttling holes in the disc. This insures gentle closing of the Air/Vacuum Valve and as soon as the valve is closed the Surge Check disc automatically returns to its normal open position ready for the next cycle.

See Bulletin 613 for more information on Surge Check Valves.

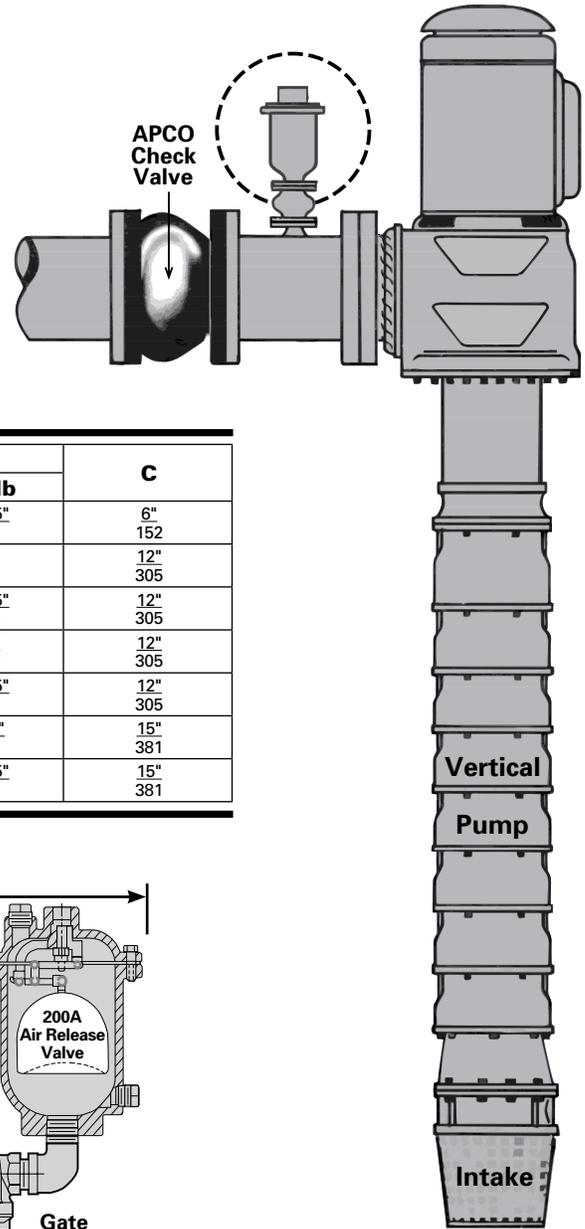
## DeZURIK Butterfly Valves for Isolation

It is good engineering practice to install isolation valves below the air valve (as shown below). Use DeZURIK Butterfly Valves instead of gate valves for this purpose. DeZURIK Butterfly Valves are reliable, economical and much shorter than gate valves, permitting a savings of height in the pump house.

Larger Valves  
Sizes 4" (100mm) and  
Larger • Series 1900



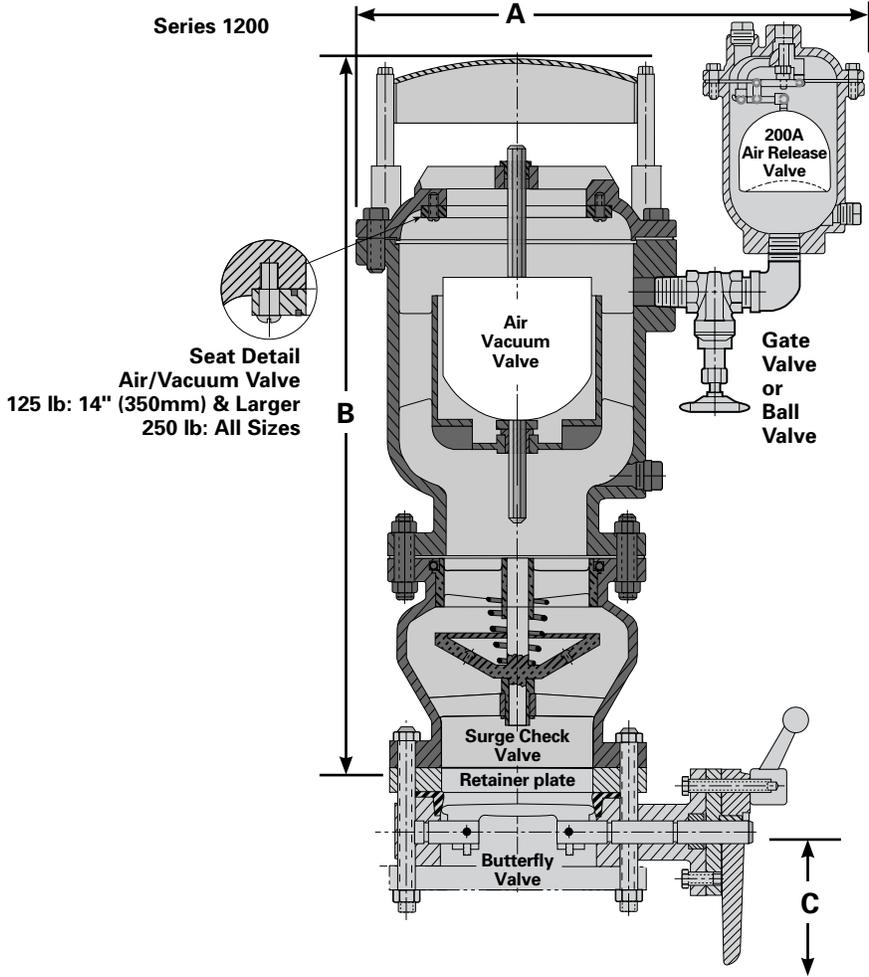
# Dimensions - Series 1200



Size	Model	A	B		C
			125 lb	250 lb	
4" 100	1204	19.438" 494	30.5" 775	30.875" 784	6" 152
6" 150	1206	22.688" 576	35.375" 899	36" 914	12" 305
8" 200	1208	25.5" 648	41.875" 1064	42.375" 1076	12" 305
10" 250	1210	27.875" 708	45.75" 1162	45.5" 1156	12" 305
12" 300	1212	32.875" 835	50.875" 1292	50.875" 1292	12" 305
14" 350	1214	41.875" 1064	52.25" 1327	52.25" 1327	15" 381
16" 400	1216	45.5" 1156	55.375" 1407	55.375" 1407	15" 381

Inch  
Millimeter

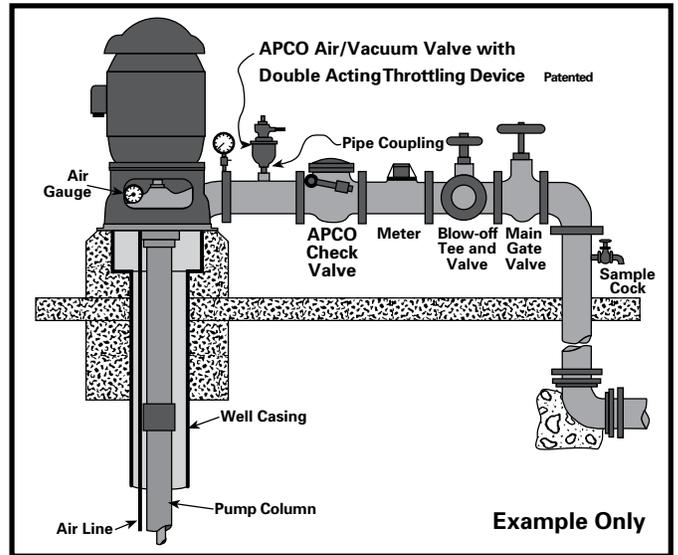
Larger sizes available



# How to Select

## Air/Vacuum Valves for Vertical Turbine Pump Installation

- Check the pump curve for GPM capacity at no head condition.
- Enter chart with GPM to determine the size of the valve.
- If valves are to be installed inside the pump house, specify the discharge connection. Sizes 3" (80mm), 4" (100mm) and 6" (150mm) are available with screwed or flanged discharge connections. Size 8" (200mm) and larger are available with flanged connection only.
- Determine if automatic air release is required.



No Head Pump Capacity GPM/LPM	Valve Size	APCO Model	(Optional) Air Release Valve*
up to 250 up to 946	.5" 15	141DAT	50
251-700 950-2650	1" 25	142DAT	50
701-1450 2654-5489	2" 50	144DAT	50
1451-3500 5493-13249	3" 80	146DAT	50
3501-7500 13253-28390	4" 100	1904	200A
7501-18500 28394-70030	6" 150	1906	200A
18501-40000 70034-151416	8" 200	1908	200A
40001-56000 151420-211983	10" 250	1910	200

The selection table shown at left will satisfy typical Deep Well Turbine pump installations which use a Silent Check or Conventional Swing Check valve, as shown above. For High Service Vertical Turbine pump installations which utilize positive shut-off type discharge Control Valves, contact our Engineering Department and a specific size will be recommended.

**Note to Engineer:**  
If the air valve is to be installed inside the pump house, use threaded or flanged discharge connections and pipe back to the well or outside. This will greatly muffle the high noise level caused by the air being discharged and provide for drainage of any small amount of water or water vapor that may exist.

Inch  
Millimeter

\* If the turbine is scheduled to run for prolonged periods (6-8 hours) without stopping, automatic air release valves should be added.

# Specifications

Air Valves for Vertical Turbine Pumps shall vent large quantities of air through the discharge orifice when the pump starts, close tight when liquid enters and permit large quantities of air to re-enter through the orifice when the pump stops to prevent vacuum forming in the pump suction column.

The main valve parts shall be a body, cover, baffle, float and seat. The baffle shall shield the float from direct impact of air and water to prevent premature float closure. The seat shall slip fit into the baffle or cover and lock in place without any distortion.

Sizes 1/2" (15mm) through 3" (80mm): the entire float and baffle assembly must be shrouded with a water diffuser to prevent water from slamming the float shut. Outlets to be threaded. Flanged connections available.

The float shall be stainless steel, center guided (not free floating) for positive seating.

The discharge orifice shall be fitted with a Double-Acting Throttling Device (patented), to regulate and restrict air venting. This device will establish a pressure loading on the rising column of water to eliminate damaging shock to the pump, controls and check valve on pump start. On pump stop, the Double-Acting Throttling Device shall automatically open allowing full line unrestricted air re-entry to prevent vacuum from forming in the suction column.

Valve exterior to be painted with universal metal primer paint as accepted by the FDA for use with potable water.

Materials of construction shall be certified conforming to following ASTM specifications:

Body and cover	Cast Iron or Ductile Iron	ASTM A126 Gr. B ASTM A536 Gr. 65-45-12
Baffle, sizes 1/2" (15mm), 1" (25mm) & 2" (50mm)	Delrin	ASTM D2133
Baffle, size 3" (80mm)	Cast Iron	ASTM A48 CL 30
Float	Stainless Steel	ASTM A240
Seat	Buna-N	
Water diffuser	Brass or Stainless Steel	ASTM B16
Double Acting Throttling Device Patented		
Housing	Malleable Iron	ASTM A47
Adj. screw & nut	Stainless Steel	ASTM A276 T304
Spring	Stainless Steel	ASTM A313 T316
Plug	Teflon	AMS 3651

\*Bronze components meet current lead-free requirements.

Valve to be APCO Series 140DAT Air/Vacuum Valve with Double Acting Throttling Device & Water Diffuser.

**Note: See Bulletin 613 for Slow Closing Air Valve Specifications.**

Manufactured to AWWA C-512

ISO flange connections available



## **Sales and Service**

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

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



250 Riverside Ave. N. Sartell, Minnesota 56377 • Phone: 320-259-2000 • Fax: 320-259-2227

*DeZURIK, Inc. reserves the right to incorporate our latest design and material changes without notice or obligation. Design features, materials of construction and dimensional data, as described in this bulletin, are provided for your information only and should not be relied upon unless confirmed in writing by DeZURIK, Inc. Certified drawings are available upon request.*