



An Ovivo Company

## COVER EQUIPMENT

### VAREC

#### DUAL PRESSURE/ VACUUM RELIEF DEVICE

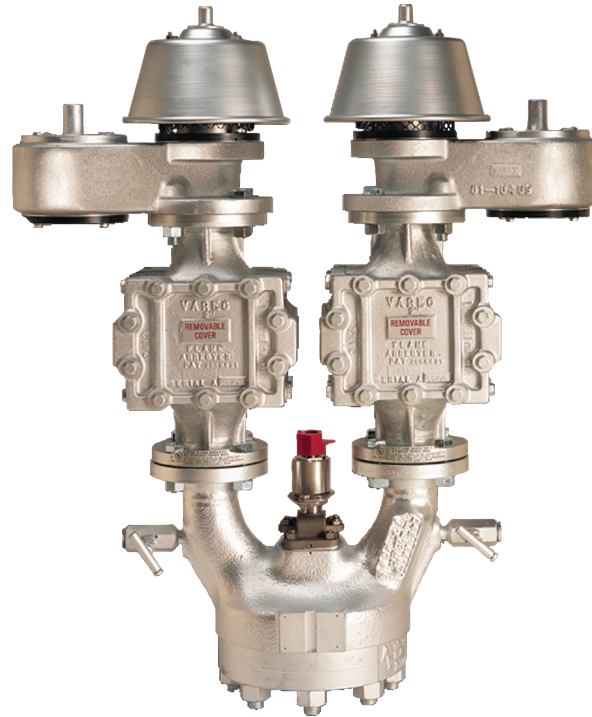
The Dual Pressure/ Vacuum Relief Device is designed to function as a switchover device that permits servicing of pressure relief devices with no process interruption.

#### Introduction

Digester and gas holder covers should be equipped with pressure and vacuum relief (PVR) valves for protection against structural damage caused by possible over and under pressure due to the rapid pumping of the sludge into and out of the vessel, or from an excess of gas production. The valves are installed with flame arresters to prevent an external flame from igniting the gas within the digester.

Water Environment Federation, Manual of Practice (MOP) No. 8 recommends redundancy to ensure that the digester is protected even during maintenance.

The Varec Dual Pressure/ Vacuum Relief Device is a combination of the Varec 5810B/ 5820B Series Relief Valve and Flame Arrester and the Safety Selector Valve.



#### Design

The Dual Pressure/Vacuum Relief Valve provides redundant pressure and vacuum relief and flame arresters to protect from overpressure and vacuum condition in the vessel and protect it from a flame flashback. Model DPRV also comes with a safety selector valve that allows switch-over between the two devices to allow for continuous system overpressure protection.

#### Features

- Oversized pressure and vacuum ports for maximized flow capacities
- Extensible flame arrester bank assembly
- Replaceable pressure and vacuum seat rings
- “All-weather” coating option available for valve seats and guides
- Vent to atmosphere or pipe-away model
- Provides a safe, efficient method of switching from an active pressure relief device to a standby, maintaining system overpressure protection
- The Safety Selector Valve provides high Cv values, resulting in less than 3% pressure drop to the active PRV inlet, when used with the largest API orifice available in a given valve size, in accordance with the recommendations of API RP520 Part II and ASME Section VIII, Division 1, Appendix M, thereby greatly reducing the possibility of destructive chatter of the PRV.
- Requires only one minimally sized penetration into the vessel or pipe, reducing costs.

## Features (Continued)

- Greatly reduces field installation costs and space requirements through pre-assembled and compact design.
- Provides process isolation of standby pressure relief device and allows pressure relief device maintenance without process shutdown.
- Bright red indicator for positive indication of active pressure relief device.
- The Safety Selector Valve meets all mandatory requirements of ASME Section VIII, Division 1, UG-135 (b).
- Foolproof provisions for dual padlocking in either pressure relief valve position, in accordance with the recommendations of ASME Section VIII.
- The Safety Selector Valve packing design has been tested to ASTM E427, Method A halogen leak test, reducing probability of fugitive emissions.
- No special tools are required which minimizes total time to operate valve.
- Meets standard temperature applications from -40°F to 250°F (-40°C to 121°C).
- A bleed valve is provided on each process side as an effective and safe means of venting entrapped process under an isolated pressure relief valve prior to removal for maintenance. It can also be used for calibration.

## Application

The 5810B/ 5820B Series Pressure and Vacuum Relief Valve with Flame Arrester are installed on low-pressure storage tank applications. The relief valve helps protect the cover from excessive pressure and vacuum within the tank. It also maintains system operating pressure so vapors are not routinely vented to the atmosphere. The flame arrester helps protect the tank from accidental ignition of vapors within the storage tank. It is designed to stop the propagation of flame from external sources.

For further information on these devices, see the product data sheet for 2010B/2020B, and 5000/5010.

A variety of materials are available to suit climate conditions. The standard aluminum construction is suitable for moderate climates. In extreme hot, humid or freezing weather, the "All-weather" 5811B Series is recommended. This design incorporated added features that can reduce potential malfunctions from these extreme conditions.

The 5820B Series provides for further protection from cold climates and provides a means to route vented gas instead of venting to atmosphere. This unit incorporates an enclosed pressure port on the relief valve. It is especially suited for field installation of insulation jackets or insulated shelters.

The 5821B Series includes the pipe-away outlet and the "All-weather" features for maximum cold weather protection.

If H<sub>2</sub>S corrosion is a concern, supplying the relief valve with 316 SS trim is an option. The flame arrester bank sheets are also available in 316 SS material.

### Flow Data

Consult Factory for flow data information. Valve sizing programs are available upon request.

## Operation

Whenever the system gas pressure or vacuum exceeds the setting, the pallet is designed to lift. Only excess pressure is vented to the atmosphere. Air is drawn into the tank only to relieve an excess vacuum condition. The valve remains closed when the gas utilization system remains within normal operating pressure.

The valve pallets are deadweight loaded with a field adjustable pressure setting range. Side and center pallet guides are incorporated for stability. "Air cushion" Teflon® seat inserts help ensure a tighter seal. Removable seats can be easily replaced.

The case outlet adapter on the pipe-away model is one pipe size larger than the valve inlet flange to optimize flow capacities.

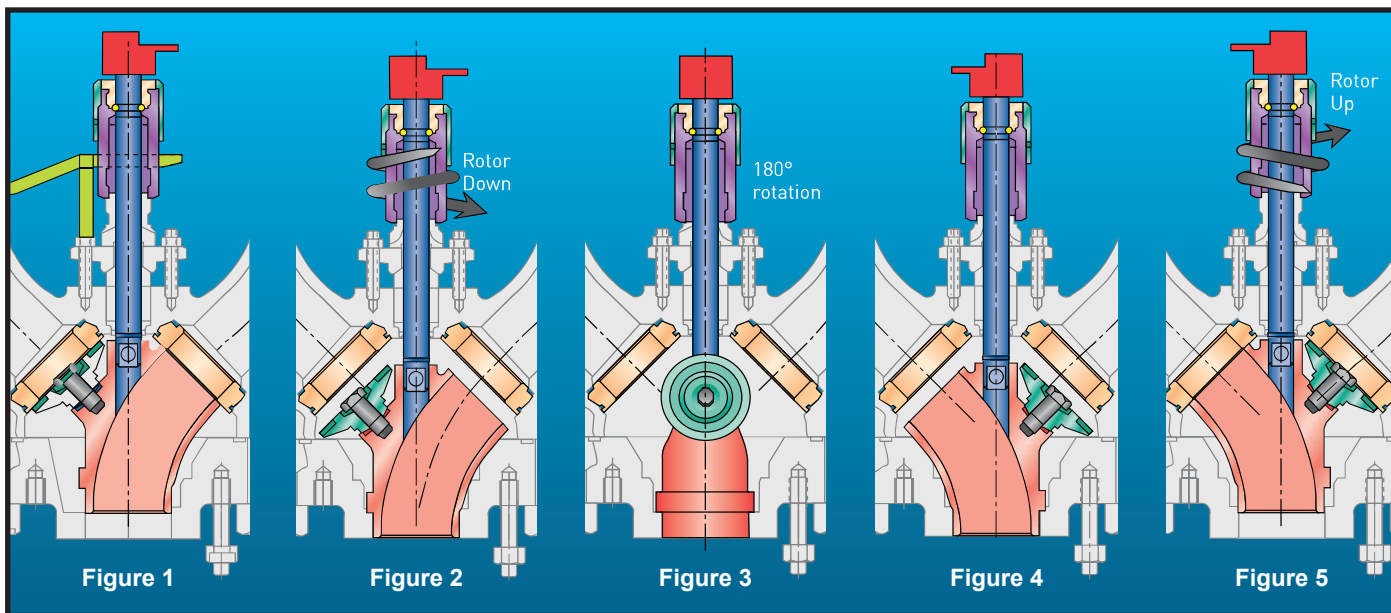
The flame arrester is designed to stop the propagation of a flame by absorbing and dissipating heat through the surface area of the bank sheets. Heat is absorbed as ignited gas attempts to pass through the small passages within the bank assembly. This action lowers the temperature of the gas below its ignition point and quenches the flame.

The net free area through the flame arrester bank is three to four times the unit pipe size. This design provides increased flow capacity with minimal pressure drop. The unique extensible bank frame allows inspection of the corrugated sheets, and routine cleaning without removal from the frame. The entire bank assembly slides out easily off the arrester housing.

It is not necessary to disassemble the flame arrester from the relief valve, nor remove the entire unit off the pipeline. The extensible bank feature is especially useful when there is excessive foaming in the digester. The bank assembly can be easily inspected and cleaned to remove any scum or residue build-up.

The "All-weather" models feature a special non-frosting and anti-icing coating. This coating is applied to the pallet perimeter and stem, guide posts, and seat ring tip. This feature provides additional protection against pallets freezing closed.

Operation (Continued)



The Safety Selector Valve body houses a uniquely designed switching mechanism. The SSV uses a Rotor and Isolation Disc assembly. Referencing the figures shown above, the SSV operates as follows:

**Figure 1**

The red indicator is used to move the retraction bushing. In this figure the process connection on the right is active because the red indicator is pointed on this connection. The process connection on the left is isolated or on stand-by. The available padlock hasp is open to allow rotation of the rotor and disc assembly.

**Standard Specification**

Model 5000 Flame Arrester UL (Underwriters Laboratories) listed in all Aluminum Construction with extensible bank assembly in 2", 3", 4", 6" and 10" sizes.







Flame Arresters installed not more than 15 feet from the open end of the vent pipe. These test conditions may not represent the actual service conditions or piping system design. It is recommended that the arrester be independently tested under actual service conditions before installation.

**Figure 2**

Rotating the Retraction Bushing through the red indicator in the clockwise direction until it hits a stop in the SSV body will lower the Rotor and the Isolation Disc away from the Nozzle or seat. In this position, both sides of the SSV are now fully pressurized by the system.

**Figure 3 and 4:**

Rotating the Index Shaft 180° to its stop is preparation for the final step to isolate the right process connection, and activate the left connection for service.

- |   |                    |   |             |
|---|--------------------|---|-------------|
|  | Retraction Bushing |  | Red Pointer |
|  | Isolation Disc     |  | Lock Hasp   |
|  | Nozzle             |  | Index Shaft |

**Figure 5**

Rotating the Retractor Bushing counterclockwise will raise the Rotor and carefully seat the Isolation Disc against the left side Nozzle. Once the disc is properly seated against the nozzle, the operator can activate the lock hasp and can padlock the unit to prevent unwanted access to the PRV valves. The red indicator will now point to the other side as being active.

**Benefits**

- Large flow capacity allows use of smaller size
- Easy maintenance
- Helps reduce maintenance time and replacement cost
- Valve will operate at temperatures to -25°F [-32°C]
- Application flexibility for weather or emissions considerations

**BLEED VALVE**

The SSV incorporates a stainless steel bleed valve on both process connections to provide a safe and effective means of venting entrapped gas prior to servicing. It also enables field testing on the PRV valve when set pressure adjustments are made.

**ACTIVE/INACTIVE PROCESS INDICATION**

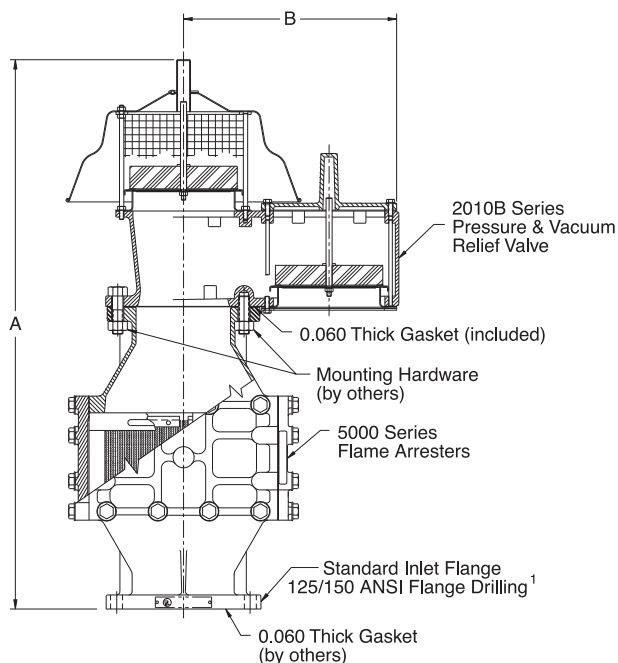
A bright red indicator for positive indication of the active process connection is available so there is never any question which process connection is active.

**PADLOCKING**

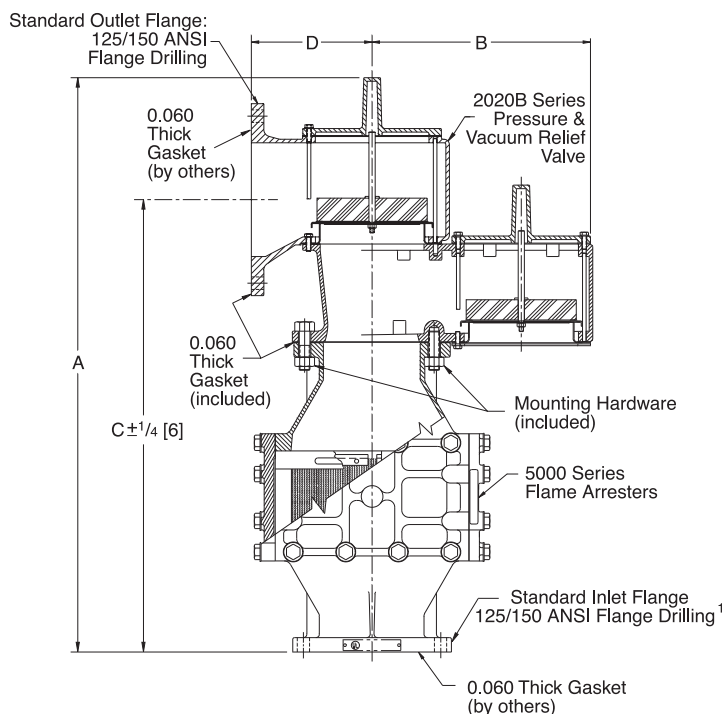
The foolproof provision for dual padlocking will prevent unwanted access to the units.

Specification

5810B SERIES



5820B SERIES



Note: 1 - Aluminum Bodies Flat Face Only.  
Stainless and Carbon Steel Raised Face Only.

5810B Dimensions, inches [mm]

Size	A	B
2"	23 1/16 [586]	9 7/8 [251]
3"	26 5/16 [668]	12 1/4 [311]
4"	30 11/16 [779]	12 7/16 [316]
6"	39 3/8 [1000]	15 1/2 [394]
8"	48 [1243]	19 9/16 [497]
10"	56 [1422]	24 15/16 [633]
12"	66 3/8 [1686]	29 3/8 [746]

5820B Dimensions, inches [mm]

Size Inlet	Outlet	A	B	C± 1/4[6]	D
		2"	3"	21 7/8 [556]	9 7/8 [251]
3"	4"	24 11/16 [627]	12 1/4 [311]	19 13/16 [503]	6 3/8 [162]
4"	6"	29 7/16 [748]	12 7/16 [316]	23 1/2 [597]	8 [203]
6"	8"	40 5/16 [1024]	15 1/2 [394]	31 9/16 [802]	8 9/16 [217]
8"	10"	45 7/16 [1154]	19 9/16 [497]	39 7/16 [1002]	11 3/16 [284]
10"	12"	56 [1422]	24 15/16 [633]	44 11/16 [1135]	13 5/8 [346]
12"	14"	66 7/16 [1688]	29 3/8 [746]	53 5/16 [1354]	15 3/8 [391]

Note: Dimensions are for preliminary general information and should not be used for construction purposes.  
Certified dimensional drawings are available upon request.

**Pressure/ Vacuum Relief Valve and Flame Arrester**

**Sizes**

5810B - 2", 3", 4", 6", 8", 10" and 12"  
 5820B - 2" x 3", 3" x 4", 4" x 6", 6" x 8",  
 8" x 10", 10" x 12" and 12" x 14"

**Connections**

Drilled to ANSI 150 Flat-Faced Flange Connection

All-Stainless Steel: Drilled to ANSI 150 Raised-Face Flange Connection

Special drilling requirements to DIN, JPI or JIS standards are available upon request. Consult factory or your local sales representative for further details.

**Settings**

Pressure and Vacuum:  
 Available up to 1 PSIG

**Materials**

VALVE BODY  
 356 T6 Low Copper Cast Aluminum  
 316 Stainless Steel (Option)

VALVE TRIM

Low Copper Aluminum with 316 SS Guideposts (Standard)  
 316 Stainless Steel (Option)

PALLET SEAT INSERTS

PTFE

PALLET WEIGHTS

Lead

PROTECTIVE SCREEN

HDPE (High-Density Polyethylene)

ARRESTER HOUSING

356 T6 Low Copper Cast Aluminum  
 316 Stainless Steel (Option)

BANK ASSEMBLY

Low Copper Aluminum Extensible Frame with Aluminum Bank Sheets (Standard)

Low Copper Aluminum Extensible Frame with 316 SS Bank Sheets (Option)

All 316 Stainless Steel (Option)

HARDWARE (Nuts, Bolts, etc.)

Zinc-plated Steel (Standard)  
 Stainless Steel (Option)

MOUNTING HARDWARE

Per ANSI standards (Supplied by Others)

ALL-WEATHER OPTION

Relief Valve Operating Temperature is -25°F to 200°F (-32°C to 93°C)

**Safety Selector Valve**

**Body Base**

Aluminum, AL B26 A356.0-T6  
 Stainless Steel, SA351-CF8M SS

**Rotor, Indicator, and Seat**

316 SS

**Isolation Disk, Index Shaft and Retraction Bushing**

17-4 Stainless Steel

**Hardware**

Stainless Steel

**Temperature Rating**

Standard Rated for a Maximum Temperature of 400° F  
 Consult Factory  
 -25°F to 200°F (-31°C to 93.3°C)

**Soft Goods**

PTFE

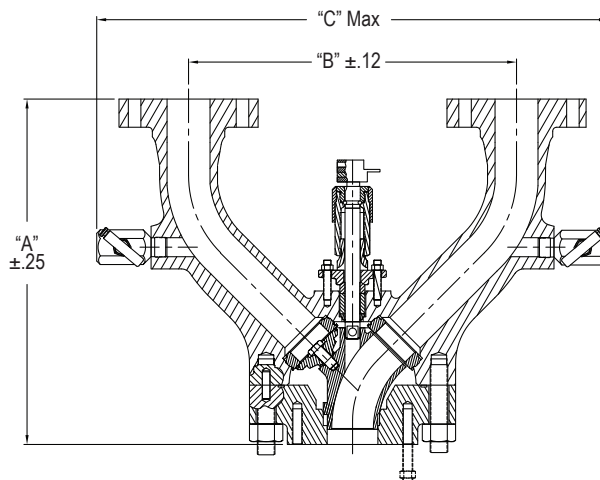
**CV Values**

Size	CV
2"	255
3"	612
4"	1061
6"	2713
8"	4512
10"	6930

**Dimensions and Weights, inches [mm] and lbs. (kg)**

Size	2	3	4	6	8	10
	[50]	[80]	[100]	[150]	[200]	[254]
<b>A</b>	16.29 [413]	15.83 [402]	20.07 [509]	23.63 [600]	26.15 [664]	24.33 [618]
<b>B</b>	15.50 [394]	15.50 [394]	19.50 [495]	19.50 [495]	23.50 [570]	29 [737]
<b>C Max</b>	25.04 [636]	26.24 [666]	31.36 [796]	33.70 [856]	39.78 [1010]	48.40 [1229]
Shipping Weight	66 (30)	98 (45)	148 (67)	320 (145)	515 (234)	725 (329)

NOTE: 1 - Dimensions shown are for Aluminum Body / Base.



**Ordering Information**

<b>Model</b>	<b>Description</b>						
DPRV	Dual Pressure/ Vacuum Relief Device (Includes Pressure/ Vacuum Relief Valve, Flame Arrester and Safety Selector Valve)						
	<b>Code</b>	<b>Relief Type</b>					
	0	Vent to Atmosphere for Relief Valve					
	1	Pipe Away for Relief Valve					
		<b>Code</b>	<b>Configuration</b>				
		0	Standard				
		1	All Weather				
			<b>Code</b>	<b>Size</b>			
			2	2"	2" x 3"		
			3	3"	3" x 4"		
			4	4"	4" x 6"		
			6	6"	6" x 8"		
			8	8"	8" x 10"		
			10	10"	10" x 12"		
			12	Consult Factory			
			<b>Code</b>	<b>Body/ Trim Material (Valve and Flame Arrester)</b>			
			0	Aluminum/ Aluminum			
			1	Aluminum/ 316SS			
			2	316SS/ 316SS			
			<b>Code</b>	<b>SSV Body/ Hardware</b>			
			0	Aluminum/ 316SS			
			1	316SS/ 316SS			
			<b>Code</b>	<b>Hardware</b>			
			Z	Aluminum/ 316SS			
			S	316SS			

DPRV      0      1      4      1      0      S      (Example)  
 Example: 4" Dual Pressure and Vacuum Relief Device, Vent to Atmosphere, All-Weather PRV Valve, Aluminum with Stainless Steel Trim on Valve, Arrester and Safety Selector Valve, Stainless Steel Hardware