



~est. 1990
CANAM
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TANKAGE | VENTING

SERIES 6000 PVRV



Features

- Direct-acting pressure and vacuum relief vent (PVRV)
- Patent-pending Unidirectional Binary Relief (UBR) valve technology offers higher flow rates with less overpressure while offering flutter-free operation.
- Offered in multiple connection sizes with flexible pressure and vacuum relief settings in a wide array of pressure + vacuum and pipe-away configurations.
- Soft Viton gaskets to combat fugitive emissions, with four-point pallet guides for repeatable reseating, and bubble-tight sealing up to 90% of set pressure.
- Flow rates third-party verified.
- Made and stocked in Canada.

FEATURES

Direct Acting Pressure and Vacuum Relief Vent

- The Series 6000 is actuated by tank pressures and vacuums directly. No external instrumentation or controls required.
- Relief values set via weights on valve pallets, and adjustable in 0.5 ozsi [0.22 kPa] increments.

UBR Valve

- A vent equipped with UBR valve technology is capable of higher relative relief flow rates at lower overpressures as compared to a conventional direct-acting valve.
- This allows the set pressure of the UBR valve equipped vent to be much closer to the design pressure of the tank or process than a conventional direct-acting valves.
- Both the pressure and vacuum valves in the vent can be configured as Hawkeye's patent pending Unidirectional Binary Relief (UBR) valve or as a standard weight-loaded direct-acting valve.

Flexible Configuration

- The Series 6000 PVRV is available in 2, 3, 4 and 6" ANSI 150# connections.
- 8" API 12B/F (gauge hatch) connections are also available, sharing the flow characteristic of the 6" ANSI 150# device.
- The PVRV can be configured as an end-of-line vent, with pressure and vacuum relief to atmosphere, or optionally as an in-line vent with pressure relief to an integral 6" ANSI 150# pipe-away connection.
- The device can be configured to provide both pressure and vacuum relief, pressure relief only or vacuum relief only.

Composite FKM Gasket

- The composite gasket bonds sponge Viton™ (eFKM), to standard Viton™ (FKM) for durability.
- The soft eFKM conforms to the contoured seat improve the seal while the standard FKM ensures ruggedness and reliability of the gasket.
- Bubble-tight sealing to 90% of set pressure is achievable.

Precision Components

- Precision molded and machined sealing components provide consistent sealing and venting performance.
- Glass-filled Nylon pallets and seats provide excellent chemical, corrosion, temperature and wear resistance while remaining light, strong and extremely durable.

Full Encompassing Guide

- The full encompassing pallet guide on the Series 6000 PVRV provides full confidence that the internal moving components will not become dislodged or misaligned.
- 4 point contact reduces friction, wear and the risk of becoming stuck over a full contact guide.

Empirical Flow Characteristic Data

- Data used to determine the pressure and vacuum relief flow rates was generated from full-scale flow characteristic determination conducted on all vents in the summer of 2017.
- All data was collected and verified by C-FER Technologies (1999) Inc. in accordance with API 2000, 7th Ed. Full report available upon request.

Design, Manufactured and Stocked in Canada

- The Series 6000 is manufactured and stocked for quick delivery at Hawkeye's Edmonton plant.



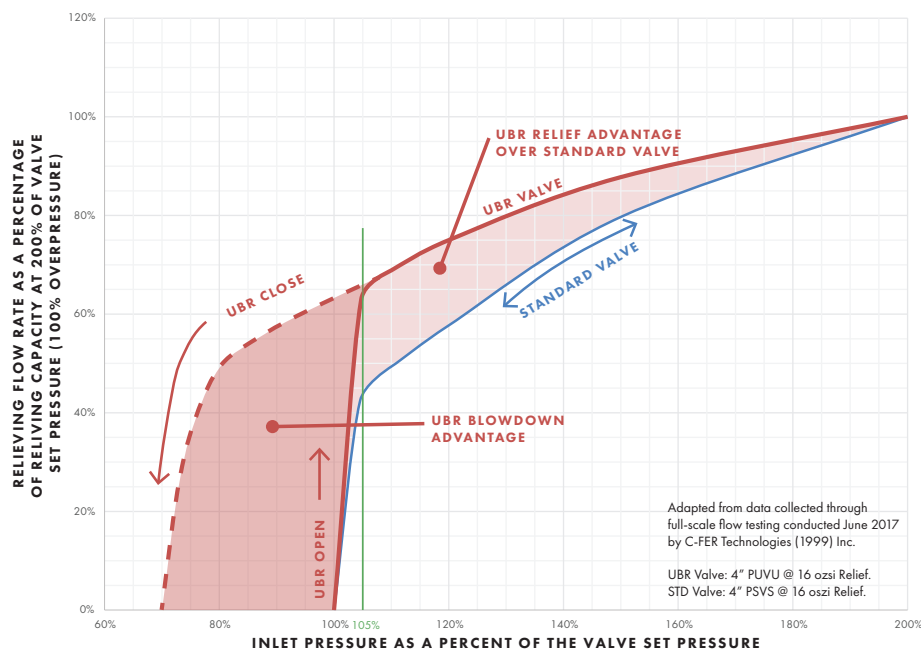
Series 6000 PVRV mounted on flow test apparatus, June 2017.
Photo courtesy C-FER Technologies (1999) Inc.

SPECIFICATIONS

Function	Pressure + Vacuum Relief Vent (PVRV)	
	Standard (STD)	Unidirection Binary Relief (UBR)
Operating Principle	Direct-acting Valve, Weight-loaded pallet	Hybrid Direct-acting / Pilot Operated Valve
Maximum allowable pressure	4 psig [28 kPag]	
Pressure Relief Set Range	0.25 ozsi to 16 ozsi [0.22 kPa to 10 kPa]	0.5 ozsi to 32 ozsi [0.22 kPa to 14 kPa]
Vacuum Relief Set Range	0.25 ozsi to 8 ozsi [0.22 kPa to 10 kPa]	0.5 ozsi to 16 ozsi [0.22 kPa to 14 kPa]
Relief Setting Accuracy	±2%	±2%
Leakage Rate (Typical)	< 1 SCFH [$< 0.03 \text{ Nm}^3/\text{hr}$] @ 90% of set 0 SCFH [0 Nm^3/hr] @ 75% of set	< 1 SCFH [$< 0.03 \text{ Nm}^3/\text{hr}$] @ 90% of set 0 SCFH [0 Nm^3/hr] @ 75% of set
Reset Pressure	At Relief Setting (approx)	At 70% of Relief Setting (Approx.)
Process Connection	2", 3", 4" or 6" ANSI/ASME 16.5 CL 150 Flange 8" API 12B/F Gauge Hatch Flange	
Temperature Range	-26°C to 100°C [-15°F to 212 °F] normal operating range -40°C to 120°C [-40°F to 248 °F] short-term extended service	

UNIDIRECTIONAL BINARY RELIEF (UBR) TECHNOLOGY

Hawkeye's patent-pending UBR valve technology combines the ease and simplicity of a weight-loaded pallet device with precise "off-on" operation of a pilot-controlled valve. UBR technology opens the valve quicker and more fully in comparison to conventional direct-acting valves at same fractional overpressures up to the rated flow capacity. The UBR valve uses the process pressure itself to assist in valve operation, and does not require any external controls or instrumentation. It is a complete, intrinsic capability available on Series 6000 PVRVs.



Operation

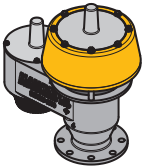
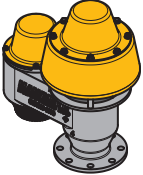
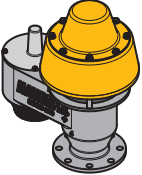
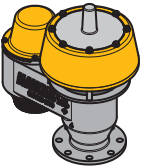
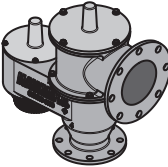
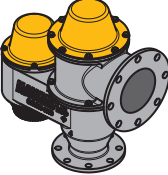
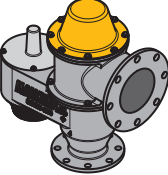
Unidirectional Binary Relief (UBR) refers to how the pallets respond to pressures within the tank or process. In the opening direction, the valve acts as a binary (off-on) device; and, in the closing direction it operates like a traditional direct-acting valve. Although the UBR valve has the same rated relief capacity at 100% overpressure (i.e. 2x relief setting) as a conventional PVRV with standard valves, it achieves a higher percentage of that rated flow rate with less overpressure (see chart).

At just 5% over the set relief pressure the UBR valve is already venting approximately 65% of its rated relief capacity, compared to just 45% for the standard valve. As inlet pressure decreases, the pallet gradually resets, reseating and closing the valve at approximately 70% of the set pressure.

Benefits

- UBR valves open less frequently, on account of the greater difference between opening and closing pressures (blowdown). As a result, the vent has reduced flutter, and is less prone to freezing due to emitted condensation.
- By achieving greater fraction of the rated relief capacity at lower overpressures, an UBR-equipped PVRV is suitable for use on processes and tanks where the operating pressure is nearer to the maximum allowable working (proof) pressure.
- PVRVs with UBR valves can have a higher relief setting as compared to a standard valve on the same process to offer the same relief capacities.

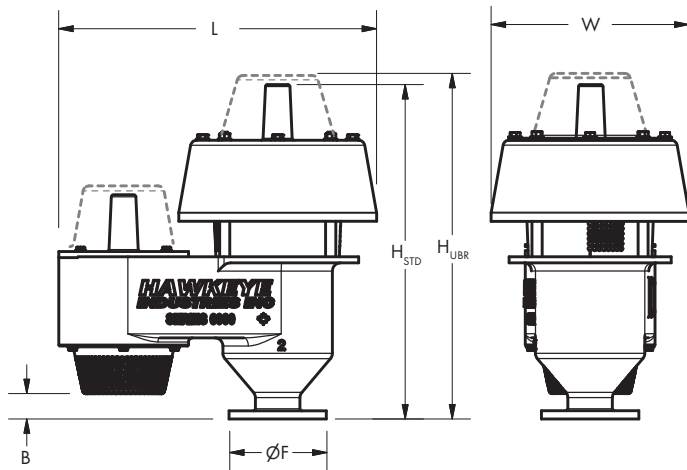
CONFIGURATIONS

PRESSURE + VACUUM RELIEF							
DEVICE							
	PSVS (6x01)	PUVU (6x00)	PUVS (6x02)	PSVU (6x03)	PSPAVS (6x11)	PUPAVU (6x10)	PUPAVS (6x12)
CONNECTION	2 — 6 ANSI 150#, 8 API 12B/F ¹						
OUTLET	ATMOSPHERE	ATMOSPHERE	ATMOSPHERE	ATMOSPHERE	6 ANSI 150# ²	6 ANSI 150# ²	6 ANSI 150# ²
PRESSURE VALVE	STD	UBR	UBR	STD	STD	UBR	UBR
VACUUM VALVE	STD	UBR	STD	UBR	STD	UBR	STD
PRESSURE RELIEF	0.25 TO 16 OZSI	0.5 TO 32 OZSI	0.5 TO 32 OZSI	0.25 TO 16 OZSI	0.25 TO 16 OZSI	0.5 TO 32 OZSI	0.5 TO 32 OZSI
VACUUM RELIEF	0.25 TO 8 OZSI	0.5 TO 16 OZSI	0.25 TO 8 OZSI	0.5 TO 16 OZSI	0.25 TO 8 OZSI	0.5 TO 16 OZSI	0.25 TO 8 OZSI

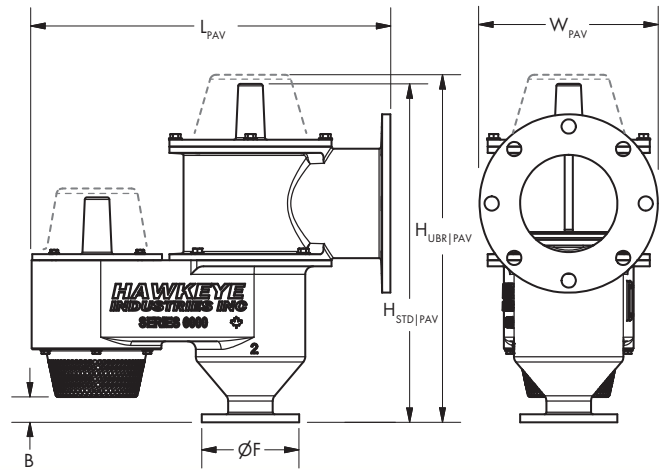
¹ Inlet diameter on 8" API connection is 6", and shares flow characteristic of the 6 ANSI 150# Device

DIMENSIONS, WEIGHTS AND MOUNTING

PSVS, PUVU, PSVU, PUVS



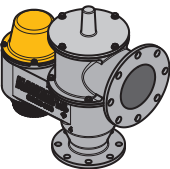
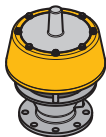
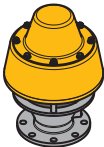
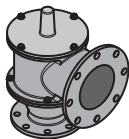
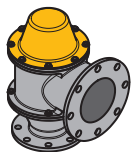
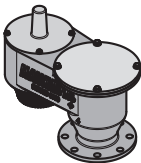
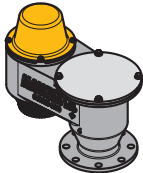
PSPAVS, PUPAVU, PUPAVS, PSPAVU



Dimension		Value	
		[in]	[mm]
B	Vacuum Inlet Clearance	1.6	41
H _{UBR V}	Vacuum only, UBR Valves	14.5	368

Height		Length	
H _{STD}	Pressure + Vacuum, STD	20.6	523
H _{UBR}	Pressure + Vacuum, UBR s	21.3	541
H _{STD P}	Pressure only, STD	16.0	406
H _{UBR P}	Pressure only, UBR	16.7	424
H _{STD PA}	Pressure only Pipe-away, STD	16.2	411
H _{UBR PA}	Pressure only Pipe-away, UBR	16.9	429
H _{STD PAV}	Pressure Pipe-away + Vacuum, STD	20.9	531
H _{UBR PAV}	Pressure Pipe-away + Vacuum, UBR	21.6	549
H _{STD V}	Vacuum only, STD Valves	13.8	351

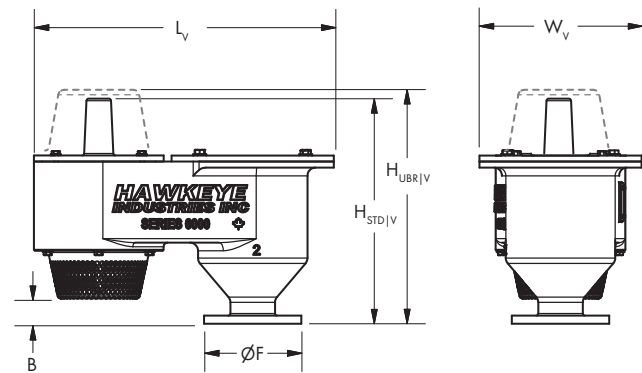
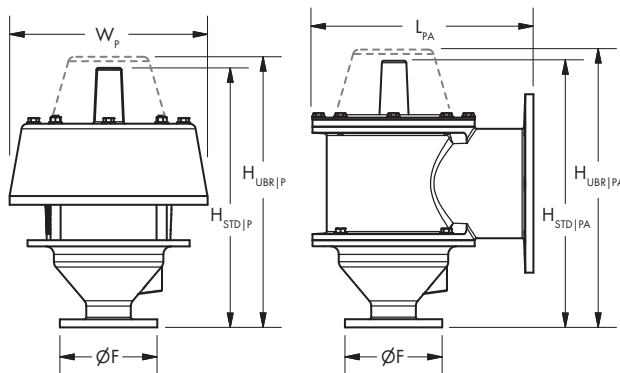
Width		Value	
		[in]	[mm]
W, W _P	Width, Pressure + Vacuum & Pressure only	12.2	310
W _{PAV}	Width, Pressure + Vacuum Pipe-away	11	279
W _V	Width, Vacuum Only	10	254

PRESSURE RELIEF ONLY					VACUUM RELIEF ONLY		
							DEVICE
PSPAVU (6x13)	PS (6x24)	PU (6x25)	PSPA (6x34)	PUPA (6x35)	VS (6x46)	VU (6x47)	
2 — 6 ANSI 150#, 8 API 12B/F ¹							CONNECTION
6 ANSI 150# ²	ATMOSPHERE	ATMOSPHERE	6 ANSI 150# ²	6 ANSI 150# ²	ATMOSPHERE	ATMOSPHERE	OUTLET
STD	STD	UBR	STD	UBR	N/A	N/A	PRESSURE VALVE
UBR	N/A	N/A	N/A	N/A	STD	UBR	VACUUM VALVE
0.25 TO 16 OZSI	0.25 TO 16 OZSI	0.5 TO 32 OZSI	0.25 TO 16 OZSI	0.5 TO 32 OZSI	N/A	N/A	PRESSURE RELIEF
0.5 TO 16 OZSI	N/A	N/A	N/A	N/A	0.25 TO 8 OZSI	0.5 TO 16 OZSI	VACUUM RELIEF

² Adapters from 6 ANSI 150# outlet to other connections available

PS, PU, PSPA, PUPA

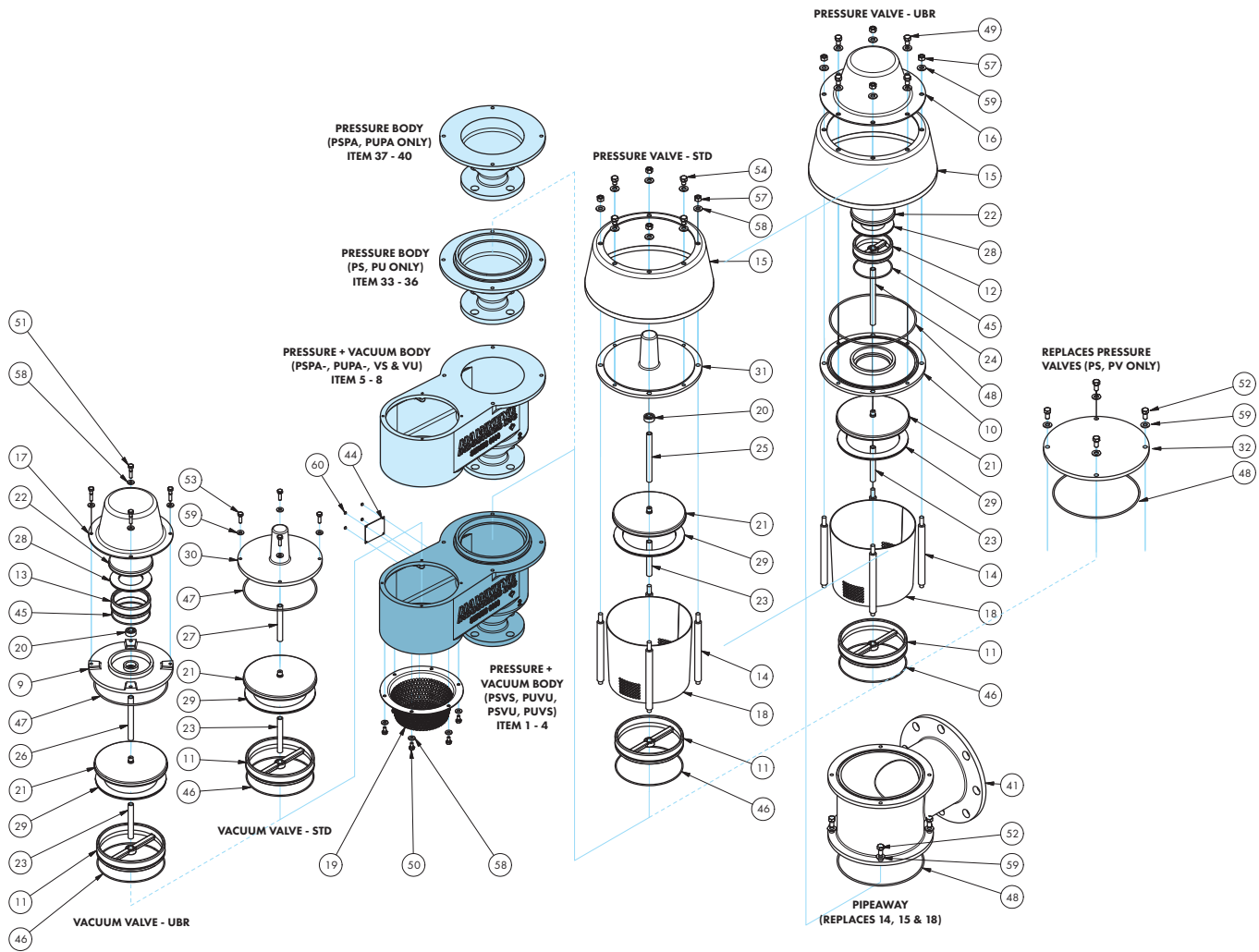
VS, VU



Device Weight, no weight plates (lb [kg])					Device Weight, no weight plates (lb [kg])				
Device	2"	3"	4"	6" / 8" API	Device	2"	3"	4"	6" / 8" API
Pressure + Vacuum					PUPA	28 [12.7]	28.5 [12.9]	29 [13.1]	30.5 [13.8]
PSVS	32 [14.5]	33 [14.9]	33.5 [15.2]	35 [15.8]	VS	24 [10.9]	25 [11.3]	25.5 [11.5]	27 [12.2]
PUVU	34 [15.4]	35 [15.8]	35.5 [16.1]	37 [16.7]	VU	25 [11.3]	26 [11.8]	26.5 [12]	28 [12.7]
PSVU	33 [14.9]	34 [15.4]	34.5 [15.6]	36 [16.3]					
PUVS	33 [14.9]	34 [15.4]	34.5 [15.6]	36 [16.3]					
Pressure Pipe-away + Vacuum									
PSPAVS	41 [18.6]	42 [19]	42.5 [19.2]	44 [19.9]					
PUPAVU	43.5 [19.7]	44.5 [20.1]	45 [20.4]	46.5 [21]					
PUPAVS	42 [19]	43 [19.5]	43.5 [19.7]	45 [20.4]					
PSPAVU	42 [19]	43 [19.5]	43.5 [19.7]	45 [20.4]					
PS	18 [8.14]	18.5 [8.37]	19 [8.6]	20.5 [9.28]					
PU	19 [8.6]	19.5 [8.82]	20 [9.05]	21.5 [9.73]					
PSPA	27 [12.2]	27.5 [12.4]	28 [12.7]	29.5 [13.3]					

DIM	Mounting				
	2"	3"	4"	6"	8"
STD	ANSI B16.5 150#			API 12B/F	
BCD	4.75	6.00	7.50	9.50	10.38
# Bolts	4	4	8	8	16
Hole Ø	3/4	3/4	3/4	7/8	9/16
F	6.0	7.5	9.0	11.5	11.5

PARTS LIST



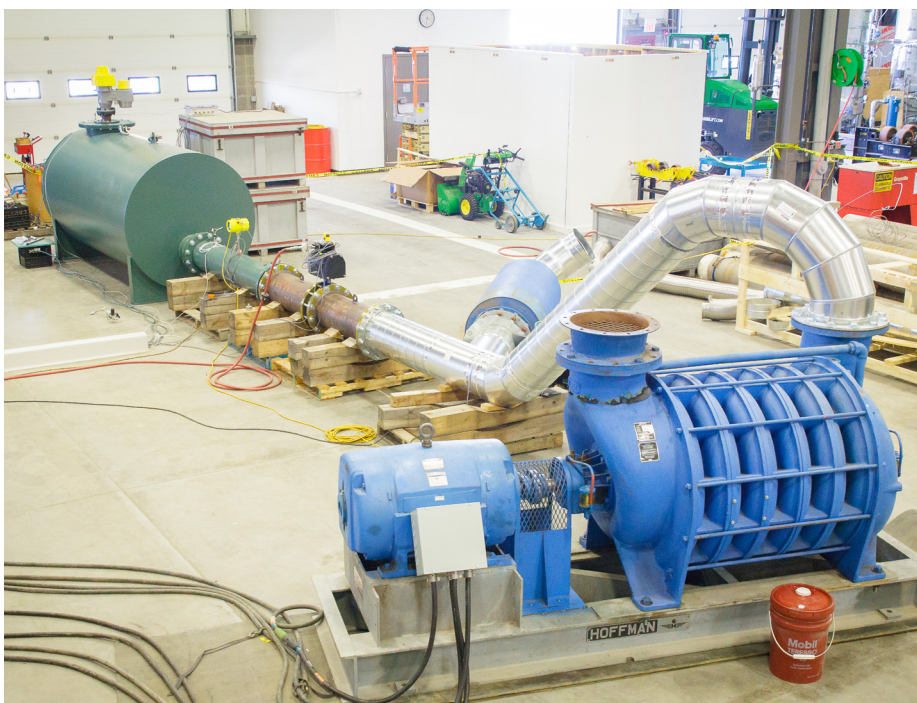
Item	Part Name	Item	Part Name	Item	Part Name
1	PVRV Base - 2 ANSI 150#	21	Relief Pallet	41	Pipe Away Body
2	PVRV Base - 3 ANSI 150#	22	Pilot Pallet	42	Pipe Away Pressure Cover
3	PVRV Base - 4 ANSI 150#	23	Lower Pallet Guide Rod	43	Pressure Pilot Pallet Seat Holder (PA)
4	PVRV Base - 6 ANSI 150#	24	Pressure Pallet Center Guide Rod	44	Vapour Control Tag
5	PVRV Base - 2 ANSI 150# PA	25	Pressure Pallet Top Guide Rod	45	153 O-Ring Viton
6	PVRV Base - 3 ANSI 150# PA	26	Vacuum Pallet Center Guide Rod	46	164 O-Ring Viton
7	PVRV Base - 4 ANSI 150# PA	27	Vacuum Pallet Top Guide Rod	47	261 O-Ring Viton
8	PVRV Base - 6 ANSI 150# PA	28	Composite Pilot Gasket	48	266 O-Ring Viton
9	Vacuum Pilot Pallet Seat Holder	29	Composite Relief Gasket	49	3/8-16 UNC x 0.625 SS Hex Bolt
10	Pressure Pilot Pallet Seat Holder	30	Vacuum Cover	50	1/4-20 UNC x 0.5 SS Hex Bolt
11	Relief Pallet Seat	31	Pressure Cover	51	1/4-20 UNC x 1.25 SS Hex Bolt
12	Pressure Pilot Pallet Seat	32	Vacuum-only Cover	52	3/8-16 UNC x 0.75 SS Hex Bolt
13	Vacuum Pilot Pallet Seat	33	Pressure-only Base 2 ANSI 150#	53	1/4-20 UNC x 0.875 SS Hex Bolt
14	Pressure Stand-off	34	Pressure-only Base 3 ANSI 150#	54	3/8-16 UNC x 0.5 SS Hex Bolt
15	Pressure Hood	35	Pressure-only Base 4 ANSI 150#	55	3/8-16 UNC x 0.875 SS Hex Bolt
16	Pressure Cap	36	Pressure-only Base 6 ANSI 150#	56	3/8-16 UNC x 1 SS Hex Bolt
17	Vacuum Hood	37	Pressure-only Base 2 ANSI 150# PA	57	3/8-16 UNC SS Hex Nut
18	Pressure Screen	38	Pressure-only Base 3 ANSI 150# PA	59	3/8 SAE SS Flat Washer
19	Vacuum Screen	39	Pressure-only Base 4 ANSI 150# PA	58	1/4 SAE SS Flat Washer
20	Guide Insert	40	Pressure-only Base 6 ANSI 150# PA	60	#4 x 5/16 ZP Drive Screw

FLOW CHARACTERISTIC

All Series 6000 PVRV configurations and valve types have flow characteristic information available for sizing purposes.

Relieving rates and behavior determined empirically in accordance with a test regime in consideration of API 2000 7th Ed from data collected and verified by C-FER Technologies (1999) Inc. Their third-party test report outlining the apparatus, procedure, error propagation and other experimental considerations available upon request.

Analysis of the data and presentation of relief rates and behavior is the product of Hawkeye Industries Inc., based on API 2000 7th Ed section 5.3.2.1.



Full-scale flow characterization apparatus, June 2017.
Photo courtesy C-FER Technologies (1999) Inc.

LEAK TESTING

Series 6000 PVRVs are tested per API 2000 7th Ed section 5.4 for pressure-tightness, relief setting accuracy and leak rate. Items passing the quality control measures are marked with the label at right.



PACKAGING

Series 6000 PVRVs are shipped complete and boxed. Inside the carton separate boxes for the weights, documentation and connection accessories.

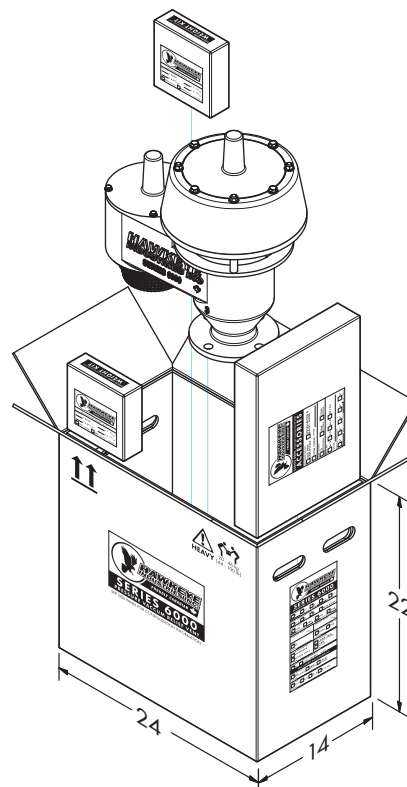
Weight varies with configuration between 44 and 100 lb [20 to 46 kg]. Two person lift is strongly recommended.

VENT MARKING

Series 6000 PVRVs are tagged permanently with the information illustrated on the tag below, per API 2000 7th Ed, Section 6.

HAWKEYE INDUSTRIES INC. PROUDLY CANADIAN				
MODEL		CONNECTION SIZE & TYPE		
PART NUMBER				
SERIAL NUMBER		MANUFACTURE DATE		
PRESSURE RELIEF				
SET PRESS.	RELIEF CAPACITY	*1000 SCFH	VALVE TYPE	SEAL MATERIAL
	OZSI	AIR@100% OVER SET		
VACUUM RELIEF				
SET VAC.	RELIEF CAPACITY	*1000 SCFH	VALVE TYPE	SEAL MATERIAL
	OZSI	AIR@100% OVER SET		
TAG NUMBER				

TAG-VENT-R3



ORDERING INFORMATION

PVRVs are assembled from stocked components for target delivery in under 2 weeks. Configure your desired vent using the part number legend below, and contact your Hawkeye sales rep to place an order. Items in **bold** are standard items. All PVRVs ship complete with a CR/Neoprene base gasket and Gr. 5 bolt kit standard.

Size & Configuration

PVRV — **6** **A** **B** **C**

[A] Size	
Size	Flag
2 in.	2
3 in.	3
4 in.	4
6 in.	6
8 in.	8

[C] Valve Type		
Pressure	Vacuum	Flag
UBR	UBR	0
STD	STD	1
UBR	STD	2
STD	UBR	3
STD	NONE	4
UBR	NONE	5
NONE	STD	6
NONE	UBR	7

[B] Relief Type	
Configuration	Flag
Pressure + Vacuum	0
Pressure Pipe-away + Vacuum	1
Pressure only	2
Pressure only Pipe-away	3
Vacuum only	4

Relief Setting

D D D E E E

[D] Pressure *	
Setting (ozsi)	Flag
n/a	000
0.25	002
0.4 †	004
0.5	005
1.0	010
⋮	⋮
31.0	310
31.5	315
32.0	320

[E] Vacuum *	
Setting (ozsi)	Flag
n/a	000
0.25	002
0.4 †	004
0.5	005
1.0	010
⋮	⋮
15.0	150
15.5	155
16.0	160

* Allowable Pressure Ranges						
	Pressure (ozsi)			Vacuum (ozsi)		
	Min	Max	Inc.	Min	Max	Inc.
Standard Valve	0.25	16	0.5	0.25	8	0.5
UBR Valve	0.5	32	0.5	0.5	16	0.5

† 0.4 ozsi setting available on Standard Valve only.

Options

F G H J

[F] Bolt Pattern	
Configuration	Flag
ANSI B16.5 150#	0
API 12B/F 650 (req for 8")	1

[G] Pallet & Seat Material	
Configuration	Flag
Glass-filled Nylon	0

[H] Body Material / Coating	
Configuration	Flag
Bare Aluminum	0
Severe Service (Teflon) Coating	1

[J] Seal Material	
Configuration	Flag
eFKM + FKM composite seals	0

Bolting Kit

PVRV-BK — **6** **A** **F** **K**

[A] Size	
Same as Device	
[F] Bolt Pat.	
Same as Device	

[K] Bolt Grade	
Grade	Flag
Gr. 5	5
Gr. 8	8
S.S	S
B7/2H	B

Base Gasket

PVRV-BG — **6** **A** **F** **L**

[A] Size	
Same as Device	
[F] Bolt Pat.	
Same as Device	

[L] Gasket Mat'l	
Grade	Flag
CR (Neoprene)	N
FKM (Viton)	V
FEPM (Aflas)	A

Examples

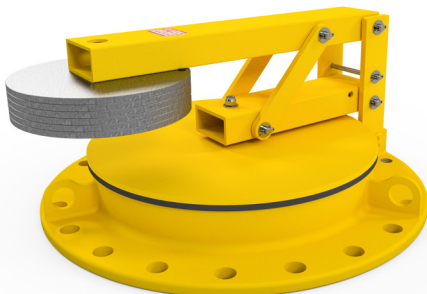
Series 6000 PVRV, 3" ANSI 150#
Pressure UBR + Vacuum UBR,
16 ozsi / 0.5 ozsi relief, STD Trim
Grade 5 Bolts, CR Base Gasket
PVRV-6300-160005-0000
& PVRV-BK-6305 + PVRV-BG-630N

Series 6000 PVRV, 4" ANSI 150#
Pressure Pipe Away Std + Vacuum UBR,
8 ozsi / 0.5 ozsi relief, STD Trim
Grade 8 Bolts, FKM Base Gasket
PVRV-6413-080005-0000
& PVRV-BK-6408 + PVRV-BG-640V

Series 6000 PVRV, 8" API 12B
Pressure Only, UBR Valve,
12 ozsi relief, Severe Service Coating
Stainless Bolts, FEPM Base Gasket
PVRV-6825-120000-1010
& PVRV-BK-6815 + PVRV-BG-681A

RELATED PRODUCTS

Series 5000 EPRV



The Series 6000 PVRV is just part of the tankage product line, which also includes:

Vapor Control

- Series 5000 EPRV
- Marsh Hawk Freeze-resistant TRV
- TVTH 200 and 300 Thief Hatches

Mechanical Level Indication

- Redtail Hawk & Roadside Hawk Dry Seal Level Gauging System
- Model 750LS and Model 375LS Liquid Seal Level Gauging Systems