ISO Registered Company

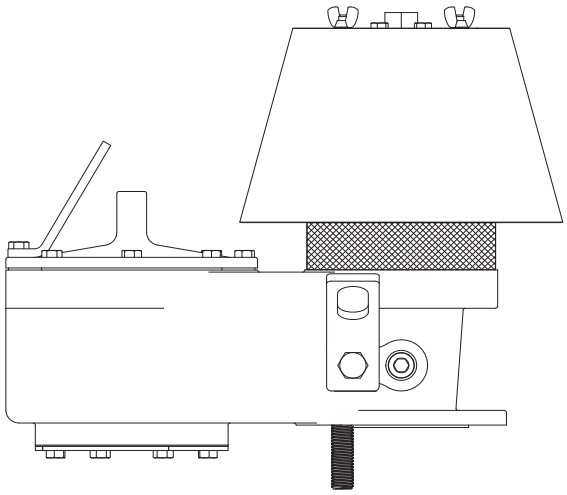
Model 4100

Spring Loaded Vacuum Vent
End-of-Line

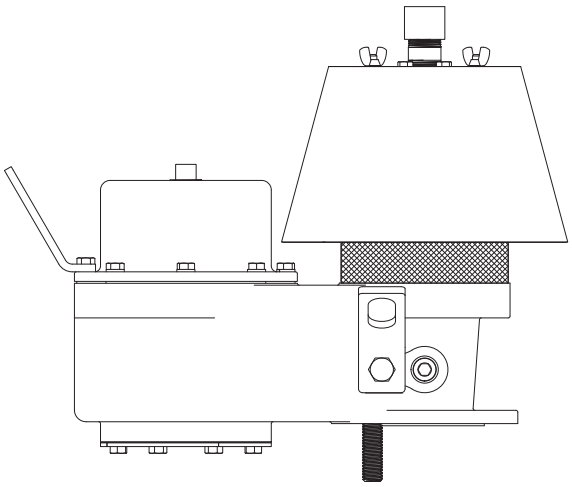
SECTION I

Model 4100 vent is used for the normal venting requirements. Normal venting is defined as venting required because of operational requirements (i.e. filling and emptying the tank) or atmospheric changes.

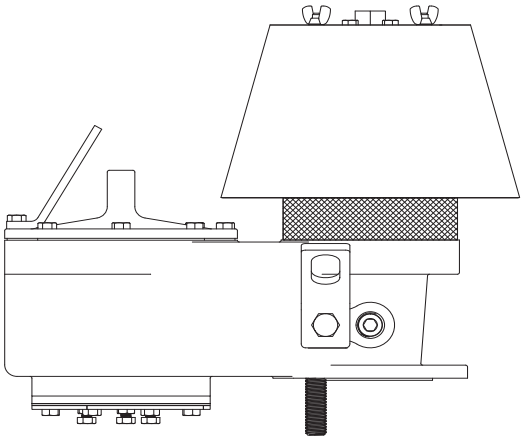
All of these devices are sized in accordance with API Standard 2000. Improperly specified relief vents may result in structural damage to the tank or system and can cause severe personal injury or death.



SPRING LOADED PRESSURE / WEIGHT LOADED VACUUM



WEIGHT LOADED PRESSURE / SPRING LOADED VACUUM



SPRING LOADED PRESSURE / WEIGHT LOADED VACUUM
WITH DIFFERENTIAL PRESSURE HARDWARE

SECTION II

II. SAFETY WARNINGS

Tank or system protection is the primary function of the spring loaded Vacuum Relief Vent. It must be selected to meet the total vacuum flow requirements within the Maximum Allowable Working Vacuum of the system on which it is installed. Consult API 2000 Standard for tank protection sizing procedures. Improperly specified relief vents may result in structural damage to the tank or system and can cause severe personal injury or death.

⚠ CAUTION

DO NOT attempt to remove the vent from the tank or process vessel without first bleeding all pressure from the system. ALTERNATIVE MEANS OF PRESSURE AND VACUUM RELIEF MUST BE PROVIDED WHEN THE VENT IS OUT OF SERVICE.

⚠ CAUTION

DO NOT change pressure or vacuum setpoints without consulting Cashco or your VCI representative.

SECTION III

III. INSPECTION AND STORAGE

The pressure vacuum relief vent is carefully packaged to prevent damage or contamination during shipping. Inspect the equipment when it is received and report any damage to the carrier immediately. The vent should be stored with all the protective flange covers in place.

SECTION IV

IV. INSTALLATION

Aluminum body 4100 vents are designed to mate with flat face flanges. Consult factory if the aluminum body must mate with raised face flanges. Carbon steel and stainless steel bodies are to mate with raised face flanges. 4100 vents are **NOT** rated for full flange pressure. Follow flange bolting torque specificatins on Table 1.

Before installing the model 4100; for weight loaded pallets, remove packing materials from inside and outside the vent. Inspect the gasket seating surface of the tank nozzle flange. It must be flat, clean, free of scratches, corrosion, and tool marks. Make sure the gasket is suitable for the application.

⚠ WARNING

The vent must be installed in a vertical position. The tank nozzle on which the vent is mounted should have the same nominal diameter as the venting device. It is recommended that the tank nozzle flange face be within 1 degree of horizontal for best performance of the venting device.

⚠ WARNING

Minimum clearance between tank roof and vacuum inlet port must be at least equal to the vents' nominal flange bore.

Center the gasket within the bolt circle of the tank flange, align the bolt holes and carefully set the vent on the flange nozzle.

NOTE: *At installation, the vent valve should be carefully lifted into position using the lifting brackets on the body*.

⚠ CAUTION

The lifting brackets should only be used for lifting the vent valve into place and should NOT be used for any other purpose.

All stud threads must be lubricated to obtain proper torque results.

Install the studs, washers and nuts and tighten nuts hand tight. Check proper alignment of flange faces. Misalignment of flange faces will cause bending stresses at the flange and flange joint and damage may result. Correct any misalignment prior to applying torque to nuts.

All nuts must be tightened in proper sequence and equal increments. Proceed through the tightening sequence until the recommended torque is attained.

Recheck the torque on each bolt in the same sequence, as bolts previously tightened may have relaxed through the torque sequence.

TABLE 1 All Torque Requirements Are Dependant On Gasket Material Bolt Torque and Stud Specifications - ASME #150 Flange Connections					
MOUNTING FLANGE	BOLT TORQUE - Ft. lbs.	NUMBER BOLTS TOTAL	STUD SPECIFICATIONS		
			THREAD UNC	STUD LENGTH	QUANTITY
2”	47	4	5/8” - 11	2.50”	2
3”		4	5/8” - 11	2.75”	2
4”		8	5/8” - 11	2.75”	4
6”	83	8	3/4” - 10	3.00”	4

SECTION V

V. MAINTENANCE

Tank or system protection is the primary function of the pressure vacuum relief vent. As a safety device, it is very important that maintenance/inspection be done on a regular interval. Maintenance should only be done by a qualified technician. Valve Concepts recommends that all service be performed at the factory or a factory authorized repair center. For information on repair centers in your area, please contact the factory.

Maintenance procedures hereinafter are based upon removal of the relief vent unit from the tank where installed.

Owner should refer to Owner’s procedures for removal, handling and cleaning of nonreusable parts, i.e. gaskets, suitable solvents, etc.

Disassemble Pressure Spring Pack: Remove wing nuts (36) and weather hood (34).

Count revolutions of adjusting screw while backing off adjusting screw assembly (143), to minimize spring force. Remove hex cap screw (135) carefully as spring may have small compression applied. Remove top plate (144), soft seal (142), adjusting screw assembly (143), spring button (141), spring (138), and pallet assembly.

Remove socket head cap screw (130), pallet guides (131), weather hood supports (31), seat ring (110), and gaskets (20).

Disassemble Spring Pack Pallet: Secure stem assembly (133) in a smooth-jawed vise with the short, threaded end up. Remove hex lock nut (115), flat washer (114), and retainer (113). Clean stem assembly and retainer with a suitable solvent. * Seat disc 10 MIL (139.3) *seat disc 20 MIL (139.2), and *backup diaphragm (139.1).

** 139.1 – 139.3 apply to FEP seat discs only. BUNA-N, EPDM, and FKM seat discs will be item 139.*

Assemble Spring Pack Pallet: Inspect seat discs (139.1 – 139.3), verify they are clean and have no imperfections; secure stem in smooth-jawed vise. NOTE: (Apply TFE paste to threads on stem and pallet hole.) Install beleville washer (65), pallet (112), backup diaphragm (139.1), seat disc 20 mil (139.2), seat disc 10 mil (139.3), retainer (113), flat washer (114), and hex lock nut (115) in respective order. Torque hex lock nut to 7 ft. lbs.

Assemble Pressure Spring Pack: Remove backing from adhesive gaskets (20) and apply to cleaned surfaces on the body. Apply loctite 242 (blue) to all fastener threads. Install seat ring (110), socket head cap screws (130) and pallet guides (131). Torque socket head cap screws and pallet guides to 117 in-lbs.

Install pallet assembly, spring(s) (138), spring button (141), adjusting screw assembly (143), soft seal (142), top plate (144), and hex cap screws (135). Torque hex cap screws to 125 in-lbs. Install weather hood supports (31) and torque to 117 in-lbs.

Turn adjusting screw clockwise to the number of recorded revolutions to apply the proper spring force. Install weather hood (34) and wing nuts (36) hand tight.

⚠ CAUTION

The differential plate is set to a specific height during factory assembly and should not be altered. If the differential plate needs to be removed for any reason, use caution not to alter the height of the hex head cap screws (55) during this process.

Disassemble Vacuum Weight Loaded: Remove cap screws (47) vacuum cover (44) and cover gasket (21).

Inspect cover for corrosion, damage, or foreign material. Clean with a suitable solvent, replace as necessary.

NOTE: *During re-assembly, install new TFE tape / rope (21).*

Remove pallet assembly, including any loading weights that may be on the pallet (12).

Clean and inspect pallet assembly. Inspect the diaphragm(s) (29) and replace if necessary.

Replace Weight Loaded Diaphragm: Secure stem assembly (43) in a soft-jawed vise with the short, threaded end up. Remove nut (115) and washer (114). Lift up to remove diaphragm retainer (13) and diaphragm(s) (29). Clean stem assembly and diaphragm retainer with a suitable solvent, replace as necessary.

NOTE: *Before re-assembly, apply TFE paste to threads of the stem and around hole on the pallet (12).*

Install new diaphragm(s) (29). Re-install diaphragm retainer (13) and washer (114). Secure nut (115) tight on stem assembly (43).

Inspect and clean seat ring (10). Check seat surface for any nicks, corrosion, pitting or product build up. Seat surfaces must be clean and smooth for diaphragm and pallet to seal properly.

Remove Seat Ring: Make a match mark between the seat ring and the body. Rotate socket head screws (130) CCW and remove. Remove pallet guides (44). Mark the location of each guide on the seat ring (10) flange for reference at re-assembly.

Lift up to remove seat ring (10) and TFE tape / rope seal (20). Inspect pallet guides (44) and inside of the body cavity (1) for any corrosion or foreign material. Clean all parts as necessary.

Install Seat Ring: Place new seat ring TFE tape seal (34.1) in grooves in body (1). Align match marks for seat ring (10) with body and re-position seat ring back in body, resting on tape seal.

Re-install pallet guides (44) around the seat rings as previously marked. Install socket head screws (130) - apply 15 ft.-lbs. torque to tighten. Place pallet stem assembly back into the body resting on seat ring (10).

Carefully install loading weights on the pallet stem assembly. Exercise care so as not to damage the pallet diaphragm and seat surface.

NOTE: *When installing the cover, ensure the stem assembly (43) is inserted in the guide.*

⚠ WARNING

When assembling a vent, ensure that the stem is straight and fits into the guide in the cover.

If the stem is cocked at an angle, pallet lift may be completely blocked. This could result in an increase in vacuum pressure in the tank and cause a tank failure, severe personal injury and material damage.

Place a new piece of TFE tape / rope seal (20) on the face of the body flange. Place vacuum cover (44) over stem of pallet assembly, align bolt holes with the body (1) and install cap screws (47). Using a star crossing pattern, tighten nuts to 15 ft. lbs.

SECTION VI

VI. ORDERING INFORMATION

NEW REPLACEMENT UNIT vs PARTS "KIT" FOR FIELD REPAIR

To obtain a quotation or place an order, please retrieve the Serial Number and Product Code that was stamped on the metal name plate and attached to the unit. This information can also be found on the Bill of Material ("BOM"), a parts list that was provided when unit was originally shipped. (Serial Number typically 6 digits).

NEW REPLACEMENT UNIT:

Contact your local Cashco Sales Representative with the Serial Number, Product code and the vacuum setting. With this information they can provide a quotation for a new unit including a complete description, price and availability.

⚠ CAUTION

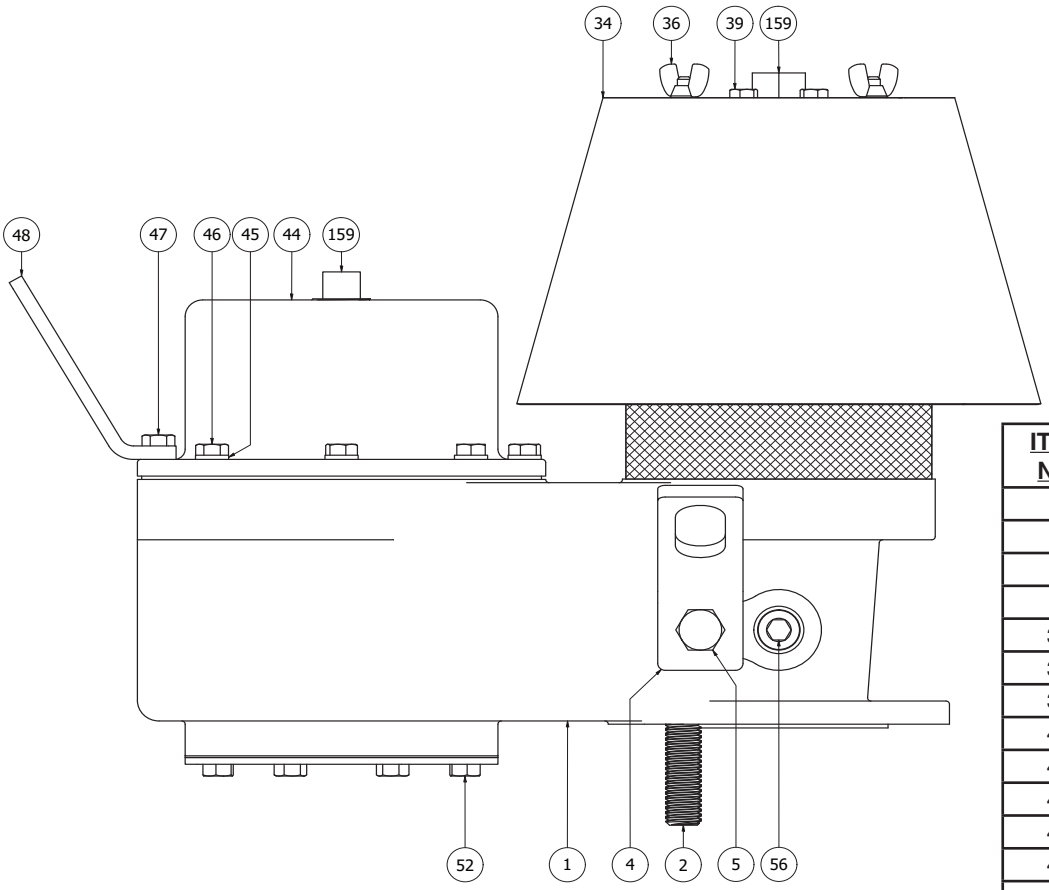
Do not attempt to alter the original construction of any unit without assistance and approval from the factory. All proposed changes will require a new name plate with appropriate ratings and new product code to accommodate the recommended part(s) changes.

PARTS "KIT" for FIELD REPAIR:

Contact your local Cashco Sales Representative with the Serial Number and Product code. Identify the parts and the quantity required to repair the unit from the "BOM" sheet that was provided when unit was originally shipped.

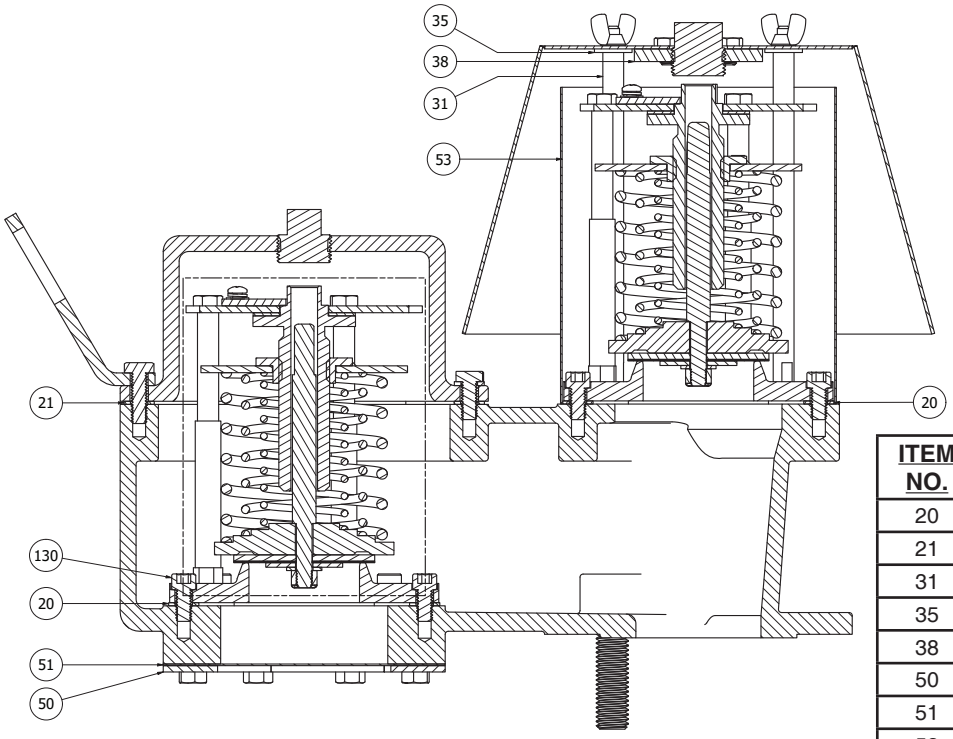
NOTE: If the "BOM" is not available, refer to the cross-sectional drawings included in this manual for part identification and selection.

A Local Sales Representative will provide quotation for appropriate Kit Number, Price and Availability.



SPRING LOADED PRESSURE / SPRING LOADED VACUUM

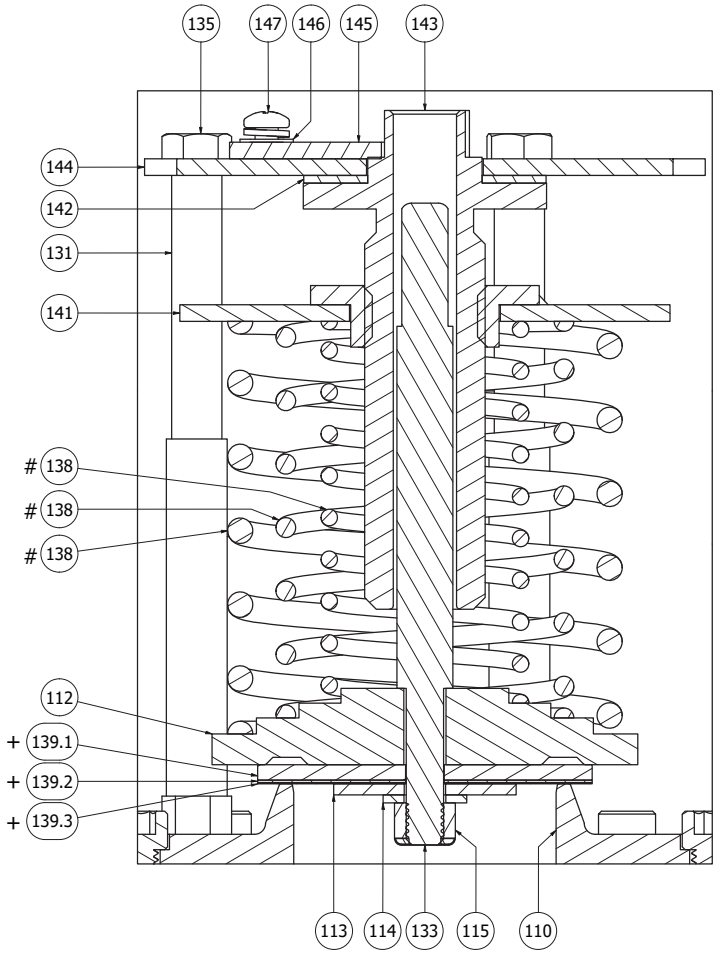
ITEM NO.	DESCRIPTION
1	LOWER BODY
2	STUD
4	LIFT BRACKET
5	HEX CAP SCREW
34	WEATHER HOOD
36	WING NUT
39	HEX HEAD CAP SCREW
44	EXTENDED COVER
45	LOCK WASHER
46	HEX HEAD CAP SCREW
47	HEX HEAD CAP SCREW
48	LIFT BRACKET
52	HEX HEAD CAP SCREW
56	PIPE PLUG
159	PIPE PLUG



SPRING LOADED PRESSURE / SPRING LOADED VACUUM

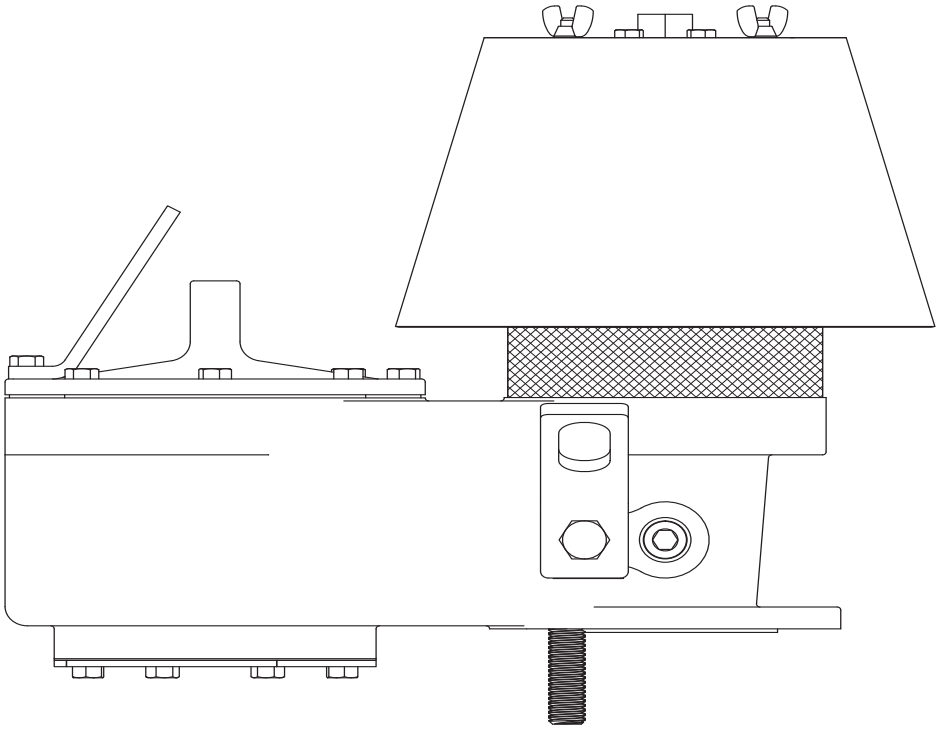
ITEM NO.	DESCRIPTION	SPARE
20	SEAT GASKET	*
21	COVER GASKET	*
31	WEATHER HOOD SUPPORT	
35	FLAT WASHER	
38	GUIDE ADAPTER	
50	VACUUM SCREEN FLANGE	
51	VACUUM BUG SCREEN	
53	BUG SCREEN	
130	SOCKET HEAD CAP SCREW	

ITEM NO.	DESCRIPTION	SPARE
110	SEAT RING	
112	PALLET	
113	DIAPHRAGM RETAINER	
114	FLAT WASHER	
115	NYLON LOCK NUT	
131	PALLET GUIDE	
133	PALLET STEM	
135	HEX HEAD CAP SCREW	
138	SPRING	
141	SPRING BUTTON	
142	SOFT SEAL	*
143	ADJUSTING SCREW	
144	TOP PLATE	
145	LOCKING PLATE	
146	FLAT WASHER	
147	PANHEAD SCREW	
139.1	PALLET DIAPHRAGM	*
139.2	SEAT DISC	*
139.3	SEAT DISC	*



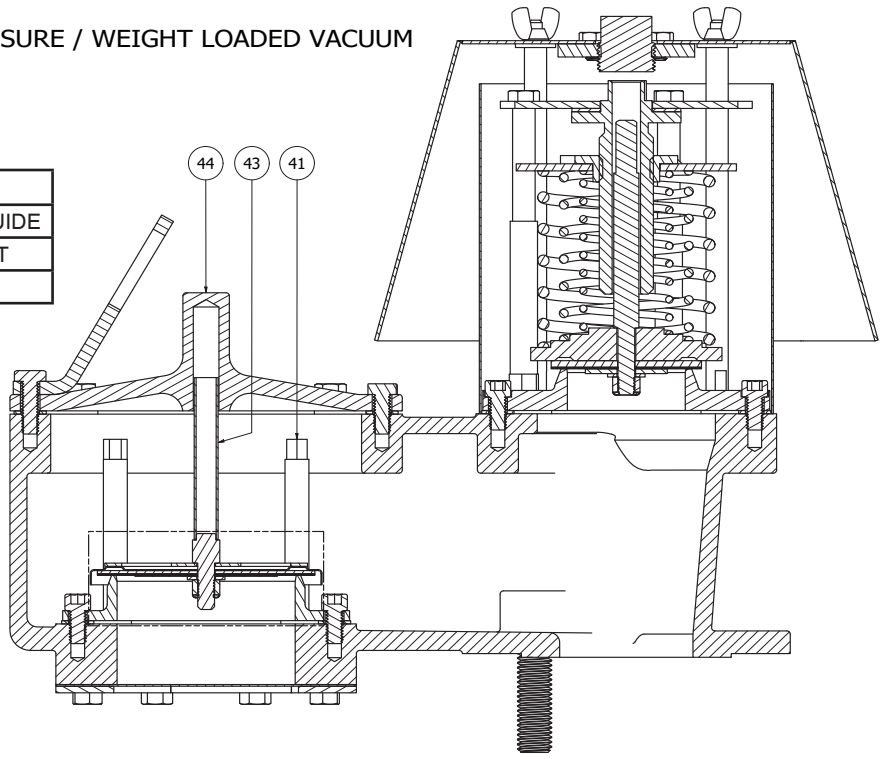
SPRING COMBINATIONS VARY BASED ON SETPOINT.
+ DIAPHRAGM COMBINATIONS BASED ON DIAPHRAGM MATERIAL.

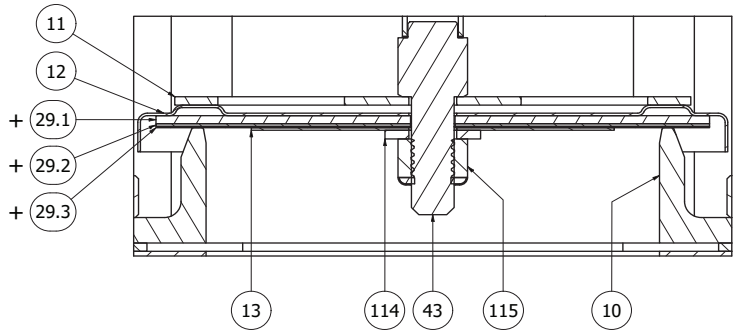
SPRING PACK SUB ASSEMBLY



SPRING LOADED PRESSURE / WEIGHT LOADED VACUUM

ITEM NO.	DESCRIPTION
41	VACUUM PALLET GUIDE
43	STEM WELDMENT
44	COVER

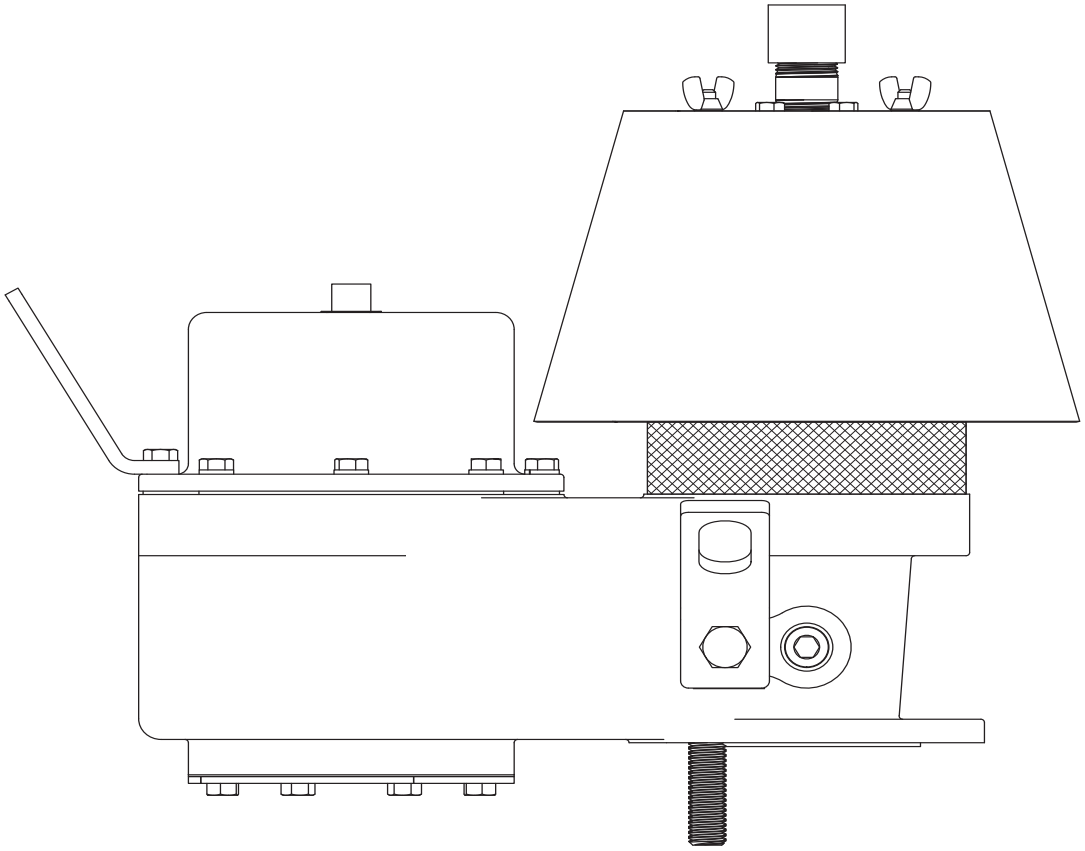




+ DIAPHRAGM COMBINATIONS BASED ON DIAPHRAGM MATERIAL.

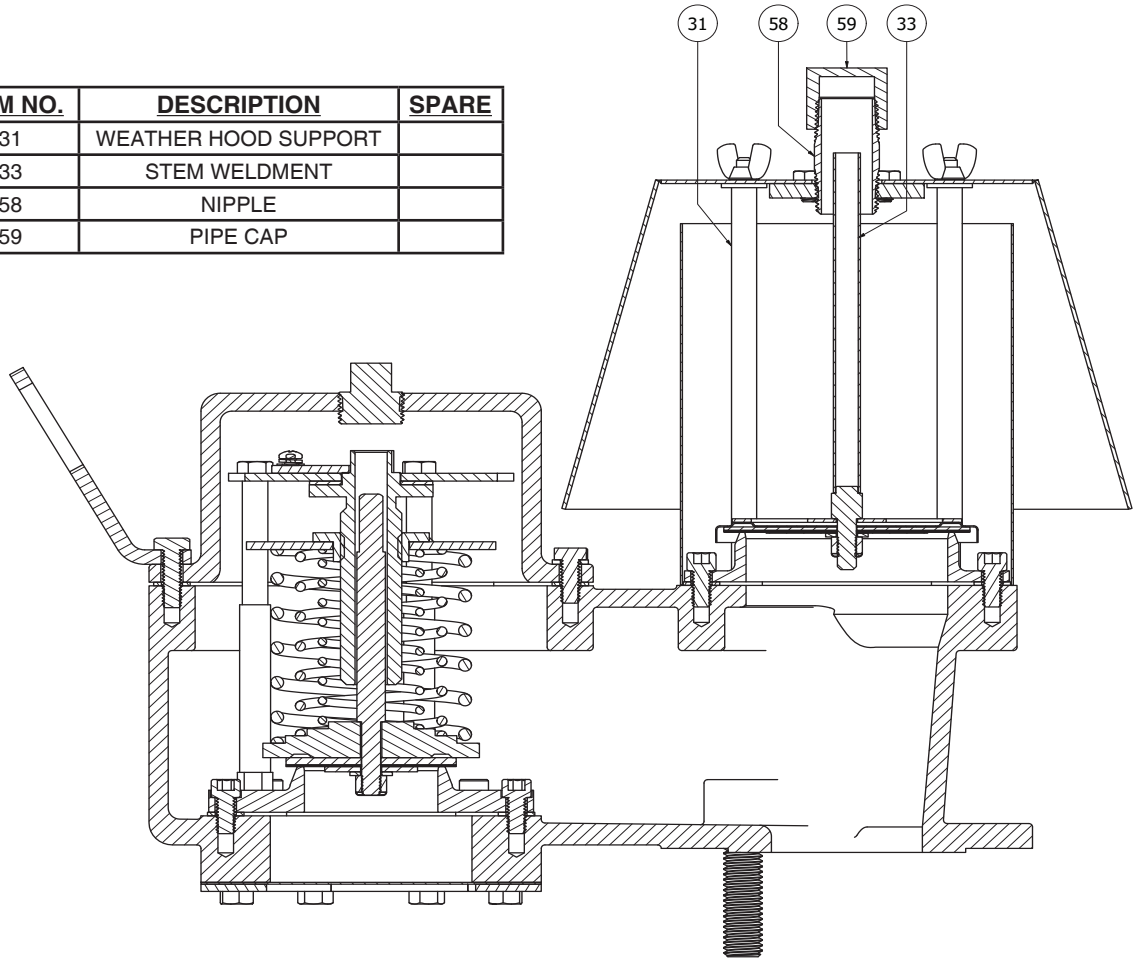
WEIGHT LOADED PALLET SUB ASSEMBLY

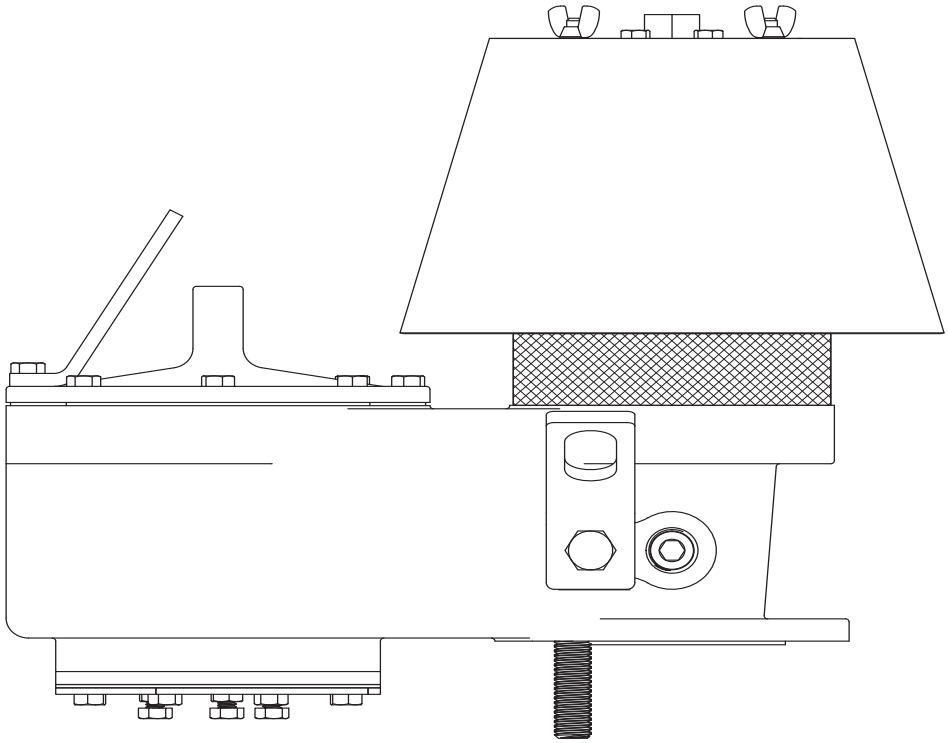
ITEM NO.	DESCRIPTION	SPARE
10	SEAT RING	
11	STIFFENER PLATE	
12	PALLET	
13	DIAPHRAGM RETAINER	
43	STEM WELDMENT	
114	FLAT WASHER	
115	NYLON LOCK NUT	
29.1	PALLET DIAPHRAGM	*
29.2	PALLET DIAPHRAGM	*
29.3	PALLET DIAPHRAGM	*



WEIGHT LOADED PRESSURE / SPRING LOADED VACUUM

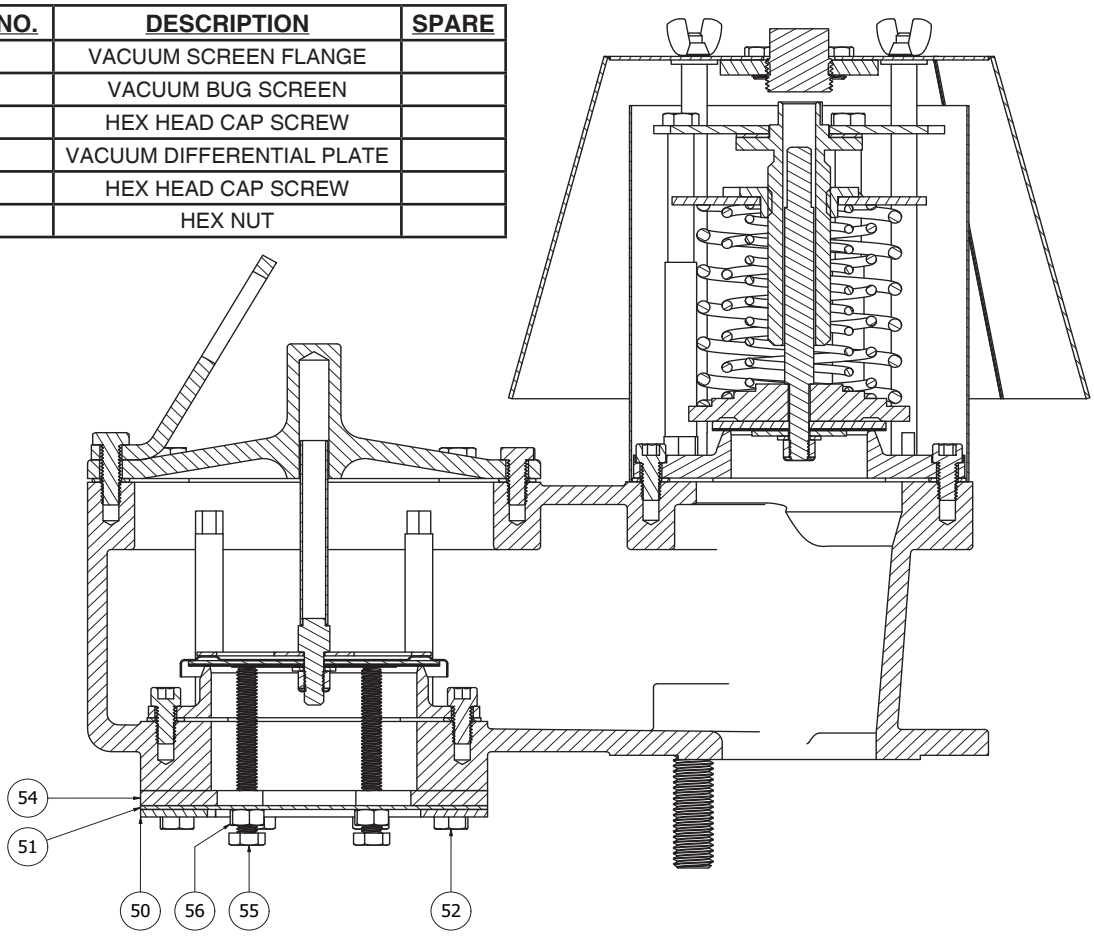
ITEM NO.	DESCRIPTION	SPARE
31	WEATHER HOOD SUPPORT	
33	STEM WELDMENT	
58	NIPPLE	
59	PIPE CAP	





SPRING LOADED PRESSURE / WEIGHT LOADED VACUUM
WITH DIFFERENTIAL PRESSURE HARDWARE

ITEM NO.	DESCRIPTION	SPARE
50	VACUUM SCREEN FLANGE	
51	VACUUM BUG SCREEN	
52	HEX HEAD CAP SCREW	
54	VACUUM DIFFERENTIAL PLATE	
55	HEX HEAD CAP SCREW	
56	HEX NUT	



IOM ADDENDUM:

ATEX DIRECTIVE 2014/34/EU and THE EQUIPMENT AND PROTECTIVE SYSTEMS INTENDED FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERES REGULATIONS 2016

Cashco declares that the products listed in the table below has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II of the ATEX Directive 2014/34/EU and given in Schedule 1 of The Equipment and Protective Systems Indented for Use in Potentially Explosive Atmospheres Regulations 2016. Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN ISO 80079-36:2016 and EN ISO 80079-37:2016. The product will be marked as follows:

II 2 G
Ex h IIB T6... T1 Gb
1000ATEXR1 X

The 'X' placed after the technical file number indicates that the product is subject to specific conditions of use as follows:

1. The maximum surface temperature depends entirely on the operating conditions and not the equipment itself. The combination of the maximum ambient and the maximum process medium temperature shall be used to determine the maximum surface temperature and corresponding temperature classification, considering the safety margins described prescribed in EN ISO 80079-36:2016, Clause 8.2. Additionally, the system designer and users must take precautions to prevent rapid system pressurization which may raise the surface temperature of system components and tubing due to adiabatic compression of the system gas. Furthermore, the Joule-Thomson effect may cause process gases to rise in temperature as they expand going through a regulator. This could raise the external surface temperature of the regulator body and the downstream piping creating a potential source of ignition. Whether the Joule-Thomson effect leads to heating or cooling of the process gas depends on the process gas and the inlet and outlet pressures. The system designer is responsible for determining whether the process gas temperature may raise under any operating conditions.

2. Where the process medium is a liquid or semi-solid material with a surface resistance in excess of 1GΩ, special precautions shall be taken to ensure the process does not generate electrostatic discharge.

3. Special consideration shall be made regarding the filtration of the process medium if there is a potential for the process medium to contain solid particles. Where particles are present, the process flow shall be <1m/s (<3.3 ft/s) in order to prevent friction between the process medium and internal surfaces.

4. Effective earthing (grounding) of the product shall be ensured during installation.

5. The valve body/housing shall be regularly cleaned to prevent build up of dust deposits.

6. Regulators must be ordered with the non-relieving option (instead of the self-relieving option) if the process gas they are to be used with is hazardous (flammable, toxic, etc.). The self-relieving option vents process gas through the regulator cap directly into the atmosphere while the non-relieving option does not. Using regulators with the self-relieving option in a flammable gas system could create an explosive atmosphere in the vicinity of the regulator.

7. Tied diaphragm regulators with outlet ranges greater than 7 barg (100 psig) should be preset to minimize the risk that improper operation might lead to an outboard leak and a potentially explosive atmosphere.

8. All equipment must only be fitted with manufacturer's original spare parts.

9. Ensure that only non-sparking tools are used, as per EN 1127-1, Annex A.

	PRODUCT
REGULATORS	31-B, 31-N
	1164, 1164(OPT-45)
	1171, 1171(OPT-45), 1171(CRYO)
	2171, 2171(OPT-45), 2171(CRYO), 3171
	1465, 3381, 3381(OPT-45), 3381(OPT-40)
	4381, 4381(OPT-37), 4381(CRYO), 4381(OPT-45), 5381
	MPRV-H, MPRV-L
	PBE, PBE-L, PBE-H
	CA-1, CA-2
	CA1, SA1, CA4, SA4, CA5, SA5
	DA2, DA4, DA5, DA6, DA8
	DA0, DA1, DAP, SAP
	SLR-1, SLR-2, PTR-1
	ALR-1, ULR-1, PGR-1
	BQ, BQ(OPT-45), BQ(CRYO)
	123, 123(CRYO), 123(OPT-45), 123(OPT-46G)
	123-1+6, 123-1+6(OPT-45), 123-1+6(OPT-46G), 123-1+6+S, 123-1+6+S(OPT-40)
	1000HP, 1000HP(OPT-37), 1000HP(OPT-45), 1000HP(OPT-45G), 1000HP(CRYO)
	1000HP-1+6, 1000HP-1+8, 1000LP, 1000LP(OPT-45), 1000LP(OPT-46G)
	6987
	8310HP, 8310HP-1+6, 8310HP-1+8, 8310LP, 8311HP, 8311LP
	345, 345(OPT-45)
	BA1/BL1, PA1/PL1
	C-BPV, C-PRV, C-CS
	D, D(CRYO), D(OPT-37), D(OPT-20), D(OPT-45)
	DL, DL(LCC), DL(OPT-45)
	BR, BR(CRYO)
	HP, HP(LCC), HP(OPT-45), HP(OPT46G), HP-1+6+S(OPT-40), HP-1+6+S
	P1, P2, P3, P4, P5, P7
	B2, B7
	POSR-1, POSR-2
	5200P, 5300P
	135
	NW-PL, NW-SO
	CG-PILOT
	FG1
CONTROL VALVES	RANGER, 987, PREMIER
	964, 521, 988, 988-MB, 989
	2296/2296HF
	SCV-30, SCV-S
TANK BLANKETING	8700, 8910, 8920, 8930, 8940
	2100, 2199
	3100, 3200, 3300, 3400, 3500, 3600, 3700
	1078, 1088, 1100, 1049
	5100, 5200, 5400 ,5500
	4100, 4200, 4300, 4400, 4500, 4600
MISC	764P/PD, 764-37, 764T

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