Valve Concepts, Inc.
ISO Registered Company

Model 1088

Vacu-Gard Blanketing Valve

SECTION I

I. DESCRIPTION AND SCOPE

The Model 1088 Vacu-Gard is a tank blanketing valve intended for installation on top of small storage tanks. The standard valve comes with FNPT connections. Flanges may be attached by adding nipples. Valve bodies with welded flanges may be ordered from the factory. There are three styles of the Model 1088 this IOM will cover: internal sensing, integral dip-tube, and remote sensing. The functionality of the unit will be the same regardless of the sensing style. Please refer to the applicable drawings in the back of this IOM manual for recommended installation schematics.

SECTION II

II. PRIOR TO INSTALLATION

It is always good practice to clean out blanket gas supply lines prior to valve installation to get rid of dirt, sand, loose scales and other foreign particles trapped in the piping. This is particularly true for new tanks and/or new piping. One way to accomplish this is to blow out the lines from the supply side up to the connection to the Vacu-Gard inlet.

⚠ CAUTION

Follow your company's safety procedures to avoid injury to personnel or damage to equipment.

SECTION III

III. INSTALLATION

It is always good practice to install a main line filter upstream of any tank blanketing valve. The element should be approximately 5-40 microns with a flow capacity equal to or greater than that of the Vacu-Gard.

The blanketing valve should be installed in the normal upright position. The inlet is horizontal and the outlet is vertical downward. There is an optional horizontal outlet for remote sensing valves. This option is not available for the integral dip-tube design. All outlet piping from the valve body to the vessel must be as large or larger than the outlet port in the body. Keep piping as short as possible for best valve performance.

For Internal Sensing:
Pipe as recommended above. **Note that internal sensing yields only 25% of full capacity.**

For Remote Sensing:
The sense line should be a 1/2" O.D. tube (or larger) and the length should not exceed fifteen feet. Longer lengths may be used with larger diameter sense lines. The sense line should slope downward from the valve to the tank to allow condensate, if any, to drain back into the tank. (The sense port is the port on the side of the body marked with an "S". A "tee" may be added to the sense port for gauging pressure in the vessel.

For Dip-Tube Sensing:
The integral dip-tube line must protrude into the tank at least 6" below the roof. The port at the end of the main valve body opposite the inlet is not a sense port. (***NOTE: This port should not be used for pressure gauging since the pressure at this point may be higher than the maximum tank pressure and may cause damage to the gauge.)*** This port is an optional horizontal outlet for remote sensing valve type.

NOTE: *The sense chamber is not a dead-ended chamber. In addition to flow movement when the valve is open, there is also a very small flow amount passing from the valve into the vessel through the sense connection. Therefore the sense tube must be large enough so that the flow will not be restricted. Premature closing of the valve may occur if excess pressure builds up in the sense chamber due to a sense line that is too small.*

⚠ CAUTION

A pressure/vacuum relieving device large enough to vent excess pressure and to serve as an emergency vacuum breaker must be installed to protect the tank.

⚠ CAUTION

DO NOT overtighten threaded connections since damage or breakage may result. Use teflon tape and/or anti-seize compound on pipe thread joints.

SECTION IV

IV. START-UP

Operation of the Model 1088 is automatic once the set pressure has been set. (The set pressure is usually bench-set at the factory prior to shipment.) ***NOTE:*** *The set pressure is defined as the pressure at which the valve should be fully closed on increasing tank pressure.*

Refer to applicable drawing (pgs. 6-7) dependent on sensing style. Temporarily keep valve A closed. Use an appropriate pressure indicating instrument for G2 to measure the pressure in the vessel.

For external sensing, open valves C and E, then valve B. For internal sensing, open valve B. For integral diptube, proceed to the next step.

Now, very slowly, open valve A while watching gauge G2. NEVER SLAM OPEN VALVE A! The Vacu-Gard should close when the tank pressure reaches the set pressure. To adjust the set pressure, remove the hex cap at the top of the valve and loosen the jam nut around the adjusting screw. Clockwise rotation of the adjusting screw will increase the set pressure. Counter clockwise will decrease the pressure provided. There is a manual valve to vent the excess pressure. Do not set the set pressure beyond the nameplate range. Tighten the jam nut after adjustments are made and replace the hex cap.

In the event that the adjusting screw is backed off without compressing the spring, intentionally or unintentionally, the valve will begin to open when the tank pressure reaches about 1” w.c. vacuum.

⚠ CAUTION

DO NOT exceed the maximum inlet pressure on the nameplate.

SECTION V

V. SHUT-DOWN

To shutdown the Vacu-Gard, reverse start-up procedure and bleed off trapped pressure before disassembly.

SECTION VI

VI. MAINTENANCE

The Model 1088 should be periodically actuated and all sliding surfaces and seals lubricated to ensure smoothness of operation. The frequency required depends on the severity of the service conditions. At least once a year is recommended.

⚠ CAUTION

If the valve must be disassembled for any reason, first make sure all pressure to the valve is blocked and pressure trapped in the valve is vented safely. Refer to your company procedure for any special precautions when handling toxic or other hazardous materials.

Maintenance procedures hereinafter are based upon removal of the unit from the vessel where installed.
To disassemble the valve, refer to the appropriate drawings.

Refer to Owner's procedures for handling and cleaning of parts with suitable solvents and the disposal of nonreusable parts.

The working components within the valve body may be removed without the need to take apart the diaphragm case.

To replace the Body Internals:

Rotate the body plug (32) CCW and remove. ***NOTE:*** *Be careful not to drop any components. The return spring (25) could dislodge the spindle (20), guide pin (25), strainer (19) and spacer (26) during the removal of the body plug.*

Remove o-rings (21, 22, and 23). Clean and inspect trim parts for wear. Replace if worn.

Install new o-ring (23) around the groove adjacent to the threads on the body plug (32). Install new o-ring (21) on the outside groove of the spindle (20). Install new o-ring (22) in the internal groove at the lower end of the spindle. ***NOTE:*** *O-RINGS MUST BE ORDERED FROM THE FACTORY*

If the valve body is installed and in the normal upright position, stack the components on the body plug (32) as follows: insert the return spring (25) into the center cavity of the body plug (32). Insert the guide pin (24) inside the return spring. Place the spindle (20) over the return spring with the small diameter tip pointing up. Place the strainer (19) around the spacer. Now slowly and carefully insert the stack into the body cavity, allowing the components to align themselves before threading on the body plug. Tighten until snug to bottom of the spacer.

If the valve body is on a work bench, turn the body upside down and install the internals as follows: insert the spindle (20) into the body with the small diameter tip first. Insert spacer (26) and let it bottom in the body. Insert the strainer (19) around the spacer. Insert return spring (25) into the spindle cavity. Insert the guide pin (24) into the spring. Place the center cavity of the body plug (32) over the spring and slowly and carefully push against the spring to thread on the body plug. Tighten until snug.

To Disassemble the Diaphragm Case Assembly:

WARNING

SPRING UNDER COMPRESSION. Prior to removing diaphragm case bolts, relieve spring compression by backing out the adjusting screw. Failure to do so may result in flying parts that could cause personal injury.

Relax the compressed spring by first unscrewing the closing cap (1), then loosen the jam nut (3) and back off the adjusting screw (2). Place a set of match marks between the upper and lower cases. The ring of nuts (15), cap screws (11), flat washers (41) and lockwashers (12) around the periphery can now be removed. Lift up to remove upper case assembly. Set range spring (7) and spring button (6) aside. Lift ring gasket (14) and diaphragm assembly up and remove from lower case (10).

To replace gasket (8) - remove cap screws (11) and lockwashers (12) from the center of the upper case.
To replace body gasket (27) - remove cap screws (11) and lockwashers (12) from the center of the lower case.

Replace all parts that show signs of damage or excessive wear. When a part is replaced, make sure the material is suitable for the service, especially elastomeric components. If an o-ring needs to be replaced, be sure to use the correct size and material. Prior to reassembly, make sure all parts are clean and free of contamination and seating surfaces are free of deep scratches.

To Reassemble:

CAUTION

DO NOT overtighten threaded connections since damage or breakage may result. Wrap all NPT threads with TFE tape. Apply anti-seize compound on bolt threads. Very lightly lubricate all o-rings with a lubricant that is compatible with the service, sealing surfaces of gaskets and diaphragms also.

Install center bolt (17) in a vise with the threaded end up. Install one bolt gasket (18) between the center bolt and the lower support plate (16) as shown on the drawing on pg. 10, Detail B. ***NOTE:*** *The support plate should be installed with the smooth side up.*

Lay the diaphragm (13) on top of the lower support plate. ***NOTE:*** *Place diaphragm with the flute facing up for pressure set point or facing down for vacuum set point.*

An identical gasket (18) is used between the upper surface of the sense diaphragm (13) and the bottom side of the upper support plate (16). ***NOTE:*** *The support plate should be installed with the smooth side down. This is to ensure a tight squeeze on both sides of the sense diaphragm to effect a tight seal.*

Install washers (33), lockwasher (12) and nut (15). Torque nut 13-15 ft-lbs. Place the diaphragm assembly on the lower case and align the bolt holes. Align the holes in the ring gasket (14) and place it on top of the diaphragm assembly. Position spring (7) in the center of the diaphragm assembly.

NOTE: *Washers are used to center the lower end of the spring. It may sometimes be necessary to "thread" the spring onto the washer or onto spring button (6). You will find that turning the end of the spring in one direction against the spring button or washers will tend to close the coils and make installation more difficult. However, turning the spring in the opposite direction will tend to open the coils for easier installation.*

Apply anti-seize compound to the recess in the spring button (6) and set spring button on top of the spring.

Align the match marks between the upper and lower cases and place the upper diaphragm case assembly on top of the ring gasket (14).

Install cap screws,(11),lockwashers (12), flat washers (41) and nuts (15). Tighten to 13 - 15 ft-lbs. Thread adjusting screw (2) with jam nut (3) into the spring bonnet (5). Install closing cap (1).

After the valve has been completely reassembled, it may be installed and put into operation as outlined above. If the valve will not shut off tight, check for dirt or other foreign particles on the o-rings or seating surfaces. Also check to make sure the body internals have not been damaged by being forced into place.

SECTION VII

VII. TROUBLE SHOOTING GUIDE

1. Vacu-Gard will not open.

Possible Cause	Remedy
A. Incorrect sense line connection.	A1. Check sense line and be sure it is connected from the sense port on the Vacu-Gard to the tank. A2. Check sense line and shut-off valve for size and configuration to prevent pressure drops and trapped condensate.
B. Sense line is clogged.	B1. Check sense line and sense port for blockage.
C. Improper inlet and/or outlet connection.	C1. Check and be sure supply line is connected to inlet of Vacu-Gard and outlet of Vacu-Gard is connected to tank, making sure it is not reversed.
D. Loss of supply pressure.	D1. Check supply pressure and see that it is within the range stated on nameplate.

2. Vacu-Gard will not close.

Possible Cause	Remedy
A. Sense line not installed.	A1. Check that the sense line is properly connected.
B. Vacu-Gard set pressure is higher than or too close to the set pressure of the pressure relieving devices.	B1. Check settings of valves and adjust if needed. The pressure relieving devices must be set higher than the Vacu-Gard setting. The greater the spread the better.
C. Blanket gas is escaping from opening in tank.	C1. Be sure all openings such as pressure relieving devices, gauge hatches, etc. are closed and working properly.
D. Malfunction of pressure relieving devices.	D1. Check operation of pressure relieving devices.
E. Blanket gas is escaping from faulty piping or connections.	E1. Check all piping and connections for tightness.
F. Foreign particles trapped in Vacu-Gard.	F1. Check Vacu-Gard for dirt and debris. (See Maintenance Section for disassembly and reassembly.)
H. Vacu-Gard has loose connections.	H1. Check and make sure all Vacu-Gard connections are tight.

3. Vacu-Gard cycles rapidly.

Possible Cause		Remedy	
A.	Shut-off valve at outlet is restricting flow.	A1.	Be sure shut-off valve at outlet is full bore or larger.
B.	Vacu-Gard set pressure too close to the set pressure of the pressure relieving devices.	B1.	Check settings of valves and adjust if needed. The pressure relieving devices must be set higher than the Vacu-Gard.
C.	Sense or flow line pipe is undersized.	C1.	Check all piping connected to Vacu-Gard for size and configuration to prevent pressure drops and trapped condensate.

4. Vacu-Gard closes but will not shut-off tight.

Possible Cause		Remedy	
A.	Worn o-rings or seat surfaces.	A1.	Replace worn parts. (See Maintenance Section for disassembly and reassembly.)
B.	Foreign particles on o-rings or seat surfaces.	B1.	Clean and lubricate parts. (See Maintenance Section for disassembly and reassembly.)
C.	Loose connections on Vacu-Gard.	C1.	Check all connections for tightness.

SECTION VIII

VIII. 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, Inc., Sales Representative with the Serial Number, Product code and the pressure/vacuum settings. 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 purposed 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:

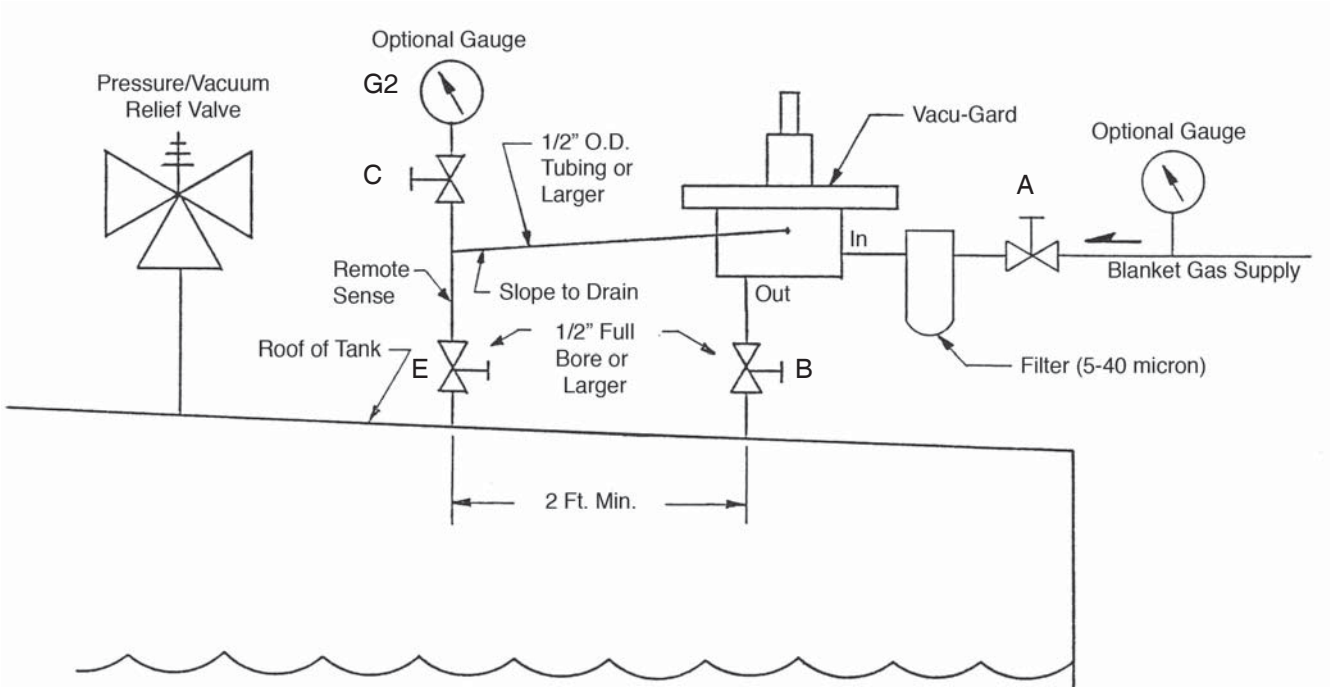
Contact your local Cashco, Inc., Sales Representative with the Serial Number and Product code. Identify the parts and the quantity required to repair the unit from the "BOM" sheet that was provided when unit was originally shipped.

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

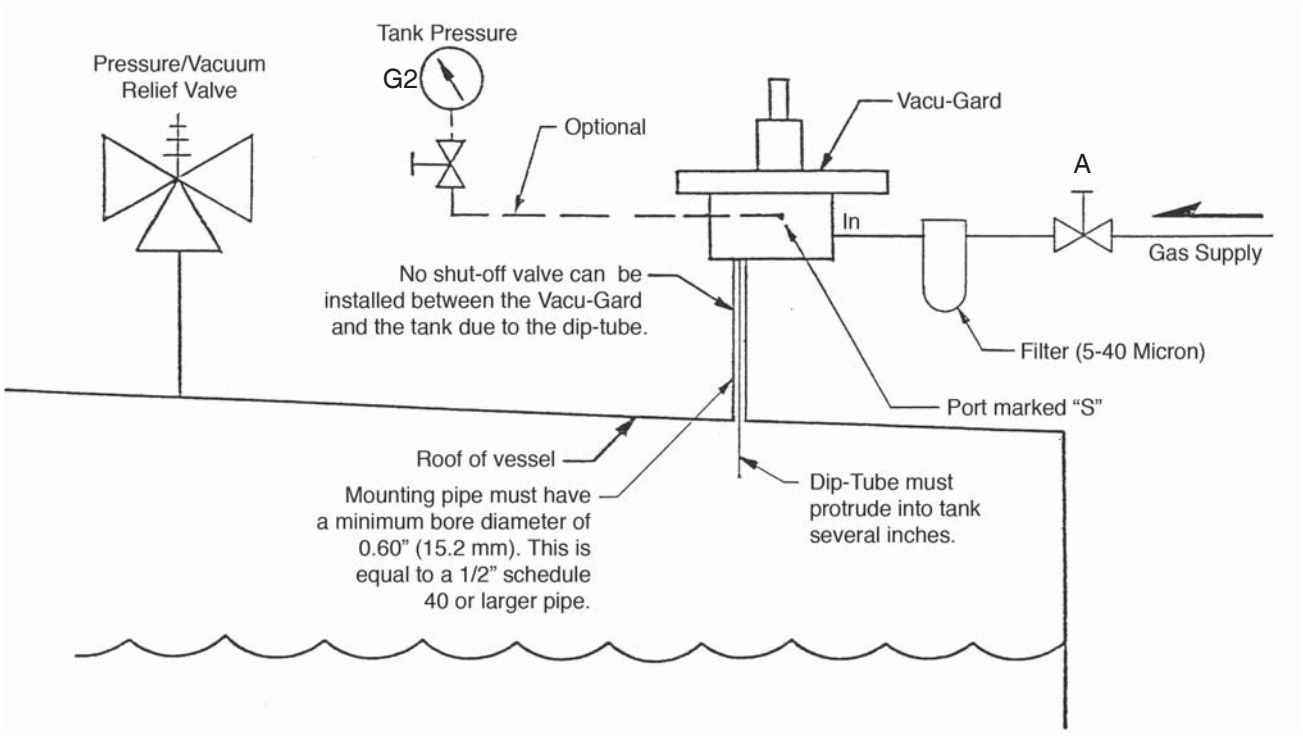
A Local Sales Representative will provide quotation for appropriate Kit Number, Price and Availability.

Recommended Installation - Remote Sensing
Model 1088 Vacu-Gard

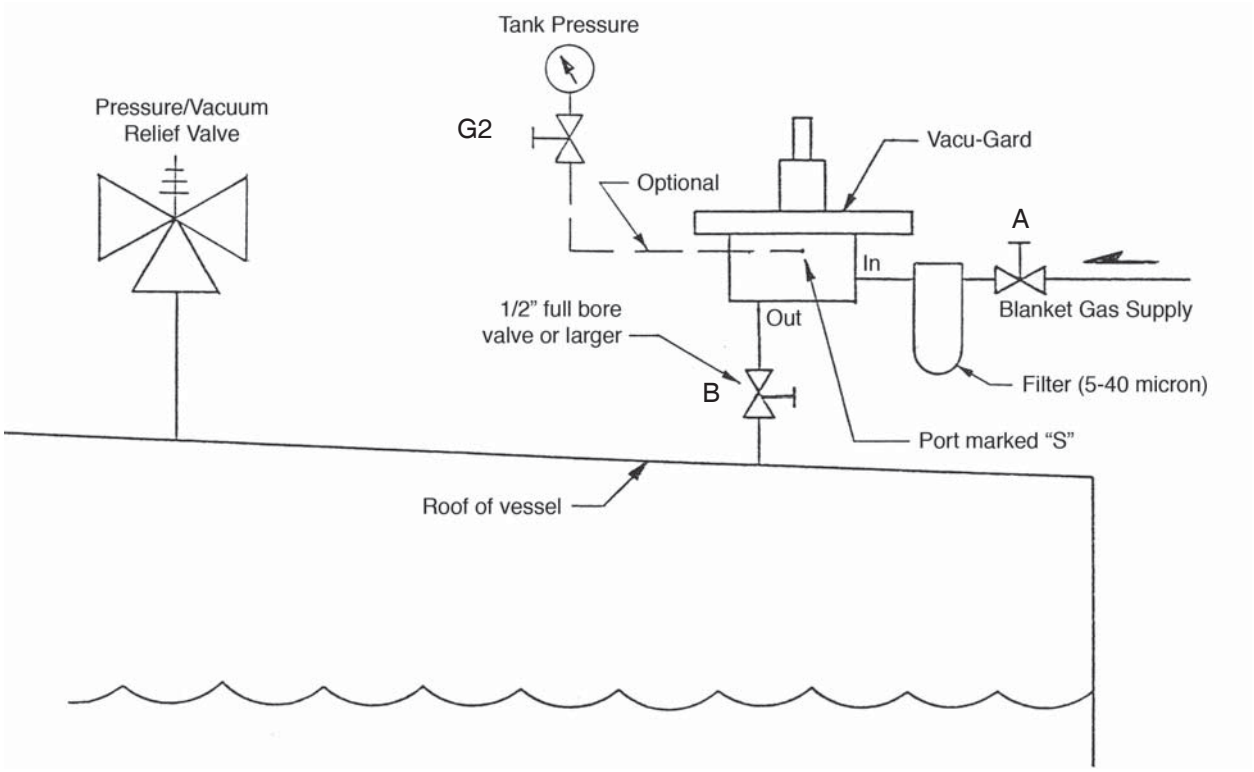
It is recommended that the Vacu-Gard be installed approximately one foot above the seat of the relief valve to avoid getting liquid into the Vacu-Gard if the tank is overfilled



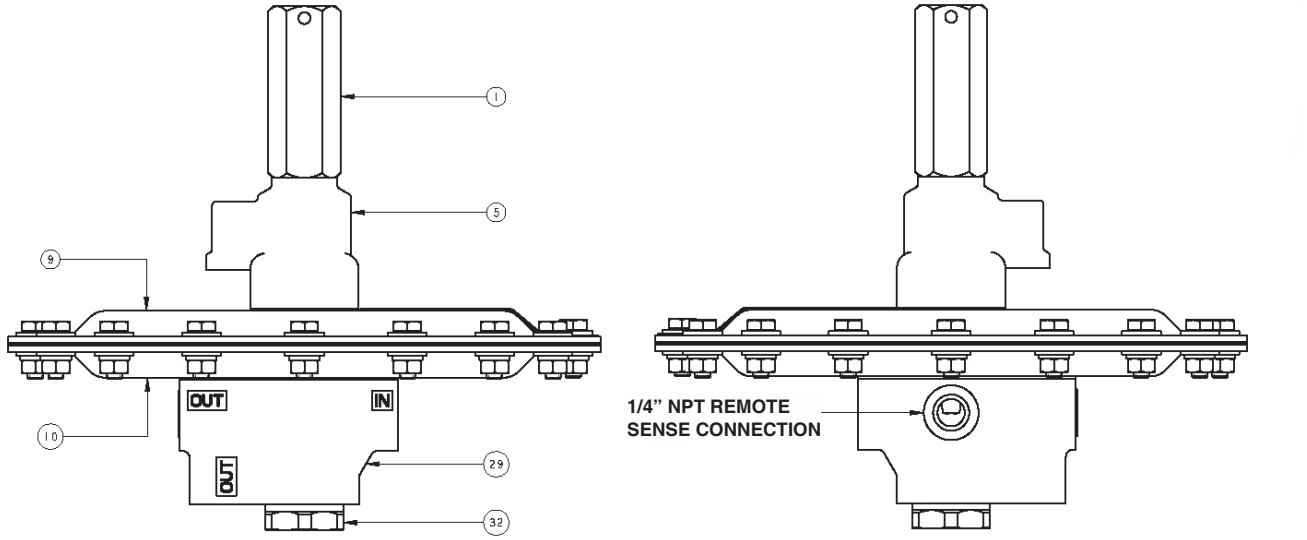
Installation - with Integral Dip-Tube Sensing
Model 1088 Vacu-Gard



Installation - with Internal Sensing
Model 1088 Vacu-Gard



External View Showing Remote Sense Port

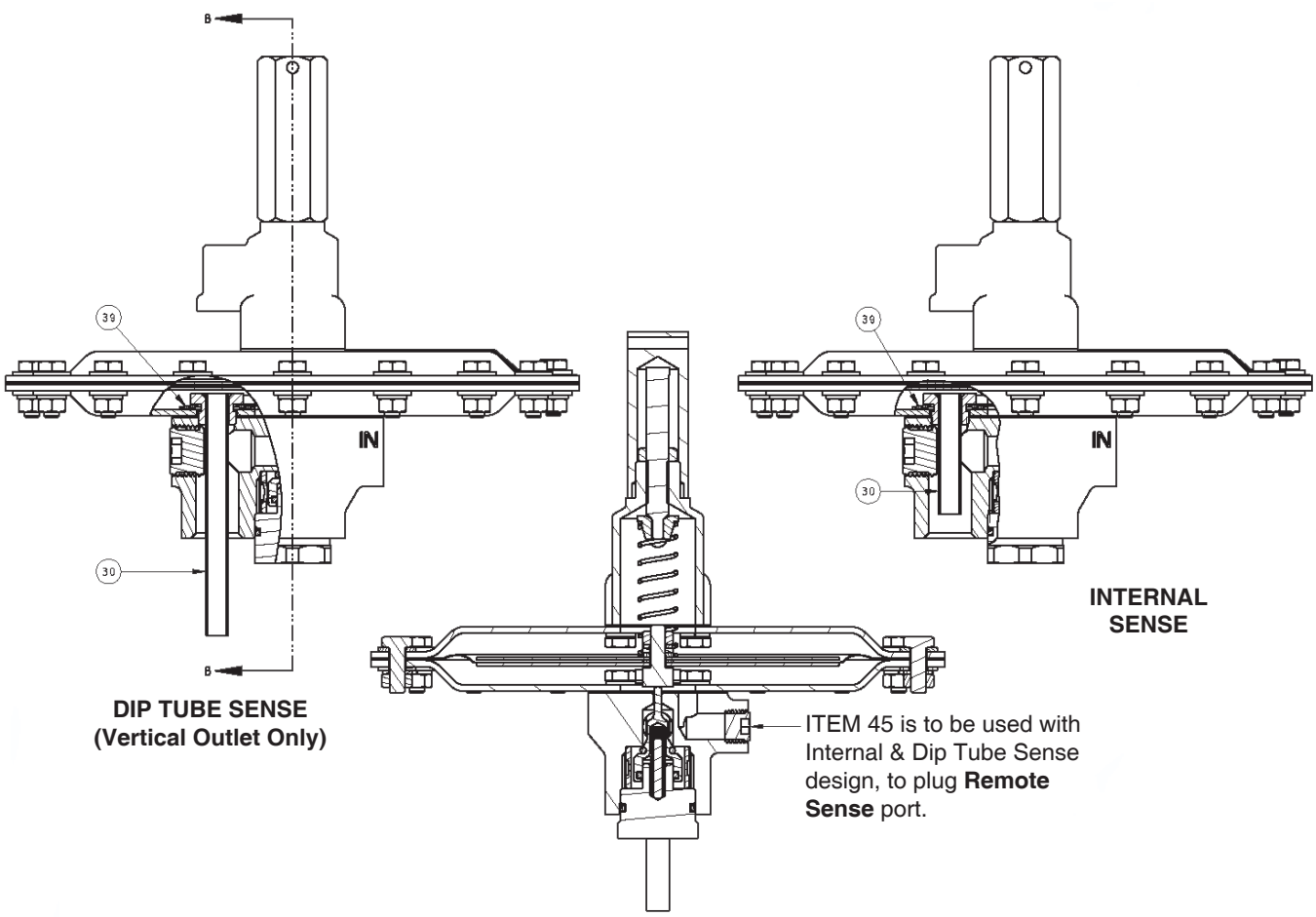


ITEM NO.	PART NAME
1	Closing Cap
2	Adjusting Screw
3	Jam Nut
4	Vent Screen
5	Spring Bonnet
6	Spring Button
7	Range Spring
8	Gasket ‡
9	Upper Diaphragm Case
10	Lower Diaphragm Case
11	Cap Screw
12	Lockwasher
13	Sense Diaphragm ‡
14	Ring Gasket ‡
15	Nut
16	Support Plate
17	Center Bolt

ITEM NO.	PART NAME
18	Bolt Gasket ‡
19	Strainer
20	Spindle
21	O-Ring ‡
22	O-Ring ‡
23	O-Ring ‡
24	Guide Pin
25	Return Spring
26	Spacer
27	Body Gasket ‡
28	Pipe Plug
29	Body
32	Body Plug
33	Washer
41	Washer-Flat
46	Spindle Spring (Vacuum)
119	Nameplate *

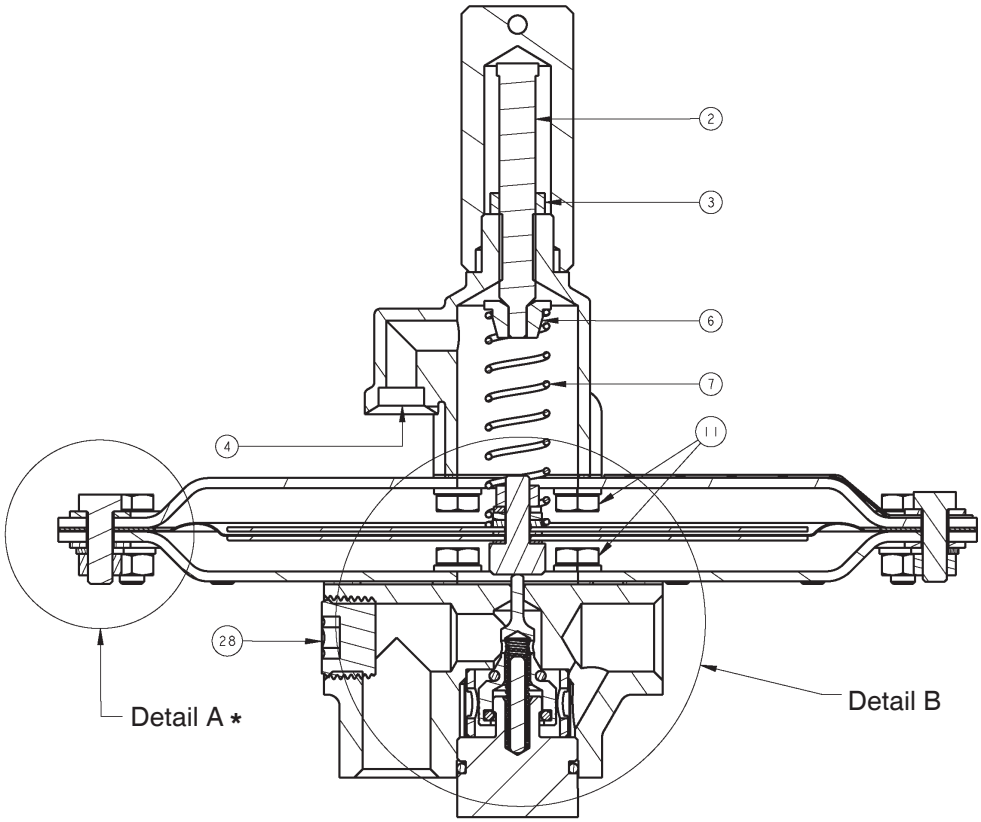
* Not Shown
‡ Recommended Spare Part

Dip Tube / Internal Sense



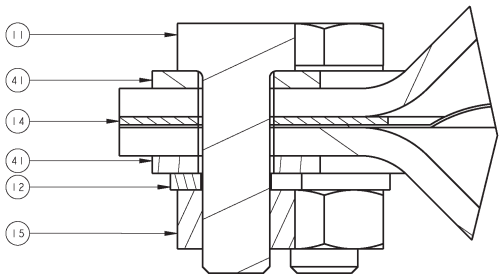
ITEM NO.	PART NAME
30	Dip Tube
39	Washer (Bllvl)

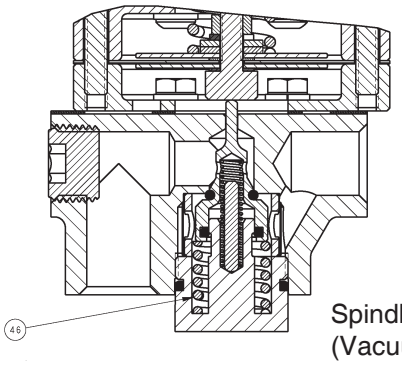
Cut-Away View Showing Vertical Outlet Connection



* For Horizontal Connections Item 28 is installed in bottom port.

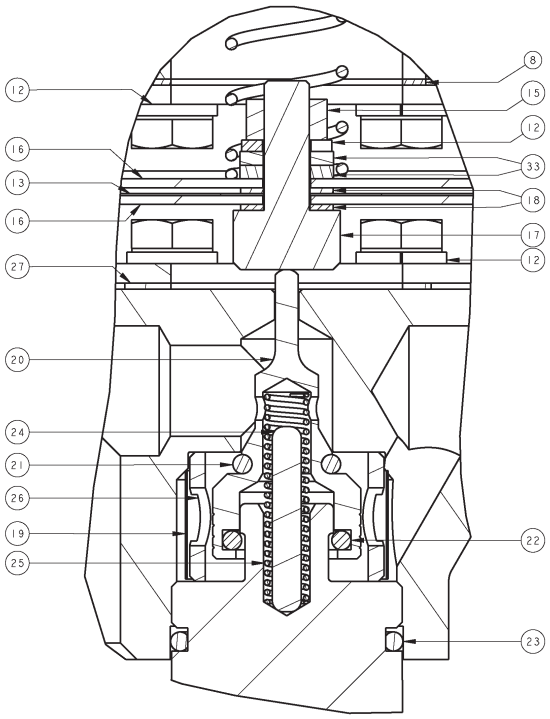
Detail A



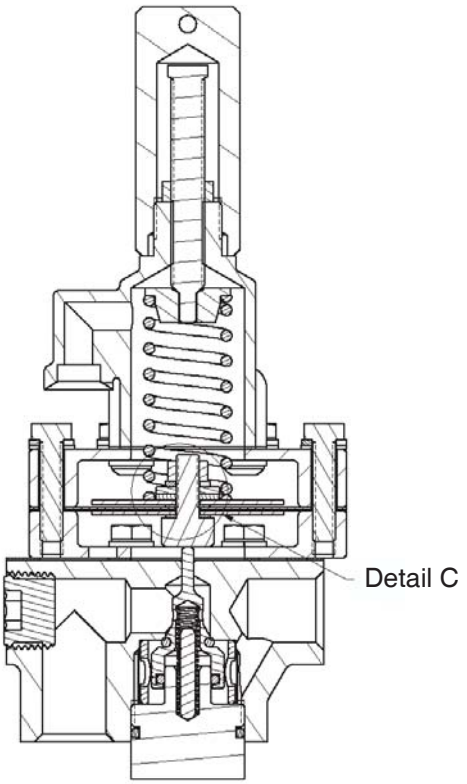


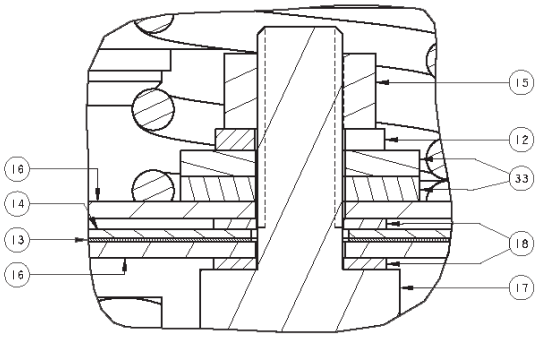
Spindle Spring (Vacuum)

Detail B

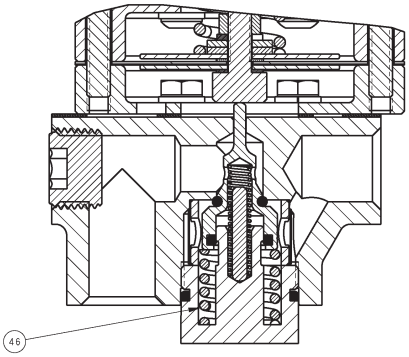


Cut-Away View for 3 - 14 PSIG Spring Range



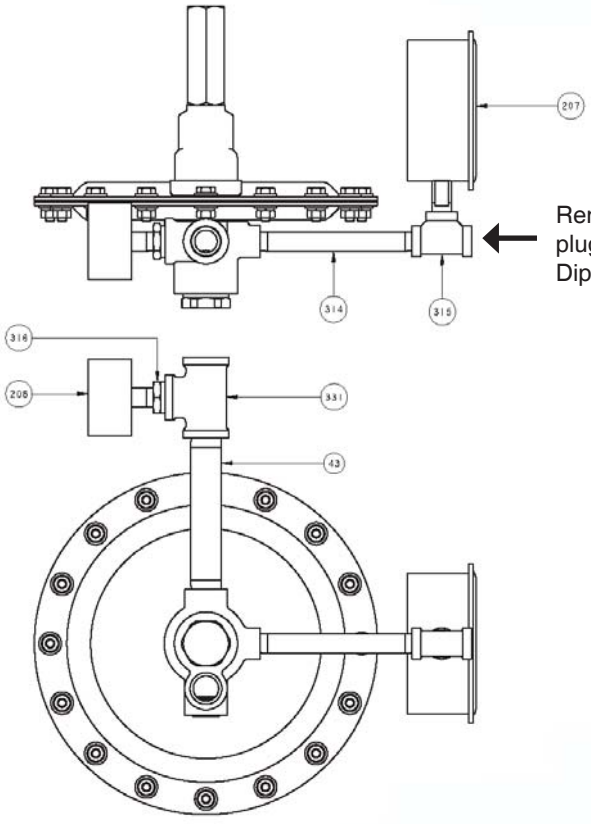


Detail C



Spindle Spring
(10-25” HG Vacuum)

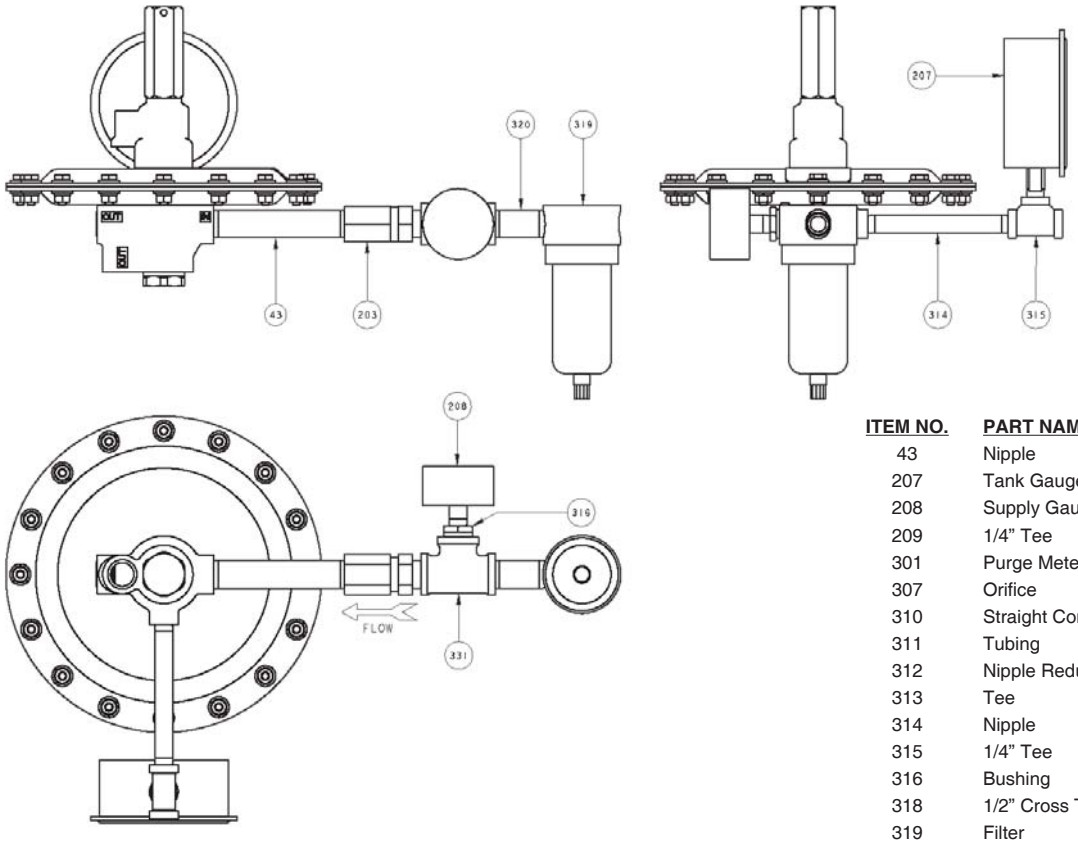
Supply & Tank Gauges
All Sensing Options for Horizontal and Vertical Outlet Connections



Remote Sense - (Insert pipe plug here for Internal and Dip Tube Sense options.)

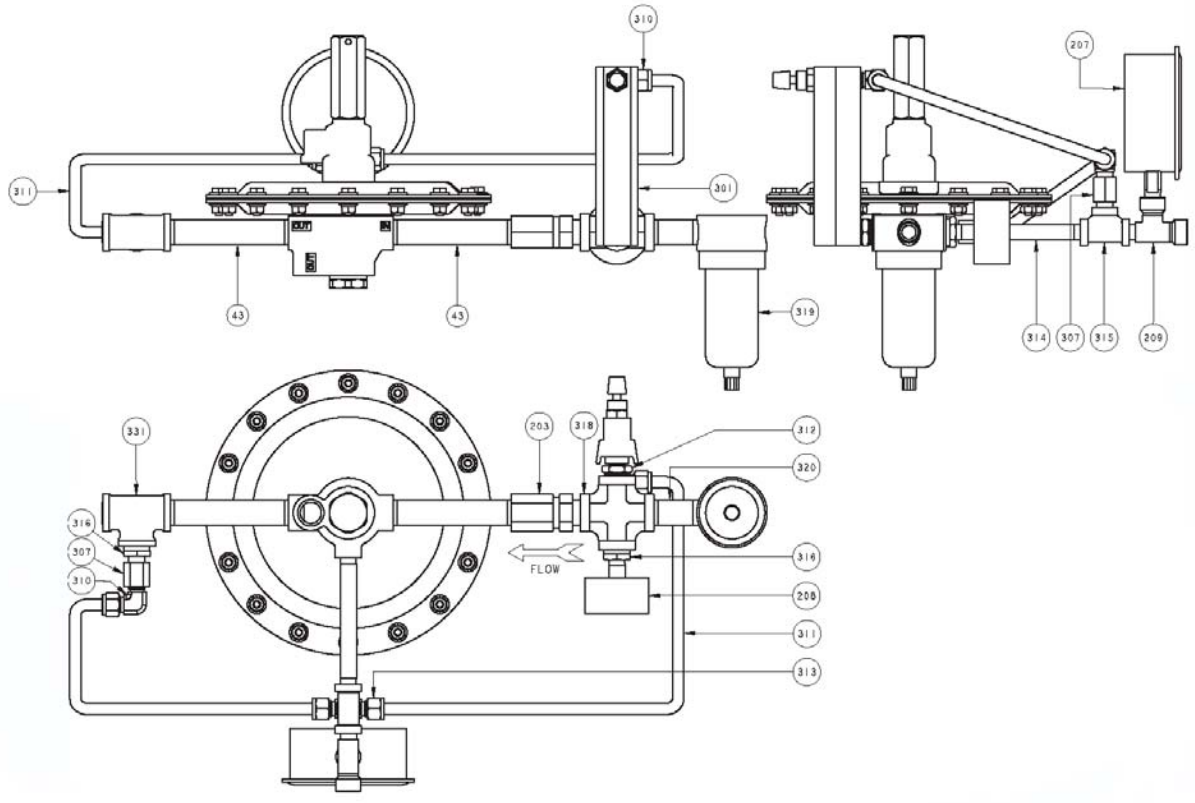
ITEM NO.	PART NAME
30	Dip Tube
39	Washer (Bllvl)
43	Nipple
207	Tank Gauge
208	Supply Gauge
314	Nipple
315	1/4” Tee
316	Bushing
331	1/2” Tee

Model 1088 with Check Valve, Filter, Tank & Supply Gauges

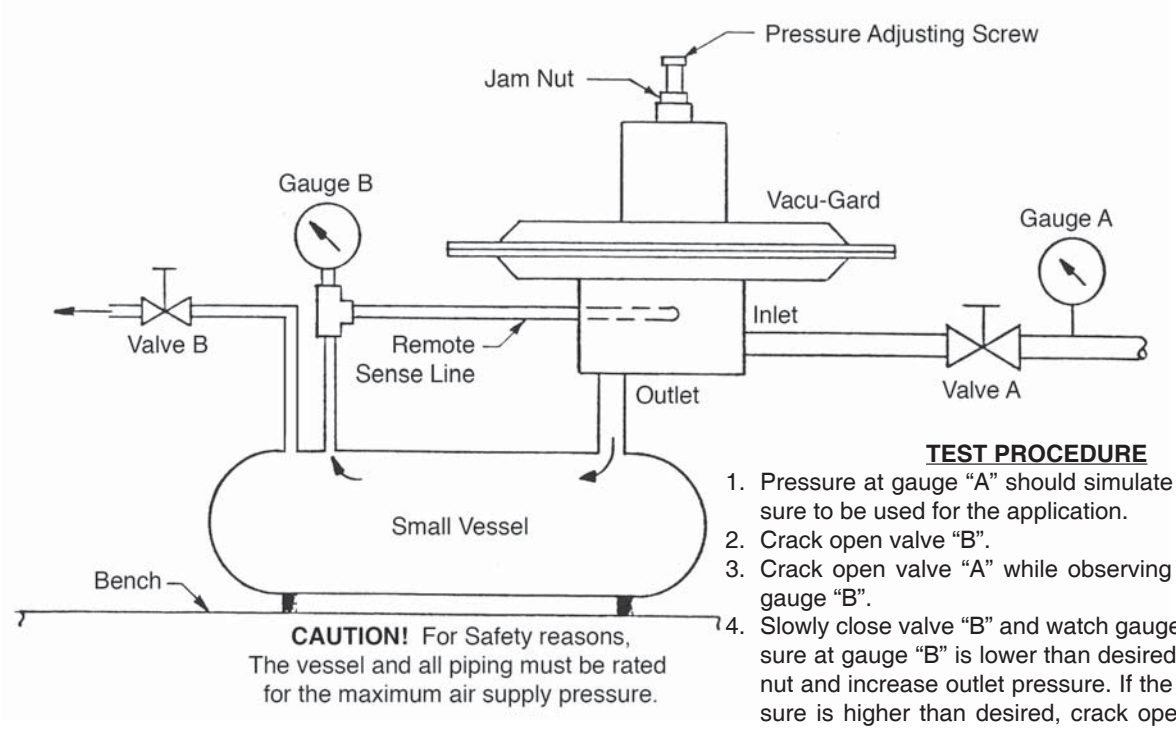


ITEM NO.	PART NAME
43	Nipple
207	Tank Gauge
208	Supply Gauge
209	1/4” Tee
301	Purge Meter
307	Orifice
310	Straight Connector
311	Tubing
312	Nipple Reducing
313	Tee
314	Nipple
315	1/4” Tee
316	Bushing
318	1/2” Cross Tee
319	Filter
320	Nipple

Model 1088 with Purge, Check Valve, Filter, Tank & Supply Gauges



Model 1088 Tank Blanketing Valve
with Remote Sensing (Bench Testing)



TEST PROCEDURE

1. Pressure at gauge “A” should simulate the actual pressure to be used for the application.
2. Crack open valve “B”.
3. Crack open valve “A” while observing the pressure at gauge “B”.
4. Slowly close valve “B” and watch gauge “B”. If the pressure at gauge “B” is lower than desired, loosen the jam nut and increase outlet pressure. If the gauge “B” pressure is higher than desired, crack open valve “B” and back off the adjusting screw (counter clockwise) until the desired pressure is reached. Tighten the jam nut.
5. Open and close valve “B” a few times to insure proper setting and operation.

ATEX 94/9/EC: Explosive Atmospheres and Cashco Inc. Regulators

NOTICE

Only for Product Codes wherein hazard category ATEX has been selected.

These valves satisfy the safety conditions according to EN 13463-1 and EN 13463-5 for equipment group IIG 2 c.

Caution: Because the actual maximum temperature depends not on the equipment itself, but upon the fluid temperature, a single temperature class or temperature cannot be marked by the manufacturer.

Specific Precaution to Installer: Electrical grounding of valve must occur to minimize risk of effective electrical discharges.

Specific Precaution to Installer: Atmosphere vent holes should be plugged to further minimize the risk of explosion.

Specific Precaution to Maintenance: The Valve Body/ Housing must be regularly cleaned to prevent buildup of dust deposits.

Specific Precaution to Maintenance: Conduct periodic Continuity Check between Valve Body/ Housing and Tank to minimize risk of electrical discharges.

Attention: When repairing or altering explosion-protected equipment, national regulations must be adhered to. For maintenance and repairs involving parts, use only manufacturer's original parts.

ATEX requires that all components and equipment be evaluated. Cashco pressure regulators are considered components. Based on the ATEX Directive, Cashco considers the location where the pressure regulators are installed to be classified Equipment-group II, Category 3 because flammable gases would only be present for a short period of time in the event of a leak. It is possible that the location could be classified Equipment-group II, Category 2 if a leak is likely to occur. Please note that the system owner, not Cashco, is responsible for determining the classification of a particular installation.

Product Assessment

Cashco performed a conformity assessment and risk analysis of its pressure regulator and control valve models and their common options, with respect to the Essential Health and Safety Requirements in Annex II of the ATEX directive. The details of the assessment in terms of the individual Essential Health and Safety Requirements, are listed in Table 1. Table 2 lists all of the models and options that were evaluated and along with their evaluation.
Models and options not listed in Table 2 should be assumed to not have been evaluated and therefore should not be selected for use in a potentially explosive environment until they have been evaluated.
Standard default options for each listed model were evaluated even if they were not explicitly listed as a separate option in the table. Not all options listed in the tables are available to all models listed in the tables. Individual TB's must be referenced for actual options.
When specifying a regulator that is to be used in a potentially explosive environment one must review the evaluations in Table 1 and 2 for the specific model and each and every option that is being specified, in order to determine the complete assessment for the unit.
A summary of the models and options found to have an impact on ATEX assessment due to potential ignition sources or other concerns from the ATEX Essential Health and Safety Requirements, are listed below.

1. The plastic knob used as standard on some models, (P1, P2, P3, P4, P5, P7, 3381, 4381, 1171, and 2171) is a potential ignition source due to static electricity. To demonstrate otherwise, the knob must be tested to determine if a transferred charge is below the acceptable values in IEC 60079-0 Section 26.14 (See items 25, 27, and 28 in Appendix A). Until the plastic knob has been shown to be acceptable, then either the metal knob option, or a preset outlet pressure option is required to eliminate this ignition source (See items 45 and 64 in Tables).

2. The pressure gauges offered as options on a few of the regulator models (DA's, P1-7, D, 764, 521), use a plastic polycarbonate window that is a potential ignition source due to static electricity. To demonstrate that the gauges are not a potential source of ignition, the gauges would need to be tested to determine if a transferred charge is below the acceptable values in IEC 60079-0 Section 26.14 or the pressure gauge supplier must provide documentation indicating the gauge is compliant with the ATEX Directive (See items 26, 27, and 28 in Appendix A). Until compliance is determined, regulators should not be ordered with pressure gauges for use in potentially explosive environments.

3. Tied diaphragm regulators with outlet ranges greater than 100 psig should be preset to minimize the risk that improper operation might lead to an outboard leak and a potentially explosive atmosphere (See item 6 in Table 1).

4. 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 regulator with the self- relieving option in a flammable gas system could create an explosive atmosphere in the vicinity of the regulator.

5. Regulators with customer supplied parts are to be assumed to not have been evaluated with regard to ATEX and thus are not to be used in a potentially explosive environment unless a documented evaluation for the specific customer supplied parts in question has been made. Refer to Table 1 for all models and options that have been evaluated.

Product Usage

A summary of ATEX related usage issues that were found in the assessment are listed below.

1. Pressure regulators and control valves must be grounded (earthed) to prevent static charge build-up due to the flowing media. The regulator can be grounded through any mounting holes on the body with metal to metal contact or the system piping can be grounded and electrical continuity verified through the body metal seal connections. Grounding of the regulator should follow the same requirements for the piping system. Also see item 30 in Table 1.

2. The system designer and users must take precautions to prevent rapid system pressurization which may raise surface temperatures of system components and tubing due to adiabatic compression of the system gas.

3. Heating systems installed by the user could possibly increase the surface temperature and must be evaluated by the user for compliance with the ATEX Directive. User installation of heating systems applied to the regulator body or system piping that affects the surface temperature of the pressure regulator is outside the scope of this declaration and is the responsibility of the user.

4. 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 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 rise under any operating conditions. If a process gas temperature rise is possible under operating conditions, then the system designer must investigate whether the regulator body and downstream piping may increase in temperature enough to create a potential source of ignition.

The process gas expansion is typically modeled as a constant enthalpy throttling process for determining the temperature change. A Mollier diagram (Pressure – Enthalpy diagram with constant temperature, density, & entropy contours) or a Temperature – Entropy diagram with constant enthalpy lines, for the process gas, can be used to determine the temperature change. Helium and hydrogen are two gases that typically increase in temperature when expanding across a regulator. Other gases may increase in temperature at sufficiently high pressures.

Product Declaration

If the above issues are addressed by selecting options that do not have potential sources of ignition, avoiding options that have not been assessed, and by taking the proper usage issue precautions, then Cashco regulators can be considered to be a mechanical device that does not have its own source of ignition and thus falls outside the scope of the ATEX directive.

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