Attachment 3

PACIFIC GAS & ELECTRIC COMPANY

BECKER POWER GAS CABINET RETROFIT PROJECT

PLS-5A STATION
VALVE V-299.00A POWER GAS

Document No. 1571-105-GN-0299-5A

WORK PACKAGE

BY

GULF INTERSTATE ENGINEERING

Rev. No.	Date	Revision Description	Prepare Initials/Date	Checker Initials/Date	Lead Disc. Engineer Initials/Date	Project Manager Initials/ Date	Client Initials/Date
1	9/20/2012	Issued For Use	Redacted 9/20/2012	9/20/2012	SEPT 20/2012 Redacted	Redacted 9/20/2012	

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1.0 INTRODUCTION

Becker power gas panels installed at various Pacific Gas & Electric Company (PG&E) stations are being retrofitted for proper ventilation among other issues as detailed in a report dated April 27, 2012, prepared by Raymundo Engineering Company, Inc. The panels supply power gas to main gas valve actuators. The existing panels enclose threaded gas tubing and valves, and can also house relief valves, filters, regulators, gauges, and in some cases electrical instruments.

Most of these panels are enclosed and most are not ventilated. With gas present and inadequate ventilation, the cabinets are a CL1 Div1 area. With adequate ventilation, the cabinets are a CL1 Div2 area. These instructions cover the retrofitting of this specific Becker power gas assembly to satisfy the requirements associated with Raymundo report issue codes 1-6:

Issue Code	Description	Retrofit Work Required for This Panel
1	The cabinet has no vent for dissipating gas leaks	No
2	The cabinet vent is not adequate to prevent the internal pressure from exceeding the mfr's MWP	Yes
3	The pressure relief valve inside the cabinet is not vented to a safe place outside the cabinet	No
4	The pressure relief valve vent stack is not at least 8 FT above ground	No
5	The set point of the pressure relief valve exceeds the MAOP specified by mfr of the actuator	Yes
6	The electrical installation inside the cabinet does not comply with Section 501 of the NEC	No

Additional retrofit work shall be performed as indicated below:

Description	Retrofit Work Required for This Panel
Replace power gas relief valve.	Yes
Replace power gas regulator.	Yes
Retubing at manual control valve (MCV).	Yes

2.0 INSTRUCTIONS FOR INSTALLATION

An "Application For Gas Clearance" must be prepared and approved by PG&E Gas Control if the valve will be taken out of service for this work. Refer to Section 4.0 for Bill of Materials.

2.1 Louver Plate Kits & Filter Media (Lower Vent)

Constructor to field install Hoffman louver plate and filter media per attached drawing, (Exhibit C), and in accordance with manufacturer's installation guide (Exhibit G).

2.2 Mushroom Ventilators (Upper Vent)

Constructor to field install two Vetus Athos1 Mushroom Ventilators at the top, horizontal plane of Becker power gas cabinet per attached drawing (Exhibit C) and photos, (Exhibit H, Exhibit I).

2.3 Power Gas Relief Valve

Constructor to remove current pressure relief valves and field install Circle Seal Relief Valve 5100 series at location per attached photo (Exhibit E) and in accordance with manufacturer's installation guide (Exhibit F). Constructor to verify that relief valves are each set at 110 psig (Exhibit F pg. 5 Describes the adjustment instructions). The relief outlet piping size shall not be smaller than the outlet connection. Maintain the relief outlet's line size to the vent stack.

2.4 Conduit for Wiring Terminal Strip

No work required. There is no exposed wiring.

2.5 Power Gas Regulator

Constructor to remove current regulators and field install Fisher regulator 1301F at location per attached photo (Exhibit E) and in accordance with manufacturer's installation guide (Exhibit J).

2.6 Retubing at Manual Control Valve (MCV)

a. Remove the line connecting the upper booster outlet with the port P1 of the MCV. Do not remove the existing isolating valve located at the booster outlet.

b. Install a plug in the port P1 of the MCV.

c. Connect, using a tee, the upper booster outlet to the line that connects MCV connection C1 to "open" side of actuator.

d. Remove the line connecting the lower booster outlet with the port P2 of the MCV. Do not remove the existing isolating valve located at the booster outlet.

e. Install a plug in the port P2 of the MCV.

f. Connect, using a tee, the lower booster outlet to the line that connects MCV connection C2 to "close" side of actuator.

For reference, see Exhibit K.

3.0 CODES, STANDARDS, AND REFERENCES

Codes:

- ffi API Recommended Practice 500, Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class 1, Division 1 and Division 2, 2nd Edition, November 1997
- ffi AGA Catalog # XL1001, Classification of Locations for Electrical Installations in Gas Utility Areas, Revised September 2010
- ffi NEC, 2011

References:

- ffi FH-70-A Form with sizing calculations, Doc No. 1571-105-CA-0005-01 & 1571-105-CA-0005-02
- ffi Design Criteria, Doc No. 1571-000-DB-0010-00
- ffi http://www.controlsouthern.com/documents/regulators/Literature/IMs/D100341.PDF
- ffi http://www.circoraerospace.com/about/companies/cai/about/quality/pdf/maint/ped_5100_series.pdf
- ffi http://www.hoffmanonline.com/stream_document.aspx?rrid=105771&prid=6088
- ffi http://viewer.zmags.com/publication/a0b8f93d#/a0b8f93d/190

4.0 BILL OF MATERIALS

PG&E CODE	ITEM NO	QTY	DESCRIPTION	CATALOG OR DRAWING REFERENCE
	1	1	VALVE, RELIEF, 1/2" NPT, ASTM 316, SP @ 110 PSIG	M-5159T1-4MP-110 CIRCLE SEAL 5100 SERIES
	2	2	VENTILATORS, MUSHROOM, 4.8" OD, AISI 316 SS	ATHOS1, VETUS
	3	1	VENTILATORS, LOUVER PLATE KIT, 15.3" X 9.5", POWDER COATED	AVK812, HOFFMAN
	4	1	FILTER MEDIA, ALUMINUM MESH	AFLT812, HOFFMAN

	5	1	REGULATOR, PRESSURE REDUCING, NATURAL GAS SERVICE, ¼" NPT CONNECTIONS, SS BODY AND SPRING CASE, PTFE (TEFLON) VALVE DISK, NEOPRENE GASKETS, OUTLET PRESSURE SPRING RANGE 50-150 PSIG (SILVER SPRING) SET PRESSURE 100 PSIG.	1301F, FISHER
	6	1	TUBE FITTING, MALE CONNECTOR, ½" TUBE OD x ½" MALE ISO TAPERED THREAD, SS	SS-810-1-8RT, SWAGELOCK
	7	AS REQUIRED	TUBING, 1/2" O.D. X 0.049" W.T., SEAMLESS, ANNEALED, GRADE TP 304 S.S., ASTM A269	PG&E GAS STD A-22
PLS-5A STATION/ V-299.00A				

5.0 EXHIBITS

Exhibit A- Operating Diagram, DWG 082293

Exhibit B- P&ID, 3803023

Exhibit C- Drawing, Panel Arrangement

Exhibit D- Area Classification Drawing

Exhibit E- Photo, Panel Internal

Exhibit F- 5100 Series Circle Seal Products

Exhibit G- Hoffman Louver Plate Kits Vendor Catalog

Exhibit H- Vetus Mushroom Ventilator Vendor Catalog

Exhibit I- Typical Mushroom Ventilators Installation

Exhibit J- 1301F Fisher Regulators

Exhibit K- Retubing MCV

Exhibit L- Check Sheet

Exhibit M- Punch List

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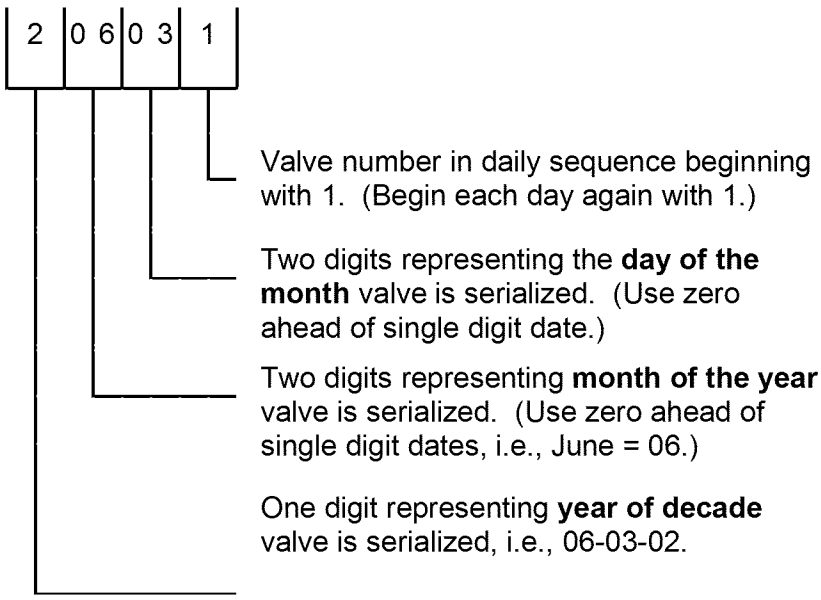
CIRCLE SEAL CONTROLS, INC.
A division of CIRCOR International, Inc.

Maintenance and Installation Instructions for 5100 Series Circle Seal Products

Each Circle Seal Controls Valve is marked with the following

- CE Mark where applicable - (Category 1, 2, 3, & 4) valves with port size 1 inch and over and all Relief valves and regulators.
- Manufacturer name and location
- Pressure and temperature ratings
- Product Series
- Serial Number:



- Product Series Serial Number, when no TTRs are requested:
  - Will be a six-digit number the first two represent the month, the second two represent the day and the third two are the year (063002).

This information should be validated to be sure the valve is appropriate for the intended application.

When installing the valve

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Maintenance and Installation Instructions for 5100 Series Circle Seal Products

- Ensure compatibility of unit ordered to fluid application.
- An adequate filter system must be installed in the line ahead of the valve to prevent foreign matter from damaging the seal surfaces and/or from obstructing the valve orifices, causing operational failure and/or leakage.
- Mount valve in the line such that the etched or cast flow arrow is oriented in the direction of system flow.

When installing the valve (continued)

- Preparation of end connections:
  - Taper Pipe Threads (NPT, ISO, BSP, JIC)
    - Where pressure-tight joints are required, it is intended that taper pipe threads be made up wrench-tight with a sealant. To prevent galling, pipe sealant normally includes a lubricant. One commonly used sealant with a lubricant is Teflon Tape. Pipe thread sealant must be contained at the end connections and prevented from entering the valve.
  - Mechanical Compression Tube Fittings (i.e. Gyrolok)
    - Where mechanical compression tube fittings are supplied for use when sealing on the outside diameter of tubing, the manufacturer's tube fitting installation instructions shall be followed.
  - Straight Thread Connectors (ISO, SAE, BSP)
    - When a straight thread fitting is supplied, tighten connection finger-tight with proper elastomer or gasket installed. Then snug wrench tight.

- Do not over-tighten valve during installation.
- New systems must be adequately flushed to remove all pipe scale, weld slag, thread burrs, and etc. It is normally necessary to flush new systems several times, removing contamination lodged in plumbing and components, until no debris is present.

Use of valve

- See nameplate for pressure/temperature limits of the valve.
- Do not exceed rated limits.

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Maintenance and Installation Instructions for 5100 Series Circle Seal Products

- This valve is not for vacuum service unless specifically stated.
- This valve is not rated for cryogenic applications unless specifically stated.
- This valve is leak & proof tested prior to shipment.
- Check compatibility of unit ordered to fluid application.
- This valve is not rated for dangerous or unstable fluids.
- This valve is for normal operations only.
- This valve is not fire rated.

For additional information, see catalog sheets for technical / use data located at http://www.circle-seal.com; or consult your Circle Seal Controls Distributor.

Maintenance of PED/CE compliant components

All units have been designed for normal operation within specified environments. Unless otherwise stated, units are expected to withstand normal operating conditions as specified for a period of five (5) years from date of manufacture. This does not include maintenance and/or repair/replacement of seals or springs. In normal service the only part(s) which may require replacement is (are) the seal(s). A repair kit may be ordered by placing a K/ in front of the complete part number, (i.e. K/5159B-2M-600). To maintain certification, PED/CE certified components must be maintained in an authorized facility. For information on maintenance please contact Circor International Ltd.

Preventive maintenance inspections should be conducted every 6 months to ensure the valve or regulator is functioning properly.

For your safety

Warning labels attached to products shall be observed. Misuse of product related to pressure and temperature hazards may result in system failure or personal injury.

It is the sole responsibility of the system designer and user to select products suitable for their specific application requirements and to ensure proper installation, operation and maintenance of these products. Material compatibility product ratings and application details should be considered in the selection. Improper selection or use of products described herein can cause personal injury or property damage.

CIRCLE SEAL CONTROLS, INC.
A division of CIRCOR International, Inc.

Maintenance and Installation Instructions for 5100 Series Circle Seal Products

Repair Kits

In normal service the only part(s) which may require replacement is (are) the seal(s). A repair kit may be ordered by placing a K/ in front of the complete part number, (i.e. K/5159B-2M-600).

Cracking Pressure Spring Ranges

Consult your local distributor or the factory for replacement spring part numbers. (Please have your complete valve part number ready when calling.)

Cracking Pressure Ranges (psig)

10–15	82–117	346–450	1201–1400
16–24	118–162	451–575	1401–1900
25–41	163–230	576–710	1901–2400
42–57	231–285	711–999	
58–81	286–345	1000–1200	

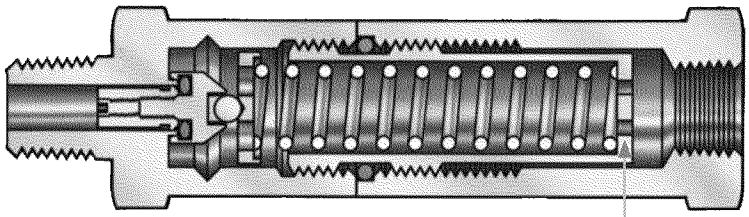
Adjustment

The 5100 Series relief valve is adjustable to ±15% of its nominal cracking pressure as follows:

1. Remove discharge line (in-line mounted unit) or override ring & rod (ASME type)
2. "Break" body joint by wrenching hexes. DO NOT USE PIPE WRENCH.
3. Insert proper size hex wrench (see table below) into the outlet end and turn clockwise to increase the cracking pressure, or counterclockwise to decrease.
4. After adjustment, hold the hex wrench stationary relative to the inlet end and turn the body to tighten the joint.
5. Test adjusted unit for cracking pressure.

Hex Wrench Size

Size	Nominal Cracking Pressure (psig) 450 & Under	451 & Over
1/8″	7/32″	7/32″
1/4″	5/16″	1/4″
3/8″	5/16″	1/4″
1/2″	1/2″	3/8″
3/4″	9/16″	1/2″
1″	9/16″	1/2″
1 1/4″	3/4″	3/4″



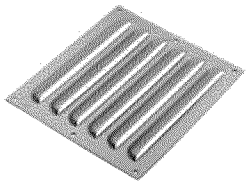
Hex adjustment screw

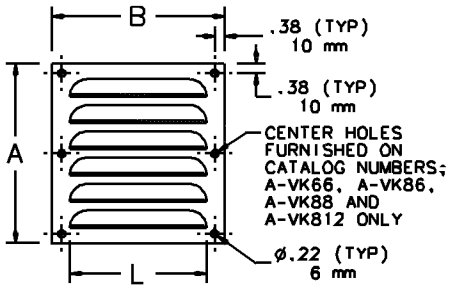
Air Flow Rates (5100–MP)

Inline valves, 1/8″–1″

Crack Pressure PSIG	Percent Over Pressure Beyond Cracking (SCFM air at room temperature) 10% 1MP	2MP/3MP	4MP	6MP/8MP	25% 1MP	2MP/3MP	4MP	6MP/8MP
15	1.0	1.5	5.0	9.0	3.0	5.0	50	52
20	1.5	2.0	10	12	4.0	5.0	60	63
25	2.0	2.7	25	27	5.4	6.5	65	67
30	2.4	4.6	30	36	6.2	13	68	71
40	3.0	5.5	34	55	6.5	25	72	100
50	3.0	10.5	40	65	8.0	29	74	110
75	4.2	14	50	70	13	38	80	114
100	6.0	25	54	90	17	55	90	130
125	8.5	32	70	120	22	58	110	136
150	10	36	72	150	27	78	115	200
200	13	40	135	190	40	96	250	375
250	16	50	150	210	43	115	280	450
300	20	60	180	225	52	127	400	600
400	25	80	270	270	68	150	600	900
500	36	46	110	190	108	120	320	700
750	45	58	130	210	90	130	420	1200
1000	47	64	170	210	160	160	620	1280
1200	67	74	240	250	200	200	1000	1500
1400	84	84	450	395	—	—	—	—
1600	110	110	720	405	—	—	—	—
1800	160	160	810	510	—	—	—	—
2000	190	190	850	515	—	—	—	—
2200	220	220	900	520	—	—	—	—
2400	240	240	990	675	—	—	—	—

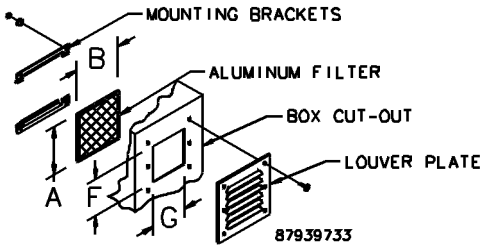
Louver Plate Kits





Designed to provide ventilation in enclosures where excessive internal heat or excessive moisture is a problem. Although louvers cannot keep all moisture out of an enclosure, gasketing or sealing the perimeter of the louver plate reduces problems associated with moisture intrusion. These kits may be easily installed in the fieldby making a cutout of the proper size and attaching the louver plate in place. Louver plates are made from 14 gauge steel with an ANSI 61 gray polyester powder finishover pretreated surfaces or 316stainless steel. Hardware is furnished for mounting. Custom sizes, materials, finishes,etc., can be provided on special order.

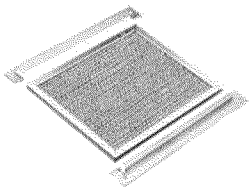
Bulletin: D85



Catalog Number	Dimensions AxB (in.)	Dimensions AxB (mm)	Number of Louvers	Depth D (in.)	Depth D (mm)	Length L (in.)	Length L (mm)	Opening Area (in.²)	Opening Area (cm²)	Cutout Size, F (in.)	Cutout Size, F (mm)	Cutout Size, G (in.)	Cutout Size, G (mm)
AVK23	3.25 x 3.25	83 x 83	3	0.19	5	2.00	51	.86	5.54	2.00	51	1.75	44
AVK23SS6	3.25 x 3.25	83 x 83	3	0.19	5	2.00	51	.86	5.54	2.00	51	1.75	44
AVK33	3.88 x 4.50	98 x 114	3	0.25	6	3.00	76	1.32	8.52	2.62	67	3.00	76
AVK33SS6	3.88 x 4.50	98 x 114	3	0.25	6	3.00	76	1.32	8.52	2.62	67	3.00	76
AVK34	4.75 x 4.50	121 x 114	4	0.25	6	3.00	76	1.76	11.35	3.50	89	3.00	76
AVK34SS6	4.75 x 4.50	121 x 114	4	0.25	6	3.00	76	1.76	11.35	3.50	89	3.00	76
AVK43	4.50 x 5.50	114 x 140	3	0.25	6	4.00	102	1.88	12.10	3.25	83	4.00	102
AVK43SS6	4.50 x 5.50	114 x 140	3	0.25	6	4.00	102	1.88	12.10	3.25	83	4.00	102
AVK44	5.62 x 5.50	143 x 140	4	0.25	6	4.00	102	2.50	16.13	4.38	111	4.00	102
AVK44SS6	5.62 x 5.50	143 x 140	4	0.25	6	4.00	102	2.50	16.13	4.38	111	4.00	102
AVK64	5.62 x 7.50	143 x 191	4	0.31	8	6.00	152	5.21	33.61	4.38	111	6.00	152
AVK64SS6	5.62 x 7.50	143 x 191	4	0.31	8	6.00	152	5.21	33.61	4.38	111	6.00	152
AVK66	7.88 x 7.50	200 x 191	6	0.31	8	6.00	152	7.82	50.45	6.62	168	6.00	152
AVK66SS6	7.88 x 7.50	200 x 191	6	0.31	8	6.00	152	7.82	50.45	6.62	168	6.00	152
AVK84	5.81 x 9.50	148 x 241	4	0.31	8	8.00	203	8.08	52.12	4.56	116	8.00	203
AVK84SS6	5.81 x 9.50	148 x 241	4	0.31	8	8.00	203	8.08	52.12	4.56	116	8.00	203
AVK86	8.19 x 9.50	208 x 241	6	0.31	8	8.00	203	12.11	78.13	6.94	176	8.00	203
AVK86SS6	8.19 x 9.50	208 x 241	6	0.31	8	8.00	203	12.11	78.13	6.94	176	8.00	203
AVK88	10.56 x 9.50	268 x 241	8	0.31	8	8.00	203	16.15	104.19	9.31	236	8.00	203
AVK88SS6	10.56 x 9.50	268 x 241	8	0.31	8	8.00	203	16.15	104.19	9.31	236	8.00	203
AVK812	15.31 x 9.50	389 x 241	12	0.31	8	8.00	203	24.22	156.26	14.06	357	8.00	203
AVK812SS6	15.31 x 9.50	389 x 241	12	0.31	8	8.00	203	24.22	156.26	14.06	357	8.00	203

SS6 in catalog number indicates louver plate is Type 316L stainless steel.

Filters for Louver Plate Kits



Design

Designed for use with Louver Plate Kit. Mounting holes on filter bracket align with louver mounting holes. Hardware supplied with louversalso secures filterbrackets in place. Aluminum air filters provide good arrestment of airborne dust and dirt.

Filter Media

Filter media is composed of layers of slit and expanded aluminum providing hundreds of adhesive coated baffle surfaces for trapping impurities. Impurities are held throughout the depth of the filter. Washing with warm water will keep the filterclean. To achieve best results, HoffmanFilter Adhesive is recommended.

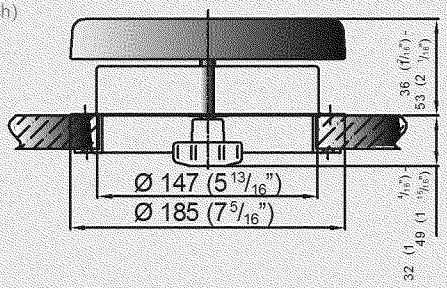
Bulletin: D85

Catalog Number	Dimensions AxB (in.)	Dimensions AxB (mm)	Use with Steel Louver	Use with Stainless Steel Louver
AFLT33	3.22 x 3.25	82 x 83	AVK33	AVK33SS6
AFLT34	4.09 x 3.25	104 x 83	AVK34	AVK34SS6
AFLT43	3.84 x 4.25	98 x 108	AVK43	AVK43SS6
AFLT44	4.97 x 4.25	126 x 108	AVK44	AVK44SS6
AFLT64	4.45 x 6.25	113 x 159	AVK64	AVK64SS6
AFLT66	6.72 x 6.25	171 x 159	AVK66	AVK66SS6
AFLT84	4.64 x 8.25	118 x 210	AVK84	AVK84SS6
AFLT86	7.02 x 8.25	178 x 210	AVK86	AVK86SS6
AFLT88	9.39 x 8.25	239 x 210	AVK88	AVK88SS6
AFLT812	14.14 x 8.25	359 x 210	AVK812	AVK812SS6

Mushroom ventilators

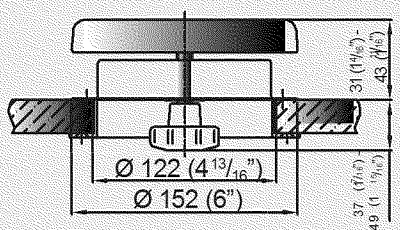
Mushroom ventilators, made of stainless steel, type AISI 316, polished high-gloss, including mosquito screen and counter flange, made of synthetic material.

Free flow area 76 cm² (10.8 sq. inch)



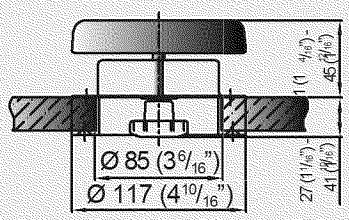
DARTAGN1

Free flow area 45 cm² (7.2 sq. inch)



ATHOS1

Free flow area 30 cm² (4.7 sq. inch)



PORTOS1

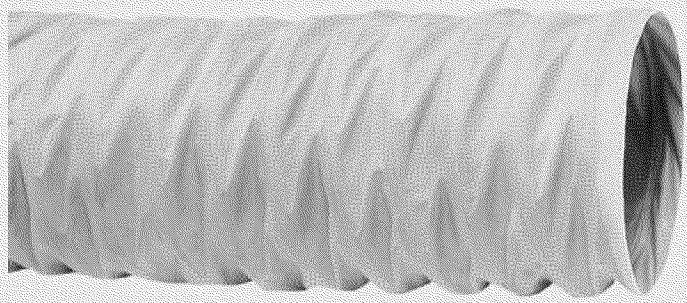
FAN12	Electric ventilator 12 Volt	
FAN24	Electric ventilator 24 Volt	
PORTOS1	Mushroom ventilator type PORTOS 1	(incl. plastic trim ring)
ATHOS1	Mushroom ventilator type ATHOS 1	(incl. plastic trim ring)
DARTAGN1	Mushroom ventilator type D'ARTAGNAN 1	(incl. plastic trim ring)

Hose for blowers (ventilators)

This type of hose is made of a woven glass fibre fabric, impregnated with PVC. Suitable for VETUS shell ventilators and extraction ventilators. Withstands temperatures of between - 20° C (-40 F) and 100° C (+ 2120 F). Available in coils of 10 m (33ft).

Bending radius 0.6 x internal diameter

Code	Internal dia	Length
BLHOSE310	76 mm (3")	10 m (33ft)
BLHOSE410	102 mm (4")	10 m (33ft)



BLHOSE

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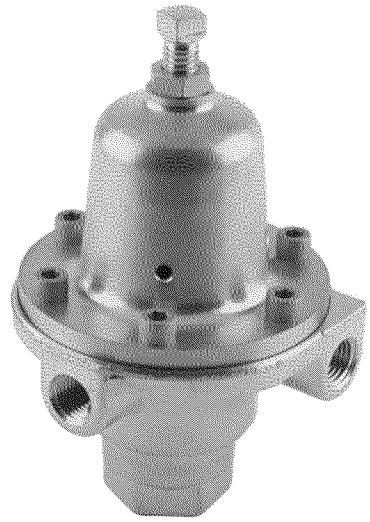

Figure 1. Type 1301F Regulator

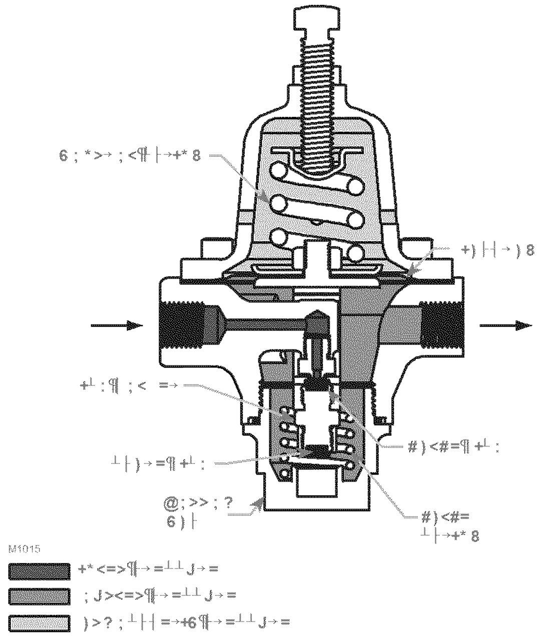

Figure 2. Type 1301F Operational Schematic

- For high-outlet pressure applications.
- Extra valve disk through a reversible disk holder assembly.
- Can control a variety of media including air, gas, water, and other liquids.
- Soft-seat valve plug disks ensure tight shutoff.
- Optional materials are available for applications handling sour gases. These constructions comply with the recommendations of NACE International Standards MR0175 and MR0103.

The proven reliability and accurate regulation of the 1301 Series regulators (see Figure 1) make them ideal for numerous high-pressure drop applications. They are direct-operated, high-pressure regulators designed for inlet pressures up to 6000 psig / 414 bar. The Type 1301F can handle outlet pressures from 10 to 225 psig / 0,69 to 15,5 bar in three ranges and the Type 1301G can handle outlet pressures from 200 to 500 psig / 13,8 to 34,5 bar in one range.

These multi-purpose regulators can be used as pilot supply or pressure-loaded regulators where high-pressure operating medium must be reduced for use by gas regulator pilots or pressure-loaded regulators. Their rugged design offers versatility for a wide variety of applications including air, gas, water, and other liquids. An optional spring case with a tapped vent and adjusting screw closing cap is available that enables the Type 1301F to be used as a pressure-loaded regulator.

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Process Management

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[illegible]

[illegible]

- **[illegible]** Direct-operated, high-pressure reducing regulator for inlet pressures to 6000 psig / 414 bar and outlet pressure ranges from 10 to 225 psig / 0,69 to 15,5 bar in three ranges
- **[illegible]** Direct-operated, high-pressure reducing regulator for inlet pressures to 6000 psig / 414 bar and an outlet pressure range of 200 to 500 psig / 13,8 to 34,5 bar

[illegible]

1/4 NPT (one inlet and two outlet connections); CL300 RF, CL600 RF, and CL1500 RF; or [illegible]

[illegible] (1)

[illegible] 6000 psig / 414 bar
[illegible]
[illegible]
1000 psig / 69,0 bar
[illegible]
Water: 1000 psig / 69,0 bar
Other Liquids: 2000 psig / 138 bar

[illegible] (1)

[illegible] 250 psig / 17,2 bar
[illegible] 550 psig / 37,9 bar

[illegible]

See Table 1

[illegible]

Internal

[illegible]

[illegible] 0.72

[illegible]

[illegible] See Tables 2, 3, and 4
[illegible] See Tables 5 and 6

[illegible]

[illegible] See Table 7
[illegible] See Table 8

[illegible]

[illegible] 5.0
[illegible] 0.13
[illegible] 38.5

[illegible]

[illegible] 0.938
[illegible] 0.50
[illegible] 0.85

[illegible]

5/64-inch / 2,0 mm

[illegible] (1)

[illegible]
[illegible] -20° to 180°F / -29° to 82°C
[illegible]
[illegible] -20° to 400°F / -29° to 204°C(2)
[illegible]
[illegible] -40° to 300°F / -40° to 149°C

[illegible]

Service to -65°F / -54°C is available with low temperature bolting and special low temperature Nitrile (NBR) O-rings to replace the gaskets

[illegible]

[illegible]
Four 5/32-inch / 4,0 mm holes
[illegible]
One 1/4 NPT connection
[illegible]
One 1/8 NPT connection with screen

[illegible]

- [illegible] tapped spring case vent (Type 1301F brass spring case only)
- [illegible]
- [illegible] adjusting screw (Type 1301G only)
- [illegible] valve actuator
- [illegible]
- [illegible]

[illegible]

8 pounds / 4 kg

1. The pressure/temperature limits in this Bulletin and any applicable standard or code limitation should not be exceeded.
2. Fluorocarbon (FKM) is limited to 180°F / 82°C hot water.

- continued -

Materials

Body, Bottom Cap, and Spring Case: Forged brass or CF8M Stainless steel

Valve Disks and Holder: Nylon (PA) and zinc-plated brass, PTFE and zinc-plated brass, Nylon (PA) and 303 Stainless steel, or PTFE and 303 Stainless steel

Valve Disk Collar: 304 Stainless steel

Elastomers: Neoprene (CR), Fluorocarbon (FKM), or Ethylenepropylene (EPDM)

Regulator Spring: Zinc-plated steel

Valve Spring: 302 Stainless steel

Diaphragm Plate: Zinc-plated steel

Adjusting Screw and Bolting: Double Zinc-plated steel with zinc dichromate overlay

Upper Spring Seat: Zinc-plated steel

Diaphragm: 302 Stainless steel

Body and Bottom Cap: Forged brass or CF8M Stainless steel

Spring Case: CF8M Stainless steel

Valve Disks and Holder: PTFE and 316 Stainless steel

Gaskets: Fluorocarbon (FKM)

Bottom Cap O-ring: Fluorocarbon (FKM)

Regulator Spring: Zinc-plated steel

Valve Spring: Inconel® X750

Diaphragm Plate: Zinc-plated steel

Adjusting Screw and Bolting: Double Zinc-plated steel with zinc dichromate overlay

Upper Spring Seat: Zinc-plated steel

Diaphragm: K500 Monel®

Inconel® and Monel® are trademarks of Special Metals Corporation.

Outlet Pressure Ranges

>m| =	; J><=>¶→=⊥⊥ J→=¶) * 8=⊥(1)		⊥|→+* 8¶)→>¶ * J ?@=→	⊥|→+* 8¶6 ; < ;→¶ 6 ; =	⊥|→+* 8¶^+→=¶ +) ?=>=→		⊥|→+* 8¶→==¶=* 8>|	
	! |⊤	□			+ ☼–	┼┼	+ ☼–	┼┼
1301F	10 to 75	0,69 to 5,2	1D387227022	Blue	0.200	5,08	1.69	42,9
	50 to 150	3,4 to 10,3	1B788527022	Silver	0.225	5,72		
	100 to 225	6,9 to 15,5	1D465127142	Red	0.243	6,17		
1301G	200 to 500	13,8 to 34,5	1K156027142	Silver	0.331	8,41	1.88	47,8

1. All springs can be backed off to 0 psig / 0 bar.

├□┬ ☼┬!☙¶7¶; !●□□┐♬

The 1301 Series regulators are direct-operated. Downstream pressure is registered internally through the body to the underside of the diaphragm. When downstream pressure is at or above set ←◀☼┼┼ ◀☒┐!>☼┐ ╫{┐╫┐>☼♂ ┐♬╫!┐!>☼┐↑◀┼→☼┐ ┐ !>☼◀☒┐╫┐↑┐□⊥ $┐!>◀ ♬>┐!>☼┐◀☒♬ ♂!↑◀┐┐ >☼┐ demand increases, downstream pressure decreases slightly allowing the regulator spring to extend, moving the yoke and disk assembly down and away |◀] ┐!>☼┐↑◀┼→☼ ┐┐+> ╫┐☙↑ $┐┼┐□⊥ $┐!>◀ ♬>┐!>☼┐ ↑ Z┐ to the downstream system. As the downstream pressure reach its setting, it started to overcome the spring force which is sensed by the diaphragm, moving the yoke and disk assembly up and near its ↑◀┼→☒ ┐◀☒┼!◀┼►! ♬┐!>☼┐□⊥ $┐→◀ ┼┼!>☼┐◀☒♬ ♂!↑◀

+ | □☙□♬

The 1301 Series regulators may be installed in any position. Spring case vents must be protected against the entrance of rain, snow, debris, or any other foreign material that might plug the vent openings. The inlet connection is marked “In” and the two outlet connections are marked “Out”. If a pressure gauge is not installed in one outlet connection, plug the unused connection. See Figure 3 for dimensions.

; $●□! □● | |□●¶╞□♪●☼┐♬

The 1301 Series regulators have outlet pressure ratings lower than the inlet pressure ratings. Complete downstream overpressure protection is needed if the actual inlet pressure exceeds the outlet pressure rating.

Overpressuring any portion of a regulator or associated equipment may cause leakage, parts damage, or personal injury due to bursting of pressure-containing parts or explosion of accumulated gas. Regulator operation within ratings does not preclude the possibility of damage from external sources or from debris in the pipeline. A regulator should be inspected for damage periodically and after any overpressure condition.

• [illegible]
[illegible]
to determine the required relief valve capacity.

[illegible]

[illegible]

Tables 2 and 3 give regulating capacities at selected [illegible] (at 60°F and 14.7 psia) and Nm³/h (at 0°C and 1,01325 bar) of air. To determine the equivalent capacities for other gases, multiply the table capacities by the following [illegible] gravity natural gas, 0.808 for propane, 0.707 for butane, or 1.018 for nitrogen. For gases of other [illegible]
[illegible]

[illegible]
sizing, use one of the following equations:

For Critical Pressure Drops

Use this equation for critical pressure drops (absolute outlet pressure equal to one-half or less than one-half the absolute inlet pressure).

$$Q = P_{1(abs)}C_g$$

where,

[illegible]
C_g [illegible]
P_1 = absolute inlet pressure, psia

For Non-Critical Pressure Drops

Use this equation for pressure drops lower than critical (absolute outlet pressure greater than one-half of absolute inlet pressure).

$$Q = \sqrt{\frac{520}{GT}}\, C_g P_1 \mathrm{SIN}\left(\frac{3417}{C_1}\sqrt{\frac{\Delta P}{P_1}}\right)\mathrm{DEG}$$

where,

[illegible]
[illegible]
T = absolute temperature of gas at inlet, °Rankine
C_g [illegible]
P_1 = absolute inlet pressure, psia
C_1 [illegible]
ΔP = pressure drop across the regulator, psi

Then, if capacity is desired in normal cubic meters per hour at 0°C and 1,01325 bar, multiply [illegible] by 0.0268.

[illegible]

Tables 5 and 6 give regulating capacities in U.S. gallons per minute and liters per minute of water.

To determine regulating capacities at pressure settings not given in Tables 5 and 6, or to determine wide-open capacities for relief sizing at any inlet pressure, use the following equation.

$$Q = C_v\sqrt{\frac{\Delta P}{G}}$$

where,

[illegible] GPM
ΔP = pressure drop across the regulator, psi
C_v = regulating or wide-open [illegible]
[illegible]

Maximum Allowable Pressure Drop for Liquid

Pressure drops in excess of allowable will result in [illegible]
vena contracta is the minimum cross-sectional area [illegible]
change is from the liquid state to the vapor state and [illegible]

SB_GT&S_0503618

[illegible] Type 1301F Regulating Capacities — Air with 100 to 750 psig / 6,9 to 51,7 bar Inlet Pressure

[illegible]	[illegible]		[illegible]															
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10 to 75 / 0,69 to 5,2 1D387227022 Blue	25 50 75	1,7 3,4 5,2	190 280 250	5,1 7,5 6,7	290 400 400	7,8 10,7 10,7	300 480 600	8,0 12,9 16,1	480 800 900	12,9 21,4 24,1	400 720 900	10,7 19,3 24,1	650 1000 1400	17,4 26,8 37,5	500 840 1000	13,4 22,5 26,8	750 1200 1600	20,1 32,2 42,9
50 to 150 / 3,4 to 10,3 1B788527022 Silver	75 150	5,2 10,3	200 ----	5,4 ----	350 ----	9,4 ----	500 750	13,4 20,1	800 1000	21,4 26,8	800 1100	21,4 29,5	1300 1800	34,8 48,2	950 1450	25,5 38,9	1500 2300	40,2 61,6
100 to 225 / 6,9 to 15,5 1D465127142 Red	150 225	10,3 15,5	---- ----		---- ----		650 500	17,4 13,4	900 800	24,1 21,4	1000 1400	26,8 37,5	1700 2100	45,6 56,3	1350 1900	36,2 50,9	2200 2900	59,0 77,7

[illegible] Type 1301F Regulating Capacities — Air with 1000 to 2000 psig / 69,0 to 138 bar Inlet Pressure

[illegible]	[illegible]		[illegible]											
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10 to 75 / 0,69 to 5,2 1D387227022 Blue	25 50 75	1,7 3,4 5,2	520 900 1100	13,9 24,1 29,5	770 1300 1700	20,6 34,8 45,6	540 950 1200	14,5 25,5 32,2	800 1400 1800	21,4 37,5 48,2	560 1000 1300	15,0 26,8 34,8	820 1500 1900	22,0 40,2 50,9
50 to 150 / 3,4 to 10,3 1B788527022 Silver	75 150	5,2 10,3	1000 1600	26,8 42,9	1600 2600	42,9 69,7	1100 1700	29,5 45,6	1700 2800	45,6 75,0	1200 1800	32,2 48,2	1800 3000	48,2 80,4
100 to 225 / 6,9 to 15,5 1D465127142 Red	150 225	10,3 15,5	1500 2400	40,2 64,3	2250 3500	60,3 93,8	1650 2700	44,2 72,4	2750 4000	73,7 107	1800 3000	48,2 80,4	3000 4500	80,4 121

[illegible] Type 1301G Regulating Capacities — Air

[illegible]	[illegible]		[illegible]		[illegible]													
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
200 to 500 / 13,8 to 34,5 1K156027142 Silver	200	13,8	10 20 30 40	0,69 1,4 2,1 2,8	350 650 900 1100	9,4 17,4 24,1 29,5	550 900 1350 1650	14,7 24,1 36,2 44,2	750 1200 1700 2100	20,1 32,2 45,6 56,3	950 1500 2000 2500	25,5 40,2 53,6 67,0	1100 1800 2300 3000	29,5 48,2 61,6 80,4	1250 2000 2700 3500	33,5 53,6 72,4 93,8	1400 2100 3000 3700	37,5 56,3 80,4 99,2
	500	34,5	15 25 50	1,0 1,7 3,4	---- ---- ----		---- ---- ----		800 1400 2200	21,4 37,5 59,0	1000 1600 2800	26,8 42,9 75,0	1300 2000 3300	34,8 53,6 88,4	1500 2600 4000	40,2 69,7 107	1600 2800 4500	42,9 75,0 121

[illegible] Type 1301F Regulating Capacities — Water[1]

[illegible]	[illegible]		[illegible]									
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10 to 75 / 0,69 to 5,2 1D387227022 Blue	25 50 75	1,7 3,4 5,2	0.50 0.50 0.46	2,0 2,0 1,7	0.73 0.83 0.91	2,8 3,1 3,4	0.94 1.12 1.28	3,6 4,2 4,8	1.09 1.32 1.52	4,1 5,0 5,7	1.16 1.43 1.69	4,4 5,4 6,4
50 to 150 / 3,4 to 10,3 1B788527022 Silver	75 150	5,2 10,3	0.43 ----	1,6 ----	0.88 1.01	3,3 3,8	1.24 1.64	4,7 6,2	1.49 2.02	5,6 7,6	1.65 2.31	6,2 8,7
100 to 225 / 6,9 to 15,5 1D4651270142 Red	150 225	10,3 15,5	---- ----		0.95 0.84	3,6 3,2	1.56 1.73	5,9 6,5	1.96 2.27	7,4 8,6	2.24 2.68	8,5 10,1

1. Inlet pressure greater than 1000 psig / 69,0 bar is not recommended for water service.

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Bulletin 71.1:1301

/←⊠# ⊓ Type 1301G Regulating Capacities — Water[1]

⊥├→+* 8¶) * 8 =q ├) →>¶ J ?@=→q¶) * ¶6 ; < ; →q¶ ! |⊤ / ⊡	; J><=>¶→ =⊥⊥ J→ =¶ ⊥=>>+* 8q¶ ! |⊤ / ⊡	6) ├) 6+>+=⊥¶* ¶B) << ; *⊥¶¶•⊡| ¶ =→ ¶?+* J>=¶; ←¶^)>=→ ¶@)⊥= ¶; *¶‼ ` ¶ → ; ; ├			
		+ ♂¶ ⊡• | |⊡•q¶ |⊤ ¶¶ ⊡			
		↕‼¶¶_‼qz	y‼¶¶ {qy	zy‼¶¶y◀z	◀‼‼¶¶vxq‼[1]
200 to 500 / 13,8 to 34,5 1K156027142 Silver	200 / 13,8 500 / 34,5	1.12 / 4,2 - - - -	1.73 / 6,5 - - - -	2.24 / 8,5 1.99 / 7,5	2.64 / 10,0 2.58 / 9,8

1. Inlet pressure greater than 1000 psig / 69,0 bar is not recommended for water service.

/←⊠$ ⊓ Type 1301F C_V ⊓⊠/←•⊠☼◀[1]

; J><=>¶→ =⊥⊥ J→ =¶ →) * 8 =q¶ ├→+* 8¶) →>¶ * J ?@=→q¶) * ¶6 ; < ; →q¶ ├⊥+8 ¶¶ ⊡	; J><=>¶ ├→ =⊥⊥ J→ =¶ ⊥=>>+* 8q¶ ├⊥+8 ¶¶ ⊡	>m├ =¶↕‼◀←¶6‚¶6 ; =←←+6+= * >⊥¶@)⊥= ¶; *¶‼ ` ¶ → ; ; ├						
		+ ♂¶ ⊡• | |⊡•q¶ |⊤ ¶¶ ⊡						
		◀‼‼¶¶vqx	_y‼¶¶zq_	y‼‼¶¶ {qy	zy‼¶¶y◀z	◀‼‼‼¶¶vxq‼	◀y‼‼¶¶‼↕[1]	_‼‼‼¶¶↕|[1]
10 to 75 / 0,69 to 5,2 1D387227022 Blue	25 / 1,7 50 / 3,4 75 / 5,2	0.056 0.065 0.073	0.048 0.057 0.066	0.043 0.052 0.061	0.040 0.050 0.058	0.037 0.046 0.055	0.032 0.041 0.051	0.029 0.038 0.049
50 to 150 / 3,4 to 10,3 1B788527022 Silver	75 / 5,2 150 / 10,3	0.068 - - - -	0.064 0.089	0.059 0.084	0.057 0.080	0.054 0.078	0.050 0.075	0.047 0.074
100 to 225 / 6,9 to 15,5 1D4651270142 Red	150 / 10,3 225 / 15,5	- - - - - - - -	0.083 0.100	0.080 0.097	0.078 0.095	0.076 0.094	0.074 0.092	0.074 0.091

1. Inlet pressure greater than 1000 psig / 69,0 bar is not recommended for water service.

/←⊠% ⊓ Type 1301G C_V ⊓⊠/←•⊠☼◀[1]

; J><=>¶→ =⊥⊥ J→ =¶ →) * 8 =q¶ ├→+* 8¶) →>¶ * J ?@=→q¶) * ¶6 ; < ; →q¶ ! |⊤ / ⊡	; J><=>¶ ├→ =⊥⊥ J→ =¶ ⊥=>>+* 8q¶ ! |⊤ / ⊡	>m├ =¶↕‼◀8¶6‚¶6 ; =←←+6+= * >⊥¶@)⊥= ¶; *¶‼ ` ¶ → ; ; ├						
		+ ♂¶ ⊡• | |⊡•q¶ |⊤ ¶¶ ⊡						
		↕‼¶¶_‼qz	y‼¶¶ {qy	zy‼¶¶y◀z	◀‼‼‼¶¶vxq‼	◀y‼‼¶¶‼↕[1]	_‼‼‼¶¶↕|[1]	__y‼¶¶yy[1]
200 to 500 / 13,8 to 34,5 1K156027142 Silver	200 / 13,8 500 / 34,5	0.095 - - - -	0.094 - - - -	0.092 0.106	0.091 0.105	0.089 0.104	0.088 0.103	0.088 0.103

1. Inlet pressure greater than 1000 psig / 69,0 bar is not recommended for water service.

To determine the maximum allowable pressure drop for water:

$$\neg P \text{ (allow)} = K_m (P_1)$$

where,

¬ P = pressure drop across the regulator, psi

K_m ⊓ ¬ ♂☼¬◀☼→↑ ☼◀⊤→↑☼\| →☼!

P_1 = absolute inlet pressure, psia

To determine maximum allowable pressure drop for ⊔ ├ ┼¬↑!>☼◀!>¬$!☼◀ ▯¬ ┼☼¬↑!>☼◀⊡ ╟>☼◀ sizing methods ↑◀→↑!→!¬Z↑ ◀♂→¶☼┼ \| →☼¬\|↑◀┼ ╟!→☼

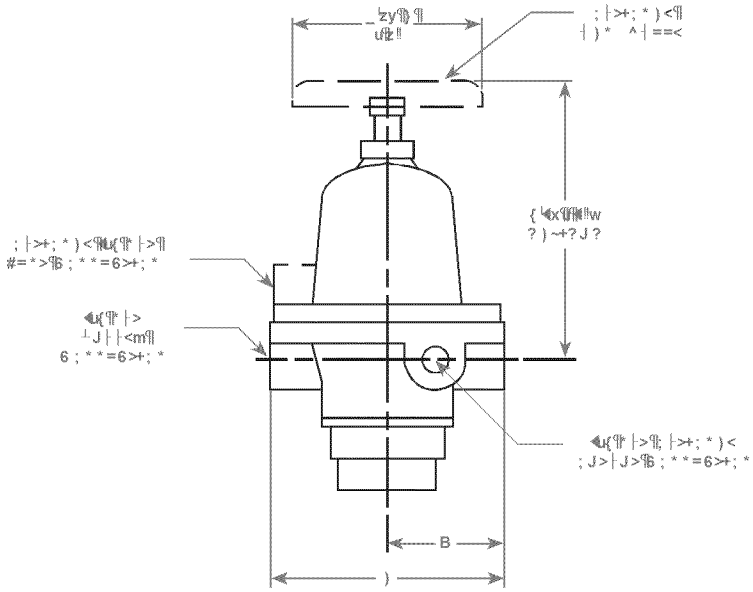
J ¬$•⊡\| ⊡♂¶*) 6 =¶6♬┼ !♂⊓ ☼•

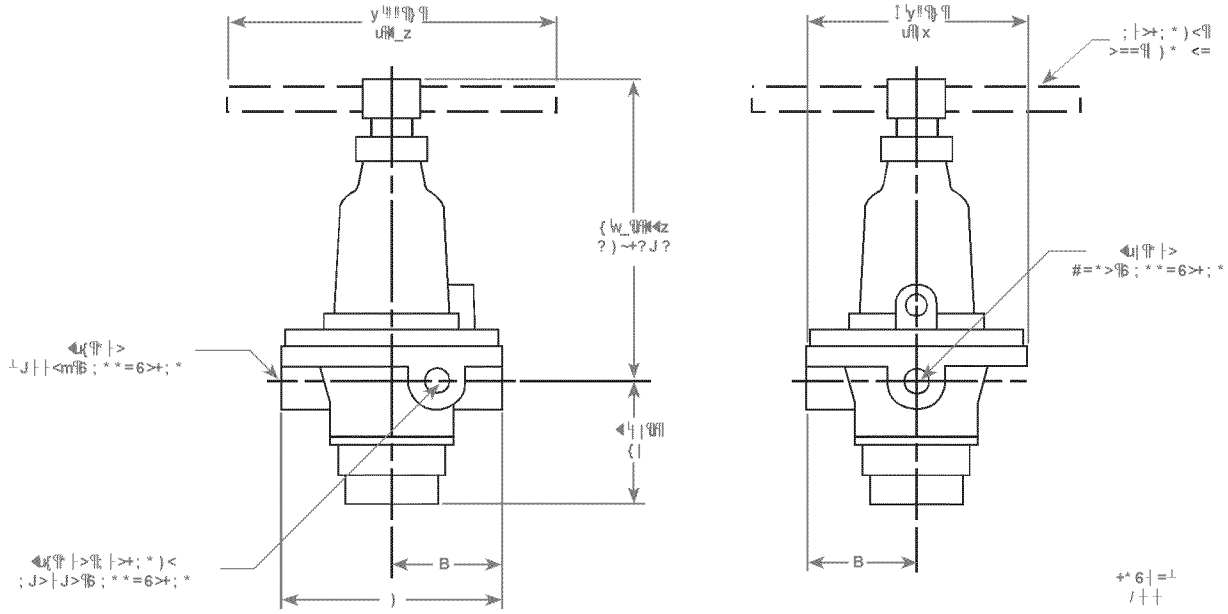
Optional materials are available for applications handling sour gases. These constructions comply with the recommendations of NACE International sour service standards.

The manufacturing processes and materials used by ~] ☼◀┼↑┼┼ ◀☼¬!>!¬♂←◀ →!┼┼←☼→├☼ ¬\|↑◀┼↑ ◀ gas service comply with the chemical, physical, and metallurgical requirements of NACE MR0175 and/or NACE MR0103. Customers have the responsibility to specify correct materials. Environmental limitations may apply and shall be determined by the user.

; ⊡' •⊡⊤ ¶ 7♬⊡┼ ⊔♬

┼☼¬!>☼¬¶←☼→├→!╫ ┼┼☼→!╟¬↑←♬☼┼\|¬ ¬[¬!↑¬ complete the Ordering Guide on page 8. Specify the desired selection wherever there is a choice to be] ☼ ¬└◀ ├☼Z↑ ◀¶♂┼ \| →☼¬$ ╟>¬!> ╟¬╟↑◀] !╟¬ when ordering the regulator.





AK2725_F

1301 Series Dimensions

1301 Series Dimensions

1301F	Brass	3.38 / 86	1.69 / 43
	Stainless steel	3.62 / 92	1.75 / 44
1301G	Brass	3.38 / 86	1.69 / 43
	Stainless steel	3.62 / 92	1.75 / 44

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;◘'●◘┬ ¶ß┬'●

>(!● (Select One)

>(!●¶‖↨‼◄←K
- ☐ 10 to 75 psig / 0,69 to 5,2 bar***
- ☐ 50 to 150 psig / 3,4 to 10,3 bar***
- ☐ 100 to 225 psig / 6,9 to 15,5 bar***

>(!●¶‖↨‼◄8K
- ☐ 200 to 500 psig / 13,8 to 34,5 bar***

@♬'(¶□ '╢!◘┬ ¶ß□|●¶? □●◘┬□♂(Select One)
- ☐ Brass***
- ☐ CF8M Stainless steel**

#□$●¶ ┬|%¶(Select One)
- ☐ Nylon (PA)***
- ☐ PTFE**

8□|%●| (Select One)
- ☐ Neoprene (CR)***
- ☐ Fluorocarbon (FKM)**
- ☐ Ethylenepropylene (EPDM)*

→● ♂♬◘|¶ ┬%¶;◘'●◘ß┬'●	
***	Standard - Readily Available for Shipment
**	Non-Standard - Allow Additional Time for Shipment
*	Special Order, Constructed from Non-Stocked Parts. ┤↑┼ ♂Z↑ ◄♂→¶☼┤ │┬☼|↑◄} ♭ |Z
Availability of the product being ordered is determined by the component with the longest shipping time for the requested construction.	

→●!♂☼●┼● ¶□◘|¶: ╢ (Optional)

☐ Yes, send one replacement parts kit to match this order.

┴!●☼┬¶□♬ ¶^♬◘%|─●●

)!!♂☼□♬ K

¶←☼→├┬┐ ┼☼ ______

Line Size ______

Fluid Type ______

¶←☼→├┬┐ ◄ |Z ______

Temperature ______

Doesthe Application Require Overpressure Protection?

☐ Yes ☐ No

├◘●| |◘●K

Maximum Inlet Pressure ______

Minimum Inlet Pressure ______

Differential Pressure ______

Set Pressure ______

Maximum Flow ______

)☼☼◘☼(¶●]◘┼● |K

Less Than or Equal To:

☐ 5% ☐ 10% ☐ 20% ☐ 40%

6♬ |◘☼♬ ¶? □●◘□¶●]◘┼● |ß7% ♬┐ K¶

______

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→● ♂♬◘¶●☼─ ♬♂ ┬●|¶ ☼└

¶}^┐<☼ ◄☼◄
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EMERSON
Process Management

Exhibit K

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GULF INTERSTATE ENGINEERING

CHECK SHEET

Project No.: 1571

PLS-5A / V-299.00A

TAG No. V-299.00A

ITEM #	ACTIVITY	COMPLETE
	MECHANICAL COMPLETION	
1	Install Circle Seal Relief Valve 5100 series and set relief pressure @ 110 psig	
2	Install Fisher 1301F Regulator	
3	Install louver plate & filter media at bottom of door.	
4	Install 2 Athos1 mushroom ventilators at the top horizontal plane of Becker cabinet	
5	Retube MCV	
6	All required O-rings & Threaded Plugs have been installed and checked	
7	Pneumatic lines have been checked and are stress-free	
8	Conductors have been terminated & verified	N/A
9	Cable & Wire tags have been secured per manufacturer recommended heating or crimping device.	N/A
10	Mounting hardware is tight and secure. YES ☑ NO ☐	
11	Verify nameplate data of relief valve & regulator	
12	Leak test piping & tubing threaded connections with soapy water	
13	Verify correct instrument installation	
	COMMISSIONING	
14	MCV Position Switch PLC Input module indication. Node #: _____ Slot/Module#: _____ Channel #: _____ Under normal conditions, is position switch is shown on PLC as: ON ☐ OFF ☐	N/A
15	Confirm if alarm is activated YES ☐ NO ☐	N/A
16	Confirm if HMI screen alarm indication YES ☐ NO ☐	N/A
17	Cabinet is internally clean	
18	Functional test of relief to verify 110 psig set pressure	
	START-UP	
19	Cycle Test (Manually-MCV): OPEN: _____ sec. CLOSE: _____ sec.	
20	Cycle Test (By Pilot): OPEN: _____ sec. CLOSE: _____ sec.	
21	Power Gas Pressure regulator Is Set At: _____ PSIG	
22	Valve is operational & all punch list items are complete. YES ☐ NO ☐	

NOTES :

GIE _____ **DATE :** _____

PG&E GC M&C _____ **DATE :** _____

PG&E DISTRICT _____ **DATE :** _____

PG&E ENGINEERING _____ **DATE :** _____

PUNCH LIST
PLS-5A STATION
V-299.00A

ITEM	EQUIPMENT	LOCATION	DESCRIPTION	Critical (C) or Non-Critical (NC) Item	RESPONSIBILITY					COMPLETION DATE		COMMENTS
					PG&E GC M&C	PG&E DISTICT	PG&E ENGINEERING	GULF	VENDOR	PLANNED	ACTUAL	
1												
2												
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