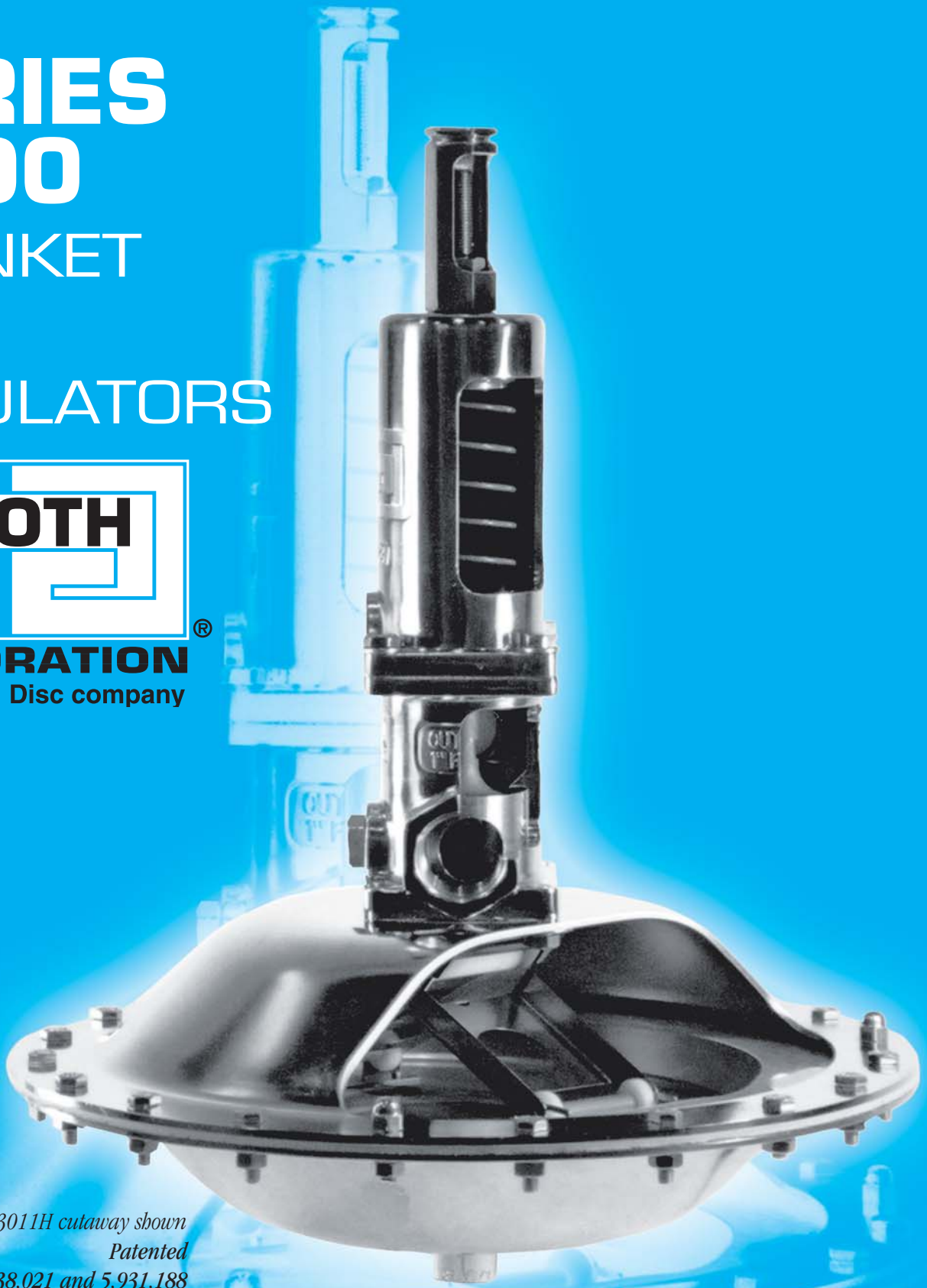
SERIES 3000

BLANKET GAS REGULATORS

GROTH®
CORPORATION
a Continental Disc company

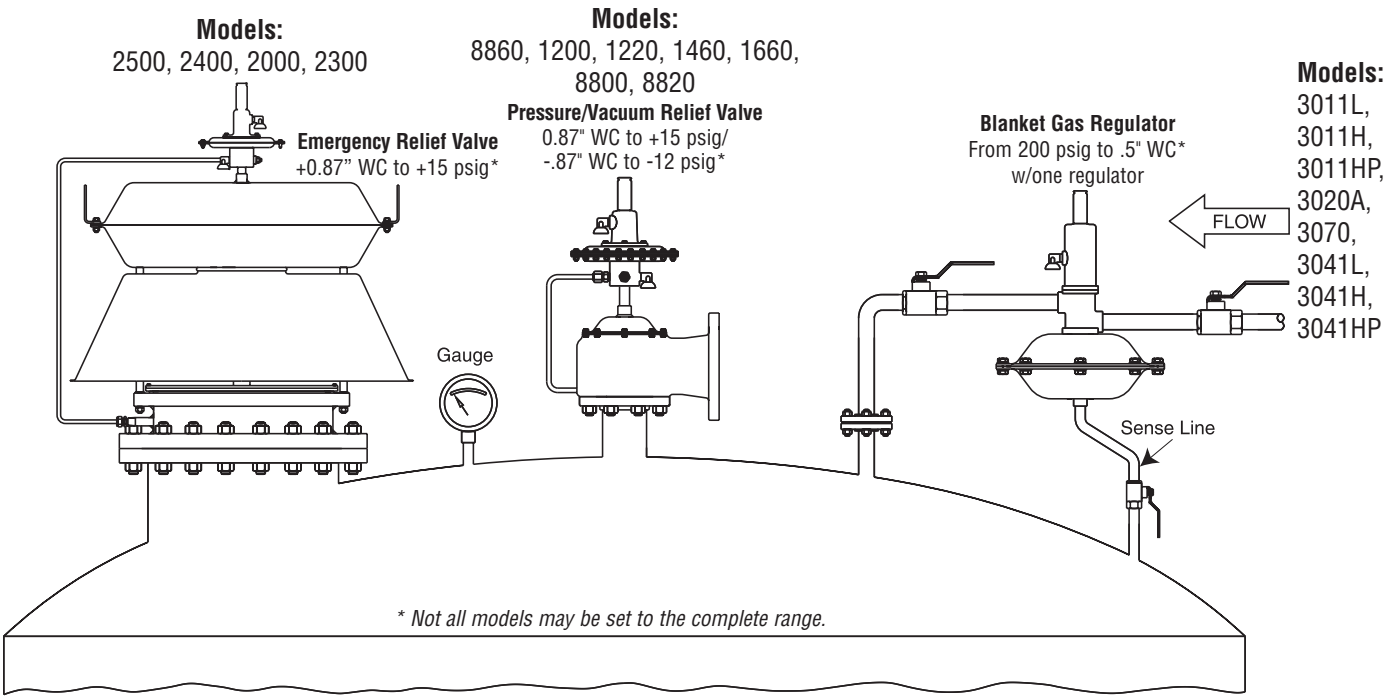


3011H cutaway shown
Patented
US 5,238,021 and 5,931,188

FEATURES

- Variable Orifice Sleeve, Field Adjustable
- Single Stage Regulation from 200 psig to 0.5" WC
- Bubble-Tight Shut-Off
- Setting Ranges from 0.5" WC to 15 psig
- Modulating Design
- Reliability-Tested to 5,000 Cycles
- Simple Operation, Spring-Loaded "Push-Push" Balanced Piston Design
- Low Maintenance Cost

WHY GAS BLANKETING?



Why Gas Blanketing

Blanket gas regulators from Groth Corporation ensure that a constant gas pressure is maintained in the vapor space of a storage tank. A blanket gas regulator supplies an inert gas to prevent a vacuum from developing when liquid is removed from a tank, to maintain the desired blanket pressure when the temperature drops, and to prevent outside air from contaminating the tank or creating a flammable or explosive environment. A blanket gas pressure as low as 0.5" water column prevents outside air and moisture from entering the storage vessel and reduces the evaporation of the stored product to a negligible amount. The result conserves product, greatly reduces emissions, and protects the tank from external fires.

The simple design of a Groth blanket gas regulator eliminates the need for a multiple regulator system or for complicated pilot operated blanketing valves. Groth units have totally balanced chambers to offer high accuracy and reliability, and ensure a leak-tight design without the need for a pilot valve to operate the unit, reducing maintenance costs.

Groth blanket gas regulators provide a controlled gas environment in storage tanks for the following applications:

- Refineries
- Chemical & Petrochemical Plants
- Liquid Bulk Storage Terminals
- Pulp & Paper Plants
- Food & Beverage Storage

Optimum Protection

For optimum protection of a tank and to meet all regulatory requirements, each tank should be protected by 1) a properly-sized blanket gas regulator, to maintain the vapor pressure in the tank, 2) a properly-sized pressure/vacuum relief valve or pilot operated valve, to release the vapor during pump-in or thermal expansion, and 3) a properly-sized emergency relief valve to protect against pressure rise due to external fire. Tank protection systems can be combined across multiple tanks, but careful consideration must be given to provide adequate relief and input capacity and to prevent fouling or clogging of system piping. Consult the factory for assistance in these situations.

A Groth blanket gas regulator will prevent evaporation or contamination by maintaining the proper atmosphere and pressure on the product. A Groth pressure/vacuum relief valve or pilot operated valve with vacuum relief will maintain a bubble-tight seal to prevent vapor from escaping into the atmosphere until the set pressure is exceeded, and provide vacuum protection in case of a gas supply failure. The emergency relief valve will provide vessel protection under control system failure or external fire conditions. The complete system can be provided by Groth Corporation.

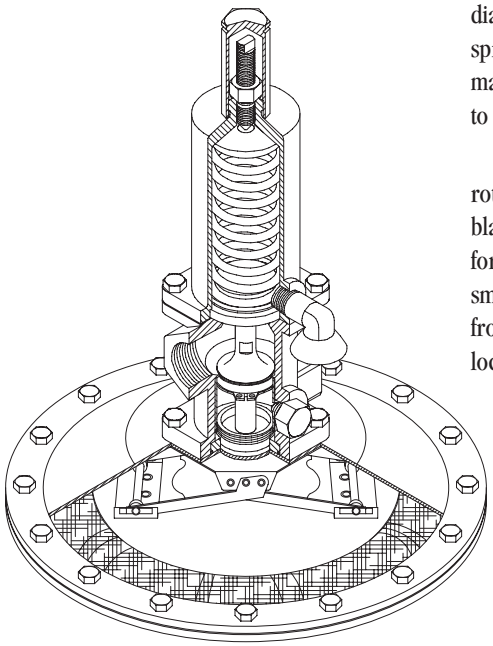
Benefits of storage tank blanketing are recognized by the following government regulations and industrial standards:

- API Standard 2000
- EPA Publication AP-42
- NFPA 69 - Standard on Explosion Prevention Systems
- OSHA Part 1910.106

Features

Groth gas blanket regulators have the following features:

- Direct acting, modulating valves with a patented force multiplying linkage (not used in 3011HP, 3041HP, or 3020A models)
- Balanced forces acting on piston (setting is not affected by supply pressure)
- Compact size and weight
- Setting range is from –10 psig to +15 psig (Consult the factory for other settings)
- Molded Teflon®[1] (FEP) Actuator Diaphragm
- NPT or flange connections
- Wide selection of elastomer seal materials
- Field adjustable flow capacity (5%-100%)
- Remote installation configuration available
- Available for vacuum service



Operation

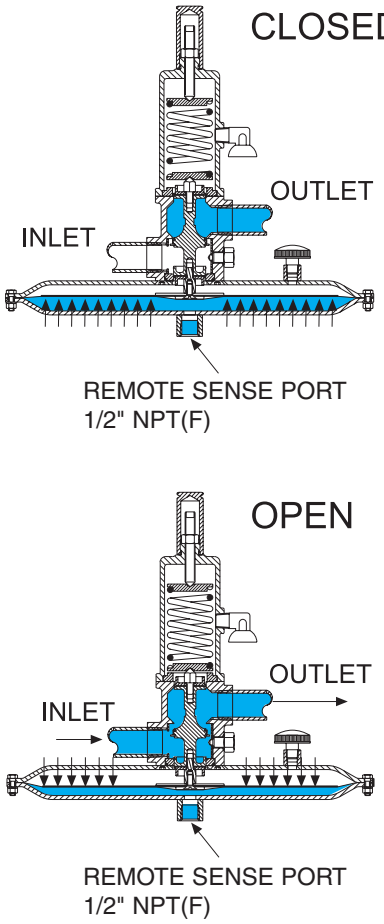
The Groth blanket gas regulator maintains vapor pressure in a tank by opening the supply gas valve when tank pressure (through a sense port) falls below the specified set pressure.

When tank pressure is at or above the set pressure, the plate diaphragm is held up by tank pressure. Through the patented force-multiplying actuator arms, the piston is held up against the spring pressure, and the supply valve is closed bubble-tight.

When the tank pressure falls below the set pressure, the spring force overcomes the pressure exerted by the diaphragm. The piston moves down, and supply gas is released into the tank.

The actuating piston has identical effective areas on the lower piston seal and the O-ring. This balances the opening and closing forces caused by supply pressure; variable gas supply pressure will not have an effect on regulator operation, which eliminates the need for an external pilot control. Pressure against the diaphragm provides direct action against the spring. This "push-push" design provides maximum force to operate the regulator and to provide a bubble-tight seal.

The flow capacity can be limited by the rotatable orifice selector sleeve. Reducing the blanket gas flow capacity may reduce the need for excessive pressure relieving capacity on smaller tanks. The sleeve is field adjustable from wide-open to 5% capacity, and can be locked down to prevent tampering.



Note: Inlet & outlet are reversed for vacuum regulator.

Options

To complete your blanket gas protection system, Groth Corporation can provide a variety of additional devices for measuring, managing, and maintaining the cleanliness of your storage system:

- Gauges
- Purges
- Filters

Contact Groth Corporation or your local representative for more information.

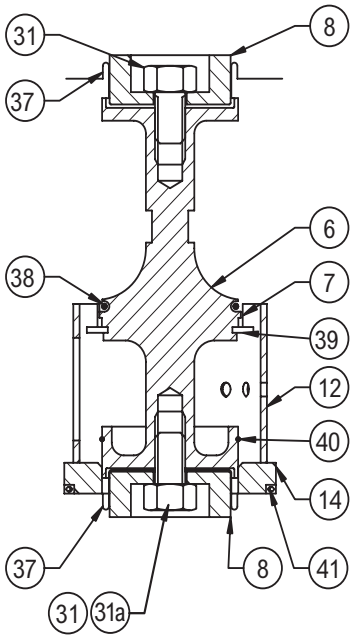
[1] Teflon is a registered trademark of E.I. du Pont de Nemours and Company used under license.

Pressure/Vacuum Regulators

Groth blanket gas regulators are available in eight different models that cover a pressure range from -10 psig to +15 psig. Units are available that can be set as low as 0.5" WC positive or negative pressure. See Tables 1 and 2 (page 707) for available pressure ranges for each model. Consult the factory for additional information on high capacity model 3070 and regulators for settings less than -2 psig.

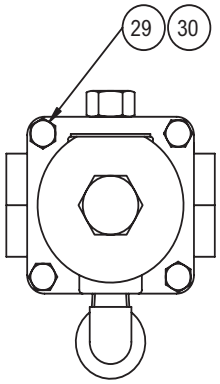
Model	Range
	PRESSURE
3011L	0.5" WC– 2.0" WC
3011H	0.5" WC – 6.5" WC
3011HP	6.5" WC– 2.0 psig
3020A	2.0 psig – 15 psig
3070	0.5" WC– 15 psig
	VACUUM
3041L	-0.5" WC– -2.0" WC
3041H	-0.5" WC – -6.5" WC
3041HP	-6.5" WC – -2.0 psig

Consult the factory for settings less than -2 psig.



PISTON DETAIL

Note: Piston inverted for vacuum regulators.



TOP VIEW

PRESSURE REGULATORS

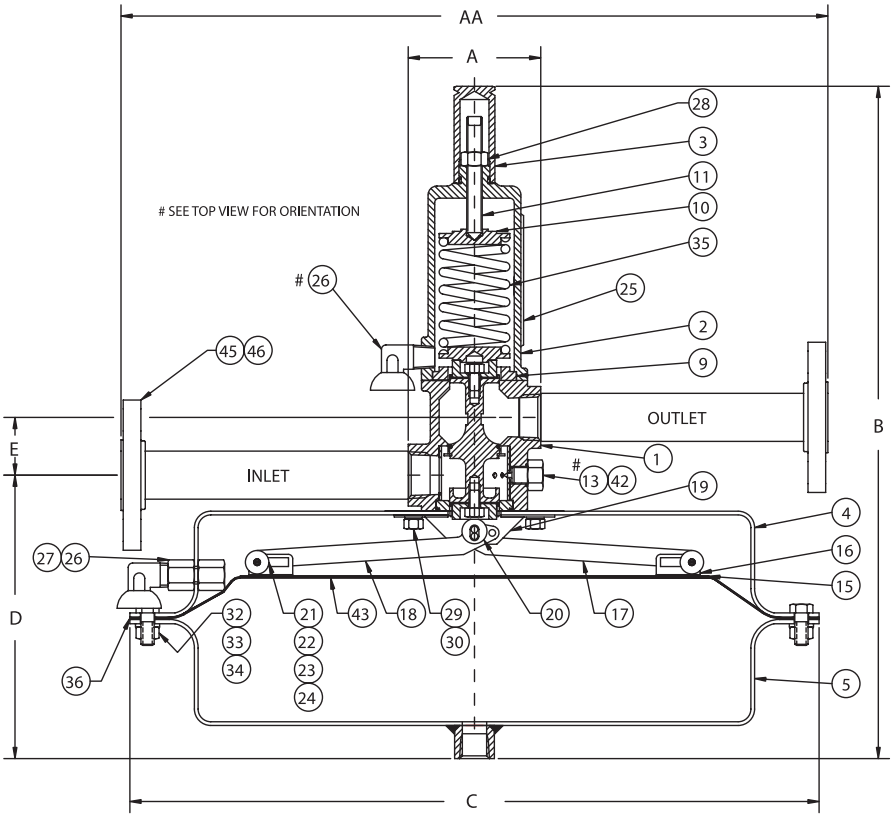


Figure 1: Cross-section of 3011L

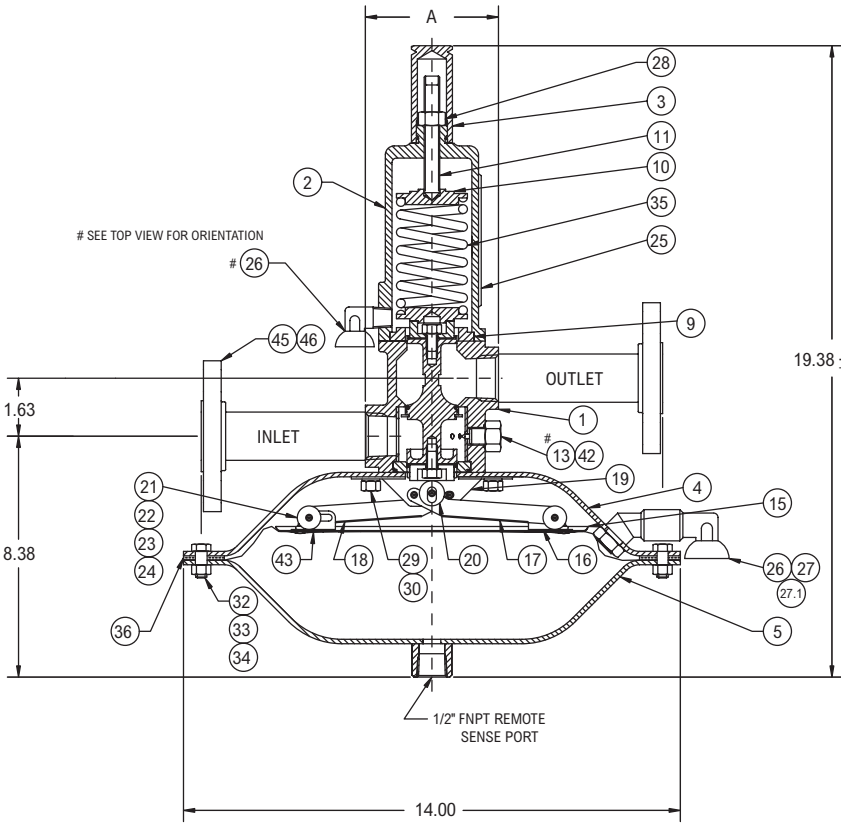


Figure 2: Cross-section of 3011H

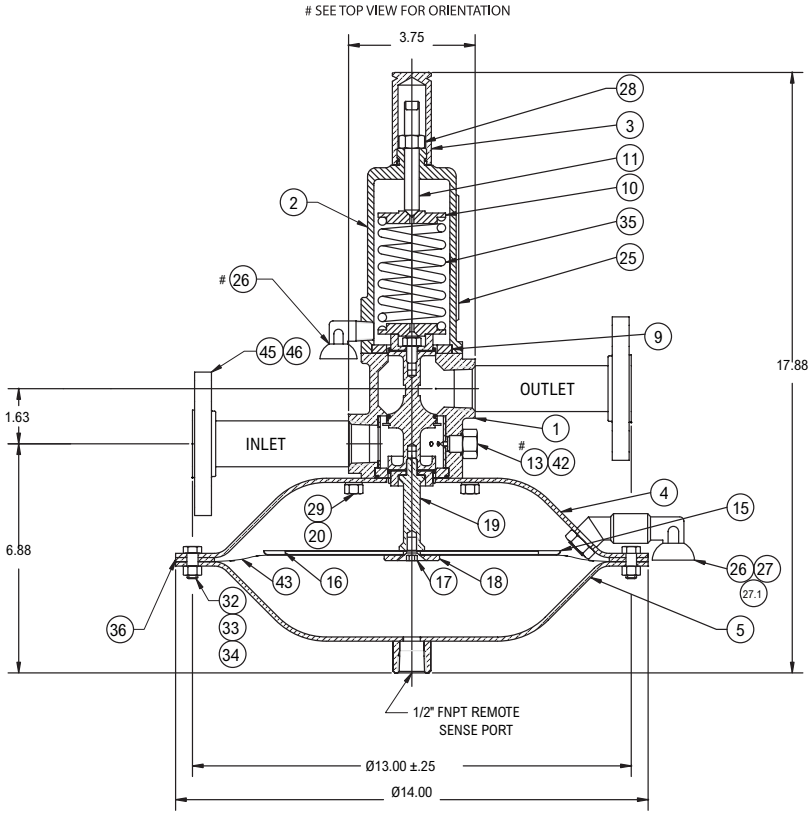


Figure 3: Cross-section of 3011HP

PRESSURE REGULATORS

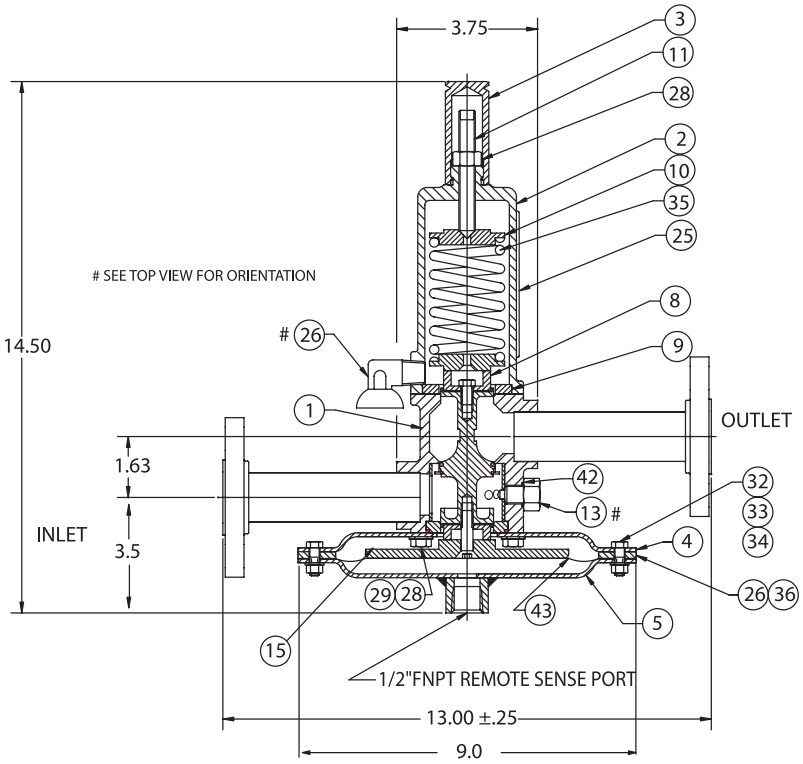


Figure 4: Cross-section of 3020A

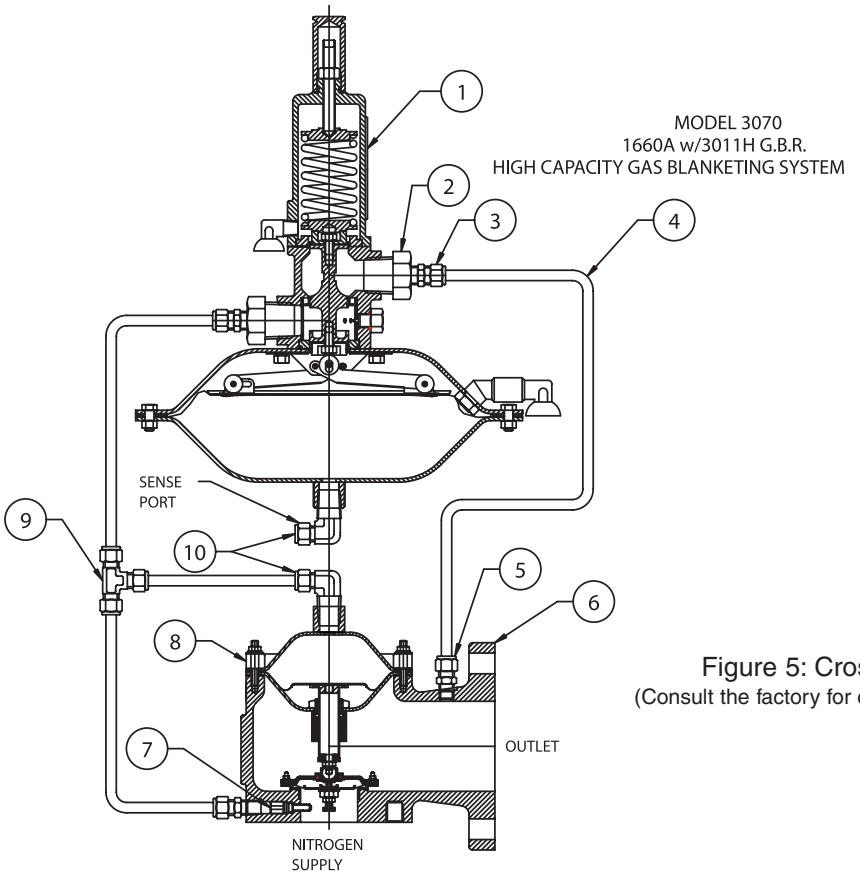


Figure 5: Cross-section of 3070
(Consult the factory for capacity, dimensions, & BOM)

VACUUM REGULATORS

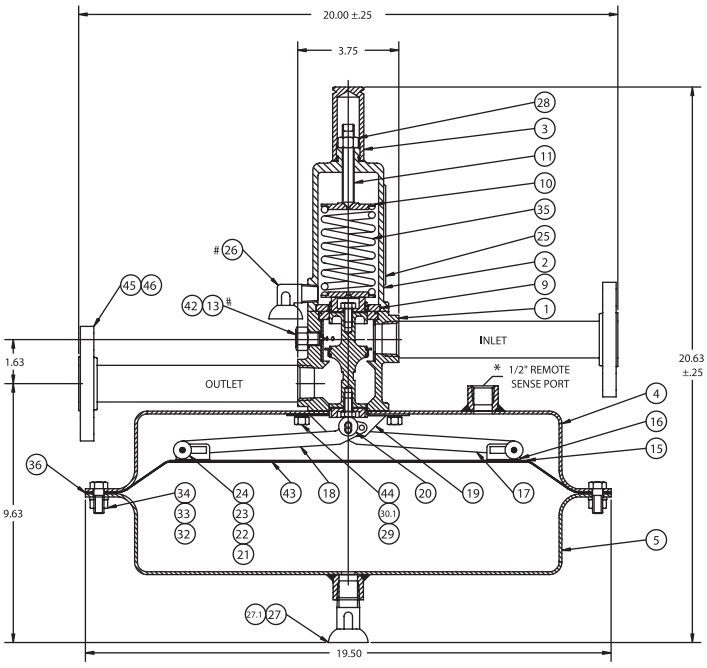


Figure 6: Cross-section of 3041L

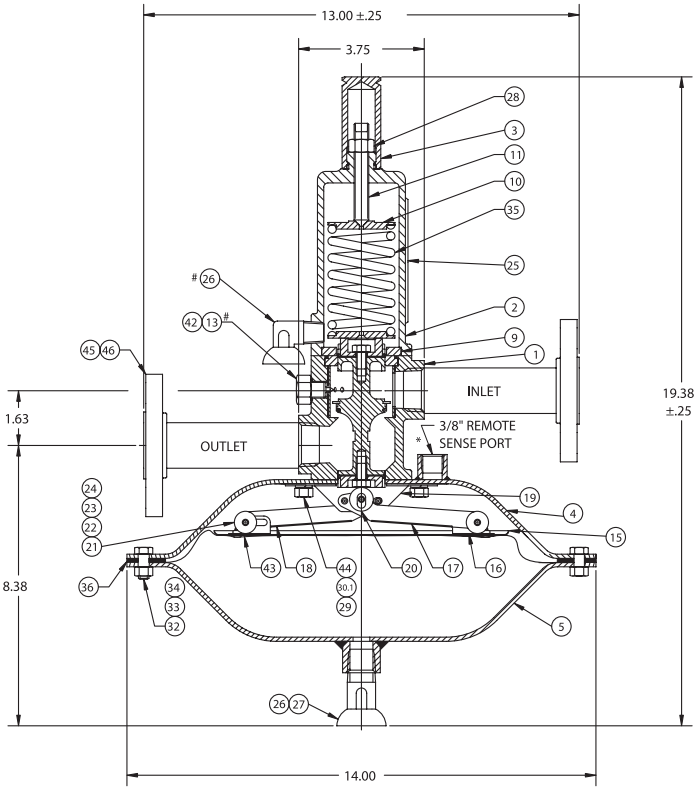


Figure 7: Cross-section of 3041H

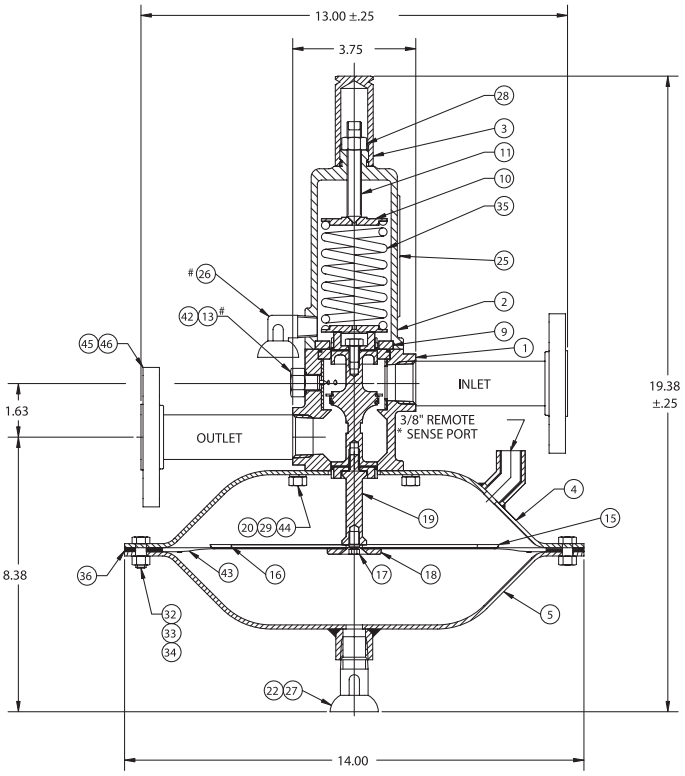


Figure 8: Cross-section of 3041HP

COMPONENT LIST

BILL OF MATERIALS

Item	Name	Material	3011L	3011H	3011HP	3020A	3041L	3041H	3041HP
1	Body	316SS	✔	✔	✔	✔	✔	✔	✔
2	Bonnet, Spring	316SS	✔	✔	✔	✔	✔	✔	✔
3	Cap, Adjustment screw	316SS	✔	✔	✔	✔	✔	✔	✔
4	Housing, Upper actuator	316SS	✔	✔	✔	✔	✔	✔	✔
5	Housing, Lower actuator	316SS	✔	✔	✔	✔	✔	✔	✔
6	Piston	316SS	✔	✔	✔	✔	✔	✔	✔
7	Retainer, O-Ring piston seat	316SS	✔	✔	✔	✔	✔	✔	✔
8	Retainer, Diaphragm	316SS	✔	✔	✔	✔	✔	✔	✔
9	Adapter, Bonnet	316SS	✔	✔	✔	✔	✔	✔	✔
10	Button, Spring	316SS	✔	✔	✔	✔	✔	✔	✔
11	Screw, Pressure adjustment	316SS	✔	✔	✔	✔	✔	✔	✔
12	Sleeve, Orifice selector	316SS	✔	✔	✔	✔	✔	✔	✔
13	Screw, Sleeve locking	316SS	✔	✔	✔	✔	✔	✔	✔
14	Ring, Piston guide	316SS	✔	✔	✔	✔	✔	✔	✔
15	Plate, Diaphragm support	316SS	✔	✔	✔	✔	✔	✔	✔
16	Bracket, Actuator linkage	316SS	✔	✔	–	–	✔	✔	–
17	Arm, Actuator linkage	316SS	✔	✔	–	–	✔	✔	–
18	Arm, Actuator linkage	316SS	✔	✔	–	–	✔	✔	–
19	Bracket, Actuator linkage	316SS	✔	✔	–	–	✔	✔	–
20	Roller, Actuator	Nylon	✔	✔	–	–	✔	✔	–
21	Roll, Actuator	Nylon	✔	✔	–	–	✔	✔	–
22	Spacer, Roll pin	Tygon®	✔	✔	–	–	✔	✔	–
23	Rivet, Pop	316SS	✔	✔	–	–	✔	✔	–
24	Pin, Actuator linkage	316SS	✔	✔	–	–	✔	✔	–
25	Nameplate	316SS	✔	✔	✔	✔	✔	✔	✔
26	Vent	Alum	✔	✔	✔	✔	✔	✔	✔
27	Vent connector	PVC	✔	✔	✔	✔	✔	✔	✔
28	Nut, Hex	316SS	✔	✔	✔	✔	✔	✔	✔
29	Bolt, Hex	316SS	✔	✔	✔	✔	✔	✔	✔
30	Washer, Lock	316SS	✔	✔	✔	✔	✔	✔	✔
31	Bolt, Hex	316SS	✔	✔	✔	✔	✔	✔	✔
31a	Screw, Flathead	316SS	–	–	–	✔	–	–	–
32	Bolt, Hex	316SS	✔	✔	✔	✔	✔	✔	✔
33	Washer, Lock	316SS	✔	✔	✔	✔	✔	✔	✔
34	Nut, Hex	316SS	✔	✔	✔	✔	✔	✔	✔
35	Spring	316SS	✔	✔	✔	✔	✔	✔	✔
	SOFT GOODS KIT								
36	Gasket, Actuator	Teflon®FEP	✔	✔	✔	✔	✔	✔	✔
37	Diaphragm, Piston	Viton®[1]	✔	✔	✔	✔	✔	✔	✔
38	O-Ring, Piston seat	Viton®[1]	✔	✔	✔	✔	✔	✔	✔
39	Ring, Retaining	SS	✔	✔	✔	✔	✔	✔	✔
40	Stop, Lift	SS	✔	✔	✔	✔	✔	✔	✔
41	O-Ring, Guide ring	Viton®[1]	✔	✔	✔	✔	✔	✔	✔
42	O-Ring, Locking screw	Viton®[1]	✔	✔	✔	✔	✔	✔	✔
43	Diaphragm, Actuator	Teflon®FEP	✔	✔	✔	✔	✔	✔	✔
44	O-Ring, Bracket	316SS	–	–	–	–	✔	✔	✔
45	Nipple, Pipe	316SS	✔	✔	✔	✔	✔	✔	✔
46	Flange, RF	316SS	✔	✔	✔	✔	✔	✔	✔

[1] Viton is a registered trademark of E.I. du Pont de Nemours and Company
See Soft Goods selection for available materials

Table 1 — Positive Pressure Selection Guide

Set Pressure	Supply Pressure psig / barg			
	5-51 0.3-3.4	>51-101 3.5-6.9	>101-151 7.0-10.3	>151-200 10.4-13.8
0.5 - .99 In WC 1.2 - 2.5 mbar	3011H	3011H	3011L	3011L
1.0 - 1.49 In WC 2.5 - 3.7 mbar	3011H	3011H	3011L	3011L
1.5 - 1.99 In WC 3.7 - 5.0 mbar	3011H	3011H	3011L	3011L
2.0 - 6.49 In WC 5.0 - 16 mbar	3011H	3011H	3011L	3011L
6.5 in WC - 1.99 psig 16 - 140 mbar	3011HP	3011HP	3011HP	3011HP
2.0 - 15 psig 0.14 - 0.68 bar	3020A	3020A	3020A	3020A

Table 2 — Vacuum Pressure Selection Guide

Set Vacuum	Supply Pressure psig / barg			
	5-51 0.3-3.4	>51-101 3.5-6.9	>101-151 7.0-10.3	>151-200 10.4-13.8
-0.5 – -.99 In WC 1.2 - 2.5 mbar	3041H	3041H	3041L	3041L
-1.0 – -1.49 In WC 2.5 - 3.7 mbar	3041H	3041H	3041L	3041L
-1.5 – -1.99 In WC 3.7 - 5.0 mbar	3041H	3041H	3041L	3041L
-2.0 – -6.49 In WC 5.0 - 16 mbar	3041H	3041H	3041L	3041L
-6.5 in WC – -1.99 psig 16 - 140 mbar	3041HP	3041HP	3041HP	3041HP

Consult the factory for settings less than -2 psig.

Table 3 – Min/Max Pressures

Model Number*	Minimum Setting	Maximum Setting	Valve MAWP	Maximum Supply Pressure (MSP)**	Shipping Weight Lb (kg)
3011L	0.5" WC	2.0" WC	2 psig	200 psig	33
	1.3 mbarg	5 mbarg	0,13 barg	13.8 barg	15
3011H	0.5" WC	6.5" WC	8 psig	200 psig	24
	1.3 mbarg	16 mbarg	0,55 barg	13.8 barg	11
3011HP	6.5" WC	2.0 psig	25 psig	200 psig	24
	16 mbarg	0,14 barg	1,7 barg	13.8 barg	11
3020A	2.0 psig	10 psig	75 psig	200 psig	15
	0,14 barg	0,68 barg	5,1 barg	13.8 barg	7
3070	0.5" WC	15 psig	*	*	*
	1.3 mbarg	0,68 barg	*	*	*
3041L	-0.5" WC	-2.0" WC	2 psig	200 psig	33
	-1.3 mbar	-5 mbar	0,13 barg	13.8 barg	15
3041H	-0.5" WC	-6.5" WC	8 psig	200 psig	29
	-1.3 mbar	-16 mbar	0,55 barg	13.8 barg	11
3041HP	-6.5" WC	-2.0 psig	25 psig	200 psig	24
	16 mbarg	-0,14 barg	1,7 barg	13.8 barg	11

* Consult the factory.
** Review Tables 1, 2 and 3 for proper selection. MSP listed is relative to component rating, i.e. diaphragms. Certified dimensions available upon request.

Flow Capacity

Required flow capacity should be determined by using API 2000 or the relevant sizing standard. Groth Corporation's "Cal-Q-Size" will size your valve and regulator applications in accordance with API 2000. To find the rated capacity for your application, please refer to Table 4, Flow Capacity. Capacity is listed as a function of supply pressure for three typical blanket gases: CO_2, nitrogen, and natural gas. The flow capacities in the table are achieved with the 100% orifice selection. For reduced capacity, multiply the table values by the appropriate percentage from the "Orifice Selector Position" column on page 708.

Table 4 — Flow Capacity (consult factory for Model 3070)

Supply Pressure		Flow Capacity					
		Carbon Dioxide		Nitrogen		Natural GAS 0.6 SG	
psig	barg	SCFH	NCMH	SCFH	NCMH	SCFH	NCMH
5	0.34	4600	130	5800	164	7400	210
10	0.69	7100	201	8800	249	11300	320
15	1.03	9200	261	11500	326	14600	414
20	1.38	11200	317	14000	397	17900	507
30	2.07	15100	428	18900	535	24000	680
40	2.76	18800	533	23600	669	30000	850
50	3.45	22500	637	28200	799	35800	1014
60	4.14	26000	737	32600	924	41500	1176
80	5.52	33000	935	41300	1170	52600	1490
100	6.90	40000	1133	50100	1419	63700	1805
120	8.28	47000	1331	58800	1666	74800	2119
140	9.66	53900	1527	67500	1912	85900	2433
160	11.0	60900	1725	76300	2161	97000	2748
180	12.4	67900	1924	85000	2408	108100	3062
200	13.8	74900	2122	93700	2654	119200	3377

Note: Unless otherwise specified, the orifice selector sleeve is factory set at 100% capacity.

SPRING RANGES/HOW TO ORDER

Table 5 — Spring Ranges

Model No.	Max Supply	Min Setting	Max Setting	Spring Range
	psig barg	in WC mbarg	in WC mbarg	
3011L/(3041L)	200	0.5	0.7	3
	13.8	1.2	1.7	
	200	0.8	1.0	4
	13.8	1.7	2.5	
	200	1.0	2.0	5
	13.8	2.5	5.0	
3011H/(3041H)	50	0.5	1.0	1
	3.4	1.2	2.5	
	100	1.0	1.5	2
	6.9	2.5	3.7	
	150	1.5	2.0	3
	10.3	3.7	5.0	
	200	2.0	3.5	4
	13.8	5.0	8.7	
	200	3.5	6.5	5
	13.8	8.7	16.2	
	200	6.5	8.0	6
	13.8	16.2	20.0	

Model No.	Max Supply	Min Setting	Max Setting	Spring Range
	psig barg	in WC mbarg	in WC mbarg	
3011HP/(3041HP)	200	6.5	11	2
	13.8	16.2	27.4	
	200	11.1	18.5	3
	13.8	27.6	46.1	
	200	18.6	27.6	4
	13.8	46.3	68.7	
	200	1.0 psig	1.37 psig	5
	13.8	69.0	94.5	
	200	1.38 psig	2.0 psig	6
	13.8	95.2	138	
3020A	200	2.0 psig	3.2 psig	4
	13.8	138	221	
	200	3.3 psig	5.0 psig	5
	13.8	228	345	
	200	5.1 psig	7.2 psig	6
	13.8	352	497	
	200	7.3 psig	15.0 psig	7
	13.8	503	1034	

Notes:
- When spring ranges overlap, select the lighter spring
- Min/Max setting applicable to both pressure and vacuum (vacuum model when used)
- Consult the factory for regulators with settings less than -2 psig

How to Order Standard BGRs

For easy ordering, select proper model number

MODEL # □□□□□ — INLET OUTLET □ — MATERIAL □ — SOFT GOODS □ — ORIFICE SELECTOR POSITION □ — SPRING RANGE □ — OPTIONS □

MODEL #
3011L
3011H
3011HP
3041L
3041H
3041HP
3020A

Inlet Outlet
A = 1" 150# ANSI RF Flange
B = DN 25 (2") PN 10 DIN RF Flg
C = DN 25 (2") PN 16 DIN RF Flg
J = 25mm (1")10K JISRF Flange
N = 1" NPT
T = 2" 150# ANSI RF Flange

Body Material
5 = 316 SS

Soft Goods
B = Buna - N
C = Chemraz®[1]
E = EPDM
V = Viton®
Z = Special

Orifice Selector Position
1 = 100%
2 = 75%
3 = 50%
4 = 25%
5 = 20%
6 = 15%
7 = 10%
8 = 5%

Spring Range
Select from Spring Range Table #5

Options
O = No Special Options
Z = Special Options

NOTES
- Include model number when ordering
- For special options, consult factory
- See flow table for available sizes
- Consult the factory for regulators with settings less than -2 psig
- Actuator diaphragm is only available in Teflon® FEP

EXAMPLE [3] [0] [1] [1] [H] — [N] — [5] — [V] — [1] — [2] — [O]

Indicates a Model 3011H Regulator with 1" NPT body connections, 316 SS construction, Viton® elastomers, full capacity orifice, set pressure range from 1.0" WC to 1.5" WC and no special requirements.

[1] Chemraz is a registered trademark of Greene, Tweed of Delaware, Inc.

Pressure/Vacuum Relief Valves

During pump-in or thermal expansion, relief of the gas blanket is necessary to protect the tank. The devices below are recommended for this application under normal conditions. Consult the Groth Corporation catalog or the factory for more information on pressure relief devices for tank blanketing applications.

1220A

1200A

1420

8800A

8820A

8860

3061

1660A

OTHER PRODUCTS MANUFACTURED BY GROTH CORPORATION

- Pressure/Vacuum Relief Valves
  - Weight-Loaded
  - Spring-Loaded
- Flame and Detonation Arresters
- Pilot Operated Relief Valves
- Emergency Relief Valves
- Digester Gas Control Equipment

GROTH CORPORATION®
a Continental Disc company

TÜV CERT ISO 9001-2000
Certified Quality System

CE
Pressure Equipment Directive
Available When Specified

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Printed in U.S.A.
11063500DG