May 2024

Type Y692 Gas Blanketing Regulator System

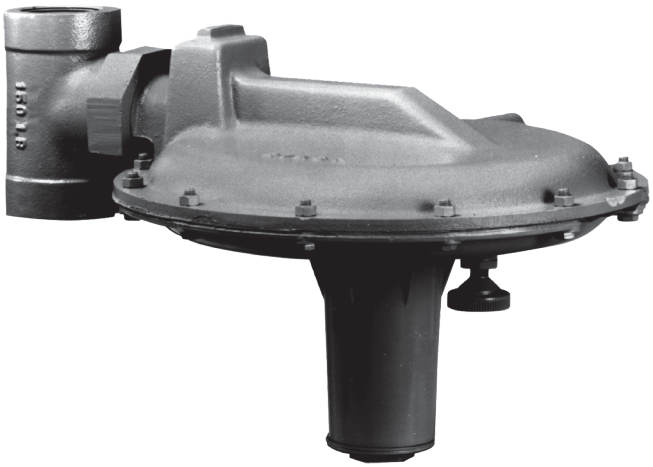


Figure 1. *Type Y692 Low-Pressure Gas Blanketing Regulator*

Introduction

An Accu-Pressure™ Gas Blanketing Regulator System reduces a high-pressure gas, such as Nitrogen, to maintain a protective environment above any liquid stored in a tank or vessel when the liquid is being pumped out. Also when the vessel is suddenly cooled, causing vapors inside the vessel to contract, the regulator system replaces the volume of contracting vapors with a volume of blanketing gas to prevent the internal vessel pressure from decreasing. In both cases, a slight positive vessel pressure prevents outside air, moisture and other contaminants from entering the vessel and the possible collapse of the vessel walls.

The Type Y692 (Figure 1) is a direct-operated regulator used for accurate pressure control on very low-pressure blanketing systems. Downstream pressure is sensed through a pitot tube installed in the lower casing of the regulator for units with internal pressure registration or through a downstream control line for units with external pressure registration. The Type Y692 is available in NPS 1-1/2 and 2 / DN 40 and 50 body sizes.

Features

- **Ease of Inspection and Maintenance**—The union nut connection between the body and actuator permits access to the disk and orifice by only removing the diaphragm casing assembly without removing the body from the line.
- **Accuracy of Control**—Large diaphragm areas provide more precise control even at low-pressure settings and the pitot tube also creates a dynamic boost that helps provide greater capacity.
- **Speed of Response**—The downstream pressure is sensed directly by the diaphragm through the pitot tube providing quick response.
- **Ease of Installation**—The Type Y692 is easy to install in the pipeline because no additional connections are required.
- **Hydrogen Ready—**Products have been evaluated for material compatibility, potential leakage and permeation and susceptibility to embitterment for Hydrogen applications. Based on an extensive evaluation and testing program, Y692 Series configurations are available for use in Hydrogen applications.

Specifications

This section lists the specifications of theType Y692 Gas Blanketing Regulator System. Factory specification, such as spring range and orifice size are stamped on the nameplate fastened on the regulator at the factory.

Available Configurations
Direct-operated pressure reducing regulator with external or internal pressure registration with seven outlet (control) pressure ranges from 1 in. w.c. to 7 psig / 2 mbar to 0.48 bar. Available in NPS 1-1/2 and 2 / DN 40 and 50 body sizes.

Body Sizes and End Connection Styles(1)
Cast Iron: NPS 1-1/2 / DN 40, NPT, NPS 2 / DN 50, NPT or CL125 FF
Steel: NPS 1-1/2 or 2 / DN 40 or 50, NPT, SWE, CL150 RF, CL300 RF or PN 16/25/40
Stainless steel: NPS 1-1/2 or 2 / DN 40 or 50, NPT, CL150 RF, CL300 RF or PN 16/25/40

Maximum Inlet Pressure(2)
150 psig / 10.3 bar

Maximum Outlet (Casing) Pressure(2)
15 psig / 1.0 bar

Maximum Operating Outlet (Control) Pressure to Avoid Internal Part Damage(2)
3 psig / 0.21 bar above outlet (control) pressure setting

Control Pressure Ranges(2)
See Table 1

Flow Capacities
See Table 5

Relief Sizing Coefficients
See Table 6

Orifice Size
See Table 6

Pressure Registration
Internal **(standard)** or External

Spring Case Connection
1/4 NPT

Temperature Capabilities(2)
Nitrile (NBR):
-20 to 180°F / -29 to 82°C
Fluorocarbon (FKM):
0 to 300°F / -18 to 149°C
Perfluoroelastomer (FFKM):
-20 to 300°F / -29 to 149°C
EthylenePropylene (EPDM):
-20 to 275°F / -29 to 135°C

IEC Sizing Coefficients
X_T: 0.775
F_D: 0.50
F_L: 0.89

Approximate Weights
Cast Iron Body: 45 lbs / 20 kg
Steel/Stainless steel Body: 57 lbs / 26 kg

Canadian Registration Number (CRN)
Approved

PED (Pressure Equipment Directive) Category
The Type Y692 may be used as a safety accessory with pressure equipment in the PED 97/23/EC Category I.

Construction Materials
Body, Union Nut, Spring Case and Lower Casing Assembly: Cast iron, WCC steel, CF8M Stainless steel
Control Spring, Control Spring Seat, Split Ring and Diaphragm Plate: Plated steel
Diaphragm: Nitrile (NBR) **(standard)**, Fluorocarbon (FKM), Ethylenepropylene (EPDM), Silicone (VMQ)
O-rings: Nitrile (NBR), Fluorocarbon (FKM), Perfluoroelastomer (FFKM), Ethylenepropylene (EPDM)
Orifice, Pusher Post, Pusher Post Connector, Lever Assembly, Stem and Pitot Tube: Stainless steel
Gasket: Composition
Disk Assembly: Nitrile (NBR) and Stainless steel, Fluorocarbon (FKM) and Stainless steel, Polytetrafluoroethylene (PTFE) and Stainless steel or Ethylenepropylene (EPDM) and Stainless steel

1. Fabricated by using slip-on flanges and socket welding nipples into body.
2. The pressure/temperature limits in this Bulletin and any applicable standard limitation should not be exceeded.

Table 1. *Control Pressure Ranges*

CONTROL PRESSURE RANGE WITH CASE BARREL POINTED DOWN		CONTROL SPRING COLOR CODE	CONTROL SPRING PART NUMBER	SPRING WIRE DIAMETER		SPRING FREE LENGTH	
				In.	mm	In.	mm
Light Spring Assembly	1 to 3 in. w.c. / 2 to 7 mbar[2][3]	Brown	1D892527022	0.109	2.77	6.12	155
	3 to 11 in. w.c. / 7 to 27 mbar[2][4]	Iridite	0B019727052	0.148	3.76	6.00	152
	6.5 in. w.c. to 1.2 psig / 16 mbar to 83 mbar[5]	Green	0B019427052	0.187	4.75	6.00	152
	0.7 to 2 psig / 48 mbar to 0.14 bar	Blue	0B019627032	0.225	5.71	6.00	152
	1 to 3.2 psig / 69 mbar to 0.22 bar	Orange	0A081127202	0.250	6.35	6.00	152
Heavy spring Assembly	2 to 5.5 psig / 0.14 to 0.38 bar	Silver with green stripe	0Y066427022	0.363	9.22	6.00	152
	4 to 10 psig / 0.28 to 0.69 bar	Silver	1H802427032	0.406	10.3	6.00	152

1. Install with spring case pointing down to achieve low setpoints in these spring ranges.
2. Do not use Fluorocarbon (FKM) diaphragm with these springs at diaphragm temperature lower than 60°F / 16°C.
3. Installation with spring case pointing up will change outlet (control) pressure range to 3 to 5 in. w.c. / 7 to 12 mbar.
4. Installation with spring case pointing up will change outlet (control) pressure range to 5.75 to 14 in. w.c. / 14 to 35 mbar.
5. Installation with spring case pointing up will change outlet (control) pressure range to 7.5 in. w.c. to 1.3 psig / 19 to 90 mbar.

Table 2. *Flow Rate Conversion[1]*

MULTIPLY MAXIMUM PUMP RATE OUT	BY	TO OBTAIN
U.S. GPM	8.021	SCFH
U.S. GPH	0.1337	SCFH
m^3/hr	1.01	Nm^3/H
Barrels/hr	5.615	SCFH
Barrels/day	0.2340	SCFH

1. Gas flow of blanketing gas to replace liquid pumped out.

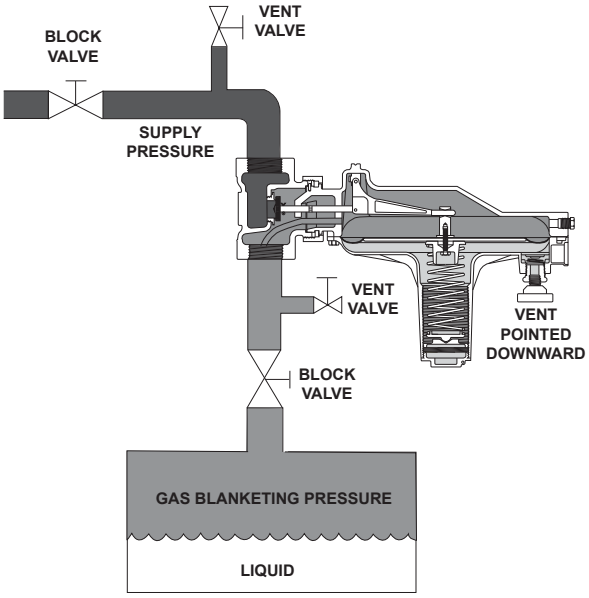
Table 3. *Conversion Factors (for converting Nitrogen flow rates to other gas flow rates)*

BLANKET GAS	SPECIFIC GRAVITY	CORRECTION FACTOR
Natural Gas	0.60	1.270
Air	1.00	0.985
Dry CO_2	1.52	0.797

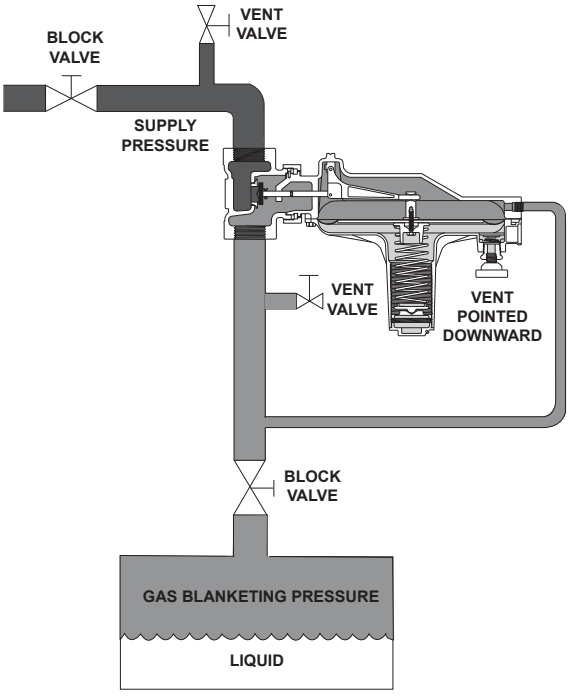
$$\text{Correction Factor} = \frac{0.985}{\sqrt{SG}}$$

Table 4. *Gas Flow Required for Thermal Heating (Outbreathing) or Cooling (Inbreathing) per API 2000 (Interpolate for Intermediate size)*

VESSEL CAPACITY			AIR FLOW RATE REQUIRED	
Barrel	Gallon	Liter	SCFH	Nm^3/h
60	2500	9500	60	1.6
100	4200	16,000	100	2.7
500	21,000	79,500	500	1.3
1000	42,000	159,000	1000	26.8
2000	84,000	318,000	2000	53.6
3000	126,000	477,000	3000	80.4
4000	168,000	636,000	4000	107
5000	210,000	795,000	5000	134
10,000	420,000	1,590,000	10,000	268
15,000	630,000	2,385,000	15,000	402
20,000	840,000	3,180,000	20,000	536
25,000	1,050,000	3,975,000	24,000	643
30,000	1,260,000	4,769,000	28,000	750
35,000	1,470,000	5,564,000	31,000	831
40,000	1,680,000	6,359,000	34,000	911
45,000	1,890,000	7,154,000	37,000	992
50,000	2,100,000	7,949,000	40,000	1072
60,000	2,520,000	9,539,000	44,000	1179
70,000	2,940,000	11,129,000	48,000	1286
80,000	3,360,000	12,718,000	52,000	1394
90,000	3,780,000	14,308,000	56,000	1501
100,000	4,200,000	15,898,000	60,000	1608
120,000	5,040,000	19,078,000	68,000	1822
140,000	5,880,000	22,437,000	75,000	2010
160,000	6,720,000	25,437,000	82,000	2198
180,000	7,560,000	28,616,000	90,000	2412



TYPE Y692 WITH INTERNAL REGISTRATION



TYPE Y692 WITH EXTERNAL REGISTRATION

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INLET PRESSURE
CONTROL PRESSURE (OUTLET PRESSURE)
ATMOSPHERIC PRESSURE

Figure 2. *Type Y692 Operational Schematics*

Principle of Operation

The Type Y692 Gas Blanketing Regulator reduces a high-pressure gas to maintain a positive low-pressure of blanket gas over a stored liquid when the liquid is being pumped out of the vessel (see Figure 2). Also when the vessel (or tank) is suddenly cooled, causing vapors to contract, the regulator replaces the volume of contracting vapors with a volume of blanketing gas to prevent the internal vessel pressure from decreasing. In both cases, a positive vessel pressure prevents outside air from entering the vessel and reduces the possibility of atmospheric pressure collapsing the vessel.

Gas blanketing regulators respond to a slight decrease in internal vessel pressure by throttling open to increase the flow rate of gas into the vessel. When the vessel's liquid level has been lowered to the desired point and the vapor pressure re-established, the regulator throttles closed.

When the liquid level drops and vessel pressure decreases below the setting of the control spring, the spring force on the diaphragm opens the disk assembly to supply the required flow of gas to the vessel. When vessel pressure has been satisfied, control pressure tends to increase slightly, acting on the diaphragm. When the control (vessel) pressure exceeds the control spring setting, the diaphragm moves to close the disk assembly.

The Type Y692 Gas Blanketing Regulator provides a constant set pressure for accurate gas blanketing. When vessel pressure decreases below the control spring setpoint, the force of the spring moves the disk away from the orifice allowing gas to flow into the vessel. As the vessel pressure increases, the increase is sensed by the diaphragm through the pitot tube or control line. This movement of the diaphragm causes the disk to move toward the orifice, decreasing the flow of blanketing gas. When the vessel pressure reaches the system setpoint, the disk will seat against the orifice shutting off the flow of gas.

Installation

Install the Type Y692 regulator with the spring case barrel pointed down. This will assure that the lowest set pressure shown in Table 1 is achieved. Flow through the regulator body is indicated by the flow arrow cast on the body. If a block valve is required, install a full flow valve between the regulator and the blanketed vessel.

Sizing Tank Blanketing Systems

When sizing a gas blanketing regulator system for a low pressure blanketing application, you must consider the replacement of blanketing gas required for the liquid loss during pump out of the vessel and also the condensation/contraction of vessel vapors during atmospheric thermal cooling.

Direct Displacement

The direct displacement method should be used with extreme caution. The direct displacement method determines the amount of blanketing gas required to replace liquid pumped out of the tank. Direct displacement does not allow for fluctuating temperature or other factors that may affect pressure in the vapor space. This method is typically applied to tanks operating at constant temperature and containing non-flammable, non-volatile products.

$$Q_{total} = Q_{pump}$$

where,

Q_{total} = Required Flow Rate

Q_{pump} = Required Flow Rate to replace pumped out liquid from Table 1

API 2000

The American Petroleum Institute Standard 2000 (API 2000) sizing method accounts for liquid pump-out as well as contraction of tank vapors due to cooling. When using API methods:

$$Q_{total} = Q_{pump} + Q_{thermal}$$

where,

Q_{total} = Required Flow Rate

Q_{pump} = Required Flow Rate to replace pumped out liquid from Table 1

$Q_{thermal}$ = Required Flow Rate due to thermal cooling. See Thermal Equations 1 to 4 below or Table 2.

Thermal Equations

For tanks up to 840,000 gallons / 3179 m^3 capacity, use one of the following equations:

Equation 1:

$$Q_{thermal}\ [SCFH\ Air] = V_{tank} \times 0.0238$$

Equation 2:

$$Q_{thermal}\ [SCFH\ Nitrogen] = V_{tank} \times 0.0238 \times 1.015$$

Equation 3:

$$Q_{thermal}\ [Nm^3/h\ Air] = V_{tank} \times 0.169$$

Equation 1:

$$Q_{thermal}\ [Nm^3/h\ Nitrogen] = V_{tank} \times 0.169 \times 1.015$$

where,
For Equations 1 and 2: V_{tank} = tank volume, gallons
For Equations 3 and 4: V_{tank} = tank volume, m^3

For tanks greater than 840,000 gallons / 3179 m^3 capacity: See Table 2.

Depending on the method, there can be a significant difference in the calculated required capacity. **No matter which method is used, the tank must be equipped with supplemental venting to protect the tank, product and personnel in cases of equipment failure, fire exposure or other conditions that could cause the tank pressure or vacuum to exceed operating limits.**

Sizing can be done by following these steps:

1. Determine the gas flow rate required to replace the liquid being pumped out (see Table 2).
2. Using the established procedures from the American Petroleum Institute Standard 2000 (API 2000), determine the gas flow rate due to “inbreathing” caused by atmospheric thermal cooling (see Table 4).
3. Add the requirements of 1 and 2 and select the regulator size, based on total capacity required from Table 6.

Sample sizing problem for blanketing applications:

Service Conditions:

Vessel Capacity . . . . . 42,000 gallons / 159,000 L
Pump In/Out Capacity . . 150 gallons/minute / 570 L/m
Inlet Pressure Source . . . . . 20 psig / 1.4 bar Nitrogen
Desired Blanket Setpoint . . . . . 1 in. w.c. / 2 mbar

Sizing and Selection Methodology:

1. From Table 2 the desired air flow rate due to pump out equals 150 GPM x 8.021 = 1203 SCFH / 32.2 Nm^3/h air.
2. From Table 4, the required air flow due to thermal cooling = 1000 SCFH / 26.8 Nm^3/h air.
3. Total flow required for pump out and thermal cooling is 1203 + 1000 = 2203 SCFH / 59.0 Nm^3/h air.
4. Convert to nitrogen by dividing the total air flow by the square root of the specific gravity of nitrogen: 2203 ÷ 0.97 = 2248 SCFH / 60.2 Nm^3/h nitrogen (See Table 3 for the conversion).
5. From Table 5, a Type Y692 in either an NPS 1-1/2 and 2 / DN 40 and 50 body sizes and a 3/8 in. / 9.5 mm orifice will flow 3620 SCFH / 97.0 Nm^3/h nitrogen at 20 psig / 1.4 bar inlet pressure. This satisfies the required flow of 2248 SCFH / 60.2 Nm^3/h nitrogen.

Capacity Information

Table 5 gives the typical regulating capacities at selected inlet pressures and outlet (control) pressure settings. Flows are in SCFH (60°F and 14.7 psia) of 0.97 specific gravity nitrogen. For gases of other specific gravities, multiply the given capacity of nitrogen by 0.985 and divide the given capacity by the square root of the appropriate specific gravity of the gas required. Then, if capacity is desired in normal cubic meters per hour at 0°C and 1.01325 bar, multiply SCFH by 0.0268.

To determine wide-open flow capacities for relief sizing, use the following formula:

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

where,

C_g = gas sizing coefficient from Table 6
C_1 = C_g/C_v or 35 from Table 6
G = gas specific gravity (air = 1.0)
P_{1abs} = inlet pressure, psia (add 14.7 psi to gauge inlet pressure to obtain absolute inlet pressure)
Q = flow rate, SCFH
T = absolute temperature in °Rankine of gas at inlet

Ordering Information

When ordering, specify:

1. Type of gas being controlled (nitrogen fuel gas, etc.); list any factors such as impurities in the gas that may affect compatibility of the gas with the regulator trim parts.
2. Specific gravity of the gas
3. Temperature of the gas
4. Range of flowing inlet pressures to regulator
5. Flow rates
   a) Minimum controlled flow
   b) Normal flow
   c) Maximum flow
6. Line size and end connection size of adjacent piping. Adjacent downstream piping must be the same size as the regulator body or longer.
7. Vessel size

Table 5. *Blanketing Regulating Capacities in SCFH / Nm³/h of 0.97 Specific Gravity Nitrogen*

BODY SIZE	OUTLET PRESSURE RANGE(1), ACCURACY AND SPRING COLOR	OUTLET PRESSURE SETTING	INLET PRESSURE		ORIFICE SIZE, IN. / mm											
					1/4 / 6.4		3/8 / 9.5		1/2 / 13		3/4 / 19		1 / 25		1-3/16 / 30	
			psig	bar	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
NPS 1-1/2 / DN 40	1 to 3 in. w.c. / 2 to 7 mbar -1 to 2 in. w.c. / -2 to 5 mbar Brown	1 in. w.c. / 2 mbar	2	0.14	360	9.7	970	26.0	1750	46.9	3280	87.9	4750	127	3650	97.8
			5	0.34	680	18.2	1560	41.8	2800	75.0	3880	104	3650	97.8	2840	76.1
			10	0.69	1030	27.6	2350	63.0	4210	113	3880	104	3650	97.8		
			20	1.4	1580	42.3	3620	97.0	4900	131	3700	99.2				
			40	2.8	2500	67.0	3620	97.0	4900	131						
			60	4.1	3410	91.4	3620	97.0								
			80	5.5	4320	116										
			100	6.9	4510	121										
			125	8.6	4510	121										
			150	10.3	4510	121										
		3 in. w.c. / 7 mbar	2	0.14	360	9.7	970	26.0	1750	46.9	3280	87.9	4750	127	3650	97.8
			5	0.34	680	18.2	1560	41.8	2800	75.0	3880	104	3650	97.8	2840	76.1
			10	0.69	1030	27.6	2350	63.0	4210	113	3880	104	3650	97.8		
			20	1.4	1580	42.3	3620	97.0	4900	131	3700	99.2				
			40	2.8	2500	67.0	3620	97.0	4900	131						
			60	4.1	3410	91.4	3620	97.0								
			80	5.5	4320	116										
			100	6.9	4510	121										
			125	8.6	4510	121										
			150	10.3	4510	121										
	3 to 11 in. w.c. / 7 to 27 mbar -1 to 2 in. w.c. / -2 to 5 mbar Iridite	7 in. w.c. / 17 mbar	0.5	0.03							950	25.5	1180	31.6	1330	35.6
			1	0.07	330	8.8	630	16.9	870	23.3	1340	35.9	1810	48.5	2290	61.4
			2	0.14	470	12.6	950	25.5	1300	34.8	2260	60.6	3160	84.7	4730	127
			5	0.34	770	20.6	1580	42.3	2520	67.5	6070	163	6100	163	6100	163
			13	0.9	1270	34.0	2590	69.4	4900	131	6100	163	6100	163		
			25	1.7	1850	49.6	4100	110	6100	163	6100	163				
			50	3.4	3040	81.5	6100	163	6100	163						
			100	6.9	5370	144	6100	163								
			150	10.3	6100	163										
	6.5 in. w.c to 1.2 psig / 16 to 83 mbar, Green or 0.7 to 2 psig / 48 mbar to 0.14 bar, Blue 0.2 psig / 14 mbar	1.5 psig / 0.10 bar	2	0.14			789	21.1	1260	33.8	2050	54.9	2660	71.3	3220	86.3
			6	0.41			1740	46.6	2760	74.0	4730	127	9790	182	7530	202
			14	0.97			3156	84.6	5050	121	9470	254	12,500	335		
			30	2.1			4890	131	8050	216	13,360	358				
			50	3.4			7120	191	11,990	321						
			150	10.3			18,030	483								
	1 to 3.2 psig / 69 mbar to 0.22 bar 0.6 psig / 41 mbar Orange	3 psig / 0.21 bar	3	0.21									2450	64.7	2840	76.1
			7	0.48			1550	41.5	2370	63.5	3950	106	5130	137	6312	169
			14	0.97			2370	63.5	3700	99.2	7020	188	7470	200		
			30	2.1			4500	121	7380	198	11,680	313				
			50	3.4			7020	188	10,750	288						
			150	10.3			17,250	462								
	2 to 5.5 psig / 0.14 to 0.38 bar 0.5 psig / 34 mbar Silver with green stripe	5 psig / 0.34 bar	10	0.69	590	15.8	950	25.5	1180	31.6	1810	48.5	2200	59.0	2370	63.5
			15	1.0	789	21.1	1030	27.6	1580	42.3	2370	63.5	2840	76.1	3310	88.7
			20	1.4	950	25.5	1380	97.0	2200	59.0	2920	78.3	3310	88.7		
			35	2.4	1420	38.1	1970	52.8	2920	78.3	4020	108				
			60	4.1	2210	59.2	2920	78.3	4730	127						
			75	5.2	2760	74.0	3470	93.0	5680	152						
			100	6.9	3550	95.1	5130	137								
	2 to 5.5 psig / 0.14 to 0.38 bar 1 psig / 69 mbar Silver with green stripe	5 psig / 0.34 bar	10	0.69	950	25.5	1500	40.2	2050	54.9	3230	86.6	4100	110	4580	123
			15	1.0	1180	31.6	1890	50.7	2760	74.0	4100	110	5520	148	6310	169
			20	1.4	1380	37.0	2200	59.0	3790	102	5130	137	6310	169		
			35	2.4	1970	52.8	3310	88.7	5130	137	7730	207				
			60	4.1	3160	84.7	5290	142	7890	211						
			75	5.2	4100	110	6390	171	10,260	275						
			100	6.9	5130	137	8680	233								
	4 to 10 psig / 0.28 to 0.69 bar 1 psig / 69 mbar Silver	10 psig / 0.69 bar	15	1.0	708	19.0	1023	27.4	1338	35.9	1810	48.5	2518	67.5	2990	80.1
			20	1.4	944	25.3	1377	36.9	1967	52.7	2597	69.9	3148	84.4	4564	122
			25	1.7	1102	29.5	1652	44.3	2203	59.0	3148	84.4	4013	108		
			40	2.8	1810	48.5	2203	59.0	2912	78.0	4720	127				
			60	4.1	2361	63.3	3148	84.4	4643	124						
			75	5.2	2754	73.8	3541	94.9	5666	152						
			100	6.9	3541	94.9	5193	139								
	4 to 10 psig / 0.28 to 0.69 bar 2 psig / 0.14 bar Silver	10 psig / 0.69 bar	15	1.0	1023	27.4	1731	46.4	2518	67.5	3620	97.0	4721	127	6295	169
			20	1.4	1259	33.7	2125	57.0	3384	90.7	5115	137	6295	169	7869	211
			25	1.7	1574	42.2	2675	71.7	3777	101	6453	173	7082	190		
			40	2.8	2282	61.2	3934	105	5272	141	8656	232				
			60	4.1	2990	80.1	5351	143	8656	232						
			75	5.2	4013	108	6531	175	10,230	274						
			100	6.9	5115	137	8656	232								

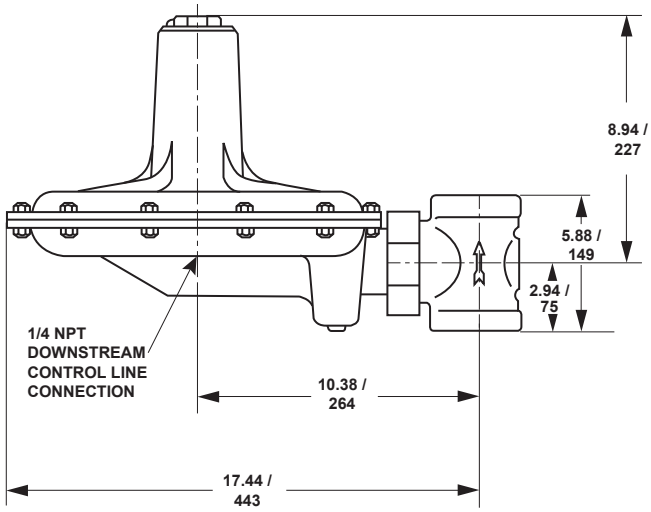
1. Spring ranges based on regulator installation with the spring case pointed down.
- Light shaded areas show where indicated droop would be exceeded regardless of capacity.
- Dark shaded areas show where maximum operating inlet pressure for a given orifice size is exceeded.

- continued -

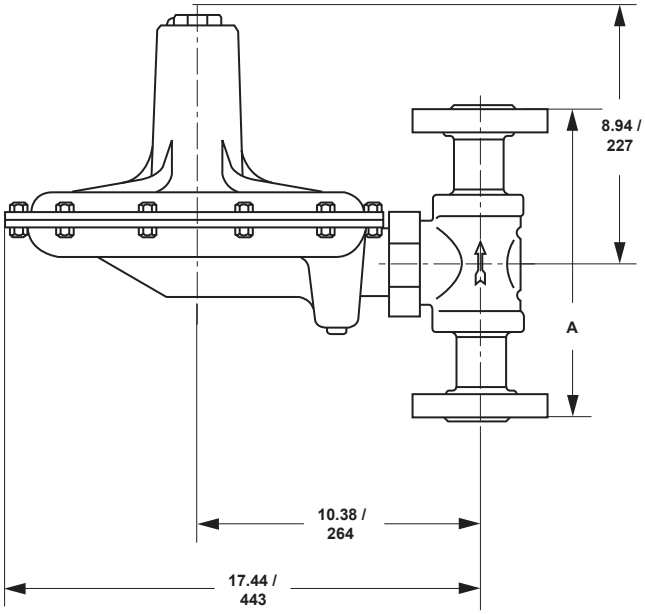
Table 5. *Blanketing Regulating Capacities in SCFH / Nm³/h of 0.97 Specific Gravity Nitrogen (continued)*

BODY SIZE	OUTLET PRESSURE RANGE(1), ACCURACY AND SPRING COLOR	OUTLET PRESSURE SETTING	INLET PRESSURE		ORIFICE SIZE, IN. / mm											
					1/4 / 6.4		3/8 / 9.5		1/2 / 13		3/4 / 19		1 / 25		1-3/16 / 30	
			psig	bar	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
NPS 2 / DN 50	1 to 3 in. w.c. / 2 to 7 mbar -1 to 2 in. w.c. / -2 to 5 mbar Brown	1 in. w.c. / 2 mbar	2	0.14	320	8.6	930	24.9	1750	46.9	4000	107	5010	134	5930	159
			5	0.34	680	18.2	1560	41.8	2800	75.0	6050	162	4630	124	4260	114
			10	0.69	1030	27.6	2350	63.0	4210	113	3650	97.8	4060	109		
			20	1.4	1580	42.3	3620	97.0	3450	92.5	3650	97.8				
			40	2.8	2500	67.0	4420	118	3450	92.5						
			60	4.1	3410	91.4	4420	118								
			80	5.5	3650	97.8										
			100	6.9	3650	97.8										
			125	8.6	3650	97.8										
			150	10.3	3650	97.8										
		3 in. w.c. / 7 mbar	2	0.14	320	8.6	930	24.9	1750	46.9	4000	107	5010	134	5930	159
			5	0.34	680	18.2	1560	41.8	2800	75.0	6050	162	4630	124	4260	114
			10	0.69	1030	27.6	2350	63.0	4210	113	3650	97.8	4060	109		
			20	1.4	1580	42.3	3620	97.0	3450	92.5	3650	97.8				
			40	2.8	2500	67.0	4420	118	3450	92.5						
			60	4.1	3410	91.4	4420	118								
			80	5.5	3650	97.8										
			100	6.9	3650	97.8										
			125	8.6	3650	97.8										
			150	10.3	3650	97.8										
	3 to 11 in. w.c. / 7 to 27 mbar -1 to 2 in. w.c. / -2 to 5 mbar Iridite	7 in. w.c. / 17 mbar	0.5	0.03							950	25.5	1180	31.6	1330	36.5
			1	0.07	330	8.8	630	16.9	870	23.3	1340	35.9	1810	48.5	2290	61.4
			2	0.14	470	12.6	950	25.5	1300	34.8	2260	60.6	3160	84.7	4730	127
			5	0.34	770	20.6	1580	42.3	2520	67.5	6080	163	7890	211	7890	211
			13	0.90	1270	34.0	2590	69.4	4900	131	7890	211	7890	211		
			25	1.7	1850	49.6	4100	110	7180	192	7890	211				
			50	3.4	3040	81.5	6700	180	7890	211						
			100	6.9	5370	144	7890	211								
			150	10.3	7890	211										
	6.5 in. w.c to 1.2 psig / 16 to 83 mbar, Green or 0.7 to 2 psig / 48 mbar to 0.14 bar, Blue 0.2 psig / 14 mbar	1 psig / 69 mbar	2	0.14			1030	27.6	1340	35.9	2450	65.7	3230	86.6	3390	90.9
			6	0.41			1970	52.8	2840	76.1	5680	152	7730	207	8760	235
			14	0.97			3390	90.9	5130	137	10,650	285	13,490	362		
			30	2.1			5130	137	8130	218	16,730	448				
			50	3.4			7120	191	11,990	321						
			150	10.3												
	1 to 3.2 psig / 69 mbar to 0.22 bar 0.6 psig / 41 mbar Orange	3 psig / 0.21 bar	3	0.21									2550	68.3	3050	81.7
			7	0.48			1740	46.6	2600	69.7	4730	127	5880	158	7140	191
			14	0.97			3310	88.7	4180	112	770	206	10,450	280		
			30	2.1			5130	137	7930	213	14,480	388				
			50	3.4			7500	201	11,400	306						
			150	10.3			19,820	531								
	2 to 5.5 psig / 0.14 to 0.38 bar 0.5 psig / 34 mbar Silver with green stripe	5 psig / 0.34 bar	10	0.69	590	15.8	950	25.5	1180	31.6	1810	48.5	2200	59.0	2370	63.5
			15	1.0	789	21.1	1030	27.6	1580	42.3	2370	63.5	2840	76.1	3310	88.7
			20	1.4	950	25.5	1380	37.0	2200	59.0	2920	78.3	2920	78.3		
			35	2.4	1420	38.1	1970	52.8	2920	78.3	4020	108				
			60	4.1	2210	59.2	2920	78.3	4730	127						
			75	5.2	2760	74.0	3470	93.0	5680	152						
			100	6.9	3550	95.1	5130	137								
	2 to 5.5 psig / 0.14 to 0.38 bar 1 psig / 69 mbar Silver with green stripe	5 psig / 0.34 bar	10	0.69	950	25.5	1500	40.2	2050	54.9	4100	110	4100	110	4580	123
			15	1.0	1180	31.6	1890	50.7	2760	74.0	5520	148	5520	148	6310	169
			20	1.4	1380	37.0	2200	59.0	3790	102	6310	169	6310	169		
			35	2.4	1970	52.8	2050	54.9	5130	137						
			60	4.1	3160	84.7	5290	142	7890	207						
			75	5.2	4100	110	6390	171	10,260	275						
			100	6.9	5130	137	8680	233								
	4 to 10 psig / 0.28 to 0.69 bar 1 psig / 69 mbar Silver	10 psig / 0.69 bar	15	1.0	708	19.0	1023	27.4	1338	35.9	2518	67.5	2518	67.5	2990	80.1
			20	1.4	944	25.3	1377	36.9	1967	52.7	3148	84.4	3148	84.4	4564	122
			25	1.7	1102	29.5	1652	44.3	2203	59.0	4013	108	4013	108		
			40	2.8	1810	48.5	2203	59.0	2912	78.0						
			60	4.1	2361	63.3	3148	84.4	4643	124						
			75	5.2	2754	73.8	3541	94.9	5666	152						
			100	6.9	3541	94.9	5193	139								
	4 to 10 psig / 0.28 to 0.69 bar 2 psig / 0.14 bar Silver	10 psig / 0.69 bar	15	1.0	1023	27.4	1731	46.4	2518	67.5	4721	127	4721	127	6295	169
			20	1.4	1259	33.7	2125	57.0	3384	90.7	6295	169	6295	169	7869	211
			25	1.7	1574	42.2	2675	71.7	3777	101	7082	190	7082	190		
			40	2.8	2282	61.2	3934	105	5272	141						
			60	4.1	2990	80.1	5351	143	8656	232						
			75	5.2	4013	108	6531	175	10,230	274						
			100	6.9	5115	137	8656	232								

1. Spring ranges based on regulator installation with the spring case pointed down.
- Light shaded areas show where indicated droop would be exceeded regardless of capacity.
- Dark shaded areas show where maximum operating inlet pressure for a given orifice size is exceeded.



NPT DIMENSIONS



A - CAST IRON FLANGES ARE 10 IN. / 254 mm FACE-TO-FACE; STEEL, STAINLESS STEEL AND HASTELLOY® C FLANGES ARE 14 IN. / 356 mm FACE-TO-FACE.

FLANGED DIMENSIONS

Figure 3. *Dimensions*

Table 6. *Orifice Sizes and Coefficients for Relief Valve Sizing*

BODY SIZE		ORIFICE SIZE		WIDE-OPEN C_v	WIDE-OPEN C_g	C_1
NPS	DN	In.	mm			
1-1/2 and 2	40 and 50	1/4 3/8 1/2 3/4 1 1-3/16	6.4 9.5 13 19 25 30	1.51 3.14 5.43 11.9 20 26	53.0 111 190 415 700 910	35

Hastelloy® C is a mark owned by Haynes International, Inc.

Ordering Information

Carefully review the Specifications section, then specify the desired selection on the Ordering Guide. If a pilot setpoint is not requested, the regulator will be factory set at the approximate midrange.

Ordering Guide

Body Size (Select One)
- ☐ NPS 1-1/2 / DN 40
- ☐ NPS 2 / DN 50

Body Material and End Connection Style (Select One)

Cast Iron
- ☐ NPT***
- ☐ CL125 FF (NPS 2 / DN 50 body only)*

WCC Steel
- ☐ NPT***
- ☐ SWE**
- ☐ CL150 RF**
- ☐ CL300 RF**
- ☐ PN 16/25/40*

CF8M Stainless Steel
- ☐ NPT***
- ☐ CL150 RF**
- ☐ CL300 RF**
- ☐ PN 16/25/40 RF*

Spring Case Material (Select One)
- ☐ Cast iron***
- ☐ WCC steel***
- ☐ CF8M Stainless steel**

Diaphragm Case Material (Select One)
- ☐ Cast iron***
- ☐ WCC steel***
- ☐ CF8M Stainless steel**

Trim Material (Select One)
- ☐ 304 Stainless steel***
- ☐ 316 Stainless steel**

Diaphragm Material (Select One)
- ☐ Nitrile (NBR) **(standard)***
- ☐ Fluorocarbon (FKM)***
- ☐ Ethylenepropylene (EPDM)***
- ☐ Silicone (VMQ)***

Disk Material (Select One)
- ☐ Nitrile (NBR) **(standard)***
- ☐ Fluorocarbon (FKM)***
- ☐ Polytetrafluoroethylene (PTFE)***
- ☐ Ethylenepropylene (EPDM)***

Orifice Size (Select One)
- ☐ 1/4 in. / 6.4 mm***
- ☐ 3/8 in. / 9.5 mm***
- ☐ 1/2 in. / 13 mm***
- ☐ 3/4 in. / 19 mm***
- ☐ 1 in. / 25 mm***
- ☐ 1-3/16 in. / 30 mm***

Outlet Pressure Range (Select One)
- ☐ 1 to 3 in. w.c. / 2 to 7 mbar, Brown***
- ☐ 3 to 11 in. w.c. / 7 to 27 mbar, Iridite***
- ☐ 6.5 in. w.c. to 1.2 psig / 16 to 83 mbar, Green***
- ☐ 0.7 to 2 psig / 48 mbar to 0.14 bar, Blue***
- ☐ 1 to 3.2 psig / 69 mbar to 0.22 bar, Orange***
- ☐ 2 to 5.5 psig / 0.14 to 0.38 bar, Silver with Green stripe***
- ☐ 4 to 10 psig / 0.28 to 0.69 bar, Silver***

Pressure Registration (Select One)
- ☐ Internal***
- ☐ External**

PTFE Diaphragm Protector (Optional)
- ☐ Yes

CRN (Canadian Registration Number) Required (Optional)
- ☐ Yes

PED (Pressure Equipment Directive) Conformity (Optional)
- ☐ Yes

Replacement Parts Kit (Optional)
- ☐ Yes, send one replacement parts kit to match this order.

Ordering Guide (continued)

Regulators Quick Order Guide	
* * *	Readily Available for Shipment
* *	Allow Additional Time for Shipment
*	Special Order, Constructed from Non-Stocked Parts. Consult your local Sales Office for Availability.
Availability of the product being ordered is determined by the component with the longest shipping time for the requested construction.	

Tank Blanketing Specification Worksheet

Application Specifications:

Tank Size _____

Pump In Rate _____

Pump Out Rate _____

Blanketing Gas (Type and Specific Gravity) _____

Pressure Requirements:

Maximum Inlet Pressure (P_{1max}) _____

Minimum Inlet Pressure (P_{1min}) _____

Control Pressure Setting (P_2) _____

Maximum Flow (Q_{max}) _____

Accuracy Requirements:

☐ 0.25 in. w.c. / 0.6 mbar ☐ 0.5 in. w.c. / 1 mbar

☐ 1 in. w.c. / 2 mbar ☐ 2 in. w.c. / 5 mbar

☐ Other

Other Specifications:

Is a vapor recovery regulator required? ☐ Yes ☐ No

Special Material Requirements: ☐ Ductile Iron ☐ Steel

☐ Stainless steel ☐ Other _____

Other Requirements: _____

_____

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