December 2014

Type Y693 Gas Blanketing Regulator

Figure 1. *Type Y693 Gas Blanketing Regulator*

Introduction

An Accu-Pressure™ Gas Blanketing Regulator reduces a high pressure gas, such as nitrogen, to maintain a protective environment above any liquid stored in a vessel or tank 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 Y693 (Figure 1) is a direct-operated regulator used for accurate pressure control on low pressure blanketing systems. Downstream pressure is sensed through an external control line in the lower casing of the regulator. The Type Y693 is available in NPS 1-1/2 and 2 / DN 40 and 50 body sizes.

Features

- **Ease of Inspection and Maintenance—**The union nut and/or hex head bolt 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 pipeline (see Figure 2).
- **Accuracy of Control—**Balanced trim and large diaphragm area reduces hysteresis to as little as +/- 0.50 in. w.c. / 1 mbar deviation from setpoint.
- **Inlet Pressure Sensitivity—**Less than 0.25 in. w.c. / 0.6 mbar setpoint shift over the entire inlet pressure range.
- **Speed of Response—**A change in vessel pressure registers directly under the diaphragm resulting in the fastest possible speed of response.
- **Variety of Materials—**Regulator body, trim and valve disk are available in various material combinations for process fluid compatibility.
- **Outlet Pressure Stability—**4 to 1 lever ratio reduces regulator sensitivity to inlet pressure fluctuation.
- **Tight Shutoff Capability—**A flat-faced disk of Nitrile (NBR), Fluorocarbon (FKM) or Polytetrafluoroethylene (PTFE) provides excellent shutoff capability.

D102026X012

Specifications

This section lists the specifications for the Type Y693 gas blanketing regulators. Factory specification are stamped on the nameplate fastened on the regulator at the factory.

Available Configurations
Direct-operated pressure reducing regulator with external registration requiring a downstream control line. Ten outlet pressure ranges from 0.5 in. w.c. to 10 psig / 1 mbar to 0.69 bar. Available in NPS 1-1/2 and 2 / DN 40 and 50 body sizes.

End Connections(1)
NPT(1) **(standard)**
Flanged(2) (Optional)
EN Class PN 16, 25 and 40 RF Flanged (Optional)

Maximum Inlet Pressure(3)
150 psig / 10.3 bar

Maximum Outlet Pressure(3)
10 psig / 0.69 bar

Maximum Outlet Pressure (Casing)(3)
15 psig / 1.0 bar

Maximum Operating Outlet Pressure to Avoid Internal Part Damage(3)
2 psig / 0.14 bar above outlet pressure setting

Outlet Pressure Ranges(3)
See Table 1

Construction Materials
See Table 2

Common Services and Materials Compatibility
See Table 3

Material Temperature Capabilities(3)
Nitrile (NBR): -20 to 180°F / -29 to 82°C
Fluorocarbon (FKM): 40 to 300°F / 4 to 149°C
PTFE: 0 to 300°F / -18 to 149°C

Orifice Diameter
1/2 in. / 13 mm

Flow Capacities
See Table 6

Coefficients For Relief Valve Sizing
C_g with fully open valve plug: 185
C_1: 33

Spring Case Connection
3/4 NPT female connection

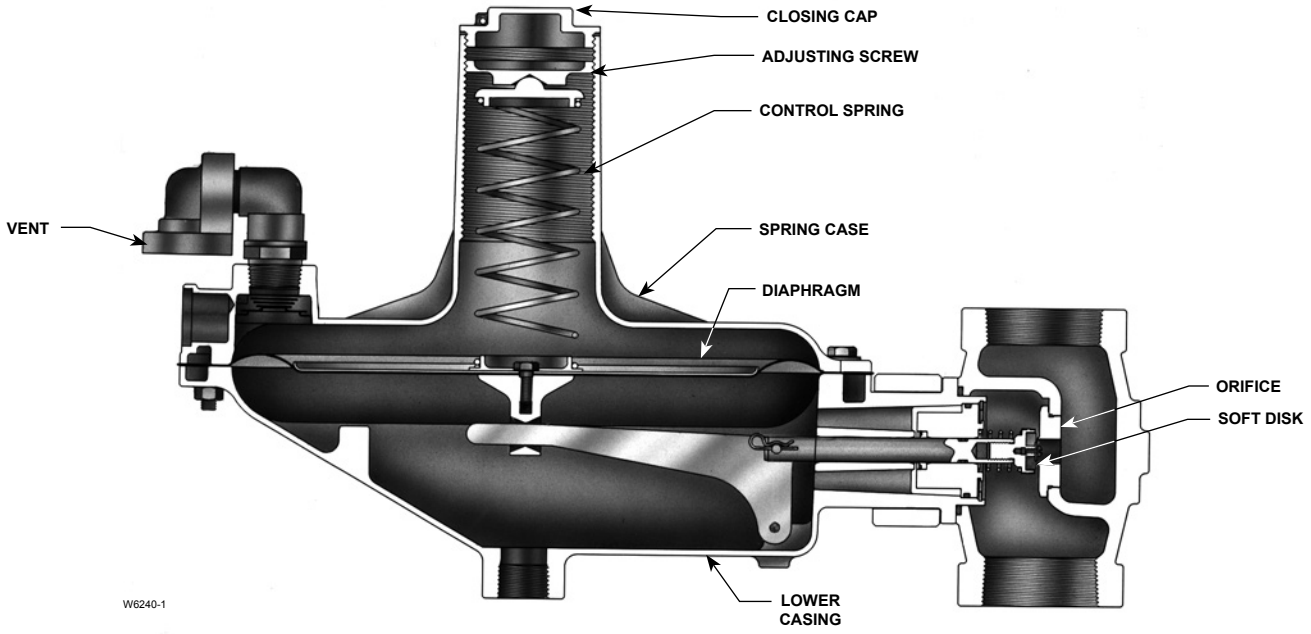
Approximate Weights
Cast iron with Aluminum: 22 lbs / 10 kg
WCC Steel or CF8M Stainless steel: 57 lbs / 26 kg
WCC Steel with Aluminum: 35 lbs / 16 kg

1. End connections for other than U.S. standards can usually be provided; consult your local Sales office.
2. Fabricated by using slip-on flanges and socket welding nipples into body.
3. The pressure/temperature limits in this Bulletin and any applicable standard limitation should not be exceeded.

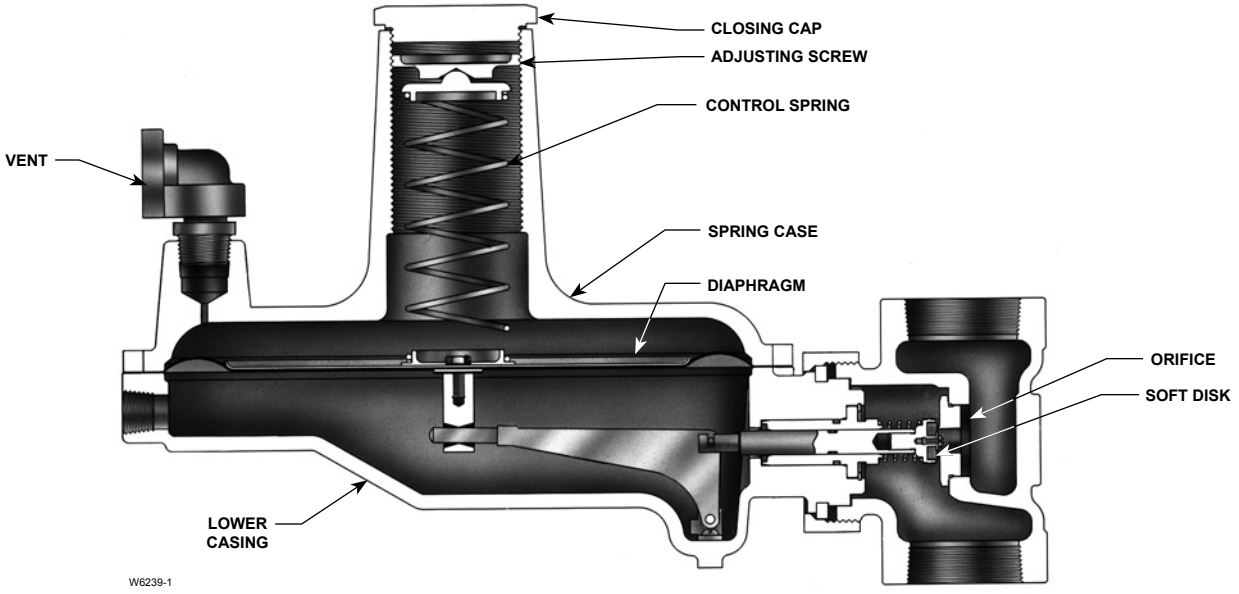
Table 1. *Outlet (Control) Pressure Ranges*

	OUTLET PRESSURE RANGES(1)		COLOR CODE	CONTROL SPRING WIRE DIAMETER		CONTROL SPRING FREE LENGTH		PART NUMBER
	In. w.c.	mbar		In.	mm	In.	mm	
Light diaphragm plate	0.5 to 2.0 2 to 5 5 to 8 8 to 18 18 to 32	1.2 to 5 5 to 12 12 to 20 20 to 45 45 to 80	Brown Red Black White Stripe Green	0.109 0.120 0.130 0.156 0.182	2.77 3.05 3.30 3.96 4.62	6.12 7.531 7.88 7.50 7.25	155 191 200 190 184	1D892527022 1D892627022 1D892727012 1D893227032 1D893327032
Heavy diaphragm plate	1 to 2 psig 1.5 to 3.3 psig 2 to 5 psig	0.07 to 0.14 bar 0.10 to 0.23 bar 0.14 to 0.34 bar	Blue Orange Yellow	0.225 0.250 0.283	5.72 6.35 7.19	7.093 6.91 6.50	176 180 165	1H975827032 1H975927032 1P615427142
Heavy diaphragm plate with brass closing cap and heavy duty spring adjustor	2 to 5.5 psig 4 to 10 psig	0.14 to 0.38 bar 0.28 to 0.69 bar	Green Stripe Red	0.363 0.406	9.22 10.3	6.00 6.00	152 152	0Y066427022 1H8024000A2

1. Outlet pressure ranges are for installations with the spring barrel positioned in any direction. After installation always check/adjust the pressure setting.



ALUMINUM LOWER CASING VERSION



STEEL OR STAINLESS STEEL LOWER CASING VERSION

Figure 2. *Type Y693 Regulator Construction Features*

Principle of Operation

The Type Y693 Gas Blanketing Regulator reduces a higher-pressure gas to maintain a positive low pressure of blanket gas over a stored liquid (see Figure 3). 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 (caused by pump out or atmospheric cooling) 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 reestablished, 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, outlet pressure tends to increase slightly, acting on the diaphragm. When the outlet pressure exceeds the control spring setting, the diaphragm moves to close the disk assembly.

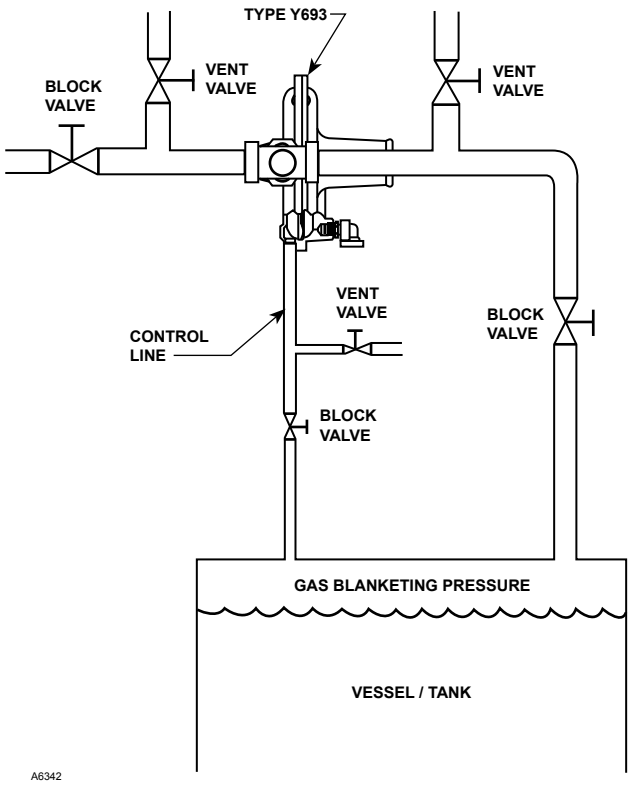


Figure 3. *Typical Type Y693 Installation (Steel or Stainless steel lower casing version)*

Sizing Blanketing Systems

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

Using the established procedures from American Petroleum Institute Standard 2000 (API 2000), determine the flow rate of blanketing gas required.

1. Determine the gas flow rate required to replace the liquid being pumped out (see Table 4).
2. Determine the gas flow rate due to "inbreathing" caused by atmospheric thermal cooling (see Table 5).
3. Add the requirements of 1 and 2 and select regulator size, based on total capacity required from Table 6.

Sample sizing problem for blanketing applications:

Vessel Capacity . . . . . 210,000 gal. / 795 000 L
Pump In/Out Capacity . . . . . 80 gal/min. / 303 L/m
Inlet (header) Pressure. . . . . .40 psig / 2.8 bar Nitrogen
Desired Blanket Setpoint. . . . . 0.5 in. w.c. / 1 mbar

1. Multiply the flow rate conversion factor from Table 4 by the pump rate to obtain the air flow required to replace the volume of liquid pumped out.

   8.021 x 80 GPM = 642 SCFH

2. Determine the air flow required for thermal cooling from Table 5.

   210,000 gal. tank size requires
   5000 SCFH / 134 Nm^3/h air

   Total required flow: 642 + 5000 =
   5642 SCFH / 151 Nm^3/h air

3. Convert air flow to nitrogen flow by multiplying the air flow by the square root of 1 divided by the specific gravity of nitrogen.

   5642 x $\sqrt{1/1.97}$ = 5729 SCFH / 154 Nm^3/h nitrogen

Table 2. *Type Y693 Regulator Construction Materials*

PART NAME	MATERIAL	
	Aluminum Lower Casing Version	**Steel or Stainless Steel Lower Casing Version**
Body	Cast iron	WCB steel or Stainless steel
Body Gasket	Composition	Composition
Union Nut	- - - -	Steel or Stainless steel
Spring case	Aluminum	Aluminum, WCB steel or Stainless steel
Lower casing	Aluminum	WCB steel or Stainless steel
Orifice and bias spring	Stainless steel	Stainless steel
Pusher post and stem	Aluminum	Stainless steel
Lever assembly	Steel	Stainless steel
Diaphragm	Nitrile (NBR) or Fluorocarbon (FKM)	Nitrile (NBR) or Fluorocarbon (FKM)
Control spring, spring seat and split ring	Plated steel	Plated steel
Diaphragm plate	Aluminum and Steel	Aluminum and Steel
Disk and O-rings	Nitrile (NBR) and Stainless steel, Fluorocarbon (FKM) and Stainless steel, PTFE and Stainless steel	Nitrile (NBR) and Stainless steel or Fluorocarbon (FKM) and Stainless steel or PTFE and Stainless steel

4. From Table 6, at 0.5 in. w.c. / 1 mbar set pressure and 40 psig inlet pressure, a Type Y693 will flow 8880 SCFH / 238 Nm^3/h nitrogen. This satisfies the 5729 SCFH / 154 Nm^3/h requirements.

Capacity Information

Table 6 gives typical nitrogen regulating capacities at selected inlet pressures and outlet 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 by the square root of the appropriate specific gravity of the gas required. Then, if capacity is desired in normal cubic meters per hours 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 Specifications table
C_1 = C_g / C_v or 33 from the Specifications table
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 °R of gas at inlet (°F + 460)

Installation

The regulator may be installed in any position as long as the flow through the body is in the direction indicated by the flow arrow attached to the body. Install the regulator as close as possible to the blanketed vessel using a straight run of pipe the same size or larger as the regulator body. Position the body and/or diaphragm spring case so it will not collect moisture or debris into the screened vent and also be self draining (as shown in Figure 3). If a block valve is required, install a full flow valve between the regulator and the blanketed vessel.

Attach a downstream pressure control line to the female connection in the lower spring case. The female pressure connection is a 1/2 NPT in the steel or Stainless steel lower spring case and a 3/4 NPT for the aluminum lower spring case. Connect the other end of the control line to the vessel. To allow for self-drainage, install the control line at an angle so that any liquid material will drain away from the regulator. See Figure 4 for the location of the external control line connection. External dimensions and connections are shown in Figure 4.

Table 3. *Materials Compatibility*

CORROSION INFORMATION							
Fluid	Material			Fluid	Material		
	Carbon Steel	Cast Iron	316 Stainless Steel		Carbon Steel	Cast Iron	316 Stainless Steel
Acetic Acid, Air Free	C	C	B	Hydrochloric Acid (Air Free)	C	C	C
Acetic Acid Vapors	C	C	A	Hydrogen	A	A	A
Acetone	A	A	A	Hydrogen Peroxide	I.L.	A	A
Acetylene	A	A	A	Hydrogen Sulfide, Liquid	C	C	A
Alcohols	A	A	A	Magnesium Hydroxide	A	A	A
Aluminum Sulfate	C	C	A	Methanol	A	A	A
Ammonia	A	A	A	Methyl Ethyl Ketone	A	A	A
Ammonium Chloride	C	C	B	Natural Gas	A	A	A
Ammonium Nitrate	A	C	A	Nitric Acid	C	C	B
Ammonium Sulfate	C	C	A	Petroleum Oils, Refined	A	A	A
Ammonium Sulfite	C	C	A	Phosphoric Acid (Air Free)	C	C	A
Beer	B	B	A	Phosphoric Acid Vapors	C	C	B
Benzene (Benzol)	A	A	A	Potassium Chloride	B	B	A
Benzoic Acid	C	C	A	Potassium Hydroxide	B	B	A
Boric Acid	C	C	A	Propane	A	A	A
Butane	A	A	A	Silver Nitrate	C	C	A
Calcium Chloride (Alkaline)	B	B	B	Sodium Acetate	A	A	A
Carbon Dioxide, Dry	A	A	A	Sodium Carbonate	A	A	A
Carbon Dioxide, Wet	C	C	A	Sodium Chloride	C	C	B
Carbon Disulfide	A	A	A	Sodium Chromate	A	A	A
Carbon Tetrachloride	B	B	B	Sodium Hydroxide	A	A	A
Carbonic Acid	C	C	B	Stearic Acid	A	C	A
Chlorine Gas, Dry	A	A	B	Sulfur	A	A	A
Chlorine Gas, Wet	C	C	C	Sulfur Dioxide, Dry	A	A	A
Chlorine, Liquid	C	C	C	Sulfur Trioxide, Dry	A	A	A
Chromic Acid	C	C	B	Sulfuric Acid (Aerated)	C	C	C
Citric Acid	I.L.	C	B	Sulfuric Acid (Air Free)	C	C	C
Coke Oven Gas	A	A	A	Sulfurous Acid	C	C	B
Copper Sulfate	C	C	B	Trichloroethylene	B	B	A
Ether	B	B	A	Water, Boiler Feed	B	C	A
Ethyl Chloride	C	C	A	Water, Distilled	A	A	A
Ethylene	A	A	A	Water, Sea	B	B	B
Ethylene Glycol	A	A	A	Zinc Chloride	C	C	C
Formaldehyde	B	B	A	Zinc Sulfate	C	C	A
Formic Acid	I.L.	C	B	- - - -	- - - -	- - - -	- - - -
Freon, Wet	B	B	A	- - - -	- - - -	- - - -	- - - -
Freon, Dry	B	B	A	- - - -	- - - -	- - - -	- - - -
Gasoline, Refined	A	A	A	- - - -	- - - -	- - - -	- - - -
Glucose	A	A	A	- - - -	- - - -	- - - -	- - - -
Hydrochloric Acid (Aerated)	C	C	C	- - - -	- - - -	- - - -	- - - -

FLUID INFORMATION							
Fluid	PTFE	Nitrile (NBR)	Fluorocarbon (FKM)	Fluid	PTFE	Nitrile (NBR)	Fluorocarbon (FKM)
Acetic Acid (30%)	A	B	B	Freon 22	A	C	C
Acetone	A	C	C	Freon 114	B	A	B
Alcohol, Ethyl	A	A	B	Gasoline	A	A+	A
Alcohol, Methyl	A	A	C	Hydrogen Gas	A	A	A
Ammonia, Anhydrous	A	C	C	Hydrogen Sulfide (Dry)	A	C	C
Ammonia, Gas (Hot)	A	C	C	Hydrogen Sulfide (Wet)	A	C	C
Benzene	A	C	A	Jet Fuel (JP-4)	A	A	A
Brine (Calcium Chloride)	A	A	B	Natural Gas	A	A+	A
Butadiene Gas	A	C	B	Natural Gas + H2S (Sour Gas)	A	B	C
Butane, Gas	A	A+	A	Nitric Acid (10%)	A	C	A
Butane, Liquid	A	A	A	Nitric Acid (50 to 100%)	B	C	A
Carbon Tetrachloride	A	C	A	Nitrogen Oil (Fuel)	A	A	A
Chlorine, Dry	A	C	A	Propane	A	A+	A
Chlorine, Wet	A	C	A	Sea Water	A	A	A
Coke Oven Gas	A	B	A+	Sulfur Dioxide	A	A	A
Ethyl Acetate	A	C	C	Sulfuric Acid (to 50%)	A	C	A
Ethylene Glycol	A	A	A	Sulfuric Acid (50 to 100%)	A	C	A
Freon 11	B	A	A+	Water (Ambient)	A	C	A
Freon 12	B	A	B	Water at 200°F / 93°C	A	A	A
					A	B	B

1. Mark owned by International Nickel Co.
2. Mark owned by Stelite Div., Cabot Corp.

A+ - Best possible selection.
A - Recommended.
B - Minor to moderate effect. Proceed with caution.
C - Unsatisfactory.
I.L. - Information lacking.

Table 4. *Flow Rate Conversion (Gas flow required to replace or displace Blanketing Gas with Pump-Out or Pump-In of Liquid)*

MULTIPLY MAXIMUM PUMP RATE IN:	BY	TO OBTAIN:
U.S. GPM	8.021	SCFH air required
U.S. GPH	0.1337	SCFH air required
Barrels/hour	5.615	SCFH air required
Barrels/day	0.2340	SCFH air required

Table 5. *Gas Flow Required for Thermal Heating (Outbreathing) or Cooling (Inbreathing) per API 2000 (Interpolate for Intermediate sizes)*

VESSEL CAPACITY		AIR FLOW RATE REQUIRED	
Barrels	gal.	SCFH	Nm^3/h
60	2500	60	1.6
100	4200	100	2.7
500	21,000	500	13.4
1000	42,000	1000	26.8
2000	84,000	2000	53.6
3000	126,000	3000	80.4
4000	168,000	4000	107
5000	210,000	5000	134
10,000	420,000	10,000	268
15,000	630,000	15,000	402
20,000	840,000	20,000	536
25,000	1,050,000	24,000	643
30,000	1,260,000	28,000	750
35,000	1,470,000	31,000	831
40,000	1,680,000	34,000	911
45,000	1,890,000	37,000	992
50,000	2,100,000	40,000	1072
60,000	2,520,000	44,000	1179
70,000	2,940,000	48,000	1286
80,000	3,360,000	52,000	1394
90,000	3,780,000	56,000	1501
100,000	4,200,000	60,000	1608
120,000	5,040,000	68,000	1822
140,000	5,880,000	75,000	2010
160,000	6,720,000	82,000	2198
180,000	7,560,000	90,000	2412

Ordering Information

When ordering, specify:

Application

1. Type of gas being used for blanketing (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. Regulator pressure setting
6. Flow rates
   a) Minimum controlled flow
   b) Normal flow
   c) Maximum flow
7. Line size and end connection size of adjacent piping

Regulator

Refer to the Specifications table on page 2. Carefully review the description of each specification and specify the desired selection wherever there is a choice to be made. Always specify the type number as identified in the Available Configurations specification.

Table 6. *Typical Type Y693 Blanketing Regulator Capacities in SCFH / Nm³/h of 0.97 Specific Gravity Nitrogen*

SPRING RANGE, PART NUMBER AND COLOR	CONTROL PRESSURE SETTING		INLET PRESSURE		CAPACITIES IN SCFH / Nm³/h OF 0.97 SPECIFIC GRAVITY NITROGEN FOR 1-1/2 AND 2 IN. / DN 40 AND 50 BODIES WITH A 1/2 IN. / 13 mm ORIFICE					
					Deviation from Setpoint					
					±0.5 In. w.c. / ±1 mbar		-0.5 to 1 In. w.c. / -1 to 2 mbar		-0.5 to 2 In. w.c. / -1 to 5 mbar	
	In. w.c.	mbar	psig	bar	SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
0.5 to 2 in. w.c. / 1 to 5 mbar 1D892527022 Brown	0.5(1)	1(1)	2	0.14	750	20.1	750	20.1	750	20.1
			5	0.34	1570	42.1	1570	42.1	1570	42.1
			10	0.69	2500	67.0	2500	67.0	2500	67.0
			20	1.4	5000	134	5000	134	5000	134
			40	2.8	8800	236	8800	236	8800	236
			60	4.1	12,100	324	12,100	324	12,100	324
			80	5.5	7100	190	15,400	413	15,400	413
			100	6.9	7100	190	15,200	407	18,600	498
			125	8.6	7100	190	14,200	381	22,700	608
			150	10.3	7100	190	12,200	327	26,700	716
					Deviation from Setpoint					
					±0.5 In. w.c. / ±1 mbar		±1 In. w.c. / ±2 mbar		-1 to 2 In. w.c. / -2 to 5 mbar	
					SCFH	Nm³/h	SCFH	Nm³/h	SCFH	Nm³/h
0.5 to 2 in. w.c. / 1 to 5 mbar 1D892527022 Brown	1	2	2	0.14	750	20.1	1270	34.0	1270	34.0
			5	0.34	1570	42.1	2280	61.1	2280	61.1
			10	0.69	2500	67.0	3400	91.1	3400	91.1
			20	1.4	5000	134	5200	139	5200	139
			40	2.8	8800	236	8800	236	8800	236
			60	4.1	12,100	324	12,100	324	12,100	324
			80	5.5	7100	190	15,400	413	15,400	413
			100	6.9	7100	190	15,200	407	18,600	498
			125	8.6	7100	190	14,200	381	22,700	608
			150	10.3	7100	190	12,200	327	26,700	716
2 to 5 in. w.c. / 5 to 12 mbar 1D892627022 Red	3	7	2	0.14	750	20.1	1270	34.0	1270	34.0
			5	0.34	1570	42.1	2280	61.1	2280	61.1
			10	0.69	2500	67.0	3400	91.1	3400	91.1
			20	1.4	5000	134	5200	139	5200	139
			40	2.8	8800	236	8800	236	8800	236
			60	4.1	12,100	324	12,100	324	12,100	324
			80	5.5	11,200	300	15,400	413	15,400	413
			100	6.9	11,200	300	14,200	381	18,600	498
			125	8.6	11,200	300	14,200	381	22,700	608
			150	10.3	11,200	300	14,200	381	26,700	716
5 to 8 in. w.c. / 12 to 20 mbar 1D892727012 Black	7	17	2	0.14	710	19.0	1070	28.7	1070	28.7
			5	0.34	1370	36.7	2030	54.4	2030	54.4
			10	0.69	2110	56.5	3130	83.9	3130	83.9
			20	1.4	3050	81.7	4260	114	4260	114
			40	2.8	5580	150	8020	215	8020	215
			60	4.1	10,200	273	11,500	308	11,500	308
			80	5.5	14,200	381	15,400	413	15,400	413
			100	6.9	18,600	498	18,600	498	18,600	498
			125	8.6	11,200	300	22,700	608	22,700	608
			150	10.3	11,200	300	26,700	716	26,700	716

1. For set pressures less than 1 in. w.c. / 2 mbar use only Nitrile (NBR) elastomers.

-continued-

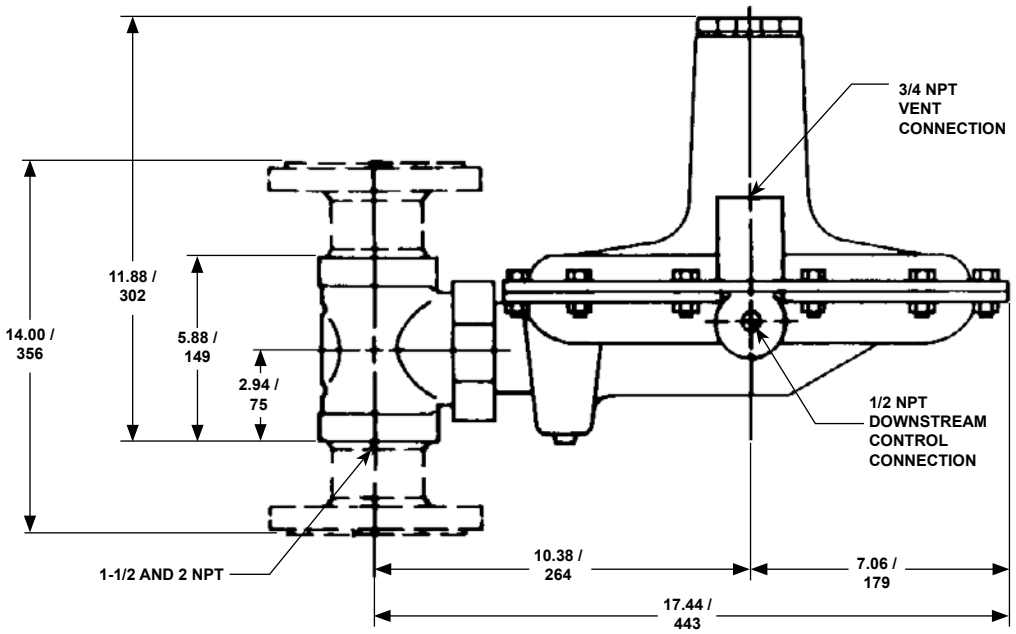
Table 6. *Typical Type Y693 Blanketing Regulator Capacities in SCFH / Nm³/h of 0.97 Specific Gravity Nitrogen (continued)*

SPRING RANGE, PART NUMBER AND COLOR	CONTROL PRESSURE SETTING		INLET PRESSURE		CAPACITIES IN SCFH / Nm³/h OF 0.97 SPECIFIC GRAVITY NITROGEN FOR 1-1/2 AND 2 IN. / DN 40 AND 50 BODIES WITH A 1/2 IN. / 13 mm ORIFICE			
					Deviation from Setpoint			
					±1 In. w.c. / ±2 mbar		±2 In. w.c. / ±5 mbar	
	In. w.c.	mbar	psig	bar	SCFH	Nm³/h	SCFH	Nm³/h
8 to 18 in. w.c. / 20 to 45 mbar 1D893227032 Gray	11	27	2	0.14	660	17.7	1020	27.3
			5	0.34	1270	34.0	1830	49.0
			10	0.69	2130	57.1	2840	76.1
			20	1.4	3050	81.7	4060	109
			40	2.8	7110	191	7610	204
			60	4.1	9540	256	12,100	324
			80	5.5	13,200	354	15,400	413
			100	6.9	18,600	498	18,600	498
			125	8.6	22,700	608	22,700	608
			150	10.3	26,700	716	26,700	716
					Deviation from Setpoint			
					±1 In. w.c. / ±2 mbar		±2 In. w.c. / ±5 mbar	
					SCFH	Nm³/h	SCFH	Nm³/h
18 to 32 in. w.c. / 45 to 80 mbar 1D893327032 Dark green	20	50	2	0.14	590	15.8	710	19.0
			5	0.34	810	21.7	1420	38.1
			10	0.69	1100	29.5	1830	49.0
			20	1.4	1520	40.7	3050	81.7
			40	2.8	2740	73.4	6090	163
			60	4.1	4060	109	10,200	273
			80	5.5	6600	177	15,400	413
			100	6.9	9140	245	18,600	498
			125	8.6	22,700	608	22,700	608
			150	10.3	26,700	716	26,700	716
					Deviation from Setpoint			
					±0.1 In. w.c. / ±0.007 mbar		±0.2 In. w.c. / ±0.014 mbar	
					SCFH	Nm³/h	SCFH	Nm³/h
1 to 2 psig / 69 to 138 mbar 1H975827032 Dark blue	1 psig	69	2	0.14	250	6.70	860	23.0
			5	0.34	1100	29.5	1830	49.0
			10	0.69	1780	47.7	2940	78.8
			20	1.4	2640	70.8	4870	131
			40	2.8	4470	120	8120	218
			60	4.1	6500	174	11,100	297
			80	5.5	9140	245	15,400	413
			100	6.9	10,400	279	18,600	498
					Deviation from Setpoint			
					±0.3 In. w.c. / ±0.021 mbar		±0.6 In. w.c. / ±0.041 mbar	
					SCFH	Nm³/h	SCFH	Nm³/h
1.5 to 3.3 psig / 103 to 228 mbar 1H975827032 Orange	3 psig	0.21 bar	5	0.34	1220	32.7	1730	46.4
			10	0.69	2540	68.1	3400	91.1
			20	1.4	3860	103	5200	139
			40	2.8	7100	190	8880	238
			60	4.1	9340	250	12,100	324
			80	5.5	13,200	354	15,400	413
			100	6.9	15,800	423	18,600	498

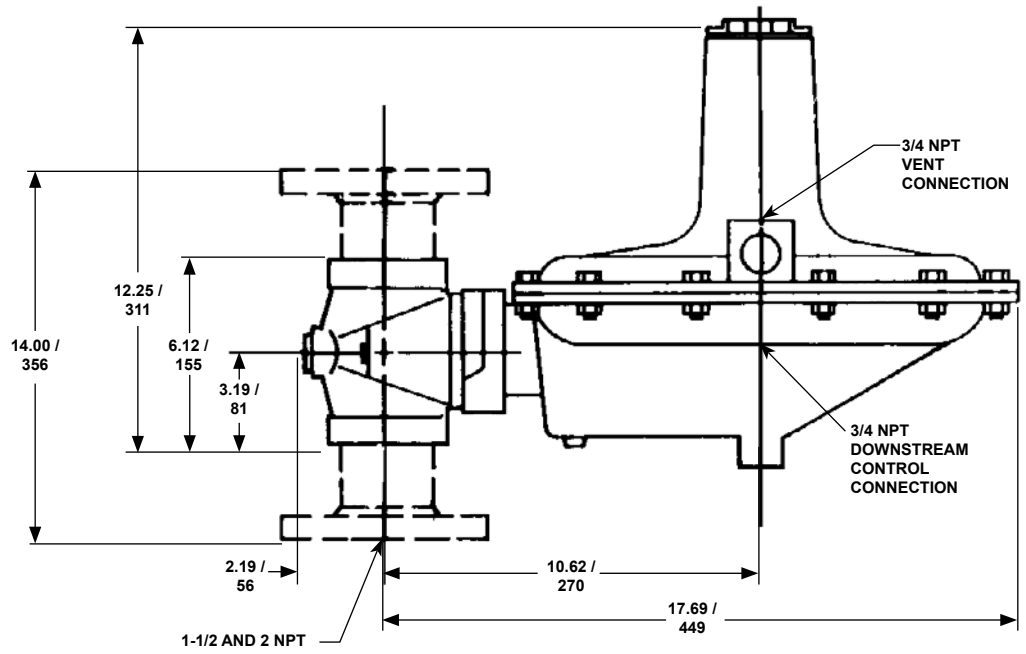
-continued-

Table 6. *Typical Type Y693 Blanketing Regulator Capacities in SCFH / Nm³/h of 0.97 Specific Gravity Nitrogen (continued)*

SPRING RANGE, PART NUMBER AND COLOR	CONTROL PRESSURE SETTING		INLET PRESSURE		CAPACITIES IN SCFH / Nm³/h OF 0.97 SPECIFIC GRAVITY NITROGEN FOR 1-1/2 AND 2 IN. / DN 40 AND 50 BODIES WITH A 1/2 IN. / 13 mm ORIFICE			
					Deviation from Setpoint			
					±0.5 In. w.c. / ±1 mbar		±1 In. w.c. / ±2 mbar	
	psig	bar	psig	bar	SCFH	Nm³/h	SCFH	Nm³/h
2 to 5 psig / 138 mbar to 0.3 bar 1P615427142 Yellow	3	0.21	7	0.48	1400	37.5	2200	59.0
			10	0.69	2330	62.4	3050	81.7
			20	1.4	4060	109	5200	139
			40	2.8	6900	185	8880	238
			60	4.1	9740	261	12,100	324
			80	5.5	12,800	343	15,400	413
			100	6.9	15,200	407	18,600	498
					Deviation from Setpoint			
					±0.6 In. w.c. / ±1 mbar		±1 In. w.c. / ±2 mbar	
					SCFH	Nm³/h	SCFH	Nm³/h
2 to 5.5 psig / 138 mbar to 0.4 bar 0Y066427022 Green Stripe	5	0.35	7	0.48	1200	32.2	1600	42.9
			10	0.69	1420	38.1	2230	59.8
			20	1.4	2440	65.4	3760	101
			40	2.8	4260	114	6290	169
			60	4.1	5890	158	8730	234
			80	5.5	7510	201	11,400	306
			100	6.9	9140	245	14,200	381
					Deviation from Setpoint			
					±0.6 In. w.c. / ±1 mbar		±2 In. w.c. / ±5 mbar	
					SCFH	Nm³/h	SCFH	Nm³/h
4 to 10 psig / 276 mbar to 0.7 bar 1H8024000A2 Silver	10	0.69	15	1.0	1600	42.9	2600	69.7
			20	1.4	2030	54.4	3500	93.8
			40	2.8	3650	97.8	6680	179
			60	4.1	5080	136	9300	249
			80	5.5	6500	174	11,900	319
			100	6.9	7920	212	14,900	399



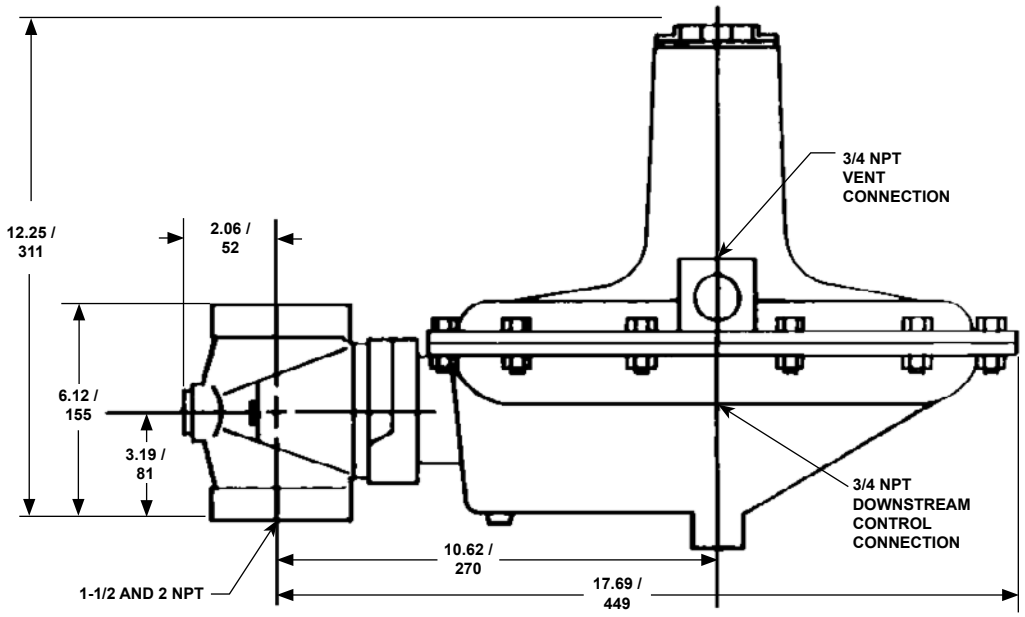
STEEL OR STAINLESS STEEL LOWER CASING VERSION



IN. / mm

ALUMINUM LOWER CASING VERSION WITH A STEEL BODY

Figure 4. *Type Y693 Dimensions*



ALUMINUM LOWER CASING VERSION WITH A CAST IRON BODY

Figure 4. *Type Y693 Dimensions (continued)*

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