

# Type Y693 Gas Blanketing Regulator

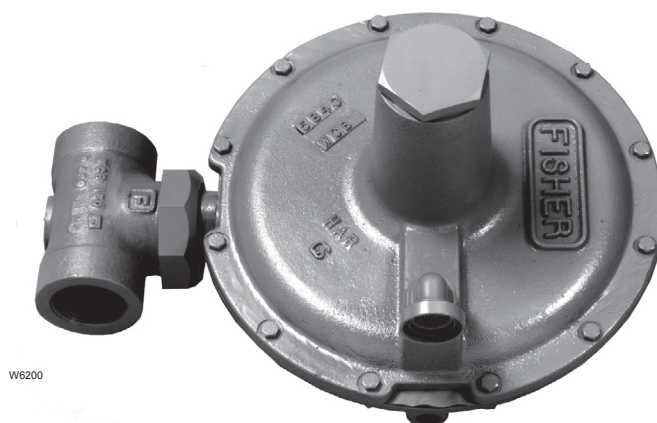


Figure 1. Type Y693 Gas Blanketing Regulator

## 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  $\pm 0.50$  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.
- **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

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## 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.

<p><b>Available Configurations</b> 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.</p> <p><b>End Connections<sup>(1)</sup></b> NPT<sup>(1)</sup> (standard) Flanged<sup>(2)</sup> (Optional) EN Class PN 16, 25 and 40 RF Flanged (Optional)</p> <p><b>Maximum Inlet Pressure<sup>(3)</sup></b> 150 psig / 10.3 bar</p> <p><b>Maximum Outlet Pressure<sup>(3)</sup></b> 10 psig / 0.69 bar</p> <p><b>Maximum Outlet Pressure (Casing)<sup>(3)</sup></b> 15 psig / 1.0 bar</p> <p><b>Maximum Operating Outlet Pressure to Avoid Internal Part Damage<sup>(3)</sup></b> 2 psig / 0.14 bar above outlet pressure setting</p> <p><b>Outlet Pressure Ranges<sup>(3)</sup></b> See Table 1</p>	<p><b>Construction Materials</b> See Table 2</p> <p><b>Common Services and Materials Compatibility</b> See Table 3</p> <p><b>Material Temperature Capabilities<sup>(3)</sup></b> <b>Nitrile (NBR):</b> -20 to 180°F / -29 to 82°C <b>Fluorocarbon (FKM):</b> 40 to 300°F / 4 to 149°C <b>PTFE:</b> 0 to 300°F / -18 to 149°C</p> <p><b>Orifice Diameter</b> 1/2 in. / 13 mm</p> <p><b>Flow Capacities</b> See Table 6</p> <p><b>Coefficients For Relief Valve Sizing</b> <b>C<sub>g</sub> with fully open valve plug:</b> 185 <b>C<sub>1</sub>:</b> 33</p> <p><b>Spring Case Connection</b> 3/4 NPT female connection</p> <p><b>Approximate Weights</b> <b>Cast iron with Aluminum:</b> 22 lbs / 10 kg <b>WCC Steel or CF8M Stainless steel:</b> 57 lbs / 26 kg <b>WCC Steel with Aluminum:</b> 35 lbs / 16 kg</p>
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1. End connections for other than U.S. standards can usually be provided; consult your local Sales office.

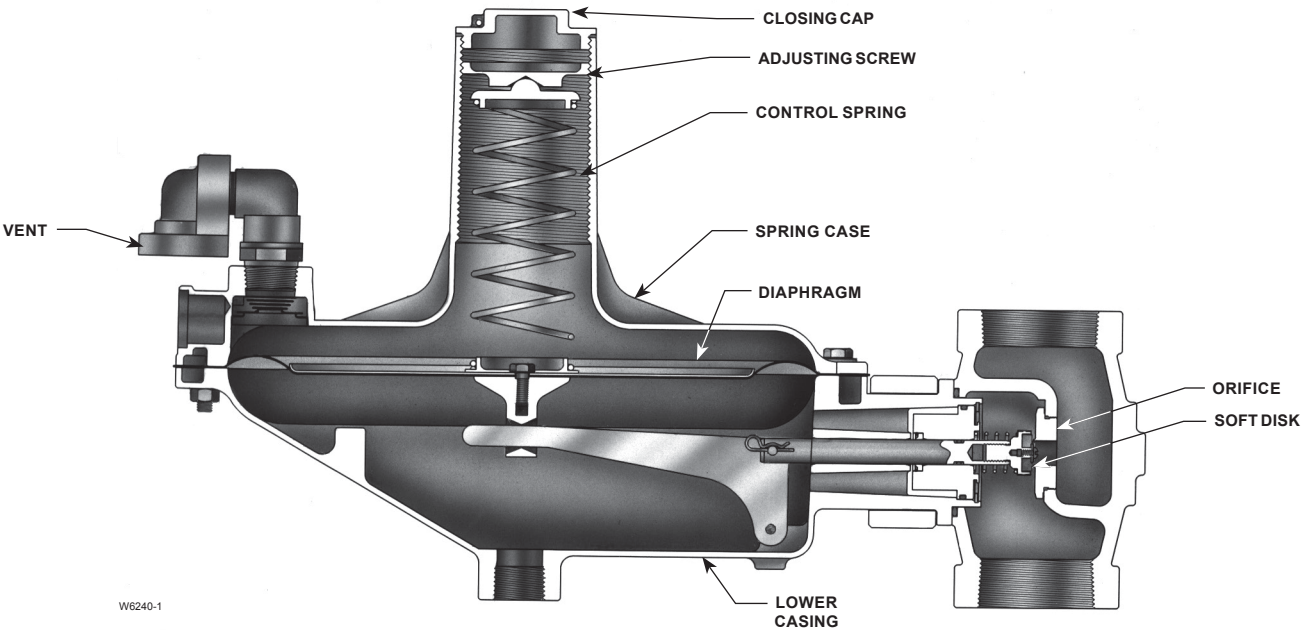
2. Fabricated by using slip-on flanges and socket welding nipples into body.

3. The pressure/temperature limits in this Bulletin and any applicable standard limitation should not be exceeded.

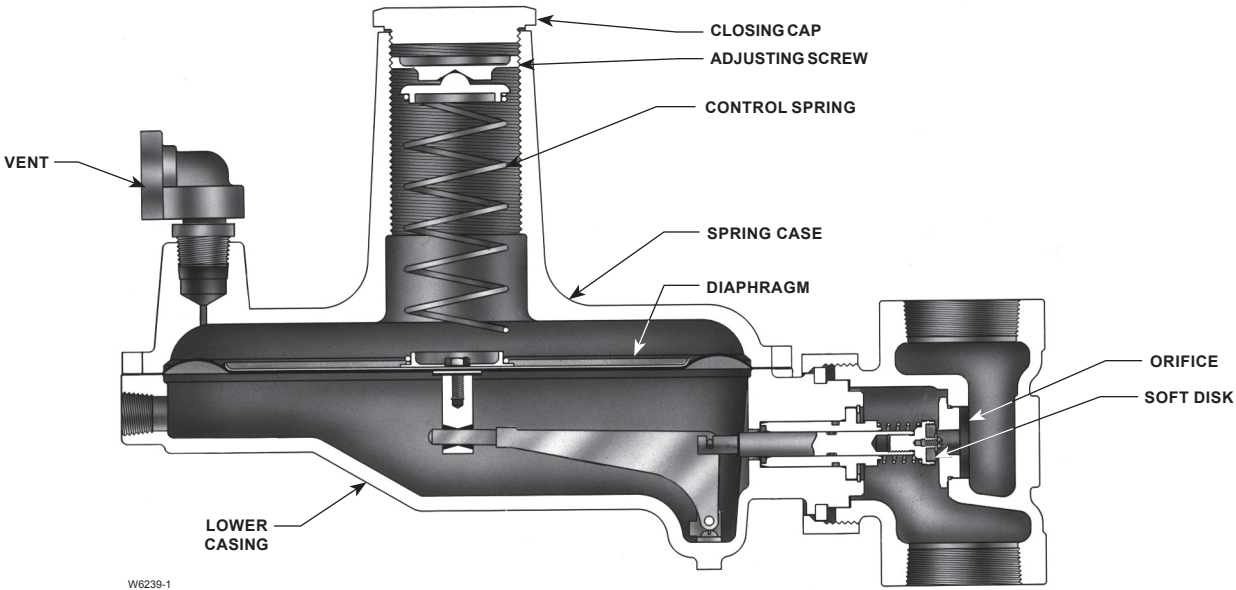
**Table 1. Outlet (Control) Pressure Ranges**

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

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

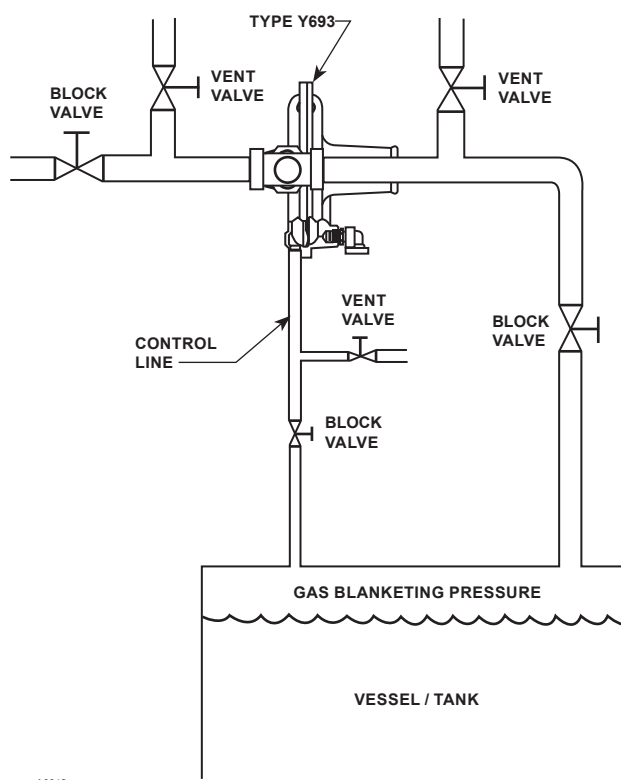
Figure 2. Type Y693 Regulator Construction Features

## 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.

$$8.021 \times 80 \text{ GPM} = 642 \text{ SCFH}$$

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

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

Total required flow: 642 + 5000 =  
 5642 SCFH / 151 Nm<sup>3</sup>/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.

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

**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<sup>3</sup>/h nitrogen. This satisfies the 5729 SCFH / 154 Nm<sup>3</sup>/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:

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

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)

$P_{1\text{abs}}$  = 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	B	Freon 114	B	A	B
Alcohol, Ethyl	A	A	C	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 + H <sub>2</sub> S (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	Nitric Acid (50 to 100%)	A	A	A
Chlorine, Dry	A	C	A	Nitrogen Oil (Fuel)	A	A+	A
Chlorine, Wet	A	C	A	Propane	A	A	A
Coke Oven Gas	A	B	A+	Sea Water	A	A	A
Ethyl Acetate	A	C	C	Sulfur Dioxide	A	A	A
Ethylene Glycol	A	A	A	Sulfuric Acid (to 50%)	A	C	A
Freon 11	B	A	A+	Sulfuric Acid (50 to 100%)	A	C	A
Freon 12	B	A	B	Water (Ambient)	A	A	A
				Water at 200°F / 93°C	A	B	B
1. Mark owned by International Nickel Co. 2. Mark owned by Stellite 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	Nm³/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.

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**Table 6. Typical Type Y693 Blanketing Regulator Capacities in SCFH / Nm<sup>3</sup>/h of 0.97 Specific Gravity Nitrogen**

SPRING RANGE, PART NUMBER AND COLOR	CONTROL PRESSURE SETTING		INLET PRESSURE		CAPACITIES IN SCFH / Nm <sup>3</sup> /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	Nm <sup>3</sup> /h	SCFH	Nm <sup>3</sup> /h	SCFH	Nm <sup>3</sup> /h
0.5 to 2 in. w.c. / 1 to 5 mbar 1D892527022  Brown	0.5 <sup>(1)</sup>	1 <sup>(1)</sup>	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
0.5 to 2 in. w.c. / 1 to 5 mbar 1D892527022  Brown	1	2	2	0.14	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	Nm <sup>3</sup> /h	SCFH	Nm <sup>3</sup> /h	SCFH	Nm <sup>3</sup> /h
					750	20.1	1270	34.0	1270	34.0
					1570	42.1	2280	61.1	2280	61.1
					2500	67.0	3400	91.1	3400	91.1
					5000	134	5200	139	5200	139
					8800	236	8800	236	8800	236
					12,100	324	12,100	324	12,100	324
					7100	190	15,400	413	15,400	413
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 / Nm<sup>3</sup>/h of 0.97 Specific Gravity Nitrogen (continued)**

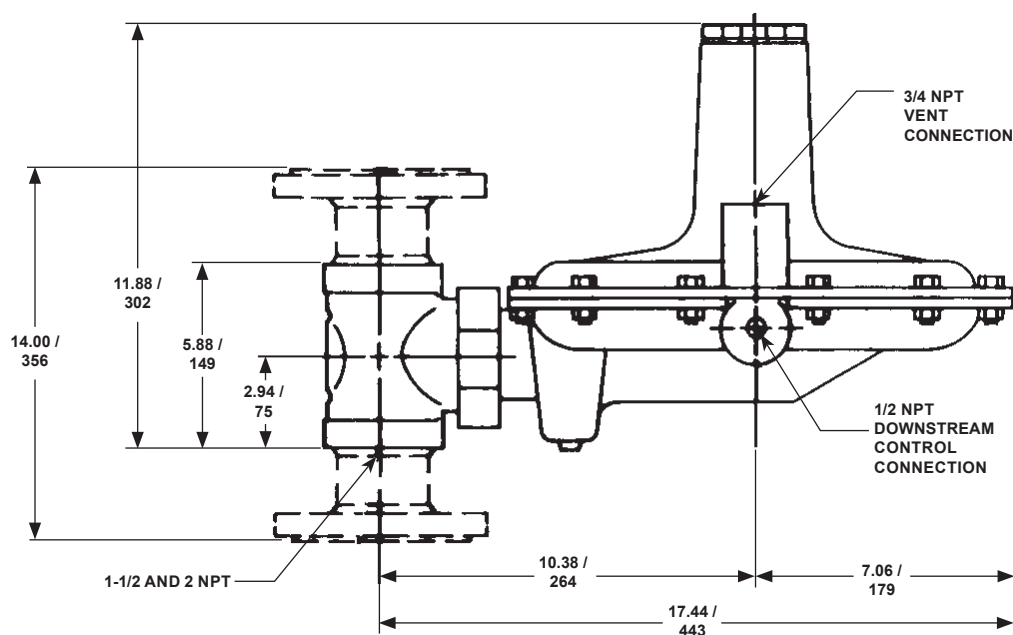
SPRING RANGE, PART NUMBER AND COLOR	CONTROL PRESSURE SETTING		INLET PRESSURE		CAPACITIES IN SCFH / Nm <sup>3</sup> /h OF 0.97 SPECIFIC GRAVITY NITROGEN FOR 1-1/2 AND 2 IN. / DN 40 AND 50 BODIES WITH A 1/2 IN. / 13 mm ORIFICE			
					Deviation from Setpoint			
					±1 In. w.c. / ±2 mbar		±2 In. w.c. / ±5 mbar	
	In. w.c.	mbar	psig	bar	SCFH	Nm <sup>3</sup> /h	SCFH	Nm <sup>3</sup> /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					
18 to 32 in. w.c. / 45 to 80 mbar 1D893327032  Dark green	20	50	2	0.14	±1 In. w.c. / ±2 mbar		±2 In. w.c. / ±5 mbar	
			5	0.34	SCFH		Nm <sup>3</sup> /h	
			10	0.69	590	15.8	710	19.0
			20	1.4	810	21.7	1420	38.1
			40	2.8	1100	29.5	1830	49.0
			60	4.1	1520	40.7	3050	81.7
			80	5.5	2740	73.4	6090	163
			100	6.9	4060	109	10,200	273
			125	8.6	6600	177	15,400	413
			150	10.3	9140	245	18,600	498
			Deviation from Setpoint					
1 to 2 psig / 69 to 138 mbar 1H975827032  Dark blue	1 psig	69	2	0.14	±0.1 In. w.c. / ±0.007 mbar		±0.2 In. w.c. / ±0.014 mbar	
			5	0.34	SCFH		Nm <sup>3</sup> /h	
			10	0.69	250	6.70	860	23.0
			20	1.4	1100	29.5	1830	49.0
			40	2.8	1780	47.7	2940	78.8
			60	4.1	2640	70.8	4870	131
			80	5.5	4470	120	8120	218
			100	6.9	6500	174	11,100	297
			Deviation from Setpoint					
			±0.3 In. w.c. / ±0.021 mbar		±0.6 In. w.c. / ±0.041 mbar		Nm <sup>3</sup> /h	
			5	0.34	1220	32.7	1730	46.4
1.5 to 3.3 psig / 103 to 228 mbar 1H975827032  Orange	3 psig	0.21 bar	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-

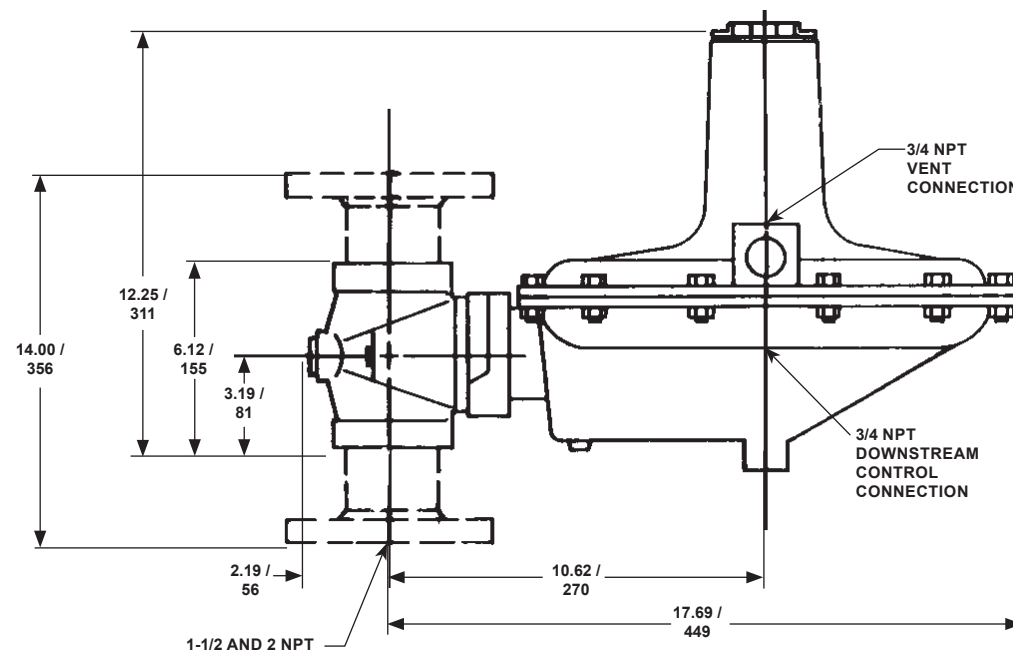
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**Table 6. Typical Type Y693 Blanketing Regulator Capacities in SCFH / Nm<sup>3</sup>/h of 0.97 Specific Gravity Nitrogen (continued)**

SPRING RANGE, PART NUMBER AND COLOR	CONTROL PRESSURE SETTING		INLET PRESSURE		CAPACITIES IN SCFH / Nm <sup>3</sup> /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	
					SCFH	Nm <sup>3</sup> /h	SCFH	Nm <sup>3</sup> /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
2 to 5.5 psig / 138 mbar to 0.4 bar 0Y066427022  Green Stripe	5	0.35	7	0.48	Deviation from Setpoint			
			10	0.69	±0.6 In. w.c. / ±1 mbar		±1 In. w.c. / ±2 mbar	
			20	1.4	SCFH	Nm <sup>3</sup> /h	SCFH	Nm <sup>3</sup> /h
			40	2.8	1200	32.2	1600	42.9
			60	4.1	1420	38.1	2230	59.8
			80	5.5	2440	65.4	3760	101
			100	6.9	4260	114	6290	169
					5890	158	8730	234
4 to 10 psig / 276 mbar to 0.7 bar 1H8024000A2  Silver	10	0.69	15	1.0	7510	201	11,400	306
			20	1.4	9140	245	14,200	381
			40	2.8	Deviation from Setpoint			
			60	4.1	±0.6 In. w.c. / ±1 mbar		±2 In. w.c. / ±5 mbar	
			80	5.5	SCFH	Nm <sup>3</sup> /h	SCFH	Nm <sup>3</sup> /h
			100	6.9	1600	42.9	2600	69.7
					2030	54.4	3500	93.8
					3650	97.8	6680	179
					5080	136	9300	249
					6500	174	11,900	319
					7920	212	14,900	399



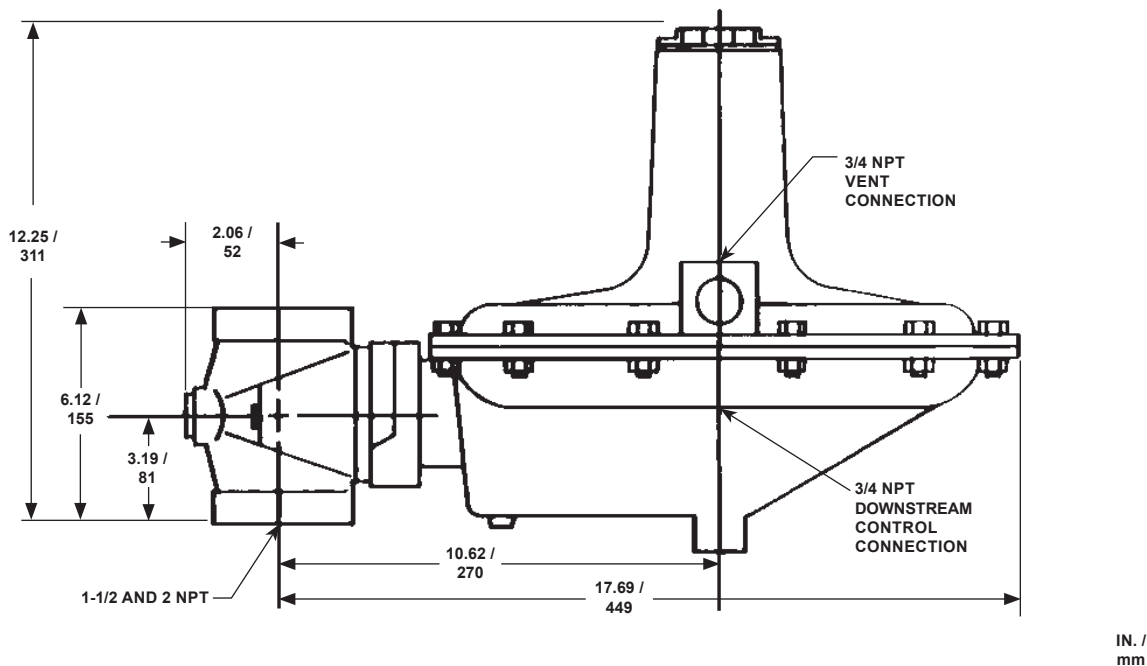
STEEL OR STAINLESS STEEL LOWER CASING VERSION



ALUMINUM LOWER CASING VERSION WITH A STEEL BODY

IN. /  
mm

Figure 4. Type Y693 Dimensions



**ALUMINUM LOWER CASING VERSION WITH A CAST IRON BODY**

**Figure 4. Type Y693 Dimensions (continued)**

## Industrial Regulators

### Emerson Process Management Regulator Technologies, Inc.

USA - Headquarters  
McKinney, Texas 75070 USA  
Tel: +1 800 558 5853  
Outside U.S. +1 972 548 3574

Asia-Pacific  
Shanghai 201206, China  
Tel: +86 21 2892 9000

Europe  
Bologna 40013, Italy  
Tel: +39 051 419 0611

Middle East and Africa  
Dubai, United Arab Emirates  
Tel: +971 4811 8100

## Natural Gas Technologies

### Emerson Process Management Regulator Technologies, Inc.

USA - Headquarters  
McKinney, Texas 75070 USA  
Tel: +1 800 558 5853  
Outside U.S. +1 972 548 3574

Asia-Pacific  
Singapore 128461, Singapore  
Tel: +65 6770 8337

Europe  
Bologna 40013, Italy  
Tel: +39 051 419 0611  
Chartres 28008, France  
Tel: +33 2 37 33 47 00

Middle East and Africa  
Dubai, United Arab Emirates  
Tel: +971 4811 8100

## TESCOM

### Emerson Process Management Tescom Corporation

USA - Headquarters  
Elk River, Minnesota 55330-2445, USA  
Tels: +1 763 241 3238  
+1 800 447 1250

Europe  
Selmsdorf 23923, Germany  
Tel: +49 38823 31 287

Asia-Pacific  
Shanghai 201206, China  
Tel: +86 21 2892 9499

For further information visit [www.fisherregulators.com](http://www.fisherregulators.com)

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