

Type 1290 Vapor Recovery Regulator



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Figure 1. Type 1290 Vapor Recovery Valve

Features

- **Quick-Change Trim Package** — Tested trim packages can be ordered and stocked ahead of time for fast replacement.
- **Easy In-Line Maintenance** — Top-entry design reduces maintenance time and manpower requirements; trim parts can be inspected, cleaned, and replaced without removing the body from the line.
- **In-Service Travel Inspection** — Standard travel indicator assembly with protective cover permits periodic inspection of plug travel without removing regulator from service.
- **High Accuracy** — Total proportional band of 0.25-inch w.c. / 0.62 mbar or less at lower set pressures.
- **Proven Technology** — Time-proven regulator technology has been adapted to meet the specific requirements of vapor recovery (depadding) applications.

Introduction

The Type 1290 vapor recovery regulator controls vessel blanketing gas pressure when the vessel is being filled with fluid or when ambient temperature causes the vapor gas to expand. The system monitors the increasing blanket pressure and throttles open to pass excess blanketing gas into a vapor disposal or reclamation system thus controlling the desired set pressure of the vessel.

The vapor recovery regulator is not intended to be used as an ASME certified relief device for overpressure protection. It is to be used as part of the gas blanketing system to control the outflow of blanketing gas under normal conditions and to collect vessel vapors for the vapor disposal or reclamation system. You should provide alternate methods of emergency overpressure protection per the American Petroleum Institute Standard 2000 (API 2000).

The vapor recovery regulator responds to any changes in the blanket gas pressure and throttles open or closed to control the flow of the blanket gas out of the vessel. A vacuum source on the outlet of the regulator is usually necessary to ensure flow of low pressure

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Specifications

Body Size and End Connection Styles⁽¹⁾

BODY SIZE, NPS / DN	MAIN VALVE END CONNECTION STYLE	
	Cast Iron	WCC Steel or CF8M Stainless Steel
1 or 2 / 25 or 50	NPT, CL125 FF or CL250 RF flanged	NPT, SWE, BWE, CL150 RF, CL300 RF, CL600 RF, or PN 16/25/40 flanged
3, 4, or 6 / 80, 100, or 150	CL125 FF or CL250 RF flanged	BWE, CL150 RF, CL300 RF, CL600 RF, or PN 16 flanged
8 x 6 or 12 x 6 / 200 x 150 or 300 x 150	----	BWE, CL150 RF, CL300 RF, CL600 RF, or PN 25 flanged

Construction Materials

See Table 1

Maximum Main Valve Inlet Pressures⁽²⁾

See Table 3

Maximum Differential Pressure

35 psi / 2.4 bar

Control Pressure Ranges⁽²⁾

See Table 2

Type 95H Supply Pressure Settings

PILOT TYPE	TYPE 1098-EGR MAIN VALVE WITH GREEN SPRING, NPS / DN		SPRING COLOR
	1, 2, 3, or 4 / 25, 50, 80, or 100	6 or 8 x 6 / 150 or 200 x 150	
Y291AL	8 psig / 0.55 bar	13 psig / 0.90 bar	Black
Y291A	8 psig / 0.55 bar	13 psig / 0.90 bar	Orange
	8 psig / 0.55 bar	13 psig / 0.90 bar	Red
	9 psig / 0.62 bar	14 psig / 0.97 bar	Unpainted
	10 psig / 0.69 bar	14 psig / 0.97 bar	Yellow
	11 psig / 0.76 bar	15 psig / 1.0 bar	Green
	14 psig / 0.97 bar	18 psig / 1.2 bar	Light blue
	15 psig / 1.0 bar	20 psig / 1.4 bar	Black

Type Y291A or Y291AL Pilot Orifice Diameter

3/8-inch / 9.5 mm

Flow Capacities

See Table 4

Flow Coefficients

See Table 5

Control Line Connection

1/2 NPT

Exhaust Line Connection

3/4 NPT

Supply Pressure and Spring Case Connections

1/4 NPT

Orifice Diameters and Travels

BODY SIZE		PORT DIAMETER		TRAVEL	
NPS	DN	Inch	mm	Inch	mm
1	25	1-5/16	33	3/4	19
2	50	2-3/8	60	1-1/8	29
3	80	3-3/8	86	1-1/2	38
4	100	4-3/8	111	2	51
6	150	7-3/16	183	2	51
8 x 6	200 x 150	7-3/16	183	2	51
12 x 6	300 x 150	7-3/16	183	2	51

Material Temperature Capabilities⁽²⁾

Nitrile (NBR):

-20 to 180°F / -29 to 82°C

Fluorocarbon (FKM):

For Inches w.c. Setpoints: 40 to 300°F / 4 to 149°C

For psig Setpoints: 0 to 300°F / -18 to 149°C

Ethylene propylene (EPDM):

-20 to 275°F / -29 to 135°C

Perfluoroelastomer (FFKM):

-20 to 300°F / -29 to 149°C

Approximate Weights

NPS 1 / DN 25: 85 pounds / 39 kg

NPS 2 / DN 50: 100 pounds / 45 kg

NPS 3 / DN 80: 145 pounds / 66 kg

NPS 4 / DN 100: 195 pounds / 88 kg

NPS 6 / DN 150: 380 pounds / 172 kg

NPS 8 x 6 / DN 200 x 150: 740 pounds / 336 kg

NPS 12 x 6 / DN 300 x 150: 1265 pounds / 574 kg

1. End connections for other than U.S. standards can usually be provided. Consult your local Sales Office.

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

blanket gas out of the vessel into a vapor disposal or reclamation system. The higher the vacuum pressure of the vacuum source, the higher the flow capacity of the vapor recovery regulator.

Principle of Operation

The Type 1290 vapor recovery regulator serves as a vessel vapor recovery system. The Type 1290

regulator controls vessel blanketing gas pressure when the vessel is being filled with fluid or when ambient temperature causes the vapor gas to expand.

The system monitors the increasing blanket pressure and throttles open to pass excess blanketing gas into a vapor recovery system thus controlling the desired set pressure of the vessel.

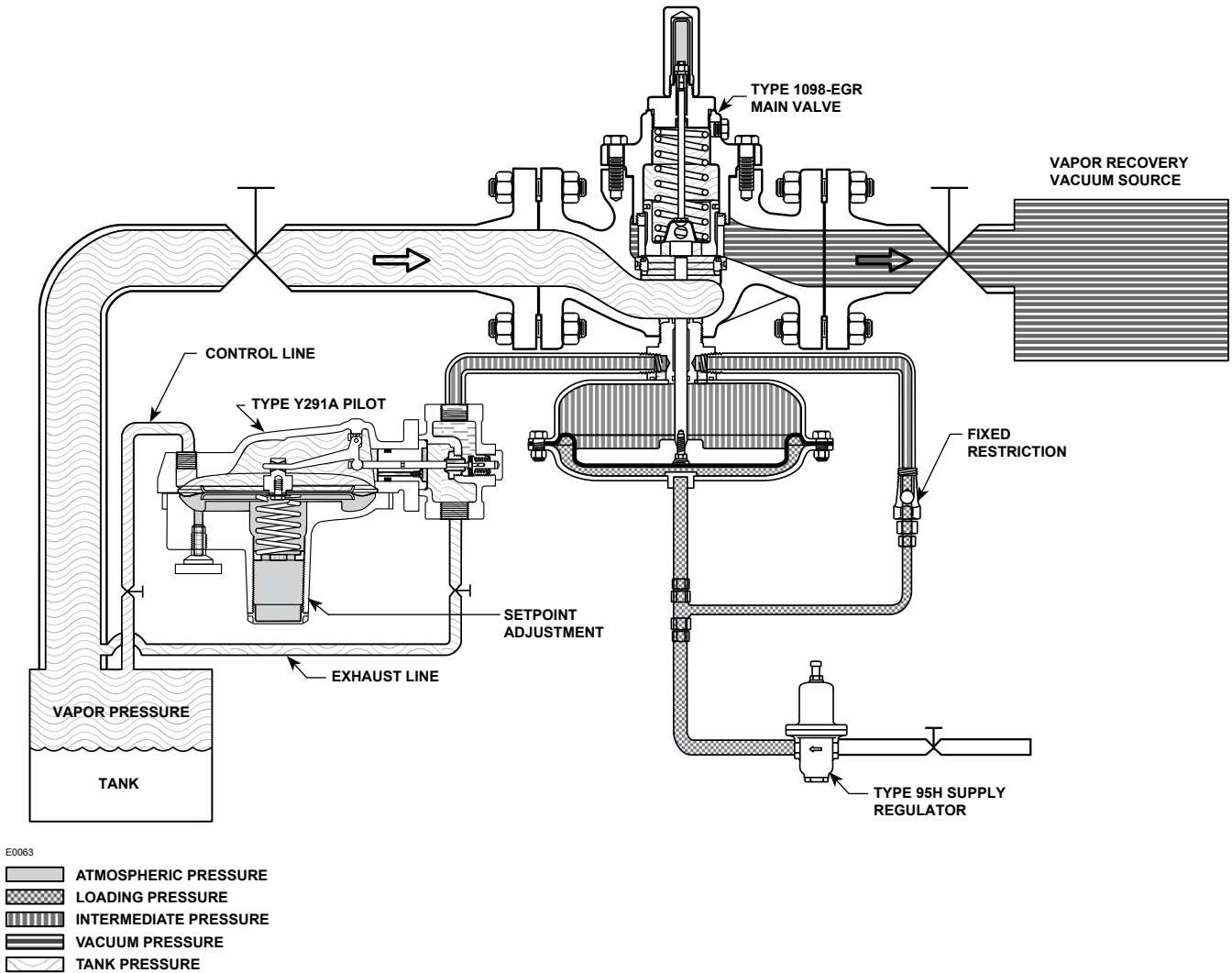


Figure 2. Operational Schematic

Table 1. Construction Materials⁽¹⁾

MAIN VALVE				SIZE 40 ACTUATOR	PILOT	SUPPLY REGULATOR	DIAPHRAGMS	O-RINGS AND SEALS
Body and Body Flange	Plug and Seat Ring	Spring	Cage					
Cast iron	416 Stainless steel	Steel	Cast iron	Steel	Ductile iron	Cast iron	Nitrile (NBR), Fluorocarbon (FKM), or Ethylenepropylene (EPDM)	Nitrile (NBR), Fluorocarbon (FKM), Ethylenepropylene (EPDM), or Perfluoroelastomer (FFKM)
WCC Steel	416 Stainless steel	Steel	Steel	Steel	Ductile iron	WCC Steel		
CF8M Stainless steel	316 Stainless steel	Inconel® X-750	316 Stainless steel Whisper Trim™ Cage	Stainless steel	CF8M Stainless steel	CF8M Stainless steel		

1. Special construction materials are offered for your system compatibility. Contact your local Sales Office for additional information. Inconel® is a mark owned by Special Metals Corporation.

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Table 2. Control Pressure Ranges

PILOT TYPE	CONTROL PRESSURE RANGES ⁽¹⁾	SPRING COLOR	SPRING PART NUMBER	BUILDUP TO WIDE-OPEN	SPRING WIRE DIAMETER		SPRING FREE LENGTH	
					Inch	mm	Inch	mm
Y291AL	0.5 to 1.5-inches w.c. / 1 to 4 mbar ⁽²⁾	Black	1B413627222	0.25-inch w.c. / 0.60 mbar	0.075	1.90	2.19	56.0
Y291A	1 to 2.5-inches w.c. / 2 to 6 mbar ⁽²⁾⁽³⁾	Orange	1B558527052	0.25-inch w.c. / 0.60 mbar	0.072	1.83	3.78	96.0
	2 to 7-inches w.c. / 5 to 17 mbar ⁽²⁾⁽⁴⁾	Red	1B653827052	0.25-inch w.c. / 0.60 mbar	0.085	2.20	3.63	92.0
	4 to 14-inches w.c. / 10 to 35 mbar	Unpainted	1B653927022	0.25-inch w.c. / 0.60 mbar	0.100	2.70	3.75	95.0
	12 to 28-inches w.c. / 30 to 70 mbar	Yellow	1B537027052	1.4-inch w.c. / 3 mbar	0.114	2.90	4.31	109
	1.0 to 2.5 psig / 0.07 to 0.17 bar	Green	1B537127022	2.8-inch w.c. / 7 mbar	0.156	4.00	4.06	103
	2.5 to 4.5 psig / 0.17 to 0.31 bar	Light blue	1B537227022	4.2-inch w.c. / 10 mbar	0.187	4.80	3.94	100
	4.5 to 7 psig / 0.31 to 0.48 bar	Black	1B537327052	5.5-inch w.c. / 14 mbar	0.218	5.40	3.98	101

1. Spring ranges based on pilot being installed with the spring case pointed down.
 2. Do not use Fluorocarbon (FKM) diaphragm with this spring at diaphragm temperatures lower than 60°F / 16°C.
 3. When using a Fluorocarbon (FKM) diaphragm, the minimum outlet pressure is 2-inches w.c. / 5 mbar.
 4. When using a Fluorocarbon (FKM) diaphragm, the minimum outlet pressure is 2.5-inches w.c. / 6 mbar.

Table 3. Maximum Main Valve Inlet Pressures

PILOT TYPE	MAXIMUM INLET PRESSURES, psig / bar					SPRING COLOR
	Type 1098-EGR Main Valve with Green Spring					
	NPS 1 / DN 25	NPS 2 / DN 50	NPS 3 / DN 80	NPS 4 / DN 100	NPS 6, 8 x 6, or 12 x 6 / DN 150, 200 x 150, or 300 x 150	
Y291AL	5.5 / 0.38	5 / 0.35	4 / 0.28	3 / 0.21	3.5 / 0.24	Black
Y291A	5.5 / 0.38	5 / 0.35	4 / 0.28	3 / 0.21	3.5 / 0.24	Orange
	5.5 / 0.38	5 / 0.35	4 / 0.28	3 / 0.21	3.5 / 0.24	Red
	6.5 / 0.45	6 / 0.41	5 / 0.35	4 / 0.28	4.5 / 0.31	Unpainted
	7.5 / 0.52	7 / 0.48	6 / 0.41	5 / 0.35	4.5 / 0.31	Yellow
	8.5 / 0.59	8 / 0.55	7 / 0.48	6 / 0.41	5.5 / 0.38	Green
	11.5 / 0.79	11 / 0.76	10 / 0.69	9 / 0.62	8.5 / 0.59	Light Blue
	12.5 / 0.86	12 / 0.83	11 / 0.76	10 / 0.69	10.5 / 0.72	Black

Table 4. Flow Capacities for Type 1290 Vapor Recovery Regulators

PILOT TYPE	PILOT SPRING COLOR	CONTROL PRESSURE	BUILDUP OVER CONTROL PRESSURE TO WIDE-OPEN ⁽¹⁾	DOWNSTREAM VACUUM PRESSURE	CAPACITIES IN SCFH / Nm ³ /h OF 0.97 SPECIFIC GRAVITY NITROGEN				
					NPS 1 / DN 25 Body	NPS 2 / DN 50 Body	NPS 3 / DN 80 Body	NPS 4 / DN 100 Body	NPS 6 / DN 150 Body
Y291AL	Black	0.5-inch w.c. / 1 mbar	0.25-inch w.c. / 0.60 mbar	0 psig / 0 bar	600 / 16.1	2300 / 61.6	4900 / 131	7600 / 204	14,600 / 391
				2.5 psig / 0.17 bar	5600 / 150	19,900 / 533	43,100 / 1155	66,900 / 1793	124,500 / 3337
Y291A	Orange	1-inch w.c. / 2 mbar	0.25-inch w.c. / 0.60 mbar	0 psig / 0 bar	700 / 18.8	2700 / 72.4	5900 / 158	9200 / 247	17,700 / 474
				2.5 psig / 0.17 bar	5700 / 153	10,000 / 268	43,200 / 1158	67,000 / 1796	126,700 / 3396
				5 psig / 0.34 bar	7400 / 198	25,900 / 694	55,800 / 1495	86,800 / 2326	160,800 / 4309
	Unpainted	2-inches w.c. / 5 mbar	0.25-inch w.c. / 0.60 mbar	0 psig / 0 bar	1100 / 29.5	3900 / 105	8400 / 225	13,000 / 348	25,000 / 670
				2.5 psig / 0.17 bar	5800 / 155	20,200 / 541	43,500 / 1166	67,600 / 1812	127,700 / 3422
				5 psig / 0.34 bar	7400 / 198	26,000 / 697	56,000 / 1501	87,200 / 2337	161,500 / 4328
	Unpainted	4-inches w.c. / 10 mbar	0.25-inch w.c. / 0.60 mbar	0 psig / 0 bar	1500 / 40.2	5300 / 142	11,500 / 308	17,800 / 477	34,200 / 917
				2.5 psig / 0.17 bar	5800 / 155	20,500 / 549	44,100 / 1182	68,500 / 1836	129,400 / 3468
				5 psig / 0.34 bar	7500 / 201	26,300 / 705	56,600 / 1517	88,100 / 2361	162,200 / 4347
	Unpainted	8-inches w.c. / 20 mbar	0.25-inch w.c. / 0.60 mbar	0 psig / 0 bar	2100 / 56.3	7400 / 198	16,000 / 429	24,800 / 665	47,600 / 1276
				2.5 psig / 0.17 bar	6000 / 161	21,000 / 563	45,300 / 1214	70,400 / 1887	132,800 / 3559
				5 psig / 0.34 bar	7600 / 204	26,800 / 718	57,700 / 1546	89,800 / 2407	166,200 / 4454
	Unpainted	15-inches w.c. / 37 mbar	0.25-inch w.c. / 0.60 mbar	0 psig / 0 bar	2900 / 77.7	10,100 / 271	21,800 / 584	33,800 / 906	64,900 / 1739
				2.5 psig / 0.17 bar	6300 / 169	22,000 / 590	47,400 / 1270	73,600 / 1972	138,700 / 3717
				5 psig / 0.34 bar	7900 / 212	27,800 / 745	59,800 / 1603	93,100 / 2495	172,400 / 4620
	Yellow	1 psig / 0.07 bar	0.05 psig / 3 mbar	0 psig / 0 bar	4000 / 107	14,100 / 378	30,500 / 817	47,200 / 1265	90,300 / 2420
				2.5 psig / 0.17 bar	6800 / 182	23,900 / 641	51,400 / 1378	79,900 / 2141	150,100 / 4023
	Light blue	3 psig / 0.21 bar	0.15 psig / 10 mbar	0 psig / 0 bar	7000 / 188	24,700 / 662	53,200 / 1426	82,500 / 2211	155,800 / 4175
				2.5 psig / 0.17 bar	8700 / 233	30,600 / 820	66,000 / 1769	102,700 / 2752	190,700 / 5111
				5 psig / 0.34 bar	9600 / 257	34,100 / 914	73,400 / 1967	114,600 / 3071	209,100 / 5604
	Light blue	5 psig / 0.34 bar	0.15 psig / 10 mbar	0 psig / 0 bar	9100 / 244	31,900 / 855	68,600 / 1838	106,700 / 2860	199,500 / 5347
				2.5 psig / 0.17 bar	10,200 / 273	36,300 / 973	78,100 / 2093	121,600 / 3259	224,000 / 6003
	Black	7 psig / 0.48 bar	0.20 psig / 14 mbar	0 psig / 0 bar	11,000 / 295	39,000 / 1045	83,900 / 2249	131,000 / 3511	327,400 / 8774
				2.5 psig / 0.17 bar	10,800 / 289	38,200 / 1024	82,200 / 2203	127,900 / 3428	237,100 / 6354
			5 psig / 0.34 bar	11,700 / 314	41,600 / 1115	89,500 / 2399	139,700 / 3744	255,300 / 6842	
				12,300 / 330	43,800 / 1174	94,200 / 2525	147,300 / 3948	265,100 / 7105	

1. Increased capacity is available at higher buildups.

Table 5. Flow Coefficients

BODY SIZE, NPS / DN	PIPING STYLE											
	Line Size Equals Body Size Piping											
	Linear Cage					Drilled Hole Whisper Trim™ Cage						
	C _g		C _v		C ₁	K _m	C _g		C _v		C ₁	K _m
Regulating	Wide-Open	Regulating	Wide-Open	Regulating			Wide-Open	Regulating	Wide-Open			
1 / 25	600	632	16.8	17.7	35.7	0.70	576	607	16.7	17.6	34.5	0.80
2 / 50	2280	2400	63.3	66.7	36.0		1970	2080	54.7	57.8	36.0	
3 / 80	4630	4880	132	139	35.1		3760	3960	107	113	35.0	
4 / 100	7320	7710	202	213	36.2		6280	6610	180	190	34.8	
6 / 150	12,900	13,600	397	418	32.5		9450	9950	295	310	32.0	
8 x 6 / 200 x 150	18,480	19,450	578	608	32.0		10,660	11,220	305	321	35.0	
12 x 6 / 300 x 150	21,180	22,290	662	697	32.0		11,050	11,630	316	332	35.0	
BODY SIZE, NPS / DN	PIPING STYLE											
	2:1 Line Size to Body Size Piping											
	Standard Linear Cage					Drilled Hole Whisper Trim Cage						
	C _g		C _v		C ₁	K _m	C _g		C _v		C ₁	K _m
Regulating	Wide-Open	Regulating	Wide-Open	Regulating			Wide-Open	Regulating	Wide-Open			
1 / 25	568	598	17.2	18.1	33.0	0.70	529	557	15.6	16.4	34.0	0.80
2 / 50	2050	2160	59.6	62.8	34.4		1830	1930	52.3	55.1	35.1	
3 / 80	4410	4650	128	135	34.4		3630	3830	106	110	34.2	
4 / 100	6940	7310	198	209	35.0		6020	6340	171	180	35.2	
6 / 150	12,100	12,800	381	404	31.7		9240	9730	291	306	31.7	
8 x 6 / 200 x 150	17,370	18,280	543	571	32.0		10,020	10,550	286	301	35.0	
12 x 6 / 300 x 150	19,900	20,950	622	655	32.0		10,380	10,930	297	312	35.0	

Table 6. Flow Rate Conversions (Gas Flow Required to Displace Blanketing Gas with Pump-in of Liquid)

MULTIPLY MAXIMUM PUMP RATE IN	BY	TO OBTAIN
U.S. GPM	8.021	SCFH air required ⁽²⁾
U.S. GPH	0.1337	
Barrels/hour	5.615	
Barrels/day	0.2340	
<small>1. For liquids with a flash point below 100°F / 38°C or normal boiling point below 300°F / 149°C, multiply the above calculated outbreathing requirement by 2.0. 2. To convert to Nm³/h, multiply SCFH by 0.0268.</small>		

Note

The Type 1290 Vapor Recovery Regulator is not intended to be used as an ASME certified relief device for overpressure protection. It is to be used as part of the gas blanketing system to control the outflow of blanketing gas under normal conditions and to collect vessel vapors for the vapor recovery system. You should provide alternate methods of emergency overpressure protection.

The Type 1290 vapor recovery regulator responds to any changes in the blanket gas pressure and throttles open or closed to control the flow of the blanket gas out of the vessel. A vacuum source on the outlet of the regulator is usually necessary to ensure flow of low pressure blanket gas out of the vessel into a vapor

recovery system. The higher the vacuum pressure of the vacuum source, the higher the flow capacity of the vapor recovery regulator.

The pressure of the blanket gas registers under the diaphragm of the pilot. A Type 95H regulator provides a constant loading pressure source to the Type 1098-EGR main valve actuator. When the pilot is closed, the loading pressure fills both sides of the Type 1098 actuator through a fixed restriction.

The Type 1098-EGR main valve spring keeps the main valve plug tightly shut off. When the vessel blanket gas pressure reaches the setting of the pilot spring, the pilot diaphragm moves, opening the pilot valve disk and exhausting some of the Type 1098-EGR's actuator loading pressure through the pilot orifice. This typically happens when the vessel is being filled with liquid.

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Table 7. Gas Flow Required for Thermal Heating (Outbreathing) per API 2000 (Interpolate for intermediate sizes)

VESSEL CAPACITY			SCFH / Nm ³ /h AIR FLOW RATE REQUIRED	
Barrels	Gallons	Liters	Flash Point is Equal to or Above 100°F / 38°C or Normal Boiling Point is Equal to or Above 300°F / 149°C	Flash Point is Below 100°F / 38°C or Normal Boiling Point is Below 300°F / 149°C
60	2500	9500	40 / 1.07	60 / 1.61
100	4200	16,000	60 / 1.61	100 / 2.68
500	21,000	79,500	300 / 8.04	500 / 13.4
1000	42,000	159,000	600 / 16.1	1000 / 26.8
2000	84,000	318,000	1200 / 32.2	2000 / 53.6
3000	126,000	477,000	1800 / 48.2	3000 / 80.4
4000	168,000	636,000	2400 / 64.3	4000 / 107
5000	210,000	795,000	3000 / 80.4	5000 / 134
10,000	420,000	1,590,000	6000 / 161	10,000 / 268
15,000	630,000	2,385,000	9000 / 241	15,000 / 402
20,000	840,000	3,180,000	12,000 / 322	20,000 / 536
25,000	1,050,000	3,975,000	15,000 / 402	24,000 / 643
30,000	1,260,000	4,769,000	17,000 / 456	28,000 / 750
35,000	1,470,000	5,564,000	19,000 / 509	31,000 / 831
40,000	1,680,000	6,359,000	21,000 / 563	34,000 / 911
45,000	1,890,000	7,154,000	23,000 / 616	37,000 / 992
50,000	2,100,000	7,949,000	24,000 / 643	40,000 / 1072
60,000	2,520,000	9,539,000	27,000 / 724	44,000 / 1179
70,000	2,940,000	11,298,000	29,000 / 777	48,000 / 1286
80,000	3,360,000	12,718,000	31,000 / 831	52,000 / 1394
90,000	3,780,000	14,308,000	34,000 / 911	56,000 / 1501
100,000	4,200,000	15,897,000	36,000 / 965	60,000 / 1608
120,000	5,040,000	19,077,000	41,000 / 1099	68,000 / 1822
140,000	5,880,000	22,256,000	45,000 / 1206	75,000 / 2010
160,000	6,720,000	25,436,000	50,000 / 1340	82,000 / 2198
180,000	7,560,000	28,615,000	54,000 / 1447	90,000 / 2412

The small fixed restriction maintains a higher loading pressure on the bottom of the Type 1098 actuator. The pressure differential across the main valve diaphragm moves the diaphragm upward causing the main valve to open which allows the blanket gas to flow out to the vapor recovery system vacuum source, hence controlling the vessel blanket pressure.

When the vessel blanket gas pressure begins to stabilize, the pilot spring throttles the pilot disk closed. This allows the loading pressure source to fill both sides of the Type 1098 actuator through the fixed restriction. This equalizes the pressure acting on the diaphragm, thus allowing the main valve spring to close the main valve plug.

Sizing Blanketing Systems

When sizing a gas vapor recovery regulator system, you must consider the volume of blanketing gas that must be displaced from the vessel when either filling the vessel with liquid (pump-in) or the expansion of vapors inside the vessel during atmospheric thermal heating.

Using the established procedures from American Petroleum Institute Standard 2000 (API 2000), determine the flow rate for outbreathing.

1. Determine the flow rate of blanketing gas displaced when liquid is being pumped into the vessel (see Table 6).
2. Determine the gas flow rate due to outbreathing caused by atmospheric thermal heating (see Table 7).

3. Add the requirements of 1 and 2 and select a vapor recovery regulator size based on total capacity required from Table 4.

Sample Sizing Problem for Vapor Recovery Applications:

Vessel Capacity 1000 barrels
 Pump in Capacity 20 GPM / 75.7 lpm
 Inlet Pressure Source 60 psig / 4.1 bar nitrogen
 Desired Blanket Setpoint 0.5-inch w.c. / 1 mbar
 Desired Vapor Recovery Setpoint 2-inches w.c. / 5 mbar
 Vapor Recovery Vacuum Source 5-inches Hg / 169 mbar
 Fluid Hexane
 Boiling Point 155°F / 68°C

1. From Table 6 the desired air flow rate due to pump in equals 20 GPM x 8.021 x 2 = 320 SCFH / 8.58 Nm³/h air.
2. From Table 7 the desired air flow rate = 1000 SCFH / 26.8 Nm³/h air due to thermal heating.
3. Total required flow rate = 1000 SCFH air + 320 SCFH = 1320 SCFH / 35.4 Nm³/h air. This converts to nitrogen requirements of 1340 SCFH / 35.9 Nm³/h.

Capacity Information

Table 4 gives typical nitrogen regulating capacities at selected inlet pressures and outlet pressure settings. Flows are in SCFH (at 60°F and 14.7 psia) and Nm³/h

Table 8. Materials Compatibility

CORROSION INFORMATION																
Fluid	Material							Fluid	Material							
	Carbon Steel	Cast or Ductile Iron	302 or 304 Stainless Steel	CF8M or 316 Stainless Steel	416 Stainless Steel	Monel ^{®(1)}	Hastelloy ^{® C(2)}		Carbon Steel	Cast or Ductile Iron	302 or 304 Stainless Steel	CF8M or 316 Stainless Steel	416 Stainless Steel	Monel ^{®(1)}	Hastelloy ^{® C(2)}	
Acetic Acid (Air Free)	C	C	B	B	C	B	A	Hydrochloric Acid (Air Free)	C	C	C	C	C	C	B	
Acetic Acid Vapors	C	C	A	A	C	A	A	Hydrogen	A	A	A	A	A	A	A	
Acetone	A	A	A	A	A	A	A	Hydrogen Peroxide	I.L.	A	A	A	B	A	B	
Acetylene	A	A	A	A	A	A	A	Hydrogen Sulfide (Liquid)	C	C	A	A	C	C	A	
Alcohols	A	A	A	A	A	A	A	Magnesium Hydroxide	A	A	A	A	A	A	A	
Aluminum Sulfate	C	C	A	A	C	B	A	Methanol	A	A	A	A	A	A	A	
Ammonia	A	A	A	A	A	A	A	Methyl Ethyl Ketone	A	A	A	A	A	A	A	
Ammonium Chloride	C	C	B	B	C	B	A	Natural Gas	A	A	A	A	A	A	A	
Ammonium Nitrate	A	C	A	A	C	C	A	Nitric Acid	C	C	A	B	C	C	B	
Ammonium Sulfate	C	C	B	A	C	A	A	Petroleum Oils (Refined)	A	A	A	A	A	A	A	
Ammonium Sulfite	C	C	A	A	B	C	A	Phosphoric Acid (Air Free)	C	C	A	A	C	B	A	
Beer	B	B	A	A	B	A	A	Phosphoric Acid Vapors	C	C	B	A	C	C	I.L.	
Benzene (Benzol)	A	A	A	A	A	A	A	Potassium Chloride	B	B	A	A	C	B	A	
Benzoic Acid	C	C	A	A	A	A	A	Potassium Hydroxide	B	B	A	B	B	A	A	
Boric Acid	C	C	A	A	B	A	A	Propane	A	A	A	A	A	A	A	
Butane	A	A	A	A	A	A	A	Silver Nitrate	C	C	A	A	B	C	A	
Calcium Chloride (Alkaline)	B	B	C	B	C	A	A	Sodium Acetate	A	A	B	A	A	A	A	
Carbon Dioxide (Dry)	A	A	A	A	A	A	A	Sodium Carbonate	A	A	A	A	B	A	A	
Carbon Dioxide (Wet)	C	C	A	A	A	A	A	Sodium Chloride	C	C	B	B	B	A	A	
Carbon Disulfide	A	A	A	A	B	B	A	Sodium Chromate	A	A	A	A	A	A	A	
Carbon Tetrachloride	B	B	B	B	C	A	A	Sodium Hydroxide	A	A	A	A	B	A	A	
Carbonic Acid	C	C	B	B	A	A	A	Stearic Acid	A	C	A	A	B	B	A	
Chlorine Gas (Dry)	A	A	B	B	C	A	A	Sulfur	A	A	A	A	A	A	A	
Chlorine Gas (Wet)	C	C	C	C	C	C	B	Sulfur Dioxide (Dry)	A	A	A	A	B	A	A	
Chlorine (Liquid)	C	C	C	C	C	C	A	Sulfur Trioxide (Dry)	A	A	A	A	B	A	A	
Chromic Acid	C	C	C	B	C	A	A	Sulfuric Acid (Aerated)	C	C	C	C	C	C	A	
Citric Acid	I.L.	C	B	A	B	B	A	Sulfuric Acid (Air Free)	C	C	C	C	C	B	A	
Coke Oven Gas	A	A	A	A	A	B	A	Sulfurous Acid	C	C	B	B	C	C	A	
Copper Sulfate	C	C	B	B	A	C	A	Trichloroethylene	B	B	B	A	B	A	A	
Ether	B	B	A	A	A	A	A	Water (Boiler Feed)	B	C	A	A	B	A	A	
Ethyl Chloride	C	C	A	A	B	A	A	Water (Distilled)	A	A	A	A	B	A	A	
Ethylene	A	A	A	A	A	A	A	Water (Sea)	B	B	B	B	C	A	A	
Ethylene Glycol	A	A	A	A	A	A	I.L.	Zinc Chloride	C	C	C	C	C	C	A	
Formaldehyde	B	B	A	A	A	A	A	Zinc Sulfate	C	C	A	A	B	A	A	
Formic Acid	I.L.	C	B	B	C	A	A	----	-	-	-	-	-	-	-	
Freon (Wet)	B	B	B	A	I.L.	A	A	----	-	-	-	-	-	-	-	
Freon (Dry)	B	B	A	A	I.L.	A	A	----	-	-	-	-	-	-	-	
Gasoline (Refined)	A	A	A	A	A	A	A	----	-	-	-	-	-	-	-	
Glucose	A	A	A	A	A	A	A	----	-	-	-	-	-	-	-	
Hydrochloric Acid (Aerated)	C	C	C	C	C	C	B	----	-	-	-	-	-	-	-	

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 2. Hastelloy^{® C} is a mark owned by Haynes International, Inc.

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

- continued -

(at 0°C and 1.01325 bar) 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. To determine regulating capacities at pressure settings not given or to determine wide-open flow capacities, 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 Table 5
- C₁ = C_g/C_v or 35 from Table 5
- G = gas specific gravity (air = 1.0)
- P₁ = absolute 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)

Bulletin 74.2:1290

Table 8. Materials Compatibility (continued)

Fluid	FLUID INFORMATION				
	Material				
	Neoprene (CR)	Nitrile (NBR)	Fluorocarbon (FKM)	Perfluorelastomer (FFKM)	Ethylenepropylene (EPDM)
Acetic Acid (30%)	C	B	B	A	A
Acetone	B	C	C	A	A
Alcohol (Ethyl)	A	A	B	A	A
Alcohol (Methyl)	A+	A	C	A	A
Ammonia (Anhydrous)	A	C	C	A	A
Ammonia (Gas, Hot)	B	C	C	A	B
Benzene	C	C	A	A	C
Brine (Calcium Chloride)	A	A	B	A	A
Butadiene Gas	B	C	B	A	C
Butane (Gas)	A	A+	A	A	C
Butane (Liquid)	B	A	A	A	C
Carbon Tetrachloride	C	C	A	A	C
Chlorine (Dry)	C	C	A	A	C
Chlorine (Wet)	C	C	A	A	C
Coke Oven Gas	C	B	A+	A	C
Ethyl Acetate	C	C	C	A	B
Ethylene Glycol	A	A	A	A	A
Freon 11	B	A	A+	A	C
Freon 12	A+	A	B	A	B
Freon 22	A+	C	C	A	A
Freon 114	A	A	B	A	A
Gasoline	B	A+	A	A	C
Hydrogen Gas	A	A	A	A	A
Hydrogen Sulfide (Dry)	A	C	C	A	A
Hydrogen Sulfide (Wet)	B	C	C	A	A
Jet Fuel (JP-4)	C	A	A	A	I.L.
Natural Gas	A	A+	A	A	C
Natural Gas + H ₂ S (Sour Gas)	A	B	C	A	C
Nitric Acid (20%)	B	C	A	A	C
Nitric Acid (50 to 100%)	C	C	A	A	C
Nitrogen	A	A	A	A	A
Oil (Fuel)	B	A+	A	A	C
Propane	A	A	A	A	C
Sulfur Dioxide	B	A	A	A	A
Sulfuric Acid (to 50%)	A	C	A	A	A
Sulfuric Acid (50 to 100%)	B	C	A	A	B
Water (Ambient)	C	C	A	A	B
Water (at 200°F / 93°C)	A	A	A	A	A
Water (Sea)	C	B	B	A	A

A+--Best possible selection
A--Recommended
B--Minor to moderate effect. Proceed with caution.

C--Unsatisfactory
I.L.--Information lacking

Installation

Install the regulator using a straight run of pipe the same size or larger than the regulator body. Flow through the regulator body is indicated by the flow arrow cast, stamped, or riveted on the body. If a block valve is required, install a full flow valve between the regulator and the blanketed vessel. For proper operation at low setpoint ranges, the regulators should be installed with the pilot spring case barrel pointed down.

Ordering information

Refer to the Specifications section on page 2. Carefully review the description of each specification and specify the desired selection on the Ordering Guide page wherever there is a choice to be made.

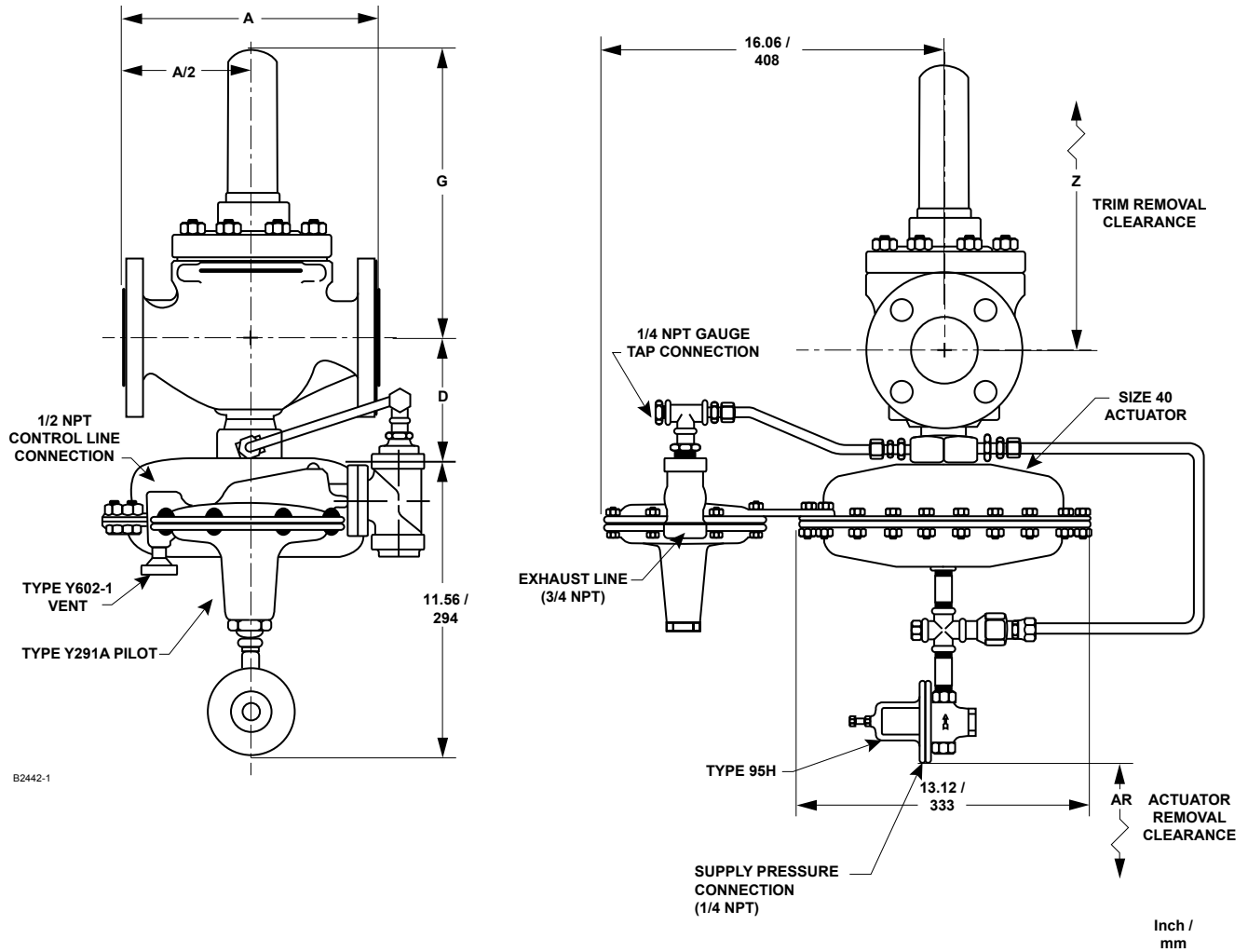


Figure 3. Type 1290 Dimensional Drawing

Table 9. Type 1290 Dimensions

MAIN VALVE BODY SIZE		DIMENSIONS																			
		A								D		G		Z				AR			
		NPT		CL125 FF Cast Iron, or CL150 RF Steel or Stainless Steel		CL250 FF Cast Iron, or CL300 RF Steel or Stainless Steel		CL600 RF Steel or Stainless Steel						Cast Iron		Stainless Steel or Steel		Cast Iron		Stainless Steel or Steel	
NPS	DN	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
1	25	8.25	210	7.25	184	7.75	197	8.25	210	3.88	99	8.62	219	12.00	305	10.50	267	3.00	76	2.44	62
2	50	11.25	286	10.00	254	10.50	267	11.25	286	4.56	116	9.12	232	13.31	338	11.81	300	3.12	79	3.12	79
3	80	-----	-----	11.75	298	12.50	317	13.25	337	5.31	135	11.25	286	16.50	419	14.00	356	3.88	99	3.88	99
4	100	-----	-----	13.88	353	14.50	368	15.50	394	6.50	165	12.62	321	19.12	486	16.88	429	5.12	130	5.12	130
6	150	-----	-----	17.75	451	18.62	473	20.00	580	7.25	184	13.69	348	20.44	519	19.19	487	6.38	162	6.62	168
8 x 6	200 x 150	-----	-----	21.40	544	22.40	569	24.00	610	9.76	248	15.02	382	20.25	514	23.25	591	6.62	168	6.62	168
12 x 6	300 x 150	-----	-----	29.00	737	30.50	775	32.25	819	9.76	248	15.02	382	-----	-----	23.25	591	-----	-----	6.62	168

Ordering Guide

Construction (Select One)

- Standard
- NACE

Type EGR Main Valve

Main Valve Body Size (Select One)

- NPS 1 / DN 25***
- NPS 2 / DN 50***
- NPS 3 / DN 80***
- NPS 4 / DN 100***
- NPS 6 / DN 150**
- NPS 8 x 6 / DN 200 x 150*
- NPS 12 x 6 / DN 300 x 150*

Main Valve Body Material (Select One)

- Cast Iron***
- WCC Steel***
- CF8M Stainless steel (NACE)**

Main Valve End Connection Style (Select One)

Cast Iron Body

- NPT (NPS 1 and 2 / DN 25 and 50 only)***
- CL125 FF***
- CL250 RF***

WCC Steel or CF8M Stainless Steel Body

- NPT (NPS 1 and 2 / DN 25 and 50 only)***
- SWE (NPS 1 and 2 / DN 25 and 50 only)**
- CL150 RF***
- CL300 RF***
- CL600 RF***
- BWE 40**
- BWE 80*
- PN 16/25/40* _____ please specify rating

Main Valve Body Flange Material (Select One)

- Cast Iron***
- WCC Steel***
- CF8M Stainless Steel (NACE)**

Percent Travel or Travel Stop (Select One)

- 100 percent (standard)***
- 70 percent (NPS 2 / DN 50 only)**
- 40 percent (Not available for NPS 1 and 2 / DN 25 and 50)**
- 30 percent (NPS 2 / DN 50 only)**

Main Valve Cage Type and Material (Select One)

- Linear, CF8M Stainless Steel (NACE)***
- Whisper Trim™ Cage, 416 Stainless steel
- Whisper Trim Cage, 316 Stainless steel (NACE)
- Quick Opening, Cast Iron
- Quick Opening, Steel (for NPS 6 / DN 150 body only)

Type EGR (continued)

Main Valve Spring Range (Select One)

- 60 psig / 4.1 bar maximum drop, Green**

Main Valve Spring

- Steel***
- Inconel® X-750 (NACE)⁽¹⁾***

O-ring and Seal Material (Select One)

- Nitrile (NBR)***
- Fluorocarbon (FKM)**
- Ethylenepropylene (EPDM)**
- Perfluoroelastomer (FFKM)

Type 1098 Actuator

Lower Diaphragm Case Material (Select One)

- Steel***
- Stainless Steel**

Bonnet Material (Select One)

- Steel***
- Stainless Steel**

O-ring Material (Select One)

- Nitrile (NBR)***
- Fluorocarbon (FKM)**
- Ethylenepropylene (EPDM)**

Diaphragm Material (Select One)

- Nitrile (NBR)***
- Fluorocarbon (FKM)**
- Ethylenepropylene (EPDM)**

Type 95H Supply Pressure Regulator

Body Material (Select One)

- Cast Iron***
- Steel***
- Stainless Steel***

Spring Case Material (Select One)

- Cast Iron***
- Steel***
- Stainless Steel***

Valve Plug Material (Select One)

- 416 Stainless Steel with Nitrile (NBR)***
- 416 Stainless Steel with Fluorocarbon (FKM)***
- 316 Stainless Steel with Neoprene (CR) (NACE)**
- 316 Stainless Steel with Fluorocarbon (FKM)**

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Ordering Guide (continued)

Type 95H (continued)

- Outlet Pressure Range (Select One)**
- 15 to 30 psig / 1.0 to 2.1 bar, Yellow***
- Diaphragm Material (Select One)**
- Neoprene (CR)***
 - Fluorocarbon (FKM)**

Type Y291A or Y291AL Pilot

- Body, Spring Case Assembly, and Diaphragm Casing Material (Select One)**
- Ductile Iron***
 - Stainless Steel***

Control Pressure Range (Select One)

- Type Y291AL**
- 0.5 to 1.5-inches w.c. / 1 to 4 mbar, Black***

- Type Y291A**
- 1.0 to 2.5-inches w.c. / 2 to 6 mbar, Orange***
 - 2 to 7-inches w.c. / 5 to 17 mbar, Red***
 - 4 to 14-inches w.c. / 10 to 35 mbar, Unpainted***
 - 12 to 28-inches w.c. / 30 to 70 mbar, Yellow***
 - 1 to 2.5 psig / 0.07 to 0.17 bar, Green***
 - 2.5 to 4.5 psig / 0.17 to 0.31 bar, Light Blue***
 - 4.5 to 7 psig / 0.31 to 0.48 bar, Black***

- Diaphragm Material (Select One)**
- Nitrile (NBR)***
 - Fluorocarbon (FKM)**
 - Nitrile (NBR) with Polytetrafluoroethylene (PTFE) diaphragm protector**

O-ring and Seal Material (Select One)

- Nitrile (NBR)***
- Fluorocarbon (FKM)**
- Ethylenepropylene (EPDM)**
- Perfluoroelastomer (FFKM)*

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.	

Type Y291A or Y291AL Pilot (continued)

- Closing Cap Material (Select One)**
- Type Y291AL**
- Zinc
- Type Y291A**
- Plastic***
 - Steel**
 - Stainless Steel**
- Vent Assembly (Select One)**
- Spring Case Up (Type Y602-11)***
 - Spring Case Down (Type Y602-1)***

Parts Kits

- Replacement Parts Kit (Optional)**
- Yes, send one replacement parts kit to match this order for each unit.
- Quick-Change Trim Package (Optional)**
- Yes, send one main valve Quick-Change Trim Package to match this order.
- Wireless Position Monitor Mounting Kit (Optional)**
- Yes, send one mounting kit for mounting the Topworx™ 4310 or the Fisher® 4320 wireless position monitor.

Specification Worksheet	
Application Specifications:	
Tank Size	_____
Pump In Rate	_____
Pump Out Rate	_____
Blanketing Gas (Type and Specific Gravity)	_____
Pressure Requirements (Please Designate Units):	
Maximum Inlet Pressure (P_{1max})	_____
Minimum Inlet Pressure (P_{1min})	_____
Control Pressure Setting (P_2)	_____
Maximum Flow (Q_{max})	_____
Accuracy Requirements:	
<input type="checkbox"/> 0.25-inch w.c. / 0.60 mbar	<input type="checkbox"/> 0.5-inch w.c. / 1 mbar
<input type="checkbox"/> 1-inch w.c. / 2 mbar	<input type="checkbox"/> 2-inches w.c. / 5 mbar
<input type="checkbox"/> Other _____	
Other Specifications:	
Is a vapor recovery regulator required? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Special Material Requirements: <input type="checkbox"/> Ductile Iron <input type="checkbox"/> Steel	
<input type="checkbox"/> Stainless Steel <input type="checkbox"/> Hastelloy® C <input type="checkbox"/> Other _____	
Other Requirements: _____	

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