

# P1098 Pressure Reducing Regulator

The BelGAS P1098 pressure regulator is an accurate and economical pressure control device for large volume gas use in pressures from inches of water column up to 200 PSIG. The P1098 incorporates a two-path pilot system and a large area actuator diaphragm allowing for fast and accurate response to changing flow conditions. The pilot acts as an amplifier to the main regulator valve for precision control. Bubble tight shutoff is also achieved with a sharp-edged orifice and soft seat material.

## Applications

- City / District gate operation
- Commercial buildings
- Boilers, furnace, oven
- Plant air systems and liquids

## Features

- Multiple Pilot choices for low to extra high pressure
- Up to 400 psi main valve inlet, up to 600 psi pilot inlet
- Loading pressure bleeds downstream
  - no atmospheric relief

## Operations

- Pilot operated providing quick response and high accuracy requires less droop than a direct operated regulator to obtain the same pressure difference.
- Pilots assemblies can be exchanged in the field from high to low pressure.
- Seat design is an elastomer seat disk against a sharp edge orifice.
- Inlet pressures provide the pilot which in turn controls the actuator operating on a pressure differential.



## Materials of Construction

Main Regulators	
Body	WCB Steel
Bonnet	Steel
Actuator Casing	Steel
Main Spring	Steel
Diaphragm	Nitrile / FKM
Trim	316 Stainless
Pilots	
Body	Aluminum / Iron
Spring Case	Aluminum / Iron
Diaphragms	Nitrile / FKM
Orifices	Stainless
Springs	Steel
Tubing & Fittings	316 Stainless

## Specifications

Pilot Version	Max Inlet	Outlet Pressure Range
P600	150 PSIG	4" WC up to 7 PSIG
PL81	150 PSIG	3 PSIG up to 100 PSIG
PL84	150 PSIG	14" WC up to 10 PSIG
PL61LD & PL61LE	160 PSIG	3" WC up to 20 PSIG
PL61H	400 PSIG	7" WC up to 65 PSIG
PL61HP	600 PSIG	15 up to 300 PSIG
Temperature Ratings		
Nitrile	-20 to 180°F	-29 to 82°C
Fluorocarbon	0 to 300°F	-18 to 149°C
Weight Approximate		
2" NPT	100 lbs.	45.4 kg
2" Flange	110 lbs.	50.0 kg
3" Flange	125 lbs.	56.7 kg
4" Flange	175 lbs.	79.4 kg

## P1098 Flow Coefficients

LINEAR CAGE								
Body Size	1:1 Line to Body				2:1 Line to Body			
	C <sub>g</sub>		C <sub>v</sub>		C <sub>g</sub>		C <sub>v</sub>	
	Regulating	Wide-Open	Regulating	Wide-Open	Regulating	Wide-Open	Regulating	Wide-Open
2"	2280	2400	64	67	2050	2160	60	63
3"	4630	4880	132	132	4410	4650	128	135
4"	7320	7710	202	213	6940	7310	198	209

QUICK OPEN								
Body Size	1:1 Line to Body				2:1 Line to Body			
	C <sub>g</sub>		C <sub>v</sub>		C <sub>g</sub>		C <sub>v</sub>	
	Regulating	Wide-Open	Regulating	Wide-Open	Regulating	Wide-Open	Regulating	Wide-Open
2"	2460	2590	68	72	2214	2331	64	68
3"	4790	5050	141	149	4571	4812	137	145
4"	8120	8550	229	242	7701	8106	225	237

## P1098 Pressure Reducing Regulator Rebuild Kits

	Kit Includes	Part Number
2" Main Valve Repair Kit, Nitrile	Fitting O-Ring, Travel Indicator O-Ring, Valve Gasket, Main Piston Ring, Main Valve Port Seal, Main Valve Plug Seal, Stem O-Ring, Upper Seal, O-ring, Backup Ring	971-1098-N2
4" Main Valve Repair Kit, Nitrile	Fitting O-Ring, Travel Indicator O-Ring, Valve Gasket, Main Piston Ring, Main Valve Port Seal, Main Valve Plug Seal, Stem O-Ring, Upper Seal, O-ring, Backup Ring	971-1098-N4
P1098 Actuator Repair Kit		971-1098-AR



## P1098 Part Matrix

P1098	↑↑	↑	↑	↑	↑	↑	↑	↑	↑		
										Port Size	
<b>16</b>										2" NPT or Flange	
<b>32</b>										4" Flange	
<b>24</b>		Available early 2020									3" Flange
<b>48</b>											6" Flange
										Special Construction	
<b>O</b>										NPT (2" Only)	
<b>E</b>										125 FF (Iron Only)	
<b>A</b>										150 RF (Steel Only)	
<b>B</b>										300 RF (Steel Only)	
<b>C</b>										600 RF (Steel Only)	
										Actuator	
<b>42</b>										No. 40 w/20 psi Spring	
<b>46</b>										No. 40 w/60 psi Spring	
<b>41</b>										No. 40 w/125 psi Spring	
<b>44</b>										No. 40 w/400 psi Spring	
										Seat Material	
<b>0</b>										Nitrile	
<b>2</b>										Fluorocarbon	
										Pilot - Outlet Range	
<b>O</b>										No Pilot Installed	
										PL81	
<b>A</b>										3-20 PSI	
<b>B</b>										5-35 PSI	
<b>C</b>										35-100 psi	
										PL84	
<b>D</b>										4" - 14" psi	
<b>E</b>										14" - 2 psi	
										P600	
<b>H</b>										4" - 8" WC	
<b>I</b>										7" - 16" WC	
<b>J</b>										4.5 - 7 PSI	
										P61H	
<b>K</b>										10 - 65 PSIG	
<b>L</b>										100 - 300 PSI	
										Cage Type/Construction	
<b>1</b>										CF8M SS Linear Cage	
<b>4</b>										EN Cast Iron Quick Open Cage	
										Trim	
<b>2</b>										316SS Plug & Ring/Steel Fittings	
<b>3</b>										316SS Plug & Ring/SS Fittings	
										Body Material	
<b>0</b>										Iron	
<b>1</b>										Steel	

## P1098 Proportional Band with Size 40 Actuator

Body Size	Pilot	Pilot Control Spring		40 Actuator					
				20 / 60 PSIG Main Spring		125 PSIG Main Spring		400 PSIG Main Spring	
		PSIG / In. WC	BAR / mBAR	PSIG	mBAR	PSIG	mBAR	PSIG	mBAR
2"	PL81	3 - 20	0.21 - 1.4	0.2	14	0.3	21	0.5	34
		5 - 35	0.35 - 2.4	0.3	21	0.5	34	1	69
		35 - 100	2.4 - 6.9	0.5	34	1	69	1.4	97
	PL84	14" - 2	35 mBar - 0.1	0.05	3	0.15	10	0.3	21
		2 - 10	0.14 - 0.69	0.1	7	0.3	21	0.6	41
61H, 61HP	Any	Any	0.5	34	1	69	1.4	97	
3"	PL81	3 - 20	0.21 - 1.4	0.3	21	0.4	28	0.6	41
		5 - 35	0.35 - 2.4	0.4	28	0.6	41	1.2	83
		35 - 100	2.4 - 6.9	0.9	62	1.2	83	1.5	103
	PL84	14" - 2	35 mBar - 0.1	0.1	7	0.2	14	0.4	28
		2 - 10	0.14 - 0.69	0.2	14	0.4	28	0.8	55
61H, 61HP	Any	Any	0.9	62	1.2	83	1.5	103	
4"	PL81	3 - 20	0.21 - 1.4	0.4	28	0.5	34	0.8	55
		5 - 35	0.35 - 2.4	0.7	48	0.8	55	1.4	97
		35 - 100	2.4 - 6.9	1.2	83	2	138	3	207
	PL84	14" - 2	35 mBar - 0.1	0.15	10	0.3	21	0.6	41
		2 - 10	0.14 - 0.69	0.3	21	0.6	41	1.2	83
61H, 61HP	Any	Any	1.2	83	2	138	3	207	
2", 3", 4"	P600	4" - 8"	10 - 20 mBar	0.01	0.6	0.02	1	0.04	3
		7" - 16"	17 - 40 mBar	0.01	0.6	0.02	1	0.04	3
		4.5 - 7	0.31 - 0.48	0.2	14	0.25	17	0.3	21

## P1098 Max and Min Differential Pressures

Body Size	Main Spring Range	Max Differential or Max Body Pressure <sup>1</sup>		Min Differential					
				30 Actuator		40 Actuator		70 Actuator	
		PSIG	BAR	PSIG	BAR	PSIG	BAR	PSIG	BAR
2"	20 PSI	20	1.4			2	0.14	1	0.07
	60 PSI	60	4.1	4	0.28	3	0.21	1.5	0.1
	125 PSI	125	8.6	6	0.41	5	0.34	2	0.14
	400 PSI	400 <sup>1</sup>	27.6 <sup>1</sup>	11	0.76	10	0.69	3	0.21
3"	20 PSI	20	1.4			2.5	0.17	1	0.07
	60 PSI	60	4.1	5	0.34	4	0.28	2	0.14
	125 PSI	125	8.6	8	0.55	6	0.41	2.5	0.17
	400 PSI	400 <sup>1</sup>	27.6 <sup>1</sup>	14	0.97	11	0.76	4	0.28
4"	20 PSI	20	1.4			3.5	0.25	1.3	0.09
	60 PSI	60	4.1	10	0.69	5	0.34	2.5	0.17
	125 PSI	125	8.6	13	0.9	8	0.55	3	0.21
	400 PSI	400 <sup>1</sup>	27.6 <sup>1</sup>	22	1.5	13	0.9	5	0.34

## P1098 Flow Capacities with Line Size Equals Main Valve Body

Inlet Pressure		Outlet Setting		Standard Travel and Standard Linear Cage, Thousands of SCFH Nat. Gas					
				2" Main Body		3" Main Body		4" Main Body	
PSIG	BAR	WC or PSIG / Bar		SCFH	Nm <sup>3</sup> /h	SCFH	Nm <sup>3</sup> /h	SCFH	Nm <sup>3</sup> /h
3	0.2	7"	17mBar	32	0.9	66	1.8	101	2.7
5	0.35	7"	17 mBar	42	1.1	87	2.3	135	3.6
		1	0.1	39	1.0	82	2.2	126	3.4
		2	0.1	35	0.9	73	2.0	112	3.0
10	0.7	7"	17 mBar	63	1.7	129	3.5	201	5.4
		3	0.2	56	1.5	116	3.1	180	4.8
		5	0.3	49	1.3	102	2.7	158	4.2
		7	0.5	40	1.1	82	2.2	127	3.4
15	1	1	0.1	79	2.1	163	4.4	254	6.8
		4	0.3	74	2.0	153	4.1	237	6.4
		8	0.5	63	1.7	130	3.5	201	5.4
		12	0.8	44	1.2	91	2.4	140	3.8
20	1.4	1	0.1	102	2.7	207	5.6	328	8.8
		10	0.7	79	2.1	164	4.4	254	6.8
		15	1.0	60	1.6	125	3.4	192	5.2
		17	2.0	48	1.3	99	2.7	153	4.1
30	2.1	4	0.2	131	3.5	267	7.2	422	11.3
		15	1.0	108	2.9	223	6.0	345	9.3
		20	1.4	93	2.5	192	5.2	297	8.0
		25	1.7	69	1.6	144	3.9	221	5.9
40	2.8	9	0.5	161	4.3	327	8.8	517	13.9
		20	1.4	136	3.6	280	7.5	434	11.6
		30	2.1	105	2.8	217	5.8	335	9.0
		35	2.4	77	2.1	161	4.3	247	6.6
50	3.4	13	0.8	190	5.1	386	10.3	611	16.4
		20	1.4	172	4.6	354	9.5	551	14.8
		30	2.1	152	4.1	313	8.4	485	13.0
		40	2.8	115	3.1	240	6.4	369	9.9
		45	3.1	85	2.3	176	4.7	270	7.5
75	5.2	24	1.6	264	7.1	536	14.4	847	22.7
		50	3.4	203	5.4	419	11.2	648	17.4
		60	4.1	166	4.5	343	9.2	529	14.2
		70	4.8	101	2.7	209	5.6	322	8.6
100	7	35	2.4	337	9.0	685	18.4	1083	29.0
		60	4.1	280	7.5	578	15.5	896	24.0
		75	5.2	236	6.3	489	13.1	754	20.2
125	8.6	46	3.2	411	11.0	834	22.4	1319	35.3
		75	5.2	344	9.2	710	19.0	1101	29.5
150	10	57	3.9	484	13.0	984	26.4	1555	41.7
		75	5.2	436	11.7	897	24.0	1396	37.4
175	12	68	4.7	558	15.0	1133	30.4	1791	48.0
200	14	75	5.2	631	16.9	1282	34.4	2027	54.3
250	17.2	75	5.2	779	20.9	1581	42.4	2500	67.0
300	20.8	75	5.2	926	24.8	1880	50.4	2972	79.6
350	24	75	5.2	1073	28.8	2178	58.4	3444	92.3
400	27.7	75	5.2	1220	32.7	2477	66.4	3916	105.0

## P1098 Flow Capacities with Line Size Equals Main Valve Body

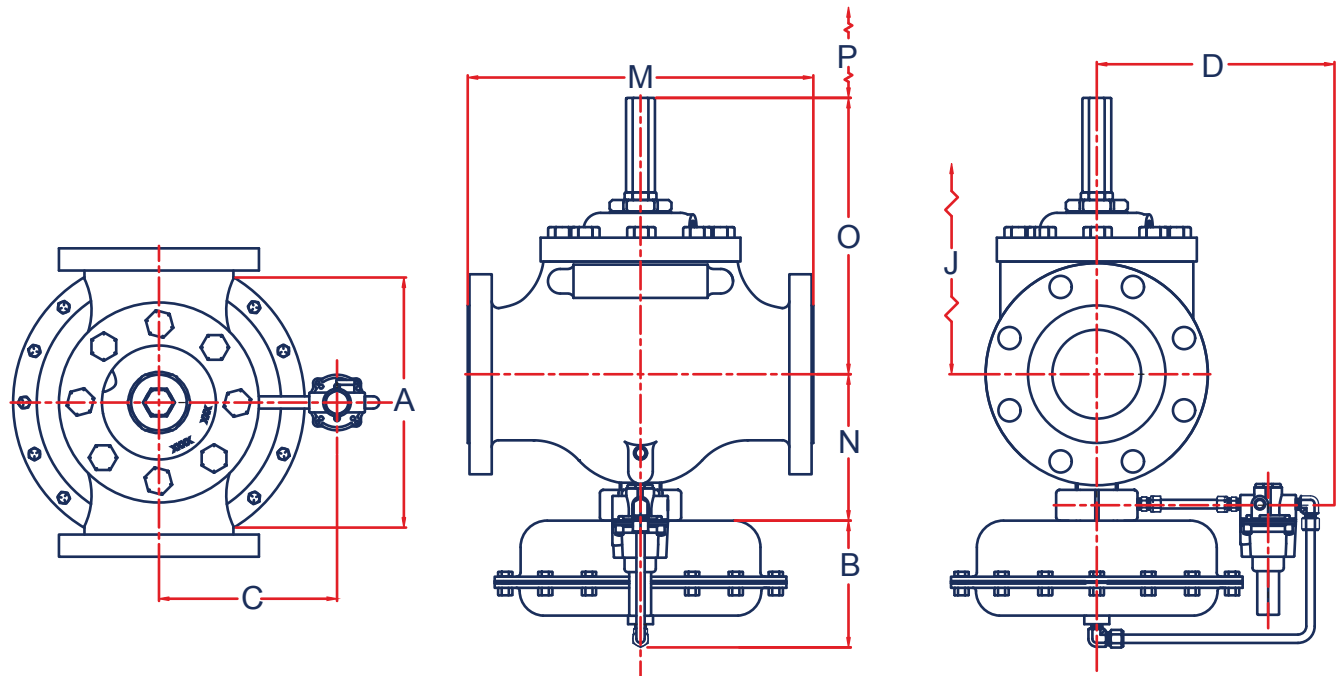
Inlet Pressure		Outlet Setting		Standard Travel and Standard Linear Cage, Gallons Per Minute Water					
				2" Main Body		3" Main Body		4" Main Body	
PSIG	BAR	WC or PSIG / Bar		GPM	L/min	GPM	L/min	GPM	L/min
3	0.2	0.25	0.02	105	397	219	829	335	1268
5	0.35	0.25	0.02	138	522	288	1090	440	1665
		1	0.1	127	481	264	999	404	1529
		2	0.1	110	416	229	867	350	1325
10	0.7	0.25	0.02	198	749	412	1559	631	2388
		3	0.2	167	632	349	1321	534	2021
		5	0.3	142	537	295	1117	452	1711
		7	0.5	110	416	229	867	350	1325
15	1	1	0.1	237	897	494	1870	756	2861
		4	0.3	210	795	438	1658	670	2536
		8	0.5	167	632	349	1321	534	2021
		12	0.8	110	416	229	867	350	1325
20	1.4	1	0.1	276	1045	575	2176	880	3331
		10	0.7	200	757	417	1578	639	2419
		15	1.0	142	537	295	1117	452	1711
		17	2.0	110	416	229	867	350	1325
30	2.1	4	0.2	323	1223	673	2547	1030	3899
		15	1.0	245	927	511	1934	782	2960
		20	1.4	200	757	417	1578	639	2419
		25	1.7	142	537	295	1117	452	1711
40	2.8	9	0.5	352	1332	735	2782	1125	4258
		20	1.4	283	1071	590	2233	903	3418
		30	2.1	200	757	417	1578	639	2419
		35	2.4	142	537	295	1117	452	1711
50	3.4	13	0.8	385	1457	803	3039	1229	4652
		20	1.4	347	1313	723	2737	1106	4186
		30	2.1	283	1071	590	2233	903	3418
		40	2.8	200	757	417	1578	639	2419
		45	3.1	142	537	295	1117	452	1711
75	5.2	24	1.6	452	1711	943	3569	1443	5462
		50	3.4	317	1200	660	2498	1010	3823
		60	4.1	245	927	511	1934	782	2960
		70	4.8	142	537	295	1117	452	1711
100	7	35	2.4	510	1930	1064	4027	1629	6166
		60	4.1	400	1514	835	3160	1278	4837
		75	5.2	317	1200	660	2498	1010	3823
125	8.6	46	3.2	563	2131	1173	4440	1795	6794
		75	5.2	448	1696	933	3531	1428	5405
150	10	57	3.9	610	2309	1273	4818	1948	7373
		75	5.2	548	2074	1143	4326	1749	6620
175	12	68	4.7	655	2479	1365	5167	2090	7911
200	14	75	5.2	708	2680	1476	5587	2258	8547
250	17.2	75	5.2	837	3168	1746	6609	2672	10114
300	20.8	75	5.2	950	3596	1980	7494	3030	11469
350	24	75	5.2	1050	3974	2189	8285	3350	12680
400	27.7	75	5.2	1141	4319	2380	9008	3642	13785

## P1098 Dimensions

Actuator						
Actuator	A	B	C	D		E
				w/ Pilot Vent	w/o Pilot Vent	Actuator Rem.
	In / mm	In / mm	In / mm	In / mm	In / mm	In / mm
40	13.2 / 333	5.8 / 146	8.0 / 200	9.5 / 241	9.3 / 236	4.0 / 100

Main Regulator							
Body Size	M			N	O	P	J
	2" NPT, 600 RF	125 FF, 150 RF	250 RF, 300 RF			Cap Removal	Trim Removal
	In / mm	In / mm	In / mm	In / mm	In / mm	In / mm	In / mm
2"	11.25 / 286	10.0 / 254	10.5 / 267	4.55 / 116	9.10 / 232	4.5 / 114	15 / 381
3"	13.25 / 337	11.75 / 298	12.5 / 317	4.30 / 135	11.30 / 287	5.5 / 140	19 / 483
4"	15.5 / 394	13.9 / 353	14.5 / 368	6.55 / 167	12.70 / 322	8.0 / 203	22 / 559

**Figure 1**

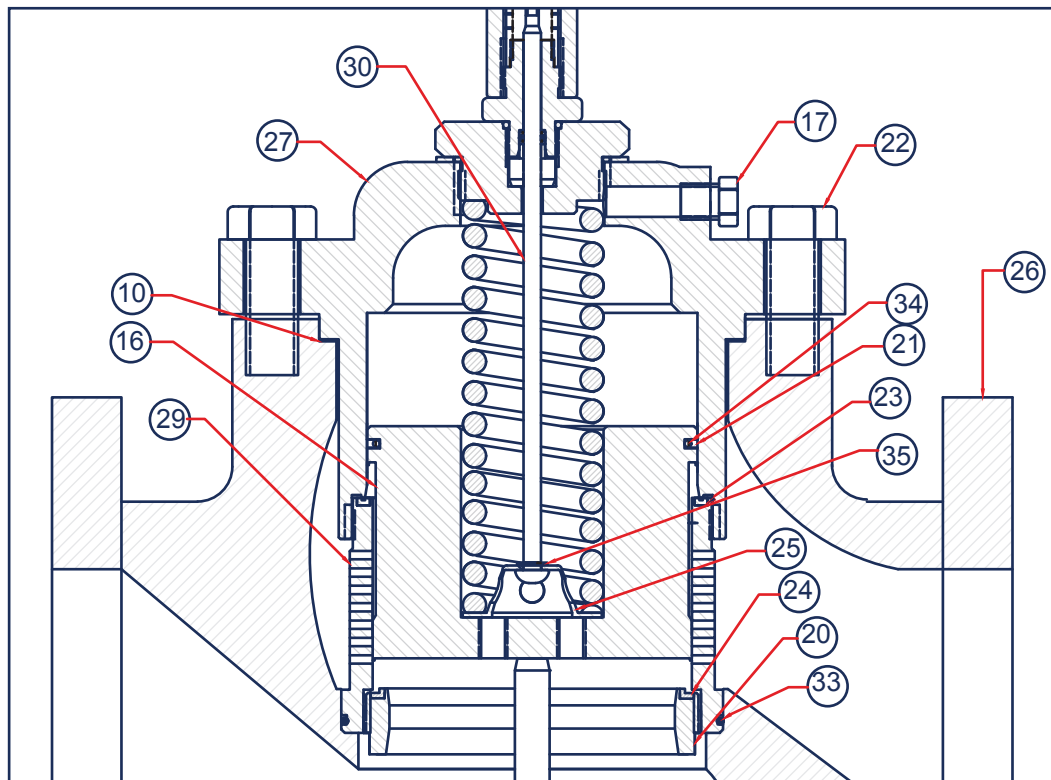


## P1098 Main Regulator Parts

Item		Qty.	Part Number
10	Valve Gasket	1	2" 629-136-001
			3" 624-136-000
			4" 639-177-001
16	Main Valve Plug	1	2" 639-177-001
			3" 639-177-000
			4" 639-177-000
17	Main Pipe Plug	2	639-178-000
20	Main Seat Ring	1	2" 644-072-001
			3" 644-072-000
			4" 644-073-001
21	Main Piston Ring	1	2" 644-073-001
			3" 644-073-000
			4" 648-626-001
22	Flange Hex Screws	8	2" 648-626-001
			3" 648-626-000
			4" 649-399-001
23	Main Valve Port Seal	1	2" 649-399-001
			3" 649-399-000
			4" 649-401-001
24	Main Valve Plug Seal	1	2" 649-401-001
			3" 649-401-000
			4" 649-401-000
25	Main Spring Seat	1	650-229-000

Item		Qty.	Part Number
26	Body	1	2" NPT / Steel 664-669-000
			2" 150RF / Steel 664-669-001
			2" 300RF / Steel 664-668-000
			3" 150RF / Steel 664-668-001
			3" 300RF / Steel 664-635-000
			4" 150RF / Steel 664-635-001
27	Body Flange	1	2" 664-636-001
			3" 664-636-000
			4" 664-636-000
28	Pipe Adaptor	1	673-037-000
29	Main Valve Cage	1	2" 688-084-001
			3" 688-084-000
			4" 688-084-000
30	Travel Indicator Stem	1	2" 689-048-001
			3" 689-048-000
			4" 689-048-000
33	Upper Seal	1	2" 649-438-000
			3" 010-468-000
			4" 649-400-000
34	O-ring	1	4" 649-400-000
			2" 649-400-001
35	E-ring	1	644-049-000

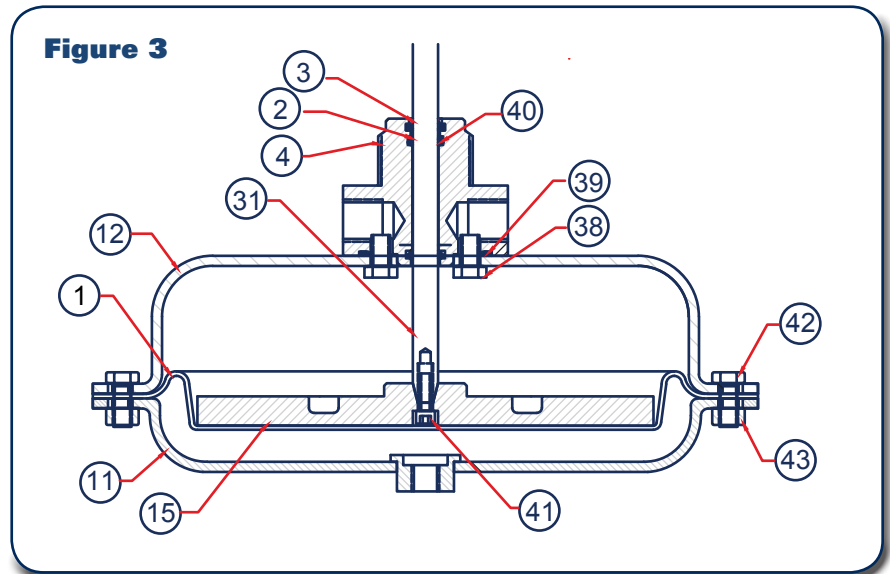
**Figure 2**





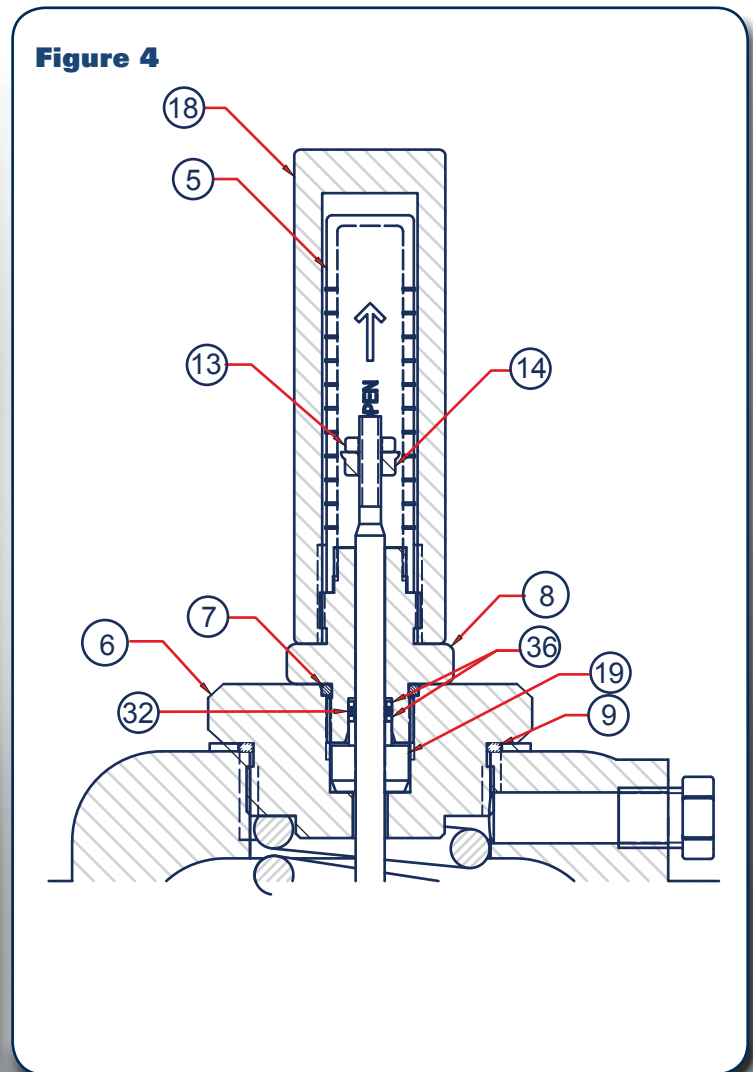
**P1098 Actuator Parts**

Item		Qty.	Part Number
1	Diaphragm	1	600-492-000
2	Actuator Bearing	2	602-146-000
3	Actuator Wiper	1	602-145-000
4	Actuator Bonnet	1	604-285-000
11	Lower Casing Assembly	1	629-297-000
12	Upper Casing	1	629-298-000
15	Diaphragm Plate	1	638-132-000
31	2" SS Actuator Stem	1	689-049-001
	3" SS Actuator Stem		
	4" SS Actuator Stem		689-049-000
38	Bonnet Screw	4	648-000-034
39	Bonnet O-ring	1	649-309-007
40	Stem O-ring	2	649-000-150
41	Diaphragm Plate Screw	1	648-466-004
42	Cap Screw	16	648-467-007
43	Hex Nut	16	634-151-000



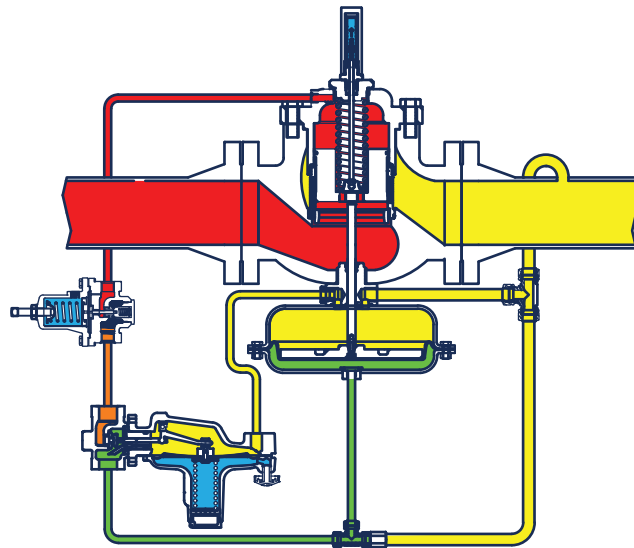
**P1098 Travel Indicator Parts**






Item		Qty.	Part Number
5	Travel Indicator Scale	1	614-075-000
6	Travel Indicator Fitting (Steel)	1	622-093-000
	Travel Indicator Fitting (SS)	1	622-093-001
7	Fitting O-Ring	1	649-000-170
8	Steel Valve Fitting	1	622-094-000
	SS Valve Fitting	1	622-094-001
9	Travel Indicator O-Ring	1	649-000-249
13	Travel Indicator Hex Nut	1	634-497-000
14	Travel Indicator Flange Nut	1	634-498-000
18	Travel Indicator Protector	1	641-016-000
19	O-ring Retainer	1	643-236-000
32	Stem O-Ring	1	649-000-003
36	Backup Ring	2	644-047-000



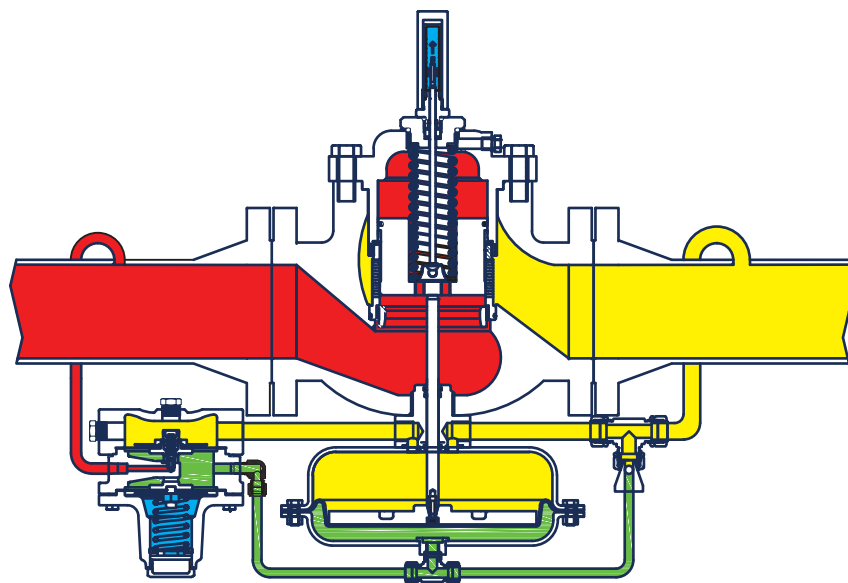
# P1098 Pressure Reducing Regulator





P95 supply to a P600 pilot



-  Inlet Pressure
-  Outlet Pressure
-  Atmospheric Pressure
-  Loading Pressure
-  Pilot Pressure

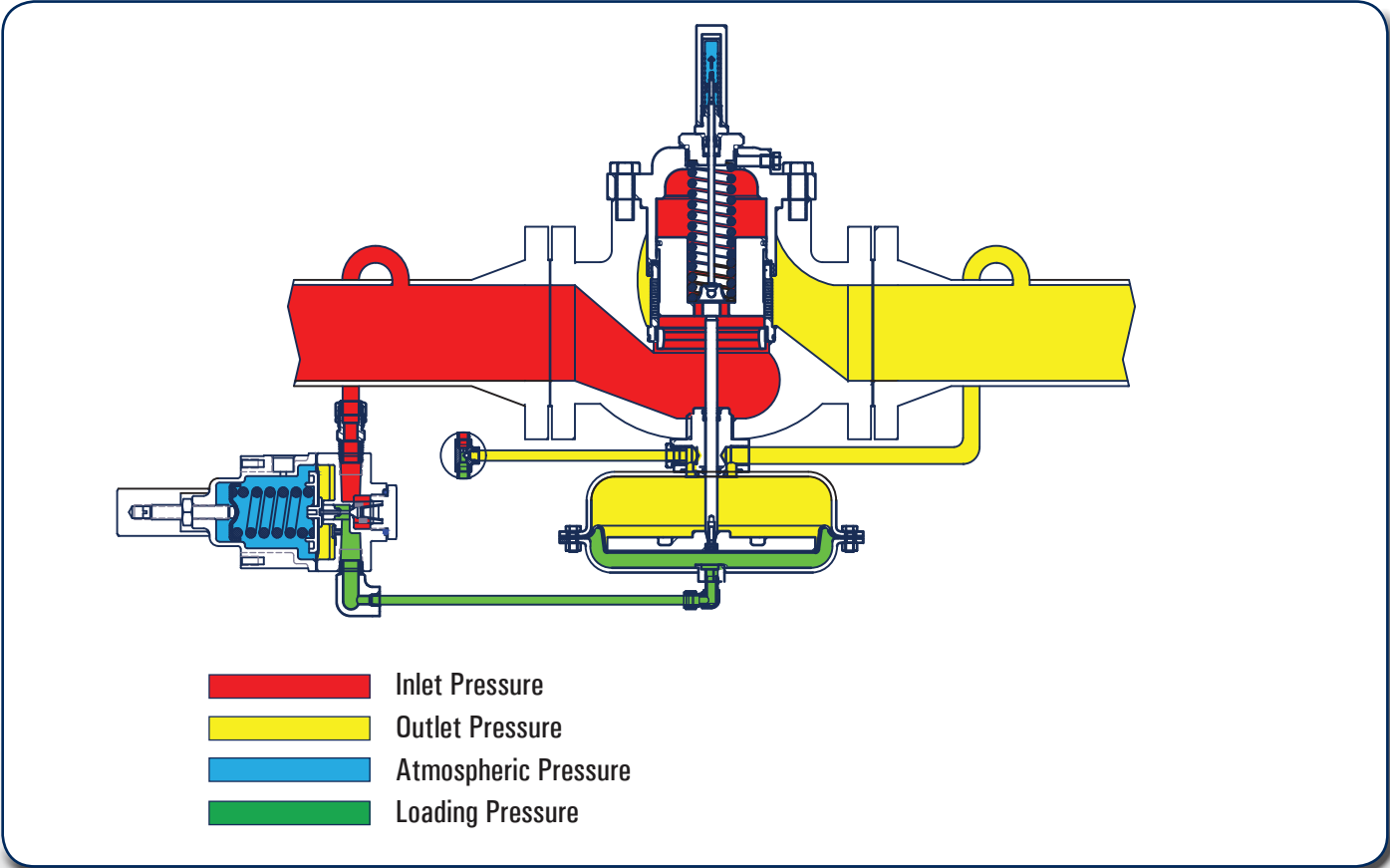
P61H series Pilot



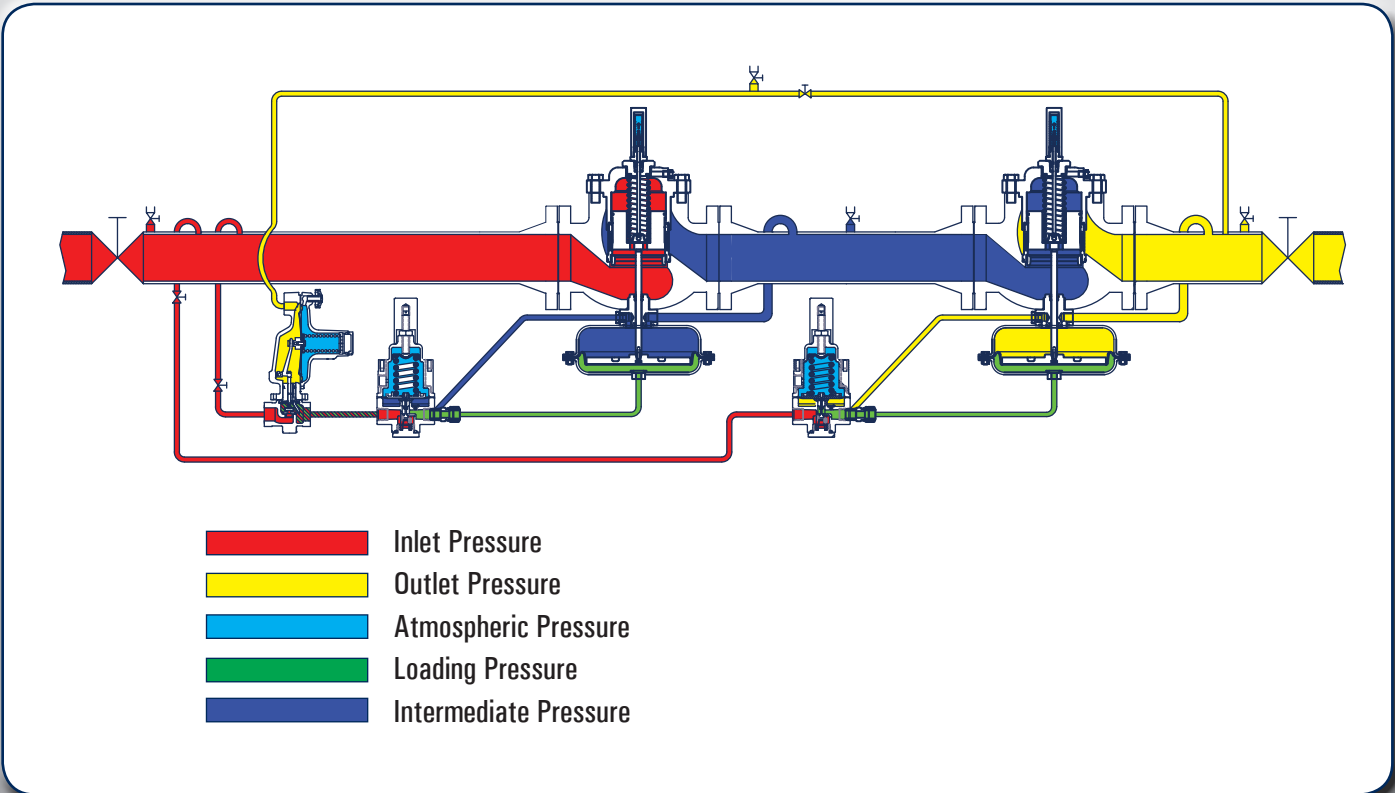
-  Inlet Pressure
-  Outlet Pressure
-  Atmospheric Pressure
-  Loading Pressure

# P1098 Pressure Reducing Regulator

BelGAS PL81 Or PL84 pilot



BelGAS P600 and PL pilots on a worker/monitor setup



# BelGAS™

A DIVISION OF MARSH BELLOFRAM



BelGAS, the leader in pressure regulator design, offers the Oil, Gas and Pipeline Industry the same precision and reliability in flow control and pressure control that the control valve market has enjoyed for over 40 years. At BelGAS, we have raised the industry standard for quality, accuracy, and dependability. Even more important is that we provide this value to our customers at an economical price.

The BelGAS product offering includes pressure regulators for gas, air and propane service; explosion-proof I/P transducers for electro-pneumatic applications; process and test gauges for pressure measurement in general and severe service and a wide assortment of bimetal thermometers and thermowells for both high and low temperature indication.

Whether the requirements call for a high pressure flow condition, a low pressure relief application or the regulation of fuel or process gas in a system, BelGAS can provide a dependable and cost effective solution.