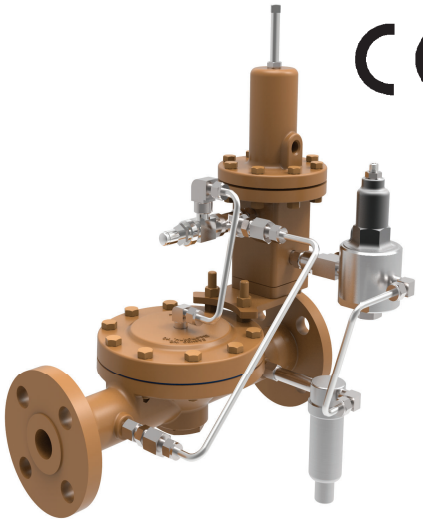
TECHNICAL BULLETIN

ISO Registered Company

PGR-2-TB
10-22

MODEL PGR-2

PILOT OPERATED
PRESSURE REDUCING REGULATOR
PRESSURE LOADED DIAPHRAGM



MODEL PGR-2

OVERVIEW

Model PGR-2 is a pressure loaded diaphragm-type, reducing regulator. The internal trim design allows the same basic unit to cover a broad range of pressure settings. Performance meets or exceeds that of competitive pressure loaded or pilot-operated designs. The PGR-2 regulator is applied primarily in clean natural gaseous service and fuel gas - sweet or sour.

FEATURES

Versatile: Three basic materials with multiple trim material combinations to select from.

Tight Shutoff: Composition seat materials BC, FKM, V-TFE or NBR.

Capacity: Handles mid-range flow rates on a line size basis.

Droop: Highly accurate outlet pressure control, due to absence of range spring in main valve design, provides almost zero "droop effect".

Trim Design: FTC - Incorporates the typical reducing regulator internal design. Internals can be easily removed.

Incorporated Cylinder: Plug is guided through its travel by the cylinder, which also serves to block harmful debris from entry to the seating surfaces.

Failure Position: Fails close on loss of loading pressure. Fails open on loss P_1 or P_2 pressures with loading pressure yet applied.

Remote Venting: Spring chambers on the pilot and the stabilizer include FNPT connections for remote venting of hazardous or explosive gaseous service.

LINE SIZES AVAILABLE
3/8" (DN10), 1/2" (DN15), 3/4" (DN20), 1" (DN25)

END CONNECTIONS
FEMALE NPT, FLANGED

COMMON APPLICATIONS
CLEAN NATURAL GASEOUS SERVICE & FUEL GAS - SWEET OR SOUR

DESIGN PRESSURE
INLET: 10-600 psig (0.68 - 41.3 Barg)
OUTLET: 0.5" WC -200 psig (13.8 Barg)

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Красноярск (391)204-63-61
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Курган (3522)50-90-47
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Набережные Челны (8552)20-53-41
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Омск (3812)21-46-40
Орел (4862)44-53-42
Оренбург (3532)37-68-04
Пенза (8412)22-31-16
Петрозаводск (8142)55-98-37
Псков (8112)59-10-37
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Самара (846)206-03-16
Санкт-Петербург (812)309-46-40
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Севастополь (8692)22-31-93
Тольятти (8482)63-91-07
Томск (3822)98-41-53
Тула (4872)33-79-87
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Улан-Удэ (3012)59-97-51
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Чебоксары (8352)28-53-07
Челябинск (351)202-03-61
Череповец (8202)49-02-64
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STANDARD / GENERAL SPECIFICATIONS

Body / Cover Dome Materials

DI/CS, CS/CS, SST/CS, SST/SST
DI = Ductile Iron CS = Carbon Steel
SST = Stainless Steel

Body Sizes

3/8", 1/2", 3/4", 1" NPT
(DN10, 15, 20, 25)

End Connections

Female NPT
ASME Flanged: - 150# and 300#

Max. Useable Cv

Up to 4.0 Cv; See Table 2.

Trim Material

316 SST with Composition Seat, Diaphragm
See Table 1.

Inlet Pressure Range

Operating: 10–600 psig (0.68 – 41.3 Barg).

NOTE: *Maximum allowable inlet pressure of the Pilot in the loading system is 250 psig. (17.2 barg).*

Outlet Pressure Range

0.5" WC – 200 psig (13.8 Barg)

Max Loading Pressure

210 psig (14.5 Barg)

Max Pressure Drop

For Spring Range	Max Drop (psig)
0.5" - 41" wc	150
1 - 200 psig	Up to 400

Min Pressure Drop

5.0 psid (.34 Bard)

Temperature Range

-70° to +400°F (-57° to +204°C)
Limited by body/cover dome/diaphragm material combinations, and by elastomeric seat – materials. See Tables 1 and 3.

Optional Constructions

Opt-21: Coalescing Filter
Opt-25P: Plastic vent
Opt-25S: SST vent screen
Opt-30: Flgd. End Conns.
Opt-34: 14" F to F
Opt-40: NACE Constr.
Opt.-55: Oxygen Cleaned
Opt-56: Special Cleaned
Opt-86: System Supply Gauge
Opt-95OS: Epoxy Paint

Pilot Body / Spring Chamber Materials

DI/DI, CS/CS, SST/SST

Pilot Body Size / End Connections

1/4" - NPT (DN6)

Stabilizing Regulator - SST body, 1/4" size, NPT connections, SST spring chamber with 1/8" FNPT vent connection, SST trim, Composition seat and diaphragm. Standard setting is 7 psig. Can be set as low as 2.5 psig.

Tubing & Fittings

Brass fittings with copper tubing or SST fittings with SST tubing. **Remote sensing is standard:** end user to connect tubing from sensing port on pilot to location in downstream piping. **Self contained sensing is optional:** factory supplied tubing from sensing port on pilot to outlet of the main regulator.

MATERIAL SPECIFICATIONS

Main Valve Body

DI – A395
CS – ASTM A352 Grade LCC
SST – ASTM A351, Grade CF8M.

Main Valve Cover Dome

CS – ASTM A352 Grade LCC
SST – ASTM A351, Grade CF8M

Main Valve Diaphragm & Seat *

Elastomeric – BC, NBR, FKM, EPDM, FK, V-TFE
Metal (Seat) - 316 SST

Painting

Standard: All non-corrosion resistant portions to be painted with corrosion resistant epoxy paint per Cashco Spec #S-1606.

* See Product Coder for possible Trim combinations.

OPTION SPECIFICATIONS

OPT-21: **COALESCING FILTER.** Coalescing filter element removes moisture. Standard construction - filter element removes particulate only.

OPT-25P: **PLASTIC RAIN PROOF BUG VENT.**

OPT-25S: **RAIN PROOF BUG VENTS**. SST material. Size - 1/4" NPT for pilot spring chamber, 1/8" NPT for stabilizer spring chamber. Do not use in applications where gaseous service is hazardous or explosive.

OPT-30: **FLANGED CONNECTIONS.** Flange of same general chemistry as body.

NOTES: 1. The body P vs. T ratings are the limiting variables for flanged end conns, unless further restricted by ASME B16.5 or the maximum ratings as established per product design requirements.

OPT-34: **STANDARD 14" FACE TO FACE DIMENSION FOR FLANGED END CONNECTIONS.** Sizes 1/2" - 1" only.

OPT-40: **NACE CONSTRUCTION**. Internal wetted portions meet NACE Std. MR0175 for application in sour gas/crude service. Exterior of unit to not be directly buried, insulated, or otherwise denied direct atmospheric exposure. CS/CS or SST/SST body/cover dome materials only. S3, S4, S5, S6, SS, ST, SU, and SY trims only. Available in all end connections. The lower spring is constructed of Inconel†. SST tubing and fittings.

OPT-55: **SPECIAL CLEANING - GOX**. SST body materials only. Cleaning, assembly and packaging per Cashco Spec #S-1134, making unit suitable for Oxygen Service. **NOTE: Design Pressure Rating shall not exceed 375 psig (25.8 Barg) when body material is SST and process medium is oxygen as recommended by CGA.**

OPT-56: **SPECIAL CLEANING**. Cleaning per Cashco Spec. No. S-1542 for all body/cover dome materials. Higher cleaning level than std. commercial cleaning. NOT suitable for Oxygen Service.

OPT-86: **SYSTEM SUPPLY GAUGE.** Glycerin filled pressure gauge. SST case, bourdon tube, socket, and movement. 2 1/2" (64 mm) dial size. Service application temperature range of 30 to +160°F (-1 to +71°C) maximum. Rear case 1/4" (DN8) NPT male connection.

TECHNICAL SPECIFICATIONS

TABLE 1

SEAT, DIAPHRAGM & SEAL TRIM COMBINATIONS							Trim Design No.	Temp. Range	
Set Point Range	Main Valve		Pilot		Stabilizer				
	Diaphragm	Seat	Ball	Diaphragm	Seat	Diaphragm		°F	°C
0.5"-41"WC	BC	BC	BC	BC	V-TFE	BC	S1	-35 - +212	-37 - +100
	NBR	NBR	NBR	NBR *	NBR	NBR	S2	-20 - +200	-28 - +93
	NBR	NBR	440C SST	NBR *	NBR	NBR	S3	-40 - +250	-40 - +121
	EPDM	BC	EPDM	EPDM **	EPR	EPDM	S4	-40 - +200	-40 - +93
	FKM	FKM	FKM	FKM	FKM	FKM	S5	-20 - +400	-28 - +204
	FKM	316 SST	FKM	FKM	FKM	FKM	S6	-20 - +400	-28 - +204
13"-41" WC	BC	BC	BC ***	BC	V-TFE	BC	SJ	-40 - +212	-40 - +100
	NBR	NBR	NBR ***	NBR *	NBR	NBR	SK	-20 - +200	-28 - +93
	NBR	V-TFE	NBR ***	NBR *	V-TFE	NBR	SL	-20 - +250	-28 - +121
	FKM	FKM	FKM	FKM	FKM	FKM	SS	-20 - +400	-28 - +204
	FKM	316 SST	FKM	FKM	FKM	FKM	ST	-20 - +400	-28 - +204
1- 200 psig	BC	BC	BC ***	BC	V-TFE	BC	SA	-35 - +212	-37 - +100
	NBR	NBR	NBR ***	NBR *	NBR	NBR	SB	-20 - +200	-28 - +93
	NBR	NBR	440C SST	NBR *	NBR	NBR	SE	-40 - +250	-40 - +121
	NBR	V-TFE	440C SST	NBR *	V-TFE	NBR	SF	-65 - +250	-54 - +121
	NBR	V-TFE	440C SST	NBR *	NBR	NBR	SG	-70 - +250	-57 - +121
	EPDM	BC	EPDM ***	EPDM **	EPR	EPDM	SH	-40 - +200	-40 - +93
	FKM	FKM	FKM	FKM	FKM	FKM	SU	-20 - +400	-28 - +204
	FKM	316 SST	FKM	FKM	FKM	FKM	SY	-20 - +400	-28 - +204
1-200 psig Oxygen Ser. Trims	FKM	V-TFE	316 SST	FKM *	V-TFE	FKM	SM	0 - +400	-17 - +205
	EXP. PTFE	V-TFE	316 SST	EXP.PTFE *	V-TFE	EXP.PTFE	SP	+100 - +400	+38 - +205
	FK	V-TFE	316 SST	EXP.PTFE * **	V-TFE	EXP.PTFE	SR	-65 - +350	-54 - +177

* Not recommended for NACE Applications.
** Not recommended for use in Natural Gas Applications.
*** For spring range 90 - 200 psig ball material is 316 SST.

ABBREVIATIONS				
BC = Neoprene	NBR = Buna-N	PTFE / Gylon	FKM = Fluorocarbon Elastomer	EPDM = Ethylene Propylene Diene
-40 - +250 °F	-30 - +250 °F	-425 - +500 °F	-20 - +400 °F	-65 - +302 °F
-40 - +121 °C	-34 - +121 °C	-254 - +260 °C	-28 - +204 °C	-54- +150 °C

TABLE 2
MAXIMUM C_V WITH PLUG WIDE OPEN
(Use for Relief Valve Sizing)

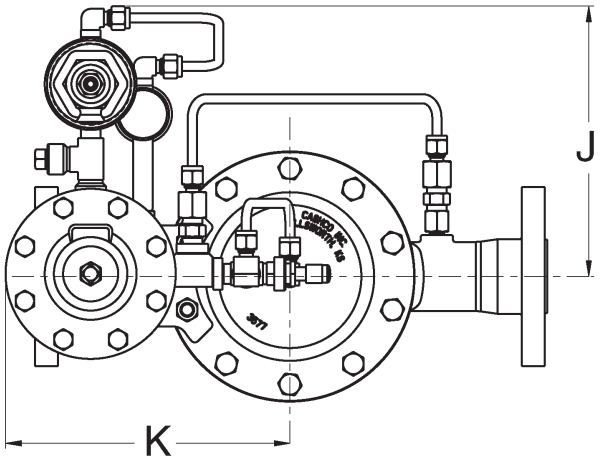
Body Size		Cv
Inch	(DN)	
3/8"	(10)	1.8
1/2"	(15)	1.8
3/4"	(20)	3.7
1"	(25)	4.0
METRIC CONVERSION FACTOR: Cv / 1.16 =kv		

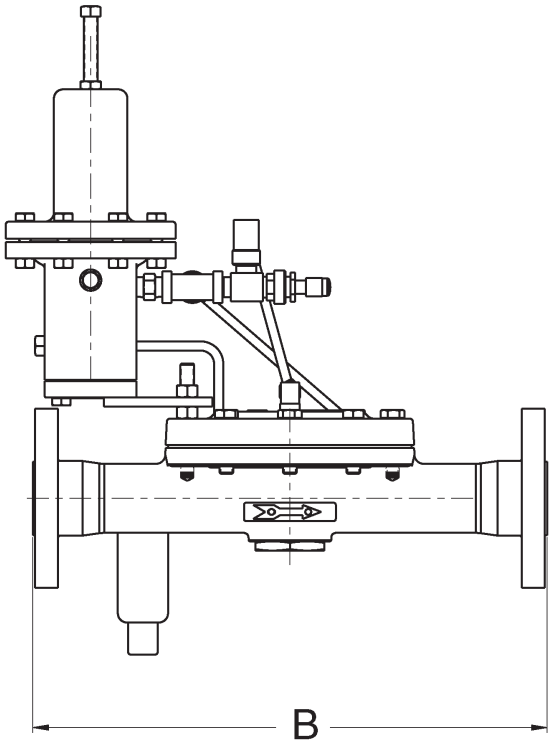
TABLE 3
DESIGN PRESSURE - TEMPERATURE MATERIAL SPECIFICATIONS
MAIN BODY
STANDARD CONSTRUCTION

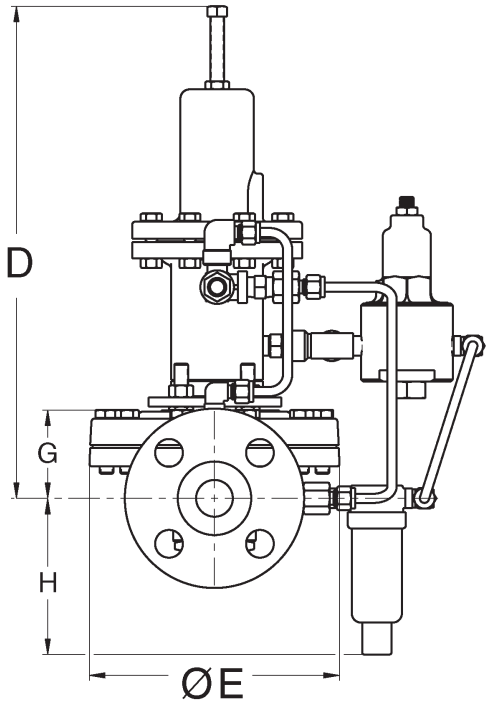
Material Specifications Body - Loading Chamber (Body Cap)		ENGLISH				METRIC			
		Inlet		Outlet		Inlet		Outlet	
		Pressure	Temperature †	Pressure	Temperature †	Pressure	Temperature†	Pressure	Temperature†
Descript	**ASTM No.**	**psig**	**°F**	**psig**	**°F**	**Barg**	**°C**	**Barg**	**°C**
DI - CS (SST)	A126, Class B - LCC	250	-20 to +400	175	-20 to +400	17.2	-29 to +205	12.1	-29 to +205
CS - CS (SST)	A216, Gr. LCC (A479 Alloy S31600/3)	600	-20 to +400	600	-20 to +400	41.3	-29 to +205	41.3	-29 to +205
SST - SST (SST)	A351, Gr. CF8M (A479 Alloy S31600/3)	600	-325 to +400	600	-325 to +400	41.3	-198 to + 205	41.3	-325 to + 205
SST CS (SST)	A351, Gr. CF8M A216, Gr. WCB (A479 Alloy S31600/3)	600	-20 to +400	600	-20 to +400	41.3	-29 to +205	41.3	-29 to +205

NOTE: Certification of material chemical and physical properties are not available for CI or for diaphragm sheet material.
† Design temperature range of the regulator may be limited by trim selection. See Table 1.

DIMENSIONS
OPTION -34 (Standard) & OPTION -30



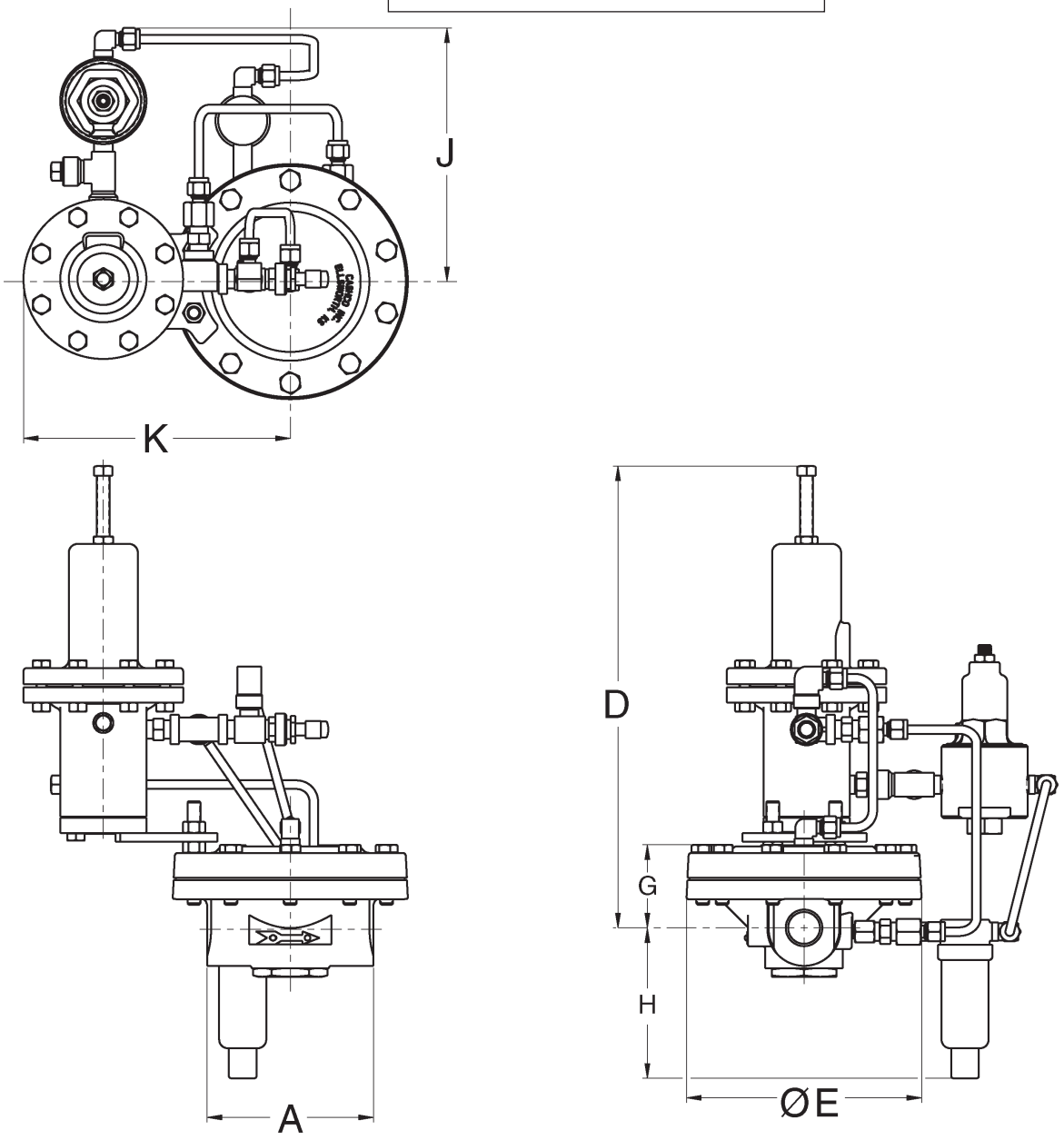




Size Inch	Dimensions - English (In.)								
	B Opt 34	B [1]	B [2]	D	ØE	G	H	J	K
3/8"	NA	NA	NA	13.11	5.63	2.13	4.36	7.36	7.14
1/2"	14.00	9	9	13.11	5.63	2.13	4.36	7.36	7.14
3/4"	14.00	11.06	11.81	13.39	5.63	2.40	4.36	7.36	7.74
1"	14.00	11.06	11.81	13.39	5.63	2.40	4.36	7.36	7.74
[1] 150# Flanged, Opt-30 [2] 300# Flanged, Opt-30									

Size (DN)	Dimensions - Metric (mm)								
	B Opt 34	B [1]	B [2]	D	ØE	G	H	J	K
(10)	NA	NA	NA	333	143	54.1	110.7	186.9	181.4
(15)	356	228.6	228.6	333	143	54.1	110.7	186.9	181.4
(20)	356	280.9	300	340.1	143	61	110.7	186.9	196.6
(25)	356	280.9	300	340.1	143	61	110.7	186.9	196.6
[1] 150# Flanged, Opt-30 [2] 300# Flanged, Opt-30									

DIMENSIONS and WEIGHTS
NPT END CONNECTION



Size Inch	Dimensions - English (In.)									Shipping Weight lbs. [3]
	A	B [1]	B [2]	D	ØE	G	H	J	K	
3/8"	3.75	NA	NA	13.11	5.63	2.13	4.36	7.36	7.14	42
1/2"	3.75	9	9	13.11	5.63	2.13	4.36	7.36	7.14	42
3/4"	4.82	11.06	11.81	13.39	5.63	2.40	4.36	7.36	7.74	48
1"	4.82	11.06	11.81	13.39	5.63	2.40	4.36	7.36	7.74	48

[1] 150# Flanged, Opt-30 [2] 300# Flanged, Opt-30
[3] Weights do not include flanged options.

Size (DN)	Dimensions - Metric (mm)									Shipping Weight kgs. [3]
	A	B [1]	B [2]	D	ØE	G	H	J	K	
(10)	95.3	NA	NA	333	143	54.1	110.7	186.9	181.4	19
(15)	95.3	228.6	228.6	333	143	54.1	110.7	186.9	181.4	19
(20)	122.4	280.9	300	340.1	143	61	110.7	186.9	196.6	22
(25)	122.4	280.9	300	340.1	143	61	110.7	186.9	196.6	22

[1] 150# Flanged, Opt-30 [2] 300# Flanged, Opt-30
[3] Weights do not include flanged options.

MODEL PGR-2 PRODUCT CODER 10/11/22

2	S	POS 3	—	POS 5	POS 6 & 7	7	—	POS 10	POS 11	POS 12	POS 13	POS 14	0	POS 16	0	A

POSITION 3 - SIZES		
Size		STD
in	(DN)	CODE
3/8"	(10)	3
1/2"	(15)	4
3/4"	(20)	5
1"	(25)	6

POSITION 5 - BODY/COVER DOME MATERIALS			
Materials	CODE	Materials	CODE
DI/CS	1	SST/CS	9
CS/CS	5	SST/SST	A

POSITION 6 & 7 - SEAT & DIAPHRAGM MATERIALS							CODE
Set Point Range	Main Valve		Pilot		Stabilizer		
	Diaph	Seat	Ball	Diaph	Seat	Diaph	
0.5"-41"WC	BC	BC	BC	BC	V-TFE	BC	S1
	NBR	NBR	NBR	NBR *	NBR	NBR	S2
	NBR	NBR	440C SST	NBR *	NBR	NBR	S3
	EPDM	BC	EPDM	EPDM **	EPR	EPDM	S4
	FKM	FKM	FKM	FKM *	FKM	FKM	S5
	FKM	316 SST	FKM	FKM *	FKM	FKM	S6
13"-41" WC	BC	BC	BC ***	BC	V-TFE	BC	SJ
	NBR	NBR	NBR ***	NBR *	NBR	NBR	SK
	NBR	V-TFE	NBR ***	NBR *	V-TFE	NBR	SL
	FKM	FKM	FKM	FKM *	FKM	FKM	SS
	FKM	316 SST	FKM	FKM *	FKM	FKM	ST
1- 200 psig	BC	BC	BC ***	BC	V-TFE	BC	SA
	NBR	NBR	NBR ***	NBR *	NBR	NBR	SB
	NBR	NBR	440C SST	NBR *	NBR	NBR	SE
	NBR	V-TFE	440C SST	NBR *	V-TFE	NBR	SF
	NBR	V-TFE	440C SST	NBR *	NBR	NBR	SG
	EPDM	BC	EPDM ***	EPDM **	EPR	EPDM	SH
	FKM	FKM	FKM	FKM *	FKM	FKM	SU
	FKM	316 SST	FKM	FKM *	FKM	FKM	SY
1-200 psig Oxygen Ser. Trims	FKM	V-TFE	316 SST	FKM *	V-TFE	FKM	SM
	EXP.PTFE	V-TFE	316 SST	EXP.PTFE	V-TFE	EXP.PTFE	SP
	FK	V-TFE	316 SST	EXP.PTFE	V-TFE	EXP.PTFE	SR

* Not recommended for NACE Applications.
** Not recommended for use in Natural Gas Applications.
*** For spring range 90 - 200 psig ball material is 316 SST.

POSITION 10 - END CONNECTIONS	
Description	CODE
NPT - Screwed	1
-34 Opt. - 150 LB RF Flgs. (14" F to F Dimension, Std.)	V
-34 Opt. - 300 LB RF Flgs. (14" F to F Dimension, Std.)	W

POSITION 11 - PILOT SPRING RANGE			
Set Point Range		NON-NACE	NACE
in WC	mbarg	CODE	CODE
0.5"-41"WC	1.9-101	1	G
13"-41"WC	32-101	2	H
psig	barg		
1-5	.07-.34	3	J
3-10	.20-.68	4	K
7-20	.48-1.3	5	L
15-50	1.0-3.4	6	M
40-100	2.7-6.8	7	N
90-200	6.2-13.7	8	P

POSITION 12 - TUBING		
Material	Remote Sensing *	Self Contained Sensing
	CODE	
Brass	B	C
Stainless Steel **	S	T

* Standard - (see page 2)
** Use with Opt-40

POSITION 13 - FEATURE OPTIONS		
Description	Option.	CODE
No Option	–	0
Coalescing Filter element.	-21	C
System Supply Gauge for Outlet of Stabilizer.	-86	U

POSITION 14 - SPRING CHAMBER OPTIONS		
Description	Option	CODE
No Option	–	0
1/8" (DN6) NPT Vent Tap for CI, CS, SST mat'ls.	-25	D
Plastic Rain-proof Bug Vent (includes Opt-25).	-25P	P
SST Rain-proof Bug Vent (includes Opt-25).	-25S	H

POSITION 16 - CERTIFICATE OPTIONS		
Description	Option	CODE
No Option	–	0
NACE CONST: CS/CS, LCC/LCC or SST/SST.Per MR0175	-40	J
SPECIAL CLEANING: Per Spec #S-1134. W/ properly selected mat'ls. Suitable for Oxygen Service. SST body material.	-55	M
Special Cleaning: Per Cashco Spec #S-1542.	-56	N

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