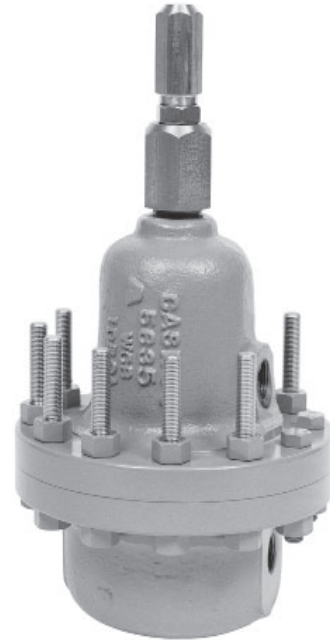




ISO Registered Company

# MODEL 123-1+6+S

## HIGH PRESSURE VERSION DIFFERENTIAL BACK PRESSURE RELIEF REGULATOR



MODEL 123-1+6+S

### OVERVIEW

Model 123-1+6+S is a “high pressure variation” of the basic Model 123-1+6 differential back pressure relief regulator. Inlet pressure may be as high as 1500 psig (103 Barg). Differential pressures may vary from 15–350 psid (1.03–24.1 Bard) in sizes through 1” (DN25), and from 10–230 psig (0.7–15.9 Bard) for size 1-1/2” (DN40). Model 123-1+6+S is NOT available for body size 2” (DN50)

### FEATURES

- High Pressure operation.
- NACE or Non-NACE constructions.
- Anit-blowout adjusting screw assembly with closing cap.
- Standard non-asbestos gaskets.

### APPLICATIONS

Most commonly applied to develop a constant differential pressure across a rotating shaft seal, providing proper sealing and lubricating conditions over varying pressure ranges. May be applied in liquid or gaseous services.

#### ⚠ CAUTION

DO NOT APPLY IN STEAM SERVICE

DO NOT APPLY IN OXYGEN SERVICE

#### ⚠ CAUTION

THIS IS NOT A SAFETY DEVICE AND MUST NOT BE SUBSTITUTED FOR A CODE APPROVED PRESSURE SAFETY RELIEF VALVE OR RUPTURE DISC.



### LINE SIZES AVAILABLE

1/2” (DN15), 3/4” (DN20) 1” (DN25)  
1-1/2” (DN40)



### END CONNECTIONS

NPT, RF FLANGED



### COMMON APPLICATIONS

LIQUID, GASEOUS SERVICES



### DESIGN PRESSURE

INLET: UP TO 1500 psig (103 Barg)

OUTLET: UP TO 1480 psig (102 Barg)

## STANDARD / GENERAL SPECIFICATIONS

**Body Sizes:** 1/2", 3/4", 1" and 1-1/2".  
(DN 15, 20, 25 and 40).

**Body/Spring Chamber Materials:** CS/CS only.  
CS = Carbon Steel.

**Inlet Pressure:** Up to 1500 psig (103 Barg). May be limited if Opt-30/600# flanges are applied.

**Outlet Pressure:** Up to 1480 psig (102 Barg).

**Temperature Range:** -20° to +400°F (-29° to +205°C).

**Maximum Pressure Drop:** No limit for liquid-oil or gaseous service. Consult factory for other fluids.

**Capacity:** Up to 7.5 Cv.

**Differential Pressure Range:** 10–350 psid (0.7–24.1 Bard) with multiple range springs. Varies with body size.

Body Size		Differential Pressure Range	
in	(DN)	psid	(Bard)
1/2, 3/4", 1"	(15, 20, 25)	15-350	(1.03-24.1)
1-1/2"	(40)	10-230	(0.7-15.9)

**Internal Trim Materials:** Metal seated design ONLY. Trim Designation No. S40S; 316 SST metallic parts, fluorocarbon elastomer diaphragm. Opt-40 NACE includes TFE diaphragm covers.

**Gaskets & Seals:** Std. – Non-asbestos.

All O-rings – Fluorocarbon Elastomer (FKM).

Gaskets – None.

Thread Seal Washer – 18-8 SST + FKM.

Backup Ring – PTFE - split.

**Flange Bolting:** All bolting is alloy steel, zinc plated.

Studs: ASTM A-193, Gr. B7.

Nuts: ASTM A194, Gr. 2H.

Cap Screws: ASTM A-193, Gr. B7.

**NOTE:** All studs are elongated to allow bracket mounting; bracket by customer.

**Miscellaneous Internal Mat'ls:**

Spring Chamber Zone –

Closing Cap – 316 SST.

Adj. Screw Jam Nut – 316 SST.

Adj. Screw – 17-4 PH SST.

\* Adj. Screw Housing – 316 SST

Pressure Plate –

Std. – All sizes – CS.

Opt-40 NACE – 316 SST.

Spring Button –

Std. – All sizes – CI or CS.

Opt-40 NACE – 316 SST.

Range Spring – Epoxy coated if CS.

Std. – All Sizes – CS.

Opt-40 NACE – Inconel X-750

\* Welded to spring chamber.

Body Zone –

Pusher Plate –

Std. – All sizes – CS.

Opt-40 NACE – 316 SST.

**Paint:**

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

## OPTION SPECIFICATIONS

**Option -30:** **FLANGED END CONNECTIONS.** Welded-on 600#, 900# or 1500# raised face flanges. Pipe nipples and flanges of same basic materials as body. Pipe nipples are seal welded after screwing into body; flanges are socket welded to pipe nipples. Flange pressure class is same for inlet and outlet.

With 600# flanges, the pressure rating is limited by flange P vs. T ratings. For 900# and 1500# flanges, the pressure rating is limited by the body P vs. T ratings.

All welding procedures in compliance with ASME Boiler & Pressure Vessel Code, Section IX, and American Petroleum Institute API-614 requirements.

A third body flanged connection may be specified as Opt-30+33.

**Option -33:** **THIRD BODY CONNECTION.** This option eliminates a pipe tee when the Model 123-1+6+S is installed in the pump outlet piping. The bottom connection handles the outlet discharge fluid. The two side connections are "pass-through", and are at the same inlet pressure conditions.

**Option -40:** **NACE CONSTRUCTION.** Internal wetted portions meet NACE Std. MRO175 revision, when the exterior of the regulator is not directly exposed to a sour environment, buried, insulated or otherwise denied direct atmospheric exposure.

Diaphragm bolting is standard bolting, and meets NACE MRO175 Section 6.3 requirements.

## APPLICATION AND SELECTION

### FUNCTIONAL OPERATION OF DIFFERENTIAL BACK PRESSURE RELIEF REGULATORS

Differential back pressure relief regulators operate in accordance with the parameters as indicated in Figure 1.

Sometimes called “tracking” regulators, a differential back pressure regulator always has the  $P_1$  – Inlet Pressure greater than the  $P_3$  - Loading Pressure by a relatively constant pressure differential – determined by the range spring. (See Graph 1.)

If  $P_3$  decreases by 15 psig (1 Barg), then  $P_1$  will also

decrease by the same 15 psig (1 Barg). If  $P_3$  increases by 29 psig (2 Barg), the  $P_1$  increases by 29 psig (2 Barg). Thus,  $P_1$  “tracks”  $P_3$ , with the differential pressure between  $P_3$  and  $P_1$  being relatively constant at  $\Delta P_{DIFF}$ , as determined by the range spring set pressure.

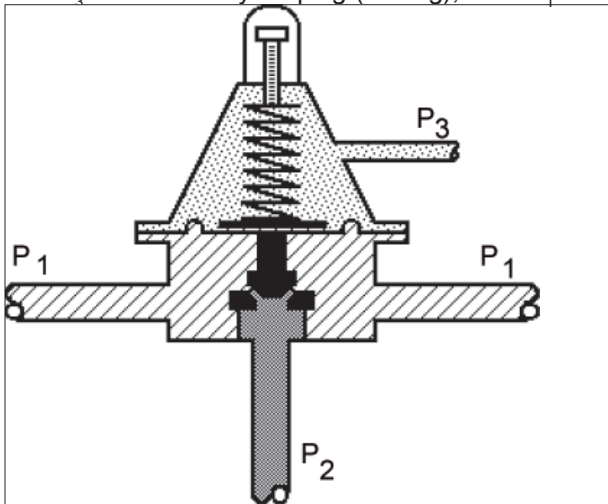
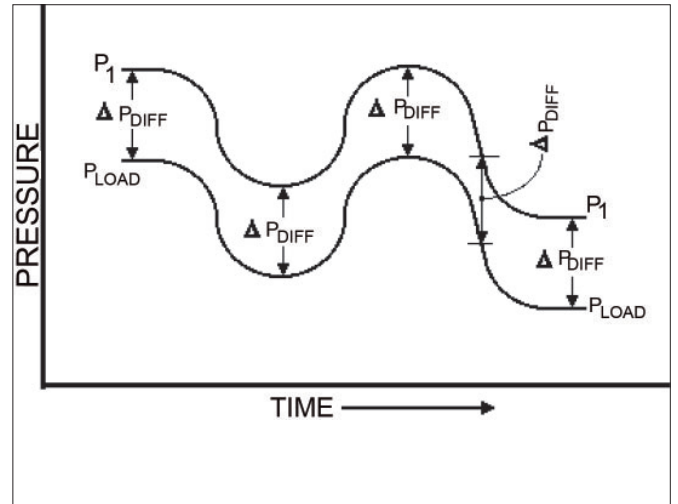


Figure 1: Model 123-1+6+S+33



Graph 1: Differential Back Pressure Relief Regulator

Cashco recommends that All Model 123-1+6+S units be sized and selected by Factory personnel. The following data must be available for a proper sizing and selection:

- Body Service Fluid – What is it? Liquid or Gas? Specific gravity or weight density? Is it corrosive?
- Loading Service Fluid – What is it? Liquid or Gas? Specific gravity or weight density? Is it corrosive?
- Loading Pressure –  $P_3$  (loading or reference pressure)? Max, Norm, Min conditions?
- Differential Pressure –  $\Delta P_{DIFF}$  or  $P_{Set}$ ? Allowable deviation of  $\Delta P_{DIFF}$  from  $P_3$  max to  $P_3$  min; i.e. acceptable “build”?
- Outlet Pressure –  $P_2$  (downstream pressure)? Required to size body.
- Desired Capacity – Cv, GPM, SCFH at  $P_3$  max and  $P_3$  min to be bypassed across valve’s main orifice?
- Body Fluid Temperature –  $T_1$ ?
- Loading Fluid Temperature –  $T_3$ ?
- Minimum Ambient Temperature –  $T_{AMB}$ ? To ensure proper FKM performance.
- Body Fluid Viscosity – cP, SSU, cS?

# TECHNICAL SPECIFICATIONS

**TABLE 1  
CAPACITY TABLE - Cv – FULL PORT**

Differential Pressure – $\Delta P$ Diff		BODY SIZES 1/2", 3/4" and 1" (DN15, 20, 25) – FULL PORT				
		Cv @ % Build				
psid	(Bard)	10%	20%	30%	40%	50%
15	(1.03)	.19	.30	.47	.65	.86
25	(1.72)	.32	.56	.80	1.12	1.50
30	(2.07)	.30	.42	.79	1.34	1.61
50	(3.45)	.43	.86	1.16	1.54	1.91
65	(4.48)	.50	.80	1.10	1.62	2.12
80	(5.52)	.57	.91	1.38	2.15	2.58
100	(6.90)	.74	1.29	1.87	2.39	2.78
125	(8.62)	.99	1.68	2.00	2.67	2.92
130	(8.97)	.86	1.59	1.87	2.46	2.65
150	(10.34)	1.01	2.04	2.32	2.72	2.86
175	(12.07)	1.14	2.41	2.62	2.90	3.00
200	(13.79)	1.20	2.57	2.81	3.00	3.00

Differential Pressure – $\Delta P$ Diff		BODY SIZES 1-1/2" (DN40) – FULL PORT				
		Cv @ % Build				
psid	(Bard)	10%	20%	30%	40%	50%
10	(.69)	1.50	3.20	4.00	4.82	5.60
15	(1.03)	1.58	3.30	4.30	5.30	6.24
25	(1.72)	1.89	3.60	5.30	6.70	7.50
30	(2.07)	1.68	2.86	4.87	6.15	6.95
50	(3.45)	1.72	3.62	5.87	6.88	7.50
65	(4.48)	1.08	2.31	3.16	4.61	5.26
80	(5.52)	1.10	2.43	3.26	4.82	5.75
100	(6.90)	1.20	2.51	3.44	5.10	6.90
125	(8.62)	1.00	1.77	2.34	3.12	4.45
130	(8.97)	1.10	1.85	2.38	3.17	4.52
150	(10.34)	1.25	1.99	2.41	3.32	4.62
175	(12.07)	1.60	2.10	2.46	3.45	4.75
200	(13.79)	1.80	2.15	2.50	3.60	4.90

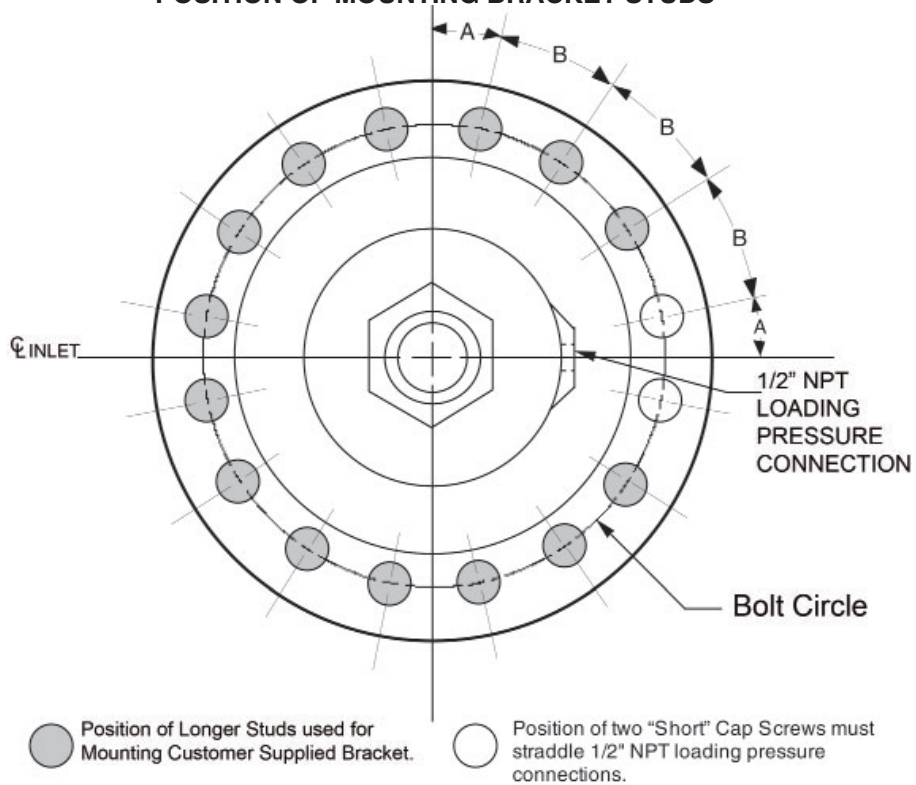
**TABLE 2  
CAPACITY TABLE - Cv – REDUCED PORT**

Differential Pressure – $\Delta P$ Diff		BODY SIZES 1/2", 3/4" and 1" (DN15, 20, 25) – REDUCED PORT				
		Cv @ % Build				
psid	(Bard)	10%	20%	30%	40%	50%
15	(1.03)	.08	.13	.20	.28	.37
25	(1.72)	.14	.24	.34	.48	.65
30	(2.07)	.13	.18	.34	.58	.69
50	(3.45)	.19	.37	.50	.66	.82
65	(4.48)	.22	.34	.47	.70	.91
80	(5.52)	.25	.39	.59	.93	1.11
100	(6.80)	.32	.56	.81	1.03	1.20
125	(8.62)	.43	.72	.86	1.95	1.26
130	(8.97)	.37	.68	.81	1.06	1.95
150	(10.34)	.44	.87	1.00	1.17	1.23
175	(12.07)	.49	1.04	1.13	1.25	1.29
200	(13.79)	.52	1.11	1.21	1.29	1.29

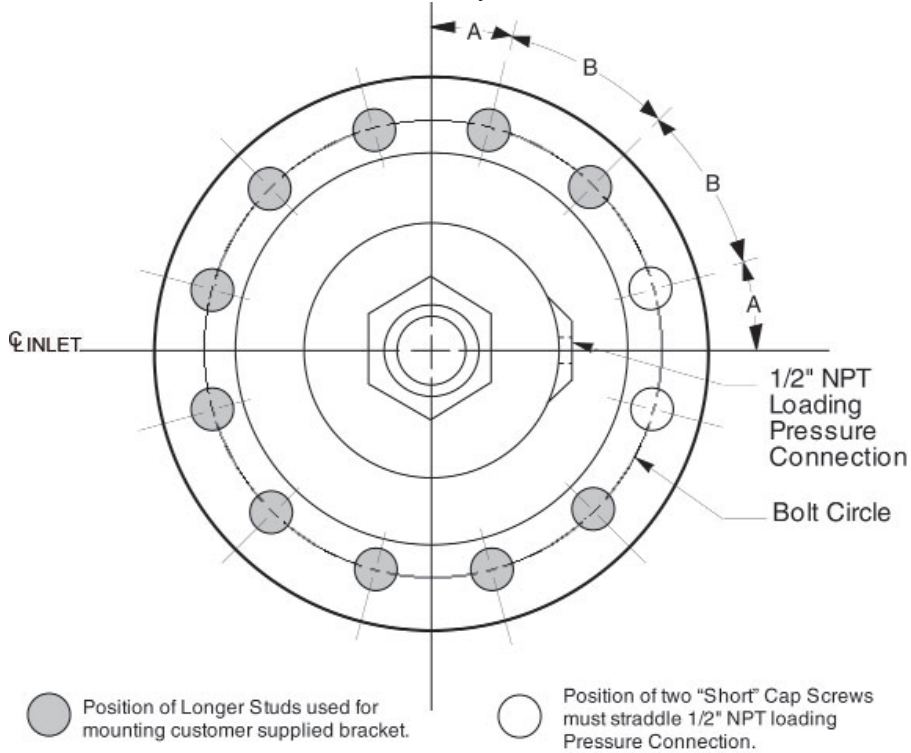
Differential Pressure – $\Delta P$ Diff		BODY SIZES 1-1/2" (DN40) – REDUCED PORT				
		Cv @ % Build				
psid	(Bard)	10%	20%	30%	40%	50%
10	(.69)	1.20	2.25	2.98	3.74	4.50
15	(1.03)	1.24	2.32	3.23	4.13	4.95
25	(1.72)	1.52	2.60	3.95	4.56	5.10
30	(2.07)	1.10	2.03	3.00	3.88	4.92
50	(3.45)	1.20	2.32	3.23	4.00	5.10
65	(4.48)	.86	1.45	2.45	3.36	4.02
80	(5.52)	.90	1.78	2.66	3.72	4.56
100	(6.90)	1.00	1.90	2.85	3.95	5.00
125	(8.62)	1.00	1.50	2.15	2.84	3.50
130	(8.97)	1.00	1.68	2.20	3.05	3.50
150	(10.34)	1.10	1.76	2.36	3.21	3.50
175	(12.07)	1.20	1.92	2.58	3.34	3.50
200	(13.79)	1.50	2.10	2.72	3.40	3.44

**POSITION OF MOUNTING BRACKET STUDS**



**Figure 2**

1/2" & 3/4" Body Sizes

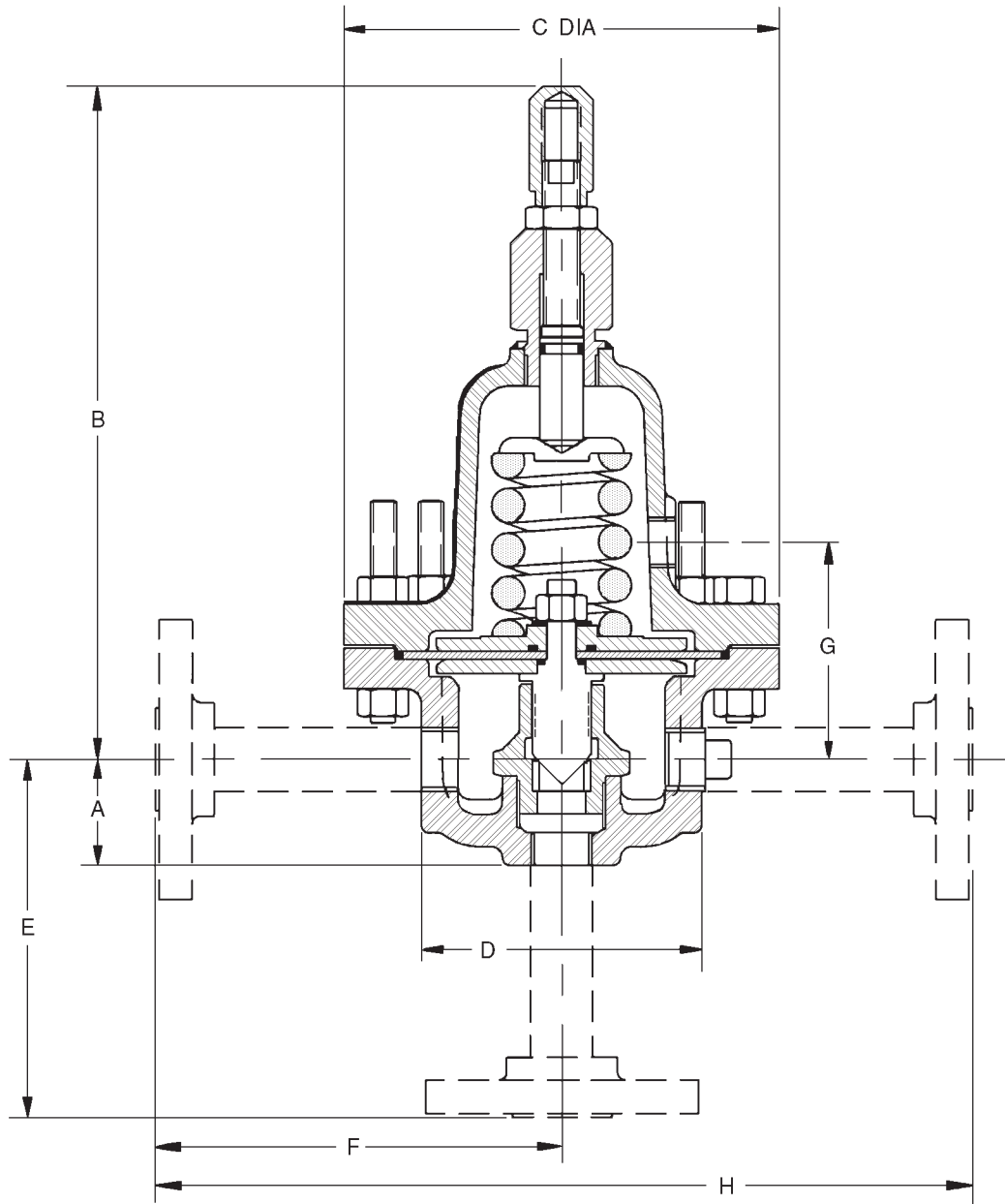


**Figure 3**

1-1/2" Body Size

Body Size	No. of 1/2" Dia. Bolt Holes	Bolt Circle	Position	
			A	B
1/2, 3/4" 1"	12	6-1/4"	15°	30°
1-1/2"	16	7-1/2"	11.25°	22.5°

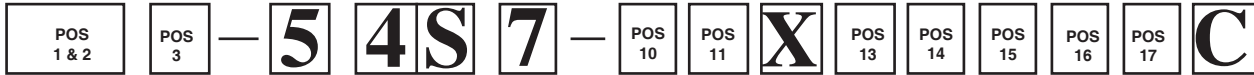
## WEIGHTS & DIMENSIONS



DIMENSION - ENGLISH UNITS (in)									Ship Weight lbs.
Body Size	A	B	C	D	E	F	G	H	
1/2", 3/4", 1"	1.75	11.12	7.38	4.75	5.94	6.88	3.59	13.76	45
1-1/2"	2.19	11.31	8.50	6.25	5.94	6.88	3.84	13.76	70
DIMENSION - METRIC UNITS (mm)									Ship Weight Kgs.
Body Size	A	B	C	D	E	F	G	H	
DN15, 20, 25	44	283	187	121	151	175	91	350	20.4
DN40	56	287	216	159	151	175	98	350	31.9

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**MODEL 123-1+6+S PRODUCT CODE** 02/07/20



POSITION 1 & 2- MODEL	
CODE	DESCRIPTION
9N	MODEL "123"-1+6+S ( Opt-40) "NACE"Construction Differential Back Pressure Relief Regulator
	MODEL "123"-1+6+S "NON-NACE" Construction Differential Back Pressure Relief Regulator

POSITION 3 - SIZES		
SIZE	ORIFICE	CODE
1/2"	3/4"	4
1/2"	1/4"	L
3/4"	3/4"	5
3/4"	1/4"	7
1"	3/4"	6
1"	1/4"	3
1-1/2"	1"	8
1-1/2"	3/4"	K

POSITION 10 - END CONNECTIONS	
DESCRIPTION	CODE
NPT - SCREWED (OPT-33)	4
600# RF. FLGS (OPT-30) *	H
900# RF. FLGS (OPT-30) *	J
1500# RF. FLGS (OPT-30) *	K

\*Nipples & Flanges of same material as body.  
Consult factory for 3rd flanged end connection Opt-30+33.

POSITION 11 - RANGE SPRINGS					
NACE CONSTRUCTION			NON-NACE CONSTRUCTION		
INCONEL Range Spring			STEEL Range Spring		
SIZE	psig	CODE	SIZE	psig	CODE
1/2", 3/4" & 1"	15-40	5	1/2", 3/4" & 1"	15-40	5
	30-80	8		30-80	8
	65-160	B		65-160	B
	130-205	E		130-205	E
1-1/2"	10-25	4	1-1/2"	10-25	4
	20-55	7		20-55	7
	45-105	A		45-105	A
	85-230	D		85-230	D

POSITIONS 13 THROUGH 17 - SPECIAL DRAWING	
SERVICE APPLICATION	CODE
NACE Service (Opt-40)	32934
NON-NACE Service	32935

**\* For information on ATEX see pages 9 & 10 on the IOM.**

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