



MODEL DA1

APPLICATIONS

The "DO-ALL" design allows application of all types of clean fluids. Designed primarily for gaseous and liquid service applications where excessive cavitation is absent. Excellent for atmospheric industrial gases – GN₂, GOX, Ar, He, H₂, CO₂ – as well as a natural gas regulator. Used as a utilities – air, oil, water, steam – regulator. Corrosive and non-corrosive chemical services – gas or liquid – are possible with broad materials range. Special variations available for cryogenic gas; consult factory.

MODEL DA1

DO-ALL SERIES I PRESSURE REDUCING REGULATOR Spring Operated: 1/2" – 4" (DN15 - 100)

The Model DA1 is a high performance, spring operated, flow-to-open pressure reducing regulator with internal pressure balancing piston-cylinder that provides high flow capacity and high pressure drop capability. Internal trim design allows the same basic unit to cover a broad range of pressure settings. Performance approaches that of competitive pilot-operated designs in the basic construction. Applied primarily in clean gaseous or liquid services. Truly a "DO-ALL" pressure regulator.

FEATURES

- Versatile:** Four basic materials and multiple trim material combinations to select from.
- Tight Shutoff:** Multiple composition materials provide Class IV or VI inboard leakage rates. Designed as a soft-seated valve.
- Capacity:** Highest in the industry. Allows smaller body sizes than competitors in majority of applications.
- Pressure Drop:** Highest in the industry when coupled with high flow capacity.
- Trim Design:** "DO-ALL" trim design provides FTO and pressure balancing for higher inlet pressure. Results in unmatched sensitivity and stability. Internals are cage-contained within easily removable quick change trim.
- Rangeability:** Basic valve gives outstanding rangeability due to close tolerances, balanced trim, and a broad range of elastomeric diaphragms and soft seats. Can be as high as 1000:1.
- Heavy-Duty Guiding:** Both top and bottom guided to maintain stability and increased diaphragm life.
- Failure Position:** Fails open on loss of P₁ or P₂ pressures.

STANDARD / GENERAL SPECIFICATIONS

Body / Spring Chamber Materials

CI/CI	BRZ/CI	HC/SST *
CS/CI	BRZ/CS	SST/CI
CS/CS	BRZ/SST	SST/CS
BRZ/BRZ *	HC/CS *	SST/SST

* Through 2" (DN50) body size only.

CI = Cast Iron CS = Carbon Steel BRZ = Bronze
SST = Stainless Steel HC = Hastelloy "C"

Body Sizes

1/2", 3/4", 1", 1-1/4", 1-1/2", 2", 2-1/2", 3", 4"
(DN15, 20, 25, 32, 40, 50, 65, 80, 100)

End Connections

Standard: Female NPT (screwed).

ASME Flanged: 125#, 150#, 250#, 300#, 600#

DIN Flanged: PN16, PN25, PN40;

(Integral Flanged Body unless listed under Opt.-30)

Opt-31 British Standard Pipe Threads.

Opt-32 Schedule 80 Extended Pipe Nipples.

Opt-41 Extension Tube Ends.

Recommended Max. Useable Cv

Body Size		Diaphragm		Body Size		Diaphragm	
		Comp. Cv	Metal Cv			Comp. Cv	Metal Cv
in	(DN)			in	(DN)		
1/2"	(15)	3.6	3.5	2"	(50)	54	12
3/4"	(20)	7.2	3.5	2-1/2"	(65)	81	N/A
1"	(25)	13.5	3.5	3"	(80)	108	N/A
1-1/4"	(32)	20.7	6.0	4"	(100)	198	N/A
1-1/2"	(40)	27.0	6.0	-	-	-	-

See Table DAG-6 for Wide Open Cv Limits.

See Tables 3A through 3D and 4A through 4C for Cv vs. Droop vs. Range Spring tables.

METRIC CONVERSION FACTOR: $C_v / 1.16 = k_v$

Inlet Pressure Range

Operating: 10–1480 psig (.69-102.1 Barg).

See Tables DAG-1A – 1H for design P vs. T limits.

Outlet Pressure Range

1/2"–1" (DN15–25):	1–450 psig (.07–34.5 Barg)
1-1/4"–1-1/2" (DN32–DN40):	1–400 psig (.07–27.6 Barg)
2" (DN50):	1–275 psig (.07–20.7 Barg)
2-1/2"–4" (DN65–100):	1–225 psig (.07–15.5 Barg)

NOTE: Ranges may be limited by diaphragm selection. See Table 5.

Pressure Drop Limits

5–1480 psid (.34-102.1 Bard)

Function of service fluid, base trim material, diaphragm and dynamic seal design. See Table 5 and Table DAG-2, DAG-3 & DAG-4.

Temperature Range

-20° to +400°F (-29° to +204° C)

Limited by body/sp.ch. material combinations, and by elastomeric – diaphragm, seat, static seal, dynamic seal – materials. See Tables DAG-1A through 1H and Table DAG-5. For Cryogenic Application see Option -5 or -36.

Inboard Leakage Rates

See Table DAG-10

Optional Constructions

<u>Opt-5:</u> Cryogenic Const.	<u>Opt-40:</u> NACE Const.
<u>Opt-9:</u> *TFE Diaph. Cover	<u>Opt-41:</u> Ext. Tube Ends
<u>Opt-25:</u> 1/4" (DN8) NPT Tap Spring Chmb.	<u>Opt-55:</u> Oxygen Cleaned
<u>Opt-25S:</u> Vent Screen	<u>Opt-56:</u> Special Cleaned
<u>Opt-30:</u> Weld-on Flanges	<u>Opt-57:</u> Chlorine Cleaned
<u>Opt-31:</u> BSP End Conns.	<u>Opt-80:</u> High Outlet Press.
<u>Opt-32:</u> Ext. Pipe Nipples	<u>Opt-85:</u> Extra Set Pressure Taps
<u>Opt-36:</u> Cryogenic Const.	<u>Opt-95:</u> Epoxy Paint
	<u>Opt-95OS:</u> Epoxy Paint

* Available with Composition Diaphragm ONLY.

ABBREVIATIONS

FK = Fluorosilicone	NBR = Buna-N	PTFE = Polytetrafluoroethylene
FKM = Fluorocarbon	RTFE = Brz-fill TFE	V-TFE = Virgin TFE
EPR = Ethylene Propylene	GF-TFE = Glass-fill TFE	CTFE = Chlorotrifluoroethylene
BC = Neoprene	PA = PolyAll	3-ply (PTFE+FKM+PTFE)

MATERIAL SPECIFICATIONS

Body

Cl – ASTM A126, Grade B.
CS – ASTM A216, Grade WCB.
BRZ – ASTM B62, Alloy 83600,
SST – ASTM A351, Grade CF3M.
HC – ASTM A494, Gr. CW-12 MW.
 See DAG-1A through DAG-1H for material specs.

Spring Chamber

Cl – ASTM A126, Grade B.
CS – Sizes 1/2" - 2" ASTM A216, Gr. WCB;
 Sizes 1/2"-4" ASTM A516, Gr. 55,
 ASTM A106, Gr. B,
BRZ – ASTM B62, Alloy 83600.
SST – Size 1/2" - 2" ASTM A351 Gr. CF3M;
 Size 2-1/2" - 4" ASTM A312, Gr. 316L,
 ASTM A479, Gr. 316L.

Diaphragm *

Elastomeric – BC, EPR, FKM, FK, NBR, FKM+TFE,
 3-ply (PTFE+FKM+PTFE).
Metallic – Be-Cu. (only 1/2" - 2" sizes)

Metallic Trim *

17-4PH SST, 316L SST, Nickel-Copper Alloy (Monel[†]),
 See Table 2.

Seat *

PolyAll, V-TFE, GF-TFE, CTFE

Static Seals (See Fig. DAG-F1) *

RTFE, NBR, FKM, FK, EPR,
 SST/TFE (1/2"-2") (DN15-50),
 V-TFE (2-1/2"-4") (DN65-100)

Dynamic Seals (See Fig. DAG-F1) *

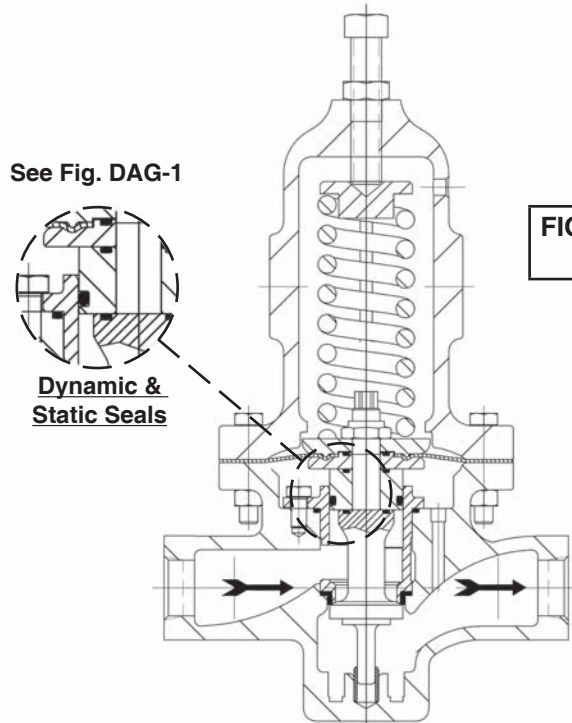
Type OR – NBR, FKM, FK, EPR o-ring seal.
Type UC – V-TFE u-cup seal w/ 316L SST energizer
 – V-TFE u-cup seal w/ Elgiloy energizer
Type CW – TFE cap seal with o-ring energizer
 (o-ring material same as above)
 and GF-TFE wiper backup seal.
Type PW – GF-TFE piston ring assembly seal with
 17-7PH SST energizer; and GF-TFE
 wiper backup seal.

Painting

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

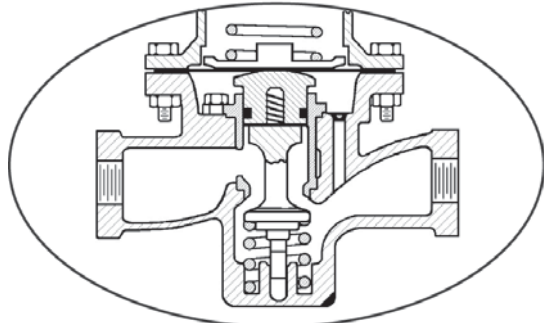
Alternate: See Opt-95 or Opt-95OS.

* See Product Coder for acceptable combinations.
[†] Hastelloy[®], Monel[™], and Inconel[®] are registered trade names:
 Hastelloy[®] is a mark owned by Stelite Div., Cabot Corp.
 Monel[™] is a mark owned by International Nickel Co.
 Inconel[®] is a mark owned by International Nickel Co.



Composition Diaphragm

**FIGURE 1 – Model DA1
Flow To Open**



Metal Diaphragm

This construction REQUIRES a Lower Piston Spring to be supplied.

OPTION SPECIFICATIONS

OPT-5: **BRZ CRYOGENIC CONSTRUCTION.** BRZ/BRZ body/spring chamber materials. NPT end connections. SN & TN trim selections only. Drilled condensate drain hole. Select Opt-55 for cleaned and packaged for oxygen service per Cashco cleaning specification #S-1134. Applicable temperature range -325° to +150° F. (-198° to +66° C). Design requires that spring chamber be mounted pointed downwards in a horizontal pipe.

OPT-9: **TFE DIAPHRAGM COVER.** A 0.020" (0.5mm) thick TFE diaphragm is added to the selected diaphragm. TFE diaphragm is exposed to fluid, providing added chemical compatibility. Use with composition diaphragm only.

OPT-25: **SPRING CHAMBER VENT TAP.** A 1/4" (DN8) - FNPT tap is located on spring chamber to allow for remote venting in case of diaphragm rupture. Primarily used when handling toxic or flammable fluids.

OPT-25S: **VENT SCREEN.** Cap (includes OPT-25).

OPT-30: **WELDED FLANGED CONNECTIONS.** CS, SST or HC body materials only. 1/2"-2" (DN15-50) body sizes only (no 1-1/4" (DN32) size). Welded-on flange of same general chemistry as body.

Weld-On Flanges		
Sizes	Body Material	ASME Pressure Class
1/2" - 3/4"	CS, SST	150, 300, 600
1"	CS, SST	600
1", 1-1/2", 2"	HC	150, 300
Sizes	Body Material	ISO Pressure Class
DN15-50	CS, SST	PN40 RF
DN65-100	CS, SST	PN16, 25, 40 RF

NOTES: 1. The body P vs. T ratings are the limiting variables for flanged end connections, unless further restricted by ASME B16.5.
2. No post-weld stress relieving performed.

OPT-31: **BSP END CONNECTIONS.** British Standard Pipe threads per ISO 7/1; used as an alternate to NPT ends. 1/2" - 2" (DN15-50) sizes only.

OPT-32: **EXTENDED PIPE NIPPLES.** Sch. 80 extension pipe nipples available for CS and SST bodies; for body sizes 1/2" - 2" (DN15-50) only.

OPT-36: **SST CRYOGENIC CONSTRUCTION.** Same specification as Opt-5 except body/spring chamber material is SST/SST. (Be-Cu Diaphragm material.)

OPT-40: **NACE CONSTRUCTION.** Internal wetted portions meet NACE Std. MR0175 for application in sour gas/crude oil service. Exterior of unit to not be directly buried, insulated, or otherwise denied direct atmospheric exposure. CS/CS, SST/CS, or SST/SST body/spring chamber materials only. 316L SST trim materials only. ELG/TFE U-cup dynamic seals. Available in all end connections. All welded portions heat treated to stress relieve weldments.

OPT-41: **EXTENDED TUBE END CONN.** SST body material only. Body sizes 1/2"-1" (DN15-25), 1-1/2" & 2" (DN40-50) only. SST extension tubes are welded to body, ending in tube diameters with 0.065 inch (1.65 mm) wall thickness. **NOT FOR HIGH PURITY REQUIREMENTS.**

OPT-55: **SPECIAL CLEANING - GOX.** BRZ or 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 290 psig (20.0 Barg) when body/topworks are constructed of SST.**

OPT-56: **SPECIAL CLEANING.** Cleaning per Cashco Spec. #S-1542 for all body & spring chamber materials. Higher cleaning level than standard commercial cleaning. NOT suitable for oxygen service.

OPT-57: **SPECIAL CLEANING - Cl₂.** CS, SST, or HC body materials only. Cleaning per Cashco Spec. #S-1589. For chlorine gas/liquid service.

OPT-80: **HIGH OUTLET PRESSURE.** Applies only to body sizes 1/2"-2" (DN15-50). Selecting highest available range spring requires special spring chamber construction. Only available as CS or SST spring chamber materials: Trims of P1, P2, P3, P4 or P7 only.

OPT-85: **PRESSURE TAPS.** Provides second set of inlet and outlet 1/4" (DN8) - FNPT taps with plugs (same basic material as body) on backside of body. Includes second external sensing port tap. See page 17 of DAG-TB for details on tap location for both STD. and Opt -85. **NOTE:** Not available for HC body.

OPT-95: **EPOXY PAINT.** Special epoxy painting of all non-corrosion resistant external surfaces per Cashco Spec #S-1547. Utilized in harsh atmospheric conditions.

OPT-950S: EPOXY PAINT. Special epoxy painting of all non-corrosion resistant external surfaces per Cashco Spec. No. S-1687. Utilized in OFFSHORE atmospheric conditions.

TECHNICAL SPECIFICATIONS

**TABLE 1
RANGE SPRINGS**

Body Size in. (DN)	Spring Range psig	Body Size in. (DN)	Spring Range psig
1/2" (15), 3/4" (20) 1" (25)	1-5 * 1-10 **	2" (50)	1-5 * 1-10 **
	5-20 10-35 20-80 30-150 70-200 100-300		5-15 10-30 15-50 30-90 50-150
	200-450 (Opt-80) √		80-225 80-275 (Opt-80)√
			1-10
1-1/4" (32) 1-1/2" (40)	1-5 * 1-10 **	2-1/2" (65), 3" (80), 4" (100)	5-20 10-40 10-70 40-125 50-225
	5-20 15-45 10-70 40-125 70-200		
	100-350 100-400 (Opt-80) √		

* Composition diaphragm construction ONLY.

** Metal diaphragm for set point pressures ≥ 5 psig (.34 Barg).

√ OPT-80 requires selection of a CS or SST spring chamber.

METRIC CONVERSION: psig / 14.5 = Barg.

**TABLE 2
METALLIC TRIM MATERIAL COMBINATIONS**

PART	TRIM DESIGNATION			
	P	M	S	T
Plug	17-4 PH SST	Monel [†]	316L SST	17-4 PH SST
Guide Bearing	17-4 PH SST	Monel [†]	316L SST	17-4 PH SST
Cage	17-4 PH SST	Monel [†]	316L SST	Monel [†]
Body Bushing	17-4 PH SST	Monel [†]	Monel [†]	Monel [†]

[†] See Page 3 for registered trade name information.

**TABLE 3A
FULL PORT FLOW CAPACITY – Cv
COMPOSITION DIAPHRAGM F_L = 0.90**

Pressure Setpoint Psp psig	Cv Capacity @ % Droop									Range Spring psig
	BODY SIZE - 1/2" (DN15)			BODY SIZE - 3/4" (DN20)			BODY SIZE - 1" (DN25)			
	10%	20%	30%	10%	20%	30%	10%	20%	30%	
1	1.08	2.00	2.70	1.35	2.50	3.38	1.51	2.79	3.76	1 - 5
3	3.06	3.24	3.42	4.05	6.48	6.84	4.51	8.34	11.25	
5	3.06	3.24	3.42	5.85	6.48	6.84	6.51	12.04	12.83	
1	0.52	0.96	1.29	0.66	1.22	1.65	0.71	1.31	1.76	1 - 10
5	3.06	3.24	3.42	3.29	6.09	6.84	4.31	7.97	10.75	
10	3.06	3.24	3.42	5.60	6.48	6.84	6.15	11.38	12.83	
5	2.16	3.24	3.42	2.71	5.01	6.76	3.00	5.55	7.49	5 - 20
10	3.06	3.24	3.42	4.28	6.48	6.84	4.75	8.79	11.87	
15	3.06	3.24	3.42	5.18	6.48	6.84	5.75	10.64	12.83	
20	3.06	3.24	3.42	6.12	6.48	6.84	8.35	12.15	12.83	10 - 35
10	1.04	1.92	2.59	1.31	2.42	3.26	1.45	2.68	3.61	
20	2.31	3.24	3.42	2.88	5.33	6.84	3.20	5.92	7.99	
30	3.06	3.24	3.42	4.68	6.48	6.84	5.20	9.62	12.83	
35	3.06	3.24	3.42	5.40	6.48	6.84	6.00	11.10	12.83	20 - 80
20	0.79	1.46	1.97	0.99	1.83	2.47	1.11	2.05	2.76	
40	1.33	2.46	3.32	1.67	3.09	4.17	1.85	3.42	4.61	
60	2.81	3.24	3.42	3.51	6.48	6.84	3.91	7.23	9.76	
80	3.06	3.24	3.42	4.91	6.48	6.84	5.45	10.08	12.83	30 - 150
30	0.72	1.33	1.79	0.91	1.68	2.26	1.00	1.85	2.50	
50	1.26	2.33	3.14	1.58	2.92	3.94	1.75	3.24	4.38	
75	2.16	3.24	3.42	2.71	5.01	6.76	3.00	5.55	7.49	
100	2.74	3.24	3.42	3.42	6.33	6.84	3.80	7.03	9.49	
125	3.06	3.24	3.42	4.51	6.48	6.84	5.00	9.25	12.49	
150	3.06	3.24	3.42	4.95	6.48	6.84	6.00	11.10	12.83	70 - 200
70	0.54	1.00	1.35	0.68	1.26	1.70	1.18	2.18	2.94	
100	1.73	3.20	3.42	2.16	4.00	5.41	2.40	4.44	5.99	
125	2.34	3.24	3.42	2.93	5.42	6.84	3.25	6.01	8.11	
150	2.74	3.24	3.42	3.42	6.33	6.84	3.80	7.03	9.49	
175	3.06	3.24	3.42	4.19	6.48	6.84	4.65	8.60	11.61	
200	3.06	3.24	3.42	5.04	6.48	6.84	4.71	8.71	11.75	100 - 300
100	0.80	1.48	2.00	0.72	1.33	1.79	0.80	1.48	2.00	
150	1.31	2.42	3.26	1.16	2.15	2.91	1.31	2.42	3.26	
200	1.75	3.24	3.42	1.44	2.66	3.58	1.65	3.05	4.11	
250	2.31	3.24	3.42	1.80	3.33	4.50	2.31	4.27	5.76	
300	3.00	3.24	3.42	2.15	3.98	5.38	3.00	5.55	7.49	200 - 450
200	2.35	3.24	3.42	2.82	5.22	6.84	3.29	6.09	8.23	
300	3.06	3.24	3.42	4.24	6.48	6.84	4.94	9.14	12.34	
400	3.06	3.24	3.42	5.65	6.48	6.84	6.59	12.15	12.83	
450	3.06	3.24	3.42	6.12	6.48	6.84	7.41	12.15	12.83	

METRIC CONVERSION FACTORS: psig / 14.5 = Barg; C_v / 1.16 = k_v

TABLE 3B
FULL PORT FLOW CAPACITY – Cv
COMPOSITION DIAPHRAGM $F_L = 0.90$

Pressure Setpoint Psp psig	Cv Capacity @ % Droop						Range Spring psig
	BODY SIZE 1-1/4" (DN32)			BODY SIZE 1-1/2" (DN40)			
	10%	20%	30%	10%	20%	30%	
1	2.09	3.87	5.23	2.20	4.07	5.49	1 - 5
3	4.75	8.79	11.87	5.00	9.25	12.49	
5	7.79	14.41	19.45	8.20	15.17	20.48	
1	1.01	1.87	2.53	1.04	1.92	2.59	1 - 10
5	4.60	8.51	11.49	4.85	8.97	12.11	
10	7.25	13.41	18.10	7.91	14.63	19.75	
5	2.66	4.92	6.64	2.80	5.18	6.99	5 - 20
10	5.71	10.56	14.25	6.00	11.10	14.99	
15	8.59	15.89	19.67	9.41	17.41	23.51	
20	11.41	18.63	19.67	11.77	21.77	25.65	15 - 45
15	4.46	8.25	11.14	4.71	8.71	11.75	
25	7.41	13.71	18.51	7.80	14.43	19.48	
35	10.31	18.63	19.67	10.91	20.18	25.65	10 - 70
45	13.41	18.63	19.67	15.06	24.30	25.65	
10	1.56	2.89	3.91	1.65	3.05	4.11	
30	4.27	7.90	10.67	4.51	8.34	11.25	40 - 125
50	7.36	13.63	18.39	7.75	14.34	19.36	
70	10.00	18.50	19.67	10.59	19.59	25.65	
40	2.56	4.74	6.41	2.71	5.01	6.76	70 - 200
50	3.80	7.03	9.49	4.00	7.40	9.99	
75	5.22	9.66	13.05	5.51	10.19	13.75	
100	6.88	12.73	17.19	7.25	13.41	18.10	100 - 350 (Opt-80)
125	8.55	15.82	19.67	9.00	16.65	22.48	
70	2.85	5.27	7.11	3.00	5.55	7.49	
100	4.65	8.60	11.61	4.91	9.08	12.25	50 - 150
125	5.36	9.92	13.40	5.65	10.45	14.10	
150	6.27	11.60	15.66	6.60	12.21	16.48	
175	7.12	13.17	17.78	7.51	13.89	18.75	80 - 275 (Opt-80)
200	8.74	16.17	19.67	9.20	17.02	22.98	
100	6.00	11.10	14.99	6.47	11.97	16.16	
200	11.29	18.63	19.67	11.77	21.77	25.65	100 - 350 (Opt-80)
300	16.94	18.63	19.67	17.65	24.30	25.65	
350	17.60	18.63	19.67	20.35	24.30	25.65	

TABLE 3C
FULL PORT FLOW CAPACITY – Cv
COMPOSITION DIAPHRAGM $F_L = 0.90$

Pressure Setpoint Psp psig	Cv Capacity @ % Droop			Range Spring psig
	BODY SIZE 2" (DN50)			
	10%	20%	30%	
1	5.00	9.25	12.49	1 - 5
3	17.06	31.56	42.61	
5	27.53	48.60	51.30	
1	2.38	4.40	5.94	1 - 10
5	16.35	30.25	40.84	
10	26.00	48.10	51.30	
5	8.51	15.74	21.24	5 - 15
10	14.47	26.77	36.14	
15	22.35	41.35	51.30	
10	4.91	9.08	12.25	10 - 30
20	11.77	21.77	29.38	
30	17.65	32.65	44.07	
15	3.00	5.55	7.49	15 - 50
25	6.00	11.10	14.99	
35	8.71	16.11	21.74	
50	12.47	23.07	31.15	30 - 90
30	4.00	7.40	9.99	
60	8.20	15.17	20.48	
90	12.00	22.20	29.97	50 - 150
50	3.75	6.94	9.37	
75	6.00	11.10	14.99	
100	8.20	15.17	20.48	80 - 275 (Opt-80)
125	9.51	17.59	23.74	
150	12.47	23.07	31.15	
80	5.10	9.40	12.70	80 - 275 (Opt-80)
100	6.35	11.75	15.85	
200	12.70	23.50	31.70	
275	17.40	32.30	43.60	

TABLE 3D
FULL PORT FLOW CAPACITY – Cv COMPOSITION DIAPHRAGM $F_L = 0.90$

Pressure Setpoint Psp psig	Cv Capacity @ % Droop									Range Spring psig
	Body Size 2.5"			Body Size 3"			Body Size 4"			
	10%	20%	30%	10%	20%	30%	10%	20%	30%	
1	4.85	8.97	12.11	6.90	12.70	17.30	7.00	12.95	17.48	1 - 10
3	9.95	18.41	24.86	18.10	34.50	47.00	20.00	37.00	50.00	
5	21.18	39.18	52.89	29.06	53.76	72.58	35.06	64.86	89.00	
10	37.53	69.43	76.95	62.35	97.20	102.60	75.30	139.30	182.00	5 - 20
5	17.53	32.43	43.78	26.00	49.00	66.00	27.06	50.06	67.58	
10	30.00	55.50	75.00	44.50	81.20	104.00	45.06	83.36	112.00	
15	42.47	72.90	77.00	64.00	96.00	105.00	64.71	97.20	125.00	10 - 40
20	57.06	74.00	78.00	74.00	98.00	106.00	82.00	124.00	158.00	
10	17.53	32.43	43.78	25.00	45.00	62.00	25.06	46.36	63.00	
20	31.06	57.46	76.95	49.00	91.00	102.00	51.06	94.46	127.52	10 - 70
30	43.30	72.90	76.95	62.00	98.50	103.00	70.00	128.00	176.00	
40	60.00	72.90	76.95	94.00	102.00	105.00	104.00	178.20	191.00	
10	9.80	18.00	26.80	14.20	26.50	39.10	14.50	27.30	39.70	40 - 125
30	19.20	37.60	55.00	32.00	52.70	68.30	33.00	54.00	68.76	
50	40.20	69.40	79.50	47.00	88.00	103.00	48.00	89.67	121.06	
70	44.40	72.90	80.10	65.00	94.50	105.00	67.06	124.06	167.48	50 - 225
40	9.80	18.10	26.50	12.00	22.20	29.97	12.40	22.70	31.00	
50	12.57	23.70	37.00	17.06	31.56	42.61	17.30	32.00	43.20	
75	19.10	36.90	54.50	27.53	50.93	68.76	28.00	51.10	69.60	50 - 225
100	25.10	46.10	72.60	36.00	66.60	89.91	36.10	67.00	90.30	
125	31.00	57.80	79.30	42.47	78.57	104.00	43.90	79.20	118.00	
50	9.10	18.04	24.36	13.10	25.25	34.08	13.60	25.80	35.10	50 - 225
100	16.10	31.00	44.50	22.60	43.70	61.30	23.00	44.20	62.00	
150	24.10	45.20	63.00	31.50	59.40	88.20	32.00	60.50	89.00	
225	31.80	60.00	87.60	47.00	79.00	104.00	47.40	79.60	119.00	

METRIC CONVERSION FACTORS: psig / 14.5 = Barg; $C_v / 1.16 = k_v$

TABLE 4A
FULL PORT FLOW CAPACITY – Cv
METAL DIAPHRAGM $F_L = 0.90$

Pressure Setpoint Psp psig	Cv Capacity @ % Droop									Range Spring
	BODY SIZE - 1/2" (DN15)			BODY SIZE - 3/4" (DN20)			BODY SIZE - 1" (DN25)			
	10%	20%	30%	10%	20%	30%	10%	20%	30%	
5	1.24	2.30	3.10	1.32	2.44	3.29	1.72	3.15	3.33	1 - 10
10	1.66	3.06	3.33	2.24	3.15	3.33	2.46	3.15	3.33	
5	0.87	1.60	2.16	1.08	2.00	2.70	1.20	2.22	3.00	5 - 20
10	1.37	2.53	3.33	1.71	3.15	3.33	1.90	3.15	3.33	
15	1.66	3.06	3.33	2.07	3.15	3.33	2.30	3.15	3.33	
20	1.66	3.06	3.33	2.98	3.15	3.33	2.98	3.15	3.33	
10	0.41	0.77	1.03	0.52	0.97	1.30	0.58	1.07	1.45	10 - 35
20	0.92	1.71	2.30	1.15	2.13	2.88	1.28	2.37	3.20	
30	1.50	2.77	3.33	1.87	3.15	3.33	2.08	3.15	3.33	
35	1.60	2.96	3.33	2.16	3.15	3.33	2.40	3.15	3.33	
20	0.32	0.58	0.79	0.40	0.73	0.99	0.44	0.82	1.10	20 - 80
40	0.53	0.98	1.33	0.67	1.24	1.67	0.74	1.37	1.85	
60	1.12	2.08	2.81	1.40	2.59	3.33	1.56	2.89	3.33	
80	1.57	2.90	3.33	1.96	3.15	3.33	2.18	3.15	3.33	
30	0.29	0.53	0.72	0.36	0.67	0.90	0.40	0.74	1.00	30 - 150
50	0.50	0.93	1.26	0.63	1.17	1.57	0.70	1.30	1.75	
75	0.87	1.60	2.16	1.08	2.00	2.70	1.20	2.22	3.00	
100	1.10	2.03	2.74	1.37	2.53	3.33	1.52	2.81	3.33	
125	1.44	2.66	3.33	1.80	3.15	3.33	2.00	3.15	3.33	
150	1.59	2.93	3.33	1.98	3.15	3.33	2.40	3.15	3.33	
70	0.22	0.40	0.54	0.27	0.50	0.68	0.47	0.87	1.18	70 - 200
100	0.69	1.28	1.73	0.87	1.60	2.16	0.96	1.78	2.40	
125	0.94	1.73	2.34	1.17	2.17	2.93	1.30	2.40	3.24	
150	1.10	2.03	2.74	1.37	2.53	3.33	1.52	2.81	3.33	
175	1.34	2.48	3.33	1.68	3.10	3.33	1.86	3.15	3.33	
200	1.60	2.96	3.33	2.01	3.15	3.33	1.88	3.15	3.33	
100	0.32	0.59	0.80	0.29	0.53	0.72	0.32	0.59	0.80	100 - 300
150	0.52	0.97	1.30	0.47	0.86	1.16	0.52	0.97	1.30	
200	0.70	1.30	1.75	0.57	1.06	1.43	0.66	1.22	1.65	
250	0.92	1.71	2.30	0.72	1.33	1.80	0.92	1.71	2.30	
300	1.20	2.22	3.00	0.86	1.59	2.15	1.20	2.22	3.00	
200	0.94	1.74	2.35	1.13	2.09	2.82	1.32	2.44	3.29	200 - 450 (Opt-80)
300	1.41	2.61	3.33	1.69	3.13	3.33	1.98	3.15	3.33	
400	1.66	3.06	3.33	2.26	3.15	3.33	2.64	3.15	3.33	
450	1.66	3.06	3.33	2.54	3.15	3.33	2.96	3.15	3.33	

METRIC CONVERSION FACTORS: psig / 14.5 = Barg; $C_v / 1.16 = k_v$

TABLE 4B
FULL PORT FLOW CAPACITY – Cv
METAL DIAPHRAGM $F_L = 0.90$

Pressure Setpoint Psp psig	Cv Capacity @ % Droop						Range Spring psig
	BODY SIZE 1-1/4" (DN32)			BODY SIZE 1-1/2" (DN40)			
	10%	20%	30%	10%	20%	30%	
5	1.84	3.40	4.60	1.94	3.59	4.84	1 - 10
10	2.90	5.36	5.70	3.16	5.40	5.70	
5	1.06	1.97	2.66	1.12	2.07	2.80	5-20
10	2.28	4.22	5.70	2.40	4.44	5.70	
15	3.44	5.40	5.70	3.76	5.40	5.70	
20	4.56	5.40	5.70	4.71	5.40	5.70	15 - 45
15	1.78	3.30	4.45	1.88	3.48	4.70	
25	2.96	5.40	5.70	3.12	5.40	5.70	
35	4.12	5.40	5.70	4.36	5.40	5.70	
45	5.10	5.40	5.70	5.10	5.40	5.70	10 - 70
10	0.63	1.16	1.56	0.66	1.22	1.65	
30	1.71	3.16	4.27	1.80	3.33	4.50	
50	2.95	5.40	5.70	3.10	5.40	5.70	
70	4.00	5.40	5.70	4.24	5.40	5.70	
40	1.03	1.90	2.56	1.08	2.00	2.70	40 - 125
50	1.52	2.81	3.80	1.60	2.96	4.00	
75	2.09	3.87	5.22	2.20	4.07	5.50	
100	2.75	5.09	5.70	2.90	5.36	5.70	
125	3.42	5.40	5.70	3.60	5.40	5.70	70 - 200
70	1.14	2.11	2.84	1.20	2.22	3.00	
100	1.86	3.44	4.64	1.96	3.63	4.90	
125	2.15	3.97	5.36	2.26	4.18	5.64	
150	2.51	4.64	5.70	2.64	4.88	5.70	
175	2.85	5.27	5.70	3.00	5.40	5.70	100 - 350 (Opt-80)
200	3.50	5.40	5.70	3.68	5.40	5.70	
100	2.40	4.44	5.70	2.59	4.79	5.70	
200	4.52	5.40	5.70	4.71	5.40	5.70	
300	5.10	5.40	5.70	5.10	5.40	5.70	
350	5.10	5.40	5.70	5.10	5.40	5.70	

TABLE 4C
FULL PORT FLOW CAPACITY – Cv
METAL DIAPHRAGM $F_L = 0.90$

Pressure Setpoint Psp psig	Cv Capacity @ % Droop			Range Spring psig
	BODY SIZE 2" (DN50)			
	10%	20%	30%	
5	6.54	10.80	11.40	1 - 10
10	10.20	10.80	11.40	
5	3.40	6.29	8.50	5 - 15
10	5.79	10.71	11.40	
15	8.94	10.80	11.40	
10	1.96	3.63	4.90	10 - 30
20	4.71	8.71	11.40	
30	7.06	10.80	11.40	
15	1.20	2.22	3.00	15 - 50
25	2.40	4.44	5.99	
35	3.48	6.44	8.70	
50	4.99	9.23	11.40	
30	1.60	2.96	4.00	30 - 90
60	3.28	6.07	8.19	
90	4.80	8.88	11.40	
50	1.50	2.78	3.75	50 - 150
75	2.40	4.44	5.99	
100	3.28	6.07	8.19	
125	3.80	7.03	9.50	
150	4.99	9.23	11.40	
80	2.10	3.80	5.00	80 - 275 (Opt-80)
100	2.60	4.75	6.25	
200	5.25	9.50	11.40	
275	7.20	11.30	11.40	

METRIC CONVERSION FACTORS: psig / 14.5 = Barg; $C_v / 1.16 = k_v$

TABLE 5
MAXIMUM DIAPHRAGM RATING

NOTE: The below ratings may be further "derated" by limitations thru the Pressure Equipment Directive (97/23/EC-May '97).

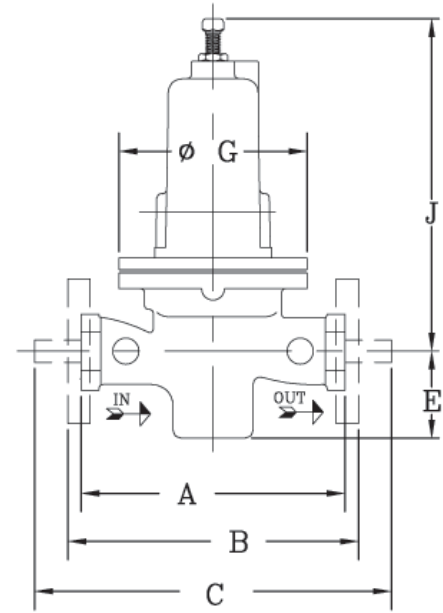
Diaphragm Material	Standard Diaphragm Construction psig (Barg) *	
	Body Size in (DN)	
	1/2" – 2" (15–50)	2-1/2" – 4" (65–100)
BC, EPR	1250 (86.1)	800 (55.1)
NBR	450 (31.0)	300 (20.6)
FKM, FKM+TFE, FK	700 (48.2)	550 (37.9)
3-ply (PTFE+FKM+PTFE)	125 (8.6)	125 (8.6)
Metal (Be-Cu)	1500 (103)	N/A

*Maximum setting of pressure safety device – safety relief valve or rupture disc.
 NA = Not Available

TABLE 6A
DIMENSIONS AND WEIGHTS - ENGLISH UNITS (in)

Dimen.	End Conn.	Body Mat'l.	Body Size					
			1/2", 3/4" & 1"	1-1/4" & 1-1/2"	2"	2-1/2"	3"	4"
A	NPT	CI, BRZ	6.00	9.88	9.88			
		CS, SST, HC	8.25	9.88	9.88			
B	125# FF	CI				10.88	11.75	13.88
	250# RF	CI				11.50	12.50	14.50
	150# FF	BRZ **	9.63	11.50 ✓	11.50	10.88	11.75	13.88
	300# FF	BRZ **	9.63	11.50 ✓	11.50	11.50	12.50	14.50
	150# RF	CS, SST, HC *	10.75	12.38 ✓	10.00	10.88	11.75	13.88
	300# RF	CS, SST, HC *	10.75	12.38 ✓	10.50	11.50	12.50	14.50
	600# RF	CS, SST	10.75	12.38 ✓	11.25	12.25	13.25	15.50
C	Opt-32 EXT NIPS	CS, SST	14.00	15.75	15.75			
E	All	All	2.56	3.69	4.00			
G	All	All	6.00	7.00	8.00	10.00	11.00	11.13
J	All	All	12.38	14.25	16.00	26.50	27.25	27.75
J w/Opt-80	-	-	17.00	17.50	19.00	—	—	—
APPROX. WEIGHT LB.	w/ Flanges	All	30	45	55	—	—	—
	w/Flanges	All	35	55	68	100	175	190

* HC body material available in sizes 1", 1-1/2", & 2" ONLY.
 ** Flanged BRZ bodies available in sizes 1", 1-1/2", 2", 2-1/2", 3", & 4" ONLY.
 ✓ Flange Connections not available for 1-1/4" size.
 CF = Consult Factory.
 Consult Factory for dimensions of ISO DIN Flanged units. (PN16, PN25, PN40)

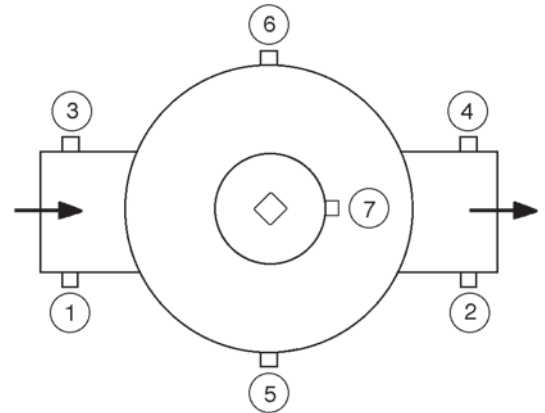


Model DA1

TABLE 6B
DIMENSIONS AND WEIGHTS - METRIC UNITS (mm)

Dimen.	End Conn.	Body Mat'l.	Body Size					
			DN15, DN20 & DN25	DN32 & DN40	DN50	DN65	DN80	DN100
A	NPT	CI, BRZ	152	251	251			
		CS, SST, HC	210	251	251			
B	125# FF	CI				276	298	353
	250# RF	CI				292	318	368
	150# FF	BRZ **	245	292 ✓	292	276	298	353
	300# FF	BRZ **	245	292 ✓	292	292	318	368
	150# RF	CS, SST, HC *	273	314 ✓	254	276	298	353
	300# RF	CS, SST, HC *	273	314 ✓	267	292	318	368
	600# RF	CS, SST	273	314 ✓	286	311	337	394
C	Opt-32 EXT NIPS	CS, SST	356	400	400			
E	All	All	65	94	102			
G	All	All	152	178	203	254	279	283
J	All	All	314	362	406	673	692	705
J w/Opt-80	-	-	432	444	483	—	—	—
APPROX. WEIGHT Kg	w/ Flanges	All	14	21	25	—	—	—
	w/Flanges	All	16	25	31	46	80	87

* HC body material available in sizes DN25, 40 & 50 ONLY.
 ** Flanged BRZ bodies available in sizes DN25, 40, 50, 65, 80, & 100 ONLY.
 ✓ Flange Connection not available for DN 32 size.
 CF = Consult Factory.
 Consult Factory for dimensions of ISO DIN Flanged units. (PN16, PN25, PN40)



PRESSURE TAP LOCATIONS							
Body Mat'l.	①	②	③	④	⑤	⑥	⑦
CI	Std	Std	Opt-85	Opt-85	Std	Opt-85	Opt-25
BRZ	Std	Std	Std	Opt-85	Std	Opt-85	Opt-25
CS	Std	Std	Opt-85	Opt-85	Std	Opt-85	Opt-25
SST	Std	Std	Opt-85	Opt-85	Std	Opt-85	Opt-25
HC	N/A	N/A	N/A	N/A	✓	N/A	Opt-25

✓ Coded as "external".

NOTES

MODEL DA1 PRODUCT CODE 11/01/10

When ordering a product requiring special construction or per a special Cashco drawing, the code "X" in this position followed by a 5-digit control number override all other options. Otherwise, proceed with coding per following tables.

D1

Table 1

Table 2

Table 3

Table 4

Table 5

Table 6

Table 7

Table 8

Table 9

E

Size		CODE
in	(DN)	
1/2"	(15)	4
3/4"	(20)	5
1"	(25)	6
1-1/4"	(32)	7
1-1/2"	(40)	8
2"	(50)	9
2-1/2"	(65)	A
3"	(80)	B
4"	(100)	C

* Not available with metal diaphragms.

Materials	CODE	Materials	CODE
CI/CI	1	CS/CI	4
		CS/CS *	5
BRZ/CI	2	SST/CI	7
BRZ/BRZ **	B	SST/CS *	9
BRZ/CS *	J	SST/SST * / ***	A
BRZ/SST *	D	HC/CS ‡	G
		HC/SST ‡	H

* Select CS or SST Spring Chamber material for Opt-80 except in Canada use SST. CS Spring Chamber in Sizes 2-1/2" - 4" not registered for shipment into Canada. See Table 6.
 ** Select for Opt-5
 *** Select for Opt-36
 ‡ Sizes 1/2" - 2" (Except No 1-1/4").

Trim Material	O-ring/Seal		Static	Dynamic	CODE	
	Seat	Diaphragm				
17-4PH SST "P"	PA	BC	NBR	O-ring ^	P1	
	PA	BC	NBR	SST/TFE u-cup ^	P2	
	CTFE	BC	NBR	SST/TFE u-cup ^	P3	
	PA	EPR	EPR	O-ring ^	P4	
	PA	NBR	NBR	O-ring	P5	
	PA	NBR	NBR	SST/TFE u-cup	P6	
	PA	FK	FK	SST/TFE u-cup ^	P7	
	GF-TFE	FK	FK	SST/TFE u-cup	P8	
	V-TFE	FK	FK	SST/TFE u-cup	P9	
	PA	FKM	FKM	O-ring	PA	
	PA	FKM	FKM	SST/TFE u-cup	PB	
	GF-TFE	FKM	FKM	O-ring	PC	
	GF-TFE	FKM	FKM	SST/TFE u-cup	PD	
	V-TFE	FKM + TFE	SST/TFE u-cup √	SST/TFE u-cup	PE	
	GF-TFE	3-ply	RTFE	SST/TFE u-cup \$	PF	
	GF-TFE	3-ply	RTFE	PRA + W \$	PG	
	PA	NBR	NBR	TFE+NBR GFTFE CW	PH	
	PA	EPR	EPR	TFE+EPR GFTFE CW	PJ	
	PA	FK	FK	TFE+FK GFTFE CW	PK	
	GF-TFE	FKM	FKM	TFE+FKM GFTFE CW	PL	
Monel "M"	PA	FK	FK	SST/TFE u-cup ‡	M7	
	V-TFE	FK	FK	SST/TFE u-cup	M9	
	V-TFE	FKM-TFE	SST/TFE u-cup √	SST/TFE u-cup	ME	
	PA	NBR	NBR	TFE+NBR GFTFE CW	MH	
	PA	EPR	EPR	TFE+EPR GFTFE CW	MJ	
	PA	FK	FK	TFE+FK GFTFE CW	MK	
	GF-TFE	FKM	FKM	TFE+FKM GFTFE CW	ML	
	PA	FK	FK	SST/TFE u-cup	S7	
	V-TFE	FK	FK	SST/TFE u-cup	S9	
	PA	BE-CU *	SST/TFE u-cup	SST/TFE u-cup	SM	
316L SST "S"	V-TFE	BE-CU *	SST/TFE u-cup	SST/TFE u-cup **	SN	
	PA	NBR	NBR	TFE+NBR GFTFE CW	SH	
	PA	EPR	EPR	TFE+EPR GFTFE CW	SJ	
	PA	FK	FK	TFE+FK GFTFE CW	SK	
	GF-TFE	FKM	FKM	TFE+FKM GFTFE CW	SL	
	NACE OPT-40	PA	NBR	NBR	ELG/TFE u-cup	NR
		PA	FKM	FKM	ELG/TFE u-cup	NS
		PA	FK	FK	SST/TFE u-cup ‡	T7
		V-TFE	FK	FK	SST/TFE u-cup	T9
		PA	BE-CU *	SST/TFE u-cup	SST/TFE u-cup	TM
V-TFE		BE-CU*	SST/TFE u-cup	SST/TFE u-cup **	TN	
PA		NBR	NBR	TFE+NBR GFTFE CW	TH	
PA		EPR	EPR	TFE+EPR GFTFE CW	TJ	
PA		FK	FK	TFE+FK GFTFE CW	TK	
GF-TFE		FKM	FKM	TFE+FKM GFTFE CW	TL	

‡ For GOX service, PA seats allowed in BRZ Bodies w/ trim materials "M" or "T" only.
 ^ Only trims that may be used with Opt. -80.
 * 2-1/2" - 4" sizes are not available with metal diaphragm.
 ** Use for Opt-5 or -36.
 √ Sizes 2-1/2"-4" use V-TFE static seal.
 \$ Only for Max < 125 psig. Abbreviations defined on page 2.

PRODUCT	HAZARD CATEGORY	CODE
Standard	N/A	7
EUROPEAN * Consult Factory for Special Code (CE Mark does not apply to DN25 and below)	Sound Engineering Practice (SEP)	S
	CE Marked Hazard Cat I or II	E

* For products to be placed in service in Europe.
 Forward Completed "EU" Application Recorder prior to quotation.
 (Without Recorder- Processing of Purchase Order will be delayed).
 Ref to Directive 97/23/EC. Contact Cashco for Assistance.

Size	Material	Method	End Conn	CODE	End Conn	CODE	End Conn	CODE
1/2" - 2"	ALL	-	NPT	1	-	-	-	-
2-1/2" - 4"	CI	Integral	125#FF	2	250#RF	3	-	-
1", 1-1/2" - 4"	BRZ	Integral	150#FF	6	300#FF	7	-	-
1/2" - 3/4"	CS,SST	Opt-30						
1" - 4"	CS-SST	Integral *	150#RF	4	300#rf	5	600# RF	8
1" - 2"	HC	Opt-30 *						
1/2" - 2"	ALL	Opt-31	BSP	P	-	-	-	-
1/2" - 2"	CS, SST	Opt-32	Extended Nipples		E	-	-	-
1/2" - 1", 1-1/2" - 2"	SST	Opt-41	Non-High Purity Tube Ends		T	-	-	-

DN15-25, 40, 50	BRZ	Integral	PN40 FF	PN16 FF	PN25 FF	PN40 FF	J
DN65-100			PN16 FF	K	PN25 FF	L	M

DN15-25, 40, 50	CS, SST, HC	Opt-30	PN40 RF	PN16 RF	PN25 RF	PN40 RF	D
DN65-100	CS, SST	Integral	PN16 RF	A	PN25 RF	C	G

* Flanges Not Available for 1-1/4" (DN32) size.
 ** 1" size w/ 600# RF CS, or SST has weld-on flanges Opt-30 (Not available in HC material)

Body Size	Pressure Range		CODE	Body Size	Pressure Range		CODE
	psig	barg			psig	barg	
1/2", 3/4" & 1" (DN15, 20 & 25)	1-5 ^	.07-.34	1	2" (DN50)	1-5 ^	.07-.34	1
	1-10 ^	.07-.68	S		1-10 ^	.07-.68	S
	5-20	.34-1.3	A		5-15	.34-1.0	M
	10-35	.68-2.4	B		10-30	.68-2.0	N
	20-80	1.3-5.5	C		15-50	1.0-3.4	P
	30-150	2.0-10.3	D		30-90	2.0-6.2	Q
	70-200	4.8-13.7	E		50-150	3.4-10.3	R
	100-300	6.8-20.6	F		80-225 *	5.5-15.5	Z
	200-450 *	13.7-31.0	G		80-275 *	5.5-18.9	4
	1-5 ^	.07-.34	1		1-10	.07-.68	S
1-1/14" & 1-1/2" (DN32 & 40)	1-10 ^	.07-.68	S	2-1/2", 3" & 4" (DN65, 80 & 100)	5-20	.34-1.3	A
	5-20	.34-1.3	A		10-40	.68-2.7	T
	15-45	1.0-3.1	H		10-70	.68-4.8	J
	10-70	.68-4.8	J		40-125	2.7-8.6	K
	40-125	2.7-8.6	K		50-225	3.4-15.5	3
	70-200	4.8-13.7	E				
	100-350 *	6.8-24.1	Y				
	100-400 *	6.8-27.5	6				

* Opt-80 - High Outlet Pressure requires CS or SST Sp.Ch. only. See Table 2.
 ^ Comp diaphragm only.

Option	Flow To Open
	CODE
Internal	1
External	2
Large Internal	4

Option	CODE
NO	0
YES	C

Description	Option	CODE
No Option	-	0
TFE Diaphragm Cover	-9	2
1/4" (DN8) NPT SPG. CH. VENT TAP	-25	E
Vent Screen (Includes Opt.-25)	-25S	H
NACE CONST: CS/CS, SST/CS or SST/SST All Sizes Except 1-1/4" per MR0175	-40	J
SPECIAL CLEANING: Per Cashco Spec #S-1134. W/ properly selected mat'ls, this procedure suitable for oxy.serv.BRZ or SST body material.	-55	M
SPECIAL CLEANING: Per Cashco Spec #S-1542. All Body/ Spring Chamber Materials.	-56	N
SPECIAL CLEANING: Per Cashco Spec #S-1589 Cl2 Service	-57	P
Second "Set" of 1/4" (DN8) FNPT Body Pressure Taps & Plugs	-85	T
Epoxy Painted Per Cashco Spec #S-1547	-95	W
Epoxy Painted Per Cashco Spec #S-1687 OFFSHORE Applic	-95OS	Y

For Special Construction Other Than Above
 Contact Cashco for Special Product Code

1. NUMERIC digits assigned first in "ascending" order.
2. ALPHA designations are assigned second in "alphabetical" order.
3. Left justify.
4. Add "0" to all unused squares.
5. If insufficient quantity of squares, consult factory for proper code.