



MODEL DA2



CAUTION

In the event of diaphragm failure, the process fluid will mix with the loading fluid.

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.

MODEL DA2

DO-ALL SERIES II

**DIFFERENTIAL PRESSURE
 REDUCING REGULATORS**

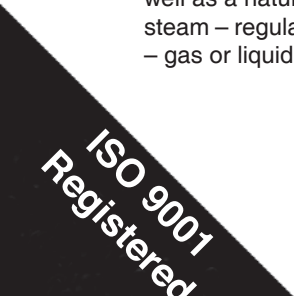
Spring Operated 1/2" – 4" (DN15 - 100)

The Model DA2 is a differential reducing regulator used to maintain a constant pressure differential between a fluid loading pressure (P_{LOAD}) piped to the spring chamber and the regulator's outlet pressure (P_2). In the Model DA2 the P_2 pressure is higher than the P_{LOAD} (Positive Bias). The amount of bias or differential pressure (ΔP_{Diff}) is controlled by the user adjustable setting of the range spring in the spring chamber.

The regulator uses a flow-to-open, cage balanced trim. The diaphragm is isolated from the fluid flow path by a balancing piston, which allows the user to specify either internal or external sensing of the P_2 pressure.

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:** DA2 fails open on loss of P_1 or P_2 pressures.



STANDARD / GENERAL SPECIFICATIONS

Body/Spring Chamber Materials

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

* Through 2" (DN50) body size only.
 CI = Cast Iron CS = Carbon Steel BRZ = Bronze
 SST = Stainless Steel

Body Sizes

1/2", 3/4", 1", 1-1/4", 1-1/2", 2", 3", 4"
 (DN15, 20, 25, 32, 40, 50, 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	
in	(DN)	Comp.	Metal	in	(DN)	Comp.	Metal
1/2"	(15)	3.6	3.5	2"	(50)	54	12
3/4"	(20)	7.2	3.5	3"	(80)	108	N/A
1"	(25)	13.5	3.5	4"	(100)	196	N/A
1-1/4"	(32)	20.7	6.0	-	-	-	-
1-1/2"	(40)	27.0	6.0				
		Cv	Cv			Cv	Cv

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.

Inlet Pressure Range

Operating: 10–3705 psig (.69-255 Barg).
 See Tables DAG-1A – 1H for design P vs. T limits.

Differential Pressure Range

1/2"–1"(DN15–25): 1 to 200 psid (.07 to 13.8 Bard)
 1-1/4"–1-1/2" (DN32–DN40): 1 to 125 psid (.07 to 8.6 Bard)
 2" (DN50): 1 to 90 psid (.07 to 6.2 Bard)
 3"–4"(DN80–100): 1 to 125 psid (.07 to 8.6 Bard)

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

Pressure Drop Limits

5–1500 psid (.34-103.4 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 elasto-
 meric – diaphragm, seat, static seal, dynamic seal – materials.
 See Tables DAG-1A through 1H and Table DAG-5.

Inboard Leakage Rates

See Table DAG-10

Optional Constructions

- | | |
|--|--|
| <p><u>Opt-30:</u> Weld-on Flanges
 <u>Opt-31:</u> BSP End Conns.
 <u>Opt-32:</u> Ext. Pipe Nipples
 <u>Opt-40:</u> NACE Const.
 <u>Opt-41:</u> Ext. Tube Ends
 <u>Opt-55:</u> Oxygen Cleaned</p> | <p><u>Opt-56:</u> Special Cleaned
 <u>Opt-57:</u> Chlorine Cleaned
 <u>Opt-65:</u> Flow-thru Spr. Chmb.
 <u>Opt-81:</u> Full Diaph Support
 <u>Opt-85:</u> Extra Set Press. Taps
 <u>Opt-95:</u> Epoxy Paint
 <u>Opt-95OS:</u> Epoxy Paint</p> |
|--|--|

ABBREVIATIONS		
FK = Fluorosilicone	NBR = Buna-N	PTFE = Polytetrafluoroethylene
FKM = Fluorocarbon Elastomer	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.

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 3" & 4" ASTM A516 Gr. 55, A106 Gr. B;
BRZ – ASTM B62, Alloy 83600.
SST – Sizes 1/2" - 2" ASTM A351 Gr. CF3M;
 Sizes 3" & 4" ASTM A479, Gr. 316L, A312,
 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.

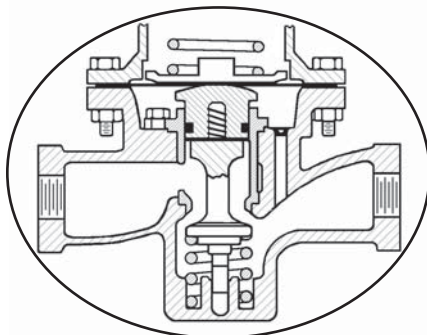
Seat *

PolyAll, V-TFE, GF-TFE, CTFE

Static Seals (See Fig. DAG-F1) *

RTFE, NBR, FKM, FK, EPR, (All Sizes)
 SST/TFE (1/2" - 2") (DN15 - 50)
 V-TFE (3" - 4") (DN80 - 100)

This construction
REQUIRES a Lower
Piston Spring to be
supplied.



Metal Diaphragm

Dynamic Seals (See Fig. DAG-F1) *

Type OR – NBR, FKM, EPR o-ring seal.

Type CW – TFE cap seal with o-ring energizer
(o-ring material same as above);
and GF-TFE wiper backup seal.

Type UC – V-TFE u-cup seal with 316L SST energizer.
- V-TFE u-cup seal with Elgiloy energizer.

Type PW – GF-TFE piston ring assembly seal with
17-7PH SST energizer; and GF-TFE wiper
backup seal.

Painting

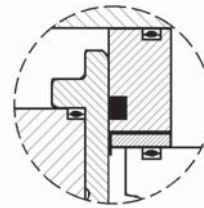
Standard: All non-corrosion resistant portions to be painted
with corrosion resistant epoxy paint per Cashco Spec #S-
1606.

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

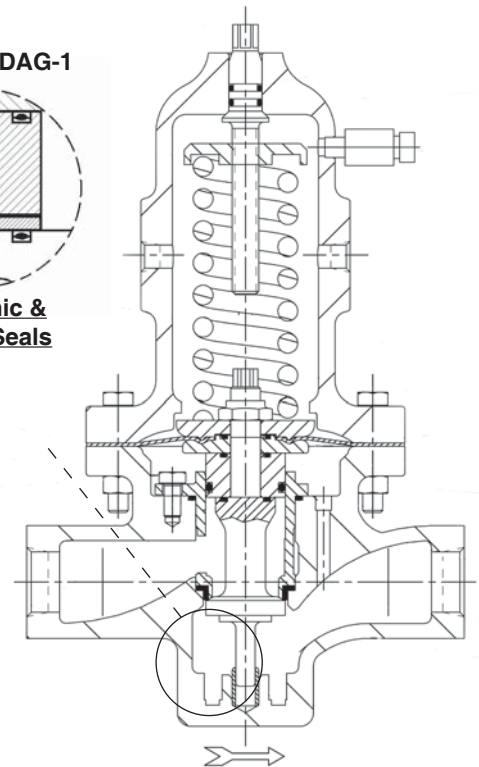
* See Product Coder for acceptable combinations.

† Monel[™], and Inconel[®] are registered trade names:
Monel[™] is a mark owned by International Nickel Co.
Inconel[®] is a mark owned by International Nickel Co.

See Fig. DAG-1



**Dynamic &
Static Seals**



Composition Diaphragm

OPTION SPECIFICATIONS

OPT-30: WELDED FLANGED CONNECTIONS. CS, or SST 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
Sizes	Body Material	ISO Pressure Class
DN15-50	CS, SST	PN40 RF
DN80-100	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-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. Body sizes 1/2"-1" (DN15–25), 1-1/2" & 2" (DN40–50) only. 316L SST trim materials only. 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 or SST materials only. Cleaning per Cashco Spec. #S-1589. For chlorine gas/liquid service.

OPT-65: FLOW-THRU SPRING CHAMBER. Spring chamber provided with two female NPT connections on spring chamber, allowing loading pressurizing fluid to be recirculated. Recommended for heavy oils with high paraffin content. CS spring chamber only. Tapped connection sizes dependent on body size.

OPT-81: FULL DIAPHRAGM SUPPORT CONSTRUCTION. Incorporates top and bottom diaphragm support that allows reaching higher fluid pressures on the underside and topside of diaphragm. Sizes 1/2"-2" (DN15-50) only. See Table 5.

OPT-85: PRESSURE TAPS. Provides second set of inlet and outlet 1/4" (DN8) - FNPT taps with plugs (same basic material as body) on back-side 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.

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-95OS: EPOXY PAINT. Special epoxy painting of all non-corrosion resistant external surfaces per Cashco Spec #S-1687. Utilized in OFFSHORE atmospheric conditions.

TECHNICAL SPECIFICATIONS

**TABLE 1
RANGE SPRINGS**

Body Size in. (DN)	Spring Range psid	Body Size in. (DN)	Spring Range psid
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		5-15 10-30 15-50 30-90
1-1/4" (32) 1-1/2" (40)	1-5* 1-10**	3" (80) 4" (100)	1-10
	5-20 15-45 10-70 40-125		5-20 10-40 10-70 40-125

* Composition diaphragm construction ONLY.

** Metal diaphragm for set point pressure \geq 5 psid (.34 Bard).

METRIC CONVERSION: psid / 14.5 = Bard

**TABLE 2
METALLIC TRIM MATERIAL COMBINATIONS**

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

† See Page 3 for registered trade name information.

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

Differential Pressure ΔP_{Diff} psid	Cv Capacity @ % Droop									Range Spring psid
	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 to 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 to 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 to 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	1.04	1.92	2.59	1.31	2.42	3.26	1.45	2.68	3.61	10 to 35
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	0.79	1.46	1.97	0.99	1.83	2.47	1.11	2.05	2.76	20 to 80
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	0.72	1.33	1.79	0.91	1.68	2.26	1.00	1.85	2.50	30-150
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	0.54	1.00	1.35	0.68	1.26	1.70	1.18	2.18	2.94	70-200
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	

METRIC CONVERSION FACTORS: psid / 14.5 = Bard; $C_v / 1.16 = k_v$

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

Differential Pressure ΔP_{Diff} psid	Cv capacity @ % Droop						Range Spring psid
	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	
45	13.41	18.63	19.67	15.06	24.30	25.65	10-70
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	
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	40-125
40	2.56	4.74	6.41	2.71	5.01	6.76	
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	
125	8.55	15.82	19.67	9.00	16.65	22.48	

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

Differential Pressure ΔP_{Diff} psid	Cv capacity @ % Droop			Range Spring psid
	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	

METRIC CONVERSION FACTORS:
psid / 14.5 = Bar; $C_v / 1.16 = k_v$

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

Pressure Setpoint ΔP_{Diff} psid	Cv Capacity @ % Droop						Range Spring psid
	BODY SIZE – 3" (DN32)			BODY SIZE – 4" (DN32)			
	10%	20%	30%	10%	20%	30%	
1	7.00	12.95	17.48	15.06	27.86	37.61	1-10
3	15.06	27.86	37.61	20.00	37.00	49.95	
5	29.06	53.76	72.58	35.06	64.86	87.56	
10	62.35	97.20	102.60	75.30	139.30	188.05	
5	13.53	25.03	33.79	30.00	55.50	74.93	5-20
10	27.06	50.06	67.58	48.00	88.80	119.88	
15	45.06	83.36	102.60	75.30	139.30	188.05	
20	64.71	97.20	102.60	100.00	178.20	188.10	
10	14.00	25.90	34.97	25.06	46.36	62.59	10-40
20	34.59	63.99	86.39	51.06	94.46	127.52	
30	52.00	96.20	102.60	70.59	139.30	176.30	
40	67.06	97.20	102.60	104.71	178.20	188.10	
10	5.00	9.25	12.49	8.00	14.80	19.98	10-70
30	15.06	27.86	37.61	27.53	50.93	68.76	
50	28.00	51.80	69.93	48.47	89.67	121.06	
70	49.30	91.20	102.60	67.06	124.06	167.48	
40	12.00	22.20	29.97	25.06	46.39	62.59	40-125
50	17.06	31.56	42.61	29.53	54.63	73.75	
75	27.53	50.93	68.76	40.00	74.00	99.90	
100	36.00	66.60	89.91	48.00	88.80	119.88	
125	42.47	78.57	102.60	57.06	105.56	142.51	

METRIC CONVERSION FACTORS: psid / 14.5 = Bard; $C_v / 1.16 = k_v$

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

Pressure Setpoint ΔP_{Diff} psid	Cv Capacity @ % Droop									Range Spring psid
	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	

METRIC CONVERSION FACTORS: psid / 14.5 = Bard; $C_v / 1.16 = k_v$

TABLE 4B
FULL PORT FLOW CAPACITY – Cv
DA2 - METAL DIAPHRAGM
F L = 0.90

Pressure Setpoint ΔP_{Diff} psid	Cv capacity @ % Droop						Range Spring psid
	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	1.78	3.30	4.45	1.88	3.48	4.70	15-45
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	0.63	1.16	1.56	0.66	1.22	1.65	10-70
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	

TABLE 4C
FULL PORT FLOW CAPACITY – Cv
DA2 - METAL DIAPHRAGM
F L = 0.90

Pressure Setpoint ΔP_{Diff} psid	Cv capacity @ % Droop			Range Spring psid
	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	30-90
30	1.60	2.96	4.00	
60	3.28	6.07	8.19	
90	4.80	8.88	11.40	

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

TABLE 5
MAXIMUM DIAPHRAGM RATING *
psig (Barg)

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

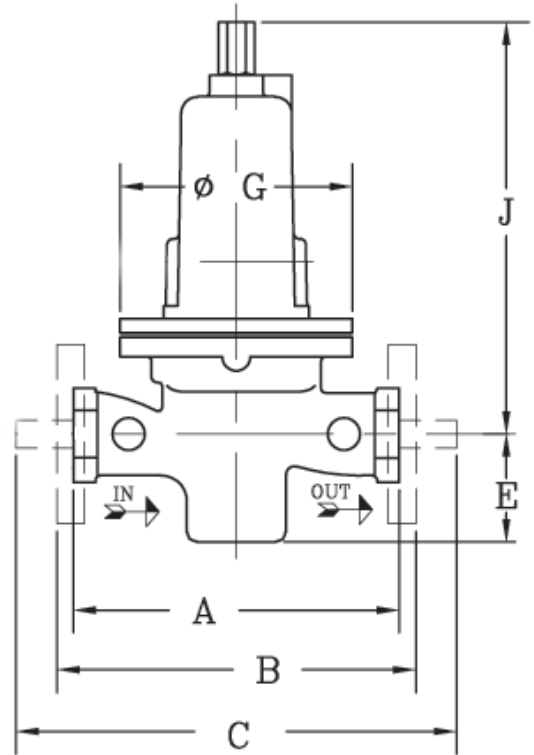
DIAPHRAGM MATERIAL	BODY SIZE 1/2" - 2" (DN15-50)		BODY SIZE 3" - 4" (DN80-100)
	STD DIAPHRAGM CONSTRUCTION	**OPT-81 FULL DIAPHRAGM SUPPORT	STD DIAPHRAGM CONSTRUCTION
	P_2 MAX	P_2 MAX	P_2 MAX
BC, EPR	1250 (86.1)	1250 (86.1)	800 (55.1)
NBR	450 (31.0)	1250 (86.1)	300 (20.6)
FKM, FKM+TFE, FK	700 (48.2)	1250 (86.1)	550 (37.9)
3-ply (PTFE+FKM+PTFE)	125 (8.6)	125 (8.6)	125 (8.6)
METAL Be-Cu	1500 (103)	NA	NA

*Maximum setting of pressure safety device – safety relief valve or rupture disc.
**Not available for Cl/Cl, BRZ/Cl, BRZ/BRZ, BRZ/CS, BRZ/SST, CS/Cl & SST/Cl constructions.
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"	3"	4"
A	NPT	CI, BRZ	6.00	9.88	9.88	-	-
		CS, SST	8.25	9.88	9.88	-	-
B	125# FF	CI	-	-	-	11.75	13.88
	250# RF	CI	-	-	-	12.50	14.50
	150# FF	BRZ **	9.63	11.50 ✓	11.50	11.75	13.88
	300# FF	BRZ **	9.63	11.50 ✓	11.50	12.50	14.50
	150# RF	CS, SST	10.75	12.38 ✓	10.00	11.75	13.88
	300# RF	CS, SST	10.75	12.38 ✓	10.50	12.50	14.50
	600# RF	CS, SST	10.75	12.38 ✓	11.25	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	5.75	7.00
G	ALL	ALL	6.00	7.00	8.00	11.00	11.13
J	ALL	ALL	10.13	12.63	13.00	23.00	23.50
APPROX. WEIGHT LB	w/ Flanges	ALL	23	33	39	-	-
	w/Flanges	ALL	28	43	52	175	190

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

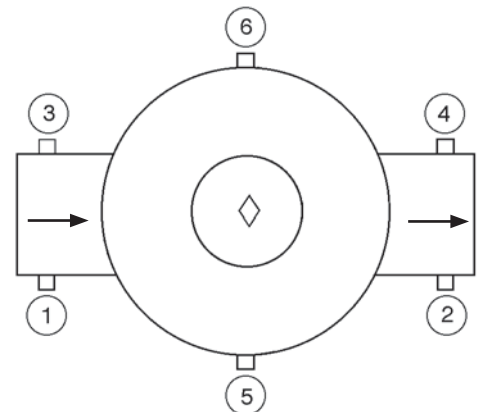


Model DA2

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

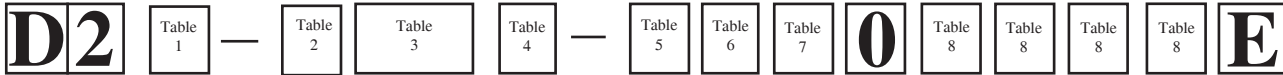
DIMEN.	END CONN.	BODY MAT'L	BODY SIZE				
			DN15, DN20 & DN25	DN32 & DN40	DN50	DN80	DN100
A	NPT	CI, BRZ	152	251	251	-	-
		CS, SST	209	251	251	-	-
B	125# FF	CI	-	-	-	298	353
	250# RF	CI	-	-	-	318	368
	150# FF	BRZ **	245	292 ✓	292	298	352
	300# FF	BRZ **	245	292 ✓	292	318	368
	150# RF	CS, SST	273	314 ✓	254	298	353
	300# RF	CS, SST	273	314 ✓	267	318	368
	600# RF	CS, SST	273	314 ✓	286	337	394
C	OPT-32 EXT NIPS	CS, SST	356	400	400	-	-
E	ALL	ALL	65	94	102	146	178
G	ALL	ALL	152	178	203	279	283
J	ALL	ALL	257	321	330	584	597
APPROX. WEIGHT KG	w/ Flanges	ALL	11	16	18	-	-
	w/Flanges	ALL	13	20	24	79	86

** Flanged BRZ bodies available in sizes DN25, DN40, DN50, DN80 & DN100 ONLY.
 ✓ Flange Connections not available for DN32 size.
 Consult Factory for dimensions of ISO DIN Flanged units. (PN16, PN25, PN40)



PRESSURE TAP LOCATIONS						
BODY MAT'L.	①	②	③	④	⑤	⑥
CI	Std	Std	OPT-85	OPT-85	Std	OPT-85
BRZ	Std	Std	Std	OPT-85	Std	OPT-85
CS	Std	Std	OPT-85	OPT-85	Std	OPT-85
SST	Std	Std	OPT-85	OPT-85	Std	OPT-85

MODEL DA2 PRODUCT CODE 11/01/10



Body Size		Diaphragm Support	
in	(DN)	STD CODE	FULL OPT-81 CODE
1/2"	(15)	4	J
3/4"	(20)	5	K
1"	(25)	6	L
1-1/4"	(32)	7	M
1-1/2"	(40)	8	N
2"	(50)	9	P
3" ^	(80)	B	NA
4" ^	(100)	C	NA

^ Not available with metal diaphragms.
NA Not Available

Materials	CODE	Materials	CODE
Cl/Cl	1	CS/Cl	4
BRZ/Cl	2	CS/CS * √	5
BRZ/BRZ	B	SST/Cl	7
BRZ/CS √	J	SST/CS * √	9
BRZ/SST	D	SST/SST *	A

* Select for Opt-81. See Table 1.
√ CS Spring Chamber in Sizes 3" - 4" not registered for shipment into Canada.

Trim Material	O-ring/Seal				CODE	
	Seat	Diaphragm	Static	Dynamic		
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	
316L SST "S"	V-TFE	FK	FK	SST/TFE u-cup	S9	
	PA	BE-CU *	SST/TFE u-cup	SST/TFE u-cup	SM	
	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
	17-4PH/ Monel/17-4PH "T"	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.
* 3" - 4" sizes are not available with metal diaphragm.
√ Sizes 3"-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	-	-	-	-
3" - 4"	Cl	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	150#RF	4	300#RF	5	600#RF	8
1" - 4"	CS-SST	Integral *	-	-	-	-	-	-
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 - will mate with PN16, 25 and 40		J	-	-	-
DN 80-100			PN16 FF	K	PN25 FF	L	PN40 FF	M
DN15-25, 40, 50	CS, SST	Opt-30	PN40 RF - will mate with PN16, 25 and 40		D	-	-	-
DN80-100	CS, SST	Integral	PN16 RF	A	PN25 RF	C	PN40 RF	G

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

Body Size	Pressure Range		CODE	Body Size	Pressure Range		CODE
	psid	bard			psid	bard	
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
1-1/4" 1-1/2" (DN3 & 40)	70-200	4.8-13.7	E	1-10	.07-.68	S	
	1-5 ^	.07-.34	1	5-20	.34-1.3	A	
	1-10 *	.07-.68	S	10-40	.68-2.7	T	
	5-20	.34-1.3	A	10-70	.68-4.8	J	
	15-45	1.0-3.1	H	40-125	2.7-8.6	K	
	10-70	.68-4.8	J	^ Composition diaphragm construction ONLY * Metal Diaphragm for P _{sp} ≥ 5 psid. (.34Bard)			

Option	CODE
Internal	1
External	2
Large Internal	4

Description	Option	CODE
No Option	-	0
NACE CONST: CS/CS, SST/CS or SST/SST. 1/2"-2" (No 1-1/4") per MR0175.	-40	J
SPECIAL CLEANING: Per Cashco Spec #S-1134. W/ properly selected mat'l's, 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 Cl ₂ Service	-57	P
Flow-thru Spring Chamber, 1/4" NPT (Std All Materials)	-65A	F
Flow-thru Spring Chamber, 1/2" NPT CS Material ONLY	-65B	G
Flow-thru Spring Chamber, 3/4" NPT CS Material ONLY	-65C	H
Flow-thru Spring Chamber, 1" NPT CS Material ONLY	-65D	K
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 Applications	-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.