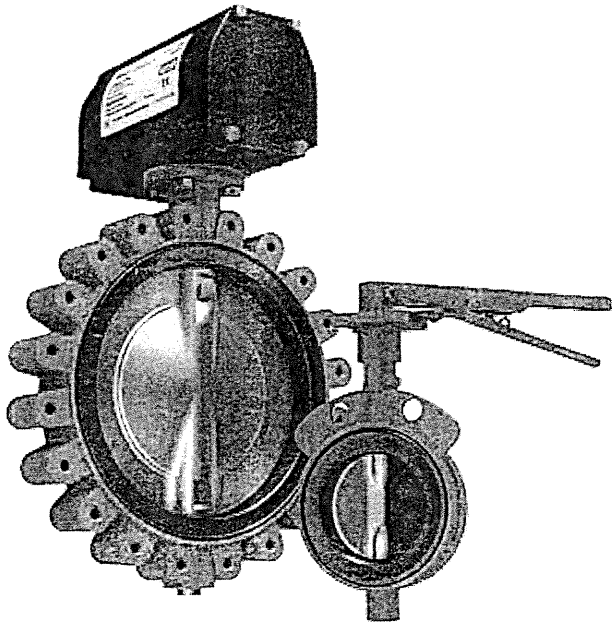
PENTAIR

KEYSTONE SERIES GR RESILIENT SEATED BUTTERFLY VALVES

GRW/GRL

A heavy duty industrial resilient seated butterfly valve



GENERAL APPLICATION

Water, air, dry bulk conveying etc. These valves are for any service where a drop-tight shut-off with maximum flow area is required.

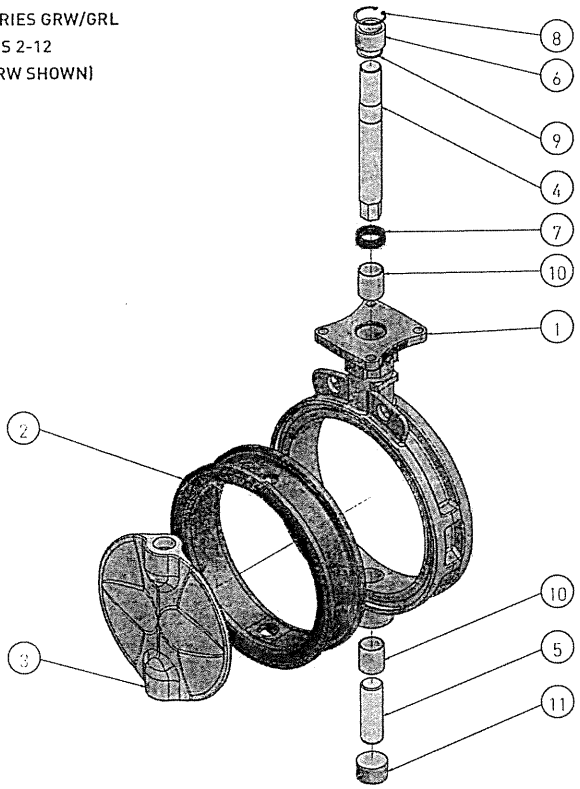
TECHNICAL DATA

Pressure (psi):	230 psi NPS 2-12 150 psi NPS 14-36
End of line (psi):	150 psi NPS 2-12 90 psi NPS 14-36
Vacuum service (psia):	5.8 psia
Temperature (°F):	-40 to +320
Sizes (NPS):	2-36
Flange accommodation:	PN 6/10/16 ASME 125/150 JIS 10K BS Table E AS4087 PN 16 AS2129 Table E

FEATURES

- Wafer and lugged body design with face-to-face dimension, according to EN 558 Series 20 and API 609.
- Designed according to EN 593 and API 609.
- The seat is field replaceable and fully isolates the body and shaft from the flow.
- Primary shaft sealing exceeds the pressure rating of the valve and prevents leakage through shaft area to atmosphere.
- A secondary shaft sealing provides back-up safety.
- A molded-in O-ring in the seat for flange sealing eliminates the need for gaskets.
- Shaft seals prevent moisture penetrating into the shaft area.
- The two piece shaft allows for a thin disc and provides minimal obstruction to flow (up to NPS 12).
- Rounded polished disc edge gives full concentric sealing, lower torques, longer seat life and drop-tight shut-off.
- Body locating holes allow ease of installation and centering between the flanges.
- Extended body neck allows for pipe insulation.
- Top and bottom shaft bearings for optimized support and minimum friction and decreased torque.
- Top bushing absorbs actuator side thrust loads.
- All valves comply to Pressure Equipment Directive (97/23/EU) Module B1 + D, CE Marking.
- Available approvals: NSF/ASME Std 61, ACS, KIWA, WRAS, DVGW-G, ABS, CU-TR.

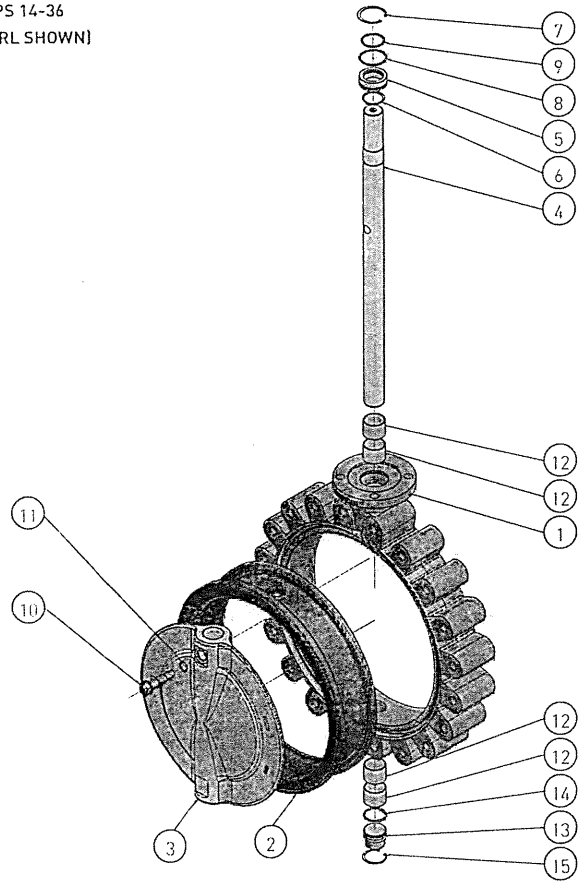
SERIES GRW/GRL
NPS 2-12
(GRW SHOWN)



PARTS LIST

Item	Qty	Description
1	1	Body
2	1	Seat
3	1	Disc
4	1	Upper shaft
5	1	Lower shaft
6	1	Upper bushing
7	1	Packing
8	1	Body circlip
9	1	Shaft circlip
10	2	Upper and lower bearing
11	1	Plug

NPS 14-36
(GRL SHOWN)



PARTS LIST

Item	Qty	Description
1	1	Body
2	1	Seat
3	1	Disc
4	1	Shaft
5	1	Bushing
6	1	Shaft circlip
7	1	Body circlip
8	1	Body O-ring
9	1	Shaft O-ring
10	1	Disc screw
11	1	Disc screw O-ring
12	4	Upper and lower bearing
13	1	Plug
14	1	Plug O-ring
15	1	Plug circlip

MATERIAL SPECIFICATION

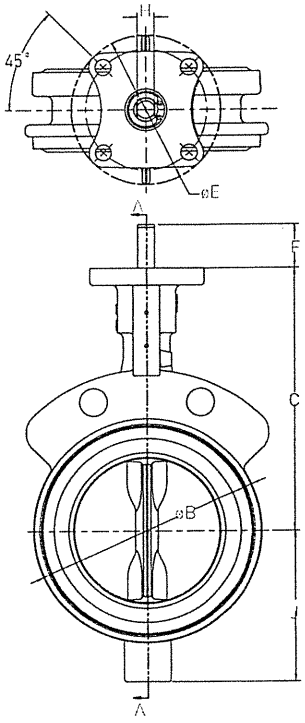
Part name	Material	Material specification	Remark
NPS 2-12			
Body	Ductile iron	ASTM A536 Gr 65-45-12	
		ASTM A395 Gr 60-40-18	(Optional)
Disc	Super duplex	ASTM A890 Gr 5A	
	316 stainless steel	ASTM A351 Gr CF8M	
	304 stainless steel	ASTM A351 Gr CF8	
	Aluminium bronze	ASTM B148 UNS C95200	
	Nickel aluminium bronze	ASTM B148 UNS C95800	
	Ductile iron NYL	ASTM A536 Gr 65-45-12	NYL = Nylon coating, max. temp. 140°F
	Ductile iron CTD	ASTM A536 Gr 65-45-12	CTD = Nickel plating
Shaft	316 stainless steel	ASTM A276 Gr 316	
	431 stainless steel	ASTM A276 Gr 431	
	Super duplex	ASTM A276 UNS S32750	
Seat	EPDM		Food grade, NSF61, ACS
	EPDM E1		KIWA, WRAS, ACS
	NBR		Food grade
	NBR N1		DVGW-G
	White NBR		Food grade
	Fluoroelastomer (FKM)		
Bushing	Polyester		
Packing	NBR		
Bearing	PTFE/steel		
Circlip	Stainless steel		
Plug	Carbon steel		
NPS 14-36			
Body	Ductile iron	ASTM A536 Gr 65-45-12	
		ASTM A395 Gr 60-40-18	(Optional)
Disc	Super duplex	ASTM A890 Gr 5A	
	Duplex	ASTM A890 Gr 4A	
	316 stainless steel	ASTM A351 Gr CF8M	
	304 stainless steel	ASTM A351 Gr CF8	
	Aluminium bronze	ASTM B148 UNS C95200	
	Nickel aluminium bronze	ASTM B148 UNS C95800	
	Ductile iron NYL	ASTM A536 Gr 65-45-12	NYL = Nylon coating, max. temp. 140°F
	Ductile iron CTD	ASTM A536 Gr 65-45-12	CTD = Epoxy coated, max. temp. 250°F
Shaft	431 stainless steel	ASTM A276 Gr 431 S43100	
	Duplex	ASTM A276 UNS S31803	
	Super duplex	ASTM A276 UNS S32750	
Seat	EPDM		Food grade, NSF61, ACS
	EPDM E1		KIWA, WRAS, ACS
	NBR		Food grade
	NBR N1		DVGW-G
	White NBR		Food grade
	Fluoroelastomer (FKM)		
Disc screw	Super duplex	ASTM A276 UNS S32750	
	Duplex	ASTM A276 UNS S31803	
Disc screw O-ring	EPDM		
	NBR		
	FKM		
Plug	Carbon steel		
Plug O-ring	NBR		
Plug circlip	Stainless steel		
Bushing	Polyester		
Shaft/Body O-ring	NBR		
Bearing	PTFE/steel		
Shaft/Body circlip	Stainless steel		

NOTE:
Valves with super duplex disc will have super duplex disc screw. All other discs will have a duplex disc screw.

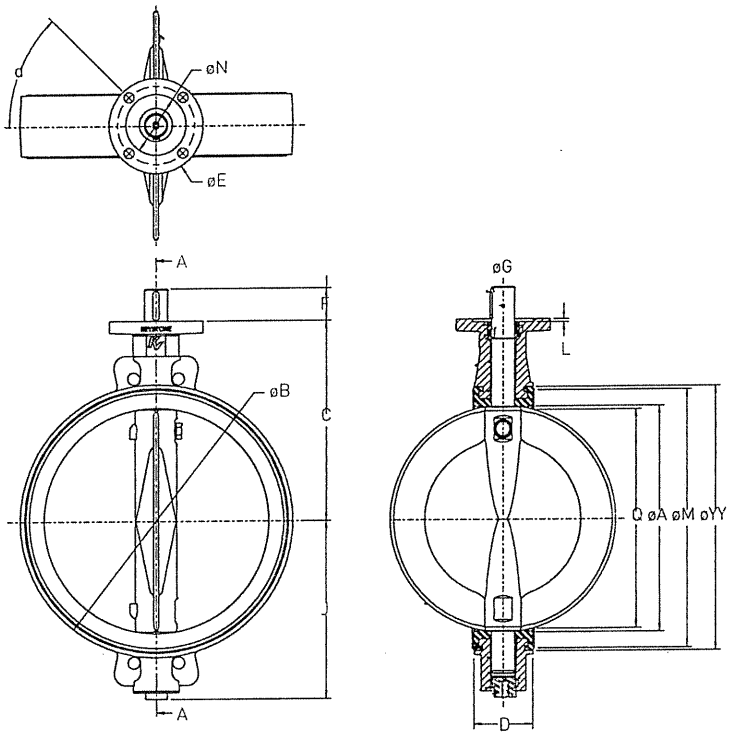
KEYSTONE SERIES GR RESILIENT SEATED BUTTERFLY VALVES

GRW/GRL

SERIES GRW (WAFER)
NPS 2-12



NPS 14-36



VALVE DIMENSIONS (in)

Size													Shaft			Top plate drilling				Adapt.	Weight[3]
(NPS)	A	B	C	D	E	F	J	L	M	N	Q[1]	YY	G	H[2]	Key	Bolt circle	No. holes	α	Hole dia.	code[4]	(lbs)
2	1.97	3.58	5.31	1.69	3.94	0.98	2.36	-	2.60	-	1.10	3.15	5/8	7/16	-	3¼	4	45°	0.43	BAC	4.5
2.5	2.44	4.13	5.91	1.81	3.94	1.18	2.99	-	3.07	-	1.70	3.66	7/8	3/8	-	3¼	4	45°	0.43	BAB	6
3	3.03	4.84	6.30	1.81	3.94	1.18	3.23	-	3.82	-	2.56	4.41	7/8	3/8	-	3¼	4	45°	0.43	BAB	7
4	3.90	6.06	7.09	2.05	3.94	1.18	4.09	-	5.08	-	3.43	5.67	5/8	7/16	-	3¼	4	45°	0.43	BAC	9.5
5	4.88	7.36	7.68	2.20	3.94	1.18	4.72	-	6.30	-	4.45	6.89	¾	½	-	3¼	4	45°	0.43	BAD	13
6	5.91	8.19	8.27	2.20	3.94	1.18	5.16	-	7.13	-	5.59	7.72	¾	½	-	3¼	4	45°	0.43	BAD	15
8	7.68	10.43	9.45	2.36	5.91	1.26	6.38	-	9.17	-	7.40	9.76	⅞	5/8	-	5	4	45°	0.53	CAE	26
10	9.65	12.6	10.83	2.68	5.91	1.97	7.80	-	11.42	-	9.33	12.01	1⅛	-	¼ x ¼	5	4	45°	0.53	CAF	42
12	11.46	14.65	12.20	3.07	5.91	1.97	9.06	-	13.39	-	11.14	13.98	1⅛	-	¼ x ¼	5	4	45°	0.53	CAF	59
14	12.80	16.38	12.80	3.07	5.90	2.99	10.24	-	14.88	-	12.50	15.67	1⅜	-	5/16 x 5/16	5	4	45°	0.53	CAG	88
16	14.96	18.66	14.17	4.02	5.90	2.99	11.73	-	17.13	-	14.50	17.91	1⅜	-	5/16 x 5/16	5	4	45°	0.53	CAG	134
18	17.09	21.02	15.55	4.49	8.00	2.99	13.15	0.24	19.49	5.12	16.60	20.28	1⅝	-	⅜ x ⅜	6½	4	45°	0.87	DAH	190
20	19.13	23.19	16.93	5.00	8.00	4.25	15.16	0.24	21.61	5.12	18.60	22.40	1⅞	-	½ x ⅜	6½	4	45°	0.87	DAJ	234
24	23.03	27.20	19.69	6.06	8.00	4.25	17.95	0.24	25.59	5.12	22.30	26.38	1⅞	-	½ x ⅜	6½	4	45°	0.87	DAJ	348
28	26.97	31.50	22.44	6.50	8.00	4.25	20.39	0.24	29.72	5.12	26.30	30.51	2¼	-	½ x ⅜	6½	4	45°	0.87	DAK	509
30	28.94	33.94	23.82	6.50	8.00	4.25	21.69	0.24	32.13	5.12	28.30	32.87	2¼	-	½ x ⅜	6½	4	45°	0.87	DAK	597
32	30.91	35.71	25.20	7.48	11.81	5.51	22.95	0.24	33.86	7.87	30.10	34.65	2⅞	-	¾ x ½	10	8	22.5°	0.69	KAV	719
36	34.84	39.65	28.15	7.99	11.81	5.51	25.94	0.24	37.80	7.87	34.00	38.58	2⅞	-	¾ x ½	10	8	22.5°	0.69	KAV	924

NOTES:

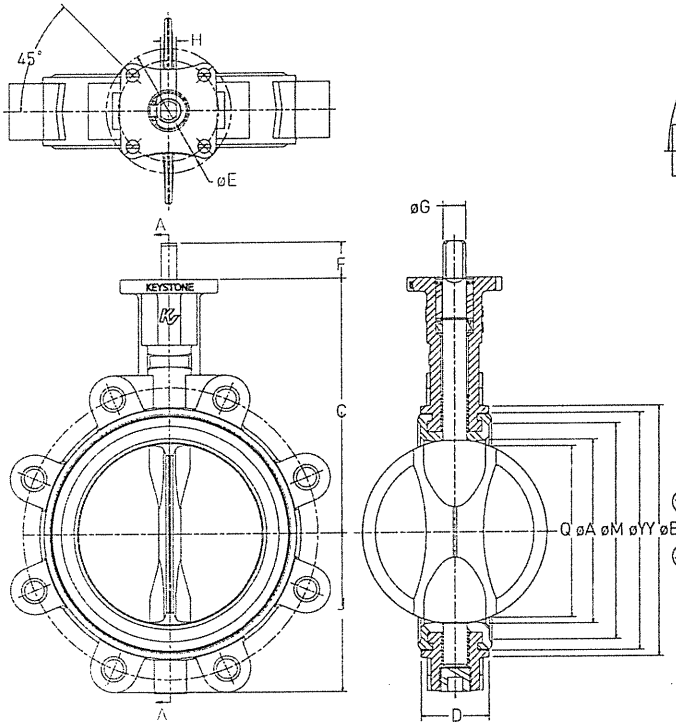
(1) 'Q' dimension is the minimum allowable pipe or flange inside diameter at the centered body face to protect the disc sealing edge against damage when opening the valve.

(2) 'H' dimension refers to flat on shaft.

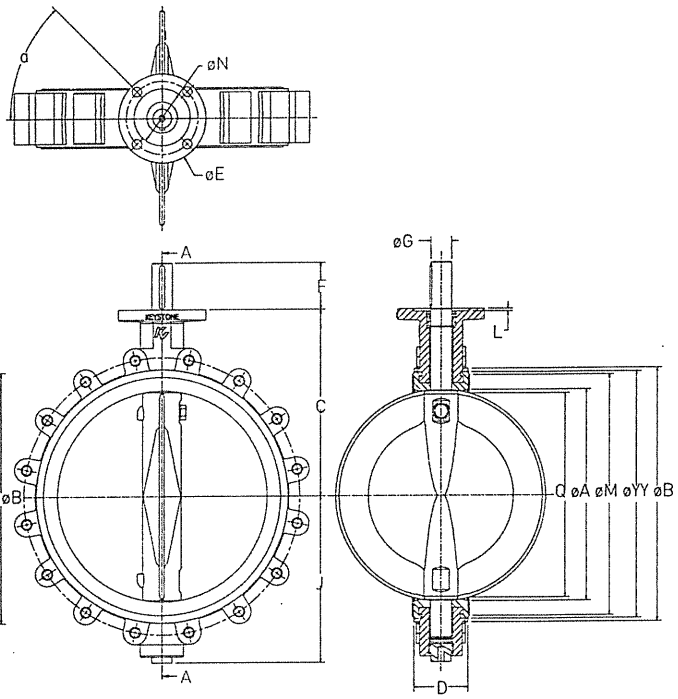
(3) Weight may vary depending on trim materials used.

(4) NPS 2 - actual shaft dimension is ½ in x ⅓ in A/F and is fitted with an adaptor to produce a BAC connection.

SERIES GRL (LUG)
NPS 2-12



NPS 14-36



VALVE DIMENSIONS (in)

Size (NPS)	A	B	C	D	E	F	J	L	M	N	Q[1]	YY	Shaft G	Shaft H[2]	Shaft Key	Top plate drilling Bolt circle	Top plate drilling No. holes	Top plate drilling α	Top plate drilling Hole dia.	Adapt. code[4]	Weight[3] (lbs)
2	1.97	3.62	5.31	1.69	3.94	0.98	2.36	-	2.60	-	1.10	3.15	5/8	7/16	-	3¼	4	45°	0.43	BAC	7
2.5	2.44	4.13	5.91	1.81	3.94	1.18	2.99	-	3.07	-	1.70	3.66	7/8	3/8	-	3¼	4	45°	0.43	BAB	9
3	3.03	4.96	6.30	1.81	3.94	1.18	3.23	-	3.82	-	2.56	4.41	7/8	3/8	-	3¼	4	45°	0.43	BAB	10
4	3.90	6.14	7.09	2.05	3.94	1.18	4.09	-	5.08	-	3.43	5.67	5/8	7/16	-	3¼	4	45°	0.43	BAC	15
5	4.88	7.48	7.68	2.20	3.94	1.18	4.72	-	6.30	-	4.45	6.89	¾	½	-	3¼	4	45°	0.43	BAD	21.5
6	5.91	8.43	8.27	2.20	3.94	1.18	5.16	-	7.13	-	5.59	7.72	¾	½	-	3¼	4	45°	0.43	BAD	24
8	7.68	10.55	9.45	2.36	5.91	1.26	6.38	-	9.17	-	7.40	9.76	⅞	5/8	-	5	4	45°	0.53	CAE	38
10	9.65	12.60	10.83	2.68	5.91	1.97	7.80	-	11.42	-	9.33	12.01	1⅛	-	¼ x ¼	5	4	45°	0.53	CAF	65
12	11.46	14.76	12.20	3.07	5.91	1.97	9.06	-	13.39	-	11.14	13.98	1⅛	-	¼ x ¼	5	4	45°	0.53	CAF	90
14	12.80	16.38	12.80	3.07	5.90	2.99	10.24	-	14.88	-	12.51	15.67	1⅜	-	5/16 x 5/16	5	4	45°	0.53	CAG	115
16	14.96	18.66	14.17	4.02	5.90	2.99	11.73	-	17.13	-	14.50	17.91	1⅜	-	5/16 x 5/16	5	4	45°	0.53	CAG	194
18	17.09	21.02	15.55	4.49	8.00	2.99	13.15	0.24	19.49	5.12	16.58	20.28	1⅝	-	⅜ x ⅜	6½	4	45°	0.87	DAH	236
20	19.13	23.19	16.93	5.00	8.00	4.25	15.16	0.24	21.61	5.12	18.56	22.40	1⅞	-	½ x ⅜	6½	4	45°	0.87	DAJ	355
24	23.03	27.20	19.69	6.06	8.00	4.25	17.95	0.24	25.59	5.12	22.35	26.38	1⅞	-	½ x ⅜	6½	4	45°	0.87	DAJ	518
28	26.97	31.50	22.44	6.50	8.00	4.25	20.39	0.24	29.72	5.12	26.30	30.51	2¼	-	½ x ⅜	6½	4	45°	0.87	DAK	694
30	28.94	33.94	23.82	6.50	8.00	4.25	21.69	0.24	32.13	5.12	28.31	32.87	2¼	-	½ x ⅜	6½	4	45°	0.87	DAK	833
32	30.91	35.71	25.20	7.48	11.81	5.51	22.95	0.24	33.86	7.87	30.12	34.65	2⅞	-	¾ x ½	10	8	22.5°	0.69	KAV	966
36[5]	34.84	39.65	28.15	7.99	11.81	5.51	25.94	0.24	37.80	7.87	34.03	38.58	2⅞	-	¾ x ½	10	8	22.5°	0.69	KAV	1232

For ASME 125/150 - flange bolt threads for NPS 2-16 are UNC
- flange bolt threads for NPS 18-36 are 8UN

NOTES:

(1) 'Q' dimension is the minimum allowable pipe or flange inside diameter at the centered body face to protect the disc sealing edge against damage when opening the valve.

(2) 'H' dimension refers to flat on shaft.

(3) Weight may vary depending on trim materials used.

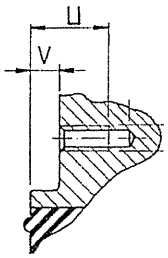
(4) NPS 2 - actual shaft dimension is ½ in x ⅓ in A/F and is fitted with an adaptor to produce a BAC connection.

(5) Valve size NPS 36 is tapped flange design and has no separate lugs.

DIMENSIONS OF TAPPED FLANGE LOCATING HOLES (in)

Size	Series GRW		Series GRL	
(NPS)	U	V	U	V
28	1.8	0.22	1.8	0.22
30	2.1	0.49	1.8	0.22
32	2.4	0.79	1.8	0.22
36	2.1	0.26	2.1	0.26

SERIES GRW & GRL



NOTE:
All holes in lugged version are through threaded, except the holes closest to top and bottom shaft.

TORQUE APPLICATION FACTOR CATEGORIES

Application I
Clean liquid lubricating media (water, clean oils, lube oil, mineral oil, etc.); and with no deposit or chemical attack, valve operated at least once a week.
Temperature range from 32°F to maximum temperature rating of the elastomer seat.

Application II
Other liquid media and lubricating gases (aqueous liquids, such as food & beverage, water, etc.); and with minor deposit or chemical attack, valve operated at least once a month.
Temperature range from 32°F to maximum temperature rating of the elastomer seat.

Application III
a. Dry non-abrasive media or gases (non-abrasive powders and dry gas); or
b. Fluids with moderate deposit or chemical attack; or
c. Valves operated less than once a month.
Temperature range from 32°F to maximum temperature rating of the elastomer seat.

Application IV
a. Dry abrasive media and degreasing applications (sand, cement, silicone free, oxygen cleaned); or
b. Liquids with severe deposit; or
c. Valves not frequently operated (once a year).
All above with temperature range from 15°F to maximum temperature rating of the elastomer seat.

Notes:
1. For applications with temperatures above or below the guidelines above, please consult factory.
2. For dry service valves it is suggested to use U/C discs (reduced diameter) when service conditions are less than 50 psi.

VALVE SEATING AND UNSEATING TORQUES (in lbs)

Differential	Valve size (NPS)																	
pressure (psi)	2	2.5	3	4	5	6	8	10	12	14	16	18	20	24	28	30	32	36
I*																		
50	115	168	230	327	513	717	1310	2133	3054	4137	5654	7479	9635	15043	22076	26264	30933	39137
100	115	177	239	354	558	779	1452	2399	3425	4605	6363	8500	11048	17518	26045	31164	36899	46688
150	124	186	266	389	620	876	1664	2788	3992	5262	7360	9936	13038	21007	31641	38076	45315	57340
200	133	204	292	434	708	1000	1938	3310	4744									
230	133	221	319	451	752	1062	2080	3567	5116									
50 (U/C)	69	101	138	196	308	430	786	1280	1832	2482	3393	4487	5781	9026	13246	15758	18560	23482
II*																		
50	124	186	257	372	584	823	1496	2425	3469	4673	6354	8364	10728	16617	24218	28723	33731	42679
100	124	195	274	398	628	885	1637	2682	3841	5129	7048	9366	12118	19059	28142	33572	39638	50155
150	133	204	292	434	690	982	1841	3071	4408	5770	8023	10775	14074	22498	33670	40404	47966[1]	60695
200	142	230	319	478	779	1106	2124	3593	5160									
230	150	239	336	496	823	1168	2257	3859	5541									
50 (U/C)	74	112	154	223	350	494	897	1455	2082	2804	3812	5018	6437	9970	14531	17234	20239	25607
III*																		
50	133	204	283	425	655	929	1682	2708	3885	5208	7053	9249	11821	18191	26361	31183	36529	46220
100	142	212	301	443	699	991	1823	2974	4257	5654	7733	10233	13188	20600	30239	35979	42378	53622
150	142	230	319	478	761	1080	2027	3363	4824	6277	8685	11614	15109	23989	35700	42734	50617[1]	64050
200	150	248	354	522	850	1204	2310	3885	5567									
230	159	257	363	540	894	1266	2443	4142	5948									
50 (U/C)	80	122	170	255	393	558	1009	1625	2331	3125	4232	5550	7093	10915	15817	18710	21918	27732
IV*																		
50	152	233	330	491	764	1081	1956	3141	4503	6012	8103	10577	13461	20552	29575	34872	40727	51533
100	157	242	344	513	807	1143	2095	3401	4878	6440	8760	11533	14794	22912	33385	39591	46487	58823
150	163	257	366	547	873	1237	2304	3792	5441	7038	9680	12872	16663	26226	38744	46229	54593[1]	69083
200	171	275	394	591	959	1362	2582	4313	6191									
230	175	285	408	613	1003	1425	2721	4574	6567									
50 (U/C)	91	140	198	295	458	648	1174	1884	2702	3607	4862	6346	8076	12331	17745	20923	24436	30920

* Application I, II, III, IV

NOTES:

50 U/C refers to reduced diameter disc option.

(1) Duplex shaft not suitable for these conditions, use only 431 stainless steel or super duplex.

MAXIMUM ALLOWABLE SHAFT TORQUES (in lbs)

Shaft material	Valve size (NPS)																	
	2	2.5	3	4	5	6	8	10	12	14	16	18	20	24	28	30	32	36
316SS	575	975	975	1415	2300	2300	3360	6740	6740									
431SS	800	1370	1370	2035	3230	3230	5750	11570	11570	13650	16140	26350	29490	45010	55860	63100	62750	130500
Duplex										10230	12110	19760	21370	33770	41900	47300	47050	97900
Super duplex	750	1260	1260	1860	3010	3010	5310	10620	10620	12510	14800	24150	26115	38640	47950	54150	53850	112000

FLOWRATE CO-EFFICIENTS - C_v VALUES

Valve size (NPS)	Disc opening (degrees)								
	10°	20°	30°	40°	50°	60°	70°	80°	90°
2	0	1.0	6	16	35	54	83	114	125
2.5	0	2.8	13	31	58	90	142	199	251
3	0	7	32	64	105	163	249	351	473
4	0	16	66	126	205	306	471	694	933
5	0	32	98	183	289	450	728	1114	1446
6	8	60	150	261	424	668	1141	1793	2250
8	25	133	267	468	747	1190	2050	3364	4065
10	39	200	392	741	1133	1787	3095	5143	6712
12	57	292	572	1081	1653	2607	4514	7757	10301
14	138	351	736	1320	2238	3595	5792	10369	12031
16	179	459	962	1725	2924	4696	7565	13542	15713
18	227	582	1217	2183	3699	5943	9582	17140	19888
20	280	718	1503	2695	4568	7338	11820	21160	24553
24	403	1034	2163	3881	6577	10566	17021	30471	35356
28	549	1406	2945	5282	8953	14382	23168	41474	48123
30	630	1614	3380	6064	10277	16510	26595	47610	55243
32	717	1837	3846	6899	11692	18784	30259	54170	62854
36	908	2325	4868	8732	14799	23773	38297	68558	79550

NOTE:

C_v = The volume of water in U.S.gpm that will pass through a valve with a pressure drop of 1 psi at 70°F.

PRESSURE-TEMPERATURE DIAGRAM

Seat material*	Disc material	Body material	Size range (NPS)	Valve function Standard / End of Line	Temperature (°F) -20	0	32	122	212	248	266	302	320
EPDM	all	DI	2-12	Std / EOL				230 psi/150 psi					
NBR and white NBR	all	DI	2-12	Std / EOL			230 psi/150 psi						
FKM	all	DI	2-12	Std / EOL				230 psi/150 psi			150 psi/90 psi		
EPDM	all	DI	14-36	Std / EOL			150 psi/90 psi						
NBR	all	DI	14-36	Std / EOL			150 psi/90 psi						
FKM	all	DI	14-36	Std / EOL				150 psi/90 psi			90 psi/60 psi		

NOTES:

* all seat materials drop tight

For non-PED requirements with EPDM seats, valves can be rated to a minimum temperature of -40°F.

ORDERING INFORMATION

Example:	GR	L	4	D	1	2	E	A1	K	B0	UC

Series
GR

Body style
L Lug
W Wafer

Size (NPS)

2	4	8	14	20	30
2.5	5	10	16	24	32
3	6	12	18	28	36

Body material
D Ductile iron ASTM A536
N Ductile iron ASTM A395

Disc material
1 316 stainless steel
2 304 stainless steel
3 Aluminum bronze
4 Ductile iron / ENP (NPS 2-12)
5 Ductile iron / Epoxy ctd. (NPS 14-36)
6 Duplex
7 Super duplex
N Nickel aluminium bronze
W Ductile Iron/Nylon ctd.

Shaft [1,2]
1 316 stainless steel
2 431 stainless steel
6 Duplex
7 Super duplex

Notes:
(1) The standard material is 431 stainless steel.
316 stainless steel shaft is available as an option in NPS 2-12.
(2) NPS 14-36 valves with a super duplex disc will have a super duplex disc screw.
All other disc materials will have a duplex disc screw.

Seat
E EPDM (Food grade, ACS)
E1 EPDM (KIWA, WRAS, ACS)
F Fluoroelastomer (FKM)
N NBR (Food grade)
N1 NBR (DVGW-G)
W White NBR (Food grade)

Flange drilling
Single drilled
A1 ASME 125/150
AD AS4087 PN 16
AE AS2129 Table E
B1 BS Table E
D1 DIN PN 6
D2 DIN PN 10
D3 DIN PN 16
J2 JIS 10K
Multidrilled (Wafer only)
M3 ASME 125/150, AS2129 Table E (NPS 2-24)

Mounting
K Keystone actuator mount

Actuation
B0 Bare shaft
H1 10 pos handle
G1 Gear
C1 Chainwheel
P1 Pneumatic DA
P2 Pneumatic SR
E Electric

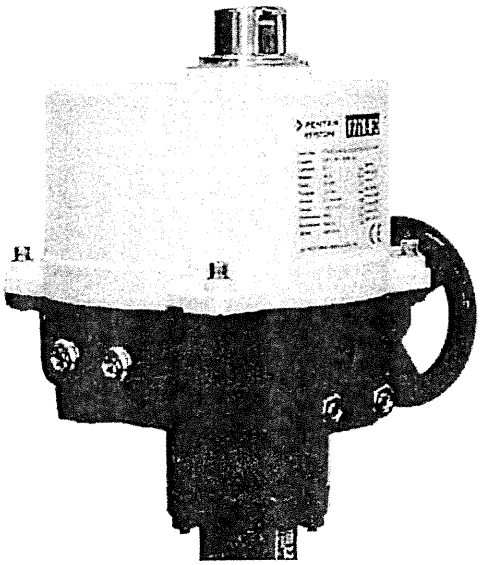
Special (If none leave blank)
UC Under cut disc for 30 psi or less pressure
SF Silicone free
P Special body coating
DOC Special documentation
MTR Material certifications

PENTAIR VALVES & CONTROLS
www.pentair.com/valves

PENTAIR

KEYSTONE F777/778 ELECTRIC ACTUATORS

The compact electric actuator for quarter turn (90°) valve operation providing a torque range from 35 to 4500 Nm



FEATURES

- Aluminium housing with ESPC coating
- Optimized mounting interface for direct mounting on top of Keystone valves
- Epicyclical gearing for smooth control and low noise level
- Top mounted position indicator (360 degree visibility)
- IP67 and NEMA 4X ingress protection
- Thermal overload protection
- Clutchless manual override by hand wheel (except smallest sizes)
- Easy accessible quick connect terminal strip
- Mechanical travel stops
- On/off and modulating duty
- Various options i.e. torque switches, additional voltage free contacts, local control module, etc.

GENERAL APPLICATION

The Keystone F777/778 is a compact economical actuator that can be used for various applications. It is particularly suitable for process applications like HVAC and water industry because of its torque span and low energy consumption.

TECHNICAL DATA

Material:	aluminium body and cover
Torque range:	35 to 4,500 Nm (300 to 40,000 lbin)
Ambient temperature range:	-30 to +65°C (-22 to +150°F)
IP rating:	IP67 / NEMA 4X
Voltage rating:	24 V DC / 24 V AC 50/60 Hz 110-120 V AC - 50/60 Hz (1-phase) 220-240 V AC - 50/60 Hz (1-phase) 400 V AC – 50/60 Hz (3-phase)
Electrical connection:	2x M20 or ½" NPT cable entry 8-point terminal strip
Certification:	CE, CSA, RoHs

The F777/778 electric actuator is available in three series with different torque values to cover the wide torque range. In addition there are various flange connections so it can be direct mounted to the Pentair butterfly valves, which reduces the requirement of brackets and creates a more compact valve package.

The available series are:
- F777 Keystone Imperial: Keystone shaft and flange - Imperial threading
- F777 Keystone Metric: Keystone shaft and flange – Metric threading
- F778 Keystone ISO: Keystone shaft / ISO flange – Metric threading

Note: when there is no difference between the F777 and F778 models, the models in the remainder of this document are referred to as F77x.

MODEL OVERVIEW

	Torque		Weight		
Model	(Nm)	(lbin)	(kg)	(lb)	Manual override
77x-003	35	310	2	5	Lever
77x-005	50	440	3	7	Lever
77x-008	90	800	11	25	Hand wheel
77x-013	150	1320	11	25	Hand wheel
77x-035	400	3540	20	45	Hand wheel
77x-044	500	4420	20	45	Hand wheel
77x-057	650	5750	20	45	Hand wheel
77x-088	1000	8850	32	72	Hand wheel
77x-130	1500	13280	32	72	Hand wheel
77x-180	2000	17700	71	158	Hand wheel
77x-220	2500	22130	71	158	Hand wheel
77x-265	3000	26560	72	160	Hand wheel
77x-310	3500	31000	72	160	Hand wheel
77x-400	4500	40000	106	236	Hand wheel

NOTES

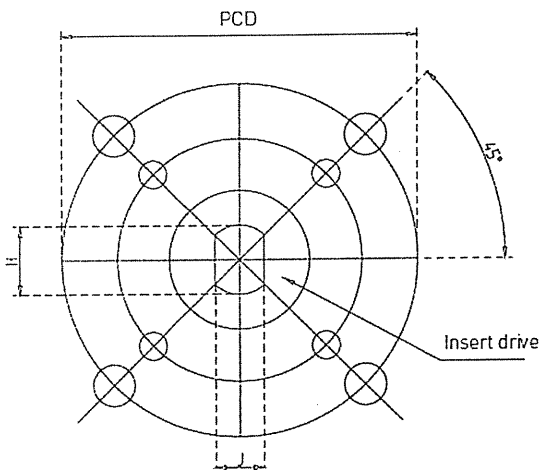
F777-014 is identical to F777-013 with larger bore
F777-036 is identical to F777-035 with larger bore
F777-045 is identical to F777-044 with larger bore
F777-058 is identical to F777-057 with larger bore
F777-089 is identical to F777-088 with larger bore
F777-181 is identical to F777-180 with larger bore
F778-058 is identical to F778-057 with larger flange
F778-089 is identical to F778-088 with larger flange
F778-131 is identical to F778-130 with larger flange

The F777/778 is available in various voltage ratings, which can be used in 50 and 60 Hz applications. Table 2 shows an overview of the available voltage ratings and appropriate stroking speed.

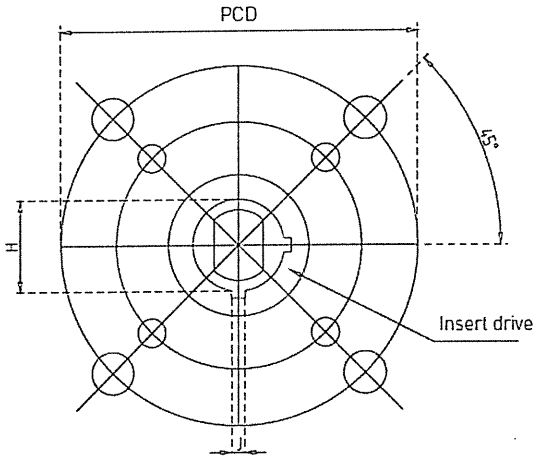
STROKE SPEED

	Torque		Stroke speed				
Model	(Nm)	(lbin)	24 V AC/DC (s/90°)	120 V AC - 60 Hz (s/90°)	240 V AC / 1 ph - 50 Hz (s/90°)	400 V AC / 3ph - 50 Hz (s/90°)	400 V AC / 3ph - 60 Hz (s/90°)
77x-003	35	310	15	12	12	12	12
77x-005	50	440	20	20	25	25	20
77x-008	90	800	15	12	18	18	12
77x-013	150	1320	22	20	25	25	20
77x-035	400	3540	15	18	18	18	18
77x-044	500	4420	20	25	25	25	25
77x-057	650	5750	28	30	30	30	30
77x-088	1000	8850	45	45	55	55	45
77x-130	1500	13280	45	45	55	55	45
77x-180	2000	17700	60	60	70	70	60
77x-220	2500	22130	60	60	70	70	60
77x-265	3000	26560	60	60	70	70	60
77x-310	3500	31000	60	60	70	70	60
77x-400	4500	40000	80	80	95	95	80

Speed indication can vary +/- 10%



MODELS 003 TO 014



MODELS 035 TO 400

VALVE CONNECTION F778 KEYSTONE ISO

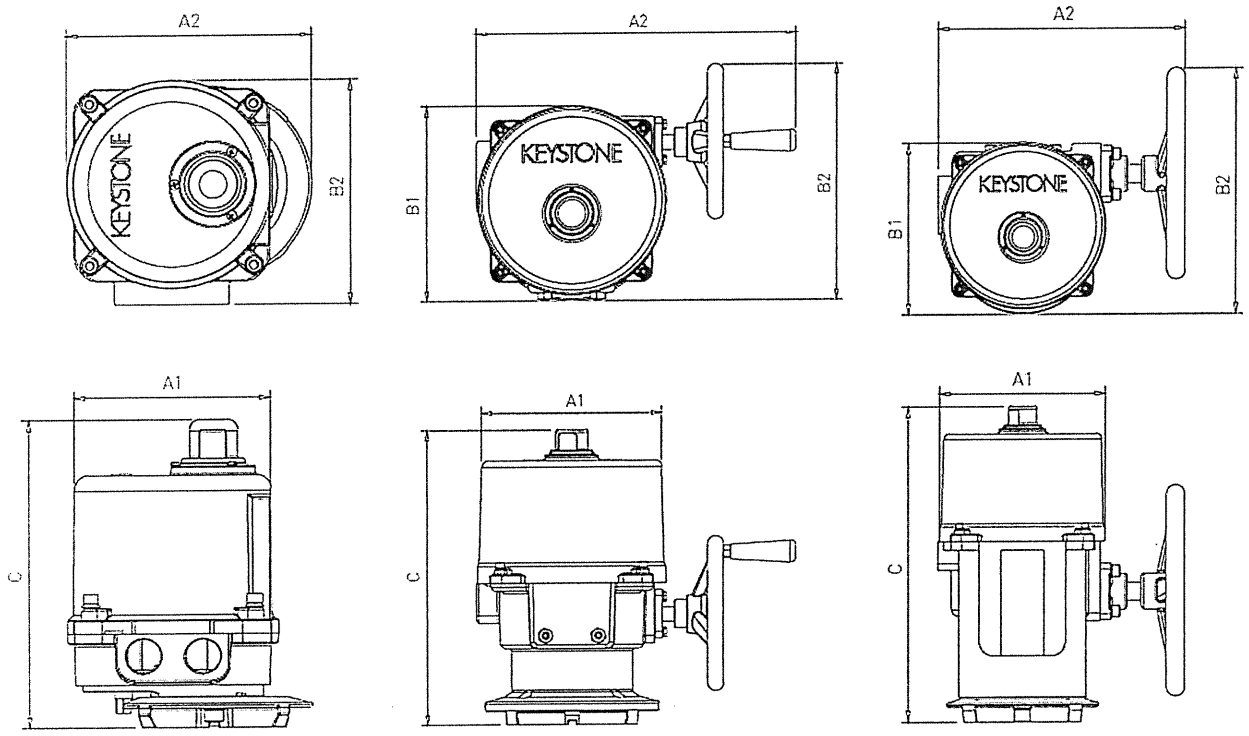
Model	Shaft connection (mm)					Mounting holes
	H	J	Key	Shaft depth	PCD	No x Size x Depth
778-003	16.0	11.0		30.0	F03	4x M5 x 10.0
					F05	4x M6 x 10.0
					F07	4x M8 x 12.0
778-005	16.0	11.0		30.0	F05	4x M6 x 10.0
					F07	4x M8 x 12.0
778-008	20.0	14.0		30.0	F07	4x M8 x 12.0
778-013	25.0	18.0		30.0	F07	4x M8 x 12.0
778-035	30.0	22.0		50.0	F07	4x M8 x 12.0
					F10	4x M10 x 15.0
					F12	4x M12 x 19.0
778-044	35.0		10.0 x 8.0	70.0	F07	4x M8 x 12.0
					F10	4x M10 x 15.0
					F12	4x M12 x 19.0
778-057	35.0		10.0 x 8.0	70.0	F10	4x M10 x 15.0
					F14	4x M16 x 24.0
778-058	35.0		10.0 x 8.0	70.0	F12	4x M12 x 19.0
					F16	4x M20 x 30.0
778-088	50.0		14.0 x 9.0	70.0	F10	4x M10 x 15.0
					F14	4x M16 x 24.0
778-089	50.0		14.0 x 9.0	70.0	F12	4x M12 x 19.0
					F16	4x M20 x 30.0
778-130	50.0		14.0 x 9.0	70.0	F10	4x M10 x 15.0
					F14	4x M16 x 24.0
778-131	50.0		14.0 x 9.0	70.0	F12	4x M12 x 19.0
					F16	4x M20 x 30.0
778-180	60.0		18.0 x 11.0	70.0	F16	4x M20 x 30.0
778-220	70.0		20.0 x 12.0	90.0	F16	4x M20 x 30.0
					F25	8x M16 x 24.0
778-265	70.0		20.0 x 12.0	90.0	F16	4x M20 x 30.0
					F25	8x M16 x 24.0
778-310	70.0		20.0 x 12.0	90.0	F16	4x M20 x 30.0
					F25	8x M16 x 24.0
778-400	70.0		20.0 x 12.0	100.0	F16	4x M20 x 30.0
					F25	8x M16 x 24.0

VALVE CONNECTION F777 KEYSTONE (IMPERIAL)

	Shaft connection (in)					Mounting holes
Model	**H**	**J**	**Key**	**Shaft depth**	**PCD**	**No x Size x Depth**
777-003	7/16	3/8		1.26	1.75	4x 1/4-20 UNC x 0.38
					3.25	4x 3/8-16 UNC x 0.56
777-005	5/16	3/8		1.26	3.25	4x 3/8-16 UNC x 0.56
777-008	3/4	1/2		1.26	3.25	4x 3/8-16 UNC x 0.56
777-013	3/4	1/2		1.26	3.25	4x 3/8-16 UNC x 0.56
777-014	7/8	5/8		2.00	3.25	4x 3/8-16 UNC x 0.56
					5.00	4x 1/2-13 UNC x 0.63
777-035	1 1/8		1/4 x 1/4	2.00	3.25	4x 3/8-16 UNC x 0.56
					5.00	4x 1/2-13 UNC x 0.63
777-036	1 3/8		5/16 x 5/16	2.00	3.25	4x 3/8-16 UNC x 0.56
					5.00	4x 1/2-13 UNC x 0.63
777-044	1 1/8		1/4 x 1/4	2.76	5.00	4x 1/2-13 UNC x 0.63
777-045	1 3/8		5/16 x 5/16	2.76	5.00	4x 1/2-13 UNC x 0.63
777-057	1 1/8		1/4 x 1/4	2.76	5.00	4x 1/2-13 UNC x 0.63
777-059	1 3/8		5/16 x 5/16	2.76	5.00	4x 1/2-13 UNC x 0.63
777-088	1 3/8		5/16 x 5/16	2.76	5.00	4x 1/2-13 UNC x 0.63
					6.50	4x 3/4-10 UNC x 1.00
777-089	1 5/8		3/8 x 3/8	2.76	5.00	4x 1/2-13 UNC x 0.63
					6.50	4x 3/4-10 UNC x 1.00
777-130	1 5/8		3/8 x 3/8	2.76	5.00	4x 1/2-13 UNC x 0.63
					6.50	4x 3/4-10 UNC x 1.00
777-131	1 7/8		1/2 x 3/8	2.76	5.00	4x 1/2-13 UNC x 0.63
					6.50	4x 3/4-10 UNC x 1.00
777-180	1 7/8		1/2 x 3/8	2.76	6.50	4x 3/4-10 UNC x 1.00
777-181	2 1/4		1/2 x 3/8	2.76	6.50	4x 3/4-10 UNC x 1.00
777-220	1 7/8		1/2 x 3/8	3.54	6.50	4x 3/4-10 UNC x 1.00
777-221	2 1/4		1/2 x 3/8	3.54	6.50	4x 3/4-10 UNC x 1.00
777-265	2 1/2		1/2 x 3/8	3.54	6.50	4x 3/4-10 UNC x 1.00
777-310	2 1/4		1/2 x 3/8	3.54	6.50	4x 3/4-10 UNC x 1.00
777-400	2 7/8		3/4 x 1/2	3.94	6.50	4x 3/4-10 UNC x 1.00
					10.00	8x 1/2-13 UNC x 1.00

VALVE CONNECTION F777 KEYSTONE (METRIC)

	Shaft connection (mm)					Mounting holes
Model	**H**	**J**	**Key**	**Shaft depth**	**PCD**	**No x Size x Depth**
777-003	14.3	9.5		32.0	44.5	4x M6 x 10.0
					82.5	4x M6 x 10.0
777-005	14.3	9.5		32.0	82.5	4x M6 x 13.0
777-008	19.1	12.7		32.0	82.5	4x M6 x 13.0
777-013	19.1	12.7		32.0	82.5	4x M6 x 13.0
777-014	22.2	15.9		51.0	82.5	4x M6 x 13.0
					127.0	4x M12 x 16.0
777-035	28.6		6.4 x 6.4	51.0	82.5	4x M6 x 13.0
					127.0	4x M12 x 16.0
777-036	34.9		7.9 x 7.9	51.0	82.5	4x M6 x 13.0
					127.0	4x M12 x 16.0
777-044	28.6		6.4 x 6.4	70.0	127.0	4x M12 x 16.0
777-045	34.9		7.9 x 7.9	70.0	127.0	4x M12 x 16.0
777-057	28.6		6.4 x 6.4	70.0	127.0	4x M12 x 16.0
777-058	34.9		7.9 x 7.9	70.0	127.0	4x M12 x 16.0
777-088	34.9		7.9 x 7.9	70.0	127.0	4x M12 x 16.0
					165.0	4x M20 x 30.0
777-089	41.3		9.5 x 9.5	70.0	127.0	4x M12 x 16.0
					165.0	4x M20 x 30.0
777-130	41.3		9.5 x 9.5	70.0	127.0	4x M12 x 16.0
					165.0	4x M20 x 30.0
777-131	47.6		12.7 x 9.5	70.0	127.0	4x M12 x 16.0
					165.0	4x M20 x 30.0
777-180	47.6		12.7 x 9.5	70.0	165.0	4x M20 x 30.0
777-181	54.0		12.7 x 9.5	70.0	165.0	4x M20 x 30.0
777-220	47.6		12.7 x 9.5	90.0	165.0	4x M20 x 30.0
777-221	54.0		12.7 x 9.5	90.0	165.0	4x M20 x 30.0
777-265	54.0		12.7 x 9.5	90.0	165.0	4x M20 x 30.0
777-310	54.0		12.7 x 9.5	90.0	165.0	4x M20 x 30.0
777-400	73.0		19.1 x 12.7	100.0	165.0	4x M20 x 30.0
					254.0	8x M16 x 24.0



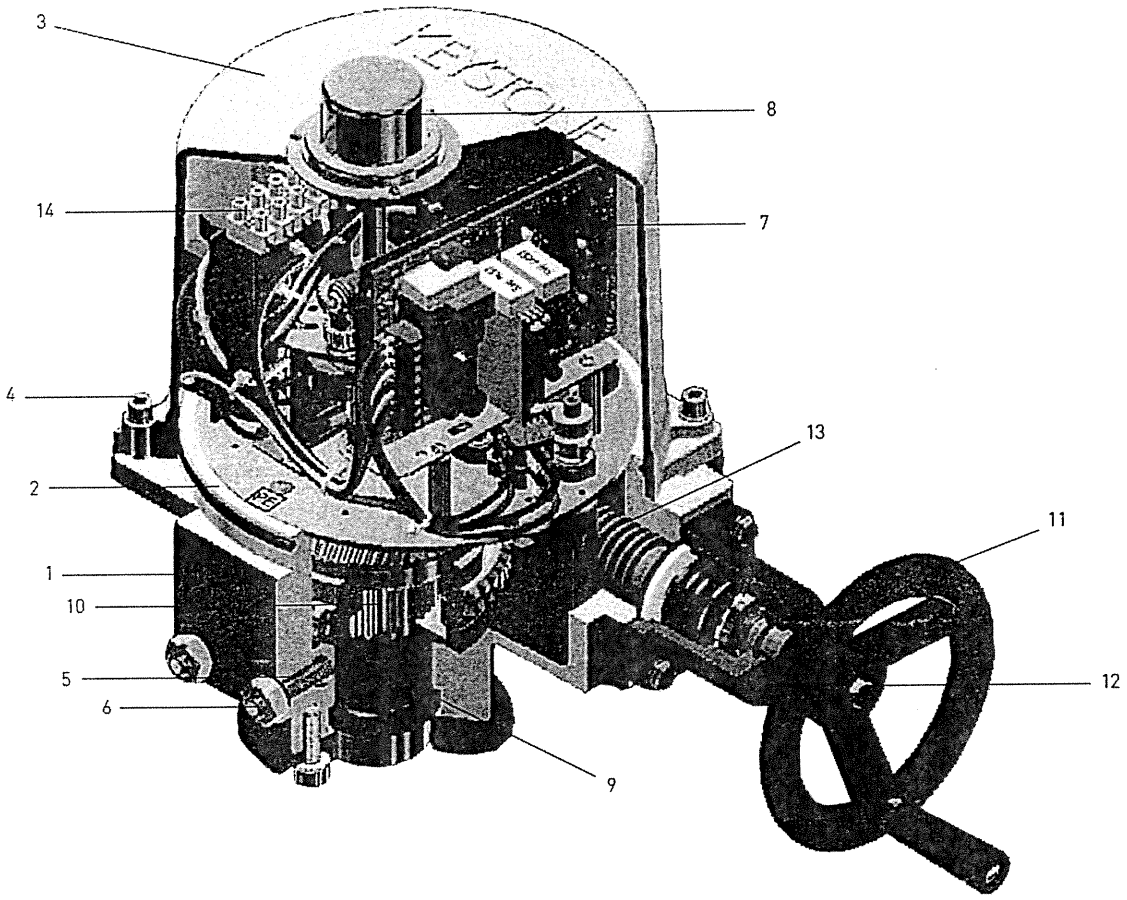
DIMENSIONS F777/778

	Length		Width	Height	Length		Width	Height
	A	B1	B2	C	A	B1	B2	C
Model	(mm)	(mm)	(mm)	(mm)	(in)	(in)	(in)	(in)
77x-003	133		123	168	5.24		4.84	6.61
77x-005	126		123	213	4.96		4.84	8.39
77x-008	393	234	291	363	15.47	9.21	11.46	14.29
77x-013	393	234	291	363	15.47	9.21	11.46	14.29
77x-035	366	190	245	306	14.41	7.48	9.65	12.05
77x-044	366	190	245	306	14.41	7.48	9.65	12.05
77x-057	366	190	245	306	14.41	7.48	9.65	12.05
77x-088	347	234	343	440	13.66	9.21	13.50	17.32
77x-130	347	234	343	440	13.66	9.21	13.50	17.32
77x-180	451	276	402	554	17.76	10.87	15.83	21.81
77x-220	451	276	402	554	17.76	10.87	15.83	21.81
77x-265	451	276	402	554	17.76	10.87	15.83	21.81
77x-310	451	276	402	554	17.76	10.87	15.83	21.81
77x-400	458	276	496	581	18.03	10.87	19.53	22.87

NOTES

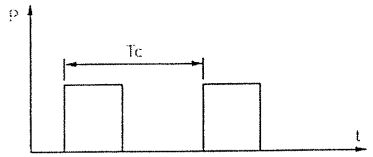
Following models use the same housing, but have different valve connection dimensions:

F778-014 dimensions are identical to F778-013
F778-036 dimensions are identical to F778-035
F778-045 dimensions are identical to F778-044
F778-058 dimensions are identical to F778-057
F778-089 dimensions are identical to F778-088
F778-131 dimensions are identical to F778-130
F778-181 dimensions are identical to F778-180
F778-221 dimensions are identical to F778-220

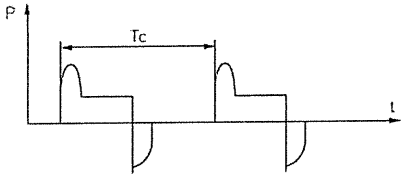


MATERIALS OF CONSTRUCTION

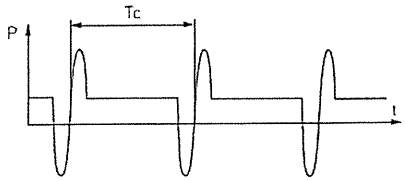
No.	Item	Material	Finish
1	Body	Aluminium alloy	ESPC
2	Body O-ring	NBR	Natural
3	Cover	Aluminium alloy	ESPC
4	Cover bolt	Stainless steel	Natural
5	Travel stop bolt	OM2-8-stainless steel	Natural/Zinc plated
6	Travel stop nut	Stainless steel	Natural
7	Position indicator shaft	S45C	Zinc plated
8	Position indicator	ABS765B	Natural
9	Output shaft	S45C/FCD60	Nickel plated/Phosphate coated
10	Gear	Alloy steel	Natural
11	Hand wheel	Up to F77x-057 Nylon	Natural
		From F77x-088: Aluminium	ESPC
12	Hand wheel bolt	Steel	Zinc plated
13	Torque shaft	S45C	Electrodeposition coating
14	Terminal strip	PA66	Natural



DUTY CYCLE S3



DUTY CYCLE S5



DUTY CYCLE S7

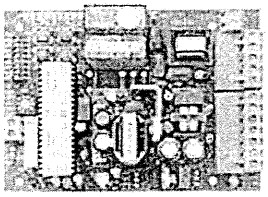
POWER REQUIREMENTS

	Model	Motor power (W)	Duty cycle (IEC60034)	12V DC/AC Run (A)	12V DC/AC Start (A)	12V DC/AC Lock (A)	24V DC/AC Run (A)	24V DC/AC Start (A)	24V DC/AC Lock (A)
OM1	77x-003	10	S7-75%	1.9	2.0	2.8	1.1	1.1	1.6
OMAM	77x-005	10	S7-75%	1.3	1.5	2.8	0.8	0.9	1.6
OM2	77x-008	40	S7-75%	3.4	5.2	16.5	2.2	4.5	14.5
OM3	77x-013	40	S7-75%	4.4	4.9	16.5	2.4	5.0	14.5
OM4	77x-035	80	S7-75%	16.1	16.1	33.0	8.5	9.2	30.0
OM5	77x-044	80	S7-75%	14.1	13.5	33.0	7.5	9.0	30.0
OM6	77x-057	80	S7-75%	12.3	12.5	33.0	7.0	8.5	30.0
OM7	77x-088	80	S7-75%				6.8	7.8	30.0
OM8	77x-130	80	S7-75%	25.0	26.0	59.0	8.1	8.0	30.0
OM9	77x-180	80	S5-50%				8.8	11.0	26.0
OM10	77x-220	80	S5-50%	28.0	60.0	59.0	11.8	11.0	26.0
OM11	77x-265	80							
OM12	77x-310	220							
OM13	77x-400	220							

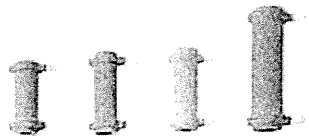
	Model	Motor power (W)	Duty cycle (IEC60034)	110V AC - 1 Ph Run (A)	110V AC - 1 Ph Start (A)	110V AC - 1 Ph Lock (A)	240V AC - 1 Ph Run (A)	240V AC - 1 Ph Start (A)	240V AC - 1 Ph Lock (A)
OM1	77x-003	10	S3-30%	0.6	0.6	0.7	0.3	0.4	0.4
OMAM	77x-005	10	S3-30%	0.6	0.6	0.7	0.3	0.4	0.5
OM2	77x-008	40	S3-30%	1.0	1.8	1.6	0.5	0.8	0.9
OM3	77x-013	40	S3-30%	1.2	1.8	1.6	1.0	1.2	0.9
OM4	77x-035	80	S3-30%	1.9	3.8	3.6	1.1	2.0	2.2
OM5	77x-044	80	S3-30%	2.0	3.8	3.6	1.1	2.0	2.2
OM6	77x-057	80	S3-30%	2.1	3.8	3.6	1.1	2.0	2.2
OM7	77x-088	120	S3-30%	3.1	8.5	9.0	1.4	4.1	5.0
OM8	77x-130	120	S3-30%	3.3	9.0	9.0	1.6	4.4	5.0
OM9	77x-180	180	S3-30%	3.3	5.8	5.9	2.1	3.8	3.6
OM10	77x-220	180	S3-30%	4.0	6.5	5.9	2.3	4.0	3.6
OM11	77x-265	180	S3-30%	4.5	3.5	5.9	2.5	4.2	3.6
OM12	77x-310	220	S3-30%	4.0	8.0	7.5	2.4	4.4	4.8
OM13	77x-400	220	S3-30%	4.2	8.0	7.5	2.4	4.8	4.8

	Model	Motor power (W)	Duty cycle (IEC60034)	220V AC - 3 Ph Run (A)	220V AC - 3 Ph Start (A)	220V AC - 3 Ph Lock (A)	380V AC - 3 Ph Run (A)	380V AC - 3 Ph Start (A)	380V AC - 3 Ph Lock (A)	440V AC - 3 Ph Run (A)	440V AC - 3 Ph Start (A)	440V AC - 3 Ph Lock (A)
OM1	77x-003											
OMAM	77x-005											
OM2	77x-008	40	S3-30%	0.8	1.4	1.5	0.4	0.7	0.7	0.4	0.9	0.6
OM3	77x-013	40	S3-30%	0.8	1.4	1.5	0.4	0.7	0.7	0.4	0.9	0.6
OM4	77x-035	80	S3-30%	1.0	1.8	2.3	0.7	1.3	1.5	0.6	1.4	1.4
OM5	77x-044	80	S3-30%	1.0	1.8	2.3	0.7	1.3	1.5	0.6	1.4	1.4
OM6	77x-057	80	S3-30%	1.0	1.8	2.3	0.7	1.3	1.5	0.6	1.4	1.4
OM7	77x-088	120	S3-30%	0.9	2.0	2.2	0.7	1.2	1.4	0.5	1.3	1.3
OM8	77x-130	120	S3-30%	1.0	2.4	2.6	0.7	1.5	1.5	0.6	1.2	1.2
OM9	77x-180	180	S3-30%	1.3	3.7	3.9	0.7	2.0	2.3	0.7	2.0	2.2
OM10	77x-220	180	S3-30%	1.3	3.4	3.9	0.7	2.0	2.4	0.7	2.0	2.2
OM11	77x-265	180	S3-30%	1.3	3.5	3.9	0.7	2.0	2.4	0.7	2.0	2.2
OM12	77x-310	220	S3-30%	1.5	4.8	5.4	0.9	2.5	2.5	0.8	2.6	2.4
OM13	77x-400	220	S3-30%	1.5	4.9	5.4	1.0	2.5	2.5	0.8	2.6	2.4

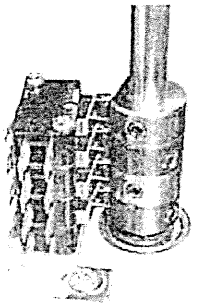
OPTIONS



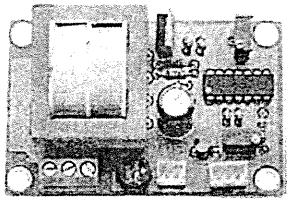
Modulating controller
The F777/778 can be equipped with a modulating controller board and control a valve position from 0-100% based on an analog input signal. This input signal can be 4-20 mA, 1-5 V DC or 2-10 V DC. This option also includes a position feedback signal either 4-20 mA or 2-10 V DC.



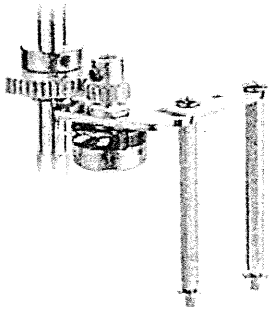
Heater
The heater option increases the internal temperature and avoids internal condensation. It is not recommended using a heater above 35°C (95°F) ambient temperature, but with large temperature deviations between day/night or between summer/winter, the heater in combination with a thermostat is recommended for these applications.



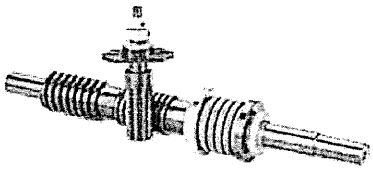
Additional limit switches
The standard position feedback switches can be extended with 2 additional switches providing dry contacts for fully open and close position. Alternatively they can also be used for intermediate position indication.



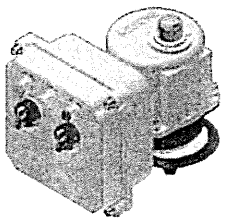
Current position transmitter
For continuous monitoring of valve position, the current position transmitter can be used. It provides a feedback signal of 0-20 mA, 4-20 mA, 0-5 V DC, 1-5 V DC, 0-10 V DC, or 2-10 V DC.

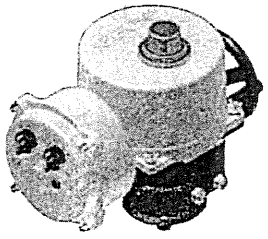


Potentiometer
The alternative continuous position monitoring is using a potentiometer. The potentiometer is available as 1k or 5k ohm resistance value, and can be used on on/off actuators only.



Torque switches
In order to reduce the torque applied to the valve stem, configurable torque switches can be used. They are available for the model F777/778-008 onwards, and must be ordered with the actuator.





Local control module
For safety during maintenance the local control module has a Local/Remote selector switch and Open/Close buttons for local operation.

SELECTION GUIDE

Example	778	035	24	15	3	X1XXXTXS	1	M	00	M11	D30

Figure number

777 Keystone flange
778 ISO flange

Model/Size

003	**035**	**058**	**180**	**310**
005	**036**	**088**	**181**	**400**
008	**044**	**089**	**221**	
013	**045**	**130**	**220**	
014	**057**	**131**	**265**	

Voltage

01	12 V DC	**12**	120 V AC 1Ph
02	24 V DC	**24**	240 V AC 1Ph
03	24 V AC 1Ph	**40**	400 V AC 3Ph

Cycle speed

Check Table for cycle speed per model

Duty cycle

3 30% (standard 120-240 V AC))
5 50%
7 70%

Options (consult sales for possible combinations)

XXXXXXX None (standard)
MXXXXXX Modulating controller
X1XXXXX Heater 24 V DC
X2XXXXX Heater 48 V DC
X3XXXXX Heater 120 V AC
X4XXXXX Heater 240 V AC
XXTXXXX 4-20 mA Current position transmitter
XXX1XXX Potentiometer 1K ohm
XXX2XXX Potentiometer 5K ohm
XXXXTXX Torque switches
XXXXXLX Local control
XXXXXXB Switch card with 2 additional limit switches (USA)
XXXXXXS 2 additional limit switches

IP rating

1 IP67/Nema 4X

Flange threading

M Metric
U Imperial

Variant

00 Standard

Valve flange

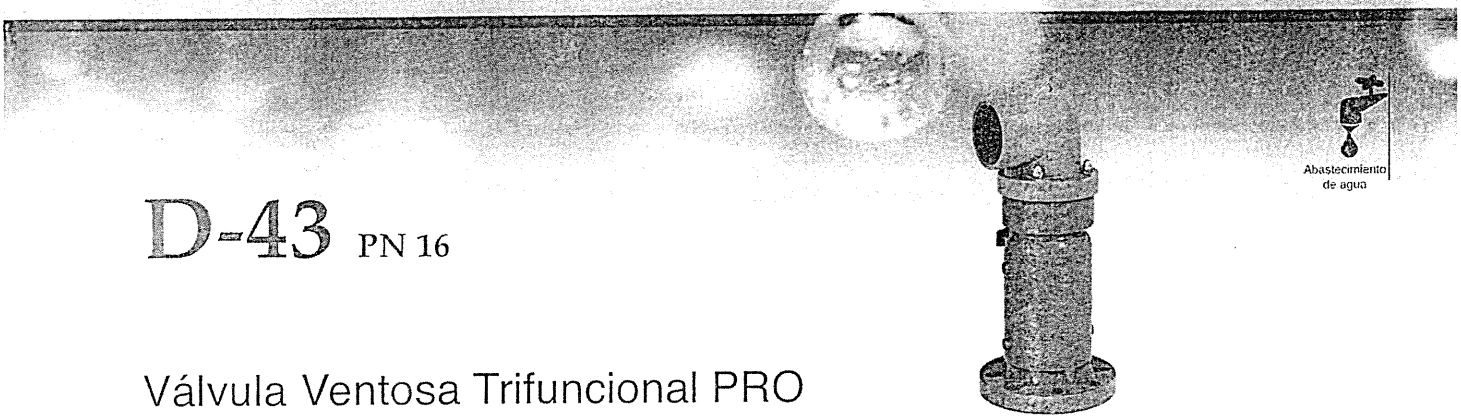
F03 PCD 36 mm (ISO5211)
F05 PCD 50 mm (ISO5211)
F07 PCD 70 mm (ISO5211)
F10 PCD 102 mm (ISO5211)
F12 PCD 125 mm (ISO5211)
F14 PCD 140 mm (ISO5211)
F16 PCD 165 mm (ISO5211)
M05 F03+F05 (ISO5211)
M06 F03+F05+F07 (ISO5211)
M07 F05+F07 (ISO5211)
M10 F07+F10 (ISO5211)
M11 F07+F10+F12 (ISO5211)
M12 F10+F12 (ISO5211)
M14 F10+F14 (ISO5211)
M16 F12+F16 (ISO5211)
M25 F16+F25 (ISO5211)
U1C PCD 1.75" (Keystone 45 degrees)
U34 PCD 3.25" (Keystone 45 degrees)
U50 PCD 5.00" (Keystone 45 degrees)
U68 PCD 6.50" (Keystone 45 degrees)
C34 PCD 1.75+3.25" (Keystone 45 degrees)
C50 PCD 3.25+5.00" (Keystone 45 degrees)
C68 PCD 5.00+6.50" (Keystone 45 degrees)
CA0 PCD 6.50+10.0" (Keystone 45 degrees)

Shaft dimension

S11 Star11
S14 Star14
S17 Star17
S22 Star22
S27 Star27
S36 Star36
S46 Star46
S55 Star55
S75 Star75
D12 DD12 x 8
D16 DD16 x 11
D20 DD20 x 14
D25 DD25 x 18
D30 DD30 x 22
M35 35K10 x 8
M40 40K12.0
M44 44K12.0
M50 50K14 x 9
M60 60K18 x 11
M70 70K20 x 12
M75 75K20 x 12
M80 80K22 x 14
M90 90K25
MA0 100K28
P06 DD3/4" x 1/4" (9.53 x 6.35 mm)
P09 DD7/16" x 3/8" (14.29 x 9.53 mm)
P0A DD5/8" x 7/16" (15.88 x 11.1 mm)
P0C DD3/4" x 1/2" (19.05 x 12.7 mm)
P0E DD7/8" x 5/8" (22.2 x 15.88 mm)
U0D Dia 3/16"; K3/16 x 3/16 (20.6K4.78 mm)
U10 Dia 1"; K1/4 x 3/16" (25.4K6.35 mm)
U11 Dia 1 1/8"; K1/4 x 1/4" (28.6K6.35 mm)
U16 Dia 1 3/8"; K5/16 x 5/16 (34.9K7.94 mm)
U1A Dia 1 5/8"; K3/8 x 3/8" (41.3K9.53 mm)
U1E Dia 1 7/8"; K1/2 x 3/8" (47.6K12.7 mm)
U24 Dia 2 1/4; K1/2 x 3/8" (57.2K12.7 mm)
U26 Dia 2 1/2"; K5/8 (63.3 x K15.9 mm)
U2C Dia 2 3/4"; K5/8" (69.9 x K15.9 mm)
U2E Dia 2 7/8"; K3/4" (73.0 x K19.1 mm)
U38 Dia 3 1/2"; K7/8" (88.9K22.23 mm)

PENTAIR

PENTAIR VALVES & CONTROLS
www.pentair.com/valves



D-43 PN 16

Válvula Ventosa Trifuncional PRO para Altos Caudales PAT.PEND

Descripción

En la válvula ventosa trifuncional para altos caudales de la serie D-43 se combinan las características de una ventosa automática con las de una válvula de aire y vacío.
El componente de purga de aire está diseñado para liberar automáticamente a la atmósfera las pequeñas bolsas de aire que se van acumulando a lo largo de la tubería cuando el sistema está lleno y presurizado.
El componente de aire y vacío ha sido diseñado para descargar o admitir automáticamente grandes volúmenes de aire, durante el llenado o el vaciado de la tubería. Esta ventosa se abrirá para aliviar las presiones negativas siempre que se produzca una separación de la columna de agua.

Aplicaciones

- Estaciones de bombeo: después de la bomba y de la válvula de retención (cheque)
- Aguas abajo y aguas arriba de las llaves de cierre.
- Después de las bombas de pozos profundos.
- En largos segmentos de tuberías en declive constante.
- En puntos elevados a lo largo de la línea y en relación con la pendiente hidráulica.
- Al final de las líneas.
- Antes de los contadores (medidores).
- En filtros

Operación

El componente de aire y vacío tiene un orificio grande para la descarga de grandes caudales de aire durante el llenado del sistema y la admisión de grandes caudales de aire durante el vaciado del sistema y en caso de separación de la columna de agua.
El aire a alta velocidad no cierra el flotador; es el agua la que eleva el flotador para cerrar herméticamente la válvula.
El descenso de la presión a un nivel inferior a la presión atmosférica, en cualquier momento de la operación, provoca la admisión de aire al sistema.
La descarga suave y lenta del aire previene las ondas de presión y otros fenómenos perniciosos.
La admisión de aire en respuesta a presiones negativas protege al sistema contra los nefastos efectos del vacío e impide los daños causados por la separación de la columna de agua. La entrada del aire es esencial para vaciar eficazmente el sistema.
El componente de purga de aire libera el aire atrapado en el sistema presurizado.

Sin válvulas de aire, las bolsas de aire que se acumulan pueden provocar los siguientes trastornos hidráulicos:
- Reducción del flujo efectivo por el efecto de estrangulación similar al de una válvula parcialmente cerrada, y en casos extremos la completa interrupción del flujo
- Menor eficiencia en la conductividad hidráulica como consecuencia de las alteraciones en el flujo del aire
- Aceleración de los daños por cavitación
- Aumento de los transitorios y ondas de presión
- Corrosión interna en tuberías y accesorios
- Peligrosas explosiones de aire comprimido
- Errores en la medición del consumo

A medida que el sistema se va llenando y se presuriza, la válvula funciona según las siguientes etapas
1. Libera el aire atrapado en la tubería.
2. El líquido entra en la válvula y hace subir al conjunto integral de flotador y junta (selladura) a la posición de cierre hermético.
3. El aire atrapado, que se acumula en los puntos elevados y a todo lo largo del sistema, sube a la parte superior de la válvula y a su vez desplaza al líquido en el cuerpo de la válvula.
4. El componente inferior del conjunto integral de flotador y junta desciende para abrir la goma desplegable de cierre hermético, despejando a su vez el orificio de purga de aire para liberar el aire acumulado.
5. El líquido entra en la válvula y hace subir al componente inferior del conjunto integral de flotador y junta, que empuja a la goma desplegable de cierre hermético a la posición de sellado.

Cuando la presión interna cae por debajo de la presión atmosférica (negativa):
1. El conjunto integral de flotador y junta baja inmediatamente para abrir los orificios de purga y de aire y vacío.
2. El aire entra en el sistema.

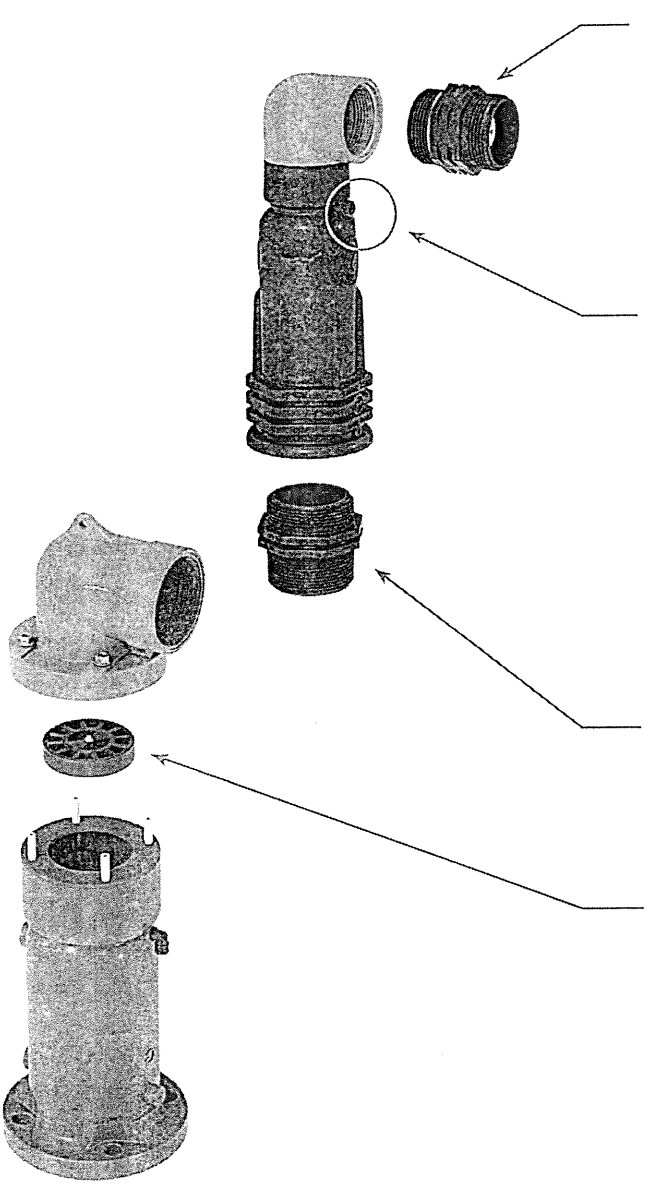
Características principales

- Presiones de trabajo: 0.1 - 16 bar
- Presión de prueba: 1.5 veces la presión máxima de trabajo de la válvula.
- Máxima temperatura de trabajo: 60º C
- Máxima temperatura momentánea de trabajo: 90º C
- La operación fiable reduce los incidentes de golpes de ariete.
- El diseño dinámico facilita la descarga de aire con alta capacidad y evita el cierre prematuro.
- Peso ligero, pequeño tamaño, estructura sencilla y fiable.
- El cuerpo exclusivo de una sola pieza reduce los riesgos de fugas y

de actos de vandalismo.
- La salida de descarga permite conectar un tubo de ventilación.
- Todas las piezas de operación se fabrican con materiales especialmente seleccionados y resistentes a la corrosión.
- Mínimo periodo de inactividad para el mantenimiento:
3" - Todas las piezas de operación están consolidadas en un cartucho reemplazable.
4" – 6" – El componente de purga de aire permite el mantenimiento sin desmontar la ventosa.
- El gran tamaño del orificio de purga automática en relación con el tamaño del cuerpo de la válvula:
Permite descargar grandes caudales de aire.
Reduce el riesgo de obstrucciones por partículas e impurezas.
Permite el uso de la goma desplegable de cierre hermético, menos sensible a las diferencias de presión que las juntas de flotador directas.

Selección de la válvula

- Tamaños: 2" – 6"
- Conexiones de brida de conformidad con cualquier normativa que se requiera
- Revestimiento: epoxi adherido por fusión (FBE) conforme a la norma DIN 30677-2



Opciones D-43 2"

- **Cuerpo** de Nylon Reforzado / Hierro dúctil / Acero Inoxidable

- **Modelos unidireccionales**
Las válvulas de aire de la serie D-43 se ofrecen en los siguientes modelos:
- **D-43-V** Con accesorio unidireccional de salida solamente, permite sólo la salida de aire e impide la admisión (todos los modelos).
- **D-43-I** Con interruptor de vacío, de entrada solamente, permite sólo la admisión de aire e impide la salida.
- **D-43-NS** Con accesorio de prevención del golpe de ariete (Non-Slam) permite la libre admisión de aire y regula la purga.

- **Salida de descarga superior**
La salida de descarga superior de la válvula de aire D-43 drena el agua acumulada de la ventosa presurizada y herméticamente cerrada. Esta aplicación se requiere cuando se acumula agua contaminada por encima del mecanismo de cierre hermético y le impide el acceso al sistema en caso de crearse condiciones de vacío. A esta salida se le puede adosar un tubo de drenaje para apartar el agua de la ventosa D-43.
En su forma estándar, la ventosa D-43 trae la salida de descarga herméticamente cerrada, pero se la puede encargar con la salida abierta y con el tubo de drenaje adosado o sin él. (La salida superior de descarga puede también abrirse fácilmente en el terreno utilizando un taladro).

- **Adaptador de rosca macho de 2"**
La válvula D-43 está disponible con un adaptador de entrada de rosca macho de 2" en BSP y NPT.

Opciones D-43 3" 4" 6"

- **D-43 NS Accesorio de prevención del golpe de cierre**
La incorporación del disco ajustable del mecanismo amortiguador convierte al modelo D-43 en una válvula amortiguadora del golpe de cierre. Se puede montar fácilmente el accesorio NS en el terreno sobre una ventosa D-43 ya instalada o adquirir la válvula con el accesorio incorporado (modelo D-43 NS).

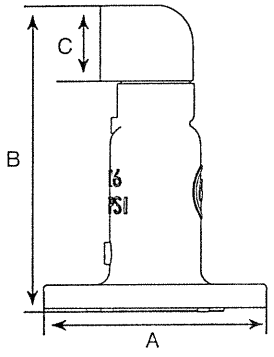
Al hacer su pedido, no olvide indicar el modelo, tamaño, presión de trabajo, normativa de las conexiones y tipo de líquido.

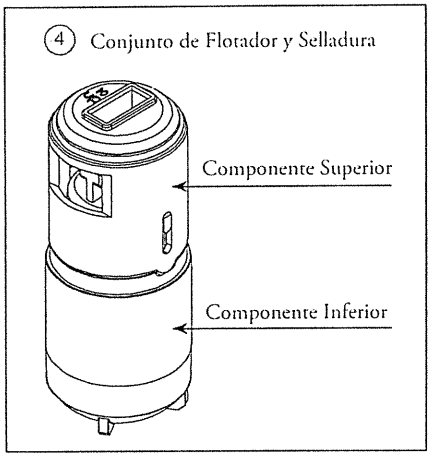
MEDIDAS Y PESOS

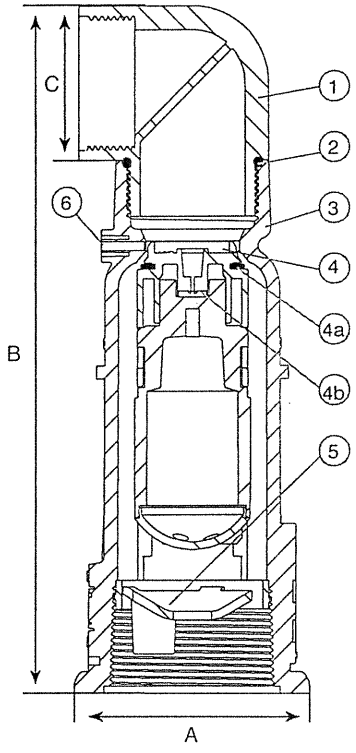
Tamaño nominal	Dimensiones mm A	B	Conexión C	Peso Kg. estándar	NS modelo	Área del orificio mm² A / V	Auto.
2" (50mm) Nylon- Rosca	85	245	1½" BSP Hembra	0.4	0.5	908	11.7
2" (50mm) Hierro dúctil - Rosca	85	245	1½" BSP Hembra	1.7	1.8	908	11.7
2" (50mm) Hierro dúctil - Brida	165	222	1½" BSP Hembra	3.9	4	908	11.7
2" (50mm) Acero Inoxidable - Rosca	85	245	1½" BSP Hembra	1.8	1.9	908	11.7

LISTA DE PIEZAS Y ESPECIFICACIONES

No.	Pieza	Material
1.	Salida de Descarga	Polipropileno
2.	Junta Tórica	BUNA-N
3.	Cuerpo	Nylon Reforzado / Hierro dúctil ASTM A536 65-45-12 / Acero Inoxidable SAE 316
4.	Conjunto de Flotador y Selladura	Polipropileno + Acetal + E.P.D.M.
4a.	Junta de aire y vacío	E.P.D.M.
4b.	Goma Desplegable de cierre Hermético	E.P.D.M.
5.	Traba del Flotador	Polipropileno
6.	Salida de descarga superior	





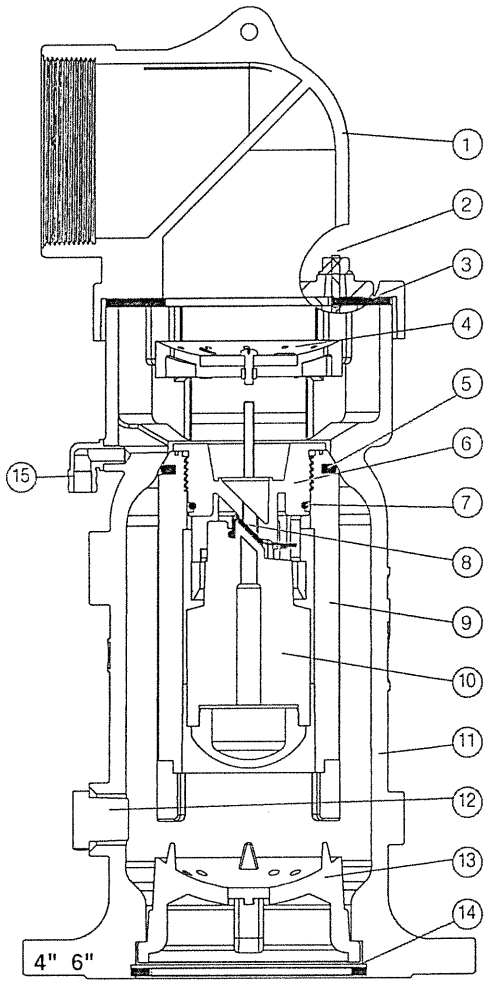


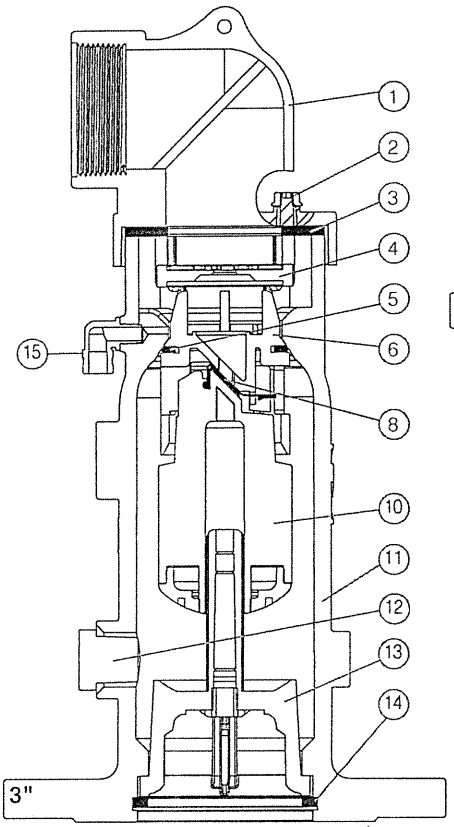
MEDIDAS Y PESOS

Tamaño nominal	Dimensiones mm A	B	Conexión C	Peso Kg. estándar	NS modelo	Área del orificio mm² A / V	Auto.
3" (80mm)	202	366	2" BSP Female	8.7	9.0	1963	13.8
4" (100mm)	218	468	3" BSP Female	15.0	15.9	5027	13.8
6" (150mm)	283	540	4" BSP Female	23.8	24.8	7854	13.8

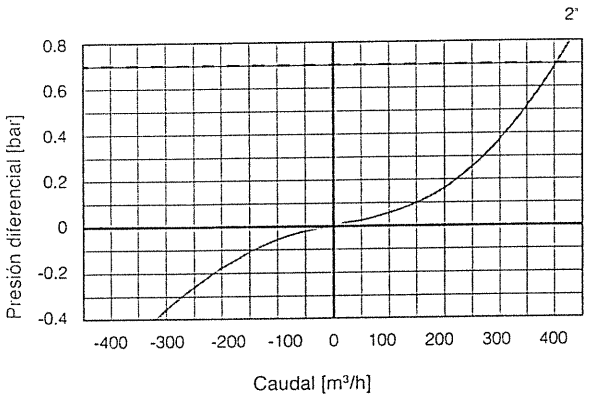
FLUJO EN EL PUNTO DE CAMBIO

Nº	Pieza	Material
1	Salida de descarga	Polipropileno
2	Varilla roscada	Acero inox. 304
3	Goma de sellado	Goma de sellado BUNA-N
4	Clapeta NS (Opcional)	Nylon reforzado
5	Junta de aire y vacío	EPDM
6	Tapa del flotador automático	Acetal
7	Junta tórica	EPDM
8	Goma desplegable de cierre hermético	EPDM
9	Flotador de la válvula cinética	Polipropileno reforzado (3") Polipropileno (4")
10.	Flotador automático	Polipropileno
11	Cuerpo	Hierro dúctil
12	Tapón de descarga de presión	Acero inox. 316
13	Traba del flotador	Acetal
14	Anillo de sujeción	Acetal
15	Salida de drenaje	Polipropileno





PURGA DE AIRE



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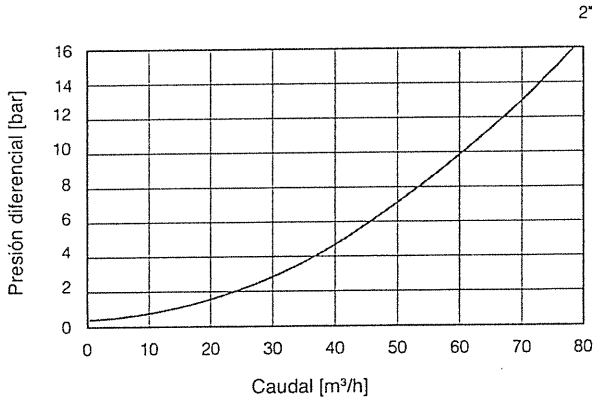

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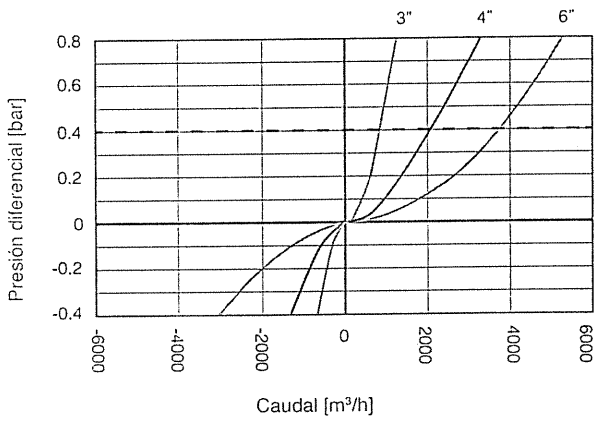

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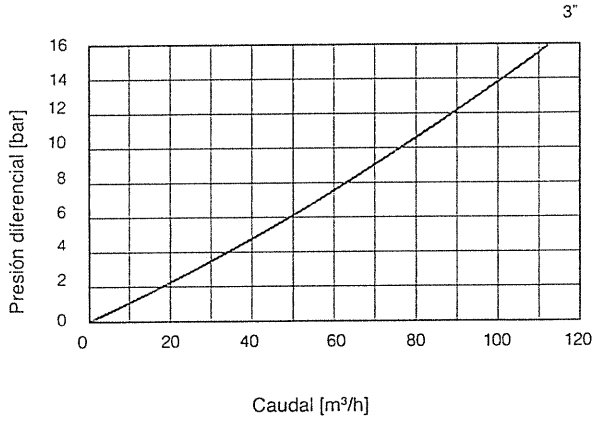
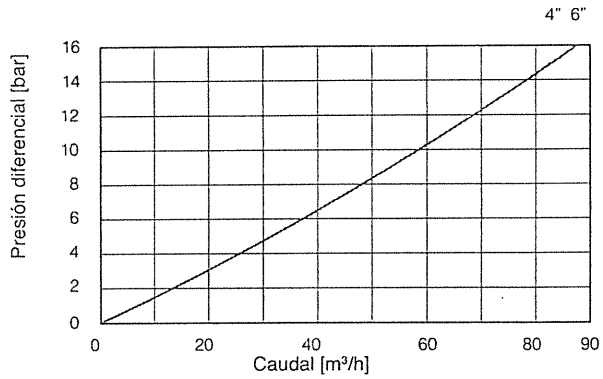


Máxima purga de aire recomendada — — —

PURGA DE AIRE AUTOMÁTICA



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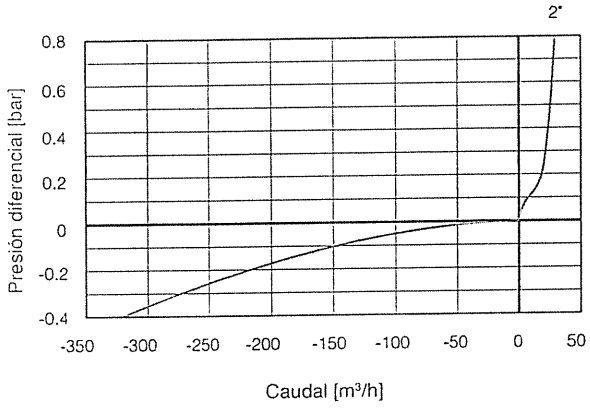
PURGA DE AIRE



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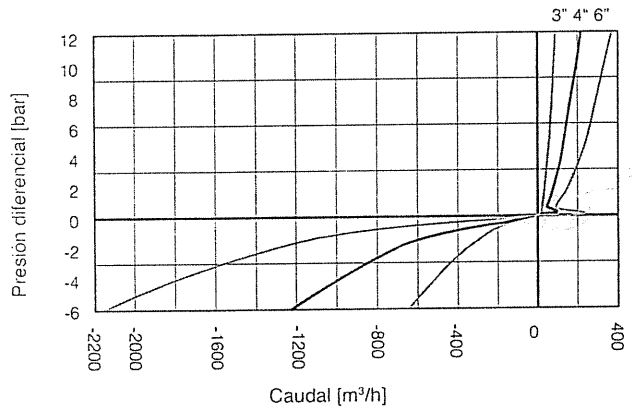

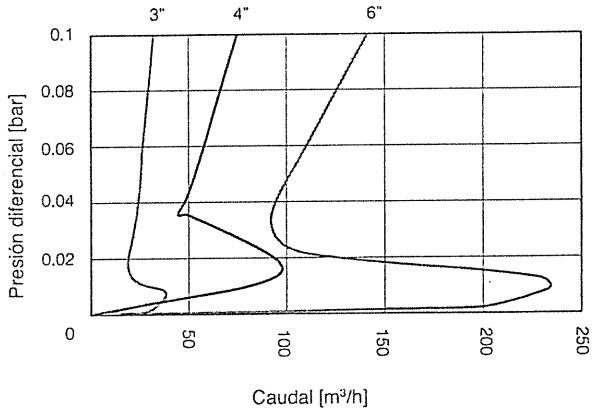

D-43 Tabla de datos del orificio de prevención del golpe de ariete (Non-Slam)

Tamaño nominal	Orificio de descarga	Área total NS	Orificio NS	Punto de cambio	Caudal a 0.4 bar
2" (50mm)	34.0 mm	12.6 mm²	4 mm	Spring loaded normally closed	24 m³/h
3" (80mm)	50 mm	78.5mm²	10 mm	0.07 m	31 m³/h
4" (100mm)	80 mm	176.7mm²	15 mm	0.05 m	125 m³/h
6" (150mm)	100 mm	314.0mm²	20 mm	0.3 m	232 m³/h