Saunders®
the science inside

brands you trust.

Industrial Diaphragm Valves

CRANE®
ChemPharma Flow Solutions

www.cranechempharma.com

A Continuing Story of Success

No matter where in the world you use valves, dedicated sales associates and distribution partners are close by.

A continuing tradition of innovation.

P. K. Saunders invented the original diaphragm valve in 1928. Today, Saunders continues to develop innovative designs using the latest materials technology.

Millions in service.

Saunders diaphragm valves are recognized worldwide for versatility and reliability. They are used in every process industry. When millions of Saunders diaphragm valves installed in process plants around the world.

Dependable operation.

Engineers know they can trust Saunders Valves. They set the industry standard for dependable, consistent operation, even in the most adverse conditions with years of trouble-free performance.

Customer Service.

Customers know they can depend on Saunders for after sales service and technical support from one of our many locally based sales associates and distribution partners.

The Science Inside.

Saunders proudly develops and manufacturers its polymer compounds, with more than 75 years of polymer technology, it is "The Science Inside™" our valves which sets us apart.

A Type flanged

Weir type flanged valve in cast iron, ductile iron, cast steel, bronze gunmetal and stainless steel. Available with various body linings and diaphragms appropriate for a wide range of applications.

1/2" to 14"
DN15 to DN350

A Type screwed

Weir type valve in ductile iron, bronze gunmetal and stainless steel.

1/4" to 3"
DN8 to DN80

Weld End Valves

Weir type weld or clamp end diaphragm valve in stainless steel for biopharm and chemical applications.

1/4" to 6"
DN8 to DN150

WFB

A specialized range of weir type diaphragm valves for marine and firefighting applications. Provides a high level of reliability in adverse conditions.

1 1/2" to **2 1/2**"
DN40 and DN65

KB Type (Straight-Through) Screwed End

Straight through bore screwed valve in cast iron, bronze and stainless steel.

1/2" to 2"
DN15 to DN50

KB Type (Straight-Through)* Flanged End

Diaphragm valve with a full bore opening to ensure maximum flow when handling viscous or abrasive fluids. Also available with various diaphragm and lining options.

3/4" to 14"
DN20 to DN350

*K type also available in USA

A Wide Range fo Applications

Listed below are four categories of typical applications for Saunders Diaphragm Valves.

ABRASIVE

Fertilizer
Titanium dioxide
Phosphate
Copper Mining
Gold Mining
Coal Slurry
Sand
FGD
Cement
Ceramics
Sewage
Sugar

- Minerals processing, chemicals, fertilizers, china clay, paper, and power generation are but a few of the industries that rely on Saunders KB Type diaphragm valves to withstand a wide variety of abrasive service conditions.
- Ores — phosphate rock or bauxite in aggregate form, slurries such as gypsum in power plant desulphurization, powders — titanium dioxide in pigment application are typical service examples.
- Applications requiring a combination of corrosion and abrasion resistance, such as phosphate rock/sulphuric acid, together with reliability and long service life are ideal applications for Saunders KB Valves.

CORROSIVE

Chlor-Alkali
Iron and Steel
Sulphuric Acid
Effluent Treatment
Potable Water
Pulp & Paper
Basic Chemicals
Acids and Alkalis
Organics
Toxic Fluids
Nitric Acid

- Corrosion is estimated to cost worldwide industry more than 300 billion dollars every year, touching every process industry sector .
- Saunders personnel offer expertise and unrivaled experience in corrosive applications.
- Innovative materials technology has resulted in the current extensive range of valve options including elastomer and fluoropolymer linings, designed especially to combat corrosion.

INDUSTRIAL

Marine
Vegetable Oil
Paints
Fire Fighting
Tanning
Oil Production
Automobile
Air
Effluent
Gases, Fuels
Dye Liquors

- Saunders valves are widely used on utility (air, water, and gas) service lines, as well as effluent treatment systems.
- In the Food Industry Saunders valves are widely used in margarine, yogurt and corn processing plants.
- Saunders are widely used in the marine applications and in the automobile sector on service lines, paint coating systems and on road and rail tankers.

ASEPTIC

Biotechnology
Pharmaceuticals
WFI
Fine Chemicals
Chromatography
Cosmetics
Ultra Filtration
Clean Water
CIP
Yeast
Food & Beverage
Soap

- Saunders pioneered high purity valve technology.
- The top ten pharmaceutical companies in the world head our international customer base.
- Saunders extensive range of valves designed for the pharmaceutical industry are detailed in other literature.

Compare various valve types against industrial process requirements

Superior

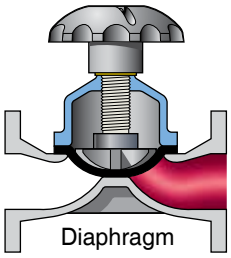
Poor

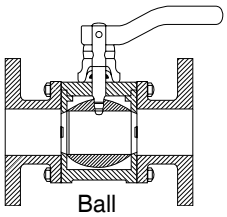
Valve/Service Features	Diaphragm	Ball	Butterfly	Globe	Gate	Lubricated Plug
Ability of leak tight shut-off against gases, liquids and solids						
Resistance to abrasion and erosion						
Wide choice of materials to match service						
Non-turbulent flow path						
Low fluid friction loss						
Weight/size ratio						
Resistance to corrosion						
Compact overall height						
Pressure range						
Vacuum capability						
Maintenance - in-line servicing, low cost spares						
High purity						
Control applications						
On/off applications						
Temperature range						

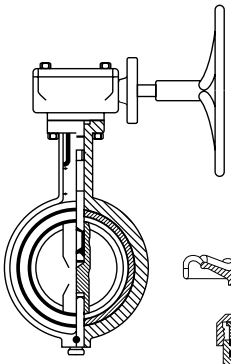
Saunders offers a comprehensive range of diaphragm valves.

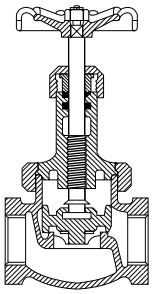
They encompass the full spectrum of corrosive and abrasive applications that require reliable leak free valve operation.

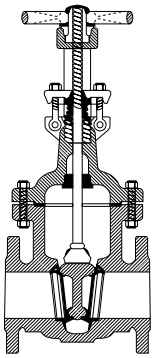
Easily maintained to ensure many years of trouble free operation, the Saunders valve has become a standard used in industries such as chemical production, mining, water treatment, fertilizer production, marine and many more.

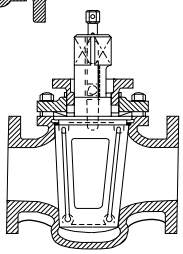

Diaphragm


Ball


Butterfly

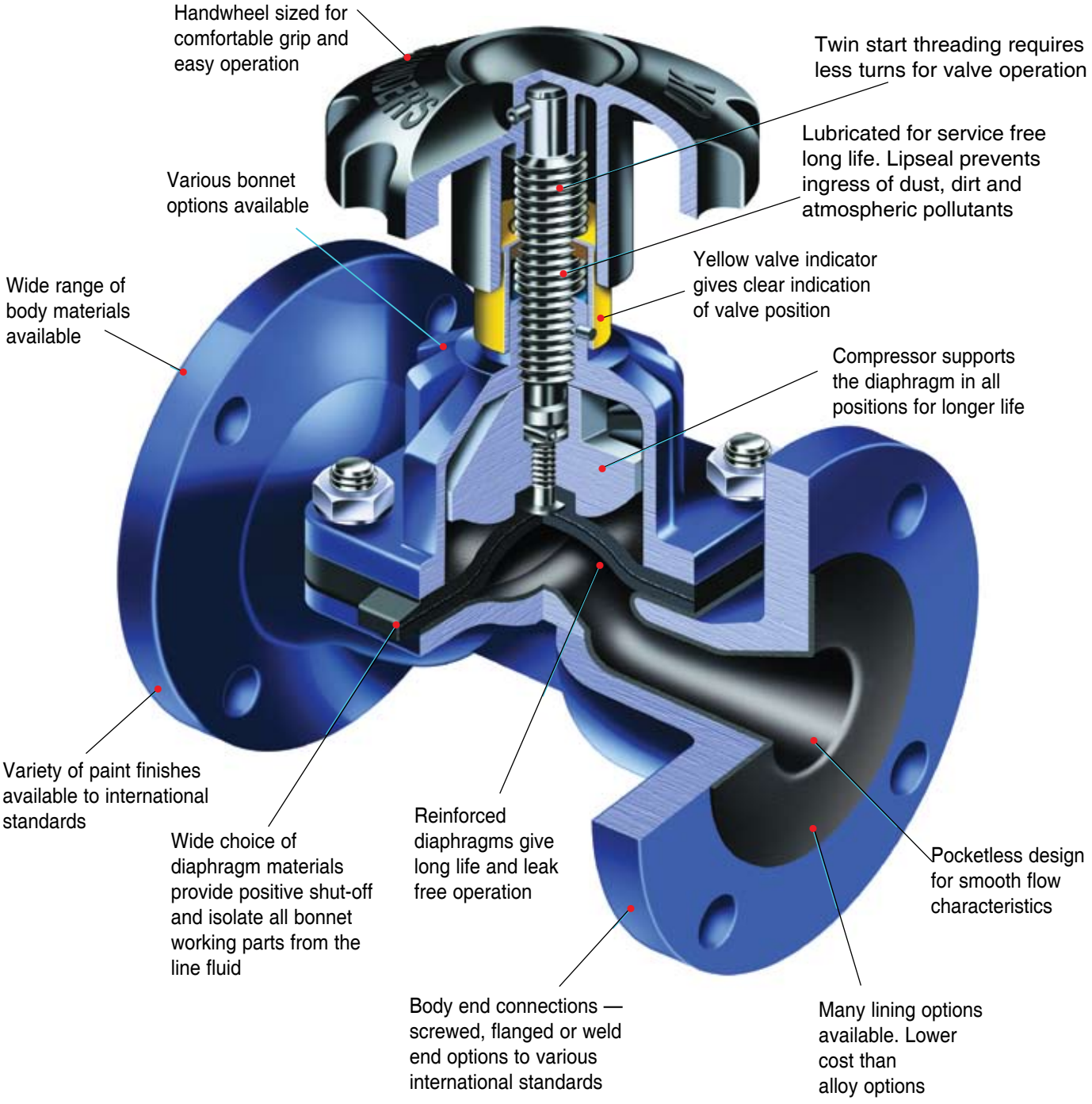

Globe


Gate


Plug

The Original and the Best

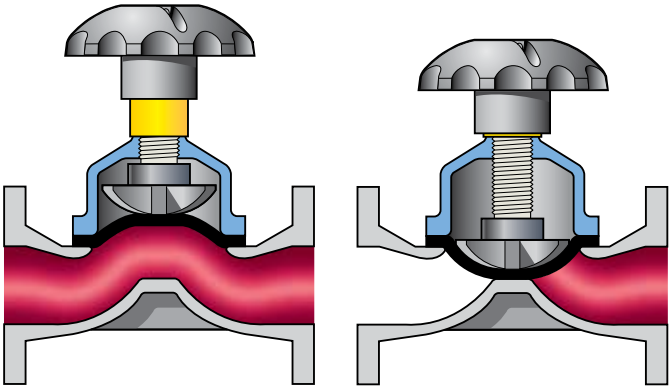
Saunders diaphragm valve features and benefits for corrosive and abrasive applications with 100% leaktight closure operation



Saunders **A** Type Diaphragm Valves

Valve Benefits for Corrosive and Abrasive Applications

Our Saunders **A** Type diaphragm valves have been developed to handle a wide range of fluids and gases. Choose from a broad range of materials, methods of operation, and body end connections to satisfy the needs of your most corrosive and abrasive applications.

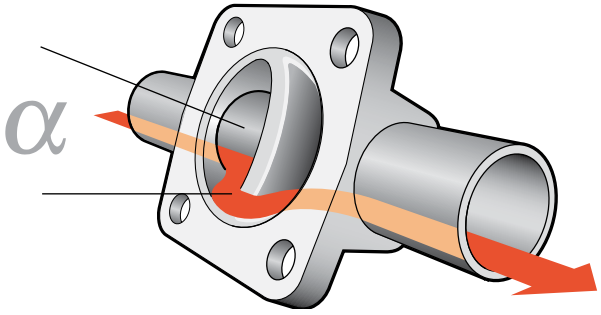


Valve flow

Pocketless design for contamination free performance and smooth flow characteristics. Linear operation ensures valve does not induce damaging pressure surges or static charges.

Ease of maintenance

Three part design allows maintenance and actuator retrofitting without removing the valve, resulting in lower long-term cost of ownership compared to other valve types.

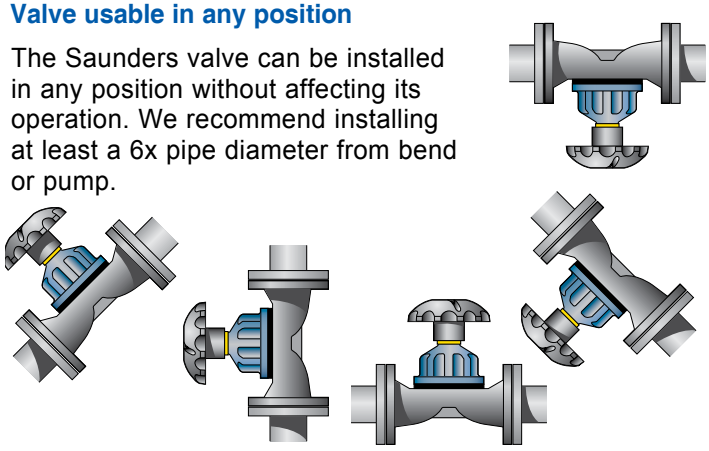


Valve set for self draining

The Saunders valve can be installed to assist self-draining if required. Please consult us for drainage angle advice.

Valve usable in any position

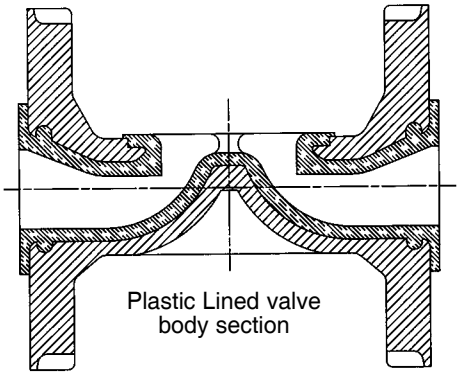
The Saunders valve can be installed in any position without affecting its operation. We recommend installing at least a 6x pipe diameter from bend or pump.



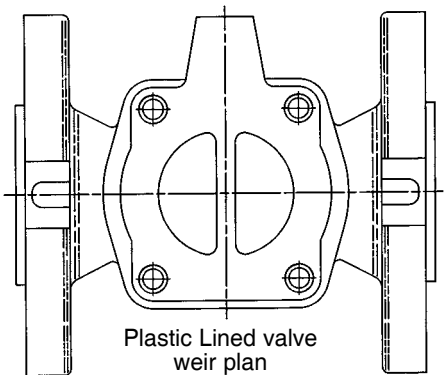
- Extended life, reliability, safety and ease of use, combined with an essentially simple design, results in low maintenance and cost-effective operation.
- On pressure and vacuum, Saunders diaphragm valves operate and close 100% leaktight even after thousands of operations, reducing processing and handling costs, by eliminating emissions normally associated with conventional valve designs.
- All working parts of the valves are isolated from the line media and positive closure is obtained even on frequent cycling or with entrained particulates in the line unlike other valve types.
- Throttling and control characteristics are enhanced by a streamlined flow path that is cavity free and provides excellent flow control capabilities.

Saunders **A** Type Diaphragm Valves

Industry Standards



Plastic Lined valve body section



Plastic Lined valve weir plan

Plastic lined body features

- Ductile iron body – high mechanical strength
- Ductile iron body – mechanically supports plastic lining
- Lining protected from ultraviolet (UV)
- Injection gate to side of weir flange means:–
  - Smooth weir for diaphragm sealing and zero leakage
  - Lining lock-on weir flange and in-bore inlet
  - Lining thickness range 0.12" – 0.20" 3–5 mm **3/4**" to 6" DN20–DN150

Rubber lined body data

- Soft rubber linings
- Natural rubber (polyisoprene) 40-46° IRHD
- Butyl (Isobutylene isoprene), 60–66° IRHD
- Hard ebonite rubber HRL, 75–85° Shore D
- Lining thickness range 0.08" – 0.18" 2–4.5mm **3/4**" to 14" DN20–DN350

Valve body lining – production tests

All Saunders lined valves have each body individually tested for lining integrity.

- Glass lining – Spark test 10kV ac
- Rubber, Butyl – Spark test 14kV ac/dc
- Rubber, HRL – Spark test 17kV ac/dc
- Plastic lined – Spark test 20kV ac/dc

Standard Body Materials

CAST IRON	Flanged. . . **1/2**" to 16" DN15–DN400 ASTM A48 Class 35C or ASTM A126 Class B
DUCTILE IRON SG IRON	Screwed . . . **1/2**" to 2" DN15–DN50 ASTM A395: 65-45-12 Flanged . . . **1/2**" to 6" DN15–DN150 ASTM A395: 60-40-18 or ASTM A395
CAST STEEL	Flanged . . . **1/2**" to 4" DN15–DN100 ASTM A216 WCB
BRONZE GUNMETAL	Screwed . . . **1/2**" to 3" DN15–DN80 ASTM B62 or ASTM B584 Alloy 836 Flanged . . . **1/2**" to 4" DN15–DN100 None
STAINLESS STEEL	Screwed . . . **1/2**" to 3" DN15–DN80 Flanged . . . **1/2**" to 6" DN15–DN150 ASTM A743: CF-8M or ASTM A351: CF-8M

New Environmental Protection

Saunders environmental protective coating has been developed specifically to provide unrivalled corrosion resistance. This protective coating utilizes Du Pont's Tefzel™ (Ethylenetetraflouroethylene) material.

The green Tefzel™ coating is applied before the injection moulding of the Perfluoroalkoxy (PFA) or Ethylenetetraflourorethylene (ETFE) lining, using an electrostatic powder coating method. By coating the valve body, bonnet and hand wheel, both internal and external corrosive protection is maximized providing peace of mind in extreme corrosive material processing applications.

Available in ¾" to 4" DN20 to DN100 with a PFA lining and ¾" to 6" DN20 to DN150 in the ETFE lined option.

Valve Body Linings for Saunders Valves

- **Perfluoroalkoxy – PFA**
  Most suitable for concentrated mineral acids at high temperature, aromatic, aliphatic and chlorinated solvents.

- **Polytetrafluoroethylene – PTFE**
  Most suitable for concentrated mineral acids at high temperature, aromatic, aliphatic and chlorinated solvents.

- **Ethylene tetrafluoroethylene – ETFE**
  Suitable for strong acids, salts in water at higher temperatures, solvents at medium temperature.

- **Polypropylene – PP**
  Main applications include mineral acids, water, salts in water, and effluent treatment chemicals.

- **Glass**
  Used in multi-process chemical plants on acids and solvents.

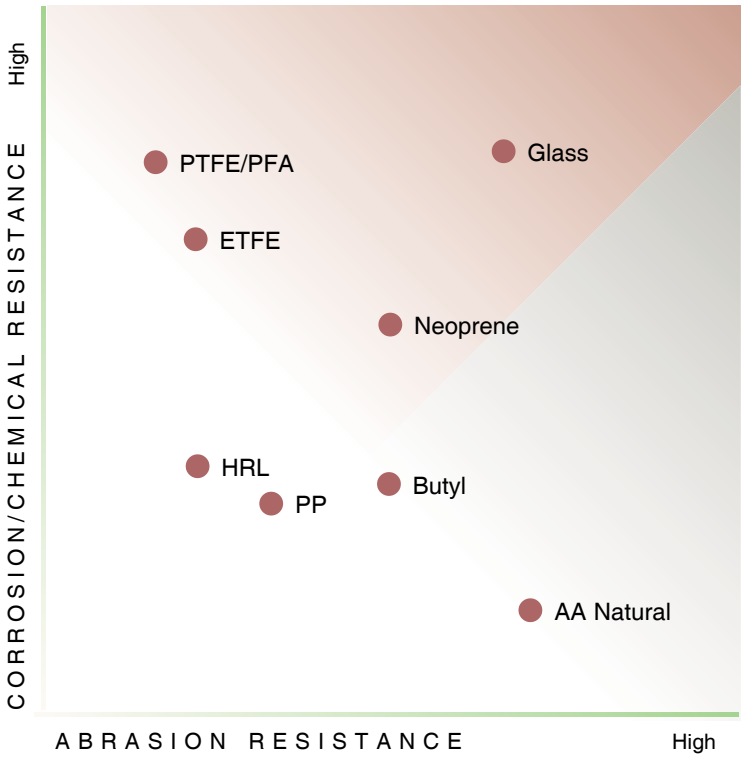
- **Hard Rubber – NR/HRL**
  Used for salts in water, dilute mineral acids, chlorine water, de-ionized water, plating solutions and potable water.

- **Soft Butyl Rubber – IIR/BL**
  Good for corrosive and abrasive slurries, mineral acids and acidic slurries.

- **Neoprene – CR**
  Particularly suitable for animal, vegetable, fatty oils and greases. Abrasion resistance over wide pH range –used for aggressive slurries.

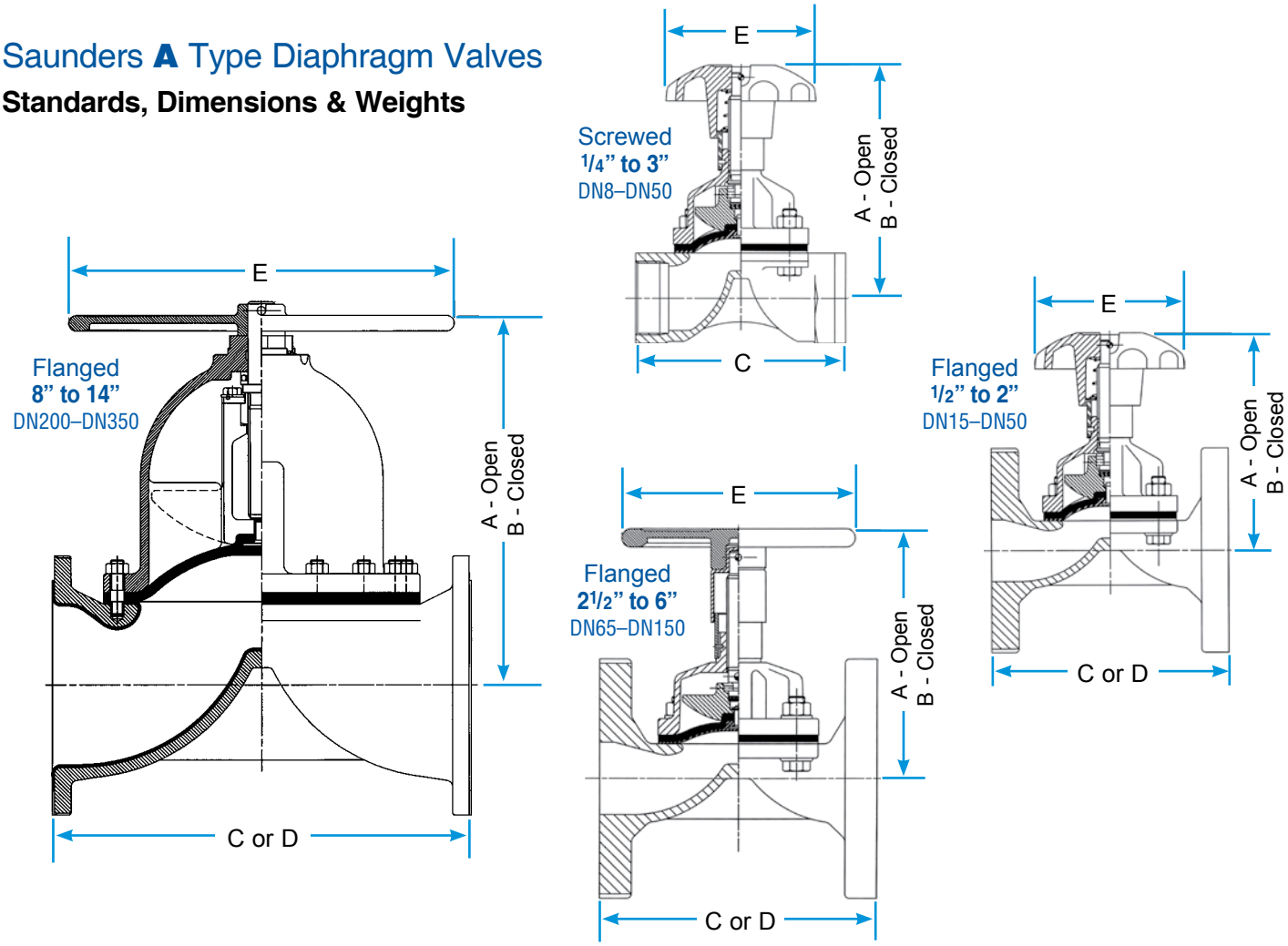
- **Soft Natural Rubber - AA/SRL**
  High abrasion resistance.
  Suitable for use on powders, abrasive slurries, clays, coal dust, dry fertilizer, gypsum.

Valve Body Lining Materials – Visual Process Resistance Guide



Saunders **A** Type Diaphragm Valves

Standards, Dimensions & Weights



Saunders Valves are manufactured to the following industry standards (where applicable)

Diaphragm Valves (Design & Manufacture Standard Practice)	MSS SP-88
Flanged Valves	ASME B 16.5
Steel Valves	ASME B16.34
Cast Iron Flanged Fittings	ASME/ANSI B16.1
Bronze Gunmetal Flanges	ASME B16.24
Bronze Gunmetal Threaded Fittings	ASME/ANSI B16.15
Socketweld Fittings	ASME B16.11
Buttweld Ends	ASME B16.25
Cast Iron Threaded Fittings	ASME B16.4
Female Screwed Pipe Connections	AP15B
Pipe Threads	ANSI/ASME B1.20.1
Power Piping	ASME B31.1
Petro/Chem Piping	ASME B31.3

As well as being in overall lengths to EN 558-1 Series 1 and Series 7 and MSS SP88, Saunders valves are manufactured to the following standards:

Flanges	
BRITISH	BS 10 tables D and E BS 4504 tables PN10/16 BS 1560 Class 150
EUROPEAN	EN 1092-1 PN10/16 EN 1092-2 PN10/16
JAPANESE	JIS B 2212
Female screwed pipe connections	
BRITISH	BS 21 taper BS 21 parallel
GERMAN	DIN 259
INTERNATIONAL	ISO 7/1 taper ISO 7/1 parallel

Valve Diameter

		Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
		DN	8	10	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350
Screwed	A		2.1	2.6	3.5	3.7	4.7	6.1	6.5	7.4	9.5	10.4	-	-	-	-	-	-	-
			54	67	90	94	119	154	164	188	241	263	-	-	-	-	-	-	-
	B		2.1	2.4	3.3	3.5	4.3	5.6	5.8	6.5	8.2	8.9	-	-	-	-	-	-	-
			52	61	84	88	108	142	148	164	208	227	-	-	-	-	-	-	-
	C		1.9	1.9	2.5	3.3	4.4	4.9	5.7	6.6	8.2	10.2	-	-	-	-	-	-	-
			49	49	63.5	83	111	125	145	168	208	260	-	-	-	-	-	-	-
	Weight		.24	.33	.99	1.98	2.49	3.97	5.95	11.02	22.04	33.06	-	-	-	-	-	-	-
			0.11	0.15	0.45	0.90	1.13	1.80	2.70	5.00	10.0	15.0	-	-	-	-	-	-	-
Flanged	A		-	-	3.9	3.6	4.3	5.6	6.2	6.9	8.9	9.6	12.1	15.3	17.4	19.5	22.9	26.7	26.0
			-	-	100	91	108	143	157	175	226	243	308	388	442	495	581	679	660
	B		-	-	3.7	3.4	3.9	5.2	5.6	6.0	7.6	8.2	10.3	12.7	14.5	-	-	-	-
			-	-	93	85	98	131	141	152	194	208	262	322	367	-	-	-	-
	C		-	-	4.3	4.6	5.0	5.8	6.3	7.5	8.5	10.0	12.5	14.0	16.0	20.5	25.0	29.5	29.5
			-	-	108	117	127	146	159	190	216	254	305	356	406	521	635	749	749
	D		-	-	5.4	5.9	6.3	7.1	7.9	9.1	11.4	12.2	13.8	15.8	18.9	23.6	28.7	33.5	38.6
			-	-	130	150	160	180	200	230	290	310	350	400	480	600	730	850	980
	Weight		-	-	3.97	3.97	5.95	8.82	10.80	16.97	33.86	41.89	69.89	105.8	136.9	335.1	595.2	793.6	1,115
			-	-	1.80	1.80	2.70	4.00	4.90	7.70	14.0	19.0	31.7	48.0	62.1	152	270	360	506
Flanged Rubber Lined	A		-	-	-	3.8	4.4	5.8	6.3	7.0	9.0	9.7	12.2	15.4	17.5	19.6	23.0	26.9	26.1
			-	-	-	97	111	146	160	177	229	246	311	391	445	498	585	683	664
	B		-	-	-	3.6	4.0	5.3	5.7	6.0	7.8	8.4	10.4	12.8	14.6	-	-	-	-
			-	-	-	91	101	134	144	154	197	212	265	325	370	-	-	-	-
	C		-	-	-	4.8	5.2	5.9	6.4	7.8	8.8	10.3	12.8	14.4	16.4	20.9	25.4	29.9	29.9
			-	-	-	121	131	150	163	194	220	258	309	362	412	527	641	755	755
	D		-	-	-	5.9	6.3	7.1	7.9	9.1	11.4	12.2	14.0	15.6	18.9	23.6	28.7	33.5	38.6
			-	-	-	150	160	180	200	230	290	310	350	400	480	600	730	850	980
	Weight		-	-	-	5.95	6.83	9.92	11.90	18.07	33.06	44.97	72.97	108.4	133.8	339.5	601.8	804.6	1,128
			-	-	-	2.70	3.10	4.50	5.40	8.20	15.0	20.4	33.1	49.2	63.0	154	273	365	512
Flanged Glass Lined	A		-	-	4.0	3.6	4.3	5.7	6.2	6.9	8.9	9.6	12.2	15.3	17.4	19.5	22.9	-	-
			-	-	101	92	109	144	158	176	227	244	309	389	443	496	582	-	-
	B		-	-	3.7	3.4	3.9	5.2	5.6	6.0	7.7	8.3	10.4	12.7	14.5	-	-	-	-
			-	-	94	86	99	132	142	153	195	210	263	323	368	-	-	-	-
	C		-	-	4.4	4.7	5.1	5.9	6.4	7.6	8.6	10.1	12.6	14.1	16.1	20.6	25.1	-	-
			-	-	110	119	129	148	161	192	218	256	307	358	408	523	637	-	-
	D		-	-	5.1	5.9	6.3	7.1	7.9	9.1	11.4	12.2	13.8	14.2	18.9	23.6	28.7	-	-
			-	-	130	150	160	180	200	230	290	310	350	360	480	600	730	-	-
	Weight		-	-	3.97	3.97	6.83	9.92	11.90	18.07	31.96	42.99	70.98	106.9	138	337.3	599.6	-	-
			-	-	1.80	1.80	3.10	4.50	5.40	8.20	14.5	19.5	32.2	48.5	62.6	153	272	-	-
Flanged Plastic Lined	A		-	-	-	3.8	4.4	-	6.4	6.9	-	9.7	12.4	-	17.7	-	-	-	-
			-	-	-	97	112	-	162	176	-	246	314	-	450	-	-	-	-
	B		-	-	-	3.6	4.0	-	5.7	6.1	-	8.3	10.5	-	14.7	-	-	-	-
			-	-	-	91	102	-	145	155	-	211	267	-	374	-	-	-	-
	C		-	-	-	5.8	5.8	-	6.8	7.8	-	10.3	12.8	-	16.4	-	-	-	--
			-	-	-	123	133	-	165	196	-	260	311	-	412	-	-	-	-
	D		-	-	-	5.9	6.3	-	7.9	9.1	-	12.2	13.8	-	18.9	-	-	-	-
			-	-	-	150	160	-	200	230	-	310	350	-	480	-	-	-	-
	Weight		-	-	-	5.95	6.83		11.90	18.08		44.97	72.97		138.8	-	-	-	-
			-	-	-	2.70	3.10	-	5.40	8.20	-	20.4	33.1	-	63.0	-	-	-	-
	E		1.5	1.97	2.44	2.44	3.15	4.72	4.72	4.72	6.70	9.05	11.02	11.02	14.5	18.9	22.9	27.5	27.5
			38	50	62	62	80	120	120	120	170	230	280	280	368	482	584	699	699
		Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
		DN	8	10	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350

Dimensions in inches mm. Weights in lb. kg.

C valve length = EN 558-1 Series 7 (ex BS 5156). D valve length = EN 558-1 Series 1 (ex DIN 3202 Series F1).

All weights are approximate based on manual valves

Saunders **A** Type Diaphragm Valve

Flow Co-efficient of Valve Range Cv (Kv)

1/2" DN15	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	5.50	4.71	-	-	6.00	5.14	-	-
90	5.28	4.53	-	-	5.75	4.93	-	-
80	5.06	4.33	-	-	5.51	4.72	-	-
70	4.83	4.14	-	-	5.27	4.52	-	-
60	4.61	3.95	-	-	5.03	4.31	-	-
50	3.84	3.29	-	-	4.19	3.59	-	-
40	3.08	2.62	-	-	3.35	2.87	-	-
30	2.30	1.97	-	-	2.51	2.15	-	-
20	1.54	1.32	-	-	1.67	1.43	-	-
10	0.77	0.66	-	-	0.83	0.71	-	-
0	0	0	-	-	0	0	-	-

3/4" DN20	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	11.50	9.86	9.20	7.89	12.00	10.29	6.50	5.59
90	11.03	9.45	9.00	7.71	11.51	9.87	6.24	5.35
80	10.57	9.06	8.80	7.54	11.03	9.45	5.98	5.13
70	10.12	8.67	8.40	7.20	10.55	9.04	5.72	4.90
60	9.66	8.28	7.70	6.60	10.07	8.63	5.45	4.67
50	8.05	6.90	6.70	5.74	8.39	7.19	4.54	3.89
40	6.43	5.51	5.50	4.71	6.71	5.75	3.63	3.11
30	4.83	4.14	4.10	3.51	5.03	4.31	2.72	2.33
20	3.21	2.75	2.50	2.14	3.35	2.87	1.81	1.55
10	1.60	1.37	1.00	0.86	1.67	1.43	0.90	0.77
0	0	0	0	0	0	0	0	0

1" DN25	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	17.60	15.09	14.00	12.00	18.00	15.43	11.19	9.60
90	16.29	13.96	13.70	11.74	17.28	14.81	10.75	9.21
80	16.19	13.88	13.40	11.49	16.56	14.19	10.30	8.83
70	15.48	13.26	12.70	10.89	15.83	13.57	9.85	8.42
60	14.78	12.67	11.60	9.94	15.11	12.95	9.40	8.06
50	12.32	10.56	10.20	8.74	12.59	10.79	7.83	6.71
40	9.85	8.44	8.40	7.20	10.07	8.63	6.27	5.37
30	7.39	6.33	6.30	5.40	7.55	6.47	4.70	4.02
20	4.92	4.22	3.80	3.25	5.03	4.31	3.13	2.68
10	2.46	2.11	1.50	1.29	2.51	2.15	1.56	1.34
0	0	0	0	0	0	0	0	0

1 1/4" DN65	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	27.50	23.57	22.00	18.86	28.00	24.00	16.70	14.31
90	26.39	22.61	21.12	18.10	26.88	23.04	16.03	13.74
80	25.29	21.68	20.24	17.35	25.75	22.07	15.36	13.17
70	24.20	20.74	19.35	16.59	24.64	21.11	14.69	12.59
60	23.09	19.79	18.47	15.83	23.51	20.15	14.02	12.02
50	19.25	16.50	15.39	13.19	19.60	16.80	11.69	10.02
40	15.39	13.19	12.32	10.57	15.67	13.43	9.35	8.01
30	11.54	9.89	9.23	7.91	11.75	10.07	7.01	6.01
20	7.69	6.59	6.16	5.28	7.83	6.71	4.67	4.00
10	3.84	3.29	3.08	2.62	3.91	3.35	2.33	1.98
0	0	0	0	0	0	0	0	0

1 1/2" DN40	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	43.00	36.86	35.00	30.00	45.00	38.57	31.00	26.57
90	41.28	35.40	34.00	29.14	43.20	37.03	29.76	25.51
80	39.56	33.91	33.60	28.80	41.39	35.48	28.51	24.43
70	37.84	32.43	32.00	27.43	39.59	33.93	27.28	23.38
60	36.11	30.95	29.00	24.86	37.79	32.41	26.03	22.32
50	30.10	25.81	26.00	22.28	31.50	27.00	21.69	18.59
40	24.07	20.63	21.00	18.00	25.19	21.59	17.35	14.87
30	18.05	15.47	16.00	13.68	18.89	16.19	13.01	11.15
20	12.03	10.31	9.5	8.14	12.59	10.79	8.67	7.43
10	6.01	5.15	3.9	3.34	6.29	5.39	4.33	3.71
0	0	0	0	0	0	0	0	0

2" DN50	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	80.00	68.61	64.00	54.89	88.00	75.47	59.00	50.60
90	76.80	65.86	63.00	54.03	84.48	72.45	56.00	48.00
80	73.59	63.11	61.00	52.31	80.96	69.43	54.00	46.29
70	70.40	60.37	58.00	49.71	77.43	66.40	52.00	44.57
60	67.19	57.62	53.00	45.43	73.91	63.38	50.00	42.86
50	56.00	48.03	47.00	40.29	61.69	52.82	41.00	35.14
40	44.79	38.39	38.00	32.57	49.28	42.24	33.00	28.28
30	33.59	28.79	29.00	24.86	36.95	31.67	25.00	21.43
20	22.39	19.19	17.00	14.57	24.64	21.11	16.00	13.71
10	11.19	9.60	7.00	6.00	12.32	10.56	8.00	6.86
0	0	0	0	0	0	0	0	0

2 1/2" DN65	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	127.00	108.80	102.00	87.40	132.00	113.10	83.00	71.10
90	121.00	103.70	97.90	83.90	126.00	108.00	79.70	68.30
80	116.00	99.40	93.80	80.40	121.00	103.70	76.40	65.40
70	111.00	95.10	89.80	76.90	116.00	99.40	73.00	62.60
60	106.00	90.90	85.70	73.40	110.00	94.30	69.70	59.80
50	88.90	76.20	71.40	61.20	92.40	79.20	58.10	49.80
40	71.12	60.90	57.10	48.90	73.90	63.40	46.50	39.80
30	53.33	45.70	42.80	36.70	55.40	47.50	34.90	29.90
20	35.56	30.50	28.60	24.50	37.00	31.70	23.20	19.90
10	17.78	15.20	14.30	12.20	18.50	15.84	11.60	9.90
0	0	0	0	0	0	0	0	0

3" DN80	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	185.00	158.60	148.00	126.90	186.00	159.40	148.00	126.90
90	177.00	151.70	145.00	124.30	178.00	152.60	142.00	121.70
80	170.00	145.70	142.00	121.70	171.00	146.60	136.00	116.60
70	162.00	138.90	135.00	115.70	163.00	139.70	130.00	111.40
60	155.00	132.90	123.00	105.40	156.00	133.70	124.00	106.30
50	129.00	110.60	108.00	92.60	130.00	111.40	103.00	88.30
40	103.00	88.30	89.00	76.30	104.00	89.10	82.90	71.00
30	77.70	66.60	67.00	48.90	78.10	67.00	62.20	44.70
20	51.80	44.40	40.00	34.30	52.10	44.60	41.40	35.50
10	25.90	22.20	16.00	13.70	26.00	22.30	20.70	17.80
0	0	0	0	0	0	0	0	0

4" DN100	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	315	270	252	216	336	288	270	231
90	302	259	247	212	322	276	259	222
80	289	248	242	207	309	265	248	213
70	277	237	229	196	295	253	237	203
60	264	226	209	179	282	242	226	194
50	220	189	184	158	235	201	189	172
40	176	151	151	129	188	161	151	129
30	132	113	113	97	141	121	113	97
20	88.20	76	68	50	94.10	81	75.60	65
10	44.10	38	28	24	47.00	40	37.80	32.40
0	0	0	0	0	0	0	0	0

5" DN125	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	420	360	363	311	440	377	-	-
90	403	345	348	298	422	362	-	-
80	386	331	333	285	404	346	-	-
70	369	316	319	273	387	332	-	-
60	352	302	304	261	369	316	-	-
50	294	252	254	218	308	264	-	-
40	235	201	203	174	246	211	-	-
30	176	151	152	130	184	158	-	-
20	117	100	101	87	123	105	-	-
10	59	49	51	44	62	53	-	-
0	0	0	0	0	0	0	-	-

6" DN150	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	605	519	484	415	630	540	505	433
90	580	497	474	406	604	518	484	414
80	556	477	465	399	579	496	464	398
70	532	456	440	377	554	475	444	381
60	508	435	402	345	529	453	424	363
50	432	363	353	303	441	378	353	303
40	338	290	290	249	352	302	282	242
30	254	218	218	187	264	226	212	182
20	169	145	131	112	176	151	141	121
10	85	73	53	45	88	75	71	61
0	0	0	0	0	0	0	0	0

8" DN200	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	1300	1114	1309	1122	1320	1131	-	-
90	1248	1070	1256	1077	1267	1086	-	-
80	1196	1025	1204	1032	1214	1041	-	-
70	1144	981	1151	987	1161	995	-	-
60	1092	936	1099	942	1108	950	-	-
50	910	780	916	785	924	792	-	-
40	728	624	733	628	739	633	-	-
30	546	468	549	471	554	475	-	-
20	364	312	366	314	369	316	-	-
10	182	156	183	157	184	158	-	-
0	0	0	0	0	0	0	0	0

10" DN250	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	1980	1697	2000	1714	2100	1800	-	-
90	1900	1629	1920	1646	2015	1727	-	-
80	1821	1561	1840	1577	1932	1656	-	-
70	1742	1493	1760	1509	1848	1584	-	-
60	1663	1425	1679	1439	1763	1511	-	-
50	1386	1188	1400	1200	1470	1260	-	-
40	1108	950	1120	960	1176	1008	-	-
30	831	712	839	719	881	755	-	-
20	554	475	560	480	588	504	-	-
10	277	237	280	240	294	252		--
0	0	0	0	0	0	0	-	-

12" DN300	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	2550	2189	2600	2249	2700	2314	-	-
90	2448	2101	2496	2159	2592	2221	-	-
80	2346	2029	2392	2069	2484	2129	-	-
70	2244	1941	2288	1979	2376	2036	-	-
60	2142	1853	2184	1889	2268	1944	-	-
50	1785	1544	1820	1574	1890	1620	-	-
40	1428	1235	1456	1259	1512	1296	-	-
30	1071	926	1092	945	1134	972	-	-
20	714	618	728	630	756	648	-	-
10	357	309	364	315	378	324	-	-
0	0	0	0	0	-	-	-	-

14" DN350	Body Material / Lining							
	Cast Iron		Rubber Lined		Glass Lined		Plastic Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv
100	3700	3171	3750	3214	3880	3326	-	-
90	3552	3045	3600	3086	3724	3191	-	-
80	3404	2917	3450	2957	3569	3059	-	-
70	3256	2791	3300	2829	3414	2926	-	-
60	3107	2663	3149	2699	3259	2793	-	-
50	2590	2220	2625	2250	2716	2327	-	-
40	2072	1776	2100	1800	2172	1861	-	-
30	1553	1331	1574	1349	1629	1396	-	-
20	1036	888	1050	900	1086	931	-	-
10	518	444	525	450	543	465	-	-
0	0	0	0	0	0	0	0	0

Cv is flow in US gpm through valve at △P of 1 psi

Kv is flow in m^3/hr through valve at △P of 1 bar

Saunders **A** Type Diaphragm Valves

Large Sizes

Saunders large diaphragm valves have proven themselves in minerals processing and water treatment applications involving corrosive and abrasive slurries.

Double weir options are also available utilizing diaphragms and bonnets proven in 12” and 14” valves.

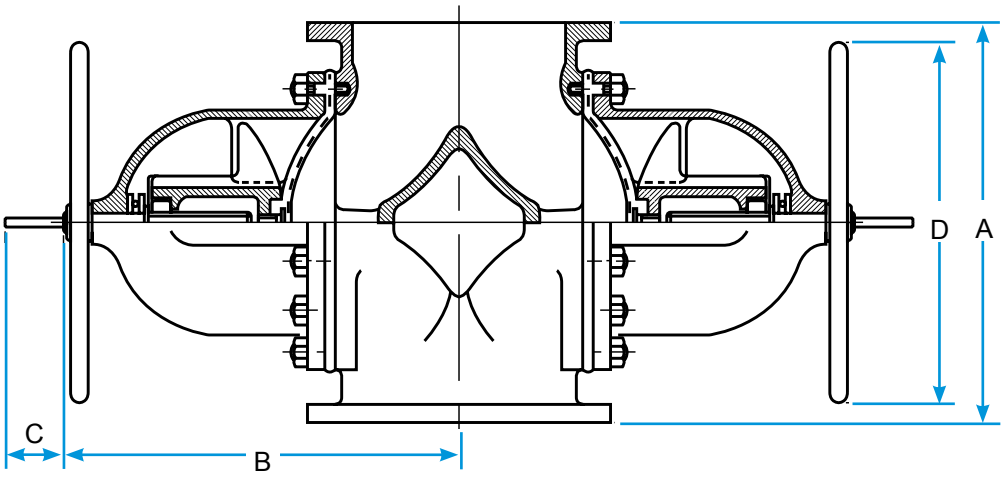
Valve sizes

16” DN400 is fitted with two 12” DN300 bonnets

18” DN450 is fitted with two 12” DN300 bonnets

20” DN500 is fitted with two 14” DN350 bonnets

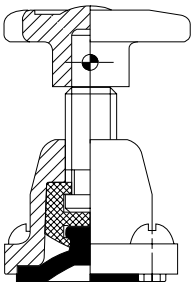
These valves are not suitable for use with Group 1 (Dangerous) Gases.



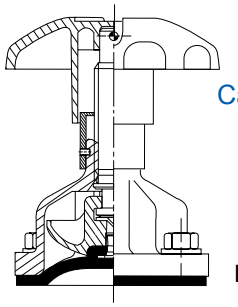
Valve Diameter

Inches DN		16 400	18 450	20 500	
Large Valves	**A**	30	30	30	Inches
		750	750	750	mm
	B	30	30	31	
		750	750	780	
	C	7.5	7.5	9.1	
		190	190	230	
	D	28	28	28	
		700	700	700	

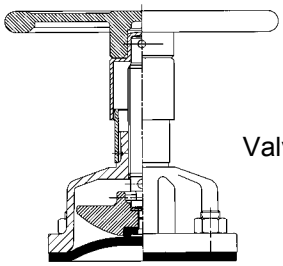
Manual Bonnet Options for A Type Valves



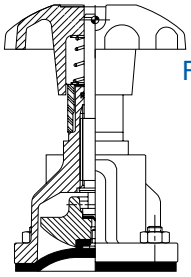
Rising Handwheel
Valve sizes:
1/4" to 3/8"
DN8 to DN10



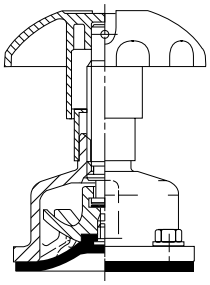
Cast Iron Rising Handwheel Bonnet
Valve sizes:
1/2" to 2"
DN15 to DN50



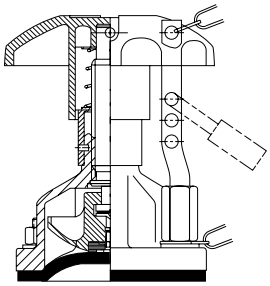
Cast Iron Rising Handwheel
Valve sizes: **2 1/2" to 6"**
DN65 to DN150



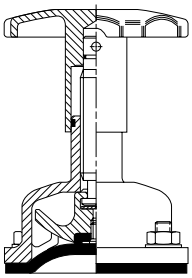
Fluoroelastomer Sealed Bonnet
Valve sizes:
1/2" to 6" *
DN15 to DN150*



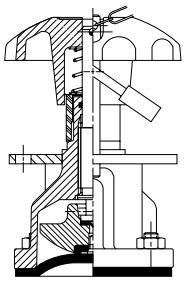
Stainless Steel
Valve sizes:
1/2" to 6" *
DN15 to DN150*



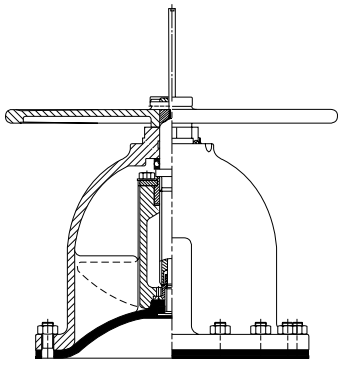
Rising Handwheel Indicator
(simple padlocking)
Valve sizes:
1/2" to 6" *
DN15 to DN150*



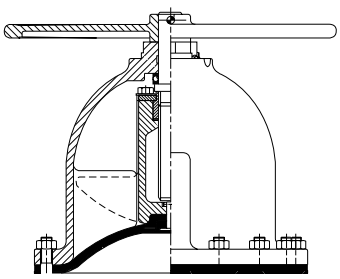
Stainless Steel (Silicone Sealed)
Valve sizes: **1/4" to 3" ***
DN8 to DN80



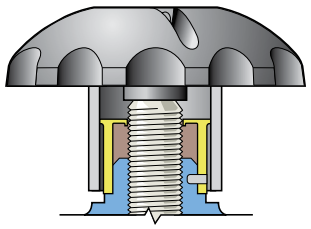
Fluoroelastomer Sealed Padlocking
Valve sizes:
1/2" to 6" *
DN15 to DN150*



Non-rising Handwheel with Indicator
Valve sizes: **8" to 12"**
DN200 to DN300

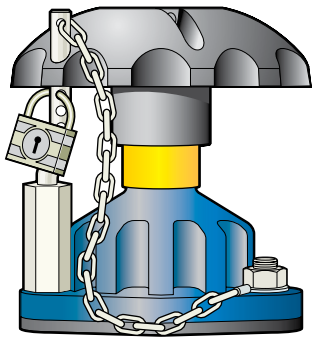


Non-rising Handwheel without Indication
Valve sizes: **8" to 14"**
DN200 to DN350



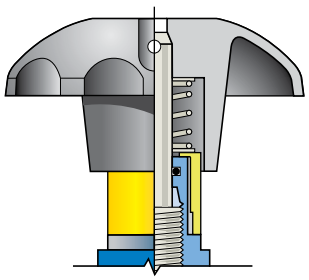
Lubrication

Bonnet assembly lubricated for long life. Needs no additional grease. The indicator lip seal stops the ingress of dust, dirt and atmospheric contaminates.



Padlock bonnet

Restricted valve operation can be achieved by utilizing the padlocking bonnet option.



Sealed bonnet

In cases where hazardous liquids or gases are being handled and where additional safety features are considered to be necessary.

* Handwheel is spoked design 2½" - 6" DN65 – DN150

Other bonnets are available upon request.

Saunders Diaphragms -**The Science Inside**

Saunders applies rigorous quality control measures at every step in the manufacture of its diaphragms.

Years of experience and materials development have resulted in a range of diaphragms providing exceptional performance in a wide variety of applications.

You can rely on Saunders for stringent quality control and continuous product development.

Key Considerations

- High flex performance
- Compression set properties
- Chemical resistance
- Abrasion resistance
- Anti-aging
- Approvals, traceability

All rubber diaphragms incorporate the following features

- Constructed with multi-layers of rubber and nylon reinforcement
- Studs are attached with bonding adhesive and mechanical anchorage
- Rib on face for weir flange and across weir for leak tight sealing and lower closure torque
- Compressor support in both the open and closed positions for extended life

PTFE diaphragm bayonet fixing

PTFE Diaphragms

A two piece construction PTFE face with a reinforced rubber backing diaphragm to increase pressure rating and durability.

These diaphragms have a bayonet fitting to ensure reliable installation, reduce point loading and ensure maximum life.

(The 214K is three piece specially reinforced for chlorine service.)

Rubber diaphragm screw fixing

Rubber Diaphragms

The polymer material is bonded with a high strength woven reinforcement to ensure maximum strength and durability.

ISO Code	Catalog Code	Grade	Elastomer type	General service and approvals
NBR	C1	**C**	Butadiene Acrylonitrile, sulphur cured, black reinforced	Lubricating oil, cutting oils, paraffin, animal and vegetable oils, aviation kerosene
NBR	CV	**CV**	Butadiene Acrylonitrile, sulphur cured, black reinforced	Vacuum where oils are present, compressed air, liquid petroleum gas (LPG)
CR	HT	**HT**	Polychloroprene, sulphur cured, black reinforced	Abrasive slurries containing hydrocarbons
NR	Q1	**Q**	Natural rubber polyisoprene/SBR, sulphur cured, black reinforced	Salts in water, dilute acids and alkalis, abrasives
FKM	V1	**226**	Fluoroelastomer, amine cured, black reinforced	Concentrated acids, aromatic solvents, chlorine, ozone, chlorinated solvents, unleaded gasoline
CSM	U1	**237**	Chlorosulphonated polyethylene metal oxide cured, black reinforced	Strong acids, sodium hypochlorite, chlorine gas
	U2	**286**	Chlorosulphonated polyethylene metal oxide cured, black reinforced Kevlar fabric reinforced	Fire mains isolation in WFB valve
IIR	D1	**300**	Isobutylene Isoprene, resin cured, black reinforced	Salts in water, dilute acids and alkalis, drinking water, Food & Drug Administration (FDA), United States Pharmacopeia (USP), Water Regulations Advisory Scheme (WRAS)
EPM	E2	**425**	Ethylene propylene (EPM) organic peroxide cured, black reinforced	Salts in water, acids and alkalis, ozone, intermittent steam, drinking water, FDA, USP, WRAS
EPM	EV	**425V**	Ethylene propylene (EPM) organic peroxide cured, black reinforced	Vacuum where acid, alkali, water vapors are present, FDA, USP, WRAS
	P3	**214/226**	Virgin PTFE/Fluoroelastomer – two piece	Strong acids, solvents, chlorine, bromine at higher temperatures
	P1	**214/300**	Virgin PTFE/Isobutylene isoprene – two piece	Strong acids, alkalis and salts in water at high temperature. Constant steam, water for injection (WFI), biopharmaceuticals, FDA USP, WRAS
	P2	**214/425**	Virgin PTFE/Ethylene propylene (EPM) – two piece	Strong acids, alkalis and salts in water at high temperature. Constant steam, water for injection (WFI), biopharmaceuticals, FDA, USP, WRAS
	S5	**214S/425**	Virgin PTFE(TFM)/Ethylene propylene (EPM) – two piece	Strong acids, alkalis and salts in water at high temperature. Constant and intermittent steam, WFI, biopharmaceuticals, FDA, USP, WRAS
	P7	**214K/425**	Virgin PTFE/PVDF/Ethylene propylene (EPM) – three piece	Chlorine, bromine gas and chlorinated solvents

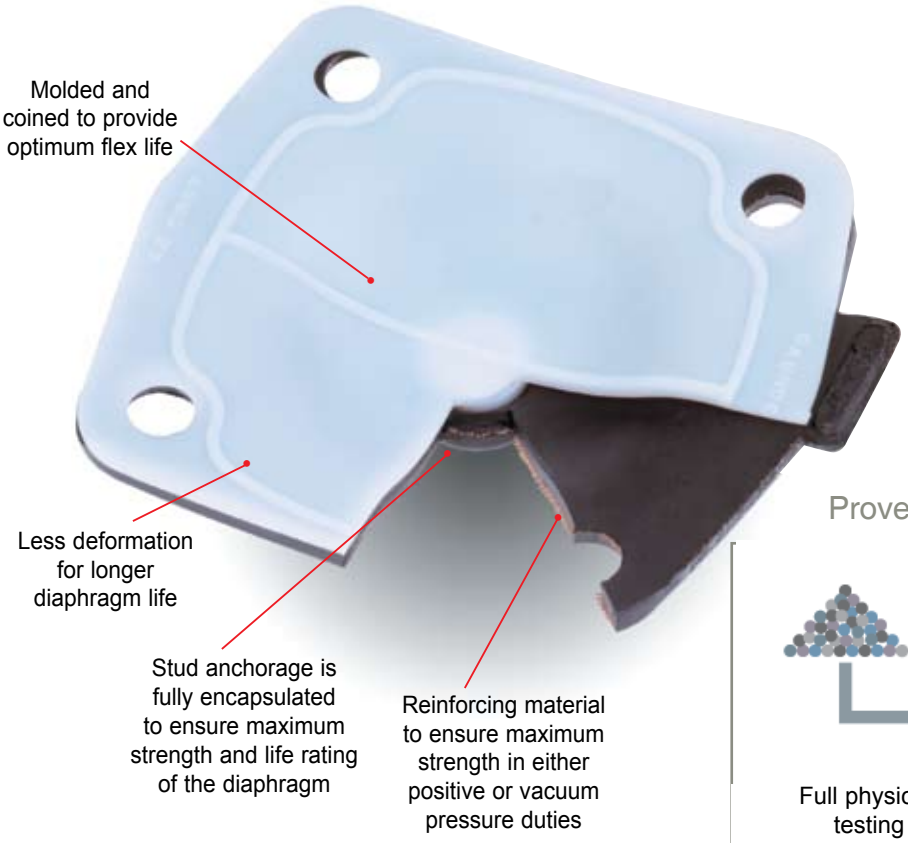
Standard

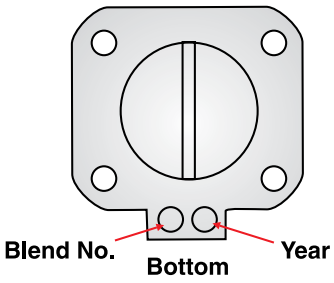
- Rubber diaphragms have a brass stud
- Diaphragms suitable for vacuum duties (eg. CV) have steel stud. (Additional reinforcement above 3 inches.)
- PTFE diaphragms are fitted with stainless steel bayonet

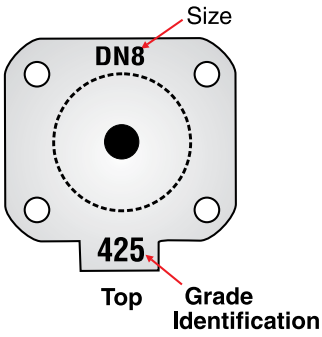
Saunders Diaphragms are provided with:

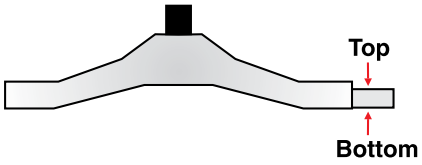
- Full traceability of manufacture
- Coding tag for both material and batch number for easy identification
- Saunders name to confirm genuine manufacture and maximum reliability

Diaphragm Traceability and Validation

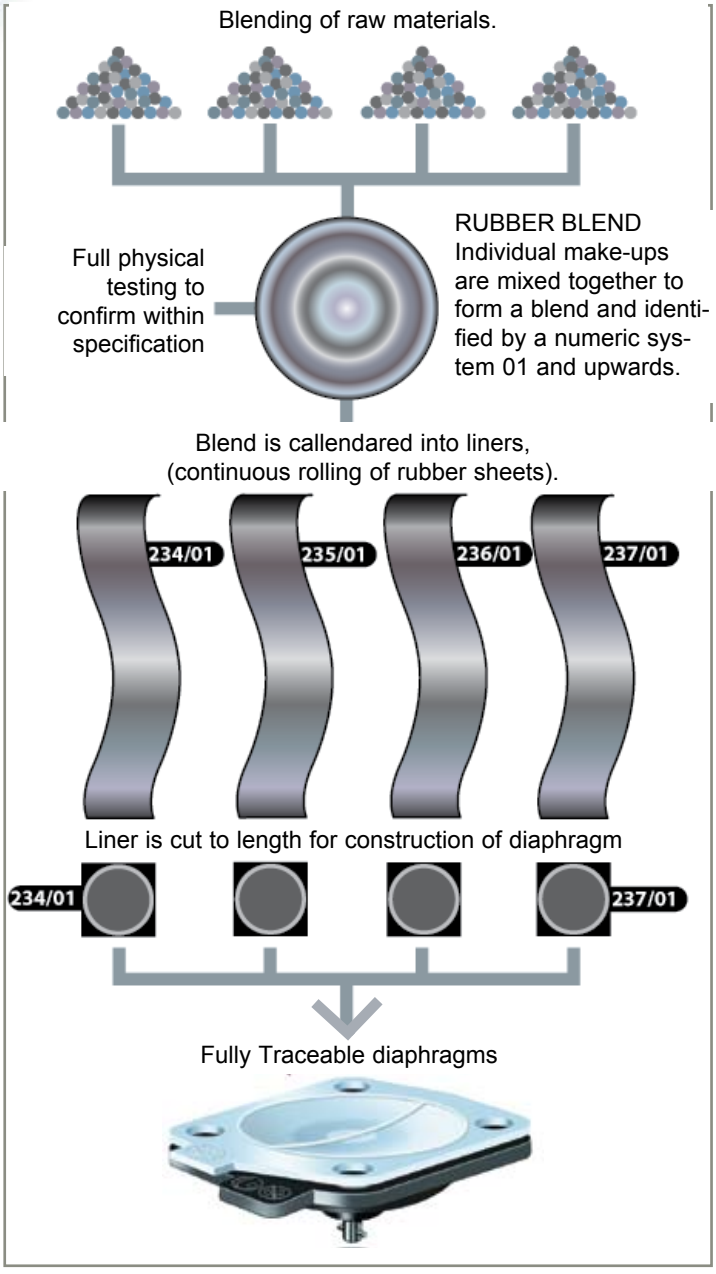








Proven manufacturing process



Diaphragm Traceability and Validation

Validation support –
from raw materials to your system

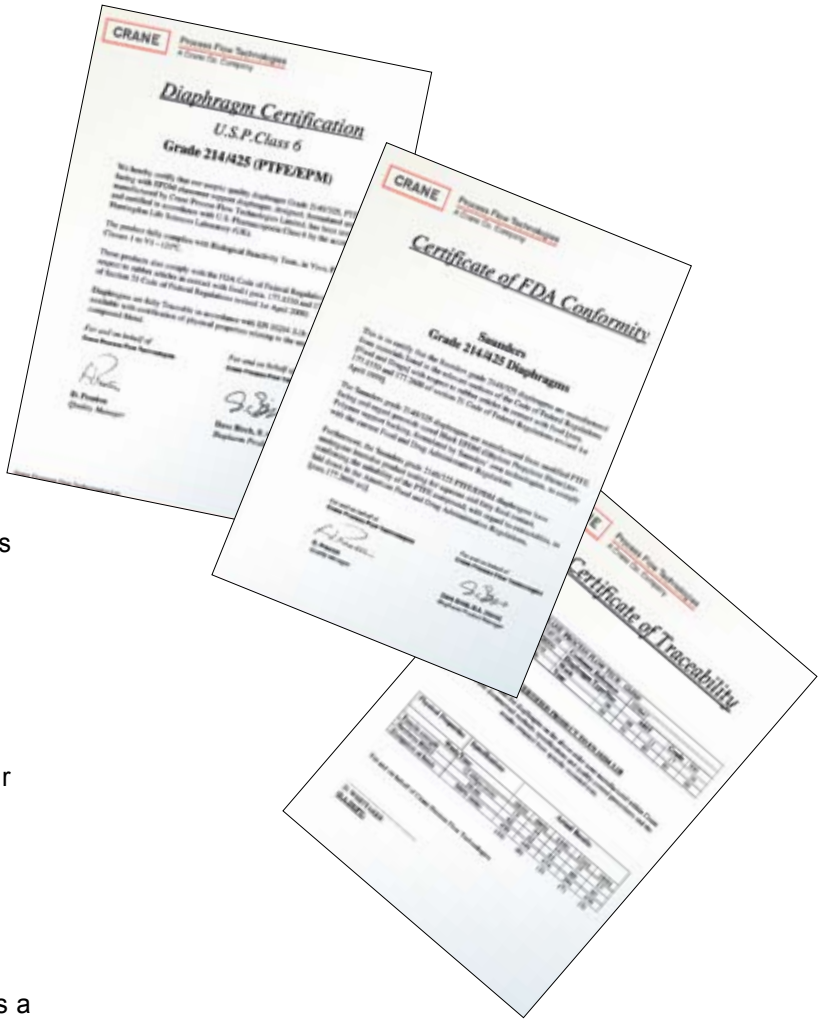
- Diaphragms are batch traceable and carry a unique molded batch identification number
- Diaphragms can be issued with a certificate of FDA conformity to assist in FDA validation and internal quality controls
- Physical property data is also available upon request

Saunders diaphragms offer enhanced performance with more confidence

- The integrity of the product and the quality of your process is assured. All extractables are fully identified and guaranteed to meet FDA limits. Access to all physical data is available upon written request.

Expert and independent verification

- Saunders has worked with the Rubber and Plastics Research Association (RAPRA) to provide complete and detailed identification of extractables and leachables – leading the way and reaffirming our commitment to our customers and the industry.



Full traceability and product validation

Saunders is acknowledged throughout the industry as a leader in quality assurance techniques and design criteria for biopharm processes.

Saunders fully traceable diaphragms provide valve users with uniquely valuable support in the validation process.

- A unique molded reference number gives precise batch traceability
- Access is available to all relevant physical data
- Diaphragms meet the most stringent validation requirements
- A certificate of the physical properties of each batch is issued to ensure consistency and support validation on request
- A profile of the complete physical data of each batch is available to help troubleshooting
- Complete documentation package is available for all valve components in contact with the process fluids (EN 10204 3.1b certification).

Validation support

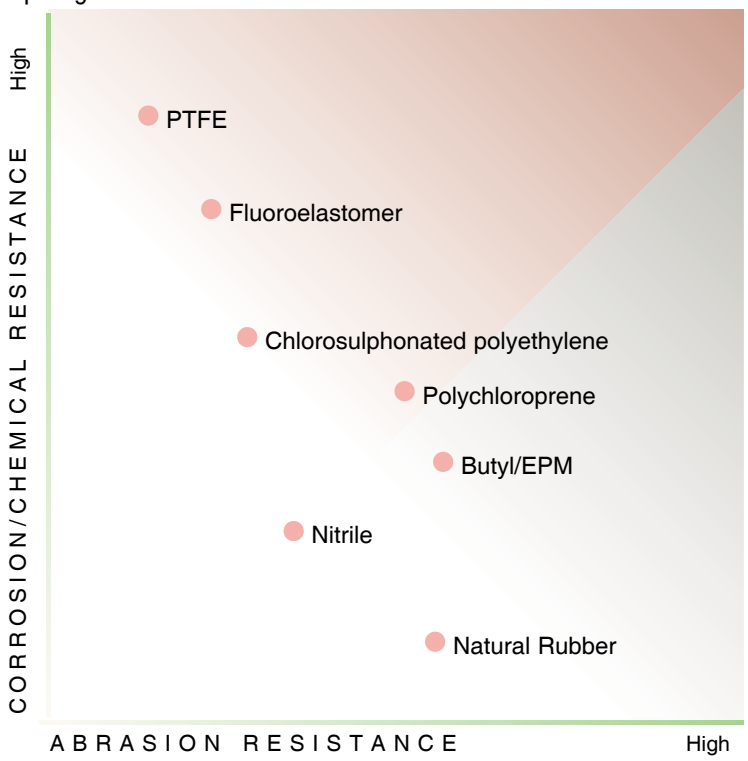
Diaphragms conform to section 177.1550 (Perfluorocarbon resins) or 177.2600 (Rubber Articles) in Chapter 1 Title 21 of the FDA Regulations (revised 1st April 2001) USP Class V and VI.

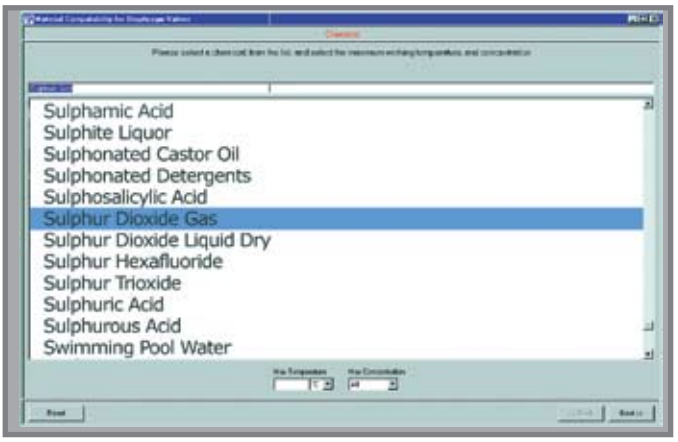
Traceable to EN10204 3.1b (was DIN 50049 3.1b)

Saunders Diaphragms -**The Science Inside**

Diaphragm Materials

Diaphragm Materials – Visual Process Resistance Guide





The Saunders Material Selection Database software is available which lists over 1,000 process chemicals. Just enter the temperature and concentration and a recommendation for the body and diaphragm material is selected.

Material	Catalog Code	Grade
PTFE	P7	214/214K
Fluoroelastomer	V1	226
Chlorosulphonated Polyethylene	U1	237
Polychloroprene	HT	HT
Nitrile	C1, CV	C, CV
Butyl	D1	300, 300V
EPM	E2, EV	425, 425V
Natural Rubber	Q1	Q

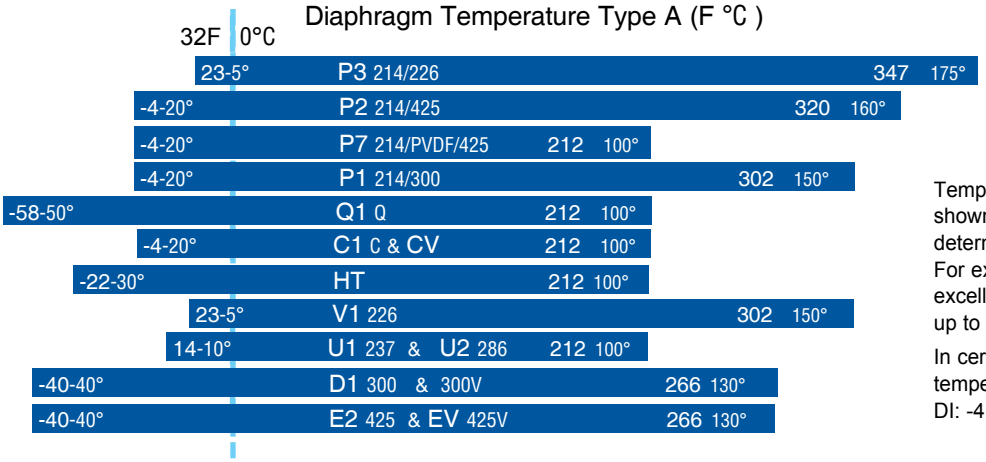
Maximum working pressure (psi / bar) – **A** Type valves

As with all valves, the application and environment have a major bearing on actual valve operating limits, but the following can be used as a guide to the maximum operational limits.

Valve Size Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14	
Valve Size DN	8	10	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	
Bonnet assemblies with rubber diaphragm																		
Non-rising handwheel														90	75	60	52.5	psi
														6	5	4	3.5	Bar
Rising handwheel	—	—	—	240	—	—	—	—	—	—	150	—	—					psi
	—	—	—	16	—	—	—	—	—	—	10	—	—					Bar
WFB and tank cleaning							225		225									psi
							15		15									Bar

Valve Size Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	12	
Valve Size DN	8	10	15	20	25	32	40	50	65	80	100	125	150	200	300	
Bonnet assemblies with PTFE faced diaphragm																
Non-rising handwheel														90	75	psi
														6	5	Bar
Rising handwheel	—	—	—	—	—	—	150	—	—	—	—	—	105			psi
	—	—	—	—	—	—	10	—	—	—	—	—	7			Bar

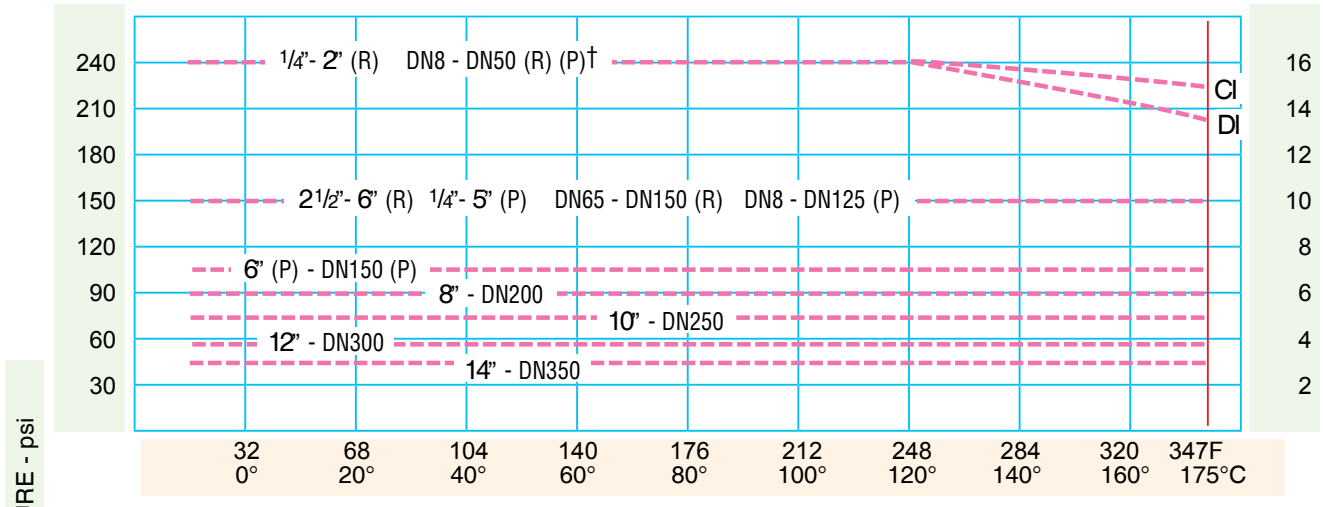
Temperature and Pressure Relationships



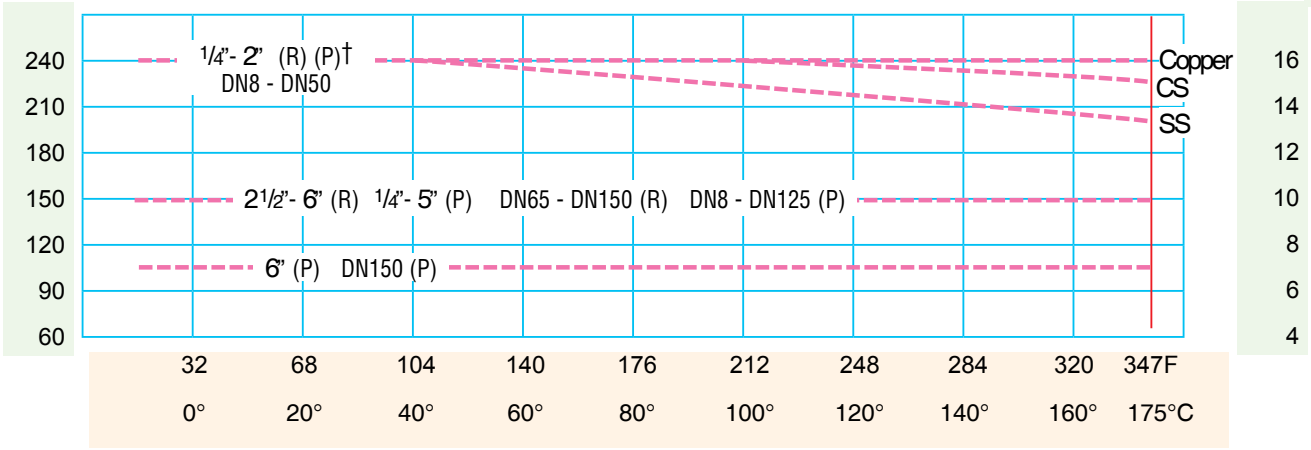
Temperature bands for diaphragms are shown as a guide only. Service conditions will determine the highest working temperature. For example, EP diaphragms have given excellent performance under certain conditions up to 302F 150°C.

In certain applications the following temperature ratings apply:
DI: -4F,-20°C. SS: -22F,-30°C. GM: -22F,-30°C.

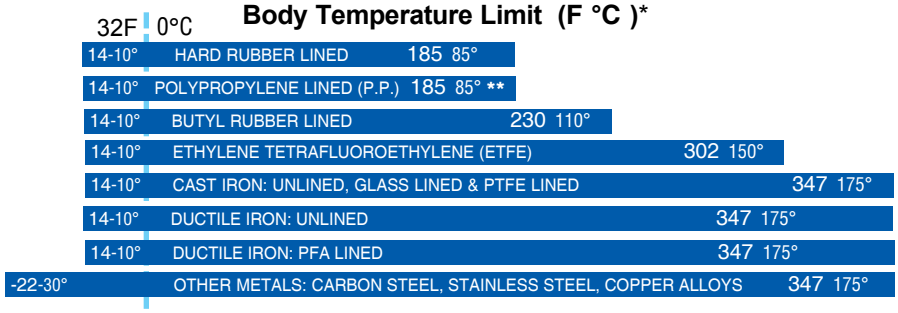
A Type Valve Body (Ductile Iron & Cast Iron) Temperature/Pressure Relationship



A Type Valve Body (Carbon Steel, St.Steel & Copper Alloys) Temperature/Pressure Relationship



Body Temperature Limit (F °C)*



* When lined body is cast steel, minimum temperature is --22F-30°C. When DI Grade EN-GJS-400-18-LT is used, minimum temperature is -4F-20°C.

** Depends on body substrate material.

† 214S Mdd closed version only.

Saunders **WFB** Type Valves

For Marine and Fire Fighting Applications

The WFB valve is a weir type diaphragm valve developed specifically for fire fighting, tank cleaning and wash-down on land or sea.

There are no second chances with fire hydrant valves. Saunders WFB model provides dependable operation when it matters – even after years of non-use.

This highly specialized fire hydrant valve has been tested and approved by the world's leading safety agencies.

Similar in design and operation to the widely used A Type, it has the added benefit of a certified chlorosulphonated polyethylene base fire resistant diaphragm.

The WFB valve is available in ductile iron SG Iron or bronze Gunmetal providing high mechanical strength. This means that they provide greater resistance to accidental impact. Bronze Gunmetal resists corrosion on the more demanding saline applications.

Diaphragms

Fire mains use:

- 286 grade 'Fire' diaphragm
- 233 CV grade diaphragm (tank cleaning)

Flanges

- BS10 Tables D, E and F (Bronze & Ductile Iron Gunmetal & SG Iron)
- BS4504 PN16
- DIN 86021 ND16 and ANSI B16.24 Class 150 (Bronze Gunmetal)
- EN1092-2 PN16 and ANSI B16.1 Class 150 (Ductile Iron SG Iron)

Main Body Inlet/Outlet Body Options

Screwed	Flanged
BS 21RP	BS4504 PN16
BS 21RP	ANSI Class 150
BS 21RP	BS10 Table D
BS 21RP	JIS10K
ANFT (American National Fire Thread) male or female	

Other screwed and flanged options available on request.

Valve Weights lb / kg

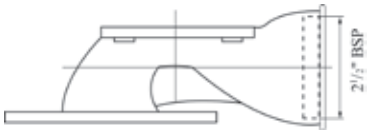
Model	4	9	11
Bronze	22.7	22	22
	10.3	10	10
Ductile Iron	17.6	17.2	19.7
	8	7.8	8.95

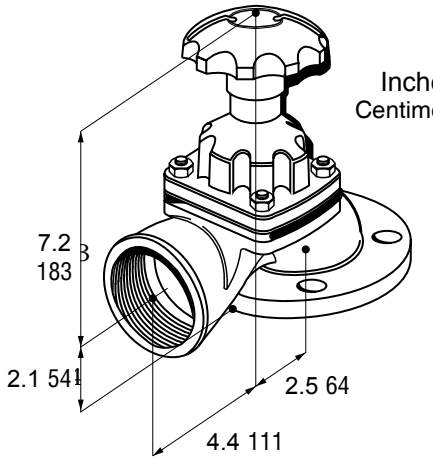
Model 4 with body and bonnet material in Ductile Iron SG Iron

Model 11 with body and bonnet material in Bronze Gunmetal.

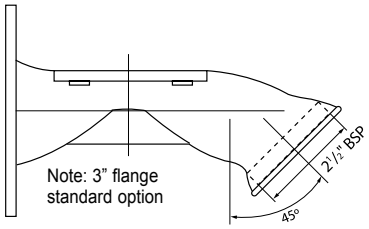
Model 4 with body and bonnet material in Bronze Gunmetal.

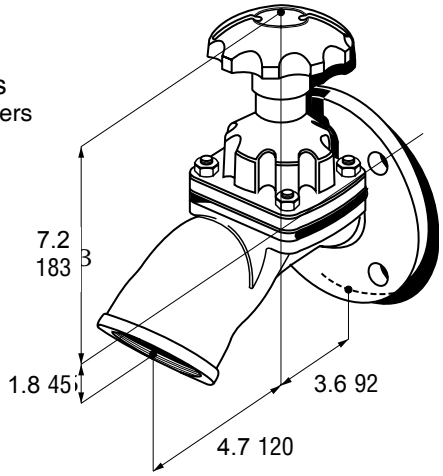
Model 4



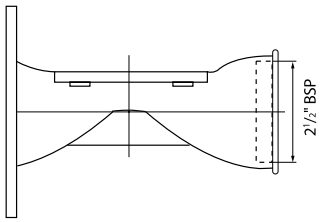


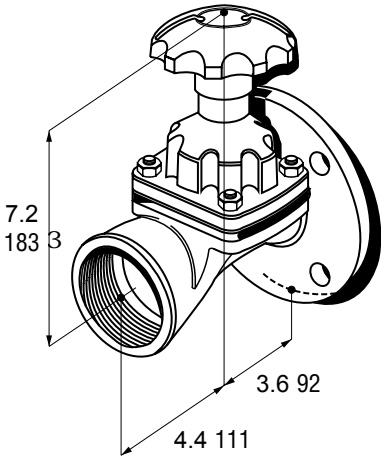
Model 11



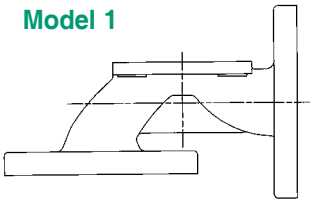


Model 9

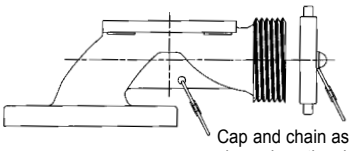




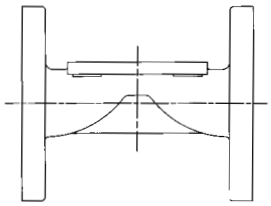
Model 1



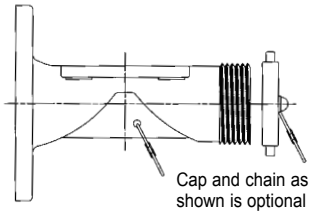
Model 2



Model 6



Model 7



SIZE	MODELS							BODY MATERIALS
	1	2	4	6	7	9	11	
1½ DN40	–	◆	◆	–	◆	◆	–	Bronze Gunmetal
2½ DN65	◆	◆	◆	◆	◆	◆	◆	Bronze & Ductile Iron Gunmetal & SG Iron

Testing: Valves tested in accordance with MSS SP-88 BS 6755 i.e. body strength test to 325 psi 22.5 bar, seat test to 240 psi 16.5 bar (1.1 x maximum working pressure)

"We specified Saunders WFB 2½" 65mm nominal bore fire-mains hydrant valves for our ferries and cruise liners. Significant factors behind this choice are excellent reliability and the low maintenance costs".
P&O Cruises (UK) Ltd

Product approvals

Marine Safety Agency
The Department of Transport Certificate of Inspection and Tests
Certificate No: SUR 222 (REV 4/94)
Model: 1½, 2½
DN40, DN65

Lloyds Register of Shipping
LR Type Approval Certificate
Certificate No: 97/00047
Model: 1½, 2½
DN40, DN65

Bureau Veritas
Type Approval Certificate
Certificate No: 2207 3457 C10 H
Model: 1½, 2½
DN40, DN65

Registro Italiano Naval
Rina
Type Approval Certificate No: MAC/057/94
Model: 2½
DN65

- UK Marine Safety Agency
- Bureau Veritas
- Rina
- Lloyds
- DTI

The whole valve has successfully undergone a high temperature resistance test, BS 5041 Part 1, audited by a Lloyds Surveyor.

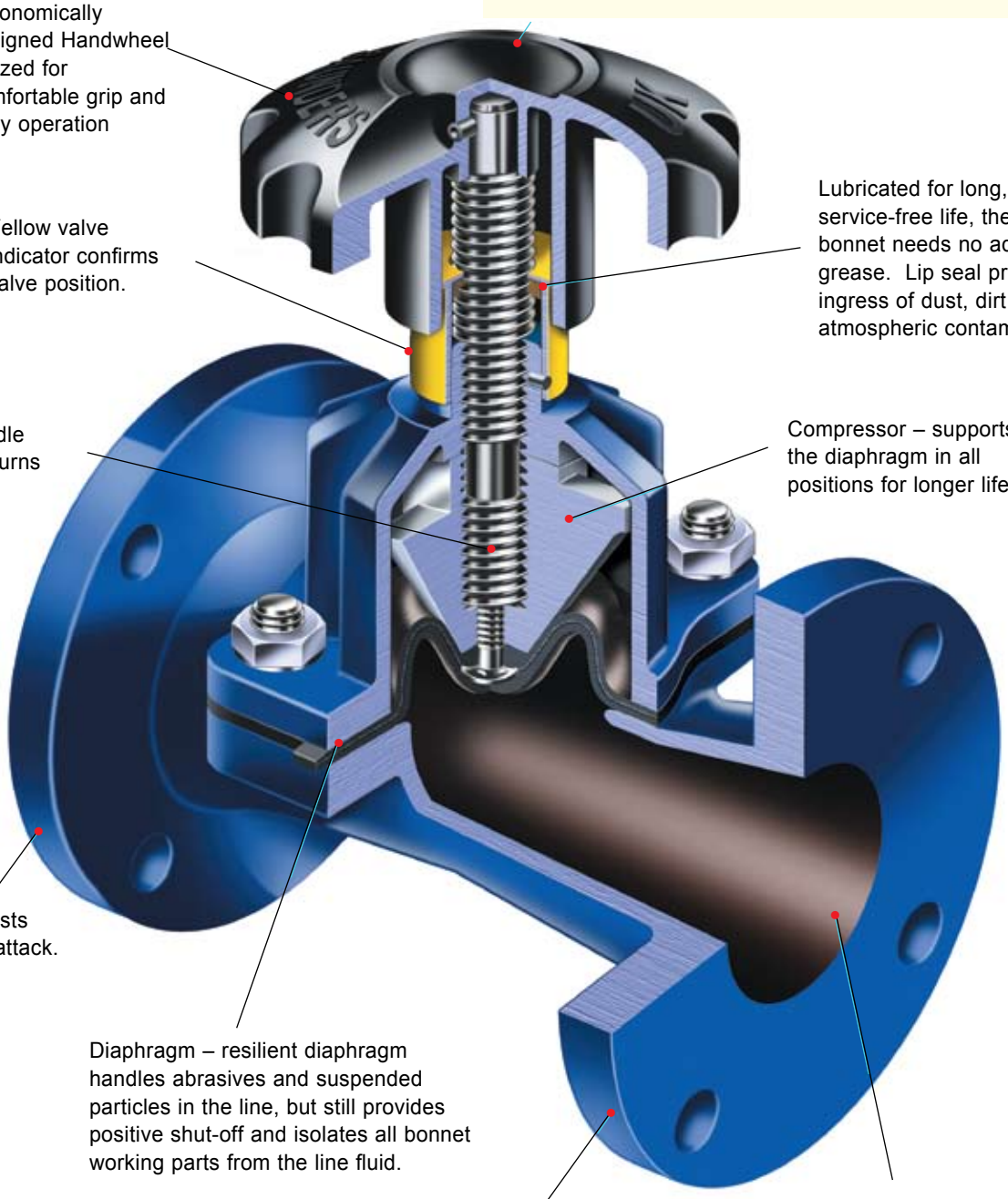
Note: All Saunders Diaphragm Valves carry DNV, LR, AUB, and BV approvals.

Saunders **K/KB** Type Design Features

Contribute to low pressure drop high flow capability and long valve life for abbrasive applications.

The Original and the Best

Saunders diaphragm valve features and benefits for corrosive and abrasive applications with 100% leaktight closure operation



Ergonomically designed Handwheel – sized for comfortable grip and easy operation

Yellow valve indicator confirms valve position.

Advance spindle reduces # of turns

Paint finish resists environmental attack.

Diaphragm – resilient diaphragm handles abrasives and suspended particles in the line, but still provides positive shut-off and isolates all bonnet working parts from the line fluid.

Body materials alloys – cast iron, rubber lined and glass coated. Screwed and flanged ranges.

Smooth non-turbulent body design for unrestricted flow and minimum pressure drop.

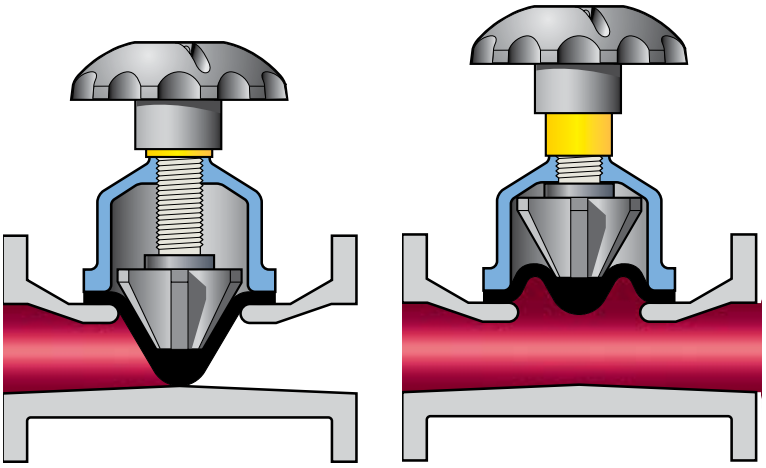
Compressor – supports the diaphragm in all positions for longer life.

Lubricated for long, service-free life, the bonnet needs no additional grease. Lip seal prevents ingress of dust, dirt and atmospheric contaminants.

Saunders K/KB Type Diaphragm Valves

K: High Flow / KB: Straight Through

Saunders full bore K/KB type diaphragm valves, with their smooth non-turbulent body design have proved to be outstanding in corrosive and abrasive applications. The full bore concept is designed for minimum flow resistance while allowing rodding out and easy cleaning.



Features	Benefits
Straight through body, high flow	No obstruction, low pressure drop
Flexible closure even with solids present	Leaktight by design
Only two wetted parts	Better resistance to corrosion/abrasion and longer life
Specially developed linings and diaphragms available	Minimal maintenance

• Low pressure drop

Low pressure drop and high flow makes this valve ideal for handling slurries.

• Cavity free

No cavities ensures solids do not build up in the line causing wear and blockage.

• Valve flow

Smooth bore straight through body gives high flow performance with minimum turbulence, while giving 100% leaktight closure.

• Lubrication

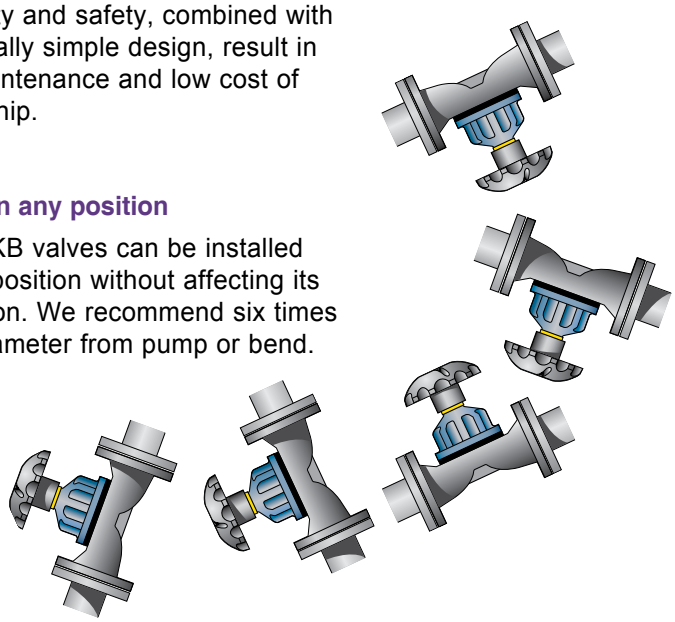
Bonnet assembly lubricated for long life. Needs no further grease. The indicator lip seal stops the ingress of dust, dirt and atmospheric contaminates.

• Ease of maintenance

Three part design allows maintenance and actuator retrofitting without removing the valve body from the pipeline. Extended life, reliability and safety, combined with essentially simple design, result in low maintenance and low cost of ownership.

• Use in any position

The K/KB valves can be installed in any position without affecting its operation. We recommend six times pipe diameter from pump or bend.



Saunders K/KB Type Diaphragm Valves

Materials of Construction

Valve bodies

Cast Iron, Bronze - Screwed - 1/2" - 2"
Cast Iron, Gunmetal - Screwed - DN15 – DN50

Cast Iron, Bronze - Flanged - 1/2" - 14"*
SG Iron, Cast Steel Stainless Steel
Cast Iron, Gunmetal - Flanged - DN15 – DN350*

* Contact us for materials range

Rubber lined body data

- Soft rubber linings
  - Natural (Polyisoprene), 40–46° IRHD
  - Polychloroprene, 72–78° IRHD
  - Butyl (Isobutylene isoprene), 60–66° IRHD
- Hard ebonite rubber HRL, 75–85° Shore D
- Lining thickness range 0.7" - 0.17" for valve sizes 3/4" - 14" 2–4.5mm (DN20–DN350)

Valve body lining – production tests

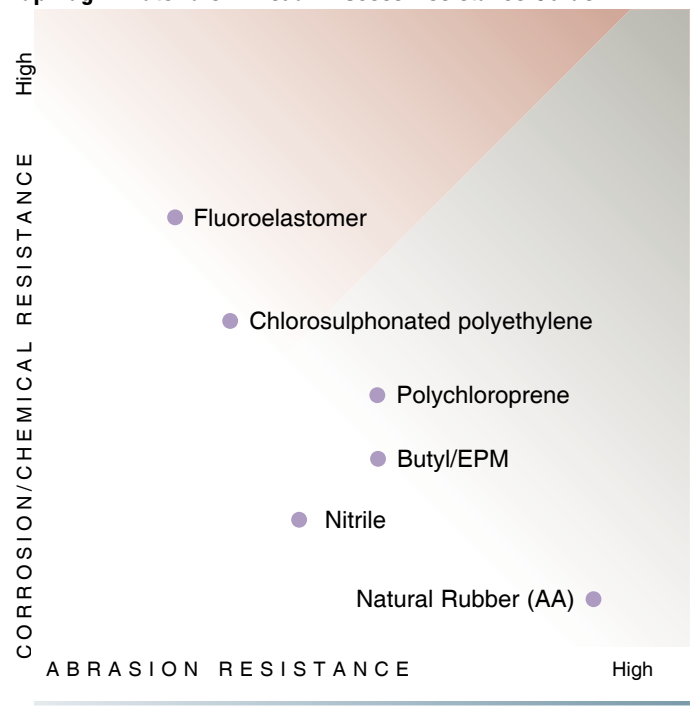
All Saunders lined valves have each body individually tested for lining integrity.

- Glass lining – Spark test 10kV ac
- Rubber, Butyl, Polychloroprene, Natural – Spark test 14kV ac/dc
- Rubber, HRL – Spark test 17kV ac/dc

Diaphragm Materials

ISO Codes	Catalog Code	Grade	Elastomer Type	General Service & Approvals
NR	AA	AA	Natural rubber (polyisoprene) metal oxide pigmented – brown sulphur cured, black reinforced	Abrasives in slurry or dry powder form
NBR	C1	C	Butadiene Acrylonitrile, (Nitrile) sulphur cured, black reinforced	Lubricating oil, cutting oils, paraffin, animal and vegetable oils, aviation kerosene
CR	HT	HT	Polychloroprene, sulphur cured, black reinforced	Abrasives slurries containing hydrocarbons
CSM	U1	237	Chlorosulphonated polyethylene	Acids, hypochlorite
FKM	V1	226	Fluoroelastomer, amine cured, black reinforced	Concentrated acids, aromatic solvents, chlorinated solvents, unleaded gasoline
IIR	D1	300	Isobutylene Isoprene, resin cured black reinforced	Abrasive slurries, acid digested slurries, alkalis, dry powders
EPM	E2	425	Ethylene propylene (EPM) organic peroxide cured, black reinforced	Abrasive slurries, acid digested slurries, alkalis, dry powders

Diaphragm Materials – Visual Process Resistance Guide



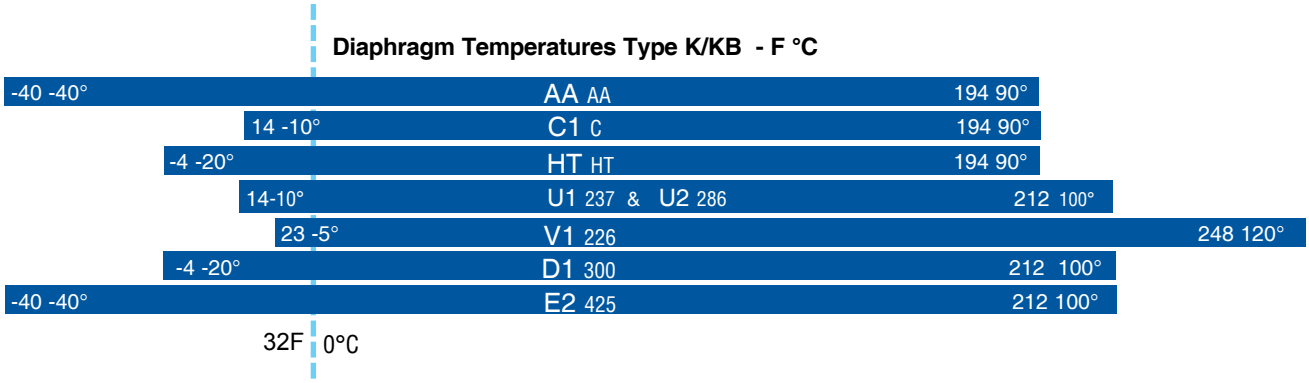
Type KB Valves – maximum working pressure - psi / bar

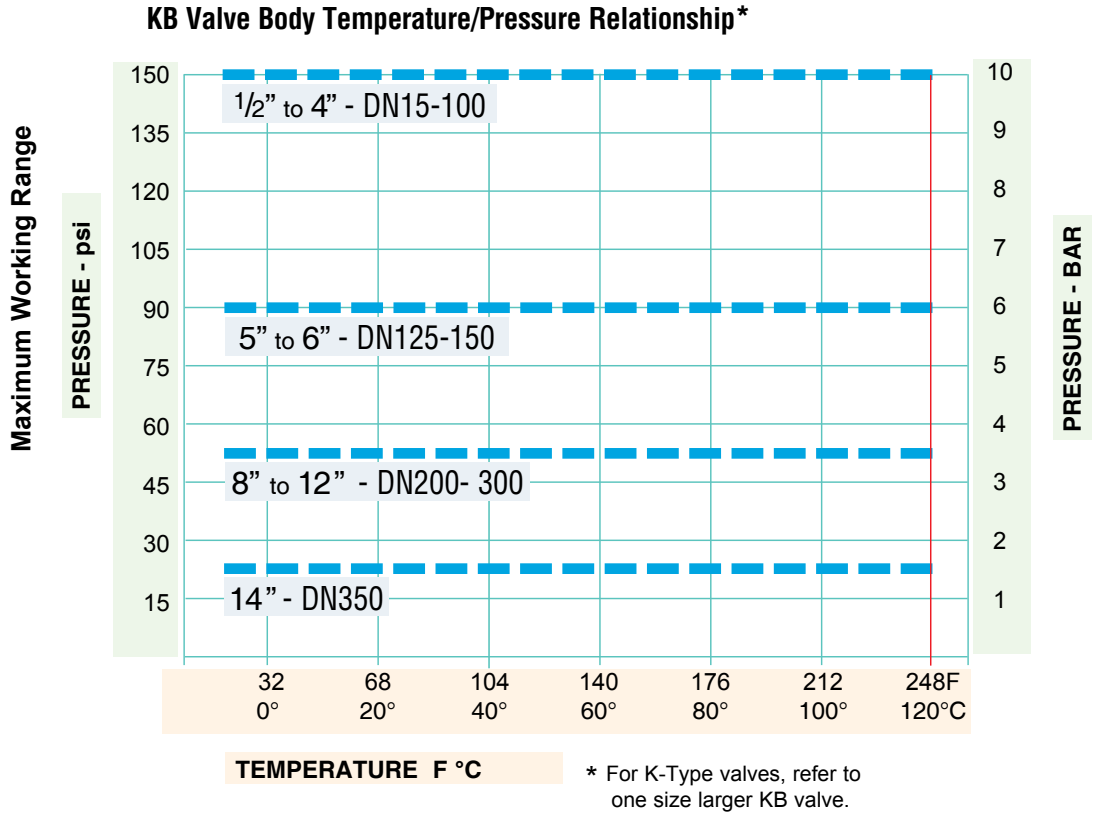
Valve Size Inches DN	1/2 15	3/4 20	1 25	1 1/4 32	1 1/2 40	2 50	2 1/2 65	3 80	4 100	5 125	6 150	8 200	10 250	12 300	14 350	
Non-rising Handwheel												52.5			22.5	psi
												3.5			1.5	bar
Rising Handwheel					150					90						psi
					10					6						bar

Maximum working pressure for KB valves shown is for manual valves, defined as the maximum line pressure against which valves may be operated to closed position up to and including 131F 55°C. For ES actuators, please refer to appropriate actuator performance selection technical data sheets.

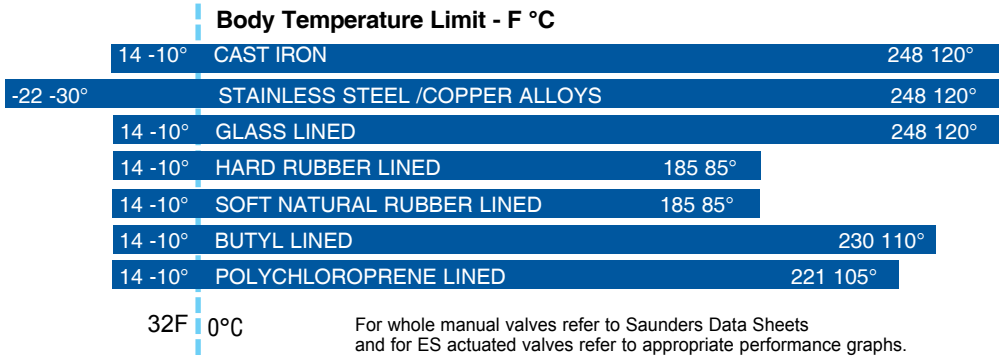
Saunders K/KB Type Diaphragm Valve Performance

Temperature and Pressure Relationship





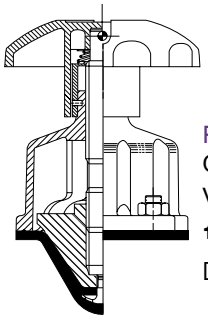
* For K-Type valves, refer to one size larger KB valve.



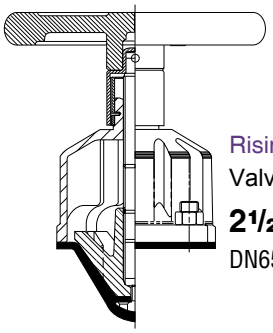
For whole manual valves refer to Saunders Data Sheets and for ES actuated valves refer to appropriate performance graphs.

Saunders KB Type Diaphragm Valves

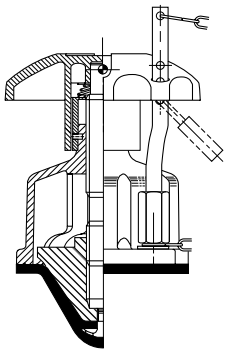
Typical Bonnet Options for Manual KB Valves



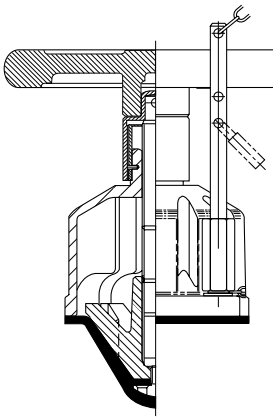
Rising Handwheel Indicator
Optional Metal Handwheel
Valve sizes:
½" to 2"
DN15 to DN50



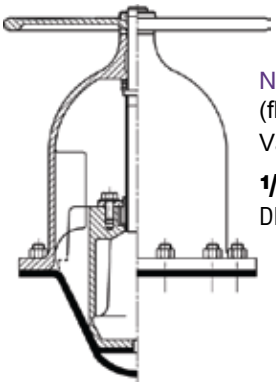
Rising Handwheel Indicator
Valve sizes:
2½" to 6"
DN65 to DN150



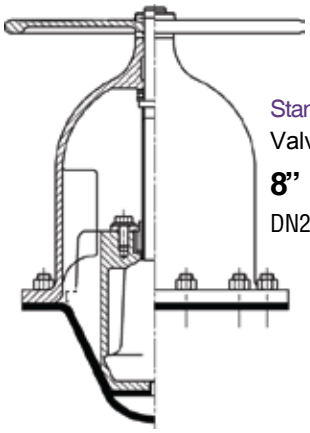
Rising Handwheel Indicator
(simple padlocking)
Valve sizes:
½" to 2"
DN15 to DN50



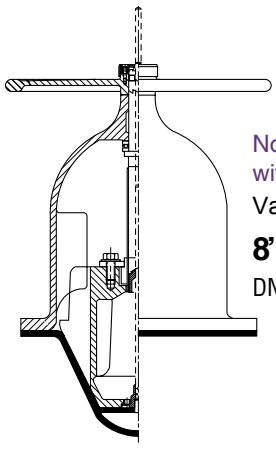
Rising Handwheel Indicator
(simple padlocking)
Valve sizes:
2½" to 6"
DN65 to DN150



Non-Rising Handwheel
(fluoroelastomer sealed)
Valve sizes:
½" to 12"
DN15 to DN300



Standard Non-Rising Handwheel
Valve sizes:
8" to 14"
DN200 to DN350



Non-Rising Handwheel
with Indicator
Valve sizes:
8" to 12"
DN200 to DN300

Saunders KB Type Diaphragm Valve Flow Co-efficients of Valve Range Cv (Kv)

1" DN25	Body Material / Lining					
	Cast Iron		Rubber Lined		Glass Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv
100	37.80	32.40	30.60	26.20	39.00	33.40
90	35.10	30.10	28.40	24.30	36.00	30.87
80	32.10	27.51	26.04	22.32	33.00	28.30
70	29.10	24.94	23.60	20.20	30.00	25.70
60	26.50	22.71	21.40	18.40	27.30	23.40
50	22.70	19.50	18.40	15.78	23.40	20.10
40	18.90	16.20	15.30	13.10	19.50	16.71
30	14.00	12.00	11.30	9.70	14.40	12.30
20	9.10	7.80	7.30	6.30	9.40	8.10
10	4.50	3.86	3.70	3.20	4.70	4.00
0	0	0	0	0	0	0

1 1/2" DN40	Body Material / Lining					
	Cast Iron		Rubber Lined		Glass Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv
100	75.00	64.30	66.00	56.00	79.00	68.00
90	70.00	60.00	61.00	52.00	73.00	63.00
80	64.00	54.90	56.00	48.00	67.00	57.00
70	58.00	49.70	51.00	44.00	61.00	52.00
60	52.00	44.60	46.00	39.00	55.00	47.00
50	45.00	28.60	40.00	34.00	47.00	40.00
40	38.00	32.60	33.00	28.00	40.00	34.00
30	28.00	24.00	24.40	21.00	29.20	25.00
20	18.00	15.43	15.80	13.55	18.90	16.00
10	9.00	7.72	7.90	6.80	9.50	8.00
0	0	0	0	0	0	0

2" DN50	Body Material / Lining					
	Cast Iron		Rubber Lined		Glass Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv
100	128.00	110.00	107.00	91.70	138.00	118.00
90	119.00	102.00	99.00	85.00	128.00	110.00
80	109.00	93.00	91.00	78.00	117.00	100.00
70	99.00	85.00	82.00	70.00	106.00	90.90
60	90.00	77.00	75.00	64.00	97.00	83.00
50	77.00	66.00	64.00	55.00	83.00	71.00
40	64.00	55.00	53.00	45.00	69.00	59.00
30	47.00	40.00	40.00	34.00	51.00	44.00
20	31.00	27.00	26.00	22.00	33.00	28.00
10	15.00	12.86	12.80	11.00	16.60	14.00
0	0	0	0	0	0	0

2 1/2" DN65	Body Material / Lining					
	Cast Iron		Rubber Lined		Glass Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv
100	238	204	195	167	254	218
90	221	189	181	155	236	202
80	202	173	166	142	216	185
70	183	157	150	129	196	168
60	167	143	136	117	178	153
50	143	123	117	100	152	130
40	119	102	97	83	127	109
30	88	75	72	62	94	81
20	57	49	47	40	61	52
10	29	25	23	19	20	26
0	0	0	0	0	0	0

3" DN80	Body Material / Lining					
	Cast Iron		Rubber Lined		Glass Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv
100	330	293	264	226	342	293
90	307	263	246	211	318	273
80	281	241	224	192	291	249
70	254	218	203	174	263	225
60	231	198	185	159	239	205
50	198	170	159	136	205	176
40	165	141	132	113	171	146
30	122	105	98	84	127	109
20	79	68	63	54	82	70
10	40	34	32	27	41	35
0	0	0	0	0	0	0

4" DN100	Body Material / Lining					
	Cast Iron		Rubber Lined		Glass Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv
100	588	504	480	411	618	528
90	547	469	446	382	575	493
80	500	429	408	350	525	450
70	453	388	370	317	476	408
60	412	353	336	288	433	371
50	353	303	288	247	371	318
40	294	252	240	206	309	265
30	218	187	178	153	229	196
20	141	121	115	99	148	127
10	71	61	58	50	74	63
0	0	0	0	0	0	0

5" DN125	Body Material / Lining					
	Cast Iron		Rubber Lined		Glass Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv
100	924	792	720	617	960	823
90	859	736	670	574	893	765
80	785	673	612	525	816	699
70	711	609	554	475	739	633
60	647	555	504	432	672	576
50	555	475	432	370	576	494
40	462	396	360	309	480	411
30	342	293	266	228	355	304
20	222	190	173	148	230	197
10	111	95	86	74	115	99
0	0	0	0	0	0	0

6" DN150	Body Material / Lining					
	Cast Iron		Rubber Lined		Glass Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv
100	1680	1440	1260	1080	1800	1543
90	1562	1339	1172	1005	1674	1435
80	1428	1224	1071	918	1530	1311
70	1294	1109	970	831	1386	1188
60	1176	1008	882	756	1260	1080
50	1008	864	756	647	1080	926
40	840	720	630	540	900	771
30	622	533	466	399	666	571
20	403	345	302	259	432	370
10	202	173	151	129	216	185
0	0	0	0	0	0	0

Flow Co-efficients of Valve Range Cv (Kv) Continued on Page 30

Cv is flow in US gpm through valve at △P of 1 psi

Kv is flow in m^3/hr through valve at △P of 1 bar

For sizes 1/2, 1 1/4, and 1 1/2 DN15, 32 and 40, please contact customer service department for details.

Saunders KB Type Diaphragm Valve Flow Co-efficients of Valve Range Cv (Kv)

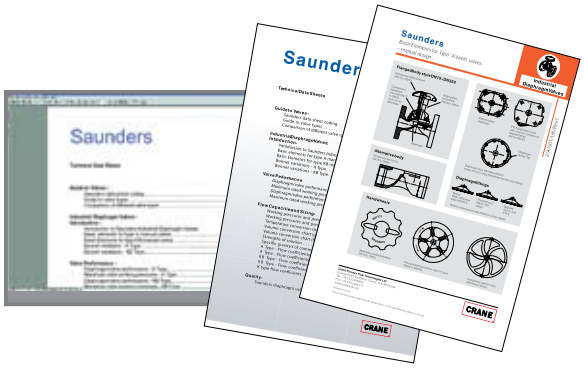
Continued from Page 29

8" DN200	Body Material / Lining					
	Cast Iron		Rubber Lined		Glass Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Kv
100	2580	2211	2196	1882	2724	2335
90	2399	2056	2042	1750	2533	2171
80	2193	1880	1867	1600	2315	1985
70	1987	1703	1691	1449	2097	1797
60	1806	1548	1537	1318	1907	1634
50	1548	1327	1318	1130	1634	1401
40	1290	1106	1098	941	1362	1167
30	955	819	813	697	1008	864
20	619	531	527	452	653	560
10	310	266	264	226	327	280
0	0	0	0	0	0	0

10" DN250	Body Material / Lining			
	Cast Iron		Rubber Lined	
% Open	Cv	Kv	Cv	Kv
100	4020	3478	3420	2958
90	3739	3234	3181	2752
80	3417	2956	2907	2515
70	3095	2677	2633	2278
60	2814	2434	2394	2071
50	2412	2087	2052	1775
40	2010	1739	1710	1479
30	1487	1286	1265	1094
20	965	835	821	710
10	482	417	410	355
0	0	0	0	0

12" DN300	Body Material / Lining			
	Cast Iron		Rubber Lined	
% Open	Cv	Kv	Cv	Kv
100	6060	5242	4884	4225
90	5636	4875	4542	3929
80	5151	4421	4151	3591
70	4666	4036	3761	3253
60	4242	3670	3419	2958
50	3636	3145	2930	2535
40	3030	2621	2442	2112
30	2242	1939	1807	1563
20	1454	1257	1172	1014
10	727	628	586	507
0	0	0	0	0

14" DN350	Body Material / Lining			
	Cast Iron		Rubber Lined	
% Open	Cv	Kv	Cv	Kv
100	10300	8910	9950	8607
90	9579	8286	9253	8004
80	8755	7574	8457	7316
70	7931	6861	7661	6627
60	7210	6237	6965	6025
50	6180	5346	5970	5164
40	5150	4455	4975	4304
30	3811	3297	3681	3184
20	3472	2138	2388	2066
10	1236	1069	1194	1033
0	0	0	0	0



Data Sheet
Index and typical
valve information

Saunders Data Sheets

are available on CD for fast and accurate detailed information on the industrial valve range.

The electronic data manual contains over 100 individual technical data sheets to assist you with the selection of the valve.

Quality Statements and Approvals

ISO 9001 Certificate of Registration

PED Certificate of Conformity

Certified Quality from Crane Process Flow Technologies Ltd.

- Quality Management system registered to ISO 9001/2000 standard in which our R & D and manufacturing process are optimized to maintain our product quality and service.
- Certified compliance to the European Pressure Equipment Directive 97/23/EC authorizing Crane Process Flow Technologies Ltd to CE mark relevant valve products.
- TUV-Merkblatt HPO Qualification for our product manufacturing and certification.
- International product approval from authorities such as Bureau Veritas, Lloyds.
- Polymer/Rubber materials certified as meeting the requirements of FDA, USP & WRAS.

QUALITY ASSURANCE APPROVALS

BS EN ISO 9001/2000

TÜV AD-MERKBLATT HPO

COMPLIANCE WITH FDA CODE 21

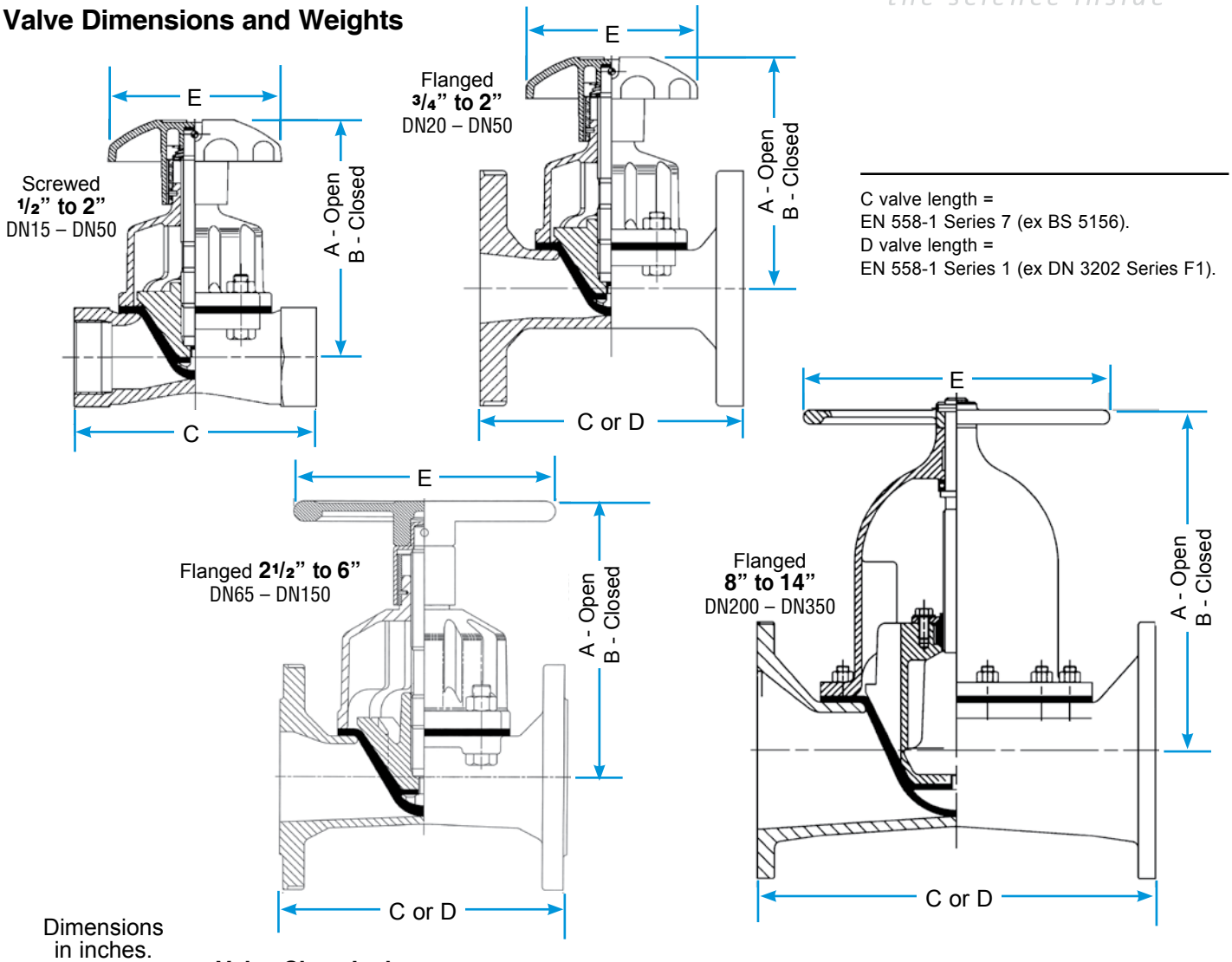
TNO CERTIFICATION
3A
cGMP
USP 23

Product and System Approvals Examples

- ISO 9001/2000
- PED 97/23/EC
- WRAS (Water Regulations Advisory Scheme)
- Lloyds Register of Shipping
- Bureau Veritas
- ATEX
- U12 Marine Safety Agency
- Food & Drug Administration (FDA)
- United States Pharmacopeia (USP)

Saunders KB Type Diaphragm Valves

Valve Dimensions and Weights



C valve length =
EN 558-1 Series 7 (ex BS 5156).
D valve length =
EN 558-1 Series 1 (ex DN 3202 Series F1).

Dimensions in inches.

Weights in pounds.

		Valve Size - Inches														
		1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
Screwed	A	4.2	-	6.5	-	6.5	7.2	-	-	-	-	-	-	-	-	-
	B	3.9	-	6.3	-	6.3	6.4	-	-	-	-	-	-	-	-	-
	C	2.5	-	4.4	-	5.6	6.6	-	-	-	-	-	-	-	-	-
	Weight	1.8	-	4.4	-	6.0	10.6	-	-	-	-	-	-	-	-	-
Flanged	A	4.1	4.1	6.5	6.5	6.5	6.9	9.2	10.6	12.3	13.2	17.1	16.0	21.9	24.7	26.2
	B	3.8	3.8	6.3	6.3	6.3	6.1	8.3	9.4	10.9	11.5	14.9	-	-	-	-
	C	4.3	4.6	5.0	5.8	6.3	7.5	8.5	10.0	12.0	14.0	16.0	20.5	25.0	29.5	38.6
	D	5.1	5.9	6.3	7.1	7.9	9.1	11.4	12.2	13.8	15.7	18.9	23.6	28.7	33.5	38.6
	Weight	4.5	5.1	9.1	9.6	12.0	22.5	24.7	39.5	69.2	101.9	148.4	240.3	429.9	648.2	1018.5
Flanged Rubber Lined	A	-	-	6.6	6.6	6.6	6.9	9.2	10.6	12.3	13.2	17.1	16.1	22.0	24.8	26.3
	B	-	-	6.4	6.4	6.4	6.1	8.3	9.4	10.9	11.5	14.9	-	-	-	-
	C	-	-	5.3	6	6.6	7.8	8.8	10.3	12.3	14.4	16.4	20.9	25.4	29.9	38.9
	D	-	-	6.6	7.4	8.2	9.4	11.7	12.5	14.1	16	19.2	23.9	29	33.8	38.9
	Weight	-	-	9.3	12.5	16.4	23.2	25.6	48.3	75.8	101.9	163.8	280.0	449.7	648.2	1025.1
Flanged Glass Lined	A	-	4.2	6.5	6.5	6.5	7.0	9.3	10.7	12.4	13.2	17.2	16.0	22.0	24.8	26.2
	B	-	3.9	6.3	6.3	6.3	6.2	8.3	9.4	10.9	11.6	15.0	-	-	-	-
	C	-	4.7	5.1	5.8	6.4	7.6	8.6	10.1	12.1	14.1	16.1	20.6	25.1	29.6	38.7
	D	-	6	6.4	7.2	8.0	9.2	11.5	12.3	13.9	15.8	19.0	23.7	28.8	33.6	38.7
	Weight	-	5.6	9.3	11.1	15.3	22.7	25.1	44.8	74.7	101.6	157.9	260.2	443.1	648.2	1018.5
	E	3.5	3.5	4.7	4.7	4.7	4.7	6.7	9.1	11.0	11.0	14.5	14.5	19.0	23.0	27.5

All dimensions + or – 1/8 inch.

Saunders K Type Diaphragm Valve Flow Co-efficients of Valve Range Cv (Kv)

1½" DN40	Body Material / Lining			
	Cast Iron		Rubber Lined	
% Open	Cv	Kv	Cv	Kv
100	138	33.9	130	32
90	128	31.5	121	29.8
80	117	28.8	111	27.3
70	106	26.1	100	24.6
60	97	23.8	91	22.4
50	83	20.4	78	19.2
40	69	19.4	65	18.3
30	51	14.3	48	13
20	33	9.2	31	8.7
10	16.6	4.6	15.6	8.3
0	0	0	0	0

2" DN50	Body Material / Lining			
	Cast Iron		Rubber Lined	
% Open	Cv	Kv	Cv	Kv
100	275	67.7	260	64
90	256	63	242	59.6
80	234	57.6	221	54.4
70	212	52.2	200	49.2
60	193	47.5	182	44.8
50	165	40.6	156	38.4
40	138	33.9	130	32
30	102	25.1	96	23.6
20	66	18.5	62	17.4
10	33	9.2	31	8.7
0	0	0	0	0

2½" DN65	Body Material / Lining			
	Cast Iron		Rubber Lined	
% Open	Cv	Kv	Cv	Kv
100	450	111	420	103
90	419	103	391	96.3
80	383	94.3	357	87.9
70	347	85.4	323	79.5
60	315	77.5	294	72.4
50	270	66.5	252	62
40	225	55.4	210	51.7
30	167	41.1	155	38.1
20	108	26.6	101	24.8
10	54	15.2	50	14
0	0	0	0	0

3" DN80	Body Material / Lining			
	Cast Iron		Rubber Lined	
% Open	Cv	Kv	Cv	Kv
100	530	130	480	118
90	493	121	446	110
80	451	111	408	100
70	408	100	370	91.1
60	371	91.3	336	82.7
50	318	78.3	288	70.9
40	265	65.2	240	59.1
30	196	48.2	178	43.8
20	127	31.2	115	28.3
10	64	18	58	16.3
0	0	0	0	0

4" DN100	Body Material / Lining			
	Cast Iron		Rubber Lined	
% Open	Cv	Kv	Cv	Kv
100	755	186	720	177
90	702	173	670	165
80	642	158	612	151
70	581	143	554	136
60	529	130	504	124
50	453	111	432	106
40	378	93.1	360	88.6
30	279	68.7	266	65.5
20	181	44.5	173	42.6
10	91	22.4	86	21.1
0	0	0	0	0

5" DN125	Body Material / Lining			
	Cast Iron		Rubber Lined	
% Open	Cv	Kv	Cv	Kv
100	1360	335	1300	320
90	1265	311	1209	297
80	1156	285	1105	272
70	1047	258	1001	246
60	952	234	910	224
50	816	201	780	192
40	680	167	650	160
30	503	124	481	118
20	326	80.2	312	76.8
10	163	40.1	156	38.4
0	0	0	0	0

6" DN150	Body Material / Lining			
	Cast Iron		Rubber Lined	
% Open	Cv	Kv	Cv	Kv
100	2360	581	2250	554
90	2195	541	2093	515
80	2006	494	1913	471
70	1817	447	1733	427
60	1652	407	1575	387
50	1416	349	1350	332
40	1180	291	1125	277
30	873	215	833	205
20	566	139	540	133
10	283	69.7	270	66.5
0	0	0	0	0

8" DN200	Body Material / Lining			
	Cast Iron		Rubber Lined	
% Open	Cv	Kv	Cv	Kv
100	4420	961	4250	924
90	4111	894	3953	859
80	3757	817	3613	785
70	3403	740	3273	711
60	3094	673	2975	733
50	2652	653	2550	628
40	2210	544	2125	523
30	1635	403	1573	387
20	1061	261	1020	251
10	530	130	510	126
0	0	0	0	0

10" DN250	Body Material / Lining			
	Cast Iron		Rubber Lined	
% Open	Cv	Kv	Cv	Kv
100	7550	1641	7250	1576
90	7021	1526	6743	1466
80	6418	1395	6163	1340
70	5813	1264	5583	1214
60	5285	1149	5075	1103
50	4530	985	4350	946
40	3775	821	3625	788
30	2794	688	2683	661
20	1812	446	1740	428
10	906	223	870	214
0	0	0	0	0

12" DN300	Body Material / Lining			
	Cast Iron		Rubber Lined	
% Open	Cv	Kv	Cv	Kv
100	10100	2196	9800	2130
90	9393	2042	9114	1981
80	8585	1866	8330	1811
70	7777	1691	7546	1640
60	7070	1537	6860	1491
50	6060	1317	5880	1278
40	5050	1098	4900	1065
30	3737	812	3626	788
20	2424	597	2352	579
10	1212	298	1176	290
0	0	0	0	0

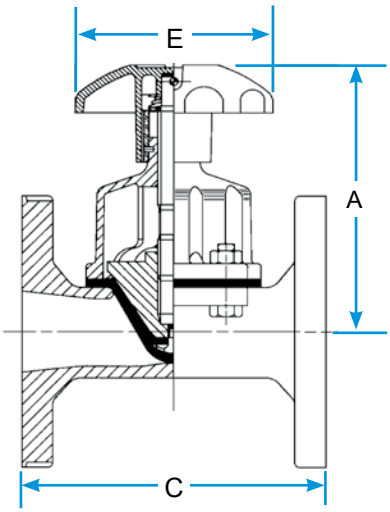
14" DN350	Body Material / Lining			
	Cast Iron		Rubber Lined	
% Open	Cv	Kv	Cv	Kv
100	10300	2239	9950	2163
90	9579	2082	9254	2012
80	8755	1903	8458	1839
70	7931	1724	7662	1666
60	7210	1567	6965	1514
50	6180	1343	5970	1298
40	5150	1119	4975	1081
30	3811	828	3682	800
20	2472	608	2388	588
10	1236	304	1194	294
0	0	0	0	0

Cv is flow in US gpm through valve at △P of 1 psi

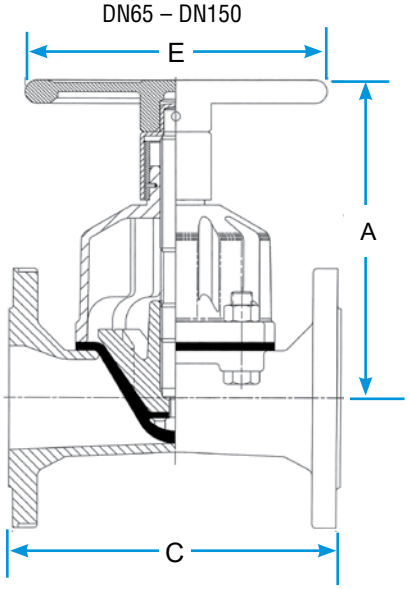
Kv is flow in m^3/hr through valve at △P of 1 bar

Saunders K Type Diaphragm Valves

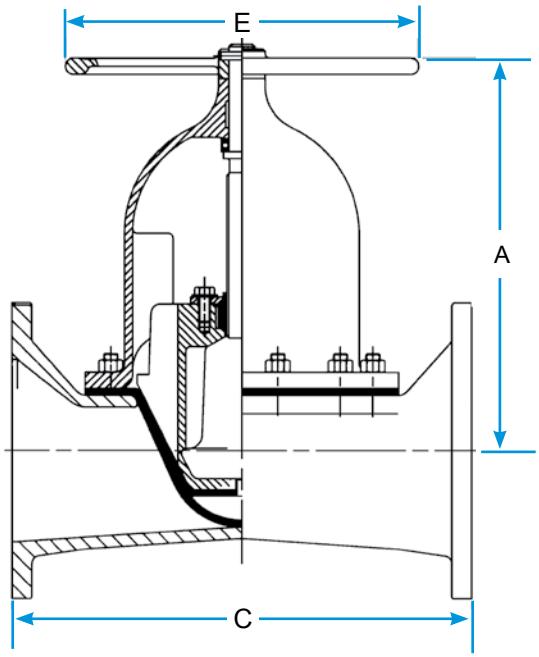
Flanged
1½"
DN40 – DN50



Flanged **2" to 5"**
DN65 – DN150



Flanged
6" to 12"
DN200 – DN350



Dimensions in inches.
Weights in pounds.

		Valve Size - Inches										
		1½	2	2½	3	4	5	6	8	10	12	14
Flanged Unlined	**A**	6.38	7.75	9.13	10.38	11	14.50	16.50	22.38	25.13	26.63	26.13
	C	6.50	7.50	8.50	10	12.50	14	16	20.50	25	29.50	36.25
	Weight	13	19	33	49	65	142	158	300	460	670	1000
Flanged Rubber Lined	**A**	6.38	7.75	9.13	10.38	11	14.50	16.50	22.38	25.13	26.63	26.13
	C	6.75	7.75	8.75	10.25	12.75	14.25	16.38	20.88	25.38	29.88	36.63
	Weight	14	20	33	50	67	142	160	303	463	674	1004
Flanged Glass Lined	**A**	6.38	7.75	9.13	10.38	11	14.50	16.50	22.38	25.13	-	-
	C	6.63	7.63	8.63	10.13	12.75	14.13	16.13	22.50	25.13		
	Weight	13	19	33	49	65	142	159	302	462	-	-
	E	4.75	6.50	11	11	12.50	14	14	19	23	27.50	27.50

All dimensions + or – ⅛ inch.

Pneumatic Valve Actuation

Compact Actuators that Provide Reliable Remote Control

- Saunders EC and SSC Pneumatic Actuators facilitate remote operation of the valve, as an integral part of a control system. Both are compact piston style actuators with excellent chemical and temperature resistance.
- The versatile and robust design derived from the use of high technology materials of construction, results in an actuator suitable for a wide range of process industry applications.
- All three operation modes, double acting, spring to close and spring to open feature the same physical dimensions for a given valve size.
- This provides uniform compact envelope dimensions and outstanding economic benefits particularly for spring return failsafe actuation.
- Field conversion of manual valves to power actuation is readily achieved “in-line” without special tools or modification.

SSC Actuator

EC

The EC is manufactured by injection molding PES (polyethersulphone), which has a temperature range of 14° to 212°F -10° to +100°C ambient (autoclave maximum 302°F 150°C). Actuators can be supplied as spring close, spring open or double acting with various spring pack options for a variety of pressure requirements.

Size range 1/4” to 2”
DN8 – DN50

EC Actuator mounted on A Type PFA lined valve

SSC

With the same flexibility as the EC Actuator, the SSC has been manufactured with a 316C12 stainless steel investment cast housing. Suitable for both aseptic and industrial applications the SSC has excellent resistance to both chemical and steam duties.

Size range 1/4” to 2”
DN8 – DN50

ECX

- Saunders ECX type actuators are designed to offer an extension to the EC size range while still maintaining the compact envelope size.
- The housing is manufactured in coated silicon aluminum for increased chemical resistance and long life.
- With the extensive flexibility in spring packs we can offer an actuator to suit a wide range of pressure and flow variations.
- Available in spring close, spring open and double acting modes of operation to suit process needs.
- A wide range of options including switches, positioners, limit stop and visual open/close indication are also available.

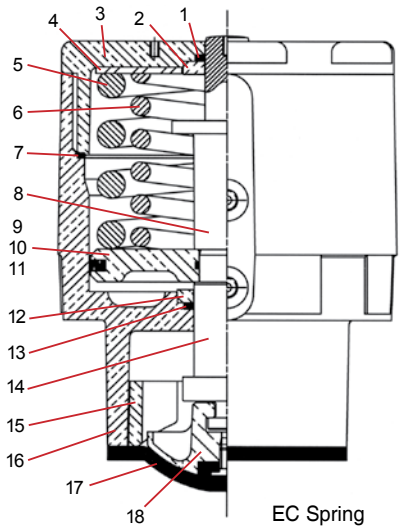
Size range 2½" to 6"
DN65 – DN150

ECX Actuator with visual indicator

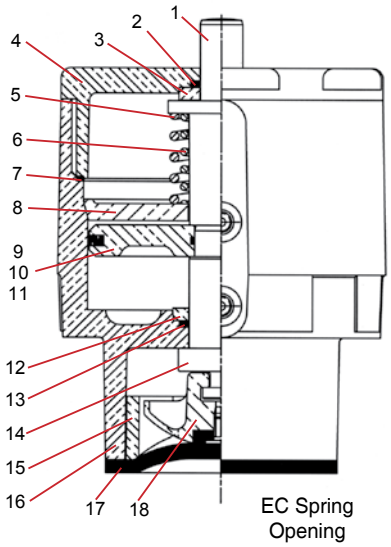
ECX Actuator with switchbox and integral solenoid

EC Pneumatic Actuators 1/4" to 2" DN8 - DN50

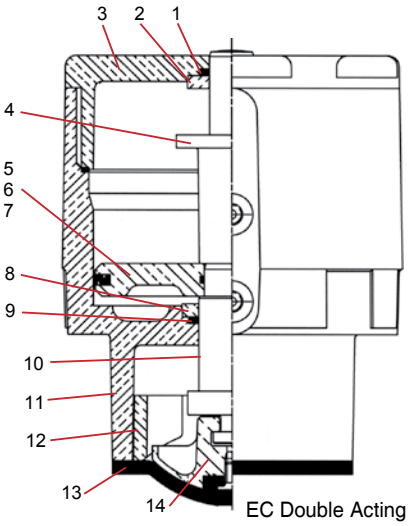
Materials of Construction



EC Spring Closing



EC Spring Opening



EC Double Acting

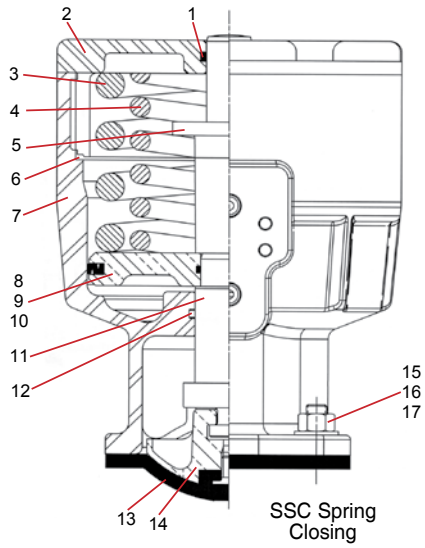
Materials Of Construction		
Item	Component	Material
1	Indicator seal	Fluoroelastomer
2	Cap washer	PES 1/4"-1" DN8-25 IXEF 1 1/2"-2" DN40-50
3	Cap	PES 1/4"-1" DN8-25 IXEF 1 1/2"-2" DN40-50
4	Loading plate	Mild steel
5	Outer spring	Steel
6	Inner spring	Steel
7	Bonnet cap "O" ring	Nitrile
8	Indicator	IXEF
9	Outer piston seal	Fluoroelastomer
10	Piston	PES 1/4"-1" DN8-25 IXEF 1 1/2"-2" DN40-50
11	Inner piston seal	Nitrile
12	Bonnet washer	PES
13	Spindle seal	Fluoroelastomer
14	Spindle	IXEF
15	Bonnet insert	PES 1 1/2"-2" DN40-50
16	Bonnet	PES
17	Line diaphragm	Rubber, Rubber/PTFE
18	Compressor	Mazak 1/4" DN8 Mild Steel 1/2"-1" DN15-25 Silicon Aluminum Stainless Steel 1/2"-2" DN15-50

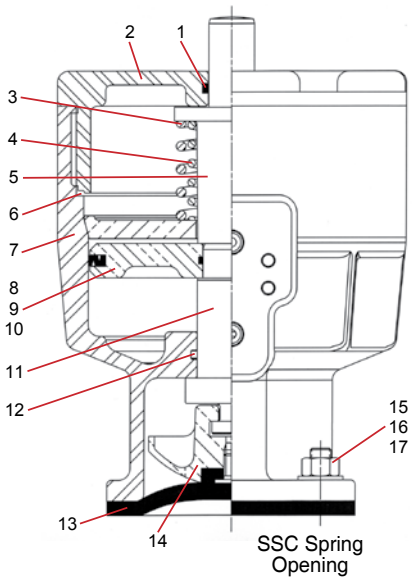
Materials Of Construction		
Item	Component	Material
1	Indicator	IXEF
2	Indicator seal	Fluoroelastomer
3	Cap washer	PES 1/4"-1" DN8-25 IXEF 1 1/2"-2" DN40-50
4	Cap	PES 1/4"-1" DN8-25 IXEF 1 1/2"-2" DN40-50
5	Outer spring	Steel
6	Inner spring	Steel
7	Bonnet cap "O" ring	Nitrile
8	Spring support plate	PES
9	Outer piston seal	Fluoroelastomer
10	Piston	PES 1/4"-1" DN8-25 IXEF 1 1/2"-2" DN40-50
11	Inner piston seal	Fluoroelastomer
12	Bonnet washer	PES
13	Spindle seal	Nitrile
14	Spindle	IXEF
15	Bonnet insert	PES 1 1/2"-2" DN40-50
16	Bonnet	PES
17	Line diaphragm	Rubber, Rubber/PTFE
18	Compressor	Mazak 1/4" DN8 Mild Steel 1/2"-1" DN15-25 Silicon Aluminum Stainless Steel 1/2"-2" DN15-50

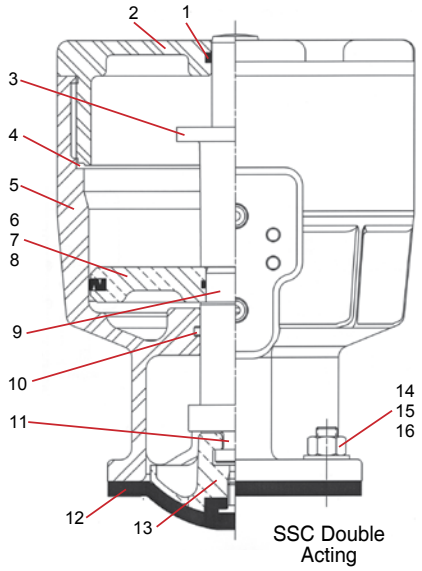
Materials Of Construction		
Item	Component	Material
1	Indicator seal	Fluoroelastomer
2	Cap washer	PES 1/4"-1" DN8-25 IXEF 1 1/2"-2" DN40-50
3	Cap	PES 1/4"-1" DN8-25 IXEF 1 1/2"-2" DN40-50
4	Indicator	IXEF
5	Outer piston seal	Fluoroelastomer
6	Piston	PES 1/4"-1" DN8-25 IXEF 1 1/2"-2" DN40-50
7	Inner piston seal	Fluoroelastomer
8	Bonnet washer	PES
9	Spindle seal	Nitrile
10	Spindle	IXEF
11	Bonnet	PES
12	Bonnet insert	PES 1 1/2"-2" DN40-50
13	Line diaphragm	Rubber, Rubber/PTFE
14	Compressor	Mazak 1/4" DN8 Mild Steel 1/2"-1" DN15-25 Silicon Aluminum Stainless Steel 1/2"-2" DN15-50

SSC (Stainless Steel) Compact Pneumatic Actuators 1/4" to 2" DN8 - DN50

Materials of Construction







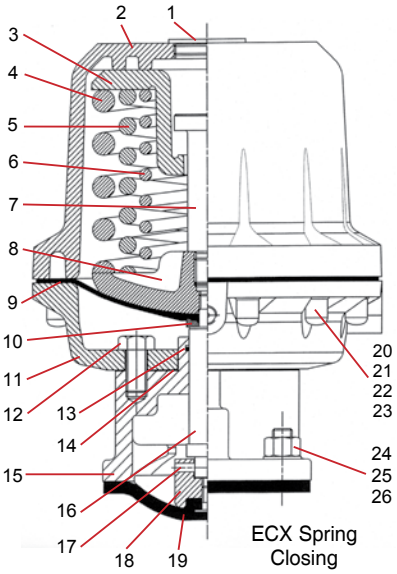
Materials Of Construction		
Item	Component	Material
1	Indicator seal	Viton
2	Cap	Stainless Steel
3	Outer spring	Steel
4	Inner spring	Steel
5	Indicator	IXEF
6	Bonnet cap "O" Ring	Nitrile
7	Bonnet	Stainless Steel
8	Outer piston seal	Fluoroelastomer
9	Piston inner "O" ring	Nitrile
10	Piston	PES 1/4"-1" DN8-25 IXEF 1 1/2"-2" DN40-50
11	Spindle	IXEF
12	Spindle "O" ring	Fluoroelastomer
13	Line diaphragm	Rubber, Rubber/PTFE
14	Compressor	Stainless Steel
15	Body/bonnet nut	Stainless Steel
16	Body/bonnet washer	Stainless Steel
17	Body/bonnet bolt/stud	Stainless Steel

Materials Of Construction		
Item	Component	Material
1	Indicator seal	Viton
2	Cap	Stainless Steel
3	Outer spring	Steel
4	Inner spring	Steel
5	Indicator	IXEF
6	Bonnet cap "O" Ring	Nitrile
7	Bonnet	Stainless Steel
8	Outer piston seal	Fluoroelastomer
9	Piston inner "O" ring	Nitrile
10	Piston	PES 1/4"-1" DN8-25 IXEF 1 1/2"-2" DN40-50
11	Spindle	IXEF
12	Spindle "O" ring	Fluoroelastomer
13	Line diaphragm	Rubber, Rubber/PTFE
14	Compressor	Stainless Steel
15	Body/bonnet nut	Stainless Steel
16	Body/bonnet washer	Stainless Steel
17	Body/bonnet bolt/stud	Stainless Steel

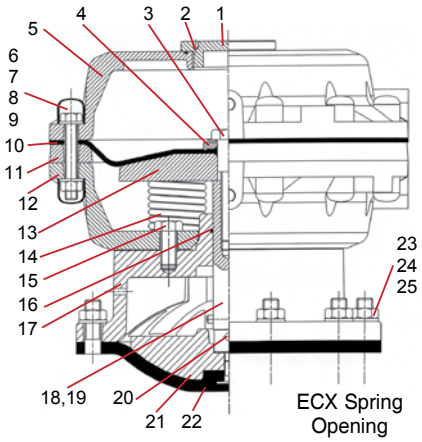
Materials Of Construction		
Item	Component	Material
1	Indicator seal	Viton
2	Cap	Stainless Steel
3	Indicator	IXEF
4	Bonnet cap "O" Ring	Nitrile
5	Bonnet	Stainless Steel
6	Outer piston seal	Fluoroelastomer
7	Piston inner "O" ring	Nitrile
8	Piston	PES 1/4"-1" DN8-25 IXEF 1 1/2"-2" DN40-50
9	Spindle	IXEF
10	Spindle "O" ring	Fluoroelastomer
11	Thrust pad	Nylatron 1/4"-3/4" DN8-20
12	Line diaphragm	Rubber, Rubber/PTFE
13	Compressor	Stainless Steel
14	Body/bonnet nut	Stainless Steel
15	Body/bonnet washer	Stainless Steel
16	Body/bonnet bolt/stud	Stainless Steel

ECX Pneumatic Actuators 2½" to 6" DN65 - DN150

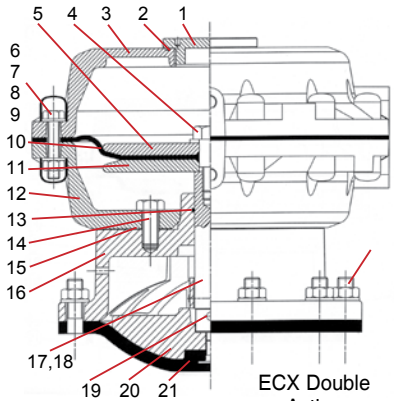
Materials of Construction



ECX Spring Closing



ECX Spring Opening

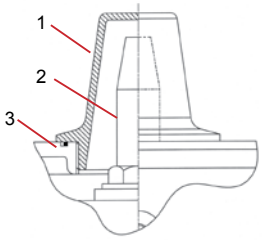


ECX Double Acting

Materials Of Construction - **ECX/SC**		
Item	Component	Material
1	Plug	Polyethylene
2	Cover	Silicon aluminum
3	Upper spring plate	Ductile iron
4	Outer spring	Steel
5	Middle spring	Steel
6	Inner spring	Steel
7	Spring retaining bolt	Mild steel
8	Diaphragm plate	Forged steel
9	Operating diaphragm	Rubber
10	Clamp washer	Mild steel
11	Lower cylinder	Silicon aluminum
12	Cylinder/ bonnet bolt	Steel
13	Bonnet "O" ring	Nitrile
14	Bonnet/cylinder joint	Klingersil
15	Bonnet	Cast iron
16	Spindle	Stainless Steel
17	Compressor pin	Steel
18	Compressor	Cast iron
19	Line diaphragm	Rubber, Rubber/PTFE
20	Screw cover	PE
21	Cylinder cover screw	Steel
22	Cylinder cover nut	Steel
23	Cylinder cover washer	Steel
24	Body/bonnet nut	Stainless Steel
25	Body/bonnet stud	Stainless Steel
26	Body/bonnet washer	Stainless Steel

Materials Of Construction - **ECX/SO**		
Item	Component	Material
1	Cover plug	Mild Steel
2	Cover plug "O" ring	Rubber
3	Spindle screw	Steel
4	Clamp washer	Mild Steel
5	Upper cylinder	Silicon aluminum
6	Screw cover	PE
7	Cylinder screw	Steel
8	Cylinder nut	Steel
9	Cylinder washer	Steel
10	Operating diaphragm	Rubber
11	Spacer ring	Silicon aluminum
12	Lower cylinder	Silicon aluminum
13	Diaphragm plate	SG Iron
14	Spring	Steel
15	Cylinder/bonnet bolt	Steel
16	Bonnet "O" ring	Nitrile
17	Bonnet	Cast iron
18	Spindle	Stainless Steel
19	Spindle limit pin	Steel
20	Compressor pin	Steel
21	Compressor	Cast iron
22	Line diaphragm	Rubber, Rubber/PTFE
23	Body/bonnet nut	Stainless Steel
24	Body/bonnet stud	Stainless Steel
25	Body/bonnet washer	Stainless Steel

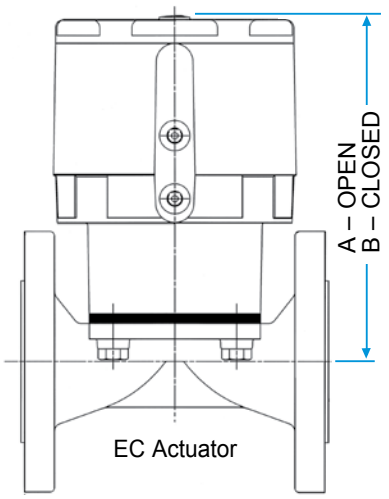
Materials Of Construction - **ECX/DA**		
Item	Component	Material
1	Cover plug	Mild Steel
2	Cover plug "O" ring	Rubber
3	Upper cylinder	Silicon aluminum
4	Spindle screw	Steel
5	Upper diaphragm plate	Mild Steel
6	Screw cover	PE
7	Cylinder screw	Steel
8	Cylinder nut	Steel
9	Cylinder washer	Steel
10	Operating diaphragm	Rubber
11	Lower dia-phragm plate	Mild Steel
12	Lower cylinder	Silicon aluminum
13	Bonnet "O" ring	Rubber
14	Cylinder/bonnet bolt	Steel
15	Cylinder/bonnet joint	Klingersil
16	Bonnet	Cast iron
17	Spindle	Stainless Steel
18	Spindle limit pin	Steel 6" 150mm
19	Compressor pin	Steel
20	Compressor	Cast iron
21	Line diaphragm	Rubber, Rubber/PTFE
22	Body/bonnet nut	Stainless Steel
23	Body/bonnet stud	Stainless Steel
24	Body/bonnet washer	Stainless Steel



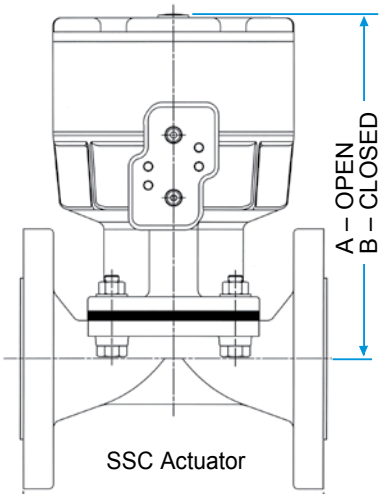
Materials Of Construction - **INDICATOR**		
Item	Component	Material
1	Indicator cover	Polycarbonate
2	Indicator	Polycarbonate
3	Indicator "O" ring	Rubber

Note: Visual indicator is an optional extra on the ECX.

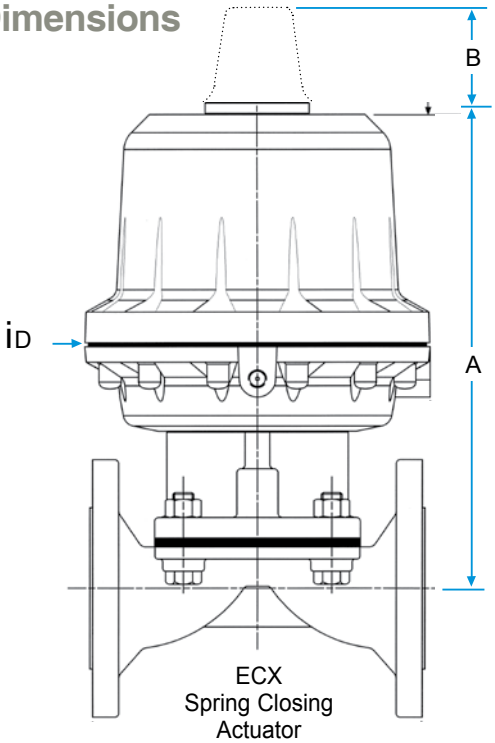
EC/SSC/ECX Actuator Dimensions



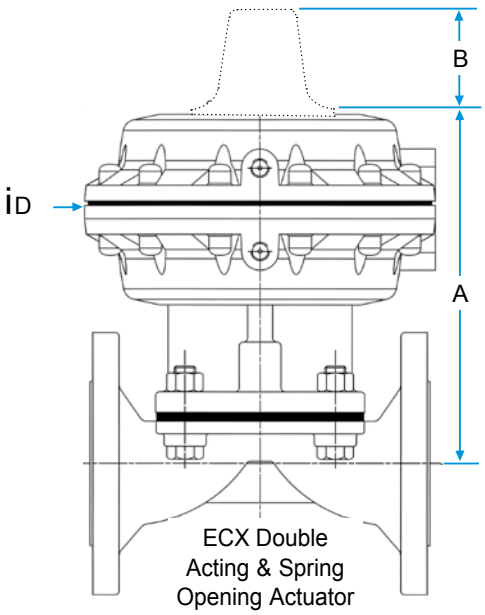
EC Actuator



SSC Actuator



ECX
Spring Closing
Actuator



ECX Double
Acting & Spring
Opening Actuator

Notes:
Dimension 'B' is for optional indicator on ECX models.
Varying line and operating pressures are accommodated by head models L and S. For performance refer to our technical data sheets.

EC/SSC

Size	A	B
1/2"	5	5
15	115	110
3/4"	6.3	6
20	160	152
1"	6.3	6
25	168	161
1 1/2"	8.8	8
40	231	217
2"	9	9
50	249	229

ECX/SO Spring Open

Size	S - Series		
	A	B	D
2 1/2"	9.6	2.2	10
65	245	55	266
3"	11	2.2	10
80	267	55	266
4"	12	2.2	10
100	305	55	266

Size	H - Series		
	A	B	D
4"	14	2.6	14.1
100	359	67	360
5"	14.7	2.6	14.1
125	373	67	360
6"	14.9	2.6	14.1
150	379	67	360

ECX/SC Spring Closed

Size Inches DN	Heads F1, F2, & F3		
	A	B	D
2 1/2"	14	2.2	10
65	359	55	266
3"	15	2.2	10
80	370	55	266
4"	16	2.2	10
100	417	55	266

Size Inches DN	Heads G1, G2, & G3		
	A	B	D
2 1/2"	15.7	2.2	10.4
65	399	55	266
3"	16.1	2.2	10.4
80	410	55	266
4"	18	2.2	10.4
100	458	55	266

Size Inches DN	Heads H1, H2, & H3		
	A	B	D
4"	22	2.6	14.1
100	560	67	360
5"	22.6	2.6	14.1
125	576	67	360
6"	23.3	26	14.1
150	593	67	360

ECX/DA Dual Action

Size	S - Series		
	A	B	D
2 1/2"	9.7	2.2	10.4
65	246	55	266
3"	10.1	2.2	10.4
80	257	55	266
4"	11.7	2.2	10.4
100	296	55	266

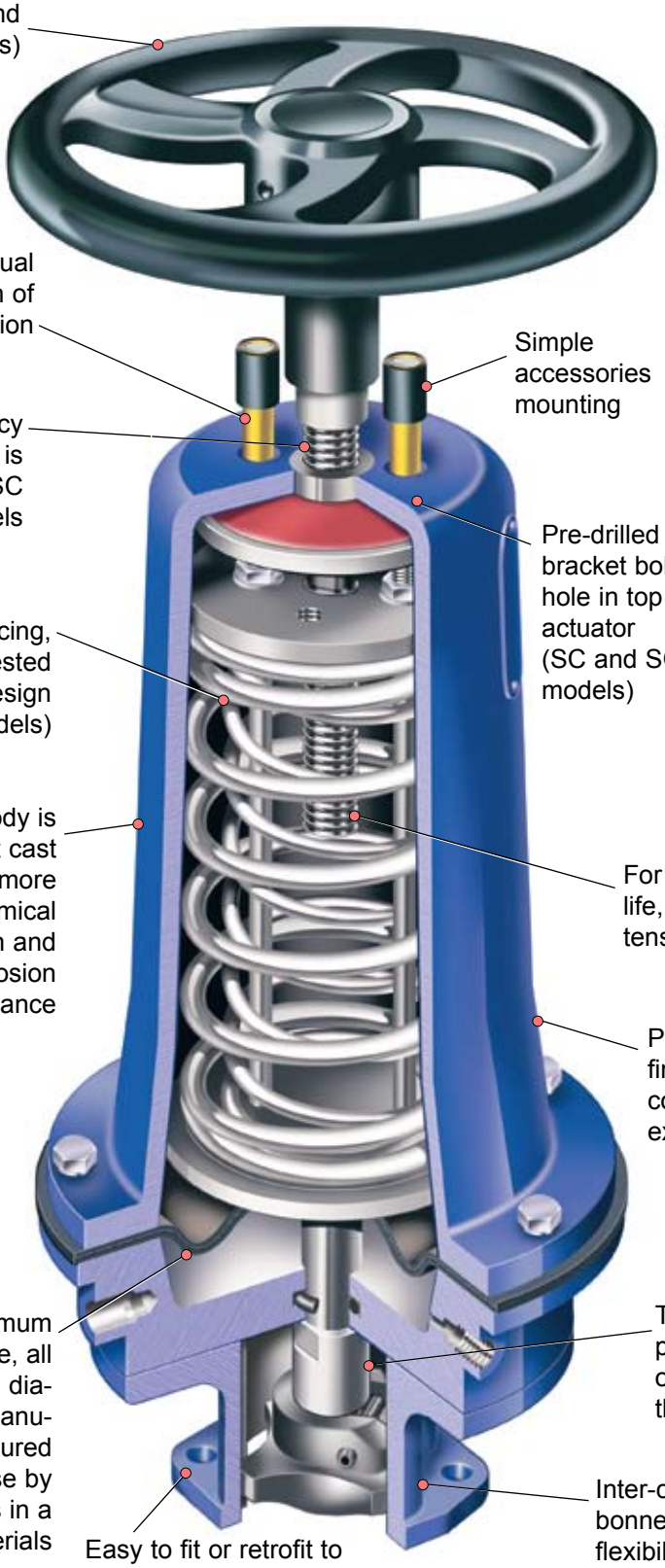
Size	H - Series		
	A	B	D
4"	14	2.6	14.1
100	355	67	360
5"	14.5	2.6	14.1
125	369	67	360
6"	14.8	2.6	14.1
150	375	67	360

Note:
All EC & SSC actuator air inlet parts are 1/8" BSP or 1/8" NPT
All ECX actuators are 1/4" BSP

Pneumatic Valve Actuation

ES Modular Actuators

ES Actuators are available for sizes up to DN250
Size range
½" to 10"
DN15 – DN250



Optional hand-wheel (SC and SO models)

Clear Visual Indication of actuator position

Simple accessories mounting

Emergency override is standard on SC and SO models

Pre-drilled bracket bolt hole in top of actuator (SC and SO models)

For safer servicing, a low tension nested spring design (SC models)

The body is lightweight cast aluminum for more economical installation and exceptional corrosion resistance

For extended diaphragm life, fully adjustable spring tension (SC model)

Polyester powder paint finish as standard for high corrosion resistance to external environment

For optimum performance, all operating diaphragms are manufactured in-house by Saunders in a variety of materials

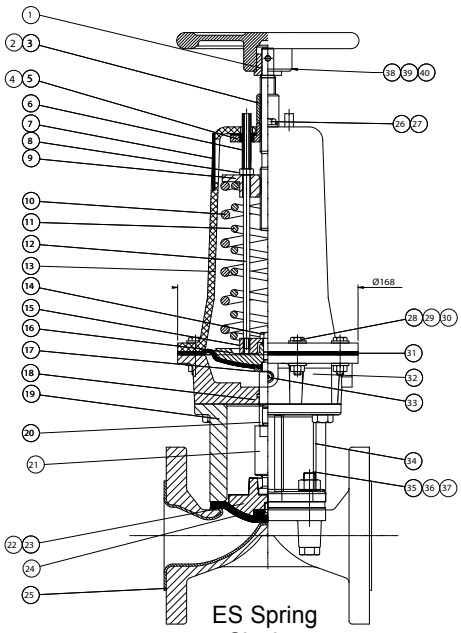
The Spindle is protected from the outside environment throughout its travel.

Inter-changeable bonnets for future flexibility

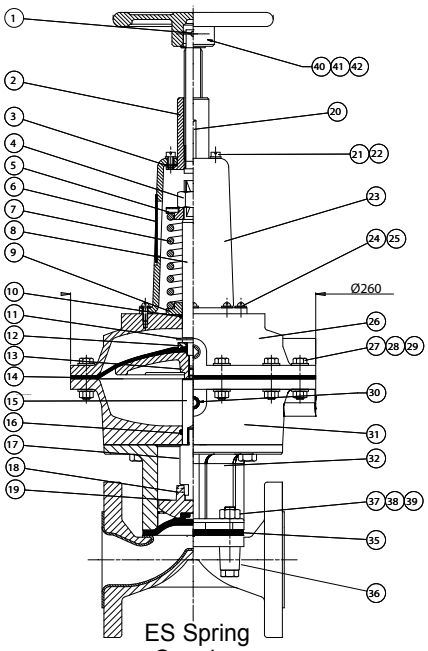
Easy to fit or retrofit to both weir and straight-through valves

Saunders®
the science inside

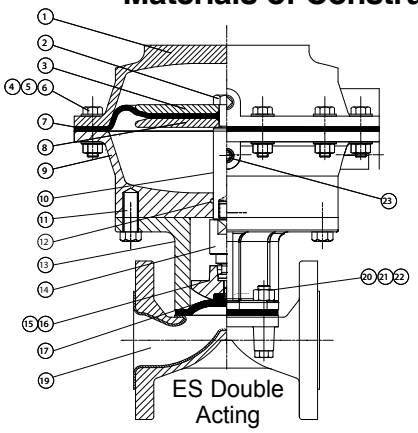
ES Pneumatic Actuation
1/2" to 8" DN15 - DN200
Materials of Construction



ES Spring Closing



ES Spring Opening


ES Double Acting

Materials Of Construction - **ES (SC)**		
Item	Component	Material
1	Handwheel spindle	Mild steel
2	Locking bush	Mild steel
3	Locking bush screw	Steel
4	Reinforcing plate	Forged steel
5	Cover seal	PVC
6	Indicator sleeve	PVC
7	Slot seal	PVC
8	Lifting rod locknut	Steel
9	Upper spring plate	Forged steel
10	Outer spring	Steel
11	Inner spring	Steel
12	Lifting rod	Mild steel
13	Cover	Silicon aluminum
14	Locking plate screw	Steel
15	Lifting plate	Mild steel
16	Diaphragm plate	Forged steel
17	Clamp washer	Mild steel
18	Cylinder/bonnet screw	Steel
19	Bonnet 'O' ring	Rubber
20	Master spindle	Stainless steel
21	Spindle attachment	Stainless steel
22	Compressor	Cast iron
23	Compressor pin	Steel
24	Line diaphragm	Rubber
25	Body	Cast iron
26	Reinforcing plt. screw	Steel
27	Reinforcing plt. washer	Steel
28	Cylinder/cover nut	Steel
29	Cylinder/cover bolt	Steel
30	Cylinder/cover washer	Steel
31	Operating diaphragm	Rubber
32	Lower cylinder	Silicon aluminum
33	Cylinder plug	Malleable iron
34	Bonnet	Cast iron
35	Body/bonnet nut	Steel/stainless steel
36	Body/bonnet stud	Steel/stainless steel
37	Body/bonnet washer	Steel/stainless steel
38	Handwheel	Cast iron
39	Handwheel adaptor	Mild steel
40	Handwheel Pin	Steel

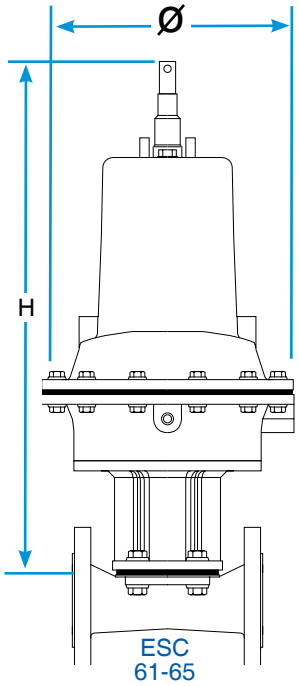
Materials Of Construction - **ES (SO)**		
Item	Component	Material
1	Handwheel spindle	Mild steel
2	H/wheel spindle brush	Mild steel
3	Cover seal	PVC
4	Adjusting screw locknut	Mild steel
5	Upper spring plate	Steel
6	Slot seal	PVC
7	Spring	Steel
8	Adjusting screw	Mild steel
9	Lower spring plate	Mild Steel
10	'O' ring	Nitrile
11	Dished washer	Mild Steel
12	Clamp washer	Mild steel
13	Diaphragm plate	Forged steel
14	Operating diaphragm	Rubber
15	Master spindle	Stainless steel
16	Cylinder 'O' ring	Rubber
17	Spindle attachment	Stainless steel
18	Compressor pin	Steel
19	Compressor	Cast iron
20	Indicator rod	Mild steel
21	H/wheel bush screw	Steel
22	H/wheel bush washer	Steel
23	Cover	Silicon Aluminum
24	Cylinder cover screw	Steel
25	Cylinder cover washer	Stainless steel
26	Upper Cylinder	Silicon Aluminum
27	Cylinder screw	Steel
28	Cylinder nut	Steel
29	Cylinder washer	Steel
30	Cylinder Plug	Malleable iron
31	Cylinder	Silicon Aluminum
32	Bonnet	Cast iron
33	Threaded insert	Steel
34	Cylinder/bonnet screw	Steel
35	Line diaphragm	Rubber
36	Body	Cast iron
37	Body/bonnet nut	Steel
38	Body/bonnet stud	Steel
39	Body/bonnet washer	Steel
40	Handwheel	Steel
41	Handwheel pin	Steel
42	Handwheel adaptor	Mild Steel

Materials Of Construction - **ES (DA)**		
Item	Component	Material
1	Upper cylinder	Silicon aluminum
2	Diaphragm plate screw	Steel
3	Upper diaphragm plate	Mild steel
4	Cylinder nut	Steel
5	Cylinder bolt	Steel
6	Cylinder washer	Steel
7	Operating diaphragm	Rubber
8	Lower diaphragm plate	Mild Steel
9	Lower cylinder	Silicon aluminum
10	Spindle	Stainless steel
11	Cylinder/bonnet bolt	Steel
12	Cylinder 'O' ring	Rubber
13	Bonnet	Cast iron
14	Spindle adaptor	Stainless steel
15	Compressor pin	Steel
16	Compressor	Cast iron
17	Line diaphragm	Rubber
18		Rubber/PTFE
19	Body	Cast iron
20	Body/bonnet nut	Steel/stainless steel
21	Body/bonnet bolt	Steel/stainless steel
22	Body/bonnet stud	Steel/stainless steel
23	Cylinder Plug	Malleable iron

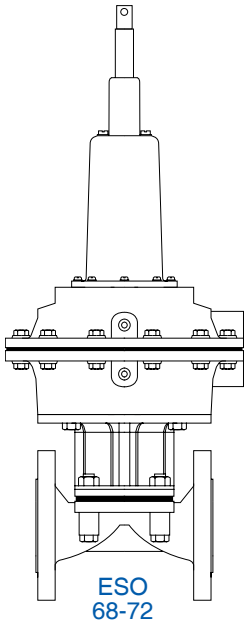
Note: For actuators > DN 150, please contact Saunders for Parts

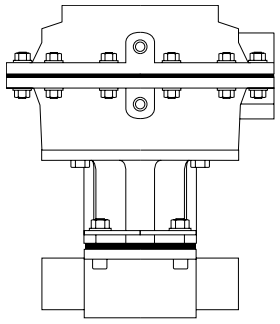
ES Modular Actuators Technical Data

Standard Materials	
CAST IRON BONNETS	ASTM A48: Class 30C & ASTM A126: Class A
ALUMINUM COVERS & LOWER CYLINDERS	ASTM B179: S12A-B
STAINLESS STEEL SPINDLE	ASTM A582: Type 303



ESC 61-65


ESO 68-72


ESDA 54-58

Ø = Actuator Diameter/Width
H = Actuator Height

Table shows diameter/ width of actuators and the maximum height of the actuator from the center of the valve flange or pipeline.

	Model	Ø In.	Ø mm	H - (Type A Valves) – Dimensions in Inches DN											H - (Type KB Valves)								
				½"	¾"	1"	1¼"	1½"	2"	2½"	3"	4"	5"	6"	1"	1¼"	1½"	2"	2½"	3"	4"	5"	6"
				15	20	25	32	40	50	65	80	100	125	150	25	32	40	50	65	80	100	125	150
Fail Safe Spring CLOSING (ESC)	ES61	6.61	169	16.1	16.3	16.7	-	17.1	18.1						18.9	-	18.9						
				408	413	423	-	435	461						480	-	480						
	ES62	10.24	260	-	-	18.2	-	18.7	19.7	19.7	19.8				20.5	-	20.5	20.4	21.5				
				-	-	462	-	476	501	501	503				520	-	521	518	547				
	ES63	12.44	316	-	-	-	-	-	27.6	28.7	28.8	29.8			-	-	-	29.1	30.1	31.4	32.6		
				-	-	-	-	-	700	729	732	756			-	-	-	740	765	797	827		
	ES64	16.73	425	-	-	-	-	-	-	-	30.9	31.5	32.6	35.2	-	-	-	-	-	33.1	34.2	33.3	37.9
				-	-	-	-	-	-	-	784	800	828	895	-	-	-	-	-	841	871	847	962
	ES65	21.61	549	-	-	-	-	-	-	-	-	40.6	41.7	44.3	-	-	-	-	-	-	44.7	42.4	47.0
				-	-	-	-	-	-	-	-	1031	1059	1125	-	-	-	-	-	-	1102	1078	1193
Fail Safe Spring OPENING (ESO)	ES68	6.61	169	14.9	15.1	15.5	-	16.0	17.0						17.7	-	17.7						
				378	383	393	-	406	432						450	-	450						
	ES69	10.24	260	-	-	19.6	-	20.1	21.1	21.1	21.2				21.9	-	21.9	21.9	23.0				
				-	-	497	-	511	537	536	538				556	-	557	555	582				
	ES70	12.44	316	-	-	-	-	-	30.4	30.8	30.9	31.9			-	-	-	31.3	32.2	33.5	34.7		
				-	-	-	-	-	773	783	786	810			-	-	-	794	819	850	881		
	ES71	16.73	425	-	-	-	-	-	-	-	30.0	30.9	32.0	34.7	-	-	-	-	-	32.6	33.7	32.8	37.3
				-	-	-	-	-	-	-	763	786	813	881	-	-	-	-	-	827	857	833	948
	ES72	21.61	549	-	-	-	-	-	-	-	-	34.6	35.7	38.3	-	-	-	-	-	-	37.4	36.5	41.0
				-	-	-	-	-	-	-	-	879	907	974	-	-	-	-	-	-	950	926	1041
DOUBLE ACTING (ESDA)	ES54	6.61	169	6.1	6.3	6.7	-	7.2	8.2						8.9	-	8.9						
				155	160	170	-	183	209						227	-	227						
	ES55	10.24	260	-	-	8.7	-	9.3	9.7	10.2	10.7				11.0	-	11.1	11.0	12.1				
				-	-	222	-	235	246	259	271				280	-	281	280	307				
	ES56	12.44	316	-	-	-	-	-	12.0	12.4	12.5	14.1			-	-	-	12.8	13.8	15.0	16.3		
				-	-	-	-	-	306	315	318	357			-	-	-	326	351	382	413		
	ES57	16.73	425	-	-	-	-	-	-	-	13.2	14.3	14.9	17.5	-	-	-	-	-	15.7	16.9	16.0	20.5
				-	-	-	-	-	-	-	336	363	378	444	-	-	-	-	-	400	430	406	521
	ES58	21.61	549	-	-	-	-	-	-	-	-	15.0	16.1	18.9	-	-	-	-	-	-	17.8	16.9	21.4
				-	-	-	-	-	-	-	-	382	410	479	-	-	-	-	-	-	453	429	544
	Inches DN			½"	¾"	1"	1¼"	1½"	2"	2½"	3"	4"	5"	6"	1"	1¼"	1½"	2"	2½"	3"	4"	5"	6"
				15	20	25	32	40	50	65	80	100	125	150	25	32	40	50	65	80	100	125	150

ES Modular Actuators are also available for the K High-Flow range of straight through valves.

Note: For actuators >150 (6") Please contact Saunders

All dimensions are based on unlined bodies and bare-shaft actuators.

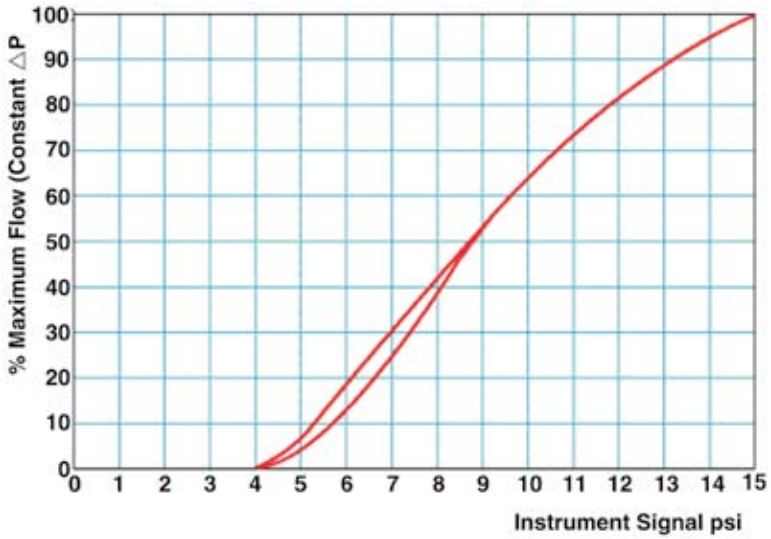
Add-on handwheel dimensions

ACTUATOR	Add-on In.	mm
68, 69, 70	0.55	14
61, 62, 63	0.55	14
71, 64	0.71	18

Pneumatic Valve Actuation

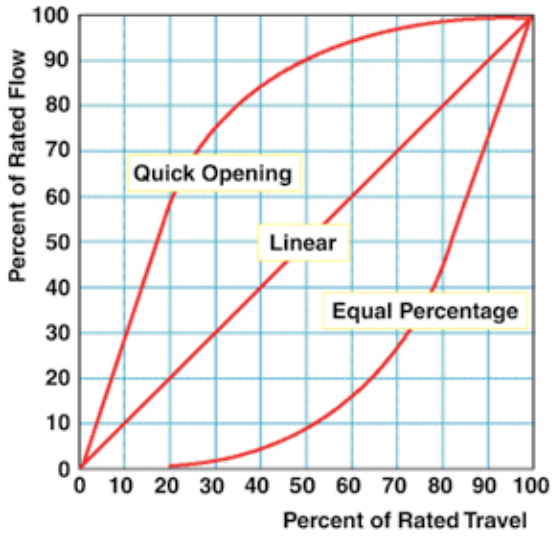
Valve Throttling and Flow Control

Hysteresis for weir type diaphragm valve fitted with actuator plus valve positioner



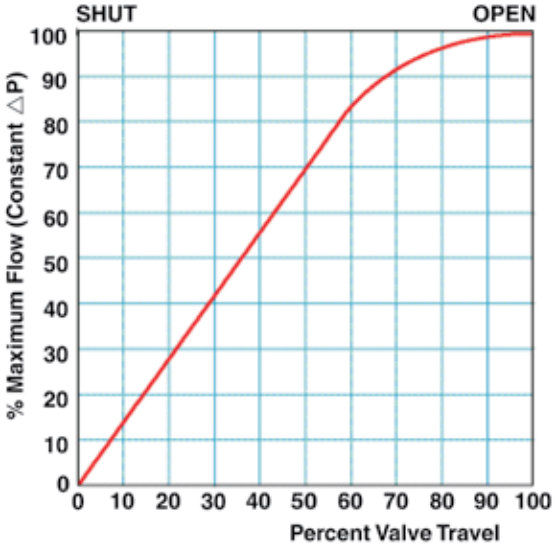
- Saunders diaphragm valves offer excellent control capabilities within a broad range of pressure, flow or level control applications.
- Rangeability (ratio of maximum flow vs. minimum control flow) of Saunders weir type valves is 35:1 extending beyond the range of most process and service control systems.
- The positive shut-off characteristics of the valve can, in many instances, eliminate the need for independent block valves, a major component in the piping system cost.
- The inherent flow characteristics illustrated shows linearity up to 60% of travel (80% of flow).
- The chart illustrates installed characteristics affected by the dynamic friction loss for the remainder of the piping system. Other characteristics can be obtained through the use of characterized positioners.
- Pressure recovery factor = 0.7.

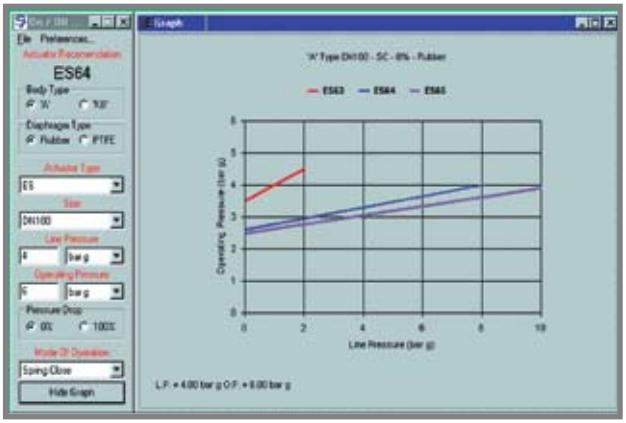
Valve characteristic curves



Actuator with digital foundation fieldbus positioner

% flow/% travel, weir type diaphragm valve





On/Off Actuation Selection

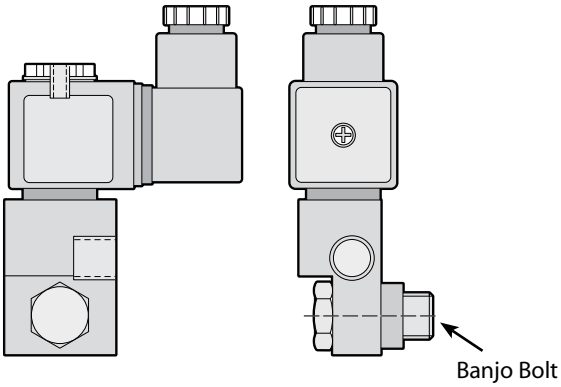
To use this software, you simply enter your process data into the selection boxes. The program sizes the actuator to suit your specific requirements.

Actuators - Accessories

Overview

MODEL	SIZE RANGE	STYLE	MATERIAL	SOLENOID	SWITCH BOX	POSITIONER	AIR FILTER	HAND-WHEEL
EC	1/4" to 2" DN8-DN50	A	PES	✓	✓	✓	×	×
SSC	1/4" to 2" DN8-DN50	A	316 C12	✓	✓	✓	×	✓
ECX	2 1/2" to 6" DN65-DN150	A	SiAl	✓	✓	×	✓	×
ES	1/2" to 8" DN15-DN250	A,KB	SiAl	✓	✓	✓	✓	✓

✓ = Available and × = Not available



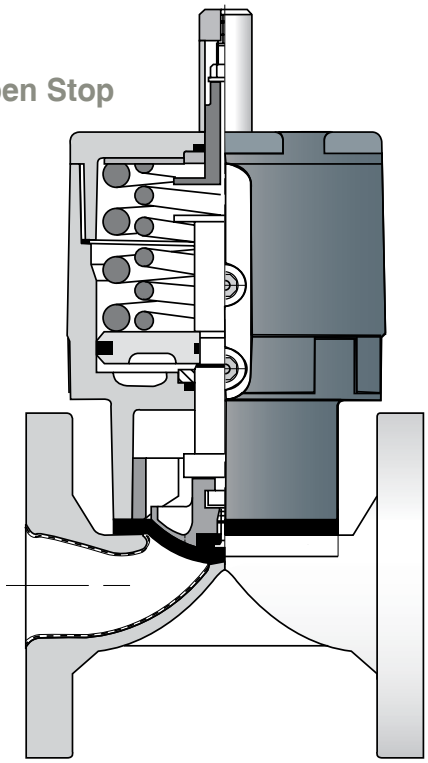
Solenoid Valves

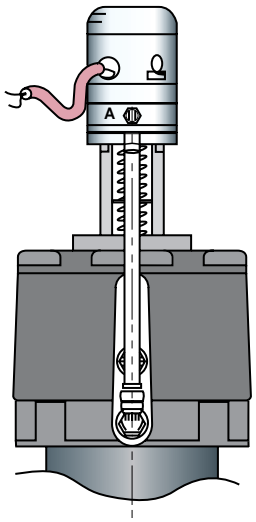
A wide range of locally mounted banjo solenoid valves can be fitted to the Saunders actuator range with a manual override option and various hazardous area classifications. The solenoid range is designed to cover all requirements.

EC & SSC Limit-Open Stop

The EC/SSC limit-open stop can be supplied to order. It offers a fully adjustable travel stop.

With the removal of the plastic cover, the limit stop is easily accessible.



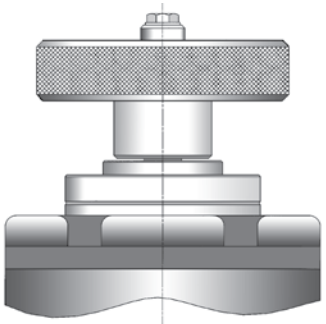


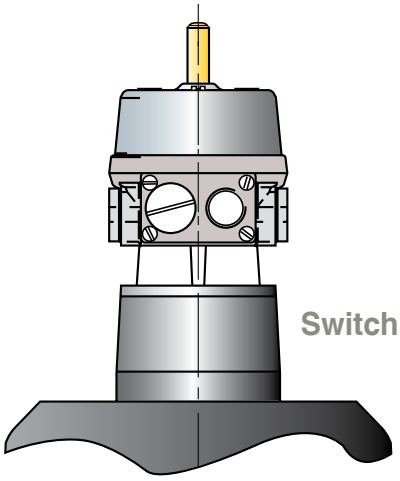
Mini Positioner

For control application on the EC and SSC, Saunders offers both pneumatic, electro-pneumatic and digital inputs with sensor feedback option and linear mounting design providing a compact control solution.

SSC Manual Over-Ride

SSC can be supplied with an emergency manual override manufactured from stainless steel. Please contact the factory for further information.

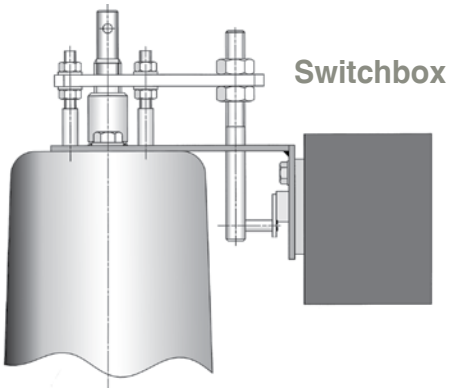




Switchbox

This modular switchbox option is available for EC/SSC & ECX actuator ranges. The switchbox offers a wide range of mechanical and proximity sensors with space for up to 4 switches, integral solenoid valve & ASi interface*.

*ASi Interface can be retrofitted.

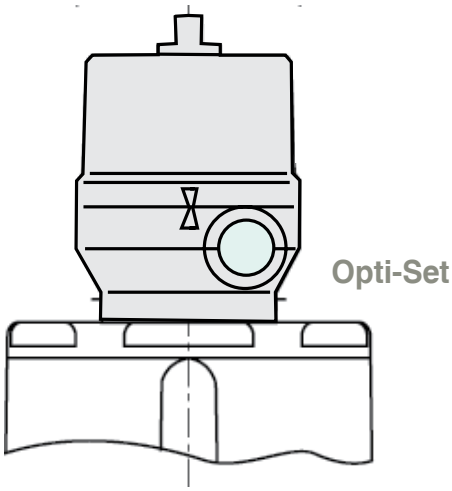


Switchbox

Shown mounted to ES Actuator

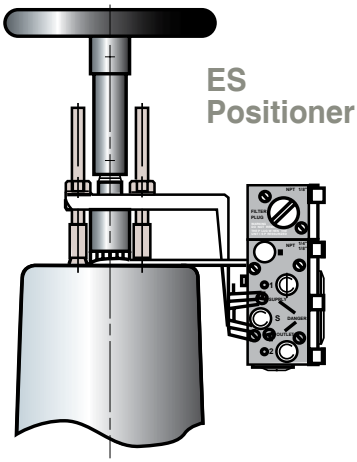
Highly modular switch-boxes are available for the ES Modular actuator range. Offering a wide range of both mechanical and proximity switches as well as other options, i.e. ASi-interface.

Other control options available upon request.



Opti-Set

- Self setting. Minimize validation/set-up time.
- Remote, open/closed indication.
- Economical, compact, lightweight design.
- Allows for compression/set of the diaphragm.
- Easy access, even at difficult angles.
- Available with mechanical or proximity switches, including safety options.



ES Positioner

Shown mounted to ES Actuator

Provides precise control of the flow through the valve. This long life corrosion resistant range suits a wide variety of applications with reliability and accuracy. Available as pneumatic electro-pneumatic intrinsically safe and explosion proof, together with a variety of feedback options. A digital option is also available.

How To Specify
Type A & WFB valves
(Weir valves)

Example: 050 - 33 - 06 - A - 36R - HT - —

Size | Body Type / Spare Type | Body Material & Lining | Length & Flange | Topworks | Diaphragm | Accessories

Type **A** Weir Valves		
1/4"	DN8	008
1/2"	DN15	015
3/4"	DN20	020
1"	DN25	025
1 1/2"	DN40	040
2"	DN50	050
2 1/2"	DN65	065
3	DN80	080
4	DN100	100
5	DN125	125
6	DN150	150
8	DN200	200
10	DN250	250
12	DN300	300
14	DN350	350

Type **WFB** Valves		
1 1/2"	DN40	040
2 1/2"	DN65	065

Type **A** Weir Valves	
22	Screwed Ends
23	Socket Weld
24	Butt Weld
33	Flanged -Unlined
34	Flanged - Lined

Type **A** Weir Spares	
S1	Spare Diaphragm
H1	Spare Bonnet
T1	Spare Actuator

Type **WFB** Valves	
11	Model 1
12	Model 2
13	Model 4
14	Model 6
15	Model 7
16	Model 9
17	Model 11

Type **WFB** Spares	
S4	Spare Diaphragm
H4	Spare Bonnet

Type **A** Weir Valves	
03	Bronze Gunmetal
04	Cast Iron
05	Ductile Iron
06	Stainless Steel CF8M (316)
07	Cast Steel
21	Soft AA Rubber Lined
22	Hard Rubber Lined (ebonite)
23	Neoprene Lined
24	Butyl Lined
25	Hypalon Lined
32	Glass Lined
48	Polypropylene Lined
49	ETFE Lined
50	PVDF Lined
52	PFA Lined
54	PTFE Lined
63	ETFE Lined, Fluoropolymer Coated
67	PFA Lined, Fluoropolymer Coated

Type **WFB** Valves	
03	Bronze Gunmetal
05	Ductile Iron

Type **A** Weir Valves	
A	U.S. Length ANSI 125/150
D	DIN - ND10
E	DIN ND10 4 bolt
F	DIN Length ANSI 125/150
W	BS4504 PN10/16
X	BS4504 ANSI 125/150
S	API / NPT
T	BS21 Rp

Manual Bonnets - Rubber Diaphragm	
10R	Handwheel Non-Indicating
11R	Rising Handwheel Indicating
13R	Sealed Bonnet Indicating
14R	Bronze Gunmetal
22R	Chainwheel Operated
27R	Locking Bonnet
31R	Sliding Spindle Bonnet
36R	Stainless Steel
48R	Fluoropolymer Coated
69R	Zytel (LCP) Bonnet

Manual Bonnets - PTFE Diaphragm	
10T	Handwheel Non-Indicating
11T	Rising Handwheel Indicating
13T	Sealed Bonnet Indicating
14T	Bronze Gunmetal
22T	Chainwheel Operated
27T	Locking Bonnet
31T	Sliding Spindle Bonnet
36T	Stainless Steel
48T	Fluoropolymer Coated
70T	Zytel (LCP) Bonnet

Acutated	
402-406	Double Acting ES for Rubber Diaphragm
502-506	Spring Close ES for Rubber Diaphragm
602-606	Spring Open ES for Rubber Diaphragm
422-426	Double Acting ES for PTFE Diaphragm
522-526	Spring Close ES for PTFE Diaphragm
622-626	Spring Open ES for PTFE Diaphragm
EC1	DA EC for Rubber
EC2	SC EC for Rubber
EC3	SO EC for Rubber
EC4	DA EC for PTFE
EC5	SC EC for PTFE
EC6	SO EC for PTFE
EC7	SC EC for Rubber 4 Bar
EC8	SC EC for PTFE 4 Bar

Note: For SSC Actuators replace "E" with "S". For example: EC1 becomes SC1

EX1	DA ECX for Rubber
EX2	SC ECX for Rubber
EX3	SO ECX for Rubber
EX4	DA ECX for PTFE
EX5	SC ECX for PTFE
EX6	SO ECX for PTFE

Note: EC and ECX only available for weir.

Note: EC 1/4" to 2" ECX 2 1/2" to 6"

How To Specify
Type K (High Flow)
Type KB (Straight Through)

Example: 050 | 56 | 24 - A - 11R - D1 - —

Size | Body Type / Spare Type | Body Material & Lining | Length & Flange | Topworks | Diaphragm | Accessories

Accessories
If accessories are required indicate: XX Accessory detail to be coded separately.

Type **A** Weir Valves	
C1	Nitrile
CV	Nitrile (Vacuum)
D1	Butyl 300
E2	EPM 425
EV	EPM 425 (Vacuum)
HT	Neoprene
Q1	Natural / Synthetic
U1	Hypalon
V1	Fluoroelastomer
S1	White Silicone
P1	PTFE / Butyl Back (214/300)
P2	PTFE / EPM Back (214/425)
P3	PTFE / Fluoro Back (214/226)
P7	PTFE(K) / EPM Back (214K/425)
S5	PTFE(S) / EPM Back (214S/425)

Type **WFB** Valves	
U2	Hypalon (Fire 286)

Type **K** & **KB** Valves		
1/2"	DN15	015
3/4"	DN20	020
1"	DN25	025
1 1/2"	DN40	040
2"	DN50	050
2 1/2"	DN65	065
3	DN80	080
4	DN100	100
5	DN125	125
6	DN150	150
8	DN200	200
10	DN250	250
12	DN300	300
14	DN350	350

Type **KB** Valves	
44	Screwed API
55	Flanged - Unlined
56	Flanged - Lined

Type **KB** Spares	
S2	Spare Diaphragm
H2	Spare Bonnet
T2	Spare Actuator

Type **K** Valves	
58	Flanged - Unlined
59	Flanged - Lined

Type **K** Spares	
S3	Spare diaphragm
H3	Spare Bonnet
T3	Spare Actuator

Type **K** & **KB** Valves	
03	Bronze Gunmetal
04	Cast Iron
05	Ductile Iron
06	Stainless Steel CF8M (316)
07	Cast Steel
21	Soft AA Rubber Lined
22	Hard Rubber Lined (ebonite)
23	Neoprene Lined
24	Butyl Lined
25	Hypalon Lined
32	Glass Lined

Type **K** & **KB** Valves	
A	U.S. Length ANSI 125/150
D	DIN - ND10
E	DIN ND10 4 bolt
F	DIN Length ANSI 125/150
W	BS4504 PN10/16
X	BS4504 ANSI 125/150
S	API / NPT
T	BS21 Rp

Manual Bonnets	
10R	Handwheel Non-Indicating
11R	Rising Handwheel Indicating
13R	Sealed Bonnet Indicating
22R	Chainwheel Operated
27R	Bonnet Locking Device
31R	Sliding Spindle Bonnet

Actuated	
402-406	Double Acting ES
502-506	Spring Close ES
602-606	Spring Open ES

Type **K** & **KB** Valves	
AA	Soft Rubber (AA)
C1	Nitrile (C)
D1	Butyl (300)*
E2	EPM (425)*
HT	Neoprene (HT)
U1	Hypalon (237)
V1	Fluoroelastomer (226)

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