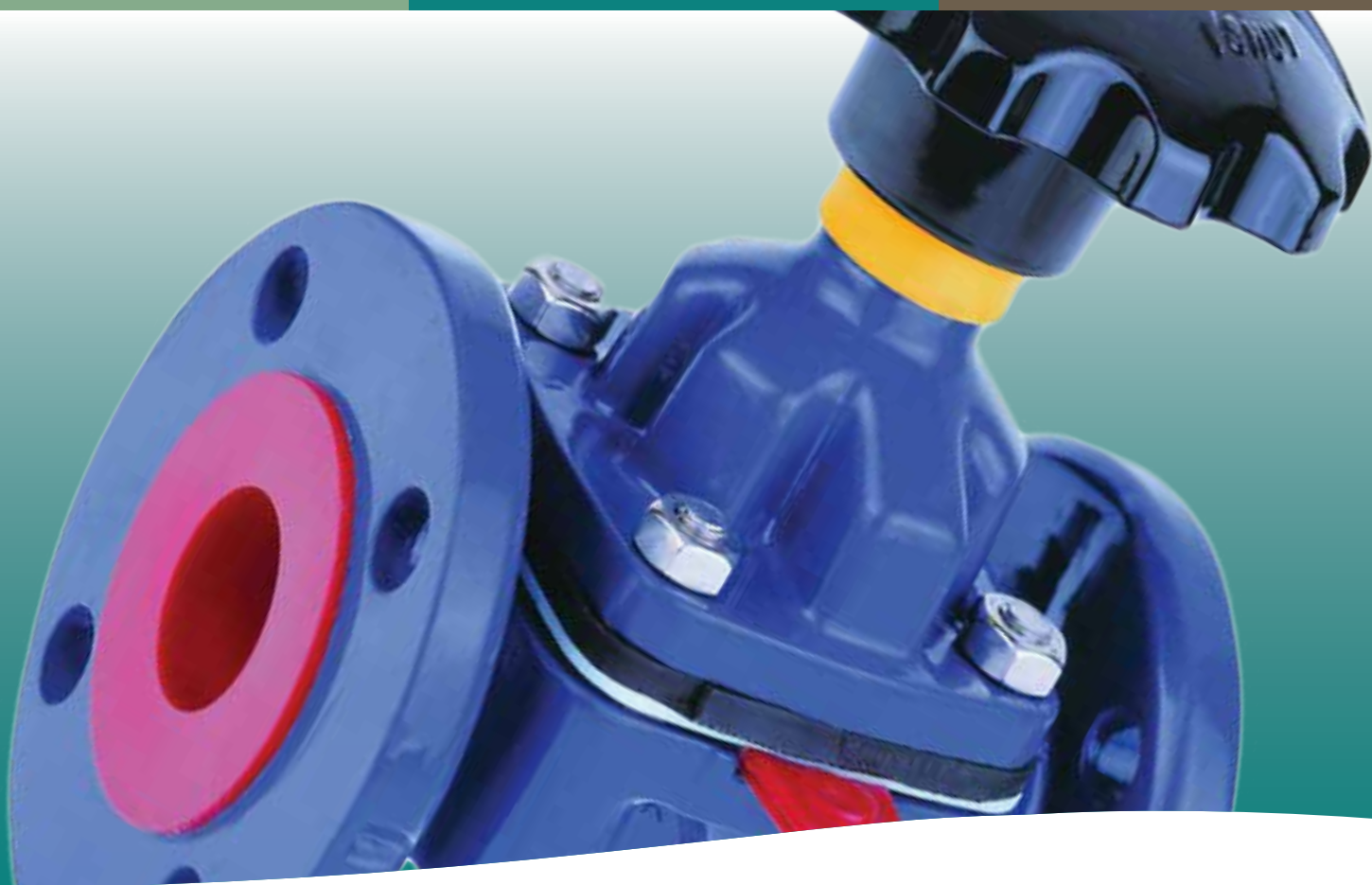


brands you trust.



Industrial Diaphragm Valves

KEY PRODUCTS

A Type Weir Design for Corrosive Media and Utilities

- Versatile and extensively used in industrial applications
- Can handle up to 15% solids (depending on process conditions)
- Perfect valve for on/off or control applications on corrosive processes

KB Straight Through Designs for Solids Handling

- Smooth, straight-through design
- High flow capacity
- Can handle highly abrasive fluids

WFB For Marine and Fire Applications

- Weir type valve for fire fighting, tank cleaning or wash down on land or sea
- Guaranteed operation even after years of being static
- Fire tested diaphragm

NX Check Valve

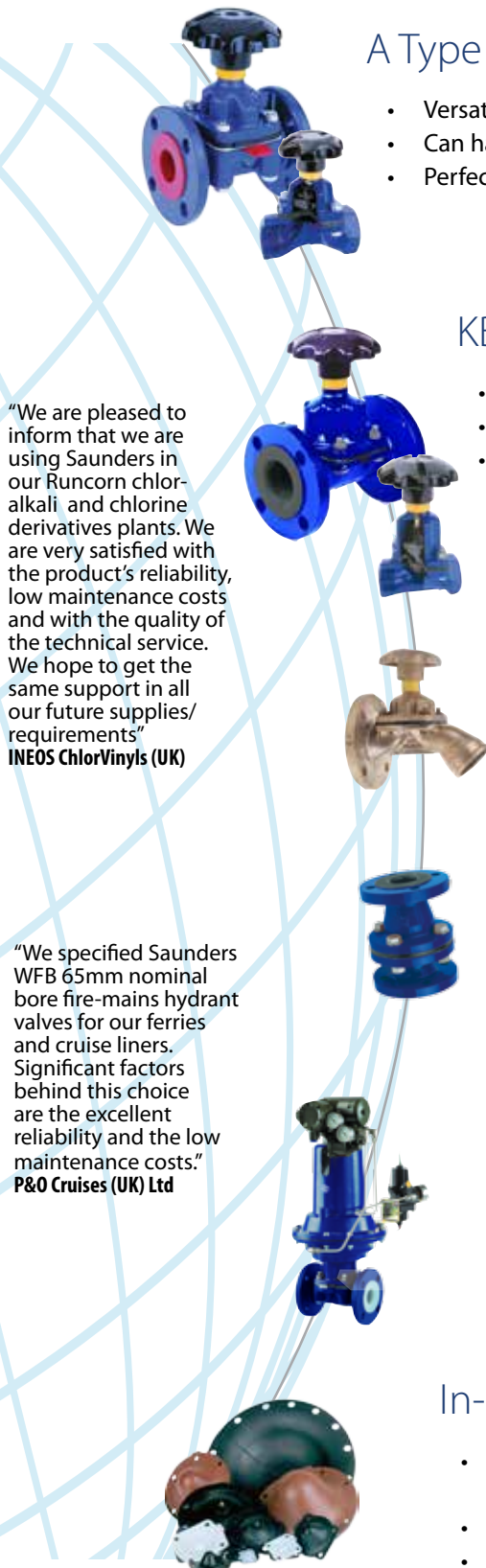
- Low pressure and vacuum duties
- Unidirectional full flow design
- Corrosion resistant linings

Actuation - Modular or Compact Actuators

- Different actuator types that cover up to DN250
- Wide range of line and operating pressure options
- Conceived to withstand the most adverse conditions

In-house Manufacture of All Diaphragms

- Vulcanized layers with high strength woven reinforcement in elastomer-based diaphragms
- Range of PTFE-type diaphragms for critical applications
- Innovative compounding based on extensive polymer knowledge



"We are pleased to inform that we are using Saunders in our Runcorn chlor-alkali and chlorine derivatives plants. We are very satisfied with the product's reliability, low maintenance costs and with the quality of the technical service. We hope to get the same support in all our future supplies/requirements"
INEOS ChlorVinyls (UK)

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

WHY DIAPHRAGM VALVES?

1 Corrosion Resistance

Saunders lined valves are the first choice for highly-corrosive applications. We offer an extensive range of linings and diaphragms to suit most applications. This wide selection of body lining and diaphragm materials provides an effective and economical solution by eliminating the need for exotic alloys. Our extensive range of valve options include elastomer and fluoropolymer linings, designed especially to combat corrosion.

3 Leak Tight

In pressure and vacuum services, Saunders diaphragm valves deliver 100% leak-tight shutoff in accordance with standards MSS SP-88 and BS EN 12266-1, even after thousands of operations. This reduces processing and handling costs by eliminating emissions commonly associated with other valve designs.

5 Easy Maintenance

A three-part design allows maintenance and actuator retrofitting without removing the valve body from the pipeline. Overall, this results in lower cost of ownership compared to other valve types.

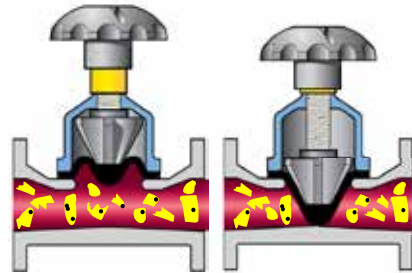


7 Linear Operation

Linear movement of the valve eliminates the rotational seat wear that is characteristic of quarter-turn valves, resulting in a longer service life and reduced total cost of ownership. This results in a longer service lifetime.

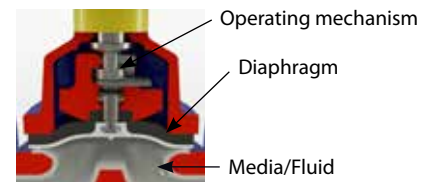
2 Abrasion Resistance

Saunders polymer technology provides superior abrasion resistance. The KB straight through valve will handle up to 100% solids and ensure leak-free shut off with a soft rubber diaphragm.



4 Operating Mechanism Isolated from Line Media

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.

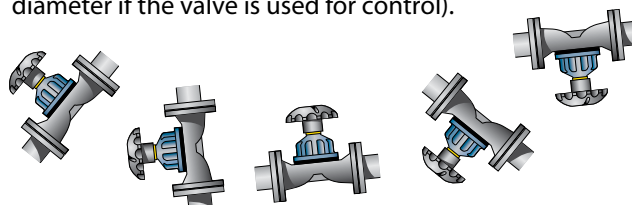


6 Suitable for Control

Throttling and control characteristics are enhanced by a streamlined flow path that is cavity free and provides excellent flow control capabilities.

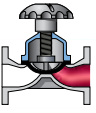

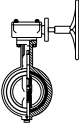
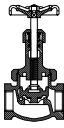


8 Installation Versatility

The Saunders valve can be installed in any position without affecting its operation. However, we recommend installation to be at least six times the pipe diameter from a bend or pump (ten times the pipe diameter if the valve is used for control).



Links to animations depicting the concepts discussed here are available on the Saunders section of the Crane ChemPharma & Energy website.

VALVE COMPARISON

Valve/Service Feature	 Diaphragm	 Ball	 Butterfly	 Globe	 Gate	 Lubricated Plug
Leak tight* shut-off against gases, liquids and solids	Green	Yellow	Yellow	Yellow	Yellow	Yellow
Resistance to abrasion and erosion	Green	Yellow	Yellow	Red	Yellow	Yellow
Wide choice of materials to match service conditions	Green	Green	Green	Yellow	Yellow	Yellow
Non-turbulent flow path	Green	Green	Yellow	Red	Green	Green
Low fluid friction loss	Green	Green	Yellow	Red	Green	Green
Resistance to corrosion	Green	Green	Green	Yellow	Yellow	Yellow
Vacuum capability	Green	Green	Yellow	Yellow	Red	Yellow
In-line maintenance, low cost spares	Green	Yellow	Yellow	Red	Red	Yellow
Resistance to seat wear	Green	Red	Red	Green	Yellow	Red
High purity	Green	Yellow	Yellow	Red	Red	Red
Control applications	Green	Yellow	Yellow	Green	Red	Yellow
On/off applications	Green	Green	Green	Yellow	Yellow	Yellow
Temperature range	Yellow	Green	Green	Green	Green	Yellow
Pressure range	Yellow	Green	Green	Green	Green	Green
Weight/size ratio	Yellow	Yellow	Green	Yellow	Yellow	Yellow

Suitable **Not Suitable**

Saunders® offers a comprehensive range of diaphragm valves for use in any industry. They encompass the full spectrum of corrosive and abrasive applications that require reliable valve operation. Easily maintained to ensure many years of trouble-free operation, Saunders® diaphragm valves have become a standard in industries such as chemical production, mining, water treatment, fertilizers and marine.

*in accordance with standards MSS SP-88 and BS EN 12266-1

POLYMER SCIENCE

At Saunders®, we apply rigorous quality control measures at every manufacturing step of our polymer materials. For many years, we have increased our expertise and accumulated experience in the production of our own **diaphragms** and valve **linings**. As a result, our valves can handle the most challenging fluids with total security. The name Saunders® is synonymous with innovation, continuous product development and the highest standards of quality control.



A type, butyl diaphragm



PTFE diaphragm with butyl rubber backing



KB type, soft natural rubber diaphragm



214K diaphragm for high performance in chlorine applications

Fitments Features



Rubber diaphragms Screw fitment



PTFE diaphragms Bayonet fitment

BEST MATERIALS

STRINGENT QUALITY CONTROLS

RELIABILITY, LONG LIFE AND SIMPLIFIED MAINTENANCE

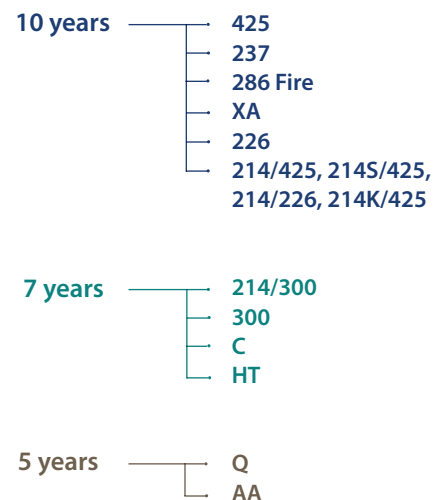
Diaphragm Construction



PTFE Diaphragm

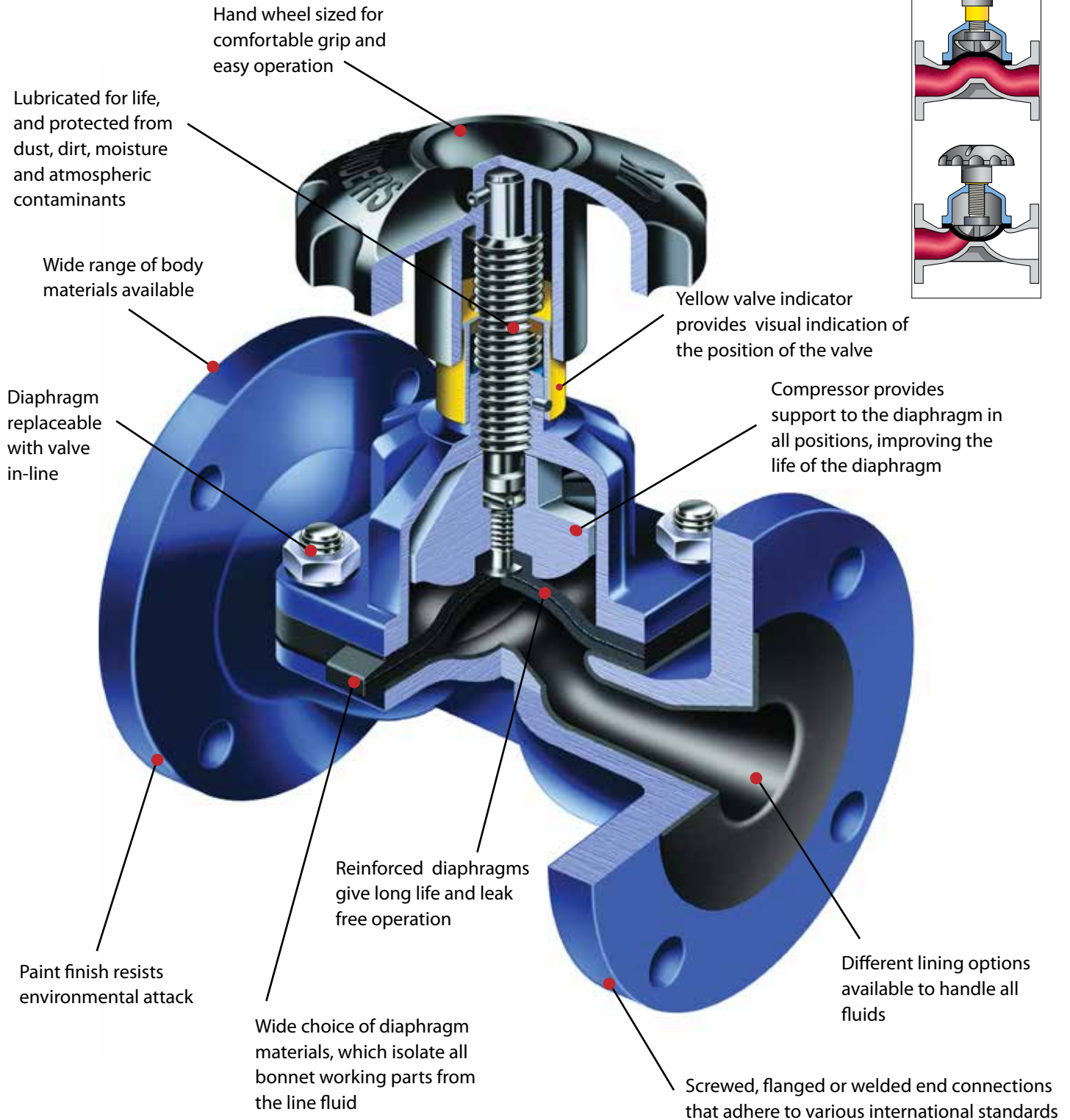
Feature	Benefit
Premium grade raw materials and fabric reinforcement in a multi-layer construction	Maximum performance and durability in the most demanding applications
Studs attached with bonding adhesive and mechanical anchorage	Strength and durability for intensive and systematic mechanical operation
Dual sealing ribs (across the weir and around the diaphragm periphery)	Enhanced leak tight sealing capabilities and lower closure torques
Two-piece diaphragm construction - PTFE face and reinforced rubber backing	Increased pressure rating and durability

Expected shelf life of diaphragm (from manufacturing dates)



A TYPE – FEATURES

Original Saunders® Design



Saunders® A type Diaphragm Valve:
the valve of choice to handle highly corrosive media

A TYPE – STANDARDS



Top Works

- Manual
- Actuated

Diaphragm

- Rubber
- PTFE

Body

- Flanged and screwed design
- Lined and unlined
- Cast iron, SG iron, cast steel, stainless steel or gunmetal

As well as meeting the overall lengths specified in EN 558-1 Series 1, Series 7* and MSS SP-88, Saunders® valves are manufactured to the following standards:

Flanged	
American	ASME B16.1 Class 125
	ASME B16.24 Class 150
	ASME B16.5 Class 150
British	BS 10 Tables D and E
British/European ¹	BS EN 1092-1 PN10/16
	BS EN 1092-2 PN10/16
	BS EN 1092-3 PN10/16
Japanese	JIS B 2220 10K
	JIS B 2239 10K
	JIS B 2240 10K

¹ Replaces BS 4504 PN10/16

Screwed	
American ²	ASME B1.20.1
British/European ³	BS EN 10226-1 Parallel
	BS EN 10226-1 Taper
European ⁴	EN ISO 228-1
International	ISO 7-1 Parallel
	ISO 7-1 Taper

² Replaces ANSI 2.1

³ Replaces BS 21 Parallel and Taper

⁴ Replaces DIN 259

* Series 7 is the original IDV standard from when PK Saunders invented the diaphragm valve.

A TYPE – BODY

Lined and Unlined Options

Our metal bodies provide simultaneous mechanical support for the lining and protection against Ultraviolet (UV) attack. The nominal bore thicknesses of Saunders® linings range from 1 to 5.5 mm, depending on lining material and valve size: glass 1 mm, rubber 2-4.5 mm and plastic 4-5.5 mm.

Unlined Bodies

Material	Connection	Standard	Material Grade	Size	Temperature
Cast Iron	Flanged	BS EN1561	GJL-250	DN15-DN500	-10 °C to 175 °C
SG Iron	Screwed	BS EN1563	GJS-450-10	DN8-DN50	-10 °C to 175 °C
	Flanged		GJS-400-18 ¹	DN15-DN350	
Cast Steel	Flanged	ASTM A216	WCB	DN15-DN250	-30 °C to 175 °C
Gun Metal	Screwed	BS EN1982	CC491K-GS	DN8-DN80	-30 °C to 175 °C
	Flanged		CC492K-GS	DN15-DN200	
Stainless Steel	Screwed	BS EN10283	1.4408 ²	DN8-DN80	-30 °C to 175 °C
	Flanged			DN15-DN200	

¹ For some sizes GJS-400-18-LT grade is available with a low temperature limit of -20 °C

² Replaces the standard BS3100 316C16

Standard material grade fasteners:

Stainless steel fasteners - All stainless steel, plastic lined and glass lined valves

Aluminium Bronze fasteners - Gunmetal flanged valves

Carbon Steel fasteners - All remaining valves.

Special material grade fasteners available upon request

Lined Options - Flanged Bodies Only

Lining	Body Material	Size	Temperature
PFA	SG Iron	DN15-DN200	-10 °C to 175 °C
ETFE	SG Iron	DN15-DN150	-10 °C to 150 °C
PVDF	SG Iron	DN20-DN150	-10 °C to 125 °C
PP	SG Iron	DN20-DN150	-10 °C to 85 °C

Glass	Cast Iron	DN15-DN200	-10 °C to 175 °C
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Butyl (Isobutylene Isoprene)	Cast Iron	DN20-DN500	-10 °C to 110 °C
	SG Iron		-10 °C to 110 °C
	Cast Steel		-30 °C to 110 °C
Neoprene (Polychloroprene)	Cast Iron	DN20-DN500	-10 °C to 105 °C
	SG Iron		-10 °C to 105 °C
	Cast Steel		-30 °C to 105 °C
HRL (Hard Natural Rubber)	Cast Iron	DN20-DN500	-10 °C to 85 °C
	SG Iron		-10 °C to 85 °C
	Cast Steel		-30 °C to 85 °C

Plastic Lining



PFA Perfluoroalkoxy – Excellent suitability for concentrated strong acids at high temperature, aromatics, aliphatic and chlorinated solvents. (White colour)



ETFE Ethylene Tetrafluoroethylene – Suitable for strong acids, salts in water, solvents at medium temperature. ETFE has the highest abrasion resistance of all the fluorocarbon linings. (Red colour)



PP Polypropylene – Economic solution for mineral acids, salts in water, de-ionised water and effluent treatment chemicals. (Light grey colour)



PVDF Polyvinylidene Fluoride – Suitable for mineral acids, salts in water, water and effluent treatment, additionally it is the best solution for wet chlorine gas or chlorine in water. (Black colour)

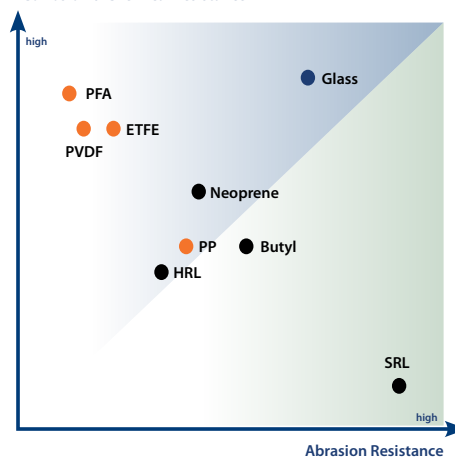


Glass Lining



Used in many different applications, including strong acids. Very high corrosion and abrasion resistance within a wide range of temperature. *Note that glass is not suitable for applications where thermal cycling occurs.* (Blue colour)

Corrosion & Chemical Resistance



Rubber Lining



HRL Hard Natural Rubber – Used for salts in water, diluted acids, de-ionised water, plating solutions and potable water. HRL has better chemical resistance than SRL. (Black)

Butyl Isobutylene Isoprene – Great for corrosive & abrasive slurries, and acidic slurries. Additional applications are salts in water, dilute acids and alkalis, and lime. (Black)

Neoprene Polychloroprene – Perfect solution for a combination of abrasive slurries containing hydrocarbons, sludge oils and also sea water. (Black)

The temperature ranges above are given for general reference purposes only. Service conditions, such as media being handled and concentration of solids, will determine the highest possible working temperature. Additionally, the performance of the valve will also depend on the diaphragm material.

A TYPE – DIAPHRAGM

A Type Diaphragm

Diaphragm	Composition	Size	Temperature
425	EPM (Ethylene Propylene)	All Sizes	-40°C to 130°C
300	Butyl (Isobutylene Isoprene)	All Sizes	-40°C to 130°C
237	CSM (Chlorosulfonated Polyethylene)	All Sizes	-10°C to 100°C
XA	EPDM (Ethylene Propylene Diene)	All Sizes	-40°C to 130°C
HT	Neoprene (Polychloroprene)	All Sizes	-30°C to 100°C
226	FKM (Fluoroelastomer)	All Sizes	-5°C to 150°C
C	Nitrile (Butadiene Acrylonitrile)	All Sizes	-20°C to 100°C
Q	Natural Rubber	All Sizes	-50°C to 100°C

214/300	PTFE/Butyl	DN8-DN250	-20°C to 150°C
214/425	PTFE/EPM	DN8-DN250	-20°C to 160°C
214/226	PTFE/FKM	DN8-DN250	-5°C to 175°C
214S/425	TFM/EPM	DN8-DN150	-20°C to 160°C
214K/425	PTFE/PVDF/EPM	DN15-DN150	-20°C to 100°C

In the range of PTFE diaphragms, Saunders offers both moulded open and closed options for your convenience. The 214S is available as moulded closed and was designed specifically to reduce polymeric creep, therefore increasing the sealing properties and life of the diaphragm.



Moulded closed



Moulded open

PTFE Diaphragm

214/300 - Used in strong acids and alkalis, and salts in water at high temperature. Sulfuric acid is a good example with temperatures up to 110°C and concentrations up to 96 %.

214/425 - Typical applications are strong acids, alkalis and salts in water at high temperature. Constant steam is also another important application.

214/226 - Strong acid, diluted chlorine, bromine solutions at low concentration.

214S/425 - Strong acids, alkalis and salts in water at high temperature. Constant steam applications where the valve is mainly closed (diaphragm is moulded closed).

214K/425 - Three layer diaphragm with PTFE/PVDF/425, the best option for chlorine, bromine gas and chlorinated solutions.

Rubber Diaphragm

425 - Salts in water, acids and alkalis, ozone, water, intermittent steam. Great solution for food and beverages applications. FDA and USP approved¹.

300 - Chemicals, diluted acids and alkalis, drinking water. Additional abrasive applications like phosphoric acid in low concentrations. FDA, USP and WRAS approved¹.

237 - The best solution for sodium hypochlorite. Great with strong acids and low concentration chlorine gas. It is also oil resistant.

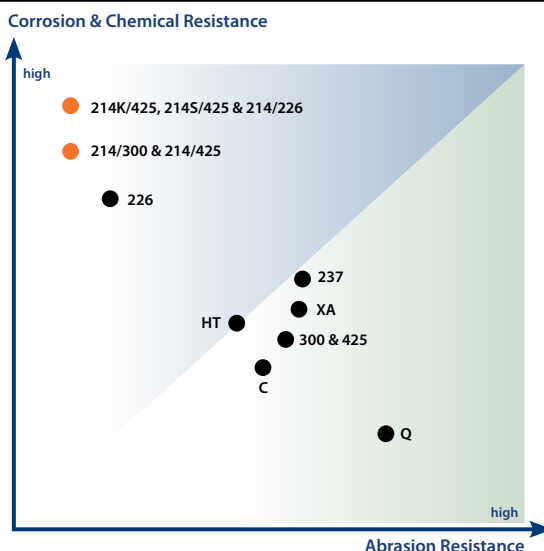
XA - Specifically designed for both abrasive and corrosive applications such as phosphoric acid, metal treatment, mining applications.

HT - Suitable for abrasive slurries containing hydrocarbons.

226 - Great solution for hydrogen at high temperature, concentrated acids, aromatic solvents, low concentrated chlorine solutions, ozone, unleaded petroleum.

C - Lubricating oil, cutting oils, paraffin, animal vegetable oils, aviation kerosene at low temperatures. Cv is ideal for vacuum applications, where oils are present, e.g. (compressed air, acetylene gas, LPG).

Q - Salts in water, diluted acids and alkalis, and abrasive applications.



¹ FDA - Food and Drug Administration

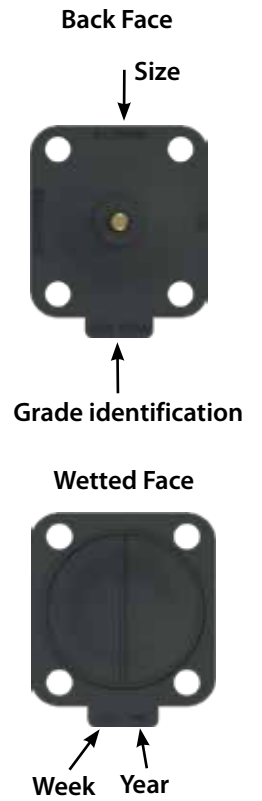
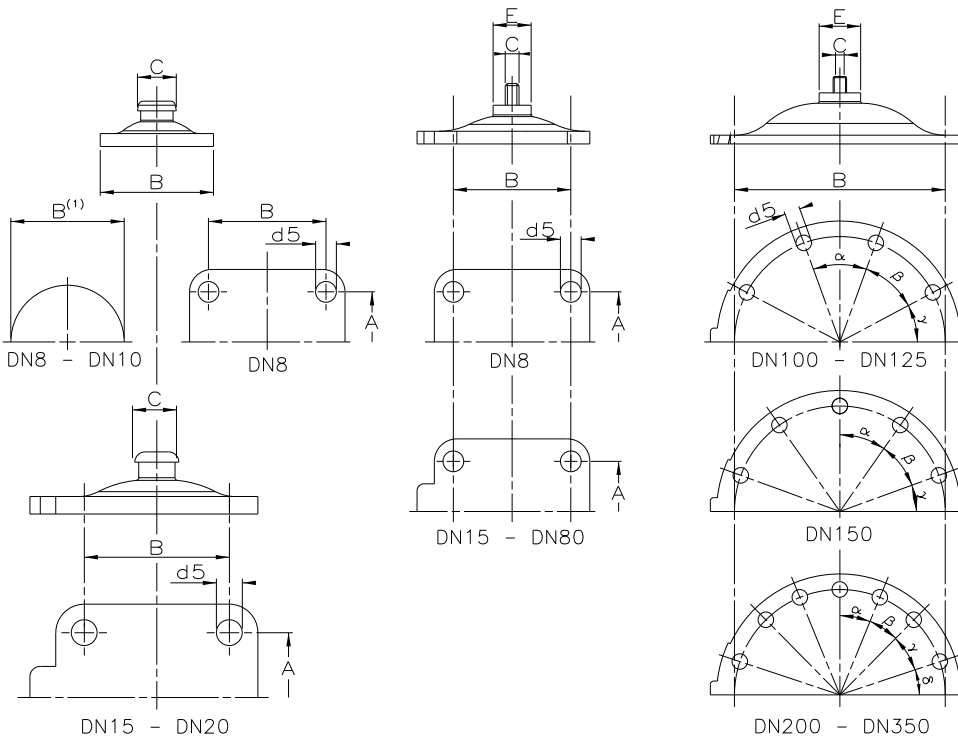
USP - United States Pharmacopeia

WRAS - Water Regulations Advisory Scheme

All rubber diaphragms have threaded brass fixings, except vacuum diaphragm (Cv, 300v, 425v), which have steel fitments. PTFE diaphragms have a stainless steel bayonet fitments.

A TYPE – DIAPHRAGM DIMENSIONS

Diaphragm Identification



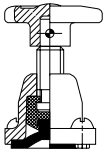
Size (DN)	Principal Diaphragm Dimensions							Angles from the holes			
	A	B	C	D (thickness)	E	d5	Number of Holes	α	β	γ	δ
8	35	28	9.5	3.2	-	5	2	-	-	-	-
10	43	35	10	4	-	6	2	-	-	-	-
15	33	37	13	5	-	6	4	-	-	-	-
20	40	44	13	5.4	-	7	4	-	-	-	-
25	46	54	1/4" BSW	5.5	17.5	10	4	-	-	-	-
32	60	67		7.2	19	10	4	-	-	-	-
40	65	70		6	22	11	4	-	-	-	-
50	78	83	5/16" BSW	6.2	25.4	13	4	-	-	-	-
65	95	102		7.9	28.6	14	4	-	-	-	-
80	114	127		7	32	17	4	-	-	-	-
100	-	194	3/8" BSW	8	38	14	8	40°	42°	56°	-
125	-	222		11.1	44.5	17	8	43°20'	43°20'	50°	-
150	-	273	7/8" BSW	11.9	50	17	10	35°	35°	40°	-
200	-	381		10	63.5	19	14	22°30'	22°30'	27°	36°
250	-	438		14	76	22	14	22°30'	22°30'	22°30'	45°
300	-	508	7/8" BSW	15.2	89	25	14	24°	24°	24°	36°
350	-	527		15.9							

BSW=British Standard Whitworth thread

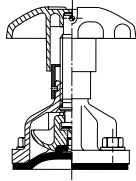
Note: Dimensions in mm unless otherwise stated.

A TYPE – TOP WORKS

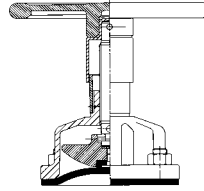
Standard Range



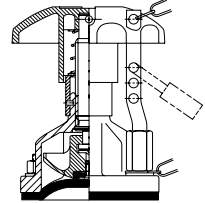
Rising handwheel (2 bolt)
DN8 - DN10



Cast iron bonnet with rising plastic handwheel
DN15 - DN50

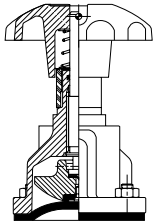


Cast iron bonnet with rising metal handwheel
DN15 - DN150

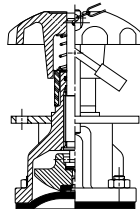


Rising handwheel with indicator (simple padlocking)
DN15 - DN150

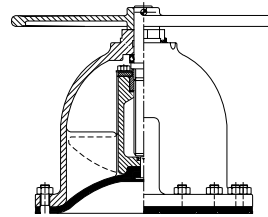
High Performance



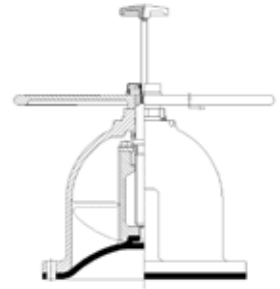
Fluoroelastomer sealed bonnet
DN15 - DN150



Fluoroelastomer sealed with padlocking
DN15 - DN150

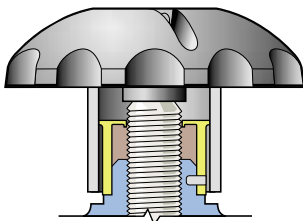


Standard non-rising handwheel without indicator
DN200 - DN350

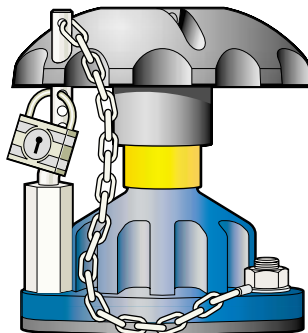


Non-Rising handwheel with indicator
DN200 - DN350

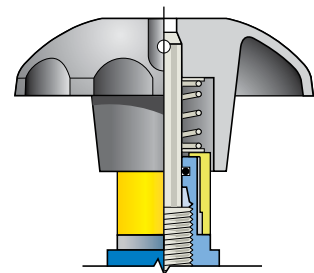
Note: Designs may vary across size range



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



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.

A TYPE – PRESSURE & TEMPERATURE LIMITS

Maximum manual working pressures for Saunders® A type diaphragm valves.
For actuated valves, please refer to the appropriate datasheets.

Bonnet pressure limits

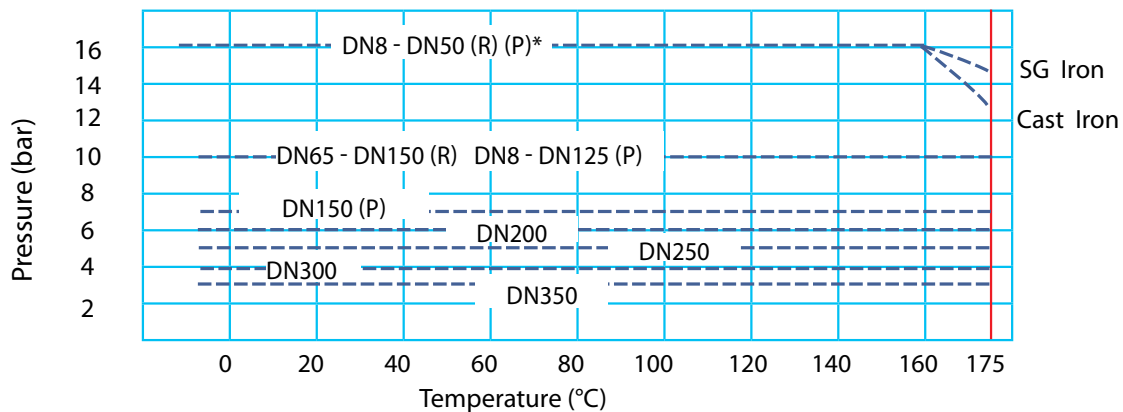
		Size (DN)	8	10	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	
		Diaphragm	Handwheel																	
Pressure (bar)	PTFE	Rising	10	10	10	10	10	10	10	10	10	10	10	10	10	7	-	-	-	-
		Non-rising	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	5	-	-
	Rubber	Rising	16	16	16	16	16	16	16	16	16	10	10	10	10	10	-	-	-	-
		Non-rising	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	5	4	3.5

All Saunders® valves are pressure tested in accordance with BS EN12266-1 standard.

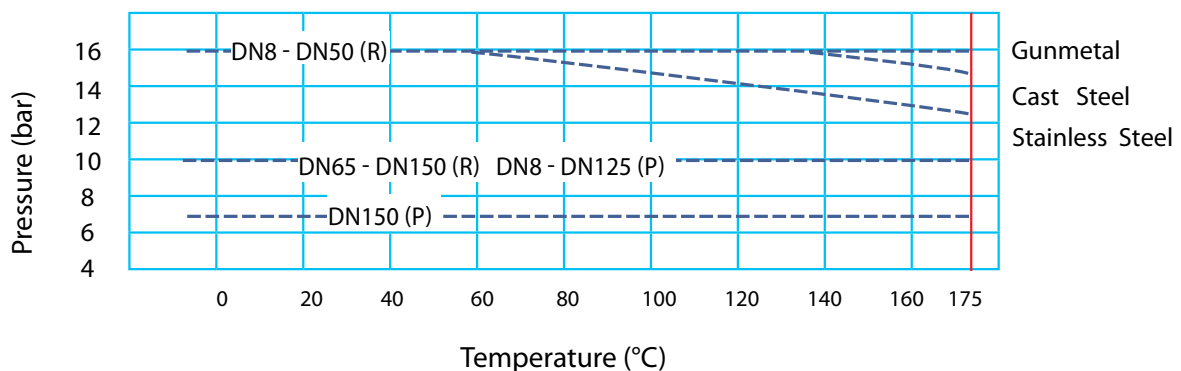
- Shell test: 1.5 times maximum rated working pressure
- Seat test: 1.1 times maximum rated working pressure

Pressure/Temperature Relationships

Cast Iron and SG Iron

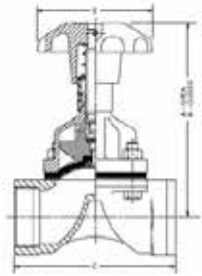


Carbon Steel, Stainless Steel & Gunmetal

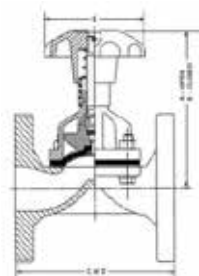


(R) = Rubber diaphragm
(P) = PTFE diaphragm
* 214S Moulded closed version only

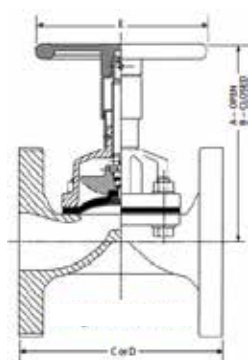
A TYPE – ASSEMBLED VALVE DIMENSIONS



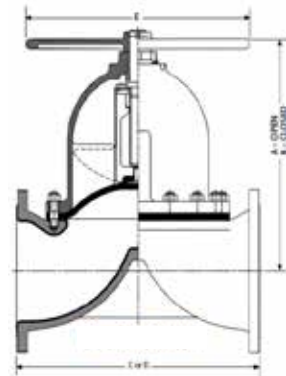
Screwed DN8-DN80



Flanged DN15-DN50



Flanged DN65-DN150



Flanged DN200-DN350

Size (DN)	8	10	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	
Screwed Unlined	A	54	67	90	94	119	154	164	188	241	263	-	-	-	-	-	-	
	B	52	61	84	88	108	142	148	164	209	229	-	-	-	-	-	-	
	C	49	49	64	83	111	125	145	168	206	257	-	-	-	-	-	-	
	Weight	0.11	0.15	0.45	0.9	1.13	1.8	3	5	9	13	-	-	-	-	-	-	
Flanged Unlined	A	-	-	100	91	108	143	157	175	226	243	308	388	442	495	581	679	660
	B	-	-	93	85	98	131	141	152	194	208	262	322	367	495	581	679	660
	C	-	-	108	117	127	146	159	190	216	254	305	356	406	521	635	749	749
	D	-	-	130	150	160	180	200	230	290	310	350	400	480	600	730	850	980
	Weight	-	-	2	2	3	4	5	8	14	19	32	48	63	152	270	360	506
Flanged Rubber Lined	A	-	-	-	97	111	146	160	177	229	246	311	391	445	498	585	683	664
	B	-	-	-	91	101	134	144	154	197	212	265	325	370	498	585	683	664
	C	-	-	-	121	131	150	163	194	220	258	309	362	412	527	641	755	755
	D	-	-	-	150	160	180	200	230	290	310	350	400	480	600	730	850	980
	Weight	-	-	-	3	4	5	6	9	15	21	32	50	63	154	273	365	512
Flanged Glass/Halar Lined	A	-	-	101	92	109	144	158	176	227	244	309	389	443	496	582	680	661
	B	-	-	94	86	99	132	142	153	195	210	263	323	368	496	582	680	661
	C	-	-	110	119	129	148	161	192	218	256	307	358	408	523	637	751	751
	D	-	-	130	150	160	180	200	230	290	310	350	400	480	600	730	850	980
	Weight	-	-	2	2	4	5	6	9	15	20	33	49	63	153	272	362	508
Flanged Plastic Lined	A	-	-	-	97	112	147	162	179	230	246	313	391	450	-	-	-	-
	B	-	-	-	91	101	133	145	155	198	211	267	322	374	-	-	-	-
	C	-	-	-	123	133	152	165	196	222	260	311	356	412	-	-	-	-
	D	-	-	-	150	160	180	200	230	290	310	350	394	480	-	-	-	-
	Weight	-	-	-	3	4	5	6	9	15	21	34	50	63	-	-	-	-
E	38	50	62	62	80	120	120	120	170	230	280	280	368	482	584	699	699	

Note: Dimensions in mm. Weights in kg. Weight may vary with materials, lining and standards. For exact weights please contact Saunders®. C valve length = EN 558 Series 7 (ex BS 5156). D valve length = EN 558 Series 1 (ex DIN 3202 Series F1).

Glass lining is typically available in the size range DN15 - DN200 for A Type valves. Contact Saunders® for further requirements.

SPECIAL VERSIONS

Saunders® environmental protective coating has been developed specifically to provide unrivaled corrosive resistance in the industrial processing industry. The green Tefzel™ coating is applied before the injection moulding of PFA or 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 to provide peace of mind in extreme corrosive material processing applications. Available in DN20-DN200 with PFA lining and DN20-DN150 with ETFE lining.

High vacuum duty valves are designed for use down to 10^{-5} Torr. Vacuum grade diaphragms contain extra nylon reinforcement for sizes DN100 and above, as well as a steel stud (not brass) as standard for all sizes. Available for C, 300 & 425 grade diaphragms.

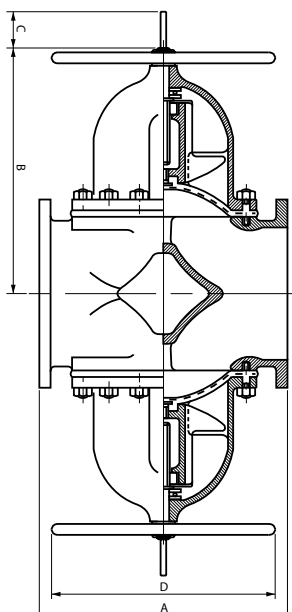
Halar® (ECTFE – ethylene chlorotrifluoroethylene) lining (dark grey) prepared using an electrostatic powder method demonstrates excellent resistance to mineral and oxidising acids, inorganic bases, salts and alcohols, and some resistance to aliphatic and aromatic hydrocarbons. Available in all sizes.

Large “double weir” valves in sizes DN400, DN450 and DN500 are available and consist of two DN300 or DN350 bodies and bonnets (see table below). Please contact Saunders® for more information. Note: these valves are not suitable for use with Group 1 (dangerous) gases.

Size (DN)	A	B	C (Travel)	D
400	750	750	190	700
450	750	750	190	700
500	750	780	230	700

Valve Sizes	
DN400	Fitted with two DN300 bonnets
DN450	Fitted with two DN300 bonnets
DN500	Fitted with two DN350 bonnets

Note: Dimensions in mm

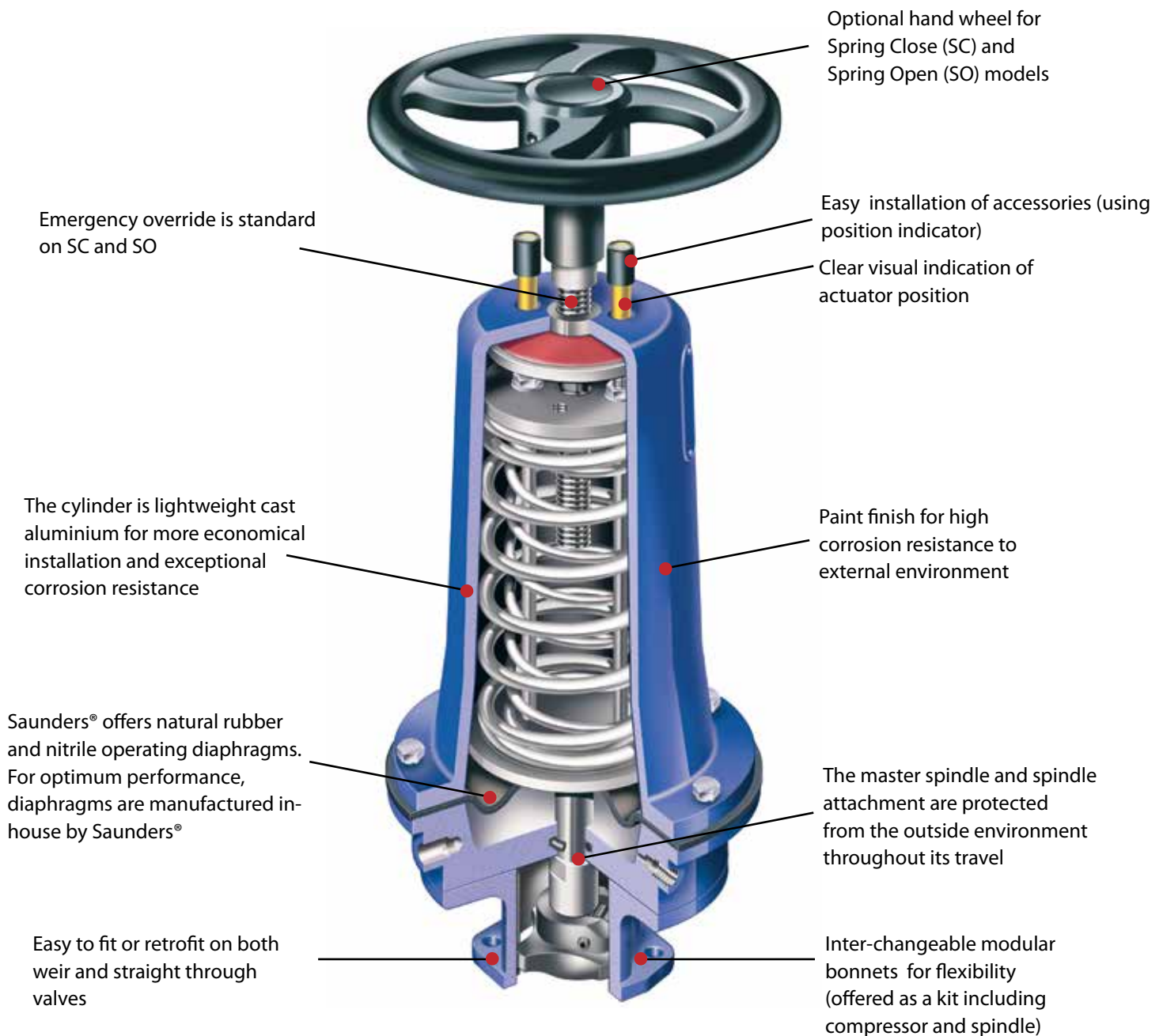


Schematic of large size double weir valves.



Tefzel® coated ETFE lined A type valve

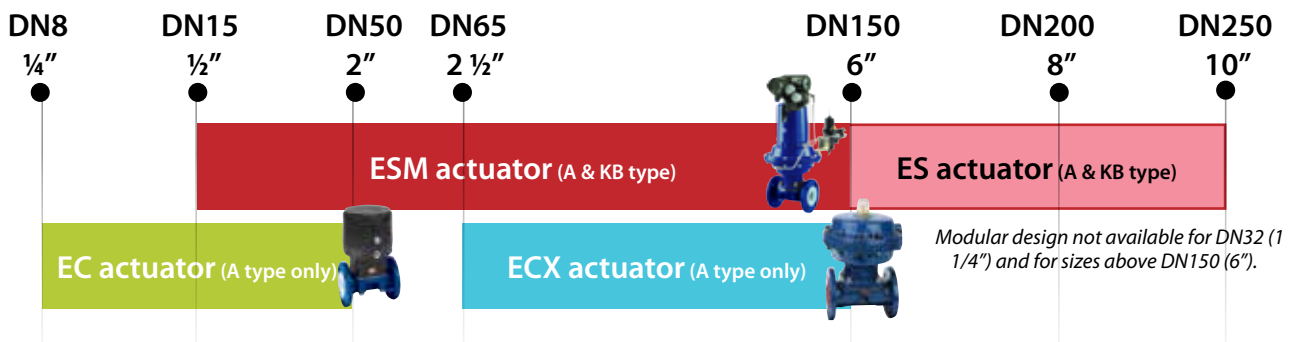
ACTUATION - ES MODULAR DESIGN



Wide range of actuators that provide reliable remote control

ACTUATION - MODEL RANGE AND MODES OF OPERATION

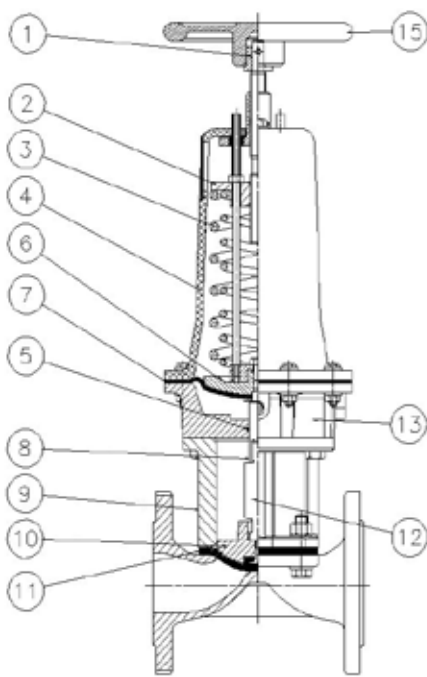
When manual operation is inadequate or inconvenient, Saunders® offer a variety of actuators covering valve sizes up to DN250 (10"), for different line and operating pressure options. We offer three different actuators, designed for various characteristic performances.



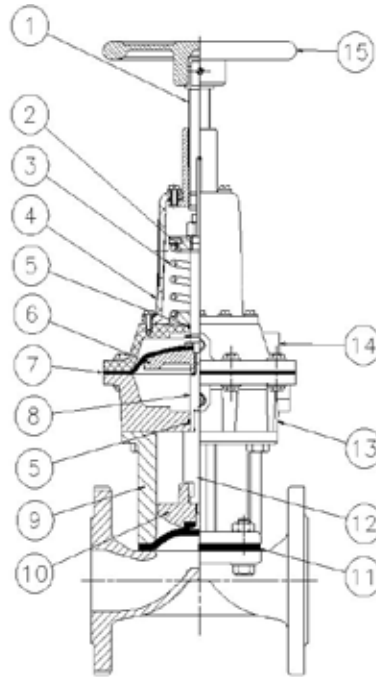
EC	ECX	ES Modular
<ol style="list-style-type: none"> 1 Compact piston style actuator 2 Spring packs to suit pressure requirements 3 Polyethersulfone (PES) bonnet 4 Versatile and robust design 5 Temperature range of -10 ° to 100 °C ambient (autoclave maximum 150 °C) 	<ol style="list-style-type: none"> 1 Diaphragm operated actuator, a compact extension to the EC size range 2 Comprehensive spring packs for a wide range of pressures 3 Full range of accessories 4 Light weight silicon aluminium housings 5 Durable paint coating for environmental protection 	<ol style="list-style-type: none"> 1 Diaphragm operated actuator, modular design for flexibility 2 Adjustable spring tension to optimize closure force and maximize diaphragm life 3 Full range of accessories 4 Light weight silicon aluminium housings 5 Durable paint coating for environmental protection

	Spring Close (SC)	Spring Open (SO)	Double Acting (DA)
Mode of operation	Closes the valve against line pressure in the event of failure (or intended shutoff) of operating pressure to the actuator.	Opens the valve to allow line fluid to flow in the event of failure (or intended shutoff) of operating pressure to the actuator.	Operating pressure opens and closes the valve. Requires a lock up valve to retain the position preceding the failure.
Normal use	When valve is usually in the closed position (to avoid using a constant supply of operating pressure).	When valve is usually in the open position (to avoid using a constant supply of operating pressure).	When a failsafe mode is not required.

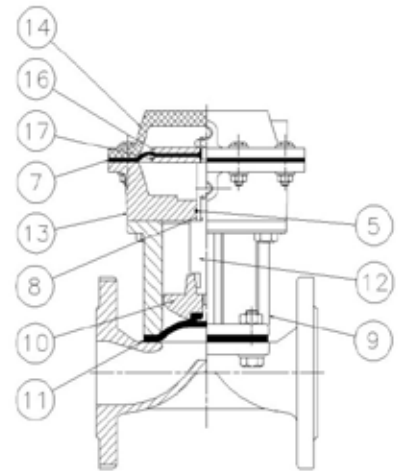
ESM/ES ACTUATORS



Spring Close



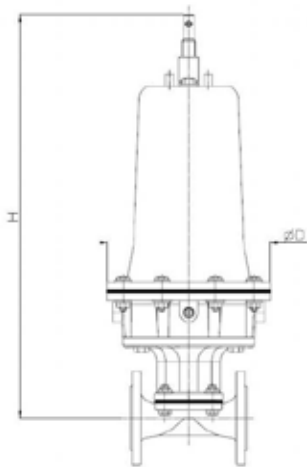
Spring Open



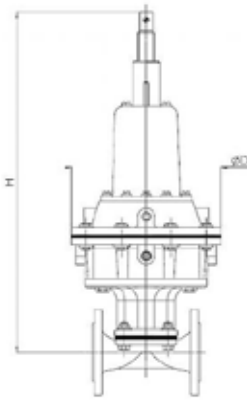
Double Acting

Item	Component	Material		
		Spring Close	Spring Open	Double Acting
1	Handwheel spindle	Mild steel		-
2	Upper spring plate	Mild steel		-
3	Spring	Steel		-
4	Cover	Silicon aluminium		-
5	Cylinder "O"ring	Nitrile		-
6	Diaphragm plate	SG Iron		-
7	Operating diaphragm	Rubber		
8	Master spindle	Stainless steel		
9	Bonnet	Cast Iron		
10	Compressor	Cast Iron		
11	Line diaphragm	Rubber or PTFE		
12	Spindle attachment	Stainless steel		
13	Lower cylinder	Silicon aluminium		
14	Upper cylinder	Silicon aluminium		
15	Handwheel	Cast Iron		
16	Upper diaphragm plate	-	-	Mild steel
17	Lower diaphragm plate	-	-	Mild steel

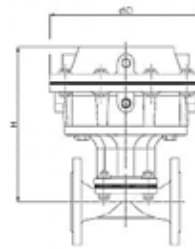
ESM/ES ACTUATORS



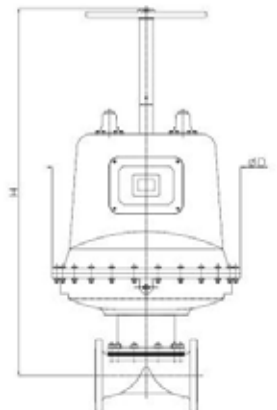
ESM (SC)



ESM (SO)



ESM (DA)



ES66

The table below shows the diameter/width and the maximum height of the actuator from the centre of the valve flange or pipeline.

Note: Dimensions are based on unlined bodies and bare shaft actuators. Add-on handwheel dimensions are displayed in the adjacent table.

Actuator Model	Add-on
68/69/70	+14mm
61/62/63	+14mm
71/64	+18mm

For all ES (non-modular) actuators, dimensions include handwheel add-on as it is provided as standard.



Dimensions

	Actuator Model	H (mm) – A type valves													H (mm) – KB type valves												
		D (mm)	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200		
Spring Close	ESM61	169	408	413	423	390	435	462 ¹	-	-	-	-	-	-	-	480	480	480	-	-	-	-	-	-	-	-	-
	ESM62	260	-	-	463	451	476	503	502	504 ¹	-	-	-	-	-	517	517	517	522	546	-	-	-	-	-	-	-
	ESM63	316	-	-	-	-	-	721	732	735	759 ¹	-	-	-	-	-	-	744	764	791	820	-	-	-	-	-	-
	ESM64	425	-	-	-	-	-	-	-	788	809	828	899	-	-	-	-	-	-	-	844	870	878	947	-	-	-
	ESM65	549	-	-	-	-	-	-	-	-	1012	1040	1106	-	-	-	-	-	-	-	-	1176	1089	1155	-	-	-
	ES66	750	-	-	-	-	-	-	-	-	-	-	-	-	1459	1529	1589 ¹	-	-	-	-	-	-	-	-	1511	1529
Spring Open	ESM68	169	382	377	389	351	401	428	-	-	-	-	-	-	522	522	522	-	-	-	-	-	-	-	-	-	-
	ESM69	260	-	-	497	401	511	537	536	538	-	-	-	-	555	555	555	560	581	-	-	-	-	-	-	-	-
	ESM70	316	-	-	-	-	-	773	783	786	810	-	-	-	-	-	795	814	841	859	-	-	-	-	-	-	-
	ESM71	425	-	-	-	-	-	-	-	-	783	822	878	-	-	-	-	-	-	-	834	858	838	-	-	-	-
	ESM72	549	-	-	-	-	-	-	-	-	879	907	974	-	-	-	-	-	-	-	-	955	935	1034	-	-	-
	ES73	750	-	-	-	-	-	-	-	-	-	-	-	-	978	1236	1245 ¹	-	-	-	-	-	-	-	-	1337	1264
Double Acting	ESM54	260	156	162	171	130	183	208	-	-	-	-	-	-	228	228	228	-	-	-	-	-	-	-	-	-	-
	ESM55	316	-	-	222	190	235	261	261	262	-	-	-	-	279	279	279	284	305	-	-	-	-	-	-	-	-
	ESM56	425	-	-	-	-	-	306	313	315	339	-	-	-	-	-	-	331	350	381	406	-	-	-	-	-	-
	ESM57	549	-	-	-	-	-	-	-	-	357	385	451	-	-	-	-	-	-	-	396	421	401	500	-	-	-
	ESM58	650	-	-	-	-	-	-	-	-	383	411	477	-	-	-	-	-	-	-	-	447	427	526	-	-	-

Existing ES actuator only

¹ PTFE diaphragm not available - rubber diaphragm only

D = Actuator diameter/width H = Actuator height

ESM/ES ACTUATORS

Head Volumes

Model	Head Volume (cm ³)												
	DN15	DN20	DN25	DN32	DN40	DN50	DN65	DN80	DN100	DN125	DN150	DN200	DN250
ESM 54/61/68	147	164	196	230	260	328	-	-	-	-	-	-	-
ESM 55/62/69	-	-	1150	1360	1425	1490	1575	1670	-	-	-	-	-
ESM 56/63/70	-	-	-	-	-	2890	3050	3245	3440	-	-	-	-
ESM 57/64/71	-	-	-	-	-	-	-	6640	6965	7440	7835	-	-
ESM 58/65/72	-	-	-	-	-	-	-	-	11470	11470	14915	-	-
ES 66/73	-	-	-	-	-	-	-	-	-	-	-	49170	49170

Weights

Assembled weight (kg) – Head, bonnet, attachment and compressor

	Model	A type valves													KB type valves											
		DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200		
Spring Close	ESM61	7.1	7.1	7.5	8	8	8.9 ¹	-	-	-	-	-	-	-	8.6	8.6	8.6	-	-	-	-	-	-	-	-	-
	ESM62	-	-	17	19	18	19	20	21 ¹	-	-	-	-	-	19	19	19	20	20	-	-	-	-	-	-	-
	ESM63	-	-	-	-	-	34	34	36	37 ¹	-	-	-	-	-	-	-	34	35	37	40	-	-	-	-	-
	ESM64	-	-	-	-	-	-	-	74	76	80	89	-	-	-	-	-	-	-	77	78	83	92	-	-	-
	ESM65	-	-	-	-	-	-	-	-	122	126	135	-	-	-	-	-	-	-	-	-	123	128	137	-	-
	ES66	-	-	-	-	-	-	-	-	-	-	345	390	440 ¹	-	-	-	-	-	-	-	-	-	350	395	-
Spring Open	ESM68	5.6	5.8	5.9	7.0	6.5	7.3	-	-	-	-	-	-	-	7.1	7.1	7.1	-	-	-	-	-	-	-	-	-
	ESM69	-	-	14	13	14	15	16	17	-	-	-	-	-	15	15	15	16	17	-	-	-	-	-	-	-
	ESM70	-	-	-	-	-	27	28	29	31	-	-	-	-	-	-	-	28	28	30	33	-	-	-	-	-
	ESM71	-	-	-	-	-	-	-	-	54	58	67	-	-	-	-	-	-	-	56	56	61	-	-	-	-
	ESM72	-	-	-	-	-	-	-	-	74	78	87	-	-	-	-	-	-	-	-	-	76	81	90	-	-
	ES73	-	-	-	-	-	-	-	-	-	-	-	345	390 ¹	-	-	-	-	-	-	-	-	-	-	350	-
Double Acting	ESM54	4.2	4.4	4.5	5.3	5.0	5.9	-	-	-	-	-	-	-	8.6	8.6	8.6	-	-	-	-	-	-	-	-	-
	ESM55	-	-	11	9.4	12	13	14	15	-	-	-	-	-	15	15	15	16	17	-	-	-	-	-	-	-
	ESM56	-	-	-	-	-	21	22	23	25	-	-	-	-	-	-	-	22	23	25	27	-	-	-	-	-
	ESM57	-	-	-	-	-	-	-	-	49	53	62	-	-	-	-	-	-	-	50	50	56	65	-	-	-
	ESM58	-	-	-	-	-	-	-	-	72	76	85	-	-	-	-	-	-	-	-	-	73	79	88	-	-

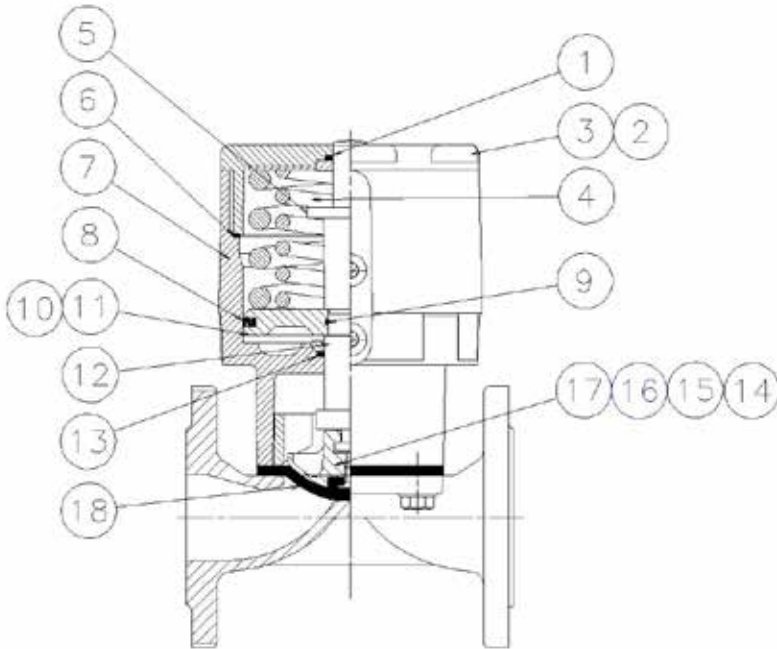
Existing ES actuator only

¹ PTFE diaphragm not available - rubber diaphragm only

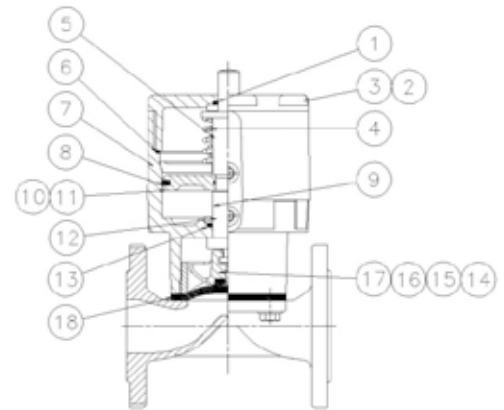
Operating Diaphragm (catalogue code)	Natural rubber (Q grade)	ES 53/60/67 ²	ESM 54/61/68	ESM 55/62/69	ESM 56/63/70	ESM 57/64/71	ESM 58/65/72	ES 66/73
		Nitrile rubber (C grade)	VS00867RD1	VS01568RD1	VS04069RD1	VS06570RD1	VS08071RD1	VS12572RD1
		VS00867RD2	VS01568RD2	VS04069RD2	VS06570RD2	VS08071RD2	VS12572RD2	VS20073RD2

² Obsolete models (codes provided for replacement spares purposes only)

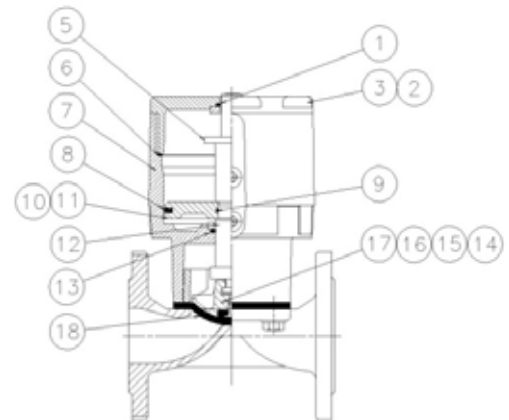
EC ACTUATORS



Spring Close



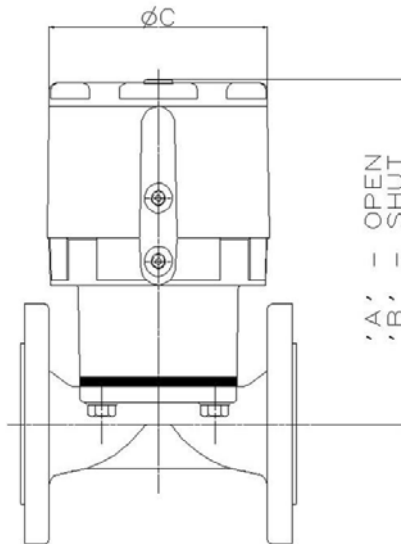
Spring Open



Double Acting

Item	Component	Material			Size Range (DN)
		Spring Close	Spring Open	Double Acting	
1	Indicator seal		Viton		—
2	Cap		IXEF		40 — 50
3	Cap		PES		8 — 25
4	Spring	Steel		—	—
5	Indicator		IXEF		—
6	Bonnet/cap o-ring		Nitrile		—
7	Bonnet		PES		—
8	Piston outer seal		Viton		—
9	Piston inner seal		Nitrile		—
10	Piston		IXEF		40 — 50
11	Piston		PES		8 — 25
12	Spindle		PES		—
13	Spindle seal		Viton		—
14	Compressor		Silicon aluminium		15 — 50
15			Silicon aluminium		40 — 50
16			Mild steel		15 — 25
17			Mazak		8 — 10
18	Line diaphragm		Rubber or PTFE		—

EC ACTUATORS



- A - Actuator height (open)
- B - Actuator height (closed)
- C - Actuator diameter/Width

All dimensions are based on unlined bodies.

The table below shows the diameter/width and maximum height of the actuator from the centre of the valve flange or pipeline.

Dimensions & Volumes

		Dimensions (mm)					
		DN8	DN15	DN20	DN25	DN40	DN50
Spring Open, Spring Close, Double Acting	A	112	127	160	161	224	240
	B	110	122	152	154	210	220
	C	58	70	103	103	153	153
Upper Head Volume (cm³)	(to Close)	22	49	212	212	988	995
Lower Head Volume (cm³)	(to Open)	8	16	62	62	244	336

Weights

		Weight (kg)					
		DN8	DN15	DN20	DN25	DN40	DN50
Spring Close, Spring Open, Double Acting		0.29	0.5	1.4	1.5	4	4.9
		0.25	0.46	1.1	1.3	2.9	3.2
		0.24	0.45	1	1.2	2.7	3

Air Connections

All EC actuator air inlet parts are 1/8" BSP or 1/8" NPT

ACTUATION ACCESSORIES

Accessories								
Model	Size Range	Valve type	Material	Solenoid	Switchbox	Positioner	Air Filter	Handwheel
ES	DN15-DN250	A, KB	SiAl ⁽¹⁾	✓	✓	✓	✓	✓
EC	DN8-DN50	A	PES ⁽²⁾	✓	✓	✓	✗	✗
ECX	DN65-DN150	A	SiAl ⁽¹⁾	✓	✓	✗	✓	✗

⁽¹⁾ SiAl – Silicon-Aluminium

⁽²⁾ PES – Polyethersulfone

✓ Available

✗ Unavailable



007 Switchbox

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.



Shown mounted to ESM Actuator

ES Positioner

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.



Opti-SET

Economical, compact and lightweight switchbox suitable for the EC actuator. Self setting, which minimizes validation/set-up-time, it is available with mechanical or proximity switches including an intrinsically safe option.



Mini Positioner

For control application using an EC actuated valve, Saunders® offers pneumatic, electropneumatic and digital inputs with sensor feedback option and linear mounting design providing a compact control solution.



Saunders® I-VUE

The Saunders® I-VUE is a compact intelligent valve sensor that provides accurate and reliable valve position feedback. It is suitable for EC or ECX actuated valves. Key Features and Benefits:

- Available as Point-to-Point or with network capabilities (ASi and DeviceNet)
- Highly accurate electronic sensing technology to continuously monitor valve position.
- Self Setting (without entry) feature that facilitates setting and programming of switch without opening the enclosure.



MODULE Switchbox

This module switchbox option is available for EC and ECX actuator ranges. The switchbox offers a wide range of mechanical and proximity sensors with space for up to 4 switches, integral solenoid valve and ASi interface (which can be retrofitted).



Solenoid valves

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

Other control options available upon request. Please, contact Saunders® for more information