Final version with small last minute items corrected 11 June 2002

## Industrial Diaphragm Valves



Dr (Im

## A Continuing Story of Success

Crane Process Flow Technologies Ltd is an international leader in the design, development and manufacture of diaphragm valves and control products under the Saunders brand. Part of Crane Co, a global manufacturing and Sales Organisation, Crane Process Flow Technologies Ltd has a strong worldwide presence via dedicated Sales companies and distribution partners.

P K Saunders invented the original diaphragm valve in 1928. Since then, we have developed our range through innovative designs and by using the latest materials technology. As a result, Saunders diaphragm valves have gained an excellent reputation for versatility and reliability establishing a presence in every process industry sector. Today there are millions of Saunders diaphragm valves installed on process plants around the world.

There is one reason above all others for this success: ours are the valves that engineers know they can trust. We have set the industry standard for dependable, consistent operation year after year under even the most adverse conditions. In choosing Saunders, customers know they are assured of many years of trouble-free and reliable products.

Customers also know they can depend on us for after sales service, support and technical advice from one of our many locally based Crane sales companies and distribution partners.

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## The Original and the Best

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



## Saunders Diaphragm Valve Range

Valves for Corrosive and Abrasive Applications

We at Crane Process Flow Technologies Ltd have in our Saunders portfolio a comprehensive range of diaphragm valves for industry. 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 the standard valve used in many industries such as chemical production, mining, water treatment, fertiliser production and marine to name just a few.

## Comparison of different valve types against industrial process requirements

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	**	****	***	****	****	***











★★★★★ Five stars – exceptional ★ One star – poor

## Saunders Diaphragm Valve Range

WFB

marine and firefighting applications. Used primarily as water hydrant valves because

of 100% reliability in

adverse conditions.

DN40 and DN65

Valves for Corrosive and Abrasive Applications



#### A Type flanged

Weir type flanged valve in cast iron, SG iron, cast steel, gunmetal and stainless steel. Can also be provided with various body linings and diaphragms to suit most industrial duties including corrosive and abrasive applications.

DN15 to DN350





#### **KB** Type screwed

Straight through bore screwed valve in cast iron, gunmetal and stainless steel. DN15 to DN50



#### KB Straight through valve

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. DN15 to DN350

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Valve Benefits for Corrosive and Abrasive Applications

Our Saunders A Type diaphragm valves have been developed to handle a wider range of fluids and gases than any other valve type. A wide choice is available for materials, methods of operation and body end connections – to satisfy the needs of 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 from the pipeline. Overall this results in lower cost of ownership compared to other valve types.



On pressure and vacuum, Saunders diaphragm valves operate and close 100% leaktight even after thousands of operations. This feature reduces 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 quarter turn ball and butterfly valves. Throttling and control characteristics are enhanced by a streamlined flow path that is cavity free and provides excellent flow control capabilities.

Extended life, reliability, safety and ease of use, combined with an essentially simple design, results in low maintenance for minimum running costs.



#### 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 utilising 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.

### 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. However, we recommend 6x pipe diameter from bend or pump.

Materials of Construction - Valve Bodies

### Standard Unlined Body Material

CAST IRON			
BS EN 1561	GJL-250	Flanged	DN15-DN500
SG IRON			
BS EN 1563	GJS-450-10	Screwed	DN15-DN50
BS EN 1563	GJS-400-18	Flanged	DN15-DN150
	GJS-400-18-LT	0	
CAST STEEL			
	ASTM A216 WCB	Flanged	DN15-DN100
BRONZE			
BS EN 1982	CC491K-GS	Screwed	DN15-DN50
BS EN 1982	CC492K-GS	Flanged	DN15-DN100
STAINLESS STEEL			
BS 3100	316C16	Screwed	DN15-DN50
BS 3100	316C16	Flanged	DN15-DN150





## Plastic lined body features

- SG iron body high mechanical strength
- SG 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 3 – 5mm (DN20–DN150)

## Rubber lined body data

- Soft rubber linings
- Butyl (Isobutylene isoprene), 60–66° IRHD
- Hard ebonite rubber HRL, 75–85° Shore D
- Lining thickness range 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 Spark test 14kV ac/dc
- Rubber, HRL Spark test 17kV ac/dc
- Plastic lined Spark test 20kV ac/dc





### Valve Body Lining Materials – Visual Process Resistance Guide



### Valve Body Linings for Saunders Valves

#### Hard Rubber – NR/HRL

Used for salts in water, dilute mineral acids, chlorine water, de-ionised water, plating solutions and potable water.

#### Soft Butyl Rubber – IIR/BL

Good for corrosive and abrasive slurries, mineral acids and acidic slurries.

### Glass

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

#### Polypropylene – PP

Main applications include mineral acids, salts in water, water and effluent treatment chemicals.

#### Ethylene tetrafluoroethylene – ETFE

Suitable for strong acids, salts in water at higher temperatures, solvents at medium temperature.

#### 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.

Materials of Construction – Diaphragms

We at Crane Process Flow Technologies are proud of our core competence, the in-house manufacture of Saunders diaphragms for use within our valve range. Many years of experience has resulted in a range of diaphragms, which handle a wide variety of fluids with total security. The guaranteed high performance of Saunders diaphragms results from stringent quality control and continuous development.

**Diaphragm Construction** 

#### **Key Considerations**

## High flex performance

- Good compression set properties
- Chemical resistance
- Abrasion resistance
- Anti-aging
- Approvals, traceability

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

- Constructed with multilayers 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 Diaphragms

A two piece construction PTFE face with a rubber backing diaphragm to increase pressure rating and durability. These diaphragms have a bayonet fitting to ensure reliable installation, reduced point loading and ensure maximum life. The 214K is three piece specially reinforced for chlorine service.







Rubber diaphragm screw fixing

Diaphragm Materials of Construction

Grade	Elastomer type	General service and approvals
С	Butadiene Acrylonitrile, sulphur cured, black reinforced	Lubricating oil, cutting oils, paraffin, animal and vegetable oils, aviation kerosene
CV	Butadiene Acrylonitrile, sulphur cured, black reinforced	Vacuum where oils are present, compressed air, liquid petroleum gas (LPG)
HT	Polychloroprene, sulphur cured, black reinforced	Abrasive slurries containing hydrocarbons
Q	Natural rubber polyisoprene/SBR, sulphur cured, black reinforced	Salts in water, dilute acids and alkalis, abrasives
226	Fluoroelastomer, amine cured, black reinforced	Concentrated acids, aromatic solvents, chlorine, ozone, chlorinated solvents, unleaded petroleum
237	Chlorosulphonated polyethylene metal oxide cured, black reinforced	Strong acids, sodium hypochlorite, chlorine gas
286	Chlorosulphonated polyethylene metal oxide cured, black reinforced Kevlar fabric reinforced	Fire mains isolation in WFB valve
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)
425	Ethylene propylene (EPM) organic peroxide cured, black reinforced	Salts in water, acids and alkalis, ozone, intermittent steam, drinking water, FDA, USP, WRAS
425V	Ethylene propylene (EPM) organic peroxide cured, black reinforced	Vacuum where acid, alkali, water vapours are present, FDA, USP, WRAS
214/226	Virgin PTFE/Fluoroelastomer – two piece	Strong acids, solvents, chlorine, bromine at higher temperatures
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
214/425	Virgin PTFE/Ethylene propylene – two piece	Strong acids, alkalis and salts in water at high temperature. Constant steam, water for injection (WFI), biopharmaceuticals, FDA, USP, WRAS
214S/425	Virgin PTFE/PPVE/Ethylene propylene – two piece	Strong acids, alkalis and salts in water at high temperature. Constant and intermittent steam, WFI, biopharmaceuticals, FDA, USP, WRAS
214K/425	Virgin PTFE/PVDF/Ethylene propylene – three piece	Chlorine, bromine gas and chlorinated solvents



#### Standard

 Rubber diaphragms have a brass stud

Saunders

- Diaphragms suitable for vacuum duties (eg. CV) have steel stud
- 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

### 1

**Diaphragm Materials** 



214/214K

226

237

ΗT

Q

C, CV

300, 300V

425, 425V

Diaphragm Materials – Visual Process Resistance Guide

### Maximum working pressure (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.

Size DN	8	10	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350
Non-rising handwheel														6	5	4	3.5
Rising handwheel	16	16	16	16	16	16	16	16	10	10	10	10	10				
WFB and tank cleaning							15		15								
Size DN	8	10	15	20	25	30	40	50	65	80	100	125	150	200	250		
	0	10	15	20	25	52		- 50	00	00	100	125	150	200	230		
Non-rising handwheel														6	5		
Rising Handwheel	10	10	10	10	10	10	10	10	10	10	10	10	7				

(12)

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## **Diaphragm Performance**

Temperature and Pressure Relationship



### Valve Body Temperature/Pressure Relationship



conditions will determine the highest working temperature. For example, 325 diaphragms have given excellent performance under certain conditions up to 150°C.

Depends on body substrate material.

When lined body is cast steel, minimum temperature is -30°C.
 When SG Grade EN-GJS-400-18-LT is used, minimum temperature is -20°C.

## Saunders Diaphragm Valves

Dimensions, Weights and Standards

#### **Valve Standards**

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
AMERICAN	ASME/ANSI B16.1 Class 125 ASME/ANSI B16.5 Class 150 and B16.24 Class 150
JAPANESE	JIS B 2212

Female screwed pipe connections											
BRITISH	BS 21 taper										
AMERICAN	API 5B										
GERMAN	DIN 259										
INTERNATIONAL	ISO 7/1 taper ISO 7/1 parallel										

## Saunders A Type Diaphragm Valves

Dimensions and Weights



#### Valve Diameter (DN)

Gloop-end malor-end malor-end Flanged DN200-DN350

## 100 125 150 200 250 300 350

	Α	54	67	90	94	119	154	164	188	-	-	-	-	-	-	_	-	_
Consultad	В	52	61	84	88	108	142	148	164	-	-	-	-	-	-	-	-	-
Screwed	C	49	49	63.5	83	111	125	145	168	-	-	-	-	-	-	-	-	-
	Weight	0.11	0.15	0.45	0.90	1.13	1.80	2.70	5.00	-	-	-	-	-	-	-	-	-
	Α	-	-	100	91	108	143	157	175	226	243	308	388	442	495	581	679	660
	В	-	-	93	85	98	131	141	152	194	208	262	322	367	-	-	-	-
Flanged	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	-	-	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
	Α	-	-	-	97	111	146	160	177	229	246	311	391	445	498	585	683	664
Flanged	В	-	-	-	91	101	134	144	154	197	212	265	325	370	-	-	-	-
Rubber	<u>C</u>	-	-	-	121	131	150	163	194	220	258	309	362	412	527	641	755	755
Lined	D	-	-	-	150	160	180	200	230	290	310	350	400	480	600	730	850	980
	Weight	-	-	-	2.70	3.10	4.50	5.40	8.20	15.0	20.4	33.1	49.2	63.0	154	273	365	512
	Α	-	-	101	92	109	144	158	176	227	244	309	389	443	496	582	-	-
Flanged	В	-	-	94	86	99	132	142	153	195	210	263	323	368	-	-	-	-
Glass Lined	C	-	-	110	119	129	148	161	192	218	256	307	358	408	523	637	-	-
Cluss Ellicu	D	-	-	130	150	160	180	200	230	290	310	350	360	480	600	730	-	-
	Weight	-	-	1.80	1.80	3.10	4.50	5.40	8.20	14.5	19.5	32.2	48.5	62.6	153	272	-	-
	Α	-	-	-	97	112	-	162	176	-	246	314	-	450	-	-	-	-
Flanged	В	-	-	-	91	102	-	145	155	-	211	267	-	374	-	-	-	-
Plastic	C	-	-	-	123	133	-	165	196	-	260	311	-	412	-	-	-	-
Lined	D	-	-	-	150	160	-	200	230	-	310	350	-	480	-	-	-	-
	Weight	-	-	-	2.70	3.10	-	5.40	8.20	-	20.4	33.1	-	63.0	-	-	-	-
	Е	38	50	62	62	80	120	120	120	170	230	280	280	368	482	584	699	699

Weights in 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).

## Saunders A Type Valve

Flow Co-efficient of Valve Range Cv (Kv)

DN	ΒO	DΥ	МАТЕ	RIA	L	/LIN	ING		
15	Cast	iron	Rubbe	er Lined		Gla	ISS	Plastic	Lined
% Open	Cv	Κv	Cv	Kv		Cv	Kv	Cv	Κv
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	-	-

DN	ΒO	DΥ	ΜΑΤΕ	RIA	L/LI	NING		
20	Cast i	iron	Rubbei	r Lined	G	lass	Plastic	Lined
% Open	Cv	Κv	Cv	Κv	Cv	Kv	Cv	Κv
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

DN	ΒO	DΥ	МАТЕ	RIA	L	/ L I M	N I N G		
25	Cast	iron	Rubbe	r Lined		Gl	ass	Plastic	Lined
% Open	Cv	Κv	Cv	Κv		Cv	Κv	Cv	Κv
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
20	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

DN	ΒO	DYI	МАТЕ	RIA	L	/LIN	IING		
32	Cast	iron	Rubbe	r Lined		Gl	ass	Plastic	Lined
% Open	Cv	Κv	Cv	Κv		Cv	Kv	Cv	Κv
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

DN	ΒO	BODY MATERIAL/LINING								
40	Cast	iron	Rubbei	r Lined	Gl	ass	Plastic	Lined		
% Open	Cv	Kv	Cv	Kv	Cv	Κv	Cv	Κv		
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	33.6	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		
20	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		

DN	ΒO	DYN	NING							
50	Cast	Cast iron		Rubber Lined		ass	Plastic	Plastic Lined		
% Open	Cv	Κv	Cv	Κv	Cv	Κv	Cv	Κv		
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		

DN	ΒO	DYI	ИАТЕ	RIA	L/LII	NING		
65	Cast	iron	Rubbei	r Lined	G	ass	Plastic	Lined
% Open	Cv	Kv	Cv	Κv	Cv	Κv	Cv	Κv
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

DN	ΒO	BODY MATERIAL/LINING							
80	Cast	iron	Rubbe	r Lined	Gl	ass	Plastic	Lined	
% Open	Cv	Kv	Cv	Kv	Cv	Κv	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	
	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	



DN	ВО	DYN	ЛАТЕ	RIAI	_ / L I N	ING			
100	Cast i	ron	Rubber Lined		Gla	SS	Plastic Lined		
% Open	Cv	Kv	Cv	Κv	Cv	Κv	Cv	Κv	
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	
20	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	

DN	ΒO	DΥ	NING						
125	Cast	iron	Rubbe	r Lined	Gl	ass	Plastic Lined		
% Open	Cv	Κv	Cv	Κv	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	-	-	

DN	BODY MATERIAL/LINING									
150	Cast	iron	Rubbe	r Lined		GI	ass		Plastic	Lined
% Open	Cv	Κv	Cv	Kv		Cv	Κv		Cv	Κv
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	423	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

DN	ΒO	DYI	NING						
200	Cast	iron	Rubbe	r Lined	GI	ass	Plastic	Plastic Lined	
% Open	Cv	Κv	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	-	-	
	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	-	-	

DN	BODY	MAT	ERIAL	/LINI	NG			
250	Cas	st iron	Rubl	oer Lined	G	Glass		
% Open	Cv	Κv	Cv	Kv	Cv	Κv		
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		
20	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		

DN	BODY	ΜΑΤΙ	ΕI	RIAL/LINING						
300	Cast	iron		Rubbe	er Lined		Glass			
% Open	Cv	Κv		Cv	Κv		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		

DN	BODY	МАТЕ	F	RIAL	/LINI	N	G		
350	Cast iron			Rubbe	er Lined		Glass		
% Open	Cv	Kv		Cv	Κv		Cv	Κv	
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	
	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	

Note: Differing Cv & Kv rating can be derived, depending on the method used for testing. The tables above are based on British Standards 1042 and EN 605314/IEC 534.2.3 and show flow in US gallons per minute and cubic metres per hour.

 $\mbox{Cv}$  is flow in US gpm through value at  $\Delta$  P of 1 psi  $\mbox{Kv}$  is flow in m³/hr through value at  $\Delta$  P of 1 bar

Large Valve Sizes: DN400, DN450 & DN500

Some applications, for example, in the minerals processing and water treatment industries involving corrosive and abrasive slurries, have successfully utilised larger size Saunders diaphragm valves for many years. Double weir options are also available.

These double weir bodies utilise diaphragms and bonnets from the tried and tested DN300 and DN350 range of valves.

#### Valve sizes

DN400	fitted with two DN300 bonnets
DN450	fitted with two DN300 bonnets
DN500	fitted with two DN350 bonnets



Large A Type valves installed in a distillery



Size D	N A	В	C (TRAV	(EL) D
400	750	750	190	700
450	750	750	190	700
500	750	780	230	700

## Manual Bonnet Options for A Type Valves

### Standard Range



Rising Handwheel Valve sizes: DN8 to DN10



Cast Iron Rising Handwheel Bonnet Valve sizes: DN15 to DN50



Cast Iron Rising Handwheel Valve sizes: DN65 to DN150

### High Performance Range



Fluoroelastomer Sealed Bonnet Valve sizes: DN15 to DN150\*



Stainless Steel (Silicone Sealed) Valve sizes: DN8 to DN80



Non-rising Handwheel with Indicator Valve sizes: DN200 to DN300



Non-rising Handwheel without Indication Valve sizes: DN200 to DN350



Stainless Steel Valve sizes: DN15 to DN150\*



Rising Handwheel Indicator (simple padlocking) Valve sizes: DN15 to DN150\*



Fluoroelastomer Sealed Padlocking Valve sizes: DN15 to DN150\*

## Saunders WFB Type Valves

For Marine and Firefighting Applications

The WFB valve is a weir type diaphragm valve developed to overcome conventional valve problems on fire fighting, tank cleaning and wash-down on land or sea, wherever guaranteed valve operation is needed.

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

This highly specialised 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 SG iron or gunmetal providing high mechanical strength. This means that they provide greater resistance to accidental impact. Gunmetal resists corrosion on the more demanding applications.



Model 11 with body and bonnet material in gunmetal.



Model 4 with body and bonnet material in SG Iron

#### Diaphragms

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

#### Flanges

- BS10 Tables D, E and F
- BS4504 PN16
- DIN 86021 ND16 and ANSI B16.24 Class 150 (Gunmetal)
- EN1092-2 PN16 and ANSI B16.1 Class 150 (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 21 RP	JIS10K
ANFT 7.5 TPI	onal Fire thread)
Male or female	Jilai File (Illeau)

(Other screwed and flanged connections available on request)

#### Valve Weights (kg)

Model	4	9	11
Gunmetal	10.3	10	10
S.G. Iron	8	7.8	8.95



Model 4 with body and bonnet material in gunmetal.





								BODY MATERIALS
	1	2	4	6	7	9	11	
DN40	-	1	1	-	1	1	-	Gunmetal

Testing Valves tested in accordance with BS 6755 i.e. body strength test to 22.5 bar, seat test to 16.5 bar (1.1 x maximum working pressure)

"We specified Saunders WFB 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**



Det Norske Veritas Register of Type Approval Products No. 5: Mechanical Equipment and Piping 1997/98 Page 54 Certificate No: P-9951 Model No: DN65



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



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



Bureau Vertias Type Approval Certificate Certificate No: 2207 3457 C10 H Model No: DN40, DN65



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



American Bureau of Shipping List of Type Approved Equipment Page 25. Certificate No: 96-WM10305-X Model No: DN40, DN65

- American Bureau of Shipping
- UK Marine Safety Agency Bureau Veritas
- Det Norske Veritas
- Rina
- Lloyds • DTI

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

Straight Through Bores

Saunders full bore KB type diaphragm valves, with their smooth non-turbulent body design have proved to be outstanding in resisting the erosive effects of corrosive and corrosive/abrasive line media. In addition, the full bore concept is designed for minimum flow resistance whilst allowing rodding out and easy cleaning.

Low pressure drop and high flow characterise the efficiency of operation of these valves. The flexible diaphragm ensures consistent leak tightness even when solids, powders and dry media are present. Valve blockage and wear due to slurry build up on the valve internals are significantly reduced by the straight through design.

In addition to the range of unlined screwed and flanged bodies, rubber linings and glass coatings are available for the more exacting corrosive and abrasive applications to a maximum working pressure of 10 bar.



Features	Benefits
Since the second body, high flow	No obstruction, low pressure drop
even with solids presen	t Leaktight by design
One of the parts	Better resistance to corrosion/abrasion and longer life
ped linings and ilable	Minimal maintenance

#### 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.

#### Valve usable in any position

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

## Saunders KB Type Design Features

Contribute to low pressure drop high flow capability and long valve life

resists

attack.



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

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

Materials of Construction

#### Valve bodies

 $\begin{tabular}{|c|c|c|c|} \hline CAST IRON, GUNMETAL \\ \hline Screwed & DN15 - DN50 \\ \hline CAST IRON, GUNMETAL \\ \hline Flanged & DN15 - DN350^* \\ \hline \end{tabular}$ 

\* 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 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

Material

Nitrile Butyl

EPM

Fluoroelastomer Polychloroprene

Natural Rubber

Diaphi	Diaphragm Materials									
Grades	Elastomer Type	General Service & Approvals								
AA	Natural rubber (polyisoprene) metal oxide pigmented – brown sulphur cured, black reinforced	Abrasives in slurry or dry powder form								
С	Butadiene Acrylonitrile, (Nitrile) sulphur cured, black reinforced	Lubricating oil, cutting oils, paraffin, animal and vegetable oils, aviation kerosene								
HT	Polychloroprene, sulphur cured, black reinforced	Abrasives slurries containing hydrocarbons								
226	Fluoroelastomer, amine cured, black reinforced	Concentrated acids, aromatic solvents, chlorinated solvents, unleaded petroleum								
300	Isobutylene Isoprene, resin cured black reinforced	Abrasive slurries, acid digested slurries, alkalis, dry powders								
425	Ethylene propylene (EPM) organic peroxide cured, black reinforced	Abrasive slurries, acid digested slurries, alkalis, dry powders								

### Diaphragm Materials - Visual Process Resistance Guide



Size DN	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350
Non-rising handwheel												3.5	3.5	3.5	1.5
Rising Handwheel	10	10	10	10	10	10	10	10	10	6	6				

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 55°C. For ES actuators, please refer to appropriate actuator performance selection technical data sheets.



## Saunders KB Type Diaphragm Valves

**Endurance Bonnet** 

Saunders Endurance Bonnet is a serviceable bonnet assembly developed for the KB straight through diaphragm valve, specifically for the mineral processing industry, in particular the phosphate, and precious metal sector.

To meet market requirements, the bonnet was designed to allow easy replacement of a range of spare parts which protect the interior of the valve from the aggressive and corrosive environment.



#### Features

- Rising handwheel
- Yellow visual indicator
- Indicator sleeve (lubrication reservoir)
- 'O' ring sealed
- Screw plug & 'O' ring protection
- Serviceable Insert
- Bonnet epoxy coated surface finish
- Spares kit

#### Bonnet size range

• KB Type : DN65 to DN150

IVIAI	TATERIALS OF CONSTRUCTION										
Item	Component	Material	Finish								
1	LABEL	Polyester	Bright silver								
2	HANDWHEEL	Cast Iron	Alkyd paint								
3	HANDWHEEL PIN	Steel	Zinc plate/passivate								
4	SCREW PLUG	Plastic	Black HDPE								
5	'O' RING	Nitrile									
6	HANDWHEEL BOSS	Polypropylene	Black								
7	'O' RING	Nitrile									
8	'O' RING	Nitrile									
9		Steel									
10	'O' RING	Nitrile									
11	BONNET SLEEVE	Aquanyl	Yellow								
12	'0' RING	Nitrile									
13	BONNET	Cast Iron	Epoxy paint								
14	COMPRESSOR	Cast Iron	Phosphate								
15	BONNET INSERT	Carbon Steel	Phosphate								
	SPINDLE	Carbon Steel	Phosphate								
	DIAPHRAGM	As specified									

Flow Co-efficients of Valve Range Cv (Kv)

DN	BODY MATERIAL/LINING										
25	Cast	iron		Rubbe	er Lined		Glass				
% 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			
	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			

DN	BOD	Υ ΜΑΤ	ERIAL	_ / L I N	ING		
50	Cas	t iron	Rubbe	er Lined	Glass		
% Open	Cv	Κv	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	
	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	

DN	BODY	′ MAT	E	RIAL	/LINI	Ν	I G		
65	Cast iron			Rubber Lined			Glass		
% Open	Cv	Kv		Cv	Kv		Cv	Κv	
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	
	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	

DN	BODY	MAT	ERIAL	/ L I N I	NG			
80	Cast	iron	Rubber	Lined	Gla	Glass		
% 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		
	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		

#### DN BODY MATERIAL/LINING

100	Cast	iron	Rubber	Lined	Gla	ISS
% 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

DN	BODY	′ MAT	ERIAL	/ L I N I	NG	
125	Cast	iron	Rubber	Lined	Gla	ISS
% 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

DN	BODY	MAT	ERIAL	/LINI	NG	
150	Cast	iron	Rubber	Lined	Gla	SS
% 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

DN	BODY MATERIAL/LINING					
200	Cast	iron	Rubber	Lined	Gla	SS
% Open	Cv	Κv	Cv	Κv	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
	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

 $\mbox{Cv}$  is flow in US gpm through value at  $\Delta$  P of 1 psi  $\mbox{Kv}$  is flow in m³/hr through value at  $\Delta$  P of 1 bar

For sizes DN15, 32 and 40, please contact customer service department for details.

## Saunders KB Type Diaphragm Valves

Valve Dimensions and Weights



Weights in 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).

## Saunders KB Type Diaphragm Valve Performance

Temperature and Pressure Relationship



Valve Body Temperature/Pressure Relationship



## Saunders KB Type Diaphragm Valves

Typical Bonnet Options for Manual KB Valves

### Standard Range





## **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.

#### EC

The EC is manufactured by injection moulding PES (polyethersulphone), which has a temperature range of -10° to +100°C ambient (autoclave maximum 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 DN8 – DN50** 





#### 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 DN8 - DN50



## **Pneumatic Valve Actuation**

Compact actuators that provide reliable remote control



ECX Actuator with visual indicator

### ECX

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: DN65 – DN150

### ECX

Saunders ECX type actuators are designed to offer an extension to the EC size range whilst still maintaining the compact envelope size. The housing is manufactured in coated silicon aluminium 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.



### **Pneumatic Valve Actuation**

EV and ES Actuators

The EV/ES actuator offers efficient mechanical/pneumatic control of the diaphragm, allowing remote and automated operation.

Saunders EV/ES actuators are designed with close coupled bonnet assemblies and have complete flexibility of performance. Several different actuator models may be provided for each valve size to suit different line and operating pressures. The range allows valve closure against the maximum valve working pressures and can be successfully used for modulating control duties in addition to more normal isolation functions.

Failsafe closing actuators are fully adjustable, i.e. spring compression can be externally adjusted to provide optimum diaphragm forces and hence provide extremely long diaphragm life in service.

Many accessory options are available which include solenoid valves, remote indication devices (switches or sensors) to suit environmental conditions such as hazardous services. Limit stops and positioners and many other devices may be offered to allow usage within particular control systems. EV/ES actuators are provided with a tough polyester coating which gives maximum durability, even in exposed locations.

ES spring close

EV spring close

## **Pneumatic Valve Actuation**

Valve Throttling and Flow Control



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.

15

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. Equal % characteristics can be obtained through the use of characterised positioners.

Pressure recovery factor = 0.7.



## TECHNICAL DATA EC Pneumatic Actuators DN8 – DN50

Materials of Construction

### MATERIALS OF CONSTRUCTION EC/SC

Indicator seal	Fluoroelastomer
Cap washer	PES (DN8-DN25) IXEF (DN40-DN50)
Сар	PES (DN8-DN25) IXEF (DN40-DN50)
Loading plate	Mild steel
Outer spring	Steel
Inner spring	Steel
Bonnet cap 'O' ring	Nitrile
Indicator	IXEF
Outer piston seal	Fluoroelastomer
Piston	PES (DN8-DN25) IXEF (DN40-DN50)
Inner piston seal	Nitrile
Bonnet washer	PES
Spindle seal	Fluoroelastomer
Spindle	PES
Bonnet insert	PES (DN40-DN50)
Bonnet	PES
Line diaphragm	Rubber, Rubber/PTFE
Compressor	Mazak (DN8),
	Mild Steel (DN15-25),
	Silicon Aluminium (DN15-DN50)

MATERIALS OF	CONSTRUCTION	EC/SO
Item Component	Material	

	Component	Wateria
1	Indicator	IXEF
2	Indicator seal	Fluoroelastomer
3	Cap washer	PES (DN8-DN25) IXEF (DN40-DN50)
4	Сар	PES (DN8-DN25) IXEF (DN40-DN50)
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 (DN8-DN25) IXEF (DN40-DN50)
11	Inner piston seal	Fluoroelastomer
12	Bonnet washer	PES
13	Spindle seal	Nitrile
14	Spindle	PES
15	Bonnet insert	PES (DN40-DN50)
16	Bonnet	PES
17	Line diaphragm	Rubber, Rubber/PTFE
18	Compressor	Mazak (DN8)
		Mild Steel (DN15-25)
		Silicone Aluminium (DN15-DN50)

### MATERIALS OF CONSTRUCTION EC/DA

	Component	Watchai
	Indicator seal	Fluoroelastomer
2	Cap washer	PES (DN8-DN25) IXEF (DN40-DN50)
3	Сар	PES (DN8-DN25) IXEF (DN40-DN50)
4	Indicator	IXEF
5	Outer piston seal	Fluoroelastomer
6	Piston	PES (DN8-DN25) IXEF (DN40-DN50)
7	Inner piston seal	Fluoroelastomer
8	Bonnet washer	PES
9	Spindle seal	Nitrile
10	Spindle	PES
11	Bonnet	PES
12	Bonnet insert	PES (DN40-DN50)
13	Line diaphragm	Rubber, Rubber/PTFE
14	Compressor	Mazak (DN8),
		Mild Steel (DN15-25),
		Silicon Aluminium (DN15-DN50)



## TECHNICAL DATA SSC (Stainless Steel) Compact Pneumatic Actuators DN8 – DN50

Materials of Construction

MATERIALS OF CONSTRUCTION	SSC/SC	

inem.		Material
1	Indicator seal	Viton
2	Сар	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 (DN8-DN25) IXEF (DN40-DN50)
11	Spindle	PES
12	Spindle 'O' ring	Fluoroelastomer
13	Thrust pad	Nylatron (DN8-DN20)
14	Line diaphragm	Rubber, Rubber/PTFE
15	Compressor	Stainless Steel
16	Body/bonnet nut	Stainless Steel
17	Body/bonnet washer	Stainless Steel
18	Body/bonnet bolt/stud	Stainless Steel

MAT	ERIALS OF CONSTR	UCTION SSC/SO
Item	Component	Material
1	Indicator seal	Viton
2	Сар	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 (DN8-DN25) IXEF (DN40-DN50)
11	Spindle	PES
12	Spindle 'O' ring	Fluoroelastomer
13	Thrust pad	Nylatron (DN8-DN20)
14	Line diaphragm	Rubber, Rubber/PTFE
15	Compressor	Stainless Steel
16	Body/bonnet nut	Stainless Steel
17	Body/bonnet washer	Stainless Steel
18	Body/bonnet bolt/stud	Stainless Steel

MAT	ERIALS OF CONSTR	UCTION SSC/DA
Item	Component	Material
1	Indicator seal	Viton
2	Сар	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 (DN8-DN25) IXEF (DN40-DN50)
9	Spindle	PES
10	Spindle 'O' ring	Fluoroelastomer
11	Thrust pad	Nylatron (DN8-DN20)
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







## TECHNICAL DATA ECX Pneumatic Actuators DN65 – DN150

## Materials of Construction

MA	Component	Material
1	Plug	Polyethylene
2	Cover	Silicon aluminium
3	Upper spring plate	SG 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 aluminium
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



MA	TERIALS OF	CONSTRUCTION	ECX/DA
Item	Component	Material	
1	Cover plug	Mild stee	I

	Cover plug	Ivilia Steel
2	Cover plug 'O' ring	Rubber
3	Upper cylinder	Silicon aluminium
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 diaphragm plate	Mild steel
12	Lower cylinder	Silicon aluminium
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 (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

IVIA	TERIALS OF CONSTRU	JUTION EUX/30
	Component	Material
	Cover plug	Mild steel
2	Cover plug 'O' ring	Rubber
3	Spindle screw	Steel
4	Clamp washer	Mild steel
5	Upper cylinder	Silicon aluminium
6	Screw cover	PE
7	Cylinder screw	Steel
8	Cylinder nut	Steel
9	Cylinder washer	Steel
10	Operating diaphragm	Rubber
11	Spacer ring	Silicon aluminium
12	Lower cylinder	Silicon aluminium
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/P1
23	Body/bonnet nut	Stainless steel
24	Body/bonnet stud	Stainless steel
25	Body/bonnet washer	Stainless steel







### TECHNICAL DATA ES Pneumatic Actuation DN15 – DN200

Materials of Construction



### MATERIALS OF CONSTRUCTION ES (SC)

Handwheel pin	Steel
Handwheel	Cast iron
Spindle	Mild steel
Lifting rod	Mild steel
Wiper seal	PVC
Reinforcing plate	Forged steel
Lifting rod locknut	Steel
Upper spring plate	Mild steel
Outer spring	Steel
Inner spring	Steel
Lifting plate screw	Steel
Lifting plate	Mild steel
Diaphragm plate	Forged steel
Clamp washer	Mild steel
Operating diaphragm	Rubber
Bonnet 'O' ring	Rubber
Cylinder bonnet screw	Steel
Cylinder bonnet joint	Klingersil
Spindle	Stainless steel
Bonnet	Cast Iron
Compressor pin	Steel
Compressor	Cast iron
Line Diaphragm	Rubber, Rubber/PTFE
Locking bush	Mild steel
Reinforcing plate screw	Steel
Reinforcing plate washer	Steel
Cover	Silicon aluminium
Cylinder/cover nut	Steel
Cylinder/cover bolt	Steel
Cylinder/cover washer	Steel
Cylinder plug	Malleable iron
Lower cylinder	Silicon aluminium
Body/bonnet nut	Stainless steel
Body/bonnet bolt/stud	Stainless steel
Body/bonnet washer	Stainless steel



## MATERIALS OF CONSTRUCTION ES (SO)

Handwheel pin Steel Cast iron Handwheel Handwheel spindle Mild steel Mild steel Spindle bush Spindle bush screw Steel Spindle bush washer Cover seal PVC Adjusting screw locknut Steel Upper spring plate Spring Adjusting screw Lower spring plate Cylinder/cover screw Cylinder/cover washer Cylinder 'O' ring Clamp washer Diaphragm plate Operating diaphragm Spindle Cylinder/adaptor screw Bonnet adaptor Bonnet/adaptor screw Bonnet Compressor pin Compressor Line Diaphragm Indicator Cover Upper cylinder Cylinder nut Cylinder bolt Cylinder washer Cylinder plug Lower cylinder Body/bonnet nut Body/bonnet bolt/stud Body/bonnet washer

Steel Mild steel Steel Steel Mild steel Steel Steel Steel Mild steel Forged steel Rubber Stainless steel Steel Mild steel Steel Cast Iron Steel Cast iron Rubber, Rubber/PTFE Mild steel Silicon aluminium Silicon aluminium Steel Steel Steel Malleable iron Silicon aluminium Stainless steel Stainless steel Stainless steel



### MATERIALS OF CONSTRUCTION ES (DA)

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Superiore	matorial
Diaphragm plate screw	Steel Mild steel
ipper diaphragm plate	IVIIId Steel
ower diaphragm plate	Mild steel
perating diaphragm	Rubber
pindle	Stainless steel
ylinder/adaptor screw	Steel
onnet adaptor	Mild steel
onnet/adaptor screw	Steel
lonnet	Cast Iron
ompressor pin	Steel
ompressor	Cast iron
ine Diaphragm	Rubber, Rubber/PTFE
Ipper cylinder	Silicon aluminium
ylinder nut	Steel
ylinder bolt	Steel
ylinder washer	Steel
ylinder plug	Malleable iron
ower cylinder	Silicon aluminium
ody/bonnet nut	Stainless steel
ody/bonnet bolt/stud	Stainless steel
odv/bonnet washer	Stainless steel

## TECHNICAL DATA EV Pneumatic Actuation DN15 – DN200

Materials of Construction



### MATERIALS OF CONSTRUCTION EV (SC)

component	Watcha
Spring adjusting spindle	Steel
Reinforcing plate	Forged steel
Wiper seal	PVC
Indicator rod	Steel
Upper spring plate	Forged steel
Outer spring	Steel
Inner spring	Steel
Cover	Silicon aluminium
Lifting plate screw	Steel
Lifting plate	Mild steel
Diaphragm plate	Forged steel
Operating diaphragm	Rubber
Clamp washer	Mild steel
Cylinder/bonnet bolt	Steel
Bonnet 'O' ring	Rubber
Spindle	Stainless steel
Compressor pin	Steel
Compressor	Cast iron
Line diaphragm	Rubber, Rubber/PTFE
Spr. adj. spindle locknut	Steel
Cylinder/cover nut	Steel
Cylinder/cover bolt	Steel
Cylinder/cover washer	Steel
Cylinder/bonnet joint	Klingersil
Cylinder plug	Malleable iron
Body/bonnet nut	Stainless steel
Body/bonnet bolt/stud	Stainless steel
Body/bonnet washer	Stainless steel

ER	TALS OF CONSTRUCTION EV	(50)
	Component	Material
	Indicator	Steel
	Cover plug	Mild steel
	Cover seal	PVC
	Adjusting screw locknut	Steel
	Upper spring plate	Forged steel
	Spring	Steel
	Adjusting screw	Mild steel
	Lower spring plate	Mild steel
	Lower spring plate 'O' ring	Rubber
	Upper cylinder	Silicon aluminium
	Clamp washer	Mild steel
	Diaphragm plate	Forged steel
	Operating diaphragm	Rubber
	Spindle	Stainless steel
	Lower cylinder	Silicon aluminium
	Cylinder/bonnet screw	Steel
	Bonnet	Cast iron
	Compressor pin	Steel
	Compressor	Cast iron
	Line diaphragm	Rubber, Rubber/PTFE
	Cover plug screw	Steel
	Cover plug washer	Steel
	Cover	Silicon aluminium
	Cylinder/cover screw	Steel
	Cylinder/cover washer	Steel
	Cylinder nut	Steel
	Cylinder bolt	Steel
	Cylinder washer	Steel
	Cylinder plug	Malleable iron
	Body/bonnet nut	Stainless steel
	Body/bonnet bolt/stud	Stainless steel
	Body/bonnet washer	Stainless steel

MATERIALS OF CONSTRUCTION FV (DA)					
item	Component	Material			
1	Indicator cover	Polyamide 6-3-T			
2	Indicator	Solid nylon			
3	Indicator cover 'O' ring	Rubber			
4	Indicator locknut	Steel			
5	Diaphragm plate screw	Steel			
6	Upper diaphragm plate	Mild steel			
7	Lower diaphragm plate	Mild steel			
8	Operating diaphragm	Rubber			
9	Spindle	Stainless steel			
10	Cylinder/bonnet screw	Steel			
11	Bonnet 'O' ring	Rubber			
12	Cylinder/bonnet joint	Klingersil			
13	Compressor pin	Steel			
14	Compressor	Cast iron			
15	Bonnet	Cast iron			
16	Line diaphragm	Rubber, Rubber/PTF			
17	Upper cylinder	Silicon aluminium			
16	Cylinder bolt	Steel			
	Cylinder nut	Steel			
	Cylinder washer	Steel			
	Cylinder plug	Malleable iron			
	Body/bonnet nut	Stainless steel			
	Body/bonnet bolt/stud	Stainless steel			
	Body/bonnet washer	Stainless steel			

# TECHNICAL DATA EC/SSC/ECX Actuator Dimensions





## EC/SSC

Size DN	A	В	С
15	127	122	108
20	160	152	117
25	161	154	127
40	224	210	159
50	240	220	190

Note: Varying line and operating pressures are accommodated by head models L and S. For Performance refer to our technical data sheets.



ECX spring closing and spring opening actuator on A Type flanged body

ECX/SC					
Size D	Size DNABCD				
Heads	5 S1, S	S2 &	S3		
65	359	55	216	266	
80	370	55	254	266	
100	417	55	305	266	

## ECX/SC

Siz	e DI	A	В	С	
He	ads	L1, L	.2 &	L3	
65	5	399	55	216	266
80	D	410	55	254	266
100	)	458	55	305	266



ECX/SO/DA									
Size D	ΝA	В	С						
Heads	5 S1,	S2 &	S3						
65	-	55	216	266					
80	-	55	254	266					
100	-	55	305	266					

#### ECX/SO/DA

NA	В	С	
5 L1,	L2 &	L3	
-	55	216	266
-	55	254	266
_	55	305	266
	NA L1, - -	N         A         B           L1, L2         &           -         55           -         55           -         55	N         A         B         C           L1, L2 & L3

**Note:** Dimension 'B' is for optional Indicator on ECX models

## **TECHNICAL DATA ES/EV** Actuator Dimensions



ESC 61-65

ESO 68-72

ESDA 54-58

	Model Δ H (Type A Valve) – Size in mm													
			15	20	25	32	40	50	65	80	100	125	150	200
	EV 61	168	368	376	386	-	415							
	ES 61	168	384	397	408	-	427							
	EV 62	260	-	-	464	486	491	504	516					
Fail Safe	ES 62	260	-	-	487	505	513	524	534					
Spring	EV 63	318	-	-	-	-	-	617	637	653				
CLOSING	ES 63	318	-	-	-	-	-	667	683	692				
	EV 64	425	-	-	-	-	-	-	-	779	820	836		
	ES 64	425	_	-	-	-	-	-	-	826	863	879		
	ES 65	549	-	-	-	-	-	-	-	-	1051	-	1131	
	EV 68	168	214	221	278	_	299	331						
	ES 68	168	255	262	371	_	407	435						
	EV 69	260	_	_	-	374	384	444	480	483				
Fail Safe	ES 69	260	-	-	-	450	456	555	570	582				
Spring	EV 70	318	-	-	-	-	_	-	-	514	555			
OPENING	ES 70	318	-	-	-	-	-	-	-	619	660			
0. 2	EV 71	425	-	-	-	-	-	-	-	-	671	690	753	
	ES 71	425	-	-	-	-	-	-	-	-	831	846	912	
	ES 72	549	-	-	-	-	-	-	-	-	-	-	974	1040
	EV 54	168	184	196	200	-	224	233						
	ES 54	168	129	136	142	-	165	196						
	EV 55	260	_	-	-	287	303	312	327	340	377			
	ES 55	260	-	-	-	215	221	232	245	257	290			
DOUBLE	EV 56	318	-	-	-	-	-	-	-	360	397	412		
ACTING	ES 56	318	-	-	-	-	-	-	-	298	337	350		
	EV 57	425	-	-	-	-	-	-	-	-	437	452	519	
	ES 57	425	-	-	-	-	-	-	-	_	355	370	436	
	ES 58	549	-	_	_	_	-	-	-	_	-	-	462	530

h (Type KB Valve) – Size in mm										
25	32	40	50	65	80	100	125	150	200	
457	457	457								
462	462	462								
522	522	522	547							
535	535	535	569							
_	-	-	687	706	736					
-	-	-	697	716	746					
-	-	-	-	806	871	918	950			
_	-	-	-	806	888	911	950			
-	-	-	-	-	-	1234	1273	1323		
347	347	347								
427	427	427								
382	382	382	505	531						
472	472	472	595	621						
-	-	-	_	577	607	654				
-	-	-	-	667	697	744				
-	-	-	-	-	627	667	809			
-	-	-	-	-	767	809	949			
-	-	-	-	-	-	-	995	1079	1122	
257	257	257								
202	202	202								
331	331	331	346	365						
257	257	257	272	291						
-	-	-	-	405	440	452				
-	-	-	-	331	366	378				
-	-	-	-	-	458	467	489			
-	-	-	-	-	384	393	415			
-	_	_	_	_	-	-	-	514	537	

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 $\square$ 

EVDA 54-57

 $\Delta = \text{Actuator Diameter/Width} \quad \textbf{H} = \text{Actuator Height}$ 

Dimension table shows in mm diameter/width of actuators and the maximum height of the actuator from the centre of the valve flange or pipeline.



## Saunders Diaphragm Valves

### **Typical Applications**

The table shows typical application areas for Saunders diaphragm valves under four categories, Abrasive, Corrosive, Industrial and Aseptic.

ABRASIVE	CORROSIVE	INDUSTRIAL	ASEPTIC
Gold Mining	Chlor-Alkali	Marine	Biotechnology
Cement	Iron and Steel	Vegetable Oil	Pharmaceuticals
Copper Mining	Sulphuric Acid	Paints	WFI
Ceramics	Effluent treatment	Fire Fighting	Fine Chemicals
FGD	Potable Water	Tanning	Chromatography
Sugar	Pulp & Paper	Oil Production	Cosmetics
Coal Slurry	Basic Chemicals	Automobile	Ultra Filtration
Phosphate	Acids and Alkalis	Air	Clean Water
Sand	Organics	Effluent	CIP
Fertilisers	Toxic Fluids	Gases, Fuels	Yeast
Titanium dioxide	Nitric Acid	Dye Liquors	Food & Beverage
C. A. S. M.			

#### Abrasive

- Minerals processing, chemicals, fertilisers, china clay, paper, power generation are some 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 de-sulphurisation, 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 also well catered for by the Saunders KB range.

### Corrosive

- Corrosion is estimated to cost worldwide industry 300 billion Euros every year.
   Every process industry sector handles corrosive fluids to a smaller or greater extent.
- Saunders have expertise and unrivalled experience in corrosive applications.
- Continuous development of 'in-house' materials technology has resulted in the current extensive range of valve options including elastomer and fluoropolymer linings, designed to combat corrosion.

Marin

in and

#### Industrial

- Saunders valves are widely used on utility (air, water, and gas) service lines. Also, as most process plants have an effluent treatment system there are many applications where Saunders valves can be used successfully: –
- The Food Industry Saunders valves are widely used on margarine, yogurt and corn processing plants.
- In the Transport Industries Saunders have found success in the marine sector as mentioned earlier, in the automobile sector on service lines and paint coating systems and on road and rail tankers.

#### Aseptic

- Saunders is a key player in the evolution of 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 dedicated literature available from us.

China Clay Production

Mining

#### Power Stations

Water Treatment

Road Tankers

## **Actuation Accessories**

#### **Overview**

MODEL	SIZE RANGE	STYLE	MATERIAL	SOLENOID	SWITCH BOX	POSITIONER	AIR FILTER	HANDWHEEL
EC	DN8-50	A, AFP	PES	1	1	1	×	×
SSC	DN8-50	A, AFP	316 C12	1	1	1	×	1
ECX	DN65-150	A, AFP	SiAl	1	đ	x	1	×
EV	DN15-150	A, AFP, KB	SiAl	1	1	1	1	
ES	DN15-200	A, AFP, KB	SiAl	1	1	1	1	1

✓ = 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 should cover all your requirements.



#### **Mini Positioner**

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



#### Module

This highly modular switchbox option is available for EC/SSC & ECX actuator ranges. The switchbox offers a wide range of V3 mechanical and proximity sensors with space for up to 4 switch, integral solenoid valve & ASI interface\*.



#### Mini Switchbox

Suitable for both the EC and SSC. This low cost switchbox offers remote, open and closed indication of the valve position. Available with two V4 mechanical or proximity switches and intrinsically safe options.



### **ES Positioner**

Providing 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.

### 007 Switchbox

Manufactured from polyester coated aluminium. This switchbox is used for the ES and EV linear actuators. It has the capability for up to 4 switches and can incorporate internal solenoid valve and ASI system.



Shown mounted to ES Actuator

### EC & SSC Limit Open Stop

The EC/SSC limit open stop can be supplied to order and offers a fully adjustable travel stop. With the removal of the plastic indicator the limit stop is easily accessible.





Shown mounted to ES Actuator

### SSC M/O

For extra security the SSC can be supplied with an emergency manual over-ride manufactured from stainless steel. Please contact Crane for further information.



## Software to Aid the Process Engineer in Selecting Saunders Products

### **Engineering Selection Tools**

- Material Selection
- On/Off Actuation
- Technical Data Sheets

#### The Saunders Material Selection

Database lists over 1,000 process chemicals – just enter the temperature and concentration and a recommendation for the body and diaphragm material is selected.



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.

#### **On/Off Actuation Selection**

By simply entering your process data into the selection boxes the program sizes the actuator to suit your specific requirements.



## **Quality Statements and Approvals**

Certificate

ISO 9001 Certificate of

Registration

Registration

PED Certificate

of Conformity

## **Certified Quality from** Crane Process Flow Technologies Ltd.

### The Complete Approach to Quality

Quality Management system registered to ISO 9001 standard in which our R & D and manufacturing process are optimised to maintain our product quality and service.

TUV-Merkblatt HPO Qualification for our product manufacturing and certification.

Certified compliance to the European Pressure Equipment Directive 97/23/EC authorising Crane Process Flow Technologies Ltd to CE mark relevant valve products.

International product approval from authorities such RESSURE EQUIPMENT DIRECTIV as Bureau Veritas, American Bureau of Shipping.

ASSURANCE MODULE TIFICATE OF CONFORMET

Polymer/Rubber materials certified as meeting the requirements of FDA, USP & WRAS.

> QUALITY ASSURANCE APPROVALS **BS EN ISO 9001**



TÜV AD-MERKBLATT HPO



COMPLIANCE WITH FDA CODE 21 TNO CERTIFICATION 3A cGMP USP 23

### Product and System Approvals Examples

ISO 9001

PED 97/23/EC

WRAS (Water Regulations Advisory Scheme)

Lloyds Register of Shipping

Det Norske Veritas

**Bureau Veritas** 

**U12 Marine Safety Agency** 

American Bureau of Shipping

Food & Drug Administration (FDA)

United States Pharmacopeia (USP)

## Valve Ordering Information





For standard options, refer to current price list







## **Actuation Options**







EC Actuato	r Mini Switchbox	Options		
Switchbox type	Conduit entry	Switch type	Switch quantity	
Switchbox Mini	<b>G</b> = 6-8mm Cable Gland <b>C</b> = $1/2^{"}$ NPT Thread	MA = V4 Mechanical Switch PA = Proximity Switch Namur DIN19234 PB = Proximity Switch 3 Wire NO NPN PC = Proximity Switch 3 Wire NO PNP	1 = One 2 = Two	









ES Actuator –	007 Swite	hbox Options				<u></u>	1
Туре	Size	Actuator/Model	Switchbox Type	Conduit Entry	Switch Type	Switch Quantity	
V S	mm	ES number	B B 007	Type B Lever	M1 = V3Mech.	<b>2</b> 2 = Two	
<b>3</b> = E3				<b>1</b> = Metric M20 <b>2</b> = PG 13.5 <b>3</b> = 1/2 NPT <b>Type C Lever</b> <b>V</b> = Metric M20 <b>W</b> = PG 13.5 <b>X</b> = 1/2 NPT	<ul> <li>M2 = V3Mech. Gold Plated</li> <li>M3 = V24T7 Mech. DPDT</li> <li>M6 = Burgess Ex. Proof EE;</li> <li>P2 = ProxSwitch Intrinsically</li> <li>P5 = ProxSwitch 2 Wire NO</li> <li>P6 = ProxSwitch 3 Wire NP</li> <li>P7 = ProxSwitch 3 Wire PN</li> </ul>	xd. y safe N	



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## Notes





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