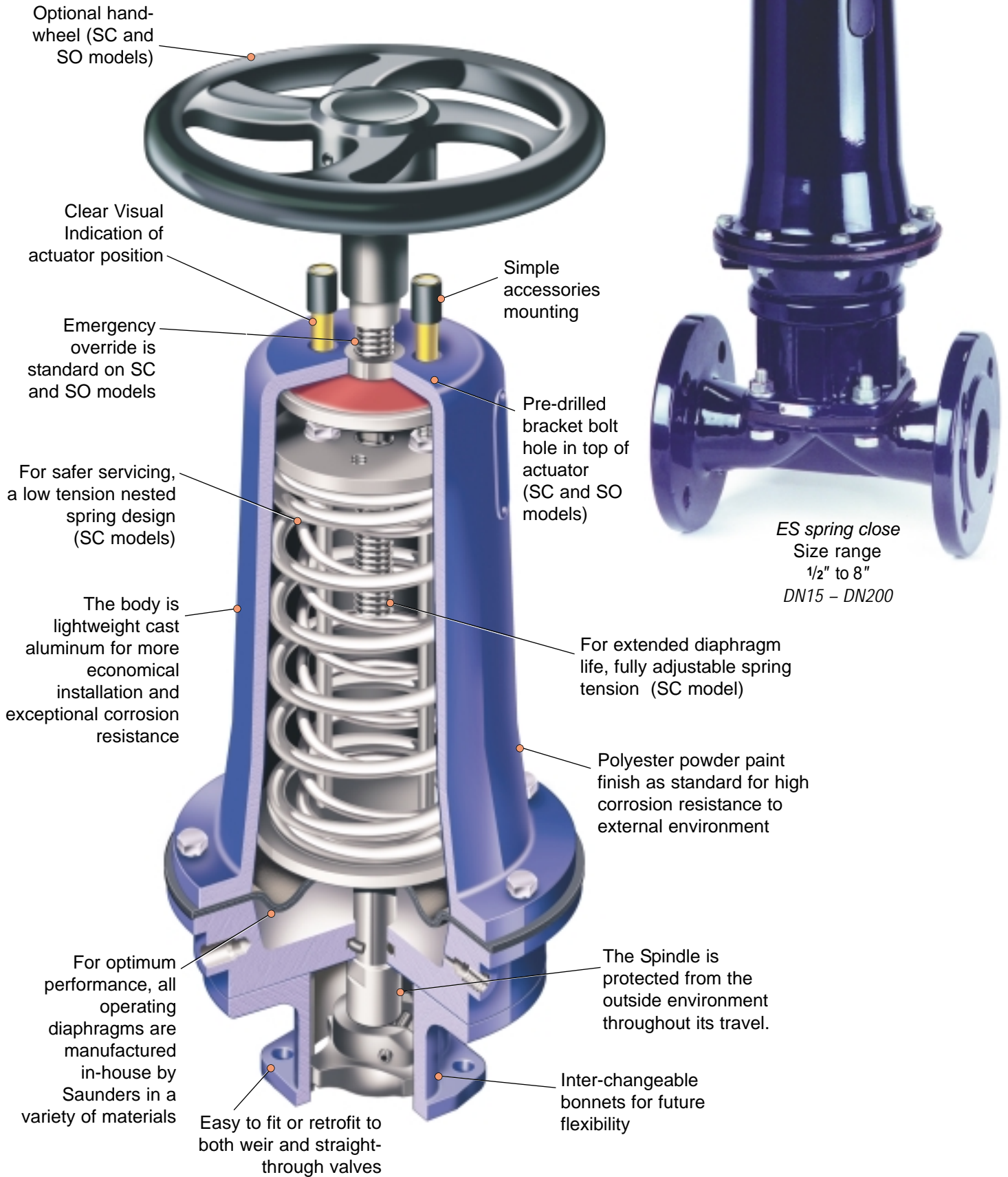


Pneumatic Valve Actuation

ES Modular Actuators



Optional hand-wheel (SC and SO models)

Clear Visual Indication of actuator position

Emergency override is standard on SC and SO models

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

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

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

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

Simple accessories mounting

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

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

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

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

Inter-changeable bonnets for future flexibility



ES spring close
Size range
1/2" to 8"
DN15 – DN200

Quality Statements and Approvals

ISO 9001
Certificate of
Registration



PED Certificate
of Conformity

Certified Quality from Crane Process Flow Technologies Ltd.

- Quality Management system registered to ISO 9001/2000 standard in which our R & D and manufacturing process are optimized to maintain our product quality and service.
- Certified compliance to the European Pressure Equipment Directive 97/23/EC authorizing Crane Process Flow Technologies Ltd to CE mark relevant valve products.

- TÜV-Merkblatt HPO Qualification for our product manufacturing and certification.
- International product approval from authorities such as Bureau Veritas, American Bureau of Shipping.
- Polymer/Rubber materials certified as meeting the requirements of FDA, USP & WRAS.

QUALITY ASSURANCE
APPROVALS

BS EN ISO 9001/2000



TÜV AD-MERKBLATT
HPO

RWTÜV

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

Product and System Approvals Examples

ISO 9001/2000

PED 97/23/EC

WRAS (Water Regulations
Advisory Scheme)

Lloyds Register of
Shipping

Det Norske Veritas

Bureau Veritas

ATEX

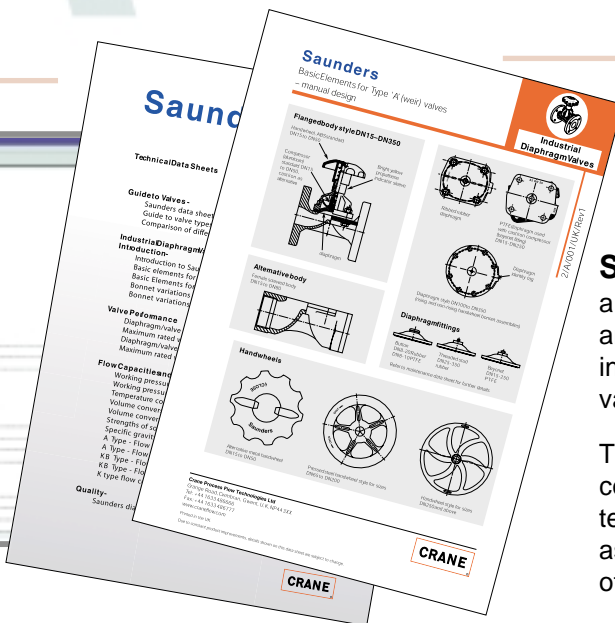
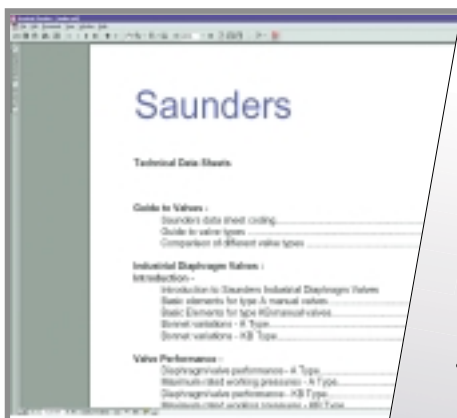
U12 Marine Safety
Agency

American Bureau of
Shipping

Food & Drug
Administration (FDA)

United States
Pharmacopeia (USP)

QA



Data Sheet
Index and typical
valve information

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

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

How To Specify

Type **K** (High Flow)
Type **KB** (Straight Through)

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

Size

Body Type / Spare Type

Body Material & Lining

Length & Flange

Topworks

Diaphragm

Accessories

Accessories

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

Type A Weir Valves

C1	Nitrile (C)
CV	Nitrile (Vacuum CV)
D1	Butyl (300)*
E2	EPM (425)*
EV	EPM 425 (Vacuum)*
HT	Neoprene(HT)
Q1	Natural / Synthetic(Q)
U1	Hypalon®(237)
V1	Fluoroelastomer (226)
S1	White Silicone (300)*

P1 PTFE / Butyl Back* (214/300)

P2 PTFE / EPM Back* (214/425)

P3 PTFE / Fluoro Back* (214/226)

P7 PTFE(K) / EPM Back (214K/425)

S5 PTFE(S) / EPM Back* (214S/425)

Type WFB Valves

U2 Hypalon (Fire 286)

Type K & KB Valves

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

Type KB Valves

44	Screwed API
55	Flanged - Unlined
56	Flanged - Lined

Type KB Spares

S2	Spare Diaphragm
H2	Spare Bonnet
T2	Spare Actuator

Type K Valves

58	Flanged - Unlined
59	Flanged - Lined

Type K Spares

S3	Spare diaphragm
H3	Spare Bonnet
T3	Spare Actuator

Type K & KB Valves

03	Bronze <i>Gunmetal</i>
04	Cast Iron
05	Ductile Iron
06	Stainless Steel CF8M (316)
07	Cast Steel
21	Soft AA Rubber Lined
22	Hard Rubber Lined (ebonite)
23	Neoprene Lined
24	Butyl Lined
25	Hypalon Lined
32	Glass Lined

Type K & KB Valves

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

Manual Bonnets

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

Actuated

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

Type K & KB Valves

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

* FDA Approved
Hypalon and Tefzel are Registered Trade Marks of DuPont

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

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

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

Type A Weir Valves		
1/4"	DN8	010
1/2"	DN15	015
3/4"	DN20	020
1"	DN25	025
1 1/2"	DN40	040
2"	DN50	050
2 1/2"	DN65	065
3"	DN80	080
4"	DN100	100
5"	DN125	125
6"	DN150	150
8"	DN200	200
10"	DN250	250
12"	DN300	300
14"	DN350	350

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

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

Type A Weir Spares

S1	Spare Diaphragm	
H1	Spare Bonnet	
T1	Spare Actuator	

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

Type WFB Spares

S4	Spare Diaphragm	
H4	Spare Bonnet	

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

Type WFB Valves		
03	Bronze	Gunmetal
05	Ductile	Iron

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

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

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

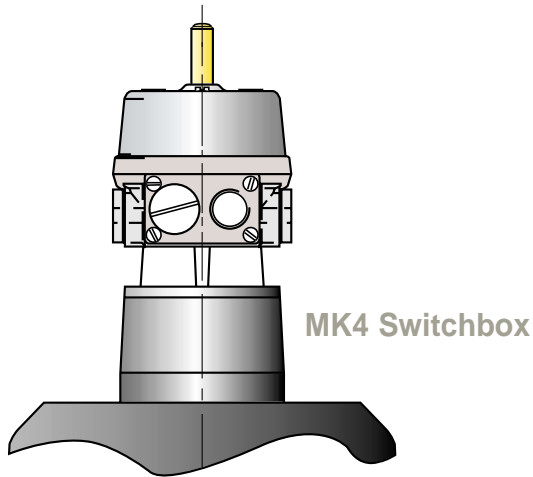
Actuated		
402-406	Double Acting ES	for Rubber Diaphragm
502-506	Spring Close ES	for Rubber Diaphragm
602-606	Spring Open ES	for Rubber Diaphragm
422-426	Double Acting ES	for PTFE Diaphragm
522-526	Spring Close ES	for PTFE Diaphragm
622-626	Spring Open ES	for PTFE Diaphragm
EC1	DA EC	for Rubber
EC2	SC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

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

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

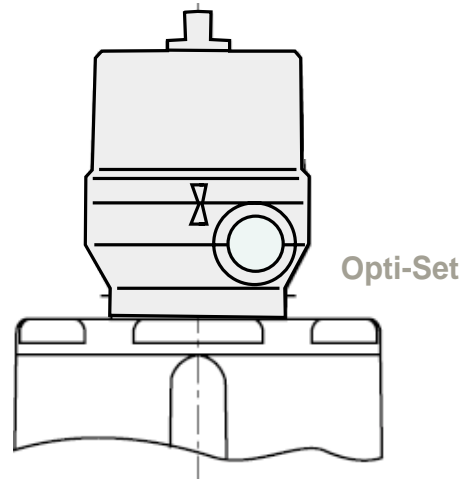
Note: EC and ECX only available for weir.

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

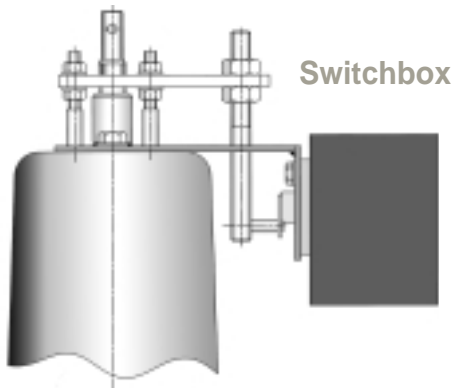


This modular switchbox option is available for EC/SSC & ECX actuator ranges. The switchbox offers a wide range of mechanical and proximity sensors with space for up to 4 switches, integral solenoid valve & ASI interface*.

*ASI Interface can be retrofitted.

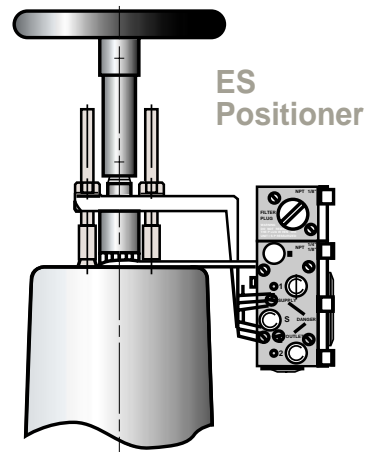


- Self setting. Minimize validation/set-up time.
- Remote, open/closed indication.
- Economical, compact, lightweight design.
- Allows for compression/set of the diaphragm.
- Easy access, even at difficult angles.
- Available with mechanical or proximity switches, including safety options.



Shown mounted to ES Actuator

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



Shown mounted to ES Actuator

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

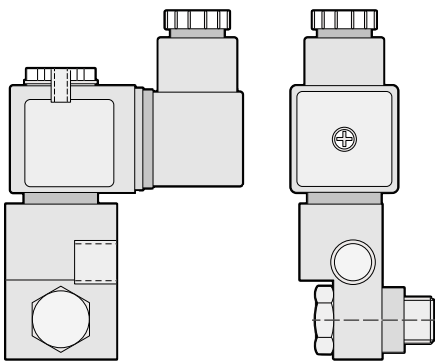
Other control options available upon request.

Actuators - Accessories

Overview

MODEL	SIZE RANGE	STYLE	MATERIAL	SOLENOID	SWITCH BOX	POSITIONER	AIR FILTER	HAND-WHEEL
EC	1/4" to 2" DN8-DN50	A	PES	✓	✓	✓	✗	✗
SSC	1/4" to 2" DN8-DN50	A	316 C12	✓	✓	✓	✗	✓
ECX	2 1/2" to 6" DN65-DN150	A	SiAl	✓	✓	✗	✓	✗
ES	1/2" to 8" DN15-DN200	A,KB	SiAl	✓	✓	✓	✓	✓

✓ = Available and ✗ = Not available



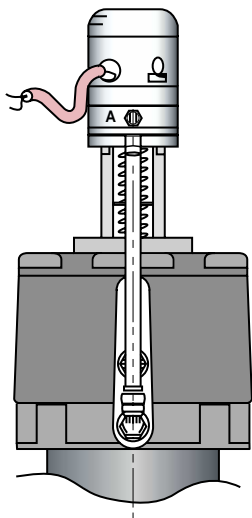
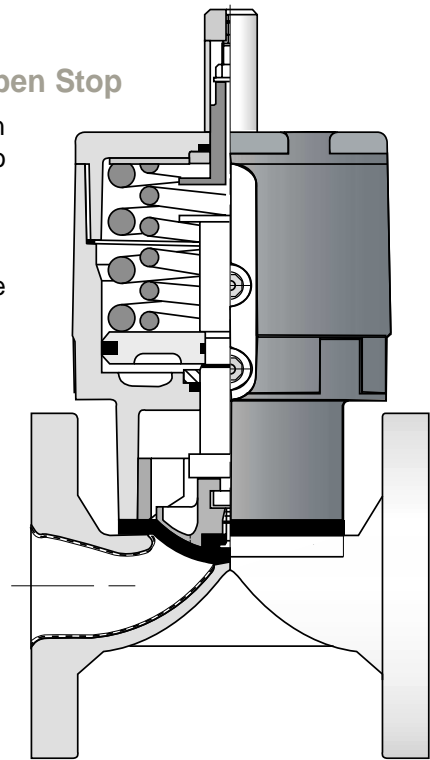
Solenoid Valves

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

EC & SSC Limit-Open Stop

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

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

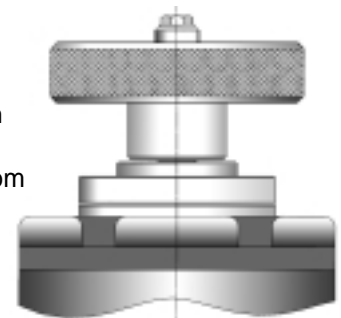


Mini Positioner

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 compact control solution.

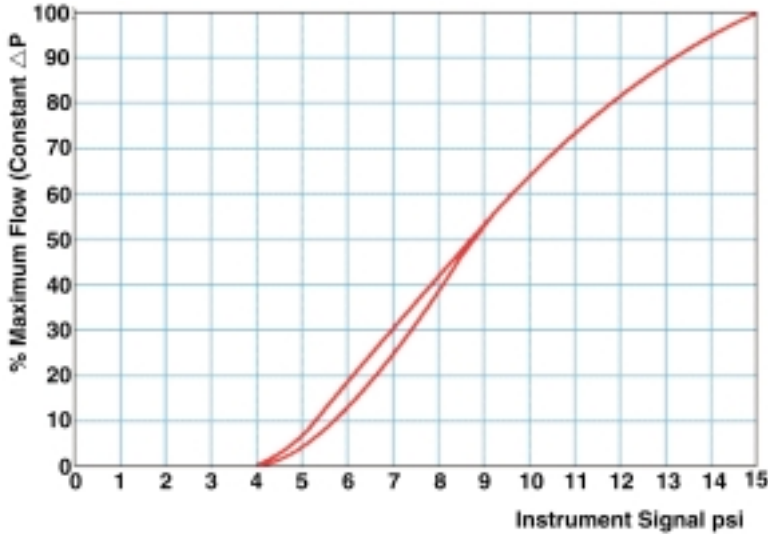
SSC Manual Over-Ride

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



Pneumatic Valve Actuation Valve Throttling and Flow Control

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



Saunders diaphragm valves offer excellent control capabilities within a broad range of pressure, flow or level control applications.

Rangeability (ratio of maximum flow vs. minimum control flow) of Saunders weir type valves is 35:1 extending beyond the range of most process and service control systems.

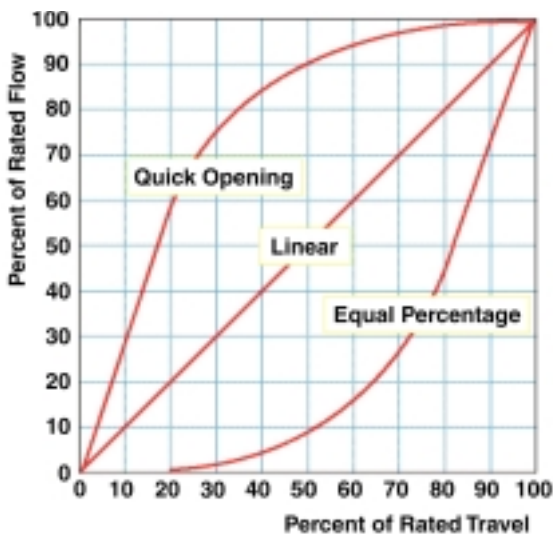
The positive shut-off characteristics of the valve can, in many instances, eliminate the need for independent block valves, a major component in the piping system cost.

The inherent flow characteristics illustrated shows linearity up to 60% of travel (80% of flow).

The chart illustrates installed characteristics affected by the dynamic friction loss for the remainder of the piping system. Other characteristics can be obtained through the use of characterized positioners.

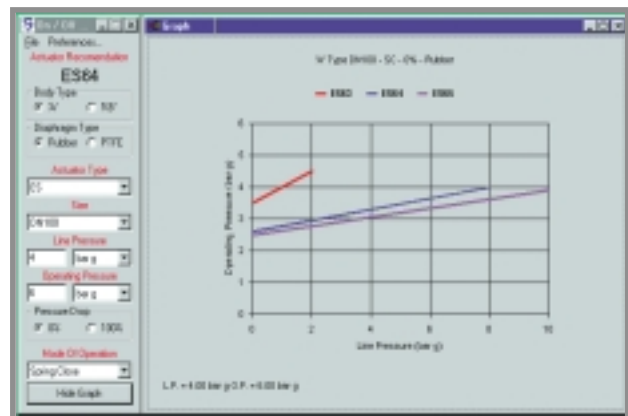
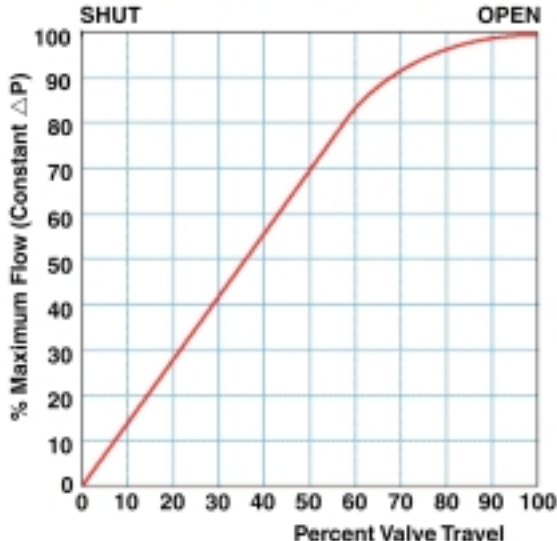
Pressure recovery factor = 0.7.

Valve characteristic curves



Actuator with digital foundation fieldbus positioner

% flow/% travel, weir type diaphragm valve

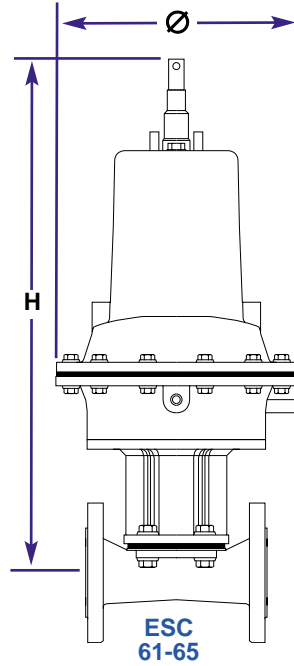


On/Off Actuation Selection

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

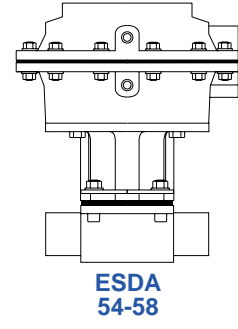
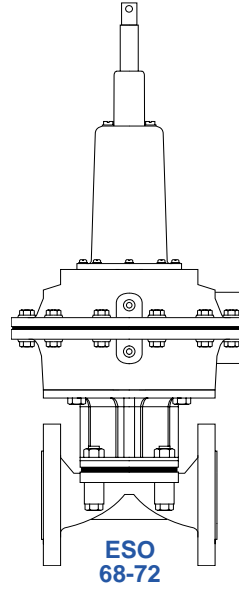
ES Modular Actuators

Technical Data



Ø = Actuator Diameter/Width
H = Actuator Height

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



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

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

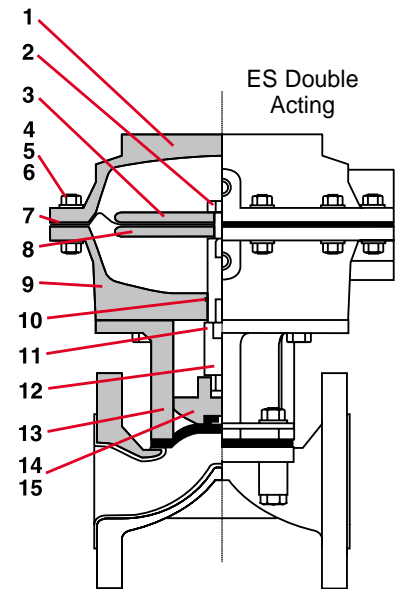
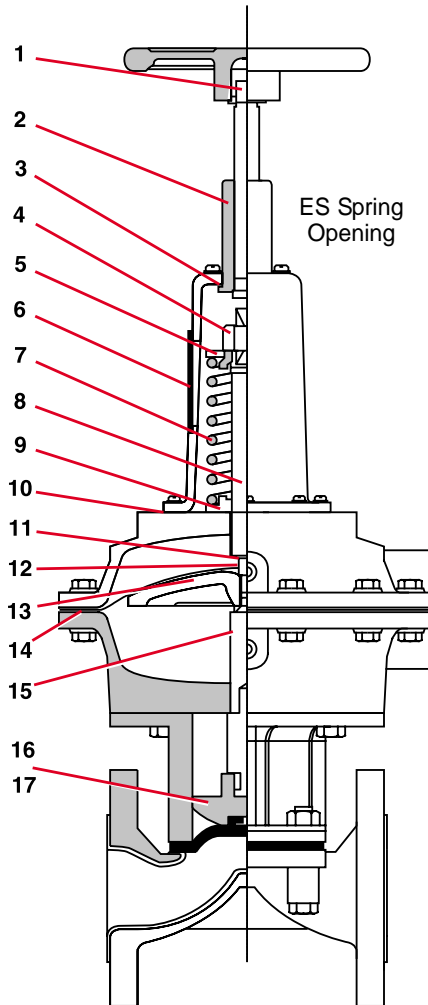
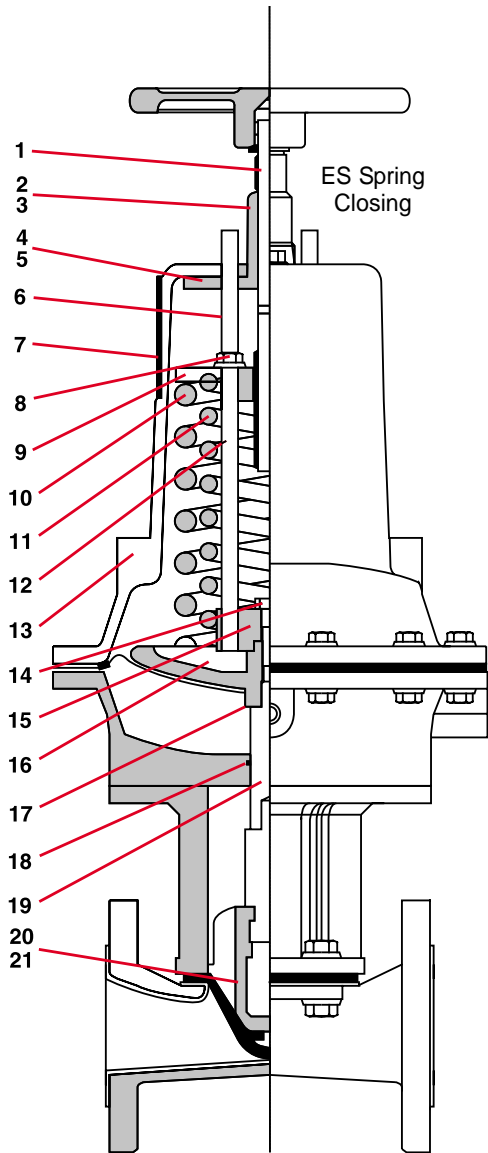
ES Modular Actuators are also available for the K High-Flow range of straight through valves.

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

Add-on handwheel dimensions

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

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



Materials Of Construction - ES (SC)

Item	Component	Material
1	Handwheel spindle	Mild steel
2	Locking bush	Mild steel
3	Locking bush screw	Steel
4	Reinforcing plate	Forged steel
5	Cover seal	PVC
6	Indicator sleeve	PVC
7	Slot seal	PVC
8	Lifting rod locknut	Steel
9	Upper spring plate	Forged steel
10	Outer spring	Steel
11	Inner spring	Steel
12	Lifting rod	Mild steel
13	Cover	Silicon aluminum
14	Locking plate screw	Steel
15	Lifting plate	Mild steel
16	Diaphragm plate	Forged steel
17	Clamp washer	Mild steel
18	Lower cylinder 'O' ring	Rubber
19	Master spindle	Stainless steel
20	Compressor pin	Steel
21	Compressor	Cast iron

Materials Of Construction - ES (SO)

Item	Component	Material
1	Handwheel spindle	Mild steel
2	Handwheel spindle brush	Mild steel
3	Cover seal	PVC
4	Adjusting screw locknut	Mild steel
5	Upper spring plate	Steel
6	Slot seal	PVC
7	Spring	Steel
8	Adjusting screw	Mild steel
9	Lower spring plate	Mild Steel
10	'O' ring	Nitrile
11	Dished washer	Mild Steel
12	Clamp washer	Mild steel
13	Diaphragm plate	Forged steel
14	Operating diaphragm	Rubber
15	Master spindle	Stainless steel
16	Compressor pin	Steel
17	Compressor	Cast iron

Materials Of Construction - ES (DA)

Item	Component	Material
1	Upper cylinder	Silicon aluminum
2	Diaphragm plate screw	Steel
3	Upper diaphragm plate	Mild steel
4	Cylinder nut	Steel
5	Cylinder bolt	Steel
6	Cylinder washer	Steel
7	Operating diaphragm	Rubber
8	Lower diaphragm plate	Mild Steel
9	Lower cylinder	Silicon aluminum
10	Lower cylinder 'O' ring	Nitrile
11	Master spindle	Stainless steel
12	Spindle attachment	Stainless steel
13	Bonnet	Cast iron
14	Compressor pin	Steel
15	Compressor	Cast iron