# <<Saunders

Industrial Diaphragm Valves

CRANE

# Saunders

## Contents



# A Continuing Story of Success

Crane Process Flow Technologies is an international leader in the design and manufacture of diaphragm valve and valve control products under the Saunders brand. Part of Crane Co, a global enterprise with Sales and Manufacturing, Crane Process Flow Technologies via dedicated sales companies and a network of closely linked channels has a strong presence world-wide.

Since PK Saunders invented the original diaphragm valve in 1928, Saunders has led the way in reliability, engineering and safety. In succeeding years our range has been developed through innovation in both design and new materials technology. As a result, Saunders has gained a widespread reputation for versatility having established a presence in many process industry sectors. Today it is fair to say that there are millions of Saunders manual and actuated diaphragm valves installed in process plants world-wide.

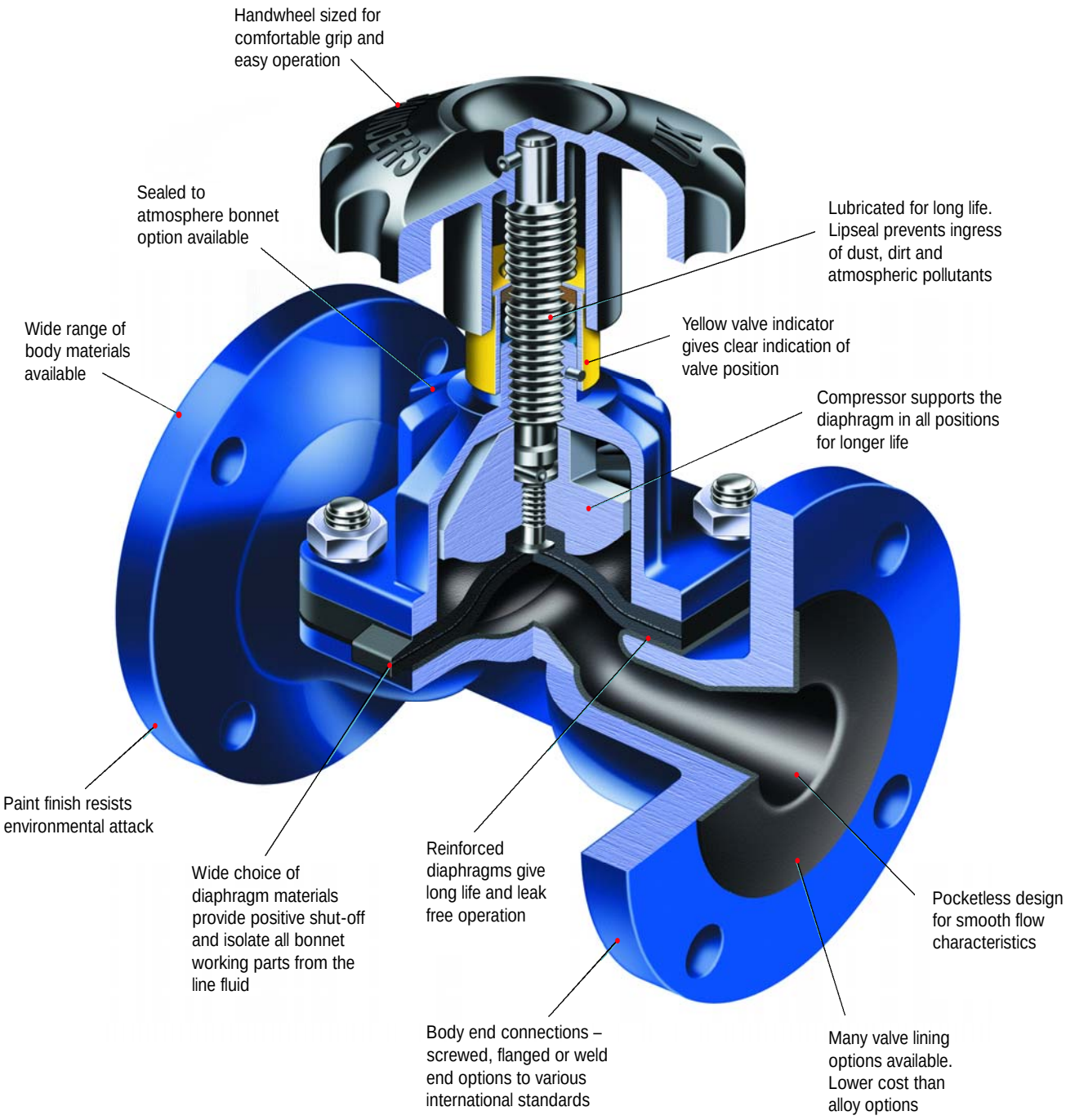
One of the reasons behind this success is that engineers know they can trust Saunders. We have set the Industry standard for dependable, consistent operation year after year under even the most adverse conditions. In choosing Saunders, our customers know they are assured of many years of trouble-free reliable operation.

Our customers also know they can depend on us for total service support via our world-wide network of Crane Sales Companies and distributor partners. Providing technical advice with dedicated after sales support and service from a local team, we can offer the best solution that meets individual process, legislative and quality plant requirements.

By choosing Saunders y
are guaranteed a combir
of excellent performance
total peace of mind.

## 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

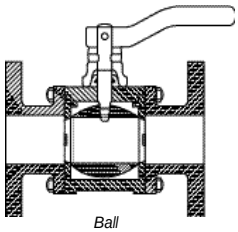
We at Crane Process Flow Technologies Ltd have in our Saunders portfolio a comprehensive range of diaphragm valves for industry. They encompass the full spectrum of corrosive and abrasive applications that require reliable leak free valve operation.

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.

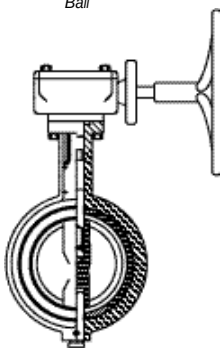
### Comparison of different valve types against industrial process requirements

| 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 | ★★★ | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★★ | ★★★★★ |

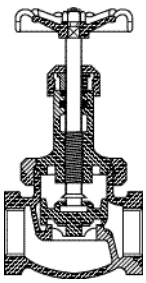
★★★★★ Five stars – exceptional
★ One star – poor



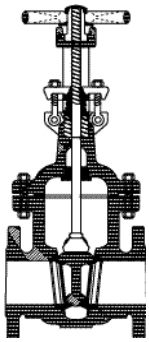
*Ball*



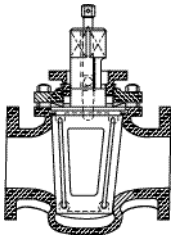
*Butterfly*



*Globe*



*Gate*



*Plug*

# Saunders Diaphragm Valve Range

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

### A Type screwed

Weir type valve in SG iron, gunmetal and stainless steel.
DN8 to DN50

### AFP valve

Weir type diaphragm valve in stainless steel for the biopharm and chemicals markets.
DN8 to DN150

### WFB

A specialised range of weir type diaphragm valves for marine and firefighting applications. Used primarily as water hydrant valves because of 100% reliability in adverse conditions.

DN40 and DN65

### KB Type screwed

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

### KB Straight through valve

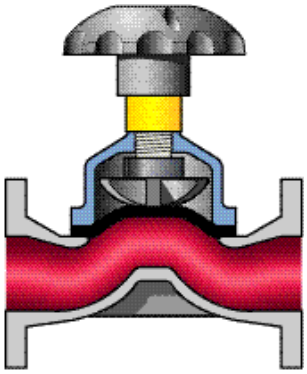
Diaphragm valve with a full bore opening to ensure maximum flow when handling viscous or abrasive fluids. Also available with various diaphragm and lining options.

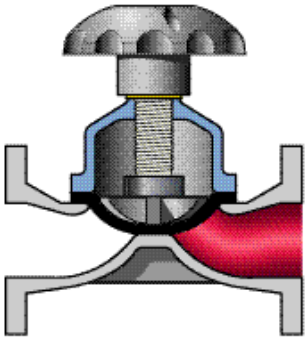
DN15 to DN350

# Saunders A Type Diaphragm Valves

## 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.





### 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.

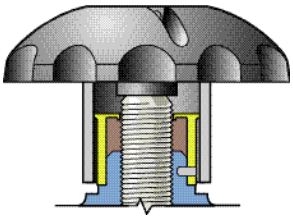
### Valve flow

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

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.

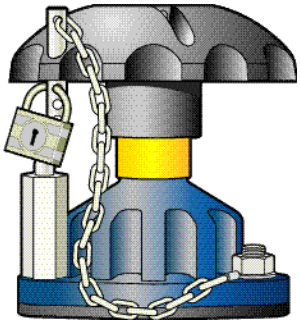
All working parts of the valves are isolated from the line media and positive closure is obtained even on frequent cycling or with entrained particulates in the line unlike quarter turn ball and butterfly valves. Throttling and control characteristics are enhanced by a streamlined flow path that is cavity 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.



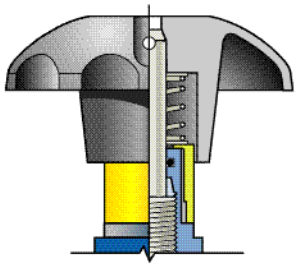
### Lubrication

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



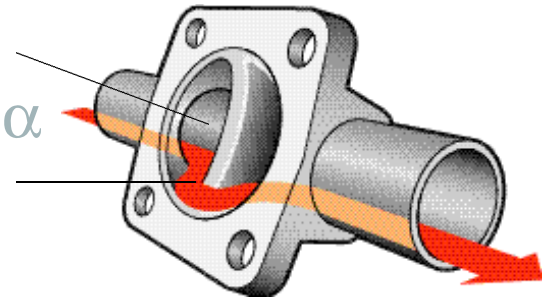
### Padlock bonnet

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.

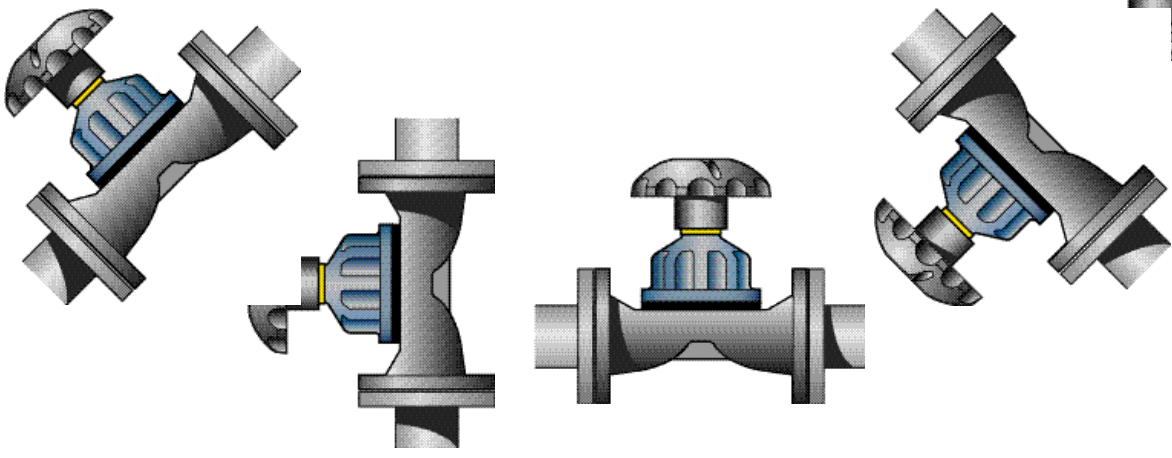



### Valve set for self draining

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.

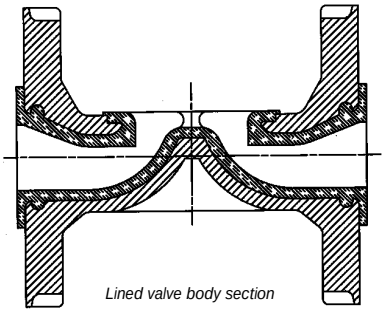


# Saunders A Type Diaphragm Valves

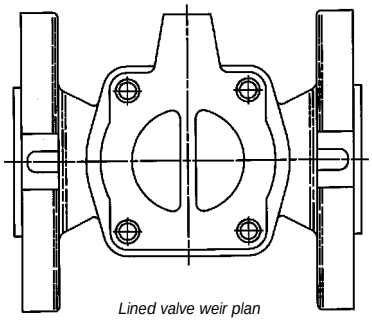
Materials of Construction – Valve Bodies

## 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 | | |
| **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 |



*Lined valve body section*



*Lined valve weir plan*

### 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

*A Type valve body hard rubber lined*

*A Type valve body ETFE lined*

## 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.

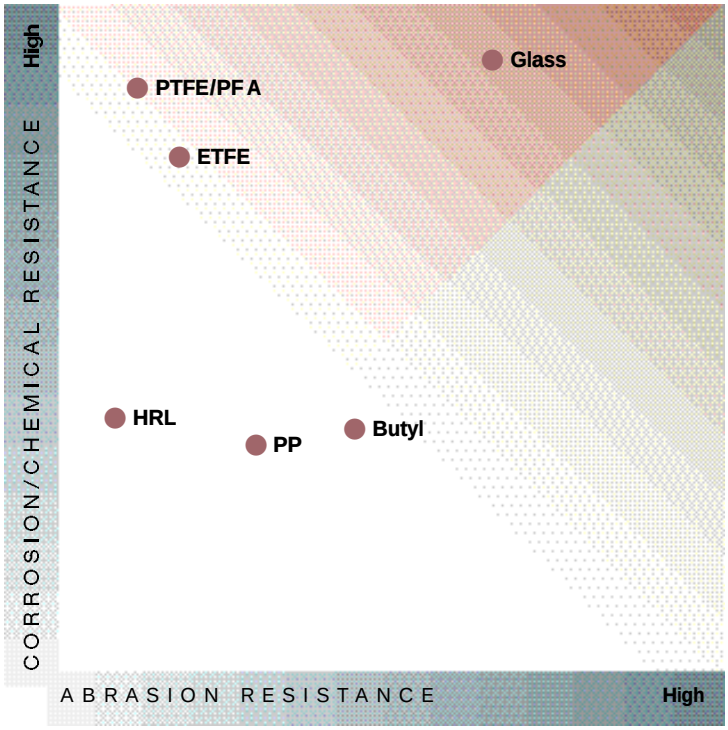
- **Perfluoroalkoxy – PFA**

  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.

Valve Body Lining Materials – Visual Process Resistance Guide



# Saunders A Type Diaphragm Valves

## 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.

### Key Considerations

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

### Diaphragm Construction

Rubber Diaphragms

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

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

PTFE 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.

*PTFE diaphragm bayonet fixing*

*Rubber diaphragm screw fixing*

# Saunders A Type Diaphragm Valves

## Diaphragm Materials of Construction

| Grade | Elastomer type | General service and approvals |
|---|---|---|
| **C** | 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 alkalies, 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 alkalies, 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 alkalies, 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, alkalies 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, alkalies 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, alkalies 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
- Diaphragms suitable for vacuum duties (eg. CV) have steel stud
- PTFE diaphragms are fitted with stainless steel bayonet

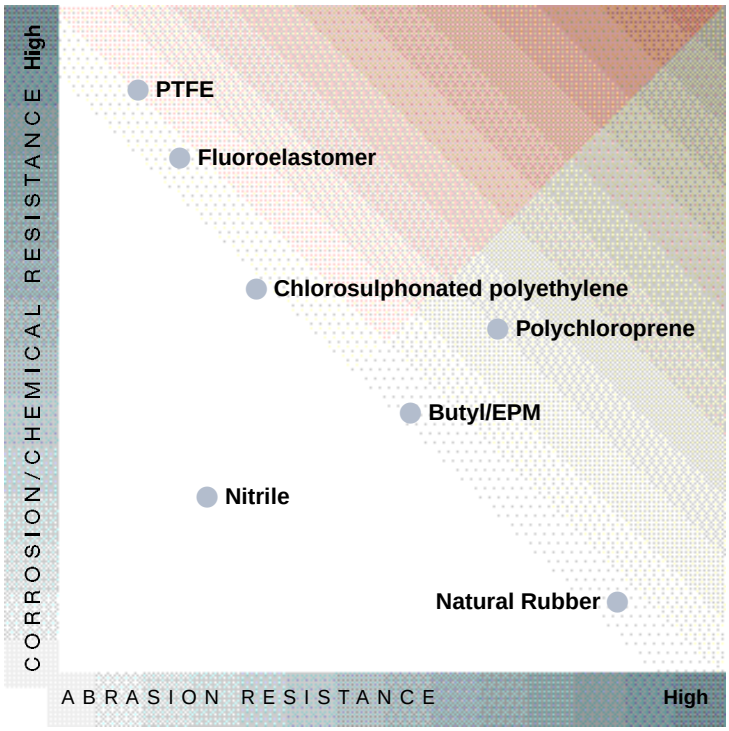
### Saunders Diaphragms are provided with:–

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

# Saunders A Type Diaphragm Valves

## Diaphragm Materials

### Diaphragm Materials – Visual Process Resistance Guide




| Material | Grade |
|---|---|
| PTFE | 214/214K |
| Fluoroelastomer | 226 |
| Chlorosulphonated polyethylene | 237 |
| Polychloroprene | HT |
| Nitrile | C, CV |
| Butyl | 300, 300V |
| EPM | 425, 425V |
| Natural Rubber | Q |

### 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.

| Bonnet assemblies with rubber diaphragm | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | |

| Bonnet assemblies with PTFE faced diaphragm | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size DN | 8 | 10 | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 | 250 |
| Non-rising handwheel | | | | | | | | | | | | | | 6 | 5 |
| Rising Handwheel | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 7 | | |

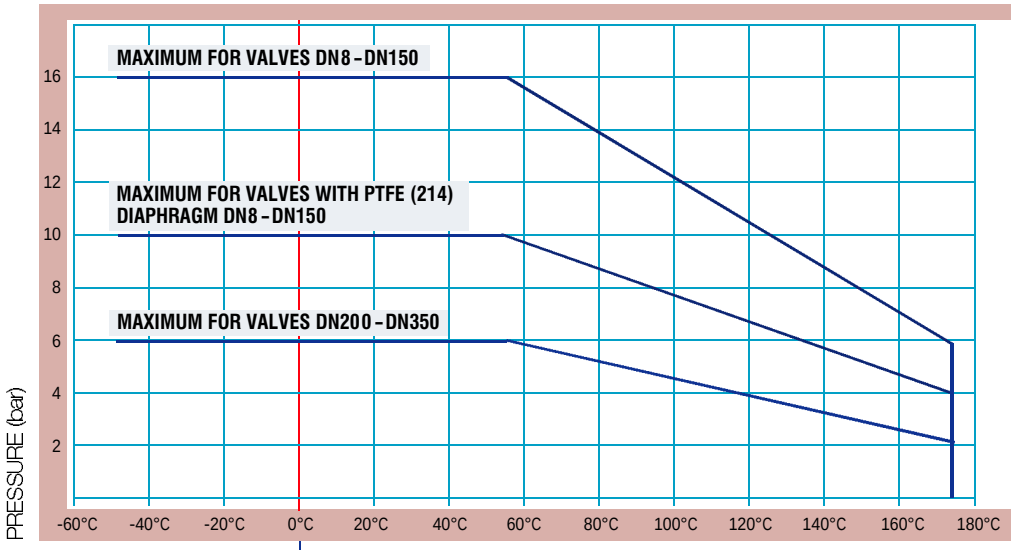
# Diaphragm Performance

## Temperature and Pressure Relationship

Diaphragm Temperature Type A (°C)

| | | |
|---|---|---|
| -5° | 214/226 | 175° |
| -20° | 214/425 & 214K/425 | 160° |
| -20° | 214/300 | 150° |
| -50° | Q | 100° |
| -20° | C & CV | 100° |
| -30° | HT | 100° |
| -5° | 226 | 150° |
| -10° | 237 & 286 | 100° |
| -40° | 300 & 300V | 130° |
| -40° | 425 & 425V | 130° |

Valve Body Temperature/Pressure Relationship




Body Temperature Limit (°C)**

| | | |
|---|---|---|
| -10° | HARD RUBBER LINED | 85° |
| -10° | POLYPROPYLENE LINED (P.P.) | 85°* |
| -10° | BUTYL RUBBER LINED | 110° |
| -10° | ETHYLENE TETRAFLUOROETHYLENE (ETFE) | 150° |
| -10° | CAST IRON: UNLINED, GLASS LINED & PTFE LINED | 175° |
| -10° | SG IRON: UNLINED AND PFA LINED | 175° |
| -30° | OTHER METALS: CARBON STEEL, STAINLESS STEEL, COPPER ALLOYS | 175° |

*Temperature bands for diaphragms are shown as a guide only. Many aspects of service 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 SGGrade EN-GJS-400-18-LT is used, minimum temperature is -20°C.*

# Saunders Diaphragm Valves

Dimensions, Weights and Standards

## Valve Standards

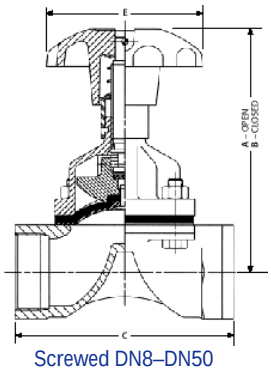
As well as being in overall lengths to EN 558-1 Series 1 and Series 7 and MSS SP88, Saunders valves are manufactured to the following standards:

| Flanges | |
|---|---|
| BRITISH | BS 10 tables D and E<br>BS 4504 tables PN10/16<br>BS 1560 Class 150 |
| EUROPEAN | EN 1092-1 PN10/16<br>EN 1092-2 PN10/16 |
| AMERICAN | ASME/ANSI B16.1 Class 125<br>ASME/ANSI B16.5 Class 150 and B16.24 Class 150 |
| JAPANESE | JIS B 2212 |

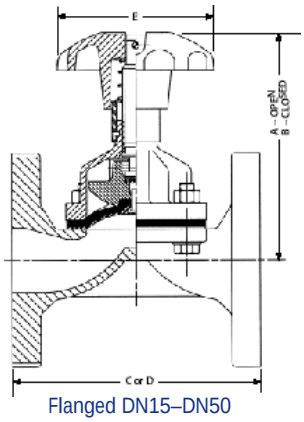
| Female screwed pipe connections | |
|---|---|
| BRITISH | BS 21 taper<br>BS 21 parallel |
| AMERICAN | API 5B |
| GERMAN | DIN 259 |
| INTERNATIONAL | ISO 7/1 taper<br>ISO 7/1 parallel |

# Saunders A Type Diaphragm Valves

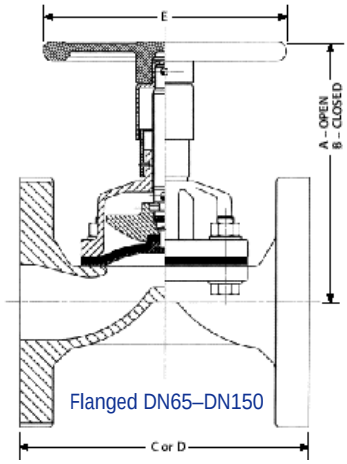
## Dimensions and Weights



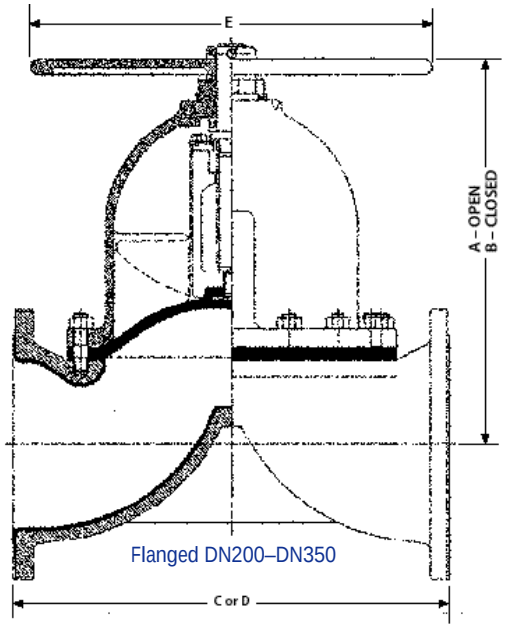

Screwed DN8–DN50




Flanged DN15–DN50




Flanged DN65–DN150




Flanged DN200–DN350

Valve Diameter (DN)

| | | 8 | 10 | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 | 250 | 300 | 350 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Screwed | **A** | 54 | 67 | 90 | 94 | 119 | 154 | 164 | 188 | – | – | – | – | – | – | – | – | – |
| | **B** | 52 | 61 | 84 | 88 | 108 | 142 | 148 | 164 | – | – | – | – | – | – | – | – | – |
| | **C** | 49 | 49 | 63.5 | 83 | 111 | 125 | 145 | 168 | – | – | – | – | – | – | – | – | – |
| | **W**eight | 0.11 | 0.15 | 0.45 | 0.90 | 1.13 | 1.80 | 2.70 | 5.00 | – | – | – | – | – | – | – | – | – |
| Flanged | **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 | – | – | – | – |
| | **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 |
| | **W**eight | – | – | 1.80 | 1.80 | 2.70 | 4.00 | 4.90 | 7.70 | 14.0 | 19.0 | 31.7 | 48.0 | 62.1 | 152 | 270 | 360 | 506 |
| Flanged Rubber Lined | **A** | – | – | – | 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 | – | – | – | – |
| | **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 |
| | **W**eight | – | – | – | 2.70 | 3.10 | 4.50 | 5.40 | 8.20 | 15.0 | 20.4 | 33.1 | 49.2 | 63.0 | 154 | 273 | 365 | 512 |
| Flanged Glass Lined | **A** | – | – | 101 | 92 | 109 | 144 | 158 | 176 | 227 | 244 | 309 | 389 | 443 | 496 | 582 | – | – |
| | **B** | – | – | 94 | 86 | 99 | 132 | 142 | 153 | 195 | 210 | 263 | 323 | 368 | – | – | – | – |
| | **C** | – | – | 110 | 119 | 129 | 148 | 161 | 192 | 218 | 256 | 307 | 358 | 408 | 523 | 637 | – | – |
| | **D** | – | – | 130 | 150 | 160 | 180 | 200 | 230 | 290 | 310 | 350 | 360 | 480 | 600 | 730 | – | – |
| | **W**eight | – | – | 1.80 | 1.80 | 3.10 | 4.50 | 5.40 | 8.20 | 14.5 | 19.5 | 32.2 | 48.5 | 62.6 | 153 | 272 | – | – |
| Flanged Plastic Lined | **A** | – | – | – | 97 | 112 | – | 162 | 176 | – | 246 | 314 | – | 450 | – | – | – | – |
| | **B** | – | – | – | 91 | 102 | – | 145 | 155 | – | 211 | 267 | – | 374 | – | – | – | – |
| | **C** | – | – | – | 123 | 133 | – | 165 | 196 | – | 260 | 311 | – | 412 | – | – | – | – |
| | **D** | – | – | – | 150 | 160 | – | 200 | 230 | – | 310 | 350 | – | 480 | – | – | – | – |
| | **W**eight | – | – | – | 2.70 | 3.10 | – | 5.40 | 8.20 | – | 20.4 | 33.1 | – | 63.0 | – | – | – | – |
| | **E** | 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 15**

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

**DN 20**

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

**DN 25**

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

**DN 32**

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

**DN 40**

| BODY MATERIAL/LINING | Cast iron | | Rubber Lined | | Glass | | Plastic Lined | |
|---|---|---|---|---|---|---|---|---|
| % Open | Cv | Kv | Cv | Kv | Cv | Kv | Cv | Kv |
| **100** | 43.00 | 36.86 | 35.00 | 30.00 | 45.00 | 38.57 | 31.00 | 26.57 |
| **90** | 41.28 | 35.40 | 34.00 | 29.14 | 43.20 | 37.03 | 29.76 | 25.51 |
| **80** | 39.56 | 33.91 | 33.6 | 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 |
| **30** | 18.05 | 15.47 | 16.00 | 13.68 | 18.89 | 16.19 | 13.01 | 11.15 |
| **20** | 12.03 | 10.31 | 9.5 | 8.14 | 12.59 | 10.79 | 8.67 | 7.43 |
| **10** | 6.01 | 5.15 | 3.9 | 3.34 | 6.29 | 5.39 | 4.33 | 3.71 |
| **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**DN 50**

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

**DN 65**

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

**DN 80**

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

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

| DN 125 | BODY MATERIAL/LINING | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Cast iron | | Rubber Lined | | Glass | | Plastic Lined | |
| % Open | Cv | Kv | Cv | Kv | Cv | Kv | Cv | Kv |
| **100** | 420 | 360 | 363 | 311 | 440 | 377 | – | – |
| **90** | 403 | 345 | 348 | 298 | 422 | 362 | – | – |
| **80** | 386 | 331 | 333 | 285 | 404 | 346 | – | – |
| **70** | 369 | 316 | 319 | 273 | 387 | 332 | – | – |
| **60** | 352 | 302 | 304 | 261 | 369 | 316 | – | – |
| **50** | 294 | 252 | 254 | 218 | 308 | 264 | – | – |
| **40** | 235 | 201 | 203 | 174 | 246 | 211 | – | – |
| **30** | 176 | 151 | 152 | 130 | 184 | 158 | – | – |
| **20** | 117 | 100 | 101 | 87 | 123 | 105 | – | – |
| **10** | 59 | 49 | 51 | 44 | 62 | 53 | – | – |
| **0** | 0 | 0 | 0 | 0 | 0 | 0 | – | – |

| DN 150 | BODY MATERIAL/LINING | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Cast iron | | Rubber Lined | | Glass | | Plastic Lined | |
| % Open | Cv | Kv | Cv | Kv | Cv | Kv | Cv | Kv |
| **100** | 605 | 519 | 484 | 415 | 630 | 540 | 505 | 433 |
| **90** | 580 | 497 | 474 | 406 | 604 | 518 | 484 | 414 |
| **80** | 556 | 477 | 465 | 399 | 579 | 496 | 464 | 398 |
| **70** | 532 | 456 | 440 | 377 | 554 | 475 | 444 | 381 |
| **60** | 508 | 435 | 402 | 345 | 529 | 453 | 424 | 363 |
| **50** | 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 200 | BODY MATERIAL/LINING | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Cast iron | | Rubber Lined | | Glass | | Plastic Lined | |
| % Open | Cv | Kv | Cv | Kv | Cv | Kv | Cv | Kv |
| **100** | 1300 | 1114 | 1309 | 1122 | 1320 | 1131 | – | – |
| **90** | 1248 | 1070 | 1256 | 1077 | 1267 | 1086 | – | – |
| **80** | 1196 | 1025 | 1204 | 1032 | 1214 | 1041 | – | – |
| **70** | 1144 | 981 | 1151 | 987 | 1161 | 995 | – | – |
| **60** | 1092 | 936 | 1099 | 942 | 1108 | 950 | – | – |
| **50** | 910 | 780 | 916 | 785 | 924 | 792 | – | – |
| **40** | 728 | 624 | 733 | 628 | 739 | 633 | – | – |
| **30** | 546 | 468 | 549 | 471 | 554 | 475 | – | – |
| **20** | 364 | 312 | 366 | 314 | 369 | 316 | – | – |
| **10** | 182 | 156 | 183 | 157 | 184 | 158 | – | – |
| **0** | 0 | 0 | 0 | 0 | 0 | 0 | – | – |

| DN 250 | BODY MATERIAL/LINING | | | | | |
|---|---|---|---|---|---|---|
| | Cast iron | | Rubber Lined | | Glass | |
| % Open | Cv | Kv | Cv | Kv | Cv | Kv |
| **100** | 1980 | 1697 | 2000 | 1714 | 2100 | 1800 |
| **90** | 1900 | 1629 | 1920 | 1646 | 2015 | 1727 |
| **80** | 1821 | 1561 | 1840 | 1577 | 1932 | 1656 |
| **70** | 1742 | 1493 | 1760 | 1509 | 1848 | 1584 |
| **60** | 1663 | 1425 | 1679 | 1439 | 1763 | 1511 |
| **50** | 1386 | 1188 | 1400 | 1200 | 1470 | 1260 |
| **40** | 1108 | 950 | 1120 | 960 | 1176 | 1008 |
| **30** | 831 | 712 | 839 | 719 | 881 | 755 |
| **20** | 554 | 475 | 560 | 480 | 588 | 504 |
| **10** | 277 | 237 | 280 | 240 | 294 | 252 |
| **0** | 0 | 0 | 0 | 0 | 0 | 0 |

| DN 300 | BODY MATERIAL/LINING | | | | | |
|---|---|---|---|---|---|---|
| | Cast iron | | Rubber Lined | | Glass | |
| % Open | Cv | Kv | Cv | Kv | Cv | Kv |
| **100** | 3700 | 3171 | 3750 | 3214 | 3880 | 3326 |
| **90** | 3552 | 3045 | 3600 | 3086 | 3724 | 3191 |
| **80** | 3404 | 2917 | 3450 | 2957 | 3569 | 3059 |
| **70** | 3256 | 2791 | 3300 | 2829 | 3414 | 2926 |
| **60** | 3107 | 2663 | 3149 | 2699 | 3259 | 2793 |
| **50** | 2590 | 2220 | 2625 | 2250 | 2716 | 2327 |
| **40** | 2072 | 1776 | 2100 | 1800 | 2172 | 1861 |
| **30** | 1553 | 1331 | 1574 | 1349 | 1629 | 1396 |
| **20** | 1036 | 888 | 1050 | 900 | 1086 | 931 |
| **10** | 518 | 444 | 525 | 450 | 543 | 465 |
| **0** | 0 | 0 | 0 | 0 | 0 | 0 |

| DN 350 | BODY MATERIAL/LINING | | | | | |
|---|---|---|---|---|---|---|
| | Cast iron | | Rubber Lined | | Glass | |
| % Open | Cv | Kv | Cv | Kv | Cv | Kv |
| **100** | 3700 | 3171 | 3750 | 3214 | 3880 | 3326 |
| **90** | 3552 | 3045 | 3600 | 3086 | 3724 | 3191 |
| **80** | 3404 | 2917 | 3450 | 2957 | 3569 | 3059 |
| **70** | 3256 | 2791 | 3300 | 2829 | 3414 | 2926 |
| **60** | 3107 | 2663 | 3149 | 2699 | 3259 | 2793 |
| **50** | 2590 | 2220 | 2625 | 2250 | 2716 | 2327 |
| **40** | 2072 | 1776 | 2100 | 1800 | 2172 | 1861 |
| **30** | 1553 | 1331 | 1574 | 1349 | 1629 | 1396 |
| **20** | 1036 | 888 | 1050 | 900 | 1086 | 931 |
| **10** | 518 | 444 | 525 | 450 | 543 | 465 |
| **0** | 0 | 0 | 0 | 0 | 0 | 0 |

*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.*

**Cv** is flow in US gpm through valve at Δ P of 1 psi
**Kv** is flow in m³/hr through valve at Δ P of 1 bar

# Saunders A Type Diaphragm Valves

## Large Valve Sizes: DN400, DN450 & DN500

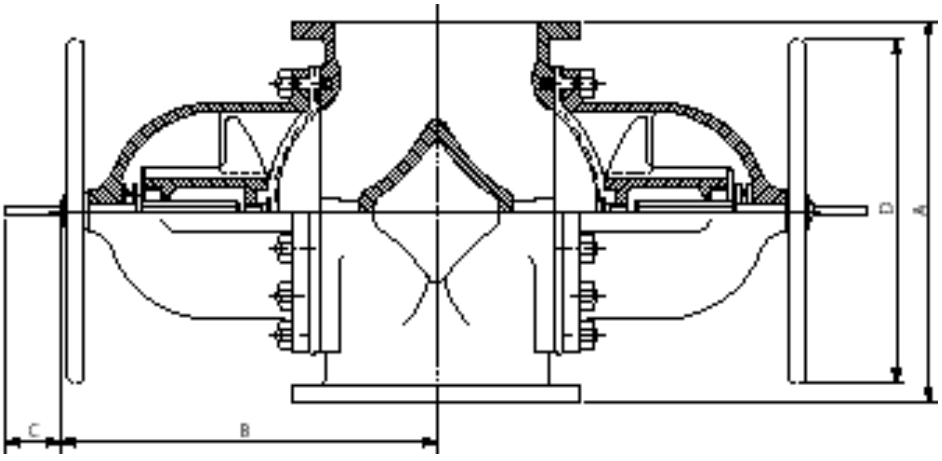
Some applications, for example, in the minerals processing and water treatment industries involving corrosive and abrasive slurries, have successfully utilised larger size Saunders diaphragm valves for many years. Double weir options are also available.

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 |

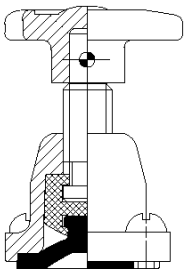
*Large A Type valves installed in a distillery*



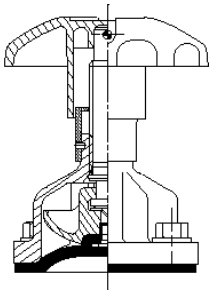

| Size DN | A | B | C (TRAVEL) | D |
|---|---|---|---|---|
| **400** | 750 | 750 | 190 | 700 |
| **450** | 750 | 750 | 190 | 700 |
| **500** | 750 | 780 | 230 | 700 |

# Manual Bonnet Options for A Type Valves

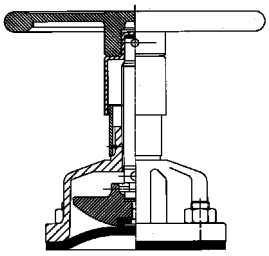
## Standard Range



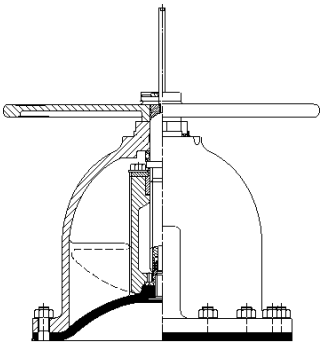
**Rising Handwheel**
Valve sizes: DN8 to DN10



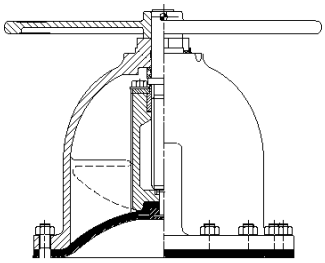
**Cast Iron Rising Handwheel Bonnet**
Valve sizes: DN15 to DN50



**Cast Iron Rising Handwheel**
Valve sizes: DN65 to DN150

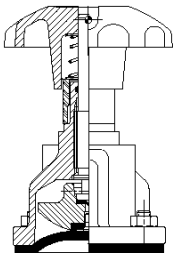


**Non-rising Handwheel with Indicator**
Valve sizes: DN200 to DN300

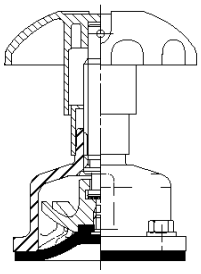


**Non-rising Handwheel without Indication**
Valve sizes: DN200 to DN350

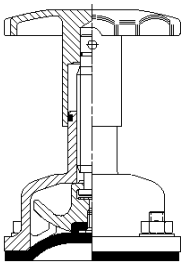
## High Performance Range



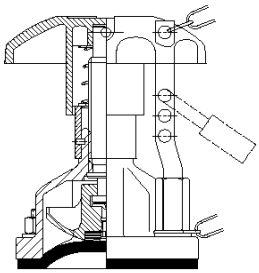
**Fluoroelastomer Sealed Bonnet**
Valve sizes: DN15 to DN150*



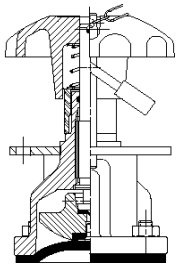
**Stainless Steel**
Valve sizes: DN15 to DN150*



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



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



**Fluoroelastomer Sealed Padlocking**
Valve sizes: DN15 to DN150*

** Handwheel is spoked design DN65 – 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 4 with body and bonnet material in SGIron*

### 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)

*Model 11 with body and bonnet material in gunmetal.*

### 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 *(American National Fire thread)* Male or female | |

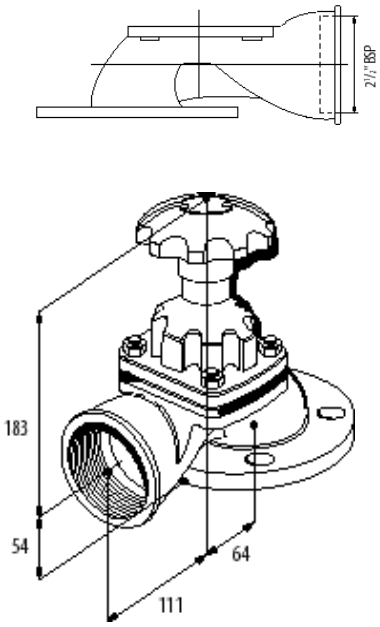
*(Other screwed and flanged connections available on request)*

*Model 4 with body and bonnet material in gunmetal.*

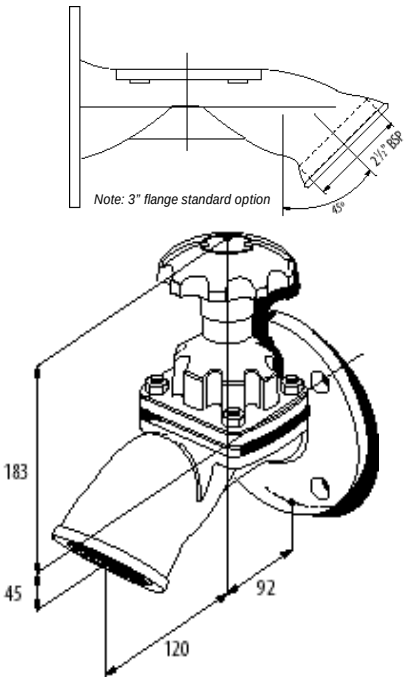
### Valve Weights (kg)

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

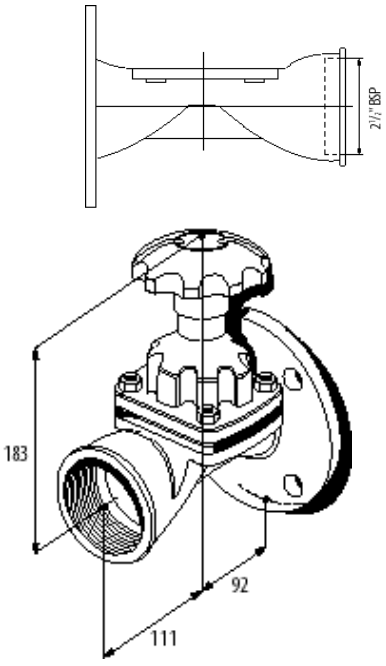
### Model 4



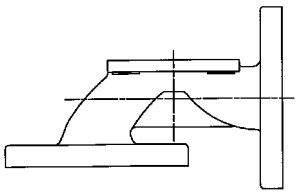

### Model 11



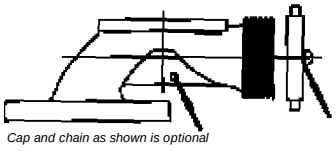

### Model 9



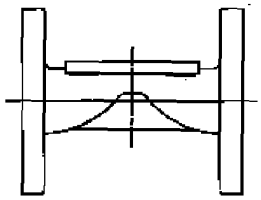

### Model 1



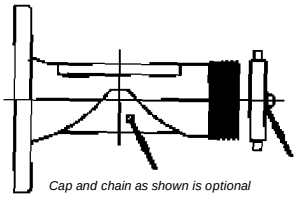
### Model 2




### Model 6



### Model 7




| SIZE | MODELS | | | | | | | BODY MATERIALS |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 4 | 6 | 7 | 9 | 11 | |
| **DN40** | – | ✓ | ✓ | – | ✓ | ✓ | – | Gunmetal |
| **DN65** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Gunmetal and SGIron |

**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.

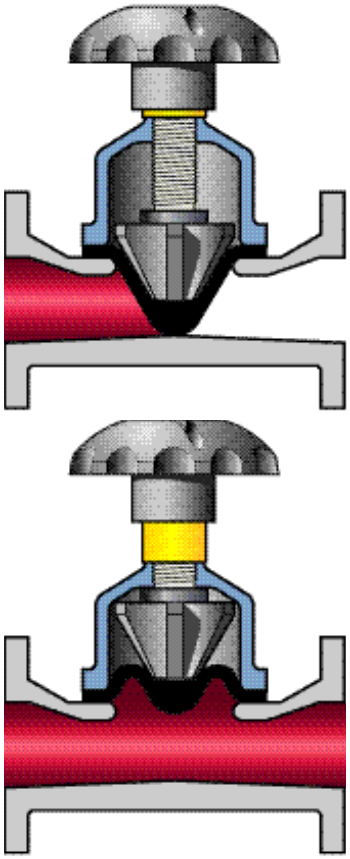
# Saunders KB Type Diaphragm Valves

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

### 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

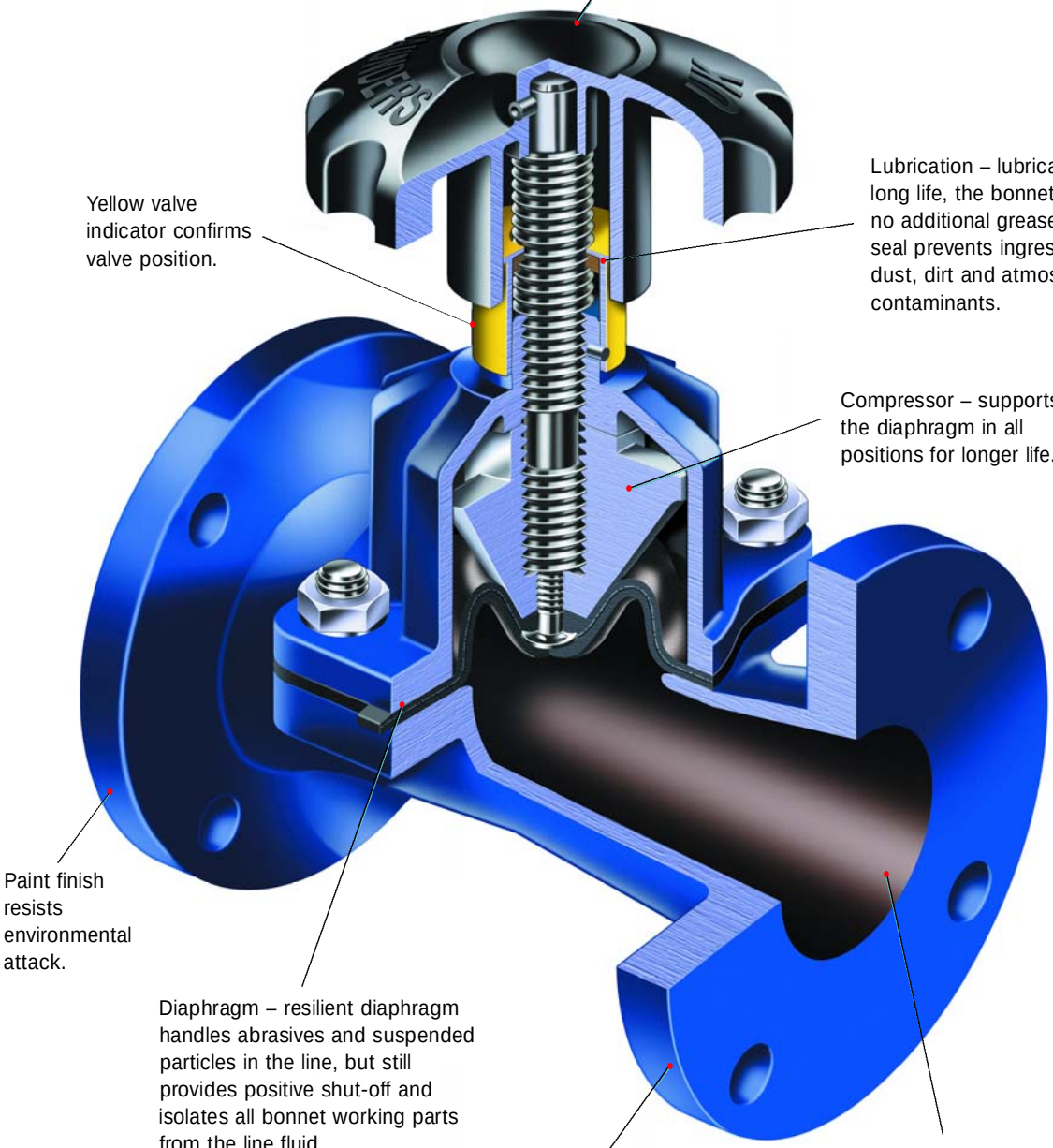
Three part design allows maintenance and actuator retrofitting without removing the valve body from the pipeline. Extended life, reliability and safety, combined with essentially simple design, result in low maintenance and low cost of ownership.

### 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



# Saunders KB Type Diaphragm Valves

## Materials of Construction

### Valve bodies

CAST IRON, GUNMETAL
Screwed DN15 – DN50

CAST IRON, GUNMETAL
Flanged DN15 – DN350*

* Contact us for materials range

### Rubber lined body data

- Soft rubber linings
  - *Natural (Polyisoprene), 40–46° IRHD*
  - *Polychloroprene, 72–78° IRHD*
  - *Butyl (Isobutylene isoprene), 60–66° IRHD*
- Hard ebonite rubber HRL, 75–85° Shore D
- Lining thickness range 2–4.5mm (DN20–DN350)

### Valve body lining – production tests

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

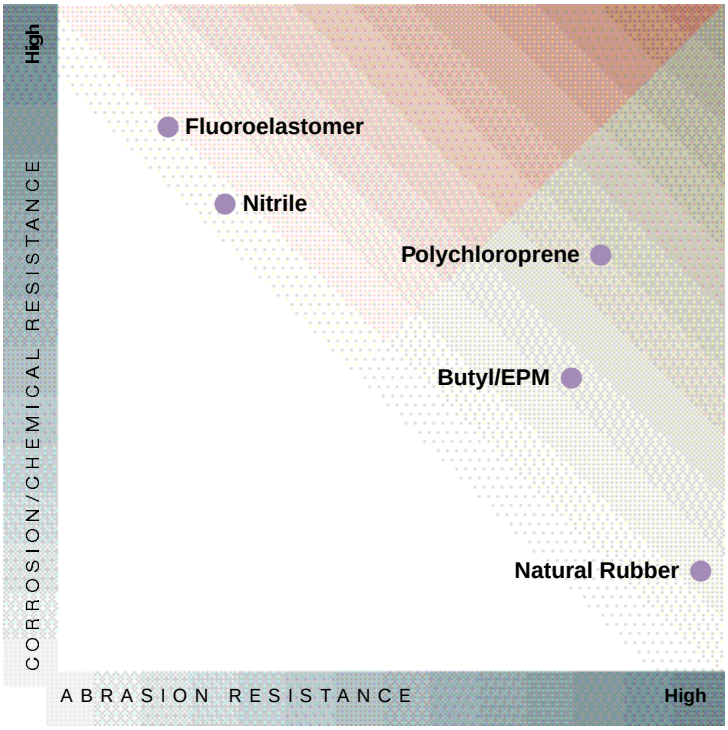
- Glass lining – *Spark test 10kV ac*
- Rubber, Butyl, Polychloroprene, Natural – *Spark test 14kV ac/dc*
- Rubber, HRL – *Spark test 17kV ac/dc*

| Material | Grade |
|---|---|
| Fluoroelastomer | 226 |
| Polychloroprene | HT |
| Nitrile | C |
| Butyl | 300 |
| EPM | 425 |
| Natural Rubber | AA |

### 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 |
| C | 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




### Type KB Valves – maximum working pressure in bar

| 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 | | | | |

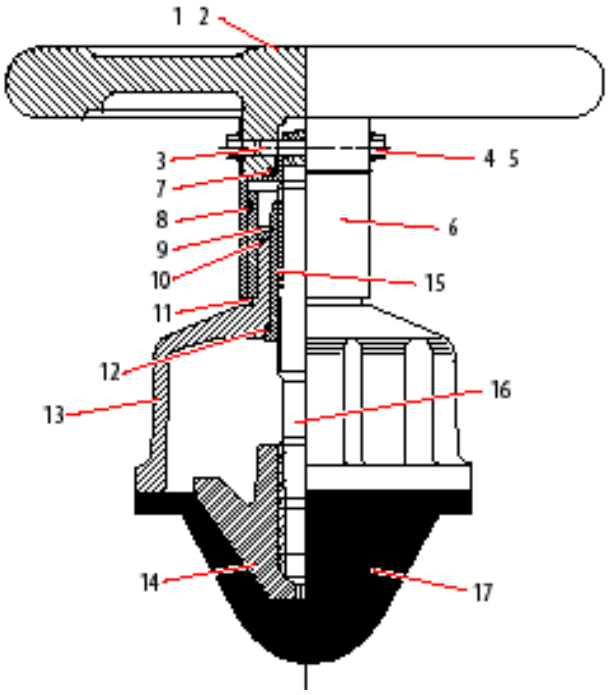
*Maximum working pressure for KB valves shown is for manual valves, defined as the maximum line pressure against which valves may be operated to closed position up to and including 55°C. For ESactuators, please refer to appropriate actuator performance selection technical data sheets.*

# 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 rese
- '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

MATERIALS 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 | CIRCLIP | Steel | |
| 10 | 'O' RING | Nitrile | |
| 11 | BONNET SLEEVE | Aquanyl | Yellow |
| 12 | 'O' RING | Nitrile | |
| 13 | BONNET | Cast Iron | Epoxy paint |
| 14 | COMPRESSOR | Cast Iron | Phosphate |
| 15 | BONNET INSERT | Carbon Steel | Phosphate |
| 16 | SPINDLE | Carbon Steel | Phosphate |
| 17 | DIAPHRAGM | As specified | |

# Saunders KB Type Diaphragm Valves

## Flow Co-efficients of Valve Range Cv (Kv)

| DN 25 | BODY MATERIAL/LINING | | | | | |
|---|---|---|---|---|---|---|
| | Cast iron | | Rubber 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 |
| 30 | 14.00 | 12.00 | 11.30 | 9.70 | 14.40 | 12.30 |
| 20 | 9.10 | 7.80 | 7.30 | 6.30 | 9.40 | 8.10 |
| 10 | 4.50 | 3.86 | 3.70 | 3.20 | 4.70 | 4.00 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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

| DN 65 | BODY MATERIAL/LINING | | | | | |
|---|---|---|---|---|---|---|
| | Cast iron | | Rubber Lined | | Glass | |
| % Open | Cv | Kv | Cv | Kv | Cv | Kv |
| 100 | 238 | 204 | 195 | 167 | 254 | 218 |
| 90 | 221 | 189 | 181 | 155 | 236 | 202 |
| 80 | 202 | 173 | 166 | 142 | 216 | 185 |
| 70 | 183 | 157 | 150 | 129 | 196 | 168 |
| 60 | 167 | 143 | 136 | 117 | 178 | 153 |
| 50 | 143 | 123 | 117 | 100 | 152 | 130 |
| 40 | 119 | 102 | 97 | 83 | 127 | 109 |
| 30 | 88 | 75 | 72 | 62 | 94 | 81 |
| 20 | 57 | 49 | 47 | 40 | 61 | 52 |
| 10 | 29 | 25 | 23 | 19 | 20 | 26 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| DN 80 | BODY MATERIAL/LINING | | | | | |
|---|---|---|---|---|---|---|
| | Cast iron | | Rubber Lined | | 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 |
| 30 | 122 | 105 | 98 | 84 | 127 | 109 |
| 20 | 79 | 68 | 63 | 54 | 82 | 70 |
| 10 | 40 | 34 | 32 | 27 | 41 | 35 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| DN 100 | BODY MATERIAL/LINING | | | | | |
|---|---|---|---|---|---|---|
| | Cast iron | | Rubber Lined | | Glass | |
| % 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 125 | BODY MATERIAL/LINING | | | | | |
|---|---|---|---|---|---|---|
| | Cast iron | | Rubber Lined | | Glass | |
| % 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 150 | BODY MATERIAL/LINING | | | | | |
|---|---|---|---|---|---|---|
| | Cast iron | | Rubber Lined | | Glass | |
| % 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 200 | BODY MATERIAL/LINING | | | | | |
|---|---|---|---|---|---|---|
| | Cast iron | | Rubber Lined | | Glass | |
| % Open | Cv | Kv | Cv | Kv | Cv | Kv |
| 100 | 2580 | 2211 | 2196 | 1882 | 2724 | 2335 |
| 90 | 2399 | 2056 | 2042 | 1750 | 2533 | 2171 |
| 80 | 2193 | 1880 | 1867 | 1600 | 2315 | 1985 |
| 70 | 1987 | 1703 | 1691 | 1449 | 2097 | 1797 |
| 60 | 1806 | 1548 | 1537 | 1318 | 1907 | 1634 |
| 50 | 1548 | 1327 | 1318 | 1130 | 1634 | 1401 |
| 40 | 1290 | 1106 | 1098 | 941 | 1362 | 1167 |
| 30 | 955 | 819 | 813 | 697 | 1008 | 864 |
| 20 | 619 | 531 | 527 | 452 | 653 | 560 |
| 10 | 310 | 266 | 264 | 226 | 327 | 280 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |

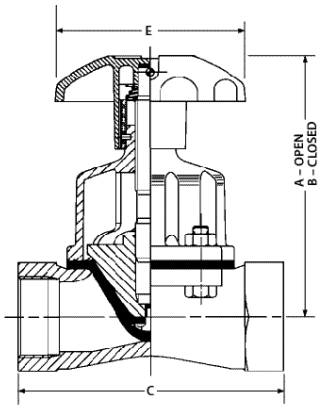
**Cv** is flow in US gpm through valve at Δ P of 1 psi

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

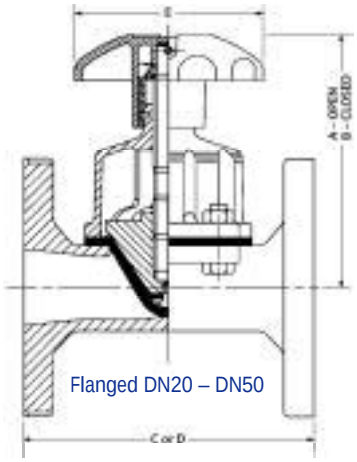
*For sizes DN15, 32 and 40, please contact customer service department for details.*

# Saunders KB Type Diaphragm Valves

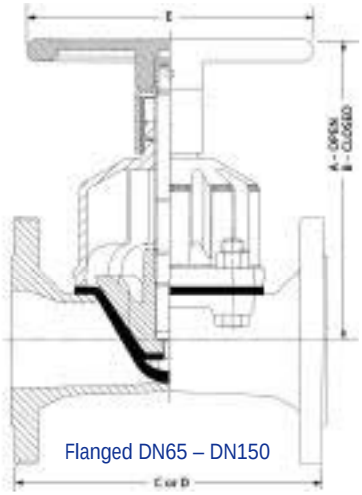
## Valve Dimensions and Weights



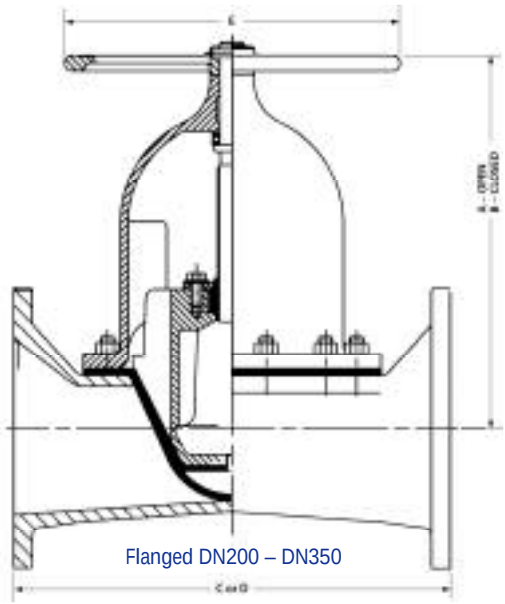

Screwed DN15 – DN50




Flanged DN20 – DN50




Flanged DN65 – DN150




Flanged DN200 – DN350

Valve Diameter (DN)

| | | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 | 250 | 300 | 350 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Screwed** | **A** | 106 | – | 166 | – | 166 | 182 | – | – | – | – | – | – | – | – | – |
| | **B** | 98 | – | 159 | – | 159 | 162 | – | – | – | – | – | – | – | – | – |
| | **C** | 63.5 | – | 111 | – | 143 | 168 | – | – | – | – | – | – | – | – | – |
| | **W**eight | 0.82 | – | 2.0 | – | 2.7 | 4.8 | – | – | – | – | – | – | – | – | – |
| **Flanged** | **A** | 105 | 105 | 165 | 165 | 165 | 176 | 234 | 270 | 313 | 335 | 435 | 406 | 557 | 628 | 665 |
| | **B** | 97 | 97 | 159 | 159 | 159 | 156 | 210 | 238 | 277 | 293 | 379 | – | – | – | – |
| | **C** | 108 | 117 | 127 | 146 | 159 | 190 | 216 | 254 | 305 | 356 | 406 | 521 | 635 | 749 | 980 |
| | **D** | 130 | 150 | 160 | 180 | 200 | 230 | 290 | 310 | 350 | 400 | 480 | 600 | 730 | 850 | 980 |
| | **W**eight | 2.02 | 2.31 | 4.12 | 4.35 | 5.45 | 10.2 | 11.2 | 17.9 | 31.4 | 46.2 | 67.3 | 109 | 195 | 294 | 462 |
| **Flanged Rubber Lined** | **A** | – | – | 168 | 168 | 168 | 176 | 234 | 270 | 313 | 335 | 435 | 408 | 559 | 630 | 667 |
| | **B** | – | – | 162 | 162 | 162 | 156 | 210 | 238 | 277 | 293 | 379 | – | – | – | – |
| | **C** | – | – | 131 | 150 | 163 | 194 | 220 | 258 | 309 | 362 | 412 | 527 | 641 | 755 | 986 |
| | **D** | – | – | 160 | 180 | 200 | 230 | 290 | 310 | 350 | 400 | 480 | 600 | 730 | 850 | 980 |
| | **W**eight | – | – | 4.22 | 5.65 | 7.45 | 10.5 | 11.6 | 21.9 | 34.4 | 46.2 | 74.3 | 127 | 204 | 294 | 465 |
| **Flanged Glass Lined** | **A** | – | 106 | 166 | 166 | 166 | 177 | 235 | 271 | 314 | 336 | 436 | 407 | 558 | 629 | 666 |
| | **B** | – | 98 | 160 | 160 | 160 | 157 | 211 | 239 | 278 | 294 | 380 | – | – | – | – |
| | **C** | – | 119 | 133 | 148 | 165 | 196 | 222 | 260 | 311 | 364 | 414 | 523 | 637 | 751 | 982 |
| | **D** | – | 150 | 160 | 180 | 200 | 230 | 290 | 310 | 350 | 400 | 480 | 600 | 730 | 850 | 980 |
| | **W**eight | – | 2.52 | 4.2 | 5.05 | 6.95 | 10.3 | 11.4 | 20.3 | 33.9 | 46.1 | 71.6 | 118 | 201 | 294 | 462 |
| | **E** | 80 | 80 | 120 | 120 | 120 | 120 | 170 | 230 | 280 | 280 | 368 | 368 | 483 | 584 | 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).

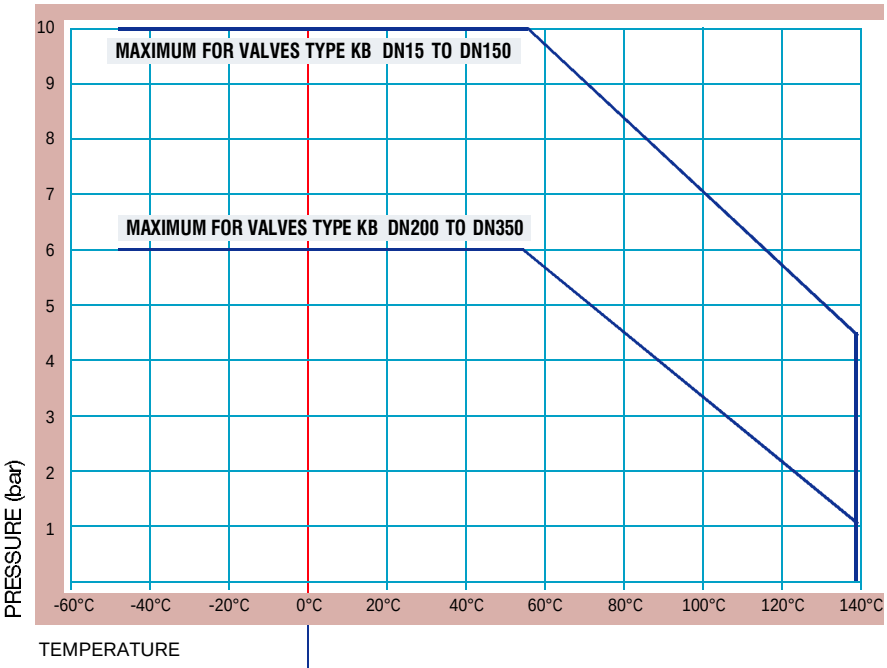
# Saunders KB Type Diaphragm Valve Performance

Temperature and Pressure Relationship

Diaphragm Temperatures Type KB (°C)

| | | |
|---|---|---|
| -40° | AA | 90° |
| -10° | C | 90° |
| -20° | HT | 90° |
| -5° | 226 | 120° |
| -20° | 300 | 100° |
| -40° | 425 | 100° |

Valve Body Temperature/Pressure Relationship




Body Temperature Limit (°C)

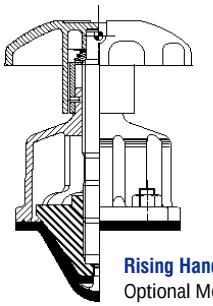
| | | |
|---|---|---|
| -10° | CAST IRON | 120° |
| -30° | STAINLESS STEEL /COPPER ALLOYS | 120° |
| -10° | GLASS LINED | 120° |
| -10° | HARD RUBBER LINED | 85° |
| -10° | SOFT NATURAL RUBBER LINED | 85° |
| -10° | BUTYL LINED | 110° |
| -10° | POLYCHLOROPRENE LINED | 105° |

*For whole manual valves refer to 2/KB/005/UK/REV1 and for ES actuated valves refer to appropriate performance graphs.*

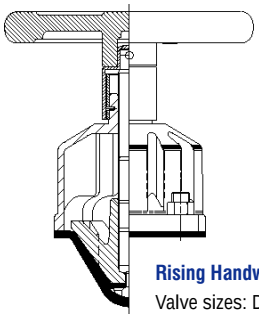
# Saunders KB Type Diaphragm Valves

Typical Bonnet Options for Manual KB Valves

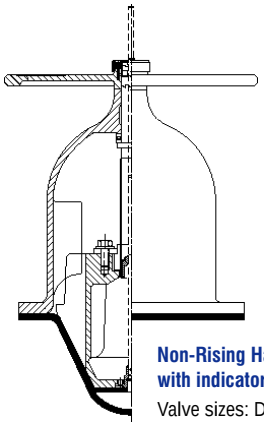
## Standard Range



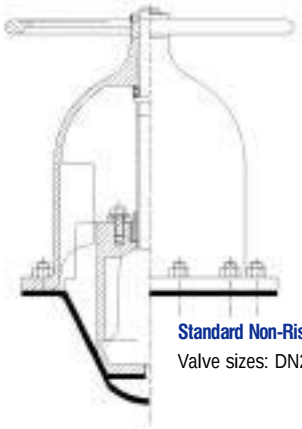
**Rising Handwheel Indicator**
Optional Metal Handwheel
Valve sizes: DN15 to DN50



**Rising Handwheel Indicator**
Valve sizes: DN65 to DN150

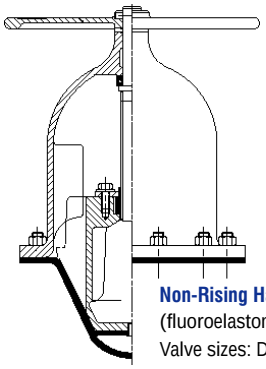


**Non-Rising Handwheel with indicator**
Valve sizes: DN200 to DN300

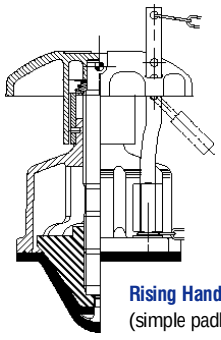


**Standard Non-Rising Handwheel**
Valve sizes: DN200 to DN350

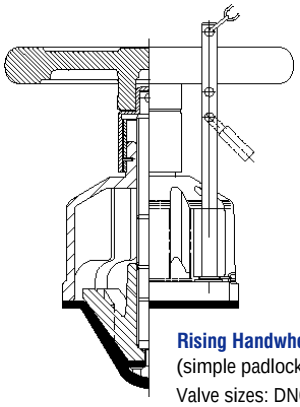
## High Performance Range



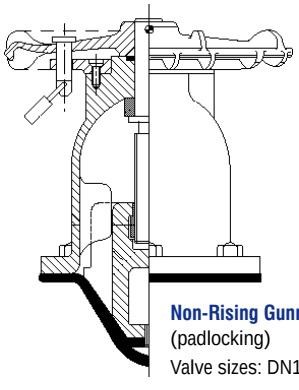
**Non-Rising Handwheel**
(fluoroelastomer sealed)
Valve sizes: DN15 to DN300



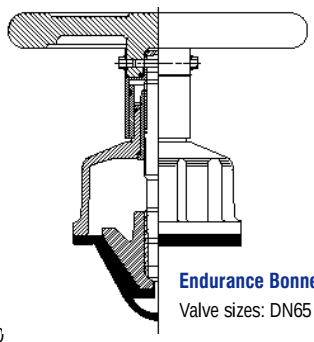
**Rising Handwheel Indicator**
(simple padlocking)
Valve sizes: DN15 to DN50



**Rising Handwheel Indicator**
(simple padlocking)
Valve sizes: DN65 to DN150



**Non-Rising Gunmetal LG4**
(padlocking)
Valve sizes: DN15 to DN200



**Endurance Bonnet**
Valve sizes: DN65 to DN150

# 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 Actuator*

*EC Actuator mounted on A Type PFA lined valve*

### SSC

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

Size range 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.

*ECX Actuator with switchbox and integral solenoid*

# Pneumatic Valve Actuation

## EV and ES Actuators

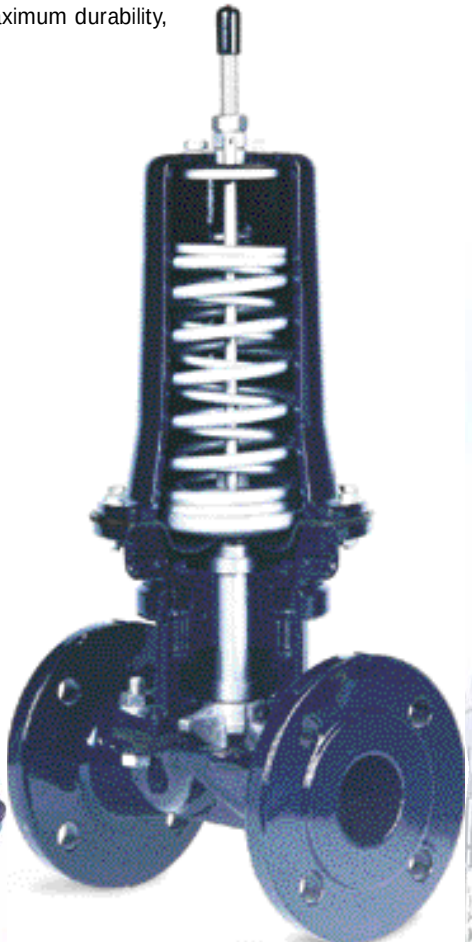
The EV/ES actuator offers efficient mechanical/pneumatic control of the diaphragm, allowing remote and automated operation.

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.

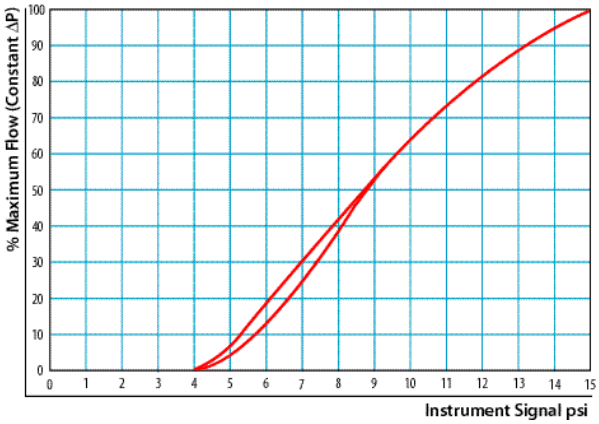
*ESspring close*



*EVspring close*

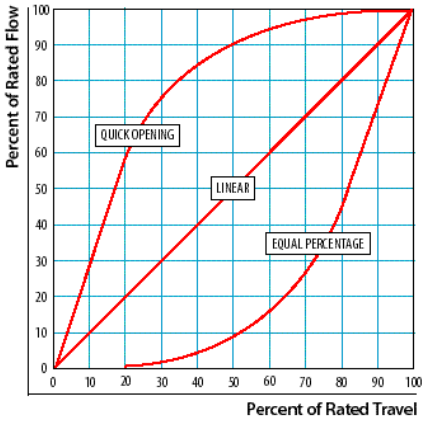
# Pneumatic Valve Actuation

## 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.




*Diaphragm valve characteristic curves*

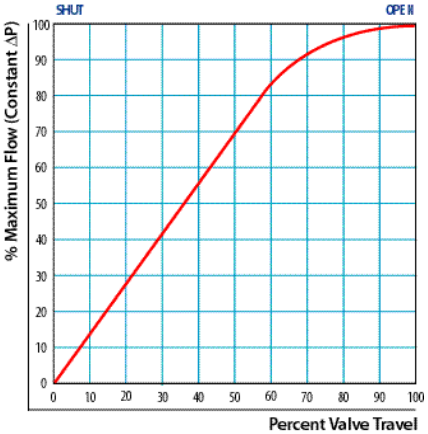
Rangeability (ratio of maximum flow vs. minimum control flow) of Saunders weir type valves is 35:1 extending beyond the range of most process and service control systems.

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

Pressure recovery factor = 0.7.




*% flow/% travel, weir type diaphragm valve*

*Actuator with digital foundation fieldbus positioner*

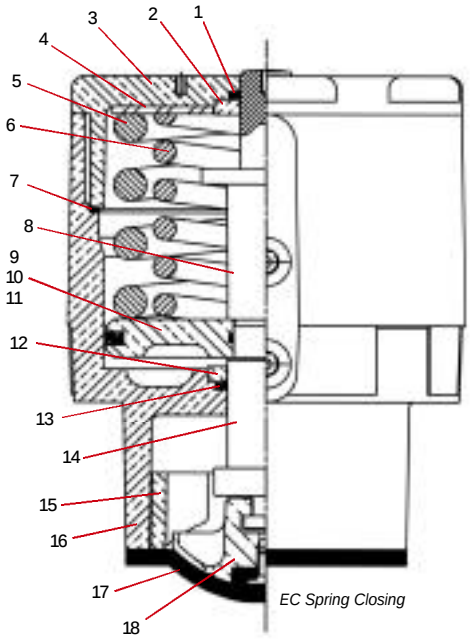
TECHNICAL DATA

# EC Pneumatic Actuators DN8 – DN50

## Materials of Construction

**MATERIALS OF CONSTRUCTION EC/SC**

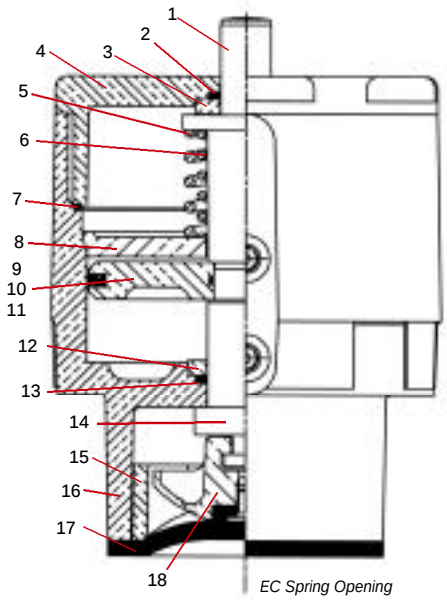
| Item | Component | Material |
|---|---|---|
| 1 | Indicator seal | Fluoroelastomer |
| 2 | Cap washer | PES (DN8-DN25) IXEF (DN40-DN50) |
| 3 | Cap | PES (DN8-DN25) IXEF (DN40-DN50) |
| 4 | Loading plate | Mild steel |
| 5 | Outer spring | Steel |
| 6 | Inner spring | Steel |
| 7 | Bonnet cap 'O' ring | Nitrile |
| 8 | Indicator | IXEF |
| 9 | Outer piston seal | Fluoroelastomer |
| 10 | Piston | PES (DN8-DN25) IXEF (DN40-DN50) |
| 11 | Inner piston seal | Nitrile |
| 12 | Bonnet washer | PES |
| 13 | Spindle seal | Fluoroelastomer |
| 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), Silicon Aluminium (DN15-DN50) |



*EC Spring Closing*

**MATERIALS OF CONSTRUCTION EC/SO**

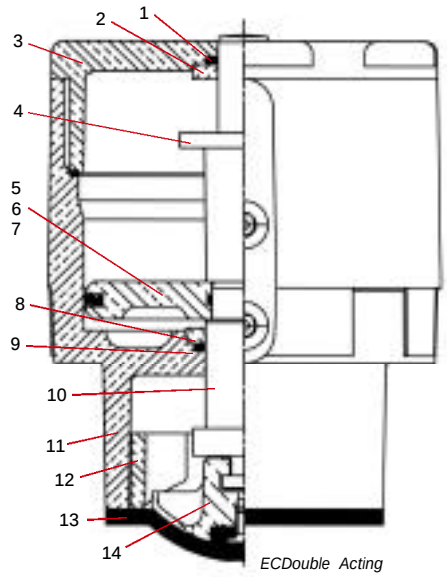
| Item | Component | Material |
|---|---|---|
| 1 | Indicator | IXEF |
| 2 | Indicator seal | Fluoroelastomer |
| 3 | Cap washer | PES (DN8-DN25) IXEF (DN40-DN50) |
| 4 | Cap | PES (DN8-DN25) IXEF (DN40-DN50) |
| 5 | Outer spring | Steel |
| 6 | Inner spring | Steel |
| 7 | Bonnet cap 'O' ring | Nitrile |
| 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) |



*EC Spring Opening*

**MATERIALS OF CONSTRUCTION EC/DA**

| Item | Component | Material |
|---|---|---|
| 1 | Indicator seal | Fluoroelastomer |
| 2 | Cap washer | PES (DN8-DN25) IXEF (DN40-DN50) |
| 3 | Cap | 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) |



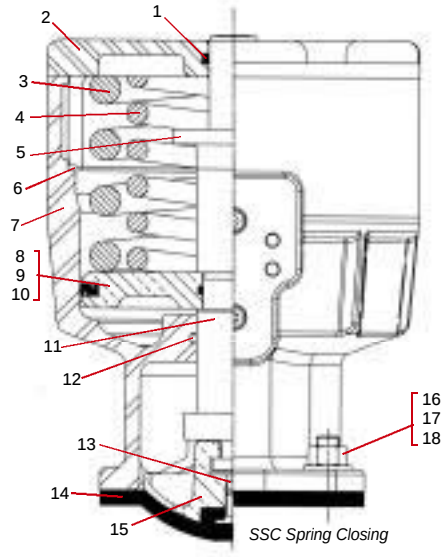
*ECDouble Acting*

TECHNICAL DATA

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

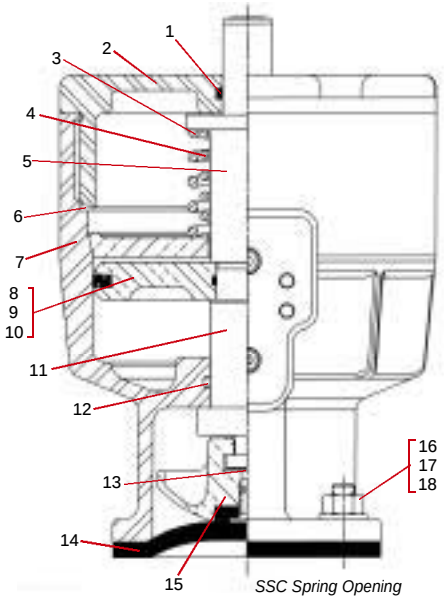
## Materials of Construction

| MATERIALS OF CONSTRUCTION SSC/SC | | |
|---|---|---|
| Item | Component | Material |
| 1 | Indicator seal | Viton |
| 2 | Cap | Stainless Steel |
| 3 | Outer spring | Steel |
| 4 | Inner spring | Steel |
| 5 | Indicator | IXEF |
| 6 | Bonnet cap 'O' ring | Nitrile |
| 7 | Bonnet | Stainless Steel |
| 8 | Outer piston seal | Fluoroelastomer |
| 9 | Piston inner 'O' ring | Nitrile |
| 10 | Piston | PES (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 |



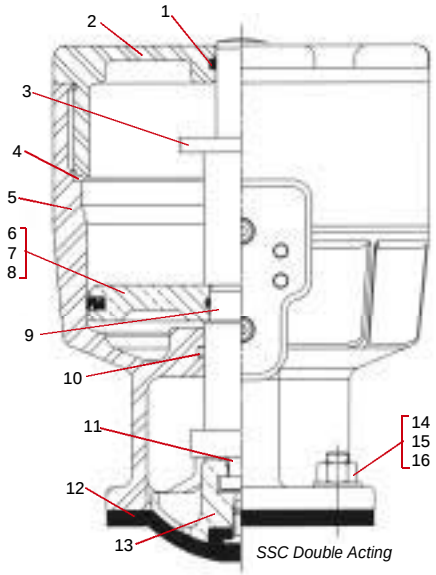
*SSC Spring Closing*

| MATERIALS OF CONSTRUCTION SSC/SO | | |
|---|---|---|
| Item | Component | Material |
| 1 | Indicator seal | Viton |
| 2 | Cap | Stainless Steel |
| 3 | Outer spring | Steel |
| 4 | Inner spring | Steel |
| 5 | Indicator | IXEF |
| 6 | Bonnet cap 'O' ring | Nitrile |
| 7 | Bonnet | Stainless Steel |
| 8 | Outer piston seal | Fluoroelastomer |
| 9 | Piston inner 'O' ring | Nitrile |
| 10 | Piston | PES (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 |



*SSC Spring Opening*

| MATERIALS OF CONSTRUCTION SSC/DA | | |
|---|---|---|
| Item | Component | Material |
| 1 | Indicator seal | Viton |
| 2 | Cap | Stainless Steel |
| 3 | Indicator | IXEF |
| 4 | Bonnet cap 'O' ring | Nitrile |
| 5 | Bonnet | Stainless Steel |
| 6 | Outer piston seal | Fluoroelastomer |
| 7 | Piston inner 'O' ring | Nitrile |
| 8 | Piston | PES (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 |



*SSC Double Acting*

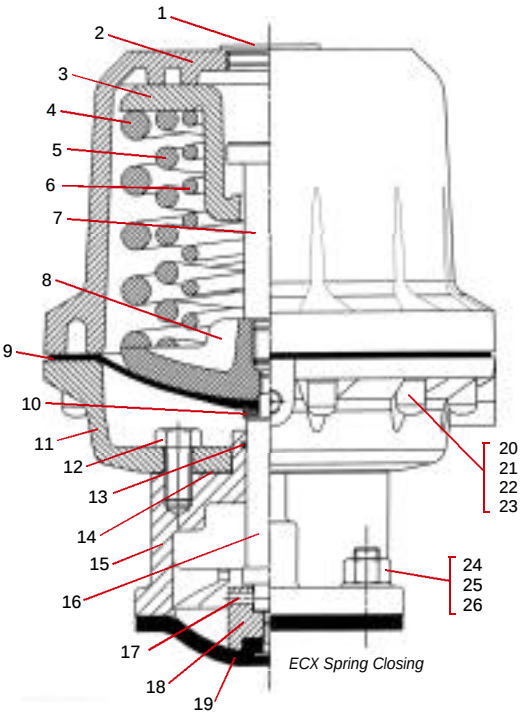
TECHNICAL DATA

# ECX Pneumatic Actuators DN65 – DN150

## Materials of Construction

**MATERIALS OF CONSTRUCTION ECX/SC**

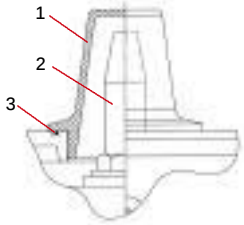
| Item | Component | Material |
|---|---|---|
| 1 | Plug | Polyethylene |
| 2 | Cover | Silicon aluminium |
| 3 | Upper spring plate | SGiron |
| 4 | Outer spring | Steel |
| 5 | Middle spring | Steel |
| 6 | Inner spring | Steel |
| 7 | Spring retaining bolt | Mild steel |
| 8 | Diaphragm plate | Forged 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, PTFE/rubber |
| 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 |
| 24 | Body/bonnet washer | Stainless steel |



*ECX Spring Closing*

**MATERIALS OF CONSTRUCTION INDICATOR**

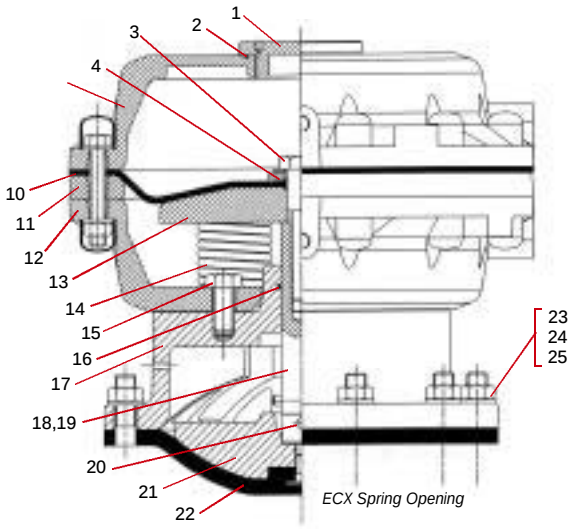
| Item | Component | Material |
|---|---|---|
| 1 | Indicator cover | Polycarbonate |
| 2 | Indicator | Polycarbonate |
| 3 | Indicator 'O' ring | Rubber |



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

**MATERIALS OF CONSTRUCTION ECX/SO**

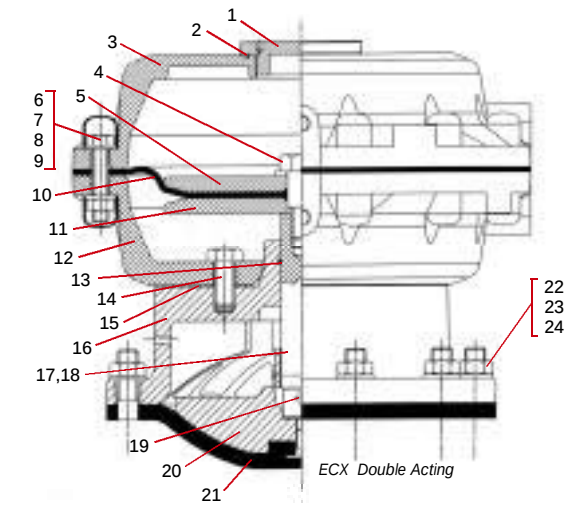
| Item | Component | Material |
|---|---|---|
| 1 | Cover plug | Mild steel |
| 2 | Cover plug 'O' ring | Rubber |
| 3 | Spindle screw | Steel |
| 4 | Clamp washer | Mild steel |
| 5 | Upper cylinder | Silicon aluminium |
| 6 | Screw cover | PE |
| 7 | Cylinder screw | Steel |
| 8 | Cylinder nut | Steel |
| 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, PTFE/rubber |
| 23 | Body/bonnet nut | Stainless steel |
| 24 | Body/bonnet stud | Stainless steel |
| 25 | Body/bonnet washer | Stainless steel |



*ECX Spring Opening*

**MATERIALS OF CONSTRUCTION ECX/DA**

| Item | Component | Material |
|---|---|---|
| 1 | Cover plug | Mild 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, PTFE/rubber |
| 22 | Body/bonnet nut | Stainless steel |
| 23 | Body/bonnet stud | Stainless steel |
| 24 | Body/bonnet washer | Stainless steel |

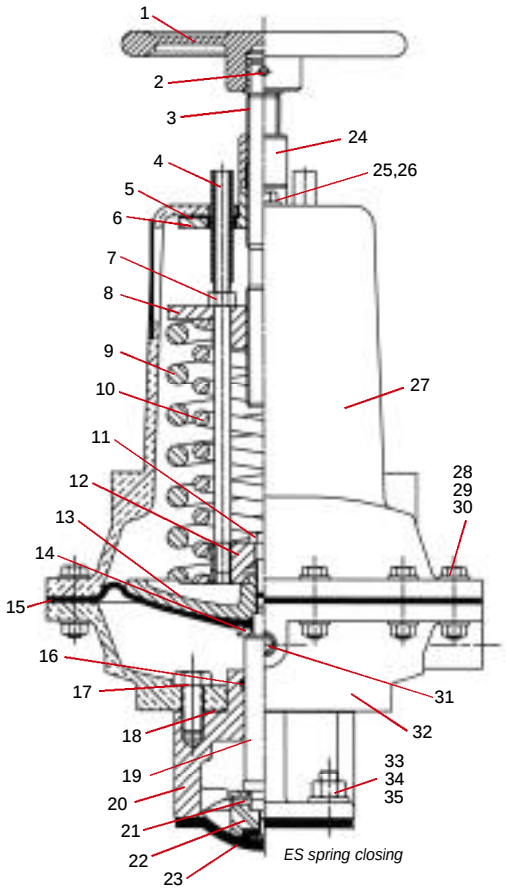


*ECX Double Acting*

TECHNICAL DATA

# ES Pneumatic Actuation DN15 – DN200

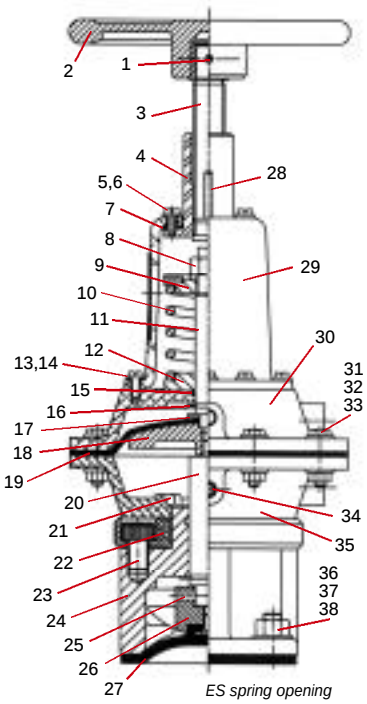
## Materials of Construction




*ES spring closing*

**MATERIALS OF CONSTRUCTION ES (SC)**

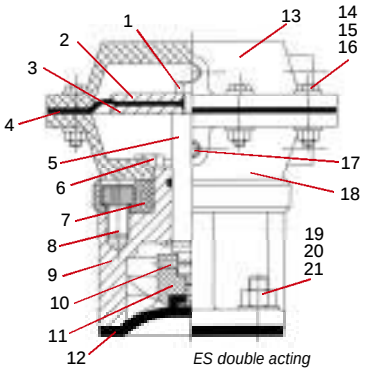
| Item | Component | Material |
|---|---|---|
| 1 | Handwheel pin | Steel |
| 2 | Handwheel | Cast iron |
| 3 | Spindle | Mild steel |
| 4 | Lifting rod | Mild steel |
| 5 | Wiper seal | PVC |
| 6 | Reinforcing plate | Forged steel |
| 7 | Lifting rod locknut | Steel |
| 8 | Upper spring plate | Mild steel |
| 9 | Outer spring | Steel |
| 10 | Inner spring | Steel |
| 11 | Lifting plate screw | Steel |
| 12 | Lifting plate | Mild steel |
| 13 | Diaphragm plate | Forged steel |
| 14 | Clamp washer | Mild steel |
| 15 | Operating diaphragm | Rubber |
| 16 | Bonnet 'O' ring | Rubber |
| 17 | Cylinder bonnet screw | Steel |
| 18 | Cylinder bonnet joint | Klingersil |
| 19 | Spindle | Stainless steel |
| 20 | Bonnet | Cast Iron |
| 21 | Compressor pin | Steel |
| 22 | Compressor | Cast iron |
| 23 | Line Diaphragm | Rubber, Rubber/PTFE |
| 24 | Locking bush | Mild steel |
| 25 | Reinforcing plate screw | Steel |
| 26 | Reinforcing plate washer | Steel |
| 27 | Cover | Silicon aluminium |
| 28 | Cylinder/cover nut | Steel |
| 29 | Cylinder/cover bolt | Steel |
| 30 | Cylinder/cover washer | Steel |
| 31 | Cylinder plug | Malleable iron |
| 32 | Lower cylinder | Silicon aluminium |
| 33 | Body/bonnet nut | Stainless steel |
| 34 | Body/bonnet bolt/stud | Stainless steel |
| 35 | Body/bonnet washer | Stainless steel |




*ES spring opening*

**MATERIALS OF CONSTRUCTION ES (SO)**

| Item | Component | Material |
|---|---|---|
| 1 | Handwheel pin | Steel |
| 2 | Handwheel | Cast iron |
| 3 | Handwheel spindle | Mild steel |
| 4 | Spindle bush | Mild steel |
| 5 | Spindle bush screw | Steel |
| 6 | Spindle bush washer | Steel |
| 7 | Cover seal | PVC |
| 8 | Adjusting screw locknut | Steel |
| 9 | Upper spring plate | Mild steel |
| 10 | Spring | Steel |
| 11 | Adjusting screw | Steel |
| 12 | Lower spring plate | Mild steel |
| 13 | Cylinder/cover screw | Steel |
| 14 | Cylinder/cover washer | Steel |
| 15 | Cylinder 'O' ring | Steel |
| 16 | Clamp washer | Mild steel |
| 17 | Diaphragm plate | Forged steel |
| 18 | Operating diaphragm | Rubber |
| 19 | Spindle | Stainless steel |
| 20 | Cylinder/adaptor screw | Steel |
| 21 | Bonnet adaptor | Mild steel |
| 22 | Bonnet/adaptor screw | Steel |
| 23 | Bonnet | Cast Iron |
| 24 | Compressor pin | Steel |
| 25 | Compressor | Cast iron |
| 26 | Line Diaphragm | Rubber, Rubber/PTFE |
| 27 | Indicator | Mild steel |
| 28 | Cover | Silicon aluminium |
| 29 | Upper cylinder | Silicon aluminium |
| 30 | Cylinder nut | Steel |
| 31 | Cylinder bolt | Steel |
| 32 | Cylinder washer | Steel |
| 33 | Cylinder plug | Malleable iron |
| 34 | Lower cylinder | Silicon aluminium |
| 35 | Body/bonnet nut | Stainless steel |
| 36 | Body/bonnet bolt/stud | Stainless steel |
| 37 | Body/bonnet washer | Stainless steel |




*ES double acting*

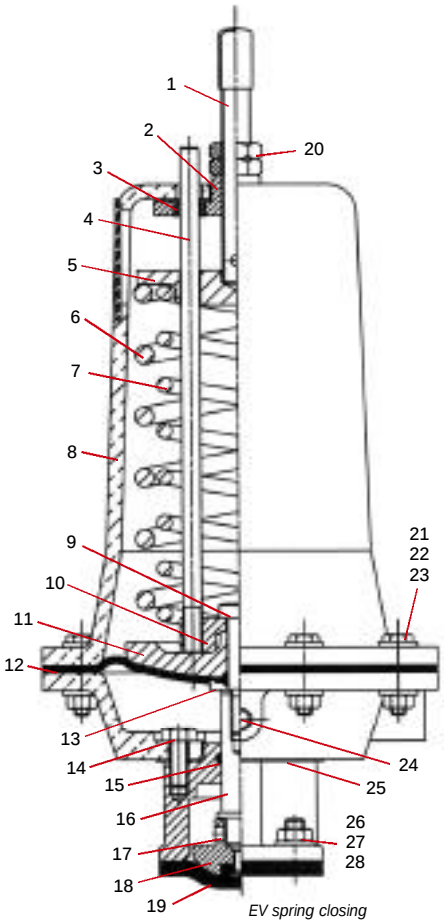
**MATERIALS OF CONSTRUCTION ES (DA)**

| Item | Component | Material |
|---|---|---|
| 1 | Diaphragm plate screw | Steel |
| 2 | Upper diaphragm plate | Mild steel |
| 3 | Lower diaphragm plate | Mild steel |
| 4 | Operating diaphragm | Rubber |
| 5 | Spindle | Stainless steel |
| 6 | Cylinder/adaptor screw | Steel |
| 7 | Bonnet adaptor | Mild steel |
| 8 | Bonnet/adaptor screw | Steel |
| 9 | Bonnet | Cast Iron |
| 10 | Compressor pin | Steel |
| 11 | Compressor | Cast iron |
| 12 | Line Diaphragm | Rubber, Rubber/PTFE |
| 13 | Upper cylinder | Silicon aluminium |
| 14 | Cylinder nut | Steel |
| 15 | Cylinder bolt | Steel |
| 16 | Cylinder washer | Steel |
| 17 | Cylinder plug | Malleable iron |
| 18 | Lower cylinder | Silicon aluminium |
| 19 | Body/bonnet nut | Stainless steel |
| 20 | Body/bonnet bolt/stud | Stainless steel |
| 21 | Body/bonnet washer | Stainless steel |

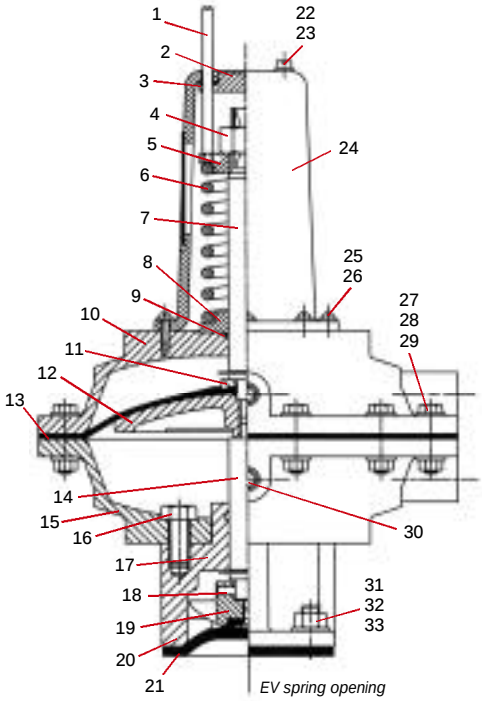
TECHNICAL DATA

# EV Pneumatic Actuation DN15 – DN200

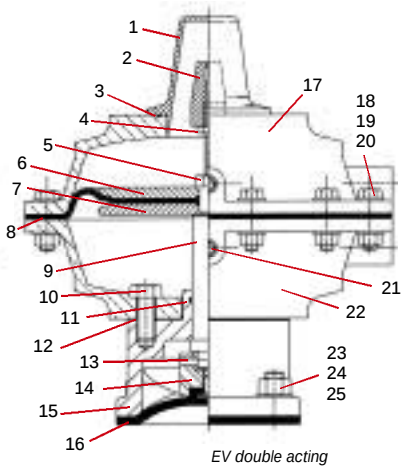
## Materials of Construction




*EV spring closing*




*EV spring opening*




*EV double acting*

**MATERIALS OF CONSTRUCTION EV (SC)**

| Item | Component | Material |
|---|---|---|
| 1 | Spring adjusting spindle | Steel |
| 2 | Reinforcing plate | Forged steel |
| 3 | Wiper seal | PVC |
| 4 | Indicator rod | Steel |
| 5 | Upper spring plate | Forged steel |
| 6 | Outer spring | Steel |
| 7 | Inner spring | Steel |
| 8 | Cover | Silicon aluminium |
| 9 | Lifting plate screw | Steel |
| 10 | Lifting plate | Mild steel |
| 11 | Diaphragm plate | Forged steel |
| 12 | Operating diaphragm | Rubber |
| 13 | Clamp washer | Mild steel |
| 14 | Cylinder/bonnet bolt | Steel |
| 15 | Bonnet 'O' ring | Rubber |
| 16 | Spindle | Stainless steel |
| 17 | Compressor pin | Steel |
| 18 | Compressor | Cast iron |
| 19 | Line diaphragm | Rubber, Rubber/PTFE |
| 20 | Spr. adj. spindle locknut | Steel |
| 21 | Cylinder/cover nut | Steel |
| 22 | Cylinder/cover bolt | Steel |
| 23 | Cylinder/cover washer | Steel |
| 24 | Cylinder/bonnet joint | Klingersil |
| 25 | Cylinder plug | Malleable iron |
| 26 | Body/bonnet nut | Stainless steel |
| 27 | Body/bonnet bolt/stud | Stainless steel |
| 28 | Body/bonnet washer | Stainless steel |

**MATERIALS OF CONSTRUCTION EV (SO)**

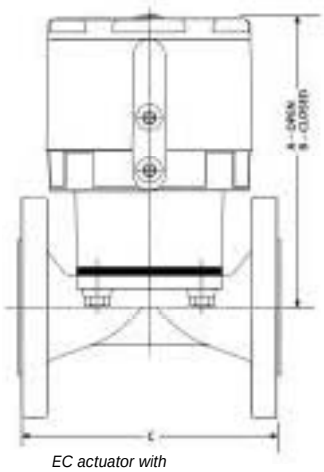
| Item | Component | Material |
|---|---|---|
| 1 | Indicator | Steel |
| 2 | Cover plug | Mild steel |
| 3 | Cover seal | PVC |
| 4 | Adjusting screw locknut | Steel |
| 5 | Upper spring plate | Forged steel |
| 6 | Spring | Steel |
| 7 | Adjusting screw | Mild steel |
| 8 | Lower spring plate | Mild steel |
| 9 | Lower spring plate 'O' ring | Rubber |
| 10 | Upper cylinder | Silicon aluminium |
| 11 | Clamp washer | Mild steel |
| 12 | Diaphragm plate | Forged steel |
| 13 | Operating diaphragm | Rubber |
| 14 | Spindle | Stainless steel |
| 15 | Lower cylinder | Silicon aluminium |
| 16 | Cylinder/bonnet screw | Steel |
| 17 | Bonnet | Cast iron |
| 18 | Compressor pin | Steel |
| 19 | Compressor | Cast iron |
| 20 | Line diaphragm | Rubber, Rubber/PTFE |
| 21 | Cover plug screw | Steel |
| 22 | Cover plug washer | Steel |
| 23 | Cover | Silicon aluminium |
| 24 | Cylinder/cover screw | Steel |
| 25 | Cylinder/cover washer | Steel |
| 26 | Cylinder nut | Steel |
| 27 | Cylinder bolt | Steel |
| 28 | Cylinder washer | Steel |
| 29 | Cylinder plug | Malleable iron |
| 30 | Body/bonnet nut | Stainless steel |
| 31 | Body/bonnet bolt/stud | Stainless steel |
| 32 | Body/bonnet washer | Stainless steel |

**MATERIALS OF CONSTRUCTION EV (DA)**

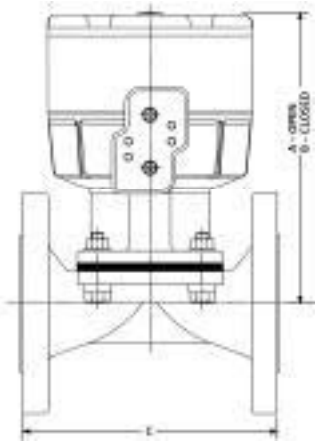
| Item | Component | Material |
|---|---|---|
| 1 | Indicator cover | Polyamide 6-3-T |
| 2 | Indicator | Solid nylon |
| 3 | Indicator cover 'O' ring | Rubber |
| 4 | Indicator locknut | Steel |
| 5 | Diaphragm plate screw | Steel |
| 6 | Upper diaphragm plate | Mild steel |
| 7 | Lower diaphragm plate | 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/PTFE |
| 17 | Upper cylinder | Silicon aluminium |
| 18 | Cylinder bolt | Steel |
| 19 | Cylinder nut | Steel |
| 20 | Cylinder washer | Steel |
| 21 | Cylinder plug | Malleable iron |
| 22 | Body/bonnet nut | Stainless steel |
| 23 | Body/bonnet bolt/stud | Stainless steel |
| 24 | Body/bonnet washer | Stainless steel |

TECHNICAL DATA

# EC/SSC/ECX Actuator Dimensions



*EC actuator with A Type flanged body*

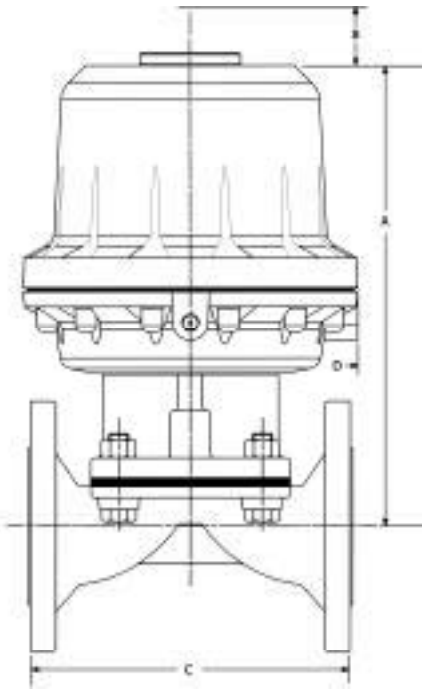


*SSC actuator with flanged body*

## EC/SSC

| Size DN | A | B | C |
|---|---|---|---|
| **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.*



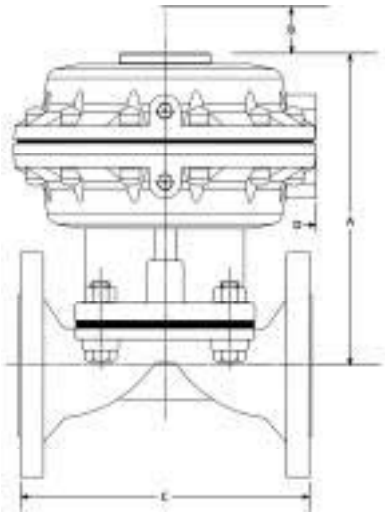
*ECX spring closing and spring opening actuator on A Type flanged body*

## ECX/SC

| Size DN | A | B | C | D |
|---|---|---|---|---|
| Heads | S1, S2 & S3 | | | |
| **65** | 359 | 55 | 216 | 266 |
| **80** | 370 | 55 | 254 | 266 |
| **100** | 417 | 55 | 305 | 266 |

## ECX/SC

| Size DN | A | B | C | D |
|---|---|---|---|---|
| Heads | L1, L2 & L3 | | | |
| **65** | 399 | 55 | 216 | 266 |
| **80** | 410 | 55 | 254 | 266 |
| **100** | 458 | 55 | 305 | 266 |



*ECXdouble acting actuator with A Type flanged body*

## ECX/SO/DA

| Size DN | A | B | C | D |
|---|---|---|---|---|
| Heads | S1, S2 & S3 | | | |
| **65** | – | 55 | 216 | 266 |
| **80** | – | 55 | 254 | 266 |
| **100** | – | 55 | 305 | 266 |

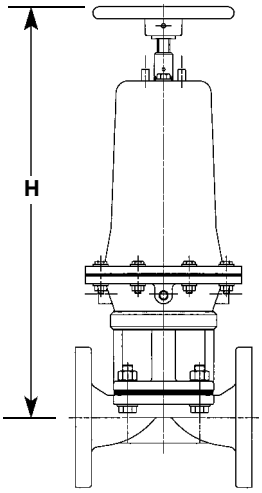
## ECX/SO/DA

| Size DN | A | B | C | D |
|---|---|---|---|---|
| Heads | L1, L2 & L3 | | | |
| **65** | – | 55 | 216 | 266 |
| **80** | – | 55 | 254 | 266 |
| **100** | – | 55 | 305 | 266 |

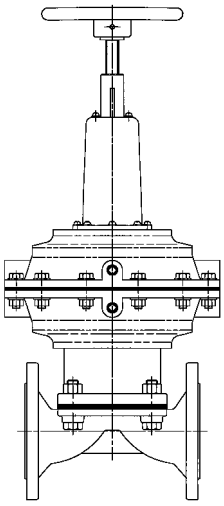
**Note:** *Dimension 'B' is for optional Indicator on ECX models*

TECHNICAL DATA

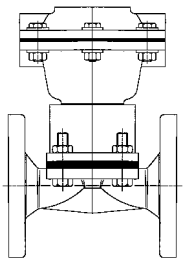
# ES/EV Actuator Dimensions




ESC 61-65

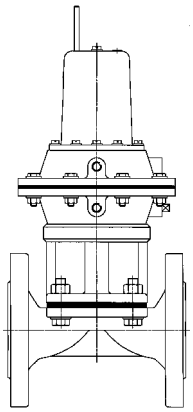


ESO 68-72

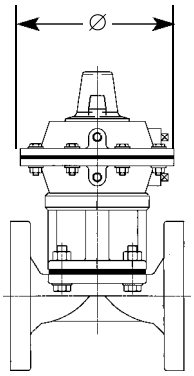


EVC 61-64

ESDA 54-58



EVO 68-71




EVDA 54-57

| | Model | Δ | H (Type A Valve) – Size in mm | | | | | | | | | | | | h (Type KB Valve) – Size in mm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 |
| Fail Safe Spring CLOSING | EV | 61 | 168 | 368 | 376 | 386 | – | 415 | | | | | | | 457 | 457 | 457 | | | | | | | |
| | ES | 61 | 168 | 384 | 397 | 408 | – | 427 | | | | | | | 462 | 462 | 462 | | | | | | | |
| | EV | 62 | 260 | – | – | 464 | 486 | 491 | 504 | 516 | | | | | 522 | 522 | 522 | 547 | | | | | | |
| | ES | 62 | 260 | – | – | 487 | 505 | 513 | 524 | 534 | | | | | 535 | 535 | 535 | 569 | | | | | | |
| | EV | 63 | 318 | – | – | – | – | – | 617 | 637 | 653 | | | | – | – | – | 687 | 706 | 736 | | | | |
| | ES | 63 | 318 | – | – | – | – | – | 667 | 683 | 692 | | | | – | – | – | 697 | 716 | 746 | | | | |
| | EV | 64 | 425 | – | – | – | – | – | – | – | 779 | 820 | 836 | | – | – | – | – | 806 | 871 | 918 | 950 | | |
| | ES | 64 | 425 | – | – | – | – | – | – | – | 826 | 863 | 879 | | – | – | – | – | 806 | 888 | 911 | 950 | | |
| | ES | 65 | 549 | – | – | – | – | – | – | – | – | 1051 | – | 1131 | – | – | – | – | – | – | 1234 | 1273 | 1323 | |
| Fail Safe Spring OPENING | EV | 68 | 168 | 214 | 221 | 278 | – | 299 | 331 | | | | | | 347 | 347 | 347 | | | | | | | |
| | ES | 68 | 168 | 255 | 262 | 371 | – | 407 | 435 | | | | | | 427 | 427 | 427 | | | | | | | |
| | EV | 69 | 260 | – | – | – | 374 | 384 | 444 | 480 | 483 | | | | 382 | 382 | 382 | 505 | 531 | | | | | |
| | ES | 69 | 260 | – | – | – | 450 | 456 | 555 | 570 | 582 | | | | 472 | 472 | 472 | 595 | 621 | | | | | |
| | EV | 70 | 318 | – | – | – | – | – | – | – | 514 | 555 | | | – | – | – | – | 577 | 607 | 654 | | | |
| | ES | 70 | 318 | – | – | – | – | – | – | – | 619 | 660 | | | – | – | – | – | 667 | 697 | 744 | | | |
| | EV | 71 | 425 | – | – | – | – | – | – | – | – | 671 | 690 | 753 | – | – | – | – | – | 627 | 667 | 809 | | |
| | ES | 71 | 425 | – | – | – | – | – | – | – | – | 831 | 846 | 912 | – | – | – | – | – | 767 | 809 | 949 | | |
| | ES | 72 | 549 | – | – | – | – | – | – | – | – | – | – | 974 | 1040 | – | – | – | – | – | – | – | 995 | 1079 | 1122 |
| DOUBLE ACTING | EV | 54 | 168 | 184 | 196 | 200 | – | 224 | 233 | | | | | | 257 | 257 | 257 | | | | | | | |
| | ES | 54 | 168 | 129 | 136 | 142 | – | 165 | 196 | | | | | | 202 | 202 | 202 | | | | | | | |
| | EV | 55 | 260 | – | – | – | 287 | 303 | 312 | 327 | 340 | 377 | | | 331 | 331 | 331 | 346 | 365 | | | | | |
| | ES | 55 | 260 | – | – | – | 215 | 221 | 232 | 245 | 257 | 290 | | | 257 | 257 | 257 | 272 | 291 | | | | | |
| | EV | 56 | 318 | – | – | – | – | – | – | – | 360 | 397 | 412 | | – | – | – | – | 405 | 440 | 452 | | | |
| | ES | 56 | 318 | – | – | – | – | – | – | – | 298 | 337 | 350 | | – | – | – | – | 331 | 366 | 378 | | | |
| | EV | 57 | 425 | – | – | – | – | – | – | – | – | 437 | 452 | 519 | – | – | – | – | – | 458 | 467 | 489 | | |
| | ES | 57 | 425 | – | – | – | – | – | – | – | – | 355 | 370 | 436 | – | – | – | – | – | 384 | 393 | 415 | | |
| | ES | 58 | 549 | – | – | – | – | – | – | – | – | – | – | 462 | 530 | – | – | – | – | – | – | – | – | 514 | 537 |

Δ = Actuator Diameter/Width H = 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 |
| Sewage | | | Soap |

**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**

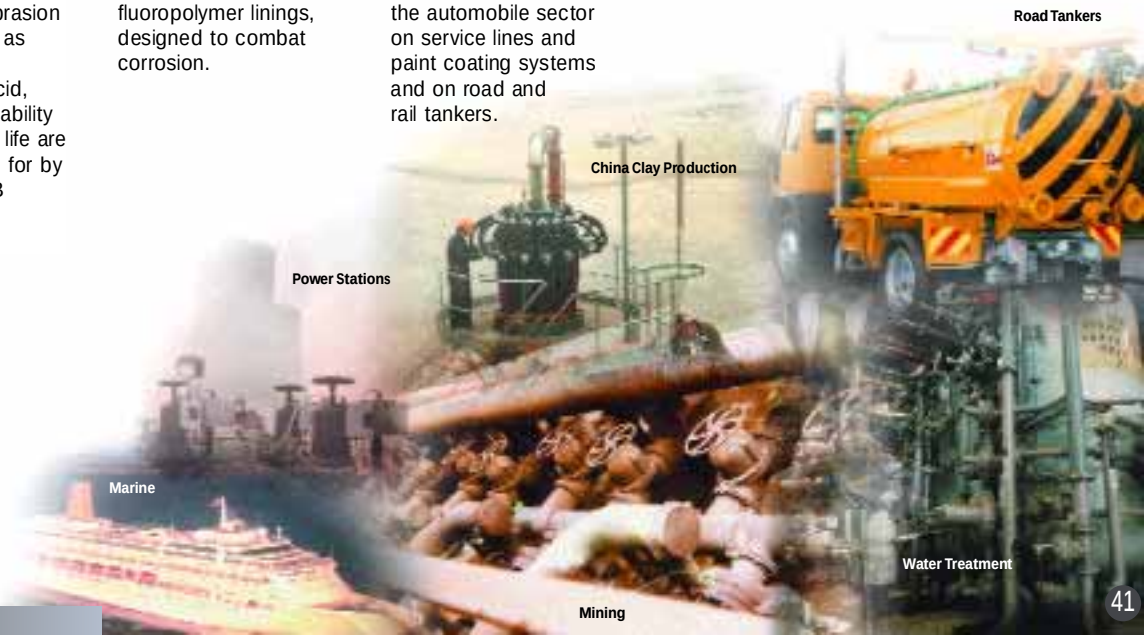
- Corrosion is estimated to cost worldwide industry 300 billion Euros every year. Every process industry sector handles corrosive fluids to a smaller or greater extent.
- Saunders have expertise and unrivalled experience in corrosive applications.
- Continuous development of 'in-house' materials technology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

**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.



# Actuation Accessories

## Overview

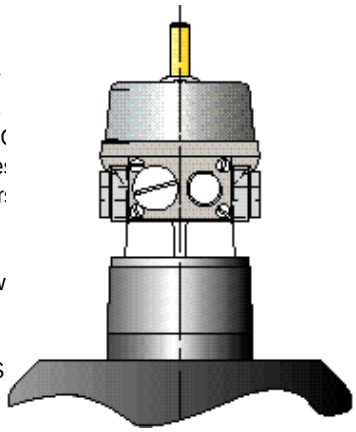
| MODEL | SIZE RANGE | STYLE | MATERIAL | SOLENOID | SWITCH BOX | POSITIONER | AIR FILTER | HANDWHEEL |
|---|---|---|---|---|---|---|---|---|
| **EC** | DN8-50 | A, AFP | PES | ✓ | ✓ | ✓ | ✘ | ✘ |
| **SSC** | DN8-50 | A, AFP | 316 C12 | ✓ | ✓ | ✓ | ✘ | ✓ |
| **ECX** | DN65-150 | A, AFP | SiAl | ✓ | ✓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

✓ = Available and ✘ = Not available

## Module

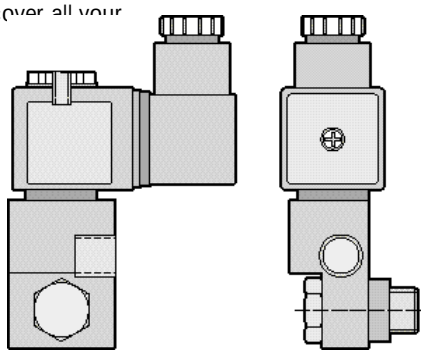
This highly modular switchbox option is available for EC/SSC ECX actuator ranges The switchbox offers wide range of V3 mechanical and proximity sensors w space for up to 4 switch, integral solenoid valve & AS interface*.

** ASI interface can be retro-fitted*



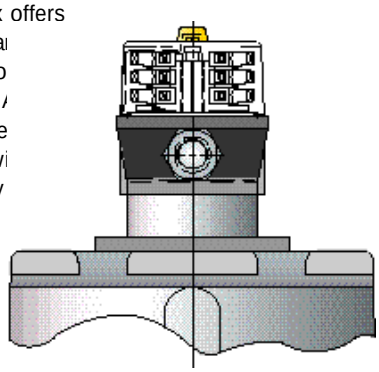
## Solenoid Valves

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.



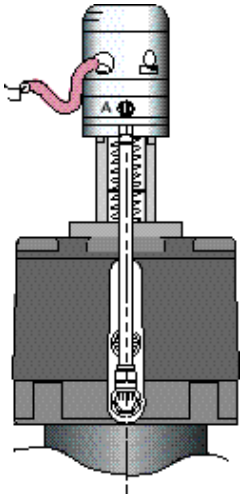
## Mini Switchbox

Suitable for both the EC and SSC. This low cost switchbox offers remote, open a closed indicatio valve position. with two V4 me or proximity swi and intrinsically options.



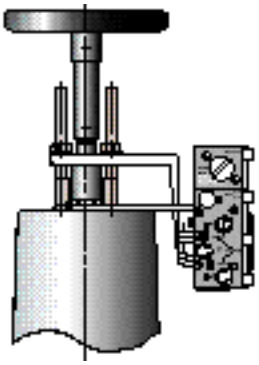
## Mini Positioner

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.



## ES Positioner

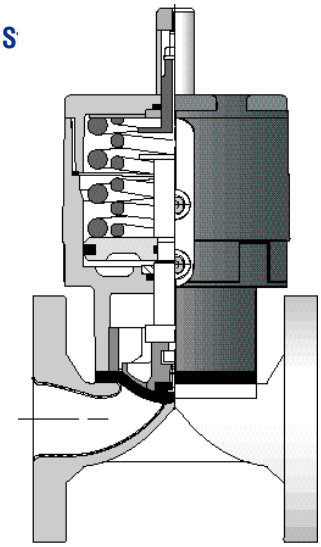
Providing precise control of the flow through the valve. This long life corrosion resistant range suits a wide variety of applications with reliability and accuracy. Available as pneumatic electro pneumatic intrinsically safe and explosion proof, together with a variety of feedback options.



*Shown mounted to ES Actuator*

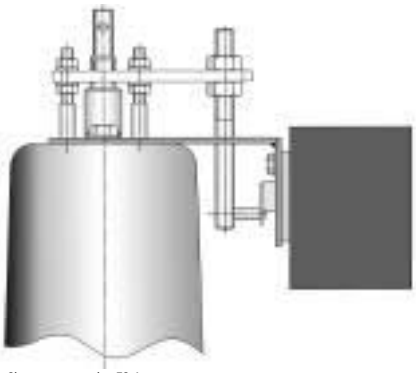
## EC & SSC Limit Open S

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.



## 007 Switchbox

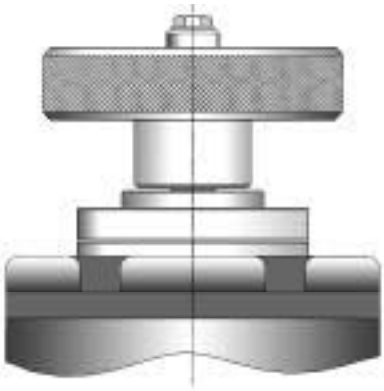
Manufactured from polyester coated aluminium. This switchbox is used for the ES and EV linear actuators. It has the capability for up to 4 switches and can incorporate internal solenoid valve and ASI system.



*Shown mounted to ES Actuator*

## 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.



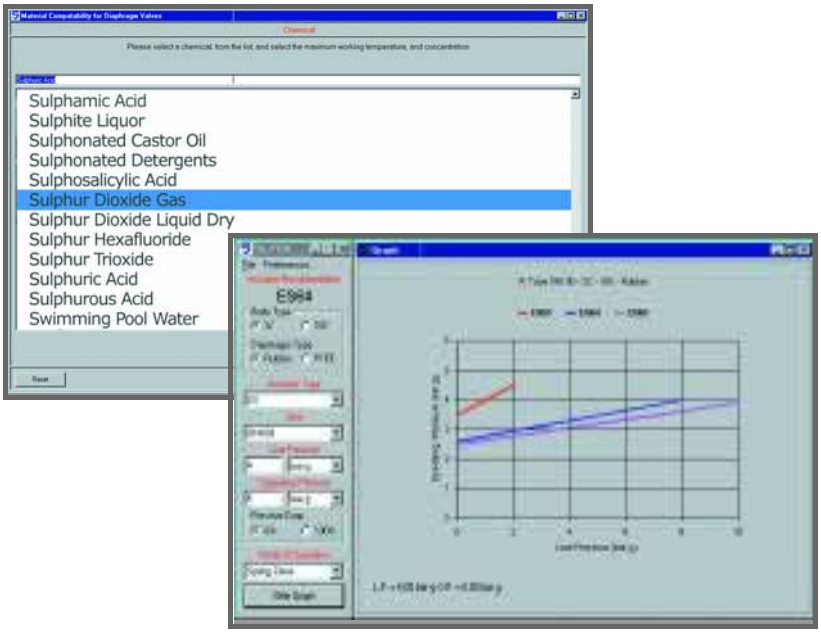
# Software to Aid the Process Engineer in Selecting Saunders Products

## 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.



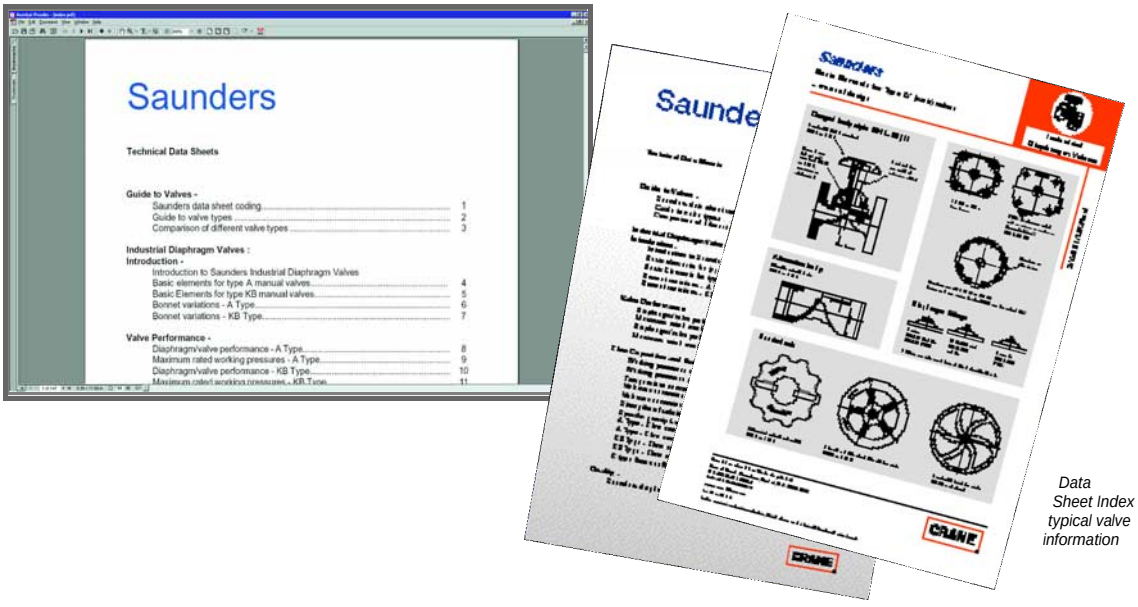

### Saunders Data Sheets

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.




*Data Sheet Index and typical valve information*

# Quality Statements and Approvals

*ISO 9001 Certificate of Registration*


Certificate of Registration

Quality Management System

This is to certify that:
Crane Process Flow Technologies Ltd
Grange Road
Cwmbran
Gwent
United Kingdom
NP44 3XX

Hold Certificate No: FM 00306
and operate a Quality Management System which complies with the requirements of BS EN ISO 9001:1994
for the following scope:
The design and manufacture of diaphragm, ball, butterfly, check and control valves.
The design and manufacture of pneumatic actuators.
The manufacture of moulded plastic products with lot traceability.
The manufacture of precision rubber components with lot traceability.
The compounding of elastomeric materials with lot traceability

For and on behalf of BSI:
Certification Manager, Systems Assessment
Originally registered: 2 Oct 1984

*PED Certificate of Conformity*


PRESSURE EQUIPMENT DIRECTIVE 97/23/EC
QUALITY ASSURANCE MODULE
CERTIFICATE OF CONFORMITY
Certificate No: CE 54841

Product type: Pressure Accessories
Name and address of manufacturer: Crane Process Flow Technologies Ltd, Grange Road, Cwmbran, Gwent, NP44 3XX
Name and address of Certificate holder: As above
Date of application for Assessment: 10 April 2000
Certificate issued on the basis of the following requirement: On the basis of our examination under the requirements of Council Directive 97/23/EC Module H of the Pressure Equipment Directive, as transposed into UK law by the Pressure Equipment Regulations SI 1999 No. 2001.
Date of Assessment: 22-23 August 2001
Documents bearing the certificate number shown above are annexed to this Certificate:
For and on behalf of the BRITISH STANDARDS INSTITUTION, Notified Body Number 0086
Signature:
Date: 12 September 2001
A Boyd (General Manager - Certification)
Issue: 1
Products produced outside of the scope of this Certificate will invalidate this Certificate and the BSI Notified Body, Number: 0086, must be informed without delay
Prepared by: BSI Product Services Maylands Avenue Hemel Hempstead Hertfordshire HP2 4SQ UK Telephone: +44 1442 230442 Fax: +44 1442 231442
PCA113
Page 1 of 2

## 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 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

TÜV AD-MERKBLATT HPO

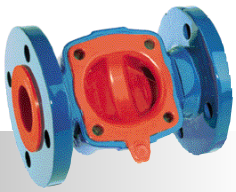
COMPLIANCEWITH FDACODE 21

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



## A and KB Valves

| Type | Style | Size | | | End Specification | | Body Material | | Diaphragm | | Operating Mechanism | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I | | | | | | | | | | | | | |

Industrial

**A = Weir A Type**
**B = KB Type**

Refer to pages 46,47 and 48

| | |
|---|---|
| DN8 | **008** |
| DN10 | **010** |
| DN15 | **015** |
| DN20 | **020** |
| DN25 | **025** |
| DN32 | **032** |
| DN40 | **040** |
| DN50 | **050** |
| DN65 | **065** |
| DN80 | **080** |
| DN100 | **100** |
| DN125 | **125** |
| DN150 | **150** |
| DN200 | **200** |
| DN250 | **250** |
| DN300 | **300** |
| DN350 | **350** |

| **BS5156 Length Flanged** | |
|---|---|
| BS10 Table D | **F1** |
| BS4504 PN10 | **F3** |
| ANSI 125/150 | **F4** |
| JIS 10K | **F5** |
| PN10 4-Bolt | **F6** |
| **Screwed Female** | |
| BS21 Rp | **S1** |
| BS21 Rc | **S2** |
| API/NPT | **S3** |
| **DIN Length Flanged** | |
| DIN ND10 | **D1** |
| DIN ND10-4 Bolt | **D2** |
| **US Length Flanged** | |
| ANSI 125/150 | **U1** |

| **Cast Iron** | | **SG Iron** | |
|---|---|---|---|
| Rubber Diaphragm | **CX** | Rubber Diaphragm | **ZX** |
| PTFE Diaphragm | **CW** | PTFE Diaphragm | **ZW** |
| Butyl Lined | **CB** | Butyl Lined | **ZB*** |
| Hard Rubber | **CC** | Hard Rubber | **ZC*** |
| HRL for PTFE | **CD** | HRL for PTFE | **ZD*** |
| HRL Full Face | **CJ** | HRL Full Face | **ZJ** |
| HRL Full Face for PTFE | **CK** | HRL Full Face for PTFE | **ZK** |
| Soft Rubber | **CS** | Soft Rubber | **ZS*** |
| Neoprene Lined | **CN** | Neoprene Lined | **ZN*** |
| Glass Lined | **CG** | ETFE | **ZE** |
| PTFE | **CT** | PFA | **ZF** |
| **Stainless Steel** | | Polypropylene | **ZP** |
| Rubber Diaphragm | **SX** | Galvanised | **ZZ** |
| PTFE Diaphragm | **SW** | **Carbon Steel** | |
| **Gunmetal** | | Rubber Diaphragm | **QX** |
| Rubber Diaphragm | **GX** | PTFE Diaphragm | **QW** |
| PTFE | **GW** | Hard Rubber L | **QC** |
| | | Hard Rubber L for PTFE | **QD** |

*** DIN bodies only**

| **PTFE** | CODE |
|---|---|
| 214/300 | **P1** |
| 214/226 | **P3** |
| 214/425 | **P2** |
| 214K/425 | **P7** |
| **Silicone** | |
| 500 | **Q1** |
| **Viton** | |
| 226 | **V1** |
| **Natural** | |
| AA | **A1** |
| Q | **A2** |
| **Butyl** | |
| 300 | **B1** |
| 300 vac | **B2** |
| **Nitrile** | |
| C | **C1** |
| Cvac | **C2** |
| **EPM** | |
| 425 | **E2** |
| **Hypalon** | |
| 237 | **H** |
| 286 fire dia. | **H3** |
| **Neoprene** | |
| HT | **N1** |

## Weir Type WFB Valves

| Type | | Size | | | Style | Flange | | Material | Diaphragm | | Operating Mechanism | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I | W | | | | | | | | | | | | |

Industrial **WFB**

**040/065 mm**

| | |
|---|---|
| Model 9 | **A** |
| Model 4 | **B** |
| Model 11 | **C** |
| Model 2 | **D** |

**F1**
**F3**
**F4**

| | |
|---|---|
| Gunmetal | **G** |
| SG Iron | **Z** |

Hypalon 286 = **H3**

| | |
|---|---|
| Gunmetal | **H01** |
| SG Iron | **H02** |

For standard options, refer to current price list

## Sub Assembly Manual Bonnets Only

| Style | | Size | | | Operating Mechanism | | |
|---|---|---|---|---|---|---|---|
| H | | | | | | | |

Manual Bonnet — **A = A Type** — **mm**

| Spares Kits | CODE |
|---|---|
| Plastic Handwheel | **S01** |
| Metal Handwheel | **S02** |
| Spindle | **S03** |
| AL Compressor | **S04** |
| CI Compressor | **S05** |
| CI Compressor (214) | **S06** |

| Bonnet Description | CODE Rubber Diaphragm | CODE PTFE Diaphragm |
|---|---|---|
| RHI – Standard Plastic Handwheel | **H01** | **H02** |
| RHI – Standard Metal Handwheel | **H03** | **H04** |
| RHI – Sealed with Plastic Handwheel | **H07** | **H08** |
| RHI – Sealed with Metal Handwheel | **H09** | **H10** |
| RHI – Viton Seal and Padlock | **H13** | **H14** |
| RHI – Padlock and Plastic Handwheel | **H15** | **–** |
| RHI – Padlock and Metal Handwheel/Compressor | **H17** | **H18** |
| RHI – GGG 40.3 Plastic Handwheel | **H25** | **–** |
| RHI – SS/EP PESHandwheel | **H26** | **H24** |
| RHI – GGG 40.3 Metal Handwheel | **H27** | **H28** |
| CI Indicator Bonnet | **H33** | **H34** |
| RHI – SS Sealed EP | **H45** | **H46** |
| Gunmetal LG2 | **H55** | **–** |
| Non-Rising Gunmetal LG4 and Padlock | **H56** | **–** |
| Non-Rising Gunmetal LG4 and Limit Open | **H57** | **–** |

| Style | | Size | | | Operating Mechanism | | |
|---|---|---|---|---|---|---|---|
| H | | | | | | | |

Manual Bonnet — **B = KB Type** — **mm**

| Spares Kits | CODE |
|---|---|
| Plastic Handwheel | **S01** |
| Metal Handwheel | **S02** |
| Spindle | **S03** |
| CI Compressor | **S04** |
| Endurance Bonnet | **S05** |

| Bonnet Description | CODE |
|---|---|
| RHI – Plastic Handwheel | **H01** |
| RHI – Metal Handwheel | **H02** |
| CI Indicator Bonnet | **H03** |
| RHI – GGG 40.3 with Metal Handwheel | **H07** |
| Non-Rising Gunmetal LG4 and Padlock | **H08** |
| CI Endurance Bonnet | **H10** |

# Actuation Options

## Type EC Compact Pneumatic Actuators

| Style | Size | Type | Mode of operation | Dia | Air Connection | Slotted | Limit stops |
|---|---|---|---|---|---|---|---|
| **A** – | | | | | | | |
| Diaphragm Type A | mm | **C** = EC | **4** = 4 bar Spring Closed<br>**6** = 6 bar Spring Closed<br>**O** = Spring Open<br>**D** = Double Acting | **R** = Rubber<br>**P** = PTFE | **B** = BSP<br>**N** = NPT | **Y** = Yes<br>**N** = No | **N** = None<br>**O** = Limit Open |

**AA** = Sizes 8mm to 50mm

## Type ECX Diaphragm Valve Actuators

| Style | Size | Type | Mode of operation | Dia | Visual indicator | Limit stops |
|---|---|---|---|---|---|---|
| **A** **A** | | **X** | | | | **N** |
| Diaphragm 'A' Type | mm | ECX | **F2,F4,G2,G3, G4,G5,H2, H4,H5** = Spring Closed<br>**OS,OH** = Spring Open<br>**DS,DH** = Double Acting | **R** = Rubber<br>**P** = PTFE | **Y** = Yes<br>**N** = Only when accessories are used | **N** = None |

## EC Actuator Mini Switchbox Options

| Switchbox type | Conduit entry | Switch type | Switch quantity |
|---|---|---|---|
| **I** | | | |
| Switchbox Mini | **G** = 6–8mm Cable Gland<br>**C** = 1/2" NPT Thread | **MA**= V4 Mechanical Switch<br>**PA** = Proximity Switch Namur DIN19234<br>**PB** = Proximity Switch 3 Wire NO NPN<br>**PC** = Proximity Switch 3 Wire NOPNP | **1** = One<br>**2** = Two |

## EC Actuator Module Switchbox Options

| Type | Size | Switchbox | Module | | | | | |
|---|---|---|---|---|---|---|---|---|
| **V** **C** | | **B** | **M** | | | | | |
| **V** = Accessory<br>**C** = EC | mm | | **Conduit Entry**<br>**O** = Metric<br>**P** = PG<br>**N** = NPT | **Switch Type**<br>**M1** = V3 Mech<br>**M2** = V3 Mech. Gold Plated<br>**M3** = V24 T7 Mech.DPST<br>**M5** = Bartec Ex. Proof EExd<br>**P2** = ProxSwitch Intrinsically Safe<br>**P6** = ProxSwitch 3 Wire NPN<br>**P7** = ProxSwitch 3 wire PNP<br>**P9** = ProxSwitch 2 Wire NPN/PNP | Switch Quantity<br>**1** = One<br>**2** = Two | Pneumatic Control<br>**0** = None<br>**1** = Single/Double Acting 1/8" BSP<br>**2** = Single/Double Acting 1/8" NPT<br>**3** = Single Acting Manifold 1/8" BSP<br>**4** = Single Acting Manifold 1/8" NPT | Solenoid Voltage<br>**0** = None<br>**1** = 220/240v AC 50/60Hz<br>**2** = 110/120v AC 50/60Hz<br>**3** = 24v DC<br>**5** = Intrinsically safe 24v DC |

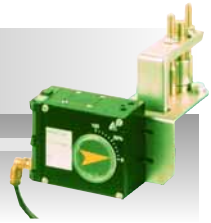
## Type ES Diaphragm Valve Actuators

| Style | Size | Type | Actuator Model | Line Diaphragm | Manual Override | Limit Stops |
|---|---|---|---|---|---|---|
| | | S | | | | |
| **Diaphragm**<br>**A** = A Type<br>**B** = KB Type | **mm** | **ES** | ES Number | **R** = Rubber<br>**P** = PTFE<br>(A Type only) | **H** = Handwheel<br>**N** = None<br>(DA only) | **N** = None<br>**C** = Close<br>**O** = Open |

## Type EV Diaphragm Valve Actuators

| Style | Size | Type | Actuator Model | Line Diaphragm | Manual Override | Limit Stops |
|---|---|---|---|---|---|---|
| | | V | | | | N |
| **Diaphragm**<br>**A** = A Type<br>**B** = KB Type | **mm** | **EV** | EV Number | **R** = Rubber<br>**P** = PTFE<br>(A Type only) | **B** = Shaft<br>**N** = None<br>(DA only) | **N** = None |

## ES Actuator Positioner Options



| Style | Type | Gauges | Feedback Unit |
|---|---|---|---|
| D | | | |
| **D** = Midi Positioner | **P** = Pneumatic<br>**E** = Electropneumatic<br>**X** = Explosion Proof<br>**I** = Intrinsically safe | **Y** = Yes<br>**N** = No | **N** = None<br>**P** = Potentiometer 4k Ohm at 90°. 2 x SPDT mechanical switches<br>**M** = 2pcs SPDT mechanical switches<br>**F** = 2 x SPDT mechanical switches & 4–20mA output re-trans. |

## ES Actuator – 007 Switchbox Options

| Type | Size | Actuator/Model | Switchbox | Type | Conduit Entry | Switch Type | Switch Quantity |
|---|---|---|---|---|---|---|---|
| V S | | | B | B | | | 2 |
| **V** = Accessory<br>**S** = ES | **mm** | **ES number** | | **007** | **Type B Lever**<br>**1** = Metric M20<br>**2** = PG 13.5<br>**3** = 1/2 NPT<br>**Type C Lever**<br>**V** = Metric M20<br>**W** = PG 13.5<br>**X** = 1/2 NPT | **M1** = V3Mech.<br>**M2** = V3Mech. Gold Plated<br>**M3** = V24T7 Mech.DPDT<br>**M6** = Burgess Ex. Proof EExd.<br>**P2** = ProxSwitch Intrinsically safe<br>**P5** = ProxSwitch 2 Wire NO<br>**P6** = ProxSwitch 3 Wire NPN<br>**P7** = ProxSwitch 3 Wire PNP | **2** = Two |

## EV Actuator – 007 Switchbox Options

| Type | Size | Actuator/Model | Switchbox | Type | Conduit Entry | Switch Type | Switch Quantity |
|---|---|---|---|---|---|---|---|
| V V | | | B | B | | | 2 |
| **V** = Accessory<br>**V** = EV | **mm** | **EV number** | **007** | **007** | **Type B Lever**<br>**1** = Metric M20<br>**2** = PG 13.5<br>**3** = 1/2 NPT<br>**Type C Lever**<br>**V** = Metric M20<br>**W** = PG 13.5<br>**X** = 1/2 NPT<br>**Type D Lever**<br>**Q** = Metric<br>**R** = PG 13.5<br>**S** = NPT | **M1** = V3Mech.silver contacts<br>**M2** = V3Mech. gold plated contacts<br>**M3** = V24T7 Mech.DPDT<br>**M6** = Burgess Ex. Proof EExd.<br>**P2** = ProxSwitch Intrinsically safe<br>**T5** = ProxSwitch 2 Wire NO<br>**P6** = ProxSwitch 3 Wire NPN<br>**P7** = ProxSwitch 3 Wire PNP<br>**P9** = ProxSwitch 2 Wire NPN/PNP | **2** = Two |

*Due to constant product improvements details shown in this brochure are subject to change*

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