

INSTRUCTION MANUAL

MAXIMIZING VALVE LIFE IN EXCESS OF 3 MILLION CYCLES

SAUNDERS[®] ANGLE SEAT VALVES

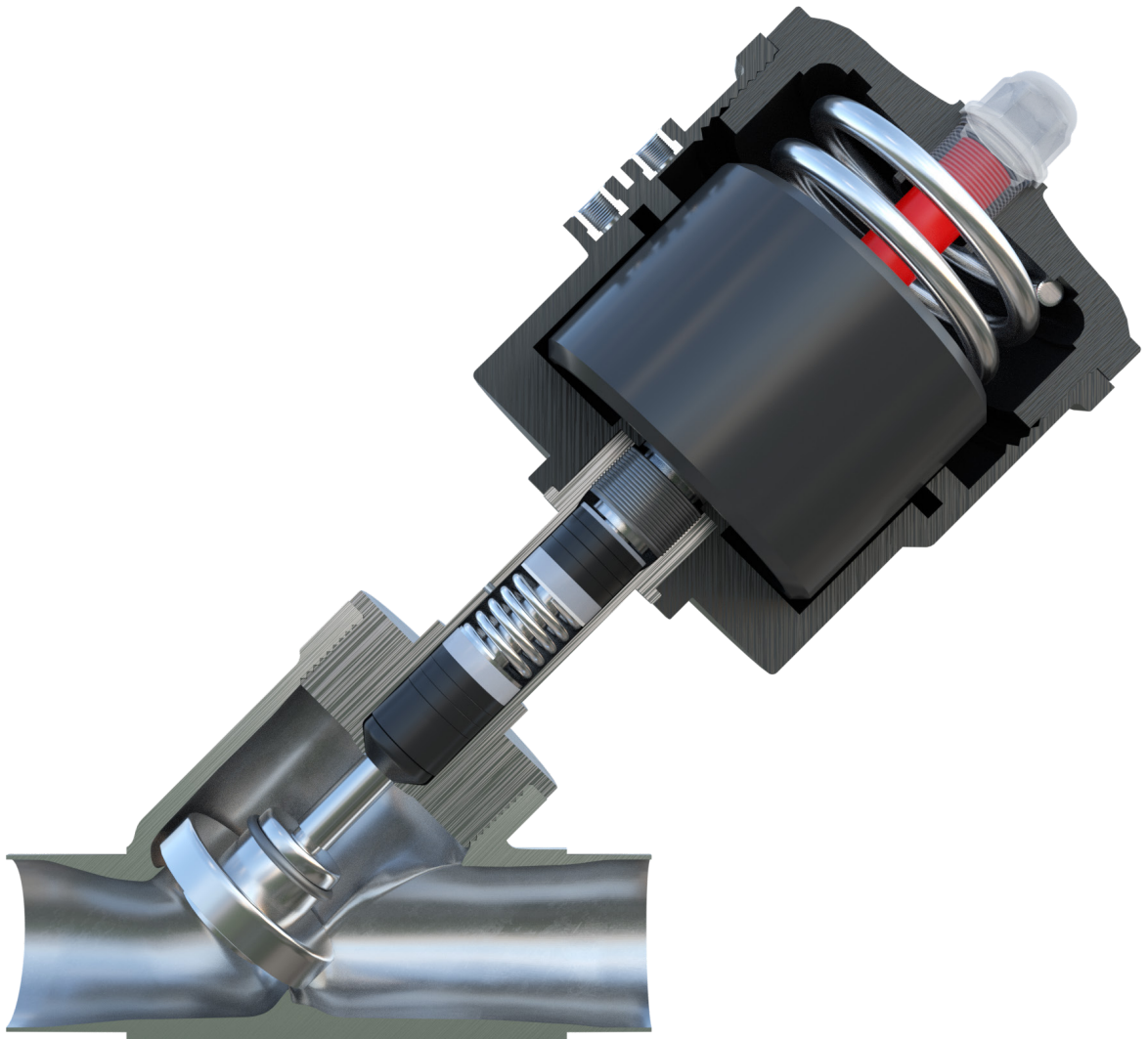
APU/AKU SERIES (ASME BPE)

Normally Closed/Normally Open/Double Acting

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1.1 Product Breakdown



Components

| Serial Number | Description | Material |
|---------------|------------------------|-----------------------------|
| 1 | Body | CF3M (SS316L) |
| 2 | Indicator Dome | Polycarbonate |
| 3 | Operator Cover | Glass filled Nylon |
| 4 | Open Indicator | ABS |
| 5 | Piston Seal | NBR |
| 6 | Insert | SS316L |
| 7 | Piston | Aluminium Anodised |
| 8 | Piston Spring | Carbon Steel (IS4454 GR II) |
| 9 | Piston Inner Spring | Carbon Steel (IS4454 GR II) |
| 10 | Operator | Glass filled Nylon |
| 11 | Shaft Seal | NBR |
| 12 | Hex Assembly | Aluminium hard Anodised |
| 13 | Shaft bearing | PTFE/PEEK |
| 14 | Gland Packing | PTFE/PEEK |
| 15 | Gland Spring | SS 302 |
| 16 | Sleeve | CF3M (SS316L Cast- 1.4435) |
| 17 | Body Seal | PTFE |
| 18 | Shaft | SS316L (1.4404) |
| 19 | Washer | SS 304 |
| 20 | Gland Packing Retainer | PTFE |
| 21 | Operator Seal | NBR |
| 22 | Dome Nut Seal | NBR/Viton |
| 23 | Operator Cover Seal | NBR/Viton |
| 24 | Hex Flange Nut | Zinc |
| 25 | Seal | NBR/Viton |
| 26 | Bush | PTFE |
| 27 | Bush Seal | NBR/Viton |
| 28 | Sleeve Seal | NBR/Viton |
| 29 | Seat holder assembly | SS 316L |
| 30 | Retaining Ring | SS 302 |
| 31 | Body Seal | PTFE |
| 32 | Shaft Seal | NBR |
| 33 | Operator Seal | NBR |
| 34 | Dome Nut Seal | NBR/Viton |
| 35 | Operator Cover Seal | NBR/Viton |
| 36 | Seal | NBR/Viton |
| 37 | Bush Seal | NBR/Viton |
| 38 | Sleeve Seal | NBR/Viton |

Operating Principle

1.2. Operating Principle

F1/F6 Single Acting, Normally Closed

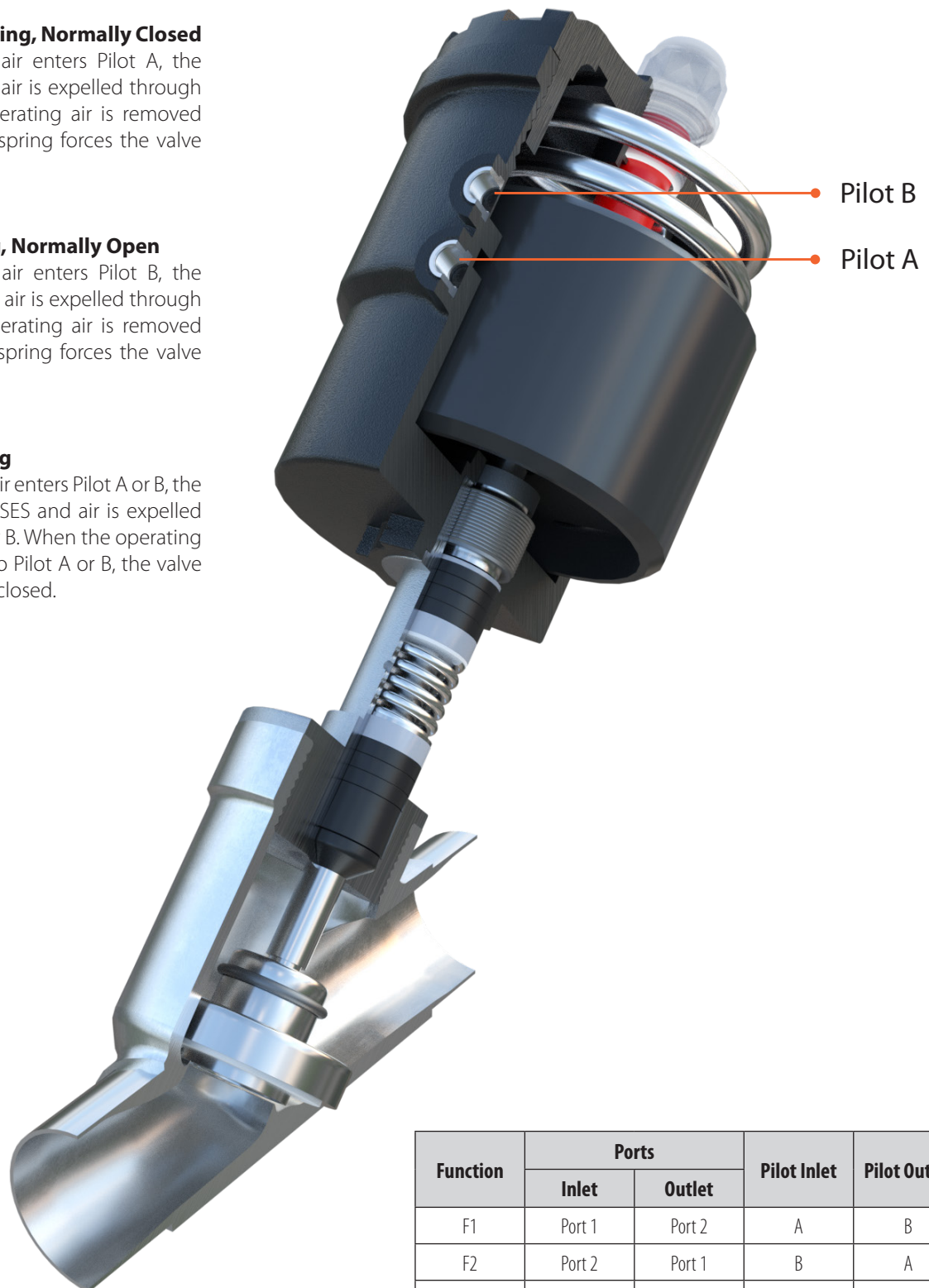
When operating air enters Pilot A, the valve OPENS and air is expelled through pilot B. When operating air is removed from Pilot A, the spring forces the valve closed.

F2 Single Acting, Normally Open

When operating air enters Pilot B, the valve CLOSES and air is expelled through pilot A. When operating air is removed from Pilot B, the spring forces the valve open.

F4 Double Acting

When operating air enters Pilot A or B, the valve OPENS/CLOSES and air is expelled through pilot A or B. When the operating air is transferred to Pilot A or B, the valve is forced open or closed.



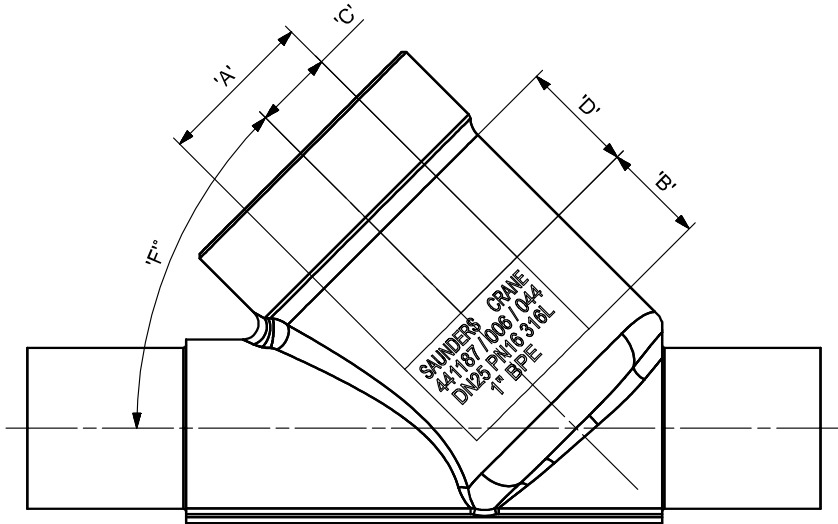
| Function | Ports | | Pilot Inlet | Pilot Outlet |
|----------|-------------|-------------|-------------|--------------|
| | Inlet | Outlet | | |
| F1 | Port 1 | Port 2 | A | B |
| F2 | Port 2 | Port 1 | B | A |
| F4 | Port 1 or 2 | Port 1 or 2 | A or B | A or B |
| F6 | Port 2 | Port 1 | A | B |

Valve Identification

1.3 Valve Identification

Port Connection

SAUNDERS[®] Angle Seat Valves are available with ASME BPE Weld ends (Code APU) or ASME BPE Clamp (Code AKU).

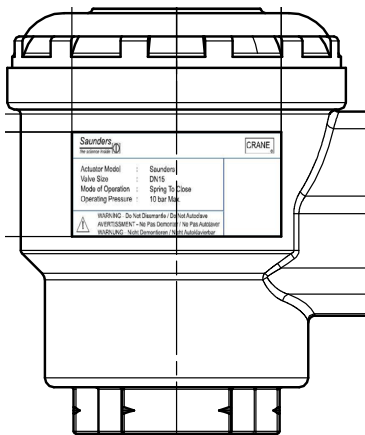





SAUNDERS CRANE
441187 / 006 / 044
DN25 PN16 316L
1" BPE

Body Marking

Spring to Close (NC), Spring to Open (NO), Double Acting (DA) modes of operation

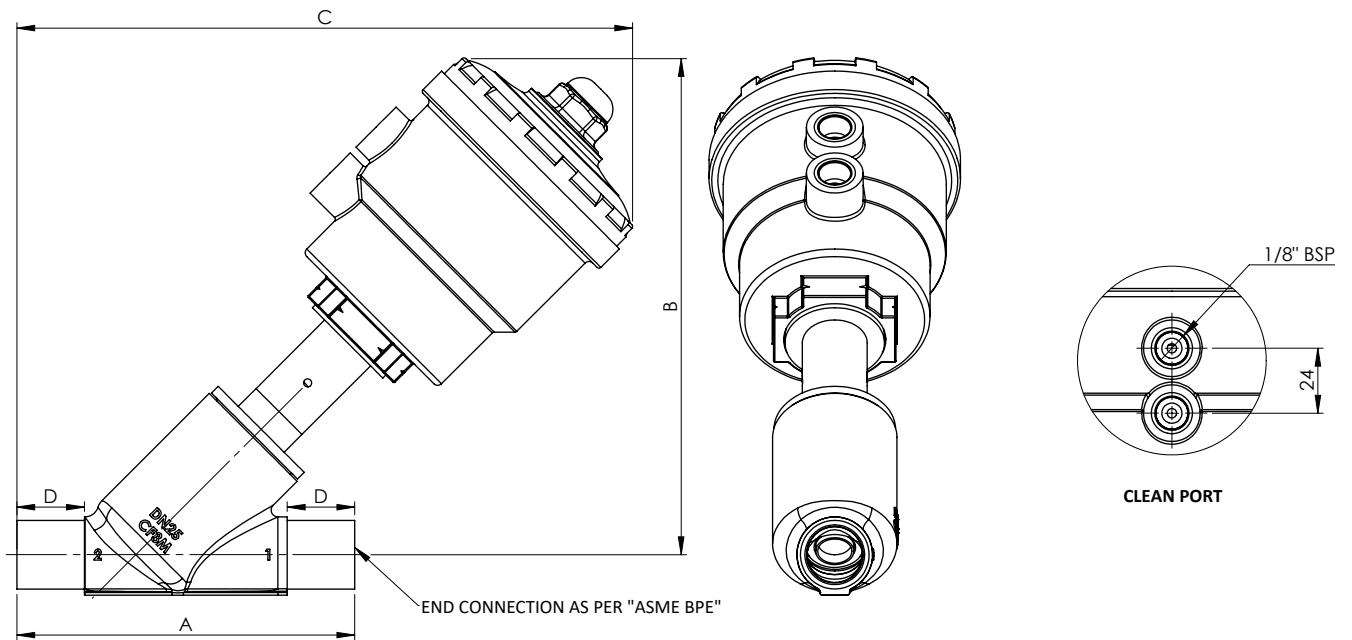
Example: Spring to Close Mode DN15



| | | |
|---|--|---|
|  | |  |
| Actuator Model : Valve Size : Mode of Operation : Operating Pressure : | Saunders DN15 Double Acting 10 bar Max. | |
|  | WARNING - Do Not Dissassemble / Do Not Autoclave AVERTISSEMENT - Ne Pas Demonter / Ne Pas Autolaver WARNUNG - Nicht Demontieren / Nicht Autoklavierbar | |

Dimensions

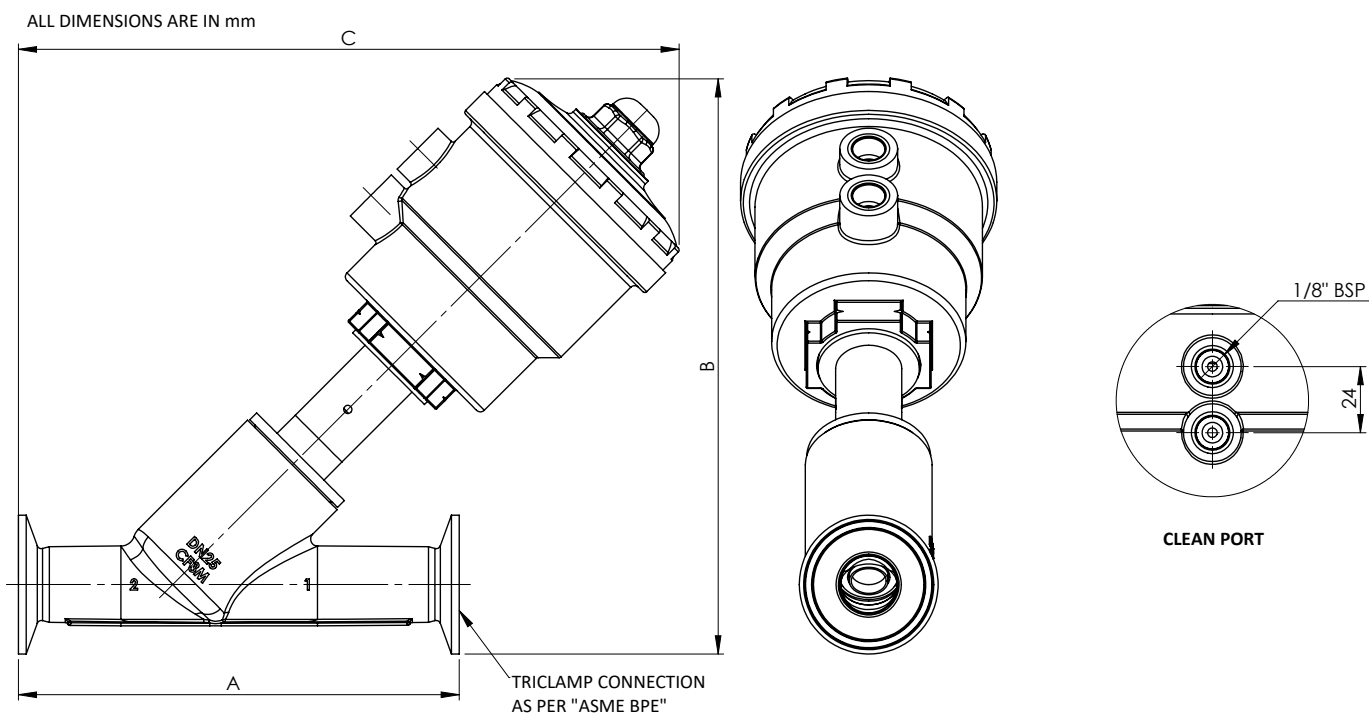
1.4 Dimensions - APU Series (Butt Weld)



| Series Number | Valve Size | Dimensions in mm | | | |
|---------------|------------|------------------|-----|-----|----|
| | | A | B | C | D |
| 1 | DN15 | 113 | 168 | 206 | 25 |
| 2 | DN20 | 123 | 167 | 209 | |
| 3 | DN25 | 125 | 184 | 228 | |
| 4 | DN40 | 160 | 221 | 268 | |
| 5 | DN50 | 180 | 271 | 325 | |

Dimensions

1.5 Dimensions - AKU Series (ASME BPE Hygienic Clamp)



| Series Number | Valve Size | Dimensions in mm | | |
|---------------|------------|------------------|-----|-----|
| | | A | B | C |
| 1 | DN15 | 130 | 180 | 215 |
| 2 | DN20 | 150 | 179 | 220 |
| 3 | DN25 | 160 | 209 | 238 |
| 4 | DN40 | 200 | 247 | 289 |
| 5 | DN50 | 230 | 303 | 343 |

2 Installation

2.1. Storage, Handling & Shelf Life

- Shelf life of the angle seat valve is 3 years from date of manufacture.
- Shelf life of seal kit is 4 years from date of manufacture.
- In storage, keep valve in a cool, dry, dust free environment, and within its protective packaging until installation is required.

2.2. Installation/Mounting procedure

Ensure that:

- Correct handling methods are adopted when lifting product to avoid physical injury and damage to product.
- The valve is only removed from its protective packaging immediately prior to installation.
- The valve is supported adequately during and after installation to avoid damage.
- Both main line and pilot air lines are flushed prior to installation.
- Airline fitting is of correct material and size with suitable thread type. (Thread type is stated on valve body), to avoid damage to thread.
- Both inlet and outlet ports are correctly identified to ensure no damage to internal components occurs.
- The valve is only installed for the line media that it is intended to avoid damage and faulty operation of the valve. In addition, check the compatibility of the media to valve body, seal material and grease used (Molykote 111). If in doubt, consult SAUNDERS[®] for clarification.
- Never carry out remedial work on valve once installed. i.e. machining of valve body etc. to avoid damage to the pressurised valve.
- Pressure applied to the valve in service does not exceed the specified limit. This is stated on the valve label/data sheet/catalogue.
- The temperature of the product does not exceed that stated in datasheet/catalogue to avoid damage to internal seals.
- The maximum operating pressure of the actuator does not exceed 10 bar.
- For line media, temperature and seal compatibility contact SAUNDERS[®].
- Dust caps are fitted to all ports.
- That body, sleeve and actuator materials are compatible with atmospheric conditions.
- Internal components (wetted) are compatible with the line media passing through the valve.
- The valve is not stepped on during installation or for the handling of other equipment.

Pressure and Temperature Ratings

3. Pressure Temperature Compatibility

3.1 Pressure Temperature Compatibility (AP/AK Type)

If the valve is to be installed in an area where PED is applicable, the following pressure/temperatures should be followed. For actual operating parameters please refer to technical data sheet and apply lowest value.

| Pressure and Temperature Chart | | | | | | | | |
|--------------------------------|-------|------------------------|-------|--------|--------|--------|--------|----------------|
| DN | CLASS | MAXIMUM PRESSURE (bar) | | | | | | PED Applicable |
| | | -29° C to 38° C | 50 °C | 100 °C | 150 °C | 180 °C | 200 °C | |
| 15 | B40 | ≤25 | ≤25 | ≤25 | ≤25 | ≤25 | ≤25 | Not applicable |
| 20 | B40 | ≤25 | ≤25 | ≤25 | ≤25 | ≤25 | ≤25 | Not applicable |
| 25 | B40 | ≤25 | ≤25 | ≤25 | ≤25 | ≤25 | ≤25 | Not applicable |
| 32 | B25 | ≤24.5 | ≤23 | ≤20 | ≤19 | ≤18 | ≤17 | Yes |
| 40 | B20 | ≤19.6 | ≤19 | ≤16 | ≤15 | ≤14 | ≤14 | Yes |
| 50 | B25 | ≤24.5 | ≤23 | ≤20 | ≤19 | ≤18 | ≤17 | Yes |
| 65 | B40 | ≤25 | ≤25 | ≤25 | ≤25 | ≤25 | ≤25 | Yes |
| 80 | B40 | ≤15 | ≤15 | ≤15 | ≤15 | ≤15 | ≤15 | Yes |

| Pressure Temperature Compatibility Chart (for AKU) | | | | | | | | |
|--|-------|------------------------|-------|--------|--------|----|----|----------------|
| DN | CLASS | MAXIMUM PRESSURE (bar) | | | | | | PED Applicable |
| | | -29° C to 38° C | 50 °C | 100 °C | 121 °C | -- | -- | |
| 15 | B40 | 13.7 | 13.4 | 11.9 | 11.3 | -- | -- | Not applicable |
| 20 | B40 | 13.7 | 13.4 | 11.9 | 11.3 | -- | -- | Not applicable |
| 25 | B40 | 13.7 | 13.4 | 11.9 | 11.3 | -- | -- | Not applicable |
| 32 | B25 | 13.7 | 13.4 | 11.9 | 11.3 | -- | -- | Yes |
| 40 | B20 | 13.7 | 13.4 | 11.9 | 11.3 | -- | -- | Yes |
| 50 | B25 | 13.7 | 13.4 | 11.9 | 11.3 | -- | -- | Yes |
| 65 | B40 | 13.7 | 13.4 | 11.9 | 11.3 | -- | -- | Yes |
| 80 | B40 | 13.7 | 13.3 | 11.2 | 10.3 | -- | -- | Yes |

3.2 Pressure Temperature Compatibility (PTFE/PEEK)

| Pressure Temperature Compatibility Chart (for PTFE & PEEK material) | | | | | | | |
|---|----------|------------------------|-------|--------|--------|--------|--------|
| DN (mm) | MATERIAL | MAXIMUM PRESSURE (bar) | | | | | |
| | | -29° C to 38° C | 50 °C | 100 °C | 150 °C | 180 °C | 200 °C |
| 15 to 80 | PTFE | 68 | 67 | 48 | 30 | 18 | --- |
| 65 to 80 | PTFE | 48 | 48 | 48 | 30 | 18 | --- |
| 12 to 50 | PEEK | 102 | 102 | 102 | 102 | 102 | 68 |
| 65 to 80 | PEEK | 48 | 48 | 48 | 48 | 48 | 48 |

General Maintenance

Notes:

1. If valves are to be operated at a higher pressure, or reduced ambient/fluid temperature, refer to following tables or contact SAUNDERS®, stating the temperature limit at which the valve will operate.
2. Pressure temperature Compatibility chart derived from Table 30 of EN 12516-1. Operating Parameters are in accordance with Table 30 of EN 12516-1.
3. Pressure Temperature Compatibility Chart derived from Table DT-2 Hygienic unions of ASME BPE. Operating Parameters for (AK series) is in accordance with Table DT-2 Hygienic unions of ASME BPE.
4. For temperatures up to 180°C select PTFE (White) seat/seal. For temperatures above 180°C select PEEK (Virgin).

4. General Maintenance

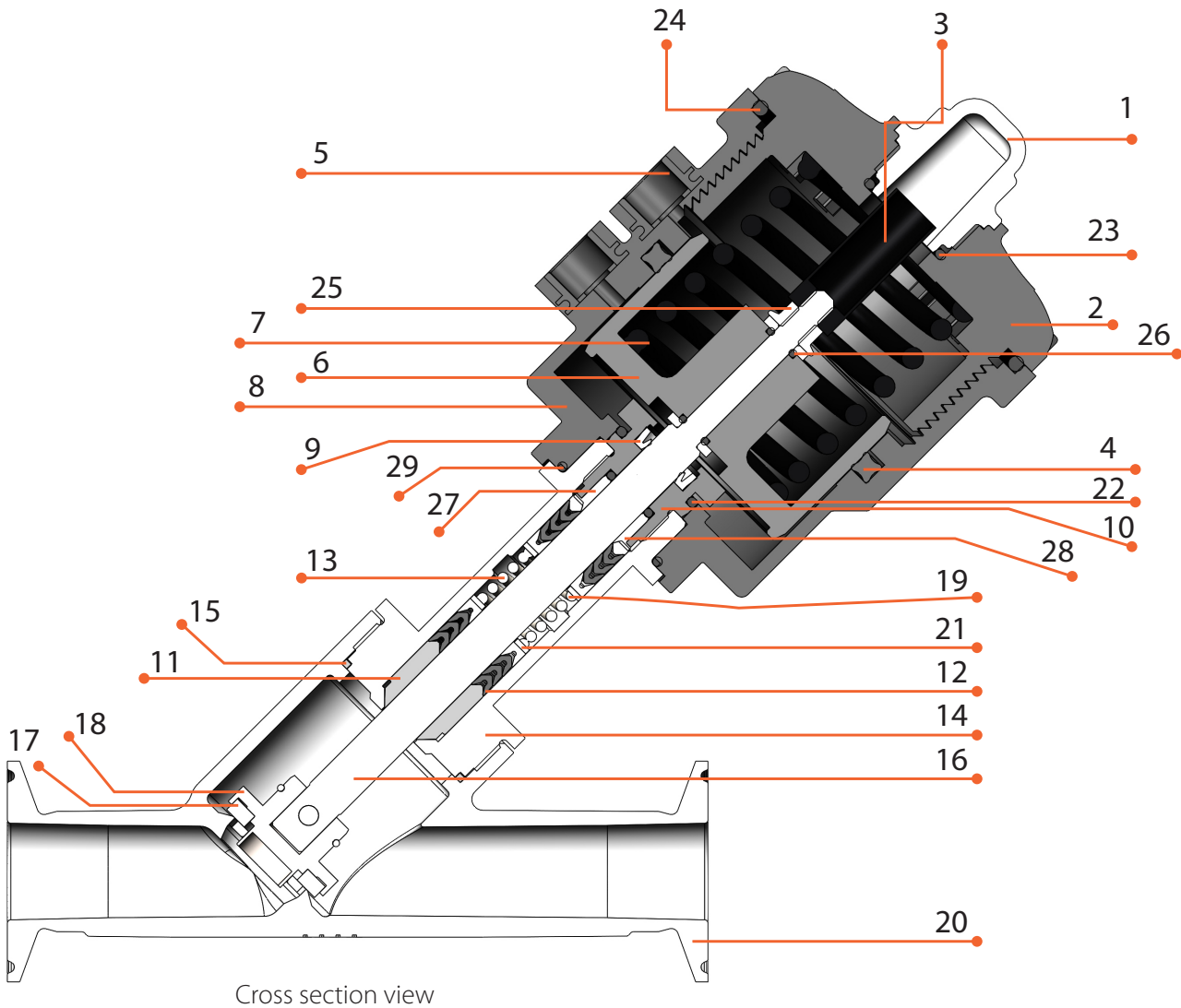
- Do not dismantle or loosen any valve components during service and always ensure that pressure is removed prior to any maintenance taking place to avoid damage to the valve or maintenance personnel.
- Do not perform maintenance on any valve in place. Remove valve from service and undertake maintenance under safe working conditions.
- Always ensure operating air supply is removed prior to removal of the valve from service.
- It is recommended that all seals are replaced in the event of a single seal failure. This will ensure trouble free operation and avoid premature failure.
- It is recommended that only Molykote 111 is used in seal lubrication. The use of any other form of grease will lead to premature failure of the seals.
- The use of a light soap detergent is recommended when cleaning of the valve is required. Do not use kerosene, diesel or petrol to clean.
- Always ensure all components are free from dust, dirt, lint or metal burrs.
- When fitting O-Rings ensure that they are free from twisting and pinching when assembling mating components to avoid damage and failure during service.
- Ensure during assembly that mating parts are pushed together without a twisting motion being applied. This will ensure no damage occurs.
- Genuine Saunders spare parts will ensure trouble free operation and avoid premature failure.
- Always follow the correct mounting/installation procedures when re-assembling valves.
- Use only recommended or specified line media during the operation of the valve to avoid damage to internal valve components and valve body.
- Avoid contact of the valve with excessive external heat, such as those associated with fire, to prevent damage to internal rubber components.

4.1. Torque Specification

| Part no. | Part (NW) | Size | Torque (Nm) |
|----------|--|-----------|-------------|
| 16 | 15/20/25 | M6 x 1.0 | ≤5 |
| | 32/40/50/65/80 | M10 x 1.5 | ≤15 |
| 14 | 15 | M28 x 1.5 | ≤90 |
| | 20 | M32 x 1.5 | ≤100 |
| | 25 | M40 x 1.5 | ≤120 |
| | 32/65/80 | M48 x 1.5 | ≤135 |
| | 40 | M58 x 1.5 | ≤150 |
| | 50 | M70 x 2 | ≤200 |
| | Flange nut-bolt (class-150/300) (NOTE-Stainless Steel having tensile strength greater than 52kg/mm ² or steel fastener grade 8.8 Or better.) | M14 x 2 | ≤40 |
| | | M18 x 2.5 | ≤90 |
| | | M20 x 2.5 | ≤140 |

Components

4.2. Parts Lists



Components and Repair Kits

| | DESCRIPTION | MATERIAL | Pos. No. | Qty. |
|----------------------|---|-----------------------------|----------|------|
| Body (Internals) | | CF3M (SS316L) | 20 | 1 |
| REPAIR KIT (97) | Consists of Operator, Sleeve, Seat and Seal Kit assembly (Assembled Condi-tion) | | | |
| | Indicator Dome | Polycarbonate | 1 | 1 |
| | Operator Cover | Glass filled Nylon | 2 | 1 |
| | Open Indicator | ABS | 3 | 1 |
| | Piston Seal | NBR | 4 | 1 |
| | Insert | SS316L | 5 | 2 |
| | Piston | Aluminium Anodised | 6 | 1 |
| | Piston Spring | Carbon Steel (IS4454 GR II) | 7 | 1 |
| | Piston Inner Spring | Carbon Steel (IS4454 GR II) | 7A | 1 |
| | Operator | Glass filled Nylon | 8 | 1 |
| | Shaft Seal (#) | NBR | 9 | 1 |
| | Hex Assembly | Aluminium hard Anodised | 10 | 1 |
| | Shaft bearing | PTFE/PEEK | 11 | 1 |
| | Gland Packing | PTFE/PEEK | 12 | 6 |
| | Gland Spring | SS 302 | 13 | 1 |
| | Sleeve | CF3M (SS316L Cast- 1.4435) | 14 | 1 |
| | Body Seal | PTFE | 15 | 1 |
| | Shaft | SS316L (1.4404) | 16 | 1 |
| | Washer | SS 304 | 21 | 2 |
| | Gland Packing Retainer | PTFE | 19 | 1 |
| | Operator Seal | NBR | 22 | 1 |
| | Dome Nut Seal | NBR/Viton | 23 | 1 |
| | Operator Cover Seal | NBR/Viton | 24 | 1 |
| | Hex Flange Nut | Zinc | 25 | 1 |
| | Seal | NBR/Viton | 26 | 2 |
| | Bush | PTFE | 27 | 1 |
| | Bush Seal | NBR/Viton | 28 | 1 |
| | Sleeve Seal | NBR/Viton | 29 | 1 |
| Seat + Seal Kit (96) | Consists of Seat assembly and seal kit | | | |
| | Seat holder assembly | SS 316L | 17 | 1 |
| | Retaining Ring | SS 302 | 18 | 1 |
| | Body Seal | PTFE | 15 | 2 |
| | Shaft Seal(#) | NBR | 9 | 1 |
| | Operator Seal | NBR | 22 | 1 |
| | Dome Nut Seal | NBR/Viton | 23 | 1 |
| | Operator Cover Seal | NBR/Viton | 24 | 1 |
| | Seal | NBR/Viton | 26 | 2 |
| | Bush Seal | NBR/Viton | 28 | 1 |
| | Sleeve Seal | NBR/Viton | 29 | 1 |

Maintenance

4.3. Replace Piston Seal & O-Rings (Kit 96)

1. Remove operator cover (2) at operator (8) from valve assembly by special operator cover opening tool (photo-1)
2. Replace operator cover seal (24) O ring between operator cover (2) and Operator (8).
3. Remove indicator Dome (1) from operator cover (2) by ring spanner.
4. Replace indicator dome (1) O-ring.
5. Remove open indicator (3), hexagonal nut, piston (6), and washer from shaft (16). Replace 2 Orings (26) at piston (6).
6. Replace piston seal (4).
7. Open body (20) from valve assembly. Replace body seal (15).
8. Remove the retainer ring (18) & pin from seat holder assembly (17) and shaft (16).
9. Remove seat holder assembly (17) from shaft (16).
10. Remove hex assembly (10), which assembled with sleeve (14). Dismantle hex assembly (10) by ring spanner. Replace shaft seal (9), O ring inside Hex assembly (10) & O ring between hex assembly (10) & Operator (8).
11. Replace operator seal (22) O ring between Operator (8) and Sleeve (14).

4.4. Replace Seat Assembly (Kit 96)

1. Open body (20) from valve assembly.
2. Remove retainer ring (18) and pin from seat holder assembly (17) & shaft (16).
3. Remove seat holder assembly (17) from shaft (16).
4. Replace new seat holder assembly(17)
5. Assemble seat holder assembly (17) on shaft (16) with Pin and clamp retainer ring (18).
6. Assemble Body (20) in valve assembly.

4.5. Replace Repair Kit (Kit 97 – Operator, Seat and Seal Kit Assembly)

1. Remove the body (20) from valve assembly.
2. Replace the PTFE body seal (15) and attach the body to new valve assembly having all parts except the body.

4.6. Disposal of Parts

1. Please follow the local regulation when disposing the Non-Metallic / Metallic parts like seat seal, O-ring, operator etc.

CRANE

CRANE CHEMPHARMA & ENERGY

Crane Process Flow Technologies Ltd.
Grange Road
Cwmbran, Gwent
NP44 3XX, United Kingdom
Tel.: + 44 1633 486666

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