

spirax sarco

PF51G

Bronze Piston Actuated On/Off Valves

TI-P373-14
CH Issue 4

Description

A 2-port pneumatically actuated on/off bronze valve for use on water, air, oil and gases. It can also be used on lower specification steam applications.

A pneumatic signal acts on the actuator piston to open or close the valve with a spring return action. The valve plugs have a PTFE soft seal (**G**) to provide a tight shut-off. A valve position indicator is included on standard and flow regulator models.

Valves are available with one of three sizes of actuator:

Type 1 (45 mm), **Type 2** (63 mm) and **Type 3** (90 mm) with the following action options:

- **NC (Normally Closed)**
These valves are designed for flow over the seat (port 1 to 2).
Caution: Not recommended for waterhammer prevention.
- **NO (Normally Open)**
These valves are designed for flow under the seat (port 2 to 1).
Can be used to prevent waterhammer on valve closure in liquid applications.
- **BD (Bi-Directional normally closed)**
These valves are designed for special applications that require flow in both directions and incorporates an anti-waterhammer design for liquid applications flowing under the seat (port 2 to 1). **Note:** To help prevent the possibility of waterhammer on liquid applications flowing over the seat (port 1 to 2) the pressure should not exceed 1 bar g.



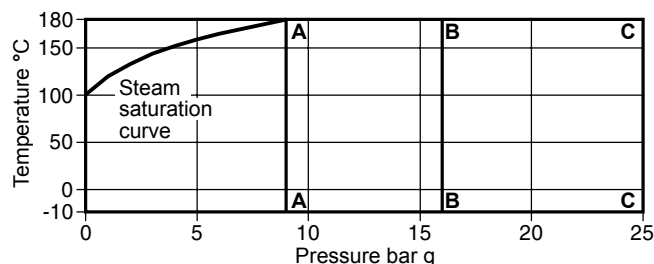
Optional extras (see 'Valve selection guide', page 7):

- Travel switch.
- Flow regulator.

Available range - sizes, pipe connections and actuator combinations

| Valve type | Pipe connections | Valve action | type | Actuator Model | Sizes | | | | | |
|------------|-----------------------|---|------|----------------|-------|------|----|--------|--------|----|
| | | | | | 1/2" | 3/4" | 1" | 1 1/4" | 1 1/2" | 2" |
| PF51G | Screwed BSP or NPT | NC - Normally Closed (flow over seat) | 1 | PF51G - 1NC | • | • | • | | | |
| | | | 2 | PF51G - 2NC | • | • | • | • | • | • |
| | | | 3 | PF51G - 3NC | | | • | • | • | • |
| | | NO - Normally Open (flow under seat) | 1 | PF51G - 1NO | • | • | • | | | |
| | | | 2 | PF51G - 2NO | • | • | • | • | • | • |
| | | | 3 | PF51G - 3NO | | | • | • | • | • |
| | | BD - Bi-Directional normally closed (flow over or flow under seat) | 1 | PF51G - 1BD | • | • | • | | | |
| | | | 2 | PF51G - 2BD | • | • | • | • | • | • |
| | | | 3 | PF51G - 3BD | | | • | • | • | • |

Pressure / temperature limits



A - A Maximum operating pressure on saturated steam 9 bar g

B - B Maximum operating pressure on size 2" 16 bar g

C - C Maximum operating pressure on sizes 1/2" to 1 1/2" 25 bar g

| | | | |
|----------------------------|--|---------------|-----------------------|
| Body design conditions | Screwed BSP or NPT | 1/2" - 1 1/2" | PN25 |
| | | 2" | PN16 |
| PMA | Maximum allowable pressure | | 25 bar g |
| TMA | Maximum allowable temperature | | 180°C |
| | Minimum allowable temperature | | -10°C |
| PMO | Maximum operating pressure for saturated steam service | | 9 bar @ 180°C |
| TMO | Maximum operating temperature | | 180°C |
| | Minimum operating temperature (Note: For lower operating temperatures consult Spirax Sarco.) | | -10°C |
| Ambient temperature limits | | Maximum | 60°C |
| | | Minimum | -10°C |
| ΔPMX | Maximum differential pressure | | (see page 4) |
| | Designed for a maximum cold hydraulic test pressure of: | | 1.5 x PMA (PN rating) |
| | Note: With internals fitted, test pressure must not exceed ΔPMX | | |

Technical details

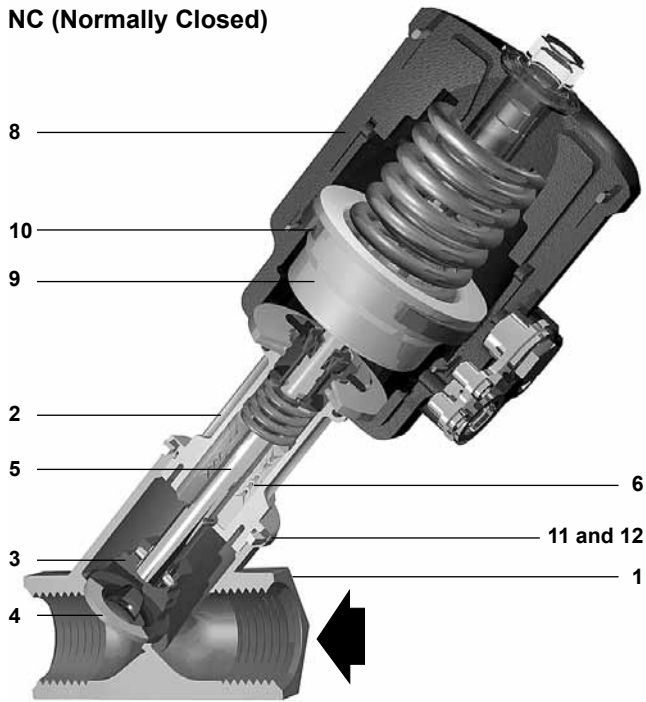
| | | | |
|-------------------------------|--------------------------------|-------------------------------|---------------|
| Leakage | | PTFE soft seal | ANSI class V1 |
| Flow characteristic | | Fast opening | On/off |
| Flow direction | PF51G-NC | Flow over seat | Port 1 to 2 |
| | PF51G-NO | Flow under seat | Port 2 to 1 |
| | PF51G-BD | Flow over seat | Port 1 to 2 |
| | | Flow under seat | Port 2 to 1 |
| Pilot media | | Air or water | 60°C maximum |
| Actuator rotation | | 360° | |
| Actuator type and size | Pilot connection | Maximum pilot pressure | |
| | Type 1 = 45 mm diameter | 1/8" BSP | 10 bar g |
| | Type 2 = 63 mm diameter | 1/4" BSP | 10 bar g |
| | Type 3 = 90 mm diameter | 1/4" BSP | 8 bar g |

Kvs values

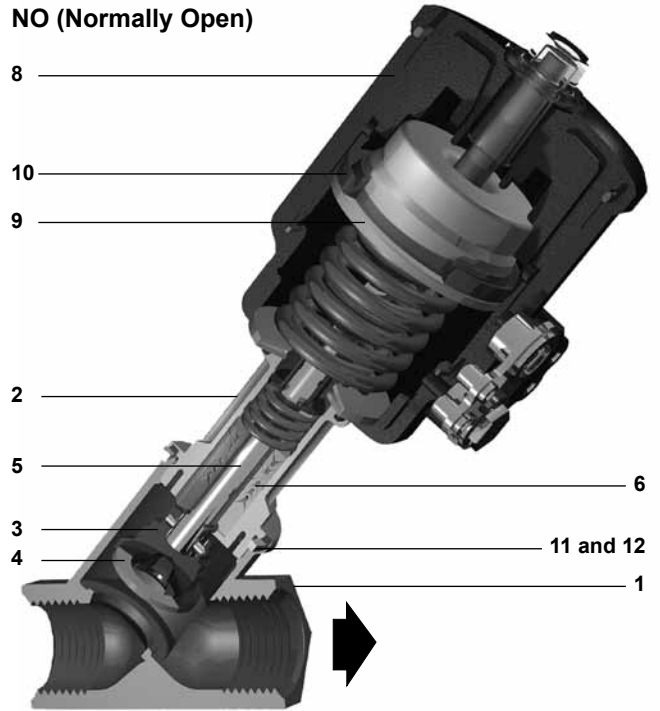
| | | | | | | |
|-------------|------|------|------|--------|--------|----|
| Size | 1/2" | 3/4" | 1" | 1 1/4" | 1 1/2" | 2" |
| Kvs | 4.5 | 8 | 15.6 | 24.6 | 42 | 57 |

For conversion: C_V (UK) = $K_V \times 0.963$ C_V (US) = $K_V \times 1.156$

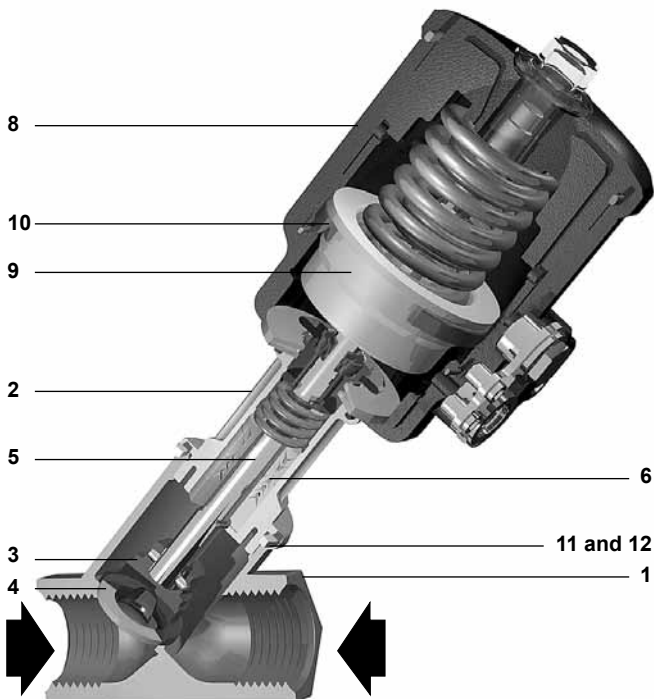
NC (Normally Closed)



NO (Normally Open)



BD (Bi-Directional normally closed)



Materials

| No. | Part | Material | |
|-----|------------------|------------------------|-----------------|
| 1 | Body | Bronze | EN 1982 CC491K |
| | | Bronze | EN 1982 CC491K |
| 2 | Bonnet | ½" and 1" | |
| | | Brass | EN 12165 CW617N |
| | | ¾", 1¼", 1½" and 2" | |
| 3 | Plug | Stainless steel | AISI 316L |
| 4 | Plug seal | PTFE | |
| 5 | Valve stem | Stainless steel | AISI 316 |
| 6 | Stem seals | PTFE chevrons | |
| * 7 | Stem 'O' ring | Viton | |
| 8 | Actuator housing | Glass filled polyamide | |
| 9 | Piston | Glass filled polyamide | |
| 10 | Piston lip seal | Viton | |
| 11 | Gasket | PTFE | |

* Note: Item 7 is not shown.

ΔPMX - Maximum differential pressures for PF51G piston actuated valves

PF51G-NC (Normally closed)

| Model | Valve size | Actuator diameter (mm) | Flow direction (port 1 to 2) | Maximum differential pressure (bar) | Pilot Pressure | |
|-----------|------------|------------------------|------------------------------|-------------------------------------|----------------|---------------|
| | | | | | Minimum (bar) | Maximum (bar) |
| PF51G-1NC | 1/2" | 45 | over seat | 16 | 1.8 | 10 |
| | 3/4" | 45 | over seat | 16 | 1.8 | 10 |
| | 1" | 45 | over seat | 16 | 1.8 | 10 |
| PF51G-2NC | 1/2" | 63 | over seat | 20 | 1.5 | 10 |
| | 3/4" | 63 | over seat | 20 | 1.5 | 10 |
| | 1" | 63 | over seat | 20 | 1.5 | 10 |
| | 1 1/4" | 63 | over seat | 16 | 3.0 | 10 |
| | 1 1/2" | 63 | over seat | 16 | 3.0 | 10 |
| | 2" | 63 | over seat | 11 | 3.0 | 10 |
| PF51G-3NC | 1" | 90 | over seat | 20 | 1.0 | 8 |
| | 1 1/4" | 90 | over seat | 16 | 2.5 | 8 |
| | 1 1/2" | 90 | over seat | 16 | 2.5 | 8 |
| | 2" | 90 | over seat | 15 | 2.5 | 8 |

PF51G-NO (Normally open)

| Model | Valve size | Actuator diameter (mm) | Flow direction (port 2 to 1) | Maximum differential pressure (bar) | Pilot Pressure | |
|-----------|------------|------------------------|------------------------------|-------------------------------------|----------------|---------------|
| | | | | | Minimum (bar) | Maximum (bar) |
| PF51G-1NO | 1/2" | 45 | under seat | 16 | 1.8 | 10 |
| | 3/4" | 45 | under seat | 16 | 1.8 | 10 |
| | 1" | 45 | under seat | 16 | 1.8 | 10 |
| PF51G-2NO | 1/2" | 63 | under seat | 16 | 1.5 | 10 |
| | 3/4" | 63 | under seat | 16 | 1.5 | 10 |
| | 1" | 63 | under seat | 16 | 1.5 | 10 |
| | 1 1/4" | 63 | under seat | 16 | 1.5 | 10 |
| | 1 1/2" | 63 | under seat | 16 | 1.5 | 10 |
| | 2" | 63 | under seat | 12 | 1.5 | 10 |
| PF51G-3NO | 1" | 90 | under seat | 16 | 1.0 | 8 |
| | 1 1/4" | 90 | under seat | 16 | 1.0 | 8 |
| | 1 1/2" | 90 | under seat | 16 | 1.0 | 8 |
| | 2" | 90 | under seat | 16 | 1.0 | 8 |

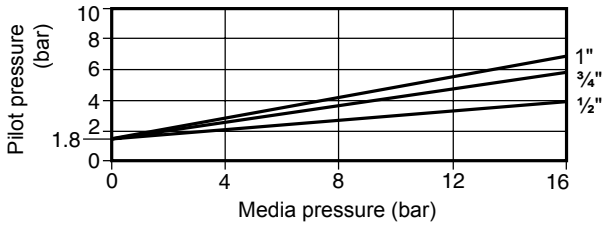
PF51G-BD (Bi-Directional normally closed)

| Model | Valve size | Actuator diameter (mm) | Flow direction (port 1 to 2) | Maximum differential pressure (port 1 to 2) (bar) | Flow direction (port 2 to 1) | Maximum differential pressure (port 2 to 1) (bar) | Pilot pressure | |
|-----------|------------|------------------------|------------------------------|---|------------------------------|---|----------------|---------------|
| | | | | | | | Minimum (bar) | Maximum (bar) |
| PF51G-1BD | 1/2" | 45 | over seat | 16 | under seat | 16.0 | 5.0 | 10 |
| | 3/4" | 45 | over seat | 16 | under seat | 7.0 | 5.0 | 10 |
| | 1" | 45 | over seat | 16 | under seat | 5.0 | 5.0 | 10 |
| PF51G-2BD | 1/2" | 63 | over seat | 16 | under seat | 16.0 | 3.8 | 10 |
| | 3/4" | 63 | over seat | 16 | under seat | 16.0 | 3.8 | 10 |
| | 1" | 63 | over seat | 16 | under seat | 11.0 | 3.8 | 10 |
| | 1 1/4" | 63 | over seat | 16 | under seat | 6.0 | 3.8 | 10 |
| | 1 1/2" | 63 | over seat | 12 | under seat | 4.0 | 3.8 | 10 |
| | 2" | 63 | over seat | 8 | under seat | 2.5 | 3.8 | 10 |
| PF51G-3BD | 1" | 90 | over seat | 16 | under seat | 14.0 | 3.3 | 8 |
| | 1 1/4" | 90 | over seat | 16 | under seat | 12.0 | 3.3 | 8 |
| | 1 1/2" | 90 | over seat | 16 | under seat | 8.0 | 3.3 | 8 |
| | 2" | 90 | over seat | 14 | under seat | 5.0 | 3.3 | 8 |

Pilot / media pressure relationship

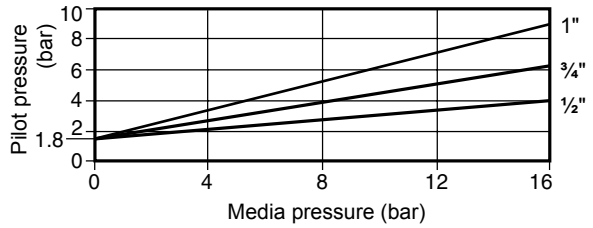
PF51G-NC (Normally Closed)

PF51G-1NC flow over seat (1 to 2)

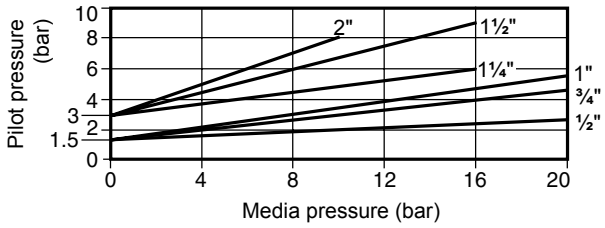


PF51G-NO (Normally Open)

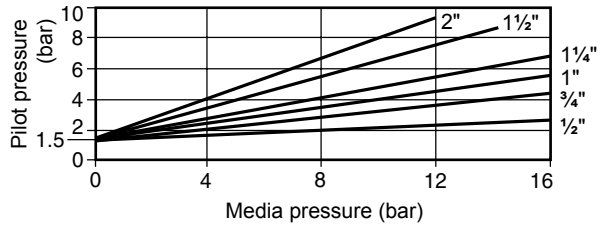
PF51G-1NO flow under seat (2 to 1)



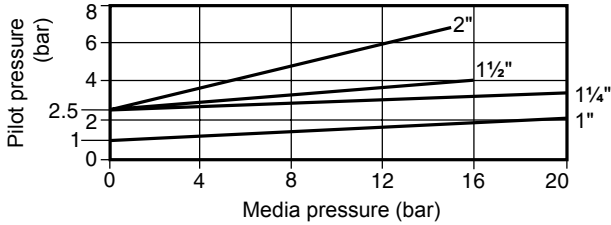
PF51G-2NC flow over seat (1 to 2)



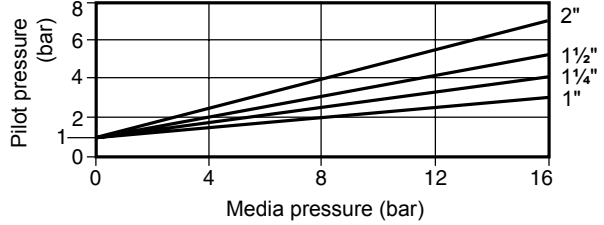
PF51G-2NO flow under seat (2 to 1)



PF51G-3NC flow over seat (1 to 2)

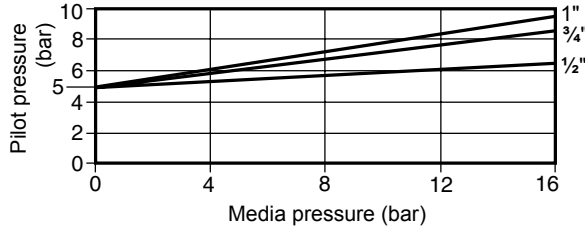


PF51G-3NO flow under seat (2 to 1)

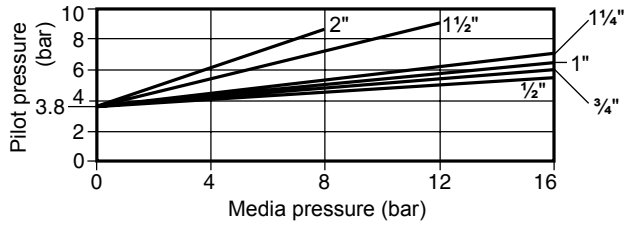


PF51G-BD (Bi-Directional normally closed)

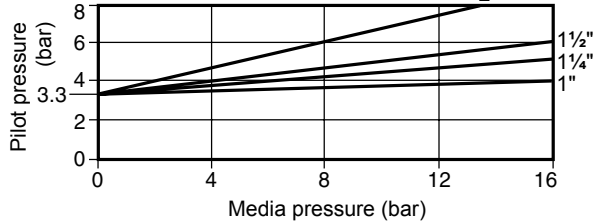
PF51G-1BD flow over seat (1 to 2)



PF51G-2BD flow over seat (1 to 2)



PF51G-3BD flow over seat (1 to 2)

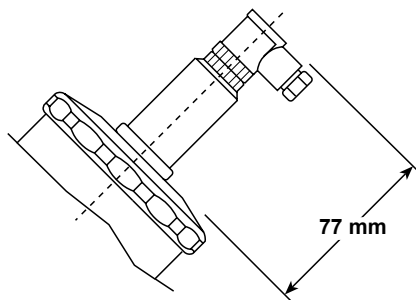


Dimensions and weights (approximate) in mm and kg

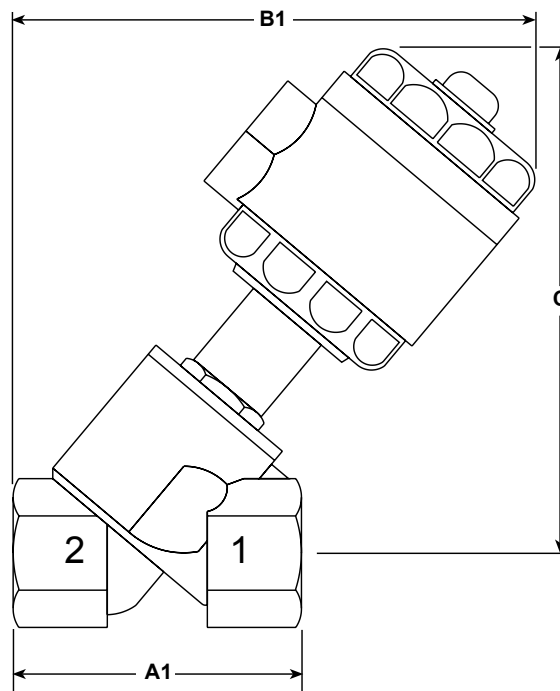
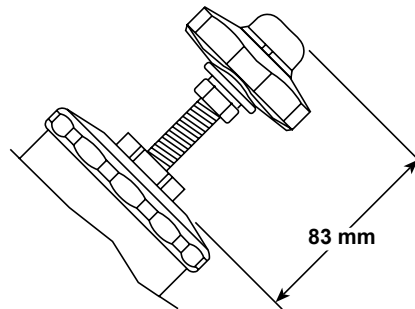
| Valve size | Actuator type and size | A1 | B1 | C | D | Weight* |
|------------|------------------------|-----|-----|-----|-----|---------|
| 1/2" | 1 (45 mm) | 65 | 144 | 136 | 123 | 0.8 |
| | 2 (63 mm) | 65 | 192 | 184 | 171 | 1.2 |
| 3/4" | 1 (45 mm) | 75 | 149 | 142 | 126 | 0.9 |
| | 2 (63 mm) | 75 | 198 | 192 | 176 | 1.3 |
| 1" | 1 (45 mm) | 90 | 168 | 161 | 141 | 1.1 |
| | 2 (63 mm) | 90 | 212 | 205 | 185 | 1.5 |
| | 3 (90 mm) | 90 | 223 | 216 | 196 | 2.2 |
| 1 1/4" | 2 (63 mm) | 110 | 225 | 217 | 193 | 1.9 |
| | 3 (90 mm) | 110 | 234 | 227 | 202 | 2.4 |
| 1 1/2" | 2 (63 mm) | 120 | 230 | 225 | 198 | 2.4 |
| | 3 (90 mm) | 120 | 239 | 235 | 207 | 2.6 |
| 2" | 2 (63 mm) | 150 | 248 | 241 | 207 | 2.9 |
| | 3 (90 mm) | 150 | 257 | 250 | 216 | 3.3 |

Notes: * Add 0.2 kg for travel switch or flow regulator options (not available for use with the Type 1 actuator).

* Travel switch



* Flow regulator



Valve selection guide

| | | |
|-----------------------------|---|----------------------|
| Valve size | 1/2", 3/4", 1", 1 1/4", 1 1/2" and 2" | 1" |
| Valve type | P = Piston valve | P |
| Valve characteristic | F = Fast opening | F |
| Body material | 5 = Bronze | 5 |
| Connections | 1 = Screwed BSP or NPT | 1 |
| Valve plug seal | G = PTFE | G |
| Actuator type | 1 = 45 mm diameter (for valve sizes 1/2" to 1") | 2 |
| | 2 = 63 mm diameter (for valve sizes 1/2" to 2") | |
| | 3 = 90 mm diameter (for valve sizes 1" to 2") | |
| Valve position | NC = Normally Closed | NC |
| | NO = Normally Open | |
| | BD = Bi-Directional | |
| Optional | Blank = No options required | <input type="text"/> |
| | I = Travel switch Provides indication of open or closed valve position through a magnetic reed switch with volt free contacts. Maximum rating: Voltage (V) = 500 V, Current (I) = 0.5 A, Power (P) = 30 VA. Available on Type 2 and Type 3 actuators with suffix 'I' if this option is required. | |
| | R = Flow regulator Provides manual control of maximum flow through the valve. Can also provide manual shut-off on normally open valves. Available on Type 2 and Type 3 actuators with suffix 'R' if this option is required. | |

Note: Shaded areas represent fixed parameters

| | | | | | | | |
|--------------------------------------|--------------------------------|--|---|--|---|----------------------|-------------|
| Valve selection guide example | <input type="text" value="1"/> | <input type="text" value="PF5"/> <input type="text" value="1"/> <input type="text" value="G"/> | - | <input type="text" value="2"/> <input type="text" value="NC"/> | - | <input type="text"/> | Screwed BSP |
|--------------------------------------|--------------------------------|--|---|--|---|----------------------|-------------|

How to order

Example: 1 off Spirax Sarco 1" PF51G-2NC bronze piston actuated on/off valve having screwed BSP connections.

Spare parts

A seal kit is available for all valve and actuator sizes comprising: Piston lip seal, stem 'O' ring, valve head seal (PTFE), body seal.

How to order spare seal kits

Always order spares by specifying the valve size, type and date code (given on the actuator label i.e. 120 = week 12, year 2000).

Example: 1 off Seal kit for a 1" PF51G-2NC, date code 120.

Safety information, installation and maintenance

For full details, see the Installation and Maintenance Instructions supplied with the product.

Installation note: These valves can be mounted in any orientation. The actuator can be rotated 360° in the direction indicated on the product label to facilitate easy pilot mounting connection.

Associated equipment

Pilot solenoid

Type DM 3-port two way electropneumatic pilot solenoid valve that can be directly mounted (banjo connection) to the PF51G-NC, NO and BD series piston actuated valves to provide actuator pilot pressure to open normally closed or close normally open valves. Suitable for air or water operating media. The valve is supplied with a DIN connector. For full details refer to the relevant Technical Information Sheet.

Available types

| Model | Type | Actuator | Voltage/Frequency | Connection |
|-------|------|----------|--------------------------|------------|
| DM11 | 1 | 45 mm | 230 / 50 or 240 / 60 Vac | 1/8" BSP |
| DM12 | 1 | 45 mm | 110 / 50 or 120 / 60 Vac | 1/8" BSP |
| DM13 | 1 | 45 mm | 24 / 50 or 24 / 60 Vac | 1/8" BSP |
| DM14 | 1 | 45 mm | 24 Vdc | 1/8" BSP |
| DM21 | 2 | 63 mm | 230 / 50 or 240 / 60 Vac | 1/4" BSP |
| DM22 | 2 | 63 mm | 110 / 50 or 120 / 60 Vac | 1/4" BSP |
| DM23 | 2 | 63 mm | 24 / 50 or 24 / 60 Vac | 1/4" BSP |
| DM24 | 2 | 63 mm | 24 Vdc | 1/4" BSP |
| DM31 | 3 | 90 mm | 230 / 50 or 240 / 60 Vac | 1/4" BSP |
| DM32 | 3 | 90 mm | 110 / 50 or 120 / 60 Vac | 1/4" BSP |
| DM33 | 3 | 90 mm | 24 / 50 or 24 / 60 Vac | 1/4" BSP |
| DM34 | 3 | 90 mm | 24 Vdc | 1/4" BSP |

