Direct Acting Solenoid Valves
Model FP01
(Up to 690 bar, 1 litre per minute)

Superior Performance Throughout the Full Operational Range

- Compact Design
- Solenoid Valve Certified as SIL 3 Capable
- Solenoid Free to Rotate Through 360°
- 316L Stainless Steel Solenoid Enclosure and Valve
- NACE MR-01-75 Internal Wetted and Body Materials (Option)
- Arctic Service Options to -36°C
- Seated Ball Design Offers Extremely Low Leakage (Less Accumulation Required, Smaller Pump Size & Duty)
- Worldwide Solenoid Approvals Ex d, Ex ia, Ex emb and Explosion Proof
- Low Power
- Up to 690 bar Working Pressure

Innovative and Reliable Valve Solutions

www.bifold.co.uk
Features & Benefits

Worldwide Approvals

![AWXUHV	%HQHÀWV](image)

Solenoid Valve Range

**Solenoid Valve Range**

**Worldwide Approvals**

- ATEX
- IEC Ex
- CE
- SIK
- VDE
- UL
- FM

**Solenoid Operator is Free to Rotate 360°**

- Solenoid operator is free to rotate 360° allowing for an easy cable layout and ease of connection wiring. Solenoid operator internals rotate with the enclosure and prevent cables being pulled out of terminal block.

**Widest Range of Override Options**


**Valve can be Mounted in any Orientation**

- Standard solenoid valve can be mounted in any orientation to simplify installation due to all the components having enhanced rotational capabilities.

**Spacious Enclosure for Ease of Wiring**

- Spacious solenoid enclosure for ease of wiring.

- No time penalty for heat dissipation before removing solenoid enclosure cover.

- No special high temperature cable requirements.

**Commissioning and Maintenance Benefits for the Standard Solenoid Valve**

- Tropicalised solenoid operator design - 316L stainless steel enclosure; stainless steel or Remko B magnetic parts (dependant upon solenoid Ex type) Fully encapsulated coil.

Quality Assurance

All Bifold products are manufactured to a most stringent QA programme to ensure every product will give optimum performance and reliability. Our products are also subject to BS EN 10204-3.1 where available. We reserve the right to make changes without prior notice. Accuracy of information: We take care to ensure that product information in this catalogue is reasonably accurate and up-to-date. However, our products are continually developed and updated so to ensure accurate and up-to-date information please refer to the product catalogue issue list on our web site or contact a member of our sales team.

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Commissioning and Maintenance Benefits for the Standard Solenoid Valve

- Spacious solenoid enclosure for ease of wiring.

- No time penalty for heat dissipation before removing solenoid enclosure cover.

- No special high temperature cable requirements.
Solenoid Valve Range

Features & Benefits

SIL 3 Capability, FMEA, Extensive Qualification Testing Coupled with 100% Computerised Diagnostic Test Procedures.

Safety and Environmental Benefits

- **SIL 3 capability**: The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3.

- **Force balanced valve design** with high safety factors to de-energise at all pressures in Normally Open and Normally Closed configurations.

- **100% computerised diagnostic testing** to ensure each solenoid valve is proven along with confirmed safety factors.

- **Bifold has state of the art testing and qualification equipment including endurance, environment, climatic, performance, function and leakage testing.**

- The standard solenoid operator is a holding magnet type which ensures the valve will operate in damp conditions. The risk of corrosion to internal components is reduced, unlike other valve types that incorporate a solenoid core tube design with a ‘wetted’ armature that will only operate in dry air conditions!

- The standard solenoid valve has proven arctic service and low temperature performance.

- **Products are manufactured, inspected, assembled and tested in our state of the art production facilities.**

- **Dry solenoid armature** to prevent corrosion and affecting safe shut down.

- **Simple maintenance - Removable transient suppression diode on Ex d DC solenoid valve assemblies and removable solenoid coil without removing valve from the tubing.**

Accuracy of information

While we ensure that product information is up to date and correct, we cannot guarantee that all product modifications and updates will be reflected online. For the most current information on all products, please visit our website or contact your local Bifold sales person. We reserve the right to make changes without notice.

Quality Assurance

All Bifold products are manufactured to a stringent QA programme to ensure optimum performance and reliability. We are an approved supplier under BS EN 10204 3.1, and our products comply with the requirements of BS EN 10204 3.1 where applicable. We reserve the right to make changes to our specifications and design details without prior notice.
# Preferred Range

## DIRECT ACTING SOLENOID VALVES - PREFERRED RANGE

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Product Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP01/S1/M/32/NC/S/74AT4-24D/36</td>
<td>3 way 2 position, direct acting, Normally Closed, 24Vdc, Auto Reset. ATEX II 2 GD c, Ex emb IIC T4 Gb IECEx Ex emb IIC T4 Gb 3.6 Watt, Cv 0.01, 345 bar.</td>
</tr>
<tr>
<td>FP01/S1/M/32/NC/S/77A-24D/30</td>
<td>3 way 2 position, direct acting, Normally Closed, 24Vdc, Auto Reset. ATEX II 2 GD, Ex d IIC T6 IECEx Ex d IIC T6 3.0 Watt, Cv 0.01, 345 bar.</td>
</tr>
<tr>
<td>FP01/S1/M/32/NC/S/78A-155</td>
<td>3 way 2 position, direct acting, Normally Closed, Manual Reset. ATEX II 1 GD, Ex ia IIC T6 Ga IECEx Ex ia IIC T6 Ga 155 Ohms, Cv 0.01, 345 bar.</td>
</tr>
<tr>
<td>FP01/S1/M/32/NC/S/74AT4-24D/ML/36</td>
<td>3 way 2 position, direct acting, Normally Closed, Manual Reset. ATEX II 2 GD, Ex emb IIC T4 Gb IECEx Ex emb IIC T4 Gb 3.6 Watt, Cv 0.01, 345 bar.</td>
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</tbody>
</table>

† Solenoid must be used in conjunction with a correctly matched Intrinsically Safe (IS) solenoid driver. The valve installer is responsible for a correct and safe IS system.
# Preferred Range

## DIRECT ACTING SOLENOID VALVES - PREFERRED RANGE

<table>
<thead>
<tr>
<th>Product</th>
<th>Schematic Representation</th>
<th>Page Number</th>
<th>Product Code</th>
<th>Product Description</th>
</tr>
</thead>
</table>
| FP01/S3/M/32/NC/S/74AT4-24D/36 | ![Schematic Diagram](image1) | 3           | 3 way 2 position, direct acting, Normally Closed, 24Vdc, Auto Reset.  
ATEX II 2 GD, Ex emb IIC T4 Gb  
IECEx Ex emb IIC T4 Gb  
3.6 Watt, Cv 0.01, 690 bar. |  |
| FP01/S3/M/32/NC/S/77A-24D/30 | ![Schematic Diagram](image2) | 13          | 3 way 2 position, direct acting, Normally Closed, 24Vdc, Auto Reset.  
ATEX II 2 GD, Ex d IIC T6  
IECEx Ex d IIC T6  
3.0 Watt, Cv 0.01, 690 bar. |  |
| FP01/S3/M/32/NC/S/78A-155 | ![Schematic Diagram](image3) | 13          | 3 way 2 position, direct acting, Normally Closed, 24Vdc, Manual Reset.  
ATEX II 2 GD c, Ex emb IIC T4 Gb  
IECEx Ex emb IIC T4 Gb  
3.6 Watt, Cv 0.01, 690 bar. |  |
| FP01/S3/M/32/NC/S/74AT4-24D/ML/36 | ![Schematic Diagram](image4) | 2           | 3 way 2 position, direct acting, Normally Closed, 24Vdc, Manual Reset.  
ATEX II 2 GD c, Ex emb IIC T4 Gb  
IECEx Ex emb IIC T4 Gb  
3.6 Watt, Cv 0.01, 690 bar. |  |
ATEX II 2 GD c, Ex em IIC T6  
IECEx Ex e IIC T6  
3.0 Watt, Cv 0.01, 690 bar. |  |
| FP01/S3/M/32/NC/S/78A-155/ML | ![Schematic Diagram](image6) | 13          | 3 way 2 position, direct acting, Normally Closed, 24Vdc, Manual Reset.  
ATEX II 2 GD, Ex emb IIC T6 Ga  
IECEx Ex emb IIC T6 Ga  
155 Ohms, Cv 0.01, 690 bar. |  |

† Solenoid must be used in conjunction with a correctly matched Intrinsically Safe (IS) solenoid driver. The valve installer is responsible for a correct and safe IS system.

---

**Accuracy of Information:**

While every effort has been made to ensure that product information is accurate and up-to-date, we cannot guarantee its completeness, accuracy, and reliability. If you require more detailed information, please visit our website or contact our sales team. We reserve the right to make changes to specifications and policies without prior notice.

**Quality Assurance:**

All Bifold products are manufactured to BS EN 10204 3.1 where available. We execute a rigorous quality assurance process to ensure performance and reliability. For more information, please visit our website at www.bifold.co.uk.
### Accuracy of Information

We take care to ensure that product information in this catalogue is reasonably accurate and up-to-date. However, our products are continually developed and updated so to ensure accurate and up-to-date information please refer to the product catalogue issue list on our website or contact a member of our sales team.

When selecting a product, the applicable operating system design must be considered to ensure safe use. The products function, material compatibility, adequate ratings, correct installation, operation and maintenance are the responsibilities of the system designer and user.

### Quality Assurance

All Bifold products are manufactured to a most stringent QA programme to ensure that every product will give optimum performance and reliability. We are third party certified to BS EN ISO 9001:2008. Intrinsic safe certification, where offered, is validated by a third party certification body. We reserve the right to make changes to the specifications and design of our products prior to manufacture.

### Other Products Within The FP01 Range

**Solenoid Valves**

#### DIRECT ACTING SOLENOID VALVES

<table>
<thead>
<tr>
<th>Product</th>
<th>Schematic Representation</th>
<th>Page Number</th>
<th>Product Code</th>
<th>Product Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP01/S1/S1/M/32/NC/S/74AT4-24D/SB/36</td>
<td><img src="image" alt="FP01 S1 / S1, S2 / S2 &amp; S3 Manual Override Spring Return" /></td>
<td>14</td>
<td>3 way 2 position, direct acting, Normally Closed, 24Vdc, pulse operated, bi-stable, hydraulically latched, fail to close on loss of pressure, Auto Reset.</td>
<td>ATEX II 2 GD, Ex d IIC T6 IECEx Ex d IIC T6 3.6 Watt, Cv 0.01, 345 bar.</td>
</tr>
<tr>
<td>FP01/S2/S2/M/32/NC/S/77A-24D/SB/30</td>
<td><img src="image" alt="FP01 S1 / S1, S2 / S2 &amp; S3 Manual Override Spring Return" /></td>
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<td>ATEX II 2 GD, Ex d IIC T6 IECEx Ex d IIC T6 3.0 Watt, Cv 0.01, 517 bar.</td>
</tr>
<tr>
<td>FP01/S3/S3/M/32/NC/S/78A-155/SB</td>
<td><img src="image" alt="FP01 S1 / S1, S2 / S2 &amp; S3 Manual Override Spring Return" /></td>
<td>14</td>
<td>3 way 2 position, direct acting, Normally Closed, 24Vdc, pulse operated, bi-stable, hydraulically latched, fail to close on loss of pressure. *Manual Override.</td>
<td>ATEX II 1 GD, Ex ia IIC T6 Ga IECEx Ex ia IIC T6 Ga 155 Ohms, Cv 0.01, 690 bar.</td>
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<td>FP01/S1/S1/M/32/NC/S/74AT4-24D/SB/M/36</td>
<td><img src="image" alt="FP01 S1 / S1, S2 / S2 &amp; S3 Manual Override Spring Return" /></td>
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<td>FP01/S3/S3/M/32/NC/S/78A-155/SB/M</td>
<td><img src="image" alt="FP01 S1 / S1, S2 / S2 &amp; S3 Manual Override Spring Return" /></td>
<td>14</td>
<td>3 way 2 position, direct acting, Normally Closed, 24Vdc, pulse operated, bi-stable, hydraulically latched, fail to close on loss of pressure. *Manual Override.</td>
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† Solenoid must be used in conjunction with a correctly matched Intrinsically Safe (IS) solenoid driver. The valve installer is responsible for a correct and safe IS system.

* Manual Override Spring Return.

**FP01 - S1 / S1, S2 / S2 & S3 / S3**

For the complete S1 / S1, S2 / S2 & S3 / S3 range, please see the selection chart on Page 14.
Overview

Materials of Construction

Solenoid enclosure and valve manufactured from 316L stainless steel as standard.
Internal components are constructed from 316L stainless steel, AISI 440C, CA104 aluminium bronze and ceramic as standard.
Alternative materials are available for NACE MR-01-75 compliance.
Valve seals are supplied in Nitrile as standard. Alternative elastomers available for extreme conditions and to suite media.
Springs are manufactured from 316S42 stainless steel as standard.
Fasteners are metric A4 18 / 10 grade stainless steel; equivalent to 316L grade stainless steel.

Technical Data

Operating Performance for FP01
Duty cycle 100% continuously rated / energised.
Surge suppression diode is fitted on all Ex d dc solenoid coils as standard.
Response times - pull in < 100ms, drop out < 70ms.
Solenoid Insulation - Class H.
Pull in volts to 90% of nominal. (checked at FAT to be within specified limits to guarantee safety factors).
Maximum volts at 110% of nominal.
IP66 & IP67 Ingress Protection to IEC 60529 and NEMA 4X for standard 7 series solenoid enclosures.
Bifold solenoid valves must be installed, operated and maintained in accordance with the relevant Bifold installation, operating and maintenance instructions, relevant installation rules and codes of practice.

Product Options

Certification & Approval options available

SIL 3 capability: The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3 in accordance with IEC 61508.
Solenoid valve assemblies can be mounted in any orientation. Solenoid enclosure can be rotated relative to the pilot stage valve body to suit cable entry.
Working pressure up to 690 bar. Maximum working pressure according to valve model.
Operating media - Mineral oils, water glycol mixtures, sea water (filtered) and some chemicals.
For operating temperature range, please see solenoid valve type and seal options.
Arctic Service options to -36ºC.

Flow Performance

Accuracy of Information

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Quality Assurance

All Bifold products are manufactured to a most stringent QA programme to ensure optimum performance and reliability. The end product complies to BS EN 10204 3.1 where available. We reserve the right to make changes to the specifications and design at our own discretion.

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**Solenoid Certification & Approvals**

### Certification Details

**Certification & Approval Details**

#### Type 74 Solenoid

- **ATEX, Certificate Number Baseefa 09ATEX0040X.**
  - Ex d IIC T6 (Tamb -60°C to +40°C).
  - Ex d IIC T5 (Tamb -60°C to +55°C).
  - Ex d IIC T4 (Tamb -60°C to +90°C).

- **IECEx, Certificate Number IECEx Bas 09.012X.**
  - Ex emb IIC T4 Gb Tamb -25°C to +50°C.
  - Ex emb IIC T3 Gb Tamb -25°C to +55°C.

#### Type 77 Solenoid

- **ATEX, Certificate Number Baseefa 10ATEX0026.**
  - Ex d IIC T6 (Tamb -60°C to +40°C).
  - Ex d IIC T5 (Tamb -60°C to +55°C).
  - Ex d IIC T4 (Tamb -60°C to +90°C).

- **IECEx, Certificate Number IECEx Bas 10.0008.**
  - Ex d IIC T6 (Tamb -60°C to +40°C).
  - Ex d IIC T5 (Tamb -60°C to +55°C).
  - Ex d IIC T4 (Tamb -60°C to +90°C).

#### Type 78 Solenoid

- **ATEX, Certificate Number Baseefa 02ATEX0124X.**
  - Ex ia IIC T6 Ga (Tamb = -60°C to +60°C).
  - Ex ia IIC T4 Ga (Tamb = -60°C to +95°C).

- **IECEx, Certificate Number IECEx Bas 09.0092X.**
  - Ex ia IIC T6 Ga (Tamb = -60°C to +60°C).
  - Ex ia IIC T4 Ga (Tamb = -60°C to +95°C).

#### Type 79 Solenoid

- **CSA (US), Certificate Number 1398692.**
  - Class I, Division 1, Groups B, C & D for both Canada & USA.
  - Ex d IIC for Canada, AEx d IIC for USA.
  - T85°C -60°C to +40°C ambient.
  - T100°C -60°C to +55°C ambient.
  - T135°C -60°C to +90°C ambient.

- **INMETRO, Certificate Number CEPEL-EX-097/2003X.**
  - BR-Ex d IIC T6 -60°C to +40°C ambient.
  - BR-Ex d IIC T5 -60°C to +55°C ambient.
  - BR-Ex d IIC T4 -60°C to +90°C ambient.

- **GOST, Certificate Number B00763, RTN.**
  - Ex d IIC T6 -60°C to +40°C ambient.
  - Ex d IIC T5 -60°C to +55°C ambient.
  - Ex d IIC T4 -60°C to +90°C ambient.

- **GOST K, GGTN K Permit, Kazakhstan, BIF 7727 2.**
  - Ex ia IIC T6 -60°C to +40°C ambient.
  - Ex ia IIC T5 -60°C to +55°C ambient.
  - Ex ia IIC T4 -60°C to +90°C ambient.

#### Label Rationalisation

The temperature details on our solenoid valve labels have, to date, been laid out with a single ambient range and 'T' rating, as follows:-

- **77A - T4** (-60°C ≤ Tamb ≤ +90°C)
- **77A6 - T5** (-60°C ≤ Tamb ≤ +55°C)
- **77A9 - T6** (-60°C ≤ Tamb ≤ +40°C)

These are in the process of being replaced with a single label which covers all potential temperature parameters. Therefore the label will for example, read as follows:-

- **77A**
  - **T4** (-60°C ≤ Tamb ≤ +90°C)
  - **T5** (-60°C ≤ Tamb ≤ +55°C)
  - **T6** (-60°C ≤ Tamb ≤ +40°C)

For solenoid type 74, the maximum permissible ambient temperature is subject to the coil Wattage. Please see page 9.

Please note that operation ambients are dependent upon seal types.

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**Quality Assurance**

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Solenoid Valve Product Options

Port Connections

Port Connections (FP01)

PORT CONNECTIONS TABLE

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Pressure</th>
<th>Service</th>
<th>Vent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normally Closed</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Normally Open</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Selector</td>
<td>1 &amp; 3</td>
<td>2</td>
<td>N/A</td>
</tr>
<tr>
<td>Diverter</td>
<td>2</td>
<td>1 &amp; 3</td>
<td>N/A</td>
</tr>
</tbody>
</table>

For port connections, please refer to selection chart ordering example on pages 13 & 14.

Product Weights

Approximate Standard Product Weights

PRODUCT WEIGHTS

<table>
<thead>
<tr>
<th>Product</th>
<th>Approximate Weight (Excluding Sub-base) (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1, S2 &amp; S3</td>
<td>2.5</td>
</tr>
<tr>
<td>S1 / S2 / S3 / S3</td>
<td>5</td>
</tr>
</tbody>
</table>

Seal Repair Kit

Seal Repair Kit Selection Chart - Ordering Example (FP01)

FP01

<table>
<thead>
<tr>
<th>Model Code</th>
<th>Maximum Valve Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>345 bar</td>
</tr>
<tr>
<td>S2</td>
<td>517 bar</td>
</tr>
<tr>
<td>S3</td>
<td>690 bar</td>
</tr>
<tr>
<td>S1 / S1</td>
<td>345 bar</td>
</tr>
<tr>
<td>S2 / S2</td>
<td>517 bar</td>
</tr>
<tr>
<td>S3 / S3</td>
<td>690 bar</td>
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</tbody>
</table>

M Sub-base Mounting

<table>
<thead>
<tr>
<th>Sub-base Mounting</th>
<th>Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>2-way, 2-position</td>
</tr>
<tr>
<td>32</td>
<td>3-way, 2-position</td>
</tr>
<tr>
<td>NC</td>
<td>Normally Closed</td>
</tr>
<tr>
<td>NO</td>
<td>Normally Open</td>
</tr>
<tr>
<td>SV</td>
<td>Selector Valve</td>
</tr>
<tr>
<td>DV</td>
<td>Diverter Valve</td>
</tr>
</tbody>
</table>

NC Position

- Normally Closed
- Normally Open

SV Position

<table>
<thead>
<tr>
<th>Valves</th>
<th>O-ring Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 / S1</td>
<td>Nitrile (standard)</td>
</tr>
<tr>
<td>S2 / S2</td>
<td>Viton</td>
</tr>
<tr>
<td>S3 / S3</td>
<td>Nitrile (Low Temperature)</td>
</tr>
</tbody>
</table>

RK Repair Kit

For detailed information, please contact Bifold sales department.

Solenoid Coil Spare

Solenoid Coil Spare Selection Chart - Ordering Example Type 74 & 77

109

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>Coil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>74 (Ex emb)</td>
<td>Voltage</td>
</tr>
<tr>
<td>77 (Ex d)</td>
<td>12, 24, 48 &amp; 110 Vdc</td>
</tr>
<tr>
<td>77 (Ex d)</td>
<td>110 &amp; 240Vac</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power (W)</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>74 (Ex emb)</td>
<td>1.8 &amp; 3.6 Watts</td>
</tr>
<tr>
<td>77 (Ex d)</td>
<td>1.5 &amp; 3.0 Watts</td>
</tr>
</tbody>
</table>

EXM 74 Only

109-24DC-30 - EXM

Ordering Example

Seal Repair Kit

Seal Repair Kit Selection Chart - Ordering Example Type 78

109

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>Coil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>78 (Ex ia)</td>
<td>Nominal Voltage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resistance (Ω)</th>
<th>Resistance †</th>
</tr>
</thead>
<tbody>
<tr>
<td>78 (Ex ia)</td>
<td>155 Ohms</td>
</tr>
</tbody>
</table>

109-12 - 155

Ordering Example

† Solenoid must be used in conjunction with a correctly matched Intrinsically Safe (IS) solenoid driver. The valve installer is responsible for a correct and safe IS system.

Accuracy of Information

While every effort has been made to ensure that product information is correct, no warranty is given as to the accuracy of the information. The user is responsible for checking the information provided and ensuring that it is suitable for their requirements. The user should also consider any supplementary information and instructions provided with the product.

Quality Assurance

All Bifold products are manufactured to a very high standard and are designed, manufactured and tested to meet the stringent requirements of the ISO 9001:2015 quality management system. We reserve the right to make changes to the specifications and design of our products without prior notice.
### SOLENOID OPTIONS TABLE 1  74 (Ex emb)

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Solenoid Order Code</th>
<th>Typical Apparatus Code</th>
<th>Standard Voltage</th>
<th>Power Consumption (W)</th>
<th>CV Rate</th>
<th>Temperature Range (°C)</th>
<th>Ingress Protection</th>
<th>Cable Entry Connection</th>
<th>Certification Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP01 (S1)</td>
<td>74</td>
<td>Ex emb IIC T3 / T4</td>
<td>24 Vdc</td>
<td>1.8</td>
<td>0.01</td>
<td>-20°C to +40°C</td>
<td>IP66 IP67 NEMA 4X</td>
<td>M20 x 1.5 (½&quot; NPT Option)</td>
<td>ATEX IECEx</td>
</tr>
<tr>
<td>FP01 (S2)</td>
<td></td>
<td></td>
<td>48 Vdc</td>
<td>3.6</td>
<td>0.01</td>
<td>-25°C to +50°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FP01 (S3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-25°C to +40°C (T3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FP01 (S1 / S1)</td>
<td>74</td>
<td></td>
<td>24 Vdc</td>
<td>1.8</td>
<td>0.01</td>
<td>-20°C to +40°C</td>
<td>IP66 IP67 NEMA 4X</td>
<td>M20 x 1.5 (½&quot; NPT Option)</td>
<td>ATEX IECEx</td>
</tr>
<tr>
<td>FP01 (S2 / S2)</td>
<td></td>
<td></td>
<td>48 Vdc</td>
<td>3.6</td>
<td></td>
<td>-25°C to +50°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FP01 (S3 / S3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-25°C to +40°C (T3)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For detailed information on certification, please see page 8.

Other Wattages available upon request.

# Permissible media operating temperatures are dependent upon the selected O-Ring material. Please refer to the product selection charts on pages 13 to 14.

---

**Accuracy of Information**

While we strive to ensure that product information is accurate to the best of our knowledge and belief, we cannot guarantee that all product data and specifications are 100% correct. Any error or omission shall not constitute a warranty, representation or other assurance of any nature nor shall it void or affect the terms of any contract between us and the customer. Any information or material, whether written, oral, visual, or electronic, made available to the customer is at the customer’s risk and discretion. We reserve the right to make changes to the specifications and design at our sole discretion.
### Ex d Options

#### Options Table 2  77 (Ex d)

**Solenoid Options Table 2  77 (Ex d)**

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Solenoid Order Code</th>
<th>Typical Apparatus Code</th>
<th>Standard Voltage</th>
<th>Power Consumption (W)</th>
<th>CV Rate</th>
<th>Temperature Range (°C)</th>
<th>Ingress Protection</th>
<th>Cable Entry Connection</th>
<th>Certification Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP01 (S1)</td>
<td>77 Ex d IIC T6, T5 or T4</td>
<td>12 Vdc 24 Vdc 48 Vdc 110 Vdc 110 Vac 240 Vac 50 or 60 Hz</td>
<td>1.5</td>
<td>0.01</td>
<td>Media # -20°C to +90°C (T4) -60°C to +90°C (T4)</td>
<td>IP66</td>
<td>M20 x 1.5 (1/4&quot; NPT Option)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FP01 (S2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ambient -60°C to +40°C (T6) -60°C to +55°C (T5) -60°C to +90°C (T4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FP01 (S3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FP01 (S1 / S1)</td>
<td>77 Ex d IIC T6, T5 or T4</td>
<td>12 Vdc 24 Vdc 48 Vdc 110 Vdc 110 Vac 240 Vac 50 or 60 Hz</td>
<td>1.5</td>
<td>0.01</td>
<td>Media # -20°C to +90°C (T4) -60°C to +90°C (T4)</td>
<td>IP66</td>
<td>M20 x 1.5 (1/4&quot; NPT Option)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FP01 (S2 / S2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ambient -60°C to +40°C (T6) -60°C to +55°C (T5) -60°C to +90°C (T4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FP01 (S3 / S3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For detailed information on certification, please see page 8.

Other Wattages available upon request.

# Permissible media operating temperatures are dependent upon the selected O-Ring material. Please refer to the product selection charts on pages 13 to 14.
**Solenoid Options Table 3 78 (Ex ia)**

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Solenoid Order Code</th>
<th>Typical Apparatus Code</th>
<th>CV Rate</th>
<th>Temperature Range</th>
<th>Ingress Protection</th>
<th>Cable Entry Connection</th>
<th>Certification Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP01 (S1)</td>
<td>78 †</td>
<td>Ex ia IIC T6 or T4</td>
<td>0.01</td>
<td>Media #</td>
<td>IP66</td>
<td>M20 x 1.5 (½&quot; NPT Option)</td>
<td>ATEX IECEx INMETRO GOST GOST K GGTN</td>
</tr>
<tr>
<td>FP01 (S2)</td>
<td>78 †</td>
<td>Ex ia IIC T6 or T4</td>
<td>0.01</td>
<td>Media #</td>
<td>IP66</td>
<td>M20 x 1.5 (½&quot; NPT Option)</td>
<td>ATEX IECEx INMETRO GOST GOST K GGTN</td>
</tr>
<tr>
<td>FP01 (S3)</td>
<td>78 †</td>
<td>Ex ia IIC T6 or T4</td>
<td>0.01</td>
<td>Media #</td>
<td>IP66</td>
<td>M20 x 1.5 (½&quot; NPT Option)</td>
<td>ATEX IECEx INMETRO GOST GOST K GGTN</td>
</tr>
</tbody>
</table>

For detailed information on certification, please see page 8.

† Solenoid must be used in conjunction with a correctly matched Intrinsically Safe (IS) solenoid driver. The valve installer is responsible for a correct and safe IS system.

# Permissible media operating temperatures are dependent upon the selected O-Ring material. Please refer to the product selection charts on pages 13 to 14.

### Safety Parameters: Type 78

- **Ui**: 31 V, **li**: 210 mA, **Pi**: 1.5 W, **Ci**: 0 μF, **Li**: 0 mH
- **Coil Resistance**: 155 Ohm ± 5%
- **Minimum Current @ solenoid coil**: 80 mA
FP01 (S1, S2 & S3)

Dimensional Drawing

FP01 Selection Chart - Ordering Example

<table>
<thead>
<tr>
<th>S</th>
<th>Model Code</th>
<th>Direct acting, spring return</th>
<th>Maximum Valve Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>FP01 / S1</td>
<td>M/32 / NC / S / S1</td>
<td>345 bar</td>
</tr>
<tr>
<td>S2</td>
<td>FP01 / S2</td>
<td>M/32 / NC / S / S2</td>
<td>517 bar</td>
</tr>
<tr>
<td>S3</td>
<td>FP01 / S3</td>
<td>M/32 / NC / S / S3</td>
<td>690 bar</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connections</th>
<th>Valve Configuration</th>
<th>O-ring Material</th>
<th>Solenoid</th>
<th>Solenoid Approval</th>
<th>Ex emb 'T' Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Sub-base Mounting</td>
<td></td>
<td></td>
<td></td>
<td>Class ≤ 4.0 W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(50°C maximum ambient temperature)</td>
</tr>
<tr>
<td>22</td>
<td>2-way, 2-position (effected by omitting / plugging one port in the sub-base)</td>
<td></td>
<td></td>
<td></td>
<td>74 (Ex emb)</td>
</tr>
<tr>
<td>32</td>
<td>3-way, 2-position</td>
<td></td>
<td></td>
<td></td>
<td>77 (Ex d)</td>
</tr>
<tr>
<td>NC NO SV DV</td>
<td>Normal Closed</td>
<td>Normally Open</td>
<td></td>
<td></td>
<td>78 (Ex ia)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>O-ring Material</th>
<th>Solenoid Approval</th>
<th>Ex emb 'T' Option</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Class ≤ 4.0 W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(50°C maximum ambient temperature)</td>
</tr>
<tr>
<td>S V SA</td>
<td></td>
<td>74 (Ex emb)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>77 (Ex d)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>78 (Ex ia)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type 74 (Ex emb)</th>
<th>Type 77 (Ex d)</th>
<th>Type 78 (Ex ia)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage, refer to Solenoid option tables.</td>
<td>Voltage</td>
<td>Voltage</td>
</tr>
<tr>
<td>74 (Ex emb)</td>
<td>77 (Ex d)</td>
<td>78 (Ex ia)</td>
</tr>
<tr>
<td>Page 10 - Table 1</td>
<td>Page 11 - Table 2</td>
<td>Page 12 - Table 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resistance (Ω)</th>
<th>Power (W)</th>
<th>Sub-Base Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>78 (Ex ia)</td>
<td>74 (Ex emb)</td>
<td>K85</td>
</tr>
<tr>
<td></td>
<td>77 (Ex d)</td>
<td>H2S</td>
</tr>
<tr>
<td></td>
<td>78 (Ex ia)</td>
<td></td>
</tr>
<tr>
<td>Page 12 - Table 3</td>
<td>Page 10 - Table 1</td>
<td>Page 11 - Table 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power (W)</th>
<th>Sub-Base Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8 &amp; 3.6 Watts</td>
<td>K85</td>
</tr>
<tr>
<td>1.5 &amp; 3.0 Watts</td>
<td>H2S</td>
</tr>
<tr>
<td>Page 10 - Table 1</td>
<td>Page 11 - Table 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>H2S NACE MR-01-75 compliant internal wetted and body materials</th>
<th>M221 ¼” NPT</th>
<th>M437 ¼” BSPP</th>
</tr>
</thead>
</table>

Ordering Example

For the shaded block sections, please refer to the same shaded sections on pages 10, 11 & 12.

† Solenoid must be used in conjunction with a correctly matched Intrinsically Safe (IS) solenoid driver. The valve installer is responsible for a correct and safe IS system. The solenoid valve installation operating and maintenance instruction reference is OP0165.

Accuracy of information

While every care is taken to ensure that product information in this catalogue is accurate and up-to-date, Bifold Group Ltd. reserve the right to make changes to any product without notice. The supplier is responsible for a correct and safe IS system.

Models / Notes

Series FP01 is available in Ex ia, Ex d or Ex emb configurations. The valve installer is responsible for correct IS system operation.

For more information please visit our website or contact your local sales team.

www.bifold.co.uk

BFD87 November’13

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FP01 (S1 / S1, S2 / S2 & S3 / S3) Selection Chart - Ordering Example

<table>
<thead>
<tr>
<th>FP01</th>
<th>Model Code</th>
<th>Maximum Valve Pressure</th>
<th>Sub-base Mounting</th>
<th>Connections</th>
<th>Valve Configuration</th>
<th>O-ring Material</th>
<th>Solenoid</th>
<th>Ex emb 'T' Option</th>
<th>Solenoid Approval</th>
<th>T4</th>
<th>Voltage</th>
<th>Resistance</th>
<th>Default Position</th>
<th>Power</th>
<th>Sub-Base Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 / S1</td>
<td>345 bar</td>
<td>Pulse operated, hydraulically latched, spring bias to close on loss of pressure</td>
<td>32</td>
<td>NC</td>
<td>Normally Closed</td>
<td>Nitrile (standard)</td>
<td>74 (Ex emb)</td>
<td>Page 10 - Table 1</td>
<td>✓</td>
<td>✓</td>
<td>+</td>
<td>✓</td>
<td>✓</td>
<td>M221 1/4&quot; NPT</td>
<td></td>
</tr>
<tr>
<td>S2 / S2</td>
<td>517 bar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Viton</td>
<td>77 (Ex d)</td>
<td>Page 11 - Table 2</td>
<td>✓</td>
<td>✓</td>
<td>+</td>
<td>✓</td>
<td>✓</td>
<td>M437 1/4&quot; BSPP</td>
<td></td>
</tr>
<tr>
<td>S3 / S3</td>
<td>690 bar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Nitrile (Low Temperature)</td>
<td>78 (Ex ia)</td>
<td>Page 12 - Table 3</td>
<td>✓</td>
<td>✓</td>
<td>+</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1 / S1</td>
<td>345 bar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2 / S2</td>
<td>517 bar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S3 / S3</td>
<td>690 bar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the shaded block sections, please refer to the same shaded sections on pages 10, 11 & 12.† Solenoid must be used in conjunction with a correctly matched Intrinsically Safe (IS) solenoid driver. The valve installer is responsible for a correct and safe IS system. The solenoid valve installation operating and maintenance instruction reference is OP0165.

Quality Assurance
The Bifold products are manufactured to a very rigorous quality assurance system that is certified to BS EN 9001:2008, ISO 9001:2008 and NSF 61. The company has a responsibility for the design and construction of the systems, with production under the control of QMS systems. This ensures the right to make changes on the specifications and design specifications, unless prior approval from Bifold is obtained. Further information can be found on the Bifold website. © Bifold 2013
Interface Details

Bifold Supplied Sub-Base Detail

Interface Detail (For Customer Designed Sub-Base)

Surface Finish Requirements

Valve Manifold Mounting - Surface Finish Requirements: - (applicable to full extent of valve/manifold interface)

Configurations

3-Way, 2-Position Normally Closed
(For 2-Way Valve Port 3 Must Be Plugged)

3-Way, 2-Position Normally Open
(For 2-Way Valve Port 1 Must Be Plugged)

3-Way Diverter
(For S1,S2 & S3 only)

3-Way Selector
(For S1,S2 & S3 only)

Accuracy of Information
While every effort has been made to ensure that product information in this catalogue is correct, Bifold reserves the right to make changes to products, features and prices at any time. Specifications, features, material compatibility, availability, ratings, correct installation, operation and maintenance are the responsibility of the system designer and user.

Quality Assurance
All Bifold products are manufactured to a most stringent QA programme. Where applicable, a full traceability system is available. To BS EN 10204 3.1 where applicable. We reserve the right to make changes to the specifications and design of our products without prior notice.

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Accessory Information

Options

Product Options

The range of products displayed in this brochure, are designed to accommodate all the options shown below. If the style or arrangement required for your application is not shown, please contact our office with full description and specification details.

Manual Override Type M

The solenoid valve switches on and off with the electrical supply. The manual override button can be pressed to operate the valve when the solenoid is in the electrically de-energised position. The manual override is non-detented, i.e. does not latch in position. When the button is released, the valve spring returns.

Manual Rotary Override Type MOR

The solenoid valve switches on and off with the electrical supply. The manual override button is rotated through ¾ turn to operate the valve when the solenoid is in the electrically de-energised position. The manual override is detented, i.e. remains in position until rotated back to its original position when the valve spring returns.

Manual Reset Type ML

Apply the electrical signal and press the reset button. The valve moves to the energised position and will not de-energise until the electrical supply is removed. The manual reset is non-detented, spring return, i.e. does not latch in position. The valve cannot be moved to the energised position by pressing the button if there is no electrical supply to the solenoid.
Accuracy of Information

We make no warranty that product information in this catalogue is correct and we reserve the right to make changes to any product. Performance may vary and is based on factory testing.

When selecting a product, the applicable operating system design must be considered to ensure safe use. The products function, material compatibility, adequate ratings, correct installation, operation and maintenance are the responsibility of the system designer and user.

Quality Assurance

All Bifold products are manufactured to a most stringent QA programme to ensure that every product will give optimum performance and reliability. We reserve the right to make changes to any product at any time. Performance may vary and is based on factory testing. Product specifications and compatibility may be influenced by material and environment where applicable. We reserve the right to make changes to the specifications and design at any time, without prior notice.

Typical Valve Assembly Showing FP01 Solenoid Valves - Manual Reset

Schematic

Typical Valve Assembly Showing FP01 Solenoid Valves

Schematic
Innovative and Reliable Valve Solutions

Instrument, Process, Directional Control Valves, and Pumps

Pneumatic and Instrumentation Valves

Hydraulic Valves

Subsea Valves

Hydraulic Pumps, Intensifiers and Valves

Accuracy of Information

We take care to ensure that product information in this catalogue is reasonably accurate and up-to-date. However, our products are continually developed and updated so to ensure accurate and up-to-date information please refer to the product catalogue issue list on our web site or contact a member of our sales team.

Quality Assurance

All Bifold products are manufactured to a most stringent QA programme. Every care is taken at all stages of manufacture to ensure that every product will give optimum performance and reliability. We are third party certified to BS EN ISO 9001:2008. Functional test certificate, letter of conformity and copies of original mill certificates, providing total traceability are available on request to BS EN 10204 3.1 where available. We reserve the right to make changes to the specifications and design etc., without prior notice.

When selecting a product, the applicable operating system design must be considered to ensure safe use. The product function, material compatibility, adequate ratings, correct installation, operation, and maintenance are the responsibilities of the system designer and user.