



**Keeping the World Flowing for Future Generations** 



Solenoid Valves

Pneumatic

07



# O Solenoid Valves Pneumatic

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# Direct Acting Solenoid Valve Range



Model Code	FP03P						
Configuration	2/2 & 3/2	2/2 & 3/2					
Port Connections	NPT & BSP - 1/8" & 1/4"	NPT & BSP - 1/8" & 1/4"					
Flow Rate	0.1 Cv						
Pressure	Up to 145 psi / 10 bar						
Power	1.5W - 3.0W (Ex d)	1.8W - 3.6W (Ex emb)	370 Ohms (Ex ia) / 32 mA				
Mounting	Body Ported						
Cycle Testing	Up to 1,000,000 Cycles						



Model Code	FP06P					
Configuration	2/2 & 3/2					
<b>Port Connections</b>	NPT & BSP - 1/4"					
Flow Rate	From 0.32 Cv, up to 1.2 Cv					
Pressure	Up to 232 psi / 16 bar					
Power	1.5W - 6.5W (Ex d)	1.8W - 6.8W (Ex emb)	135 Ohms (Ex ia) / 80 mA			
Mounting	Body Ported NAMUR					
Cycle Testing	Up to 1,000,000 Cycles					

# **Direct Acting Solenoid Valve Range**



Model Code	FPIOP	
Configuration	2/2 & 3/2	
<b>Port Connections</b>	NPT & BSP - 1/4", 3/8" & 1/2"	
Flow Rate	From 0.4 Cv, up to 1.2 Cv	
Pressure	Up to 725 psi / 50 bar	
Power	1.5W - 6.5W (Ex d)	I.8W - 6.8W (Ex emb)
Mounting	Body Ported	
Cycle Testing	Up to 1,000,000 Cycles	



Model Code	FP12P
Configuration	2/2 & 3/2
<b>Port Connections</b>	NPT & BSP - ½"
Flow Rate	2.5 Cv
Pressure	Up to 145 psi / 10 bar
Power	6.5W - 12.0W (Ex d)
Mounting	Body Ported
Cycle Testing	Up to 50,000 Cycles

# Indirect Acting Solenoid Valve Range



Model Code	BXS					
Configuration	2/2, 3/2, 5/2 & 5/3					
<b>Port Connections</b>	NPT & BSP - 1/4"					
Flow Rate	0.73 Cv					
Pressure	Up to 145 psi / 10 bar					
Power	0.8W - 3.0W (Ex d)	I.8W (Ex emb)	260 - 375 Ohms (Ex ia) / 37 mA			
Mounting	Body Ported NAMUR					
Cycle Testing	Up to 1,000,000 Cycles					



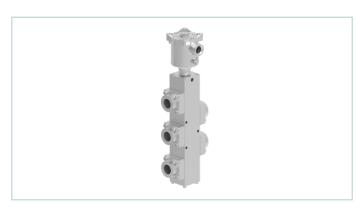
Model Code	SPR & (PPV Coming Soon)			
Configuration	2/2, 3/2 & 5/2			
<b>Port Connections</b>	NPT & BSP - 1/4" up to I"			
Flow Rate	From 2.0 Cv, up to 11.2 Cv			
Pressure	Up to 145 psi / 10 bar			
Power	0.8W - 3.0W (Ex d)	I.8 W (Ex emb)		260 - 375 Ohms (Ex ia) / 37 mA
Mounting	Body Ported			
Cycle Testing	Up to 10,000 Cycles (SPR)		Up to 1,000,000 C	ycles (PPV)

#### **Product Spotlight**



#### Low Power Operator - (FP06P-(10LP & 28LP))

- (10LP) 1.0W holding power 3.5W energise (less than 100 mS)
- (28LP) 2.8W holding power 8.0W energise (less than 100 mS)
- High flow, low holding power
- Low power consumption
- High cycle capability up to I million cycles



#### **High Flow** - (SPR & PPV)

- Low power consumption
- High flow capabilities
- Up to I" NPT
- Operates down to -60°C
- High cycle capability up to 1 million cycles (PPV)

#### Solenoid Valve Enclosure & Valve Body Options



	1 2 3 & 4							
(1)	Standard	Standard - 24 & 74AT4 Series (Ex emb), 27 & 77 Series (Ex d) & 77 Series (Explosion Proof)						
2	Slimline	28, 58 & 78 Series (Ex ia)						
3	Safe Area	130 Series (Safe Area) (BXS and SPR Only)						
3	Hazadous Area	140 Series (Ex ia) (BXS and SPR Only)						

#### One Source..... One Solution



#### **SETTING THE STANDARD:**



Outperforms all other solenoid valves in the industry.

Ultra low power consumption, under 1.0W continuous power ideal for solar applications.

For global wellhead, process, choke, valve actuation, deluge and fire damper markets.

Wide Range of operating media covered - 1/8" to 1" ports, 2/2, 3/2, 5/2, 5/3, 2 out of 3 voting and over 1.5 x 10° permutations - every application covered.

Low Cost Solution - Increase safety with no downtime and no leakage, without compromising on cost.

The operator is a flat plate armature, ensuring the valve will

operate in all conditions.

Capability to offer an expedited delivery service.

Highest qualified safety factors in the industry - Worldwide Ex Hazardous Area solenoid approvals: Ex emb, Ex d, Ex ia, Explosion Proof & Safe Area use, SIL 3 third party certified options available.

World leading supplier of control valves for low and high temperature applications.





# **07** Solenoid Valves Pneumatic

#### **Overview**

# Pneumatic Direct Acting & Indirect Acting Solenoid Valves, FP03P, FP10P, FP12P, BXS, SPR











Manufactured from 316L stainless steel as standard with aluminium options available, our range of pneumatic solenoid valves are ideally suited for hazardous (classified) locations and corrosive atmospheres and can also be used in low pressure hydraulic applications. Ultra low power consumption, under 1.0W continuous power ideal for solar applications up to 12.0W.

- Suitable for air quality to ISO 8573.1 Class 4: dirt, water and oil
- High flow up to 11.2 Cv

- Versions available for up to 725 psi / 50 bar working pressure
- Namur interface available

#### **Market Sectors**

- Wellhead Controls & Associated Field Instrumentation
- Shale Gas
- Process Choke Valve Actuation
- Process Skids & Modules

- HVAC, Fire Damper Actuator & Fire Water Deluge Controls
- Gas Compression & Turbine Controls
- Process Valve Actuator & Pipeline ESD (Emergency Shut Down) Valve Actuator Controls

#### **Application Example**



#### **Solenoid Valve Features & Benefits**







#### **Equipment Design & Build**

- Standard and slimline 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 the terminal block.
- Widest range of override options: auto reset, spring return manual override, stayput manual override, manual latch and manual reset.
- Standard solenoid valve can be mounted in any orientation to simplify installation and also due to all the components having enhanced rotational capabilities.
- Coils fully encapsulated as standard.
- A NAMUR interface is available on 5/2 port configuration valves. These types are supplied with multi-functional adaptor plates to permit valve orientation through 90° or conversion to a 3/2 configuration.
- All internal wetted and body materials conforming to NACE MR-01-75 as standard on the FP03P, FP06P, FP10P & FP12P with options available on the BXS & SPR.
- Suitable for air quality to ISO 8573.1 Class 4: dirt, water and oil.
- Simple installation and operation single enclosure with integral override options.
- Low / high temperature options.
- Ultra low power consumption, under 1.0 W continuous holding power, ideal for solar applications.
- Compatible within our 'AXIS' valve actuator control modular systems.

#### Commissioning & Maintenance

- Tropicalised solenoid operator design 316L stainless steel enclosure with aluminium options also available; stainless steel or Remko B magnetic parts (dependant upon solenoid Ex series). Fully encapsulated coil.
- Worldwide technical and field support.
- Spacious solenoid enclosure for ease of wiring.
- No special high temperature cable requirements.
- No time penalty for heat dissipation before removing solenoid enclosure cover.
- Simple maintenance Removable transient suppression diode on Ex d DC solenoid valve assemblies as standard and removable solenoid coil without removing valve from the tubing.
- Compact design and space envelope.

# O Solenoid Valves Pneumatic

#### **Solenoid Valve Features & Benefits**











#### Safety & Environmental

- Worldwide Ex hazardous area solenoid approvals: Ex emb, Ex d, Ex ia, explosion proof & safe area use.
- SIL 3 capability: The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3 in accordance with IEC 61508. (For the FP03P, FP06P, FP10P, BXS & SPR).
- Consistent high safety factors.
- The 77 series Ex d solenoid enclosure has been designed with 'spigot' and 'threaded' type flamepath joints. The minimum spacing requirements for obstruction of 'flange' joints regarding the installation of the solenoid enclosure and its proximity with other objects is not applicable (in accordance with IEC/BS EN 60079-14 Explosive atmospheres: Electrical installations design, selection and erection).
- Our safe area operator option is designed for continuous duty in conformity to the EN60730 safety standards. They are encapsulated in a self-extinguishing synthetic material and offer high mechanical protection and excellent thermal dissipation.
- 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 product qualification and production equipment including flow (Cv), environment (-60°C to +180°C), function and leakage testing and data logging.
- The standard solenoid operator is a flat plate armature type which ensures the valve will operate in all conditions. Other solenoid valve types using core tube design solenoid operators risk corrosion and seizure of the armature within the core tube.
- Tolerant to moist air in control lines.
- High tolerance to field misuse.
- Products are manufactured, inspected, assembled and tested in our state of the art production facilities.
- Large clearances, metal back up to seals and no knife edge sealing to prevent long term valve sticking.

#### **Standard & Slimline Solenoid Valve Technical Attributes**

Solenoid Valve Information									
Model Codes	FP03P, F	FP03P, FP06P, FP10P, FP12P, BXS & SPR							
Connections	⅓s" up t	<sup>1</sup> / <sub>8</sub> " up to I" (NPT and BSP)							
Cv	0.1 up t	:o 11.2							
Working Pressure	0 - 725	psi / 0	50 bar (N	<b>1</b> aximun	۱)				
Enclosure Type	Standar	d					Slimline	Safe Area	Hazadous Area
Enclosure Series	24	74AT4	27	77	28	78	58	130	140
Solenoid Classification	Ex emb T3 / T4	IIC Gb	Ex d II0 T4 / T5		Ex ia IIC Gb T4 / T6	Ex ia IIC Ga T4 / T6	Ex ia IIC Ga T6	N/A	Ex ia IIC Ga T4/T6
Ingress Protection	IP66, IP6 4X	67 and	IP66, IP 4X	67 and	IP66, IP67 and 4X	IP66, IP67 and 4X	IP66	IP65	IP65
Maximum Leakage Rate	40Pa/S	Maximun	n (Closed	d) Comp	oressed Air				
Materials of Cons	struction	on							
Enclosure & Valve Body	316L sta	ainless st	eel as sta	andard v	vith aluminium o	ptions also availab	e		
Internal Components	316L st	ainless st	eel						
Springs	302S26	& 316S4	2 stainle	ss steel a	as standard				
Fasteners	Metric A	44 18/10	grade st	ainless s	teel; equivalent t	o 316L grade stair	less steel		
O-ring Material HNE Temp FKM FVM		NBR - Nitrile (Standard) HNBR - Nitrile (Low Temperature) FKM - Fluoroelastomer FVMQ - Fluorosilicone FFKM - Perfluoroelastome		Media Temperature Range -60°C to +130°C (Dependant on seal type. Alternative elastomer's available for extreme conditions and to suit media)  Ambient Temperature Range -60°C to +90°C (Dependant on Solenoid Classification)					
Operating Media					d air, inert gas, sv erated valves)	weet (natural) and	sour gas optic	ns. Water, water	glycol mixtures
Conformity	All internal wetted and body materials conforming to NACE MR-01-75 as standard on the FP06P, FP10P & FP12P with options available on the BXS & SPR  SIL 3 capability: The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3 in accordance with IEC 61508. (For the FP03P, FP06P, FP10P, BXS & SPR)								
Electrical Charac	teristi	cs							
Duty cycle	100% co	ontinuou	sly rated	/ energi	sed				
Response Times	Pull in <	<100ms, o	drop out	<70ms					
Solenoid Insulation	Class H	l							
Volts	Pull-In volts 90% up to 110% nominal Drop-out volts, typically 10 - 20% of nominal								
Coil Voltage DC (=)	I2V DC up to 240 V DC								
Coil Voltage AC 50Hz and 60Hz (~)	24 V AC up to 240 V AC								
Cable Entry	M20 x I.5 & ½" NPT								
Bifold solenoid valves must be installed, operated and maintained in accordance with the relevant Bifold installation, operating and maintenance instructions, relevant installation rules, regulations and codes of practice.									

#### Safe Area & Hazardous Area Solenoid Valve Technical Attributes

Safe Area Solenoid Valve Information						
Enclosure Series	130					
Compatible with Valve Model Codes	BXS & SPR					
Materials of Construction						
Enclosure & Valve Body	PBT - Polybutylene Tereph standard with aluminium of	nthalate (Reinforced Fiberglass 30%) enclosure and 316L stainless steel valve body as options also available				
Tube	Stainless Steel AISI 304					
Flange	Stainless Steel 1.4305 EN	10088 (AISI 303)				
Plunger	Stainless Steel 1.4105 EN	10088 (AISI 430F) or equivalent				
Top Stop	Stainless Steel 1.4105 EN	10088 (AISI 430F)				
Springs	Stainless Steel AISI 302					
O-ring Material	FKM - Fluoroelastomer	Media Temperature Range -10°C to +130°C				
o ring riaceria.	The Fider Collegeomer	Ambient Temperature Range -10°C to +50°C				
<b>Electrical Charac</b>	teristics					
Duty Cycle	100%					
Coil Insulation	Class F 155°C					
Coil Voltage DC	24V DC					
Voltage Tolerance	+10% ÷ -5%					
Electrical Connection	PG9 EN 175301-803 Forr	n B				
Hazardous Area S	Solenoid Valve Infor	mation				
Enclosure Series	140					
Compatible with Valve Model Codes	BXS & SPR					
Materials of Cons	truction					
Enclosure & Valve Body	Thermoplastic Resin enclo	osure and 316L stainless steel valve body as standard with aluminium options also available				
Tube	Brass					
Flange	Brass					
Plunger	Magnetic Steel					
Top Stop	Magnetic Steel					
0 · M · · ·	FIGN. FI.	Media Temperature Range -10°C to +50°C				
O-ring Material	FKM - Fluoroelastomer	Ambient Temperature Range -40°C to +50°C				
<b>Electrical Charac</b>	teristics					
Duty Cycle	100%					
Coil Insulation	Class F 155°C					
Coil Voltage DC	28V DC					
Voltage Tolerance						
Electrical Connection	on PG9 EN 175301-803 Form A					
Impregnated coils for us	e in damp/humid environm	ents are available on request, must be used with connector and gasket.				
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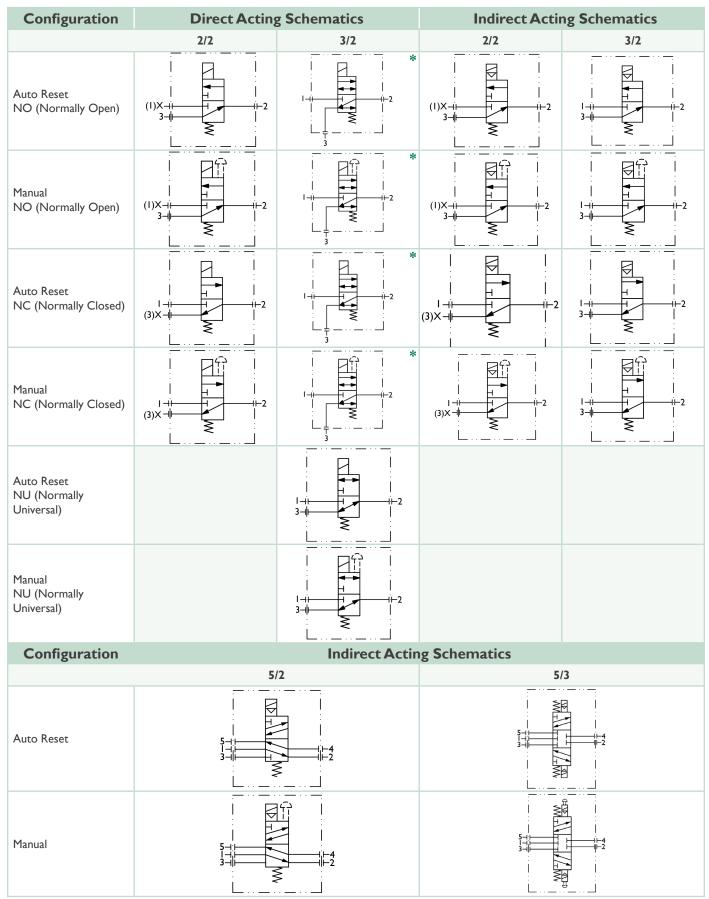
## **Solenoid Valve Technical Attributes**

Enclosure							
Certification	ATEX EX EX C E & SE ENT ENT & CCOE PESO  (Please contact bifold for available certification)						
Protection Class (Ex emb) - 24 & 74AT4 Series	II 2 GD c Ex emb IIC Gb T3 Tamb -25°C to +55°C (powers up to 3.0W or below) II 2 GD c Ex emb IIC Gb T4 Tamb -25°C to +50°C (powers up to 4.0W or below) II 2 GD c Ex emb IIC Gb T3 Tamb -25°C to +45°C (powers up to 4.5W or below) II 2 GD c Ex emb IIC Gb T3 Tamb -25°C to +40°C (powers up to 6.8W or below)						
Protection Class (Ex d) - 27 & 77 Series	II 2 GD Ex db IIC GbT6 (Tamb -60°C to +40°C) II 2 GD Ex db IIC GbT5 (Tamb -60°C to +55°C) II 2 GD Ex db IIC GbT4 (Tamb -60°C to +90°C)						
28 - II 2 GD Ex ia IIC Gb T6 (Tamb = -60°C to +60°C) II 2 GD Ex ia IIC Gb T4 (Tamb = -60°C to +95°C)  Protection Class (Ex ia) - 28, 58 & 78  Series  58 - II I GD Ex ia IIC Ga T6 (Tamb = -60°C to +60°C)  78 - II I GD Ex ia IIC Ga T6 (Tamb = -60°C to +60°C) II I GD Ex ia IIC Ga T4 (Tamb = -60°C to +95°C)							
Protection Class (Ex ia) - 140 Series	II 2 G Ex ia IIC Ga T6 (Tamb = -40°C to +40°C) II 2 G Ex ia IIC Ga T4 (Tamb = -40°C to +85°C)						
Power	24 & 74AT4 (Ex emb) - up to 6.8 Watts 27 & 77 (Ex d) - up to 6.5 Watts 77 (Ex d) - (10LP)* 1.0W holding power 3.5W Energise and (28LP)* 2.8W holding power 8.0W Energise 130 (Safe Area) - up to 3.0 Watt						
Resistance (Ω) and (Ex ia) - Safety Parameters <sup>1</sup>	28 & 78 (Ex ia) - 260 Ohms  Safety Parameters: 28 & 78 Series  Ui = 31 Vdc, li = 210 mA, Pi = 1.5 W, Ci ≈ 0 μF, Li ≈ 0mH Coil Resistance : 260 Ohm ± 5% Minimum Current Required @ solenoid coil = 45 mA  58 (Ex ia) - 135 Ohms Safety Parameters: 58 Series  Ui = 35 Vdc, li = 600 mA, Pi = 3 W, Ci ≈ 0 μF, Li ≈ 0 mH Coil Resistance : 135 Ohm ± 5% Minimum Current Required @ solenoid coil = 80 mA  140 (Ex ia) - 275 (Nominal) up to 375 (Warm) Ohms Safety Parameters: 140 Series  Ui = 28 Vdc, li = 115 mA, Pi = 1.6 W, Ci ≈ 0 μF, Li ≈ 0ml Coil Resistance : 275 Ohm (nominal) : 375 Ohm (warm) Minimum Current Required @ solenoid coil = 37 mA	28 & 78 (Ex ia) - 370 Ohms  Safety Parameters: 28 & 78 Series  Ui = 31 Vdc, li = 210 mA, Pi = 1.5 W, Ci ≈ 0 μF, Li ≈ 0mH  Coil Resistance : 370 Ohm ± 5%  Minimum Current Required @ solenoid coil = 32 mA					
Terminal Block (FP Operator)	The type MK3 terminal block can accommodate solid conductors between the range of 0.5mm² to 2.5mm² and flexible conductors between the range of 0.5mm² to 1.5mm²						
Seal Repair Kit	For solenoid operator specific SRK (Seal Repair Kits), p	olease contact Bifold sales department					
Coil Repair Kit	For solenoid operator specific CRK (Coil Repair Kits),	please contact Bifold sales department					

<sup>\*</sup> Low power

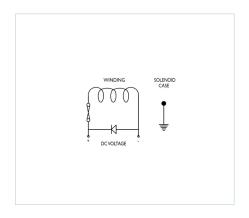
# Solenoid Valves Pneumatic

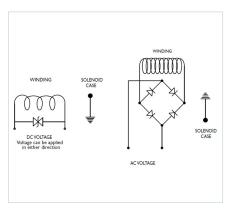
#### **Direct Acting & Indirect Acting Schematics**

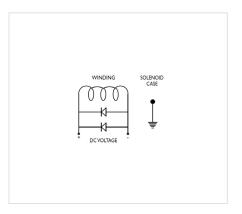


<sup>\*</sup> NAMUR Mounted

#### Standard & Slimline Wiring Diagrams





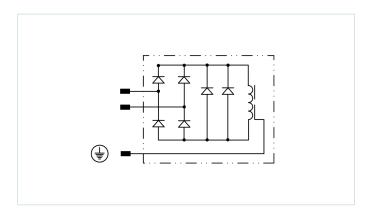


- (Ex emb) 24 & 74AT4 Series
- (Ex d) 27 & 77 Series
- (Ex ia) 28, 58 & 78 Series

## Safe Area Wiring Diagram

# WINDING SOLENOID CASE The state of the stat

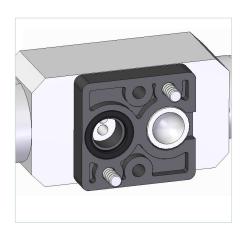
## Hazadous Area Wiring Diagram

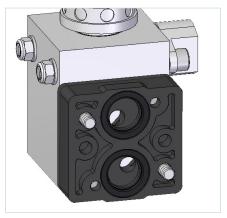


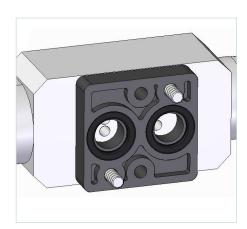
(Safe Area) - 130 Series

■ (Ex ia) - 140 Series

## 3/2 & 5/2 NAMUR Mounting Options







- 3/2 (BXS)
- 3/2 with 90° Rotation (FP06P)
- 5/2 & 5/3 (BXS)

Supplied as Standard with NAMUR mounted valves

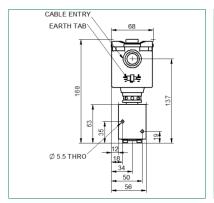
#### **Configurable Datasheet**

The Bifold Product Configurator can be used to configure valves to your exact specifications and automatically create a bespoke datasheet, 2D dimensional drawing and 3D CAD / Step file in real time, ready to download. Simply choose the product you would like from the products list and configure each option to your exact specification. Then simply click 'Request Documents' to download the relevant documents. To configure your product online visit www.bifold.co.uk/Product-Configurator.aspx, follow the instructions detailed on page 17 or contact Bifold for products not listed.

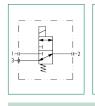
#### **FP06P Datasheet**







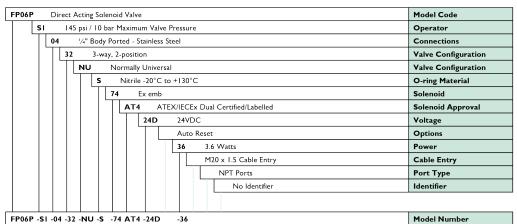








#### FP06P-S1-04-32-NU-S-74AT4-24D-36



#### **Protection Class**

II 2 GD c Ex emb IIC Gb T3 Tamb -25°C to +55°C (powers up to 3.0W or below)
II 2 GD c Ex emb IIC Gb T4 Tamb -25°C to +50°C (powers up to 4.0W or below)
II 2 GD c Ex emb IIC Gb T3 Tamb -25°C to +45°C (powers up to 4.5W or below)
II 2 GD c Ex emb IIC Gb T3 Tamb -25°C to +40°C (powers up to 6.8W or below)

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 continuably developed and classes to to ensure accurate and up-to-date information please refer to the product
catalogue issues life on our web site or occurs 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 to system designer and user. Quality Assurance
All Bifold products are manufactured to a stringent QA programme to ensure that every prowill give optimum performance and reliability. We are third parry certified to BS EN ISO 9001

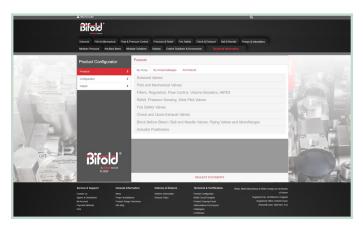
#### **Product Configurator**



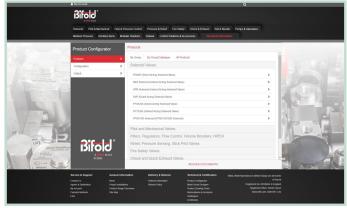
Visit www.bifold.co.uk/Index.aspx and go to the technical information tab or the technical & certification section of the footer and click the product configurator link.



**2.** Register or login to enter the product configurator.



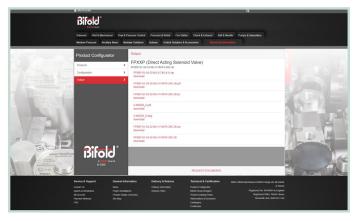
 Simply choose and click the product range you would like from the products list.



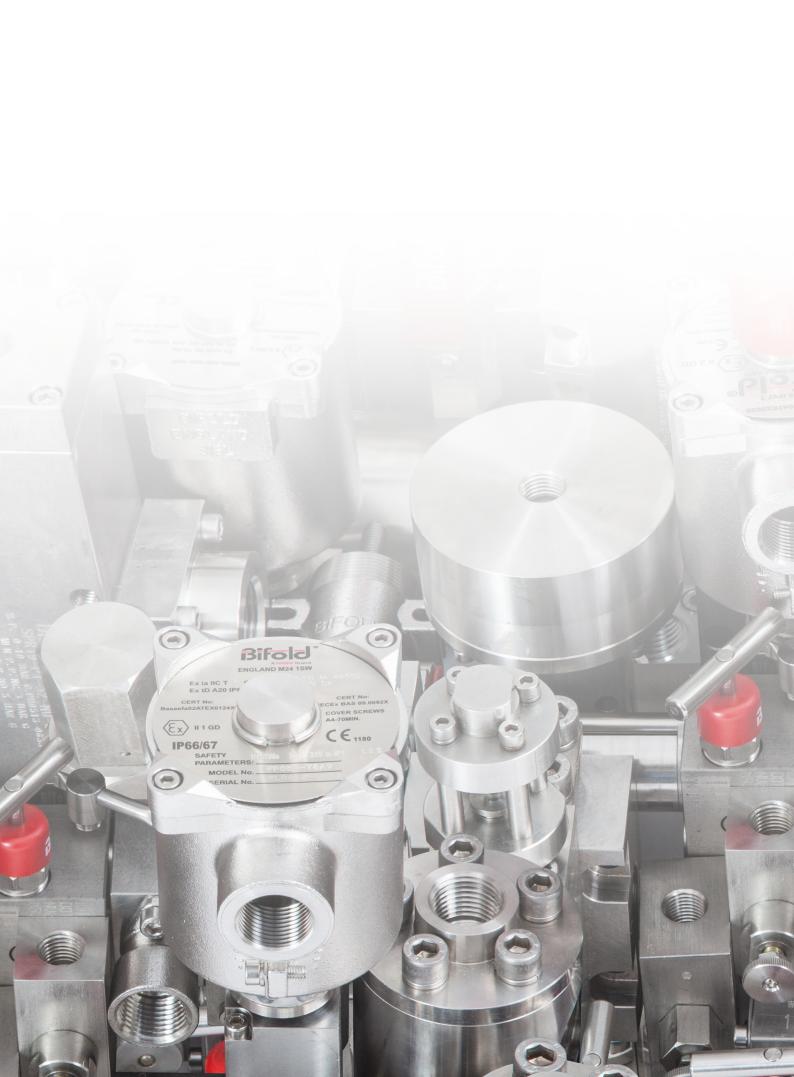
4. Choose and click the model code you would like to configure from the products list.



 Configure the selected product to your required specification.



Once you have configured the products to your exact specifications, simply click 'request documents' which will automatically create a bespoke datasheet, 2D dimensional drawing and 3D CAD / Step file in real time, ready to download.









Registered No. 06186844 in England.

Registered Office: Rotork House, Brassmill Lane, Bath, BAI 3JQ.

Bifold

Broadgate, Oldham Broadway Business Park, Chadderton, Greater Manchester, OL9 9XA. UK.

**Tel:** +44 (0) 161 345 4777 **Email:** bifold.sales@rotork.com

USA Office Tel: +1 (713) 304 4012

Singapore Office Mobile: +65 9824 5580

Email: bifold.sales@rotork.com

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PUB171-001-00 Issue 03/20