

► Supply and discharge valves SAFELINE



- ▶ Interruption of supply and unloading of the downstream pneumatic circuit
- ▶ Single version classified in CATEGORY 1, suitable for use in safety circuits up to PL=c
- ▶ Double version classified in CATEGORY 4, suitable for use in safety circuits up to PL=e
- ▶ Compliance with the ATEX Directive and the Machinery Directive
- ▶ Solenoid valves with marking:



**II 3G Ex ec h IIC T6 Gc X**  
**II 3D Ex tc IIIC T85°C Dc X**  
**-10°C ≤ Ta ≤ +50°C**

2

AIR TREATMENT

Upon implementation of the **size 3 AIRPLUS** series air treatment units, Pneumax develops a supply and discharge valve, with an electropneumatic control and spring-return, fitted with a diagnostic system regarding the state of the valve, with the possibility of creating a double channel to determine the system's redundancy.

The version with one single channel emphasises the features of an S.V. 3/2 NC, monostable with electropneumatic control and spring-return, which operation involves:

- condition of the **valve at rest**, with a **de-energised** coil; port 1 (air supply) is not connected to port 2 (downstream air circuit). port 2 is discharged through port 3;
- condition of the **valve activated**, with an **energised** coil; port 1 (air supply) is connected to port 2 (downstream air circuit), with port 3 (discharge) closed. By de-energising the coil, the system resets the condition of **valve at rest** by means of the return spring, which repositions the spool. Once again port 2 (downstream air circuit), is discharged via port 3.

The state of the valve is constantly monitored by a diagnostic system, using a Hall effect sensor, which reads the position of the spool and consequently takes note of the valve's position.

The sensor is in the ON state when the valve is at rest (**de-energised** coil), while it is in the OFF state when the valve is activated (**energised** coil).

The sensor is in the OFF state under conditions of an activated valve (**de-energised** coil), indicating a possible problem.

The version with a double redundant channel is made using two single solenoid valves 3/2 NC provided with diagnostics, mounted in series so that the port 2 of the first solenoid valve is linked to the port 1 of the second solenoid valve.

It is sufficient that only one of the S.V. is de-energised to guarantee the discharge of the air circuit.

If one of the two S.V. remained blocked due to a malfunction, the other one ensures the discharge function of the pneumatic installation. Even in this case, the diagnostic system of both solenoid valves constantly monitors the state of the 2 single S.V.

Construction characteristics	
Body	Aluminium
Solenoid Operator	Technopolymer
Rear end cap	Aluminium
Spool	Aluminium
Spool seals	Polyurethane
Piston	Aluminium
Spring	EN 10270-1 DH steel
Electrical Interface	Male M12 5P TYPE A connector

Operational characteristics	
Fluid	Filtered air. No lubrication needed, if applied it shall be continuous
Working temperature	-10°C ... +50°C
Minimum working pressure	2,5 bar
Maximum working pressure	10 bar

### Instructions for installation and use

Undertake the installation respecting the safety requirements with regards to the system and components for hydraulic and pneumatic transmissions. Install the device as close as possible to the point of use. Its assembly is possible in any position. Pay attention to the flow direction, indicated on the main body with the labels IN and OUT. During the components discharge, high levels of noise occur.

The use of a silencer on the discharge port is recommended. Ensure there is sufficient space for assembly during the installation process. Please ensure that the discharge area is always clear, and in case a silencer is used, periodically verify that it is not obstructed.

It is possible to integrate and install the device in an existing AIRPLUS group or in a new installation, or else to use the device individually attaching it by aligning the assembled unit with the relevant fastening flange for the supply and discharge valve, or to use the device individually attaching it by aligning the assembled unit with the type "Y" fastening flange for the double supply and discharge valve



**WARNING!**

**Pay particular attention to external factors such as the nearness of live wires, magnetic fields, metallic objects providing magnetic conduction very close to the device, which may influence and disturb the diagnostic system.**



**WARNING!**

**The electrical connection must be made exclusively by specialized personnel, using components that have no voltage present. Only use power supplies which can guarantee a safe electrical isolation of the working voltage in accordance to IEC/EN 60204-1. Additionally, observe the requirements anticipated by the PELV circuits in accordance to IEC/EN 60204-1.**

### Care and maintenance



**WARNING!**

**Do not connect or disconnect the device when energised! Do not open and/or disassemble the parts that are included in the energised valve. Once the power supply is disconnected, wait for a few minutes before opening or disassembling parts of the valve that result in its disassembly.**

Before carrying out any operation, it is essential to remove the pneumatic and power supply to the device and wait for the residual pressure to be completely discharged.

Please ensure that the discharge is always clear, and in case a silencer is used, periodically verify that it is not obstructed.

Periodically remove any dust deposits from the valve using a damp cloth.

Use soapy water to clean the device.

Do not use corrosive or alcohol-based products.

For maintenance operations on internal components, please consult with PNEUMAX SPA.

Supply and discharge valve single (VS)

Technical characteristics	
Connections	G1/2" UNI-ISO 228/1
Fluid	Filtered air. No lubrication needed, if applied it shall be continuous
Function	3/2 N.C. monostable
Minimum working pressure	2,5 bar
Maximum working pressure	10 bar
Working temperature	-10°C ... +50°C
Flow rate at 6bar Δp (from 1 to 2)	3500 NI/min
Flow rate at 6bar Δp (from 2 to 3)	2000 NI/min
Flow rate at 6bar Δp (from 2 to 3) with free discharge	3800 NI/min
Type of installation	Stand alone
Assembly positions	Indifferent
Noise level	90 dB
Response time ON ISO 12238	36 ms
Response time OFF ISO 12238	76 ms
Protection degree	IP65 (with mounted connector)

Electrical characteristics	
Electrical connection	Male M12 5P TYPE A connector
Coil Features	24 V DC, 1 W
Suppressor diode for coil reverse voltage spike	Present
Supply voltage allowance	-5% ... +10%

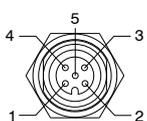
Electrical characteristics of sensor	
Sensor characteristics	10 ... 30 VDC
Operating principle	Hall effect
Contact type	N.O.
Output type	PNP
Permanent maximum current	100 mA
Permanent maximum power	3 W
Voltage drop max.	2 V

Safety characteristics	
Regulatory compliance	EN ISO 13849
Safety function fulfilled	Interruption of supply and unloading of the downstream pneumatic circuit
Performance Level (PL)	Up to c
EN ISO 13849 category	up to 1
Safety Integrity Level (SIL) EN 62061	up to 1
B10d	7.000.000 cycles
CE marking	Directive 2006/42/EC
	Directive 2014/34/EU
	Directive 2011/65/EU

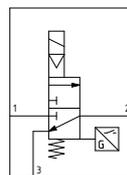
**Note B10d:**

Reliability and lifetime of pneumatic valves assessed in accordance with ISO 19973-2: Pneumatic fluid power – Assessment of component reliability by testing – Part 2: Directional control valves.

**Electrical connection**



PIN	Description
1	+ 24 V DC (Sensor)
2	+ 24 V DC (EV)
3	0 V DC (EV)
4	SENSOR OUTPUT
5	0 V DC (Sensor)



**Certifications available:**

**II 3G Ex ec h IIC T6 Gc X**  
**II 3D Ex tc IIIC T85°C Dc X**  
**-10°C ≤ Ta ≤ +50°C**

**CODING: P173BVS**

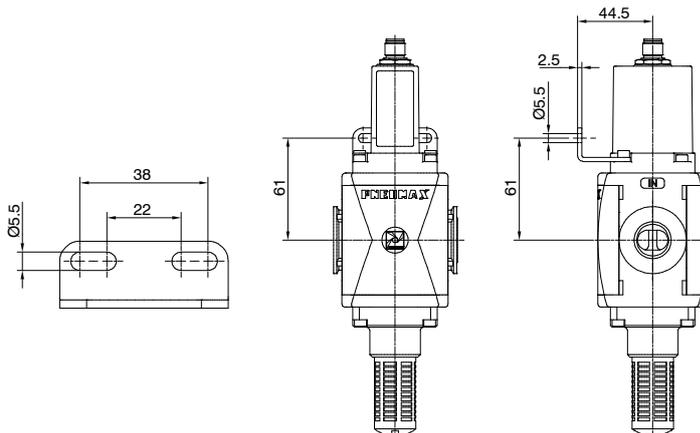
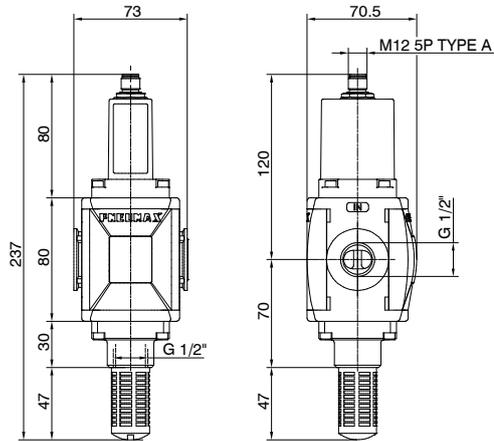
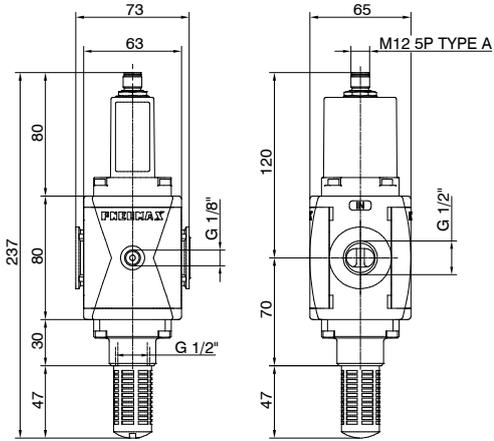
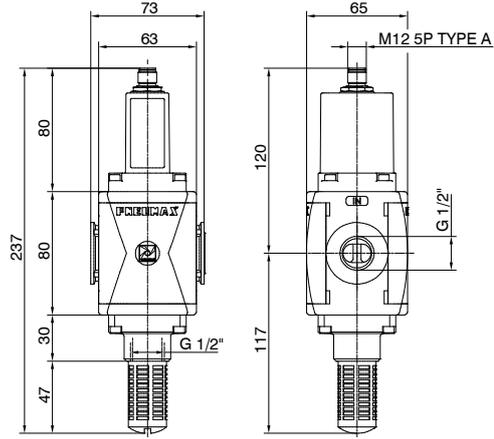
V	VERSIONS
	= Standard
	M = Integrated pressure gauge
	W = Integrated pressure gauge (Right-Left)
F	G = G1/8" pressure gauge connection
	FIXING
	= Without fixing
	01 = Fixing bracket mounted (Left-Right)
	02 = Fixing bracket mounted (Right-Left)

**Example: P173BVSM01**

Size 3 single safety valve G1/2", Built-in pressure gauge and fixing bracket mounted (Left-Right)



Dimensions



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AIR TREATMENT

Supply and discharge valve double (V2S)

Technical characteristics	
Connections	G1/2" UNI-ISO 228/1
Fluid	Filtered air. No lubrication needed, if applied it shall be continuous
Function	3/2 N.C. monostable
Minimum working pressure	2,5 bar
Maximum working pressure	10 bar
Working temperature	-10°C ... +50°C
Flow rate at 6bar Δp (from 1 to 2)	2500 NI/min
Flow rate at 6bar Δp (from 2 to 3)	2000 NI/min
Flow rate at 6bar Δp (from 2 to 3) with free discharge	3800 NI/min
Type of installation	Stand alone
Assembly positions	Indifferent
Noise level	90 dB
Response time ON ISO 12238	68 ms
Response time OFF ISO 12238	79 ms
Protection degree	IP65 (with mounted connector)

Electrical characteristics	
Electrical connection	2 Male M12 5P TYPE A connectors
Coil Features	24 V DC, 1 W + 1 W
Suppressor diode for coil reverse voltage spike	Present
Supply voltage allowance	-5% ... +10%

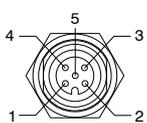
Electrical characteristics of sensor	
Sensor characteristics	10 ... 30 VDC
Operating principle	Hall effect
Contact type	N.O.
Output type	PNP
Permanent maximum current	100 mA + 100 mA
Permanent maximum power	3 W + 3 W
Voltage drop max.	2 V + 2 V

Safety characteristics	
Regulatory compliance	EN ISO 13849
Safety function fulfilled	Interruption of supply and unloading of the downstream pneumatic circuit
Performance Level (PL)	up to e
EN ISO 13849 category	up to 4
Safety Integrity Level (SIL) EN 62061	Up to 3
B10d	7.000.000 cycles
CE marking	Directive 2006/42/EC
	Directive 2014/34/EU
	Directive 2011/65/EU

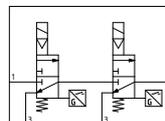
**Note B10d:**

Reliability and lifetime of pneumatic valves assessed in accordance with ISO 19973-2: Pneumatic fluid power – Assessment of component reliability by testing – Part 2: Directional control valves.

**Electrical connection**



PIN	Description
1	+ 24 V DC (Sensor)
2	+ 24 V DC (EV)
3	0 V DC (EV)
4	SENSOR OUTPUT
5	0 V DC (Sensor)



**Certifications available:**

**II 3G Ex ec h IIC T6 Gc X**  
**II 3D Ex tc IIIC T85°C Dc X**  
**-10°C ≤ Ta ≤ +50°C**

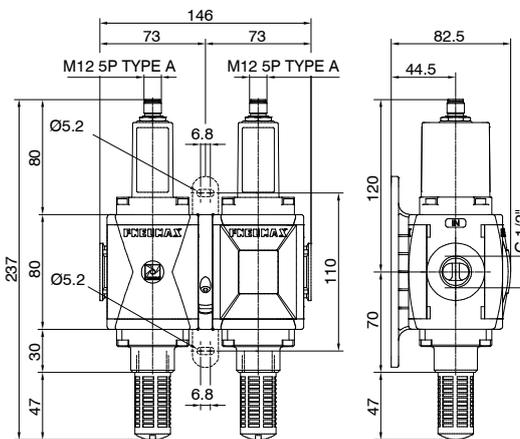
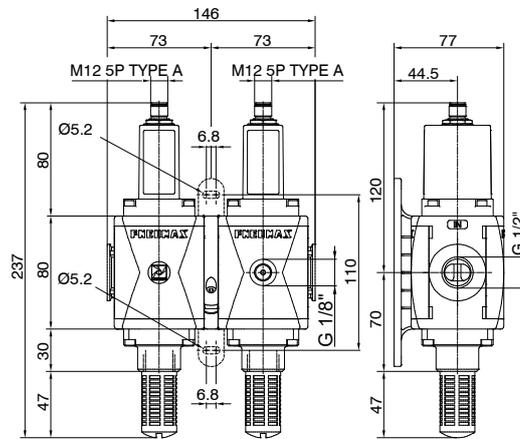
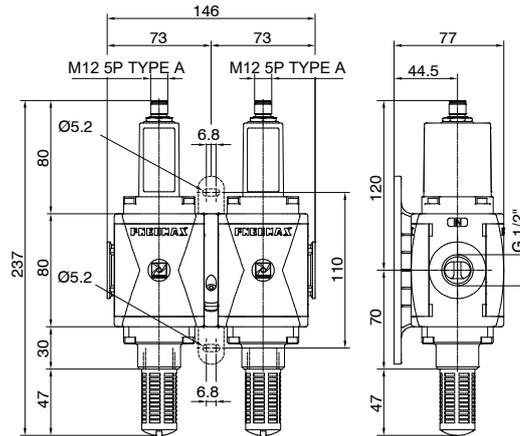
**CODING: P173BV2S**

<b>V</b>	VERSIONS
	= Standard
	<b>M</b> = Integrated pressure gauge
<b>F</b>	<b>G</b> = G1/8" pressure gauge connection
	FIXING
	<b>X</b> = Flange X
	<b>Y</b> = Flange Y
<b>D</b>	<b>K</b> = Aluminium flange Y
	<b>Z</b> = Aluminium flange X
	FLOW RATE DIRECTION
	= Standard (Left-Right)
	<b>W</b> = (Right-Left)

**Example: P173BV2SMK**

Size 3 double safety valve G1/2", built-in pressure gauge and Y aluminum flange

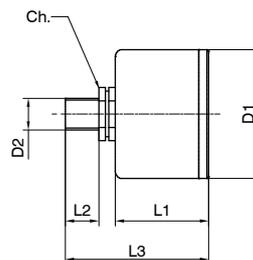
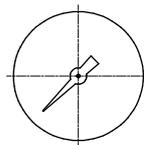
**Dimensions**



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AIR TREATMENT

**Pressure gauge**



**CODING: 17070** **V** **S**

<b>V</b>	VERSION
<b>A</b>	Dial Ø40
<b>B</b>	Dial Ø50
<b>S</b>	SCALE
<b>A</b>	0 - 4 bar
<b>B</b>	0 - 6 bar
<b>C</b>	0 - 12 bar

Model	D1	D2	L1	L2	L3	Ch
17070A...	41	Gc - 1/8"	26	10	44	14
17070B...	49	Gc - 1/8"	27	10	45	14



## Regulatory Framework

The purpose of the Machinery Directive is to define the health and safety requirements in the framework of designing and constructing machinery.

Since 2009, the new Machinery Directive has become effective in the European Union.

Member countries of the EU are required to implement this standard.

The manufacturers of machinery can comply with the Machinery Directive applying the harmonised standards listed in the Official Journal of the European Union.

The design and manufacture of safety controls are developed in compliance with one of the two important harmonised standards:

EN ISO 13849
Safety of machinery Safety-related parts of control systems Part 1: General design principles

EN 62061
Safety of machinery Functional safety of electrical, electronic and programmable control systems regarding safety

The EN ISO 13849 standard is one of the most important harmonised standards, which has been widely used; it is intended to provide a guide to principles for design and integration of safety-related parts of the control system.

Each safety-related control system must be designed and constructed in accordance with the principles of ISO 12100 and ISO 14121 by which the possible risks are considered and assessed, in view of the intended uses and the reasonably anticipated incorrect uses.

The parts of a machinery's control system are called "Safety-related parts of control systems". Their capacity to perform a safety function under predictable conditions is assigned by means of five possible levels called "**performance levels**" (PL). These levels are defined in terms of probability of dangerous malfunction per hour.

PL - Performance Level	Average probability of dangerous malfunction per hour (1/h)
a	$\geq 10^{-5}$ up to $< 10^{-4}$
b	$\geq 3 \times 10^{-6}$ up to $< 10^{-4}$
c	$\geq 10^{-6}$ up to $< 3 \times 10^{-6}$
d	$\geq 10^{-7}$ up to $< 10^{-6}$
e	$\geq 10^{-8}$ up to $< 10^{-10}$

The calculated PL must be greater or equal to the necessary value, which arises from the calculation of the risk correlated to one single function and to the need to reduce it to an acceptable level.

Calculated risk assessment				
S1 - Slight danger	F1 - Occasional danger and brief exposure	P1 - possibly avoidable danger	PL= a PL= b	
		P2 - largely unavoidable danger		
F2 - Frequent danger and long exposure	P1 - possibly avoidable danger	PL= c PL= d		
	P2 - largely unavoidable danger			
S2 - Serious danger	F1 - Occasional danger and brief exposure		P1 - possibly avoidable danger	PL= e
			P2 - largely unavoidable danger	
F2 - Frequent danger and long exposure	P1 - possibly avoidable danger			
	P2 - largely unavoidable danger			