SAFE AIR®

SYNTESI® SHUT-OFF-VALVE SAFE AIR® SERIES

METAL WORK PNEUMATIC

The V3V Syntesi® SAFE AIR® is a three-way valve that, when closed, vents the downstream system. It is used during maintenance operations or when it is necessary to remove air from machinery or equipment.
It is equipped with a diagnostic system, that uses an inductive sensor, to monitor the position of the spool.
This means that when the valve is deactivated, the sensor is in the ON state, when the valve is activated, the sensor is in the OFF state.
A status in which the sensor is OFF state and the coil de-energized indicates that there is a problem.
To reduce the probability of risk during plant maintenance, the manual actuator mounted on the electric control is the monostable type.
This valve is a category 2 component, according to EN ISO 13849, and is suitable for use in safety circuits up to PL = d.
For applications requiring higher performance levels, we have also develop a double-channel version (redundant) that requires the use of two valves with a monitored spool arranged so that port 2 of the first valve is connected to port 1 of the second valve. It is sufficient for just one of the two valves to be de-energized to discharge the downstream system; so, even if one of the two spools remains blocked, the other guarantees relief of the compressed-air circuit. In this case, too, the presence of spool position sensors can be used to monitor the status. The double valve is a category 4 component according to EN ISO 13849 and is suitable for use in safety circuits up to PL = e.
Both the single and double channel valves come with: a voluntary examination certificate No. BVI-25-MAC-CV-0004 issued by Bureau Veritas in accordance with EN ISO 13849.





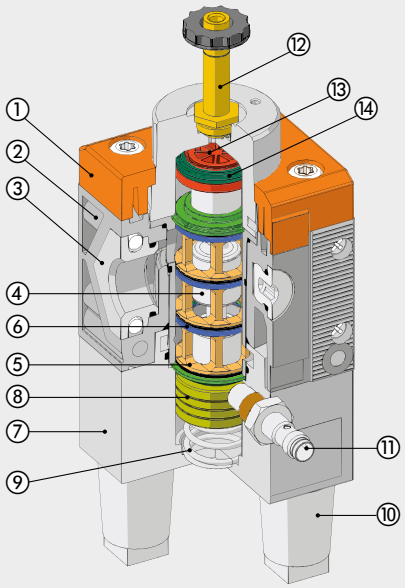
SINGLE V3V Syntesi® SERIES SAFE AIR®

TECHNICAL DATA		SINGLE V3V SY2 SAFE AIR®			
Threaded port		3/8"	1/2"	3/4"	1"
Threaded discharge port		No. 2 from 1/2"			
Fluid		Filtered unlubricated air (50µm)			
Operation		3/2 monostable			
Operating pressure:					
non-assisted		from 3 to 10 bar - from 0.3 to 1 MPa - from 43 to 145 psi			
pilot-assisted		from 0 to 10 bar - from 0 to 1 MPa - from 0 to 145 psi			
Minimum pilot pressure		from 3 to 10 bar - from 0.3 to 1 MPa - from 43 to 145 psi			
Min/max temperature at 10 bar; 1 MPa; 145 psi	°C	from -10 to +50 ✱			
Weight	g	920	890	890	875
Conductance C	Nl/min · bar	764	821	828	
Critical ratio b	bar/bar	0.25	0.27	0.36	
Flow rate at 6.3 bar Δp 0.5 bar	Nl/min	2300	2550	2700	
Flow rate at 6.3 bar Δp 1 bar	Nl/min	3200	3500	3700	
Conductance C on relief	Nl/min · bar	742			
Critical ratio b on relief	bar/bar	0.09			
Flow rate on free exhaust at 6.3 bar	Nl/min	5400			
TRA/TRR at 6.3 bar	ms/ms	33/100			
Mounting position		In any position			
Wall fixing screws		No. 2 M5 screws			
Hand operator		Monostable			
Coils		22 and 30 mm side, Ø 8 hole – EN175301-803 connection, type B			
		Certified EN 60204.1 and VDE 0580 ■			
Class of protection		IP65 with coil and connector mounted			
Noise level		Max 95 dBA with silenced relief			
Max coil ring nut torque	Nm	1			
CE marking		In accordance with Machinery Directive, Annexe V ●			
Safety function		Cuts off the power supply and relieves the air circuit connected to port 2			
Type of sensor used		Inductive proximity sensors (refer to page **C1**.47 for sensor details)			
B10d		10 x 10^6 cycles			
Category - EN ISO 13849		2			
PL - EN ISO 13849		Suitable for use in safety circuits up to PL = d			

✱ The dew point must be at least 10°C lower than the fluid temperature, to avoid ice formation
■ To avoid malfunctions, we recommend using Metal Work accessories
● The declaration can be downloaded from www.metalwork.it

COMPONENTS - SINGLE VALVE

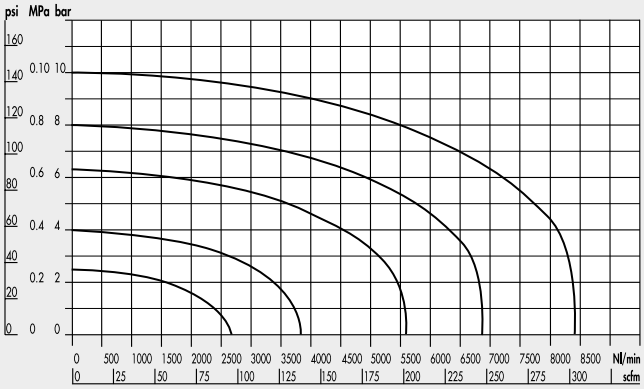
① Technopolymer flange
② Technopolymer body
③ IN/OUT bushing made of OT58 nickel-plated brass or passivated aluminium for 3/4" - 1"
④ Chemically nickel-plated aluminum spool
⑤ Technopolymer distance
⑥ NBR gaskets
⑦ Anodized aluminium end cap
⑧ Aluminum spring guide
⑨ Special steel spring
⑩ Silencers
⑪ Inductive sensor
⑫ Operator: Brass pipe - Stainless steel core
⑬ Technopolymer piston
⑭ NBR piston gasket



FLOW CHARTS ON DELIVERY - SINGLE VALVE

V3V Syntesi® **SY2** 3/8"

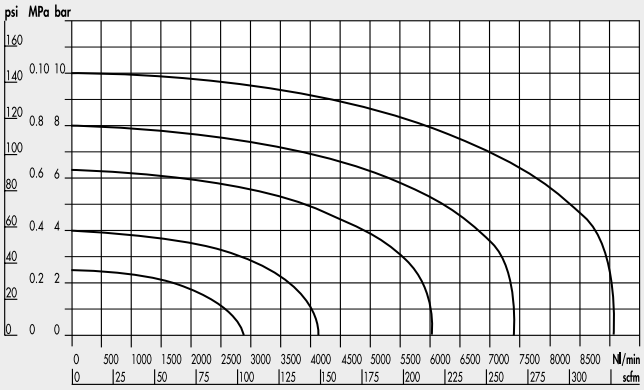
Outlet pressure



Flow rate

V3V Syntesi® **SY2** 1/2"

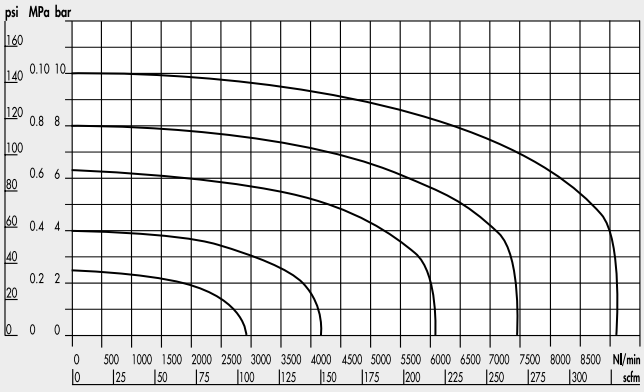
Outlet pressure



Flow rate

V3V Syntesi® **SY2** 3/4" - 1"

Outlet pressure

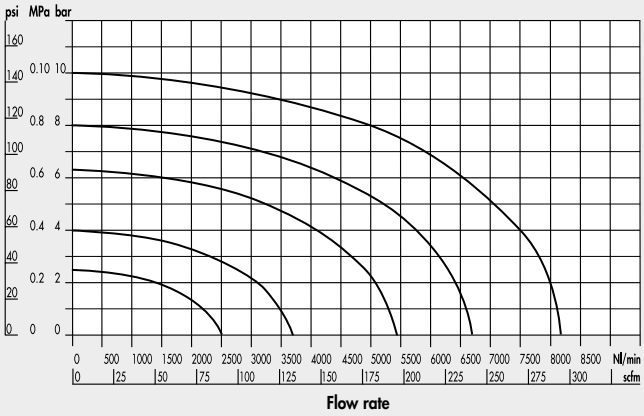


Flow rate

FLOW CHARTS ON RELIEF - SINGLE VALVE

V3V Syntesi® **SY2** 3/8" - 1/2" - 3/4" - 1"

Outlet pressure



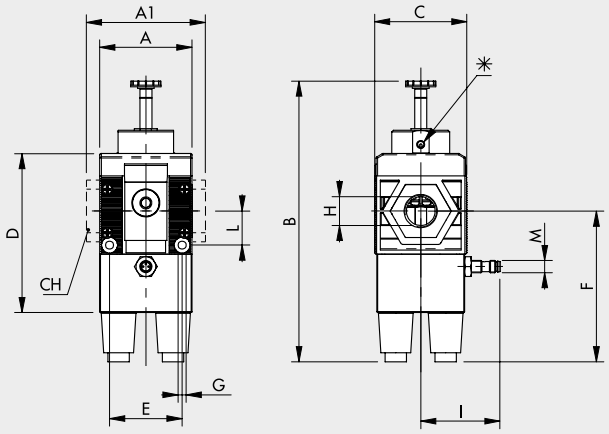
DIMENSIONS - SINGLE VALVE

PILOT-ASSISTED VERSION



NOT PILOT-ASSISTED VERSION





	SIZE 2			
H (threaded port)	3/8"	1/2"	3/4"	1"
A	60.5			
A1	-	-	95	95
B	186			
C	61			
CH	-	-	32	36
D	105			
E	47.5			
F	97			
G	Hole for M5 screws			
I	53			
L	22.5			
M	M8x1			
*** Pilot**	M5			

KEY TO CODES - SINGLE VALVE

56	2	3	W	70	3
SYNTESI	**SIZE**	**THREADED INPUT CONNECTION**	**ELEMENT**	**TYPE**	**THREADED OUTPUT CONNECTION**
56 Syntesi	**2** Size 2	**0** Without bushing **3** 3/8" port **4** 1/2" port **5** 3/4" port **6** 1" port	**W** Shut-off-valve Safe Air®	**30** Solenoid pilot-assisted **70** Solenoid	**0** Without bushing **3** 3/8" port **4** 1/2" port **5** 3/4" port **6** 1" port

PURCHASE ORDER CODES HAVING A MORE FREQUENT USE - SINGLE VALVE

N.B. Besides the below mentioned codes, you can order elements composed at your will according to the key to codes.

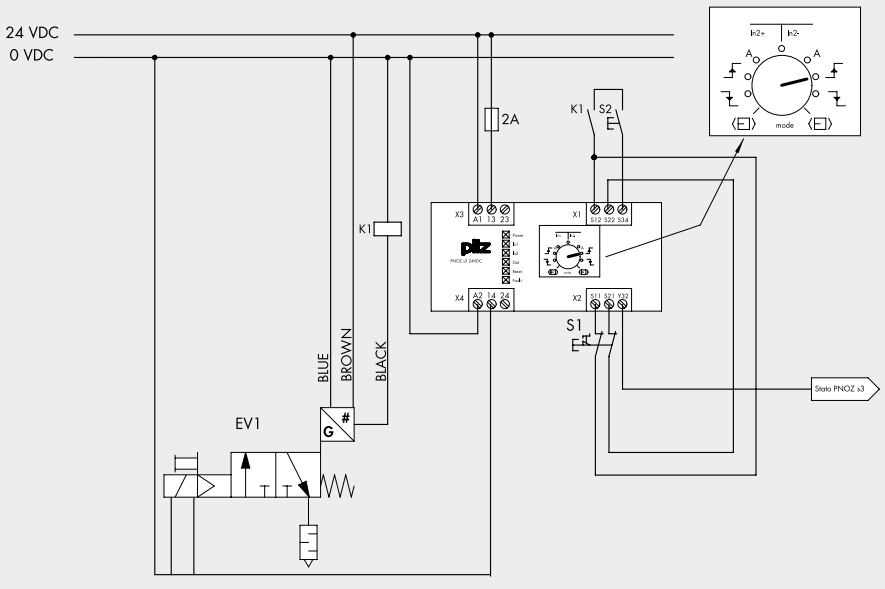
Code	Description
Syntesi® SY2 SHUT-OFF-VALVES SAFE AIR®	
5620W300	V3V SY2 elpn Safe Air® pilot-assisted without bushings
5623W303	V3V SY2 3/8 elpn pilot-assisted Safe Air®
5624W304	V3V SY2 1/2 elpn pilot-assisted Safe Air®
5625W305	V3V SY2 3/4 elpn pilot-assisted Safe Air®
5626W306	V3V SY2 1 elpn pilot-assisted Safe Air®
5620W700	V3V SY2 elpn Safe Air® without bushings
5623W703	V3V SY2 3/8 elpn Safe Air®
5624W704	V3V SY2 1/2 elpn Safe Air®
5625W705	V3V SY2 3/4 elpn Safe Air®
5626W706	V3V SY2 1 elpn Safe Air®

EXAMPLE OF A SAFETY CIRCUIT WITH A SINGLE VALVE

Below is an example of a wiring diagram for controlling Metal Work SAFE AIR® single valves using Pilz® components.
Circuit components:
- a Pilz® safety module PNOZ® s3 for controlling the emergency stop button; terminal Y32 indicates the status of the module, which can be relayed to the machine control logic
- an emergency stop button S1 (Pilz® - PIT® es Set) linked to terminals S11-S12-S22-S23 of the PNOZ® s3
- a Metal Work SAFE AIR® solenoid valve, the 24 VDC coil of which is fed by terminal 14 of the PNOZ® s3 (the other terminal of the coil is 0 V); the valve's Hall-effect sensor is 24 VDC
- a start/reset button S2
- a relay K1, controlled by the valve sensor; an NO contact of the relay is in series with button S2 of the PNOZ® s3.

Expected behaviour with the system operating correctly:
- system deactivated:
  - contact 14 is OFF
  - the coil is de-energized
  - the sensor is ON
  - relay K1 is energized
  - contact K1 is closed
  - contact Y32 is OFF
- with the system activated via the start/reset button S2:
  - contact 14 is ON
  - the coil is energized
  - the sensor is OFF
  - relay K1 is de-energized
  - contact K1 is open
  - contact Y32 is ON

In the event of a malfunction (e.g. spool jam), the coil is de-energized but the sensor remains OFF, relay K1 remains de-energized, contact K1 remains open (preventing subsequent restarts) and contact Y32 is OFF.
In the event of a valve fault, the circuit in the diagram below does not allow relief of the compressed air system. Sensor status must be monitored to assess valve operation. Contact Y32 indicates the status of the PNOZ® s3, not the status of the sensor.
All the electrical connections between the various components must comply with the applicable safety regulations.
If the emergency button is operated at a frequency of 1 actuation per hour, the circuit activates a safety function with PL = c (calculations made with the PAScal programme by Pilz®). Responsibility for final checking that PL lies with the person assembling the circuit.



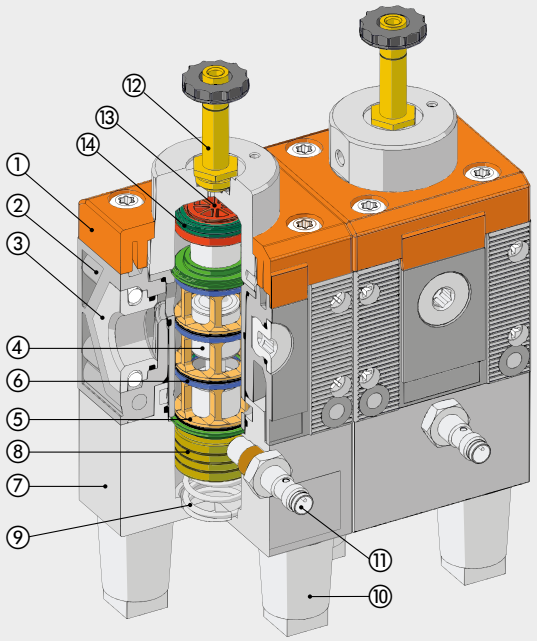
DOUBLE V3V Syntesi® SERIE SAFE AIR®

TECHNICAL DATA		DOUBLE V3V SY2 SAFE AIR®			
Threaded port		3/8"	1/2"	3/4"	1"
Threaded discharge port		No. 4 from 1/2"			
Fluid		Filtered unlubricated air (50µm)			
Operation		3/2 monostable			
Operating pressure:					
non-assisted		from 3 to 10 bar - from 0.3 to 1 MPa - from 43 to 145 psi			
pilot-assisted		from 0 to 10 bar - from 0 to 1 MPa - from 0 to 145 psi			
Minimum pilot pressure		from 3 to 10 bar - from 0.3 to 1 MPa - from 43 to 145 psi			
Min/max temperature at 10 bar; 1 MPa; 145 psi	°C	from -10 to +50 ✱			
Weight	g	1840	1780	1780	1750
Conductance C	Nl/min · bar	557	600		
Critical ratio b	bar/bar	0.23	0.24		
Flow rate at 6.3 bar Δp 0.5 bar	Nl/min	1700	1800		
Flow rate at 6.3 bar Δp 1 bar	Nl/min	2300	2500		
Conductance C on relief	Nl/min · bar	742			
Critical ratio b on relief	bar/bar	0.09			
Flow rate on free exhaust at 6.3 bar	Nl/min	5400			
TRA/TRR at 6.3 bar	ms/ms	70/100			
Mounting position		In any position			
Wall fixing screws		No. 2 M5 screws			
Hand operator		Monostable			
Coils		22 and 30 mm side, Ø 8 hole – EN175301-803 connection, type B			
		Certified EN 60204.1 and VDE 0580 ■			
Class of protection		IP65 with coil and connector mounted			
Noise level		Max 95 dBA with silenced relief			
Max coil ring nut torque	Nm	1			
CE marking		In accordance with Machinery Directive, Annexeo V ●			
Safety function		Cuts off the power supply and relieves the air circuit connected to port 2			
Type of sensor used		Inductive proximity sensors (refer to page **C1**.47 for sensor details)			
B10d		10 x 10^6 cycles			
Category - EN ISO 13849		4			
PL - EN ISO 13849		Suitable for use in safety circuits up to PL = e			

✱ The dew point must be at least 10°C lower than the fluid temperature, to avoid ice formation
■ To avoid malfunctions, we recommend using Metal Work accessories
● The declaration can be downloaded from www.metalwork.it

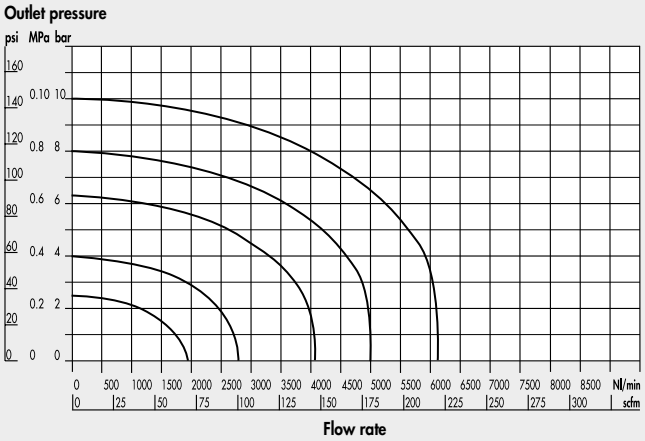
COMPONENTS - DOUBLE VALVE

① Technopolymer flange
② Technopolymer body
③ IN/OUT bushing made of OT58 nickel-plated brass or passivated aluminium for 3/4" - 1"
④ Chemically nickel-plated aluminum spool
⑤ Technopolymer distance
⑥ NBR gaskets
⑦ Anodized aluminium end cap
⑧ Aluminum spring guide
⑨ Special steel spring
⑩ Silencers
⑪ Inductive sensor
⑫ Operator: Brass pipe - Stainless steel core
⑬ Technopolymer piston
⑭ NBR piston gasket

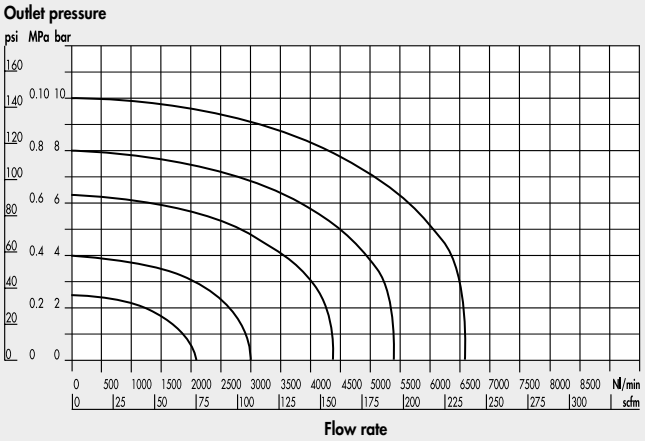


FLOW CHARTS ON DELIVERY - DOUBLE VALVE

V3V Syntesi® **SY2** 3/8″

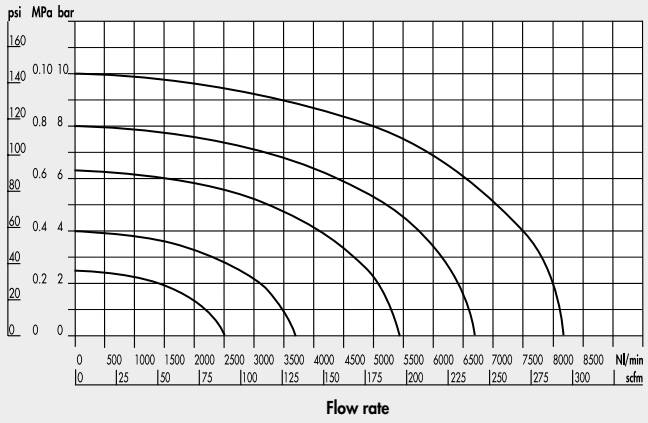


V3V Syntesi® **SY2** 1/2″- 3/4″ - 1″



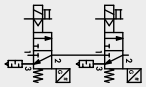
FLOW CHARTS ON RELIEF - DOUBLE VALVE

V3V Syntesi® **SY2** 3/8″ - 1/2″- 3/4″ - 1″

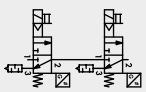


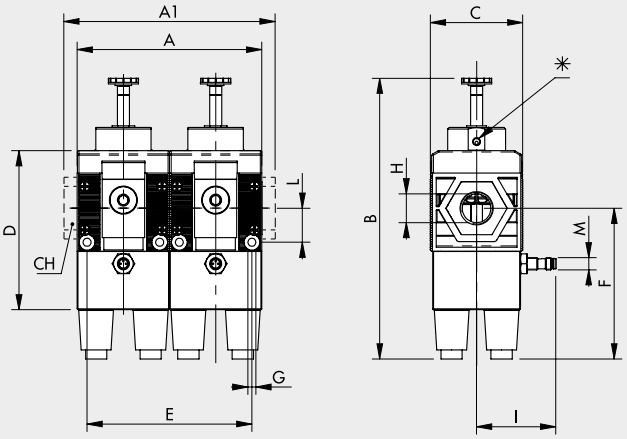
DIMENSIONS - DOUBLE VALVE

PILOT-ASSISTED VERSION



NOT PILOT-ASSISTED VERSION





	SIZE 2			
H (threaded port)	3/8"	1/2"	3/4"	1"
A	121			
A1	-	-	217	217
B	186			
C	61			
CH	-	-	32	36
D	105			
E	108			
F	97			
G	Hole for M5 screws			
I	53			
L	22.5			
M	M8x1			
*** Pilot**	M5			

KEY TO CODES - DOUBLE VALVE

56	2	3	W	72	3
SYNTESI	**SIZE**	**THREADED INPUT CONNECTION**	**ELEMENT**	**TYPE**	**THREADED OUTPUT CONNECTION**
56 Syntesi	**2** Size 2	**0** Without bushing **3** 3/8″ port **4** 1/2″ port **5** 3/4″ port **6** 1″ port	**W** Shut-off-valve Safe Air®	**32** Double solenoid pilot-assisted **72** Double solenoid	**0** Without bushing **3** 3/8″ port **4** 1/2″ port **5** 3/4″ port **6** 1″ port

PURCHASE ORDER CODES HAVING A MORE FREQUENT USE - DOUBLE VALVE

N.B. Besides the below mentioned codes, you can order elements composed at your will according to the key to codes.

Code	Description
Syntesi® SY2 SHUT-OFF-VALVES SAFE AIR®	
5620W320	V3V SY2 elpn Safe Air® double pilot-assisted without bushing
5623W323	V3V SY2 3/8 elpn double pilot-assisted Safe Air®
5624W324	V3V SY2 1/2 elpn double pilot-assisted Safe Air®
5625W325	V3V SY2 3/4 elpn double pilot-assisted Safe Air®
5626W326	V3V SY2 1 elpn double pilot-assisted Safe Air®
5620W720	V3V SY2 elpn Safe Air® double without bushing
5623W723	V3V SY2 3/8 elpn double Safe Air®
5624W724	V3V SY2 1/2 elpn double Safe Air®
5625W725	V3V SY2 3/4 elpn double Safe Air®
5626W726	V3V SY2 1 elpn double Safe Air®

NOTES

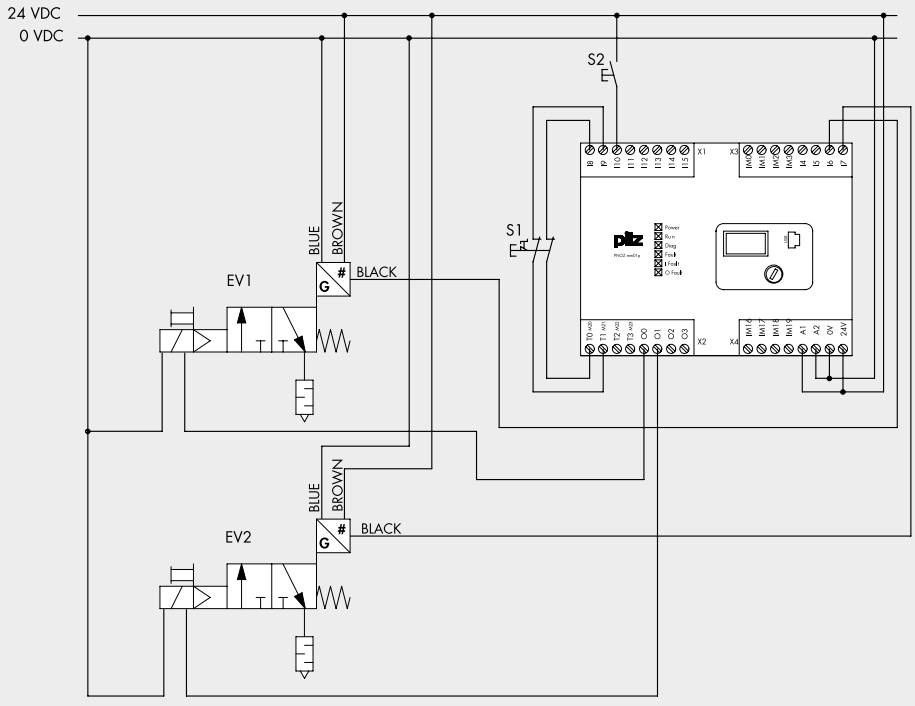
EXAMPLE OF A SAFETY CIRCUIT WITH A DOUBLE VALVE

Below is an example of a wiring diagram for controlling double valves SAFE AIR® a Metal Work using Pilz® components.
Circuit components:
- a Pilz® PNOZ® mm 0.1p modular safety system
- an emergency stop button S1 (Pilz® - PIT® es Set) linked to terminals T0-T1-I8-I9 of the PNOZ® mm 0.1p
- a Metal Work double solenoid valve SAFE AIR®, the 24 VDC coils of which are fed by terminals O0 (SV1) and O1 (SV2) of the PNOZ® mm 0.1p (the other terminals of the coils are OV); the valves' Hall-effect sensors are 24 VDC
- the sensor signals are relayed to terminals 16 (SV1) and 17 (SV2) of the PNOZ® mm 0.1p
- a start/reset button S2

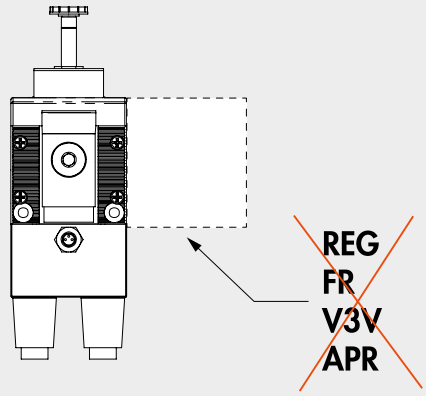
Expected behaviour with the system operating correctly:
- system deactivated:
  - contacts O0 and O1 are OFF
  - the coils are de-energized
  - the sensors are ON (and hence signals to terminals 16 and 17)
  - if one of the sensors is OFF, the Pilz® module does not allow subsequent start/reset
- with the system activated via the start/reset button:
  - contacts O0 and O1 are ON
  - the coils are energized
  - the sensors are OFF (and hence signals to terminals 16 and 17)

The PNOZ® mm 0.1p module is programmed so that:
- when either sensor is OFF, and the coils are de-energized, the module does not allow subsequent restarts.
- when the valves are energized, the 2 sensors must go off within the valve actuation time, otherwise the 2 valves are switched off again.
  The programme can be downloaded from www.metalwork.it (the licence for programming Pilz® modules is not included).

All the electrical connections between the various components must comply with the applicable safety regulations.
If the emergency button is operated at a frequency of 1 actuation per hour, the circuit activates a safety function with PL = e (calculations made with the PAScal programme by Pilz®).
Responsibility for final checking that PL lies with the person assembling the circuit.



ASSEMBLY DIAGRAM V3V Syntesi® SERIES SAFE AIR®



N.B. The **REG**, **FR**, **V3V**, **APR** elements **cannot be mounted** downstream the safety valves because if the elements are blocked, safety relief is not guaranteed.

SENSOR FOR V3V Syntesi® SERIES SAFE AIR®

TECHNICAL DATA SENSOR		
Type of sensor		INDUCTIVE PROXIMITY
Type of contact		N.O.
Switch		PNP
Supply voltage (Ub)	V	from 10 to 30
Voltage dro (for Ia max)	V	≤ 2
Hysteresis	%	from 3 to 20
EMC		EN 60 947-5-2
Continuous current Ia	mA	≤ 200
No load current	mA	≤ 10
Switching frequency	Hz	4000
Over-voltage suppression		Yes
Vibration and shock resistance		100 g /11 ms / 1000 cycles;; 150 g / 1 Mio cycles; from 10 to 55 Hz / 1 mm / from 55 to 500 Hz / 15 g
LED display		Yellow
Degree of protection (EN 60529)		IP68
Temperature range	°C	from -40 to +100
Sensor capsule material		Stainless steel V2A, DIN 1.4305 / AISI 303
Sensing face material		Plastic, LCP
Protection class		III
Communication interface detail		Connector male M8, 3-pin
MTTFd	years	1971
UL-File-Nr		E.181493
Certifications		CE cULus UKCA

WIRING DIAGRAM SENSOR

