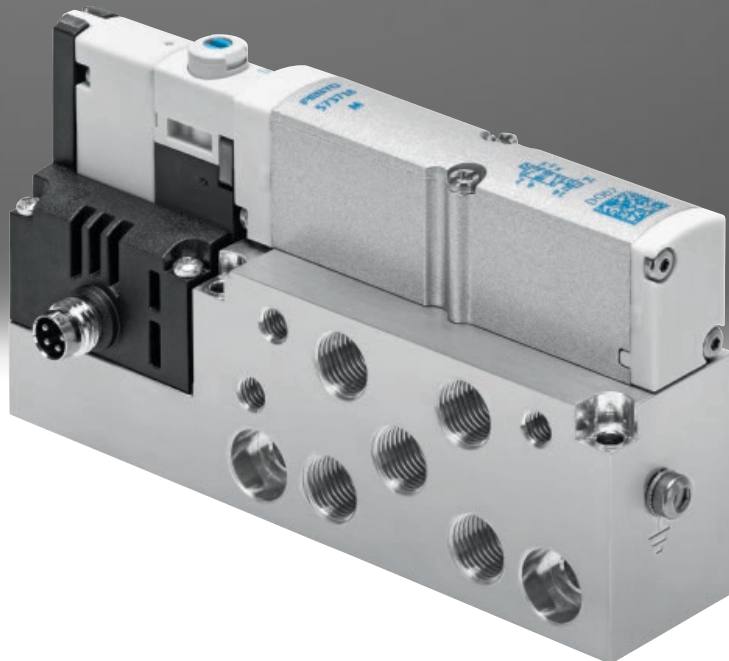
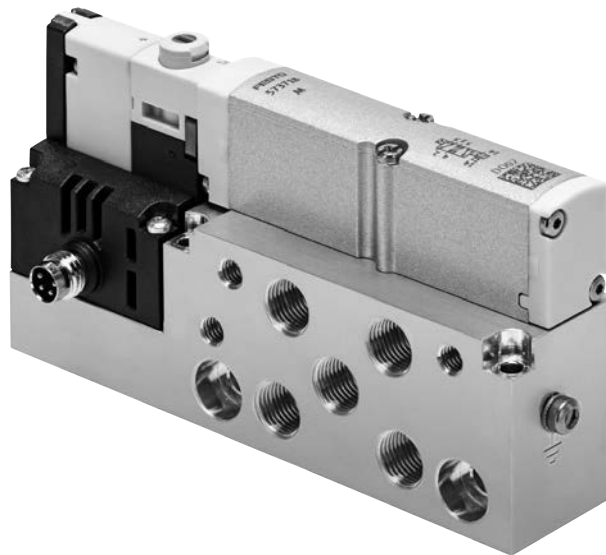


## Solenoid valves VMPA

**FESTO**



## Key features



### Innovative

- Compact high-performance valves in sturdy metal housing
- MPA1 (width 10 mm)  
flow rate up to 360 l/min
- MPA14 (width 14 mm)  
flow rate up to 670 l/min
- MPA2 (width 20 mm)  
flow rate up to 840 l/min

The valves are identical to the valves in the valve terminal MPA-S and MPA-L. This simplifies planning, ordering and warehousing.

### Versatile

- High pressure range
- $-0.09 \dots +1$  MPa
- Wide range of valve functions

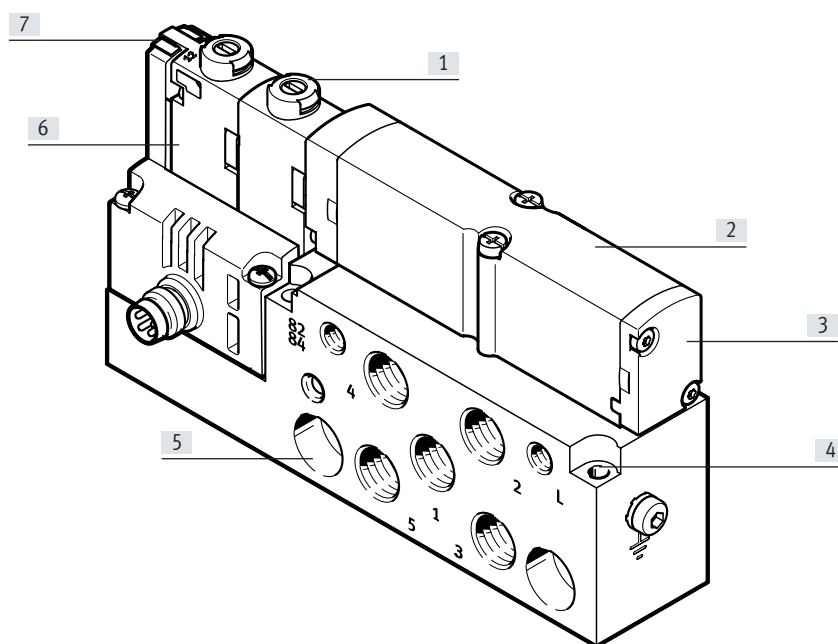
### Reliable

- Fast troubleshooting thanks to LEDs on the valves
- Extensive operating voltage range  $\pm 25\%$
- Easy to service thanks to replaceable valves and electronic modules
- Manual override either non-detenting, detenting or secured against unauthorised activation (concealed)

### Easy to mount

- Secure wall mounting

## Key features



- [1] Safe operation: Manual override, non-detenting/detenting or concealed
- [2] Space-saving: Flat valves
- [3] Wide range of valve functions
- [4] Quick to mount: directly using screws
- [5] Practical: robust metal thread
- [6] Width 10, 14 and 20 mm
- [7] Reduced downtimes: LED diagnostics locally

## Equipment options

## Valve functions

- 5/2-way valve, single solenoid
- 5/2-way valve, double solenoid
- 2x 3/2-way valve, normally open
- 2x 3/2-way valve, normally closed
- 2x 3/2-way valve, 1x normally open, 1x normally closed
- 5/3-way valve  
Mid-position pressurised
- 5/3-way valve  
Mid-position closed
- 5/3-way valve  
Mid-position exhausted
- 2x 2/2-way valve  
Normally closed

## Special features

- Electrical M8 connection, 4-pin with screw connection
- Detachable electronics module with integrated holding current reduction

## Peripherals overview

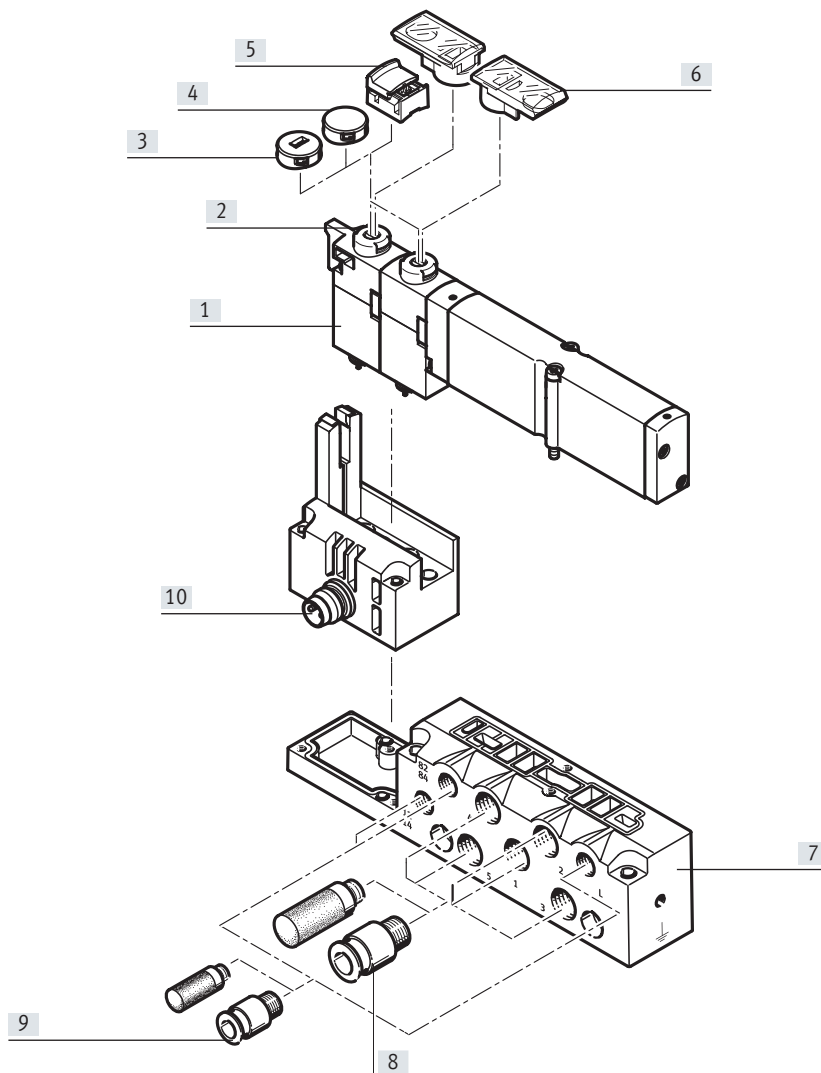
### Individual sub-base for solenoid valve, width 10 mm

Ordering:

- Using individual part numbers

Individual sub-bases of type VMPA1-IC... can be equipped with any solenoid valve VMPA1 of width 10 mm.

The electrical connection is established using a standard 4-pin M8 plug (EN 60947-5-2).



Designation	Brief description	→ Page/Internet
[1] Solenoid valve	VMPA1...	24
[2] Manual override (MO)	Non-detenting/detenting by turning, per solenoid coil	–
[3] Cover cap, coded	After fitting the cover cap, manual override operation is non-detenting only	26
[4] Cover cap, concealed	After fitting the cover cap, manual override is blocked	26
[5] Cover cap, manual override detenting	After fitting the cover cap, manual override is detenting and can be operated without tools	26
[6] Identification holder	Can be pushed onto manual override	26
[7] Sub-base	For solenoid valve VMPA1...	26
[8] Fittings, silencers or blanking plugs	M7 for working ports (2, 4) and air supply/exhaust ports (1, 3, 5)	27
[9] Fittings and/or silencers	M5 for pilot air supply/pilot exhaust air (12/14, 82/84) and pressure compensation	27
[10] Electrical connection M8	4-pin	–

## Peripherals overview

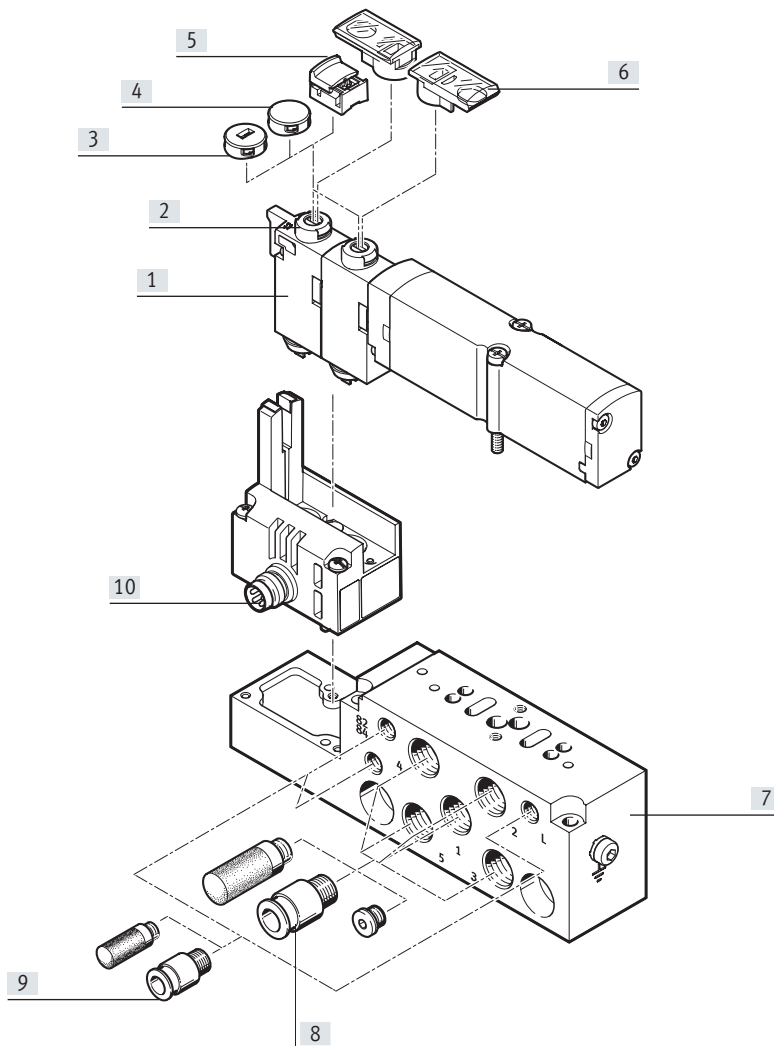
### Individual sub-base for solenoid valve, width 14 mm

#### Ordering:

- Using individual part numbers

Individual sub-bases of type VM-PA14-IC... can be equipped with any solenoid valve VMPA14 of width 14 mm.

The electrical connection is established using a standard 4-pin M8 plug (EN 60947-5-2).



Designation	Brief description	→ Page/Internet
[1] Solenoid valve	VMPA14...	24
[2] Manual override (MO)	Non-detenting/detenting by turning, per solenoid coil	–
[3] Cover cap, coded	After fitting the cover cap, manual override operation is non-detenting only	26
[4] Cover cap, concealed	After fitting the cover cap, manual override is blocked	26
[5] Cover cap, manual override detenting	After fitting the cover cap, manual override is detenting and can be operated without tools	26
[6] Identification holder	Can be pushed onto manual override	26
[7] Sub-base	For solenoid valve VMPA14...	26
[8] Fittings, silencers or blanking plugs	G1/8 for working ports (2, 4) and air supply/exhaust ports (1, 3, 5)	27
[9] Fittings and/or silencers	M5 for pilot air supply/pilot exhaust air (12/14, 82/84) and pressure compensation	27
[10] Electrical connection M8	4-pin	–

## Peripherals overview

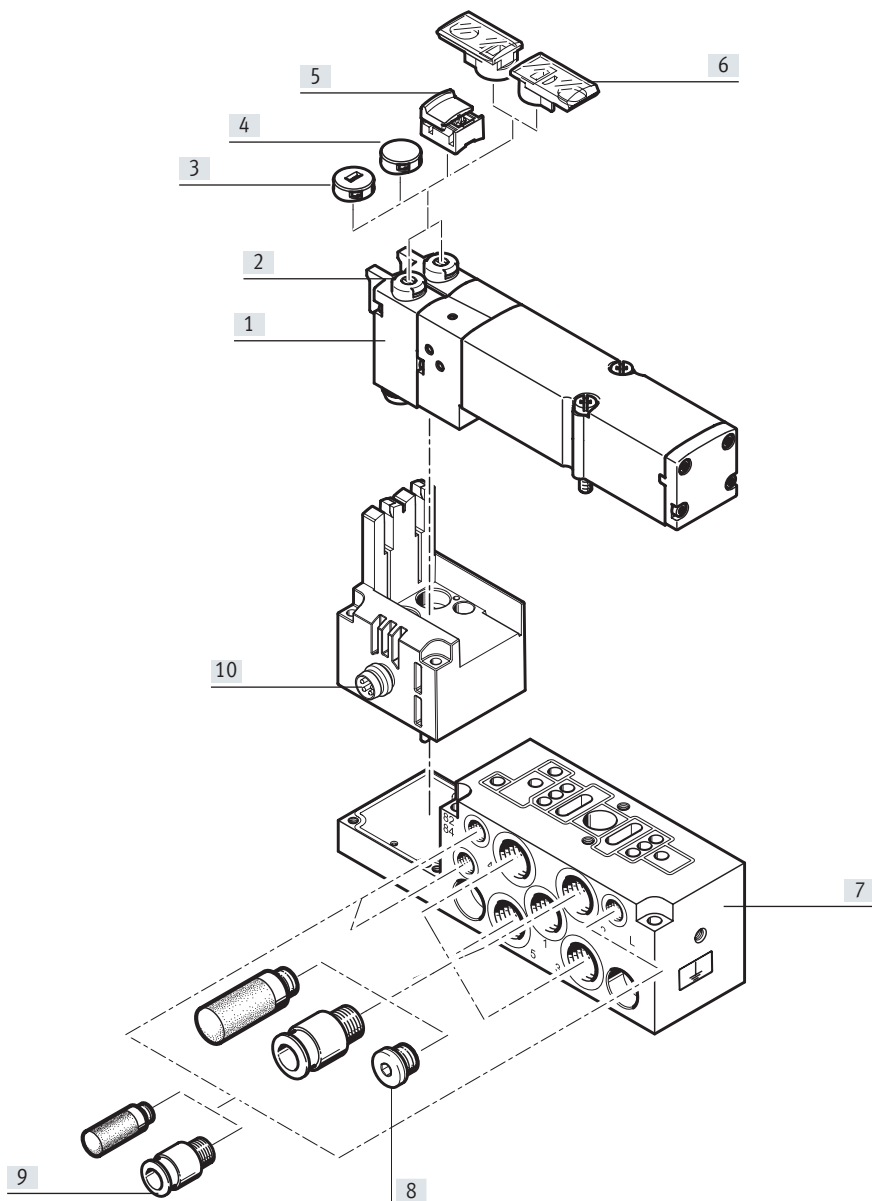
### Individual sub-base for solenoid valve, width 20 mm

Ordering:

- Using individual part numbers

Individual sub-bases of type VMPA2-IC... can be equipped with any solenoid valve VMPA2 of width 20 mm

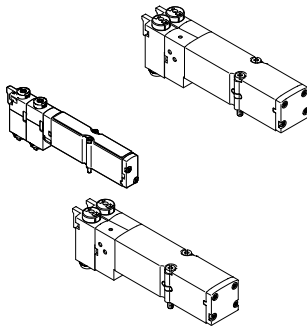
The electrical connection is established using a standard 4-pin M8 plug (EN 60947-5-2).



Designation	Brief description	→ Page/Internet
[1] Solenoid valve	VMPA2...	24
[2] Manual override (MO)	Non-detenting/detenting by turning, per solenoid coil	–
[3] Cover cap, coded	After fitting the cover cap, manual override operation is non-detenting only	26
[4] Cover cap, concealed	After fitting the cover cap, manual override is blocked	26
[5] Cover cap, manual override detenting	After fitting the cover cap, manual override is detenting and can be operated without tools	26
[6] Identification holder	Can be pushed onto manual override	26
[7] Sub-base	For solenoid valve VMPA2...	26
[8] Fittings, silencers or blanking plugs	G1/8 for working ports (2, 4) and air supply/exhaust ports (1, 3, 5)	27
[9] Fittings and/or silencers	M5 for pilot air supply/pilot exhaust air (12/14, 82/84) and pressure compensation	27
[10] Electrical connection M8	4-pin	–

## Key features – Pneumatic components

### Solenoid valve



VMPA offers a comprehensive range of valve functions. All valves have a patented sealing system, which ensures efficient sealing, a broad pressure range and a long service life. They have a pneumatic pilot control for optimising performance. Compressed air is supplied via a pilot air supply port.

Solenoid valves can be replaced quickly since the tubing connections remain on the sub-base. This design is also very flat.

Whatever valve function is required, there are solenoid valves with one solenoid coil (single solenoid) or with two solenoid coils (double solenoid or two single solenoid valves in one housing).

### Design

#### Valve replacement

The valves are attached to the metal sub-base using two screws,

which means that they can be easily replaced. The mechanical sturdiness of the sub-base guarantees good long-term sealing.

#### Valve code

The valve code (M, MS, MU, J, N, NS, NU, K, KS, KU, H, HS, HU, B, G, E, X, W, D, DS, I) is located

on the front of the valve beneath the manual override

5/2-way valve Type	Circuit symbol	Width [mm]	Description
M		10, 14, 20	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Pneumatic spring return</li> <li>• Reversible</li> <li>• Operating pressure -0.09 ... +1 MPa</li> </ul>
MS		14	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Mechanical spring return</li> <li>• Reversible</li> <li>• Operating pressure -0.09 ... +0.8 MPa</li> </ul>
J		10, 14, 20	<ul style="list-style-type: none"> <li>• Double solenoid</li> <li>• Reversible</li> <li>• Operating pressure -0.09 ... +1 MPa</li> </ul>

Key features – Pneumatic components

2x 3/2-way valve Type	Circuit symbol	Width [mm]	Description
N		10, 14, 20	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Normally open</li> <li>• Pneumatic spring return</li> <li>• Operating pressure 0.3 ... 1 MPa</li> </ul>
NS		14	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Normally open</li> <li>• Mechanical spring return</li> <li>• Reversible</li> <li>• Operating pressure -0.09 ... +0.8 MPa</li> </ul>
K		10, 14, 20	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Normally closed</li> <li>• Pneumatic spring return</li> <li>• Operating pressure 0.3 ... 1 MPa</li> </ul>
KS		14	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Normally closed</li> <li>• Mechanical spring return</li> <li>• Reversible</li> <li>• Operating pressure -0.09 ... +0.8 MPa</li> </ul>
H		10, 14, 20	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Normal position                             <ul style="list-style-type: none"> <li>- 1x closed</li> <li>- 1x open</li> </ul> </li> <li>• Pneumatic spring return</li> <li>• Operating pressure 0.3 ... 1 MPa</li> </ul>
HS		14	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Normal position                             <ul style="list-style-type: none"> <li>- 1x closed</li> <li>- 1x open</li> </ul> </li> <li>• Mechanical spring return</li> <li>• Reversible</li> <li>• Operating pressure -0.09 ... +0.8 MPa</li> </ul>



### Key features – Pneumatic components

5/3-way valve			
Type	Circuit symbol	Width [mm]	Description
B		10, 14, 20	<ul style="list-style-type: none"> <li>• Mid-position pressurised<sup>1)</sup></li> <li>• Mechanical spring return</li> <li>• Reversible</li> <li>• Operating pressure -0.09 ... +1 MPa</li> </ul>
G		10, 14, 20	<ul style="list-style-type: none"> <li>• Mid-position closed<sup>1)</sup></li> <li>• Mechanical spring return</li> <li>• Reversible</li> <li>• Operating pressure -0.09 ... +1 MPa</li> </ul>
E		10, 14, 20	<ul style="list-style-type: none"> <li>• Mid-position exhausted<sup>1)</sup></li> <li>• Mechanical spring return</li> <li>• Reversible</li> <li>• Operating pressure -0.09 ... +1 MPa</li> </ul>

1) If neither solenoid coil is energised, the valve assumes its mid-position by spring force.  
If both coils are energised at the same time, the valve remains in the previously assumed switching position.

2x 2/2-way valve			
Type	Circuit symbol	Width [mm]	Description
D		10, 14, 20	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Normally closed</li> <li>• Pneumatic spring return</li> <li>• Operating pressure 0.3 ... 1 MPa</li> </ul>
DS		14	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Normally closed</li> <li>• Mechanical spring return</li> <li>• Reversible</li> <li>• Operating pressure -0.09 ... +0.8 MPa</li> </ul>
I		10, 14, 20	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• 1x normally closed</li> <li>• 1x normally closed, reversible only</li> <li>• Pneumatic spring return</li> <li>• Operating pressure 0.3 ... 1 MPa</li> <li>• Vacuum at port 3/5 only</li> </ul>

**Note**  
A filter must be installed upstream of valves operated in vacuum mode. This prevents any foreign matter in the intake air getting into the valve (e.g. when operating a suction cup with connector).

## Key features – Pneumatic components

### Pilot air supply

The pneumatic connection is located on the individual sub-base.

The ports differ for the following types of pilot air supply:

- internal pilot air and
- external pilot air.

#### Internal pilot air supply

If the required working pressures are between 0.3 and 0.8 MPa, internal pilot air supply can be selected.

In this case, the pilot air supply in the sub-base is branched from the compressed air supply 1 using an internal connection. Port 12/14 is sealed at the factory with a blanking plug.

#### External pilot air supply

If the supply pressure is less than 0.3 MPa or greater than 0.8 MPa, you must operate your VMPA valve using external pilot air.

The pilot air is then supplied via port 12/14 of the sub-base.

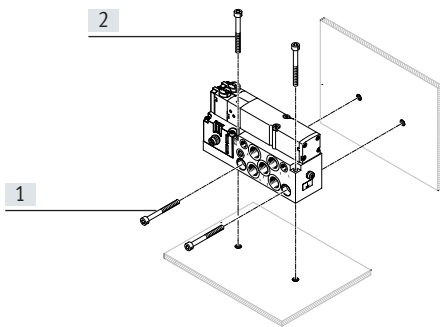


#### Note

If a gradual pressure build-up is required in the system by using a soft-start valve, then external pilot air should be selected whereby the pilot pressure is already applied at the point of switch-on.

## Key features – Mounting and operation

### Mounting



- [1] Horizontal mounting holes
- [2] Vertical mounting holes

The individual sub-base for wall mounting is designed for integration into a system or machine. It can be mounted horizontally or vertically.

### Display and operation

Each valve solenoid coil is allocated an LED which indicates its operating status.

- Indicator 12 shows the signal status of the coil for output 2
- Indicator 14 shows the signal status of the coil for output 4

#### Manual override

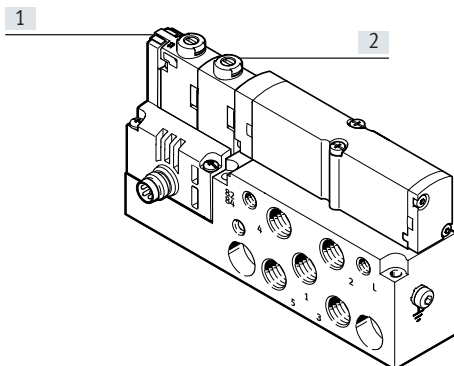
The manual override (MO) enables the valve to be switched when not electrically activated or energised.

The pilot valve is switched by pushing the manual override. The set switching status can also be locked by turning the manual override.

Alternatives:

- A covering (VMPA-HBT-B) prevents the manual override from being locked. The manual override can then only be activated by pushing it.
- A covering (VMPA-HBV-B) can be fitted over the manual override to prevent it from being accidentally activated.
- The cover cap (VAMC-L1-CD) can be used to operate the manual override

in detenting mode without additional tools.



- [1] LED indicator
- [2] Manual override

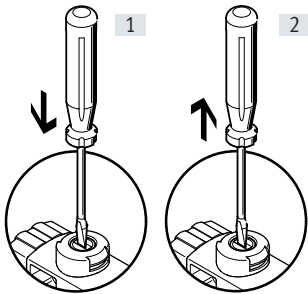
#### Note

A manually operated valve (manual override) cannot be reset electrically. Conversely, an electrically actuated valve cannot be reset using the mechanical manual override.

## Key features – Mounting and operation

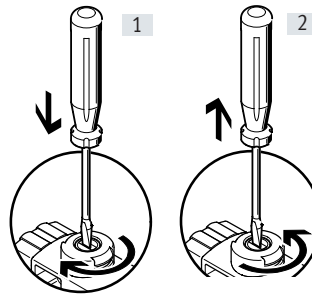
### Manual override (MO)

#### MO with automatic return (non-detenting)



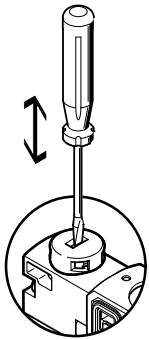
- [1] Press in the stem of the MO with a pointed object or screwdriver. The pilot valve switches and actuates the main valve.
- [2] Remove the pointed object or screwdriver. The spring force pushes the stem of the MO back. The pilot valve returns to its normal position as does the single solenoid main valve (not the case with double solenoid valve code J).

#### MO with detent (locking)



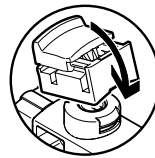
- [1] Press in the stem of the MO with a pointed object or screwdriver until the valve switches and then turn the stem clockwise by 90° until the stop is reached. The valve remains actuated
- [2] Turn the plunger anti-clockwise by 90° until the stop is reached and then remove the pointed object or screwdriver. The spring force pushes the stem of the MO back. The valve returns to its normal position (not the case with double solenoid valve code J).

#### MO with automatic return (non-detenting)



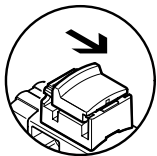
MO is actuated by pushing it with a pointed object or screwdriver and reset by spring force (detenting position prevented by coded cover cap).

#### MO with lock – Assembly



Clip MO with detent onto the pilot valve. The MO cap can then be operated (detenting) without tools.

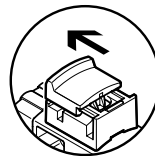
#### MO with lock – Actuation



By sliding the cap for the MO with detent in the direction of the arrow:

- Cap locks into the end position
- The pilot valve switches and actuates the main valve.

#### MO with lock – Actuation



By sliding the cap for the MO with detent in the direction of the arrow:

- Cap locks into the end position
- The spring force pushes the stem of the MO back.
- The pilot valve returns to its normal position as does the single solenoid main valve (not the case with double solenoid valve code J).

## Key features – Electrical components

### Electrical power as a result of current reduction

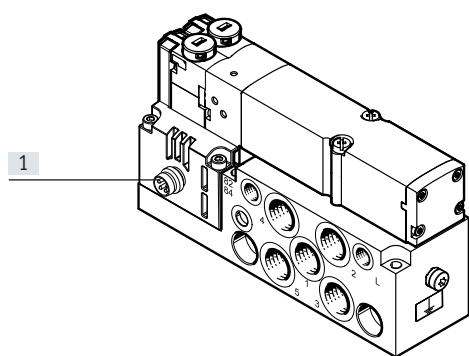
Each MPA solenoid coil is protected with a spark arresting protective circuit as well as against polarity reversal.

All valve types are additionally equipped with integrated current reduction.

MPA valves are supplied with operating voltage in the range 18 ... 30 V (24 V +/-25%). This high tolerance is made possible by the integrated

control electronics and offers additional safety, e.g. in the case of a drop in operating voltage.

### Electrical connection



[1] Electrical connection, plug 4-pin, M8, to EN 60947-5-2

Tightening torque for M8 plug: 0.25 ... 0.5 Nm (manual torque)

### Pin allocation to ISO 20401

	Pin	With positive logic	With negative logic
	1	n.c.	n.c.
	2	U <sub>B</sub> for coil 12	0 V for coil 12
	3	0 V for coil 12 and 14	U <sub>B</sub> for coil 12 and 14
	4	U <sub>B</sub> for coil 14	0 V for coil 14

### Application notes

#### System equipment

Operate your system with unlubricated compressed air if possible. Festo valves and cylinders are designed so that, if used as designated, they will not require additional lubrication and will still achieve a long service life. The quality of compressed air downstream of the compressor must correspond to that of unlubricated compressed air. If possible, do not operate the entire system with lubricated compressed air. The lubricators should, where possible, always be installed directly upstream of the actuator requiring them.

Incorrect additional oil and too high an oil content in the compressed air reduce the service life of the valve terminal.  
Use Festo special oil OFSW-32 or the alternatives listed in the Festo catalogue (as specified in DIN 51524 HLP32; basic oil viscosity 32 CST at 40°C).


#### Bio-oils

When using bio-oils (oils which are based on synthetic or native esters, e.g. rapeseed oil methyl ester), the maximum residual oil content of 0.1 mg/m<sup>3</sup> must not be exceeded (see ISO 8573-1 Class 2).


#### Mineral oils

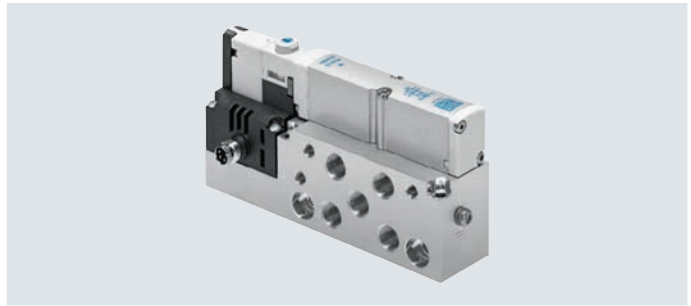
When using mineral oils (e.g. HLP oils to DIN 51524, parts 1 to 3) or similar oils based on poly-alpha-olefins (PAO), the maximum residual oil content of 5 mg/m<sup>3</sup> must not be exceeded (see ISO 8573-1 Class 4).  
A higher residual oil content is not permitted, regardless of the compressor oil, because permanent lubrication would otherwise be flushed out over a period of time.

Data sheet – Solenoid valve on sub-base

-  - Flow rate  
 VMPA1: up to 360 l/min  
 VMPA14: up to 670 l/min  
 VMPA2: up to 840 l/min

-  - Voltage  
 24 V DC

-  - Valve width  
 VMPA1: 10 mm  
 VMPA14: 14 mm  
 VMPA2: 20 mm



General technical data		10 mm	14 mm	20 mm
Width				
Lubrication	Life-time lubrication, PWIS-free (free of paint-wetting impairment substances)			
Type of mounting	With through-holes			
Mounting position	Any			
Manual override	Non-detenting, detenting			
Weight of sub-base	[g]	92	184	233
<b>Pneumatic connections</b>				
Pneumatic connection	Via sub-base			

Technical data – Valve width 10 mm		M	J	N	K	H	B	G	E	D	I	
Design		Piston spool valve										
Sealing principle		Soft										
Overlap		Positive overlap										
Reset method		Pneumatic spring	–	Pneumatic spring			Mechanical spring			Pneumatic spring		
Switching times	On	[ms]	10	10	10	10	10	10	10	10	8	
	Off	[ms]	20	–	20	20	20	35	35	35	20	20
	Change-over	[ms]	–	15	–	–	–	15	15	15	–	–
Standard nominal flow rate	[l/min]	360	360	300	230	300	300	320	240	230	260	
Operating pressure	[MPa]	–0.09 ... +1		0.3 ... 1			–0.09 ... +1			0.3 ... 1		
	[bar]	–0.9 ... +10		3 ... 10			–0.9 ... +10			3 ... 10		
Pilot pressure	[MPa]	0.3 ... 0.8										
	[bar]	3 ... 8										
Max. tightening torque for valve mounting	[Nm]	0.25										
Materials		Die-cast aluminium										
Product weight	[g]	49	56	56	56	56	56	56	56	56	56	

## Data sheet – Solenoid valve

Technical data – Valve width 14 mm												
Code		M	J	N	K	H	B	G	E	D	I	
Design		Piston spool valve										
Sealing principle		Soft										
Overlap		Positive overlap										
Reset method		Pneumatic spring					Mechanical spring				Pneumatic spring	
Switching times	On	[ms]	13	9	12	12	12	16	13	13	12	9
	Off	[ms]	30	–	38	38	38	50	52	50	30	25
	Change-over	[ms]	–	24	–	–	–	26	26	26	–	–
Standard nominal flow rate		[l/min]	550	590	580	550	550	560	540	460	570	570
Operating pressure		[MPa]	–0.09 ... +1			0.3 ... 1		–0.09 ... +1			0.3 ... 1	
		[bar]	–0.9 ... +10			3 ... 10		–0.9 ... +10			3 ... 10	
Pilot pressure		[MPa]	0.3 ... 0.8									
		[bar]	3 ... 8									
Max. tightening torque for valve mounting		[Nm]	0.65									
Materials		Die-cast aluminium										
Product weight		[g]	77									

Technical data – Valve width 14 mm												
Code		MS	NS	KS	HS	DS						
Design		Piston spool valve										
Sealing principle		Soft										
Overlap		Positive overlap										
Reset method		Mechanical spring										
Switching times	On	[ms]	13	12	12	12	10					
	Off	[ms]	41	23	23	23	25					
	Change-over	[ms]	–	–	–	–	–					
Max. switching frequency		[Hz]	2	–	–	–	–					
Standard nominal flow rate		[l/min]	550 ... 670	460	500	460	510					
Note on standard nominal flow rate			MPA-S: 550 l/min MPA-L: 670 l/min	–	–	–	–					
Operating pressure		[MPa]	–0.09 ... +0.8									
		[bar]	–0.9 ... +8									
Pilot pressure		[MPa]	0.3 ... 0.8									
		[bar]	3 ... 8									
Max. tightening torque for valve mounting		[Nm]	0.65	0.25								
Materials		Die-cast aluminium										
Product weight		[g]	77									

Technical data – Valve width 20 mm												
Code		M	J	N	K	H	B	G	E	D	I	
Design		Piston spool valve										
Sealing principle		Soft										
Overlap		Positive overlap										
Reset method		Pneumatic spring					Mechanical spring				Pneumatic spring	
Switching times	On	[ms]	15	9	8	8	8	11	10	11	7	7
	Off	[ms]	28	–	28	28	28	46	40	47	25	25
	Change-over	[ms]	–	22	–	–	–	23	21	23	–	–
Standard nominal flow rate		[l/min]	700	670	550 ... 600	500	550	450	610	590	650	650
Note on standard nominal flow rate			–	–	MPA-S: 550 l/min MPA-L: 600 l/min	–	–	–	–	–	–	–
Operating pressure		[MPa]	–0.09 ... +1			0.3 ... 1		–0.09 ... +1			0.3 ... 1	
		[bar]	–0.9 ... +10			3 ... 10		–0.9 ... +10			3 ... 10	
Pilot pressure		[MPa]	0.3 ... 0.8									
		[bar]	3 ... 8									
Max. tightening torque for valve mounting		[Nm]	0.65									
Materials		Die-cast aluminium										
Product weight		[g]	100									

## Data sheet – Solenoid valve

Safety characteristics		Valve width 10 mm	Valve width 14 mm	Valve width 20 mm
Max. positive test pulse with 0 signal	[ $\mu$ s]	400	400	400
Max. negative test pulse with 1 signal	[ $\mu$ s]	200	200	900
Shock resistance		Shock test with severity level 2 to FN 942017-5 and EN 60068-2-27		
Vibration resistance		Transport application test with severity level 2 to FN 942017-4 and EN 60068-2-6		

Current consumption per solenoid coil at nominal voltage				
Width		10 mm	14 mm	20 mm
Nominal pick-up current	[mA]	50	50	110
Nominal current with current reduction	[mA]	10	10	23
Time until current reduction	[ms]	20	20	20

Electrical data		
Nominal voltage	[V DC]	24
Operating voltage range	[V DC]	18 ... 30
Residual ripple	[Vss]	4
Degree of protection to EN 60529		IP67 (for all types of signal transmission in assembled state)

Operating and environmental conditions		
Operating medium		Compressed air to ISO 8573-1:2010 [7:4:4]
Note on operating/pilot medium		Lubricated operation possible (in which case lubricated operation will always be required)
Ambient temperature	[°C]	-5 ... +50
Temperature of medium	[°C]	-5 ... +50
Storage temperature	[°C]	-20 ... +40
Relative humidity		Max. 90% at 40°C
Corrosion resistance class CRC <sup>1)</sup>		1
CE marking (see declaration of conformity)		To EU EMC Directive <sup>2)</sup>
		To EU RoHS Directive <sup>2)</sup>
UKCA marking (see declaration of conformity)		To UK instructions for EMC <sup>2)</sup>
		To UK RoHS instructions <sup>2)</sup>
Certification		c UL us - Recognized (OL)

1) Corrosion resistance class CRC 1 to Festo standard FN 940070

Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).

2) For information about the area of use, see the EC declaration of conformity at: [www.festo.com/catalogue/...](http://www.festo.com/catalogue/...) → Support/Downloads.

If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

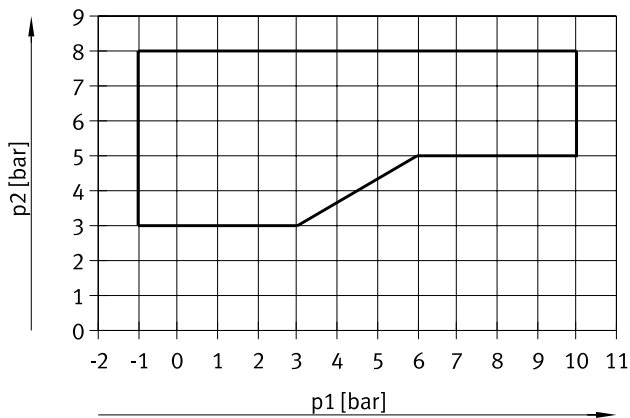
Materials	
Housing	Die-cast aluminium, reinforced PPA
Seals	NBR
Note on materials	RoHS-compliant
PWIS conformity	VDMA24364-B1/B2-L



## Data sheet – Solenoid valve

### Pilot pressure $p_2$ as a function of working pressure $p_1$ with external pilot air supply

For valves with code: M, J, B, G, E, W, X

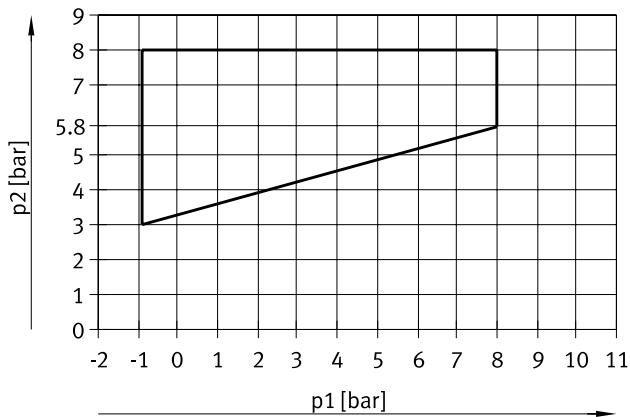


For valves with code: N, K, H, D, I

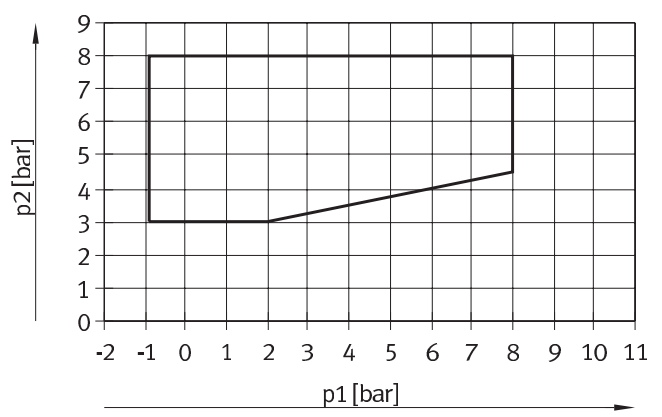


### Pilot pressure $p_2$ as a function of working pressure $p_1$ for valves with mechanical spring return

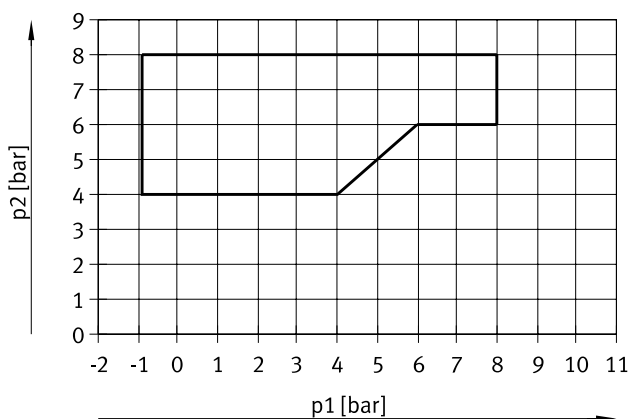
For valves in width 10 mm with code: MS, NS, KS, HS, DS



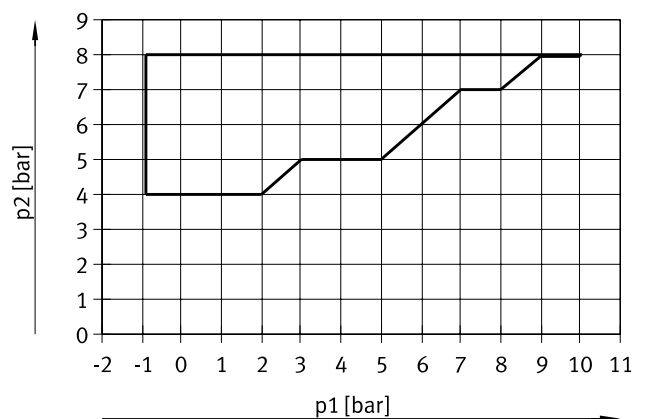
For valves in width 20 mm with code: MS, NS, KS, HS, DS




For valves in width 14 mm with code: NS, KS, HS, DS




For polymer poppet valves in width 10 mm with code: MU, NU, KU, HU

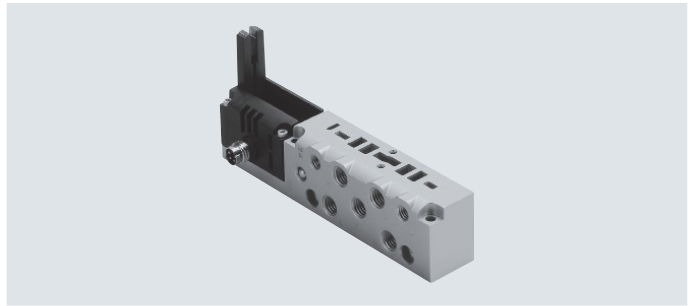


## Data sheet – Sub-base

-  - Flow rate  
 VMPA1: up to 360 l/min  
 VMPA14: up to 670 l/min  
 VMPA2: up to 840 l/min

-  - Voltage  
 24 V DC

-  - Valve width  
 VMPA1: 10 mm  
 VMPA14: 14 mm  
 VMPA2: 20 mm




General technical data				
Width		10 mm	14 mm	20 mm
Electrical connection	Plug M8x1, 4-pin, to EN 60947-5-2			
Type of mounting	With through-hole			
Mounting position	Any			
Pneumatic connections				
Supply port	1	M7	G1/8	G1/8
Exhaust port	3	M7	G1/8	G1/8
	5	M7	G1/8	G1/8
Working ports	2	M7	G1/8	G1/8
	4	M7	G1/8	G1/8
Pilot air connection	12/14	M5	M5	M5
Pilot exhaust air port	82/84	M5	M5	M5

Operating and environmental conditions				
Type		VMPA...1	VMPA...-EX1E	
Operating medium	Compressed air to ISO 8573-1:2010 [7:4:4]			
Note on the operating/pilot medium	Lubricated operation possible (in which case lubricated operation will always be required)			
Operating pressure	Internal pilot air supply	[MPa]	0.3 ... 0.8	
		[bar]	3 ... 8	
	External pilot air supply	[MPa]	-0.09 ... +1	
		[bar]	-0.9 ... +10	
Pilot pressure		[bar]	3 ... 8	
Ambient temperature		[°C]	-5 ... +50	
CE marking (see declaration of conformity)			To EU EMC Directive <sup>1)</sup>	To EU EMC Directive <sup>1)</sup>
			-	To EU Explosion Protection Directive (ATEX)

1) For information about the area of use, see the EC declaration of conformity at: [www.festo.com/catalogue/...](http://www.festo.com/catalogue/...) → Support/Downloads.  
 If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

ATEX <sup>1)</sup>				
Type		VMPA...-EX1E		
ATEX category gas		II 3G		
Type of ignition protection for gas		Ex ec IIC T4 Gc X		
Explosion-proof ambient temperature		[°C]	-5 ≤ Ta ≤ +50	
CE marking (see declaration of conformity)		To EU Explosion Protection Directive (ATEX)		

 **Note**  
 Also applies to the sub-base for individual connection type VMPA...EX1E with retrofitted valve (see declaration of conformity).

1) For special ATEX applications please speak to your technical consultant

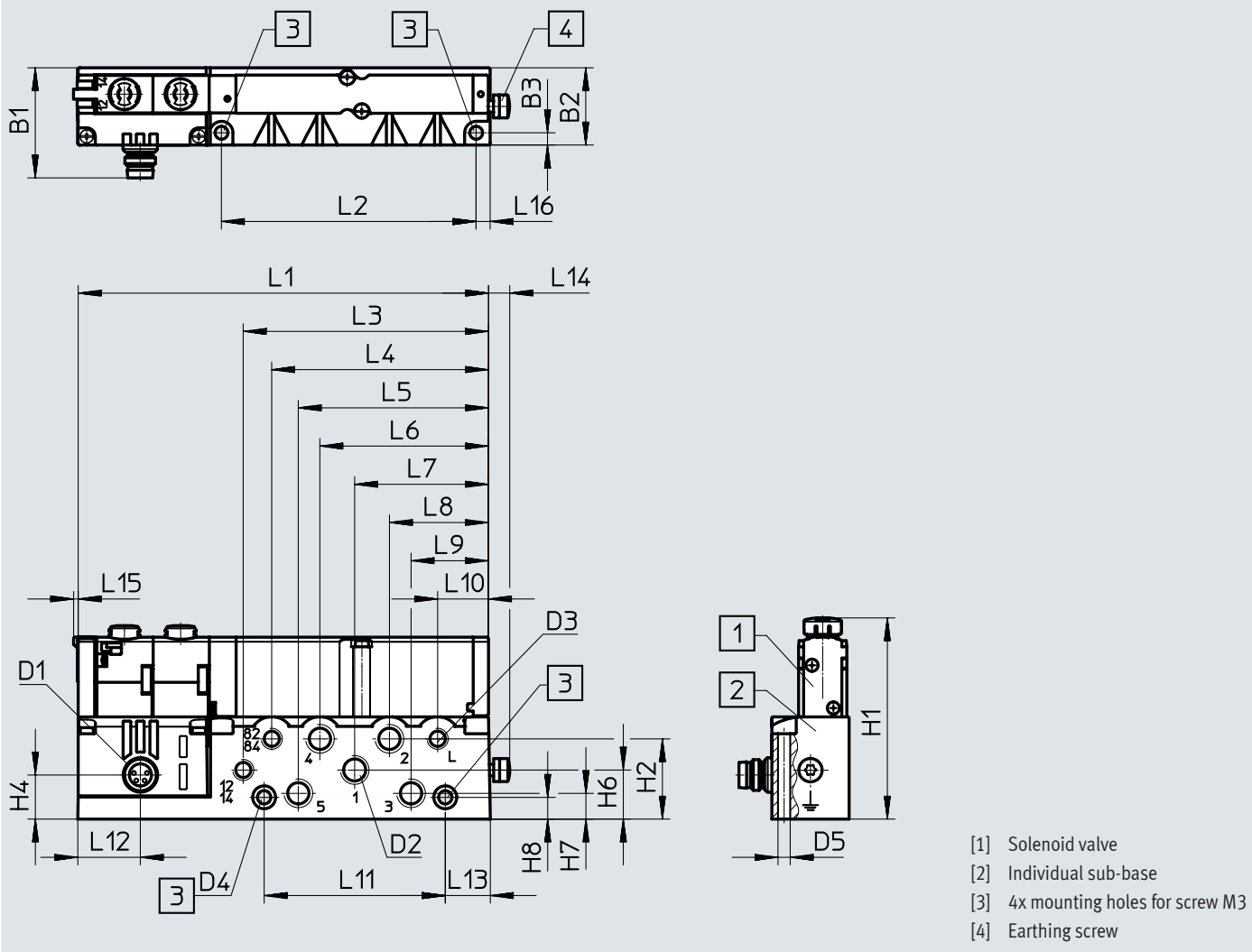
Materials	
Sub-base	Die-cast aluminium
Note on materials	RoHS-compliant
PWIS conformity	VDMA24364-B1/B2-L

Data sheet

Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)

Solenoid valve, width 10 mm, on individual sub-base



- [1] Solenoid valve
- [2] Individual sub-base
- [3] 4x mounting holes for screw M3
- [4] Earthing screw

Type	B1	B2	B3	D1	D2	D3	D4 ø	D5 ø	H1	H2	H4	H6	H7	H8
VMPA1-...	28.8	20.2	3.2	M8x1	M7	M5	3.4	3.4	52.2	21	11.6	12.9	6.8	5.7

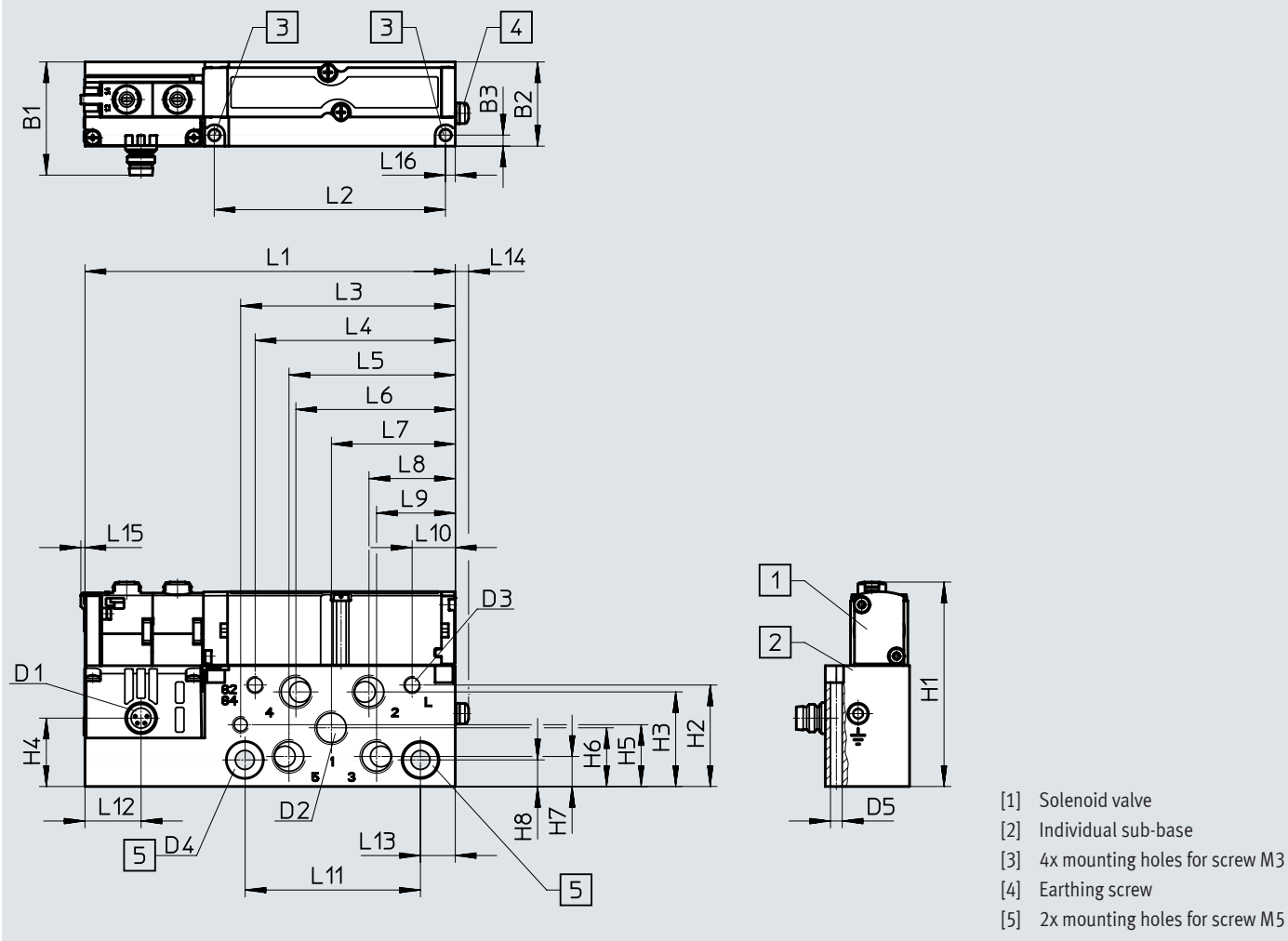
Type	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16
VMPA1-...	107.3	66.6	64.2	56.7	49.8	44.1	35	25.9	20.3	13.3	47.4	16.4	11.3	5.6	1.2	3.2

Data sheet

Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)

Solenoid valve, width 14 mm, on individual sub-base



Type	B1	B2	B3	D1	D2	D3	D4 ø	D5 ø	H1	H2	H3	H4	H5	H6	H7	H8
VMPA14-...	35.1	24.4	3.2	M8x1	G1/8	M5	5.5	3.4	59	29.4	27.4	19.8	17.9	17	8.7	7.7

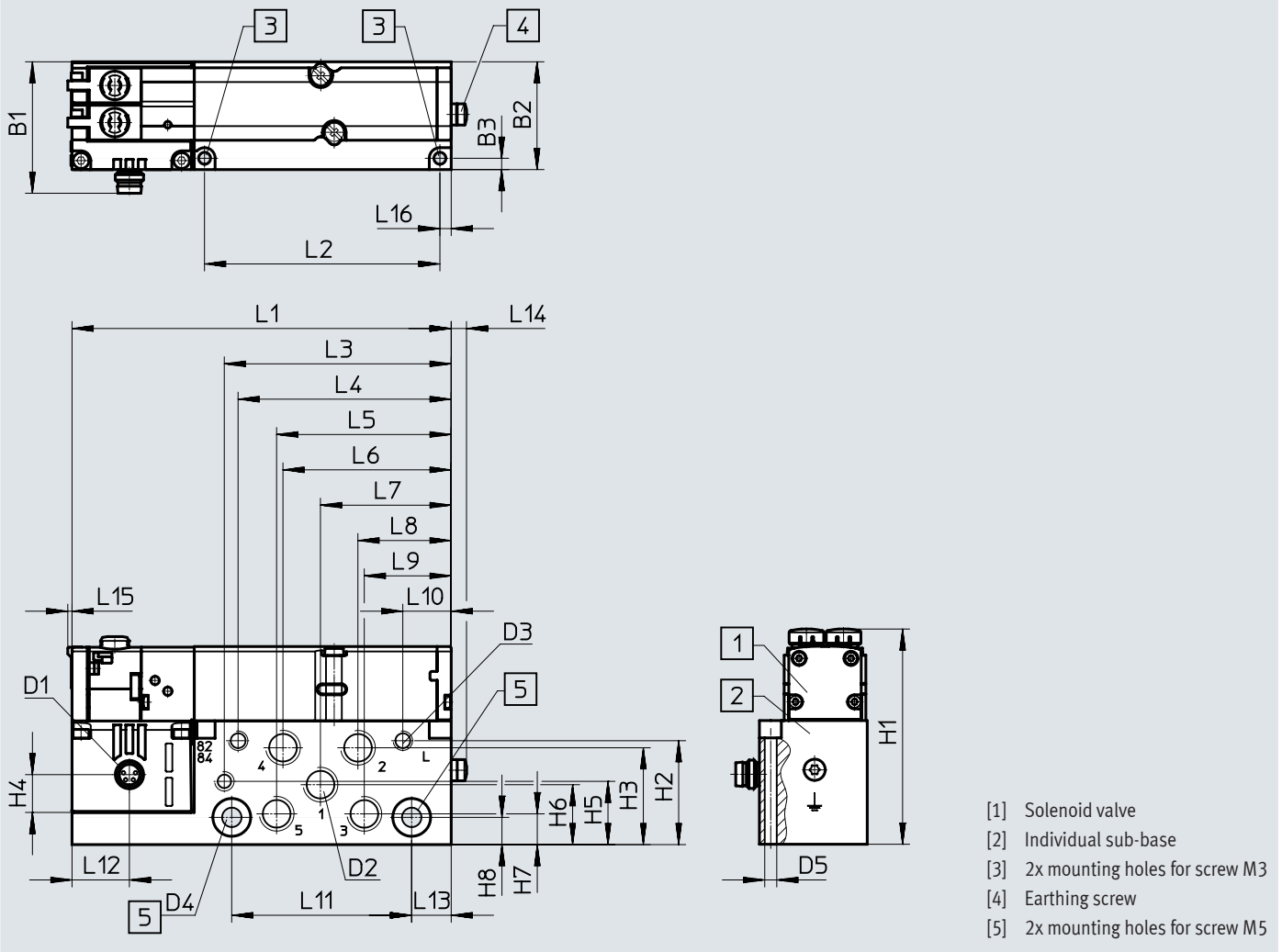
Type	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16
VMPA14-...	107.3	67	62.2	58	48.2	46.2	35.9	25	22.8	12.5	50.9	16.3	10.1	3.9	1.2	2.9

Data sheet

Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)

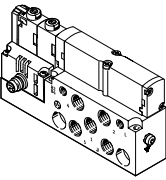
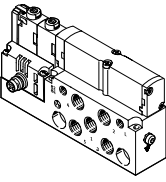
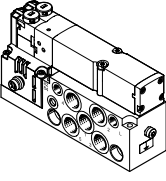

Solenoid valve, width 20 mm, on individual sub-base



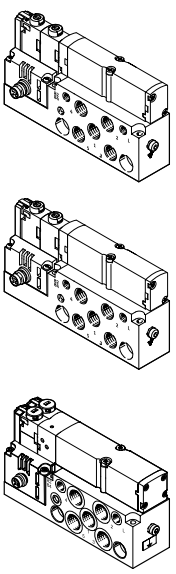
Type	B1	B2	B3	D1	D2	D3	D4 ø	D5 ø	H1	H2	H3	H4	H5	H6	H7	H8
VMPA2-...	37.2	30.5	3.2	M8x1	G1/8	M5	5.5	3.4	60.5	29.4	27.4	10.7	17.9	17	8.7	7.7

Type	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16
VMPA2-...	107.3	66.6	64.2	60.3	49.4	47.6	37	26.4	24.6	13.7	50.9	16.3	11.2	4.4	1.2	3.2

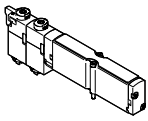
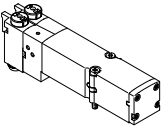

## Ordering data

Ordering data	Valve function	Width [mm]	Part no.	Type	
<b>Internal pilot air supply – Set comprising solenoid valve on individual sub-base</b>					
	<b>5/2-way valve</b>				
	Single solenoid	10	533376	VMPA1-M1H-M-M7-PI	
		14	8023543	VMPA14-M1H-M-G1/8-PI	
		20	537963	VMPA2-M1H-M-G1/8-PI	
	Single solenoid, mechanical reset	14	8023554	VMPA14-M1H-MS-G1/8-PI	
	Double solenoid	10	533377	VMPA1-M1H-J-M7-PI	
		14	8023542	VMPA14-M1H-J-G1/8-PI	
		20	537964	VMPA2-M1H-J-G1/8-PI	
		<b>2x 3/2-way valve</b>			
		Normally open	10	533382	VMPA1-M1H-N-M7-PI
			14	8023550	VMPA14-M1H-N-G1/8-PI
			20	537969	VMPA2-M1H-N-G1/8-PI
		Normally open, mechanical reset	14	8023556	VMPA14-M1H-NS-G1/8-PI
		Normally closed	10	533381	VMPA1-M1H-K-M7-PI
			14	8023549	VMPA14-M1H-K-G1/8-PI
20			537968	VMPA2-M1H-K-G1/8-PI	
Normally closed, mechanical reset		14	8023555	VMPA14-M1H-KS-G1/8-PI	
1x normally open 1x normally closed		10	533383	VMPA1-M1H-H-M7-PI	
		14	8023551	VMPA14-M1H-H-G1/8-PI	
		20	537970	VMPA2-M1H-H-G1/8-PI	
1x normally open 1x normally closed, mechanical reset		14	8023558	VMPA14-M1H-HS-G1/8-PI	
		<b>5/3-way valve</b>			
		Mid-position pressurised	10	533378	VMPA1-M1H-B-M7-PI
	14		8023544	VMPA14-M1H-B-G1/8-PI	
	20		537965	VMPA2-M1H-B-G1/8-PI	
	Mid-position closed	10	533379	VMPA1-M1H-G-M7-PI	
		14	8023546	VMPA14-M1H-G-G1/8-PI	
		20	537966	VMPA2-M1H-G-G1/8-PI	
	Mid-position exhausted	10	533380	VMPA1-M1H-E-M7-PI	
		14	8023545	VMPA14-M1H-E-G1/8-PI	
		20	537967	VMPA2-M1H-E-G1/8-PI	
		<b>2x 2/2-way valve</b>			
		Normally closed	10	533384	VMPA1-M1H-D-M7-PI
			14	8023552	VMPA14-M1H-D-G1/8-PI
			20	537971	VMPA2-M1H-D-G1/8-PI
		Normally closed, mechanical reset	14	8023557	VMPA14-M1H-DS-G1/8-PI
1x normally closed 1x normally closed, reversible		10	545230	VMPA1-M1H-I-M7-PI	
		14	8023553	VMPA14-M1H-I-G1/8-PI	
		20	545232	VMPA2-M1H-I-G1/8-PI	

## Ordering data

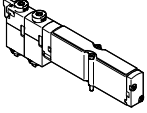
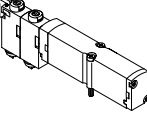
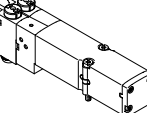
Ordering data	Valve function	Width [mm]	Part no.	Type
<b>External pilot air supply – Set comprising solenoid valve on individual sub-base</b>				
	<b>5/2-way valve</b>			
	Single solenoid	10	533385	VMPA1-M1H-M-S-M7-PI
		14	8023560	VMPA14-M1H-M-S-G1/8-PI
		20	537972	VMPA2-M1H-M-S-G1/8-PI
	Single solenoid, mechanical reset	14	8023571	VMPA14-M1H-MS-S-G1/8-PI
	Double solenoid	10	533386	VMPA1-M1H-J-S-M7-PI
		14	8023559	VMPA14-M1H-J-S-G1/8-PI
		20	537973	VMPA2-M1H-J-S-G1/8-PI
	<b>2x 3/2-way valve</b>			
	Normally open	10	533391	VMPA1-M1H-N-S-M7-PI
		14	8023567	VMPA14-M1H-N-S-G1/8-PI
		20	537978	VMPA2-M1H-N-S-G1/8-PI
	Normally open, mechanical reset	14	8023573	VMPA14-M1H-NS-S-G1/8-PI
	Normally closed	10	533390	VMPA1-M1H-K-S-M7-PI
		14	8023566	VMPA14-M1H-K-S-G1/8-PI
		20	537977	VMPA2-M1H-K-S-G1/8-PI
	Normally closed, mechanical reset	14	8023572	VMPA14-M1H-KS-S-G1/8-PI
	1x normally open 1x normally closed	10	533392	VMPA1-M1H-H-S-M7-PI
		14	8023568	VMPA14-M1H-H-S-G1/8-PI
		20	537979	VMPA2-M1H-H-S-G1/8-PI
	1x normally open 1x normally closed, mechanical reset	14	8023575	VMPA14-M1H-HS-S-G1/8-PI
<b>5/3-way valve</b>				
Mid-position pressurised	10	533387	VMPA1-M1H-B-S-M7-PI	
	14	8023561	VMPA14-M1H-B-S-G1/8-PI	
	20	537974	VMPA2-M1H-B-S-G1/8-PI	
Mid-position closed	10	533388	VMPA1-M1H-G-S-M7-PI	
	14	8023563	VMPA14-M1H-G-S-G1/8-PI	
	20	537975	VMPA2-M1H-G-S-G1/8-PI	
Mid-position exhausted	10	533389	VMPA1-M1H-E-S-M7-PI	
	14	8023562	VMPA14-M1H-E-S-G1/8-PI	
	20	537976	VMPA2-M1H-E-S-G1/8-PI	
<b>2x 2/2-way valve</b>				
Normally closed	10	533393	VMPA1-M1H-D-S-M7-PI	
	14	8023569	VMPA14-M1H-D-S-G1/8-PI	
	20	537980	VMPA2-M1H-D-S-G1/8-PI	
Normally closed, mechanical reset	14	8023574	VMPA14-M1H-DS-S-G1/8-PI	
1x normally closed	10	545231	VMPA1-M1H-I-S-M7-PI	
1x normally closed, reversible only	14	8023570	VMPA14-M1H-I-S-G1/8-PI	
	20	545233	VMPA2-M1H-I-S-G1/8-PI	

## Ordering data

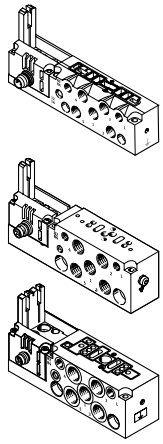
Ordering data	Valve function	Width [mm]	Part no.	Type	
<b>Individual solenoid valve, piston spool valve</b>					
	<b>5/2-way valve</b>				
	Single solenoid	10	533342	VMPA1-M1H-M-PI	
		14	573718	VMPA14-M1H-M-PI	
		20	537952	VMPA2-M1H-M-PI	
	Single solenoid, mechanical spring return	10	571334	VMPA1-M1H-MS-PI	
		14	573974	VMPA14-M1H-MS-PI	
		20	571333	VMPA2-M1H-MS-PI	
	Double solenoid	10	533343	VMPA1-M1H-J-PI	
		14	573717	VMPA14-M1H-J-PI	
20		537953	VMPA2-M1H-J-PI		
	<b>2x 3/2-way valve</b>				
	Normally open	10	533348	VMPA1-M1H-N-PI	
		14	573725	VMPA14-M1H-N-PI	
		20	537958	VMPA2-M1H-N-PI	
	Normally open, mechanical spring return	10	556839	VMPA1-M1H-NS-PI	
		14	575977	VMPA14-M1H-NS-PI	
		20	568655	VMPA2-M1H-NS-PI	
	Normally closed	10	533347	VMPA1-M1H-K-PI	
		14	573724	VMPA14-M1H-K-PI	
		20	537957	VMPA2-M1H-K-PI	
	Normally closed, mechanical spring return	10	556838	VMPA1-M1H-KS-PI	
		14	575976	VMPA14-M1H-KS-PI	
		20	568656	VMPA2-M1H-KS-PI	
	1x normally open, 1x normally closed	10	533349	VMPA1-M1H-H-PI	
		14	573726	VMPA14-M1H-H-PI	
		20	537959	VMPA2-M1H-H-PI	
	1x normally open, 1x normally closed, mechanical spring return	10	556840	VMPA1-M1H-HS-PI	
		14	575979	VMPA14-M1H-HS-PI	
		20	568658	VMPA2-M1H-HS-PI	
		<b>5/3-way valve</b>			
		Mid-position pressurised	10	533344	VMPA1-M1H-B-PI
14			573719	VMPA14-M1H-B-PI	
20			537954	VMPA2-M1H-B-PI	
Mid-position closed		10	533345	VMPA1-M1H-G-PI	
		14	573721	VMPA14-M1H-G-PI	
		20	537955	VMPA2-M1H-G-PI	
Mid-position exhausted		10	533346	VMPA1-M1H-E-PI	
		14	573720	VMPA14-M1H-E-PI	
		20	537956	VMPA2-M1H-E-PI	







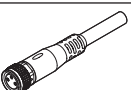
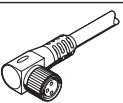

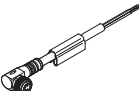
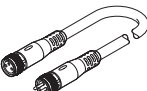
## Ordering data

Ordering data	Valve function	Width [mm]	Part no.	Type
<b>Individual solenoid valve, piston spool valve</b>				
	<b>2x 2/2-way valve</b> Normally closed	10	<b>533350</b>	<b>VMPA1-M1H-D-PI</b>
		14	<b>573727</b>	<b>VMPA14-M1H-D-PI</b>
		20	<b>537960</b>	<b>VMPA2-M1H-D-PI</b>
	Normally closed, mechanical spring return	10	<b>556841</b>	<b>VMPA1-M1H-DS-PI</b>
		14	<b>575978</b>	<b>VMPA14-M1H-DS-PI</b>
		20	<b>568657</b>	<b>VMPA2-M1H-DS-PI</b>
	1x normally closed 1x normally closed, reversible	10	<b>543605</b>	<b>VMPA1-M1H-I-PI</b>
		14	<b>573728</b>	<b>VMPA14-M1H-I-PI</b>
		20	<b>543703</b>	<b>VMPA2-M1H-I-PI</b>

## Ordering data


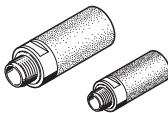
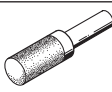
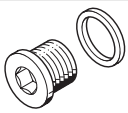
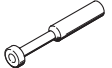
Ordering data		Width [mm]	Part no.	Type	
Designation					
<b>Sub-base for individual connection</b>					
	Without ATEX specification	Internal pilot air supply	10	533394	VMPA1-IC-AP-1
			14	8023666	VMPA14-IC-AP-1
			20	537981	VMPA2-IC-AP-1
		External pilot air supply	10	533395	VMPA1-IC-AP-S-1
			14	8023667	VMPA14-IC-AP-S-1
			20	537982	VMPA2-IC-AP-S-1
	With ATEX category → 18	Internal pilot air supply	10	8005149	VMPA1-IC-AP-1-EX1E
			14	8023668	VMPA14-IC-AP-1-EX1E
			20	8005151	VMPA2-IC-AP-1-EX1E
		External pilot air supply	10	8005150	VMPA1-IC-AP-S-1-EX1E
			14	8023669	VMPA14-IC-AP-S-1-EX1E
			20	8005152	VMPA2-IC-AP-S-1-EX1E

Ordering data		Part no.	Type	PU <sup>1)</sup>
Designation				
<b>Cover</b>				
	Cover cap for manual override with coded cover cap, manual override non-detenting	540897	VMPA-HBT-B	10
	Cover cap for manual override, concealed, manual override blocked	540898	VMPA-HBV-B	10
	Cover cap for manual override, manual override detenting, can be operated manually without accessories	8002234	VAMC-L1-CD	10
	Inscription label holder for an inscription label and cover for the switching status indication and the manual override (blocked)	570818	ASLR-D-L1	10

<b>Connecting cable, individual connection</b>					
	<ul style="list-style-type: none"> <li>• Straight socket, M8x1, 4-pin,</li> <li>• Open end, 4-wire</li> </ul>	2.5 m	158960	SIM-M8-4GD-2.5-PU	1
		5 m	158961	SIM-M8-4GD-5-PU	1
	<ul style="list-style-type: none"> <li>• Angled socket, M8x1, 4-pin</li> <li>• Open end, 4-wire</li> </ul>	2.5 m	158962	SIM-M8-4WD-2.5-PU	1
		5 m	158963	SIM-M8-4WD-5-PU	1
	<ul style="list-style-type: none"> <li>• Straight socket, M8x1, 4-pin,</li> <li>• Open end, 4-wire</li> </ul>	2.5 m	541342	NEBU-M8G4-K-2.5-LE4	1
		5 m	541343	NEBU-M8G4-K-5-LE4	1
	<ul style="list-style-type: none"> <li>• Angled socket, M8x1, 4-pin</li> <li>• Open end, 4-wire</li> </ul>	2.5 m	541344	NEBU-M8W4-K-2.5-LE4	1
		5 m	541345	NEBU-M8W4-K-5-LE4	1
	Modular system for a choice of connecting cables		–	→ Internet: nebu	

1) Packaging unit.

## Accessories

Ordering data		Part no.	Type	PU <sup>1)</sup>	
Designation					
<b>Push-in fitting</b>					
	Connecting thread M5 for tubing O.D.	3 mm	153313	QSM-M5-3-I	10
		4 mm	153315	QSM-M5-4-I	10
			578370	NPQH-DK-M5-Q4-P10	10
		6 mm	153317	QSM-M5-6-I	10
			578371	NPQH-DK-M5-Q6-P10	10
		Connecting thread M7 for tubing O.D.	4 mm	153319	QSM-M7-4-I
	578372			NPQH-DK-M7-Q4-P10	10
	6 mm		153321	QSM-M7-6-I	10
			132919	QSM-M7-6-I-R-100	100
			578373	NPQH-DK-M7-Q6-P10	10
			6 mm	186107	QS-G1/8-6-I
	Connecting thread G1/8 for tubing O.D.	6 mm	578375	NPQH-DK-G18-Q6-P10	10
8 mm			186109	QS-G1/8-8-I	10
578376		NPQH-DK-G18-Q8-P10	10		
<b>Silencer</b>					
	Connecting thread	M5	165003	UC-M5	1
		M7	161418	UC-M7	1
		G1/8	161419	UC-1/8	1
	Push-in sleeve connection	3 mm	165005	UC-QS-3H	1
		4 mm	165006	UC-QS-4H	1
		6 mm	165007	UC-QS-6H	1
		8 mm	175611	UC-QS-8H	1
<b>Blanking plug</b>					
	M5 thread		578404	NPQH-BK-M5-P10	10
	M7 thread		174309	B-M7	10
			578405	NPQH-BK-M7-P10	10
	G1/8 thread		3568	B-1/8	10
		578406	NPQH-BK-G18-P10	10	
<b>Plug</b>					
	Blanking plug for tubing O.D.	4 mm	153267	QSC-4H	10
		6 mm	153268	QSC-6H	10
		8 mm	153269	QSC-8H	10

1) Packaging unit.

# Festo - Your Partner in Automation



**1 Festo Inc.**  
5300 Explorer Drive  
Mississauga, ON L4W 5G4  
Canada

**Festo Customer Interaction Center**  
Tel: 1 877 463 3786  
Fax: 1 877 393 3786  
Email: [customer.service.ca@festo.com](mailto:customer.service.ca@festo.com)



**2 Festo Pneumatic**  
Av. Ceylán 3,  
Col. Tequesquináhuac  
54020 Tlalnepantla,  
Estado de México

**Multinational Contact Center**  
01 800 337 8669  
[ventas.mexico@festo.com](mailto:ventas.mexico@festo.com)



**3 Festo Corporation**  
1377 Motor Parkway  
Suite 310  
Islandia, NY 11749

**Festo Customer Interaction Center**  
1 800 993 3786  
1 800 963 3786  
[customer.service.us@festo.com](mailto:customer.service.us@festo.com)



**4 Regional Service Center**  
7777 Columbia Road  
Mason, OH 45040

Connect with us



[www.festo.com/socialmedia](http://www.festo.com/socialmedia)



[www.festo.com](http://www.festo.com)

Subject to change