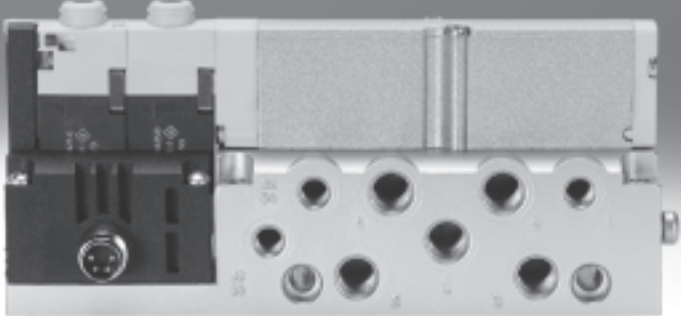


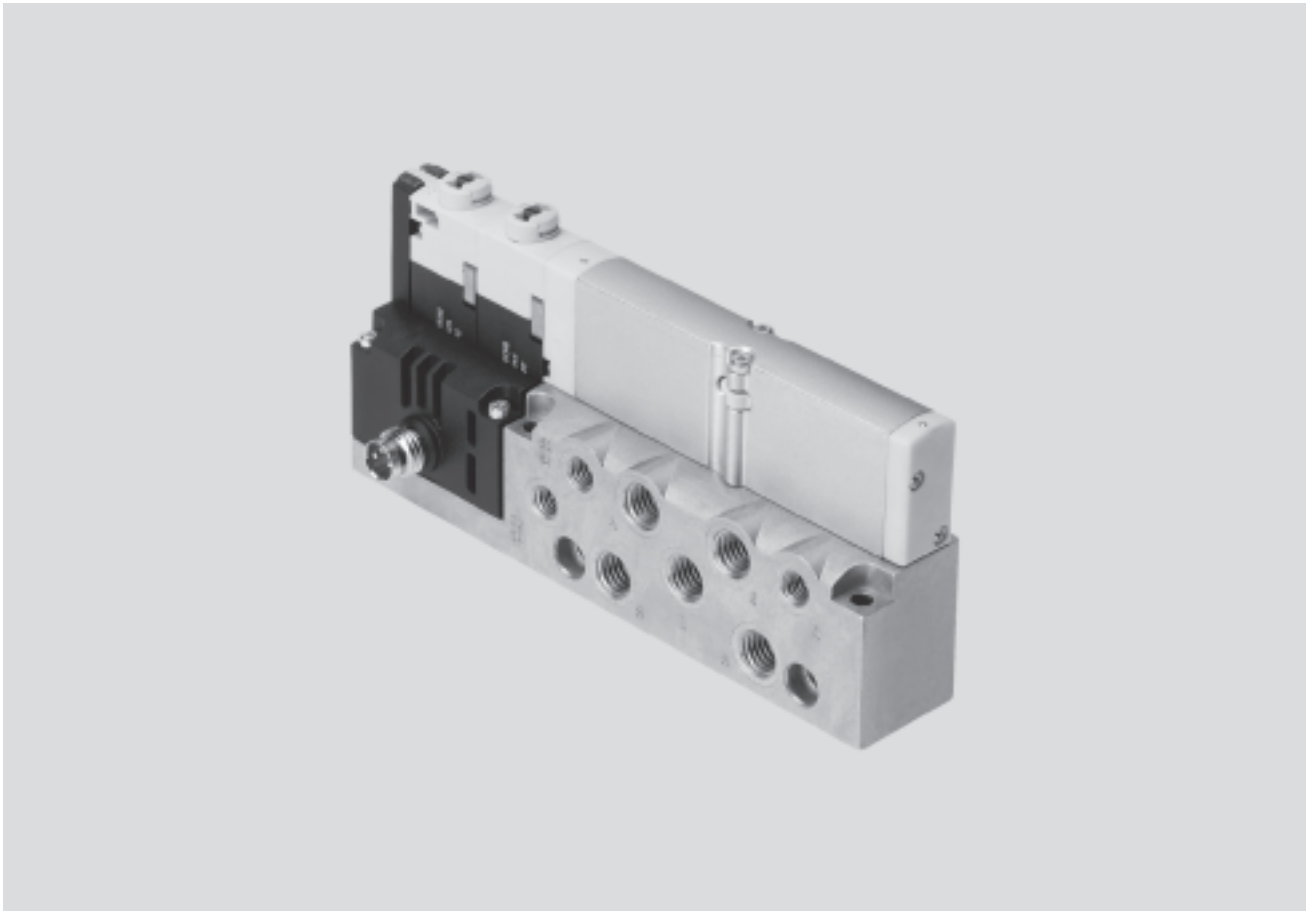
# Solenoid valves VMPA



## Solenoid valves VMPA

Key features

**FESTO**



### Innovative

- Slim high-performance valves in a 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 870 l/min

The valves are identical with the valves from the valve terminals MPA-S, MPA-F and MPA-L. This simplifies planning, ordering and warehousing.

### Versatile

- High pressure range  
–0.9 ... 10 bar
- Wide range of valve functions

### Reliable

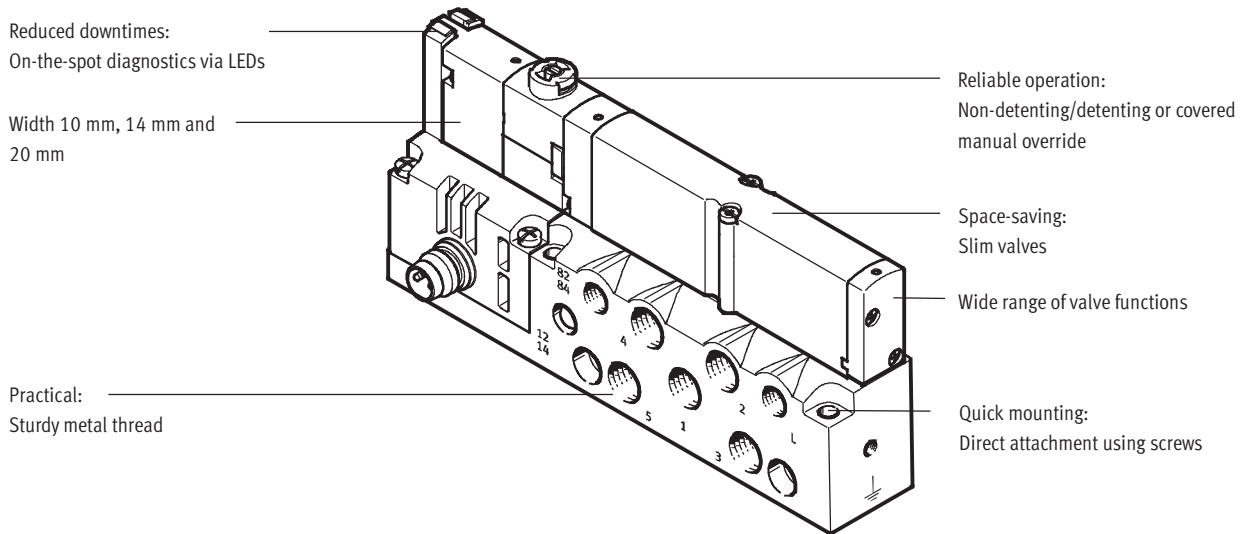
- Fast troubleshooting thanks to LEDs on the valves and diagnostics via fieldbus
- Extensive operating voltage range  $\pm 25\%$
- Easy to service thanks to replaceable valves and electronic modules
- Manual override either non-detenting, detenting or secured against unauthorised activation (covered)

### Easy to mount

- Secure wall mounting

## Solenoid valves VMPA

Key features



### 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

# Solenoid valves VMPA

Peripherals overview

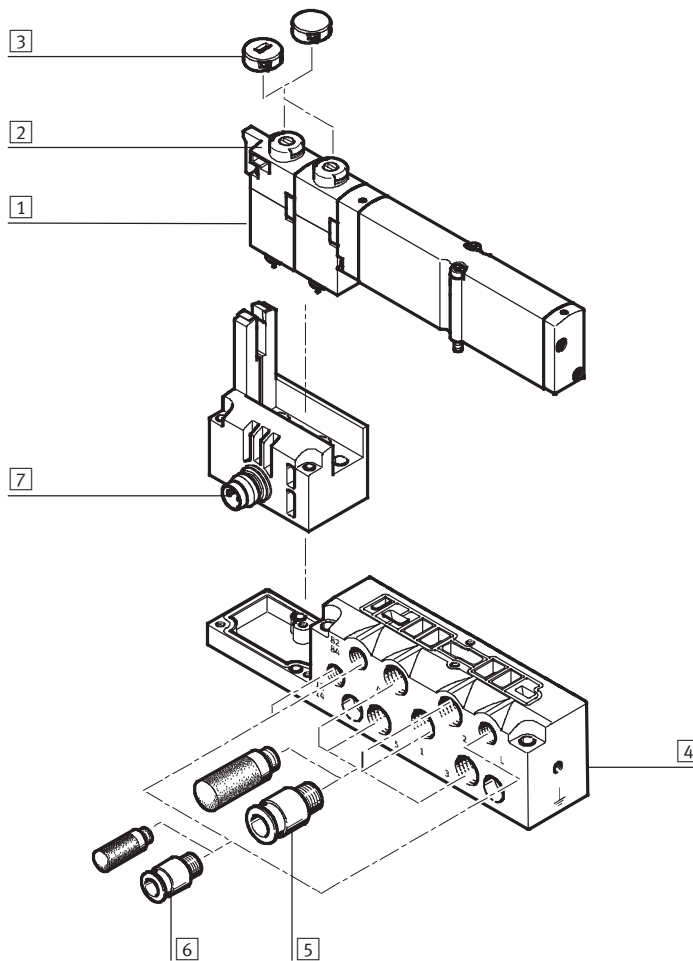
## Individual sub-base for solenoid valve width 10 mm

Ordering:

- Using individual part numbers

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

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



Designation	Brief description	→ Page/Internet
1 Solenoid valve	VMPA1...	23
2 Manual override	Non-detenting/turning with detent, per solenoid coil	-
3 Cover cap for manual override	Conversion from detenting/non-detenting to non-detenting or covered	25
4 Sub-base	For solenoid valve VMPA1...	25
5 Fittings and/or silencers	M7 for working ports (2, 4) and supply air/exhaust ports (1, 3, 5)	25
6 Fittings, silencers or blanking plugs	M5 for pilot air supply/pilot exhaust air (12/14, 82/84) and pressure compensation	25
7 Electrical connection M8	4-pin	-

## Solenoid valves VMPA

Peripherals overview

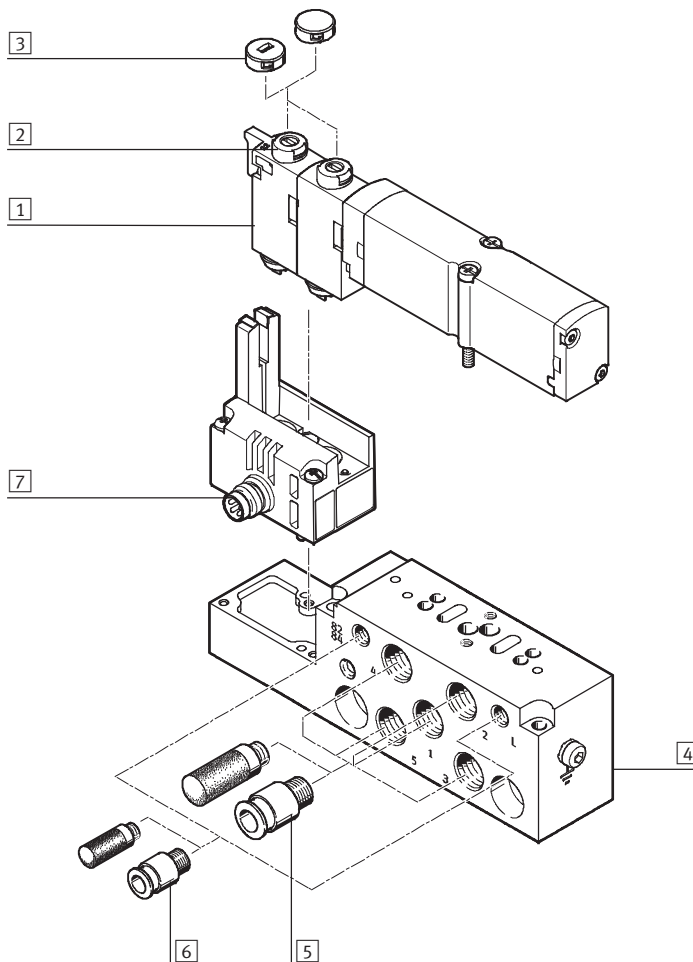
### Individual sub-base for solenoid valve width 14 mm

Ordering:

- Using individual part numbers

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

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



Designation	Brief description	→ Page/Internet
1 Solenoid valve	VMPA14...	23
2 Manual override	Non-detenting/turning with detent, per solenoid coil	–
3 Cover cap for manual override	Conversion from detenting/non-detenting to non-detenting or covered	25
4 Sub-base	For individual valve VMPA14...	25
5 Fittings and/or silencers	G $\frac{3}{8}$ for working ports (2, 4) and supply air/exhaust ports (1, 3, 5)	25
6 Fittings, silencers or blanking plugs	M5 for pilot air supply/pilot exhaust air (12/14, 82/84) and pressure compensation	25
7 Electrical connection M8	4-pin	–

# Solenoid valves VMPA

Peripherals overview

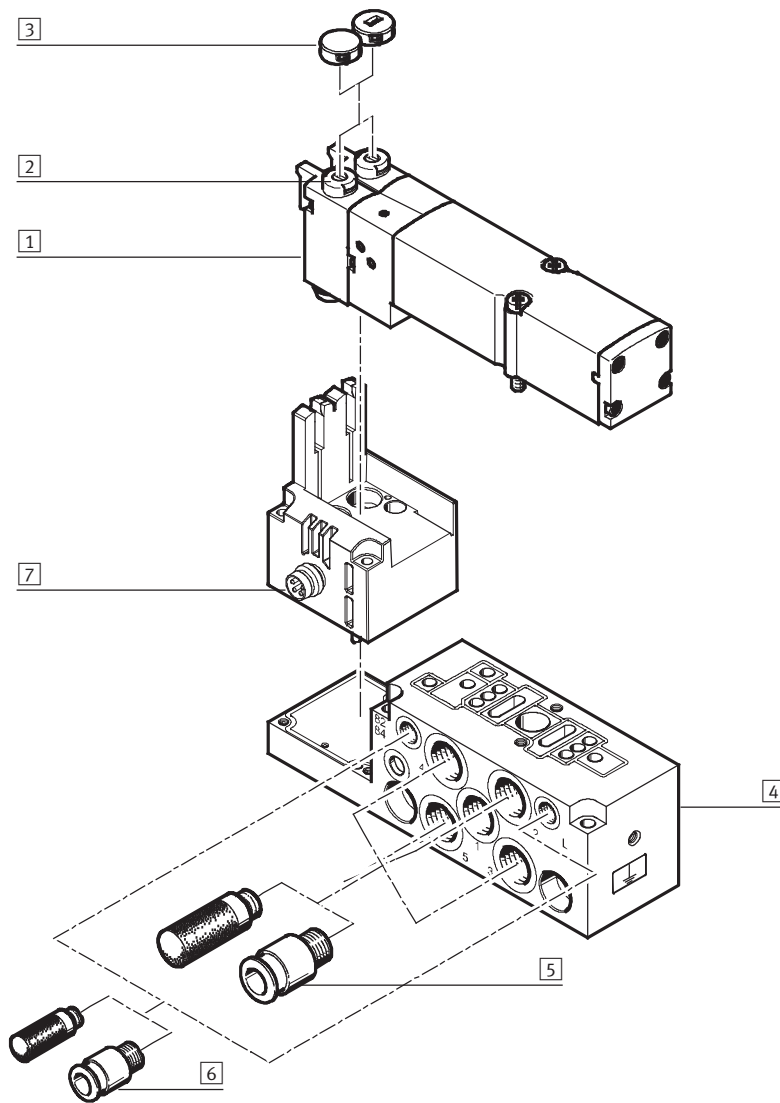
## Individual sub-base for solenoid valve width 20 mm

Ordering:

- Using individual part numbers

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

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

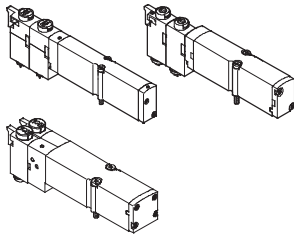


Designation	Brief description	→ Page/Internet
1 Solenoid valve	VMPA2...	23
2 Manual override	Non-detenting/turning with detent, per solenoid coil	-
3 Cover cap for manual override	Conversion from detenting/non-detenting to non-detenting or covered	25
4 Sub-base	For individual valve VMPA2...	25
5 Fittings and/or silencers	G $\frac{1}{8}$ for working ports (2, 4) and supply air/exhaust ports (1, 3, 5)	25
6 Fittings, silencers or blanking plugs	M5 for pilot air supply/pilot exhaust air (12/14, 82/84) and pressure compensation	25
7 Electrical connection M8	4-pin	-

## Solenoid valves VMPA

Key features – Pneumatic components

### Sub-base valve



The VMPA offers a comprehensive range of valve functions. All valves are equipped with a patented sealing system that facilitates efficient sealing, a broad pressure range and long service life. They have a pneumatic pilot control for optimising performance. Air is supplied by means of pilot air supply.

Solenoid valves can be quickly replaced since the tubing connectors remain on the sub-base. This design is also particularly slim.

Irrespective of the valve function 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

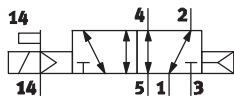
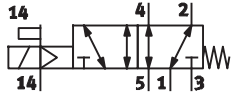
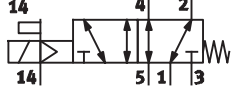
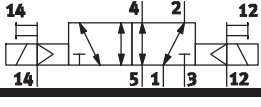
The valves are attached to the metal manifold block using two screws, which means that they can be easily

replaced. The mechanical sturdiness of the sub-base guarantees good long-term sealing.

#### Valve code

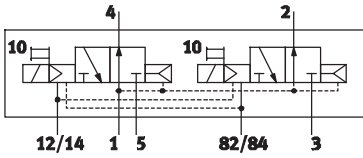
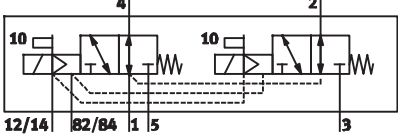
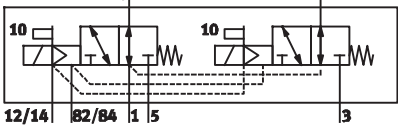
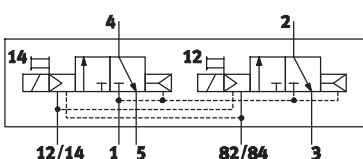
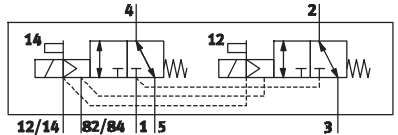
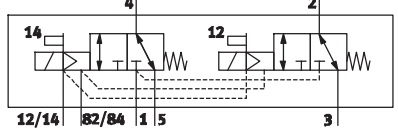
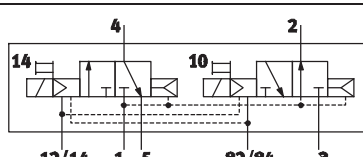
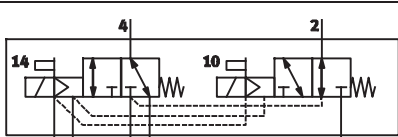
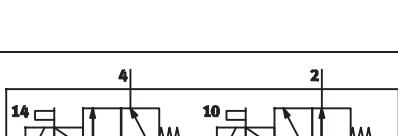
The valve code (M, MS, MU, J, N, NS, NU, K, KS, KU, H, HS, HU, B, G, E, X, W,

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>• Reverse operation</li> <li>• Operating pressure –0.9 ... +10 bar</li> </ul>
MS		10, 20	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Mechanical spring return</li> <li>• Reverse operation</li> <li>• Operating pressure –0.9 ... +8 bar</li> </ul>
MU		10	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Polymer poppet valve</li> <li>• Mechanical spring return</li> <li>• Reverse operation</li> <li>• Operating pressure –0.9 ... +10 bar</li> </ul>
J		10, 14, 20	<ul style="list-style-type: none"> <li>• Double solenoid</li> <li>• Reverse operation</li> <li>• Operating pressure –0.9 ... +10 bar</li> </ul>

## Solenoid valves VMPA

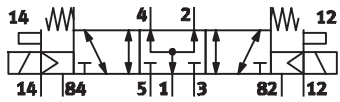
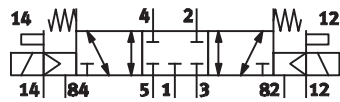
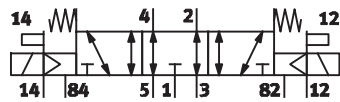
Key features – Pneumatic components

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 3 ... 10 bar</li> </ul>
NS		10, 14, 20	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Normally open</li> <li>• Mechanical spring return</li> <li>• Reverse operation</li> <li>• Operating pressure -0.9 ... +8 bar</li> </ul>
NU		10	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Polymer poppet valve</li> <li>• Normally open</li> <li>• Mechanical spring return</li> <li>• Reverse operation</li> <li>• Operating pressure -0.9 ... +10 bar</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 3 ... 10 bar</li> </ul>
KS		10, 14, 20	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Normally closed</li> <li>• Mechanical spring return</li> <li>• Reverse operation</li> <li>• Operating pressure -0.9 ... +8 bar</li> </ul>
KU		10	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Polymer poppet valve</li> <li>• Normally closed</li> <li>• Mechanical spring return</li> <li>• Reverse operation</li> <li>• Operating pressure -0.9 ... +10 bar</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 3 ... 10 bar</li> </ul>
HS		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>• Mechanical spring return</li> <li>• Reverse operation</li> <li>• Operating pressure -0.9 ... +8 bar</li> </ul>
HU		10	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Polymer poppet valve</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>• Reverse operation</li> <li>• Operating pressure -0.9 ... +10 bar</li> </ul>

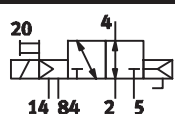
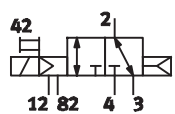


## Solenoid valves VMPA

Key features – Pneumatic components

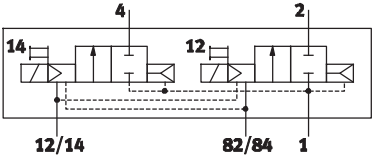
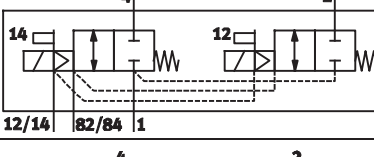
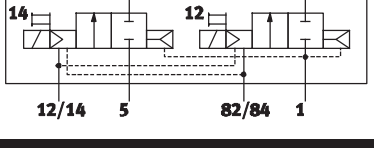
5/3-way valve			
Type	Circuit symbol	Width [mm]	Description
B		10, 14, 20	<ul style="list-style-type: none"> <li>• Mid-position pressurised<sup>1)</sup></li> <li>• Mechanical spring return</li> <li>• Reverse operation</li> <li>• Operating pressure -0.9 ... +10 bar</li> </ul>
G		10, 14, 20	<ul style="list-style-type: none"> <li>• Mid-position closed<sup>1)</sup></li> <li>• Mechanical spring return</li> <li>• Reverse operation</li> <li>• Operating pressure -0.9 ... +10 bar</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>• Reverse operation</li> <li>• Operating pressure -0.9 ... +10 bar</li> </ul>

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

3/2-way valve			
Type	Circuit symbol	Width [mm]	Description
W		10, 14, 20	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Normally open</li> <li>• External compressed air supply</li> <li>• Pneumatic spring return</li> <li>• Reverse operation</li> <li>• Operating pressure -0.9 ... +10 bar</li> </ul> <p>Compressed air (-0.9 ... +10 bar) supplied at working port 2 can be switched with both internal and external pilot air supply.</p>
X		10, 14, 20	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Normally closed</li> <li>• External compressed air supply</li> <li>• Pneumatic spring return</li> <li>• Reverse operation</li> <li>• Operating pressure -0.9 ... +10 bar</li> </ul> <p>Compressed air (-0.9 ... +10 bar) supplied at working port 4 can be switched with both internal and external pilot air supply.</p>

## Solenoid valves VMPA

Key features – Pneumatic components

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 3 ... 10 bar</li> </ul>
DS		10, 14, 20	<ul style="list-style-type: none"> <li>• Single solenoid</li> <li>• Normally closed</li> <li>• Mechanical spring return</li> <li>• Reverse operation</li> <li>• Operating pressure -0.9 ... +8 bar</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, reverse operation only</li> <li>• Pneumatic spring return</li> <li>• Operating pressure 3 ... 10 bar</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).

### 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

Internal pilot air supply can be selected if the required working pressure is between 3 and 8 bar. The pilot air in the sub-base is branched from the compressed air supply 1 using an internal connection. Port 12/14 is sealed with a blanking plug at the factory.

#### External pilot air supply

If the supply pressure is less than 3 bar or greater than 8 bar, you must operate your valve VMPA using external pilot air.

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

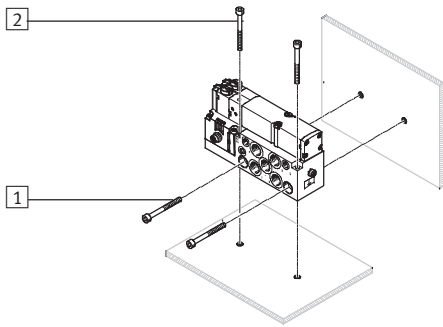
 Note

If a slow pressure rise by means of a soft-start valve is required in the system, external pilot air should be selected whereby the pilot pressure applied during switch-on is already very high.

# Solenoid valves VMPA

Key features – Assembly and operation

## Assembling the solenoid valve on an individual sub-base



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

### Manual override

The manual override (MO) enables the valve to be actuated when not electrically activated or energised. The pilot valve is switched by pushing the manual override. The set switching

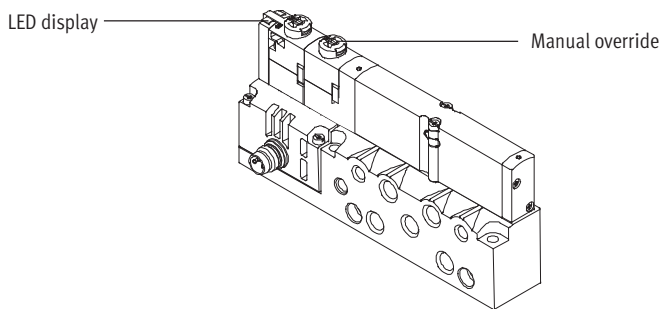
status can also be locked by turning the manual override.

Alternatives:

- A cover (VMPA-HBT-B) can be fitted over the manual override to prevent it from being locked. The manual

override can then only be activated by pushing it.

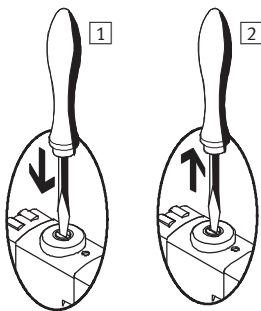
- A cover (VMPA-HBV-B) can be fitted over the manual override to prevent it from being accidentally actuated.



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

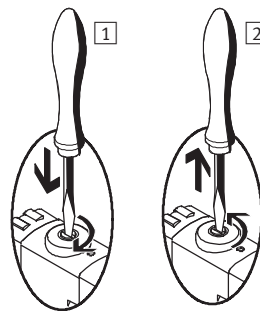
## Manual override (MO)

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



- 1 Press in the stem of the MO with a pointed object or screwdriver. Pilot valve switches and actuates the main valve.
- 2 Remove the pointed object or screwdriver. Spring force pushes the stem of the MO back. Pilot valve returns to its initial position and so too the single solenoid main valve (not with double solenoid valve code J).

### MO set via turning (detenting)

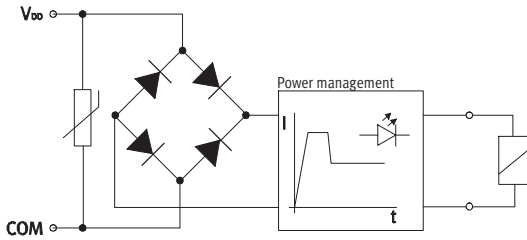


- 1 Press in the stem of the MO with a pointed object or screwdriver until the valve switches and then turn the stem clockwise by 90° until the stop is reached. Valve remains switched.
- 2 Turn the stem anti-clockwise by 90° until the stop is reached and then remove the pointed object or screwdriver. Spring force pushes the stem of the MO back. Valve returns to its initial position (not with double solenoid valve code J).

# Solenoid valves VMPA

Key features – Electrical components

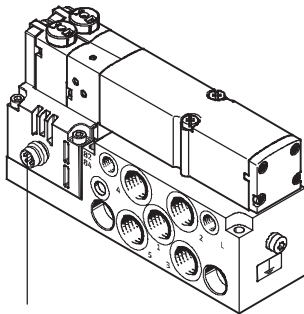
## Electrical power as a result of current reduction



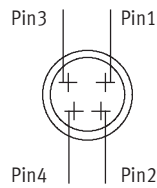
Each solenoid coil MPA is protected with a spark arresting protective circuit as well as against polarity reversal. All valve types are additionally equipped with integrated current reduction.

Valves MPA are supplied with operating voltage in the range 18 ... 30 V (24 V +/-25%). This high tolerance is made possible through integrated control electronics and offers additional security, e.g. if the operating voltage drops.

## Electrical connection – Individual valve interface



Connector plug M8 x 1, male, 4-pin to EN 60947-5-2



### Pin allocation on individual valve to VDMA 24571

With positive logic:

- Pin1 – Unused
- Pin2 –  $U_B$  for coil 12
- Pin3 – 0 V for coil 12 and 14
- Pin4 –  $U_B$  for coil 14

With negative logic:

- Pin1 – Unused
- Pin2 – 0 V for coil 12
- Pin3 –  $U_B$  for coil 12 and 14
- Pin4 – 0 V for coil 14

### Tightening torque for M8 plug

0.25 ... 0.5 Nm (manual torque)

## Instructions for use

### Equipment

Operate system equipment 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 all of your system equipment with lubricated compressed air. The lubricators should, where possible, always be installed directly upstream of the actuator used.

Unsuitable 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 ester, 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).

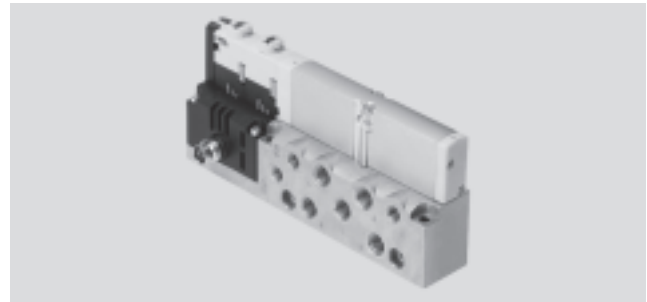
### Mineral oils

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 irrespective of the compressor oil cannot be permitted, as the basic lubricant would be flushed out over time.

## Solenoid valves VMPA

Technical data – solenoid valve

-  - Flow rate  
VMPA1: Up to 360 l/min  
VMPA14: Up to 670 l/min  
VMPA2: Up to 870 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		10 mm	14 mm	20 mm
Lubrication		Life-time lubrication, PWIS-free (free of paint-wetting impairment substances)		
Type of mounting		Via through-hole		
Mounting position		Any		
Manual override		Non-detenting, detenting, blocked		
Valve weight	[g]	→ Page 14		
Sub-base weight	[g]	185		
Pneumatic connections				
Pneumatic connection		Via sub-base		

## Solenoid valves VMPA

Technical data – solenoid valve

Technical data – Valve width 10 mm														
Code		M	J	N	K	H	B	G	E	X	W	D	I	
Switching times	On	[ms]	10	10	10	10	10	10	10	10	10	10	8	
	Off	[ms]	20	–	20	20	20	35	35	35	20	20	20	
	Changeover	[ms]	–	15	–	–	–	15	–	15	–	–	–	
Operating pressure	[bar]	–0.9 ... +10			3 ... 10			–0.9 ... +10				3 ... 10		
Pilot pressure	[bar]	3 ... 8												
Standard nominal flow rate	[l/min]	360	360	300	230	300	300	320	240	255	255	230	260	
Design		Piston spool valve												
Max. tightening torque of valve mounting	[Nm]	0.25												
Materials		Die-cast aluminium												
Product weight	[g]	49	56	56	56	56	56	56	56	49	49	56	–	

Technical data – Valve width 10 mm											
Code		MS	NS	KS	HS	DS	MU	NU	KU	HU	
Switching times	On	[ms]	10	10	10	10	10	8	8	8	
	Off	[ms]	27	20	20	20	20	12	8	10	
	Changeover	[ms]	–	–	–	–	–	–	–	–	
Operating pressure	[bar]	–0.9 ... +8					–0.9 ... +10				
Pilot pressure	[bar]	3 ... 8									
Standard nominal flow rate	[l/min]	360	300	230	300	230	190	190	160	190	
Design		Piston spool valve					Poppet valve with spring return				
Max. tightening torque of valve mounting	[Nm]	0.25									
Materials		Die-cast aluminium					PPA reinforced				
Product weight	[g]	56	56	56	56	56	35	42	42	42	

Technical data – Valve width 14 mm																	
Code		M	J	N	K	H	B	G	E	X	W	D	I	NS	KS	HS	DS
Switching times	On	[ms]	13	22	12	12	12	16	13	13	12	12	9	12	12	12	10
	Off	[ms]	30	–	38	38	38	50	52	50	20	20	30	25	23	23	25
	Changeover	[ms]	–	24	–	–	–	26	26	26	–	–	–	–	–	–	–
Operating pressure	[bar]	–0.9 ... +10											–0.9 ... +8				
Pilot pressure	[bar]	3 ... 8															
Standard nominal flow rate	[l/min]	670	670	650	600	650	630	610	480	400	400	650	570	520	560	520	570
Design		Piston spool valve															
Max. tightening torque of valve mounting	[Nm]	0.65															
Materials		Die-cast aluminium															
Product weight	[g]	77															


Technical data – Valve width 20 mm																			
Code		M	J	N	K	H	B	G	E	X	W	D	I	MS	NS	KS	HS	DS	
Switching times	On	[ms]	15	9	8	8	8	11	10	11	13	13	7	7	8	12	12	12	
	Off	[ms]	28	–	28	28	28	46	40	47	22	22	25	23	36	25	25	25	
	Changeover	[ms]	–	22	–	–	–	23	21	23	–	–	–	–	–	–	–	–	
Operating pressure	[bar]	–0.9 ... +10			3 ... 10			–0.9 ... +10				3 ... 10		–0.9 ... +8					
Pilot pressure	[bar]	3 ... 8																	
Standard nominal flow rate	[l/min]	700	700	560	500	560	520	630	610	590	500	680	680	700	560	500	560	680	
Design		Piston spool valve																	
Max. tightening torque of valve mounting	[Nm]	0.65																	
Materials		Die-cast aluminium																	
Product weight	[g]	100											–		100				

## Solenoid valves VMPA

Technical data – solenoid valve

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
Protection class to EN 60529	IP65 (for all types of signal transmission in assembled state)	

 Note  
Note possible restrictions for the IP protection class  
→ ATEX conformity declaration

Operating and environmental conditions	
Operating medium	Compressed air to ISO 8573-1:2010 [7:4:4]
Note on operating/pilot medium	Lubricated operation possible (required during subsequent operation)
Ambient temperature	[°C] -5 ... +50
Temperature of medium	[°C] -5 ... +50
Storage temperature	[°C] -20 ... +40
Relative air humidity at 40 °C	[%] 90
Corrosion resistance class CRC <sup>1)</sup>	1
CE marking (see declaration of conformity)	To EU EMC Directive <sup>2)</sup>
Certification	cULus recognized (OL)

- 1) Corrosion resistance class 1 according to Festo standard 940 070  
Components subject to low corrosion stress. Transport and storage protection. Parts that do not have primarily decorative surface requirements, e.g. in internal areas that are not visible or behind covers.
- 2) For information about the applicability of the component see the manufacturer's EC declaration of conformity at: [www.festo.com](http://www.festo.com) → Support → User documentation.  
If the component is subject to restrictions on usage in residential, office or commercial environments or small businesses, further measures to reduce the emitted interference may be necessary.

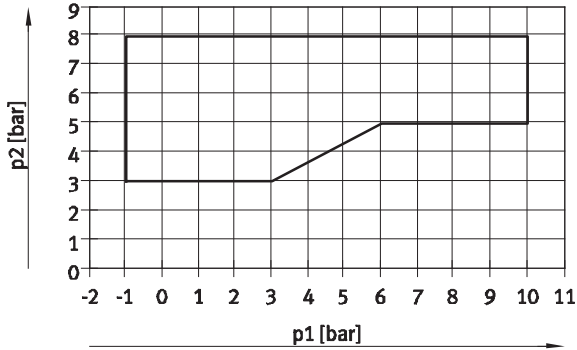
Materials	
Sub-base	Die-cast aluminium
Seals	Nitrile rubber
Note on materials	RoHS-compliant

## Solenoid valves VMPA

Technical data – solenoid valve

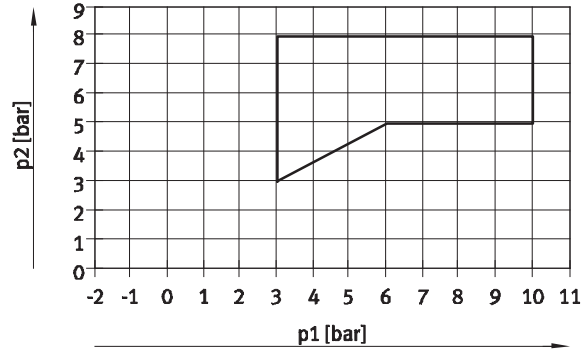
### Pilot pressure $p_2$ as a function of working pressure $p_1$ with external pilot air supply

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



1 Operating range for valves with external pilot air supply

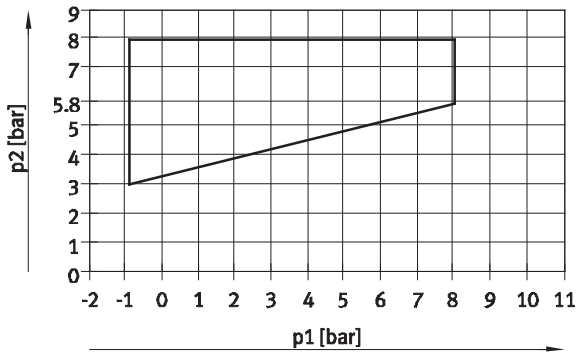
For valves with code: N, K, H, D, I



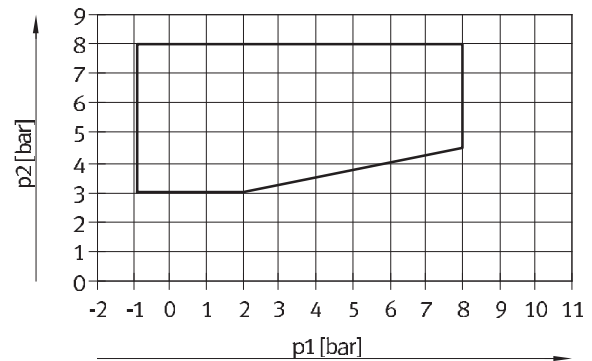
1 Operating range for valves with external pilot air supply

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

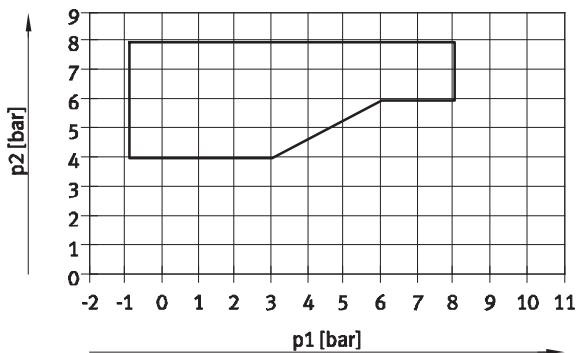
For valves in width 10 mm with code: MS, NS, KS, HS, DS



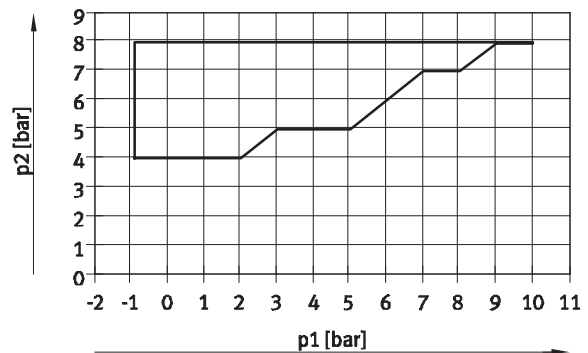
For valves in width 20 mm with code: MS, NS, KS, HS, DS



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




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






## Solenoid valves VMPA

Technical data – sub-base

 Flow rate  
VMPA1: Up to 360 l/min  
VMPA14: Up to 670 l/min  
VMPA2: Up to 870 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	Via through-hole			
Mounting position	Any			
Pneumatic connections				
Supply port	1	M7	G $\frac{1}{8}$	G $\frac{1}{8}$
Exhaust port	3/5	M7	G $\frac{1}{8}$	G $\frac{1}{8}$
Working ports	2/4	M7	G $\frac{1}{8}$	G $\frac{1}{8}$
Pilot air port	12/14	M5	M5	M5
Pilot exhaust air port	82/84	M5	M5	M5

Operating and environmental conditions					
	VMPA1-...-EX1E	VMPA1	VMPA14	VMPA2-...-EX1E	VMPA2
Operating medium	Compressed air to ISO 8573-1:2010 [7:4:4]				
Note on operating/pilot medium	Lubricated operation possible (required during subsequent operation)				
Operating pressure [bar]	3 ... 8				
Pilot pressure [bar]	3 ... 8				
Ambient temperature [°C]	-5 ... +50				
CE marking (see declaration of conformity)	-	-	To EU EMC Directive <sup>1)</sup>	-	-
Certification	-	cULus recognized (OL)	-	-	cULus recognized (OL)

1) For information about the applicability of the component see the manufacturer's EC declaration of conformity at: [www.festo.com](http://www.festo.com) → Support → User documentation.  
If the component is subject to restrictions on usage in residential, office or commercial environments or small businesses, further measures to reduce the emitted interference may be necessary.

ATEX <sup>1)</sup>			
	VMPA1-...-EX1E	VMPA14	VMPA2-...-EX1E
ATEX category for gas	II 3 G	II 3 G	II 3 G
Explosion ignition protection type for gas	Ex nA IIC T4 X Gc	Ex nA IIC T4 X Gc	Ex nA IIC T4 X Gc
ATEX temperature rating [°C]	-5 ≤ Ta ≤ +50	-5 ≤ Ta ≤ +50	-5 ≤ Ta ≤ +50
CE marking (see declaration of conformity)	-	To EU Explosion Protection Directive (ATEX)	-

1) For special ATEX applications, please talk to your technical consultant.

Materials	
Sub-base	Die-cast aluminium
Note on materials	RoHS-compliant

# Solenoid valves VMPA

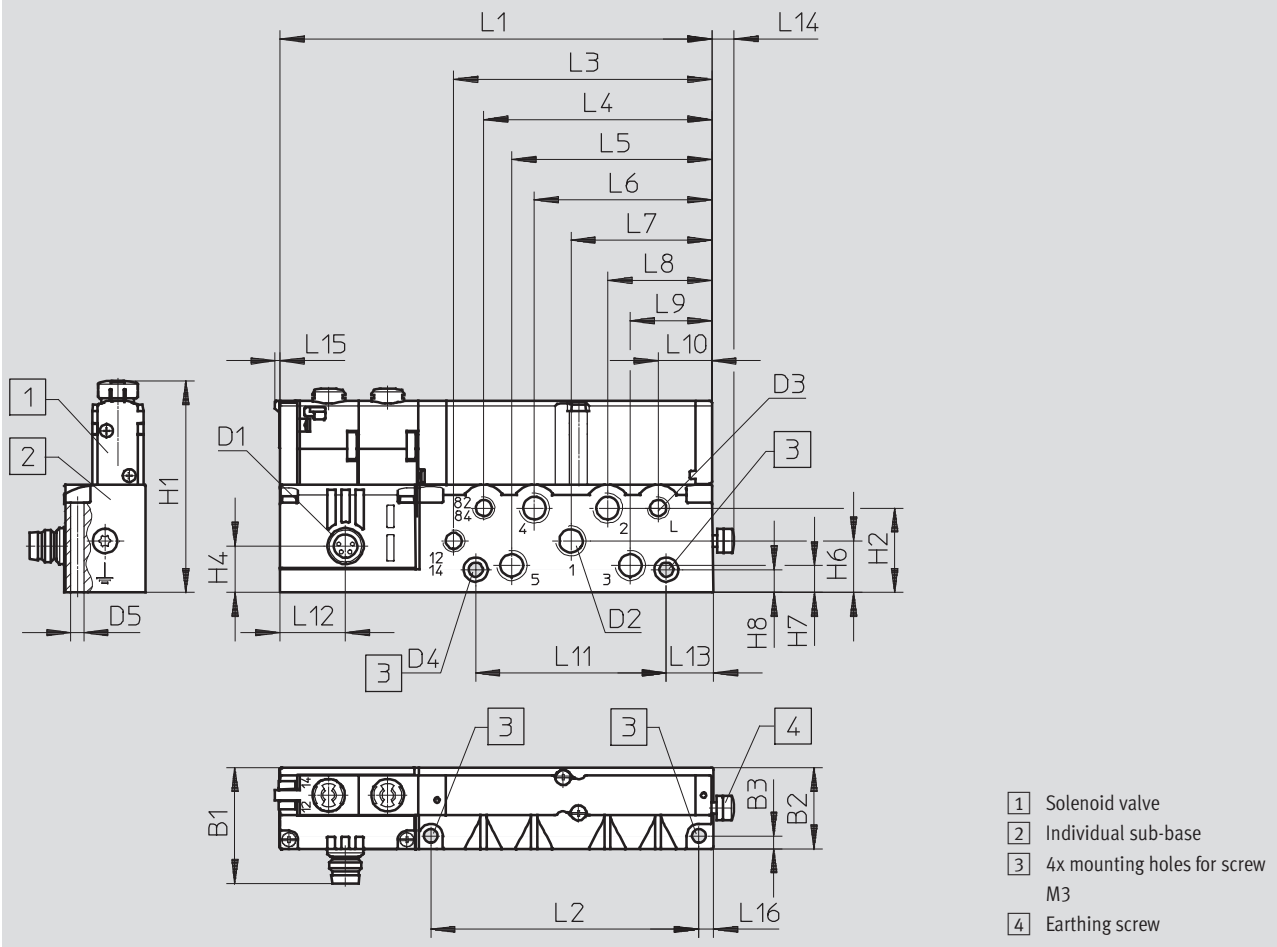
Technical data

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## Dimensions

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

Solenoid valve width 10 mm on individual sub-base



Type	B1	B2	B3	D1	D2	D3	D4 Ø	D5 Ø	H1	H2	H3	H6	H7	H8
VMPA1-...	28.8	20.2	3.2	M8x1	M7	M5	3.4	3.4	52.2	21	12.9	11.6	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

# Solenoid valves VMPA

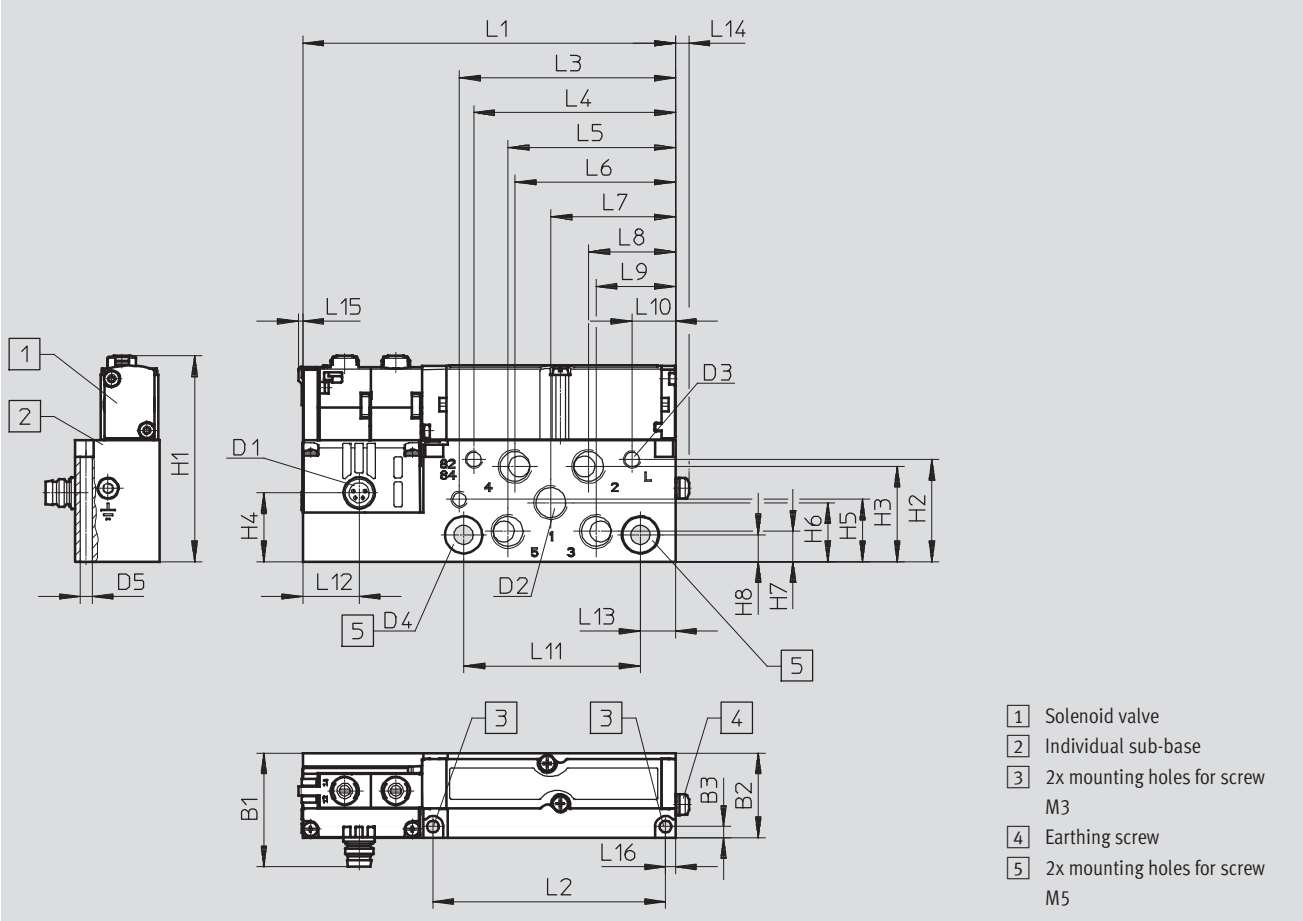
Technical data

**FESTO**

## 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

# Solenoid valves VMPA

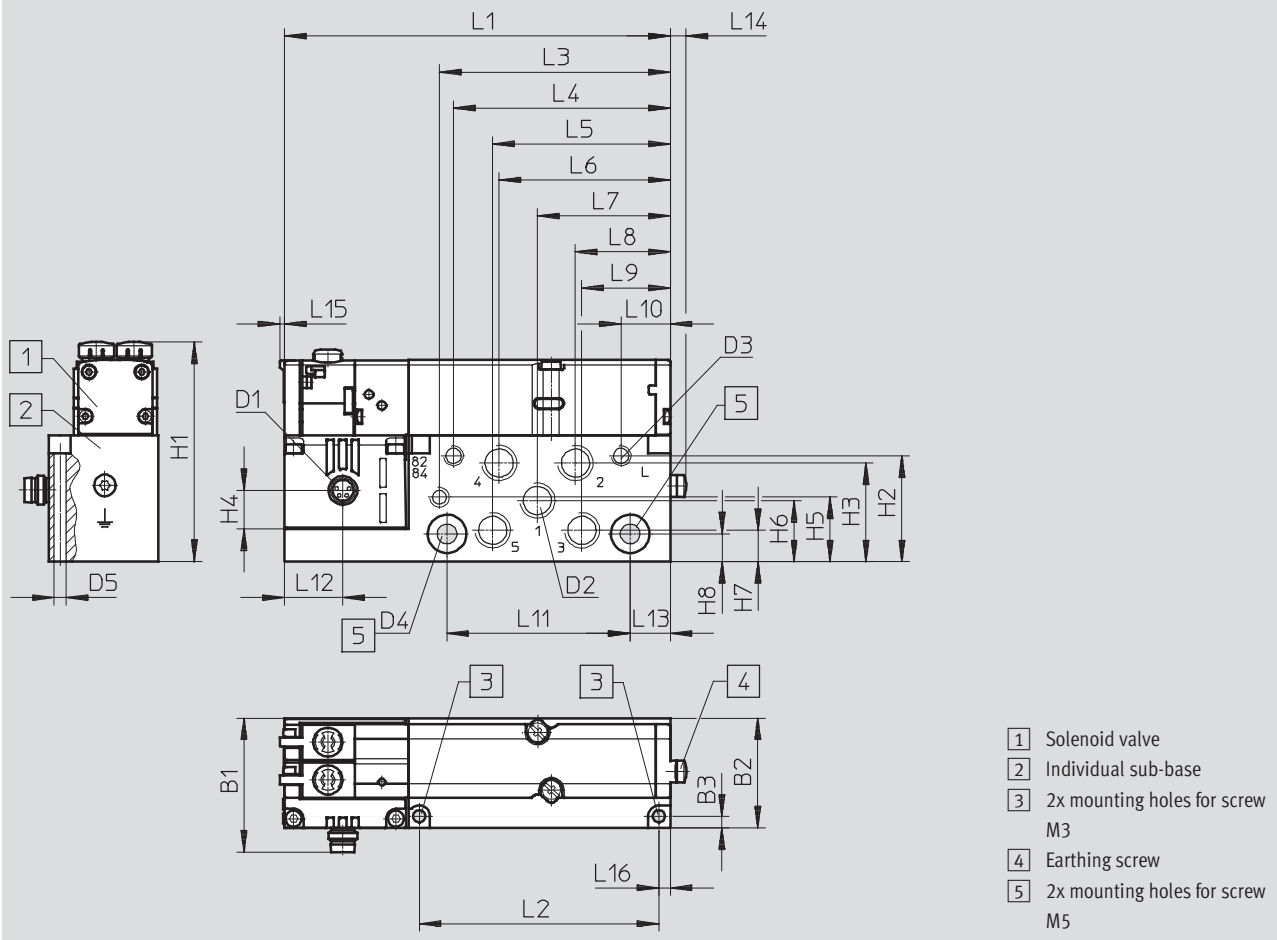
Technical data

FESTO

## Dimensions

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

Solenoid valve width 20 mm on individual sub-base



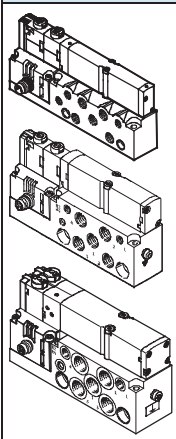














Type	B1	B2	B3	D1	D2	D3	D4 Ø	D5 Ø	H1	H2	H3	H4	H5	H6	H7	H8
VMPA2-...	37.2	30.5	3.2	M8x1	G $\frac{1}{8}$	M5	5.5	3.4	60.5	29.4	27.4	10.7	17.9	17	8.7	7.7

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

# Solenoid valves VMPA

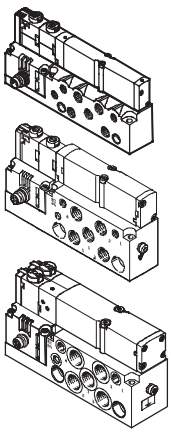














Ordering data

FESTO

Ordering data				
	Valve function	Width [mm]	Part No.	Type
Internal pilot air supply – Solenoid valve on individual sub-base				
	5/2-way valve			
	Single solenoid	10	533376	VMPA1-M1H-M-M7-PI
		14	8023543	VMPA14-M1H-M-PI 
		20	537963	VMPA2-M1H-M-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
	2x 3/2-way valve			
	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 spring return	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 spring return	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 spring return	14	8023558	VMPA14-M1H-HS-G1/8-PI 
	5/3-way valve			
	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	
2x 2/2-way valve				
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 spring return	14	8023557	VMPA14-M1H-DS-G1/8-PI 	
1x normally closed 1x normally closed, reverse operation	10	545230	VMPA1-M1H-I-M7-PI	
	14	8023553	VMPA14-M1H-I-G1/8-PI 	
	20	545232	VMPA2-M1H-I-G1/8-PI	

## Solenoid valves VMPA

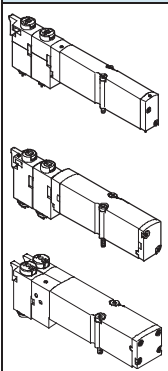











Ordering data

Ordering data				
	Valve function	Width [mm]	Part No.	Type
<b>External pilot air supply – 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
	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 spring return	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 spring return	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 spring return	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 spring return	14	8023574	VMPA14-M1H-DS-S-G1/8-PI 	
1x normally closed 1x normally closed, reverse operation	10	545231	VMPA1-M1H-I-S-M7-PI	
	14	8023570	VMPA14-M1H-I-S-G1/8-PI 	
	20	545233	VMPA2-M1H-I-S-G1/8-PI	

# Solenoid valves VMPA

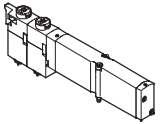


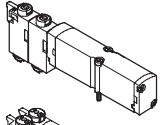



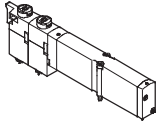
Ordering data

FESTO

Ordering data					
	Valve function	Width [mm]	Part No.	Type	
Individual solenoid valve, piston spool valve					
	5/2-way valve				
	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	
		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	
	2x 3/2-way valve				
	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		
5/3-way valve					
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		

## Solenoid valves VMPA

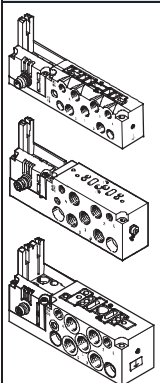
Ordering data




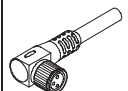


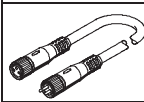

Ordering data					
	Valve function	Width [mm]	Part No.	Type	
<b>Individual solenoid valve, piston spool valve</b>					
	<b>3/2-way valve</b>				
	Normally open, external compressed air supply	10	540050	VMPA1-M1H-W-PI	
		14	573723	VMPA14-M1H-W-PI 	
		20	540051	VMPA2-M1H-W-PI	
	Normally closed, external compressed air supply	10	534415	VMPA1-M1H-X-PI	
		14	573722	VMPA14-M1H-X-PI 	
		20	537961	VMPA2-M1H-X-PI	
		<b>2x 2/2-way valve</b>			
		Normally closed	10	533350	VMPA1-M1H-D-PI
14			573727	VMPA14-M1H-D-PI 	
20			537960	VMPA2-M1H-D-PI	
Normally closed, mechanical spring return		10	556841	VMPA1-M1H-DS-PI	
		14	575978	VMPA14-M1H-DS-PI 	
		20	568657	VMPA2-M1H-DS-PI	
1x normally closed 1x normally closed, reverse operation only		10	543605	VMPA1-M1H-I-PI	
		14	573728	VMPA14-M1H-I-PI 	
	20	543703	VMPA2-M1H-I-PI		
<b>Individual solenoid valve, polymer poppet valve</b>					
	<b>5/2-way valve</b>				
	Single solenoid, mechanical spring return	10	553113	VMPA1-M1H-MU-PI	
	<b>2x 3/2-way valve</b>				
	normally open, mechanical spring return	10	553111	VMPA1-M1H-NU-PI	
	Normally closed, mechanical spring return	10	553110	VMPA1-M1H-KU-PI	
1x normally open, 1x normally closed, mechanical spring return	10	553112	VMPA1-M1H-HU-PI		



# Solenoid valves VMPA

Ordering data

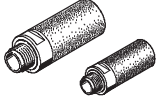


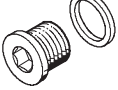

Ordering data					
Designation			Width [mm]	Part No.	Type
Sub-base for individual valve					
	Without ATEX specification	Internal pilot air	10	533394	VMPA1-IC-AP-1
			14	8023666	VMPA14-IC-AP-1
			20	537981	VMPA2-IC-AP-1
		External pilot air	10	533395	VMPA1-IC-AP-S-1
			14	8023667	VMPA14-IC-AP-S-1
			20	537982	VMPA2-IC-AP-S-1
	With ATEX specification → 17	Internal pilot air	10	8005149	VMPA1-IC-AP-1-EX1E
			14	8023668	VMPA14-IC-AP-1-EX1E
			20	8005151	VMPA2-IC-AP-1-EX1E
		External pilot air	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					
Designation			Part No.	Type	
Cover					
	Cover for manual override, non-detenting (10 pieces)			540897	VMPA-HBT-B
	Cover for manual override, covered (10 pieces)			540898	VMPA-HBV-B
Connecting cable, individual connection					
	<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	
		5 m	158961	SIM-M8-4GD-5-PU	
	<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	
		5 m	158963	SIM-M8-4WD-5-PU	
	<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	
		5 m	541343	NEBU-M8G4-K-5-LE4	
	<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	
		5 m	541345	NEBU-M8W4-K-5-LE4	
	Modular system for connecting cables			-	→ Internet: nebu
Push-in fitting					
	Connecting thread M5 for tubing O.D. (10 pieces)	3 mm	153313	QSM-M5-3-I	
		4 mm	153315	QSM-M5-4-I	
		6 mm	153317	QSM-M5-6-I	
	Connecting thread M7 for tubing O.D. (10 pieces)	4 mm	153319	QSM-M7-4-I	
		6 mm	153321	QSM-M7-6-I	
	Connecting thread G1/8 for tubing O.D. (10 pieces)	6 mm	186107	QS-G1/8-6-I	
		8 mm	186109	QS-G1/8-8-I	

# Solenoid valves VMPA

Accessories

**FESTO**

Ordering data				
Designation			Part No.	Type
<b>Silencer</b>				
	Connecting thread	M5	<b>165003</b>	<b>UC-M5</b>
		M7	<b>161418</b>	<b>UC-M7</b>
		G $\frac{1}{8}$	<b>161419</b>	<b>UC-1/8</b>
	Push-in sleeve connection	3 mm	<b>165005</b>	<b>UC-QS-3H</b>
		4 mm	<b>165006</b>	<b>UC-QS-4H</b>
		6 mm	<b>165007</b>	<b>UC-QS-6H</b>
		8 mm	<b>175611</b>	<b>UC-QS-8H</b>
<b>Blanking plug</b>				
	Thread M5 (10 pieces)		<b>3843</b>	<b>B-M5</b>
	Thread M7 (10 pieces)		<b>174309</b>	<b>B-M7</b>
	Thread G $\frac{1}{8}$ (10 pieces)		<b>3568</b>	<b>B-1/8</b>
<b>Plug</b>				
	Blanking plug for tubing O.D. (10 pieces)	4 mm	<b>153267</b>	<b>QSC-4H</b>
		6 mm	<b>153268</b>	<b>QSC-6H</b>
		8 mm	<b>153269</b>	<b>QSC-8H</b>