

Solenoid valves VMPA1

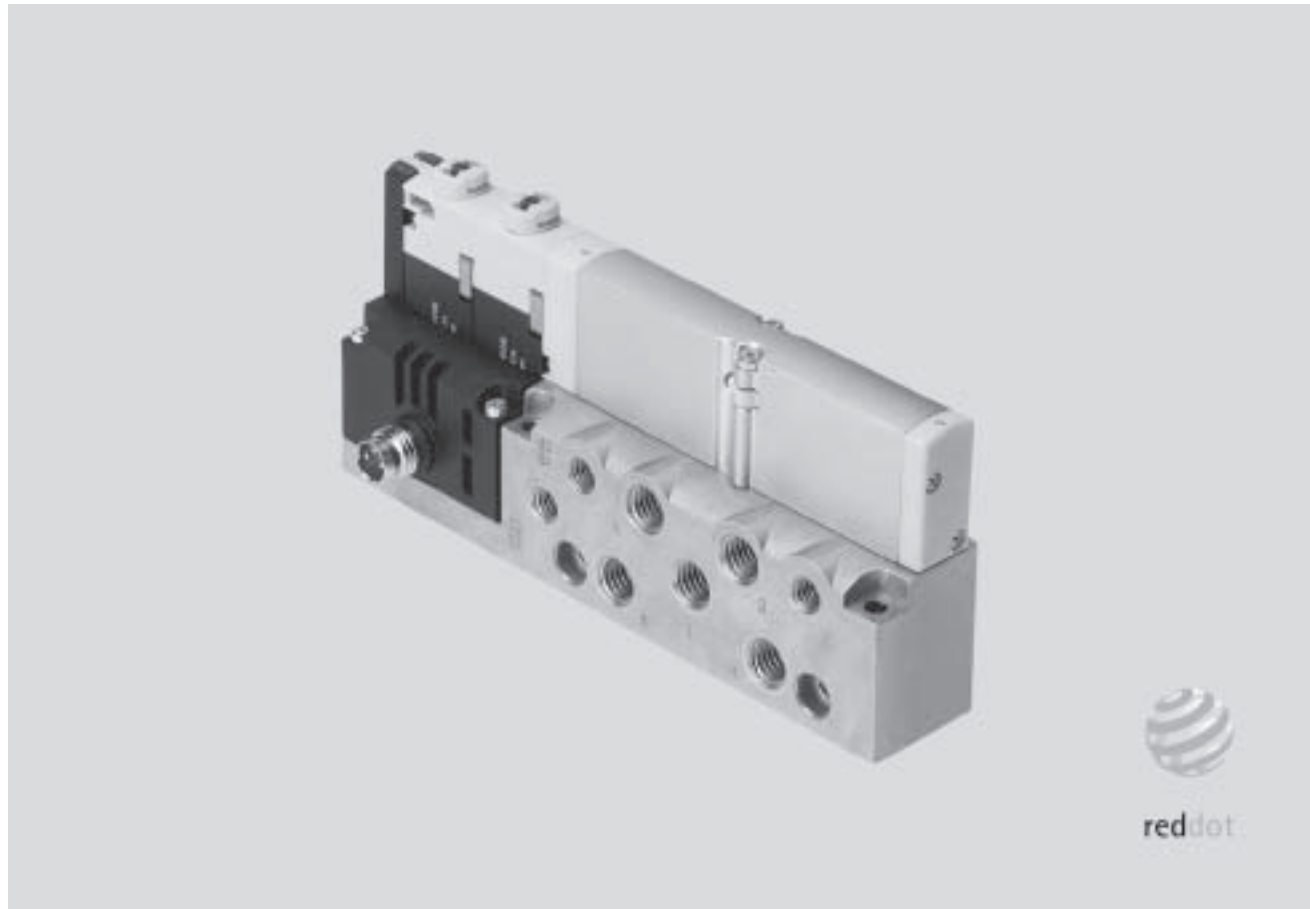


- Straightforward valve replacement
- Flow rates of up to 360 l/min
- Also available as a modular multi-functional valve terminal for up to 64 valves

Solenoid valves VMPA1

Key features

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Innovative

- Slim high-performance valves in sturdy metal housing, size MPA1 up to 360 l/min

The valves are identical with the valves in the valve terminal MPA. This simplifies planning, ordering and warehousing.

Flexible

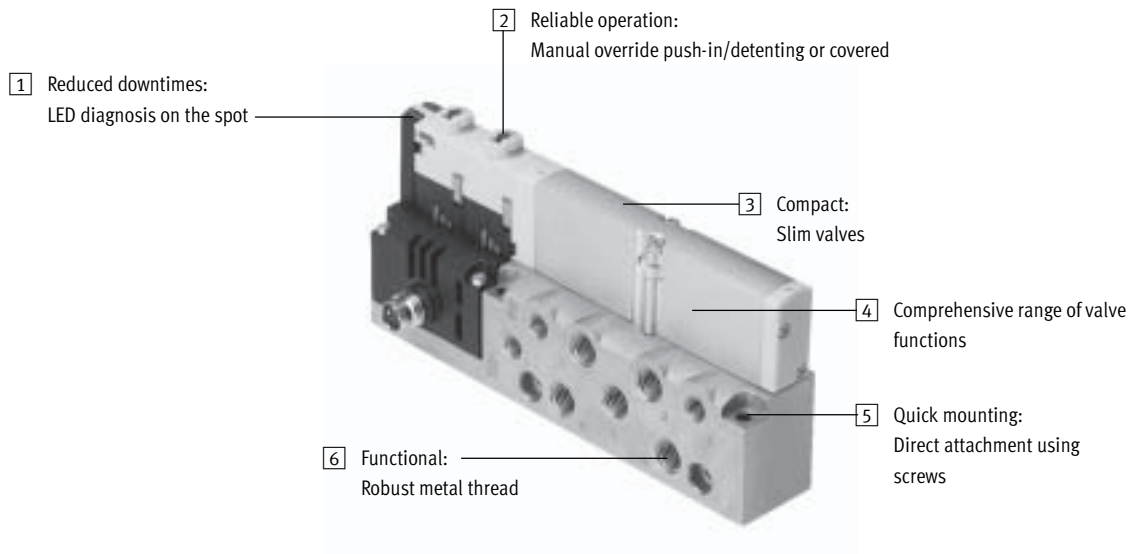
- High pressure range
–0.9 ... 10 bar
- Wide range of valve functions

Reliable

- Sturdy and durable metal components
 - Valves
 - Sub-bases
 - Seals
- Fast troubleshooting thanks to LEDs on the valves and diagnosis via fieldbus
- High operating voltage tolerance $\pm 25\%$
- Reliable servicing through replaceable valves and electronics modules
- Manual override either push-in, detenting or secured against unauthorised activation (covered)
- Durable thanks to the use of tried-and-tested piston spool valves
- Secure wall mounting

Solenoid valves VMPA1

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 VMPA1

Peripherals overview

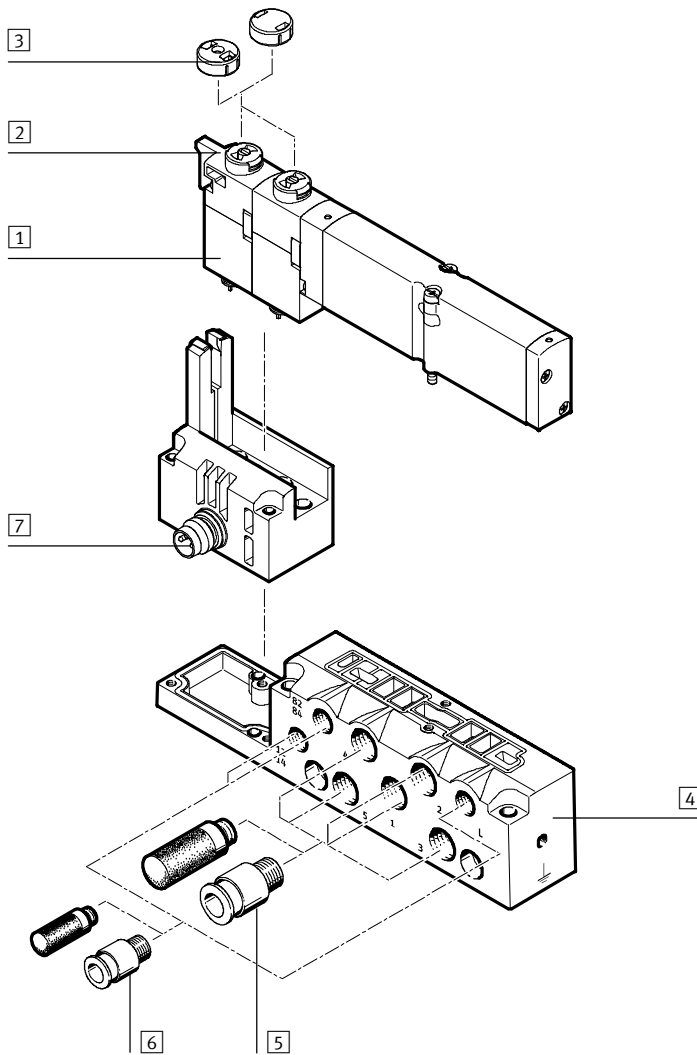
Individual sub-base

Ordering:

- Using individual part numbers

Individual sub-bases can be equipped with any valve.

The electrical connection is established using a standard 4-pin M8 plug (VDMA 24 571).

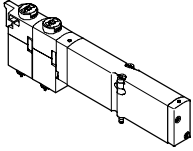


- 1 MPA valve
- 2 Manual override (per solenoid coil, push-in/rotary-detenting)
- 3 Cover for manual override (push-in, covered only)
- 4 Sub-base for individual valve
- 5 Threaded connectors and/or silencers M7 for working lines (2, 4) and supply air/exhaust ports (1, 3, 5)
- 6 Threaded connectors, silencers or blanking plugs M5 for auxiliary pilot air supply/exhaust ports (12/14, 82/84) and pressure compensation
- 7 Electrical connection M8, 4-pin

Solenoid valves VMPA1

Key features – Pneumatic components

Sub-base valve



MPA offers a comprehensive range of valve functions. All valves are equipped with piston spool and patented sealing system which facilitates efficient sealing, a broad pressure range and long service life. To increase power they have a pneumatic pilot control supplied by auxiliary pilot air.

Sub-base valves can be quickly replaced since the pipe connection remains on the sub-base. This design is also particularly slim.

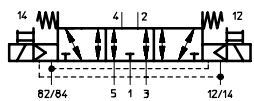
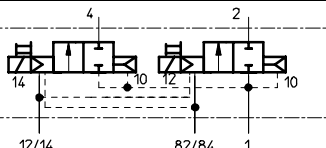
Irrespective of the valve function there are sub-base valves with one solenoid coil (single solenoid) or with two solenoid coils (double solenoid).

Valve function			
Code	Circuit symbol	Size 10	Description
M		■	5/2-way valve, single solenoid ■ Pneumatic spring return
J		■	5/2-way valve, double solenoid
N		■	2x 3/2-way valve, single solenoid ■ Normally open ■ Pneumatic spring return
K		■	2x 3/2-way valve, single solenoid ■ Normally closed ■ Pneumatic spring return
H		■	2x 3/2-way valve, single solenoid ■ Normal position 1x open 1x closed ■ Pneumatic spring return
B		■	5/3-way valve ■ Mid-position pressurised ¹⁾ ■ Spring force return
G		■	5/3-way valve ■ Mid-position closed ¹⁾ ■ Spring force return

1) Mid-position can be reached without electrical signal or using both signals

Solenoid valves VMPA1

Key features – Pneumatic components

Valve function			
Code	Circuit symbol	Size 10	Description
E		■	5/3-way valve <ul style="list-style-type: none"> ■ Mid-position exhausted¹⁾ ■ Spring force return
D		■	2x 2/2-way valve <ul style="list-style-type: none"> ■ Normally closed ■ Pneumatic spring return

1) Mid-position can be reached without electrical signal or using both signals

Constructional design

Valve replacement

The valves are attached to the metal sub-base using two screws. This means that they can be easily replaced. The mechanical robustness of the sub-base guarantees good long-term tightness.

The valve code (M, J, N, K, B, G, E, D) is located on the front of the valve beneath the manual override.

Auxiliary pilot air

The port for the main pneumatic supply is located on the sub-base. The ports differ for the following auxiliary pilot air types:

- internal auxiliary pilot air and
- external auxiliary pilot air


Internal auxiliary pilot air

An internal auxiliary pilot air supply can be selected if the required working pressure is between 3 and 8 bar.

The auxiliary pilot air is then branched from the compressed air supply 1 at the sub-base using an internal connection. The port 12/14 is sealed at the factory.

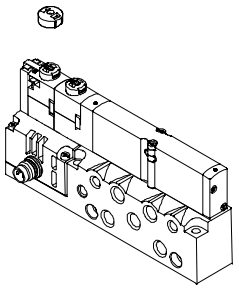
External auxiliary pilot air

If the supply pressure is less than 3 bar or greater than 8 bar, you must operate your MPA valve using an external auxiliary pilot air supply. In this case the auxiliary pilot air is supplied externally via port 12/14 in the sub-base.

 Note

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

Sub-base variants

Code	Size 10	Number of valve positions (solenoid coils)	Notes
-	■	1 (max. 2)	<ul style="list-style-type: none"> ■ With working lines M7 ■ With ports M7 for supply air (1, 3, 5) and M5 for auxiliary pilot and pilot exhaust air (12/14, 82/84)
<p>Individual connection</p>  <p>VMPA1-M1H...-M7-PI</p>			

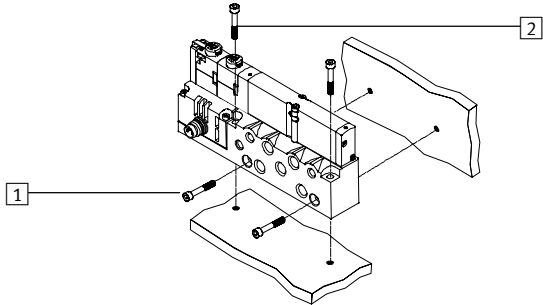
Directional control valves for standard applications
Valves MPA

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Solenoid valves VMPA1

Key features – Assembly and operation

Individual valve assembly



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

- 1 Horizontal mounting holes
- 2 Vertical mounting holes

Display and operation

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

- Indicator 12 shows the switching status of the pilot control for output 2
- Indicator 14 shows the switching status of the pilot control for output 4

Manual override

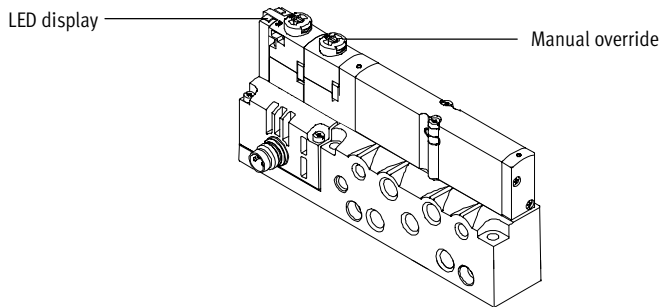
The manual override (MO) allows the valve to be switched when in the electrically non-activated or de-energised status.

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

the manual override (code: R).
Alternatives:

- A cover (code: N) can be fitted over the manual override to prevent it from being locked. The valve can then only be activated by pushing it.

- A cover (code: V) can be fitted over the manual override to prevent it from being activated accidentally.

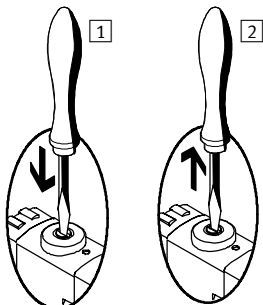


 **Note**

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

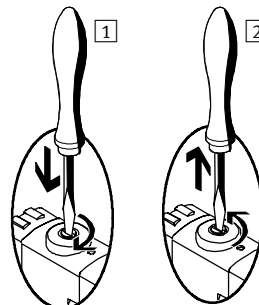
Manual override (MO)

Manual override with automatic return (push-in)



- 1 Press in the stem of the MO with a pointed object or screwdriver.
→ Valve is in switching position
- 2 Remove the pointed object or screwdriver.
Spring force pushes the stem of the MO back.
→ Valve returns to initial position (not with double solenoid valve code J)

Manual override with lock (detenting)



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

Solenoid valves VMPA1

Key features – Electrical components

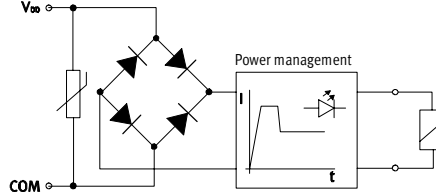
Electrical power as a result of current reduction

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

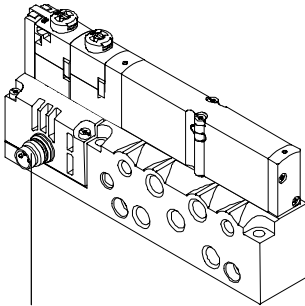
All valve types are additionally equipped with an integrated current reduction, e.g. for fieldbus:

- Pull current: 60 mA
- Holding current after 20 ms: 25 mA

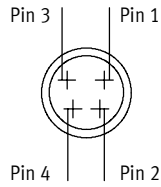
MPA valves are supplied with operating voltage in the range 18 ... 30 V (24 V +/-25%). This high tolerance is made possible through integrated control electronics and offers additional security, e.g. if the operating voltage drops.



Electrical connection



Connector plug M8 x 1, 4-pin to EN 60 947-5-2



Pin allocation on individual valve to VDMA 24 571

With positive logic:

- Pin 1 – Not allocated
- Pin 2 – U_B for coil 12
- Pin 3 – 0 V for coils 12 and 14
- Pin 4 – U_B for coil 14

With negative logic:

- Pin 1 – Not allocated
- Pin 2 – 0 V for coil 12
- Pin 3 – U_B for coils 12 and 14
- Pin 4 – 0 V for coil 14

Tightening torque for M8 plug

0.25 ... 0.5 Nm (manual torque)

Connecting cable

Designation	Version	Cable length [m]	Part No.	Type
Plug socket with cable	Straight socket	2.5	158 960	SIM-M8-4GD-2,5-PU
Plug socket with cable	Straight socket	5	158 961	SIM-M8-4GD-5-PU
Plug socket with cable	Angled socket	2.5	158 962	SIM-M8-4WD-2,5-PU
Plug socket with cable	Angled socket	5	158 963	SIM-M8-4WD-5-PU

Solenoid valves VMPA1

Instructions for use

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Pneumatic equipment

Operate your equipment with unlubricated compressed air if possible. Festo valves and cylinders are designed for operation under normal use without any additional lubrication, yet still have a long service life. The quality of compressed air downstream from the compressor must correspond to that of unlubricated compressed air. If possible, do not operate all of your equipment with lubricated compressed air. The lubricators should, where possible, always be installed directly upstream of the actuator used.

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 51 524-HLP32; basic oil viscosity 32 CST at 40 °C).

Bio-oils




When using bio-oils (oils which are based upon synthetic or native ester, e.g. rapeseed oil methyl ester), the maximum residual oil content of 0.1 mg/m³ must not be exceeded (see ISO 8573-1 Class 2).

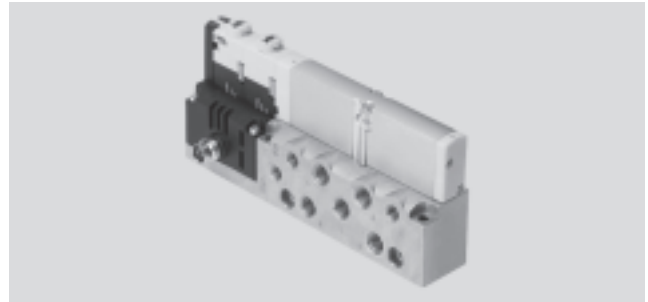
Mineral oils

When using mineral oils (e.g. HLP oils to DIN 51 524, parts 1 through 3) or similar oils based on poly-alpha-olefins (PAO), the maximum residual oil content of 5 mg/m³ 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 VMPA1

Technical data

-  - Flow rates of up to 360l/min
-  - Valve width 10 mm
-  - Voltage 24 V DC



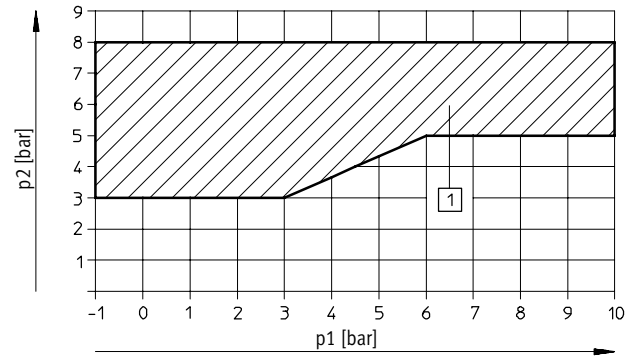
General technical data									
Valve function	5/2-way valve		2x 3/2-way valve			5/3-way valve			2x 2/2-way valve closed
	single solenoid	double solenoid	Normal position		1x open 1x closed	Mid-position		exhausted	
Valve function order code	M	J	open	closed		H	pressurised		closed
Constructional design	Electromagnetically actuated piston spool valve								
Width [mm]	10								
Nominal size [mm]	3.5	3.5	3.2	2.8	3.1	3.1	3.3	2.8	2.8
Lubrication	Lubrication for life, PWIS-free (free of paint-wetting impairment substances)								
Type of mounting	Wall mounting								
Mounting position	Any								
Manual override	Push-in, rotary/detenting, covered								
Pneumatic connections									
Pneumatic connection	Via individual connections on sub-base								
Supply port 1	M7								
Exhaust port 3/5	M7								
Working lines 2/4	M7								
Pilot air port 12/14	M5								
Pilot exhaust air port 82/84	M5								
Pressure compensation port	M5								

Solenoid valves VMPA1

Technical data

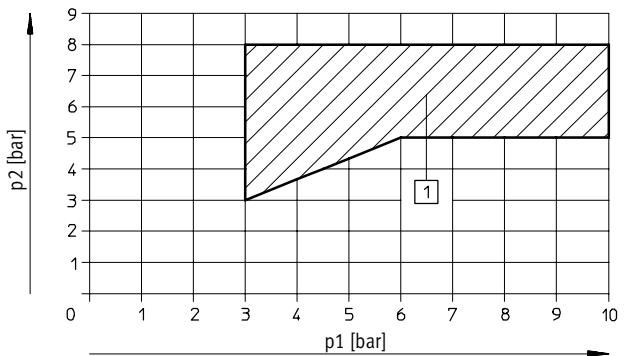
Operating pressure [bar]									
Valve function order code	M	J	N	K	H	B	G	E	D
Internal auxiliary pilot air	3 ... 8								
External auxiliary pilot air	-0.9 ... +10		3 ... 10			-0.9 ... +10		3 ... 10	

Pilot pressure p2 as a function of the working pressure p1 with external auxiliary pilot air
for valves with code M, J, B, G, E



1 Operating range for valves with external auxiliary pilot air

for valves with code N, K, H, D



1 Operating range for valves with external auxiliary pilot air

Valve response times [ms]										
Valve function order code		M	J	N	K	H	B	G	E	D
Response times	on	10	-	10	10	10	10	10	10	10
	off	20	-	20	20	20	35	35	35	20
	change-over	-	10	-	-	-	-	-	-	-

Operating and environmental conditions									
Valve function order code	M	J	N	K	H	B	G	E	D
Operating medium	Filtered compressed air, lubricated or unlubricated, inert gases → 4 / 2.2-25								
Grade of filtration [µm]	40 (average pore size)								
Ambient temperature [°C]	-5 ... +50								
Storage temperature ²⁾ [°C]	-20 ... +40								
Corrosion resistance class CRC ¹⁾	1								

1) Corrosion resistance class 1 according to Festo standard 940 070
Components requiring low corrosion resistance. 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) Long-term storage

Solenoid valves VMPA1

Technical data

Electrical data	
Valve function order code	M J N K H B G E D
Electromagnetic compatibility	Interference emission tested to EN 61 000-6-4, industry Interference immunity ¹⁾ tested to EN 61 000-6-2, industry
Protection against electric shock (protection against direct and indirect contact to EN 60204-1/IEC 204)	By means of PELV power supply unit
Operating voltage [V]	24 (±25%)
Current consumption per solenoid coil at 18 V at 24 V at 30 V	Nominal pull current (up to 20 ms) 60 mA/nominal current with current reduction (after 20 ms) 20 mA Nominal pull current (up to 20 ms) 80 mA/nominal current with current reduction (after 20 ms) 20 mA Nominal pull current (up to 20 ms) 100 mA/nominal current with current reduction (after 20 ms) 20 mA
Electrical power consumption [W]	Pull: 1 Hold: 0.24
Duty cycle	100% at 40 °C ambient temperature
Protection class to EN 60 529	IP65 (in assembled state and with detenting plug)
Relative air humidity	90% at 40 °C, non-condensing
Vibration resistance	To DIN/IEC 68/EN 60 068, Parts 2-6: 0.35 mm at 10 ... 60 Hz, 5 g at 60 ... 150 Hz
Shock resistance	To DIN/IEC 68/EN 60 068, Parts 2-27: +/- 30 g at 11 ms, 15 cycles
Continuous shock resistance	To DIN/IEC 68/EN 60 068, Parts 2-29: +/- 15 g at 6 ms, 1000 cycles

- 1) The maximum signal line length is 10 m
- 2) Intrinsic current consumption per electronics module

Materials	
Valve function order code	M J N K H B G E D
Sub-base	Die-cast aluminium
Valve	Die-cast aluminium, PPS, ST, PA-GF
Seals	NBR, HNBR, Viton
Supply plate	Die-cast aluminium
Right-hand end plate	Die-cast aluminium
Left-hand pneumatic interface	Die-cast aluminium, polyamide 6 (cover)
Exhaust plate	Polyamide
Surface mounted silencer	Polyethylene
Electronics module	POM/polycarbonate
Electrical interlinking	CuBe/PBT

Directional control valves for standard applications
Valves MPA

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Solenoid valves VMPA1

Technical data

Product weight [g]	approx. weights									
	Valve function order code	M	J	N	K	H	B	G	E	D
Individual sub-base		45								
per valve M		49								
per valve J, N, K, H, B, G, E, D		56								
QSM-M5-3-1		3								
QSM-M5-4-1		4								
QSM-M5-6-1		5								
QSM-M7-4-1		4								
QSM-M7-6-1		5								

1) With thin metal seal, inscription label holder, screws

Nominal flow rate [l/min] ¹⁾			
Code	Valve function	Valve (1 → 2) ²⁾	Valve (2 → 3) ²⁾
Sub-base valve			
M	5/2-way valve, single solenoid	360	360
J	5/2-way valve, double solenoid	360	360
N	2x 3/2-way valve, normally open	300	300
K	2x 3/2-way valve, normally closed	230	310
H	2x 3/2-way valve, 1x normally open 1x normally closed	280	305
B	5/3-way valve, mid-position pressurised	300	270
G	5/3-way valve, mid-position closed	320	320
E	5/3-way valve, mid-position exhausted	240	240
D	2x 2/2-way valve	230	230

1) Flow rates measured on sub-base with QS-6 push-in fittings

2) Values refer to the flow direction 1 → 2 or 2 → 3

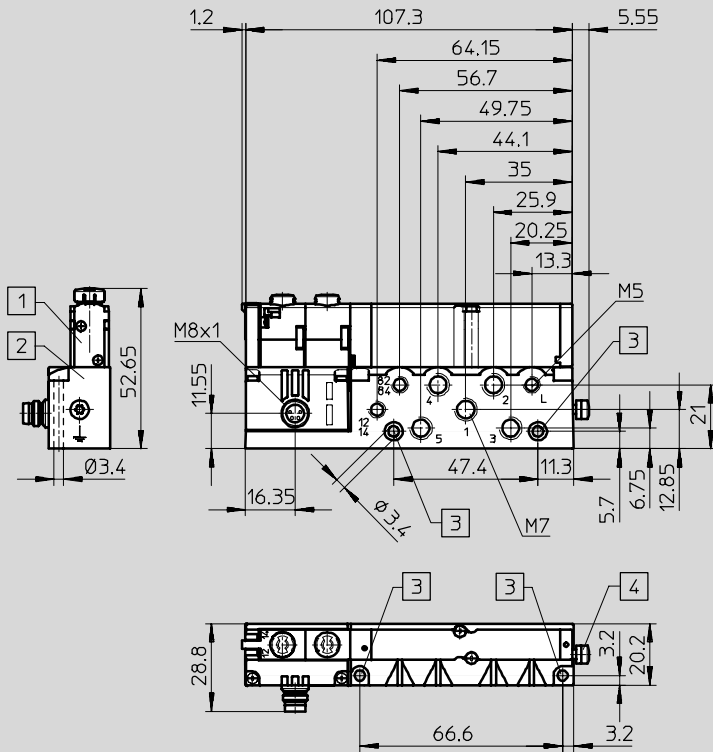
Solenoid valves VMPA1

Technical data

Dimensions

Download CAD data → www.festo.com/en/engineering

Valve on individual sub-base

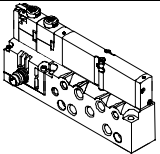


- 1 Solenoid valve
- 2 Individual sub-base
- 3 4x mounting holes
- 4 Earthing screw

Directional control valves for standard applications
Valves MPA

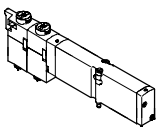
Solenoid valves VMPA1

Ordering data

Ordering data				
Valves on individual sub-base				
	Code	Valve function	Part No.	Type
	Internal auxiliary pilot air			
	M	5/2-way valve, single solenoid	533 376	VMPA1-M1H-M-M7-PI
	J	5/2-way valve, double solenoid	533 377	VMPA1-M1H-J-M7-PI
	N	2x 3/2-way valve, normally open	533 382	VMPA1-M1H-N-M7-PI
	K	2x 3/2-way valve, normally closed	533 381	VMPA1-M1H-K-M7-PI
	H	2x 3/2-way valve, 1x normally open 1x normally closed	533 383	VMPA1-M1H-H-M7-PI
	B	5/3-way valve, mid-position pressurised	533 378	VMPA1-M1H-B-M7-PI
	G	5/3-way valve, mid-position closed	533 379	VMPA1-M1H-G-M7-PI
	E	5/3-way valve, mid-position exhausted	533 380	VMPA1-M1H-E-M7-PI
	D	2x 2/2-way valve, normally closed	533 384	VMPA1-M1H-D-M7-PI
	External auxiliary pilot air			
	M	5/2-way valve, single solenoid	533 385	VMPA1-M1H-MS-M7-PI
	J	5/2-way valve, double solenoid	533 386	VMPA1-M1H-JS-M7-PI
	N	2x 3/2-way valve, normally open	533 391	VMPA1-M1H-NS-M7-PI
	K	2x 3/2-way valve, normally closed	533 390	VMPA1-M1H-KS-M7-PI
	H	2x 3/2-way valve, 1x normally open 1x normally closed	533 392	VMPA1-M1H-HS-M7-PI
	B	5/3-way valve, mid-position pressurised	533 387	VMPA1-M1H-BS-M7-PI
	G	5/3-way valve, mid-position closed	533 388	VMPA1-M1H-GS-M7-PI
E	5/3-way valve, mid-position exhausted	533 389	VMPA1-M1H-ES-M7-PI	
D	2x 2/2-way valve, normally closed	533 393	VMPA1-M1H-DS-M7-PI	

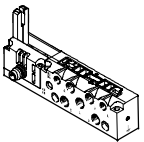
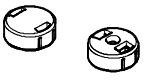
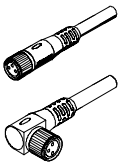

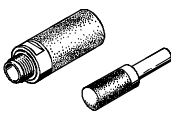


Solenoid valves VMPA1

Ordering data

Ordering data				
Individual sub-base valve				
	Code	Valve function	Electrical plug-in connection	
			Part No.	Type
	M	5/2-way valve, single solenoid	533 342	VMPA1-M1H-M-PI
	J	5/2-way valve, double solenoid	533 343	VMPA1-M1H-J-PI
	N	2x 3/2-way valve, normally open	533 348	VMPA1-M1H-N-PI
	K	2x 3/2-way valve, normally closed	533 347	VMPA1-M1H-K-PI
	H	2x 3/2-way valve, 1x normally open 1x normally closed	533 349	VMPA1-M1H-H-PI
	B	5/3-way valve, mid-position pressurised	533 344	VMPA1-M1H-B-PI
	G	5/3-way valve, mid-position closed	533 345	VMPA1-M1H-G-PI
	E	5/3-way valve, mid-position exhausted	533 346	VMPA1-M1H-E-PI
	D	2x 2/2-way valve, normally closed	533 350	VMPA1-M1H-D-PI

Solenoid valves VMPA1

Accessories

Ordering data			
Designation		Part No.	Type
Sub-base			
	Individual connection, internal auxiliary pilot air	533 394	VMPA1-IC-AP-1
	Individual connection, external auxiliary pilot air	533 395	VMPA1-IC-AP-S-1
Cover			
	Cover for manual override, detenting (10 pieces)	533 366	VMPA1-HBT
	Cover for manual override, covered (10 pieces)	535 257	VMPA1-HBV
Individual connection, electrical			
	Plug socket with cable	2.5 m	158 960 SIM-M8-4GD-2,5-PU
		5 m	158 961 SIM-M8-4GD-5-PU
	Plug socket with cable	2.5 m	158 962 SIM-M8-4WD-2,5-PU
		5 m	158 963 SIM-M8-4WD-5-PU
Push-in fitting for sub-base			
	Connecting thread M5 for tubing O.D.	3 mm (10 pieces)	153 313 QSM-M5-3-I
		4 mm (10 pieces)	153 315 QSM-M5-4-I
		6 mm (10 pieces)	153 317 QSM-M5-6-I
	Connecting thread M7 for tubing O.D.	4 mm (10 pieces)	153 319 QSM-M7-4-I
		6 mm (10 pieces)	153 321 QSM-M7-6-I
Silencer			
	Connecting thread	M5	165 003 UC-M5
		M7	161 418 UC-M7
	Push-in sleeve connection type	3 mm	165 005 UC-QS-3H
		4 mm	165 006 UC-QS-4H
		6 mm	165 007 UC-QS-6H
Blanking plug			
	Thread M5	3 843	B-M5
	Thread M7	174 309	B-M7
Plug			
	Blanking plug for tubing O.D.	4 mm	153 267 QSC-4H
		6 mm	153 268 QSC-6H