

- 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

Key features



#### 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 ±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 triedand-tested piston spool valves
- Secure wall mounting

Key features





• 2x 3/2-way valve, normally closed

mid-position pressurised

- mid-position exhausted
- 2x 2/2-way valve, normally closed
- Detachable electronics module with integrated holding current reduction

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).



- Threaded connectors, silencers or blanking plugs M5 for pilot air supply/exhaust ports (12/14, 82/84) and pressure compensation
- 7 Electrical connection M8, 4-pin

## **FESTO**

3 Cover for manual override

(push-in, covered only)

4 Sub-base for individual valve

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 fun	ction		
Code	Circuit symbol	Size 10	Description
Μ		-	<ul><li>5/2-way valve, single solenoid</li><li>Pneumatic spring return</li></ul>
J		-	5/2-way valve, double solenoid
N	4 2 10 10 12/14 15 82/84 3	•	<ul> <li>2x 3/2-way valve, single solenoid</li> <li>Normally open</li> <li>Pneumatic spring return</li> </ul>
К	4 2 14 14 12/14 15 82/84 3	-	<ul> <li>2x 3/2-way valve, single solenoid</li> <li>Normally closed</li> <li>Pneumatic spring return</li> </ul>
Н	4 2 14 2 14 15 82/84 3	•	<ul> <li>2x 3/2-way valve, single solenoid</li> <li>Normal position</li> <li>1x open</li> <li>1x closed</li> <li>Pneumatic spring return</li> </ul>
В		-	<ul> <li>5/3-way valve</li> <li>Mid-position pressurised<sup>1)</sup></li> <li>Mechanical spring return</li> </ul>
G		-	<ul> <li>5/3-way valve</li> <li>Mid-position closed<sup>1)</sup></li> <li>Mechanical spring return</li> </ul>

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

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Key features – Pneumatic components

Valve func	/alve function									
Code	Circuit symbol	Size 10	Description							
E		-	<ul> <li>5/3-way valve</li> <li>Mid-position exhausted<sup>1)</sup></li> <li>Spring force return</li> </ul>							
D	4 2 14 14 12/14 12/14 12/14 12/14 12/14 12/14 12/14 12/14	•	<ul> <li>2x 2/2-way valve</li> <li>Normally closed</li> <li>Pneumatic spring return</li> </ul>							

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

### Pilot air supply

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 pilot air

An internal pilot air supply can be selected if the required working pressure is between 3 and 8 bar. The pilot air is then branched from the compressed air supply 1 at the subbase using an internal connection. The port 12/14 is sealed at the factory.

#### External 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 pilot air supply. In this case the 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 v	variants			
Code		Size 10	Number of valve positions (solenoid coils)	Notes
-	Individual connection			
		•	1 (max. 2)	<ul> <li>With working lines M7</li> <li>With ports M7 for supply air (1, 3, 5) and M5 for auxiliary pilot and pilot exhaust air (12/14, 82/84)</li> </ul>

Key features - Assembly and operation



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 deenergised status. The valve is switched by pushing the manual override. The set switching

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.

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# 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.

Walve is in switching positionRemove 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.

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

#### **Electrical connection**





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

operating voltage drops.

offers additional security, e.g. if the

#### Pin allocation on individual valve to

Power management

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## 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

Voo

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## Tightening torque for M8 plug

0.25 ... 0.5 Nm (manual torque)

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

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

Connecting cable				
Designation	Version	Cable length	Part No.	Туре
		[m]		
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

Instructions for use

## 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/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 51 524, parts 1 through 3) or similar oils based on poly-alphaolefins (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.

Technical data



General technical data										
Valve function	5/2-way valve		2x 3/2-way	2x 3/2-way valve			5/3-way valve			
			Normal position			Mid-position			way valve	
	single	double	open	closed	1x open	pressurise	closed	exhausted	closed	
	solenoid	solenoid			1x closed	d				
Valve function order code	Μ	J	Ν	К	Н	В	G	E	D	
Constructional design	Electromagne	tically actuat	ed piston spo	ol 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	or life, PWIS-fi	ree (free of pa	int-wetting impa	irment substance	es)				
Type of mounting	Wall mountin	g								
Mounting position	Any									
Manual override	Push-in, rota	ry/detenting,	ıg, covered							
Pneumatic connections	1									
Pneumatic connection	Via individua	l connections	on sub-base							
Supply port 1	M7									
Exhaust port 3/5	M7									
Working lines 2/4	lines 2/4 M7									
Pilot air port 12/14	M5									
Pilot exhaust 82/84	t 82/84 M5									
air port										
Pressure compensation port	M5									

- N - Flow rates of up to 360l/min

- **J**- Valve width 10 mm

- **L** - Voltage 24 V DC

Technical data

Operating pressure [bar]									
Valve function order code	М	J	Ν	К	Н	В	G	E	D
Internal auxiliary pilot air	3 8	38							
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 pilot air supply

for valves with code M, J, B, G, E



## for valves with code N, K, H, D



1 Operating range for valves with

1 Operating range for valves with

external pilot air

external pilot air

## Valve response times [ms]

valve response times [ms]										
Valve function order code	Μ	J	Ν	К	Н	В	G	E	D	
Response times	on	10	-	10	10	10	10	10	10	10
	off	20	-	20	20	20	35	35	35	20
	changeo	-	10	-	-	-	-	-	-	-
	ver									

Operating and environmental conditions										
Valve function order code	М	J	Ν	К	Н	В	G	E	D	
Operating medium		Filtered com	pressed air, lu	Ibricated or ur	nlubricated, in	ert gases				
Grade of filtration	[µm]	40 (average	pore size)							
Ambient temperature	[°C]	-5 +50								
Storage temperature <sup>2</sup> ) [°C] –20 +40										
Corrosion resistance class CRC <sup>1)</sup> 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

Technical data

Electrical data												
Valve function order code		М	J	Ν	К	Н	В	G	E	D		
Electromagnetic compatibilit	y	Interference	emission t	tested to EN 6	51 000-6-4, in	dustry						
		Interference	immunity <sup>1</sup>	<sup>1)</sup> tested to El	V 61 000-6-2,	industry						
Protection against electric sh	nock	By means of	PELV powe	er supply uni								
(protection against direct an	d indirect											
contact to EN 60204-1/IEC 2	04)											
Operating voltage	[V]	24 (±25%)										
Current consumption per sol	enoid coil											
	at 18 V	Nominal pull current (up to 20 ms) 60 mA/nominal current with current reduction (after 20 ms) 20 mA										
	at 24 V	Nominal pull current (up to 20 ms) 80 mA/nominal current with current reduction (after 20 ms) 20 mA										
	at 30V	Nominal pull current (up to 20 ms) 100 mA/nominal current with current reduction (after 20 ms) 20 mA										
Electrical power	[W]	Pull: 1										
consumption		Hold: 0.24										
Duty cycle		100% at 40 °C ambient temperature										
Protection class to EN 60 52	9	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 6	8/EN 60 0	68, Parts 2-2	9: +/-15 g at	6 ms, 1000 c	ycles					

The maximum signal line length is 10 m
 Intrinsic current consumption per electronics module

Materials									
Valve function order code	М	J	Ν	К	Н	В	G	E	D
Sub-base	Die-cast alum	ninium							
Valve	Die-cast alum	ninium, PPS, S	ST, PA-GF						
Seals	NBR, HNBR, E	lastomer							
Supply plate	Die-cast alum	ninium							
Right-hand end plate	Die-cast alum	ninium							
Left-hand pneumatic interface	Die-cast alum	ninium, polya	mide 6 (cover)						
Exhaust plate	Polyamide								
Surface mounted silencer	Polyethylene								
Electronics module	POM/polycarbonate								
Electrical interlinking	CuBe/PBT								

Technical data

Product weight [g]	approx. wei	approx. weights							
Valve function order code	Μ	J	Ν	К	Н	В	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-I	3								
QSM-M5-4-I	4								
QSM-M5-6-I	5								
QSM-M7-4-I	4								
QSM-M7-6-I	5								

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

Nomina	ominal flow rate [l/min] <sup>1)</sup>									
Code	Valve function	Valve $(1 \rightarrow 2)^{2}$	Valve $(2 \rightarrow 3)^{2}$							
Sub-bas	se valve									
М	5/2-way valve,	360	360							
	single solenoid									
J	5/2-way valve,	360	360							
	double solenoid									
Ν	2x 3/2-way valve,	300	300							
	normally open									
К	2x 3/2-way valve,	230	310							
	normally closed									
Н	2x 3/2-way valve,	280	305							
	1x normally open									
	1x normally closed									
В	5/3-way valve,	300	270							
	mid-position pressurised									
G	5/3-way valve,	320	320							
	mid-position closed									
E	5/3-way valve,	240	240							
	mid-position exhausted									
D	2x 2/2-way valve	230	230							

Flow rates measured on sub-base with QS-6 push-in fittings
 Values refer to the flow direction 1 → 2 or 2 → 3

Technical data



# Solenoid valves VMPA1 Ordering data

Ordering data							
Valves on individual sub-base							
	Code	Valve function	Part No.	Туре			
	Internal pilot air						
	М	5/2-way valve,	533 376	VMPA1-M1H-M-M7-PI			
		single solenoid					
	J	5/2-way valve,	533 377	VMPA1-M1H-J-M7-PI			
		double solenoid					
	Ν	2x 3/2-way valve,	533 382	VMPA1-M1H-N-M7-PI			
		normally open					
	К	2x 3/2-way valve,	533 381	VMPA1-M1H-K-M7-PI			
		normally closed					
	Н	2x 3/2-way valve,	533 383	VMPA1-M1H-H-M7-PI			
		1x normally open					
		1x normally closed					
	В	5/3-way valve,	533 378	VMPA1-M1H-B-M7-PI			
		mid-position pressurised					
	G	5/3-way valve,	533 379	VMPA1-M1H-G-M7-PI			
		mid-position closed					
	E	5/3-way valve,	533 380	VMPA1-M1H-E-M7-PI			
		mid-position exhausted					
	D	2x 2/2-way valve,	533 384	VMPA1-M1H-D-M7-PI			
		normally closed					
	External pilot air						
	M	5/2-way valve,	533 385	VMPA1-M1H-MS-M7-PI			
			533.394				
	J	5/2-way valve,	533 386	VMPA1-M1H-JS-M7-PI			
	N		500.004				
	N	2X 3/2-way valve,	533 391	VMPA1-M1H-NS-M7-PI			
	IV.	normally open	522.200				
	К	2X 3/2-Way valve,	533 390	VMPA1-M1H-KS-M7-PI			
		normally closed	522.202				
	н	2X 3/2-Way valve,	533 392	VMPA1-M1H-HS-M7-PI			
		1x normally open					
	D	1X hormally closed	522.207				
	В	5/3-Way valve,	533 387	VMPA1-M1H-BS-M7-PI			
	C		522.200				
	0	J/J-Way valve,	222 222	VWPA1-W10-G2-M/-PI			
	E		E22.200				
	L C	D/D-way valve,	222 222	VIVIPA1-IVI1N-ES-IVI/-PI			
			522.202				
	U	2X 2/2-way valve,	533 393	VMPA1-M1H-DS-M/-PI			
		normally closed					



# Solenoid valves VMPA1 Ordering data

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

Accessories

Ordering data										
Designation			Part No.	Туре						
Sub-base										
നീ	Individual connection, internal pilot air		533 394	VMPA1-IC-AP-1						
	Individual connection, external pilot air		533 395	VMPA1-IC-AP-S-1						
			I							
100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0										
30										
	•									
Cover										
$\bigcirc$	Cover for manual override, detenting (10 pieces)	533 366	VMPA1-HBT							
S Ca	Cover for manual override, covered (10 pieces)	535 257	VMPA1-HBV							
G										
	·									
Individual connectio	n, electrical		_							
	Plug socket with cable	2.5 m	158 960	SIM-M8-4GD-2,5-PU						
The second second		5 m	158 961	SIM-M8-4GD-5-PU						
	Plug socket with cable	2.5 m	158 962	SIM-M8-4WD-2,5-PU						
- The second sec		5 m	158 963	SIM-M8-4WD-5-PU						
Contraction of the second seco		· · · · ·								
	·									
Push-in fitting for su	b-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							
Ŭ	Thread M7	174 309	B-M7							
Plug										
	Blanking plug for tubing O.D.	4 mm	153 267	QSC-4H						
a s		6 mm	153 268	QSC-6H						
1										



# Product Range and Company Overview

#### **A Complete Suite of Automation Services**

Our experienced engineers provide complete support at every stage of your development process, including: conceptualization, analysis, engineering, design, assembly, documentation, validation, and production.



**Custom Automation Components** Complete custom engineered solutions



**Custom Control Cabinets** Comprehensive engineering support and on-site services



**Complete Systems** Shipment, stocking and storage services

## **The Broadest Range of Automation Components**

With a comprehensive line of more than 30,000 automation components, Festo is capable of solving the most complex automation requirements.



Electromechanical Electromechanical actuators, motors, controllers & drives



**Pneumatics** Pneumatic linear and rotary actuators, valves, and air supply



PLCs and I/O Devices PLC's, operator interfaces, sensors and I/O devices

#### Supporting Advanced Automation... As No One Else Can!

Festo is a leading global manufacturer of pneumatic and electromechanical systems, components and controls for industrial automation, with more than 12,000 employees in 56 national headquarters serving more than 180 countries. For more than 80 years, Festo has continuously elevated the state of manufacturing with innovations and optimized motion control solutions that deliver higher performing, more profitable automated manufacturing and processing equipment. Our dedication to the advancement of automation extends beyond technology to the education and development of current and future automation and robotics designers with simulation tools, teaching programs, and on-site services.

#### Quality Assurance, ISO 9001 and ISO 14001 Certifications

Festo Corporation is committed to supply all Festo products and services that will meet or exceed our customers' requirements in product quality, delivery, customer service and satisfaction.





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