



- Electrically or pneumatically actuated valves
- With internal or external pilot air
- Pneumatic or mechanical reset











Specified types in accordance with ATEX directive for potentially explosive atmospheres

➔ www.festo.com/en/ex

Solenoid valves, ISO 5599-1

Product range overview

FESTO

Function	Version	Type	ISO size	Nominal flow rate [l/min]	Pneumatic working port on sub-base	Operating voltage	
						[V DC]	[V AC]
5/2-way valves, single solenoid	Solenoid valve						
		MN1H	1	1,200	G $\frac{1}{4}$	24	110, 230
			2	2,300	G $\frac{3}{8}$		
			3	4,500	G $\frac{1}{2}$		
		MFH	1	1,200	G $\frac{1}{4}$	12, 24, 42	24, 42, 48, 110, 230, 240
			2	2,300	G $\frac{3}{8}$		
			3	4,500	G $\frac{1}{2}$		
		MDH	4	6,000	G $\frac{3}{4}$	24	42, 110, 230
	Solenoid valve with central plug M12x1						
		MEBH-...-ZSR	1	1,200	G $\frac{1}{4}$	24	-
			2	2,300	G $\frac{3}{8}$		
			3	4,500	G $\frac{1}{2}$		
	Solenoid valve with single plug M12x1, connector pin allocation to VDMA or Desina						
		MDH	1	1,200	G $\frac{1}{4}$	24	-
			2	2,300	G $\frac{3}{8}$		
3			4,500	G $\frac{1}{2}$			
5/2-way valves, double solenoid	Double solenoid valve						
		JMN1H	1	1,200	G $\frac{1}{4}$	24	110, 230
			2	2,300	G $\frac{3}{8}$		
			3	4,500	G $\frac{1}{2}$		
	Double solenoid valve with dominant signal at 14						
		JMN1DH	1	1,200	G $\frac{1}{4}$	24	110, 230
			2	2,300	G $\frac{3}{8}$		
			3	4,500	G $\frac{1}{2}$		
	Double solenoid valve						
		JMFH	1	1,200	G $\frac{1}{4}$	12, 24, 42	24, 42, 48, 110, 230, 240
			2	2,300	G $\frac{3}{8}$		
			3	4,500	G $\frac{1}{2}$		
	Double solenoid valve with dominant signal						
		JMFDH	1	1,200	G $\frac{1}{4}$	12, 24, 42	24, 42, 48, 110, 230, 240
			2	2,300	G $\frac{3}{8}$		
3			4,500	G $\frac{1}{2}$			
Double solenoid valve							
	JMDH	4	6,000	G $\frac{3}{4}$	24	42, 110, 230	

Solenoid valves, ISO 5599-1

Product range overview





FESTO






Type	Pilot air supply		Type of reset		→ Page/Internet
	internal	external	pneumatic spring	mechanical spring	
Solenoid valve					
MN1H	■	■	■	■	18
	■	■	■	■	
	■	■	■	■	
MFH	■	■	■	■	31
	■	■	■	■	
	■	■	■	■	
MDH	■	-	■	-	67
Solenoid valve with central plug M12x1					
MEBH-...-ZSR	■	-	■	■	43
	■	-	■	■	
	■	-	■	■	
Solenoid valve with single plug M12x1, connector pin allocation to VDMA or Desina					
MDH	■	■	■	■	31
	■	-	■	■	
	■	-	■	■	
Double solenoid valve					
JMN1H	■	■	-	-	22
	■	■	-	-	
	■	■	-	-	
Double solenoid valve with dominant signal at 14					
JMN1DH	■	■	-	-	22
	■	■	-	-	
	■	■	-	-	
Double solenoid valve					
JMFH	■	■	-	-	35
	■	■	-	-	
	■	■	-	-	
Double solenoid valve with dominant signal at 14					
JMFDH	■	-	-	-	35
	■	-	-	-	
	■	-	-	-	
Double solenoid valve					
JMDH	■	-	-	-	70
	■	-	-	-	
	■	-	-	-	

Solenoid valves, ISO 5599-1

Product range overview

FESTO

Function	Version	Type	ISO size	Nominal flow rate [l/min]	Pneumatic working port on sub-base	Operating voltage	
						[V DC]	[V AC]
5/2-way valves, double solenoid	Double solenoid valve with central plug M12x1						
		JMEBH	1	1,200	G $\frac{1}{4}$	24 V DC	-
			2	2,300	G $\frac{3}{8}$		
			3	4,500	G $\frac{1}{2}$		
	Double solenoid valve with central plug M12x1, dominant signal at 14						
		JMEBDH	1	1,200	G $\frac{1}{4}$	24 V DC	-
			2	2,300	G $\frac{3}{8}$		
			3	4,500	G $\frac{1}{2}$		
	Double solenoid valve with single plug M12x1, connector pin allocation to VDMA or Desina						
		JMDH	1	1,200	G $\frac{1}{4}$	24 V DC	-
			2	2,300	G $\frac{3}{8}$		
			3	4,500	G $\frac{1}{2}$		
	Double solenoid valve with single plug M12x1, connector pin allocation to VDMA or Desina, dominant signal at 14						
		JMDDH	1	1,200	G $\frac{1}{4}$	24 V DC	-
			2	2,300	G $\frac{3}{8}$		
			3	4,000	G $\frac{1}{2}$		

Function	Version	Type	ISO size	Nominal flow rate [l/min]	Pneumatic working port on sub-base	Operating voltage	
						[V DC]	[V AC]
5/3-way valves	Solenoid valve						
		MN1H-5/3...	1	1,200	G $\frac{1}{4}$	24	110, 230
			2	2,300	G $\frac{3}{8}$		
			3	4,100	G $\frac{1}{2}$		
		MFH-5/3...	1	1,200	G $\frac{1}{4}$	12, 24, 42	24, 42, 48, 110, 230, 240
			2	2,300	G $\frac{3}{8}$		
			3	4,100	G $\frac{1}{2}$		
		MDH-5/3...	4	6,000	G $\frac{3}{4}$	24	110, 230
			Solenoid valve with central plug M12x1				
		MEBH-5/3-...-ZSR	1	1,200	G $\frac{1}{4}$	24	-
			2	2,300	G $\frac{3}{8}$		
			3	4,100	G $\frac{1}{2}$		
	Solenoid valve with single plug M12x1, connector pin allocation to VDMA or Desina						
		MDH-5/3...	1	1,200	G $\frac{1}{4}$	24	-
			2	2,300	G $\frac{3}{8}$		
			3	4,000 ... 4,600	G $\frac{1}{2}$		

Solenoid valves, ISO 5599-1

Product range overview




FESTO


Type	Pilot air supply		Type of reset		→ Page/Internet
	internal	external	pneumatic spring	mechanical spring	
Double solenoid valve with central plug M12x1					
JMEBH	■	-	-	-	47
	■	-	-	-	
	■	-	-	-	
Double solenoid valve with central plug M12x1, with dominant signal					
JMEBDH	■	-	-	-	47
	■	-	-	-	
	■	-	-	-	
Double solenoid valve with single plug M12x1, connector pin allocation to VDMA or Desina					
JMDH	■	-	-	-	35
	■	-	-	-	
	■	-	-	-	
Double solenoid valve with single plug M12x1, connector pin allocation to VDMA or Desina, dominant signal at 14					
JMDDH	■	-	-	-	35
	■	-	-	-	
	■	-	-	-	

Type	Pilot air supply		Mid position			→ Page/Internet
	internal	external	closed	exhausting	pressurised	
Solenoid valve						
MN1H-5/3...	■	■	■	■	■	26
	■	■	■	■	■	
	■	■	■	■	■	
MFH-5/3...	■	■	■	■	■	38
	■	■	■	■	■	
	■	■	■	■	■	
MDH-5/3...	■	-	■	■	-	73
Solenoid valve with central plug M12x1						
MEBH-5/3-...-ZSR	■	-	■	■	■	51
	■	-	■	■	■	
	■	-	■	■	■	
Solenoid valve with single plug M12x1, connector pin allocation to VDMA or Desina						
MDH-5/3...	■	-	■	■	■	38
	■	-	■	■	■	
	■	-	■	■	■	

Pneumatic valves, ISO 5599-1

Product range overview

Function	Version	Type	ISO size	Nominal flow rate [l/min]	Pneumatic working port on sub-base	Type of reset		→ Page/Internet
						pneumatic spring	mechanical spring	
5/2-way valves	Pneumatic valve, single pilot							
		VL	1	1,200	G1/4	■	■	81
			2	2,300	G3/8	■	■	
			3	4,500	G1/2	■	■	
			4	6,000	G3/4	■	■	
	Pneumatic double pilot valve							
		J	1	1,200	G1/4	-	-	85
			2	2,300	G3/8	-	-	
			3	4,500	G1/2	-	-	
			4	6,000	G3/4	-	-	
	Pneumatic double pilot valve with dominant signal at 14							
		JD	1	1,200	G1/4	-	-	85
2			2,300	G3/8	-	-		
3			4,500	G1/2	-	-		

Function	Version	Type	ISO size	Nominal flow rate [l/min]	Pneumatic working port on sub-base	Mid position			→ Page/Internet
						closed	exhausted	pressurised	
5/3-way valves	Pneumatic valve								
		VL5/3...	1	1,200	G1/4	■	■	■	88
			2	2,300	G3/8	■	■	■	
			3	4,100	G1/2	■	■	■	
			4	4,800	G3/4	■	■	■	

Solenoid valves, ISO 5599-1

Type codes for valves with square plug

MN1H		5/3	G	D-1				C
Type								
MN1H	Single pilot, for N1 solenoid coil							
MFH	Single solenoid, for F solenoid coil							
MDH	Single solenoid, with D solenoid coil							
MEBH	Single solenoid, with EB solenoid coil							
JMN1H	Double solenoid, for N1 solenoid coil							
JMN1DH	Double solenoid, for N1 solenoid coil, with dominant signal at 14							
JMFH	Double solenoid, for F solenoid coil							
JMFDH	Double solenoid, for F solenoid coil, with dominant signal at 14							
JMDH	Double solenoid, with D solenoid coil							
Valve function								
5/2	5/2-way valve							
5/3	5/3-way valve							
Mid position								
G	closed							
E	exhausted							
B	pressurised							
Size								
D-1	ISO size 1							
D-2	ISO size 2							
D-3	ISO size 3							
¾-D-4	ISO size 4							
Electrical connection, operating voltage								
Plug, square design to EN 175301-803, type A								
24DC	24 V DC							
Pilot air supply								
	internal							
S	external							
Type of reset								
FR	Mechanical spring							
	Pneumatic spring							
Generation								
C	Series C							

Solenoid valves, ISO 5599-1

Type codes for valves with round plug

MDH - 5/3 G - D-1 - - - - - C

Type	
MDH	Single solenoid, with D solenoid coil
MEBH	Single solenoid, with EB solenoid coil
JMDH	Double solenoid, for D solenoid coil
JMDDH	Double solenoid, for D solenoid coil, with dominant signal at 14
JMEBH	Double solenoid, with EB solenoid coil
JMEBDH	Double solenoid, with EB solenoid coil, with dominant signal at 14

Valve function	
5/2	5/2-way valve
5/3	5/3-way valve

Mid position	
G	closed
E	exhausted
B	pressurised

Size	
D-1	ISO size 1
D-2	ISO size 2
D-3	ISO size 3

Electrical connection, operating voltage	
Central plug, round design, M12x1	
ZSR	24 V DC
Individual plug, round design, M12x1	
M12	24 V DC

Pin allocation	
	2-pin to VDMA
D	4-pin to Desina

Pilot air supply	
	internal
S	external

Type of reset	
FR	Mechanical spring
	Pneumatic spring

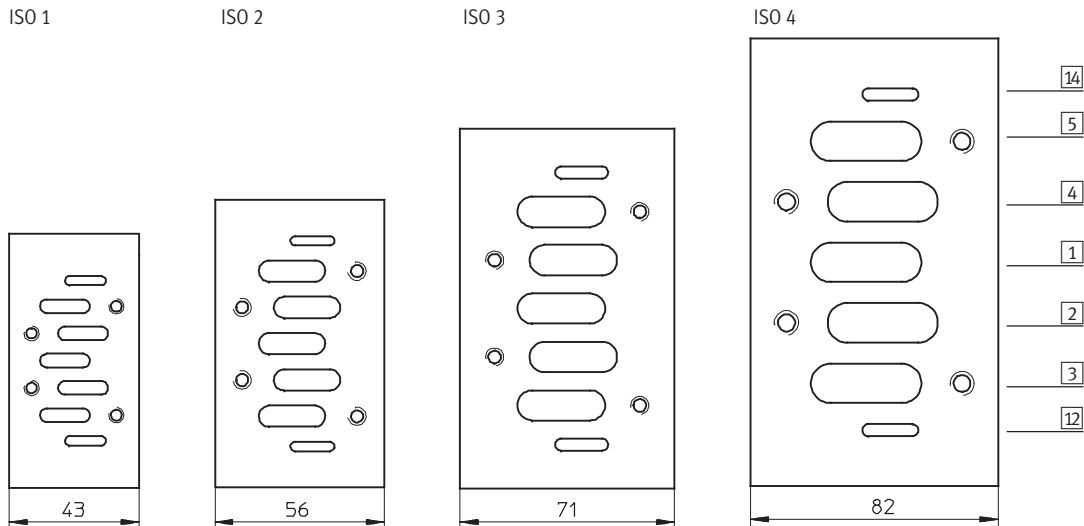
Generation	
C	Series C

Solenoid valves, ISO 5599-1

Peripherals overview

Port pattern on sub-base to ISO 5599-1

Defined interfaces between valve and sub-base



Sub-base port designations

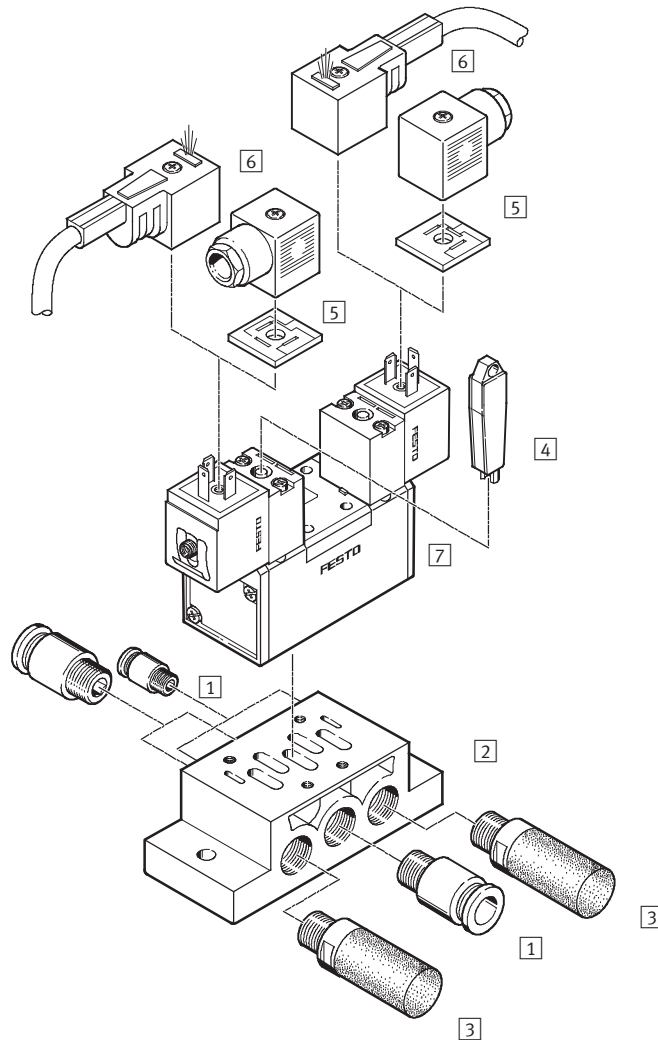
Sub-base port designations		Solenoid valves	Pneumatic valves
14	Control section	External pilot air supply for pilot valve 14	Signal input 14
5	Power section	Valve exhaust port 5	
4	Power section	Working port 4 www.festo.com	
1	Power section	Working air supply port 1	
2	Power section	Working port 2	
3	Power section	Valve exhaust port 3	
12	Control section	External pilot air supply for pilot valve 12	Signal input 12

Solenoid valves, ISO 5599-1

Peripherals overview

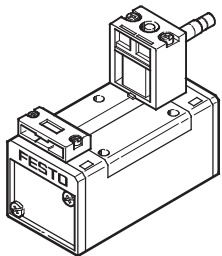
FESTO

Individual mounting with square plug

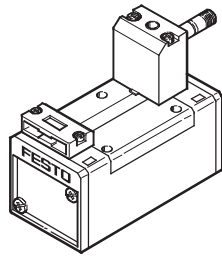


Variants

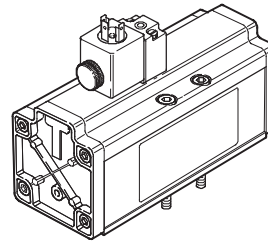
MN1H-5/2



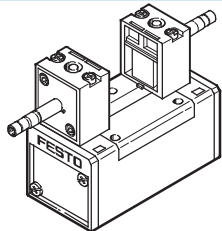
MFH-5/2



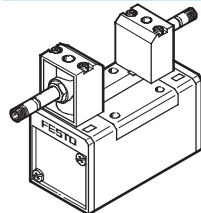
MDH-5/2-D-4



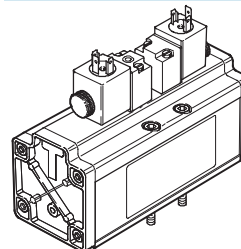
JMN1H-5/2, MN1H-5/3



JMFH-5/2, MFH-5/3



JMDH-5/2-D-4, MDH-5/3-D-4



Solenoid valves, ISO 5599-1

Peripherals overview

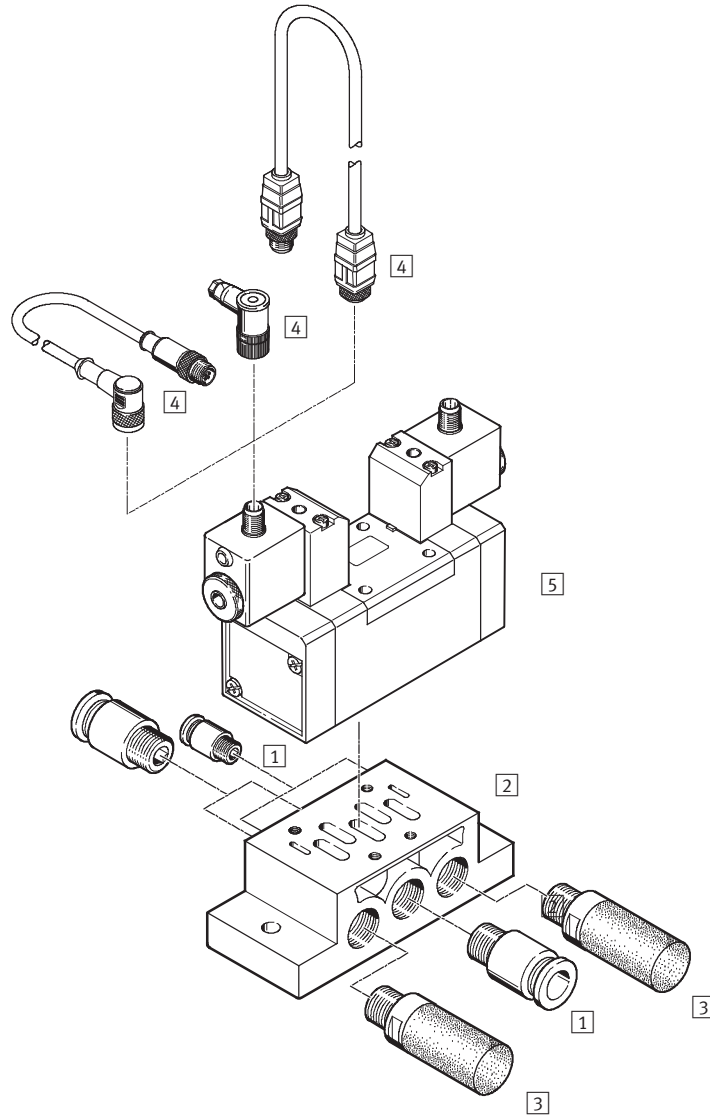
Accessories		
	Brief description	→ Page/Internet
1	Push-in fitting QS	quick star
2	Individual sub-base NAS	92
3	Silencers	u
4	Manual override tool AHB	105
5	Illuminating seal M...-LD	105
6	Plug sockets with/without cables MSSD, KMF, KMC	104
7	Solenoid valve	Port pattern to ISO 5599-1, corresponding solenoid coils → 103

Solenoid valves, ISO 5599-1

Peripherals overview

FESTO

Individual mounting with round plug



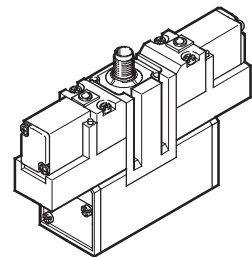
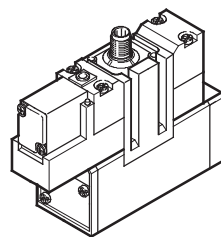
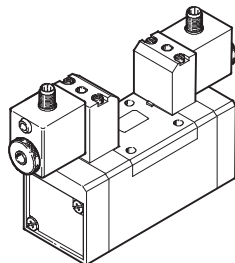
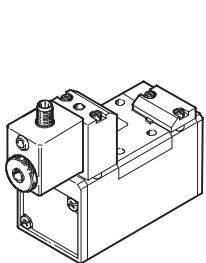
Variants

MDH-5/2

JMDH-5/2, MDH-5/3

MEBH-5/2

JMEBH-5/2, MEBH-5/3



Solenoid valves, ISO 5599-1

Peripherals overview

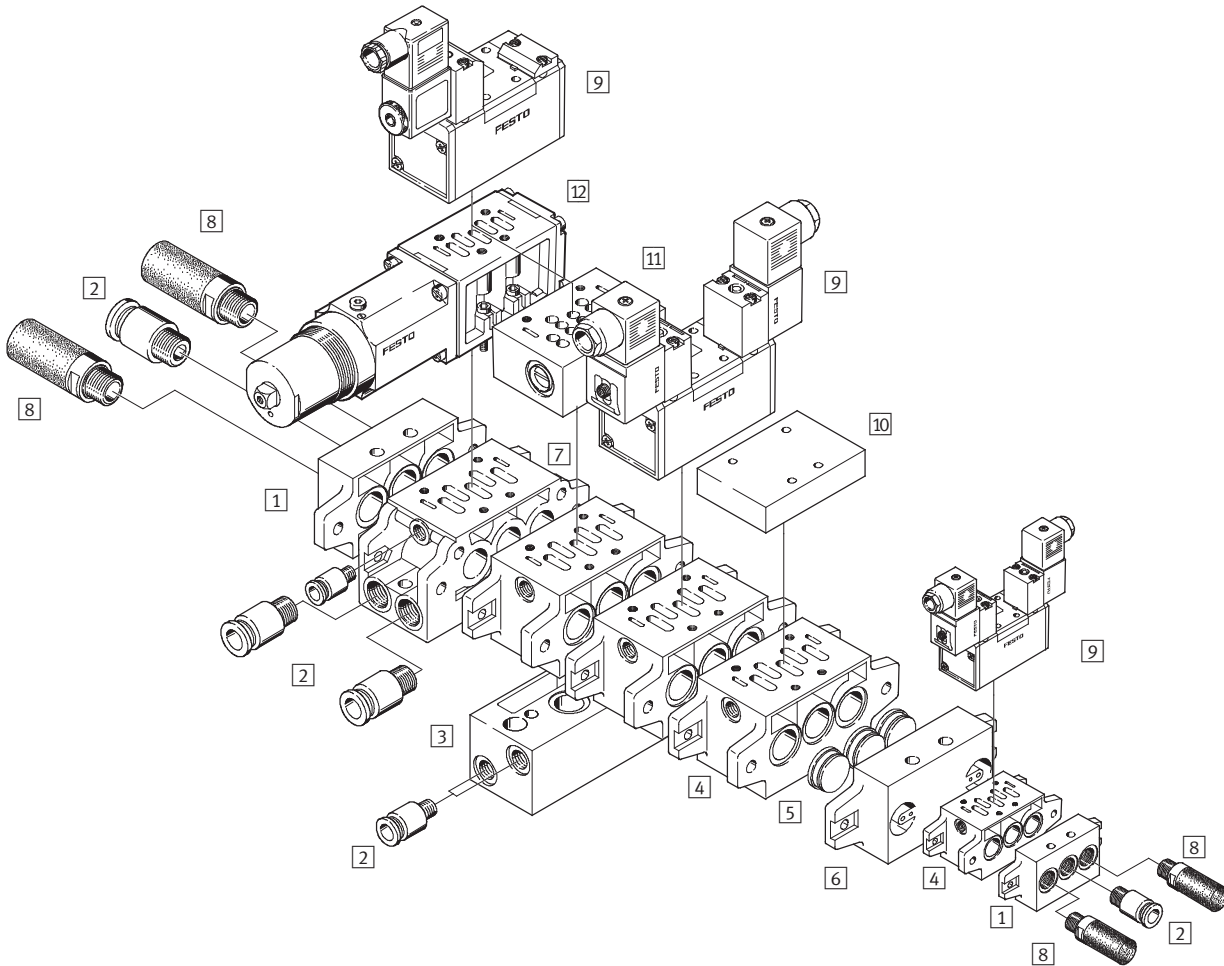
Accessories		
	Brief description	→ Page/Internet
1	Push-in fitting QS	quick star
2	Individual sub-base NAS	92
3	Silencers	u
4	Plug sockets with/without cables SAE, KM	105
5	Solenoid valve	43

Solenoid valves, ISO 5599-1

Peripherals overview

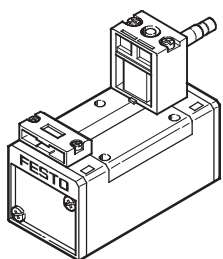


Manifold mounting with square plug

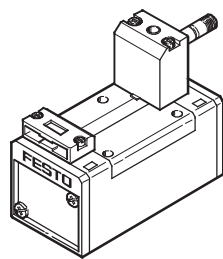


Variants

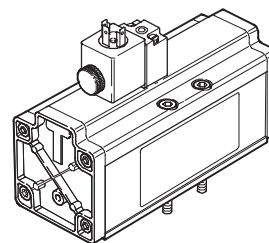
MN1H-5/2



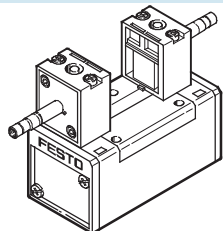
MFH-5/2



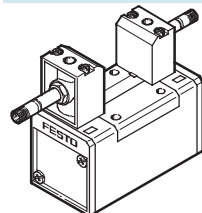
MDH-5/2-D-4



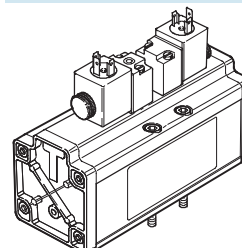
JMN1H-5/2, MN1H-5/3



JMFH-5/2, MFH-5/3



JMDH-5/2-D-4, MDH-5/3-D-4



Solenoid valves, ISO 5599-1

Peripherals overview

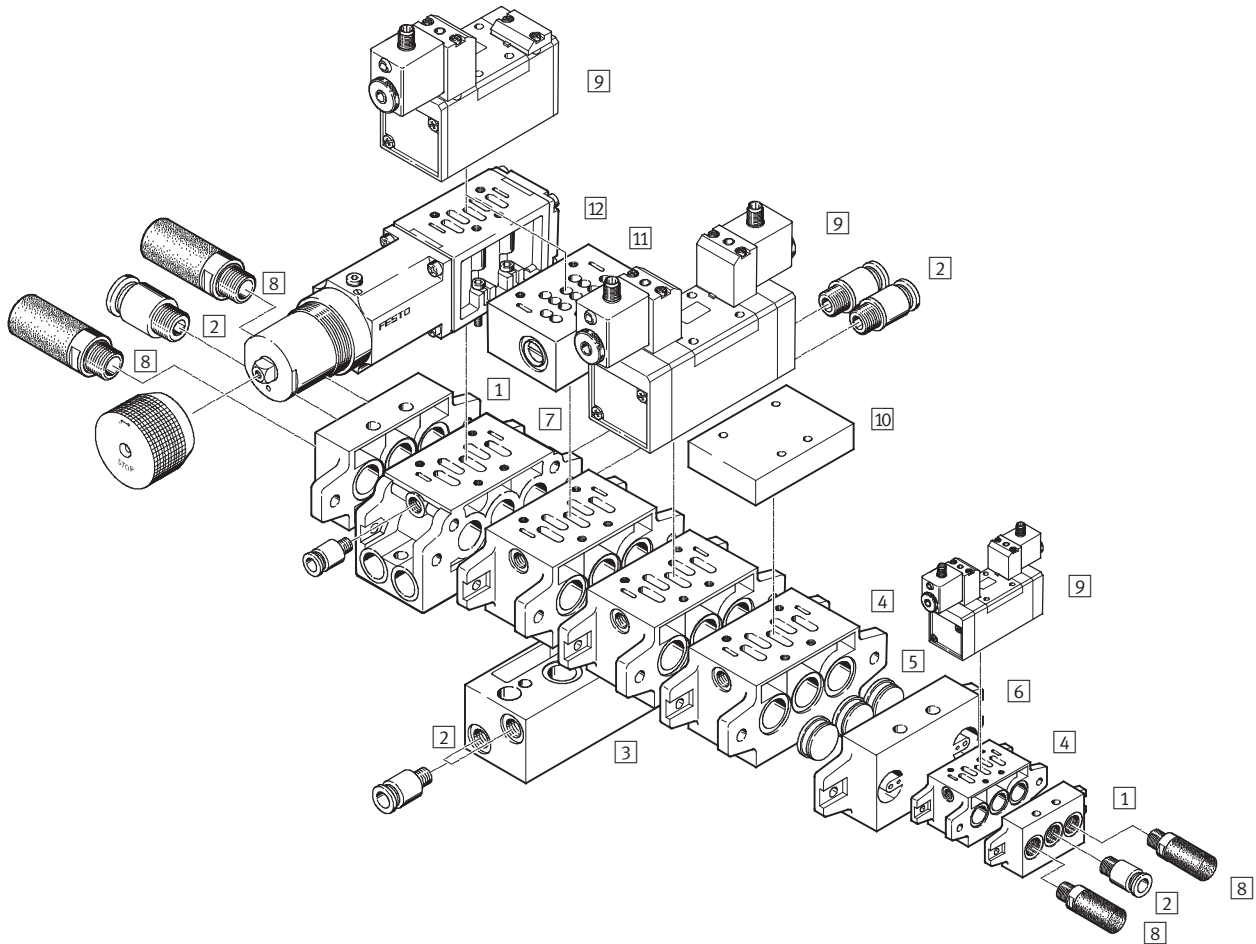
Accessories		
	Remarks	→ Page/Internet
1 End plate kit NEV	For sealing the manifold sub-bases	95
2 Push-in fitting QS	For connecting compressed air tubing with standard O.D.	quick star
3 Angle connection block NAW	For routing ports 2 and 4 to the front	94
4 Manifold sub-base NAV	With ports 2 and 4 underneath	94
5 Isolating disc NSC	For sealing the common lines 1, 3, 5 between end plates and manifold sub-bases or between 2 manifold sub-bases, e.g. for different working pressures	96
6 Intermediate plate NZV	For connecting manifold sub-bases of different sizes	98
7 Manifold sub-base for angle connection NAWV	With ports 2 and 4 either underneath or to the front	95
8 Silencers	For fitting in exhaust ports	u
9 Solenoid valve	Port pattern to ISO 5599-1, corresponding solenoid coils → 103	2
10 Blanking plate NDV	For sealing unused manifold sub-bases	96
11 Throttle plate GRO	For ISO size 1, 2 and 3 with integrated exhaust air restrictors at ports 3 and 5. The throttle plate is mounted between the valve and the individual sub-base/manifold sub-base	99
12 Intermediate pressure regulator plate LR-ZP	For ISO size 1, 2 and 3 for regulating the pressure from 0 to 10 bar according to the supply pressure. The intermediate pressure regulator plate is mounted between the valve and the individual sub-base/manifold sub-base	100

Solenoid valves, ISO 5599-1

Peripherals overview



Manifold mounting with round plugs



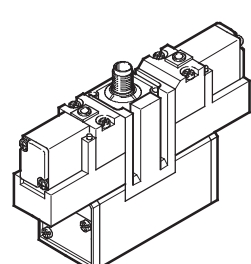
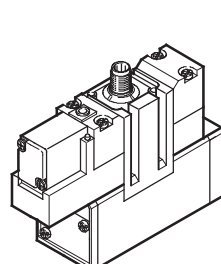
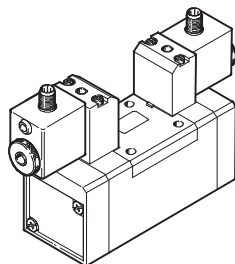
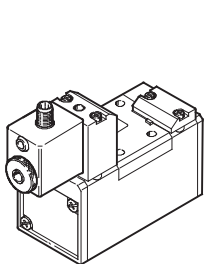
Variants

MDH-5/2

JMDH-5/2, MDH-5/3

MEBH-5/2

JMEBH-5/2, MEBH-5/3



Solenoid valves, ISO 5599-1

Peripherals overview

Accessories		
	Remarks	→ Page/Internet
1 End plate kit NEV	For sealing the manifold sub-bases	nev
2 Push-in fitting QS	For connecting compressed air tubing with standard O.D.	quick star
3 Angle connection block NAW	For routing ports 2 and 4 to the front	94
4 Manifold sub-base NAV	With ports 2 and 4 underneath	94
5 Isolating disc NSC	For sealing the common lines 1, 3, 5 between end plates and manifold sub-bases or between 2 manifold sub-bases, e.g. for different working pressures	96
6 Intermediate plate NZV	For connecting manifold sub-bases of different sizes	98
7 Manifold sub-base for angle connection NAWV	With ports 2 and 4 either underneath or to the front	95
8 Silencers	For fitting in exhaust ports	u
9 Solenoid valve	Port pattern to ISO 5599-1	2
10 Blanking plate NDV	For sealing unused manifold sub-bases	96
11 Throttle plate GRO	For ISO size 1, 2 and 3 with integrated exhaust air restrictors at ports 3 and 5. The throttle plate is mounted between the valve and the individual sub-base/manifold sub-base	99
12 Intermediate pressure regulator plate LR-ZP	For ISO size 1, 2 and 3 for regulating the pressure from 0 to 10 bar according to the supply pressure. The intermediate pressure regulator plate is mounted between the valve and the individual sub-base/manifold sub-base	100

Solenoid valves MN1H, ISO 5599-1

FESTO

Technical data – 5/2-way valves

Flow rate

1200 ... 4500 l/min

Voltage

24 V DC

110, 230 V AC



General technical data			
ISO size	1	2	3
Valve function	5/2-way, single solenoid		
Constructional design	Piston spool		
Sealing principle	Soft		
Actuation type	Electrical		
Type of reset	Mechanical or pneumatic spring		
Type of pilot control	Piloted		
Pilot air supply	Internal or external		
Direction of flow	Non-reversible		
Exhaust function	With flow control		
Manual override	Via accessory, detenting		
Type of mounting	Via through-holes		
Mounting position	Any		
Nominal size	[mm] 8	11	14.5
Standard nominal flow rate	[l/min] 1200	2300	4500
Grid dimension	[mm] 43	56	71
Pneumatic connection on sub-base	G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$
Product weight	[g] 450	710	1000
Noise level	[dB (A)] 85		
Certification	Germanischer Lloyd		

Operating and environmental conditions			
Type of reset		Pneumatic	Mechanical
Operating medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]	
Pilot medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]	
Note on operating/pilot medium		Operation with lubricated medium possible (in which case lubricated operation will always be required)	
Operating pressure	Internal pilot air supply	[bar] 2 ... 10	3 ... 10
	External pilot air supply	[bar] -0.9 ... +16	-0.9 ... +16
Pilot pressure	[bar]	2 ... 10	3 ... 10
Ambient temperature	[°C]	-10 ... +50	
Temperature of medium	[°C]	-10 ... +50	

Valve response times [ms]						
ISO size	1		2		3	
	Pneumatic	Mechanical	Pneumatic	Mechanical	Pneumatic	Mechanical
On	23	17	46	24	49	33
Off	32	39	69	62	71	74

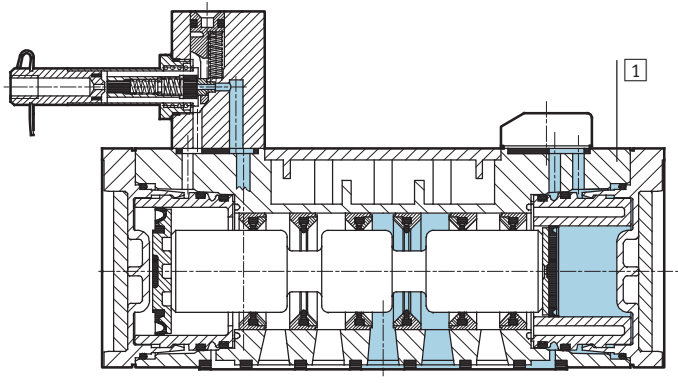
Solenoid valves MN1H, ISO 5599-1

Technical data – 5/2-way valves

Electrical data			
N1 solenoid coil			
Electrical connection		Plug, square design to EN 175301-803, type A	
Operating voltage	D.C. voltage	[V DC]	24
	A.C. voltage	[V AC]	110/230 (50 ... 60 Hz)
Coil characteristics	D.C. voltage	[W]	2.5
	A.C. voltage	[VA]	Pull: 7.5 Hold: 5
Protection class to EN 60 529		IP65	

Materials

Sectional view



1	Housing	Die-cast aluminium, polyacetate
-	Seals	Nitrile rubber

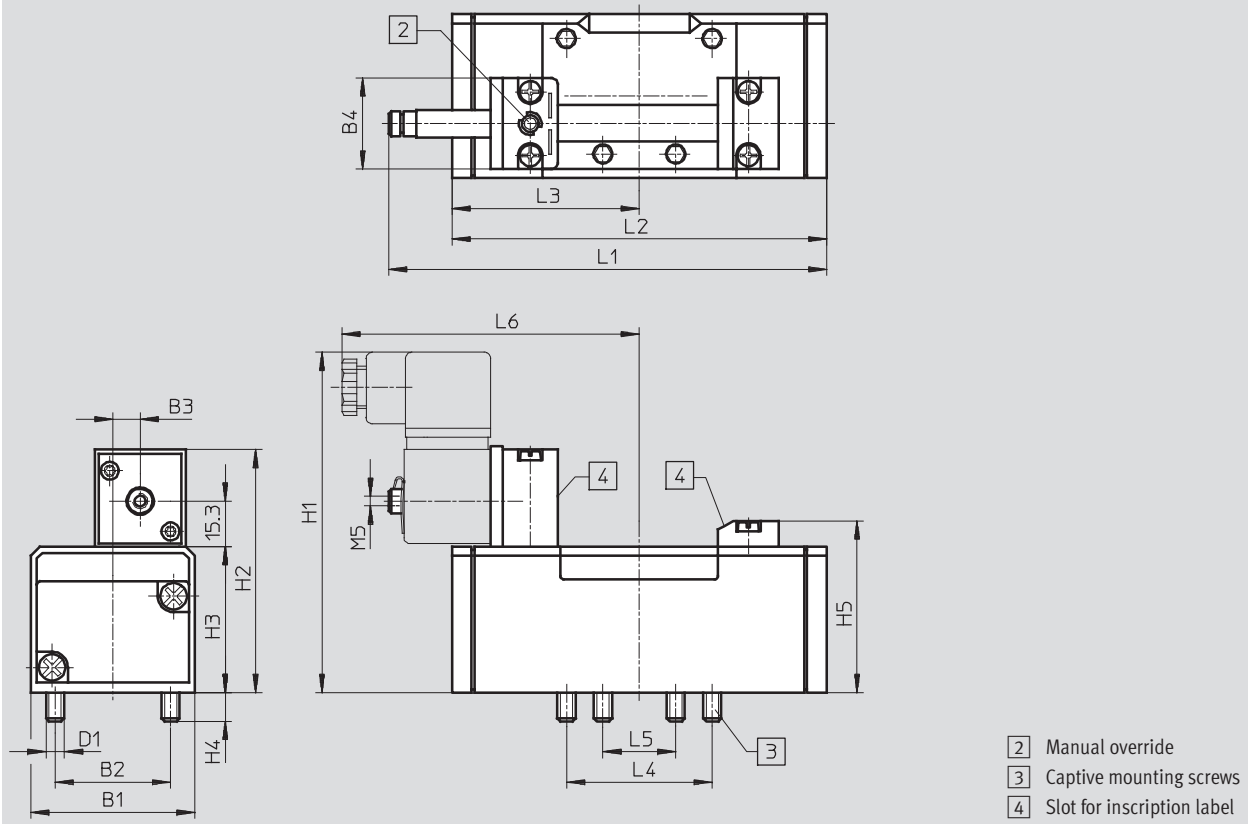
Solenoid valves MN1H, ISO 5599-1

Technical data – 5/2-way valves



Dimensions

Download CAD Data → www.festo.com/us/cad



Type	B1	B2	B3	B4	D1	H1	H2	H3	H4	H5	L1	L2	L3	L4	L5	L6
ISO size 1																
MN1H-5/2-...	42	28	6	30	M5	106	74	38	9	46.5	117.5	87.6	43.8	36	18	89
MN1H-5/2-...-FR											128	98				
ISO size 2																
MN1H-5/2-...	54	38	9	30	M6	116	84	48	9.5	56.5	147.6	123.4	61.7	48	24	98
MN1H-5/2-...-FR											161.5	140.7				
ISO size 3																
MN1H-5/2-...	65	48	12	30	M8	123	91	55	12	63.5	169	145.4	72.7	64	32	109
MN1H-5/2-...-FR											184.8	164.7				

Solenoid valves MN1H, ISO 5599-1

Technical data – 5/2-way valves

Ordering data				
Circuit symbol	Description	ISO size	Part No.	Type
	Without N1 solenoid coil ¹⁾ , internal pilot air supply, pneumatic reset	1	159688	MN1H-5/2-D-1-C
		2	159700	MN1H-5/2-D-2-C
		3	159712	MN1H-5/2-D-3-C
	Without N1 solenoid coil ¹⁾ , external pilot air supply, pneumatic reset	1	159686	MN1H-5/2-D-1-S-C
		2	159698	MN1H-5/2-D-2-S-C
		3	159710	MN1H-5/2-D-3-S-C
	Without N1 solenoid coil ¹⁾ , internal pilot air supply, mechanical reset	1	159687	MN1H-5/2-D-1-FR-C
		2	159699	MN1H-5/2-D-2-FR-C
		3	159711	MN1H-5/2-D-3-FR-C
	Without N1 solenoid coil ¹⁾ , external pilot air supply, mechanical reset	1	159716	MN1H-5/2-D-1-FR-S-C
		2	159718	MN1H-5/2-D-2-FR-S-C
		3	160896	MN1H-5/2-D-3-FR-S-C

1) N1 solenoid coils → 102

Solenoid valves JMN1H, ISO 5599-1

FESTO

Technical data – 5/2-way valves, double solenoid

Flow rate

1200 ... 4500 l/min

Voltage

24 V DC

110, 230, 240 V AC



General technical data				
ISO size	1	2	3	
Valve function	5/2-way, double solenoid			
Constructional design	Piston spool			
Sealing principle	Soft			
Actuation type	Electrical			
Type of reset	Mechanical spring			
Type of pilot control	Piloted			
Pilot air supply	Internal or external			
Direction of flow	Non-reversible			
Exhaust function	With flow control			
Manual override	Via accessory, detenting			
Type of mounting	Via through-holes			
Mounting position	Any			
Nominal size	[mm]	8	11	14.5
Standard nominal flow rate	[l/min]	1200	2300	4500
Grid dimension	[mm]	43	56	71
Pneumatic connection on sub-base		G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$
Product weight	[g]	610	880	1090
Noise level	[dB (A)]	85		
Certification	Germanischer Lloyd			

Operating and environmental conditions			
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Pilot medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)		
Operating pressure	Internal pilot air supply	[bar]	2 ... 10
	External pilot air supply	[bar]	-0.9 ... +16
Pilot pressure		[bar]	2 ... 10
Ambient temperature		[°C]	-10 ... +50
Temperature of medium		[°C]	-10 ... +50

Valve response times						
ISO size	1		2		3	
		Dominant signal at 14		Dominant signal at 14		Dominant signal at 14
	18	12: 18 ms; 14: 15 ms	21	12: 24 ms; 14: 21 ms	21	12: 24 ms; 14: 21 ms

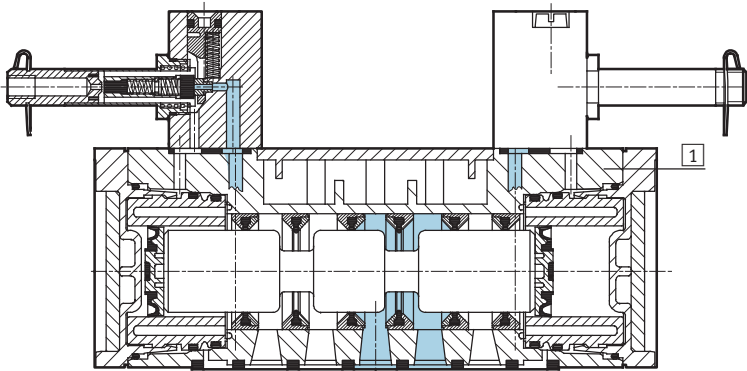
Solenoid valves JMN1H, ISO 5599-1

Technical data – 5/2-way valves, double solenoid

Electrical data			
N1 solenoid coil			
Electrical connection		Plug, square design to EN 175301-803, type A	
Operating voltage	D.C. voltage	[V DC]	24
	A.C. voltage	[V AC]	110/230 (50 ... 60 Hz)
Coil characteristics	D.C. voltage	[W]	2.5
	A.C. voltage	[VA]	Pull: 7.5 Hold: 5
Protection class to EN 60 529		IP65	

Materials

Sectional view



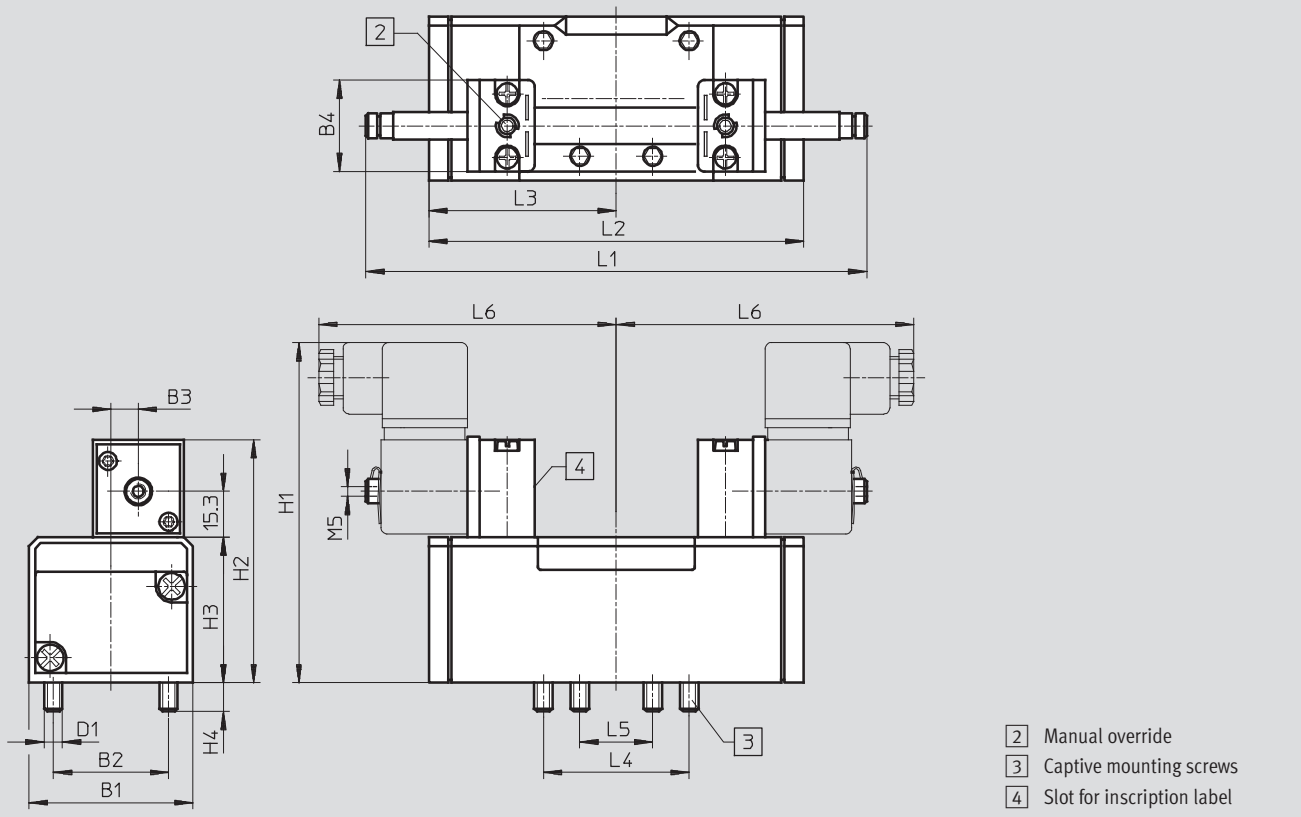
1	Housing	Die-cast aluminium, polyacetate
-	Seals	Nitrile rubber

Solenoid valves JMN1H, ISO 5599-1

Technical data – 5/2-way valves, double solenoid

Dimensions

Download CAD Data → www.festo.com/us/cad



ISO size	B1	B2	B3	B4	D1	H1	H2	H3	H4	L1	L2	L3	L4	L5	L6
1	42	28	6	30	M5	106	74	38	9	147.3	87.6	43.8	36	18	89
2	54	38	9	30	M6	116	84	48	9.5	165	123.4	61.7	48	24	98
3	65	48	12	30	M8	123	91	55	12	185.7	145.4	72.7	64	32	109

Solenoid valves JMN1H, ISO 5599-1

Technical data – 5/2-way valves, double solenoid

Ordering data – Double solenoid valve				
Circuit symbol	Description	ISO size	Part No.	Type
	Without N1 solenoid coil ¹⁾ , internal pilot air supply	1	159690	JMN1H-5/2-D-1-C
		2	159702	JMN1H-5/2-D-2-C
		3	159714	JMN1H-5/2-D-3-C
	Without N1 solenoid coil ¹⁾ , external pilot air supply	1	159689	JMN1H-5/2-D-1-S-C
		2	159701	JMN1H-5/2-D-2-S-C
		3	159713	JMN1H-5/2-D-3-S-C
	Without N1 solenoid coil ¹⁾ , internal pilot air supply, with dominant signal at 14	1	159691	JMN1DH-5/2-D-1-C
		2	159703	JMN1DH-5/2-D-2-C
		3	159715	JMN1DH-5/2-D-3-C
	Without N1 solenoid coil ¹⁾ , external pilot air supply, with dominant signal at 14	1	159717	JMN1DH-5/2-D-1-S-C
		2	159719	JMN1DH-5/2-D-2-S-C
		3	160897	JMN1DH-5/2-D-3-S-C

1) N1 solenoid coils → 102

Solenoid valves MN1H, ISO 5599-1

Technical data – 5/3-way valves

FESTO

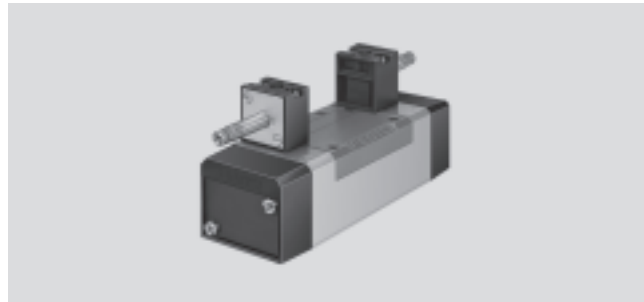
Flow rate

1200 ... 4600 l/min

Voltage

24 V DC

110, 230 V AC



General technical data					
ISO size		1	2	3	
Valve function		5/3-way, double solenoid			
Constructional design		Piston spool			
Sealing principle		Soft			
Actuation type		Electrical			
Type of reset		Mechanical spring			
Type of pilot control		Piloted			
Pilot air supply		Internal			
Direction of flow		Non-reversible			
Exhaust function		With flow control			
Manual override		Via accessory, detenting			
Type of mounting		Via through-holes			
Mounting position		Any			
Nominal size	[mm]	8	11	14.5	
Standard nominal flow rate	Closed	[l/min]	1200	2300	4100
	Exhausted	[l/min]			4600
	Pressurised	[l/min]			4000
Grid dimension	[mm]	43	56	71	
Pneumatic connection on sub-base		G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$	
Product weight	[g]	650	940	1170	
Noise level	[dB (A)]	85			
Certification		Germanischer Lloyd			

Operating and environmental conditions			
Operating medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]	
Pilot medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]	
Note on operating/pilot medium		Operation with lubricated medium possible (in which case lubricated operation will always be required)	
Operating pressure	Internal pilot air supply	[bar]	3 ... 10
	External pilot air supply	[bar]	-0.9 ... +16
Pilot pressure		[bar]	3 ... 10
Ambient temperature		[°C]	-10 ... +50
Temperature of medium		[°C]	-10 ... +50

Valve response times [ms]						
ISO size	1		2		3	
	On	Off	On	Off	On	Off
With N1 solenoid coil						
Closed	20	44	33	82	33	82
Exhausted	20	46	36	84	36	84
Pressurised	20	46	35	78	35	78

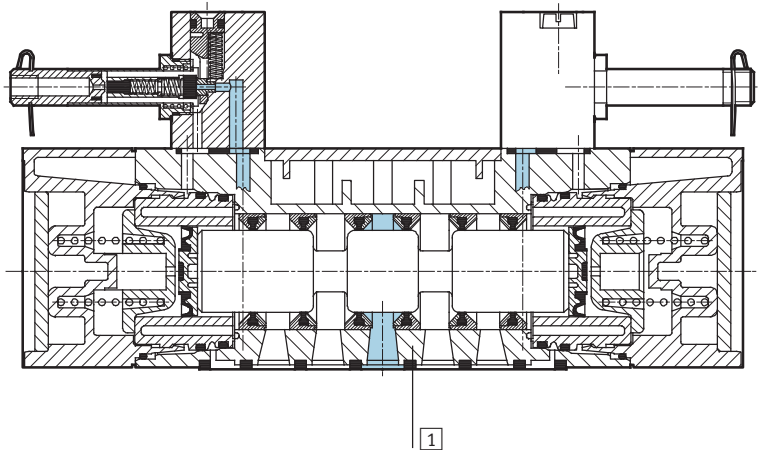
Solenoid valves MN1H, ISO 5599-1

Technical data – 5/3-way valves

Electrical data			
N1 solenoid coil			
Electrical connection		Plug, square design to EN 175301-803, type A	
Operating voltage	D.C. voltage	[V DC]	24
	A.C. voltage	[V AC]	110/230 (50 ... 60 Hz)
Coil characteristics	D.C. voltage	[W]	2.5
	A.C. voltage	[VA]	Pull: 7.5 Hold: 5
Protection class to EN 60 529		IP65	

Materials

Sectional view



1	Housing	Die-cast aluminium, polyacetate
-	Seals	Nitrile rubber

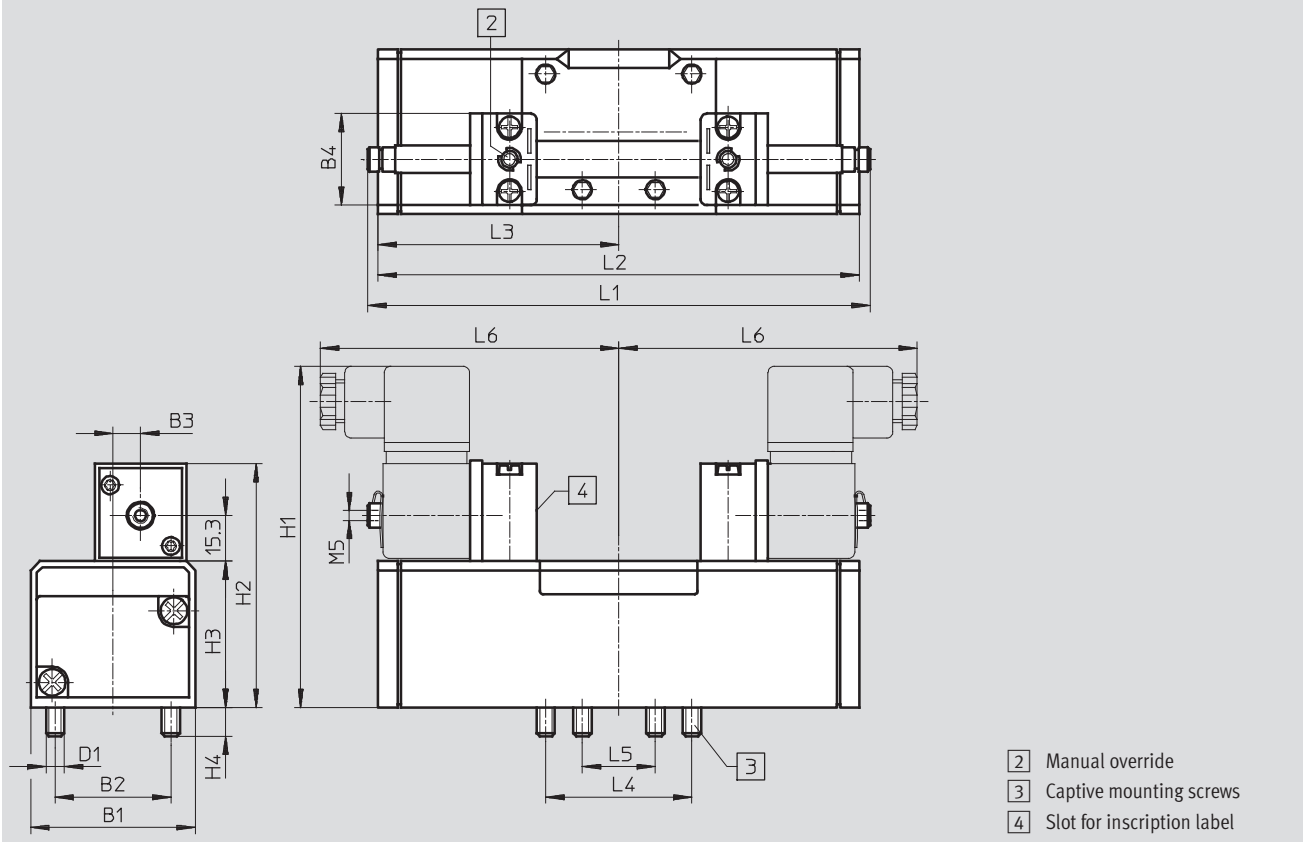
Solenoid valves MN1H, ISO 5599-1

Technical data – 5/3-way valves

FESTO

Dimensions

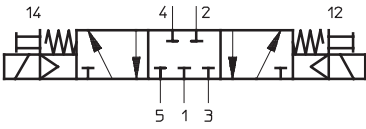
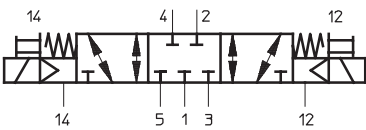
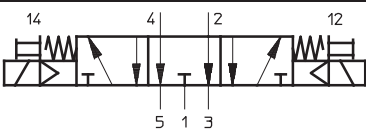
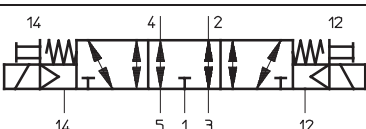
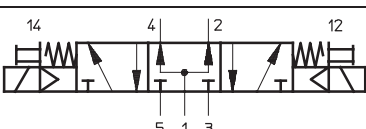
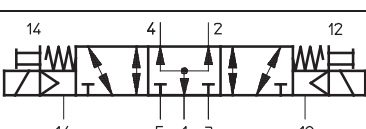
Download CAD Data → www.festo.com/us/cad



ISO size	B1	B2	B3	B4	D1	H1	H2	H3	H4	L1	L2	L3	L4	L5	L6
1	42	28	6	30	M5	106	74	38	9	147.3	108.4	54.2	36	18	89
2	54	38	9	30	M6	116	84	48	9.5	165	158	79	48	24	98
3	65	48	12	30	M8	123	91	55	12	185.7	184	92	64	32	109

Solenoid valves MN1H, ISO 5599-1

Technical data – 5/3-way valves

Ordering data				
Circuit symbol	Description	ISO size	Part No.	Type
	Without N1 solenoid coil ¹⁾ , normally closed, internal pilot air supply	1	159681	MN1H-5/3G-D-1-C
		2	159693	MN1H-5/3G-D-2-C
		3	159705	MN1H-5/3G-D-3-C
	Without N1 solenoid coil ¹⁾ , normally closed, external pilot air supply	1	159680	MN1H-5/3G-D-1-S-C
		2	159692	MN1H-5/3G-D-2-S-C
		3	159704	MN1H-5/3G-D-3-S-C
	Without N1 solenoid coil ¹⁾ , normally exhausted, internal pilot air supply	1	159683	MN1H-5/3E-D-1-C
		2	159695	MN1H-5/3E-D-2-C
		3	159707	MN1H-5/3E-D-3-C
	Without N1 solenoid coil ¹⁾ , normally exhausted, external pilot air supply	1	159682	MN1H-5/3E-D-1-S-C
		2	159694	MN1H-5/3E-D-2-S-C
		3	159706	MN1H-5/3E-D-3-S-C
	Without N1 solenoid coil ¹⁾ , normally pressurised, internal pilot air supply	1	159685	MN1H-5/3B-D-1-C
		2	159697	MN1H-5/3B-D-2-C
		3	159709	MN1H-5/3B-D-3-C
	Without N1 solenoid coil ¹⁾ , normally pressurised, external pilot air supply	1	159684	MN1H-5/3B-D-1-S-C
		2	159696	MN1H-5/3B-D-2-S-C
		3	159708	MN1H-5/3B-D-3-S-C

1) N1 solenoid coils → 102

Solenoid valves MFH, ISO 5599-1

FESTO

Technical data – 5/2-way valves

Flow rate

1200 ... 4500 l/min

Voltage

12, 24, 42, 48 V DC
24, 42, 48, 110, 230,
240 V AC



General technical data			
ISO size	1	2	3
Valve function	5/2-way, single solenoid		
Constructional design	Piston spool		
Sealing principle	Soft		
Actuation type	Electrical		
Type of reset	Mechanical or pneumatic spring		
Type of pilot control	Piloted		
Pilot air supply	Internal		
Direction of flow	Non-reversible		
Exhaust function	With flow control		
Manual override	Via accessory, detenting		
Type of mounting	Via through-holes		
Mounting position	Any		
Nominal size [mm]	8	11	14.5
Standard nominal flow rate [l/min]	1200	2300	4500
Grid dimension [mm]	43	56	71
Pneumatic connection on sub-base	G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$
Product weight [g]	390	650	960
Noise level [dB (A)]	85		
Certification	Germanischer Lloyd		

Operating and environmental conditions			
Type of reset		Pneumatic	Mechanical
Operating medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]	
Pilot medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]	
Note on operating/pilot medium		Operation with lubricated medium possible (in which case lubricated operation will always be required)	
Operating pressure	Internal pilot air supply [bar]	2 ... 10	3 ... 10
	External pilot air supply [bar]	-0.9 ... +16	-0.9 ... +16
Pilot pressure [bar]		2 ... 10	3 ... 10
Ambient temperature [°C]		-5 ... +40	
Temperature of medium [°C]		-10 ... +60	

Valve response times [ms]						
ISO size	1		2		3	
	Pneumatic	Mechanical	Pneumatic	Mechanical	Pneumatic	Mechanical
With F solenoid coil						
On	23	16	48	27	60	30
Off	35	45	71	73	66	82

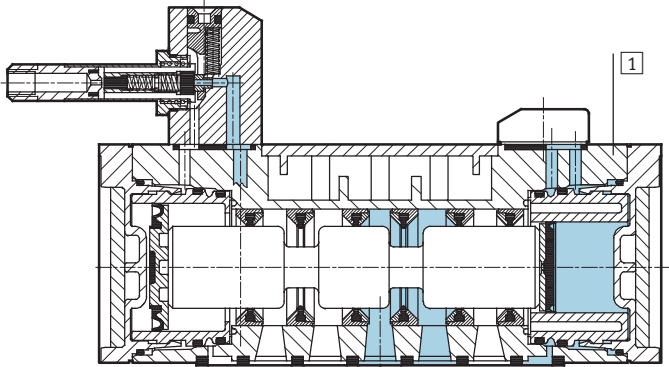
Solenoid valves MFH, ISO 5599-1

Technical data – 5/2-way valves

Electrical data			
F solenoid coil			
Electrical connection	Design		Plug vanes for plug sockets MSSD-F, KMF
Operating voltage	D.C. voltage	[V DC]	12, 24, 42, 48
	A.C. voltage	[V AC]	24, 42, 48, 110, 230, 240 (50 ... 60 Hz)
Coil characteristics	D.C. voltage	[W]	4.5
	A.C. voltage	[VA]	Pull: 7.5 Hold: 6
Protection class to EN 60 529			IP65

Materials

Sectional view



1	Housing	Die-cast aluminium, polyacetate
-	Seals	Nitrile rubber

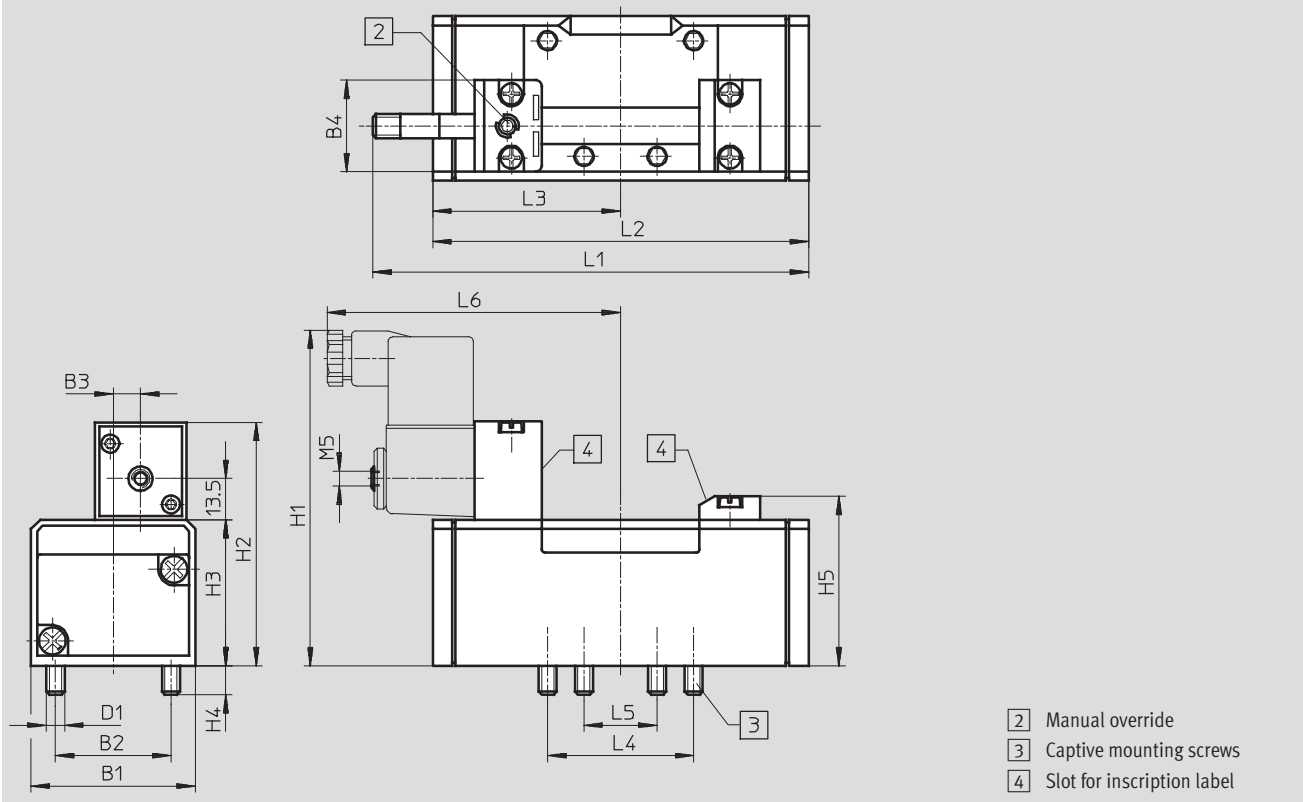
Solenoid valves MFH, ISO 5599-1

Technical data – 5/2-way valves



Dimensions

Download CAD Data → www.festo.com/us/cad



Type	B1	B2	B3	B4	D1	H1	H2	H3	H4	H5	L1	L2	L3	L4	L5	L6
ISO size 1																
MFH-5/2-...	42	28	6	30	M5	100	70.3	38	9	46.5	115	87.6	43.8	36	18	89
MFH-5/2-...-FR											125.6	98				
ISO size 2																
MFH-5/2-...	54	38	9	30	M6	110	80.3	48	9.5	56.5	142	123.4	61.7	48	24	98
MFH-5/2-...-FR											159.4	140.7				
ISO size 3																
MFH-5/2-...	65	48	12	30	M8	117	87.3	55	12	63.5	163	145.4	72.7	64	32	109
MFH-5/2-...-FR											182	164.7				

Solenoid valves MFH, ISO 5599-1

Technical data – 5/2-way valves

Ordering data				
Circuit symbol	Description	ISO size	Part No.	Type
	Without F solenoid coil ¹⁾ , pneumatic reset, internal pilot air supply	1	150981	MFH-5/2-D-1-C
		2	151851	MFH-5/2-D-2-C
		3	151870	MFH-5/2-D-3-C
	Without F solenoid coil ¹⁾ , pneumatic reset, external pilot air supply	1	152562	MFH-5/2-D-1-S-C
		2	151022	MFH-5/2-D-2-S-C
		3	151032	MFH-5/2-D-3-S-C
	Without F solenoid coil ¹⁾ , mechanical reset, internal pilot air supply	1	151016	MFH-5/2-D-1-FR-C
		2	151709	MFH-5/2-D-2-FR-C
		3	151711	MFH-5/2-D-3-FR-C

1) F solenoid coils → 101

Solenoid valves JMFH, ISO 5599-1

FESTO

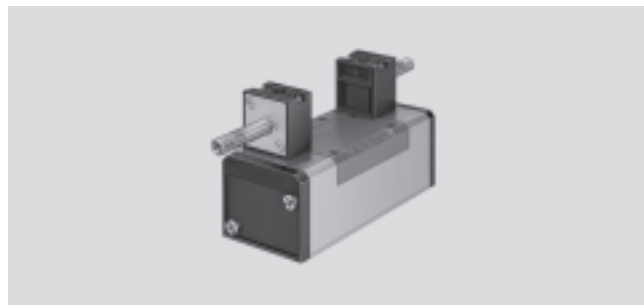
Technical data – 5/2-way valves, double solenoid

Flow rate

1200 ... 4500 l/min

Voltage

12, 24, 42, 48 V DC
24, 42, 48, 110, 230,
240 V AC



General technical data				
ISO size	1	2	3	
Valve function	5/2-way, double solenoid			
Constructional design	Piston spool			
Sealing principle	Soft			
Actuation type	Electrical			
Type of pilot control	Piloted			
Pilot air supply	Internal or external			
Direction of flow	Non-reversible			
Exhaust function	With flow control			
Manual override	Via accessory, detenting			
Type of mounting	Via through-holes			
Mounting position	Any			
Nominal size	[mm]	8	11	14.5
Standard nominal flow rate	[l/min]	1200	2300	4500
Grid dimension	[mm]	43	56	71
Pneumatic connection on sub-base		G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$
Product weight	[g]	490	750	1060
Noise level	[dB (A)]	85		
Certification	Germanischer Lloyd			

Operating and environmental conditions			
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Pilot medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)		
Operating pressure	Internal pilot air supply	[bar]	2 ... 10
	External pilot air supply	[bar]	-0.9 ... +16
Pilot pressure		[bar]	2 ... 10
Ambient temperature		[°C]	-5 ... +40
Temperature of medium		[°C]	-10 ... +60

Valve response times [ms]						
ISO size	1		2		3	
		Dominant signal at 14		Dominant signal at 14		Dominant signal at 14
With F solenoid coil						
	16	16	18	18	18	18

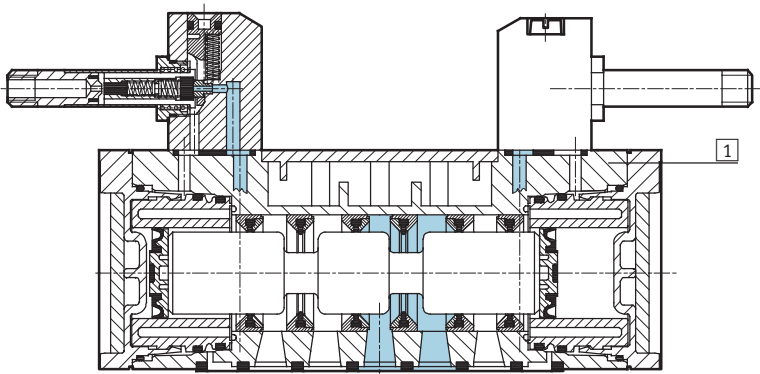
Solenoid valves JMFH, ISO 5599-1

Technical data – 5/2-way valves, double solenoid

Electrical data			
ISO size		1, 2, 3	
F solenoid coil			
Electrical connection	Design	Plug vanes for plug sockets MSSD-F, KMF	
Operating voltage	D.C. voltage	[V DC]	12, 24, 42, 48
	A.C. voltage	[V AC]	24, 42, 48, 110, 230, 240 (50 ... 60 Hz)
Coil characteristics	D.C. voltage	[W]	4.5
	A.C. voltage	[VA]	Pull: 7.5 Hold: 6
Protection class to EN 60 529		IP65	

Materials

Sectional view



1	Housing	Die-cast aluminium, polyacetate
-	Seals	Nitrile rubber

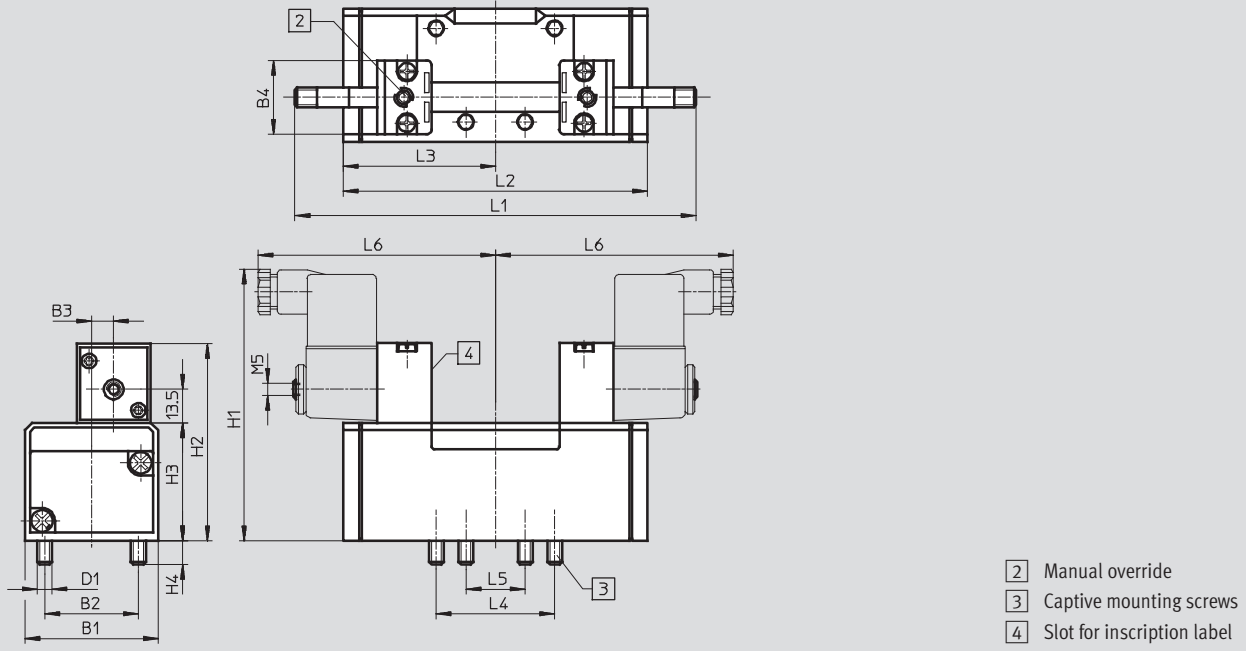
Solenoid valves JMFH, ISO 5599-1

Technical data – 5/2-way valves, double solenoid



Dimensions

Download CAD Data → www.festo.com/us/cad



ISO size	B1	B2	B3	B4	D1	H1	H2	H3	H4	L1	L2	L3	L4	L5	L6
1	42	28	6	30	M5	100	70.3	38	9	142.6	87.6	43.8	36	18	88
2	54	38	9	30	M6	110	80.3	48	9.5	160.4	123.4	61.7	48	24	97
3	65	48	12	30	M8	117	87.3	55	12	181	145.4	72.7	64	32	109

Ordering data

Circuit symbol	Description	ISO size	Part No.	Type
	Without F solenoid coil ¹⁾ , internal pilot air supply	1	150980	JMFH-5/2-D-1-C
		2	151852	JMFH-5/2-D-2-C
		3	151871	JMFH-5/2-D-3-C
	Without F solenoid coil ¹⁾ , external pilot air supply	1	152563	JMFH-5/2-D-1-S-C
		2	151023	JMFH-5/2-D-2-S-C
		3	151033	JMFH-5/2-D-3-S-C
	Without F solenoid coil ¹⁾ , internal pilot air supply, with dominant signal at 14	1	151019	JMFDH-5/2-D-1-C
		2	151853	JMFDH-5/2-D-2-C
		3	151872	JMFDH-5/2-D-3-C

1) F solenoid coils → 101

Solenoid valves MFH, ISO 5599-1

FESTO

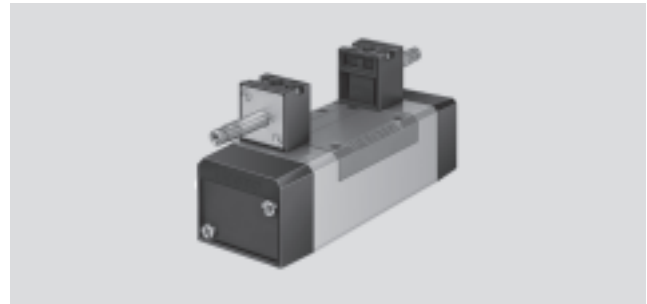
Technical data – 5/3-way valves

Flow rate

1200 ... 4600 l/min

Voltage

12, 24, 42, 48 V DC
24, 42, 48, 110, 230,
240 V AC



General technical data					
ISO size		1	2	3	
Valve function		5/3-way, double solenoid			
Constructional design		Piston spool			
Sealing principle		Soft			
Actuation type		Electrical			
Type of reset		Mechanical spring			
Type of pilot control		Piloted			
Pilot air supply		Internal or external			
Direction of flow		Non-reversible			
Exhaust function		With flow control			
Manual override		Via accessory, detenting			
Type of mounting		Via through-holes			
Mounting position		Any			
Nominal size	[mm]	8	11	14.5	
Standard nominal flow rate	Closed	[l/min]	1200	2300	4100
	Exhausted	[l/min]			4600
	Pressurised	[l/min]			4000
Grid dimension	[mm]	43	56	71	
Pneumatic connection on sub-base		G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$	
Product weight	[g]	520	820	1040	
Noise level	[dB (A)]	85			
Certification		Germanischer Lloyd			

Operating and environmental conditions			
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Pilot medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)		
Operating pressure	Internal pilot air supply	[bar]	3 ... 10
	External pilot air supply	[bar]	-0.9 ... +16
Pilot pressure	[bar]	3 ... 10	
Ambient temperature	[°C]	-5 ... +40	
Temperature of medium	[°C]	-10 ... +60	

Valve response times [ms]						
ISO size	1		2		3	
	On	Off	On	Off	On	Off
With F solenoid coil						
Closed	18	36	33	63	36	77
Exhausted	18	36	35	67	37	78
Pressurised	18	36	35	69	36	75

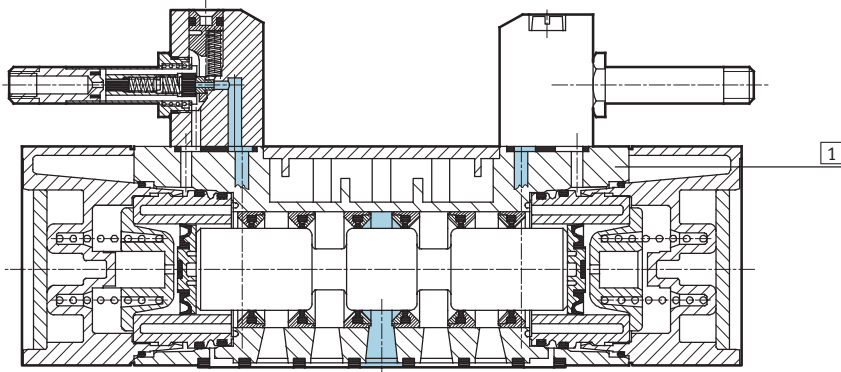
Solenoid valves MFH, ISO 5599-1

Technical data – 5/3-way valves

Electrical data			
F solenoid coil			
Electrical connection	Design		Plug vanes for plug sockets MSSD-F, KMF
Operating voltage	D.C. voltage	[V DC]	12, 24, 42, 48
	A.C. voltage	[V AC]	24, 42, 48, 110, 230, 240 (50 ... 60 Hz)
Coil characteristics	D.C. voltage	[W]	4.5
	A.C. voltage	[VA]	Pull: 7.5 Hold: 6
Protection class to EN 60 529			IP65

Materials

Sectional view



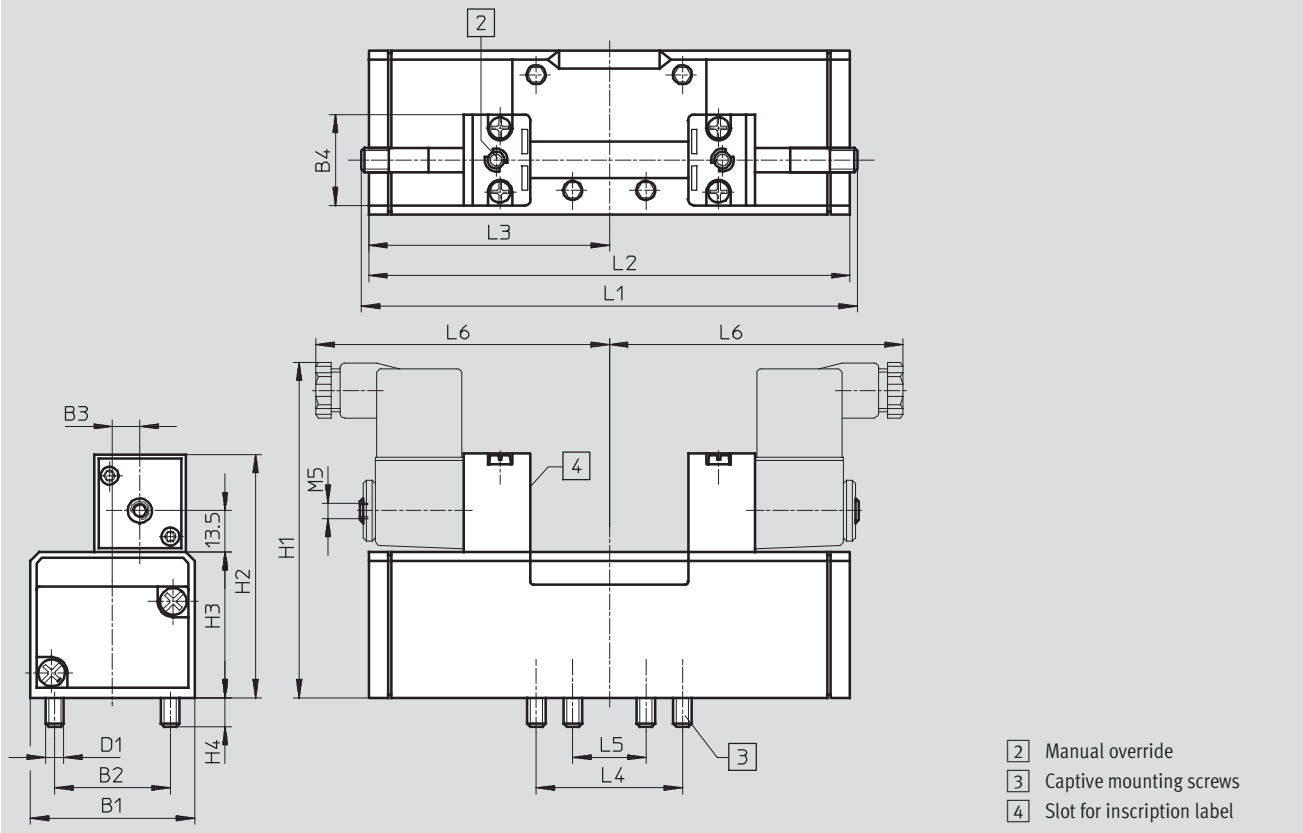
1	Housing	Die-cast aluminium, polyacetate
-	Seals	Nitrile rubber

Solenoid valves MFH, ISO 5599-1

Technical data – 5/3-way valves

Dimensions

Download CAD Data → www.festo.com/us/cad



ISO size	B1	B2	B3	B4	D1	H1	H2	H3	H4	L1	L2	L3	L4	L5	L6
1	42	28	6	30	M5	100	70.3	38	9	142.6	108.4	54.2	36	18	89
2	54	38	9	30	M6	110	80.3	48	9.5	160	158	79	48	24	98
3	65	48	12	30	M8	117	87.3	55	12	181	184	92	64	32	109

Solenoid valves MFH, ISO 5599-1

Technical data – 5/3-way valves

Ordering data				
Circuit symbol	Description	ISO size	Part No.	Type
	Without F solenoid coil ¹⁾ , normally closed, internal pilot air supply	1	150982	MFH-5/3G-D-1-C
		2	151854	MFH-5/3G-D-2-C
		3	151873	MFH-5/3G-D-3-C
	Without F solenoid coil ¹⁾ , normally closed, external pilot air supply	1	152564	MFH-5/3G-D-1-S-C
		2	151024	MFH-5/3G-D-2-S-C
		3	151034	MFH-5/3G-D-3-S-C
	Without F solenoid coil ¹⁾ , normally exhausted, internal pilot air supply	1	150983	MFH-5/3E-D-1-C
		2	151855	MFH-5/3E-D-2-C
		3	151874	MFH-5/3E-D-3-C
	Without F solenoid coil ¹⁾ , normally exhausted, external pilot air supply	1	152565	MFH-5/3E-D-1-S-C
		2	151025	MFH-5/3E-D-2-S-C
		3	151035	MFH-5/3E-D-3-S-C
	Without F solenoid coil ¹⁾ , normally pressurised, internal pilot air supply	1	150984	MFH-5/3B-D-1-C
		2	151856	MFH-5/3B-D-2-C
		3	151875	MFH-5/3B-D-3-C
	Without F solenoid coil ¹⁾ , normally pressurised, external pilot air supply	1	152566	MFH-5/3B-D-1-S-C
		2	151026	MFH-5/3B-D-2-S-C
		3	151036	MFH-5/3B-D-3-S-C

1) F solenoid coils → 101

Solenoid valves MEBH, ISO 5599-1

FESTO

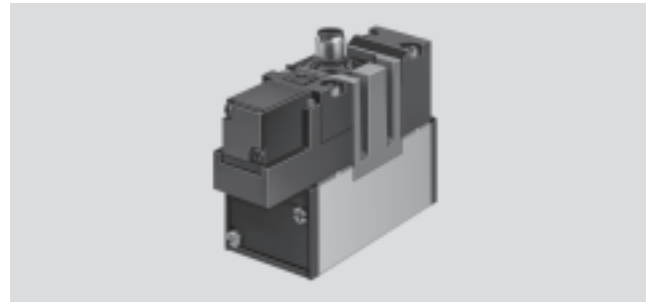
Technical data – 5/2-way valves

Flow rate

1200 ... 4500 l/min

Voltage

24 V DC



General technical data			
ISO size	1	2	3
Valve function	5/2-way, single solenoid		
Constructional design	Piston spool		
Sealing principle	Soft		
Actuation type	Electrical		
Type of reset	Mechanical or pneumatic spring		
Type of pilot control	Piloted		
Pilot air supply	Internal		
Direction of flow	Non-reversible		
Exhaust function	With flow control		
Manual override	Via accessory, detenting		
Type of mounting	Via through-holes		
Mounting position	Any		
Nominal size	[mm] 8	11	14.5
Standard nominal flow rate	[l/min] 1200	2300	4500
Grid dimension	[mm] 43	56	71
Pneumatic connection on sub-base	G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$
Product weight	[g] 550	700	1000
Noise level	[dB (A)] 85		

Operating and environmental conditions			Pneumatic	Mechanical
Type of reset				
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]			
Pilot medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]			
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)			
Operating pressure	Internal pilot air supply	[bar] 2 ... 10	3 ... 10	
	External pilot air supply	[bar] -0.9 ... +16	-0.9 ... +16	
Pilot pressure	[bar] 2 ... 10	3 ... 10		
Ambient temperature	[°C] -5 ... +50			
Temperature of medium	[°C] -5 ... +50			

Valve response times [ms]						
ISO size	1		2		3	
	Pneumatic	Mechanical	Pneumatic	Mechanical	Pneumatic	Mechanical
With EB solenoid coil						
On	20	15	50	33	59	28
Off	33	50	85	103	87	109

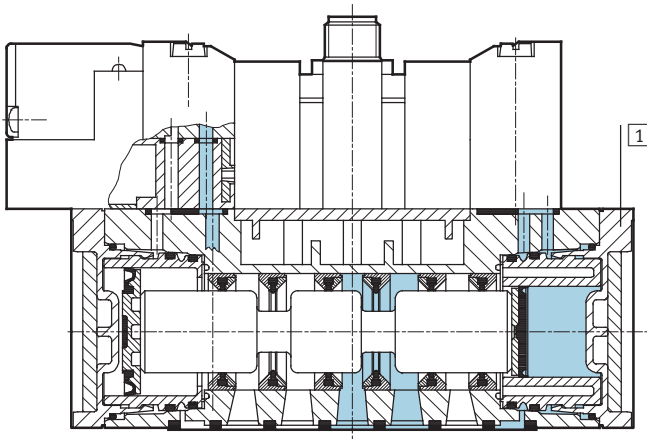
Solenoid valves MEBH, ISO 5599-1

Technical data – 5/2-way valves

Electrical data			
EB solenoid coil			
Electrical connection			Central plug, round design, M1 2x1
Operating voltage	D.C. voltage	[V DC]	24
Coil characteristics	D.C. voltage	[W]	2.5
Protection class to EN 60 529			IP65

Materials

Sectional view



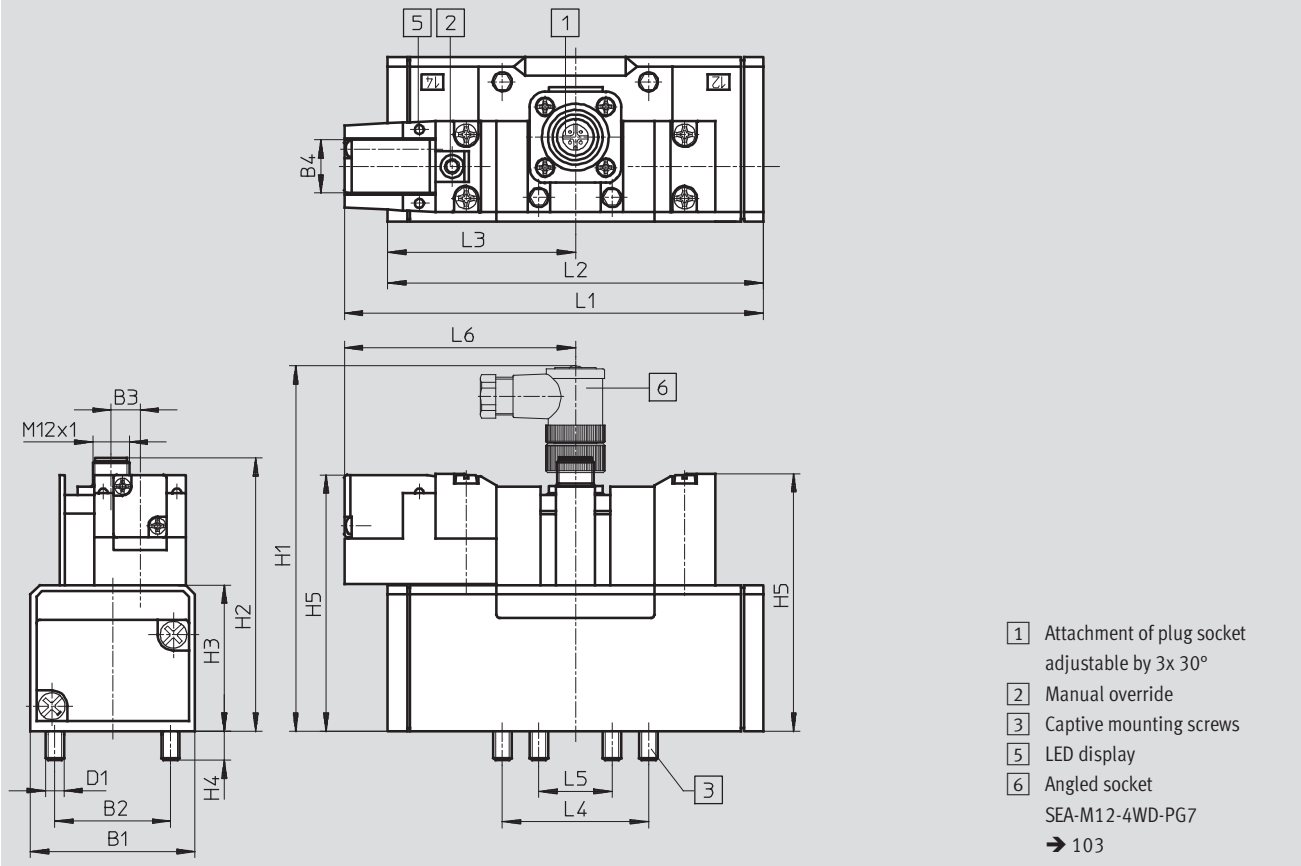
1	Housing	Die-cast aluminium, polyacetate
-	Seals	Nitrile rubber

Solenoid valves MEBH, ISO 5599-1

Technical data – 5/2-way valves

Dimensions

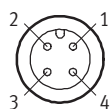
Download CAD Data → www.festo.com/us/cad



Type	B1	B2	B3	B4	D1	H1	H2	H3	H4	H5	L1	L2	L3	L4	L5	L6
ISO size 1																
MEBH-5/2-...	42	28	6	17.5	M5	110	80.3	38	9	74.7	110.8	87.6	43.8	36	18	67
MEBH-5/2-...-FR											121.3	98				
ISO size 2																
MEBH-5/2-...	54	38	9	17.5	M6	120	90.1	48	9.5	84.2	137.6	123.4	61.7	48	24	75.9
MEBH-5/2-...-FR											154.9	140.7				
ISO size 3																
MEBH-5/2-...	65	48	12	17.5	M8	130	97.8	55	12	93.1	158.7	145.4	72.7	64	32	86
MEBH-5/2-...-FR											178	164.7				

M12 central plug – Terminal allocation

Mono connection



- 1 Unused
- 2 Unused
- 3 com (-)
- 4 Signal (+) Solenoid 14

Solenoid valves MEBH, ISO 5599-1

Technical data – 5/2-way valves

Ordering data					
Circuit symbol	Description	Voltage	ISO size	Part No.	Type
	With EB solenoid coil, with central plug, pneumatic reset, internal pilot air supply	24 V DC	1	184493	MEBH-5/2-D-1-ZSR-C
			2	184500	MEBH-5/2-D-2-ZSR-C
			3	184507	MEBH-5/2-D-3-ZSR-C
	With EB solenoid coil, with central plug, mechanical reset, internal pilot air supply	24 V DC	1	184494	MEBH-5/2-D-1-ZSR-FR-C
			2	184501	MEBH-5/2-D-2-ZSR-FR-C
			3	184508	MEBH-5/2-D-3-ZSR-FR-C

Solenoid valves JMEBH, ISO 5599-1

FESTO

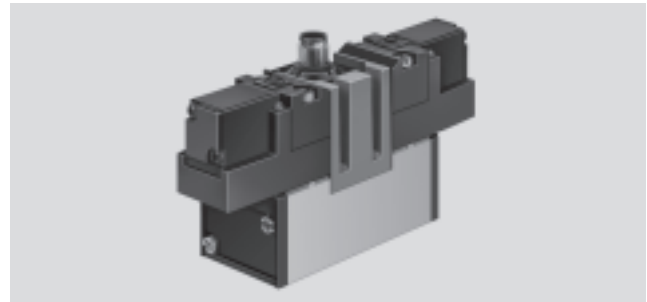
Technical data – 5/2-way valves, double solenoid

Flow rate

1200 ... 4500 l/min

Voltage

24 V DC



General technical data				
ISO size	1	2	3	
Valve function	5/2-way, double solenoid			
Constructional design	Piston spool			
Sealing principle	Soft			
Actuation type	Electrical			
Type of pilot control	Piloted			
Pilot air supply	Internal or external			
Direction of flow	Non-reversible			
Exhaust function	With flow control			
Manual override	Via accessory, detenting			
Type of mounting	Via through-holes			
Mounting position	Any			
Nominal size	[mm]	8	11	14.5
Standard nominal flow rate	[l/min]	1200	2300	4500
Grid dimension	[mm]	43	56	71
Pneumatic connection on sub-base		G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$
Product weight	[g]	600	770	1080
Noise level	[dB (A)]	85		

Operating and environmental conditions			
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Pilot medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)		
Operating pressure	Internal pilot air supply	[bar]	2 ... 10
	External pilot air supply	[bar]	-0.9 ... +16
Pilot pressure		[bar]	2 ... 10
Ambient temperature		[°C]	-5 ... +50
Temperature of medium		[°C]	-5 ... +50

Valve response times [ms]						
ISO size	1		2		3	
		Dominant signal at 14		Dominant signal at 14		Dominant signal at 14
With EB solenoid coil						
Changeover	12	13	15	23	16	20

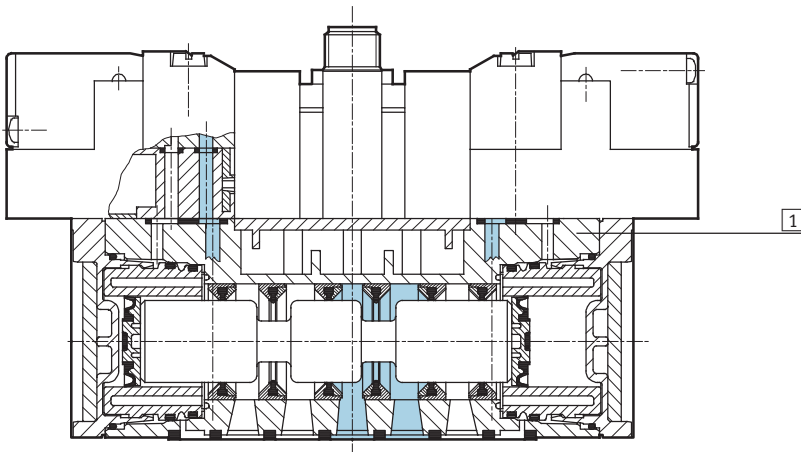
Solenoid valves JMEBH, ISO 5599-1

Technical data – 5/2-way valves, double solenoid

Electrical data			
EB solenoid coil			
Electrical connection	Design	Central plug, round design, M1 2x1	
Operating voltage	D.C. voltage	[V DC]	24
Coil characteristics	D.C. voltage	[W]	2.5
Protection class to EN 60 529			IP65

Materials

Sectional view



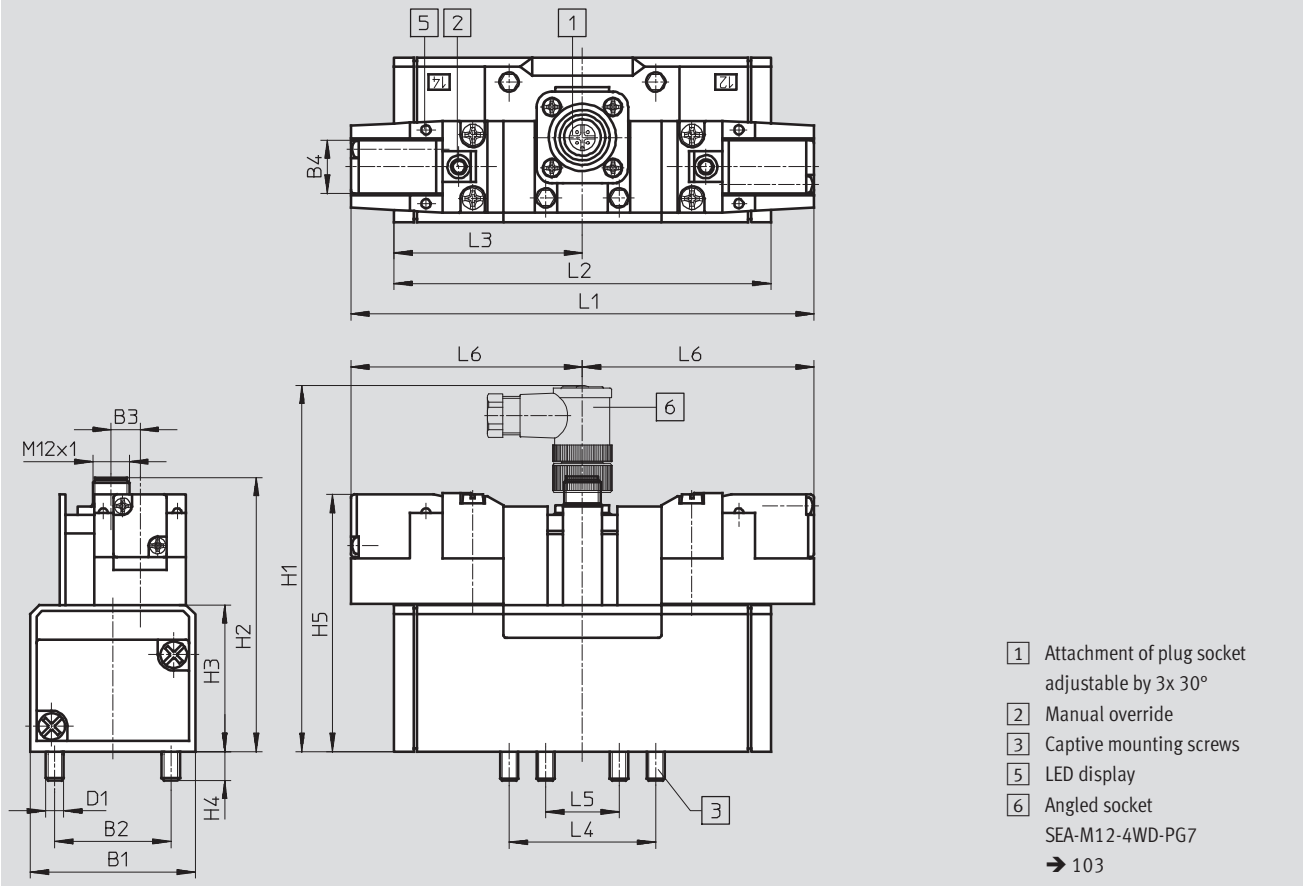
1	Housing	Die-cast aluminium, polyacetate
-	Seals	Nitrile rubber

Solenoid valves JMEBH, ISO 5599-1

Technical data – 5/2-way valves, double solenoid

Dimensions

Download CAD Data → www.festo.com/us/cad

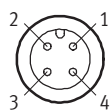


- 1 Attachment of plug socket adjustable by 3x 30°
- 2 Manual override
- 3 Captive mounting screws
- 5 LED display
- 6 Angled socket SEA-M12-4WD-PG7 → 103

ISO size	B1	B2	B3	B4	D1	H1	H2	H3	H4	H5	L1	L2	L3	L4	L5	L6
1	42	28	6	17.5	M5	110	80.3	38	9	74.7	134	87.6	43.8	36	18	67
2	54	38	9	17.5	M6	120	90.1	48	9.5	84.2	151.8	123.4	61.7	48	24	75.9
3	65	48	12	17.5	M8	130	97.8	55	12	93.1	171.9	145.4	72.7	64	32	86

M12 central plug – Terminal allocation

Duo connection



- 1 Unused
- 2 Signal (+) Solenoid 12
- 3 com (-)
- 4 Signal (+) Solenoid 14

Solenoid valves JMEBH, ISO 5599-1

Technical data – 5/2-way valves, double solenoid

Ordering data					
Circuit symbol	Solenoid coil	Voltage	ISO size	Part No.	Type
	With EB solenoid coil, with central plug, internal pilot air supply	24 V DC	1	184495	JMEBH-5/2-D-1-ZSR-C
			2	184502	JMEBH-5/2-D-2-ZSR-C
			3	184509	JMEBH-5/2-D-3-ZSR-C
	With EB solenoid coil, with central plug, internal pilot air supply, with dominant signal at 14	24 V DC	1	184496	JMEBDH-5/2-D-1-ZSR-C
			2	184503	JMEBDH-5/2-D-2-ZSR-C
			3	184510	JMEBDH-5/2-D-3-ZSR-C

Solenoid valves MEBH, ISO 5599-1

FESTO

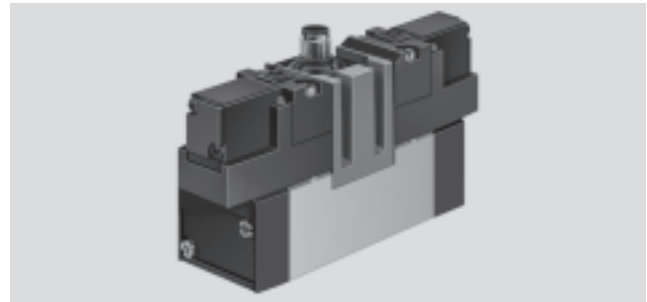
Technical data – 5/3-way valves

Flow rate

1200 ... 4600 l/min

Voltage

24 V DC



General technical data					
ISO size		1	2	3	
Valve function		5/3-way, double solenoid			
Constructional design		Piston spool			
Sealing principle		Soft			
Actuation type		Electrical			
Type of reset		Mechanical spring			
Type of pilot control		Piloted			
Pilot air supply		Internal			
Direction of flow		Non-reversible			
Exhaust function		With flow control			
Manual override		Via accessory, detenting			
Type of mounting		Via through-holes			
Mounting position		Any			
Nominal size	[mm]	8	11	14.5	
Standard nominal flow rate	Closed	[l/min]	1200	2300	4100
	Exhausted	[l/min]			4600
	Pressurised	[l/min]			4000
Grid dimension	[mm]	43	56	71	
Pneumatic connection on sub-base		G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$	
Product weight	[g]	630	800	1120	
Noise level	[dB (A)]	85			

Operating and environmental conditions				
Operating medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Pilot medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Note on operating/pilot medium		Operation with lubricated medium possible (in which case lubricated operation will always be required)		
Operating pressure	Internal pilot air supply	[bar]	3 ... 10	
	External pilot air supply	[bar]	-0.9 ... +16	
Pilot pressure		[bar]	3 ... 10	
Ambient temperature		[°C]	-5 ... +50	
Temperature of medium		[°C]	-5 ... +50	

Valve response times [ms]						
ISO size	1		2		3	
	On	Off	On	Off	On	Off
With EB solenoid coil						
	19	68	30	106	38	130

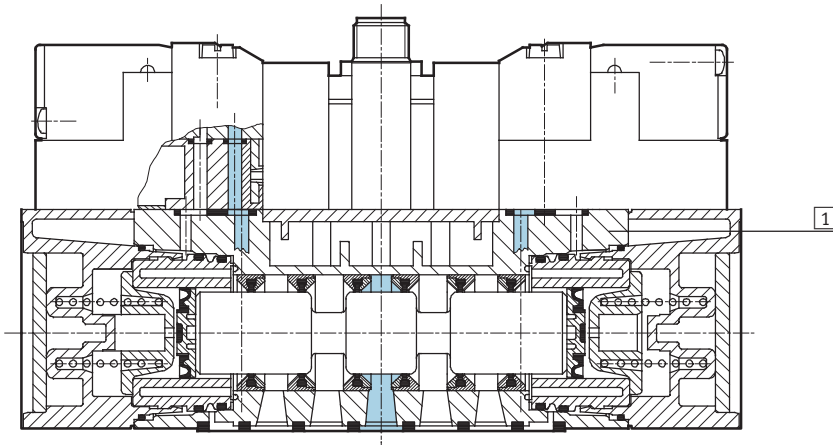
Solenoid valves MEBH, ISO 5599-1

Technical data – 5/3-way valves

Electrical data			
EB solenoid coil			
Electrical connection		Central plug, round design, M1 2x1	
Operating voltage	D.C. voltage	[V DC]	24
Coil characteristics	D.C. voltage	[W]	2.5
Protection class to EN 60 529		IP65	

Materials

Sectional view



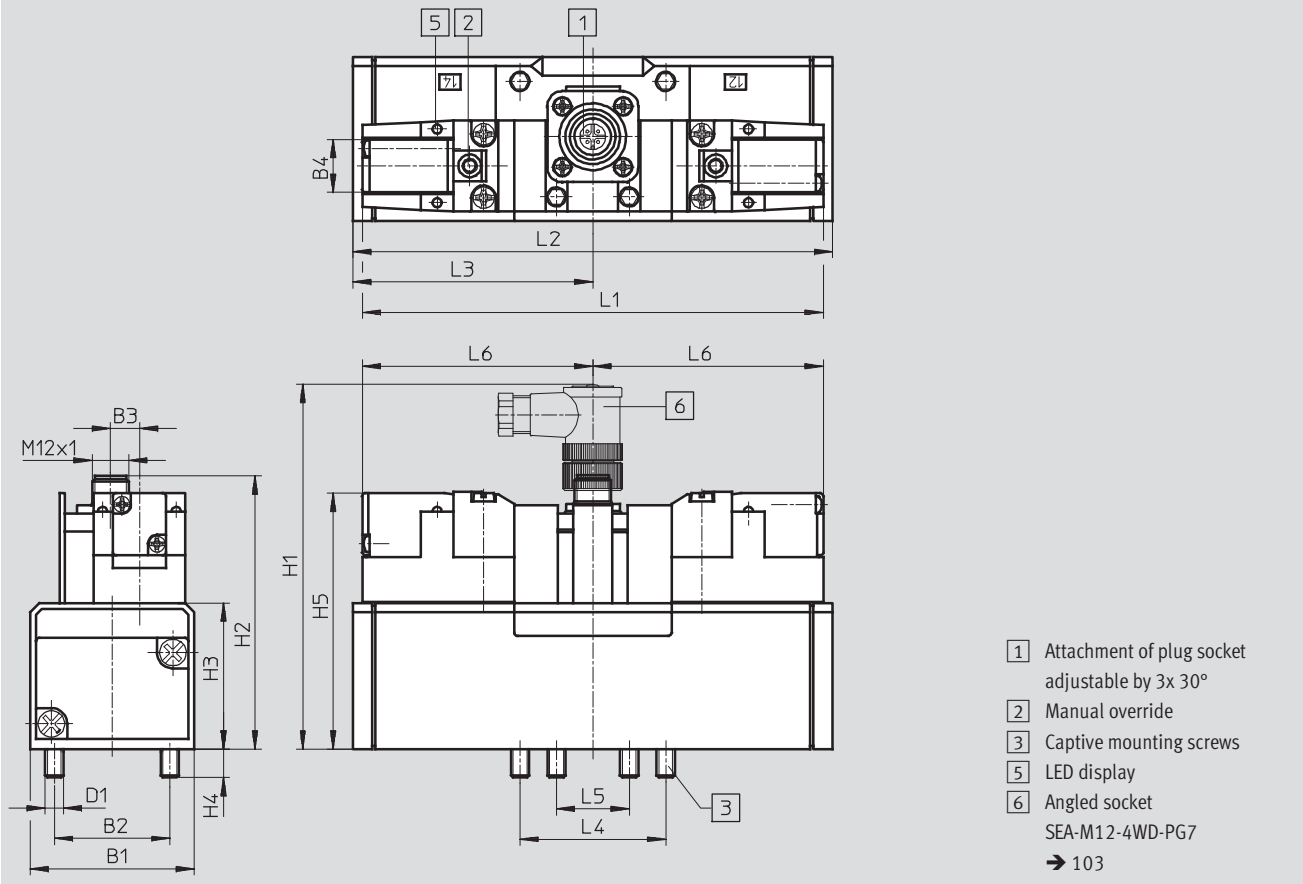
1	Housing	Die-cast aluminium, polyacetate
-	Seals	Nitrile rubber

Solenoid valves MEBH, ISO 5599-1

Technical data – 5/3-way valves

Dimensions

Download CAD Data → www.festo.com/us/cad

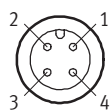


- 1 Attachment of plug socket adjustable by 3x 30°
- 2 Manual override
- 3 Captive mounting screws
- 5 LED display
- 6 Angled socket
SEA-M12-4WD-PG7
→ 103

ISO size	B1	B2	B3	B4	D1	H1	H2	H3	H4	H5	L1	L2	L3	L4	L5	L6
1	42	28	6	17.5	M5	110	80.3	38	9	74.7	134	108.4	54.2	36	18	67
2	54	38	9	17.5	M6	120	90.1	48	9.5	84.2	151.8	158	79	48	24	75.9
3	65	48	12	17.5	M8	130	97.8	55	12	93.1	171.9	184	92	64	32	86

M12 central plug – Terminal allocation

Duo connection



- 1 Unused
- 2 Signal (+) Solenoid 12
- 3 com (-)
- 4 Signal (+) Solenoid 14

Solenoid valves MEBH, ISO 5599-1

Technical data – 5/3-way valves

Ordering data					
Circuit symbol	Description	Voltage	ISO size	Part No.	Type
	With EB solenoid coil, with central plug, normally closed, internal pilot air supply	24 V DC	1	184498	MEBH-5/3G-D-1-ZSR-C
			2	184505	MEBH-5/3G-D-2-ZSR-C
			3	184512	MEBH-5/3G-D-3-ZSR-C
	With EB solenoid coil, with central plug, normally exhausted, internal pilot air supply	24 V DC	1	184497	MEBH-5/3E-D-1-ZSR-C
			2	184504	MEBH-5/3E-D-2-ZSR-C
			3	184511	MEBH-5/3E-D-3-ZSR-C
	With EB solenoid coil, with central plug, normally pressurised, internal pilot air supply	24 V DC	1	184499	MEBH-5/3B-D-1-ZSR-C
			2	184506	MEBH-5/3B-D-2-ZSR-C
			3	184513	MEBH-5/3B-D-3-ZSR-C

Solenoid valves MDH-M12, ISO 5599-1

FESTO

Technical data – 5/2-way valves

Flow rate
1,200 ... 4,500 l/min

Voltage
24 V DC



General technical data			
ISO size	1	2	3
Valve function	5/2-way, monostable		
Design	Piston slide		
Sealing principle	Soft		
Actuation type	Electrical		
Type of reset	Mechanical or pneumatic spring		
Type of actuation	Piloted		
Pilot air supply	Internal or external		
Direction of flow	Reversible for external pilot air supply		
Exhaust function	Restrictable		
Manual override	Via tool accessory, detenting		
Type of mounting	Via through-holes		
Mounting position	Any		
Nominal size	[mm] 8	11	14.5
Standard nominal flow rate	[l/min] 1,200	2,300	4,500
Grid dimension	[mm] 43	56	71
Pneumatic connection on sub-base	G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$
Product weight	[g] 420	810	1,000

Operating and environmental conditions			pneumatic spring	mechanical spring
Type of reset			pneumatic spring	mechanical spring
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]			
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)			
Operating pressure	internal pilot air supply	[bar] 2 ... 10	3 ... 10	
	external pilot air supply	[bar] -0.9 ... +16		
Pilot pressure	[bar] 2 ... 10	3 ... 10		
Ambient temperature	[°C] -10 ... +50			
Temperature of medium	[°C] -10 ... +50			

Valve response times							
ISO size	Type of reset	1		2		3	
		pneumatic	mechanical	pneumatic	mechanical	pneumatic	mechanical
D solenoid coil with M12x1 plug							
On	[ms]	25	20	45	25	55	30
Off	[ms]	36	42	60	60	60	70

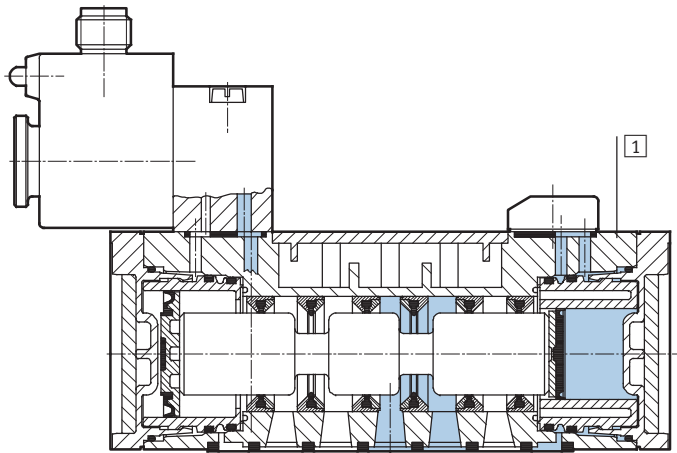
Solenoid valves MDH-M12, ISO 5599-1

Technical data – 5/2-way valves

Electrical data			
D solenoid coil with round plug M12x1			
Electrical connection	Type	M12X1	
Coil characteristics	D.C. voltage	[V DC]	21.6...26.4
	Power	[Watt]	2.7
Duty cycle		%	100
Protection class to EN 60 529			IP65

Materials

Sectional view



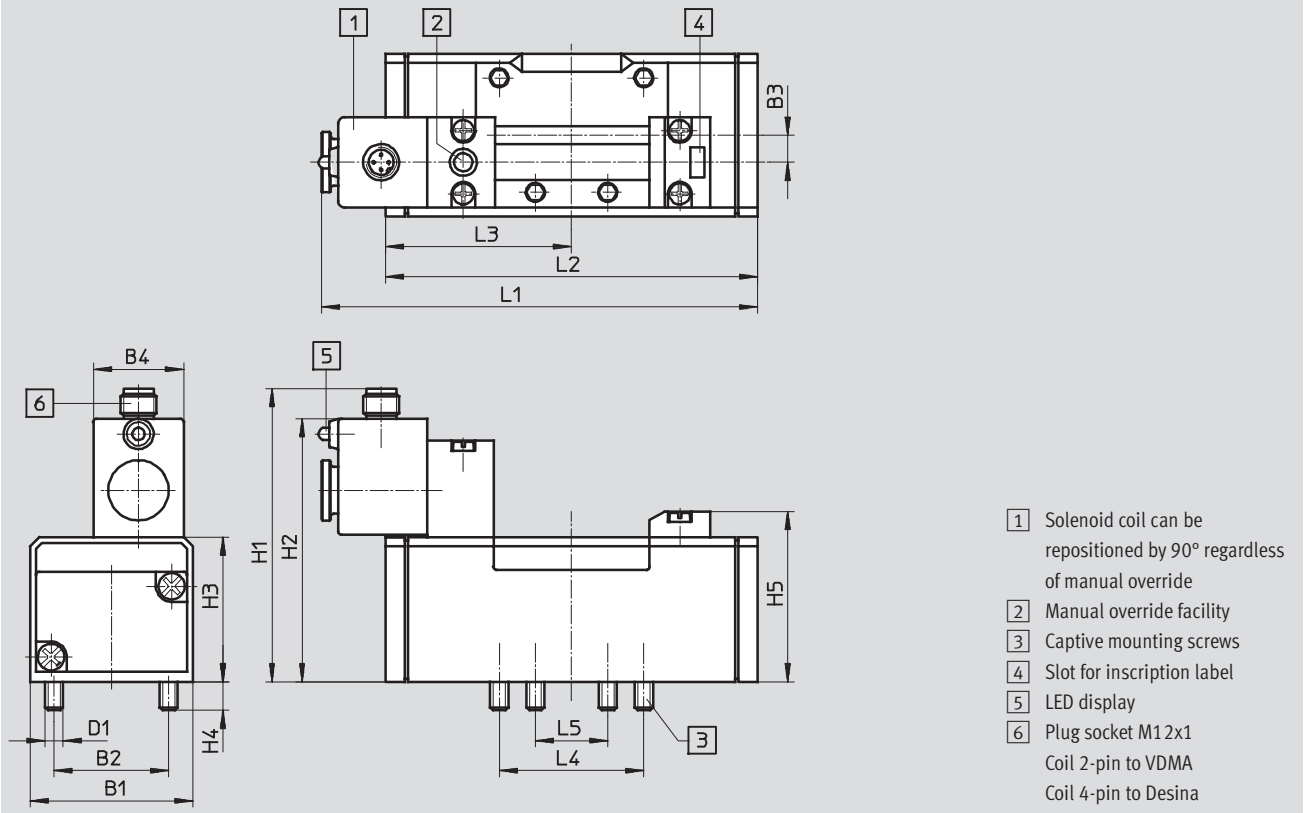
1	Body	Die-cast aluminium, polyacetate
-	Seals	Nitrile rubber

Solenoid valves MDH-M12, ISO 5599-1

Technical data – 5/2-way valves

Dimensions

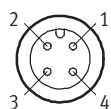
Download CAD Data → www.festo.com/us/cad



- 1 Solenoid coil can be repositioned by 90° regardless of manual override
- 2 Manual override facility
- 3 Captive mounting screws
- 4 Slot for inscription label
- 5 LED display
- 6 Plug socket M12x1
Coil 2-pin to VDMA
Coil 4-pin to Desina

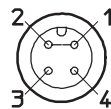
Type	B1	B2	B3	B4	D1	H1	H2	H3	H4	H5	L1	L2	L3	L4	L5
ISO size 1															
MDH-5/2-...	42	28	6	30	M5	87.2	77.3	38	9	46.5	121.8	87.6	43.8	36	18
MDH-5/2-...-FR											132.2	98			
ISO size 2															
MDH-5/2-...	54	38	9	30	M6	97.2	87.2	48	9.5	56.5	144.6	123.4	61.7	48	24
MDH-5/2-...-FR											161.9	140.6			
ISO size 3															
MDH-5/2-...	65	48	12	30	M8	104.2	94.2	55	12	62.7	165.9	145.4	72.7	64	32
MDH-5/2-...-FR											185.2	164.7			

M12 plug – Pin allocation 2-pin to VDMA



- 1 Unused
- 2 Unused
- 3 com (-)
- 4 Signal (+)

M12 plug – Pin allocation 4-pin to Desina



- 1 connected with 2
- 2 connected with 1
- 3 com (-)
- 4 Signal (+)

Solenoid valves MDH-M12, ISO 5599-1

Technical data – 5/2-way valves

Ordering data					
Circuit symbol	Description	ISO size	Part No.	Type	
	Type of reset: – pneumatic Pilot air supply: – internal	Coil 2-pin to VDMA	1	197125	MDH-5/2-D-1-M12-C
			2	533008	MDH-5/2-D-2-M12-C
			3	533009	MDH-5/2-D-3-M12-C
		Coil 4-pin to Desina	1	540803	MDH-5/2-D-1-M12D-C
			2	540812	MDH-5/2-D-2-M12D-C
			3	540819	MDH-5/2-D-3-M12D-C
	Type of reset: – pneumatic Pilot air supply: – external	Coil 2-pin to VDMA	1	533332	MDH-5/2-D-1-S-M12-C
		Coil 4-pin to Desina	1	540810	MDH-5/2-D-1-S-M12D-C
	Type of reset: – mechanical Pilot air supply: – internal	Coil 2-pin to VDMA	1	533010	MDH-5/2-D-1-FR-M12-C
			2	533011	MDH-5/2-D-2-FR-M12-C
			3	533012	MDH-5/2-D-3-FR-M12-C
		Coil 4-pin to Desina	1	540804	MDH-5/2-D-1-FR-M12D-C
			2	540813	MDH-5/2-D-2-FR-M12D-C
			3	540820	MDH-5/2-D-3-FR-M12D-C
	Type of reset: – mechanical Pilot air supply: – external	Coil 2-pin to VDMA	1	533761	MDH-5/2-D-1S-FR-M12-C
		Coil 4-pin to Desina	1	540811	MDH-5/2-D-1S-FR-M12D-C

Solenoid valves JMDH-M12, ISO 5599-1

Technical data – 5/2-way valves, double solenoid

Flow rate
1,200 ... 4,500 l/min

Voltage
24 V DC



General technical data			
ISO size	1	2	3
Valve function	5/2-way, bistable		
Design	Piston spool		
Sealing principle	Soft		
Actuation type	Electrical		
Type of actuation	Piloted		
Pilot air supply	Internal		
Direction of flow	Non-reversible		
Exhaust function	Restrictable		
Manual override	Via tool accessory, detenting		
Type of mounting	Via through-holes		
Mounting position	Any		
Nominal size [mm]	8	11	14.5
Standard nominal flow rate [l/min]	1,200	2,300	4,000
Grid dimension [mm]	43	56	71
Pneumatic connection on sub-base	G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$
Product weight [g]	550	810	1,100

Operating and environmental conditions			
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)		
Operating pressure	internal pilot air supply	[bar]	2 ... 10
Ambient temperature		[°C]	-10 ... +50
Temperature of medium		[°C]	-10 ... +50

Valve response times				
ISO size	1	2	3	
D solenoid coil with round plug M12x1				
	[ms]	18	22	25

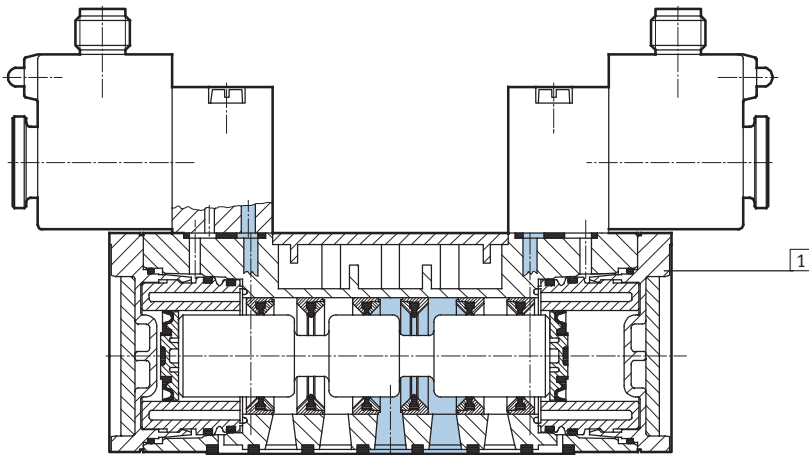
Solenoid valves JMDH-M12, ISO 5599-1

Technical data – 5/2-way valves, double solenoid

Electrical data			
D solenoid coil with round plug			
Electrical connection	Type	M12X1	
Coil characteristics	D.C. voltage	[V DC]	21.6...26.4
	Power	[Watt]	2.7
Duty cycle		%	100
Protection class to EN 60 529			IP65

Materials

Sectional view



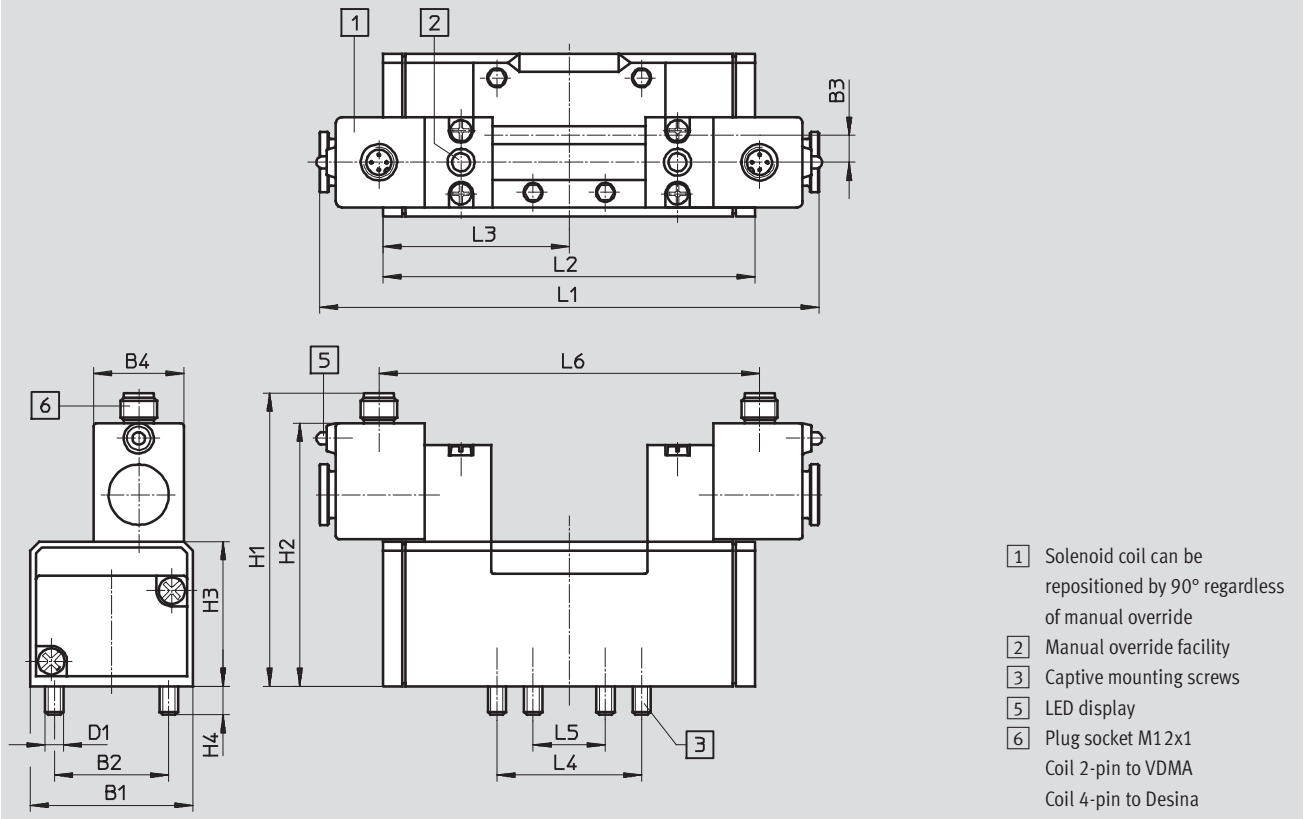
1	Body	Die-cast aluminium, polyacetate
-	Seals	Nitrile rubber

Solenoid valves JMDH-M12, ISO 5599-1

Technical data – 5/2-way valves, double solenoid

Dimensions

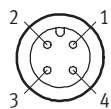
Download CAD Data → www.festo.com/us/cad



- 1 Solenoid coil can be repositioned by 90° regardless of manual override
- 2 Manual override facility
- 3 Captive mounting screws
- 5 LED display
- 6 Plug socket M12x1
Coil 2-pin to VDMA
Coil 4-pin to Desina

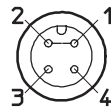
ISO size	B1	B2	B3	B4	D1	H1	H2	H3	H4	L1	L2	L3	L4	L5	L6
1	42	28	6	30	M5	87.2	77.2	38	9	148	87.6	43.8	36	18	108.5
2	54	38	9	30	M6	97.2	87.2	48	9.5	165.8	123.4	61.7	48	24	126.3
3	65	48	12	30	M8	104.2	94.2	55	12	186.4	145.4	72.7	64	32	146.9

M12 plug – Pin allocation 2-pin to VDMA



- 1 Unused
- 2 Unused
- 3 com (-)
- 4 Signal (+)

M12 plug – Pin allocation 4-pin to Desina



- 1 connected with 2
- 2 connected with 1
- 3 com (-)
- 4 Signal (+)

Solenoid valves JMDH-M12, ISO 5599-1

Technical data – 5/2-way valves, double solenoid

Ordering data				
Circuit symbol	Description	ISO size	Part No.	Type
	Pilot air supply: – internal	Coil 2-pin to VDMA	1	532687 JMDH-5/2-D-1-M12-C
			2	533013 JMDH-5/2-D-2-M12-C
			3	533015 JMDH-5/2-D-3-M12-C
		Coil 4-pin to Desina	1	540809 JMDH-5/2-D-1-M12D-C
			2	540818 JMDH-5/2-D-2-M12D-C
			3	540825 JMDH-5/2-D-3-M12D-C
	Pilot air supply: – internal Dominant: – signal at 14	Coil 2-pin to VDMA	1	539079 JMDDH-5/2-D-1-M12-C
			2	539077 JMDDH-5/2-D-2-M12-C
			3	539081 JMDDH-5/2-D-3-M12-C
		Coil 4-pin to Desina	1	540808 JMDDH-5/2-D-1-M12D-C
			2	540817 JMDDH-5/2-D-2-M12D-C
			3	540824 JMDDH-5/2-D-3-M12D-C

Solenoid valves MDH-M12, ISO 5599-1

FESTO

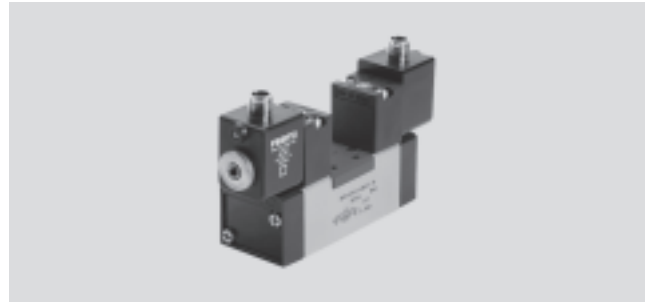
Technical data – 5/3-way valves

Flow rate

1,200 ... 4,600 l/min

Voltage

24 V DC



General technical data			
ISO size	1	2	3
Valve function	5/3-way, monostable		
Design	Piston spool		
Sealing principle	Soft		
Actuation type	Electrical		
Type of reset	Mechanical spring		
Type of actuation	Piloted		
Pilot air supply	Internal		
Direction of flow	Non-reversible		
Exhaust function	Restrictable		
Manual override	Via tool accessory, detenting		
Type of mounting	Via through-holes		
Mounting position	Any		
Nominal size [mm]	8	11	14.5
Standard nominal flow rate [l/min]	1,200	2,300	4,000 (B), 4,100 (G), 4,600 (E)
Grid dimension [mm]	43	56	71
Pneumatic connection on sub-base	G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$
Product weight [g]	580	880	1,120

Operating and environmental conditions	
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)
Operating pressure internal pilot air supply [bar]	3 ... 10
Ambient temperature [°C]	-10 ... +50
Temperature of medium [°C]	-10 ... +50

Valve response times							
ISO size	1		2		3		
	On	Off	On	Off	On	Off	
with D solenoid coil with round plug M12x1							
	[ms]	25	55	35	70	36	90

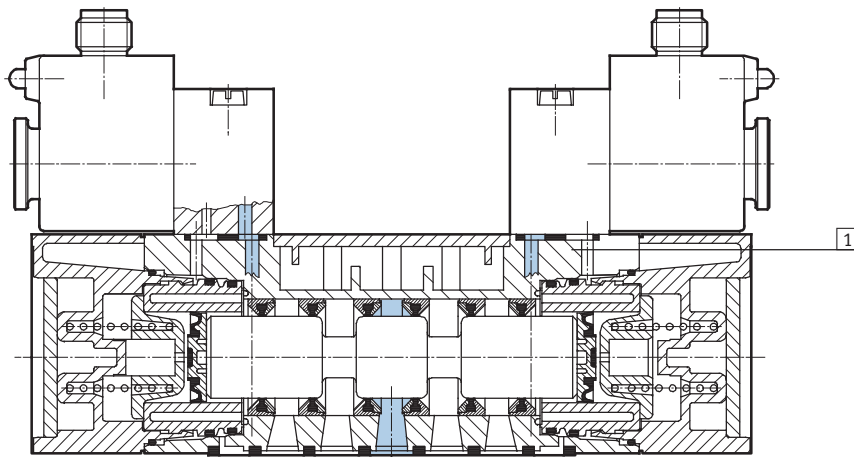
Solenoid valves MDH-M12, ISO 5599-1

Technical data – 5/3-way valves

Electrical data			
D solenoid coil with round plug			
Electrical connection	Type	M12X1	
Coil characteristics	D.C. voltage	[V DC]	21.6...26.4
	Power	[Watt]	2.7
Duty cycle		%	100
Protection class to EN 60 529			IP65

Materials

Sectional view



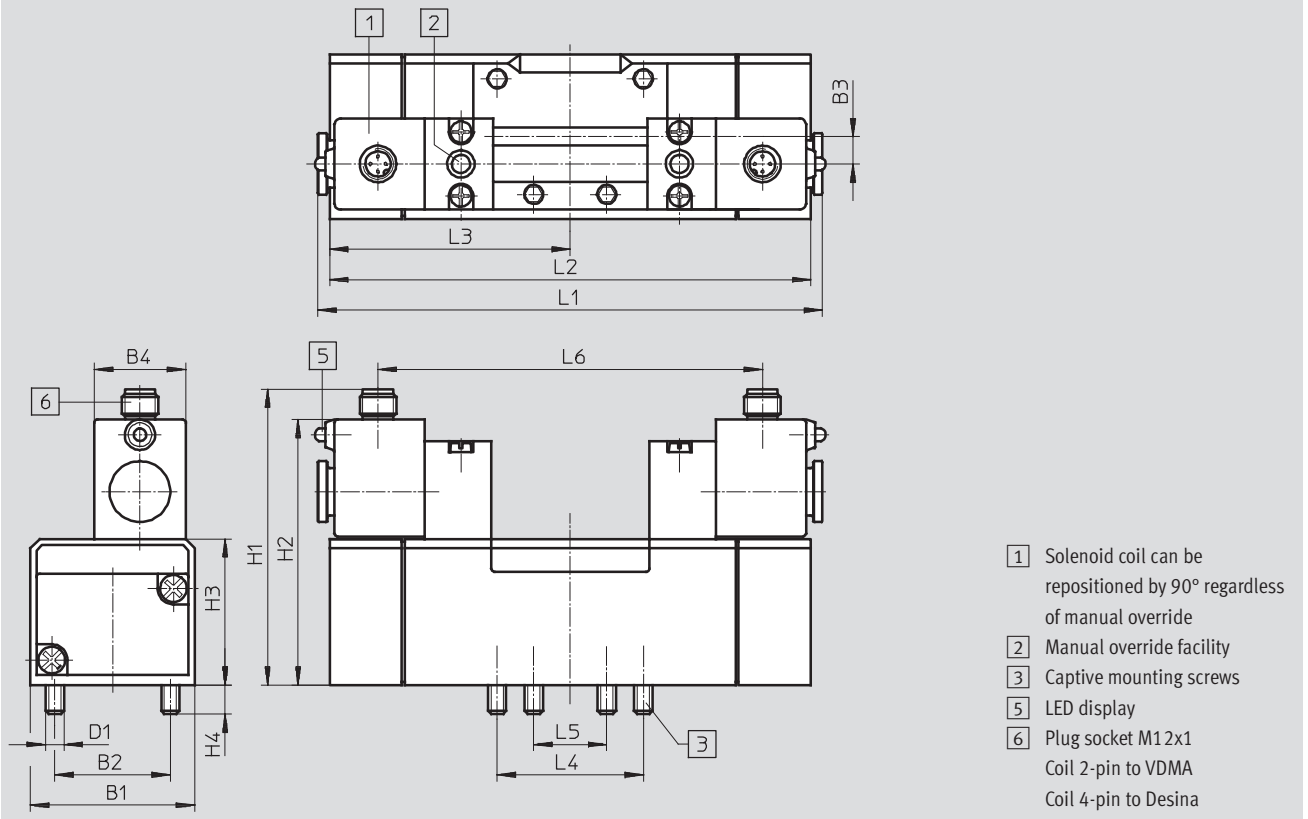
1	Body	Die-cast aluminium, polyacetate
-	Seals	Nitrile rubber

Solenoid valves MDH-M12, ISO 5599-1

Technical data – 5/3-way valves

Dimensions

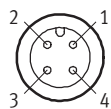
Download CAD Data → www.festo.com/us/cad



- 1 Solenoid coil can be repositioned by 90° regardless of manual override
- 2 Manual override facility
- 3 Captive mounting screws
- 5 LED display
- 6 Plug socket M12x1
Coil 2-pin to VDMA
Coil 4-pin to Desina

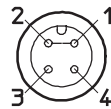
ISO size	B1	B2	B3	B4	D1	H1	H2	H3	H4	L1	L2	L3	L4	L5	L6
1	42	28	6	30	M5	87.2	77.2	38	9	148	108.4	54.3	36	18	108.5
2	54	38	9	30	M6	97.2	87.2	48	9.5	165.8	158	79	48	24	126.3
3	65	48	12	30	M8	104.2	94.2	55	12	186.4	184	92	64	32	146.9

M12 plug – Pin allocation 2-pin to VDMA



- 1 Unused
- 2 Unused
- 3 com (-)
- 4 Signal (+)

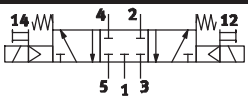
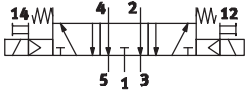
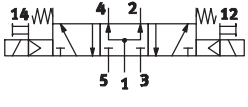
M12 plug – Pin allocation 4-pin to Desina



- 1 connected with 2
- 2 connected with 1
- 3 com (-)
- 4 Signal (+)

Solenoid valves MDH-M12, ISO 5599-1

Technical data – 5/3-way valves

Ordering data					
Circuit symbol	Description	ISO size	Part No.	Type	
	Normal position: – closed Pilot air supply: – internal	Coil 2-pin to VDMA	1	525307	MDH-5/3G-D-1-M12-C
			2	539078	MDH-5/3G-D-2-M12-C
			3	539080	MDH-5/3G-D-3-M12-C
		Coil 4-pin to Desina	1	540806	MDH-5/3G-D-1-M12D-C
			2	540815	MDH-5/3G-D-2-M12D-C
			3	540822	MDH-5/3G-D-3-M12D-C
	Normal position: – exhausted Pilot air supply: – internal	Coil 2-pin to VDMA	1	197126	MDH-5/3E-D-1-M12-C
			2	533016	MDH-5/3E-D-2-M12-C
			3	533017	MDH-5/3E-D-3-M12-C
		Coil 4-pin to Desina	1	540805	MDH-5/3E-D-1-M12D-C
			2	540814	MDH-5/3E-D-2-M12D-C
			3	540821	MDH-5/3E-D-3-M12D-C
	Normal position: – pressurised Pilot air supply: – internal	Coil 2-pin to VDMA	1	533005	MDH-5/3B-D-1-M12-C
			2	533006	MDH-5/3B-D-2-M12-C
			3	533007	MDH-5/3B-D-3-M12-C
		Coil 4-pin to Desina	1	540807	MDH-5/3B-D-1-M12D-C
			2	540816	MDH-5/3B-D-2-M12D-C
			3	540823	MDH-5/3B-D-3-M12D-C

Solenoid valves MDH, ISO 5599-1

Technical data – 5/2-way valves

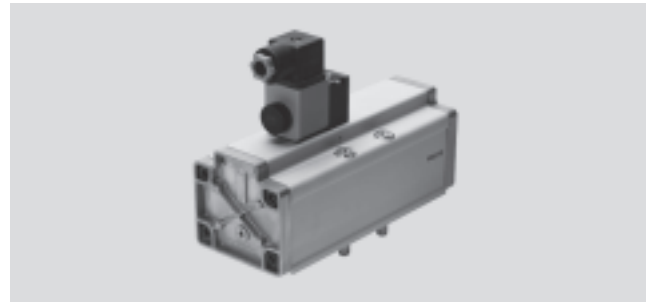
FESTO

Flow rate

Voltage

24 V DC

42, 110, 230 V AC



General technical data		
ISO size		4
Valve function		5/2-way, single solenoid
Constructional design		Piston spool
Sealing principle		Soft
Actuation type		Electrical
Type of reset		Pneumatic spring
Type of pilot control		Piloted
Pilot air supply		Internal
Direction of flow		Non-reversible
Exhaust function		With flow control
Manual override		Via accessory, detenting
Type of mounting		Via through-holes
Mounting position		Any
Nominal size	[mm]	18
Standard nominal flow rate	[l/min]	6000
Grid dimension	[mm]	82
Pneumatic connection on sub-base		G $\frac{3}{4}$
Product weight	[g]	2600

Operating and environmental conditions			
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)		
Operating pressure	Internal pilot air supply	[bar]	3 ... 16
	External pilot air supply	[bar]	–
Pilot pressure		[bar]	–
Ambient temperature		[°C]	–5 ... +40
Temperature of medium		[°C]	–10 ... +60

Valve response times [ms]	
D solenoid coil	
On	120
Off	160

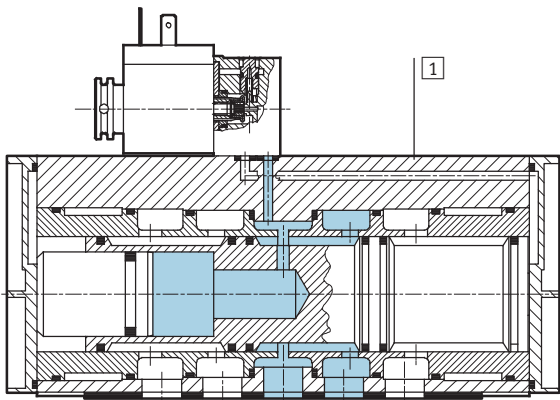
Solenoid valves MDH, ISO 5599-1

Technical data – 5/2-way valves

Electrical data			
D solenoid coil			
Electrical connection	Design		Plug, square design to EN 175301-803, type A
Operating voltage	D.C. voltage	[V DC]	24
	A.C. voltage	[V AC]	42, 110, 230 (50 ... 60 Hz)
Coil characteristics	D.C. voltage	[W]	6.8
	A.C. voltage	[VA]	Pull: 16.5
	42 V		Hold: 12.2
	A.C. voltage 110 V, 230 V	[VA]	Pull: 14.4
			Hold: 10.5
Protection class to EN 60 529			IP65

Materials

Sectional view



1	Housing	Anodised aluminium, polyacetate, brass
-	Seals	Nitrile rubber, polyurethane, polytetrafluoroethylene carbon

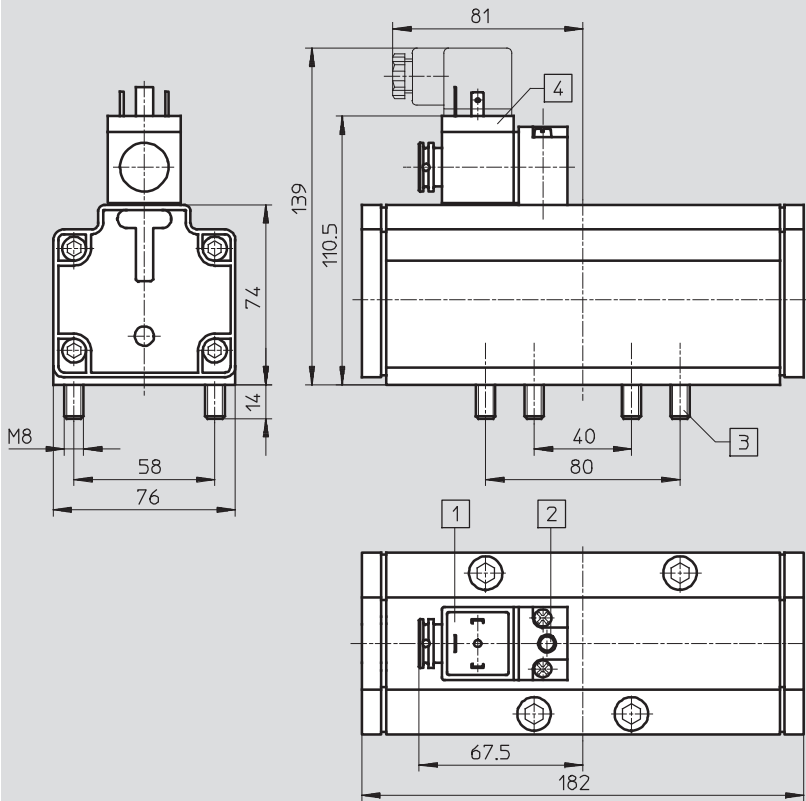
Solenoid valves MDH, ISO 5599-1

Technical data – 5/2-way valves

FESTO

Dimensions

Download CAD Data → www.festo.com/us/cad



- 1 Wiring at plug socket to EN 175301-803, type A → 102
- 2 Manual override
- 3 Captive mounting screws
- 4 Solenoid coil can be repositioned by 90° regardless of manual override

Ordering data

	Description	Voltage	ISO size	Part No.	Type
	With D solenoid coil, pneumatic reset, internal pilot air supply	24 V DC	4	12457	MDH-5/2-3/4-D-4-24DC
		–	–	14544	MDH-5/2-3/4-D-4 ¹⁾
Usable pilot valves					
	Electrical connection to EN 175301-803 type A	24 V DC	–	119600	MDH-3/2-24DC
		110 V AC	–	119601	MDH-3/2-110AC
		230 V AC	–	119602	MDH-3/2-230AC
		24 V DC/ 42 V AC	–	119603	MDH-3/2-24DC/42AC

1) Without pilot valve. The part number for the pilot valve must be quoted when ordering.
Order example: 14544 MDH-5/2-3/4-D-4-119602

Solenoid valves JMDH, ISO 5599-1

FESTO

Technical data – 5/2-way valves, double solenoid

Flow rate

6000 l/min

Voltage

24 V DC

42, 110, 230 V AC



General technical data			
ISO size	4		
Valve function	5/2-way, double solenoid		
Constructional design	Piston spool		
Sealing principle	Soft		
Actuation type	Electrical		
Type of pilot control	Piloted		
Pilot air supply	Internal		
Direction of flow	Non-reversible		
Exhaust function	With flow control		
Manual override	Via accessory, detenting		
Type of mounting	Via through-holes		
Mounting position	Any		
Nominal size	[mm]	18	
Standard nominal flow rate	[l/min]	6000	
Grid dimension	[mm]	82	
Pneumatic connection on sub-base	G $\frac{3}{4}$		
Product weight	[g]	2600	

Operating and environmental conditions			
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)		
Operating pressure	Internal pilot air supply	[bar]	2 ... 16
	External pilot air supply	[bar]	–
Pilot pressure		[bar]	–
Ambient temperature		[°C]	–5 ... +40
Temperature of medium		[°C]	–10 ... +60

Valve response times [ms]	
With D solenoid coil	
40	

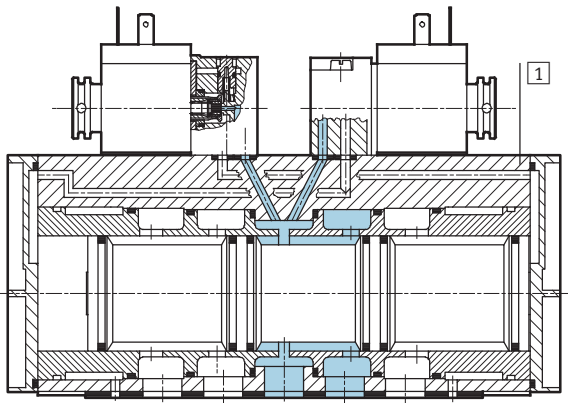
Solenoid valves JMDH, ISO 5599-1

Technical data – 5/2-way valves, double solenoid

Electrical data			
D solenoid coil			
Electrical connection		Plug, square design to EN 175301-803, type A	
Operating voltage	D.C. voltage	[V DC]	24
	A.C. voltage	[V AC]	42, 110, 230 (50 ... 60 Hz)
Coil characteristics	D.C. voltage	[W]	6.8
	A.C. voltage	[VA]	Pull: 16.5 Hold: 12.2
	42 V A.C. voltage 110 V, 230 V	[VA]	Pull: 14.5 Hold: 10.5
Protection class to EN 60 529		IP65	

Materials

Sectional view



1	Housing	Anodised aluminium, polyacetate, brass
-	Seals	Nitrile rubber, polyurethane, polytetrafluoroethylene carbon

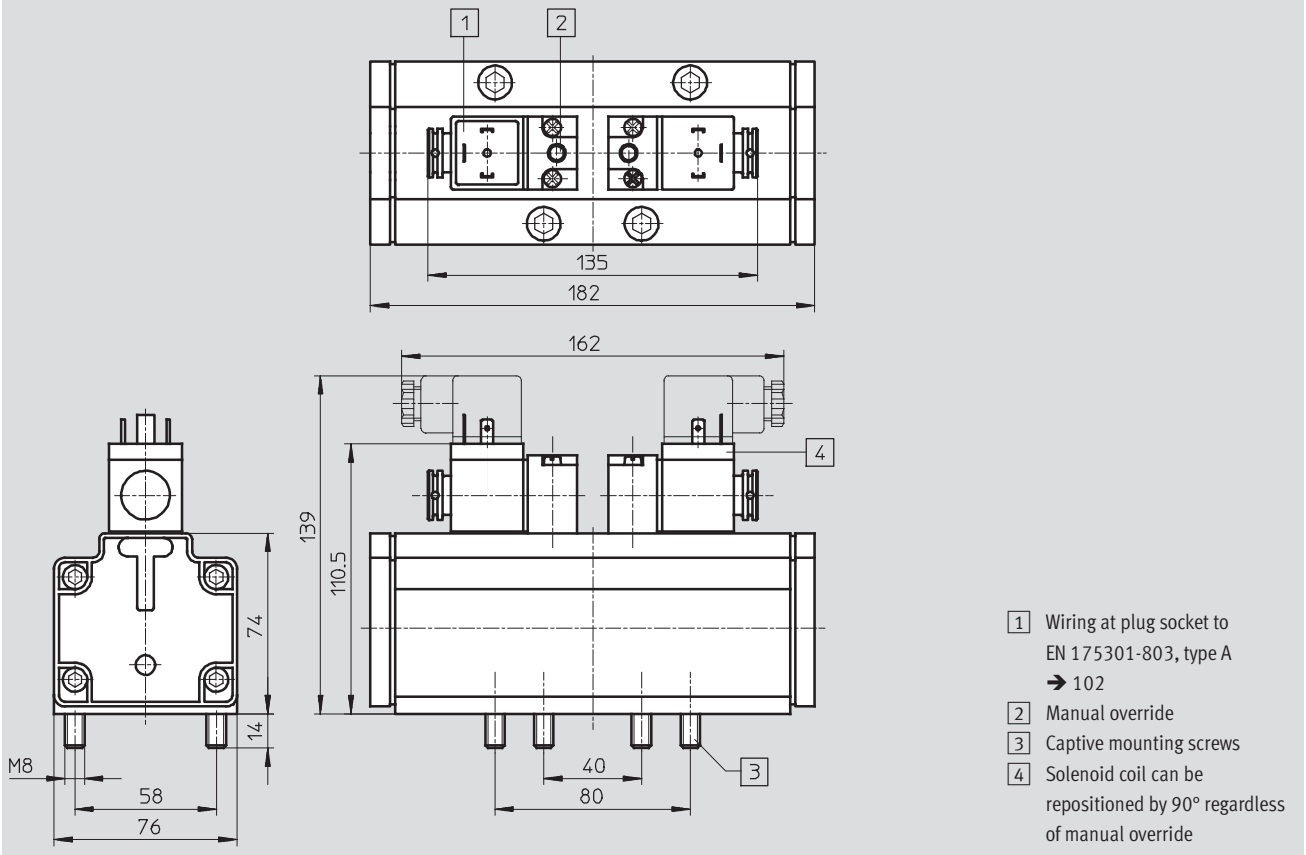
Solenoid valves JMDH, ISO 5599-1

Technical data – 5/2-way valves, double solenoid

FESTO

Dimensions

Download CAD Data → www.festo.com/us/cad



Ordering data – Double solenoid valve

	Description	Voltage	ISO size	Part No.	Type
	With D solenoid coil, internal pilot air supply	24 V DC	4	12458	JMDH-5/2-3/4-D-4-24DC
		–		14545	JMDH-5/2-3/4-D-4 ¹⁾
Usable pilot valves					
	Electrical connection to EN 175301-803 type A	24 V DC	–	119600	MDH-3/2-24DC
		110 V AC	–	119601	MDH-3/2-110AC
		230 V AC	–	119602	MDH-3/2-230AC
		24 V DC/ 42 V AC	–	119603	MDH-3/2-24DC/42AC

1) Without pilot valve. The part number for the pilot valve must be quoted when ordering.
Order example: 14545 MDH-5/2-3/4-D-4-119602

Solenoid valves MDH, ISO 5599-1

Technical data – 5/3-way valves

Flow rate
4800 l/min

Voltage
24 V DC
42, 110, 230 V AC



General technical data			
ISO size	4		
Valve function	5/3-way, double solenoid		
Constructional design	Piston spool		
Sealing principle	Soft		
Actuation type	Electrical		
Type of reset	Pneumatic spring		
Type of pilot control	Piloted		
Pilot air supply	Internal		
Direction of flow	Non-reversible		
Exhaust function	With flow control		
Manual override	Via accessory, detenting		
Type of mounting	Via through-holes		
Mounting position	Any		
Nominal size	[mm]	18	
Standard nominal flow rate	Closed	[l/min]	4800
	Exhausted	[l/min]	4800
Grid dimension	[mm]	82	
Pneumatic connection on sub-base	G3/4		
Product weight	[g]	2600	

Operating and environmental conditions			
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)		
Operating pressure	Internal pilot air supply	[bar]	3 ... 16
	External pilot air supply	[bar]	–
Pilot pressure	[bar]	–	
Ambient temperature	[°C]	– 5 ... +40	
Temperature of medium	[°C]	–10 ... +60	

Valve response times [ms]	
With D solenoid coil	
On	85
Off	290

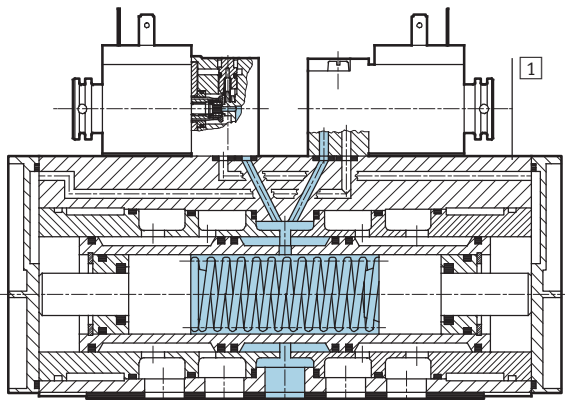
Solenoid valves MDH, ISO 5599-1

Technical data – 5/3-way valves

Electrical data			
D solenoid coil			
Electrical connection		Plug, square design to EN 175301-803, type A	
Operating voltage	D.C. voltage	[V DC]	24
	A.C. voltage	[V AC]	42, 110, 230 (50 ... 60 Hz)
Coil characteristics	D.C. voltage	[W]	6.8
	A.C. voltage	[VA]	Pull: 16.5
	42 V		Hold: 12.2
	A.C. voltage 110 V, 230 V	[VA]	Pull: 14.5
			Hold: 10.5

Materials

Sectional view



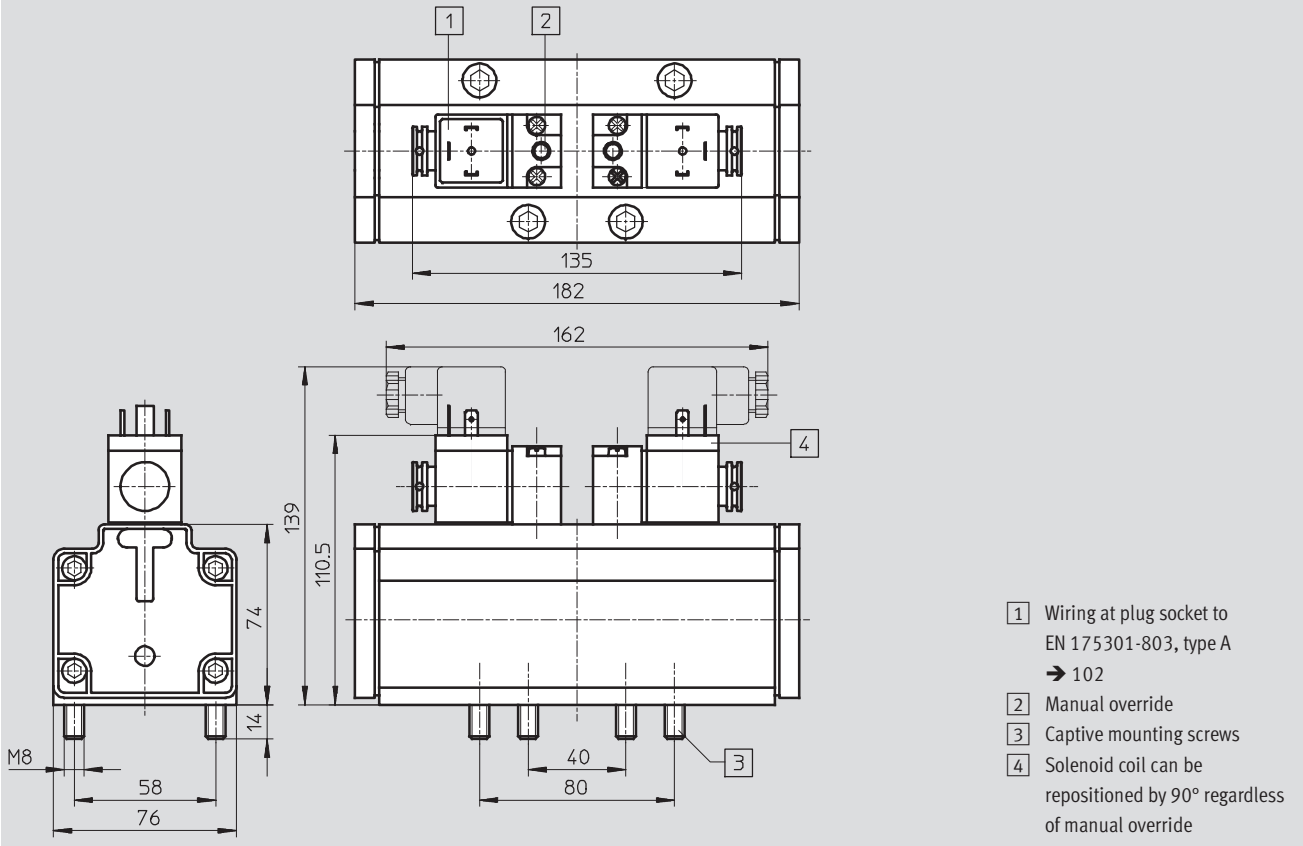
1	Housing	Anodised aluminium, polyacetate, brass
-	Seals	Nitrile rubber, polyurethane, polytetrafluoroethylene carbon

Solenoid valves MDH, ISO 5599-1

Technical data – 5/3-way valves

Dimensions

Download CAD Data → www.festo.com/us/cad



Ordering data

	Description	Voltage	ISO size	Part No.	Type
	With D solenoid coil, normally closed, internal pilot air supply	24 V DC	4	12459	MDH-5/3G-3/4-D-4-24DC
		–	–	14546	MDH-5/3G-3/4-D-4¹⁾
	With D solenoid coil, normally exhausted, internal pilot air supply	24 V DC	4	12460	MDH-5/3E-3/4-D-4-24DC
		–	–	14547	MDH-5/3E-3/4-D-4¹⁾
Usable pilot valves					
	Electrical connection to EN 175301-803 type A	24 V DC	–	119600	MDH-3/2-24DC
		110 V AC	–	119601	MDH-3/2-110AC
		230 V AC	–	119602	MDH-3/2-230AC
		24 V DC/ 42 V AC	–	119603	MDH-3/2-24DC/42AC

1) Without pilot valve. The part number for the pilot valve must be quoted when ordering.
Order example: 14546 MDH-5/3G-3/4-D-4-119602

Pneumatic valves, ISO 5599-1

Type code

VL - 5/3 G - D-1 - - C

Type	
VL	Single pilot
J	Double pilot
JD	Double pilot, with dominant signal

Valve function	
5/2	5/2-way valve
5/3	5/3-way valve

Normal position	
G	Closed
E	Exhausted
B	Pressurised

Size	
D-1	ISO size 1
D-2	ISO size 2
D-3	ISO size 3
¾-D-4	ISO size 4

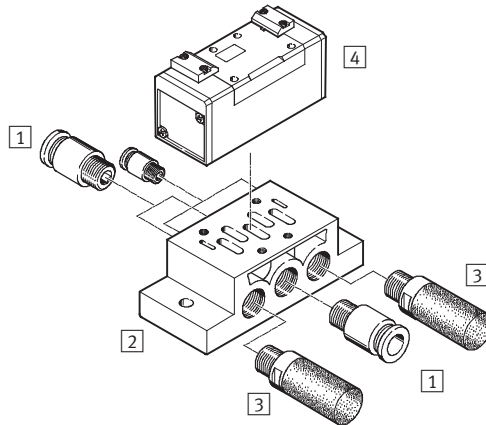
Type of reset	
FR	Mechanical spring
	Pneumatic spring

Generation	
C	Series C

Pneumatic valves, ISO 5599-1

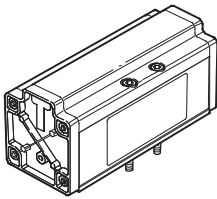
Peripherals overview

Individual mounting



Variants

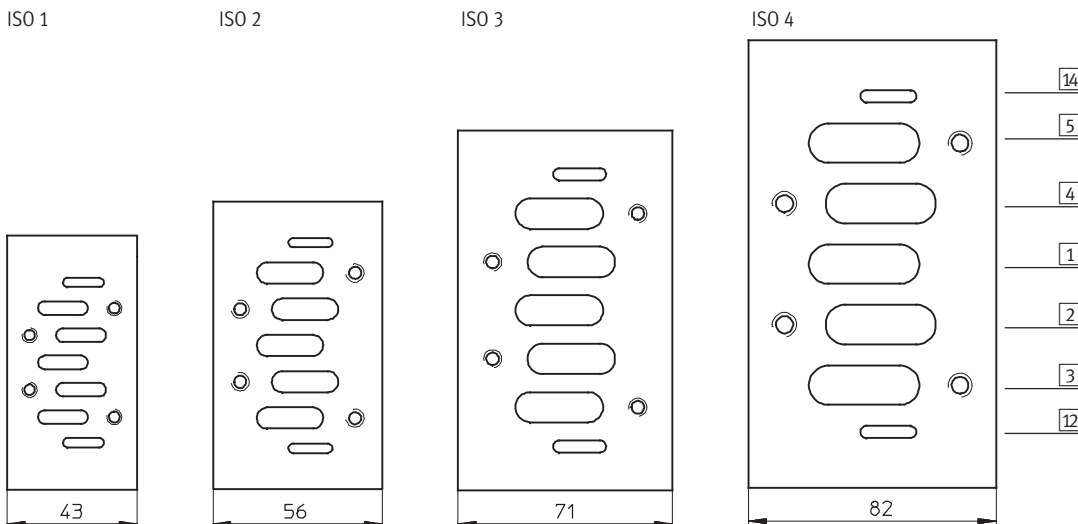
J-5/...-3/4-D-4,
VL-5/...-3/4-D-4



Accessories		Brief description	→ Page/Internet
1	Push-in fitting QS	For connecting compressed air tubing with standard O.D.	quick star
2	Individual sub-base NAS/NAU	NAS – With lateral ports NAU – With ports underneath	89
3	Silencer	For fitting in exhaust ports	u
4	Pneumatic valve	Port pattern to ISO 5599-1	6

Port pattern on sub-base to ISO 5599-1

Defined interfaces between valve and sub-base

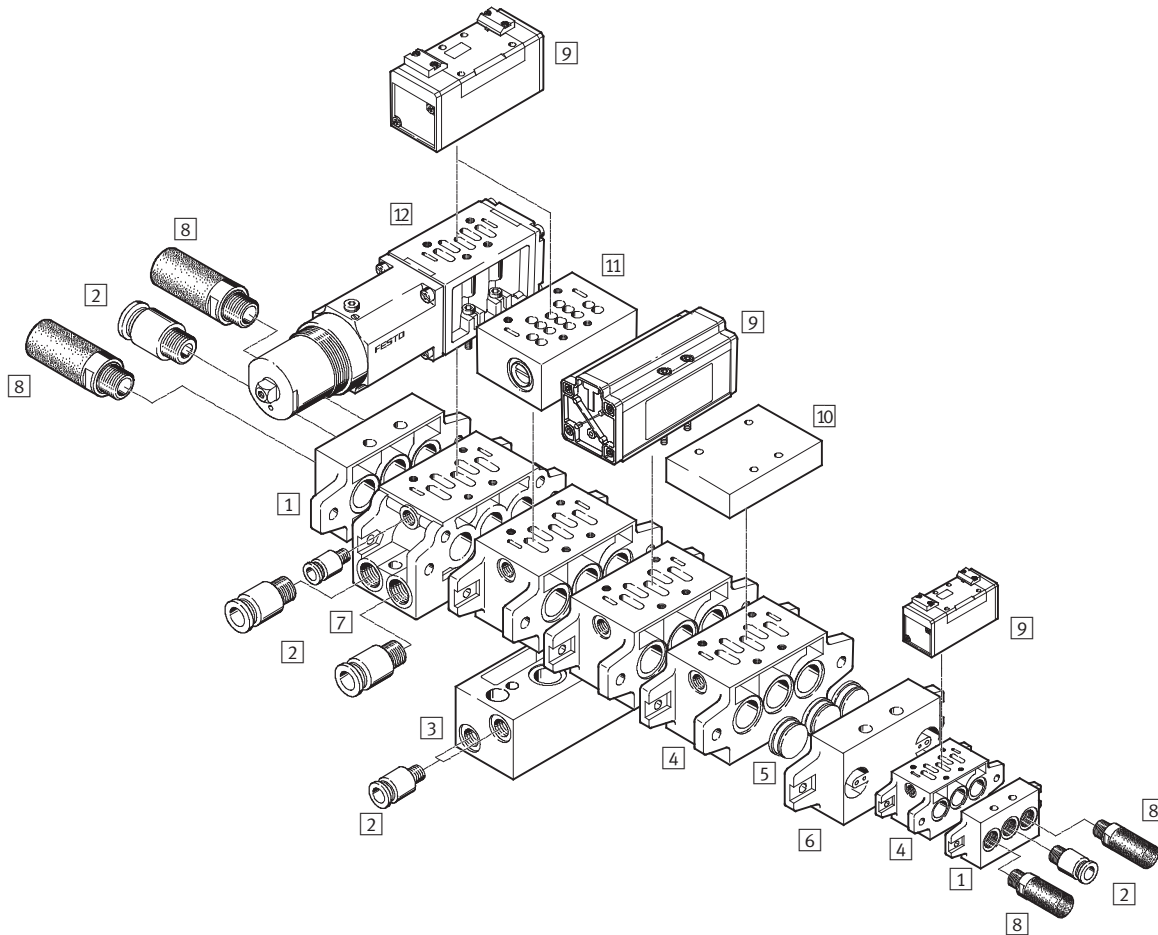


Pneumatic valves, ISO 5599-1

Peripherals overview



Manifold mounting



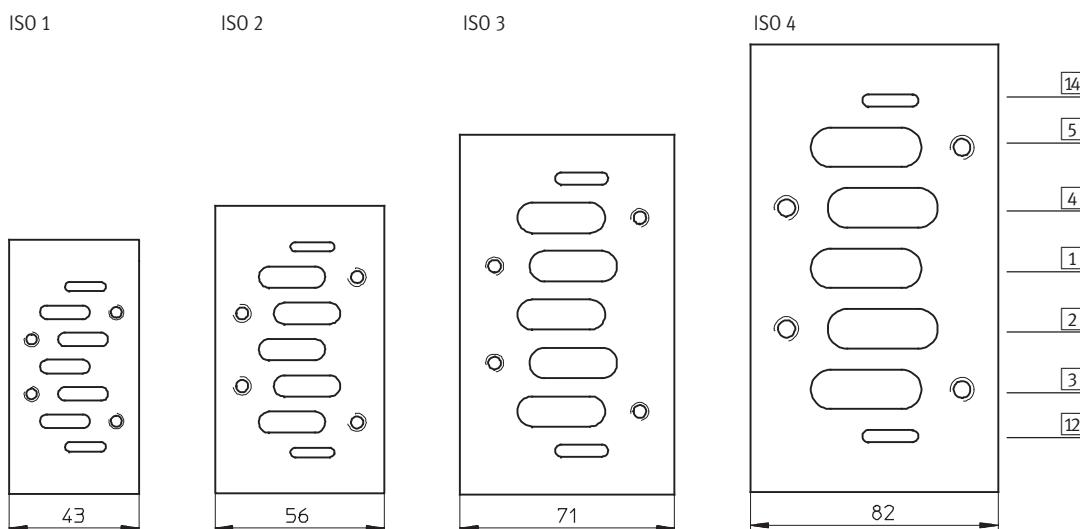
Pneumatic valves, ISO 5599-1

Peripherals overview

Accessories		
	Brief description	→ Page/Internet
1	End plate kit NEV	92
2	Push-in fitting QS	quick star
3	Angle connection block NAW	91
4	Manifold sub-base NAV	91
5	Isolating disc NSC	93
6	Intermediate plate NZV	95
7	Manifold sub-base for angle connection NAWV	92
8	Silencer	u
9	Pneumatic valve	6
10	Blanking plate NDV	93
11	Throttle plate for ISO size 1, 2 and 3 GRO	96
12	Intermediate pressure regulator plate for ISO size 1, 2 and 3 LR-ZP	97

Port pattern on sub-base to ISO 5599-1

Defined interfaces between valve and sub-base



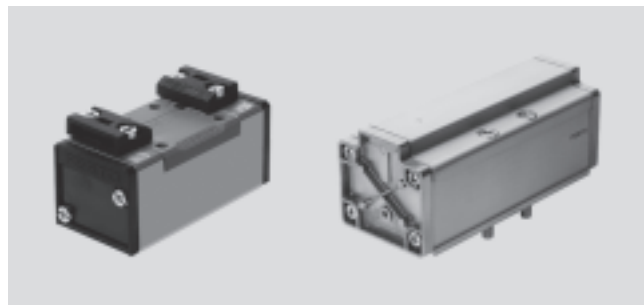
Pneumatic valves VL, ISO 5599-1

FESTO

Technical data – 5/2-way valves

Flow rate

1200 ... 6000 l/min



General technical data					
ISO size	1	2	3	4	
Valve function	5/2-way, single pilot				
Constructional design	Piston spool				
Sealing principle	Soft				
Actuation type	Pneumatic				
Type of reset	Mechanical or pneumatic spring			Mechanical spring	
Type of pilot control	Direct				
Direction of flow	Type of reset mechanical spring	Reversible			
	Type of reset pneumatic spring	Non-reversible			
Exhaust function	With flow control				
Manual override	None				
Type of mounting	Via through-holes				
Mounting position	Any				
Nominal size	[mm]	8	11	14.5	18
Standard nominal flow rate	[l/min]	1200	2300	4500	6000
Grid dimension	[mm]	43	56	71	82
Pneumatic connection on sub-base	1, 2, 3, 4, 5	G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$	G $\frac{3}{4}$
	12, 14	G $\frac{1}{8}$	G $\frac{1}{8}$	G $\frac{1}{8}$	G $\frac{1}{8}$
Product weight	[g]	290	550	810	1800
Noise level	[dB (A)]	85			
Certification	Germanischer Lloyd UL - recognized (OL)				

Operating and environmental conditions				
ISO size	1, 2, 3	4		
Type of reset	Pneumatic	Mechanical	Mechanical	
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]			
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)			
Operating pressure	[bar]	2 ... 16	-0.9 ... 16	-0.9 ... +16
Pilot pressure	[bar]	2 ... 16	3 ... 16	3 ... 16
Ambient temperature	[°C]	-10 ... +60		
Temperature of medium	[°C]	-10 ... +60		

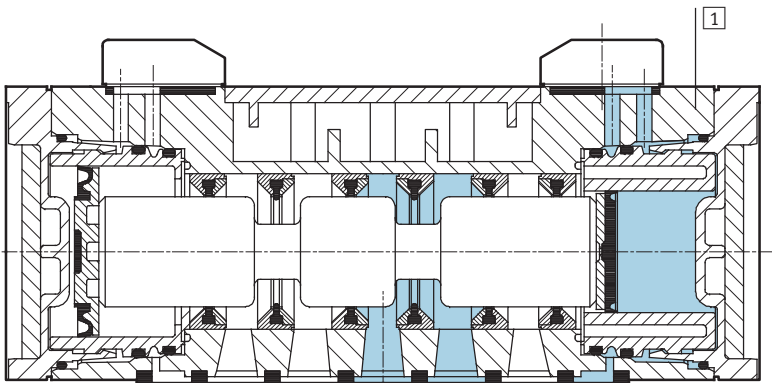
Pneumatic valves VL, ISO 5599-1

Technical data – 5/2-way valves

Valve response times								
ISO size	1		2		3		4	
Type of reset	Pneumatic	Mechanical	Pneumatic	Mechanical	Pneumatic	Mechanical	Pneumatic	Mechanical
On	9	6	23	11	29	13	–	25
Off	18	23	39	39	36	43	–	90

Materials

Sectional view (ISO size 1, 2, 3)



ISO size	1, 2, 3	4
1 Housing	Die-cast aluminium, polyacetate	Anodised aluminium, brass, polyurethane
– Seals	Nitrile rubber	Nitrile rubber, polytetrafluoroethylene carbon

Pneumatic valves VL, ISO 5599-1

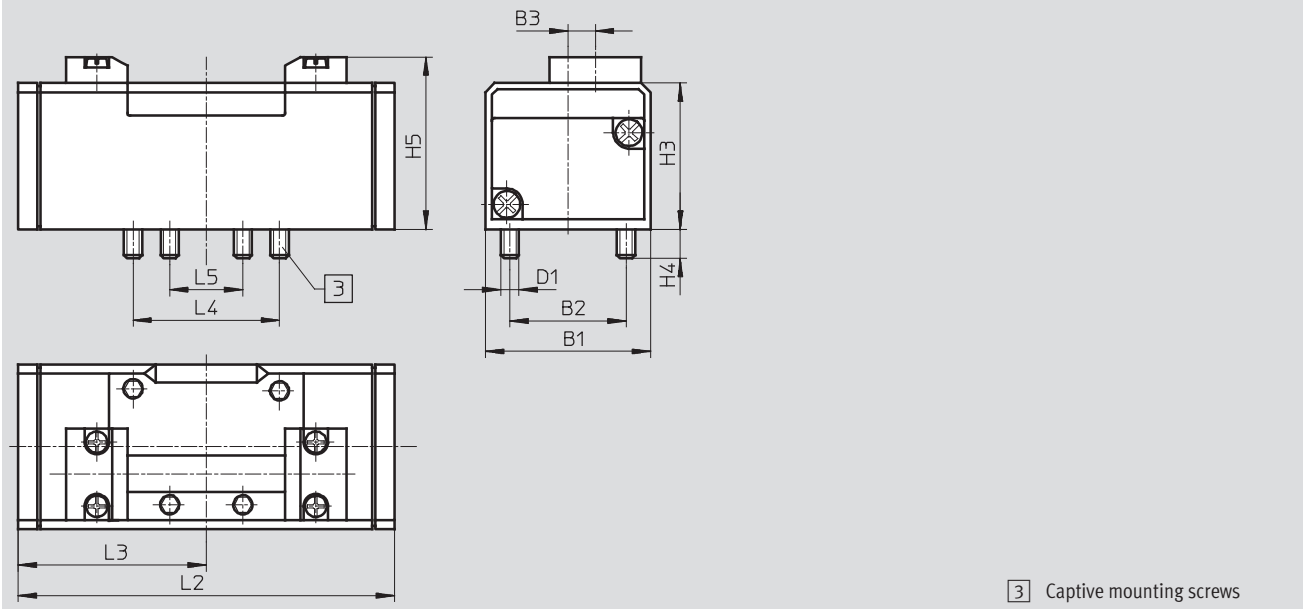
Technical data – 5/2-way valves



Dimensions

Download CAD Data → www.festo.com/us/cad

ISO size 1, 2, 3



Type	B1	B2	B3	D1	H3	H4	H5	L2	L3	L4	L5
ISO size 1											
VL-5/2-...	42	28	6	M5	38	9	46.5	87.6	43.8	36	18
VL-5/2-...-FR								98			
ISO size 2											
VL-5/2-...	54	38	9	M6	48	9.5	56.5	123.4	61.7	48	24
VL-5/2-...-FR								140.7			
ISO size 3											
VL-5/2-...	65	48	12	M8	55	12	63.5	145.4	72.7	64	32
VL-5/2-...-FR								164.7			

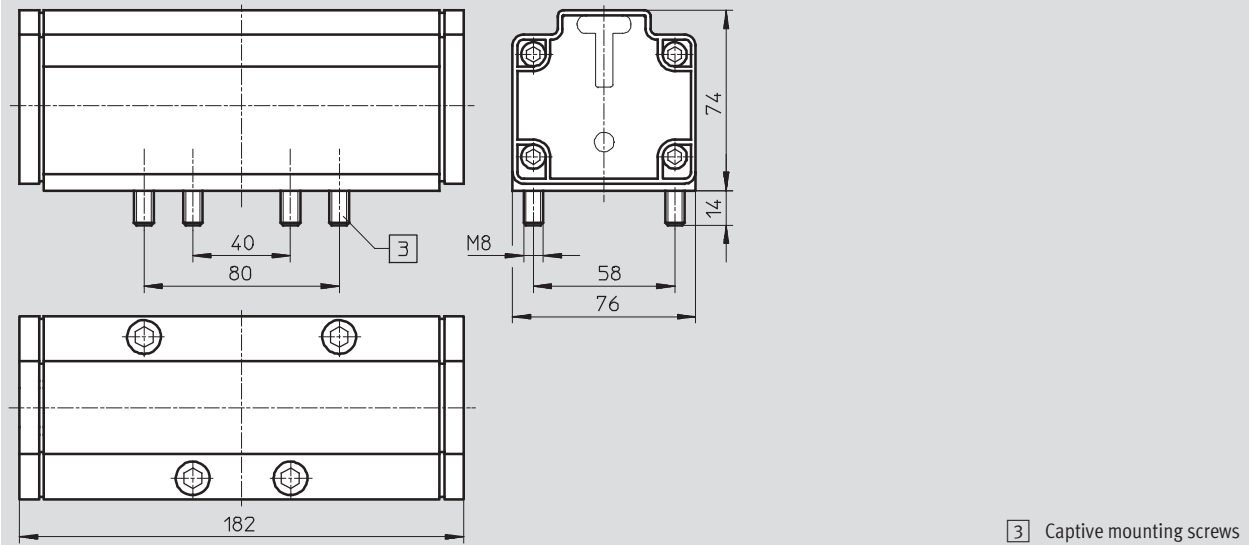
Pneumatic valves VL, ISO 5599-1

Technical data – 5/2-way valves

Dimensions

Download CAD Data → www.festo.com/us/cad

ISO size 4



Ordering data

Circuit symbol	Description	ISO size	Part No.	Type
	Pneumatic reset	1	151009	VL-5/2-D-1-C
		2	151845	VL-5/2-D-2-C
		3	151864	VL-5/2-D-3-C
	Mechanical reset	1	151014	VL-5/2-D-1-FR-C
		2	151844	VL-5/2-D-2-FR-C
		3	151863	VL-5/2-D-3-FR-C
		4	12461	VL-5/2-3/4-D-4

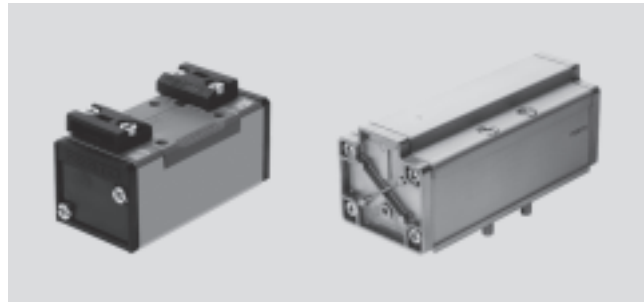
Pneumatic valves J, ISO 5599-1

FESTO

Technical data – 5/2-way valves, double pilot

Flow rate

1200 ... 6000 l/min



General technical data				
ISO size	1	2	3	4
Valve function	5/2-way, double pilot			
Constructional design	Piston spool			
Sealing principle	Soft			
Actuation type	Pneumatic			
Type of pilot control	Direct			
Direction of flow	Reversible			
Exhaust function	With flow control			
Manual override	None			
Type of mounting	Via through-holes			
Mounting position	Any			
Nominal size [mm]	8	11	14.5	18
Standard nominal flow rate [l/min]	1200	2300	4500	6000
Grid dimension [mm]	43	56	71	82
Pneumatic connection on sub-base	1, 2, 3, 4, 5	G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$
	12, 14	G $\frac{1}{8}$	G $\frac{1}{8}$	G $\frac{1}{8}$
Product weight [g]	290	550	810	1800
Noise level [dB (A)]	85			
Certification	Germanischer Lloyd UL - recognized (OL)			

Operating and environmental conditions	
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)
Operating pressure [bar]	-0.9 ... 16
Pilot pressure [bar]	2 ... 16
Ambient temperature [°C]	-10 ... +60
Temperature of medium [°C]	-10 ... +60

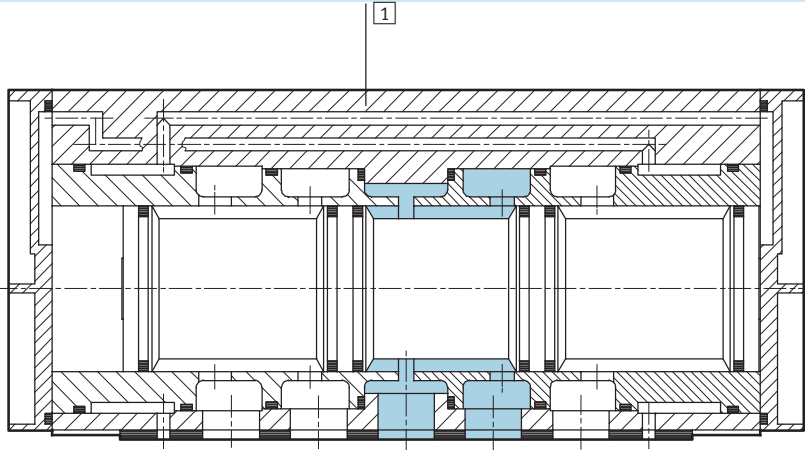
Valve response times [ms]				
ISO size	1	2, 3	4	
		Dominant signal at 14	Dominant signal at 14	
	6	6/4	8	20

Pneumatic valves J, ISO 5599-1

Technical data – 5/2-way valves, double pilot

Materials

Sectional view (ISO size 4)

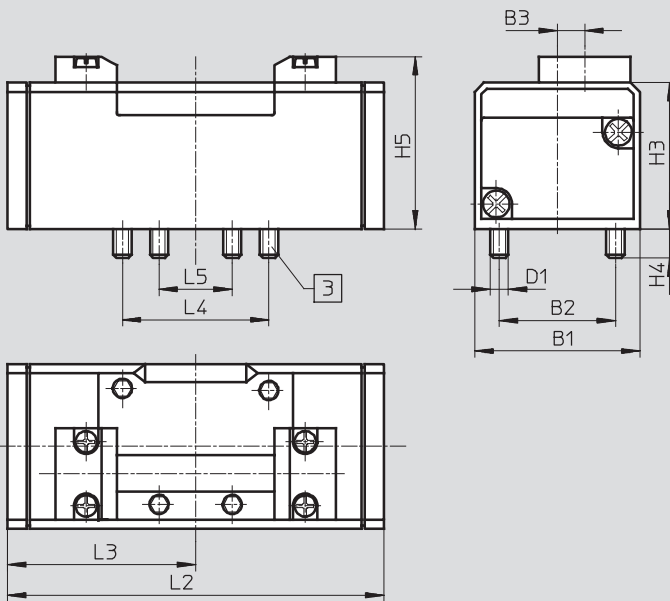


ISO size	1, 2, 3	4
1 Housing	Die-cast aluminium, polyacetate	Anodised aluminium, brass, polyurethane
- Seals	Nitrile rubber	Nitrile rubber, polytetrafluoroethylene carbon

Dimensions

Download CAD Data → www.festo.com/us/cad

ISO size 1, 2, 3



3 Captive mounting screws

ISO size	B1	B2	B3	D1	H3	H4	H5	L2	L3	L4	L5
1	42	28	6	M5	38	9	46.5	87.6	43.8	36	18
2	54	38	9	M6	48	9.5	56.5	123.4	61.7	48	24
3	65	48	12	M8	55	12	63.5	145.4	72.7	64	32

Pneumatic valves J, ISO 5599-1

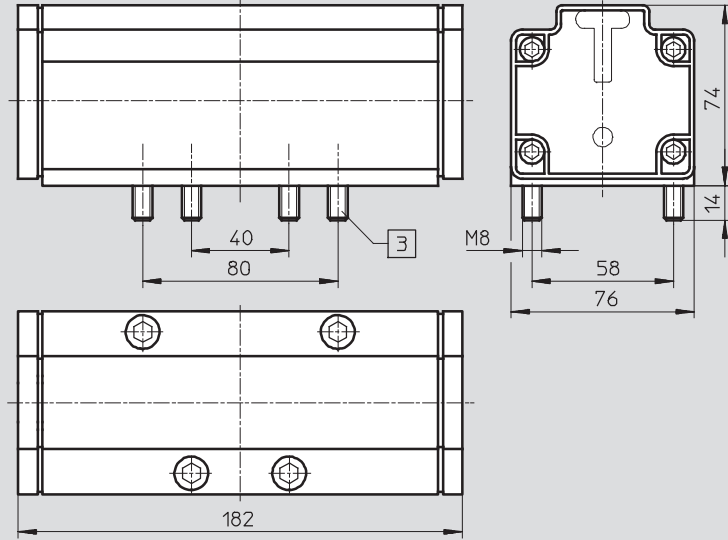
Technical data – 5/2-way valves, double pilot



Dimensions

Download CAD Data → www.festo.com/us/cad

ISO size 4



3 Captive mounting screws

Ordering data

Circuit symbol	Description	ISO size	Part No.	Type
		1	151007	J-5/2-D-1-C
		2	151846	J-5/2-D-2-C
		3	151865	J-5/2-D-3-C
		4	12462	J-5/2-3/4-D-4
	With dominant signal at 14	1	151008	JD-5/2-D-1-C
		2	151847	JD-5/2-D-2-C
		3	151866	JD-5/2-D-3-C

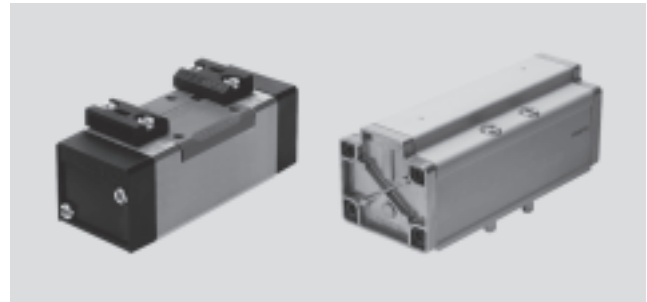
Pneumatic valves VL, ISO 5599-1

Technical data – 5/3-way valves

FESTO

Flow rate

1200 ... 6000 l/min



General technical data				1	2	3	4			
ISO size										
Valve function				5/3-way, double pilot						
Constructional design				Piston spool						
Sealing principle				Soft						
Actuation type				Pneumatic						
Type of reset				Mechanical spring						
Type of pilot control				Direct						
Pilot air supply				Internal						
Direction of flow				Reversible						
Exhaust function				With flow control						
Manual override				None						
Type of mounting				Via through-holes						
Mounting position				Any						
Nominal size		[mm]		8	11	14.5	18			
Standard nominal flow rate	Closed	[l/min]		1200	2300	4100	6000			
		Exhausted	[l/min]						4600	4800
		Pressurised	[l/min]							
Grid dimension		[mm]		43	56	71	82			
Pneumatic connection on sub-base			1, 2, 3, 4, 5	G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$	G $\frac{3}{4}$			
			12, 14	G $\frac{1}{8}$	G $\frac{1}{8}$	G $\frac{1}{8}$	G $\frac{1}{8}$			
Product weight		[g]		320	825	910	2000			
Noise level		[dB (A)]		85						
Certification				Germanischer Lloyd UL - recognized (OL)						

Operating and environmental conditions			
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]		
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)		
Operating pressure	[bar]	–0.9 ... +16	
Pilot pressure	[bar]	3 ... 16	
Ambient temperature	[°C]	–10 ... +60	
Temperature of medium	[°C]	–10 ... +60	

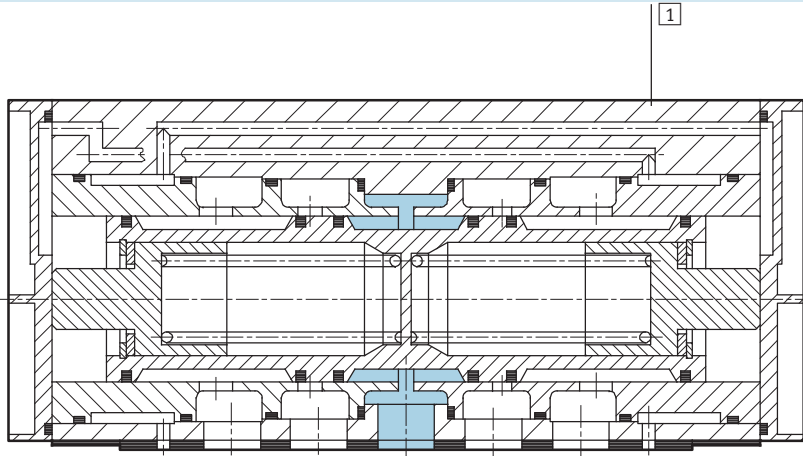
Valve response times								
ISO size	1		2		3		4	
	On	Off	On	Off	On	Off	On	Off
Closed	7	45	15	56	17	61	40	130
Exhausted	7	45	16	59	18	63	40	130
Pressurised	7	45	15	57	16	60	–	–

Pneumatic valves VL, ISO 5599-1

Technical data – 5/3-way valves

Materials

Sectional view (ISO size 4)

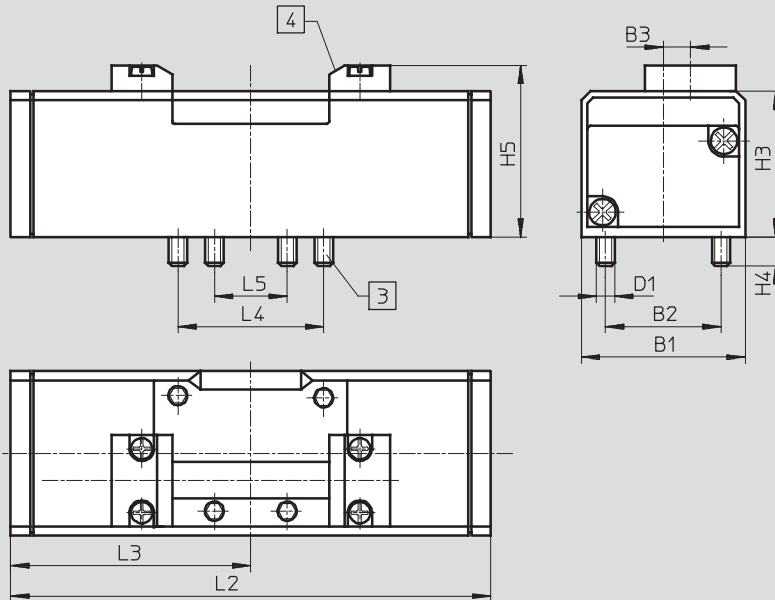


ISO size	1, 2, 3	4
1 Housing	Die-cast aluminium, polyacetate	Anodised aluminium, brass, polyurethane
- Seals	Nitrile rubber	Nitrile rubber, polytetrafluoroethylene carbon

Dimensions

Download CAD Data → www.festo.com/us/cad

ISO size 1, 2 and 3



- 3 Captive mounting screws
- 4 Slot for inscription label

ISO size	B1	B2	B3	D1	H3	H4	H5	L2	L3	L4	L5
1	42	28	6	M5	38	9	46.5	108.4	54.2	36	18
2	54	38	9	M6	48	9.5	56.5	158	79	48	24
3	65	48	12	M8	55	12	63.5	184	92	64	32

Pneumatic valves VL, ISO 5599-1

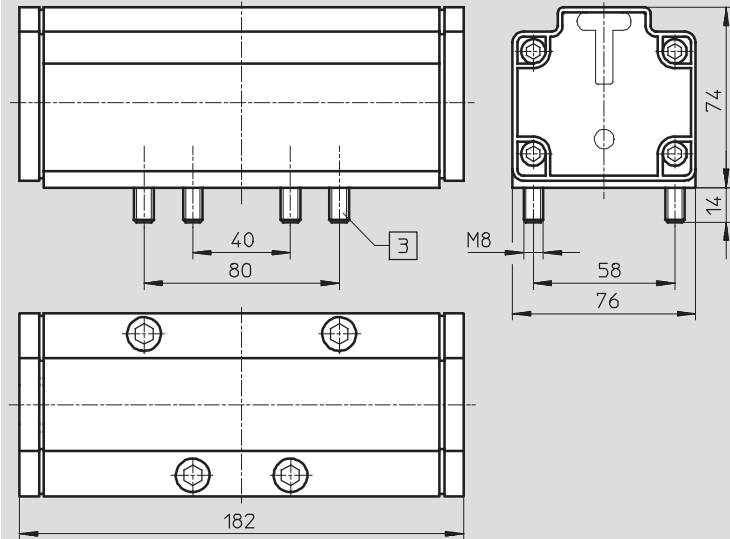
Technical data – 5/3-way valves

FESTO

Dimensions

Download CAD Data → www.festo.com/us/cad

ISO size 4



3 Captive mounting screws

Ordering data

Circuit symbol	Description	ISO size	Part No.	Type
	Normally closed, mechanical reset	1	151010	VL-5/3G-D-1-C
		2	151848	VL-5/3G-D-2-C
		3	151867	VL-5/3G-D-3-C
		4	12463	VL-5/3G-¾-D-4
	Normally exhausted, mechanical reset	1	151011	VL-5/3E-D-1-C
		2	151849	VL-5/3E-D-2-C
		3	151868	VL-5/3E-D-3-C
		4	12464	VL-5/3E-¾-D-4
	Normally pressurised, mechanical reset	1	151012	VL-5/3B-D-1-C
		2	151850	VL-5/3B-D-2-C
		3	151869	VL-5/3B-D-3-C

Solenoid/pneumatic valves, to ISO 5599-1



Accessories

Individual sub-base NAS

Ports at side

Materials:

ISO size 1, 2, 3:

Die-cast aluminium

ISO size 4:

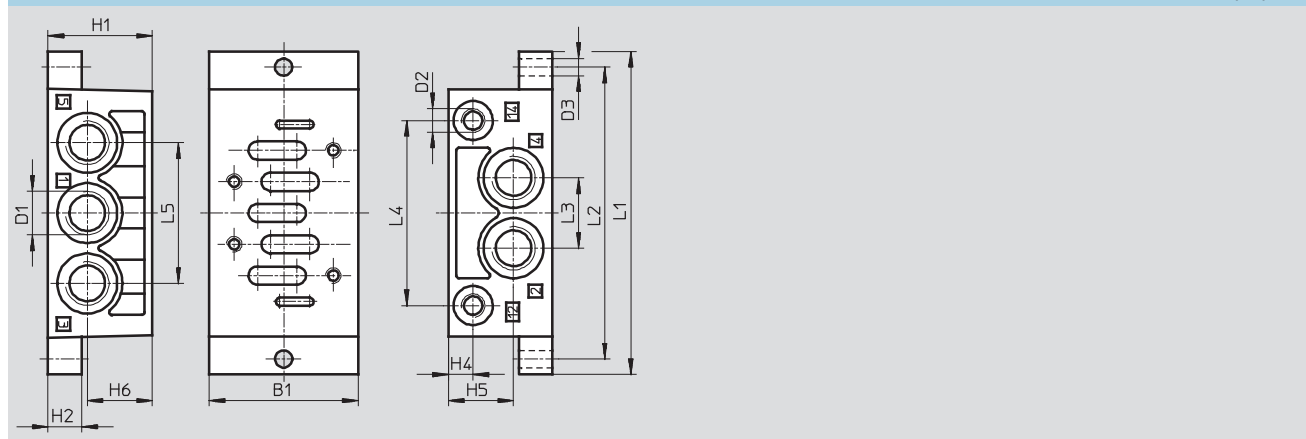
Anodised aluminium



General technical data	
Conforms to standard	ISO 5599-1
Type of mounting	2 through-holes in housing

Operating and environmental conditions				
ISO size	1	2	3	4
Note on materials	Free of copper and PTFE			-
Certification	UL recognized (OL)			-

Dimensions Download CAD Data → www.festo.com/us/cad



ISO size	B1	D1	D2	D3	H1	H2	H4	H5	H6	L1	L2	L3	L4	L5
1	48	G $\frac{1}{4}$	G $\frac{1}{8}$	5.5	32	10	9	20.3	20.3	110	98	23	60	46
2	57	G $\frac{3}{8}$	G $\frac{1}{8}$	6.6	40	13	9	25	25	124	112	27	71	54
3	71	G $\frac{1}{2}$	G $\frac{1}{8}$	6.6	32	18	9	16	16	149	136	32	91	64
4	85	G $\frac{3}{4}$	G $\frac{1}{8}$	9	42	19	9	21	21	186	170	42	111	84

Ordering data						
Designation to VDMA	ISO size	Pneumatic connection		Weight [g]	Part No.	Type
		1, 2, 3, 4, 5	12, 14			
VDMA 24345-A-1	1	G $\frac{1}{4}$	G $\frac{1}{8}$	190	9484	NAS-$\frac{1}{4}$-1A-ISO
VDMA 24345-A-2	2	G $\frac{3}{8}$	G $\frac{1}{8}$	300	11310	NAS-$\frac{3}{8}$-2A-ISO
VDMA 24345-A-3	3	G $\frac{1}{2}$	G $\frac{1}{8}$	360	10336	NAS$\frac{1}{2}$-3A-ISO
VDMA 24345-A-4	4	G $\frac{3}{4}$	G $\frac{1}{8}$	1,260	152813	NAS-$\frac{3}{4}$-4A-ISO

Note: This product conforms to ISO 1179-1 and ISO 228-1

Solenoid/pneumatic valves, to ISO 5599-1



Accessories

Individual sub-base NAU

Ports underneath

Materials:

ISO size 1, 2, 3:

Die-cast aluminium

ISO size 4:

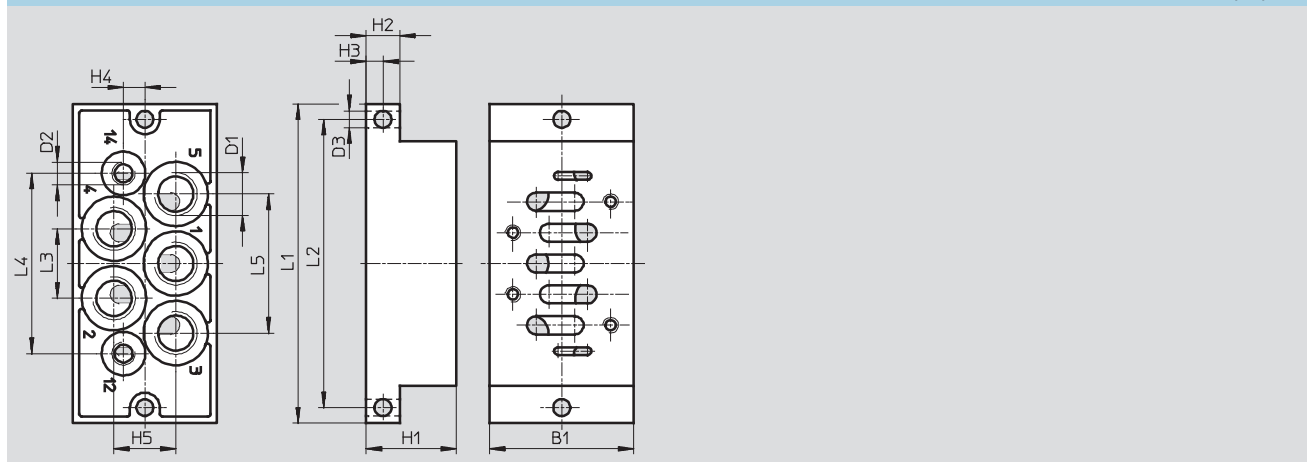
Anodised aluminium



General technical data	
Conforms to standard	ISO 5599-1
Type of mounting	2 through-holes in housing

Operating and environmental conditions				
ISO size	1	2	3	4
Note on materials	Free of copper and PTFE			–
Certification	UL recognized (OL)		–	–

Dimensions Download CAD Data → www.festo.com/us/cad



ISO size	B1	D1	D2	D3	H1	H2	H3	H4	H5	L1	L2	L3	L4	L5
1	46	G $\frac{1}{4}$	G $\frac{1}{8}$	5.5	30	10	5	7.5	20	110	98	23	60.7	46
2	56	G $\frac{3}{8}$	G $\frac{1}{8}$	6.6	35	13	6.5	8.3	24	124	112	27	70	54
3	71	G $\frac{1}{2}$	G $\frac{1}{8}$	6.6	32	18	9	10	30	149	136	32	90	66
4	85	G $\frac{3}{4}$	G $\frac{1}{8}$	9	28	19	9.5	12	37	186	170	42	111	84

Ordering data						
Designation to VDMA	ISO size	Pneumatic connection		Weight [g]	Part No.	Type
		1, 2, 3, 4, 5	12, 14			
VDMA 24345-B-1	1	G $\frac{1}{4}$	G $\frac{1}{8}$	280	9485	NAU- $\frac{1}{4}$ -1B-ISO
VDMA 24345-B-2	2	G $\frac{3}{8}$	G $\frac{1}{8}$	450	11416	NAU- $\frac{3}{8}$ -2B-ISO
VDMA 24345-B-3	3	G $\frac{1}{2}$	G $\frac{1}{8}$	660	10337	NAU- $\frac{1}{2}$ -3B-ISO
VDMA 24345-B-4	4	G $\frac{3}{4}$	G $\frac{1}{8}$	1,080	152814	NAU- $\frac{3}{4}$ -4B-ISO

Note: This product conforms to ISO 1179-1 and ISO 228-1

Solenoid/pneumatic valves, to ISO 5599-1

Accessories

Manifold sub-base NAV

Ports underneath

Materials:

ISO size 1, 2, 3:

Die-cast aluminium

ISO size 4:

Anodised aluminium

Dimensions → 93



General technical data	
Conforms to standard	ISO 5599-1

Operating and environmental conditions				
ISO size	1	2	3	4
Certification	-	UL recognized (OL)	-	-

Ordering data						
Designation to VDMA	ISO size	Pneumatic connection		Weight [g]	Part No.	Type
		2, 4	12, 14			
VDMA 24345-C-1	1	G $\frac{1}{4}$	G $\frac{1}{8}$	240	10173	NAV- $\frac{1}{4}$ -1C-ISO
VDMA 24345-C-2	2	G $\frac{3}{8}$	G $\frac{1}{8}$	400	11305	NAV- $\frac{3}{8}$ -2C-ISO
VDMA 24345-C-3	3	G $\frac{1}{2}$	G $\frac{1}{8}$	700	10175	NAV- $\frac{1}{2}$ -3C-ISO
VDMA 24345-C-4	4	G $\frac{3}{4}$	G $\frac{1}{8}$	1,400	11139	NAV- $\frac{3}{4}$ -4C-ISO

90° connection plate NAW

Ports at side and underneath

Materials:

ISO size 1, 2, 3:

Die-cast aluminium

ISO size 4:

Anodised aluminium

Dimensions → 93



General technical data	
Conforms to standard	ISO 5599-1

Operating and environmental conditions				
ISO size	1	2	3	4
Note on materials	Free of copper and PTFE			-

Ordering data						
Designation to VDMA	ISO size	Pneumatic connection		Weight [g]	Part No.	Type
		2, 4	12, 14			
VDMA 24345-E-1	1	G $\frac{1}{4}$	G $\frac{1}{8}$	360	11304	NAW- $\frac{1}{4}$ -1E-ISO
VDMA 24345-E-2	2	G $\frac{3}{8}$	G $\frac{1}{8}$	600	11307	NAW- $\frac{3}{8}$ -2E-ISO
VDMA 24345-E-3	3	G $\frac{1}{2}$	G $\frac{1}{8}$	920	11309	NAW- $\frac{1}{2}$ -3E-ISO
VDMA 24345-E-4	4	G $\frac{3}{4}$	G $\frac{1}{8}$	1,550	11141	NAW- $\frac{3}{4}$ -4E-ISO

Note: This product conforms to ISO 1179-1 and ISO 228-1

Solenoid/pneumatic valves, to ISO 5599-1

Accessories

Manifold sub-base with 90° connections NAVW

Ports at side and underneath

Materials:

Die-cast aluminium

Dimensions → 93



General technical data	
Conforms to standard	ISO 5599-1

Ordering data					
ISO size	Pneumatic connection		Weight [g]	Part No.	Type
	2, 4	12, 14			
1	G1/4	G1/8	320	152789	NAVW-1/4-1-ISO
2	G3/8	G1/8	550	152790	NAVW-3/8-2-ISO
3	G1/2	G1/8	1,020	152791	NAVW-1/2-3-ISO

End plate kit NEV

Materials:

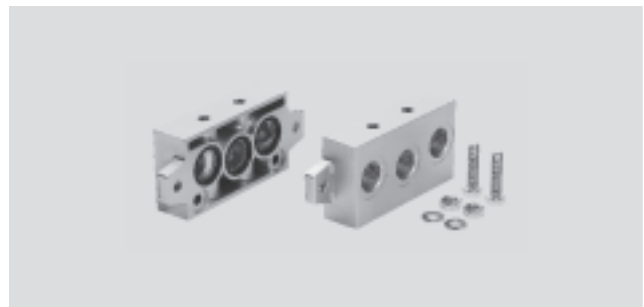
ISO size 1, 2, 3:

Die-cast aluminium

ISO size 4:

Anodised aluminium

Dimensions → 93



General technical data	
Conforms to standard	ISO 5599-1

Operating and environmental conditions				
ISO size	1	2	3	4
Note on materials	Free of copper and PTFE			-

Ordering data					
Designation to VDMA	ISO size	Pneumatic connection	Weight [g]	Part No.	Type
		1, 3, 5			
VDMA 24345-D-1	1	G3/8	280	10174	NEV-1DA/DB-ISO
VDMA 24345-D-2	2	G1/2	450	11306	NEV-2DA/DB-ISO
VDMA 24345-D-3	3	G1	760	10176	NEV-3DA/DB-ISO
VDMA 24345-D-4	4	G1	1,390	11140	NEV-4DA/DB-ISO

Note: This product conforms to ISO 1179-1 and ISO 228-1

Solenoid/pneumatic valves, to ISO 5599-1

Accessories

Blanking plate NDV

Materials:
 ISO size 1, 2, 3:
 Steel

 ISO size 4:
 Wrought aluminium alloy

 Dimensions → 93



General technical data	
Conforms to standard	ISO 5599-1

Operating and environmental conditions	
Operating medium	Compressed air according to ISO 8573-1:2010 [7:-:-]
Note on operating/pilot medium	Lubricated operation possible (in which case lubricated operation will always be required)

Ordering data			
ISO size	Weight [g]	Part No.	Type
1	113	9489	NDV-1-ISO
2	166	11308	NDV-2-ISO
3	314	10340	NDV-3-ISO
4	1,480	11142	NDV-4-ISO

Isolating disc NSC

Materials:
 Die-cast aluminium

 Dimensions → 93



General technical data	
Conforms to standard	ISO 5599-1

Operating and environmental conditions				
ISO size	1	2	3	4
Note on materials	Free of copper and PTFE			-

Ordering data				
ISO size	Pneumatic connection	Weight [g]	Part No.	Type
1	G $\frac{1}{4}$	6	11550	NSC- $\frac{1}{4}$ -1-ISO
2	G $\frac{3}{8}$	9.2	11908	NSC- $\frac{3}{8}$ -2-ISO
3	G $\frac{1}{2}$	20	11551	NSC- $\frac{1}{2}$ -3-ISO
4	G $\frac{3}{4}$	24	11699	NSC- $\frac{3}{4}$ -4-ISO

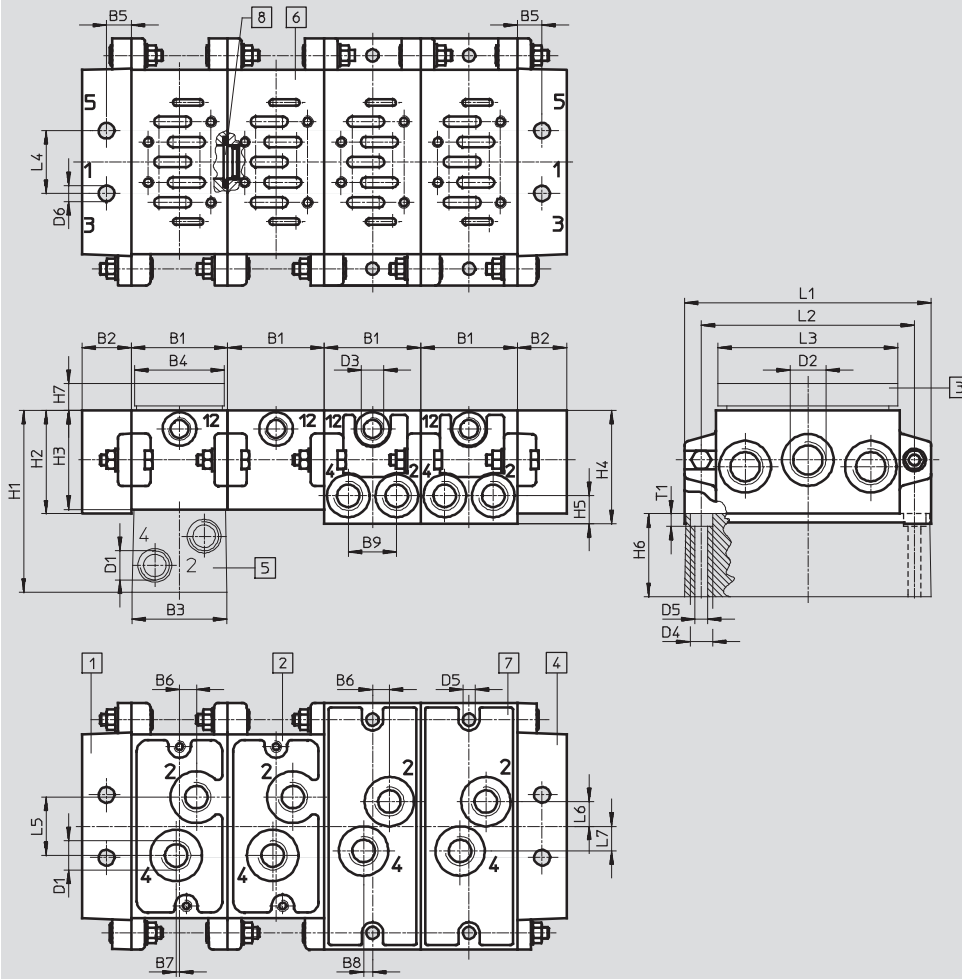
Solenoid/pneumatic valves, to ISO 5599-1

Accessories

FESTO

Dimensions – Manifold assembly

Download CAD Data → www.festo.com/us/cad



- 1 Left-hand end plate
- 2 Manifold sub-base NAV
- 3 Blanking plate NDV
- 4 Right-hand end plate
- 5 90° connection plate NAW
- 6 Port pattern to ISO 5599-1
- 7 Manifold sub-base with 90° connections NAVW
- 8 Isolating disc NSC

ISO size	B1	B2	B3	B4	B5	B6	B7	B8	B9	D1	D2	D3	D4 Ø	D5 Ø	D6 Ø
1	43	22	42	40	11	7.5	1.5	4	21.6	G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{8}$	10	5.5	7
2	56	26	55	50	13	6	5	6	27	G $\frac{3}{8}$	G $\frac{1}{2}$	G $\frac{1}{8}$	11	6.6	9
3	71	30	70	70	15	8	6	6	35.5	G $\frac{1}{2}$	G1	G $\frac{1}{8}$	15	9	12
4	82	30	80	80	15	9	8	-	-	G $\frac{3}{4}$	G1	G $\frac{1}{8}$	15	9	12

ISO size	H1	H2	H3	H4	H5	H6	H7	L1	L2	L3	L4	L5	L6	L7	T1
1	81	46	44	50.5	12.5	37	5	110	95	80	28	26	11	11	5.7
2	85	47	45	60	15	40	5	135	115	96	35	30	15	14	6.8
3	99	56	54	66	17.5	45	5	190	168	120	52	38	19	19	9
4	120	58	55	-	-	65	5	215	184	-	56	52	-	-	9

Note: This product conforms to ISO 1179-1 and ISO 228-1

Solenoid/pneumatic valves, to ISO 5599-1

Accessories

FESTO

Flow control plate GRO

Exhaust air flow control for 3 and 5

Materials:
Anodised aluminium

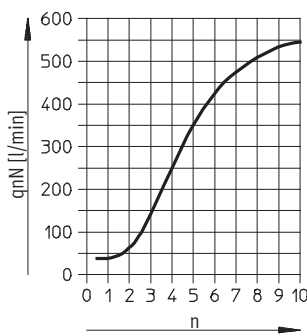


General technical data	
Based on standard	ISO 5599-1
Integrated function	Flow control valve, non-return valve

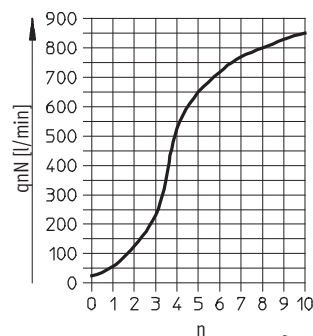
Operating and environmental conditions	
Note on materials	RoHS-compliant
Certification	UL recognized (OL)

Standard nominal flow rate q_{nN} as a function of turns n of the regulating screw

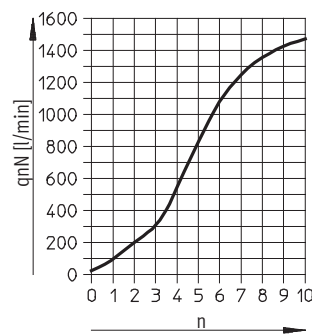
GRO-ZP-1-ISO-B



GRO-ZP-2-ISO-B

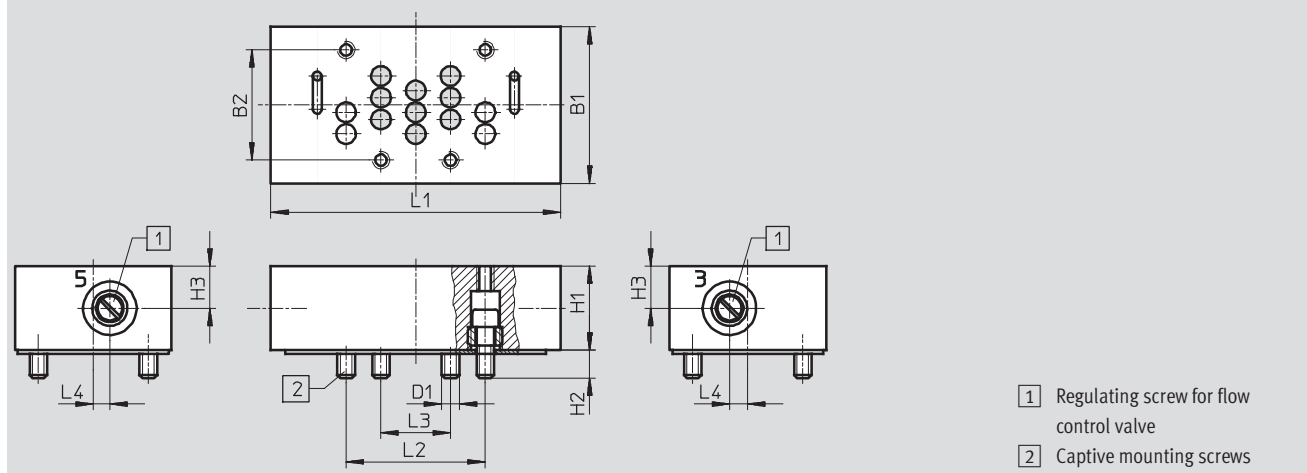


GRO-ZP-3-ISO



Dimensions

Download CAD Data → www.festo.com/us/cad



- 1 Regulating screw for flow control valve
- 2 Captive mounting screws

Dimensions and ordering data												
ISO size	D1	B1	B2	H1	H2	H3	L1	L2	L3	L4	Weight [g]	Part No. Type
1	M5	42	28	25	6.5	12.5	77	36	18	6	230	151705 GRO-ZP-1-ISO-B
2	M6	54	38	29	9.5	14.5	100	48	24	6.3	440	151706 GRO-ZP-2-ISO-B
3	M8	70	48	33	12	16.5	132	64	32	7	850	119674 GRO-ZP-3-ISO

Solenoid/pneumatic valves, to ISO 5599-1

Accessories

Intermediate pressure regulator
plate
LR-ZP

Materials:
Housing: Die-cast aluminium, steel
Seals: NBR

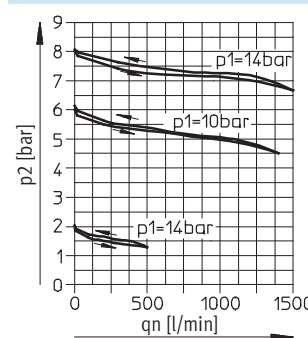


General technical data	
Conforms to standard	ISO 5599-1
Integrated function	Pressure regulator
Design	Piston
Pressure regulation range	[bar] 0 ... 12
Supply pressure 1	[bar] Max. 14
Type of mounting	2 through-holes in housing

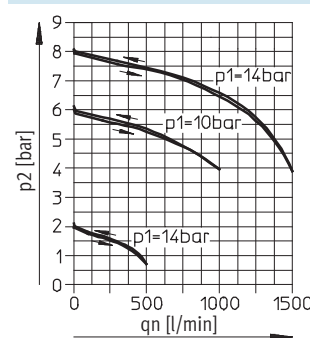
Operating and environmental conditions			
ISO size	1	2	3
Note on materials	Contains PWIS (paint-wetting impairment substances)		
	-	-	RoHS-compliant
Certification	UL recognized (OL)		

Flow rate q_n as a function of output pressure p_2

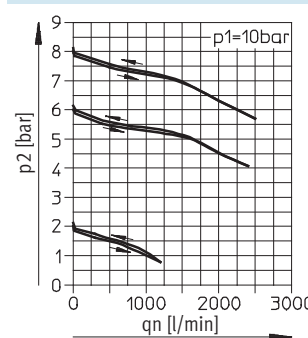
LR-ZP-A-D-1, LR-ZP-B-1,
LR-ZP-A/B-1



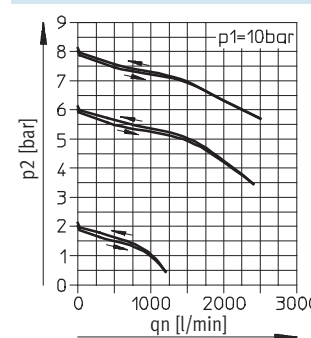
LR-ZP-P-D-1



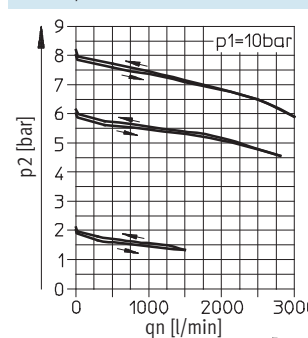
LR-ZP-A-D-2, LR-ZP-B-2,
LR-ZP-A/B-2



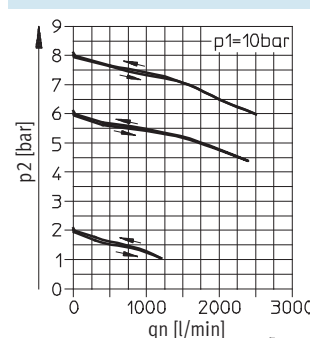
LR-ZP-P-D-2



LR-ZP-A-D-3, LR-ZP-B-3,
LR-ZP-A/B-3



LR-ZP-P-D-3



Solenoid/pneumatic valves, to ISO 5599-1

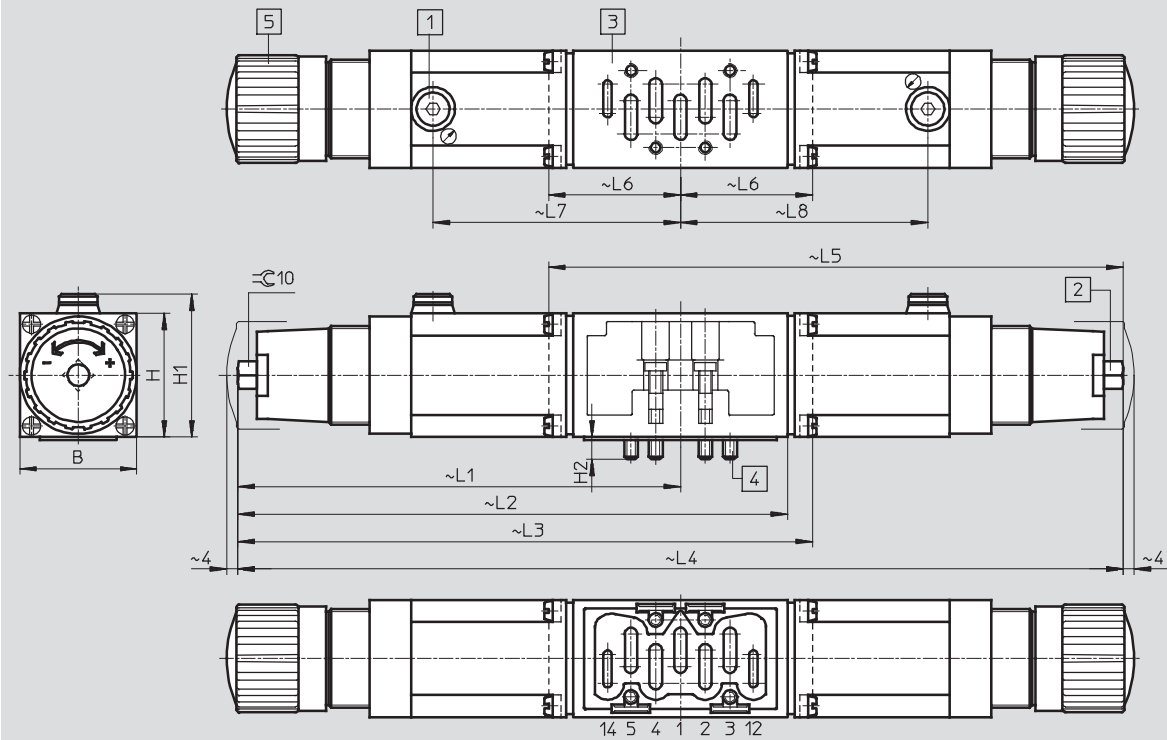
Accessories

FESTO

Dimensions

Download CAD Data → www.festo.com/us/cad

Intermediate pressure regulator plates LR-ZP – ISO size 1, 2, 3



- 1 Pressure gauge connection G $\frac{1}{8}$
- 2 Regulating screw
- 3 Port pattern to ISO 5599-1
- 4 Captive mounting screws
- 5 Rotary knob

Regulated port	B	H	H1	H2	L1	L2	L3	L4	L5	L6	L7	L8
ISO size 1												
1	42.6	45	52	8	161	–	209	–	–	48	90	–
2					–	–	–	209	48	–	90	
4					161	–	–	322	–	–	90	90
2, 4					161	200	–	–	–	–	90	–
ISO size 2												
1	54	58	62.5	10	188	–	247	–	–	–	105.5	–
2					–	–	–	247	59	–	105.5	
4					188	–	–	376	–	–	105.5	105.5
2, 4					188	233	–	–	–	–	105.5	–
ISO size 3												
1	70	63	65	14	201.5	–	274	–	–	–	119	–
2					201.5	–	–	–	274	72.5	–	119
4					201.5	–	–	403	–	–	119	119
2, 4					201.5	260	–	–	–	–	119	–

Solenoid/pneumatic valves, to ISO 5599-1

Accessories

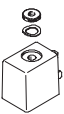

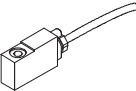
Ordering data					
	Regulated port	ISO size	Weight [g]	Part No.	Type
	1	1	520	35966	LR-ZP-P-D-1
		2	960	35967	LR-ZP-P-D-2
		3	1,220	35968	LR-ZP-P-D-3
	2	1	520	35424	LR-ZP-B-D-1
		2	960	35425	LR-ZP-B-D-2
		3	1,220	35426	LR-ZP-B-D-3
	4	1	520	35969	LR-ZP-A-D-1
		2	960	35970	LR-ZP-A-D-2
		3	1,220	35971	LR-ZP-A-D-3
	2, 4	1	840	35427	LR-ZP-A/B-D-1
		2	1,490	35428	LR-ZP-A/B-D-2
		3	1,770	35429	LR-ZP-A/B-D-3

Ordering data – Accessories					
		ISO size	Weight [g]	Part No.	Type
Pressure gauge for intermediate pressure regulator plates LR-ZP		1, 2, 3	64.5	345395	MA-40-16-1/8

Note: This product conforms to ISO 1179-1 and ISO 228-1

Solenoid/pneumatic valves, to ISO 5599-1



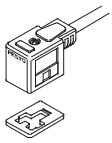
Accessories

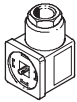
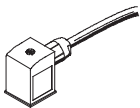
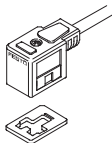
Ordering data – Solenoid coils				
	Voltage	Cable length [m]	Part No.	Type
F solenoid coils for valves MFH, JMFH				
	12 V DC	–	34410	MSFG-12DC-OD
	24 V DC and 42 V AC, 50 ... 60 Hz	–	34411	MSFG-24/42-50/60-OD
	42 V DC	–	34413	MSFG-42DC-OD
	24 V AC	–	34415	MSFG-24AC-OD
	48 V AC, 50 ... 60 Hz	–	34418	MSFW-48AC-OD
	110 V AC, 50 ... 60 Hz and 120 V AC, 60 Hz	–	34420	MSFW-110AC-OD
	230 V AC, 50 ... 60 Hz and 240 V AC, 60 Hz	–	34422	MSFW-230AC-OD
	240 V AC, 50 ... 60 Hz	–	34424	MSFW-240AC-OD
N1 solenoid coils for valves MN1H, JMN1H				
	24 V DC	–	123060	MSN1G-24DC-OD
	12 V DC and 24 V AC, 50 ... 60 Hz	–	170152	MSN1W-24AC/12DC
	110 V AC, 50 ... 60 Hz	–	123061	MSN1W-110AC-OD
	230 V AC, 50 ... 60 Hz	–	123062	MSN1W-230AC-OD
F solenoid coils for valves MFH, JMFH – Explosion-proof to EN 50028				
	24 V DC	1	535619	MSFG-24DC-EX
	24 V DC	5	535621	MSFG-24DC-EX-K5
	24 V AC, 50 ... 60 Hz	1	535623	MSFW-24AC-EX
	110 V AC, 50 ... 60 Hz	1	535622	MSFW-110AC-EX
	230 V AC, 50 ... 60 Hz	1	535620	MSFW-110AC-EX
	230 V AC, 50 ... 60 Hz	5	535625	MSFW-110AC-EX-K5

Solenoid/pneumatic valves, to ISO 5599-1

Accessories


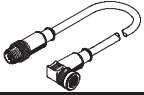
FESTO



Ordering data – Plug sockets, plug sockets with cable for F solenoid coils					
	Description	Cable length [m]	Switching status display via LED	Part No.	Type
Plug socket without cable					
	Angled socket, screw terminal, cable connector Pg9	–	–	34431	MSSD-F
	Angled socket, screw terminal, cable connector M16	–	–	59710	MSSD-F-M16
Plug socket without cable					
	Angled socket, insulation displacement connector	–	–	192746	MSSD-F-S-M16
Plug socket with cable					
	24 V DC	2.5	■	30935	KMF-1-24DC-2,5-LED
	24 V DC	5	■	30937	KMF-1-24DC-5-LED
	24 V DC	10	■	193458	KMF-1-24DC-10-LED
	Up to 240 V	2.5	–	30936	KMF-1-230AC-2,5
	Up to 240 V	5	–	30938	KMF-1-230AC-5

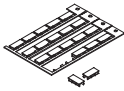

Ordering data – Plug sockets, plug sockets with cable for N1 and D solenoid coils					
	Description	Cable length [m]	Switching status display via LED	Part No.	Type
Plug socket without cable					
	Angled socket, screw terminal, cable connector Pg9	–	–	34583	MSSD-C
	Angled socket, screw terminal, cable connector M16	–	–	539709	MSSD-C-M16
Plug socket without cable					
	Angled socket, insulation displacement connector	–	–	192748	MSSD-C-S-M16
Plug socket with cable					
	24 V DC	2.5	■	30931	KMC-1-24DC-2,5-LED
	24 V DC	5	■	30933	KMC-1-24DC-5-LED
	24 V DC	10	■	193459	KMC-1-24DC-10-LED
	Up to 230 V	2.5	–	30932	KMC-1-230AC-2,5
	Up to 230 V	5	–	30934	KMC-1-230AC-5

Solenoid/pneumatic valves, to ISO 5599-1

Accessories

Ordering data – Plug sockets, plug sockets with cable for valves with central plug			
	Description	Part No.	Type
Plug socket without cable			
	Angled socket, M12, 4-pin, type A, screw terminal	185498	SEA-M12-4WD-PG7
Plug socket with cable			
	Connecting cable, straight plug, angled socket	M12, 4-pin, 1.0 m	185499 KM12 M12-GSWD-1-4

Ordering data – Illuminating seal			
	Description	Voltage	Part No. Type
	For F solenoid coils	12 ... 24 V DC	19143 MF-LD-12-24DC
		230 V DC/V AC	19144 MF-LD-230AC
	For N1 solenoid coils	12 ... 24 V DC	19145 MC-LD-12-24DC
		230 V DC/V AC	19146 MC-LD-230AC

Ordering data – Accessories			
	Description	Part No.	Type
Inscription label			
	Inscription label for valves (24 in frames included in the scope of delivery)	161937	IBS-9x17
Manual override			
	Tool for manual override	Valves MEBH	157601 AHB-MEB
		Valves MN1H/MFH	157651 AHB-MD/MF/MV

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.

To meet this commitment, we strive to ensure a consistent, integrated, and systematic approach to management that will meet or exceed the requirements of the ISO 9001 standard for Quality Management and the ISO 14001 standard for Environmental Management.



© Copyright 2008, Festo Corporation. While every effort is made to ensure that all dimensions and specifications are correct, Festo cannot guarantee that publications are completely free of any error, in particular typing or printing errors. Accordingly, Festo cannot be held responsible for the same. For Liability and Warranty conditions, refer to our "Terms and Conditions of Sale", available from your local Festo office. All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, electronic, mechanical, photocopying or otherwise, without the prior written permission of Festo. All technical data subject to change according to technical update.



Printed on recycled paper at New Horizon Graphic, Inc., FSC certified as an environmentally friendly printing plant.

Festo North America

Festo Regional Contact Center

5300 Explorer Drive
Mississauga, Ontario L4W 5G4
Canada

USA Customers:

For ordering assistance,

Call: 1.800.99.FESTO (1.800.993.3786)

Fax: 1.800.96.FESTO (1.800.963.3786)

Email: customer.service@us.festo.com

For technical support,

Call: 1.866.GO.FESTO (1.866.463.3786)

Fax: 1.800.96.FESTO (1.800.963.3786)

Email: product.support@us.festo.com

Canadian Customers:

Call: 1.877.GO.FESTO (1.877.463.3786)

Fax: 1.877.FX.FESTO (1.877.393.3786)

Email: festo.canada@ca.festo.com

USA Headquarters

Festo Corporation
395 Moreland Road
P.O. Box 18023
Hauppauge, NY 11788, USA
www.festo.com/us

USA Sales Offices

Appleton

North 922 Tower View Drive, Suite N
Greenville, WI 54942, USA

Boston

120 Presidential Way, Suite 330
Woburn, MA 01801, USA

Chicago

1441 East Business Center Drive
Mt. Prospect, IL 60056, USA

Dallas

1825 Lakeway Drive, Suite 600
Lewisville, TX 75057, USA

Detroit – Automotive Engineering Center

2601 Cambridge Court, Suite 320
Auburn Hills, MI 48326, USA

New York

395 Moreland Road
Hauppauge, NY 11788, USA

Silicon Valley

4935 Southfront Road, Suite F
Livermore, CA 94550, USA

United States



USA Headquarters, East: Festo Corp., 395 Moreland Road, Hauppauge, NY 11788

Phone: 1.631.435.0800; Fax: 1.631.435.8026;

Email: info@festo-usa.com

www.festo.com/us

Canada



Headquarters: Festo Inc., 5300 Explorer Drive, Mississauga, Ontario L4W 5G4

Phone: 1.905.624.9000; Fax: 1.905.624.9001;

Email: festo.canada@ca.festo.com

www.festo.ca

Mexico



Headquarters: Festo Pneumatic, S.A., Av. Ceylán 3, Col. Tequesquahuac,
54020 Tlalnepanitla, Edo. de México

Phone: 011 52 [55] 53 21 66 00; Fax: 011 52 [55] 53 21 66 65;

Email: festo.mexico@mx.festo.com

www.festo.com/mx

Central USA

Festo Corporation
1441 East Business
Center Drive
Mt. Prospect, IL 60056, USA
Phone: 1.847.759.2600
Fax: 1.847.768.9480



Western USA

Festo Corporation
4935 Southfront Road,
Suite F
Livermore, CA 94550, USA
Phone: 1.925.371.1099
Fax: 1.925.245.1286



Festo Worldwide

Argentina Australia Austria Belarus Belgium Brazil Bulgaria Canada Chile China Colombia Croatia Czech Republic Denmark
Estonia Finland France Germany Great Britain Greece Hong Kong Hungary India Indonesia Iran Ireland Israel Italy Japan Latvia
Lithuania Malaysia Mexico Netherlands New Zealand Norway Peru Philippines Poland Romania Russia Serbia Singapore
Slovakia Slovenia South Africa South Korea Spain Sweden Switzerland Taiwan Thailand Turkey Ukraine United States Venezuela

www.festo.com