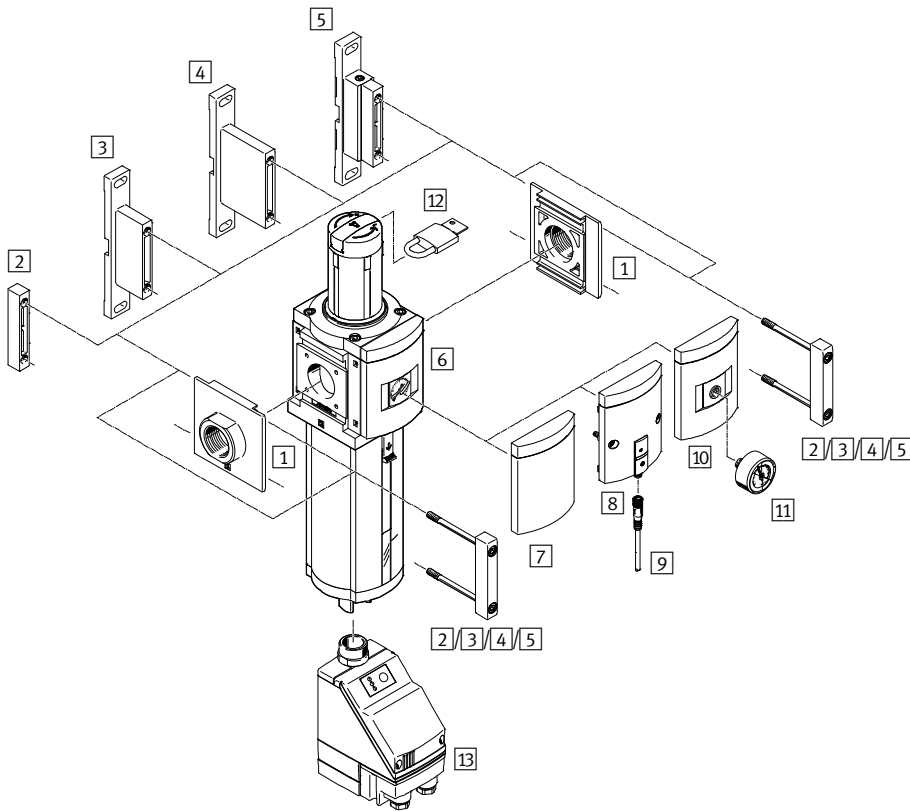



Filter regulators MS-LFR, MS series, NPT



Filter regulators MS9-LFR, MS series, NPT

Peripherals overview



 Note
Additional accessories:
– Module connector for combinations with size MS6, MS9 or MS12
→ Internet: rmv, armv

Mounting attachments and accessories					
		Individual unit		Combination	→ Page/ Internet
		With female thread N $\frac{3}{4}$ or N1	With connecting plate AQ...	Module without connecting thread, without connecting plate NG	
1	Connecting plate-SET MS9-AQ...	-	■	■	ms9-aq
2	Module connector MS9-MV	-	-	■	ms9-mv
3	Mounting bracket MS9-WP	■	■	■	ms9-wp
4	Mounting bracket MS9-WPB	■	■	■	ms9-wp
5	Mounting bracket MS9-WPM	■	■	■	ms9-wp
6	MS pressure gauge AG	■	■	■	12
7	Cover plate VS	■	■	■	12
8	Pressure sensor without display AD7 ... AD10	■	■	■	12
9	Connecting cable NEBU-M8...-LE3	■	■	■	15
10	Adapter plate for EN pressure gauge $\frac{1}{4}$ A4	■	■	■	12
11	Pressure gauge MA	■	■	■	15
12	Padlock LRVS-D	■	■	■	15
13	Condensate drain, fully automatic, electrically actuated E2/E3/E4	■	■	■	12

Filter regulators MS9-LFR, MS series, NPT

Type codes

		MS	9	-	LFR	-	NG	-	D6	-	E	U	M	-	DI	-	AG	-	PSI	-	AS	
Series																						
MS	Standard service unit																					
Size																						
9	Grid dimension 90 mm																					
Service function																						
LFR	Filter regulator																					
Connection size																						
NG	Module without connecting thread, without connecting plate																					
Pressure regulation range/operation mode																						
D6	0.5 ... 7 bar, manually operated																					
Grade of filtration																						
C	5 µm																					
E	40 µm																					
Bowl guard																						
U	Integrated as metal bowl																					
Condensate drain																						
M	Manual rotary																					
V	Fully automatic																					
Regulator type																						
	Piloted																					
DI	Directly actuated																					
Pressure gauge																						
AG	MS pressure gauge																					
Pressure gauge scale																						
PSI	Psi																					
Security																						
AS	Rotary knob with detent, can be locked using accessories																					

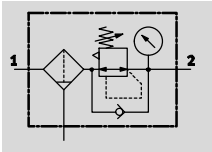
Additional variants can be ordered using the modular system → 12




- Connecting plates
- Pressure regulation range
- Condensate drain
- Pressure gauge alternatives
- Alternative pressure gauge scale
- Secondary venting
- Security lock
- Type of mounting
- UL certification
- Alternative flow direction

Filter regulators MS9-LFR, MS series, NPT

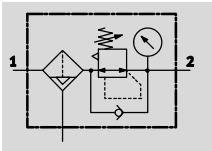
Technical data

Manual rotary condensate drain, with pressure gauge



-  - Flow rate
6,000 ... 23,000 l/min
-  - Temperature range
-10 ... +60 °C
-  - Supply pressure
1 ... 20 bar

Semi or fully automatic condensate drain, with pressure gauge



With this component, the filter and pressure regulator are combined into a single unit. The sintered filter with water separator removes contamination, pipe sinter, rust and condensate from the compressed air.

- Good regulation characteristics with low hysteresis and primary pressure compensation
- Good particle and condensate separation
- Piloted or directly actuated filter-diaphragm regulator
- High flow rates
- Available with or without secondary venting
- Four pressure regulation ranges: 0.5 ... 4 bar, 0.5 ... 7 bar, 0.5 ... 12 bar and 0.5 ... 16 bar
- Actuator lock to protect set values against adjustment
- Pressure gauge connection for different fitting options
- Available with manual, semi-automatic, fully automatic or fully automatic, electrically actuated condensate drain
- Optional pressure sensor
- Choice of filter cartridges: 5 µm or 40 µm
- New filter cartridges → 14



General technical data					
Pneumatic connection 1, 2		NPT3/4-14	NPT1-1 1/2	NPT1/2-14 ... NPT1 1/2-1 1/2 (with connecting plate AQ...)	- (without connecting thread NG)
Design		Piloted filter-diaphragm regulator			Directly actuated filter-diaphragm regulator
Regulator type	Piloted	Output pressure constant, with return flow action, with primary pressure compensation, with secondary venting			
	Directly actuated	Output pressure constant, with return flow action, with/without secondary venting			
Type of mounting		Via accessories			In-line installation
Mounting position		Vertical ±5°			
Grade of filtration	[µm]	5 (air purity class at the output: compressed air in accordance with ISO 8573-1:2010 [6:4:4])			
		40 (air purity class at the output: compressed air in accordance with ISO 8573-1:2010 [7:4:4])			
Bowl guard		Integrated as metal bowl			
Condensate drain		Manual rotary			
		Semi-automatic			
		Fully automatic			
		Fully automatic, electrically actuated			
Security		Rotary knob with detent			
		Rotary knob with detent, can be locked using accessories			
		Rotary knob with integrated lock			
Pressure regulation range/operation mode	D5 [bar]	0.5 ... 4, manually operated			
	D6 [bar]	0.5 ... 7, manually operated			
	D7 [bar]	0.5 ... 12, manually operated (0.5 ... 10 with pressure sensor variant AD...)			
	D8 [bar]	0.5 ... 16, manually operated (0.5 ... 10 with pressure sensor variant AD...)			
Max. pressure hysteresis		[bar]	0.4		
Pressure display		Via pressure sensor for displaying output pressure via operational status indicator and electrical output			
		Via pressure gauge for displaying output pressure			
		Via pressure gauge with red/green scale for displaying output pressure			
		G1/4 prepared			
Max. condensate volume		[ml]	220		

Filter regulators MS9-LFR, MS series, NPT

Technical data

Standard nominal flow rate $q_{nN}^{1)2)}$ [l/min]					
Design	Piloted filter-diaphragm regulator			Directly actuated filter-diaphragm regulator DI	
Pneumatic connection	NPT $\frac{3}{4}$ -14		NPT1-11 $\frac{1}{2}$	NPT $\frac{3}{4}$ -14	NPT1-11 $\frac{1}{2}$
D5 – Pressure regulation range 0.5 ... 4 bar					
Grade of filtration	5 μ m	17,000 ³⁾	20,000 ³⁾	16,000 ³⁾	18,000 ³⁾
	40 μ m	18,000 ³⁾	23,000 ³⁾	16,000 ³⁾	20,000 ³⁾
D6 – Pressure regulation range 0.5 ... 7 bar					
Grade of filtration	5 μ m	15,000	18,000	12,000	10,000
	40 μ m	16,000	20,000	12,000	10,000
D7 – Pressure regulation range 0.5 ... 12 bar					
Grade of filtration	5 μ m	15,000	18,000	–	–
	40 μ m	16,000	20,000	–	–
D8 – Pressure regulation range 0.5 ... 16 bar					
Grade of filtration	5 μ m	15,000	18,000	–	–
	40 μ m	16,000	20,000	–	–

 1) All values $\pm 15\%$

 2) Measured at $p_1 = 10$ bar and $p_2 = 6$ bar, $\Delta p = 1$ bar

 3) Measured at $p_1 = 10$ bar and $p_2 = 4$ bar, $\Delta p = 1$ bar

Operating and environmental conditions				
Condensate drain	Manual rotary	Semi-automatic	Fully automatic	Fully automatic, electrically actuated
	M	H	V	E2/E3/E4
Operating pressure [bar]	1 ... 20	1.5 ... 12	2 ... 12	1 ... 16
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [-:4:-]	Compressed air in accordance with ISO 8573-1:2010 [-:4:-]	Compressed air in accordance with ISO 8573-1:2010 [7:4:-]	Compressed air in accordance with ISO 8573-1:2010 [-:4:-]
Ambient temperature [°C]	-10 ... +60	+5 ... +60	+5 ... +60	+1 ... +60
Ambient temperature with pressure sensor AD [°C]	0 ... +50	+5 ... +50	+5 ... +50	+1 ... +50
Temperature of medium [°C]	-10 ... +60	+5 ... +60	+5 ... +60	+1 ... +60
Temperature of medium with pressure sensor AD [°C]	0 ... +50	+5 ... +50	+5 ... +50	+1 ... +50
Storage temperature [°C]	-10 ... +60	+5 ... +60	+5 ... +60	+1 ... +60
Corrosion resistance class CRC ¹⁾	2			
Certification (variant UL1)	cULus recognized (OL)			

1) CRC2: Corrosion resistance class to Festo standard 940 070

Components with medium corrosion exposure. Externally visible components with significant decorative function in direct contact with normal industrial atmosphere or media such as coolants and lubricants.

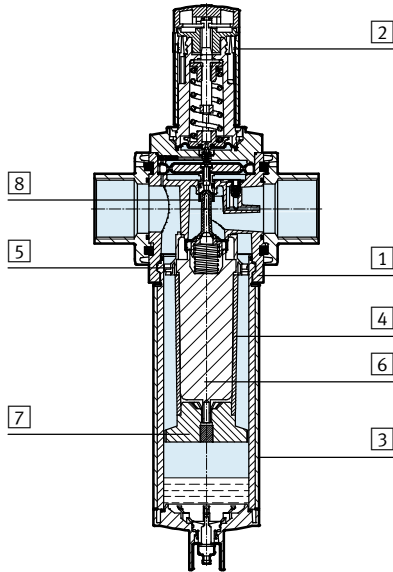
Weight [g]		
Rotary knob	Without integrated lock E11	With integrated lock E11
Filter regulator with metal bowl U	2,400	2,700
Filter regulator with metal bowl U and fully automatic condensate drain, electrically actuated E2/E3/E4	2,800	3,100

Filter regulators MS9-LFR, MS series, NPT

Technical data

Materials

Sectional view



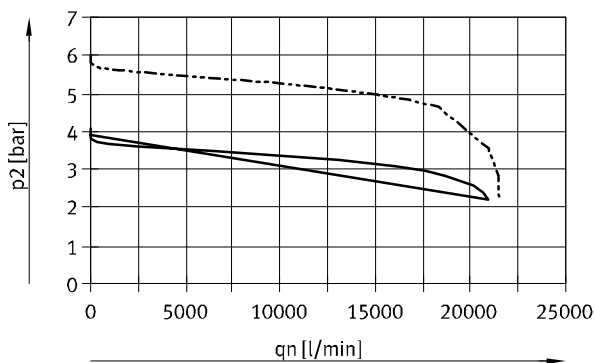
Filter regulator

1	Housing	Die-cast aluminium
2	Rotary knob	PA
	Rotary knob with integrated lock E11	Aluminium
3	Bowl	Wrought aluminium alloy
	Inspection window	PA
4	Filter element	PE
5	Spin disc	POM
6	Filter holder	POM
7	Separating plate	POM
8	Valve stem	Wrought aluminium alloy, NBR, POM
-	Cover	PA reinforced
-	Connecting plate, module connector, mounting bracket	Die-cast aluminium
-	Seals, diaphragm	NBR
Note on materials		RoHS-compliant (not with variant E2, E3 or E4)

Standard flow rate q_n as a function of output pressure p_2 at operating pressure $p_1 = 10$ bar

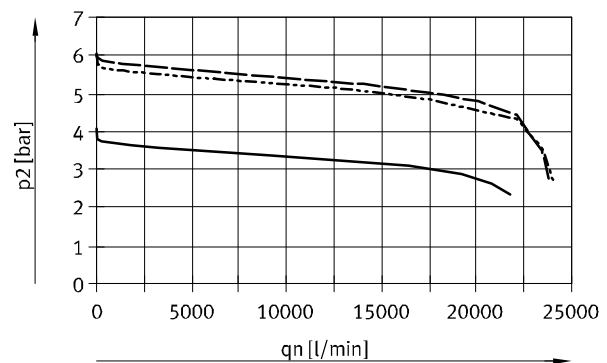
Piloted filter-diaphragm regulator

Grade of filtration $5 \mu\text{m}$, pneumatic connection NPT $\frac{3}{4}$ -14



— D5: 0.5 ... 4 bar
 - - - D6: 0.5 ... 7 bar,
 D7: 0.5 ... 12 bar,
 D8: 0.5 ... 16 bar

Grade of filtration $40 \mu\text{m}$, pneumatic connection NPT $\frac{3}{4}$ -14



— D5: 0.5 ... 4 bar
 - - - D6: 0.5 ... 7 bar,
 D8: 0.5 ... 16 bar
 - - - D7: 0.5 ... 12 bar

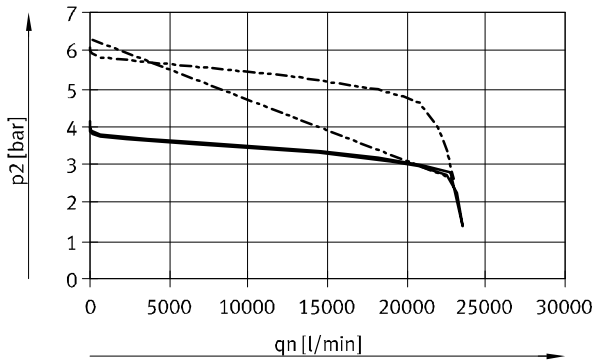
Filter regulators MS9-LFR, MS series, NPT

Technical data

Standard flow rate q_n as a function of output pressure p_2 at operating pressure $p_1 = 10$ bar

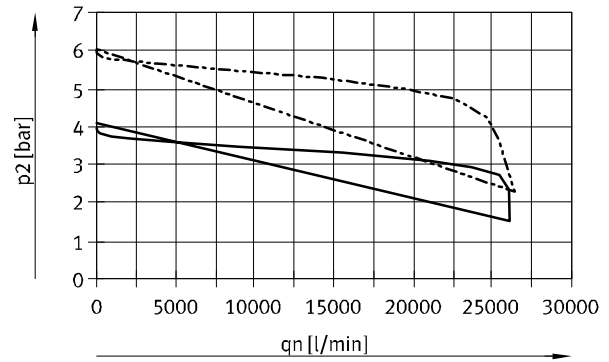
Piloted filter-diaphragm regulator

Grade of filtration $5 \mu\text{m}$, pneumatic connection NPT1-11½



— D5: 0.5 ... 4 bar
 - - - D6: 0.5 ... 7 bar,
 ····· D7: 0.5 ... 12 bar,
 - · - · D8: 0.5 ... 16 bar

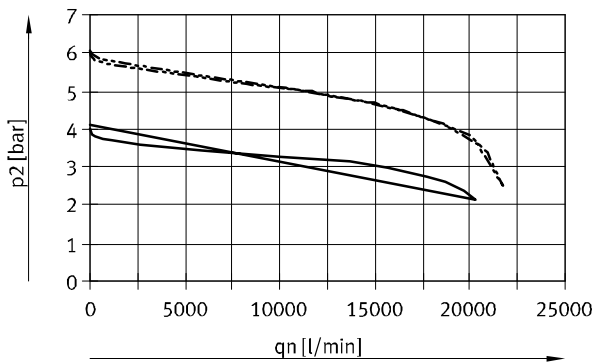
Grade of filtration $40 \mu\text{m}$, pneumatic connection NPT1-11½



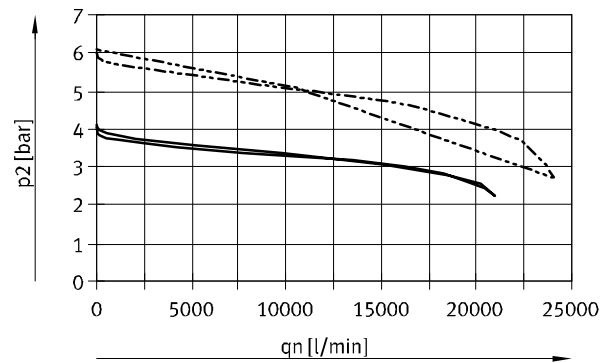
Standard flow rate q_n as a function of output pressure p_2 at operating pressure $p_1 = 10$ bar

Directly actuated filter-diaphragm regulator DI

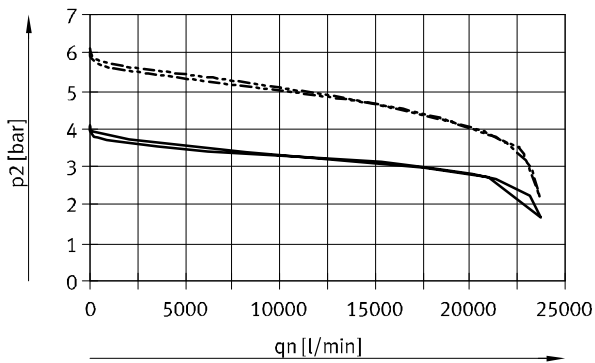
Grade of filtration $5 \mu\text{m}$, pneumatic connection NPT¾-14



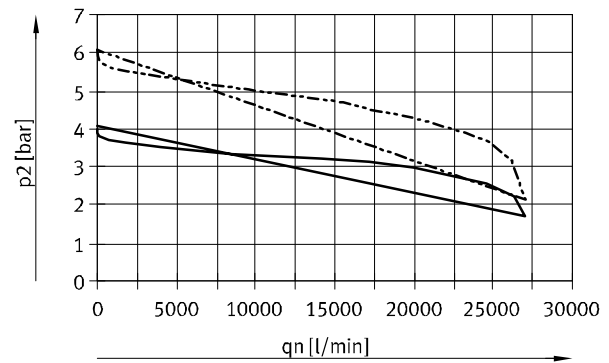
Grade of filtration $40 \mu\text{m}$, pneumatic connection NPT¾-14



Grade of filtration $5 \mu\text{m}$, pneumatic connection NPT1-11½



Grade of filtration $40 \mu\text{m}$, pneumatic connection NPT1-11½



— D5: 0.5 ... 4 bar
 - - - D6: 0.5 ... 7 bar

New
Variant UL1

Filter regulators MS9-LFR, MS series, NPT

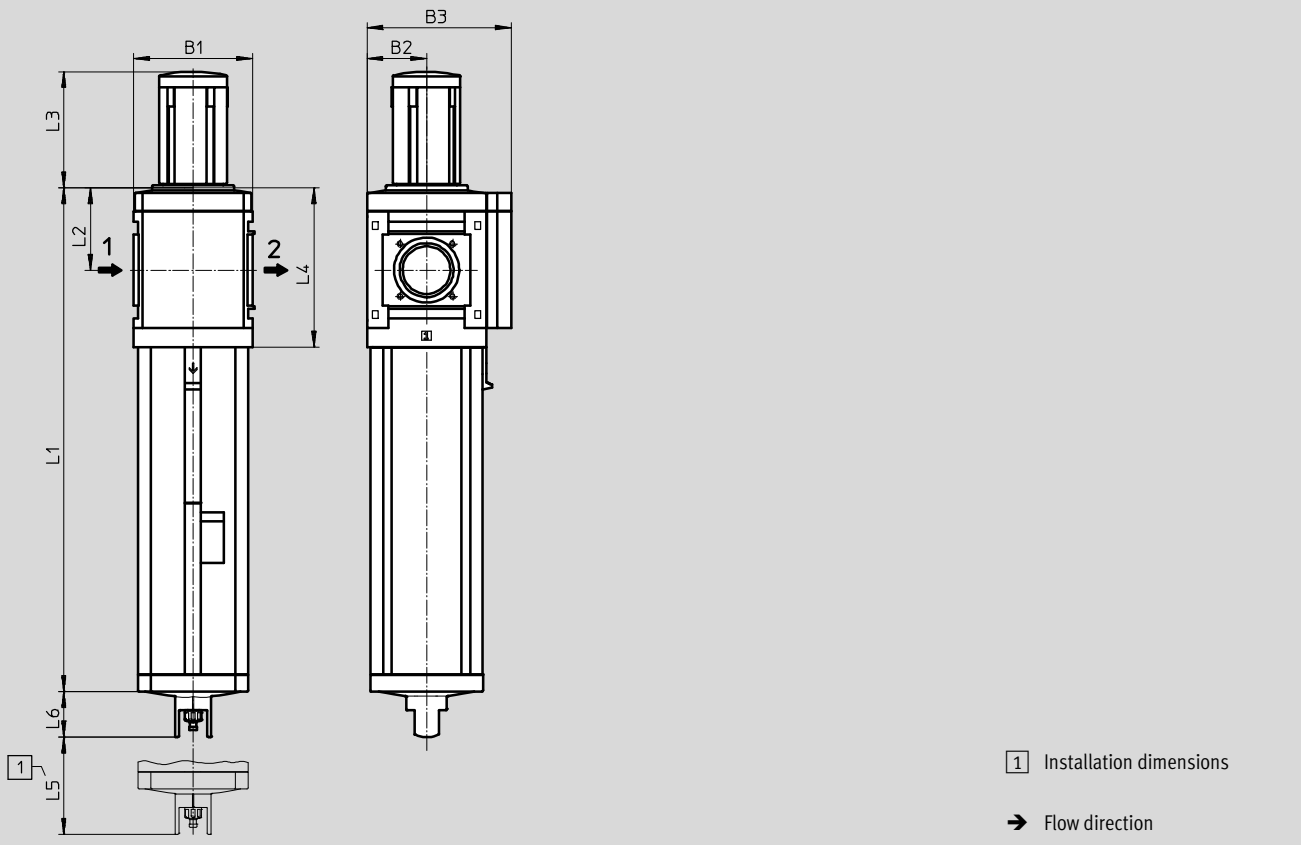
Technical data

FESTO

Dimensions – Basic version

Download CAD data → www.festo.com

Without connecting thread NG, cover plate VS, rotary knob with detent



Type	B1	B2	B3	L1		L2		L3	L4		L5	L6
				pilot actuated	directly actuated DI	pilot actuated	directly actuated DI		pilot actuated	directly actuated DI		
MS9-LFR-NG	90	45	109	320	313	69	62	86	127	120	150	34.5

Filter regulators MS9-LFR, MS series, NPT

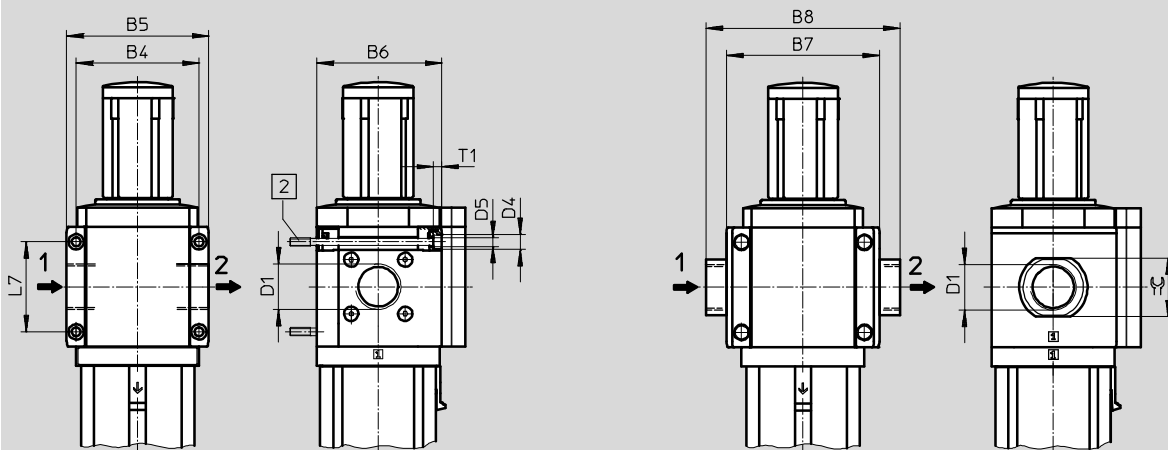
Technical data

Dimensions – Connecting thread/connecting plate

Download CAD data → www.festo.com

With connecting thread N $\frac{3}{4}$ or N1

With connecting plate AQ...



2 Mounting screw M6xmin.90 to DIN 912 (not included in the scope of delivery) for wall mounting without mounting bracket

→ Flow direction

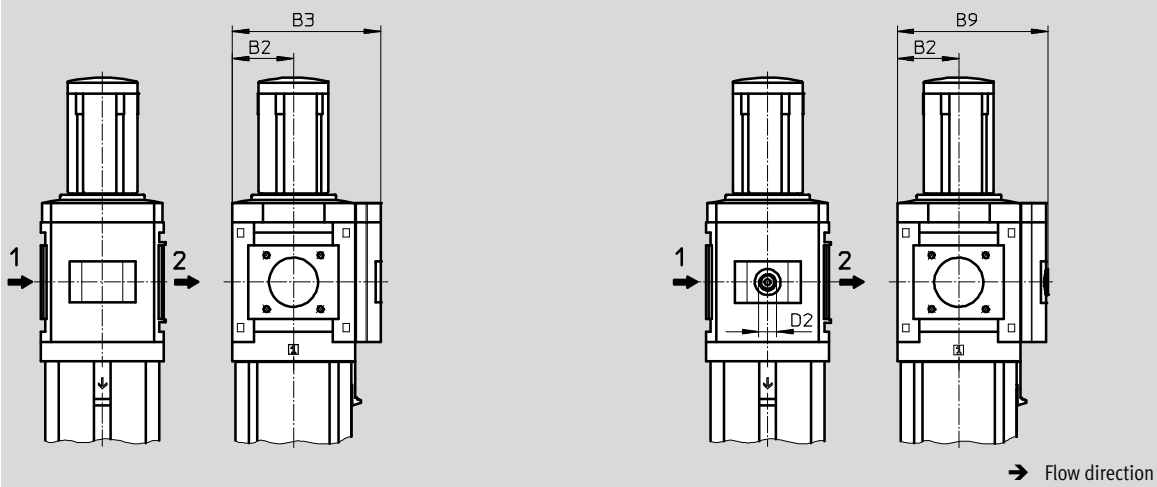
Type	B4	B5	B6	B7	B8	D1	D4	D5	L7	T1	⌀
MS9-LFR-N $\frac{3}{4}$	90	104	91.5	-	-	NPT $\frac{3}{4}$ -14	11	6.5	66	6	-
MS9-LFR-N1						NPT1-11 $\frac{1}{2}$					
MS9-LFR-AQR	-	-	-	112	132	NPT $\frac{1}{2}$ -14	-	-	-	-	30
MS9-LFR-AQS					132	NPT $\frac{3}{4}$ -14					36
MS9-LFR-AQT					142	NPT1-11 $\frac{1}{2}$					41
MS9-LFR-AQU					162	NPT1 $\frac{1}{4}$ -11 $\frac{1}{2}$					50
MS9-LFR-AQV					176	NPT1 $\frac{1}{2}$ -11 $\frac{1}{2}$					55

Dimensions – Pressure gauge alternatives

Download CAD data → www.festo.com

Integrated MS pressure gauge with standard scale AG or red/green scale RG

Adapter plate A4 for EN pressure gauge $\frac{1}{4}$, without pressure gauge



→ Flow direction

Type	B2	B3	B9	D2
MS9-LFR-...-AG/RG	45	109	-	-
MS9-LFR-...-A4		-	110	G $\frac{1}{4}$

Filter regulators MS9-LFR, MS series, NPT

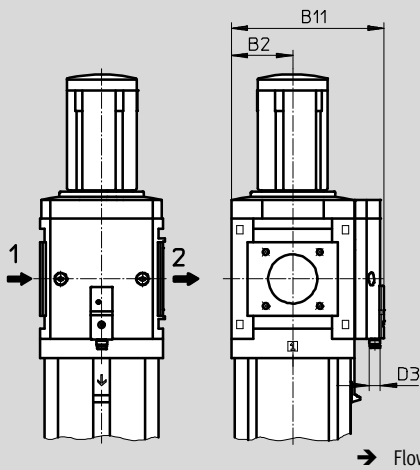
Technical data

Dimensions – Pressure gauge alternatives

Download CAD data → www.festo.com

Pressure sensor without LCD display (operational status indicator only) AD7 ... AD10

Technical data → Internet: sde5



Variant AD7:
SDE5-D10-O-...-P-M8 with 3-pin plug M8x1, threshold value comparator, 1 switching output PNP, N/O contact

Variant AD9:
SDE5-D10-O3-...-P-M8 with 3-pin plug M8x1, window comparator, 1 switching output PNP, N/O contact

Variant AD8:
SDE5-D10-C-...-P-M8 with 3-pin plug M8x1, threshold value comparator, 1 switching output PNP, N/C contact

Variant AD10:
SDE5-D10-C3-...-P-M8 with 3-pin plug M8x1, window comparator, 1 switching output PNP, N/C contact

Type	B2	B11	D3
MS9-LFR ... AD7/AD8/AD9/AD10	45	112	M8

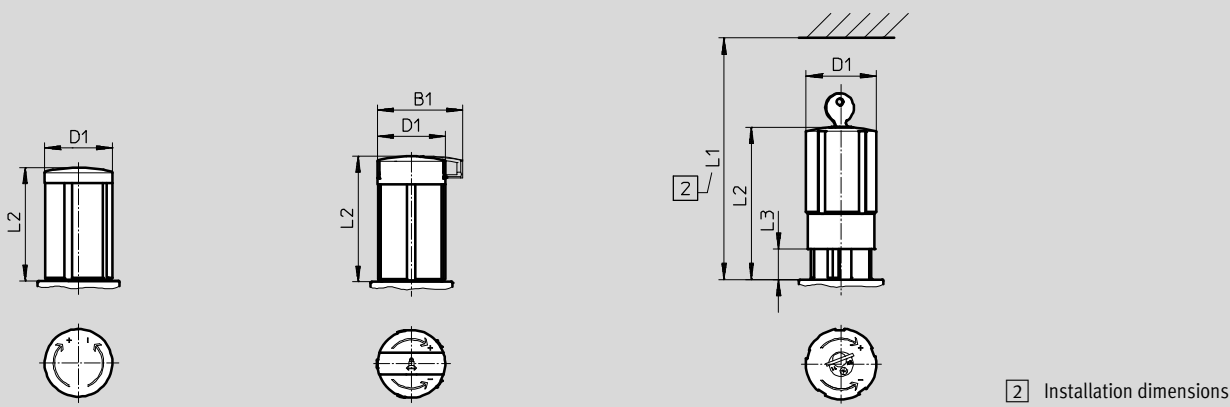
Dimensions – Rotary knob

Download CAD data → www.festo.com

Rotary knob with detent

Rotary knob with detent, can be locked using accessories AS

Rotary knob with integrated lock E11



Type	B1	D1	L1	L2	L3
MS9-LFR	–	52	–	86	–
MS9-LFR-...-AS	65	52	–	96	–
MS9-LFR-...-E11	–	52	174	114	25

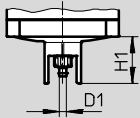
Filter regulators MS9-LFR, MS series, NPT

Technical data

Dimensions – Condensate drain

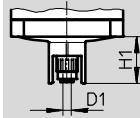
Download CAD data → www.festo.com

Manual rotary M/fully automatic V



Barbed connector for plastic tubing PCN-4

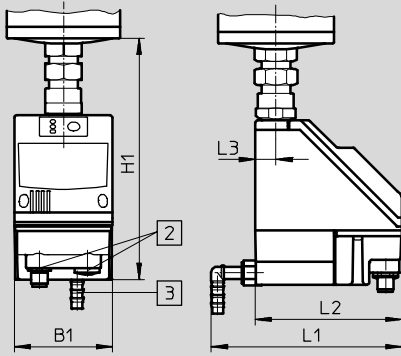
Semi-automatic H



QS connector for plastic tubing PUN-6/PAN-6

Fully automatic, electrically actuated E2/E3/E4

Technical data → Internet: pwea



Condensate drain PWEA:

- 2 Electrical connection: Screw terminal PG9
- 3 Connection 360° rotatable for plastic tubing PUN-H-12x2

Type	B1	D1	H1	L1	L2	L3
MS9-LFR-...-M/V	-	5	34.5	-	-	-
MS9-LFR-...-H		6				
MS9-LFR-...-E2/E3/E4	72	-	178	140	108	15

Ordering data

Pressure regulation range 0.5 ... 7 bar, integrated pressure gauge, display unit [psi], rotary knob with detent, can be locked using accessories

Size	Condensate drain	Connection	Grade of filtration 5 µm		Grade of filtration 40 µm	
			Part No.	Type	Part No.	Type
Directly actuated filter-diaphragm regulator						
MS9	Manual rotary	-	564128	MS9-LFR-NG-D6-CUM-DI-AG-PSI-AS	564124	MS9-LFR-NG-D6-EUM-DI-AG-PSI-AS
	Fully automatic	-	564129	MS9-LFR-NG-D6-CUV-DI-AG-PSI-AS	564125	MS9-LFR-NG-D6-EUV-DI-AG-PSI-AS

Filter regulators MS9-LFR, MS series, NPT

Ordering data – Modular products

M Mandatory data →								
Module No.	Series	Size	Function	Connection size	Pressure range/operation mode	Grade of filtration	Bowl	Condensate drain
562531	MS	9	LFR	N $\frac{3}{4}$, N1, AQR, AQS, AQT, AQU, AQV, NG	D5, D6, D7, D8	E, C	U	M, H, V, E2, E3, E4
Ordering example								
562531	MS	9	- LFR	- NG	- D5	- E	- U	- M

Ordering table		Grid dimension	[mm]	90	Condi- tions	Code	Enter code	
M	Module No.	562531						
	Series	Standard				MS	MS	
	Size	9				9	9	
	Function	Filter regulator				-LFR	-LFR	
	Connection size	Thread NPT $\frac{3}{4}$				-N $\frac{3}{4}$		
		Thread NPT1				-N1		
		Connecting plate NPT $\frac{1}{2}$				-AQR		
		Connecting plate NPT $\frac{3}{4}$				-AQS		
		Connecting plate NPT1				-AQT		
		Connecting plate NPT1 $\frac{1}{4}$				-AQU		
		Connecting plate NPT1 $\frac{1}{2}$				-AQV		
		Module without connecting thread, without connecting plate				-NG		
	Pressure range/operation mode	0.5 ... 4 bar, manually operated				-D5		
		0.5 ... 7 bar, manually operated				-D6		
		0.5 ... 12 bar, manually operated				-D7		
		0.5 ... 16 bar, manually operated				-D8		
	Grade of filtration	40 μ m				-E		
		5 μ m				-C		
	Bowl	Metal bowl				-U	-U	
	Condensate drain	Manual				-M		
		Semi-automatic (P1 max. 12 bar)				-H		
		Fully automatic (P1 max. 12 bar)				-V		
		External, fully automatic, electric	110 V AC, terminals (P1 max. 16 bar)				-E2	
			230 V AC, terminals (P1 max. 16 bar)				-E3	
		24 V DC, terminals (P1 max. 16 bar)				-E4		

Transfer order code

562531	MS	9	-	LFR	-		-		-	E	-	U	-	
--------	----	---	---	-----	---	--	---	--	---	---	---	---	---	--

Filter regulators MS9-LFR, MS series, NPT

Ordering data – Modular products

O	M	O Options					
Regulator type	Pressure gauge/pressure gauge alternatives	Alternative pressure gauge scale	Secondary venting	Security	Type of mounting	UL certification	Alternative flow direction
DI	AG, VS, A4, RG, AD7 ... AD10	PSI, MPA, BAR	OS	AS, E11	WP, WPM, WPB	UL1	Z
- DI	- AG	- BAR	- OS	- AS	-	-	-

Ordering table		Grid dimension [mm]	90	Condi-tions	Code	Enter code
O	Regulator type	Directly actuated		1	-DI	
M	Pressure gauge/pressure gauge alternatives	MS pressure gauge			-AG	
		Cover plate			-VS	
		Adapter plate for EN pressure gauge 1/4, without pressure gauge			-A4	
		Integrated pressure gauge, red/green scale		2	-RG	
		Pressure sensor without display, plug M8, threshold value comparator, PNP, N/O contact		3	-AD7	
		Pressure sensor without display, plug M8, threshold value comparator, PNP, N/C contact		3	-AD8	
		Pressure sensor without display, plug M8, window comparator, PNP, N/O contact		3	-AD9	
	Pressure sensor without display, plug M8, window comparator, PNP, N/C contact		3	-AD10		
O	Alternative pressure gauge scale	Psi		4	-PSI	
		MPa		4	-MPA	
		Bar		4	-BAR	
	Secondary venting	Without secondary venting		5	-OS	
	Security	Can be locked using accessories			-AS	
		With integrated lock			-E11	
	Type of mounting	Mounting bracket		6	-WP	
		Mounting bracket		6	-WPM	
		Mounting bracket for large wall gap		6	-WPB	
	UL certification	cULus, ordinary location for Canada and USA			-UL1	
	Alternative flow direction	Flow direction from right to left			-Z	

- | | | | |
|-------------------------------|--|------------------------------|-----------------------------|
| 1 DI | Not with pressure range D7, D8 | 5 OS | Only with regulator type DI |
| 2 RG | Not with alternative pressure gauge scale PSI | 6 WP, WPM, WPB | Not with module NG |
| 3 AD7 ... AD10 | PSI scale serves only as an auxiliary scale | | |
| 4 PSI, MPA, BAR | Measuring range max. 10 bar | | |
| | Not with pressure gauge alternatives VS, A4, AD7, AD8, AD9, AD10 | | |

Transfer order code

- - - - - - - -

Filter regulators MS-LFR, MS series, NPT

Accessories

FESTO

Filter cartridges

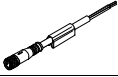





Ordering data			
Size	Grade of filtration [µm]	Part No.	Type
MS4	5 (colour: blue)	534501	MS4-LFP-C
	40 (colour: white)	534502	MS4-LFP-E
MS6	5 (colour: blue)	534499	MS6-LFP-C
	40 (colour: white)	534500	MS6-LFP-E
MS9	5	570309	MS9-LFP-C
	40	570310	MS9-LFP-E
MS12	5	537143	MS12-LFP-C
	40	537144	MS12-LFP-E


Filter regulators MS-LFR, MS series, NPT


Accessories

FESTO

Ordering data – Connecting cable NEBU-M8				Technical data → Internet: nebu	
	Electrical connection	Number of wires	Cable length [m]	Part No.	Type
	M8x1, straight socket	3	2.5	541333	NEBU-M8G3-K-2.5-LE3
			5	541334	NEBU-M8G3-K-5-LE3
	M8x1, angled socket	3	2.5	541338	NEBU-M8W3-K-2.5-LE3
			5	541341	NEBU-M8W3-K-5-LE3

Ordering data – Connecting cable NEBU-M12				Technical data → Internet: nebu	
	Electrical connection	Number of wires	Cable length [m]	Part No.	Type
	M12x1, straight socket	4	2.5	550326	NEBU-M12G5-K-2.5-LE4
			5	541328	NEBU-M12G5-K-5-LE4
	M12x1, angled socket	4	2.5	550325	NEBU-M12W5-K-2.5-LE4
			5	541329	NEBU-M12W5-K-5-LE4

Ordering data – Pressure gauge MA						
	Nominal size	Pneumatic connection	Indicating range		Part No.	Type
			[bar]	[psi]		
	Pressure gauge MA, DIN EN 837-1				Technical data → Internet: ma	
	40	R $\frac{1}{4}$	0 ... 16	0 ... 232	187080	MA-40-16-R$\frac{1}{4}$-EN
		G $\frac{1}{4}$	0 ... 16	0 ... 232	183901	MA-40-16-G$\frac{1}{4}$-EN
	Pressure gauge MA, DIN EN 837-1, with red-green range				Technical data → Internet: ma	
40	R $\frac{1}{8}$	0 ... 16	–	525726	MA-40-16-R$\frac{1}{8}$-E-RG	
50	R $\frac{1}{4}$	0 ... 16	–	525729	MA-50-16-R$\frac{1}{4}$-E-RG	

Ordering data – Padlock LRVS-D		
	Weight [g]	Part No. Type
	120	193786 LRVS-D