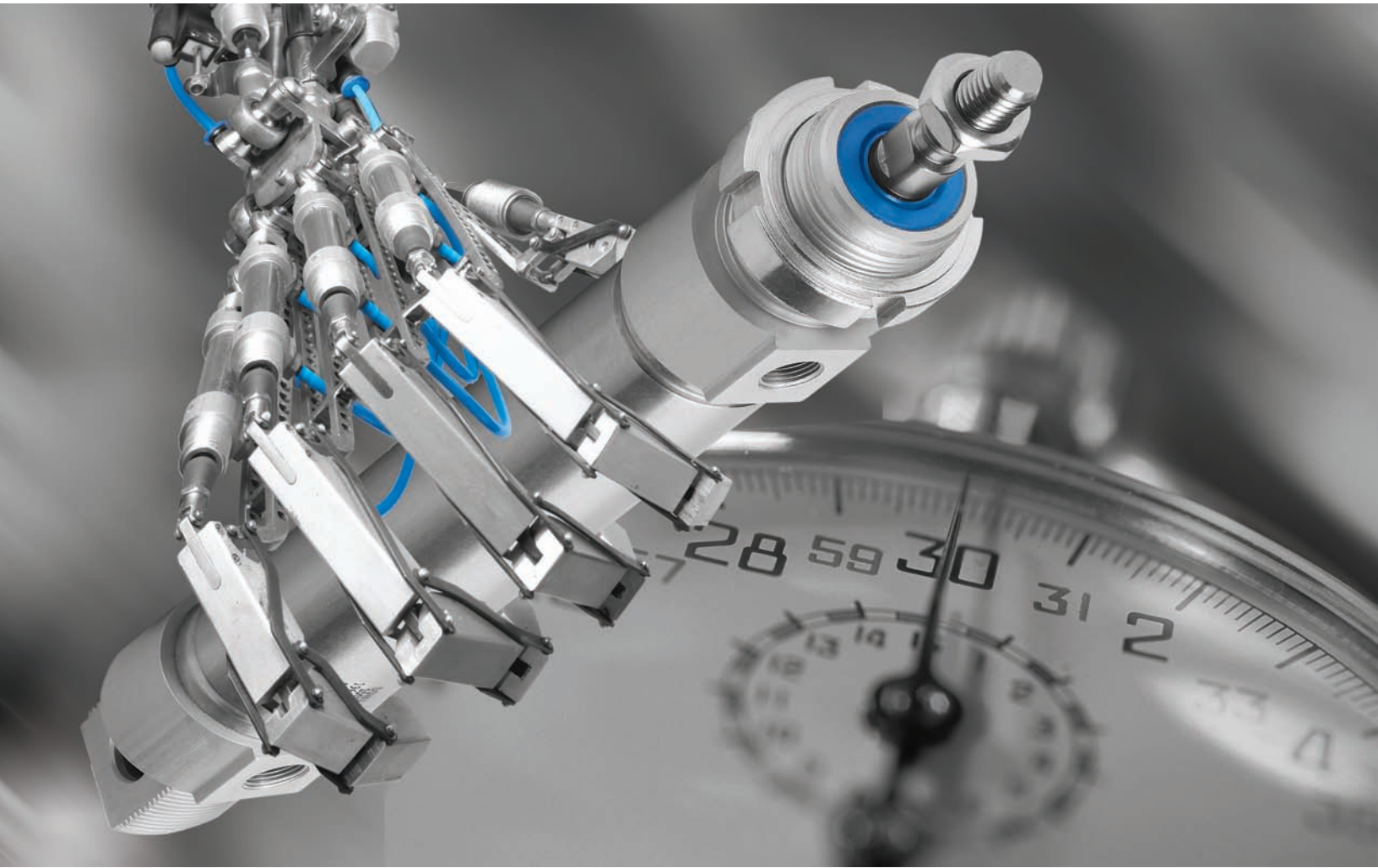


FAST™ Program 2010
Festo Assured Shipping Time

FESTO



A complete line of automation components available when you need them!

FAST™ Program 2010

Festo Assured Shipping Time

A complete line of automation components available when you need them!

With “Same Day” and “3 Day” availability of 1000's of Festo automation components, the FAST program enables designers and manufacturers to:

- lower inventory costs
- reduce “time-to-market” for prototype and production equipment
- invest inventory savings and time savings in growing their business

It's on time or it's shipped free!

Festo will reimburse the shipping charges for qualifying orders which do not meet the shipment times specified by the FAST Program.

For program details including complete catalog documentation, visit: www.festo.com/us/fast

FAST Program Conditions: Quantity limit to qualify for the FAST Program “It's on time, or it's shipped free” promise is 5 pieces per item, except for fittings/flow controls (100 pcs.), tubing (100 meters), and mounting accessories (10 pcs).

Pneumatic Cylinders and Actuators

- Piston Rod Cylinders
- Guided Piston Rod Actuators
- Rodless Actuators
- Rotary Actuators



Pneumatic Valves and Valve Manifolds

- Manual/Mechanical Valves
- Stand Alone Valves
- Valve Manifolds



Sensors

- Pressure Sensors
- Vacuum Sensors
- Actuator Feedback



Air Preparation Units

- Filter/Regulator-Lubricators
- Filter Regulators
- Pressure Regulators and Accessories
- Filters
- Lubricators
- On/Off Valves and Soft-start Valves
- Distribution Blocks



Fittings / Flow Controls / Tubing / Silencers

- Fittings
- Flow Controls
- Tubing
- Silencers



Online or offline — Internet or DVD

Festo products and services provide solutions for greater productivity in industrial and process automation.


Define your optimal solution from over 12,000 products in thousands of variants offline on DVD, or on the internet with our user-friendly digital catalog, and Online Shops.


For customer service 24 hours a day, visit our Online Shop at www.festo.com/us/onlineshop. Once registered, download 2D and 3D CAD models, view pricing and availability, place orders and track the status of all your online and offline orders.


Air Preparation Units, D Series – Overview

Service Units FRC, Filter Regulators LFR, Pressure Regulators LR



Service Units FRC												
	Flow Rate	Pneumatic Connection						Operating Pressure	Filtration Grade	Lead Time ¹⁾		→ Page
										Same Day/Next Day	3 Days	
	Inch Series											
	[scfm]	1/8 NPT	1/4 NPT	3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	[psi]	[µm]			
	25 ... 46	■	■	–	–	–	–	7 ... 103,	40	–	■	210
	71 ... 99	–	–	■	■	–	–	7 ... 176		–	■	
	293 ... 307	–	–	–	–	■	■			–	■	
	Metric Series											
	[l/min]	G1/8	G1/4	G3/8	G1/2	G3/4	G1	[bar]	[µm]			
	700 ... 1,300	■	■	–	–	–	–	0.5 ... 7,	40	–	■	234
	2,000 ... 2,800	–	–	■	■	–	–	0.5 ... 12		–	■	
	8,300 ... 8,700	–	–	–	–	■	■			–	■	


Filter Regulators LFR												
	Flow Rate	Pneumatic Connection						Operating Pressure	Filtration Grade	Lead Time ¹⁾		→ Page
										Same Day/Next Day	3 Days	
	Inch Series											
	[scfm]	–	1/8 NPT	1/4 NPT	3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	[psi]	[µm]		
	23 ... 53	–	■	■	–	–	–	–	7 ... 103,	5, 40	–	■
	85 ... 138	–	–	–	■	■	–	–	7 ... 176		–	■
	268 ... 388	–	–	–	–	–	■	■			–	■
	Metric Series											
	[l/min]	M5	G1/8	G1/4	G3/8	G1/2	G3/4	G1	[bar]	[µm]		
	110 ... 410	■	■	–	–	–	–	–	0.5 ... 7	5	■	–
	650 ... 1,500	–	■	■	–	–	–	–	0.5 ... 7,	5, 40	–	■
	2,400 ... 3,900	–	–	–	■	■	■	–	0.5 ... 12		–	■
7,600 ... 11,000	–	–	–	–	■	■	■			–	■	


Pressure Regulators LR												
	Flow Rate	Pneumatic Connection						Operating Pressure	Lead Time ¹⁾		→ Page	
									Same Day/Next Day	3 Days		
	Inch Series											
	[scfm]	–	1/8 NPT	1/4 NPT	3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	[psi]			
	28 ... 56	–	■	■	–	–	–	–	7 ... 103,		–	■
	113 ... 141	–	–	–	■	■	–	–	7 ... 176		–	■
	388 ... 441	–	–	–	–	–	■	■			–	■
	Metric Series											
	[l/min]	M5	G1/8	G1/4	G3/8	G1/2	G3/4	G1	[bar]			
	120 ... 230	■	■	–	–	–	–	–	0.5 ... 7		■	–
	800 ... 1,600	–	■	■	–	–	–	–	0.5 ... 7,		–	■
	3,200 ... 4,000	–	–	–	■	■	–	–	0.5 ... 12		–	■
11,000 ... 12,500	–	–	–	–	■	■	■			–	■	


1) Same day lead time when product is purchased with port blocks, seals, and screws as separate items. 3 day lead time when product is purchased with port blocks mounted. The lead time, from order placement until the item will ship, is approximate only. Actual shipping date to be confirmed upon order placement.

Air Preparation Units, D Series – Overview

Pressure Regulators LRB, Standard Filters LF, Fine and Micro Filters LFMB/LFMA

Pressure Regulators LRB (Manifold Assembly)													
	Flow Rate	Pneumatic Connection							Operating Pressure	Lead Time ¹⁾			→ Page
										Same Day/Next Day	3 Days		
	Metric Series												
	[l/min]	M5	G1/8	G1/4	G3/8	G1/2	G3/4	G1	[bar]				
	1,600... 1,800	-	-	■	■	-	-	-	0.5 ... 7,	-	■		241
	3,200... 3,800	-	-	-	■	■	-	-	0.5 ... 12	-	■		


Standard Filters LF													
	Flow Rate	Pneumatic Connection							Operating Pressure	Filtration Grade	Lead Time ¹⁾		→ Page
											Same Day/Next Day	3 Days	
	Inch Series												
	[scfm]	-	1/8 NPT	1/4 NPT	3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	[psi]	[µm]			
	28 ... 42	-	■	■	-	-	-	-	0 ... 235	5,	-	■	217
	64 ... 106	-	-	-	■	■	-	-		40	-	■	
	127 ... 187	-	-	-	-	-	■	■			-	■	
	Metric Series												
	[l/min]	M5	G1/8	G1/4	G3/8	G1/2	G3/4	G1	[bar]	[µm]			
	170 ... 290	■	■	-	-	-	-	-	0 ... 16	5	■	-	243
	800 ... 1,200	-	■	■	-	-	-	-		5,	-	■	
	1,800 ... 3,000	-	-	-	■	■	-	-		40	-	■	
3,600 ... 5,300	-	-	-	-	-	■	■			-	■		


Fine and Micro Filters LFMB/LFMA													
	Flow Rate	Pneumatic Connection							Operating Pressure	Filtration Grade	Lead Time ¹⁾		→ Page
											Same Day/Next Day	3 Days	
	Inch Series												
	[scfm]	1/8 NPT	1/4 NPT	3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	[psi]	[µm]				
	5 ... 11	■	■	-	-	-	-	15 ... 235	0.01,	-	■	219	
	13 ... 32	-	-	■	■	-	-		1	-	■		
	32 ... 44	-	-	-	-	■	■			-	■		
	Metric Series												
	[l/min]	G1/8	G1/4	G3/8	G1/2	G3/4	G1	[bar]	[µm]				
	130 ... 300	■	■	-	-	-	-	1 ... 16	0.01,	-	■	245	
	380 ... 900	-	-	■	■	-	-		1	-	■		
	900 ... 1,250	-	-	-	-	■	■			-	■		


1) Same day lead time when product is purchased with port blocks, seals, and screws as separate items. 3 day lead time when product is purchased with port blocks mounted. The lead time, from order placement until the item will ship, is approximate only. Actual shipping date to be confirmed upon order placement.

Air Preparation Units, D Series – Overview

Lubricators LOE, Manual On/Off Valves HE, Electric On/Off Valves HEE

Lubricators LOE												
	Flow Rate	Pneumatic Connection							Operating Pressure	Lead Time ¹⁾		→ Page
										Same Day/Next Day	3 Days	
	Inch Series											
	[scfm]	–	1/8 NPT	1/4 NPT	3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	[psi]			
	46 ... 81	–	■	■	–	–	–	–	0 ... 235	–	■	221
	194 ... 215	–	–	–	■	■	–	–		–	■	
	297 ... 318	–	–	–	–	–	■	■		–	■	
	Metric Series											
	[l/min]	M5	G1/8	G1/4	G3/8	G1/2	G3/4	G1	[bar]			
	200 ... 410	■	■	–	–	–	–	–	0 ... 16	■	–	247
	1,300 ... 2,300	–	■	■	–	–	–	–		–	■	
	5,500 ... 6,100	–	–	–	■	■	–	–		–	■	
8,400 ... 9,000	–	–	–	–	–	■	■		–	■		

Manual On/Off Valves HE												
	Flow Rate	Pneumatic Connection						Operating Pressure	Lead Time ¹⁾		→ Page	
									Same Day/Next Day	3 Days		
	Inch Series											
	[scfm]		1/8 NPT	1/4 NPT	3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	[psi]			
	35 ... 53	■	■	–	–	–	–	–	0 ... 235	–	■	223
	113 ... 127	–	–	■	■	–	–	–		–	■	
	212 ... 229	–	–	–	–	■	■	–		–	■	
	Metric Series											
	[l/min]	G1/8	G1/4	G3/8	G1/2	G3/4	G1	[bar]				
	1,000 ... 1,500	■	■	–	–	–	–	0 ... 16	–	■	249	
	3,200 ... 3,600	–	–	■	■	–	–		–	■		
	6,000 ... 6,500	–	–	–	–	■	■		–	■		


Electric On/Off Valves HEE													
	Flow Rate	Pneumatic Connection						Operating Pressure	Supply Voltage	Lead Time ¹⁾		→ Page	
										Same Day/Next Day	3 Days		
	Inch Series												
	[scfm]		1/8 NPT	1/4 NPT	3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	[psi]	[µm]			
	35 ... 53	■	■	–	–	–	–	–	37 ... 235	24 V DC, 110 V AC	–	■	225
	113 ... 127	–	–	■	■	–	–	–			–	■	
	212 ... 229	–	–	–	–	■	■	–			–	■	
	Metric Series												
	[l/min]	G1/8	G1/4	G3/8	G1/2	G3/4	G1	[bar]	[µm]				
	1,000 ... 1,500	■	■	–	–	–	–	2.5 ... 16	24 V DC, 110 V AC, 230 V DC	–	■	251	
	3,200 ... 3,600	–	–	■	■	–	–			–	■		
	6,000 ... 6,500	–	–	–	–	■	■			–	■		


1) Same day lead time when product is purchased with port blocks, seals, and screws as separate items. 3 day lead time when product is purchased with port blocks mounted. The lead time, from order placement until the item will ship, is approximate only. Actual shipping date to be confirmed upon order placement.


Air Preparation Units, D Series – Overview



Soft-start Valves HEL, Distributor Blocks FRM/FRZ, Pressure Gauges MA

Soft-start Valves HEL												
	Flow Rate	Pneumatic Connection						Operating Pressure	Lead Time ¹⁾			→ Page
									Same Day/Next Day	3 Days		
	Inch Series											
	[scfm]	1/8 NPT	1/4 NPT	3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	[psi]				
	35 ... 53	■	■	–	–	–	–	44 ... 235	–	■		227
	113 ... 127	–	–	■	■	–	–		–	■		
	212 ... 229	–	–	–	–	■	■		–	■		
	Metric Series											
	[l/min]	G1/8	G1/4	G3/8	G1/2	G3/4	G1	[bar]				
	1,000 ... 1,500	■	■	–	–	–	–	3 ... 16	–	■		253
	3,200 ... 3,600	–	–	■	■	–	–		–	■		
	6,000 ... 6,500	–	–	–	–	■	■		–	■		

Distributor Blocks FRM/FRZ												
	Flow Rate	Pneumatic Connection						Operating Pressure	Lead Time ¹⁾			→ Page
									Same Day/Next Day	3 Days		
	Inch Series											
	[scfm]	1/8 NPT	1/4 NPT	3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	[psi]				
	7.5 ... 20.5	■	–	–	–	–	–	0 ... 235	–	■		229
	46 ... 117	■	■	–	–	–	–		–	■		
	194 ... 290	–	–	■	■	–	–		–	■		
	473 ... 706	–	–	–	–	■	■		–	■		
	Metric Series											
	[l/min]	G1/8	G1/4	G3/8	G1/2	G3/4	G1	[bar]				
	210 ... 580	■	–	–	–	–	–	0 ... 16	–	■		255
	1,300 ... 3,300	■	■	–	–	–	–		–	■		
5,500 ... 8,200	–	–	■	■	–	–	–		■			
13,400 ... 20,000	–	–	–	–	■	■	–		■			

Pressure Gauges MA										
	Pneumatic Connection			Housing ∅ [mm]	Operating Pressure / Indicating Range		Lead Time			→ Page
	M5	G1/8	G1/4		[psi]	[bar]	Same Day/Next Day	3 Days		
	Metric and Inch Series									
	■	–	–	27	0 ... 160	0 ... 10	■	–		231
	–	■	–	40	0 ... 145	0 ... 10	■	–		
	–	■	–	40	0 ... 240	0 ... 16	■	–		
	–	–	■	50	0 ... 145	0 ... 10	■	–		
	–	–	■	50	0 ... 240	0 ... 16	■	–		

1) Same day lead time when product is purchased with port blocks, seals, and screws as separate items. 3 day lead time when product is purchased with port blocks mounted. The lead time, from order placement until the item will ship, is approximate only. Actual shipping date to be confirmed upon order placement.

Air Preparation Units – Inch and Metric Series



Overview



- Sturdy and versatile metal series
- 4 sizes: Micro (Metric Series only), Mini, Midi and Maxi
- 13 connection sizes:
Inch Series: 1/8NPT, 1/4NPT, 3/8NPT, 1/2NPT, 3/4NPT, 1NPT
Metric Series: M5, G1/8, G1/4, G3/8, G1/2, G3/4, G1
- 2 pressure ranges:
7 ... 103 psi / 0.5 ... 7 bar or 7 ... 176 psi / 0.5 ... 12 bar
- Flow rates up to 307 scfm / 8.700 l/min
- Broad range of functions:
Individual devices or pre-assembled and tested combinations

Detailed product information → www.festo.com/catalog/<type>

Features

- High-quality and sturdy product
- Metal bowl guard standard
- Wide range of functions in four sizes
- Wealth of options ensures the right solution for every task
- Compressed air qualities to DIN ISO 8573-1
- Reduced maintenance overheads, long service life and easy servicing save time and money

Contents

Inch Series

– Service Units FRC	→ 210
– Filter Regulators LFR	→ 212
– Pressure Regulators LR	→ 215
– Pressure Regulators LRB	–
– Standard Filters LF	→ 217
– Fine and Micro Filters LFMB/LFMA	→ 219
– Lubricators LOE	→ 221

– Manual On/Off Valves HE	→ 223
– Electric On/Off Valves HEE	→ 225
– Soft-start Valves HEL	→ 227
– Distributor Blocks FRM	→ 229
– Pressure Gauges MA	→ 231
– Accessories	→ 232

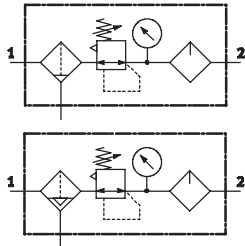
Metric Series

– Service Units FRC	→ 234
– Filter Regulators LFR	→ 236
– Pressure Regulators LR	→ 239
– Pressure Regulators LRB	→ 241
– Standard Filters LF	→ 243
– Fine and Micro Filters LFMB/LFMA	→ 245
– Lubricators LOE	→ 247

– Manual On/Off Valves HE	→ 249
– Electric On/Off Valves HEE	→ 251
– Soft-start Valves HEL	→ 253
– Distributor Blocks FRM	→ 255
– Pressure Gauges MA	→ 231
– Accessories	→ 258

Service Units FRC – Inch Series

Technical Data



Materials
 Housing: Die-cast zinc
 Bowl: Polycarbonate
 Seals: Nitrile rubber
 Free of copper and PTFE



The following oils are recommended for Festo components:

Viscosity range to ISO 3448 ,
 ISO class VG 32
 32 mm²/s (= cSt) at 104 °F

- Festo special oil OFSW-32
- ARAL Vitam GF 32
- BP Energol HLP 32
- Esso Nuto H 32
- Mobil DTE 24
- Shell Tellus Oil DO 32

Technical Data		Download CAD data → www.festo.com/us/engineering				
Size	Mini		Midi		Maxi	
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Design	Filter regulator					
	Proportional standard mist lubricator					
Type of mounting	Via accessories					
	In-line installation					
Mounting position	Vertical ±5°					
Grade of filtration [µm]	40					
Pressure regulation range [psi]	7.5 ... 103					
	7.5 ... 176					
Pressure indication	With pressure gauge					
Length [in]	3.0		3.7		4.2	
Width [in]	3.1 (4.1) ¹⁾		4.3 (5.5) ¹⁾		5.1 (6.4) ¹⁾ 5.2 (7.2) ¹⁾	
Height [in]	8.3		10.6		10.7	

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ q _N [scfm]						
Size	Mini		Midi		Maxi	
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Pressure regulation range 7.5 ... 103 psi						
Grade of filtration 40 µm	28	46	71	99	300	307
Pressure regulation range 7.5 ... 176 psi						
Grade of filtration 40 µm	25	35	71	92	293	300

1) Measured at p₁ = 147 psi, p₂ = 88 psi and Δp = 15 psi. A minimum flow rate of 4 scfm is required for flawless functioning.

Operating Conditions		
Condensate drain	Manual rotary Fully automatic	
Supply pressure [psi]	15 ... 235 29 ... 176	
Ambient temperature [°F]	14 ... 140	

Service Units FRC – Inch Series

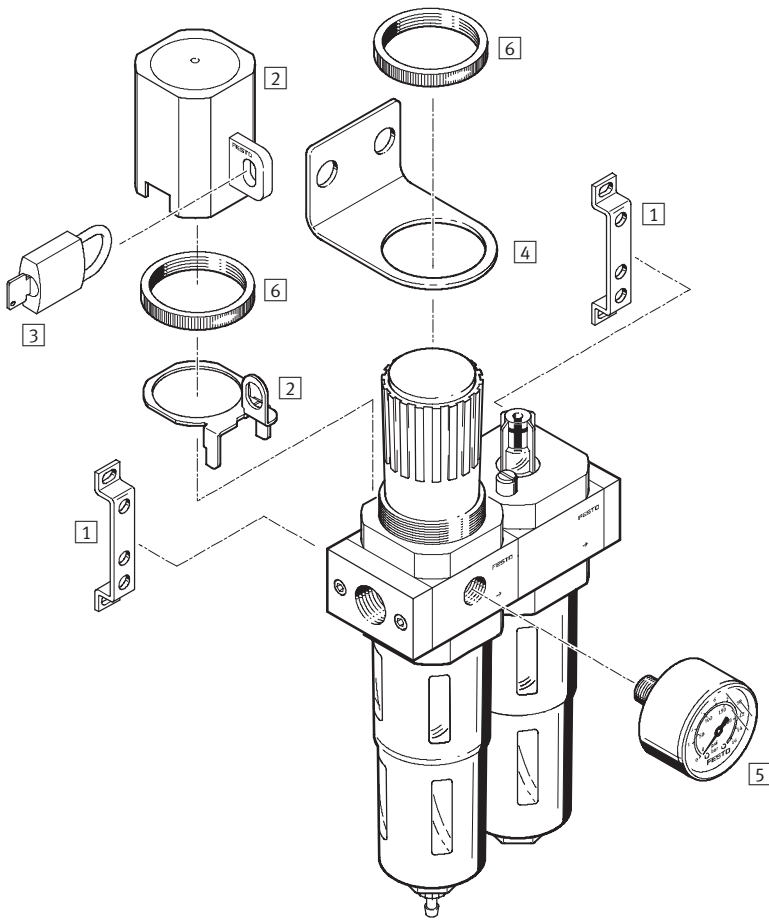
Ordering Data, Accessories



Ordering Data							
Condensate drain	Size	Connection	Pressure regulation range 7.5 ... 103 psi		Pressure regulation range 7.5 ... 176 psi		
			Type	LT	Type	LT	
Turned manually	Mini	1/8NPT	FRC-1/8-D-7-MINI-NPT	3D	FRC-1/8-D-MINI-NPT	3D	
		1/4NPT	FRC-1/4-D-7-MINI-NPT	3D	FRC-1/4-D-MINI-NPT	3D	
	Midi	3/8NPT	FRC-3/8-D-7-MIDI-NPT	3D	FRC-3/8-D-MIDI-NPT	3D	
		1/2NPT	FRC-1/2-D-7-MIDI-NPT	3D	FRC-1/2-D-MIDI-NPT	3D	
	Maxi	3/4NPT	FRC-3/4-D-7-MAXI-NPT	3D	FRC-3/4-D-MAXI-NPT	3D	
		1NPT	FRC-1-D-7-MAXI-NPT	3D	FRC-1-D-MAXI-NPT	3D	
Fully automatic	Mini	1/8NPT	FRC-1/8-D-7-MINI-A-NPT	3D	FRC-1/8-D-MINI-A-NPT	3D	
		1/4NPT	FRC-1/4-D-7-MINI-A-NPT	3D	FRC-1/4-D-MINI-A-NPT	3D	
	Midi	3/8NPT	FRC-3/8-D-7-MIDI-A-NPT	3D	FRC-3/8-D-MIDI-A-NPT	3D	
		1/2NPT	FRC-1/2-D-7-MIDI-A-NPT	3D	FRC-1/2-D-MIDI-A-NPT	3D	
	Maxi	3/4NPT	FRC-3/4-D-7-MAXI-A-NPT	3D	FRC-3/4-D-MAXI-A-NPT	3D	
		1NPT	FRC-1-D-7-MAXI-A-NPT	3D	FRC-1-D-MAXI-A-NPT	3D	

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview

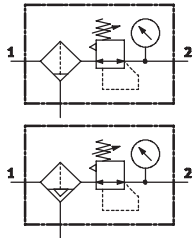


Mounting attachments and accessories	→ Page
1 Mounting bracket HFOE	232
2 Regulator lock LRVS	232
3 Padlock LRVS-D	-

Mounting attachments and accessories	→ Page
4 Mounting bracket HR-D	232
5 Pressure gauge MA (included in scope of delivery)	231
6 Knurled nut HMR (included in scope of delivery)	-

Filter Regulators LFR – Inch Series

Technical Data



Materials
 Housing: Die-cast zinc
 Bowl: Polycarbonate
 Seals: Nitrile rubber
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering				
Size	Mini		Midi		Maxi	
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Design	Filter regulator with pressure gauge					
	Filter regulator without pressure gauge					
Type of mounting	Via accessories					
	In-line installation					
	Front panel mounting					
Mounting position	Vertical ±5°					
Grade of filtration [µm]	5 or 40					
Pressure regulation range [psi]	7.5 ... 103					
	7.5 ... 176					
Pressure indication	Via pressure gauge					
Length [in]	3.0		3.7		4.2	
Width [in]	1.6 (2.5) ¹⁾		2.2 (3.3) ¹⁾		2.6 (3.8) ¹⁾ 2.6 (4.6) ¹⁾	
Height [in]	8.3		10.6		10.7	

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ qnN [scfm]							
Size	Mini		Midi		Maxi		
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT	
Pressure regulation range 7.5 ... 103 psi							
	40 µm	32	53	113	138	353	388
Pressure regulation range 7.5 ... 176 psi							
Grade of filtration	5 µm	23	42	85	92	268	282
	40 µm	26	49	109	120	342	353

1) Measured at p1 = 147 psi, p2 = 88 psi and Δp = 15 psi.

Operating Conditions		
Condensate drain	Manual rotary Fully automatic	
Supply pressure [psi]	15 ... 235 29 ... 176	
Ambient temperature [°F]	14 ... 140	

Filter Regulators LFR – Inch Series

Ordering Data

Ordering Data – Filtration Grade 40µm							
Condensate drain	Size	Connection	Pressure regulation range 7.5 ... 103 psi	LT	Pressure regulation range 7.5 ... 176 psi	LT	
			Type		Type		
Directly actuated diaphragm regulator							
Turned manually	Mini	1/8NPT	LFR-1/8-D-7-MINI-NPT	3D	LFR-1/8-D-MINI-NPT	3D	
		1/4NPT	LFR-1/4-D-7-MINI-NPT	3D	LFR-1/4-D-MINI-NPT	3D	
	Midi	3/8NPT	LFR-3/8-D-7-MIDI-NPT	3D	LFR-3/8-D-MIDI-NPT	3D	
		1/2NPT	LFR-1/2-D-7-MIDI-NPT	3D	LFR-1/2-D-MIDI-NPT	3D	
	Maxi	3/4NPT	LFR-3/4-D-7-MAXI-NPT	3D	LFR-3/4-D-MAXI-NPT	3D	
		1NPT	LFR-1-D-7-MAXI-NPT	3D	LFR-1-D-MAXI-NPT	3D	
Fully automatic	Mini	1/8NPT	LFR-1/8-D-7-MINI-A-NPT	3D	LFR-1/8-D-MINI-A-NPT	3D	
		1/4NPT	LFR-1/4-D-7-MINI-A-NPT	3D	LFR-1/4-D-MINI-A-NPT	3D	
	Midi	3/8NPT	LFR-3/8-D-7-MIDI-A-NPT	3D	LFR-3/8-D-MIDI-A-NPT	3D	
		1/2NPT	LFR-1/2-D-7-MIDI-A-NPT	3D	LFR-1/2-D-MIDI-A-NPT	3D	
	Maxi	3/4NPT	LFR-3/4-D-7-MAXI-A-NPT	3D	LFR-3/4-D-MAXI-A-NPT	3D	
		1NPT	LFR-1-D-7-MAXI-A-NPT	3D	LFR-1-D-MAXI-A-NPT	3D	

Ordering Data – Basic Units without Threaded Connecting Plates, Filtration Grade 5µm							
Condensate drain	Size	Connection	Pressure regulation range 7.5 ... 103 psi	LT	Pressure regulation range 7.5 ... 176 psi	LT	
			Type		Type		
Basic Unit without pressure gauge							
Turned manually	Mini	–	LFR-D-5M-MINI	1D	–		
	Midi	–	LFR-D-5M-MIDI	1D	–		
	Maxi	–	LFR-D-5M-MAXI	1D	–		
Fully automatic	Mini	–	LFR-D-5M-MINI-A	1D	–		
	Midi	–	LFR-D-5M-MIDI-A	1D	–		
	Maxi	–	LFR-D-5M-MAXI-A	1D	–		

Ordering Data – Basic Units without Threaded Connecting Plates, Filtration Grade 40µm							
Condensate drain	Size	Connection	Pressure regulation range 7.5 ... 103 psi	LT	Pressure regulation range 7.5 ... 176 psi	LT	
			Type		Type		
Basic Unit without pressure gauge							
Turned manually	Mini	–	LFR-D-7-MINI	1D	LFR-D-MINI	1D	
	Midi	–	LFR-D-7-MIDI	1D	LFR-D-MIDI	1D	
	Maxi	–	LFR-D-7-MAXI	1D	LFR-D-MAXI	1D	
Fully automatic	Mini	–	LFR-D-7-MINI-A	1D	LFR-D-MINI-A	1D	
	Midi	–	LFR-D-7-MIDI-A	1D	LFR-D-MIDI-A	1D	
	Maxi	–	LFR-D-7-MAXI-A	1D	LFR-D-MAXI-A	1D	
Basic Unit without pressure gauge, with integrated return flow function							
Turned manually	Maxi	–	LFR-D-7-DI-MAXI	1D	LFR-D-DI-MAXI	1D	
Fully automatic	Maxi	–	LFR-D-7-DI-MAXI-A	1D	LFR-D-DI-MAXI-A	1D	

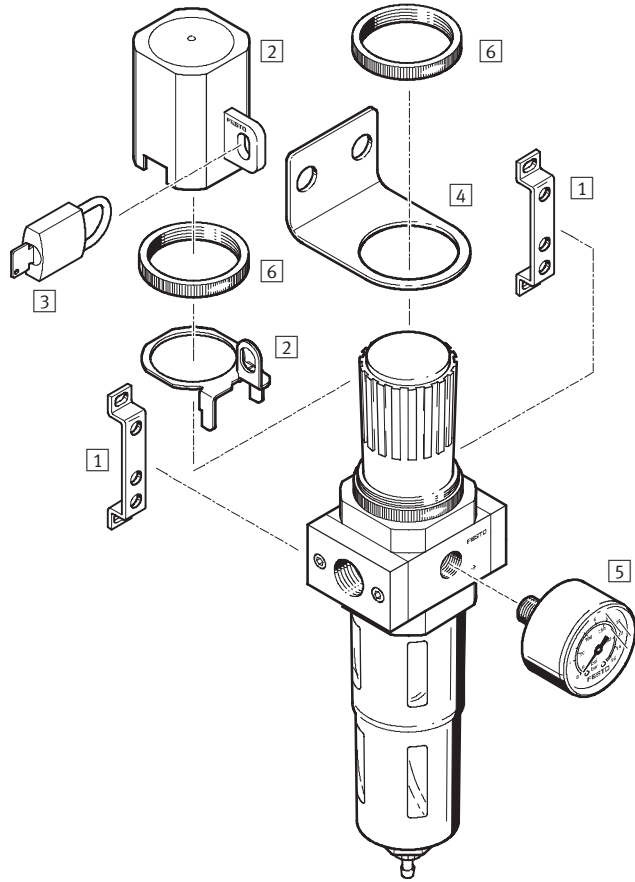
LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Filter Regulators LFR – Inch Series

Accessories



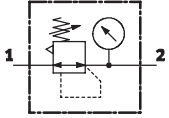
Accessories Overview



Mounting attachments and accessories		→ Page
1	Mounting bracket HFOE	232
2	Regulator lock LRVS	232
3	Padlock LRVS-D	–
4	Mounting bracket HR-D	232
5	Pressure gauge MA	231
6	Knurled nut HMR (included in scope of delivery)	–

Pressure Regulators LR – Inch Series

Technical Data



Materials
 Housing: Die-cast zinc/aluminum
 Seals: Nitrile rubber
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering				
Size	Mini		Midi		Maxi	
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Design	Directly actuated diaphragm regulator				Pilot actuated piston regulator	
Type of mounting	Via accessories In-line installation Front panel mounting					
Mounting position	Any					
Max. hysteresis [psi]	1.5				2.9	
Pressure regulation range [psi]	7.5 ... 103 7.5 ... 176					
Pressure indication	Via pressure gauge					
	G1/8 port		G1/4 port		G1/4 port	
Length [in]	3.0		3.7		4.2	
Width [in]	1.6 (2.5) ¹⁾		2.2 (3.3) ¹⁾		2.6 (3.8) ¹⁾ 2.6 (4.6) ¹⁾	
Height [in]	3.8		5.3		4.9	

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ qnN [scfm]						
Size	Mini		Midi		Maxi	
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Pressure regulation range 7.5 ... 103 psi	35	56	116	141	424	441
Pressure regulation range 7.5 ... 176 psi	28	53	113	124	388	406

1) Measured at p1 = 147 psi, p2 = 88 psi and Δp = 15 psi.

Operating Conditions	
Operating medium	Filtered compressed air, lubricated or unlubricated, grade of filtration 40 μm
Supply pressure [psi]	15 ... 235
Ambient temperature [°F]	14 ... 140

Pressure Regulators LR – Inch Series

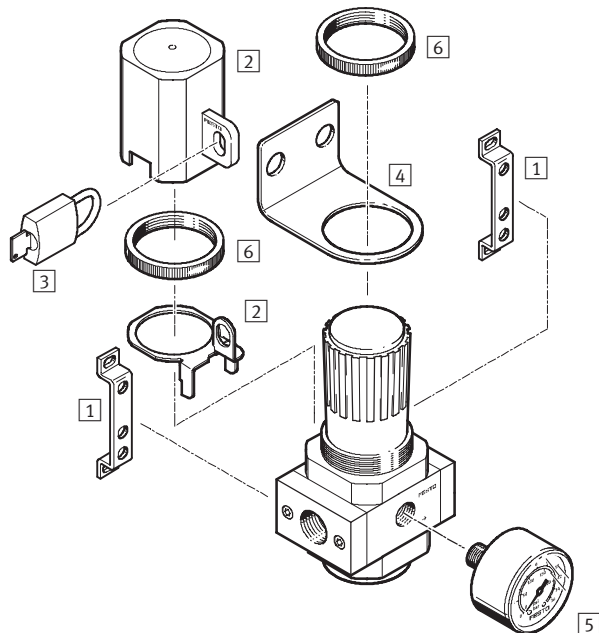
Ordering Data, Accessories

Ordering Data						
Size	Connection	Pressure regulation range 7.5 ... 103 psi		LT	Pressure regulation range 7.5 ... 176 psi	
		Type			Type	
Directly actuated diaphragm regulator						
Mini	1/8NPT	LR-1/8-D-7-MINI-NPT	3D	LR-1/8-D-MINI-NPT	3D	
	1/4NPT	LR-1/4-D-7-MINI-NPT	3D	LR-1/4-D-MINI-NPT	3D	
Midi	3/8NPT	LR-3/8-D-7-MIDI-NPT	3D	LR-3/8-D-MIDI-NPT	3D	
	1/2NPT	LR-1/2-D-7-MIDI-NPT	3D	LR-1/2-D-MIDI-NPT	3D	
Pilot actuated piston regulator						
Maxi	3/4NPT	LR-3/4-D-7-MAXI-NPT	3D	LR-3/4-D-MAXI-NPT	3D	
	1NPT	LR-1-D-7-MAXI-NPT	3D	LR-1-D-MAXI-NPT	3D	

Ordering Data – Basic Units, without Threaded Connecting Plates						
Size	Connection	Pressure regulation range 7.5 ... 103 psi		LT	Pressure regulation range 07.5 ... 176 psi	
		Type			Type	
Basic Unit without pressure gauge						
Mini	–	LR-D-7-MINI	1D	LR-D-MINI	1D	
Midi	–	LR-D-7-MIDI	1D	LR-D-MIDI	1D	
Maxi	–	LR-D-7-MAXI	1D	LR-D-MAXI	1D	
Basic Unit without pressure gauge, with integrated return flow function						
Maxi	–	LR-D-7-DI-MAXI	1D	LR-D-DI-MAXI	1D	

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

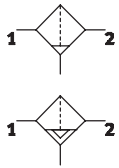
Accessories Overview



Mounting attachments and accessories		→ Page
1	Mounting bracket HFOE	232
2	Regulator lock LRVS	232
3	Padlock LRVS-D	–
4	Mounting bracket HR-D	232
5	Pressure gauge MA	231
6	Knurled nut HMR (included in scope of delivery)	–

Filters LF – Inch Series

Technical Data



Materials
 Housing: Die-cast zinc
 Bowl: Polycarbonate
 Seals: Nitrile rubber
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering				
Size	Mini		Midi		Maxi	
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Design	Sintered filter with centrifugal separation					
Type of mounting	Via accessories In-line installation					
Mounting position	Vertical ±5°					
Grade of filtration	[µm]	5 or 40				
Length	[in]	1.6		2.2		2.6
Width	[in]	1.6 (2.5) ¹⁾		2.2 (3.3) ¹⁾		2.6 (3.8) ¹⁾ 2.6 (4.6) ¹⁾
Height	[in]	6.4		7.8		8.7

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ q _N [scfm]							
Size	Mini		Midi		Maxi		
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT	
Grade of filtration	5 µm	28	34	64	71	127	134
	40 µm	35	42	95	106	177	187

1) Measured at p₁ = 147 psi, p₂ = 88 psi and Δp = 15 psi.
 A minimum flow rate of 4.4 scfm is required for flawless functioning.

Operating Conditions		
Condensate drain	Manual rotary Fully automatic	
Supply pressure	[psi]	0 ... 235 29 ... 176
Ambient temperature	[°F]	14 ... 140

Filters LF – Inch Series

Ordering Data, Accessories

Ordering Data							
Condensate drain	Size	Connection	Grade of filtration 5 µm		LT	Grade of filtration 40 µm	
			Type			Type	LT
Turned manually	Mini	1/8NPT	LF-1/8-D-5M-MINI-NPT		3D	LF-1/8-D-MINI-NPT	3D
		1/4NPT	LF-1/4-D-5M-MINI-NPT		3D	LF-1/4-D-MINI-NPT	3D
	Midi	3/8NPT	LF-3/8-D-5M-MIDI-NPT		3D	LF-3/8-D-MIDI-NPT	3D
		1/2NPT	LF-1/2-D-5M-MIDI-NPT		3D	LF-1/2-D-MIDI-NPT	3D
	Maxi	3/4NPT	LF-3/4-D-5M-MAXI-NPT		3D	LF-3/4-D-MAXI-NPT	3D
		1NPT	LF-1-D-5M-MAXI-NPT		3D	LF-1-D-MAXI-NPT	3D
Fully automatic	Mini	1/8NPT	LF-1/8-D-5M-MINI-A-NPT		3D	LF-1/8-D-MINI-A-NPT	3D
		1/4NPT	LF-1/4-D-5M-MINI-A-NPT		3D	LF-1/4-D-MINI-A-NPT	3D
	Midi	3/8NPT	LF-3/8-D-5M-MIDI-A-NPT		3D	LF-3/8-D-MIDI-A-NPT	3D
		1/2NPT	LF-1/2-D-5M-MIDI-A-NPT		3D	LF-1/2-D-MIDI-A-NPT	3D
	Maxi	3/4NPT	LF-3/4-D-5M-MAXI-A-NPT		3D	LF-3/4-D-MAXI-A-NPT	3D
		1NPT	LF-1-D-5M-MAXI-A-NPT		3D	LF-1-D-MAXI-A-NPT	3D

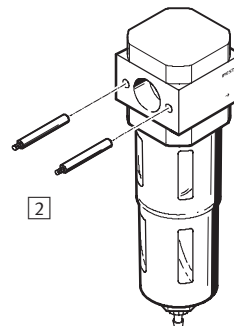
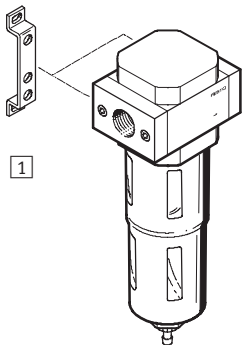
Ordering Data – Basic Units, without Threaded Connecting Plates							
Condensate drain	Size	Connection	Grade of filtration 5 µm		LT	Grade of filtration 40 µm	
			Type			Type	LT
Turned manually	Mini	–	LF-D-5M-MINI-U		1D	LF-D-MINI-U	1D
	Midi	–	LF-D-5M-MIDI-U		1D	LF-D-MIDI-U	1D
	Maxi	–	LF-D-5M-MAXI-U		1D	LF-D-MAXI-U	1D
Fully automatic	Mini	–	LF-D-5M-MINI-A-U		1D	LF-D-MINI-A-U	1D
	Midi	–	LF-D-5M-MIDI-A-U		1D	LF-D-MIDI-A-U	1D
	Maxi	–	LF-D-5M-MAXI-A-U		1D	LF-D-MAXI-A-U	1D

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview

Individual device

Basic unit for manifold assembly

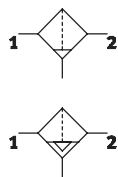


Mounting attachments and accessories	→ Page
1 Mounting bracket HFOE	232

Mounting attachments and accessories	→ Page
2 Threaded pin FRB (included in scope of delivery)	232

Fine and Micro Filters LFMB/LFMA – Inch Series

Technical Data



Materials
 Housing: Die-cast zinc
 Bowl: Polycarbonate
 Filter: Borosilicate fibre
 Seals: Nitrile rubber
 Free of copper and PTFE



LFMA
 DIN ISO class 1 for particles:
 max. particle density 0.1 mg/m³
 DIN ISO class 2 for oil aerosols:
 max. oil concentration 0.1 mg/m³

LFMB
 DIN ISO class 2 for particles:
 max. particle density 1 mg/m³
 DIN ISO class 3 for oil aerosols:
 max. oil concentration 1 mg/m³

Technical Data		Download CAD data → www.festo.com/us/engineering				
Size	Mini	Midi		Maxi		
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Design	Fibre filter					
Type of mounting	Via accessories					
	In-line installation					
Mounting position	Vertical ±5°					
Length [in]	3.0	3.7		4.2		
Width [in]	1.6 (2.5) ¹⁾	2.2 (3.3) ¹⁾		2.6 (3.8) ¹⁾	2.6 (4.6) ¹⁾	
Height [in]	6.4	7.8		8.7		

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ qnN [scfm]						
Size	Mini	Midi		Maxi		
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Micro filter LFMA	5	6	13	14	32	34
Fine filter LFMB	9	11	25	32	42	44

1) Measured at p₁ = 88 psi and Δp = 70 mbar.
 A minimum flow rate of 4.4 scfm is required for flawless functioning.

Operating Conditions				
Type	LFMA		LFMB	
Condensate drain	Manual rotary	Fully automatic	Manual rotary	Fully automatic
Operating medium	Filtered compressed air, lubricated or unlubricated, grade of filtration 1 µm		Filtered compressed air, lubricated or unlubricated, grade of filtration 5 µm	
Grade of filtration [µm]	0.01		1	
Residual oil content [mg/m ³]	≤ 0.01		≤ 0.5	
Supply pressure [psi]	15 ... 235	22 ... 176	15 ... 235	22 ... 176
Ambient temperature [°F]	14 ... 140		14 ... 140	

Fine and Micro Filters LFMB/LFMA – Inch Series

Ordering Data, Accessories

Ordering Data – Fine filters LFMB						
Grade of filtration 1 µm, metal bowl guard						
Size	Connection	Input pressure 15 ... 235 psi		LT	Input pressure 22 ... 176 psi	
		Condensate drain turned manually			Condensate drain fully automatic	
		Type			Type	
With threaded connecting plates						
Mini	1/8NPT	LFMB-1/8-D-MINI-NPT	3D	LFMB-1/8-D-MINI-A-NPT	3D	
	1/4NPT	LFMB-1/4-D-MINI-NPT	3D	LFMB-1/4-D-MINI-A-NPT	3D	
Midi	3/8NPT	LFMB-3/8-D-MIDI-NPT	3D	LFMB-3/8-D-MIDI-A-NPT	3D	
	1/2NPT	LFMB-1/2-D-MIDI-NPT	3D	LFMB-1/2-D-MIDI-A-NPT	3D	
Maxi	3/4NPT	LFMB-3/4-D-MAXI-NPT	3D	LFMB-3/4-D-MAXI-A-NPT	3D	
	1NPT	LFMB-1-D-MAXI-NPT	3D	LFMB-1-D-MAXI-A-NPT	3D	
Basic Units, without Threaded Connecting Plates						
Mini	–	LFMB-D-MINI-U	1D	LFMB-D-MINI-A-U	1D	
Midi	–	LFMB-D-MIDI-U	1D	LFMB-D-MIDI-A-U	1D	
Maxi	–	LFMB-D-MAXI-U	1D	LFMB-D-MAXI-A-U	1D	

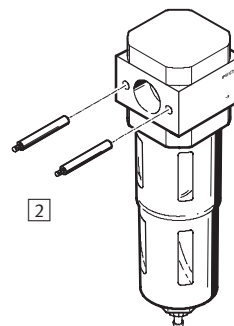
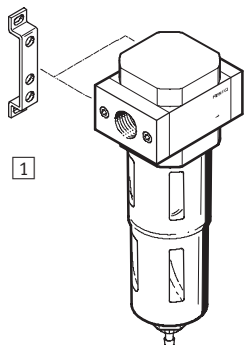
Ordering Data – Micro filters LFMA						
Grade of filtration 0.01 µm, metal bowl guard						
Size	Connection	Input pressure 15 ... 235 psi		LT	Input pressure 22 ... 176 psi	
		Condensate drain turned manually			Condensate drain fully automatic	
		Type			Type	
With threaded connecting plates						
Mini	1/8NPT	LFMA-1/8-D-MINI-NPT	3D	LFMA-1/8-D-MINI-A-NPT	3D	
	1/4NPT	LFMA-1/4-D-MINI-NPT	3D	LFMA-1/4-D-MINI-A-NPT	3D	
Midi	3/8NPT	LFMA-3/8-D-MIDI-NPT	3D	LFMA-3/8-D-MIDI-A-NPT	3D	
	1/2NPT	LFMA-1/2-D-MIDI-NPT	3D	LFMA-1/2-D-MIDI-A-NPT	3D	
Maxi	3/4NPT	LFMA-3/4-D-MAXI-NPT	3D	LFMA-3/4-D-MAXI-A-NPT	3D	
	1NPT	LFMA-1-D-MAXI-NPT	3D	LFMA-1-D-MAXI-A-NPT	3D	
Basic Units, without Threaded Connecting Plates						
Mini	–	LFMA-D-MINI-U	1D	LFMA-D-MINI-A-U	1D	
Midi	–	LFMA-D-MIDI-U	1D	LFMA-D-MIDI-A-U	1D	
Maxi	–	LFMA-D-MAXI-U	1D	LFMA-D-MAXI-A-U	1D	

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview

Individual device

Basic unit for manifold assembly



Mounting attachments and accessories	→ Page
1 Mounting bracket HFOE	232

Mounting attachments and accessories	→ Page
2 Threaded pin FRB (included in scope of delivery)	232

Lubricators LOE – Inch Series

Technical Data

FESTO



Materials
 Housing: Die-cast zinc/aluminum
 Seals: Nitrile rubber
 Free of copper and PTFE



The following oils are recommended for Festo components:
 Viscosity range to ISO 3448, ISO class VG 32
 32 mm²/s (= cSt) at 40 °C

- Festo special oil OFSW-32
- ARAL Vitam GF 32
- BP Energol HLP 32
- Esso Nuto H 32
- Mobil DTE 24
- Shell Tellus Oil DO 32

Technical Data						
Size	Mini		Midi		Maxi	
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Design	Proportional standard mist lubricator					
Type of mounting	Via accessories In-line installation					
Mounting position	Vertical ±5°					
Minimum flow for lubricator operation [scfm]	0.1		0.3		0.4	
Max. oil capacity [in ³]	2.7		6.7		11.6	
Length [in]	1.6		2.2		2.6	
Width [in]	1.6 (2.5) ¹⁾		2.2 (3.3) ¹⁾		2.6 (3.8) ¹⁾ 2.6 (4.6) ¹⁾	
Height [in]	6.7		8		9	

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ qnN [scfm]						
Size	Mini		Midi		Maxi	
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Lubricator LOE	46	81	194	215	297	318

1) Measured at p1 = 6 bar and Δp = 1 bar.

Operating Conditions	
Operating medium	Filtered compressed air, unlubricated, grade of filtration 40 μm
Supply pressure [psi]	0 ... 235
Ambient temperature [°F]	14 ... 140

Lubricators LOE – Inch Series

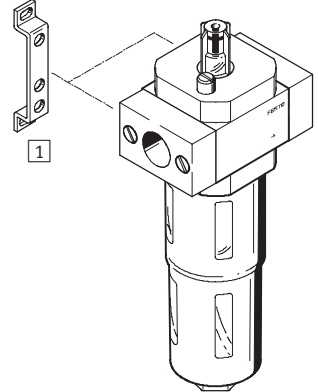
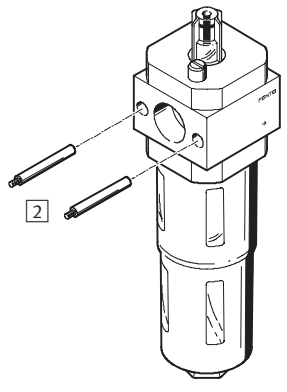
Ordering Data, Accessories

Ordering Data			
Size	Connection	Type	LT
Mini	1/8NPT	LOE-1/8-D-MINI-NPT	3D
	1/4NPT	LOE-1/4-D-MINI-NPT	3D
Midi	3/8NPT	LOE-3/8-D-MIDI-NPT	3D
	1/2NPT	LOE-1/2-D-MIDI-NPT	3D
Maxi	3/4NPT	LOE-3/4-D-MAXI-NPT	3D
	1NPT	LOE-1-D-MAXI-NPT	3D

Ordering Data – Basic Units, without Threaded Connecting Plates			
Size	Connection	Type	LT
Mini	–	LOE-D-MINI-U	1D
Midi	–	LOE-D-MIDI-U	1D
Maxi	–	LOE-D-MAXI-U	1D

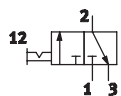
LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview

Individual device	Basic unit for manifold assembly	Mounting attachments and accessories	→ Page
		1 Mounting bracket HFOE	232
		2 Threaded pin FRB (included in scope of delivery)	232

Manual On-off Valves HE – Inch Series

Technical Data



Materials
 Housing: Die-cast aluminum
 Seals: Nitrile rubber
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering				
Size	Mini		Midi		Maxi	
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Design	Piston spool					
Type of mounting	Via accessories In-line installation					
Mounting position	Any					
Valve function	3/2-way					
Exhaust port	G1/8		G1/4		G3/8	
Reset method	Mechanical spring					
Direction of flow	Non-reversible					
Length [in]	1.6		2.2		2.6	
Width [in]	1.6 (2.5) ¹⁾		2.2 (3.3) ¹⁾		2.6 (3.8) ¹⁾ 2.6 (4.6) ¹⁾	
Height [in]	3.9		4.8		5.3	

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ q _N [scfm]						
Size	Mini		Midi		Maxi	
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
On-off valve HE	35	53	113	127	212	229

1) Measured at p₁ = 88 psi and Δp = 15 psi

Operating Conditions	
Operating medium	Filtered compressed air, lubricated or unlubricated, grade of filtration 50 μm
Operating pressure [psi]	0 ... 235
Ambient temperature [°F]	14 ... 140

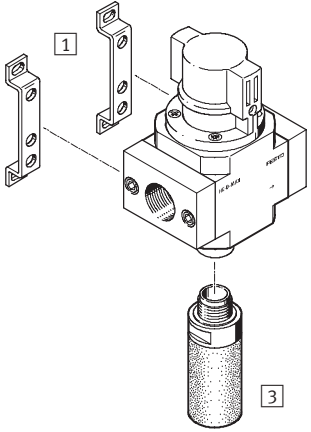
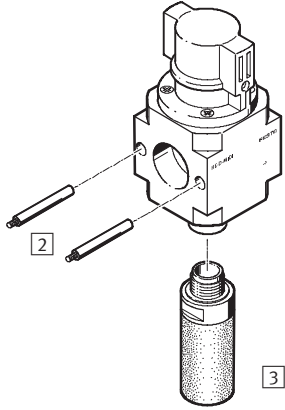
Manual On-off Valves HE – Inch Series

Ordering Data, Accessories

Ordering Data			
3/2-way valve, operating pressure 0 ... 235 psi, normally closed			
Size	Connection	Type	LT
With threaded connecting plates			
Mini	1/8NPT	HE-1/8-D-MINI-NPT	3D
	1/4NPT	HE-1/4-D-MINI-NPT	3D
Midi	3/8NPT	HE-3/8-D-MIDI-NPT	3D
	1/2NPT	HE-1/2-D-MIDI-NPT	3D
Maxi	3/4NPT	HE-3/4-D-MAXI-NPT	3D
	1NPT	HE-1-D-MAXI-NPT	3D
Basic Unit, without threaded connecting plates			
Mini	–	HE-D-MINI	1D
Midi	–	HE-D-MIDI	1D
Maxi	–	HE-D-MAXI	1D

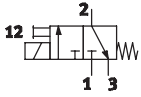
LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview

Individual device	Basic unit for manifold assembly	Mounting attachments and accessories	→ Page
		1 Mounting bracket HFOE	232
		2 Threaded pin FRB (included in scope of delivery)	232
		3 Silencer U	233

Electric On-off valves HEE – Inch Series

Technical Data



Materials
 Housing: Die-cast aluminum
 Seals: Nitrile rubber
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering				
Size	Mini		Midi		Maxi	
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Design	Piston spool					
Type of mounting	Via accessories In-line installation					
Mounting position	Any					
Valve function	3/2-way, single solenoid					
Exhaust port	G1/8		G1/4		G3/8	
Reset method	Mechanical spring					
Direction of flow	Non-reversible					
Operating voltage	[V DC]	24				
	[V AC]	110, 230				
Length	[in]	1.6		2.2		2.6
Width	[in]	1.6 (2.5) ¹⁾		2.2 (3.3) ¹⁾		2.6 (3.8) ¹⁾ 2.6 (4.6) ¹⁾
Height	[in]	4.1		4.8		5.3

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ qnN [scfm]						
Size	Mini		Midi		Maxi	
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
On-off valve HE	35	53	113	127	212	229

1) Measured at p1 = 88 psi and Δp = 15 psi

Operating Conditions	
Operating medium	Filtered compressed air, lubricated or unlubricated, grade of filtration 50 μm
Operating pressure	[psi] 37 ... 235
Ambient temperature	[°F] 14 ... 140

Electric On-off valves HEE – Inch Series

Ordering Data, Accessories

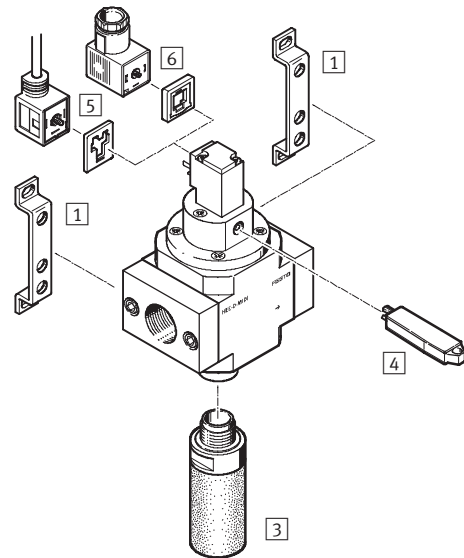


Ordering Data							
3/2-way valve, operating pressure 37 ... 235 psi, normally closed							
Size	Connection	24 V DC		LT	110 V AC		LT
		Type			Type		
		230 V AC				LT	
		Type				Type	
With threaded connecting plates							
Mini	1/8NPT	HEE-1/8-D-MINI-24-NPT	3D	HEE-1/8-D-MINI-110-NPT	3D	–	
	1/4NPT	HEE-1/4-D-MINI-24-NPT	3D	HEE-1/4-D-MINI-110-NPT	3D	–	
Midi	3/8NPT	HEE-3/8-D-MIDI-24-NPT	3D	HEE-3/8-D-MIDI-110-NPT	3D	–	
	1/2NPT	HEE-1/2-D-MIDI-24-NPT	3D	HEE-1/2-D-MIDI-110-NPT	3D	–	
Maxi	3/4NPT	HEE-3/4-D-MAXI-24-NPT	3D	HEE-3/4-D-MAXI-110-NPT	3D	–	
	1NPT	HEE-1-D-MAXI-24-NPT	3D	HEE-1-D-MAXI-110-NPT	3D	–	
Without threaded connecting plates							
Mini	–	HEE-D-MINI-24	1D	HEE-D-MINI-110	1D	HEE-D-MINI-230	1D
Midi	–	HEE-D-MIDI-24	1D	HEE-D-MIDI-110	1D	HEE-D-MIDI-230	1D
Maxi	–	HEE-D-MAXI-24	1D	HEE-D-MAXI-110	1D	HEE-D-MAXI-230	1D

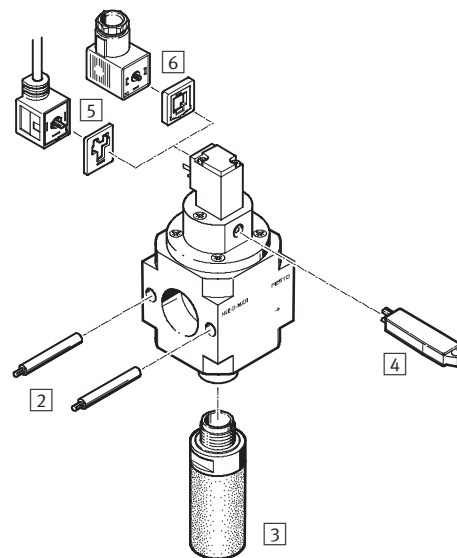
LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview

Individual device



Basic unit for manifold assembly

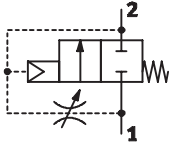


Mounting attachments and accessories	→ Page
1 Mounting bracket HFOE	232
3 Silencer U	233
4 Non-detenting manual override tool AHB-MD/MF/MY	233
5 Plug socket with cable KMEB	www.festo.com
6 Plug socket MSSD-EB	www.festo.com

Mounting attachments and accessories	→ Page
2 Threaded pin FRB (included in scope of delivery)	232
3 Silencer U	233
4 Non-detenting manual override tool AHB-MD/MF/MY	233
5 Plug socket with cable KMEB	www.festo.com
6 Plug socket MSSD-EB	www.festo.com

Soft-start Valves HEL – Inch Series

Technical Data



Materials
 Housing: Die-cast aluminum
 Seals: Nitrile rubber
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering				
Size	Mini		Midi		Maxi	
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Design	Piston spool					
Type of mounting	Via accessories In-line installation					
Mounting position	Any					
Valve function	2/2-way, closed, air operated, adjustable					
Reset method	Mechanical spring					
Actuation method	Direct					
Direction of flow	Non-reversible					
Length [in]	1.6		2.2		2.6	
Width [in]	1.6 (2.5) ¹⁾		2.2 (3.3) ¹⁾		2.6 (3.8) ¹⁾ 2.6 (4.6) ¹⁾	
Height [in]	2.6		3		3.5	

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ q _N [scfm]						
Size	Mini		Midi		Maxi	
Pneumatic connection	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
On-off valve HE	35	53	113	127	212	229

1) Measured at p₁ = 88 psi and Δp = 15 psi

Operating Conditions	
Operating medium	Filtered compressed air, lubricated or unlubricated, grade of filtration 50 μm
Operating pressure [psi]	44 ... 235
Ambient temperature [°F]	14 ... 140

Soft-start Valves HEL – Inch Series

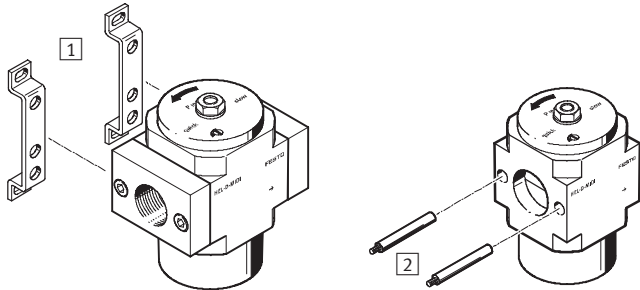
Ordering Data, Accessories

Ordering Data			
Gradual pressure build-up, 2/2-way valve, normally closed, operating pressure 44 ... 235 psi			
Size	Connection	Type	LT
With threaded connecting plates			
Mini	1/8NPT	HEL-1/8-D-MINI-NPT	3D
	1/4NPT	HEL-1/4-D-MINI-NPT	3D
Midi	3/8NPT	HEL-3/8-D-MIDI-NPT	3D
	1/2NPT	HEL-1/2-D-MIDI-NPT	3D
Maxi	3/4NPT	HEL-3/4-D-MAXI-NPT	3D
	1NPT	HEL-1-D-MAXI-NPT	3D
Basic Unit, without threaded connecting plates			
Mini	–	HEL-D-MINI	1D
Midi	–	HEL-D-MIDI	1D
Maxi	–	HEL-D-MAXI	1D

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

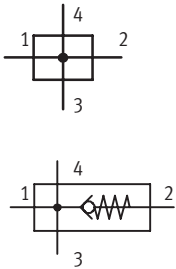
Accessories Overview

Individual device	Basic unit for manifold assembly	Mounting attachments and accessories	→ Page
		1 Mounting bracket HFOE	232
		2 Threaded pin FRB (included in scope of delivery)	232



Branching Modules FRM/FRZ – Inch Series

Technical Data



Materials
 Housing: Die-cast zinc
 Seals: Nitrile rubber, polyvinyl chloride
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering					
Size	Micro	Mini		Midi		Maxi	
Pneumatic connection 1, 2 ¹⁾	1/8NPT	1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Pneumatic connection 3	1/8NPT	1/4NPT		1/2NPT		3/4NPT	
Pneumatic connection 4	10/32 UNF	1/4NPT					
Design	Branching module						
Type of mounting	With accessories						
	In-line installation						
Mounting position	Any						
Length [in]	1	1.6		2.2		2.6	
Width [in]	1	1.6 (2.5) ²⁾		2.2 (3.3) ²⁾		2.6 (3.8) ²⁾ 2.6 (4.6) ²⁾	
Height [in]	1.2	1.9		2.6		3.1	

- 1) With connecting plates.
- 2) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ q _N [scfm]								
Connection		Basic Unit Without Connecting Plates	With connecting plates					
			1/8NPT	1/4NPT	3/8NPT	1/2NPT	3/4NPT	1NPT
Standard								
In main flow direction	Micro	7.4	–	–	–	–	–	–
	Mini	117	53	117	–	–	–	–
	Midi	290	–	–	247	290	–	–
	Maxi	706	–	–	–	–	706	614
With non-return function								
In main flow direction	Mini	71	46	71	–	–	–	–
	Midi	198	–	–	194	198	–	–
	Maxi	530	–	–	–	–	530	473

- 1) Measured at p₁ = 6 bar and Δp = 1 bar.

Operating Conditions				
Size	Micro	Mini	Midi	Maxi
Operating medium	Filtered compressed air			
Ambient temperature [°F]	14 ... 140			
Operating pressure [psi]				
Standard	0 ... 235			
With non-return function	–	2.2 ... 235		2.9 ... 235 3.7 ... 235

Branching Modules FRM/FRZ – Inch Series

Ordering Data, Accessories

Ordering Data – With Connecting Plates			
Size	Port	With integrated non-return function	
		Type	LT
Mini	1/8NPT	FRM-H-1/8-D-MINI-NPT	3D
	1/4NPT	FRM-H-1/4-D-MINI-NPT	3D
Midi	3/8NPT	FRM-H-3/8-D-MIDI-NPT	3D
	1/2NPT	FRM-H-1/2-D-MIDI-NPT	3D
Maxi	3/4NPT	FRM-H-3/4-D-MAXI-NPT	3D
	1NPT	FRM-H-1-D-MAXI-NPT	3D

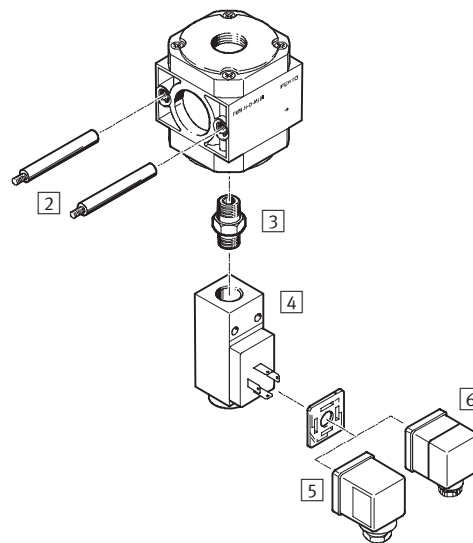
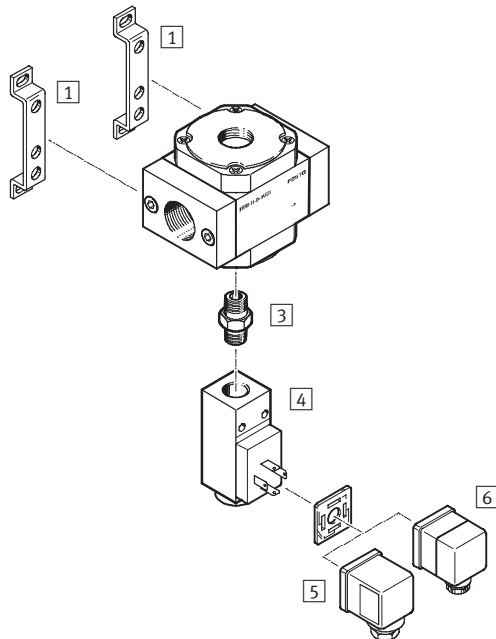
Ordering Data – Basic Unit Without Connecting Plates					
Size	Standard		LT	With integrated non-return function	
	Type			Type	LT
Micro	FRZ-D-MICRO-NPT		1D	–	
Mini	FRM-D-MINI		1D	FRM-H-D-MINI	1D
Midi	FRM-D-MIDI		1D	FRM-H-D-MIDI	1D
Maxi	FRM-D-MAXI		1D	FRM-H-D-MAXI	1D

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview

Individual device

Basic unit for manifold assembly



Mounting attachments and accessories	→ Page
1 Mounting bracket HFOE	232
3 Double nipple ESK	–
4 Pressure switch PEV	233
5 Plug socket MSSD-C	–
6 Angled plug socket PEV-...-WD-LED	–

Mounting attachments and accessories	→ Page
2 Threaded pin FRB (included in scope of delivery)	–
3 Double nipple ESK	–
4 Pressure switch PEV	233
5 Plug socket MSSD-C	–
6 Angled plug socket PEV-...-WD-LED	–

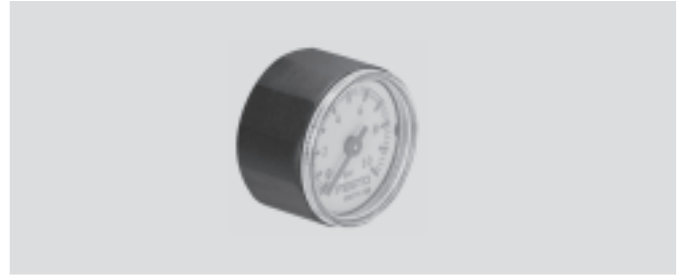
Pressure Gauges MA

Technical Data, Ordering Data

FESTO



Materials
 Housing:
 MA-23: Brass
 MA-27/40/50: Acrylic butadiene styrene/plastic
 MA-63: Steel
 Dial cover: Polystyrene/plastic
 Threaded plug: Brass



Technical Data		Download CAD data → www.festo.com/us/engineering	
Nominal size	27	40	50
Pneumatic connection	M5	G $\frac{1}{8}$	G $\frac{1}{4}$
Operating medium	Liquid and gaseous media		
	Not permitted: Oxygen, Acetylene		
Constructional design	Bourdon tube pressure gauge		
Type of mounting	Screw-in		
Connection position	Rear side, center		
Ambient temperature	[°F]	32 ... 140	-4 ... +140
	[°C]	0 ... +60	-20 ... +60
Measurement accuracy class	4	2.5	
Continuous load factor	0.75		
Intermittent load factor	0.66		
Protection class	IP43		

Ordering Data						
Nominal size	For D Series service units	Pneumatic connection	Indicating range		Order code	LT
			[bar]	[psi]		
27	MICRO	M5	0 ... 10	-	MA-27-10-M5	1D
			-	0 ... 160	MA-27-160-M5-PSI	1D
40	MINI	G $\frac{1}{8}$	0 ... 10	0 ... 145	MA-40-10-1/8-U	1D
			0 ... 16	0 ... 240	MA-40-16-1/8-U	1D
50	MIDI/MAXI	G $\frac{1}{4}$	0 ... 10	0 ... 160	MA-50-10-1/4-U	1D
			0 ... 16	0 ... 240	MA-50-16-1/4-U	1D

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Air Preparation Units
4

Accessories – Inch Series

Ordering Data



Ordering Data – Mounting attachments		
Designation	Size	Order code
Mounting bracket HFOE		
	Mini	HFOE-D-MINI
	Midi/Maxi	HFOE-D-MIDI/MAXI
Mounting bracket HRBK		
	Mini	HRBK-D-MINI
	Midi	HRBK-D-MIDI
Mounting bracket HRB		
	Mini	HRB-D-MINI
	Midi	HRB-D-MIDI
Mounting bracket HR-D		
	Mini	HR-D-MINI
	Midi	HR-D-MIDI
	Maxi	HR-D-MAXI
Threaded pin FRB		
	Mini	FRB-D-MINI-U
	Midi	FRB-D-MIDI-U
	Maxi	FRB-D-MAXI-U
Threaded pin LF/LOE		
	Mini	LF/LOE-D-MINI
	Midi	LF/LOE-D-MIDI
	Maxi	LF/LOE-D-MAXI
Connecting kit HRBC		
	Mini	HRBC-D-MINI
	Midi	HRBC-D-MIDI

Ordering Data – Connecting plates				
Designation	Size	Connection	Position	Order code
Connecting plates PBL				
	Micro	G $\frac{1}{8}$	Either	PBL-N1/8-D-MICRO
	Mini	G $\frac{1}{8}$	Left	PBL-1/8-D-MINI-L-NPT
			Right	PBL-1/8-D-MINI-R-NPT
		G $\frac{1}{4}$	Left	PBL-1/4-D-MINI-L-NPT
			Right	PBL-1/4-D-MINI-R-NPT
		G $\frac{3}{8}$	Left	PBL-3/8-D-MINI-L-NPT
			Right	PBL-3/8-D-MINI-R-NPT
	Midi	G $\frac{1}{4}$	Left	PBL-1/4-D-MIDI-L-NPT
			Right	PBL-1/4-D-MIDI-R-NPT
		G $\frac{3}{8}$	Left	PBL-3/8-D-MIDI-L-NPT
			Right	PBL-3/8-D-MIDI-R-NPT
		G $\frac{1}{2}$	Left	PBL-1/2-D-MIDI-L-NPT
			Right	PBL-1/2-D-MIDI-R-NPT
		G $\frac{3}{4}$	Left	PBL-3/4-D-MIDI-L-NPT
			Right	PBL-3/4-D-MIDI-R-NPT
Maxi	G $\frac{1}{2}$	Left	PBL-1/2-D-MAXI-L-NPT	
		Right	PBL-1/2-D-MAXI-R-NPT	
	G $\frac{3}{4}$	Left	PBL-3/4-D-MAXI-NPT-L	
		Right	PBL-3/4-D-MAXI-NPT-R	
	G1	Left	PBL-1-D-MAXI-NPT-L	
		Right	PBL-1-D-MAXI-NPT-R	

Ordering Data – Safety components		
Designation	Size	Order code
Regulator lock LRVS		
	Mini	LRVS-D-MINI
	Midi	LRVS-D-MIDI
	Maxi	LRVS-D-MAXI

Lead Time LT for all products on this page: **1D** typically ships same day/next day

Accessories – Inch Series

Ordering Data



Ordering Data – Pressure gauges		Technical Data → 231		
Connection	Connection	Indicating range		Order code
		[bar]	[psi]	
	M5	0 ... 10	–	MA-27-10-M5
		–	0 ... 160	MA-27-160-M5-PSI
	G1/8	0 ... 10	0 ... 145	MA-40-10-1/8-U
		0 ... 16	0 ... 240	MA-40-16-1/8-U
	G1/4	0 ... 10	0 ... 160	MA-50-10-1/4-U
		0 ... 16	0 ... 240	MA-50-16-1/4-U

Ordering Data – Accessories		
Designation	Description	Order code
Silencer U		Technical Data → 295
	G1/8	U-1/8-B
	G1/4	U-1/4-B
	G3/8	U-3/8-B
Manual override AHB		
	–	AHB-MD/MF/MV

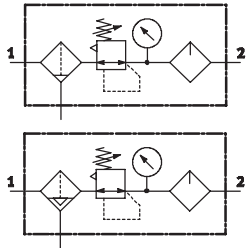
Ordering Data – Sensors		
Designation	Connection	Order code
Pressure switch PEV		Technical Data → 167
	G1/4	PEV-1/4-B
Pressure sensor SDE1		Technical Data → 175
	R1/4	SDE1-D10-G2-R14-C-P1-M8
	R1/8	SDE1-D10-G2-R18-C-P1-M8

Ordering Data – Filter cartridges		
Designation	Size	Order code
Grade of filtration 5 µm		
	Micro	LFP-D-MICRO-5M
	Mini	LFP-D-MINI-5M
	Midi	LFP-D-MIDI-5M
	Maxi	LFP-D-MAXI-5M
Grade of filtration 40 µm		
	Mini	LFP-D-MINI-40M-U
	Midi	LFP-D-MIDI-40M-U
	Maxi	LFP-D-MAXI-40M-U
Grade of filtration 1 µm		
	Mini	MS4/D-MINI-LFM-B
	Midi	LFMBP-D-MIDI
	Maxi	LFMBP-D-MAXI
Grade of filtration 0.01 µm		
	Mini	MS4/D-MINI-LFM-A
	Midi	LFMAP-D-MIDI
	Maxi	LFMAP-D-MAXI

Ordering Data – Electrical connection technology		
Designation	Description	Order code
Connecting cable NEBU		
	M8x1, 3-pin	NEBU-M8G3-K-2.5-LE3
	M8x1, 4-pin	NEBU-M8G4-K-2.5-LE4

Service Units FRC – Metric Series

Technical Data



Materials
 Housing: Die-cast zinc
 Bowl: Polycarbonate
 Seals: Nitrile rubber
 Free of copper and PTFE



The following oils are recommended for Festo components:

Viscosity range to ISO 3448 ,
 ISO class VG 32
 32 mm²/s (= cSt) at 104 °F

- Festo special oil OFSW-32
 - ARAL Vitam GF 32
 - BP Energol HLP 32
- Esso Nuto H 32
 - Mobil DTE 24
 - Shell Tellus Oil DO 32

Technical Data		Download CAD data → www.festo.com/us/engineering				
Size	Mini		Midi		Maxi	
Pneumatic connection	G1/8	G1/4	G3/8	G1/2	G3/4	G1
Design	Filter regulator					
	Proportional standard mist lubricator					
Type of mounting	Via accessories					
	In-line installation					
Mounting position	Vertical ±5°					
Grade of filtration [µm]	40					
Pressure regulation range [bar]	0.5 ... 7					
	0.5 ... 12					
Pressure indication	With pressure gauge					
Length [mm]	76		95		107	
Width [mm]	80 (104) ¹⁾		110 (140) ¹⁾		130 (162) ¹⁾ 132 (182) ¹⁾	
Height [mm]	212		269		271	

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ q _{nN} [l/min]							
Size	Mini		Midi		Maxi		
Pneumatic connection	G1/8	G1/4	G3/8	G1/2	G3/4	G1	
Pressure regulation range 0.5 ... 7 bar							
Grade of filtration 40 µm	800	1,300	2,000	2,800	8,500	8,700	
Pressure regulation range 0.5 ... 12 bar							
Grade of filtration 40 µm	700	1 000	2 000	2 600	8 300	8 500	

1) Measured at p₁ = 10 bar, p₂ = 6 bar and Δp = 1 bar. A minimum flow rate of 125 l/min is required for flawless functioning.

Operating Conditions		
Condensate drain	Manual rotary Fully automatic	
Supply pressure [bar]	1 ... 16 2 ... 12	
Ambient temperature [°C]	−10 ... +60	

Service Units FRC – Metric Series

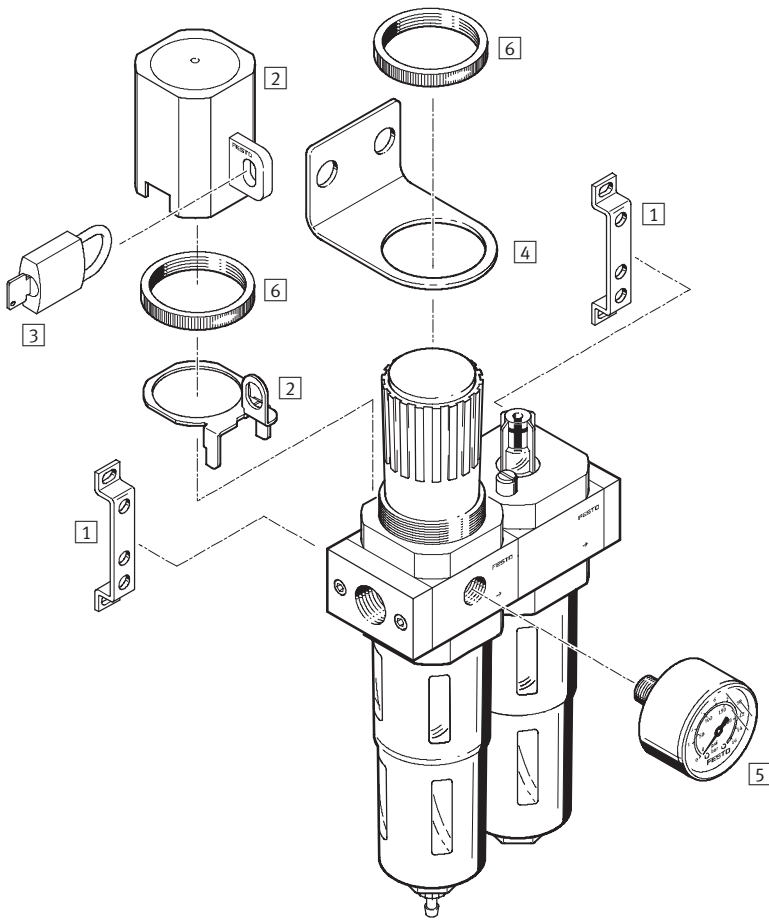
Ordering Data, Accessories



Ordering Data							
Condensate drain	Size	Connection	Pressure regulation range 0.5 ... 7 bar		Pressure regulation range 0.5 ... 12 bar		
			Type	LT	Type	LT	
Turned manually	Mini	G1/8	FRC-1/8-D-7-MINI	3D	FRC-1/8-D-MINI	3D	
		G1/4	FRC-1/4-D-7-MINI	3D	FRC-1/4-D-MINI	3D	
	Midi	G3/8	FRC-3/8-D-7-MIDI	3D	FRC-3/8-D-MIDI	3D	
		G1/2	FRC-1/2-D-7-MIDI	3D	FRC-1/2-D-MIDI	3D	
	Maxi	G3/4	FRC-3/4-D-7-MAXI	3D	FRC-3/4-D-MAXI	3D	
		G1	FRC-1-D-7-MAXI	3D	FRC-1-D-MAXI	3D	
Fully automatic	Mini	G1/8	FRC-1/8-D-7-MINI-A	3D	FRC-1/8-D-MINI-A	3D	
		G1/4	FRC-1/4-D-7-MINI-A	3D	FRC-1/4-D-MINI-A	3D	
	Midi	G3/8	FRC-3/8-D-7-MIDI-A	3D	FRC-3/8-D-MIDI-A	3D	
		G1/2	FRC-1/2-D-7-MIDI-A	3D	FRC-1/2-D-MIDI-A	3D	
	Maxi	G3/4	FRC-3/4-D-7-MAXI-A	3D	FRC-3/4-D-MAXI-A	3D	
		G1	FRC-1-D-7-MAXI-A	3D	FRC-1-D-MAXI-A	3D	

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview

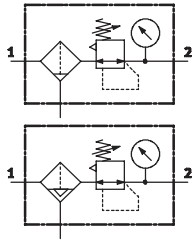


Mounting attachments and accessories	→ Page
1 Mounting bracket HFOE	258
2 Regulator lock LRVS	258
3 Padlock LRVS-D	-

Mounting attachments and accessories	→ Page
4 Mounting bracket HR-D	258
5 Pressure gauge MA (included in scope of delivery)	231
6 Knurled nut HMR (included in scope of delivery)	-

Filter Regulators LFR – Metric Series

Technical Data



Materials
 Housing: Die-cast zinc
 Bowl: Polycarbonate
 Seals: Nitrile rubber
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering						
Size	Micro		Mini		Midi		Maxi	
Pneumatic connection	M5	G1/8	G1/8	G1/4	G3/8	G1/2	G3/4	G1
Design	Filter regulator with pressure gauge							
	–		Filter regulator without pressure gauge					
Type of mounting	Via accessories							
	In-line installation							
	Front panel mounting							
Mounting position	Vertical ±5°							
Grade of filtration [µm]	5		5 or 40					
Pressure regulation range [bar]	0,5 ... 7							
	–		0,5 ... 12					
Pressure indication	Via pressure gauge							
Length [mm]	50		76		95		107	
Width [mm]	25	45	40 (64) ¹⁾		55 (85) ¹⁾		66 (96) ¹⁾	66 (116) ¹⁾
Height [mm]	120		212		269		271	

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ q _N [l/min]									
Size	Micro		Mini		Midi		Maxi		
Pneumatic connection	M5	G1/8	G1/8	G1/4	G3/8	G1/2	G3/4	G1	
Pressure regulation range 0.5 ... 7 bar									
Grade of filtration	5 µm	110	410	–	–	–	–	–	–
	40 µm	–	–	900	1,500	3,200	3,900	10,000	11,000
Pressure regulation range 0.5 ... 12 bar									
Grade of filtration	5 µm	–	–	650	1,200	2,400	2,600	7,600	8,000
	40 µm	–	–	750	1,400	3,100	3,400	9,700	10,000

1) Measured at p₁ = 10 bar, p₂ = 6 bar and Δp = 1 bar.

Operating Conditions			
Size	Micro		Mini / Midi / Maxi
Condensate drain	Manual rotary		Semi-automatic
			Manual rotary
Supply pressure [bar]	1 ... 10		1 ... 16
Ambient temperature [°C]	–10 ... +60		–10 ... +60
			Fully automatic
			2 ... 12

Filter Regulators LFR – Metric Series

Ordering Data

Ordering Data – Filtration Grade 5µm							
Condensate drain	Size	Connection	Pressure regulation range 0.5 ... 7 bar		LT	Pressure regulation range 0.5 ... 12 bar	
			Type			Type	
Directly actuated diaphragm regulator							
Turned manually	Micro	M5	LFR-M5-D-7-5M-MICRO		1D	-	
		G1/8	LFR-1/8-D-7-5M-MICRO		1D	-	
Semi-automatic	Micro	M5	LFR-M5-D-7-5M-MICRO-H		1D	-	
		G1/8	LFR-1/8-D-7-5M-MICRO-H		1D	-	
Directly actuated diaphragm regulator with integrated return flow function							
Turned manually	Maxi	G1/2	LFR-1/2-D-5M-DI-MAXI		3D	-	
		G3/4	LFR-3/4-D-5M-DI-MAXI		3D	-	
		G1	LFR-1-D-5M-DI-MAXI		3D	-	
Fully automatic	Maxi	G1/2	LFR-1/2-D-5M-DI-MAXI-A		3D	-	
		G3/4	LFR-3/4-D-5M-DI-MAXI-A		3D	-	
		G1	LFR-1-D-5M-DI-MAXI-A		3D	-	

Ordering Data – Filtration Grade 40µm							
Condensate drain	Size	Connection	Pressure regulation range 0.5 ... 7 bar		LT	Pressure regulation range 0.5 ... 12 bar	
			Type			Type	
Directly actuated diaphragm regulator							
Turned manually	Mini	G1/8	LFR-1/8-D-7-MINI		3D	LFR-1/8-D-MINI	3D
		G1/4	LFR-1/4-D-7-MINI		3D	LFR-1/4-D-MINI	3D
	Midi	G3/8	LFR-3/8-D-7-MIDI		3D	LFR-3/8-D-MIDI	3D
		G1/2	LFR-1/2-D-7-MIDI		3D	LFR-1/2-D-MIDI	3D
	Maxi	G3/4	LFR-3/4-D-7-MAXI		3D	LFR-3/4-D-MAXI	3D
		G1	LFR-1-D-7-MAXI		3D	LFR-1-D-MAXI	3D
Fully automatic	Mini	G1/8	LFR-1/8-D-7-MINI-A		3D	LFR-1/8-D-MINI-A	3D
		G1/4	LFR-1/4-D-7-MINI-A		3D	LFR-1/4-D-MINI-A	3D
	Midi	G3/8	LFR-3/8-D-7-MIDI-A		3D	LFR-3/8-D-MIDI-A	3D
		G1/2	LFR-1/2-D-7-MIDI-A		3D	LFR-1/2-D-MIDI-A	3D
	Maxi	G3/4	LFR-3/4-D-7-MAXI-A		3D	LFR-3/4-D-MAXI-A	3D
		G1	LFR-1-D-7-MAXI-A		3D	LFR-1-D-MAXI-A	3D
Directly actuated diaphragm regulator with integrated return flow function							
Turned manually	Maxi	G1/2	LFR-1/2-D-7-DI-MAXI		3D	LFR-1/2-D-DI-MAXI	3D
		G3/4	LFR-3/4-D-7-DI-MAXI		3D	LFR-3/4-D-DI-MAXI	3D
		G1	LFR-1-D-7-DI-MAXI		3D	LFR-1-D-DI-MAXI	3D
Fully automatic	Maxi	G1/2	LFR-1/2-D-7-DI-MAXI-A		3D	LFR-1/2-D-DI-MAXI-A	3D
		G3/4	LFR-3/4-D-7-DI-MAXI-A		3D	LFR-3/4-D-DI-MAXI-A	3D
		G1	LFR-1-D-7-DI-MAXI-A		3D	LFR-1-D-DI-MAXI-A	3D

Ordering Data – Basic Units without Threaded Connecting Plates, Filtration Grade 5µm							
Condensate drain	Size	Connection	Pressure regulation range 0.5 ... 7 bar		LT	Pressure regulation range 0.5 ... 12 bar	
			Type			Type	
Basic Unit without pressure gauge							
Turned manually	Mini	-	LFR-D-5M-MINI		1D	-	
	Midi	-	LFR-D-5M-MIDI		1D	-	
	Maxi	-	LFR-D-5M-MAXI		1D	-	
Fully automatic	Mini	-	LFR-D-5M-MINI-A		1D	-	
	Midi	-	LFR-D-5M-MIDI-A		1D	-	
	Maxi	-	LFR-D-5M-MAXI-A		1D	-	

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

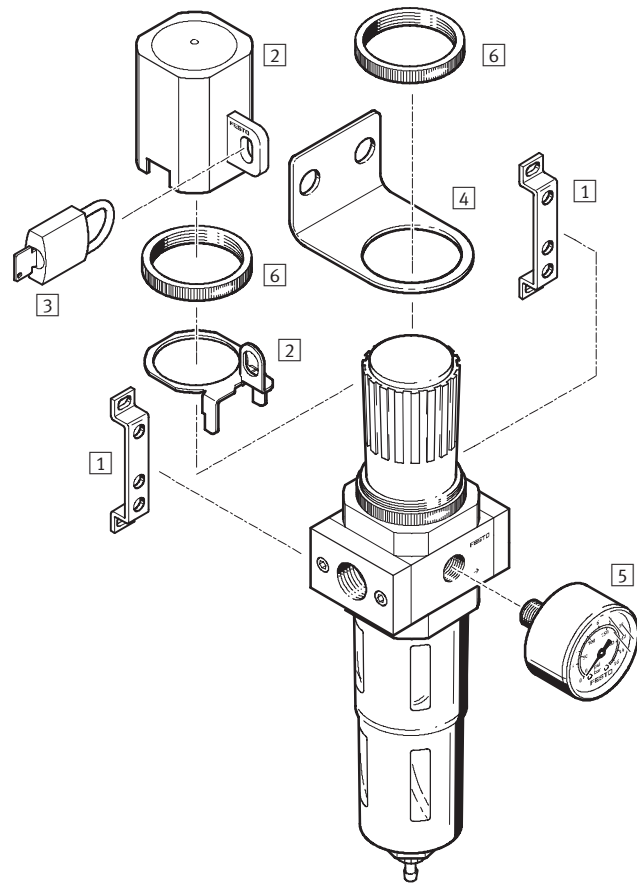
Filter Regulators LFR – Metric Series

Ordering Data, Accessories

Ordering Data – Basic Units without Threaded Connecting Plates, Filtration Grade 40µm						
Condensate drain	Size	Connection	Pressure regulation range 0.5 ... 7 bar	LT	Pressure regulation range 0.5 ... 12 bar	LT
			Type		Type	
Basic Unit without pressure gauge						
Turned manually	Mini	–	LFR-D-7-MINI	1D	LFR-D-MINI	1D
	Midi	–	LFR-D-7-MIDI	1D	LFR-D-MIDI	1D
	Maxi	–	LFR-D-7-MAXI	1D	LFR-D-MAXI	1D
Fully automatic	Mini	–	LFR-D-7-MINI-A	1D	LFR-D-MINI-A	1D
	Midi	–	LFR-D-7-MIDI-A	1D	LFR-D-MIDI-A	1D
	Maxi	–	LFR-D-7-MAXI-A	1D	LFR-D-MAXI-A	1D
Basic Unit without pressure gauge, with integrated return flow function						
Turned manually	Maxi	–	LFR-D-7-DI-MAXI	1D	LFR-D-DI-MAXI	1D
Fully automatic	Maxi	–	LFR-D-7-DI-MAXI-A	1D	LFR-D-DI-MAXI-A	1D

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

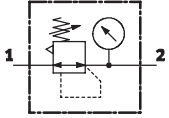
Accessories Overview



Mounting attachments and accessories		→ Page
1	Mounting bracket HFOE	258
2	Regulator lock LRVS	258
3	Padlock LRVS-D	–
4	Mounting bracket HR-D	258
5	Pressure gauge MA	231
6	Knurled nut HMR (included in scope of delivery)	–

Pressure Regulators LR – Metric Series

Technical Data



Materials
 Housing: Die-cast zinc/aluminum
 Seals: Nitrile rubber
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering						
Size	Micro		Mini		Midi		Maxi	
Pneumatic connection	M5	G $\frac{1}{8}$	G $\frac{1}{8}$	G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$	G $\frac{3}{4}$	G1
Design	Directly actuated diaphragm regulator						Pilot actuated piston regulator	
Type of mounting	Via accessories In-line installation Front panel mounting							
Mounting position	Any							
Max. hysteresis [bar]	0.2		0.2				0.4	
Pressure regulation range [bar]	0.5 ... 7		0.5 ... 7				0.5 ... 12	
Pressure indication	Via pressure gauge							
	M5 port		G $\frac{1}{8}$ port		G $\frac{1}{4}$ port		G $\frac{1}{4}$ port	
Length [mm]	50		76		95		107	
Width [mm]	25	45	40 (64) ¹⁾		55 (85) ¹⁾		66 (96) ¹⁾	66 (116) ¹⁾
Height [mm]	65		96		135		125	

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ q _N [l/min]								
Size	Micro		Mini		Midi		Maxi	
Pneumatic connection	M5	G $\frac{1}{8}$	G $\frac{1}{8}$	G $\frac{1}{4}$	G $\frac{3}{8}$	G $\frac{1}{2}$	G $\frac{3}{4}$	G1
Pressure regulation range 0.5 ... 7 bar	120	230	1,000	1,600	3,300	4,000	12,000	12,500
Pressure regulation range 0.5 ... 12 bar	–		800	1,500	3,200	3,500	11,000	11,500

1) Measured at p₁ = 10 bar, p₂ = 6 bar and Δp = 1 bar.

Operating Conditions	
Operating medium	Filtered compressed air, lubricated or unlubricated, grade of filtration 40 μm
Supply pressure [bar]	1 ... 16 (Micro: 1 ... 10)
Ambient temperature [°C]	–10 ... +60

Pressure Regulators LR – Metric Series

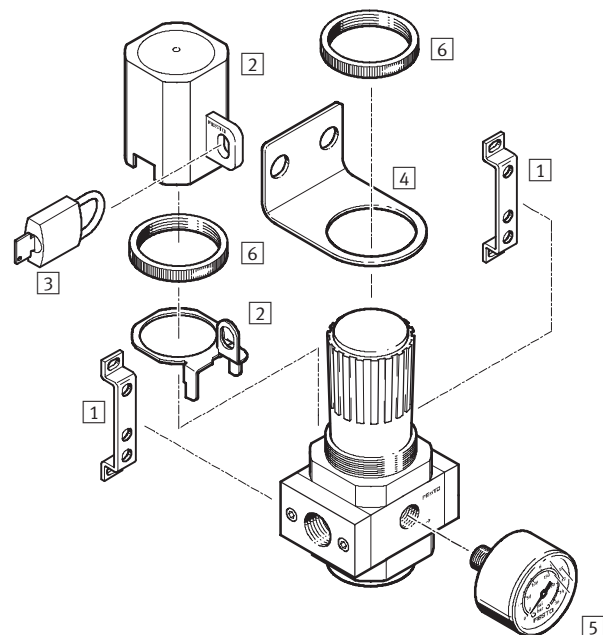
Ordering Data, Accessories

Ordering Data						
Size	Connection	Pressure regulation range 0.5 ... 7 bar		LT	Pressure regulation range 0.5 ... 12 bar	
		Type			Type	
Directly actuated diaphragm regulator						
Micro	M5	LR-M5-D-7-MICRO		1D	–	
	G1/8	LR-1/8-D-7-MICRO		1D	–	
Mini	G1/8	LR-1/8-D-7-MINI		3D	LR-1/8-D-MINI	3D
	G1/4	LR-1/4-D-7-MINI		3D	LR-1/4-D-MINI	3D
Midi	G3/8	LR-3/8-D-7-MIDI		3D	LR-3/8-D-MIDI	3D
	G1/2	LR-1/2-D-7-MIDI		3D	LR-1/2-D-MIDI	3D
Pilot actuated piston regulator						
Maxi	G3/4	LR-3/4-D-7-MAXI		3D	LR-3/4-D-MAXI	3D
	G1	LR-1-D-7-MAXI		3D	LR-1-D-MAXI	3D
Directly actuated diaphragm regulator with integrated return flow function						
Maxi	G1/2	LR-1/2-D-7-DI-MAXI		3D	LR-1/2-D-DI-MAXI	3D
	G3/4	LR-3/4-D-7-DI-MAXI		3D	LR-3/4-D-DI-MAXI	3D
	G1	LR-1-D-7-DI-MAXI		3D	LR-1-D-DI-MAXI	3D

Ordering Data – Basic Units, without Threaded Connecting Plates						
Size	Connection	Pressure regulation range 0.5 ... 7 bar		LT	Pressure regulation range 0.5 ... 12 bar	
		Type			Type	
Basic Unit without pressure gauge						
Mini	–	LR-D-7-MINI		1D	LR-D-MINI	1D
Midi	–	LR-D-7-MIDI		1D	LR-D-MIDI	1D
Maxi	–	LR-D-7-MAXI		1D	LR-D-MAXI	1D
Basic Unit without pressure gauge, with integrated return flow function						
Maxi	–	LR-D-7-DI-MAXI		1D	LR-D-DI-MAXI	1D

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

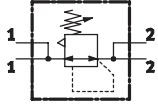
Accessories Overview



Mounting attachments and accessories		→ Page
1	Mounting bracket HFOE	258
2	Regulator lock LRVS	258
3	Padlock LRVS-D	–
4	Mounting bracket HR-D	258
5	Pressure gauge MA	231
6	Knurled nut HMR (included in scope of delivery)	–

Pressure Regulators LRB – Metric Series

Technical Data



Materials
 Housing: Die-cast zinc
 Seals: Nitrile rubber
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering	
Size	Mini	Midi	
Pneumatic connection 1 ¹⁾	G ¹ / ₄	G ³ / ₈	G ³ / ₈ G ¹ / ₂
Pneumatic connection 2 (rear outlet)	G ¹ / ₄	G ³ / ₈	
Design	Directly actuated diaphragm regulator with through pressure supply		
Type of mounting	Via accessories In-line installation		
Mounting position	Any		
Max. hysteresis [bar]	0.2		
Pressure regulation range [bar]	0.5 ... 7 0.5 ... 12		
Pressure indication	G ¹ / ₈ port	G ¹ / ₄ port	
Length [mm]	40	55	
Width [mm]	40	55	
Height [mm]	96	136	

1) Dependent on connecting plate selected, must be ordered separately as an accessory → 258

Standard Nominal Flow Rate ¹⁾ qnN [l/min]		
Size	Mini	Midi
Pressure regulation range 0.5 ... 7 bar	1,800	3,800
Pressure regulation range 0.5 ... 12 bar	1,600	3,200

1) Measured at p₁ = 10 bar, p₂ = 6 bar and Δp = 1 bar.

Operating Conditions	
Operating medium	Filtered compressed air, grade of filtration 40 μm
Supply pressure [bar]	1 ... 16
Ambient temperature [°C]	-10 ... +60

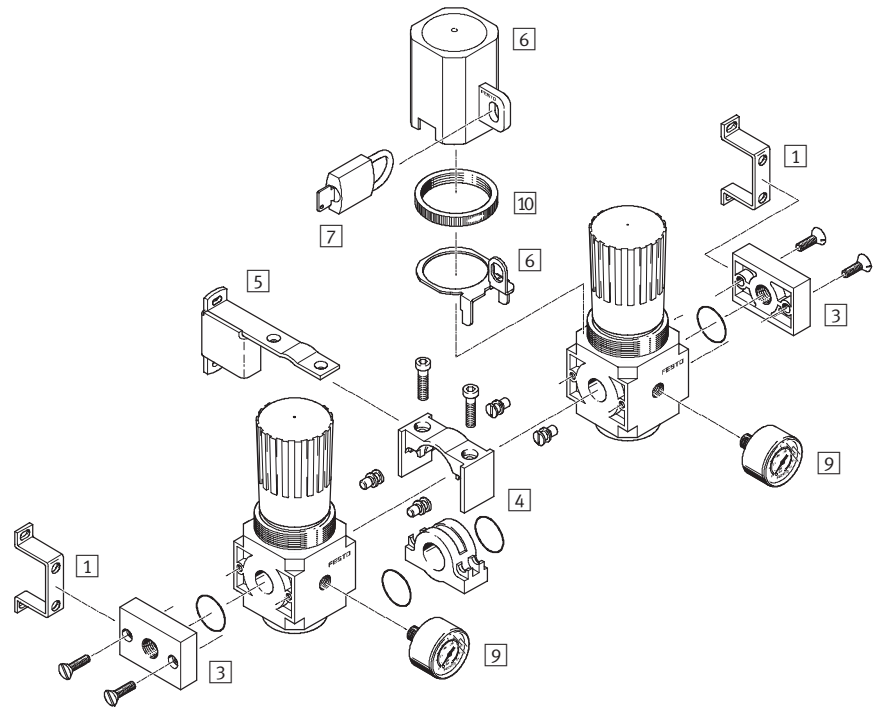
Pressure Regulators LRB – Metric Series

Ordering Data, Accessories

Ordering Data				
Pressure regulator for manifold assembly				
Size	Pressure regulation range 0.5 ... 7 bar	LT	Pressure regulation range 0.5 ... 12 bar	LT
	Type		Type	
Mini	LRB-D-7-O-MINI	1D	LRB-D-O-MINI	1D
Midi	LRB-D-7-O-MIDI	1D	LRB-D-O-MIDI	1D

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview



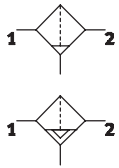
Mounting attachments and accessories	→ Page
1) Mounting bracket HRB	258
3) Connecting plates LRBAS	-
4) Connecting kit HRBC	258
5) Mounting bracket HRBK ¹⁾	258

Mounting attachments and accessories	→ Page
6) Regulator lock LRVS	258
7) Padlock LRVS-D	-
9) Pressure gauge MA	231
10) Knurled nut HMR (included in scope of delivery)	-

1) The mounting bracket must be mounted after every second pressure regulator.

Filters LF – Metric Series

Technical Data



Materials
 Housing: Die-cast zinc
 Bowl: Polycarbonate
 Seals: Nitrile rubber
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering						
Size	Micro		Mini		Midi		Maxi	
Pneumatic connection	M5	G1/8	G1/8	G1/4	G3/8	G1/2	G3/4	G1
Design	Sintered filter with centrifugal separation							
Type of mounting	Via accessories In-line installation							
Mounting position	Vertical ±5°							
Grade of filtration [µm]	5		5 or 40					
Length [mm]	25		40		55		66	
Width [mm]	25	45	40 (64) ¹⁾		55 (85) ¹⁾		66 (96) ¹⁾	66 (116) ¹⁾
Height [mm]	88		163		198		222	

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ qnN [l/min]		Micro		Mini		Midi		Maxi	
Size		M5	G1/8	G1/8	G1/4	G3/8	G1/2	G3/4	G1
Grade of filtration	5 µm	170	290	800	950	1,800	2,000	3,600	3,800
	40 µm	–		1,000	1,200	2,700	3,000	5,000	5,300

1) Measured at p1 = 6 bar and Δp = 1 bar.
 A minimum flow rate of 125 l/min. is required for flawless functioning.

Operating Conditions		Micro		Mini / Midi / Maxi	
Condensate drain		Manual rotary		Semi-automatic	
Supply pressure [bar]		0 ... 10		1 ... 10	
Ambient temperature [°C]		–10 ... +60		0 ... 16	
				Manual rotary	
				Fully automatic	
				2 ... 12	

Filters LF – Metric Series

Ordering Data, Accessories

Ordering Data							
Condensate drain	Size	Connection	Grade of filtration 5 µm		LT	Grade of filtration 40 µm	
			Type			Type	
Input pressure 0 ... 10 bar							
Turned manually	Micro	M5	LF-M5-D-5M-MICRO		1D	-	
		G1/8	LF-1/8-D-5M-MICRO		1D	-	
Semi-automatic	Micro	M5	LF-M5-D-5M-MICRO-H		1D	-	
		G1/8	LF-1/8-D-5M-MICRO-H		1D	-	
Input pressure 0 ... 16 bar, metal bowl guard							
Turned manually	Mini	G1/8	LF-1/8-D-5M-MINI		3D	LF-1/8-D-MINI	3D
		G1/4	LF-1/4-D-5M-MINI		3D	LF-1/4-D-MINI	3D
	Midi	G3/8	LF-3/8-D-5M-MIDI		3D	LF-3/8-D-MIDI	3D
		G1/2	LF-1/2-D-5M-MIDI		3D	LF-1/2-D-MIDI	3D
	Maxi	G3/4	LF-3/4-D-5M-MAXI		3D	LF-3/4-D-MAXI	3D
		G1	LF-1-D-5M-MAXI		3D	LF-1-D-MAXI	3D
Fully automatic	Mini	G1/8	LF-1/8-D-5M-MINI-A		3D	LF-1/8-D-MINI-A	3D
		G1/4	LF-1/4-D-5M-MINI-A		3D	LF-1/4-D-MINI-A	3D
	Midi	G3/8	LF-3/8-D-5M-MIDI-A		3D	LF-3/8-D-MIDI-A	3D
		G1/2	LF-1/2-D-5M-MIDI-A		3D	LF-1/2-D-MIDI-A	3D
	Maxi	G3/4	LF-3/4-D-5M-MAXI-A		3D	LF-3/4-D-MAXI-A	3D
		G1	LF-1-D-5M-MAXI-A		3D	LF-1-D-MAXI-A	3D

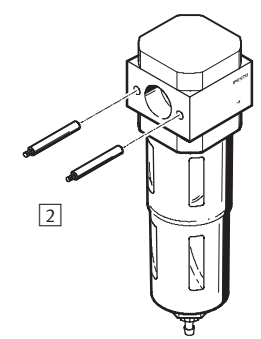
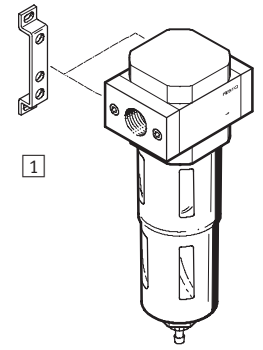
Ordering Data – Basic Units, without Threaded Connecting Plates							
Input pressure 0 ... 16 bar, metal bowl guard							
Condensate drain	Size	Connection	Grade of filtration 5 µm		LT	Grade of filtration 40 µm	
			Type			Type	
Input pressure 0 ... 16 bar, metal bowl guard							
Turned manually	Mini	-	LF-D-5M-MINI-U		1D	LF-D-MINI-U	1D
	Midi	-	LF-D-5M-MIDI-U		1D	LF-D-MIDI-U	1D
	Maxi	-	LF-D-5M-MAXI-U		1D	LF-D-MAXI-U	1D
Fully automatic	Mini	-	LF-D-5M-MINI-A-U		1D	LF-D-MINI-A-U	1D
	Midi	-	LF-D-5M-MIDI-A-U		1D	LF-D-MIDI-A-U	1D
	Maxi	-	LF-D-5M-MAXI-A-U		1D	LF-D-MAXI-A-U	1D

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview

Individual device

Basic unit for manifold assembly

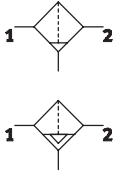


Mounting attachments and accessories	→ Page
1 Mounting bracket HFOE	258

Mounting attachments and accessories	→ Page
2 Threaded pin FRB (included in scope of delivery)	258

Fine and Micro Filters LFMB/LFMA – Metric Series

Technical Data



Materials
 Housing: Die-cast zinc
 Bowl: Polycarbonate
 Filter: Borosilicate fibre
 Seals: Nitrile rubber
 Free of copper and PTFE



LFMA
 DIN ISO class 1 for particles:
 max. particle density 0.1 mg/m³
 DIN ISO class 2 for oil aerosols:
 max. oil concentration 0.1 mg/m³

LFMB
 DIN ISO class 2 for particles:
 max. particle density 1 mg/m³
 DIN ISO class 3 for oil aerosols:
 max. oil concentration 1 mg/m³

Technical Data		Download CAD data → www.festo.com/us/engineering				
Size	Mini		Midi		Maxi	
Pneumatic connection	G1/8	G1/4	G3/8	G1/2	G3/4	G1
Design	Fibre filter					
Type of mounting	Via accessories In-line installation					
Mounting position	Vertical ±5°					
Length [mm]	40		55		66	
Width [mm]	40 (64) ¹⁾		55 (85) ¹⁾		66 (96) ¹⁾ 66 (116) ¹⁾	
Height [mm]	163		198		222	

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ qnN [l/min]						
Size	Mini		Midi		Maxi	
Pneumatic connection	G1/8	G1/4	G3/8	G1/2	G3/4	G1
Micro filter LFMA	130	160	380	400	900	950
Fine filter LFMB	250	300	700	900	1,200	1,250

1) Measured at p₁ = 6 bar and Δp = 70 mbar.
 A minimum flow rate of 125 l/min. is required for flawless functioning.

Operating Conditions				
Type	LFMA		LFMB	
Condensate drain	Manual rotary		Fully automatic	
Operating medium	Filtered compressed air, lubricated or unlubricated, grade of filtration 1 µm		Filtered compressed air, lubricated or unlubricated, grade of filtration 5 µm	
Grade of filtration [µm]	0.01		1	
Residual oil content [mg/m ³]	≤ 0.01		≤ 0.5	
Supply pressure [bar]	1 ... 16	1.5 ... 12		1 ... 16 1.5 ... 12
Ambient temperature [°C]	-10 ... +60		-10 ... +60	

Fine and Micro Filters LFMB/LFMA – Metric Series

Ordering Data, Accessories



Ordering Data – Fine filters LFMB						
Grade of filtration 1 µm, metal bowl guard						
Size	Connection	Input pressure 1 ... 16 bar		LT	Input pressure 1.5 ... 12 bar	
		Condensate drain turned manually			Condensate drain fully automatic	
		Type			Type	
With threaded connecting plates						
Mini	G1/8	LFMB-1/8-D-MINI	1D	LFMB-1/8-D-MINI-A	1D	
	G1/4	LFMB-1/4-D-MINI	1D	LFMB-1/4-D-MINI-A	1D	
Midi	G3/8	LFMB-3/8-D-MIDI	1D	LFMB-3/8-D-MIDI-A	1D	
	G1/2	LFMB-1/2-D-MIDI	1D	LFMB-1/2-D-MIDI-A	1D	
Maxi	G3/4	LFMB-3/4-D-MAXI	1D	LFMB-3/4-D-MAXI-A	1D	
	G1	LFMB-1-D-MAXI	1D	LFMB-1-D-MAXI-A	1D	
Basic Units, without Threaded Connecting Plates						
Mini	–	LFMB-D-MINI-U	1D	LFMB-D-MINI-A-U	1D	
Midi	–	LFMB-D-MIDI-U	1D	LFMB-D-MIDI-A-U	1D	
Maxi	–	LFMB-D-MAXI-U	1D	LFMB-D-MAXI-A-U	1D	

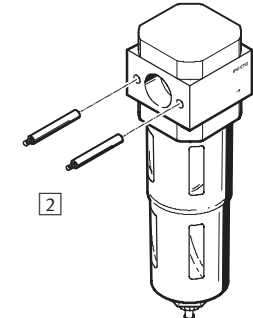
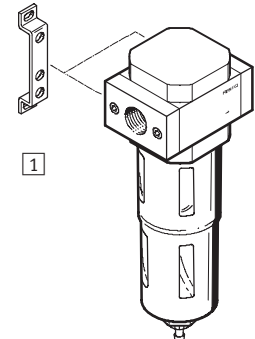
Ordering Data – Micro filters LFMA						
Grade of filtration 0.01 µm, metal bowl guard						
Size	Connection	Input pressure 1 ... 16 bar		LT	Input pressure 1.5 ... 12 bar	
		Condensate drain turned manually			Condensate drain fully automatic	
		Type			Type	
With threaded connecting plates						
Mini	G1/8	LFMA-1/8-D-MINI	1D	LFMA-1/8-D-MINI-A	1D	
	G1/4	LFMA-1/4-D-MINI	1D	LFMA-1/4-D-MINI-A	1D	
Midi	G3/8	LFMA-3/8-D-MIDI	1D	LFMA-3/8-D-MIDI-A	1D	
	G1/2	LFMA-1/2-D-MIDI	1D	LFMA-1/2-D-MIDI-A	1D	
Maxi	G3/4	LFMA-3/4-D-MAXI	1D	LFMA-3/4-D-MAXI-A	1D	
	G1	LFMA-1-D-MAXI	1D	LFMA-1-D-MAXI-A	1D	
Basic Units, without Threaded Connecting Plates						
Mini	–	LFMA-D-MINI-U	1D	LFMA-D-MINI-A-U	1D	
Midi	–	LFMA-D-MIDI-U	1D	LFMA-D-MIDI-A-U	1D	
Maxi	–	LFMA-D-MAXI-U	1D	LFMA-D-MAXI-A-U	1D	

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview

Individual device

Basic unit for manifold assembly



Mounting attachments and accessories	→ Page
1 Mounting bracket HFOE	258

Mounting attachments and accessories	→ Page
2 Threaded pin FRB (included in scope of delivery)	258

4 Air Preparation Units

Lubricators LOE – Metric Series

Technical Data



Materials
 Housing: Die-cast zinc/aluminum
 Seals: Nitrile rubber
 Free of copper and PTFE



The following oils are recommended for Festo components:
 Viscosity range to ISO 3448, ISO class VG 32
 32 mm²/s (= cSt) at 40 °C

- Festo special oil OFSW-32
- ARAL Vitam GF 32
- BP Energol HLP 32
- Esso Nuto H 32
- Mobil DTE 24
- Shell Tellus Oil DO 32

Technical Data								
Size	Micro		Mini		Midi		Maxi	
Pneumatic connection	M5	G ¹ / ₈	G ¹ / ₈	G ¹ / ₄	G ³ / ₈	G ¹ / ₂	G ³ / ₄	G1
Design	Proportional standard mist lubricator							
Type of mounting	Via accessories							
	In-line installation							
Mounting position	Vertical ±5°							
Minimum flow for lubricator operation [l/min]	3		3		8		10	
Max. oil capacity [cm ³]	6.5		45		110		190	
Length [mm]	25		40		55		66	
Width [mm]	25	45	40 (64) ¹⁾		55 (85) ¹⁾		66 (96) ¹⁾	66 (116) ¹⁾
Height [mm]	96		169		204		228	

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ qnN [l/min]								
Size	Micro		Mini		Midi		Maxi	
Pneumatic connection	M5	G ¹ / ₈	G ¹ / ₈	G ¹ / ₄	G ³ / ₈	G ¹ / ₂	G ³ / ₄	G1
Lubricator LOE	200	410	1,300	2,300	5,500	6,100	8,400	9,000

1) Measured at p₁ = 6 bar and Δp = 1 bar.

Operating Conditions		
Size	Micro	Mini / Midi / Maxi
Operating medium	Filtered compressed air, unlubricated, grade of filtration 40 μm	
Supply pressure [bar]	0 ... 10	
Ambient temperature [°C]	-10 ... +60	

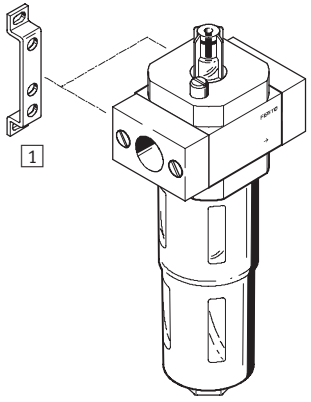
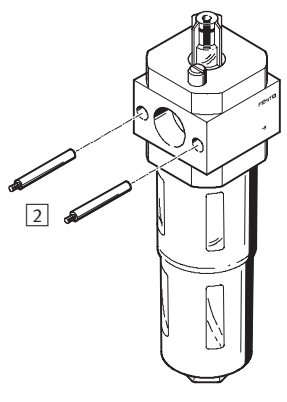
Lubricators LOE – Metric Series

Ordering Data, Accessories

Ordering Data			
Size	Connection	Type	LT
Input pressure 0 ... 10 bar			
Micro	M5	LOE-M5-D-MICRO	1D
	G1/8	LOE-1/8-D-MICRO	1D
Input pressure 0 ... 16 bar, metal bowl guard			
Mini	G1/8	LOE-1/8-D-MINI	3D
	G1/4	LOE-1/4-D-MINI	3D
Midi	G3/8	LOE-3/8-D-MIDI	3D
	G1/2	LOE-1/2-D-MIDI	3D
Maxi	G3/4	LOE-3/4-D-MAXI	3D
	G1	LOE-1-D-MAXI	3D

Ordering Data – Basic Units, without Threaded Connecting Plates			
Size	Connection	Type	LT
Input pressure 0 ... 16 bar, metal bowl guard			
Mini	–	LOE-D-MINI-U	1D
Midi	–	LOE-D-MIDI-U	1D
Maxi	–	LOE-D-MAXI-U	1D

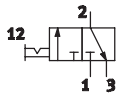
LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview			
Individual device	Basic unit for manifold assembly	Mounting attachments and accessories	→ Page
		1 Mounting bracket HFOE	258
		2 Threaded pin FRB (included in scope of delivery)	258

Air Preparation Units
4

Manual On-off Valves HE – Metric Series

Technical Data



Materials
 Housing: Die-cast aluminum
 Seals: Nitrile rubber
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering				
Size	Mini		Midi		Maxi	
Pneumatic connection	G1/8	G1/4	G3/8	G1/2	G3/4	G1
Design	Piston spool					
Type of mounting	Via accessories In-line installation					
Mounting position	Any					
Valve function	3/2-way					
Exhaust port	G1/8		G1/4		G3/8	
Reset method	Mechanical spring					
Direction of flow	Non-reversible					
Length [mm]	40		55		66	
Width [mm]	40 (64) ¹⁾		55 (85) ¹⁾		66 (96) ¹⁾ 66 (116) ¹⁾	
Height [mm]	100		121		134	

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ qnN [l/min]						
Size	Mini		Midi		Maxi	
Pneumatic connection	G1/8	G1/4	G3/8	G1/2	G3/4	G1
On-off valve HE	1,000	1,500	3,200	3,600	6,000	6,500

1) Measured at p1 = 6 bar and Δp = 1 bar.

Operating Conditions	
Operating medium	Filtered compressed air, lubricated or unlubricated, grade of filtration 50 μm
Operating pressure [bar]	0 ... 16
Ambient temperature [°C]	-10 ... +60

Manual On-off Valves HE – Metric Series

Ordering Data, Accessories



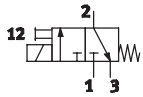
Ordering Data			
3/2-way valve, operating pressure 0 ... 16 bar, normally closed			
Size	Connection	Type	LT
With threaded connecting plates			
Mini	G1/8	HE-1/8-D-MINI	3D
	G1/4	HE-1/4-D-MINI	3D
Midi	G3/8	HE-3/8-D-MIDI	3D
	G1/2	HE-1/2-D-MIDI	3D
Maxi	G3/4	HE-3/4-D-MAXI	3D
	G1	HE-1-D-MAXI	3D
Basic Unit, without threaded connecting plates			
Mini	–	HE-D-MINI	1D
Midi	–	HE-D-MIDI	1D
Maxi	–	HE-D-MAXI	1D

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview			
Individual device	Basic unit for manifold assembly	Mounting attachments and accessories	→ Page
		1 Mounting bracket HFOE	258
		2 Threaded pin FRB (included in scope of delivery)	258
		3 Silencer U	259

Electric On-off Valves HEE – Metric Series

Technical Data



Materials
 Housing: Die-cast aluminum
 Seals: Nitrile rubber
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering				
Size	Mini		Midi		Maxi	
Pneumatic connection	G1/8	G1/4	G3/8	G1/2	G3/4	G1
Design	Piston spool					
Type of mounting	Via accessories In-line installation					
Mounting position	Any					
Valve function	3/2-way, single solenoid					
Exhaust port	G1/8		G1/4		G3/8	
Reset method	Mechanical spring					
Direction of flow	Non-reversible					
Operating voltage	[V DC]	24				
	[V AC]	110, 230				
Length	[mm]	40		55		66
Width	[mm]	40 (64) ¹⁾		55 (85) ¹⁾		66 (96) ¹⁾ 66 (116) ¹⁾
Height	[mm]	104		122		135

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ qnN [l/min]						
Size	Mini		Midi		Maxi	
Pneumatic connection	G1/8	G1/4	G3/8	G1/2	G3/4	G1
On-off valve HEE	1,000	1,500	3,200	3,600	6,000	6,500

1) Measured at p1 = 6 bar and Δp = 1 bar.

Operating Conditions	
Operating medium	Filtered compressed air, lubricated or unlubricated, grade of filtration 50 μm
Operating pressure	[bar] 2,5 ... 16
Ambient temperature	[°C] -10 ... +60

Electric On-off Valves HEE – Metric Series



Ordering Data, Accessories

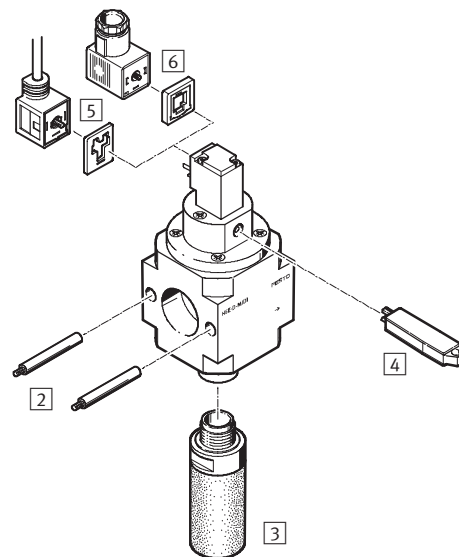
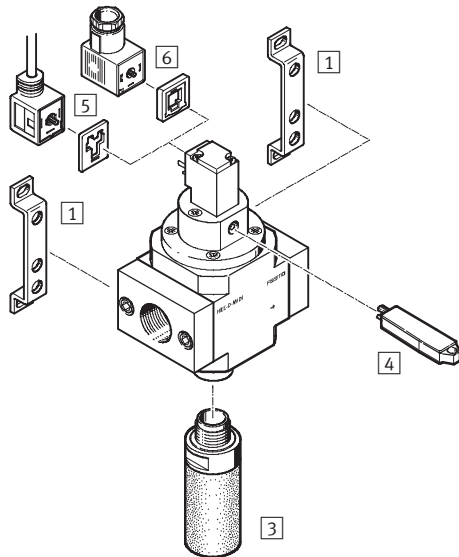
Ordering Data							
3/2-way valve, operating pressure 2.5 ... 16 bar, normally closed							
Size	Connection	24 V DC	LT	110 V AC	LT	230 V AC	LT
		Type		Type		Type	
Without threaded connecting plates							
Mini	–	HEE-D-MINI-24	1D	HEE-D-MINI-110	1D	HEE-D-MINI-230	1D
Midi	–	HEE-D-MIDI-24	1D	HEE-D-MIDI-110	1D	HEE-D-MIDI-230	1D
Maxi	–	HEE-D-MAXI-24	1D	HEE-D-MAXI-110	1D	HEE-D-MAXI-230	1D

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview

Individual device

Basic unit for manifold assembly

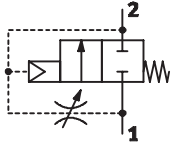


Mounting attachments and accessories	→ Page
1 Mounting bracket HFOE	258
3 Silencer U	259
4 Non-detenting manual override tool AHB-MD/MF/MY	259
5 Plug socket with cable KMEB	www.festo.com
6 Plug socket MSSD-EB	www.festo.com

Mounting attachments and accessories	→ Page
2 Threaded pin FRB (included in scope of delivery)	258
3 Silencer U	259
4 Non-detenting manual override tool AHB-MD/MF/MY	259
5 Plug socket with cable KMEB	www.festo.com
6 Plug socket MSSD-EB	www.festo.com

Soft-start Valves HEL – Metric Series

Technical Data



Materials
 Housing: Die-cast aluminum
 Seals: Nitrile rubber
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering				
Size	Mini		Midi		Maxi	
Pneumatic connection	G1/8	G1/4	G3/8	G1/2	G3/4	G1
Design	Piston spool					
Type of mounting	Via accessories In-line installation					
Mounting position	Any					
Valve function	2/2-way, closed, air operated, adjustable					
Reset method	Mechanical spring					
Actuation method	Direct					
Direction of flow	Non-reversible					
Length [mm]	40		55		66	
Width [mm]	40 (64) ¹⁾		55 (85) ¹⁾		66 (96) ¹⁾ 66 (116) ¹⁾	
Height [mm]	66		77		89	

1) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ q _N [l/min]						
Size	Mini		Midi		Maxi	
Pneumatic connection	G1/8	G1/4	G3/8	G1/2	G3/4	G1
Soft-start valve HEL	1,000	1,500	3,200	3,600	6,000	6,500

1) Measured at p₁ = 6 bar and Δp = 1 bar.

Operating Conditions	
Operating medium	Filtered compressed air, lubricated or unlubricated, grade of filtration 50 μm
Operating pressure [bar]	3 ... 16
Ambient temperature [°C]	-10 ... +60

Soft-start Valves HEL – Metric Series

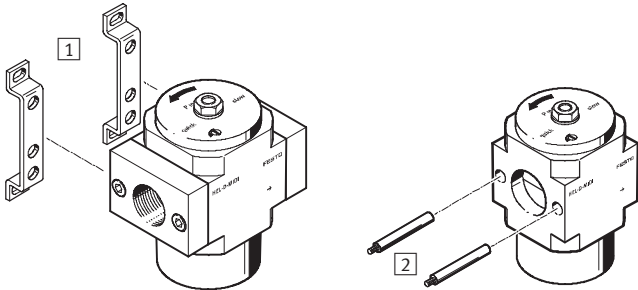
Ordering Data, Accessories

Ordering Data			
Gradual pressure build-up, 2/2-way valve, normally closed, operating pressure 3 ... 16 bar			
Size	Connection	Type	LT
With threaded connecting plates			
Mini	G1/8	HEL-1/8-D-MINI	3D
	G1/4	HEL-1/4-D-MINI	3D
Midi	G3/8	HEL-3/8-D-MIDI	3D
	G1/2	HEL-1/2-D-MIDI	3D
Maxi	G3/4	HEL-3/4-D-MAXI	3D
	G1	HEL-1-D-MAXI	3D
Basic Unit, without threaded connecting plates			
Mini	–	HEL-D-MINI	1D
Midi	–	HEL-D-MIDI	1D
Maxi	–	HEL-D-MAXI	1D

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

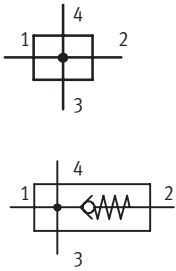
Accessories Overview

Individual device	Basic unit for manifold assembly	Mounting attachments and accessories	→ Page
		1 Mounting bracket HFOE	258
		2 Threaded pin FRB (included in scope of delivery)	258



Branching Modules FRM/FRZ – Metric Series

Technical Data



Materials
 Housing: Die-cast zinc
 Seals: Nitrile rubber, polyvinyl chloride
 Free of copper and PTFE



Technical Data		Download CAD data → www.festo.com/us/engineering					
Size	Micro	Mini		Midi		Maxi	
Pneumatic connection 1, 2 ¹⁾	G1/8	G1/8	G1/4	G3/8	G1/2	G3/4	G1
Pneumatic connection 3	G1/8	G1/4		G1/2		G3/4	
Pneumatic connection 4	M5	G1/4					
Design	Branching module						
Type of mounting	With accessories						
	In-line installation						
Mounting position	Any						
Length [mm]	25	40		55		66	
Width [mm]	25	40 (64) ²⁾		55 (85) ²⁾		66 (96) ²⁾	66 (116) ²⁾
Height [mm]	30	49		67		78	

- 1) With connecting plates.
- 2) Value in brackets with connecting plates.

Standard Nominal Flow Rate ¹⁾ qnN [l/min]								
Connection		Basic Unit Without Connecting Plates	With connecting plates					
			G1/8	G1/4	G3/8	G1/2	G3/4	G1
Standard								
In main flow direction	Micro	210	–	–	–	–	–	–
	Mini	3,300	1,500	3,300	–	–	–	–
	Midi	8,200	–	–	7,000	8,200	–	–
	Maxi	20,000	–	–	–	–	20,000	17,400
With non-return function								
In main flow direction	Mini	2,000	1,300	2,000	–	–	–	–
	Midi	5,600	–	–	5,500	5,600	–	–
	Maxi	15,000	–	–	–	–	15,000	13,400

- 1) Measured at p1 = 6 bar and Δp = 1 bar.

Operating Conditions				
Size	Mini	Mini	Midi	Maxi
Operating medium	Filtered compressed air			
Ambient temperature [°C]	–10 ... +60			
Operating pressure [bar]				
Standard	0 ... 16			
With non-return function	–	0.15 ... 16	0.2 ... 16	0.25 ... 16

Branching Modules FRM/FRZ – Metric Series

Ordering Data, Accessories

Ordering Data – With Connecting Plates			
Size	Port	With integrated non-return function	
		Type	LT
Mini	G1/8	FRM-H-1/8-D-MINI	3D
	G1/4	FRM-H-1/4-D-MINI	3D
Midi	G3/8	FRM-H-3/8-D-MIDI	3D
	G1/2	FRM-H-1/2-D-MIDI	3D
Maxi	G3/4	FRM-H-3/4-D-MAXI	3D
	G1	FRM-H-1-D-MAXI	3D

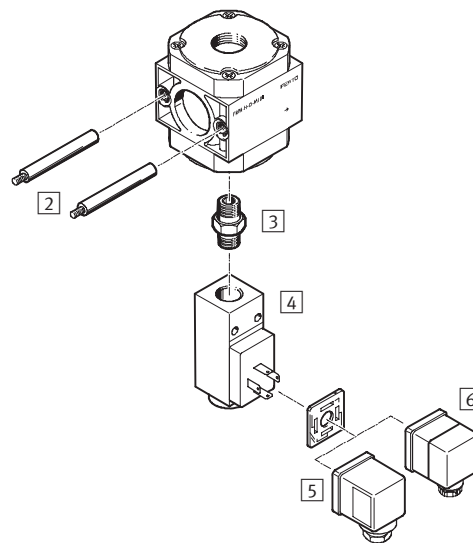
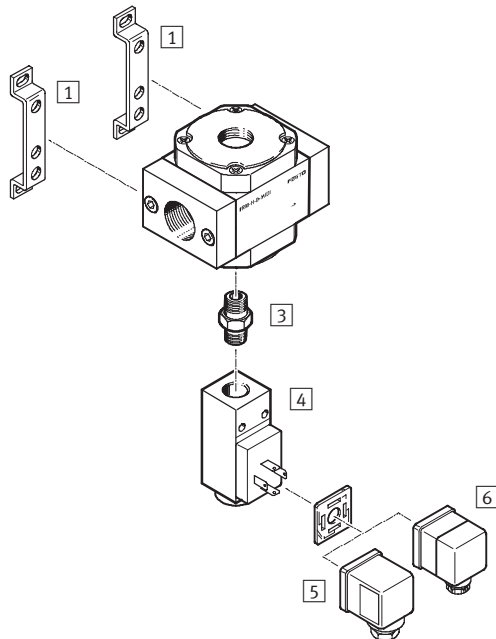
Ordering Data – Basic Unit Without Connecting Plates					
Size	Standard		LT	With integrated non-return function	
	Type			Type	LT
Micro		FRZ-D-MICRO	1D	-	
Mini		FRM-D-MINI	1D	FRM-H-D-MINI	1D
Midi		FRM-D-MIDI	1D	FRM-H-D-MIDI	1D
Maxi		FRM-D-MAXI	1D	FRM-H-D-MAXI	1D

LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

Accessories Overview

Individual device

Basic unit for manifold assembly



Mounting attachments and accessories	→ Page
1 Mounting bracket HFOE	258
3 Double nipple ESK	-
4 Pressure switch PEV	259
5 Plug socket MSSD-C	-
6 Angled plug socket PEV-...-WD-LED	-

Mounting attachments and accessories	→ Page
2 Threaded pin FRB (included in scope of delivery)	-
3 Double nipple ESK	-
4 Pressure switch PEV	259
5 Plug socket MSSD-C	-
6 Angled plug socket PEV-...-WD-LED	-

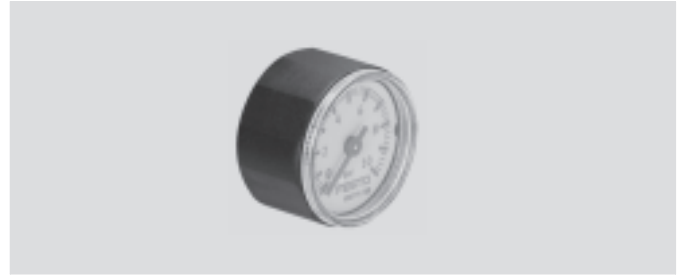
Pressure Gauges MA

Technical Data, Ordering Data

FESTO



Materials
 Housing:
 MA-23: Brass
 MA-27/40/50: Acrylic butadiene styrene/plastic
 MA-63: Steel
 Dial cover: Polystyrene/plastic
 Threaded plug: Brass



Technical Data		Download CAD data → www.festo.com/us/engineering	
Nominal size	27	40	50
Pneumatic connection	M5	G $\frac{1}{8}$	G $\frac{1}{4}$
Operating medium	Liquid and gaseous media		
	Not permitted: Oxygen, Acetylene		
Constructional design	Bourdon tube pressure gauge		
Type of mounting	Screw-in		
Connection position	Rear side, center		
Ambient temperature	[°F]	32 ... 140	-4 ... +140
	[°C]	0 ... +60	-20 ... +60
Measurement accuracy class	4	2.5	
Continuous load factor	0.75		
Intermittent load factor	0.66		
Protection class	IP43		

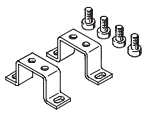
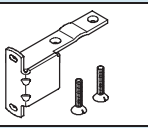
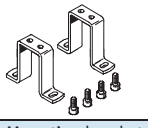

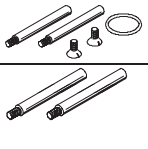
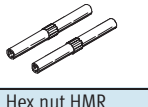

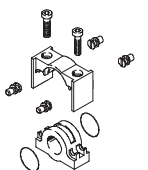
Ordering Data						
Nominal size	For D Series service units	Pneumatic connection	Indicating range		Order code	LT
			[bar]	[psi]		
27	MICRO	M5	0 ... 10	-	MA-27-10-M5	1D
			-	0 ... 160	MA-27-160-M5-PSI	1D
40	MINI	G $\frac{1}{8}$	0 ... 10	0 ... 145	MA-40-10-1/8-U	1D
			0 ... 16	0 ... 240	MA-40-16-1/8-U	1D
50	MIDI/MAXI	G $\frac{1}{4}$	0 ... 10	0 ... 160	MA-50-10-1/4-U	1D
			0 ... 16	0 ... 240	MA-50-16-1/4-U	1D

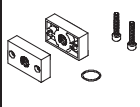
LT = Lead time 1D typically ships same day/next day 3D typically ships within 3 days

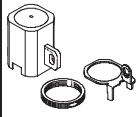
Accessories – Metric Series

Ordering Data



Ordering Data – Mounting attachments		
Designation	Size	Order code
Mounting bracket HFOE		
	Micro	HFOE-D-MICRO
	Mini	HFOE-D-MINI
	Midi/Maxi	HFOE-D-MIDI/MAXI
Mounting bracket HRBK		
	Mini	HRBK-D-MINI
	Midi	HRBK-D-MIDI
Mounting bracket HRB		
	Mini	HRB-D-MINI
	Midi	HRB-D-MIDI
Mounting bracket HR-D		
	Micro	HRS-D-MICRO
	Mini	HR-D-MINI
	Midi	HR-D-MIDI
	Maxi	HR-D-MAXI
Threaded pin FRB		
	Micro	FRB-D-MICRO
	Mini	FRB-D-MINI
	Midi	FRB-D-MIDI
	Maxi	FRB-D-MAXI
Threaded pin LF/LOE		
	Mini	LF/LOE-D-MINI
	Midi	LF/LOE-D-MIDI
	Maxi	LF/LOE-D-MAXI
Hex nut HMR		
	Micro	HMR-D-MICRO
Connecting kit HRBC		
	Mini	HRBC-D-MINI
	Midi	HRBC-D-MIDI

Ordering Data – Connecting plates				
Designation	Size	Connection	Position	Order code
Connecting plates PBL				
	Micro	G $\frac{1}{8}$	Either	PBL-1/8-D-MICRO
		QS-4	Either	PBL-QS4-D-MICRO
		QS-6	Either	PBL-QS6-D-MICRO
	Mini	G $\frac{1}{8}$	Left	PBL-1/8-D-MINI-L
			Right	PBL-1/8-D-MINI-R
		G $\frac{1}{4}$	Left	PBL-1/4-D-MINI-L
			Right	PBL-1/4-D-MINI-R
		G $\frac{3}{8}$	Left	PBL-3/8-D-MINI-L
			Right	PBL-3/8-D-MINI-R
	Midi	G $\frac{1}{4}$	Left	PBL-1/4-D-MIDI-L
			Right	PBL-1/4-D-MIDI-R
		G $\frac{3}{8}$	Left	PBL-3/8-D-MIDI-L
			Right	PBL-3/8-D-MIDI-R
		G $\frac{1}{2}$	Left	PBL-1/2-D-MIDI-L
			Right	PBL-1/2-D-MIDI-R
	G $\frac{3}{4}$	Left	PBL-3/4-D-MIDI-L	
Right		PBL-3/4-D-MIDI-R		
Maxi	G $\frac{1}{2}$	Left	PBL-1/2-D-MAXI-L	
		Right	PBL-1/2-D-MAXI-R	
	G $\frac{3}{4}$	Left	PBL-3/4-D-MAXI-L	
		Right	PBL-3/4-D-MAXI-R	
G1	Left	PBL-1-D-MAXI-L		
	Right	PBL-1-D-MAXI-R		


Ordering Data – Safety components		
Designation	Size	Order code
Regulator lock LRVS		
	Mini	LRVS-D-MINI
	Midi	LRVS-D-MIDI
	Maxi	LRVS-D-MAXI

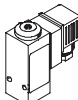
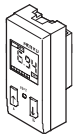
Lead Time LT for all products on this page: **1D** typically ships same day/next day


Accessories – Metric Series



Ordering Data



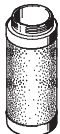
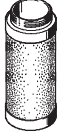
FESTO

Ordering Data – Pressure gauges		Technical Data → 231		
Connection	Connection	Indicating range		Order code
		[bar]	[psi]	
	M5	0 ... 10	–	MA-27-10-M5
		–	0 ... 160	MA-27-160-M5-PSI
	G1/8	0 ... 10	0 ... 145	MA-40-10-1/8-U
		0 ... 16	0 ... 240	MA-40-16-1/8-U
	G1/4	0 ... 10	0 ... 160	MA-50-10-1/4-U
		0 ... 16	0 ... 240	MA-50-16-1/4-U

Ordering Data – Sensors		Technical Data → 167	
Designation	Connection	Order code	
Pressure switch PEV			
	G1/4	PEV-1/4-B	
Pressure sensor SDE1			
	R1/4	SDE1-D10-G2-R14-C-P1-M8	
	R1/8	SDE1-D10-G2-R18-C-P1-M8	

Ordering Data – Electrical connection technology		
Designation	Description	Order code
Connecting cable NEBU		
	M8x1, 3-pin	NEBU-M8G3-K-2.5-LE3
	M8x1, 4-pin	NEBU-M8G4-K-2.5-LE4

Ordering Data – Accessories		
Designation	Description	Order code
Silencer U		
	G1/8	U-1/8-B
	G1/4	U-1/4-B
	G3/8	U-3/8-B
Manual override AHB		
	–	AHB-MD/MF/MV

Ordering Data – Filter cartridges		
Designation	Size	Order code
Grade of filtration 5 µm		
	Micro	LFP-D-MICRO-5M
	Mini	LFP-D-MINI-5M
	Midi	LFP-D-MIDI-5M
	Maxi	LFP-D-MAXI-5M
Grade of filtration 40 µm		
	Mini	LFP-D-MINI-40M-U
	Midi	LFP-D-MIDI-40M-U
	Maxi	LFP-D-MAXI-40M-U
Grade of filtration 1 µm		
	Mini	MS4/D-MINI-LFM-B
	Midi	LFMBP-D-MIDI
	Maxi	LFMBP-D-MAXI
Grade of filtration 0.01 µm		
	Mini	MS4/D-MINI-LFM-A
	Midi	LFMAP-D-MIDI
	Maxi	LFMAP-D-MAXI

This page intentionally left blank.

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. Tequesquinahuac,

54020 Tlalneantla, 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