Linear modules HMP

FESTO

- Precision backlash-free guide system
- Infinitely adjustable end stops
- Adjustable end-position cushioning

Linear modules HMP

Key features

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Key features at a glance

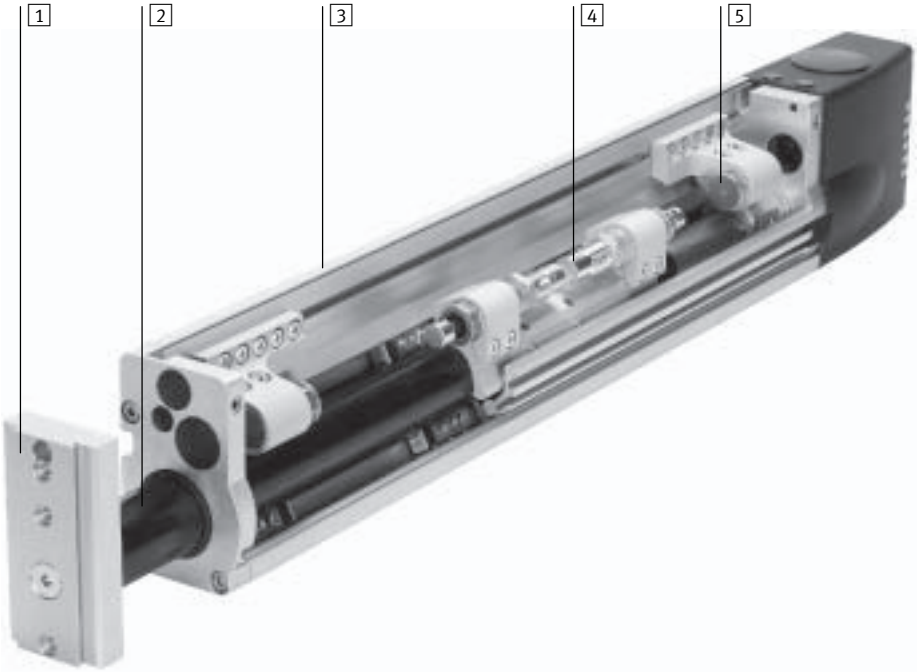
New

- Sturdier
- Optimized end stop system
- Minimized susceptibility to wear
- One-way flow control valves that can be externally adjusted
- Integrated sensor strip

- Diameter of 16 ... 32 mm
- Stroke lengths of 50 ... 400 mm
- Extremely rigid basic profile
- Infinitely adjustable end stops
- Rotatable yoke plate
- Integrated clamping unit
- Precision backlash-free guide system

- Adjustable end-position cushioning
- Integrated sensors:
  - Sensor strip for proximity sensors for end-position sensing
  - Mounting slot for proximity sensors for position sensing
- Functional end cap
  - Pneumatic interface
  - Electrical interface

- Highly flexible thanks to various mounting and assembly options:
  - Basic profile
  - Yoke plate
- Large selection of adapters for:
  - Drive units
  - Grippers
- Innovative and user-friendly installation system



1 Yoke plate
Can be turned to any angle from 0 to 360°. The yoke plate cannot be turned if combined with the clamping unit. Drives and grippers can be mounted on the yoke plate by means of adapter kits (direct mounting or dovetail connections).

2 Guide system
Extremely high rigidity thanks to the hardened steel guide barrel which is supported in pre-tensioned and backlash-free recirculating ball bearing guides guaranteeing the utmost precision.

3 Basic profile
Drives and basic components can be attached to the rigid light alloy profile using adapter, connector and component kits.

4 End-position cushioning
Extremely dynamic operation thanks to hydraulic shock absorbers which cushion the piston sleeve at the end positions.

5 End stop
Any desired intermediate position can be set between minimum and maximum stroke (plus the strokes of the shock absorbers).

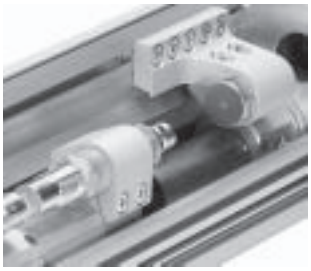
Linear modules HMP

Key features

Wide choice of variants

End stop

The optimized end stop system is practically wear-free. Rough adjustment by moving the stop into the profile groove. Fine adjustment using compressed air via a rotatable sleeve.



Clamping unit

The pneumatically-powered clamping unit can be used to hold loads at any end position and with the module installed at any angle. In the case of a pressure drop or pressure failure, the clamping unit acts like an EMERGENCY STOP device. The clamping unit can be released by means of the manual override.

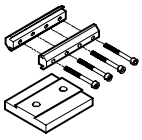
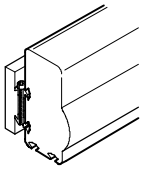
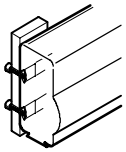
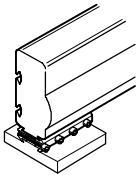
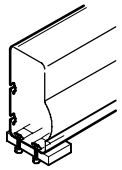
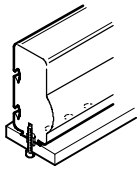
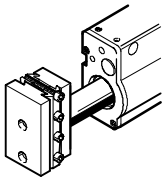
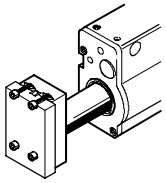
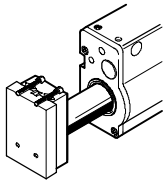
End cap

Connections can be made on the top and bottom of the end cap. Pneumatic tubing and electrical cables can be bundled and routed through the end cap and conduits.

Max. 6 proximity sensors can be connected to the integral terminal strip. The switching states of the proximity sensors are indicated via a display window in the end cap.

Mounting and assembly options

Mounting options

	Dovetail mounting using connecting kit HAVB	Direct mounting using screws and slot nuts NST	Direct mounting using screws and centring sleeves ZBH
			
Mounting surfaces			
On the side of the basic profile	HMP-16/-20/-25/-32 	HMP-16/-20/-25/-32 	
On the underside of the basic profile	HMP-16/-20/-25/-32 	HMP-25/-32 	HMP-16/-20 
On the yoke plate	HMP-16/-20/-25/-32 	HMP-25/-32 	HMP-16/-20/-25/-32 

Linear modules HMP

System example

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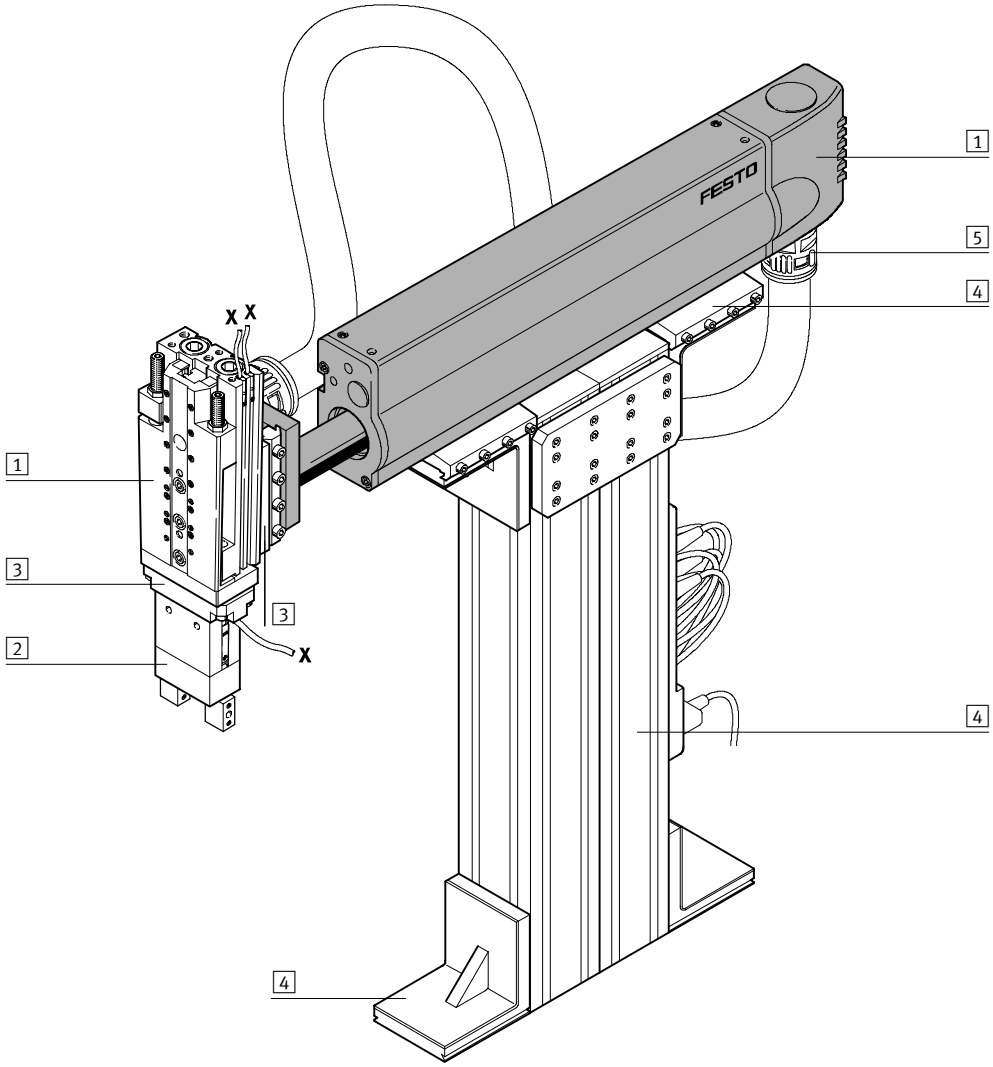
System product for handling and assembly technology

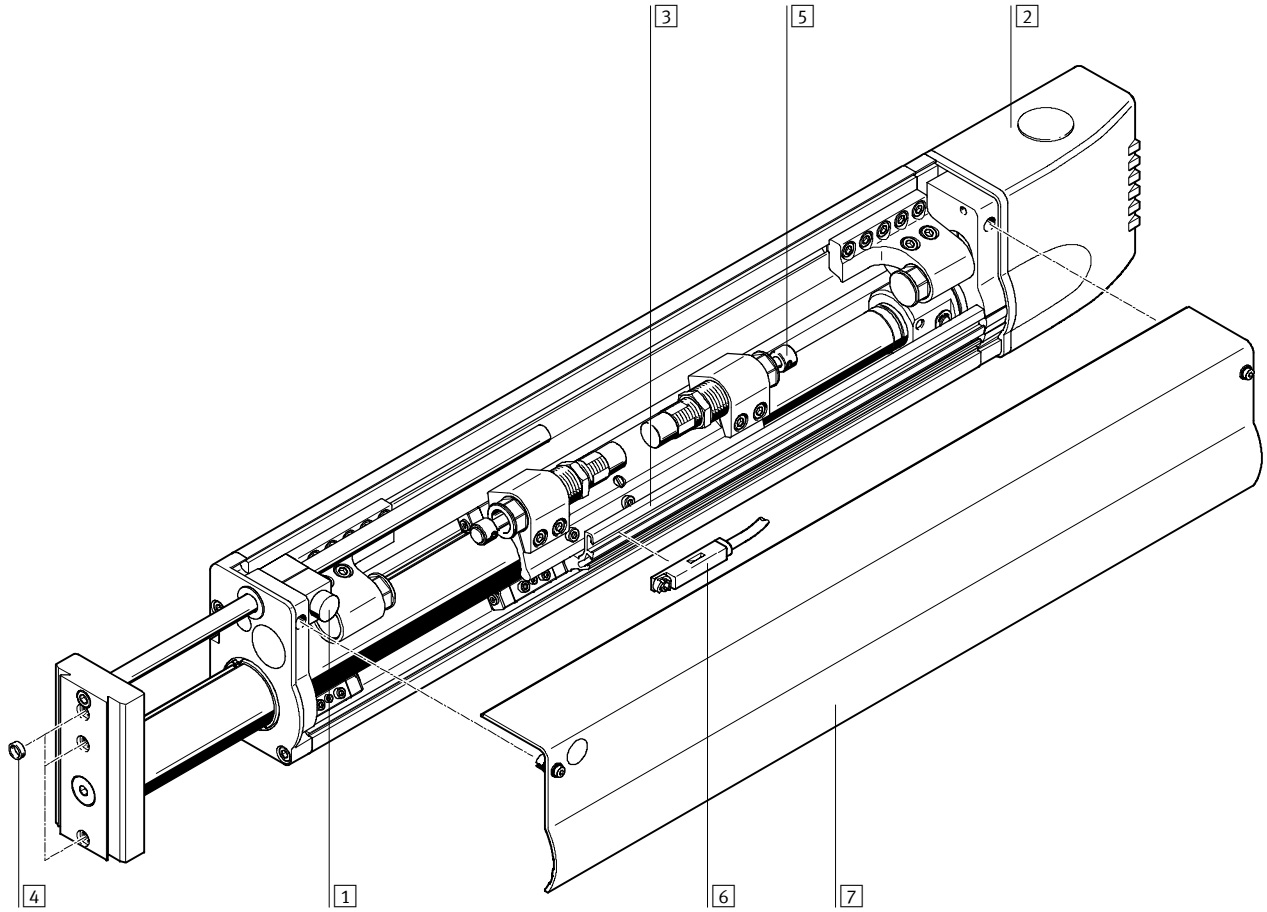


System elements and accessories			
		Brief description	**➔Page**
1	Drive units	Wide range of combination options within handling and assembly technology	Volume 1
2	Grippers	Wide choice of variants within handling and assembly technology	Volume 1
3	Adapters	For drive/drive and drive/gripper combinations	Volume 5
4	Basic mounting components	Profiles and profile connectors as well as profile/drive connectors	Volume 5
5	Installation components	For achieving a clear-cut, safe layout for electrical cables and tubing	Volume 5
–	Axes	Wide range of combination options within handling and assembly technology	Volume 5
–	Motors	Servo and stepper motors, with or without gearing	Volume 5

Linear modules HMP

Peripherals overview

Peripherals overview



Accessories			
		Brief description	**➔Page**
1	Clamping unit KP	For holding loads in all mounting and end positions in the event of a drop in pressure	1 / 7.1-20
2	End cap AD/EL	The end cap (EL) houses an integrated electrical interface	1 / 7.1-20
3	Sensor strip SL	For mounting proximity sensors and flexible sensing of any desired end positions. Included in the scope of delivery of the linear module.	1 / 7.1-20
4	Centring sleeve Z	For centring loads and attachments on the yoke plate	1 / 7.1-22
5	Shock absorber	Included in the scope of delivery of the linear module	1 / 7.1-22
6	Proximity sensor A...	For position sensing via the sensor strip	1 / 7.1-23
7	Housing cover	Included in the scope of delivery of the linear module	–
–	Plug socket with cable V	For proximity sensors	1 / 7.1-23
–	Slot cover A	For the protection of proximity sensor cable	1 / 7.1-22

Linear modules HMP

Type codes

HMP – 16 – 150 – B – SL – 2G3 – KP – EL – A1 – E

Type	
HMP	Linear module

Piston ∅ [mm]	

Stroke [mm]	

Generation	
B	B series

Sensing	
SL	Sensor strip

Pneumatic connection	
2G3	For 3 mm I.D. tubing
2G4	For 4 mm I.D. tubing
2G6	For 6 mm I.D. tubing

Clamping unit	
KP	Clamping cartridge

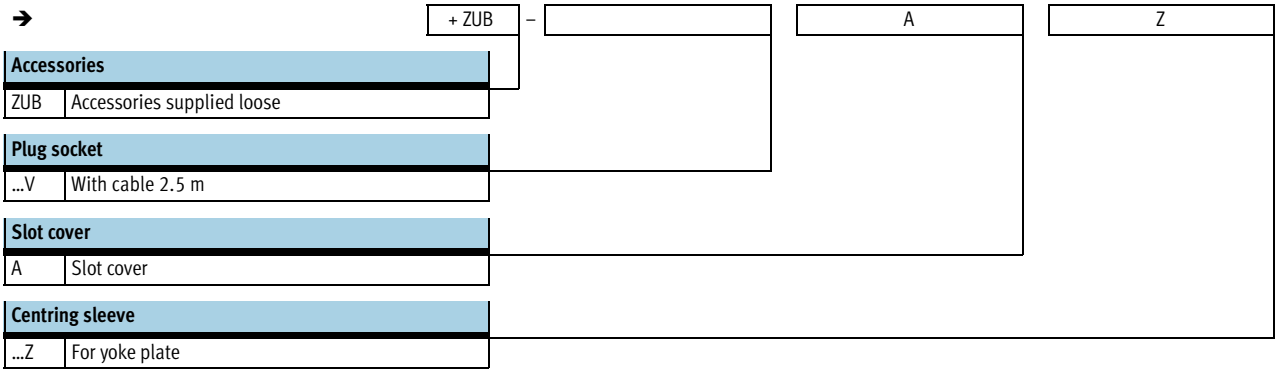
Interface	
AD	End cap
EL	End cap with electrical interface

Proximity sensor	
A1	With cable 2.5 m
A2	Contactless with cable, 2.5 m, NPN
A3	Contactless with cable, 2.5 m, PNP
A4	With plug
A5	Contactless with plug, NPN
A6	Contactless with plug, PNP

User manual	
E	English
S	Spanish
F	French
I	Italian
V	Swedish
B	Express waiver - no manual to be included (already available)

Linear modules HMP

Type codes



Linear modules HMP

Technical data

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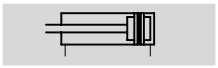
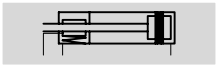
Function

Standard version



with clamping unit



Piston ∅
16 ... 32 mm

Stroke length
50 ... 400 mm

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Spare_parts_service

General technical data						
Piston ∅			16	20	25	32
System mode			Yoke			
Mode of operation			Double-acting			
Protection against torsion			Guide			
Type of connection			Female thread			
Pneumatic connection			M5	G1⁄8	G1⁄8	G1⁄4
Assembly position			Any			
Effective stroke		[mm]	16 ... 320	24 ... 400	24 ... 400	40 ... 400
Position sensing			With proximity sensor			
Max. repetition accuracy[1]		[mm]	0.01			
Max. speed	advancing	[m/s]	0.8	1.1	1.1	1.2
	retracting	[m/s]	0.8	1.1	1.1	1.1

1) Variation of end position for 100 successive strokes under constant operating conditions

Operating and environmental conditions					
Piston ∅		16	20	25	32
Operating pressure	[bar]	4 ... 8			
Operating medium		Dried compressed air, lubricated or unlubricated			
Ambient temperature[1]	[°C]	0 ... +60			
Protection class to EN 60 529		IP 40			
Noise level F_{LEQ}	[dB(A)]	62	65	68	69
Corrosion resistance class CRC[2]		2			

1) Note operating range of proximity sensors
2) Corrosion resistance class 2 according to Festo standard 940 070
Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents.

Forces [N]				
Piston ∅	16	20	25	32
Theoretical force at 6 bar, advancing[1]	121	188	295	483
Theoretical force at 6 bar, retracting[1]	104	158	247	415

1) Theoretical values, please note: Degree of efficiency: approx. 90%

Linear modules HMP

Technical data

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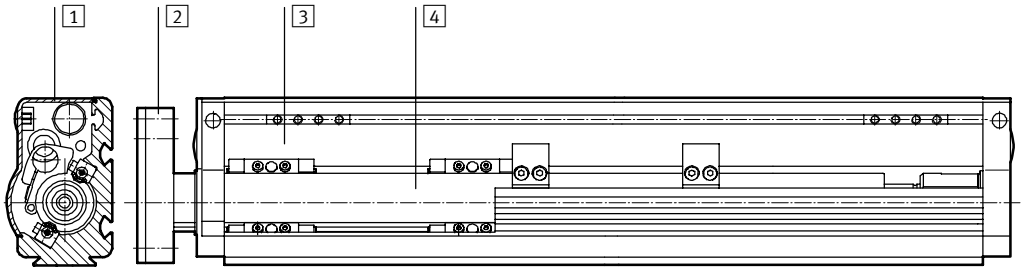
Weights [g]					
Piston ∅		16	20	25	32
Product weight	at 0 mm stroke	2,100	4,700	6,300	10,900
	Per 10 mm stroke	88	110	150	200
Moving load	at 0 mm stroke	900	1,500	2,300	4,000
	Per 10 mm stroke	28	37	55	74
End cap	HMP-...-AD	180	270	300	400
	HMP-...-EL	210	300	330	430
Clamping unit HMP-...-KP for effective stroke	50 mm	109	114	–	–
	100 mm	120	125	–	–
	150 mm	131	136	–	–
	200 mm	142	147	–	–
	250 mm	153	158	–	–
	320 mm	168	173	–	–
	400 mm	–	191	–	–

Materials

Sectional view



Linear module		
1	End cap	Anodised aluminium
2	Yoke plate	Anodised aluminium
3	Profile	Anodised aluminium
4	Guide barrel	Tool steel
–	Seals	Perbunan, polyurethane

Linear modules HMP

Technical data

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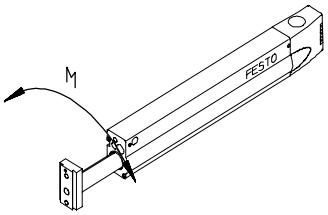
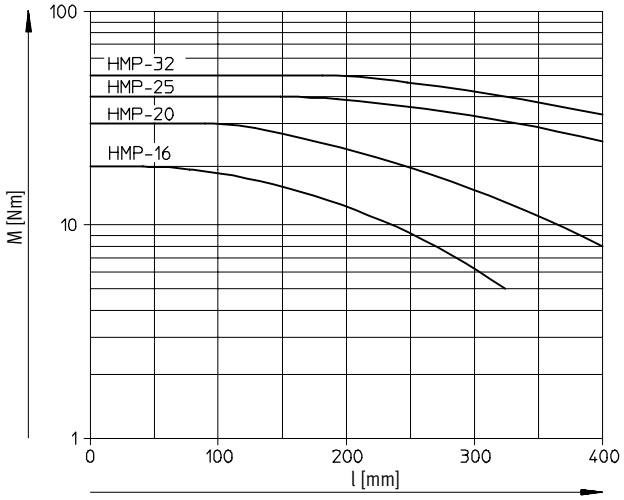
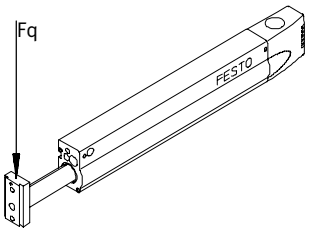
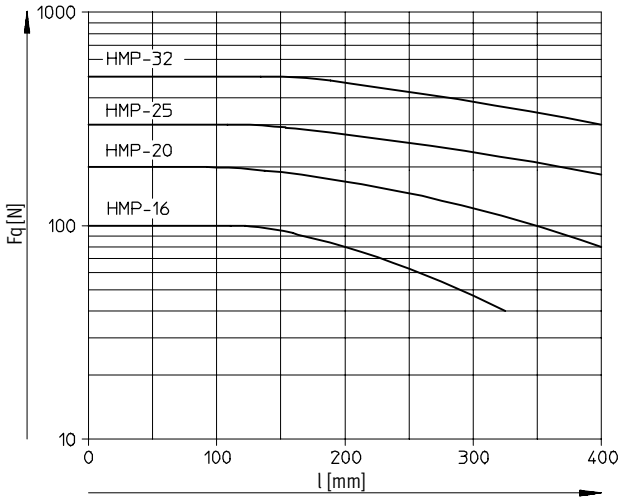
Permissible torque M as a function of the stroke length l (at the yoke plate)





Permissible effective load Fq as a function of the stroke length l (at the front plate)

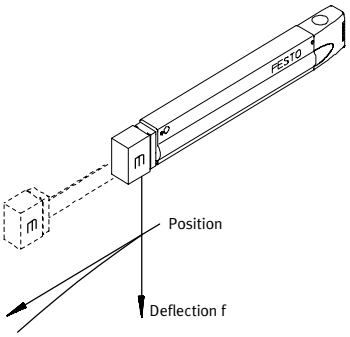




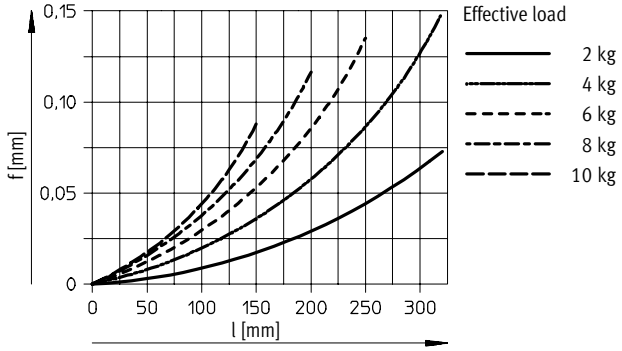
Linear modules HMP

Technical data

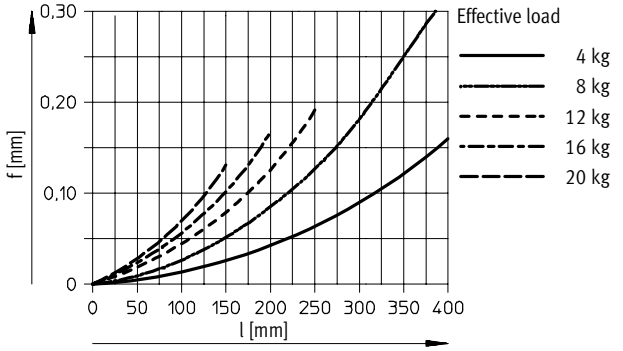
Deflection/deformation f as a function of the working load m and the position l (stroke)



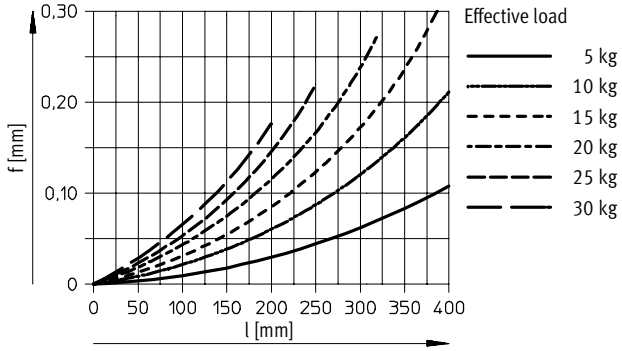
HMP-16



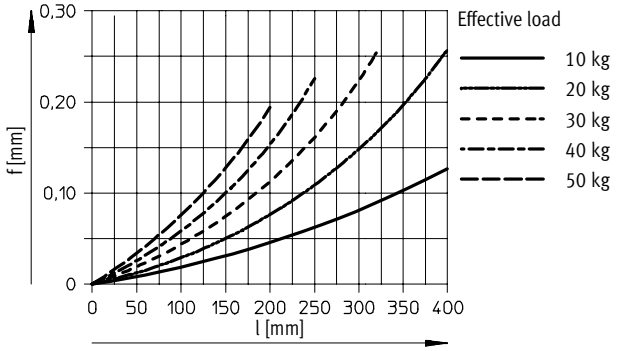
HMP-20



HMP-25



HMP-32



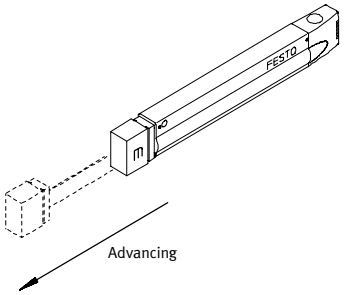
Linear modules HMP

Technical data

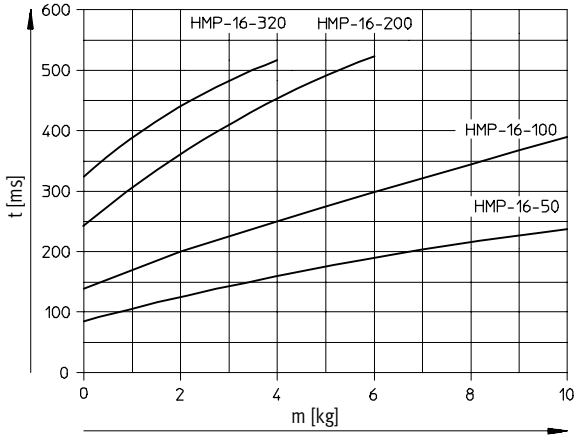
Max. permissible horizontal working load at 6 bar

HMP-16: 10 kg
HMP-20: 20 kg
HMP-25: 30 kg
HMP-32: 50 kg

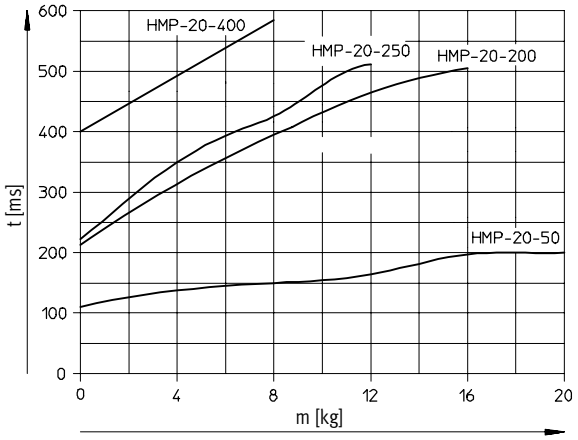
Permissible horizontal advancing time t as a function of the stroke length and the working load m with optimum shock absorber stroke



HMP-16[1)]



HMP-20[1)]



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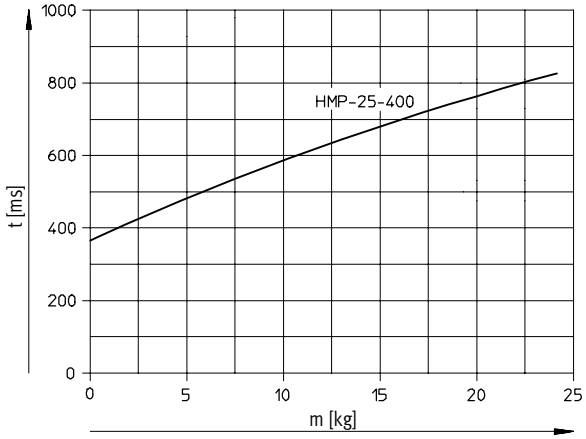
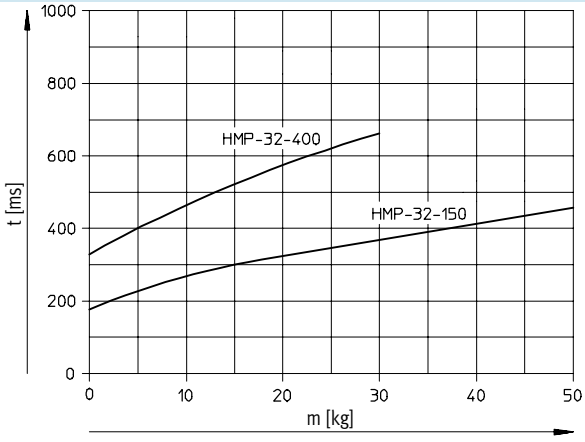


HMP-32[1)]



1) Further nominal strokes in preparation

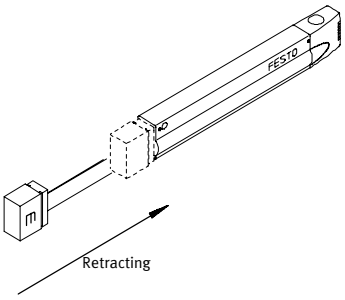
Linear modules HMP

Technical data

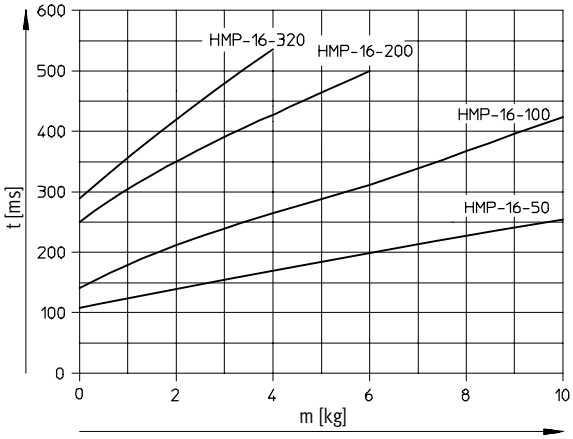
Max. permissible horizontal working load at 6 bar

HMP-16: 10 kg
HMP-20: 20 kg
HMP-25: 30 kg
HMP-32: 50 kg

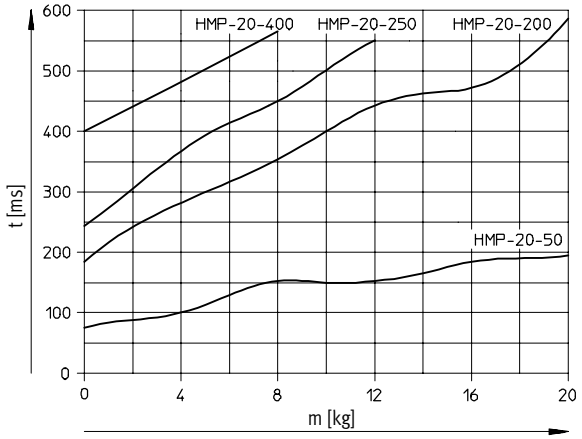
Permissible horizontal retracting time t as a function of the stroke length and the working load m with optimum shock absorber stroke



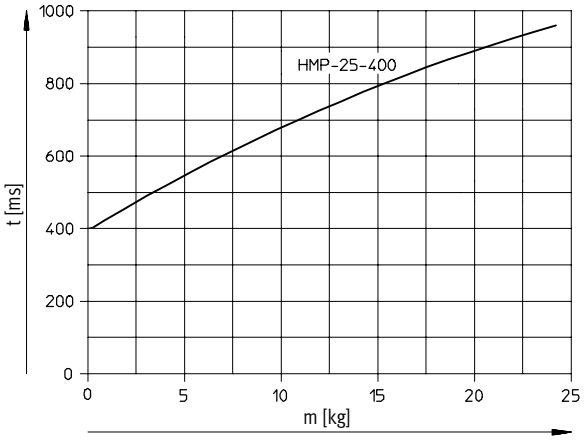
HMP-16[1)]



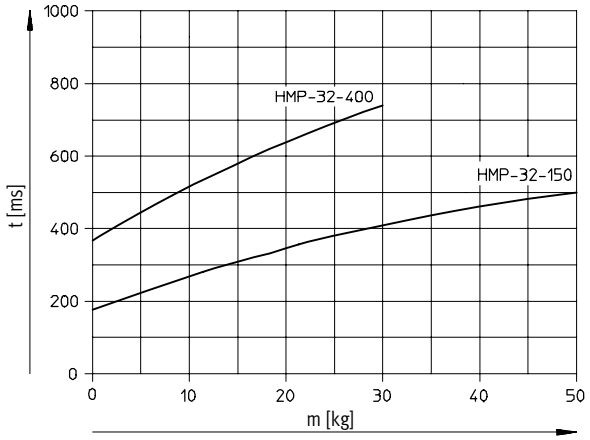
HMP-20[1)]



HMP-25[1)]



HMP-32[1)]



1) Further nominal strokes in preparation

Linear modules HMP

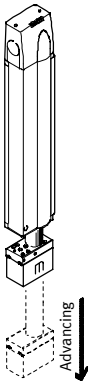
Technical data

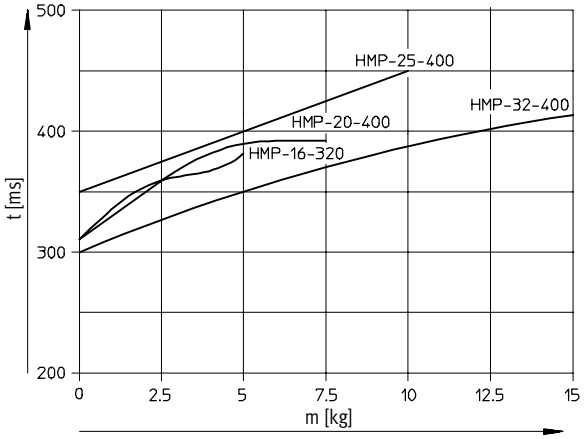
FESTO

Max. permissible vertical working load at 6 bar	
Without clamping cartridge	With clamping cartridge
HMP-16: 5 kg	HMP-16: 4 kg
HMP-20: 10 kg	HMP-20: 7.5 kg
HMP-25: 15 kg	
HMP-32: 25 kg	

Permissible vertical advancing time t as a function of the stroke length and the working load m with optimum shock absorber stroke

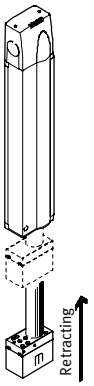
HMP-16/-20/-25/-32[1)]

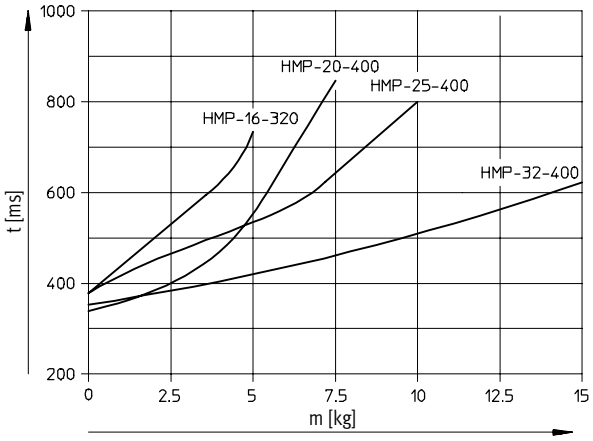




Permissible vertical retracting time t as a function of the stroke length and the working load m with optimum shock absorber stroke

HMP-16/-20/-25/-32[1)]





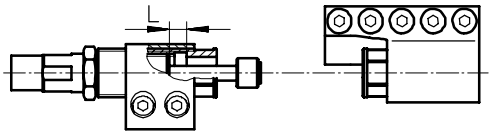
1) Further nominal strokes in preparation

Linear modules HMP

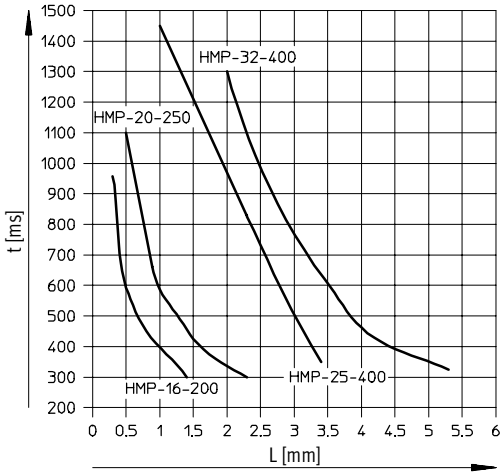
Technical data

Advancing/retracting time t as a function of the optimum length L to which the shock absorber should be screwed out

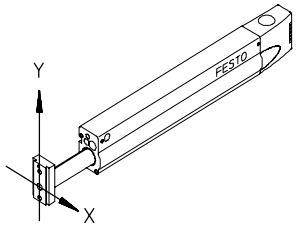
In order to obtain the shortest possible travel time with a linear module HMP, it is essential to adjust the shock absorbers to match the advance/retract stroke time t.



The optimum length L to which the shock absorbers should be screwed out is shown in the adjacent graph.

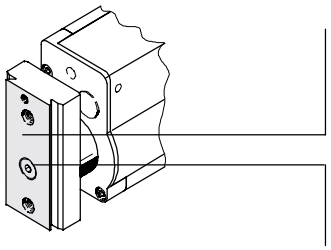


Determination of permissible working load



As long as the centre of gravity of the working load on the yoke plate lies within the outline of this plate, it is impossible to overload the linear module.

Centre of gravity



When dovetail mounting components are used, the centre of gravity should be within this area.

Recommended position of centre of gravity for low-vibration operation.

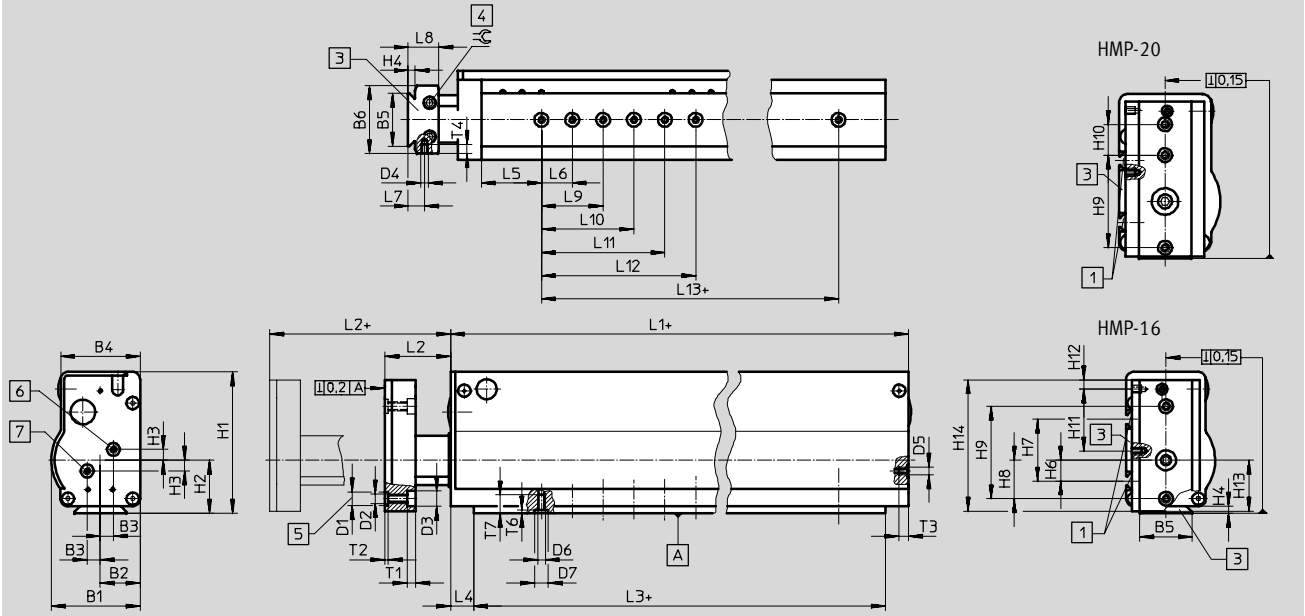
Linear modules HMP

Technical data

FESTO

Dimensions Download CAD data ➔ **www.festo.com/en/engineering**

Piston ∅ 16/20 mm



1 2 mounting slots for slot nuts HMBN-5-2M5
3 Dovetail mounting facility
4 Set screw for clamping of yoke plate (can be turned 360°)
5 Thread and centring hole for load attachment with centring sleeves ZBH-9
6 Air connection, advancing
7 Air connection, retracting
\+ = plus stroke length

Type	B1	B2	B3 ±0.1	B4	B5	B6	D1 ∅ H7	D2	D3 ∅ H13	D4	D5	D6	D7 ∅ H7	H1	H2	H3 ±0.1
HMP-16	57.8	26	8.5	51.7	34	44	9	M6	10	M5	M5	M5	9	92	34.5	7
HMP-20	65.8	30	10	59.8		51					G⅛			107	37	

Type	H4	H6	H7	H8	H9 ±0.03[1]	H10 ±0.03[1]	H11	H12	H13	H14	L1	L2	L3	L4 +0.2
HMP-16	4.5	13.5	40	25	60	–	40	6	33	85	247	23	217	15
HMP-20				30		20			45.5	100.4	320		290	

Type	L5	L6 ±0.03	L7	L8 +0.2	L9 ±0.03	L10 ±0.03	L11 ±0.03	L12 ±0.03	L13 ±0.03	T1	T2 ±0.1	T3	T4	T6	T7	⫷
HMP-16	39	20	10.75	20	40	60	80	100	140	5.7	2.1	6.4	6	2.1	12	4
HMP-25	45								200			9				

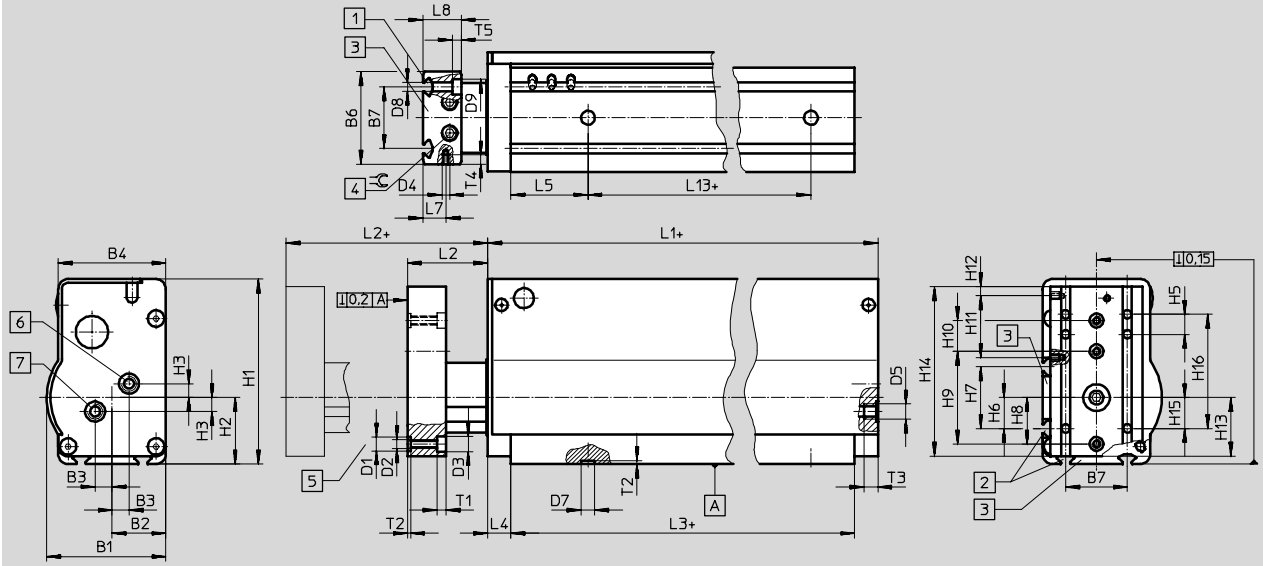
1) Tolerance specification applies to countersink D1; tolerance for thread D2: ±0.2

Linear modules HMP

Technical data

Dimensions Download CAD data ➔ **www.festo.com/en/engineering**

Piston ∅ 25/32 mm



1 2 mounting slots for slot nuts HMBN-5-2M5
2 4 mounting slots for slot nuts HMBN-5-2M5
3 Dovetail mounting facility
4 Set screw for clamping of yoke plate (can be turned through 360°)
5 Thread and centring hole for load attachment with centring sleeves ZBH-9
6 Air connection, advancing
7 Air connection, retracting
\+ = plus stroke length

Type	B1	B2	B3 ±0.1	B4	B6	B7	D1 ∅ H7	D2	D3 ∅ H13	D4	D5	D7 ∅ H7	D8 ∅ H13	D9 ∅
HMP-25	77.3	35	11	69.8	60	40	9	M6	10	M5	G1⁄8	9	5.5	10
HMP-32	90.8	40		79.8	70						G1⁄4			

Type	H1	H2	H3 ±0.1	H5	H6	H7	H8	H9 ±0.03[1]	H10 ±0.03[1]	H11	H12	H13	H14	H15
HMP-25	120	43	9	13	20	40	30	60	20	40	6	38	110	20
HMP-32	143	53			30		40	80				48	133	

Type	H16	L1	L2	L3	L4 +0.2	L5	L7	L8 ±0.2	L13 ±0.03	T1	T2 ±0.1	T3	T4	T5	⌯
HMP-25	74	320	28	290	15	50	15	25	190	5.7	2.1	9	6	5.7	5
HMP-32		427		392					290			12			

1) Tolerance specification applies to countersink D1; tolerance for thread D2: ±0.2

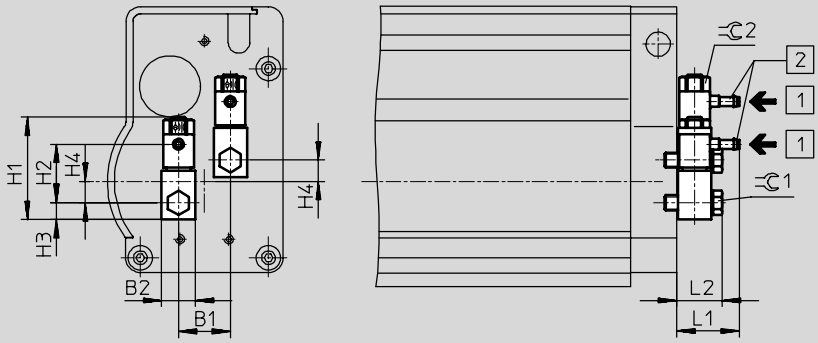
Linear modules HMP

Technical data

FESTO

Dimensions – Pneumatic connections Download CAD data ➔ **www.festo.com/en/engineering**

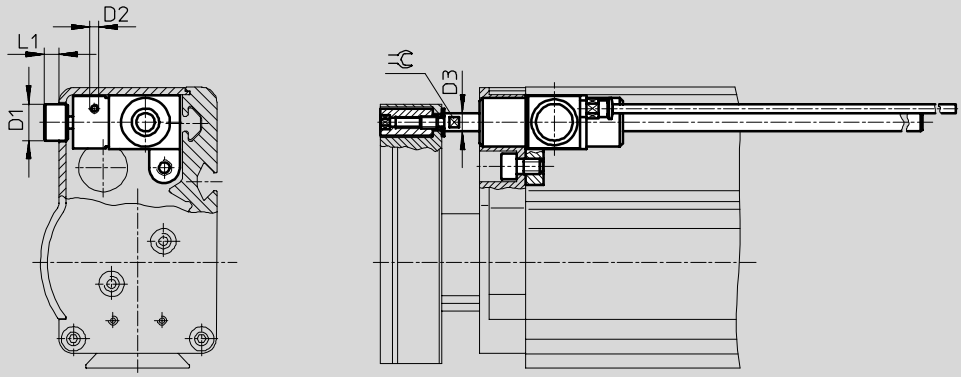
(code 2G3/2G4/2G6)



Type	B1	B2	H1	H2	H3	H4	L1	L2	⫧1	⫧2
HMP-16-...-2G3	17	11	33.6	19	5.5	7	20.6	15	7	9
HMP-16-...-2G4							22.6			
HMP-20-...-2G4	20	16	48.7	28.9	8		31.3	22.2	13	14
HMP-20-...-2G6				27.5			31.4			
HMP-25-...-2G4	22			28.9		9	31.3			
HMP-25-...-2G6				27.5			31.4			
HMP-32-...-2G4		20	61.8	37.9	10		35.8	28.2	17	17
HMP-32-...-2G6				38.2			35.9			

Dimensions – Clamping unit Download CAD data ➔ **www.festo.com/en/engineering**

(code KP)



Type	D1 ∅	D2 1)	D3 ∅	L1	⫧	Holding force [N]	Effective load horizontal [kg]	Effective load vertical [kg]
HMP-16	11.4	M3	6	5	5	100	10	4
HMP-20				3.8			20	7.5

1) Air connection is supplied ready-fitted with QS connector QSM-M3-4

Note

The clamping unit must only be operated when the shaft is stationary (end position). Dynamic braking operations can result in severe damage to the holding device.

Precision positioning cannot be guaranteed with the clamping unit since slippage of approx. 1-2 mm can occur.

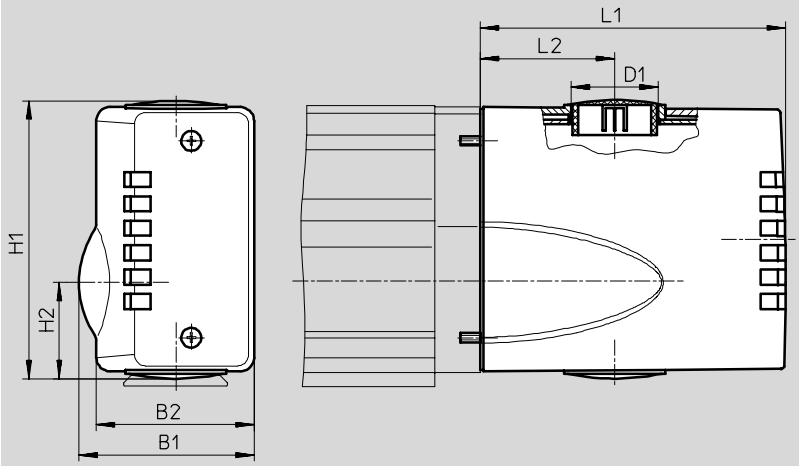
Linear modules HMP

Technical data

FESTO

Dimensions – End cap Download CAD data ➔ **www.festo.com/en/engineering**

(code AD/EL)



Type	B1	B2	D1 ∅	H1	H2	L1	L2
HMP-16	57.4	51.2	28.5 (PG 21)	91.3	31.5	100	44
HMP-20	65.4	59.2	37.2 (PG 29)	106.3	34.4	120	55
HMP-25	76.9	69.2		119	40.1		
HMP-32	90.4	79.2		141.6	49.9		

Linear modules HMP

Ordering data – Modular products

FESTO

M **Mandatory data**

Module No.	Function	Piston ∅	Stroke	Generation	Position sensing	Pneumatic connection
537 940 537 941 537 942 537 943	HMP	16 20 25 32	50 100 150 200 250 320 400	B	SL	2G3 2G4 2G6
Ordering example						
	HMP –		–	**B** –	**SL** –	

Ordering table

Size		16	20	25	32	Conditions	Code		Enter code
M	Module No.	**537 940**	**537 941**	**537 942**	**537 943**				
	Function	Linear module with ball bearing guide					**HMP**		HMP
	Piston ∅ [mm]	16	20	25	32		**-...**		
	Stroke [mm]	50	50	–	–		**-50**		
		100	100	100	100		**-100**		
		150	150	150	150		**-150**		
		200	200	200	200		**-200**		
		250	250	250	250		**-250**		
		320	320	320	320		**-320**		
		–	400	400	400		**-400**		
	Generation	B series					**-B**		-B
	Position sensing	Sensor strip					**-SL**		-SL
	Pneumatic connection	One-way flow control valve with barbed fitting for tubing I.D. 3 mm	–	–	–		**-2G3**		
		One-way flow control valve with barbed fitting for tubing I.D. 4 mm					**-2G4**		
↓		–	One-way flow control valve with barbed fitting for tubing I.D. 6 mm				**-2G6**		

Transfer order code

	HMP	–		–		–	**B**	–	**SL**	–

Linear modules HMP

Ordering data – Modular products

FESTO

O Options							
Clamping unit	Interface	Proximity sensor set	User manual	Accessories	Plug socket	Slot cover	Centring sleeves
KP	AD EL	A1 A2 A3 A4 A5 A6	E S F I V B	ZUB	...V	A	...Z
–	–	–	–	ZUB	–		

Ordering table

Size		16	20	25	32	Conditions	Code		Enter code
O	Clamping unit	Clamping cartridge		–	–		-KP		
	Interface	End cap					-AD		
		End cap with electrical interface					-EL		
	Proximity sensor set (2 piece), magnetic, supplied separately	Proximity sensor with cable, 2.5 m					-A1		
		Proximity sensor, contactless, cable 2.5 m, NPN					-A2		
		Proximity sensor, contactless, cable 2.5 m, PNP					-A3		
		Proximity sensor with plug				1	-A4		
		Proximity sensor, contactless, plug, NPN				1	-A5		
		Proximity sensor, contactless, plug, PNP				1	-A6		
	Alternative user documentation (standard is German/English)	User documentation, English					-E		
		User documentation, Spanish					-S		
		User documentation, French					-F		
		User documentation, Italian					-I		
		User documentation, Swedish					-V		
		Express waiver - no manual to be included (already available)					-B		
	Accessories	Supplied separately					ZUB-		ZUB-
	Plug socket with cable, 2.5 m	1 ... 10					...V		
	Slot cover	Slot cover					A		
	Centring sleeves (pack of 10)	10, 20, 30, 40, 50, 60, 70, 80, 90					...Z		

1 **A4, A5, A6** Not with interface EL

Transfer order code

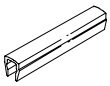
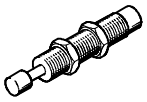
–		–		–		ZUB	–			

Linear modules HMP

Accessories

FESTO

Ordering data

	For piston ∅ [mm]	Remarks	Order code	Part No.	Type	PU[1]
Centring sleeve ZBH						Technical data ➔ 1 / 10.1-19
	16 ... 32	For yoke plate	Z	**150 927**	**ZBH-9**	10
Slot cover ABP						
	16 ... 32	For sensor strip every 0.5 m	A	**151 681**	**ABP-5**	2
Shock absorber YSRW						Technical data ➔ 1 / 9.1-8
	16	–	–	**191 194**	**YSRW-8-14**	1
	20			**191 196**	**YSRW-12-20**	
	25			**191 196**	**YSRW-12-20**	
	32			**191 197**	**YSRW-16-26**	

1) Packaging unit quantity

Core Range

Linear modules HMP

Accessories

FESTO

Ordering data – Proximity sensor for slot type 8, magneto-resistive — Technical data → 1 / 10.2-13

	Mounting	Switch output	Electrical connection			Cable length [m]	Part No.	Type
			Cable	M8 plug	M12 plug			
NO contact								
	Insertable from above	PNP	3-wire	–	–	2.5	525 898	SMT-8F-PS-24V-K2,5-OE
		NPN					525 909	SMT-8F-NS-24V-K2,5-OE
		–	2-wire	–	–	2.5	525 908	SMT-8F-ZS-24V-K2,5-OE
		PNP	–	3-pin	–	0.3	525 899	SMT-8F-PS-24V-K0,3-M8D
		NPN					525 910	SMT-8F-NS-24V-K0,3-M8D
		PNP	–	–	3-pin	0.3	525 900	SMT-8F-PS-24V-K0,3-M12
	Insertable from end, flush with the cylinder profile	PNP	3-wire	–	–	2.5	175 436	SMT-8-PS-K-LED-24-B
			–	3-pin	–	0.3	175 484	SMT-8-PS-S-LED-24-B
NC contact								
	Insertable from above	PNP	3-wire	–	–	7.5	525 911	SMT-8F-PO-24V-K7,5-OE

Ordering data – Proximity sensor for slot type 8, magnetic reed — Technical data → 1 / 10.2-16

	Mounting	Electrical connection		Cable length [m]	Part No.	Type
		Cable	M8 plug			
NO contact						
	Insertable from above	3-wire	–	2.5	525 895	SME-8F-DS-24V-K2,5-OE
				5.0	525 897	SME-8F-DS-24V-K5,0-OE
		2-wire	–	2.5	525 907	SME-8F-ZS-24V-K2,5-OE
		–	3-pin	0.3	525 896	SME-8F-DS-24V-K0,3-M8D
	Insertable from end, flush with the cylinder profile	3-wire	–	2.5	150 855	SME-8-K-LED-24
		–	3-pin	0.3	150 857	SME-8-S-LED-24
NC contact						
	Insertable from above	3-wire	–	7.5	525 906	SME-8F-DO-24V-K7,5-OE

Ordering data – Plug sockets — Technical data → 1 / 10.2-100

	Mounting	Switch output		Connection	Cable length [m]	Part No.	Type
		PNP	NPN				
Straight plug socket							
	Union nut M8	■	■	3-pin	2.5	159 420	SIM-M8-3GD-2,5-PU
					5	159 421	SIM-M8-3GD-5-PU
	Union nut M12	■	■	3-pin	2.5	159 428	SIM-M12-3GD-2,5-PU
					5	159 429	SIM-M12-3GD-5-PU
Angled plug socket							
	Union nut M8	■	■	3-pin	2.5	159 422	SIM-M8-3WD-2,5-PU
					5	159 423	SIM-M8-3WD-5-PU
	Union nut M12	■	■	3-pin	2.5	159 430	SIM-M12-3WD-2,5-PU
					5	159 431	SIM-M12-3WD-5-PU

Core Range