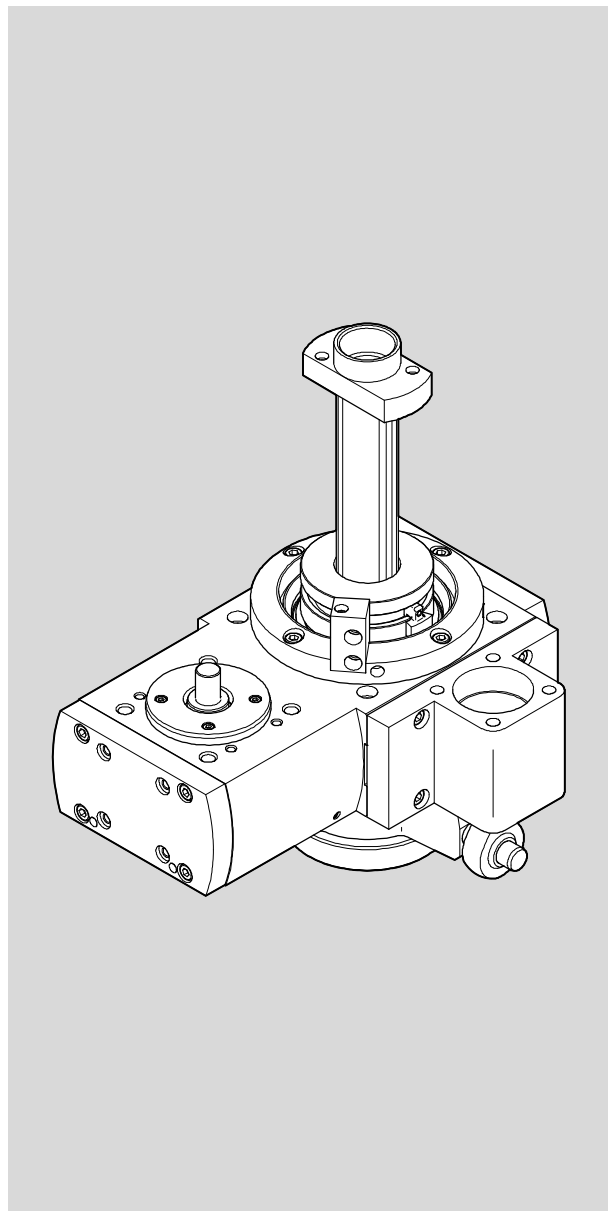


Rotary/lifting module

EHMB



FESTO

Operating
instructions

8113426
2019-05c
[8113428]

Translation of the original instructions

Identification of hazards and instructions on how to prevent them:



Danger

Immediate dangers which can lead to death or serious injuries



Warning

Hazards that can cause death or serious injuries



Caution

Hazards that can cause minor injuries

Other symbols:



Note

Material damage or loss of function



Recommendations, tips, references to other documentation



Essential or useful accessories



Information on environmentally sound usage

Text designations:

- Activities that may be carried out in any order
- 1. Activities that should be carried out in the order stated
- General lists
- ➔ Result of an action/References to more detailed information

English – Rotary/lifting module EHMB

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1 Configuration



For all available product documentation → www.festo.com/pk

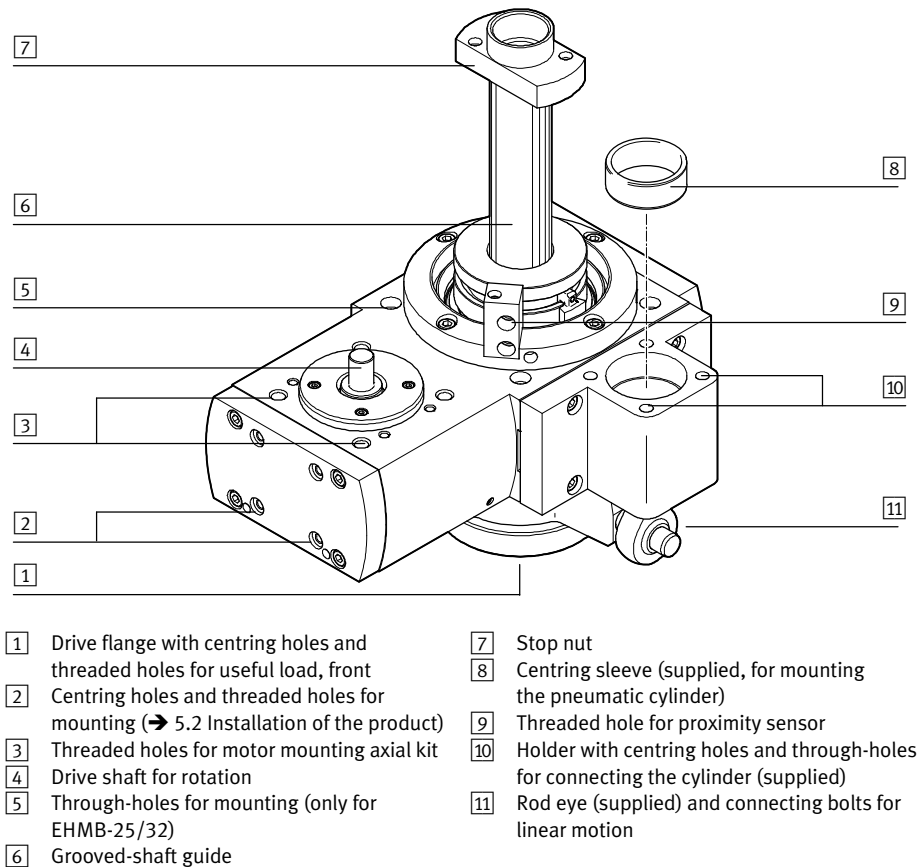


Fig. 1

2 Safety

2.1 Intended use

The EHMB rotary/lifting module is intended for turning and lifting payloads (e. g. with grippers).

The EHMB is not permitted for operating conditions in which vegetable and water-soluble greases or oils can penetrate into the axis. Vegetable greases or oils can reduce the capacity of the toothed belt.

2.2 General safety information

- Take due account of legislative provisions for each intended location.
- Only use the product if it is in its original condition and in perfect working order.
- Use the product only within the defined values (→ 11 Technical data and 12 Characteristic curves).
- Take into account labelling on the product.
- Do not make any unauthorised modifications to the product.
- Observe other applicable documents.
- Take into consideration the ambient conditions at the location of use.
- Protect the product during storage and operation from damaging influences. These influences include:
 - Wetness or moisture
 - Corrosive coolant or other materials (e.g. ozone)
 - UV radiation
 - Oils, greases and grease-solvent vapours
 - Grinding dust
 - Glowing chips or sparks

2.3 Mounting and connecting

- Observe tightening torques. Unless otherwise specified, the tolerance is $\pm 20\%$.

2.4 Qualification of specialized personnel

Only qualified personnel may perform installation, commissioning, maintenance and disassembly of the axis.

The qualified personnel must be familiar with installation and operation of electrical and pneumatic control systems.

3 Function

The EHMB rotary/lifting module combines 2 movements, rotation and stroke, in one product. A toothed belt transfers the rotation of a motor to a hollow shaft. The stroke of a pneumatic/electric cylinder is transferred via a connection bolt [11] to the drive flange [1] and the grooved shaft guide [6] of the EHMB. The shafts run in ball bearings. The reference position of the rotation can be detected with the aid of an inductive proximity sensor in the threaded hole [9]. The position of the stroke is detected on the cylinder.



Note

The EHMB is not braked: If the input torque of the drive motors is not applied, the rotary/lifting module is freely movable. Generally, self-locking of the complete system can be achieved by the use of motors with a spring-loaded holding brake or with high self-braking torque.



Note

Without stop nut [7] and linear drive, the shaft [6] can slip out of the seat of the EHMB. Then a repair by Festo is required.

- If the linear drive is dismantled, make sure that the stop nut is not removed.



Note

The positioning times and permitted mass moments of inertia on the drive depend to a large extent on the flange-mounted motor.

- Use Festo's "PositioningDrives" design tool to determine the best combination of products (→ www.festo.com).

- Use the following motors from Festo (→ www.festo.com/catalogue).
Doing this will ensure you are operating two devices that are perfectly harmonised with one another.

When using other motors:

- Observe the limit values for torques and rotational speeds (→ 11 Technical data).
- Observe the interface geometries (e.g. for the drive shaft → www.festo.com/catalogue).

4 Transport

- Take product weight into account (→ 11 Technical data).

5 Mounting

5.1 Mounting of motor and lifting cylinder

- Do not modify the screws and threaded pins if not directly requested to do so in these operating instructions.

To mount the motor for rotation:

- Mount the motor on the rotary/lifting module in accordance with the assembly instructions for the kit recommended in the catalogue.

To mount the pneumatic or electric cylinder for lifting:

- For the pneumatic cylinder, insert the supplied centring sleeve [8] into the drill hole of the holder.
- Push cylinder into the holder and fasten 4 retaining screws (supplied) in the through-holes of the cylinder holder [10]. The tightening torque is 5+1 Nm.
- Screw the rod eye [11] onto the piston rod.

When attaching the cylinder holder, the rod eye should be adjusted so that it fits onto the connecting bolt on the EHMB and the dimension X (→ Tab. 1) is observed.

- Push the aligned rod eye [11] onto the connecting bolt [12] on the EHMB.
- Fasten the cylinder holder [10] to the threaded holes with 4 screws and 2 centring sleeves.

The cylinder holder can also be mounted on the sides (A) and (C) of the EHMB. To attach to the side (A), the front cover must be removed and the sensor holder (only for EHMB-20 → Fig. 7) must be modified.

The tightening torque for the cylinder holder is summarised in the table below.

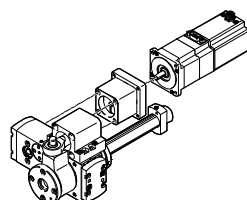


Fig. 2

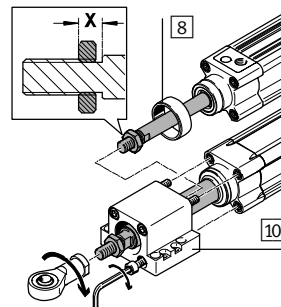


Fig. 3

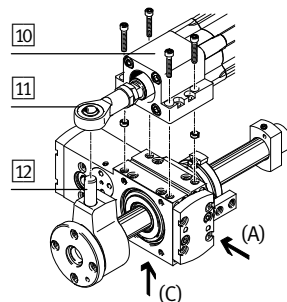


Fig. 4

Size		20	25	32
Dimension X	[mm]	5 +0.5	5.5 +0.5	11.5 +0.5
Screw		M4	M4	M5
Tightening torque	[Nm]	2.9	2.9	5.9
Centring sleeve	[mm]	∅ 7x3	∅ 7x3	∅ 9x4

Tab. 1

5.2 Installation of the product



Note

External stops can cause the toothed belt to tear due to excessive forces.

- Use only the motor controller to brake the rotation.



Note

Eccentric loads can destroy the bearing. Note that the front side (A) (→ Fig. 5) is approved only for attachment with a symmetric applied load.

- Position the EHMB in such a way that its operating elements are accessible.
- Fasten the EHMB to the threaded holes with 4 screws and 2 centring sleeves or with the aid of kits. Mounting to the sides (A), (B) and (C) is possible (→ Fig. 5). Tighten the mounting screws evenly. The tightening torque is summarised in the following table.

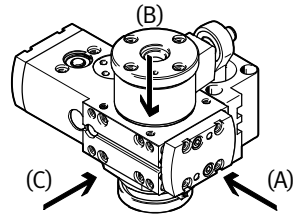


Fig. 5

Size			20	25	32
Screw (through-hole)			–	M5	M5
Screw (direct mounting)			M5	M6	M6
Tightening torque	M5	[Nm]	5.9	5.9	5.9
	M6	[Nm]	–	9.9	9.9
Centring sleeve			Ø 9x4		

Tab. 1

For eccentric payloads in a vertical or sloping position:



Warning

Uncontrolled moving masses can cause personal injury and material damage (pinching). If there is a power failure or the toothed belt breaks inside the EHMB, the payload will slide down.

- Use motors with spring-loaded holding brakes.
- Check whether additional external safety measures against damage due to breaking of the toothed belt are required (e.g. toothed latches or movable bolts).

5.3 Attachment of the payload

- Place the centre of gravity of the payload, if possible, centrally to the drive shaft.
- Attach the payload. There are 2 options here:
 - with at least 2 screws and 2 centring sleeves
 - with adapter kits on the drive shaft (→ Assembly instructions of the adapter kits)

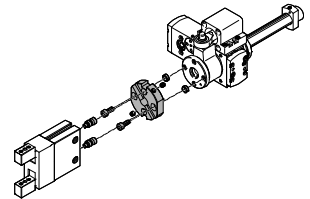


Fig. 6

Size		20	25	32	
Max. screw-in depth E	[mm]	9.6	14		
Bolt		M6	M8		
Tightening torque	[Nm]	9.9	14		
Centring sleeve	[mm]	Ø 9x4	Ø 12x4		

Tab. 2

5.4 Electrical installation

- Check whether additional proximity sensors are required. There are 2 trip cams for sensing the rotation.

To set the trip cams:

- Loosen the threaded pin in the trip cam.
 - Move the cams to the desired position.
 - Tighten the threaded pins (D → Fig. 9) lightly at first. After final positioning, tighten (tightening torque: 0.7 Nm).
 - Screw proximity sensor (E) into the sensor bracket (F).
- If necessary, the sensor bracket can be mounted off-set by 90° (EHMB-20/32) or 180° (EHMB-25).

The following steps are to be carried out:

- Unscrew the screws (G) of the retaining ring.
- Turn retaining ring with sensor bracket.
- Screw the screws of the retaining ring back in (tightening torque: 3 Nm).

Mountability is dependent on the attachment position of the cylinder and accessories.

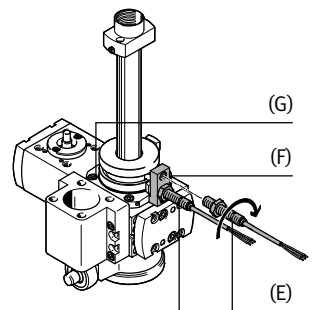


Fig. 7

To guarantee the switching function of the proximity sensor:

- Set proximity sensor (E) so that there is a gap of $X = 0.5 \text{ mm}$ to the cams.
- Mount each proximity sensor using the supplied lock nut (tightening torque of the lock nuts → Operating instructions of the proximity sensor).

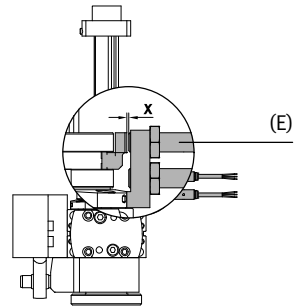


Fig. 8

To install additional trip cams (→ Catalogue specifications, → www.festo.com/catalogue).

- Installing additional trip cams:
 - Insert cam (C) into the cut-out on the groove of the fixture. For the EHMB-32, this requires removal of the sensor bracket (tightening torque when reattaching: 1.2 Nm).
 - Swivel cam (C) either upwards or downwards.
 - Insert additional cams into the cut-out as needed.

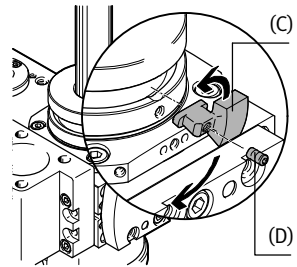


Fig. 9

6 Commissioning



WARNING

Uncontrolled moving mass if there is a power failure.
Injury due to impacts or pinching.

- Ensure that nobody can place his/her hand in the path of the moving components (e.g. through protective crate).
- Ensure that no foreign objects are located in the positioning range.

It should not be possible to touch the EHMB until the load has come to complete standstill.

The cover 13 serves to protect the drive shaft
(→ 9 Accessories).

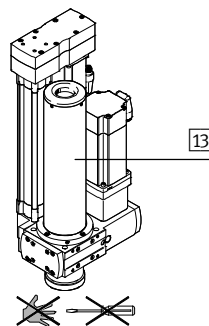


Fig. 10



Note

Excessive driving torque or axial force will destroy the EHMB.

- Comply with maximum permissible driving torque or axial force of the EHMB.
The motor current may need to be limited.



Note

With excessive rotation (e.g. endless rotation), the energy supply to the attachment components may be interrupted. This can cause held loads to fall down (e.g. if the tubing line of a pneumatic gripper comes loose).

- Check whether mechanical or electric safety measures are necessary.

Procedure	Purpose	Note
1. Check travel	Determining the rotation/lifting direction of the motor	Even with identical control, motors of the same design can turn in opposite directions due to different wiring.
2. Homing to reference switch	Comparison of real situation to the image of the control	Comply with operating instructions of the motor drive system. Follow procedure with limitation to low dynamic response to reference switch: 1. Rotation, 2. Lifting motion 3. Combined rotary/lifting motion.

Procedure	Purpose	Note
3. Test run	Checking the overall behaviour	Check the following requirements: – The rotary/lifting module moves through the intended positioning cycle completely. – The rotary/lifting module stops as expected. After a successful test run, the rotary/lifting module is ready for operation.

Tab. 3

7 Maintenance and care



WARNING

Unexpected movement of components.
Injury due to impacts or pinching.

- When working on the axis, switch off the control and secure it to prevent it from being switched back on accidentally.

- Clean the product as needed using non-abrasive cleaning agents and a soft cloth.



Note

Due to its life-time lubrication, the slot shaft guide [6] moves somewhat sluggishly at first.

After a start-up phase, the guide's friction decreases and the excess grease can be wiped off.

To extend the service life of the linear guide:

- Dismantle cam fixture (H) as follows:
 - Unscrew threaded pin (SW 2).
 - Slide cam fixture upwards.
- Grease the ball bearing of the guide at the 3 lubrication holes every 3000 km (grease → 9 Accessories).
The amount of grease is:
 - 2.3 g (for EHMB-20)
 - 4.7 g (for EHMB-25/32)
- Shift the linear part backwards and forwards during lubrication. Otherwise the grease cavities will not be filled equally.
- Reassemble cam fixture (H). The tightening torque of the threaded pin is 1 Nm.

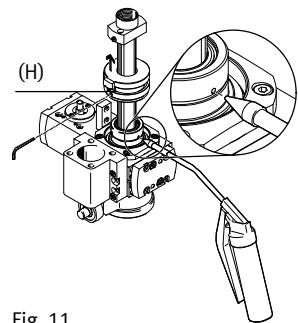


Fig. 11

- Check whether the proximity sensors operate as desired.
- Correct the position of the cams if necessary (→ 5.4 Electrical installation).

**Note**

The lubrication intervals depend on the product load.

- Shorten the lubrication intervals to half the length in case of:
 - Speed > 1 m/s
 - Load factor > 80 %
 - Ambient temperature close to +40 °C
 - Frequent acceleration and braking
 - Dusty and dirty environment.

To optimise the service life of the toothed belt with swivel angles less than 360°:

1. Perform the following steps after every 2 million load changes:
 - Dismantle the payload and rotate by 90°.
 - Mount the payload again.
 - Also move the trip cams by 90° in the same direction (→ Fig. 9 in chapter 5.4 Electrical installation).
A different part of the toothed belt then comes into the load zone of the gears.
2. Repeat commissioning.

8 Disassembly and repair

**WARNING**

Unexpected movement of components.
Injury due to impacts or pinching.

- When working on the product, switch off the control and secure it to prevent it from being switched back on accidentally.

**Note**

The reference position is lost when the motor, trip cam or electric cylinder is dismantled.

- Start homing as detailed in chapter 6 Commissioning in order to determine the new reference position.

If repairs are required:

- Send axis to Festo or contact your local Festo service centre (→ www.festo.com).
Festo carries out the required repairs, fine adjustments and checks.
- Information about spare parts and auxiliary means (→ www.festo.com/spareparts).

9 Accessories

→ www.festo.com/catalogue

Maintenance accessories:

Designation	Part number/type
Grease gun with needle-pointed nozzle	647958/LUB-1 ¹⁾
Lubrication adapter	705639/LUB-1-TR ¹⁾
Roller bearing grease	LUB-KB2 from Festo ¹⁾

1) (→ Spare parts catalogue at www.festo.com/spareparts)

Tab. 4

10 Fault clearance

Malfunction	Possible cause	Remedy
Squeaking noises or vibrations	Controller is set incorrectly.	Change parameters.
	Overloading/fatigue	Send EHMB to Festo or contact the local Festo service.
	Shock absorber is defective (if a pneumatic cylinder is used).	Change shock absorbers.
Rotary/lifting module does not move	Load levels are too high.	Reduce load mass/torques.
		Reduce travel speed.
		Send EHMB to Festo or contact the local Festo service.
	Mounting screws are too long.	Observe max. screw-in depth (→ 5.3 Attachment of the payload).
	Motor is blocked.	Eliminate cause
Drive shaft can be turned freely	Linear guide is defective.	Send EHMB to Festo or contact the local Festo service.
	Toothed belt has broken	Check mounting, tighten clamping screw.
	Clamp of the motor coupling has loosened.	

Tab. 5

11 Technical data

Size	20	25	32
Design	Electromechanical rotary/lifting module with toothed belt		
Mounting position	Any		
Drive pinion Ø [mm]	6	8	12
Rotation angle	Infinite		
Repeat accuracy, rotary ¹⁾			
With EMMS-AS and EMME-AS motor [°]	± 0.03		
With EMMS-ST motor ²⁾ [°]	± 0.08		
With MTR-DCI motor [°]	± 0.05		
Gear ratio	4.5:1	4:1	3:1
Max. driving torque [Nm]	0.7	2.2	6.7
Max. output torque ³⁾ [Nm]	3.15	8.8	20
No-load driving torque ⁴⁾ [Nm]	< 0.07	< 0.18	< 0.5
Max. input speed [rpm]	1350	1200	900
Max. output speed [rpm]	300		
Max. feed force ⁵⁾ [N]	480	480	750
Max. speed of the linear guide [m/s]	1.5		
Max. payload [kg]	3	5	8 ⁶⁾
Ambient temperature [°C]	-10 ... +60		
Vibration	tested in accordance with DIN/IEC 68/EN 60068 part 2-6; 0.15 mm path with 10 ... 58 Hz; 2 g acceleration with 58 ... 150 Hz		
Shock	tested in accordance with DIN/IEC 68/EN 60068 parts 2-27; ±15 g at 11 ms duration; 5 shocks per direction		

- 1) With constant travel profile. The specifications apply only when the motor is directly mounted. If a gearbox is also installed, the repeat accuracy will be different.
- 2) Dependent on the encoder resolution
- 3) Output torque less friction is dependent on speed.
- 4) At maximum rotational speed
- 5) Cylinder-dependent; values with DSBC-32/40 (with ESBF-32/40, these values must be the limit)
- 6) Horizontal use (for vertical use and symmetric, not-eccentric configuration up to 15 kg are possible)

Size	20	25	32
Note on materials	Contains paint-wetting impairment substances		
Materials			
Drive shaft	Steel		
Cover, housing	Anodised aluminum		
Drive shaft	High-alloy stainless steel		
Toothed belt	Polychloroprene with glass fibre		
Product weight			
100 mm stroke [kg]	1.72	3.35	6.11
200 mm stroke [kg]	1.85	3.62	6.39

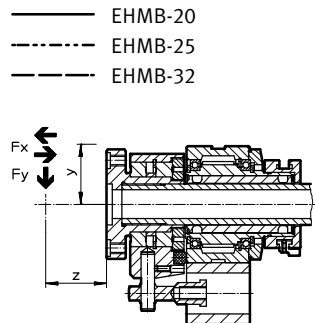
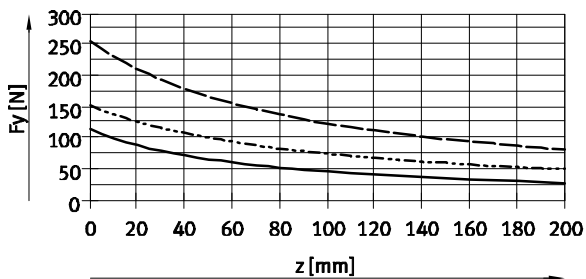
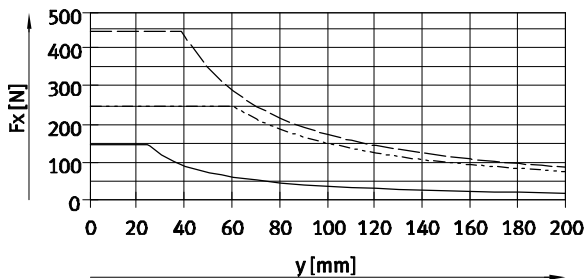
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- 6) Horizontal use (for vertical use and symmetric, not-eccentric configuration up to 15 kg are possible)

Tab. 6

12 Characteristic curves (at the end of the operating instructions)

12 Characteristic curves

Max. dynamic force F_x and F_y as a function of distance y and z



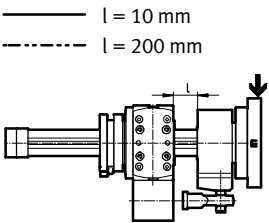
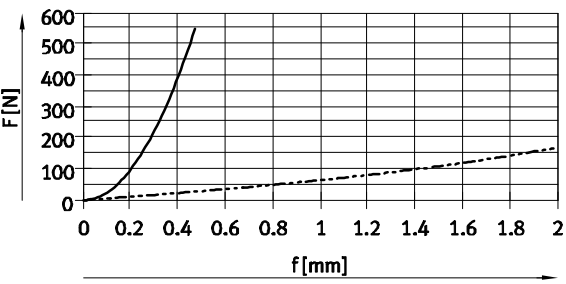
$$\frac{|F_x|}{F_{x_{\max}}} + \frac{|F_y|}{F_{y_{\max}}} + \frac{|F_z|}{F_{z_{\max}}} \leq 1$$

$$F_{z_{\max}} = F_{y_{\max}}$$

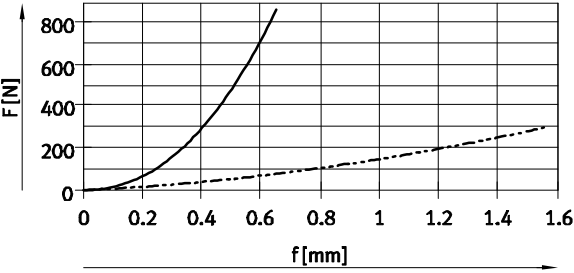
Fig. 12

Deflection f as a function of lateral force F and stroke l

EHMB-20



EHMB-25



EHMB-32

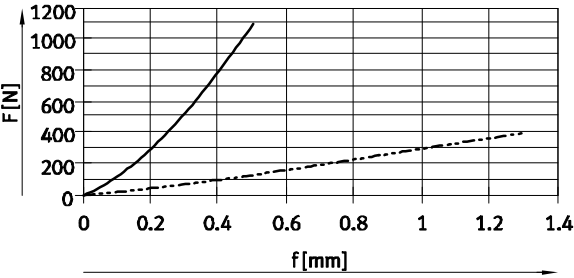
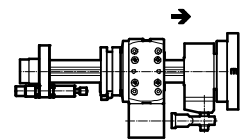
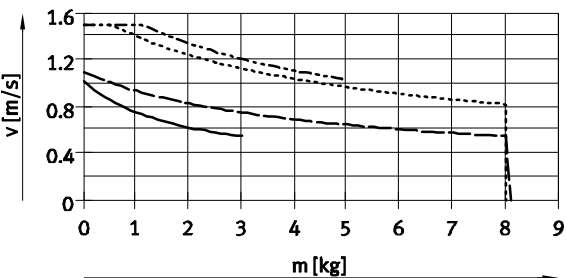
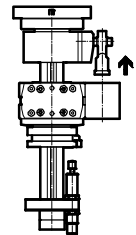
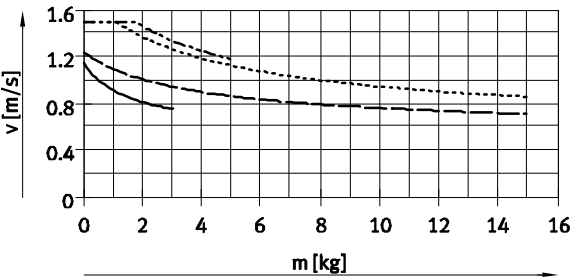
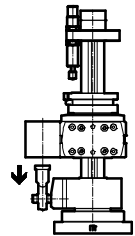
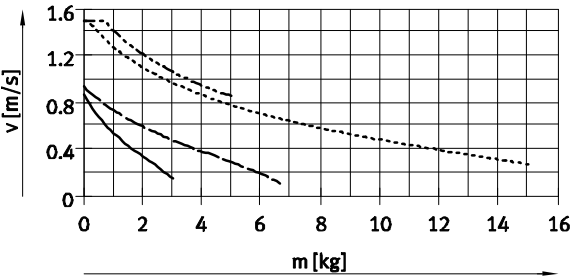


Fig. 13

Max. speed v as a function of the payload m (pneumatic cylinder)



- EHMB-20
- EHMB-25
- EHMB-32 (DYSW 1x)
- EHMB-32 (DSYW 2x)

Fig. 14

Copyright:
Festo SE & Co. KG
Ruiter Straße 82
73734 Esslingen
Germany

Phone:
+49 711 347-0

Fax:
+49 711 347-2144

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