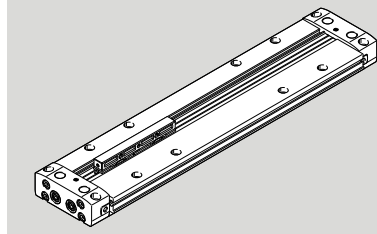


Linear drive DLGF



FESTO

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Instruction manual - Operation

8069099
2017-03
[8069101]

Original instructions

1 Further applicable documents

All available documents for the product → www.festo.com/pk.

The DLGF linear drive is designated as product or drive in these operating instructions.

2 Safety

2.1 General safety information

- Take into consideration the ambient conditions at the location of use.
- Only use the product in original status without unauthorised modifications.
- Observe labelling on the product.
- Observe further applicable documents.
- Store the product in a cool, dry, UV-protected and corrosion-protected environment. Ensure that storage times are kept to a minimum.
- Prior to mounting, installation and maintenance work: Switch off compressed air supply and secure it from being switched back on.
- Observe tightening torques. Unless otherwise specified, the tolerance is $\pm 20\%$.

2.2 Intended use

The product is intended for the space-saving transport of masses. The product is approved for rotor/slide operating mode.

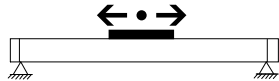


Fig. 1

2.3 Foreseeable misuse

Mechanical movement of rotor/slide at high speed creates a vacuum in the piston chamber. This vacuum can pull the sealing band into the piston chamber. This results in severe leakage and unacceptable levels of acceleration (e. g. in vertical mounting position).

Only move rotor/slide mechanically at low speeds.

2.4 Qualification of specialized personnel

Installation, commissioning, maintenance and disassembly should only be conducted by qualified personnel. The specialized personnel must be familiar with the installation and operation of electrical and pneumatic control systems.

3 Further information

- Accessories → www.festo.com/catalogue.
- Spare parts → www.festo.com/spareparts.

4 Service

Contact your regional Festo contact person if you have technical questions → www.festo.com.

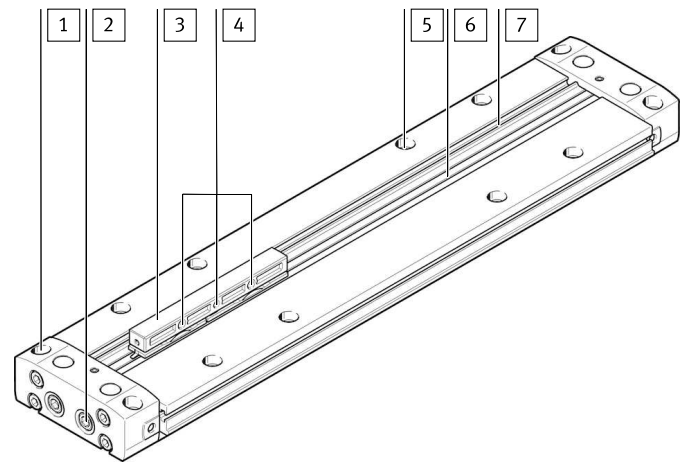
5 Product overview

5.1 Function

When the pneumatic ports are pressurized alternately, the piston moves backwards and forwards in the profile barrel. The rigid connection to the piston causes the rotor/slide to move too. A sealing band spans the slot required in the profile barrel.

5.2 Layout

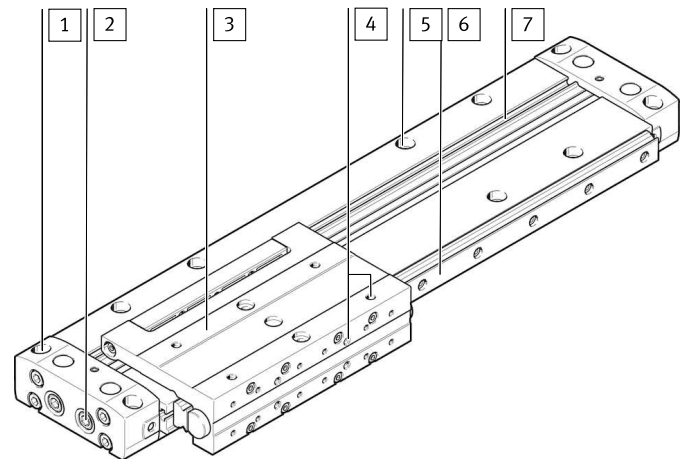
DLGF-G



- | | |
|---|---|
| 1 Bores for direct mounting in the cover | 5 Bores for direct/profile mounting in the profile barrel |
| 2 Pneumatic connection | 6 Sealing band |
| 3 Slide | 7 Groove for Proximity sensor |
| 4 Mounting interface for connection of working load | |

Fig. 2

DLGF-KF



- | | |
|--|---|
| 1 Bores for direct mounting in the cover | 5 Bores for direct/profile mounting in the profile barrel |
| 2 Pneumatic connection | 6 Guide rail |
| 3 Slide (mounted on rotor) | 7 Slot for proximity sensor |
| 4 Mounting thread for payload | |

Fig. 3

6 Transport

NOTICE!

Unexpected movement of components. The rotor/slide is unbraked and can move freely.

- Secure rotor/slide during transport.

- Take product weight into account → 13 Technical data.
- Maintain support clearance ≤ 300 mm when attaching transportation aids.

7 Assembly

7.1 Preparation

- Avoid damage and contamination to the sealing band.
- Do not modify the screws and threaded pins.
Exception: Immediate requirement for change in this instruction manual.
- Place the product in such a way that the control sections can be reached (e. g. adjusting screws).
- Install product without torsional stresses.
- Fasten product to a mounting surface with flatness of 0.05 % of the stroke length, but max. 0.5 mm.
- For gantry applications, attention must also be paid to parallel alignment or product heights in alignment of the products. For further information please contact your local Festo Service centre.
- If needed: Select mounting components or accessories → www.festo.com/catalogue.
To avoid collisions, attach the mounting components outside the positioning range.

7.2 Direct mounting

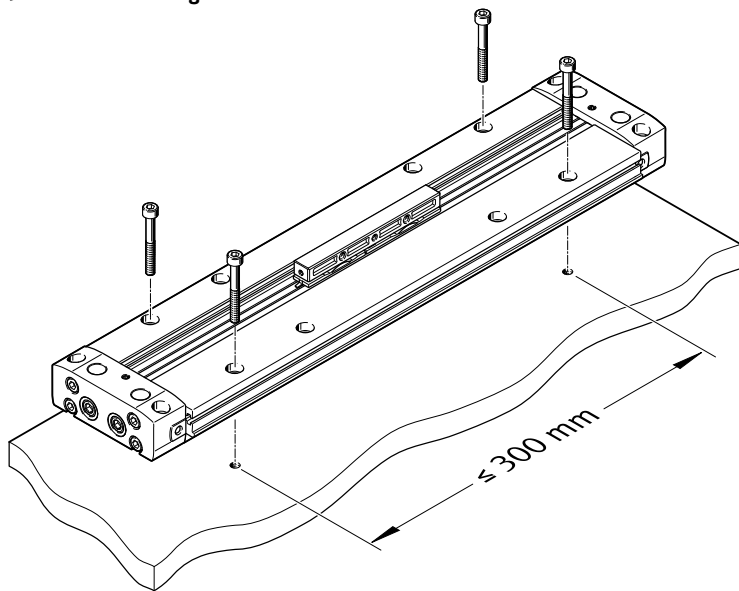


Fig. 4

1. Attach drive paying attention to the minimum number of screws used in pairs (in this example: 2 pairs of screws):
 - On the bores in the profile or cover (with DLGF)
 - On the bores in the cover (with DLGF-...-W)
 Maintain a maximum support clearance of 300 mm at all times. With DLGF-...-W where necessary provide external support (e.g. from the machine frame).
2. Tighten screws uniformly to the following tightening torque.

DLGF-...		20	25	32	40
Minimum number of pairs of screws depending on stroke					
50 ... 150	[mm]	2	2	2	2
200	[mm]	2	2	2	3
250	[mm]	2	2	3	3
300	[mm]	3	3	3	3
350 ... 450	[mm]	3	3	3	4
500 ... 600	[mm]	4	4	4	4
650 ... 750	[mm]	4	4	4	5
800 ... 1000	[mm]	5	5	5	5
Screw size and tightening torque					
Bolt		M4	M5	M6	M6
Tightening torque	[Nm]	2,5 ± 10 %	5,8 ± 20 %	7,7 ± 20 %	8,2 ± 10 %

Tab. 1

7.3 Attachment

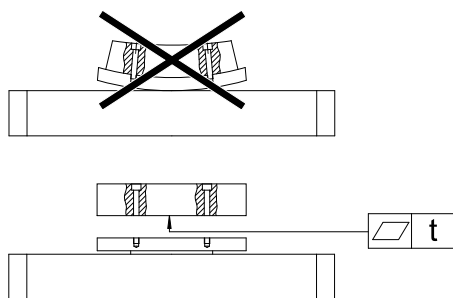


Fig. 5

NOTICE!

A warped attachment component bends the slide and shortens the service life of the guide.

- Use an attachment component with an even surface.
Flatness with recirculating ball bearing: $t = 0.01 \text{ mm}$
- Position the payload in such a way, that the break-down torque (parallel to the axis of motion) and lever arm remains as low as possible.
- Avoid collisions of tool and payload with attachments.
- For attachment components with their own guide:
Adjust the guides of the tool and drive so that they are exactly parallel, or use a connection that permits tolerance compensation. In this way, the guide is not overloaded.

On DLGF-G in basic version:

- Attach mounting element (e.g. moment compensator DARD-L8) to slide with screws.

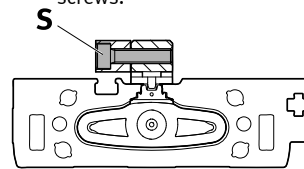


Fig. 6

DLGF-G-...	20	25	32	40	
Screw S	M4	M4	M4	M4	
Tightening torque M	[Nm]	3 ± 10 %	3 ± 10 %	3,4 ± 10 %	3,4 ± 10 %

Tab. 2

On DLGF-KF with recirculating ball bearing:

- Fasten the attachment to the slide with screws and centring elements. Pay attention to the maximum screw-in depth D and the tightening torque.

Attachment of mounting component from above/front:

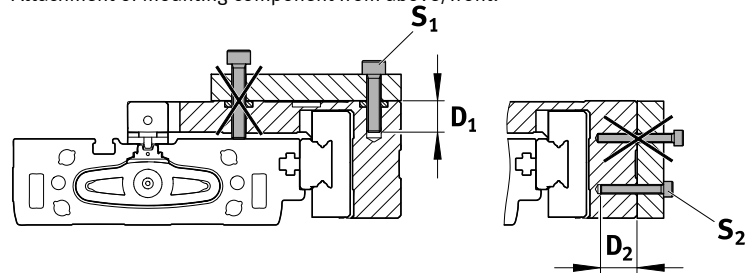


Fig. 7

DLGF-KF-...	20	25	32	40					
Mounting from above									
Screw S_1	M4	M5	M5	M6					
Max. screw-in depth D_1	[mm]	8.8	9.8	10.3	10.3				
Tightening torque M_1	[Nm]	2.2	4.5	4.5	7.5				
Centring H7	[mm]	∅ 7	∅ 9	∅ 9	∅ 12				
Mounting from front									
Screw S_2	M3	M4	M3	M4	M4	M5	M4	M6	
Max. screw-in depth D_2	[mm]	7	7	7	9	7.5	10	8	10
Tightening torque M_2	[Nm]	1	2.2	1	2.2	2.2	4.5	2.2	7.5

Tab. 3

7.4 Mounting accessories

Position scanning with proximity sensors:

- Press proximity switch into the grooves \square → 5.2 Layout.
- Avoid external influences from magnetic or ferritic parts in the vicinity of the proximity sensors (maintain a minimum distance of 10 mm).
- To avoid contamination, use groove covers on all unused grooves
→ www.festo.com/catalogue.

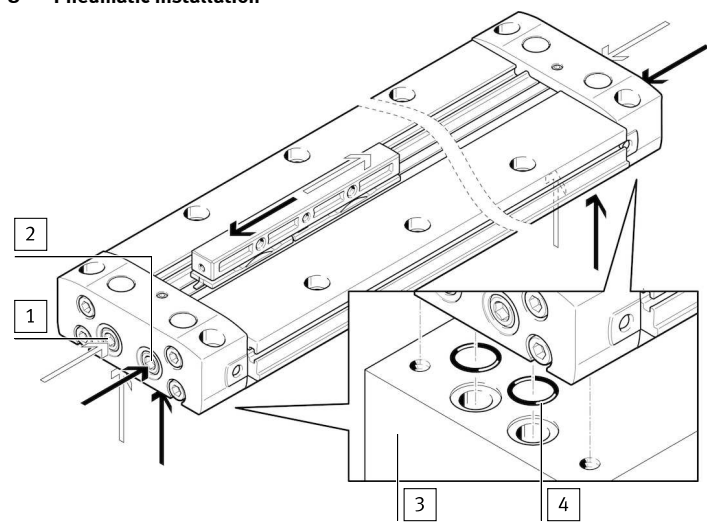
To set the speed:

- Use one-way flow control valves in the supply ports.

To secure the payload from dropping when a pressure failure occurs:

- Use check valves.

8 Pneumatic installation



- 1 Supply port for movement to the right
2 Supply port for movement to the left

- 3 Sub-base
4 Sealing ring

Fig. 8

- Select suitable supply ports.
The compressed air supply can be one-sided or at both ends.
In addition to the supply ports provided ex-factory, a base plate can provide a port [3] (→ enlarged image). When a base plate is used, attachment must be made using the cover bores. This is the only way to seal the O-rings with enough contact force.
- Connect hoses to supply ports.

9 Start-up

Preparation

NOTICE!

Unexpected movement of components.

- Keep foreign objects out of the positioning range.
- Initiate start-up at low speed.

– Slowly supply complete system with air. For slow start-up pressurisation, use on-off valve HEL.

With medium or large payloads and/or at high speeds:

- Use sufficiently large arrester fixtures.
Without the use of external arrester fixtures, the product can contend with the maximum speeds and payloads defined in catalogue details or in technical data.

Processing

NOTICE!

Risk of collision by payloads that protrude through the rotor/slide.

- Only turn adjusting screws while the rotor/slide is stationary.

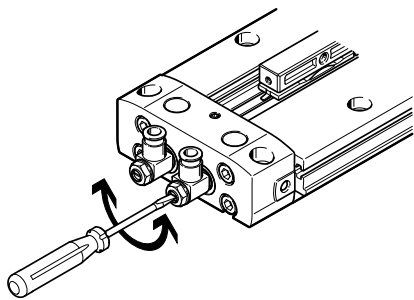


Fig. 9

- First of all, almost close the one-way control valves on both sides completely, then unscrew them one complete turn.
- Initially exhaust drive simultaneously at both sides.
↳ This causes the rotor/slide to move slightly to a point of balance
- Then exhaust the drive on just one side.
↳ This causes the rotor/slide to move into an end position.
- Start the test run.
- If needed: Correct speed at the restrictor check valves. The rotor/slide should reach the end positions without striking them harshly or recoiling.

10 Maintenance

10.1 Cleaning

Do not clean the guide elements (e.g. guide rails).

- Clean the outside of the product with a soft cloth. Do not use aggressive cleaning agents.

10.2 Lubrication

NOTICE!

Lubrication of the basic version of the shaft is not necessary.

Lubrication of recirculating ball bearing (DLGF-KF)

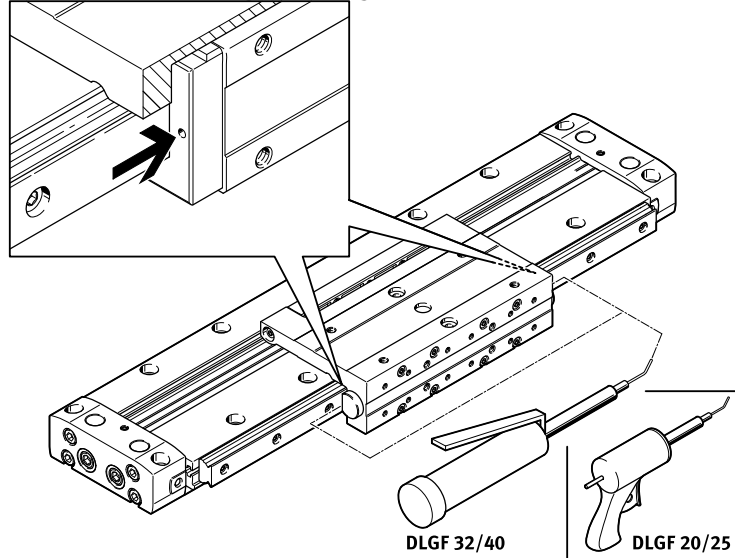


Fig. 10

- Calculate load comparison factor f_v with the help of the formula for combined loads → 13 Technical data.
- Read off lube interval S_{int} → Fig.11.
- Oil or grease the guide at all relubrication openings → Fig.10.
When pressing in grease: Move slide slowly to and fro by hand.
 - Accessories and permitted lubricant → Maintenance accessories.
 - Amount of lubricant → Tab. 4.

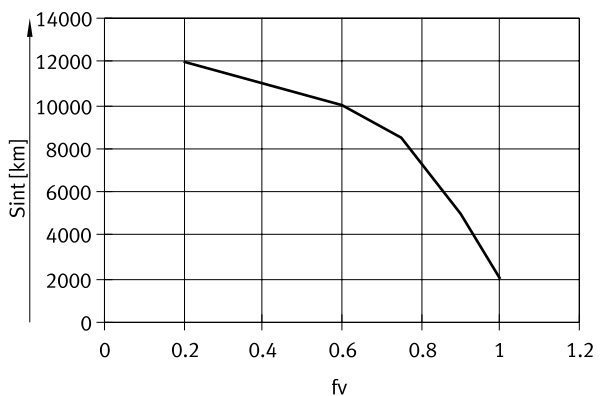


Fig. 11

NOTICE!

The lubrication interval S_{int} is dependent on the load acting on the product.

Load factors include e. g.:

- Dusty and dirty environment
- Nominal stroke > 2000 mm or < 300 mm
- Speed > 2 m/s
- Ambient temperature > +40 °C
- Service age of product > 3 years
- Travel profile matches triangular operation (frequent acceleration and braking)

If one of these factors applies:

- Halve lubrication interval S_{int} .

If several factors apply at the same time:

- Divide service interval S_{int} by four.

Size	20	25	32	40
Lubricant quantity at each lubricating point [g]	0.3	0.5	1.7	1.9

Tab. 4

Maintenance accessories

Designation	Part number ¹⁾	Type ¹⁾
DLGF-KF-20/-25		
Oil gun	8041022	AZTP-S-L
Metering needle kit	8075522	AZTN-DSG Metering needle for DLGF-20: Green, angled 45° Metering needle for DLGF-25: Olive, angled 45°
Cartridge	8073523	AZLG-H1-C-10, (Elkalub VP 922, Chemie-Technik Co., Vöhringen)
DLGF-KF-32/-40		
Grease gun with needle-pointed nozzle	647958	LUB-1
Lubrication adapter, angled output	8073388	LUB-1-TR-W
Lubricating grease	8073786	ELKALUB VP 922, (Chemie-Technik, Vöhringen)

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

Tab. 5

11 Malfunctions

11.1 Fault clearance

Fault description	Cause	Remedy
Irregular movement of slide	One-way flow control valve not installed correctly	Choke with exhaust air as far as possible (not with supply air).
Malfunctions in position sensing	Ferritic parts in the vicinity of the proximity switch	Use parts of non-magnetic materials or maintain minimum distances → 7.4 Mounting accessories.
Heavy leakage	Linear actuator integrated in a distorted manner	Fasten the linear actuator to a flat base.
	Seal worn	Replace wearing parts: – Self repair with a set of wearing parts – Repair at Festo
	Sealing band pressed/sucked in	For unpressurized linear drive: – Loosen the tubing connection and move the slide twice by hand through the entire stroke (if necessary, move fixed stops into the end position). – Avoid low pressure in the piston chamber (e.g. only move the depressurised slide slowly).
Linear actuator does not achieve the desired speed.	Lack of air volume	– Increase connection cross-section. – Place volume upstream.
	High friction or counteracting force	Observe limit values.

Tab. 6

11.2 Repair

Send product to the Festo repair service for repair.

12 Recycling

ENVIRONMENT!

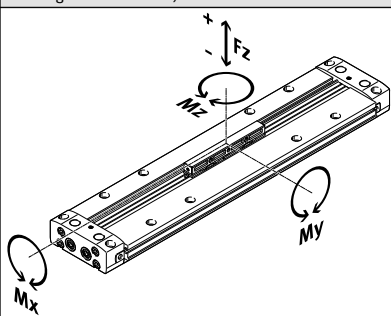
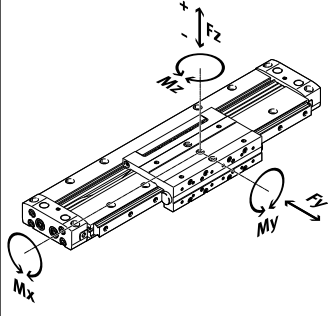
Dispose of the packaging and product according to the valid provisions of environmentally sound recycling → www.festo.com/sp.

13 Technical data

Size	20	25	32	40
Design	Rodless drive			
Mode of operation	Double-acting			
Cushioning	Pneumatic cushioning, Self-adjusting on both sides			
Pneumatic connection	M5	G1/8	G1/8	G1/4
Speed [m/s]	0.07 ... 1.5			
Repetition accuracy [mm]	±0.05			
Mounting position	Optional			
Operating pressure [bar]	2 ... 8	1.5 ... 8		
Operating medium	Compressed air acc. to ISO 8573-1:2010 [7:-:-]			

Size	20	25	32	40
Notes on the operating/pilot medium	Lubricated operation possible (in which case lubricated operation will always be required)			
Ambient temperature [°C]	0 ... 60			
Theoretical force at 6 bar [N]	188	295	483	754
Weight DLGF-G				
Basic weight with 0 mm stroke [g]	590	957	1703	3234
Additional weight per 10 mm stroke [g]	28.2	35.3	54.7	80.6
Weight DLGF-KF				
Basic weight with 0 mm stroke [g]	1015	1640	2829	5585
Additional weight per 10 mm stroke [g]	35.5	45.5	69.4	105.5
Materials				
Cover, housing, rotor/slide	Aluminium			
Seals	NBR, TPE-U (PU)			
Guide band, guide (DLGF-KF), scraper	POM			
Sleeve, stop	Steel			

Tab. 7

Size	20	25	32	40
Loading characteristics, DLGF-G				
				
Formula for combined loads: $0,4 \times \frac{F_z}{F_{zmax}} + \frac{M_x}{M_{xmax}} + \frac{M_y}{M_{ymax}} + 0,2 \times \frac{M_z}{M_{zmax}} \leq 1$				
Permitted forces and torques, DLGF-G				
+F _{zmax} [N]	54	95	138	456
-F _{zmax} [N]	98	164	276	662
M _{xmax} [Nm]	0.6	1.1	1.8	7.7
M _{ymax} [Nm]	2.2	4.5	7.6	37.6
M _{zmax} [Nm]	0.7	1.4	2.9	11.2
Characteristic load values, DLGF-KF				
				
Formula for combined loads (load comparison factor): $f_v = \frac{F_y}{F_{ymax}} + \frac{F_z}{F_{zmax}} + \frac{M_x}{M_{xmax}} + \frac{M_y}{M_{ymax}} + \frac{M_z}{M_{zmax}} \leq 1$				
Permitted forces and torques, DLGF-KF				
F _{ymax} [N]	600	1000	1300	1700
+F _{zmax} [N]	400	700	950	1150
-F _{zmax} [N]	700	1200	1600	2000
M _{xmax} [Nm]	5.4	12.3	30	54
M _{ymax} [Nm]	15	30	50	90
M _{zmax} [Nm]	15	30	50	90

Tab. 8