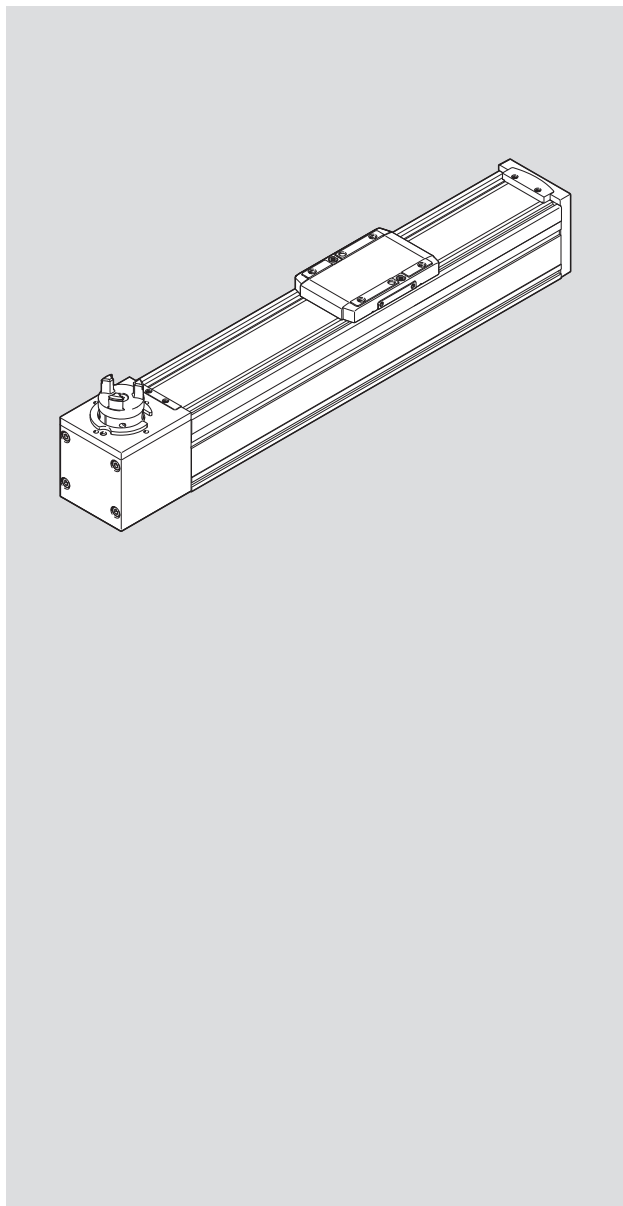


ELGC-TB

Toothed belt axis



FESTO

Operating instruc-
tion



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2023-05c
[8178711]

Translation of the original instructions

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1 Applicable documents



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

2 Safety

2.1 Safety instructions

- Observe the identifications on the product.
- Only use the product if it is in perfect technical condition.
- Before working on the product: Switch off the power supply, ensure that it is off and secure it against being switched on again.
- Store the product in a cool, dry environment protected from UV and corrosion. Keep storage times short.
- Store the product in ambient conditions without oils, greases and grease-dissolving vapours.

2.2 Intended use

The axis positions payloads or moves external guides.

The axis is approved for slide operation.



Fig. 1: Slide operation

2.3 Training of qualified personnel

Work on the product may only be carried out by qualified personnel who can evaluate the work and detect dangers. The qualified personnel have knowledge and experience in handling electric drives and axes.

3 Additional information

- Contact the regional Festo contact if you have technical problems → www.festo.com.
- Accessories and spare parts → www.festo.com/catalogue.

4 Product overview

4.1 Function

The axis converts the rotary motion of the mounted motor into a linear motion of the slide. The toothed belt drive converts the torque of the motor into a feed force. The linear movement of the slide is precisely guided by the guide. The integrated cover strip prevents abraded particles from penetrating the immediate vicinity of the drive. Sensors monitor end positions, reference position and intermediate position.

4.2 Product design

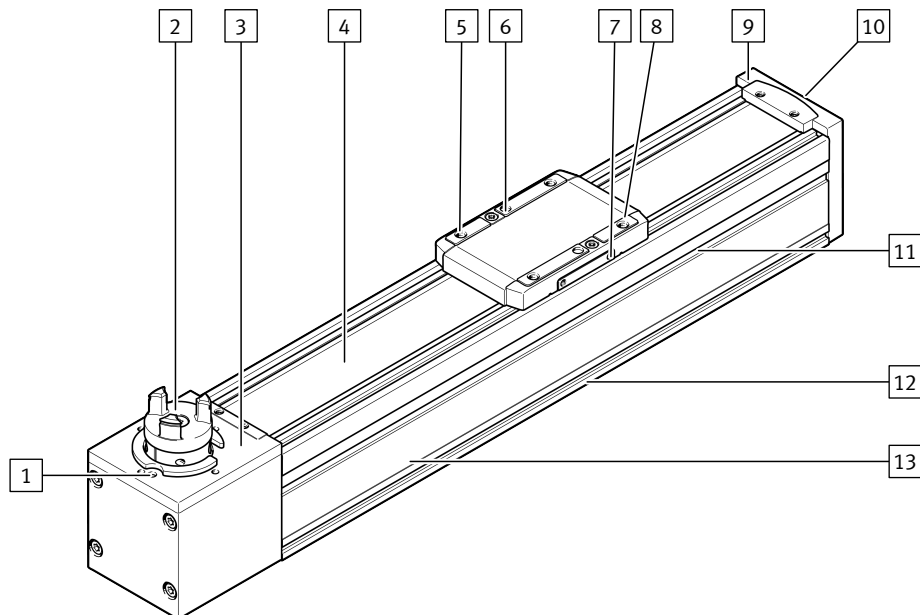


Fig. 2: Product design ELGC-TB

- | | |
|--|---|
| 1 Interface for motor mounting kit | 8 Slide |
| 2 Drive shaft | 9 End cap |
| 3 Drive cover | 10 Sealing air connection |
| 4 Cover strip | 11 Slot for sensors and sensor brackets |
| 5 Threaded hole for attachment component | 12 Slot for profile mountings |
| 6 Centring hole for attachment component | 13 Profile |
| 7 Threaded hole for switch lug | |

5 Transport

⚠ WARNING

Risk of injury due to falling product

If the product is lifted incorrectly, it may fall and cut, crush or separate body parts.

- Lift the product only with suitable load-bearing equipment.
-
- Store and transport the product in its original packaging. Observe the weight, the dimensions and the ambient conditions.
 - Take the centre of gravity of the product into consideration.

- Store and transport the product in a horizontal position.
- Comply with the maximum permitted support clearances when attaching transportation aids
→ 10.2 Characteristic curves of support distances. Compliance with the support clearances prevents the axis from excessive bending.

6 Assembly

6.1 Safety

WARNING

Risk of Injury due to Unexpected Movement of Components

For vertical or slanted mounting position: when power is off, moving parts can travel or fall uncontrolled into the lower end position.

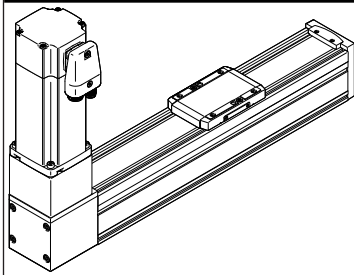
- Bring moving parts of the product into a safe end position or secure them against falling.

6.2 Mounting motor



Observe the limit values for forces, torques and speeds if a non-recommended motor and motor mounting kit are used.

Axial kit EAMM-A



Tab. 1: Overview of motor mounting

- Mount the motor and motor mounting kit without tension.

6.3 Mounting axis



Tab. 2: Overview of mounting component

Requirements:

- Adequate clearance for payload to avoid collisions with motor, mounting components and sensor components.
 - Sufficient space for maintenance work.
 - Flatness of the mounting surface of 0.05% of the stroke length or maximum 0.5 mm over the stroke length of the bearing surface.
 - Required support points lie within the specified support clearances → 10.2 Characteristic curves of support distances. Compliance with the support clearances prevents the axis from excessive bending.
1. Place the mounting components on the support points.
 2. Tighten the screws. Observe the maximum tightening torque and maximum screw-in depth.



When used in multi-axis systems: align to the first axis and install without tension.

ELGC-TB-...	-45	-60	-80
Profile mounting EAHF-L2			
Thread	Instruction manual → www.festo.com/sp .		

6.4 Mounting the payload

 **WARNING**

Unexpected movement of components.

Injury due to impacts or crushing.

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

⚠ WARNING

Risk of Injury due to Unexpected Movement of Components

For vertical or slanted mounting position: when power is off, moving parts can travel or fall uncontrolled into the lower end position.

- Bring moving parts of the product into a safe end position or secure them against falling.

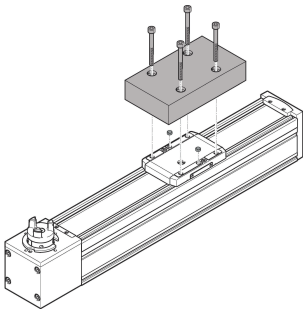


Fig. 3: Mounting payload, example "top mounting"

Requirements:

- Adequate clearance for payload to avoid collisions with motor, mounting components and sensor components.
- Sufficient space for maintenance work.
- A payload mounting surface flatness of 0.01 mm above the slide surface.
- Minimise the guide load. Short lever arms from the guide centre to the force application points and centres of gravity of the payload.

1. Place centring components in the centring holes.
2. Position the payload at the intended location.
3. Tighten the screws. Observe the maximum tightening torque and maximum screw-in depth.

ELGC-TB-...	-45	-60	-80
Direct fastening			
Thread	M4	M5	M6
Max. tightening torque [Nm]	2.9	5.9	9.9
Max. screw-in depth $t_{\max}$ [mm]	7.8	10.8	14.7
Centring pins [mm]	Ø 4 H7	–	–
Centring sleeve [mm]	–	Ø 5 H7	Ø 7 H7

6.5 Mounting sensor

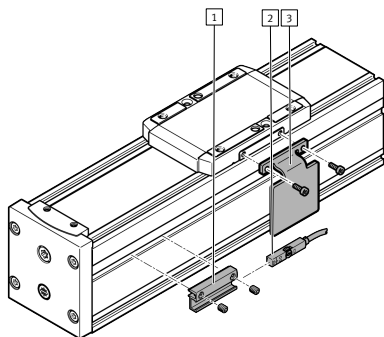


Fig. 4: Mounting switch lug, sensor and sensor bracket

- | | | | |
|---|----------------|---|------------|
| 1 | Sensor bracket | 3 | Switch lug |
| 2 | Sensor | | |

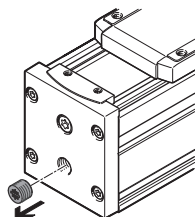
Requirements:

- Protect the sensor from external magnetic or ferritic influences with min. 10 mm distance from slot nuts.
 - Use a hardware limit switch with N/C contact function to guarantee protection in the event of a sensor failure.
 - Use an inductive sensor.
 - Only query the integrated magnets in the slide with a magnetoresistive sensor.
1. Only mount the switch lug on the inductive sensor.
 2. If necessary, mount the sensor bracket.
 3. Mount the sensor.

6.6 Connecting sealing air

The use of sealing air at approx. ± 0.02 MPa (± 0.2 bar, ± 2.9 psi) reduces or prevents the following forms of contamination:

- The application of negative pressure minimises the release of abraded particles into the environment.
 - The application of overpressure reduces the penetration of dirt into the drive train.
1. Remove the sealing air plug screw from the threaded hole.



2. Mount the fitting and connect the hose.

7 Commissioning

WARNING

Risk of injury due to unexpected movement of components.

- Protect the positioning range from unwanted intervention.
- Keep foreign objects out of the positioning range.
- Perform commissioning with low dynamic response.

NOTICE

Elasticity of the toothed belt

The elasticity of the toothed belt generates an additional spring effect at high acceleration and deceleration, which can lead to an inadmissible nominal/actual deviation when the slide is moved or when the end position is reached.

- Consider the setpoint deviation determined during the test run during parameterisation of position setpoint values.

Block-shaped acceleration profiles without jerk limitation can have the following effects:

- High mechanical loads on the lead screw due to high force peaks.
- Overshooting effects during positioning.
- Rise of the entire system.

Recommendation: reduce high force peaks in the acceleration and deceleration phases by using the jerk limitation.

Identical axes can generate different running noises depending on the parameterisation, mode of operation, type of mounting, installation environment and components.

For use with reduced particle emission

- Clean product → 8.4 Cleaning axis.

Requirements:

- The motor encoder is referenced to the reference mark by a homing run.
- The motor encoder has the absolute reference to the reference mark.
- The direction of movement of the slide is determined by the direction of rotation of the motor.
- The mounting of the drive system has been checked.
- The protective cover of the cover strip is removed.
- The installation on the motor has been checked.
- There are no foreign objects in the movement space of the drive system.
- Maximum permissible feed force and drive torque as a function of acceleration, deceleration, e.g. with stop function or quick stop, speed, moving mass and mounting position, are not exceeded.

- Axis is not mechanically overloaded and dynamic setpoint deviation is not exceeded as a result of force peaks, torque peaks or overshoot effects, e.g. overrunning the end position.
Overloads and overruns as a result of jerk limitation must be restricted by reduced acceleration and deceleration setpoints or optimised controller settings.
 - The software end positions are not within the effective range of the mechanical stops.
 - No homing or test run to mechanical end stops.
1. Start check run.
 2. Select permissible reference points "against reference switch" for the homing.
 3. Start the homing run with reduced speed setpoints, acceleration setpoints and deceleration setpoints.
 4. Start the test run with reduced speed setpoints, acceleration setpoints and deceleration setpoints.
 5. Check that the slide completes the entire travel cycle within the specified time.
 - ↳ The slide stops its travel when it reaches a limit switch and the drive system is ready for operation.

Size	45	60	80
Max. stop speed [m/s]	0.01		
Max. stop energy [mJ]	0.125	0.25	0.5
Calculation of the maximum stop energy			
$E_{max} = \frac{v^2 * m}{2}$	– v = max. stop speed – m = mass of all linear moving components Additional information → www.festo.com/catalogue .		

Tab. 3: Speed and energy at the end positions

8 Maintenance

8.1 Safety

WARNING

Unexpected movement of components.

Injury due to impacts or crushing.

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

8.2 Checking toothed belt wear



The toothed belt is tensioned for its entire service life.

The toothed belt must not be retensioned.

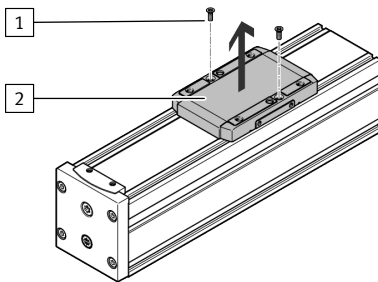
1. ELGC-TB:
 - Initial check: after 5000 km.
 - Periodic check: every 1000 km.
2. If the toothed belt shows visible wear: send the axis to Festo or contact Festo Service
→ www.festo.com.

8.3 Retensioning cover strip

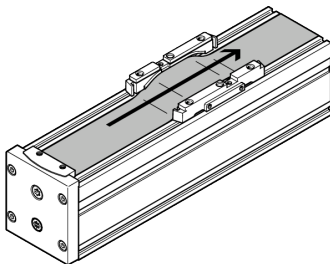
1. Check the cover strip for wave formation every 2000 km.
2. Retension the cover strip as follows if waves are detected.
3. Replace the belt reversals and the cover strip if retension is no longer possible.

Retensioning cover strip for magnetic reversal

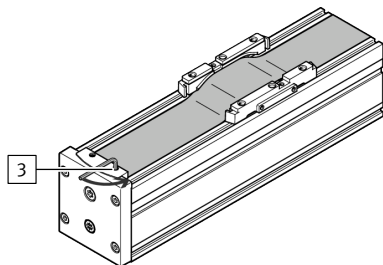
1. Remove the screws **1**.
Remove the covering **2**.



2. Check the cover strip for wave formation.
 - Retension the cover strip if wave formation is detected → Step 3.
 - If there is no wave formation, mount the removed carriage components → Step 7.

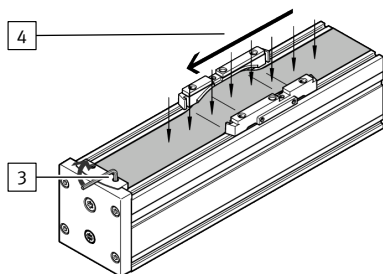


3. Unscrew clamping screws on one side **3**.

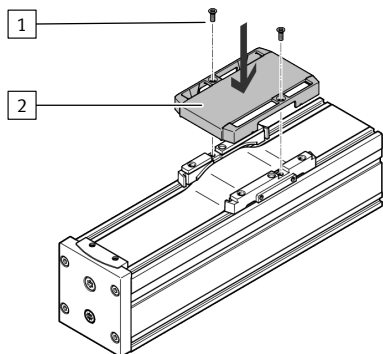


4. Slowly press the cover strip **4** flat onto the guide surfaces in the direction of the loosened clamping screws.

Tighten the clamping screws **3** to 2 Nm while maintaining the tension of the cover strip.



5. Place the covering **2** on the moment compensator. The cover strip must not contact the cover. Tighten the screws **1** to 0.2 Nm for size 32 and to 0.5 Nm for sizes 45, 60 and 80.



8.4 Cleaning axis

Clean the product with a clean, soft cloth and non-abrasive cleaning agents.

For use with reduced particle emission:

- Remove abrasion and contamination from the product on the following schedule:
 - Prior to initial commissioning.
 - Regularly during operation.

8.5 Lubricating axis



The axis is lubricated for life.

Additional lubrication of the axis is not necessary.

9 Fault clearance



WARNING

Unexpected movement of components.

Injury due to impacts or crushing.

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



WARNING

Risk of injury due to unexpected movement of components.

- Protect the positioning range from unwanted intervention.
- Keep foreign objects out of the positioning range.
- Perform commissioning with low dynamic response.

Error description	Cause	Remedy
Loud running noises, vibrations or rough running of the axis.	Coupling distance too short.	– Observe the permissible coupling spacings → Assembly instructions of the motor mounting kit.
	Torsional stresses	– Install axis without tension. Make sure that the contact surface is flat → 6.3 Mounting axis. – Change the layout of the attachment component, e.g. payload. – Align axes parallel to each another.
	Current controller settings.	– Optimise controller data, e.g. speed, acceleration,
	Resonance oscillation of the axis.	– Change travel speed.

Error description	Cause	Remedy
Loud running noises, vibrations or rough running of the axis.	Wear on bearing or guide.	– Contact local Festo Service. – Replace axis.
	Toothed belt wear.	– Contact local Festo Service. – Replace axis.
Vibrations on the slide.	Operation at the resonant frequency of the axis.	– Change travel speed. – Change the acceleration. – Increase axis stiffness, e.g. shorter support distances. – Change the payload geometry.
Long oscillations of the profile.	Resonant frequency of profile and payload too low.	– Optimise controller data, e.g. speed, acceleration, ... – Change the payload geometry.
Slide does not move.	Coupling slips.	– Check the mounting of the shaft-hub connection ➔ Assembly instructions of the motor mounting kit.
	Loads are too high.	– Reduce forces and torques. Consider dynamics.
	Screws for mounting the attachment component are too long, e.g. payload.	– Observe the screw-in depth ➔ 6.4 Mounting the payload.
	Toothed belt torn.	– Contact local Festo Service. – Replace axis.
Overruns the end position.	Sensor does not switch.	– Check sensor, installation and parameterisation.
Idling torque too high.	Wear in the drivetrain.	– Contact local Festo Service. – Replace axis.
Toothed belt skips.	Toothed belt pretensioning too low.	– Contact local Festo Service. – Replace axis.
	Current controller settings.	– Optimise controller data, e.g. speed, acceleration,

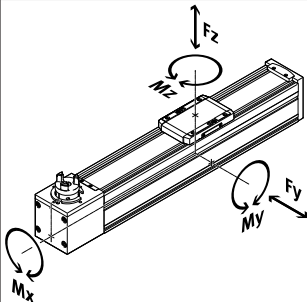
Error description	Cause	Remedy
Toothed belt skips.	Loads are too high.	– Reduce travel speed.
Wave formation on the cover strip or aluminium abrasion on the axis.	Wear on belt reversals.	– Retension cover strip → 8.3 Retensioning cover strip. – Replace belt reversal and cover strip.

Tab. 4: Fault clearance

10 Technical data

10.1 Technical data, mechanical

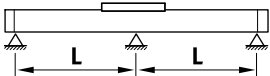
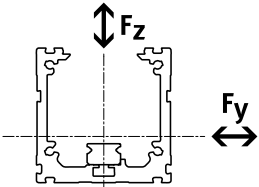
ELGC-TB-...	-45	-60	-80
Design	Electromechanical axis with toothed belt		
Guide	Recirculating ball bearing guide		
Mounting position	Any		
Max. feed force [N]	75	120	250
Max. driving torque [Nm]	0.716	1.49	4.18
Max. idling torque at speed = 0.2 m/s and with cover strip [Nm]	0.075	0.194	0.413
Max. speed [m/s]	1.2	1.5	1.5
Max. acceleration [m/s²]	15		
Repetition accuracy [mm]	± 0.1		
Feed constant [mm/rev]	60	78	105
Ambient temperature [°C]	0 ... +50		
Storage temperature [°C]	−20 ... +60		
Degree of protection	IP40		
Max. permissible forces and torques on the slide			
Fy [N]	300	600	900
Fz [N]	600	1800	2700
Mx [Nm]	5.5	29.1	59.8
My [Nm]	4.7	31.8	56.2
Mz [Nm]	4.7	31.8	56.2

ELGC-TB-...	-45	-60	-80
Calculating the load comparison factor			
f_v	$f_v = \frac{ F_y, dyn }{F_{y, max}} + \frac{ F_z, dyn }{F_{z, max}} + \frac{ M_x, dyn }{M_{x, max}} + \frac{ M_y, dyn }{M_{y, max}} + \frac{ M_z, dyn }{M_{z, max}} \leq 1$		
			

Tab. 5: Technical data, mechanical

10.2 Characteristic curves of support distances

The maximum permissible support distance L without profile mounting MUE as a function of force Fy/Fz with a maximum deflection of 0.5 mm.

Support distance	Force load
	

Tab. 6: Overview of support distance and force load

ELGC-TB-45

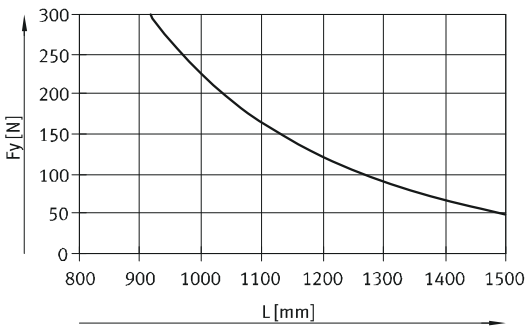


Fig. 5: ELGC-TB-KF-45, support distance L as a function of force Fy

ELGC-TB-60/80

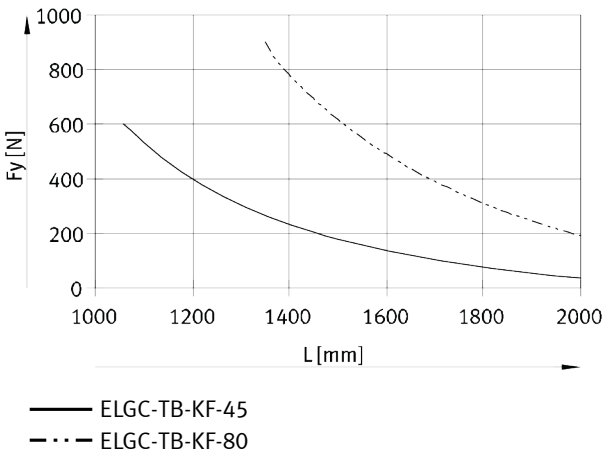


Fig. 6: ELGC-TB-KF-60/80, support distance L as a function of force F_y

ELGC-TB-45

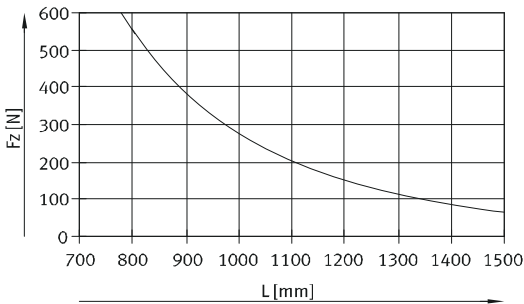


Fig. 7: ELGC-TB-KF-45, support distance L as a function of force F_z

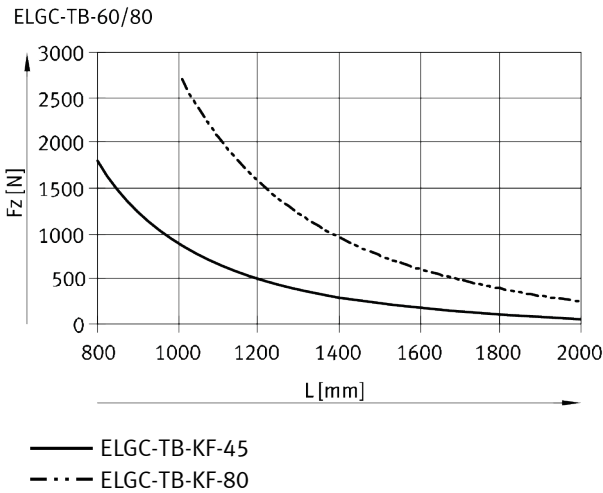


Fig. 8: ELGC-TB-KF-60/80, support distance L as a function of force F_z

10.3 Characteristic speed curves

Speed v as a function of rotational speed n .

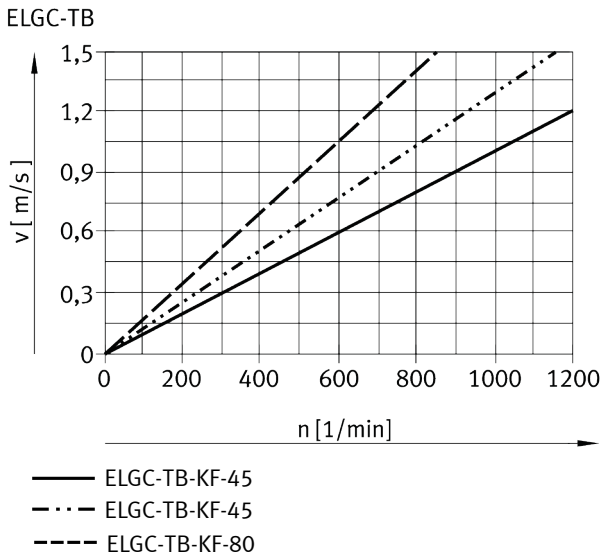


Fig. 9: ELGC-TB, speed v as a function of rotational speed n

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