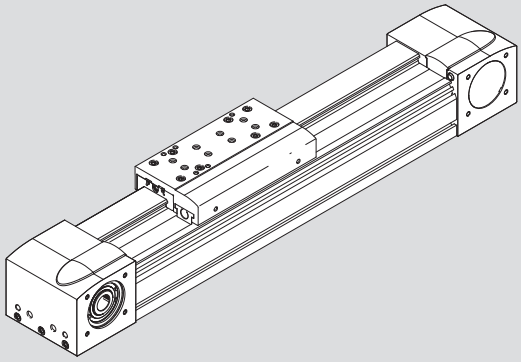
EGC-...-TB
Toothed belt axis



FESTO

Operating instruction

8162896

8162896
2023-05e
[8162898]

Translation of the original instructions

Table of contents

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 Product design

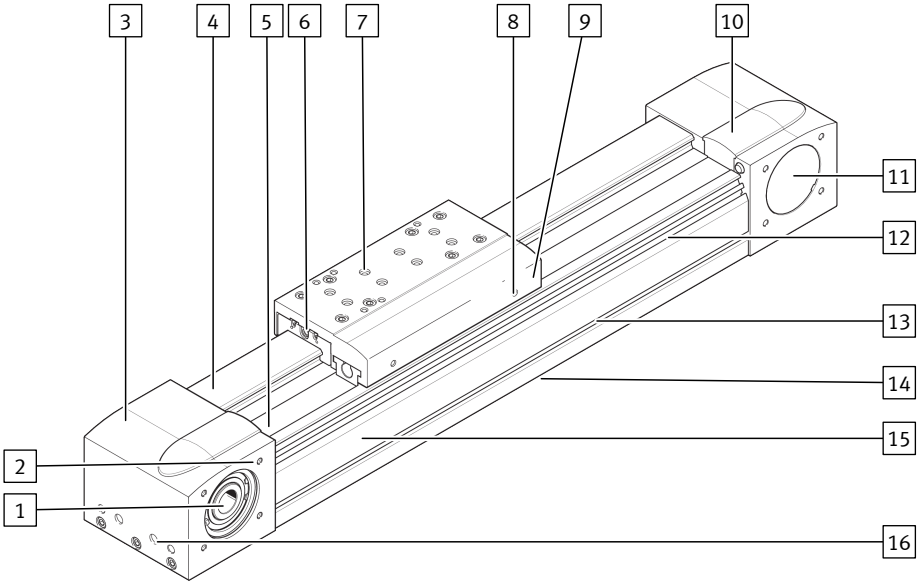


Fig. 2: Product design EGC-...-TB

1 Hollow drive shaft
2 Threaded hole for motor mounting kit
3 Drive cover
4 Guide rail
5 Toothed belt
6 Guide lubrication point
7 Threaded hole and centring hole for payload
8 Threaded hole for switch lug
9 Slide
10 Cover cap
11 Shaft cover
12 Slot for sensor
13 Slot for profile mounting, slot nut and sensor bracket
14 Slot for slot nut
15 Profile
16 Threaded hole for foot mounting

4.2 Function

The axis converts the rotary motion of the mounted motor to a linear motion of the slide. The toothed belt drive converts the torque of the motor to a feed force. The linear motion of the slide is precisely guided by the guide. Sensors and displacement encoder enable query of end positions, reference position and intermediate position.

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 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.

6.2 Mounting motor

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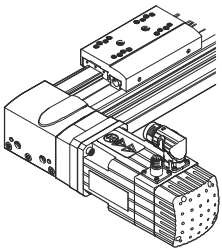
Observe the limit values for forces, torques and speeds if a non-recommended motor and motor mounting kit are used.

Axial kit EAMM-A


Tab. 1: Overview of mounting motors

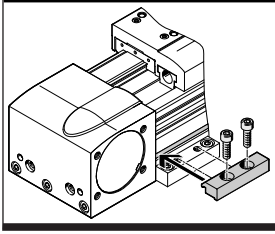
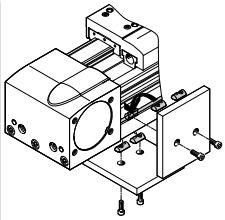
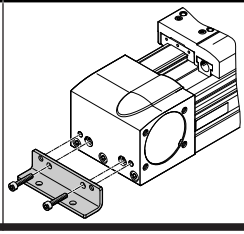
- Mount the motor and motor mounting kit without tension.

6.3 Mounting axis

High mechanical loads on the mounting connections

If high parallel torques are applied to the drive system at the same time, this will result in high mechanical loads at the mounting interfaces.

- Use the foot mounting HPE only in combination with the profile mounting MUE or the slot nuts NST.

Profile mounting MUE	Slot nut NST	Foot mounting HPE
		

Tab. 2: Overview of mounting components

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.

i

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

EGC-...-TB		-50	-70	-80	-120	-185
Profile mounting MUE						
Instruction manual ➔ www.festo.com/sp.						
Slot nut NST						
Thread		M3	M5	M5	M6	M6
Max. screw-in depth t_{max}	[mm]	3.8	6	6	12	12
Foot mounting HPE						
Thread		M4	M5	M5	M8	M10
Max. tightening torque	[Nm]	2.9	5.9	5.9	24	47
Max. screw-in depth t_{max}	[mm]	7	10	10	16	20

6.4 Mounting payload on the standard slide

⚠ 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.

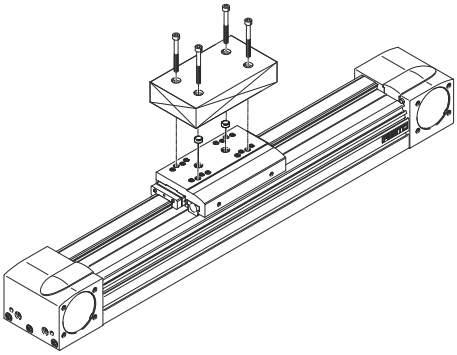


Fig. 3: Mounting payload, example "top mounting"

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.

EGC-...-TB		**-50**	**-70**	**-80**	**-120**	**-185**
Thread, top and side		M4	M5	M5/M6		M6/M8
Max. tightening torque	[Nm]	2.9	5.9	5.9/9.9		9.9/24
Max. screw-in depth t_{max}	[mm]	4.2	8.4	9.5	10	15
Centring pins	[mm]	∅ 5 H7		–		
Centring sleeve	[mm]	–		∅ 9 H7		

6.5 Mounting payload on the additional slide

⚠ 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.

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- When using an additional external guide, ensure that the axes and guide are precisely parallel and aligned.
- Recommendation: use guide mountings with tolerance compensation.

Tension due to manufacturing tolerances may be encountered with axes with additional slides when mounting an adapter plate supplied by the customer.

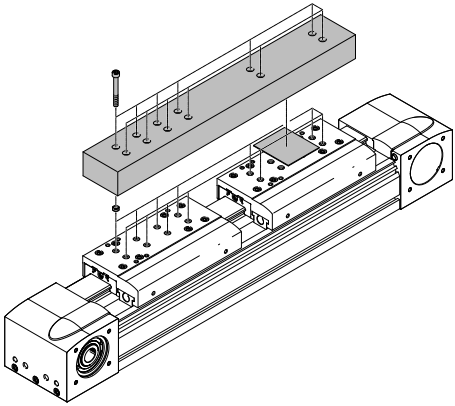

Fig. 4: Mounting payload, example "top mounting"

Requirements:

– A fixed-floating bearing for the carriage connection.
– Use a tolerance compensation in case of height deviation from the standard slide surface.
– 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 surfaces.
– 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. Mount the adapter plate on the standard slide.
3. Place the tolerance compensation elements on the additional slide.
4. Align and mount the adapter plate on the additional slide.

5. Tighten the screws. Observe the maximum tightening torque and maximum screw-in depth.

EGC-...-TB-...-K...		-50	-70	-80	-120	-185
Thread		M4	M5	M5/M6		M6/M8
Max. tightening torque	[Nm]	2.9	5.9	5.9/9.9		9.9/24
Max. screw-in depth t_{max}	[mm]	4.2	8.4	9.5	10	15
Centring pins	[mm]	∅ 5 H7		–		
Centring sleeve	[mm]	–		∅ 9 H7		

6. Check the running behaviour of the slides.

6.6 Mounting end position protection

1. Mount the shock absorber retainer.
2. Mount the shock absorber or the emergency buffer.

6.7 Mounting sensor

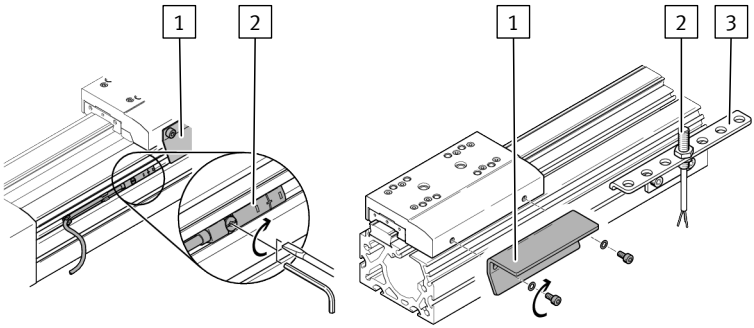

Fig. 5: Mounting switch lug, sensor and sensor bracket

1 Switch lug

2 Sensor

3 Sensor bracket

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.
- The measuring system is mounted.

1. Mount the switch lug.
2. If necessary, mount the sensor bracket.
3. Mount the sensor.
4. If necessary, mount the cable with clips.
5. If necessary, mount the slot cover.

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.

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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.

i

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

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 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.

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

i

The toothed belt is tensioned for its entire service life.
The toothed belt must not be retensioned.

1. – 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.

8.3 Cleaning axis

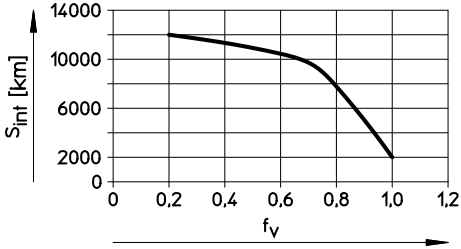
– If the guide rail is dirty, clean it with a clean, soft and lint-free cloth without cleaning agents and then apply the lubricant thinly to the guide rail.
– Clean the other product components with a clean, soft cloth and non-abrasive cleaning agents.

8.4 Lubricating axis

Requirements:
– The pressure grease gun LUB-1, 647958 is available.
– The roller bearing grease LUB-KC1, 684474 is available.
– The lubrication adapter LUB-1-TR-I, 647959 or LUB-1-TR-L, 647960 is available.

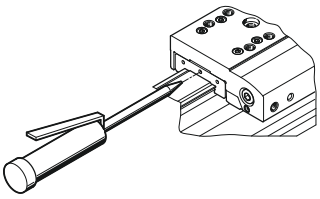
1. Calculate the load comparison factor f_v with formula for combined loads ➔ 10.1 Technical data, mechanical.

2. Take the lubrication interval S_{int} as a function of the load comparison factor f_v from the characteristic curve.



3. Determine the load factors:
   - Dusty and dirty environment.
   - Nominal stroke < 300 mm or > 2000 mm.
   - Ambient temperature > +40 °C.
   - Operating age > 3 years.
   - The travel profile matches triangular operation, e.g. frequent acceleration and braking.
4. If there is a load factor, halve the lubrication interval S_{int}. If there are multiple load factors, reduce the lubrication interval S_{int} to a quarter of the standard interval.
5. If necessary, replace the needle point of the pressure grease gun with the lubrication adapter, axial outlet or radial outlet.
6. Press the pressure grease gun on the lubricating hole for the recirculating ball bearing guide. Press in the roller bearing grease on the left and right sides. The EGC-...-GP/GQ does not have a lubrication hole.

EGC-...-TB		**-50**	**-70**	**-80**	**-120**	**-185**
Grease volume per lubricating hole	[g]	0.2	0.3	0.6	1.2	3.6



7. Move along the complete travel distance during the lubrication process to distribute the grease evenly in the interior.
8. If necessary, grease other components with roller bearing grease, e.g. the guide rail.

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.

Malfunction	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 arrangement of the 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.
	Wear on bearing or guide.	– Contact local Festo Service. – Replace axis.
	Toothed belt wear.	– Contact local Festo Service. – Replace axis.
	Insufficient lubrication of the guide.	– Lubricate the guide ➔ 8.4 Lubricating axis.

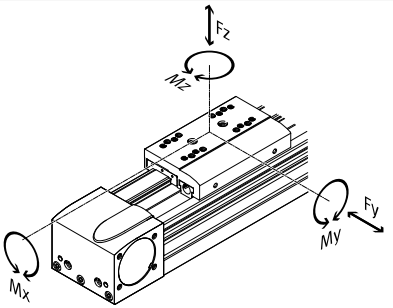
Malfunction	Cause	Remedy
Vibrations on the slide.	Operation at the resonant frequency of the axis.	– Change travel speed. – Change the acceleration. – Increase axis stiffness, e.g. shorter support distances. – Change the payload geometry.
Long oscillations of the profile.	Resonant frequency of profile and payload too low.	– Increase axis stiffness, e.g. shorter support distances. – 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 too long for mounting payload.	– Observe the screw-in depth ➔ 6.4 Mounting payload on the standard slide.
	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, ...
	Loads are too high.	– Reduce travel speed.

Tab. 3: Fault clearance

10 Technical data

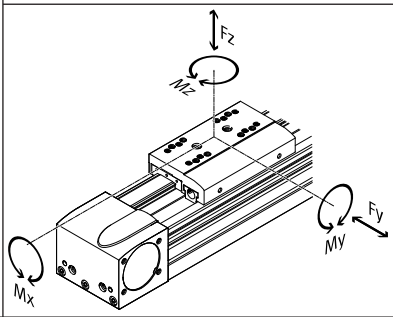
10.1 Technical data, mechanical

EGC-...-TB		-50	-70	-80
Design		Electromechanical axis with toothed belt		
Guide		Recirculating ball bearing guide		
Mounting position		Any		
Max. feed force	[N]	50	100	350
Max. driving torque	[Nm]	0.46	1.24	5
Max. idling torque at speed = 0.2 m/s	[Nm]	0.07	0.18	0.4
Max. speed				
– EGC-...-TB	[m/s]	3	5	
– EGC-...-TB-...-GP	[m/s]	–	5	
Max. acceleration	[m/s²]	50		
Repetition accuracy	[mm]	±0.08		
Feed constant	[mm/rev]	58	78	90
Ambient temperature	[°C]	–10 ... +60		
Degree of protection		IP40		
Max. permissible forces and torques on the slide				
EGC-...-TB-...-GK, EGC-...-TB-...-GP				
Fy	[N]	650	1850	3050
Fz	[N]	650	1850	3050
Mx	[Nm]	3.5	16	36
My	[Nm]	10	51	97
Mz	[Nm]	10	51	97
EGC-...-TB-...-GV, EGC-...-TB-...-GQ				
Fy	[N]	–	1850	3050
Fz	[N]	–	1850	3050
Mx	[Nm]	–	16	36
My	[Nm]	–	132	228
Mz	[Nm]	–	132	228

EGC-...-TB	-50	-70	-80
Calculating the load comparison factor			
fv	$fv = \frac{\lvert Fy,dyn\rvert}{Fy,max} + \frac{\lvert Fz,dyn\rvert}{Fz,max} + \frac{\lvert Mx,dyn\rvert}{Mx,max} + \frac{\lvert My,dyn\rvert}{My,max} + \frac{\lvert Mz,dyn\rvert}{Mz,max} \leq 1$ 		

Tab. 4: Technical data, mechanical

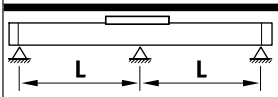
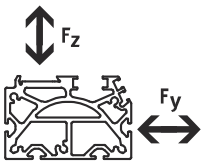
EGC-...-TB		-120	-185
Design		Electromechanical axis with toothed belt	
Guide		Recirculating ball bearing guide	
Mounting position		Any	
Max. feed force	[N]	800	2500
Max. driving torque	[Nm]	16	93
Max. idling torque at speed = 0.2 m/s	[Nm]	1.4	4.05
Max. speed			
– EGC-...-TB	[m/s]	5	5
– EGC-...-TB-...-GP	[m/s]	5	5
Max. acceleration	[m/s²]	50	
Repetition accuracy	[mm]	±0.08	±0.1
Feed constant	[mm/rev]	125	232
Ambient temperature	[°C]	–10 ... +60	
Degree of protection		IP40	
Max. permissible forces and torques on the slide			
EGC-...-TB-...-GK, EGC-...-TB-...-GP			
Fy	[N]	6890	15200

EGC-...-TB		-120	-185
Fz	[N]	6890	15200
Mx	[Nm]	144	529
My	[Nm]	380	1157
Mz	[Nm]	380	1157
EGC-...-TB-...-GV, EGC-...-TB-...-GQ			
Fy	[N]	6890	15200
Fz	[N]	6890	15200
Mx	[Nm]	144	529
My	[Nm]	680	1820
Mz	[Nm]	680	1820
Calculating the load comparison factor			
fv		$fv = \frac{\lvert Fy,dyn\rvert}{Fy,max} + \frac{\lvert Fz,dyn\rvert}{Fz,max} + \frac{\lvert Mx,dyn\rvert}{Mx,max} + \frac{\lvert My,dyn\rvert}{My,max} + \frac{\lvert Mz,dyn\rvert}{Mz,max} \leq 1$	
			

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

EGC-...-TB-KF

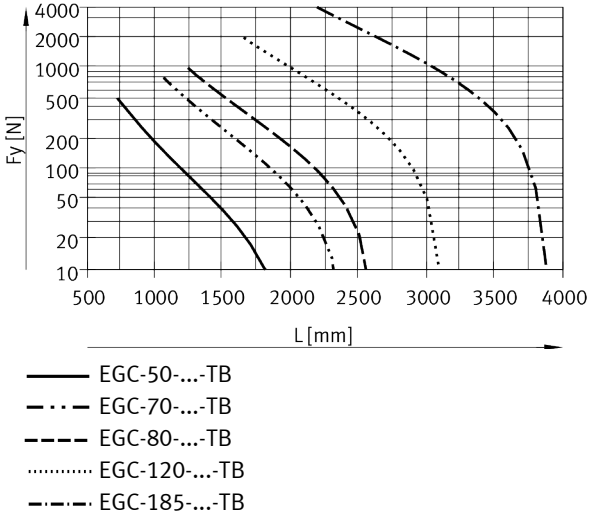


Fig. 6: The support distance L as a function of force Fy

EGC-...-TB-KF

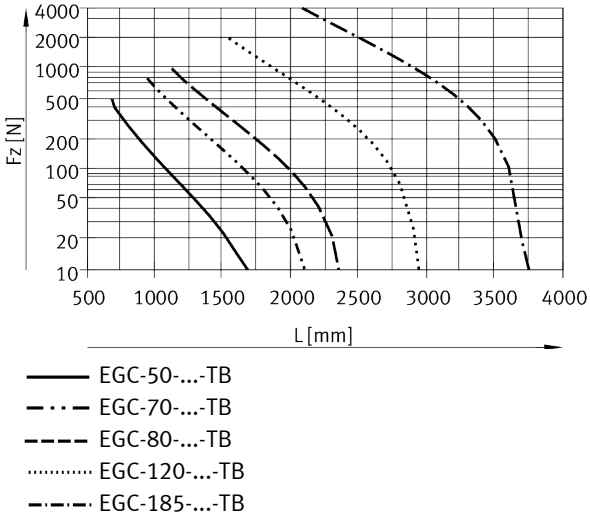


Fig. 7: The support distance L as a function of force Fz

10.3 Characteristic speed curves

Speed v as a function of rotational speed n.
EGC-...-TB

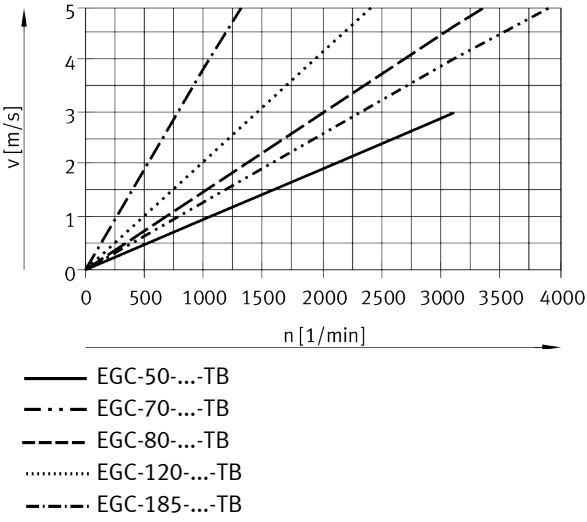


Fig. 8: Speed v as a function of rotational speed n

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