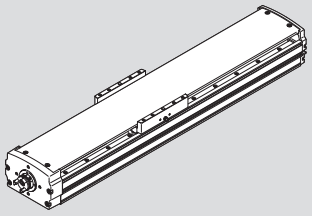
ELGT-BS
Spindle axis



FESTO

Festo SE & Co. KG
Ruiter Straße 82
73734 Esslingen
Deutschland
+49 711 347-0

www.festo.com

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Translation of the original instructions

1 Applicable Documents

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

2 Safety

2.1 Safety instructions

- Observe labelling on the product.
- Prior to assembly, installation and maintenance work: Switch off power supply, ensure that it is off and secure it against being switched back on.
- Store the product in a cool, dry, UV-protected and corrosion-protected environment. Ensure that storage times are kept to a minimum.
- Observe tightening torques. Unless otherwise specified, the tolerance is ± 20 %.

2.2 Intended use

The axis is intended to be used for positioning payloads in combination with tools or as a drive when external guides are used.
The axis is only approved for slide operation.

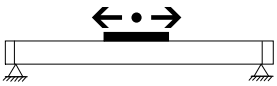


Fig. 1: Slide operation

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 dealing with electric drive systems.

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 screw drive converts the torque of the motor into a feed force. The linear movement of the slide is precisely guided by the guide. Sensors enable the monitoring of end positions, reference position and intermediate position.

4.2 Product design

Product design ELGT-BS

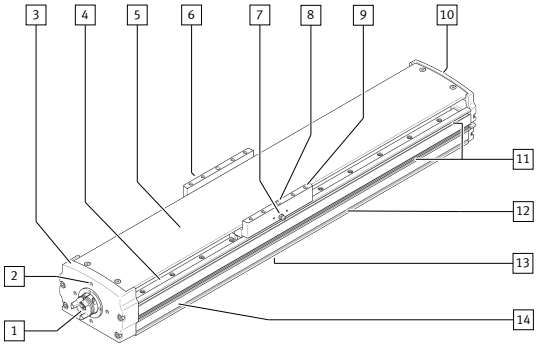


Fig. 2: Product design ELGT-BS

1 Drive hub
2 Threaded hole for motor mounting kit
3 Drive cover
4 Guide rail
5 Cover
6 Lubrication point with ball screw drive
7 Guide lubrication point
8 Centring hole for attachment component
9 Threaded hole for attachment component
10 End cap
11 Slot for sensors
12 Slot for profile mounting
13 Slot for slot nut, threaded and centring hole
14 Profile

5 Transport and storage

NOTICE

Unexpected and unbraked movement of components

- Secure moving components for transport.

Transport and storage conditions

- Take product weight into account ➔ Technical data.
  Weight › 25 kg: transport with a suitable hoist (cross-brace) or with two persons.
- Take the product centre of gravity into consideration.
- Comply with maximum permitted support clearances when attaching transportation aids ➔ Technical data.
- Store and transport the product in its original packaging.
- Store product in a cool and dry environment protected from sunlight and corrosion.
- Store product in areas where it is not exposed to oils, greases and degreasing vapours.
- Keep storage times short.

6 Assembly

6.1 Safety

⚠ WARNING

Risk of Injury due to Unexpected Movement of Components

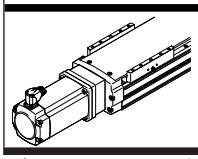
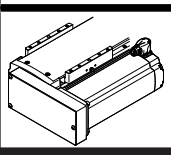
For vertical or slanted mounting position: when power is off, moving parts can travel or fall uncontrolled into the lower end position.

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

6.2 Unpacking product

1. Open packaging.
2. Remove all transport materials (e.g. foils, caps, cardboard boxes).
3. Remove the product from the packaging and place it on the mounting surface. Comply with maximum permitted support clearances when attaching transportation aids ➔ 12.2 Characteristic curves.
4. Dispose of packaging and transport materials.

6.3 Mounting the motor

Axial kit	Parallel kit
	

Tab. 1: Motor mounting

Only loosen screws or threaded pins that are described in the directions in the instruction manual.

1. Select the motor and motor mounting kit from Festo➔ www.festo.com/catalogue.
   When using other motors: observe the critical limits for forces, torques and velocities.
2. Fasten motor mounting kit, observe instructions ➔ www.festo.com/sp.

3. Fasten the motor without tension. Support large and heavy motors.

Connect motor cables only on completion of mounting.

6.4 Fasten axis

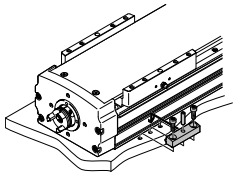
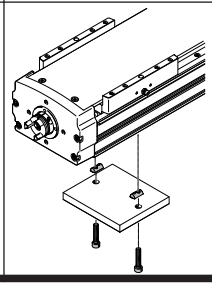
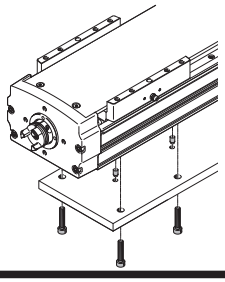
Requirement

- No collision in the movement space of the attachment component with motor, mounting and sensor components.
- Sufficient space to reach maintenance interfaces.
- Flatness of the mounting surface of 0.05% of the stroke length or max. 0.5 mm over the stroke length of the bearing surface.
- Required support points lie within the specified support distances➔ 12.2 Characteristic curves.
- No distortion or bending when installing the product.

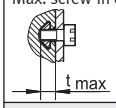
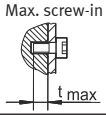
1. Select mounting attachments ➔ www.festo.com/catalogue.
2. Place the mounting attachments on the support points.
3. Tighten retaining screws.
   Observe max. tightening torque and max. screw-in depth.

In the case of planar and 3-dimensional gantries, pay attention to parallelism, product height and alignment of the axes.

For additional information, contact your local Festo Service.

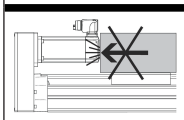
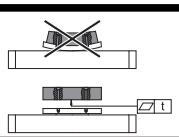
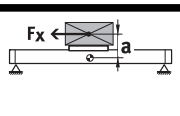
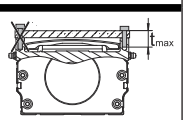
Profile mounting EAHF-L2	Slot nut NST for mounting slot	Direct mounting
Mounting via profile groove	Mounting via profile groove	Mounting via thread
		

Tab. 2: Overview of mounting components

Size		90	120	160
Profile mounting EAHF-L2				
Screw		Instruction manual ➔ www.festo.com/sp.		
Slot nut mounting NST				
Screw (bottom)		M5		M6
Max. screw-in depth t_{max} 	[mm]	6		11.5
Direct mounting				
Screw (bottom)		M6		M8
Max. tightening torque	[Nm]	9.9		15
Max. screw-in depth t_{max} 	[mm]	8	7	9
Centring (bore tolerance H7)				
Cylindrical pins	[mm]	∅5	∅6	∅8

Tab. 3: Information for mounting components

6.5 Mounting the attachment component

Collision-free	Flat	Centre of gravity and tilting moment	Max. screw-in depth
			

Tab. 4: Requirement for attachment component

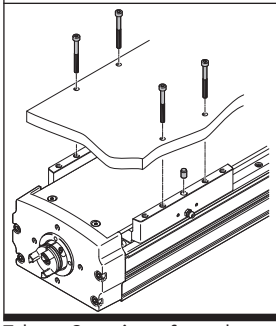
Requirement:

- No collision in the movement space of the attachment component with motor, mounting and sensor components.
- Flatness of the mounting surface of the attachment component of 0.03 mm above the slide surface.
- Minimise breakdown torque with force Fx. Short lever arm a from the centre of the guide ◔ to the centre of gravity of the attachment
- The maximum screw-in depth of the retaining screws is not exceeded.

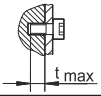
1. Select accessories ➔ www.festo.com/catalogue.
2. Place centring components in centring holes.
3. Position the attachment component on the slide.
4. Tighten retaining screws.
   Observe max. tightening torque and max. screw-in depth.

When using an additional external guide, ensure exact parallelism and alignment of the axes and guide.

Recommendation: use guide mountings with tolerance compensation.

Direct fastening
Mounting via thread


Tab. 5: Overview of attachment component

Size		90	120	160
Direct fastening				
Screw		M6		M8
Max. tightening torque	[Nm]	9.9		15
Max. screw-in depth t_{max} 	[mm]	12		15
Centring (bore tolerance H7)				
Cylindrical pins	[mm]	∅5	∅6	∅8

Tab. 6: Information on attachment component

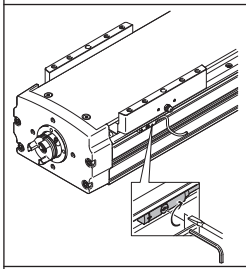
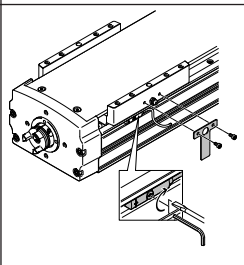
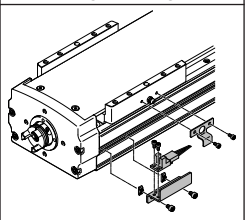
6.6 Mounting accessories

Requirement

- No collision in the movement space of the attachment component with motor, mounting and sensor components.
- Protection against uncontrolled overtravel of the end positions.
- Homing to reference switch or end position.
- Query of end positions or intermediate positions.
- Avoidance of hard impacts at the end positions.
- Prevention of contamination in the slots.

1. Select accessories ➔ www.festo.com/catalogue.
2. Mount the sensor (reference or query):
   - Mount sensor in the profile slot.
   - Fasten cable.

Instruction manuals ➔ www.festo.com/sp.

Profile groove	Profile slot and switch lug	Sensor bracket and switch lug
– Mounting via profile groove	– Mounting via profile groove – Switch lug: mounting on slide	When using other sensors (e.g. Omron EE-SX674): – Sensor bracket: mounting via profile groove – Switch lug: mounting on slide
		
– Protect the sensor from external magnetic or ferritic influences (e.g. min. 10 mm distance to slot nuts). – Preferably use hardware limit switches with normally closed function (protection guaranteed even in case of sensor failure). Instruction manual ➔ www.festo.com/sp.		Instruction manual ➔ www.festo.com/sp.

Tab. 7: Overview of sensor mountings

7 Commissioning

7.1 Safety

⚠ 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.

7.2 Performing commissioning

i

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

When the motor is removed, the motor encoder loses its absolute reference to the reference mark (e.g. by turning the motor drive shaft).
- Carry out a homing run after every motor mounting in order to establish the absolute reference between the motor encoder and the reference mark.

i

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

i

For use with reduced particle emission:
- Clean product ➔ 9.3 Cleaning.

Requirement
- Mounting of the drive system checked.
- Installation and wiring of the motor checked.
- No foreign objects in the movement space of the drive system.
- Max. permissible feed force and drive torque not exceeded as a function of acceleration, deceleration (e.g. stop function, quick stop), velocity, moving mass and mounting position.
- No mechanical overload of the axis and dynamic setpoint deviation not exceeded (e.g. overrunning the end position) due to force and torque peaks or overshoot effects.
  Limit overloads and overruns by jerk limitation, lower acceleration and deceleration setpoints or optimised controller settings.
- Control and referencing movement at reduced velocity, acceleration and deceleration setpoints.
- No test drive to mechanical end stops.
- Software end positions do not lie within the effective range of the mechanical stops.

Steps	Purpose	Note
1. Check travel	Determining the direction of travel of the slide	– The direction of movement of the slide for positive and negative position values depends on the mounting position of the motor on the axis. – Set a required reversal of direction of rotation via parameters in the controller or controller.
2. Homing	Determination of the reference point and adjustment of the dimensional reference system – During the initial start-up procedure – After replacement of the motor	Permissible reference points: – towards reference switch. Travel at reduced velocity ➔ Technical data. Further information ➔ Instruction manual of the drive system, ➔ www.festo.com/sp.
3. Test run	Checking the operating conditions	Check application requirements: – Slide travels through the complete travel cycle in the specified time. – Slide stops moving when a limit switch is reached.
After a successful test run, the drive system is ready for operation.		

Tab. 8: Commissioning steps

8 Operation

⚠ 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.

9 Maintenance

9.1 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.

9.2 Checking axis elements

Checking reversing backlash
- Check the reversing backlash of the slide at every maintenance interval (e.g. lubrication interval).
  If the max. permissible reversing backlash is exceeded, the axis should be replaced.

Size		90	120	160
Max. permissible reversing backlash	[mm]	0.15		

Tab. 9: Max. permissible reversing backlash

9.3 Cleaning

– 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.

For use with reduced particle emission:
– Remove abraded particles and dirt from the product:
  – Prior to initial commissioning.
  – Regularly during operation.

9.4 Lubrication

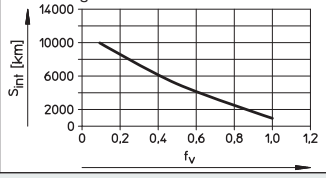
Lubrication interval and accessories

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)

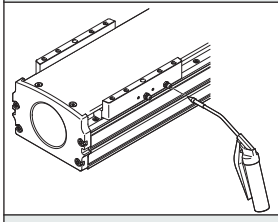
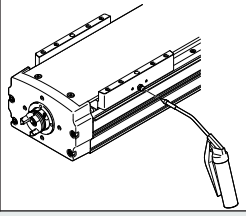
If one of these factors applies:
- Halve lubrication interval S_{int}.

If several factors apply at the same time:
- Divide service interval S_{int} by four.

Lubrication	Ball screw drive BS Recirculating ball bearing guide	Guide rail
Lubrication interval	– Calculate the comparative loading factor f_v using the formula for combined loads ➔ 12.1 Technical data, mechanical. – Lubrication intervals S_{int} as a function of the load comparison factor f_v can be taken from the diagram. 	If required, e.g. if the grease coating is insufficient.
Accessories ➔ www.festo.com/spareparts		
Lubrication point	Lubrication nipple	Interface
Lubricant	Roller bearing grease LUB-KC1Elkalub VP 922	
Grease gun	Pressure grease gun with pinpoint nozzle LUB-1, 647958	
	Lubrication adapter, axial outlet, LUB-1-KE, 744167	–

Tab. 10: Overview of lubrication intervals and accessories

Lubricating guide

Ball screw drive BS	Recirculating ball bearing guide
Lubrication nipple, one-sided	Lubrication nipples, at both ends
	
Grease quantity per lubricating hole:	
ELGT-BS (size), 1 lubrication opening, at side (rear) – 90: 1.4 g – 120: 1.4 g – 160: 2 g	**ELGT-BS (size), 2 lubrication holes, at side (front and rear)** – 90: 1.5 g – 120: 3.5 g – 160: 5 g

Tab. 11: Lubrication overview

1. Inject lubricant into all lubrication holes.
2. During the lubrication process, travel the entire distance in order to distribute the lubricant evenly inside the machine.

10 Malfunctions

10.1 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	Possible cause	Remedy
Loud running noises, vibrations or rough running of the axis.	Coupling distance too short.	Observe permissible coupling spacings ➔ Instruction manual for motor mounting kit, ➔ www.festo.com/sp.
	Torsional stresses	– Install axis without tension. Note the flatness of the contact surface ➔ 6.4 Fasten axis. – Change the layout of the attachment component (e.g. payload). – Align axes parallel to one another.
	Current controller settings.	Optimise controller data (e.g. velocity, acceleration, ...).
	Resonance oscillation of the axis.	Change the travel velocity.
	Wear on bearing or guide.	– Contact local Festo Service. – Replace axis ➔ www.festo.com/catalogue.
	Wear of the ball screw drive.	– Check reversing backlash ➔ 9.2 Checking axis elements. – Contact local Festo Service. – Replace axis ➔ www.festo.com/catalogue.
	Insufficient lubrication of guide.	Lubricate the guide ➔ 9.4 Lubrication.
Vibrations on the slide.	Operation at the resonant frequency of the axis.	– Change the travel velocity. – 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 ➔ Instruction manual for the motor mounting kit, ➔ www.festo.com/sp.
	Loads too high.	Reduce forces and torques. Consider dynamics.
	Ball screw drive blocked.	– Contact local Festo Service. – Replace axis ➔ www.festo.com/catalogue.
Overruns the end position.	Sensor does not switch.	Check sensor, installation and parameterisation.
Idling torque too high.	Wear in the drive train.	– Contact local Festo Service. – Replace axis ➔ www.festo.com/catalogue.

Tab. 12: Overview of fault clearance

10.2 Repair

The product can be repaired or maintained.
– Spare parts and accessories ➔ www.festo.com/spareparts.
– Replace with an identical product ➔ www.festo.com/catalogue.

11 Disassembly

⚠ 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

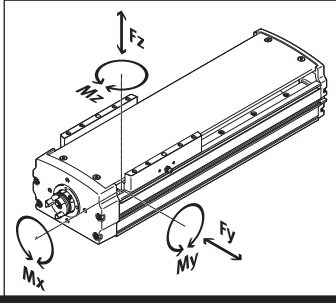
Risk of Injury due to Unexpected Movement of Components
For vertical or slanted mounting position: when power is off, moving parts can travel or fall uncontrolled into the lower end position.
- Bring moving parts of the product into a safe end position or secure them against falling.

1. Disconnect electrical installations.
2. Remove the mounted attachment component.
3. Remove the attached accessories.
4. Remove motor and mounting kit.
5. Remove the mounting attachments.
6. Observe transport information ➔ 5 Transport and storage.

12 Technical data

12.1 Technical data, mechanical

Additional information ➔ www.festo.com/catalogue.

Size		90		120		160	
Spindle pitch		10P	20P	10P	20P	10P	20P
Design		Electromechanical axis with ball screw drive					
Guide		Recirculating ball bearing guide					
Mounting position		any					
Max. feed force Fx	[N]	1054	810	1265	805	1575	1045
Max. no-load drive torque at vmax	[Nm]	0.3	0.2	0.3		0.4	
Max. rotational speed	[rpm]	3000					
Max. velocity	[m/s]	0.5	1	0.5	1	0.5	1
Max. acceleration	[m/s²]	15					
Repetition accuracy	[mm]	± 0.02					
Reversing backlash	[mm]	➔ 9.2 Checking axis elements					
Feed constant	[mm/rev]	10	20	10	20	10	20
Ambient temperature	[°C]	0 ... +50					
Storage temperature	[°C]	–20 ... +60					
Degree of protection		IP20					
Max. permissible lateral force on the drive shaft							
Fr	[N]	290					
Max. permissible forces and torques on the slide							
Fy	[N]	4710		6800		9550	
Fz	[N]	5600		8090		11370	
Mx	[Nm]	65		300		600	
My	[Nm]	51		310		560	
Mz	[Nm]	51		310		560	
Calculating the load comparison factor							
fv		$f_v = \frac{\lvert F_{y,dyn}\rvert}{F_{y,max}} + \frac{\lvert F_{z,dyn}\rvert}{F_{z,max}} + \frac{\lvert M_{x,dyn}\rvert}{M_{x,max}} + \frac{\lvert M_{y,dyn}\rvert}{M_{y,max}} + \frac{\lvert M_{z,dyn}\rvert}{M_{z,max}} \leq 1$					
							

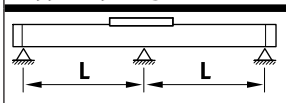
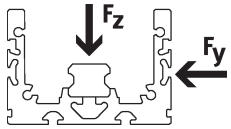
Tab. 13: General data; ELGT-BS

Size		90		120		160	
Spindle pitch		10P	20P	10P	20P	10P	20P
Materials							
Note on materials		Contains PWIS					
Profile Slide Cover		Anodised aluminium					
Drive cover End cap		Die-cast aluminium, painted					
Guide Ball bearing Ball screw		Rolling bearing steel					
Screws		Steel					
Weight							
Basic weight at 0 mm stroke	[kg]	4.38	4.35	5.25	5.23	9.56	9.6
Added weight per 1000 mm stroke	[kg]	10.4	10.2	12.4	12.2	18.8	18.9

Tab. 14: Materials and weight

12.2 Characteristic curves

Additional information ➔ www.festo.com/catalogue.
Support spacing ELGT-BS-90/120/160
Maximum permissible support distance L (without central support EAHF) as a function of force Fy/Fz with a maximum deflection of 0.5 mm.

Support spacing	Force load
	

Tab. 15: Overview of support spacing and force load

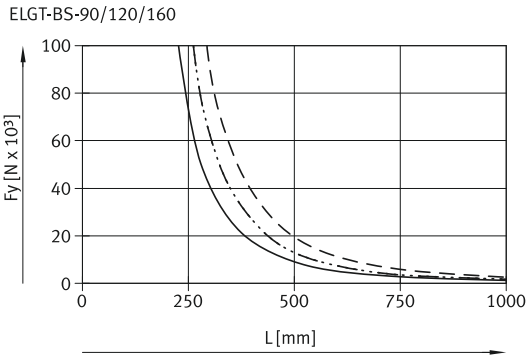


Fig. 3: Support distances L as a function of force Fy

ELGT-BS-90 ELGT-BS-160
ELGT-BS-120

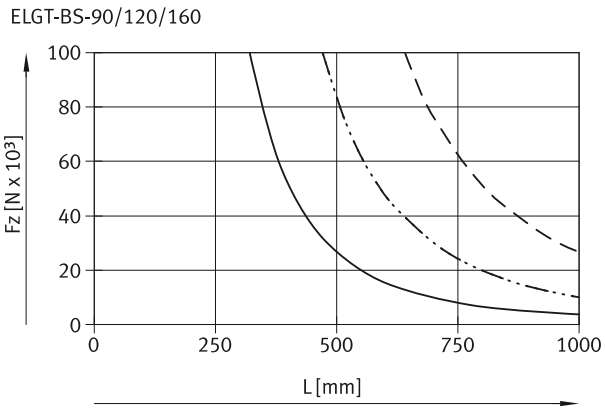


Fig. 4: Support distances L as a function of force Fz

ELGT-BS-90 ELGT-BS-160
ELGT-BS-120

Velocity ELGT-BS-90/120/160
Velocity v as a function of the rotational speed n.

i

Rotational speed n and speed v are stroke-dependent. Observe max. Permissible rotational speed n as a function of working stroke l.

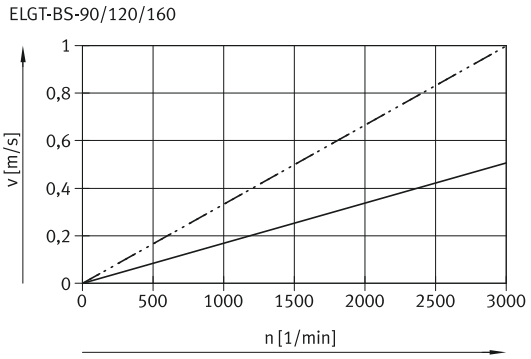


Fig. 5: Velocity v as a function of the rotational speed n.

ELGT-BS -...- P10 ELGT-BS -...- P20

Max. permissible rotational speed n as a function of working stroke l.

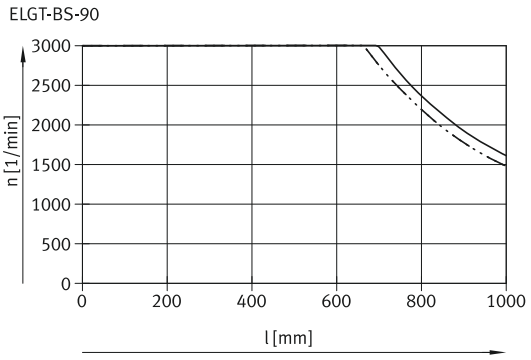


Fig. 6: ELGT-BS-90, rotational speed n as a function of working stroke l

ELGT-BS-90-P10 ELGT-BS-90-P20

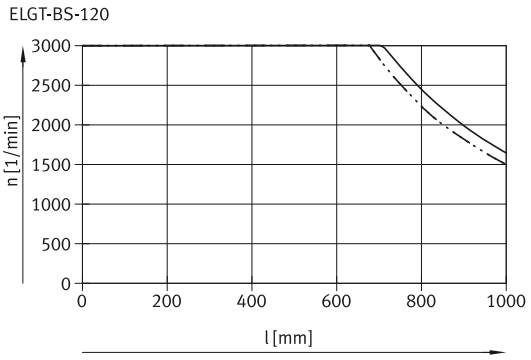


Fig. 7: ELGT-BS-120, rotational speed n as a function of working stroke l

ELGT-BS-120-P10 ELGT-BS-120-P20

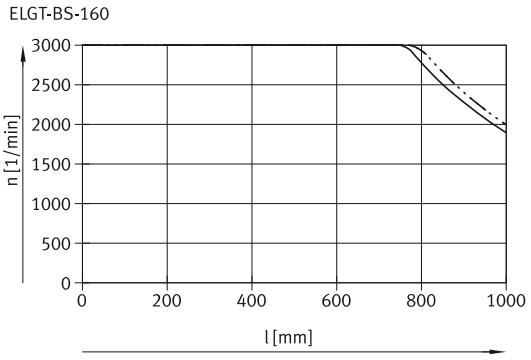


Fig. 8: ELGT-BS-160, rotational speed n as a function of working stroke l

ELGT-BS-160-P10 ELGT-BS-160-P20