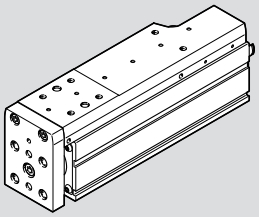
EGSC-BS
Mini slide



FESTO

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

www.festo.com

Operating instructions

8166189
2021-12e
[8166191]

8166189

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.
- Before working on the product, switch off the power supply 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 mini slide is intended to be used for positioning payloads in combination with tools.
The mini slide 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 mini slide 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 monitor end positions, reference position and intermediate position.

4.2 Product design

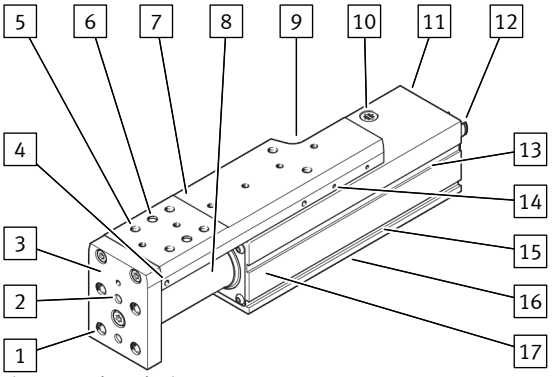


Fig. 2: Product design EGSC-BS

1 Through-hole and centring hole
2 Centring hole for attachment component
3 Yoke plate
4 Hole for accessories
5 Threaded hole for attachment component
6 Centring hole for attachment component
7 Slide
8 Piston rod
9 Guide rail
10 Sealing air connection with filter element
11 Interface for motor mounting kit
12 Drive hub
13 Slot for sensor bracket
14 Threaded hole for switch lug
15 Slot for profile mounting
16 Thread and centring hole for direct fastening
17 Cylinder profile

5 Transport

NOTICE

Unexpected and unbraked movement of components

- Secure moving components for transport.

- 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.

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.

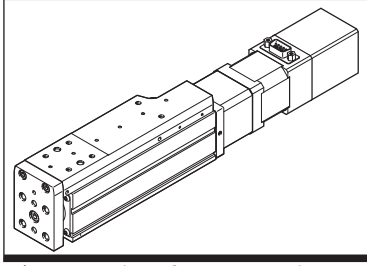
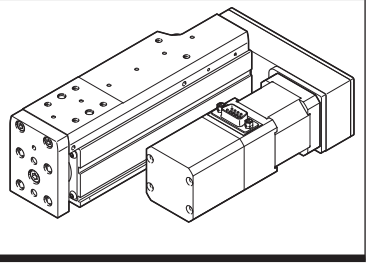
6.2 Unpacking product

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.
4. Dispose of packaging and transport materials.

6.3 Mounting the motor

Transverse load on the drive hub

When mounting the motor and motor mounting kit, do not exceed the maximum transverse load F_R of the drive hub, e.g. toothed belt tension when mounting the parallel kit ➔ 12.1 Technical data, mechanical.

Axial kit EAMM-A	Parallel kit EAMM-U
	

Tab. 1: Overview of motor mountings

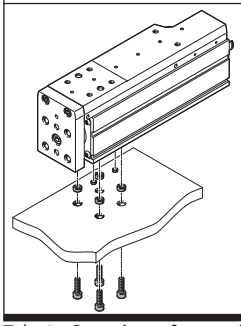
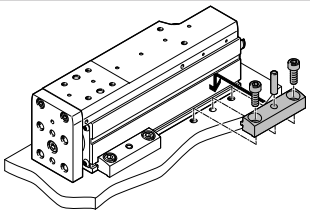
Requirement
– Only loosen screws or threaded pins that are described in the directions in the instruction manuals.
– Sufficient space for reaching and securing the sealing air connection ➔ 6.6 Mounting accessories.
1. Select the motor and motor mounting kit from Festo➔ www.festo.com/catalogue.
   If other motors are used: observe the critical limits for forces, torques and velocities.
2. Fasten motor mounting kit, observe instruction manual ➔ www.festo.com/sp.
3. Fasten the motor without tension. Support large and heavy motors.

Connect motor cables only on completion of mounting.

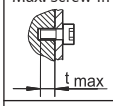
6.4 Mounting mini slide

Requirement
– No collision in the range of motion of the attachment component with motor, mounting components and sensor components.
– Sufficient space for reaching and securing the sealing air connection.
– Flatness of the mounting surface of 0.05% of the stroke length or maximum 0.2 mm over the stroke length of the bearing surface.
– No distortion or bending when installing the product.
1. Select mounting attachments ➔ www.festo.com/catalogue.
2. Direct fastening: remove rubber cover caps from centring holes or threaded holes.
3. Direct fastening: place centring components in the centring holes.
   Profile mounting: place mounting attachments on the support points.
4. Tighten retaining screws.
   Observe the maximum tightening torque and screw-in depth.

For additional information, contact your local Festo Service.

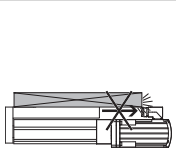
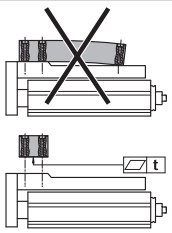
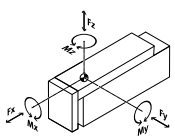
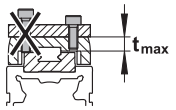
Direct mounting	Profile mounting EAHF-L2
Mounting via thread	Mounting via profile groove
	

Tab. 2: Overview of mounting components

Size		25	32	45	60
Direct mounting					
Screw		M3	M4	M5	M5
Max. screw-in depth t_{max} 	[mm]	6	8.5	7	8
Max. tightening torque	[Nm]	1.4	3.2	3	3
Centring hole and centring element, centre	[mm]	∅2	∅4	∅5	∅7
Centring hole and centring element, outside	[mm]	∅5	∅7	∅7	∅7
Centre hole tolerance		H7			
Profile mounting EAHF-L2					
Screw		Instruction manual ➔ www.festo.com/sp.			

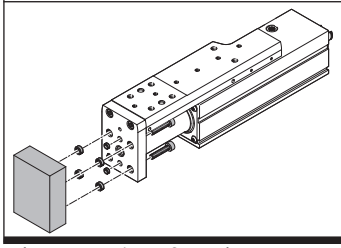
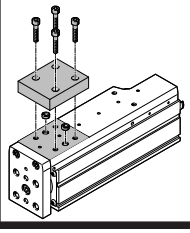
Tab. 3: Information for mounting components

6.5 Mounting the attachment component

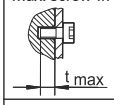
Collision-free	Flatness	Guide load	Max. screw-in depth
			

Tab. 4: Requirement for attachment components

Requirement:
– No collision in the range of motion of the attachment component with motor, mounting components and sensor components.
– Flatness of the mounting surface of the attachment component of 0.01 mm above the slide surface.
– Minimise guide load. Short lever arms from the guide centre ⊕ to the force application points and centres of gravity of the add-on elements.
1. Select accessories ➔ www.festo.com/catalogue.
2. Place centring components in centring holes.
3. Position the attachment component on the slide or yoke plate.
4. Tighten retaining screws.
   Observe the maximum tightening torque and screw-in depth.

Direct mounting	
Yoke plate	Slide
Mounting via through-hole	Mounting via thread (only mount on marked surface)
	

Tab. 5: Overview of attachment components

Size		25	32	45	60
Direct fastening of yoke plate					
Screw		M3	M4	M5	M5
Centring hole and centring element, centre	[mm]	∅ 2	∅ 4	∅ 5	∅ 7
Centring hole and centring element, outside	[mm]	∅ 5	∅ 7	∅ 7	∅ 7
Centre hole tolerance, centre		H8			
Centre hole tolerance, outside		H7			
Direct fastening on slide					
Screw		M3	M4	M5	M5
Max. tightening torque	[Nm]	1.5	2.7	5.1	6.5
Max. screw-in depth t_{max} 	[mm]	4.5	5	6	8
Centring hole and centring element	[mm]	∅ 2	∅ 4	∅ 5	∅ 7
Centre hole tolerance		H7			

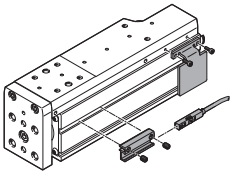
Tab. 6: Information on attachment components

6.6 Mounting accessories

Requirement
– No collision in the range of motion of the attachment component with motor, mounting components and sensor components.

Function
– Protection against uncontrolled overtravel of the end positions.
– Referencing to reference switch or end position.
– Query of end positions or intermediate positions.
– Prevention of hard impacts at the end positions.
– Prevention of contamination in the slots.
1. Select accessories ➔ www.festo.com/catalogue.
2. Mount sensor for reference or query:
   – Mount sensor bracket and switch lug.
   – Align sensor and mount it at the switching position.
   – Fasten cable.

Instruction manuals ➔ www.festo.com/sp.

Sensor bracket EAPM and switch lug EAPM	
– Switch lug: mounting on slide – Sensor bracket: mounting via profile groove	
	– Protect the sensor from external magnetic or ferritic influences, e.g. min. 10 mm distance to slot nuts. – Preferably use hardware limit switches with N/C contact function to ensure protection in the event of a sensor failure. – Query switching lug only with inductive sensor. Instruction manual ➔ www.festo.com/sp

Tab. 7: Overview of sensor mountings

Connecting sealing air
The use of sealing air at approx. ± 0.02 MPa (± 0.2 bar, ± 2.9 psi) reduces or prevents subsequent 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 drivetrain.

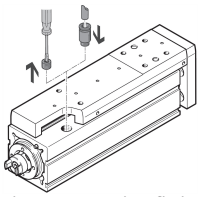


Fig. 3: Mounting fitting

1. Remove the filter element from the threaded hole.
2. Mount the screw fitting and connect the hose.

Size		25	32	45	60
Thread		M5	M5	G 1/8	G 1/4
Max. screw-in depth	[mm]	4	5	7	7
Max. tightening torque	[Nm]	1.4	1.4	5	8

Tab. 8: Information on sealing air connection

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.

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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 every time the motor is mounted in order to establish the absolute reference between the motor encoder and the reference mark.

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

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

Requirement
- Mounting of the drive system s checked.
- Installation and wiring of the motor is checked.
- No foreign objects in the movement space of the drive system.
- Maximum 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.
- Mini slide not mechanically overloaded and dynamic setpoint deviation not exceeded due to force and torque peaks or overshoot effects, e.g. overrunning the end position.
  Limit overloads and overruns by jerk limitation, reduced acceleration and deceleration setpoints or optimised controller settings.
- Control run and reference run with reduced speed setpoints, acceleration setpoints and deceleration setpoints.
- No test run to mechanical end stops.
- Software end positions ≥ 0.25 mm away from the mechanical stops.

Steps	Purpose	Note

1. Check travel	Determining the direction of travel of the slide	– Direction of movement of the slide, clockwise spindle:
		  – Retracting: rotate drive shaft clockwise.
		  – Advancing: rotate drive shaft anti-clockwise.
		– The direction of movement of the slide for positve and negative position values depends on the mounting position of the motor on the slide, e.g. parallel kit or axial kit.
		– Set a required reversal of direction of rotation via parameters in the servo drive 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 ➔ 12 Technical data. – towards end position: do not exceed maximum values ➔ Tab. 10 Speed and energy at the end positions. Additional 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. – The slide stops travel when a limit switch or software end position is reached.
After a successful test run, the drive system is ready for operation.		

Tab. 9: Commissioning steps

Size		25	32	45	60
Max. stop velocity	[m/s]	0.01			
Max. stop energy	[mJ]	0.005	0.009	0.014	0.044
Calculation of the maximum stop energy					
$E_{max} = \frac{v^2}{2}\left(m + \frac{J_R}{J_L}\right)$		– v = max. stop velocity – m = mass of all linear moving components – J_R = mass moment of inertia of all rotating components – J_L = mass moment of inertia per kg payload Additional information ➔ www.festo.com/catalogue.			

Tab. 10: Speed and energy at the end positions

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.

i

Lubrication run during operation
Observe the following lubrication travel intervals.
- With working stroke less than 2 x spindle pitch... P:
  - Perform a lubrication run within 10 travel cycles with a minimum stroke of ≥ 2 x spindle pitch.

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 slide elements

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

Size		25	32	45	60
Max. permissible reversing backlash	[mm]	≤ 0.15			

Tab. 11: Maximum permissible reversing backlash

9.3 Cleaning

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

9.4 Lubrication

Lubrication interval and accessories

Lubrication	Ball screw drive BS	Recirculating ball bearing guide KF	Piston rod
Lubrication interval	Lubrication for life		If required, e.g. if the grease layer is insufficient.
Accessories			
Lubrication point	—		Interface
Lubricant	—		ELKALUB VP 922, ChemieTechnik, Vöhringen

Tab. 12: Overview of lubrication intervals and accessories

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 or vibrations or rough running of the slide.	Coupling distance too short.	Observe permissible coupling spacings ➔ Instruction manual for motor mounting kit ➔ www.festo.com/sp.
	Torsional stresses	– Install the mini slide without tension. Make sure that the contact surface is flat ➔ 6.4 Mounting mini slide. – Change the layout of the attachment component, e.g. payload. – Align slide and attached guide element parallel to each other.
	Current controller settings.	Optimise controller values, e.g. velocity, acceleration, etc.
	Resonance oscillation of the slide.	Change the travel velocity.
	Wear on bearing or guide.	– Contact local Festo Service. – Replace slide ➔ www.festo.com/catalogue.
	Wear of the ball screw drive.	– Check reversing backlash ➔ 9.2 Checking slide elements. – Contact local Festo Service. – Replace slide ➔ www.festo.com/catalogue.
	Insufficient lubrication of the piston rod.	Lubricate the piston rod ➔ 9.4 Lubrication.
Vibrations on the slide.	Operation at the resonance point of the slide.	– Change the travel velocity. – Change the acceleration. – Increase slide rigidity, e.g. shorter support distances. – Change the payload geometry.
Long oscillations of the profile.	Resonant frequency of profile and payload too low.	– Increase slide rigidity, 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 of the motor mounting kit, ➔ www.festo.com/sp.
	Loads 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 ➔ 6.5 Mounting the attachment component.
	Ball screw drive blocked.	– Contact local Festo Service. – Replace slide ➔ www.festo.com/catalogue.
	Pre-tension of toothed belt too high in parallel kit.	Reduce the pre-tension of the toothed belt ➔ Instruction manual for parallel kit, ➔ www.festo.com/sp.
	Operation at the lower ambient temperature limit.	– Optimise controller data, e.g. velocity, acceleration, ... – Use gear unit.
	Slide jammed in the mechanical end position.	Manually releasing a jam: – Switch off the controller and lock it to prevent it from being switched on again unintentionally. – Remove motor and motor mounting kit. – Rotate drive shaft freely.
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 slide ➔ www.festo.com/catalogue.

Tab. 13: Overview of fault clearance

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.

12 Technical data

12.1 Technical data, mechanical

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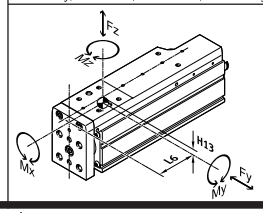
Use the Festo sizing software for sizing the drive ➔ www.festo.com/sp.

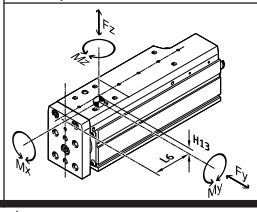
Additional information ➔ www.festo.com/catalogue.

EGSC-BS-25/32

Size		25		32	
Spindle pitch		2P	6P	3P	8P
Design		Mini slide with ball screw drive			
Guide		Recirculating ball bearing guide			
Mounting position		any			
Max. perm. payload	[kg]	2		6	
Max. feed force F_x	[N]	20		60	
Max. driving torque	[Nm]	0.02	0.05	0.07	0.135
No-load driving torque at v_{max}	[Nm]	0.015	0.029	0.044	0.042
Max. rotational speed	[rpm]	4000		3750	
Max. velocity v_{max}	[m/s]	0.133	0.4	0.188	0.5
Max. acceleration	[m/s²]	5	15	5	15
Repetition accuracy	[mm]	± 0.015			
Max. reversing backlash	[mm]	➔ 9.2 Checking slide elements			
Feed constant	[mm/rev]	2	6	3	8
Duty cycle	[%]	100			
Relative humidity	[%]	0 ... 95 (non-condensing)			
Ambient temperature	[°C]	0 ... +50			
Storage temperature	[°C]	–20 ... +60			
Degree of protection		IP40			
Max. permissible force on the drive hub					
Max. transverse load Fx, Fy	[N]	30		75	
Max. permissible forces and torques on the guide centre					
Fy	[N]	669		991	
Fz	[N]	669		991	
Mx	[Nm]	2		3.4	
My	[Nm]	2.1		3.2	
Mz	[Nm]	2.1		3.2	
Distance to the guide centre when the slide is retracted					
H13	[mm]	7.3		7.9	
L6	[mm]	25.1		31.8	
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. 14: General data, EGSC-BS-25/32

EGSC-BS-45/60

Size		**45**		**60**	
Spindle pitch		3P	10P	5P	12P
Design		Mini slide with ball screw drive			
Guide		Recirculating ball bearing guide			
Mounting position		any			
Max. perm. payload	[kg]	12		25	
Max. feed force F_x	[N]	120		250	
Max. driving torque	[Nm]	0.12	0.35	0.36	0.9
No-load driving torque at v_{max}	[Nm]	0.059	0.1	0.125	0.306
Max. rotational speed	[rpm]	3600		3000	
Max. velocity v_{max}	[m/s]	0.18	0.6	0.25	0.6
Max. acceleration	[m/s²]	5	15	5	15
Repetition accuracy	[mm]	± 0.015			
Max. reversing backlash	[mm]	➔ 9.2 Checking slide elements			
Feed constant	[mm/rev]	3	10	5	12
Duty cycle	[%]	100			
Relative humidity	[%]	0 ... 95 (non-condensing)			
Ambient temperature	[°C]	0 ... +50			
Storage temperature	[°C]	–20 ... +60			
Degree of protection		IP40			
Max. permissible force on the drive hub					
Max. transverse load Fx, Fy	[N]	180		230	
Max. permissible forces and torques on the guide centre					
Fy	[N]	1314		4937	
Fz	[N]	1314		4937	
Mx	[Nm]	8.1		20	
My	[Nm]	7		30	
Mz	[Nm]	7		30	
Distance to the guide centre when the slide is retracted					
H13	[mm]	10.2		15.9	
L6	[mm]	37.3		53.4	
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. 15: General data, EGSC-BS-45/60

EGSC-BS-25/32/45/60

Size		**25**	**32**	**45**	**60**
Materials					
Yoke plate Slide Cylinder profile		Anodised aluminium			
Piston rod		High-alloy steel			
Guide rail Spindle Spindle nut		Rolling bearing steel			
Coverings		Polyamide, acrylonitrile butadiene rubber			
Weight					
Basic weight at 0 mm stroke	[kg]	0.176	0.331	0.608	1.555
Added weight per 10 mm stroke	[kg]	0.019	0.031	0.063	0.095

Tab. 16: Materials and weight