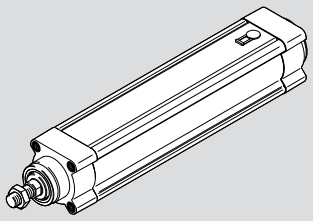
ESBF-BS/-LS
Electric cylinder



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

www.festo.com

Operating instructions

8155148
2021-04d
[8155150]

8155148

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 electric cylinder is intended to be used for positioning payloads in combination with tools or as a drive when external guides are used.

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.

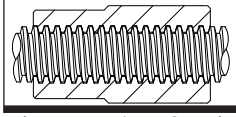
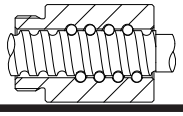
3 Additional information

- 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 electric cylinder converts the rotary motion of the mounted motor into a linear motion of the non-rotating piston rod. The lead screw converts the torque of the motor into a feed force. The linear movement of the piston rod is precisely guided by the guide in the bearing cap. Sensors enable the monitoring of end positions, reference position and intermediate position.

Lead screw ESBF-LS	Ball screw drive ESBF-BS
– Low speeds – Self-braking with de-energised motor (without brake)	– High speeds – High forces
	

Tab. 1: Overview of Lead Screw

4.2 Product design

ESBF product design

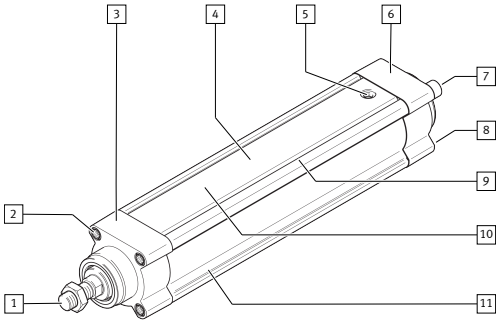


Fig. 1: ESBF product design (example ESBF-BS)

1 Piston rod
2 Threaded hole for mounting
3 Bearing cap
4 Cylinder profile
5 Pressure compensation port
6 Drive cover
7 Drive shaft
8 Threaded hole for motor mounting kit
9 Interface for sensor bracket
10 Interface for sensor rail
11 Interface for profile mounting

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 focus into consideration.
- Store and transport the product in its original packaging.
- Store product in a cool, dry, shaded and corrosion protected environment.
- Store product in ambient conditions without oils, greases and degreasing vapours.
- Ensure short storage times.

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.

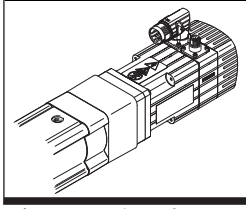
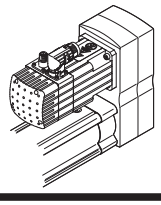
6.2 Unpacking

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 shaft

When mounting the motor and motor mounting kit, do not exceed the maximum transverse load F_R of the drive shaft (for example toothed belt tension when mounting the parallel kit) ➔ 12.2 Characteristic curves.

Axial kit EAMM-A	Parallel kit EAMM-U
	

Tab. 2: 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 mounting the pressure compensation port ➔ Connecting pressure compensation (ESBF -...- S1 only).

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 the cylinder

i

High mechanical loads on the mounting connections

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

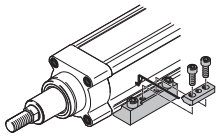
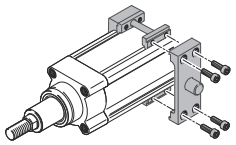
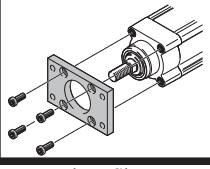
- The foot mounting HNC, CRHNC should only be used in combination with the profile mounting EAHF.
- In the case of an inclined or horizontal mounting position with direct fastening or flange mounting EAHH-V2, the drive system must also be supported near the motor mounting.

Requirement

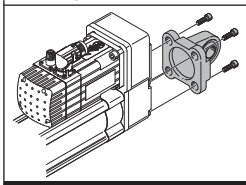
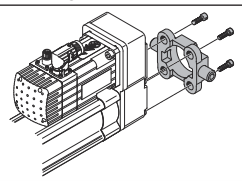
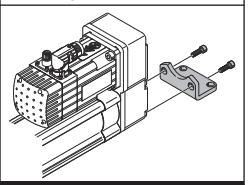
– No collision with mounting and sensor components in the movement space of the attachment component.
– Sufficient space to reach maintenance interfaces.
– Sufficient space for reaching and mounting the pressure compensation port.
– Flat mounting surface maximum 0.2 mm over the stroke length of the bearing surface.
– No distortion or bending when installing the product.

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

For additional information, contact your local Festo Service.

Profile mounting EAHF-V2	**Trunnion flange mounting kit DAMT-V1**	**Direct fastening Flange mounting EAHH-V2**
Profile		Bearing cap
Mounting via profile	Mounting via thread	Mounting via thread
		

Tab. 3: Overview of mounting components for bearing caps and profile

Swivel flange DAMS, SNC..., CRSNCS	**Trunnion flange ZNCF, CRZNG**	**Foot mounting HNC, CRHNC**
Parallel kit		
Mounting via thread	Mounting via thread	Mounting via thread
		

Tab. 4: Overview of mounting components for parallel kit

Size		**32**	**40**	**50**	**63**	**80**	**100**
Profile mounting EAHF-V2							
Screw		Instruction manual ➔ www.festo.com/sp.					
Trunnion flange mounting kit DAMT-V1							
Screw		M5	M6	M6	M8	M8	M8
Max. tightening torque	[Nm]	4^{+1}	8^{+1}	8^{+2}	18^{+2}	28^{+2}	28^{+2}
Direct fastening Flange mounting EAHH-V2 Foot mounting HNC, CRHNC Swivel flange DAMS (not ESBF-BF-32) Trunnion flange ZNCF, CRZNG							
Screw		M6	M6	M8	M8	M10	M10
Max. tightening torque	[Nm]	6	6	12	12	25	25
Max. screw-in depth t_{max} 	[mm]	16	16	17	17	17	17
Swivel flange SNC..., CRSNCS							
Screw		Instruction manual ➔ www.festo.com/sp.					

Tab. 5: Information for mounting components

6.5 Mounting the attachment component

i

Torque on the Piston Rod

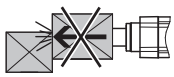
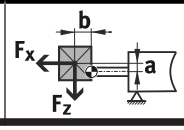
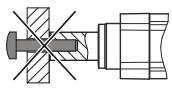
During commissioning and operation, the piston rod may only be operated without torque.

If external torques occur, an external guide must be used.

i

Mounting the attachment component on the piston rod

When mounting the attachment component, do not exceed the maximum torque of the piston rod. The maximum torque of the piston rod may only be used for a short time during mounting ➔ Tab. 8 Information on attachment components.

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

Tab. 6: Requirement for attachment components

Requirement:

– No collision with mounting and sensor components in the movement space of the attachment component.
– No transverse load or torque on the piston rod.
  Absorb external forces and torques via an external guide.
– Minimise tilting torque by the Fx and Fz forces. Short lever arms a and b from the piston rod ⊕ 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. Screw the lock nut onto the male thread of the piston rod or attachment component.
3. Rotate or place the attachment component on the piston rod.
4. Tighten retaining screws or lock nut.
   The tightening torque must not act on the piston rod. Counterhold with a suitable tool on the spanner flat of the piston rod.
   Observe the maximum tightening torque and screw-in depth.

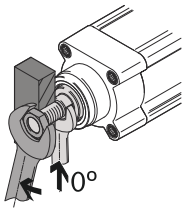
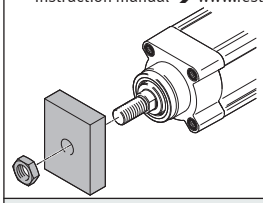
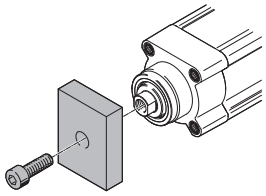
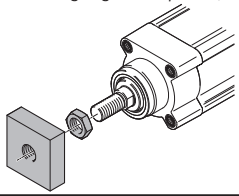
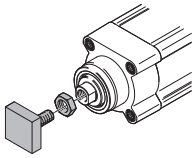


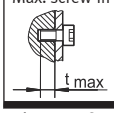
Fig. 2: Torque-free mounting

When using an additional external guide, ensure that the electric cylinder and piston rod are aligned exactly parallel.

ESBF-...	**ESBF-...-F**
Mounting via male thread	Mounting via female thread
With nut	With screw
– Guide unit EAGF Instruction manual ➔ www.festo.com/sp. 	
With lock nut	With lock nut
– Rod eye SGS, CRSGS – Rod clevis SG, CRSG – Coupling piece KSZ – Self-aligning rod coupler FK; CRFK 	

Tab. 7: Overview of attachment components

Size		**32**	**40**	**50**	**63**	**80**	**100**
Piston rod							
Width across flats ⌀	[mm]	10	13	17	17	22	22
Max. torque	[Nm]	2.4	6.4	12	15	31	53
Piston rod with male thread ESBF -...							
Nut, lock nut		M10x1.25	M12x1.25	M16x1.5		M20x1.5	

Size		32	40	50	63	80	100
Piston rod with female thread ESBF -...- F							
Screw, lock nut		M6	M8	M10	M10	M12	M12
Max. screw-in depth t_{max} 	[mm]	12	12	16	16	20	20

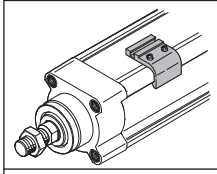
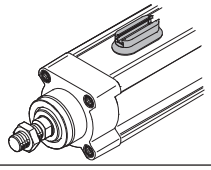
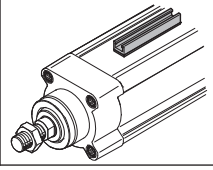
Tab. 8: Information on attachment components

6.6 Mounting accessories

Requirement
- No collision with mounting and sensor components in the movement space of the attachment component.
- Protection against uncontrolled overtravel of the end positions.
- Referencing 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 the sensor rail or mounting kit (depending on the type of mounting).
   - Align sensor and mount it at the switching position.

Instruction manuals ➔ www.festo.com/sp.

Mounting kit SMB	Mounting kit CRSMB	Sensor rail SAMH
– mounting on profile lug	– central mounting on the profile	– central mounting on the profile
		
– 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.		

Tab. 9: Overview of sensor mountings

Connecting pressure compensation (ESBF -...- S1 only)

i

The standard version of the ESBF is supplied with a press-fitted sinter filter.

The pressure compensation port permits the reduction of negative or excess pressure in the cylinder interior. Pressure compensation may only take place in clean ambient air.

Alternatives to pressure compensation via the environment:
- Operation in a dust-free and dry area
- Connection to a large expansion tank
- Connection of sealing air (for example excess pressure with maximum 0.2 bar).

Position of the pressure compensation port:
- ESBF-32/40/50: in the drive cover
- ESBF-63/80/100: in the cylinder profile

1. Remove protective cap.
2. Mount the screw fitting and connect the hose.

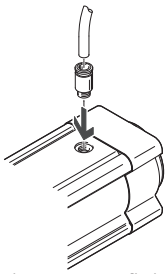


Fig. 3: Mount fitting (example: cylinder profile connection)

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.
- Swinging up 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

Torque on the Piston Rod

During commissioning and operation, the piston rod may only be operated without torque.

If external torques occur, an external guide must be used.

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.
- 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.
- Cylinder not mechanically overloaded 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 homing travel at reduced velocity, acceleration and deceleration setpoint values.
- No test run to mechanical end stops.
- Software end positions ≥0.25 mm away from the mechanical stops.

Steps	Purpose	Note

1. Check travel	Determine the direction of travel of the piston rod	– Direction of movement of piston rod (clockwise spindle):
		  – Retracting: rotate cylinder drive shaft clockwise.
		  – Extending: rotate cylinder drive shaft anti-clockwise.
		– The direction of motion of the piston rod for positive and negative position values depends on the mounting position of the motor on the cylinder.
		– 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.
		– against the end position on the motor side.
		  do not exceed maximum values ➔ Tab. 11 Speed and energy at the end positions.
		Further information ➔ Instruction manual of the drive system, ➔ www.festo.com/sp.

3. Test run	Checking the operating conditions	Check application requirements: – Piston rod runs through the complete travel cycle in the specified time. – The piston rod 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. 10: Commissioning steps

Size		32	40	50	63	80	100
Max. stop velocity	[m/s]	0.01					
Max. stop energy	[mJ]	0.03	0.05	0.07	0.15	0.38	0.60
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. 11: 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

Torque on the Piston Rod
During commissioning and operation, the piston rod may only be operated without torque.
If external torques occur, an external guide must be used.

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 ≥2.5 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 the cylinder elements

Checking the reversing backlash (ESBF-LS only)
- Check the reversing backlash of the piston rod at every maintenance interval (e.g. lubrication interval).
  If the maximum permissible reversing backlash is exceeded, the cylinder should be replaced.

Size		32	40	50
Spindle pitch ...P		2.5	3	4
Max. reversing backlash	[mm]	0.62	0.75	1

Tab. 12: Maximum permissible reversing backlash, ESBF-LS-32/40/50

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 abraded particles and dirt from the product:
  - Prior to initial commissioning.
  - Regularly during operation.

9.4 Lubrication

Lubrication Interval and Accessories

Lubrication	Lead screw	Piston rod	
	ESBF-...	ESBF-...	ESBF-...-F1
Lubrication interval	Lubrication for life	If required, e.g. if the grease layer is too low.	
Accessories ➔ www.festo.com/spareparts			
Lubrication point	—	Surface	
Lubricant	—	Roller bearing grease LUB-KC1	Roller bearing grease, suitable for use in the food industry LUB-E1

Tab. 13: 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
Wear on the lead screw ESBF-LS.	Reversing backlash is too large.	– Contact local Festo Service. – Replace cylinder ➔ www.festo.com/catalogue.
Loud running noises or vibrations or rough running of the cylinder.	Coupling distance too short.	Observe permissible coupling spacings ➔ Instruction manual for motor mounting kit, ➔ www.festo.com/sp.
	Tensions	– Install the cylinder so it is free of tension. Note the flatness of the contact surface ➔ 6.4 Mounting the cylinder. – Change the layout of the attachment component (e.g. payload). – Align cylinder and attached guide element parallel to each other. – Use external guide.
	Current controller settings.	Optimise controller data (e.g. velocity, acceleration, ...).
	Resonant oscillation of the cylinder.	Change the travel velocity.
	Wear on bearing or guide.	– Contact local Festo Service. – Replace cylinder ➔ www.festo.com/catalogue.
	Reversing backlash is too large.	– Contact local Festo Service. – Replace cylinder ➔ www.festo.com/catalogue.
	Insufficient lubrication of the piston rod.	Lubricate the piston rod ➔ Tab. 13 Overview of Lubrication Intervals and Accessories.
Oscillations at the piston rod.	Operation at the resonance point of the cylinder.	– Change the travel velocity. – Change the acceleration. – Increase the cylinder rigidity (for example shorter support distances). – Change the payload geometry.
Long oscillations of the profile.	Resonant frequency of profile and payload too low.	– Increase the cylinder rigidity (for example shorter support distances). – Change the payload geometry.
Piston rod 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.
	Threaded drive blocked.	– Contact local Festo Service. – Replace cylinder ➔ www.festo.com/catalogue.
	Pre-tension of toothed belt too high in parallel kit.	Reduce the pretension 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.
	Piston rod stuck in the mechanical end position.	**Manually Releasing a Jam:** – Switch off the controller and safeguard 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 drive train.	– Contact local Festo Service. – Replace cylinder ➔ www.festo.com/catalogue.

Tab. 14: Overview of Fault Clearance

10.2 Repair

- Observe the instructions for dismantling ➔ 11 Disassembly.
- Send the electric cylinder to the Festo repair service.
- Information about spare parts and accessories ➔ www.festo.com/spareparts.

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

i

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

Additional information ➔ www.festo.com/catalogue.

ESBF-BS-32/40

Size		32		40		
Spindle pitch		5P	10P	5P	10P	16P
Design		Electric cylinder with ball screw drive				
Mounting position		any				
Max. feed force F	[kN]	1		3		2.6
Max. driving torque [Nm]	[Nm]	1.1	2	3	5.6	7.7
No-load driving torque at n = 200 rpm	[Nm]	0.1		0.2		
Max. rotational speed	[rpm]	6600		4800		4500
Max. velocity	[m/s]	0.55	1.1	0.4	0.8	1.2
Max. acceleration	[m/s²]	5	15	5	15	25
Repetition accuracy	[mm]	± 0.01		± 0.01		
Feed constant	[mm/rev]	5	10	5	10	16
Duty cycle	[%]	100				
Relative humidity	[%]	0 ... 95 (non-condensing)				
Ambient temperature	[°C]	0 ... +60				
Storage temperature	[°C]	–20 ... +60				
Degree of protection		IP40; IP65 (ESBF -...- S1)				
Max. permissible force on the drive shaft ➔ 12.2 Characteristic curves						
Max. transverse load Fq	[N]	115		130		
Max. permitted forces and torsional backlash on the piston rod						
Max. transverse load Fq	[N]	➔ 12.2 Characteristic curves				
Max. torsional backlash	[°]	± 0.25		± 0.20		

Tab. 15: General data, ESBF-BS-32/40

ESBF-BS-50/63

Size		50			63		
Spindle pitch		5P	10P	20P	5P	10P	25P
Design		Electric cylinder with ball screw drive					
Mounting position		any					
Max. feed force F	[kN]	5		4.5	7		6
Max. driving torque	[Nm]	4.8	9.2	16.3	7	13.1	26.5
No-load driving torque at n = 200 rpm	[Nm]	0.3			0.4	0.45	0.5
Max. rotational speed	[rpm]	3600			3250	3220	3260
Max. velocity	[m/s]	0.3	0.6	2	0.27	0.53	1.35
Max. acceleration	[m/s²]	5	15	25	5	15	25
Repetition accuracy	[mm]	±0.01			±0.015	±0.01	
Feed constant	[mm/rev]	5	10	20	5	10	25
Duty cycle	[%]	100					
Relative humidity	[%]	0 ... 95 (non-condensing)					
Ambient temperature	[°C]	0 ... +60					
Storage temperature	[°C]	–20 ... +60					
Degree of protection		IP40; IP65 (ESBF -...- S1)					
Max. permissible forces on the drive shaft ➔ 12.2 Characteristic curves							
Max. transverse load Fq	[N]	300			700		
Max. permitted forces, torques and torsional backlash on the piston rod							
Max. transverse load Fq	[N]	➔ 12.2 Characteristic curves					
Max. torsional backlash	[°]	±0.15			±0.4		

Tab. 16: General data, ESBF-BS-50/63

ESBF-BS-80/100

Size		80			100		
Spindle pitch		5P	15P	32P	5P	20P	40P
Design		Electric cylinder with ball screw drive					
Mounting position		any					
Max. feed force F	[kN]	12		10	17		14.5
Max. driving torque	[Nm]	11.9	33.7	56.6	16.9	63.7	102.6
No-load driving torque at n = 200 rpm	[Nm]	0.5	0.6	0.65	0.7	0.9	1
Max. rotational speed	[rpm]	2530	2515		2010		
Max. velocity	[m/s]	0.21	0.62	1.34	0.16	0.67	1.34
Max. acceleration	[m/s²]	5	15	25	5	15	25
Repetition accuracy	[mm]	±0.01					
Feed constant	[mm/rev]	5	15	32	5	20	40
Duty cycle	[%]	100					
Relative humidity	[%]	0 ... 95 (non-condensing)					
Ambient temperature	[°C]	0 ... +60					
Storage temperature	[°C]	–20 ... +60					
Degree of protection		IP40; IP65 (ESBF -...- S1)					

Size		80			100		
Spindle pitch		5P	15P	32P	5P	20P	40P
Max. permissible forces on the drive shaft ➔ 12.2 Characteristic curves							
Max. transverse load Fq	[N]	1100			1100		
Max. permitted forces, torques and torsional backlash on the piston rod							
Max. transverse load Fq	[N]	➔ 12.2 Characteristic curves					
Max. torsional backlash	[°]	±0.5			±0.5		

Tab. 17: General data, ESBF-BS-80/100

ESBF-LS-32/40/50

Size		32	40	50
Spindle pitch ...P		2.5	3	4
Design		Electric cylinder with lead screw		
Mounting position		any		
Max. feed force F	[kN]	0.6	1	1.6
Max. driving torque	[Nm]	1.1	2.4	4.8
No-load driving torque at n = 200 rpm	[Nm]	0.1	0.2	0.3
Max. rotational speed	[rpm]	1200	1000	750
Max. velocity	[m/s]	0.05		
Max. acceleration	[m/s²]	2.5		
Repetition accuracy	[mm]	± 0.05		
Max. reversing backlash	[mm]	➔ 9.2 Checking the cylinder elements		
Feed constant	[mm/rev]	2.5	3	4
Duty cycle	[%]	100		
Relative humidity	[%]	0 ... 95 (non-condensing)		
Ambient temperature	[°C]	0 ... +50		
Storage temperature	[°C]	–20 ... +60		
Degree of protection		IP40; IP65 (ESBF -...- S1)		
Max. permissible forces on the drive shaft ➔ 12.2 Characteristic curves				
Max. transverse load Fq	[N]	115	130	300
Max. permitted forces, torques and torsional backlash on the piston rod				
Max. transverse load Fq	[N]	➔ 12.2 Characteristic curves		
Max. torsional backlash	[°]	± 0.25	± 0.20	± 0.15

Tab. 18: General Data, ESBF-LS

		ESBF-BS						ESBF-LS		
Size		32	40	50	63	80	100	32	40	50
Materials										
Note on materials		Contains PWIS								
Cylinder barrel		Anodised aluminium								
Drive cover Bearing cap		Aluminium			Die-cast aluminium			Aluminium		
		coated								
Piston rod		High-alloy steel								
Spindle		Rolling bearing steel						Steel, high strength		
Spindle nut		Rolling bearing steel						Polyoxymethylene with polytetrafluoroethylene		
Ball bearing		High-alloy steel								
Screws		Galvanised steel (ESBF-...) Steel, chemically nickel-plated (ESBF -...- F1A)								
Weight										
Basic weight at 0 mm stroke	[kg]	0.78	1.24	1.98	3.17	7.39	11.1	0.67	1.08	1.72
Added weight per 1000 mm stroke	[kg]	3.3	4.7	6.5	8.7	15.5	19.3	3.4	4.8	6.7

Tab. 19: Materials and weight

12.2 Characteristic curves

Additional information ➔ www.festo.com/catalogue.

Transverse load piston rod ESBF -...

Maximum transverse load Fq on the piston rod as a function of the piston rod length l (stroke + piston rod extension)

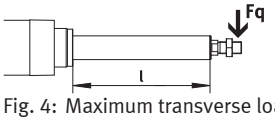


Fig. 4: Maximum transverse load Fq and piston rod length l

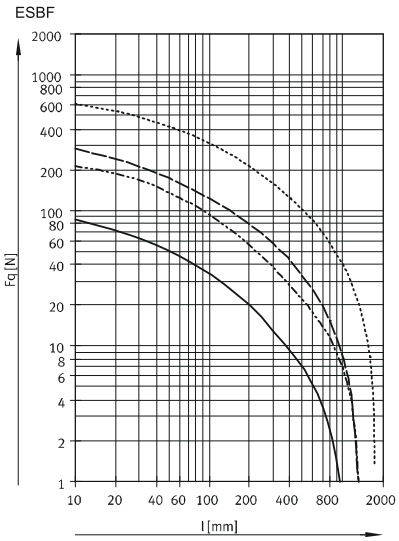


Fig. 5: ESBF, transverse load Fq as a function of piston rod length l

ESBF-BS/LS-32
ESBF-BS/LS-40
ESBF-BS/LS-50/ESBF-BS-63
ESBF-BS-80/100

Transverse load drive shaft ESBF -...
Maximum transverse load Fq on the drive shaft as a function of point of application x

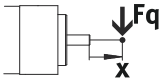


Fig. 6: Maximum lateral force Fq and point of application x

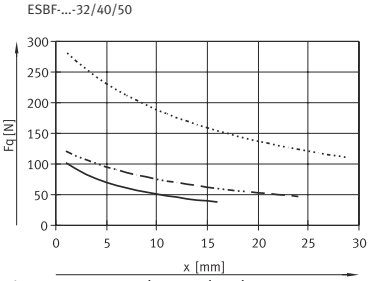


Fig. 7: ESBF-BS/LS-32/40/50, transverse load Fq as a function of point of application x

ESBF-BS/LS-32
ESBF-BS/LS-40
ESBF-BS/LS-50

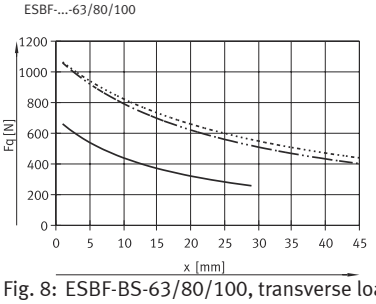


Fig. 8: ESBF-BS-63/80/100, transverse load Fq as a function of point of application x

ESBF-BS-63
ESBF-BS-80
ESBF-BS-100

Feed force – feed speed ESBF -...
Maximum feed force F as a function of the feed speed v

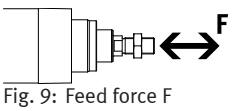


Fig. 9: Feed force F

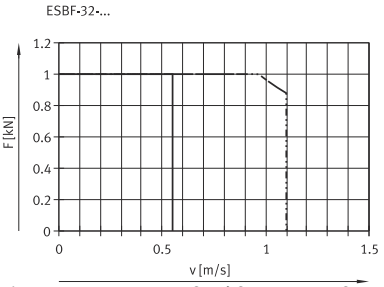


Fig. 10: ESBF-BS-32, feed force F as a function of the feed speed v

ESBF-BS-32-...-5P
ESBF-BS-32-...-10P

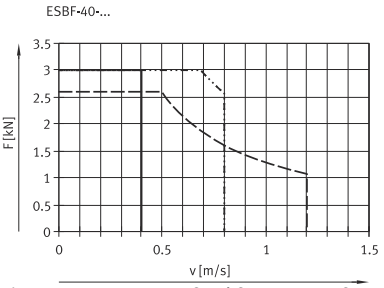


Fig. 11: ESBF-BS-40, feed force F as a function of the feed speed v

ESBF-BS-40-...-5P
ESBF-BS-40-...-10P
ESBF-BS-40-...-16P

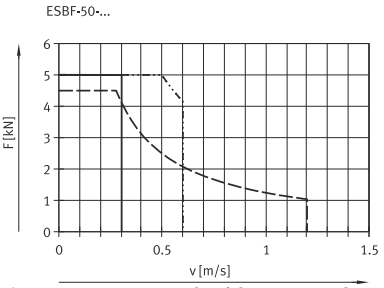


Fig. 12: ESBF-BS-50, feed force F as a function of the feed speed v

ESBF-BS-50-...-5P
ESBF-BS-50-...-10P
ESBF-BS-50-...-20P

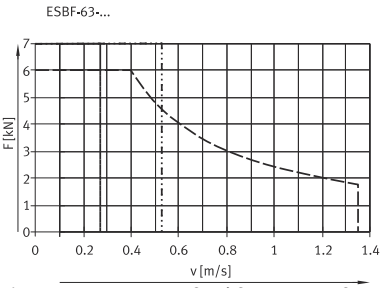


Fig. 13: ESBF-BS-63, feed force F as a function of the feed speed v

ESBF-BS-63-...-5P
ESBF-BS-63-...-10P
ESBF-BS-63-...-25P

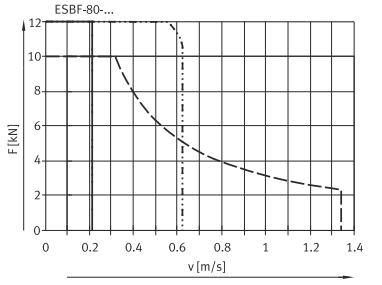


Fig. 14: ESBF-BS-80, feed force F as a function of the feed speed v

ESBF-BS-80-...-5P
ESBF-BS-80-...-15P
ESBF-BS-80-...-32P

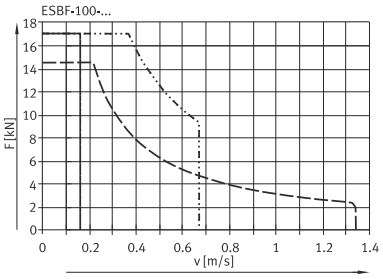


Fig. 15: ESBF-BS-100, feed force F as a function of the feed speed v

ESBF-BS-100-...-5P
ESBF-BS-100-...-40P
ESBF-BS-100-...-20P

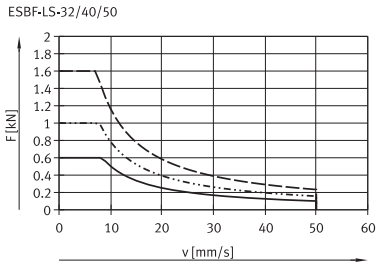


Fig. 16: ESBF-LS-32/40/50, feed force F as a function of the feed speed v

ESBF-LS-32-...-2.5P
ESBF-LS-50-...-4P
ESBF-LS-40-...-3P

Pressure force – piston rod length ESBF -...

Maximum pressure force F as a function of the piston rod length l (stroke + piston rod extension)

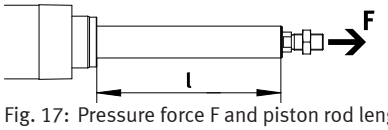


Fig. 17: Pressure force F and piston rod length l

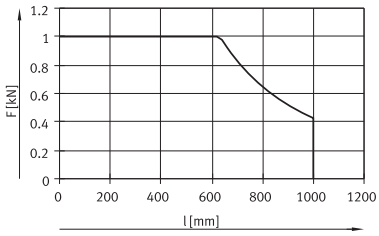


Fig. 18: ESBF-BS-32, pressure force F as a function of the piston rod length l

ESBF-BS-32-...-5P/10P

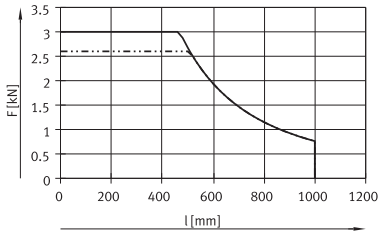


Fig. 19: ESBF-BS-40, pressure force F as a function of the piston rod length l

ESBF-BS-40-...-5P/10P
ESBF-BS-40-...-16P

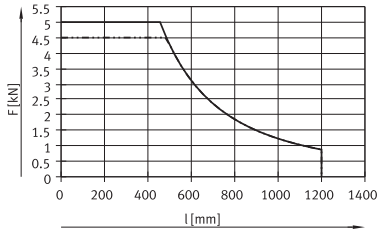


Fig. 20: ESBF-BS-50, pressure force F as a function of the piston rod length l

ESBF-BS-50-...-5P/10P
ESBF-BS-50-...-20P

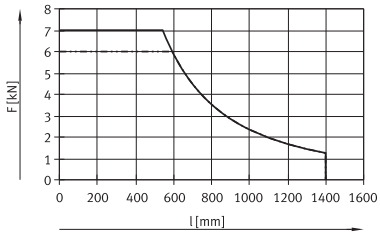


Fig. 21: ESBF-BS-63, pressure force F as a function of the piston rod length l

ESBF-BS-63-...-5P/10P
ESBF-BS-63-...-25P

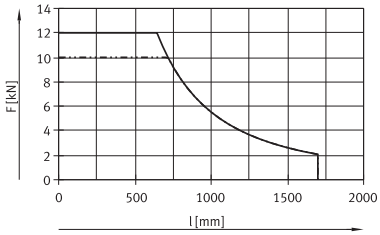


Fig. 22: ESBF-BS-80, pressure force F as a function of the piston rod length l

ESBF-BS-80-...-5P/15P
ESBF-BS-80-...-32P

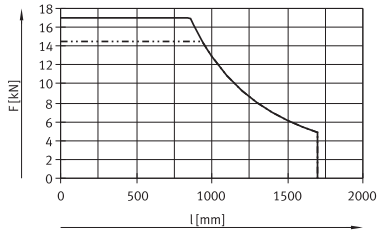


Fig. 23: ESBF-BS-100, pressure force F as a function of the piston rod length l

ESBF-BS-100-...-5P/20P
ESBF-BS-100-...-40P

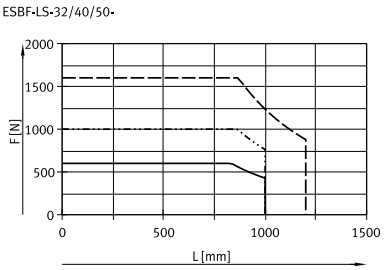


Fig. 24: ESBF-LS-32/40/50, pressure force F as a function of the piston rod length l

ESBF-LS-32-...-2.5P
ESBF-LS-50-...-4P
ESBF-LS-40-...-3P

Feed speed – stroke ESBF-BS

Maximum feed speed v as a function of the stroke l

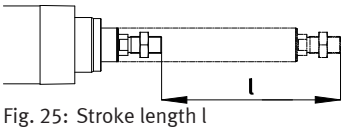


Fig. 25: Stroke length l

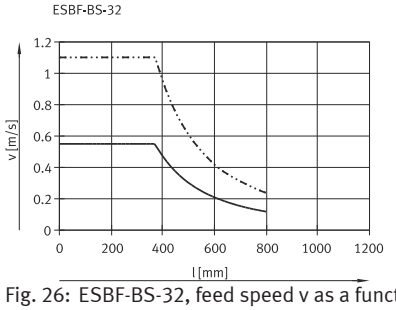


Fig. 26: ESBF-BS-32, feed speed v as a function of the stroke l

ESBF-BS-32-...-5P
ESBF-BS-32-...-10P

ESBF-BS-40

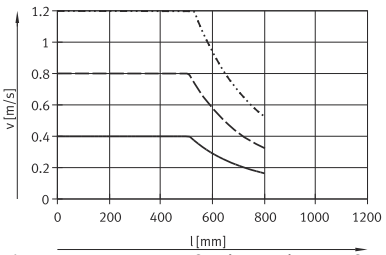


Fig. 27: ESBF-BS-40, feed speed v as a function of the stroke l

ESBF-BS-40-...-5P
ESBF-BS-40-...-16P
ESBF-BS-40-...-10P

ESBF-BS-50

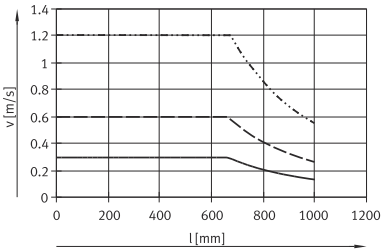


Fig. 28: ESBF-BS-50, feed speed v as a function of the stroke l

ESBF-BS-50-...-5P
ESBF-BS-50-...-20P
ESBF-BS-50-...-10P

ESBF-63

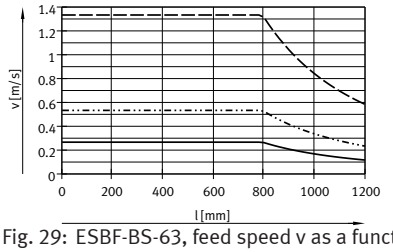


Fig. 29: ESBF-BS-63, feed speed v as a function of the stroke l

ESBF-BS-63-...-5P
ESBF-BS-63-...-25P
ESBF-BS-63-...-10P

ESBF-80

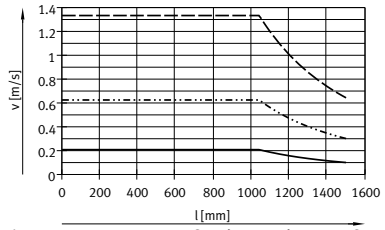


Fig. 30: ESBF-BS-80, feed speed v as a function of the stroke l

ESBF-BS-80-...-5P
ESBF-BS-80-...-32P
ESBF-BS-80-...-15P

ESBF-100

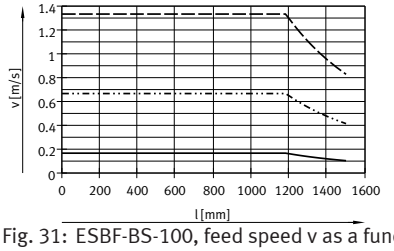


Fig. 31: ESBF-BS-100, feed speed v as a function of the stroke l

ESBF-BS-100-...-5P
ESBF-BS-100-...-40P
ESBF-BS-100-...-20P