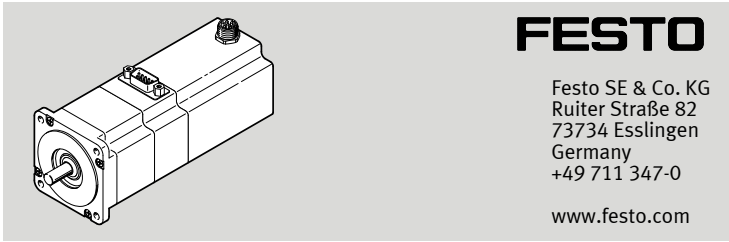


EMMS-ST
Stepper motor



Operating instructions

8146153
2020-11b
[8146155]



Translation of the original instructions

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1 About this document
1.1 Applicable Documents

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

1.2 Product version
This documentation describes the following product versions:

EMMS-ST-...-E/B-G2	Product version
E	Encoder, single-turn
B	with holding brake
G2	2nd generation (only for EMMS-ST-42/57/87)

Tab. 1 Product version

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 %.
- Electrostatic contact discharges to the motor of more than 3.2 kV can cause sporadic motor malfunctions.

2.2 Intended use
The motor is intended to be used as a component in drive systems and may only be operated in combination with a suitable servo drive.

2.3 Foreseeable misuse
The holding brake must not be used for braking the motor.

2.4 Training of qualified personnel
Installation, commissioning, maintenance and disassembly should only be conducted by qualified personnel.
The qualified personnel must be familiar with the assembly and installation of electric drive systems.

2.5 Area of application and approval
In combination with the UL inspection mark on the product, the information in this section must also be observed in order to comply with the certification conditions of Underwriters Laboratories Inc. (UL) for USA and Canada.

UL certification information	
Product category code	PRHZ2 (USA) or PRHZ8 (Canada)
File number	E342973
Considered standards	UL 1004-1/-6, C22.2 No.100
UL mark	

Tab. 2 UL/CSA certification information

3 Additional Information
– Accessories → www.festo.com/catalogue.

4 Service
Contact your regional Festo contact person if you have technical questions
→ www.festo.com.

5 Product overview

5.1 Function
The product is a stepper motor with 2-phase hybrid technology. The direction of rotation and step angle are specified by the connected servo drive in the form of a sinusoidal current injection. The encoder is used to detect the step angle position. The de-energised holding brake enables the motor shaft to be held at a standstill.

i Servo-light operation (closed loop control) is possible in conjunction with the servo drive CMMT-ST or the motor controllers CMMS-ST or CMMO-ST.

5.2 Product design

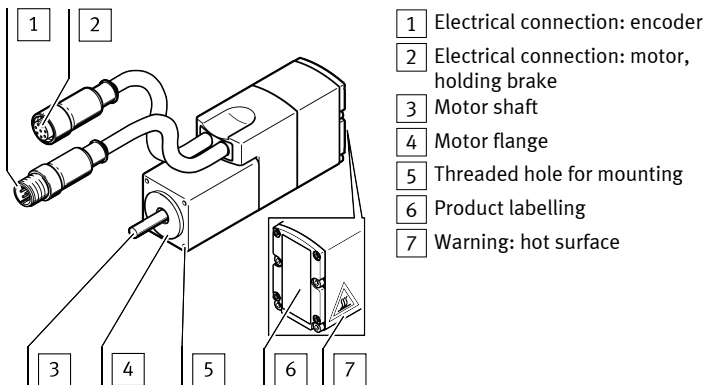


Fig. 1 Product structure EMMS-ST-28 (example EMMS-ST-28 ... EB)

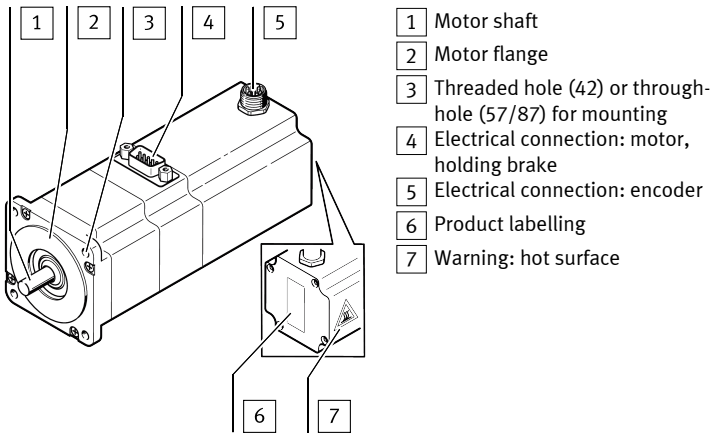


Fig. 2 Product structure EMMS-ST-42/57/87 (example EMMS-ST-57 ... EB)

6 Transport and storage

- Transport and storage conditions**
- Store and transport the product in its original packaging.
 - Store and transport the product in a horizontal position.
 - Store product in a cool and dry environment protected from sunlight and corrosion.
 - Store the product in ambient conditions without oils, greases and grease-dissolving vapours.
 - Keep storage times short.

7 Assembly
7.1 Safety

⚠ WARNING!

Risk of injury due to unexpected movement of components.

- Bring moving parts of the connected mechanical system into a secure position (e.g. move into the lower end position).

i The max. permissible axial and radial forces on the motor shaft must not be exceeded during transport, assembly or operation → www.festo.com/catalogue.

- 7.2 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 → 13 Disposal.
- 7.3 Mounting motor**
- Requirement
- Select accessories → www.festo.com/catalogue.
1. Degrease and dry the motor shaft.
 2. Mount motor on the driven mechanical system.

8 Electrical installation

⚠ WARNING!

Risk of injury due to electric shock.

- Switch off the power supply during mounting and installation work.
Cancelling the controller enable signal is not sufficient.

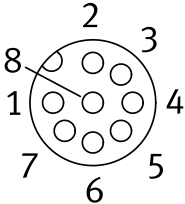
Connect lines

Requirement

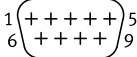
- Select accessories → www.festo.com/catalogue.
- Observe permissible cable length and conductor cross section
→ www.festo.com/catalogue.
- Use screened cables.

- Plug the cables into the appropriate plugs.
- Connect the cables to the servo drive.

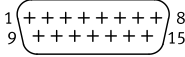
Instructions for servo drive and cable → www.festo.com/sp.

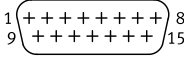
Plug, M12, 8-pin, A-coded, socket	Pin	Function	Description
			
Servo motor EMMS-ST-28			
	1	A	String A
	2	A/	String A/
	3	B	String B
	4	B/	String B/
	5	–	not connected
	6	–	not connected
Holding brake EMMS-ST-28 ... B			
	7	BR+	Holding brake control: – 24 V DC (21.6 ... 26.4 V DC): open (vented) – 0 V DC: closed (retracted)
	8	BR–	Holding brake, reference potential 0 V
	–	FE	Housing for supporting the cable screening

Tab. 3 EMMS-ST-28: plug for motor and holding brake

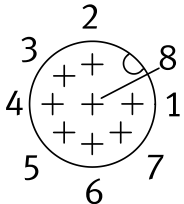
Plug, Sub-D, 9-pin, pins	Pin	Function	Description
			
Servo motor EMMS-ST-42/57			
	1	A	String A
	2	A/	String A/
	3	B	String B
	4	B/	String B/
	5	–	not connected
	6	–	not connected
Holding brake EMMS-ST-42/57 ... B			
	7	BR+	Holding brake control: – 24 V DC (21.6 ... 26.4 V DC): open (vented) – 0 V DC: closed (retracted)
	8	BR–	Holding brake, reference potential 0 V
	9	–	not connected
	–	FE	Housing for supporting the cable screening

Tab. 4 EMMS-ST-42/57: plug for motor and holding brake

Plug, Sub-D, 15-pin, pins	Pin	Function	Description
			
Servo motor EMMS-ST-87			
	1	A	String A
	2	A	String A
	3	A/	String A/
	4	A/	String A/
	5	B	String B
	6	B	String B
	7	B/	String B/
	8	B/	String B/
	9	–	not connected
	10	–	not connected
Holding brake EMMS-ST-87 ... B			
	11	BR+	Holding brake control: – 24 V DC (21.6 ... 26.4 V DC): open (vented) – 0 V DC: closed (retracted)
	12	BR–	Reference potential 0 V
	13	–	not connected

Plug, Sub-D, 15-pin, pins	Pin	Function	Description
	14	–	not connected
	15	–	not connected
	–	FE	Housing for supporting the cable screening

Tab. 5 EMMS-ST-87: plug for motor and holding brake

Plug, M12, 8-pin, A-coded, pin	Pin	Function	Description
Incremental encoder, EMMS-ST-...-...E...			
	1	A	A-track signal, RS485-compliant, differential
	2	/A	
	3	B	B-track signal, RS485-compliant, differential
	4	/B	
	5	GND	Reference potential 0 V
	6	N	N-track signal, RS485-compliant, differential
	7	/N	
	8	VCC	Supply voltage 5 V ¹⁾
	–	FE	Housing for supporting the cable screening

1) Short circuit proof, max. load 100 mA

Tab. 6 Plug for encoder

9 Commissioning

9.1 Safety

⚠ WARNING!

Risk of injury due to unexpected movement of components.

- When releasing the holding brake, secure the driven mechanical system to prevent unintended movement.
- Deenergise the motor before releasing the holding brake manually.
- Before setting the enable signal, protect the traversing range of the driven mechanical system from access.

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High voltage loss in the motor cable can result in the permissible operating voltage of the holding brake being undershot.

- Observe permissible cable length and conductor cross section
→ www.festo.com/catalogue.

9.2 Performing commissioning

- Commission the motor in combination with a suitable servo drive.
Instructions for servo drive → www.festo.com/sp.
- Check function and holding torque of the holding brake.
For the grinding-in process of the brake system, briefly close the holding brake at low speed, e.g. 3 s at 100 rpm.

10 Operation

⚠ WARNING!

Danger of burns from hot housing surfaces.

Metallic housing parts can reach high temperatures during operation.
Contact with metal housing parts can cause burn injuries.

- Do not touch metallic housing parts.
- After the power supply is switched off, let the device cool down to room temperature.

- Check the function and holding torque of the holding brake at regular intervals.
If the holding torque is reduced, close the holding brake briefly at low speed, e.g. 3 s at 100 rpm.

11 Maintenance

11.1 Disassembly

⚠ WARNING!

Risk of injury due to electric shock.

- Switch off power supply prior to assembly and installation work; ensure that it is off and secure it against being switched back on.
Cancelling the enable signal is not sufficient.

⚠ WARNING!

Risk of injury due to unexpected movement of components.

- Bring moving parts of the connected mechanical system into a secure position (e.g. for vertical installation, move the slide into the lower end position).
- Only then should you disconnect the motor from the mechanical system.

11.2 Cleaning

Before cleaning, the product must be cooled down to below 40°C.
Clean the outside of the product with a soft cloth as required. Cleaning agents include all non-abrasive media.

12Malfunctions

12.1Fault clearance

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Repairs may only be carried out by the Festo repair service.

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Motor must not be opened.


Malfunction	Possible cause	Remedy
Loud rotation noises of the motor shaft.	Coupling distance too short.	Observe permissible coupling spacings ➔ Instruction manual for motor mounting kit, www.festo.com/sp .
Motor shaft does not turn.	Excessive load.	Reduce load.
	Servo drive has not yet been enabled.	Check signals.
	Holding brake closed.	Release holding brake.
	Min. operating voltage for opening the holding brake is not reached.	<div><div>–</div><div>Comply with permissible cable length and cable cross section ➔ www.festo.com/catalogue.</div></div> <div><div>–</div><div>Contact local Festo Service.</div></div>
Torque of the motor shaft is not transmitted to the drive system.	Coupling slips.	Check the mounting of the shaft-hub connection ➔ Instruction manual for the motor mounting kit, www.festo.com/sp .
Motor shaft vibrates.	Current controller settings.	Optimise controller data, e.g. velocity, acceleration, ...
Motor shaft rotates in the wrong direction.	Cabling error.	Check and correct cabling.
Step loss	Motor load or acceleration too high.	<div><div>–</div><div>Reduce transmitted torque.</div></div> <div><div>–</div><div>Reduce acceleration values.</div></div>
Holding torque of the holding brake is not reached.	Insufficient conditioning of the brake disc.	Briefly close the holding brake several times at low speed, e.g. 3 s at 100 rpm.
Holding torque of the holding brake not effective.	Holding brake fault, e.g. excessive axial force on the motor shaft.	<div><div>–</div><div>Replace motor ➔ www.festo.com/catalogue.</div></div> <div><div>–</div><div>Observe max. permissible axial force, e.g. mount the coupling so it is free of tension.</div></div>
Encoder signals not transmitted.	Cabling error.	Check and correct cabling.
	Encoder fault, e.g. excessive axial force on the motor shaft.	<div><div>–</div><div>Replace motor ➔ www.festo.com/catalogue.</div></div> <div><div>–</div><div>Observe max. permissible axial force, e.g. mount the coupling so it is free of tension.</div></div>

Tab. 7 Overview of fault clearance

12.2Repair

Send the product to the Festo repair service for repair.




13Disposal

 ENVIRONMENT!

Dispose of the product and packaging according to the applicable provisions of environmentally sound recycling.

14Technical data

Additional information ➔ www.festo.com/catalogue.

Identifier	Description
Motor EMMS-ST ...	
U _N [V]	Nominal operating voltage DC
I _N [A]	Nominal current
M _N [Nm]	Nominal torque
n _{max} [rpm]	Maximum mechanically permissible rotational speed
Approval ➔ www.festo.com/sp	
	CE mark for the European Union. ¹⁾
	UL certification mark for the USA and Canada.
	RCM certification mark for Australia and New Zealand.

1) EMC Directive: the product is intended for use in industrial environments. Measures for interference suppression may be required in residential areas. The product may generate high frequency malfunctions, which may require interference suppression measures in residential areas. Additional measures are required to comply with the EMC Directive for cables > 30 m. Compliance with the EMC Directive is the responsibility of the user.

Tab. 8 Identifiers on the product labelling