Stepper motors EMMS-ST

★/☆	Festo core product range Covers 80% of your automation tasks	★	Generally ready for dispatch from the factory within 24 hours In stock at 13 Service Centres worldwide More than 2200 products
Worldwide:	Always in stock	☆	Generally ready for dispatch from the factory within 5 days Assembled for you at 4 Service Centres worldwide Up to 6 × 10^{12} variants per product family
Superb:	Festo quality at an attractive price		
Easy:	Simplified procurement and warehousing		

Just look for the star!

Key features

Everything from a single source

Motors → Page 4

- Conforms to standard IEC 60034
- 2-phase hybrid technology
- Optionally integrated encoder (closed loop)
- Sinusoidal current injection
- Optionally with holding brake
- Degree of protection: IP54

Gear unit EMGA-SST → Page 13

- Planetary gear
- Gear ratio i = 3 and 5, available from stock
- Other ratios and versions on request
- Life-time lubrication
- Degree of protection: IP54

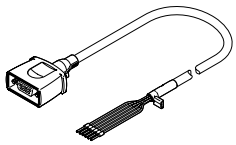
Servo drive CMMT-ST → Internet: cmmt-st

- Servo drive for operating stepper motors and brushless direct current motors
- Options for point-to-point and interpolating motion and for precise positioning
- Primary voltage from 24 ... 48 V DC
- Position controller
- Speed controller
- Force controller
- Range of control functions
- Interfaces:
  - EtherCAT
  - PROFINET RT/IRT
  - EtherNet/IP

Power supply units CACN → Internet: cacn

- Sturdy mechanical system
- Input voltage range 100 ... 240 V AC
- Output voltage 24, 48 V DC
- Output current 5, 10, 20 A

Motor and encoder cables NEBM → Page 13



- Can be used in a wide temperature range
- Screened cables
- Suitable for energy chains
- Degree of protection IP65

Axial kits EAMM → Internet: eamm

- Specific kits for all electromechanical axes from Festo

Type codes

001	Series	
EMMS	Motor	

002	Motor type	
ST	Stepper motor ST	

003	Flange size, motors	
28	28	
42	42	
57	57	
87	87	

004	Length	
S	Short	
M	Centre	
L	Long	

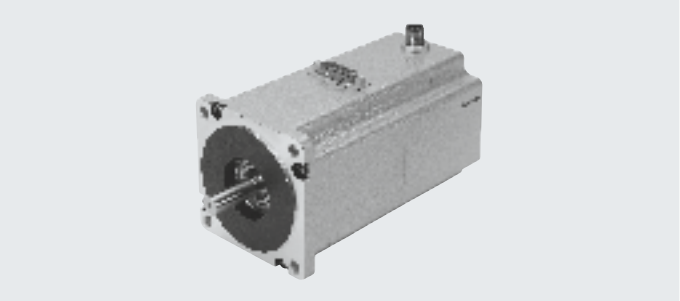
005	Electrical connection	
S	Straight plug	

006	Measuring unit	
	None	
E	Encoder	

007	Brake	
	None	
B	With brake	

008	Generation	
	1st generation	
G2	2nd generation	

Data sheet



General technical data			
Size		28	42
Motor			
Nominal voltage	[V DC]	48	48
Nominal current	[A]	1.4	1.8
Max. rotational speed[1]	[rpm]	6000	1740
Holding torque	[Nm]	0.09	0.5
Voltage constant, phase	[mVmin]	6	23
Step angle	[°]	1.8 ±5%	1.8 ±5%
Winding resistance	[Ω]	2.3 ±15%	1.75 ±15%
Winding inductance	[mH]	1.4	3.3
Output moment of inertia	[kg cm²]	0.01 8/0.025[2]	0.08 2/0.095[2]
Radial load on shaft	[N]	20	20
Axial load on shaft	[N]	7	7
Mass moment of inertia of rotor	[kgcm²]	0.018	0.082
Brake			
Operating voltage	[V DC]	24 ±10%	24 ±10%
Power	[W]	8	8
Holding torque	[Nm]	0.2	0.4
Mass moment of inertia	[kgcm²]	0.007	0.013
Response delay	[ms]	2/6	2/6
Separation time	[ms]	10	10

1) Theoretical max. rotational speed while idling at nominal voltage
2) With brake

Size		57-S	57-M
Motor			
Nominal voltage	[V DC]	48	
Nominal current	[A]	5	
Max. rotational speed[1]	[rpm]	2720	1940
Holding torque	[Nm]	0.8	1.4
Voltage constant, phase	[mVmin]	12	25.5
Step angle	[°]	1.8 ±5%	
Winding resistance	[Ω]	0.15 ±10%	0.25 ±10%
Winding inductance	[mH]	0.5	0.95
Output moment of inertia	[kg cm²]	0.2 9/0.30[2]	0.4 8/0.5[2]
Radial load on shaft	[N]	52	
Axial load on shaft	[N]	10	
Mass moment of inertia of rotor	[kgcm²]	0.29	0.48
Brake			
Operating voltage	[V DC]	24 ±10%	
Power	[W]	8	10
Holding torque	[Nm]	0.4	1
Mass moment of inertia	[kgcm²]	0.01	0.02
Response delay	[ms]	2/6	2/6
Separation time	[ms]	10	12

1) Theoretical max. rotational speed while idling at nominal voltage
2) With brake

Data sheet

General technical data				
Size		87-S	87-M	87-L
Motor				
Nominal voltage	[V DC]	48		
Nominal current	[A]	9.5		
Max. rotational speed[1]	[rpm]	2130	550	430
Holding torque	[Nm]	2.5	5.9	9.3
Voltage constant, phase	[mVmin]	19	68.6	77.2
Step angle	[°]	1.8 ±5%		
Winding resistance	[Ω]	0.1 ±10%	0.23 ±10%	0.23 ±10%
Winding inductance	[mH]	0.45	2.6	2.7
Output moment of inertia	[kg cm²]	1/1.07[2]	1.9/1.97[2]	3/3.07[2]
Radial load on shaft	[N]	200		
Axial load on shaft	[N]	65		
Mass moment of inertia of rotor	[kgcm²]	1	1.9	3
Brake				
Operating voltage	[V DC]	24 ±10%		
Power	[W]	11		
Holding torque	[Nm]	2		
Mass moment of inertia	[kgcm²]	0.07		
Response delay	[ms]	2/6	2/6	2/6
Separation time	[ms]	25		

1) Theoretical max. rotational speed while idling at nominal voltage

2) With brake

Technical data – Encoder		
Rotor position encoder		Incremental
Rotor position encoder measuring principle		Optical
Pulses/revolution	[1/rev]	500
Interface		RS422, TTL, AB channel, zero index
Operating voltage	[V DC]	5

Weights [g]								
Size		28	42	57-S	57-M	87-S	87-M	87-L
Product weight		320	360	870	1100	1950	3050	4200
With encoder		380	450	970	1200	2100	3200	4350
With brake		320	540	1090	1320	2350	3450	4600
With encoder and brake		380	600	1150	1380	2500	3600	5000

Operating and environmental conditions								
Size		28	42	57-S	57-M	87-S	87-M	87-L
Insulation class		B						
Thermal class to EN 60034-1		B						
Rating class to EN 60034-1		S1						
Degree of protection: motor shaft		IP40						
Degree of protection: motor housing		IP65	IP54					
Ambient temperature	[°C]	–10 … +50						
Storage temperature	[°C]	–20 … +70						
Relative humidity (non-condensing)	[%]	0 … 85						
CE marking (see declaration of conformity)		To EU EMC Directive[1]						
Certification		c UL us - Recognized (OL)						
		RCM compliance mark						
PWIS conformity		VDMA24364-B2-L						
Note on materials		RoHS-compliant						

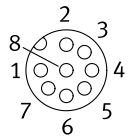
1) For information about the area of use, see the EC declaration of conformity: www.festo.com/sp → Certificates.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

Data sheet

Pin allocation

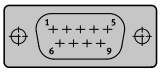
Motor connection

Size 28



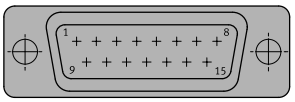
PIN	Function
1	String A
2	String A/
3	String B
4	String B/
5	n. c.
6	n. c.
7	Brake (24 V)
8	Brake (0 V)
9	–

Size 42, 57

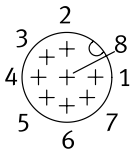


PIN	Function
1	String A
2	String A
3	String A/
4	String A/
5	String B
6	String B
7	String B/
8	String B/
9	n. c.
10	n. c.
11	Brake (24 V)
12	Brake (0 V)
13	n. c.
14	n. c.
15	n. c.

Size 87



Encoder connection

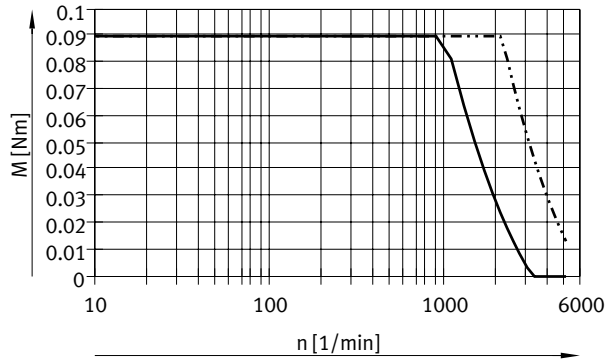


PIN	Function
1	Signal trace A
2	Signal trace A/
3	Signal trace B
4	Signal trace B/
5	0 V
6	Signal trace N
7	Signal trace N/
8	5 V

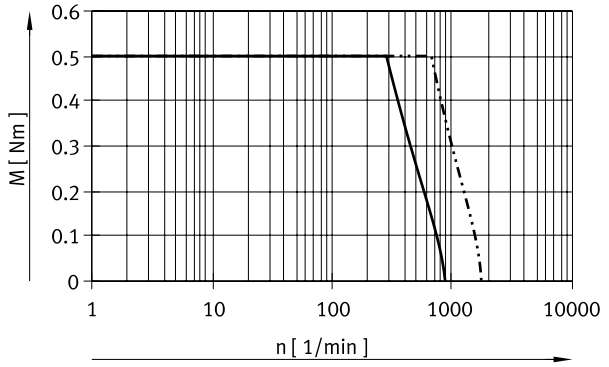
Data sheet

Torque M as a function of rotational speed n

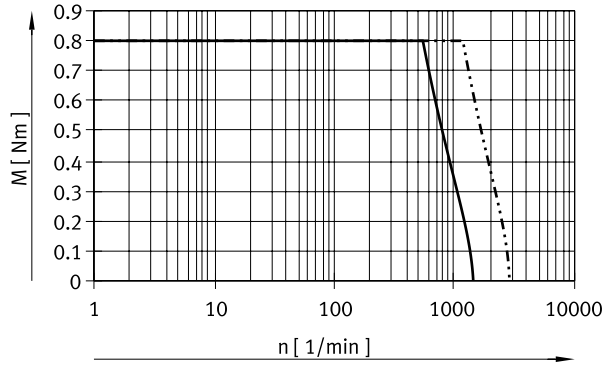
EMMS-ST-28



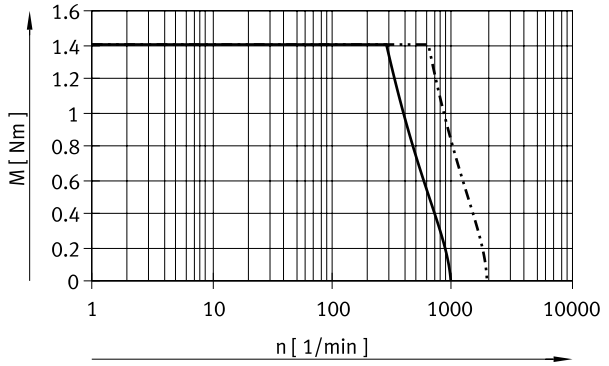
EMMS-ST-42



EMMS-ST-57-S



EMMS-ST-57-M



24 V DC
48 V DC

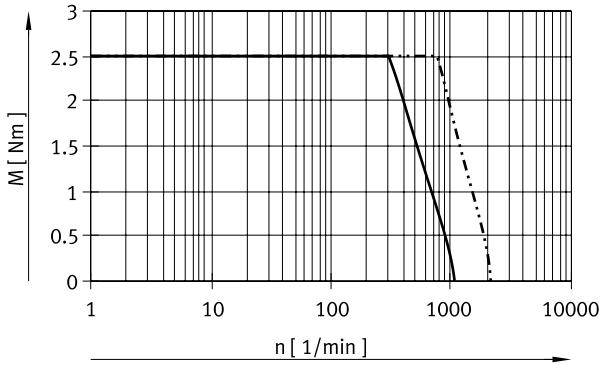
Note

Typical motor characteristic curves (typical production tolerances ±20%) with nominal voltage and optimal motor controller.

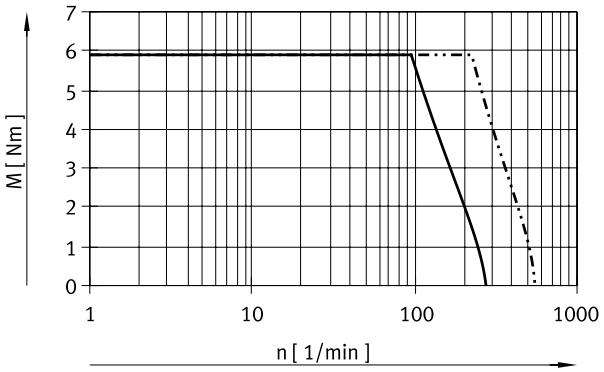
Data sheet

Torque M as a function of rotational speed n

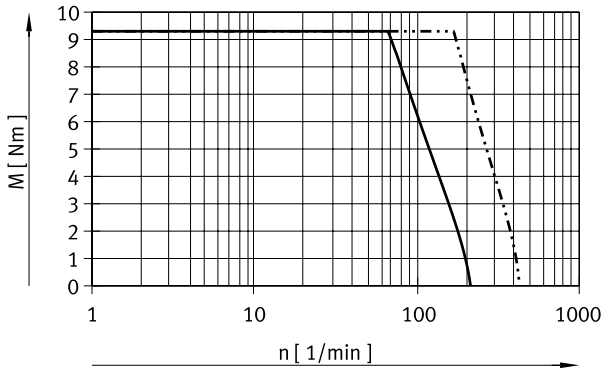
EMMS-ST-87-S



EMMS-ST-87-M



EMMS-ST-87-L



24 V DC
48 V DC

Note

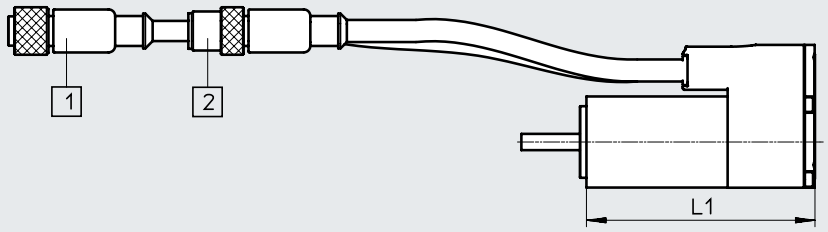
Typical motor characteristic curves (typical production tolerances ±20%) with nominal voltage and optimal motor controller.

Data sheet

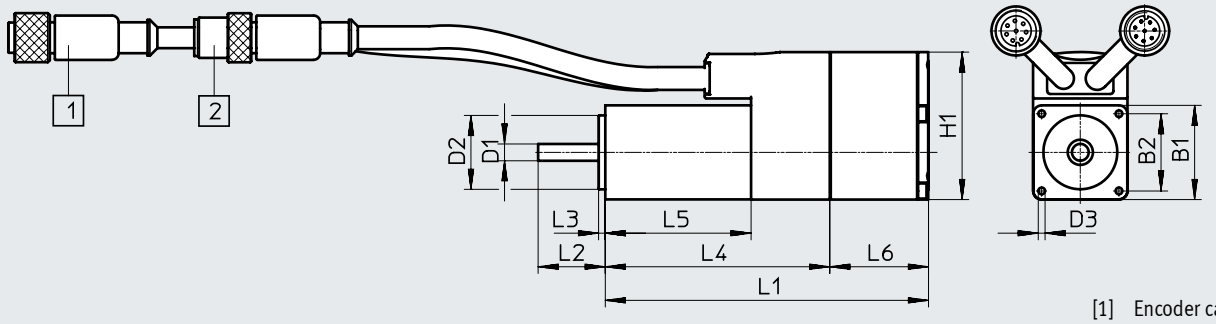
Dimensions Download CAD data ➔ www.festo.com

Size 28

EMMS-ST-...-S/SE



EMMS-ST-...-SB/SEB



[1] Encoder cable
[2] Motor cable

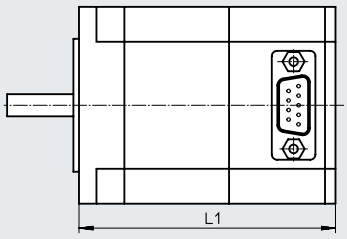
Type	B1 ±1	B2 ±0.2	D1 ø –0.013	D2 ø –0.03	D3	H1
EMMS-ST-28-L-S	28	23	5	22	M2.5x4.5	44
EMMS-ST-28-L-SE						
EMMS-ST-28-L-SB						
EMMS-ST-28-L-SEB						

Type	L1	L2 ±1	L3	L4 ±1	L5 ±1	L6 ±0.5
EMMS-ST-28-L-S	70±1	20	2	67	43	–
EMMS-ST-28-L-SE						
EMMS-ST-28-L-SB	96±1.5					29
EMMS-ST-28-L-SEB						

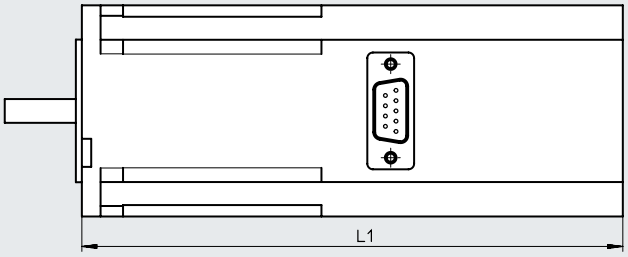
Data sheet

Dimensions Download CAD data ➔ www.festo.com

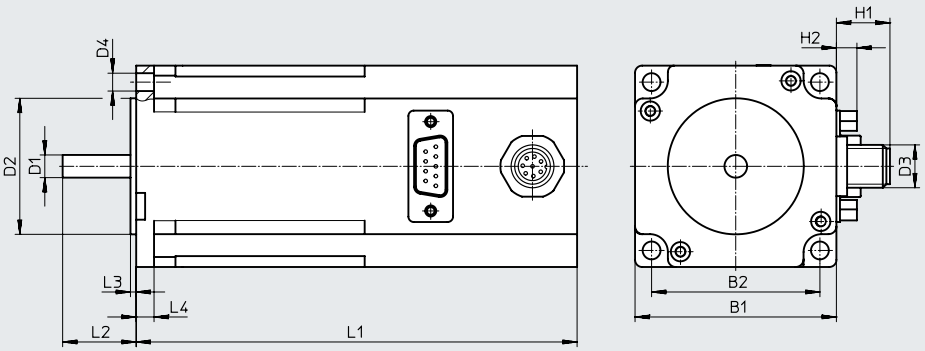
Size 42, 57, 87
EMMS-ST-...-S



EMMS-ST-...-SB

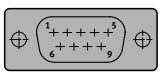


EMMS-ST-...-SE/SEB

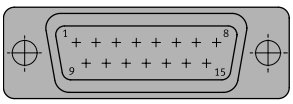


Plug pattern

9-pin Sub-D plug
for size 42, 57



15-pin Sub-D plug
for size 87



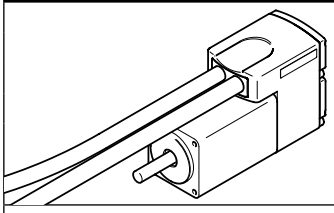
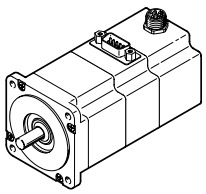
Data sheet

Type	B1	B2 ±0.2	D1 Ø	D2 Ø	D3	D4 Ø
EMMS-ST-42-S-S-G2	42.3	31	5–0.012	22–0.05	–	M3x4.5
EMMS-ST-42-S-SE-G2					M12	
EMMS-ST-42-S-SB-G2					–	
EMMS-ST-42-S-SEB-G2					M12	
EMMS-ST-57-S-S-G2	56.4	47.14	6.35–0.013	38.1±0.025	–	5
EMMS-ST-57-S-SE-G2					M12	
EMMS-ST-57-S-SB-G2					–	
EMMS-ST-57-S-SEB-G2					M12	
EMMS-ST-57-M-S-G2					–	
EMMS-ST-57-M-SE-G2					M12	
EMMS-ST-57-M-SB-G2					–	
EMMS-ST-57-M-SEB-G2					M12	
EMMS-ST-87-S-S-G2	85.85	69.5	11–0.013	73–0.046	–	6.6
EMMS-ST-87-S-SE-G2					M12	
EMMS-ST-87-S-SB-G2					–	
EMMS-ST-87-S-SEB-G2					M12	
EMMS-ST-87-M-S-G2					–	
EMMS-ST-87-M-SE-G2					M12	
EMMS-ST-87-M-SB-G2					–	
EMMS-ST-87-M-SEB-G2					M12	
EMMS-ST-87-L-S-G2					–	
EMMS-ST-87-L-SE-G2					M12	
EMMS-ST-87-L-SB-G2					–	
EMMS-ST-87-L-SEB-G2					M12	

Type	H1	H2	L1	L2	L3	L4
EMMS-ST-42-S-S-G2	–	6.5	66±1	24±1	2	–
EMMS-ST-42-S-SE-G2	13		94±1.2			
EMMS-ST-42-S-SB-G2	–		114±1.3			
EMMS-ST-42-S-SEB-G2	13		127±1.3			
EMMS-ST-57-S-S-G2	–		73.5±0.8	20.6±0.5	1.6	5
EMMS-ST-57-S-SE-G2	13		102.5±1.1			
EMMS-ST-57-S-SB-G2	–		123.5±1.1			
EMMS-ST-57-S-SEB-G2	13		138±1.1			
EMMS-ST-57-M-S-G2	–		95±0.8			
EMMS-ST-57-M-SE-G2	13		124±1.1			
EMMS-ST-57-M-SB-G2	–		145±1.1			
EMMS-ST-57-M-SEB-G2	13		159.5±1.1			
EMMS-ST-87-S-S-G2	–		82.6±1	27±1	2	8.38
EMMS-ST-87-S-SE-G2	13		112.6±1.3			
EMMS-ST-87-S-SB-G2	–		132.6±1.3			
EMMS-ST-87-S-SEB-G2	13		152.6±1.3			
EMMS-ST-87-M-S-G2	–		114.9±1			
EMMS-ST-87-M-SE-G2	13		144.9±1.3			
EMMS-ST-87-M-SB-G2	–		164.9±1.3			
EMMS-ST-87-M-SEB-G2	13		184.9±1.3			
EMMS-ST-87-L-S-G2	–		144.9±1			
EMMS-ST-87-L-SE-G2	13		174.9±1.3			
EMMS-ST-87-L-SB-G2	–		194.9±1.3			
EMMS-ST-87-L-SEB-G2	13		214.9±1.3			

Data sheet

Ordering data

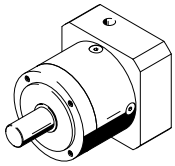
	Size	Variant			Part no.	Type
		Basic type	With encoder	With brake		
	28	■			☆ 1451384	EMMS-ST-28-L-S
			■		☆ 1430663	EMMS-ST-28-L-SE
				■	☆ 1451383	EMMS-ST-28-L-SB
			■	■	☆ 1451382	EMMS-ST-28-L-SEB
	42	■			☆ 1370470	EMMS-ST-42-S-S-G2
			■		☆ 1370471	EMMS-ST-42-S-SE-G2
				■	☆ 1370472	EMMS-ST-42-S-SB-G2
			■	■	☆ 1370473	EMMS-ST-42-S-SEB-G2
	57	■			☆ 1370474	EMMS-ST-57-S-S-G2
			■		☆ 1370475	EMMS-ST-57-S-SE-G2
				■	☆ 1370476	EMMS-ST-57-S-SB-G2
			■	■	☆ 1370477	EMMS-ST-57-S-SEB-G2
		■			☆ 1370478	EMMS-ST-57-M-S-G2
			■		☆ 1370479	EMMS-ST-57-M-SE-G2
				■	☆ 1370480	EMMS-ST-57-M-SB-G2
			■	■	☆ 1370481	EMMS-ST-57-M-SEB-G2
	87	■			☆ 1370482	EMMS-ST-87-S-S-G2
			■		☆ 1370483	EMMS-ST-87-S-SE-G2
				■	☆ 1370484	EMMS-ST-87-S-SB-G2
			■	■	☆ 1370485	EMMS-ST-87-S-SEB-G2
		■			☆ 1370486	EMMS-ST-87-M-S-G2
			■		☆ 1370487	EMMS-ST-87-M-SE-G2
				■	☆ 1370488	EMMS-ST-87-M-SB-G2
			■	■	☆ 1370489	EMMS-ST-87-M-SEB-G2
		■			☆ 1370490	EMMS-ST-87-L-S-G2
			■		☆ 1370491	EMMS-ST-87-L-SE-G2
				■	☆ 1370493	EMMS-ST-87-L-SB-G2
			■	■	☆ 1370494	EMMS-ST-87-L-SEB-G2

Festo core product range	★	Generally ready for dispatch from the factory within 24 hours
	☆	Generally ready for dispatch from the factory within 5 days

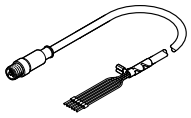
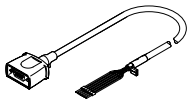
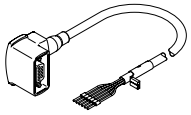
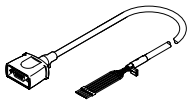
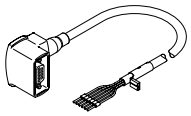
Accessories

Ordering data – Gear unit

Data sheets → Internet: emga

	Motor interface	Gear ratio	Part no.	Type
	42A	3	☆ 549428	EMGA-40-P-G3-SST-42
		5	☆ 549429	EMGA-40-P-G5-SST-42
	57A	3	☆ 549430	EMGA-60-P-G3-SST-57
		5	☆ 549431	EMGA-60-P-G5-SST-57
	87A	3	☆ 549432	EMGA-80-P-G3-SST-87
		5	☆ 549433	EMGA-80-P-G5-SST-87

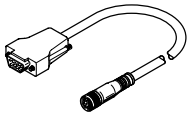
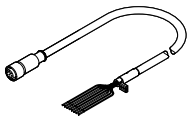
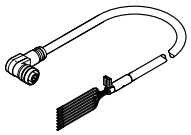
Ordering data

	Description	Cable length [m]	Part no.	Type
Motor cable				
For EMMS-ST-28				
and motor controller CMMT-ST/CMMO-ST				
	**Straight plug** • Min. bending radius: 62 mm • Suitable for energy chains • Ambient temperature: −40 … +80°C	1.5	☆ 1449600	NEBM-SM12G8-E-1.5-Q5-LE6
		2.5	☆ 1449601	NEBM-SM12G8-E-2.5-Q5-LE6
		5.0	☆ 1449602	NEBM-SM12G8-E-5-Q5-LE6
		7.0	☆ 1449603	NEBM-SM12G8-E-7-Q5-LE6
		10.0	☆ 1449604	NEBM-SM12G8-E-10-Q5-LE6
		X length[1]	1449605	NEBM-SM12G8-E-...-Q5-LE6
For EMMS-ST-4 2/57				
and motor controller CMMT-ST/CMMS-ST/CMMO-ST				
	**Straight plug** • Min. bending radius: 62 mm • Suitable for energy chains • Ambient temperature: −40 … +80°C • Current rating at Tamb = 25°C is 5 A_{rms}; at temperatures Tamb › 25°C, observe derating of 1%/K	1.5	☆ 1450368	NEBM-S1G9-E-1.5-Q5-LE6
		2.5	☆ 1450369	NEBM-S1G9-E-2.5-Q5-LE6
		5.0	☆ 1450370	NEBM-S1G9-E-5-Q5-LE6
		7.0	☆ 1450371	NEBM-S1G9-E-7-Q5-LE6
		10.0	☆ 1450372	NEBM-S1G9-E-10-Q5-LE6
		X length[1]	1450373	NEBM-S1G9-E-...-Q5-LE6
	**Angled plug** • Min. bending radius: 62 mm • Suitable for energy chains • Ambient temperature: −40 … +80°C • Current rating at Tamb = 25°C is 5 A_{rms}; at temperatures Tamb › 25°C, observe derating of 1%/K	1.5	☆ 1450736	NEBM-S1W9-E-1.5-Q5-LE6
		2.5	☆ 1450737	NEBM-S1W9-E-2.5-Q5-LE6
		5.0	☆ 1450738	NEBM-S1W9-E-5-Q5-LE6
		7.0	☆ 1450739	NEBM-S1W9-E-7-Q5-LE6
		10.0	☆ 1450740	NEBM-S1W9-E-10-Q5-LE6
		X length[1]	1450741	NEBM-S1W9-E-...-Q5-LE6
For EMMS-ST-87				
and motor controller CMMT-ST/CMMS-ST/CMMO-ST				
	**Straight plug** • Min. bending radius: 80 mm • Suitable for energy chains • Ambient temperature: −40 … +80°C	1.5	☆ 1450834	NEBM-S1G15-E-1.5-Q7-LE6
		2.5	☆ 1450835	NEBM-S1G15-E-2.5-Q7-LE6
		5.0	☆ 1450836	NEBM-S1G15-E-5-Q7-LE6
		7.0	☆ 1450837	NEBM-S1G15-E-7-Q7-LE6
		10.0	☆ 1450838	NEBM-S1G15-E-10-Q7-LE6
		X length[1]	1450839	NEBM-S1G15-E-...-Q7-LE6
	**Angled plug** • Min. bending radius: 80 mm • Suitable for energy chains • Ambient temperature: −40 … +80°C	1.5	☆ 1450943	NEBM-S1W15-E-1.5-Q7-LE6
		2.5	☆ 1450944	NEBM-S1W15-E-2.5-Q7-LE6
		5.0	☆ 1450945	NEBM-S1W15-E-5-Q7-LE6
		7.0	☆ 1450946	NEBM-S1W15-E-7-Q7-LE6
		10.0	☆ 1450947	NEBM-S1W15-E-10-Q7-LE6
		X length[1]	1450948	NEBM-S1W15-E-...-Q7-LE6

1) Maximum 25 m. Available in 0.1 m increments.

Festo core product range	★	Generally ready for dispatch from the factory within 24 hours
	☆	Generally ready for dispatch from the factory within 5 days

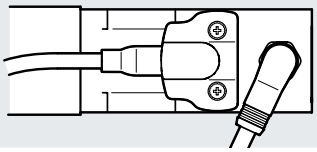
Accessories

Ordering data	Description	Cable length [m]	Part no.	Type
Encoder cable				
For motor controller CMMS-ST				
	**Straight plug** • Min. bending radius: 51 mm • Suitable for energy chains • Ambient temp.: −40 … +70°C	5.0	☆ **550748**	**NEBM-M12G8-E-5-S1G9**
		10.0	☆ **550749**	**NEBM-M12G8-E-10-S1G9**
		15.0	☆ **550750**	**NEBM-M12G8-E-15-S1G9**
		X length[1)]	**550751**	**NEBM-M12G8-E-...-S1G9**
For motor controller CMMT-ST/CMMO-ST				
	**Straight plug** • Min. bending radius: 68 mm • Suitable for energy chains • Ambient temperature: −40 … +80°C	1.5	☆ **1451586**	**NEBM-M12G8-E-1.5-LE8**
		2.5	☆ **1451587**	**NEBM-M12G8-E-2.5-LE8**
		5.0	☆ **1451588**	**NEBM-M12G8-E-5-LE8**
		7.0	☆ **1451589**	**NEBM-M12G8-E-7-LE8**
		10.0	☆ **1451590**	**NEBM-M12G8-E-10-LE8**
		X length[1)]	**1451591**	**NEBM-M12G8-E-...-LE8**
	**Angled plug** • Min. bending radius: 68 mm • Suitable for energy chains • Ambient temperature: −40 … +80°C	1.5	☆ **1451674**	**NEBM-M12W8-E-1.5-LE8**
		2.5	☆ **1451675**	**NEBM-M12W8-E-2.5-LE8**
		5.0	☆ **1451676**	**NEBM-M12W8-E-5-LE8**
		7.0	☆ **1451677**	**NEBM-M12W8-E-7-LE8**
		10.0	☆ **1451678**	**NEBM-M12W8-E-10-LE8**
		X length[1)]	**1451679**	**NEBM-M12W8-E-...-LE8**

1) Maximum 25 m. Available in 0.1 m increments.

Note

Angled cables and leads can protrude into the area of the axis/drive!



Festo core product range	★	Generally ready for dispatch from the factory within 24 hours
	☆	Generally ready for dispatch from the factory within 5 days