

Stepper motors EMMS-ST

FESTO



Stepper motors EMMS-ST

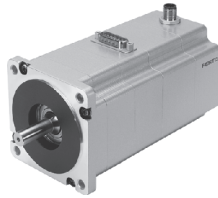
Key features

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Everything from a single source

Stepper motors EMMS-ST

→ 4



- 2-phase hybrid technology
- Optionally integrated encoder for "Servo Lite operation" (closed loop)
- Sinusoidal current impressing
- Optionally with holding brake
- Protection class: IP54



Gear unit EMGA-SST

→ 13



- Planetary gear unit
- Gear ratio $i = 3$ and 5 , available ex-stock
- Other ratios and versions on request
- Life-time lubrication
- Protection class: IP54

Motor controller CMMS-ST

→ Internet: cmms-st



- Position controller with setpoint specifications for position, speed and torque
- "Servo Lite operation" (closed loop) with optional encoder, in other words no step losses, current following errors are corrected
- Interfaces:
 - I/O interface
 - CANopen
 - Profibus DP
 - DeviceNet

Power supply units SVG

→ Internet: svg



- Sturdy mechanical system
- Input voltage 230 V AC/115 V AC
- Output voltage 24, 48 V DC
- Output current 5, 10, 20 A

Motor and encoder cables NEBM

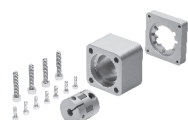
→ 14



- Can be used in a wide temperature range
- Screened cables
- Suitable for use with energy chains
- Protection class IP65

Axial kits EAMM

→ Internet: eamm



- Defined kits for all electro-mechanical axes from Festo

PROFIBUS®, DeviceNet®, CANopen® is a registered trademark of its respective trademark holder in certain countries.

Stepper motors EMMS-ST

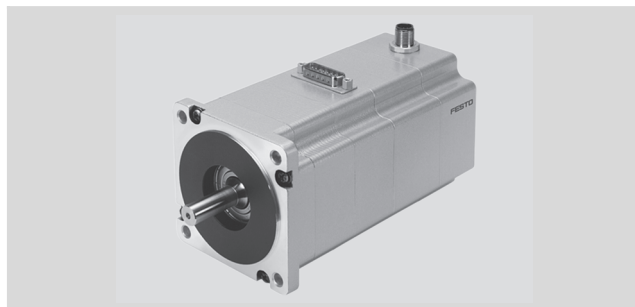
Type codes

		EMMS	–	ST	–	42	–	S	–	SEB	–	G2
Type												
EMMS	Motor											
Motor type												
ST	Stepper motor											
Flange dimensions												
28	28 mm											
42	42 mm											
57	57 mm											
87	87 mm											
Overall length options												
S	Small											
M	Medium											
L	Large											
Additional function												
S	Straight connection											
E	Encoder											
B	Brake											
Generation												
G2	Second generation											

Stepper motors EMMS-ST

Technical data

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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]	6,000	1,740
Holding torque	[Nm]	0.09	0.5
Stepper angle	[°]	1.8 ±5%	1.8 ±5%
Winding resistance	[Ω]	2.3 ±15%	1.75 ±10%
Winding inductance	[mH]	1.4	5.4
Output mass moment of inertia	[kgcm ²]	0.018/0.025 ²⁾	0.082/0.095 ²⁾
Radial load on shaft	[N]	20	20
Axial load on shaft	[N]	7	7
Mass moment of inertia of rotor	[kgcm ²]	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	[kgcm ²]	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]	2,720	1,940
Holding torque	[Nm]	0.8	1.4
Stepper angle	[°]	1.8 ±5%	
Winding resistance	[Ω]	0.15 ±10%	0.25 ±10%
Winding inductance	[mH]	0.5	0.95
Output mass moment of inertia	[kgcm ²]	0.29/0.30 ²⁾	0.48/0.5 ²⁾
Radial load on shaft	[N]	52	
Axial load on shaft	[N]	10	
Mass moment of inertia of rotor	[kgcm ²]	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	[kgcm ²]	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

Stepper motors EMMS-ST

Technical data

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]	2,130	550	430
Holding torque	[Nm]	2.5	5.9	9.3
Stepper 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 mass moment of inertia	[kgcm ²]	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	[kgcm ²]	1	1.9	3
Brake				
Operating voltage	[V DC]	24 ±10%		
Power	[W]	11		
Holding torque	[Nm]	2		
Mass moment of inertia	[kgcm ²]	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		
Encoder, optical		
Operating voltage	[V DC]	5
Pulses/revolution	[1/rev]	500
Zero pulse		Yes
Line driver		RS422 protocol

Weight [g]							
Size	28	42	57-S	57-M	87-S	87-M	87-L
Product weight	320	360	870	1,100	1,950	3,050	4,200
With encoder	380	450	970	1,200	2,100	3,200	4,350
With brake	320	540	1,090	1,320	2,350	3,450	4,600
With encoder and brake	380	600	1,150	1,380	2,500	3,600	5,000

Operating and environmental conditions							
Size	28	42	57-S	57-M	87-S	87-M	87-L
Insulation protection class	B						
Heat class to EN 60034-1	B						
Rated class to EN 60034-1	S1						
Protection class: Motor shaft	IP54						
Protection class: Motor housing	IP65	IP54					
Ambient temperature [°C]	−10 ... +50						
Storage temperature [°C]	−20 ... +70						
Relative air humidity (non-condensing) [%]	45 ... 80						
CE marking (see declaration of conformity)	To EU EMC Directive ¹⁾						
Certification	–	c UL us - Recognized (OL)					
	C-Tick						
Note on materials	RoHS-compliant						

1) For information about the applicability of the component see the manufacturer's EC declaration of conformity at: www.festo.com → Support → User documentation.

If the component is subject to restrictions on usage in residential, office or commercial environments or small businesses, further measures to reduce the emitted interference may be necessary.

Stepper motors EMMS-ST

Technical data

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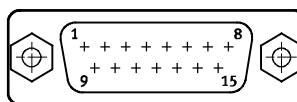
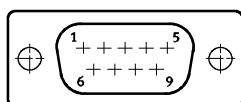
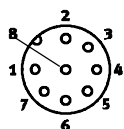
Pin allocation

Motor connection

Size 28

Size 42, 57

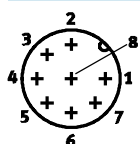
Size 87



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	–

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.

Encoder connection



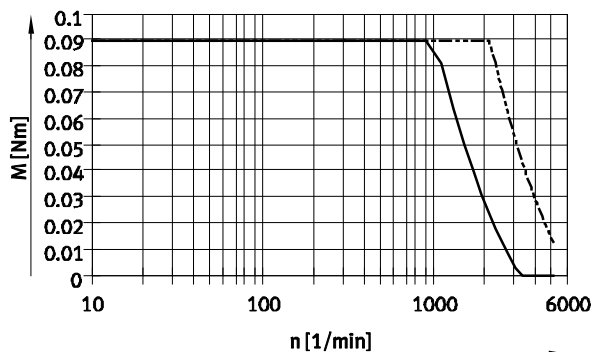
Pin	Function
1	Signal trace A
2	Signal trace A/
3	Signal trace B
4	Signal trace B/
5	0 V
6	Signal trace N
7	Signal trace N/
8	5 V

Stepper motors EMMS-ST

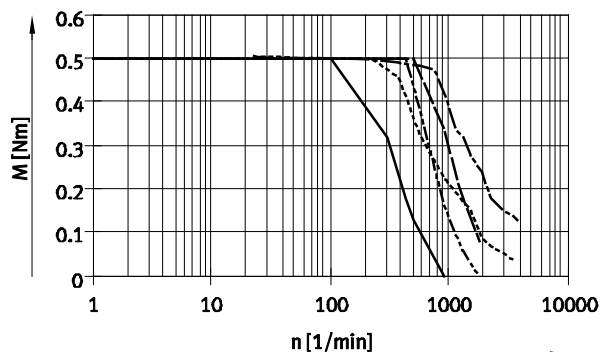
Technical data

Torque M as a function of rotational speed n

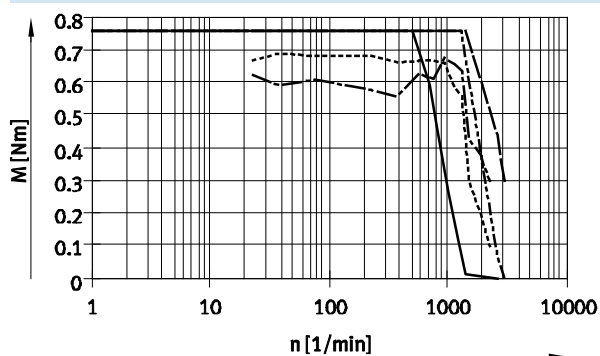
EMMS-ST-28



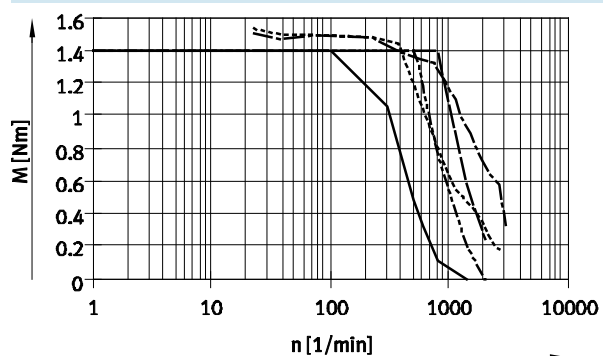
EMMS-ST-42



EMMS-ST-57-S



EMMS-ST-57-M



- 24 V DC
- - - 48 V DC
- 72 V DC
- - - 24 V DC 1/4 step
- - - 48 V DC 1/4 step



Note

The characteristic curves apply in combination with the motor controller CMMS-ST.

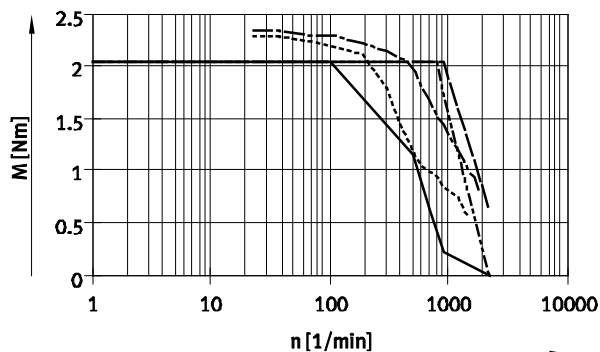
Stepper motors EMMS-ST

Technical data

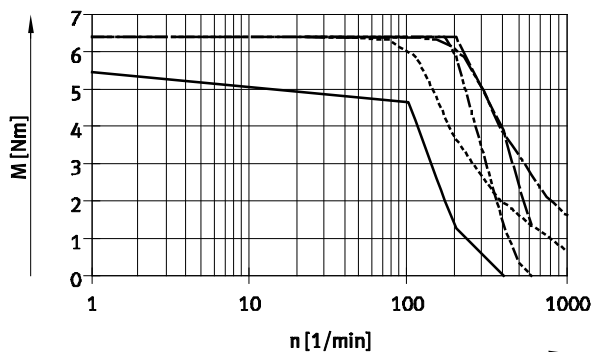
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Torque M as a function of rotational speed n

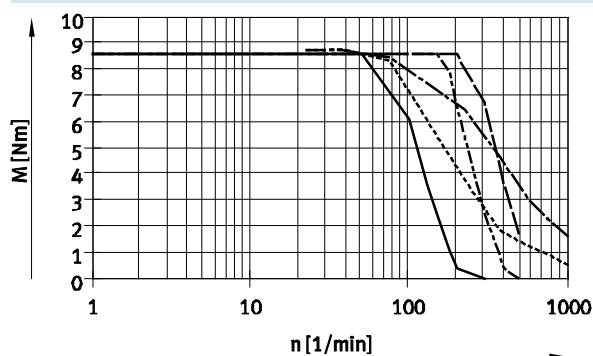
EMMS-ST-87-S



EMMS-ST-87-M



EMMS-ST-87-L



- 24 V DC
- - - 48 V DC
- · - 72 V DC
- 24 V DC 1/4 step
- · - 48 V DC 1/4 step

 **Note**

The characteristic curves apply in combination with the motor controller CMMS-ST.

The size EMMS-ST-87 is operated with the motor controller CMMS-ST with max. 8A.

Stepper motors EMMS-ST

Technical data

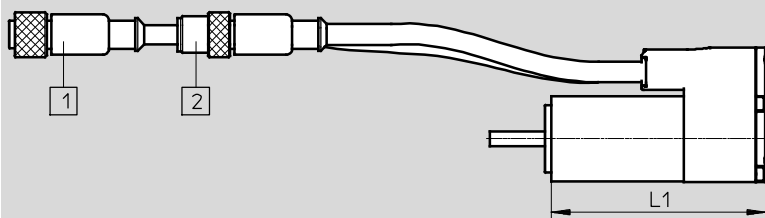
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Dimensions

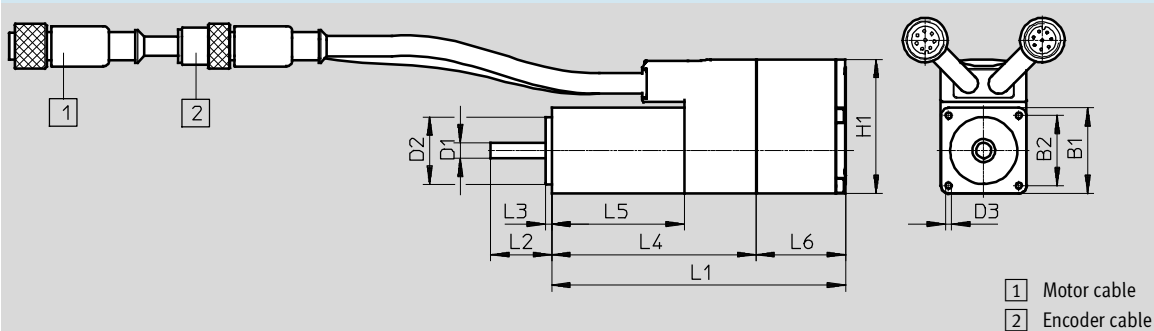
Download CAD data → www.festo.com

Size 28

EMMS-ST-...-S/SE



EMMS-ST-...-SB/SEB



Type	B1	B2	D1 Ø	D2 Ø	D3	H1
	±1	±0.2	-0.013	-0.03		
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	L3	L4	L5	L6
		±1		±1	±1	±0.5
EMMS-ST-28-L-S	70±1	20	2	67	43	29
EMMS-ST-28-L-SE						
EMMS-ST-28-L-SB	96±1.5					
EMMS-ST-28-L-SEB						

Stepper motors EMMS-ST

Technical data

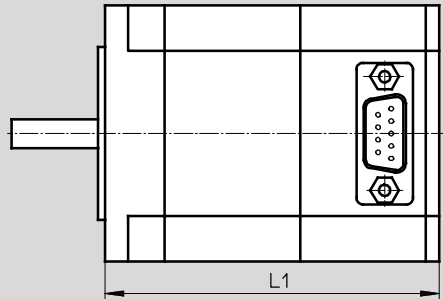
FESTO

Dimensions

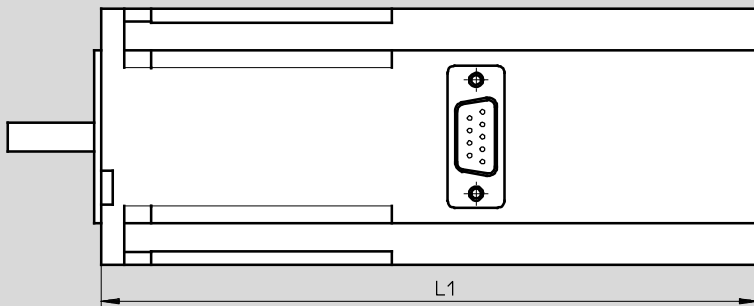
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Sizes 42, 57, 87

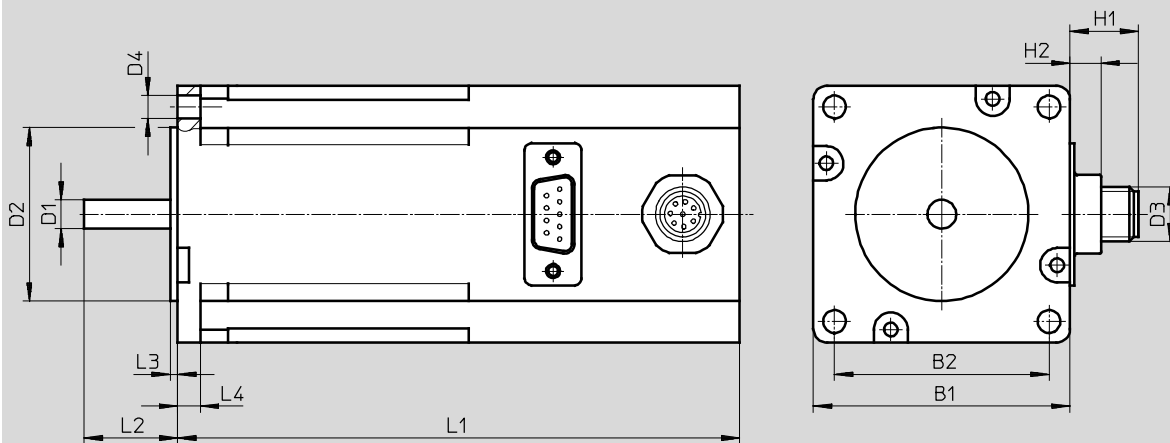
EMMS-ST-...-S



EMMS-ST-...-SB

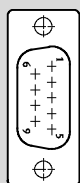


EMMS-ST-...-SE/SEB

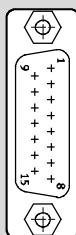


Plug pattern

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



15-pin Sub-D plug
with size 87



Stepper motors EMMS-ST

Technical data

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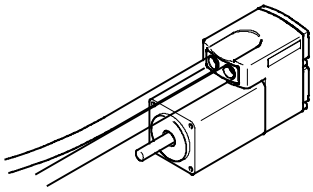
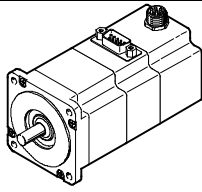
Type	B1	B2 ±0.2	D1 Ø	D2 Ø	D3	D4 Ø
EMMS-ST-42-S-S-G2	42.3	31	5-0.012	22-0.05	–	M3x4.5
EMMS-ST-42-S-SE-G2					M12	
EMMS-ST-42-S-SB-G2					–	
EMMS-ST-42-S-SEB-G2					M12	
EMMS-ST-57-S-S-G2	56.4	47.14	6.35-0.013	38.1±0.025	–	5
EMMS-ST-57-S-SE-G2					M12	
EMMS-ST-57-S-SB-G2					–	
EMMS-ST-57-S-SEB-G2				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

Stepper motors EMMS-ST

Technical data

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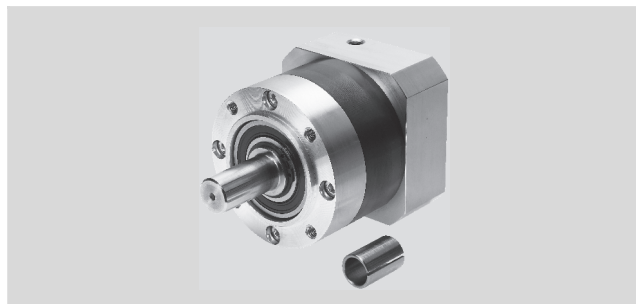
Ordering data					
	Size	Variant			Part No. Type
		Basic design	With encoder	With brake	
	28	■			1451384 EMMS-ST-28-L-S
			■		1430663 EMMS-ST-28-L-SE
				■	1451383 EMMS-ST-28-L-SB
			■	■	1451382 EMMS-ST-28-L-SEB
	42	■			1370470 EMMS-ST-42-S-S-G2
			■		1370471 EMMS-ST-42-S-SE-G2
				■	1370472 EMMS-ST-42-S-SB-G2
			■	■	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
		■			1370482 EMMS-ST-87-S-S-G2
	87		■		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

Stepper motors EMMS-ST

Accessories

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Gear unit EMGA



General technical data							
For motor size		42		57		87	
Gear unit type		EMGA-40-P-G...		EMGA-60-P-G...		EMGA-80-P-G...	
Gear ratio	[i]	3	5	3	5	3	5
Continuous output torque ¹⁾	[Nm]	11	14	22	22	85	110
Max. output torque	[Nm]	17.6	22	22	22	136	176
Torsional rigidity	[Nm/arcmin]	1		2.3		6	
Torsional backlash	[deg]	0.4		0.27		0.15	
Moment of inertia ²⁾	[kgcm ²]	0.031	0.019	0.135	0.078	0.77	0.45
Efficiency	[%]	96					
Operating temperature ³⁾	[°C]	-25 ... +90					
Protection class		IP54					

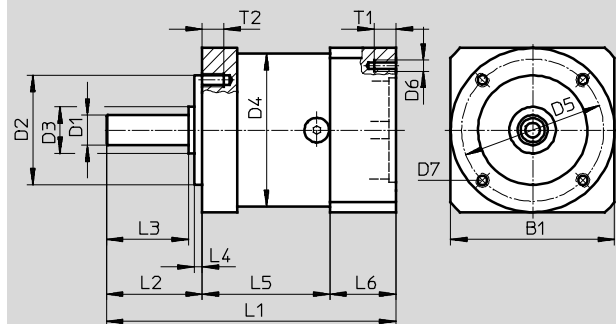
1) At the output shaft

2) In relation to the drive shaft

3) Note the temperature range of the motor

Dimensions

Download CAD data → www.festo.com



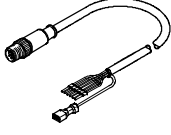
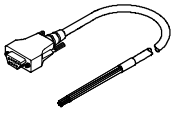
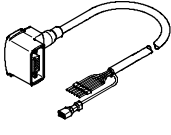
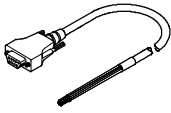
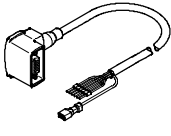
For size	B1	D1 Ø h7	D2 Ø h7	D3 Ø	D4 Ø	D5 Ø	D6	D7	L1 ±1.5	L2 26±0.6	L3 ±0.2	L4 ±0.2	L5	L6	T1	T2
42	40	10	26	12	40	34	Ø3.4	M4	92.5	26±0.6	23	2	39	27.5	5	6
57	60	11	40	17	60	52	M4	M5	106	35±0.8	30	3	47	24	8	8
87	90	20	60	25	80	70	M5	M6	135.5	40±0.8	36	3	60	35.5	12	10

Ordering data			
For size	Gear ratio	Part No.	Type
42	3	549428	EMGA-40-P-G3-SST-42
	5	549429	EMGA-40-P-G5-SST-42
57	3	549430	EMGA-60-P-G3-SST-57
	5	549431	EMGA-60-P-G5-SST-57
87	3	549432	EMGA-80-P-G3-SST-87
	5	549433	EMGA-80-P-G5-SST-87

Stepper motors EMMS-ST

Accessories

FESTO

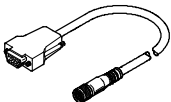
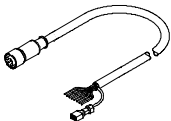
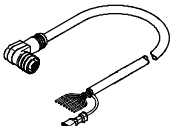
Ordering data				
	Description	Cable length [m]	Part No.	Type
Motor cable				
For EMMS-ST-28				
	Straight plug			
	– Min. bending radius: 62 mm – Suitable for use with energy chains – Ambient temperature: –40 ... +80 °C	1.5	1449600	NEBM-M12G8-E-1.5-Q5-LE6
		2.5	1449601	NEBM-M12G8-E-2.5-Q5-LE6
		5	1449602	NEBM-M12G8-E-5-Q5-LE6
		7	1449603	NEBM-M12G8-E-7-Q5-LE6
		10	1449604	NEBM-M12G8-E-10-Q5-LE6
		X length ¹⁾	1449605	NEBM-M12G8-E-...-Q5-LE6
For EMMS-ST-42/57				
	Straight plug			
	– Min. bending radius: 58 mm – Suitable for use with energy chains – Ambient temperature: –40 ... +70 °C	5	550740	NEBM-S1G9-E-5-LE6
		10	550741	NEBM-S1G9-E-10-LE6
		15	550742	NEBM-S1G9-E-15-LE6
		X length ¹⁾	550743	NEBM-S1G9-E-...-LE6
	Angled plug			
	– Min. bending radius: 62 mm – Suitable for use with energy chains – Ambient temperature: –40 ... +80 °C	1.5	1450736	NEBM-S1W9-E-1.5-Q5-LE6
		2.5	1450737	NEBM-S1W9-E-2.5-Q5-LE6
		5	1450738	NEBM-S1W9-E-5-Q5-LE6
		7	1450739	NEBM-S1W9-E-7-Q5-LE6
		10	1450740	NEBM-S1W9-E-10-Q5-LE6
		X length ¹⁾	1450741	NEBM-S1W9-E-...-Q5-LE6
For EMMS-ST-87				
	Straight plug			
	– Min. bending radius: 70 mm – Suitable for use with energy chains – Ambient temperature: –30 ... +70 °C	5	550744	NEBM-S1G15-E-5-LE6
		10	550745	NEBM-S1G15-E-10-LE6
		15	550746	NEBM-S1G15-E-15-LE6
		X length ¹⁾	550747	NEBM-S1G15-E-...-LE6
	Angled plug			
	– Min. bending radius: 80 mm – Suitable for use with 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	1450945	NEBM-S1W15-E-5-Q7-LE6
		7	1450946	NEBM-S1W15-E-7-Q7-LE6
		10	1450947	NEBM-S1W15-E-10-Q7-LE6
		X length ¹⁾	1450948	NEBM-S1W15-E-...-Q7-LE6

1) Max. 25 m

Stepper motors EMMS-ST

Accessories

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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 use with energy chains – Ambient temperature: –40 ... +70 °C	5	550748	NEBM-M12G8-E-5-S1G9
		10	550749	NEBM-M12G8-E-10-S1G9
		15	550750	NEBM-M12G8-E-15-S1G9
		X length ¹⁾	550751	NEBM-M12G8-E-...-S1G9
For motor controller CMMO-ST				
	Straight plug			
	– Min. bending radius: 68 mm – Suitable for use with 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	1451588	NEBM-M12G8-E-5-LE8
		7	1451589	NEBM-M12G8-E-7-LE8
		10	1451590	NEBM-M12G8-E-10-LE8
		X length ¹⁾	1451591	NEBM-M12G8-E-...-LE8
	Angled plug			
	– Min. bending radius: 68 mm – Suitable for use with 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	1451676	NEBM-M12W8-E-5-LE8
		7	1451677	NEBM-M12W8-E-7-LE8
		10	1451678	NEBM-M12W8-E-10-LE8
		X length ¹⁾	1451679	NEBM-M12W8-E-...-LE8

1) Max. 25 m