Motor controller CMMO-ST

FESTO

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

Key features

At a glance

- The motor controller CMMO-ST is an open- and closed-loop position controller
- Separate load and logic supply
- Supports the safe torque off (STO) safety function
- Easy to control via:
  – I/O interface
  – IO-Link or I-Port
  – Modbus TCP

- Monitoring of freely defined positions and torque ranges
  Backup file enables seamless device replacement
- H-rail mounting possible
- Encoder option (closed loop), in other words no step losses, following errors are corrected

Parameterisation possible via:
- Configuration package FCT (Festo Configuration Tool)
- Ethernet interface with integrated web server

Communication system IO-Link

IO-Link

IO-Link is a standardised I/O technology (IEC 61131-9) which enables communication with sensors and actuators.
This is a form of point-to-point communication.
The data profile FHPP is transmitted via the physical interface.

Specific I-Port interface from Festo

The I-Port interface is based on IO-Link technology and enables communication with sensors and actuators.
The advantage is that the connected devices are automatically detected by Festo (plug and work).
The data profile FHPP is transmitted via the physical interface.
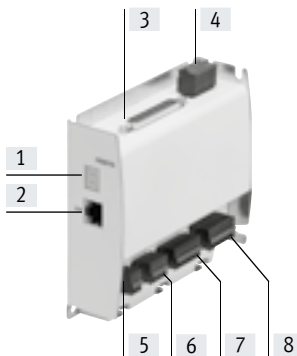
Communication system Modbus TCP

Modbus

Modbus TCP is an open communication protocol (IEC 61158) based on the master-slave architecture. It is an established standard for communication via Ethernet-TCP/IP in automation technology.

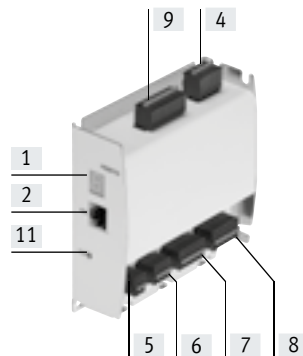The data profile FHPP is transmitted via the physical interface.

Description of the interfaces
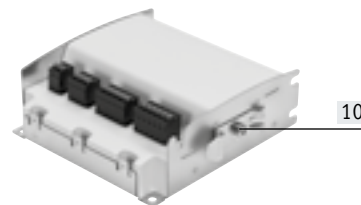
With I/O interface

With IO-Link interface

[1]	7-segment display	[5]	Reference switch	[9]	IO-Link interface
[2]	Ethernet interface (RJ45)	[6]	Safety function STO	[10]	Mounting bracket for fitting on an H-rail
[3]	I/O interface	[7]	Encoder	[11]	Status of IO-Link connection
[4]	Power supply	[8]	Motor		

For controlling

Electric cylinder EPCO	Toothed belt axis ELGR	Rotary drive ERMO	Stepper motor EMMS-ST

IO-Link® and Modbus® are registered trademarks of the respective trademark holder in certain countries.

Key features

System overview

Fieldbus modules CTEU serve as an interface between the PLC controller and the motor controller CMMO-ST. This is then integrated into the control systems of various manufacturers using different bus nodes.
The following protocols are supported using the appropriate module:
- CANopen
- DeviceNet
- EtherCAT
- PROFIBUS
- PROFINET

PLC

Fieldbus

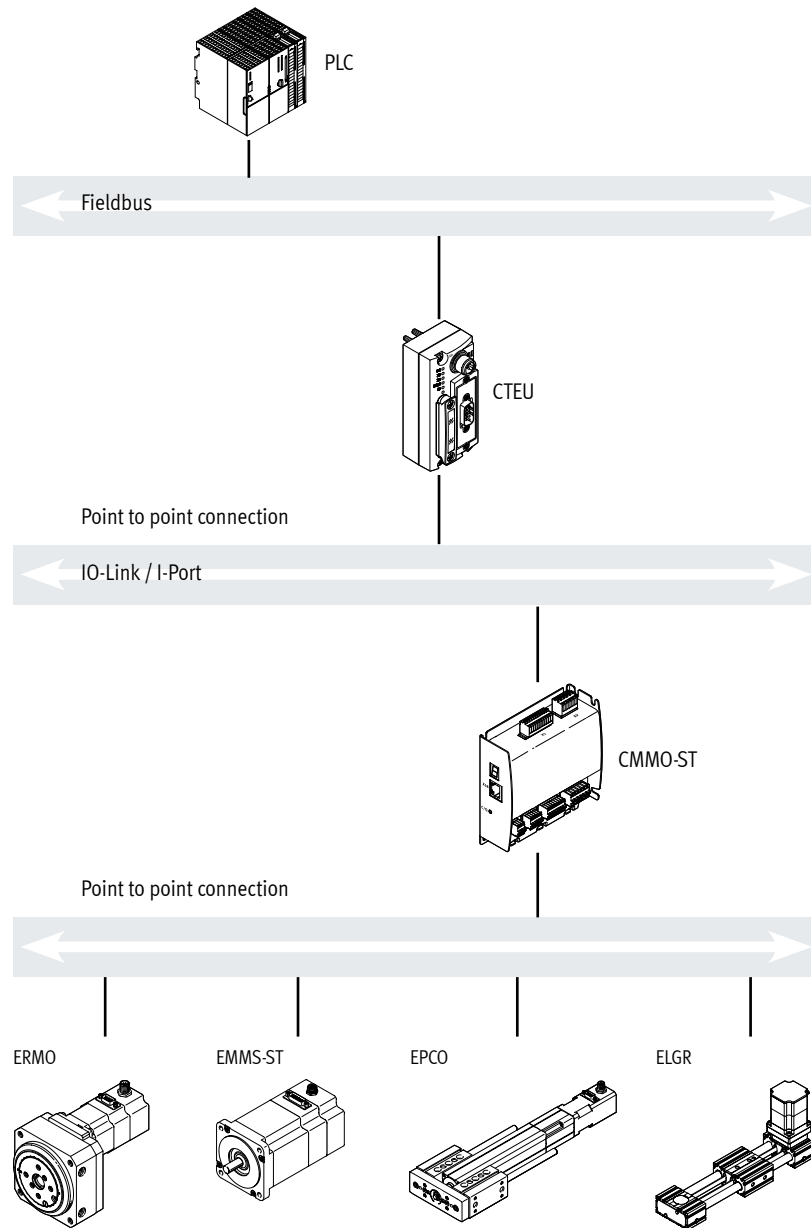CTEU

Point to point connection

IO-Link / I-Port

CMMO-ST

Point to point connection

For controlling:
Electric cylinder EPCO
Toothed belt axis ELGR
Rotary drive ERMO
Stepper motor EMMS-ST

ERMO   EMMS-ST   EPCO   ELGR

Key features

FCT software – Festo Configuration Tool

Software platform for electric drives from Festo

- All drives in a system can be managed and saved in a common project
- Project and data management for all supported device types
- Simple to use thanks to graphically supported parameter entry
- Universal mode of operation for all drives
- Work offline at your desk or online at the machine

Mechanical reference positions and limit positions

- Reference positions can be either edited or taught in
- Flexible adaptation to installation conditions
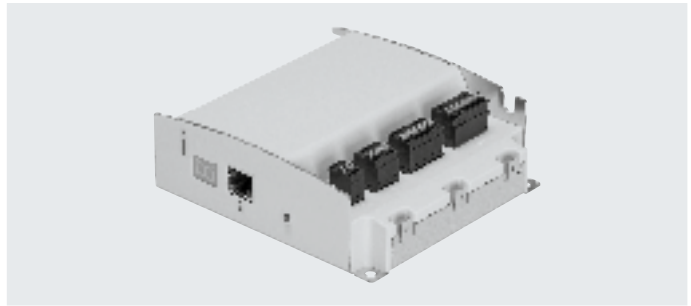- Settings are displayed clearly

Position set table

- Up to 64 position sets ensure flexibility in positioning
- Absolute or relative positioning values can be used
- The following parameters can be set flexibly for each application:
  - Position
  - Speed
  - Acceleration
  - Braking ramps
- Force control
- Complete function test

Type codes

001	Series	
CMMO	Motor controller	

002	Motor type	
ST	Stepper motor ST	

003	Nominal current	
C5	5 A	

004	Nominal input voltage	
1	24 V DC	

005	Bus protocol/activation	
DIO	Digital I/O interface	
LK	IO-Link®	

006	Switching input/output	
P	PNP	
N	NPN	

Data sheet

c (UL) US LISTED

General technical data

Type CMMO-ST-...		-DIO	-LK
Operating mode		Cascade controller with	
		PI speed controller	
		PI current regulator	
		P position controller	
		PWM-MOSFET power output stage	
Operating mode			
Open-loop operation		Sinusoidal current form	
Closed-loop operation		Controlled sinusoidal current, cascade controller for speed and position	
Display		7-segment display	
Rotor position sensor		Encoder	
Encoder interface input		RS422	
Parameterisation interface		Ethernet	
Ethernet, supported protocols		TCP/IP	TCP/IP, Modbus TCP
Protocol		–	IO-Link
			I-Port
			Modbus TCP
Position sets		32	64
Communication profile		–	FHPP
Number of digital logic inputs		11	1
Number of digital logic outputs		11	3
Characteristics of digital logic outputs		Freely configurable in some cases	
		Not galvanically isolated	
Adjustable current reduction		Via software	
Nominal current setting		Via software	
Braking resistor	[Ω]	15	
Pulse power of braking resistor	[kVA]	0.1	
Mains filter		Integrated	
Type of mounting		Screwed onto connecting plate, lying down or upright	
		With H-rail	
Product weight	[g]	290	

Data sheet

Electrical data

Type CMMO-ST-...		-DIOP	-DION	-LKP
General				
Max. DC link voltage	[V DC]	28		31
Nominal output current	[A]	5.7		
Load voltage				
Nominal voltage	[V DC]	24 ±15%		
Nominal current	[A]	6		
Peak current	[A]	8		
Logic supply				
Nominal voltage	[V DC]	24 ±15%		
Nominal current	[A]	0.3		
Operating range of logic input	[V]	24		
Max. current per output (digital logic outputs)	[mA]	100		
Switching logic, input/output		PNP	NPN	PNP

Safety data

Safety function to EN 61800-5-2		Safe torque off (STO)
Performance level (PL) to EN ISO 13849-1		Category 3, Performance Level e
Safety Integrity Level (SIL) to EN 61800-5-2, EN 62061, EN 61508		SIL 3 / SIL CL 3
Certificate issuing authority		German Technical Control Board (TÜV) 01/205/5165.01/14
Proof test interval		20a
PFH		1.3×10^{-10}
Diagnostic coverage	[%]	90
Safe failure fraction (SFF)	[%]	99.8
Hardware fault tolerance		1
CE marking (see declaration of conformity)		In accordance with EU EMC Directive[1]
		In accordance with EU Machinery Directive
Shock resistance		To EN 60068-2-29
Vibration resistance		To EN 60068-2-6

[1] For information about the area of use, see the EC declaration of conformity at: 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.

Technical data – CMMO-ST-...-LK (IO-Link)

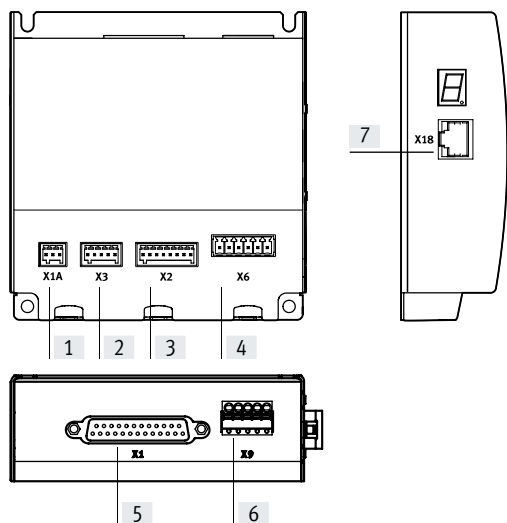|		
Connection technology		Cage Clamp
Protocol version		Device V1.1
Communication mode		COM3 (230.4 kBaud)
Number of ports		Device 1
Process data width OUT		8 or 16 bytes parameterisable
		FHPP or FHPP+FPC parameterisable
Process data width IN		8 or 16 bytes parameterisable
		FHPP or FHPP+FPC parameterisable
Min. cycle time	[ms]	1

Data sheet

Operating and environmental conditions		
Characteristics of digital logic outputs		Not galvanically isolated
Characteristics of logic inputs		Galvanically connected to logic potential
Logic input specification		Based on IEC 61131-2
Degree of protection		IP40
Protective function		I^2t monitoring
		Following error monitoring
		Software end-position detection
		Voltage failure detection
		Current monitoring
		Temperature monitoring
Ambient temperature	[°C]	0 ... +50
UL ambient temperature	[°C]	0 ... +40
Storage temperature	[°C]	−25 ... +75
Relative humidity	[%]	0 ... 90 (non-condensing)
Certification		c UL us listed (OL)
		RCM compliance mark
CE marking (see declaration of conformity)		In accordance with EU EMC Directive[1]
		In accordance with EU Machinery Directive
KC mark		KC-EMV
Note on materials		RoHS-compliant

[1] For information about the area of use, see the EC declaration of conformity at: 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 for CMMO-ST-...-DIO

[5] I/O interface, 25-pin Sub-D plug

Pin	Function
1	Input 1
2	Input 2
3	Input 3
4	Input 4
5	Input 5
6	Input 6
7	Input 7
8	Input 8
9	Input 9
10	Input 10
11	Input 11
12	Output 1
13	Output 2
14	Output 3
15	Output 4
16	Output 5
17	Output 6
18	Output 7
19	Output 8
20	Output 9
21	Output 10
22	Output 11
23	n.c.
24	+24 V (logic output)
25	0 V

[1] Reference switch

Pin	Function
1	+24 V (logic output)
2	Signal
3	0 V

[2] Safety function STO

Pin	Function
1	+24 V (logic output)
2	STO 1
3	STO 2
4	Diagnostics 1
5	Diagnostics 2

[6] Power supply

Pin	Function
1	n.c.
2	n.c.
3	+24 V (logic)
4	0 V
5	+24 V (load)

[3] Encoder

Pin	Function
1	A
2	A/
3	B
4	B/
5	N
6	N/
7	+5 V (output)
8	0 V

[7] Ethernet interface

Pin	Function
1	Tx+ (Transmit +)
2	Tx− (Transmit −)
3	Rx+ (Receive +)
4	n.c.
5	n.c.
6	Rx− (Receive −)
7	n.c.
8	n.c.

[4] Motor

Pin	Function
1	String A
2	String A/
3	String B
4	String B/
5	Brake +24 V (switched output)
6	Brake 0 V

Data sheet

Pin allocation for CMMO-ST-...-LK

[5] I/O interface with IO-Link

Pin	Function
2	0 V
3	Parameterisable output 2
4	Parameterisable output 1
5	Ready/Error
6	Controller enable
7	n.c.
8	n.c.
9	L– (0 V IO-Link)
10	C/Q (IO-Link Signal)
11	L+ (+24 V supply to IO-Link)

[6] Power supply

Pin	Function
1	n.c.
2	n.c.
3	+24 V (logic)
4	0 V
5	+24 V (load)

[7] Ethernet interface

Pin	Function
1	Tx+ (Transmit +)
2	Tx– (Transmit –)
3	Rx+ (Receive +)
4	n.c.
5	n.c.
6	Rx– (Receive –)
7	n.c.
8	n.c.
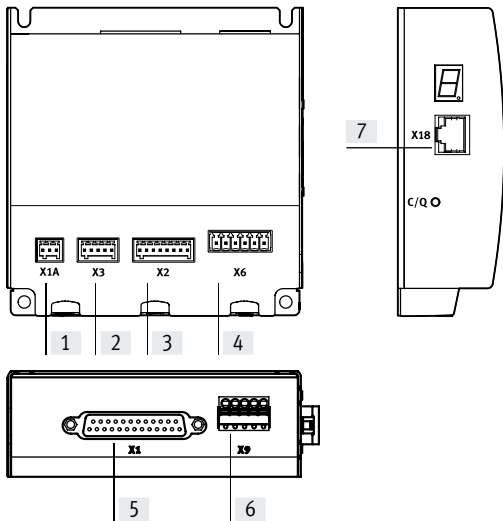
[1] Reference switch

Pin	Function
1	+24 V (logic output)
2	Signal
3	0 V

[2] Safety function STO

Pin	Function
1	+24 V (logic output)
2	STO 1
3	STO 2
4	Diagnostics 1
5	Diagnostics 2

[3] Encoder

Pin	Function
1	A
2	A/
3	B
4	B/
5	N
6	N/
7	+5 V (output)
8	0 V

[4] Motor

Pin	Function
1	String A
2	String A/
3	String B
4	String B/
5	Brake +24 V (switched output)
6	Brake 0 V

[5] I/O interface with IO-Link

Pin	Function
1	+24 V (logic output)

Data sheet

Minimum distance between two motor controllers
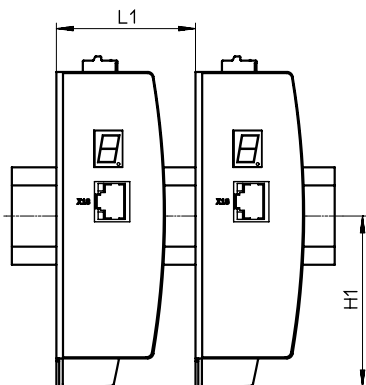
Type	L1	H1
CMMO-ST-...	41	61.35

Dimensions

Download CAD data ➔ www.festo.com
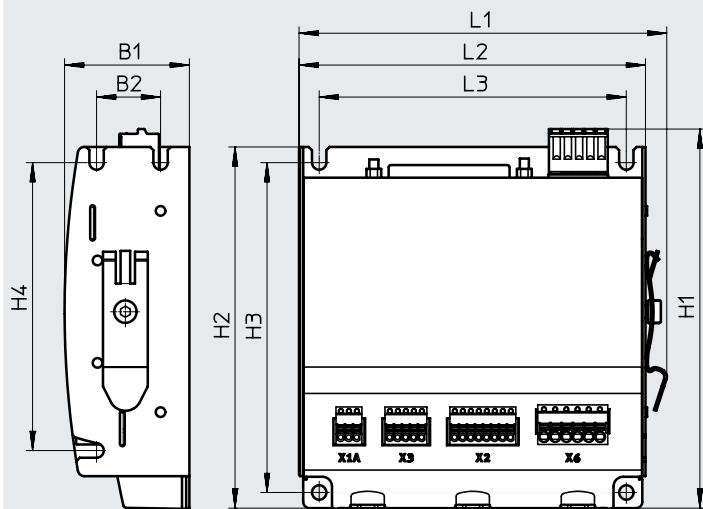
Type	B1	B2	H1	H2	H3	H4	L1	L2	L3
CMMO-ST-...	39	20	118.7	113.1	103.1	90	115	108.8	96

☆ Core product range

Ordering data
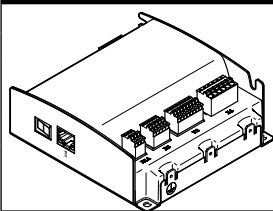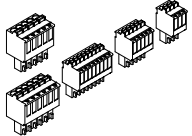
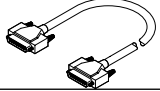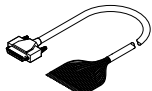| Motor controller	Description	Part no.	Type
	With I/O interface		
	Switching input/output PNP	☆ 1512316	**CMMO-ST-C5-1-DIOP**
	Switching input/output NPN	☆ 1512317	**CMMO-ST-C5-1-DION**
	With IO-Link		
	Switching input/output PNP	☆ 1512320	**CMMO-ST-C5-1-LKP**
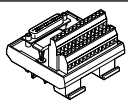
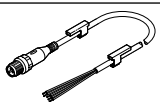|		
Festo core product range	★	Generally ready for dispatch from the factory within 24 hours
	☆	Generally ready for dispatch from the factory within 5 days

Accessories

Ordering data

	Description	Part no.	Type
Assortment of plugs			
	Assortment of plugs for motor cable, encoder cable, power supply, reference switch, safety function STO Additional control cable for I/O interface, see below	☆ 576005	NEKM-C-10[1]
	Assortment of plugs for motor cable, encoder cable, power supply, reference switch, safety function STO and IO-Link	☆ 2948940	NEKM-C-14[1]

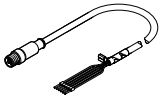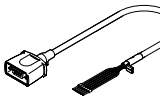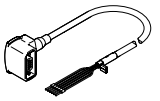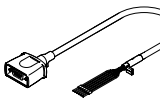1) Plugs are included in the scope of delivery of the motor controller.
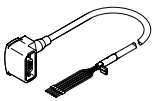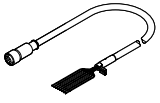
Ordering data – Connection options from I/O interface to controller

	Description	Cable length [m]	Part no.	Type
Connection block				
	Ensures simple and clear wiring. The connection to the motor controller is established via the connecting cable NEBC-S1G25-K-....	–	8001371	NEFC-S1G25-C2W25-S7
Connecting cable				
	Connects the motor controller to the connection block.	1.0	8001374	NEBC-S1G25-K-1.0-N-S1G25
		2.0	8001375	NEBC-S1G25-K-2.0-N-S1G25
		5.0	8001376	NEBC-S1G25-K-5.0-N-S1G25
Control cable				
	Is connected to the motor controller. The other end comprises individual flying leads.	3.2	☆ 8001373	NEBC-S1G25-K-3.2-N-LE25
Plug				
	25-pin Sub-D plug. Each wire can be individually assembled using screw terminals.	–	☆ 8001372	NEFC-S1G25-C2W25-S6

Ordering data – Cables[1]

	Description	Cable length [m]	Part no.	Type
Connecting cable between fieldbus motor CTEU and motor controller CMMO-ST				
	• Min. bending radius: 75 mm • Suitable for energy chains • Ambient temperature: −25 ... +70 °C	1	569840	NEBU-LE5-K-1-M12G5

1) Other line variants available on request.

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 – Cables[1]

	For type	Description		Cable length [m]	Part no.	Type
Motor cable						
	EPCO-16 ERMO-12/-16 EMMS-ST-28	**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**
	EPCO-25/-40 ELGR-35 ERMO-25/-32 EMMS-ST-42/-57	**Straight plug** • Min. bending radius: 62 mm • Suitable for energy chains • Ambient temperature: −40 ... +80 °C		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**
	EPCO-25/-40 ELGR-35 ERMO-25/-32 EMMS-ST-42/-57	**Angled plug** • Min. bending radius: 62 mm • Suitable for 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**
				5.0	☆ 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**
	ELGR-45/-55 EMMS-ST-87	**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**
	ELGR-45/-55 EMMS-ST-87	**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**
Encoder cable						
	EPCO-16/-25/-40 ELGR-35/-45/-55 ERMO-12/-16/-25/-32 EMMS-ST-28/-42/-57/-87	**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**
	EPCO-25/-40 ERMO-25/-32 EMMS-ST-42/-57/-87	**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**

1) Other cable lengths on request.

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	☆	Generally ready for dispatch from the factory within 5 days