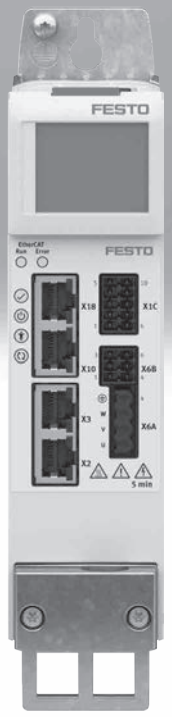
Servo drives CMMT-AS



Key features

At a glance

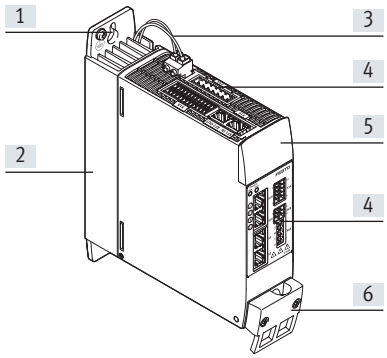
- Universal servo drive for PM-synchronous servo motors up to 2500 W
- Supports the motor series EMMT-AS, EMME-AS and EMMS-AS, as well as third-party motors
- Integrated single-phase/three-phase mains connection 230/400 V AC, mains filter and braking resistor, connection option for external braking resistor
- Precise force, speed and position control
- Motion from point-to-point to interpolated motion
- Comprehensively integrated protective functions for the servo drive, motor and axis with automatic motor shut-down/quick stop
- Bus protocols

EtherCAT. PROFINET® EtherNet/IP Modbus

  - Prepared device description files and function blocks for integration in PLC systems

- Configuration:
  - Automatically with the "Festo Automation Suite" as well as auto-tuning
  - Directly via fieldbus and PLC
  - Data backup concept via PLC or operating panel CDSB
- Supports digital absolute encoders (EnDat, Hiperface, Nikon-A) in the motor as well as incremental (A/B, Sin/Cos) displacement encoders on the axis
- Integrated safety functions:
  - Safe torque off (STO) up to SIL3/Cat. 4 PL e
  - Safe stop 1 (SS1) when using a suitable external safety relay unit and suitable circuitry for the servo drive
  - Safe brake control (SBC) up to SIL3/Cat. 3 PL e
  - Diagnostic outputs STA and SBA for feedback on the active safety function

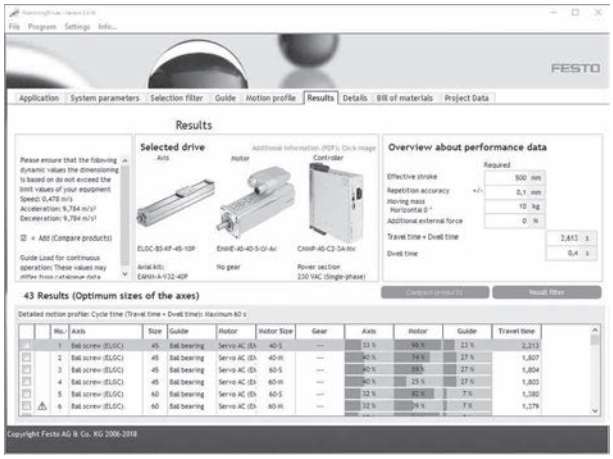
The technology in detail



[1] Elongated hole for mounting the servo drive on the control cabinet back wall
[2] Cooling element for dissipating heat. The internal braking resistor is housed in the cooling element
[3] Connection for braking resistor
[4] Connections
[5] Blind plate (optionally with plug-on operating panel CDSB
➔ page 14)
[6] Shield clamp and strain relief

PositioningDrives

Configuring electromechanical drives



Create the optimum drive package quickly and reliably. PositioningDrives calculates suitable combinations of electric axis, electric motor and servo drive using just a few application details. You can sort the results according to your specifications and obtain all the relevant data including the bill of materials and documentation for the selected combination. This avoids design errors and results in significantly improved energy efficiency for the system.

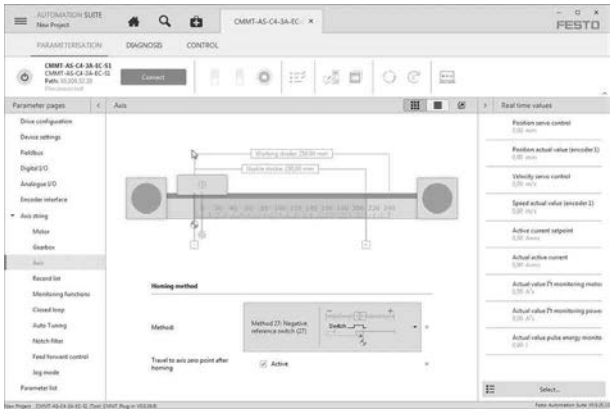
Key features

Library for EPLAN → www.festo.de/eplan

EPLAN macros for fast and reliable planning of electrical projects in combination with servo drives, motors and cables. This enables a high level of planning reliability, standardisation of documentation, without the need to create symbols, graphics and master data.

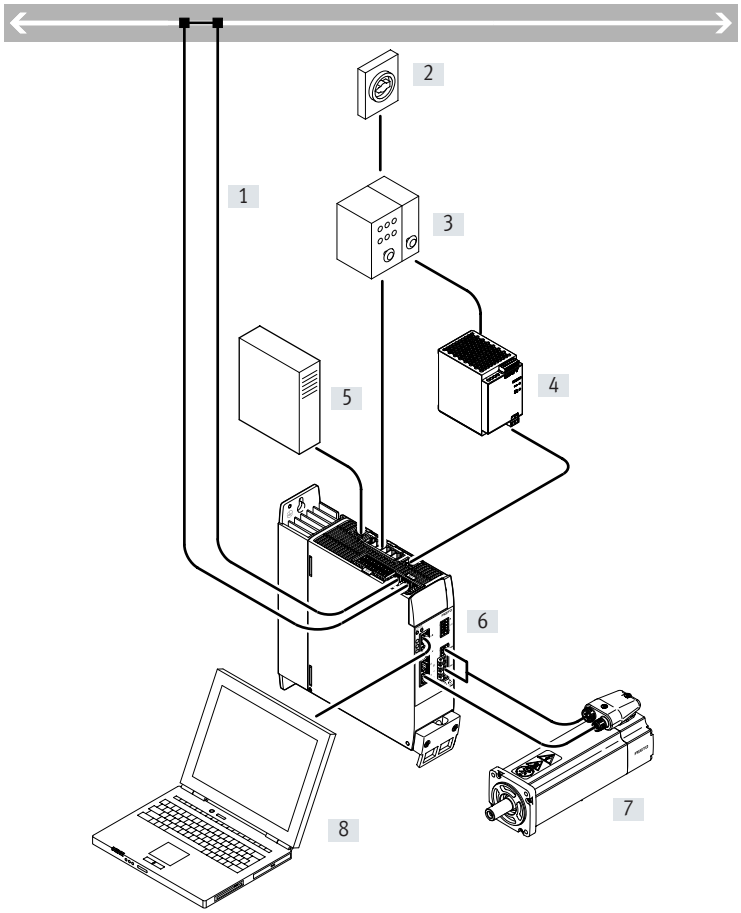
Festo Automation Suite

Parameterisation and programming software for electronic devices from Festo



- Parameterisation, programming and commissioning in a clear and user-friendly interface
- Optimum support for complex processes thanks to guided wizards (e.g. for commissioning, drive configuration, etc.)
- Fast access to required documents and additional information
- Easy integration of electric drives in the controller programming

System overview



[1] Bus/network
[2] Main switch
[3] Circuit breaker/fuses
[4] Fixed power supply unit for logic voltage supply 24 V DC (PELV)
[5] External braking resistor (optional)
[6] Servo drive CMMT-AS
[7] Servo motor
[8] PC with Ethernet connection for parameterisation

NEW

Type codes

001	Baureihe	
CMMT	Motorcontroller	

002	Motorart	
AS	AC-Synchron	

003	Nennstrom	
C2	2 A	
C3	3 A	
C4	4 A	
C5	5 A	
C7	7 A	
C12	12 A	

004	Nenneingangsspannung	
3A	230 V AC/50-60Hz	
11A	400 V AC	

005	Phasenanzahl	
	Einphasig	
P3	Dreiphasig	

006	Busprotokoll/Ansteuerung	
EC	EtherCAT	
EP	EtherNet/IP	
PN	PROFINET	

007	Sicherheitsfunktion	
S1	Standard safety	

Data sheet

Bus protocols

EtherCAT

PROFINET

EtherNet/IP

Modbus

General technical data

CMMT-AS-	C2-3A-...	C4-3A-...	C2-11A-...	C3-11A-...	C5-11A-...
Type of mounting	Mounting plate, screwed in				
Display	Green/yellow/red LED or operating panel CDSB with plain text message				
Controller operating mode	• Cascade controller • P position controller • PI speed controller • PI current regulator for F or M • Profile operation with record and direct mode • Interpolated mode via fieldbus • Homing/setup mode/auto-tuning				
Operating mode	• Field-oriented control, position resolution 24-bit/rev. • Sampling rate 16 kHz • PWM with 8 or 16 kHz, vector modulation with 3rd harmonic • Real-time data acquisition: – 2x input position capture – 2x output position trigger – 2x position encoder input – 1x SYNC interface for encoder emulation or encoder input				
Mounting position	Vertical				
Product weight [g]	1300	1400	2100	2100	2200

Bus protocols

Interface	EtherCAT	PROFINET RT/IRT	EtherNet/IP	Modbus TCP
Function	Bus connection incoming/outgoing			
Process interface	Interpolated mode CSP	AC1: Adjustable-speed drives	Adjustable-speed drives	Adjustable-speed drives
	Interpolated mode CSV	AC3: Drives with positioning function	Drives with positioning function	Drives with positioning function
	Interpolated mode CST	AC4: Synchronous servo application		
	Point-to-point mode PP			
	Point-to-point mode PV			
	Point-to-point mode PT			
	Homing mode HM			
	Record table with 128 entries			
Communication profile	CiA402	PROFIdrive	DriveProfile	DriveProfile
	CoE (CANopen over EtherCAT)	PROFIenergy		
	EoE (Ethernet over EtherCAT)			
Max. fieldbus transmission rate [Mbps]	100			
Connection type	2 x socket			
Connection technology	RJ45			

Data sheet

Electrical data						
CMMT-AS-		C2-3A-...	C4-3A-...	C2-11A-...	C3-11A-...	C5-11A-...
Output connection data						
Output voltage range	[V AC]	3x (0 – Input)				
Nominal current per phase	[A_{eff}]	2	4	1.7	2.5	5
Peak current per phase	[A_{eff}]	6	12	5.1	7.5	15
Max. peak current duration (at fs ≥ 5 Hz)	[s]	2				
Nominal power	[W]	350	700	800	1200	2500
Peak power	[W]	1000	2000	2400	3600	7500
Output frequency	[Hz]	0 ... 599				
Max. motor cable length[1]	[m]	25		50		
Load voltage AC						
Nominal operating voltage phases		Single-phase		Three-phase		
Input voltage range	[V AC]	100 –20% ... 230 +15%		200 –10% ... 480 +10%		
Nominal operating voltage	[V AC]	230		400		
Nominal current	[A_{eff}]	2.8	5.6	2	3	6
Peak current		8.4	16.8	6	9	18
Mains frequency	[Hz]	48 ... 62				
System voltage to EN 61800-5-1	[V]	300				
Max. short circuit current rating of the mains	[kA]	100				
Mains types of system earthing		TN, TT, IT				
Mains filter		Integrated				
Load voltage DC						
Input voltage range	[V DC]	80 ... 360		80 ... 700		
Max. DC link voltage	[V DC]	395		800		
Nominal current						
at 320 V DC	[A]	1.3	2.6	–	–	–
at 560 V DC	[A]	–	–	1.5	2.3	4.7
Logic supply						
Nominal voltage	[V DC]	24 ±20%				
Max. current consumption	[A]	0.5/2.3[2]				0.5/2.7[2]

1) Without external mains filter

2) Max. current at full expansion, with two position encoders, brake output and all I/Os with max. specified loads connected

Braking resistor						
CMMT-AS-		C2-3A-...	C4-3A-...	C2-11A-...	C3-11A-...	C5-11A-...
Integrated						
Resistance	[Ω]	100		130		
Pulse power	[kW]	1.6		5		
Pulse energy	[Ws]	230		850		
Nominal power	[W]	23		48	48	58
External						
Resistance	[□]	100 ... 160	70 ... 100	130 ... 250	130 ... 250	80 ... 130
Max. continuous power	[W]	180	350	400	600	1200

Motor auxiliary connections						
CMMT-AS-		C2-3A-...	C4-3A-...	C2-11A-...	C3-11A-...	C5-11A-...
Motor temperature monitoring						
Digital		Connection for temperature switch (PTC, N/C contact or N/O contact)				
Analogue		Connection for analogue temperature sensor (KTY81 ... 84, NTC, Pt1000)				
Output for holding brake						
Version		High-side switch; 24 V; monitored internally				
Output current	[A]	0.8	0.8	1.0	1.0	1.3
Output for 2nd brake						
Version		High-side switch; 24 V; monitored internally				
Output current	[A]	0.1	0.1	0.1	0.1	0.1

Data sheet

Interfaces		
Ethernet		
Function		Parameterisation and commissioning
Protocol		DHCP
		FTP
		TCP/IP
Position encoder		
Function of position encoder 1		ENDAT 2.1 encoder
		ENDAT 2.2 encoder
		HIPERFACE encoder
		Incremental encoder
		SIN/COS encoder
		Nikon-A
Function of position encoder 2		Incremental encoder
		SIN/COS encoder
Synchronisation		
Function		Encoder emulation A/B/Z
		Encoder input A/B/Z
		Pulse/direction signals CLK/DIR
		CW/CCW counting signals
Encoder output, characteristics		1 MHz maximum output frequency
		Resolution up to 16384 ppr
Encoder input, characteristics		1 MHz maximum input frequency
		Resolution up to 16384 ppr
Input/output		
Digital inputs		
Number		10 ... 12 (depending on device design)
Number of high-speed		2
Time resolution of high-speed	[µs]	1
Switching logic		PNP
Properties		Not galvanically isolated
		Freely configurable in some cases
		Safety inputs in some cases
Specification		Based on IEC 61131-2, type 3
Working area	[V]	0 ... 30
Digital outputs		
Number		4 ... 6 (depending on device design)
Number of high-speed		2
Time resolution of high-speed	[µs]	1
Switching logic		PNP
Properties		Not galvanically isolated
		Freely configurable in some cases
Max. current	[mA]	20
Analogue setpoint inputs		
Number		1
Properties		Differential input
		Configurable for current/force, rotational speed and position
Working area	[V]	±10
Impedance	[kΩ]	70
Floating switching outputs		
Number		1
Max. current	[mA]	50

Data sheet

Safety data		
Safety function to EN 61800-5-2		Safe torque off (STO)
		Safe stop 1 (SS1)
		Safe brake control (SBC)
Performance Level (PL) to EN ISO 13849-1		
Safe torque off (STO)		Category 4, Performance Level e
Safe brake control (SBC)		Category 3, Performance Level e
Safety integrity level (SIL) to EN 62061 and EN 61508		
Safe torque off (STO)		SIL 3/SILCL 3
Safe brake control (SBC)		SIL 3/SILCL 3
Certificate issuing authority and no.		German Technical Control Board (TÜV Rheinland) 0 1/20 5/5640.0 0/18
Proof test interval		
Safe torque off (STO)		Up to 20a
Safe brake control (SBC)		24 h
Diagnostic coverage	[%]	Up to 97
Safe failure fraction (SFF)	[%]	Up to 99
Hardware fault tolerance		1

Operating and environmental conditions		
Degree of protection		IP20
Ambient temperature[1]	[°C]	0 ... +50
Storage temperature	[°C]	–25 ... +55
Relative humidity	[%]	5 ... 90 (non-condensing)
Protection class		I
Overvoltage category		III
Contamination level		2
Surge resistance	[kV]	6
Max. installation height[2]	[m]	2000
Shock and vibration resistance		To EN 61800-2 and EN 61800-5-1
CE marking (see declaration of conformity)		To EU EMC Directive[3]
		To EU Machinery Directive
		To EU Low Voltage Directive
		To EU RoHS Directive
Certification		c UL us listed (OL)
		RCM
Note on materials		Contains paint-wetting impairment substances
		RoHS-compliant

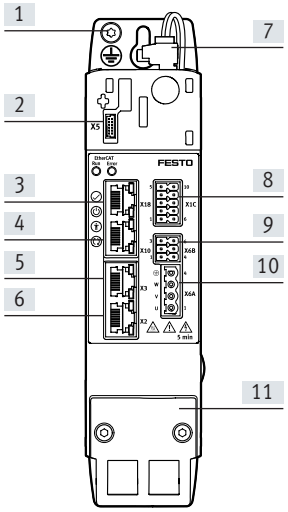
1) Above 40°C power is reduced by 3% per K.
2) Above 1000 m power is reduced by 1% per 100 m.
3) For information about the area of use, see the EC declaration of conformity at: www.festo.com/sp → Certificates.
If the devices are subject to usage restrictions in residential, commercial or light-industrial environments, further measures for the reduction of the emitted interference may be necessary.

Data sheet

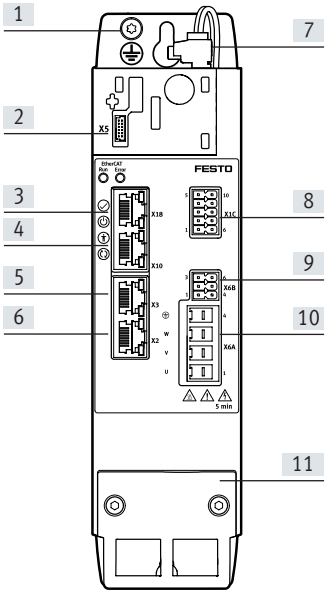
View of servo drive

Front view

CMMT-AS-...-3A

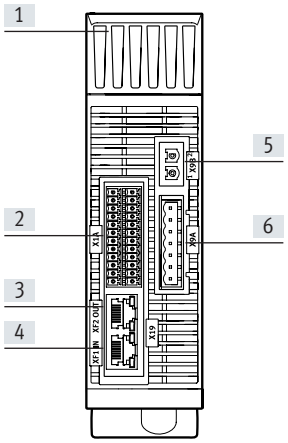


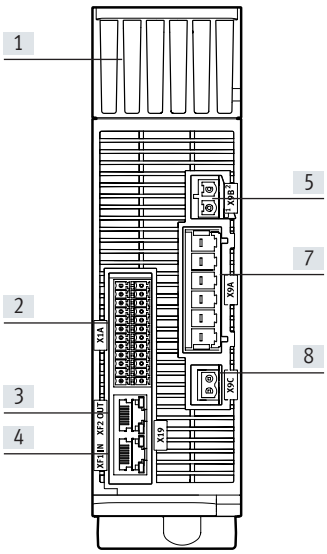
CMMT-AS-...-11A



[1] PE connection, housing
[2] [X5] Connection for operating panel (behind blind plate)
[3] [X18] Standard Ethernet
[4] [X10] Device synchronisation
[5] [X3] Position encoder 2
[6] [X2] Position encoder 1
[7] [X9B] Connection for braking resistor
[8] [X1C] Inputs/outputs for the axis
[9] [X6B] Motor auxiliary connection
[10] [X6A] Motor phase connection
[11] Shield clamp and strain relief

Top view

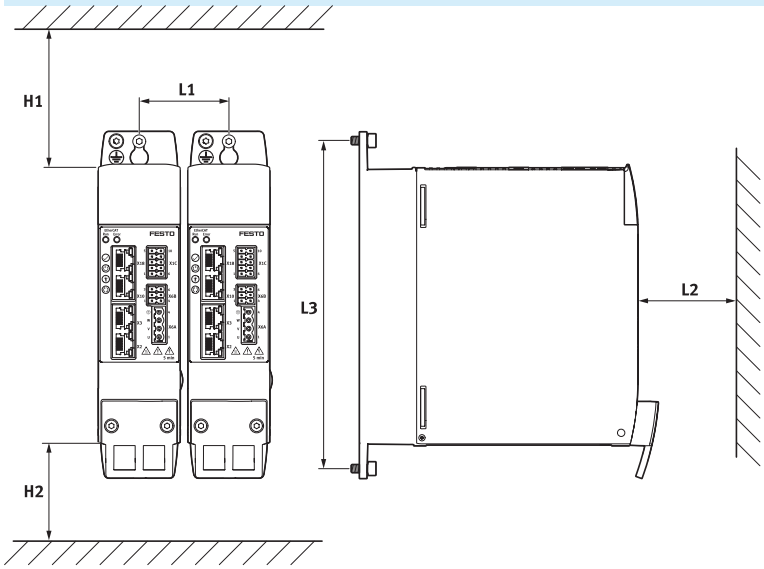




[1] Cooling element
[2] [X1A] I/O interface
[3] [XF2 OUT] RTE interface port 2
[4] [XF1 IN] RTE interface port 1
[5] [X9B] Connection for braking resistor
[6] [X9A] Supply: mains, DC link and logic voltage
[7] [X9A] Supply: mains and DC link voltage
[8] [X9C] Supply: logic voltage

Data sheet

Installation clearance for servo drive

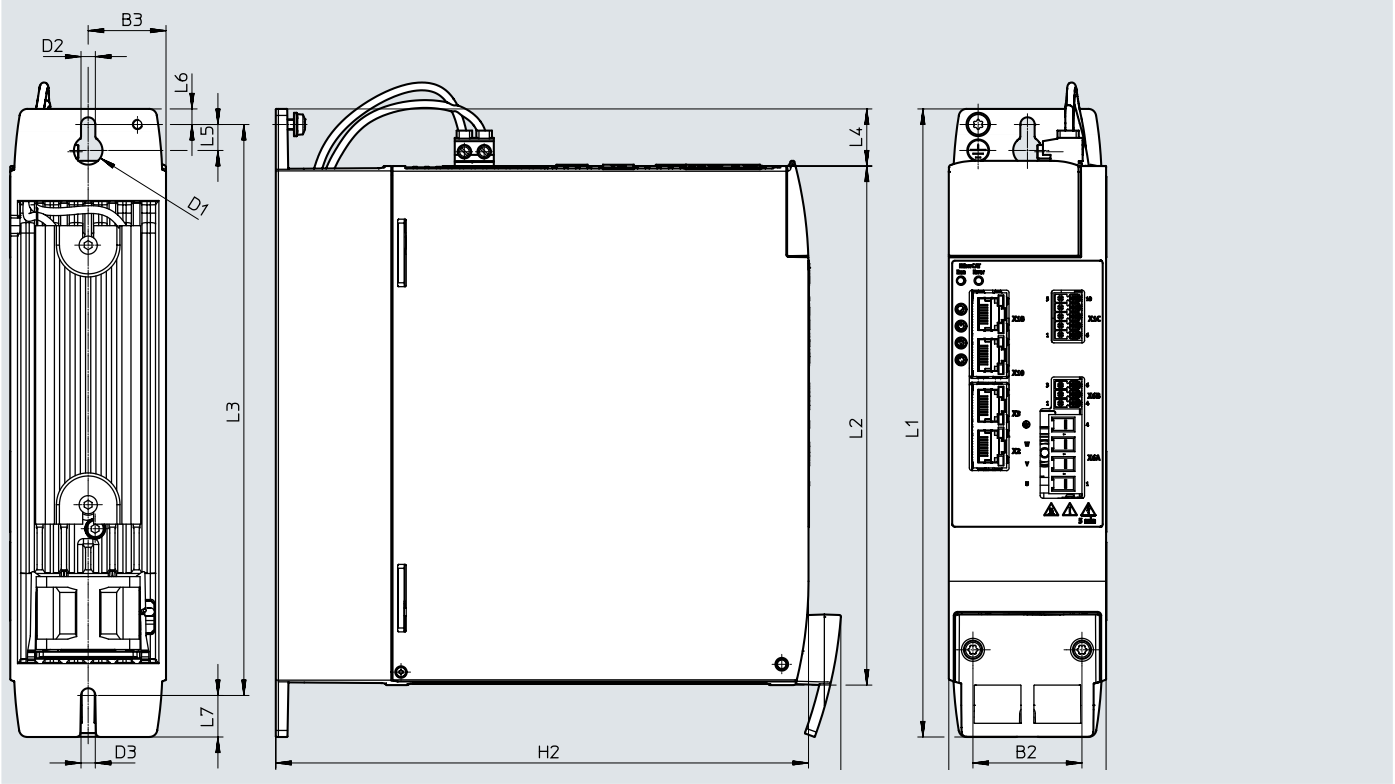


Type	H1	H2[1)]	L1	L2	L3
CMMT-AS-...-3A	70	70	52	70	200
CMMT-AS-...-11A	100	70	62	70	230

1) An installation clearance of 150 mm underneath the servo drive is recommended for optimum wiring of the motor or encoder cable

Data sheet

Dimensions Download CAD data ➔ www.festo.com

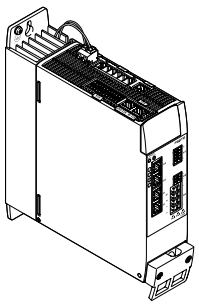


Type	B1	B2	B3	D1 Ø	D2	D3	H1	H2
CMMT-AS-...-3A	50	34	25	11	5.5	5.5	183	170
CMMT-AS-...-11A-P3	60	42	29.7	11	5.5	5.5	218	205

Type	L1	L2	L3	L4	L5	L6	L7
CMMT-AS-...-3A	212	170	200	22	10	6	9
CMMT-AS-...-11A-P3	242	200	220	22	10	6	16

Data sheet

Ordering data

	Description	Number of phases	Nominal current	Part no.	Type
	The assortment of plugs NEKM (→ page 14) is not included in the scope of delivery of the servo drive.	**Bus protocol: EtherCAT**			
		Single-phase	2	**5340819**	**CMMT-AS-C2-3A-EC-S1**
			4	**5340820**	**CMMT-AS-C4-3A-EC-S1**
		Three-phase	2	**5340821**	**CMMT-AS-C2-11A-P3-EC-S1**
			3	**5340822**	**CMMT-AS-C3-11A-P3-EC-S1**
			5	**5340823**	**CMMT-AS-C5-11A-P3-EC-S1**
		Bus protocol: PROFINET RT/IRT			
		Single-phase	2	**5340814**	**CMMT-AS-C2-3A-PN-S1**
			4	**5340815**	**CMMT-AS-C4-3A-PN-S1**
		Three-phase	2	**5340816**	**CMMT-AS-C2-11A-P3-PN-S1**
			3	**5340817**	**CMMT-AS-C3-11A-P3-PN-S1**
			5	**5340818**	**CMMT-AS-C5-11A-P3-PN-S1**
		Bus protocol: EtherNet/IP			
		1-phase	2	**5340824**	**CMMT-AS-C2-3A-EP-S1**
			4	**5340825**	**CMMT-AS-C4-3A-EP-S1**
		Three-phase	2	**5340826**	**CMMT-AS-C2-11A-P3-EP-S1**
			3	**5340827**	**CMMT-AS-C3-11A-P3-EP-S1**
			5	**5340828**	**CMMT-AS-C5-11A-P3-EP-S1**

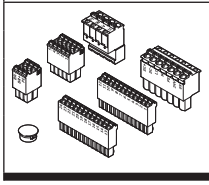
Ordering data – Modular product system

Ordering table

Series CMMT-AS-...	-3A	-11A	Condi- tions	Code		Enter code
Module no.	**5111184**	**5111189**				
Series	CMMT			**CMMT**		CMMT
Motor type	AC synchronous			**-AS**		-AS
Nominal current						
2 A				**-C2**		
3 A	–			**-C3**		
4 A		–		**-C4**		
5 A	–			**-C5**		
Nominal input voltage						
230 VAC/50-60 Hz		–		**-3A**		
400 VAC	–			**-11A**		
Number of phases						
Single-phase		–				
Three-phase	–			**-P3**		
Bus protocol/control	EtherCAT			**-EC**		
	PROFINET RT/IRT			**-PN**		
	EtherNet/IP			**-EP**		
Safety function	Standard safety			**-S1**		-S1

Accessories

Ordering data – Required accessories

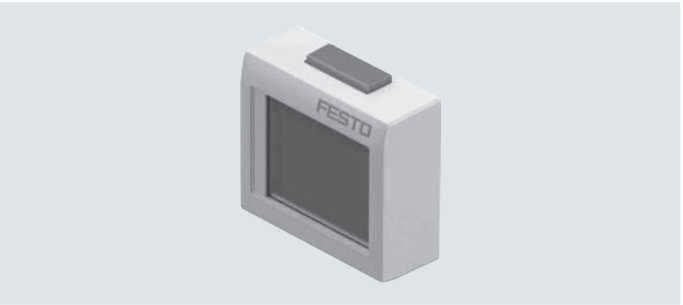
	Description	Part no.	Type
Assortment of plugs			
	For single wiring connection with single-phase servo drives	**4325822**	**NEKM-C6-C16-S**
	For double wiring connection with single-phase servo drives	**5054513**	**NEKM-C6-C16-D**
	For single wiring connection with three-phase servo drives	**5119205**	**NEKM-C6-C45-P3-S**
	For double wiring connection with three-phase servo drives	**5118001**	**NEKM-C6-C45-P3-D**
	Not included in the scope of delivery of the servo drive.		

Ordering data – Optional accessories

Operating panel CDSB-A1

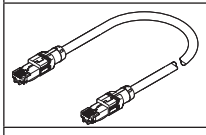
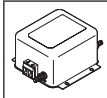
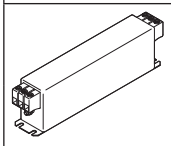
- Display of full-text messages. This means that errors, warnings and selected data can be read at a glance
- Easy data backup of parameters and firmware in the unit for e.g. serial commissioning or device replacement
- One operating panel can be used for several servo drives
- Control element: touchscreen
- Display: colour TFT
- Display size: 1.77"
- User memory: 3 GB
- USB interface: USB 2.0 type mini

Additional technical data:
→ Internet: cdsb



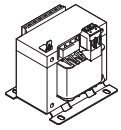
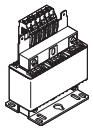
Ambient temperature [°C]	Storage temperature [°C]	Degree of protection	Weight [g]	Part no.	Type
0 … 60	–20 … +70	IP20	40	**8070984**	**CDSB-A1**
Not included in the scope of delivery of the servo drive					

Ordering data – Optional accessories

	Description	Part no.	Type
Connecting cable			
	• Patch cable for the daisy-chain connection of the bus interfaces X19A/B • Patch cable for master/slave functions (X10-X10) • Ethernet catagory Cat 5e • Not included in the scope of delivery of the servo drive	**8082383**	**NEBC-R3G8-KS-0.2-N-S-R3G8-ET**
Mains filter			
	Single-phase, 8 A, sufficient for: 2x CMMT-AS-C2-3A or 1x CMMT-AS-C4-3A	**8088928**	**CAMF-C6-F-C8-3A**
	Single-phase, 20 A, sufficient for: 6x CMMT-AS-C2-3A or 3x CMMT-AS-C4-3A	**8088929**	**CAMF-C6-F-C20-3A**
	Three-phase, 16 A, sufficient for: 8x CMMT-AS-C2-11A or 5x CMMT-AS-C3-11A or 2x CMMT-AS-C5-11A	**8096868**	**CAMF-C6-F-C16-11A**
	Three-phase, 42 A, sufficient for: 21x CMMT-AS-C2-11A or 14x CMMT-AS-C3-11A or 7x CMMT-AS-C5-11A	**8096894**	**CAMF-C6-F-C42-11A**
	Not included in the scope of delivery of the servo drive		

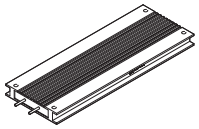
Accessories

Ordering data – Optional accessories

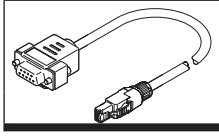
	Description	Part no.	Type
Flow control filter			
	Single-phase, 6 A, sufficient for: 2x CMMT-AS-C2-3A or 1x CMMT-AS-C4-3A	**8088930**	**CAMF-C6-FD-C6-3A**
	Three-phase, 6 A, sufficient for: 3x CMMT-AS-C2-11A or 2x CMMT-AS-C3-11A or 1x CMMT-AS-C5-11A	**8096867**	**CAMF-C6-FD-C6-11A**
	Not included in the scope of delivery of the servo drive		

Ordering data – Optional accessories

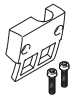
Data sheets → Internet: cacr

	For type CMMT-AS-					Resistance value	Nominal power	Part no.	Type
	C2-3A	C4-3A	C2-11A	C3-11A	C5-11A	[Ω]	[W]		
Braking resistor									
	–	■	–	–	–	72	200	**1336611**	**CACR-LE2-72-W500**
	■	■	–	–	■	100	200	**1336615**	**CACR-LE2-100-W500**
	–	–	■	■	–	240	200	**8091543**	**CACR-LE2-240-W500**
	–	–	■	■	–	240	720	**8091544**	**CACR-KL2-240-W1800**
	–	–	–	–	■	100	720	**8091545**	**CACR-KL2-100-W1800**
	Not included in the scope of delivery of the servo drive								

Ordering data – Optional accessories

	Description	Part no.	Type
Adapters			
	Required in combination with the linear axes EGC-...-M1/M2 or ELGA-...-M1/M2 (external displacement encoder) as adapter between encoder cable NEBM-M12G8-...-V3 and interface X3 (position encoder 2)	**8106112**	**NEFM-S1G9-K-0,5-R3G8**
	Not included in the scope of delivery of the servo drive		

Ordering data – Optional accessories

	Description	For CMMT-AS-...		Part no.	Type
		-3A	-11A		
Blind plate					
	• Used to cover the connections if no operating panel used • Included in the scope of delivery of the servo drive	■	■	**5395254**	**CAFC-06-C**
Shield clamp					
	• For clamping the shield and strain relief for the motor cable • Included in the scope of delivery of the servo drive	■	–	**5326867**	**CAMA-C6-SK-S2**
		–	■	**5335956**	**CAMA-C6-SK-S3**

Festo - Your Partner in Automation

1 Festo Inc.

5300 Explorer Drive
Mississauga, ON L4W 5G4
Canada

Festo Customer Interaction Center
Tel: 1 877 463 3786
Fax: 1 877 393 3786
Email: customer.service.ca@festo.com

2 Festo Pneumatic

Av. Ceylán 3,
Col. Tequesquináhuac
54020 Tlalnepantla,
Estado de México

Multinational Contact Center
01 800 337 8669

ventas.mexico@festo.com

3 Festo Corporation

1377 Motor Parkway
Suite 310
Islandia, NY 11749

Festo Customer Interaction Center
1 800 993 3786
1 800 963 3786
customer.service.us@festo.com

4 Regional Service Center

7777 Columbia Road
Mason, OH 45040

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www.festo.com

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