Motor controllers CMMP-AS, for servo motors

★/☆	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
Superb:	Festo quality at an attractive price		Assembled for you in 4 Service Centres worldwide
Easy:	Simplified procurement and warehousing		Up to 6 × 10^{12} variants per product family

Just look for the star!

Key features

Features

Compact

- Extremely small dimensions
- Full integration of all components for the controller and power unit, including USB interface, Ethernet and CANopen interface
- Integrated brake chopper
- Integrated EMC filters
- Automatic actuation for a holding brake
- Compliance with the current CE and EN standards without additional external measures (➔ page 6)

Motion control

- Evaluation of digital absolute encoders (EnDat/HIPERFACE) in single-turn or multi-turn versions
- Can be operated as a torque, rotational speed or position controller
- Integrated positioning control
- Time-optimised (trapezoidal) or jerk-free (S-shaped) positioning
- Absolute and relative movements
- Point-to-point positioning with and without motion path smoothing
- Position synchronisation
- Electronic gear unit
- 255 position sets
- Wide range of homing methods

Bus protocols

CANopen, EtherCAT, PROFIBUS, EtherNet/IP, DeviceNet, PROFINET, Modbus

Input/output

- Freely programmable I/Os
- High-resolution 16-bit analogue input
- Jog/teach mode
- Easy connection to a higher-order controller via I/O or fieldbus
- Synchronous operation
- Master/slave mode
- Additional I/Os with the plug-in card CAMC-D-8E8A ➔ page 18

Integrated sequence control

- Automatic sequence of position sets without a higher-level controller
- Linear and cyclical position sequences
- Adjustable delay times
- Branches and wait positions
- Overlapping restart possible during the movement

Integrated safety functions

- Depending on the variant or plug-in card, the motor controller supports the following safety functions:
  - Safe torque off (STO)
  - Safe stop 1 (SS1)
  - Safe brake control (SBC)
  - Safe operating stop (SOS)
  - Safe stop 2 (SS2)
  - Safely limited speed (SLS)
  - Safe speed range (SSR)
  - Safe speed monitor (SSM)

Interpolating multi-axis movement

- With a suitable controller, the CMMP-AS can perform path movements with interpolation via CANopen or EtherCAT. To do this, the controller specifies set-point position values in a fixed time pattern. In between, the servo position controller independently interpolates the data values between two interpolation points.

Key features

Motion program

- Linking of any number of position sets into a motion program
- Step enabling conditions for the motion program possible via digital inputs, for example
  MC – motion complete
  I/O – digital inputs

Library for EPLAN → www.festo.com/eplan

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

Cam disc functionality

The "electronic cam disc" application type creates optimised motion profiles that generate less vibration and lower acceleration forces at the machine. In addition, the movement of the motor is always synchronised with the position of a master axis so that overlapping, time-optimised motion sequences can be easily defined. To be able to use the cam disc function, you will need the Festo Configuration Tool (FCT) and also the cam editor → Page 4.

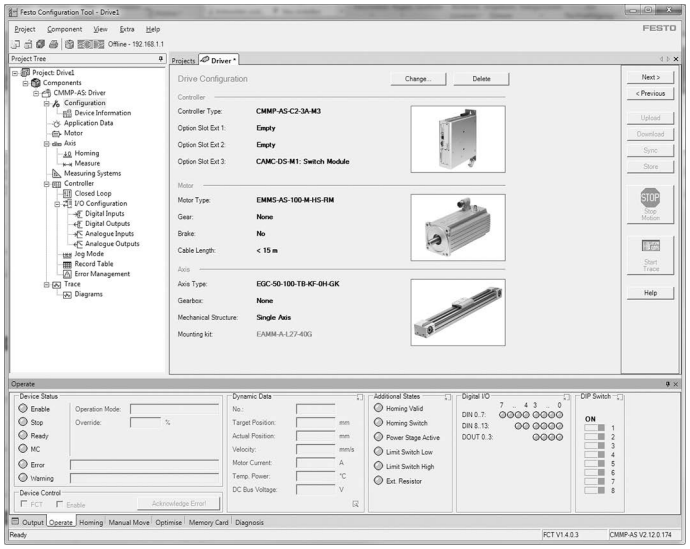
Key features:

- High flexibility of the system. The mechanical system does not need to be modified if the requirements for the cam shapes change.
- User-friendly motion plan editor. All limits for position, speed and acceleration are immediately displayed in the editor. Up to 16 cam discs with a total of up to 2048 interpolation points can be managed. The interpolation points can be randomly distributed along the cam discs.
- There are four digital trip cams coupled with each cam disc.
- Each cam disc can be offset by a certain amount from the master axis.

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 types of equipment
- Easy 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

FHPP – Festo Handling and Positioning Profile

Optimised data profile

Festo has developed an optimised data profile, the "Festo Handling and Positioning Profile (FHPP)", which is specifically tailored to handling and positioning applications.
With the FHPP data profile, Festo motor controllers can be controlled using a fieldbus interface via standardised control and status bytes.

The following are defined, among others:

- Operating modes
- I/O data structure
- Parameter objects
- Sequence control

Product range overview and type codes

Type	CMMP-AS-...-M0	CMMP-AS-...-M3
Bus protocols		
Integrated in the controller		
CANopen	■	■
Modbus TCP	■	■
Optional via plug-in card		
PROFIBUS DP	–	■
DeviceNet	–	■
EtherCAT	–	■
EtherNet/IP	–	■
PROFINET RT	–	■
Safety functions		
Integrated in the controller	■	–
Optional via plug-in card	–	■

Type codes

001	Series	
CMMP	Motor controller, premium	

002	Motor type	
AS	AC synchronous	

003	Nominal current	
C2	2 A	
C5	5 A	
C10	10 A	
C15	15 A	

004	Nominal input voltage	
3A	230 V AC/50-60Hz	
11A	400 V AC	

005	Number of phases	
	Single-phase	
P3	Three-phase	

006	Number of slots	
M0	Without slots	
M3	With 3 slots	

Data sheet

Bus protocols

General technical data						
CMMP-AS-		C2-3A-...	C5-3A-...	C5-11A-P3-...	C10-11A-P3-...	C15-11A-P3-...
Type of mounting		Screwed onto connection plate				
Display		Seven-segment display				
Parameterisation interface		USB, Ethernet				
Active PFC		Yes		–		
DIP switch		Firmware download/fieldbus settings[1]/CAN terminating resistor				
SD card slot		Memory card ➔ page 18				
Encoder interface input		Resolver				
		Incremental encoder with analogue or digital tracking signals				
		Absolute encoder with EnDat V2.1 serial/V2.2				
		Absolute encoder with HIPERFACE				
		Additional input for synchronous/cam disc operation				
Encoder interface output		Actual value feedback via encoder signals in rotational speed control mode				
		Setpoint specification for downstream slave drive				
		Resolution up to 16384 ppr				
Braking resistor, integrated	[Ω]	60		68		
Pulse power of braking resistor	[kVA]	2.8		8.5		
Braking resistor, external	[Ω]	≥ 50		≥ 40		
Impedance of setpoint input	[kΩ]	20				
Number of analogue outputs		2				
Operating range of analogue outputs	[V]	±10				
Resolution of analogue outputs		9 bit				
Characteristics of analogue outputs		Short-circuit-proof				
Number of analogue inputs		3				
Operating range of analogue inputs	[V]	±10				
Characteristics of analogue inputs		1x differential, resolution 16 bit				
		2x single-ended, resolution 10 bit				
		Configurable for rotational speed setpoint value/torque setpoint value/position setpoint value				
Mains filter		Integrated				External[2]
Max. motor cable length[3]	[m]	25				–
Product weight	[g]	2100	2200	3800		3450

1) Not in combination with CMMP-AS-...-M0

2) The mains filter is mandatory for compliance with the CE and EN standards ➔ page 20

3) Without external mains filter

Function blocks for PLC programming							
Programming software	Controller manufacturer	Interfaces					
		CANopen	PROFIBUS DP	DeviceNet	EtherCAT	EtherNet/IP	PROFINET RT
CODESYS TwinCAT	Festo	■	■	■	■	■	■
	Beckhoff						
	Other manufacturers						
RSLogix5000	Rockwell Automation	–	–	■	–	■	–
Step 7/TIA Portal	Siemens	–	■	–	–	–	■

Data sheet

Technical data – Bus protocols/control										
Interfaces		I/O	Additional I/O[1]	CANopen	Modbus TCP	PROFIBUS DP	DeviceNet	EtherCAT	EtherNet/IP	PROFINET RT
Number of digital logic outputs		5	8	5						
Characteristics of digital logic outputs		Freely configurable								
Number of digital logic inputs		10	8	10						
Characteristics of logic inputs		Freely configurable								
Process interfacing		16 (127) position sets[2]	255 position sets	250 position sets						
Communication profile		–	–	DS301; FHPP+ DS301; DSP402	FHPP+	DP-V0/ FHPP+	FHPP+	DS301; FHPP+ CoE: DS301; DSP402	FHPP+	FHPP+
Max. fieldbus transmission rate	[Mbps]	–	–	1	100	12	0.5	100	100	100
Interface										
CMMP-AS-...-M0	Integrated	■	–	■	■	–	–	–	–	–
CMMP-AS-...-M3	Integrated	■	–	■	■	–	–	–	–	–
	Optional[3]	–	■	–	–	■	■	■	■	■

1) With the plug-in card CAMC-D8E8A → page 18

2) Can be extended with configurable logic inputs up to max. 127 position sets

3) Plug-in cards can be ordered separately → page 18

Electrical data						
CMMP-AS-		C2-3A-...	C5-3A-...	C5-11A-P3-...	C10-11A-P3-...	C15-11A-P3-...
Output connection data						
Output voltage range	[V AC]	3x 0 ... 270		3x 0 ... 360		
Nominal current	[A_{eff}]	2.5	5	5	10	15
Peak current	[A_{eff}]	5	10	10	20	30
at max. peak current duration	[s]	5				
	[A_{eff}]	10	20	20	40	45
	[s]	0.5				1
Max. DC link voltage	[V DC]	320/380[1]		560		
Output frequency	[Hz]	0 ... 1000				
Load supply						
Nominal voltage phases		1		3		
Input voltage range	[V AC]	100 ... 230 ±10%		3x 230 ... 480 ±10%		
Max. nominal input current	[A]	3	6	5.5	11	13
Nominal power	[VA]	500	1000	3000	6000	9000
Peak power	[VA]	1000	2000	6000	12000	18000
Mains frequency	[Hz]	50 ... 60				
Logic supply						
Nominal voltage	[V DC]	24 ±20%				
Nominal current	[A]	0.55/2.05[2]	0.65/2.15[2]	1/3.5[2]		
Max. current of digital logic outputs	[mA]	100				

1) Without PFC/with PFC

2) Max. current with brake and I/Os

Data sheet

Safety functions to EN 61800-5-2			
Motor controller	CMMP-AS- C2/C5/C10-...-M0	C2/C5/C10/C15-...-M3	
With plug-in card	–	CAMC-G-S1 → Page 14	CAMC-G-S3 → Page 15
Safe torque off (STO)	■	■	■
Safe stop 1 (SS1)	–	–	■
Safe brake control (SBC)	■	■	■
Safe operating stop (SOS)	–	–	■
Safe stop 2 (SS2)	–	–	■
Safely limited speed (SLS)	–	–	■
Safe speed range (SSR)	–	–	■
Safe speed monitor (SSM)	–	–	■

Safety data		
CMMP-AS-		C2/C5/C10-...-M0
Safety function to EN 61800-5-2		Safe torque off (STO)
Performance Level (PL) to EN ISO 13849-1		Category 4, Performance Level e
Safety Integrity Level (SIL) to EN 61800-5-2, EN 62061, EN 61508		SIL 3
Certificate issuing authority		German Technical Control Board (TÜV) 01/205/5162.02/19
Proof test interval		20a
Diagnostic coverage	[%]	97
Safe failure fraction (SFF)	[%]	99.2
Hardware fault tolerance		1
CE marking (see declaration of conformity)		To EU EMC Directive[1)]
		To EU Machinery Directive

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.

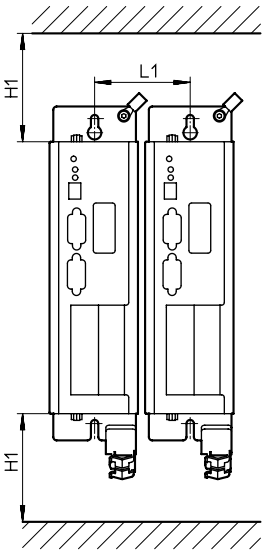
Technical data – Connection to the integrated safety module with CMMP-AS-...-M0		
Control input STO-A/STO-B		
Nominal voltage	[V DC]	24 (related to 0V-A/B)
Operating range	[V]	19.2 ... 28.8
Nominal current	[mA]	20 (typical; max. 30)
Starting current	[mA]	450 (typical, duration approx. 2 ms; max. 600 at 28.8 V)
Max. positive test pulse length with logic 0	[ms]	0.3 (related to nominal voltage 24 V and intervals > 2 s between pulses)
Max. allowable time for test pulses at 24 V signal	[ms]	< 2 ... 6
Key features		Galvanically isolated
Monitoring contact C1, C2		
Nominal voltage	[V DC]	24
Max. voltage	[V DC]	< 30 (overvoltage-resistant up to 60 V)
Nominal current	[mA]	< 200 (not short-circuit-proof)
Design		Potential-free signal contact
Switching logic		Contact closes at STO

Data sheet

Operating and environmental conditions						
CMMP-AS-		C2-3A-...	C5-3A-...	C5-11A-P3-...	C10-11A-P3-...	C15-11A-P3-...
Digital logic outputs		Galvanically isolated				
Logic inputs		Galvanically isolated				
Degree of protection						
With plug at X6 and X9		IP20				
Without plug at X6 and X9		IP10				
Protective function		I^2t monitoring				
		Intermediate circuit over/undervoltage				
		Output stage short circuit				
		Standstill monitoring				
		Temperature monitoring				
Ambient temperature	[°C]	0 ... +40				
Storage temperature	[°C]	−25 ... +70				
Relative humidity	[%]	0 ... 90 (non-condensing)				
CE marking (see declaration of conformity)		To EU Low Voltage Directive				
		To EU EMC Directive[1)]				
		To EU Machinery Directive				
UKCA marking (see declaration of conformity)		To UK instructions for EMC				
		To UK instructions for machines				
		To UK regulations for electrical equipment				
Certification		c UL us listed (OL)				
		RCM compliance mark				
PWIS conformity		VDMA24364 zone III				
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.

Installation clearance for motor controller



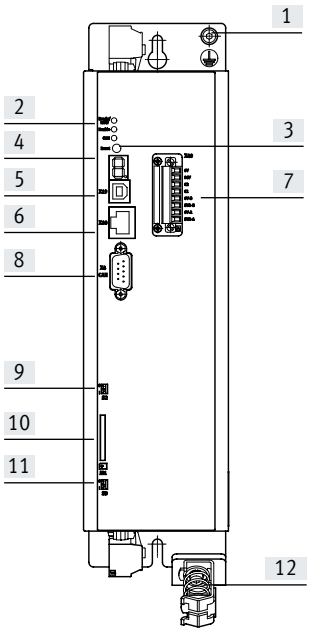
Type	H1[1)]	L1
CMMP-AS-C2-3A-... CMMP-AS-C5-3A-...	100	71
CMMP-AS-C5-11A-P3-... CMMP-AS-C10-11A-P3-... CMMP-AS-C15-11A-P3-...	100	85

1) An installation clearance of 150 mm is recommended for optimum wiring of the motor or encoder cable on the underside of the motor controller

Data sheet

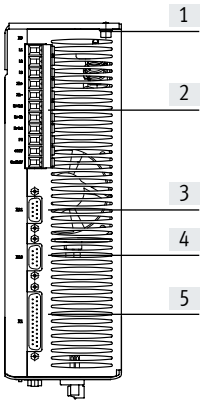
View of motor controller

CMMP-AS-...-M0



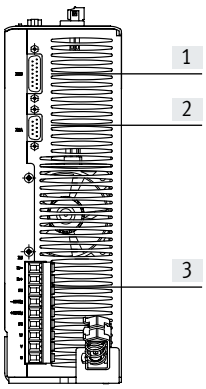
[1] PE connection
[2] LEDs
[3] Reset button
[4] Seven-segment display
[5] X19 USB interface
[6] X18 Ethernet interface
[7] X40 digital I/O interface for controlling the STO function
[8] X4 CANopen interface
[9] Activation of CANopen terminating resistor
[10] SD/MMC card slot
[11] Activation of firmware download
[12] Shield connection

From above



[1] PE connection
[2] X9 power supply
[3] X11 incremental encoder interface (output)
[4] X10 incremental encoder interface (input)
[5] X1 I/O interface

From underneath

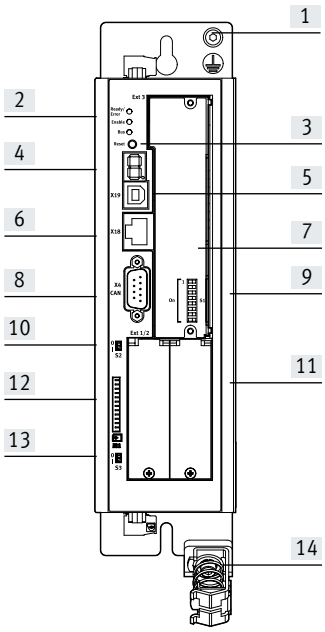


[1] X2B encoder connection
[2] X2A resolver connection
[3] X6 motor connection

Data sheet

View of motor controller

CMMP-AS-...-M3



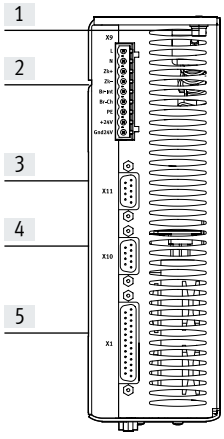
[1] PE connection
[2] LEDs
[3] Reset button
[4] Seven-segment display
[5] X19 USB interface
[6] X18 Ethernet interface
[7] Slot for switch or safety module
[8] X4 CANopen interface
[9] Fieldbus settings
[10] Activation of CANopen terminating resistor
[11] Slots for extension modules
[12] SD/MMC card slot
[13] Activation of firmware download
[14] Shield connection

Note

One of the plug-in cards must be inserted in slot [7] in order to operate the motor controller.

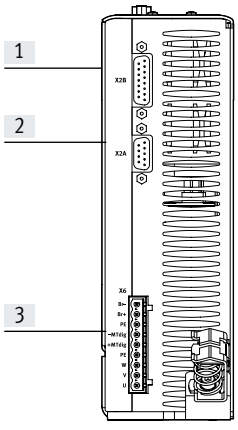
Possible plug-in cards:
CAMC-DS-M1 ➔ page 18
CAMC-G-S1 ➔ page 14
CAMC-G-S3 ➔ page 15

From above



[1] PE connection
[2] X9 power supply
[3] X11 incremental encoder interface (output)
[4] X10 incremental encoder interface (input)
[5] X1 I/O interface

From underneath

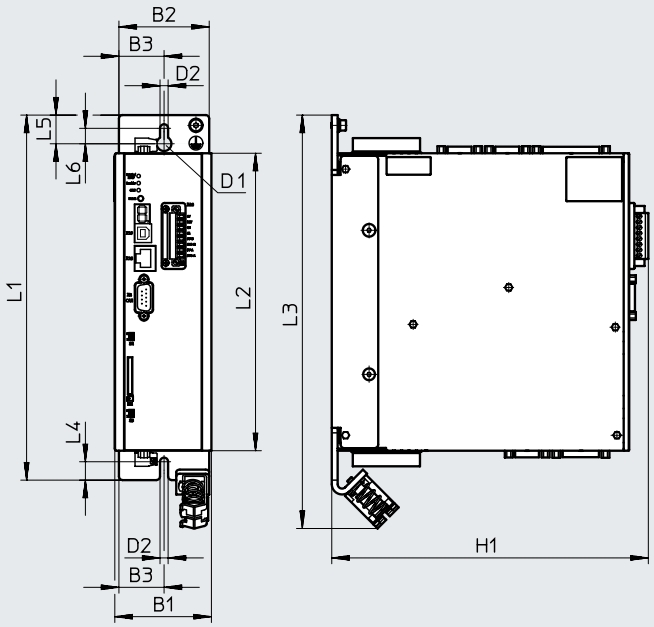


[1] X2B encoder connection
[2] X2A resolver connection
[3] X6 motor connection

Data sheet

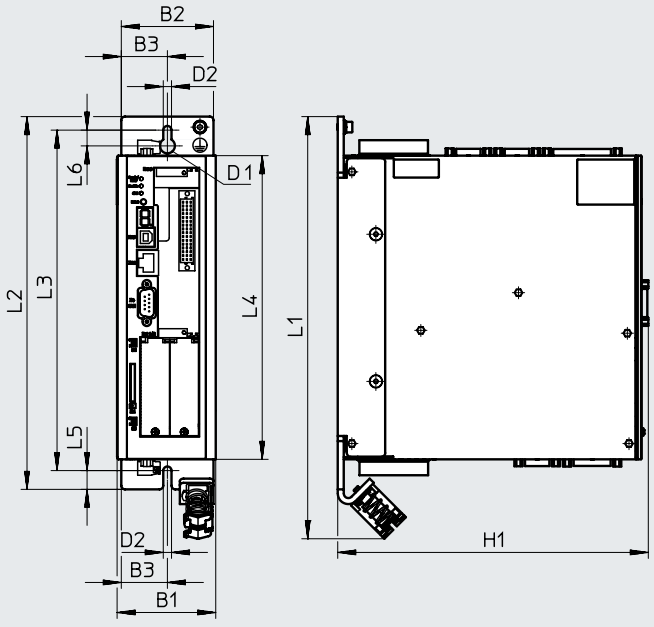
Dimensions Download CAD data ➔ www.festo.com

CMMP-AS-C2/C5-3A-M0, CMMP-AS-C5/C10-11A-P3-M0



Type	B1	B2	B3	D1 ø	D2 ø	H1	L1	L2	L3	L4	L5	L6
CMMP-AS-C2-3A-M0	66	61	30.7	10	5.5	215	248	202	281	12.5	19.5	10.5
CMMP-AS-C5-3A-M0												
CMMP-AS-C5-11A-P3-M0	79	75	37.5	10	5.5	255	297	252	330	12.5	19.8	10.5
CMMP-AS-C10-11A-P3-M0												

CMMP-AS-C2/C5-3A-M3, CMMP-AS-C5/C10/-C15-11A-P3-M3

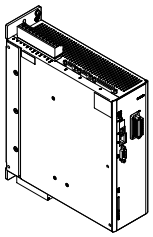
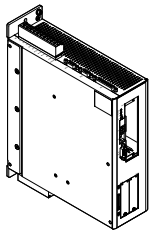


Type	B1	B2	B3	D1 ø	D2 ø	H1	L1	L2	L3	L4	L5	L6
CMMP-AS-C2-3A-M3 CMMP-AS-C5-3A-M3	66	61	30.7	10	5.5	207	281	248	227	202	12.5	10.5
CMMP-AS-C5-11A-P3-M3 CMMP-AS-C10-11A-P3-M3 CMMP-AS-C15-11A-P3-M3	79	75	37.5	10	5.5	247	330	297	276	252	12.5	10.5

Data sheet

☆ Core product range

Ordering data

	Description	Part no.	Type
CMMP-AS-...-M0 – Without slot			
	The plug assortment NEKM (➔ page 19) is included in the scope of delivery of the motor controller.	**1622901**	**CMMP-AS-C2-3A-M0**
		1622902	**CMMP-AS-C5-3A-M0**
		1622903	**CMMP-AS-C5-11A-P3-M0**
		1622904	**CMMP-AS-C10-11A-P3-M0**
CMMP-AS-...-M3 – With 3 slots			
	• One of the plug-in cards must be inserted in slot [7] (➔ page 11) in order to operate the motor controller. Possible plug-in cards: – CAMC-DS-M1 ➔ page 18 – CAMC-G-S1 ➔ page 14 – CAMC-G-S3 ➔ page 15 • The mains filter is mandatory with CMMP-AS-C15... for compliance with the CE and EN standards (➔ page 20). • The plug assortment NEKM (➔ page 19) is included in the scope of delivery of the motor controller.	☆ **1501325**	**CMMP-AS-C2-3A-M3**
		☆ **1501326**	**CMMP-AS-C5-3A-M3**
		☆ **1501327**	**CMMP-AS-C5-11A-P3-M3**
		☆ **1501328**	**CMMP-AS-C10-11A-P3-M3**
		3215473	**CMMP-AS-C15-11A-P3-M3**

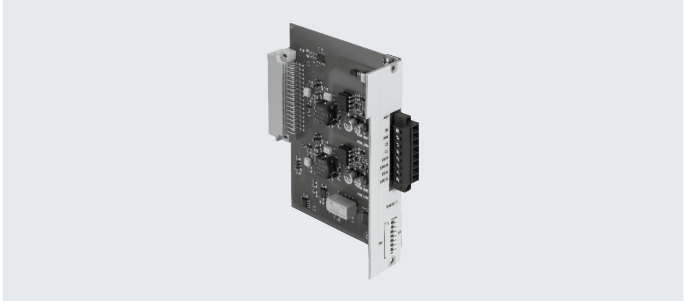
Festo core product range	★	Generally ready for dispatch from the factory within 24 hours
	☆	Generally ready for dispatch from the factory within 5 days

Accessories

Safety module CAMC-G-S1

Only for motor controller:
CMMP-AS-...-M3

The safety module serves as an extension to achieve the safety function:
- Safe torque off (STO)

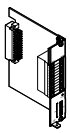


Safety data		
Safety function to EN 61800-5-2		Safe torque off (STO)
Performance Level (PL) to EN ISO 13849-1		Category 4, Performance Level e
Safety Integrity Level (SIL) to EN 61800-5-2, EN 62061, EN 61508		SIL 3
Certificate issuing authority		German Technical Control Board (TÜV) 01/205/5165.02/19
Proof test interval		20a
PFH		1.27×10^{-10}
Diagnostic coverage	[%]	97
Safe failure fraction (SFF)	[%]	99.2
Hardware fault tolerance		1
CE marking (see declaration of conformity)[1)]		To EU EMC Directive
		To EU Machinery Directive
UKCA marking (see declaration of conformity)[1)]		To UK instructions for EMC
		To UK instructions for machines

1) More information www.festo.com/catalogue/camc ⇢ Support/Downloads

Technical data		
Control input STO-A/STO-B		
Nominal voltage	[V DC]	24 (related to 0V-A/B)
Operating range	[V]	19.2 ... 28.8
Nominal current	[mA]	20 (typical; max. 30)
Max. positive test pulse length with logic 0	[ms]	0.3 (related to nominal voltage 24 V and intervals > 2 s between pulses)
Max. allowable time for test pulses at 24 V signal	[ms]	< 2 ... 6
Key features		Galvanically isolated
Monitoring contact C1, C2		
Nominal voltage	[V DC]	24
Max. voltage	[V DC]	< 30 (overvoltage-resistant up to 60 V)
Nominal current	[mA]	< 200 (not short-circuit-proof)
Design		Potential-free signal contact
Switching logic		Contact closes at STO

Ordering data – Plug-in card

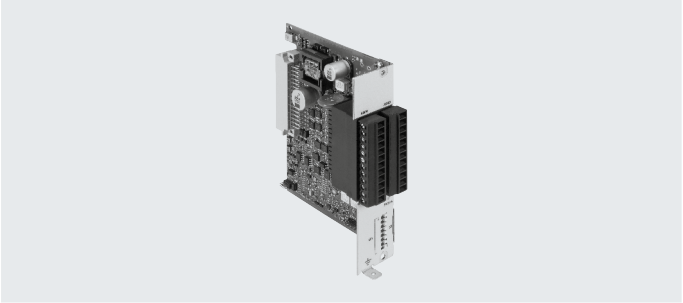
	Description	Part no.	Type
	Safety module: • One of the plug-in cards CAMC-G-S1, CAMC-G-S3 or CAMC-DS-M1 must be inserted in slot [7] (➔ page 11) in order to operate the motor controller. • The plugs are included in the scope of delivery. To reorder plug NEKM ➔ page 19	☆ **1501330**	**CAMC-G-S1**

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

Safety module CAMC-G-S3

Only for motor controller:
CMMP-AS-...-M3



The safety module serves as an extension to achieve the safety functions:
- Safe torque off (STO)
- Safe stop 1 (SS1)
- Safe brake control (SBC)
- Safe operating stop (SOS)
- Safe stop 2 (SS2)
- Safely limited speed (SLS)
- Safe speed range (SSR)
- Safe speed monitor (SSM)

Safety data		
Safety function to EN 61800-5-2		Safe torque off (STO)
		Safe stop 1 (SS1)
		Safe brake control (SBC)
		Safe operating stop (SOS)
		Safe stop 2 (SS2)
		Safely limited speed (SLS)
		Safe speed range (SSR)
		Safe speed monitor (SSM)
Performance Level (PL) to EN ISO 13849-1		Up to category 4, Performance Level e
Safety Integrity Level (SIL) to EN 61800-5-2, EN 62061, EN 61508		SIL 3
Certificate issuing authority		German Technical Control Board (TÜV) 01/205/5165.02/19
Proof test interval		20a
PFH		9.5×10^{-9}
Diagnostic coverage	[%]	97.5
Safe failure fraction (SFF)	[%]	99.5
Hardware fault tolerance		1
CE marking (see declaration of conformity)[1)]		To EU EMC Directive
		To EU Machinery Directive
UKCA marking (see declaration of conformity)[1)]		To UK instructions for EMC
		To UK instructions for machines

1) More information www.festo.com/catalogue/camc ⇢ Support/Downloads

Accessories

Technical data		
General		
Parameterisation		Using SafetyTool, integrated into the FCT plug-in for CMMP-AS-...
Digital safe inputs DIN 40A/B to DIN 43A/B		
Specification		IEC 61131-2, type 3
Number of 2-channel inputs		4
Nominal voltage	[V DC]	24
Operating range	[V]	–3 ... 30
Nominal current	[mA]	15
Max. nominal current	[mA]	200
Key features		Suitable for emergency-stop switchgear, protective door circuit, light curtain, enabling button, two-hand operator unit; Inputs switching equivalently/antivalently; Test pulses can be configured; Function can be configured
Digital safe inputs DIN 44 to DIN 49		
Specification		IEC 61131-2, type 3
Number of 1-channel inputs		6
Nominal voltage	[V DC]	24
Operating range	[V DC]	–3 ... 30
Nominal current	[mA]	15
Max. nominal current	[mA]	200
Key features		Suitable for start button, brake feedback, mode selector, error acknowledgement, restart blocking; Test pulses can be configured; Function can be configured
Digital safe outputs DOUT 40A/B to 42A/B		
Number of 2-channel outputs		3
Output		High-side switch with pull-down
Nominal voltage	[V DC]	24
Operating range	[V DC]	18 ... 30
Permissible output current	[mA]	< 50
Key features		Semiconductor outputs: parameterisable PNP (positive switching) Outputs switching equivalently/antivalently Test pulses can be configured Function can be configured
Monitoring contact C1, C2		
Nominal voltage	[V DC]	24
Max. voltage	[V DC]	< 30 (overvoltage-resistant up to 60 V)
Nominal current	[mA]	< 200 (not short-circuit-proof)
Design		Potential-free signal contact
Key features		Suitable for the diagnostics of safety functions Function can be configured

Accessories

Supported position encoders

- Resolver via X2A
- SIN/COS incremental encoder
- SICK Hiperface shaft encoder (only process data channel)
- Heidenhain EnDat encoder
- Incremental encoder with digital A/B signals
- BISS position sensors for linear motors
- Incremental encoder with digital A/B signals

The manufacturers of SIL-certified shaft encoders publish guidelines for their use in safety applications.

The safety module CAMC-G-S3 takes the following manufacturer specifications into account when evaluating the encoder signals:

- Implementation Manual HIPERFACE® Safety dated 21.12.2010 (801412 0/2010-12-21)
  ➔ www.sick.com
- Specification of the E/E/PES safety requirements for EnDat Master dated 19.10.2009 (D533095-04-G-01)
  ➔ www.heidenhain.de
  (in preparation)

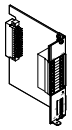
Permissible combinations of position encoders

First encoder	Second encoder	Achievable safety level		Note
Resolver	Other encoder	SIL 3	Cat. 3/PL d; Cat. 3/PL e	–
Resolver	Incremental encoder	SIL 3	Cat. 4/PL e	–
Resolver	None	SIL 2	Cat. 3/PL d	Please see the note below
SIN/COS incremental encoder	None	SIL 3	Cat. 3/PL d	Requires SIL classification of the encoder
SIN/COS incremental encoder	Incremental encoder	SIL 3	Cat. 4/PL e	Please see the note below
Hiperface incremental encoder	Incremental encoder	SIL 3	Cat. 3/PL e	Please see the note below
Hiperface incremental encoder	None	SIL 2 or 3	Cat. 3/PL d; Cat. 4/PL e	Requires SIL classification of the encoder
EnDat encoder	Incremental encoder	SIL 3	Cat. 4/PL e	Encoder setting: "Other encoder" Please see the note below
EnDat encoder	None	SIL 2	Cat. 3/PL d	In preparation. Requires SIL classification of the encoder
Other encoder	Incremental encoder	SIL 2	Cat. 3/PL d	–

Note

- Please check whether your selected position encoder is sufficiently accurate to fulfil the monitoring task, in particular the SOS safety function.
- In applications with only one shaft encoder/position encoder, it must have the SIL classification required in accordance with the risk assessment. In most cases, the classification requires additional requirements or fault exclusions in the mechanical system. Please check carefully that these requirements are fulfilled in your application and that the appropriate fault exclusions can be performed.
- In applications with only one shaft encoder/position encoder with analogue signal interface (resolver, SIN/COS, Hiperface, etc.), the restrictions on diagnostic coverage as well as the restrictions on the achievable accuracy of standstill and speed monitoring must be taken into account.
- When using two functional encoders without SIL classification, the suitability of the encoder combination for use in safe systems up to SIL3 must be proven separately (for example, the following are required: diversity of the encoder systems with regard to CCF, MTTFd, etc., suitability of the encoders for the operating and ambient conditions, EMC, etc.).

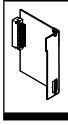
Ordering data – Plug-in card

	Description	Part no.	Type
	Safety module: • One of the plug-in cards CAMC-G-S1, CAMC-G-S3 or CAMC-DS-M1 must be inserted in slot [7] (➔ page 11) in order to operate the motor controller. • The plugs are included in the scope of delivery. To reorder plug NEKM ➔ page 19	☆ **1501331**	**CAMC-G-S3**

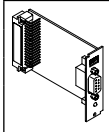
Festo core product range
★ Generally ready for dispatch from the factory within 24 hours
☆ Generally ready for dispatch from the factory within 5 days

Accessories

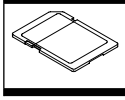
Ordering data – Plug-in card

	Description	Part no.	Type
	Switch module: • One of the plug-in cards CAMC-G-S1, CAMC-G-S3 or CAMC-DS-M1 must be inserted in slot [7] (→ page 11) in order to operate the motor controller CMMP-AS-...-M3.	☆ 1501329	CAMC-DS-M1

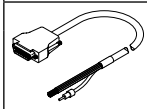
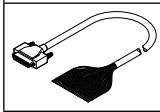
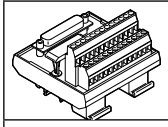
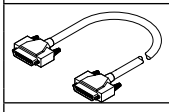
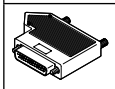
Ordering data – Plug-in cards for bus protocols

	Description	Part no.	Type
	For PROFIBUS DP	☆ 547450	CAMC-PB
	For PROFINET RT	☆ 1911916	CAMC-F-PN
	For DeviceNet	547451	CAMC-DN
	For EtherCAT	☆ 567856	CAMC-EC
	For EtherNet/IP	☆ 1911917	CAMC-F-EP

Ordering data – Memory card

	Description	Part no.	Type
	Memory card, for data backup and firmware download	☆ 1436343	CAMC-M-S-F10-V1

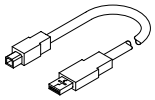
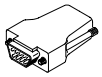
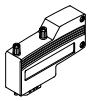
Ordering data – Connection options from I/O interface to the controller

	Description	Cable length [m]	Part no.	Type
Control cable				
	• For I/O interface to any controller • Recommended for analogue signals since the cable is shielded	2.5	552254	NEBC-S1G25-K-2.5-N-LE26
	• For I/O interface to any controller • Cannot be used if the incremental encoder interface (plug X10) is in use	3.2	☆ 8001373	NEBC-S1G25-K-3.2-N-LE25
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 manifold block. • Cannot be used if the incremental encoder interface (input) is in use	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
Plug				
	• 25-pin Sub-D plug. Each single core can be individually assembled using screw terminals. • Cannot be used if the incremental encoder interface (input) is in use	–	☆ 8001372	NEFC-S1G25-C2W25-S6

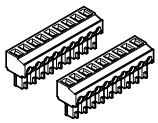
Festo core product range	★	Generally ready for dispatch from the factory within 24 hours
	☆	Generally ready for dispatch from the factory within 5 days

Accessories

Ordering data – Cables and plugs

	Description	Cable length [m]	Part no.	Type
Programming cable				
	For CMMP-AS-...-M0, CMMP-AS-...-M3	1.8	**1501332**	**NEBC-U1G4-K-1.8-N-U2G4**
Encoder plug				
	For incremental encoder interface	–	**564264**	**NECC-A-S-S1G9-C2M**
Plugs				
	For PROFIBUS interface	–	**533780**	**FBS-SUB-9-WS-PB-K**
	For CANopen interface	–	**533783**	**FBS-SUB-9-WS-CO-K**
	For DeviceNet interface	–	**525635**	**FBSD-KL-2X5POL**

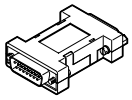
Ordering data – Assortment of plugs

	Description Assortment of plugs for:	Part no.	Type
	• Motor controller CMMP-AS-C5/-C10-11A-P3-M0 • Motor controller CMMP-AS-C5/-C10/-C15-11A-P3-M3	☆ **552256**	**NEKM-C-3**[1]
	• Interface CAMC-D-8E8A	**569959**	**NEKM-C-5**[2]
	• Motor controller CMMP-AS-C2/-C5-3A-M0 • Motor controller CMMP-AS-C2/-C5-3A-M3	☆ **1659228**	**NEKM-C-7**[1]
	• Safety module CAMC-G-S1 • Motor controller CMMP-AS-...-M0	☆ **1660640**	**NEKM-C-8**[3]
	• Safety module CAMC-G-S3	☆ **1660937**	**NEKM-C-9**[4]

1) Plugs are included in the scope of delivery of the motor controller CMMP-AS-...-M0, CMMP-AS-...-M3
2) Plugs are included in the scope of delivery of the plug-in card CAMC-D-8E8A
3) Plug is included in the scope of delivery of the plug-in card CAMC-G-S1
   Plug is included in the scope of delivery of the motor controller CMMP-AS-...-M0
4) Plug is included in the scope of delivery of the plug-in card CAMC-G-S3

Ordering data – EMC filter for servo motors EMME-AS Data sheets → Internet: emme-as

For cable lengths ≥ 10 m, the use of the EMC filter is recommended to reduce EMC interference.
For encoder cables ≥ 10 m, the filter is included in the scope of delivery of the cable.

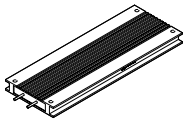
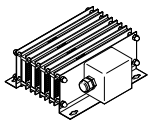
	Degree of protection	Ambient temperature	Part no.	Type
	IP30 (in mounted state)	–40 ... +80°C	**4825847**	**CAMF-C5-FC**

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

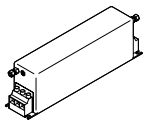
Ordering data – Braking resistors

Data sheets → Internet: cacr

	For type	Resistance value [Ω]	Nominal power [W]	Part no.	Type
CACR-LE2-...					
	CMMP-AS-C2-3A-...	50	200	**2882342**	**CACR-LE2-50-W500**[1]
	CMMP-AS-C5-3A-...	72	200	**1336611**	**CACR-LE2-72-W500**
CACR-KL2-...					
	CMMP-AS-C5-11A-P3-...	67	720	**1336617**	**CACR-KL2-67-W1800**
	CMMP-AS-C10-11A-P3-...	40	800	**2882343**	**CACR-KL2-40-W2000**[1]
	CMMP-AS-C15-11A-P3-...				

1) Recommended braking resistor

Ordering data – Mains filter

	For type	Operating voltage [V]	Input current [A]	Dimensions [mm]	Part no.	Type
	CMMP-AS-C15-11A-P3-...	520/300	16	Length: 230 Width: 50 Height: 70	**3947275**	**CADF-C15-11A-P3**

Note

Regardless of the length of the motor cable, the mains filter is mandatory for compliance with the CE and EN standards.

Ordering data – Software and documentation

	Description	→ Internet
	The following descriptions are available on the Festo website: • Hardware: mounting and installation of all variants • Functions: instructions on commissioning with FCT + functional description • FHPP: control and parameterisation of the motor controller via the FHPP profile • DS402: control and parameterisation of the motor controller via the device profile CiA 402 (DS402) • Safety module: functional safety engineering for the motor controller with the safety function STO	www.festo.com/net/SupportPortal

Ordering data – Software and documentation for the cam editor

	Description	Part no.	Type
	Software package contains: • CD-ROM – With user documentation in de, en, es, fr, it, ru, zh The software package is not included in the scope of delivery	**570903**	**GSPF-CAM-MC-ML**