Motor controllers CMMP-AS, for servo motors

FESTO

★/☆	Festo core product range Covers 80% of your automation tasks
Worldwide:	Always in stock
Superb:	Festo quality at an attractive price
Easy:	Reduces procurement and storing complexity

★ Generally ready for shipping ex works in 24 hours
Held in stock in 13 service centres worldwide
More than 2200 product

☆ Generally ready for shipping ex works in 5 days
Assembled for you in 4 service centres worldwide
Up to 6 x 10^{12} variants per product series

Look for the star!

Motor controllers CMMP-AS, for servo motors

Key features

Performance characteristics

Compactness

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

Motion control

- Evaluation of digital absolute encoder (EnDat/HIPERFACE) in single-turn or multiturn versions
- Can be operated as a torque, speed or position controller
- Integrated position 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

Fieldbus interfaces

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

Input / Output

- Freely programmable I/Os
- High-resolution 16-bit analogue input
- Jog/Teach mode
- Simple 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-order 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

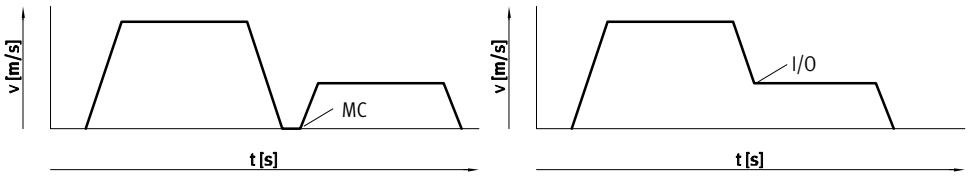
- With a suitable controller, the CMMP-AS can perform path movements with interpolation via CANopen or EtherCAT. To do this, the controller specifies setpoint position values in a fixed time pattern. In between, the servo position controller independently interpolates the data values between two data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

Motor controllers CMMP-AS, for servo motors

Key features

Travel program

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



Library for EPLAN

➔ www.festo.de/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, standardisation of documentation, no 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 curve editor ➔ Page 21

Features:

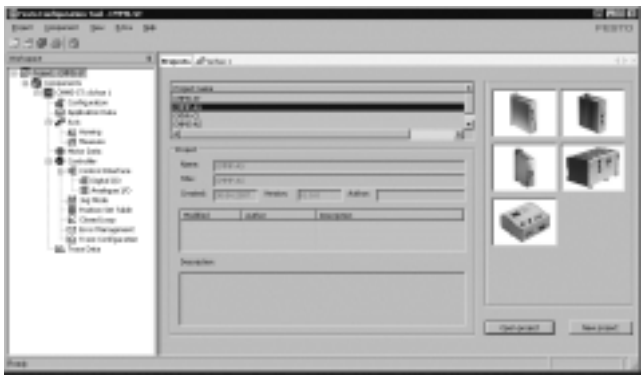
- High system flexibility. The mechanics do not need to be modified if the requirements for the curve shapes change.
- User-friendly motion plan editor. All limits for position, speed and acceleration are immediately displayed in the editor.
- Up to 16 cam discs with a total of up to 2048 data points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

Motor controllers CMMP-AS, for servo motors

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

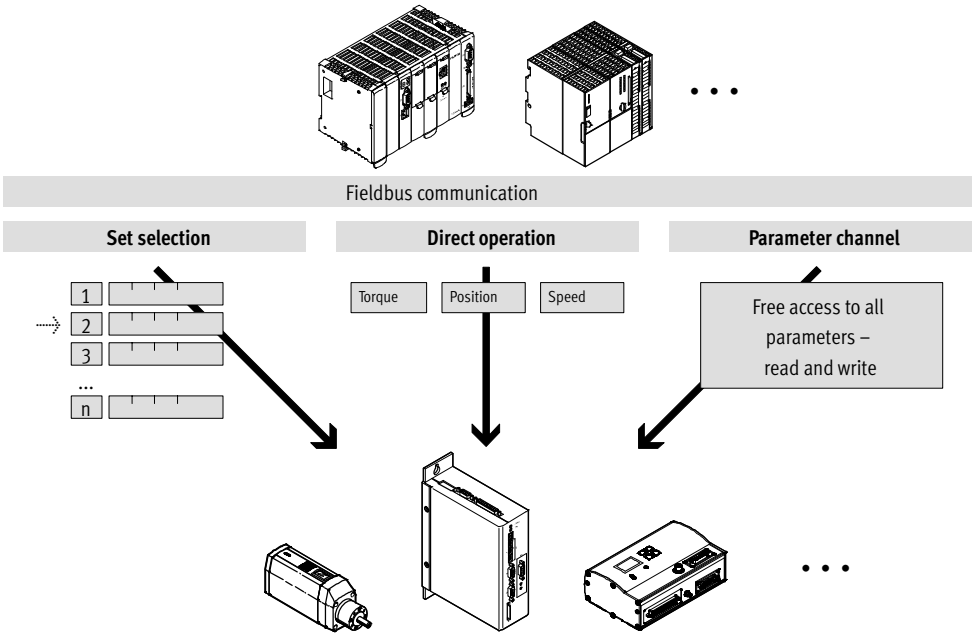
FHPP – Festo Handling and Positioning Profile

Optimised data profile

Festo has developed an optimised data profile, the "Festo Handling and Positioning Profile (FHPP)", which is especially tailored to handling and positioning applications.

With the FHPP data profile, Festo motor controllers can be actuated 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



Motor controllers CMMP-AS, for servo motors

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

CMMP – AS – C5 – 11A – P3 – M3

Type	
CMMP	Motor controller, premium

Motor technology	
AS	AC synchronous

Nominal current	
C2	2.5 A
C5	5 A
C10	10 A
C15	15 A

Input voltage	
3A	100 ... 230 V AC
11A	3x 230 ... 480 V AC

Number of phases	
–	1-phase
P3	3-phase

Number of slots	
M0	No slot
–	With 2 slots
M3	With 3 slots

Motor controllers CMMP-AS, for servo motors

Technical data

FESTO

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 connecting plate				
Display		7-segment display				
Parameterisation interface		USB, Ethernet				
Active PFC		Yes		–		
DIP switches		Firmware download/fieldbus settings[1]/CAN terminating resistor				
SD card slot		Memory card ➔ Page 19				
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 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 bits				
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 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 21
3) Without external mains filter

Function elements 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	–	■	–	–	–	■

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+	FHPP+	DP-V0 / FHPP+	FHPP+	DS301, FHPP+	FHPP+	FHPP+
				DS301, DSP402				CoE: DS301, DSP402		
Max. fieldbus transmission rate	[Mbit/s]	–	–	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 expanded 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 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

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		TÜV 01/205/5262.01/14
Proof test interval		20a
Diagnostic coverage	[%]	97
Safe failure fraction (SFF)	[%]	99.2
Hardware fault tolerance		1
CE marking (see declaration of atmosphere)		To EU EMC Directive[1)]
		To EC Machinery Directive

1) For information about the applicability of the component see the manufacturer's EC declaration of conformity at: www.festo.com/sp ➔ Certificates.
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.

Technical data – Connection to the integrated safety module with CMMP-AS-...-M0		
Control port 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)
Maximum positive test impulse length at 0 signal	[ms]	0.3 (related to nominal voltage 24 V and intervals > 2 s between impulses)
Maximum allowable time for test pulse at 24 V signal	[ms]	< 2 ... 6
Properties		Electrically 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)
Version		Potential-free signal contact
Switching logic		Contact closes at STO

Operating and environmental conditions						
CMMP-AS-		C2-3A-...	C5-3A-...	C5-11A-P3-...	C10-11A-P3-...	C15-11A-P3-...
Digital logic outputs		Electrically isolated				
Logic inputs		Electrically isolated				
Degree of protection						
With plug connector at X6 and X9		IP20				
Without plug connector 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 EC Machinery Directive				
Certification		c UL us listed (OL)				
		RCM				
Note on materials		Contains paint-wetting impairment substances				
		RoHS compliant				

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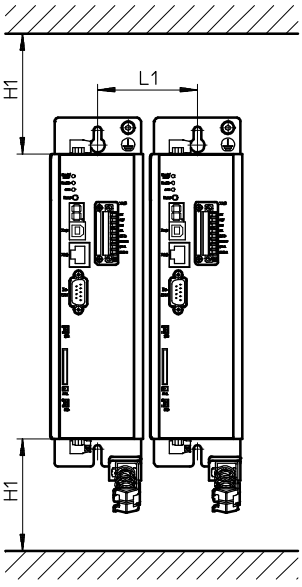
If the component is subject to restrictions on usage in residential, office or commercial environments or small businesses, further measures to reduce the emitted interference may be necessary.

Installation clearance for motor controller

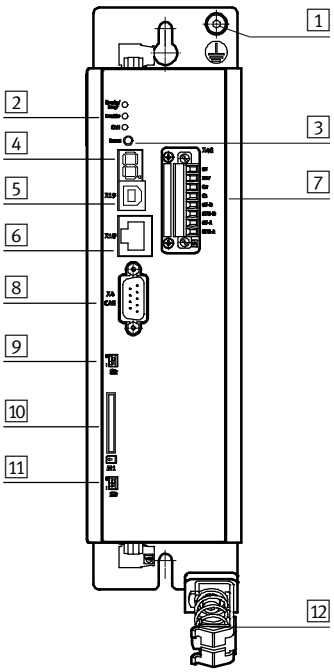


Type	H1[1)]	L1
CMMP-AS-C2-3A-... CMMP-AS-C5-3A-...	100	71
CMMP-AS-C5-11A-P3-... CMMP-AS-C10-11A-P3-... CMMP-AS-C15-11A-P3-...	100	85

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

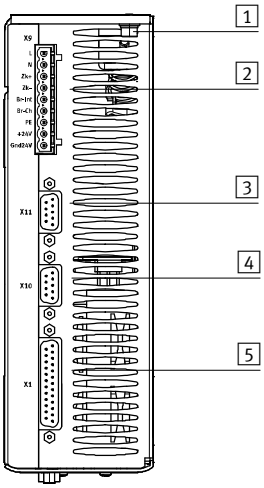
View of motor controller

CMMP-AS-...-M0



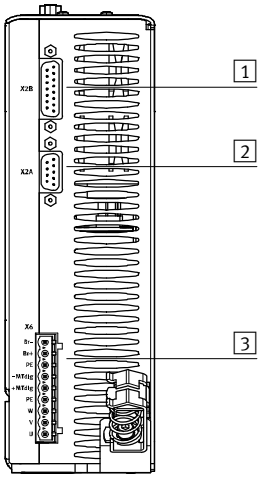
1 PE connection
2 LEDs
3 Reset button
4 7-segment display
5 X19 USB interface
6 X18 Ethernet interface
7 X40 digital I/O interface for controlling the STO function
8 X4 CANopen interface
9 Activation of CANopen terminating resistor
10 SD/MMC card slot
11 Activation of firmware download
12 Screened connection

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

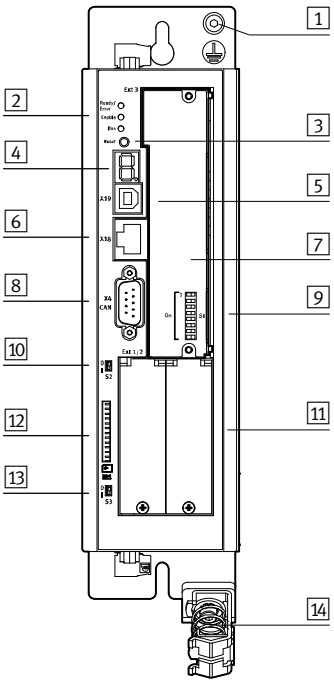
From underneath



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

View of motor controller

CMMP-AS-...-M3



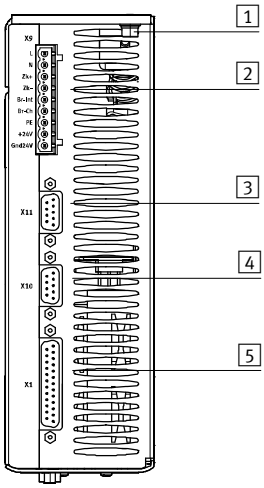
1 PE connection
2 LEDs
3 Reset button
4 7-segment display
5 X19 USB interface
6 X18 Ethernet interface
7 Slot for switch or safety module
8 X4 CANopen interface
9 Fieldbus settings
10 Activation of CANopen terminating resistor
11 Slots for extension modules
12 SD/MMC card slot
13 Activation of firmware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

Note

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

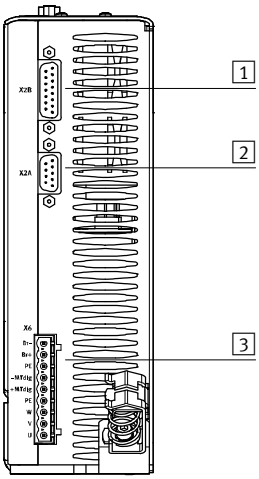
Possible plug-in cards:
CAMC-DS-M1 ➔ Page 19
CAMC-G-S1 ➔ Page 14
CAMC-G-S3 ➔ Page 15

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

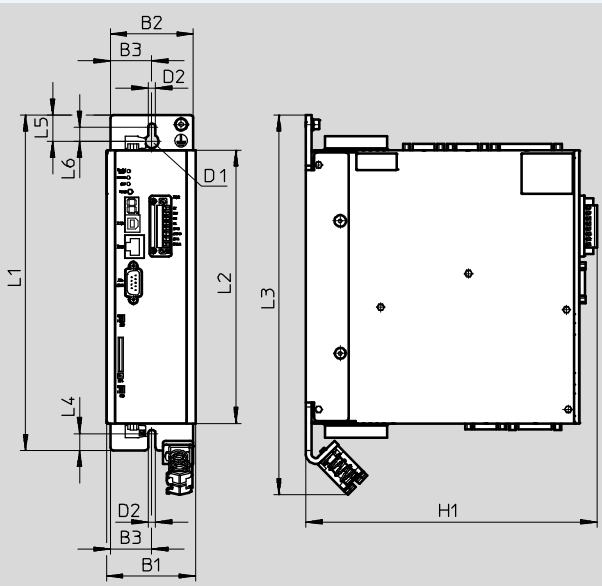
From underneath



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

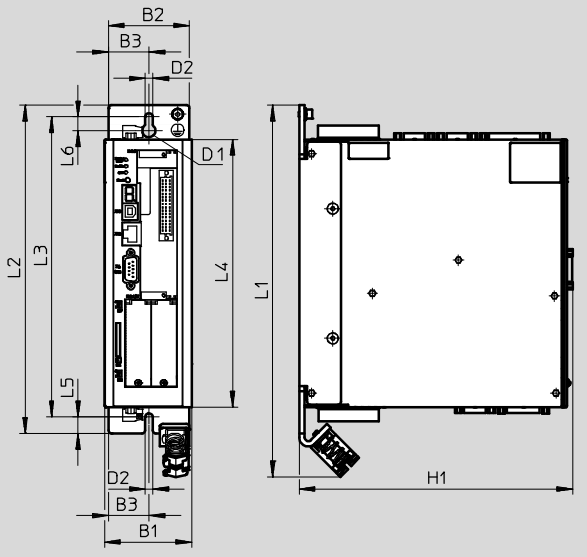
Dimensions Download CAD data ➔ **www.festo.com**

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



Type	B1	B2	B3	D1 ∅	D2 ∅	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												

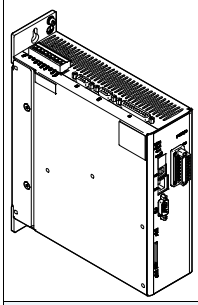
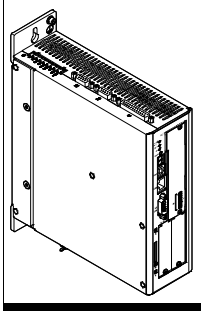
CMMP-AS-C2/C5-3A-M3, CMMP-AS-C5/C10/-C15-11A-P3-M3



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

☆ Core product range

Ordering data

	Description	Part No.	Type
CMMP-AS-...-M0 – Without slot			
	The plug assortment NEKM (➔ Page 20) 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 19 – CAMC-G-S1 ➔ Page 14 – CAMC-G-S3 ➔ Page 15 • For the CMMP-AS-C15..., the mains filter is mandatory for compliance with the CE and EN standards (➔ Page 21) • The plug assortment NEKM (➔ Page 20) 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 shipping ex works in 24 hours ☆ Generally ready for shipping ex works in 5 days

Safety module CAMC-G-S1

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

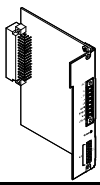
Only for motor controller:
CMMP-AS-...-M3

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		TÜV 01/205/5165.01/14
Proof test interval		20a
PFH		1.27x 10^{-10}
Diagnostic coverage	[%]	97
Safe failure fraction (SFF)	[%]	99.2
Hardware fault tolerance		1
CE marking (see declaration of atmosphere)		To EU EMC Directive[1)]
		To EC Machinery Directive

1) For information about the applicability of the component see the manufacturer's EC declaration of conformity at: www.festo.com/sp ➔ Certificates.
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.

Technical data		
Control port 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)
Maximum positive test impulse length at 0 signal	[ms]	0.3 (related to nominal voltage 24 V and intervals > 2 s between impulses)
Maximum allowable time for test pulse at 24 V signal	[ms]	< 2 ... 6
Properties		Electrically 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)
Version		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 plug connectors are included in the scope of delivery. To reorder plug connector NEKM ➔ Page 20	☆ **1501330**	**CAMC-G-S1**

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Safety module CAMC-G-S3

The safety module serves as an expansion 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)

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

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		Category 4, Performance Level e
Safety integrity level (SIL) to EN 61800-5-2, EN 62061, EN 61508		SIL 3
Certificate issuing authority		TÜV 01/205/5165.01/14
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 atmosphere)		To EU EMC Directive[1)]
		To EC Machinery Directive

1) For information about the applicability of the component see the manufacturer's EC declaration of conformity at: www.festo.com/sp ➔ Certificates.
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.

Technical data		
General information		
Parameterisation		Using SafetyTool, integrated into the FCT plugin 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
Properties		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
Properties		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
Properties		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)
Version		Potential-free signal contact
Properties		Suitable for diagnosing safety functions Function can be configured

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 (8014120/2010-12-21) ➔ 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)

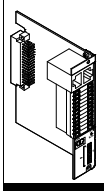
Permissible combinations of position encoders

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 assess 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 with analogue signal interface (resolver, SIN-/COS, Hiperface etc.), the restrictions regarding diagnostic cover and limitations as to the accuracy of standstill and speed monitoring that can be achieved must be taken into account.
- In applications with only one shaft encoder/position encoder, it must have the SIL classification required in accordance with the risk evaluation. 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.
- 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 plug connectors are included in the scope of delivery. To reorder plug connector NEKM ➔ Page 20	☆ **1501331**	**CAMC-G-S3**

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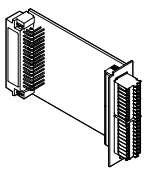
Interface CAMC-D-8E8A

The interface is used to extend the digital I/Os.
Up to two interfaces are supported simultaneously.

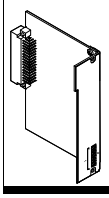
Only for motor controller:
CMMP-AS-...-M3

Technical data		
General information		
Max. connection cross section	[mm²]	0.5
Electrical connection		Screw terminal
		Straight plug
Digital inputs		
Number		8
Nominal voltage	[V DC]	24
Voltage range	[V]	–30 ... +30 (protected against reverse polarity and short circuit proof)
Nominal value for True	[V]	8
Nominal value for False	[V]	2
Input impedance	[kΩ]	4.7
Digital outputs		
Number		8
Nominal voltage	[V DC]	24
Voltage range	[V]	+18 ... +30 (protected against reverse polarity and short circuit, protection in the event of thermal overload)
Output current	[mA]	100
Short circuit, overcurrent protection	[mA]	500

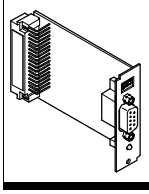
Ordering data – Plug-in card

	Description	Part No.	Type
	Interface: for additional I/Os (The plug connectors are included in the scope of delivery. To reorder plug connector NEKM ➔ Page 20)	**567855**	**CAMC-D-8E8A**

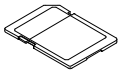
Ordering data – Plug-in card

	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**

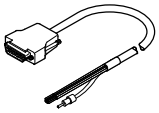
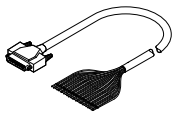
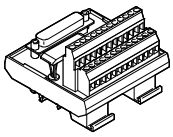
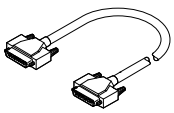
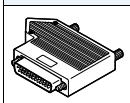
Ordering data – Plug-in cards for bus protocols

	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 connection 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 connector				
	• 25-pin Sub-D plug connector. Each wire can be individually assembled using screw terminals • Cannot be used if the incremental encoder interface (input) is in use	–	☆ **8001372**	**NEFC-S1G25-C2W25-S6**

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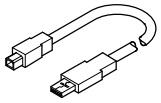
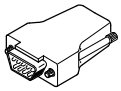
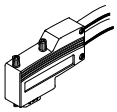
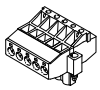
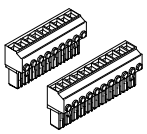
Ordering data – Cables and plugs

	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**
Plug connector				
	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**

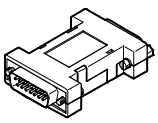
Ordering data – Assortment of plugs

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

Ordering data – EMC filter for servo motors EMME-AS Technical data ➔ Internet: emme-as

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

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

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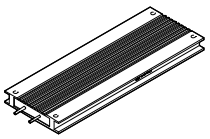
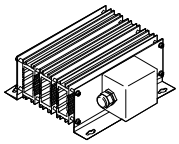
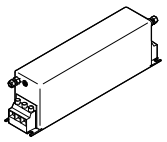
Ordering data – Braking resistors Technical data ➔ Internet: cacr

	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: assembly and installation for 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) – CAM editor: cam disc functionality (CAM) of the motor controller – 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 curve editor

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