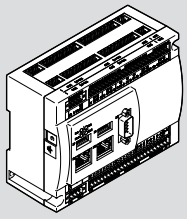
CECC-X-M1
Controller



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Operating instructions

8093618
2022-01b
[8093620]

8093618

Translation of the original instructions

1 Applicable documents

All available documents for the product ➔ www.festo.com/sp.

This product uses Open-Source software, which is subject to "GNU General Public License, Version 2". The license conditions of the GPL are available in Engineering Tool or at the following address: ➔ http://www.gnu.org/copyleft/gpl.html

2 Safety

2.1 Safety instructions

- Only use the product in its original condition without unauthorised modifications.
- Only use the product if it is in perfect technical condition.
- Observe the identifications on the product.
- Before working on the product, switch off the power supply and secure it against being switched on again.
- Comply with the handling specifications for electrostatically sensitive devices.

2.2 Intended use

The product is intended for use in the industrial sector, within machines or automation systems, permanently mounted in a control cabinet.

2.3 Training of qualified personnel

Work on the product may only be carried out by qualified personnel who can evaluate the work and detect dangers.
The qualified personnel have skills and experience in dealing with electrical (open-loop) control technology.

3 Additional information

- Contact the regional Festo contact if you have technical problems ➔ www.festo.com.
- Accessories and spare parts ➔ www.festo.com/catalogue.

4 Product overview

4.1 Product design

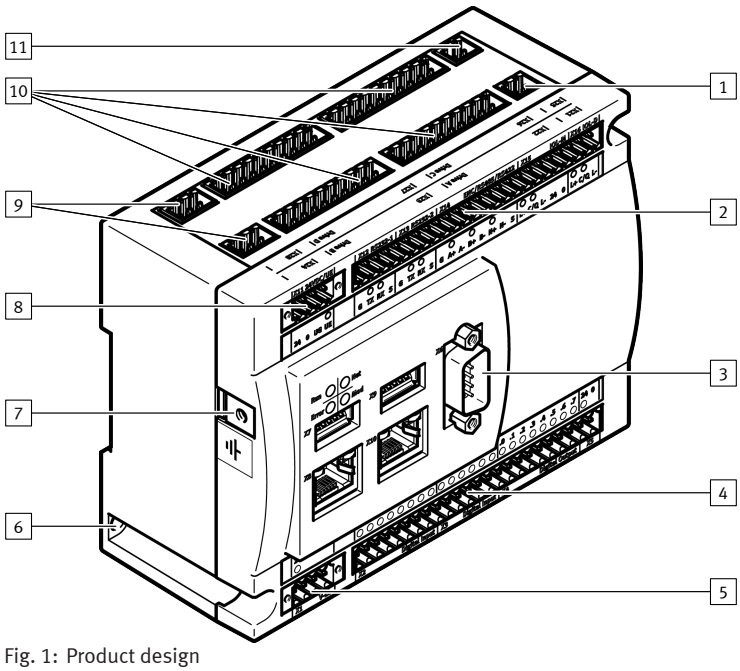


Fig. 1: Product design

1 Load voltage supply for servo drive [X21]
2 Communications interfaces: RS232, ENC/RS485/RS422 and IO-Link [X12] ... [X16]
3 CANopen interface CAN 1 [X6]
4 I/O interfaces [X2] ... [X5]
5 Infeed for I/O power supply [X1]
6 Mounting hole
7 Functional earth connection
8 Load voltage supply infeed for IO-Link and power supply for encoder [X11]
9 Multi-functional interface [X24], [X28]
10 Direct connections for servo drives [X22], [X23], [X26], [X27]
11 Torque-off input [X25]

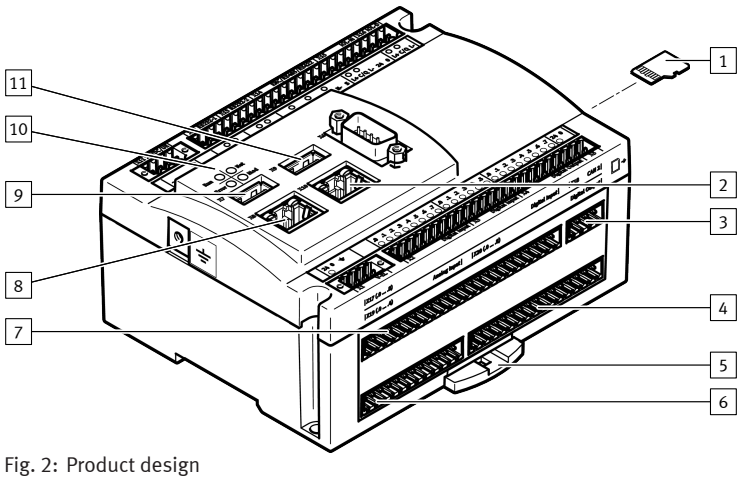


Fig. 2: Product design

1 microSD card slot
2 Ethernet interface [X10]
3 CANopen interface CAN 2 [X18]
4 Digital outputs [X20]
5 Clip
6 Analogue inputs [X19]
7 Digital inputs [X17]
8 Ethernet interface [X8]
9 USB interface [X7]
10 Status LEDs
11 USB interface [X9]

4.2 Display components

Status LEDs
The status LEDs show the operating status of the controller.

Status LED	Meaning
[Run]	Application status
[Error]	Error
[Net]	Device detected
[Mod]	Reserved

Tab. 1: Status LEDs

4.3 Connecting elements

4.3.1 Power supplies

Power supply for device, digital and analogue inputs [X1]

- Resultant current for all supplied ports: ≤ 750 mA, of which intrinsic current consumption: ≤ 200 mA
- Use an external overload protection for the power supply of the device.

Terminal	Connection	Use
X1.1	24	24 V DC
X1.2	0	0 V DC
X1.3	⏚	Functional earth
X1.4	not assigned	–

Tab. 2: Power supply for device, digital and analogue inputs [X1]

Power supply for digital outputs [X5]

- Permissible load of a digital output: ≤ 0.5 A
- Resultant current for all supplied ports: ≤ 5 A

Terminal	Connection	Use
X5.1	24	24 V DC
X5.2	0	0 V DC

Tab. 3: Power supply for digital outputs [X5]

Load voltage supply for IO-Link and for encoder [X11]

This port is used for the power supply of a IO-Link device that is connected via the IO-Link master port.

- Current consumption:
  - IO-Link: ≤ 0.75 A
  - Encoder: ≤ 0.3 A

Terminal	Connection	Use	Internal connection
X11.1	24	24 V DC UA+ infeed for IO-Link master port	X15.4
X11.2	0	0 V DC UA– infeed for IO-Link master port	X15.5
X11.3	UG	Encoder power supply (ground)	–
X11.4	UE	Encoder power supply (5 V DC)	–

Tab. 4: Load voltage supply for IO-Link and for encoder [X11]

Load voltage supply for servo drive [X21]

- Resultant current for all supplied ports: ≤ 8 A

Terminal	Connection	Use
X21.1	1	24 V DC/48 V DC
X21.2	2	0 V DC

Tab. 5: Load voltage supply for servo drive [X21]

4.3.2 Interfaces

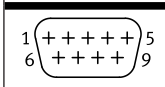
I/O interfaces [X2], [X3], [X4]

Terminal	Use
X2.0 ... X2.1	2 high-speed digital inputs (200 kHz)
X2.2 ... X2.7[1)2)]	6 digital inputs (1 kHz, IEC type 1)
X3.0 ... X3.5	6 digital inputs (1 kHz, IEC type 1)
X4.0 ... X4.7[3)]	8 digital outputs (0.7 A per channel, PNP, SSR[4)])

1) X2.2 and X2.3 can optionally also be used as machine vision inputs (e.g. triggers).
2) X2.3 also serves as a latch input for the encoder via the multiple interface X14.
3) X4.0 ... X4.2 can optionally also be used as machine vision outputs (e.g. flash output).
4) SSR: Solid State Relay

Tab. 6: I/O interfaces [X2], [X3], [X4]

CANopen interface CAN 1 [X6]

Pin		Connection	Use
	1	not assigned	–
	2	CAN1_L[1)]	CAN bus signal 1 (dominant low)
	3	CAN_GND	CAN Ground
	4	not assigned	–
	5	CAN_SHLD	Connection to functional earth
	6	CAN_GND	CAN Ground (optional)
	7	CAN1_H[1)]	CAN bus signal 1 (dominant high)
	8	not assigned	–
	9	not assigned	–

1) For connection of the device at the end of the line: connect pin 2 and pin 7 via a resistor. Matching plug with resistor (120 Ω/0.25 W) ➔ www.festo.com/catalogue.

Tab. 7: CANopen interface CAN 1 [X6]

USB interfaces [X7], [X9]

The USB interfaces are compatible with USB 3.0 and USB 2.0 standards. They are suitable for USB plug type A.

The following functions are supported (cable length ≤ 3 m):

- General data storage
- Connection of a camera
- Connection of hardware extensions

Ethernet interfaces [X8], [X10]

The Ethernet interfaces are designed as an RJ45 socket and support Gigabit LAN. The controller cannot be used as a switch.

The following functions are supported:

- [X8]:
  - TCP/IP (e.g. Modbus TCP)
  - UDP (e.g. network variables, EasyIP)
  - EtherNet/IP (e.g. generic IO device)
  - PROFINET IO
  - TPM (encrypted communication possible)
- [X10]:
  - EtherCAT Master

Parameter	Value
IP	192.168.4.2
Subnet mask	255.255.0.0
Gateway	192.168.1.1

Tab. 8: Network settings on delivery

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If required, the network settings can be configured with the Festo Field Device Tool (FFT) using a web browser.

Serial interfaces [X12], [X13]

- X12 = RS232-1
- X13 = RS232-2

Terminal	Connection	Use
X12.1, X13.1	G	Earth
X12.2, X13.2	Tx	Transmitted data[1)] (Output)
X12.3, X13.3	Rx	Received data[1)] (Input)
X12.4, X13.4	S	Shielding, connection to functional earth

1) Max. level: Low -15 V High +15 V; TTL level not permitted

Tab. 9: Serial interfaces [X12], [X13]

Multiple interface for encoder/RS422/RS485 [X14]

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Simultaneous use of the interfaces is not possible.

Terminal	Connection	Encoder	RS422[1)]	RS485[1)]
X14.1	G	Earth	Earth	Earth
X14.2	A+	Track A +	Transmitted data +[2)]	Transmitted/ received data +[2)]
X14.3	A–	Track A –	Transmitted data –[2)]	Transmitted/ received data –[2)]
X14.4	B+	Track B +	Received data +[3)]	–
X14.5	B–	Track B –	Received data –[3)]	–
X14.6	N+	Zero track +	–	–
X14.7	N–	Zero track –	–	–
X14.8	S	Shield, connection to functional earth		

1) Permissible data rate ≤ 1 MHz
2) If the device is connected at the end of the cable: connect terminals X14.2 and X14.3 via resistor (120 Ω/0.25 W).
3) If the device is connected at the end of the cable: connect terminals X14.4 and X14.5 via resistor (120 Ω/0.25 W).

Tab. 10: Multiple interface for encoder/RS422/RS485 [X14]

Communication interface IO-Link [X15], [X16]

Terminal	Connection	Use
X15.1	L+	24 V DC
X15.2	C/Q	Communication signal IO-Link
X15.3	L–	0 V DC
X15.4	24	UA+
X15.5	0	UA–

Tab. 11: Communication interface IO-Link Master [X15]

Terminal	Connection	Use
X16.1	L+	24 V DC
X16.2	C/Q	Communication signal IO-Link
X16.3	L–	0 V DC

Tab. 12: Communication interface for IO-Link device [X16]

Digital inputs [X17]

The digital inputs, configured in 3-wire connection technology, are not galvanically separated. The ground potential for all inputs relates to GND of the power supply [X1].

Use 3 adjacent terminals when connecting a sensor with a 3-wire configuration.

Terminal	Connection	Use
X17.0.1/X17.0.2/X17.0.3	24 V DC/signal 1[1]/GND logic	Connection for digital sensor 1[2]
X17.1.1/X17.1.2/X17.1.3	24 V DC/signal 2[3]/GND logic	Connection for digital sensor 2[2]
X17.2.1/X17.2.2/X17.2.3	24 V DC/signal 3/GND logic	Connection for digital sensor 3[2]
X17.3.1/X17.3.2/X17.3.3	24 V DC/signal 4/GND logic	Connection for digital sensor 4[2]
X17.4.1/X17.4.2/X17.4.3	24 V DC/signal 5/GND logic	Connection for digital sensor 5[2]
X17.5.1/X17.5.2/X17.5.3	24 V DC/signal 6/GND logic	Connection for digital sensor 6[2]
X17.6.1/X17.6.2/X17.6.3	24 V DC/signal 7/GND logic	Connection for digital sensor 7[2]
X17.7.1/X17.7.2/X17.7.3	24 V DC/signal 8/GND logic	Connection for digital sensor 8[2]

1) Home signal for drive A
2) 1 kHz, IEC type 1
3) Home signal for drive C

Tab. 13: Digital inputs [X17]

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The inputs can be adjusted for PNP or NPN sensors. Configuration is via CODESYS parameters in the control project for all inputs together.

CANopen interface CAN 2 [X18]

Terminal	Connection	Use
X18.1	CAN2_H[1]	CAN bus signal 2 (dominant high)
X18.2	CAN2_H[1]	CAN bus signal 2 (dominant low)
X18.3	CAN_GND	CAN Ground
X18.4	CAN_SHLD	Connection to functional earth

1) No terminating resistor necessary; ports are connected internally via a resistor.

Tab. 14: CANopen interface CAN 2 [X18]

Analogue inputs [X19]

The analogue inputs, configured in 3-wire connection technology, are NOT galvanically separated. The ground potential for all inputs relates to GND of the power supply [X1]. An incoming signal is digitised with a 14-bit resolution.

Terminal	Connection	Use
X19.0.1/X19.0.2/X19.0.3	24 V DC/signal/GND	Port analogue sensor 1[1]
X19.1.1/X19.1.2/X19.1.3	24 V DC/signal/GND	Port analogue sensor 2[1]
X19.2.1/X19.2.2/X19.2.3	24 V DC/signal/GND	Port analogue sensor 3[1]
X19.3.1/X19.3.2/X19.3.3	24 V DC/signal/GND	Port analogue sensor 4[1]

1) 0 ... 10 V DC; 0 ... 20 mA

Tab. 15: Analogue inputs [X19]

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The inputs can be operated either with a voltage signal (0 ... 10 V DC) or a current signal (0 ... 20 mA).
Configuration is made via CODESYS parameters in the control project separately for each input.

Digital outputs [X20]

The digital outputs, configured in 2-wire connection technology, are galvanically separated from the power supply [X1]. The current load per output is 0.5 A. The earth potential of all outputs relates to GND of the power supply [X5]. All outputs are protected against short circuit and thermal overload.

i

The outputs can be set to PNP or NPN circuitry. Configuration is via CODESYS parameters in the control project for all inputs together.

Use 2 adjacent terminals to connect a consumer.

Terminals	Connection	Use
X20.0.1/X20.0.2	Signal P/signal N	Port output 1[1]
X20.1.1/X20.1.2	Signal P/signal N	Port output 2[1]
X20.2.1/X20.2.2	Signal P/signal N	Port output 3[1]
X20.3.1/X20.3.2	Signal P/signal N	Port output 4[1]
X20.4.1/X20.4.2	Signal P/signal N	Port output 5[1]
X20.5.1/X20.5.2	Signal P/signal N	Port output 6[1]
X20.6.1/X20.6.2	Signal P/signal N	Port output 7[1]
X20.7.1/X20.7.2	Signal P/signal N	Port output 8[1]

1) 0.5 A per channel, SSR: Solid State Relay

Tab. 16: Digital outputs [X20]

Servo drive A, B, C, D [X22], [X23], [X26], [X27] with CANopen CAN 2 interface

- Resultant current for all supplied ports: ≤ 8 A
- Cable length: ≤ 3 m

Terminal	Connection	Use	Internal connection
X2x.1	24/48 V DC	Load voltage supply for servo drive controller[1]	X21.1
X2x.2	GND		X21.2
X2x.3	24 V DC	Servo drive power supply (logic)	X1.1
X2x.4	GND		X1.2
X2x.5	CAN2_H	CAN bus signal 2 (dominant high)	X18.1
X2x.6	CAN2_L	CAN bus signal 2 (dominant low)	X18.2
X2x.7	CAN_GND	CAN Ground	X18.3
X2x.8	CAN_SHLD	Connection to functional earth	X18.4
X2x.9	GPIO	Home signal (digital in)	X17.0.2/X17.1.2[2]
		Multi-functional signal	X24.2/X28.2[3]
X2x.10	GND	Power supply (logic)	X1.2

1) Continuous load per output: ≤ 2.0 A; power pulse current per output: ≤ 4.2 A
2) Home signal: X22.9 (drive A) at X17.0.2; X26.9 (drive C) at X17.1.2
3) Multi-functional signal: X23.9 (drive B) at X24.2; X27.9 (drive D) at X28.2

Tab. 17: Servo drive A, B, C, D [X22], [X23], [X26], [X27] with CANopen CAN 2 interface

Multi-functional interface [X24], [X28]

Terminal	Connection	Use
X2x.1	24 V DC	Power supply
X2x.2	Signal	Multi-functional signal
X2x.3	GND	Earth

Tab. 18: Multi-functional interface [X24], [X28]

Torque-off input [X25]

Terminal	Connection	Use
X25.1	Signal	Torque-off input
X25.2	24 V DC	Power supply

Tab. 19: Torque-off input [X25]

Memory card slot

Supported microSD cards:
- microSD
- microSD HC
- microSD XC

Supported functions:
- Saving boot projects and test programs (only CECC-X-M1-MV/-S1)
- General data storage

5 Assembly

Mounting on H-rail

1. Insert the product into the H-rail and press in until it audibly clicks into place.
2. For dismantling, unlock the fastening tab on the underside with a suitable tool and remove the product.

Mounting onto mounting surface

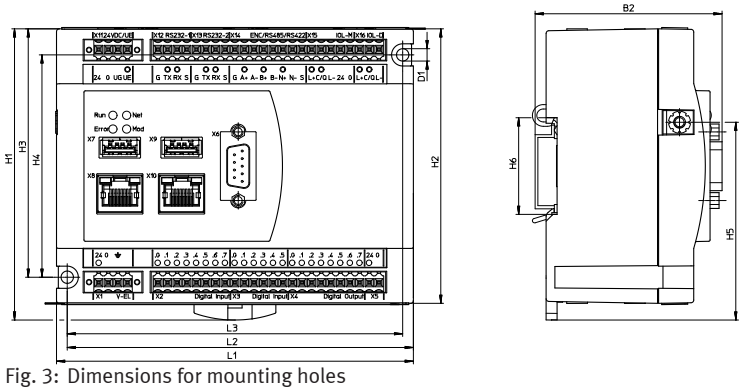

Fig. 3: Dimensions for mounting holes

		∅ D1	L3	H4
CECC-X-M1	[mm]	4.5	122.2	81

Tab. 20: Dimensions for mounting holes

1. Drill mounting holes on a level, torsion-resistant surface.
2. Screw the product tight. Screws: M4. ∅ screw head: 7 mm. Tightening torque: 0.8 Nm.

6 Installation

⚠ WARNING

Risk of injury due to electric shock.

- For the electric power supply, use only PELV circuits that ensure a reliable electric disconnection from the mains network.
- Observe IEC 60204-1/EN 60204-1.

NOTICE

Unauthorised Access to the Device Can Cause Damage or Malfunction.

- When connecting the device to a network, protect the network from unauthorised access.
  Standards for security in information technology can be used for network protection measures, e.g. IEC 62443, ISO/IEC 27001.

NOTICE

Damage to the product in case of overload.

Do not exceed the maximum permitted total current of the digital outputs.

7 Technical data

Controller CECC-X-M1		
Operating voltage [X1], [X5]	[V DC]	19.2 ... 30
Operating voltage [X21]	[V DC]	19.2 ... 50
Nominal current consumption at 24 V DC	[mA]	200
Reverse polarity protection		no
Certification		RCM
Degree of protection		IP20
Protection class		III
Vibration and shock resistance (in accordance with IEC/EN 60068-2-6)		SL1 ➔ Tab. 22 Features of severity level (SL)
Ambient temperature	[°C]	0 ... 55
Storage temperature	[°C]	–25 ... +70
Product weight	[g]	410
Fan noise LpAeq (1 m distance)	[dB(A)]	35.7
Integrated brake chopper		
Switch-on threshold voltage limit	[V]	Operating voltage [X21] + 2.0
Switch-off threshold voltage limit	[V]	Operating voltage [X21] + 0.5
Nominal power	[W]	18
Continuous power	[W]	≤ 5
Pulse power with pulse frequency 1 Hz (duty cycle ≤ 10%)	[W]	≤ 50
Braking resistor	[Ω]	15
Max. line and cable lengths		
USB cable	[m]	3
Motor cable	[m]	3
Other cables	[m]	10
CE marking		
Declaration of conformity		in accordance with EU EMC Directive[1)2)]
Storage media		
Supported types		microSD, microSDHC, microSDXC, USB
Capacity	[GB]	≤ 32
File system		FAT32
Analogue inputs		
Input signal U	[V]	0 ... 10
Input signal I	[mA]	0 ... 20
Resolution	[bit]	14
Hardware		
Processor (CPU)		Dual core, 2 x 866 MHz
Total main memory	[MB]	512
Memory for project data (temporary)	[MB]	64
Memory for project data (permanent)	[MB]	20
Remanent memory	[kB]	4

1) The product is intended for use in industrial environments. Measures for interference suppression may be required in residential areas.
2) The product is classified in zone A in accordance with EN 61131-2:2007.

Tab. 21: Technical data

Features of severity level (SL)					
Vibration load					
Frequency range [Hz]		Acceleration [m/s²]		Deflection [mm]	
SL1	SL2	SL1	SL2	SL1	SL2
2 ... 8	2 ... 8	–	–	±3.5	±3.5
8 ... 27	8 ... 27	10	10	–	–
27 ... 58	27 ... 60	–	–	±0.15	±0.35
58 ... 160	60 ... 160	20	50	–	–
160 ... 200	160 ... 200	10	10	–	–
Shock load					
Acceleration [m/s²]		Duration [ms]		Shocks per direction	
SL1	SL2	SL1	SL2	SL1	SL2
±150	±300	11	11	5	5
Continuous shock load					
Acceleration [m/s²]		Duration [ms]		Shocks per direction	
±150		6		1000	

Tab. 22: Features of severity level (SL)

Remanent variables

A maximum of 24572 bytes is available on the controller for storing remanent variables. They are automatically distributed based on the variable declaration within the application. The following sample combinations for distributing the remanent memory are available.

RETAIN variable		PERSISTENT RETAIN variable
24572	Byte	0 bytes (only if there is no PERSISTENT variable list)
0	Byte	24528 (44 bytes for identification)
300	Byte	24528 – 300 bytes = 24228 bytes (44 bytes for identification)
x	Byte	24528 – x bytes (44 bytes for identification)

Tab. 23: Remanent variables

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When programming, the remanent data must not exceed the maximum available capacity of 24572 bytes.