

SIMATIC

ET 200pro distributed I/O system

Operating Instructions

Introduction

1

Safety instructions

2

New properties/functions

3

Description

4

Application Planning

5

Mounting

6

Connection

7

Configuring

8

Commissioning

9

Maintenance and service

10

Functions

11

Alarm, error and system messages

12

General technical data

13

Connection modules

14

Interface modules

15

Power modules

16

Continued on next page

14	Connection modules.....	254
14.1	Connection modules for interface modules with PROFIBUS DP.....	254
14.1.1	Connection module CM IM DP Direct for interface modules.....	254
14.1.2	CM IM DP ECOFAST Cu connection module for interface modules.....	255
14.1.3	CM IM DP M12 connection module, 7/8" for interface modules.....	257
14.2	Connection modules for the interface module with PROFINET IO.....	258
14.2.1	CM IM PN M12, 7/8" connection module for interface modules.....	258
14.2.2	Connection module CM IM PN M12, 7/8" S for interface modules.....	260
14.2.3	CM IM PN M12, M12-L S connection module for interface modules.....	262
14.2.4	CM IM PN PP Cu connection module for interface module.....	264
14.2.5	CM IM PN PP FO connection module for interface modules.....	266
14.3	Connection modules for electronic modules.....	267
14.3.1	Connection module CM IO 4 x M12 for electronic modules.....	267
14.3.2	CM IO 4 x M12P connection module for electronic modules.....	269
14.3.3	CM IO 4 x M12 Inverse connection module for electronic modules.....	270
14.3.4	CM IO 8 x M12 connection module for electronic modules.....	272
14.3.5	CM IO 8 x M12P connection module for electronic modules.....	273
14.3.6	CM IO 8 x M12D connection module for electronic modules.....	275
14.3.7	CM IO 8 x M8 connection module for electronic modules.....	276
14.3.8	CM IO 2 x M12 connection module for electronic modules.....	277
14.3.9	CM IO 1 x M23 connection module for electronic modules.....	279
14.4	Connection modules for power modules.....	281
14.4.1	CM PM-E Direct connection module for power modules.....	281
14.4.2	CM PM-E ECOFAST connection module for power modules.....	282
14.4.3	CM PM-E 7/8" connection module for power modules.....	283
14.4.4	CM PM-E M12-L connection module for power modules.....	284
14.4.5	CM PM-E PP connection module for power modules.....	285
14.4.6	CM PM-O PP connection module for the PM-O outgoing module.....	287
15	Interface modules.....	289
15.1	Interface modules for PROFIBUS DP.....	289
15.1.1	IM 154-1 DP interface module.....	289
15.1.2	IM 154-2 DP High Feature interface module.....	295
15.1.3	Overview of parameters of the interface module.....	301
15.1.4	Description of the interface module parameters.....	302
15.1.5	Parameter assignment dependencies.....	303
15.2	Interface modules for PROFINET IO.....	304
15.2.1	Measures for protecting the operational application environment.....	304
15.2.2	Interface module IM 154-3 PN High Feature (6ES7154-3AB00-0AB0).....	306
15.2.3	IM 154-4 PN High Feature interface module (6ES7154-4AB10-0AB0).....	315
15.2.4	Overview of parameters of the interface module.....	326
15.2.5	Description of the interface module parameters.....	327

16	Power modules.....	328
16.1	Measures for protecting the operational application environment.....	328
16.2	PM-E power module.....	329
16.3	PM-O DC 2x24V outgoing module.....	333
16.4	Parameter overview of power/outgoing module.....	336
16.5	Parameter description for power/outgoing module.....	336
17	Digital electronic modules.....	337
17.1	Measures for protecting the operational application environment.....	337
17.2	Digital electronic module 8 DI DC 24V (6ES7141-4BF00-0AA0).....	338
17.3	Digital electronic module 8 DI DC 24V High Feature (6ES7141-4BF00-0AB0).....	343
17.4	Digital electronic module 16 DI DC 24V (6ES7141-4BH00-0AA0).....	347
17.5	Digital electronic module 4 DO DC 24V/2.0A (6ES7142-4BD00-0AA0).....	350
17.6	Digital electronic module 4 DO DC 24V/2.0A High Feature (6ES7142-4BD00-0AB0).....	355
17.7	Digital electronic module 8 DO DC 24V/0.5A (6ES7142-4BF00-0AA0).....	360
17.8	Digital electronic module 4 DI / 4 DO DC 24V/0.5A (6ES7143-4BF50-0AA0).....	365
17.9	Digital electronic module 4 DIO / 4 DO DC 24V/0.5A (6ES7143-4BF00-0AA0).....	371
17.10	Overview of parameters of the digital electronic modules	376
17.11	Overview of parameters of the digital electronic modules.....	378
18	Analog electronic modules.....	382
18.1	Measures for protecting the operational application environment.....	382
18.2	4 AI U High Feature analog electronic module (6ES7144-4FF01-0AB0).....	383
18.3	4 AI I High Feature analog electronic module (6ES7144-4GF01-0AB0).....	388
18.4	Analog electronic module 4 AI RTD High Feature (6ES7144-4JF00-0AB0).....	393
18.5	4 AI TC High Feature analog electronic module (6ES7144-4PF00-0AB0).....	398
18.6	Analog electronic module 4 AO U High Feature (6ES7145-4FF00-0AB0).....	404
18.7	Analog electronic module 4 AO I High Feature (6ES7145-4GF00-0AB0).....	408
18.8	Parameter overview for analog electronic modules.....	412
18.9	Overview of parameters of the analog electronic modules.....	417
18.10	Dynamic reference temperature for the 4 AI TC High Feature electronic module.....	422
18.11	Special features when using PTC resistors.....	426
18.12	Analog value representation for measuring ranges with SIMATIC S7.....	428
18.13	Measuring ranges of the analog input modules in S7 format.....	429
18.14	Output ranges of the analog output modules in S7 format.....	436
18.15	Influence of the range of values	438

19	Pneumatic interface modules.....	439
19.1	Measures for protecting the operational application environment.....	439
19.2	Pneumatic interface module 16 DO DC 24V CPV10 (6ES7148-4EA00-0AA0).....	439
19.3	Pneumatic interface module 16 DO DC 24V CPV14 (6ES7148-4EB00-0AA0).....	442
19.4	Overview of parameters of pneumatic interface module.....	444
20	Industrial cybersecurity.....	445
20.1	Cybersecurity information.....	445
20.2	Security update notification.....	446
20.3	Basic information on industrial cybersecurity.....	446
20.3.1	Definition of industrial cybersecurity.....	446
20.3.2	Objectives of industrial cybersecurity.....	446
20.4	Comprehensive security concept and security strategies.....	447
20.4.1	Comprehensive security concept "Defense in Depth".....	447
20.4.2	Security management.....	448
20.5	Measures for protecting the operational application environment.....	450
20.5.1	Intended use.....	450
20.5.2	Description of the operational application environment (security context).....	450
20.6	Cybersecurity risks and protective measures.....	453
20.7	Security properties of the devices.....	455
20.8	Secure operation of the system.....	455
20.8.1	Hardening measures.....	455
20.8.2	Secure configuration.....	455
20.8.3	Handling of sensitive data.....	455
20.8.4	Regular firmware updates.....	456
20.8.5	Notifications about security vulnerabilities (Siemens Security Advisories).....	456
20.8.6	Data backup.....	457
20.8.7	Security checks.....	457
20.8.8	Secure decommissioning.....	457
20.8.8.1	Securely removing data.....	458
20.8.8.2	Recycling and disposal.....	459
20.9	Secure operation of the engineering software.....	460
20.10	Secure operation of interface modules.....	460
20.10.1	Data integrity for interface modules.....	460
20.10.2	Signed firmware update for interface modules.....	462
20.11	Secure operation of I/O modules.....	463
A	Appendix.....	464
A.1	Order numbers.....	464
A.1.1	Module order numbers.....	464
A.1.2	Order numbers for accessories.....	466
A.1.3	Order numbers for manuals.....	479

Principle of operation

The figure below highlights the principles of grouping.

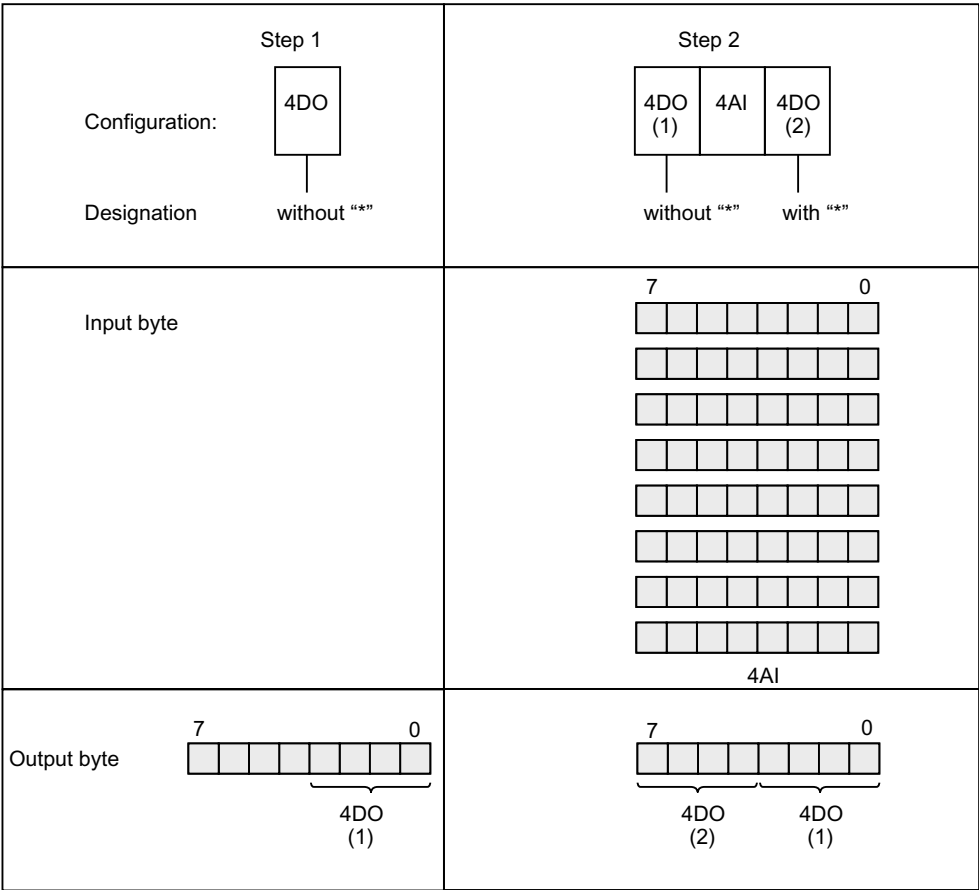


Figure 8-1 Grouping of digital output modules

No grouping of electronic modules

If you choose not to group digital output modules in a single byte when you configure the ET 200pro distributed I/O system, select only the module names which do not contain the "*" character from the hardware catalog of your configuration software.
Each electronic module will then occupy 1 byte in the process output image.

See also

- Configuring by Means of GSD File (Page 147)
- Example of a configuration (Page 151)

8.1.3.4 Example of a configuration

Introduction

The example below explains how to configure an ET 200pro configuration using the GSD file, and how to group digital output modules in a single byte.

ET 200pro configuration

The diagram below shows a practical example of an ET 200pro configuration using slots 2 to 7:

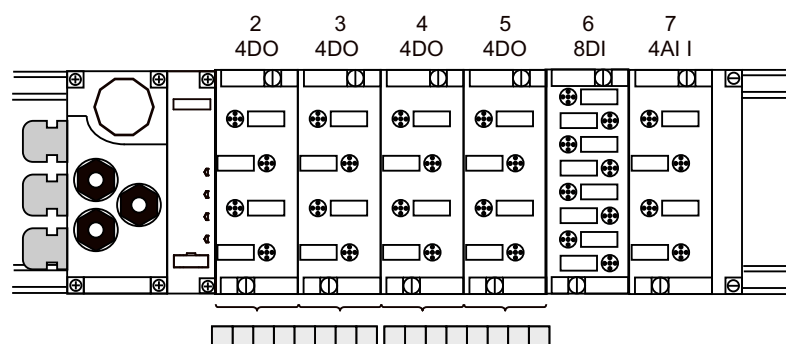


Figure 8-2 Example: Configuring an ET 200pro configuration

Configuration table and address range

The user is free to select the byte addresses of the inputs and outputs, if the configuration software supports this. The bit addresses result automatically from the sequence of the grouped modules.

The table below shows which modules have been grouped and the corresponding address range.

Slot	Module	Grouping	I/O address	
			Inputs	Outputs
2	6ES7142-4BD00-0AA0 4DO DC24V	Yes		0.0 to 0.3
3	6ES7142-4BD00-0AA0* 4DO DC24V			0.4 to 0.7
4	6ES7142-4BD00-0AA0 4DO DC24V	Yes		1.0 to 1.3
5	6ES7142-4BD00-0AA0* 4DO DC24V			1.4 to 1.7
6	6ES7141-4BF00-0AA0 8DI	No	0.0 to 0.7	
7	6ES7144-4GF01-0AB0 4AI I	No	1.0 to 8.7	

See also

[Configuring by Means of GSD File \(Page 147\)](#)

[Procedure when using the GSD file \(Page 149\)](#)

8.2 PROFINET IO**8.2.1 Configuring in STEP 7****Introduction**

The ET 200pro is listed in the hardware catalog after you start STEP 7.

Requirements

Interface module	Configuration software		Assignment of a name to the IO device
	STEP 7 (TIA Portal)	STEP 7	
IM 154-3 PN High Feature (6ES7154-3AB00-0AB0)	as of V14 SP1	as of V5.5 SP4 + HSP	See section Assigning device names to the I/O device (Page 153)
IM 154-4 PN High Feature (6ES7154-4AB10-0AB0)	All versions	as of V5.4 SP4 + HSP	

You can find the available HSPs for your configuration on the Internet
<https://support.industry.siemens.com/cs/ww/en/view/23183356>.

Procedure

1. Start SIMATIC Manager.
2. Create a new project.
3. Configure ET 200pro in HW Config.
4. Drag the modules from the hardware catalog into the configuration table.
5. Double-click the first module of the ET 200pro in the configuration table and set the parameters.
6. Parameterize all other modules of ET 200pro.
7. Save the configuration, or download it to the IO controller.

Reference

More information is available in the STEP 7 online help and the System Manual SIMATIC PROFINET with STEP 7 <https://support.industry.siemens.com/cs/ww/en/view/49948856>.

13.3 Shipping and storage conditions

Transport and storage conditions

The ET 200pro distributed I/O system exceeds requirements in terms of transport and storage conditions according to IEC 61131-2. The following information applies to modules that are transported and/or stored in their original packaging.

Type of condition	Permitted range
Free fall	≤ 1 m
Temperature	From -40 °C to +70 °C
Temperature change	20 K/h
Air pressure	From 1140 to 660 hPa (corresponds to an elevation from 1000 to 3500 m)
Relative humidity	From 5 to 95%, without condensation

13.4 Mechanical and climatic environmental conditions

Climatic environmental conditions

The following climatic environmental conditions apply (indoor use only):

Environmental requirements	Areas of application	Remarks
Temperature	0° C to 55° C *	All mounting positions
Temperature change	10 K/h	-
Relative humidity	5% to 100%	With condensation and mounted covers
Barometric pressure	from 1140 to 795 hPa	Corresponds to an altitude of -1000 m to 2000 m
Concentration of pollutants	ANSI/ISA-71.04 severity level G1; G2; G3	-
* The FESTO CPV10 and CPV14 valve terminals deviate from the specified operating temperature range of 0 to 55° C. For the temperature operating range of FESTO valve terminals, refer to the corresponding FESTO Operating Manuals.		

Modules for use in the -25° C to 55° C temperature range

The following modules support operation in the -25° C to 55° C temperature range (indoor use only):

Designation	Article number
IM 154-1 DP with termination module	6ES7154-1AA01-0AB0
IM 154-2 DP High Feature with termination module	6ES7154-2AA01-0AB0
IM 154-3 PN High Feature with termination module	6ES7154-3AB00-0AB0
IM 154-4 PN High Feature with termination module	6ES7154-4AB10-0AB0
PM-E DC 24V	6ES7148-4CA00-0AA0

13.4 Mechanical and climatic environmental conditions

Designation	Article number
PM-O DC 2x24V	6ES7148-4CA60-0AA0
CM IM DP Direct	6ES7194-4AC00-0AA0
CM IM DP ECOFAST Cu	6ES7194-4AA00-0AA0
CM IM DP M12, 7/8"	6ES7194-4AD00-0AA0
CM IM PN M12, 7/8"	6ES7194-4AJ00-0AA0
CM IM PN M12, 7/8" S	6ES7194-4AK00-0AA0
CM IM PN M12, M12-L S	6ES7194-4AL00-0AA0
CM IM PN M12, M12-L S	6ES7194-4AL01-0AA0
CM IM PN PP Cu	6ES7194-4AF00-0AA0
CM IM PN PP FO	6ES7194-4AG00-0AA0
CM PM-E Direct	6ES7194-4BC00-0AA0
CM PM-E ECOFAST	6ES7194-4BA00-0AA0
CM PM-E 7/8"	6ES7194-4BD00-0AA0
CM PM-E M12-L	6ES7194-4BL01-0AA0
CM PM-E M12-L	6ES7194-4BL00-0AA0
CM PM-E PP	6ES7194-4BE00-0AA0
CM PM-O PP	6ES7194-4BH00-0AA0
CM IO 4 x M12	6ES7194-4CA00-0AA0
CM IO 4 x M12P	6ES7194-4CA10-0AA0
CM IO 4 x M12 Inverse	6ES7194-4CA50-0AA0
CM IO 8 x M12	6ES7194-4CB00-0AA0
CM IO 8 x M12P	6ES7194-4CB10-0AA0
CM IO 8 x M12D	6ES7194-4CB50-0AA0
CM IO 8 x M8	6ES7194-4EB00-0AA0
CM IO 2 x M12	6ES7194-4FB00-0AA0
CM IO 1 x M23	6ES7194-4FA00-0AA0
8 DI DC 24V	6ES7141-4BF00-0AA0
16 DI DC 24V	6ES7141-4BH00-0AA0
8 DI DC 24V High Feature	6ES7141-4BF00-0AB0
8 DO DC 24V/0.5A	6ES7142-4BF00-0AA0
4 DO DC 24V/2.0A	6ES7142-4BD00-0AA0
4 DO DC 24V/2.0A High Feature	6ES7142-4BD00-0AB0
4 DI / 4 DO DC 24V/0.5A	6ES7143-4BF50-0AA0
4 DIO / 4 DO DC 24V/0.5A	6ES7143-4BF00-0AA0
4 AI U High Feature	6ES7144-4FF01-0AB0
4 AI I High Feature	6ES7144-4GF01-0AB0
4 AI RTD High Feature	6ES7144-4JF00-0AB0
4 AI TC High Feature	6ES7144-4PF00-0AB0
4 AO U High Feature	6ES7145-4FF00-0AB0
4 AO I High Feature	6ES7145-4GF00-0AB0

Mechanical environmental conditions

The table below shows the mechanical environmental conditions in the form of sinusoidal oscillation.

Modules	Frequency range	continuous	infrequent
Interface, electronic, and connection modules; Pneumatic interface modules with FESTO valve terminals	$5 \leq f \leq 12.9 \text{ Hz}$	15 mm amplitude	-
	$12.9 \leq f \leq 150 \text{ Hz}$	5 g constant acceleration	10 g constant acceleration

Testing mechanical environmental conditions

The table below provides information about the type and scope of mechanical environmental condition tests.

Condition tested	Test standard	Interface, electronic, and connection modules; Pneumatic interface modules with FESTO valve terminals
Vibrations	Vibration test according to IEC 60068-2-6	Type of vibration: Frequency sweeps with a rate of change of 1 octave/minute. $5 \text{ Hz} \leq f \leq 12.9 \text{ Hz}$, 15 mm constant amplitude $12.9 \text{ Hz} \leq f \leq 150 \text{ Hz}$, constant acceleration 10 g Duration of vibration: 10 frequency sweeps per axis in each of three perpendicular axes
Shock	Shock, tested according to IEC 60068-2-27	Type of shock: half-sine Shock intensity: 30 g peak value, 18 ms duration Direction of shock: 3 shock tests in +/- direction in each of the 3 perpendicular axes
Continuous shock	Shock, tested according to IEC 60068-2-27	Type of shock: half-sine Shock intensity: 25 g peak value, 6 ms duration Direction of shock: 1000 shock tests in +/- direction at each of the 3 perpendicular axes

13.5 Specifications for insulation tests, protection class, degree of protection, and rated voltage

Insulation

The insulation is designed in accordance with the requirements of EN 61131-2.

NOTE

In the case of modules with 24 V DC (SELV/PELV) supply voltage, galvanic isolations are tested with 707 V DC (type test).

You can find information on insulation for ET 200pro motor starters in the operating instructions for the ET 200pro motor starter on the Internet (<http://support.automation.siemens.com/WW/view/en/22332388>).

Technical specifications	
• 1L+ electronics/encoder supply	Max. 16 A*, up to 40 °C ambient temperature Max. 8 A*, up to 55 °C ambient temperature
• 2L+ load voltage supply	Max. 16 A*, up to 40 °C ambient temperature Max. 8 A*, up to 55 °C ambient temperature
* Observe the permitted current carrying capacity of the cable.	

NOTE**Feed current**

The load on the internal busbars of ET 200pro must not exceed the following values:

- At 1L+ 5 A
- At 2L+ 10 A

NOTE

The CM IM PN PP FO connection module may only be pulled/plugged at zero voltage.

If you pull or plug the CM IM PN PP FO connection module under voltage, the module will not reach ready-to-operate status. In this case, briefly switch the voltage supply off and back on.

14.3 Connection modules for electronic modules

14.3.1 Connection module CM IO 4 x M12 for electronic modules

Order number

6ES7194-4CA00-0AA0

Properties

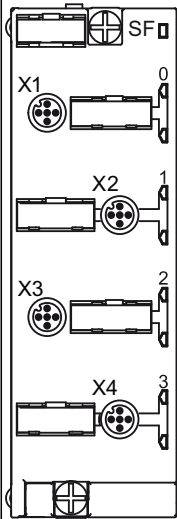
Properties of the connection module CM IO 4 x M12:

- Can be plugged in and attached with screws to the electronic module
- 4 M12 circular socket connectors
- 4 labels and 1 module tag

Pin assignment

The pin assignment depends on the electronic module used.

View	Connection	Designation
	X1	1. M12 circular socket connector

View	Connection	Designation
	X2	2. M12 circular socket connector
	X3	3. M12 circular socket connector
	X4	4. M12 circular socket connector

Block diagram

The figure below shows the block diagram of the connection module CM IO 4 x M12.

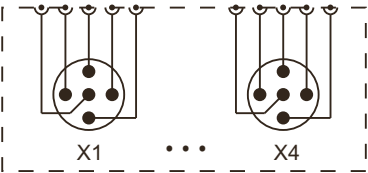


Figure 14-4 Block diagram, CM IO 4 x M12 connection module

Technical specifications

Technical specifications	
Dimensions and weight	
Dimensions W x H x D (mm)	45 x 130 x 39
Weight	Approx. 300 g

See also

- [Digital electronic module 8 DI DC 24V \(6ES7141-4BF00-0AA0\) \(Page 338\)](#)
- [Digital electronic module 8 DI DC 24V High Feature \(6ES7141-4BF00-0AB0\) \(Page 343\)](#)
- [Digital electronic module 4 DO DC 24V/2.0A \(6ES7142-4BD00-0AA0\) \(Page 350\)](#)
- [Digital electronic module 4 DO DC 24V/2.0A High Feature \(6ES7142-4BD00-0AB0\) \(Page 355\)](#)
- [Digital electronic module 8 DO DC 24V/0.5A \(6ES7142-4BF00-0AA0\) \(Page 360\)](#)
- [Digital electronic module 4 DI / 4 DO DC 24V/0.5A \(6ES7143-4BF50-0AA0\) \(Page 365\)](#)
- [4 AI U High Feature analog electronic module \(6ES7144-4FF01-0AB0\) \(Page 383\)](#)
- [4 AI I High Feature analog electronic module \(6ES7144-4GF01-0AB0\) \(Page 388\)](#)
- [4 AI TC High Feature analog electronic module \(6ES7144-4PF00-0AB0\) \(Page 398\)](#)

[Analog electronic module 4 AI RTD High Feature \(6ES7144-4JF00-0AB0\) \(Page 393\)](#)

[Analog electronic module 4 AO U High Feature \(6ES7145-4FF00-0AB0\) \(Page 404\)](#)

[Analog electronic module 4 AO I High Feature \(6ES7145-4GF00-0AB0\) \(Page 408\)](#)

14.3.2 CM IO 4 x M12P connection module for electronic modules

Order number

6ES7194-4CA10-0AA0

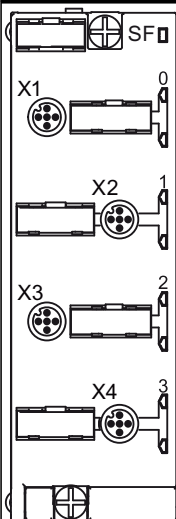
Properties

Properties of the CM IO 4 x M12P connection module:

- Can be plugged in and attached with screws to the electronic module
- 4 M12 circular socket connectors
- 4 labels and 1 module tag

Pin assignment

The pin assignment depends on the electronic module used.

View	Connection	Designation
	X1	1. M12 circular socket connector
	X2	2. M12 circular socket connector
	X3	3. M12 circular socket connector
	X4	4. M12 circular socket connector

Block diagram

The figure below shows the block diagram of the connection module CM IO 4 x M12P.

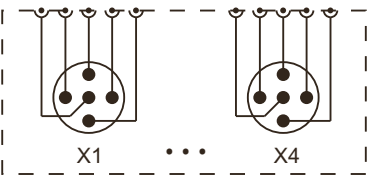


Figure 14-5 Block diagram, CM IO 4 x M12P connection module

Technical specifications

Technical specifications	
Dimensions and weight	
Dimensions W x H x D (mm)	45 x 130 x 39
Weight	Approx. 300 g

See also

- [Digital electronic module 8 DI DC 24V \(6ES7141-4BF00-0AA0\) \(Page 338\)](#)
- [Digital electronic module 8 DI DC 24V High Feature \(6ES7141-4BF00-0AB0\) \(Page 343\)](#)
- [Digital electronic module 4 DO DC 24V/2.0A \(6ES7142-4BD00-0AA0\) \(Page 350\)](#)
- [Digital electronic module 4 DO DC 24V/2.0A High Feature \(6ES7142-4BD00-0AB0\) \(Page 355\)](#)
- [Digital electronic module 8 DO DC 24V/0.5A \(6ES7142-4BF00-0AA0\) \(Page 360\)](#)
- [Digital electronic module 4 DI / 4 DO DC 24V/0.5A \(6ES7143-4BF50-0AA0\) \(Page 365\)](#)

14.3.3 CM IO 4 x M12 Inverse connection module for electronic modules

Order number

6ES7194-4CA50-0AA0

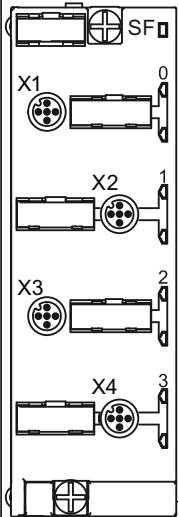
Properties

The CM IO 4 x M12 Inverse connection module has the following properties:

- Can be plugged in and attached with screws to the following electronic modules:
 - 4 DO DC 24V/2.0A (6ES7142-4BD00-0AA0)
 - 4 DO DC 24V/2.0A High Feature (6ES7142-4BD00-0AB0)
- 4 M12 circular socket connectors
- Double assignment of circular socket connectors X1, X3 for 4-channel electronic modules
- 4 labels and 1 module tag (circular socket connectors X1, X3 and the module tag are in white for purposes of identifying the double assignment)

Pin assignment

The pin assignment depends on the electronic module used.

View	Connection	Designation
	X1	1. M12 circular socket connector
	X2	2. M12 circular socket connector
	X3	3. M12 circular socket connector
	X4	4. M12 circular socket connector

Block diagram

The figure below shows the block diagram of the CM IO 4 x M12 Inverse connection module.

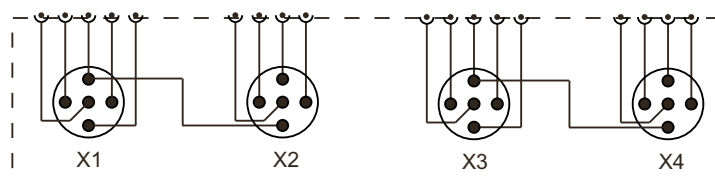


Figure 14-6 Block diagram of CM IO 4 x M12 Inverse connection module

Technical specifications

Technical specifications	
Dimensions and weight	
Dimensions W x H x D (mm)	45 x 130 x 39
Weight	Approx. 300 g

See also

[Digital electronic module 4 DO DC 24V/2.0A \(6ES7142-4BD00-0AA0\) \(Page 350\)](#)

[Digital electronic module 4 DO DC 24V/2.0A High Feature \(6ES7142-4BD00-0AB0\) \(Page 355\)](#)

14.3.4 CM IO 8 x M12 connection module for electronic modules

Order number

6ES7194-4CB00-0AA0

Properties

The CM IO 8 x M12 connection module has the following properties:

- Can be plugged in and attached with screws to the electronic module
- 8 M12 circular socket connectors
- 8 labels and 1 module identification tag

Pin assignment

The pin assignment depends on the electronic module used.

View	Connection	Designation
	X1	1. M12 circular socket connector
	X2	2. M12 circular socket connector
	X3	3. M12 circular socket connector
	X4	4. M12 circular socket connector
	X5	5. M12 circular socket connector
	X6	6. M12 circular socket connector
	X7	7. M12 circular socket connector
	X8	8. M12 circular socket connector

Block diagram

The figure below shows the block diagram of the connection module CM IO 8 x M12.

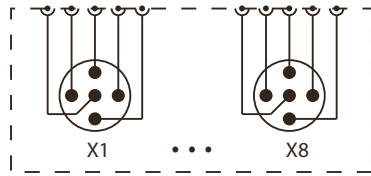


Figure 14-7 Block diagram, CM IO 8 x M12 connection module

Technical specifications

Technical specifications	
Dimensions and weight	
Dimensions W x H x D (mm)	45 x 130 x 39
Weight	Approx. 305 g

See also

[Digital electronic module 8 DI DC 24V \(6ES7141-4BF00-0AA0\) \(Page 338\)](#)

[Digital electronic module 8 DI DC 24V High Feature \(6ES7141-4BF00-0AB0\) \(Page 343\)](#)

[Digital electronic module 8 DO DC 24V/0.5A \(6ES7142-4BF00-0AA0\) \(Page 360\)](#)

[Digital electronic module 4 DI / 4 DO DC 24V/0.5A \(6ES7143-4BF50-0AA0\) \(Page 365\)](#)

14.3.5 CM IO 8 x M12P connection module for electronic modules

Order number

6ES7194-4CB10-0AA0

Properties

The CM IO 8 x M12P connection module has the following properties:

- Can be plugged in and attached with screws to the electronic module
- 8 M12 circular socket connectors
- 8 labels and 1 module identification tag

Pin assignment

The pin assignment depends on the electronic module used.

View	Connection	Designation
	X1	1. M12 circular socket connector
	X2	2. M12 circular socket connector
	X3	3. M12 circular socket connector

View	Connection	Designation
	X4	4. M12 circular socket connector
	X5	5. M12 circular socket connector
	X6	6. M12 circular socket connector
	X7	7. M12 circular socket connector
	X8	8. M12 circular socket connector

Block diagram

The figure below shows the block diagram of the connection module CM IO 8 x M12P.

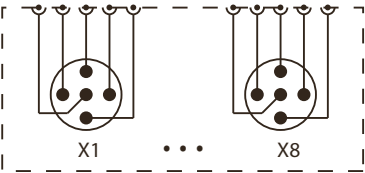


Figure 14-8 Block diagram, CM IO 8 x M12P connection module

Technical specifications

Technical specifications	
Dimensions and weight	
Dimensions W x H x D (mm)	45 x 130 x 39
Weight	Approx. 305 g

See also

- [Digital electronic module 8 DI DC 24V \(6ES7141-4BF00-0AA0\) \(Page 338\)](#)
- [Digital electronic module 8 DI DC 24V High Feature \(6ES7141-4BF00-0AB0\) \(Page 343\)](#)
- [Digital electronic module 8 DO DC 24V/0.5A \(6ES7142-4BF00-0AA0\) \(Page 360\)](#)
- [Digital electronic module 4 DI / 4 DO DC 24V/0.5A \(6ES7143-4BF50-0AA0\) \(Page 365\)](#)

14.3.6 CM IO 8 x M12D connection module for electronic modules

Order number

6ES7194-4CB50-0AA0

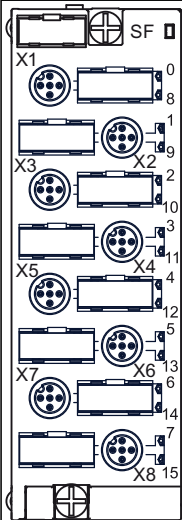
Properties

The CM IO 8 x M12D connection module has the following properties:

- Can be plugged in and attached with screws to the electronic module
- 8 M12 circular socket connectors
- 8 labels and 1 module identification tag

Pin assignment

The pin assignment depends on the electronic module used.

View	Connection	Designation
	X1	1. M12 circular socket connector
	X2	2. M12 circular socket connector
	X3	3. M12 circular socket connector
	X4	4. M12 circular socket connector
	X5	5. M12 circular socket connector
	X6	6. M12 circular socket connector
	X7	7. M12 circular socket connector
	X8	8. M12 circular socket connector

Block diagram

The block diagram below relates to the CM IO 8 x M12D connection module.

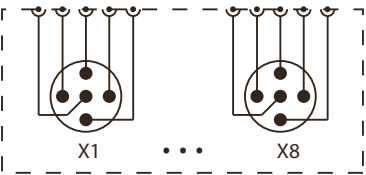


Figure 14-9 Block diagram, CM IO 8 x M12D connection module

Technical specifications

Technical specifications	
Dimensions and weight	
Dimensions W x H x D (mm)	45 x 130 x 39
Weight	Approx. 305 g

See also

- Digital electronic module 16 DI DC 24V (6ES7141-4BH00-0AA0) (Page 347)
- Digital electronic module 4 DIO / 4 DO DC 24V/0.5A (6ES7143-4BF00-0AA0) (Page 371)

14.3.7 CM IO 8 x M8 connection module for electronic modules

Order number

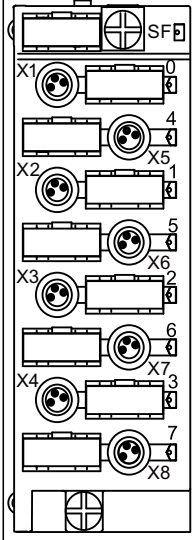
6ES7194-4EB00-0AA0

Properties

- Properties of the CM IO 8 x M8 connection module:
- Can be plugged in and attached with screws to the electronic module
 - 8 M8 circular socket connectors
 - 8 labels and 1 module identification tag

Pin assignment

The pin assignment depends on the electronic module used.

View	Connection	Designation
	X1	1. M8 circular socket connector
	X2	2. M8 circular socket connector
	X3	3. M8 circular socket connector
	X4	4. M8 circular socket connector
	X5	5. M8 circular socket connector
	X6	6. M8 circular socket connector
	X7	7. M8 circular socket connector
	X8	8. M8 circular socket connector

Block diagram

The figure below shows the block diagram of CM IO 8 x M8 connection module.

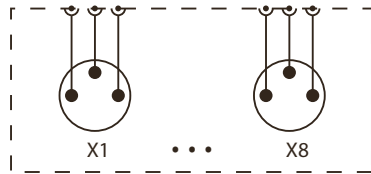


Figure 14-10 Block diagram CM IO 8 x M8

Technical specifications

Technical specifications	
Dimensions and weight	
Dimensions W x H x D (mm)	45 x 130 x 39
Weight	Approx. 310 g

See also

[Digital electronic module 8 DI DC 24V \(6ES7141-4BF00-0AA0\) \(Page 338\)](#)

[Digital electronic module 8 DI DC 24V High Feature \(6ES7141-4BF00-0AB0\) \(Page 343\)](#)

[Digital electronic module 4 DO DC 24V/2.0A \(6ES7142-4BD00-0AA0\) \(Page 350\)](#)

[Digital electronic module 4 DO DC 24V/2.0A High Feature \(6ES7142-4BD00-0AB0\) \(Page 355\)](#)

[Digital electronic module 8 DO DC 24V/0.5A \(6ES7142-4BF00-0AA0\) \(Page 360\)](#)

[Digital electronic module 4 DI / 4 DO DC 24V/0.5A \(6ES7143-4BF50-0AA0\) \(Page 365\)](#)

14.3.8 CM IO 2 x M12 connection module for electronic modules

Order number

6ES7194-4FB00-0AA0

Properties

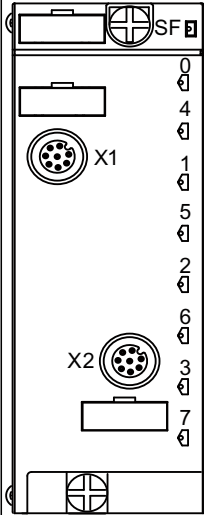
Properties of the connection module CM IO 2 x M12:

- Can be plugged in and attached with screws to the electronic module
- 2 M12 circular socket connectors (8-pin) for connection of 2 actuator/sensor distributors
- 2 labels and 1 module tag

Pin assignment

The pin assignment depends on the electronic module used.

View	Connection	Designation
	X1	1. M12 circular socket connector

View	Connection	Designation
	X2	2. M12 circular socket connector

Block diagram

The figure below shows the block diagram of the connection module CM IO 2 x M12.

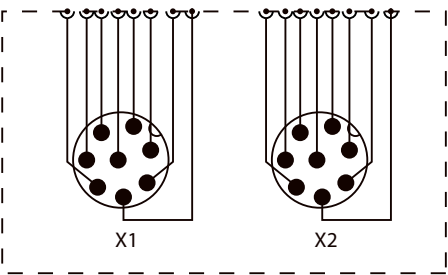


Figure 14-11 Block diagram CM IO 2 x M12

Technical specifications

Technical specifications	
Dimensions and weight	
Dimensions W x H x D (mm)	45 x 130 x 40
Weight	Approx. 115 g
Currents	
Total current per M12 circular socket connector	Max. 2 A

NOTE

The maximum total current per M12 circular socket connector should not exceed 2 A.

See also

[Digital electronic module 8 DI DC 24V \(6ES7141-4BF00-0AA0\) \(Page 338\)](#)

[Digital electronic module 4 DO DC 24V/2.0A \(6ES7142-4BD00-0AA0\) \(Page 350\)](#)

[Digital electronic module 8 DO DC 24V/0.5A \(6ES7142-4BF00-0AA0\) \(Page 360\)](#)

[Digital electronic module 4 DI / 4 DO DC 24V/0.5A \(6ES7143-4BF50-0AA0\) \(Page 365\)](#)

14.3.9 CM IO 1 x M23 connection module for electronic modules

Order number

6ES7194-4FA00-0AA0

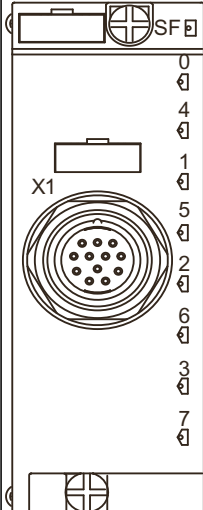
Properties

The CM IO 1 x M23 connection module has the following properties:

- Can be plugged in and attached with screws to the electronic module
- 1 M23 circular socket connectors (12-pin) for connection of one actuator/sensor distributor
- 1 label and 1 module tag

Pin assignment

The pin assignment depends on the electronic module used.

View	Connection	Designation
	X1	1. M23 circular socket connector

Block diagram

The figure below shows the block diagram of the CM IO 1 x M23 connection module.

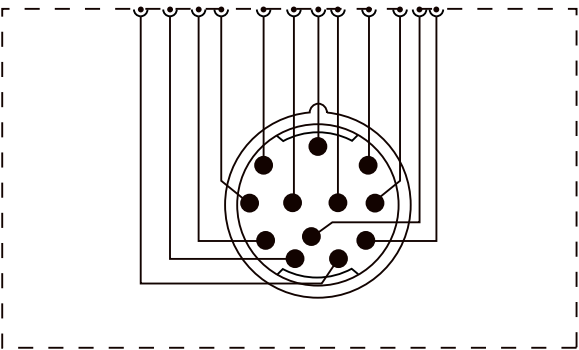


Figure 14-12 Block diagram CM IO 1 x M23

Technical specifications

Technical specifications	
Dimensions and weight	
Dimensions W x H x D (mm)	45 x 130 x 61
Weight	Approx. 170 g
Currents	
Total current of M23 circular socket connector	Max. 4 A

NOTE
The maximum total current per M23 circular socket connector must not exceed 4 A.

See also

- [Digital electronic module 8 DI DC 24V \(6ES7141-4BF00-0AA0\) \(Page 338\)](#)
- [Digital electronic module 4 DO DC 24V/2.0A \(6ES7142-4BD00-0AA0\) \(Page 350\)](#)
- [Digital electronic module 8 DO DC 24V/0.5A \(6ES7142-4BF00-0AA0\) \(Page 360\)](#)
- [Digital electronic module 4 DI / 4 DO DC 24V/0.5A \(6ES7143-4BF50-0AA0\) \(Page 365\)](#)

14.4 Connection modules for power modules

14.4.1 CM PM-E Direct connection module for power modules

Order number

6ES7194-4BC00-0AA0

Properties

The CM PM-E Direct connection module has the following properties:

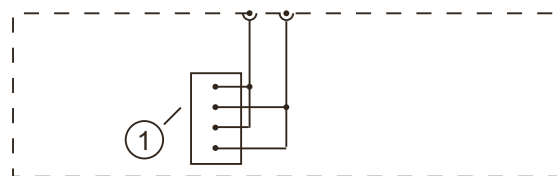
- Can be plugged in and attached with screws to the power module.
- Connecting the 2L+ load voltage supply using screw terminals.
- You can loop through the 2L+ load voltage supply via additional terminals
- 3 labeling strips

Pin assignment

For details on the pin assignment of CM PM-E Direct, refer to the chapter Power modules (Page 328).

Block diagram

The block diagram below relates to the CM PM-E Direct connection module.



① X01: Connection for infeed of the 2L+ load voltage supply

Technical specifications

Technical specifications	
Dimensions and weight	
Dimensions W x H x D (mm)	45 x 130 x 100
Weight	Approx. 140 g
Currents	
Feed current	
• 2L+ load voltage supply	16 A

Digital electronic modules

17.1 Measures for protecting the operational application environment

Purpose and intended application environment

ET 200pro is a modular distributed I/O system available in degrees of protection IP65, IP66, and IP67, having the following properties:

- Robust construction with protection from the penetration of foreign objects and water
- No additional enclosure/control cabinet required
- Use in harsh industrial environments and indoors possible

The digital electronic modules of the ET 200pro are available in various models. Digital inputs can, for example, acquire binary signals from switches and proximity switches. Digital outputs can, for example, connect solenoid valves, DC contactors and indicator lights.

Classification by security context for the product

An appropriate operational application environment is necessary in order to protect the product from cyber threats. You can achieve this by considering the following classification into categories according to the security context and by implementing the necessary measures.

You can find a description of the categories in the section "Description of the operational application environment (security context) [\(Page 450\)](#)".

Category	Phase of use/Access	Classification	Required measures
Persons	Installing	Instructed Person	• Training on the product • Documented training processes
	Wiring	Instructed Person	
	Configuring	Skilled Person	• Regular training on product, plant, cybersecurity • Documented training processes • Clear roles and responsibilities • Monitoring and checking of employee qualifications
	Testing, commissioning, maintenance	Skilled Person	
	Decommissioning	Instructed Person	• Training on the product • Documented training processes
Physical access	Device with digital inputs or digital outputs	Controlled	• Access control with keys, card systems or biometric methods • Monitoring of critical areas with cameras or alarm systems • Physical separation of publicly accessible areas • Accompaniment of non-employees
Communication access	Access via PROFINET IO	Controlled	• Physical protection of the network infrastructure • Cable protection by laying bus cables in protected cable ducts/channels • Covering unused ports with port blockers

Category	Phase of use/Access	Classification	Required measures
Communication access	Access from the plant network	Limited	• Network segmentation using routers • Communication control by means of fire-walls • User management/authentication for CPUs/CPs used as gateway

More information

Moreover, take into consideration all the aspects on this subject in the section "Industrial cybersecurity (Page 445)". There you will find detailed descriptions of:

- Comprehensive security concepts
- Secure operation of the systems
- And lots more

17.2 Digital electronic module 8 DI DC 24V (6ES7141-4BF00-0AA0)

Order number

6ES7141-4BF00-0AA0

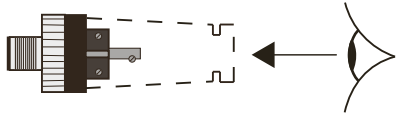
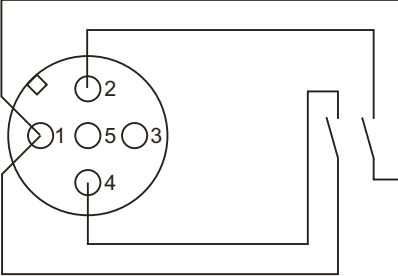
Properties

- Digital electronic module with eight inputs
- Rated input voltage 24 V DC
- Suitable for switches and proximity switches
- Diagnostics for encoder supply short-circuit to M per module

Pin assignment of connection modules CM IO 4 x M12 and CM IO 4 x M12P

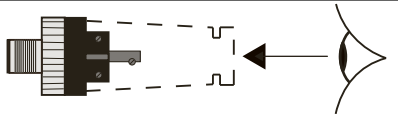
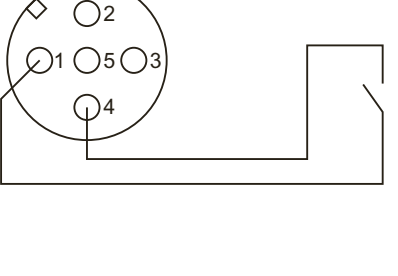
The table below shows the pin assignment of the 8 DI DC 24V on the CM IO 4 x M12 and CM IO 4 x M12P connection modules.

View of circular connector	Terminal	Assignment X1 to X4
	1	24 V encoder supply U _S (provided by ET 200pro for the connected encoder)
	2	Input signal DI ₄ : Connector X1 Input signal DI ₅ : Connector X2 Input signal DI ₆ : Connector X3 Input signal DI ₇ : Connector X4

View of circular connector	Terminal	Assignment X1 to X4
 	3	Encoder supply ground 1M
	4	Input signal DI ₀ : Connector X1 Input signal DI ₁ : Connector X2 Input signal DI ₂ : Connector X3 Input signal DI ₃ : Connector X4
	5	Functional earth (FE)

Pin assignment of connection modules CM IO 8 x M12 and CM IO 8 x M12P

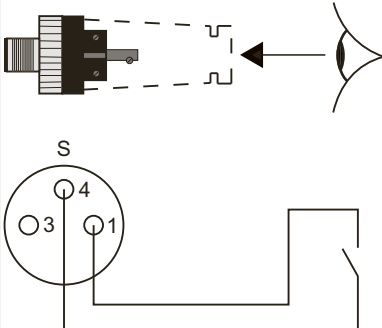
The table below shows the pin assignment of the 8 DI DC 24V on the CM IO 8 x M12 and CM IO 8 x M12P connection modules.

View of circular connector	Terminal	Assignment X1 to X8
 	1	24 V encoder supply U _s (provided by ET 200pro for the connected encoder)
	2	Not assigned
	3	Encoder supply ground 1M
	4	Input signal DI ₀ : Connector X1 Input signal DI ₁ : Connector X2 Input signal DI ₂ : Connector X3 Input signal DI ₃ : Connector X4 Input signal DI ₄ : Connector X5 Input signal DI ₅ : Connector X6 Input signal DI ₆ : Connector X7 Input signal DI ₇ : Connector X8
	5	Functional earth (FE)

Pin assignment of connection module CM IO 8 x M8

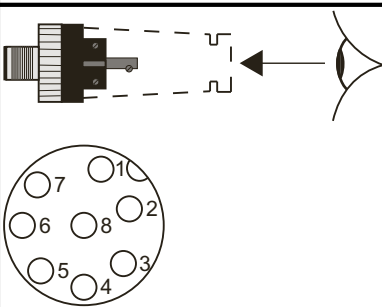
The table below shows the pin assignment of 8 DI DC 24V on the connection module CM IO 8 x M8.

View of circular connector	Terminal	Assignment X1 to X8
	1	24 V encoder supply U _s (provided by ET 200pro for the connected encoder)
	-	-
	3	Encoder supply ground 1M
	4	Input signal DI ₀ : Connector X1 Input signal DI ₁ : Connector X2

View of circular connector	Terminal	Assignment X1 to X8
		Input signal DI ₂ : Connector X3 Input signal DI ₃ : Connector X4 Input signal DI ₄ : Connector X5 Input signal DI ₅ : Connector X6 Input signal DI ₆ : Connector X7 Input signal DI ₇ : Connector X8
	S (shield)	Functional earth (FE)

Pin assignment of connection module CM IO 2 x M12

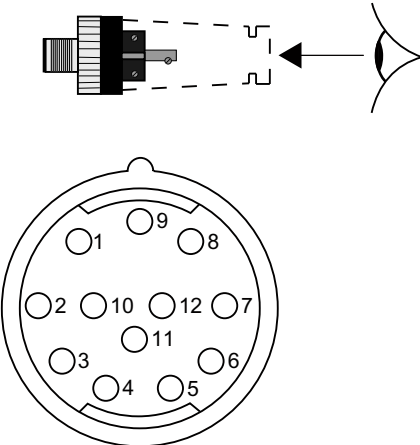
The table below shows the pin assignment of the 8 DI DC 24V on the CM IO 2 x M12 connection module.

View of circular connector	Terminal	Assignment X1 and X2
	1	Input signal DI ₀ : Connector X1 Input signal DI ₄ : Connector X2
	2	Input signal DI ₁ : Connector X1 Input signal DI ₅ : Connector X2
	3	Input signal DI ₂ : Connector X1 Input signal DI ₆ : Connector X2
	4	Input signal DI ₃ : Connector X1 Input signal DI ₇ : Connector X2
	5	24V encoder supply U _S
	6	Not assigned
	7	Encoder supply ground 1M
	8	Functional earth (FE)

Pin assignment of connection module CM IO 1 x M23

The table below shows the pin assignment of 8 DI DC 24V on the connection module CM IO 1 x M23.

View of circular connector	Terminal	Assignment X1
	1	Input signal DI ₀
	2	Input signal DI ₁
	3	Input signal DI ₂
	4	Input signal DI ₃
	5	Input signal DI ₄
	6	Input signal DI ₅
	7	Input signal DI ₆
	8	Input signal DI ₇
	9	Encoder supply ground 1M

View of circular connector	Terminal	Assignment X1
	10	Encoder supply ground 1M
	11	24V encoder supply U_S
	12	Functional earth (FE)

Block diagram

The figure below shows the block diagram of the 8 DI DC 24V.

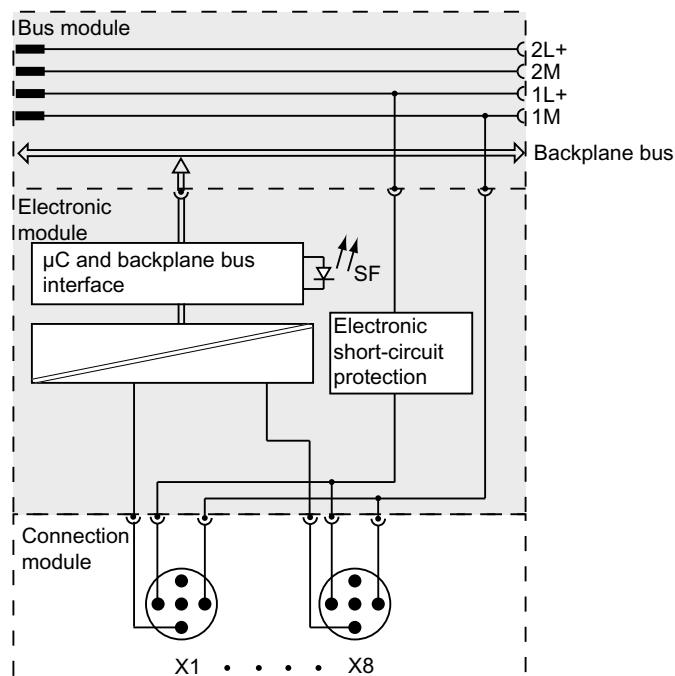


Figure 17-1 Block diagram 8 DI DC 24V

Technical specifications

Technical specifications	
Dimensions and weight	
Dimensions W x H x D (mm)	45 x 130 x 35; with bus module, without connection module

Technical specifications	
Weight	Approx. 140 g
Voltages and currents	
Rated supply voltage of electronics/encoder 1L+	24 V DC
Reverse polarity protection	Yes, against destruction; encoder supply outputs are connected with reverse polarity
Current consumption	
• From backplane bus	< 20 mA
• From electronics/encoder supply 1L+ (no load)	< 20 mA
Power loss of the module	Typ. 2.5 W
Digital inputs	
Number of inputs	8
Number of inputs that can be controlled simultaneously	8; up to 55 °C in any mounting position
Cable length, shielded	Max. 30 m
Cable length, unshielded	Max. 30 m
Input voltage	
• Rated value	24 V DC
• For "0" signal	-3 V to +5 V
• For "1" signal	11 V to 30 V
Input current	
• With "1" signal	Typ. 7 mA
Input delay	
• At "0" to "1" transition	1.2 ms to 4.8 ms
• At "1" to "0" transition	1.2 ms to 4.8 ms
Input characteristics	to IEC 61131, type 1
Connection of 2-wire proximity switch	Supported
• Permissible quiescent current	Max. 1.5 mA
Encoder supply	
Number of encoder supplies	8
Total current up to 55 °C	Max. 1 A
Short-circuit protection	Yes; each module, electronic
• Response threshold	Min. 1.4 A
Status, interrupts, diagnostics	
Status display	Green LED; per channel
Interrupts	
• Diagnostic interrupt	Configurable
Diagnostic functions	
• Group error display	Red LED (SF)
• Channel error display	No
• Diagnostic information can be read	Yes
Monitoring for	
• Short-circuit	Yes
Insulation	
Insulation tested with	707 V DC (type test)

Technical specifications	
Electrical isolation	
• Between channels and backplane bus	Yes
• Between channels	No
• Between backplane bus and all other circuit elements	Yes

See also

[Connection module CM IO 4 x M12 for electronic modules \(Page 267\)](#)

[CM IO 8 x M12 connection module for electronic modules \(Page 272\)](#)

[Response times of digital input modules \(Page 511\)](#)

17.3 Digital electronic module 8 DI DC 24V High Feature (6ES7141-4BF00-0AB0)

Order number

6ES7141-4BF00-0AB0

Properties

- Digital electronic module with eight inputs
- Rated input voltage 24 V DC
- Suitable for switches and proximity switches
- "Encoder supply to M short-circuit" diagnostics for each channel
- "Wire break" diagnostics for each channel
- Hardware interrupt
- Configurable input delay

Pin assignment of connection modules CM IO 4 x M12 and CM IO 4 x M12P

The table below shows the pin assignment of the 8 DI DC 24V High Feature on the CM IO 4 x M12 and CM IO 4 x M12P connection modules.

View of circular connector	Terminal	Assignment X1 to X4
	1	24 V encoder supply U_S (provided by ET 200pro for the connected encoder)
	2	Input signal DI ₄ : Connector X1 Input signal DI ₅ : Connector X2 Input signal DI ₆ : Connector X3 Input signal DI ₇ : Connector X4

Appendix

A.1 Order numbers

A.1.1 Module order numbers

Interface modules

Table A-1 Interface module order numbers

Designation	Order number
IM154-1 DP interface module with termination module, 1 item	6ES7154-1AA01-0AB0
IM154-2 DP High Feature interface module with termination module, 1 item	6ES7154-2AA01-0AB0
Interface module IM 154-3 PN High Feature with termination module, 1 item	6ES7154-3AB00-0AB0
IM 154-4 PN High Feature interface module with termination module (V5.0 or higher), 1 item	6ES7154-4AB10-0AB0

Power module/outgoing module

Table A-2 Power module/outgoing module order number

Designation	Order number
PM-E DC 24V, 1 item	6ES7148-4CA00-0AA0
PM-O DC 2x24V, 1 item	6ES7148-4CA60-0AA0

Connection modules

Table A-3 Connection module order numbers

Designation	Order number
CM IM DP Direct, 1 item	6ES7194-4AC00-0AA0
CM IM DP ECOFAST Cu, 1 item	6ES7194-4AA00-0AA0
CM IM DP M12, 7/8", 1 item	6ES7194-4AD00-0AA0
CM IM PN M12, 7/8", 1 item	6ES7194-4AJ00-0AA0
CM IM PN M12, 7/8" S, 1 item	6ES7194-4AK00-0AA0
CM IM PN M12, M12-L S, 1 item	6ES7194-4AL01-0AA0
CM IM PN PP Cu, 1 item	6ES7194-4AF00-0AA0
CM IM PN PP FO, 1 item	6ES7194-4AG00-0AA0
CM PM-E Direct, 1 item	6ES7194-4BC00-0AA0
CM PM-E ECOFAST, 1 item	6ES7194-4BA00-0AA0

Designation	Order number
CM PM-E 7/8", 1 item	6ES7194-4BD00-0AA0
CM PM-E M12-L, 1 item	6ES7194-4BL01-0AA0
CM PM-E PP, 1 item	6ES7194-4BE00-0AA0
CM PM-O PP, 1 item	6ES7194-4BH00-0AA0
CM IO 4 x M12, 1 item	6ES7194-4CA00-0AA0
CM IO 4 x M12P, 1 item	6ES7194-4CA10-0AA0
CM IO 4 x M12 Inverse, 1 item	6ES7194-4CA50-0AA0
CM IO 8 x M12, 1 item	6ES7194-4CB00-0AA0
CM IO 8 x M12P, 1 item	6ES7194-4CB10-0AA0
CM IO 8 x M12D, 1 item	6ES7194-4CB50-0AA0
CM IO 8 x M8, 1 item	6ES7194-4EB00-0AA0
CM IO 2 x M12, 1 item	6ES7194-4FB00-0AA0
CM IO 1 x M23, 1 item	6ES7194-4FA00-0AA0

Digital electronic modules

Table A-4 Digital electronic module order numbers

Designation	Order number
8 DI DC 24V, 1 item	6ES7141-4BF00-0AA0
8 DI DC 24V High Feature, 1 item	6ES7141-4BF00-0AB0
16 DI DC 24V, 1 item	6ES7141-4BH00-0AA0
4 DI / 4 DO DC 24V/0.5A, 1 item	6ES7143-4BF50-0AA0
4 DIO / 4 DO DC 24V/0.5A, 1 item	6ES7143-4BF00-0AA0
4 DO DC 24V/2.0A, 1 item	6ES7142-4BD00-0AA0
4 DO DC 24V/2.0A High Feature, 1 item	6ES7142-4BD00-0AB0
8 DO DC 24V/0.5A, 1 item	6ES7142-4BF00-0AA0

Analog electronic modules

Table A-5 Analog electronic module order numbers

Designation	Order number
4 AI U High Feature, 1 item	6ES7144-4FF01-0AB0
4 AI I High Feature, 1 item	6ES7144-4GF01-0AB0
4 AI RTD High Feature, 1 item	6ES7144-4JF00-0AB0
4 AI TC High Feature, 1 item	6ES7144-4PF00-0AB0
4 AO U High Feature, 1 item	6ES7145-4FF00-0AB0
4 AO I High Feature, 1 item	6ES7145-4GF00-0AB0

Pneumatic interface modules

Table A-6 Pneumatic interface module order numbers

Designation	Order number
16 DO DC 24V CPV10, 1 item	6ES7148-4EA00-0AA0
16 DO DC 24V CPV14, 1 item	6ES7148-4EB00-0AA0

A.1.2 Order numbers for accessories

ET 200pro accessories

Table A-7 Order numbers of ET 200pro accessories

Designation	Order number
Rack, narrow type, length 500 mm (ready for installation), 1 item	6ES7194-4GA00-0AA0
Rack, narrow type, length 1000 mm (ready for installation), 1 item	6ES7194-4GA60-0AA0
Rack, narrow type, length 2000 mm, 1 item	6ES7194-4GA20-0AA0
Rack, wide type, length 500 mm (ready for installation), 1 item	6ES7194-4GB00-0AA0
Rack, wide type, length 1000 mm (ready for installation), 1 item	6ES7194-4GB60-0AA0
Rack, wide type, length 2000 mm, 1 item	6ES7194-4GB20-0AA0
Rack, compact-narrow type, length 500 mm (ready for installation), 1 item	6ES7194-4GC70-0AA0
Rack, compact-narrow type, length 1000 mm (ready for installation), 1 item	6ES7194-4GC60-0AA0
Rack, compact-narrow type, length 2000 mm, 1 item	6ES7194-4GC20-0AA0
Rack, compact-wide type, length 500 mm (ready for installation), 1 item	6ES7194-4GD00-0AA0
Rack, compact-wide type, length 1000 mm (ready for installation), 1 item	6ES7194-4GD10-0AA0
Rack, compact-wide type, length 2000 mm, 1 item	6ES7194-4GD20-0AA0
Labeling strips 20 x 7 mm, pale turquoise, 340 items per pack	3RT1900-1SB20
Colored module tags for the identification of IO connection modules; Package of 100 labels 20 x 7 in red, green, blue, and white, 1 package	6ES7194-4HA00-0AA0
12.5 A quick-response spare fuse, 10 items per package, 1 package	6ES7194-4HB00-0AA0

Accessories for CM IM DP Direct connection module

Table A-8 Accessories CM IM DP Direct connection module, order numbers

Designation	Order number
Raw cables:	
PB Hybrid standard cable PVC sheath, 4-wire Sold by the meter, minimum order quantity 20 m Delivery unit max. 1000 m, 1 m	6XV1860-2R

A.4 Response times

A.4.1 Response times between the DP master and ET 200pro

Principle of operation

The figure below shows the various reaction times between the DP master and ET 200pro

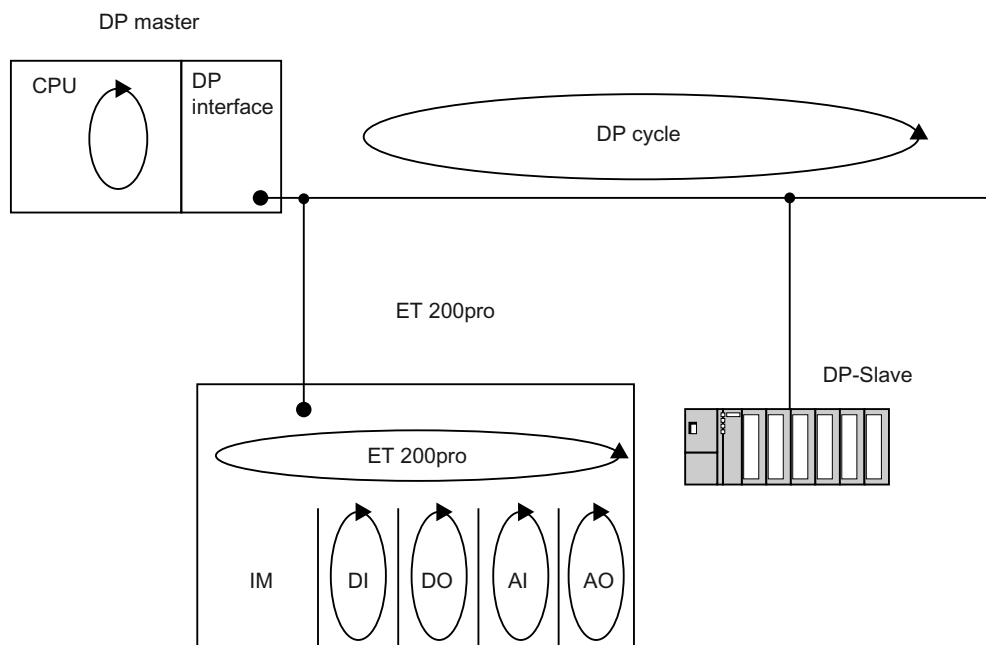


Figure A-33 Reaction times between the DP master and ET 200pro

A.4.2 DP master response times

Response time

For information on response times, refer to the DP master manual.

A.4.3 Reaction times at ET 200pro

Rules

The response time of ET 200pro is determined by

- The number of modules
- The number of diagnostic messages
- Removal and insertion of modules
- Interrupts

Calculating the response time

The equation below can be used to calculate the approximate response time of ET 200pro:

$$\text{Response time } [\mu\text{s}] = 55 \cdot m + 110 \cdot a + 190$$

m Total of all electronic and pneumatic interface modules in the ET 200pro station

a Total of all analog electronic modules in the ET 200pro station

Example of calculating the ET 200pro response time

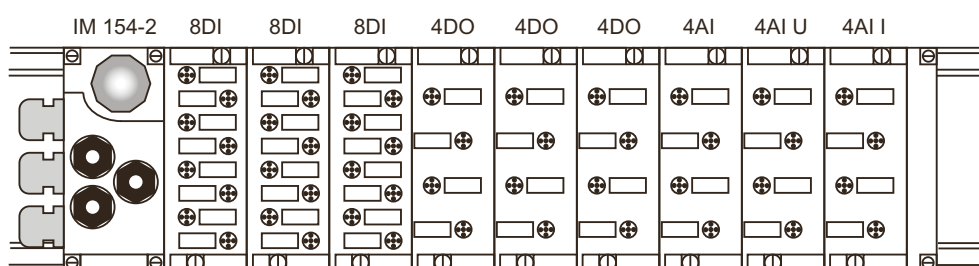


Figure A-34 Example of calculating the response time for IM 154-2 DP High Feature

$$\text{Response time} = 55 \cdot 9 + 110 \cdot 3 + 190$$

$$\text{Response time} = 495 + 330 + 190$$

$$\text{Response time} = 1015 \mu\text{s}$$

A.4.4 Response times of digital input modules

Input delay

The response times of digital input modules depend on the input delay. Refer to the technical specifications of the digital electronic modules.

See also

[Digital electronic module 8 DI DC 24V \(6ES7141-4BF00-0AA0\) \(Page 338\)](#)

[Digital electronic module 16 DI DC 24V \(6ES7141-4BH00-0AA0\) \(Page 347\)](#)

[Digital electronic module 8 DI DC 24V High Feature \(6ES7141-4BF00-0AB0\) \(Page 343\)](#)

A.4.5 Response times for digital output and pneumatic interface modules

Output delay

The response times correspond to the output delay. Refer to the technical specifications of the digital electronic modules.

See also

[Digital electronic module 4 DO DC 24V/2.0A \(6ES7142-4BD00-0AA0\) \(Page 350\)](#)

[Digital electronic module 4 DO DC 24V/2.0A High Feature \(6ES7142-4BD00-0AB0\) \(Page 355\)](#)

[Digital electronic module 8 DO DC 24V/0.5A \(6ES7142-4BF00-0AA0\) \(Page 360\)](#)

[Pneumatic interface module 16 DO DC 24V CPV10 \(6ES7148-4EA00-0AA0\) \(Page 439\)](#)

[Pneumatic interface module 16 DO DC 24V CPV14 \(6ES7148-4EB00-0AA0\) \(Page 442\)](#)

A.4.6 Response times for analog input modules

Conversion time

The basic conversion time depends directly on the conversion method of the analog input channel (integrating method, actual value conversion). The integration time of integrating conversions has a direct influence on conversion times. The integration time depends on the interference frequency suppression.

For information on the basic conversion times and additional processing times of the individual analog modules, refer to the technical specifications of the corresponding analog electronic modules.

Cycle time

The analog/digital conversion and the transfer of the digitized measured values to memory or to the backplane bus take place sequentially. In other words, the analog input channels are converted one after the other. The cycle time, i.e. the time until an analog input value is converted again, is equivalent to the sum of the conversion times of all active analog input channels of the analog input modules. Unused analog input channels should be disabled in the parameter settings in order to reduce the cycle time. The conversion and integration time of disabled channels is 0.

NOTE

With the 4 AI TC High Feature electronic module, the cycle time increases by 1× conversion time in the case of temperature compensation involving RTD (0).
