SIEMENS

Desigo Essentials

Desigo Essentials I/O Extension Modules

EM1.8D, EM1.8R, EM1.8U

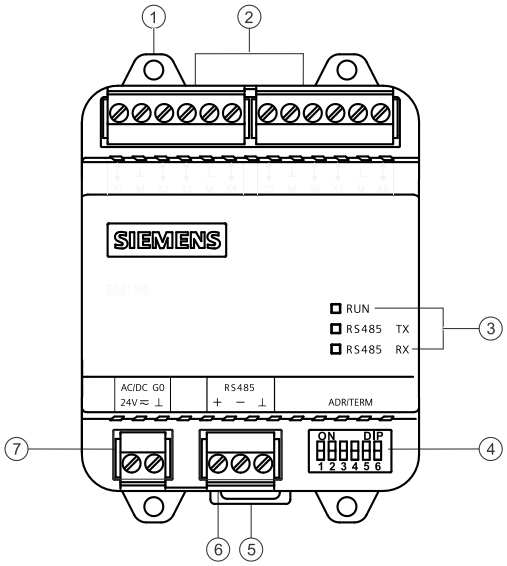
EM1.8D, EM1.8R and EM1.8U can be connected to any Modbus controllers. Their high combination flexibility meets the requirements of various industrial applications.

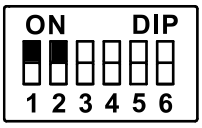
- AC 24 V or DC 24 V power supply
- EM1.8D: 8 digital inputs
- EM1.8R: 8 relay outputs (NO contacts)
- EM1.8U: 8 universal inputs and outputs (analog inputs/outputs or digital inputs, configurable)
- Product documentation QR codes printed on the device for easy reference at any time

Features

- Operating voltage AC/DC 24 V
- Plug-in screw terminal blocks

Mechanical design



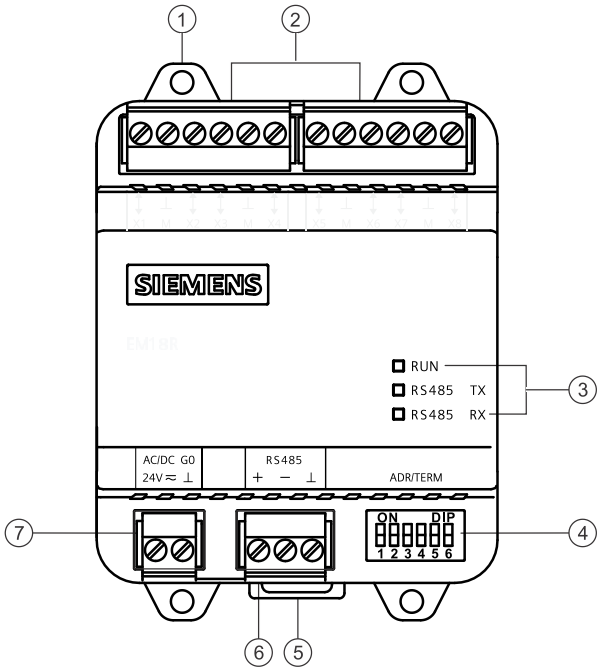
Serial No.	Description
1	Mounting holes (4 in total, for surface/wall mounting)
2	● EM1.8D: 8 digital inputs ● EM1.8R: 8 relay outputs ● EM1.8U: 8 universal inputs and outputs
3	LED indicators: ● RUN: Device status indicator ● RS485 TX, RS485 RX: Communication status indicator ● See "LED indicator" for more information about LED indicators
4	A 6-position DIP switch for setting communication parameters: ● Positions 1...5 are used to set the Modbus communication address of the device. The bit order of the five positions is 1 to 5. The lowest bit is 1 (2^0); the highest is 5 (2^4). The following example shows Modbus address "3":  (Set the first two positions to **ON**.) See Appendix B: Modbus addresses configured by DIP switch [▶ 23] for schematics of all addresses. ● The extension module address set by the DIP switch must match the module address configured in the commissioning and engineering tool. ● Positions 1...5 can also be used to enter automatic baud rate mode and perform factory reset. See Automatic baud rate detection [▶ 7] and Factory reset [▶ 9] ● Position 6 is used for the EOL setting. EOL is done with 120 Ω + 1nF. If the extension module is a network terminal, position 6 must be **ON**.
5	Pull-down hole for disassembly (DIN rail mounting)
6	RS485 interface for Modbus communication with the controller
7	Power input

LED indicator

LED	Color	Status	Description
RUN	Green	Flash	Device starting up or waiting to be discovered by the controller
		Continuously ON	Device works normally
	Red	Continuously ON	Hardware or software fault
	Alternating red and green	Flash	Firmware upgrade* in progress
	Yellow	Flash	Firmware error; firmware download required
RS485 TX	Yellow	Flash	Data sending on the bus
RS485 RX	Yellow	Flash	Data receiving on the bus

* See detailed information on firmware upgrade in document A6V14300949.

Mechanical design



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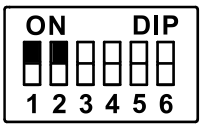
4	A 6-position DIP switch for setting communication parameters: • Positions 1...5 are used to set the Modbus communication address of the device. The bit order of the five positions is 1 to 5. The lowest bit is 1 (2^0); the highest is 5 (2^4). The following example shows Modbus address "3":  (Set the first two positions to **ON**.) See Appendix B: Modbus addresses configured by DIP switch [▶ 23] for schematics of all addresses. • The extension module address set by the DIP switch must match the module address configured in the commissioning and engineering tool. • Positions 1...5 can also be used to enter automatic baud rate mode and perform factory reset. See Automatic baud rate detection [▶ 7] and Factory reset [▶ 9] • Position 6 is used for the EOL setting. EOL is done with 120 Ω + 1nF. If the extension module is a network terminal, position 6 must be **ON**.
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RS485 RX	Yellow	Flash	Data receiving on the bus

* See detailed information on firmware upgrade in document A6V14300949.

Type summary

Type	Stock number	Input	Output
EM1.8D	S55370-C203	8 digital inputs	
EM1.8R	S55370-C205	8 relay outputs	
EM1.8U	S55370-C204	8 universal inputs and outputs, with configurable analog inputs/outputs and digital inputs	

Product documentation

Document Title	Document ID
Mounting instructions	A6V13959646
Environmental Product Declarations (EPD)	A5W00744636A
CE declarations	A5W00744646A
UKCA Declarations	A5W00757649A
RCM declarations	A5W00744647A

Related documents such as the environmental declarations, declarations of conformity, etc., can be downloaded from the following Internet address:
www.siemens.com/bt/download

Note:

Security

⚠ CAUTION	
	**National safety regulations** Failure to comply with national safety regulations may result in personal injury and property damage ● Observe national provisions and comply with the appropriate safety regulations.

Engineering

Restrictions

All restrictions in this chapter and in "Technical data [▶ 11]" must be complied with.

⚠ CAUTION	
	The sections marked with a warning symbol contain technical safety requirements and restrictions. Observe all of these warnings as they directly relate to the protection of personnel and equipment.

Mounting

- Fixed screwed and DIN rail mounting are both supported.
  - Screw specification: Fillister head sheet metal screw with cross top ST 4.2; tightening torque 2.5 Nm
  - Rail specification: TH 35-7.5 or TH 35-15 per EN60715

⚠ CAUTION	
	Fuses, switches, wiring, and earthing must be installed in compliance with local safety regulations. External relay must meet the electrical requirements.

Installation

Ensure correct wiring and leakage protection.

⚠ WARNING	
	**Ensure leakage protection when applying to devices with supply voltage (AC 24 V or AC 230 V), such as relays, contactors, valve actuators, etc.** ● Risk of fire and injury due to short-circuits. Adapt the line diameters as per local regulations to the rated value of the installed fuse.

Operation

The module must be prepared for use and commissioned by qualified staff with appropriate training.

Observe the following notes when commissioning:

- Ensure power supply and correct wiring of the module and its peripherals.

DIP switch

See Mechanical design [▶ 4] for detailed description of DIP switch.

Automatic baud rate detection

If positions 1...5 of the DIP switch are set to **OFF**, the extension module enters automatic baud rate mode after reboot. It gets Modbus address "246" temporarily.

During this mode, the baud rate is recognized automatically as one of the following: 9600, 19200, 38400 and 115200. The transmission mode is 1-8-E-1 by default. Though other transmission modes are also supported, it takes more time to recognize the correct one.

If there are no valid data frames on the bus, the extension module remains in transmission mode detection. If no valid frames are received within 10 minutes, the extension module reboots.

NOTICE	
!	After you set positions 1...5 of the DIP switch to **OFF** and reboot the device, all terminal configurations of EM1.8U are also cleared.

NOTICE	
!	Unsuccessful communication with Modbus Client rarely occurs in the automatic baud rate mode, but if it does occur, try to set positions 1...5 of the DIP switch to **OFF** again and reboot the device.

Initialization of multiple extension modules on the same bus

When you open product packages for the first time, the extension modules default to automatic baud rate mode. You can set the communication addresses directly via the DIP switches. See Appendix B: Modbus addresses configured by DIP switch [▶ 23] for schematics of all addresses.

If extension modules are in non-factory state, additional steps are needed.

1. Ensure the modules are powered off.
2. Set positions 1...5 of the DIP switches to **OFF** and then reboot the modules to perform factory reset.
3. Set the communication addresses via DIP switches. It is recommended to power off the modules again before doing so. See Appendix B: Modbus addresses configured by DIP switch [▶ 23] for schematics of all addresses.
4. Reboot the modules if they are in a power-off state.

⇨ The automatic baud mode starts. See Automatic baud rate detection [▶ 7] for more details.

⇨ The module works normally (the RUN LED turns to green (continuously ON)).

⇨ The modules maintain the current communication parameters until another factory reset occurs. See Factory reset [▶ 9] for more details.

On-event addressing (with PXC 4/5/7/... controller)

✓ The extension module is wired and connected to the controller via the RS485 interface. See Connect to the controller [▶ 18].

✓ The module is configured and programmed.

1. Set the module to the automatic baud rate mode. See Automatic baud rate detection [▶ 7].

   ⇨ The module receives Modbus address "246" temporarily.

2. Set positions 1...5 of the DIP switch to the same address configured in the tool (ABT Site). See Mechanical design [▶ 4] for information on how to set the Modbus communication address via DIP switch.

   ⇨ The baud rate in bps is recognized automatically as one of the following values: 9600, 19200, 38400 and 115200.

   ⇨ The transmission mode is recognized automatically as one of the following: 1-8-E-1, 1-8-O-1, 1-8-N-2 and 1-8-N-1.

⇨ After a successful pairing, the module works normally (the RUN LED turns to green (continuously ON)).

Manual configuration of communication parameters for EM1.8U in a Modbus debugging tool (e.g., Modbus Poll)

If a 3rd-party Modbus controller cannot configure EM1.8U, you need to perform the following steps to configure the extension module via a Modbus debugging tool.

1. Initialize the extension module. See Initialization of multiple extension modules on the same bus [▶ 7] for details.
2. Connect the extension module with the PC where the debugging tool is installed using an RS485 communication cable.
3. In the debugging tool, configure the baud rate and transmission mode following the configurations in the Modbus controller.
4. In the debugging tool, configure the communication address to be the same one that you've set via the DIP switch during the initialization period.

   ⇨ The module is connected to the Modbus debugging tool successfully.

5. Write parameters into registers 4x0100...4x0107 to configure signal types for channels X1...X8 of the module. The signal type value written into registers ranges from 0 to 10. See "Appendix A: Modbus registers [▶ 20]" for more information.

   ⇨ The signal types will be configured successfully in several seconds. Don't power off EM1.8U during this period.

6. Disconnect the module from the debugging tool by unplugging the RS485 communication cable.
7. Connect the module with the 3rd-party controller.

Fault detection and correction

- Register addresses 4x0009...4x0016 (value reliability of channels UIO 1...8) match with register addresses 4x0001...4x0008 (channels UIO1...8) respectively. A channel value is abnormal if its corresponding reliability is not "0". See the following table for detailed error codes.

Code		Reliability description (registers 4x0009...4x0016)	Value change (registers 4x0001...4x0008)
Decimal	Hexadecimal		
32762	0x7FFA	Other error	0
32763	0x7FFB	No sensor	0
32764	0x7FFC	Under range	Keeps the last valid value
32765	0x7FFD	Short circuit*	Keeps the last valid value
32766	0x7FFE	Over range	Keeps the last valid value
0	0x0000	No error	Changes to the valid value

* If a terminal is configured as 0…20 mA or DC 0...10 V input, the occurrence of short circuit doesn't generate error code 0x7FFD. The reliability value remains "0" (no error).

Factory reset

Two ways are available:

- Set positions 1...5 of the DIP switch to **OFF** and then reboot the device.
- Set register address 4x0320 to "0xcafe" (Enable), and then save this reset command by setting register address 4x0315 (Bus configuration command) to "1" (toggle bit).

  If you do not want to perform the factory reset, set the register address to "0xcac0" (Disable), and then set register address 4x0315 to "1".

NOTICE	
!	After the factory reset, all terminal configurations of EM1.8U are also cleared.

Maintenance

The module is maintenance-free, apart from cleaning at regular intervals.

Open Source Software (OSS)

Software license overview

These devices use Open Source Software (OSS). All Open Source Software components used in the product (including copyrights and licensing agreement) are available at http://siemens.com/bt/download.

OSS document ID	Device
A6V14816232	EM1.8D
A6V14816234	EM1.8R
A6V14816236	EM1.8U

Disposal

This symbol or any other national label indicates that the product, its packaging, and, where applicable, any batteries may not be disposed of as domestic waste. Delete all personal data and dispose of the item(s) at separate collection and recycling facilities in accordance with local and national regulations.
For additional details, refer to Siemens information on disposal.

Warranty

Technical data on specific applications are valid only together with Siemens products listed under "Equipment combinations". Siemens rejects any and all warranties in the event that third-party products are used.

Technical data

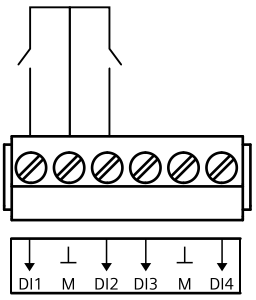
Power supply

Power supply	
Operating voltage （24 V ≂, ⊥）	AC 24 V （+20 %，-15 %） DC 24 V （±10 %）
Frequency	50/60 Hz (AC only)
Screw terminals for wire cross sections	Max. 2.5 mm² （14 AWG）
External supply line protection	External supply line protection

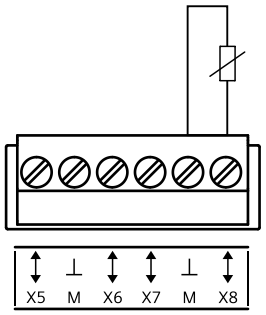
Power consumption (for transformer planning)

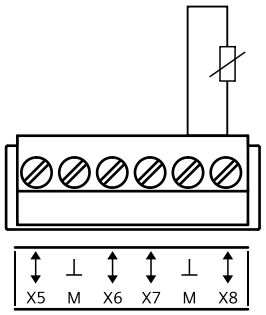
Power consumption, excluding connected field devices	AC 24 V	DC 24 V
EM1.8D	4.5 VA	3.6 W
EM1.8R	6.5 VA	5.2 W
EM1.8U	4.5 VA	3.6 W

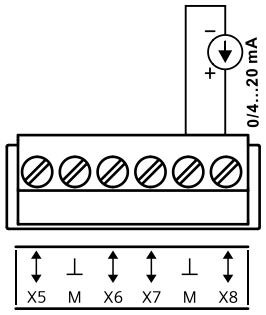
Input (EM1.8D only)

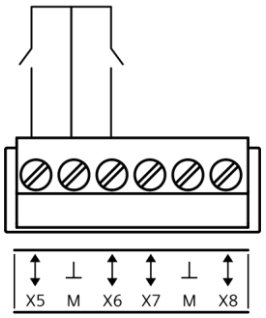
Digital input (pulse type unsupported)		
Technical data		**Wiring diagram (for reference only)**
Terminals to be connected to	DI1...DI8	
Contact query voltage	DC 18…25 V	
Contact query current	6 mA	
Contact resistance for open contacts	Min. 50 kΩ	
Contact resistance for closed contacts	Max. 200 Ω	

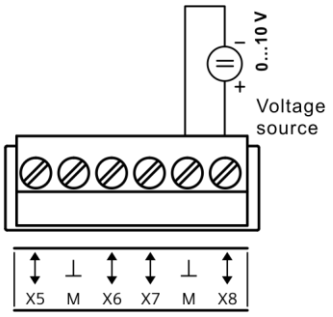
Input (EM1.8U only)

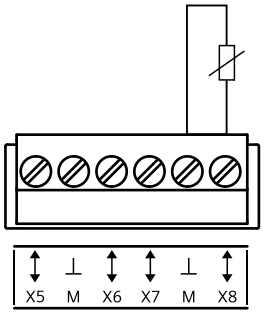
NTC 10 K (3892 K)		
Technical data		**Wiring diagram (for reference only)**
Terminals to be connected to	X1…X8	
Temperature range	-40...115 °C	
Input range	680 kΩ…180 Ω	
Resolution (25 °C)	0.1 °C	

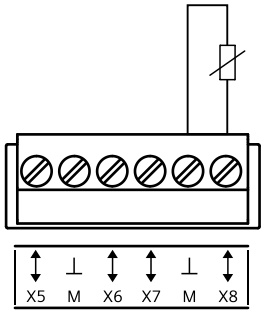
PT 1000 (3850 ppm/K), LG Ni 1000 (5000 ppm/K)		
Technical data		**Wiring diagram (for reference only)**
Terminals to be connected to	X1…X8	
Temperature range	-50...150 °C (LG Ni 1000) -50...180 °C (PT 1000)	
Input range	780...1800 Ω	
Resolution	0.5 °C	

0/4…20 mA		
Technical data		**Wiring diagram (for reference only)**
Terminals to be connected to	X1…X8	 **WARNING! No internal over-current protection!**
Measurement range	0/4...20 mA	
Input range	0/1.6...22.4 mA	
Resolution	6 uA	
Input impedance	< 500 Ω	

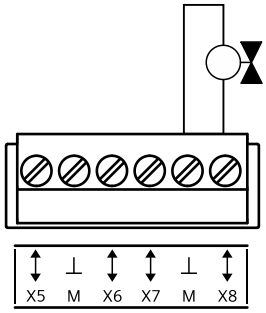
Digital input (pulse type unsupported)		
Technical data		**Wiring diagram (for reference only)**
Terminals to be connected to	X1…X8	
Contact query voltage	DC 15 V	
Contact query current	1 mA; 6 mA initial current	
Contact resistance for open contacts	Min. 50 kΩ	
Contact resistance for closed contacts	Max. 200 Ω	

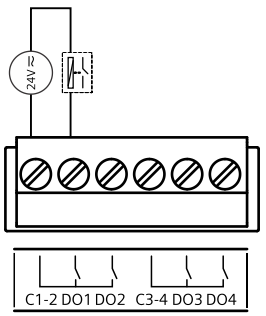
DC 0…10 V		
Technical data		**Wiring diagram (for reference only)**
Terminals to be connected to	X1…X8	
Voltage range	0...10 V	
Resolution	4 mV	
Input impedance	> 100 kΩ	

Resistance measurement R1000		
Technical data		**Wiring diagram (for reference only)**
Terminals to be connected to	X1…X8	
Resistance range	700...1800 Ω	
Resolution	0.6 Ω	

Resistance measurement R10000		
Technical data		**Wiring diagram (for reference only)**
Terminals to be connected to	X1…X8	
Resistance range	1.8...100 kΩ	
Resolution	0.5 kΩ	

Output

DC 0...10 V (EM1.8U only)		
Technical data		**Wiring diagram (for reference only)**
Terminals to be connected to	X1…X8	
Voltage range	0...10 V	
Accuracy	100 mV	
Output current	Max. 1 mA	

Relay output *)		
Technical data		**Wiring diagram (for reference only)**
Terminals to be connected to	DO1…DO8	
Contact type	Monostable, normally open	
Switching voltage	AC 24 V (-15 %, +20 %) DC 12…30 V	
Rated current (resistive/inductive)	AC 3 A (resistive) / 2 A (inductive, cos phi 0.6) DC 3 A (resistive)	
Min. current load (AC 20 V)	30 mA	
Min. current load (DC 12 V)	50 mA	

Relay output *)		
Technical data		**Wiring diagram (for reference only)**
Max. switch-on current	3 A, max. 1 s	
Contact life	100,000 switchings @AC 24 V, 3 A (resistive)	
Max. external supply line protection	Max 4 A slow wire fuse or circuit breaker type B, C or D.	

*) I/O extension modules are SELV devices and do not support direct connection to AC 230 V devices. The connection between the modules and any AC 230 V device must be made via an intermediate relay.

Interface

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RS485	For connection to Desigo automation stations or third-party Modbus controllers

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Connection terminals

Connection terminals	
Cu-wire or Cu-strand with ferrule	1 x 0.6...2.5 mm^2 (14...19 AWG) 2 x 0.6...1.0 mm^2 (17...19 AWG)
Cu-strand without ferrule	1 x 0.6...2.5 mm^2 (14...19 AWG) 2 x 0.6...1.5 mm^2 (16...19 AWG)
Stripping length	7...8 mm (0.28...0.31 in)
Screws	M2.5, tightening torque 0.5 Nm (0.37 lb-ft)
Max. cable length	● RS485 communication cable length[1) 2) 3)]: – 300 m (1000 ft) (without repeaters) – 1000 m (3300 ft) (with repeaters) ● Resistance-type analog input cable length[4)]: 30 m (100 ft) ● Digital input, analog input (non-resistance type), and analog output cable length[4)]: 100 m (330 ft)

[1] It is recommended to use 3-wire EIA-485 shielded twisted-pair cables with a characteristic impedance of 100...130 Ω, a capacitance of < 100 pF/m between the wires and < 200 pF/m between the wires and the shield.

[2] The shield of the shielded twisted-pair cable must be connected to building earth in the mounting panel at one end to ensure that there is no large voltage difference between the reference grounds.

[3] In case of long distance and/or high baud rate or EMC, consider end-of-line 120-Ohm resistors on both sides (according to RS485 rules) and add isolated repeaters.

[4] Be aware that the cable resistance and the influence of EMC as well as the hum increases with the length of the cable and has an impact on the accuracy of the analogue value. If the maximum cable length can be reached in an application depends on factors like selection of cable type, dimension, shielding, wiring, distance to high power devices, the requirements regarding measurement and control accuracy etc. and is in the responsibility of the customer.

Conformity

Protection classification	
Protection classification as per EN 60730-1 Automatic action: Degree of pollution Overvoltage category	 Type 1 2 II
Safety class	Class III
Degree of protection of housing to EN 60529	IP20

Ambient conditions **Products in electrical cabinets or in room applications**	
Climatic ambient conditions	
Transport and storage (in packaging) as per IEC EN 60721-3-1 / IEC EN 60721-3-2	Temperature -25...+70 °C (-13...158 °F) Air humidity 5...95 % (non-condensing)
Operation as per IEC/EN 60721-3-3	Operation in enclosed dry locations, having no temperature or humidity control Temperature -5...+50 °C (23...122 °F) Air humidity 5...95 % (non-condensing)
Mechanical ambient conditions	
Transport (in transport packaging) as per IEC/EN 60721-3-2	Class 2M4
Operation as per IEC/EN 60721-3-3	Class 3M11

Standards, directives and approvals	
Product standard	IEC/EN 60730-1 Automatic electrical controls
Product family standards	EN 61000-6-2 EN 61000-6-3
Electromagnetic compatibility	For use in residential, commercial and industrial environments
EU conformity (CE)	See EU declaration of conformity A5W00744646A*)
UKCA conformity	See UKCA declaration of conformity A5W00757649A*)
RCM conformity	See RCM declaration of conformity A5W00744647A*)
UL certificate	UL916, UL60730-1, http://database.ul.com
FCC	FCC CFR 47 Part 15 Class B
CSA certificate	CSA C22.2 NO. 205-17
ICES	CAN ICES-3 (B)/NMB-3 (B)
Environmental compatibility	The Environmental Product Declaration (A5W00744636A*)) contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

*) The documents can be downloaded at the following Internet address:
www.siemens.com/bt/download

General

General	
Dimensions	See "Dimensions (mm) [▶ 19]"
Weight without packaging	• EM1.8D: 127 g • EM1.8R: 158 g • EM1.8U: 127 g
Weight with packaging	• EM1.8D: 163 g • EM1.8R: 195 g • EM1.8U: 164.5 g
Color	Siemens 2003 Ti-Grey

Wiring diagram

Connect to the controller

The wiring diagram may vary slightly if the connected controller is different. Following is an example of connecting the extension module to Desigo automation stations:

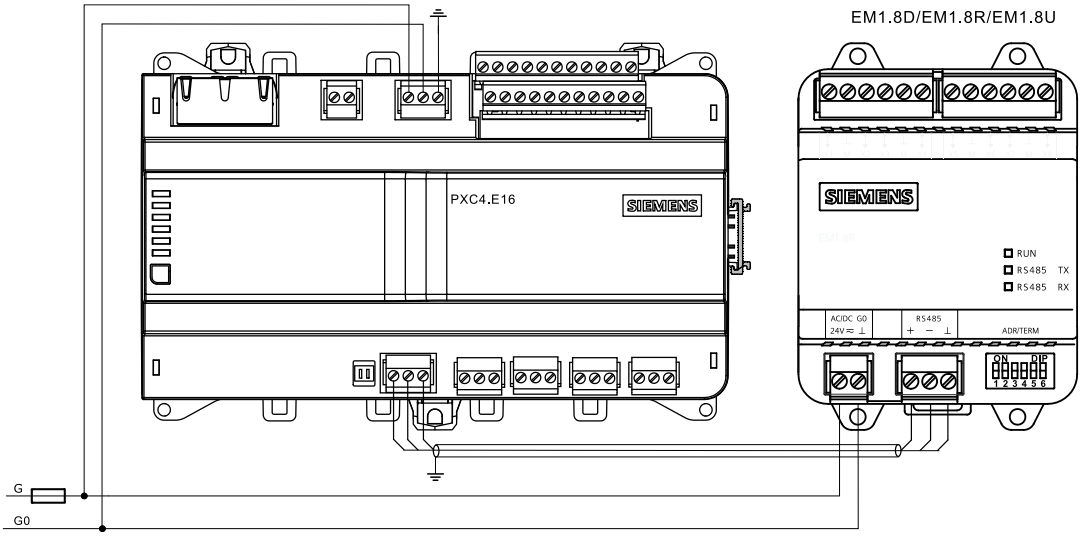
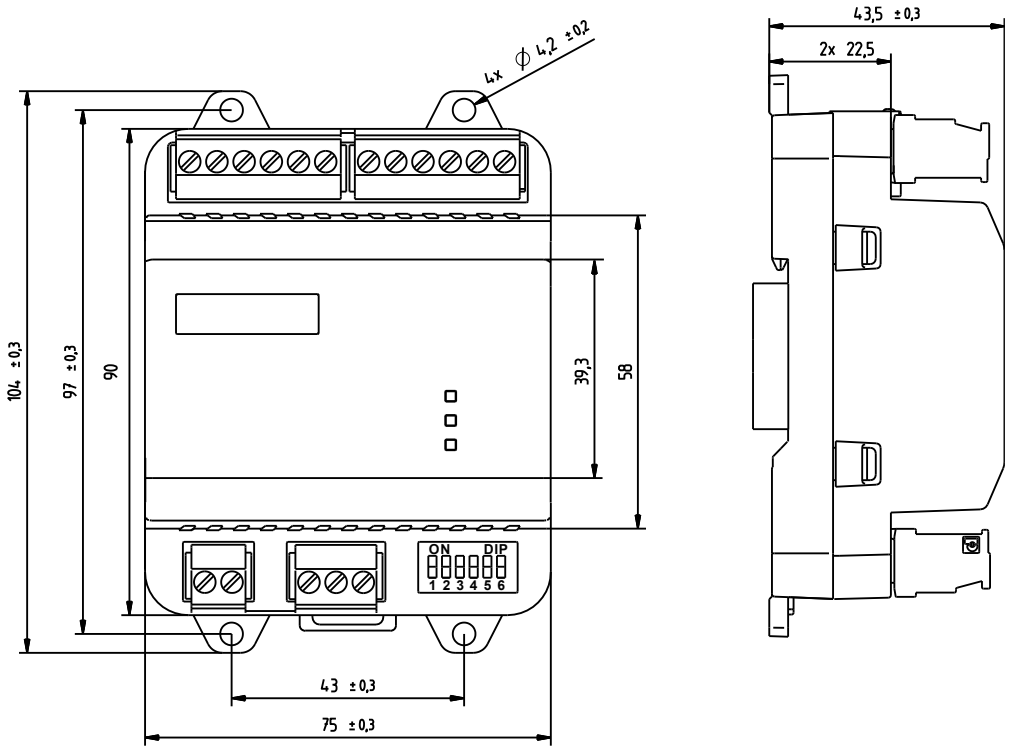


Fig. 1: Connect to Desigo automation stations (PXC 4/5/7/… controller)

NOTICE	
!	See "Technical data [► 11]" for the wiring of each I/O port on a single device.

NOTICE	
!	Dynamically adjust the fuse size and power supply according to system requirements.

Dimensions (mm)



Support

- A faulty device shall be returned with a Return Goods Note for Service provided by an appropriate Siemens branch office.
- Contact our technical support if you have further questions concerning the product.
  - ☎ +86 (10) 4001506060
  - ✉ support.ap.i-bt@siemens.com

Regulatory compliance information

FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation

FCC Caution: Changes or modifications not expressly approved by Siemens Switzerland Ltd. could void user authority to operate the equipment. United States representative https://new.siemens.com/us/en/products/buildingtechnologies/home.html

Appendix A: Modbus registers

Supported function codes	
01 (0x01)	Read coils
02 (0x02)	Read discrete inputs
03 (0x03)	Read holding registers
05 (0x05)	Write single coil
06 (0x06)	Write single register
15 (0x0F)	Write multiple coils
16 (0x10)	Write multiple registers

Any changes in settings are completed with setting register address 4x0315 (Bus configuration command) to "**1**" (toggle bit).

Modbus register (discrete register for EM1.8D)								
Address	**Description**	**Function code**	**Data type**	**Value**	**Unit**	**Scaling**	**Default**	**R/W**
1x0001...1x0008	Values of DI1...DI8	2	n × B1 (single bit)	0, 1	-	-	-	R

Note: The register number starts from 1. In tools where it starts from 0, it is necessary to shift all register numbers by 1 for correct communication.

Modbus register (coil register for EM1.8R)								
Address	**Description**	**Function code**	**Data type**	**Value**	**Unit**	**Scaling**	**Default**	**R/W**
0x0001...0x0008	Values of DO1...DO8	1, 5, 15	n × B1 (single bit)	0, 1	-	-	-	R/W

Note: The register number starts from 1. In tools where it starts from 0, it is necessary to shift all register numbers by 1 for correct communication.

Modbus register (holding register (16-bit) for EM1.8U)					
Address	**Description**	**Function code**	**Data type**	**Range**	**R/W**
4x0001	UIO1 Value	3, 6, 16	U16-B/S16-B	-	R/W
4x0002	UIO2 Value	3, 6, 16	U16-B/S16-B	-	R/W
4x0003	UIO3 Value	3, 6, 16	U16-B/S16-B	-	R/W
4x0004	UIO4 Value	3, 6, 16	U16-B/S16-B	-	R/W
4x0005	UIO5 Value	3, 6, 16	U16-B/S16-B	-	R/W
4x0006	UIO6 Value	3, 6, 16	U16-B/S16-B	-	R/W
4x0007	UIO7 Value	3, 6, 16	U16-B/S16-B	-	R/W
4x0008	UIO8 Value	3, 6, 16	U16-B/S16-B	-	R/W

4x0009	UIO1 Value Reliability	3	U16-B	-	R
4x0010	UIO2 Value Reliability	3	U16-B	-	R
4x0011	UIO3 Value Reliability	3	U16-B	-	R
4x0012	UIO4 Value Reliability	3	U16-B	-	R
4x0013	UIO5 Value Reliability	3	U16-B	-	R
4x0014	UIO6 Value Reliability	3	U16-B	-	R
4x0015	UIO7 Value Reliability	3	U16-B	-	R
4x0016	UIO8 Value Reliability	3	U16-B	-	R
4x0100	UIO1_SignalType	3, 6, 16	U16-B	0...10 (default: 0)	R/W
4x0101	UIO2_SignalType	3, 6, 16	U16-B	0...10 (default: 0)	R/W
4x0102	UIO3_SignalType	3, 6, 16	U16-B	0...10 (default: 0)	R/W
4x0103	UIO4_SignalType	3, 6, 16	U16-B	0...10 (default: 0)	R/W
4x0104	UIO5_SignalType	3, 6, 16	U16-B	0...10 (default: 0)	R/W
4x0105	UIO6_SignalType	3, 6, 16	U16-B	0...10 (default: 0)	R/W
4x0106	UIO7_SignalType	3, 6, 16	U16-B	0...10 (default: 0)	R/W
4x0107	UIO8_SignalType	3, 6, 16	U16-B	0...10 (default: 0)	R/W

Note:

- The register number starts from 1. In tools where it starts from 0, it is necessary to shift all register numbers by 1 for correct communication.
- If a terminal is configured as NTC 10 K, PT 1000 or LG Ni 1000 input, the data type can be configured as U16-B (unsigned integer big-endian) or S16-B (signed integer big-endian).
- If a terminal is configured as DC 0...10 V output, function codes 6 and 16 are supported. Accordingly, the write permission is allowed.
- If the Client sends a write command with invalid values, the corresponding register rejects with an error code. The register values remain unchanged.
- Register addresses 4x0009...4x0016 (value reliability of channels UIO 1...8) match with register addresses 4x0001...4x0008 (channels UIO1...8) respectively. A channel value is abnormal if its corresponding reliability is not "0". See Fault detection and correction [► 8] for detailed error codes.
- Depending on different universal input/output types, signal type value, measurement range, unit, scaling and R/W are different. See the following table for details:

UIO Type	Signal type	Signal type value	Measurement Range	Unit	Scaling	R/W
-	NOT_USED	0	-	-	-	
Input	T_NI1000	1	-50...150 °C	°C	0.01	R
Input	T_PT1000	2	-50...180 °C	°C	0.01	R
Input	T_NTC10K	3	-40...115 °C	°C	0.01	R
Input	R_R10000	4	1.8...100 kΩ	Ohm	100	R
Input	R_R1000	5	700...1800 Ω	Ohm	0.1	R
Input	DI	6	0, 1	-	-	R
Input	I_0-20ma	7	0...22.4 mA	mA	0.001	R
Input	I_4-20ma	8	1.6...22.4 mA	mA	0.001	R
Input	V_10V	9	0...10 V	V	0.001	R
Output	V_OUT10V	10	0...10 V	V	0.001	R/W

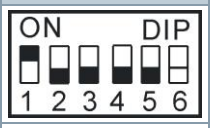
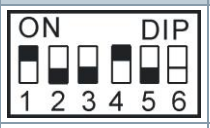
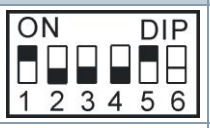
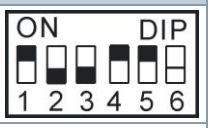
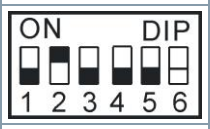
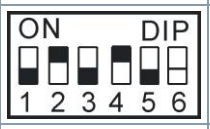
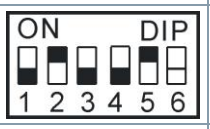
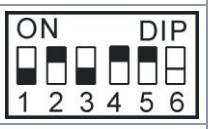
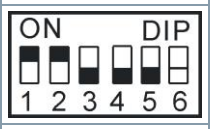
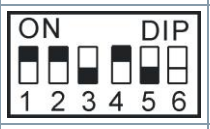
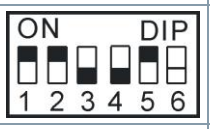
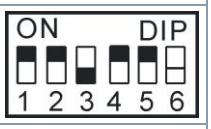
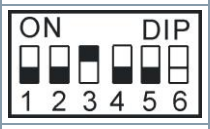
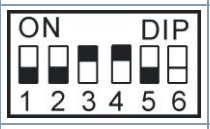
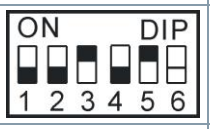
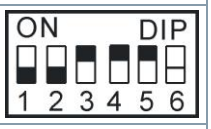
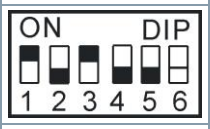
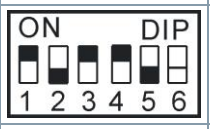
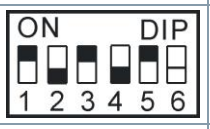
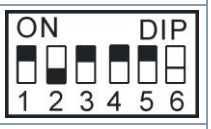
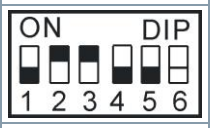
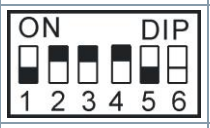
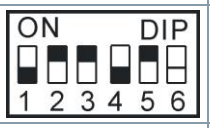
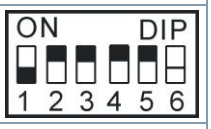
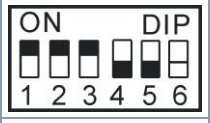
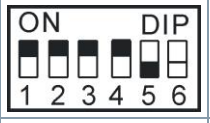
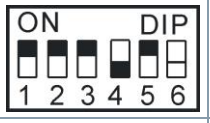
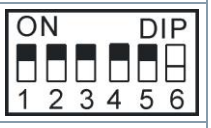
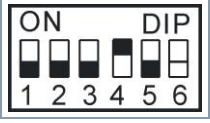
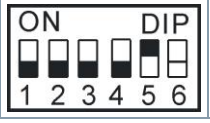
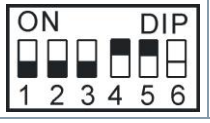
Modbus settings for EM1.8D, EM1.8R, EM1.8U

Note: When the value of 4x0310/4x0311/4x0320 is modified, writing 1 to 4x0315 is required. The module then automatically restarts, and only after this restart, the 'Baud Rate', 'Format', and 'Factory Reset' settings take effect.

Address	Description	Function code	Scaling	R/W	Area	Data type
4x0310	Baud rate	3, 6	1	R/W	0 = Auto (default) 1 = 9600 2 = 19200 3 = 38400 4 = 115200	U16-B
4x0311	Format	3, 6	1	R/W	0 = 1-8-E-1 (default) 1 = 1-8-O-1 2 = 1-8-N-1 3 = 1-8-N-2	U16-B
4x0315	Bus configuration command	6	1	R/W	0 = Ready (default) 1 = Load 2 = Discard	U16-B
4x0320	Factory reset	6	1	R/W	0xcac0 = Disable 0xcafe = Enable	U16-B

Appendix B: Modbus addresses configured by DIP switch

Positions 1...5 of the DIP switch are used to set the Modbus communication address of the device. The bit order of the five positions is 1 to 5. The lowest bit is 1 (2^0); the highest is 5 (2^4). By combining the five positions, max. 31 addresses can be configured as follows:

No.	Schematics	No.	Schematics	No.	Schematics	No.	Schematics
1		9		17		25	
2		10		18		26	
3		11		19		27	
4		12		20		28	
5		13		21		29	
6		14		22		30	
7		15		23		31	
8		16		24			

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