

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

SIEMENS

6ES7540-1AB01-0AA0

SIMATIC S7-1500 CM PTP RS422/485 BA

Used with the applicable SIMATIC S7-1500 serial communication system configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official pages follow this cover with source pagination retained.

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SIMATIC

S7-1500/ET 200MP Communications module CM PtP RS422/485 BA (6ES7540-1AB01-0AA0), CM PtP RS422/485 HF (6ES7541-1AB01-0AB0)

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Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Preface

Preface

Purpose of the documentation

This documentation provides important information on installing, wiring and commissioning the point-to-point communications module for the ET 200MP.

This equipment manual supplements the S7-1500 / ET 200MP Automation system (<http://support.automation.siemens.com/WW/view/en/59191792>) system manual. You can find functions generally relating to the S7-1500 or the ET 200MP in the S7-1500 / ET 200MP Automation system manual.

Conventions

This documentation contains figures of the described device. The figures may differ slightly from the devices supplied.

Please also observe notes marked as follows:

Note

A note contains important information on the product described in the documentation, on the handling of the product and on the section of the documentation to which particular attention should be paid.

Document history

The following table shows the most important changes to the documentation compared to the previous edition.

Manual edition	Comments
06/2024	All sections have been revised. The equipment manual is valid for the modules CM PtP RS422/485 BA and CM PtP RS422/485 HF.
01/2013	First edition

Product overview

2.1 Properties

Article numbers

	CM PtP RS422/485 BA	CM PtP RS422/485 HF
Article number	6ES7540-1AB01-0AA0	6ES7541-1AB01-0AB0
Note	The CM PtP module with the article number 6ES7540-1AB01-0AA0 is a compatible replacement for the CM PtP module with the article number 6ES7540-1AB00-0AA0 .	The CM PtP module with the article number 6ES7541-1AB01-0AB0 is a compatible replacement for the CM PtP module with the article number 6ES7541-1AB00-0AB0.

Firmware version

This equipment manual describes the properties of firmware version V2.0 of the module.

2.2 Functions

Introduction

The communications module allows you to exchange data between your own and other programmable controllers or computers by means of a point-to-point connection, and to connect various devices from a variety of manufacturers.

Functionality

The communications module offers the following functionality:

- RS422/485 interface
- Data transmission rate:
 - CM PtP RS422/485 BA: 300 to 19200 bit/s
 - CM PtP RS422/485 HF: 300 to 250000 bit/s
- Maximum frame length:
 - Without option for performance optimization:
 - CM PtP RS422/485 BA: 1024 bytes
 - CM PtP RS422/485 HF: 4096 bytes
 - With option for performance optimization: 24 bytes for receiving, 30 bytes for sending
- Transmission protocols:
 - CM PtP RS422/485 BA: Freeport, 3964(R), USS via instructions (Page 29)
 - CM PtP RS422/485 HF: Freeport, 3964(R), USS via instructions, Modbus via instructions (Page 29)

Hardware components of a point-to-point connection

You require the following hardware components for a point-to-point connection with the communications module:

Components	Function
Automation system	... contains the CPU and PROFINET interface, and the centralized I/O, if applicable, and executes the user program.
Communications module	... communicates with a communication partner (point-to-point) by means of the interface.
Connecting cable	... connects the communications module with the communication partner. 

Applications for a point-to-point connection are, for example:

- Communication with a converter via USS
- Communication with a heating control system via Modbus

Additional information

You can find information on the configuration and programming of the communications module in the function manual CM PtP - Configurations for point-to-point connections (<http://support.automation.siemens.com/WW/view/en/59057093>) and in the information system of STEP 7 (TIA Portal).

Connecting

3.1 RS422/485 (X27) interface of the communication module

The RS422/485 (X27) interface is a differential voltage interface and is used for serial data transmission.

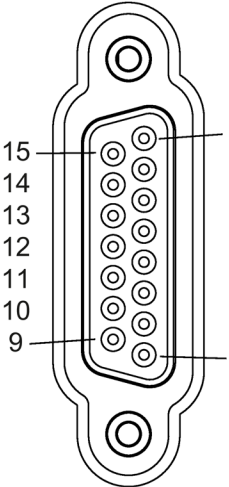
The inputs and outputs are not isolated from each other. The inputs and outputs are electrically isolated from the backplane bus.

Terminal assignment

Plug the connecting cable into the 15-pin D-sub socket behind the front flap of the communications module.

The table below shows the pin assignment of the 15-pin D-sub socket.

Table 3- 1 Pin assignment for the 15-pin D-sub socket of the integrated interface of the communications module

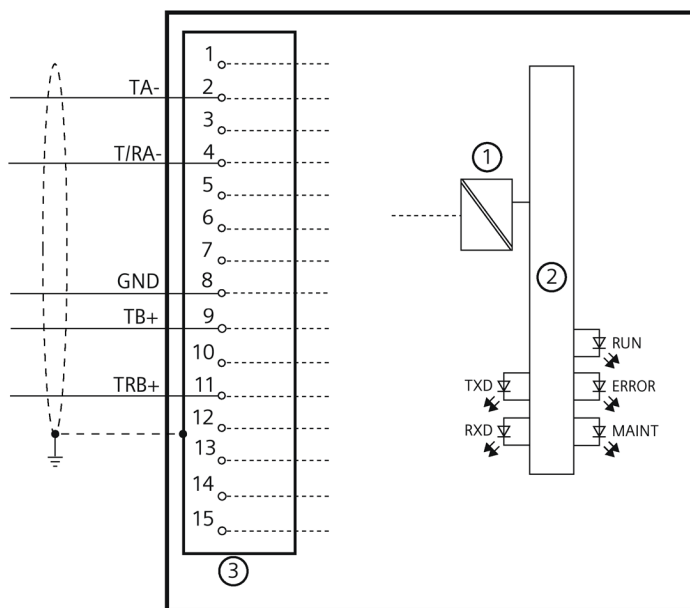
RS422/485 socket	Pin	Designation	Input/output	Meaning
	2	T (A)-	Output	Send data (four-wire mode)
	4	R (A)- T(A)/R(A)	Input Input/output	Receive data (four-wire mode) Receive/send data (two-wire mode)
	8	GND	—	Shared ground reference (ground)
	9	T (B)+	Output	Send data (four-wire mode)
	11	R (B)+ T(B)/R(B)	Input Input/output	Receive data (four-wire mode) Receive/send data (two-wire mode)
	7			
	6			
	5			
	4			
	3			
	2			
	1			
Front view				

Schematic circuit diagram

Standard connecting cables of various lengths (see section Properties (Page 11)) are available for connection with a communication partner which also has a 15-pin D-sub socket.

Note that you must only use shielded connector enclosures and cables. A large surface area of the cable shield must be in contact with the connector enclosure at both ends of the cable. You must ground the shields of the cables between communication partner and communications module both through the enclosure of the male plug and on the communication partner.

The figure below shows the circuit diagram of the communications module for operation at the RS422/485 connection.



- ① Electrical isolation
- ② Technology and backplane bus interface
- ③ Enclosure of the D-sub socket

Figure 3-1 Schematic circuit diagram

CAUTION

Never connect cable shield with GND

Never connect the cable shield with the GND, as this could destroy the interfaces. GND must always be connected with the communications module *and* communication partner; otherwise the interface modules could again be destroyed.

Note

Ensure the power supply is disconnected before you wire the communications module.

Note

To ensure interference-free operation for cable lengths > 50 m, you must install a terminating resistor of approx. 330 Ω at the receiver end.

Additional information

You can find information on connecting the modules in the FAQ with the entry ID 109736665 (<https://support.industry.siemens.com/cs/ww/en/view/109736665>) and in the system manual Automation System S7-1500 / ET 200MP (<http://support.automation.siemens.com/WW/view/en/59191792>).

3.2 Installation guidelines

To take into consideration

The general installation guidelines must be taken into consideration (see the EMC/EMI compatible installation of control systems (<http://support.automation.siemens.com/WW/view/en/59193566>) Function Manual).

Technical specifications

The following table shows the technical specifications as of the issue date. You can find a data sheet with up-to-date technical specifications on the Internet.

- CM PtP RS422/485 BA
(<https://support.industry.siemens.com/cs/de/en/pv/6ES7540-1AB01-0AA0/td?dl=en>)
- CM PtP RS422/485 HF
(<https://support.industry.siemens.com/cs/de/en/pv/6ES7541-1AB01-0AB0/td?dl=en>)

Article number	6ES7540-1AB01-0AA0	6ES7541-1AB01-0AB0
General information		
Product type designation	CM PtP RS 422 / 485 BA	CM PtP RS 422 / 485 HF
Product function		
• I&M data	Yes; I&M 0	Yes; I&M 0
• Fast startup	Yes	Yes
Engineering with		
• STEP 7 configurable/integrated from version	V5.5 SP2 with GSD file	V5.5 SP2 with GSD file
• PROFIBUS from GSD version/GSD revision	- / -	- / -
• PROFINET from GSD version/GSD revision	GSDML V2.42	GSDML V2.42
Installation type/mounting		
Rail mounting	Yes; S7-1500 mounting rail	Yes; S7-1500 mounting rail
Supply voltage		
Design of the power supply	system power supply	system power supply
Input current		
Current consumption (rated value)	43 mA; From the backplane bus	43 mA; From the backplane bus
Power		
Power available from the backplane bus	0.65 W	0.65 W
Power loss		
Power loss, typ.	0.6 W	0.6 W
Address area		
Address space per module		
• Inputs	8 byte; performance mode: 32 byte	8 byte; performance mode: 32 byte
• Outputs	0 byte; performance mode: 32 byte	0 byte; performance mode: 32 byte

Article number	6ES7540-1AB01-0AA0	6ES7541-1AB01-0AB0
Interface types		
RS 485		
• Transmission rate, max.	19.2 kbit/s	250 kbit/s
• Cable length, max.	1 200 m	1 200 m
RS 422		
• Transmission rate, max.	19.2 kbit/s	115.2 kbit/s
• Cable length, max.	1 200 m	1 200 m
• 4-wire full duplex connection	Yes	Yes
• 4-wire multipoint connection	No	No
Protocols		
Integrated protocols		
Freeport		
– Telegram length, max.	1 kbyte	4 kbyte
– Bits per character	7 or 8	7 or 8
– Number of stop bits	1 or 2 bit	1 or 2 bit
– Parity	None, even, odd, always 1, always 0, any	None, even, odd, always 1, always 0, any
3964 (R)		
– Telegram length, max.	1 kbyte	4 kbyte
– Bits per character	7 or 8	7 or 8
– Number of stop bits	1 or 2 bit	1 or 2 bit
– Parity	None, even, odd, always 1, always 0, any	None, even, odd, always 1, always 0, any
Modbus RTU master		
– Address area		1 to 247, extended 1 to 65535
– Number of slaves, max.		32
MODBUS RTU slave		
– Address area		1 to 247, extended 1 to 65535
Telegram buffer		
• Buffer memory for telegrams	2 kbyte	8 kbyte
• Number of telegrams which can be buffered	255	255

Article number	6ES7540-1AB01-0AA0	6ES7541-1AB01-0AB0
Interrupts/diagnostics/status information		
Diagnostics function	Yes	Yes
Alarms		
• Diagnostic alarm	Yes	Yes
• Hardware interrupt	No	No
Diagnoses		
• Wire-break	Yes	Yes
Diagnostics indication LED		
• RUN LED	Yes; green LED	Yes; green LED
• ERROR LED	Yes; red LED	Yes; red LED
• Receive RxD	Yes; Yellow LED	Yes; Yellow LED
• Transmit TxD	Yes; Yellow LED	Yes; Yellow LED
Potential separation		
between backplane bus and interface	Yes	Yes
Isolation		
Isolation tested with	707 V DC (type test)	707 V DC (type test)
Ambient conditions		
Ambient temperature during operation		
• horizontal installation, min.	-30 °C	-30 °C
• horizontal installation, max.	60 °C	60 °C
• vertical installation, min.	-30 °C	-30 °C
• vertical installation, max.	40 °C	40 °C
Altitude during operation relating to sea level		
• Installation altitude above sea level, max.	5 000 m; restrictions for installation altitudes > 2 000 m, see ET 200MP system manual	5 000 m; restrictions for installation altitudes > 2 000 m, see ET 200MP system manual
Decentralized operation		
to SIMATIC S7-300	Yes	Yes
to SIMATIC S7-400	Yes	Yes
to SIMATIC S7-1500	Yes	Yes
to standard PROFINET controller	Yes	Yes
Dimensions		
Width	35 mm	35 mm
Height	147 mm	147 mm
Depth	127 mm	127 mm
Weights		
Weight, approx.	0.22 kg	0.22 kg

Additional general technical specifications for SIMATIC S7-1500 are available in the system manual S7-1500 Automation System (<http://support.automation.siemens.com/WW/view/en/59191792>).