SIEMENS

SIMATIC

ET 200SP
CM PtP communication module (6ES7137-6AA00-0BA0)

Manual

01/2013

A5E03790792-01

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Preface

Purpose of the documentation

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

This device manual complements the system manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293). General functions of the ET 200SP are described in the system manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293).

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 contain 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.

Note on IT security

Siemens offers IT security mechanisms for its automation and drive product portfolio in order to support the safe operation of the plant/machine. We recommend that you inform yourself regularly on the IT security developments regarding your products. You can find information on this on the Internet (http://support.automation.siemens.com).

You can register for a product-specific newsletter here.

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Table of contents

Documentation guide

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Introduction

This modular documentation of the SIMATIC products covers diverse topics concerning your automation system.

The complete documentation for the S7-1500 and ET 200SP automation systems consists of system manuals, function manuals and manuals.

The STEP 7 information system (Online Help) also helps you configure and program your automation system.

Overview of the documentation provided for the CM PtP communication module (ET 200SP)

The following table lists additional references that you will need when using the CM PtP communication module.

Table 1- 1 Documentation for the CM PtP communication module

Topic	Documentation	Key content
System description	System Manual S7 -1500 Automation System (http://support.automation.siemens.com/WW/view/en/59191792) System Manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293)	• Application planning • Installation • Connecting • Addressing • Commissioning • Maintenance
	Device manual Interface module (http://support.automation.siemens.com/WW/view/en/55683316/133300)	• Connecting • Interrupt, error and system messages • Technical specifications • Dimensional drawing
	Function manual EMC/EMI compatible installation of control systems (http://support.automation.siemens.com/WW/view/en/59193566)	• Basics • Electromagnetic compatibility • Lightning protection
Point-to-point communication	Function manual CM PtP - Configurations for point-to-point connections (http://support.automation.siemens.com/WW/view/en/59057093)	• Basic information • Data transmission functions • Diagnostics functions

SIMATIC Manuals

All current manuals for the SIMATIC products are available for download free of charge on the Internet (http://www.siemens.com/automation/service&support).

Product overview

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2.1 Properties

Order number

6ES7137-6AA00-0BA0

View of the module

Figure 2-1 View of CM PtP (without BaseUnit)

Properties

The communication module has the following properties:

- Technical properties
  - RS232 interface (via BaseUnit)
  - RS422/485 interface (via BaseUnit)
  - short-circuit proof
  - electrically disconnected
  - Protocols: 3964(R), Modbus master (RTU), Modbus slave (RTU), Freeport and USS with instructions
- Supported system functions
  - Firmware update
  - Identification data I&M0
  - Parameter re-assignment in CPU RUN mode (using instructions)
  - Diagnostic interrupts

Additional information

Additional information on the properties of the CM PtP can be found in the function manual CM PtP - Configurations for point-to-point connections (http://support.automation.siemens.com/WW/view/en/59057093).

You can find additional information on the design of the ET 200SP and the associated modules in the system manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293).

2.2 Accessories

ET 200SP accessories

Accessories and spare parts for ET 200SP can be found in the System Manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293).

Online catalog

Additional order numbers for ET 200SP can be found on the Internet (http://www.siemens.com/industrymall) in the online catalog and online ordering system.

2.3 Functions

Introduction

The communication 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 of the CM PtP

The CM PtP communication module offers the following functionality:

- RS232 and RS422/485 interface
- Data transmission rate: 300 to 115200 bps
- Maximum frame length: 2 kbyte
- Transmission protocols: Freeport, 3964(R) and Modbus

Note

The USS protocol can be implemented with instructions included in STEP 7 (TIA Portal).

Hardware components of a point-to-point connection

You require certain hardware components for a point-to-point connection with the CM PtP.

Components	Function
Automation system	... contains the CPU and PROFINET interface, and the central I/O, if applicable, and executes the user program.
ET 200SP Distributed I/O System	... contains the distributed I/O.
Interface module (IM)	... connects the distributed I/O system ET 200SP to PROFINET IO and supports all ET 200SP I/O modules.
CM PtP communication module	... communicates with a communication partner (point-to-point) by means of the interface.
BaseUnit (6ES7193-6BP00-0xA0)	... connects the communication module with the I/O system and the supply voltage.
Server module	... completes the setup of the ET 200SP

System environment

The communication module can be used in the following system environments:

Applications	Components required	Configuration
Distributed operation in an S7-1500 system	• CPU 151x • IM 155-6 • CM PtP • Power supply (optional)	STEP 7 (TIA Portal)
Distributed operation in an S7-300/400 system	• CPU 31x / CPU 41x • IM 155-6 • CM PtP • BaseUnit	STEP 7 (TIA Portal) STEP 7 with integration of a GSD file
Distributed operation in a third-party automation system	• Third-party automation system • IM 155-6 • CM PtP	GSD file imported to/installed in the engineering system [1]

[1] Information on using the communication module in a third-party system is available in the programming and operating manual CM PtP operation with PROFINET controller (http://support.automation.siemens.com/WW/view/en/59062563).

Additional information

Information on configuration and programming of the CM PtP communications module is available 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 the TIA Portal.

2.4 Properties of the interfaces

Interfaces of the CM PtP

The CM PtP has the following interfaces, which are connected by means of the associated BaseUnit (see RS232 and RS422/485 interface of the communication module (Page 17) for assignment):

- RS232 interface
- RS422/485 interface

2.4.1 Properties of the RS232 interface

Definition - RS232 interface

The RS232 interface is a voltage interface used for serial data transmission.

Properties - RS232 interface

The RS232 interface has the following properties and meets the following requirements:

Type	Voltage interface
BaseUnit terminals	Terminals connected to the electronics module (see RS232 and RS422/485 interface of the communication module (Page 17) for assignment)
RS232 signals	TXD, RXD, RTS, CTS, DTR, DSR, RI, DCD, GND; all signals isolated against the backplane bus and load voltage
Max. data transmission rate	115.2 kbps
max. cable length	15 m, cable type LIYCY 9 x 0.14
Standard	DIN 66020, DIN 66259, EIA-RS 232C, CCITT V.24/V.28

RS232 signals

The table below shows the meaning of the individual RS232 accompanying signals.

Table 2- 1 Signals of the RS232 interface

Signal	Designation	Meaning
TXD	Transmit Data	Transmit data; transmit cable logically held to "1" by communication module in idle state.
RXD	Receive Data	Receive data; receive cable logically held to "1" by communication partner in idle state.
RTS	Request To Send	Request to send RTS set to "ON": Communication module ready to send; signals to the communication partner that there is data ready to send RTS set to "OFF": Communication module does not send
CTS	Clear To Send	Clear to send CTS set to "ON": Signals "clear to send" to the communication partner CTS set to "OFF": Signals "Not clear to send" to the communication partner
DTR	Data Terminal Ready	DTR set to "ON": Communications module switched on, ready for operation DTR set to "OFF": Communications module not switched on, not ready for operation
DSR	Data Set Ready	DSR set to "ON": Communication partner signals "ready for operation" DSR set to "OFF": Communication partner not switched on, not ready for operation
RI	Ring Indicator	Incoming call when connecting a modem
DCD	Data Carrier Detect	Carrier signal when connecting a modem. The communication partner signals with a high level that it detects incoming data on the cable.

2.4.2 Properties of the RS422/485 interface

Definition - RS422/485 interface

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

Properties - RS422/485 interface

The RS422/485 (X27) interface has the following properties and meets the following requirements:

Type	Differential voltage interface
BaseUnit terminals	Terminals connected to the electronics module (see RS232 and RS422/485 interface of the communication module (Page 17) for assignment)
RS422 signals:	T (A), R (A), T (B), R (B), GND; all signals are isolated against the backplane bus and the load voltage
RS485 signals:	R/T (A), R/T (B), GND; all signals isolated against backplane bus and load voltage
Max. data transmission rate:	115.2 kbps
Max. cable length:	1200 m; cable type LIYCY 3 x 2 x 0.14. T(A)/T(B) and R(A)/R(B) twisted in pairs.
Standard:	DIN 66259 Parts 1 and 3, EIA-RS422/485, CCITT V.11

Connecting

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3.1 RS232 and RS422/485 interface of the communication module

Pin assignment

Table 3- 1 RS232 connection

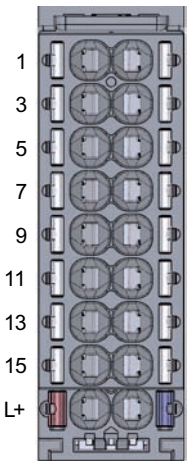
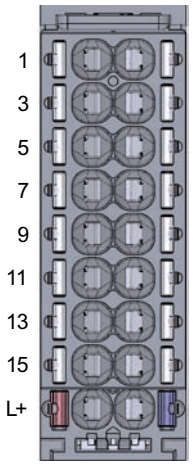
Terminal assignment of the communication module BaseUnit	Pin	Designation	Input/output	Meaning
	1	TXD Transmit Data	Output	Transmit data
	2	RXD Receive Data	Input	Receive data
	3	RTS Request To Send	Output	Request to send
	4	CTS Clear To Send	Input	Clear to send
	5	DTR Data Terminal Ready	Output	Data terminal ready
	6	DSR Data Set Ready	Input	Data set ready
	7	DCD Data Carrier Detect	Input	Received signal level
	8	RI Ring Indicator	Input	Incoming call
	9+10	GND Ground	-	GND functional ground (isolated)
Front view				

Table 3- 2 RS422/485 connection

Terminal assignment of the communication module BaseUnit	Pin	Designation	Input/output	Meaning
	11	T (A) -	Output	Send data (four-wire mode)
	12	R (A) - T(A)/R(A)	Input Input/output	Receive data (four-wire mode) Receive/send data (two-wire mode)
	13	T (B) +	Output	Send data (four-wire mode)
	14	R (B) + T(B)/R(B)	Input Input/output	Receive data (four-wire mode) Receive/send data (two-wire mode)
	15+16	GND Ground	-	GND functional ground (isolated)
Front view				

Note

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

Additional information

Information on connecting the modules can be found in the ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293) system manual.

3.2 Installation guidelines

To take into consideration

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

The cable shield must be installed on a grounding rail to maintain the EMC values (electromagnetic compatibility).

Parameters/address space 4

4.1 Parameter assignment

Introduction

You configure and assign the parameters of the communication module with STEP 7 (TIA Portal V12 or later) or with STEP 7 with integration of a GSD file.

Additional information

The device manual of the communication module is supplemented by the function manual CM PtP - Configurations for point-to-point connections (http://support.automation.siemens.com/WW/view/en/59057093) and the TIA Portal information system.

There you will find information on the following topics:

- Operating modes
- Receive buffer
- Data flow control
- Transmission integrity
- Data transmission - protocol specific
- Programming/configuring in STEP 7 (TIA Portal)
- Module-specific instructions
- Diagnostics

4.2 Reaction to CPU STOP

Ongoing transmissions are aborted when the higher-level control (CPU) goes to STOP.

Frames in the receive buffer are retained. With a corresponding configuration in the properties dialog of the communication module, you can automatically clear the receive buffer on the communication module during CPU startup.

4.3 Address space

Address space of the communication module

The input addresses of the communications module total 8 bytes. The input addresses are automatically assigned for each communications module when you specify the device configuration in STEP 7 (TIA Portal). Output addresses are not required.

Hardware identification (not freely configurable)

The hardware identification (HW ID) is automatically assigned for each communications module when you specify the device configuration in STEP 7 (TIA Portal).

The hardware ID is issued along with the diagnostic messages to localize the module. In addition, the HW identification is required for S7-1500 at the communication instructions in order to identify the communication module. For S7-300/400, the communication module is identified by the start address of the input data.

Programming

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Overview of the instructions

Communication between the CPU, the communication module and a communication partner takes place by means of special instructions and protocols that support the corresponding communication modules. The instructions process the exchange of data between the CPU and the communication module. They must be called cyclically from the user program. Data transmission takes place asynchronously across several cycles.

The transmission protocols are implemented on the communication module. The protocol is used to adapt the interface of the communication module to the interface of the communication partner.

Instruction	Meaning
Port_Config	You use the Port_Config instruction to dynamically assign basic interface parameters.
Send_Config	You use the Send_Config (send configuration) instruction to dynamically assign serial send parameters of a protocol.
Receive_Config	You use the Receive_Config (receive configuration) instruction to dynamically assign serial receive parameters of a protocol.
P3964_Config	You use the P3964_Config (protocol configuration) instruction to dynamically assign the parameters of the 3964(R) procedure.
Send_P2P	You use the Send_P2P instruction to send data to a communication partner.
Receive_P2P	You use the Receive_P2P instruction to receive data from a communication partner.
Receive_Reset	You use the Receive_Reset instruction to delete the receive buffer of the communication module.
Signal_Get	You use the Signal_Get instruction to read the RS232 accompanying signals.
Signal_Set	You use the Signal_Set instruction to set the RS232 accompanying signals.
Get_Features	You use the Get_Features instruction to read expanded functions supported by the communication module.
Set_Features	You use the Set_Features instruction to set expanded functions supported by the communication module.
USS_Port_Scan	You use the USS_Port_Scan instruction to communicate using the USS.
USS_Drive_Control	You use the USS_Drive_Control instruction to exchange data with a drive.
USS_Read_Param	You use the USS_Read_Param instruction to read parameters from the drive.
USS_Write_Param	You use the USS_Write_Param instruction to change parameters in the drive.
Modbus_Comm_Load	The instruction Modbus_Comm_Load allows you to configure the port of the communication module for Modbus RTU.

Instruction	Meaning
Modbus_Master	The instruction Modbus_Master allows you to communicate as Modbus master by means of the PtP port.
Modbus_Slave	The instruction Modbus_Slave allows you to communicate as Modbus slave by means of the PtP port.

The instructions are part of STEP 7 (TIA Portal). The instructions are available in the "Instructions" task card under Communication > Communication processor.

Additional information

Additional information on programming the communication modules can be found in the function manual CM PtP - Configurations for point-to-point connections (http://support.automation.siemens.com/WW/view/en/59057093).

Error and system messages

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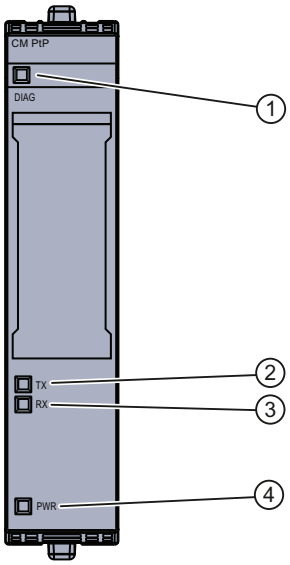
LED displays of the communication module

The figure below shows the LED displays of the CM PtP communication module.



① LED display DIAG
② LED display TX
③ LED display RX
④ LED display PWR

Figure 6-1 View of CM PtP (without BaseUnit)

Meaning of DIAG LED display

LED DIAG	Meaning	Solution
■ On	CM configured and ready for operation	---
☼ Flashes	CM in startup, parameters not assigned yet	---
☼ Flashes	Error information; diagnostic interrupt (break)	Evaluate the diagnostics data and eliminate the error. [1)]

1) Information on communication module startup and diagnostics is available in the CM PtP - Configurations for point-to-point connections (http://support.automation.siemens.com/WW/view/en/59057093) function manual

Meaning of the TXD/RXD LED displays

LED		Meaning	Solution
TX	RX		
☼ Flashes	□ Off	Interface is transmitting	---
□ Off	☼ Flashes	Interface is receiving	---

Meaning of PWR LED display

LED PWR	Meaning	Solution
■ On	Power ON (supply voltage present)	---
□ Off	Power OFF (supply voltage missing)	Check the voltage supply of the load group

Additional information

Information on communication module startup and diagnostics is available in the CM PtP - Configurations for point-to-point connections (http://support.automation.siemens.com/WW/view/en/59057093) function manual.

Technical specifications

7

Technical specifications of the CM PtP communication module

	6ES7137-6AA00-0BA0
Product type designation	ET 200SP CM PtP
General information	
• I&M data	Yes: I&M 0
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	V12.0 / V12.0
STEP 7 can be configured/integrated as of version	V5.5 SP2 or higher with a GSD file
PROFIBUS as of GSD version/GSD revision	- / -
PROFINET as of GSD version/GSD revision	V2.3
Installation type/mounting	
• Rail mounting possible	Yes; standard - DIN rail
Supply voltage	
Voltage type of supply voltage	24 V DC
• Rated value (DC)	24 V
• Low limit of valid range (DC)	19.2 V
• High limit of valid range (DC)	28.8 V
• Reverse polarity protection	Yes
Input current	
• Current consumption (rated value)	29 mA
Power loss	
• Power loss, typ.	0.7 W
Address area	
Occupied address area	
• Inputs	8 bytes

	6ES7137-6AA00-0BA0
Interfaces	
1. Interface	
Interface hardware	
• RS 232	Yes
• RS 422	Yes
• RS 485	Yes
Interface hardware	
RS 232	
• Transmission rate, max.	115.2 kbps
• Max. cable length	15 m
RS-232 accompanying signals	RTS, CTS, DTR, DSR, RI, DCD
RS 485	
• Transmission rate, max.	115.2 kbps
• Max. cable length	1200 m
RS 422	
• Transmission rate, max.	115.2 kbps
• Max. cable length	1200 m
• 4-wire full duplex connection	Yes
• 4-wire multipoint connection	Yes
Protocols	
Integrated protocols	
Freeport	
• Frame length, max.	2 kbyte
• Bits per character	7 or 8
• Number of stop bits	1 or 2 bits
• Parity	None, even, odd, always 1, always 0, any
3964 (R)	
• Frame length, max.	2 kbyte
• Bits per character	7 or 8
• Number of stop bits	1 or 2 bits
• Parity	None, even, odd, always 1, always 0, any
Modbus RTU master	
Address area	1 to 247, extended 1 to 65,535
• Max. number of slaves	32

	6ES7137-6AA00-0BA0
Modbus RTU slave	
Address area	1 to 247, extended 1 to 65,535
Frame buffer	
• Buffer memory for frames	4 kbyte
• Number of frames which can be buffered	255
Interrupts/diagnostics/status information	
Interrupts	
• Diagnostic interrupt	Yes
• Hardware interrupt	No
Diagnostic messages	
Diagnostics	Yes
• Wire break	Yes
Diagnostics display LED	
• Monitoring of supply voltage	Yes; green PWR-LED
• For module diagnostics	Yes; green/red DIAG-LED
• Receive RxD	Yes; green LED
• Send TxD	Yes; green LED
Electrical isolation	
• between backplane bus and interface	Yes
Permitted potential difference	
Between the different circuits	75 V DC / 60 V AC (Basic insulation)
Insulation	
Insulation tested with	707 V DC (Type Test)
Ambient conditions	
Operating temperature	
• Horizontal installation, min.	0 °C
• Horizontal installation, max.	60 °C
• Vertical installation, min.	0 °C
• Vertical installation, max.	50 °C
Distributed operation	
• At SIMATIC S7-300	Yes
• At SIMATIC S7-400	Yes
• At SIMATIC S7-1200	No
• At SIMATIC S7-1500	Yes
• At Standard Profinet Controller	Yes

	6ES7137-6AA00-0BA0
Dimensions	
• Width	15 mm
• Height	73 mm
• Depth	58 mm
Weights	
• Weight, approx.	30 g

Additional general technical specifications for SIMATIC ET 200SP can be found in the system manual S7-1500 Automation System (http://support.automation.siemens.com/WW/view/en/59191792).

Dimensional drawing

A

In this appendix, you will find the dimensional drawing of the communication module, inserted into a BaseUnit and mounted on a DIN rail. You have to consider the dimensions during installation in control cabinets, control rooms, etc (BaseUnit: 6ES7193-6BP00-0xA0).

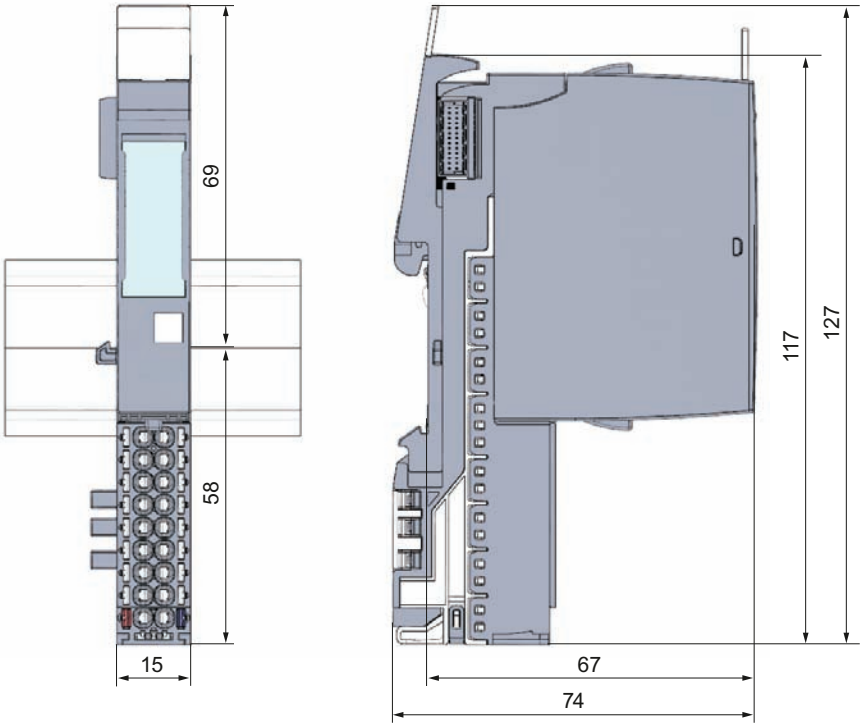


Figure A-1 Dimensional drawing of the CM PtP communication module