SIEMENS

SIMATIC

S7-1500/ET 200MP CM PtP RS232 HF (6ES7541-1AD00-0AB0) communication module

Manual

01/2013

A5E03790665-01

Legal information

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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.

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

⚠ WARNING

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

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Preface

Purpose of the documentation

This device manual complements the system manual S7 1500 Automation System (http://support.automation.siemens.com/WW/view/en/59191792). General functions of the S7-1500 are described in the S7-1500 Automation System 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 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

1

Introduction

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

The complete documentation for the S7-1500 and ET 200MP 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 RS232 HF communication module

The following table lists additional references that you will need when using the CM PtP RS232 HF communication module.

Table 1- 1 Documentation for the CM PtP RS232 HF 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 200MP distributed I/O system (http://support.automation.siemens.com/WW/view/en/59193214) System manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293)	• Application planning • Installation • Connecting • Addressing • Commissioning • Maintenance
	Power supply manuals (http://support.automation.siemens.com/WW/view/en/59173914)	• Connecting • Interrupt, error and system messages • Technical specifications • Dimensional drawing
	CPU manuals (http://support.automation.siemens.com/WW/view/en/56926947)	
	Function manual EMC/EMI compatible installation of control systems (http://support.automation.siemens.com/WW/view/en/59193566)	• Basics • Electromagnetic compatibility • Lightning protection

Topic	Documentation	Key content
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

2

2.1 Properties

Order number

6ES7541-1AD00-0AB0

View of the module

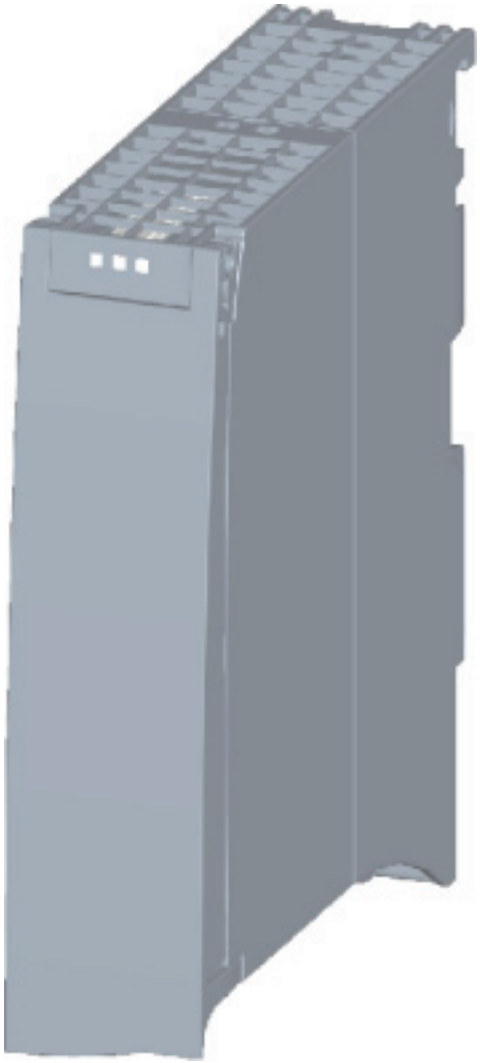


Figure 2-1 CM PtP RS232 HF view

Properties

The communication module has the following properties:

- Technical properties
  - RS232 interface
  - 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 RS232 HF can be found in the function manual CM PtP - Configurations for point-to-point connections (http://support.automation.siemens.com/WW/view/en/59057093).

Information on the properties of the S7-1500 and associated modules can be found in the system manual S7 -1500 Automation System (http://support.automation.siemens.com/WW/view/en/59191792).

2.2 Accessories

Scope of delivery

The scope of delivery of the communication module includes a U connector for connection to the backplane bus.

Connecting cables

The following connecting cables can be ordered separately in the standard lengths: 5 m, 10 m and 15 m (each with a 9-pin sub D female connector).

Table 2- 1 Order numbers of connecting cables

Connecting cables for CM PtP RS232 BA CM PtP RS232 HF	Type	Order number
RS232 interface	RS232, 5 m	6ES7902–1AB00–0AA0
	RS232, 10 m	6ES7902–1AC00–0AA0
	RS232, 15 m	6ES7902–1AD00–0AA0

Online catalog

Additional order numbers for S7-1500 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 RS232 HF

The CM PtP RS232 HF communication module offers the following functionality:

- RS232 interface
- Data transmission rate: 300 to 115200 bps
- Maximum frame length: 4 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 RS232 HF.

Components	Function
CPU module Accessories: Memory card	... executes the user program.
CM PtP RS232 HF communication module	... communicates with a communication partner (point-to-point) by means of the interface.
Connecting cable	... connects the CM PtP RS232 HF communication module with the communication partner. 
U connector	... provides the mechanical and electrical connection between the modules.
Optional: Power supply module (PS)	... converts the line voltage (120/230V AC or 24V DC) into the operating voltage required to supply the S7-1500.

System environment

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

Applications	Components required	Configuration
Central operation in an S7-1500 system	• CPU 151x • CM PtP RS232 HF • Power supply (optional)	STEP 7 (TIA Portal)
Distributed operation in an S7-1500 system	• CPU 151x • IM 155-5 • CM PtP RS232 HF • Power supply (optional)	STEP 7 (TIA Portal)
Distributed operation in an S7-300/400 system	• CPU 31x / CPU 41x • IM 155-5 • CM PtP RS232 HF	STEP 7 (TIA Portal) STEP 7 with integration of a GSD file
Distributed operation in a third-party system	• Third-party programmable controller • IM 155-5 • CM PtP RS232 HF	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 configuring and programming the CM PtP RS232 HF communication module is available in the function manual CM PtP - Configurations for point-to-point connections (http://support.automation.siemens.com/WW/view/en/59057093).

2.4 Properties of the RS232 interface

Definition

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

Properties

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

Type	Voltage interface
Front connector	9-pin sub-D male connector with screw lock
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- 2 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 not ready to 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.

Connecting

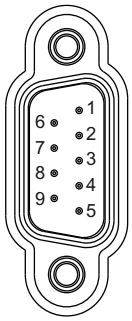
3

3.1 RS232 interface of the communications module

Terminal assignment

The table below shows the terminal assignment for the 9-pin sub D male connector in the front panel of the communications module.

Table 3- 1 Terminal assignment for the sub D male connector of the integrated interface of the communications module

Male connector of the communications module	Pin	Designation	Input/output	Meaning
	1	DCD Data Carrier Detect	Input	Received signal level
	2	RXD Receive Data	Input	Receive data
	3	TXD Transmit Data	Output	Transmit data
	4	DTR Data Terminal Ready	Output	Data terminal ready
	5	GND Ground	-	Functional ground (isolated)
	6	DSR Data Set Ready	Input	Data set ready
	7	RTS Request To Send	Output	Request to send
	8	CTS Clear To Send	Input	Clear to send
	9	RI Ring Indicator	Input	Incoming call
* View from the front				

Connecting cables

Standard connecting cables of various lengths (see chapter Accessories (Page 11)) are available for connection with a communication partner which also has a 9-pin sub-D male connector.

Please note that you must only use shielded connector casings and cables. A large surface area of the cable shield must be in contact with the connector casing on both sides.

NOTICE
Never connect the cable shield with the GND, as this could destroy the interfaces. GND must always be connected on both sides (pin 5), otherwise the modules could be destroyed.

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).

4 Parameters/address space

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

5

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 port.
Receive_Config	You use the Receive_Config (receive configuration) instruction to dynamically assign serial receive parameters of a port.
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 via the USS network.
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

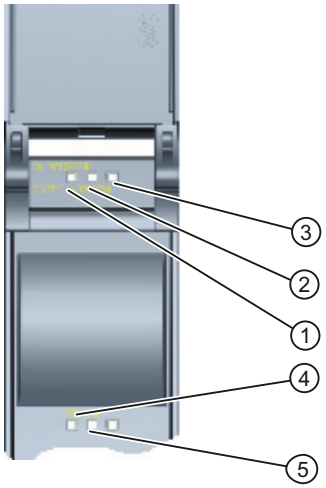
Additional information on programming the communication modules is available in the function manual CM PtP - Configurations for point-to-point connections (http://support.automation.siemens.com/WW/view/en/59057093) and in the TIA Portal information system.

Error and system messages

6

LED displays of the communication module

The figure below shows the LED displays of the CM PtP RS232 HF communication module with open front panel.



① LED display RUN
② LED display ERROR
③ LED display MAINT
④ LED display TXD
⑤ LED display RXD

Figure 6-1 CM PtP RS232 HF view

Meaning of the LED displays for RUN/ERROR/(MAINT)

LED			Meaning	Solution
RUN	ERROR	MAINT		
Off	Off	Off	Supply voltage not present or too low at communication module	Check the power supply of the station.
Flashes	Off	Off	CM in startup, parameters not assigned yet	---
On	Off	Off	CM configured and ready for operation	---
Off	Flashes	Off	Group error (at least one error pending)	Evaluate the diagnostics data and eliminate the error. [1]

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

Meaning of LED displays for TXD/RXD (under the front panel)

LED		Meaning	Solution
TXD	RXD		
Flashes	Off	Interface is transmitting	---
Off	Flashes	Interface is receiving	---

Technical specifications

7

	6ES7541-1AD00-0AB0
Product type designation	CM PtP RS232 HF
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; S7-1500 mounting rail
Supply voltage	
Voltage type of supply voltage	System power supply
Input current	
• Current consumption (rated value)	35 mA; from backplane bus
Power	
• Power from the backplane bus	0.65 W
Power loss	
• Power loss, typ.	0.6 W
Address area	
Occupied address area	
• Inputs	8 bytes
Interfaces	
1. Interface	
Interface hardware	
• RS 232	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
Protocols	
Integrated protocols	
Freeport	

	6ES7541-1AD00-0AB0
• Frame length, max.	4 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.	4 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	1
Modbus RTU slave	
Address area	1 to 247, extended 1 to 65,535
Frame buffer	
• Buffer memory for frames	8 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	
• RUN LED	Yes; green LED
• ERROR LED	Yes; red LED
• Receive RxD	Yes; yellow LED
• Send TxD	Yes; yellow LED
Electrical isolation	
• between backplane bus and interface	Yes
Insulation	
Insulation tested with	707 V DC (Type Test)
Ambient conditions	
Operating temperature	
• Horizontal installation, min.	0 °C
• Horizontal installation, max.	60 °C

	6ES7541-1AD00-0AB0
• Vertical installation, min.	0 °C
• Vertical installation, max.	40 °C
Distributed operation	
• At SIMATIC S7-300	Yes
• At SIMATIC S7-400	Yes
• At SIMATIC S7-1500	Yes
• At Standard Profinet Controller	Yes
• Supports Fast Startup	Yes
Dimensions	
• Width	35 mm
• Height	147 mm
• Depth	127 mm
Weights	
• Weight, approx.	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).

Dimensional drawing

A

This appendix contains the dimensional drawing of the communication module installed on a mounting rail and with a shield bracket. Always observe the specified dimensions for installation in cabinets, control rooms, etc.

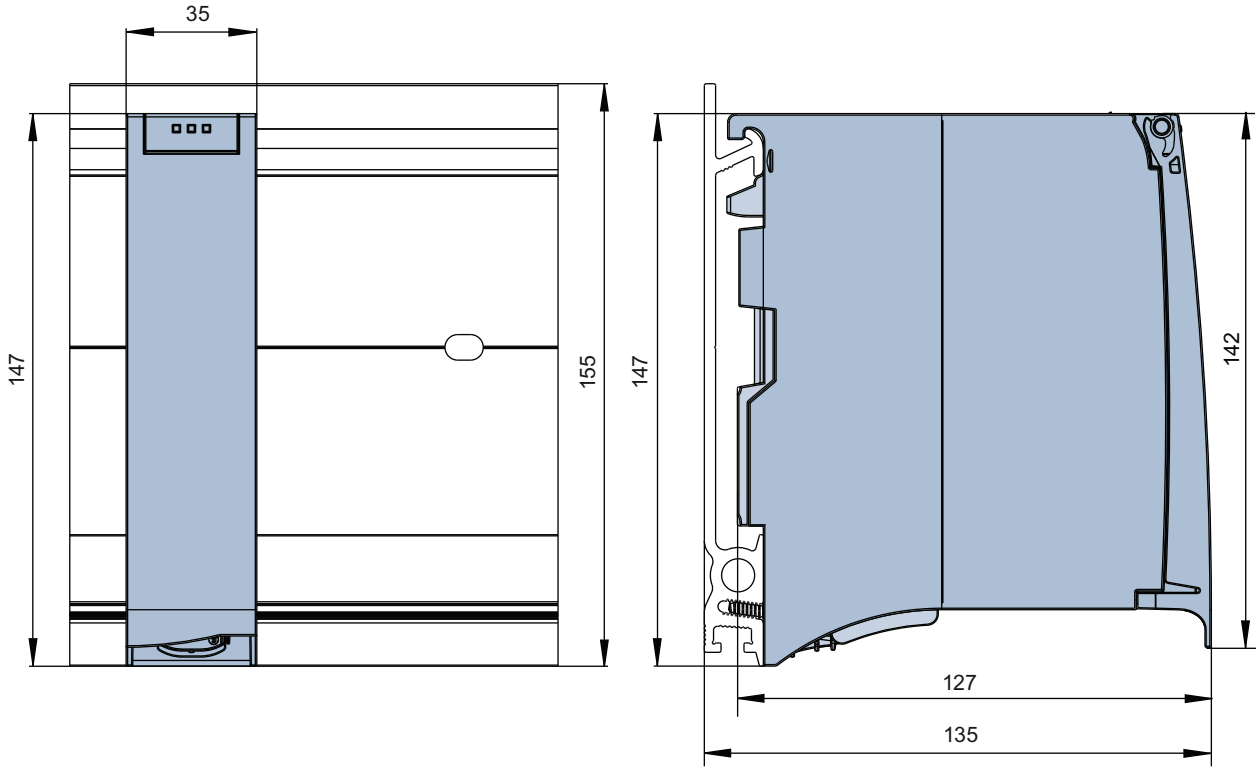


Figure A-1 Dimensional drawing of the CM PtP RS232 HF communication module

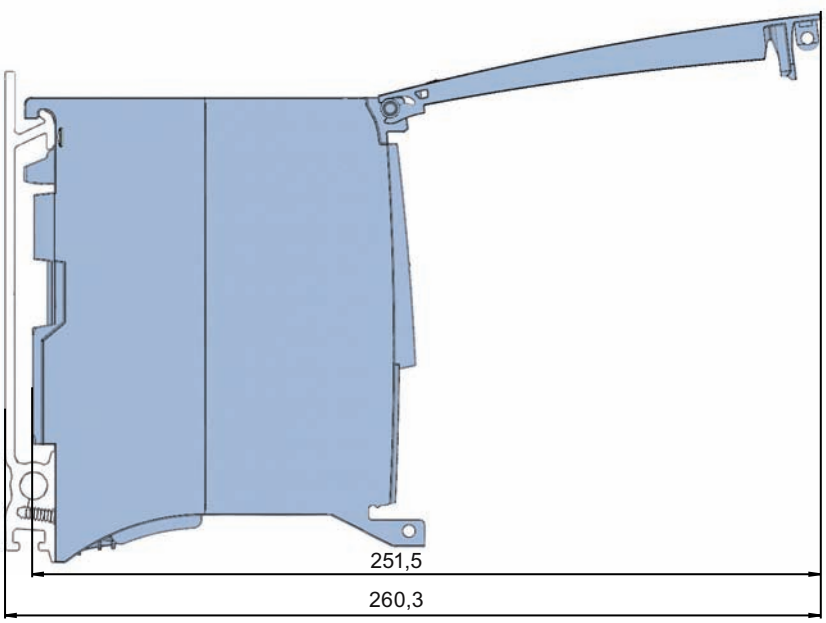


Figure A-2 Dimensional drawing of the CM PtP RS232 HF communication module with open front panel