

SIMATIC NET

S7-1500 - PROFIBUS SIMATIC CP 1542-5

Equipment Manual

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CP 1542-5, firmware V2.0 (6GK7542-5FX00-0XE0)
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Legal information

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 persons are those who, because of their training and experience, are familiar with the installation, assembly, commissioning, operation, decommissioning and disassembly of the product and can recognize risks and avoid possible hazards.

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the application described in the catalog and the associated usage information. 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

All names identified by ® are registered trademarks of Siemens Aktiengesellschaft. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

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



CAUTION

Risk of injury

To prevent injury, read the manual before use.

Article number, validity and product names

This description contains information on the following product:

- CP 1542-5
Article number 6GK7 542-5FX00-0XE0
Hardware version 1
Firmware version V2.0
- CP 1542-5
Article number 6GK7 542-5FX10-0XE0
Hardware version 1
Firmware version V3.1

Communications processors for connecting SIMATIC S7-1500 to PROFIBUS DP

View of the CP

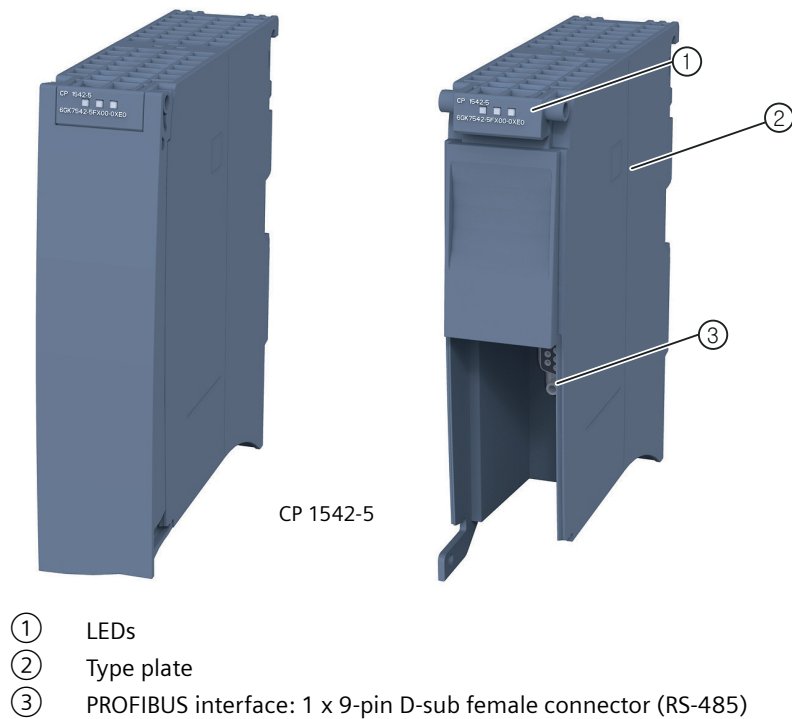


Figure 1 View of the CP 1542-5 with closed (left) and open (right) front cover

Abbreviations and reference to the module version

- CP / module / device
These terms are used in the following instead of the complete product designation. In this case, the information applies equally to both firmware versions or hardware product versions of the module.
If the data of the two devices differs, the firmware version or the hardware version of the respective device is explicitly stated.
- STEP 7
The name STEP 7 is used to mean the STEP 7 Professional configuration tool.
- "FX00" / "FX10"
 - "FX00"
Abbreviation for CP 1542-5 with article number 6GK7 542-5FX00-0XE0
 - "FX10"
Abbreviation for CP 1542-5 with article number 6GK7 542-5FX10-0XE0

Purpose of the manual

This manual supplements the system manual of the S7-1500 automation system and the function manuals. All functions that go beyond the system are described in the system manual.

With the information in this manual and the system manual, you will be able to commission the CP 1542-5.

New in this edition

- New firmware version V3.1 of the "FX10" module with the following functional improvements:
 - S7 connection to a passive slave, see section Configuring connections to passive slaves (e.g. for PUT/GET) (Page 35).
 - Online diagnostics: Display of the real PROFIBUS address, also with addressing from the user program.
- Editorial revision:
 - "Security Recommendations" section renamed "Industrial Cybersecurity".

Replaced edition

Edition 01/2023

Manual on DVD

You will find the manual on the DVD supplied with the product. This DVD contains the product manuals valid at the time it is created.

Current manual edition on the Internet

You will also find the current edition of this manual on the Internet pages of Siemens Industry Online Support:

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15672/man>)

Sources of information and other documentation

See section Preface (Page 3).

Information can be accessed via QR code

There is a QR code on the device via which you can call up a web page relating to the device which provides a great deal of information. Refer to section QR code (Page 23) for more on this.

License conditions

Note

Open source software

Read the license conditions for open source software carefully before using the product.

You will find license conditions in the following documents on the supplied data medium:

- OSS_CM15425_86.pdf
- OSS_CMCP15425_99.pdf

Siemens provides products and solutions with industrial cybersecurity functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial cybersecurity concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial cybersecurity measures that may be implemented, please visit
<https://www.siemens.com/cybersecurity-industry>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Cybersecurity RSS Feed under
<https://www.siemens.com/cert>.

Observe the following security recommendations to prevent unauthorized access to the system.

- Evaluate your plant as a whole in terms of security. Use a cell protection concept with suitable products.
- Keep the firmware up to date. Check regularly for security updates of the firmware and use them.
- Restrict physical access to the device to qualified personnel.
- Configure a protection level of the CPU.

Firmware

The firmware is signed and encrypted. This ensures that only firmware created by Siemens can be downloaded to the device.

Note on firmware/software support

Check regularly for new firmware/software versions or security updates and apply them. After the release of a new version, previous versions are no longer supported and are not maintained.

Documentation guide

The documentation of the SIMATIC products has a modular structure and covers topics relating to your automation system.

The complete documentation for the S7-1500 system consists of a system manual, function manuals and device manuals.

The STEP 7 information system (online help) also supports you when configuring and programming your automation system.

Overview of the documentation on communication with S7-1500

The following table lists additional documents that supplement this description of the CP 1542-5. The documents are available on the Internet.

Table 1 Documentation for the CP 1542-5

Topic	Documentation	Important contents
System description	System manual: S7-1500 Automation System (https://support.industry.siemens.com/cs/ww/en/view/59191792)	• Application planning • Installation • Connecting • Commissioning
Module properties	Power supplies (https://support.industry.siemens.com/cs/ww/en/ps/13721/man) manual	• Connecting • Parameter assignment/ addressing • Interrupts, error messages, diagnostics and system alarms • Technical specifications • Dimension drawing
	Signal modules (https://support.industry.siemens.com/cs/ww/en/ps/13743/man) manual	
System diagnostics	System diagnostics (https://support.industry.siemens.com/cs/ww/en/view/59192926) function manual	• Overview • Diagnostics evaluation for hardware/software
Communication	Communication (https://support.industry.siemens.com/cs/ww/en/view/59192925) function manual	• Overview
	Function manual PROFINET with STEP 7 (https://support.industry.siemens.com/cs/ww/en/view/49948856)	• PROFINET basics • PROFINET functions • PROFINET diagnostics
	Function manual PROFIBUS with STEP 7 (https://support.industry.siemens.com/cs/ww/en/view/59193579)	• PROFIBUS basics • PROFIBUS functions • PROFIBUS diagnostics
	Web server (https://support.industry.siemens.com/cs/ww/en/view/59193560) function manual	• Function • Operation
Interference-free installation of control systems	Designing interference-free controllers (https://support.industry.siemens.com/cs/ww/en/view/59193566) function manual	• Basics • Electromagnetic compatibility • Lightning protection • Housing selection

Topic	Documentation	Important contents
Memory concept	Structure and Use of the CPU Memory (https://support.industry.siemens.com/cs/ww/en/view/59193101) function manual	• Design • Principle of operation • Use
Cycle and re- sponse times	Function manual: Cycle and Response Times (https://support.industry.siemens.com/cs/ww/en/view/59193566)	• Basics • Calculations
Analog value pro- cessing	Function manual: Analog value processing (https://support.industry.siemens.com/cs/ww/en/view/67989094)	• Wiring options • Tables of measured values

SIMATIC manuals

All current manuals for SIMATIC products are available for download free of charge from the Internet:

Link: (<https://support.industry.siemens.com/cs/ww/en>)

Device defective

If a fault develops, please send the device to your Siemens representative for repair. Repairs on-site are not possible.

Decommissioning

Shut down the device properly to prevent unauthorized persons from accessing confidential data in the device memory.

Recycling and disposal



The products are low in pollutants, can be recycled and meet the requirements of the WEEE directive 2012/19/EU for the disposal of electrical and electronic equipment.

Do not dispose of the products at public disposal sites.

For environmentally friendly recycling and the disposal of your old device contact a certified disposal company for electronic scrap or your Siemens contact (Product return (<https://support.industry.siemens.com/cs/ww/en/view/109479891>)).

Note the different national regulations.

SIMATIC NET glossary

The SIMATIC NET glossary describes terms that may be used in this document.

You will find the SIMATIC NET glossary in the Siemens Industry Online Support at the following address:

Link: (<https://support.industry.siemens.com/cs/ww/en/view/50305045>)

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Application and functions

1.1 Application

Application

The communications processor CP 1542-5 is intended for operation in an S7-1500 automation system. The CP 1542-5 allows the connection of an S7-1500 station to a PROFIBUS fieldbus system.

Supported communications services

In its current configuration, the CP 1542-5 supports the following communications services:

- **PROFIBUS DP master (class 1)**
 - DP master according to EN 50170, DP-V1
 - DP master mode for DP slaves according to PROFIBUS DP-V0 and DP-V1
 - DP master mode for Siemens DP slaves
 - Direct data exchange (DP slave to DP slave)
As a DP master, the CP 1542-5 is capable of enabling direct data exchange for its assigned DP slaves.
 - SYNC/FREEZE
The outputs or inputs can be synchronized by the user program using system function DPSYNC_FR.

- **PROFIBUS DP slave**
DP slave according to EN 50170, DP-V0 / DP-V1

Note

DP master or DP slave

The CP only supports operation either as DP master or DP slave.

- **S7 communication**
 - PG communication for uploading / downloading of S7 configuration, diagnostics and routing
 - Operator control and monitoring functions (HMI communication)
 - Data exchange over S7 connections

The services of the CP 1542-5 listed above can be used independently at the same time.

1.2 PUT/GET: Restrictions in the CPU

Communications services without connections

The CPU can be a server for a series of communications services without connections being configured for the CPU. Other communications partners can access CPU data. This means that it is no longer possible for the local CPU to control communication with the clients.

You need to grant permission for these communications services at the following location in the CPU configuration:

- Parameter group "Protection & Security > Connection mechanisms"
Enable the option "Permit access with PUT/GET communication from remote partner".

A prerequisite for enabling this option is enabling an access option in the "Access control > Access level" parameter group. Set the option "Read access" or "Full access".

Note: This setting is connected with security restrictions.

When the "No access (complete protection)" option is enabled, PUT/GET communication cannot be enabled.

"Permit access with PUT/GET communication from remote partner"

Parameter group "Protection & Security > Connection mechanisms" > option "Permit access with PUT/GET communication from remote partner"

The activation of communication services described below applies to the use of the communications module together with a CPU V2.x to V3.0.

- Option enabled
 - Access to CPU data from the client side via the communications module using PUT/GET is possible.
- Option disabled
 - Access to CPU data from the client side via the communications module using PUT/GET is not possible.
 - FTP access via the communications module is possible.

Read and write access to CPU data is only possible with communication connections that require configuration or programming both for the local CPU and for the communications partner.

Connections for which the local CPU is only a server (no configuration/programming of communication with the partner) are not possible.

Reduced amount of data with PUT/GET via one-sided connections to passive slaves

In a one-sided S7 connection to a passive slave (CP/CM), the frames of a master class 2 connection have a reduced amount of data as compared to frames to active slaves.

The maximum amount of data of a frame with passive slaves is 244 bytes and is different for both program blocks:

- PUT = 212 bytes payload + 32 bytes header
- GET = 222 bytes payload + 22 bytes header

Configuring PUT/GET

For information on the configuration, refer to section Configuring connections to passive slaves (e.g. for PUT/GET) (Page 35).

1.3 Further functions

Enabling /disabling DP slave - in the standard system

DP slaves can be activated and deactivated by the user program using system function D_ACT_DP.

Diagnostics requests

As a DP master (class 1), the CP 1542-5 supports diagnostics requests of a DP master (class 2).

Getting the bus topology in a DP master system

The CP 1542-5 operating as DP master supports the measurement of the PROFIBUS bus topology in a DP master system using a diagnostics repeater (DP slave).

System function DP_TOPOL in the user program can instruct diagnostics repeaters to measure the PROFIBUS BUS topology in a DP master system.

Time-of-day synchronization - time master or time slave

The CP 1542-5 can be enabled for time-of-day synchronization. As an alternative, the CP can be configured as time master or time slave on PROFIBUS.

- Time master: The CP is synchronized using the time of day in the S7-1500 station and outputs the time of day on PROFIBUS. The output interval can be set.
- Time slave: The CP receives time-of-day frames on PROFIBUS and outputs the time within the S7-1500 station. The output interval within the S7-1500 station is set permanently to 10 seconds.

Note

Recommendation for setting the time

It is advisable to set the time-of-day master so that time-of-day frames are sent at intervals of approximately 10 seconds. This achieves as small a deviation as possible between the internal time and the absolute time.

Web diagnostics

With the aid of Web diagnostics of the CPU, you read the diagnostics data from an S7 station via the Web browser on the PG/PC.

In terms of the CP, the Web pages provide the following information:

- Module and status information
- Special information on the DP master system (status of the DP slaves)

1.4 Configuration limits and performance data

1.4.1 Configuration limits

When using the CP type described here, the following limits apply:

- The number of CPs that can be operated in a rack depends on the CPU type being used.
Note the information in the documentation of the CPU, see Preface (Page 3)

Note

Measured values of transfer or reaction times

Measurements of transfer and reaction times in Ethernet, PROFIBUS and PROFINET networks for a series of configurations can be found on the Internet (<https://support.industry.siemens.com/cs/ww/en/view/25209605>)

1.4.2 Transmission speeds supported

The transmission speed is set with the SIMATIC STEP 7 configuration software.

Note

Remember the cable length

The permitted cable length must be kept to depending on the transmission speed.

Refer to the information in the section Technical specifications (Page 51)

1.4.3 Characteristic data of the DP interface

General characteristic data

No special program blocks are required for DP mode. The interfacing to the distributed I/O is by direct I/O access or using program blocks (SFCs/SFBs) of the CPU.

Table 1-1 General characteristic data of DP mode

Characteristic	Explanation / values
Number of operable DP slaves	32
Max. size of the input area of all DP slaves	2 Kbytes
Max. size of the output area of all DP slaves	2 Kbytes
Maximum size of the input area per DP slave	244 bytes
Maximum size of the output area per DP slave	244 bytes
Max. size of the consistent area for a module	128 bytes

Diagnostics requests

As a DP master (class 1), the CP 1542-5 supports diagnostics requests of a DP master (class 2).

DP startup behavior

Note

Increasing the default value for startup parameters - configuration of the CPU

In some situations, it is necessary to increase the default value for the startup parameter "Parameter assignment time for the distributed I/O" in the configuration of the CPU:

- When there is a large number of modules (DP slaves) configured that can be assigned parameters.
- When a high value is configured for the constant bus cycle time in the network properties of the PROFIBUS DP line.

1.4.4 Characteristics of S7 communication

General characteristic data

The following information is important when operating S7 connections:

Table 1-2 General characteristics of S7 connections

Characteristic	Explanation / values
Number of S7 connections that can be operated via PROFIBUS	Operable in total: Max. 16 The value depends on the S71500 CPU being used.

1.5 Requirements for use

1.5.1 Usable CPUs

The following CPUs can be used as local CPU of the communications module:

- Compatible CPUs
All CPUs that can be configured in STEP 7 as of firmware version V2.1 from the following series:
 - Standard CPUs (CPU 15xx)
 - Compact CPUs (CPU 15xxC)
 - Technology CPUs (CPU 15xxT / TF)
 - Fail-safe CPUs (CPU 15xxF)

The following CPUs cannot be used:

- Non-compatible CPUs
 - H-CPU (CPU 1517H / HF)
 - R-CPU (CPU 151xR)

Note

Keep the firmware version of the CPUs and communications modules up to date

To avoid possible problems when using newer CPUs together with older communications modules, you should keep the firmware of both your communications modules and your CPUs up to date.

Check regularly for security updates for the firmware and use them.

Information regarding product news and new firmware versions of the communications module is available at the following address:

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15672/dl>)

1.5.2 Project engineering

Configuration

To configure the CP, the following configuration tool is required:

STEP 7 version	CP (6GK7542-5FX00-0XE0)	CP (6GK7542-5FX10-0XE0)
STEP 7 Professional V16	The functionality of the CP with firmware version V2.0.4 can be configured.	The CP is configurable, but with the functionality of the CP (6GK7542-5FX00-0XE0) with firmware version V2.0.4.
STEP 7 Professional V17	The functionality of the CP with firmware version V2.0.5 can be configured.	The CP is configurable, but with the functionality of the CP (6GK7542-5FX00-0XE0) with firmware version V2.0.5.
STEP 7 Professional V18	The functionality of the CP with firmware version V2.0.5 can be configured.	The functionality of the CP with firmware version V3.0 can be configured.

Downloading the configuration data

When the configuration data is downloaded to the CPU, the CP is supplied with the relevant configuration data. The configuration data can be downloaded to the CPU via PROFIBUS or any PROFINET interface of the S7-1500 station.

1.5.3 Program blocks

For the use of the program blocks for the CP, STEP 7 in the following version is required:

STEP 7 version	CP (6GK7542-5FX00-0XE0)	CP (6GK7542-5FX10-0XE0)
STEP 7 Professional V17	Using the program blocks for the CP with firmware version V2.0.5	Using the program blocks for the CP (6GK7542-5FX00-0XE0) with firmware version V2.0.5
STEP 7 Professional V18	Using the program blocks for the CP with firmware version V2.0.5	Using the program blocks for the CP with firmware version V3.0

LEDs, connections, QR code

2.1 LEDs

The status and error displays of the CP 1542-5 are described below.

You can find additional information on "Interrupts" in the STEP 7 online help.

You can find additional information on "Diagnostics" and "System alarms" in the System diagnostics (<https://support.industry.siemens.com/cs/ww/en/view/59192926>) function manual.

LED display

The following figure shows the LEDs of the CP 1542-5 .



- ① RUN/STOP LED
- ② ERROR LED
- ③ MAINT LED

Figure 2-1 LED display of the CP 1542-5 (without front cover)

2.1 LEDs

Meaning of the LED displays

The CP 1542-5 has 3 LEDs to display the current operating status and the diagnostics status and these have the following meanings:

- RUN/STOP LED (one-color LED: green)
- ERROR LED (one-color LED: red)
- MAINT LED (one-color LED: yellow)

The following table shows the meaning of the various combinations of colors of the RUN/STOP, ERROR and MAINT LEDs.

Table 2-1 Meaning of the LEDs

RUN/STOP LED	ERROR LED	MAINT LED	Meaning
 LED off	 LED off	 LED off	No supply voltage on the CP or supply voltage too low.
 LED lit green	 LED lit red	 LED lit yellow	LED test during startup
 LED lit green	 LED lit red	 LED off	Startup (booting the CP)
 LED lit green	 LED off	 LED off	CP is in RUN mode.
			No disruptions
 LED flashing green	 LED off	 LED off	No CP configuration exists
			Loading firmware
 LED lit green	 LED flashing red	 LED off	A diagnostics event has occurred.
 LED lit green	 LED off	 LED lit yellow	Maintenance, maintenance is demanded.
 LED lit green	 LED off	 LED flashing yellow	Maintenance is required.
			Downloading the user program
 LED flashing green	 LED flashing red	 LED flashing yellow	Module fault

Diagnostics with LEDs

Diagnostics using the LEDs is the first means of narrowing down errors/faults. To narrow the error/fault down even further, evaluate the message on the display of the S7-1500 CPU. If errors/faults occur, you can also identify them using the Web server or by evaluating the diagnostics buffer of the CPU. The diagnostics buffer of the CPU contains plain language information about the error/fault that has occurred. The diagnostics buffer is accessible via STEP 7, the display and the Web server.

2.2 PROFIBUS interface

9-pin D-sub female connector (PROFIBUS)

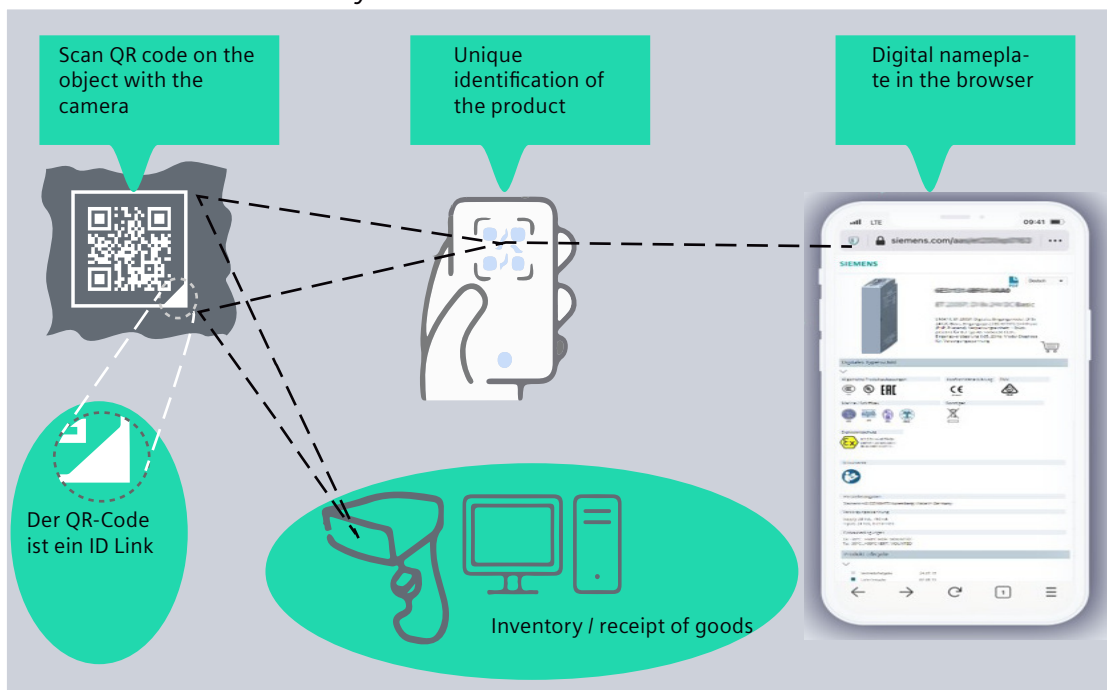
The PROFIBUS connector is located behind the cover of the housing. The interface is a 9-pin D-sub female connector operating according to the RS-485 standard.

You also have the option of connecting to optical PROFIBUS networks via an Optical Bus Terminal OBT or an Optical Link Module OLM.

You will find the pin assignment of the D-sub socket in section PROFIBUS interface terminal assignment (Page 53).

2.3 QR code

Identification link - Easy to use



QR code

The QR code on the front of this product and on the packaging uniquely identifies the product.

The QR code is an Identification Link in accordance with IEC 61406-1.

When you scan the QR code, e.g. with a smartphone, you directly open the Siemens web page of the digital nameplate. The web page of the digital nameplate is structured in line with responsive web design.

For your plant documentation, you have the option to connect the link with your data.

Digital nameplate

The digital nameplate is:

- A contribution by Siemens towards reducing the CO₂ footprint and conserving resources.
- An efficient way to access the product information available on the Internet. This information is kept up to date over the entire product life.

You can retrieve the following information about the product on the web page of the digital nameplate:

- Product identification
- User documentation
- Technical specifications
- Certificates, Declaration of Conformity, manufacturer information
- Current software/firmware versions
- Product news and more information

Installation, wiring, commissioning, operation, disassembly

3

3.1 Important notes on using the device

Safety notices on the use of the device

Note the following safety notices when setting up and operating the device and during all associated work such as installation, connecting up or replacing the device.

3.1.1 Notes on use in hazardous areas

 WARNING
The device may only be operated in an environment with pollution degree 1 or 2 as described in EN/IEC 60664-1, GB/T 16935.1.

 WARNING
EXPLOSION HAZARD
Do not connect or disconnect cables to or from the device when a flammable or combustible atmosphere is present.

3.1.2 Notes on use in hazardous areas according to ATEX / UKEX / IECEx / CCC-Ex

 WARNING
Requirements for the cabinet
To comply with EU Directive 2014/34 EU (ATEX 114), UK Regulation SI 2016/1107 or the conditions of IECEx or CCC-Ex, the housing or cabinet must meet the requirements of at least IP54 (according to EN/IEC 60529, GB/T 4208) in compliance with EN IEC/IEC 60079-7, GB 3836.8.

3.1 Important notes on using the device

 WARNING

Suitable cables at high ambient temperatures in hazardous area

At an ambient temperature of $\geq 60\text{ }^{\circ}\text{C}$, use heat-resistant cables designed for an ambient temperature at least $20\text{ }^{\circ}\text{C}$ higher. The cable entries used on the housing must comply with the IP degree of protection required by EN IEC / IEC 60079-0, GB/T 3836.1.

 WARNING

Transient overvoltages

Take measures to prevent transient surges of more than 40% of the rated voltage. Under no circumstances may transient surges exceed 119 V. This is the case if you only operate devices with SELV (safety extra low voltage).

3.1.3 Notes on use in hazardous areas according to UL HazLoc and FM

 WARNING

The IP degree of protection marking on the nameplate is not associated with FM approval.

This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only.

This equipment is suitable for use in Class I, Zone 2, Group IIC or non-hazardous locations only.

 WARNING

When used in hazardous environments corresponding to Class I, Division 2 or Class I, Zone 2, the device must be installed in a cabinet or a suitable enclosure.

 WARNING

EXPLOSION HAZARD

The equipment is intended to be installed within an ultimate enclosure. The inner service temperature of the enclosure corresponds to the ambient temperature of the module. Use installation wiring connections with admitted maximum operating temperature of at least $30\text{ }^{\circ}\text{C}$ higher than maximum ambient temperature.

 WARNING

If the device is installed in a cabinet, the inner temperature of the cabinet corresponds to the ambient temperature of the device.

! WARNING

Wall mounting outside of the control cabinet or housing does not fulfill the requirements of the FM approval.

! WARNING

Do not remove or replace while circuit is live when a flammable or combustible atmosphere is present.

! WARNING

EXPLOSION HAZARD

Replacing components may impair suitability for Class 1, Division 2 or Zone 2.

3.2 Installation, removal and repairs in hazardous areas

! WARNING

Impermissible accessories and spare parts

Risk of explosion in hazardous areas

- Only use original accessories and original spare parts.
- Observe all relevant installation and safety instructions described in the manuals for the device or supplied with the accessories or spare parts.

! WARNING

Unsuitable cables or connectors

Risk of explosion in hazardous areas

- Only use connectors that meet the requirements of the relevant type of protection.
- If necessary, tighten the connector screw connections, device fastening screws, grounding screws, etc. according to the specified torques.
- Close unused cable openings for electrical connections.
- Check the cables for a tight fit after installation.

 WARNING

Improper installation of shielded cables

There is a risk of explosion due to equalizing currents between the hazardous area and the non-hazardous area.

- Ground shielded cables that cross hazardous areas at one end only.
- Lay a potential equalization conductor when grounding at both ends.

 WARNING

Lack of equipotential bonding

If there is no equipotential bonding in hazardous areas, there is a risk of explosion due to equalizing current or ignition sparks.

- Ensure that equipotential bonding is available for the device.

 WARNING

Unprotected cable ends

There is a risk of explosion due to unprotected cable ends in hazardous areas.

- Protect unused cable ends according to IEC/EN 60079-14.

 WARNING

Insufficient isolation of intrinsically safe and non-intrinsically safe circuits

Risk of explosion in hazardous areas

- When connecting intrinsically safe and non-intrinsically safe circuits, ensure that the galvanic isolation is performed properly in compliance with local regulations (e.g. IEC 60079-14).
- Observe the device approvals applicable for your country.

 WARNING

Unauthorized repair of devices in explosion-proof design

Risk of explosion in hazardous areas

- Repair work may only be performed by personnel authorized by Siemens.
- For function checks, maintenance and servicing work, you need to observe the requirements on checking and maintaining plants in hazardous areas according to the standards EN / IEC 60079-17.

3.3 Installation

NOTICE

Improper mounting

Improper mounting may damage the device or impair its operation.

- Before mounting the device, always ensure that there is no visible damage to the device.
- Mount the device using suitable tools. Observe the information in the respective section about mounting.

WARNING

Open equipment

The devices are "open equipment" acc. to the standard IEC 61010-2-201 or UL 61010-2-201 / CSA C22.2 No. 61010-2-201. To fulfill requirements for safe operation with regard to mechanical stability, flame retardation, stability, and protection against contact, the following alternative types of installation are specified:

- Installation in a suitable cabinet.
- Installation in a suitable enclosure.
- Installation in a suitably equipped, enclosed control room.

Installation

NOTICE

Install and remove the device only when the power is off

Turn off the power supply to the station before you install or remove the module. Installing and removing modules with the power supply on can lead to damage to the modules and to loss of data.

3.3 Installation

NOTICE

Installation location - Dependency of the temperature range

Note the dependency of the permitted temperature range on the installation location:

- Horizontal installation of the rack (DIN rail) means a vertical position of the modules.
- Vertical installation of the rack (DIN rail) means a horizontal position of the modules.

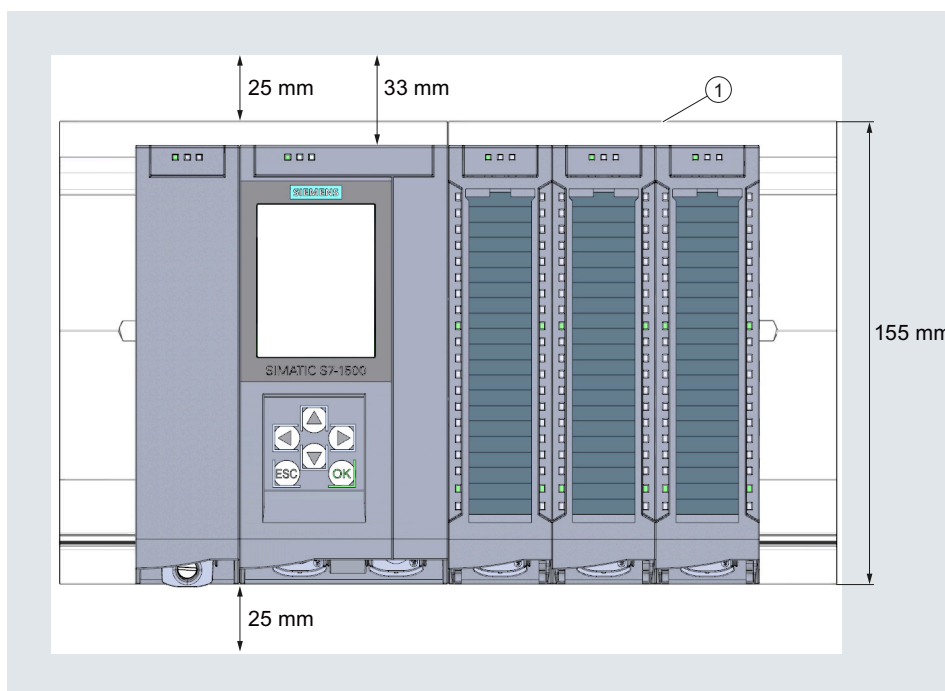
You will find the permitted temperature ranges in the section Technical specifications (Page 51) or AUTOHOTPOT.

Minimum clearances

Install the module in such a way that its upper and lower ventilation slits are not covered, allowing adequate ventilation as protection from overheating.

Keep to the following minimum clearances for the circulation of air when the rack is installed horizontally:

- Above the module: At least 33 mm
- Below the module: At least 25 mm



Installation of the rack	Installation position of the modules
Horizontal installation of the rack	
Vertical installation of the rack	

! WARNING

Read the system manual "S7-1500 Automation System"

Prior to mounting, connection and commissioning, read the relevant sections in the system manual "S7-1500 Automation System", for bibliographical references see Preface (Page 3) > Documentation guide.

Make sure that the power supply is turned off when installing/uninstalling the devices.

Configuration

Commissioning the CP fully is only possible if the STEP 7 project data is complete.

Procedure for installation and commissioning

Step	Execution	Notes and explanations
1	When installing and connecting up, keep to the procedures described for installing I/O modules in the system manual "S7-1500 Automation System".	
2	Connect the CP to PROFIBUS via the RS-485 socket.	Underside of the CP
3	Turn on the power supply.	

3.4 Connecting and commissioning

Step	Execution	Notes and explanations
4	Close the front covers of the module and keep them closed during operation.	
5	The remaining steps in commissioning involve downloading the STEP 7 project data.	The STEP 7 project data of the CP is transferred when you download to the station. To load the station, connect the engineering station on which the project data is located to the Ethernet/MPI interface of the CPU. You will find more detailed information on loading in the following sections of the STEP 7 online help: • Downloading project data • Using online and diagnostics functions

3.4 Connecting and commissioning

WARNING

Open equipment

The devices are "open equipment" acc. to the standard IEC 61010-2-201 or UL 61010-2-201 / CSA C22.2 No. 61010-2-201. To fulfill requirements for safe operation with regard to mechanical stability, flame retardation, stability, and protection against contact, the following alternative types of installation are specified:

- Installation in a suitable cabinet.
- Installation in a suitable enclosure.
- Installation in a suitably equipped, enclosed control room.

WARNING

Power supply

The device is designed for operation with a directly connectable safety extra low voltage (SELV) from a limited power source (LPS).

The power supply therefore needs to meet at least one of the following conditions:

- Only safety extra low voltage (SELV) with limited power source (LPS) complying with IEC 60950-1 / EN 60950-1 / VDE 0805-1 or IEC 62368-1 / EN 62368-1 / VDE 62368-1 may be connected to the power supply terminals.

If the equipment is connected to a redundant power supply (two separate power supplies), both must meet these requirements.

Connector



WARNING

Read the system manual "S7-1500 Automation System"

Prior to installation, connecting up and commissioning, read the relevant sections in the system manual "S7-1500 Automation System", see Preface (Page 3), Documentation guide.

Power supply off

Make sure that the power supply is turned off when connecting the devices.

Procedure

1. Connect the module to PROFIBUS via the RS485 interface.
For the terminal assignment of the interface, see section PROFIBUS interface terminal assignment (Page 53).
2. Switch on the power supply of the S7 station.
3. Close the front covers of the modules.

During operation, keep the hinged front panel closed.

PROFIBUS connection

Only use 90° connectors for the PROFIBUS connection. With other connector types, you cannot close the front cover of the device.

3.5 Mode of the CPU - effect on the CP

You can change the mode of the CPU between RUN and STOP using the STEP 7 configuration software.

Depending on the operating status of the CPU, the CP behaves as described below.

Changing the CPU from STOP to RUN:

The CP loads configured and/or downloaded data into the work memory and then changes to RUN mode.

Changing the CPU from RUN to STOP:

The reaction is as follows in STOP:

- DP master mode: Change to the CLEAR mode.
- DP slave mode: Input data is sent to the DP master with the value "0" and a DP diagnostics alarm is sent.
- The following functions remain enabled:
 - Configuration and diagnostics of the CP (relevant system connections for configuration, diagnostics, and PG channel routing are retained);
 - S7 routing function
 - Time-of-day synchronization

3.6 Disassembly



WARNING

Improper disassembly

Improper disassembly may result in a risk of explosion in hazardous areas.

For proper disassembly, observe the following:

- Before starting work, ensure that the electricity is switched off.
- Secure remaining connections so that no damage can occur as a result of disassembly if the system is accidentally started up.

Configuration, program blocks

4.1 Configuration in STEP 7

Configuration in STEP 7

You configure the CP in SIMATIC STEP 7. You will find the required version in the section Project engineering (Page 19).

You will find complete information on configuration in the STEP 7 information system.

Loading and saving the configuration data

When you load the station, the project data of the station including the configuration data of the CP is stored on the CPU. You will find information on loading the station in the STEP 7 information system.

4.2 Configuring in third-party systems

Configuring in third-party systems via GSD file

To allow configuration as DP slave in third-party systems, a GSD file is available. You will find this on the following page of Siemens Industry Online Support:

Link: (<https://support.industry.siemens.com/cs/ww/en/view/113652>)

The protocol variant DP-V1 or DP-V0 is decided during operation by the setting of the connected DP master.

4.3 Configuring connections to passive slaves (e.g. for PUT/GET)

Requirements and restrictions in communications services without connections

You will find detailed information about the requirements and restrictions in the section Link: (<https://support.industry.siemens.com/cs/ww/en/view/82212115>).

You will also find explanations on the "Permit access with PUT/GET communication from remote partner" parameter there.

One-sided S7 connections to passive slaves

To configure one-sided S7 connections to passive slaves, including via PROFIBUS, follow these steps:

1. Create a station with one CPU and one PROFIBUS CP.
2. At the PROFIBUS interface of the CP to be connected to the passive slave, create a PROFIBUS network that is networked with the interface.
3. Switch from "Networking" to "Connections" in the network view at the top left in the Inspector window and select "S7 connections".
4. Select the CPU and open the "Add new connection" shortcut menu.
5. In the open "Add new connection" window, select the "S7 connection" entry from the "Type" drop-down list (top right), the CPU in the left-hand column "Unspecified", and then the PROFIBUS interface of the CP in this station in the right-hand column "Local interface ...".
6. At the bottom of the window, click "Add" and then "Close".
The new connection appears with its parameters at the bottom in the "Properties" area in the network view.
The connection has the station ("Local") and the "Unspecified" interface for the "Partner".
7. In the "General" tab, click the partner address (PROFIBUS address) of the passive slave.
8. Now select the TSAP of the partner in the "Address details" tab of the connection properties under "Connection resource".

Further documentation

You can find additional information on unspecified connections and PUT-GET communication in the Siemens Industry Customer Support FAQ in the documentation specified in the "Download" section:

PUT/GET: Restrictions in the CPU (Page 14)

4.4 Program blocks for communication and distributed I/O

Program blocks (instructions) for communications services

For communications services, there are preprogrammed program blocks (instructions) available as the interface in your STEP 7 user program.

Table 4-1 Instructions for PROFIBUS DP

System blocks and system functions	Meaning when used with CM
DPSYC_FR	DP slaves synchronize / freeze inputs (SYNC/FREEZE instruction)
DPNRM_DG	Reading the diagnostics data of a DP slave
DP_TOPO	Detecting the topology for the DP master system
WRREC	Writing the data record of a DP slave
RDREC	Reading the data record of a DP slave

System blocks and system functions	Meaning when used with CM
GETIO	Reading the process image of a DP standard slave
SETIO	Transferring the process image of a DP standard slave
GETIO_PART	Reading the process image partition of a DP standard slave
SETIO_PART	Transferring the process image partition of a DP standard slave
D_ACT_DP	Disable / enable DP slaves
DPRD_DAT	Reading consistent data of a DP standard slave (user data)
DPWR_DAT	Writing consistent data of a DP standard slave
RALRM	Event-driven reading of interrupt information (diagnostics, pull/plug, hardware interrupt) and DPV1-specific interrupts (update, status, vendor-specific interrupt)

Refer to the documentation of the program blocks in the information system of STEP 7.

Calling program blocks (instructions) for distributed I/O

Several calls are necessary for the instructions of the distributed I/O.

The time required to process the job depends on load, round-trip time and transmission speed. If these instructions are called in a loop within one cycle, the cycle time could be exceeded.

Exception: Only one call is required for RALRM "receive alarm".

Program blocks for DPV1 according to the PNO standard (PROFIBUS user organization):

- RDREC
"Read data record from a DP slave" corresponds to SFC59 in terms of function
- WRREC
"Write data record to a DP slave" corresponds to SFC58 in terms of function
- RALRM
"Read interrupt information from a DP slave" - call in an interrupt OB

Diagnostics and maintenance

5.1 Diagnostics

5.1.1 Diagnostics options

Diagnostics options

You have the following diagnostics options available for the module:

- The LEDs of the module
For information on the LED displays, refer to the section LEDs (Page 21).
- STEP 7: The "Diagnostics" tab in the Inspector window
Here, you can obtain the following information on the selected module:
 - Entries in the diagnostics buffer of the CPU
 - Information on the online status of the module
- STEP 7: Diagnostics functions in the "Online > Online and diagnostics" menu
Here, you can obtain static information on the selected module:
 - General information on the module
 - Diagnostics status
 - Information on the PROFIBUS interface

You can obtain further information on the diagnostics functions of STEP 7 in the STEP 7 online help.

- DP diagnostics
The DP diagnostics of the CP is described below.
The evaluation of diagnostics data records requested by the DP master and the diagnostics interrupts or diagnostics alarms of the DP slaves is handled in the user program of the DP master station.

5.1.2 DP slave diagnostics

DP-V1 slave: Diagnostics interrupt

The diagnostics data is transferred as a diagnostics interrupt. Diagnostics interrupts must be acknowledged by the DP master.

Supported diagnostics functions

The CP 1542-5 supports the following blocks of DP diagnostics:

- Standard diagnostics (6 bytes)
- Identifier-related diagnostics (2 to 17 bytes), depending on the number of configured transfer areas
- Module status (5 to 35 bytes), depending on the number of configured transfer areas
- If it exists: Diagnostics interrupt (8 bytes)

User program (DP master)

To read out the diagnostics data of the DP slave (DP single diagnostics), use the "DPNRM_DG" instruction on the DP master.

Diagnostics interrupts of DP-V1 slaves are evaluated in the user program of the master using the "RALRM" instruction.

You will find the required parameter assignment for the instructions in the STEP 7 online help.

Below, there is an overview of the structure of the diagnostics data.

Overview of standard diagnostics

Standard diagnostics	
Byte	Meaning
0	Station status 1
1	Station status 2
2	Station status 3
3	Master address
4...5	Vendor ID of the slave

Overview of device-specific diagnostics

The device-specific diagnostics data depends on the protocol variant operating on the DP slave:

- **DP-V1 slave**

Table 5-1 Overview of device-specific diagnostics of the CP with DP-V1 slaves

Device-specific diagnostics		
Byte	Meaning	
0	Header	
1	Variant Interrupt type	Variant Status type
2	Slot number	
3	Variant Interrupt specifier	Variant Status specifier
4...62	Module-specific diagnostics data	

5.1.3 Standard diagnostics

The coding of the standard diagnostics bytes is explained below.

Byte 0: Station status 1

Table 5-2 Structure of station status byte 1

Bit no.	Name	Explanation
7	Master_Lock	The DP slave was assigned parameters by a different DP master. The DP slave can only be read by the configured productive DP master. This bit is set by the DP master when its bus address differs from the configured address.
6	Parameter_Fault	The last received parameter assignment frame was bad or not permitted. The DP slave sets this bit. Solution: Check the parameter settings for illegal parameters.
5	Invalid_Slave_Response	This bit is set by the DP master when no plausible response has been received from the DP slave.
4	Service_Not_Supported	This bit is set by the DP master when the master has requested a function that is not supported by the DP slave. Solution: Change the parameter setting to disable the function on the master.
3	Ext_Diag	This bit is set by the slave. - Bit =1: There is diagnostics data in the slave-specific diagnostics area. The diagnostics data can be evaluated in the user program of the master. - Bit =0: There may be status information in the slave-specific diagnostics area. The status information can be evaluated in the user program of the master.
2	Slave_Config_Check_Fault	The configuration data sent by the DP master is rejected by the DP slave. Cause: Configuration error. Solution: Change configuration.
1	Station_Not_Ready	The DP slave is not ready for productive data exchange. This is a temporary status that cannot be influenced by the DP master.
0	Station_Non_Existent	The DP slave is not reacting on the bus. This bit is set by the DP master 1 (the slave sets this bit permanently to 0). If the bit is set, the diagnostic bits have the state of the last diagnostics alarm or the initial value.

Byte 1: Station status 2

Table 5-3 Structure of station status byte 2

Bit no.	Name	Explanation
7	Deactivated	The DP slave was identified as being not active in the local parameter record and it is not polled cyclically.
6	Reserved	- reserved -
5	Sync_Mode	The DP slave is in SYNC mode. The bit is set by the slave.
4	Freeze_Mode	The DP slave is in FREEZE mode. The bit is set by the slave.
3	Watchdog_On	Watchdog monitoring is active on the DP slave. The bit is set by the slave.

5.1 Diagnostics

Bit no.	Name	Explanation
2	Status_From_Slave	Bit =1: The diagnostics information comes from the DP slave. The bit is set permanently to 1 by the slave.
1	Static_Diag	Static diagnostics If the DP slave sets this bit, the DP master must fetch diagnostics data from the DP slave until the DP slave resets the bit. The DP slave sets this bit, for example when it is not capable of data transfer.
0	Parameter_Request	The DP slave sets this bit when it needs to have new parameters assigned and be reconfigured. If bit 0 and bit 1 are both set, bit 0 has the higher priority.

Byte 2: Station status 3

Table 5-4 Structure of station status byte 3

Bit no.	Name	Explanation
7	Ext_Data_Overflow	If this bit is set, there is more diagnostics information available than indicated in the diagnostics data. This data cannot be displayed.
6...0	Reserved	- reserved -

Byte 3: Master address

The address of the DP master that assigned parameters to this DP slave is entered in the "Master_Add" byte.

If the DP slave did not have parameters assigned to it by any DP master, the DP slave sets the address 255 in this byte.

Bytes 4 and 5: Vendor ID of the slave ("Ident_Number")

The vendor ID ("Ident_Number") for the DP slave type is entered in bytes 4 and 5. This identifier can be used to identify the slave.

The more significant part of the value is in byte 5.

5.1.4 Device-specific diagnostics in DP-V1

There are two variants of device-specific diagnostics with DP-V1 slaves:

- Interrupt type
- Status type

The two variants differ from each other in the coding of byte 1, bit 7 of the device-specific diagnostics data. The difference is component-specific.

Byte 0: Header

The two most significant bits have the value 00. This identifies the "module-specific diagnostics data" block (see bytes 4...62) as a whole.

The remaining six bits indicate the length of the data field including byte 0.

Byte 1: Variant "Interrupt type"

Table 5-5 Structure of byte 1 of the device-specific diagnostics (variant "interrupt type")

Bit no.	Meaning	
7	Value	Meaning
	0	Interrupt
6...0	Alarm_Type	
	0	- reserved -
	1	Diagnostics interrupt
	2	Hardware interrupt
	3	Pull interrupt
	4	Plug interrupt
	5	Status interrupt
	6	Update interrupt
	7...31	- reserved -
	32...126	Vendor-specific
	127	- reserved -

If status interrupts are received in quick succession, older status interrupts may be overwritten by newer interrupts.

Byte 1: Variant "Status type"

Table 5-6 Structure of byte 1 of the device-specific diagnostics (variant "status type")

Bit no.	Meaning	
7	Value	Meaning
	1	Status information
6...0	Status_Type	
	0	- reserved -
	1	Status information
	2	Modul_Status (see also bytes 4...62)
	3...31	- reserved -
	32...126	Vendor-specific
	127	- reserved -

Byte 2: Slot number

Slot number (1...n) of the slave module

0 is the placeholder for the entire device.

Byte 3: Variant "Interrupt specifier"

Table 5-7 Structure of byte 3 of the device-specific diagnostics (variant "interrupt specifier")

Bit no.	Meaning	
7...3	Seq_No	Unique identifier of an interrupt alarm
2	Add_Ack	If this bit is set, the DP-V1 master indicates that this interrupt requires user acknowledgment in the form of a WRITE job.
1...0	Alarm_Specifier	
	0	No further distinction
	1	Interrupt appears, slot disrupted The slot generates an interrupt due to an error.
	2	Interrupt disappears, slot OK The slot generates the interrupt and indicates that it has no further errors.
	3	Interrupt disappears, slot still disrupted The slot generates an interrupt and indicates that it has further errors.

Byte 3: Variant "Status specifier"

Table 5-8 Structure of byte 3 of the device-specific diagnostics (variant "status specifier")

Bit no.	Meaning	
7...2	- reserved -	
1...0	Status_Specifier	
	0	No further distinction
	1	Status appears
	2	Status disappears
	3	- reserved -

Bytes 4...62: Module-specific diagnostics: General coding

This byte contains data with module-specific information that is described in the relevant module documentation. The relevant module is identified by the slot (byte 2).

Bytes 4...62: Module-specific diagnostics with "status type" and "module status"

With the variant "status type" of the device-specific diagnostics of DP-V1 slaves (see byte 1, bit 7) and the setting "Modul_Status" (see byte 1, bits 0...6), there are two status bits here for each slot (= module). Bits not required are set to 0.

Table 5-9 Structure of the bytes for module-specific diagnostics data

Byte	Bit assignment							
Bit	7	6	5	4	3	2	1	0
4	Module status 4		Module status 3		Module status 2		Module status 1	
5	Module status 8		Module status 7		Module status 6		Module status 5	
...	...		...		...		...	
62	Module status 236		Module status 235		Module status 234		Module status 233	

The status bits are coded as follows:

Table 5-10 Meaning of the values of the status bits

Value	Meaning
00	Data valid
01	Data invalid - error (for example short-circuit)
10	Data invalid - wrong module
11	Data invalid - no module plugged in

5.1.5 DP diagnostics frames when the CPU is in STOP

DP diagnostics frames when the CPU is in STOP

All diagnostics frames from DPV0 standard slaves and all DP interrupt frames from DP-S7/DPV1 standard slaves arriving when the CPU is in STOP are forwarded to the CPU. During module startup, the diagnostics frames must then be evaluated by a suitable user program.

5.2 Maintenance



! CAUTION

Hot surfaces

Risk of burns during maintenance work on parts with a surface temperature above 70 °C (158 °F).

- Take appropriate protective measures, for example, wear protective gloves.
- Once maintenance work is complete, restore the touch protection measures.

! WARNING**Cleaning the housing**

- **In hazardous areas**
Only clean the outer parts of the housing with a damp, but not wet, cloth.
 - **In non-hazardous areas**
Only clean the outer parts of the housing with a dry cloth.
- Do not use any liquids or solvents.

! WARNING**Unauthorized repair of devices in explosion-proof design**

Risk of explosion in hazardous areas

- Repair work may only be performed by personnel authorized by Siemens.
- For function checks, maintenance and servicing work, you need to observe the requirements on checking and maintaining plants in hazardous areas according to the standards EN / IEC 60079-17.

5.2.1 Update firmware

New firmware versions of the module

If a new firmware version is available for the communications module, you will find this on the Internet pages of Siemens Industry Online Support:

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15672/dl>)

Firmware files have the file format *.upd. Save the file on your PC.

There are different ways of loading a new firmware file into the module:

- Online functions of STEP 7 via Ethernet
- Loading the firmware file into the CPU from an SD card

Note**SD card only for firmware file**

For the firmware file, you need a SIMATIC SD memory card, for example (article numbers):

- 6AV6671-8XB10-0AX1
- 6AV2181-8XP00-0AX0
- 6AV2181-8AQ10-0AX0

The firmware update card may not contain any other files. An SD card with configuration data cannot be used.

Scenarios

It is not possible to upgrade the CP with article number 6GK7542-5FX00-0XE0 to firmware version V3.

Updating earlier versions:

- **V2.x → V2.y**
It is possible to upgrade from a version V2.x to a higher version V2.y.
- **V1.x → V2.x**
It is possible to upgrade from a version V1.x to a higher version V2.y.
- **V2.x → V1.x**
If you purchase a module with pre-installed firmware version V2.x but wish to operate it with an older firmware V1.x, this is not directly possible.
In this case, contact Siemens Customer Support.

Loading the firmware with the online functions of STEP 7 via Ethernet

Note

Duration of the firmware update

Downloading a new firmware file can take several minutes.

Always wait until the completion of the firmware update can be recognized from the LEDs (see below).

Requirements:

- The CPU of the station is accessible via Ethernet.
- The engineering station and the CPU are located in the same subnet.
- The new firmware file is stored on your engineering station.
- The engineering station is connected to the network.
- The relevant STEP 7 project is open on the engineering station.

Procedure:

1. Select the station that you want to update with a new firmware.
2. Enable the online functions using the "Connect online" icon.
3. In the "Connect online" dialog, select the Ethernet interface in the "Type of PG/PC interface" list box.
4. Select the CPU of the station.
5. Click on "Start search" to search for the module in the network and to specify the connection path.
When the module is found it is displayed in the table.
6. Connect using the "Connect" button.
The "Connect online" wizard guides you through the remaining steps in installation.
7. Select the CPU in the network view and select the "Online & Diagnostics" shortcut menu (right-click).

8. In the navigation panel of the Online & Diagnostics view, select the entry "Functions > Firmware update".
9. Using the "Browse" button (parameter group "Firmware loader") search for the new firmware file in the file system of the engineering station.
10. Start to download the firmware with the "Start update" button when the correct version of the signed firmware is displayed in the "Status" output box.

You will find further information on the online functions in the STEP 7 information system.

Loading the firmware via the SD card

You can find detailed information on using an SD card in the S7-1500 System Manual, see Preface (Page 3), Documentation guide.

Requirements:

- You have copied the new firmware file from your PC to the SD card using a suitable card reader.
- Optional: You have saved a backup file of the currently used firmware file.

Procedure:

1. Set the operating mode switch of the CPU to STOP.
Ensure that no write functions (e.g. online or test functions) are active in the STOP state.
2. Remove the SIMATIC Memory Card with the configuration data from the slot of the CPU.
3. Insert the SD card with the firmware file in the card slot of the CPU.
The firmware update starts shortly after the card has been inserted. The display shows the following: "STOP - FW UPDATE"
If errors occur, appropriate messages are displayed.
After completing the firmware update, the display shows a result page.
A successful firmware update can be recognized by the following LED pattern from the CPU:
 - RUN lights up yellow.
 - MAINT flashing yellow.
For the LED pattern of the module during startup, refer to section LEDs (Page 21).
4. Remove the SD card and insert the SIMATIC Memory Card again.
5. Set the operating mode switch of the CPU to RUN.
The module uses the new firmware during startup.

5.2.2 Module replacement

General procedure

The configuration data of the module is stored on the CPU. This makes it possible to replace this module with a module of the same type (identical article number) without a programming device.

If you want to exchange a module with the article number of the predecessor module for a newer module with the current article number (same module name), the data of the older module is adopted when the newer module starts.

Note**Note the power loss**

When replacing an older module with a new module, note the power loss of the new module, see section Technical specifications (Page 51).

Check whether the power supply of the station is still ensured with the new module.

Technical specifications

6.1 Technical specifications of the CP (6GK7542-5FX00-0XE0)

You will find the product functions in the section Configuration limits and performance data (Page 16).

Refer to the information in the SIMATIC S7-1500 System Manual, see Preface (Page 3) > Documentation guide

In addition to the information in the system description, the following technical specifications apply to the module.

Technical specifications - 6GK7542-5FX00-0XE0	
Product name	SIMATIC CP 1542-5
Article number	6GK7 542-5FX00-0XE0
Connection to PROFIBUS	
• Quantity	1 x PROFIBUS interface
• Design	D-sub socket (RS-485)
• Transmission speed	9.6 kbps, 19.2 kbps, 45.45 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1.5 Mbps, 3 Mbps, 6 Mbps, 12 Mbps
Electrical data	
Power supply	
• Via S7-1500 backplane bus	15 V
Current consumption (typical)	
• From backplane bus	100 mA
Effective power loss (typical)	1.5 W
Overvoltage category according to IEC / EN 60664-1	Category II
Permissible ambient conditions	
Ambient temperature *	During operation with the rack installed horizontally 0 °C ... +60 °C
	During operation with the rack installed vertically 0 °C ... +40 °C
	During storage -40 °C ... +70 °C
	During transportation -40 °C ... +70 °C
Relative humidity	During operation ≤ 95 % at 30 °C, no condensation
Permitted contaminant concentration	Corrosive gas test according to ISA-S71.04 severity level G1, G2, G3
Design, dimensions and weight	
Module format	Compact module S7-1500, single width
Degree of protection	IP20
Weight	270 g

6.2 Technical specifications of the CP (6GK7542-5FX10-0XE0)

Technical specifications - 6GK7542-5FX00-0XE0	
Dimensions (W x H x D)	35 x 147 x 129 mm
Mounting type	Mounting in S7-1500 rack, S7-1500 mounting bar installation

* Also read the information in the Ambient temperature (Page 53) section.

6.2 Technical specifications of the CP (6GK7542-5FX10-0XE0)

You will find the product functions in the section Configuration limits and performance data (Page 16).

Refer to the information in the SIMATIC S7-1500 System Manual, see Preface (Page 3) > Documentation guide

In addition to the information in the system description, the following technical specifications apply to the module.

Technical specifications - 6GK7542-5FX00-0XE0	
Product name	SIMATIC CP 1542-5
Article number	6GK7 542-5FX10-0XE0
Connection to PROFIBUS	
• Quantity	1 x PROFIBUS interface
• Design	D-sub socket (RS485)
• Transmission speed	9.6 kbps, 19.2 kbps, 45.45 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1.5 Mbps, 3 Mbps, 6 Mbps, 12 Mbps
Electrical data	
Power supply	
• Via S7-1500 backplane bus	15 V
Current consumption (typical)	
• From backplane bus	200 mA
Effective power loss (typical)	3 W
Overvoltage category according to IEC / EN 60664-1	Category II
Permissible ambient conditions	
Ambient temperature *	During operation with the rack installed horizontally
	-30 °C ... +60 °C, without condensation or ice
	During operation with the rack installed vertically
	-30 °C ... +40 °C, without condensation or ice
	During storage
	-40 °C ... +70 °C
	During transportation
	-40 °C ... +70 °C
Relative humidity	During operation
	≤ 95 % at 30 °C, no condensation
Permitted contaminant concentration	Corrosive gas test according to ISA-S71.04 severity level G1, G2, G3
Design, dimensions and weight	
Module format	Compact module S7-1500, single width
Degree of protection	IP20
Weight	250 g

Technical specifications - 6GK7542-5FX00-0XE0

Dimensions (W x H x D) 35 x 147 x 129 mm

Mounting type Mounting in S7-1500 rack, S7-1500 mounting bar installation

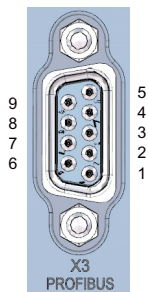
* Also read the information in the Ambient temperature (Page 53) section.

6.3 PROFIBUS interface terminal assignment

PROFIBUS interface

The table below shows the terminal assignment of the PROFIBUS interface. The assignment corresponds to the standard assignment of RS485 interface.

Table 6-1 Terminal assignment PROFIBUS interface

View	Signal name		Designation
	1	-	-
	2	-	-
	3	RxD/TxD-P	Data line B
	4	RTS	Request To Send
	5	M5V2	Data reference potential (from station)
	6	P5V2	Supply plus (from station)
	7	-	-
	8	RxD/TxD-N	Data line A
	9	-	-

Note

No 24 V DC supply voltage

The PROFIBUS interface does not provide a 24 V DC power supply. I/O devices (for example, PC adapter 6ES7972-0CB20-0XA0) are therefore not operational on the interface.

6.4 Ambient temperature

Restrictions of the maximum specified ambient temperature

The maximum permissible temperatures of the module for altitudes up to 2000 m can be found above in the technical specifications.

When using the module at higher altitudes, the decrease in the cooling effect due to convection as a result of the lower air pressure must be taken into account. According to IEC 61010-2-201 CD2 2015, the temperature at altitudes > 2000 m must be reduced.

6.5 Resistance to harmful gases according to ISA-71.04

The following derating factors and maximum ambient temperatures apply.

Table 6-2 Restrictions of the maximum permissible ambient temperature in relation to the installation altitude

Installation altitude (Height above mean sea level)	Derating factor ¹⁾	Maximum ambient temperature when the rack is mounted horizontally
-1000 m to 2000 m	1.00	60 °C
2000 m to 3000 m	0.93	56 °C
3000 m to 4000 m	0.86	52 °C
4000 m to 5000 m	0.78	47 °C

¹⁾ Basic value for applying the derating factor is the maximum permissible ambient temperature in °C for 2000 m.

Note

- The derating factors compensate for the decreasing cooling effect of air at higher altitudes due to lower density.
- Linear interpolation between altitudes is permissible.

6.5 Resistance to harmful gases according to ISA-71.04

The devices listed in the scope of validity meet the following requirements regarding resistance to harmful gases:

Corrosive gases as airborne contaminants Reactive species H ₂ S and SO ₂	ISA-71.04 severity level	G1, G2, G3 RH ≤ 75%, no condensation
	Test according to	IEC 60068-2-42 (SO ₂ 10ppm)
		IEC 60068-2-43 (H ₂ S 1ppm)

Approvals

Approvals issued

Note

Issued approvals on the type plate of the device

The specified approvals - with the exception of the certificates for shipbuilding - have only been obtained when there is a corresponding mark on the product. You can check which of the following approvals have been granted for your product by the markings on the type plate. The approvals for shipbuilding are an exception to this.

Certificates for shipbuilding and national approvals

The device certificates for shipbuilding and special national approvals can be found in Siemens Industry Online Support on the Internet:

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15247/cert>)

Documents on the Internet

You will find the declarations of conformity listed below and certificates of the product on the Internet at the following address:

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15671/cert>)

You can see the current versions of the standards in the relevant certificate, which you will find on the Internet at the address specified above.

Address for declarations of conformity

The EU and the UK declarations of conformity are available to all responsible authorities at:

Siemens Aktiengesellschaft
Digital Industries
P.O. Box 48 48
90026 Nuremberg
Germany

EU declaration of conformity



The device meets the requirements and safety objectives of the following EC directives and it complies with the harmonized European standards (EN) for programmable logic controllers which are published in the official documentation of the European Union.

- **2014/34/EU (ATEX explosion protection directive)**
Directive of the European Parliament and the Council of 26 February 2014 on the approximation of the laws of the member states concerning equipment and protective systems intended for use in potentially explosive atmospheres, official journal of the EU L96, 29/03/2014, pages. 309-356
- **2014/30/EU (EMC)**
EMC directive of the European Parliament and of the Council of 26 February 2014 on the approximation of the laws of the member states relating to electromagnetic compatibility; official journal of the EU L96, 29/03/2014, p. 79-106
- **2011/65/EU (RoHS)**
Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

UK Declaration of Conformity



Importer UK:

Siemens plc
Sir William Siemens House
Princess Road
Manchester
M20 2UR

The product meets the requirements of the following directives:

- UKEX Regulations
SI 2016/1107 The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016, and related amendments.
- EMC Regulations
SI 2016/1091 The Electromagnetic Compatibility Regulations 2016, and related amendments.
- RoHS Regulations
SI 2012/3032 The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012, and related amendments.

ATEX / IECEx / UKEX / CCC-Ex

Observe the information in the "Use of subassemblies/modules in a Zone 2 Hazardous Area" document, which you will find here:

- On the documentation DVD supplied with the product, under:
"All documents" > "Use of subassemblies/modules in a Zone 2 Hazardous Area"
- On the Internet at the following address:
Link: (<https://support.industry.siemens.com/cs/ww/en/view/78381013>)

The conditions must be met for safe usage of the product according to the section Notes on use in hazardous areas according to ATEX / UKEX / IECEx / CCC-Ex (Page 25).

The product meets the explosion protection requirements outlined below.

IECEx

Classification: Ex ec IIC T4 Gc, Certificate no.: IECEx DEK 18.0019X

The product meets the requirements of the standards:

- IEC 60079-0 - Explosive atmospheres - Part 0: Equipment - General requirements
- IEC 60079-7 - Explosive Atmospheres - Part 7: Equipment protection by increased safety 'e'

ATEX

Classification: II 3 G Ex ec IIC T4 Gc, Certificate no.:DEKRA 18ATEX0027 X

The product meets the requirements of the standards:

- EN IEC 60079-0 - Explosive atmospheres - Part 0: Equipment - General requirements
- EN 60079-7 - Explosive Atmospheres - Part 7: Equipment protection by increased safety 'e'

UKEX

Classification: II 3 G Ex ec IIC T4 Gc, Certificate no.:DEKRA 21UKEX0003 X

The product meets the requirements of the standards:

- EN IEC 60079-0 - Explosive atmospheres - Part 0: Equipment - General requirements
- EN 60079-7 - Explosive Atmospheres - Part 7: Equipment protection by increased safety 'e'

Importer UK: Siemens plc (see above)

CCC-Ex

Classification: Ex ec IIC T4 Gc

The product meets the requirements of the following standards:

- GB/T 3836.1
Hazardous areas - Part 0: Equipment - General requirements
- GB/T 3836.3
Explosive atmospheres - Part 3: Equipment protection by increased safety 'e'

EMC

The device meets the requirements of the following guidelines:

- EU directive 2014/30/EU "Electromagnetic Compatibility" (EMC directive)
- EMC Regulations SI 2016/1091 The Electromagnetic Compatibility Regulations 2016, and related amendments.

Applied standards:

- EN 61000-6-2
Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-4
Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

RoHS

The device meets the requirements of the following guidelines:

- EU directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
- SI 2012/3032 The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012, and related amendments.

Applied standard: EN IEC 63000

c(UL)us



Applied standards:

- Underwriters Laboratories, Inc.: UL 61010-1 (Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements)
- IEC/UL 61010-2-201 (Safety requirements for electrical equipment for measurement, control and laboratory use. Particular requirements for control equipment)
- Canadian Standards Association: CSA C22.2 No. 142 (Process Control Equipment)

Report / UL file: E 85972 (NRAG, NRAG7)

cULus Hazardous (Classified) Locations



Underwriters Laboratories, Inc.: cULus IND. CONT. EQ. FOR HAZ. LOC.

Applied standards:

- ANSI ISA 12.12.01
- CSA C22.2 No. 213-M1987

APPROVED for Use in:

- Cl. 1, Div. 2, GP. A, B, C, D T3...T6
- Cl. 1, Zone 2, GP. IIC T3...T6

Ta: Refer to the temperature class on the type plate of the module

Report / UL file: E223122 (NRAG, NRAG7)

Note the conditions for the safe deployment of the product according to the section Notes on use in hazardous areas according to UL HazLoc and FM (Page 26).

Note

For devices with C-PLUG memory: The C-PLUG memory module may only be inserted or removed when the power is off.

CSA



CSA Certification Mark Canadian Standard Association (CSA) nach Standard C 22.2 No. 142:

- Certification Record 063533–C-000

FM



Factory Mutual Approval Standards:

- Class 3600
- Class 3611
- Class 3810
- ANSI/ISA 61010-1

Report Number 3049847

Class I, Division 2, Group A, B, C, D, T4

Class I, Zone 2, Group IIC, T4

You will find the temperature class on the type plate on the module.

For the permissible temperature range of the module, refer to the section Technical specifications (Page 51).

Australia - RCM



The product meets the requirements of the AS/NZS 2064 standards (Class A).

Canada

This class A digital device meets the requirements of the Canadian standard ICES-003.

AVIS CANADIEN

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

MSIP 요구사항 - For Korea only



A급 기기(업무용 방송통신기자재)

이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정 외의 지역에서 사용하는 것을 목적으로 합니다.

Note that in terms of the emission of interference, this device corresponds to limit class A. This device can be used in all areas except for residential environments.

Current approvals

SIMATIC NET products are regularly submitted to the relevant authorities and approval centers for approvals relating to specific markets and applications.

If you require a list of the current approvals for individual devices, consult your Siemens contact or check the Internet pages of Siemens Industry Online Support:

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15671/cert>)

Dimension drawings

All dimensions in the dimension drawings are in millimeters.

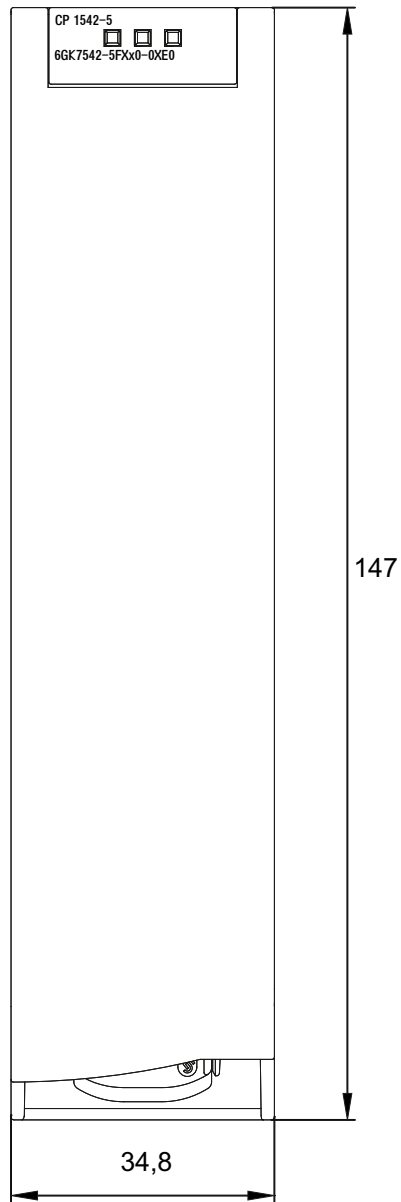


Figure 8-1 Front view

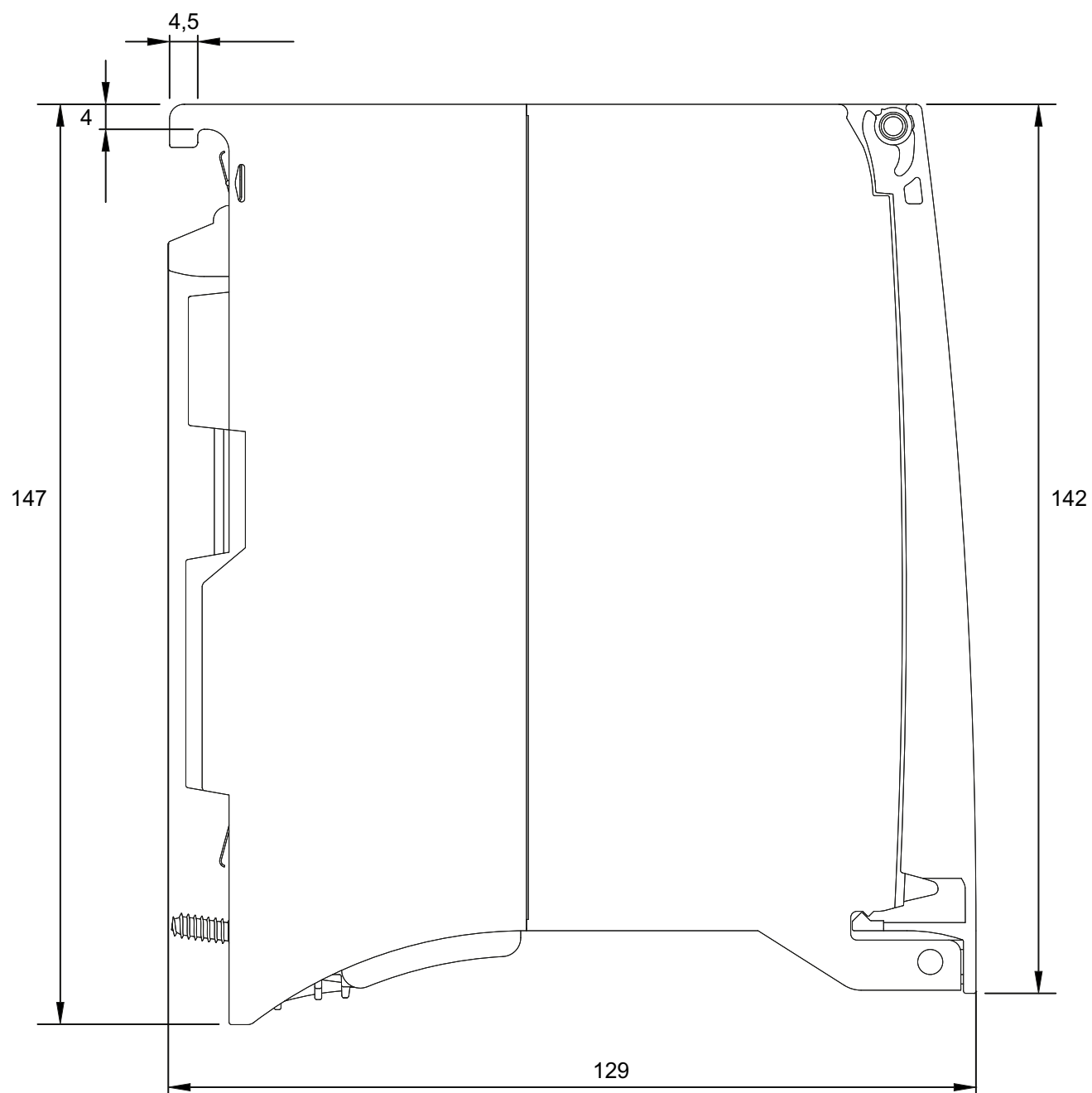


Figure 8-2 Side view

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