

SIEMENS

SIMATIC NET

S7-1200 - PROFIBUS SIMATIC CM 1242-5

Operating Instructions

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Warning notice system

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

 DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.
 WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.
 CAUTION
indicates that minor personal injury can result if proper precautions are not taken.
NOTICE
indicates that property damage can result if proper precautions are not taken.


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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

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

Trademarks

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Disclaimer of Liability

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

Preface

Validity of this manual

This document contains information on the following product:

CM 1242-5

Article number 6GK7 242-5DX30-0XE0

Hardware version 1

Firmware version V1.0.6

Communications module for connection of the SIMATIC S7-1200 to PROFIBUS (DP slave module)



Figure 1 CM 1242-5

At the top right behind the hinged cover of the module housing, you will see the hardware product version printed as a placeholder "X" (for example X 2 3 4). In this case, "X" would be the placeholder for hardware product version 1.

Product name

In this document, the term "CM" is also used instead of the full product name "CM 1242-5".

New in this edition

- New firmware version with the following new functions, among others, compared to the versions V1.0.4 and V1.0.5:
 - Changing the PROFIBUS address from the user program using the data record 8193, see:
Link: (<https://support.industry.siemens.com/cs/ww/en/view/81522429>)
 - Small functional improvements
- New approvals (CCC / UKEX)
- Editorial revision

Replaced manual edition

Edition 02/2014

Current manual edition on the Internet

You can find the current version of this manual on the Internet pages of Siemens Industry Online Support:

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15667/man>)

Purpose of the manual

This manual describes the properties of this module and supports you when installing and commissioning the device.

The necessary configuration steps are described in the form of an overview.

You will find instructions for operation and maintenance and information on the diagnostics options of the device.

Required experience

To install, commission and operate the CM, you require experience in the following areas:

- Automation engineering
- Setting up the SIMATIC S7-1200 system
- SIMATIC STEP 7
- Data transfer with PROFIBUS

Notes on this document

Product names

- **CM / module / device**

In this document, these terms are used instead of the complete product designation CP 1243-1.

Cross-references in the PDF

In this manual, there are often cross-references to other sections. To be able to return to the initial page after jumping to a cross-reference, some PDF readers support the command <Alt>+<left arrow>.

Search

To show all places where a term was found in a list, some PDF readers support the command <Ctrl>+<Shift>+<F>.

Security information

Siemens provides products and solutions with industrial security 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 security 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 security measures that may be implemented, please visit

Link: (<https://www.siemens.com/industrialsecurity>)

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 customers' exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under

Link: (<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.

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.

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.

To do this, restore the factory settings on the device.

You achieve this by resetting the CPU using the online functions of STEP 7.

Recycling and disposal



The product is low in pollutants, can be recycled and meets the requirements of the WEEE directive 2012/19/EU "Waste Electrical and Electronic Equipment".

Do not dispose of the product 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.

Keep to the local regulations.

You will find information on returning the product on the Internet pages of Siemens Industry Online Support:

Link: (<https://support.industry.siemens.com/cs/ww/en/view/109479891>)

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>)

Training, Service & Support

You will find information on Training, Service & Support in the multi-language document "DC_support_99.pdf" on the data medium supplied with the documentation.

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Application and properties

1.1 Connecting the S7-1200 to PROFIBUS

Connecting the S7-1200 to PROFIBUS DP

The S7-1200 can be connected to a PROFIBUS fieldbus system with the following communications modules:

- CM 1242-5
Operates as DP slave
- CM 1243-5
Operates as DP master class 1

If a CM 1242-5 and a CM 1243-5 are installed together, an S7-1200 can perform the following tasks simultaneously:

- Slave of a higher-level DP master system
and
- Master of a lower-level DP master system

1.2 Communications services of the CM

Bus protocol

PROFIBUS communication with the S7-1200 CMs is based on the PROFIBUS DP-V1 protocol. The supported functions are described below.

When configuring in third-party systems with the GSD file, the CM 1242-5 can also be operated as a DP-V0 slave, refer to section Configuration (Page 27).

Possible DP masters for the DP slave CM 1242-5

With the DP slave module CM 1242-5, the S7-1200 can communicate with the following DP-V0/V1 masters:

- SIMATIC S7-1200, S7-300, S7-400, S7-Modular Embedded Controller
- DP master modules and the distributed IO SIMATIC ET200
- SIMATIC PC stations
- SIMATIC NET IE/PB Link PN IO
- Programmable controllers of various vendors

Types of communication with the CM 1242-5 in DP-V1

The following types of communication are available with DP-V1:

- Cyclic communication

The CM supports cyclic communication for the transfer of process data between DP slave and DP master.

Cyclic communication is handled by the operating system of the CPU. No software blocks are required for this. The I/O data is read or written directly from/to the process image of the CPU.

Reading out identification data

With data record 255 (index 65000 to 65003), according to the DP-V1 specification, the identification data I&M 0 can be read out.

You will find information on the data structure in the PROFIBUS Profile Guideline, Part 1, V1.1.1, order number 3.502.

1.3 Performance data

Number of CPs/CMs that can be plugged in per S7-1200 station

You can configure a maximum of three CMs/CPs per station, in other words, 3 DP slave modules (CM 1242-5).

Transmission speeds of the CM 1242-5

As the transmission speed on PROFIBUS, values of 9.6 kbps to 12 Mbps are permitted for the CM.

Characteristic data of the DP interface of the CM 1242-5

Maximum size of the DP data areas of the DP slaves

- Input area per DP slave: Max. 240 bytes
- Output area per DP slave: Max. 240 bytes

1.4 Requirements for operation

Configuration tool

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

STEP 7 Basic as of version V11 SP2 Update 2

CPUs of the S7-1200

Using the full functionalities requires a CPU as of firmware version 3.0.

1.5 Configuration examples for PROFIBUS

Below, you will find examples of configurations in which the CM 1242-5 is used as a DP slave and the CM 1243-5 is used as a DP master.

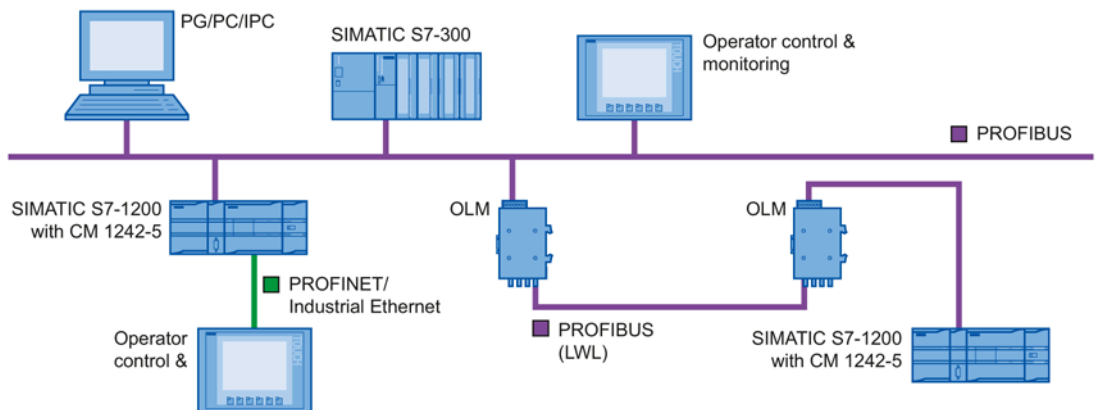


Figure 1-1 Configuration example with a CM 1242-5 as PROFIBUS slave

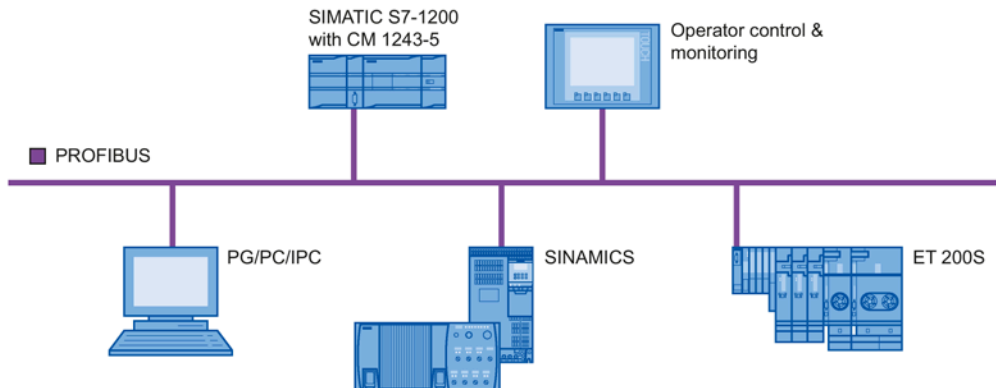


Figure 1-2 Configuration example with a CM 1243-5 as PROFIBUS master

Displays and connectors

2.1 Opening the covers of the housing

Location of the display elements and the electrical connectors

The LEDs for the detailed display of the module statuses are located behind the upper cover of the module housing.

The PROFIBUS connector is located behind the lower cover of the module.

Opening the covers of the housing

Open the upper or lower cover of the housing by pulling it down or up as shown in the illustration. The covers extend beyond the housing to give you a grip.

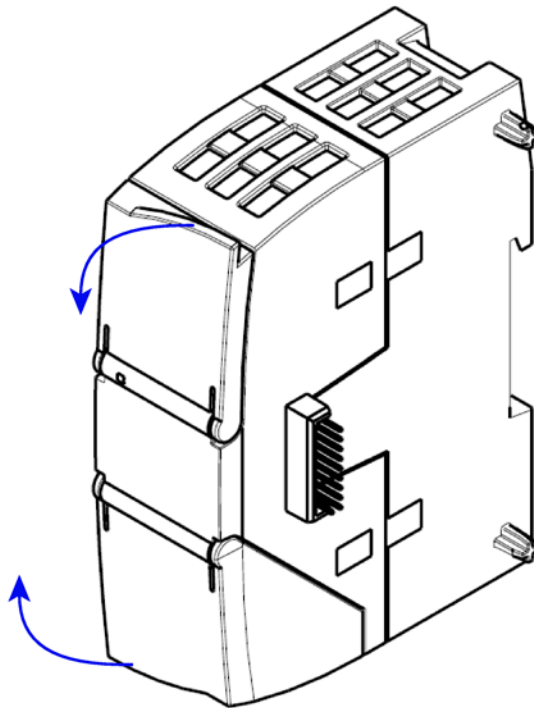


Figure 2-1 Opening the covers of the housing

2.2 LEDs


LEDs of the module

The module has various LEDs for displaying the status:

- LED on the front panel

The "DIAG" LED that is always visible shows the basic statuses of the module.



Table 2-1 LED on the front panel

LED / colors	Name	Meaning
 red / green	DIAG	Display of the basic status of the module

- LEDs below the upper cover of the housing

Open the upper housing cover. The LEDs here provide more detailed information on the module status.

Table 2-2 LEDs below the upper cover of the housing

LED / colors	Name	Meaning
 yellow / green	RUN/STOP	Details on the operational and communications status of the module
 red	ERROR	Group error
	- not used -	-
	- not used -	-

Note





LED colors when the module starts up

When the module starts up, all its LEDs are lit for a short time. Multicolored LEDs display a color mixture. At this point in time, the color of the LEDs is not clear.

Display of the operating and communication status

The LED symbols in the following tables have the following significance:

Table 2-3 Meaning of the LED symbols

Symbol					-
LED status	OFF	ON (steady light)	Flashing, one color	Flashing yellow-green	Not relevant

The LEDs indicate the operating and communications status of the module according to the following scheme:

Table 2- 4 Display of the basic states of the module by the "DIAG" LED

























DIAG (red / green)	Meaning	Comment
	Power OFF	
 green	RUN without errors	
 flashing green	<ul style="list-style-type: none"> Startup STOP without errors No project data Firmware update 	The individual states are signaled by the RUN/STOP and ERROR LEDs (see below).
 flashing red	Problem / error	The individual states are signaled by the RUN/STOP and ERROR LEDs (see below).

Table 2- 5 Display schemes for detailed module statuses

DIAG (red / green)	-	RUN/STOP (yellow / green)	ERROR (red)	Meaning
Detailed status schemes				
 green	-			RUN without errors, Exchange of user data with DP master
 flashing green	-			<ul style="list-style-type: none"> Stopped (STOP) without errors No project data available
 flashing green	-			Starting up (STOP → RUN)
 flashing green	-			Loading firmware (The DIAG and RUN/STOP LEDs flash alternately.)
 flashing red	-		-	If a master-slave connection is established: <ul style="list-style-type: none"> DP master CPU in STOP, "CLEAR" on PROFIBUS or Slave error

DIAG (red / green)	-	RUN/STOP (yellow / green)	ERROR (red)	Meaning
 flashing red				No master-slave connection detected.
 red				PROFIBUS cable not connected or not detected.

In STOP mode, configuring and performing diagnostics on the CM remain possible.

2.3 Electrical connections

Power supply

The CM 1242-5 is supplied with power from the backplane bus. It does not require a separate power supply.

9-pin D-sub female connector (PROFIBUS)

The PROFIBUS connector is located behind the lower cover of the module. 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 Pinout of the D-sub socket (Page 42).

More detailed information on the electrical connections

For technical information on the electrical connections, refer to the section Technical data (Page 41).

Installation, connecting up, commissioning

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 Important notes on using the device

3.1.1 Notices 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
You may only connect or disconnect cables carrying electricity when the power supply is switched off or when the device is in an area without inflammable gas concentrations.

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.

 **WARNING**

Suitable cables at high ambient temperatures in hazardous area

Use heat-resistant cables with an ambient temperature ≥ 60 °C; these cables must be rated for an ambient temperature that is at least 20 °C higher. The cable entries used on the housing must comply with the IP degree of protection required by EN IEC 60079-0 / GB 3836.1.

 **WARNING**

Transient overvoltages

Take measures to prevent transient overvoltages of more than 40% of the rated voltage (or more than 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

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**

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

 **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 °C higher than maximum ambient temperature.

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.

3.3 Installing, connecting and commissioning

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.

 **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.
- The power supply unit for the device must meet NEC Class 2 according to the National Electrical Code (r) (ANSI / NFPA 70).

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

Prior to installation and commissioning

 **WARNING**

Read the system manual "S7-1200 Programmable Controller"

Prior to installation, connecting up and commissioning, read the relevant sections in the system manual "S7-1200 Programmable Controller" (references to documentation in the Appendix).

When installing and connecting up, keep to the procedures described in the system manual "S7-1200 Programmable Controller".

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

Configuration

One requirement for the commissioning of the CP is the completeness of the STEP 7 project data. You should also read the section "Configuration and program blocks (Page 27)".

Dimensions for installation

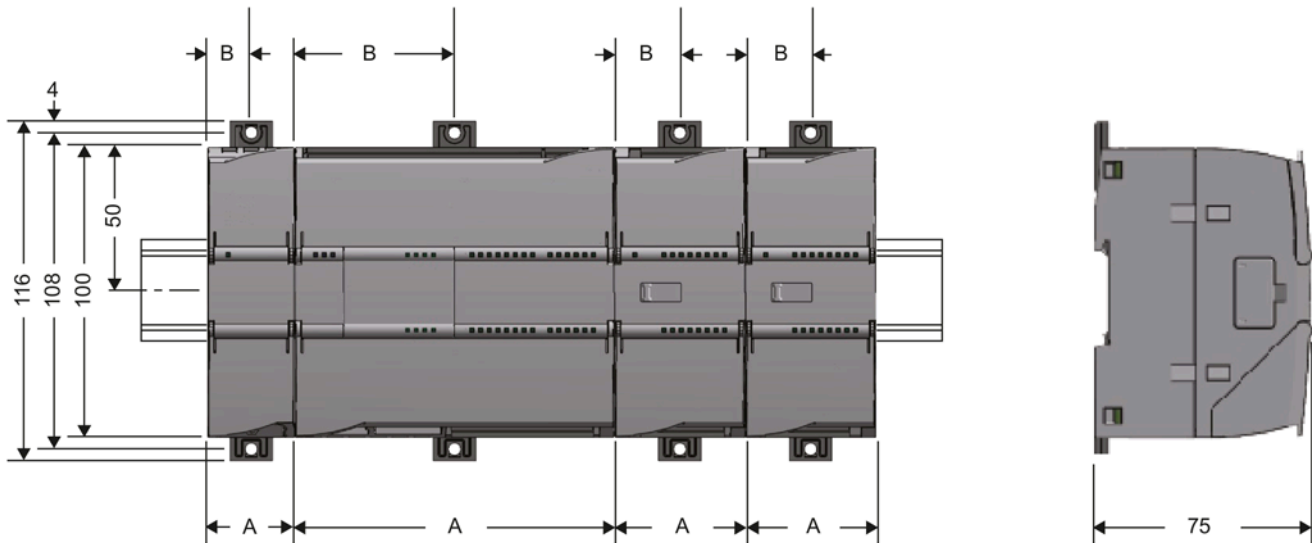


Figure 3-1 Dimensions for installation of the S7-1200

Table 3- 1 Dimensions for installation

S7-1200 devices		Width A	Width B *
CPU	CPU 1211C, CPU 1212C	90 mm	45 mm
	CPU 1214C	110 mm	55 mm
Signal modules	8 or 16 digital I/Os 2, 4 or 8 analog I/Os Thermocouple, 4 or 8 I/Os RTD, 4 I/Os	45 mm	22.5 mm
	16 analog I/Os RTD, 8 I/Os	70 mm	35 mm
Communications interfaces	CM 1241 RS-232 and CM 1241 RS-485	30 mm	15 mm
	CM 1243-5 (PROFIBUS master) CM 1242-5 (PROFIBUS slave)	30 mm	15 mm
	CP 1242-7 (GPRS CP)	30 mm	15 mm

* Width B: The distance between the edge of the housing and the center of the hole in the DIN rail mounting clip

DIN rail mounting clips

All CPUs, SMs, CMs and CPs can be installed on the DIN rail in the cabinet. Use the pull-out DIN rail mounting clips to secure the device to the rail. These mounting clips also lock into place when they are extended to allow the device to be installed in a switching panel. The inner dimension of the hole for the DIN rail mounting clips is 4.3 mm.

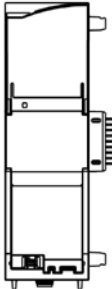
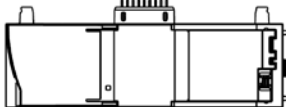
Procedure for installation and commissioning

Note

Installation location

During installation, make sure that the upper and lower ventilation slits of the module are not obstructed and good ventilation is possible. Above and below the device, there must be a clearance of 25 mm to allow air to circulate and prevent overheating.

Remember that the permitted temperature ranges depend on the position of the installed device.

Device position / permitted temperature range	Installation location
Horizontal installation of the rack: 0 °C to 55 °C	
Vertical installation of the rack: 0 °C to 45 °C	

3.4 Note on operation

Table 3- 2 Procedure for installation and connecting up

Step	Execution	Notes and explanations
1	Mount the CM on the DIN rail and connect it to the module to its right.	Use a 35 mm DIN rail. The slots to the left of the CPU are permitted.
2	Secure the DIN rail.	
3	Connect the PROFIBUS cable to the D-sub female connector of the CM.	Lower surface of the CM
4	Turn on the power supply.	
5	Close the front covers of the module and keep them closed during operation.	
6	The remaining steps in commissioning involve downloading the STEP 7 project data.	The STEP 7 project data of the CM 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 interface of the CPU. You will find more detailed information on loading in the following sections of the STEP 7 online help: <ul style="list-style-type: none"> • "Loading project data" • "Using online and diagnostics functions"

PROFIBUS connection

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

3.4 Note on operation

NOTICE

Closing the front panels

To ensure interference-free operation, keep the front panels of the module closed during operation.

3.5 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.

Uninstalling

1. Remove the connectors of the data cables before you switch off the power supply and thus terminate the ground connection of the devices.
2. Switch off the power supply to the station.
3. Pull down the two lower DIN rail clamps on the rear of the devices into the extended position using a slotted screwdriver.
This releases the locking mechanism.
4. Swing the devices out of the DIN rail profile to the front.

Configuration and program blocks

4.1 Configuration

Configuration in STEP 7

You configure the DP modules and DP master systems in SIMATIC STEP 7. You will find the required version in the section Requirements for operation (Page 10).

When configuring with STEP 7 as of V11.0, the CM 1242-5 is set to the protocol variant DP-V1 as default.

Configuring in third-party systems via GSD file

To allow configuration 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.

Overview of the STEP 7 configuration

Follow the steps below when configuring:

1. Create a STEP 7 project.
 2. Insert the required SIMATIC stations.
 3. Insert the communications modules and other required modules in the stations.
 4. Select the PROFIBUS interface of the master module and create a DP master system using the shortcut menu (right mouse button).
 5. Configure the DP master system in the following parameter groups:
 - General
 - Network settings
 - Cable configuration
 - Additional network nodes
 - Bus parameters
 6. Network the PROFIBUS slaves with the master system:
 - Either using the shortcut menu command with the PROFIBUS interface selected
 - Or in the "Operating mode" parameter group of the slave module
- Configuring the master is described in the manual of the master module.

4.2 DP data exchange with the CPU

7. Configure the DP slaves.

This affects the properties in the following parameter groups:

- General
- PROFIBUS address
- Mode > I-slave communication

Here, you specify the transfer areas for cyclic data exchange.

8. Configure the remaining modules and submodules according to your requirements.

9. Save the project.

Note

You will find more detailed information on configuring the individual parameters in the help system of STEP 7.

Downloading project data

When you load the station, the project data of the CM is stored on the CPU.

4.2 DP data exchange with the CPU

DP data exchange with the CPU

No instructions are necessary for GP data exchange with the CPU.

4.3 New slave address with data record 0x2001

Starting a slave with a new slave address

The CM 1242-5 supports data record 0x2001 that can be written in the slave CPU using SFB53 and the hardware identifier of the CM module. When this data record is written, the slave is restarted with this address.

If you want to store the address retentively, save the address in a DB of the CPU and write the DB to the CM during startup using OB100.

When the slave starts up, it initially goes onto the bus with its configured address. To avoid disruptions, you should select a free address as the configured address. In this case, the CPU starts up with an error because the slave does not signal a station return with its configured address.

When the CPU has transferred the configuration data to the CP during startup, it changes to the RUN status. Only then can it change the address using data record 0x2001. The station then runs free of errors.

If the data record is written with invalid values (wrong version, too short, invalid address etc.), SFB53 signals a general error and no address change is made.

If the data record is written several times within a short period, the last address to be written is used.

Table 4- 1 Example of the byte assignment of data record 0x2001 version V1.0

	Byte 1	Byte 2	Byte 3	Byte 4
Meaning	Version (high byte)	Version (low byte)	Opcode <ul style="list-style-type: none"> • 0 = do not change address • 1 = change address 	Data from Opcode
Assignment (example)	01 _H	00 _H	01 _H	20 _H
Meaning of the example	Version 1.0		The address is to be changed.	New address = 32

Diagnostics and upkeep

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 14).
- 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 CM 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

Diagnostics data depending on the protocol version of the DP slave

Depending on the type of configuration, the CM 1242-5 operates either as a DP-V1 slave or as a DP-V0 slave, see also section Configuration (Page 27). Depending on this, the diagnostics data is transferred to the DP master in different ways:

- **As DP-V1 slave: Diagnostics interrupt**

Transfer of the diagnostics data as a diagnostics interrupt Diagnostics interrupts must be acknowledged by the DP master

- **As DP-V0 slave: Diagnostics alarm**

Transfer of the diagnostics data as a diagnostics alarm Diagnostics alarms are not acknowledged by the DP master.

Supported diagnostics functions

The CM 1242-5 supports the following blocks of DP diagnostics:

- Standard diagnostics (6 bytes)
- Device-specific diagnostics (6 bytes)

Depending on whether a DP-V1 or DP-V0 slave is involved, there are differences in the data of the device-specific diagnostics.

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 CM with DP-V1 slaves

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

- **DP-V0 slave**

Table 5- 2 Overview of device-specific diagnostics of the CM with DP-V0 slaves

Device-specific diagnostics	
Byte	Meaning
0	Header
1...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- 3 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.

Bit no.	Name	Explanation
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. <ul style="list-style-type: none"> • 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- 4 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. The bit is always = 0 on the CM 1242-2 (function not supported).
4	Freeze_Mode	The DP slave is in FREEZE mode. The bit is set by the slave. The bit is always = 0 on the CM 1242-2 (function not supported).
3	Watchdog_On	Watchdog monitoring is active on the DP slave. The bit is set by the slave.
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- 5 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 (big endian format).

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 6 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" field (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- 6 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- 7 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- 8 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 is indicating that this interrupt expects an acknowledgement 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 the interrupt and indicates that it has further errors

Byte 3: Variant "Status specifier"

Table 5- 9 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- 10 Structure of the bytes for module-specific diagnostics data

Byte	Bit assignment							
	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- 11 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 Device-specific diagnostics in DP-V0

With standard DP slaves (DP-V0), this field contains general diagnostics information such as overtemperature, undervoltage or similar. The coding is specified for the specific device by the slave manufacturer. For further evaluation, the Ident_Number of the slave is required (bytes 4...5 of the standard diagnostics).

The device-specific diagnostics data of DP-V0 slaves is structured as follows:

Byte 0: Header

The two most significant bits have the value 00. This identifies the "module-specific diagnostics data" field as a whole.

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

Bytes 1...62: Module-specific diagnostics data

Diagnostics is slot-specific.

The structure is the same as for the diagnostics data in DP-V1, see section Device-specific diagnostics in DP-V1 (Page 35), bytes 4..62: Module-specific diagnostics with "status type" and "module status"

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.

5.2.1 Downloading firmware

New firmware versions

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

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15667/dl>)

Loading the firmware file

To load a firmware file you require a SIMATIC memory card.

You will find a description of the procedure for loading firmware on the respective page of Siemens Industry Online Support.

You can recognize that firmware is being loaded by the flashing LEDs of the CM, see section LEDs (Page 14).

5.2.2 Module replacement

Module replacement



WARNING

Read the system manual "S7-1200 Programmable Controller"

Prior to installation, connecting up and commissioning, read the relevant sections in the system manual "S7-1200 Programmable Controller" (refer to the documentation in the Appendix).

When installing and connecting up, keep to the procedures described in the system manual "S7-1200 Programmable Controller".

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

The configuration data of the CM is stored on the local CPU. This allows simple replacement of this communications module when necessary.

When the station starts up again, the new CM reads the project data from the CPU.

Technical data

6.1 Technical specifications of the CM 1242-5

Table 6-1 Technical specifications of the CM 1242-5

Technical specifications	
Article number	6GK7 242-5DX30-0XE0
Interfaces	
Connection to PROFIBUS	9-pin D-sub female connector
Maximum current consumption on the PROFIBUS interface when connecting network components (for example optical network components)	15 mA at 5 V (only for bus termination) *)
Permitted ambient conditions	
Ambient temperature	
• During storage	• -40 °C to 70 °C
• During transportation	• -40 °C to 70 °C
• During operation with the rack installed horizontally	• 0 °C to 55 °C
• During operation with the rack installed vertically	• 0 °C to 45 °C
Relative humidity at 25 °C during operation, without condensation, maximum	95 %
Degree of protection	IP20
Power supply, current consumption and power loss	
Type of power supply	DC
Power supply from the backplane bus	5 V
Current consumption (typical)	150 mA
Effective power loss (typical)	0.75 W
Electrical isolation	710 VDC for 1 minute
• PROFIBUS interface to ground	
• PROFIBUS interface to internal circuit	
Dimensions and weights	
• Width	• 30 mm
• Height	• 100 mm
• Depth	• 75 mm
Weight	
• Net weight	• 115 g
• Weight including packaging	• 152 g

*)The current load of an external consumer connected between VP (pin 6) and DGND (pin 5) must not exceed a maximum of 15 mA (short-circuit proof) for bus termination.

6.2 Pinout of the D-sub socket

PROFIBUS interface

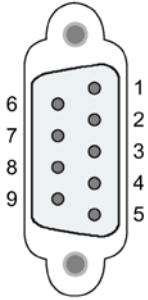


Table 6-2 Pinout of the D-sub socket

Pin	Description	Pin	Description
1	- not used -	6	VP: Power supply +5 V only for bus terminating resistors; not for supplying external devices
2	- not used -	7	- not used -
3	RxD/TxD-P: Data line B	8	RxD/TxD-N: Data line A
4	CNTR-P: RTS	9	- not used -
5	DGND: Ground for data signals and VP	Housing	Ground connector

PROFIBUS cable and connector

NOTICE

Contacting the shield of the PROFIBUS cable

The shield of the PROFIBUS cable must be contacted.

To do this, strip the insulation from the end of the PROFIBUS cable and connect the shield to functional earth.

Note

If you use a 180° PROFIBUS or a PG connector, the lower panel cannot be completely closed.

Dimension drawings

A

Note

All dimensions in the drawings are in millimeters.

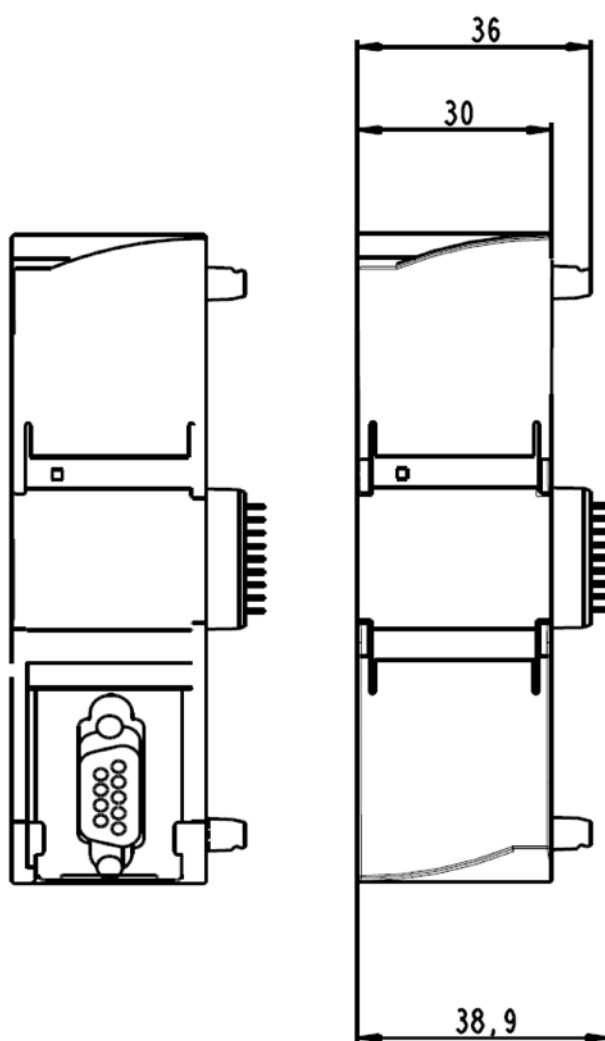


Figure A-1 CM 1242-5 - front view

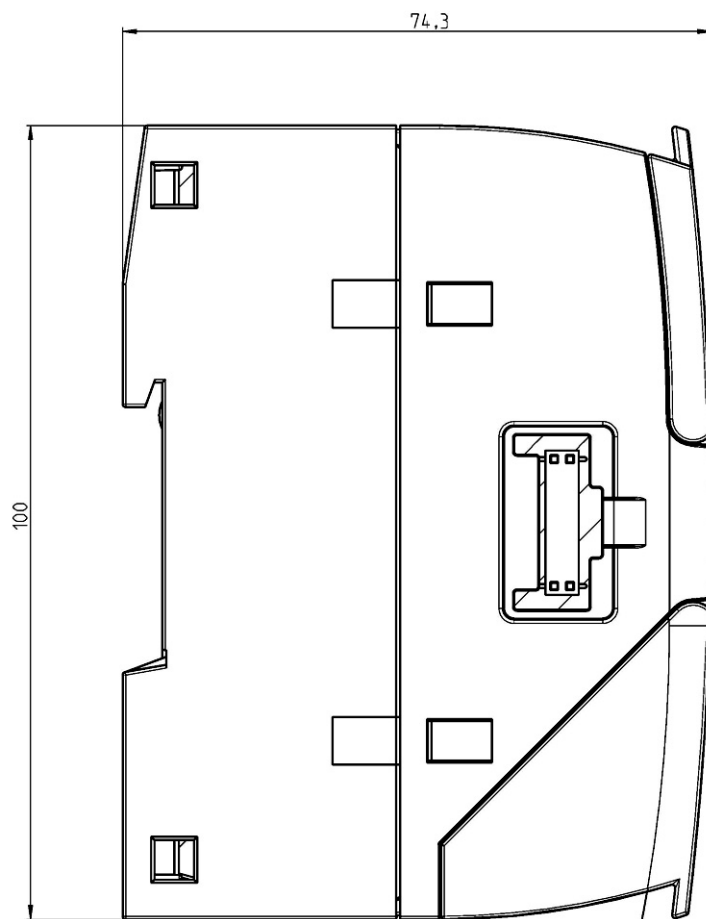


Figure A-2 CM 1242-5 - side view

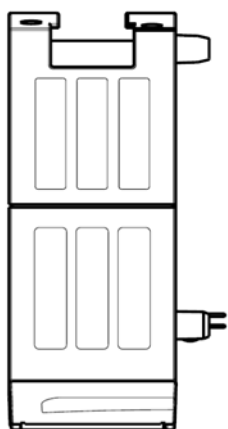


Figure A-3 CM 1242-5 - view from above

Approvals

Approvals issued

Note**Issued approvals on the type plate of the device**

The specified approvals apply only when the corresponding mark is printed on the product. You can check which of the following approvals have been granted for your product by the markings on the type plate.

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/15667/cert>)

You can view the considered standards in the respective certificate which is available on the Internet at the address listed 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 CP meets the requirements and safety objectives of the following EU 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 17).

The product meets the explosion protection requirements outlined below.

 WARNING
<p>Observe installation guidelines</p> <p>The product meets the requirements if you observe the following during installation and operation:</p> <ul style="list-style-type: none"> • The notes in the section Important notes on using the device (Page 17) • The installation instructions in the document /1/ (Page 51)

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 na IIC T4 Gc (not on the type plate), Certificate no.:2020322310002625

The product meets the requirements of the following standards:

- GB 3836.1
Hazardous areas - Part 0: Equipment - General requirements
- GB 3836.3
Explosive atmospheres - Part 3: Equipment protection by increased safety "e"
- GB 3836.8
Explosive atmospheres - Part 15: Equipment protection by type of protection 'n'

EMC

The CP meets the requirements of the following directives:

- 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 CP meets the requirements of the following directives:

- 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 CP

Report / UL file: E223122 (NRAG.E223122)

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 18).

FM

Factory Mutual Approval Standards:

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

Report Number 3040919, 3049779, 3049925

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.

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 on the Internet

You will also find the current approvals for the product on the Internet pages of Siemens
Industry Online Support under the following entry ID:

Link: (<https://support.industry.siemens.com/cs/ww/en/ps/15667/cert>)

→ "Entry list" tab, entry type "Certificates"

References

Where to find Siemens documentation

- Article numbers

You will find the article numbers for the Siemens products of relevance here in the following catalogs:

- SIMATIC NET - Industrial Communication / Industrial Identification, catalog IK PI
- SIMATIC - Products for Totally Integrated Automation and Micro Automation, catalog ST 70

You can request the catalogs and additional information from your Siemens representative. You will also find the product information in the Siemens Industry Mall at the following address:

Link: (<http://support.automation.siemens.com/WW/view/en>)

- Manuals on the Internet

You will find SIMATIC NET manuals on the Internet pages of Siemens Industry Online Support:

Link: (<http://support.automation.siemens.com/WW/view/en/10805878>)

Go to the required product in the product tree and make the following settings:

Entry type "Manuals"

- Manuals on the data medium

You will find manuals of SIMATIC NET products on the data medium that ships with many of the SIMATIC NET products.

/1/

SIMATIC
S7-1200 Automation System
system manual
Siemens AG

Link: (<https://support.industry.siemens.com/cs/ww/en/view/109759862>)

/2/

/2/

SIMATIC NET
PROFIBUS Network Manual
system manual
Siemens AG
Link: (<http://support.automation.siemens.com/WW/view/en/35222591>)

/3/

SIMATIC NET
CM 1243-5
Operating instructions
Siemens AG
Link: (<https://support.industry.siemens.com/cs/ww/en/view/49851842>)

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