SIEMENS

SIMATIC NET

S7-1500 - PROFINET
SIMATIC CM 1542-1

Operating Instructions

Preface

Properties and functions 1

LEDs, connections, QR code 2

Installation, connecting up, commissioning, operation 3

Configuration, program blocks 4

Diagnostics and upkeep 5

Technical specifications 6

Approvals 7

Dimension drawings 8

Documentation references A

CM 1542-1, firmware V3.0 (6GK7542-1AX00-0XE0)
CM 1542-1, firmware V4.1 (6GK7542-1AX10-0XE0)

12/2024
C79000-G8976-C355-07

Properties and functions

1

1.1 Communication services

The CM supports the following communications services:

- **PROFINET IO**
  PROFINET IO allows direct access to IO devices over Industrial Ethernet.
  - Real-Time communication (RT)
  - Isochronous Real-Time communication (IRT)
  - Media redundancy MRP
  - Device replacement without exchangeable storage medium
  - IO controller
  - IO device (iDevice, Shared Device, Prioritized startup)
  - Isochronous real time
- **Open User Communication**
  Open User Communication supports the following communications services via the CM using programmed or configured communications connections:
  - TCP (complying with RFC 793), ISO-on-TCP (complying with RFC 1006) and UDP (complying with RFC 768)
    With the interface via TCP connections, the CM supports the socket interface to TCP/IP available on practically every end system.
  - Multicast with UDP
    The multicast mode is made possible by selecting a suitable IP address when configuring connections. A maximum of six multicast groups are supported via UDP.
- **S7 communication**
  - PG communication
  - Operator control and monitoring functions (HMI communication)
  - Data exchange over S7 connections

1.2 Further functions

Time synchronization with NTP (Network Time Protocol)

The CP can synchronize its local time of day via NTP.

For details, see section Time-of-day synchronization (Page 47).

Media redundancy (MRP)

Within an Ethernet network with a ring topology, the CM supports the media redundancy protocol MRP. You can assign the role of "Client" or "Manager (Auto)" to the CM.

Addressable with the factoryset MAC address

To assign the IP address to a new CM (direct from the factory), it can be accessed using the preset MAC address on the interface being used. You perform online address assignment in STEP 7.

SNMP agent

The CM supports data queries using SNMP in version V1 (Simple Network Management Protocol).

For details, see section SNMP (Page 53).

IP configuration - IPv4

The essential features of IP configuration for the CM:

- The CM supports the use of IP addresses according to IPv4.
- You can configure how and with which method the CM is assigned the IP address, the subnet mask and the address of a gateway.
- The IP configuration and the connection configuration (IPv4) can also be assigned to the CM by the user program. For information on the program blocks, see section Program blocks (Page 24).
  Note: Does not apply to S7 connections.

IP routing

The CM supports static IP routing (IPv4) to other CMs/CPs.

For details, see section IP routing (Page 45).

Access to the Web server of the CPU

Via the LAN interface of the CM, you have access to the Web server of the CPU. With the aid of the Web server of the CPU, you can read out module data from a station.

Note the special description of the Web server; refer to the section Documentation references (Page 75)

Note

Web server access using the HTTPS protocol

The Web server of a SIMATIC S7-1500 station is located in the CPU. For this reason, when there is secure access (HTTPS) to the Web server of the station using the IP address of the CM 1542-1, the SSL certificate of the CPU is displayed.

1.3 Security information

Note

Security

- Security recommendations
  Refer to the information in the section Security recommendations (Page 41).
- Configuration with implementation of security measures
  You can find a sample network configuration with the CM and the relevant data flows can be found in the section Intended operating environment (Page 18).

Security Advisories

If Siemens detects and resolves security incidents in the products, this is published in Security Advisories.

You can find the documents for CM on the following Siemens AG web page:
Link: (https://new.siemens.com/global/en/products/services/cert.html?s=CM%201542-1#SecurityPublications)

There, enter "CM 1542-1" in the "Search Security Advisories" search field.

Security Incidents and fixes

The following Security Incidents are open for the CM 1542-1 at the time of publication of this manual:

- None

The following Security Incidents have been fixed with the listed firmware versions:

- **V3.0**
  - **SSA-462066**
    Vulnerability known as TCP SACK PANIC in Industrial Products
    Affected versions: All versions < V3.0
    Remediation: Update to V3.0 or later version
  - **SSA-599968**
    Denial-of-Service Vulnerability in Profinet Devices
    Affected versions: All versions < V3.0
    Remediation: Update to V3.0 or later version
  - **SSA-936080**
    Multiple Vulnerabilities in Third-Party Component libcurl
    Affected versions: All versions < V3.0
    Remediation: Update to V3.0 or later version
- **V2.0**
  - **SSA-293562**
    Denial of Service Vulnerabilities in PROFINET DCP Implementation of Industrial Products
    Affected versions: All versions < V2.0
    Remediation: Update to V2.0 or later version

1.5.3 Characteristic data Open User Communication incl. e-mail

Open User Communication (OUC) provides access to communication over TCP, ISO-on-TCP and UDP connections.

Characteristic	Explanation / values
Number of connections	• Max. number of connections in total (configured and programmed): (ISO-on-TCP + TCP + UDP + e-mail) ≤ 64 of which: – TCP connections: 0 ... 64 [1)] – ISO-on-TCP connections: 0 ... 64 – Total number of UDP connections (specified and free) that can be configured: 0 ... 64 – Connection for e-mail: 0 to 1; only one e-mail can be processed at any one time. Notes: • [1)] Avoid overload at receiving end Make sure that the processing capabilities of a receiving CM are not permanently exceeded by the sender (approximately 150 200 messages per second).
Number of multicast address groups	Max. 6
Maximum data length for program blocks	Program blocks allow the transfer of user data in the following lengths: 1. ISO-on-TCP, TCP: 1 - 64 kbytes 2. UDP – CM with article number 6GK7542-1AX00-0XE0: 1 - 1452 bytes – CM with article number 6GK7542-1AX10-0XE0: 1 - 2048 bytes 3. E-mail (job header + user data): 1 - 256 bytes e-mail attachment: ≤ 64 kbytes
LAN interface max. data field length generated by the CM per protocol data unit (TPDU = transport protocol data unit)	• For sending – ISO-on-TCP, TCP: 1452 bytes / TPDU • For receiving – ISO-on-TCP: 512 bytes / TPDU – TCP: 1452 bytes / TPDU

Note

Connection resources of the CPU

Depending on the CPU type, different numbers of connection resources are available. The number of connection resources is the decisive factor for the number of configurable connections. This means that the values that can actually be achieved may be lower than specified in this section describing the CM.

You will find detailed information on the topic of connection resources in the function manual /4/ (Page 76).

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.

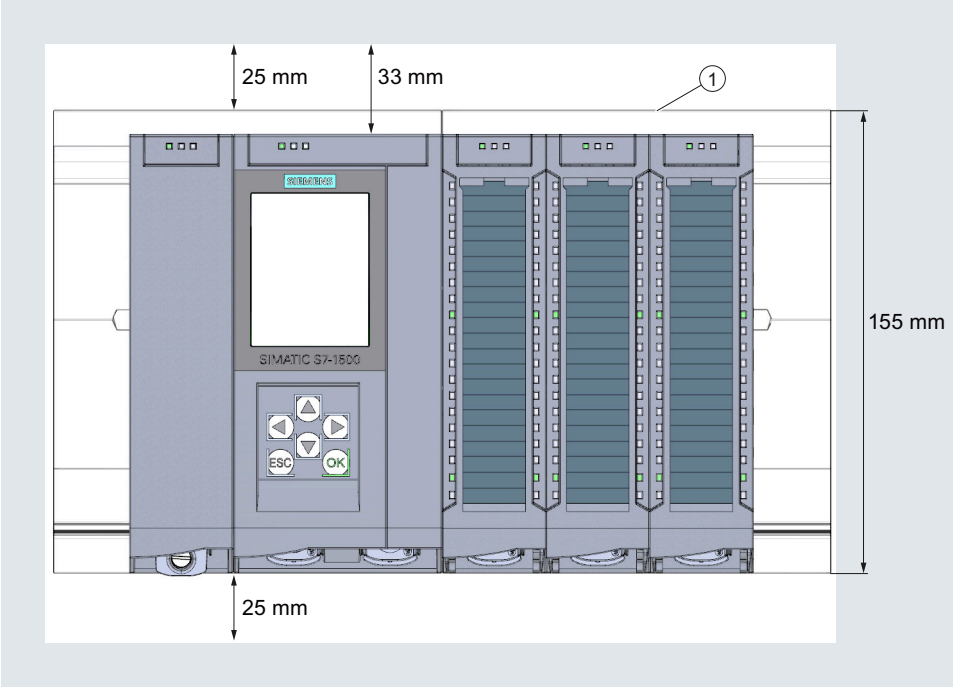
You will find the permitted temperature ranges in the section Technical specifications of the CM (6GK7542-1AX00-0XE0) (Page 61) or Technical specifications of the CM (6GK7542-1AX10-0XE0) (Page 62).

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



4.2 Network settings

4.2.1 Fast Ethernet

Transmission speed/directionality of the interface

- CM 1542-1 (6GK7542-1AX00-0XE0)
  Only "Automatic" for automatic detection (autosensing) and "100 Mbps full duplex" can be set for the transmission speed/directionality of the connection.
  In normal situations, the basic setting ensures troublefree communication.
- CM 1542-1 (6GK7542-1AX10-0XE0)
  In PROFINET operation, the CM only supports "100 Mbps full duplex".

Auto-crossover mechanism

With the integrated auto-crossover mechanism, it is possible to use a standard cable to connect the PC/PG. A crossover cable is not necessary.

To connect a switch that does not support auto-crossover, use a crossover cable.

4.3 IP configuration

4.3.1 Restart after detection of a duplicate IP address in the network

To save you timeconsuming troubleshooting in the network, during startup the CM detects double addressing in the network.

Behavior when the CM starts up

If double addressing is detected when the CM starts up, the CM changes to RUN and cannot be reached via the Ethernet interface. The ERROR LED flashes.

4.3.2 Remove retentive storage of the IP address if there are duplicate addresses

The IP address and the device name of the CM 1542-1 remain installed retentively:

If, for example during startup, the CM detects a duplicate address in another network, the CM is not connected to the network. The CM changes to RUN and cannot be reached via the Ethernet interface.

Technical specifications

6

6.1 Technical specifications of the CM (6GK7542-1AX00-0XE0)

You will find the product functions in the section Properties and functions (Page 15).

Observe the information in the System Manual S7-1500 automation system /1/ (Page 75).

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

Technical specifications - 6GK7542-1AX00-0XE0		
Product name	CM 1542-1	
Article number	6GK7542-1AX00-0XE0	
Attachment to Industrial Ethernet		
Quantity	1 x PROFINET interface with 2-port switch	
Design	2 x RJ45 socket, galvanically isolated	
Properties		
• Standard	• 100BASE-TX, IEEE 802.3-2005	
• Transmission speeds	• 10 / 100 Mbps	
• Other properties	• Half duplex/full duplex, auto-crossover, auto-negotiation	
Aging time	5 minutes	
Special features of the ports X1 P1 and X1 P2	Integration in ring topology / MRP possible	
Power supply		
Design	Via S7-1500 backplane bus (15 V)	
Further electrical data		
Current consumption (typical)	220 mA from S7-1500 backplane bus	
Active power loss (typical)	3.3 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	

Technical specifications - 6GK7542-1AX00-0XE0	
Weight	400 g
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 64) section.

6.2 Technical specifications of the CM (6GK7542-1AX10-0XE0)

You will find the product functions in the section Properties and functions (Page 15).

Observe the information in the System Manual S7-1500 automation system /1/ (Page 75).

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

Technical specifications - 6GK7542-1AX10-0XE0		
Product name	CM 1542-1	
Article number	6GK7542-1AX10-0XE0	
Attachment to Industrial Ethernet		
Quantity	1 x PROFINET interface with 2-port switch	
Design	2 x RJ45 socket, galvanically isolated	
Properties		
• Standard	• 100BASE-TX, IEEE 802.3-2005	
• Transmission speeds	• 100 Mbps	
• Other properties	• Full duplex, auto-crossover	
	• In PROFINET operation, only 100 Mbps full duplex	
Aging time	5 minutes	
Special features of the ports X1 P1 and X1 P2	Integration in ring topology / MRP possible	
Power supply		
Design	Via S7-1500 backplane bus (15 V)	
Further electrical data		
Current consumption (typical)	200 mA from S7-1500 backplane bus	
Active 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