MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Selected official pages for procurement and maintenance review

PRODUCT BRAND

Siemens

PRODUCT MODEL

6ES7441-1AA04-0AE0

CP 441-1 Communication Processor. Relevant section pages: 2, 3, 4, 11, 12, 17, 18, 193, 194. Adjacent model text on shared pages is outside this product reference.

OFFICIAL SOURCE

Point-to-point Link CP 441 Installation and Parameter Assignment; 04/2022

Siemens original documentation and product reference

AA04 processor reference: xAA00 interface modules only. Interface-module limits are separate from the 38.4 kbps processor limit. The supplied interface type is not established by this package.

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Amikon Limited prepared this independent reference package. Selected manufacturer pages follow with their original content and pagination visible.

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Preface

Purpose of This Manual

This manual explains how to establish and operate a point-to-point link.

Contents of the manual

The manual describes the hardware and software of the CP 441 communication processor and its integration in an S7-400 automation system.

The following subjects are covered:

- The basics of point-to-point link with the CP 441
- Commissioning the CP 441
- Mounting the CP 441
- Communication via the CP 441
- Troubleshooting
- Application examples
- Properties and technical specifications

Scope of the manual

The manual is relevant to the following CPs and interface modules:

Product	Order number	As of Release
CP 441-1	6ES7 441-1AA**04**-0AE0 6ES7 441-1AA**05**-0AE0	01 01
CP 441-2	6ES7 441-2AA**04**-0AE0 6ES7 441-2AA**05**-0AE0	01 01
RS232 module	6ES7 963-1AA**00**-0AA0 6ES7 963-1AA**10**-0AA0	01 01
20 mA TTY module	6ES7 963-2AA**00**-0AA0 6ES7 963-2AA**10**-0AA0	01 01
X27 (RS422/485) module	6ES7 963-3AA**00**-0AA0 6ES7 963-3AA**10**-0AA0	01 01

Note

For CP 441 up to order number 6ES7 441-xAA**04**-0AE0, IF 963 interface modules with order number 6ES7 963-xAA**00**-0AA0 are used.

For CP 441 as of order number 6ES7 441-xAA**05**-0AE0, the IF 963 interface modules with order number 6ES7 963-xAA**10**-0AA0 must be used.

Note

The descriptions of the CP 441 communication processor and the interface modules in this manual were correct at the time of publication. We reserve the right to describe modifications to the functionality of the modules in a separate Product Information.

Changes compared to the previous version (04/2011)

Compared to edition 04/2011 of this manual, this edition describes the additional functions of the CP 441 (as of order number 6ES7441-xAA05-AE0; x=1,2).

This includes:

- Firmware update via HW Config
- Identification data (I&M functions)
- Elimination of limitations (depending on the type of interface) for the data transmission rate
  - CP441-1: Additional data transmission rates 57.6, 76.8 and 115.2 kbps
  - CP441-2: Both interfaces can be operated with 115.2 kbps
- Lowest character delay time at 9600 bps: 2 ms
- Lowest character delay time at data transmission rates ≥ 19.2 kbps: 1 ms
- The dependency of the waiting times on the data transmission rate can be set with RK512.

Approvals

You can find detailed information about certificates, approvals and standards in the manual *S7-400 Programmable Controller; Module Specifications*.

Structure of This Manual

To help you to quickly find the information you require, this manual offers the following:

- A heading indicating the contents of each section is provided in the left-hand column on each page of each chapter.
- Following the appendices, a glossary defines important technical terms used in the manual.
- Finally, a comprehensive index allows quick access to information on specific subjects.

Product Description

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1.1 Applications for the Communication Processor

Introduction

The communication processor allows you to exchange data between programmable controllers or computers by means of a point-to-point link.

Functionality of the CP 441

The CP 441 communication processor provides the following functionality:

- A choice of two models with either one (the CP 441-1) or two (CP 441-2) serial device interfaces, which can be adjusted to suit the properties of the communication partners by means of plug-in interface modules. There are three interface modules available:
  - RS232 interface module
  - 20mA TTY interface module
  - X27 (RS422/485) interface module
- Transmission rate:
  - CP 441-1 (6ES7 441-1AA**04**-0AE0): Max. 38.4 kbps
  - CP 441-1 (6ES7 441-1AA**05**-0AE0): Max. 115.2 kbps
  - CP 441-2 (6ES7 441-2AA**04**-0AE0): Max. 115.2 kbps (sum data transmission rate)
  - CP 441-2 (6ES7 441-2AA**05**-0AE0): Max. 115.2 kbps per interface
- Integration of the most important transmission protocols in the module firmware.
- Custom parameter assignment of the transmission protocols with the **CP441: Configuration Package for Point to Point Communication** parameter assignment interface
- For CP 441-2 from order number 6ES7 441-2AA**02**-0AE0 to order number 6ES7 441-2AA**04**-0AE0 is the reloading of customer-specific driver (transmission protocols) with the **CP 441: Configuration Package for Point to Point Communication** possible.

Note

Modbus

The firmware of the CP 441-2 with order number 6ES7 441-2AA05-0AE0 already includes drivers for Modbus master, Modbus slave and Data Highway that can be used with a dongle.

Configuration of the reloadable drivers requires the installation of the packages for Modbus master and Modbus slave.

Combination options for CP with interface module

Note

For CP 441 up to order number 6ES7 441-xAA**04**-0AE0, IF 963 interface modules with order number 6ES7 963-xAA**00**-0AA0 are used.

For CP 441 as of order number 6ES7 441-xAA**05**-0AE0, the IF 963 interface modules with order number 6ES7 963-xAA**10**-0AA0 must be used.

Interface module	**CP**			
	CP 441-x (6ES7 441-xAA**04**-0AE0)		CP 441-x (6ES7 441-xAA**05**-0AE0)	
	CP 441-1 (x=1)	CP 441-2 (x=2)	CP 441-1 (x=1)	CP 441-2 (x=2)
IF963 module RS232 6ES7 963-1AA**00**-0AA0	●	●	-	-
IF963 module TTY 6ES7 963-2AA**00**-0AA0	●	●	-	-
IF963 module RS422/RS485 6ES7 963-3AA**00**-0AA0	●	●	-	-
IF963 module RS232 6ES7 963-1AA**10**-0AA0	-	-	●	●
IF963 module TTY 6ES7 963-2AA**10**-0AA0	-	-	●	●
IF963 module RS422/RS485 6ES7 963-3AA**10**-0AA0	-	-	●	●

Integrated Transmission Protocols

The following transmission protocols are integrated in the module firmware of the CP 441:

Table 1-1 Transmission Protocols in the Module Firmware

Product	**Integrated drivers**
CP 441-1	3964(R) procedure, ASCII driver, printer driver
CP 441-2	3964(R) procedure, ASCII driver, RK512 computer link, printer driver

Applications for the Communication Processor

The communication processor allows point-to-point link with SIMATIC modules and with third-party products.

1.4.1 Properties of the RS232 interface module

Definition

The RS232 interface is a voltage interface used for serial data transmission in compliance with the RS232 standard.

Properties

The RS232 interface module has the following properties and fulfills the following requirements:

- Type: Voltage interface
- Front connector: 9-pin sub D male connector with screw-locking
- Max. data transmission rate: 115.2 kbps
- Max. cable length: 15 m
- Standard: DIN 66020, DIN 66259, EIA-RS232, CCITT V.24/V.28
- Degree of protection: IP 00

Please observe the maximum permitted data transmission rates for the modules.

See also

RS232 interface module (Page 201)

1.4.2 Attributes of the 20mA TTY interface submodule

Definition

The 20mA TTY interface module is a current-loop interface used for serial data transmission.

Properties

The 20mA TTY interface module has the following attributes and fulfills the following requirements:

- Type: Linear current interface
- Front connector: 9-pin subminiature D female with screw interlock
- Max. data transmission rate: 19.2 kbps
- Max. cable length: 1000 m at 9600 bps
- Standard: DIN 66258 Part 1
- Degree of protection: IP 00

Please observe the maximum permitted data transmission rates for the modules.

See also

20mA TTY interface submodule (Page 208)

1.4.3 Properties of the X27 (RS422/485) interface module

Definition

The X27 (RS 422/485) interface is a differential voltage interface for serial data transmission in compliance with the X27 standard.

Properties

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

- Type: Differential voltage interface
- Front connector: 15-pin sub-D female, with screwed interlock
- Max. data transmission rate: 115.2 kbps
- Max. cable length: 1200 m at 19200 bps
- Standard: DIN 66259 Parts 1 and 3, EIA-RS 422/485, CCITT V.11
- Degree of protection: IP 00

Please observe the maximum permitted data transmission rates for the modules.

Note

With the RK512 and 3964(R) protocols, the X27 (RS422/485) interface module can only be used in 4-wire mode.

See also

X27 (RS422/485) interface module (Page 215)

1.5 Installation Guidelines

Considerations

The general installation guidelines for S7-400 must be followed (see the *S7-400 Automation System, Installation* Installation manual).

To meet the EMC (electromagnetic compatibility) values, the cable shield must be connected to a shield bus.

Technical specifications

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10.1 Technical data of the CP 441 and the interface modules

General technical specifications

In the following table you can find the technical specifications of the CP 441.
You can find additional technical specifications of the SIMATIC S7-400 in the *S7-400 Automation System, Module Specifications* reference manual and the *S7-400 Automation System, Installation* installation manual.

Table 10-1 Technical specifications of the CP 441

Technical specifications		
	6ES7 441-xAA04-0AE0	**6ES7 441-xAA05-0AE0**
Current consumption (rated value)	0.6 A / 5 V	0.3 A / 5 V
Power loss	3.5 W	1.5 W
Degree of protection	IP20	
Dimensions W x H x D	25 x 290 x 210 mm	
Weight	Approx. 0.8 kg	Approx. 0.58 kg
Display elements	LEDs for transmitting (TXD), receiving (RXD) and interface fault (FAULT) Group alarm LEDs for internal fault (INTF) and external fault (EXTF)	
Supplied protocol drivers CP 441-1	• ASCII driver • 3964(R) procedure • Printer	
Supplied protocol drivers CP 441-2	• ASCII driver • 3964(R) procedure • RK512 computer link • Printer • Modbus RTU master • Modbus RTU slave	
Interrupts • Diagnostic Interrupt	Configurable	
Diagnostics • Indicators for internal and external faults	Yes, 2 red LEDs	
Diagnostic information dump	Yes	

Technical specifications interface module - 6ES7 441-xAA04-0AE0

The following table contains the technical specifications of the plug-in interface modules of the CP 441.

Table 10-2 Technical specifications interface module - 6ES7 441-xAA**04**-0AE0

Technical specifications	RS232	20mA TTY	X27 (RS422/485)
	6ES7 963-1AA00-0AA0	**6ES7 963-2AA00-0AA0**	**6ES7 963-3AA00-0AA0**
Current consumption (rated value)	0.1 A at 5 V	0.1 A at 5 V 0.045 A at 24 V	0.25 A at 5 V
Power loss	0.5 W	1.5 W	1.25 W
Degree of protection	IP00	IP00	IP00
Isolation	No	Yes	Yes
Dimensions W x H x D	Approx. 95 x 70 x 20 mm	Approx. 95 x 70 x 20 mm	Approx. 95 x 70 x 20 mm
Weight	0.08 kg	0.08 kg	0.08 kg
Data transmission rate	Max. 115.2 kbps Min. 300 bps	Max. 19.2 kbps Min. 300 bps	Max. 115.2 kbps Min. 300 bps
Cable length	Max. 15 m	Max. 1000 m at 9600 bps	Max. 1200 m at 19200 bps
Front connectors	9-pin sub-d male with screw interlock	9-pin sub-d female with screw interlock	15-pin sub-d female with screw interlock

Technical specifications interface module - 6ES7 441-xAA05-0AE0

The following table contains the technical specifications of the plug-in interface modules of the CP 441.

Table 10-3 Technical specifications interface module - 6ES7 441-xAA**05**-0AE0

Technical specifications	RS232	20mA TTY	X27 (RS422/485)
	6ES7 963-1AA10-0AA0	**6ES7 963-2AA10-0AA0**	**6ES7 963-3AA10-0AA0**
Current consumption (rated value)	15 mA at 3.3 V	15 mA at 3.3 V 23 mA at 24 V per current source	41 mA at 3.3 V
Power loss	0.05 W	0.6 W	0.14 W
Degree of protection	IP00	IP00	IP00
Isolation	No	Yes	Yes
Dimensions W x H x D	Approx. 87 x 67 x 19 mm	Approx. 87 x 67 x 19 mm	Approx. 87 x 67 x 19 mm
Weight	0.08 kg	0.08 kg	0.08 kg
Data transmission rate	Max. 115.2 kbps Min. 300 bps	Max. 19.2 kbps Min. 300 bps	Max. 115.2 kbps Min. 300 bps
Cable length	Max. 15 m	Max. 1000 m at 9600 bps	Max. 1200 m at 19200 bps
Front connectors	9-pin sub-d male with screw interlock	9-pin sub-d female with screw interlock	15-pin sub-d female with screw interlock