

SIEMENS

SIMATIC

S7-1500/ET 200MP Power supply module PS 60W 24/48/60VDC HF (6ES7505-0RB00-0AB0)

Equipment Manual

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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.
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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.

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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.

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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

Preface

Purpose of the documentation

This manual supplements the system manual S7-1500/ET 200MP Automation System (<https://support.industry.siemens.com/cs/ww/en/view/59191792>).

Functions that generally relate to the system are described in this manual.

The information provided in this manual and in the system/function manuals support you in commissioning the systems.

Changes compared to previous version

Compared to the previous version, this manual contains the following change:

Correction of technical specifications

Conventions

The term "CPU" is used in this manual both for the CPUs of the S7-1500 automation system and for interface modules of the ET 200MP distributed I/O system.

Also observe notes marked as follows:

Note

A note contains important information on the product described in the documentation, on the handling of the product, or on the section of the documentation to which particular attention should be paid.

Security information

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

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To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under (<http://www.siemens.com/industrialsecurity>).

Open Source Software

Open-source software is used in the firmware of the I/O modules. Open Source Software is provided free of charge. We are liable for the product described, including the open-source software contained in it, pursuant to the conditions applicable to the product. Siemens accepts no liability for the use of the open source software over and above the intended program sequence, or for any faults caused by modifications to the software.

For legal reasons, we are obliged to publish the original text of the license conditions and copyright notices. Please read the information relating to this on the Internet (<https://support.industry.siemens.com/cs/ww/en/view/109741045>).

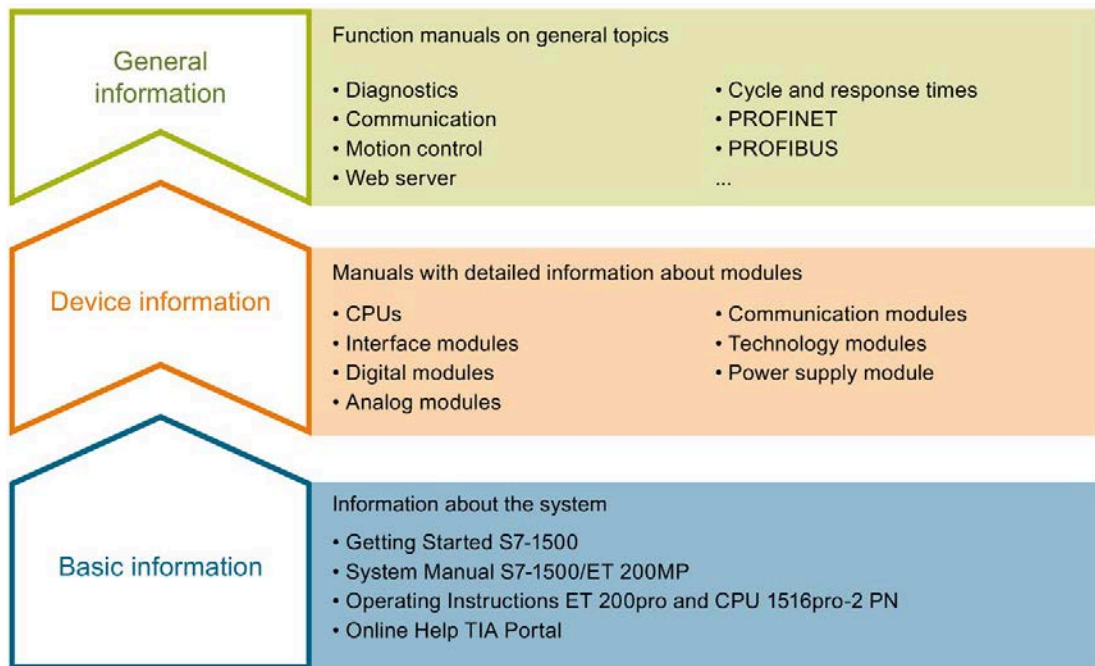
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Documentation guide

The documentation for the SIMATIC S7-1500 automation system, the CPU 1516pro-2 PN based on SIMATIC S7-1500 and the SIMATIC ET 200MP distributed I/O system is arranged into three areas.

This arrangement enables you to access the specific content you require.



Basic information

The System Manual and Getting Started describe in detail the configuration, installation, wiring and commissioning of the SIMATIC S7-1500 and ET 200MP systems. For CPU 1516pro-2 PN you use the corresponding operating instructions. The STEP 7 online help supports you in the configuration and programming.

Device information

Product manuals contain a compact description of the module-specific information, such as properties, wiring diagrams, characteristics and technical specifications.

General information

The function manuals contain detailed descriptions on general topics regarding the SIMATIC S7-1500 and ET 200MP systems, e.g. diagnostics, communication, motion control, Web server, OPC UA.

You can download the documentation free of charge from the Internet (<http://w3.siemens.com/mcms/industrial-automation-systems-simatic/en/manual-overview/Pages/Default.aspx>).

Changes and supplements to the manuals are documented in a Product Information.

You can download the product information free of charge from the Internet (<https://support.industry.siemens.com/cs/us/en/view/68052815>).

Manual Collection S7-1500/ET 200MP

The Manual Collection contains the complete documentation on the SIMATIC S7-1500 automation system and the ET 200MP distributed I/O system gathered together in one file.

You can find the Manual Collection on the Internet (<https://support.industry.siemens.com/cs/ww/en/view/86140384>).

SIMATIC S7-1500 comparison list for programming languages

The comparison list contains an overview of which instructions and functions you can use for which controller families.

You can find the comparison list on the Internet (<https://support.industry.siemens.com/cs/ww/en/view/86630375>).

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You must register once to use the full functionality of "mySupport".

You can find "mySupport" on the Internet (<https://support.industry.siemens.com/My/ww/en>).

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In the Documentation area in "mySupport" you can combine entire manuals or only parts of these to your own manual.

You can export the manual as PDF file or in a format that can be edited later.

You can find "mySupport" - Documentation on the Internet (<http://support.industry.siemens.com/My/ww/en/documentation>).

"mySupport" - CAx data

In the CAx data area in "mySupport", you can access the current product data for your CAx or CAe system.

You configure your own download package with a few clicks.

In doing so you can select:

- Product images, 2D dimension drawings, 3D models, internal circuit diagrams, EPLAN macro files
- Manuals, characteristics, operating manuals, certificates
- Product master data

You can find "mySupport" - CAx data on the Internet (<http://support.industry.siemens.com/my/ww/en/CAxOnline>).

Application examples

The application examples support you with various tools and examples for solving your automation tasks. Solutions are shown in interplay with multiple components in the system - separated from the focus on individual products.

You will find the application examples on the Internet (<https://support.industry.siemens.com/sc/ww/en/sc/2054>).

TIA Selection Tool

With the TIA Selection Tool, you can select, configure and order devices for Totally Integrated Automation (TIA).

This tool is the successor of the SIMATIC Selection Tool and combines the known configurators for automation technology into one tool.

With the TIA Selection Tool, you can generate a complete order list from your product selection or product configuration.

You can find the TIA Selection Tool on the Internet (<http://w3.siemens.com/mcmts/topics/en/simatic/tia-selection-tool>).

SIMATIC Automation Tool

You can use the SIMATIC Automation Tool to run commissioning and maintenance activities simultaneously on various SIMATIC S7 stations as a bulk operation independently of the TIA Portal.

The SIMATIC Automation Tool provides a multitude of functions:

- Scanning of a PROFINET/Ethernet network and identification of all connected CPUs
- Address assignment (IP, subnet, gateway) and station name (PROFINET device) to a CPU
- Transfer of the date and the programming device/PC time converted to UTC time to the module
- Program download to CPU
- Operating mode switchover RUN/STOP
- Localization of the CPU by means of LED flashing
- Reading out CPU error information
- Reading the CPU diagnostic buffer
- Reset to factory settings
- Updating the firmware of the CPU and connected modules

You can find the SIMATIC Automation Tool on the Internet (<https://support.industry.siemens.com/cs/ww/en/view/98161300>).

PRONETA

With SIEMENS PRONETA (PROFINET network analysis), you analyze the PROFINET network during commissioning. PRONETA features two core functions:

- The topology overview independently scans PROFINET and all connected components.
- The IO check is a fast test of the wiring and the module configuration of a system.

You can find SIEMENS PRONETA on the Internet (<https://support.industry.siemens.com/cs/ww/en/view/67460624>).

Product overview

2.1 Properties

Article number

6ES7505-0RB00-0AB0

View of the module

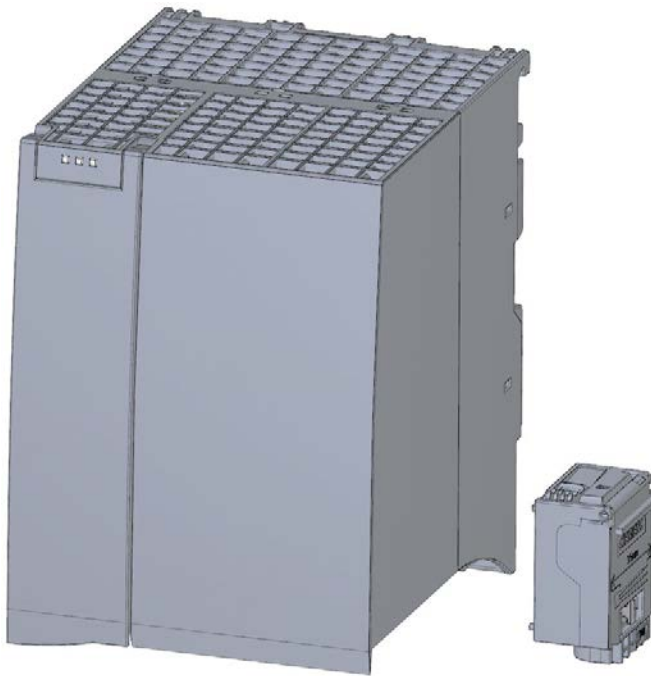


Figure 2-1 View of the PS 60W 24/48/60VDC HF module

Properties

The PS 60W 24/48/60VDC HF power supply module supports the use of additional modules.

Advantage over the "standard" power supply module:

To save a higher volume of data retentively in case of power failure, the PS 60W 24/48/60VDC HF supplies power to the CPU.

The PS 60W 24/48/60VDC HF has the following properties:

- Technical properties
 - Rated input voltages 24/48/60 VDC
 - Output power 60 W
 - Power failure backup
 - Electrical isolation to the bus, safe electrical separation according to EN 61131-2

The module supports the following functions:

Table 2- 1 Version dependencies of the module functions

Function	Firmware version of the module	Configuration software	
		STEP 7 (TIA Portal) as of V14 SP1	GSD file in STEP 7 (TIA Portal) V12 or higher, or STEP 7 V5.5 SP3 or higher
Firmware update	V1.0.0 or higher	X	X (PROFINET IO only)
Identification data I&M0 to I&M4	V1.0.0 or higher	X	
Configuration in RUN	V1.0.0 or higher	X	
Diagnostic alarms	V1.0.0 or higher	X	
Diagnostic interrupts	V1.0.0 or higher	X	
Only configurable on LH side next to interface module / CPU	V1.0.0 or higher	X	---
Extended retentivity of the CPU data area in the event of a power failure	V1.0.0 or higher	X (only with CPU S7-1500 firmware version V2.1 or higher)	

Accessories

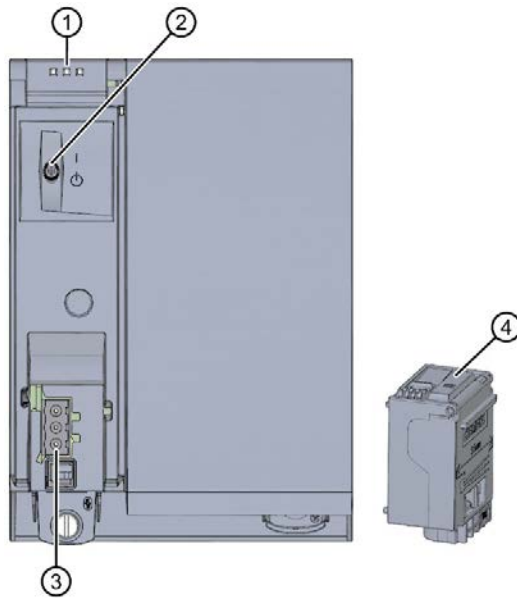
The following components are supplied with the power supply module:

- Power connector
- U connector

These components are also available as spare parts.

2.2 Operating and display elements

The following figure shows the control and connection elements of the PS 60W 24/48/60VDC HF behind the front panel as well as the power connector.



- ① LED displays indicating the current operating state and diagnostic status of the PS
- ② On/off switch
- ③ Power inlet for the power connector
- ④ Power connector; inserted in delivery state

Figure 2-2 View of the PS 60W 24/48/60VDC HF (without front panel) and of the power connector

Wiring

3.1 Connecting the supply voltage (PS 60W 24-48-60VDC HF)

This section contains information on connecting the power supply module to the mains voltage.

Mains connection

WARNING

Installation instructions

Risk of death or serious injury.

Observe the general installation instructions applicable in your country when wiring the power supply module.

Fuse the power cables according to their conductor cross-section.

The following applies to mains connection of the power supply module using the power connector:

- The power connector enables connection of the input voltage to the power supply module with touch protection.
- The power connector enables permanent wiring.
- The power connector features internal strain relief.
- The power connector ensures reverse polarity protection. A coding element assigns each power connector to a specific type of power supply module on delivery. A connector coded for 230 V AC does not fit in the connection to a 24 V DC power supply module.

DANGER

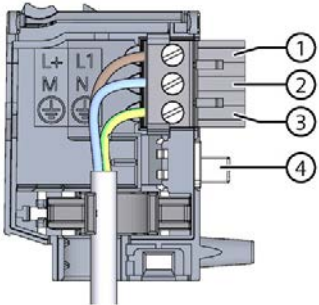
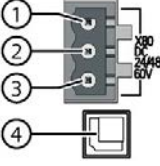
Do not manipulate or omit the coding element

Changes to the coding element can result in dangerous states in your plant and/or damage to the outputs of the I/O modules. In order to avoid damage, do not manipulate the coding. The coding element may not be omitted.

Connection plug

The connection plug for the power supply is plugged in when the power supply module ships from the factory.

The following figure shows the assignment of the connection plug:

Connector	PS connection	Name
		<ul style="list-style-type: none"> ① L ② N ③ Protective conductor ④ Coding element

Cables

You need flexible cables to wire power to the power supply module. The conductor cross-section must be 1.5 mm² (AWG: 16). The diameter of a 3 x 1.5 mm² sheathed cable can be no more than 8.5 mm. The ground conductor of flexible cables must be longer than the two other conductors. The fusing must meet the requirements of the corresponding control cabinet.

Reference

You can find additional information about wiring the mains connector in the system manual S7-1500 automation system.

Siemens recommends the use of devices from the SITOP family of products for applications with load power supplies. Wiring information is available in the documentation for the load power supply.

Parameters

4.1 Parameters

Parameters of the PS 60W 24/48/60VDC HF

The PS 60W 24/48/60VDC HF is usually already integrated in the hardware catalog of STEP 7 (TIA Portal). In this case, STEP 7 (TIA Portal) checks the configured properties for plausibility during configuration.

However, you can also assign parameters to the module by means of a GSD file and the configuration software of any provider. The module does not check the validity of the configured properties until after the configuration has been loaded.

When you assign the module parameters in STEP 7, you use various parameters to specify the module properties. The following table lists the configurable parameters. The effective range of the parameters that can be set depends on the type of configuration. The following configurations are possible:

- Central operation with an S7-1500 CPU (with STEP 7 TIA Portal V14 SP1 or higher)
- Distributed operation on PROFINET IO in an ET 200MP system (with GSD file PROFINET IO in STEP 7 (TIA Portal) V12 or higher or STEP 7 V5.5 SP3 or higher)

For parameter assignment in the user program, the parameters are transferred to the module using the WRREC instruction (reparameterization in RUN) and data records; see section Parameter data record (Page 24).

Table 4-1 Configurable parameters and their defaults

Parameters	Range of values	Default setting	Parameter assignment in RUN	Scope with configuration software, e.g., STEP 7 (TIA Portal)	
				Integrated in the hardware catalog STEP 7 (TIA Portal) V14 SP1 or higher or GSD file PROFINET IO	GSD file PROFIBUS DP
Diagnostics / maintenance					
• Supply voltage monitoring *	Yes/No	No	Yes	Module	---
• Switch position Off *	Yes/No	No	Yes	Module	---

* In case of central operation of a S7-1500 CPU with firmware V2.1.0 or higher the diagnostics are **not** displayed in the diagnostics buffer to ensure reliable backup of the extended retentive data.

Interrupts, diagnostic alarms, error and status alarms

5

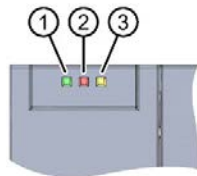
5.1 Status and error displays

Introduction

Diagnostics by means of LEDs is a basic tool for troubleshooting. Usually, you can pinpoint the source of error more precisely by analyzing the module status information in STEP 7, or in the diagnostic buffer of the CPU. These locations contain the corresponding error information in plain text.

LED displays

The following figure shows the LED displays (status and error displays) of the PS 60W 24/48/60VDC HF.

















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

Figure 5-1 LED displays of PS 60W 24/48/60VDC HF

Meaning of the LED displays

The following table explains the meaning of the status and error displays. You can find remedial measures for diagnostic alarms in chapter Diagnostic alarms (Page 18).

Table 5- 1 Status and error displays RUN/ERROR/MAINT

LED			Meaning	Remedy
RUN	ERROR	MAINT		
 Off	 Off	 Off	OFF; PS returns no bus voltage <ul style="list-style-type: none"> External error; diagnostics is disabled PS not powered in the system, no supply voltage at the PS and CPU/IM. 	Switch on power to the PS Check the supply voltage Switch on PS
 On	 On	 On	Startup; all LED displays are lit briefly after system startup, or during module restart after firmware update.	-
 Flashing	Not relevant	Not relevant	Startup, PS returns bus voltage, PS waiting for parameterization	-
 Off	 Flashing	Not relevant	Error, PS supplies no bus voltage <ul style="list-style-type: none"> Supply voltage missing and diagnostics is enabled Internal error 	Evaluate diagnostic alarms and take appropriate remedial measures; see chapter Diagnostic alarms (Page 18)
 Off	Not relevant	 On	Maintenance request, PS returns no bus voltage <ul style="list-style-type: none"> Switch is off; power is present and diagnostics is enabled 	Switch on PS
 Flashing	 Flashing	 Flashing	Malfunction LEDs flash persistently	Replace PS

5.2 Diagnostic alarms

Diagnostic alarms

The following table shows the meaning of the diagnostic alarms and possible remedial measures for the respective cause.

One of the following "LED images" indicates directly on the PS that a diagnostic alarm was triggered.

- The red ERROR-LED is flashing.
Indicates external or internal errors.
- The yellow MAINT-LED is lit.
Maintenance; a maintenance request is active.
- All three LEDs are flashing permanently
The PS is in "Defective" state.

In STEP 7, the diagnostic results are displayed in plain text by means of the online and diagnostic view. You can read the diagnostic data records by means of the "RDREC" instruction.

Table 5- 2 Diagnostic alarms, their meaning and remedies

Diagnostic alarm	Error code		Meaning	Reaction	Remedial measures
	Dec.	Hex.			
External error					
Supply voltage missing	266 _D	010A _H	No supply voltage, or incorrect insertion of the power connector into the PS.	1	Check the supply voltage.
Internal error					
Overtemperature	5 _D	0005 _H	Overtemperature on the printed circuit board.	2	Check PS load. Isolate PS from mains. Wait one minute before you power on the PS again.
Overvoltage back-plane bus	267 _D	010B _H	High EMC interference or a defective PS, CPU or IM inserted.	2	Eliminate electromagnetic interference. Check inserted modules and bus connectors. Isolate PS from mains. Wait one minute before you power on the PS again.
Safety shutdown	285 _D	011D _H	Reliable operation of the module is no longer guaranteed.	2	Check ambient conditions. Isolate PS from mains. Wait one minute before you power on the PS again.
Maintenance					
Switch turned off	268 _D	010C _H	The PS is switched off.	1	Switch on PS.
Malfunction					
Module failure	256 _D	0100 _H	PS failure.	3	Replace PS.

External errors, internal errors and malfunctions

- External errors occur outside the PS. In the parameterization, specify whether or not an external error can trigger a diagnostic alarm. By default, external errors do not trigger diagnostic alarms.
- Internal errors occur inside the PS. If still possible, an internal error always triggers a diagnostic alarm.
- A malfunction is a static state; the PS must be sent in for repair. If still possible, a defect always triggers a diagnostic alarm.

Explanation of the reactions

The PS is switched off retentively. Alarm is only generated if the PS is still powered by the CPU or IM via the backplane bus. You cannot switch on the module unless you have eliminated the error and disconnected power to the PS for approximately one minute.

5.3 Interrupts

What is a diagnostic interrupt?

You can determine reactions to internal or external errors in the user program, by programming a diagnostic interrupt which interrupts cyclic program execution on the CPU and triggers the diagnostic interrupt OB (OB82). The event which led to the interrupt is entered in the start information of the OB82.

Trigger of a diagnostic interrupt

Events that can trigger a diagnostic alarm can also trigger a diagnostic interrupt:

- Supply voltage missing
- Overtemperature
- Overvoltage on the backplane bus
- Safety shutdown
- Switch position Off
- Malfunction

Reactions to a diagnostic interrupt

You can find the CPU reaction to a diagnostic interrupt in the function manual System diagnostics (<http://support.automation.siemens.com/WW/view/en/59192926>).

Detailed information on the error event is available in the diagnostic interrupt OB by executing the "RALRM" instruction (read additional interrupt information) and in the STEP 7 Online Help.

Technical specifications

Technical specifications of the PS 60W 24/48/60VDC HF

Article number	6ES7505-0RB00-0AB0
General information	
Product type designation	PS 60 W 24/48/60 V DC HF
HW functional status	E01
Firmware version	V1.0.0
Engineering with	
<ul style="list-style-type: none"> STEP 7 TIA Portal configurable/integrated as of version 	V14 SP1
Supply voltage	
Rated value (DC)	24 V / 48 V / 60 V
permissible range, lower limit (DC)	Static 19.2 V, dynamic 18.5 V
permissible range, upper limit (DC)	Static 72 V, dynamic 75.5 V
Reverse polarity protection	Yes
Short-circuit protection	Yes
Mains buffering	
<ul style="list-style-type: none"> Mains/voltage failure stored energy time 	20 ms
Input current	
Rated value at 24 V DC	3 A
Rated value at 48 V DC	1.5 A
Rated value at 60 V DC	1.2 A
Inrush current, max.	≤ 8 A for t ≤ 1 s
Output current	
Short-circuit protection	Yes
Power	
Infeed power to the backplane bus	60 W
Power loss	
Power loss at nominal rating conditions	12 W
Interrupts/diagnostics/status information	
Status indicator	Yes
Isolation	
Isolation tested with	2 500 V DC (type test)
EMC	
Interference immunity against voltage surge	
<ul style="list-style-type: none"> on the supply lines acc. to IEC 61000-4-5 	Yes; ±1 kV (acc. to IEC 61000-4-5; 1995; surge symm.), ±2 kV (acc. to IEC 61000-4-5; 1995; surge asymm.), no external protective circuit required

Article number	6ES7505-0RB00-0AB0
Degree and class of protection	
Degree of protection acc. to EN 60529	IP20
Equipment protection class	I, with protective conductor
Dimensions	
Width	105 mm
Height	147 mm
Depth	129 mm
Weights	
Weight, approx.	865 g

Dimensional drawing

Dimensional drawing of PS 60W 24/48/60VDC HF

This appendix includes the dimensional drawing of the power supply module that is installed on a mounting rail with shielding bracket. Take the dimensions into account for installation in cabinets, control rooms, etc.

The following figure shows the front view and the side view of the module

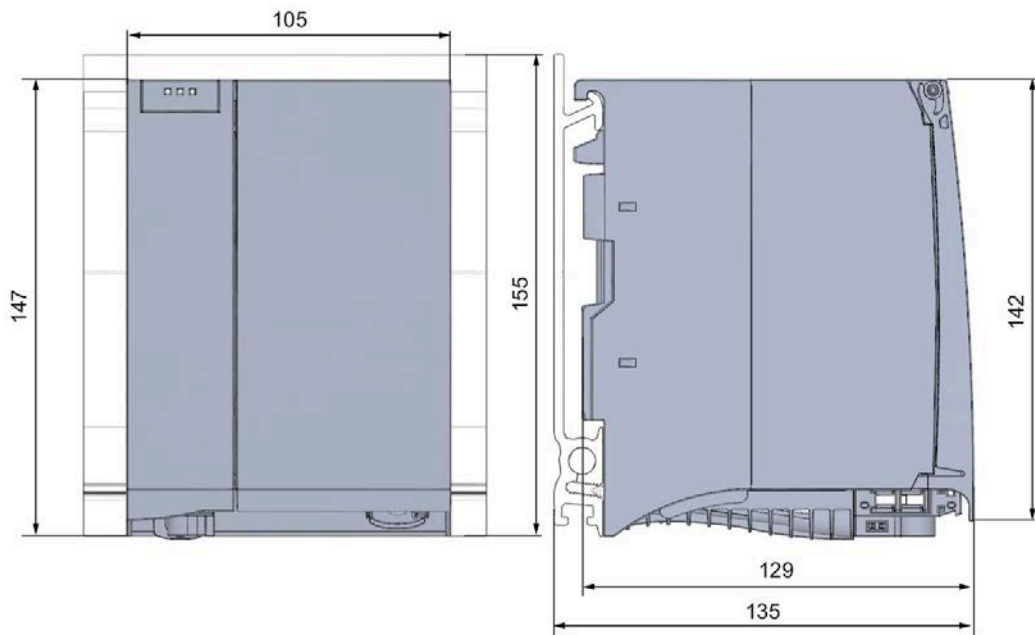


Figure A-1 Dimensional drawing of the PS 60W 24/48/60VDC HF module

The following figure shows the side view of the module with open front panel.

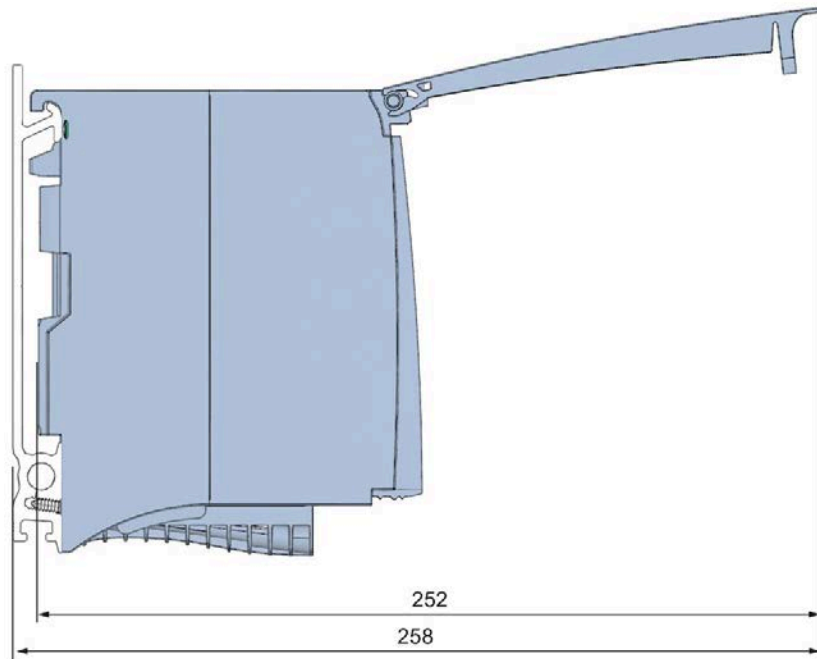


Figure A-2 Dimensional drawing of the PS 60W 24/48/60VDC HF module

Parameter data record

Parameter assignment in the user program

You have the option to re-parameterize the power supply module in RUN mode of CPU.

Changing parameters in RUN mode

The parameters of the power supply module are in data record 0. Using the instruction WRREC the adjustable parameters can be transferred to the power supply module. The parameters assigned in STEP 7 are not changed permanently in the CPU, which means the parameters assigned in STEP 7 are valid again after a restart.

Output parameter RET_VAL

The power supply module ignores errors that occur during transfer of parameters with the WRREC instruction and continues operation with the previous parameter assignment. However, a corresponding error code is written to the RET_VAL output parameter. If no error occurs, the length of the data actually transferred is entered in RET_VAL.

RET_VAL is 4 bytes long and structured as follows:

- Byte1: Function_Num, general error code
- Byte2: Error Decode, location of the error detection
- Byte3: Error_Code_1, error detection
- Byte4: Error_Code_2, manufacturer-specific expansion of the error detection

The description of the WRREC instruction and the general error codes are available in the STEP 7 online help.

Module-specific errors are displayed by means of Error_Code_1 = 224_D or Error_Code_1 = 225_D.

Manufacturer-specific expansions of the error detection of the WRREC instruction have the following meaning:

Table B- 1 Manufacturer-specific expansions of the error detection of the WRREC instruction

Error_Code 1	Error_Code 2	Meaning
224 _D Error in the data record header	1 _D	The version entered in the data record header is not supported by the module or reserved bits of the version are set.
	2 _D	The net length entered in the data record header is incorrect.
225 _D Errors in the net data entered in the data record (parameter)	1 _D	Diagnostic interrupt enable is incorrect
	16 _D	Reserved parameters are not 0

Data record structure

The following figure shows the structure of the data record 0.

- A fixed bit pattern is entered in byte 0. It indicates the version of the data record structure. Each time a data record is written, the module checks the written data and accepts only data records with major version 1.
- Byte 1 specifies the maximum data length that can be used for parameter data.
- Byte 2 contains the parameter data.
- Bytes 3 to 11 are reserved.

To enable a parameter in byte 2, set the corresponding bit to "1". The corresponding diagnostics is then activated, for example, for supply voltage monitoring. If you set the corresponding bit to "0", the diagnostics is deactivated.

You are not permitted to change byte 0, byte 1 or bytes 3 to 11.

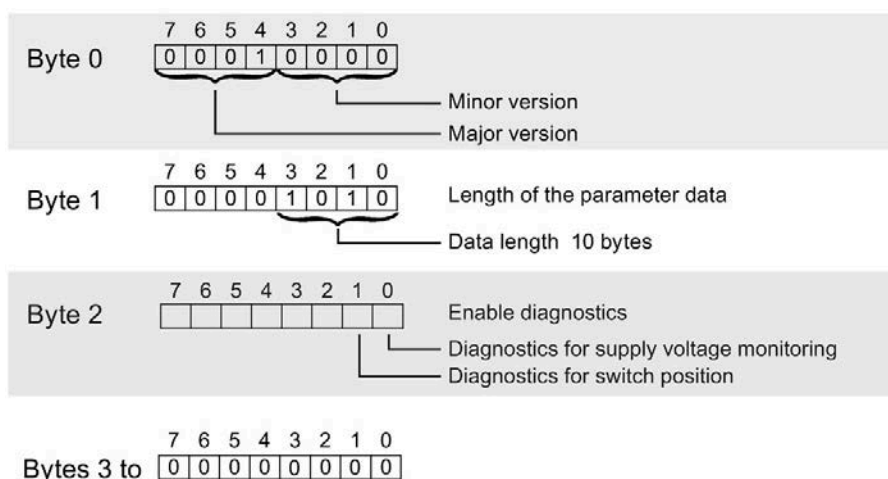


Figure B-1 Structure of data record 0