SIEMENS

SIMATIC

S7-1500/ET 200MP
Power supply module PS 60W
120/230V AC/DC (6ES7507-
0RA00-0AB0)

Manual

Legal information

Warning notice system

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

⚠ DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

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

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified 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

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

Disclaimer of Liability

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

Preface

Purpose of the documentation

This manual complements the system manuals:

- S7-1500 automation system
  (http://support.automation.siemens.com/WW/view/en/59191792)
- ET 200MP distributed I/O system
  (http://support.automation.siemens.com/WW/view/en/59193214)

Functions that generally concern the systems are described in these manuals.

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

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.

Note on IT security

Siemens offers IT security mechanisms for its automation and drive product portfolio in order to support the safe operation of the plant/machine. We recommend that you inform yourself regularly on the IT security developments regarding your products. You can find information on this on the Internet (http://support.automation.siemens.com).

You can register for a product-specific newsletter here.

For the safe operation of a plant/machine, however, it is also necessary to integrate the automation components into an overall IT security concept for the entire plant/machine, which corresponds to the state-of-the-art IT technology. You can find information on this on the Internet (http://www.siemens.com/industrialsecurity).

Products used from other manufacturers should also be taken into account here.

Copyright notice for the open-source software used

Open-source software is used in the firmware of the product described. The 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 following copyright notices.

© Copyright William E. Kempf 2001
Permission to use, copy, modify, distribute and sell this software and its documentation for any purpose is hereby granted without fee, provided that the above copyright notice appear in all copies and that both that copyright notice and this permission notice appear in supporting documentation. William E. Kempf makes no representations about the suitability of this software for any purpose. It is provided "as is" without express or implied warranty.

Copyright © 1994 Hewlett-Packard Company
Permission to use, copy, modify, distribute and sell this software and its documentation for any purpose is hereby granted without fee, provided that the above copyright notice appear in all copies and that both that copyright notice and this permission notice appear in supporting documentation. Hewlett-Packard Company makes no representations about the suitability of this software for any purpose. It is provided ``as is'' without express or implied warranty.

Table of contents

Documentation guide

1

Introduction

The modular documentation of the S7-1500 and ET 200MP system families covers all aspects of your automation system.

The documentation consists of different modules that are divided into system manuals, function manuals and manuals.

The following table provides an overview of the documents that complement this manual. Information in the manual overrides specifications in the system manual.

Overview of the documentation for the power supply module PS 60W 120/230VAC

The table below lists additional documentation for using the PS 60W 120/230VAC benötigen. power supply module.

Table 1- 1   Documentation for the power supply module PS 60W 120/230VAC

Topic	Documentation	Most important contents
System description	System manual S7-1500 automation system (http://support.automation.siemens.com/WW/view/en/59191792) System manual ET 200MP distributed I/O system (http://support.automation.siemens.com/WW/view/en/59193214)	• Application planning • Installation • Wiring • Commissioning • Standards and approvals • Electromagnetic compatibility • Mechanical and climatic ambient conditions
Designing interference-free controllers	Function manual Designing interference-free controllers (http://support.automation.siemens.com/WW/view/en/59193566)	• Basics • Electromagnetic compatibility • Lightning protection
System diagnostics	Function manual System diagnostics (http://support.automation.siemens.com/WW/view/en/59192926)	• Overview • Hardware/software diagnostics evaluation

SIMATIC manuals

All current manuals for SIMATIC products are available for download free of charge from the Internet (http://www.siemens.com/automation/service&support).

Product overview

2

2.1 Properties

Order number

6ES7507-0RA00-0AB0
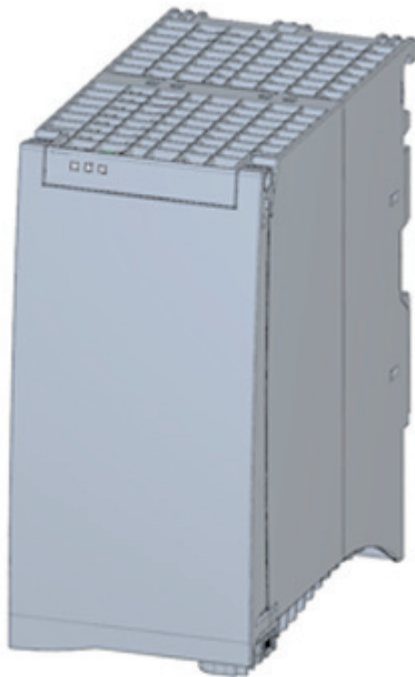
View of the module

Figure 2-1   View of the PS 60W 120/230V AC/DC module

Properties

The PS 60W 120/230V AC/DC power supply module supports the use of additional modules.

The power supply module has the following properties:

- Technical properties
    - Rated input voltages 120 V AC/DC and 230 V AC/DC
    - Output power 60 W
    - Power failure backup
    - Electrical isolation to the bus, safe electrical separation to EN 61131-2
- Supported functions
    - Firmware update
    - Identification data I&M0 to I&M4
    - Configuration in RUN
    - Diagnostic alarms
   - Diagnostic interrupts

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 120/230 V UC behind the front panel as well as the power connector.
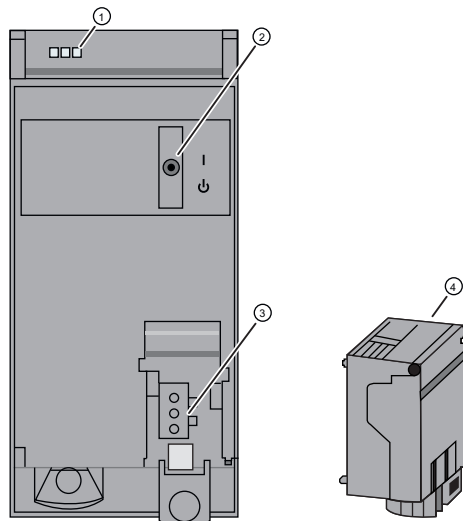
①   LED displays indicating the current operating state and diagnostic status of the PS

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 120/230V AC/DC (without front panel) and of the power connector

Wiring 3

3.1   Wiring the power supply module

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 provides connection of the input voltage to the power supply module with touch protection.

- The power connector provides permanent wiring.

- The power connector features an internal strain relief.

- A coding element is used on the power connector to assign it to a specific type of power supply module. A connector coded for 230V AC cannot be inserted into 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.

Cables

You need flexible cables to wire power to the power supply module. The conductor cross-section must be 1.5 mm² (AWG: 16). You must fuse conductors with a cross-section of 1.5 mm² externally with a 16 A circuit breaker (B or C characteristic). 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.

Note

You can operate the PS 60W AC in vertical mode at 120V AC/DC in the first segment only. The clearance next to the PS should be at least 70 mm; see the figure below.
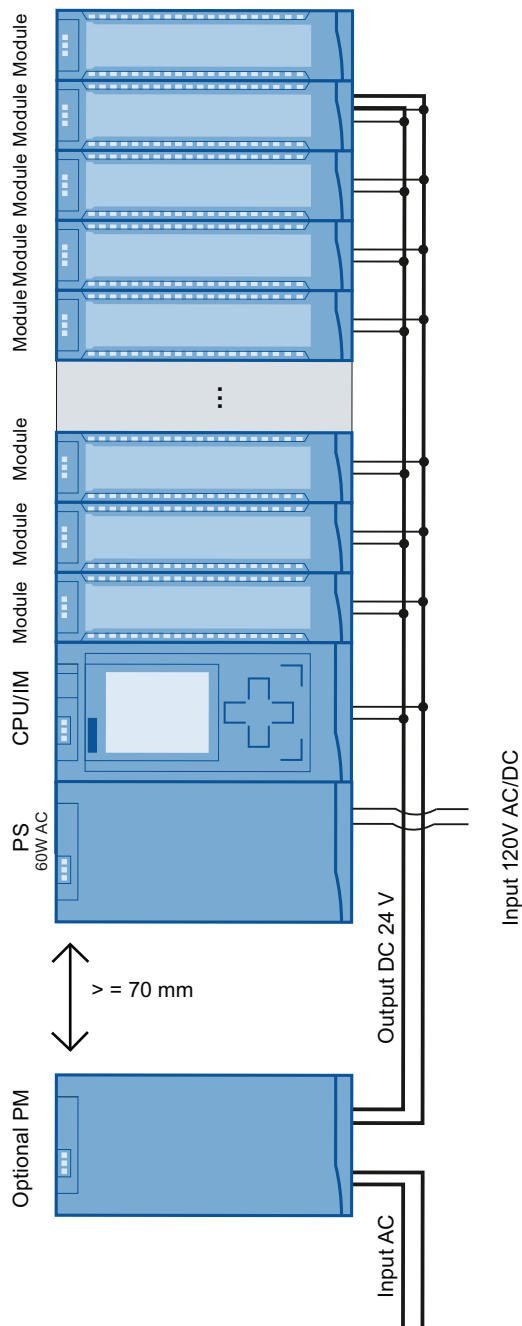

Figure 3-1   Vertical mode

Reference

For information on installation of the power supply module and wiring of the power connector, refer to the system manual S7-1500 automation system (http://support.automation.siemens.com/WW/view/en/59191792).

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

4.1   Parameters

Parameters of the PS 60W 120/230V AC/DC

Specify the module properties at the various parameters in the course of your STEP 7 parameterization. The following table lists the configurable parameters.

The parameters you define in the user program are transferred to the module by means of WRREC instruction (Configuration in RUN); see chapter Parameter data record (Page 29).

Table 4- 1   Configurable parameters and their defaults

Parameters	Range of values	Defaults	Configuration in RUN
Diagnostic/maintenance			
• Supply voltage missing	Yes/No	No	Yes
• Switch position Off	Yes/No	No	Yes

Note

Diagnostic alarms without supply voltage

Regardless of whether the supply voltage is missing or the On/Off switch is set to "Off", the power supply module of the CPU or the IM is still capable of generating diagnostic alarms because it is provided sufficient power from the backplane bus. The entire diagnostic functionality is still available.

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 120/230V AC/DC.

①   RUN LED
②   ERROR LED
③   MAINT LED
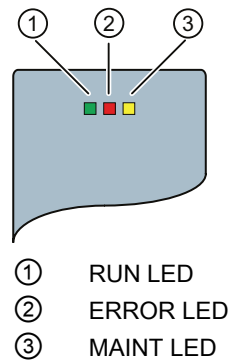
Figure 5-1   LED displays of the PS 60W 120/230V AC/DC

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 21).

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 • 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 • Supply voltage missing and diagnostics is enabled • Internal error	Evaluate diagnostic alarms and take appropriate remedial measures; see chapter Diagnostic alarms (Page 21)
□ Off	Not relevant	■ On	Maintenance request, PS returns no bus voltage • 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.	3	Check PS load. Isolate PS from mains. Wait one minute before you power on the PS again.
Overvoltage backplane bus	267$_D$	010B$_H$	High EMC interference or a defective PS, CPU or IM inserted.	3	Eliminate electromagnetic interference. Check inserted modules and bus connectors. Isolate PS from mains. Wait one minute before you power on the PS again.
Low voltage/overload in the power segment	281$_D$	0119$_H$	A voltage dip below the valid limit has been detected in the power segment to the right of the PS.	2	Check the modules in the affected segment; replace if necessary. Switch off the PS at the switch, then switch on again.
Error in the power segment	282$_D$	011A$_H$	PS or module to the right of the PS is defective.	2	Replace the defective module. Switch off the PS at the switch, then switch on again.
Safety shutdown	285$_D$	011D$_H$	Reliable operation of the module is no longer guaranteed.	3	Check ambient conditions. Isolate PS from mains. Wait one minute before you power on the PS again.

Diagnostic alarm	Error code		Meaning	Reaction	Remedial measures
	Dec.	Hex.			
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

1. No power at the power segment to the right of the PS. Alarm is only generated if the PS is still powered by the CPU or IM via the backplane bus.

2. The modules to the right of the PS are switched off.

3. 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
- Low voltage/overload in the power segment
- Error in the power segment
- 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 6

Technical specifications of the PS 60W 120/230V AC/DC

	6ES7507-0RA00-0AB0
Product type designation	PS 60W 120/230V AC/DC
General information	
Hardware version	E01
Firmware version	V1.0.0
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	V12.0 / V12.0
STEP 7 can be configured/integrated as of version	V5.5 SP3 or higher
FH technology	
Redundancy	
• Capable of redundancy	Yes
• For increasing performance	Yes
Supply voltage	
Type of supply voltage	AC/DC
• Rated value (DC)	120 V / 230 V
• Valid range low limit (DC)	88 V
• Valid range high limit (DC)	300 V
• Rated value (AC)	120 V / 230 V
• Valid range low limit (AC)	85 V
• Valid range high limit (AC)	264 V
• Short-circuit protection	Yes
Mains frequency	
• Rated value 50 Hz	Yes
• Valid range, low limit	47 Hz
• Valid range, high limit	63 Hz
Power failure backup	
• Power failure backup time	20 ms

	6ES7507-0RA00-0AB0
Input current	
• Rated value at 120 V DC	0.6 A
• Rated value at 230 V DC	0.3 A
• Rated value at 120 V AC	0.6 A
• Rated value at 230 V AC	0.34 A
Output current	
• Short-circuit protection	Yes
Power	
• Power feed to the backplane bus	60 W
Power loss	
• Power loss at rated conditions	12 W
Interrupts/diagnostics/status information	
• Status display	Yes
Electrical isolation	
• Primary/secondary	Yes
Insulation	
Insulation tested with	2500 V DC 2s (routine test)
EMC	
Immunity to surge voltages	
• on the supply lines in accordance with IEC 61000-4-5	Yes; +/- 1 kV (according to IEC 61000-4-5; 1995; symm. surge), +/- 2 kV (according to IEC 61000-4-5; 1995; unsymm. surge), no external protective circuit required
Degree of protection and protection class	
Degree of protection to EN 60529	IP20
• Protection class	1; with ground conductor
Dimensions	
• Width	70 mm
• Height	147 mm
• Depth	129 mm
Weights	
• Weight, approx.	600 g

Dimensional drawing A

A.1 Dimensional drawing

Dimensional drawing of the PS 60W 120/230V AC/DC

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.
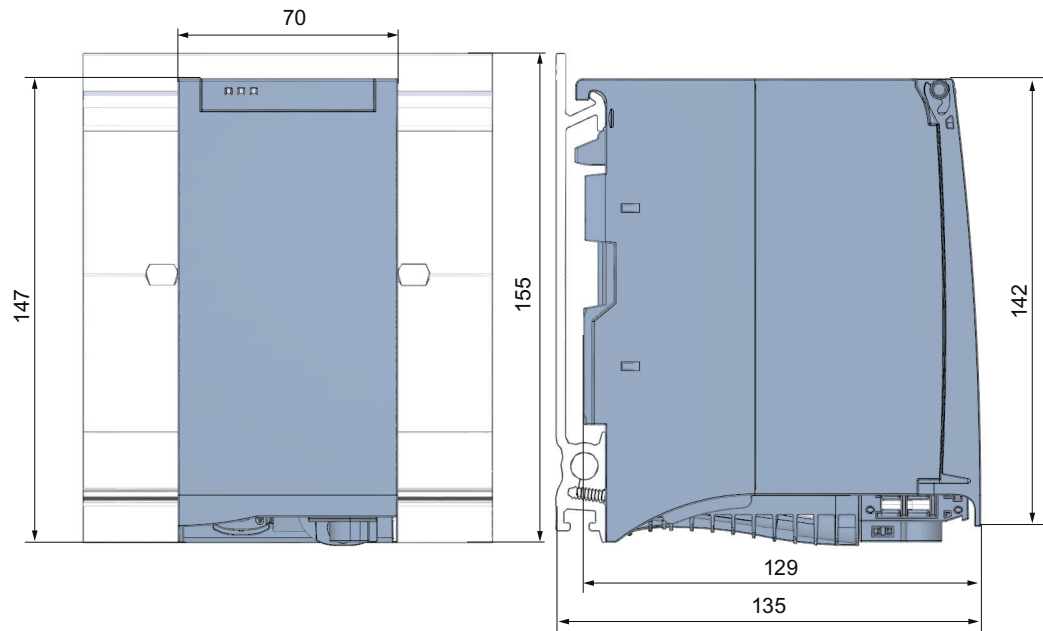

Figure A-1   Dimensional drawing of the PS 60W 120/230V AC/DC module

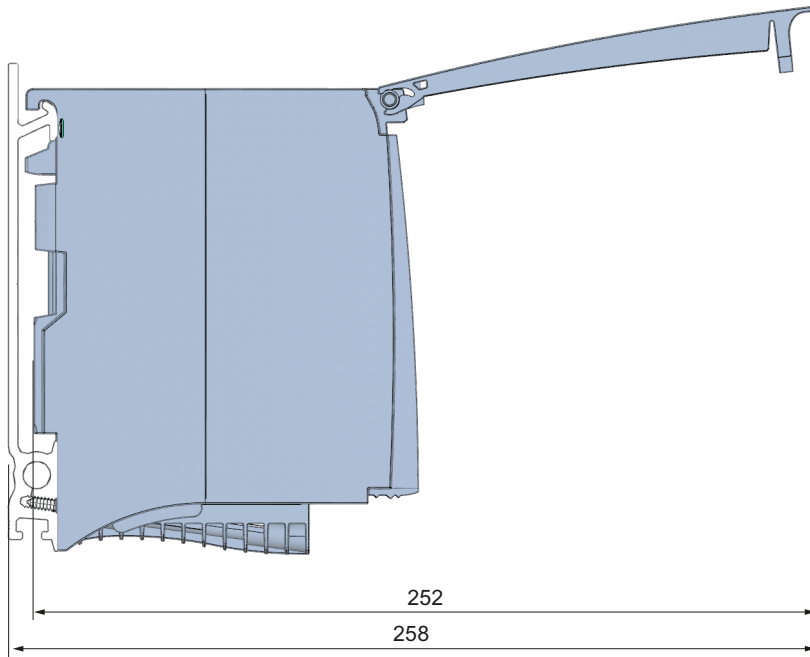This figure shows the dimensions of the module with open front panel.

Figure A-2   Dimensional drawing of the PS 60W 120/230V AC/DC module, side view with open front panel

Parameter data record

<div style="text-align: right; font-size: 3em;">B</div>

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 for the power supply module are contained in data record 0. You can use the WRREC instruction to transfer the configurable parameters 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
224D 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 Error in the net data (parameters) entered in the data record	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.
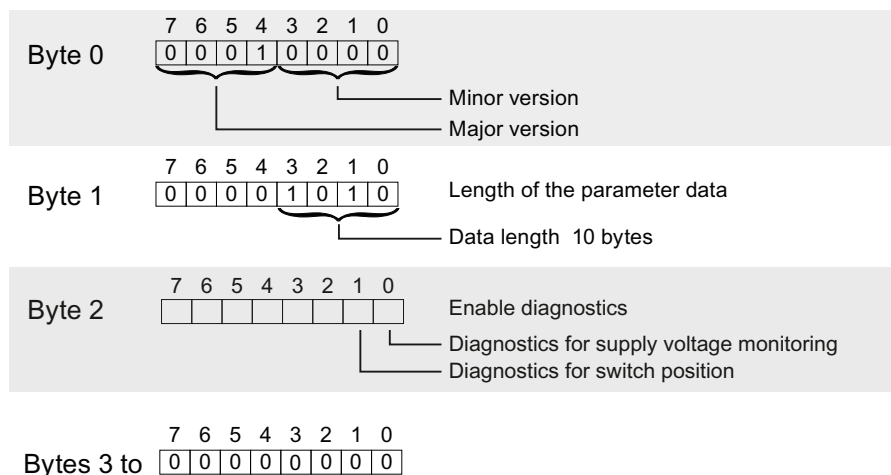
You are not permitted to change byte 0, byte 1 or bytes 3 to 11.

Figure B-1   Structure of data record 0