SIEMENS

SIMATIC

PC Adapter USB

Manual

Edition 01/2004
A5E00166353-03

Safety Guidelines

This manual contains notices intended to ensure personal safety, as well as to protect the products and connected equipment against damage. These notices are highlighted by the symbols shown below and graded according to severity by the following texts:

Danger
indicates that death, severe personal injury or substantial property damage will result if proper precautions are not taken.

Warning
indicates that death, severe personal injury or substantial property damage can result if proper precautions are not taken.

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

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

Notice
draws your attention to particularly important information on the product, handling the product, or to a particular part of the documentation.

Qualified Personnel

Only **qualified personnel** should be allowed to install and work on this equipment. Qualified persons are defined as persons who are authorized to commission, to ground and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

Correct Usage

Note the following:

Warning
This device and its components may only be used for the applications described in the catalog or the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens.

This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

Trademarks

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Third parties using for their own purposes any other names in this document which refer to trademarks might infringe upon the rights of the trademark owners.

Preface

Purpose of the Manual

This manual gives you a complete overview of PC Adapter USB. It guides you when installing and commissioning the software and hardware. It also describes the operation and hardware installation requirements, as well as, the connection of the Adapter to MPI/DP networks.

This manual is intended for the programmers and for those responsible for configuring, commissioning, and servicing automation systems.

Required Basic Knowledge

You require a general knowledge in the field of automation engineering to be able to understand this manua.

In addition, you should know how to use computers or devices with similar functions (e.g programming devices) under Windows 2000 or Windows XP operating systems.

Where is this Manual valid?

This manual is valid for the product PC Adapter USB.

Certification

PC Adapter USB have the following certification:

- Underwriters Laboratories, Inc.: UL 60950 registered and Canadian Standard C22.2 No. 60950 (Information Technology Equipment)

CE Labeling

PC Adapter USB fulfil the requirements and protection guidelines of the following EU directives:

- EC Directive 89/336/EWG "EMC directive"

CTick Mark

 PC Adapter USB is compliant with requirements of the AS/NZS 3548 (Australian and New Zeeland) standard.

Further Support

If you have any technical questions, please get in touch with your Siemens representative or agent responsible.

You will find your contact person at:

http://www.siemens.com/automation/partner

Training Centers

Siemens offers a number of training courses to familiarize you with the SIMATIC S7 automation system. Please contact your regional training center or our central training center in D 90327 Nuremberg, Germany for details:

Telephone: +49 (911) 895-3200.

Internet: http://www.sitrain.com

A&D Technical Support

Worldwide, available 24 hours a day:

Worldwide (Nuernberg) Technical Support		
24 hours a day, 365 days a year Phone: +49 (180) 5050-222 Fax: +49 (180) 5050-223 E-Mail: adsupport@ siemens.com GMT: +1:00		
Europe / Africa (Nuernberg) Authorization	United States (Johnson City) Technical Support and Authorization	Asia / Australia (Beijing) Technical Support and Authorization

Local time: Mon.-Fri. 8:00 to 5:00 PM
Phone: +49 (180) 5050-222
Fax: +49 (180) 5050-223
E-Mail: adsupport@
            siemens.com
GMT: +1:00
	Local time: Mon.-Fri. 8:00 to 5:00 PM
	Phone: +1 (423) 262 2522
	Fax: +1 (423) 262 2289
	E-Mail: simatic.hotline@
	            sea.siemens.com
	GMT: -5:00
		Local time: Mon.-Fri. 8:00 to 5:00 PM
		Phone: +86 10 64 75 75 75
		Fax: +86 10 64 74 74 74
		E-Mail: adsupport.asia@
		            siemens.com
		GMT: +8:00

The languages of the SIMATIC Hotlines and the authorization hotline are generally German and English.		

Service & Support on the Internet

In addition to our documentation, we offer our Know-how online on the internet at:

http://www.siemens.com/automation/service&support

where you will find the following:

- The newsletter, which constantly provides you with up-to-date information on your products.

- The right documents via our Search function in Service & Support.

- A forum, where users and experts from all over the world exchange their experiences.

- Your local representative for Automation & Drives..

- Information on field service, repairs, spare parts and more under "Services".

Contents

1 Properties of the PC Adapter USB

The PC Adapter USB is compatible with USB V1.1 and satisfies the requirements for "Low-Powered" USB devices. The SIMATIC PC Adapter USB supports the energy saving mode (hibernate mode).

1.1 Function

The SIMATIC PC Adapter USB connects a PC to the MPI/DP interface of an S7/M7/C7 system via USB.

A slot is not required in the PC, which means that the adapter can also be used for non-expandable PCs such as notebooks.
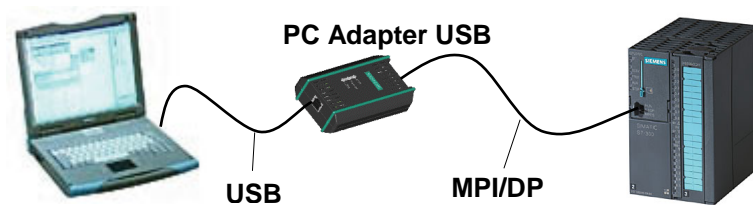

PC Adapter USB

USB

MPI/DP

Fig. 1-1:   Configuration with PC Adapter USB

Note

Only one PC Adapter USB can be used on a PC.

1.2   Performance specifications

The PC Adapter USB can be used on MPI and PROFIBUS networks. Starting at firmware V1.1, the PC Adapter USB can also be operated on homogeneous PPI networks.

The following table shows the transmission rates and network types supported by the PC Adapter USB.

Table 1: Bus profile and transmission rates

Transmission rate	MPI	PPI	PROFIBUS			
			DP	**Standard**	**Universal**	**User-defined**
9.6 kbps	-	✓	✓	✓	✓	✓
19.2 kbps	✓	✓	✓	✓	✓	✓
45.45 kbps	-	-	✓	✓	-	✓
93.75 kbps	-	-	✓	✓	✓	✓
187.5 kbps	✓	✓	✓	✓	✓	✓
0.5 kbps	-	-	✓	✓	✓	✓
1.5 kbps	✓	-	✓	✓	✓	✓

Other performance features

- Automatic bus profile detection
- Up to 16 communication connections, of those up to 4 slaves (DP/T connections)
- Routing support

2 Package Components

The SIMATIC PC Adapter USB package includes:

- One "SIMATIC Software PC Adapter USB" CD containing the software and documentation
- One USB cable (5 m)
- One MPI cable (0.3 m)

The MPI cable can be used to connect the PC Adapter USB to MPI, homogeneous PPI or PROFIBUS (DP) networks.

Spare parts

Spare parts	Order number
USB cable (5 m)	A5E00276884
MPI cable (0.3 m)	A5E00164946

You can forward your spare parts orders to your local Siemens partner.

3 Requirements for Operation

3.1 Software requirements

One of the following operating systems must be installed on the PC in order to be able to operate the SIMATIC PC Adapter USB:

- Windows 2000
- Windows XP Professional
- Windows XP Home

and

- a SIMATIC software package that communicates via MPI (for example, STEP 7)

To operate the PC Adapter USB on a PPI network, you also need the STEP 7-Micro/Win32 SW package.
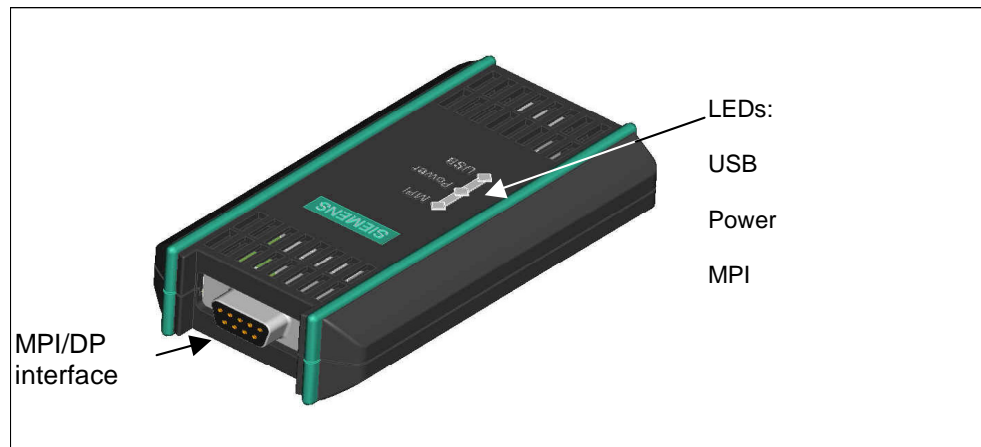
3.2 Hardware requirements

You require a PC with a USB interface and a CD ROM drive.

4 Hardware Design of the PC Adapter USB

4.1 Connections

Connections on the PC Adapter USB:

USB interface

MPI/DP interface

LEDs:

USB

Power

MPI

4.2 LEDs on the PC Adapter USB

The LEDs on the PC Adapter USB indicate the following:

Name	Color	Meaning
USB	green	Lights up when the PC Adapter USB is connected to the USB and the operating system of your PC is in normal operating mode. This LED is not lit when the PC is in standby or idle mode. The LED flickers when data are being transferred.
POWER	green	Lights up when the PC Adapter USB is supplied with the necessary power. Flashes when a hardware fault is detected.
MPI	green	Lights up when the PC Adapter USB is connected to the MPI/DP network and is operational. The LED flashes when data are transferred on the MPI/DP network. The LED is off when no firmware has been loaded in the PC Adapter USB.

The LED displays for error states are described in Chapter 8 Error Diagnostics.

4.3 Power supply

The PC Adapter USB is supplied with power by the automation system via the MPI cable included in the delivery.

It requires 24 V (see the technical data).

⚠ **Caution**

Always connect the PC Adapter USB to power supplies with limited power or NEC Class 2.

UL cable, AWM 2464, 80°C, 300 V, 28 AWG, VW-1.

Fig. 1:   MPI cable, 0.3 m with 9-pin sub-D connectors.

⚠ **Warning**

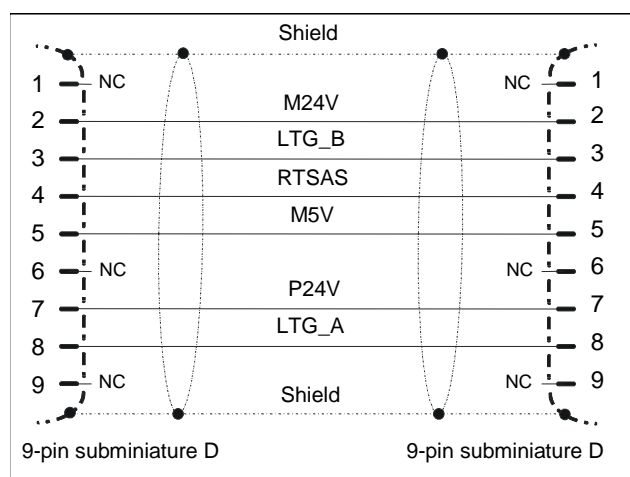Always use the MPI cable included with your PC Adapter USB.
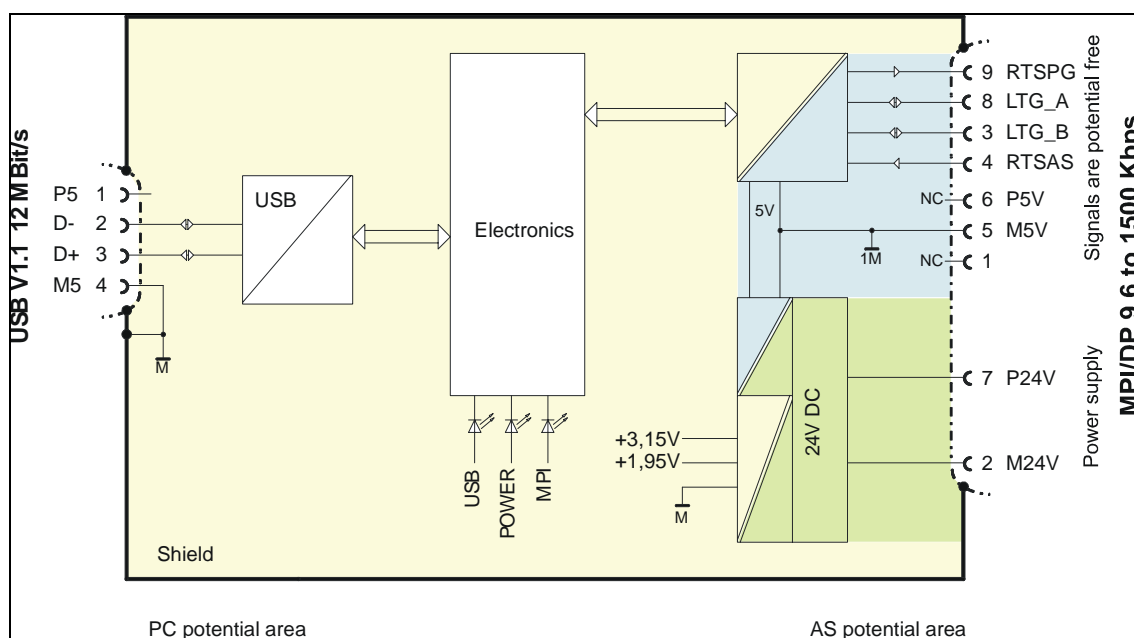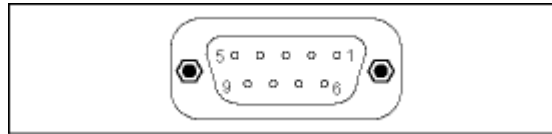
Fig. 2:   MPI cable (0.3 m)

Fig. 3:   Block diagram

The MPI/DP and USB interfaces of the PC Adapter USB are electrically isolated within a safety extra low-voltage circuit (SELV). It can therefore be operated directly on ungrounded S7/M7/C7 systems.

4.4 MPI/DP interface

Pin assignment

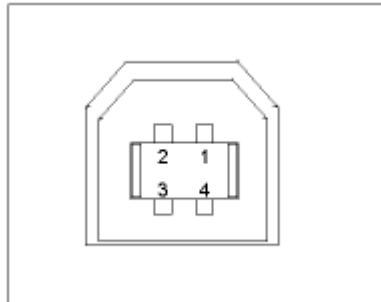Pin assignment of the MPI/DP interface:

Description of signals

Pin no.	Short name	Meaning	Input / Output
1	NC	Not connected	–
2	M24V	Zero volt of the 24 V power supply, provided by the electronic DC/DC circuit of the adapter (AS potential range)	Input
3	LTG_B	Data line B	Input / Output
4	RTS_AS	RTSAS control signal for receive data current. The signal is active '1' when the directly connected AS is transmitting data.	Input
5	M5V	Reference potential of the MPI/DP interface for the RTS_AS and RTS_PG signals	Input
6	P5V	Not connected	
7	P24V	Zero volt of the +24 V power supply, provided by the electronic DC/DC circuit of the adapter (AS potential range)	Input
8	LTG_A	Data line A	Input / Output
9	RTS_PG	Adapter's RTS output signal. The signal is '1' when the adapter is transmitting data. The signal is not contained in the 0.3 m MPI cable!	Output
Shielding		on connector housing*	

*   The shielding is interconnected with the USB interface via the adapter electronic module.

4.5 USB interface

Interface pin assignments

Top view of the USB socket:

Description of signals

Pin no.	Signal	
1	+5V	Power supply
2	-Data	- Differential signal
3	+ Data	+ Differential signal
4	Ground	Ground

> ⚠ **Caution**
>
> Operating several USB devices on your PC may effect the data transmission rates. To obtain optimum communication performance with the automation system, disconnect USB devices that are not required.

5 Working with the PC Adapter USB

5.1 Technical safety notes

Qualified personnel

The device should only be accessed by qualified personnel. Qualified personnel as referred to in safety guidelines in this documentation are persons who are authorized to commission, ground, and tag circuits, equipment, and systems in accordance with established safety practice.

Use as intended:

> ⚠ **Warning**
>
> The equipment/system or the system components may only be used for the applications described in the catalog or the technical description, and only in combination with the equipment, components, and devices of other manufacturers as far as this is recommended or permitted by Siemens.
>
> The product will function correctly and safely only it is transported, stored, set up, and installed as intended, and operated and maintained with care.

5.2 Installation of the software

Setup runs the installation of the PC Adapter USB software automatically after you insert the CD.

If the autorun function is disabled, proceed as follows:

1. Insert the CD for your PC Adapter USB into the CD-ROM drive.

2. Open the root directory of this drive.

3. Double-click "setup.exe" to run Setup.

Setup is menu controlled. Please note the readme file in the root directory on the CD for information on the installation and use of your PC Adapter USB.

5.3 Configuring the PG / PC interface

You are prompted to configure the PG / PC interface during setup.

1. Check the PG / PC interface dialog box for the following interface settings.

   The following items should be available in the selection list:

   - PC Adapter (Auto) (only when STEP 7 is installed)

   - PC Adapter (MPI)

   - PC Adapter (PPI) (only if STEP 7-Micro/Win has been installed)

   - PC Adapter (PROFIBUS)

   If this is not so:

   - Click "Select..." to add / remove interfaces. This opens a dialog box for installing / uninstalling interfaces.

   - Select the PC Adapter module from the list and install it. Click "Close" to exit the dialog box.

4. Now select the interface configuration in the PG / PC interface dialog box with which you intend to communicate, for example, the PC Adapter (MPI). Click "Properties".

5. In the Properties dialog box of the PC Adapter (see table below), check if the parameter settings fit your system configuration, and change the settings if necessary:

Interface configuration	check in the tab
PC Adapter (Auto)	Auto-detection of the bus profile
PC Adapter (MPI)	MPI
PC Adapter (PPI)	PPI
PC Adapter (PROFIBUS)	PROFIBUS

6. The properties dialog box for the PC Adapter (MPI) appears. Select the local connection tab. Set USB in the COM port selection box (or connection to:).

7. Close this properties dialog box by clicking "OK".

8. Click OK to close the PG / PC interface dialog box.

9. A warning appears if you have changed an access path during the configuration. Acknowledge the message with OK to accept the changes.

5.4   Connecting the PC Adapter USB

Connecting to the PC

1. Insert the supplied USB cable into the USB port of your PC.

2. Plug the other end of the USB cable into PC Adapter USB.

Connecting to the PLC

1. Insert the supplied MPI cable into the PC Adapter USB and screw-tighten it.

2. Insert the other end of the MPI cable into the MPI port of your CPU and screw-tighten it.

Note

The adapter and the S7/M7/C7 system each represent a network node.

- In networks consisting of two nodes (adapter and S7/M7/C7 system), the adapter is connected directly to the socket of the S7/M7/C7 system.

- When the network contains more than two nodes, the adapter should be connected to the "PG socket" of a PROFIBUS connector (SINEC L2 bus connector). You do not need to change the settings of the terminating resistors.

Caution

Do not connect the SIMATIC PC Adapter USB to the automation system with any other cable than the supplied MPI cable.

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6 PC Adapter USB on the MPI/DP Network

6.1 General

A maximum of 32 nodes can be connected to an MPI/DP network segment. The total cable length may not exceed 50 meters. Several network segments can be connected together using RS485 repeaters, thus allowing a maximum number of 127 network nodes. The maximum data transmission rate in the MPI/DP network is 12 Mbps.

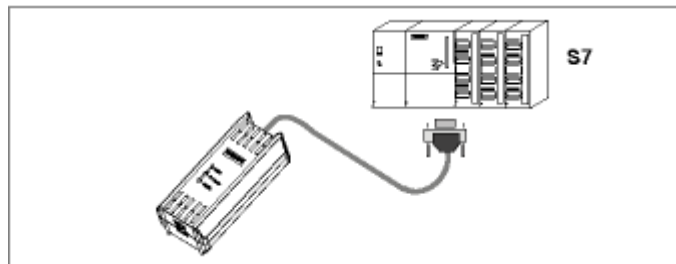The PC Adapter USB supports transmission rates up to 1.5 Mbps.

⚠ **Warning**

An extension cord should not be interconnected between the adapter and the S7/M7/C7 system.
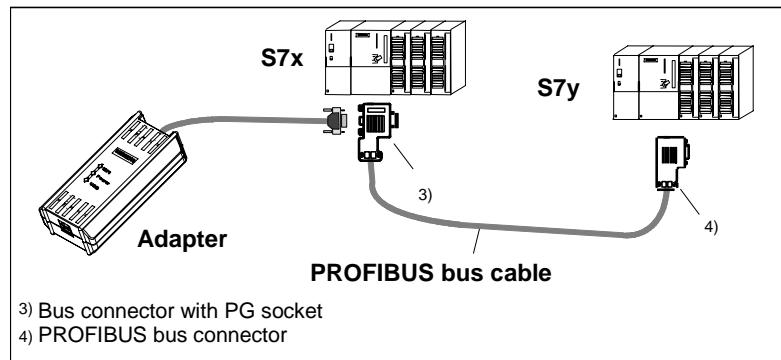
6.2 Use as a stand-alone system

The following illustration shows the connection to a stand-alone system (2 network nodes).

6.3　Use in a networked system

The following illustration shows the connection in a networked S7 system (MPI/DP network containing 2 or more network nodes).

3) Bus connector with PG socket
4) PROFIBUS bus connector

Once you have completed the installation and configuration of the PG / PC interface, you can communicate with the PLC using your SIMATIC software package.

7 Firmware Update

The firmware of the PC Adapter USB can be updated, for example, when new functions have been added.

How to update the firmware:

- Download the latest firmware and the firmware update utility from the Internet:

  http://www.siemens.de/automation/simatic-cs

- Search the product support area for the term "PC Adapter USB".

- Download the self-extracting EXE file containing the available firmware and the firmware update utility to your PC.

- Unzip the files to a local drive, then run the *.exe file to update your PC Adapter USB firmware. Follow the instructions on the screen.

- Please read the readme file in the "Firmware" folder of the firmware update utility. It contains notes about the installation and use of the latest firmware.

Note

The latest firmware and the firmware update utility is available on your "SIMATIC Software PC Adapter USB" CD in the "Firmware" folder at the time of delivery.

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8 Error Diagnostics

The information in the following section offers support to help you locate and perhaps correct common errors by yourself.

Error / cause	To avoid or correct errors
The power LED is not lit	
• MPI cable not connected • The PLC is switched off • Hardware error	• Connect the MPI cable • Switch on the PLC • Inform Customer Support
The USB LED is not lit	
• USB cable not connected • PC and PC Adapter USB are in energy saving mode (hibernate mode). • The PC can not find the PC Adapter USB	• Connect the USB cable • permitted operating mode • Check your driver installation, and install it if necessary
The MPI LED is not lit	
• The MPI cable not connected • Firmware not loaded	• Connect MPI cable • Start the supplied firmware update utility and check if the firmware is loaded.
None of the LEDs is lit	
• MPI cable not connected • The required 24 V DC are not wired to the MPI socket • Hardware error	• Connect the MPI cable • Check the wiring • Inform Customer Support
The power LED flashes continuously	
• Hardware error	• If the POWER LED of the device continues to flash continuously even after pulling and plugging the MPI cable several times, the device is defective and should be replaced.

9 Technical Data

PC Adapter USB	
Order no.	6ES7972-0CB20-0XA0
Dimensions	Approx. 105 x 58 x 26 mm
Weight	Approx. 250 g
Interfaces	
to S7 / M7 / C7 to PC	RS485 (max. 1.5 Mbps) USB (12 Mbps)
Power supply (via MPI interface)	24 V DC (SELV) (18V.. 30 V DC)
Power consumption	50 mA (typically) / 100 mA (max.)
Inrush current	Imax. 700 mA; 8µs
Safety	
Safety class	Safety class III conforming to IEC 60950
Safety requirements	IEC 60950 corresponds to DIN/EN 60950
Degree of protection	IP 20
Electromagnetic compatibility (EMC	
Noise emission	Limit value class B according to EN 55022
Noise immunity on signal lines	2 kV (according to IEC 61000-4-4; burst; length > 3m)
Immunity to discharge of static electricity (ESD)	6 kV, contact discharge (according to IEC 61000-4-2 8 kV, air gap discharge (according to IEC 61000-4-2
RF immunity	10 V/m 80 - 1000 MHz, 80% AM (to IEC 61000-4-3) 10 V/m 900 MHz, 1.89 GHz, 50% ED (to IEC 61000-4-3)
RF conductance	10 V 9 kHz - 80 MHz (to IEC 61000-4-6)
Climatic conditions	
Temperature Operation Storage / shipping	Tested according to DIN EN 60068-2-2, DIN IEC 60068-2-1 +0 °C to +60°C, temperature change max. 10 K/h –20°C to +60°C, temperature change max. 20 K/h
Relative humidity Operation Storage / shipping	Tested according to DIN IEC 60068-2-3, DIN IEC 60068-2-30, DIN IEC 60068-2-14 5% to 80% at 25°C (no dewing) 5% to 95% at 25°C (no dewing)

PC Adapter USB	
Mechanical ambient conditions	
Vibration	Tested according to DIN IEC 60068-2-6
Operation	10 to 58 Hz: amplitude 0.075 mm, 58 to 500 Hz: acceleration 9.8 m/s
Storage / shipping	5 to 9 Hz: amplitude 3.5 mm, 9 to 500 Hz: acceleration 9.8 m/s
Shockproof	Tested according to DIN IEC 60068-2-27/29
Operation	150 m/s, 11 ms, 100 shocks
Storage / shipping	250 m/s, 6 ms, 1000 shocks

A   Appendix

A.1   Certificates, Directives and Declarations

Notes on the CE Label

$\mathsf{C}\mathsf{E}$ The following applies to the SIMATIC product described in this documentation:

EMC directive

This product fulfills the requirements for the EC directive 89/336/EEC on "electromagnetic compatibility" and the following fields of application apply according to this CE label:

Fields of application	Requirement for	
	Noise emission	Noise Immunity
Residential and commercial areas and small businesses.	EN 61000-6-3: 2001	EN 61000-6-1: 2001
Industry	EN 61000-6-4: 2001	EN 61000-6-2: 2001

Declaration of Conformity

The EC declarations of conformity and the documentation relating to this are available to the authorities concerned, according to the above EC directive, from:

Siemens AG
Automation and Drives
A&D AS RD 4
PO Box 1963
D–92209 Amberg, Germany
Phone: +49 9621 80 3283
Fax: +49 9621 80 3278

Observing the installation guidelines

The installation guidelines and notes on safety given in the manual must be observed at startup and during operation.

Connecting I/O devices

Noise immunity when connected to industrial standard PC conforms with the
requirements of EN 61000-6-2:2001.

A.2 Certification for the USA, Canada and Australia

One of the following markings on a device is indicative of the corresponding approval:

	Underwriters Laboratories (UL) according to the UL 60950 standard, and Canadian standard C22.2 No. 60950 (I.T.E) or to UL508 and C22.2 No. 142 (IND.CONT.EQ)
	UL Recognition Mark

EMC

Australia and New Zealand

 This product meets the requirements of the AS/NZS 3548 Standard.

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