

CyBox GW-P

WIRELESS GATEWAY

INSTALLATION MANUAL

REVISION

Revision	Changes	Date
0.0	Initial version	22.01.2019
0.1	Safety Information extended	24.04.2019
0.2	Order in Figure 3 changed.	18.09.2020

DISCLAIMER

Copyright

© 2017 ELTEC Elektronik AG. The information, data, and figures in this document including respective references have been verified and found to be legitimate. In particular in the event of error they may, therefore, be changed at any time without prior notice. The complete risk inherent in the utilization of this document or in the results of its utilization shall be with the user; to this end, ELTEC Elektronik AG shall not accept any liability. Regardless of the applicability of respective copyrights, no portion of this document shall be copied, forwarded or stored in a data reception system or entered into such systems without the express prior written consent of ELTEC Elektronik AG, regardless of how such acts are performed and what system is used (electronic, mechanic, photocopying, recording, etc.). All product and company names are registered trademarks of the respective companies.

Our General Business, Delivery, Offer, and Payment Terms and Conditions shall otherwise apply.

Federal communications commission statement

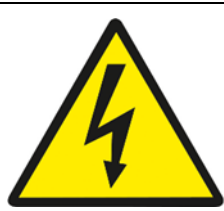
- ↷ This device complies with FCC Rules Part 15. Operation is subject to the following two conditions:
- ↷ This device may not cause harmful interference, and
- ↷ This device must accept any interference received including interference that may cause undesired operation.
- ↷ This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try correct the interference by one or more of the following measures:
 - ↷ Reorient or relocate the receiving antenna.
 - ↷ Increase the separation between the equipment and receiver.
 - ↷ Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
 - ↷ Consult the dealer or an experienced radio/TV technician for help.
- ↷ The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Canadian department of communications statement

- This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.
- This class B digital apparatus complies with Canadian ICES-003.

SAFETY INFORMATION

Electrical safety

**WARNING**

The device can be operated with voltages over 60V DC.
Incorrect handling risks causing a fatal electrical shock.

Before connecting the power supply, connect the device to protective earth

General advice:

- To prevent the risk of electric shock, turn off the external power supply and remove the power supply cable from the electrical outlet before handling or disassembling the system.
- When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add device.
- Before connecting or removing signals cables from motherboard, ensure that all power cables are unplugged.
- Make sure that your power supply is set to the correct voltage in your area. If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your retailer.

Operation safety



WARNING

The device can become very hot during operation ($> 80^{\circ} \text{C}$).
Make sure it is protected from accidental contact.
The device must be installed so that it is not accessible to children.
Allow only appropriate trained personal to handle the devices.

To prevent burns, switch off the device and allow to cool down for half an hour before disassembling or working on it

- Before installing the device and connecting cables to it, carefully read the related manuals.
- Before using the device, make sure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter technical problems with the product, contact a qualified service technician or your retailer.

RECYCLING

Please recycle packaging environmentally friendly:



Packaging materials are recyclable. Please do not dispose packaging into domestic waste but recycle it.

Please recycle old or redundant devices environmentally friendly:



Old devices contain valuable recyclable materials that should be reutilized. Therefore please dispose old devices at collection points which are suitable.

CONTENTS

1	About This Document	1
2	Overview	2
2.1	Main Features	2
2.2	Description	2
3	Hardware Description	3
3.1	Connectors	3
3.1.1	Power Supply Connector	3
3.1.2	Ethernet Connectors	3
3.1.3	Antenna Connectors	4
3.2	Power Supply	5
3.2.1	Local Power Input	5
3.3	M12 service interface (USB and serial ports)	5
3.4	Front plate and module to antenna distribution	6
3.4.1	Correspondence Front plate / Software	6
3.5	LED Indicators	7
3.5.1	Power LED Status	7
3.5.2	Status LEDs 1	7
3.5.3	Status LEDs 2	7
3.5.4	Modules 1-5 Status	7
3.5.5	LAN LEDs	8
3.6	Reset Switch	8
3.7	SIM Cards	8
4	Mounting the CyBox GW-P	9
4.1	Connecting an Earthing Cable	10
4.2	Electrical Connection	10

LIST OF TABLES

Table 1	Pin Assignment of the Power Supply Connector (PWR)	3
Table 2	Pin Assignment of M12 Ethernet Connectors (LAN 1, 2)	3
Table 3	Pin Assignment of the M12 service connector	5
Table 4	Front plate antenna description overview	6
Table 5	Power LED Status	7
Table 6	Status Leds	7
Table 7	Status Leds	7
Table 8	Modules 1 LED Status	7
Table 9	LAN LEDs	8
Table 10	Reset Switch Behavior	8

LIST OF FIGURES

Figure 1	Front Panel LED Indicators	6
Figure 2	Dimensions of the CyBox GW-P housing	9
Figure 3	Earth cabel mounting on Earth Stud	10

1 About This Document

This installation manual is intended only for system developers and integrators; it is not intended for end users.

It describes the hardware functions of the product, connection of peripheral devices and integration into a system. Additional information for special applications and configuration of the product is available in a separate configuration manual.

2 Overview

2.1 Main Features

- ↘ IEEE802.11a/b/g/n/ac compliant
- ↘ Simultaneous operation on 2.4 GHz and 5 GHz frequencies possible
- ↘ Integrated 2-Port Gigabit Ethernet ports
- ↘ Designed for harsh industrial and mobile applications
- ↘ -40 to +70 °C operating temperature
- ↘ EN 50155 compliant
- ↘ Integrated firmware for management and configuration

2.2 Description

CyBox GW-P is a member of the new family of robust industrial Ethernet access points and wireless gateways. It is particularly designed to meet requirements of rolling stock and automotive applications. The mobile wireless gateway allows connecting multiple mobile wifi clients to gain access to the onboard Ethernet and / or to the internet via several available LTE / GSM modems onboard a passenger train or a long distance bus for example.

CyBox GW-P is capable of hosting up to 5 independent WLAN radios and up to 5 independent LTE / GSM modems, allowing operation of flexible wireless network configurations, including different frequency bands. The WLAN interfaces are fully compliant to IEEE 802.11a/b/g/n/ac, allowing a maximum wireless transmission rate of up to 1300 Mbps on each interface. The cellular modules support the latest 3G and 4G networks all around the world. On the fixed network side, the access point features two 10/100/1000 Mbps Ethernet ports with auto-negotiation and TX-crossover.

CyBox GW-P provides very flexible powering options. It can be supplied by a local 24-110 VDC power source; the power input is EN50155 compliant and tolerates an input voltage range from 16.8 V to 154 V. CyBox GW-P can optionally provide the capability to tolerate power interruptions up to 10 ms, compliant to EN50155, Class S2.

The robust IP30 housing can be deployed in industrial and mobile environments; it does not require forced air cooling in temperature ranges between -40 and +70 °C (EN50155, Class TX) and has no maintainable parts inside. CyBox GW-P is especially suited for use in rugged environments with regard to shock and vibration according to applicable DIN, EN or IEC industry standards.

The CyBox GW-P firmware provides a comfortable management interface through https service. Besides global setup parameters the software allows complete configuration of all of the wireless and wired interfaces, such as channel selection, SSID, encryption keys, and firewall setup. Configurations can be up- and downloaded and the complete management firmware can be upgraded.

3 Hardware Description

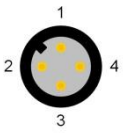
3.1 Connectors

3.1.1 Power Supply Connector

The electrical power can be supplied to the device using the A-coded M12 power connector, labeled PWR.

Table 1 shows the pin-assignment of the power supply connector.

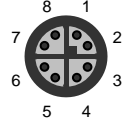
Table 1 Pin Assignment of the Power Supply Connector (PWR)

	Pin	Signal Name	Description
	1	+VIN	Supply Voltage, positive terminal
	2	+VIN	Supply Voltage, positive terminal
	3	-VIN	Supply Voltage, negative terminal
	4	-VIN	Supply Voltage, negative terminal

3.1.2 Ethernet Connectors

The two LAN-ports of the CyBox GW-P are utilizing X-coded (CAT-6A) M12 connectors with the pin-assignment as shown in Table 2. Mating connectors are available from several manufacturers.

Table 2 Pin Assignment of M12 Ethernet Connectors (LAN 1, 2)

	Pin	Signal Name
	1	D1+
	2	D1-
	3	D2+
	4	D2-
	5	D4+
	6	D4-
	7	D3-
	8	D3+

3.1.3 Antenna Connectors

The up to 17 QLS antenna connectors are located at bottom part of the front panel of the access point. The connectors labeled from A1 to A17. Their functionalities depend on the CyBox GW-P model (see 3.4.1 Correspondence Front plate / Software).

While connecting an antenna to the QLS connector, make sure that you hear a 'click' sound confirming proper mounting.

To remove an antenna, it has to be gently pulled from the basis of the connector with one hand, while the other hand is holding the antenna. Alternately, a screwdriver can be used as a lever arm at the basis of the antenna to make the removal easier, as illustrated below:

Step one:

Place the screwdriver between the connector and the access point



Step two:

Rotate and/or push the screwdriver while pulling on the antenna



3.2 Power Supply

3.2.1 Local Power Input

CyBox GW-P can be powered by a DC power source connected to the power supply connector, shown in Table 1. The nominal input voltage can vary between 24 V and 110 VDC.

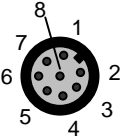
3.3 M12 service interface (USB and serial ports)

CyBox GW-P is equipped with USB and serial ports. The USB port can be used to attach a memory device to update the firmware or configuration of the wireless gateway.

Note that the USB port is a dedicated maintenance port. It is not designed to be used while the device is in operation inside rolling stock equipment.

Table 3 shows the pin-assignment of the power supply connector.

Table 3 Pin Assignment of the M12 service connector

	Pin	Signal Name	Description
	1	USB _{VCC}	USB positive power supply voltage
	2	USB _{D-}	USB positive data line
	3	USB _{D+}	USB negative data line
	4	USB _{GND}	USB negative power supply voltage
	5	n.c.	Not connected
	6	RS232-TX	Console Port Transmit Data
	7	RS232-RX	Console Port Receive Data
	8	RS232-GND	Console Port Ground

3.4 Front plate and module to antenna distribution

The figure below provides an overview of the front plate.

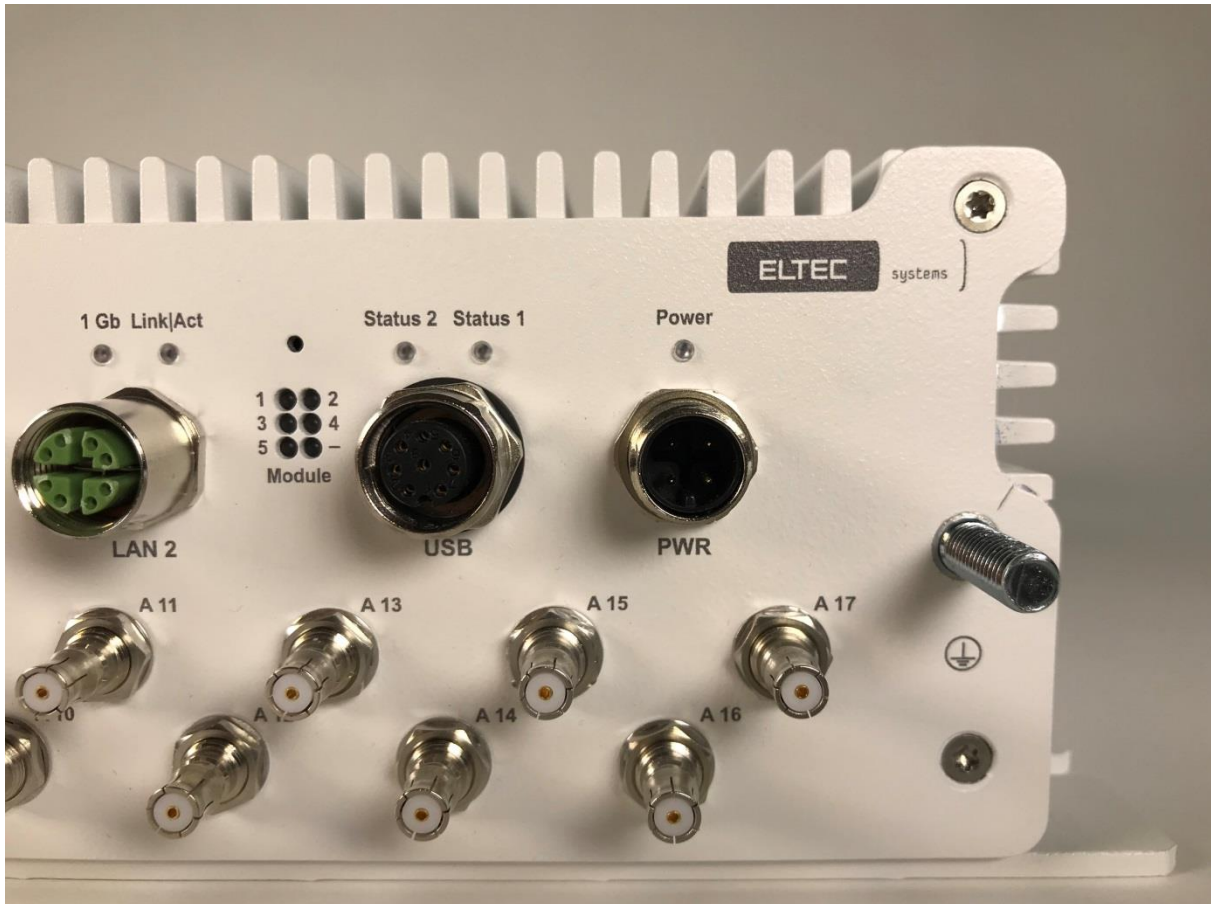


Figure 1 Front Panel LED Indicators

3.4.1 Correspondence Front plate / Software

- The ports and LEDs “LAN 1” & “LAN 2” correspond respectively to the interfaces “eth0” & “eth1”
- The LEDs “Module 1” to “Module 2” refer to WLAN and/or LTE modules
 - a WLAN module is called a “radio” in the software
 - a LTE module is called a “modem” in the software
- The purpose of antennas depends on the modules of your CyBox

Table 4 Front plate antenna description overview

CyBox models	Slot	Function	Antennas
--------------	------	----------	----------

CyBox GW-P 1090 / 1190	Slot 0	LTE	A15 – A17 Main / GPS / Aux
	Slot 1	LTE	A12 – A14 Main / GPS / Aux
	Slot 2	Wlan AC	A9 – A11
	Slot 3	Wlan AC	A6 – A8
	Slot 4	Wlan AC Wave 2	A2 – A5
	GPS	-	A1

3.5 LED Indicators

The LEDs on the front panel of CyBox GW-P provide quick indication of the device status.

3.5.1 Power LED Status

Table 5 **Power LED Status**

LED Color	State	Description
Green	On	Access point is receiving correct input power
Green	Off	Access point is not powered

3.5.2 Status LEDs 1

Table 6 **Status Leds**

LED Color	State	Description
Red	On	tbd
Green	Off	tbd

3.5.3 Status LEDs 2

Table 7 **Status Leds**

LED Color	State	Description
Red	On	tbd
Green	Off	tbd

3.5.4 Modules 1-5 Status

Table 8 **Modules 1 LED Status**

LED Color	State	Description
Green	On	Indicates Module 1 is in use

Green	Blink	Indicates Data Transfer on Module N
Green	Off	Indicates Module N is inactive

3.5.5 LAN LEDs

Table 9 LAN LEDs

1 Gb (green)	Link/Act (yellow)	Description
On	On	1 Gbit Link established
Off	Off	No Link
On	Off	10/100 Mbit Link established
Blinking	Off	10/100 Mbit Link established & activity
Blinking	On	1 Gbit Link established & activity

3.6 Reset Switch

CyBox GW-P is equipped with a hidden reset switch behind the front panel, nearby the top-right corner. The button is accessible with a straightened paper clip pushed through the little hole on the front plate. The function of the reset switch depends on the duration of its activation, as indicated in Table 10 below. The timing behavior is only valid, if the access point has completely booted (after approx. 1 mn). While the access point is booting or executing U-Boot, pushing the button will always reset the access point. The following table describes the functions of the reset switch:

Table 10 Reset Switch Behavior

Hold Time	Fail LED Behavior	Action
< 2 seconds	Off	Reset after release
2-5 seconds	Off	No action
> 5 seconds	Green blinking	Remove custom configuration then reset

3.7 SIM Cards

To install SIM cards, the back panel of the CyBox GW-P has to be removed using suitable torx screwdriver. The indexing of SIM slots is software dependent; more information is available in the configuration manual.

4 Mounting the CyBox GW-P

When mounting the CyBox GW-P, please take into account the following aspects

- ↘ Do not install the device close to any sources of heat, such as radiators or heat registers.
- ↘ Keep the device away from any liquids and avoid exposure to dripping or splashing. The protection class of the housing is IP30.
- ↘ Keep a free space of at least 150 mm around the housing to ensure adequate heat dissipation capabilities.
- ↘ For optimal heat dissipation, the connectors should face down.
- ↘ The CyBox GW-P housing provides four mounting holes for fixation.
- ↘ Use M6 screws.

The drawing in Figure 2 shows the outer dimensions of the CyBox GW-P housing, including the position of the mounting holes.

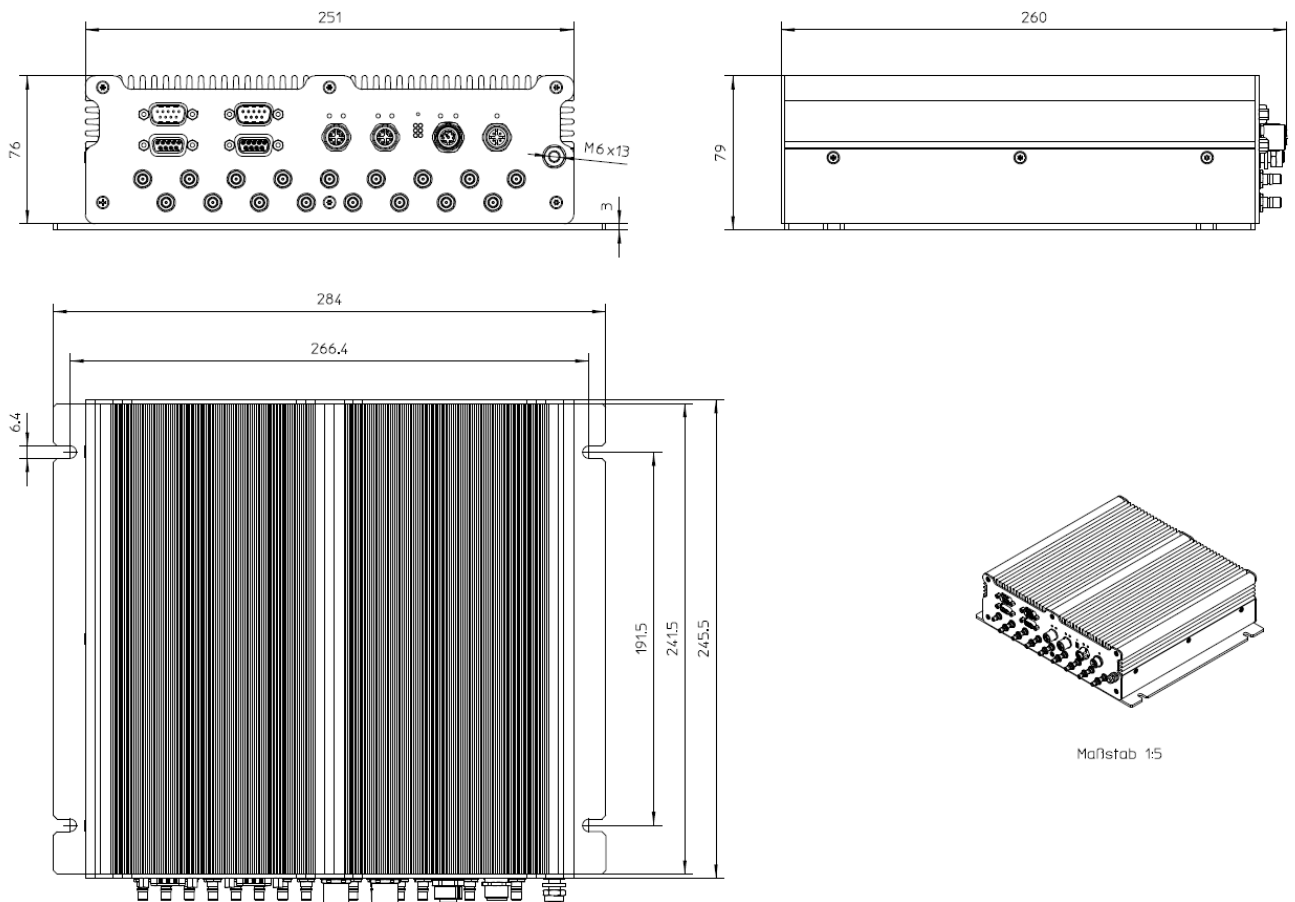


Figure 2 Dimensions of the CyBox GW-P housing

4.1 Connecting an Earthing Cable

A M6 earthing stud on the right side of the device (also refer to Figure 2) for protective earth connection is essential for the device security. Carry out the following steps to connect an earthing cable:

- Take an earthing cable with a cross section of at least 0.75 mm² and a ferrule with eyelet suitable for a 6 mm threaded bolt.
- Mount the earth cable as shown in Figure 3.
- Fasten the cable by tightening the nut to the required torque (recommended according to EN60947-1 are 3 Nm, 5.5 Nm must not be exceeded).

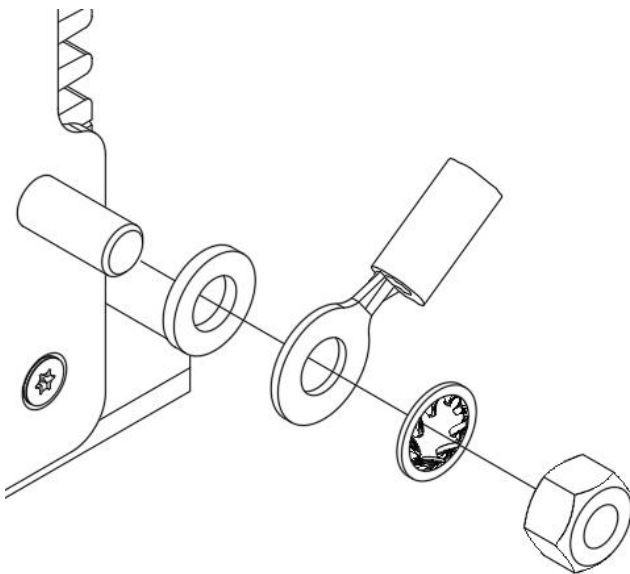


Figure 3 Earth cable mounting on Earth Stud

4.2 Electrical Connection

- Make sure the device is properly grounded.
- Establish a connection to the network by plugging an M12 patch cable to one of the front panel M12 connectors. Either LAN port may be used, if the access point is supplied by a local power supply through the power supply connector.
- Connect the desired number of antennas to the access point. Each WLAN radio can use up to four antennas for maximal performance. LTE modules are intended to be connected to two antennas. In some version there is an additional GPS antenna connector.
- In case of using a local power supply, the appropriate wiring (see Table 1) must be established to connect the power line to the access point.
- Make sure that the voltage of the power supply conforms to the voltage on the type plate.
- Ensure that the power supply (power socket) is grounded correctly and that the power cable is intact and undamaged. Do not switch on the system if there are damages on the power cable or plug.
- Use power cables which are approved for the power supply in your country.

- ↷ Power supplies have to be grounded.
- ↷ The device itself has no on / off switch, it starts as soon as it is supplied with power