prime cube PBI1100ED_044_0 Prime Box Pico Instruction Manual

Contents

prime cube PBI1100ED_044_0 Prime Box Pico

Product Information

The Prime Box Pico is a modular product developed by Schubert System Elektronik GmbH. It is designed for specific applications and complies with relevant harmonized European standards (EN) for its respective area of application. The product is intended for use by qualified personnel who are authorized to perform installation, commissioning, operation, and maintenance tasks. These personnel should have knowledge of safety engineering standards and be able to ground and label devices, systems, and circuits according to those standards.

Please note the following important information:

- Failure to follow the instructions may result in personal injury or damage to property.
- The product may contain electrostatic sensitive devices (ESD), so take precautions to prevent electrostatic discharge.
- Installation conditions and safety instructions specified in the documentation must be observed during commissioning and ongoing operation.
- All hardware and software names used are trade names and/or trademarks of their respective manufacturers.
- The user documentation provided is intended solely for the operator and their personnel. Unauthorized reproduction, distribution, or disclosure of the document's contents is prohibited.

For more information and updates, please visit the official website of Schubert System Elektronik GmbH: www.schubert-system-elektronik.de.

WARNING: Failure to follow the safety instructions may result in death or serious injury.

CAUTION: Failure to comply with instructions can cause minor injuries or damage to property.

Product Usage Instructions

Before using the Prime Box Pico, please ensure that you have read and understood the user manual and safety instructions provided by Schubert System Elektronik GmbH

To use the Prime Box, Pico:

1. Ensure that you are a qualified personnel authorized to handle the product.
2. Follow the designated use of the system as specified in the user manual.
3. Take necessary precautions to prevent electrostatic discharge (ESD) when handling the product.
4. Observe the installation conditions and safety instructions during commissioning and ongoing operation.
5. Refer to the user manual for specific instructions on installation, operation, and maintenance tasks.
6. Regularly check for updates or corrections in subsequent editions of the user manual.

Please contact Schubert System Elektronik GmbH for any further assistance or suggested improvements regarding the usage of the Prime Box Pico.

Operating instructions

6902167 | V 1.02
US-English translation of the original German Operating instructions This operating manual is part of the technical documentation. It provides technicians and system managers with the necessary information on:

To be observed in general

Safety instructions
This document contains instructions that you must follow for your personal safety and to prevent damage to property. The instructions are marked by a warning triangle and are graded according to the degree of risk.

- **DANGER**
  - Symbol with signal word: DANGER
  - Imminent danger to life and health of persons.
  - Non-compliance will result in death or serious injury (crippling).
- **WARNING**
  - Symbol with signal word: WARNING
  - Dangerous situation for the life and health of persons.
  - Non-compliance may result in death or serious injury.
- **CAUTION**
  - Symbol with signal word: CAUTION
  - Potentially dangerous situation
  - Non-compliance can cause minor injuries or damage to property.
-  **Instructions for proper handling**
- Non-compliance can cause damage to the product or other objects in the vicinity.
- Important information about the product, the handling of the product or the part of the
- documentation to which special attention should be paid.

- **Environmental protection**
  - Non-compliance may have an impact on the environment.
- **Electrostatic discharge**
  - The adjacent symbol indicates the use of electrostatic sensitive devices (ESD).

The following markings are used in this operating manual:

- First level enumeration
- Second level enumeration
- Instruction for action

Designated use of the system

WARNING

- Products from Schubert System Elektronik GmbH may only be used for the purposes intended in the technical documentation and only in conjunction with third-party devices and components recommended or approved by us.
- Commissioning is prohibited until it has been established that the machine in which this component is to be installed complies with the provisions of Directive 2006/42/EC.
- Correct and safe operation of the product is subject to proper transport, storage, installation and assembly as well as careful operation and maintenance.

Qualification of the personnel

- Only qualified personnel may perform the following work on the products:
- Installation, commissioning, operation, maintenance.
- Qualified personnel in the sense of the safety instructions are persons who are authorized to commission, ground and label devices, systems and circuits in accordance with the standards of safety engineering.

Exclusion of liability

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

Areas of application

- Products from Schubert System Elektronik GmbH comply with the relevant harmonized European standards (EN) for the respective area of application.

Warranty

The agreements stipulated in the General Terms and Conditions of Business (GTC) apply to Schubert System Elektronik GmbH equipment.

Installation conditions

- The installation conditions and safety instructions specified in this document must be observed during the commissioning and ongoing operation of the products.

Trade names and/or trademarks

- All hardware and software names used are trade names and/or trademarks of the respective manufacturers.

Copyright

- Any user documentation is intended only for the operator and his personnel.
- Passing on and reproduction of this document and use and disclosure of its contents are prohibited unless expressly permitted.
- Any violations will result in compensation claims.

EU Declaration of Conformity

- The product from Schubert System Elektronik GmbH complies with the directives listed in the “Technische Daten” chapter.
- The requirements are assessed on the basis of the standards listed therein.
- The EU Declaration of Conformity and the associated documentation are provided in accordance with the directives at:
- Schubert System Elektronik GmbH
- take-off Gewerbepark 36
- 78579 Neuhausen ob Eck
- Germany

Note
This operating manual with doc. no.: 6902167 describes the following devices:

- Prime Box Pico | PBI1100ED_044_00 – Version without wireless interfaces
- Prime Box Pico | PBI1100ED_044_01 – Version with Wi-Fi / Bluetooth®

Please read the operating manual before using the device for the first time and keep it in a safe place for later use. It is intended for users with previous knowledge of PC and automation technology.

Intended use of the document
This operating manual is part of the technical documentation. It provides technicians and system managers with the necessary information on the installation, commissioning, operation, and maintenance of the device.

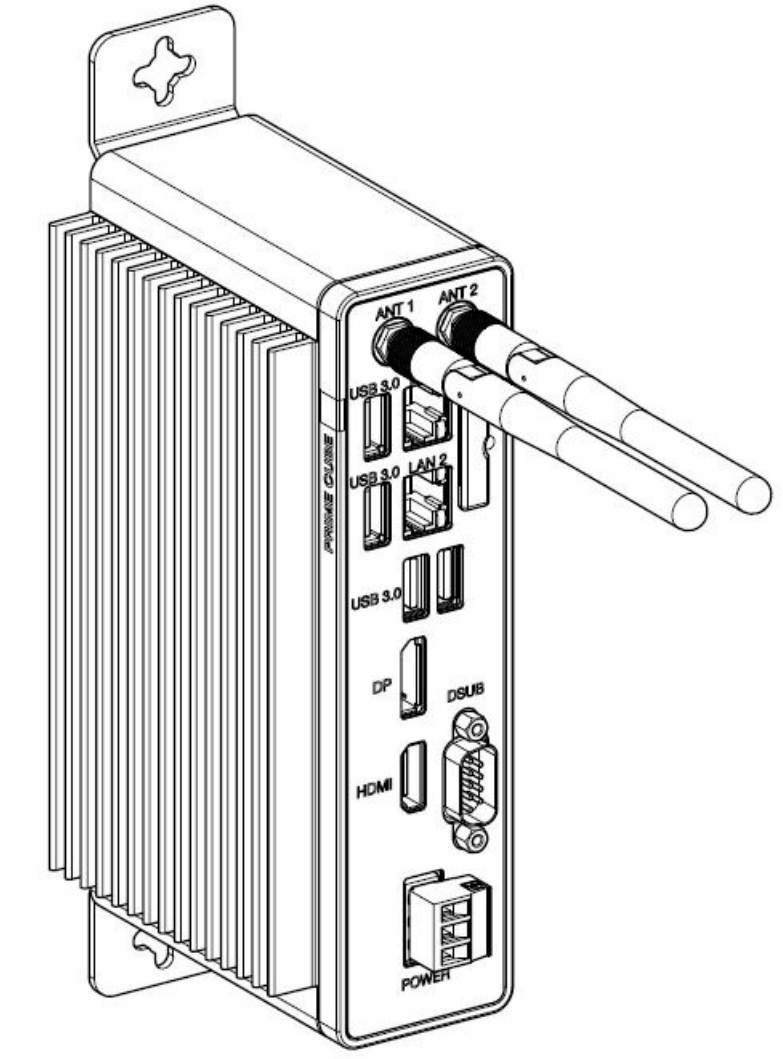
Characteristic

Overview
The Prime Box Pico PBI1100ED_044 is designed as a modular box PC with high connectivity in a compact design for vertical installation in the control cabinet.

- **Protection class:** IP20 compliant with DIN EN60529 (not evaluated by UL)
- Mechanically stable aluminum housing for vertical installation in the control cabinet
- Can be mounted on 35 mm top-hat rail (DIN EN50022 and EN50045)
- Fanless CPU and system cooling
- Industrial, EMC-compliant housing design

Areas of application
The Prime Box Pico can be used for a broad range of applications, such as:

- Measurements, open-loop control, and closed-loop control of machines, systems, and industrial processes
- Operation and display tasks
- Data collection and data processing



Block diagram

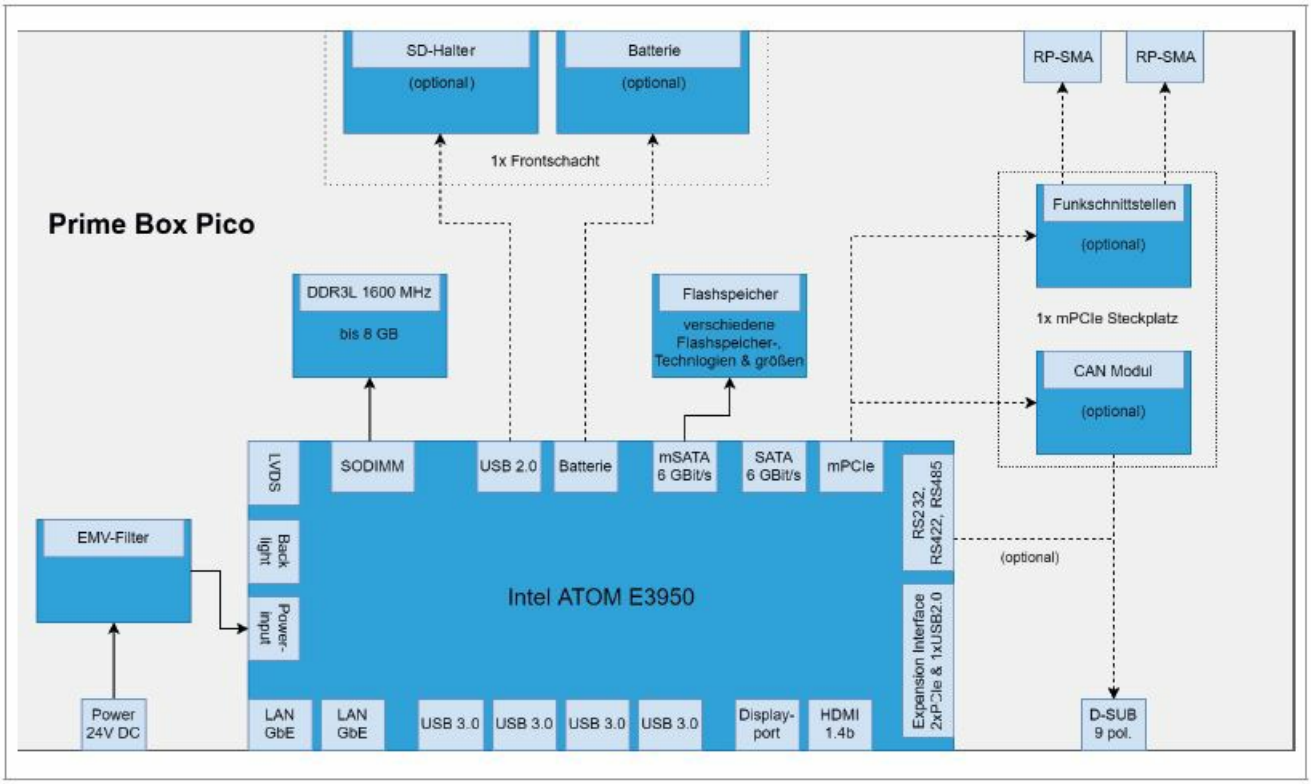


Fig. 1-2: Block diagram

Installation

Unpacking and checking delivery contents

- Check packaging for transport damage.
- Carefully remove the packaging to avoid causing damage.
- Keep the original packaging for future transport.
  - Keep the documents supplied.
  - Check the contents of the packaging for visible transport damage.
- Check the contents for completeness on the basis of the delivery bill.

Storage and transport

- During storage and transport, observe the permissible limit values specified in the “General” section of the “Technical data” chapter.
- Especially in cold weather and in case of extreme temperature differences, ensure that moisture does not condense on or in the device (dew).
- Protect the device from excessive mechanical stress. Suitable packaging improves its resistance to vibrations during transport.
- When transporting the individual device, use the original packaging, incl. all shock-absorbing elements, or comparable packaging!

Installation

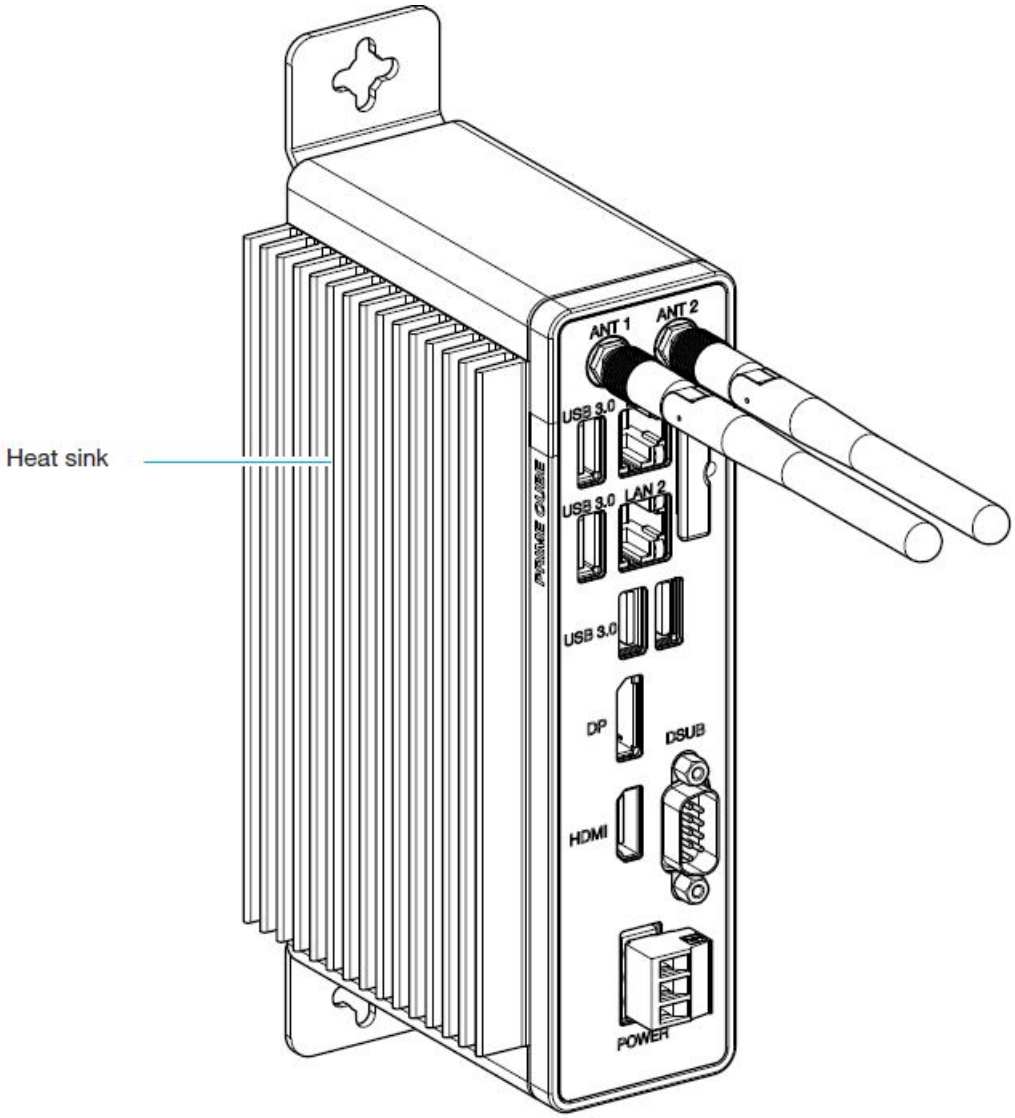
- The Prime Box Pico is not suitable for outdoor operation.
- The following points must be observed to ensure trouble-free operation of the
- Prime Box Pico and to avoid damage.
- When installing the Prime Box Pico, observe chapter 4 “Technical data.”

Temperature

- Before commissioning:
- Slowly adjust the device to the room temperature.
- In case of condensation, do not start up the device until it is completely dry.
- Prevent overheating during operation:
- Do not expose the device to direct irradiation from a heat source, such as sunlight.
- Only operate the device within the temperature range specified in chapter “4 Technical data” on page 14.

Ventilation

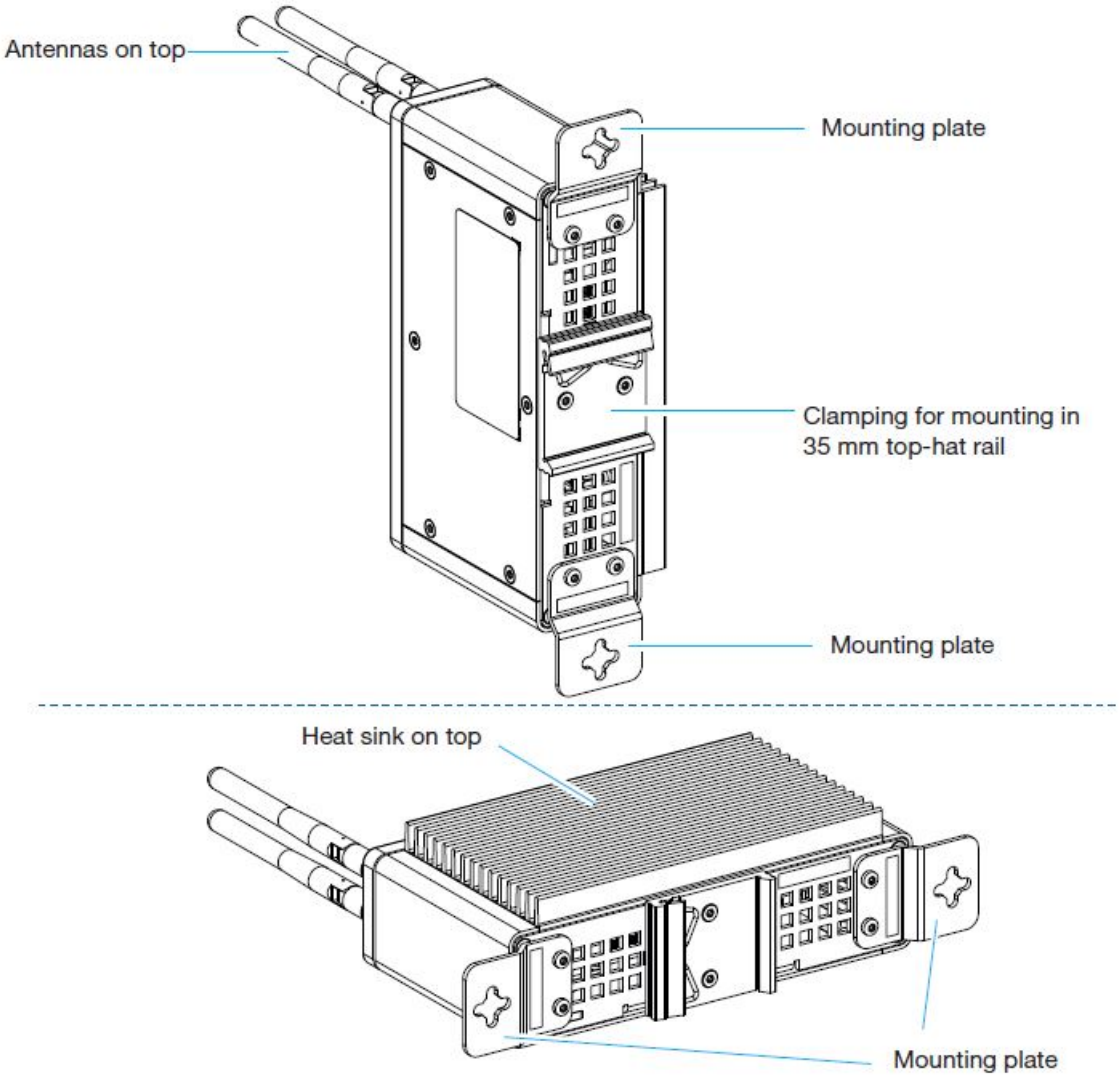
- Cooling concept
  - The processor is cooled purely passively via free convection, i.e. neither CPU nor system fans are used.
  - The CPU as well as all power semiconductors of the power supply are connected to the cover of the computer housing via heatspreaders.
  - An aluminum heat sink inside the housing collects the heat generated at components with high power dissipation and dissipates it to the lateral heat sink.
- Vents are provided to allow air exchange with the surrounding air. The heat generated on the inside is dissipated to the circulating air via large-area cooling fins.
- A space of 50 mm is to be kept free above, below and to the side of the device for free air convection.



Installation position and mounting

- The Prime Box Pico PBI1100ED_044 is designed for vertical installation in control cabinets. Pay attention to the correct orientation during installation; do not install the device upside down – see illustration below. Installation in the control cabinet is carried out on the top-hat rail by means of a mounting bracket.
- Alternatively, a vertical or horizontal installation at the rear of the housing is possible, using the two mounting plates. Pay attention to the correct orientation during installation; install the device vertically (antennas on top) orhorizontally (heat sink on top) – see illustration below.
- Use one M4 bolt each to install the mounting plates at the top and bottom. Apply a torque of 2.2 Nm when tightening the M4 bolts.
- **CAUTION:** The mounting wall on which the Prime Box Pico is installed – including the mounting elements – must be able to support four times the weight of the device.

For dimensions, see chapter “4 Technical data” on page 14.



Connection, commissioning, and operation

Establishing operational readiness

- Interference-free connections for trouble-free operation
- When connecting peripheral devices, use shielded bus and LAN cables with shielded connectors to meet EMC requirements.
- **CAUTION:** If possible, screw or lock the plug connections as this will improve electrical shielding
- Signal lines must not be routed in the same cable duct as power lines.
- Check all cable connections before commissioning the system.
- Make sure that all voltages and signals comply with the required values.
- Safe discharge of electrical interference
- Connect the device and control cabinet to a central grounding point using the shortest possible path.
- **CAUTION:** To ensure safe operation of the Prime Box Pico during use, make sure that the connection (functional earth) between the device and the control cabinet is as low impedance as possible.
- In this context, be sure to also observe the Merkblatt “Erdungskonzept” in the ANLAGE
- at the end of this operating manual.
- **CAUTION:** Only qualified personnel may open the Prime Box, Pico.
- Open the device only when it is de-energized.

Emitted interference

-  Industrial environment according to EN 61000-6-2
- This device may cause radio interference in residential areas; in this case, the operator may be required to implement appropriate measures.

Electrostatic discharge

- All assemblies and components are ESD-sensitive.
- The ESD instructions must be observed.
- Avoid touching electrostatically sensitive components (e.g. connector pins).
- Discharge your body electrostatically before touching the device (e.g. by touching a grounded metallic object).

Expanding the Prime Box Pico
Limitation of liability

- The devices are supplied with a specific hardware and software configuration according to the respective application.
- No liability can be assumed in the event of changes to the hardware or software that go beyond the documented possibilities, or in the event of improper use of the components.

Precautionary measures

Electronic components are very sensitive to electrostatic discharges. Precautionary measures must therefore be taken when handling the assemblies. These can be found in the guidelines for electrostatically sensitive components (ESD guidelines).

- Disconnect the Prime Box Pico from the power supply before connecting or disconnecting components or expansion modules.
- Wear a grounding strap when handling components.
- Before plugging in the cables, the static charge of the technician and that of the Prime Box Pico must be brought to the same potential. To do this, briefly touch the metal housing.
- Discharge electrostatic charge from your tools before using them.
- Leave components and expansion modules in their packaging until they are installed.
- Do not touch the pins and conductors of components and expansion modules.
- Never operate the Prime Box Pico with the housing open.

Preconditions

The devices from Schubert System Elektronik GmbH feature peripheral interfaces that can be used to connect various components.

- When using commercially available peripheral devices (e.g. at the USB port), please note that their EMC interference immunity is often designed for office use.
- However, they are not suitable for operation in an industrial environment!
- For process operation, devices that are connected must have the CE mark.
- When connecting peripheral devices, ensure that they are suitable for industrial use!
- Do not plug in or out any plugs during operation!

Opening

Opening and closing the device again

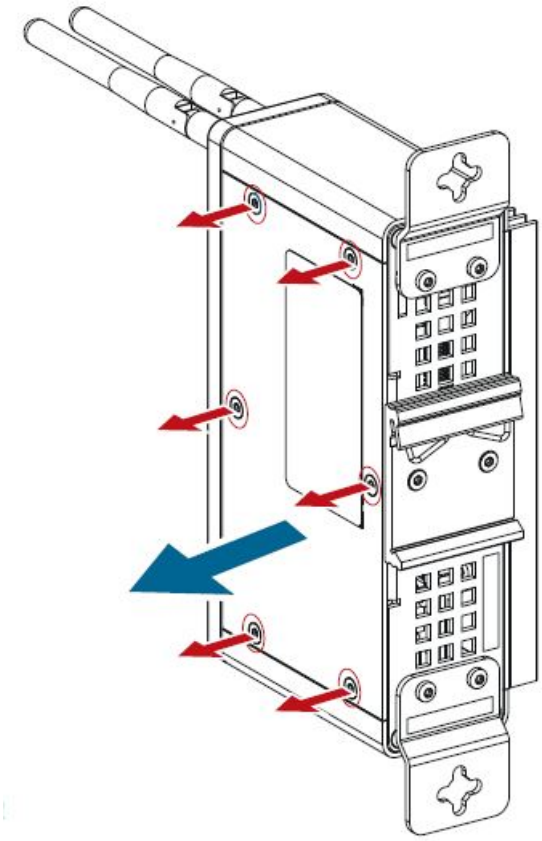
Damage to the device.

To avoid damage to the device, perform the following before opening it:

- Shut down the operating system.
- Disconnect the power supply.

Risk of burns from hot surfaces

- Heat sinks and heat pipes on the inside can still be very hot even after the device has been turned off:
- Allow the device to cool down before opening it.



Opening the device

- Remove the 6 Torx screws with TX10 (TORX 8.8 M3X8 ISO14581) of the side cover (red arrows).
- Lift the side cover off the housing (blue arrow).
- The mainboard and the optional mPCIe slot can be accessed in the computer housing for possible service work.

Closing the device

- Place the side cover on the housing to fit.
- Install the 6 Torx screws with TX10 (TORX 8.8 M3X8 ISO14581) of the side cover.
- Observe the torque of 0.9 Nm when tightening the Torx screws.

Connecting the power supply

Supply voltage 24 V DC

- Electric shock if unsuitable power supply is used.
- Connect the device only to a power supply that meets the requirements for safe extra- low voltage (SELV/PELV) according to EN/UL 61010-2-201.
- **WARNING:** Connect the device only to a power supply that meets the requirements for an energy- limited circuit according to EN/UL 61010-2-201, chapter 9.4 or to a circuit that meets the requirements of NEC Class 2 according to UL 1310.
- Spannungsbereich (see chapter “Technical data”) Observe “+” and “-” polarity!
- Functional earthing: Is ensured via the plug connection according to chapter “3.4.2 Plug connection for 24 V DC” on page 9.

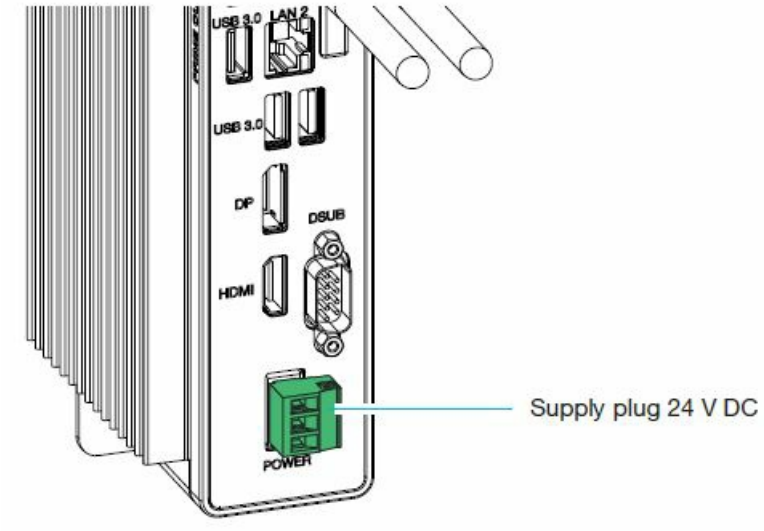
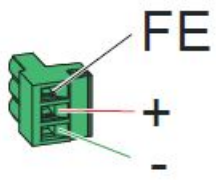


Fig. 3-2: Connecting the 24 V DC supply voltage

Connection cable
The following is recommended for connecting the power supply: Cu conductor 75 °C, cross-section 1 mm².
Plug connection for 24 V DC



Basic housing	**MSTBA 2.5/ 3-G-5.08** 3-pole, pitch: 5.08 mm Phoenix Contact part no. 1757255
Plug component	**MSTBA 2.5/ 3-ST-5.08** 3-pole, pitch: 5.08 mm Phoenix Contact part no. 1757022

Enclosed as accessory on delivery!

Designation	Meaning
FE	Functional earthing:
+	+24 V supply voltage
–	GND supply voltage

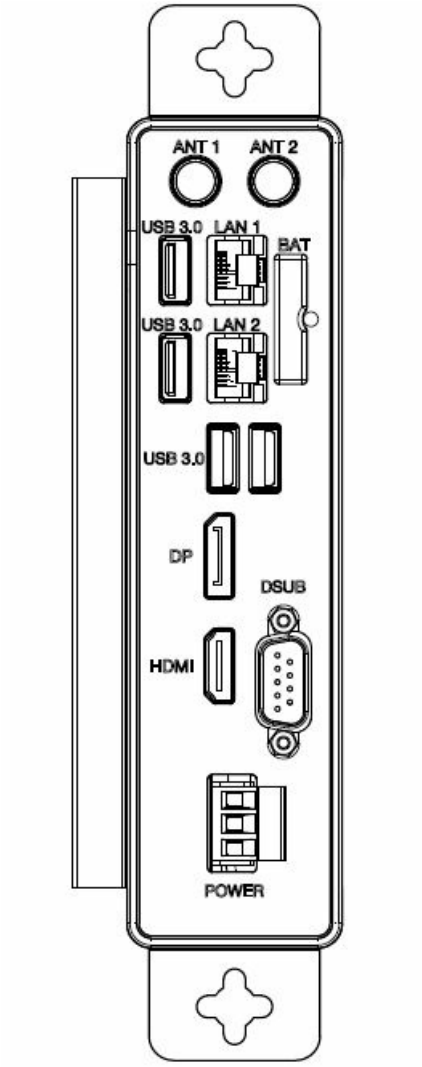
- Connect the supplied plug with the wires of a 3-pole cable according to the labeling and plug it into the socket on the interface plate inside the computer housing.
- Connect the “+” and “-” wires of the supply cable to a suitable 24 V supply.
- Connect functional earth FE to chassis ground – see “Annex | Grounding concept” on page A-1

Connecting peripheral devices

Interfaces

Access to connections and drives

- Connections to the peripherals are located on the front of the housing (see chapter “4 Technical data” on page 14).



-  The connections are marked on the front cover.
- The ports are standardized contacts with the known standard pin assignments.
- The total power of all connected USB devices must not exceed 14 W.

Prime Box Pico setup/operation
Operating system
As ordered, Schubert System Elektronik GmbH installs the operating system specified in chapter “4 Technical data” on page 14.

License notice:
The pre-installed operating system is software in the
Microsoft Embedded license model.

- Device, operating system and license are one unit in the Microsoft Embedded license model and must not be used separately!
- A subsequent software installation by the customer on the delivered operating system is permitted, provided that the software is exclusively required for the technical function of the overall system.

Installation and commissioning
After connecting the supply voltage, the system starts automatically.
Installing memory modules
The memory modules are mounted on the computer board of the Prime Box Pico at delivery.

Information on Microsoft Windows software

- By default, the system starts with the existing Windows administrator user without password.
- We recommend creating a new local user or a user belonging to the administrator group and deactivating the administrator user.
- The following password rules are predefined:
- The password must be at least 10 characters.
- This setting can be changed in the Policy Editor:
- Computer Configuration -> Windows Settings -> Security Settings -> Account Policies -> Password Policy:
- Minimum Password length
- The password must meet the following complexity rules:
- The password must not contain the user account name or more than two characters that are contained sequentially in the user’s full name.

Permitted characters:

- Upper-case letters (A to Z)
- Lower-case letters (a to z)
- Base-ten numbers (0 to 9)
- Special characters (for example !, $, #, %)
- This setting can be changed in the Policy Editor:
- Computer Configuration -> Windows Settings -> Security Settings -> Account Policies -> Password Policy:

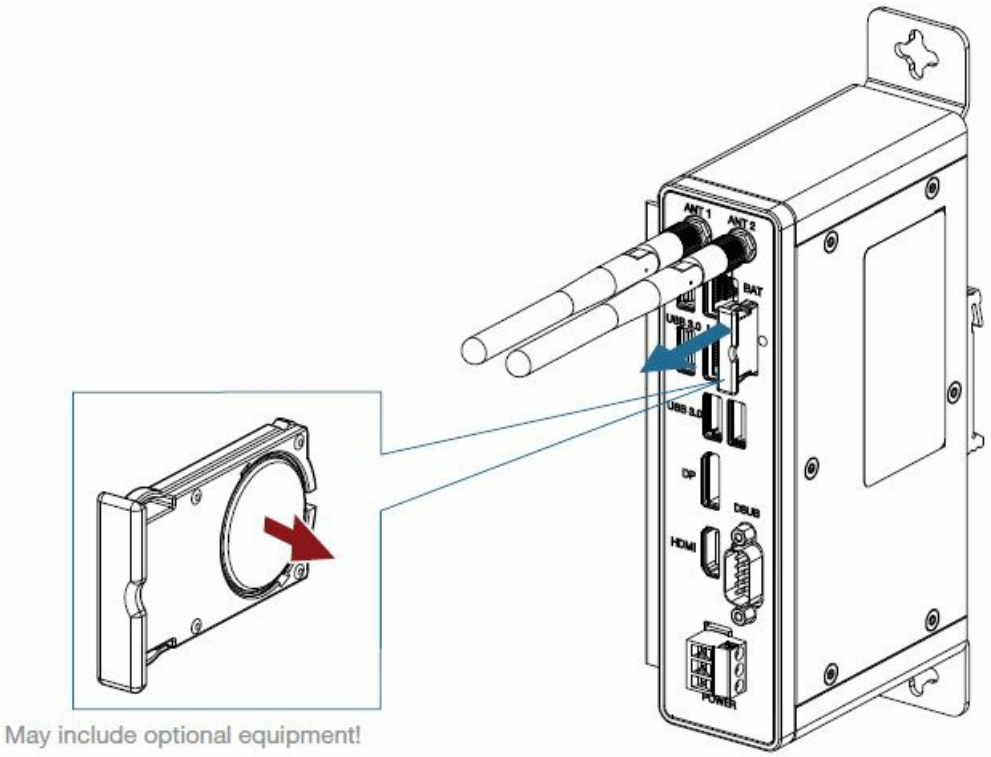
- Password must meet complexity requirements
- After five failed attempts at entering the password, the user will be locked out for five minutes.
- This setting can be changed in the Policy Editor:
- Computer Configuration-> Windows Settings-> Security Settings-> Account Policies->
- Account Lockout Policy: Account lockout duration
- The configuration includes an Auto-lock function that is activated after 10 minutes.
- This setting can be changed in the Policy Editor:
- Computer Configuration -> Windows Settings -> Security Settings -> Local Policies -> Security Options: Interactive logon
- A value of ‘0’ means that the Auto-lock function is disabled.
- The Update function is completely disabled.
- This setting can be changed in the Policy Editor:
- Computer Configuration-> Administrative Templates -> Windows Components -> Windows Update:
- Configure Automatic Updates
- In addition, the Update service must be re-enabled:
- Open the command prompt with administrator rights and enter the following command: sc config „wuauserv“ start=auto
- The Unified Write filter is installed but disabled.
    - The preconfigured protected drive is the C: drive.
    - The Unified Write filter can be configured by using the uwfrngr command on the command prompt with administrator rights.
- A .Net 3.5 installer compatible with Windows 10 loT Enterprise 2019 LTSC is included with the system in the following directory:
    - C: \Installations\dotNet35 installer
    - The system comes with the following language packs:
    - German (preinstalled), French, Italian, Spanish, Portuguese, Chinese (simplified)
    - The language packs can be found in the following directory: C: \Installations\LangPacks
    - To install them, follow these steps:
    - Press the Windows + R key combination and enter lpksetup.
    - Then follow the instructions on the screen.
- **Backlight control**
    - For panel devices that include the D3633 board, an app installer can be found under C:\Installations\Tools\ LVDS_BacklightApp_Vl.l.

Replacing the buffer battery
Fire and explosion hazard of the battery.

- The battery may explode if not handled according to instructions!
- Do not recharge, disassemble or dispose of in fire!
- The lithium battery may only be replaced by a type approved by the manufacturer.

Approved battery type: PANASONIC BR2032 or BR-2032 Material no. 64 10 023
The buffer battery is located on a battery carrier in the computer housing.

- When the battery is replaced, the configuration data of the device is deleted.
- Take note of the current BIOS setup settings.
- Dispose of used batteries according to local regulations.



- To access the battery, pull the battery carrier out of the front panel (blue arrow).
- Remove the buffer battery from the battery carrier (red arrow) and insert the new buffer battery into the battery carrier with the + pole first.
- Push the battery carrier back into the slot in the front panel.

Disposal

- Dispose of the product in accordance with the applicable national regulations.
- The device is dismounted and completely disassembled:
- Metal and plastic parts can be recycled accordingly.
- Electronic components must be disposed of in accordance with the national regulation.

Technical data

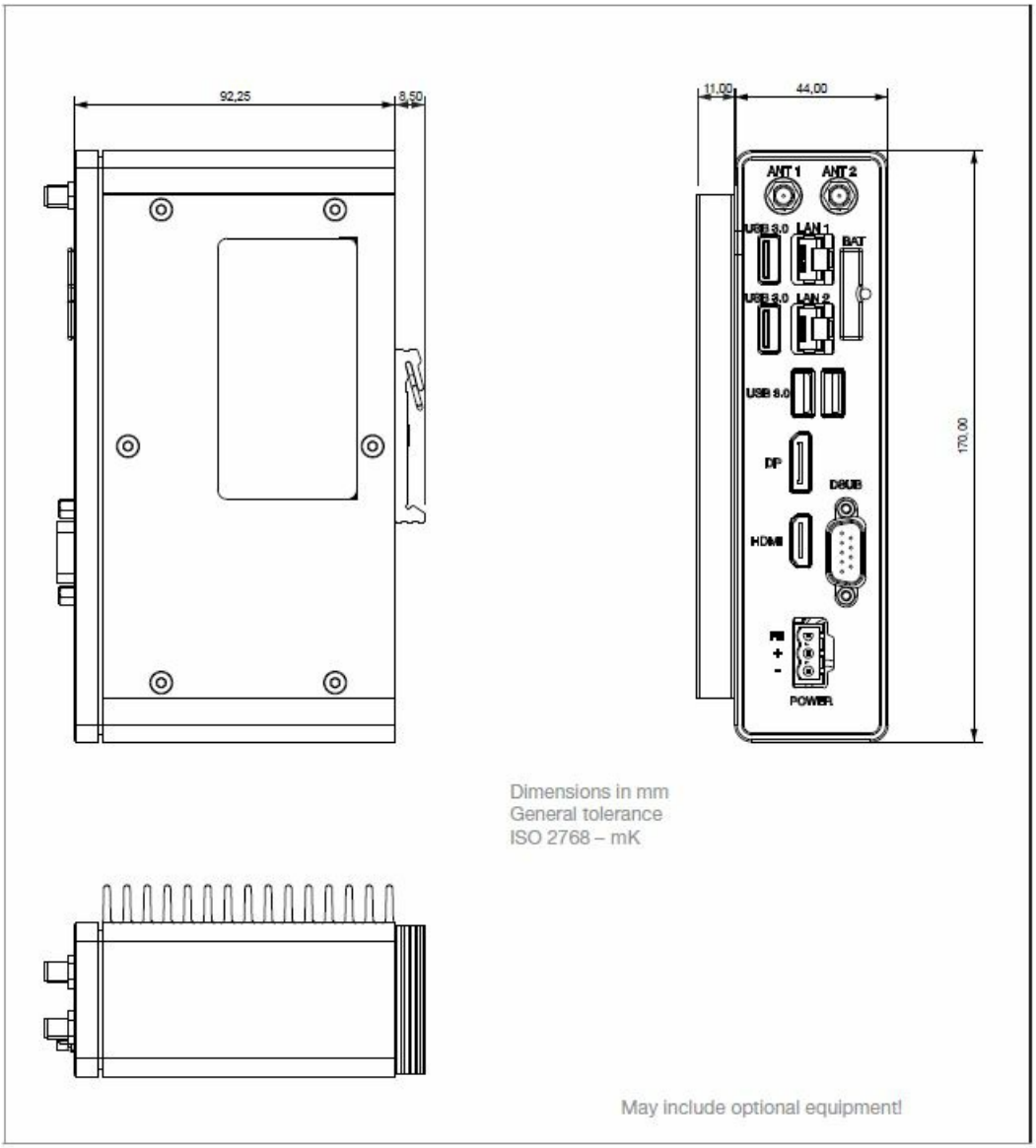
General

Component	Description
Housing	Prime Box Pico Mechanically stable aluminum housing for vertical installation in the control cabinet Wall mounting or mounting on 35 mm top-hat rail (DIN EN50022 and EN50045) Passive cooling Industrial, EMC-compliant housing design Dimensions including heat sink and holder (WxHxD): 55 mm x 170 mm x 100.75 mm Weight: 1.15 kg
Protection class	IP20 compliant with DIN EN60529 (not evaluated by UL)
Computer	Processor Intel® Atom x7-E3950, Quad Core, 1.6 GHz
Working memory	4GB, 8 GB DDR3L 1x SODIMM
Mass storage	1x mSATA 64 GB - 512 GB, MLC flash memory Other memory sizes and flash technologies tailored to individual requirements
Interfaces (standard)	• 2x GbE LAN, separate controllers • 4x USB 3.0 • 1x DP • 1x HDMI
Interfaces (optional)	• 1x RS232/422/485 or • 1x CAN
Wireless interfaces (optional)	1x Wi-Fi / Bluetooth® (only PBI1100ED_044_01) (uses the mPCIE interface)
Extension	1 x mPCIE (interface for Wi-Fi or CAN module)
Battery	Buffer battery externally changeable
Power supply	24 V DC (12 ... 32 V DC)
Over-voltage category	II
Current consumption	max. 1.3 A at 24 V DC
Operating system	Windows 10 IoT Enterprise 2019 LTSC
Elevation	max. 2,000 m above sea level
Ambient temperature range	-10 °C to +45 °C with natural convection
Storage temperature	-20 °C to +60 °C
Air humidity	10 % to 90 %, non-condensing
Degree of pollution	2
EMC immunity	Industrial environment according to DIN EN 61000-6-2
EMC emitted interference	Industrial environment according to DIN EN 61000-6-4
Shock	15 g: 11 ms and 25 g: 6 ms according to EN 60068-2-27
Vibration	2...9 Hz: 3.5 mm amplitude, 9...200 Hz: 1 g according to EN 60068-2-6
Warranty	36 months excluding the buffer battery
Approvals	CE
Approvals	CE; UL-listed for USA & Canada according to UL 61010-2-201 & CSA C22.2 NO. 61010-2-201

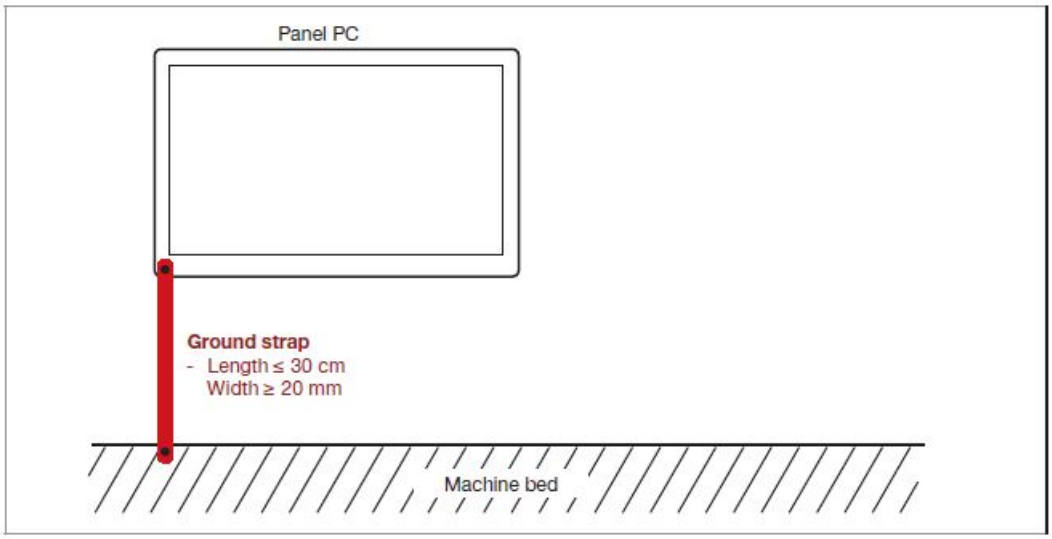
Mechanical dimensions

Device dimensions

Prime Box Pico | PBI1100ED_044



A 1 Annex | Grounding concept



- Contact surfaces must be designed to be conductive (free of paint, etc.) and corrosion-resistant.
  - Lock washers against corrosion of the contact surface.
  - The conductive contact surface must be as large as possible.
  - Ground straps with ring cable lugs are not suitable.
- The grounding point must also have a low-impedance ground connection.

- Length, width and shape of the ground straps are recommendations of Schubert System Elektronik GmbH.

Annex: Grounding concept

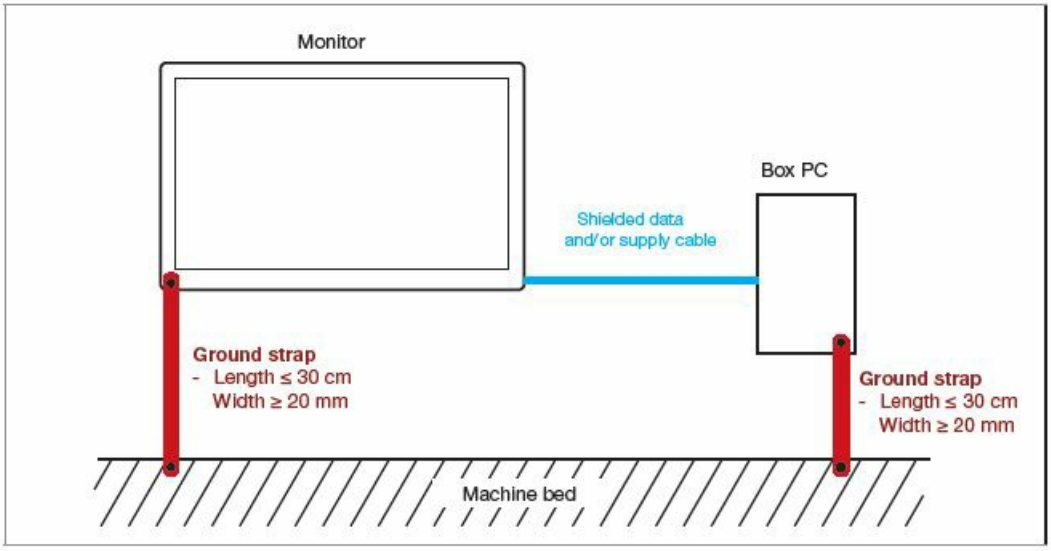


Fig. A-3: Grounding concept - monitor PC

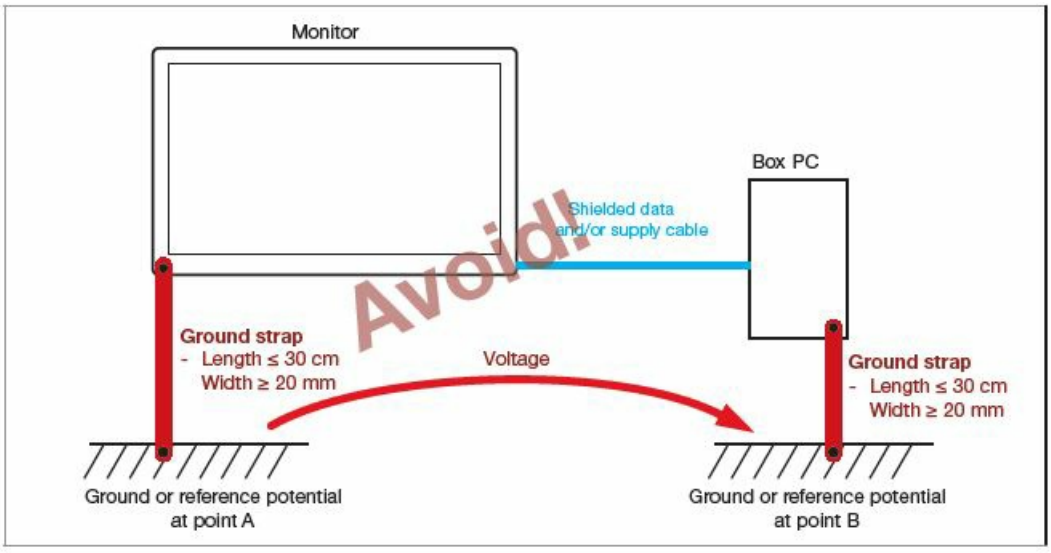


Fig. A-4: Grounding to be avoided

Annex | Grounding concept

- Instructions for low-impedance grounding of components
- This instruction sheet is part of the technical documentation.

- It provides technicians and system managers with the necessary information on:
- Correct, low-impedance grounding of the device

CONTACT

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- www.schubert-system-elektronik.de.

Documents / Resources

	prime cube PBI1100ED_044_0 Prime Box Pico [pdf] Instruction Manual PBI1100ED_044_0 Prime Box Pico, PBI1100ED_044_0, Prime Box Pico, Box Pico

References

- System-Elektronik
- Industrielle Computertechnik "Made in Germany" | Schubert System Elektronik