Power Panel T50 mobile

User's manual

Version: **1.30 (December 2022)**
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Translation of the original documentation

Publishing information

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1 Introduction

Information:

B&R makes every effort to keep user's manuals as current as possible. The most current versions can be downloaded from the B&R website www.br-automation.com.

1.1 Manual history

Version	Date	Comment
1.30	December 2022	Updated the following chapters: • "Installing with retaining clips" on page 36 • "Installing the holding plate for control cabinet installation" on page 36 • Updated documentation for PPT system 1.6.0: • New note about default hostname if it is not defined (see "Hostname" on page 45). • New options on service page Web: ⇨ "Ignore server certificate errors" on page 58. ⇨ "Enable Screen Capture" on page 60 ⇨ "Suppress Screen Capture security warning" on page 60 • New option on service page Network"Back end WebSocket port" on page 73. • New service page Digital inputs • New OPC UA parameters: ⇨ Parameters for remote access: RemoteAccessModeWebGL, RemoteAccessPortWebGL, RemoteAccessWSPortWebGL, RemoteAccessModeVNC, RemoteAccessPortVNC ⇨ Parameters for boot animation: BootAnimationDelay, BootAnimationLeftPos, BootAnimationTopPos ⇨ Parameters for VNC: VNCConnectionMonitor ⇨ Parameters for web: IgnoreServerCertificateErrors, EnableScreenCapture, SuppressScrnCaptSecWarn • Updated chapter "International and national certifications" with UKCA certification.
1.20	June 2021	Updated the following chapters: • "Holding plate for control cabinet installation" on page 131 (Technical data) • "EU directives and standards (CE)" on page 144 (Link to declaration of conformity) • Updated software description to version 1.5.0. • Updated product photos
1.10	March 2021	Updated the following chapters: • "Technical data" on page 22 • "Wall mounting" on page 39
1.01	December 2020	Editorial corrections. Added accessories under Technical data and Accessories. Updated dimension diagrams in the Technical data.
1.00	November 2020	First version

1.2 Information about this document

This document is not intended for end customers! The safety guidelines required for end customers must be incorporated into the operating instructions for end customers in the respective national language by the machine manufacturer or system provider.

1.2.1 Organization of notices

Safety notices

Contain **only** information that warns of dangerous functions or situations.

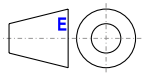
Signal word	Description
Danger!	Failure to observe these safety guidelines and notices will result in death, severe injury or substantial damage to property.
Warning!	Failure to observe these safety guidelines and notices can result in death, severe injury or substantial damage to property.
Caution!	Failure to observe these safety guidelines and notices can result in minor injury or damage to property.
Notice!	Failure to observe these safety guidelines and notices can result in damage to property.

General notices

Contain **useful** information for users and instructions for avoiding malfunctions.

Signal word	Description
Information:	Useful information, application tips and instructions for avoiding malfunctions.

1.2.2 Guidelines



European dimension standards apply to all dimension diagrams.

All dimensions, specifications in dimension diagrams and associated tables are in millimeters [mm].

Unless otherwise specified, the following general tolerances apply:

Nominal dimension range	General tolerance per DIN ISO 2768 medium
Up to 6 mm	±0.1 mm
Over 6 to 30 mm	±0.2 mm
Over 30 to 120 mm	±0.3 mm
Over 120 to 400 mm	±0.5 mm
Over 400 to 1000 mm	±0.8 mm

1.2.3 Software-specific information

Information:

Graphics and paths to menu commands and help topics contained in this document refer to a specific Automation Studio version. There may be differences in display and path specifications when using a different version.

2 General safety guidelines

2.1 Intended use

In all cases, applicable national and international standards, regulations and safety measures must be taken into account and observed!

The B&R products described in this manual are intended for use in industry and industrial applications.
The intended use includes control, operation, monitoring, drive and HMI tasks as part of automation processes in machines and systems.

B&R products are only permitted to be used in their original condition. Modifications and extensions are only permitted if they are described in this manual.

B&R excludes liability for damage of any kind resulting from the use of B&R products in any intended way.

B&R products have not been designed, developed and manufactured for use that involves fatal risks or hazards that could result in death, injury, serious physical harm or other loss without the assurance of exceptionally stringent safety precautions.

B&R products are explicitly not intended for use in the following applications:

- Monitoring and control of thermonuclear processes
- Weapon systems control
- Flight and traffic control systems for passenger and freight transport
- Health monitoring and life support systems

2.2 Protection against electrostatic discharge

Electrical assemblies that can be damaged by electrostatic discharge (ESD) must be handled accordingly.

2.2.1 Packaging

- **Electrical assemblies with housing:**
  Do not require special ESD packaging but must be handled properly (see "Electrical assemblies with housing").
- **Electrical assemblies without housing:**
  Are protected by ESD-suitable packaging.

2.2.2 Regulations for proper ESD handling

Electrical assemblies with housing

- Do not touch the connector contacts of connected cables.
- Do not touch the contact tips on circuit boards.

Electrical assemblies without housing

The following applies in addition to "Electrical assemblies with housing":

- All persons handling electrical assemblies and devices in which electrical assemblies are installed must be grounded.
- Assemblies are only permitted to be touched on the narrow sides or front plate.
- Always place assemblies on suitable surfaces (ESD packaging, conductive foam, etc.). Metallic surfaces are not suitable surfaces!
- Assemblies must not be subjected to electrostatic discharges (e.g. due to charged plastics).
- A minimum distance of 10 cm from monitors or television sets must be maintained.
- Measuring instruments and devices must be grounded.
- Test probes of floating potential measuring instruments must be discharged briefly on suitable grounded surfaces before measurement.

Individual components

- ESD protective measures for individual components are implemented throughout B&R (conductive floors, shoes, wrist straps, etc.).
- The increased ESD protective measures for individual components are not required for handling B&R products at customer locations.

2.3 Regulations and measures

Electronic devices are generally not failsafe. If the programmable logic controller, operating or control device or uninterruptible power supply fails, the user is responsible for ensuring that connected devices (such as motors) are brought to a safe state.

When using programmable logic controllers as well as when using operating and monitoring devices as control systems in conjunction with a Soft PLC (e.g. B&R Automation Runtime or similar product) or Slot PLC (e.g. B&R LS251 or similar product), the safety measures that apply to industrial controllers (protection by protective equipment such as emergency stops) must be observed in accordance with applicable national and international regulations. This also applies to all other connected devices, such as drives.

All work such as installation, commissioning and servicing are only permitted to be carried out by qualified personnel. Qualified personnel are persons who are familiar with the transport, installation, assembly, commissioning and operation of the product and have the appropriate qualifications for their job (e.g. IEC 60364). National accident prevention regulations must be observed.
The safety guidelines, information about connection conditions (nameplate and documentation) and limit values specified in the technical data must be read carefully before installation and commissioning and must be strictly observed.

2.4 Transport and storage

During transport and storage, devices must be protected against undue stress (mechanical stress, temperature, humidity, aggressive atmosphere).

2.5 Installation

- The devices are not ready for use and must be installed and wired according to the requirements of this documentation in order to comply with EMC limit values.
- Installation must be carried out according to the documentation using suitable equipment and tools.
- Devices are only permitted to be installed in a voltage-free state and by qualified personnel. The control cabinet must first be disconnected from the power supply and secured against being switched on again.
- General safety regulations and national accident prevention regulations must be observed.
- The electrical installation must be carried out in accordance with relevant regulations (e.g. line cross section, fuse protection, protective ground connection).

2.6 Operation

2.6.1 Protection against contact with electrical parts

In order to operate programmable logic controllers, operating and monitoring devices and uninterruptible power supplies, it is necessary for certain components to carry dangerous voltages over 42 VDC. Touching one of these components can result in a life-threatening electric shock. There is a risk of death, serious injury or damage to property.

Before switching on programmable logic controllers, operating and monitoring devices and uninterruptible power supplies, it must be ensured that the housing is properly connected to ground potential (PE rail). Ground connections must also be made if the operating and monitoring device and uninterruptible power supply are only connected for testing purposes or only operated for a short time!

Before switching on, live parts must be securely covered. All covers must be kept closed during operation.

2.6.2 Ambient conditions - Dust, moisture, aggressive gases

The presence of aggressive gases in the environment can also result in malfunctions. In combination with high temperature and relative humidity, aggressive gases – for example with sulfur, nitrogen and chlorine components – trigger chemical processes that can very quickly impair or damage electronic components. Blackened copper surfaces and cable ends in existing installations are indicators of aggressive gases.

When operated in rooms with dust and condensation that can endanger functionality, operating and monitoring devices such as Automation Panels or Power Panels are protected on the front against the ingress of dust and moisture when installed correctly (e.g. cutout installation). The back of all devices must be protected against the ingress of dust and moisture, however, or the dust deposits must be removed at suitable intervals.

2.6.3 Programs, viruses and malicious programs

Any data exchange or installation of software using data storage media (e.g. floppy disk, CD-ROM, USB flash drive) or via networks or the Internet poses a potential threat to the system. It is the direct responsibility of the user to avert these dangers and to take appropriate measures such as virus protection programs and firewalls to protect against them and to use only software from trustworthy sources.

2.7 Cybersecurity disclaimer for products

B&R products communicate via a network interface and were developed for secure connection with internal and, if necessary, other networks such as the Internet.

Information:

In the following, B&R products are referred to as "product" and all types of networks (e.g. internal networks and the Internet) are referred to as "network".

It is the sole responsibility of the customer to establish and continuously ensure a secure connection between the product and the network. In addition, appropriate security measures must be implemented and maintained to protect the product and entire network from any security breaches, unauthorized access, interference, digital intrusion, data leakage and/or theft of data or information.

B&R Industrial Automation GmbH and its subsidiaries are not liable for damages and/or losses in connection with security breaches, unauthorized access, interference, digital intrusion, data leakage and/or theft of data or information.

The aforementioned appropriate security measures include, for example:

- Segmentation of the network (e.g. separation of the IT network from the control network[1)])
- Use of firewalls
- Use of authentication mechanisms
- Encryption of data
- Use of anti-malware software

Before B&R releases products or updates, they are subjected to appropriate functional testing. Independently of this, we recommend that our customers develop their own test processes in order to be able to check the effects of changes in advance. Such changes include, for example:

- Installation of product updates
- Significant system modifications such as configuration changes
- Deployment of updates or patches for third-party software (non-B&R software)
- Hardware replacement

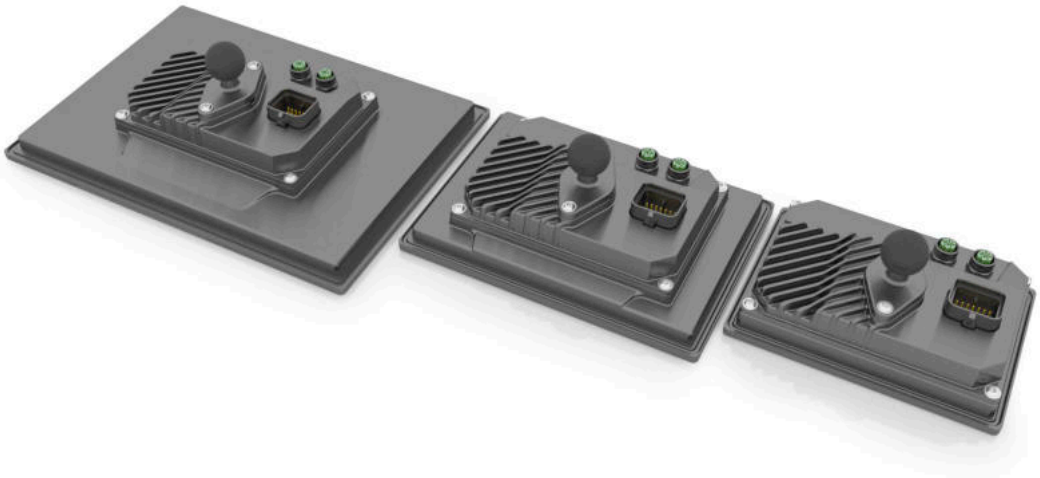
These tests should ensure that implemented security measures remain effective and that systems in the customer's environment behave as expected.

1) The term "control network" refers to computer networks used to connect control systems. The control network can be divided into zones, and there can be several separate control networks within a company or site. The term "control systems" refers to all types of B&R products such as controllers (e.g. X20), HMI systems (e.g. Power Panel T30), process control systems (e.g. APROL) and supporting systems such as engineering workstations with Automation Studio.

3 System overview

3.1 System overview

The Power Panel T50 mobile is equipped with an integrated browser and can also be used as a Visual Components client. This Power Panel is equipped with an Ethernet interface, integrated digital inputs and outputs and a rugged aluminum housing.



With a glass front and multi-touch technology, these Power Panels are compact HMI devices that are easy to configure and ideal for high-quality machine design.

The high sensitivity and accuracy of the projected capacitive touch screen improves usability. Multi-touch technology also makes it possible to integrate common gestures such as zooming and swiping.

Highlights

- High-quality slim design
- Multi-touch support
- Widescreen versions up to 10.1" WXGA
- Simple configuration
- Web-based or VNC-based HMI
- Configurable status LEDs
- Brightness sensor

3.1.1 Compact solution

Power Panels are characterized by their compact design, low installation depth and robust housing. The panels are suitable for various installation types such as swing arms and front mounting. They also have no hard disks, fans or batteries and are thus maintenance-free. The panels are designed with IP66 protection on all sides, making the devices suitable for use in harsh environments as well.

3.1.2 Flexibility

Power Panel T50 mobile devices are available in 3 different display sizes (ranging from 5.0" to 10.1"). For additional information, see "Type overview" on page 14).

Flexibility at the machine is provided by installation in landscape and portrait format.

Very small installation depths and minimized frame widths characterize all devices in all diagonals. Nevertheless, no compromises have been made with regard to stability and sealing levels. In addition, devices can be operated with both 12 V and 24 V.

3.1.3 Simple HMI

The Power Panel T50 mobile is a dedicated HMI device and can be operated in two different terminal modes:

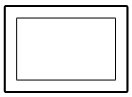
- Terminal as VNC client for VNC-based HMI applications. These are HMI applications that were created with Visual Components in Automation Studio.
- Terminal with web browser technology (full screen mode).

3.2 Model number key

Product area																
6																Device with browser technology
	Product family															
	P	M														Power Panel Mobile
			Model													
			T													Terminal series
				Variant												
				5	0											ARM processor (Cortex-A9)
							Diagonal									
						.	0	5	0							5.0"
						.	0	7	0							7.0"
						.	1	0	1							10.1"
										Resolution						
										2						WVGA (800 x 480)
										E						WXGA (1280 x 800)
												Display / Touch screen technology				
											-	1				TFT color + multi-touch PCT (glass)
													Optional interfaces and features			
													9			1x USB on multi-header
														Front design		
														B		Black
Examples																
6	**P**	**M**	**T**	**5**	**0**	**.**	**0**	**5**	**0**	**2**	**-**	**1**	**9**	**B**		Power Panel T50 mobile, 5.0", glass front, 1x Ethernet. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 512 MB onboard flash drive. Display and touch screen: 5.0", 800 x 480 (WVGA) resolution, projected capacitive touch screen, multi-touch support, glass front with black frame, landscape and portrait format configurable with software. Interfaces: 1x Ethernet 10/100 Mbit/s, 1x USB 2.0 on multi-header. Client software: Integrated service page, VNC client, embedded web browser.
6	**P**	**M**	**T**	**5**	**0**	**.**	**1**	**0**	**1**	**E**	**-**	**1**	**9**	**B**		Power Panel T50 mobile, 10.1", glass front, 1x Ethernet. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 512 MB onboard flash drive. Display and touch screen: 10.1", 1280 x 800 (WXGA) resolution, projected capacitive touch screen, multi-touch support, glass front with black frame, landscape and portrait format configurable with software. Interfaces: 1x Ethernet 10/100 Mbit/s, 1x USB 2.0 on multi-header. Client software: Integrated service page, VNC client, embedded web browser.

3.3 System characteristics

3.3.1 Type overview

Panel size	5.0"	7.0"	10.1"
Model number	6PMT50.0502-1xx	6PMT50.0702-1xx	6PMT50.101E-1xx
			
Format/Resolution	**Landscape/Portrait format**		
Resolution	WVGA 800 x 480	WVGA 800 x 480	WXGA 1280 x 800
Model number	0502	0702	101E
	6PMT50.xxxx-xxx		
Technology			
Model number	TFT color + multi-touch PCT (glass)		
	6PMT50.xxxx-1xx		
Front	**Black**		
Model number	Glass		
	6PMT50.xxxx-xxB		
Interfaces/Features			
Model number	1x USB on multi-header		
	6PMT50.xxxx-x9x		

3.3.2 System requirements

The following minimum versions are required to generally be able to use all functions:

- Automation Studio 4.7
- Automation Runtime 4.7

3.3.3 Projected capacitive touch (PCT)

Depending on the area of use, the touch controller can be optimized for the respective application.

	Standard
Operation	
Number of fingers	10
Glove operation	Yes
Passive stylus pens	Yes
Active stylus pens	No
Error detection	
Ball of hand	Yes
Water	Yes
Front	
Hardened front glass	Yes

Operation with gloves

Projected capacitive touch screens (PCT) are suitable for operation with or without gloves.

A large number of gloves (rubber gloves, light/heavy leather gloves, disposable latex gloves, etc.) are supported.

Due to the variety of commercially available gloves, however, B&R cannot guarantee all types.

Support for stylus pens

Passive stylus pens:
In principle, the Power Panel supports passive stylus pens. Due to the large number of passive stylus pens available on the market, there may be functional differences. For this reason, B&R cannot comprehensively guarantee their functionality.

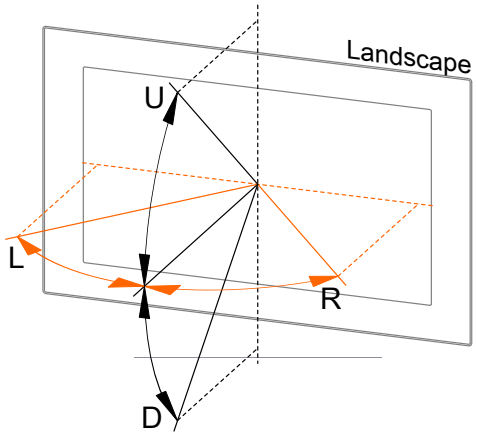
Active stylus pens are not supported!

Touch actions during cleaning

Touch actions can be triggered during cleaning of the PCT touch screen. If this is not desired, this behavior must be taken into account in the application.

3.3.4 Viewing angles

For the viewing angles values (U, D, R, L) of the display types, see the technical data of the respective device.



Legend	Display viewing angle
U	From top
D	From bottom
L	From left
R	From right

The viewing angles are specified for the horizontal (L, R) and vertical (U, D) axes in reference to the vertical axis of the display. The specified viewing angles above always refer to the standard mounting orientation of the respective Power Panel.

Standard mounting orientation: Sensor openings are on the top.

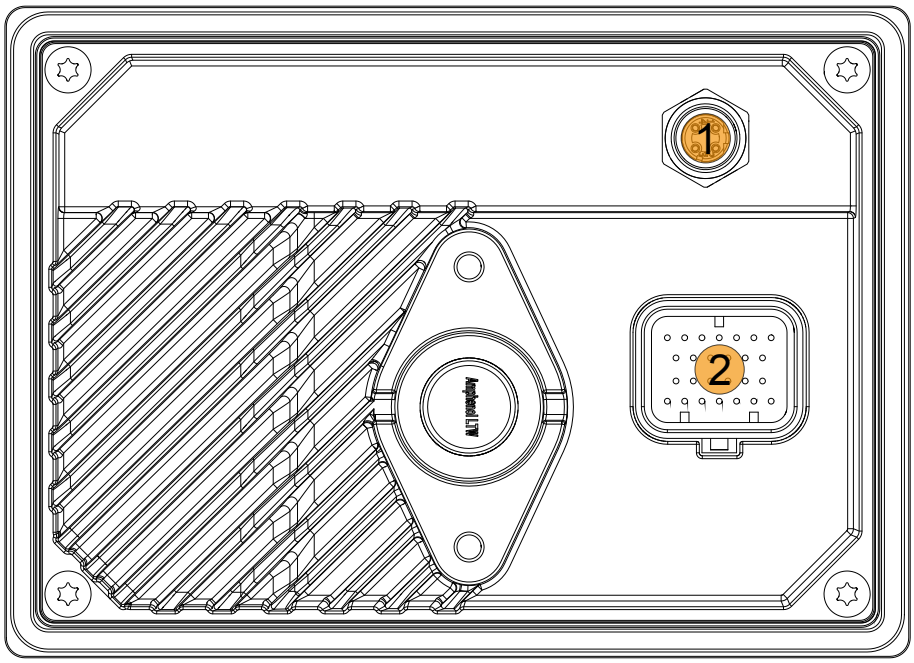
3.3.5 Surface resistance

Chemical resistance of the front glass per ASTM D 1308-02 and ASTM F 1598-95 for an exposure time of 24 hours without visible changes:

- Acetone
- Alkaline cleaning agents
- Ammonia 5%
- Gasoline (unleaded)
- Beer
- Brake fluid
- Chlorine-alkaline cleaning and disinfecting agents (pH value min. 11) 1.5%
- Hydrogen chloride 6%
- Coca-Cola
- Diesel
- Diesel oil
- Dimethylbenzene
- Vinegar
- Ethanol
- Grease
- Ammonia-based glass cleaners
- Sidolin glass cleaner
- Graphite
- Hydraulic fluid (Skydrol)
- Isopropanol
- Coffee
- Ink
- Lysol
- Methylbenzene
- Methyl ethyl ketone
- Naphtha
- Caustic soda 5%
- Nitric acid 70%
- Hydrochloric acid 5%
- Lubricants
- Sulphuric acid 40%
- Suntan oil and UV radiation
- Cooking oil
- Stamping ink
- Tea
- Turpentine
- Turpentine oil replacement (thinner)
- Trichloroethylene

3.3.6 Device interfaces

3.3.6.1 Overview



Legend	
No.	**Description**
1	Ethernet M12
2	26-pin male Superseal connector

3.3.6.2 Ethernet interface

Notice!

The maximum torque of 0.6 Nm is not permitted to be exceeded.

Interface	Pinout		
	Pin	**Name**	**Assignment**
	1	Tx+	Transmit data +
	2	Rx+	Receive data+
	3	Tx-	Transmit data-
	4	Rx-	Receive data -

3.3.6.3 Grounding (functional ground)

Depending on the application, it may be necessary to connect a functional ground to dissipate interference. For mobile applications, for example, no functional ground is required.

There are two ways to ground the Power Panel T50 mobile:

1) Grounding via one of the two M5 threads of the RAM bracket.
2) Grounding via one of the M4 screw threads provided for the holding plates for control cabinet installation (only available on 7.0" and 10.1" devices).

For additional information about electromagnetic compatibility, see the **INSTALLATIONS / EMC GUIDE** user's manual (MAEMV-ENG on the B&R website www.br-automation.com).

Notice!

Possible malfunction of interfaces and touch screen!

If functional ground is not present, faults in interface communication and touch screen functionality can occur.

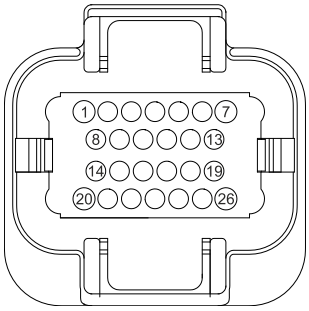
3.3.6.4 Superseal connection

Pinout

Notice!

Unused pins must be closed with blind plugs.

The USB interface is only permitted to be used for service purposes.[2)]



No.	Description		No.	Description	
1	Digital output 0.5 A	Channel 1	14	Digital input	Channel 5
2	Digital output 0.5 A	Channel 2	15	Digital input	Channel 6
3	Digital output 0.5 A	Channel 3	16	Digital input	Channel 7
4	Digital output 0.5 A	Channel 4	17	Digital input	Channel 8
5	GND		18	90Ω USB GND	
6	VCC		19	90Ω USB D-[1)]	
7	VCC		20	Do not use! For testing purposes only!	
8	Digital input	Channel 1	21	NC	
9	Digital input	Channel 2	22	NC	
10	Digital input	Channel 3	23	NC	
11	Digital input	Channel 4	24	NC	
12	USB cable shield		25	90Ω USB 5 V	
13	GND		26	90Ω USB D+[1)]	

1) USB data cable

The transition from the Superseal connection to a standard USB cable (characteristic impedance of the data lines 90 Ω) should be kept as short as possible. In addition, the data lines should be twisted. Depending on the quality of the transition, USB devices can only be used to a limited extent or only work with reduced cable length.

Power supply

Warning!

For industrial applications with functional ground, the device is only permitted to be supplied with protective extra-low voltage (PELV) (not applicable for mobile applications).

Protective earth (or the device housing) and the GND connection of the power supply are connected internally in the Power Panel.

Electrical properties	
Nominal voltage	12 / 24 VDC
Input voltage	9 to 32 VDC
Short-circuit proof and reverse polarity protection	Yes
Integrated protection	No (required fuse max. 5 A, slow-blow per connection pin)

2) The service interface can be used for the following tasks, for example: software updates, input devices (mouse or keyboard), user authentication, acyclic writing/reading of data. The interface is not suitable for cyclic writing/reading of application-relevant data or accessing software licenses.

3.3.6.5 Digital inputs and outputs

3.3.6.5.1 General information

Technical data

For information about digital inputs and outputs, see "Technical data" on page 22 under the respective Power Panel T50 mobile.

Naming conventions

> **Information:**
>
> **It is important to note that the numbering of OPC UA data points starts at 0; when used in Automation Studio, it starts at 1.**

Operation (OPC UA)

The digital inputs and outputs can be read asynchronously via Ethernet using OPC UA (see " ProcessData" on page 117).

Operation (Automation Studio)

In order to use the digital inputs and outputs in Automation Studio, the required upgrade must be downloaded from the B&R website (www.br-automation.com) and installed. The operation takes place in the background after suitable configuration via OPC UA drivers. The driver works with a sampling rate of 100 ms for the LEDs and 200 ms for all other OPC UA data points. This means that every 200 ms, the status of the digital inputs is read out asynchronously via OPC UA and passed on to the controller.

> **Information:**
>
> **The readout via Ethernet is processed in the controller's available idle time. This means possible delays with high CPU utilization and/or high Ethernet traffic.**

3.3.6.5.2 Digital inputs

Naming conventions	Data type	Description
DigitalInput01	BOOL (read-only)	Input state of the digital input
DigitalInput02		
DigitalInput03		
DigitalInput04		
DigitalInput05		
DigitalInput06		
DigitalInput07		
DigitalInput08		
Edgecounter01	UINT (16) (read-only)	Running counter of positive edge events, restarts at 0 in the event of overflow
Edgecounter02		
Edgecounter03		
Edgecounter04		
Edgecounter05		
Edgecounter06		
Edgecounter07		
Edgecounter08		

3.3.6.5.3 Digital outputs

Acknowledging an error

If the output driver is enabled and the read-back does not detect voltage on the output for a period of 500 ms, the affected channel is set to an error state (output via ErrorDO[##]). Only after the error state has been acknowledged (via a positive edge on ErrorClearDO[##]), the channel can be switched on again.

Since the driver only looks at a value every 200 ms and only reacts to changes accordingly, the following must be observed when acknowledging errors (Error):

When acknowledging an error, the corresponding data value must first be 0 and then set to 1 so that this is recognized as a change via the controller. It is also important to note that the value of ErrorClearD[##] should only be changed by the control program every 500 ms to ensure that the driver reliably detects the change. The following procedure is recommended:

Acknowledging an overcurrent error via a control task

1. Set ErrorClear to 0.
2. Wait at least 500 ms.
3. Set ErrorClear to 1.
4. Wait at least 500 ms.
5. The error is acknowledged and the digital output can be switched on again.

Naming conventions	Data type	Description
DigitalOutput01	BOOL (output)	Output state of digital output
DigitalOutput02		
DigitalOutput03		
DigitalOutput04		
ReadbackDO01	BOOL (input)	0: No voltage on the output pin 1: Voltage on the output pin
ReadbackDO02		
ReadbackDO03		
ReadbackDO04		
ErrorDO01	BOOL (output)	0: No error 1: Error (acknowledge required)
ErrorDO02		
ErrorDO03		
ErrorDO04		
ErrorClearDO01	BOOL (input)	0: No acknowledgment 1: One-time acknowledgment of the error via positive edge
ErrorClearDO02		
ErrorClearDO03		
ErrorClearDO04		

Additional information

- Read-back of the outputs:
  The processor is notified via a hardware read-back measurement whether the voltage on the output pin exceeds the typical value of 50% of the module power supply. This enables diagnostic functions and a shutdown in error state.
- Response time of the overload shutdown:
  Short-term overcurrents during the switch-on procedure are tolerated. This does not cause any problems for the digital outputs.
- Connecting digital outputs in parallel:
  Since the outputs are operated asynchronously via Ethernet, they do not switch exactly at the same time. The offset take be up to several hundred milliseconds. The inertia of the overload shutdown allows the first enabled output to take over the entire current for a short time until the other outputs are connected.

3.3.6.6 User LEDs

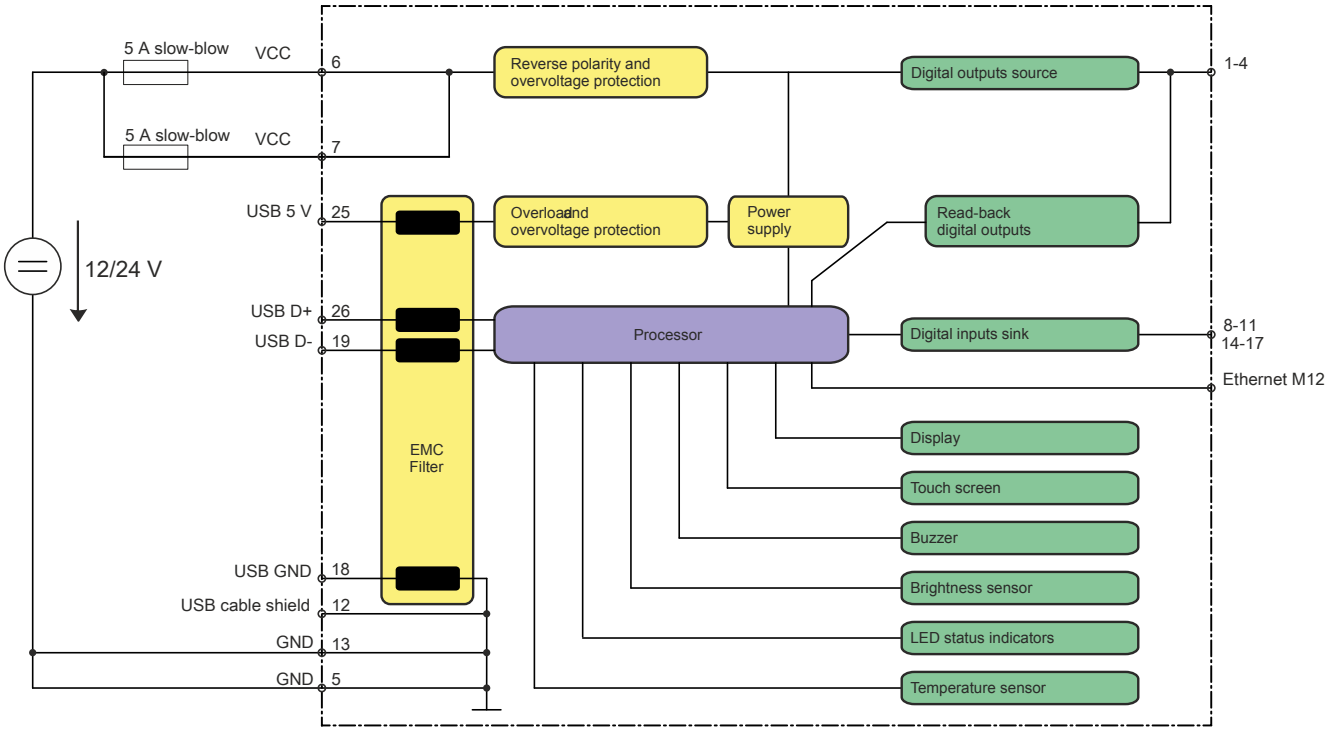
Information:

It is important to note that the numbering of the data points for OPC UA starts at 0, and for control via Automation Studio at 1.

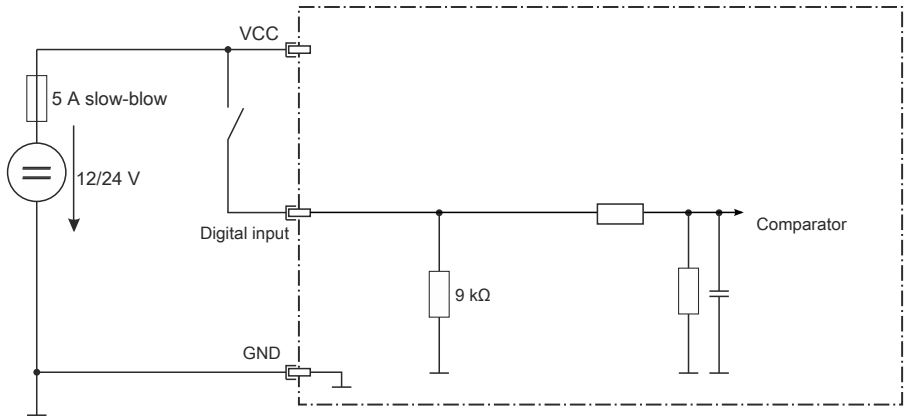
For information about positioning, see "Sensor and LED positioning" on page 21; for information about control via OPC UA, see " UserInterface" on page 120.

Naming conventions	Data type	Description
LedBlue01	USINT	LED brightness: 0: LED off 255: Maximum brightness
LedGreen01		
LedRed01		
LedBlue02		
LedGreen02		
LedRed02		
LedGreen03		
LedRed03		

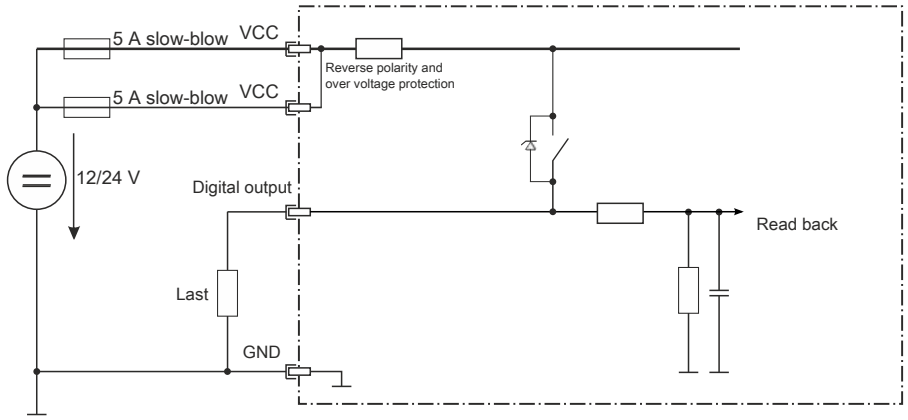
3.3.7 Block diagrams



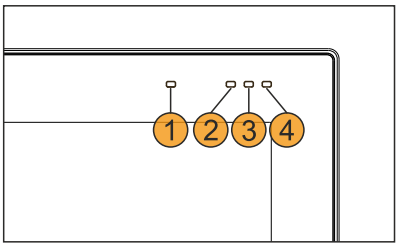
Digital inputs sink



Digital outputs source



3.3.8 Sensor and LED positioning



Legend			
No.	**Description**	**OPC UA data point**	**Automation Studio**
1	Brightness sensor	AmbientLight	AmbientLight
2	LED status indicator (red/green)[3][4][5]	RGB02	LEDRed03 LEDGreen03
3	User LED (red / green / blue)	RGB01	LEDRed02 LEDGreen02 LEDBlue02
4	User LED (red / green / blue)	RGB00	LEDRed01 LEDGreen01 LEDBlue01

3.3.8.1 Description of the red-green LED status indicator:

The following configurations apply for the LED status indicator (number 2 in the figure):

Green	Red	Description
Off	Off	Module not connected / undervoltage (<9 V)
Blinking	Off	Preliminary mode
On	Off	Processor is started.
Off	Blinking	Undertemperature/overtemperature

3.3.9 Overtemperature management

If one of the respective upper temperature limits is reached in the Power Panel T50 mobile, display or processor overtemperature can occur. If this occurs, the device switches off and the LED status indicator blinks red. The following automatic mechanisms then come into effect:

- Display overtemperature
  As soon as the temperature has cooled down to 10°C below the upper temperature limit, the device switches itself on again automatically.
- Processor overtemperature
  After 1 minute cooling time, the device switches itself on again automatically.

Switch-off temperatures in the event of overtemperature

	CPU component housing	Inside temperature (display temperature)
6PPT50.0502-19B	100°C	80°C
6PPT50.0702-19B	100°C	80°C
6PPT50.101E-19B	100°C	80°C

It is essential that devices are operated within the specified temperature ranges (see the ambient conditions in the technical data or temperature/humidity diagram) to avoid shutdown due to overtemperature.

[3] After processor startup, the LED status indicator becomes a user LED.
[4] In event of overtemperature, all user LEDs are switched off and the status LED blinks red until the device has cooled down again.
[5] When the processor is started up or in event of overtemperature, the brightness of the LED status indicator is 50% and cannot be configured further.

4 Technical data

4.1 Power Panel T50 mobile 5.0"

4.1.1 Order data

Order number	Short description	Figure
	Power Panel T50 mobile	
6PMT50.0502-19B	Power Panel T50 mobile, 5.0", glass front, 1x Ethernet. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 512 MB onboard flash drive. Display and touch screen: 5.0", 800 x 480 (WVGA) resolution, projected capacitive touch screen, multi-touch support, glass front with black frame, landscape and portrait format configurable with software. Interfaces: 1x Ethernet 10/100 Mbit/s, 1x USB 2.0 on multi-header. Client software: Integrated service page, VNC client, embedded web browser.	
	Optional accessories	
	Brackets	
6PM.AC.PAN-050	T50 mobile 5 inch, panel installation set	
6PM.AC.RAM-001	RAM installation set 1 inch B-ball, diamond plate for panel, including screws, short connecting arm, round base plate, suitable for T50 mobile 5", 7"	
	Mounting tools	
X67ACTQMX	X67 torque wrench set, for X67 M8 and M12 connectors, for hex-head connectors	
	Other	
6PMTBT50.01-00	T50 mobile, connector for Superseal header, with connector contacts and dummy plugs	
	POWERLINK/Ethernet	
X67AC2E01	X67 male M12 connector, 4-pin, D-keyed, shielded, insulation piercing connection	
	POWERLINK/Ethernet-Cable	
X67CA0E41.0010	POWERLINK/Ethernet connection cable, RJ45 to M12, 1 m	
X67CA0E41.0020	POWERLINK/Ethernet connection cable, RJ45 to M12, 2 m	
X67CA0E41.0030	POWERLINK/Ethernet connection cable, RJ45 to M12, 3 m	
X67CA0E41.0050	POWERLINK/Ethernet connection cable, RJ45 to M12, 5 m	
X67CA0E41.0150	POWERLINK/Ethernet connection cable, RJ45 to M12, 15 m	
X67CA0E41.0500	POWERLINK/Ethernet connection cable, RJ45 to M12, 50 m	
X67CA0E61.0010	POWERLINK/Ethernet connection cable, M12 to M12, 1 m	
X67CA0E61.0020	POWERLINK/Ethernet connection cable, M12 to M12, 2 m	
X67CA0E61.0050	POWERLINK/Ethernet connection cable, M12 to M12, 5 m	
X67CA0E61.0100	POWERLINK/Ethernet connection cable, M12 to M12, 10 m	
X67CA0E61.0150	POWERLINK/Ethernet connection cable, M12 to M12, 15 m	
X67CA0E61.0200	POWERLINK/Ethernet connection cable, M12 to M12, 20 m	
X67CA3E41.0150	POWERLINK/Ethernet connection cable, RJ45 to M12, can be used in cable drag chains, 15 m	
	Wiring harness	
6PMCAT50.02-00	T50 mobile, wiring harness starter set for T50 mobile, 2 m length, for Superseal connection	

Table 1: 6PMT50.0502-19B - Order data

4.1.2 Technical data

Order number	6PMT50.0502-19B
General information	
B&R ID code	0xF9B7
Status LED	1x red/green; configurable, dimmable 2x red/green/blue; configurable, dimmable
Buzzer	Yes
Brightness sensor	Yes
Certifications	
UN ECE-R10	Yes
CE	Yes
Controller	
Operating system	PPT50 system
Processor	
Type	ARM Cortex-A9, dual core
Clock frequency	800 MHz

Table 2: 6PMT50.0502-19B - Technical data

Order number	6PMT50.0502-19B
Flash	512 MB
DRAM	1 GB
Display	
Type	TFT color
Diagonal	5.0"
Colors	16.7 million (RGB, 8 bits per channel)
Resolution	WVGA, 800 x 480 pixels
Contrast	Typ. 600:1
Viewing angles	
Horizontal	Direction L / Direction R = 70°
Vertical	Direction U = 50° / Direction D = 70°
Backlight	
Type	LED
Brightness	Typ. 400 cd/m²
Brightness (dimmable)	Yes
Half-brightness time	30,000 h
Touch screen	
Type	Multi-touch
Technology	PCT (projected capacitive touch)
Surface	Glass, chemically hardened (6H)
Screen rotation	Yes
Interfaces	
Interface IF1	
Type	Ethernet
Variant	M12, D-coded
Transfer rate	10/100 Mbit
Interface IF3	
Type	USB 2.0
Variant	On multi-header
Current-carrying capacity	Max. 0.5 A
Digital inputs	
Quantity	8
Nominal voltage	12 / 24 VDC
Input voltage	9 to 32 VDC
Input circuit	Sink
Input filter	
Hardware	Approx. 20 ms
Software	No
Input current	Typ. 1.3 mA (at 12 VDC) Typ. 2.5 mA (at 24 VDC)
Input resistance	Typ. 9 kΩ
Switching threshold	Typ. 50% of the supply voltage
Digital outputs	
Quantity	4
Variant	Source (current-sourcing FET)
Nominal voltage	12 / 24 VDC
Nominal output current	Max. 0.5 A permissible continuous current
Output protection	Shutdown in the event of overcurrent or short circuit, integrated protection for switching inductive loads
Diagnostic status	Status display via read-back measurement
$R_{DS(on)}$	Max. 100 mΩ
Residual voltage	<0.1 V at 0.5 A nominal current
Additional functions	Overload shutdown / short-circuit shutdown: Yes (for each channel); must be acknowledged by user Hardware filter read-back measurement: Approx. 20 ms Software filter read-back measurement: No Short-term overcurrents during the switch-on procedure are tolerated.
Electrical properties	
Nominal voltage	12 / 24 VDC
Power consumption	Max. 8 W [1)]
Fuse	No [2)]
Reverse polarity protection	Yes
Short-circuit proof	Yes
Operating conditions	
Mounting orientation	
Any	Yes
Degree of protection per EN 60529	IP66
Ambient conditions	
Temperature	
Operation	-20 to +70°C housing surface
Storage	-20 to 80°C [3)]
Transport	-20 to 80°C [3)]

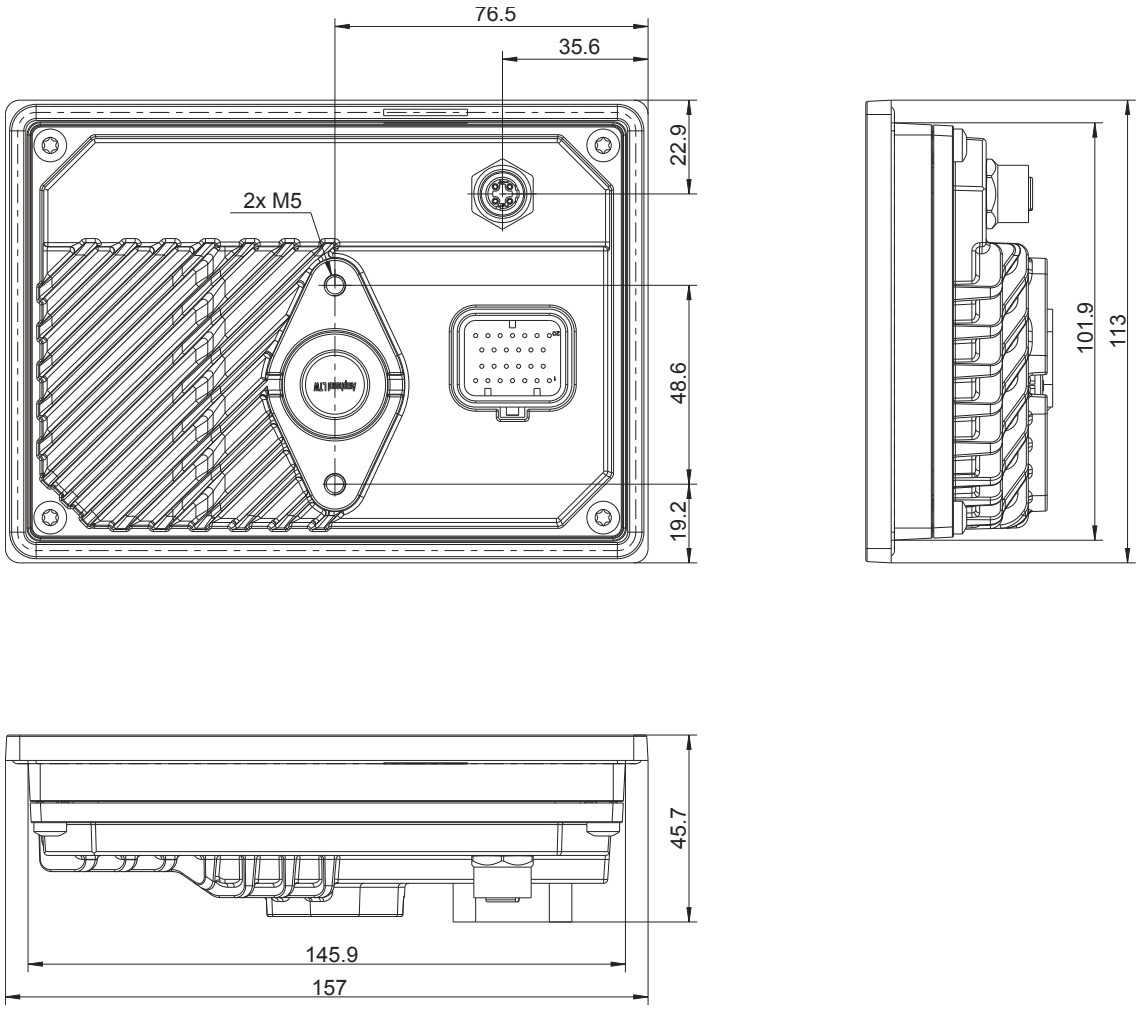
Table 2: 6PMT50.0502-19B - Technical data

Order number	6PMT50.0502-19B
Mechanical properties	
Front	
Design	Black
Dimensions	
Width	157 mm
Height	113 mm
Depth	45.4 mm
Weight	658 g

Table 2: 6PMT50.0502-19B - Technical data

1) Additional power consumption for each USB interface: Max. 2.75 W.
2) Required fuse: Max. 5 A slow-blow per connection pin
3) See also temperature/humidity diagram

4.1.3 Dimensions



Information:

2D and 3D data (DXF and STEP formats) can be downloaded from the B&R website (www.br-automation.com). To do this, search for the order number of the device using the search bar.

Dimensions of the installation cutout for this Power Panel variant: 147.5 ±1 mm x 103.5 ±1 mm

See also "Requirements for the installation cutout" on page 38

4.1.4 Temperature/Humidity diagram

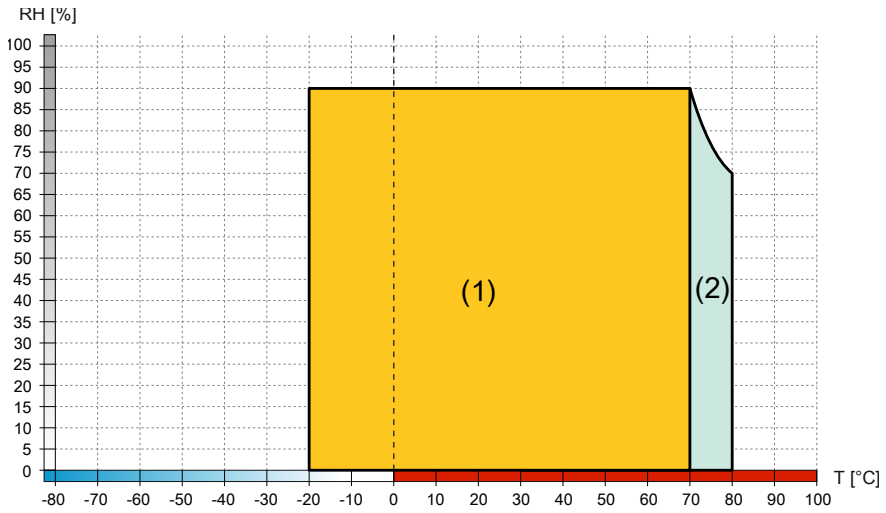


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C[1)]
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

1) Measured on the housing surface

4.2 Power Panel T50 mobile 7.0"

4.2.1 Order data

Order number	Short description	Figure
	Power Panel T50 mobile	
6PMT50.0702-19B	Power Panel T50 mobile, 7.0", glass front, 1x Ethernet. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 512 MB onboard flash drive. Display and touch screen: 7.0", 800 x 480 (WVGA) resolution, projected capacitive touch screen, multi-touch support, glass front with black frame, landscape and portrait format configurable with software. Interfaces: 1x Ethernet 10/100 Mbit/s, 1x USB 2.0 on multi-header. Client software: Integrated service page, VNC client, embedded web browser.	
	Optional accessories	
	Brackets	
6PM.AC.PAN-070	T50 mobile 7 inch, panel installation set	
6PM.AC.RAM-001	RAM installation set 1 inch B-ball, diamond plate for panel, including screws, short connecting arm, round base plate, suitable for T50 mobile 5", 7"	
6PM.AC.RAM-002	RAM installation set 1.5 inch, C-ball, diamond plate for panel, including screws, medium connecting arm, round base plate, suitable for T50 mobile 5", 7", 10.1"	
	Mounting tools	
X67ACTQMX	X67 torque wrench set, for X67 M8 and M12 connectors, for hex-head connectors	
	Other	
6PMTBT50.01-00	T50 mobile, connector for Superseal header, with connector contacts and dummy plugs	
	POWERLINK/Ethernet	
X67AC2E01	X67 male M12 connector, 4-pin, D-keyed, shielded, insulation piercing connection	
	POWERLINK/Ethernet-Cable	
X67CA0E41.0010	POWERLINK/Ethernet connection cable, RJ45 to M12, 1 m	
X67CA0E41.0020	POWERLINK/Ethernet connection cable, RJ45 to M12, 2 m	
X67CA0E41.0030	POWERLINK/Ethernet connection cable, RJ45 to M12, 3 m	
X67CA0E41.0050	POWERLINK/Ethernet connection cable, RJ45 to M12, 5 m	
X67CA0E41.0150	POWERLINK/Ethernet connection cable, RJ45 to M12, 15 m	
X67CA0E41.0500	POWERLINK/Ethernet connection cable, RJ45 to M12, 50 m	
X67CA0E61.0010	POWERLINK/Ethernet connection cable, M12 to M12, 1 m	
X67CA0E61.0020	POWERLINK/Ethernet connection cable, M12 to M12, 2 m	
X67CA0E61.0050	POWERLINK/Ethernet connection cable, M12 to M12, 5 m	
X67CA0E61.0100	POWERLINK/Ethernet connection cable, M12 to M12, 10 m	
X67CA0E61.0150	POWERLINK/Ethernet connection cable, M12 to M12, 15 m	
X67CA0E61.0200	POWERLINK/Ethernet connection cable, M12 to M12, 20 m	
X67CA3E41.0150	POWERLINK/Ethernet connection cable, RJ45 to M12, can be used in cable drag chains, 15 m	
	Wiring harness	
6PMCAT50.02-00	T50 mobile, wiring harness starter set for T50 mobile, 2 m length, for Superseal connection	

Table 3: 6PMT50.0702-19B - Order data

4.2.2 Technical data

Order number	6PMT50.0702-19B
General information	
B&R ID code	0xF9B8
Status LED	1x red/green; configurable, dimmable 2x red/green/blue; configurable, dimmable
Buzzer	Yes
Brightness sensor	Yes
Certifications	
UN ECE-R10	Yes
CE	Yes
UKCA	Yes
Controller	
Operating system	PPT50 system
Processor	
Type	ARM Cortex-A9, dual core
Clock frequency	800 MHz
Flash	512 MB
DRAM	1 GB
Display	
Type	TFT color

Table 4: 6PMT50.0702-19B - Technical data

Order number	6PMT50.0702-19B
Diagonal	7.0"
Colors	16.7 million (RGB, 8 bits per channel)
Resolution	WVGA, 800 x 480 pixels
Contrast	Typ. 600:1
Viewing angles	
Horizontal	Direction L / Direction R = 70°
Vertical	Direction U / Direction D = Typ. 60°
Backlight	
Type	LED
Brightness	Typ. 500 cd/m²
Brightness (dimmable)	Yes
Half-brightness time	50,000 h
Touch screen	
Type	Multi-touch
Technology	PCT (projected capacitive touch)
Surface	Glass, chemically hardened (6H)
Screen rotation	Yes
Interfaces	
Interface IF1	
Type	Ethernet
Variant	M12, D-coded
Transfer rate	10/100 Mbit
Interface IF3	
Type	USB 2.0
Variant	On multi-header
Current-carrying capacity	Max. 0.5 A
Digital inputs	
Quantity	8
Nominal voltage	12 / 24 VDC
Input voltage	9 to 32 VDC
Input circuit	Sink
Input filter	
Hardware	Approx. 20 ms
Software	No
Input current	Typ. 1.3 mA (at 12 VDC) Typ. 2.5 mA (at 24 VDC)
Input resistance	Typ. 9 kΩ
Switching threshold	Typ. 50% of the supply voltage
Digital outputs	
Quantity	4
Variant	Source (current-sourcing FET)
Nominal voltage	12 / 24 VDC
Nominal output current	Max. 0.5 A permissible continuous current
Output protection	Shutdown in the event of overcurrent or short circuit, integrated protection for switching inductive loads
Diagnostic status	Status display via read-back measurement
$R_{DS(on)}$	Max. 100 mΩ
Residual voltage	<0.1 V at 0.5 A nominal current
Additional functions	Overload shutdown / short-circuit shutdown: Yes (for each channel); must be acknowledged by user Hardware filter read-back measurement: Approx. 20 ms Software filter read-back measurement: No Short-term overcurrents during the switch-on procedure are tolerated.
Electrical properties	
Nominal voltage	12 / 24 VDC
Power consumption	Max. 10.5 W [1]
Fuse	No [2]
Reverse polarity protection	Yes
Short-circuit proof	Yes
Operating conditions	
Mounting orientation	
Any	Yes
Degree of protection per EN 60529	IP66
Ambient conditions	
Temperature	
Operation	-20 to +70°C housing surface
Storage	-20 to 80°C [3]
Transport	-20 to 80°C [3]
Mechanical properties	
Front	
Design	Black

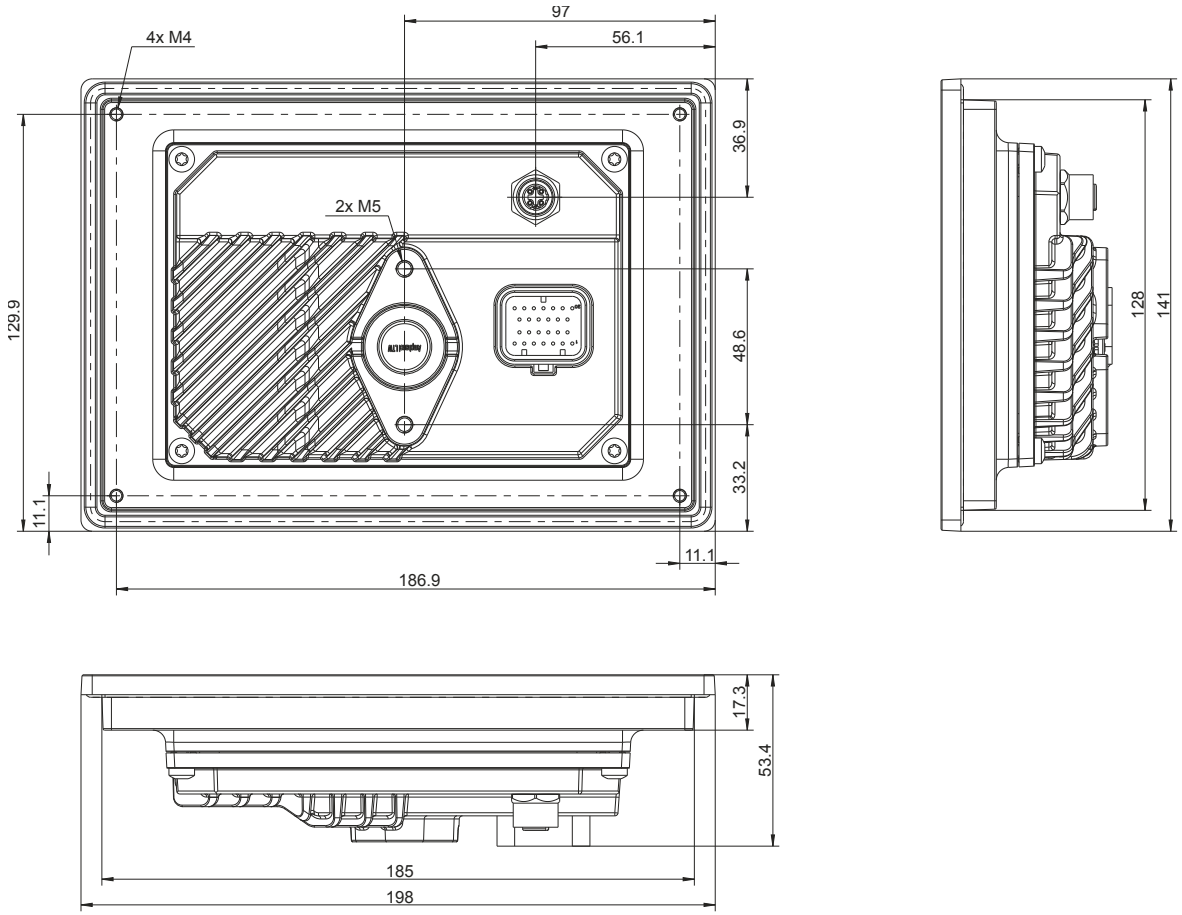
Table 4: 6PMT50.0702-19B - Technical data

Order number	6PMT50.0702-19B
Dimensions	
Width	198 mm
Height	141 mm
Depth	53.15 mm
Weight	963 g

Table 4: 6PMT50.0702-19B - Technical data

1) Additional power consumption for each USB interface: Max. 2.75 W.
2) Required fuse: Max. 5 A slow-blow per connection pin
3) See also temperature/humidity diagram

4.2.3 Dimensions



Information:

2D and 3D data (DXF and STEP formats) can be downloaded from the B&R website (www.br-automation.com). To do this, search for the order number of the device using the search bar.

Dimensions of the installation cutout for this Power Panel variant: 187 ±1 mm x 130 ±1 mm

See also Requirements for the installation cutout

4.2.4 Temperature/Humidity diagram

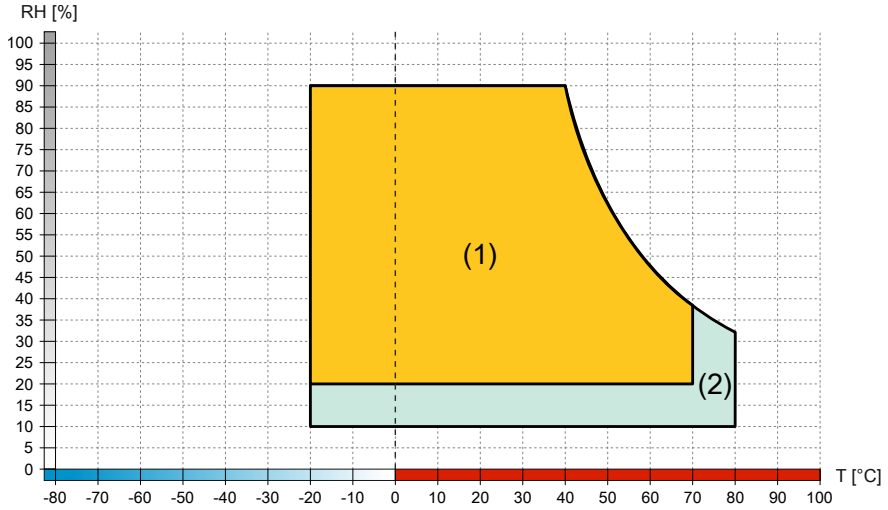


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C[1)]
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

1) Measured on the housing surface

4.3 Power Panel T50 mobile 10.1"

4.3.1 Order data

Order number	Short description	Figure
	Power Panel T50 mobile	
6PMT50.101E-19B	Power Panel T50 mobile, 10.1", glass front, 1x Ethernet. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 512 MB onboard flash drive. Display and touch screen: 10.1", 1280 x 800 (WXGA) resolution, projected capacitive touch screen, multi-touch support, glass front with black frame, landscape and portrait format configurable with software. Interfaces: 1x Ethernet 10/100 Mbit/s, 1x USB 2.0 on multi-header. Client software: Integrated service page, VNC client, embedded web browser.	
	Optional accessories	
	Brackets	
6PM.AC.PAN-101	T50 mobile 10.1 inch, panel installation set	
6PM.AC.RAM-002	RAM installation set 1.5 inch, C-ball, diamond plate for panel, including screws, medium connecting arm, round base plate, suitable for T50 mobile 5", 7", 10.1"	
	Mounting tools	
X67ACTQMX	X67 torque wrench set, for X67 M8 and M12 connectors, for hex-head connectors	
	Other	
6PMTBT50.01-00	T50 mobile, connector for Superseal header, with connector contacts and dummy plugs	
	POWERLINK/Ethernet	
X67AC2E01	X67 male M12 connector, 4-pin, D-keyed, shielded, insulation piercing connection	
	POWERLINK/Ethernet-Cable	
X67CA0E41.0010	POWERLINK/Ethernet connection cable, RJ45 to M12, 1 m	
X67CA0E41.0020	POWERLINK/Ethernet connection cable, RJ45 to M12, 2 m	
X67CA0E41.0030	POWERLINK/Ethernet connection cable, RJ45 to M12, 3 m	
X67CA0E41.0050	POWERLINK/Ethernet connection cable, RJ45 to M12, 5 m	
X67CA0E41.0150	POWERLINK/Ethernet connection cable, RJ45 to M12, 15 m	
X67CA0E41.0500	POWERLINK/Ethernet connection cable, RJ45 to M12, 50 m	
X67CA0E61.0010	POWERLINK/Ethernet connection cable, M12 to M12, 1 m	
X67CA0E61.0020	POWERLINK/Ethernet connection cable, M12 to M12, 2 m	
X67CA0E61.0050	POWERLINK/Ethernet connection cable, M12 to M12, 5 m	
X67CA0E61.0100	POWERLINK/Ethernet connection cable, M12 to M12, 10 m	
X67CA0E61.0150	POWERLINK/Ethernet connection cable, M12 to M12, 15 m	
X67CA0E61.0200	POWERLINK/Ethernet connection cable, M12 to M12, 20 m	
X67CA3E41.0150	POWERLINK/Ethernet connection cable, RJ45 to M12, can be used in cable drag chains, 15 m	
	Wiring harness	
6PMCAT50.02-00	T50 mobile, wiring harness starter set for T50 mobile, 2 m length, for Superseal connection	

Table 5: 6PMT50.101E-19B - Order data

4.3.2 Technical data

Order number	6PMT50.101E-19B
General information	
B&R ID code	0xF9B9
Status LED	1x red/green; configurable 2x red/green/blue; configurable, dimmable
Buzzer	Yes
Brightness sensor	Yes
Certifications	
UN ECE-R10	Yes
CE	Yes
UKCA	Yes
Controller	
Operating system	PPT50 system
Processor	
Type	ARM Cortex-A9, dual core
Clock frequency	800 MHz
Flash	512 MB
DRAM	1 GB
Display	
Type	TFT color
Diagonal	10.1"
Colors	16.7 million (RGB, 8 bits per channel)

Table 6: 6PMT50.101E-19B - Technical data

Order number	6PMT50.101E-19B
Resolution	WXGA, 1280 x 800 pixels
Contrast	Typ. 800:1
Viewing angles	
Horizontal	Direction L / Direction R = Typ. 85°
Vertical	Direction U / Direction D = Typ. 85°
Backlight	
Type	LED
Brightness	Typ. 500 cd/m²
Brightness (dimmable)	Yes
Half-brightness time	50,000 h
Touch screen	
Type	Multi-touch
Technology	PCT (projected capacitive touch)
Surface	Glass, chemically hardened (6H)
Screen rotation	Yes
Interfaces	
Interface IF1	
Type	Ethernet
Variant	M12, D-coded
Transfer rate	10/100 Mbit
Interface IF3	
Type	USB 2.0
Variant	On multi-header
Current-carrying capacity	Max. 0.5 A
Digital inputs	
Quantity	8
Nominal voltage	12 / 24 VDC
Input voltage	9 to 32 VDC
Input circuit	Sink
Input filter	
Hardware	Approx. 20 ms
Software	No
Input current	Typ. 1.3 mA (at 12 VDC) Typ. 2.5 mA (at 24 VDC)
Input resistance	Typ. 9 kΩ
Switching threshold	Typ. 50% of the supply voltage
Digital outputs	
Quantity	4
Variant	Source (current-sourcing FET)
Nominal voltage	12 / 24 VDC
Nominal output current	Max. 0.5 A permissible continuous current
Output protection	Shutdown in the event of overcurrent or short circuit, integrated protection for switching inductive loads
Diagnostic status	Status display via read-back measurement
$R_{DS(on)}$	Max. 100 mΩ
Residual voltage	<0.1 V at 0.5 A nominal current
Additional functions	Overload shutdown / short-circuit shutdown: Yes (for each channel); must be acknowledged by user Hardware filter read-back measurement: Approx. 20 ms Software filter read-back measurement: No Short-term overcurrents during the switch-on procedure are tolerated.
Electrical properties	
Nominal voltage	12 / 24 VDC
Power consumption	Max. 12.5 W [1]
Fuse	No [2]
Reverse polarity protection	Yes
Short-circuit proof	Yes
Operating conditions	
Mounting orientation	
Any	Yes
Degree of protection per EN 60529	IP66
Ambient conditions	
Temperature	
Operation	-20 to +70°C housing surface
Storage	-20 to 80°C [3]
Transport	-20 to 80°C [3]
Mechanical properties	
Front	
Design	Black

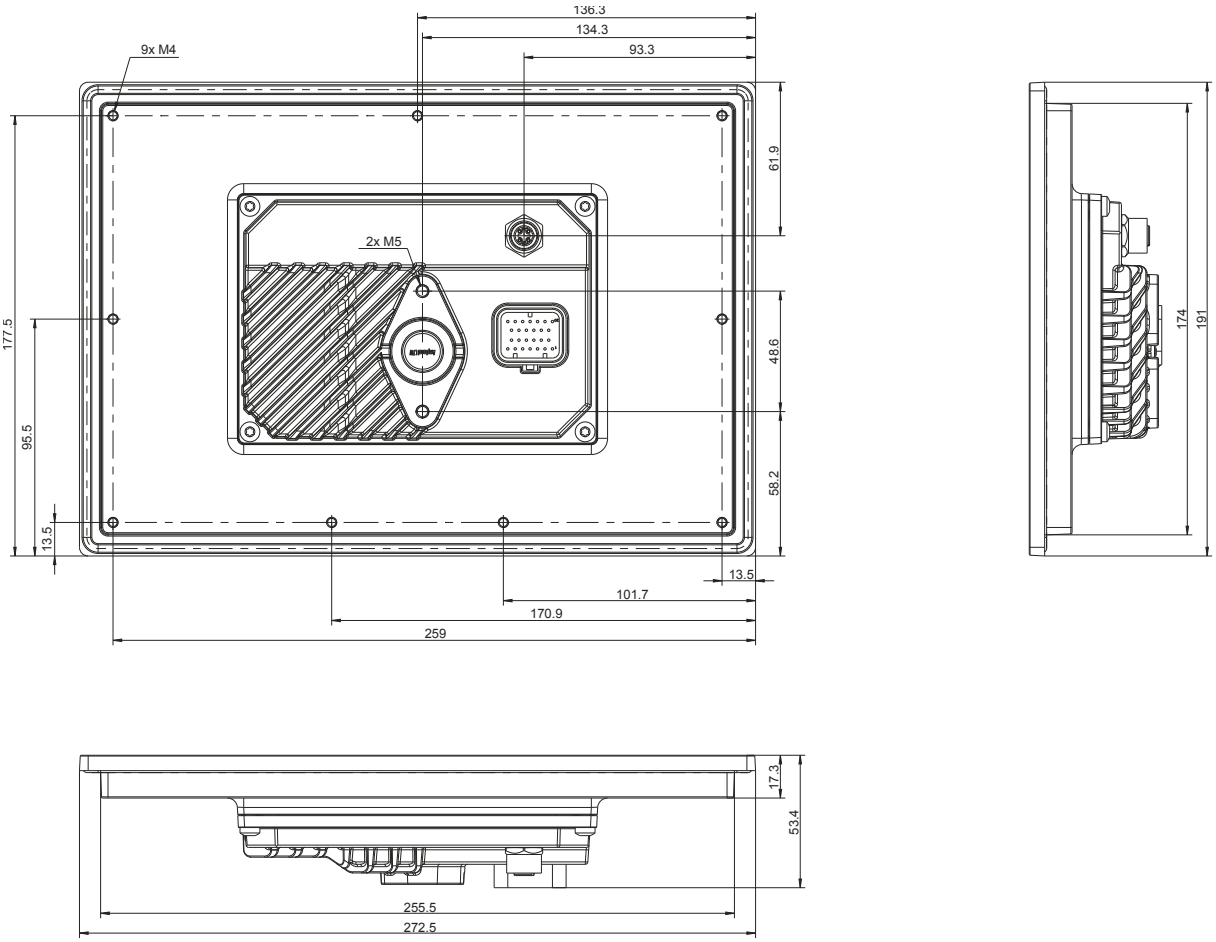
Table 6: 6PMT50.101E-19B - Technical data

Order number	6PMT50.101E-19B
Dimensions	
Width	271.5 mm
Height	190 mm
Depth	53 mm
Weight	1260 g

Table 6: 6PMT50.101E-19B - Technical data

1) Additional power consumption for each USB interface: Max. 2.75 W.
2) Required fuse: Max. 5 A slow-blow per connection pin
3) See also temperature/humidity diagram

4.3.3 Dimensions



Information:

2D and 3D data (DXF and STEP formats) can be downloaded from the B&R website (www.br-automation.com). To do this, search for the order number of the device using the search bar.

Dimensions of the installation cutout for this Power Panel variant: 257.5 ±1 mm x 176 ±1 mm

See also Requirements for the installation cutout

4.3.4 Temperature/Humidity diagram

Diagram legend			
(1)	Operation	T [°C]	Temperature in °C[1)]
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

1) Measured on the housing surface

5 Installation and wiring

5.1 Installation

Notice!

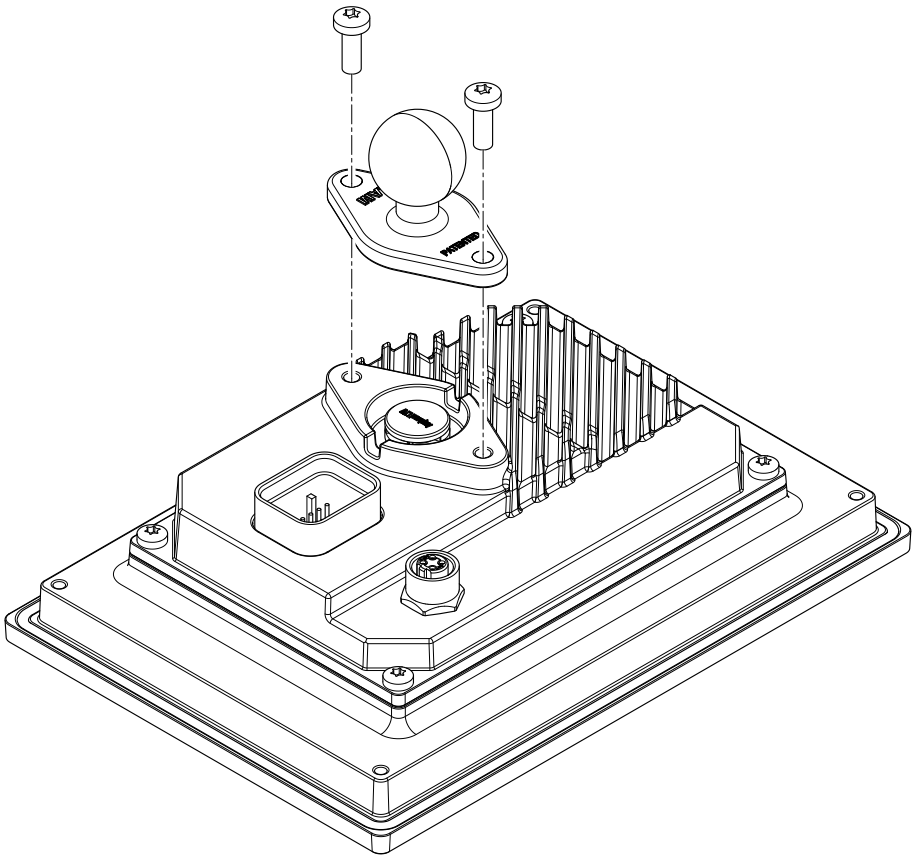
Possible damage to the device!

- **Commissioning and maintenance work is only permitted to be carried out when the device is in a voltage-free state. To do this, disconnect the power cable from the power supply and from the device.**
- **Do not use excessive force! Handle all modules and components carefully.**
- **All covers and components, accessories, hardware and cables must be installed or secured before the device is connected to the power supply and switched on.**
- **Observe ESD instructions (see "Protection against electrostatic discharge" on page 8).**

- Ambient conditions must be taken into account.
- When installed in a closed housing, there must be sufficient volume for air circulation.
- The device must be installed on a flat, clean and burr-free surface.
- When connecting cables, the bend radius must be taken into account.
- The device must be installed such that viewing is optimized for the user (see the technical data for information regarding the viewing angle).

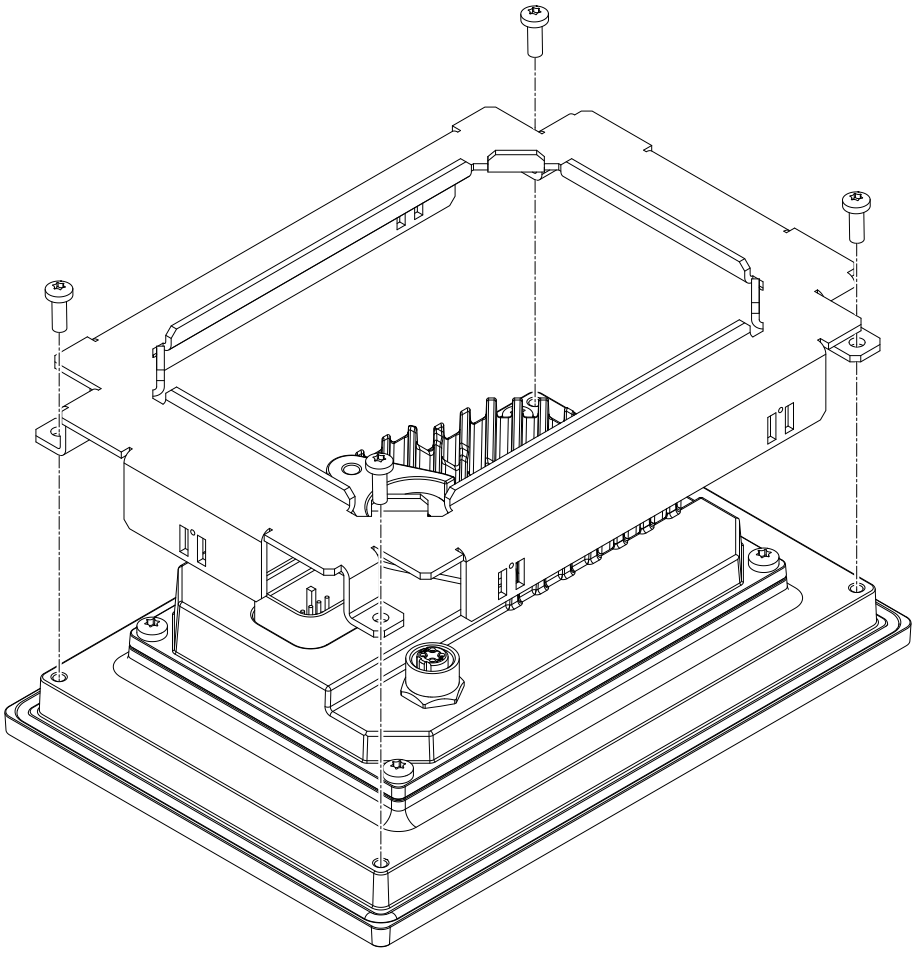
5.2 Installing the RAM bracket

- Mount the RAM bracket.
- Secure with the two screws (torque: 6 Nm).



5.3 Installing the holding plate for control cabinet installation

1. Insert the device into the front of the prepared, burr-free and flat installation cutout. For the dimensions of the installation cutout, see section "Dimensions" for the individual devices.
2. Mount the holding plate on the terminal.
3. Secure with the screws (torque: 6 Nm).[6)]
4. Install the terminal using the retaining clips (see "Installing with retaining clips" on page 36).



5.3.1 Installing with retaining clips

Figure: Retaining clips (symbolic)

The retaining clips are designed for a certain thickness of the material to be clamped (max. 6 mm, min. 2 mm).

A large flat-blade screwdriver is needed to tighten and loosen the screw.

The device must be installed on a flat, clean and burr-free surface since tightening screws on an uneven area can result in damage to the display or the ingress of dust and water.

See also "Requirements for the installation cutout" on page 38.

[6)] The number of screws required may vary depending on the selected diagonal.

Procedure

1. Install the retaining clips on the device. To do this, insert the clips into the openings on the sides of the device (indicated by the orange circles). The number of openings may vary depending on the size of the device.

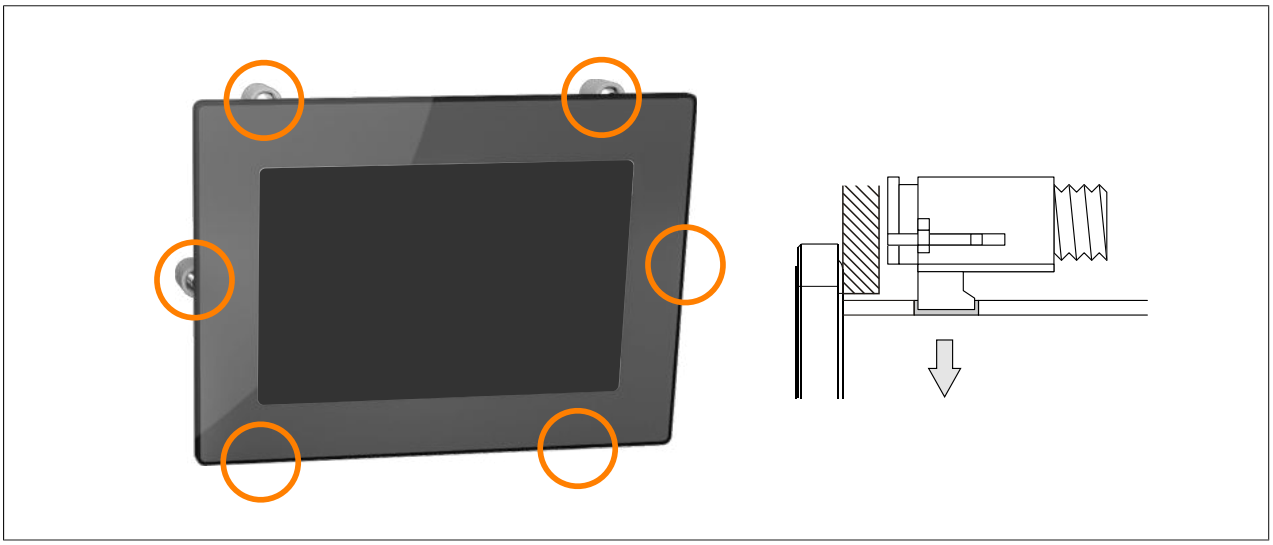


Figure: Inserting the retaining clips

2. Slide the retaining clips all the way to the back of the openings.

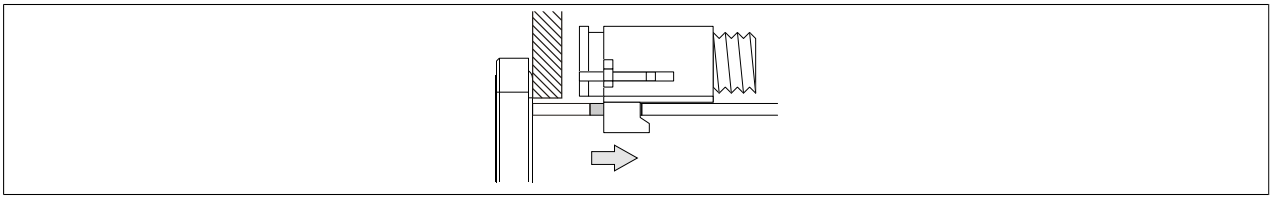


Figure: Sliding the retaining clips back

3. Secure the retaining clips to the wall or control cabinet panel by tightening the mounting screws with a flat-blade screwdriver.

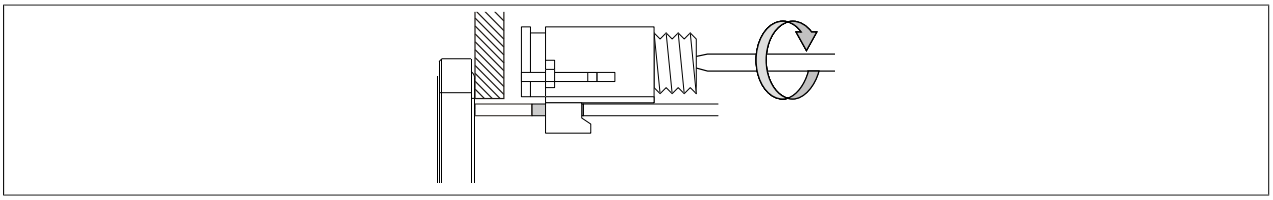


Figure: Securing the retaining clips

Torque limiting is built into the retaining clips.

✓ The retaining clip is secured correctly if the following conditions apply:

- As soon as torque limiting takes effect, the blade of the screwdriver is pushed out of the screw drive.
- The screwdriver can no longer grip and further tightening is no longer possible.

5.3.2 Requirements for the installation cutout

When installing the Power Panel, it is important to ensure that the surface and wall thickness meet the following conditions:

Installation cutout property	Value
Permissible deviation from evenness **Note:** This condition must also be observed when the device is installed.	≤0.5 mm
Permissible surface roughness in the area of the gasket	≤120 µm (Rz 120)
Min. wall thickness	2 mm
Max. wall thickness	6 mm

Notice!

The degree of protection provided by the device (see technical data) can only be maintained if it is installed in an appropriate housing that has at least the same degree of protection and in accordance with the above requirements.

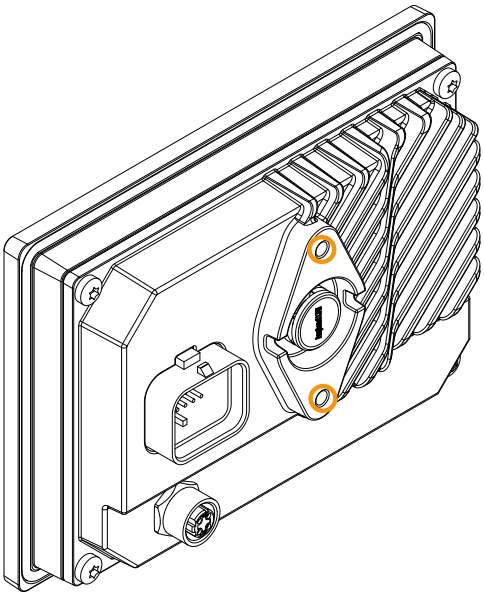
Notice!

The device must ultimately be installed in a protective housing with sufficient rigidity (per UL 61010-1 and UL 61010-2-201).

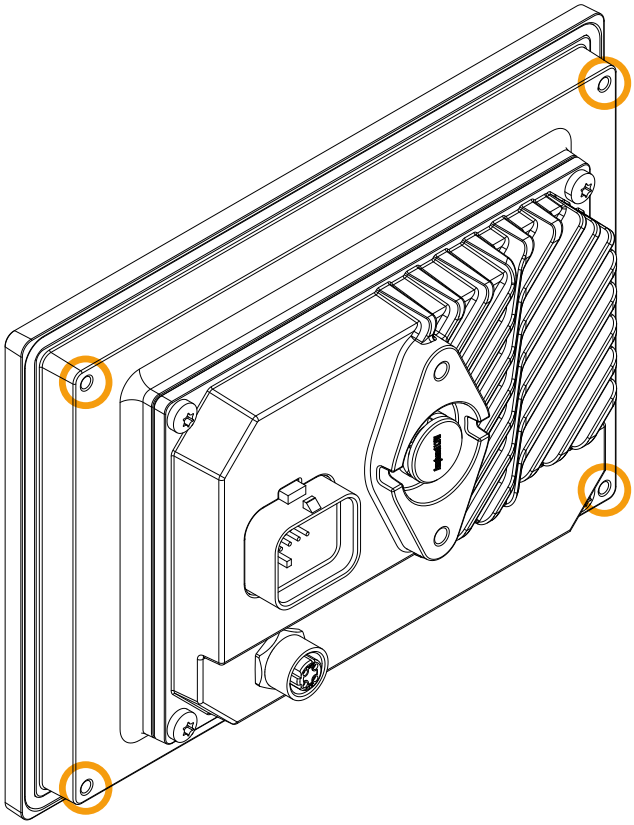
5.4 Wall mounting

The device can be secured in the prepared installation cutout using the screws[7]. For the required dimensions, see the corresponding chapter under "Technical data".

- 5" devices: 2x M5 screws
- 7" to 10.1" devices: 4x M4 screws



Installation 5"



Installation 7" to 10.1"

[7] The number of screws required may vary depending on the selected diagonal.

6 Commissioning

6.1 Operating the Power Panel

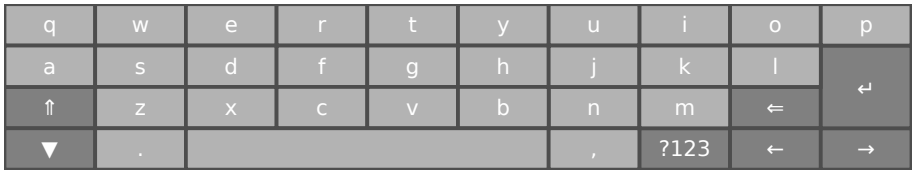
The following input methods can be used individually or together to operate the Power Panel:

- Touch screen
- USB keyboard
- USB mouse

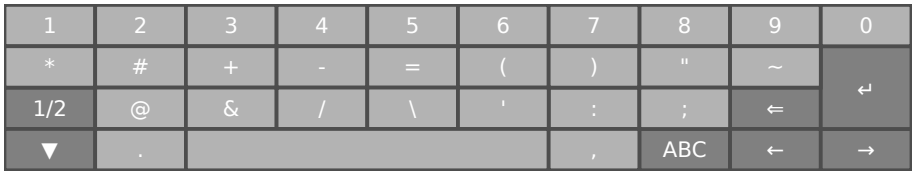
6.1.1 Keyboard

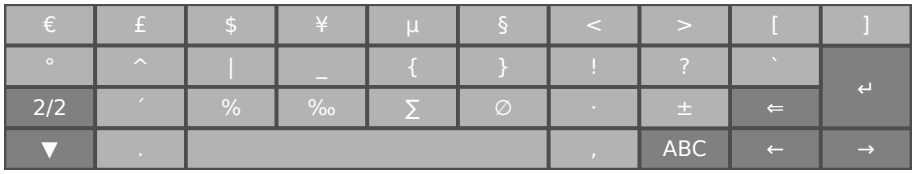
Text can be entered using a USB keyboard or virtual keyboard.

The virtual keyboard is displayed as soon as a text input field (blinking text input cursor "**|**") has the focus.



The [**?123**], [**ABC**], [**1/2**] and [**2/2**] keys can be used to open additional keyboard layouts:





6.1.2 Mouse

The mouse cursor automatically appears if a USB mouse is connected to the Power Panel.

If the left and right mouse buttons are pressed simultaneously for more than 2 seconds, the Power Panel navigates to the service pages.

7 Configuration

The Power Panel can be configured in the following ways:

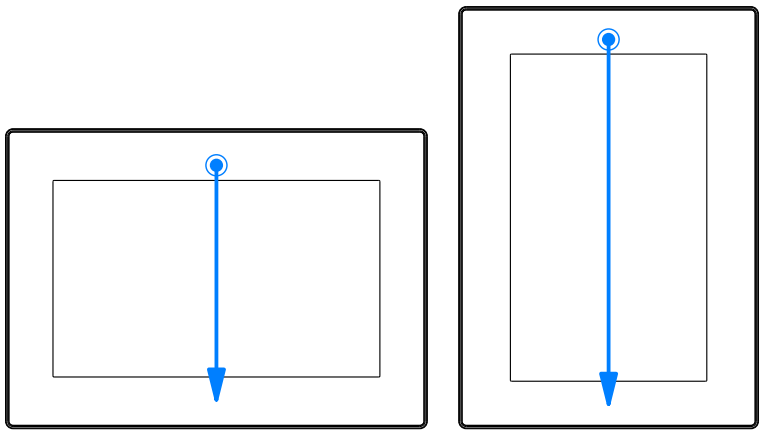
- Via the service page of the Power Panel (see "Service pages" on page 41)
- Via OPC UA (OPC UA server must be enabled beforehand)
- Via update:
  - ⇨ Updating with Automation Studio and USB flash drive
  - ⇨ Updating with a downloaded from the website and USB flash drive
  - ⇨ Duplicating an existing setup using a USB flash drive

7.1 Service pages

T-Series Power Panels can be configured via the integrated service page. This service page can be opened in various ways:

Opening the service page with a gesture

The service page can be opened with a Gesture if this is configured accordingly (see "Configuring the gesture" on page 53):



Gesture for opening the service page: Use a finger to swipe from the middle of the top edge of the touch screen down over the entire touch screen area.

The setting for *Screen rotation* on service page *Screen* is decisive for the swiping direction.

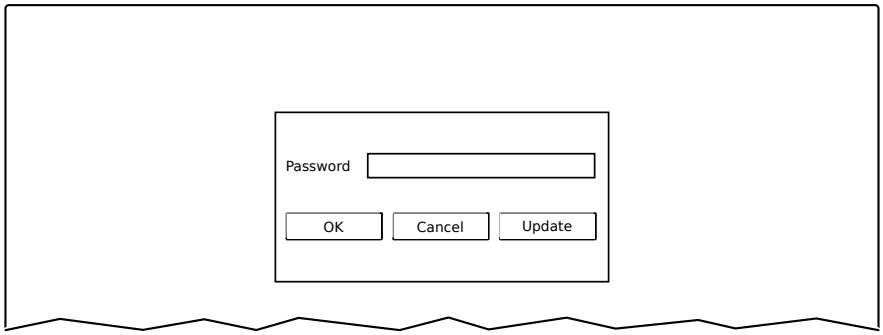
Other ways to open the service page

The following options are also available to open the service page:

- By pressing the left and right buttons of a connected USB mouse simultaneously for at least 2 seconds.
- Opened automatically after restarting the Power Panel if the corresponding *Start mode* is configured on service page *Startup* (see service page *"Startup" on page 44*)

Entering the service password

If a service password has been configured in the settings (see "Service page Security" on page 69), then this password must be entered each time the service pages are opened before the service page is displayed.



The service password must be entered in the corresponding text input field.

Button	Description
[OK]	Confirms password entry
[Cancel]	Cancels password entry
[Update]	When button "Update" is pressed, the Power Panel attempts to perform an update. This executes function *Update settings / boot logo / system*, which can also be opened on service page *Update* (see "Service page Update" on page 62). If an update is found (on a USB flash drive or on the network), it will be loaded and installed. In the next step, the Power Panel will be started in the configured mode (see "Service page Startup" on page 44) regardless of whether an update is found.

Representation of service pages in this documentation

In this documentation, service pages are not represented as original screenshots. For better readability, the service pages are displayed as black text on a white background:

Original screenshot of the Power Panel	Representation in this documentation

Language of the service pages

As can be seen in the previous service page example, all of the content on the service pages for the Power Panel is **generally in English**.

Saving the settings

Any settings changed on the service pages are not saved permanently while settings are still being edited. Saving only takes place permanently when one of the following commands is launched from service page Save & Exit:

- *Save changes & exit*
- *Save changes*

See "Service page Save & Exit" on page 76.

Information:

Changes only become active after saving and exiting the service pages (command *Save changes & exit*).

Information:

All settings on the service pages are saved on the Power Panel in XML file `PMT50Config.xml` . When backing up or restoring the panel settings, a file with this name is created or expected to be on the storage medium (see "Service page Backup & Reset" on page 68 and "Service page Update" on page 62).

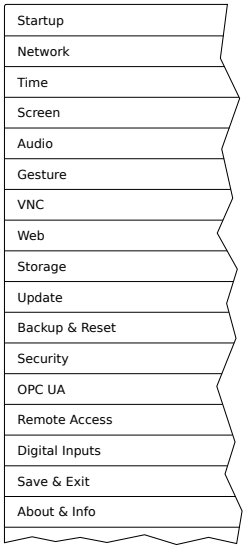
Input elements on the service pages

1	Menu for selecting individual service pages "Startup", "Network", "About & Info", etc.
2	The active or selected service page is marked in the menu using a different background color.
3	The selection list indicates the selected option. Pressing the up/down arrows moves between the available options.
4	Checkbox not activated.
5	Checkbox activated.
6	UpDown input field for entering values within a certain range. The value can be increased/decreased using the "-" or "+" symbols. The value can also be changed directly using the keyboard.
7	Text field where text can be entered with the keyboard.
8	Text field where text can be entered with the keyboard. The "+" symbol can be used to add the entered text to a text list.
9	Text field for entering a password. The password will be displayed as plain text or wildcard characters (●●●●●●) depending on the setting.
10	Button that can be used to trigger a specific function. Under the short title, a more detailed description of the function is displayed as gray text.
11	If the service page contains more elements than fit on the display, it is possible to scroll through the content using the up/down buttons.

To simplify operation, some text fields are enlarged during input (increased readability). The descriptive text to the left of the text field is hidden during this (covered up by the text field).

7.1.1 Overview

The following service pages are available:

Menu for the service pages	Menu option (English)	Description
	Startup	Settings that take effect when the Power Panel is restarted
	Network	Settings for the Ethernet network
	Time	Time settings (time server, daylight savings time)
	Screen	Screen settings (screensaver, rotation, etc.)
	Audio	Buzzer settings
	Gesture	Enables/Disables a *gesture* for opening the service page
	VNC	Settings for the VNC client on Power Panel
	Web	Settings for the web browser
	Storage	Settings for accessing memory (USB flash drives, user memory)
	Update	Updates the Power Panel (manual)
	Backup & Reset	Backs up Power Panel settings or resets the Power Panel to factory settings
	Security	Security settings (password query when opening the service page)
	OPC UA	Settings for the OPC UA server of the Power Panel
	Remote access	Enables/Disables and configures remote access
	Digital inputs	For configuring the digital inputs
	Save & Exit	Saves the Power Panel settings and closes/exits the service page
	About & Info	Information about the Power Panel (PPT system version, licenses for the software being used)

7.1.1.1 Service page *Startup*

The start mode is configured on service page *Startup* and determines how the Power Panel behaves after being switched on. The Power Panel is started in one of the following modes (*Start mode*) in accordance with this setting:

- *Service page* (default setting)
- *VNC*
- *Web*

Start mode *Service page* (default setting)

This setting is typically used during the development phase of an application because the service page is opened immediately after every Power Panel restart.

Start mode *VNC*

In this start mode, the Power Panel is started as a VNC client in order to display an HMI application made available on a VNC server.

In start mode *VNC*, option *Show boot logo* additionally configures whether the boot logo and boot animation of the system should be displayed while establishing the connection to the VNC server:

Start mode *Web*

In start mode *Web*, a web browser that displays web server content is started immediately after restarting the Power Panel.

In start mode *Web*, option *Show boot logo* additionally configures whether the boot logo and boot animation of the system should be displayed while establishing the connection to the web server:

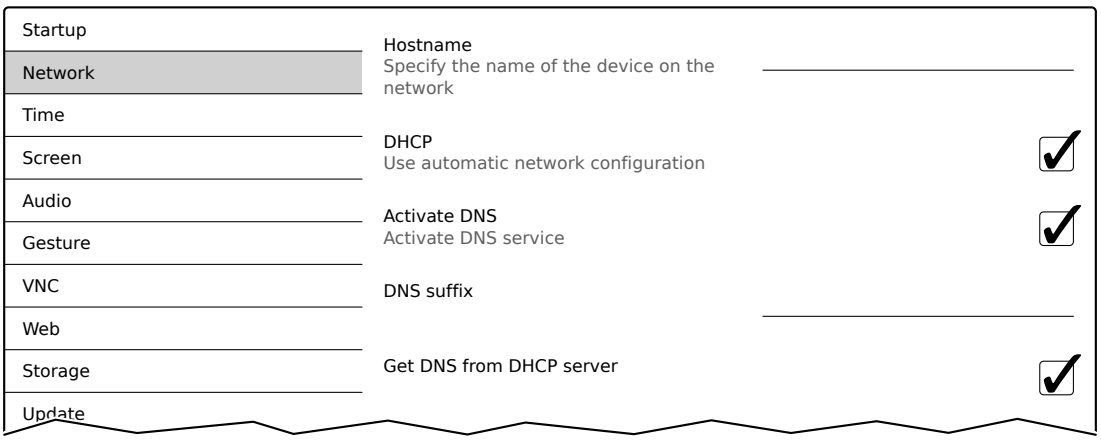
Boot logo or boot animation

For requirements and information about the boot logo and boot animation, see the following sections:

- "Boot logo" on page 83
- "Boot animation" on page 83

7.1.1.2 Service page *Network*

The default settings for service *Network* appear as follows:



Information:

Network configuration changes do not require the Power Panel to be rebooted and are applied by the system and processed immediately after saving the settings and exiting the service pages (see "Service page Save & Exit" on page 76).

Hostname

Default setting: EMPTY (no hostname defined)

The Power Panel is identified in the network using its IP address or hostname. If a hostname is entered here, the Power Panel can be identified in the network using this name, which allows it to be accessed (e.g. by Automation Studio).

Important information:

- The hostname must be **unique** in the network.
- The name can have a maximum length of 64 characters.

Information:

If no hostname is defined (input field is empty), 6PMT50 is automatically used as the hostname.

DHCP

Default setting: Enabled

When the Dynamic Host Configuration Protocol (DHCP) is enabled, the network configuration is automatically obtained from the DHCP server and assigned to the Power Panel; otherwise, it must be entered manually (e.g. IP address of the device, IP address of the gateway, etc.).

For information about manual network configuration, see "Network configuration without DHCP" on page 48.

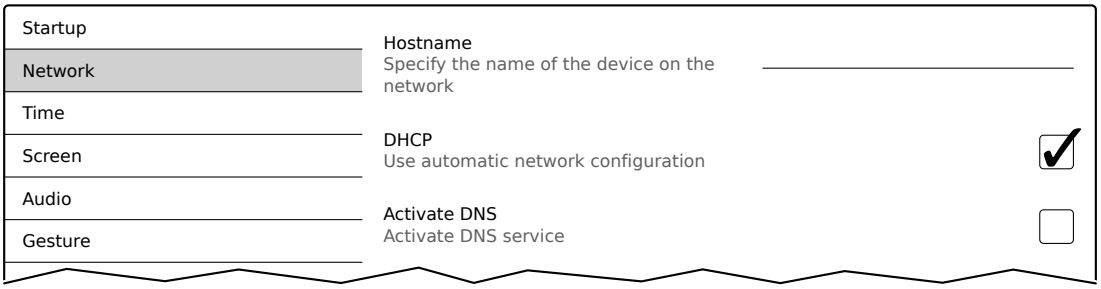
Activate DNS[8)]

Default setting: Enabled

DNS usage of the device (DNS client) can be enabled or disabled with this option.

If a hostname is entered in VNC or web mode, this option must be enabled so the hostname of the VNC or web server can be resolved and the associated IP address can be obtained from the DNS server.

If this option is disabled, the device can only be accessed using an IP address assigned by the DHCP. Options *DNS suffix* and *Get DNS from DHCP server* are not available in this case and will be hidden:



DNS suffix

Default setting: EMPTY

A DNS suffix is usually entered when a hostname is defined. The DNS suffix is specific to the network in which the device is being operated. Information about this must be obtained from the network administrator.

The hostname and the DNS suffix make up the full domain name (FQDN: fully qualified domain name) for the device:

```
hostname.dns-suffix
```

The full domain name could look like this, for example:

Hostname:	`ppt-visualization-machine-01`
DNS suffix:	`network-domain.com`
Fully qualified hostname (FQDN):	`ppt-visualization-machine-01.network-domain.com`

[8)] In order to use DNS functionality, appropriate infrastructure must be available within the network.

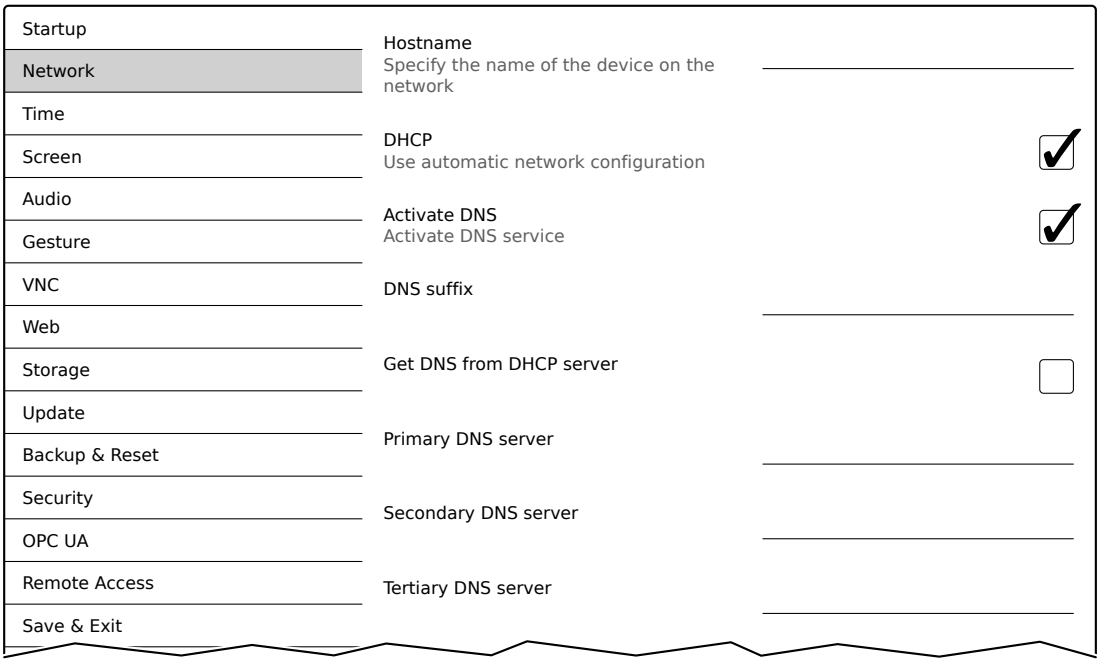
For more information, please contact your network administrator.

Get DNS from DHCP server

Default setting: Enabled

By default, the IP addresses for the DNS server are automatically obtained from the DHCP server.

If it is necessary to manually enter the IP addresses for the DNS server (without generally disabling DHCP), this can be done by disabling the option *Get DNS from DHCP server*:



Primary DNS server* / *Secondary DNS server* / *Tertiary DNS server

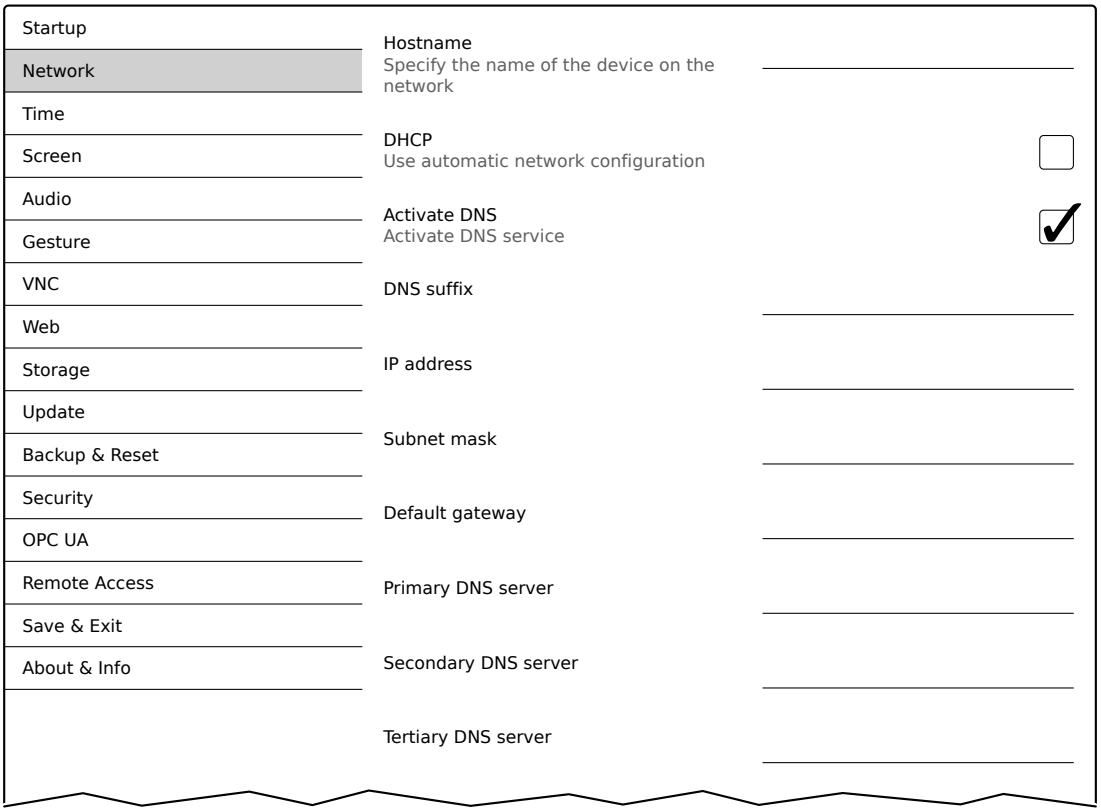
Default setting: EMPTY

The IP addresses for the DNS server.

This input option for the DNS server is only displayed if option *Activate DNS* is enabled.

7.1.1.2.1 Network configuration without *DHCP*

The entire network configuration can be completed manually by disabling option *DHCP*:



Information:

The data required for manual network configuration can be obtained from the network or system administrator.

Information:

IP addresses are checked for validity when they are entered. Only characters that build a valid IP address can be entered.

If the IP address entered is incomplete or the network configuration is incorrect, error messages will be output when starting up the device.

Hostname* / *DHCP* / *Activate DNS* / *DNS suffix

For a description of these options, see service page *"Network" on page 45*.

IP address

Default setting: EMPTY

The IP address of the Power Panel within the network must be entered here.

Subnet mask* / *Default gateway

Default setting: EMPTY

Subnet mask and IP address of the default gateway.

Primary DNS server* / *Secondary DNS server* / *Tertiary DNS server

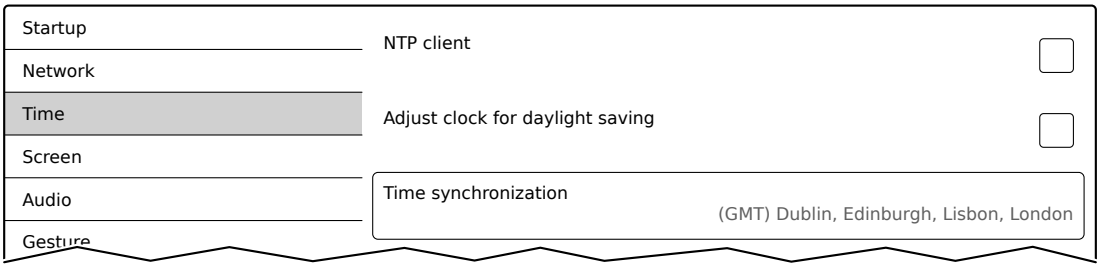
Default setting: EMPTY

The IP addresses for the DNS server.

This input option for the DNS server is only displayed if option *Activate DNS* is enabled.

7.1.1.3 Service page *Time*

Various settings for the time server and daylight saving time can be configured on this service page.



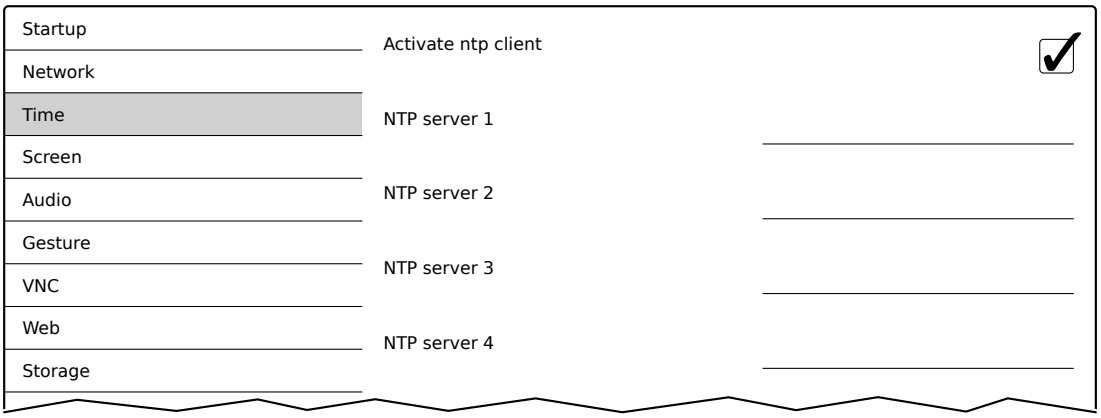
Information: The date and time can be set by the user using OPC UA method SetTime.

NTP client

Default setting: Disabled

With this option, an NTP client can be enabled on the Power Panel that synchronizes the time on the Power Panel with a time server (NTP server).

After enabling the option, one to four NTP servers can be entered:



Synchronization takes place cyclically. The interval between synchronizations is increased as soon as a certain accuracy of the system time has been achieved.

Adjust clock for daylight saving

Default setting: Disabled

If this option is enabled, time changes related to daylight savings time take place automatically.

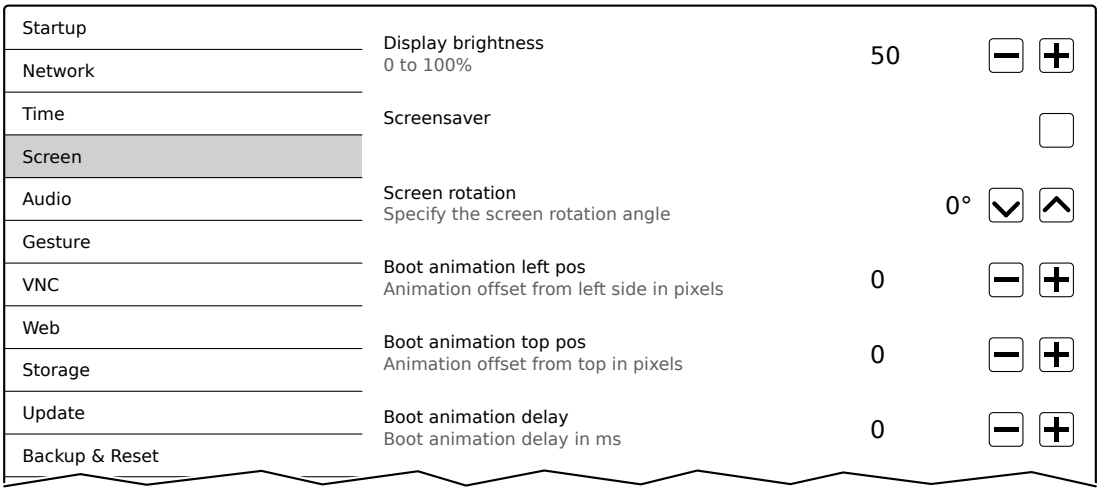
Time synchronization

Default setting: (GMT) Dublin, Edinburgh, Lisbon, London

When making a selection (via touch or mouse click), a list of all time zones is displayed and the appropriate one can be selected.

7.1.1.4 Service page *Screen*

On this service page, some settings for the display can be changed. The following graphic shows the default settings:



Display brightness

Default setting: 50

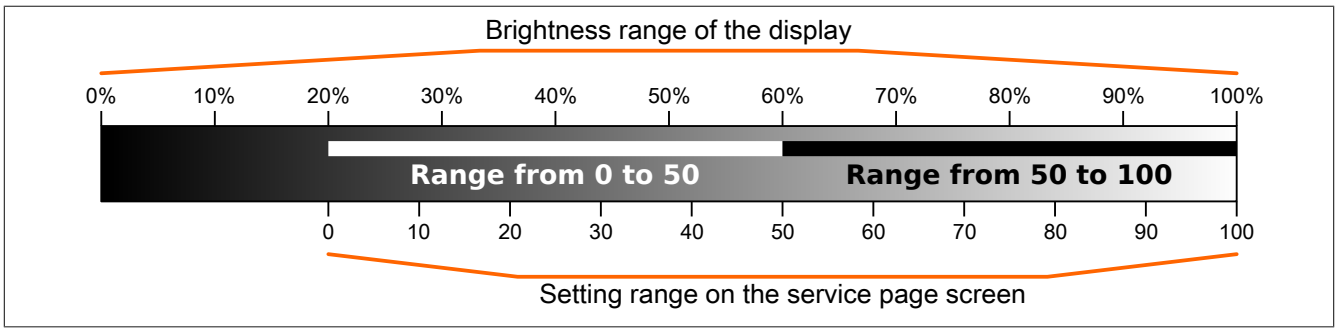
Input range: 0 to 100

Unit: %

Here, the current brightness of the display and the basic setting for the display are set after restarting the device:

- Each change to a value on the service page directly and immediately affects the brightness of the display.
- The currently set value is only stored as the default setting for the device when saved (see "Service page Save & Exit" on page 76).

Setting 0% on the service page corresponds to a residual brightness of 20%:



The brightness can also be controlled by the application (see "Adjusting display brightness" on page 85).

Screensaver

Default setting: Disabled

Options for the enabled screensaver are described in section "Screensaver settings" on page 51.

Screen rotation

Default setting: 0°

Input range: 0°, 90°, 180°, 270° (in 90° steps)

The angle of rotation of the display is set here. This setting affects how screen content is output. After selection, the display content is rotated clockwise according to the specified angle.

Settings for the boot animation

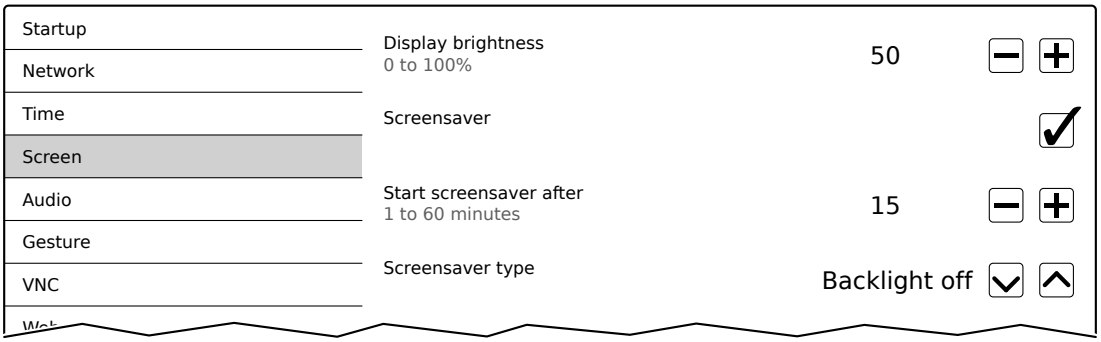
These settings are used to configure the position and time delay for the boot animation:

Boot animation left pos	
Default setting	0
Input range	0 to 2048 [1]
Unit	Pixels
Function	Defines the distance from an existing boot animation to the left edge of the display.
Boot animation top pos	
Default setting	0
Input range	0 to 2048 [1]
Unit	Pixels
Function	Defines the distance from an existing boot animation to the top edge of the display.
Boot animation delay	
Default setting	0
Input range	0 to 1000
Unit	ms (milliseconds)
Function	Delay in milliseconds between individual images in the GIF animation. The individual values have the following effect: **Value [ms]** / **Description** 0 / In this case, the delay defined in the GIF file will be used. If no delay is defined in the GIF file, 100 ms is used. >0 / Applies the set delay time. It may not be possible to achieve small values due to the power limits of the device. In this case, the animation is displayed slower than the value specified.
Boot animation requirements/information	
See: "Boot animation" on page 83	

1) Reasonable values range from 0 to the width/height of the screen. The screen width/height depends on the used device and the configured *Screen rotation*.

7.1.1.4.1 Screensaver settings

If option *Screensaver* is enabled, additional options are displayed:



Start screensaver after

Default setting: 15

Input range: 1 to 60

Unit: Minutes

If there is no touch screen activity for the specified duration, the screensaver is started. Touching the screen exits the screensaver and the last active screen contents are shown.

Screensaver type

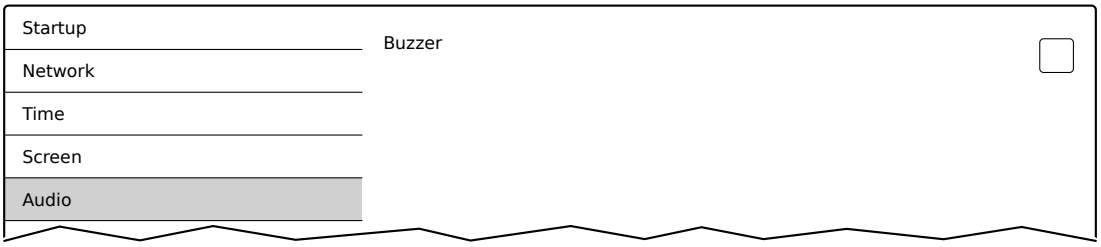
Default setting: Backlight off

If the screensaver is started after a period of inactivity, the display goes into the selected mode:

Black	The display is dark. The backlight remains on.
Backlight off	The display is dark. The backlight is switched off (result: lower power consumption).

7.1.1.5 Service page *Audio*

On this service page, an audio signal can be configured to be output when a touch operation occurs or controlled by an application.

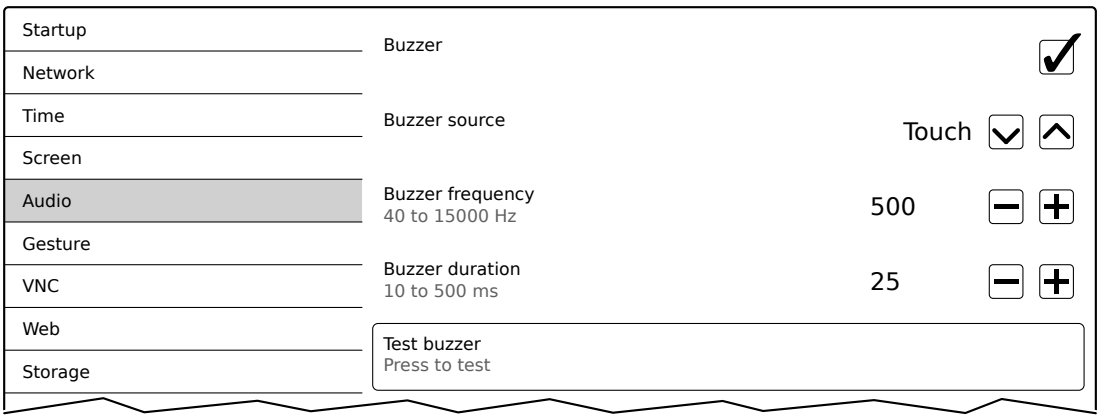


Buzzer

Default setting: Enabled

If this option is disabled, an audio signal is not output when a touch operation occurs on the Power Panel.

The following settings can be made when *Buzzer* is enabled:



Buzzer source

Default setting: Touch

The following options are available for triggering a buzzer:

Touch	In VNC and web mode, an audio signal is output for each touch operation. This takes place independently of the application controlled by the Power Panel operating system.
App	The RFB extension and corresponding library can be used to allow the application to trigger the audio signal. See: "Outputting an audio signal" on page 85

Buzzer frequency

Default setting: 2500

Input range: 40 to 15000

Unit: Hz

This setting is used to configure the frequency of the generated audio signal.

Buzzer duration

Default setting: 50

Input range: 10 to 500

Unit: ms (milliseconds)

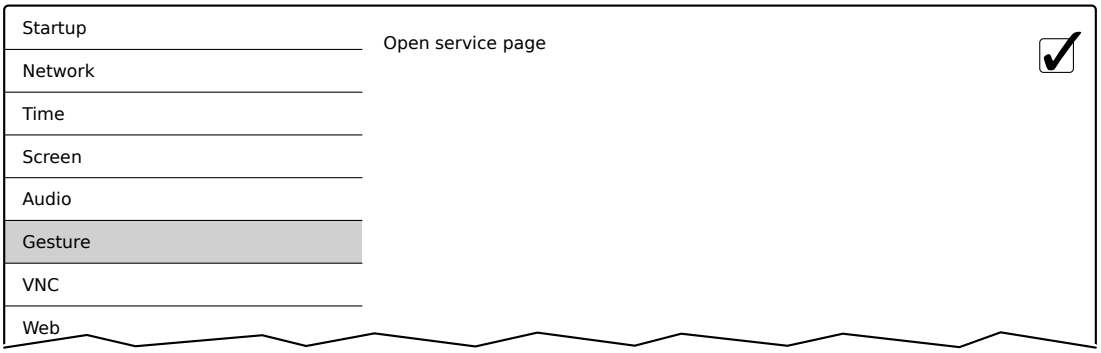
This setting is used to configure the duration of the generated audio signal.

Test buzzer **(button)**

Function: Triggers the buzzer for testing purposes (sound is generated).

7.1.1.6 Service page *Gesture*

The settings on this service page configure the gesture for opening the service page:



Information:

If this function is disabled, the service page can only be opened with a USB mouse or via an OPC UA method and restarting the panel!

Opens the service page with a gesture if option *Open service page* is enabled:

- See "Opening the service page with a gesture" on page 41

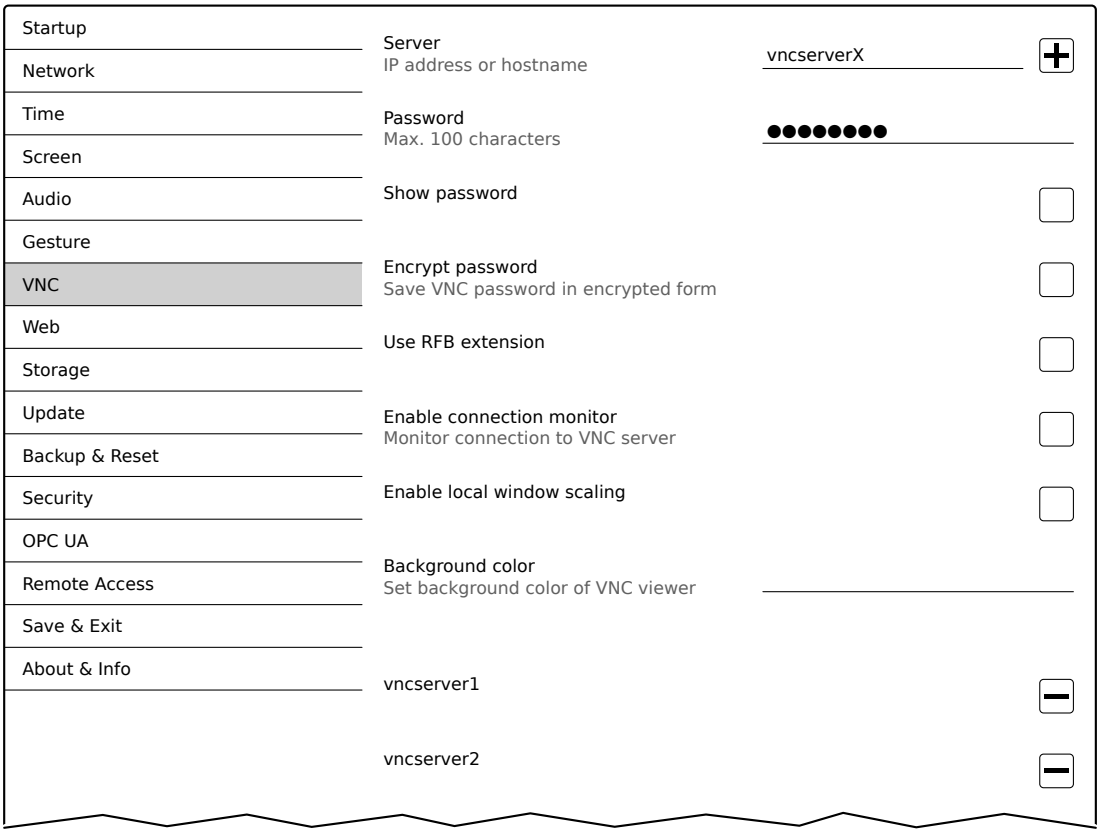
Open service page

Default setting: Enabled

Enabled	In VNC/web mode, the service page can be opened using this gesture.
Disabled	In VNC/web mode, the service page **cannot** be opened using this gesture. **Information:** **A mouse must be connected in order to open the service page in VNC/web mode (see "Mouse" on page 40).**

7.1.1.7 Service page *VNC*

In order to use the Power Panel as a VNC client, some settings are necessary:



Server

Default setting: EMPTY (no server entered or selected)

In order to use the Power Panel as a VNC client, a hostname or IP address for the VNC server must be specified.

It is possible here to enter multiple servers in a list. Entering the hostname or IP address and then clicking on the [+] icon adds the specified server in the list at the end of this services page (see "vncserver1" and "vncserver2" in the previous image).

To use a specific VNC server from this list, it must be selected in the server list (via touch screen or mouse click). The currently selected VNC server is displayed in input field *Server*.

By default, port 5900 is used to establish a connection.

If the VNC-based HMI application is available on a different port, the port number must be specified explicitly together with the IP address or hostname:

Syntax	Example	Description
`IP address:Port`	`10.23.19.48:5907`	A VNC connection to IP address `10.23.19.48` is established on port `5907`.
`Hostname:Port`	`vncserver1:5908`	A VNC connection to host `vncserver1` is established on port `5908`.

Information:

If the entered IP address is incomplete or no VNC server exists for the IP address or entered hostname, a corresponding message will be output if a connection attempt fails in VNC mode.

The error message is only output if display of the boot logo is disabled in start mode *VNC*.

Password

Default setting: EMPTY (no password entered)

Input range: Max. 100 characters

Note: Only one password can be entered, which is only used for the currently selected VNC server.

If a password has been entered, then the VNC client (Power Panel) is connected to the VNC server without an additional password query.

If no password has been entered, then the password will be queried on the Power Panel each time a connection to the VNC server is established.

The password is stored on the device in configuration file PMT50Config.xml .

Show password

Default setting: Disabled

Enabled	The password is displayed in the input field as plain text.
Disabled	The password is hidden in the input field by placeholder characters (●●●●●●).

Note: This option only switches the display of the password between plain text and wildcard characters. This option is not saved. This option is always disabled after restart.

Encrypt password

Default setting: Disabled

Enabled	The password is stored on the device in encrypted form.
Disabled	The password is stored on the device as plain text.

Use RFB extension

Default setting: Disabled

With the RFB extension enabled, a B&R VNC server (VNC-based HMI application) can query data from the VNC client and execute a variety of functions.

See: "RFB extension" on page 84

Enable connection monitor

Default setting: Disabled

Limitation: Enabling this option disables option *Use RFB extension*.

Enabled	Enables monitoring of the connection to the VNC server.
Disabled	Disables monitoring of connection to the VNC server.

See section "VNC connection monitoring" on page 56.

Enable local window scaling

Default setting: Disabled

Enabled	Scales the VNC application to the display size of the Power Panel.
Disabled	Displays the VNC application in its original size on the Power Panel display.

Information:

Enabling this option results in a reduction in the performance of the Power Panel due to increased computing power.

Background color

Default setting: EMPTY

This setting can be used to set the background color of the VNC client on this Power Panel. If the VNC-based HMI application is smaller than the size of the Power Panel display, the background of the display (border around the HMI application) is shown with the defined background color.

Value	Background color
RGB color value[1)]	The RGB color value is noted as a three-digit (#rgb) or six-digit (#rrggbb) hexadecimal number, with the value preceded by the # character. The color value is composed of the red, green and blue values.
HTML/CSS color name[1)]	The color name corresponds to a specific RGB color value.
EMPTY	Light gray.
Invalid values	Black.

1) For the syntax of the RGB color value and valid HTML/CSS color names, see the HTML/CSS standard.

Examples of color values and color names:

#rrggbb	#rgb	HTML/CSS color name	Color display
#ffffff	#fff	white	
#ff0000	#f00	red	
#00ff00	#0f0	lime	
#008000	-	green	
#ffff00	#ff0	yellow	
#ff8800	#f80	-	
#0000ff	#00f	blue	
#000000	#000	black	

7.1.1.7.1 VNC connection monitoring

If the Power Panel is configured as a VNC client, the connection to the VNC server can be monitored. If the connection to the VNC server is lost, a loading screen is displayed with a message that the Power Panel is trying to reconnect.

Enabling VNC connection monitoring of a VNC client

VNC connection monitoring of a VNC client is enabled with one of the following two options:

Option	Description
Use RFB extension	Enabling the RFB extension developed by B&R for the VNC client also enables connection monitoring. The RFB extension can only be used together with a B&R VNC server. For additional information about installation, see section "RFB extension" on page 84.
Enable connection monitor	Without the RFB extension, this option can be enabled to enable VNC monitoring for the VNC client. This option also works with third-party VNC servers.

If several VNC clients are operated on one B&R VNC server, option *Use RFB extension* is only permitted to be enabled on one VNC client.

7.1.1.8 Service page *Web*

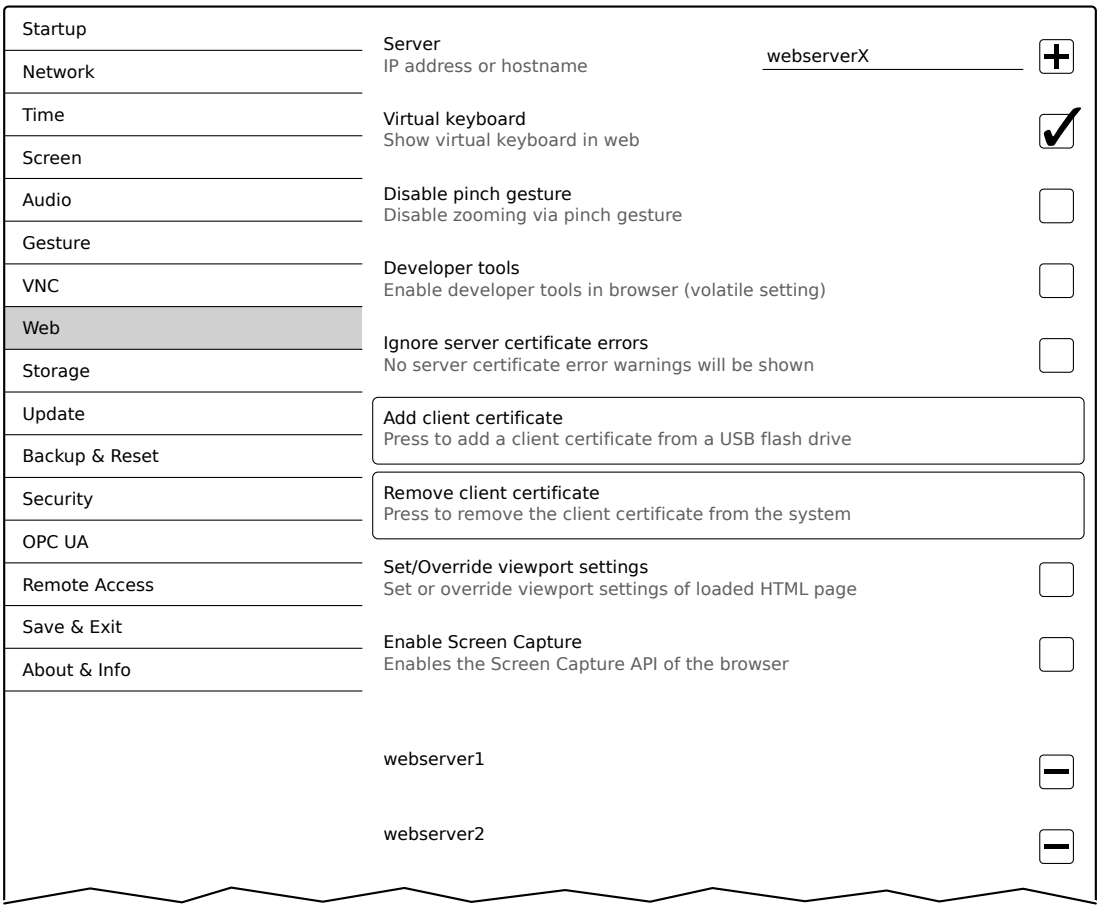
The Power Panel can be configured as a web client on this service page. In this case, a web browser is operated in full screen mode and an HMI application or other application running on a web server (e.g. mapp View) is displayed in the browser.

The following features are not supported:

- Java
- Flash

The web browser provides full JavaScript support!

The following figure shows service page *Web* with the default settings:



Server

Default setting: EMPTY (no server entered or selected)

In order to use the Power Panel as a web client, a hostname or IP address for the web server must be specified.

It is possible here to enter multiple servers in a list. Entering the hostname or IP address and then clicking on the [+] icon) adds the specified server in the list at the end of this services page (see "webserver1" and "webserver2" in the previous image).

To use a specific web server from this list, it must be selected in the server list (via touch screen or mouse click). The currently selected web server is displayed in input field *Server*.

If a port number is not specified together with the server, port 80 is used by default.

If the web server is available on a different port, the port must be specified explicitly together with the IP address or hostname:

Syntax	Example	Description
`IP address:Port`	`10.23.20.17:8080`	A connection to IP address `10.23.20.17` is established on port `8080`.
`Hostname:Port`	`webserver1:8081`	A connection to host `webserver1` is established on port `8081`.

Information:

If the entered IP address is incomplete or no web server exists for the IP address or entered hostname, then only the boot logo (if enabled) or standard animation of the web browser will be displayed when connecting to the web server.

Virtual keyboard

Default setting: Enabled

Enabled	The virtual keyboard is automatically displayed on the screen if a text input field in the web browser has the focus (see "Keyboard" on page 40).
Disabled	The virtual keyboard for the web page is automatically displayed if a text input field in the web browser has the focus. This functionality must be made available by the web server.

Input can also be made at any time using a connected USB keyboard.

Information:

The virtual keyboard is generated by the Power Panel system. If the web application (e.g. mapp View) contains its own on-screen keyboard, the virtual keyboard of the Power Panel should be disabled.

Disable pinch gesture

Default setting: Disabled

Enabled	The two-finger gesture for zooming the browser content is disabled. Zooming the entire HMI application is prevented. However, zoom is supported in some mapp View widgets (e.g. LineChart).
Disabled	The browser recognizes the well-known two-finger gesture (pinch-to-zoom) and allows zooming of the browser content.

Developer tools

Default setting: Disabled

Enabled	The next time the web browser is started (see setting *Start mode* on service page *Startup*), the developer tools are enabled. See "Using the developer tools" on page 60. **Note:** This setting is not permanently saved in the system settings and only valid until the next restart of the web browser.
Disabled	Developer tools are disabled.

Information:

Safety notice!

This option is for development purposes only while creating an HTML-based HMI application.

When using this option, it should be noted that the functions enabled in this way can be misused; it is therefore recommended to handle the developer tools with appropriate care.

It is possible to change the port used after enabling option *Developer tools*:

Developer tools port

Default setting: 9222

This setting defines the port used for the developer tools (see "Using the developer tools").

Ignore server certificate errors

Default setting: Disabled

If the web browser detects an error in the server certificate when establishing the connection to the web server, then the web browser displays a corresponding warning message that the user must acknowledge. If this option is enabled, such warning messages will be suppressed.

Use case:
If a self-signed server certificate is used during testing or development, it may be helpful to enable this option.

Add client certificate **(button)**

This function allows a client certificate to be stored on the device to authenticate the web browser on the server.

Saving the client certificate on the device:

1. Create a client certificate and copy it to a USB storage medium.
2. Connect the USB storage medium to the device.
3. Press button *Add client certificate*.
4. Select the corresponding USB drive in the following dialog box.
5. A list of all client certificates in the PKCS #12 standard (file extension ".p12") is displayed.
6. After the desired client certificate is selected, the password must be entered.
   If the client certificate was created without a password, the input field must remain empty.

✓ If all data is entered correctly, the certificate on the device is stored in the certificate store of the web browser.

Information:

If a client certificate already exists on the device, it is replaced by the new one.

Remove client certificate **(button)**

This function can be used to delete a client certificate stored on the device.

Deleting a client certificate from the device:

1. Press button *Remove client certificate*.
2. A confirmation prompt appears querying whether the client certificate should be completely deleted from the device.

✓ After the confirmation prompt is confirmed, the client certificate is deleted from the device.

Set/Override viewport settings

Default setting: Disabled

This option is used to enable setting or overwriting the viewport settings. If this option is enabled, additional input field *Viewport settings* appears.

Information:

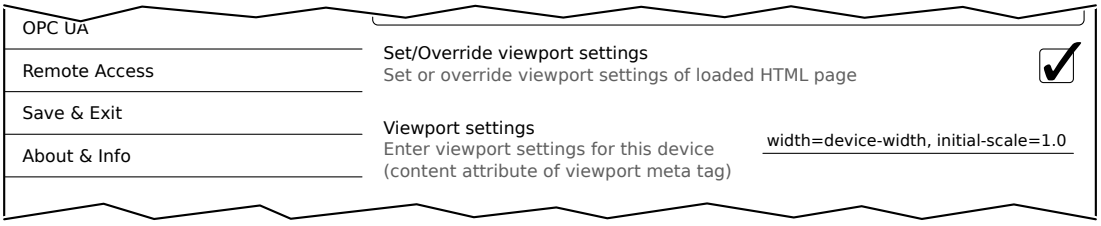
This setting is not needed for the majority of use cases. When using mapp View HMI applications, viewport settings are already set correctly and using this option is not necessary.

For HMI applications from third-party providers over which the user has no influence, it may be useful to enable this option and make the appropriate settings.

If option *Set/Override viewport settings* is active, a viewport meta tag provided with the HTML page is overwritten.

Viewport settings

Default setting: width=device-width, initial-scale=1.0



The value of attribute content in the viewport meta tag is entered in the input field.

Example of a viewport meta tag as it may be contained in an HTML page:

```
<meta name="viewport" content="width=device-width, initial-scale=1.0">
```

This viewport meta tag is set if the following is entered in input field *Viewport settings*:

```
width=device-width, initial-scale=1.0
```

Note: The user must ensure that the syntax is correct. For detailed information about viewport settings and valid syntax, see relevant HTML documentation regarding responsive design.

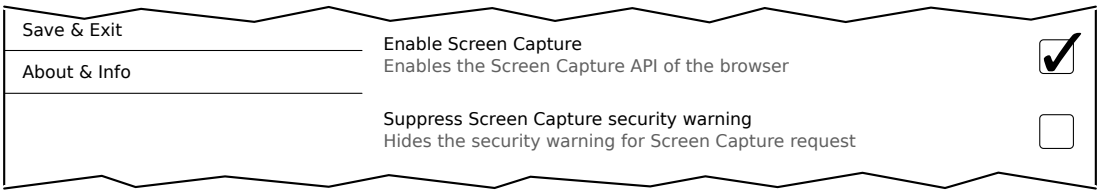
Enable Screen Capture

Default setting: Disabled

This option enables the screen capture API of the built-in browser.

If this option is enabled, the HTML application can use the browser's screen capture API to create screen captures of the HMI application. Both individual and video recordings are possible.

If this option is enabled, option *Suppress Screen Capture security warning* is displayed:



Suppress Screen Capture security warning

Default setting: Disabled

By default, the browser displays a security warning when the HTML application starts a screen capture using the screen capture API. The user is prompted to permit or deny the screen capture.

This option can be used to disable this security warning.

7.1.1.8.1 Using the developer tools

The developer tools make it possible to access the browser from any remote computer over the network. Developer tools can help to edit pages on the fly and quickly diagnose problems.

> **Information:**
>
> **To be able to use the developer tools, either Google Chrome or the Chromium is required.**
>
> **Information about the functionality and use of the developer tools: Chrome DevTools**

Enabling remote developer tools

1. On service page *Startup*, select start mode *Web*.
2. Enable option *Developer tools* on service page *Web*.
3. Set a valid free port (*Developer tools port*).
4. On service page *Save & Exit*, save the settings and leave the service page with *Save changes & exit*.

✓ The web browser is started with the corresponding settings and enabled developer tools.

To use the remote developer tools, the following conditions must also be met:

- The Power Panel is accessible via the Ethernet network.
- Communication is permitted for the network and the computer being used.
- A browser that supports the developer tools is required on the remote computer.

Launching the developer tools

If the developer tools are enabled and the web browser is started, the remote computer can launch the developer tools for the Power Panel browser with the following URL:

⇨ With the IP address of the Power Panel: `http://IP address:Port`

IP address	The IP address of the Power Panel is listed on service page *About & Info*.
Port	The port was defined on service page *Web* when enabling option *Developer tools* (default setting: 9222).

Additional functions

If the web browser on the Power Panel is running with developer tools enabled, the following additional features are enabled:

⇨ When using a USB mouse, a shortcut menu is opened with the right mouse button.

⇨ When using a USB keyboard, the following keys are also enabled:

[F5]	**Refresh:** Reloads the current browser window.
[Alt]+[Left]	**One page back:** Opens the previous page in the browser history.
[Alt]+[Right]	**One page forward:** Opens the next page in the browser history.

7.1.1.9 Service page *Storage*

On this service page, Power Panel memory can be shared to allow access from the network. The following memory areas can be shared for network access:

- Connected USB storage media
- Internal user memory

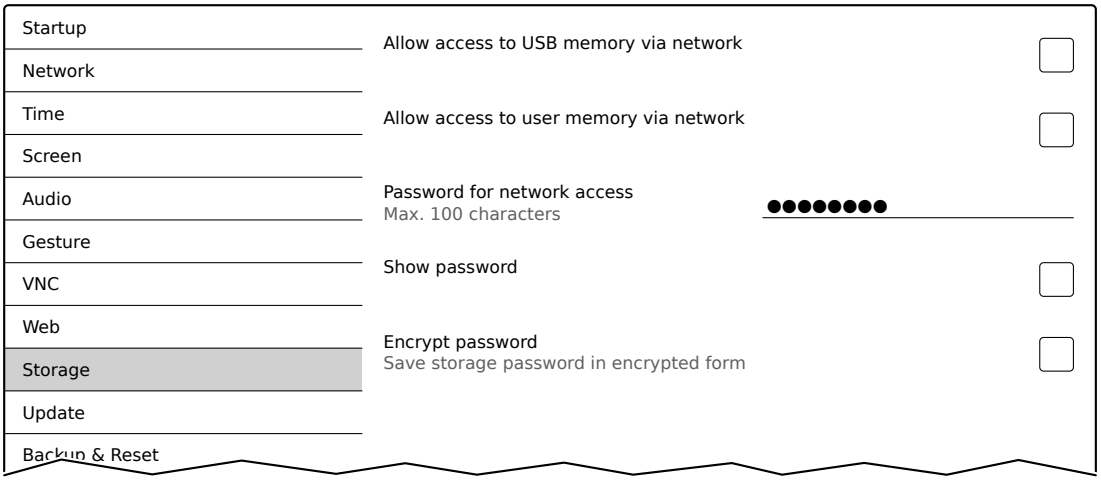
Sharing takes place using the **C**ommon **I**nternet **F**ile **S**ystem (CIFS) protocol. In this case, the Power Panel functions as a server and makes resources (a memory area) available to a client in the network using an access mechanism. CIFS uses a user, password and memory for authentication.

The client will require the following information to access the memory area shared on the Power Panel:

CIFS user	The CIFS user cannot be configured. "`pmt50-user`" must always be used as the CIFS user. **Note: The username is device-specific. This is important to note if a device is replaced by a Power Panel from another family(e.g. T50 ► T80).**	
CIFS password	The password configured on this service page is used.	
CIFS memory location	The following names can be used to specify the memory location:	
	Name	Description
	usbshare	USB storage medium connected to USB interface IF3.
	usbshare2	USB storage medium connected to USB interface IF4.
	usershare	Internal user memory (flash) on the Power Panel.

The USB storage medium must be formatted using the FAT32 file system.

The following figure shows the default settings for service page *Storage*:



Allow access to USB memory via network

Default setting: Disabled

If this option is enabled, access to the connected USB storage medium will be shared on the network.

Allow access to user memory via network

Default setting: Disabled

If this option is enabled, access to the internal user memory will be shared on the network.

Password for network access

Default setting: EMPTY (no password entered)

Input range: Max. 100 characters

The CIFS password for network sharing is configured here. This password applies both for sharing the USB storage medium as well as internal user memory.

The password is stored on the device in configuration file PMT50Config.xml .

Show password

Default setting: Disabled

Enabled	The password is displayed in the input field as plain text.
Disabled	The password is hidden in the input field by placeholder characters (●●●●●●).

Note: This option only switches the display of the password between plain text and wildcard characters. This option is not saved. This option is always disabled after restart.

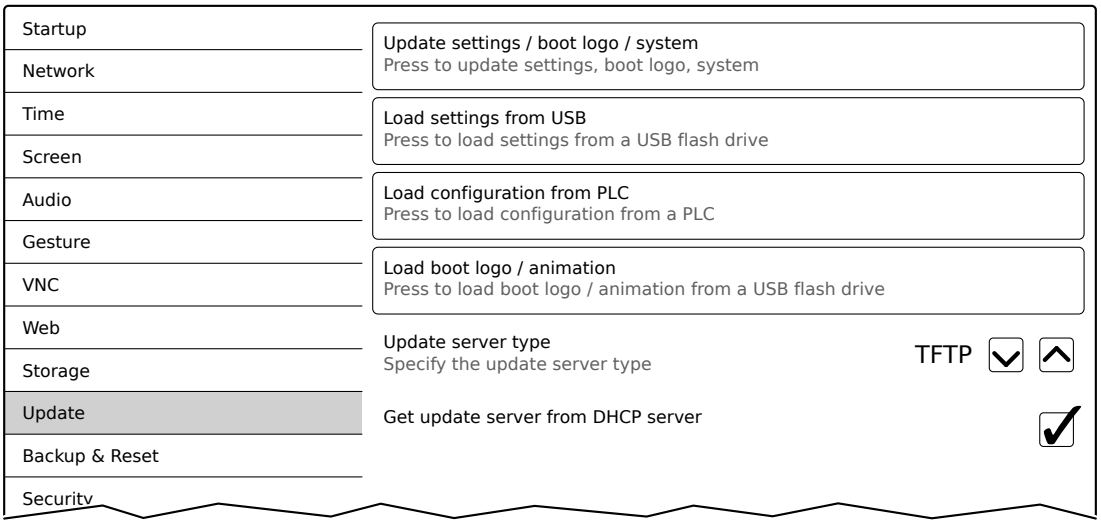
Encrypt password

Default setting: Disabled

Enabled	The password is stored on the device in encrypted form.
Disabled	The password is stored on the device as plain text.

7.1.1.10 Service page *Update*

Various parts of the system can be updated from a range of different sources on this service page.



Update settings / boot logo / system **(button)**

The Power Panel system is restarted with an update system. During the restart, the update files are searched for at the following sources in the specified order:

1) The USB storage medium connected to the Power Panel
   For the update process, only 1 USB flash drive is permitted to be connected to the Power Panel.
2) On the configured update server (see "Configuring the update server" on page 64)

The following update files are searched for:

File type	Filename
PPT image	PMT50Image.img.gz, PMT50Image.info, PMT50Image.img.gz.sig (see "PPT image" on page 82)
System settings	PMT50Config.xml (see "System settings" on page 82)
Boot logo	PPTLogo.bmp.gz (see "Boot logo" on page 83)

If valid update files are found during this search, they are loaded on the Power Panel and the system is restarted.

With this function, it is also possible to carry out a partial update if only a portion of the above-mentioned update files are on the USB flash drive.

Information:

If the current settings of the Power Panel should be retained, XML file PMT50Config.xml is not permitted to exist on the source medium.

Load settings from USB **(button)**

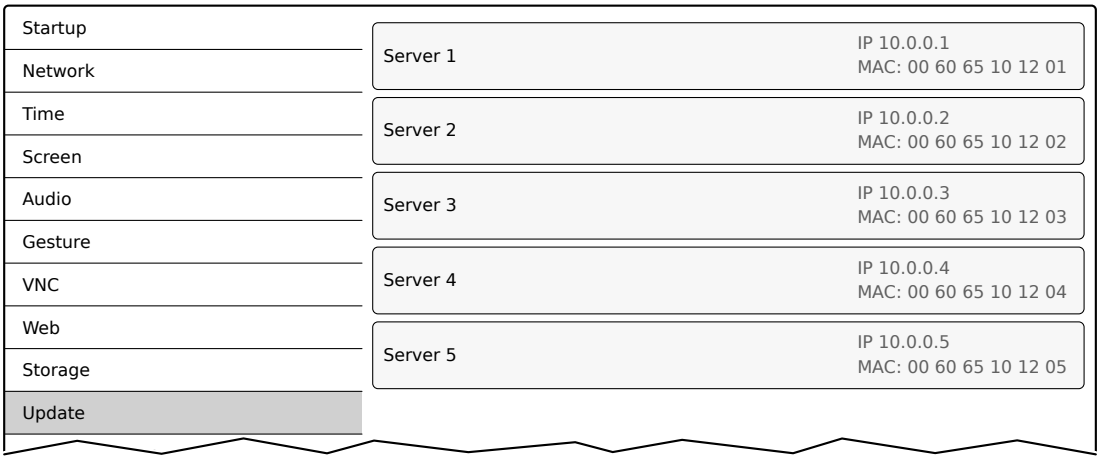
If no USB storage medium is connected, an appropriate message is displayed.

If at least one USB storage medium is connected, then a dialog box with USB interfaces IF3 and IF4 is displayed. The name of the USB storage medium is also displayed to aid in selection. After the interface is selected, the settings are loaded from XML file PMT50Config.xml .

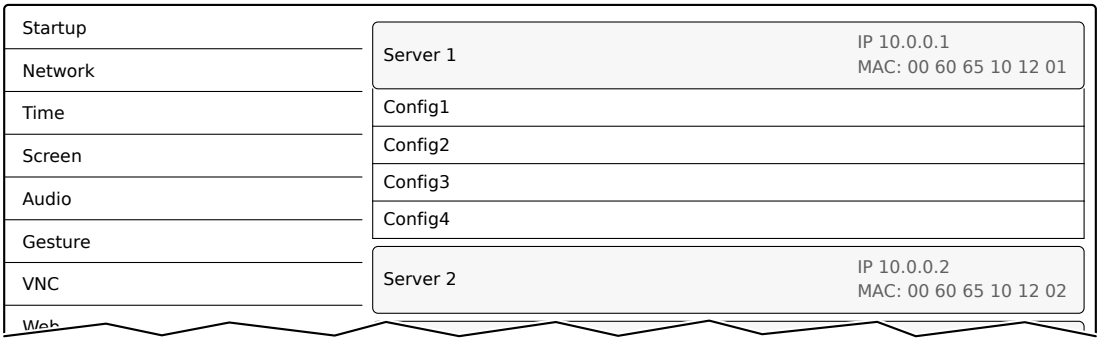
They can be checked and modified on the service pages if necessary after loading and before saving the settings. Data is stored using functions on service page *Save & Exit* (see "Service page Save & Exit" on page 76).

Load configuration from PLC **(button)**

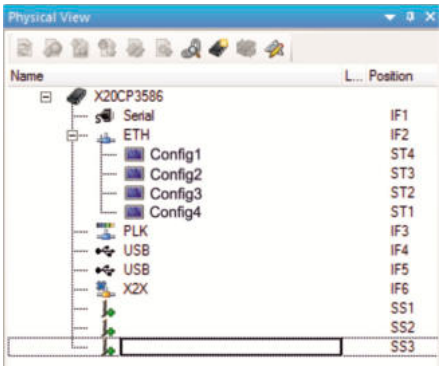
This function searches for controllers in the network that have a valid configuration for a Power Panel. After the search is complete (a few seconds), the discovered controllers are listed:



When selecting an entry, a list with the configurations of all Power Panels for the selected controller is displayed:



The names of the listed configurations match the names of the configurations in Automation Studio:



If a configuration entry is selected, a dialog box appears prompting to confirm the loading of the selected configuration. After the data is loaded, the application switches to service page *Save & Exit*. The loaded configuration can now be saved with a corresponding command (see section "Service page Save & Exit" on page 76). Alternatively, the user can check the loaded settings on all service pages before saving and change them if necessary.

Information:

In order for Power Panel configurations to be found on and loaded from controllers, the following requirements apply to these controllers:

- **SNMP is enabled (Ethernet interface configuration on the controller).**
- **TFTP is enabled (controller configuration).**

***Load boot logo / animation* (button)**

If no USB storage medium is connected, an appropriate message is displayed.

If at least one USB storage medium is connected, then a dialog box with USB interfaces IF3 and IF4 is displayed. The name of the USB storage medium is also displayed to aid in selection. After the interface is selected, the boot logo and/or the boot animation are loaded and stored on the Power Panel.

The following syntax must be used for filenames:

File type	Filename
Boot logo	PPTLogo.bmp.gz (see "Boot logo" on page 83)
Boot animation	PPTLogoA.gif (see "Boot animation" on page 83)

If a boot logo and/or boot animation are already on the Power Panel, they will be overwritten.

7.1.1.10.1 Configuring the update server

The following figure shows the default settings for the configuration of the update server on service page *Update*:

Update server type

Default setting: *TFTP*

The following settings are possible:

TFTP	*TFTP* (Trivial File Transfer Protocol) is a very simple data transfer protocol.
FTP	*FTP* (File Transfer Protocol) offers more possibilities than *TFTP*.
HTTP	*HTTP* (Hypertext Transfer Protocol).

Get update server from DHCP server

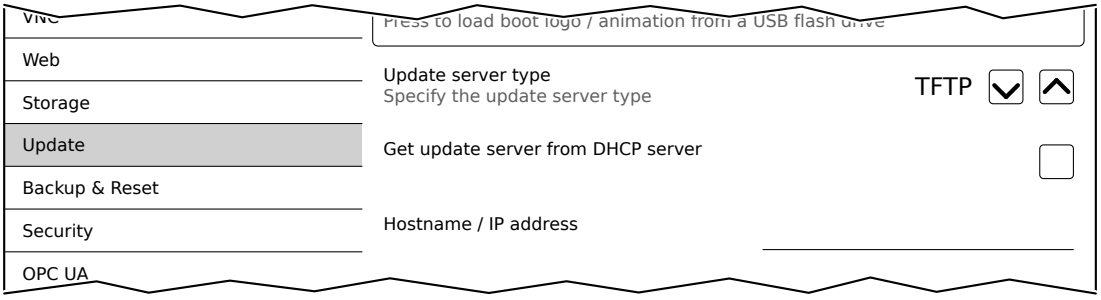
Default setting: Enabled

All information required by the update server for the configured type is requested from the DHCP server. This corresponds to the information that must be entered manually when the option is disabled (see the following two sections "Configuration of an update server of the type TFTP and FTP").

If this option is disabled, one or more additional input fields are displayed depending on the selected update server type. They are described in the following two sections:

7.1.1.10.1.1 Configuring an update server of type *TFTP*

If option *Get update server from DHCP server* is disabled and update server type *TFTP* is selected, input field *Hostname / IP address* is displayed:



Hostname / IP address

Default setting: EMPTY (no update server entered)

To update a Power Panel from a TFTP server, a hostname or IP address for the TFTP server must be specified.

By default, port 69 is used for the connection to the TFTP server.

If the TFTP server makes its services available on a different port, the port must be specified explicitly together with the IP address or hostname:

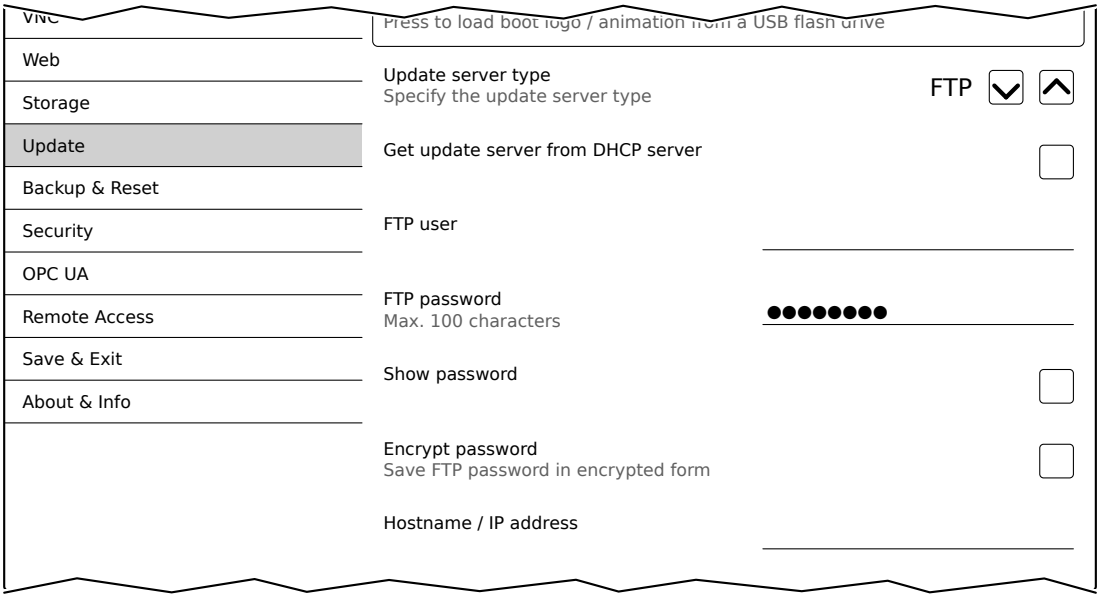
Syntax	Example	Description
`IP address:Port`	`10.23.20.38:1069`	A connection to IP address `10.23.20.38` is established on port `1069`.
`Hostname:Port`	`tftp-server:1169`	A connection to the host `tftp-server` is established on port `1169`.

Information:

If the entered IP address is incomplete or no TFTP server exists for the IP address or entered hostname, a message will be output that no network connection could be established if a connection attempt fails during the update process.

7.1.1.10.1.2 Configuring an update server of type *FTP*

If option *Get update server from DHCP server* is disabled and update server type *FTP* is selected, the following additional input fields are displayed:



FTP user

Default setting: EMPTY (no username entered)

To access an update server of type *FTP*, an FTP username must be entered here.

FTP password

Default setting: EMPTY (no password entered)

Input range: Max. 100 characters

To access an update server of type *FTP*, an FTP password must be entered here.

The FTP password is stored on the device in configuration file PMT50Config.xml .

Show password

Default setting: Disabled

Enabled	The password is displayed in the input field as plain text.
Disabled	The password is hidden in the input field by placeholder characters (●●●●●●).

Note: This option only switches the display of the password between plain text and wildcard characters. This option is not saved. This option is always disabled after restart.

Encrypt password

Default setting: Disabled

Enabled	The password is stored on the device in encrypted form.
Disabled	The password is stored on the device as plain text.

Hostname / IP address

Default setting: EMPTY (no update server entered)

To update a Power Panel from an FTP server, a hostname or IP address for the FTP server must be specified.

The FTP connection is generally established via standard port 21 on the FTP server.

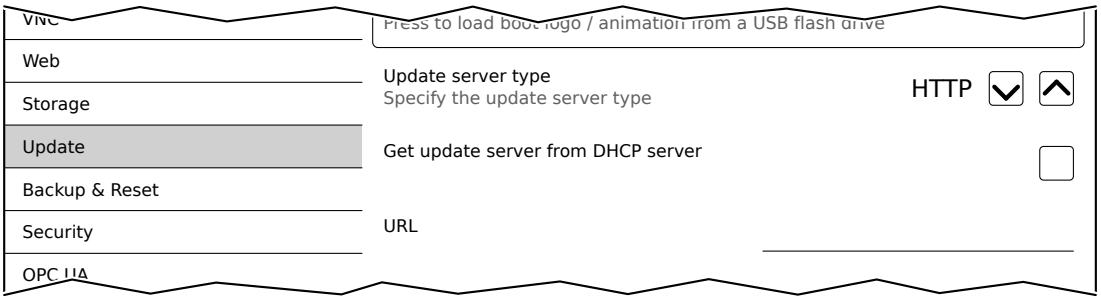
It is not possible to enter other ports!

Information:

If the entered IP address is incomplete or no FTP server exists for the IP address or entered hostname, a message will be output that no network connection could be established if a connection attempt fails during the update process.

7.1.1.10.1.3 Configuring an update server of type *HTTP*

If option *Get update server from DHCP server* is disabled and update server type *HTTP* is selected, the following additional input fields are displayed:



URL

Default setting: EMPTY (no update server entered)

To be able to update the Power Panel from an HTTP server (web server), a valid URL (hostname or IP address and, if necessary, corresponding path) must be entered where the update files are stored.

The FTP connection is generally established via standard port 80 on the HTTP server.

Syntax of *URL*: `[http://]update server[:port][/path/to/update-files]`

URL fragment	Description
`http://`	Optional specification of the HTTP protocol.
`update-server`	Either the hostname or IP address of the update server to which a connection should be established is specified here.
`:port`	Optional specification of the port used to access the HTTP server.
`/path/to/update-files`	Specification of the path where the update files are stored.

Valid *URL* examples:

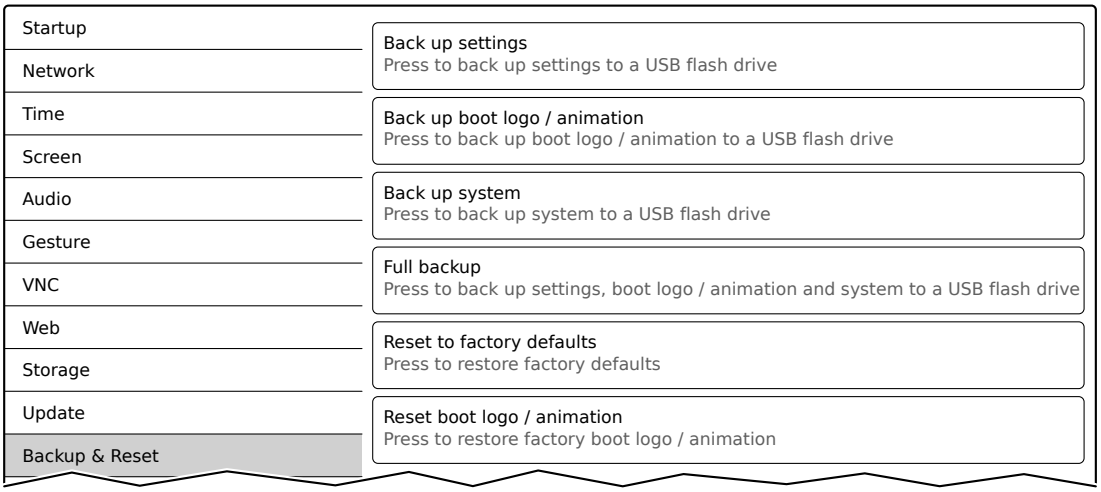
***URL* with hostname**	***URL* with IP address**
`webserver/`	`123.234.345.64/`
`webserver/terminal/os-update`	`123.234.345.64/terminal/os-update`
`http://server-werk3/term-updates`	`http://10.11.12.13/term-updates`
`http://server-werk2:8080/terminal-os`	`http://123.234.345.64:1234/terminal-os`

Information:

If the entered IP address is incomplete or no HTTP server exists for the IP address or entered hostname, a message will be output that no network connection could be established if a connection attempt fails during the update process.

7.1.1.11 Service page *Backup & Reset*

On this service page, individual parts or the entire system can be backed up or restored. A factory reset is also possible:



Information:

Only settings that have already been saved with a function of service page *Save & Exit* are taken into account and backed up when a backup is created. Unsaved service page settings are not backed up.

Back up settings **(button)**

Accessing this function creates a backup of the settings and stores it on the USB storage medium.

Back up boot logo / animation **(button)**

Accessing this function creates a backup of the boot logo and stores it on the USB storage medium.

Back up system **(button)**

When this function is executed, a backup of the PPT system is created and stored on the USB storage device as a PPT image .

Information:

Creating a backup can take several minutes.

Full backup **(button)**

Accessing this function creates a full backup of the system, its settings and boot logo and stores it on the USB storage medium.

Information:

Creating a backup can take several minutes.

Reset to factory defaults **(button)**

Accessing this function loads the factory default settings. The device is thus reset to a defined state:

- User settings (server names and hostnames, passwords, etc.) are deleted.
- Boot logos are deleted.
- The client certificate of the web browser is deleted.

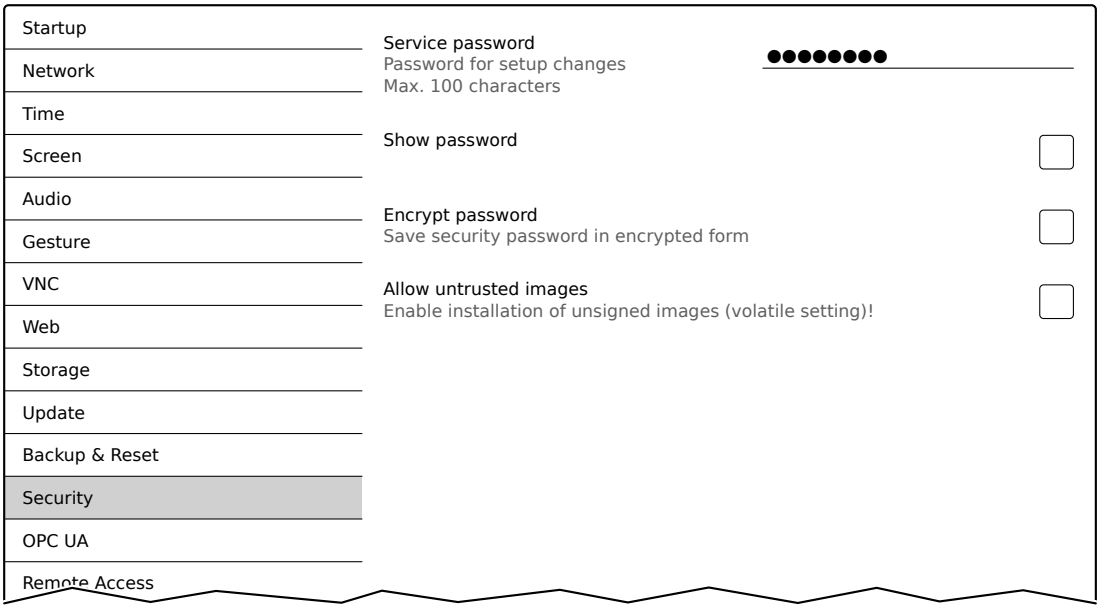
Information:

The current settings made on the service pages are not saved and will be lost.

Reset boot logo / animation **(button)**

Accessing this function resets the boot logo and the boot animation to the factory default settings (summary screen).

7.1.1.12 Service page *Security*



Service password

Default setting: EMPTY (no password entered)

Input range: Max. 100 characters

The service password is used to secure access to the service pages (see "Entering the service password" on page 42).

The password is stored on the device in configuration file PMT50Config.xml .

Show password

Default setting: Disabled

Enabled	The password is displayed in the input field as plain text.
Disabled	The password is hidden in the input field by placeholder characters (●●●●●●).

Note: This option only switches the display of the password between plain text and wildcard characters. This option is not saved. This option is always disabled after restart.

Encrypt password

Default setting: Disabled

Enabled	The password is stored on the device in encrypted form.
Disabled	The password is stored on the device as plain text.

Allow untrusted images

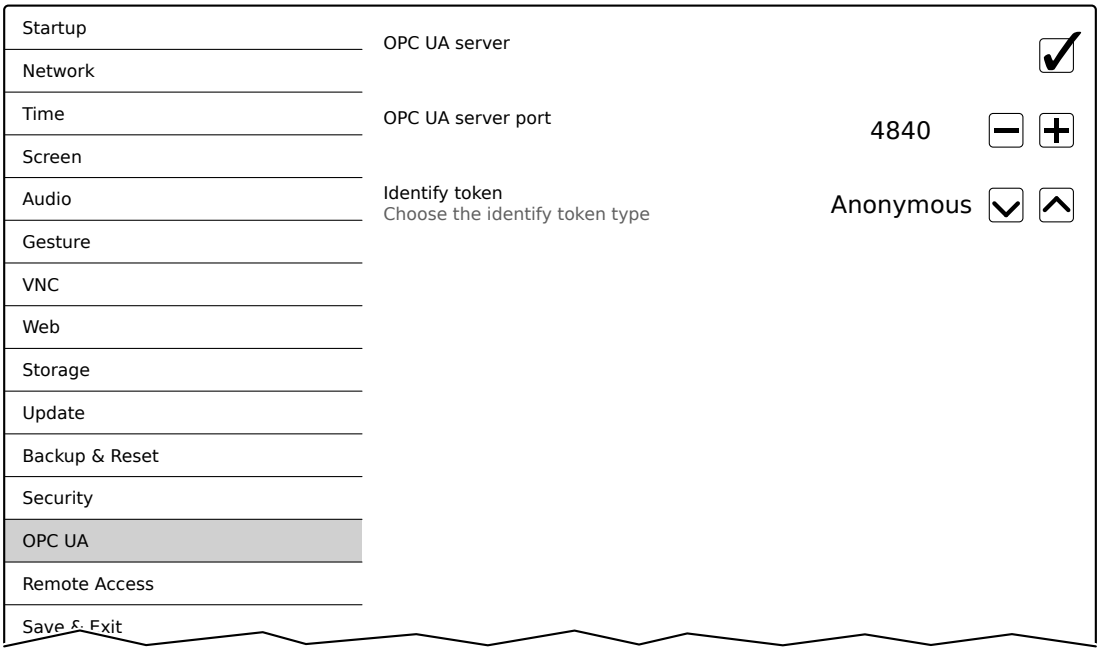
Default setting: Disabled

Disabled	Only signed images can be installed on the device.
Enabled	If this option is enabled, an unsigned image can be installed (see service page "Update" on page 62). This option is not saved in the system settings and immediately disabled after exiting the service pages.

This function is necessary to install a system backup created earlier on the device, for example (backups are generally saved without a signature).

7.1.1.13 Service page *OPC UA*

The OPC UA server can be enabled/disabled on this service page:



OPC UA server

Default setting: Disabled

If this setting is enabled, options *Port* and *Identify token* are available.

Either the hostname specified on service page *Network* or the IP address entered there must be used as the address for the OPC UA server.

Notice!

The OPC UA server is stopped while the Power Panel service page is active.

Port

Default setting: *4840*

The port number used to reach the OPC UA server of the Power Panel is specified here.

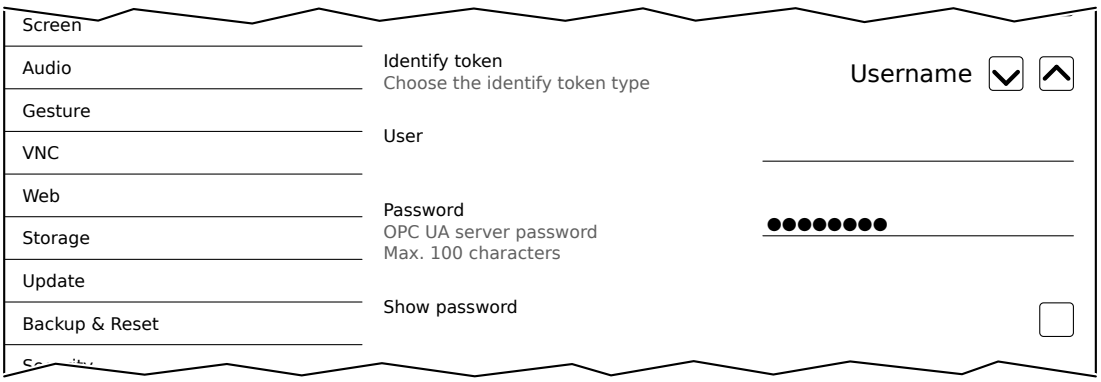
Identify token

Default setting: *Anonymous*

The following selections are available for option *Identify token*:

Anonymous	The OPC UA server can be reached within the network without authentication.
Username	The OPC UA server can only be accessed within the network by specifying a username and password.

Additional input fields are displayed if option *Username* is selected:



User

Default setting: EMPTY (no username entered)

For access with authentication, a username must be entered here.

Password

Default setting: EMPTY (no password entered)

Input range: Max. 100 characters

For access with authentication, a password must be entered here.

The password is stored on the device in configuration file PMT50Config.xml .

Show password

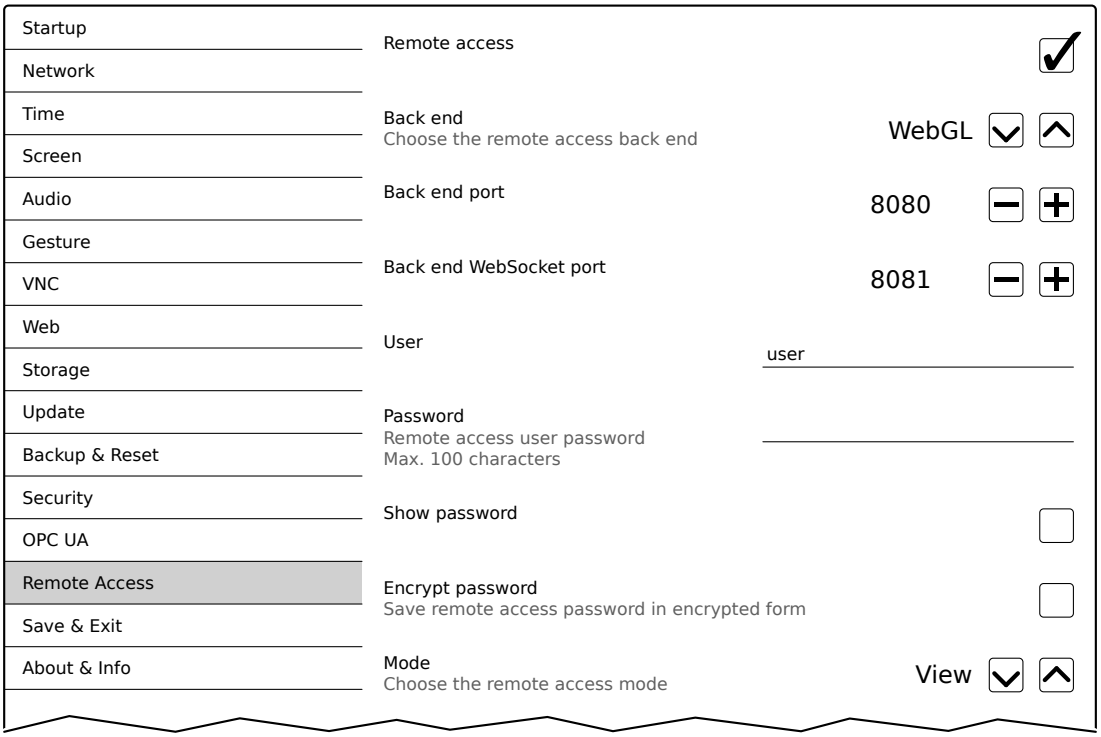
Default setting: Disabled

Enabled	The password is displayed in the input field as plain text.
Disabled	The password is hidden in the input field by placeholder characters (●●●●●●).

Note: This option only switches the display of the password between plain text and wildcard characters. This option is not saved. This option is always disabled after restart.

7.1.1.14 Service page *Remote Access*

This service page is used to enable/disable and configure remote access for the Power Panel:



The following options are available when remote access is enabled:

- Displaying the display content of the Power Panel on a remote client.
- Operating the Power Panel from a remote client with mouse and keyboard.

Information:

Remote access within the network where the Power Panel is located takes place using an unencrypted and non-secure protocol.

The network must be secured accordingly, and corresponding security measures (e.g. VPN access to the network) are strongly recommended for external access.

Remote access

Default setting: Disabled

Enabled	Remote access to the Power Panel is enabled.
Disabled	Remote access to the Power Panel is disabled.

The following remote access settings can be changed regardless of whether this option is enabled or disabled.

Back end

Default setting: *WebGL*

The following choices are available for option *Back end*:

WebGL	Enables remote access via web browser. The Web Graphics Library (WebGL) interface is used for this.
VNC	Allow remote access via VNC client.

Back end port

Default setting: See the following table.

This defines the port number used by the remote client to access the Power Panel.

Port number	***Back end = WebGL***	***Back end = VNC***
1024 - 65,535	Default port: 8080	Default port: 5900
	Valid range for entering the port number. Inputs outside this range are not possible.	

***Back end WebSocket port* (if *Back end* = *WebGL*)**

Default setting: See the following table.

This defines the port number used by the remote client to establish WebSocket communication between the web browser and Power Panel.

Port number	*Back end* = *WebGL*
1024 - 65,535	Default port: 8081
	Valid range for entering the port number. Inputs outside this range are not possible.

User

Default setting: user

A username must be entered at this point for access with authentication.

Password

Default setting: EMPTY (no password entered)

Input range: Max. 100 characters

A password must be entered at this point for access with authentication.

The password is stored on the device in configuration file PMT50Config.xml .

Show password

Default setting: Disabled

Enabled	The password is displayed in the input field as plain text.
Disabled	The password is hidden in the input field by placeholder characters (●●●●●●).

Note: This option only switches the display of the password between plain text and wildcard characters. This option is not saved. This option is always disabled after restart.

Encrypt password

Default setting: Disabled

Enabled	The password is stored on the device in encrypted form.
Disabled	The password is stored on the device as plain text.

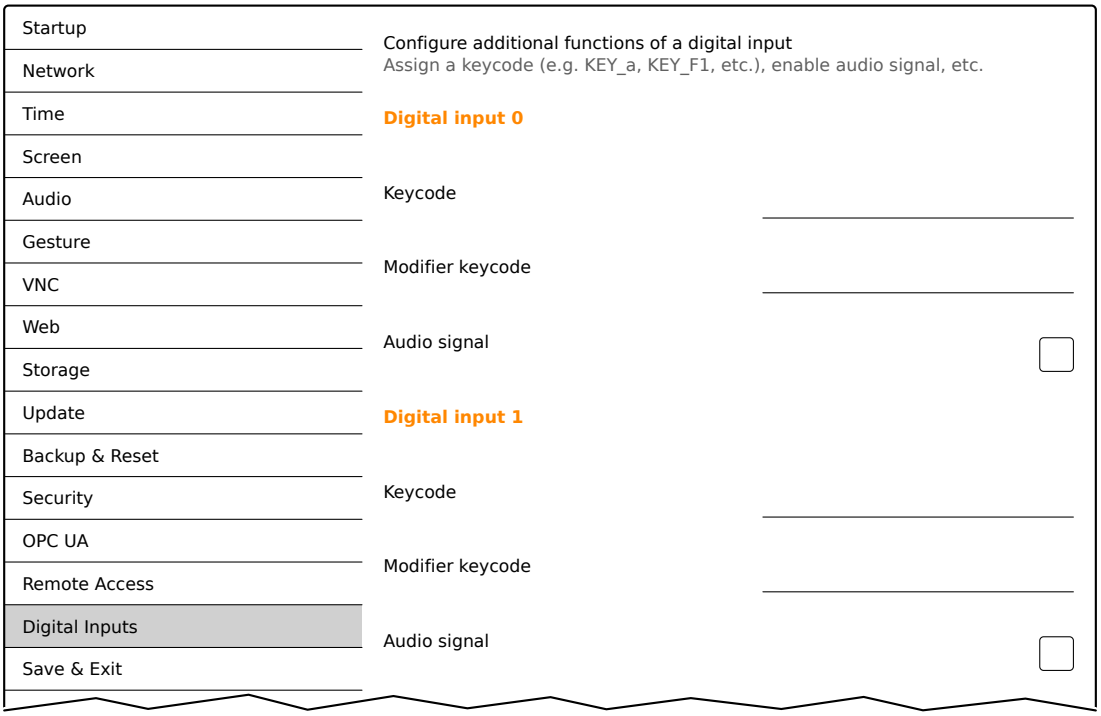
Mode

Selects the remote access operating mode:

	Display of content	Operation with mouse and keyboard
View	Yes	No
Control	Yes	Yes

7.1.1.15 Service page "Digital inputs"

The digital inputs of the Power Panel can be configured on this service page:



Key codes for input field *Keycode*

The key codes listed in the following table can be entered in field *Keycode*.

Information:

When entering the key code, it is important to ensure that the text or characters that are located in the following table in column "Key code" are entered for the desired character or key.

Numbers

Key code		Number
KEY_1	**1**	1
KEY_2	**2**	2
KEY_3	**3**	3
KEY_4	**4**	4
KEY_5	**5**	5
KEY_6	**6**	6
KEY_7	**7**	7
KEY_8	**8**	8
KEY_9	**9**	9
KEY_0	**0**	0

Upper and lower case letters

Key code		Lowercase letters	Key code	Upper case letters
KEY_a	**a**	a	**A**	A
KEY_b	**b**	b	**B**	B
KEY_c	**c**	c	**C**	C
KEY_d	**d**	d	**D**	D
KEY_e	**e**	e	**E**	E
KEY_f	**f**	f	**F**	F
KEY_g	**g**	g	**G**	G
KEY_h	**h**	h	**H**	H
KEY_i	**i**	i	**I**	I
KEY_j	**j**	j	**J**	J
KEY_k	**k**	k	**K**	K
KEY_l	**l**	l	**L**	L
KEY_m	**m**	m	**M**	M
KEY_n	**n**	n	**N**	N
KEY_o	**o**	o	**O**	O
KEY_p	**p**	p	**P**	P
KEY_q	**q**	q	**Q**	Q
KEY_r	**r**	r	**R**	R
KEY_s	**s**	s	**S**	S
KEY_t	**t**	t	**T**	T
KEY_u	**u**	u	**U**	U
KEY_v	**v**	v	**V**	V
KEY_w	**w**	w	**W**	W
KEY_x	**x**	x	**X**	X
KEY_y	**y**	y	**Y**	Y
KEY_z	**z**	z	**Z**	Z

Function keys

Key code	Description	Key code	Description
KEY_F1	F1	**KEY_F13**	F13
KEY_F2	F2	**KEY_F14**	F14
KEY_F3	F3	**KEY_F15**	F15
KEY_F4	F4	**KEY_F16**	F16
KEY_F5	F5	**KEY_F17**	F17
KEY_F6	F6	**KEY_F18**	F18
KEY_F7	F7	**KEY_F19**	F19
KEY_F8	F8	**KEY_F20**	F20
KEY_F9	F9	**KEY_F21**	F21
KEY_F10	F10	**KEY_F22**	F22
KEY_F11	F11	**KEY_F23**	F23
KEY_F12	F12	**KEY_F24**	F24

Special characters

The following special characters must be entered directly using the keyboard.

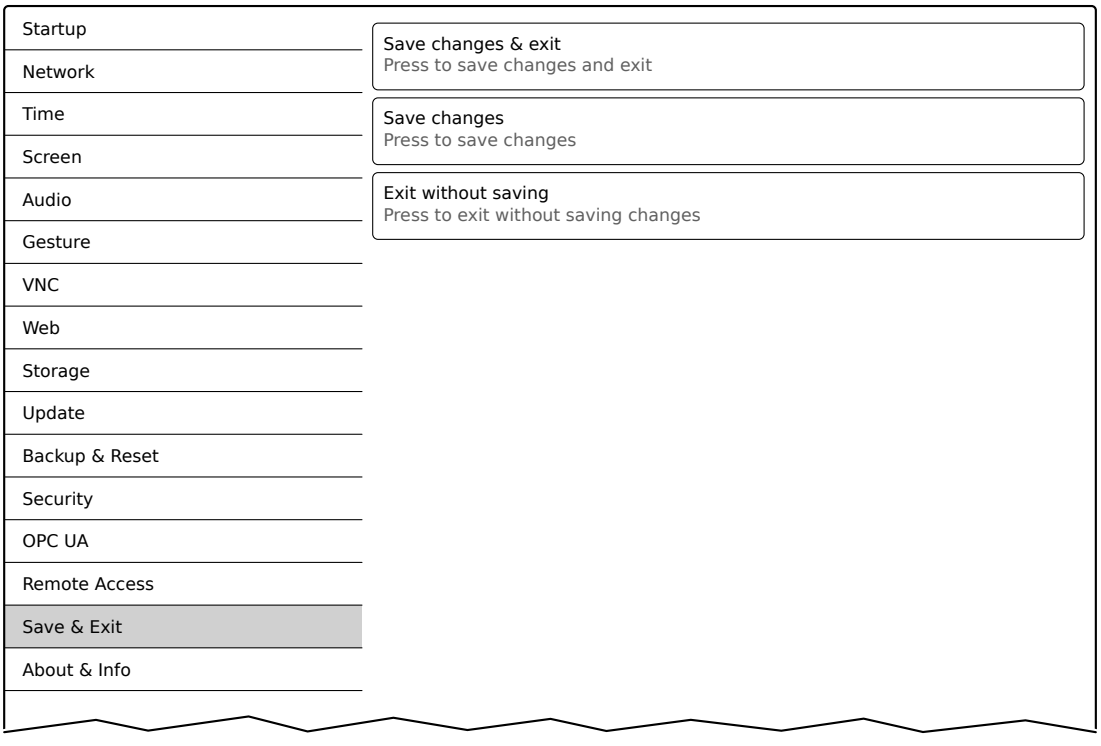
Key code	Description	Key code	Description
!	Exclamation mark	**{**	Left curly bracket
"	Quotation marks	**|**	Vertical bar
#	Hash mark	**}**	Right curly bracket
$	Dollar	**~**	Tilde
%	Percent	**£**	Pound symbol
&	Ampersand	**¥**	Yen symbol
(	Left parenthesis	**§**	Paragraph character
)	Right parenthesis	**°**	Degree character
*****	Asterisk	**±**	Plus/Minus
+	Plus	**´**	Accent (acute)
:	Colon	**µ**	Greek letter µ (My)
<	Less than	**·**	Interpunct
>	Greater than	**‰**	Per mill
?	Question mark	**€**	Euro symbol
@	At symbol	**ø**	Empty set / Diameter
^	Circumflex	**∑**	Sigma
_	Underline		

Special keys, other special characters

Key code	Description	Key code	Description
KEY_BACKSPACE	Backspace key	**KEY_-**	Minus
KEY_CAPSLOCK	Capslock key	**-**	
KEY_DELETE	Delete key	**KEY_=**	Equal to
KEY_DOWN	Down cursor key	**=**	
KEY_END	End key	**KEY_APOSTROPHE**	Minus
KEY_ENTER	Enter key	**'**	
KEY_ESC	Escape	**KEY_BACKSLASH**	Backslash
KEY_HOME	Home key	****	
KEY_INSERT	Insert key	**KEY_COMMA**	Comma
KEY_LEFT	Left cursor key	**,**	
KEY_LEFTALT	Left Alt key	**KEY_DOT**	Item
KEY_LEFTCTRL	Left Ctrl key	**.**	
KEY_LEFTMETA	Left meta key	**KEY_GRAVE**	Accent (grave)
KEY_LEFTSHIFT	Left shift key	**`**	
KEY_MENU	Menu key	**KEY_LEFTBRACE**	Left square bracket
KEY_PAGEDOWN	Page down key	**[**	
KEY_PAGEUP	Page up key	**KEY_RIGHTBRACE**	Right square bracket
KEY_PAUSE	Pause	**]**	
KEY_RIGHT	Right cursor key	**KEY_SEMICOLON**	Semicolon
KEY_RIGHTALT	Right Alt key	**;**	
KEY_RIGHTCTRL	Right Ctrl key	**KEY_SLASH**	Slash
KEY_RIGHTMETA	Right meta key	**/**	
KEY_RIGHTSHIFT	Right shift key	**KEY_SPACE**	Space
KEY_TAB	Tab key		
KEY_UP	Up cursor key		

7.1.1.16 Service page *Save & Exit*

On this page, the settings currently made or modified on service pages can be saved using *Save*. *Exit* leaves the service pages, and the Power Panel starts in the configured start mode (see "Service page Startup" on page 44).



Save changes & exit **(button)**

All changes that have been made are saved and the Power Panel is started with the specified settings (see "Service page Startup" on page 44)

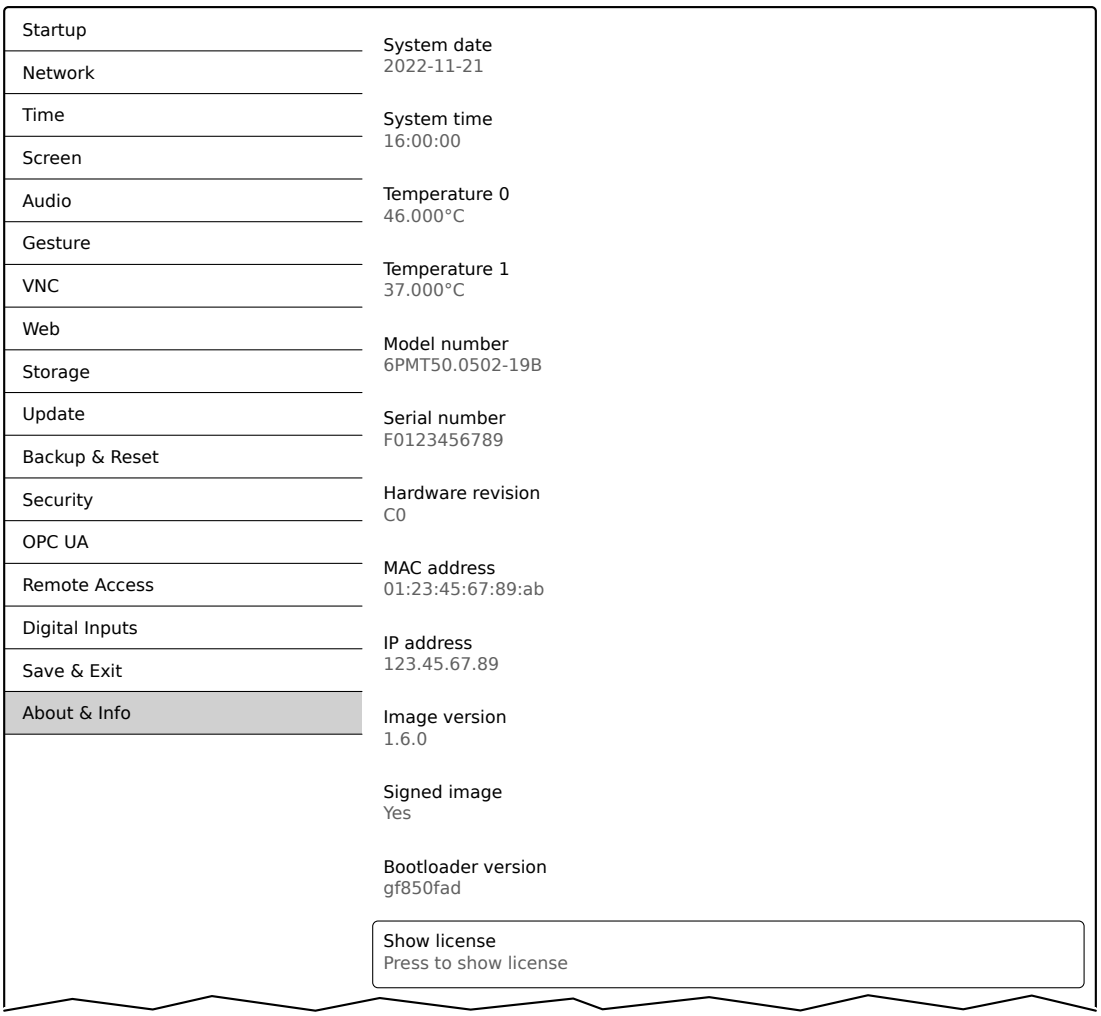
Save changes **(button)**

All changes made are saved. The service pages are not exited, and other settings can be made.

Exit without saving **(button)**

Changes made are not saved and will be lost. The Power Panel starts as configured with the last settings that were saved (see "Service page Startup" on page 44).

7.1.1.17 Service page *About & Info*



The following information about the Power Panel is displayed on this service page:

System date	Current date
System time	Current time
Model number	Device number / model number / order number
Serial number	Serial number of the device
Hardware revision	Hardware revision
MAC address	MAC address of the network interface
IP address	IP address currently being used in the network
Image version	Version number of the PPT system (PPT image)
Signed image	Information about whether a signed or unsigned image is installed on the Power Panel: **Yes**: A signed image is installed. **No**: An unsigned image is installed. **Not supported**: The Power Panel does not support signed images. This means that the signature is not checked.
Bootloader version	Version number of the bootloader

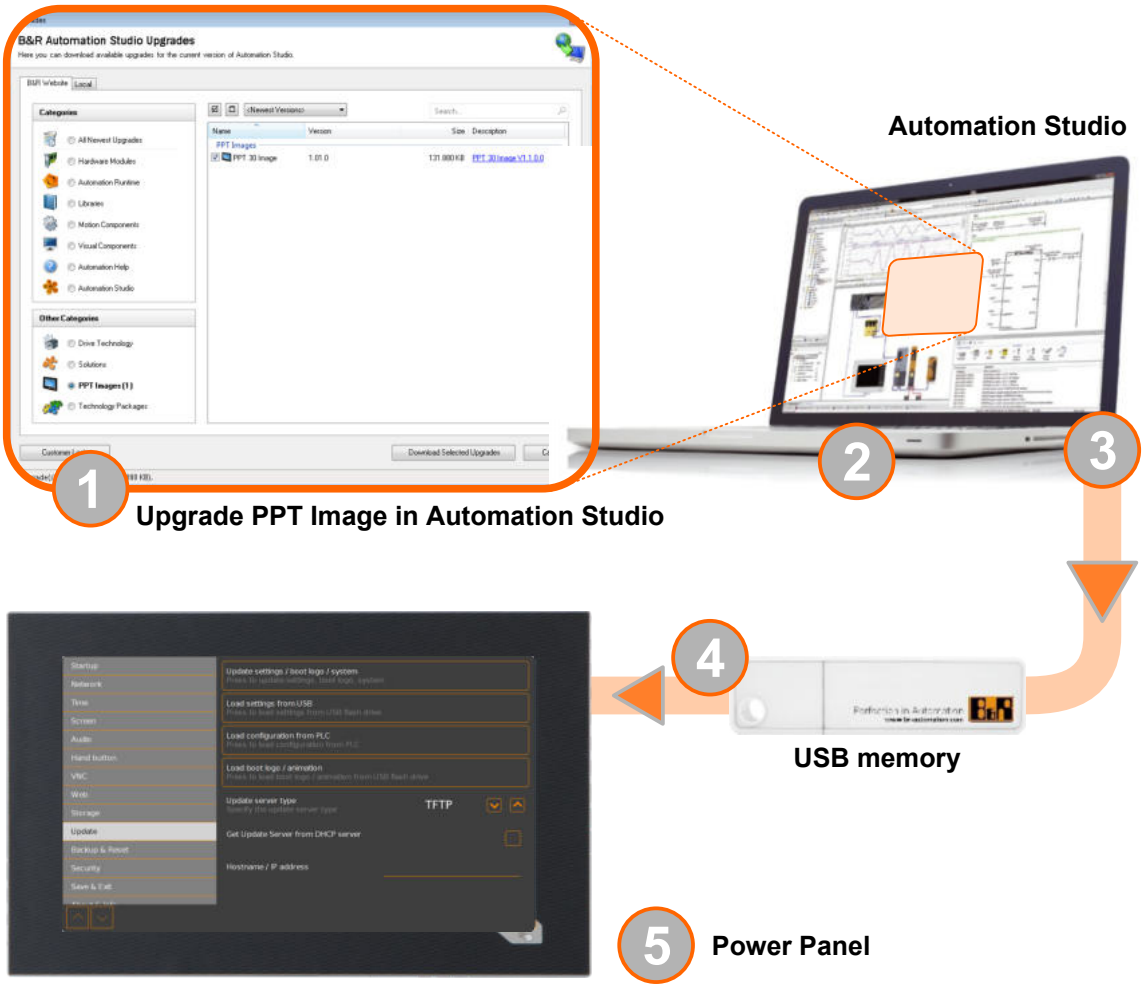
Show license **(button)**

Accessing this function displays the licenses of the software components used on the Power Panel.

7.2 Update

When updating the Power Panel with a USB flash drive, it is important to note that the drive must have a capacity of at least 256 MB. In addition, an industrial-grade USB flash drive must be used (see "Storage media" on page 142).

7.2.1 Updating with Automation Studio and USB flash drive



1. Update the PPT image for the Power Panel in Automation Studio (upgrade).
2. Configure the Power Panel in Automation Studio according to requirements.
3. Connect a USB flash drive to the computer and select the following menu command in Automation Studio:
   - **Project / Project installation / Generate project installation package**

   The corresponding device (Power Panel) must be selected in the following selection dialog box. After confirming the selection, the target medium (connected USB flash drive) is selected and the process is started using button [*Download to application memory*].

   The USB flash drive is reformatted and the following data is copied to the root directory:

PPT system	Configuration	Boot logo/animation
• PMT50Image.img.gz • PMT50Image.info • PMT50Image.img.gz.sig	• PMT50Config.xml	• PPTLogo.bmp.gz • PPTLogoA.gif

   Depending on the configuration, files PPTLogo.bmp.gz and PPTLogoA.gif may not be included.
4. Connect the USB flash drive to the Power Panel.

5. Select one of the following functions on service page *Update* depending on what should be updated (see section "Service page Update" on page 62):
    - *Update settings / boot logo / system*
    - *Load settings from USB*
    - *Load boot logo / animation*

7.2.2 Updating with a downloaded from the website and USB flash drive

Updated versions of the PPT system are made available on the B&R website in the form of an upgrade package that includes a PPT image. To update the PPT system using an upgrade package from the B&R website, the following steps must be carried out.

1. Download the Power Panel T-Series upgrade package from the B&R website (www.br-automation.com). This upgrade package is available in various places on the website:
    - Directly on the product page (it is possible to search for the model number) in section "PPT upgrades" under tab "Downloads".
    - On the download page under *Software* > *Automation Studio* > *Automation Studio* (or higher) in category "Linux images".

    Download the upgrade package in **ZIP format** (not EXE format)!
2. Unzip the ZIP file with the corresponding contents directly into the root directory of a USB flash drive:
    - PMT50Image.img.gz
    - PMT50Image.info
    - PMT50Image.img.gz.sig
    - Readme.txt
3. Connect the USB flash drive to the Power Panel.
4. Select function *Update settings / boot logo / system* on service page *Update* (see section "Service page Update" on page 62).

7.2.3 Duplicating an existing setup using a USB flash drive

It is possible to save the system, system settings, boot logo and boot animation from one Power Panel to a USB flash drive and apply all or part of the setup to another Power Panel.

Perform the following steps to do so:

1. Connect a USB flash drive to the Power Panel whose configuration should be copied.
2. On service page *Backup & Reset*, the functions can be used to back up the entire system or just portions of it (configuration, boot logo, boot animation) on a USB flash drive (see "Service page Backup & Reset" on page 68).
3. Then connect the USB flash drive to another Power Panel.
4. On service page *Update*, use a corresponding function to update the Power Panel with the backed up system (or portions of it) (see section "Service page Update" on page 62).

Note the following when updating a Power Panel with a backup created on another device:

Restore from:	Note
PPT system	The backup of a PPT system (PPT image) can be used to update any Power Panel in the same family (T30, T50, etc.).
Configuration	The backup of a configuration (system settings) can be used to update any Power Panel in the same family (T30, T50, etc.). Note that certain settings may have to be adapted to the specific device, however (e.g. position of the boot animation).
Boot logo, boot animation	A boot logo and/or boot animation can only be used on devices with the same display size.

8 Software

This chapter provides software-specific information (RFB extension, image formats) that has been referenced multiple times in other chapters.

- License information about the PPT System
- Web browser information
- File formats
- RFB extension
- OPC UA server

8.1 License information about the PPT System

Display licenses on the service page *About & Info*

The licenses of the software components used on the Power Panel can be displayed directly on the service page *About & Info* (see "Show license (button) " on page 77).

License information in ZIP archive *license.zip*

ZIP archive *license.zip* contains file *license.manifest*, which contains an overview of software components being used with name, version and license information. In addition, the ZIP archive also contains detailed version information for each individual software component.

Information: When unpacking the ZIP archive, note that for technical reasons files with the same name may be included.

ZIP archive *license.zip* is included in the following image packages:

Type of PPT image[1]	Description
Automation Studio upgrade	Executable file for installation in Automation Studio[2] **Location of *license.zip* after installation:** • Typically in the local installation directory for Automation Studio: *C:\BrAutomation\AS\[PanelSeries]\[PanelVariant]\V[ImageVersion]* • *[PanelSeries]*: e.g. PPC, PPT, PMT or PFT • *[PanelVariant]*: e.g. 30, 50 or 80 • *[ImageVersion]*: Linux image version[3]
ZIP archive	ZIP archive that, in addition to the Linux image, also contains file `license.zip`.

1) The PPT image is a Linux image. This image is an image of the Power Panel operating system (see "PPT image" on page 82) that is required to installation or update it.
Install/Update Linux image on Power Panel: see "Update" on page 78
2) See Automation Help for information about the download and installation in Automation Studio.
3) The Linux image version is not identical to the version from the Power Panel hardware upgrade.

Information:

The license information in *license.zip* always refers to a specific image version.

8.2 Web browser information

The implemented web browser of the terminal offers full JavaScript support!

The following features are not supported, however:

- Java
- Flash

8.2.1 Installing certificates in the browser

If user-defined certificates are required for the browser running on the Power Panel, they can be provided as follows:

- Set up network sharing for internal user memory "`usershare`".
  See also: "Service page Storage" on page 61
- Create a directory called "`cert`" in the internal user memory.
- Copy user-defined certificates into directory `cert`.
  Permissible file extensions for certificates: "`.cer`" or "`.crt`"

Each time the browser is started, all certificates are imported from directory `cert`.

8.2.2 Supported fonts

System fonts

Fonts are installed in the PPT system that are used by the browser to display HTML-based HMI applications (mapp View):

Font	Installed starting with PPT system 1.x.x
Arial	✓
Arial Unicode	✓
DejaVu Sans	✓
DejaVu Sans Mono	✓
Verdana	✓

Substitute fonts (font mapping)

If the HTML-based HMI application (mapp View) contains fonts that do not exist on the PPT system, the following system fonts are used as replacements instead:

Font	Substitute font starting with PPT system 1.x.x
serif	Arial, Regular
sans-serif	DejaVu Sans, Book
monospace	DejaVu Sans Mono, Book
Arial	Arial, Regular
Helvetica	Arial, Regular
Verdana	Verdana, Regular
Times New Roman	Arial, Regular
Courier New	DejaVu Sans Mono, Book

*) "serif", "sans-serif" and "monospace" are "generic" fonts.

16 px is set as the default font size.

8.2.3 Supported video formats

Videos can be displayed in web mode (see "Configuring web mode" on page 56). The following container formats are supported when embedding videos into a web-based HMI application:

- WebM
- MP4 (H.264)

8.2.4 User agent

For identification purposes, each web browser transmits various information (e.g. browser name, version, operating system) to the web server providing the HTML page.

As part of the HTTP header, a web browser identifies itself as a user agent. With PPT image version 1.3.0 and later, the web browser on the Power Panel transmits additional information.

Example:	`User-Agent: Mozilla/5.0 ... BRPanel/1.0 (PPT50;landscape;1280x800;6PPT50.101E-16B;)`

Description of the Power Panel information:

Identification := BRPanel/<Version> (<Type>;<Orientation>;<Resolution>;<OrderId>)		
BRPanel	Identification as B&R panel.	
<Version>	Version number of the comment (expression in parentheses), which is primarily used to evaluate the information within the parentheses correctly. **Format of <Version>:** `<Number>.<Number>`	
<Type>	Name of device family: `PPT50`, `PPC50`, etc.	
<Orientation>	The orientation of the screen display contains one of the following two values:	
	`landscape`	Landscape
	`portrait`	Portrait
<Resolution>	Resolution of the device in the format "WIDTHxHEIGHT". **Format of <Resolution>:** `WIDTHxHEIGHT`	
	`WIDTH`	Width of the display in pixels.
	`HEIGHT`	Height of the display in pixels.
	The width and height of the display are output according to the orientation: • Example for landscape format: `1280x800` • Example for portrait format: `800x1280`	
<OrderId>	Model number of the Power Panel.	

8.3 File formats

8.3.1 PPT image

The PPT image is a compressed image of the PPT system (Power Panel T-Series operating system). The PPT image is a package and consists of the following files:

File	Description
PMT50Image.img.gz	Compressed image of the PPT system.
PMT50Image.img.gz.sig	Signature of the image.
PMT50Image.info	Information about the image (MD5 checksum, image version, etc.).

Information:

This Power Panel supports signed images. During an update, the Power Panel uses the supplied signature to determine whether the image comes from a trusted source.

During an update, the MD5 checksum determines if the image is free of errors.

8.3.2 System settings

Filename: PMT50Config.xml

The system settings that can be defined by the user on the service pages are saved on the Power Panel in XML file PMT50Config.xml .

When backing up and restoring (see the two service pages Backup & Reset and Update) the system settings, the data for the settings is exchanged via an XML file with this name.

8.3.3 Boot logo

Filename: PPTLogo.bmp.gz

The boot logo is displayed during the startup phase of the Power Panel.

If configured on service page Startup, the boot logo is also displayed in web/VNC mode while establishing the connection.

The boot logo must meet the following requirements:

File format	Only file format BMP (Windows bitmap) is permitted for the boot logo.
Size	The size of the graphic must correspond to the size of the display in full screen mode. To determine the size of the display on the Power Panel being used, see section "Technical data".
Name	`PPTLogo.bmp.gz` The boot logo must be compressed in GZ format (GNU ZIP file). If the boot logo (any name possible) is added in Automation Studio and then the data for the USB flash drive is generated, then Automation Studio will compress the boot logo into the GZ format and name the file accordingly. The user only has to make sure that the boot logo is compressed into the GZ format and the file is named accordingly if Automation Studio is not being used.
Color depth	The color depth is limited to 24-bit.

8.3.4 Boot animation

Filename: PPTLogoA.gif

If configured on service page Startup, the boot animation is displayed in web or VNC mode while establishing the connection.

The boot animation must meet the following requirements:

File format	Only file format GIF (Graphics Interchange Format) is permitted for the boot animation.
Size	The size of the boot animation is not permitted to exceed the size of the used display in full screen mode.
Name	`PPTLogoA.gif` If the boot animation (any name possible) is added in Automation Studio and then the data for the USB flash drive is generated, then Automation Studio will name the file accordingly. The user only has to make sure that the boot animation is named accordingly if Automation Studio is not being used. It is important to ensure that capitalization matches the name specified above!
Position	When specifying the position of the boot animation (see service page "Screen" on page 50) it is important to ensure that the **entire** boot animation can still be shown on the display.
Application	The boot animation is superimposed over an existing static boot logo. The boot animation is only displayed when starting web or VNC mode. It is not displayed while the device is booting.

8.4 RFB extension

In addition to transferring screen content, the RFB protocol (remote frame buffer protocol) is also used to transfer data between a VNC client and the VNC server. This makes it possible to control VNC-based HMI applications. These extensions can be configured in Automation Studio using library AsRfbExt.

Library AsRfbExt provides additional options for controlling VNC-based HMI applications and evaluating any input devices connected to the client (B&R device). B&R's VNC Viewer must be used on the client with the RFB extension enabled.

RFB extensions offer the following basic functions:

- Evaluating additional control devices on the Power Panel.
- Querying the temperature of the VNC client.
- Starting a process on the VNC client to carry out certain functions.
- Determining and limiting the number of connected VNC clients.
- Disconnecting VNC clients from the VNC server (Power Panel is not turned off, configurations remain).
- Reading the controller's operating hours.

Information:

For more information about RFB extensions and programming with library *AsRfbExt*, see the documentation in Automation Help.

Information:

Only one Power Panel with enabled RFB extension can be operated per B&R VNC server.

The following functions are described in this section:

- Temperature monitoring
- Adjusting display brightness
- Outputting an audio signal

8.4.1 Temperature monitoring

Monitoring by the application

Necessary function of library *AsRfbExt*: *RfbExtTemperatureValue()*

Function *RfbExtTemperatureValue()* reads out the value of a temperature sensor in the device using a sensor index:

Sensor index	Description
0	Temperature of the CPU housing (TemperatureCPUCase).
1	Inner temperature of the Power Panel (TemperatureEnvironmental).

Use case

Under certain circumstances (e.g. if the device is operated near the maximum permissible ambient temperature), it makes sense for the application to monitor the temperature of the CPU component housing. The application can take appropriate measures if a certain temperature is exceeded.

Notice!

The temperature of the CPU housing is not permitted to exceed 105°C. The service life of the processor may be reduced at continuously high temperatures.

8.4.2 Adjusting display brightness

Necessary function of library *AsRfbExt*: *RfbExtStartProcess()*

Function *RfbExtStartProcess()* is used to adjust the display brightness process *dim*. Here, parameter *pcmdLine* is used to call the command line process as follows:

Call syntax	`dim brightness`
Parameter	brightness ... Brightness of the display in percent [%]: Valid range: 0 - 100
Example	pcmdLine: `dim 75` The display brightness is set to 75%.
Implementation	In the VNC-based HMI application, a button is assigned a corresponding function that calls *RfbExtStartProcess()* with the corresponding parameters. The application can take the display brightness from an input field that has also been defined in the HMI application.

The display brightness set with *dim* changes the current display setting but does not change the default setting used after restarting the device.

The default display brightness setting is configured on service page *Screen* or in Automation Studio (see section "Configuration" on page 41).

In contrast to the setting option on service page *Screen*, *dim* can be used to set the entire brightness range of the display from 0 to 100% (see "Service page Screen" on page 50).

8.4.3 Outputting an audio signal

Necessary function of library *AsRfbExt*: *RfbExtStartProcess()*

Function *RfbExtStartProcess()* is used to start the *beep* process and output an audio signal on the Power Panel. Here, parameter *pcmdLine* is used to call the command line process as follows:

Call syntax	`beep [frequency] [duration]`
Parameter	frequency ... Frequency of the audio signal in hertz [Hz]. Valid range: 10 - 15000 duration ... Duration of the audio signal in milliseconds [ms]. Valid range: 10 - 500 If a value is not specified, the default setting is used.
Example	pcmdLine: `beep 880 400` An audio signal with 880 Hz and duration of 400 ms is output.
Implementation	The VNC-based HMI application can output an audio signal using function *RfbExtStartProcess()* in order to clearly illustrate certain states or actions.

Calling `beep` with specific parameters does not change the default setting for the device.

The default audio signal setting is configured on service page *Audio* or in Automation Studio (see section "Configuration" on page 41).

Information:

Emitting an audible tone with *beep* is always done independently of the setting on service page *Audio* (see "Service page Audio" on page 52).

8.5 OPC UA server

The Power Panel can be configured as an OPC UA server (see "Service page OPC UA" on page 70). The OPC UA server on the Power Panel provides the following functionalities:

- Configuration of the Power Panel as is also possible via the "service pages" on page 41.
- Reading status information (temperature, version information, etc.).
- Querying touch screen keys.
- Calling functions/methods (setting brightness, triggering signal tone, etc.)

Notice!

The OPC UA server is stopped while the Power Panel service page is active.

General information about OPC UA

Corresponding knowledge of "OPC Unified Architecture" (OPC UA) is required to communicate with the OPC UA server on the Power Panel. Corresponding information is available e.g. on the OPC Foundation website (opcfoundation.org).

Communication via library AsOpcUac

Library AsOpcUac can be used to create an OPC UA client on B&R systems that communicates with the OPC UA server of the Power Panel.

Working groups of the OPC Foundation and PLCopen collaborated to develop the function blocks for OPC UA client functionality contained in the library.

Information:

Additional information about OPC UA and programming with library *AsOpcUac* is available in Automation Help.

Graphical OPC UA clients

During development, it is helpful to use a graphical OPC UA client to determine attributes and node IDs of nodes and methods.

OPC UA client *UaExpert* from Unified Automation GmbH (www.unified-automation.com) is very common.

8.5.1 Information model

General information

In addition to the base model of the OPC UA specification and OPC UA companion specification for device integration (DI = device integration), the OPC UA information model of the Power Panel provides both properties as well as methods for operating the Power Panel in its own address space (namespace).

8.5.1.1 Namespaces

Namespaces are used by OPC UA to generate unique identifiers. Attributes *NodeId* and *BrowseName* are identifiers that identify a node within the entire information model. A node in the OPC UA address space is uniquely identified with attribute *NodeId*. Attribute *BrowseName* alone cannot be used to unambiguously and uniquely identify a node. Different nodes can use the same *BrowseName*. BrowseNames can be combined into a path (Browse path), which makes it possible to locate a certain node in the OPC UA address space and to determine attribute *NodeId*.

Node identifiers are either specified in the OPC UA specification or by B&R itself. A namespace therefore specifies which institution defined the node (naming authority) and is specified in the form of a namespace URI.

The following namespaces are used in the OPC UA server of the Power Panel:

ns	Namespace URI	Description	
0	http://opcfoundation.org/UA/	Address space for types and objects defined in the OPC UA specification.	
		Namespace index	0
1	urn:[hostname]/BR/UA/EmbeddedServer	This namespace URI is the address space of device on which the OPC UA server is running.	
		[hostname]	Hostname of the OPC UA server. Corresponds to the hostname that was specified in the network settings of the device. If no hostname was specified in the network settings, name "6PMT50" is used automatically.
		Namespace index	1
2	http://opcfoundation.org/UA/DI/	Address space for types and objects defined in the OPC UA companion specification for device integration (DI).	
3	http://br-automation.com/OpcUa/BrTypes/	Address space for general types and objects defined by B&R.	
4	http://br-automation.com/OpcUa/HMI/Terminal/	Address space for types and objects of the device defined by B&R.	

ns Namespace index

Information:

Namespace URIs are case-sensitive; this must be taken into account.

Only namespace indexes 0 and 1 are defined according to the OPC UA specification. The other namespace indexes in this documentation may differ from the indices generated on the device.

The recommended procedure here is to dynamically determine the namespace indexes and use a namespace cache.

Notice!

Attribute *NodeId* of each node can change with a new version of the PPT image.

The explicit (fixed) use of *NodeIds* results in problems in this case. *NodeIds* should therefore always be determined dynamically and managed in a node cache during communication with the OPC UA server.

Syntax for namespaces and nodes

This documentation describes a node in the information model using the namespace and *BrowseName*. The following syntax is used for this:

Path:
`ns:BrowseName`

`ns`	Namespace index of the node.
`BrowseName`	*BrowseName* of the node.

A complete path to a node would look like this:

Path:
`/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Startup/4:StartMode`

8.5.1.2 Symbols for object types

Depending on the object type of the nodes of the information model, the following symbols are used in some places:

Symbol	Object type	Note
	Folder	Contains additional objects/nodes.
	BaseObject	Contains additional objects/nodes.
	FunctionalGroup	Contains additional objects/nodes.
	Method	These nodes provide methods for executing functions on the device.
	Variable	These nodes provide variables/parameters for configuring the device or for reading information from the device.
	Variable	These nodes provide variables/parameters for reading information from the device.
	Property	Specific properties for identifying the device are read out via these nodes.

8.5.1.3 ParameterSet

All readable and writable parameter nodes of the Power Panel are accessible under the following path:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet

ns	Path to ParameterSet	Description
0	Root	Root directory.
0	Objects	Object directory.
2	DeviceSet	Device directory.
4	PowerPanelMT50	Node for the Power Panel.
2	ParameterSet	Node containing all available parameters of the device.

Information:

Any changes made to the system settings using the parameters listed are only saved after method SaveConfiguration is called.

All parameter nodes are available under ParameterSet as well as under an alternative path. The parameters are structured in the following tables according to these alternative paths (function groups).

Legend for tables

This legend applies to all of the following tables in this section:

ns Namespace index (see "Namespaces" on page 86)
B The cross-references in column "BrowseName of the parameter" refer to the description of the nodes.
S Column "Service page" contains cross-references to the service page where the parameter can also be changed.
R Value attribute of the node can be read.
W Value attribute of the node can be changed.

Configuration/Audio

Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Audio

ns	BrowseName of the parameter	Description	Service page	R	W
4	EnableBuzzer	Enables/Disables the buzzer.	Audio	+	+
	BuzzerSource	Selects the trigger for the buzzer.		+	+
	BuzzerFrequency	Frequency of the buzzer.		+	+
	BuzzerDuration	Duration of the buzzer.		+	+

Configuration/Gesture

Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Gesture

ns	BrowseName of the parameter	Description	Service page	R	W
4	OpenServicePage	Configures opening the service page with a gesture.	Gesture	+	+

Configuration/Network

Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Network

ns	BrowseName of the parameter	Description	Service page	R	W
4	Hostname	Hostname of the Power Panel.	Network	+	+
	NetworkMode	Network mode: DHCPClient or StaticIP. Setting corresponds to option *DHCP* on service page *Network*.		+	+
	ActivateDNS	Enables DNS usage.		+	+
	DNSSuffix	DNS suffix for the fully qualified domain name (FQDN).		+	+
	GetDNSFromDHCP	Enables/Disables obtaining IP addresses of the DNS servers from DHCP.		+	+
	PrimaryDNS	Address of the first DNS server.		+	+
	SecondaryDNS	Address of the second DNS server.		+	+
	TertiaryDNS	Address of the third DNS server.		+	+
	IpAddress	Static IP address of the Power Panel.		+	+
	SubnetMask	Subnet mask.		+	+
	DefaultGateway	IP address of the default gateway.		+	+

Configuration/RemoteAccess

Alternative path (function group):
`/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:RemoteAccess`

ns	BrowseName of the parameter	Description	Service page	R	W
4	EnableRemoteAccess	Enables/Disables remote access.	Remote access	+	+
	RemoteAccessBackEnd	Selects which technology is used for remote access.		+	+
	RemoteAccessModeWebGL	Selects the WebGL remote access operating mode.		+	+
	RemoteAccessPortWebGL	Network port for WebGL remote access.		+	+
	RemoteAccessWSPortWebGL	Network port for WebSocket communication with WebGL remote access.		+	+
	RemoteAccessModeVNC	Selects the VNC remote access operating mode.		+	+
	RemoteAccessPortVNC	Network port for VNC remote access.		+	+

Configuration/Screen

Alternative path (function group):
`/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Screen`

ns	BrowseName of the parameter	Description	Service page	R	W
4	DisplayBrightness	Screen brightness.	Screen	+	+
	ScreenRotation	Angle of rotation of the display.		+	+
	EnableScreensaver	Enables/Disables the screensaver.		+	+
	ScreensaverIdleTime	Time without touch activity after which the screensaver is displayed.		+	+
	ScreensaverType	Screensaver mode.		+	+
	BootAnimationDelay	Delay in milliseconds between frames of the GIF animation.		+	+
	BootAnimationLeftPos	Defines the distance of an existing boot animation to the left edge of the display.		+	+
	BootAnimationTopPos	Defines the distance of an existing boot animation to the right edge of the display.		+	+

Configuration/Startup

Alternative path (function group):
`/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Startup`

ns	BrowseName of the parameter	Description	Service page	R	W
4	StartMode	Power Panel start mode: `ServicePage`, `VNC` or `Web`.	Startup	+	+
	ShowBootLogoVNC	Enables/Disables the boot logo or boot animation of the system while connecting to the VNC server.		+	+
	ShowBootLogoWeb	Enables/Disables the boot logo or boot animation of the system while connecting to the web server.		+	+

Configuration/Storage

Alternative path (function group):
`/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Storage`

ns	BrowseName of the parameter	Description	Service page	R	W
4	USBMemoryShare	Enables/Disables network sharing to the connected USB storage medium.	Storage	+	+
	UserMemoryShare	Enables/Disables network sharing to internal user memory.		+	+

Configuration/Time

Alternative path (function group):
`/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Time`

ns	BrowseName of the parameter	Description	Service page	R	W
4	EnableNTPClient	Enables/Disables the NTP client for time synchronization.	Time	+	+
	NTPServer1	Address of an NTP server.		+	+

Configuration/Vnc

Alternative path (function group):
`/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Vnc`

ns	BrowseName of the parameter	Description	Service page	R	W
4	VNCServer	Address of the VNC server.	VNC	+	+
	UseRfbExtension	Enables/Disables the RFB extension in VNC mode.		+	+
	VNCConnectionMonitor	Enables/Disables monitoring of the connection to the VNC server.		+	+
	VNCLocalWindowScaling	Enables/Disables automatic scaling of the HMI application in VNC mode.		+	+
	VNCBackgroundColor	Changes the background color of the VNC client.		+	+

Configuration/Web

Alternative path (function group):
`/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Web`

ns	BrowseName of the parameter	Description	Service page	R	W
4	WebServer	Address of the web server.	Web	+	+
	VirtualKeyboardWeb	Enables/Disables the on-screen keyboard in web mode.		+	+
	DisablePinchGesture	The two-finger gesture (pinch-to-zoom) for zooming the browser content is disabled. Zooming the entire HMI application is prevented.		+	+
	SetOverrideViewport	Enables/Disables viewport settings.		+	+
	ViewportSettings	Viewport settings.		+	+
	IgnoreServerCertificateErrors	Enables/Disables warnings regarding server certificates.		+	+
	EnableScreenCapture	Enables/Disables the screen capture API.		+	+
	SuppressScrnCaptSecWarn	Enables/Disables the security warning when the screen capture is started.		+	+

Control/ConnectionWatchdog

Alternative path (function group):
`/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:ConnectionWatchdog`

ns	BrowseName of the method	Description	R	W
4	ConnectionWatchdogTimeout	This parameter defines the period for the watchdog timeout or disables the watchdog function.	+	+
	ConnectionWatchdogTrigger	This parameter is used firstly to enable the watchdog and secondly to trigger it.	+	+

Diagnostics

Alternative path (function group):
`/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Diagnostics`

ns	BrowseName of the information	Description	R	W
4	CPUCore0Usage	CPU utilization of core 0 (percent).	+	
4	CPUCore1Usage	CPU utilization of core 1 (percent).	+	
4	CPUUsage	CPU utilization of all cores (percent).	+	
4	MemoryAvailable	Available RAM in MB.	+	
4	MemoryTotal	Entire RAM of system in MB.	+	

Status

Alternative path (function group):
`/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Status`

ns	BrowseName of the parameter	Description	Service page	R	W
4	Temperature0	Temperature of the CPU housing: See Temperature monitoring.	About & Info	+	
	Temperature1	Inner temperature of the Power Panel: See "Temperature monitoring" on page 84.		+	
	USBFlashDrive0	Indicates whether a USB flash drive is connected.		+	
	USBFlashDrive1	Indicates whether a USB flash drive is connected to IF4.		+	

UserInterface

Alternative path (function group):
`/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:UserInterface`

ns	BrowseName of the parameter	Description	R	W
4	RGBLed00	Parameter for setting the color of the front LED.	+	+
	RGBLed01	Parameter for setting the color of the front LED.	+	+
	RGBLed02	Parameter for setting the color of the front LED.	+	+

ProcessData

Alternative path (function group):
`/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ProcessData`

ns	BrowseName of the parameter	Description	R	W
4	DI[##]	Digital input 00	+	
		Digital input 01	+	
		Digital input 02	+	
		Digital input 03	+	
		Digital input 04	+	
		Digital input 05	+	
		Digital input 06	+	
		Digital input 07	+	
	DO[##]	Digital output 00	+	+
		Digital output 01	+	+
		Digital output 02	+	+
		Digital output 03	+	+

8.5.1.4 MethodSet

All methods of the Power Panel are accessible under the following path:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:MethodSet

ns	Path/Node	Description
0	Root	Root directory
0	Objects	Object directory
2	DeviceSet	Device directory
4	PowerPanelMT50	Node for the "Power Panel " device
2	MethodSet	Node containing all methods of the device

ns	BrowseName of the method	Description
4	AwakePanel	"Wakes up" the Power Panel if the screensaver is running.
	BuzzerDefault	Plays the signal tone with the system settings.
	BuzzerWithPara	Plays the buzzer with the specified parameters.
	LoadConfiguration	The Power Panel loads the last saved settings and restarts. Any changes made to the parameters are not saved and will be lost.
	SaveConfiguration	Saves changes made to the parameters. Method *LoadConfiguration* must be used in order for these saved settings to be enabled on the Power Panel.
	SetBrightness	Changes screen brightness in the range from 20% to 100%.
	SetBrightnessUnlimited	Changes screen brightness in the range from 0% to 100%.
	SetTime	Sets the date and/or time of the device.
	StartUpdate	Reboots the Power Panel and starts the update process.
	StartRemoteAccess	Enables remote access with immediate effect.
	StopRemoteAccess	Disables remote access with immediate effect.

8.5.1.5 Device properties

Device properties (product-specific information) of the Power Panel are located under the following path:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50

ns	Path/Node	Description
0	Root	Root directory
0	Objects	Object directory
2	DeviceSet	Device directory
4	PowerPanelMT50	Nodes for the Power Panel

ns	BrowseName of the information	Description
3	CompatibilityId	ID to indicate compatibility.
2	DeviceManual	Link to the website: The user's manual is available in the Downloads section.
2	DeviceRevision	Hardware revision of the device (e.g. C3).
2	HardwareRevision	
2	Manufacturer	Manufacturer of the device: B&R Industrial Automation GmbH
2	Model	Order number of the device, e.g. 6PMT50.101E-19B.
3	ProductCode	B&R ID code (see technical data of the device).
2	RevisionCounter	Value: -1 (reserved, not in use)
2	SerialNumber	Serial number of the device (see label on the back of the device).
2	SoftwareRevision	Software version of the PPT system: e.g. 1.2.0
3	VendorId	Vendor code, for customized models.

8.5.1.6 Alternative paths of nodes

The nodes listed in previous section "Information model" are also available via other paths. This alternative structure organizes the nodes in sections " ParameterSet", " MethodSet" and "Device properties" into logical function groups. The detailed description of the nodes in this section is organized according to this logical structure.

8.5.2 Description of the nodes of the information model

8.5.2.1 Alternative paths of nodes

The nodes listed in previous section "Information model" are also available via other paths. This alternative structure organizes the nodes in sections " ParameterSet", " MethodSet" and "Device properties" into logical function groups. The detailed description of the nodes in this section is organized according to this logical structure.

8.5.2.2 Diagnostics

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Diagnostics

ns	BrowseName of the information	Description	R	W
4	CPUCore0Usage	CPU utilization of core 0 (percent).	+	
4	CPUCore1Usage	CPU utilization of core 1 (percent).	+	
4	CPUUsage	CPU utilization of all cores (percent).	+	
4	MemoryAvailable	Available RAM in MB.	+	
4	MemoryTotal	Entire RAM of system in MB.	+	

8.5.2.2.1 CPUCore0Usage

CPU utilization of core 0 (percent).

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:CPUCore0Usage
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Diagnostics/4:CPUCore0Usage

Node attributes

NodeClass	Variable
DataType	Byte
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.2.2 CPUCore1Usage

CPU utilization of core 1 (percent).

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:CPUCore1Usage
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Diagnostics/4:CPUCore1Usage

Node attributes

NodeClass	Variable
DataType	Byte
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.2.3 CPUUsage

CPU utilization of all cores (percent).

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:CPUUsage
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Diagnostics/4:CPUUsage

Node attributes

NodeClass	Variable
DataType	Byte
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.2.4 MemoryAvailable

Available RAM in MB.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:MemoryAvailable
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Diagnostics/4:MemoryAvailable

Node attributes

NodeClass	Variable
DataType	UInt16
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.2.5 MemoryTotal

Entire RAM of system in MB.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:MemoryTotal
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Diagnostics/4:MemoryTotal

Node attributes

NodeClass	Variable
DataType	UInt16
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.3 Configuration

All parameters for configuring the device are located under node *Configuration*.

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration

8.5.2.3.1 Audio

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Audio

ns	BrowseName of the parameter	Description	Service page	R	W
4	EnableBuzzer	Enables/Disables the buzzer.	Audio	+	+
	BuzzerSource	Selects the trigger for the buzzer.		+	+
	BuzzerFrequency	Frequency of the buzzer.		+	+
	BuzzerDuration	Duration of the buzzer.		+	+

8.5.2.3.1.1 EnableBuzzer

Function identical to: Service page Audio → "Buzzer" on page 52

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:EnableBuzzer
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Audio/4:EnableBuzzer

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.1.2 BuzzerSource

Function identical to: Service page Audio → "Buzzer source" on page 52

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:BuzzerSource
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Audio/4:BuzzerSource

Node attributes

NodeClass	Variable
DataType	BrBuzzerSource (Enumeration)
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

Data type *BrBuzzerSource* (enumeration)

Value	String
0	App
1	Touch

8.5.2.3.1.3 BuzzerFrequency

Function identical to: Service page Audio → "Buzzer frequency" on page 52

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:BuzzerFrequency
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Audio/4:BuzzerFrequency

Node attributes

NodeClass	Variable
DataType	UInt16
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.1.4 BuzzerDuration

Function identical to: Service page Audio → "Buzzer duration" on page 52

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:BuzzerDuration
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Audio/4:BuzzerDuration

Node attributes

NodeClass	Variable
DataType	UInt16
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.2 Gesture

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Gesture

ns	BrowseName of the parameter	Description	Service page	R	W
4	OpenServicePage	Configures opening the service page with a gesture.	Gesture	+	+

8.5.2.3.2.1 OpenServicePage

Description

Function identical to: Service page Gesture → "Open service page" on page 53

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:OpenServicePage
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Gesture/4:OpenServicePage

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.3 Network

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Network

ns	BrowseName of the parameter	Description	Service page	R	W
4	Hostname	Hostname of the Power Panel.	Network	+	+
	NetworkMode	Network mode: DHCPClient or StaticIP. Setting corresponds to option *DHCP* on service page *Network*.		+	+
	ActivateDNS	Enables DNS usage.		+	+
	DNSSuffix	DNS suffix for the fully qualified domain name (FQDN).		+	+
	GetDNSFromDHCP	Enables/Disables obtaining IP addresses of the DNS servers from DHCP.		+	+
	PrimaryDNS	Address of the first DNS server.		+	+
	SecondaryDNS	Address of the second DNS server.		+	+
	TertiaryDNS	Address of the third DNS server.		+	+
	IpAddress	Static IP address of the Power Panel.		+	+
	SubnetMask	Subnet mask.		+	+
	DefaultGateway	IP address of the default gateway.		+	+

8.5.2.3.3.1 Hostname

Function identical to: Service page Network → "Hostname" on page 45

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:Hostname
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Network/4:Hostname

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.3.2 NetworkMode

Function identical to: Service page Network → "DHCP" on page 46

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:NetworkMode
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Network/4:NetworkMode

Node attributes

NodeClass	Variable
DataType	BrNetMode (Enumeration)
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

Data type *BrNetMode* (enumeration)

Value	String
0	DHCPClient
1	StaticIP

8.5.2.3.3.3 ActivateDNS

Function identical to: Service page Network → Activate DNS

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:ActivateDNS
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Network/4:ActivateDNS

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.3.4 DNSSuffix

Function identical to: Service page Network → "DNS suffix" on page 46

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:DNSSuffix
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Network/4:DNSSuffix

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.3.5 GetDNSFromDHCP

Function identical to: Service page Network → "Get DNS from DHCP server" on page 47

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:GetDNSFromDHCP
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Network/4:GetDNSFromDHCP

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.3.6 PrimaryDNS / SecondaryDNS / TertiaryDNS

Function identical to:
Service page Network → "Primary DNS server / Secondary DNS server / Tertiary DNS server" on page 47

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:PrimaryDNS
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:SecondaryDNS
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:TertiaryDNS
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Network/4:PrimaryDNS
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Network/4:SecondaryDNS
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Network/4:TertiaryDNS

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.3.7 IpAddress

Function identical to: Service page Network → "IP address" on page 48

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:IpAddress
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Network/4:IpAddress

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.3.8 SubnetMask

Function identical to: Service page Network → "Subnet mask / Default gateway" on page 48

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:SubnetMask
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Network/4:SubnetMask

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.3.9 DefaultGateway

Function identical to: Service page Network → "Subnet mask / Default gateway" on page 48

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:DefaultGateway
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Network/4:DefaultGateway

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.4 RemoteAccess

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:RemoteAccess

ns	BrowseName of the parameter	Description	Service page	R	W
4	EnableRemoteAccess	Enables/Disables remote access.	Remote access	+	+
	RemoteAccessBackEnd	Selects which technology is used for remote access.		+	+
	RemoteAccessModeWebGL	Selects the WebGL remote access operating mode.		+	+
	RemoteAccessPortWebGL	Network port for WebGL remote access.		+	+
	RemoteAccessWSPortWebGL	Network port for WebSocket communication with WebGL remote access.		+	+
	RemoteAccessModeVNC	Selects the VNC remote access operating mode.		+	+
	RemoteAccessPortVNC	Network port for VNC remote access.		+	+

Changed parameter names starting with PPT system version 1.6.0

The mode and port settings for VNC and WebGL can be set separately starting with this PPT system version:

	PPT system version	
Parameter name	<1.6.0	≥1.6.0
RemoteAccessMode	x	
RemoteAccessModeWebGL		x
RemoteAccessModeVNC		x
RemoteAccessPort	x	
RemoteAccessPortWebGL		x
RemoteAccessWSPortWebGL		x
RemoteAccessPortVNC		x

8.5.2.3.4.1 EnableRemoteAccess

Function identical to: Service page Remote Access → "Remote access" on page 72

Setting EnableRemoteAccess only has an effect after the configuration is loaded with LoadConfiguration. In contrast, StartRemoteAccess and StopRemoteAccess can be used to enable or disable remote access immediately.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:EnableRemoteAccess
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:RemoteAccess/4:EnableRemoteAccess

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.4.2 RemoteAccessBackEnd

Function identical to: Service page Remote Access → "Back end" on page 72

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:RemoteAccessBackEnd
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:RemoteAccess/4:RemoteAccessBackEnd

Node attributes

NodeClass	Variable
DataType	BrRemoteAccessBackEnd (Enumeration)
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

Data type *BrRemoteAccessBackEnd* (enumeration)

Value	String
0	WebGL
1	VNC

8.5.2.3.4.3 RemoteAccessModeWebGL

Function identical to: Service page Remote Access → "Mode" on page 73

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:RemoteAccessModeWebGL
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:RemoteAccess/4:RemoteAccessModeWebGL

Node attributes

NodeClass	Variable
DataType	BrRemoteAccessMode (Enumeration)
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

Data type *BrRemoteAccessMode* (enumeration)

Value	String
0	View
1	Control

8.5.2.3.4.4 RemoteAccessPortWebGL

Function identical to: Service page Remote Access → "Back end port" on page 72

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:RemoteAccessPortWebGL
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:RemoteAccess/4:RemoteAccessPortWebGL

Node attributes

NodeClass	Variable
DataType	UInt16
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.4.5 RemoteAccessWSPortWebGL

Function identical to: Service page Remote Access → "Back end WebSocket port" on page 73

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:RemoteAccessWSPortWebGL
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:RemoteAccess/4:RemoteAccessWSPortWebGL

Node attributes

NodeClass	Variable
DataType	UInt16
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.4.6 RemoteAccessModeVNC

Function identical to: Service page Remote Access → "Mode" on page 73

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:RemoteAccessModeVNC
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:RemoteAccess/4:RemoteAccessModeVNC

Node attributes

NodeClass	Variable
DataType	BrRemoteAccessMode (Enumeration)
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

Data type *BrRemoteAccessMode* (enumeration)

Value	String
0	View
1	Control

8.5.2.3.4.7 RemoteAccessPortVNC

Function identical to: Service page Remote Access → "Back end port" on page 72

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:RemoteAccessPortVNC
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:RemoteAccess/4:RemoteAccessPortVNC

Node attributes

NodeClass	Variable
DataType	UInt16
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.5 Screen

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Screen

ns	BrowseName of the parameter	Description	Service page	R	W
4	DisplayBrightness	Screen brightness.	Screen	+	+
	ScreenRotation	Angle of rotation of the display.		+	+
	EnableScreensaver	Enables/Disables the screensaver.		+	+
	ScreensaverIdleTime	Time without touch activity after which the screensaver is displayed.		+	+
	ScreensaverType	Screensaver mode.		+	+
	BootAnimationDelay	Delay in milliseconds between frames of the GIF animation.		+	+
	BootAnimationLeftPos	Defines the distance of an existing boot animation to the left edge of the display.		+	+
	BootAnimationTopPos	Defines the distance of an existing boot animation to the right edge of the display.		+	+

8.5.2.3.5.1 DisplayBrightness

Function identical to: Service page Screen → "Display brightness" on page 50

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:DisplayBrightness
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Screen/4:DisplayBrightness

Node attributes

NodeClass	Variable
DataType	Byte
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.5.2 ScreenRotation

Function identical to: Service page Screen → "Screen rotation" on page 50

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:ScreenRotation
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Screen/4:SceenRotation

Node attributes

NodeClass	Variable
DataType	BrRotation (Enumeration)
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

Data type *BrRotation* (enumeration)

Value	String
0	0
1	90
2	180
3	270

8.5.2.3.5.3 EnableScreensaver

Function identical to: Service page Screen → "Screensaver" on page 50

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:EnableScreensaver
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Screen/4:EnableScreensaver

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.5.4 ScreensaverIdleTime

Function identical to: Service page Screen → "Start screensaver after" on page 51

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:ScreensaverIdleTime
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Screen/4:ScreensaverIdleTime

Node attributes

NodeClass	Variable
DataType	UInt16
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.5.5 ScreensaverType

Function identical to: Service page Screen → "Screensaver type" on page 51

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:ScreensaverType
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Screen/4:ScreensaverType

Node attributes

NodeClass	Variable
DataType	BrScreensaver (Enumeration)
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

Data type *BrScreensaver* (enumeration)

Value	String
0	Black
1	BacklightOff

8.5.2.3.5.6 BootAnimationTopPos

Function identical to: Service page Screen → "Settings for the boot animation" on page 51

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:BootAnimationTopPos
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Screen/4:BootAnimationTopPos

Node attributes

NodeClass	Variable
DataType	UInt16
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.5.7 BootAnimationLeftPos

Function identical to: Service page Screen → "Settings for the boot animation" on page 51

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:BootAnimationLeftPos
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Screen/4:BootAnimationLeftPos

Node attributes

NodeClass	Variable
DataType	UInt16
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.5.8 BootAnimationDelay

Function identical to: Service page Screen → "Settings for the boot animation" on page 51

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:BootAnimationDelay
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Screen/4:BootAnimationDelay

Node attributes

NodeClass	Variable
DataType	UInt16
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.6 Startup

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Startup

ns	BrowseName of the parameter	Description	Service page	R	W
4	StartMode	Power Panel start mode: ServicePage, VNC or Web.	Startup	+	+
	ShowBootLogoVNC	Enables/Disables the boot logo or boot animation of the system while connecting to the VNC server.		+	+
	ShowBootLogoWeb	Enables/Disables the boot logo or boot animation of the system while connecting to the web server.		+	+

8.5.2.3.6.1 StartMode

Function identical to: Service page Startup → "Start mode" on page 44

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:StartMode
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Startup/4:StartMode

Node attributes

NodeClass	Variable
DataType	BrStartMode (Enumeration)
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

Data type *BrStartMode* (enumeration)

Value	String
0	ServicePage
1	VNC
2	Web

8.5.2.3.6.2 ShowBootLogoVNC / ShowBootLogoWeb

Function identical to: Service page Startup → "Boot logo or boot animation" on page 45

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:ShowBootLogoVNC
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:ShowBootLogoWeb
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Startup/4:ShowBootLogoVNC
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Startup/4:ShowBootLogoWeb

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.7 Storage

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Storage

ns	BrowseName of the parameter	Description	Service page	R	W
4	USBMemoryShare	Enables/Disables network sharing to the connected USB storage medium.	Storage	+	+
	UserMemoryShare	Enables/Disables network sharing to internal user memory.		+	+

8.5.2.3.7.1 USBMemoryShare / UserMemoryShare

Function identical to: Options on "Service page Storage" on page 61

- USBMemoryShare → Option *Allow access to USB memory via network*
- UserMemoryShare → Option *Allow access to user memory via network*

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:USBMemoryShare
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:UserMemoryShare
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Storage/4:USBMemoryShare
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Storage/4:UserMemoryShare

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.8 Time

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Time

ns	BrowseName of the parameter	Description	Service page	R	W
4	EnableNTPClient	Enables/Disables the NTP client for time synchronization.	Time	+	+
	NTPServer1	Address of an NTP server.		+	+

8.5.2.3.8.1 EnableNTPClient

Function identical to: Service page Time → "NTP client" on page 49

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:EnableNTPClient
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Time/4:EnableNTPClient

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.8.2 NTPServer1

Function identical to: Service page Time → NTPServer1

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:NTPServer1
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Time/4:NTPServer1

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.9 Vnc

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Vnc

ns	BrowseName of the parameter	Description	Service page	R	W
4	VNCServer	Address of the VNC server.	VNC	+	+
	UseRfbExtension	Enables/Disables the RFB extension in VNC mode.		+	+
	VNCConnectionMonitor	Enables/Disables monitoring of the connection to the VNC server.		+	+
	VNCLocalWindowScaling	Enables/Disables automatic scaling of the HMI application in VNC mode.		+	+
	VNCBackgroundColor	Changes the background color of the VNC client.		+	+

8.5.2.3.9.1 VNCServer

Function identical to: Service page VNC → "Server" on page 54

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:VNCServer
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Vnc/4:VNCServer

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.9.2 UseRfbExtension

Function identical to: Service page VNC → "Use RFB extension" on page 55

Note: The system will not accept options UseRfbExtension and VNCConnectionMonitor both simultaneously set to *true*. After the changes are saved with method SaveConfiguration, option VNCConnectionMonitor will be automatically set to *false* in such a case.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:UseRfbExtension
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Vnc/4:UseRfbExtension

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.9.3 VNCConnectionMonitor

Function identical to: Service page VNC → "Enable connection monitor" on page 55

Note: The system will not accept options UseRfbExtension and VNCConnectionMonitor both simultaneously set to *true*. After the changes are saved with method SaveConfiguration, option VNCConnectionMonitor will be automatically set to *false* in such a case.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:VNCConnectionMonitor
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Vnc/4:VNCConnectionMonitor

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.9.4 VNCLocalWindowScaling

Function identical to: Service page VNC → "Enable local window scaling" on page 55

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:VNCLocalWindowScaling
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Vnc/4:VNCLocalWindowScaling

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.9.5 VNCBackgroundColor

Function identical to: Service page VNC → "Background color" on page 56

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:VNCBackgroundColor
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Vnc/4:VNCBackgroundColor

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.10 Web

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Web

ns	BrowseName of the parameter	Description	Service page	R	W
4	WebServer	Address of the web server.	Web	+	+
	VirtualKeyboardWeb	Enables/Disables the on-screen keyboard in web mode.		+	+
	DisablePinchGesture	The two-finger gesture (pinch-to-zoom) for zooming the browser content is disabled. Zooming the entire HMI application is prevented.		+	+
	SetOverrideViewport	Enables/Disables viewport settings.		+	+
	ViewportSettings	Viewport settings.		+	+
	IgnoreServerCertificateErrors	Enables/Disables warnings regarding server certificates.		+	+
	EnableScreenCapture	Enables/Disables the screen capture API.		+	+
	SuppressScrnCaptSecWarn	Enables/Disables the security warning when the screen capture is started.		+	+

8.5.2.3.10.1 WebServer

Function identical to: Service page Web → "Server" on page 57

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:WebServer
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Web/4:WebServer

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.10.2 VirtualKeyboardWeb

Function identical to: Service page Web → "Virtual keyboard" on page 58

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:VirtualKeyboardWeb
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Web/4:VirtualKeyboardWeb

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.10.3 DisablePinchGesture

Function identical to: Service page Web → "Disable pinch gesture" on page 58

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:DisablePinchGesture
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Web/4:DisablePinchGesture

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.10.4 SetOverrideViewport

Function identical to: Service page Web → "Set/Override viewport settings" on page 59

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:SetOverrideViewport
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Web/4:SetOverrideViewport

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.10.5 ViewportSettings

Function identical to: Service page Web → "Viewport settings" on page 59

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:ViewportSettings
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Web/4:ViewportSettings

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.10.6 IgnoreServerCertificateErrors

Function identical to: Service page Web → "Ignore server certificate errors" on page 58

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:IgnoreServerCertificateErrors
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Web/4:IgnoreServerCertificateErrors

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.10.7 EnableScreenCapture

Function identical to: Service page Web → "Enable Screen Capture" on page 60

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:EnableScreenCapture
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Web/4:EnableScreenCapture

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.3.10.8 SuppressScrnCaptSecWarn

Function identical to: Service page Web → "Suppress Screen Capture security warning" on page 60

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:SuppressScrnCaptSecWarn
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Configuration/4:Web/4:SuppressScrnCaptSecWarn

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.4 Control

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control

ns	BrowseName of the method	Description
4	AwakePanel	"Wakes up" the Power Panel if the screensaver is running.
	BuzzerDefault	Plays the signal tone with the system settings.
	BuzzerWithPara	Plays the buzzer with the specified parameters.
	LoadConfiguration	The Power Panel loads the last saved settings and restarts. Any changes made to the parameters are not saved and will be lost.
	SaveConfiguration	Saves changes made to the parameters. Method *LoadConfiguration* must be used in order for these saved settings to be enabled on the Power Panel.
	SetBrightness	Changes screen brightness in the range from 20% to 100%.
	SetBrightnessUnlimited	Changes screen brightness in the range from 0% to 100%.
	SetTime	Sets the date and/or time of the device.
	StartUpdate	Reboots the Power Panel and starts the update process.
	StartRemoteAccess	Enables remote access with immediate effect.
	StopRemoteAccess	Disables remote access with immediate effect.

8.5.2.4.1 AwakePanel

"Wakes up" the Power Panel if the screensaver is running.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:MethodSet/4:AwakePanel
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:AwakePanel

Arguments for a method call

Arguments	-

8.5.2.4.2 BuzzerDefault

Plays the signal tone with the system settings.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:MethodSet/4:BuzzerDefault
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:BuzzerDefault

Arguments for a method call

Arguments	-

8.5.2.4.3 BuzzerWithPara

Plays the buzzer with the specified parameters.

See arguments for the method call.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:MethodSet/4:BuzzerWithPara
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:BuzzerWithPara

Arguments for a method call

Argument	Data type	Name	Description
0	UInt32	Frequency	Frequency of the buzzer in hertz [Hz].
1	UInt32	Duration	Duration of the buzzer in milliseconds [ms].

8.5.2.4.4 LoadConfiguration

The Power Panel loads the last saved settings and restarts. Any changes made to the parameters are not saved and will be lost.

Function identical to: Service page Save & Exit → Exit without saving (button)

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:MethodSet/4:LoadConfiguration
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:LoadConfiguration

Arguments for a method call

Arguments	-

8.5.2.4.5 SaveConfiguration

Saves changes made to the parameters. Method *LoadConfiguration* must be used in order for these saved settings to be enabled on the Power Panel.

Function identical to: Service page Save & Exit → Save changes (button)

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:MethodSet/4:SaveConfiguration
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:SaveConfiguration

Arguments for a method call

Arguments	-

8.5.2.4.6 SetBrightness

Changes screen brightness in the range from 20% to 100%.

See arguments for the method call.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:MethodSet/4:SetBrightness
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:SetBrightness

Arguments for a method call

Argument	Data type	Name	Description	
0	UInt32	Brightness	Brightness in percent [%].	
			Range of values:	0 - 100
			Scaling	0 → 20% to 100 → 100%

8.5.2.4.7 SetBrightnessUnlimited

Changes screen brightness in the range from 0% to 100%.

See arguments for the method call.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:MethodSet/4:SetBrightnessUnlimited
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:SetBrightnessUnlimited

Arguments for a method call

Argument	Data type	Name	Description	
0	UInt32	BrightnessUnlimited	Brightness in percent [%]. Values >100 are limited to 100.	
			Range of values	0 - 100
			Scaling	No scaling: 0 → 0% to 100 → 100%

8.5.2.4.8 SetTime

Sets the date and/or time of the device.

See arguments for the method call.

> **Information:**
>
> **This method only works if automatic NTP time synchronization is disabled (see "Service page Time" on page 49).**

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:MethodSet/4:SetTime
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:SetTime

Arguments for a method call

Argument	Data type	Name	Description	
0	String	Time	Date and/or time for setting the internal clock. The following string formats are allowed:	
			Valid formats	**Description**
			2018-10-19 15:45	Sets the date and time. Seconds are set to 0.
			2018-10-19	Sets the date. The time remains unchanged.
			15:45	Sets the time. Seconds are set to 0. The date remains unchanged.

8.5.2.4.9 StartUpdate

Reboots the Power Panel and starts the update process.

Function identical to: Service page Update → Update settings / boot logo / system (button)

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:MethodSet/4:StartUpdate
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:StartUpdate

Arguments for a method call

Arguments	-

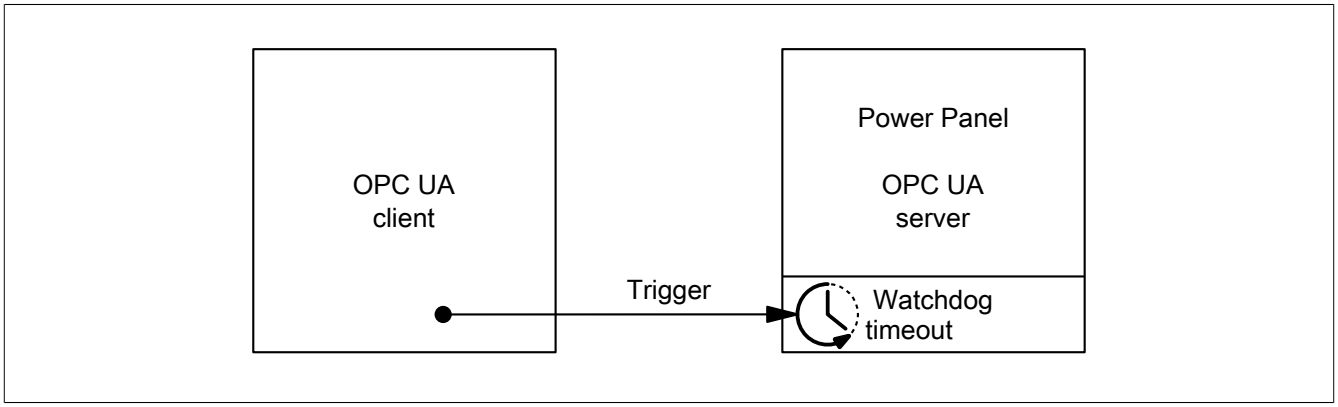
8.5.2.4.10 Control/ConnectionWatchdog

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:ConnectionWatchdog

ns	BrowseName of the method	Description	R	W
4	ConnectionWatchdogTimeout	This parameter defines the period for the watchdog timeout or disables the watchdog function.	+	+
	ConnectionWatchdogTrigger	This parameter is used firstly to enable the watchdog and secondly to trigger it.	+	+

8.5.2.4.10.1 ConnectionWatchdog - Function description



When ConnectionWatchdog is active, the OPC UA client must send a trigger signal to the Power Panel within the timeout period. If the Power Panel does not receive a trigger signal within the defined timeout period, all LEDs on the Power Panel are disabled.

8.5.2.4.10.2 ConnectionWatchdogTimeout

This parameter defines the period for the watchdog timeout or disables the watchdog function.

The following values are valid for ConnectionWatchdogTimeout:

Value [ms]	Description
0	This value immediately disables the watchdog.
500 to 10000	Timeout period in milliseconds. The client must set parameter ConnectionWatchdogTrigger to value "true" within the time defined here if the watchdog is active.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:ConnectionWatchdogTimeout
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:ConnectionWatchdog/4:ConnectionWatchdogTimeout

Node attributes

NodeClass	Variable
DataType	UInt16
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.4.10.3 ConnectionWatchdogTrigger

This parameter is used firstly to enable the watchdog and secondly to trigger it.

The following values are valid for ConnectionWatchdogTrigger:

Value	Description
true	If the watchdog is not active, the watchdog is started with the value from ConnectionWatchdogTimeout.
	If the watchdog is active, the watchdog is restarted with the value from ConnectionWatchdogTimeout.
false	No function.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:ConnectionWatchdogTrigger
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:ConnectionWatchdog/4:ConnectionWatchdogTrigger

Node attributes

NodeClass	Variable
DataType	Boolean
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite

8.5.2.4.11 StartRemoteAccess

Enables remote access with immediate effect.

This method is independent of setting EnableRemoteAccess.

Additional information about remote access: Service page Remote Access → Remote access

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:MethodSet/4:StartRemoteAccess
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:StartRemoteAccess

Arguments for a method call

Arguments	-

8.5.2.4.12 StopRemoteAccess

Disables remote access with immediate effect.

This method is independent of setting EnableRemoteAccess.

Additional information about remote access: Service page Remote Access → Remote access

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:MethodSet/4:StopRemoteAccess
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Control/4:StopRemoteAccess

Arguments for a method call

Arguments	-

8.5.2.5 ProcessData

Digital inputs and outputs of the Power Panel.

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ProcessData

ns	BrowseName of the parameter	Description	R	W
4	DI[##]	Digital input 00	+	+
		Digital input 01	+	+
		Digital input 02	+	+
		Digital input 03	+	+
		Digital input 04	+	+
		Digital input 05	+	+
		Digital input 06	+	+
		Digital input 07	+	+
	DO[##]	Digital output 00	+	+
		Digital output 01	+	+
		Digital output 02	+	+
		Digital output 03	+	+

8.5.2.5.1 DI[##][9)]

This parameter allows settings to be made with regard to the digital inputs.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:DI[##]
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ProcessData/4:DI[##]

Node attributes

NodeClass	Variable			
DataType	BrDigitalIn			
	Field	**DataType**	**AccessLevel**	**UserAccessLevel**
	Input	Boolean	CurrentRead	CurrentRead
	EdgeCounter	UInt16	CurrentRead	CurrentRead
	Keycode	String	CurrentRead, CurrentWrite	CurrentRead, CurrentWrite
	Modifier Keycode	String	CurrentRead, CurrentWrite	CurrentRead, CurrentWrite
	Audiosignal	Boolean	CurrentRead, CurrentWrite	CurrentRead, CurrentWrite

9) Available, digital inputs: DI00 to DI07

8.5.2.5.2 DO[##][10)]

This parameter allows settings to be made with regard to the digital outputs.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:DO[##]
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ProcessData/4:DO[##]

Node attributes

NodeClass	Variable			
DataType	BrDigitalOut			
	Field	**DataType**	**AccessLevel**	**UserAccessLevel**
	Output	Boolean	CurrentRead, CurrentWrite	CurrentRead, CurrentWrite
	ReadBack	Boolean	CurrentRead	CurrentRead
	Error	Boolean	CurrentRead	CurrentRead
	ErrorClear	Boolean	CurrentRead, CurrentWrite	CurrentRead, CurrentWrite

[10)] Available digital outputs: DO00 to DO03

8.5.2.6 Status

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Status

ns	BrowseName of the parameter	Description	Service page	R	W
4	Temperature0	Temperature of the CPU housing: See Temperature monitoring.	About & Info	+	
	Temperature1	Inner temperature of the Power Panel: See "Temperature monitoring" on page 84.		+	
	USBFlashDrive0	Indicates whether a USB flash drive is connected.		+	
	USBFlashDrive1	Indicates whether a USB flash drive is connected to IF4.		+	

8.5.2.6.1 Temperature0

Temperature of the CPU housing: See Temperature monitoring.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:Temperature0
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Status/4:Temperature0

Node attributes

NodeClass	Variable
DataType	Float
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.6.2 Temperature1

Inner temperature of the Power Panel: See "Temperature monitoring" on page 84.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:Temperature1
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Status/4:Temperature1

Node attributes

NodeClass	Variable
DataType	Float
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.6.3 USBFlashDrive0

Indicates whether a USB flash drive is connected.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:USBFlashDrive0
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Status/4:USBFlashDrive0

Node attributes

NodeClass	Variable
DataType	BrUSBFlashDriveState (Enumeration)
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

Data type *BrUSBFlashDriveState* (enumeration)

Value	String
0	UNPLUGGED
1	PLUGGED

8.5.2.6.4 USBFlashDrive1

Indicates whether a USB flash drive is connected to IF4.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:USBFlashDrive1
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:Status/4:USBFlashDrive1

Node attributes

NodeClass	Variable
DataType	BrUSBFlashDriveState (Enumeration)
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

Data type *BrUSBFlashDriveState* (enumeration)

Value	String
0	UNPLUGGED
1	PLUGGED

8.5.2.7 UserInterface

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:UserInterface

ns	BrowseName of the parameter	Description	R	W
4	RGBLed00	Parameter for setting the color of the front LED.	+	+
	RGBLed01	Parameter for setting the color of the front LED.	+	+
	RGBLed02	Parameter for setting the color of the front LED.	+	+

8.5.2.7.1 RGBLed00, RGBLed01, RGBLed02

This parameter sets the color of the LED on the front of the terminal.

Colors	Description
Blue	0 to 255
Green	0 to 255
Red	0 to 255

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:RGBLed00 /0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:RGBLed01 /0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:RGBLed02
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:UserInterface/4:RGBLed00 /0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:UserInterface/4:RGBLed01 /0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:UserInterface/4:RGBLed02

Node attributes

NodeClass	Variable	
DataType	BrRGBLed (Structure)	
	Field	**DataType**
	Red	Byte
	Green	Byte
	Blue	Byte
AccessLevel	CurrentRead, CurrentWrite	
UserAccessLevel	CurrentRead, CurrentWrite	

8.5.2.7.2 RGBLed01

This parameter sets the color of the LED on the front of the terminal.

Colors	Description
Blue	0 to 255
Green	0 to 255
Red	0 to 255

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:RGBLed00
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:UserInterface/4:RGBLed00

Node attributes

NodeClass	Variable	
DataType	BrRGBLed (Structure)	
	Field	**DataType**
	Red	Byte
	Green	Byte
	Blue	Byte
AccessLevel	CurrentRead, CurrentWrite	
UserAccessLevel	CurrentRead, CurrentWrite	

8.5.2.7.3 RGBLed02

This parameter sets the color of the LED on the front of the terminal.

Colors	Description
Blue	0 to 255
Green	0 to 255
Red	0 to 255

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:ParameterSet/4:RGBLed00
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:UserInterface/4:RGBLed00

Node attributes

NodeClass	Variable	
DataType	BrRGBLed (Structure)	
	Field	**DataType**
	Red	Byte
	Green	Byte
	Blue	Byte
AccessLevel	CurrentRead, CurrentWrite	
UserAccessLevel	CurrentRead, CurrentWrite	

8.5.2.8 Identification

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Identification

ns	BrowseName of the information	Description
3	CompatibilityId	ID to indicate compatibility.
2	DeviceRevision	Hardware revision of the device (e.g. C3).
2	HardwareRevision	
2	Manufacturer	Manufacturer of the device: B&R Industrial Automation GmbH
2	Model	Order number of the device, e.g. 6PMT50.101E-19B.
3	ProductCode	B&R ID code (see technical data of the device).
2	RevisionCounter	Value: -1 (reserved, not in use)
2	SerialNumber	Serial number of the device (see label on the back of the device).
2	SoftwareRevision	Software version of the PPT system: e.g. 1.2.0
3	VendorId	Vendor code, for customized models.

8.5.2.8.1 CompatibilityId

ID to indicate compatibility.

A future version of the device could be equipped with different technology. Although the module name and functionality of the device are identical to the previous version, the firmware may not be compatible, for example. In this case, the device reports a new *CompatibilityId*.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:CompatibilityId
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Identification/3:CompatibilityId

Node attributes

NodeClass	Variable
DataType	UInt32
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.8.2 DeviceRevision

Hardware revision of the device (e.g. C3).

The value of *DeviceRevision* is identical to the value of *HardwareRevision* .

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:DeviceRevision
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Identification/2:DeviceRevision

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.8.3 HardwareRevision

Hardware revision of the device (e.g. C3).

The value of *HardwareRevision* is identical to the value of *DeviceRevision* .

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:HardwareRevision
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Identification/2:HardwareRevision

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.8.4 Manufacturer

Manufacturer of the device: B&R Industrial Automation GmbH

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Manufacturer
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Identification/2:Manufacturer

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.8.5 Model

Order number of the device, e.g. 6PMT50.101E-19B.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Model
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Identification/2:Model

Node attributes

NodeClass	Variable
DataType	LocalizedText
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.8.6 ProductCode

B&R ID code (see technical data of the device).

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:ProductCode
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Identification/3:ProductCode

Node attributes

NodeClass	Variable
DataType	UInt32
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.8.7 RevisionCounter

Value: -1 (reserved, not in use)

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:RevisionCounter
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Identification/2:RevisionCounter

Node attributes

NodeClass	Variable
DataType	Int32
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.8.8 SerialNumber

Serial number of the device (see label on the back of the device).

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:SerialNumber
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Identification/2:SerialNumber

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.8.9 SoftwareRevision

Software version of the PPT system: e.g. 1.2.0

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:SoftwareRevision
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Identification/2:SoftwareRevision

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.8.10 VendorId

Vendor code, for customized models.

VendorId	Description
0	B&R
1	B&R
≥2	Customer ID

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/3:VendorId
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Identification/3:VendorId

Node attributes

NodeClass	Variable
DataType	UInt32
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.9 Other device properties

The following device properties are not available within group *Identification*.

Path to the object dictionary:

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50

ns	BrowseName of the information	Description
2	DeviceManual	Link to the website: The user's manual is located in the Downloads section.

8.5.2.9.1 Manufacturer

Manufacturer of the device: B&R Industrial Automation GmbH

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Manufacturer
Alternative path (function group):
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:Identification/2:Manufacturer

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

8.5.2.9.2 DeviceManual

Link to the website: The user's manual is available in the Downloads section.

Path to the node (BrowsePath)

Path:
/0:Root/0:Objects/2:DeviceSet/4:PowerPanelMT50/2:DeviceManual

Device property *DeviceManual* is only available as a property of node PowerPanelMT50.

Node attributes

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

9 Maintenance

The following chapter describes the maintenance work that can be carried out by a qualified and trained end user.

> **Information:**
>
> **Only components approved by B&R are permitted to be used for maintenance work.**

9.1 User tips for increasing the display's service life

Pixel errors

> **Information:**
>
> **Displays can contain faulty pixels (pixel errors) due to the manufacturing process. They are not grounds for initiating a complaint or warranty claim.**

9.1.1 Backlight

The service life of the backlight is specified by its "half-brightness time". An operating time of 50,000 hours would mean that the display brightness would still be 50% after this time.

9.1.1.1 Measures to maintain backlight service life

- The display brightness can be set to the lowest level that is comfortable for the user's eyes.
- Bright images should be avoided as far as possible.
- A 50% reduction in brightness can increase the half-brightness time by about 50%.

9.1.2 Screen burn-in

Image persistence refers to the "burning in" of a static image on a display after being displayed for a long time. It does not only occur with static images, however. Image persistence is also referred to in the technical literature as screen burn-in, image retention, memory effect, memory sticking or ghost image.

There are 2 different types:

- Area type: This type can be seen in a dark gray image. The effect disappears if the display is switched off for a long time.
- Line type: This can result in permanent damage.

What causes image persistence?

- Static images
- No screensaver
- Sharp transitions in contrast (e.g. black/white)
- High ambient temperatures
- Operation outside of specifications

How can image persistence be reduced?

- Switch continuously between static and dynamic images.
- Prevent excessive differences in brightness between foreground and background elements.
- Use colors with similar brightness.
- Use complementary colors for subsequent images.
- Use screensavers.

10 Accessories

The following accessories have undergone functional testing by B&R in connection with the device used and can be operated with this device. Possible limitations regarding operation with individual components other than the complete system must be taken into account, however. All individual specifications of the components must be observed when operating the complete system.

All components listed in this manual have undergone intensive system and compatibility testing and been approved accordingly. B&R cannot assume any functional warranty for accessories that have not been approved.

10.1 Overview

Model number	Product ID
RAM brackets	
6PM.AC.RAM-001	RAM installation set 1 inch
6PM.AC.RAM-002	RAM installation set 1.5 inch
Cables and connectors	
6PMCAT50.02-00	MT50, 2 m wiring harness
6PMTBT50.01-00	Set of connectors and pins
X67CA0E41.xxxx	Ethernet attachment cable, RJ45 and straight M12 connector
X67CA3E41.xxxx	ETH connection cable RJ45-M12, drag chain, 15 m
X67CA0E61.xxxx	Ethernet connection cable, straight M12 connector and straight M12 connector
X67AC2E01	X67 connector, M12, 4-pin, D-coded, shielded, insulation piercing connection
Installation sets	
6PM.AC.PAN-050	MT50 5" installation set
6PM.AC.PAN-070	MT50 7" installation set
6PM.AC.PAN-101	MT50 10" installation set
X67ACTQMX	Torque wrench set, for hexagonal connectors (M8 and M12)
Brackets	
6PM.AC.CLP-100	100x retaining clips with torque limiting
USB accessories	
5MMUSB.2048-01	USB 2.0 flash drive, 2048 MB, B&R
5MMUSB.4096-01	USB 2.0 flash drive, 4096 MB, B&R
0TGF016.01	Technology Guard (MSD), flash drive, 16 GB

10.2 RAM bracket

10.2.1 Order data

Order number	Short description	Figure
	Brackets	
6PM.AC.RAM-001	RAM installation set 1 inch B-ball, diamond plate for panel, including screws, short connecting arm, round base plate, suitable for T50 mobile 5", 7"	
6PM.AC.RAM-002	RAM installation set 1.5 inch, C-ball, diamond plate for panel, including screws, medium connecting arm, round base plate, suitable for T50 mobile 5", 7", 10.1"	

Table 9: 6PM.AC.RAM-001, 6PM.AC.RAM-002 - Order data

10.2.2 Content of delivery

6PM.AC.RAM-001

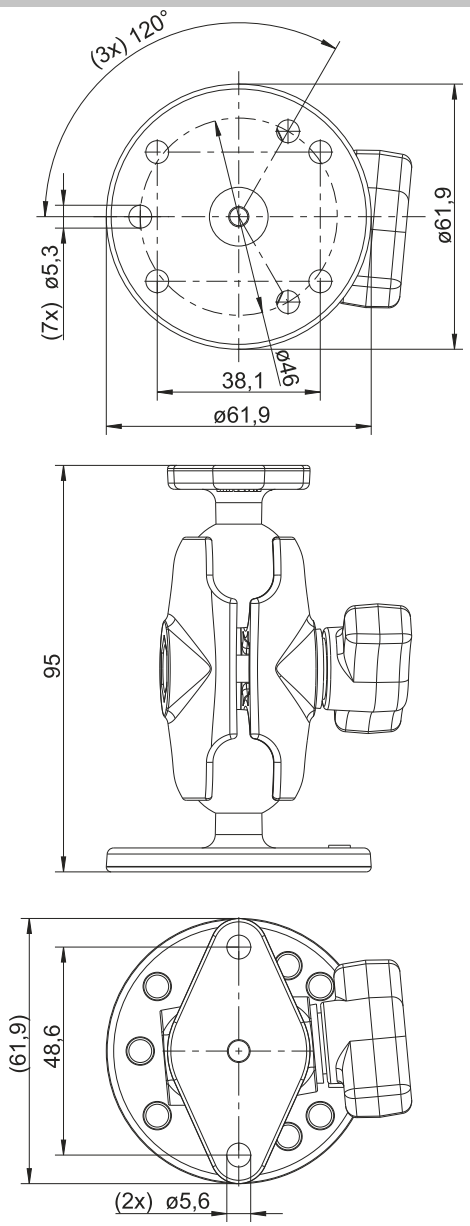
Quantity	Description
1	RAM installation set 1 inch B-ball
2	M5x14 screws

6PM.AC.RAM-002

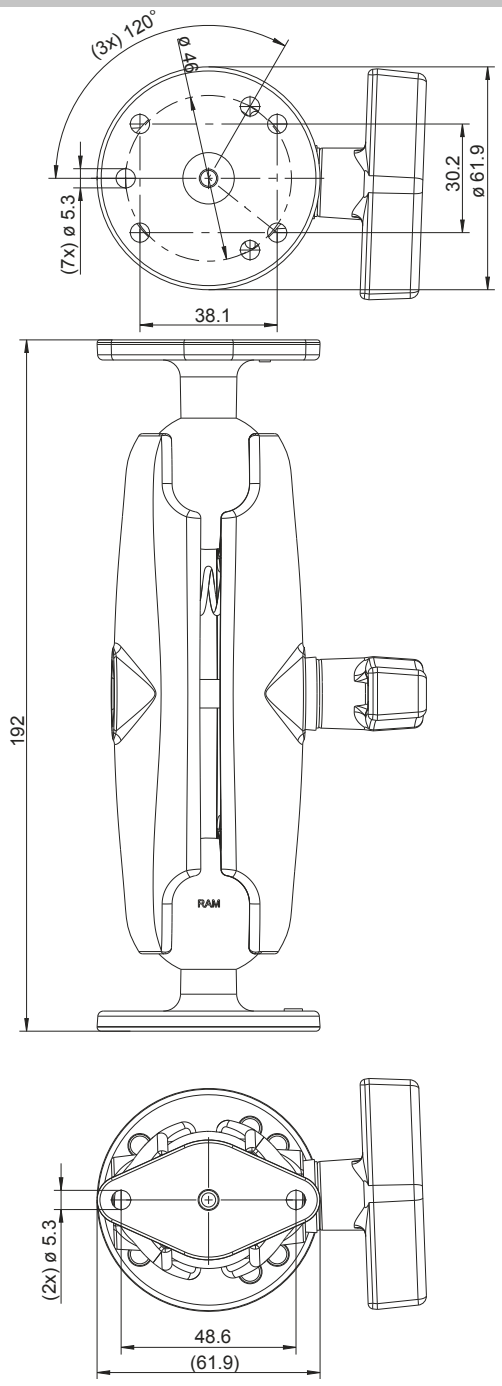
Quantity	Description
1	RAM installation set 1.5 inch, C-ball
2	M5x14 screws

10.2.3 Dimensions

6PM.AC.RAM-001



6PM.AC.RAM-002



10.3 Holding plate for control cabinet installation

10.3.1 Order data

Order number	Short description	Figure
	Brackets	
6PM.AC.PAN-050	T50 mobile 5 inch, panel installation set	
6PM.AC.PAN-070	T50 mobile 7 inch, panel installation set	
6PM.AC.PAN-101	T50 mobile 10.1 inch, panel installation set	

10.3.2 Content of delivery

6PM.AC.PAN-050

Quantity	Description
1	T50 mobile 5" panel installation set
4	Retaining clip for mounting the panel
2	M5x12 screws

6PM.AC.PAN-070

Quantity	Description
1	T50 mobile 7" panel installation set
6	Retaining clip for mounting the panel
4	M4x10 screws

6PM.AC.PAN-101

Quantity	Description
1	T50 mobile 10.1" panel installation set
8	Retaining clip for mounting the panel
9	M4x10 screws

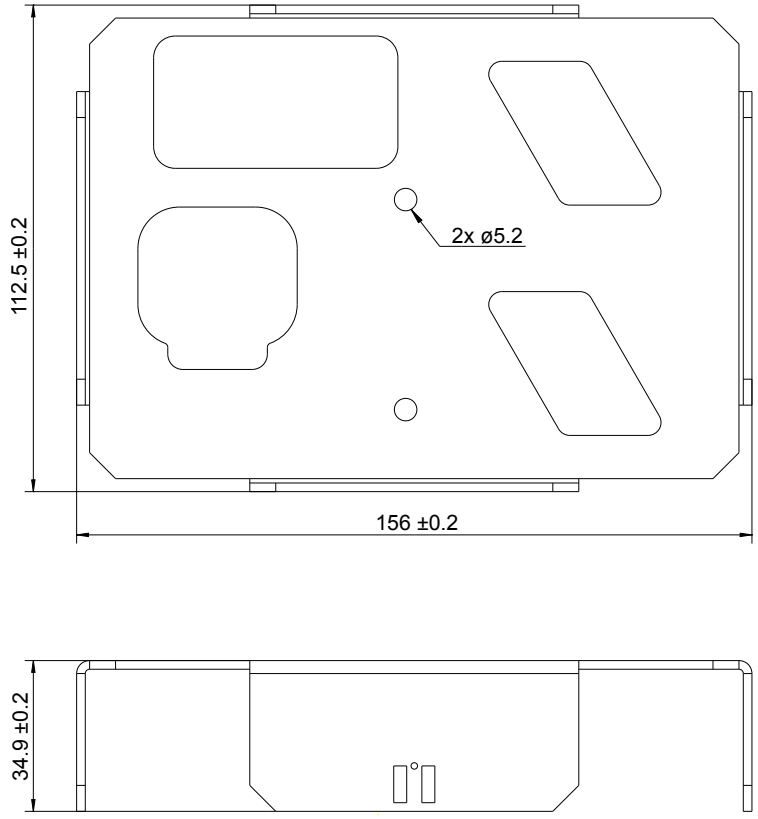
10.3.3 Technical data

Order number	6PM.AC.PAN-050	6PM.AC.PAN-070	6PM.AC.PAN-101
Operating conditions			
Degree of protection per EN 60529	IP66 [1]		
Mechanical properties			
Dimensions			
Width	156 mm	196 mm	266.5 mm
Length	112.5 mm	139 mm	185 mm
Height	33.2 mm	31 mm	
Weight	111 g	119 g	263 g

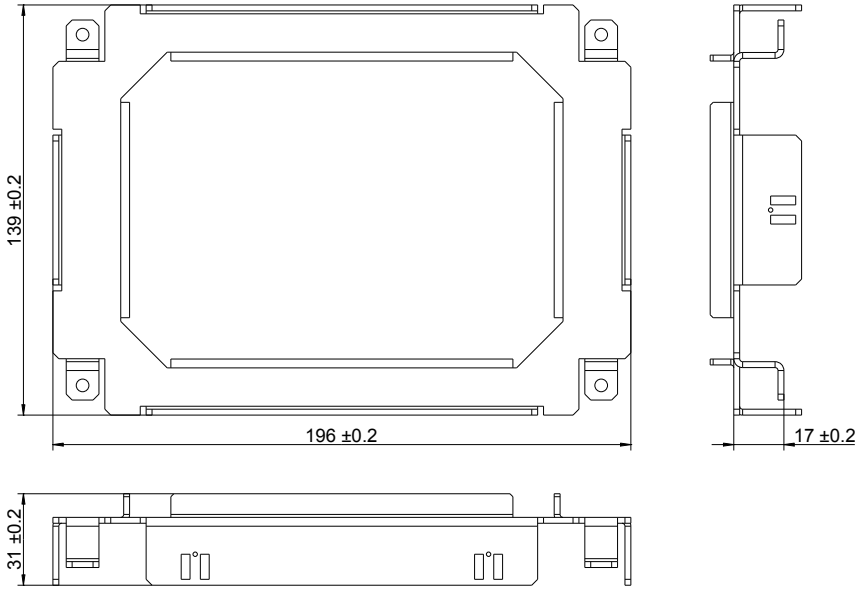
1) Applies to sealing the control cabinet installation cutout when the specified installation instructions are observed (see chapter "Installation and wiring").

10.3.4 Dimensions

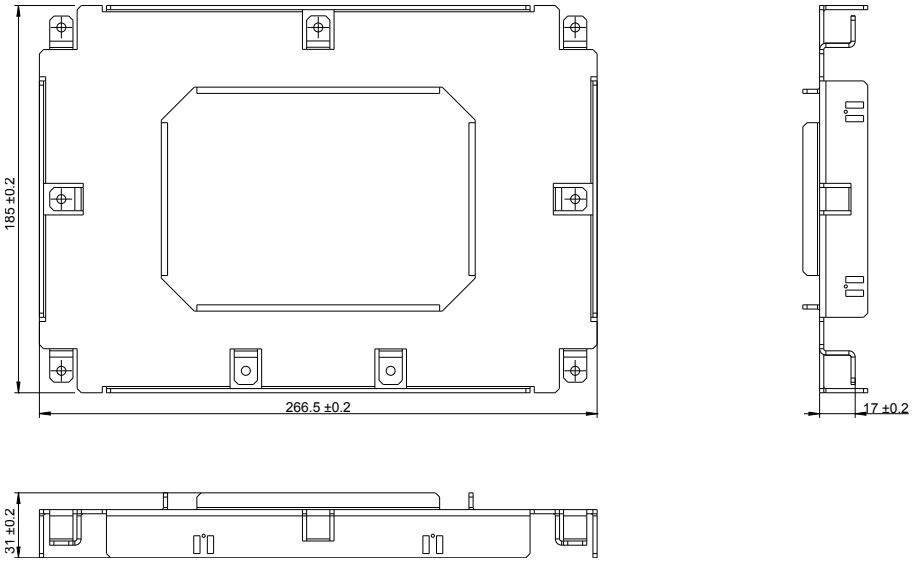
Holding plate 5"



Holding plate 7"



Holding plate 10.1"



10.4 Wiring harness

10.4.1 Order data

Order number	Short description	Figure
	Wiring harness	
6PMCAT50.02-00	T50 Mobile, wiring harness for T50 Mobile, 2 m length, for Superseal connection	

Table 12: 6PMCAT50.02-00 - Order data

10.4.2 Technical data

Order number	6PMCAT50.02-00
General information	
Short description	Superseal connection cable with USB connection
Type	Power Panel T50 Mobile wiring harness
Cable cross section	
mm²	See section "Superseal connector".
Certifications	
CE	Yes
Interfaces	
USB	
Quantity	1
Type	2.0
Variant	Type A, female
Current-carrying capacity	500 mA
Cable construction	
Outer jacket	
Material	PVC
Color	See table in section "Pinout".
Labeling	At least every 25 cm
Ambient conditions	
Temperature	
Operation	Max. 80°C
Storage	Max. 80°C
Mechanical properties	
Dimensions	
Length	2 m

Table 13: 6PMCAT50.02-00 - Technical data

10.4.3 Pinout

No.	Description		Cross section	Color
1	Digital output 0.5 A	Channel 1	0.75 mm²	Yellow
2	Digital output 0.5 A	Channel 2	0.75 mm²	Yellow
3	Digital output 0.5 A	Channel 3	0.75 mm²	Yellow
4	Digital output 0.5 A	Channel 4	0.75 mm²	Yellow
5	GND		1.0 mm²	Black
6	VCC		1.0 mm²	Red
7	VCC		1.0 mm²	Red
8	Digital input	Channel 1	0.75 mm²	Green
9	Digital input	Channel 2	0.75 mm²	Green
10	Digital input	Channel 3	0.75 mm²	Green
11	Digital input	Channel 4	0.75 mm²	Green
12	USB cable shield	USB cables	-	-
13	GND		1.0 mm²	Black
14	Digital input	Channel 5	0.75 mm²	Green
15	Digital input	Channel 6	0.75 mm²	Green
16	Digital input	Channel 7	0.75 mm²	Green
17	Digital input	Channel 8	0.75 mm²	Green
18	90Ω USB GND	USB cables	-	-
19	90Ω USB D-[1)]	USB cables	-	-
20	NC		-	-
21	NC		-	-
22	NC		-	-
23	NC		-	-
24	NC		-	-
25	90Ω USB 5 V	USB cables	-	-
26	90Ω USB D+[1)]	USB cables	-	-

1) USB data cable

10.5 X90TB100.03-00

For additional information about the following accessories, see the manufacturer's website: www.te.com.

10.5.1 Order data

Order number	Short description	Figure
	Other	
6PMTBT50.01-00	T50 mobile, connector for Superseal header, with connector contacts and dummy plugs	

Table 14: 6PMTBT50.01-00 - Order data

10.5.2 Technical data

Order number	6PMTBT50.01-00
Short description	
Accessories	Set consisting of: 1x 26-pin connector housing, 1x 26-pin connector, 20x Superseal contact for 0.50 mm² wire, 10x Superseal contact for 0.75 to 1.25 mm² wire, 25x blind plug for 1.0 mm
General information	
Certifications	
CE	Yes
Vendor information	
Manufacturer	TE
Manufacturer's product ID	26-pin connector housing: 3-1437290-8 26-pin connector housing: 9-6437287-9 Superseal contact for 0.50 mm² wire: 3-1447221-4 Superseal contact for 0.75 to 1.25 mm² wire: 3-1447221-3 Blind plug for 1.0 mm: 4-1437284-3

Table 15: 6PMTBT50.01-00 - Technical data

10.5.3 Set contents

10.5.4 Connector housings

- Manufacturer: TE
- Manufacturer number: 3-1437290-8
- Connections: 26x 1.0 mm
- Color: Black

10.5.5 Contacts

For 0.50 mm² wire

- Manufacturer: TE
- Manufacturer number: 3-1447221-4
- Size: 1.0 mm
- Insulation diameter: 1.6 to 2.2 mm

For 0.75 to 1.25 mm² wire

- Manufacturer: TE
- Manufacturer number: 3-1447221-3
- Size: 1.0 mm
- Insulation diameter: 1.6 to 2.2 mm

10.5.6 Blind plug for contacts

- Manufacturer: TE
- Manufacturer number: 4-1437284-3
- Size: 1.0 mm
- Color: White

10.5.7 Hand crimp tool

- Manufacturer: TE
- Manufacturer number: 1454509-1

10.5.8 Applicator

- Manufacturer: TE
- Manufacturer number: 2151705-1
  Applicator with mechanical feed
- Manufacturer number: 2151705-2
  Applicator with pneumatic feed

10.6 Pre-assembled cables

10.6.1 General

	Short description, order number	
Length	Attachment cables - RJ45 to M12	Connection cables - M12 to M12
1 m	X67CA0E41.0010	X67CA0E61.0010
2 m	X67CA0E41.0020	X67CA0E61.0020
3 m	X67CA0E41.0030	
5 m	X67CA0E41.0050	X67CA0E61.0050
10 m		X67CA0E61.0100
15 m	X67CA0E41.0150 X67CA3E41.0150	X67CA0E61.0150
20 m		X67CA0E61.0200
50 m	X67CA0E41.0500	
		

Length	Tolerances for cable lengths
0 to <10 m	+10 cm
10 m to <50 m	+2% of the length

10.6.1.1 Technical data

Product ID	X67CA0E41	X67CA0E61	X67CA3E41
General information			
Note	Halogen-free		
Durability	Flame-retardant in accordance with IEC 60332-1-2		Oil resistant in accordance with EN 60811-2-1 Flame-retardant in accordance with IEC 60332-1-2 UV resistant in accordance with UL 2556
Connection	RJ45 to M12; 4-pin	M12 to M12, 4-pin	RJ45 to M12; 4-pin
Type	Attachment cables	Connection cables	
Cable cross section			
AWG	4x 22 AWG		
mm²	4x 0.34 mm²		
Cable construction			
Complete shielding	Aluminum-clad foil (overlapping), tinned copper braiding, 85% covering		
Outer sheathing			
Material	Polyurethane (PUR)		
Color	Green		
Labeling	B&R X67CA0Exx.xxxx Rev. C0[1)]		
Lines			
Wire insulation	Polyethylene (PE)		
Wire colors	White, yellow, blue, orange		
Type	Tinned copper stranded wire Fine stranded wire (7x 0.25 mm / 7x 30 AWG)		
Stranding	4-wire twisted pair		
Electrical characteristics			
Conductor resistance	≤120 Ω/km at 20°C		
Transfer properties	Category 5 / Class D up to 100 MHz in accordance with ISO/IEC 11801 (EN50173-1), ISO/IEC 24702 (EN 50173-3)		
Transfer rate	10/100 Mbit/s		
Insulation resistance	≥500 MΩ/km at 20°C		
Operating conditions			
EN 60529 protection			
Cables	IP67		
Male M12 connector	IP67, only when screwed in		
RJ45 connector	IP20, only when connected properly		
Environmental conditions			
Temperature			
Transport	-40 to 70°C		
Fixed installation	-40 to 70°C		
Flexible installation	-20 to 60°C		
Mechanical characteristics			
Dimensions	Various		
Length			
Diameter	6.5 mm ±0.2 mm		
Bend radius	≥7x outer diameter		
Drag chain data			
Acceleration	-		4 m/s²
Flex cycles	-		Min. 3 million
Speed	-		4 m/s
Weight	0.062 kg/m		0.061 kg/m

Table 16: X67CAxExx - Technical data

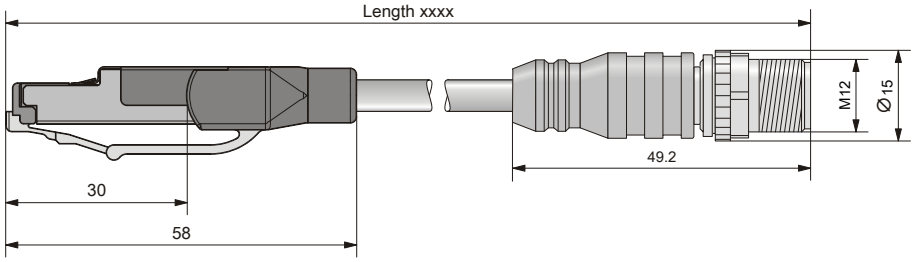
1) xx.xxxx: Group number and cable length.

10.6.1.2 X67CA0E41.xxxx and X67CA3E41.xxxx

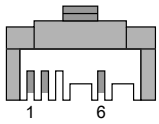
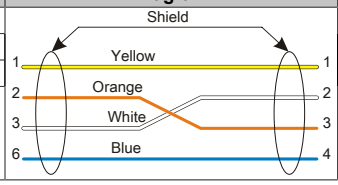
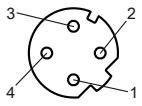
This cable is offered in 2 variants:

- X67CA0Exx: Standard variant
- X67CA3Exx: Can be used in cable drag chains

Dimensions

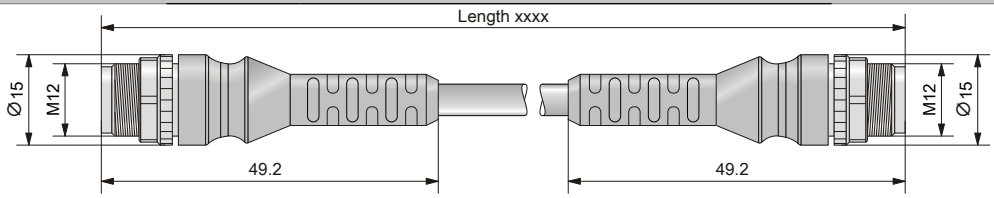


Pinout

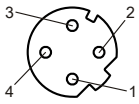
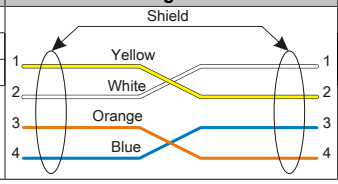
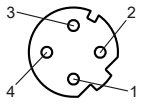
Male RJ45 connector	Pin	Name	Diagram	M12 connector
	1 - 1	TXD		 D-coded
	2 - 3	TXD\		
	3 - 2	RXD		
	6 - 4	RXD\		

10.6.1.3 X67CA0E61.xxxx

Dimensions



Pinout

Connector	Pin	Name	Diagram	Connector
 D-coded	1 - 2	TXD		 D-coded
	2 - 1	RXD		
	3 - 4	TXD\		
	4 - 3	RXD\		

10.7 Field-assembled connectors

10.7.1 Ethernet

Order number	Short description	Figure
	POWERLINK/Ethernet	
X67AC2E01	X67 male M12 connector, 4-pin, D-keyed, shielded, insulation piercing connection	

Table 17: X67AC2E01 - Order data

Information:

The color of the wires on field-assembled cables used for connecting the Ethernet bus controller may deviate from the standard.

Make sure to check the proper pinout.
For technical data and additional information about Ethernet cables, see the corresponding documentation. This is located under the order number of the cable on the B&R website (www.br-automation.com) and can be downloaded from there.

10.8 6PM.AC.CLP-100

10.8.1 General information

Installation kit for Power Panel Mobile T50. This installation kit contains the following replacement parts:

- 100x retaining clips with torque limiting

10.8.2 Order data

Order number	Short description	Figure
	Brackets	
6PM.AC.CLP-100	100x retaining clips for Power Panel T-Series mobile	

10.8.3 Technical data

Order number	6PM.AC.CLP-100
General information	
Certifications	
CE	Yes

10.9 Installation tool

10.9.1 Torque wrench set

Order number	Short description	Figure
	Mounting tools	
X67ACTQMX	X67 torque wrench set, for X67 M8 and M12 connectors, for hex-head connectors	

Table 20: X67ACTQMX - Order data

10.10 Storage media

For technical data and additional information about storage media, see the corresponding documentation. This can be found under the purchase order number of the storage medium at www.br-automation.com and can be downloaded from there.

11 International and national certifications

Products and services from B&R comply with applicable regulations, directives and standards.

These are national, European and international regulations, mainly from organizations such as ISO, IEC and CENELEC. Special attention has been paid to reliability when used in mobile machinery for construction and agriculture, but also for industrial applications.

Information:

Certifications applicable to the respective Power Panel are available at the following locations:

- **In "Technical data" under "General information" in chapter "Device description".**
- **In "Technical data" under "General information" on the website (www.br-automation.com).**
- **On the product label on the back of the housing.**

Changes and new certifications are available promptly in electronic form on the B&R website (www.br-automation.com).

11.1 Overview of certifications

Mark	Explanation	Certificate authority	Region
	UN/ECE marking	National authorities	Europe (worldwide)
	CE marking	Notified bodies	Europe (EU)

11.1.1 UN/ECE type approval

UN/ECE mark

Products with this mark are tested by an accredited testing laboratory in accordance with relevant UN/ECE regulations and approved by a national authority for use in motor vehicles.

Europe (worldwide)

This mark was originally only valid in Europe, but since many non-European countries have now also acceded to the ECE agreement, it is already possible to speak of a certain degree of worldwide recognition.

UN/ECE regulation applied for this purpose:

UN/ECE-R10	Regulation no. 10 of the Economic Commission for Europe of the United Nations (UNECE) - Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility.

The corresponding certificate is available for download from the B&R website.

Certificate

Website > Downloads > Certificates > UN ECE-R10 > Power Panel T50 mobile

11.1.2 EU directives and standards (CE)

CE marking

The respective product complies with all applicable EU directives and relevant harmonized standards.

Certification of these products is performed in cooperation with accredited testing laboratories.

Europe (EU)

EMC Directive 2014/30/EU

All products meet the requirements of the EMC Directive and are designed for mobile machinery, outdoor and industrial applications.

Applicable standards from this directive:

EN ISO 13766-1	Earth-moving and building construction machinery - Part 1: General EMC requirements under typical electromagnetic environmental conditions
EN ISO 14982	Agricultural and forestry machines - Electromagnetic compatibility - Test methods and acceptance criteria
EN 61131-2	Programmable logic controllers - Part 2: Equipment requirements and tests
EN 61000-6-2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments
EN 61000-6-4	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emissions standard for industrial environments

The corresponding declaration of conformity is available for download from the B&R website. For information about the versions of applicable standards, see the declaration of conformity.

Declaration of conformity

Website > Downloads > Certificates > Declarations of conformity > Power Panel Mobile

UK Conformity Assessed (UKCA)

United Kingdom (UK)

All directives applicable to the respective product and their relevant standards are met.

Products with this marking are permitted to be imported into Great Britain (England, Wales, Scotland).

For information about the editions of applicable standards, see the "**UK Declaration of Conformity**". The "**UK Declaration of Conformity**" is available for download on the B&R website.

UK Declaration of Conformity
Website > Downloads > Certificates > Declarations of conformity > Power Panel:
> UK Declaration HMI_OI Power Panels

11.2 Overview of tests

11.2.1 EMC and electrical tests

Standard	Title	Note
UN/ECE-R10	Regulation no. 10 of the Economic Commission for Europe of the United Nations (UNECE) - Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility	UN/ECE type approval
EN ISO 13766-1 (Replacement for EN 13309)	Earth-moving and building construction machinery - Part 1: General EMC requirements under typical electromagnetic environmental conditions	EU conformity (CE)
EN ISO 14982	Agricultural and forestry machines - Electromagnetic compatibility - Test methods and acceptance criteria	EU conformity (CE)
ISO 15003	Agricultural engineering - Electrical and electronic equipment - Testing resistance to ambient conditions	Manufacturer's specification
EN 61131-2	Programmable logic controllers - Part 2: Equipment requirements and tests	EU conformity (CE)
EN 61000-6-2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments	EU conformity (CE)
EN 61000-6-4	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments	EU conformity (CE)

11.2.2 Mechanical tests

Standard	Title	Note
EN 61131-2	Programmable logic controllers - Part 2: Equipment requirements and tests	EU conformity (CE)

11.2.3 Climatic loads

Standard	Title	Note
ISO 15003	Agricultural engineering - Electrical and electronic equipment - Testing resistance to ambient conditions	Manufacturer's specification
EN 61131-2	Programmable logic controllers - Part 2: Equipment requirements and tests	EU conformity (CE)

11.2.4 Chemical resistance

Standard	Title	Note
ISO 15003	Agricultural engineering - Electrical and electronic equipment - Testing resistance to ambient conditions	Manufacturer's specification

11.2.5 Degree of protection (IP code)

Standard	Title	Note
ISO 20653	Road vehicles - Degrees of protection (IP code) - Protection of electrical equipment against foreign objects, water and access	Manufacturer's specification IP6K6
EN 60529	Degrees of protection provided by enclosures (IP code)	Manufacturer's specification IP66

11.3 Vehicle requirements

11.3.1 Requirements for immunity to disturbances

Testing	Testing performed per	Test values per
Electrostatic discharge (ESD)	ISO 10605	B&R
		EN ISO 13766-1: Earth-moving and building construction machinery (Replacement for EN 13309)
		EN ISO 14982: Agricultural and forestry machines
		ISO 15003: Agricultural engineering
Conducted transient disturbances (test pulse 1, 2a, 2b, 3a, 3b, 4, 5a, 5b)	ISO 7637-2 ISO 16750-2	B&R
		UN/ECE-R10: Vehicle approval (EMC)
		EN ISO 13766-1: Earth-moving and building construction machinery (Replacement for EN 13309)
		EN ISO 14982: Agricultural and forestry machines
		ISO 15003: Agricultural engineering
High-frequency electromagnetic fields	ISO 11452-x	B&R
		UN/ECE-R10: Vehicle approval (EMC)
		EN ISO 13766-1: Earth-moving and building construction machinery (Replacement for EN 13309)
		EN ISO 14982: Agricultural and forestry machines
		ISO 15003: Agricultural engineering

Classification of operating performance

Status	During testing / After testing
A	All functions of a device/system perform as designed during and after exposure to disturbance. Operation of the display is maintained with justified comfort.
B	All functions of a device/system perform as designed during exposure. However, one or more of them can go beyond specified tolerance. All functions return automatically to within normal limits after exposure is removed. Memory functions shall remain class A.
C	One or more functions of a device/system do not perform as designed during exposure but return automatically to normal operation after exposure is removed.
D	One or more functions of a device/system do not perform as designed during exposure and do not return to normal operation until exposure is removed and the device/system is reset by simple "operator/use" action.
E	One or more functions of a device/system do not perform as designed during and after exposure and cannot be returned to proper operation without repairing or replacing the device/system.

Electrostatic discharge (ESD)

Testing performed per ISO 10605	Test values per B&R		Test values per EN 13766-1		Test values per EN ISO 14982 and ISO 15003
Contact discharge (CD) On conductive accessible parts (Unloading network: 330 pF + 2 kΩ)	±4 kV Status A	±6 kV Status C	±4 kV Status A	±6 kV Status C	±4 kV Status A
Air discharge (AD) On insulating accessible parts (Unloading network: 330 pF + 2 kΩ)	±4 kV Status A	±8 kV Status A	±4 kV Status A	±8 kV Status C	±4 kV Status A

Conducted transient disturbances

Testing performed per ISO 7637-2:2004 or ISO 7637-2:2011 & ISO 16750-2:2012	Test values per B&R (12 V / 24 V system)	Test values per UN/ECE-R10 (12 V / 24 V system)	Test values per ISO 13766-1 (12 V / 24 V system)	Test values per EN ISO 14982 and ISO 15003[3] (12 V / 24 V system)
Test pulse 1 Switching off inductive parallel loads (ISO 7637-2)	-450 V 5000 pulses Status C[1] **(ISO 7637-2:2004 and ISO 7637-2:2011)**	-450 V 5000 pulses Status C[1] **(ISO 7637-2:2004)**	-450 V 500 pulses Status C[1] **(ISO 7637-2:2011)**	-450 V 5000 pulses Status C[1] **(ISO 7637-2:2004)**
Test pulse 2a Sudden power interruption in a device connected in parallel (ISO 7637-2)	+55 V 5000 pulses Status B[1] **(ISO 7637-2:2004 and ISO 7637-2:2011)**	+37 V 5000 pulses Status B[1] **(ISO 7637-2:2004)**	+55 V 500 pulses Status B[1] **(ISO 7637-2:2011)**	+37 V 5000 pulses Status B[1] **(ISO 7637-2:2004)**
Test pulse 2b Rundown of DC motors (generator effect) (ISO 7637-2)	+20 V 10 pulses Status C[1] **(ISO 7637-2:2004 and ISO 7637-2:2011)**	+20 V 10 pulses Status C[1] **(ISO 7637-2:2004)**	+20 V 10 pulses Status C[1] **(ISO 7637-2:2011)**	+20 V 10 pulses Status C[1] **(ISO 7637-2:2004)**
Test pulse 3a / Negative transients Switching operations (e.g. relays) (ISO 7637-2)	-220 V Test time 1h Status A **(ISO 7637-2:2004 and ISO 7637-2:2011)**	-150 V Test time 1h Status A **(ISO 7637-2:2004)**	-220 V Test time 1h Status A **(ISO 7637-2:2011)**	-150 V Test time 1h Status A **(ISO 7637-2:2004)**
Test pulse 3b / Positive transients Switching operations (e.g. relay) (ISO 7637-2)	+220 V Test time 1h Status A **(ISO 7637-2:2004 and ISO 7637-2:2011)**	+150 V Test time 1h Status A **(ISO 7637-2:2004)**	+220 V Test time 1h Status A **(ISO 7637-2:2011)**	+150 V Test time 1h Status A **(ISO 7637-2:2004)**
Test pulse 4 / Starting curve Fluctuations in the vehicle electrical system when starting the engine (ISO 7637-2 or ISO 16750-2)	12 V_{dc}: Level III (-6 V) (U_B min = 6 V) 24 V_{dc}: Level III (-12 V) U_B min = 12 V) 1 pulse Status C / B[2] **(ISO 7637-2:2004)** 12 V_{dc}: Level IV (U_B min = 6 V) 24 V_{dc}: Level II (U_B min = 8 V) 10 pulses Status C / A[2] **(ISO 16750-2:2012)**	12 V_{dc}: Level III (-6 V) (U_B min = 6 V) 24 V_{dc}: Level III (-12 V) (U_B min = 12 V) 1 pulse Status C / B[2] **(ISO 7637-2:2004)**	12 V_{dc}: Level IV (U_B min = 6 V) 24 V_{dc}: Level II (U_B min = 8 V) 10 pulses Status C / A[2] **(ISO 16750-2:2012)**	12 V_{dc}: Level III (-6 V) (U_B min = 6 V) 24 V_{dc}: Level III (-12 V) (U_B min = 12 V) 1 pulse Status C / B[2] **(ISO 7637-2:2004)**
Test pulse 5a / Load dump Load dump at the alternator without central protection (ISO 7637-2 or ISO 16750-2)	+175 V Ri = 4 Ω 350 ms 1 pulse Status C[1] **(ISO 7637-2:2004)** +202 V Ri = 4 Ω 350 ms 10 pulses @ 1 min. Status C[1] **(ISO 16750-2:2012)**	-	+151 V to +202 V Ri = 1-8 Ω 100-350 ms 10 ms 10 pulses @ 1 min. Functional status Status C[1] **(ISO 16750-2:2012)**	+123 V Ri = 1-8 Ω 100-350 ms 10 ms 1 pulse Status C[1] **(ISO 7637-2:2004)**
Test pulse 5b / Load dump Load dump at the alternator with central protection (ISO 7637-2 or ISO 16750-2)	See test pulse 5a	-	Per agreement with customers **(ISO 16750-2:2012)**	Per agreement with customers **(ISO 7637-2:2004)**

1) No influence is permitted that could result in dangerous machine behavior (e.g. unintentional movement).
2) Relevant for functions of equipment/systems that are active during the motor startup phase.
3) Adjusted test values according to the best available technology.

High-frequency electromagnetic fields

Testing performed per ISO 11452-x	Test values per B&R	Test values per UN/ECE-R10	Test values per ISO 13766-1	Test values per EN ISO 14982 and ISO 15003
ISO 11452-2 / Antenna	30 V/m 20 MHz - 1 GHz (AM) 800 MHz - 2 GHz (PM) Status A	30 V/m 20 MHz - 800 MHz (AM) 800 MHz - 2 GHz (PM) Status A	30 V/m 20 MHz - 800 MHz (AM) 800 MHz - 2 GHz (PM) Status A	30 V/m 20 MHz to 1 GHz (AM) Status A
ISO 11452-4 / BCI clamp	60 mA 20 MHz - 1 GHz (AM) 800 MHz - 2 GHz (PM) Status A	60 mA 20 MHz - 800 MHz (AM) 800 MHz - 2 GHz (PM) Status A	60 mA 20 MHz - 800 MHz (AM) 800 MHz - 2 GHz (PM) Status A	60 mA 20 MHz to 1 GHz (AM) Status A
ISO 11452-5 / Stripline	60 V/m 20 MHz - 1 GHz (AM) 800 MHz - 2 GHz (PM) Status A	60 V/m 20 MHz - 800 MHz (AM) 800 MHz - 2 GHz (PM) Status A	60 V/m 20 MHz - 800 MHz (AM) 800 MHz - 2 GHz (PM) Status A	60 V/m 20 MHz to 1 GHz (AM) Status A

11.3.2 Emission requirements

Testing	Testing performed per	Limit values per
Conducted transient emissions	ISO 7637-2	UN/ECE-R10 - Vehicle approval (EMC)
		EN ISO 13766-1: Earth-moving and building construction machinery (replacement for EN 13309)
Radiated emissions	EN 55025 (CISPR 25)	UN/ECE-R10 - Vehicle approval (EMC)
		EN ISO 13766-1: Earth-moving and building construction machinery (replacement for EN 13309)
		EN ISO 14982 - Agricultural and forestry machinery
		ISO 15003 - Agriculture engineering

Conducted transient emissions

Testing performed per ISO 7637-2	Limit values per UN/ECE-R10 / EN ISO 13766-1 (12 V / 24 V system)	
Power on (switched fast/slow)	Positive pulse amplitude Max. +75 V	Negative pulse amplitude Max. -100 V
Power off (switched fast/slow)		

Radiated emissions

Testing performed per EN 55025 (CISPR 25)	Limit values per UN/ECE-R10 / EN ISO 13766-1 / EN ISO 14982 / ISO 15003	
Electric field / Measured from 1 m 30 MHz to 75 MHz	52 to 42 dB (µV/m) Mean	62 to 52 dB (µV/m) Quasi-peak value
Electric field / Measured from 1 m 75 MHz to 400 MHz	42 to 53 dB (µV/m) Mean	52 to 63 dB (µV/m) Quasi-peak value
Electric field / Measured from 1 m 400 MHz to 1 GHz	53 dB (µV/m) Mean	63 dB (µV/m) Quasi-peak value

11.3.3 Chemical resistance

Testing	Testing performed per	Limit values per
Chemical resistance	ISO 15003	B&R
		ISO 15003: Agriculture engineering

Chemical resistance

Testing media

Sequential number	Chemical name	Concentration	Specification
1	Herbicide (glyphosate)	100%	Manufacturer
2	Fungicide (boscalid, kresoxim-methyl)	0.42%	Manufacturer
3	NPK fertilizer	100%	Standard
4	Liquid lime	10%	Standard
5	Urea fertilizer	100%	Standard
6	AHL fertilizer	20%	Standard
7	Ammonia	32%	Manufacturer
8	Gasoline	100%	Standard
9	Diesel	100%	Standard
10	Radiator antifreeze (glycol)	50%	Standard
11	Motor oil	100%	Manufacturer
12	Hydraulic oil	100%	Standard
13	Gear oil	100%	Manufacturer
14	Brake fluid	100%	Manufacturer

Testing performed

Testing was performed per standard ISO 15003.

Temperature:	25°C
Humidity:	45% relative humidity
Application method:	Painting
Frequency of application:	3 applications
Exposure:	24 hours per application
Post-conditioning:	Cleaning with distilled water and subsequent storage for 100 hours

Test results

During and after testing, no relevant corrosive changes or influences on functions could be determined.

11.4 Requirements for industry

11.4.1 Requirements for immunity to disturbances

Testing	Testing performed per	Test values per
Electrostatic discharge (ESD)	EN 61000-4-2	EN 61131-2: Product standard - Programmable logic controllers
		EN 61000-6-2: Generic standard - Immunity for industrial environments
Radiated high-frequency electromagnetic fields (RF radiated)	EN 61000-4-3	EN 61131-2: Product standard - Programmable logic controllers
		EN 61000-6-2: Generic standard - Immunity for industrial environments
High-speed transient electrical disturbances (Burst)	EN 61000-4-4	EN 61131-2: Product standard - Programmable logic controllers
		EN 61000-6-2: Generic standard - Immunity for industrial environments
Surge voltages (Surge)	EN 61000-4-5	EN 61131-2: Product standard - Programmable logic controllers
		EN 61000-6-2: Generic standard - Immunity for industrial environments
Conducted induced radio-frequency fields (RF-conducted)	EN 61000-4-6	EN 61131-2: Product standard - Programmable logic controllers
		EN 61000-6-2: Generic standard - Immunity for industrial environments
Power frequency magnetic fields (H field)	EN 61000-4-8	EN 61131-2: Product standard - Programmable logic controllers
		EN 61000-6-2: Generic standard - Immunity for industrial environments
Voltage dips (AC) Short-term interruptions (AC) Voltage fluctuations (AC)	EN 61000-4-11	EN 61131-2: Product standard - Programmable logic controllers
		EN 61000-6-2: Generic standard - Immunity for industrial environments
Voltage dips (DC) Short-term interruptions (DC) Voltage fluctuations (DC)	EN 61000-4-29	EN 61131-2: Product standard - Programmable logic controllers
		-

Evaluation criteria for performance

Criteria	During test	After test
A	The PLC system shall continue to operate as intended. No loss of function or performance.	The PLC system shall continue to operate as intended.
B	Degradation of performance accepted. The operating mode is not permitted to change. Irreversible loss of stored data is not permitted.	The PLC system shall continue to operate as intended. Temporary degradation of performance must be self-recoverable.
C	Loss of functions accepted, but no destruction of hardware or software (program or data).	The PLC system shall continue to operate as intended either automatically, after manual restart or power off / power on.
D	Degradation or failure of functionality that can no longer be restored.	PLC system permanently damaged or destroyed.

Electrostatic discharge (ESD)

Testing performed per EN 61000-4-2	Test values per EN 61131-2 / Zone B	Test values per EN 61000-6-2
Contact discharge (CD) On conductive accessible parts	±4 kV Criteria B	
Air discharge (AD) On insulating accessible parts	±8 kV Criteria B	

Radiated high-frequency electromagnetic fields (RF radiated)

Testing performed per EN 61000-4-3	Test values per EN 61131-2 / Zone B	Test values per EN 61000-6-2
Housing, completely wired	80 MHz - 1 GHz, 10 V/m 1.4 GHz - 2 GHz, 3 V/m 2 GHz - 2.7 GHz, 1 V/m Criteria A	80 MHz - 1 GHz, 10 V/m 1.4 GHz - 6 GHz, 3 V/m Criteria A

High-speed transient electrical disturbances (Burst)

Testing performed per EN 61000-4-4	Test values per EN 61131-2 / Zone B	Test values per EN 61000-6-2
AC mains inputs >3 m	±2 kV / 5 kHz Criteria B	±2 kV / 5 kHz or 100 kHz Criteria B
AC mains outputs >3 m	±2 kV / 5 kHz Criteria B	±2 kV / 5 kHz or 100 kHz[1)] Criteria B
AC other I/Os >3 m	±2 kV / 5 kHz Criteria B	-
DC mains inputs/outputs >3 m	±2 kV / 5 kHz Criteria B	±1 kV / 5 kHz or 100 kHz Criteria B
Other I/Os and interfaces >3 m	±1 kV / 5 kHz Criteria B	±1 kV / 5 kHz or 100 kHz Criteria B

1) Without length limitation.

Surge voltages (Surge)

Testing performed per EN 61000-4-5	Test values per EN 61131-2 / Zone B	Test values per EN 61000-6-2
AC mains inputs/outputs (line to line)	±1 kV Criteria B	
AC mains inputs/outputs (line to PE)	±2 kV Criteria B	
DC mains inputs/outputs >30 m (line to line)	±0.5 kV Criteria B	±0.5 kV[1)] Criteria B
DC mains inputs/outputs >30 m (line to PE)	±0.5 kV Criteria B	±1 kV[1)] Criteria B
Signal connections, unshielded >30 m (line to PE)	±1 kV Criteria B	
All shielded cables >30 m (line to PE)	±1 kV Criteria B	-

1) Without length limitation.

Conducted induced radio-frequency fields (RF-conducted)

Testing performed per EN 61000-4-6	Test values per EN 61131-2 / Zone B	Test values per EN 61000-6-2
AC mains inputs/outputs	10 V 150 kHz to 80 MHz 80% AM (1 kHz) Criteria A	
DC mains inputs/outputs	10 V 150 kHz to 80 MHz 80% AM (1 kHz) Criteria A	
Other I/Os and interfaces >3 m	10 V 150 kHz to 80 MHz 80% AM (1 kHz) Criteria A	

Power frequency magnetic fields (H field)

Testing performed per EN 61000-4-8	Test values per EN 61131-2 / Zone B	Test values per EN 61000-6-2
Housing, completely wired	30 A/m 3 axes (x, y, z) 50/60 Hz[1)] Criteria A	

1) Mains frequency per manufacturer data

Voltage dips

Testing performed per EN 61000-4-11	Test values per EN 61131-2 / Zone B	Test values per EN 61000-6-2
AC power inputs	0% residual voltage 250/300 periods (50/60 Hz)[1] 20 attempts Criteria C	
	40% residual voltage 10/12 periods (50/60 Hz)[1] 20 attempts Criteria C	
	70% residual voltage 25/30 periods (50/60 Hz)[1] 20 attempts Criteria C	

1) Mains frequency per manufacturer data

Short-term interruptions

Testing performed per EN 61000-4-11 / EN 61000-4-29	Test values per EN 61131-2 / Zone B	Test values per EN 61000-6-2
AC power inputs	0% residual voltage 0.5 periods (50/60 Hz)[1] 20 interruptions Criteria A	0% residual voltage 1 period (50/60 Hz)[1] 3 interruptions Criteria B
DC power inputs	0% residual voltage ≥10 ms (PS2) [2] 20 interruptions Criteria A	-

1) Mains frequency per manufacturer data
2) Use of a B&R power supply unit guarantees that these requirements are met.

Voltage fluctuations

Testing performed per EN 61000-4-11 / EN 61000-4-29	Test values per EN 61131-2 / Zone B
AC power inputs	-15% / +10% Test duration per 30 minutes Criteria A
DC power inputs	-15% / +20% Each test duration 30 min. Criteria A

11.4.2 Emission requirements

Testing	Testing performed per	Limit values per
Emissions related to lines	EN 55011 / EN 55022 EN 55016-2-1	EN 61131-2: Product standard - Programmable logic controllers
		EN 61000-6-4: Generic standard - Emissions in industrial sectors
Radiated emissions	EN 55011 / EN 55022 EN 55016-2-3	EN 61131-2: Product standard - Programmable logic controllers
		EN 61000-6-4: Generic standard - Emissions in industrial sectors

Emissions related to lines

Testing performed per EN 55011 / EN 55022 / EN 55016-2-1	Limit values per EN 61131-2 (Zone B)	Limit values per EN 61000-6-4
AC mains connection 150 kHz to 30 MHz	150 kHz to 500 kHz 79 dB (µV) Quasi-peak value 66 dB (µV) Mean	150 kHz to 500 kHz 79 dB (µV) Quasi-peak value 66 dB (µV) Mean
	500 kHz to 30 MHz 73 dB (µV) Quasi-peak value 60 dB (µV) Mean	500 kHz to 30 MHz 73 dB (µV) Quasi-peak value 60 dB (µV) Mean
Telecommunications / network connection 150 kHz to 30 MHz	-	150 kHz to 500 kHz 97 to 87 dB (µV) 53 to 40 dB (µA) Quasi-peak value 84 to 74 dB (µV) 40 to 30 dB (µA) Mean
	-	500 kHz to 30 MHz 87 dB (µV) 43 dB (µA) Quasi-peak value 74 dB (µV) 30 dB (µA) Mean

Radiated emissions

Testing performed per EN 55011 / EN 55022 / EN 55016-2-3	Limit values per EN 61131-2 (Zone B)	Limit values per EN 61000-6-4
Electric field (measuring distance 10 m) 30 MHz to 1 GHz	30 MHz to 230 MHz 40 dB (µV/m) Quasi-peak value	30 MHz to 230 MHz 40 dB (µV/m) Quasi-peak value
	230 MHz to 1 GHz 47 dB (µV/m) Quasi-peak value	230 MHz to 1 GHz 47 dB (µV/m) Quasi-peak value
Electric field (measuring distance 3 m) 1 GHz to 6 GHz[1)]	-	1 GHz to 3 GHz[1)] 76 dB (µV/m) Peak value 56 dB (µV/m) Mean
	-	3 GHz to 6 GHz[1)] 80 dB (µV/m) Peak value 60 dB (µV/m) Mean

1) Depends on the highest internal frequency

11.4.3 Mechanical conditions

Testing	Testing performed per	Test values per
Vibration (sinusoidal) / Operation	EN 60068-2-6	B&R
		EN 61131-2: Product standard - Programmable logic controllers
		EN 60721-3-3 / class 3M4
Shock/Operation	EN 60068-2-27	EN 61131-2: Product standard - Programmable logic controllers
		EN 60721-3-3 / class 3M4
Sinusoidal vibration / Transport (packaged)	EN 60068-2-6	EN 60721-3-2 / Class 2M1, 2M2, 2M3
Shock/Transport (packaged)	EN 60068-2-27	EN 60721-3-2 / Class 2M1, 2M2
Free fall / Transport (packaged)	EN 60068-2-31 (replacement for EN 60068-2-32)	EN 61131-2: Product standard - Programmable logic controllers
		EN 60721-3-2 / Class 2M1
Toppling / Transport (packaged)	EN 60068-2-31	EN 60721-3-2 / Class 2M1, 2M2, 2M3

Vibration (sinusoidal) / Operation

Testing performed per EN 60068-2-6	Test values per B&R		Test values per EN 61131-2		Test values per EN 60721-3-3 / class 3M4	
Sinusoidal vibration Continuous and logarithmic sweeping. Sweep rate 1 octave per minute.	**Frequency**	**Amplitude**	**Frequency**	**Amplitude**	**Frequency**	**Amplitude**
	2 to 9 Hz	Deflection 3.5 mm	5 to 8.4 Hz	Deflection 3.5 mm	2 to 9 Hz	Deflection 3 mm
	9 to 200 Hz	Acceleration 1 g	8.4 to 150 Hz	Acceleration 1 g	9 to 200 Hz	Acceleration 1 g
	20 sweeps per axis (x, y, z)					

1 g = 10 m/s²
2 sweeps = 1 frequency cycle (fmin → fmax → fmin)

Shock/Operation

Testing performed per EN 60068-2-27	Test values per ISO 61131-2	Test values per EN 60721-3-3 / class 3M4
Positive and negative pulse (half-sine) stress in all 3 axes (x, y, z)	Acceleration 15 g Duration 11 ms 18 shocks	Acceleration 10 g Duration 11 ms 18 shocks

1 g = 10 m/s²

Sinusoidal vibration / Transport (packaged)

Testing performed per EN 60068-2-6	Test values per EN 60721-3-2 / Class 2M1		Test values per EN 60721-3-2 / class 2M2		Test values per EN 60721-3-2 / Class 2M3	
Sinusoidal vibration / Transport (packaged) Continuous and logarithmic sweeping. Sweep rate 1 octave per minute.	**Frequency**	**Amplitude**	**Frequency**	**Amplitude**	**Frequency**	**Amplitude**
	2 to 9 Hz	Deflection 3.5 mm	2 to 9 Hz	Deflection 3.5 mm	2 to 8 Hz	Deflection 7.5 mm
	9 to 200 Hz	Acceleration 1 g	9 to 200 Hz	Acceleration 1 g	8 to 200 Hz	Acceleration 2 g
	200 to 500 Hz	Acceleration 1.5 g	200 to 500 Hz	Acceleration 1.5 g	200 to 500 Hz	Acceleration 4 g
	20 sweeps per axis (x, y, z)					

1 g = 10 m/s²
2 sweeps = 1 frequency cycle (fmin → fmax → fmin)

Shock/Transport (packaged)

Testing performed per EN 60068-2-27	Test values per EN 60721-3-2 / Class 2M1	Test values per EN 60721-3-2 / class 2M2
Positive and negative pulse (half-sine) shock load in all 3 axes (x, y, z)	**Type I** Acceleration 10 g Duration 11 ms 18 shocks	**Type I** Acceleration 10 g Duration 11 ms 18 shocks
	Type II -	**Type II** Acceleration 30 g Duration 6 ms 18 shocks

1 g = 10 m/s²

Free fall / Transport (packaged)

Testing performed per EN 60068-2-31 (replacement for EN 60068-2-32)	Test values per EN 61131-2 with shipping packaging		Test values per EN 61131-2 with product packaging		Test values per EN 60721-3-2 / Class 2M1	
Free fall / Transport (packaged)	**Weight**	**Height**	**Weight**	**Height**	**Weight**	**Height**
	<10 kg	1 m	<10 kg	0.3 m	<20 kg	0.25 m
	10 to 40 kg	0.5 m	10 to 40 kg	0.3 m	20 to 100 kg	0.25 m
	>40 kg	0.25 m	>40 kg	0.25 m	>100 kg	0.1 m
	5 attempts					

Toppling / Transport (packaged)

Testing performed per EN 60068-2-31	Test values per EN 60721-3-2 / Class 2M1		Test values per EN 60721-3-2 / Class 2M2		Test values per EN 60721-3-2 / Class 2M3	
Toppling / Transport (packaged)	**Weight**	**Required**	**Weight**	**Required**	**Weight**	**Required**
	<20 kg	Yes	<20 kg	Yes	<20 kg	Yes
	20 to 100 kg	-	20 to 100 kg	Yes	20 to 100 kg	Yes
	>100 kg	-	>100 kg	-	>100 kg	Yes
	Topple on all edges					

11.4.4 Electrical safety

Overvoltage category

Requirement per EN 61131-2	Definition per EN 60664-1
Overvoltage category **II**	Equipment of "overvoltage category II" is energy-consuming equipment to be supplied from the fixed installation.

Pollution degree

Requirement per EN 61131-2	Definition per EN 60664-1
Pollution degree **2**	Only non-conductive pollution occurs. Temporary conductivity caused by condensation must occasionally be expected, however.

Protection rating provided by enclosure (IP code)

Requirement per B&R	Definition per EN 60529	Explanation for the protection of equipment	Explanation for the protection of personnel
IP66	First number IP**6**x	Dust-proof	Protected against touching dangerous parts with conductor.
	Second number IPx**6**	Protected against strong water jets	-

11.5 Overview of standards

Standard	Title
UN/ECE-R10	Regulation no. 10 of the Economic Commission for Europe of the United Nations (UNECE) - Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility
ISO 7637-2	Road vehicles - Electrical disturbances from conduction and coupling - Part 2: Electrical transient conduction along supply lines only
ISO 10605	Road vehicles - Test methods for electrical disturbances from electrostatic discharge
ISO 11452-2	Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy - Part 2: Absorber-lined shielded enclosure
ISO 11452-4	Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy - Part 4: Bulk current injection (BCI)
ISO 11452-5	Road vehicles - Component test methods for electrical disturbances from narrowband radiated electromagnetic energy - Part 5: Stripline
ISO 13766-1 (Replacement for EN 13309)	Earth-moving and building construction machinery - Electromagnetic compatibility of machines with internal power supply - Part 1: General EMC requirements under typical electromagnetic environmental conditions
EN ISO 14982	Agricultural and forestry machines - Electromagnetic compatibility - Test methods and acceptance criteria
ISO 15003	Agricultural engineering - Electrical and electronic equipment - Testing resistance to ambient conditions
ISO 16750-2	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 2: Electrical loads
ISO 20653	Road vehicles - Degrees of protection (IP code) - Protection of electrical equipment against foreign objects, water and access
EN 55011 (CISPR 11)	Industrial, scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement
EN 55016-2-1 (CISPR 16-2-1)	Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-1: Methods of measurement of disturbances and immunity - Conducted disturbance measurements
EN 55016-2-3 (CISPR 16-2-3)	Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity - Radiated disturbance measurements
EN 55022 (CISPR 22)	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
EN 55025 (CISPR 25)	Vehicles, boats and internal combustion engines - Radio disturbance characteristics - Limits and methods of measurement for the protection of on-board receivers
EN 60068-2-6	Environmental testing - Part 2-6: Procedures - Test Fc: Vibration (sinusoidal)
EN 60068-2-27	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock
EN 60068-2-31 (replacement for EN 60068-2-32)	Environmental testing - Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens
EN 60068-2-64	Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance
EN 60529	Degrees of protection provided by enclosures (IP code)
EN 60664-1	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests
EN 60721-3-2	Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 2: Transportation
EN 60721-3-3	Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities Section 3: Stationary use at weatherprotected locations
EN 61000-4-2	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
EN 61000-4-3	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
EN 61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measuring techniques - Surge immunity test
EN 61000-4-6	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measuring techniques - Power frequency magnetic field immunity test
EN 61000-4-11	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests

Standard	Title
EN 61000-4-29	Electromagnetic compatibility (EMC) - Part 4-29: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on DC input power port immunity tests
EN 61000-6-2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments
EN 61000-6-4	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
EN 61131-2	Programmable logic controllers - Part 2: Equipment requirements and tests

12 Environmentally friendly disposal

All programmable logic controllers, operating and monitoring devices and uninterruptible power supplies from B&R are designed to have as little impact on the environment as possible.

12.1 Separation of materials

To ensure that devices can be recycled in an environmentally friendly manner, it is necessary to separate out the different materials.

Component	Disposal
Programmable logic controllers Operating and monitoring devices Uninterruptible power supplies Batteries and rechargeable batteries Cables	Electronics recycling
Paper/Cardboard packaging	Paper/Cardboard recycling
Plastic packaging material	Plastic recycling

Disposal must be carried out in accordance with applicable legal regulations.