Power Panel T50

User's manual

Version: **1.22 (November 2018)**

Model no.: **MAPPT50-ENG**

Translation of the original documentation

1 General information

> **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
1.22	November 2018	Updated technical data: • Added UL certification for 5.0" to 10.1" devices. Editorial changes.
1.21	August 2018	New content: • "Installing certificates in the browser" on page 76 • "Supported fonts" on page 81 • Note regarding OPC UA server and service page (see "OPC UA server" on page 82)
1.20	July 2018	New content: • "Service page OPC UA" on page 70 • Information about "OPC UA server" on page 82
1.11	May 2018	New section: "Safety-relevant symbols" on page 10 Note added in the following sections: • "Installation cutout requirements" on page 39 • "Requirements for the cables used" on page 42 • "Cleaning" on page 107 • "Ethernet interface" on page 36
1.10	April 2018	New content: • New panel variants: 12.1" and 15.6" • Description of the touch screen • Surface resistance • Retaining clips with torque limiting • Incompatibilities with PPT image up to 1.0.1 Corrections, changes and updates: • Maximum additional power consumption via USB interfaces • Internal fuse: 3 A, slow-blow • Storage temperature: -20 - 80°C • Permissible mounting orientations • Temperature/Humidity diagrams • Standard mounting orientations at viewing angles
1.01	November 2017	Corrections, changes and updates: • Technical data • Temperature/Humidity diagrams • Description of USB interfaces for the connection elements
1.00	June 2017	First edition.

1.2 Safety guidelines

Important!

If the device is not used in accordance with the manufacturer's instructions, the protection provided by the device may be impaired.

1.2.1 Introduction

Programmable logic controllers (PLCs), operating/monitoring devices (industrial PCs, Power Panels, Mobile Panels, etc.) and uninterruptible power supplies from B&R have been designed, developed and manufactured for conventional use in industrial environments. They were not designed, developed and manufactured for any use involving serious risks or hazards that could lead to death, injury, serious physical impairment or loss of any kind without the implementation of exceptionally stringent safety precautions. In particular, this includes the use of these devices to monitor nuclear reactions in nuclear power plants, in flight control or flight safety systems as well as in the control of mass transportation systems, medical life support systems or weapons systems.

When using programmable logic controllers or operating/monitoring devices as control systems in connection with a Soft PLC (e.g. Automation Runtime or comparable product) or Slot PLC (e.g. B&R LS251 or comparable product), safety precautions relevant to industrial control systems (e.g. the provision of safety devices such as emergency stop, etc.) must be observed in accordance with applicable national and international regulations. This also applies to all other devices connected to the system, such as drives.

All tasks such as the installation, commissioning and servicing of devices are only permitted to be carried out by qualified personnel. Qualified personnel are those familiar with the transport, mounting, installation, commissioning and operation of devices who also have the appropriate qualifications to perform these tasks (e.g. IEC 60364). National accident prevention regulations must be observed.

The safety notices, information about connection conditions (nameplate and documentation) and limit values specified in the technical data must be read carefully before installation and commissioning and are to be observed in all cases.

1.2.2 Intended use

Electronic devices are never completely failsafe. If the programmable logic controller, operating/monitoring device or uninterruptible power supply fails, the user is responsible for ensuring that other connected devices such as motors are brought to a safe state.

1.2.3 Protection against electrostatic discharge

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

1.2.3.1 Packaging

- Electrical components with a housing
  ...do not require special ESD packaging but must be handled properly (see "Electrical components with a housing" on page 7).
- Electrical components without a housing
  ...are protected by ESD-suitable packaging.

1.2.3.2 Guidelines for proper ESD handling

Electrical components with a housing

- Do not touch the connector contacts on the device (bus data contacts).
- Do not touch the connector contacts on connected cables.
- Do not touch the contact tips on circuit boards.

Electrical components without a housing

The following points apply in addition to the points listed under "Electrical components with a housing":

- Any persons handling electrical components or devices with installed electrical components must be grounded.
- Components are only permitted to be touched on their narrow sides or front plate.
- Components must always be placed on or stored in a suitable medium (ESD packaging, conductive foam, etc.).
  Information: Metallic surfaces are not suitable storage surfaces!
- Components must not be subjected to electrostatic discharge (e.g. caused by charged plastics).
- Observe a minimum distance of 10 cm from monitors and television sets.
- Measuring instruments and equipment must be grounded.
- Probe tips of galvanically isolated measuring instruments must be temporarily discharged on suitably grounded surfaces before taking measurements.

Individual components

- ESD protective measures for individual components are thoroughly implemented at B&R (conductive floors, footwear, arm bands, etc.).
- Increased ESD protective measures for individual components are not required for handling B&R products at customer locations.

1.2.4 Policies and procedures

Electronic devices are never completely failsafe. If the programmable logic controller, operating/monitoring device or uninterruptible power supply fails, the user is responsible for ensuring that other connected devices such as motors are brought to a safe state.

When using programmable logic controllers or operating/monitoring devices as control systems in connection with a Soft PLC (e.g. B&R Automation Runtime or comparable product) or Slot PLC (e.g. B&R LS251 or comparable product), safety precautions relevant to industrial control systems (e.g. the provision of safety devices such as emergency stop, etc.) must be observed in accordance with applicable national and international regulations. This also applies to all other devices connected to the system, such as drives.

All tasks such as the installation, commissioning and servicing of devices are only permitted to be carried out by qualified personnel. Qualified personnel are those familiar with the transport, mounting, installation, commissioning and operation of devices who also have the appropriate qualifications to perform these tasks (e.g. IEC 60364). National accident prevention regulations must be observed.
The safety notices, information about connection conditions (nameplate and documentation) and limit values specified in the technical data must be read carefully before installation and commissioning and are to be observed in all cases.

1.2.5 Transport and storage

During transport and storage, devices must be protected against undue stress (mechanical loads, temperature, moisture, corrosive atmospheres, etc.).

Devices contain components sensitive to electrostatic charges that can be damaged by improper handling. It is therefore necessary to provide the required protective measures against electrostatic discharge when installing or removing these devices (see "Protection against electrostatic discharge" on page 7).

1.2.6 Installation

- Installation must be performed according to this documentation using suitable equipment and tools.
- Devices are only permitted to be installed by qualified personnel and when the power is switched off.
- General safety guidelines and national accident prevention regulations must be observed.
- Electrical installation must be carried out in accordance with applicable guidelines (e.g. wire cross sections, fuses, protective ground connections).
- Take the necessary protective measures against electrostatic discharge (see "Protection against electrostatic discharge" on page 7).

1.2.7 Operation

1.2.7.1 Protection against touching electrical parts

To operate programmable logic controllers, operating/monitoring devices and uninterruptible power supplies, certain components must carry dangerous voltage levels over 42 VDC. Touching one of these components can result in a life-threatening electric shock. This could lead to death, severe injury or damage to property.

Before switching on programmable logic controllers, operating/monitoring devices or the uninterruptible power supply, it must be ensured that the housing is properly connected to ground (PE rail). Ground connections must also be established when the operating/monitoring device or uninterruptible power supply is connected for test purposes or only being operated for a short period of time!

Before switching on the device, all voltage-carrying components must be securely covered. During operation, all covers must remain closed.

1.2.7.2 Environmental conditions - Dust, moisture, corrosive gases

The use of operating/monitoring devices (e.g. industrial PCs, Power Panels, Mobile Panels) and uninterruptible power supplies in very dusty environments must be avoided. The collection of dust on devices can affect functionality and may prevent sufficient cooling, especially in systems with active cooling (fans).

The presence of corrosive gases can also result in impaired functionality. When combined with high temperature and humidity, corrosive gases – e.g. with sulfur, nitrogen and chlorine components – can induce chemical reactions that can damage electronic components very quickly. The presence of corrosive gases is indicated by blackened copper surfaces and cable ends on existing installations.

When operated in dusty or moist environments that could potentially impair functionality, operating/monitoring devices such as the Automation Panel and Power Panel are protected on the front against the ingress of dust or moisture when installed properly (e.g. cutout installation). The back of all devices must be protected from the ingress of dust and moisture, however; any collected dust must be removed at suitable intervals.

1.2.7.3 Viruses and dangerous programs

This system is subject to potential risk each time data is exchanged or software is installed from a data storage medium (e.g. diskette, CD-ROM, USB flash drive, etc.), network connection or the Internet. The user is responsible for assessing these risks, implementing preventive measures such as virus protection programs, firewalls, etc. and making sure that software is obtained only from trusted sources.

1.2.8 Environmentally friendly disposal

All programmable controllers, operating/monitoring devices and uninterruptible power supplies from B&R are designed to minimize harm to the environment as far as possible.

1.2.8.1 Separation of materials

It is necessary to separate out the different materials so that devices can undergo an environmentally friendly recycling process.

Component	Disposal
Programmable logic controllers Operating/Monitoring devices Uninterruptible power supply Batteries and rechargeable batteries Cables	Electronics recycling
Cardboard/Paper packaging	Paper/Cardboard recycling
Plastic packaging material	Plastic recycling

Table 1: Environmentally friendly disposal

Disposal must take place in accordance with applicable legal regulations.

1.2.9 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.

Table 2: Organization of safety notices

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.

Table 3: Organization of general notices

1.2.10 Safety-relevant symbols

The following symbols may appear on the device or its packaging:

Symbol	Explanation
	The operating instructions must be observed. This documentation contains information about types of potential hazards and enables you to identify risks and implement countermeasures.

2 System characteristics

The Power Panel T50 is equipped with an integrated browser and can also be used as a Visual Components client. This Power Panel has Ethernet and USB interfaces as well as various configuration options.

Power Panel T50 devices with glass front and multi-touch technology are compact, easy to configure and perfectly suited for premium machine designs.

The high sensitivity and accuracy of the projected capacitive touch screen improves usability. The multi-touch technology also makes it possible to integrate convenient gestures like zooming and swiping.

Highlights

- High-quality, slim design
- Multi-touch capability
- Widescreen variants up to 15.6" HD
- Easy configuration
- Web-based or VNC-based HMI

2.1 Compact solution

With an extremely compact design, minimal installation depth and intelligent cable outlet arrangement, Power Panels are extreme space-savers that are very easy to install. They also have no hard disks, fans or batteries, which makes them maintenance-free. The front of the panel provides IP65 protection, making these devices extremely well-suited for harsh industrial environments.

2.2 Flexibility

Power Panel T50 devices are available in 5 different display sizes from 5.0" to 15.6" (see "Type overview" on page 13).

Landscape and portrait formats add even more flexibility to the machine layout.

Regardless of model, size and color, what all these devices have in common is a shallow installation depth and minimized border width. At the same time, no compromises were made with regard to stability and seal integrity.

2.3 Simple HMI

The Power Panel T50 is a dedicated HMI device that can be operated in 2 different terminal modes:

- Terminal as a VNC client for VNC-based HMI applications created with Visual Components in Automation Studio.
- Terminal with web browser technology (full screen mode).
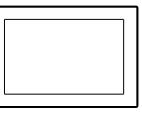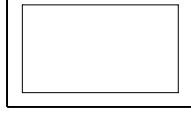
2.4 Model number key

Product area														
6														Device with browser technology

	Product family													
	P	P												Power Panel

			Model											
			T											Terminal series

				Model (processor)										
				5	0									ARM processor (Cortex-A9, dual core)

						Diagonal								
						.	0	5	0					5.0"
						.	0	7	0					7.0"
						.	1	0	1					10.1"
						.	1	2	1					12.1"
						.	1	5	6					15.6"

										Resolution				
										2				WVGA (800 x 480) landscape
										B				HD (1366 x 768) landscape
										E				WXGA (1280 x 800) landscape

											Display / Touch screen technology			
											-	1		TFT color + multi-touch PCT (glass)

													Optional interfaces and features	
													0	No optional interfaces/features
													6	Integrated switch with second Ethernet interface

														Front design
														Standard variants
													B	Black
													A	Black, anti-glare glass
														Industry-specific variant
													I . . .	Seq. number: I[0...Z][0...Z][0...Z]
														Customized panel overlay only
													F . . .	Seq. number: F[0...Z][0...Z][0...Z]
														Complete customized variant
													C . . .	Seq. number: C[0...Z][0...Z][0...Z]

Model or I/O variants														
														Base model
													- 0 1	Derivative: Sequential number [0...Z]

Examples														
6	P	P	T	5	0	.	0	5	0	2	-	1	0	B	Power Panel T50, **5.0"**, glass front, **1x** Gigabit Ethernet. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB 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 10/100/1000 Mbit/s, 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.
6	P	P	T	5	0	.	0	7	0	2	-	1	0	A	Power Panel T50, **7.0"**, glass front **(anti-reflective)**, **1x** Gigabit Ethernet. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: **7.0", 800 x 480 (WVGA)** resolution, projected capacitive touch screen, multi-touch support, **anti-reflective** glass front with black frame, landscape and portrait format configurable with software. Interfaces: **1x** Ethernet 10/100/1000 Mbit/s, 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.
6	P	P	T	5	0	.	1	0	1	E	-	1	6	B	Power Panel T50, **10.1"**, glass front, **2x** Gigabit Ethernet **(integrated switch)**. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB 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: **2x** Ethernet 10/100/1000 Mbit/s **(integrated switch)**, 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.
6	P	P	T	5	0	.	1	0	1	E	-	1	6	A	Power Panel T50, **10.1"**, glass front **(anti-reflective)**, **2x** Gigabit Ethernet **(integrated switch)**. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: **10.1", 1280 x 800 (WXGA)** resolution, projected capacitive touch screen, multi-touch support, **anti-reflective** glass front with black frame, landscape and portrait format configurable with software. Interfaces: **2x** Ethernet 10/100/1000 Mbit/s **(integrated switch)**, 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.

3 Device description

3.1 Type overview

Panel size	5.0"	7.0"	10.1"	12.1"	15.6"
Model number	6PPT50.**0502**-1xx	6PPT50.**0702**-1xx	6PPT50.**101**E-1xx	6PPT50.**121**E-1xx	6PPT50.**156**B-1xx
Format/Resolution	**Portrait/Landscape format**				
Resolution	WVGA 800 x 480	WVGA 800 x 480	WXGA 1280 x 800	WXGA 1280 x 800	HD 1366 x 768
Model number	**0502**	**0702**	**101E**	**121E**	**156B**
	6PPT50.**xxxx**-xxx				
Front	**Black**				
	Glass		Glass, non-reflective		
Model number	6PPT50.xxxx-xx**B**		6PPT50.xxxx-xx**A**		
Interfaces/Features					
	1 Ethernet interface		2 Ethernet interfaces, integrated switch		
Model number	6PPT50.xxxx-x**0**x		6PPT50.xxxx-x**6**x		

3.2 General technical data

Name	Description
Processor	ARM processor, Cortex A9, dual core, 800 MHz
Memory	1 GB DDRAM (64-bit bandwidth)
Interfaces	1 or 2 Ethernet interfaces 10/100BASE-T/1000BASE-T 2x USB 2.0 interfaces
Other	Protection: IP65 (front), IP20 (back) Temperature range from -20 to 60°C Fanless Power supply 24 VDC -15%/+20%

3.2.1 System requirements

General system requirements for Power Panel T50:

Function	Starting with AS version	Starting with AR version	Starting with HW upgrade
General support for Power Panel T50:	4.3.3	4.33	-
OPC UA configuration in Automation Studio	-	-	1.2.0.0

*   AS ... Automation Studio, AR ... Automation Runtime, HW ... Hardware

3.2.2 Projected capacitive touch (PCT)

Starting with the second generation of devices, a new touch controller with improved properties is used:

Power Panel T50	2nd device generation	1st device generation
Operation		
Number of fingers	10	5
Glove operation	Yes	Yes, with limitations
Passive stylus pens	Yes	Yes
Active stylus pens	No	No
Error detection		
Ball of hand	Yes	No
Water	Yes	No
Front		
Hardened front glass	Yes	Yes

Hardware revisions of device generations

Model number	6PPT50.0502-xxx	6PPT50.0702-xxx	6PPT50.101E-xxx	6PPT50.121E-xxx	6PPT50.156B-xxx
Panel size	5.0"	7.0"	10.1"	12.1"	15.6"
1st device generation	<C0	<D0	<D0	<C0	<C0
2nd device generation	≥C0	≥D0	≥D0	≥C0	≥C0

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, Power Panel T50 devices support 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.

3.2.3 Viewing angles

For the viewing angles values (U, D, R, L) of the display types, see the technical data of the respective device.
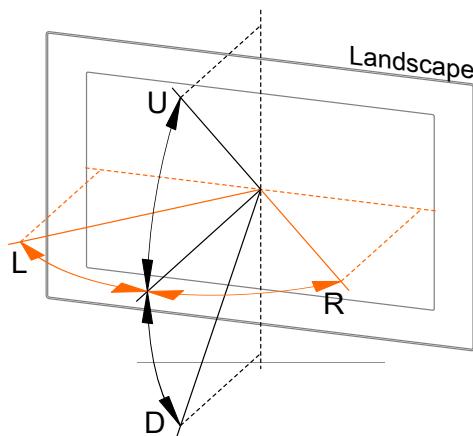
Legend:	Display viewing angle
U	From top
D	From bottom
L	From left
R	From right

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: Interfaces are at the bottom.

3.2.4 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
- 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 Power Panel T50 - 5.0" variants

3.3.1 Order data

Model number	Short description	Figure
	Power Panel T50	
6PPT50.0502-10B	Power Panel T50, 5.0", glas front, 1x Gigabit ethernet. CPU and memory: 800 MHz dual core (ARM Cortex A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 5.0", 800 x 480 (WVGA) resolution, projected capacitive touch screen, multitouch capable, glass front with black frame, landscape and portrait format with SW adjustable. Interfaces: 1x Ethernet 10/100/1000 MBit/s, 2x USB 2.0. Client software: embedded service page, VNC client, embedded web browser.	
6PPT50.0502-10A	Power Panel T50, 5.0", glas front (anti-glare), 1x Gigabit ethernet. CPU and memory: 800 MHz dual core (ARM Cortex A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 5.0", 800 x 480 (WVGA) resolution, projected capacitive touch screen, multitouch capable, anti-glare glass front with black frame, landscape and portrait format with SW adjustable. Interfaces: 1x Ethernet 10/100/1000 MBit/s, 2x USB 2.0. Client software: embedded service page, VNC client, embedded web browser.	
6PPT50.0502-16B	Power Panel T50, 5.0", glas front, 2x Gigabit ethernet (integrated switch). CPU and memory: 800 MHz dual core (ARM Cortex A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 5.0", 800 x 480 (WVGA) resolution, projected capacitive touch screen, multitouch capable, glass front with black frame, landscape and portrait format with SW adjustable. Interfaces: 2x Ethernet 10/100/1000 MBit/s (integrated Switch), 2x USB 2.0. Client software: embedded service page, VNC client, embedded web browser.	
6PPT50.0502-16A	Power Panel T50, 5.0", glas front (anti-glare), 2x Gigabit ethernet (integrated switch). CPU and memory: 800 MHz dual core (ARM Cortex A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 5.0", 800 x 480 (WVGA) resolution, projected capacitive touch screen, multitouch capable, anti-glare glass front with black frame, landscape and portrait format with SW adjustable. Interfaces: 2x Ethernet 10/100/1000 MBit/s (integrated Switch), 2x USB 2.0. Client software: embedded service page, VNC client, embedded web browser.	
	Included in delivery	
	Terminal blocks	
0TB6102.2110-01	Accessory terminal block, 2-pin (3.81), cage clamp terminal block 1.5 mm²	
	Optional accessories	
0TB6102.2010-01	Accessory terminal block, 2-pin (3.81), screw clamp terminal block 1.5 mm²	
	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	

Table: Power Panel T50 - 5.0" variants - Order data

3.3.2 Content of delivery

Name	Quantity	Description
0TB6102.2110-01	1	Accessory terminal block, 2-pin (3.81), cage clamp terminal block 1.5 mm²
-	1	Accessory set 4x retaining clip for fastening the panel in the installation cutout

3.3.3 Technical data

Model number	6PPT50.0502-10B	6PPT50.0502-10A	6PPT50.0502-16B	6PPT50.0502-16A
General information				
Cooling		Passive		
LED status indicators		Ethernet (Link, Activity, Speed)		
B&R ID code	0xEDC0	0xF07F	0xF080	0xF081
Power button		No		
Reset button		No		
Buzzer		Yes		
Certifications				
CE		Yes		
UL (cULus)		LISTED UL 61010 E115267		
DNV GL (DNVGL)	-		In preparation	-
Controller				
Operating system		PPT50 system		
Real-time clock		No		
Processor				
Type		ARM Cortex-A9, dual core		
Clock frequency		800 MHz		
L1 cache		64 kB		
L2 cache		512 kB		
Flash		512 MB		
Mode/Node switches		No		
DRAM		1 GB (64-bit bandwidth)		
Interfaces				
Interface				
Connection		ETH1 (IF1)	ETH1 (IF1) and ETH2 (IF2)	
Type		Ethernet		
Variant		Shielded RJ45	Shielded RJ45 (integrated 2-port switch)	
Line length		Max. 100 m between 2 stations (segment length)		
Max. transfer rate		10/100/1000 Mbit/s		
Transfer				
Physical layer		10BASE-T / 100BASE-TX / 1000BASE-T		
Half-duplex		Yes		
Full-duplex		Yes		
Autonegotiation		Yes		
Auto-MDI / MDIX		Yes		
Interface IF3				
Type		USB 2.0		
Variant		Type A		
Current-carrying capacity		0.5 A		
Interface IF4				
Type		USB 2.0		
Variant		Type A		
Current-carrying capacity		0.5 A		
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 = Typ. 70°		
Vertical		U direction = Typ. 50° / D direction = Typ. 70°		
Backlight				
Type		LED		
Brightness		Typ. 400 cd/m²		
Half-brightness time [1]		30,000 h		
Touch screen				
Type		Multi-touch		
Technology		PCT (projected capacitive touch)		
Surface	Glass, chemically hardened (6H)	Glass, chemically hardened (6H), anti-reflective	Glass, chemically hardened (6H)	Glass, chemically hardened (6H), anti-reflective
Screen rotation		Yes		
Electrical characteristics				
Nominal voltage		24 VDC		
Power consumption [2]		typ. 6.5 W / max. 16 W		
Fuse		3 A slow-blow, internal [3]		
Voltage range		24 VDC (-15% / +20%)		
Reverse polarity protection		Yes		
Electrical isolation		Ethernet (ETH1/IF1) to other interfaces, power supply and ground	Ethernet (ETH1/IF1 and EHT2/IF2) to other interfaces, power supply and ground	

Table: Power Panel T50 - 5.0" variants - Technical data

Model number	6PPT50.0502-10B	6PPT50.0502-10A	6PPT50.0502-16B	6PPT50.0502-16A
Operating conditions				
Permissible mounting orientations				
Standard mounting orientation	Vertical			
Tilt	±25°			
Rotation	In 90° increments (portrait/landscape)			
All other mounting orientations	With derating: Max. operating temperature minus 5°C			
Installation elevation above sea level				
0 to 2000 m	No limitation			
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m			
Degree of protection per EN 60529	Front: IP65, Back: IP20			
Environmental conditions				
Temperature				
Operation	-20 to 60°C			
Storage	-20 to 80°C			
Transport	-20 to 80°C			
Relative humidity	See temperature/humidity diagram.			
Mechanical properties				
Front				
Design	Black			
Dimensions				
Width	156 mm			
Height	112 mm			
Depth	39.7 mm			
Weight	0.6 kg			

Table: Power Panel T50 - 5.0" variants - Technical data

1)   At an ambient temperature of 25°C. Reducing the brightness by 50% can typically result in an approximately 50% increase in the half-brightness time.
2)   Power consumption of device including all interfaces.
3)   The internal fuse cannot be replaced by the user or reset.

3.3.4 Temperature/Humidity diagram
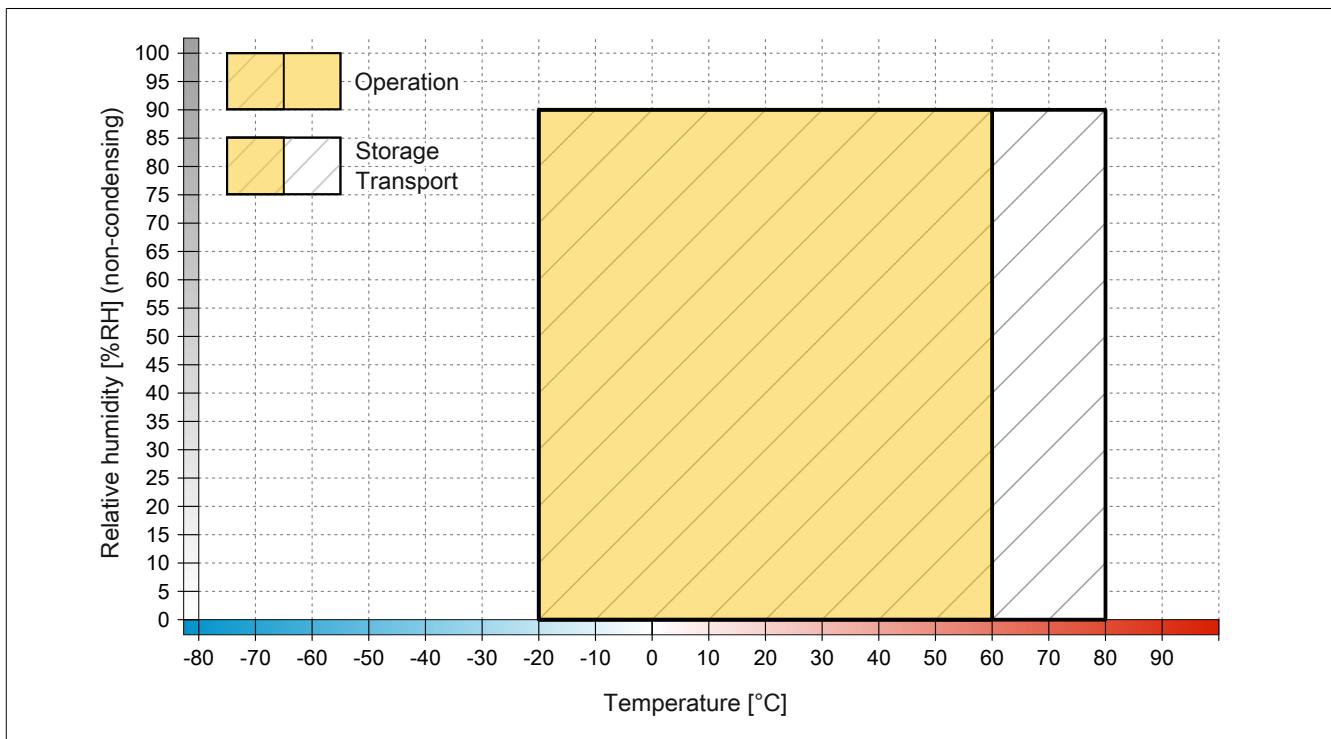
Figure 1: Power Panel T50 - 5.0" variants - Temperature/Humidity diagram

3.3.5 Dimensions
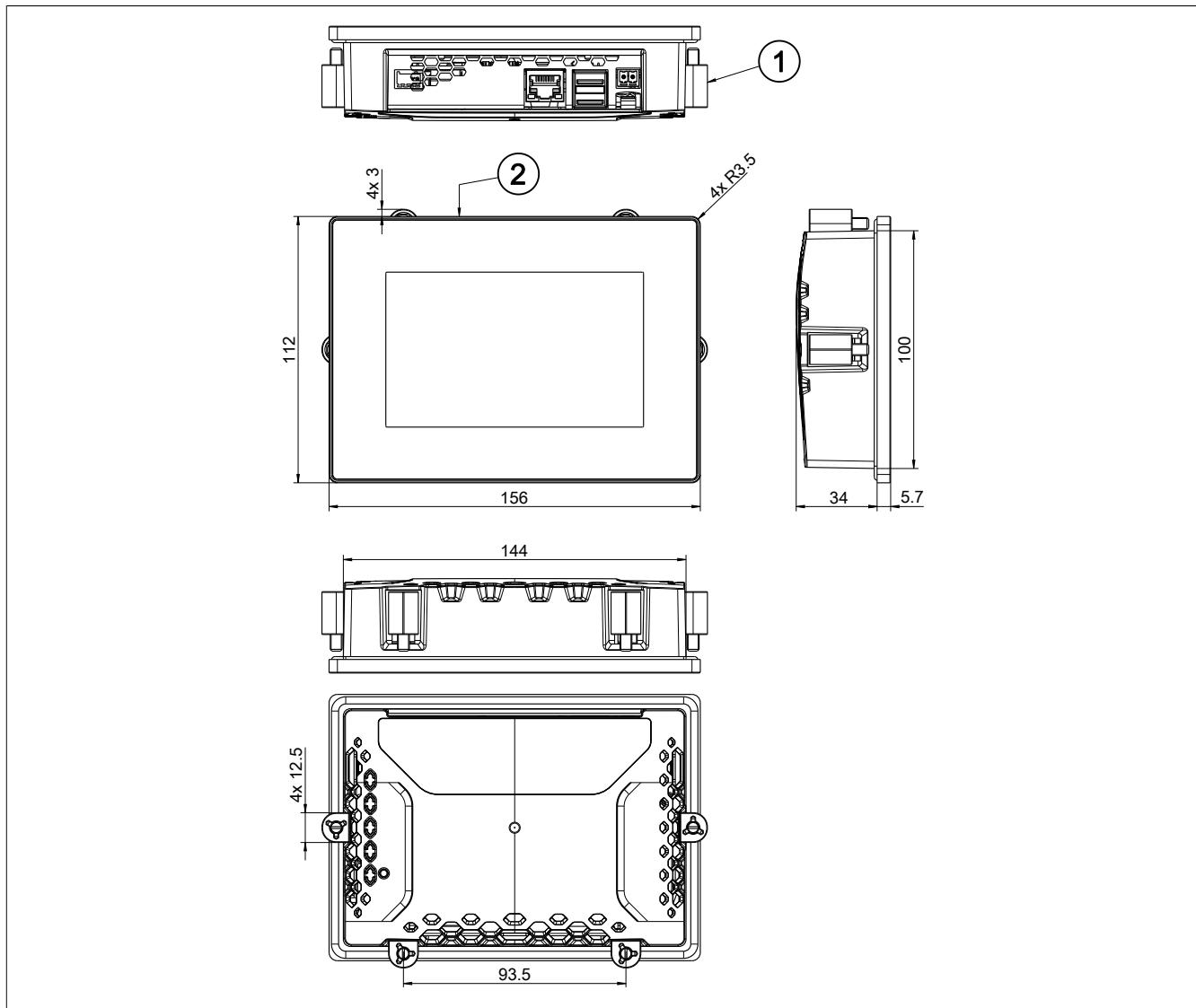
1	4x retaining clips with torque limiting
2	Anodized front plate E6/C8 (black)

Dimensions of the installation cutout for this Power Panel variant: 146 ±1 mm x 102 ±1 mm

See also "Installation cutout requirements" on page 39.

3.4 Power Panel T50 - 7.0" variants

3.4.1 Order data

Model number	Short description	Figure
	Power Panel T50	
6PPT50.0702-10B	Power Panel T50, 7.0", glas front, 1x Gigabit ethernet. CPU and memory: 800 MHz dual core (ARM Cortex A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 7.0", 800 x 480 (WVGA) resolution, projected capacitive touch screen, multitouch capable, glass front with black frame, landscape and portrait format with SW adjustable. Interfaces: 1x Ethernet 10/100/1000 MBit/s, 2x USB 2.0. Client software: embedded service page, VNC client, embedded web browser.	
6PPT50.0702-10A	Power Panel T50, 7.0", glas front (anti-glare), 1x Gigabit ethernet. CPU and memory: 800 MHz dual core (ARM Cortex A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 7.0", 800 x 480 (WVGA) resolution, projected capacitive touch screen, multitouch capable, anti-glare glass front with black frame, landscape and portrait format with SW adjustable. Interfaces: 1x Ethernet 10/100/1000 MBit/s, 2x USB 2.0. Client software: embedded service page, VNC client, embedded web browser.	
6PPT50.0702-16B	Power Panel T50, 7.0", glas front, 2x Gigabit ethernet (integrated switch). CPU and memory: 800 MHz dual core (ARM Cortex A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 7.0", 800 x 480 (WVGA) resolution, projected capacitive touch screen, multitouch capable, glass front with black frame, landscape and portrait format with SW adjustable. Interfaces: 2x Ethernet 10/100/1000 MBit/s (integrated Switch), 2x USB 2.0. Client software: embedded service page, VNC client, embedded web browser.	
6PPT50.0702-16A	Power Panel T50, 7.0", glas front (anti-glare), 2x Gigabit ethernet (integrated switch). CPU and memory: 800 MHz dual core (ARM Cortex A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 7.0", 800 x 480 (WVGA) resolution, projected capacitive touch screen, multitouch capable, anti-glare glass front with black frame, landscape and portrait format with SW adjustable. Interfaces: 2x Ethernet 10/100/1000 MBit/s (integrated Switch), 2x USB 2.0. Client software: embedded service page, VNC client, embedded web browser.	
	Included in delivery	
	Terminal blocks	
0TB6102.2110-01	Accessory terminal block, 2-pin (3.81), cage clamp terminal block 1.5 mm²	
	Optional accessories	
0TB6102.2010-01	Accessory terminal block, 2-pin (3.81), screw clamp terminal block 1.5 mm²	
	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	

Table: Power Panel T50 - 7.0" variants - Order data

3.4.2 Content of delivery

Name	Quantity	Description
0TB6102.2110-01	1	Accessory terminal block, 2-pin (3.81), cage clamp terminal block 1.5 mm²
-	1	Accessory set 6x retaining clip for fastening the panel in the installation cutout

3.4.3 Technical data

Model number	6PPT50.0702-10B	6PPT50.0702-10A	6PPT50.0702-16B	6PPT50.0702-16A
General information				
Cooling		Passive		
LED status indicators		Ethernet (Link, Activity, Speed)		
B&R ID code	0xEB2A	0xF082	0xF083	0xF084
Power button		No		
Reset button		No		
Buzzer		Yes		
Certifications				
CE		Yes		
UL (cULus)		LISTED UL 61010 E115267		
DNV GL (DNVGL)	-		In preparation	-
Controller				
Operating system		PPT50 system		
Real-time clock		No		
Processor				
Type		ARM Cortex A9, dual core		
Clock frequency		800 MHz		
L1 cache		64 kB		
L2 cache		512 kB		
Flash		512 MB		
Mode/Node switches		No		
DRAM		1 GB (64-bit bandwidth)		
Interfaces				
Interface				
Connection		ETH1 (IF1)	ETH1 (IF1) and ETH2 (IF2)	
Type		Ethernet		
Variant		Shielded RJ45	Shielded RJ45 (integrated 2-port switch)	
Line length		Max. 100 m between 2 stations (segment length)		
Max. transfer rate		10/100/1000 Mbit/s		
Transfer				
Physical layer		10BASE-T / 100BASE-TX / 1000BASE-T		
Half-duplex		Yes		
Full-duplex		Yes		
Autonegotiation		Yes		
Auto-MDI / MDIX		Yes		
Interface IF3				
Type		USB 2.0		
Variant		Type A		
Current-carrying capacity		0.5 A		
Interface IF4				
Type		USB 2.0		
Variant		Type A		
Current-carrying capacity		0.5 A		
Display				
Type		Color TFT		
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		L direction / R direction = typ. 70°		
Vertical		Direction U / Direction D = Typ. 60°		
Backlight				
Type		LED		
Brightness		Typ. 500 cd/m²		
Half-brightness time [1]		50,000 h		
Touch screen				
Type		Multi-touch		
Technology		PCT (projected capacitive touch)		
Surface	Glass, chemically hardened (6H)	Glass, chemically hardened (6H), anti-reflective	Glass, chemically hardened (6H)	Glass, chemically hardened (6H), anti-reflective
Screen rotation		Yes		
Electrical characteristics				
Nominal voltage		24 VDC		
Power consumption [2]		typ. 8.5 W / max. 16 W		
Fuse		3 A slow-blow, internal [3]		
Voltage range		24 VDC (-15% / +20%)		
Reverse polarity protection		Yes		
Electrical isolation		Ethernet (ETH1/IF1) to other interfaces, power supply and ground	Ethernet (ETH1/IF1 and EHT2/IF2) to other interfaces, power supply and ground	

Table: Power Panel T50 - 7.0" variants - Technical data

Model number	6PPT50.0702-10B	6PPT50.0702-10A	6PPT50.0702-16B	6PPT50.0702-16A
Operating conditions				
Permissible mounting orientations				
Standard mounting orientation	Vertical			
Tilt	±25°			
Rotation	In 90° increments (portrait/landscape)			
All other mounting orientations	With derating: Max. operating temperature minus 5°C			
Installation elevation above sea level				
0 to 2000 m	No limitations			
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m			
Degree of protection per EN 60529	Front: IP65, Back: IP20			
Environmental conditions				
Temperature				
Operation	-20 to 60°C			
Storage	-20 to 80°C			
Transport	-20 to 80°C			
Relative humidity	See temperature/humidity diagram			
Mechanical properties				
Front				
Design	Black			
Dimensions				
Width	197 mm			
Height	140 mm			
Depth	42.2 mm			
Weight	0.9 kg			

Table: Power Panel T50 - 7.0" variants - Technical data

1) At an ambient temperature of 25°C. Reducing the brightness by 50% can typically result in an approximately 50% increase in the half-brightness time.
2) Power consumption of device including all interfaces.
3) The internal fuse cannot be replaced by the user or reset.

3.4.4 Temperature/Humidity diagram
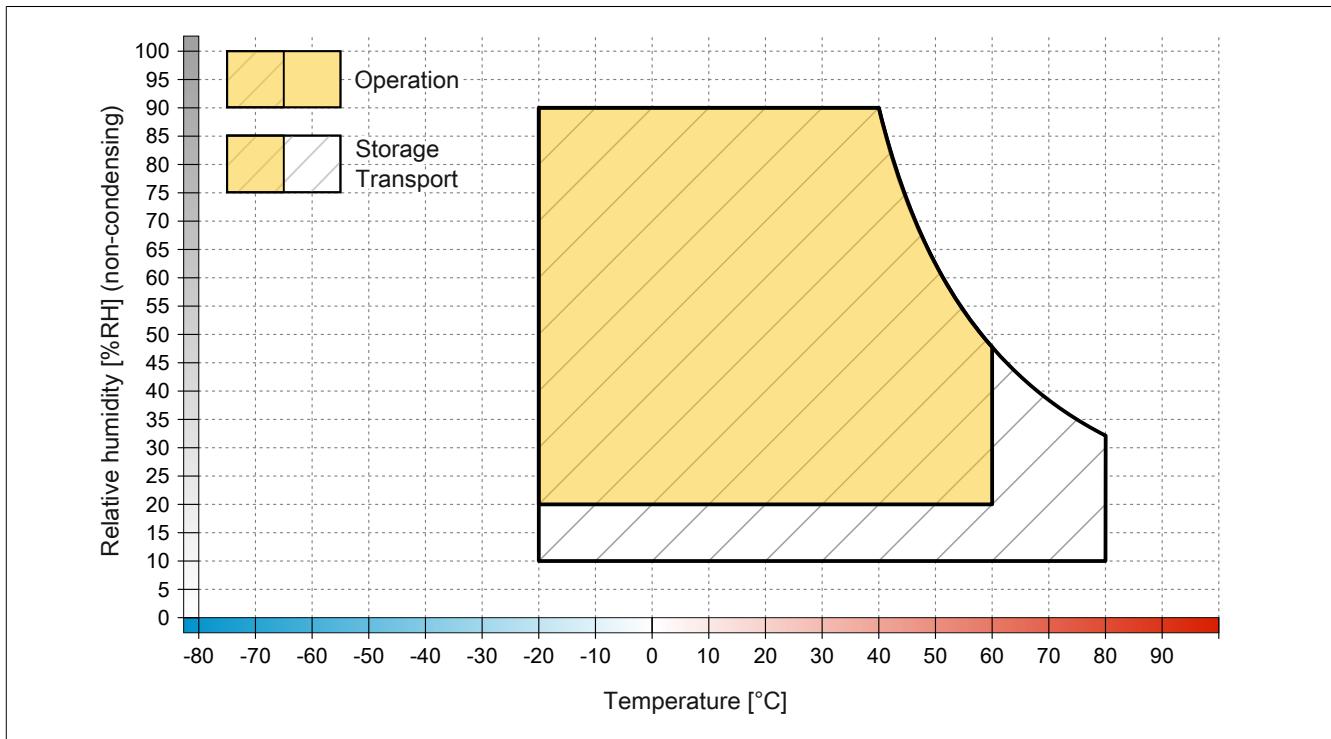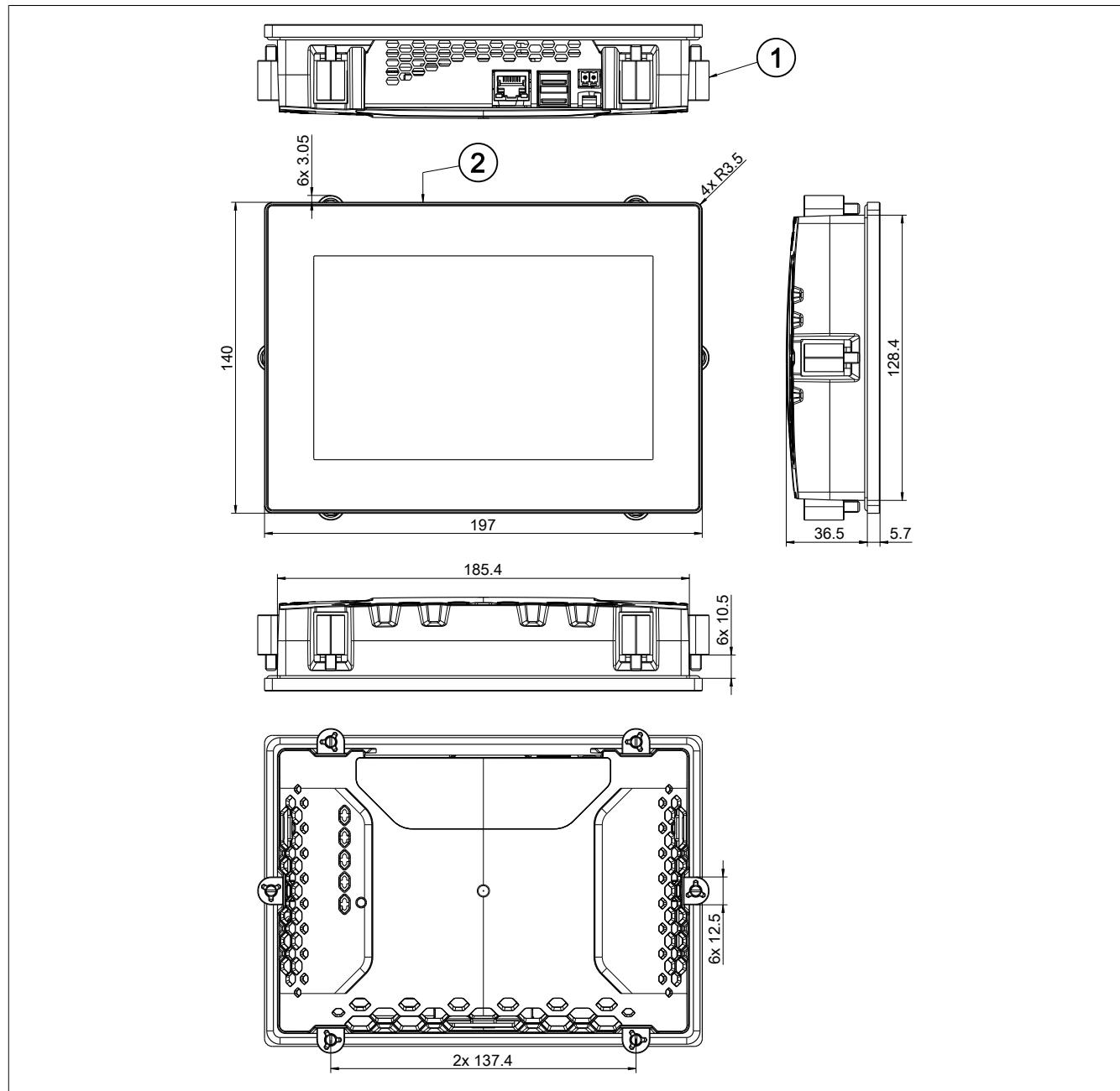

Figure: Power Panel T50 - 7.0" variants - Temperature/Humidity diagram

3.4.5 Dimensions

1	6x retaining clips with torque limiting
2	Anodized front plate E6/C8 (black)

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

See also "Installation cutout requirements" on page 39.

3.5 Power Panel T50 - 10.1" variants

3.5.1 Order data

Model number	Short description	Figure
	Power Panel T50	
6PPT50.101E-10B	Power Panel T50, 10.1", glass front, 1x Gigabit Ethernet. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB 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 10/100/1000 Mbit/s, 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.	
6PPT50.101E-10A	Power Panel T50, 10.1", glass front (anti-reflective), 1x Gigabit Ethernet. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 10.1", 1280 x 800 (WXGA) resolution, projected capacitive touch screen, multi-touch support, anti-reflective glass front with black frame, landscape and portrait format configurable with software. Interfaces: 1x Ethernet 10/100/1000 Mbit/s, 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.	
6PPT50.101E-16B	Power Panel T50, 10.1", glass front, 2x Gigabit Ethernet (integrated switch). CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB 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: 2x Ethernet 10/100/1000 MBit/s (integrated switch), 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.	
6PPT50.101E-16A	Power Panel T50, 10.1", glass front (anti-reflective), 2x Gigabit Ethernet (integrated switch). CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 10.1", 1280 x 800 (WXGA) resolution, projected capacitive touch screen, multi-touch support, anti-reflective glass front with black frame, landscape and portrait format configurable with software. Interfaces: 2x Ethernet 10/100/1000 MBit/s (integrated switch), 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.	
	Included in delivery	
	Terminal blocks	
0TB6102.2110-01	Accessory terminal block, 2-pin (3.81), cage clamp terminal block 1.5 mm²	
	Optional accessories	
0TB6102.2010-01	Accessory terminal block, 2-pin (3.81), screw clamp terminal block 1.5 mm²	
	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	

Table: Power Panel T50 - 10.1" variants - Order data

3.5.2 Content of delivery

Name	Quantity	Description
0TB6102.2110-01	1	Accessory terminal block, 2-pin (3.81), cage clamp terminal block 1.5 mm²
-	1	Accessory set 8x retaining clip for fastening the panel in the installation cutout

3.5.3 Technical data

Model number	6PPT50.101E-10B	6PPT50.101E-10A	6PPT50.101E-16B	6PPT50.101E-16A
General information				
Cooling		Passive		
LED status indicators		Ethernet (Link, Activity, Speed)		
B&R ID code	0xEDC1	0xF085	0xF086	0xF087
Power button		No		
Reset button		No		
Buzzer		Yes		
Certifications				
CE		Yes		
UL (cULus)		LISTED UL 61010 E115267		
DNV GL (DNVGL)	-		In preparation	-
Controller				
Operating system		PPT50 system		
Real-time clock		No		
Processor				
Type		ARM Cortex A9, dual core		
Clock frequency		800 MHz		
L1 cache		64 kB		
L2 cache		512 kB		
Flash		512 MB		
Mode/Node switches		No		
DRAM		1 GB (64-bit bandwidth)		
Interfaces				
Interface				
Connection		ETH1 (IF1)	ETH1 (IF1) and ETH2 (IF2)	
Type		Ethernet		
Variant		Shielded RJ45	Shielded RJ45 (integrated 2-port switch)	
Line length		Max. 100 m between 2 stations (segment length)		
Max. transfer rate		10/100/1000 Mbit/s		
Transfer				
Physical layer		10BASE-T / 100BASE-TX / 1000BASE-T		
Half-duplex		Yes		
Full-duplex		Yes		
Autonegotiation		Yes		
Auto-MDI / MDIX		Yes		
Interface IF3				
Type		USB 2.0		
Variant		Type A		
Current-carrying capacity		0.5 A		
Interface IF4				
Type		USB 2.0		
Variant		Type A		
Current-carrying capacity		0.5 A		
Display				
Type		Color TFT		
Diagonal		10.1"		
Colors		16.7 million (RGB, 8 bits per channel)		
Resolution		WXGA, 1280 x 800 pixels		
Contrast		Typ. 800:1		
Viewing angles				
Horizontal		L direction / R direction = typ. 85°		
Vertical		Direction U / Direction D = Typ. 85°		
Backlight				
Type		LED		
Brightness		Typ. 500 cd/m²		
Half-brightness time [1]		50,000 h		
Touch screen				
Type		Multi-touch		
Technology		PCT (projected capacitive touch)		
Surface	Glass, chemically hardened (6H)	Glass, chemically hardened (6H), anti-reflective	Glass, chemically hardened (6H)	Glass, chemically hardened (6H), anti-reflective
Screen rotation		Yes		
Electrical characteristics				
Nominal voltage		24 VDC		
Power consumption [2]		typ. 10.5 W / max. 16 W		
Fuse		3 A slow-blow, internal [3]		
Voltage range		24 VDC (-15% / +20%)		
Reverse polarity protection		Yes		
Electrical isolation	Ethernet (ETH1/IF1) to other interfaces, power supply and ground		Ethernet (ETH1/IF1 and EHT2/IF2) to other interfaces, power supply and ground	

Table: Power Panel T50 - 10.1" variants - Technical data

Model number	6PPT50.101E-10B	6PPT50.101E-10A	6PPT50.101E-16B	6PPT50.101E-16A
Operating conditions				
Permissible mounting orientations				
Standard mounting orientation		Vertical		
Tilt		±25°		
Rotation		In 90° increments (portrait/landscape)		
All other mounting orientations		With derating: Max. operating temperature minus 5°C		
Installation elevation above sea level				
0 to 2000 m		No limitations		
>2000 m		Reduction of ambient temperature by 0.5°C per 100 m		
Degree of protection per EN 60529		Front: IP65, Back: IP20		
Environmental conditions				
Temperature				
Operation		-20 to 60°C		
Storage		-20 to 80°C		
Transport		-20 to 80°C		
Relative humidity		See temperature/humidity diagram		
Mechanical properties				
Front				
Design		Black		
Dimensions				
Width		271.5 mm		
Height		190 mm		
Depth		42.2 mm		
Weight		1.3 kg		

Table: Power Panel T50 - 10.1" variants - Technical data

1) At an ambient temperature of 25°C. Reducing the brightness by 50% can typically result in an approximately 50% increase in the half-brightness time.
2) Power consumption of device including all interfaces.
3) The internal fuse cannot be replaced by the user or reset.

3.5.4 Temperature/Humidity diagram
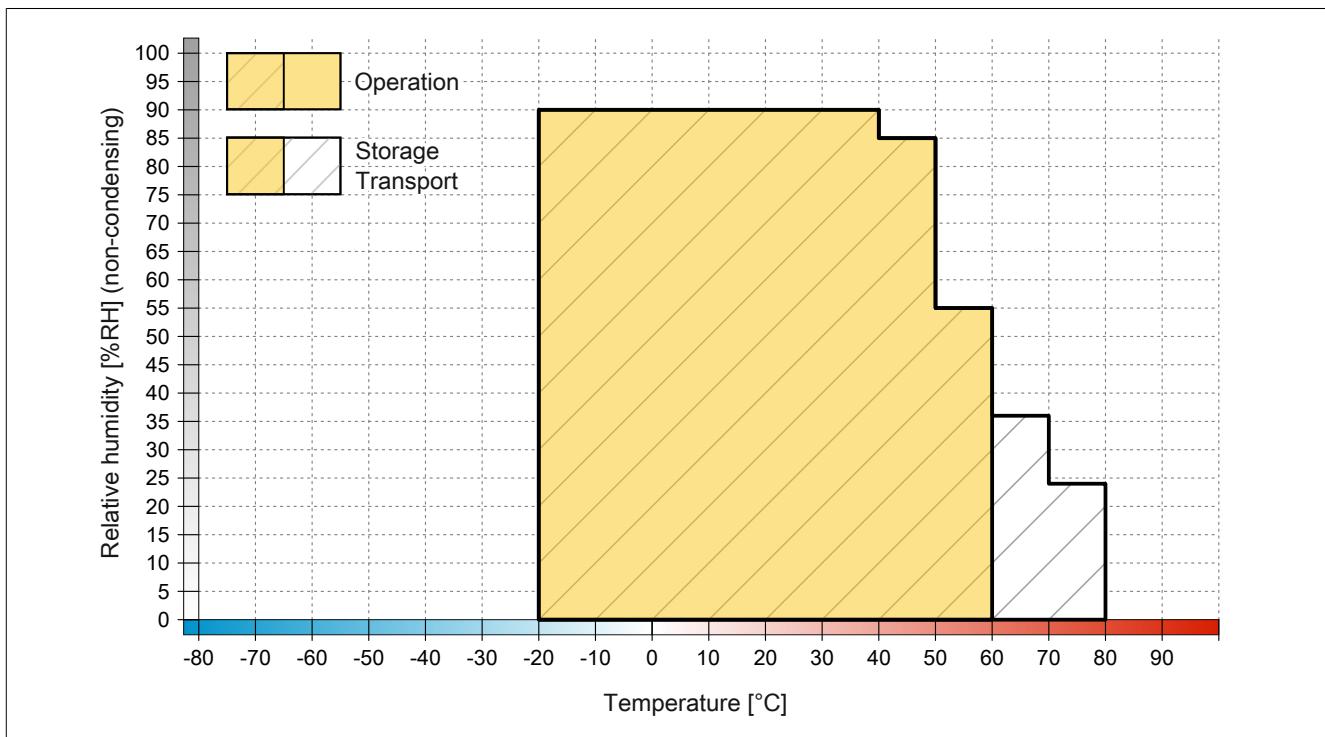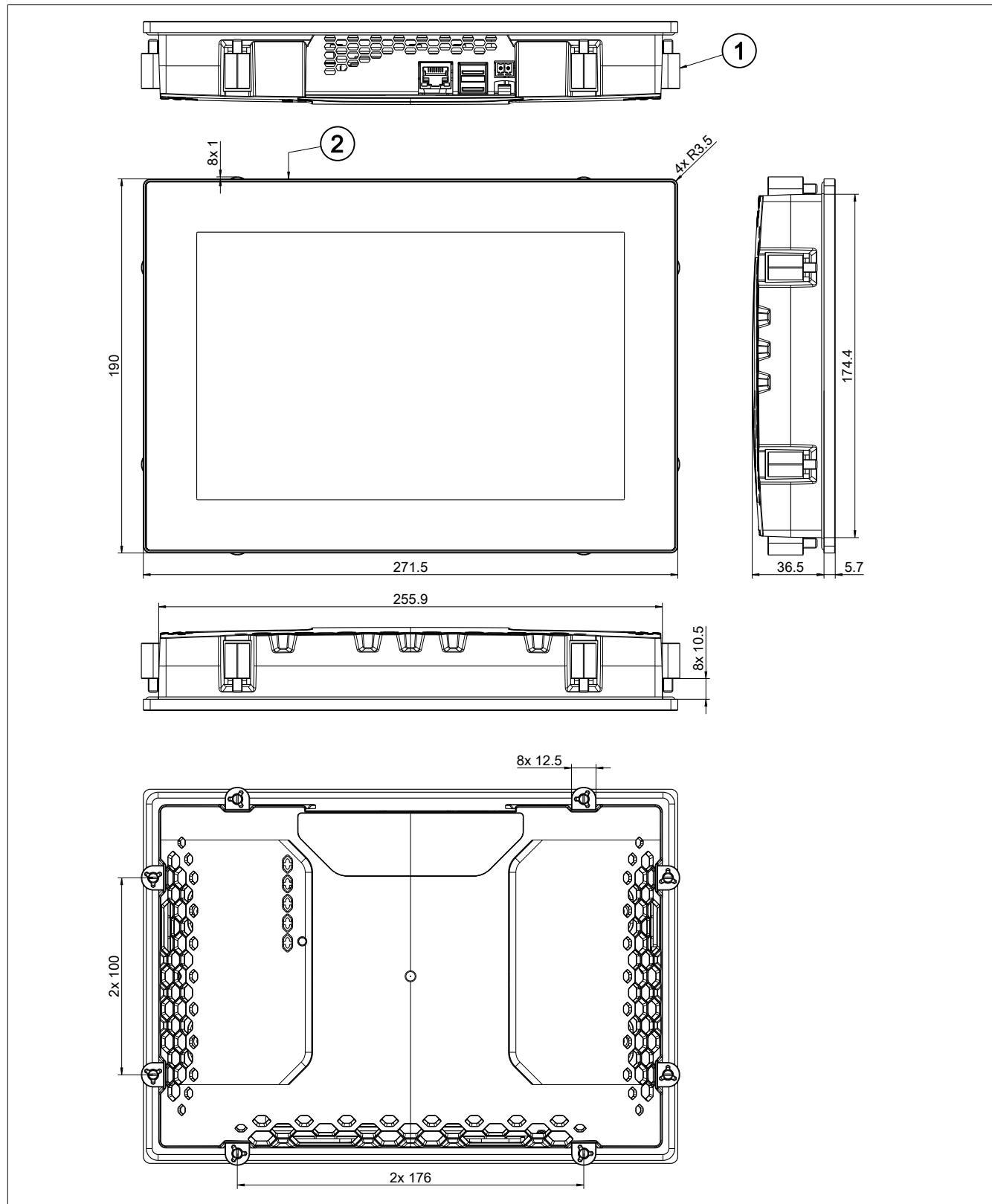

Figure: Power Panel T50 - 10.1" variants - Temperature/Humidity diagram

3.5.5 Dimensions

1	8x retaining clips with torque limiting
2	Anodized front plate E6/C8 (black)

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

See also "Installation cutout requirements" on page 39.

3.6 Power Panel T50 - 12.1" variants

3.6.1 Order data

Model number	Short description	Figure
	Power Panel T50	
6PPT50.121E-10B	Power Panel T50, 12.1", glass front, 1x Gigabit Ethernet. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 12.1", 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 10/100/1000 Mbit/s, 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.	
6PPT50.121E-10A	Power Panel T50, 12.1", glass front (anti-reflective), 1x Gigabit Ethernet. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 12.1", 1280 x 800 (WXGA) resolution, projected capacitive touch screen, multi-touch support, anti-reflective glass front with black frame, landscape and portrait format configurable with software. Interfaces: 1x Ethernet 10/100/1000 Mbit/s, 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.	
6PPT50.121E-16B	Power Panel T50, 12.1", glass front, 2x Gigabit Ethernet (integrated switch). CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 12.1", 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: 2x Ethernet 10/100/1000 MBit/s (integrated switch), 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.	
6PPT50.121E-16A	Power Panel T50, 12.1", glass front (anti-reflective), 2x Gigabit Ethernet (integrated switch). CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 12.1", 1280 x 800 (WXGA) resolution, projected capacitive touch screen, multi-touch support, anti-reflective glass front with black frame, landscape and portrait format configurable with software. Interfaces: 2x Ethernet 10/100/1000 MBit/s (integrated switch), 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.	
	Included in delivery	
	Terminal blocks	
0TB6102.2110-01	Accessory terminal block, 2-pin (3.81), cage clamp terminal block 1.5 mm²	
	Optional accessories	
0TB6102.2010-01	Accessory terminal block, 2-pin (3.81), screw clamp terminal block 1.5 mm²	
	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	

Table: Power Panel T50 - 12.1" variants - Order data

3.6.2 Content of delivery

Name	Quantity	Description
0TB6102.2110-01	1	Accessory terminal block, 2-pin (3.81), cage clamp terminal block 1.5 mm²
-	1	Accessory set 8x retaining clip for fastening the panel in the installation cutout

3.6.3 Technical data

Model number	6PPT50.121E-10B	6PPT50.121E-10A	6PPT50.121E-16B	6PPT50.121E-16A
General information				
Cooling	Passive			
LED status indicators	Ethernet (Link, Activity, Speed)			
B&R ID code	0xF1F7	0xF1F9	0xF1F8	0xF1FA
Power button	No			
Reset button	No			
Buzzer	Yes			
Certifications				
CE	Yes			
Controller				
Operating system	PPT50 system			
Real-time clock	No			
Processor				
Type	ARM Cortex-A9, dual core			
Clock frequency	800 MHz			
L1 cache	64 kB			
L2 cache	512 kB			
Flash	512 MB			
Mode/Node switches	No			
DRAM	1 GB (64-bit bandwidth)			
Interfaces				
Interface				
Connection	ETH1 (IF1)		ETH1 (IF1) and ETH2 (IF2)	
Type	Ethernet			
Variant	Shielded RJ45		Shielded RJ45 (integrated 2-port switch)	
Line length	Max. 100 m between 2 stations (segment length)			
Max. transfer rate	10/100/1000 Mbit/s			
Transfer				
Physical layer	10BASE-T / 100BASE-TX / 1000BASE-T			
Half-duplex	Yes			
Full-duplex	Yes			
Autonegotiation	Yes			
Auto-MDI / MDIX	Yes			
Interface IF3				
Type	USB 2.0			
Variant	Type A			
Current-carrying capacity	0.5 A			
Interface IF4				
Type	USB 2.0			
Variant	Type A			
Current-carrying capacity	0.5 A			
Display				
Type	TFT color			
Diagonal	12.1"			
Colors	16.7 million (RGB, 8 bits per channel)			
Resolution	WXGA, 1280 x 800 pixels			
Contrast	Typ. 800:1			
Viewing angles				
Horizontal	Direction L / Direction R = Typ. 80°			
Vertical	U direction = Typ. 80° / D direction = Typ. 65°			
Backlight				
Type	LED			
Brightness	Typ. 400 cd/m²			
Half-brightness time [1]	50,000 h			
Touch screen				
Type	Multi-touch			
Technology	PCT (projected capacitive touch)			
Surface	Glass, chemically hardened (6H)	Glass, chemically hardened (6H), anti-reflective	Glass, chemically hardened (6H)	Glass, chemically hardened (6H), anti-reflective
Screen rotation	Yes			
Electrical characteristics				
Nominal voltage	24 VDC			
Power consumption [2]	typ. 12.5 W / max. 30 W			
Fuse	3 A slow-blow, internal [3]			
Voltage range	24 VDC (-15% / +20%)			
Reverse polarity protection	Yes			
Electrical isolation	Ethernet (ETH1/IF1) to other interfaces, power supply and ground		Ethernet (ETH1/IF1 and EHT2/IF2) to other interfaces, power supply and ground	

Table: Power Panel T50 - 12.1" variants - Technical data

Model number	6PPT50.121E-10B	6PPT50.121E-10A	6PPT50.121E-16B	6PPT50.121E-16A
Operating conditions				
Permissible mounting orientations				
Standard mounting orientation	Vertical			
Tilt	±25°			
Rotation	In 90° increments (portrait/landscape)			
All other mounting orientations	With derating: Max. operating temperature minus 5°C			
Installation elevation above sea level				
0 to 2000 m	No limitation			
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m			
Degree of protection per EN 60529	Front: IP65, Back: IP20			
Environmental conditions				
Temperature				
Operation	-20 to 60°C			
Storage	-20 to 80°C			
Transport	-20 to 80°C			
Relative humidity	See temperature/humidity diagram.			
Mechanical properties				
Front				
Design	Black			
Dimensions				
Width	324 mm			
Height	221.5 mm			
Depth	41.7 mm			
Weight	2.0 kg			

Table: Power Panel T50 - 12.1" variants - Technical data

1) At an ambient temperature of 25°C. Reducing the brightness by 50% can typically result in an approximately 50% increase in the half-brightness time.
2) Power consumption of device including all interfaces.
3) The internal fuse cannot be replaced by the user or reset.

3.6.4 Temperature/Humidity diagram

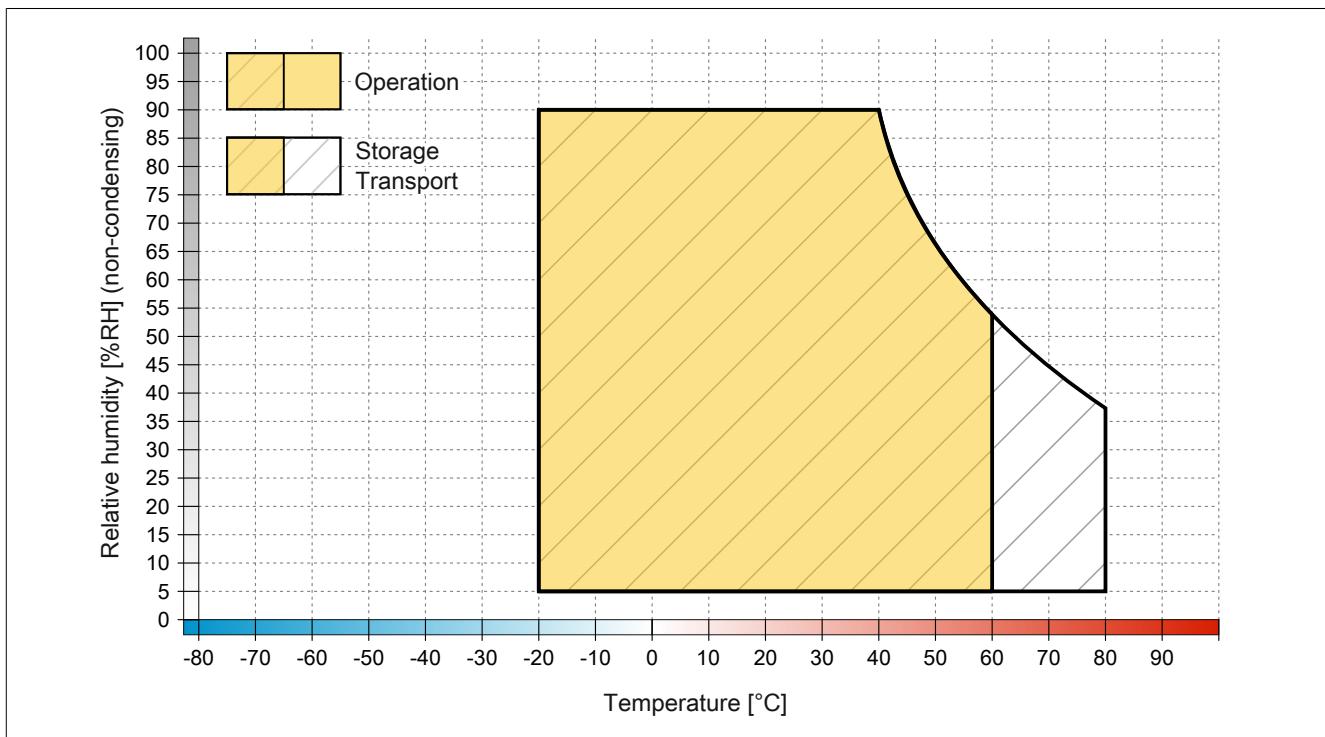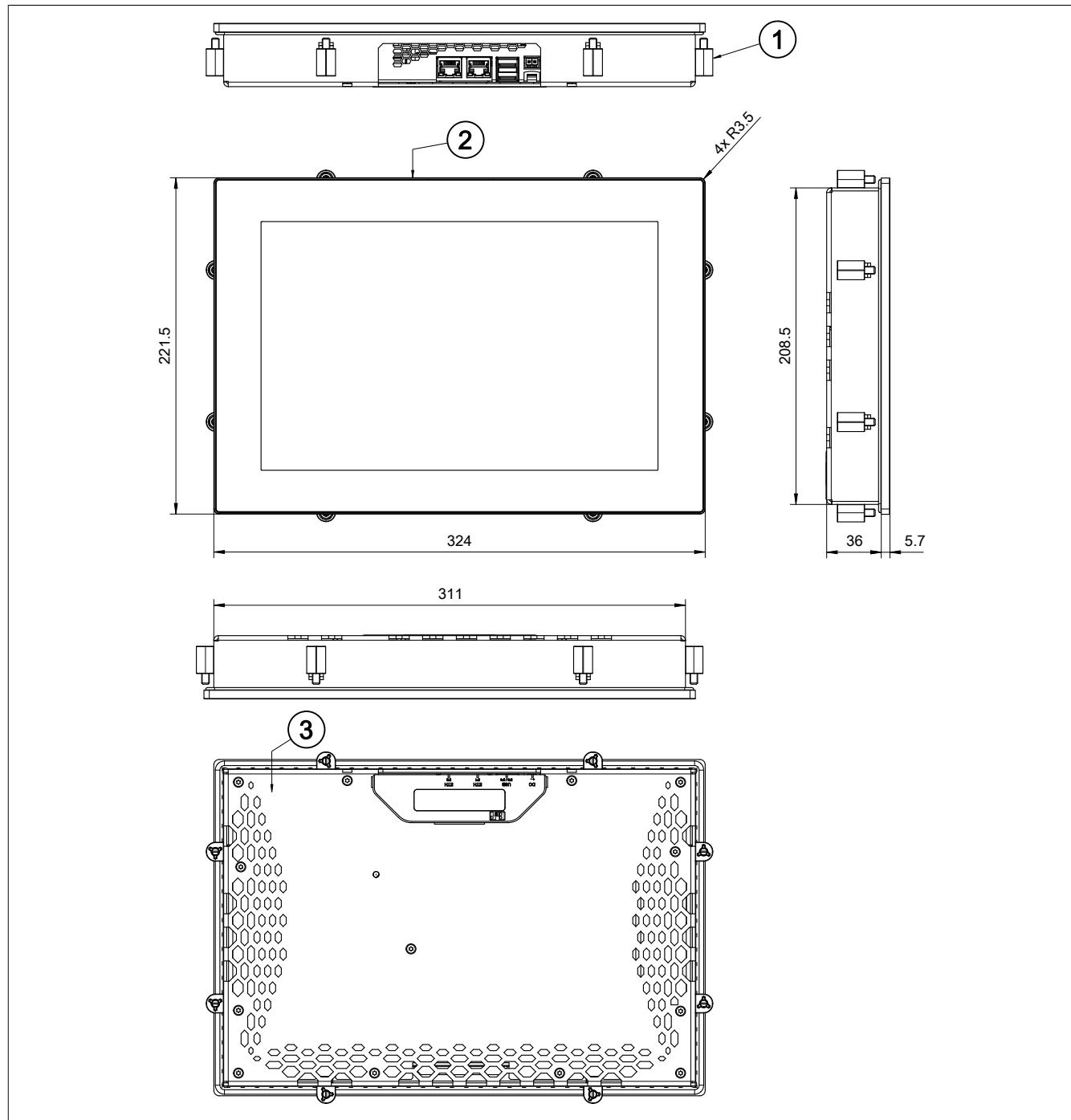Figure: Power Panel T50 - 12.1" variants - Temperature/Humidity diagram

3.6.5 Dimensions

1	8x retaining clips with torque limiting
2	Anodized front plate E6/C8 (black)
3	Power-coated cover, RAL 9005, fine structure, flat

Dimensions of the installation cutout for this Power Panel variant: 313 ±1 mm x 210.5 ±1 mm

See also "Installation cutout requirements" on page 39.

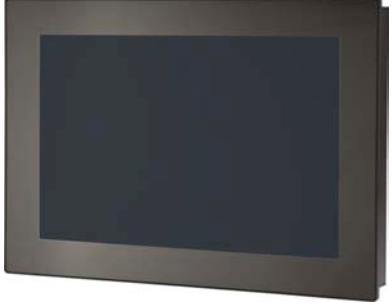## 3.7 Power Panel T50 - 15.6" variants

3.7.1 Order data

Model number	Short description	Figure
	Power Panel T50	
6PPT50.156B-10B	Power Panel T50, 15.6", glass front, 1x Gigabit Ethernet. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 15.6", 1366 x 768 (HD) resolution, projected capacitive touch screen, multi-touch support, glass front with black frame, landscape and portrait format configurable with software. Interfaces: 1x Ethernet 10/100/1000 Mbit/s, 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.	
6PPT50.156B-10A	Power Panel T50, 15.6", glass front (anti-reflective), 1x Gigabit Ethernet. CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 15.6", 1366 x 768 (HD) resolution, projected capacitive touch screen, multi-touch support, anti-reflective glass front with black frame, landscape and portrait format configurable with software. Interfaces: 1x Ethernet 10/100/1000 Mbit/s, 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.	
6PPT50.156B-16B	Power Panel T50, 15.6", glass front, 2x Gigabit Ethernet (integrated switch). CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 15.6", 1366 x 768 (HD) resolution, projected capacitive touch screen, multi-touch support, glass front with black frame, landscape and portrait format configurable with software. Interfaces: 2x Ethernet 10/100/1000 MBit/s (integrated switch), 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.	
6PPT50.156B-16A	Power Panel T50, 15.6", glass front (anti-reflective), 2x Gigabit Ethernet (integrated switch). CPU and memory: 800 MHz dual core (ARM Cortex-A9), 1 GB RAM, 2 GB onboard flash drive. Display and touch screen: 15.6", 1366 x 768 (HD) resolution, projected capacitive touch screen, multi-touch support, anti-reflective glass front with black frame, landscape and portrait format configurable with software. Interfaces: 2x Ethernet 10/100/1000 MBit/s (integrated switch), 2x USB 2.0. Client software: Integrated service page, VNC client, embedded web browser.	
	Included in delivery	
	Terminal blocks	
0TB6102.2110-01	Accessory terminal block, 2-pin (3.81), cage clamp terminal block 1.5 mm²	
	Optional accessories	
0TB6102.2010-01	Accessory terminal block, 2-pin (3.81), screw clamp terminal block 1.5 mm²	
	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	

Table: Power Panel T50 - 15.6" variants - Order data

3.7.2 Content of delivery

Name	Quantity	Description
0TB6102.2110-01	1	Accessory terminal block, 2-pin (3.81), cage clamp terminal block 1.5 mm²
-	1	Accessory set 9x retaining clip for securing the panel in the installation cutout
-	2	Cable clamps for securing / strain relief of connecting cables.

3.7.3 Technical data

Model number	6PPT50.156B-10B	6PPT50.156B-10A	6PPT50.156B-16B	6PPT50.156B-16A
General information				
Cooling		Passive		
LED status indicators		Ethernet (Link, Activity, Speed)		
B&R ID code	0xF1FB	0xF1FD	0xF1FC	0xF1FE
Power button		No		
Reset button		No		
Buzzer		Yes		
Certifications				
CE		Yes		
Controller				
Operating system		PPT50 system		
Real-time clock		No		
Processor				
Type		ARM Cortex-A9, dual core		
Clock frequency		800 MHz		
L1 cache		64 kB		
L2 cache		512 kB		
Flash		512 MB		
Mode/Node switches		No		
DRAM		1 GB (64-bit bandwidth)		
Interfaces				
Interface				
Connection	ETH1 (IF1)		ETH1 (IF1) and ETH2 (IF2)	
Type		Ethernet		
Variant	Shielded RJ45		Shielded RJ45 (integrated 2-port switch)	
Line length		Max. 100 m between 2 stations (segment length)		
Max. transfer rate		10/100/1000 Mbit/s		
Transfer				
Physical layer		10BASE-T / 100BASE-TX / 1000BASE-T		
Half-duplex		Yes		
Full-duplex		Yes		
Autonegotiation		Yes		
Auto-MDI / MDIX		Yes		
Interface IF3				
Type		USB 2.0		
Variant		Type A		
Current-carrying capacity		0.5 A		
Interface IF4				
Type		USB 2.0		
Variant		Type A		
Current-carrying capacity		0.5 A		
Display				
Type		TFT color		
Diagonal		15.6"		
Colors		16.7 million (RGB, 8 bits per channel)		
Resolution		HD, 1366 x 768 pixels		
Contrast		Typ. 1000:1		
Viewing angles				
Horizontal		Direction L / Direction R = Typ. 85°		
Vertical		Direction U / Direction D = Typ. 85°		
Backlight				
Type		LED		
Brightness		Typ. 400 cd/m²		
Half-brightness time [1]		70,000 h		
Touch screen				
Type		Multi-touch		
Technology		PCT (projected capacitive touch)		
Surface	Glass, chemically hardened (6H)	Glass, chemically hardened (6H), anti-reflective	Glass, chemically hardened (6H)	Glass, chemically hardened (6H), anti-reflective
Screen rotation		Yes		
Electrical characteristics				
Nominal voltage		24 VDC		
Power consumption [2]		typ. 24 W / max. 30 W		
Fuse		3 A slow-blow, internal [3]		
Voltage range		24 VDC (-15% / +20%)		
Reverse polarity protection		Yes		
Electrical isolation	Ethernet (ETH1/IF1) to other interfaces, power supply and ground		Ethernet (ETH1/IF1 and EHT2/IF2) to other interfaces, power supply and ground	

Table: Power Panel T50 - 15.6" variants - Technical data

Model number	6PPT50.156B-10B	6PPT50.156B-10A	6PPT50.156B-16B	6PPT50.156B-16A
Operating conditions				
Permissible mounting orientations				
Standard mounting orientation	Vertical			
Tilt	±25°			
Rotation	In 90° increments (portrait/landscape)			
All other mounting orientations	With derating: Max. operating temperature minus 5°C			
Installation elevation above sea level				
0 to 2000 m	No limitation			
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m			
Degree of protection per EN 60529	Front: IP65, Back: IP20			
Environmental conditions				
Temperature				
Operation	-20 to 60°C			
Storage	-20 to 80°C			
Transport	-20 to 80°C			
Relative humidity	See temperature/humidity diagram.			
Mechanical properties				
Front				
Design	Black			
Dimensions				
Width	414 mm			
Height	258.5 mm			
Depth	41.7 mm			
Weight	3.1 kg			

Table: Power Panel T50 - 15.6" variants - Technical data

1) At an ambient temperature of 25°C. Reducing the brightness by 50% can typically result in an approximately 50% increase in the half-brightness time.
2) Power consumption of device including all interfaces.
3) The internal fuse cannot be replaced by the user or reset.

3.7.4 Temperature/Humidity diagram
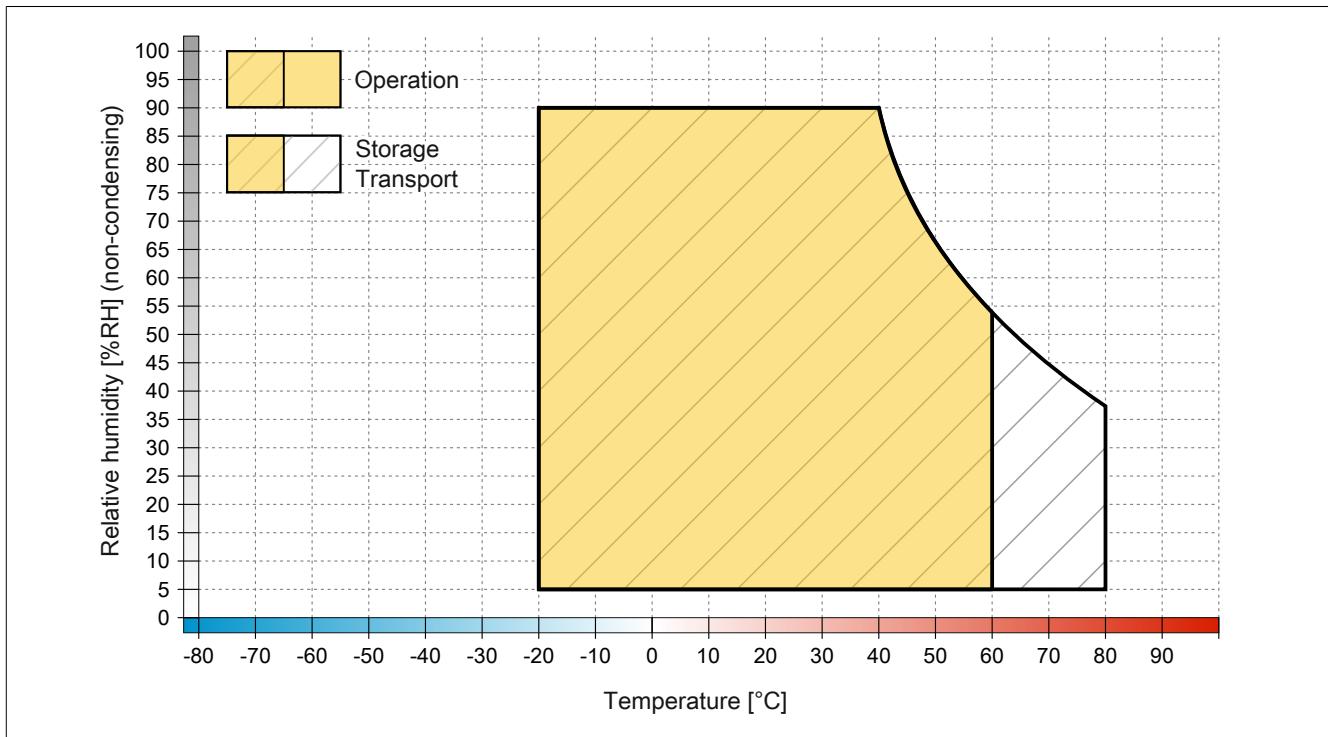
Figure: Power Panel T50 - 15.6" variants - Temperature/Humidity diagram

3.7.5 Dimensions

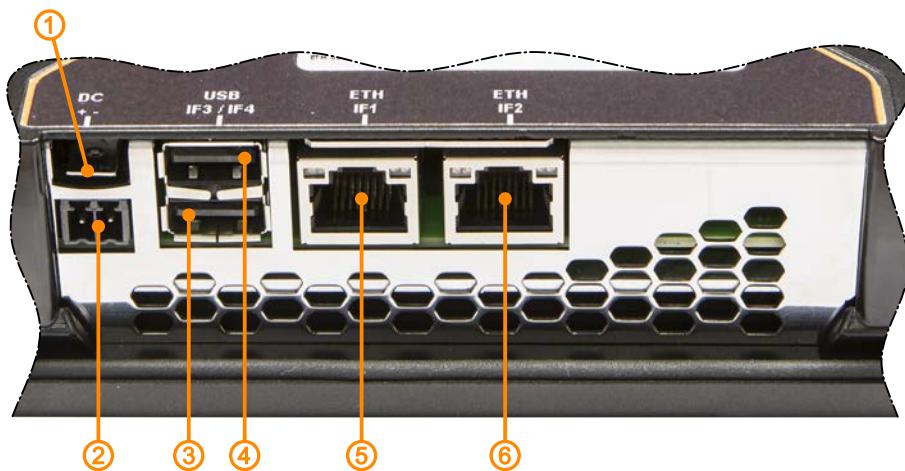| 1	9x retaining clips with torque limiting
2	Anodized front plate E6/C8 (black)
3	Power-coated cover, RAL 9005, fine structure, flat
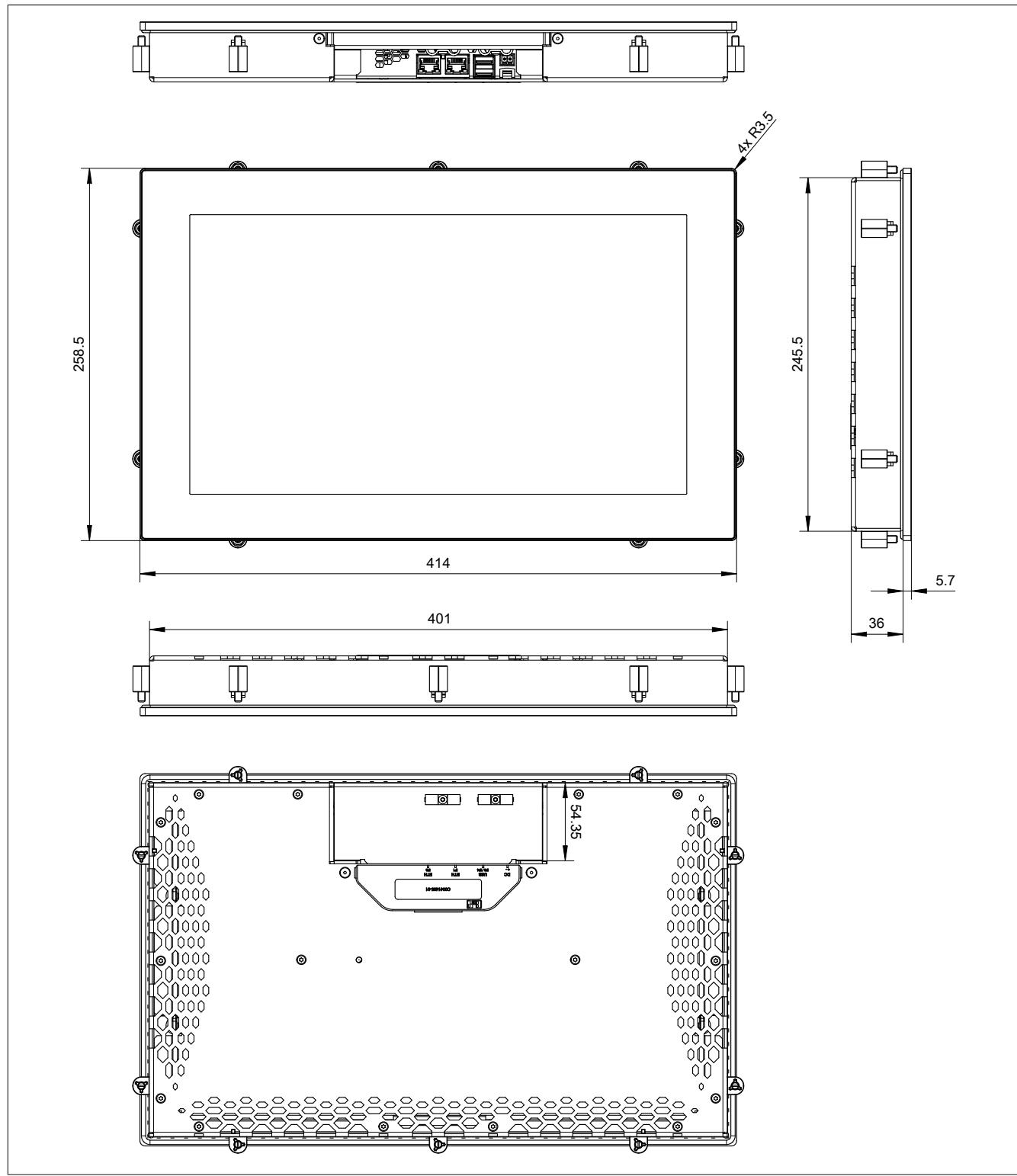
Dimensions of the installation cutout for this Power Panel variant: 403 ±1 mm x 247.5 ±1 mm

See also "Installation cutout requirements" on page 39.

3.8 Connection elements

1	Grounding clip
2	Power supply
3	USB interface IF3
4	USB interface IF4
5	Ethernet interface IF1
6	Ethernet interface IF2 (depending on Power Panel variant)

3.8.1 Ethernet interface

Figure	Pinout		
Back LNK/ACT SPEED 8 1 Front (touch screen) Shielded RJ45 (10BASE-T/100BASE-TX/1000BASE-T)	**Terminal**	**Ethernet**	
	1	D1+	Data 1+
	2	D1-	Data 1-
	3	D2+	Data 2+
	4	D3+	Data 3+
	5	D3-	Data 3-
	6	D2-	Data 2-
	7	D4+	Data 4+
	8	D4-	Data 4-

Diagnostic LEDs			
LED	**Color**	**Status**	**Description**
SPEED	Transfer rate		
	Orange	On	1000 Mbit/s
	Green	On	100 Mbit/s
	Orange + Green	Off	10 Mbit/s
LNK/ACT	Link/Activity		
	Green	On	Link established to Ethernet network.
		Blinking	Link established to Ethernet network and Ethernet activity taking place on bus.
		Off	No link established to Ethernet network.

Danger!

External circuits connected to the device must be electrically isolated from the low voltage mains or from lethal voltages using reinforced or double insulation and must meet the requirements for SELV/PELV circuits.

3.8.2 USB interfaces
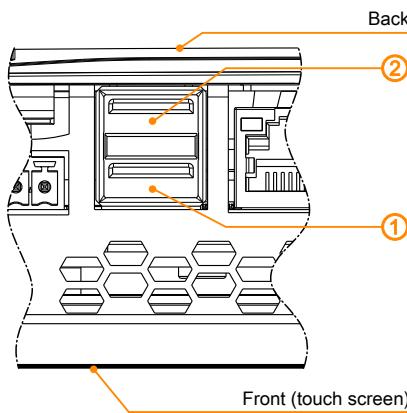
1	USB interface IF3
2	USB interface IF4

The Power Panel is equipped with a USB 2.0 host controller with 2 USB interfaces.

USB interface	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Power supply	Max. 0.5 A per interface

Important!

Possible damage to USB interfaces or USB devices!

- **Peripheral USB devices can be connected to the USB interfaces. Due to the large number of USB devices available on the market, B&R cannot guarantee their functionality. Functionality is ensured when using the USB devices available from B&R.**
- **Because of general PC specifications these USB interfaces should be handled with extreme care with regard to EMC, location of cables, etc.**
- **The device is only permitted to be operated if properly grounded (see "Grounding (functional ground)" on page 42).**

3.8.3 Power supply

> # Danger!
>
> **This device is only permitted to be supplied with protective extra-low voltage (PELV).**
>
> **Protective earth (grounding clip on the device) and the GND connection of the power supply are connected internally in the Power Panel.**

Back

Front (touch screen)
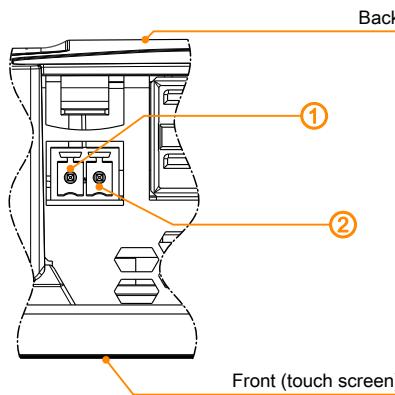
The pinout for the power supply is listed in the following table and printed on the back of the Power Panel. The Power Panel has reverse polarity protection that prevents the supply voltage from being connected incorrectly and damaging the device.

Terminal	Assignment	Explanation
1	+	24 VDC
2	−	GND

Required accessories	
0TB6102.2010-01	Accessory terminal block, 2-pin (3.81), screw clamp terminal block 1.5 mm²
0TB6102.2110-01	Accessory terminal block, 2-pin (3.81), cage clamp terminal block 1.5 mm²

The supply voltage is protected internally by a soldered fuse (see technical data) against overload. The device must be sent to B&R for repairs if the fuse is destroyed in the event of error (fuse replacement).

4 Commissioning

4.1 Installation

> **Important!**
>
> **Possible damage to device!**
> - **Commissioning and maintenance work is only permitted to be performed when the power is switched off. The power cable must also be disconnected from the power supply and device.**
> - **Do not use force! Handle all the modules and components carefully.**
> - **All covers, components, accessories, hardware and cables must be installed or connected before the device can be connected to the power supply and switched on.**
> - **Observe the ESD notes (see "Protection against electrostatic discharge" on page 7).**

Important installation information

- The environmental conditions must be observed.
- 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).

4.1.1 Installation cutout requirements

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

Properties of the installation cutout	Value
Permissible deviation from the evenness **Note:** This condition must also be met with a built-in device.	≤0.5 mm
Permitted surface roughness in the area of the seal	≤120 µm (R z 120)
Min. wall thickness	2 mm
Max. wall thickness	6 mm

> **Important!**
>
> **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 the same degree of protection and in accordance with the above requirements.**
>
> **The device must ultimately be installed in a protective housing with sufficient rigidity (per UL61010-1 and UL61010-2-201).**

4.1.2 Mounting with retaining clips

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 remove the screws.

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

See also "Installation cutout requirements" on page 39.

Figure: Retaining clip

Procedure

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. 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.
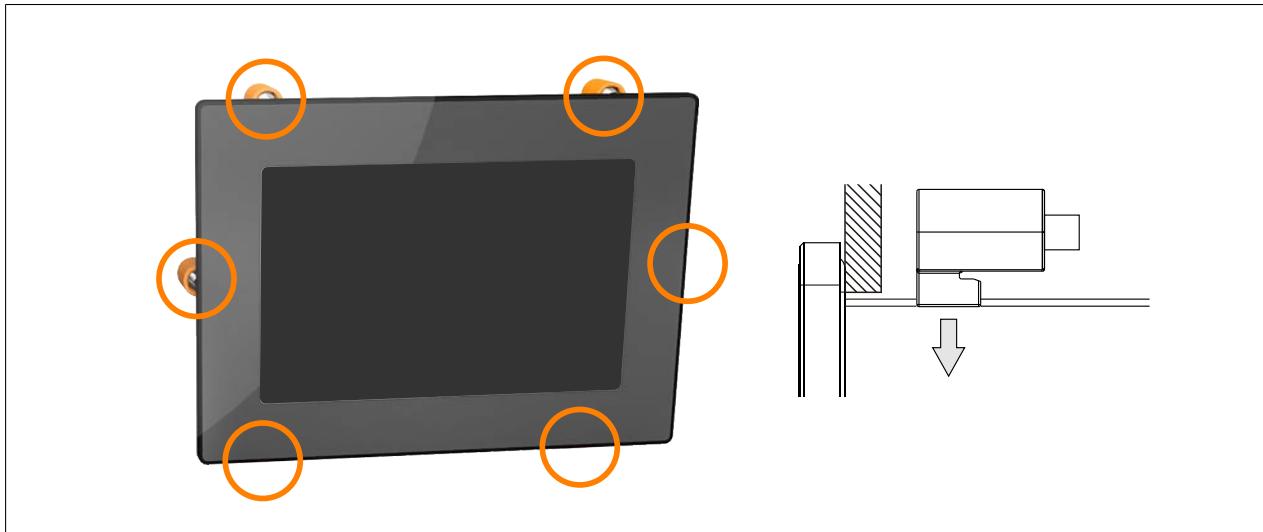
Figure: Using the retaining clips

3. Slide the retaining clips all the way to the back of the openings.
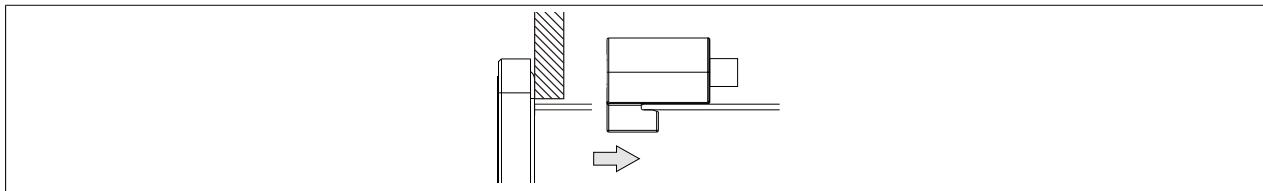
Figure: Sliding the retaining clips back

4. Now secure the retaining clips to the wall or control cabinet by tightening the screws with a flat-blade screw-driver.
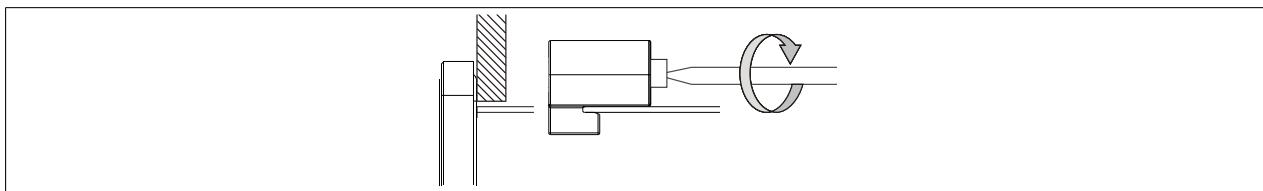
Figure: Securing the retaining clips

   Torque limiting is built into the retaining clips.

Tightening torque of first device generation

Retaining clips without torque limiting are used in the first device generation. These must be secured with a max. tightening torque of 0.4 Nm.

Model number	6PPT50.0502-xxx	6PPT50.0702-xxx	6PPT50.101E-xxx	6PPT50.121E-xxx	6PPT50.156B-xxx
Panel size	5.0"	7.0"	10.1"	12.1"	15.6"
1st device generation	<C0	<D0	<D0	<C0	<C0
2nd device generation	≥C0	≥D0	≥D0	≥C0	≥C0

4.1.3 Mounting orientations

Important!

Possible damage to device!

- **An ambient temperature that is too high can cause damage to the device or faulty behavior.**
- **For the maximum permissible ambient temperature, see the technical data for the respective device.**

Vertical or tilted mounting orientation
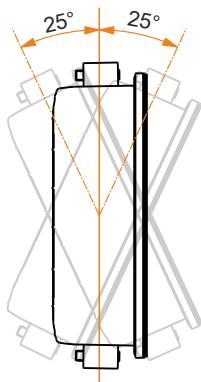
The device can be operated without derating (see environmental conditions in the technical data).

Other mounting orientations (horizontal, inclined, etc.)

The device can be operated in all other mounting orientations with derating up to the maximum operating temperature minus 5°C (see environmental conditions in the technical data).

4.1.4 Grounding (functional ground)

Disturbances are discharged effectively via a grounding clip. 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).

> ## Important!
>
> **Possible malfunction of interfaces and touch screen!**
>
> **If functional ground is not present, faults in interface communication and touch screen functionality can occur.**
>
> **The device is only permitted to be operated if properly grounded.**

Grounding in the control cabinet
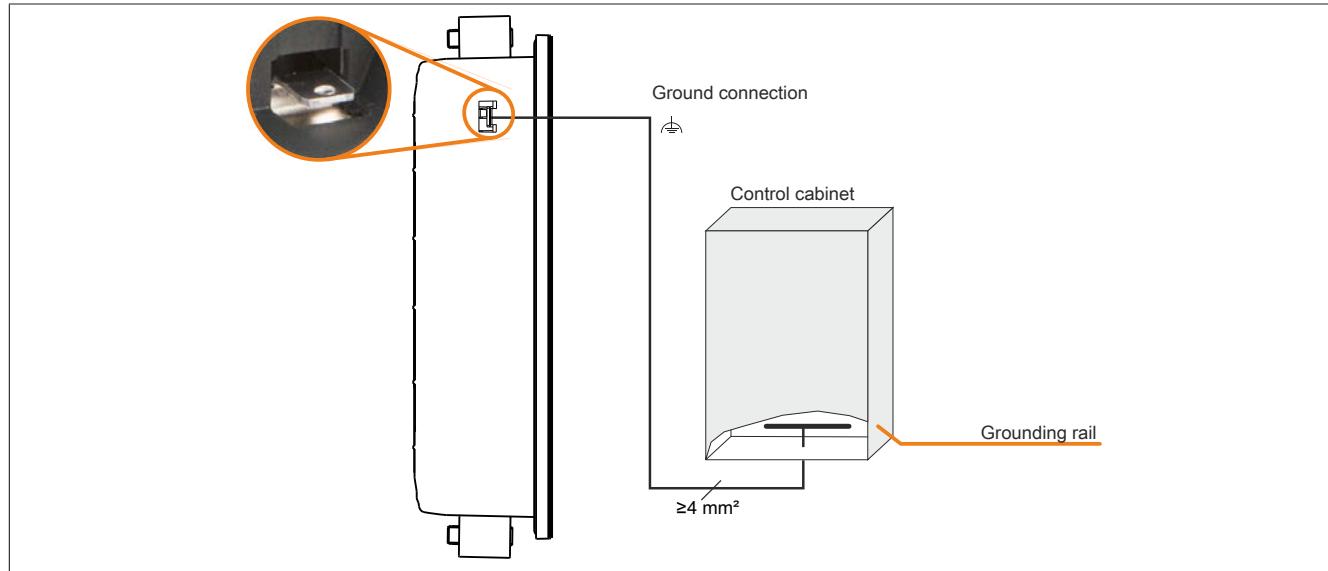
Figure: Grounding in the control cabinet

> ## Important!
>
> **The ground connection of the device must be low impedance and connected to ground (e.g. grounding rail in the control cabinet) using a short path.**

4.1.5 Securing the connecting cables

On Power Panel variants with 15.6" display size, cables can be relieved of tensile stress using the cable clamps provided on the back of the device.

For all other Power Panel variants, an appropriate method for securing the connecting cables in the vicinity of the device (control cabinet, machine, etc.) must be provided.
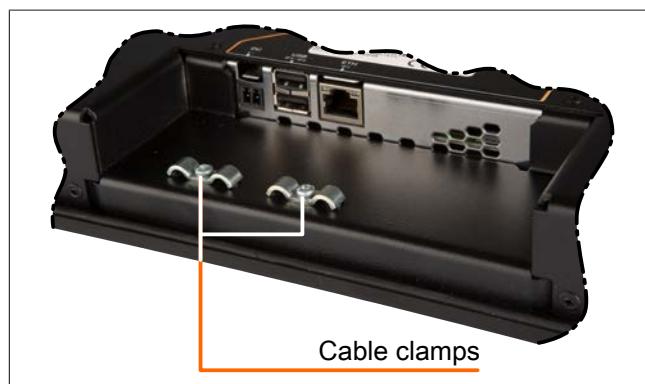
4.1.6 Requirements for the cables used

> ## Important!
>
> **In order to comply with the UL certification, use copper cables that are designed for operating temperature of >70 °C.**

4.2 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

4.2.1 Keyboard

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

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

q	w	e	r	t	y	u	i	o	p
a	s	d	f	g	h	j	k	l	↵
⇑	z	x	c	v	b	n	m	⇐	
▼	.				,	?123	←	→

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

1	2	3	4	5	6	7	8	9	0
*	#	+	-	=	(	)	"	~	↵
1/2	@	&	/	\	'	:	;	⇐	
▼	.				,	ABC	←	→

€	£	$	¥	µ	§	<	>	[	]
°	^	|	_	{	}	!	?	`	↵
2/2	´	%	‰	Σ	∅	·	±	⇐	
▼	.				,	ABC	←	→

4.2.2 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.

5 Configuration

There are three ways to configure the Power Panel:

- Using the Power Panel service page (see "Service pages" on page 44)
- Using update:

  ⇒ Updating with Automation Studio and a USB flash drive
  ⇒ Updating with a file downloaded from website and a USB flash drive
  ⇒ Duplicating an existing setup using a USB flash drive

5.1 Service pages

The 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 has been configured (see "Configuring the gesture" on page 57):
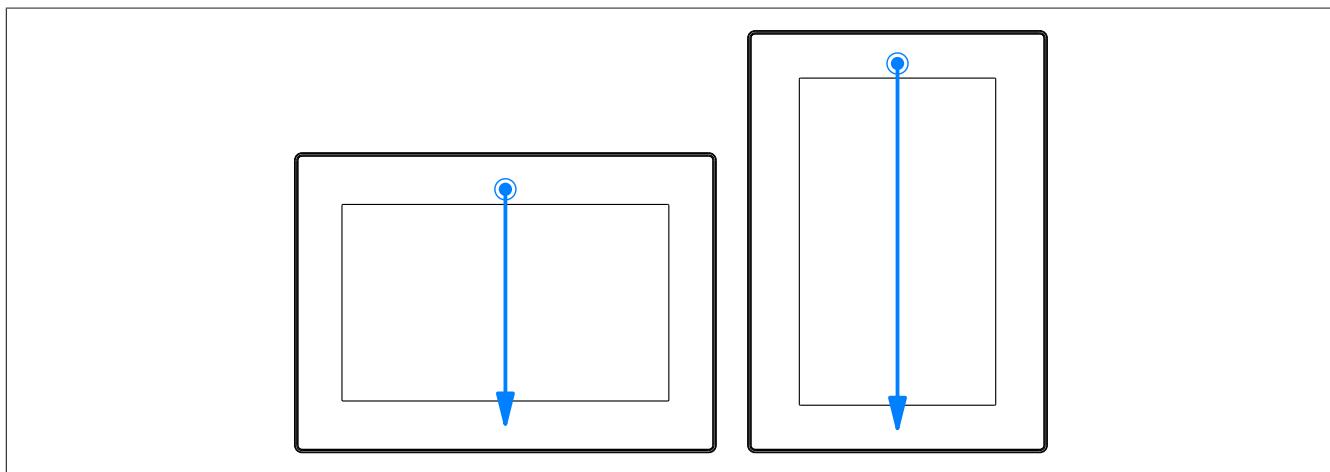
Gesture for opening the service page: Swipe a finger from the top center edge of the touch screen to the bottom over the entire touch area.

The setting for *Screen rotation* on service page *Screen* is important for the swipe 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 the mouse simultaneously for at least 2 seconds if a USB mouse is connected.
- Opened automatically after restarting the Power Panel if the corresponding *Start mode* is configured on service page *Startup* (see service page *"Startup" on page 49*)

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 called before the respective service page is displayed.
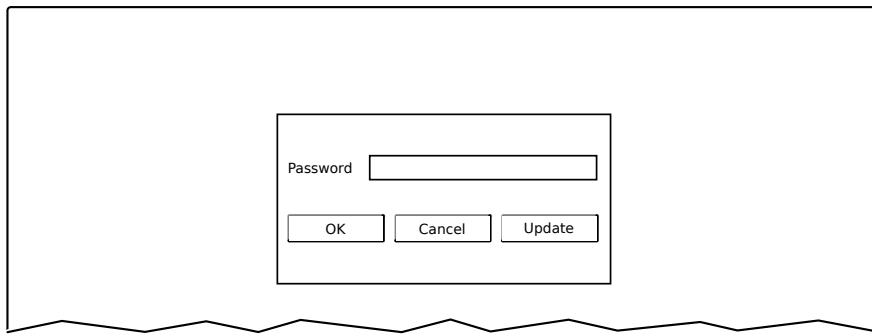
The service password must be entered in the corresponding text input field.

Button	Description
[OK]	Confirming password entry
[Cancel]	Canceling password entry
[Update]	Pressing button "Update" causes the Power Panel to attempt an update. The *Update settings / boot logo / system* function is executed, which can also be called from service page *Update* (see "Service page Update" on page 64). If an update is found on a USB flash drive or on the network), then it will be downloaded and installed. In the next step, the Power Panel will be started in configured mode (see "Service page Startup" on page 49) regardless of whether an update is found or not.

Representation of the service pages in this documentation

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

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

When editing the settings on the service pages, final version of the changed settings is not saved. The final version is saved when one of the following commands on service page Save & Exit is called:

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

See section "Service page Save & Exit" on page 72.

> **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 `PPT50Config.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 64).**

Input elements on the service pages

	Startup		Selection list Click up/down button to select a different option.	Option 1 ⌄ ⌃	
	Network	**1**			**3**
	Time		Selection list	Option C ⌄ ⌃	
	Screen				
	Audio		Checkbox Checkbox not enabled	☐	**4**
	Gesture				
	VNC		Checkbox Checkbox enabled	✔	**5**
	Web	**2**			
	Storage		UpDown input field +/- buttons for range of values	50 − +	**6**
	Update		Text field Text input...	Enter text here	**7**
	Backup & Reset				
	Security		Text field Multiple text input...	Hostname +	**8**
	Save & Exit				
	About & Info		Text field Password entry	●●●●●●●●	**9**

Button A
Description of button A...   **10**

Button B
Description of button B...

⌃ ⌄   **11**

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).

5.1.1 Overview

The following service pages are available:

Menu for the service pages	Menu option (English)	Description
Startup Network Time Screen Audio Gesture VNC Web Storage Update Backup & Reset Security OPC UA Save & Exit About & Info	Startup	Settings that take affect when restarting the Power Panel
	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 memory, user memory)
	Update	Updates the Power Panel (manual)
	Backup & Reset	Backing up Power Panel settings or resetting 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
	Save & Exit	Saving the Power Panel settings and closing/exiting the service page
	About & Info	Information about the Power Panel (PPT system version, licenses for the software being used)

5.1.2 Service page *Startup*

Startup	Start mode	Service page ∨ ∧
Network	Specify the startup application	
Time		

The start mode is configured the 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 Start mode, the Power Panel is started as a VNC client in order to display an HMI application that is available on a VNC server.

In Start mode *VNC*, option *Show boot logo* is also used to configure if the system boot logo and boot animation should be displayed when establishing a connection to the VNC server:

Startup	Start mode	VNC ∨ ∧
Network	Specify the startup application	
Time	Show boot logo	☐
Screen	Use boot logo / animation as VNC load screen	
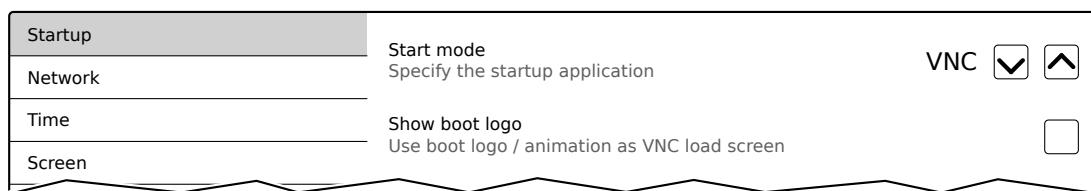
Start mode *Web*

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* is also used to configure if the system boot logo and boot animation should be displayed when establishing a connection to the web server:

Startup	Start mode	Web ∨ ∧
Network	Specify the startup application	
Time	Show boot logo	☐
Screen	Use boot logo / animation as web load screen	
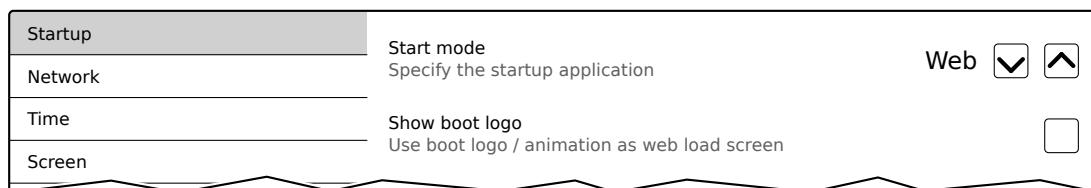
Boot logo or boot animation

Requirements and information about the boot logo and boot animation can be found in the following sections:

- "Boot logo" on page 77
- "Boot animation" on page 77

5.1.3 Service page *Network*

The default settings for the service page *Network* are as follows:

Startup	Hostname
Network	Specify the name of the device on the network
Time	
Screen	DHCP — Use automatic network configuration ✓
Audio	
Gesture	Activate DNS — Activate DNS service ✓
VNC	DNS suffix
Web	
Storage	Get DNS from DHCP server ✓
Update	

> **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 72).**

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.

DHCP

Default setting: Enabled

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

For information about manual network configuration: see "Network configuration without DHCP" on page 52

Activate DNS[1]

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 deactivated and the associated IP address can be obtained from the DNS server.

---

[1] For DNS functionality to be used, appropriate infrastructure must exist in the network.

For more information, please contact your network administrator.

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

Startup		
Network	Hostname Specify the name of the device on the network	
Time		
Screen	DHCP Use automatic network configuration	☑
Audio	Activate DNS Activate DNS service	☐
Gesture		

DNS suffix

Default setting: EMPTY (no DNS suffix defined)

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, for example, look like this:

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

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

Startup		
Network	Hostname Specify the name of the device on the network	
Time		
Screen	DHCP Use automatic network configuration	☑
Audio	Activate DNS Activate DNS service	☑
Gesture		
VNC	DNS suffix	
Web		
Storage	Get DNS from DHCP server	☐
Update		
Backup & Reset	Primary DNS server	
Security		
OPC UA	Secondary DNS server	
Save & Exit	Tertiary DNS server	
About & Info		

Primary DNS server / Secondary DNS server / Tertiary DNS server

Default setting: EMPTY

The IP addresses for the DNS server.

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

5.1.3.1 Network configuration without *DHCP*

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

Startup		Hostname	
Network		Specify the name of the device on the network	
Time			
Screen		DHCP Use automatic network configuration	☐
Audio		Activate DNS	✔
Gesture		Activate DNS service	
VNC		DNS suffix	
Web			
Storage		IP address	
Update			
Backup & Reset		Subnet mask	
Security			
OPC UA		Default gateway	
Save & Exit		Primary DNS server	
About & Info			
		Secondary DNS server	
		Tertiary DNS server	

> **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

Description of these options: See service page *"Network" on page 50*

IP address

Default setting: EMPTY

Here you have to enter the IP address of the Power Panel within the network.

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.

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

5.1.4 Service page *Time*

On this service page you can configure various settings for the time server and daylight saving time.

Startup	NTP client	☐
Network		
Time	Adjust clock for daylight saving	☐
Screen		
Audio	Time synchronization	
Gesture		(GMT) Dublin, Edinburgh, Lisbon, London

NTP client

Default setting: Disabled

With this option, an NTP Client can be enabled on the Power Panel, which 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:

Startup	Activate ntp client	☑
Network		
Time	NTP server 1	_____
Screen		
Audio	NTP server 2	_____
Gesture		
VNC	NTP server 3	_____
Web		
	NTP server 4	_____
Storage		

Synchronization takes place cyclically. The interval between synchronization is increased once a certain degree of accuracy has been achieved on the system.

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 shown and the appropriate one can be selected.

5.1.5 Service page *Screen*

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

Startup	Display brightness	50	⊟ ⊞
Network	0 to 100%		
Time	Screensaver		☐
Screen			
Audio	Screen rotation	0°	⌄ ⌃
Gesture	Specify the screen rotation angle		
VNC	Boot animation left pos	0	⊟ ⊞
Web	Animation offset from left side in pixel		
Storage	Boot animation top pos	0	⊟ ⊞
Update	Animation offset from top in pixel		
Backup & Reset	Boot animation delay	0	⊟ ⊞
	Delay of boot animation in ms		

Display brightness

Default setting: 50

Entry range: 0 to 100

Unit: %

Here, the current brightness of the display and the basic setting for the display are configured 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 only becomes the default setting for the device once it is saved (see "Service page Save & Exit" on page 72).

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

Brightness range of the display

| 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |

Range from 0 to 50   Range from 50 to 100

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

Setting range on the service page screen
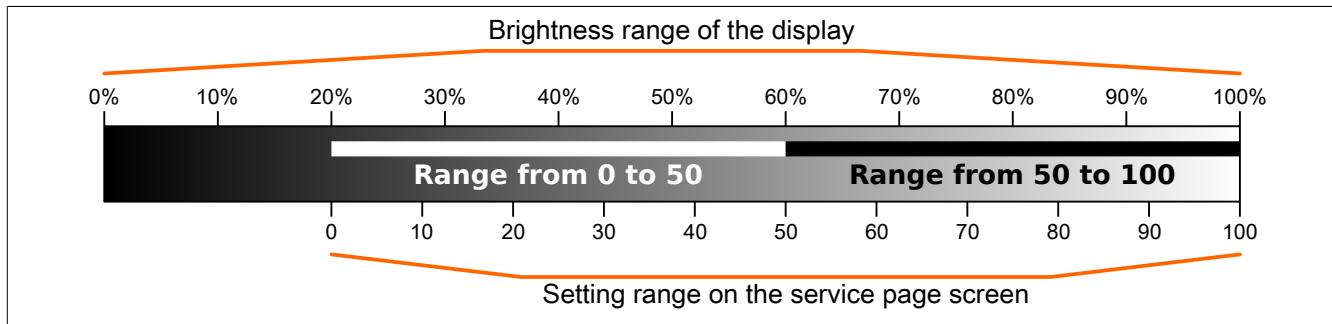
Brightness can also be controlled by the application (see "Adjusting display brightness" on page 79).

Screensaver

Default setting: Disabled

The options for the selected screen saver is described in the following section "Screensaver settings" on page 55.

Screen rotation

Default setting: 0°

Entry range: 0°, 90°, 180°, 270° (in 90° increments)

The angle of rotation of the display is set here. This setting affects how the 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
Entry range	0 to 2048 [1]
Unit	Pixels
Function	Definition of the distance from an existing boot animation to the left edge of the display.
Boot animation top pos	
Default setting	0
Entry range	0 to 2048 [1]
Unit	Pixels
Function	Definition of the distance from an existing boot animation to the top edge of the display.
Boot animation delay	
Default setting	0
Entry range	0 to 1000
Unit	ms (milliseconds)
Function	Delay in milliseconds between the 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 delay time as configured.

It is possible that small values cannot be achieved because of performance limitation of the device. In this case, the animation is slower than defined by the value.

Boot animation prerequisites/information
See "Boot animation" on page 77.

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

5.1.5.1 Screensaver settings

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

Start screensaver after

Default setting: 15

Entry 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).

5.1.6 Service page *Audio*

On this service page, an audio signal can be configured for a touch gesture or controlled by an application.

Startup	Buzzer	☐
Network		
Time		
Screen		
Audio		

Buzzer

Default setting: Disabled

If this option is disabled, an audio signal is not output for a touch gesture on the Power Panel.

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

Startup	Buzzer	✓
Network		
Time	Buzzer source	Touch ⌄ ⌃
Screen		
Audio	Buzzer frequency 40 to 15000 Hz	4000 ⊟ ⊞
Gesture		
VNC	Buzzer duration 10 to 500ms	10 ⊟ ⊞
Web	Test buzzer Press to test	
Storage		

Buzzer source

Default setting: Touch screen

The following options are available for triggering a buzzer:

Touch	In VNC and Web mode, an audio signal is output for each touch gesture. This takes place independent 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 "Audio signal output" on page 79.

Buzzer frequency

Default setting: 4000

Entry range: 10 to 15000

Unit: Hz

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

Buzzer duration

Default setting: 10

Entry range: 10 to 500

Unit: ms (milliseconds)

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

Test buzzer (Button)

Function: Testing the buzzer (sound is produced).

5.1.7 Service page *Gesture*

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

Startup	Open service page	☐
Network		
Time		
Screen		
Audio		
Gesture		
VNC		
Web		
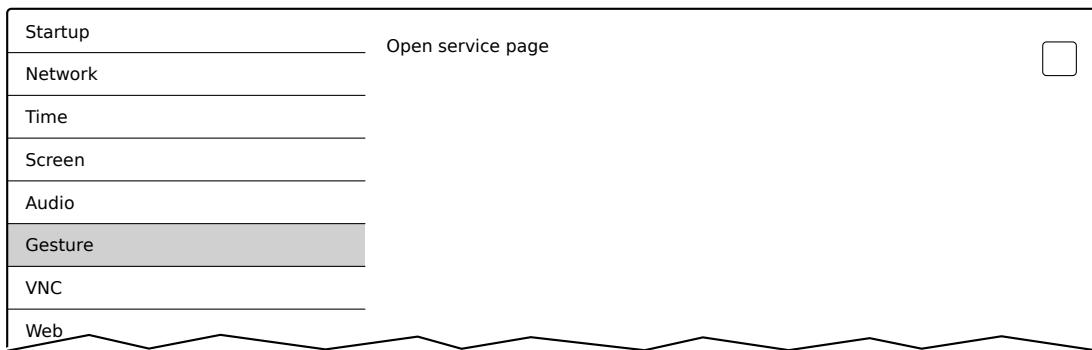
Opens the service page with a gesture if option *Open service page* is enabled:

- See "Opening the service page with a gesture" on page 44.

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 43****).**

5.1.8 Service page *VNC*

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

Startup	**Server**
Network	IP address or hostname
Time	**Password**
Screen	Max. 100 characters
Audio	Show password
Gesture	
VNC	Encrypt password
Web	Save VNC password encrypted
Storage	Use RFB extension
Update	
Backup & Reset	Enable local window scaling
Security	
OPC UA	vncserver1
Save & Exit	
About & Info	vncserver2

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 gesture or mouse click). The currently selected VNC server is displayed in the 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 the host vncserver1 is established on port 5908.

> **Information:**
>
> **If the specified IP address is incomplete or a VNC server does not exist for the IP address or the specified hostname, a message is output indicating that a network connection could not be established in VNC mode.**
>
> **The error message is only output if option *Show boot logo* is disabled start mode *VNC*.**

Password

Default setting: EMPTY (no password entered)

Entry 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 each time a connection to the VNC server is established.

The password is stored in configuration file PPT50Config.xml on the device.

Show password

Default setting: Disabled

Enabled	The password is shown in the entry field as plain text.
Disabled	The password is hidden in the entry field using placeholder characters (●●●●●●).

Encrypt password

Default setting: Enabled

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 78.

Enable local window scaling

Default setting: Disabled

Enabled	The VNC application is scaled to the Power Panel screen size.
Disabled	The VNC application is shown on the Power Panel screen in its original size.

Information:

Enabling option *Enable local window scaling* reduces the performance of the Power Panel because of increased demands on processing power.

5.1.9 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 any other application that runs 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 image shows service page *Web* with the default settings:
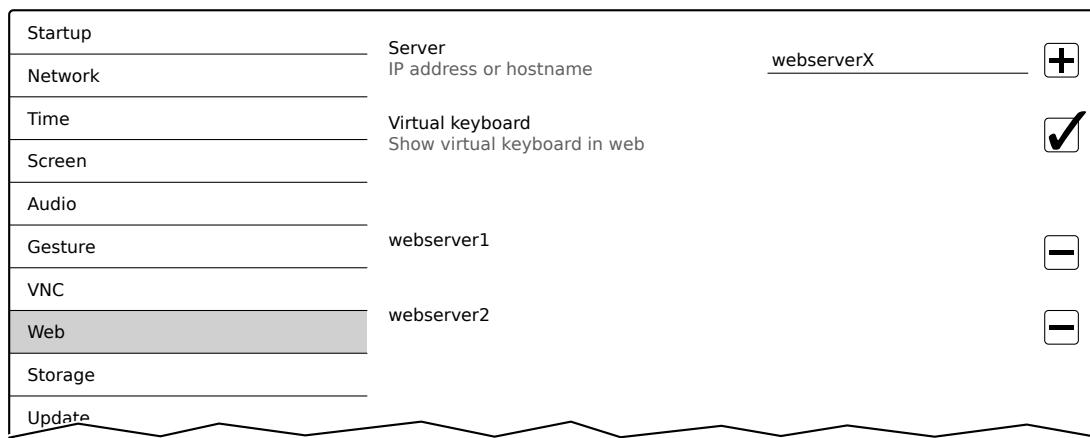
Server

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 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 "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 gesture 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 the host webserver1 is established on port 8081.

Information:

If the specified IP address is incomplete or a web server does not exist for the IP address or the specified hostname, only the boot logo (if enabled) or the default animation for the web browser will be shown when establishing a connection to the web server.

Virtual keyboard

Default setting: Enabled

Enabled	The virtual keyboard is automatically shown on the screen if a text input field in the web browser has the focus (see "Keyboard" on page 43).
Disabled	The virtual keyboard for the web page is automatically shown if a text input field in the web browser has the focus. This functionality must be made available by the web server.

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

Information:

The virtual keyboard is created 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.

5.1.10 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 data storage devices
- Internal user memory

Sharing takes place using the CIFS protocol (**C**ommon **I**nternet **F**ile **S**ystem). 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 Power Panel:

CIFS user	The CIFS user cannot be configured. "`ppts50-user`" must always be used as the CIFS user.		
CIFS password	The password configured on this service page password is used.		
CIFS memory location	The following names can be used to specify the memory location:		
	Name	Description	
	usbshare	USB memory connected to USB interface IF3.	
	usbshare2	USB memory connected to USB interface IF4.	
	usershare	Internal user memory (flash) on the Power Panel.	

▌ **The USB memory must be formatted using the FAT32 file system.**

The following image 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 memory 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)

Entry range: Max. 100 characters

The CIFS password for network sharing is configured here. This password is used share USB memory internal user memory.

The password is stored in configuration file PPT50Config.xml on the device.

Show password

Default setting: Disabled

Enabled	The password is shown in the entry field as plain text.
Disabled	The password is hidden in the entry field using placeholder characters (●●●●●●).

Encrypt password

Default setting: Enabled

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

5.1.11 Service page *Update*

On this service page, various parts of the system can be updated from a range of different sources.

Startup	Update settings / boot logo / system Press to update settings, boot logo, system
Network	
Time	Load settings from USB Press to load settings from USB flash drive
Screen	
Audio	Load configuration from PLC Press to load configuration from PLC
Gesture	
VNC	Load boot logo / animation Press to load boot logo / animation from USB flash drive
Web	
Storage	Update server type TFTP ⌄ ⌃ Specify the update server type
Update	Get Update Server from DHCP server ✓
Backup & Reset	
Security	

Update settings / boot logo / system (Button)

The Power Panel system is restarted as a minimized version of the system. When restarting, the following sources are searched in the specified order in order to find update files:

1   The USB memory inserted in the Power Panel

     For the update process, only 1 USB flash drive can be inserted in the Power Panel.

2   The configured update server (see "Configuring the update server" on page 66)

The following update files are searched for:

File type	Filename
PPT image	PPT50Image.img.gz, PPT50Image.md5, PPT50Image.img.gz.sig (see "PPT image" on page 77)
System settings	PPT50Config.xml (see "System settings" on page 77)
Boot logo	PPTLogo.bmp.gz (see "Boot logo" on page 77)
Boot animation	PPTLogoA.gif (see "Boot animation" on page 77)

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 Power Panel settings should be retained, XML file PPT50Config.xml must not be on the source media.**

> **Information:**
>
> **It is generally only possible to install signed images on the Power Panel. If it is necessary to install an unsigned image, this must first be explicitly allowed beforehand on service page Security.**

Load settings from USB (Button)

If no USB memory is connected, an appropriate message is shown.

If at least one USB memory device is connected, then a dialog box with USB interfaces IF3 and IF4 is shown. The name of the USB memory device is also shown to aid in selection. After the interface is selected, the settings will be loaded from XML file PPT50Config.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 72).

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:

Startup		
Network	Server 1	IP 10.0.0.1 MAC: 00 60 65 10 12 01
Time	Server 2	IP 10.0.0.2 MAC: 00 60 65 10 12 02
Screen		
Audio	Server 3	IP 10.0.0.3 MAC: 00 60 65 10 12 03
Gesture		
VNC	Server 4	IP 10.0.0.4 MAC: 00 60 65 10 12 04
Web		
Storage	Server 5	IP 10.0.0.5 MAC: 00 60 65 10 12 05
Update		

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

Startup		
Network	Server 1	IP 10.0.0.1 MAC: 00 60 65 10 12 01
Time	Config1	
Screen	Config2	
Audio	Config3	
Gesture	Config4	
VNC	Server 2	IP 10.0.0.2 MAC: 00 60 65 10 12 02

The names of the listed configurations match the names of the configurations in Automation Studio:
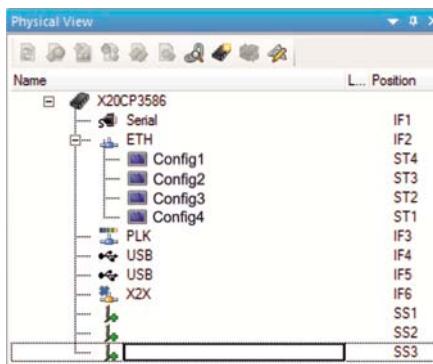
If a configuration entry is selected, a dialog box appears asking for installation of the configuration to be confirmed. After downloading the data, the application goes to the *Save & Exit* service page and the data can be stored using a corresponding command. Alternatively, the user can check and – if necessary – modify the loaded settings on any of the service pages before saving.

Load boot logo / animation (Button)

If no USB memory is connected, an appropriate message is shown.

If at least one USB memory device is connected, then a dialog box with USB interfaces IF3 and IF4 is shown. The name of the USB memory device is also shown 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 77)
Boot animation	PPTLogoA.gif (see "Boot animation" on page 77)

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

5.1.11.1 Configuring the update server

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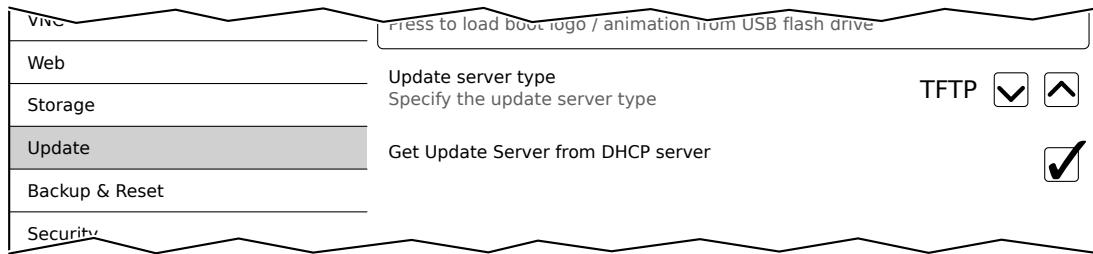
Update server type

Default setting: TFTP

The following settings are possible:

TFTP	*TFTP* (Trivial File Transfer Protocol) is a very simple data transfer protocol.
FTP[1]	*FTP* (File Transfer Protocol) offers more possibilities than *TFTP*.

1) The update server type *FTP* is only available for devices with hardware revision C0 and later.

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 if the option is disabled (see the following two sections "Configuring a TFTP or FTP update server").

If the 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:

5.1.11.1.1 Configuring an *TFTP* update server

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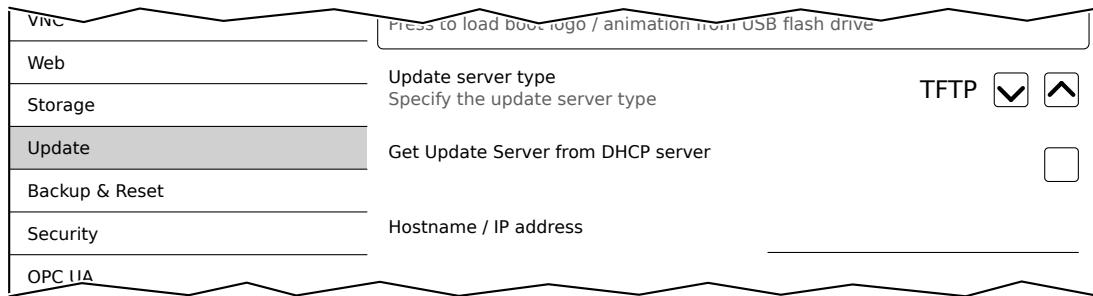
Hostname / IP address

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 specified IP address is incomplete or a TFTP server does not exist for the IP address or the specified hostname, a message is output indicating that a network connection could not be established when attempting to connect fails during the update procedure.**

5.1.11.1.2 Configuring an *FTP* update server

If option *Get Update Server from DHCP server* is disabled and update server type *FTP* is selected, then the following input fields are also 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)

Entry range: Max. 100 characters

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

The FTP password is stored in configuration file PPT50Config.xml on the device.

Show password

Default setting: Disabled

Enabled	The password is shown in the entry field as plain text.
Disabled	The password is hidden in the entry field using placeholder characters (●●●●●●).

Encrypt password

Default setting: Enabled

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 specified IP address is incomplete or an FTP server does not exist for the IP address or the specified hostname and therefore attempting to connect fails during the update procedure, a message is output indicating that a network connection could not be established.**

5.1.12 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:

Startup	**Backup settings** Press to backup settings to USB flash drive
Network	
Time	**Backup boot logo / animation** Press to backup boot logo / animation to USB flash drive
Screen	
Audio	**Backup system** Press to backup system to USB flash drive
Gesture	
VNC	**Complete backup** Press to backup settings, boot logo / animation and system to USB flash drive
Web	**Reset settings** Press to restore factory settings
Storage	
Update	**Reset boot logo / animation** Press to restore factory boot logo / animation
Backup & Reset	

Information:

Only settings that have already been saved using a function on service page *Save & Exit* are included when creating a backed up. Settings and service pages that have not been saved are not backed up.

Backup settings (Button)

Accessing this function creates a backup of the settings and stores it on the USB flash drive.

Backup boot logo / animation (Button)

Accessing this function creates a backup of the boot - logo and stores it on the USB flash drive.

Backup system (Button)

Accessing this function creates a backup of the PPT system (unsigned PPT image) and stores it on the USB flash drive.

Information:

Creating a backup can take several minutes.

Complete backup (Button)

Accessing this function creates a full backup of the system, its settings and boot logo and stores it on the USB flash drive. The PPT image is saved without a signature.

Information:

Creating a backup can take several minutes.

Reset settings (Button)

Accessing this function loads the factory default settings.

Information:

The 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).

5.1.13 Service page *Security*

Startup	**Service password**
Network	Password for setup changes
Time	max. 100 characters
Screen	**Show password**
Audio	
Gesture	**Encrypt password**
VNC	Save security password encrypted
Web	**Allow untrusted images**
Storage	Enable installation of unsigned images! (volatile setting)
Update	
Backup & Reset	
Security	
OPC UA	
Save & Exit	

Service password

Default setting: EMPTY (no password entered)

Entry range: Max. 100 characters

The service password is used to control access to the service pages (see "Entering the service password" on page 45).

The password is stored in configuration file PPT50Config.xml on the device.

Show password

Default setting: Disabled

Enabled	The password is shown in the entry field as plain text.
Disabled	The password is hidden in the entry field using placeholder characters (●●●●●●).

Encrypt password

Default setting: Enabled

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 64). This option is not saved in the system settings and is 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).

5.1.14 Service page *OPC UA*

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

Startup	OPC UA server	✔
Network		
Time	Port OPC UA server port	4840 ⊟ ⊞
Screen		
Audio	Identify token Choose the identify token type	Anonymous ⌄ ⌃
Gesture		
VNC		
Web		
Storage		
Update		
Backup & Reset		
Security		
OPC UA		
Save & Exit		
About & Info		

OPC UA server

Default setting: Disabled

If the 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.

| **Important!**

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

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

Screen		
Audio	Identify token Choose the identify token type	Username ⌄ ⌃
Hand button		
VNC	User	
Web		
Storage	Password OPC UA server password max. 100 characters	●●●●●●●●
Update		
Backup & Reset	Show password	☐

User

Default setting: EMPTY (no username entered)

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

Password

Default setting: EMPTY (no password entered)

Entry range: Max. 100 characters

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

The password is stored in configuration file PPT50Config.xml on the device.

Show password

Default setting: Disabled

Enabled	The password is shown in the entry field as plain text.
Disabled	The password is hidden in the entry field using placeholder characters (●●●●●●).

5.1.15 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 49).

Startup	Save changes & exit
Network	Press to save changes and exit
Time	Save changes
Screen	Press to save changes
Audio	Exit without saving
Gesture	Press to exit without saving changes
VNC	
Web	
Storage	
Update	
Backup & Reset	
Security	
OPC UA	
Save & Exit	
About & Info	
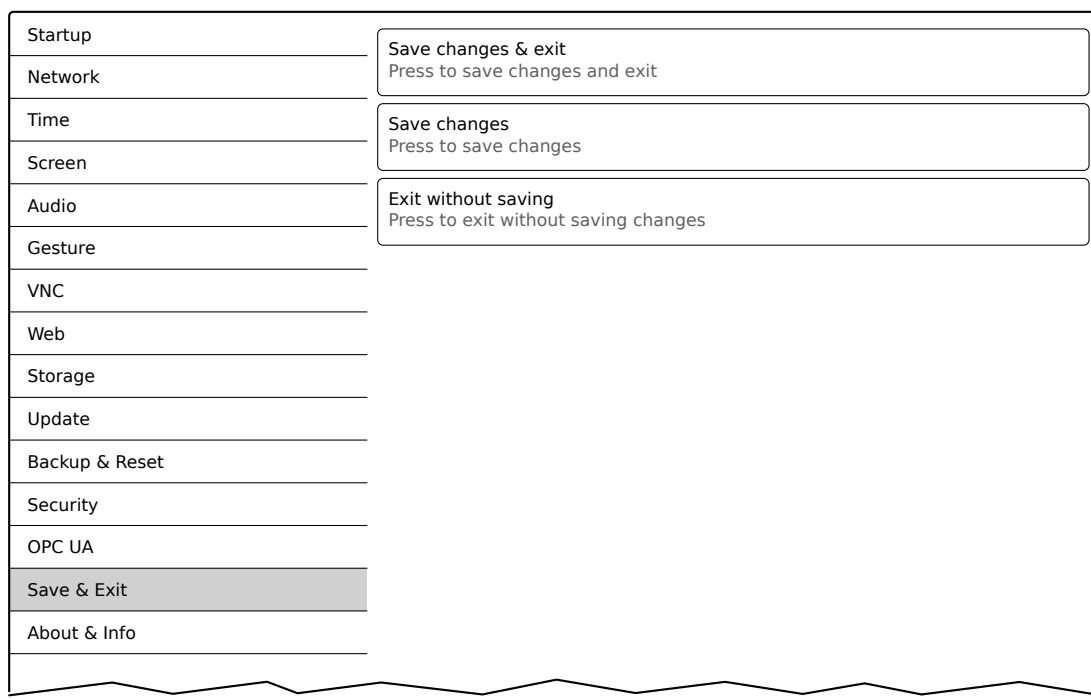
Save changes & exit (Button)

All changes that have been made are saved and the Power Panel is started with the specified settings (see "Service page Startup" on page 49)

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 49).

5.1.16 Service page *About & Info*

Startup	**System time** 16:58:37
Network	
Time	**System date** 2018-07-24
Screen	
Audio	**Model number** 6PPT50.101E-16B
Gesture	
VNC	**Serial number** F0123456789
Web	**Hardware revision** C0
Storage	
Update	**MAC address** 01:23:45:67:89:ab
Backup & Reset	
Security	**IP address** 123.45.67.89
OPC UA	
Save & Exit	**Image version** 1.2.0
About & Info	**Signed image** Yes
	Bootloader version rc3
	Show license Press to show license

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

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. In other words, the signature is not checked.
Bootloader version	Version number of the boot loader	

Show license (Button)

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

5.2 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 "Data storage devices" on page 110).

5.2.1 Updating with Automation Studio and a USB flash drive

Upgrade PPT Image in Automation Studio

Automation Studio

USB memory
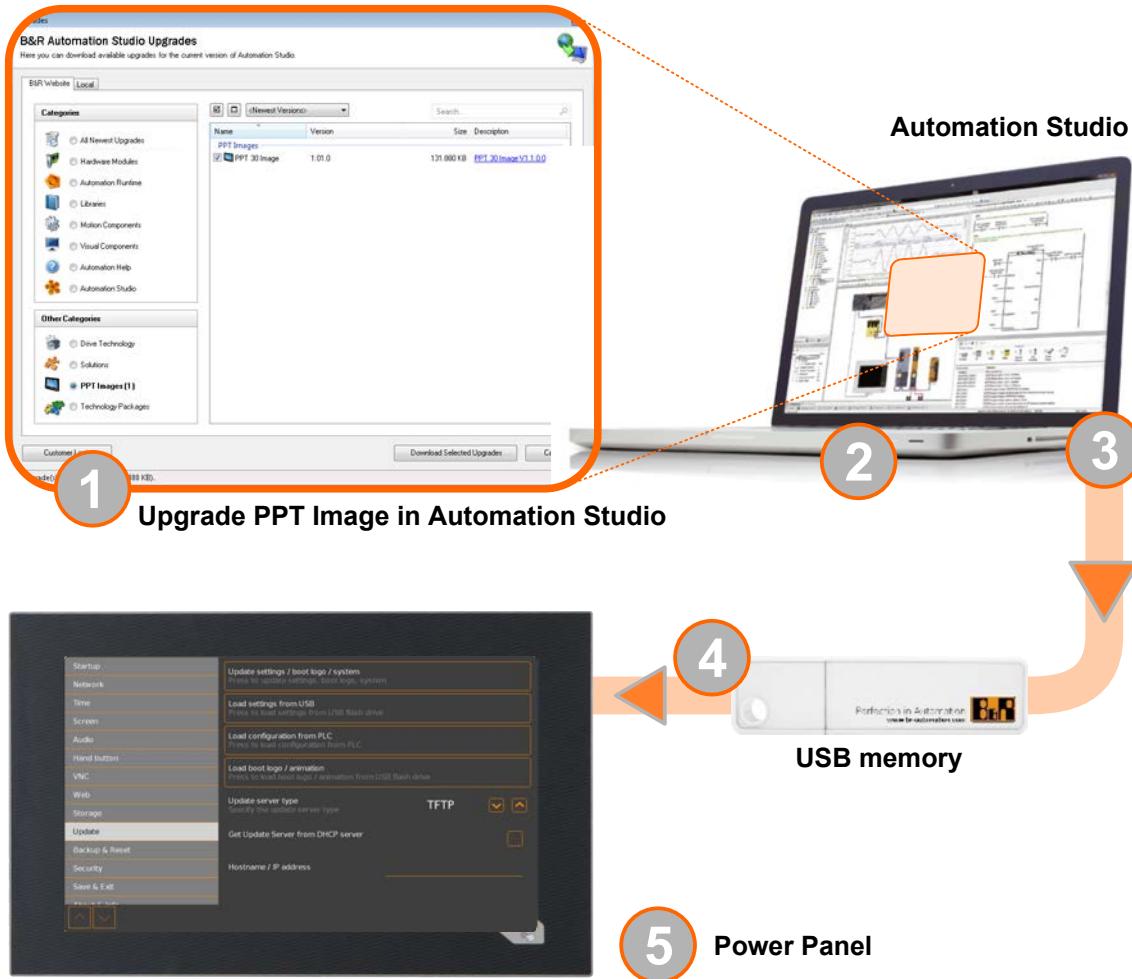
Power Panel

1. The PPT image for the Power Panel is updated in Automation Studio (upgrade).
2. Configuring the Power Panel according to requirements in Automation Studio.
3. Insert a USB flash drive in your computer and select the following menu item in Automation Studio:

   ° **Project / Project installation / Generate project installation package**

   In the following selection dialog box, it is necessary to select the appropriate equipment (Power Panel). After confirming the selection, the target medium (connected USB flash drive) is selected and the process is started using the button [*Download to application memory*].

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

   ° PPT50Image.img.gz
   ° PPT50Image.md5
   ° PPT50Image.img.gz.sig
   ° PPT50Config.xml
   ° PPTLogo.bmp.gz
   ° PPTLogoA.gif

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

5. On service page *Update*, select one of the following functions depending on what should be updated (see section):

- ° *Update settings / boot logo / system*
- ° *Load settings from USB*
- ° *Load boot logo / animation*

5.2.2 Updating with a file downloaded from website and a USB flash drive

Updated versions of the PPT operating 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. The Power Panel T-Series upgrade package must be downloaded from the B&R website. This upgrade package can be found and various locations 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 4.3* (or later version) in section "PPT upgrades".

   Download the upgrade package in **ZIP format** (not EXE format)!

2. Unzip the ZIP file with the corresponding content directly into the root directory of a USB flash drive:

   - ° PPT50Image.img.gz
   - ° PPT50Image.md5
   - ° PPT50Image.img.gz.sig
   - ° Readme.txt

3. Connect the USB flash drive to the Power Panel.

4. On service page *Update*, select function *Update settings / boot logo / system* (see section).

5.2.3 Duplicating an existing setup using a USB flash drive

It is possible to save the Power Panel system, system settings, boot logo and boot animation on a USB flash drive and cope the entire setup or portions of the setup to a different Power Panel.

To do so, the following steps must be carried out

1. Connect a USB flash drive to the Power Panel with the configuration that should be copied.

2. On service page *Backup & Reset*, the available 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).

3. Then connect the USB flash drive to another Power Panel.

4. On service page *Backup & Reset*, the available functions can be used to update the Power Panel using entire system (or portions of it) that have been backed up (see section).

The PPT system (PPT image) can be used to update any Power Panel. The boot logo and configuration (settings), on the other hand, can only be used on the same devices.

6 Software-specific information

In this chapter, software-specific information (RFB extension, image formats) are described, which have been referenced multiple times in the other chapters.

- Installing certificates in the browser
- Supported video formats
- File formats
- RFB extension
- Notes about the PPT image
- Supported fonts
- OPC UA server

6.1 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 62
- 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`.

6.2 Supported video formats

Videos can be displayed in web mode (see "Configuring web mode" on page 60). The following container formats are supported when embedding videos into a web-based HMI application:

- WebM

6.3 File formats

6.3.1 PPT image

Filenames: PPT50Image.img.gz, PPT50Image.md5, PPT50Image.img.gz.sig

The PPT image is a compressed image of the PPT system (Power Panel T-Series operating system). File PPT50Image.img.gz contains the image and file PPT50Image.md5 contains the MD5 checksum of the image.

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

This Power Panel supports signed images. During an update, the Power Panel checks the provided signature PPT50Image.img.gz.sig to determine if the image package comes from a trusted source.

6.3.2 System settings

Filename: PPT50Config.xml

The system settings, which can be defined by the user on the service pages, are saved on the Power Panel in XML file PPT50Config.xml.

When you back up and restore (see the two service pages Backup & Reset and Update) the system settings, the data is exchanged using an XML file with the following name.

6.3.3 Boot logo

Filename: PPTLogo.bmp.gz

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

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

The boot logo must meet the following requirements:

File format	Only the BMP (Windows bitmap) file format is allowed for the boot logo.
Size	The size of the bitmap 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 bitmap must be compressed in GZ format (GNU zip).
	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.
Application	The boot animation is superimposed over an existing static boot logo.

6.3.4 Boot animation

Filename: PPTLogoA.gif

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

The boot animation must meet the following requirements:

File format	Only the GIF (Graphics Interchange Format) file format is allowed for the boot animation.
Size	The size of the boot animation must be equal to or smaller than the size of the display being used in full screen.
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), it is important to ensure that the **entire** boot animation is 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.

6.4 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 library 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).
- Read the controller's operating hours.

Information:

Additional information about the RFB extensions and programming with the *AsRfbExt* library can be found in Automation Help.

Information:

Only a Power Panel with RFB extensions enabled can be operated via B&R VNC server.

The following functions are described in this section:

- Temperature monitoring
- Adjusting display brightness
- Audio signal output

6.4.1 Temperature monitoring

Required function in library *AsRfbExt*: *RfbExtTemperatureValue()*

Function *RfbExtTemperatureValue()* is used to read the value of one of the following temperature sensors on the device.

- Temperature of the CPU housing (index 0: TemperatureCPUCase)

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.

Important!

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.

6.4.2 Adjusting display brightness

Required function in 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	The VNC-based HMI application includes a button that has been assigned a corresponding function, which calls *RfbExtStartProcess()* with the appropriate parameters. The application can get the display brightness from an input field, which 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 44).

Unlike the setting option on service page *Screen*, *dim* can be used to set the total brightness range of the display from 0 to 100% (see "Service page Screen" on page 54).

6.4.3 Audio signal output

Required function in 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 a 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 setting for the audio signal is configured on service page *Audio* or in Automation Studio (see section "Configuration" on page 44).

> **Information:**
>
> **Emitting an audible tone with *beep* is always done independent of the setting on service page *Audio* (see "Service page Audio" on page 56).**

6.5 Notes about the PPT image

This section contains notes about certain PPT image versions.

6.5.1 PPT image 1.0.1

Incompatibilities

> # Important!
>
> **Incompatibilities occur in combination with a PPT image with a version ≤1.0.1 and certain hardware revisions of the Power Panel T50. This results in the following problem:**
>
> - **The touch screen does not work.**

This problem occurs if a PPT image with a version ≤1.0.1 is used on 2nd generation devices.

Model number	6PPT50.0502-xxx	6PPT50.0702-xxx	6PPT50.101E-xxx	6PPT50.121E-xxx	6PPT50.156B-xxx
Panel size	5.0"	7.0"	10.1"	12.1"	15.6"
1st device generation	<C0	<D0	<D0	<C0	<C0
2nd device generation	≥C0	≥D0	≥D0	≥C0	≥C0

Correcting the problem

If the problem occurs (touch screen does not work), updating the PPT system with a more recent PPT image restores touch functionality.

Updating the PPT system:

1. Connect the USB mouse to the affected device.
2. Install a more recent PPT image version (≥1.0.2, see "Update" on page 74).

✓ After updating the PPT system, touch functionality is available again.

6.6 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	
	1.0.0 ...	**1.0.2 ...**
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 instead:

Font	Substitute font starting with PPT system	
	1.0.0 ...	**1.0.2 ...**
serif	Arial, Regular	
sans-serif	DejaVu Sans, Book	
monospace	Arial, Regular	DejaVu Sans Mono, Book
Arial	Arial, Regular	
Helvetica	Arial, Regular	
Verdana	Verdana, Regular	
Times New Roman	Arial, Regular	
Courier New	Arial, Regular	DejaVu Sans Mono, Book

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

16 px is set as the default font size.

6.7 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 of the Power Panel provides the following functionalities:

- Configuration of the Power Panel as is also possible via the "service pages" on page 44.
- Reading status information (temperature, version information, etc.).
- Querying the touch screen keys.
- Calling up functions/methods (setting brightness, triggering signal tone, etc.)

> **Important!**
>
> **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 of the Power Panel. Corresponding information is available on the OPC Foundation website, for example (→ opcfoundation.org).

Communication via library AsOpcUac

Using library AsOpcUac, an OPC UA client can be created on B&R systems that communicates with the OPC UA server of the Power Panel.

The function blocks contained in the library for OPC UA client functionality were developed in a collaboration between working groups of the OPC Foundation and PLCopen.

> **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.

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

6.7.1 Information model

General information

In addition to the basic model of the OPC UA specification and the OPC UA Companion specification for device integration (DI = Device Integration), the OPC UA information model of the Power Panel provides both properties and methods for configuring and operating the Power Panel in its own address space (namespace).

6.7.1.1 Namespaces

Namespaces are used by OPC UA to create 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 uniquely identify a node. Different nodes can use the same *BrowseName*. BrowseNames can be combined to a path (Browse path) with which a certain node can be localized in the OPC UA address space and attribute *NodeId* can be determined.

The node identifiers are partly specified in the OPC UA specification or by B&R. A namespace therefore specifies which institution defined the node (naming authority) and is listed 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 represents the address space of the device on which the OPC UA server is running.	
		[hostname]	Hostname of the OPC UA server. This corresponds to the hostname specified in the network settings of the device. If no hostname was specified in the network settings, the name "PPT50" 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 = Device Integration).	
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 and must be taken into account.

Only the namespace indices 0 and 1 are defined according to the OPC UA specification. The other namespace indices 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.

Important!

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

Explicit (fixed) use of *NodeIds* leads to 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:PowerPanel T50 /3:Configuration/4:Startup/4:StartMode`

6.7.1.2 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	Device-specific properties of the device are read out via these nodes in order to be able to identify the device.

6.7.1.3 ⬡ 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:PowerPanel T50 /2:ParameterSet`

ns	Path to `ParameterSet`	Description
0	Root	Root directory.
0	Objects	Object directory.
2	DeviceSet	Device directory.
4	PowerPanel T50	Node for the Power Panel T50 device.
2	ParameterSet	Node containing all available parameters of the device.

ns	BrowseName of the parameter	Description	Service page	R	W
4	ActivateDNS	Enable DNS usage.	Network	+	+
	BuzzerDuration	Duration of the buzzer.	Audio	+	+
	BuzzerFrequency	Frequency of the buzzer.	Audio	+	+
	BuzzerSource	Selects the trigger for the buzzer.	Audio	+	+
	DefaultGateway	IP address of the default gateway.	Network	+	+
	DisplayBrightness	Screen brightness.	Screen	+	+
	DNSSuffix	DNS suffix for the fully qualified domain name (FQDN).	Network	+	+
	EnableBuzzer	Enables/Disables the buzzer.	Audio	+	+
	EnableNTPClient	Enables/Disables the NTP client for time synchronization.	Time	+	+
	EnableScreensaver	Enables/Disables the screensaver.	Screen	+	+
	GetDNSFromDHCP	Enables/Disables obtaining IP addresses of the DNS servers from DHCP.	Network	+	+
	Hostname	Hostname of the Power Panel.	Network	+	+
	IpAddress	Static IP address of the Power Panel.	Network	+	+
	NetworkMode	Network mode: `DHCPClient` or `StaticIP`. Setting corresponds to option *DHCP* on service page *Network*.	Network	+	+
	NTPServer1	Address of an NTP server.	Time	+	+
	OpenServicePage	Configures opening the service page with a gesture.	Gesture	+	+
	PrimaryDNS	Address of the first DNS server.	Network	+	+
	ScreenRotation	Angle of rotation of the display.	Screen	+	+
	ScreensaverIdleTime	Time without touch activity after which the screensaver is displayed.	Screen	+	+
	ScreensaverType	Screensaver mode.	Screen	+	+
	SecondaryDNS	Address of the second DNS server.	Network	+	+
	ShowBootLogoVNC	Enables/Disables the boot logo or boot animation of the system while connecting to the VNC server.	Startup	+	+
	ShowBootLogoWeb	Enables/Disables the boot logo or boot animation of the system while connecting to the web server.	Startup	+	+
	StartMode	Power Panel start mode: `ServicePage`, `VNC` or `Web`.	Startup	+	+
	SubnetMask	Subnet mask.	Network	+	+
	Temperature0	Temperature of the CPU housing.	-	+	
	TertiaryDNS	Address of the third DNS server.	Network	+	+
	USBMemoryShare	Enables/Disables network sharing to connected USB memory.	Storage	+	+
	UserMemoryShare	Enables/Disables network sharing to internal user memory.	Storage	+	+
	UseRfbExtension	Enables/Disables the RFB extension in VNC mode.	VNC	+	+
	VirtualKeyboardWeb	Enables/Disables the on-screen keyboard in web mode.	Web	+	+
	VNCLocalWindowScaling	Enables/Disables automatic scaling of the HMI application in VNC mode.	VNC	+	+
	VNCServer	Address of the VNC server.	VNC	+	+
	WebServer	Address of the web server.	Web	+	+

ns   Namespace index (see "Namespaces" on page 82)
B   The cross-references in column "BrowseName of 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.

> ## Information:
>
> **The changes to the system settings that were made with the parameters above are only saved with method SaveConfiguration.**

6.7.1.4 ⬡ MethodSet

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

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:MethodSet

ns	Path/Node	Description
0	Root	Root directory
0	Objects	Object directory
2	DeviceSet	Device directory
4	PowerPanel T50	Node for the "Power Panel T50" device
2	MethodSet	Node containing all methods of the device

ns	BrowseName of the method	Description
4	AwakePanel	"Wakes up" the Power Panel when the screensaver is running.
	BuzzerDefault	Plays the buzzer 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 are lost.
	SaveConfiguration	Changes made to the parameters are saved. Method *LoadConfiguration* must be used to enable these stored settings on the Power Panel.
	SetBrightness	Changes the screen brightness from 20% to 100%.
	SetBrightnessUnlimited	Changes the screen brightness from 0% to 100%.
	StartUpdate	Reboots the Power Panel and start the update process.

6.7.1.5 Device properties

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

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50

ns	Path/Node	Description
0	Root	Root directory
0	Objects	Object directory
2	DeviceSet	Device directory
4	PowerPanel T50	Node for the "Power Panel T50" device

ns	BrowseName of the information	Description
3	CompatibilityId	ID to indicate compatibility.
2	DeviceManual	Link to the website: The user's manual is located in the Downloads section.
2	DeviceRevision	Hardware revision of the device (e.g. C3).
2	HardwareRevision	Hardware revision of the device (e.g. C3).
2	Manufacturer	Manufacturer of the device: B&R Industrial Automation GmbH
2	Model	Model number of the device: e.g. 6PPT50.101E-16B.
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 back of the device).
2	SoftwareRevision	Software version of the PPT system: e.g. 1.2.0
3	VendorId	Vendor ID for customized models.

6.7.1.6 Alternative paths of nodes

The nodes described in the previous sections can also be retrieved using other paths. This alternative structure divides the nodes of ParameterSet, MethodSet and Device properties into logical function groups. The detailed description of the nodes in the following section is structured according to this logical structure.

6.7.2 Description of the nodes of the information model

6.7.2.1 Configuration

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

Path to the object directory:

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration

6.7.2.1.1 Audio

Path to the object directory:

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /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.	Audio	+	+
	BuzzerFrequency	Frequency of the buzzer.	Audio	+	+
	BuzzerDuration	Duration of the buzzer.	Audio	+	+

6.7.2.1.1.1 EnableBuzzer

Function identical to: Service page Audio → "Buzzer" on page 56

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:EnableBuzzer
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Audio/4:EnableBuzzer

Node attribute

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

6.7.2.1.1.2 BuzzerSource

Function identical to: Service page Audio → "Buzzer source" on page 56

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:BuzzerSource
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Audio/4:BuzzerSource

Node attribute

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

Data type *BrBuzzerSource* (enumeration)

Value	String
0	App
1	Touch

6.7.2.1.1.3 BuzzerFrequency

Function identical to: Service page Audio → "Buzzer frequency" on page 56

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:BuzzerFrequency
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Audio/4:BuzzerFrequency

Node attribute

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

6.7.2.1.1.4 BuzzerDuration

Function identical to: Service page Audio → "Buzzer duration" on page 56

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:BuzzerDuration
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Audio/4:BuzzerDuration

Node attribute

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

6.7.2.1.2 ⬡ Gesture

Path to the object directory:

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Gesture

ns	BrowseName of the parameter	Description	Service page	R	W
4	OpenServicePage	Configuration of the Hand button.	Gesture	+	+

6.7.2.1.2.1 ⬟ OpenServicePage

Description

Function identical to: Service page Gesture → "Open service page" on page 57

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:OpenServicePage
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Gesture/4:OpenServicePage

Node attribute

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

6.7.2.1.3 📦 Network

Path to the object directory:

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /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*.	Network	+	+
	ActivateDNS	Enable DNS usage.	Network	+	+
	DNSSuffix	DNS suffix for the fully qualified domain name (FQDN).	Network	+	+
	GetDNSFromDHCP	Enables/Disables obtaining IP addresses of the DNS servers from DHCP.	Network	+	+
	PrimaryDNS	Address of the first DNS server.	Network	+	+
	SecondaryDNS	Address of the second DNS server.	Network	+	+
	TertiaryDNS	Address of the third DNS server.	Network	+	+
	IpAddress	Static IP address of the Power Panel.	Network	+	+
	SubnetMask	Subnet mask.	Network	+	+
	DefaultGateway	IP address of the default gateway.	Network	+	+

6.7.2.1.3.1 🏷 Hostname

Function identical to: Service page Network → "Hostname" on page 50

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:Hostname
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Network/4:Hostname

Node attribute

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

6.7.2.1.3.2 🏷 NetworkMode

Function identical to: Service page Network → "DHCP" on page 50

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:NetworkMode
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Network/4:NetworkMode

Node attribute

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

Data type *BrNetMode* (enumeration)

Value	String
0	DHCPClient
1	StaticIP

6.7.2.1.3.3 🏷 ActivateDNS

Function identical to: Service page Network → Activate DNS

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:ActivateDNS
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Network/4:ActivateDNS

Node attribute

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

6.7.2.1.3.4 🏷 DNSSuffix

Function identical to: Service page Network → "DNS suffix" on page 51

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:DNSSuffix
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Network/4:DNSSuffix

Node attribute

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

6.7.2.1.3.5 🏷 GetDNSFromDHCP

Function identical to: Service page Network → "Get DNS from DHCP server" on page 51

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:GetDNSFromDHCP
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Network/4:GetDNSFromDHCP

Node attribute

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

6.7.2.1.3.6 🏷 PrimaryDNS / SecondaryDNS / TertiaryDNS

Function identical to:
Service page Network → "Primary DNS server / Secondary DNS server / Tertiary DNS server" on page 51

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:PrimaryDNS
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:SecondaryDNS
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:TertiaryDNS
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Network/4:PrimaryDNS
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Network/4:SecondaryDNS
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Network/4:TertiaryDNS

Node attribute

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

6.7.2.1.3.7 🏷 IpAddress

Function identical to: Service page Network → "IP address" on page 52

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:IpAddress
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Network/4:IpAddress

Node attribute

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

6.7.2.1.3.8 🏷 SubnetMask

Function identical to: Service page Network → "Subnet mask / Default gateway" on page 52

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:SubnetMask
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Network/4:SubnetMask

Node attribute

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

6.7.2.1.3.9 🏷 DefaultGateway

Function identical to: Service page Network → "Subnet mask / Default gateway" on page 52

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:DefaultGateway
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Network/4:DefaultGateway

Node attribute

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

6.7.2.1.4 🧊 Screen

Path to the object directory:

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /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.	Screen	+	+
	EnableScreensaver	Enables/Disables the screensaver.	Screen	+	+
	ScreensaverIdleTime	Time without touch activity after which the screensaver is displayed.	Screen	+	+
	ScreensaverType	Screensaver mode.	Screen	+	+

6.7.2.1.4.1 🏷 DisplayBrightness

Function identical to: Service page Screen → "Display brightness" on page 54

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:DisplayBrightness
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Screen/4:DisplayBrightness

Node attribute

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

6.7.2.1.4.2 🏷 ScreenRotation

Function identical to: Service page Screen → "Screen rotation" on page 54

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:ScreenRotation
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Screen/4:SceenRotation

Node attribute

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

6.7.2.1.4.3 🏷 EnableScreensaver

Function identical to: Service page Screen → "Screensaver" on page 54

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:EnableScreensaver
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Screen/4:EnableScreensaver

Node attribute

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

6.7.2.1.4.4 ScreensaverIdleTime

Function identical to: Service page Screen → "Start screensaver after" on page 55

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:ScreensaverIdleTime
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Screen/4:ScreensaverIdleTime

Node attribute

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

6.7.2.1.4.5 ScreensaverType

Function identical to: Service page Screen → "Screensaver type" on page 55

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:ScreensaverType
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Screen/4:ScreensaverType

Node attribute

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

Data type *BrScreensaver* (enumeration)

Value	String
0	Black
1	BacklightOff

6.7.2.1.5 🟦 Startup

Path to the object directory:

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /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.	Startup	+	+
	ShowBootLogoWeb	Enables/Disables the boot logo or boot animation of the system while connecting to the web server.	Startup	+	+

6.7.2.1.5.1 🟢 StartMode

Function identical to: Service page Startup → "Start mode" on page 49

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:StartMode
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Startup/4:StartMode

Node attribute

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

Data type *BrStartMode* (enumeration)

Value	String
0	ServicePage
1	VNC
2	Web

6.7.2.1.5.2 🟢 ShowBootLogoVNC / ShowBootLogoWeb

Function identical to: Service page Startup → "Boot logo or boot animation" on page 49

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:ShowBootLogoVNC
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:ShowBootLogoWeb
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Startup/4:ShowBootLogoVNC
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Startup/4:ShowBootLogoWeb

Node attribute

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

6.7.2.1.6 ⬡ Storage

Path to the object directory:

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Storage

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

6.7.2.1.6.1 🏷 USBMemoryShare / UserMemoryShare

Function identical to: Options on "Service page Storage" on page 62

- 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:PowerPanel T50 /2:ParameterSet/4:USBMemoryShare
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:USBMemoryShare
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Storage/4:UserMemoryShare
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Storage/4:UserMemoryShare

Node attribute

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

6.7.2.1.7 Time

Path to the object directory:

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /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.	Time	+	+

6.7.2.1.7.1 EnableNTPClient

Function identical to: Service page Time → "NTP client" on page 53

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:EnableNTPClient
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Time/4:EnableNTPClient

Node attribute

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

6.7.2.1.7.2 NTPServer1

Function identical to: Service page Time → NTPServer1

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:NTPServer1
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Time/4:NTPServer1

Node attribute

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

6.7.2.1.8 Vnc

Path to the object directory:

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /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.	VNC	+	+
	VNCLocalWindowScaling	Enables/Disables automatic scaling of the HMI application in VNC mode.	VNC	+	+

6.7.2.1.8.1 VNCServer

Function identical to: Service page VNC → "Server" on page 58

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:VNCServer
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Vnc/4:VNCServer

Node attribute

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

6.7.2.1.8.2 UseRfbExtension

Function identical to: Service page VNC → "Use RFB extension" on page 59

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:UseRfbExtension
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Vnc/4:UseRfbExtension

Node attribute

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

6.7.2.1.8.3 VNCLocalWindowScaling

Function identical to: Service page VNC → "Enable local window scaling" on page 59

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:VNCLocalWindowScaling
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Vnc/4:VNCLocalWindowScaling

Node attribute

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

6.7.2.1.9 ⬢ Web

Path to the object directory:

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /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.	Web	+	+

6.7.2.1.9.1 🏷 WebServer

Function identical to: Service page Web → "Server" on page 60

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:WebServer
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Web/4:WebServer

Node attribute

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

6.7.2.1.9.2 🏷 VirtualKeyboardWeb

Function identical to: Service page Web → "Virtual keyboard" on page 61

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:VirtualKeyboardWeb
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Configuration/4:Web/4:VirtualKeyboardWeb

Node attribute

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

6.7.2.2 ⬡ Control

Path to the object directory:

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Control

ns	BrowseName of the method	Description
4	AwakePanel	"Wakes up" the Power Panel when the screensaver is running.
	BuzzerDefault	Plays the buzzer 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 are lost.
	SaveConfiguration	Changes made to the parameters are saved. Method *LoadConfiguration* must be used to enable these stored settings on the Power Panel.
	SetBrightness	Changes the screen brightness from 20% to 100%.
	SetBrightnessUnlimited	Changes the screen brightness from 0% to 100%.
	StartUpdate	Reboots the Power Panel and start the update process.

6.7.2.2.1 ⬡ AwakePanel

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

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:MethodSet/4:AwakePanel
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Control/4:AwakePanel

Arguments for method call

Arguments	-

6.7.2.2.2 ⬡ BuzzerDefault

Plays the buzzer with the system settings.

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:MethodSet/4:BuzzerDefault
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Control/4:BuzzerDefault

Arguments for method call

Arguments	-

6.7.2.2.3 ⬡ 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:PowerPanel T50 /2:MethodSet/4:BuzzerWithPara
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Control/4:BuzzerWithPara

Arguments for 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].

6.7.2.2.4 ⬦ LoadConfiguration

The Power Panel loads the last saved settings and restarts. Any changes made to the parameters are not saved and are 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:PowerPanel T50 /2:MethodSet/4:LoadConfiguration
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Control/4:LoadConfiguration

Arguments for method call

Arguments	-

6.7.2.2.5 ⬦ SaveConfiguration

Changes made to the parameters are saved. Method *LoadConfiguration* must be used to enable these stored settings 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:PowerPanel T50 /2:MethodSet/4:SaveConfiguration
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Control/4:SaveConfiguration

Arguments for method call

Arguments	-

6.7.2.2.6 ⬦ SetBrightness

Changes the screen brightness from 20% to 100%. See arguments for the method call.

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:MethodSet/4:SetBrightness
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Control/4:SetBrightness

Arguments for method call

Argument	Data type	Name	Description	
0	UInt32	Brightness	Brightness in percent [%].	
			Range of values:	0 - 100
			Scaling	0 → 20% to 100 → 100%

6.7.2.2.7 ⬦ SetBrightnessUnlimited

Changes the screen brightness from 0% to 100%. See arguments for the method call.

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:MethodSet/4:SetBrightnessUnlimited
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Control/4:SetBrightnessUnlimited

Arguments for 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%

6.7.2.2.8 StartUpdate

Reboots the Power Panel and start 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:PowerPanel T50 /2:MethodSet/4:StartUpdate`
Alternative path (function group):
`0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Control/4:StartUpdate`

Arguments for method call

Arguments	-

6.7.2.3 🔷 Status

Path to the object directory:

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Status

ns	BrowseName of the parameter	Description	Service page	R	W
4	Temperature0	Temperature of the CPU housing.	-	+	

6.7.2.3.1 ▱ Temperature0

Temperature of the CPU housing: See "Temperature monitoring" on page 78.

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:ParameterSet/4:Temperature0
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:Status/4:Temperature0

Node attribute

NodeClass	Variable
DataType	Float
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

6.7.2.4 Identification

Path to the object directory:

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /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	Hardware revision of the device (e.g. C3).
2	Model	Model number of the device: e.g. 6PPT50.101E-16B.
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 back of the device).
2	SoftwareRevision	Software version of the PPT system: e.g. 1.2.0
3	VendorId	Vendor ID for customized models.

6.7.2.4.1 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:PowerPanel T50 /3:CompatibilityId
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:Identification/3:CompatibilityId

Node attribute

NodeClass	Variable
DataType	UInt32
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

6.7.2.4.2 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:PowerPanel T50 /2:DeviceRevision
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:Identification/2:DeviceRevision

Node attribute

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

6.7.2.4.3 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:PowerPanel T50 /2:HardwareRevision
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:Identification/2:HardwareRevision

Node attribute

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

6.7.2.4.4 Model

Model number of the device: e.g. 6PPT50.101E-16B.

See also "Model number key" on page 12.

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:Model
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:Identification/2:Model

Node attribute

NodeClass	Variable
DataType	LocalizedText
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

6.7.2.4.5 ProductCode

B&R ID code (see technical data of the device).

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /3:ProductCode
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:Identification/3:ProductCode

Node attribute

NodeClass	Variable
DataType	UInt32
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

6.7.2.4.6 RevisionCounter

Value: -1 (reserved, not in use)

Path to the node (BrowsePath)

Path:
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:RevisionCounter
Alternative path (function group):
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:Identification/2:RevisionCounter

Node attribute

NodeClass	Variable
DataType	Int32
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

6.7.2.4.7 SerialNumber

Serial number of the device (see label on back of the device).

Path to the node (BrowsePath)

Path:
`0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:SerialNumber`
Alternative path (function group):
`0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:Identification/2:SerialNumber`

Node attribute

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

6.7.2.4.8 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:PowerPanel T50 /2:SoftwareRevision`
Alternative path (function group):
`0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:Identification/2:SoftwareRevision`

Node attribute

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

6.7.2.4.9 VendorId

Vendor ID 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:PowerPanel T50 /3:VendorId`
Alternative path (function group):
`0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:Identification/3:VendorId`

Node attribute

NodeClass	Variable
DataType	UInt32
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

6.7.2.5 Additional device properties

The following device properties are not available within group *Identification* .

Path to the object directory:

Path:	
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50	

ns	BrowseName of the information	Description
2	Manufacturer	Manufacturer of the device: B&R Industrial Automation GmbH
2	DeviceManual	Link to the website: The user's manual is located in the Downloads section.

6.7.2.5.1 Manufacturer

Manufacturer of the device: B&R Industrial Automation GmbH

Path to the node (BrowsePath)

Path:	
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:Manufacturer	

Device property *Manufacturer* is only available as a property of node `PowerPanel T50` .

Node attribute

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

6.7.2.5.2 DeviceManual

Link to the website: The user's manual is located in the Downloads section.

Path to the node (BrowsePath)

Path:	
0:Root/0:Objects/2:DeviceSet/4:PowerPanel T50 /2:DeviceManual	

Device property *CompatibilityId* is only available as a property of node `PowerPanel T50` .

Node attribute

NodeClass	Variable
DataType	String
AccessLevel	CurrentRead
UserAccessLevel	CurrentRead

7 Maintenance

7.1 Cleaning

Danger!

Power Panel devices are only permitted to be cleaned while switched off in order to prevent unintended functions from being triggered when handling the touch screen or pressing keys.

Power Panel devices should be cleaned with a moist cloth. The cloth should be moistened with water and detergent, a screen cleaning agent or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand, not sprayed directly on the Power Panel! Never use aggressive solvents, chemicals, scouring agents, pressurized air or steam-jet air ejectors.

Important!

Cleaning the label on the back of the unit is only permitted with a dry cloth. This ensures readability of the thermal print during the service life of the device.

Information:

The display with the touch screen should be cleaned at regular intervals.

7.2 User tips for increasing the service life of the display

Pixel errors

> ### Information:
>
> **Displays may contain defective pixels (pixel errors) that result from the manufacturing process. They are not grounds for initiating a complaint or warranty claim.**

7.2.1 Backlight

The service life of the backlight is specified by its "half-brightness time". An operating time of 50,000 would mean that the display would still retain 50% of its brightness after this time.

How can the service life of backlights be extended?

- Setting the display brightness to the lowest value that is still comfortable for the eyes
- Using dark images
- Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.

7.2.2 Image persistence

Image persistence refers to the "burning in" of a static image on a display after being displayed for a prolonged period of time. This not only occurs with static images, however. Image persistence is also referred to in the technical literature as burn-in effect, image retention, memory effect, memory sticking or ghost image.

There are basically 2 types:

- Area type: This type is characterized by a dark gray image. The effect disappears if the display is switched off for a long period of time.
- Line type: 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?

- Constantly switching between static and dynamic images
- Avoiding excessive brightness differences between foreground and background elements
- Using colors with similar brightness
- Using complementary colors in consecutive images
- Using screensavers

8 Accessories

8.1 Overview

Model number	Product ID	Page
Cage clamp terminal block		
0TB6102.2110-01	Accessory 2-pin cage clamp terminal block (3.81)	110
Screw clamp terminal block		
0TB6102.2010-01	Accessory 2-pin screw clamp (3.81)	110
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	110
Ethernet cable [1] **RJ45 to RJ45**		
X20CA0E61.00020	POWERLINK connection cable, RJ45 to RJ45, 0.20 m	
X20CA0E61.00025	POWERLINK connection cable, RJ45 to RJ45, 0.25 m	110
X20CA0E61.00030	POWERLINK connection cable, RJ45 to RJ45, 0.30 m	
X20CA0E61.00035	POWERLINK connection cable, RJ45 to RJ45, 0.35 m	
X20CA0E61.00040	POWERLINK connection cable, RJ45 to RJ45, 0.40 m	
X20CA0E61.00050	POWERLINK connection cable, RJ45 to RJ45, 0.50 m	
X20CA0E61.00100	POWERLINK connection cable, RJ45 to RJ45, 1 m	
X20CA0E61.00150	POWERLINK connection cable, RJ45 to RJ45, 1.50 m	
X20CA0E61.00200	POWERLINK connection cable, RJ45 to RJ45, 2 m	
X20CA0E61.00300	POWERLINK connection cable, RJ45 to RJ45, 3 m	
X20CA0E61.00500	POWERLINK connection cable, RJ45 to RJ45, 5 m	
X20CA0E61.00800	POWERLINK connection cable, RJ45 to RJ45, 8 m	
X20CA0E61.01000	POWERLINK connection cable, RJ45 to RJ45, 10 m	
X20CA0E61.01200	POWERLINK connection cable, RJ45 to RJ45, 12 m	
X20CA0E61.01500	POWERLINK connection cable, RJ45 to RJ45, 15 m	
X20CA0E61.02000	POWERLINK connection cable, RJ45 to RJ45, 20 m	
X20CA0E61.0300 [2]	POWERLINK connection cable, RJ45 to RJ45, 30 m	
X20CA0E61.0500 [2]	POWERLINK connection cable, RJ45 to RJ45, 50 m	
X20CA0E61.0600 [2]	POWERLINK connection cable, RJ45 to RJ45, 60 m	
Ethernet cable [1] [2] **RJ45 to RJ45, can be used in cable drag chains**		
X20CA3E61.0100	POWERLINK connection cable, RJ45 to RJ45, can be used in drag chains, 10 m	110
X20CA3E61.0150	POWERLINK connection cable, RJ45 to RJ45, can be used in drag chains, 15 m	
X20CA3E61.0200	POWERLINK connection cable, RJ45 to RJ45, can be used in drag chains, 20 m	

1) B&R POWERLINK cables can be used for the Ethernet connections.
2) These cables are suitable for networks with transfer rates up to 100 Mbit/s, but not for Gigabit networks.

8.2 TB6102 2-pin power supply connector

This 1-row 2-pin terminal block is used to connect the power supply.

8.2.1 Order data

Model number	Short description
	Terminal blocks
0TB6102.2010-01	Accessory terminal block, 2-pin (3.81), screw clamp terminal block 1.5 mm²
0TB6102.2110-01	Accessory terminal block, 2-pin (3.81), cage clamp terminal block 1.5 mm²

Table 4: 0TB6102.2010-01, 0TB6102.2110-01 - Order data

8.2.2 Technical data

> **Information:**
>
> **The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. The data specifications for the complete system take precedence over those of individual components.**
>
> **The technical data in this manual is current as of its creation/publication. We reserve the right to make changes.**

Model number	0TB6102.2010-01	0TB6102.2110-01
Terminal block		
Number of pins	2 (female)	
Type of terminal block	Screw clamp terminal block	Cage clamp terminal block
Cable type	Only copper wires (no aluminum wires!)	
Spacing	3.81 mm	
Connection cross section		
AWG wire	28 to 16	
Wire end sleeves with plastic covering	0.25 to 0.5 mm²	
With wire end sleeves	0.25 to 1.5 mm²	
Flexible	0.14 to 1.5 mm²	
Inflexible	0.14 to 1.5 mm²	
Tightening torque	0.22 to 0.25 Nm	-
Electrical characteristics		
Nominal voltage	300 V	
Nominal current [1]	8 A	

Table 5: 0TB6102.2010-01, 0TB6102.2110-01 - Technical data

1)   The limit data for each Power Panel must be taken into consideration.

8.3 Data storage devices

For technical data and additional information about data storage devices, see the corresponding documentation. This can be located and downloaded by searching for the data storage device's model number at www.br-automation.com.

8.4 Cable accessories

For technical data and additional information about cables, see the corresponding documentation. This can be located and downloaded by searching for the cable's model number on the B&R website at www.br-automation.com.

9 International and national certifications

Power Panel devices meet the requirements of the listed certifications and their relevant standards. We are committed to ensuring the reliability of our products in industrial environments.

Information:

Certifications applicable to the respective Power Panel are available at the following locations:

- **Chapter "Device description" in section "Technical data" for the individual products.**
- **On the website www.br-automation.com in section "Technical data" for the individual products (possible to search using model number).**
- **On the product label (see Power Panel housing).**

Changes and new certifications are promptly made available in electronic form on the B&R website at www.br-automation.com.

9.1 Overview of certifications

Mark	Explanation	Certificate authority	Region
CE	CE marking	Notified bodies	Europe (EU)
c(UL)us LISTED	Underwriters Laboratories Inc. (UL) (certification for Canada and USA)	UL	Canada USA
DNV·GL MARITIME	Det Norske Veritas - Germanischer Lloyd (DNV GL)	DNV GL	Germany Norway

9.2 EU directives and standards (CE)

CE markings

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 devices satisfy the protection requirements of the "EMC directive" and are designed for industrial use:

Applicable standards from this directive:

EN 61131-2	Programmable logic controllers - Part 2: Guidance for inspection and routine testing
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 > Declaration of conformity HMI IPC

9.2.1 Overview of standards

Standard	Description
EN 55011 (CISPR 11)	Industrial, scientific and medical equipment - Radio frequency 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 60068-2-6	Environmental testing - Part 2-6: Procedures - Test Fc: Vibration (sinusoidal)
EN 60068-2-27	Environmental testing - Part 2-27: Test procedure - Test Ea and guidance: Shock
EN 60068-2-31[1]	Environmental testing - Part 2-31: Test procedure - Test Ec: Rough handling shocks, mainly for devices
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: Transport
EN 60721-3-3	Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 3: Stationary use at weather-protected 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 - Immunity tests for voltage dips, short interruptions and voltage variations
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: Guidance for inspection and routine testing

1)   Replacement for EN 60068-2-32

9.2.2 Requirements for immunity to disturbances

Immunity	Testing performed per standard:	Requirements per standard:	
		EN 61131-2 [1]	EN 61000-6-2 [2]
Electrostatic discharge (ESD)	EN 61000-4-2	✓	✓
High-frequency electromagnetic fields (HF field)	EN 61000-4-3	✓	✓
High-speed transient electrical disturbances (Burst)	EN 61000-4-4	✓	✓
Surge voltages (Surge)	EN 61000-4-5	✓	✓
Conducted disturbances	EN 61000-4-6	✓	✓
Magnetic fields with electrical frequencies	EN 61000-4-8	✓	✓
Voltage dips (AC) Short-term interruptions (AC) Voltage fluctuations (AC)	EN 61000-4-11	✓	✓
Short-term interruptions (DC) Voltage fluctuations (DC)	EN 61000-4-29	✓	-

1) EN 61131-2: Product standard - Programmable logic controllers
2) EN 61000-6-2: Generic standard - Immunity for industrial environments

Criteria to prove the performance of a PLC system against EMC disturbances

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 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 standard: EN 61000-4-2	Requirements per standard: EN 61131-2 / Zone B	Requirements per standard: EN 61000-6-2
Contact discharge (CD) to conductive accessible parts	±4 kV Criteria B	
Air discharge (AD) to insulating external parts	±8 kV Criteria B	

High-frequency electromagnetic fields (HF field)

Testing performed per standard: EN 61000-4-3	Requirements per standard: EN 61131-2 / Zone B	Requirements per standard: EN 61000-6-2
Housing, completely wired	80 MHz to 1 GHz, 10 V/m 1.4 to 2 GHz, 3 V/m 2 to 2.7 GHz, 1 V/m Criteria A	

High-speed transient electrical disturbances (Burst)

Testing performed per standard: EN 61000-4-4	Requirements per standard: EN 61131-2 / Zone B	Requirements per standard: EN 61000-6-2
AC power inputs	±2 kV / 5 kHz Criteria B	
AC power outputs	±2 kV / 5 kHz [1] Criteria B	±2 kV / 5 kHz Criteria B
Other AC I/O	±2 kV / 5 kHz [1] Criteria B	-
DC mains inputs/outputs	±2 kV / 5 kHz [1] Criteria B	
Other I/Os and interfaces	±1 kV / 5 kHz [1] Criteria B	

1) Only for connections with a permitted line length greater than 3 m.

Surge voltages (Surge)

Testing performed per standard: EN 61000-4-5	Requirements per standard: EN 61131-2 / Zone B	Requirements per standard: EN 61000-6-2
AC mains inputs/outputs Line / line	±1 kV Criteria B	
AC mains inputs/outputs Line / ground	±2 kV Criteria B	
DC mains inputs/outputs Line / line	±0.5 kV [1] Criteria B	±0.5 kV Criteria B
DC power inputs Line / ground	±0.5 kV [1] Criteria B	±0.5 kV Criteria B
DC power outputs Line / ground	±0.5 kV [1] Criteria B	±0.5 kV Criteria B
Signal connections, unshielded Line / ground	±1 kV [1] Criteria B	
All shielded lines Line / ground	±1 kV [1] Criteria B	-

[1]   Only for connections with a permitted line length greater than 30 m.

Conducted disturbances

Testing performed per standard: EN 61000-4-6	Requirements per standard: EN 61131-2 / Zone B	Requirements per standard: 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	10 V [1] 150 kHz to 80 MHz 80% AM (1 kHz) Criteria A	

[1]   Only for connections with a permitted line length greater than 3 m.

Magnetic fields with electrical frequencies

Testing performed per standard: EN 61000-4-8	Requirements per standard: EN 61131-2 / Zone B	Requirements per standard: 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 standard: EN 61000-4-11	Requirements per standard: EN 61131-2 / Zone B	Requirements per standard: 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 standard: EN 61000-4-11 / EN 61000-4-29	Requirements per standard: EN 61131-2 / Zone B	Requirements per standard: EN 61000-6-2
AC power inputs	0% residual voltage 0.5 periods (50/60 Hz) [1] 20 attempts Criteria A	0% residual voltage 1 period (50/60 Hz) [1] 3 attempts Criteria B
DC power inputs	0% residual voltage ≥10 ms (PS2) [2] 20 attempts Criteria A	-

[1]   Mains frequency per manufacturer data
[2]   Use of a B&R power supply guarantees that these requirements are met.

Voltage fluctuations

Testing performed per standard: EN 61000-4-11 / EN 61000-4-29	Requirements per standard: EN 61131-2 / Zone B	Requirements per standard: EN 61000-6-2
AC power inputs	-15% / +10% Test duration per 30 minutes Criteria A	-
DC power inputs	-15% / +20% Test duration per 30 minutes Criteria A	-

9.2.3 Emission requirements

Phenomenon	Testing performed per standard:	Limit values per standard:	
		EN 61131-2 [1]	EN 61000-6-4 [2]
Emissions related to lines	EN 55011 / EN 55022 EN 55016-2-1	✓	✓
Radiated emissions	EN 55011 / EN 55022 EN 55016-2-3	✓	✓

1) EN 61131-2: Product standard - Programmable logic controllers
2) EN 61000-6-4: Generic standards - Emission standard for industrial environments

Emissions related to lines

Testing performed per standard: EN 55011 / EN 55022 / EN 55016-2-1	Limit values per standard: EN 61131-2 / Zone B	Limit values per standard: EN 61000-6-4
AC mains connection 150 kHz to 30 MHz	150 to 500 kHz 79 dB (µV) quasi-peak value 66 dB (µV) average value	
	500 kHz to 30 MHz 73 dB (µV) quasi-peak value 60 dB (µV) average value	
Telecommunications / network connection 150 kHz to 30 MHz	-	150 to 500 kHz 97 to 87 dB (µV) quasi-peak value 53 to 40 dB (µA) quasi-peak value 84 to 74 dB (µV) average value 40 to 30 dB (µA) average value
	-	500 kHz to 30 MHz 87 dB (µV) quasi-peak value 43 dB (µA) quasi-peak value 74 dB (µV) average value 30 dB (µA) average value

Radiated emissions

Testing performed per standard: EN 55011 / EN 55022 / EN 55016-2-3	Limit values per standard: EN 61131-2 / Zone B	Limit values per standard: EN 61000-6-4
Electric field / Measured from 10 m 30 MHz to 1 GHz	30 to 230 MHz 40 dB (µV/m) quasi-peak value	
	230 MHz to 1 GHz 47 dB (µV/m) quasi-peak value	
Electric field / Measured from 3 m 1 to 6 GHz [1]	-	1 to 3 GHz 76 dB (µV/m) peak value 56 dB (µV/m) average value
	-	3 to 6 GHz 80 dB (µV/m) peak value 60 dB (µV/m) average value

1) Depending on highest internal frequency

9.2.4 Mechanical conditions

Testing	Testing performed per standard:	Requirements per standard:				
		EN 61131-2 [1]	EN 60721-3-2 Class 2M1	EN 60721-3-2 Class 2M2	EN 60721-3-2 Class 2M3	EN 60721-3-3 Class 3M4
Vibration (sinusoidal) / Operation	EN 60068-2-6	✔	-	-	-	✔
Shock / Operation	EN 60068-2-27	✔	-	-	-	✔
Vibration (sinusoidal) / Transport (packaged)	EN 60068-2-6	-	✔	✔	✔	-
Shock / Transport (packaged)	EN 60068-2-27	-	✔	✔	-	-
Free fall / Transport (packaged)	EN 60068-2-31 [2]	✔	✔	-	-	-
Toppling / Transport (packaged)	EN 60068-2-31	-	✔	✔	✔	-

1) EN 61131-2: Product standard - Programmable logic controllers
2) Replacement for EN 60068-2-32

Vibration (sinusoidal) / Operation

Testing performed per standard: EN 60068-2-6	Requirements per standard: EN 61131-2		Requirements per standard: EN 60721-3-3 / Class 3M4	
Vibration (sinusoidal) [1] Operation	**Frequency**	**Amplitude**	**Frequency**	**Amplitude**
	5 to 8.4 Hz	Deflection 3.5 mm	2 to 9 Hz	Deflection 3 mm
	8.4 to 150 Hz	Acceleration 1 g [2]	9 to 200 Hz	Acceleration 1 g [2]
	20 sweeps for each axis [3]			

1) Uninterrupted duty with movable frequency in all 3 axes (x, y, z); 1 octave per minute
2) 1 g = 10 m/s²
3) 2 sweeps = 1 frequency cycle ($f_{min} \rightarrow f_{max} \rightarrow f_{min}$)

Shock / Operation

Testing performed per standard: EN 60068-2-27	Requirements per standard: EN 61131-2	Requirements per standard: EN 60721-3-3 / Class 3M4
Shock [1] Operation	Acceleration 15 g Duration 11 ms 18 shocks	Acceleration 10 g Duration 11 ms 18 shocks

1) Pulse (half-sine) stress in all 3 axes (x, y, z), 1 octave per minute

Vibration (sinusoidal) / Transport (packaged)

Testing performed per standard: EN 60068-2-6	Requirements per standard: EN 60721-3-2 / Class 2M1		Requirements per standard: EN 60721-3-2 / Class 2M2		Requirements per standard: EN 60721-3-2 / Class 2M3	
Vibration (sinusoidal) [1] Transport (packaged)	**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 [2]	9 to 200 Hz	Acceleration 1 g [2]	8 to 200 Hz	Acceleration 2 g [2]
	200 to 500 Hz	Acceleration 1.5 g [2]	200 to 500 Hz	Acceleration 1.5 g [2]	200 to 500 Hz	Acceleration 4 g [2]
	20 sweeps for each axis [3]					

1) Uninterrupted duty with movable frequency in all 3 axes (x, y, z); 1 octave per minute
2) 1 g = 10 m/s²
3) 2 sweeps = 1 frequency cycle ($f_{min} \rightarrow f_{max} \rightarrow f_{min}$)

Shock / Transport (packaged)

Testing performed per standard: EN 60068-2-27	Requirements per standard: EN 60721-3-2 / Class 2M1	Requirements per standard: EN 60721-3-2 / Class 2M2
Shock [1] Transport (packaged)	Type I Acceleration 10 g Duration 11 ms 18 shocks	
	Type II -	Type II Acceleration 30 g Duration 6 ms 18 shocks

1) Pulse (half-sine) stress in all 3 axes (x, y, z)

Free fall / Transport (packaged)

Testing performed per standard: EN 60068-2-31 [1]	Requirements per standard: EN 61131-2 with shipping packaging		Requirements per standard: EN 61131-2 with product packaging		Requirements per standard: EN 60721-3-2 / Class 2M1	
Free fall Transport (packaged)	**Weight**	**Height**	**Weight**	**Height**	**Weight**	**Height**
	<10 kg	1.0 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					

1) Replacement for EN 60068-2-32

Toppling / Transport (packaged)

Testing performed per standard: EN 60068-2-31	Requirements per standard: EN 60721-3-2 / Class 2M1		Requirements per standard: EN 60721-3-2 / Class 2M2		Requirements per standard: 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		Topple on all edges		Topple on all edges	

9.2.5 Electrical safety

Overvoltage category

Requirement per standard: EN 61131-2	Explanation per standard: EN 60664-1
Overvoltage category II	Equipment of "Overvoltage category II" is energy-consuming equipment to be supplied by the fixed installation.

Pollution degree

Requirement per standard: EN 61131-2	Explanation per standard: EN 60664-1
Pollution degree 2	Only non-conductive pollution occurs. Occasionally, however, temporary conductivity caused by condensation is to be expected.

Protection rating provided by enclosure (IP code)

Requirement per standard: EN 61131-2	Explanation of code numbers per standard: EN 60529	Meaning for the protection of equipment	Meaning for the protection of personnel
Back: ≥IP20	First number IP**2**x	Protected against solid foreign bodies with a diameter ≥12.5 mm	Protected against touching dangerous parts with fingers
	Second number IPx**0**	Not protected.	-

Requirement per manufacturer	Explanation of code numbers per standard: EN 60529	Meaning for the protection of equipment	Meaning for the protection of personnel
Front: IP65	First number IP**6**x	Dust-proof.	Protected against touching dangerous parts with conductor.
	Second number IP x**5**	Protection against water jets.	-

9.3 Underwriters Laboratories (UL)

UL markings

Ind. Cont. Eq.
E115267

Underwriters Laboratories (UL)

Products with this mark are tested by Underwriters Laboratories and listed as "industrial control equipment" in category NRAQ (programmable controllers) with file number E115267.

This mark is valid for the USA and Canada and simplifies the certification of your machines and manufacturing systems in this economic region.

Canada / USA

Standards applied:

UL 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
UL 61010-2-201	Standard for safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-201: Particular requirements for control equipment
CSA C22.2 No. 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
CSA C22.2 No. 61010-2-201	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-201: Particular requirements for control equipment

Certificate

Website > Downloads > Certificates > UL > Power Panel

9.4 Det Norske Veritas - Germanischer Lloyd

DNV GL mark

Many B&R products are certified by DNV GL and suitable for use in maritime environments.

DNV GL Maritime certificates (type approval) are generally accepted by other classification societies during ship acceptance procedures.

For corresponding environmental categories, see the technical data for the respective product.

Germany/Norway

Standards applied:

DNVGL-CG-0339	Environmental test specification for electrical, electronic and programmable equipment and systems.

Certificate

Website > Downloads > Certificates > Maritime > DNV GL > X20 / Power Panel T/C > DNV GL Type Approval Certificate