Power Panel T30

User's manual

Version: **1.30 (December 2016)**

Model no.: **MAPPT30-ENG**

Translation of the original documentation

Power Panel T30 User's manual V1.30

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
1.30	December 2016	Restructuring of the manual: • Moved section "System characteristics" into a separate chapter. • Grouped chapter "Power Panel T-Series" and section "T30-Series" together and renamed to chapter "Device description". • Restructured chapter "Device description" and renamed individual sections. • Additional editorial changes. Further changes: • Renamed chapter "Standards and certifications" to "International and national certifications" and updated information. • Added new section "Instructions for use in Ex zone 2 / 22" in chapter "Installation" • Corrected content in the "Technical data". • Revised section "Grounding". • Redesigned chapter "Configuration".
1.20	November 2015	Updated "Installation" and "Standards and certifications".
1.10	September 2015	Added new section "Operating the Power Panel with a USB mouse". Updated "Technical data", "Dependencies to Automation Studio and Automation Runtime" and "Installation".
1.00	May 2015	Added new chapter "Automation Studio and Automation Runtime dependencies". Updated "Installation".
0.70	May 2015	Added new chapters to "General information" and "Installation". Updated "Technical data" and "Installation".
0.60	March 2015	Updated "T-Series" and "Installation".
0.50	February 2015	Updated "Installation and "Accessories".
0.40	December 2014	Updated "Installation".
0.30	September 2014	Updated "Technical data", "Humidity diagram, "Installation guidelines" and "Mounting orientations".
0.20	September 2014	Updated "Technical data" and "Connection elements".
0.10	August 2014	First edition

1.2 Safety guidelines

1.2.1 Introduction

Programmable logic controllers (PLCs), operating and monitoring devices (industrial PCs, Power Panels, Mobile Panels, etc.), as well as the B&R uninterruptible power supplies have been designed, developed or manufactured for conventional use in industry. They were not designed, developed and manufactured for any use involving serious risks or hazards that could lead to death, injury, serious physical damage or loss of any kind without the implementation of exceptionally stringent safety precautions. In particular, such risks and hazards include the use of these devices to monitor nuclear reactions in nuclear power plants, their use 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 together 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 circuits, etc.) must be observed in accordance with applicable national and international regulations. The same 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 (e.g. IEC 60364). National accident prevention regulations must be observed.

The safety notices, connection descriptions (type plate and documentation) and limit values listed in the technical data are to be read carefully before installation and commissioning and must be observed.

1.2.2 Intended use

Electronic devices are never completely failsafe. If the programmable control system, operating/monitoring device or uninterruptible power supply fails, the user is responsible for ensuring that other connected devices, e.g. motors, are brought to a secure 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 they still 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 should always be stored in a suitable medium (ESD packaging, conductive foam, etc.). **Information: Metallic surfaces are not suitable storage surfaces!**
- Components should not be subjected to electrostatic discharge (e.g. through the use of charged plastics).
- Ensure a minimum distance of 10 cm from monitors and TV sets.
- Measuring instruments and equipment must be grounded.
- Probes on potential-free measuring instruments must be discharged on sufficiently grounded surfaces before taking measurements.

Individual components

- ESD protective measures for individual components are thoroughly integrated at B&R (conductive floors, footwear, arm bands, etc.).
- These increased ESD protective measures for individual components are not necessary for customers handling B&R products.

1.2.4 Policies and procedures

Electronic devices are never completely failsafe. If the programmable control system, operating/monitoring device or uninterruptible power supply fails, the user is responsible for ensuring that other connected devices, e.g. motors, are brought to a secure state.

When using programmable logic controllers or operating/monitoring devices as control systems together 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. The same applies for 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 (e.g. IEC 60364). National accident prevention regulations must be observed.
The safety notices, connection descriptions (type plate and documentation) and limit values listed in the technical data are to be read carefully before installation and commissioning and must be observed.

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 inappropriate 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 without voltage applied.
- General safety guidelines and national accident prevention regulations must be observed.
- Electrical installation must be carried out in accordance with applicable guidelines (e.g. line cross sections, fuses, protective ground connections).
- Take the necessary steps to protect against electrostatic discharges (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 and monitoring devices, and uninterruptible power supplies, certain components must carry dangerous voltage levels over 42 VDC. Touching one of these parts can result in a life-threatening electric shock. This could lead to death, severe injury or damage to property.

Before turning on the programmable logic controller, operating/monitoring devices or uninterruptible power supply, the housing must be properly grounded (PE rail). Ground connections must be established even when testing or operating operating/monitoring devices or the uninterruptible power supply for a short time!

Before switching on the device, all parts that carry voltage 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, etc.) and uninterruptible power supplies in very dusty environments should be avoided. Dust collection on the devices can affect functionality and may prevent sufficient cooling, especially in systems with active cooling systems (fans).

The presence of corrosive gases can also lead to malfunctions. 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. Signs of the presence of corrosive gases are blackened copper surfaces and cable ends on existing equipment.

For operation in dusty or moist conditions, correctly installed (e.g. cutout installations) operating/monitoring devices like the Automation Panel or Power Panel are protected on the front. The back of all devices must be protected from dust and moisture and cleaned 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 medium (e.g. diskette, CD-ROM, USB flash drive, etc.), a network connection or the Internet. The user is responsible for assessing these dangers, implementing preventive measures such as virus protection programs, firewalls, etc. and making sure that software is only obtained from trusted sources.

1.2.8 Environmentally friendly disposal

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

1.2.8.1 Separation of materials

It is necessary to separate different materials so the device 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 box / Paper packaging	Cardboard box / Paper recycling
Plastic packaging	Plastic recycling

Disposal must comply with applicable legal regulations.

1.2.9 Organization of safety notices

Safety notices and what they mean are organized in this manual as follows:

Safety notice	Description
Danger!	Disregarding the safety regulations and guidelines can result in severe injury or death.
Warning!	Disregarding the safety regulations and guidelines can result in extensive damage to property, severe injury or death.
Caution!	Disregarding the safety regulations and guidelines can result in damage to property or slight injury.
Important!	This information is important for preventing errors. Disregarding these safety guidelines and notices can be result in damage to property.
Information:	Tips for use and useful information. Does not contain information that warns against a dangerous or damaging function.

2 System characteristics

The Power Panel T30 is equipped with an embedded browser and can also be used as a Visual Components client. The terminal series has 2 Ethernet and 2 USB interfaces as well as various configuration options.

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 T30 devices are available in 4 different display sizes ranging from 4.3" to 10.1" (see).

A touch button is integrated in the panel overlay at the lower right corner of the display. This element can be elegantly incorporated into the HMI application and easily set up for home or help functionality.

The ability to choose between a landscape or portrait format adds even more flexibility to the machine layout. It is easy to switch between panel models depending on the machine. In addition to the 2 different formats, users can also select between 2 pinstripe options: anthracite gray or aluminum white.

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 T30 is a dedicated HMI device that can be operated in 2 different terminal modes:

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

2.4 Model number key
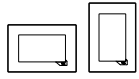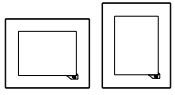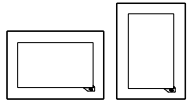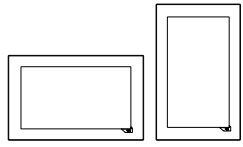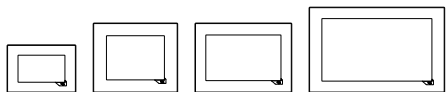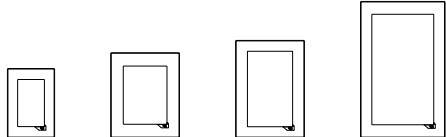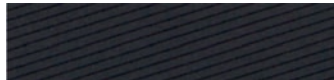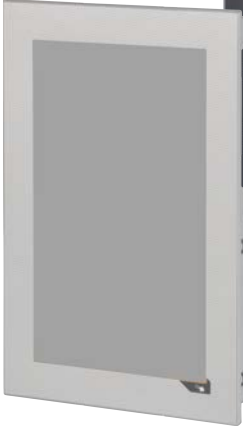
1	2	3	4	5	6	.	7	8	9	10	-	11	12	13	14	15	16	
X	X	X	X	X	X	.	X	X	X	X	-	X	X	X	X	X	X	**Product area**
6																		Device with browser technology
																		Product family
	P	P																Power Panel
																		Model
			T															Terminal series
																		Model (processor)
				3	0													ARM processor (Cortex A8, single core)
																		Display size
							0	4	3									4.3"
							0	5	7									5.7"
							0	7	0									7.0"
							1	0	1									10.1"
																		Resolution
										2								WVGA (800 x 480) landscape
										3								VGA (640 x 480) landscape
										F								WQVGA (480 x 272) landscape
										G								WSVGA (1024 x 600) landscape
										K								WQVGA (272 x 480) portrait
										L								VGA (480 x 640) portrait
										M								WVGA (480 x 800) portrait
										N								WSVGA (600 x 1024) portrait
Standard variant																		
																		Display / Touch screen technology and memory expansion
																		Standard memory
												2						color TFT + analog resistive touch screen
																		Interfaces on option board
													0					No option board
Overlays and customized variants																		
																		Standard panel overlay variants
														W				Aluminum white
														B				Anthracite
																		Customized
																		Customized panel overlay only
														F	.	.	.	Sequential number [F][0...Z][0...Z][0...Z]
																		Customization beyond customized overlay
														C	.	.	.	Sequential number [C][0...Z][0...Z][0...Z]
Follow-up model variants or I/O configuration																		
																		Base model
															-	0	1	Derivative: Sequential number [0...Z]

3 Device description

3.1 Type overview

Panel size	4.3"		5.7"		7.0"		10.1"	
Model number	6PPT30.043x-20x		6PPT30.057x-20x		6PPT30.070x-20x		6PPT30.101x-20x	
Format / Resolution	**Landscape format**				**Portrait format**			
Resolution	WQVGA 480 x 272	VGA 640 x 480	WVGA 800 x 480	WSVGA 1024 x 600	WQVGA 272 x 480	VGA 480 x 640	WVGA 480 x 800	WSVGA 600 x 1024
Model number	043F	0573	0702	101G	043K	057L	070M	101N
	6PPT30.xxxx-20x				6PPT30.xxxx-20x			
Panel overlay	**Pinstripe pattern in aluminum white**				**Pinstripe pattern in anthracite**			
	6PPT30.xxxx-20W				6PPT30.xxxx-20B			

3.1.1 Compare Power Panel T30 variants

		Format / Panel overlay			
		Landscape format		Portrait format	
		Aluminum white	Anthracite	Aluminum white	Anthracite
Display size / Resolution	4.3" / WQVGA				
	5.7" / VGA				
	7.0" / WVGA				
	10.1" / WSVGA				

3.2 General technical data

Name	Description
Processor	ARM Cortex A8 600 MHz / 1 GHz
Memory	256 MB DDRAM
Interfaces	2x Ethernet interfaces 10/100BASE-T 2x USB 2.0 interfaces
Other	**IP65 protection (front)** Temperature range from -20 to 60°C Fanless 8 to 32 VDC power supply

3.2.1 Viewing angles

Viewing angle specifications (U, D, R, L) for the display types are listed in the technical data for each device.
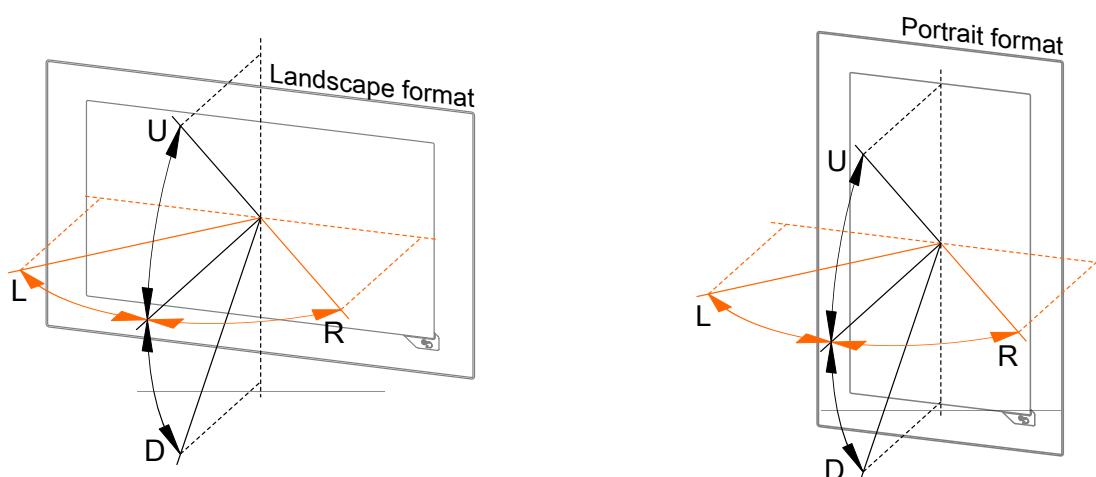
Key	Display viewing angle
U	From top
D	From bottom
L	From left
R	From right

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 always refer to the default standard mounting orientation of the respective Power Panel.

3.2.2 Automation Studio and Automation Runtime dependencies

The Power Panel functions below refer to the most recent version of the PPT system. The following table shows dependencies between these functions and the hardware revision and Automation Studio / Automation Runtime version:

Function	Starting with AS version	Starting with AR version	Starting with HW revision
Updating with Automation Studio and a USB flash drive	4.2.1	-	-
Support "*Load configuration from PLC*"	4.2.3	A4.23	-
Using a boot logo for Power Panels in portrait format	4.2.4	-	D3
Using a boot animation in GIF format	4.3.2	-	-

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

3.2.3 Surface resistance of the panel overlay

The panel overlay conforms to DIN 42115 (Part 2). This means it is resistant to exposure to the following chemicals for a 24-hour period with no visible signs of damage:

Ethanol Cyclohexanol Diacetone alcohol Glycol Isopropanol Glycerine Methanol Triacetin Dowandol DRM/PM	Formaldehyde 37%-42% Acetaldehyde Aliphatic hydrocarbons Toluene Xylene White spirits	Trichloroethane Ethyl acetate Diethyl ether n-Butyl acetate Amyl acetate Butylcellosolve Ether
Acetone Methyl ethyl ketone Dioxan Cyclohexanone Methylisobutylketone (MIBK) Isophorone	Formic acid <50% Acetic acid <50% Phosphoric acid <30% Hydrochloric acid <36% Nitric acid <10% Trichloracetic acid <50% Sulphuric acid <10%	Sodium chloride <20% Hydrogen peroxide <25% Potassium carbonate Washing agents Tenside Fabric conditioner Iron (II) chloride
Ammonia <40% Caustic soda <40% Potassium hydroxide Alkali carbonate Bichromate Potassium Acetonitrile Sodium bisulphate	Cutting oil Diesel oil Linseed oil Paraffin oil Ricinus oil Silicon oil Turpentine oil substitute Brake fluid Aviation fuel Gasoline Water Sea water Decon	Iron (III) chloride Dibutyl phthalate Dioctyl phthalate Sodium carbonate

Information:

The specified characteristics, features and limit values only apply to this individual component and can deviate from those specified for the complete system. For the complete system in which this individual component is used, refer to the data given specifically for that device.

The panel overlay conforms to DIN 42115 Part 2 for exposure to glacial acetic acid for less than one hour without visible damage.

3.2.4 Surface resistance of the touch screen

The surface of the analog resistive touch screen is resistant to the following chemicals at a temperature of 25°C for a duration of 1 hour.

- Acetone
- Methylene chloride
- Butanone
- Isopropyl alcohol
- Hexane
- Turpentine
- Mineral spirit
- Unleaded gasoline
- Diesel fuel
- Motor oil
- Transmission fluid
- Antifreeze
- Ammonia-based glass cleaner
- Washing agents
- Household cleaners
- Vinegar
- Coffee
- Tea
- Lubricating grease
- Cooking oil
- Salt

3.3 Power Panel T30 - 4.3" variants

3.3.1 Order data

Model number	Short description	Figure
	Power Panel T30	
6PPT30.043F-20W	Power Panel T30, 4.3", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, landscape format, aluminum white pinstripe	
6PPT30.043F-20B	Power Panel T30, 4.3", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, landscape format, anthracite pinstripe	
6PPT30.043K-20W	Power Panel T30, 4.3", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, Portrait format, aluminum white pinstripe	
6PPT30.043K-20B	Power Panel T30, 4.3", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, Portrait format, anthracite pinstripe	
	Required accessories	
	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	
	Optional accessories	
	Miscellaneous	
9A0013.01	Stylus pen for resistive touch screen	
	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 T30 - 4.3" variants - Order data

3.3.2 Content of delivery

Name	Quantity	Description
-	1	T-Series 4.3" accessory plate: Plate for securing the connection lines and connecting the shielding
-	1	Accessory set 3x retaining clip for fastening the panel in the installation cutout

3.3.3 Technical data

Model number	6PPT30.043F-20W	6PPT30.043F-20B	6PPT30.043K-20W	6PPT30.043K-20B
General information				
Cooling	Passive			
LED status indicators	Ethernet			
B&R ID code	0xE589	0xE58A	0xE58B	0xE58C
Power button	No			
Reset button	No			
Buzzer	Yes			
Electrical isolation				
24 VDC - USB	No			
USB - Ethernet	Yes			
Ethernet - 24 VDC	Yes			
Certification				
CE	Yes			
UL	cULus E115267 Industrial Control Equipment			
Controller				
Operating system	PPT30 system			
Real-time clock	No			
Processor				
Type	ARM Cortex A8			
Clock frequency	600 MHz			
L1 cache	64 kB			
L2 cache	256 kB			
Flash	512 MB			
Mode/Node switches	No			
DRAM	256 MB			

Table: Power Panel T30 - 4.3" variants - Technical data

Model number	6PPT30.043F-20W	6PPT30.043F-20B	6PPT30.043K-20W	6PPT30.043K-20B
Interfaces				
Interface				
Connection	IF1 and IF2			
Type	Ethernet			
Design	Shielded RJ45 (integrated 2-port switch)			
Cable length	Max. 100 m between 2 stations (segment length)			
Max. transfer rate	10/100 Mbit/s			
Transmission				
Physical layer	10BASE-T / 100BASE-TX			
Half-duplex	Yes			
Full-duplex	Yes			
Autonegotiation	Yes			
Auto-MDI / MDIX	Yes			
IF3 interface				
Type	USB 2.0			
Design	Type A			
Current-carrying capacity	0.5 A [1]			
IF4 interface				
Type	USB 2.0			
Design	Type A			
Current-carrying capacity	0.2 A [2]			
Display				
Type	Color TFT			
Display size	4.3"			
Colors	16.7 million (RGB, 8 bits per channel)			
Resolution	WQVGA, 480 x 272 pixels		WQVGA, 272 x 480 pixels	
Contrast	Typ. 350:1			
Viewing angles				
Horizontal	L direction / R direction = typ. 70°		L direction = typ. 70° / R direction = typ. 50°	
Vertical	U direction = typ. 50° / D direction = typ. 70°		U direction / D direction = typ. 70°	
Backlight				
Type	LED			
Brightness	Typ. 450 cd/m²			
Half-brightness time [3]	30,000 h			
Touch screen				
Type	AMT			
Technology	Analog resistive			
Controller	B&R, 12-bit			
Transmittance	80% ±3%			
Screen rotation	Yes			
Electrical characteristics				
Nominal voltage	24 VDC			
Max. current at nominal voltage	230 mA			
Max. power consumption	5.5 W			
Voltage range	8 to 32 VDC			
Reverse polarity protection	Yes			
Operating conditions				
Installation at elevations above sea level				
0 to 2000 m	No limitations			
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m			
EN 60529 protection	Front: IP65, Back: IP20			
Environmental conditions				
Temperature				
Operation				
Horizontal installation	-20 to 60°C			
Vertical installation	-20 to 60°C			
Storage	-20 to 70°C			
Transport	-20 to 70°C			
Relative humidity				
Operation	See temperature/humidity diagram			
Storage	See temperature/humidity diagram			
Transport	See temperature/humidity diagram			
Mechanical characteristics				
Note	Order terminal blocks 1x 0TB6102.2010-01 and 1x 0TB6102.2110-01 separately			
Front				
Design	Aluminum white pinstripe	Anthracite gray pinstripe	Aluminum white pinstripe	Anthracite gray pinstripe

Table: Power Panel T30 - 4.3" variants - Technical data

Model number	6PPT30.043F-20W	6PPT30.043F-20B	6PPT30.043K-20W	6PPT30.043K-20B
Dimensions				
Width	140 mm		96 mm	
Height	96 mm		140 mm	
Depth	38.3 mm			
Weight	0.3 kg			

Table: Power Panel T30 - 4.3" variants - Technical data

1) The current-carrying capacity is 0.1 A for hardware revisions less than B0.
2) The current-carrying capacity is 0.1 A for hardware revisions B0 to B2.
   The current-carrying capacity is 0.5 A for hardware revisions less than B0.
3) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.

3.3.4 Temperature/Humidity diagram
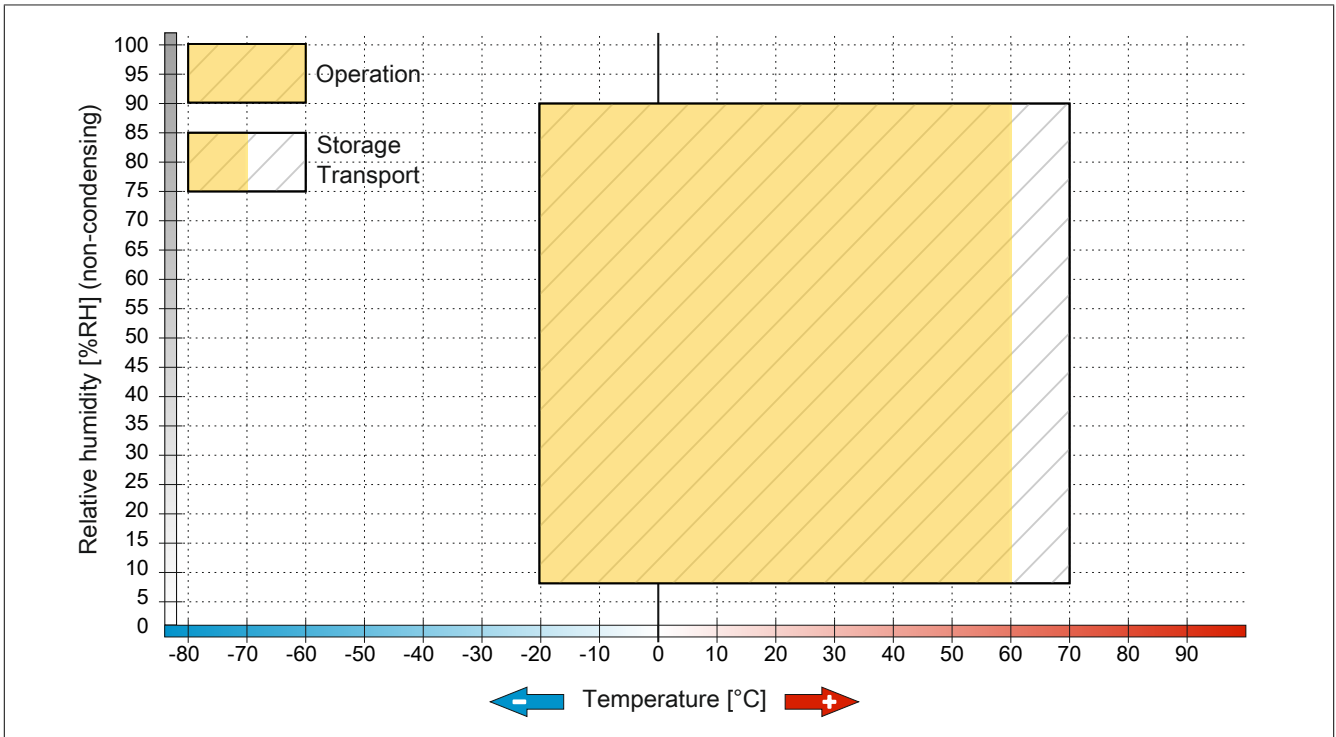
Figure: Power Panel T30 - 4.3" variants - Temperature/Humidity diagram

3.3.5 Dimensions

Landscape format for 4.3" variants
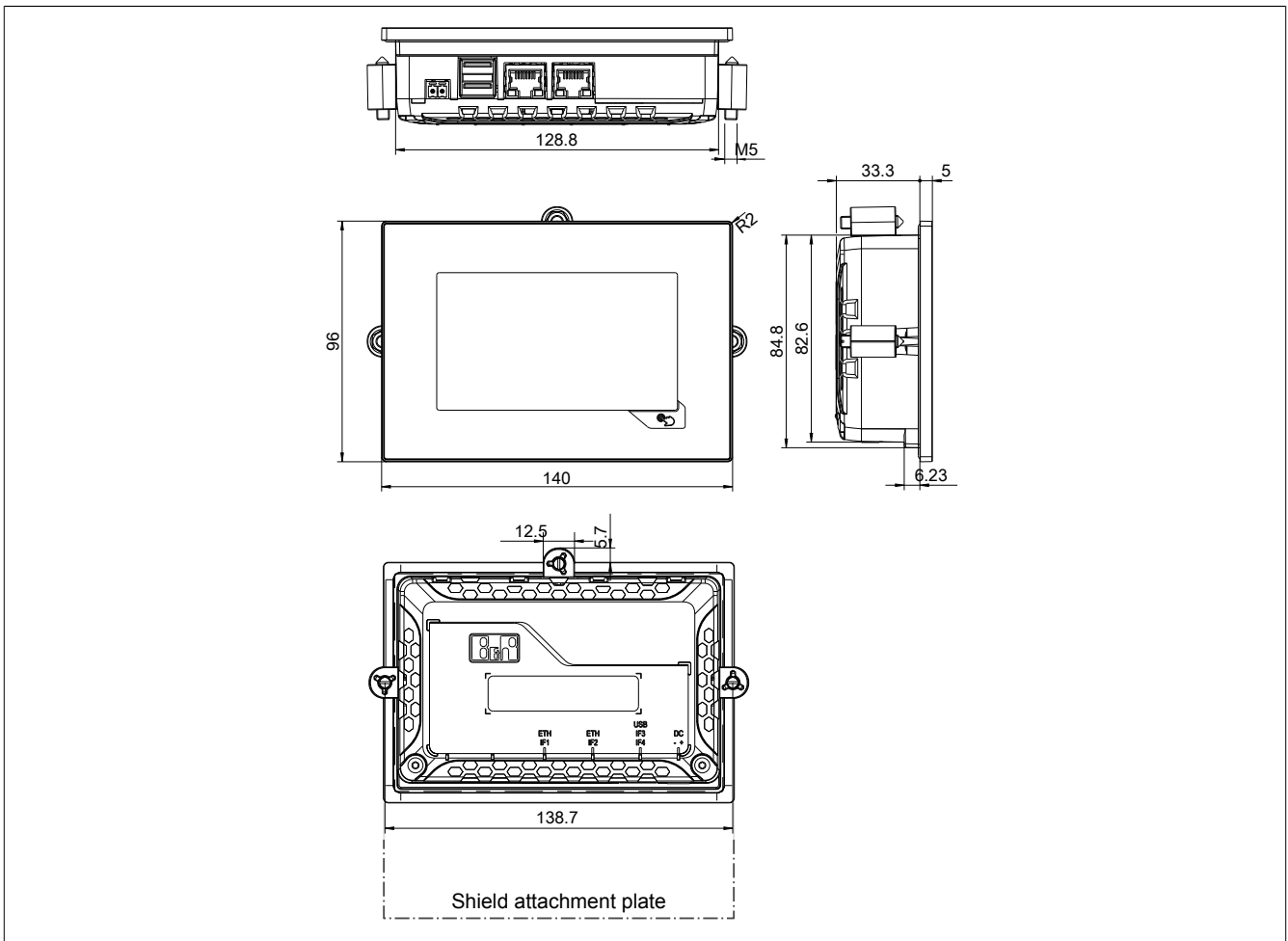
Shield attachment plate, see Mounting shield attachment plate for 4.3" Power Panel, page 45

Dimensions of the installation cutout for this Power Panel variant: 130.8 ±1 mm x 86.8 ±1 mm

See also: "Installation cutout requirements" on page 41

Portrait format for 4.3" variants
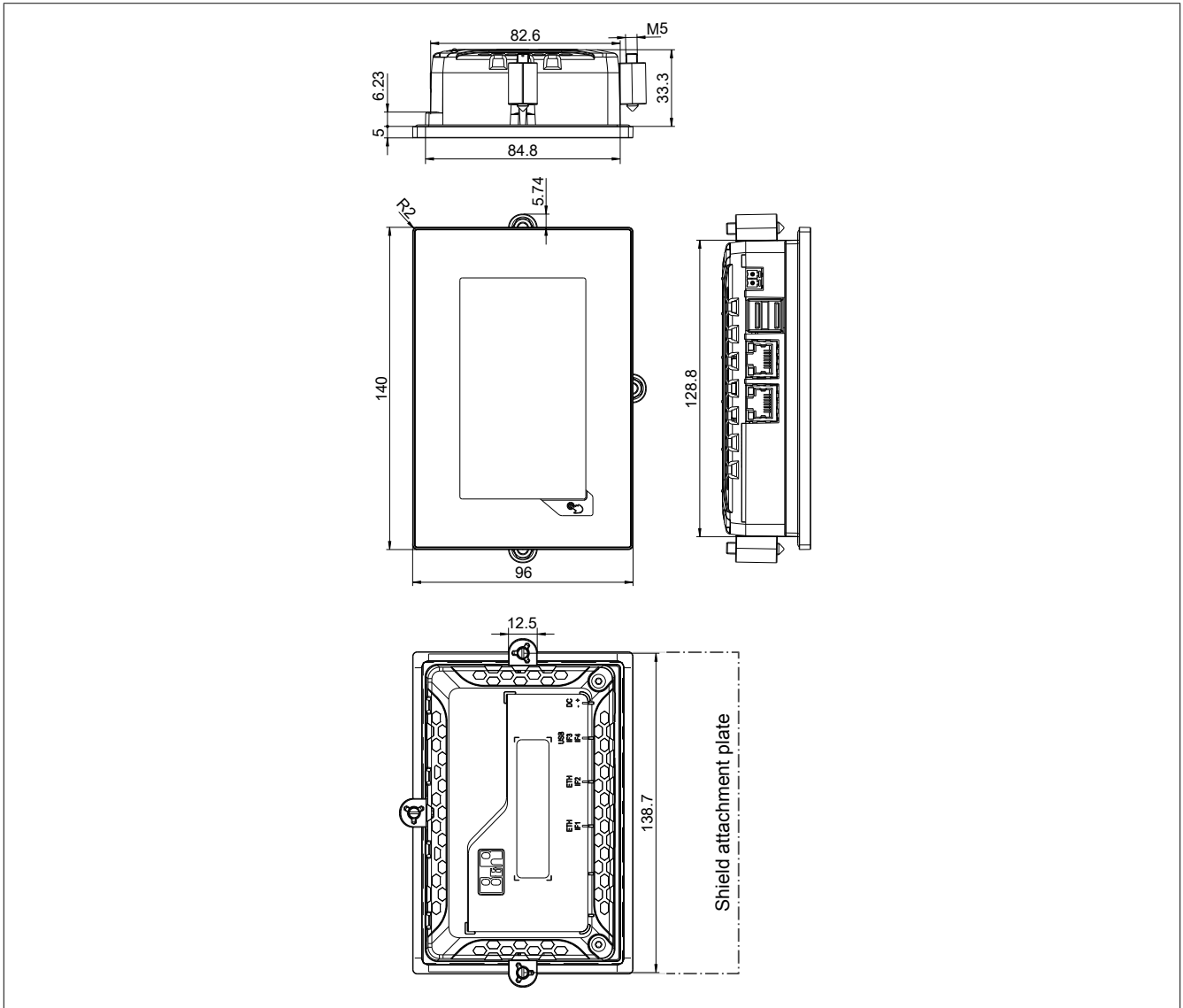
Shield attachment plate, see Mounting shield attachment plate for 4.3" Power Panel, page 45

Dimensions of the installation cutout for this Power Panel variant: 86.8 ±1 mm x 130.8 ±1 mm

See also: "Installation cutout requirements" on page 41

3.4 Power Panel T30 - 5.7" variants

3.4.1 Order data

Model number	Short description	Figure
	Power Panel T30	
6PPT30.0573-20W	Power Panel T30, 5.7", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, landscape format, aluminum white pinstripe	
6PPT30.0573-20B	Power Panel T30, 5.7", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, landscape format, anthracite pinstripe	
6PPT30.057L-20W	Power Panel T30, 5.7", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, Portrait format, aluminum white pinstripe	
6PPT30.057L-20B	Power Panel T30, 5.7", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, Portrait format, anthracite pinstripe	
	Required accessories	
	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	
	Optional accessories	
	Miscellaneous	
9A0013.01	Stylus pen for resistive touch screen	
	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: Order data - Power Panel T30 - 5.7" variants

3.4.2 Content of delivery

Name	Quantity	Description
-	1	Accessory set 5x retaining clip for fastening the panel in the installation cutout

3.4.3 Technical data

Model number	6PPT30.0573-20W	6PPT30.0573-20B	6PPT30.057L-20W	6PPT30.057L-20B
General information				
Cooling		Passive		
LED status indicators		Ethernet		
B&R ID code	0xE58D	0xE58E	0xE58F	0xE590
Power button		No		
Reset button		No		
Buzzer		Yes		
Electrical isolation				
24 VDC - USB		No		
USB - Ethernet		Yes		
Ethernet - 24 VDC		Yes		
Certification				
CE		Yes		
UL		cULus E115267 Industrial Control Equipment		
Controller				
Operating system		PPT30 system		
Real-time clock		No		
Processor				
Type		ARM Cortex A8		
Clock frequency		600 MHz		
L1 cache		64 kB		
L2 cache		256 kB		
Flash		512 MB		
Mode/Node switches		No		
DRAM		256 MB		

Table: Power Panel T30 - 5.7" variants - Technical data

Model number	6PPT30.0573-20W	6PPT30.0573-20B	6PPT30.057L-20W	6PPT30.057L-20B
Interfaces				
Interface				
Connection	IF1 and IF2			
Type	Ethernet			
Design	Shielded RJ45 (integrated 2-port switch)			
Cable length	Max. 100 m between 2 stations (segment length)			
Max. transfer rate	10/100 Mbit/s			
Transmission				
Physical layer	10BASE-T / 100BASE-TX			
Half-duplex	Yes			
Full-duplex	Yes			
Autonegotiation	Yes			
Auto-MDI / MDIX	Yes			
IF3 interface				
Type	USB 2.0			
Design	Type A			
Current-carrying capacity	0.5 A [1]			
IF4 interface				
Type	USB 2.0			
Design	Type A			
Current-carrying capacity	0.2 A [2]			
Display				
Type	Color TFT			
Display size	5.7"			
Colors	262,144 (RGB, 6 bits per channel)			
Resolution	VGA, 640 x 480 pixels		VGA, 480 x 640 pixels	
Contrast	Typ. 850:1			
Viewing angles				
Horizontal	L direction / R direction = typ. 80°		L direction / R direction = typ. 70°	
Vertical	U direction / D direction = typ. 70°		U direction / D direction = typ. 80°	
Backlight				
Type	LED			
Brightness	Typ. 400 cd/m²			
Half-brightness time [3]	50,000 h			
Touch screen				
Type	AMT			
Technology	Analog resistive			
Controller	B&R, 12-bit			
Transmittance	80% ±3%			
Screen rotation	Yes			
Electrical characteristics				
Nominal voltage	24 VDC			
Max. current at nominal voltage	319 mA			
Max. power consumption	7.66 W			
Voltage range	8 to 32 VDC			
Reverse polarity protection	Yes			
Operating conditions				
Installation at elevations above sea level				
0 to 2000 m	No limitations			
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m			
EN 60529 protection	Front: IP65, Back: IP20			
Environmental conditions				
Temperature				
Operation				
Horizontal installation	-20 to 60°C			
Vertical installation	-20 to 60°C			
Storage	-20 to 70°C			
Transport	-20 to 70°C			
Relative humidity				
Operation	See temperature/humidity diagram			
Storage	See temperature/humidity diagram			
Transport	See temperature/humidity diagram			
Mechanical characteristics				
Note	Order terminal blocks 1x 0TB6102.2010-01 and 1x 0TB6102.2110-01 separately			
Front				
Design	Aluminum white pinstripe	Anthracite gray pinstripe	Aluminum white pinstripe	Anthracite gray pinstripe

Table: Power Panel T30 - 5.7" variants - Technical data

Model number	6PPT30.0573-20W	6PPT30.0573-20B	6PPT30.057L-20W	6PPT30.057L-20B
Dimensions				
Width	172 mm		140 mm	
Height	140 mm		172 mm	
Depth	47.8 mm			
Weight	0.5 kg			

Table: Power Panel T30 - 5.7" variants - Technical data

1) The current-carrying capacity is 0.1 A for hardware revisions less than B0.
2) The current-carrying capacity is 0.1 A for hardware revisions B0 to B2.
    The current-carrying capacity is 0.5 A for hardware revisions less than B0.
3) 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.

3.4.4 Temperature/Humidity diagram
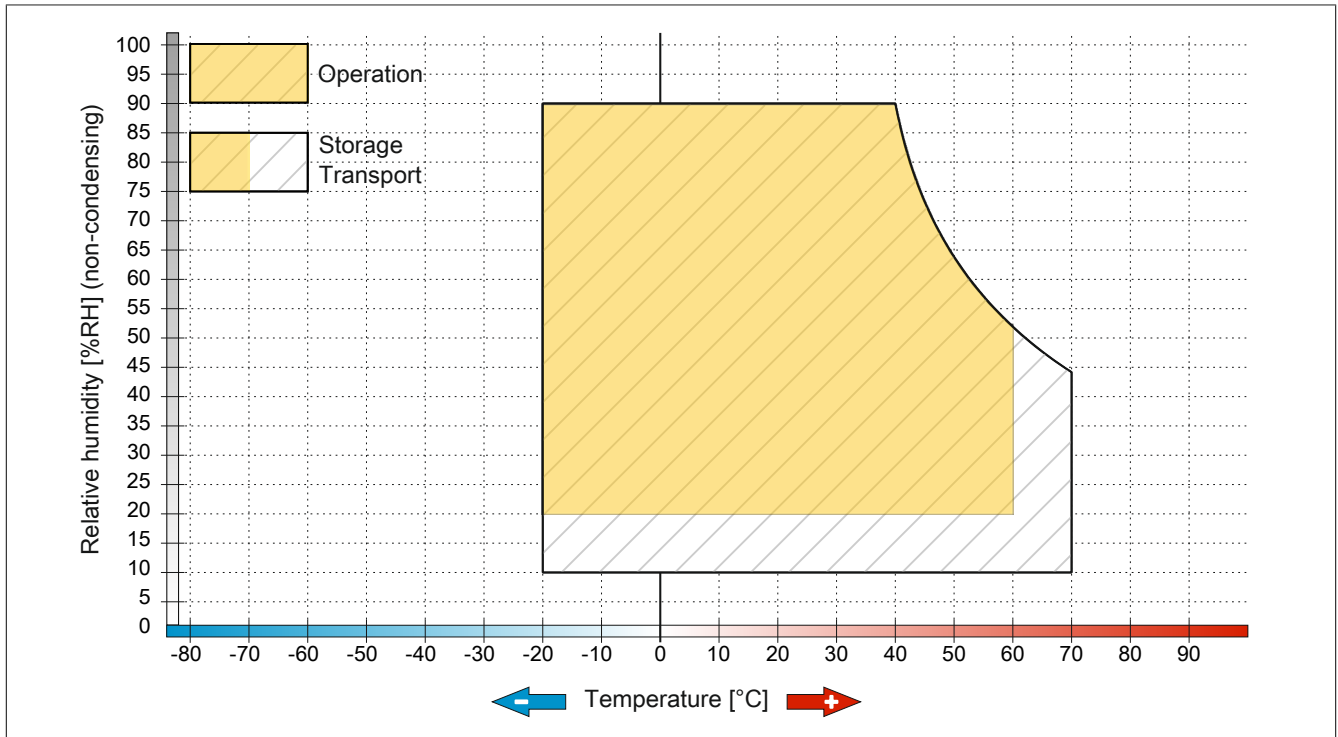
Figure 1: Power Panel T30 - 5.7" variants - Temperature/Humidity diagram

3.4.5 Dimensions

Landscape format for 5.7" variants
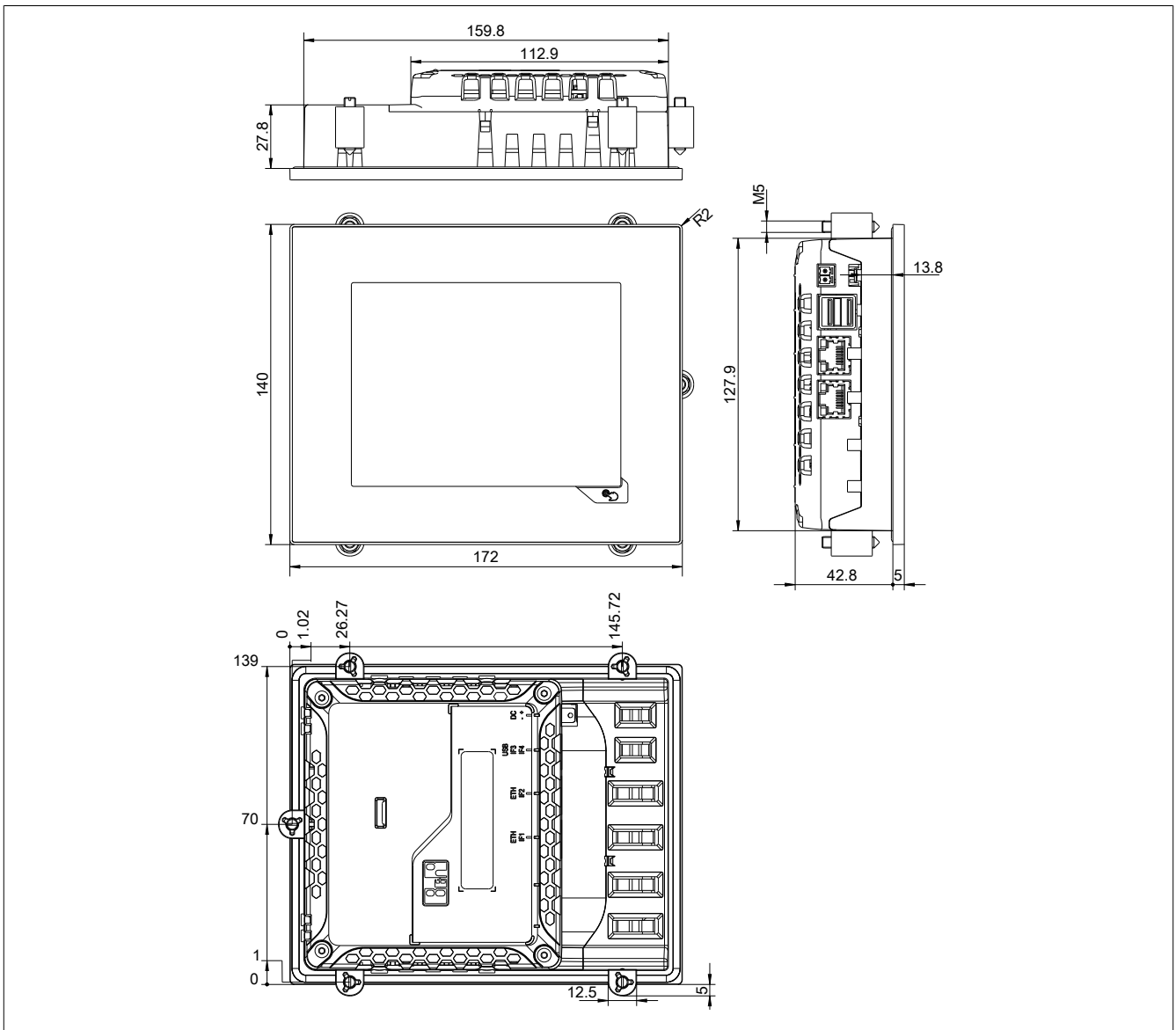
Dimensions of the installation cutout for this Power Panel variant: 161.8 ±1 mm x 129.9 ±1 mm

See also: "Installation cutout requirements" on page 41

Portrait format for 5.7" variants
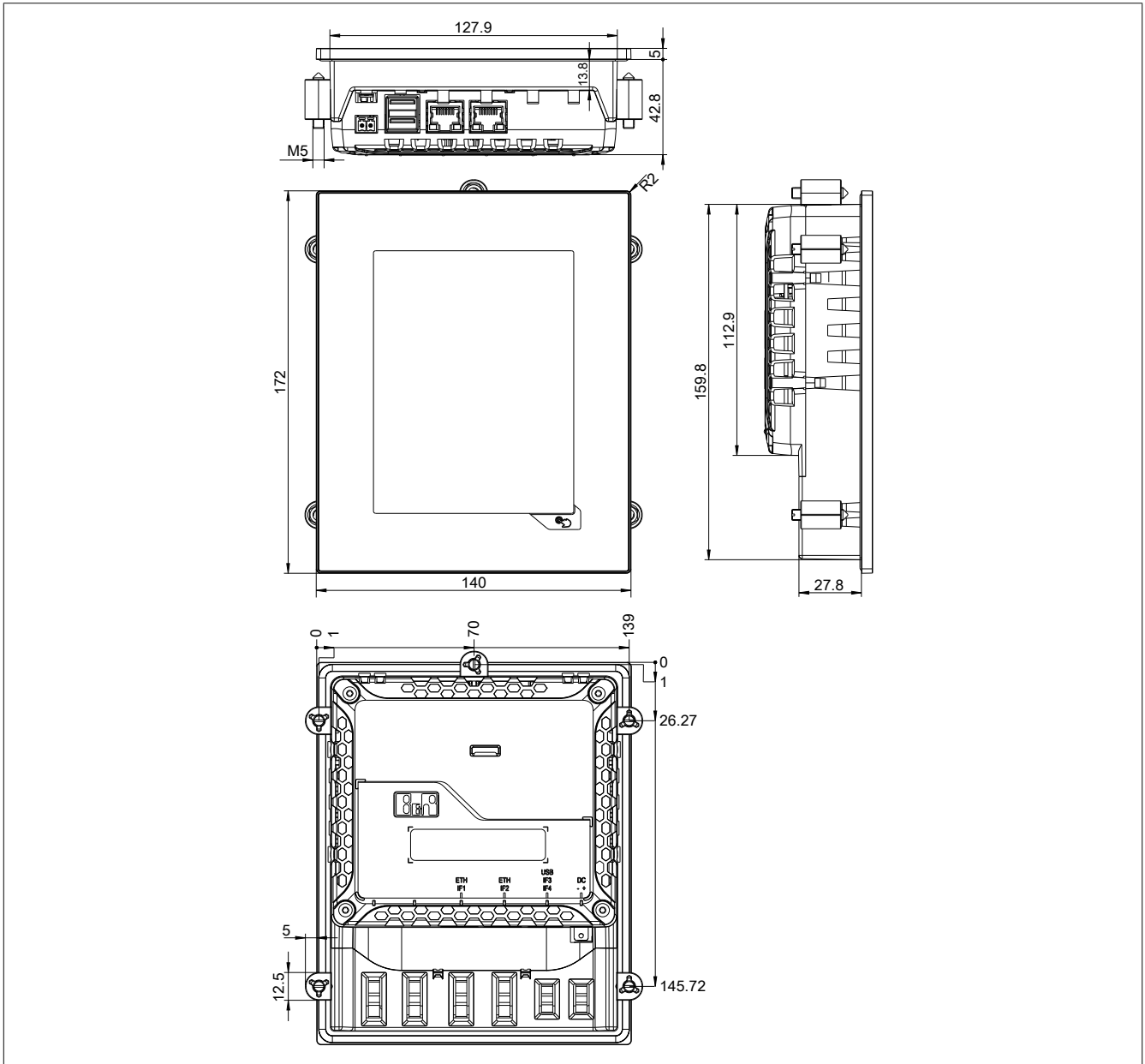
Dimensions of the installation cutout for this Power Panel variant: 129.9 ±1 mm x 161.8 ±1 mm

See also: "Installation cutout requirements" on page 41

3.5 Power Panel T30 - 7.0" variants

3.5.1 Order data

Model number	Short description	Figure
	Power Panel T30	
6PPT30.0702-20W	Power Panel T30, 7.0", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, landscape format, aluminum white pinstripe	
6PPT30.0702-20B	Power Panel T30, 7.0", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, landscape format, anthracite pinstripe	
6PPT30.070M-20W	Power Panel T30, 7.0", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, Portrait format, aluminum white pinstripe	
6PPT30.070M-20B	Power Panel T30, 7.0", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, Portrait format, anthracite pinstripe	
	Required accessories	
	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	
	Optional accessories	
	Miscellaneous	
9A0013.01	Stylus pen for resistive touch screen	
	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 T30 - 7.0" variants - Order data

3.5.2 Content of delivery

Name	Quantity	Description
-	1	Accessory set 5x retaining clip for fastening the panel in the installation cutout

3.5.3 Technical data

Model number	6PPT30.0702-20W	6PPT30.0702-20B	6PPT30.070M-20W	6PPT30.070M-20B
General information				
Cooling		Passive		
LED status indicators		Ethernet		
B&R ID code	0xE591	0xE592	0xE593	0xE594
Power button		No		
Reset button		No		
Buzzer		Yes		
Electrical isolation				
24 VDC - USB		No		
USB - Ethernet		Yes		
Ethernet - 24 VDC		Yes		
Certification				
CE		Yes		
UL		cULus E115267 Industrial Control Equipment		
Controller				
Operating system		PPT30 system		
Real-time clock		No		
Processor				
Type		ARM Cortex A8		
Clock frequency		1 GHz [1]		
L1 cache		64 kB		
L2 cache		256 kB		
Flash		512 MB		
Mode/Node switches		No		
DRAM		256 MB		

Table: Power Panel T30 - 7.0" variants - Technical data

Model number	6PPT30.0702-20W	6PPT30.0702-20B	6PPT30.070M-20W	6PPT30.070M-20B
Interfaces				
Interface				
Connection	IF1 and IF2			
Type	Ethernet			
Design	Shielded RJ45 (integrated 2-port switch)			
Cable length	Max. 100 m between 2 stations (segment length)			
Max. transfer rate	10/100 Mbit/s			
Transmission				
Physical layer	10BASE-T / 100BASE-TX			
Half-duplex	Yes			
Full-duplex	Yes			
Autonegotiation	Yes			
Auto-MDI / MDIX	Yes			
IF3 interface				
Type	USB 2.0			
Design	Type A			
Current-carrying capacity	0.5 A [2]			
IF4 interface				
Type	USB 2.0			
Design	Type A			
Current-carrying capacity	0.2 A [3]			
Display				
Type	Color TFT			
Display size	7.0"			
Colors	16.7 million (RGB, 8 bits per channel)			
Resolution	WVGA, 800 x 480 pixels		WVGA, 480 x 800 pixels	
Contrast	Typ. 600:1			
Viewing angles				
Horizontal	L direction / R direction = typ. 70°		L direction / R direction = typ. 60°	
Vertical	U direction / D direction = typ. 60°		U direction / D direction = typ. 70°	
Backlight				
Type	LED			
Brightness	Typ. 500 cd/m²			
Half-brightness time [4]	50,000 h			
Touch screen				
Type	AMT			
Technology	Analog resistive			
Controller	B&R, 12-bit			
Transmittance	80% ±3%			
Screen rotation	Yes			
Electrical characteristics				
Nominal voltage	24 VDC			
Max. current at nominal voltage	389 mA			
Max. power consumption	9.34 W			
Voltage range	8 to 32 VDC			
Reverse polarity protection	Yes			
Operating conditions				
Installation at elevations above sea level				
0 to 2000 m	No limitations			
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m			
EN 60529 protection	Front: IP65, Back: IP20			
Environmental conditions				
Temperature				
Operation				
Horizontal installation	-20 to 60°C			
Vertical installation	-20 to 60°C			
Storage	-20 to 70°C			
Transport	-20 to 70°C			
Relative humidity				
Operation	See temperature/humidity diagram			
Storage	See temperature/humidity diagram			
Transport	See temperature/humidity diagram			
Mechanical characteristics				
Note	Order terminal blocks 1x 0TB6102.2010-01 and 1x 0TB6102.2110-01 separately			
Front				
Design	Aluminum white pinstripe	Anthracite gray pinstripe	Aluminum white pinstripe	Anthracite gray pinstripe

Table: Power Panel T30 - 7.0" variants - Technical data

Model number	6PPT30.0702-20W	6PPT30.0702-20B	6PPT30.070M-20W	6PPT30.070M-20B
Dimensions				
Width	197 mm		140 mm	
Height	140 mm		197 mm	
Depth	47.8 mm			
Weight	0.6 kg			

Table: Power Panel T30 - 7.0" variants - Technical data

1) The clock frequency is 600 MHz for hardware revisions less than C0.
2) The current-carrying capacity is 0.1 A for hardware revisions less than B0.
3) The current-carrying capacity is 0.1 A for hardware revisions B0 to B2.
   The current-carrying capacity is 0.5 A for hardware revisions less than B0.
4) At an ambient temperature of 25°C.

3.5.4 Temperature/Humidity diagram
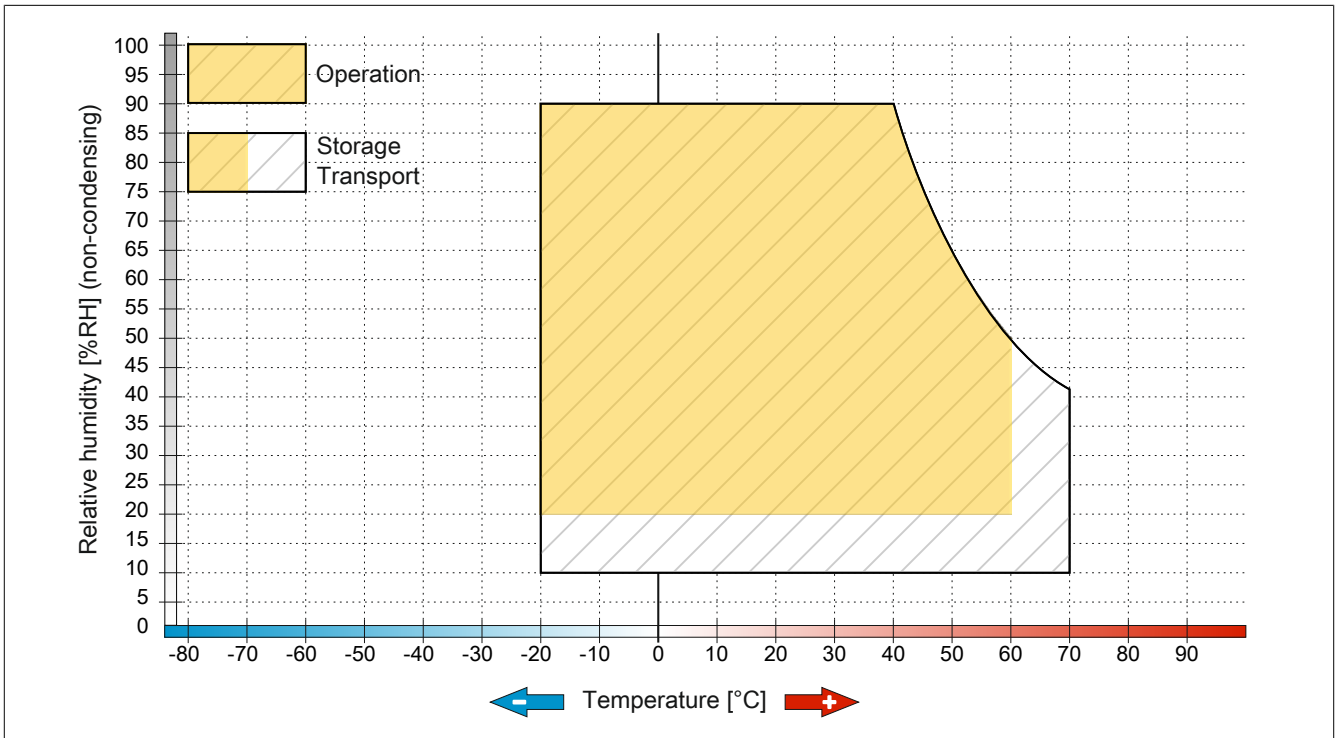
Figure: Power Panel T30 - 7.0" variants - Temperature/Humidity diagram

3.5.5 Dimensions

Landscape format for 7.0" variants
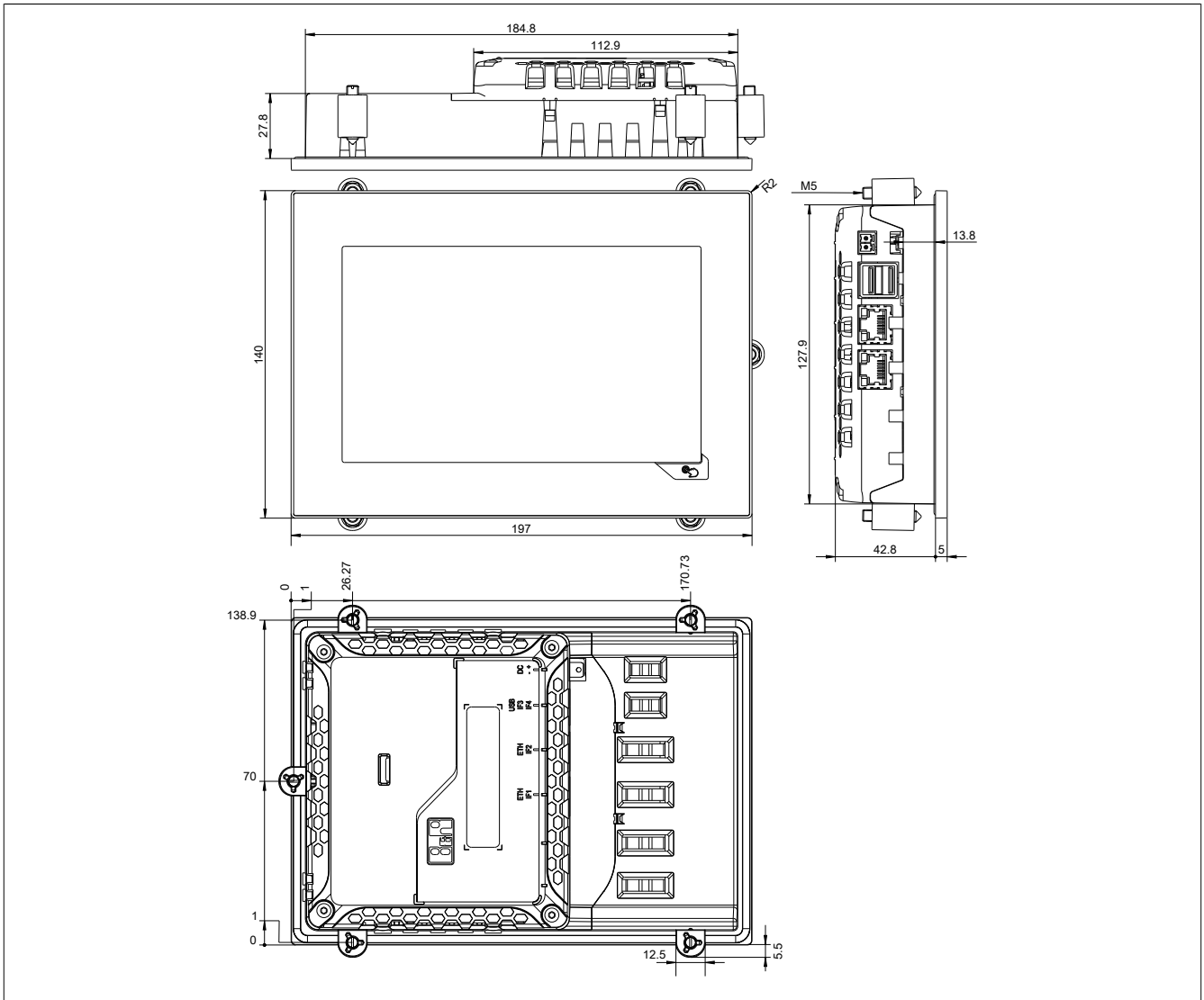
Dimensions of the installation cutout for this Power Panel variant: 186.8 ±1 mm x 129.8 ±1 mm

See also: "Installation cutout requirements" on page 41

Portrait format for 7.0" variants
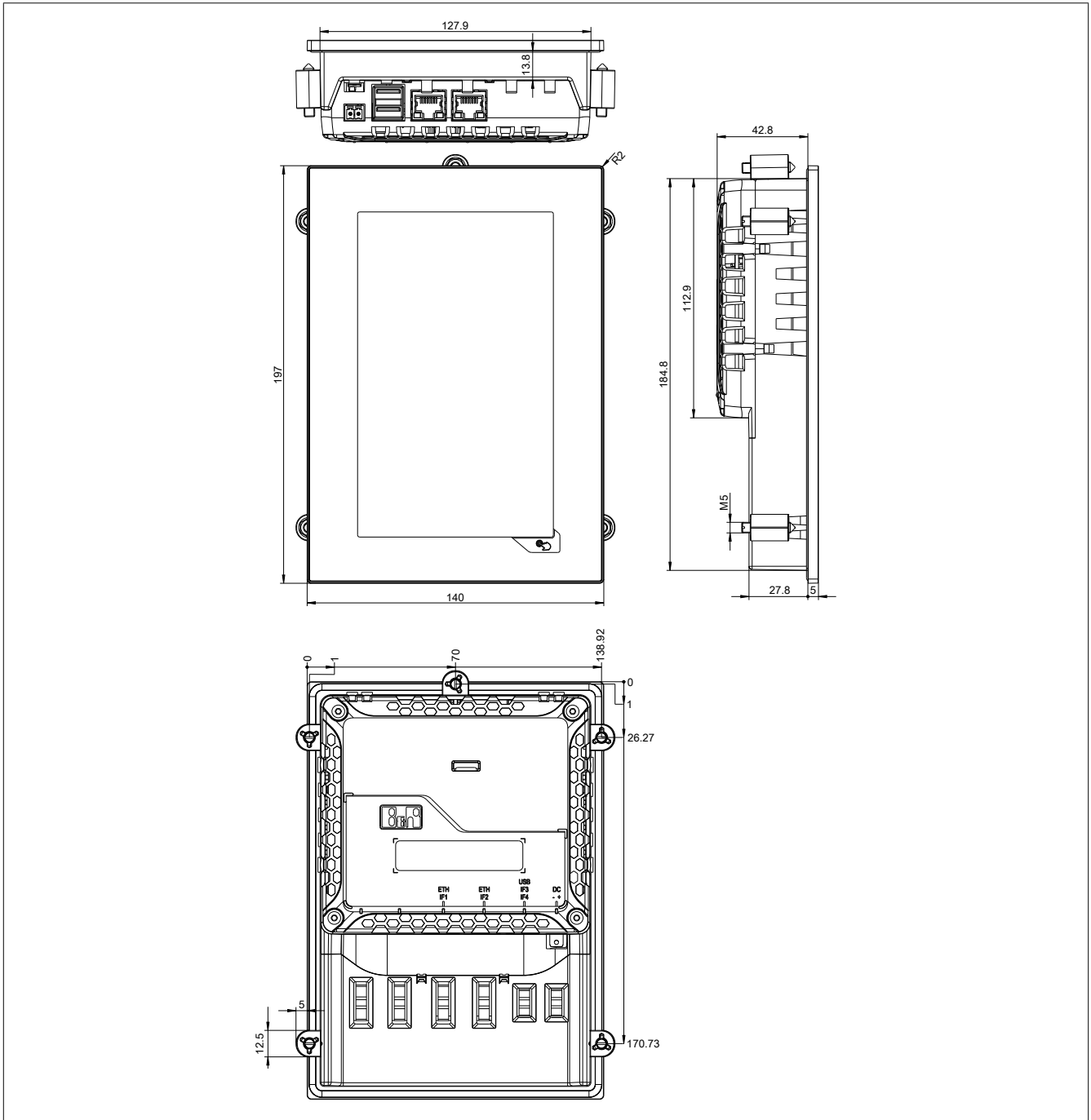
Dimensions of the installation cutout for this Power Panel variant: 129.8 ±1 mm x 186.8 ±1 mm

See also: "Installation cutout requirements" on page 41

3.6 Power Panel T30 - 10.1" variants

3.6.1 Order data

Model number	Short description	Figure
	Power Panel T30	
6PPT30.101G-20W	Power Panel T30, 10.1", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, landscape format, aluminum white pinstripe	
6PPT30.101G-20B	Power Panel T30, 10.1", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, landscape format, anthracite pinstripe	
6PPT30.101N-20W	Power Panel T30, 10.1", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, Portrait format, aluminum white pinstripe	
6PPT30.101N-20B	Power Panel T30, 10.1", analog resistive touch screen, 2 Ethernet interfaces, internal switch, 2 USB 2.0 interfaces, embedded client software: - VNC client mode - Embedded web browser on board, Portrait format, anthracite pinstripe	
	Required accessories	
	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	
	Optional accessories	
	Miscellaneous	
9A0013.01	Stylus pen for resistive touch screen	
	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 T30 - 10.1" variants - Order data

3.6.2 Content of delivery

Name	Quantity	Description
-	1	Accessory set 6x retaining clip for fastening the panel in the installation cutout

3.6.3 Technical data

Model number	6PPT30.101G-20W	6PPT30.101G-20B	6PPT30.101N-20W	6PPT30.101N-20B
General information				
Cooling		Passive		
LED status indicators		Ethernet		
B&R ID code	0xE595	0xE596	0xE597	0xE598
Power button		No		
Reset button		No		
Buzzer		Yes		
Electrical isolation				
24 VDC - USB		No		
USB - Ethernet		Yes		
Ethernet - 24 VDC		Yes		
Certification				
CE		Yes		
UL		cULus E115267 Industrial Control Equipment		
Controller				
Operating system		PPT30 system		
Real-time clock		No		
Processor				
Type		ARM Cortex A8		
Clock frequency		1 GHz [1]		
L1 cache		64 kB		
L2 cache		256 kB		
Flash		512 MB		
Mode/Node switches		No		
DRAM		256 MB		

Table: Power Panel T30 - 10.1" variants - Technical data

Model number	6PPT30.101G-20W	6PPT30.101G-20B	6PPT30.101N-20W	6PPT30.101N-20B
Interfaces				
Interface				
Connection		IF1 and IF2		
Type		Ethernet		
Design		Shielded RJ45 (integrated 2-port switch)		
Cable length		Max. 100 m between 2 stations (segment length)		
Max. transfer rate		10/100 Mbit/s		
Transmission				
Physical layer		10BASE-T / 100BASE-TX		
Half-duplex		Yes		
Full-duplex		Yes		
Autonegotiation		Yes		
Auto-MDI / MDIX		Yes		
IF3 interface				
Type		USB 2.0		
Design		Type A		
Current-carrying capacity		0.5 A [2]		
IF4 interface				
Type		USB 2.0		
Design		Type A		
Current-carrying capacity		0.2 A [3]		
Display				
Type		Color TFT		
Display size		10.1"		
Colors		16.7 million (RGB, 8 bits per channel)		
Resolution	WSVGA, 1024 x 600 pixels		WSVGA, 600 x 1024 pixels	
Contrast		Typ. 500:1		
Viewing angles				
Horizontal		L direction / R direction = typ. 80°		
Vertical		U direction / D direction = typ. 80°		
Backlight				
Type		LED		
Brightness		Typ. 500 cd/m²		
Half-brightness time [4]		50,000 h		
Touch screen				
Type		AMT		
Technology		Analog resistive		
Controller		B&R, 12-bit		
Transmittance		80% ±3%		
Screen rotation		Yes		
Electrical characteristics				
Nominal voltage		24 VDC		
Max. current at nominal voltage		429 mA		
Max. power consumption		10.3 W		
Voltage range		8 to 32 VDC		
Reverse polarity protection		Yes		
Operating conditions				
Installation at elevations above sea level				
0 to 2000 m		No limitations		
>2000 m		Reduction of ambient temperature by 0.5°C per 100 m		
EN 60529 protection		Front: IP65, Back: IP20		
Environmental conditions				
Temperature				
Operation				
Horizontal installation		-20 to 60°C		
Vertical installation		-20 to 60°C		
Storage		-20 to 70°C		
Transport		-20 to 70°C		
Relative humidity				
Operation		See temperature/humidity diagram		
Storage		See temperature/humidity diagram		
Transport		See temperature/humidity diagram		
Mechanical characteristics				
Note		Order terminal blocks 1x 0TB6102.2010-01 and 1x 0TB6102.2110-01 separately		
Front				
Design	Aluminum white pinstripe	Anthracite gray pinstripe	Aluminum white pinstripe	Anthracite gray pinstripe

Table: Power Panel T30 - 10.1" variants - Technical data

Model number	6PPT30.101G-20W	6PPT30.101G-20B	6PPT30.101N-20W	6PPT30.101N-20B
Dimensions				
Width	276 mm		172 mm	
Height	172 mm		276 mm	
Depth	47.8 mm			
Weight	0.9 kg			

Table: Power Panel T30 - 10.1" variants - Technical data

1)   The clock frequency is 600 MHz for hardware revisions less than C0.
2)   The current-carrying capacity is 0.1 A for hardware revisions less than B0.
3)   The current-carrying capacity is 0.1 A for hardware revisions B0 to B2.
      The current-carrying capacity is 0.5 A for hardware revisions less than B0.
4)   At an ambient temperature of 25°C.

3.6.4 Temperature/Humidity diagram
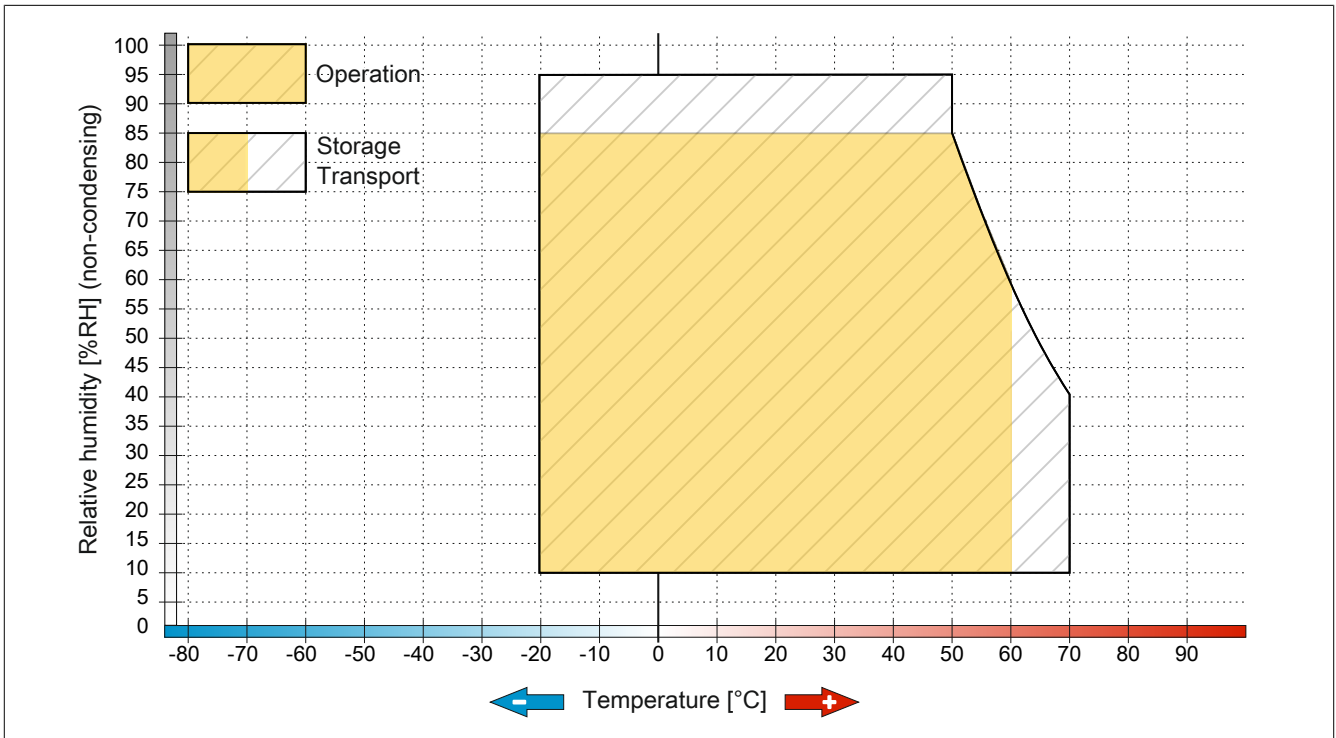
Figure: Power Panel T30 - 10.1" variants - Temperature/Humidity diagram

3.6.5 Dimensions

Landscape format for 10.1" variants

Dimensions of the installation cutout for this Power Panel variant: 265.9 ±1 mm x 161.9 ±1 mm

See also: "Installation cutout requirements" on page 41

Portrait format for 10.1" variants
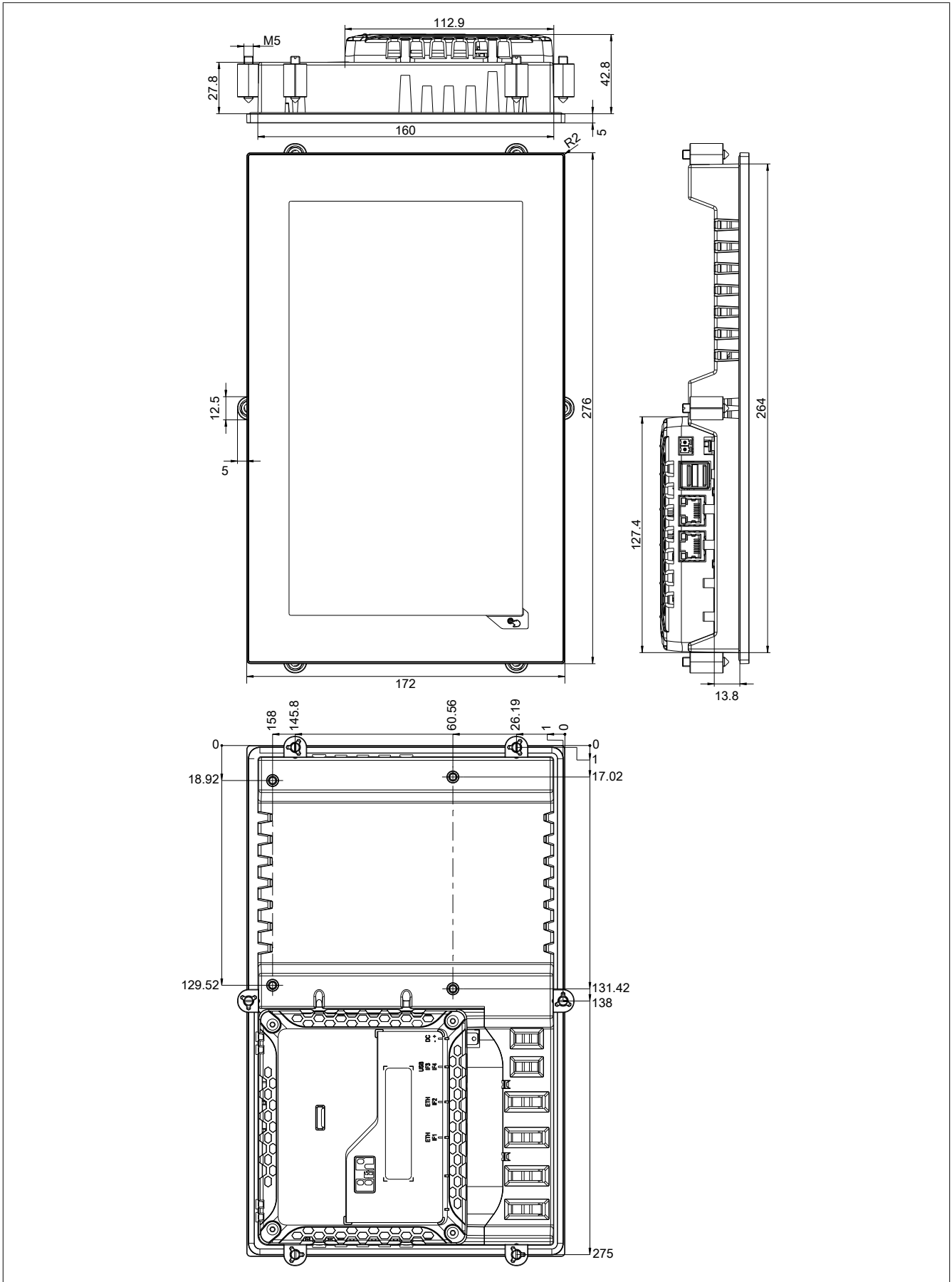
Dimensions of the installation cutout for this Power Panel variant: 161.9 ±1 mm x 265.9 ±1 mm

See also: "Installation cutout requirements" on page 41

3.7 Connection elements

Power supply

Grounding clip

USB interface - IF3

USB interface - IF4

Ethernet connection IF1/IF2
2 x RJ45 connectors for simple wiring
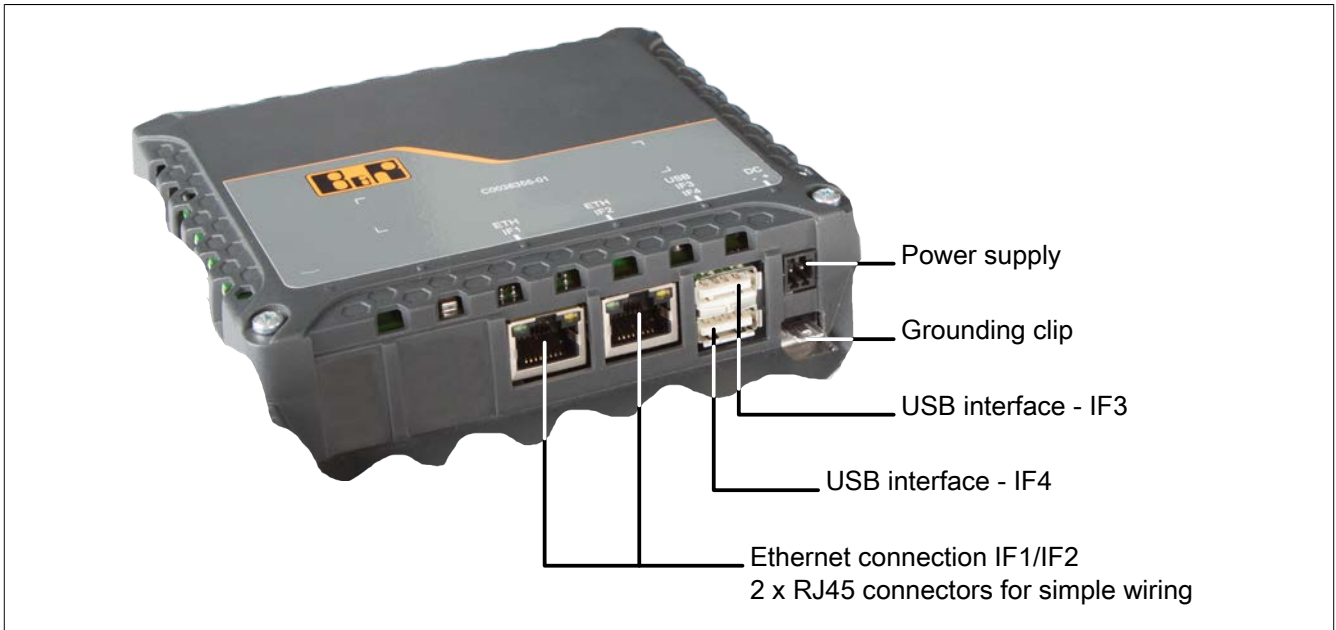
3.7.1 Ethernet interface

Figure	Pinout		
	Terminal	**Ethernet**	
	1	RXD	Receive signal
	2	RXD\	Receive signal inverted
	3	TXD	Transmit signal
	4	Termination	Termination
	5	Termination	Termination
	6	TXD\	Transmit signal inverted
	7	Termination	Termination
	8	Termination	Termination
	Diagnostic LEDs		
	LED	**Color**	**Status**	**Description**
	LNK	Green	On	Link established to the remote station
	ACT	Orange	On	No Ethernet activity on the bus.
			Blinking	A link to the remote station has been established and there is Ethernet activity on the bus.

LNK   ACT

8   1

Shielded RJ45
(10BASE-T/100BASE-TX)

3.7.2 USB interfaces

IF3

IF4

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

USB interface	
Transfer rate[1]	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Power supply	Max. 0.5 A (IF3) or max. 0.2 A (IF4) per interface[2]

1) The actual value depends on the operating system or driver being used.
2) Each USB interface is protected by a maintenance-free "USB current-limiting circuit breaker" (max. 0.5 A on IF3 / max. 0.2 A on IF4).

Important!

Peripheral USB devices can be connected to the USB interfaces on this device. Due to the large number of USB devices available on the market, B&R cannot guarantee their performance. All USB devices provided by B&R are guaranteed to function properly.

Important!

Because of general PC specifications these USB interfaces should be handled with extreme care with regard to EMC, location of cables etc.

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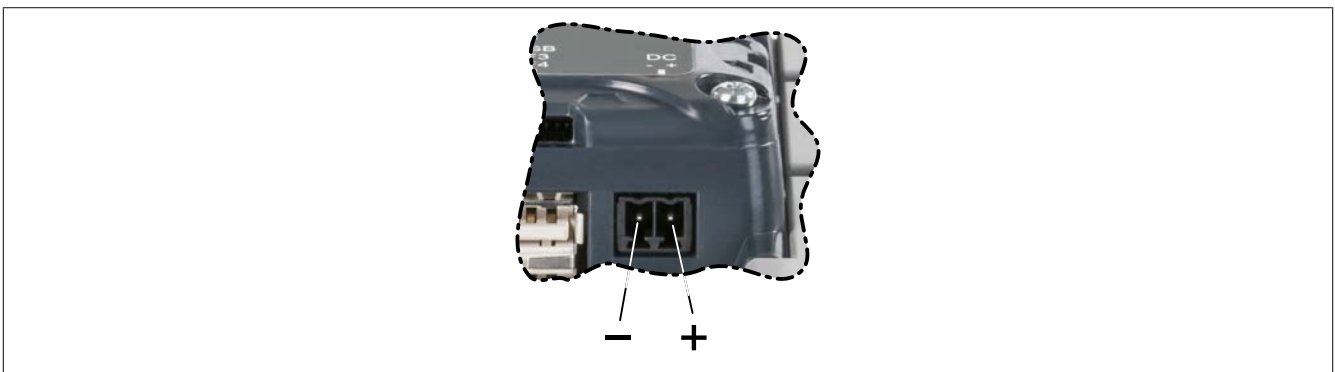
The pinout for the power supply is listed in the following table and printed on the back of the Power Panel. The Power Panel has reverse polarity protection that prevents the supply voltage from being connected incorrectly and damaging the device.

Pinout		
Terminal	Assignment	
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 (4 A, fast-acting) to prevent damage to the device in the event of an overload. The device must be returned to B&R for repairs if the fuse is blown in the event of error (fuse replacement).

Danger!

Protective earth (grounding clip on the device) and the GND connection of the power supply are connected internally in the Power Panel. For this reason, at least one PELV power supply is needed.

Important!

The ground connection of the device is to be connected to ground at a short distance and with low impedance (e.g. ground rail in control cabinet).

4 Installation

4.1 Mounting

> ## Danger!
>
> - **All supplied power must be disconnected before removing device covers or components or installing/removing accessories, hardware or cables.**
> - **The power cable must be disconnected from the device and from the voltage supply.**
> - **All covers, components, accessories, hardware and cables must be installed or connected before the device can be connected to the power supply and turned on.**

- Environmental conditions must be taken into consideration.
- When installed in an enclosure, enough space must be available for air to circulate sufficiently.
- This device must be installed on a flat, clean and burr-free surface.
- Ventilation holes must not be covered.
- This device must be installed using one of the approved mounting orientations.
- The bend radius of connected cables must not be exceeded.
- This device must be installed in a position and orientation that make viewing as easy as possible for the operator.

Only 2 screws are needed in order to adhere to the mechanical characteristics. For this reason, the cover of the Power Panel is installed using 2 screws when delivered. Some devices have unused drill holes which can be used for additional installation purposes (e.g. Mounting rail for X20 modules).

4.1.1 Installation cutout requirements

When installing the Power Panel, it is important that the surface and wall thickness for the installation cutout satisfies the following conditions:

Properties of the installation cutout	Value
Permitted deviations in flatness **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

4.1.2 Mounting with retaining clips
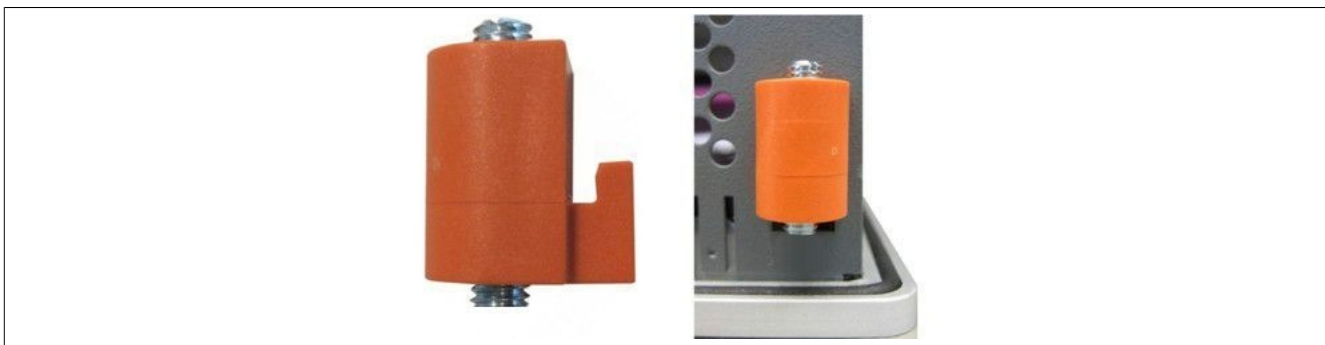
Figure: Retaining clip

Retaining clips are designed to clamp a maximum thickness of 6 mm and minimum thickness of 2 mm.

A large flat-blade screwdriver is needed to tighten and loosen the screws. The tightening torque for the retaining clips is 0.6 Nm.

Devices must be installed on a flat, clean and burr-free surface; uneven areas can cause damage to the display when the screws are tightened or the intrusion of dust and water.

Procedure

1. Insert the device into the front side of the smooth, flat installation cutout. The required dimensions of the installation cutout can be found in the "Dimensions" section.

2. Place the retaining clips on the B&R device. To do this, insert the clips into the openings on the sides of the B&R device (indicated by the orange circles). The number of openings may vary depending on the size of the device.
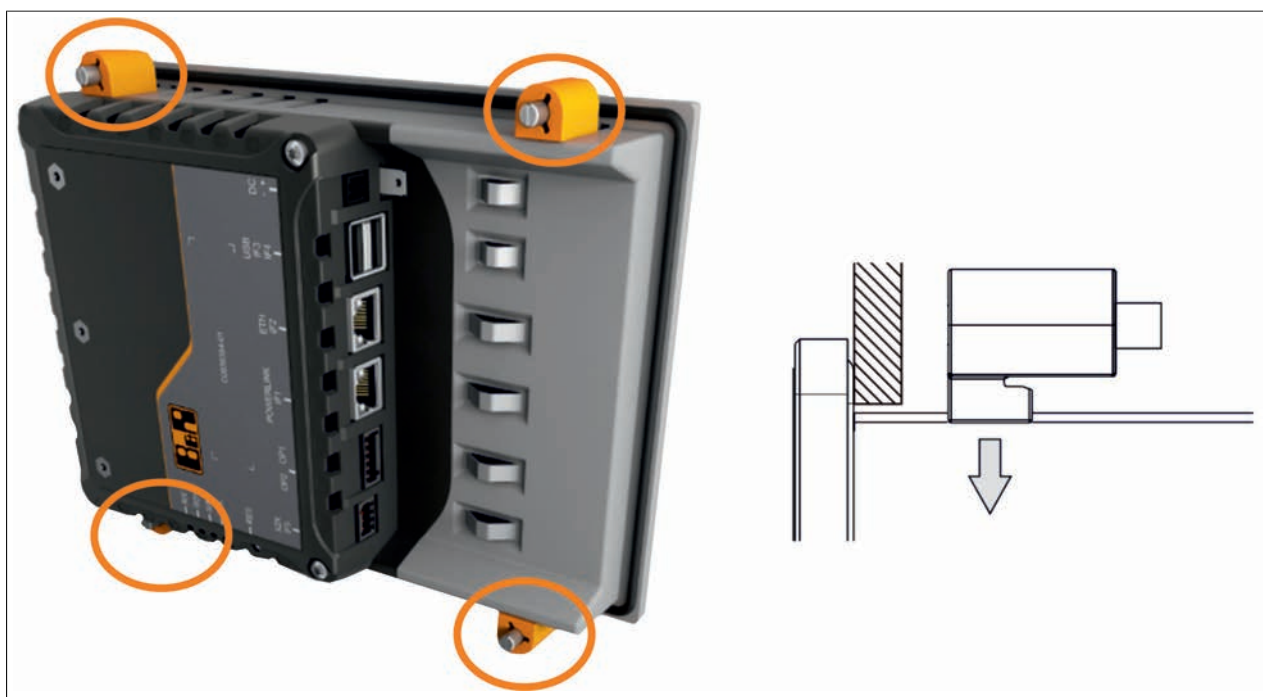
Figure: Inserting the retaining clips

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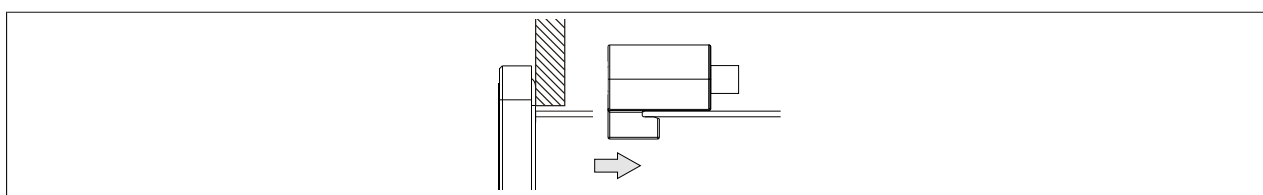
Figure: Sliding the retaining clips back

4. Now fasten the retaining clips to the wall or control cabinet by tightening the screws with a flat-blade screw-driver.
   Tightening torque: 0.6 Nm
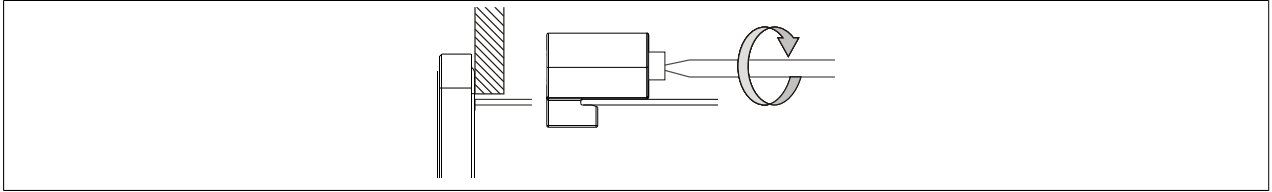
Figure: Mounting with retaining clips

4.1.3 Installation instructions

The Power Panel must be mounted using the retaining clips included in delivery (tightening torque: 0.6 Nm).

In order to guarantee sufficient air circulation, the specified amount of space above, below, to the side and behind the Power Panel must be provided. The minimum specified spacing is indicated in the following diagram. This applies to all Power Panel variants.

Air circulation - Rear view
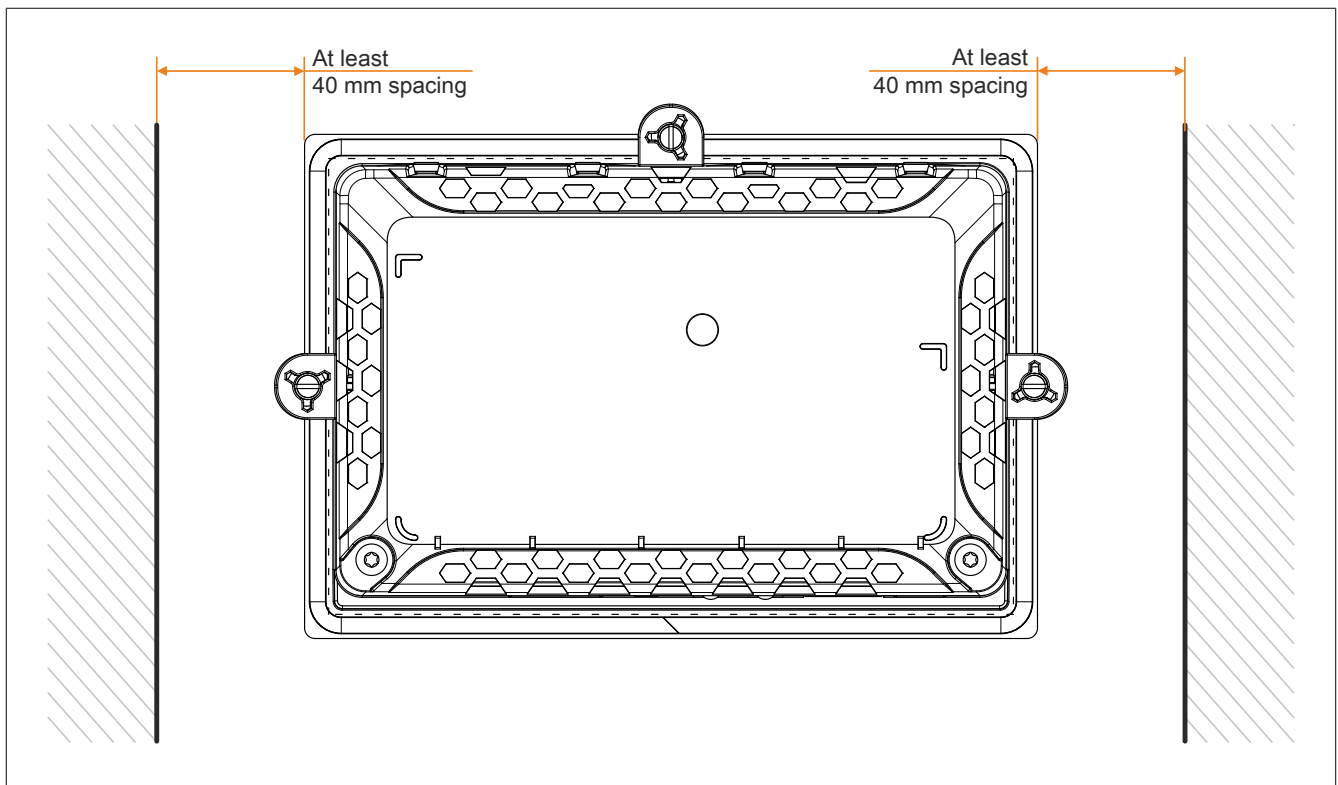
Air circulation - Side view
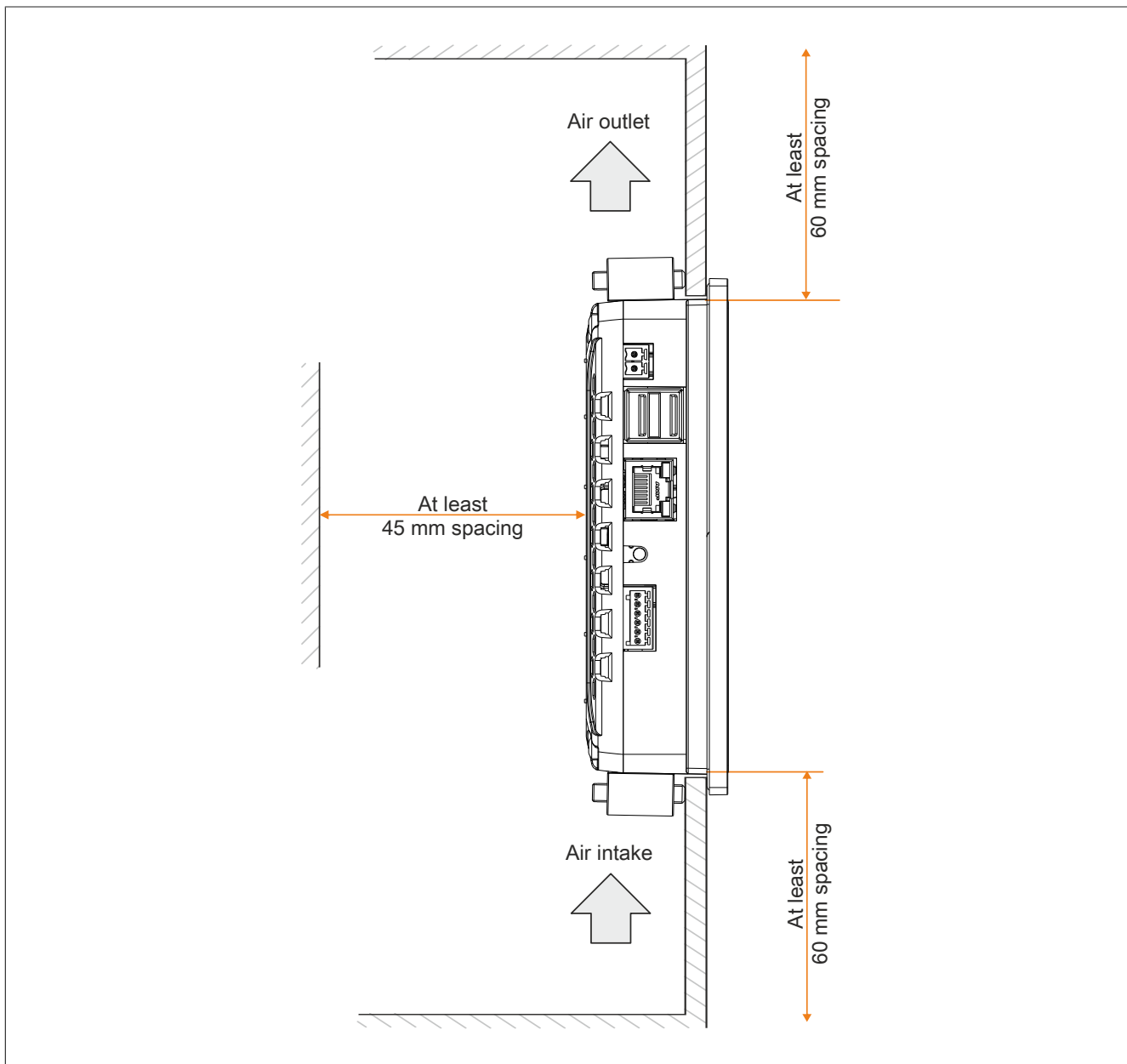
Information:

The spacing specifications for air circulation are based on the worst-case scenario for operation at the maximum specified ambient temperature (see "Temperature specifications" under "Technical data").

If the spacing specifications for air circulation cannot be observed, then the temperature within the housing must be monitored by the user and appropriate measures taken if they are exceeded (see "Temperature monitoring" on page 87).

Mounting shield attachment plate for 4.3" Power Panel
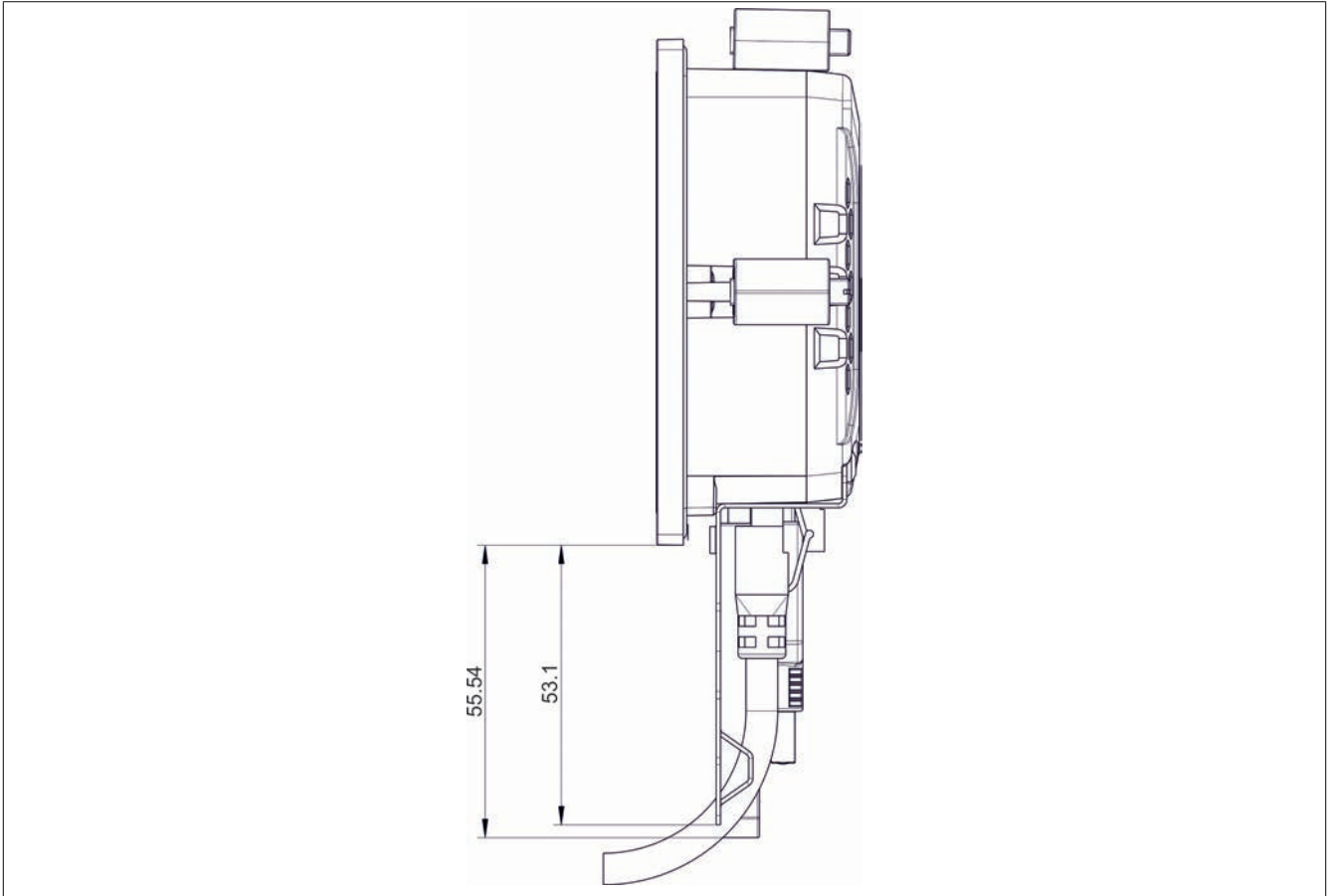
4.1.4 Mounting orientations

The following diagram displays the specified mounting orientation for the Power Panel. These mounting orientations apply to all Power Panel variants.

Caution!

The maximum permitted ambient temperature can be found in the technical data for the respective Power Panel.
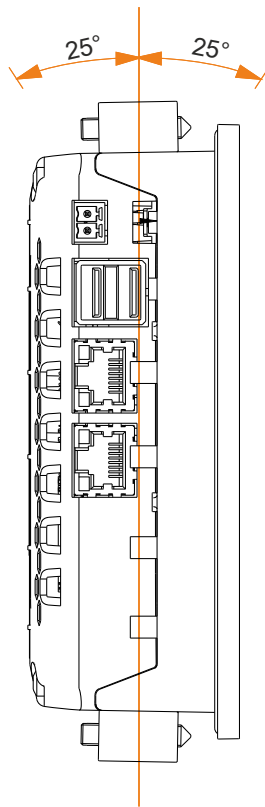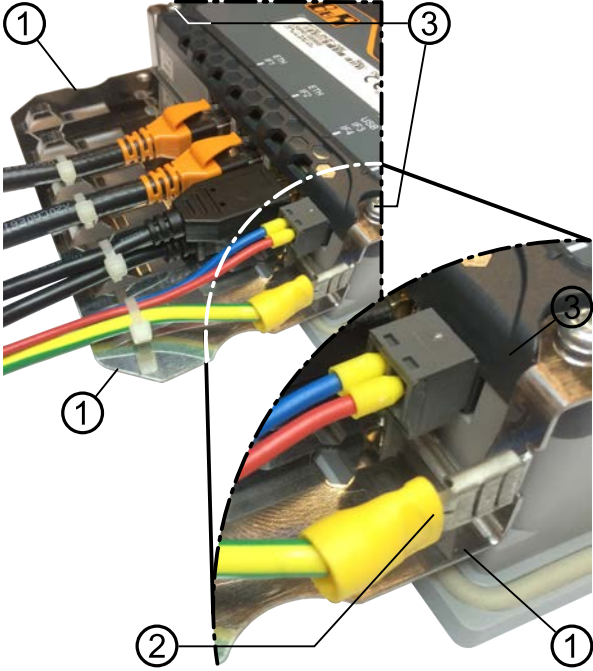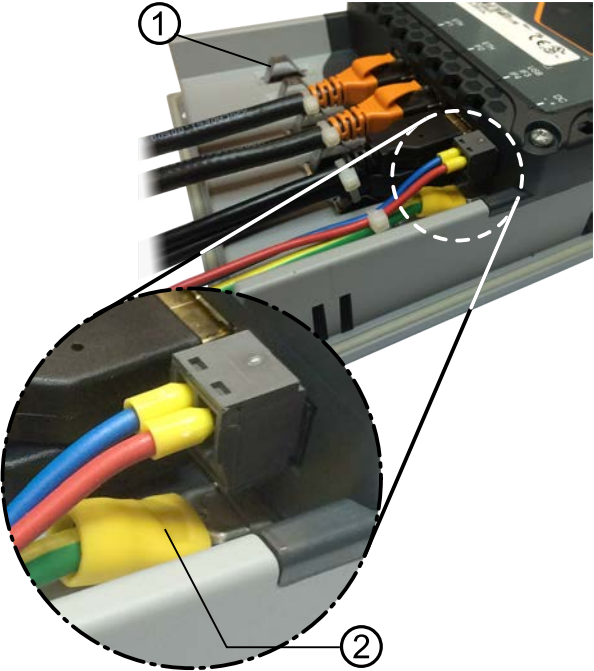
4.1.5 Grounding

Danger!

Protective earth (grounding clip on the device) and the GND connection of the power supply are connected internally in the Power Panel. For this reason, at least one PELV power supply is needed.

Disturbances are discharged effectively via a grounding clip. The cable shields (e.g.Ethernet) are discharged via the grounding plate. Additional information about electromagnetic compatibility is available in the **INSTALLATION / EMC GUIDE** (MAEMV-ENG, B&R website at www.br-automation.com).

Power Panel T30 - 4.3" variant	Power Panel T30 - 7.0" variant[1]
1 Grounding plate (included in delivery) 2 Grounding connection to the grounding clip on the grounding plate 3 The grounding plate is connected directly to the device with the available screws. See Mounting shield attachment plate for 4.3" Power Panel, page 45.	1 Grounding plate (built into the device) 2 Grounding connection to the grounding clip on the grounding plate

1)   **Note:** The image is valid for display variants 5.7" and 10.1".

Grounding in the control cabinet
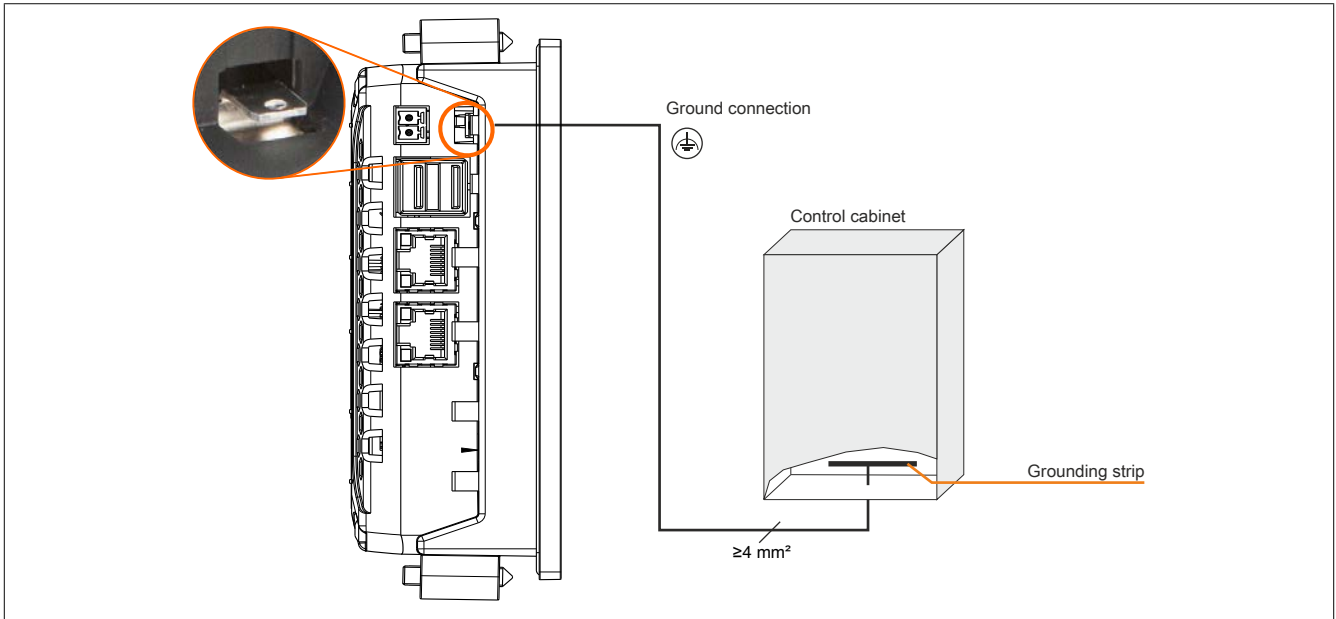
Fastening the conductor lines to the grounding plate

1   **Ground conductor**
    The connection to ground potential must be as short as possible and sufficiently strong (≥4 mm²) over the
    intended spade terminal (Faston 6.3 mm).

2   **Unshielded lines**
    All unshielded lines must be relieved of tension by using a cable tie to tie them to the grounding plate.

Power Panel T30 - 4.3" variant	Power Panel T30 - 7.0" variant[1]

1   Ground conductor
2   Unshielded lines
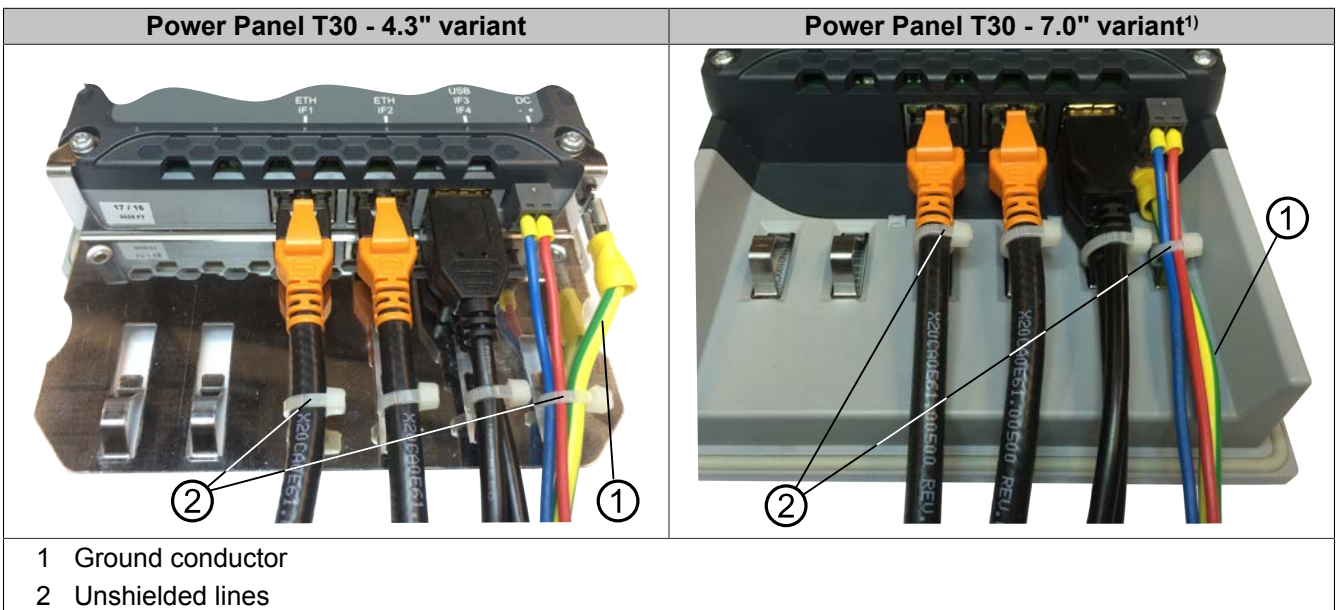
1)   **Note:** The image is valid for display variants 5.7" and 10.1".

4.2 Instructions for use in Ex zone 2 / 22

In addition to the general installation guidelines, the following instructions must also be followed for use in explosive atmospheres!

See also chapter "International and national certifications": "ATEX Directive 2014/34/EU" on page 96

General safety guidelines

Power Panel T30 devices are suitable for use in the environment described in chapter "International and national certifications", section "ATEX Directive 2014/34/EU" on page 96. The wiring must be in accordance with the respective national regulations. All cables used must be able to handle a surface temperature of at least 70°C. Additional equipment must also be approved for the respective environment. Devices must be used in suitable protective housings and final assembly must be inspected and approved by the local authorities. **Devices with explosion protection are to be used as intended and are only permitted to be operated by knowledgeable and qualified personnel according to these operating instructions and the corresponding user's manual.** Operation in any other way endangers the safety and functionality of the devices and the connected systems. The operator is responsible for following all applicable safety and accident prevention regulations, as well as adhering to standards.

Mounting

The devices must be installed in accordance with the instruction in the user's manual. The Power Panels must be installed in a wall cutout of an inspected and certified housing with EPL "Gc" or "Dc" (e.g. control cabinet). In order to guarantee sufficient air circulation, allow the specified amount of space around the device. During the installation, make sure that the risk of mechanical hazards is low. When exposed to UV light, plastics can age prematurely and become brittle. The devices must therefore be protected against excessive ultraviolet light (direct sunshine).

Installation

The devices must remain voltage-free until installation work is complete. The devices must be connected with the potential equalization system. Strain relief must be implemented for all connectors, as described in the user's manual.

Maintenance

Accumulated dust must be removed regularly. Electrostatic charges must therefore be avoided. The devices must therefore only be cleaned with damp cloths.

Breakdowns and disassembly

The devices must be shut down and protected against accidental startup. Defective devices must only be replaced by knowledgeable and qualified personnel.

Conformity test and certification

Devices marked "Ex" satisfy the requirements set forth in directives 2014/34/EU as well as the harmonized standards (EN 60079-0:2012+A11:2013, EN 60079-15:2010, EN 60079-31:2014).

Danger!

Explosion hazard!

The USB interface – if it is not permanently connected – is only permitted to be used for maintenance work, setup or programming in non-hazardous environments. Continual use in explosive atmospheres is only permitted when sufficient strain relief is implemented.

Danger!

Explosion hazard!

Exchanging components is prohibited.

Danger!

Explosion hazard!

Do not disconnect plugs with power applied or only in safe locations.

The instructions in this section, including details regarding ATEX approval, can also be found on the information sheet delivered with the device.

4.3 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

4.3.1 Touch screen

The touch screen ① of the Power Panel juts out over the display on all four sides by about 1 cm:
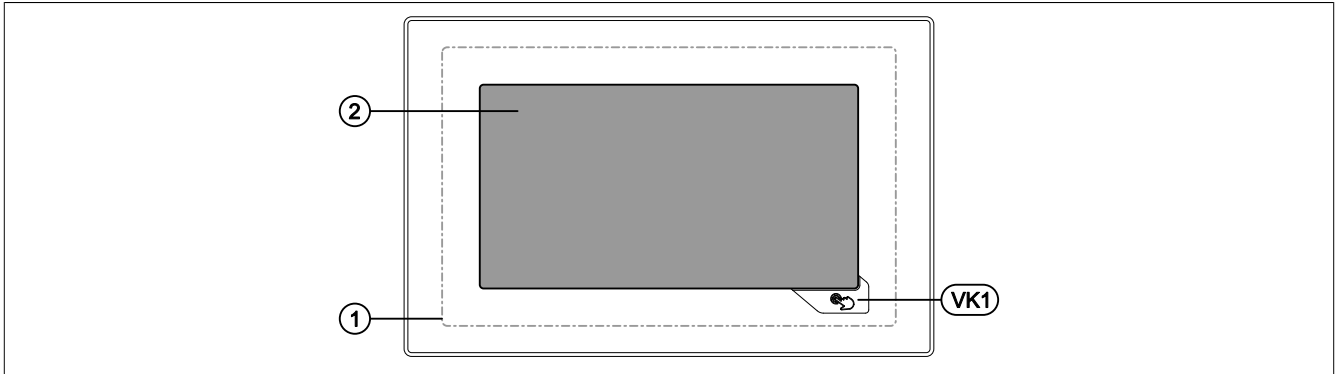
Touching the touch screen ② (corresponds to the display) and the Hand button (VK1) triggers commands in the application.

Because the analog resistive touch screen is not capable of multi-touch, touching multiple positions simultaneously generates an average value. This averaged position value is evaluated by the application. Because the entire touch screen ① is bigger than the display itself, it may occur that multiple touches (also outside of the display area) can lead to a command being triggered unintentionally. This can happen when the Power Panel is held in your hands.

Defined touch keys

The following touch keys (virtual keys) are predefined if the Visual Components object is used for designing the HMI application in Automation Studio:
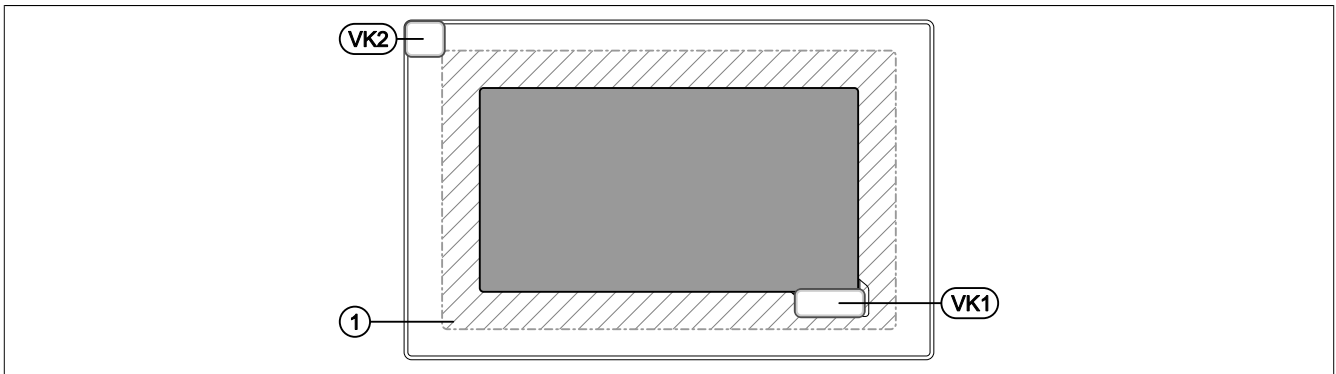
In addition to the Hand button (VK1 virtual key), a further VK2 virtual key is available, which represents the touch-screen ① outside of the display area (hatched area). With this key, a touch outside of the display area can be recognized by the application. The application can warn the user of faulty operation with a corresponding message.

Using the defined touch keys

The defined touch keys on Power Panel T-Series devices described earlier can only be used with an enabled RFB extension (see option in section "Service page VNC" on page 71). The following possibilities are available to the user:

- In the VNC-based HMI application in Automation Studio, a touch key can be assigned to a variable in the application and the status of the key can thus be queried.
- The touch keys can also be queried using functions in library *AsRfbExt*[1].

---

[1] Functions in the AsRfbExt library are described in Automation Help.

4.3.2 Touch screen calibration

B&R touch screen devices are equipped with a touch controller that supports hardware calibration. These devices come already pre-calibrated from the factory. This is an advantageous feature when replacing devices with an identical model of the same type since it avoids having to recalibrate the new device. Nevertheless, calibrating the device is recommended in order to achieve the best results and to adapt the touch screen to the user's preferences.

During the calibration process, the specified point must be pressed four times in row within a certain time frame.

An error message is displayed if calibration is not performed properly.

> ## Information:
>
> **A stylus pen (e.g. 9A0013.01) is recommended for touch screen calibration.**

touch the crosshair
8
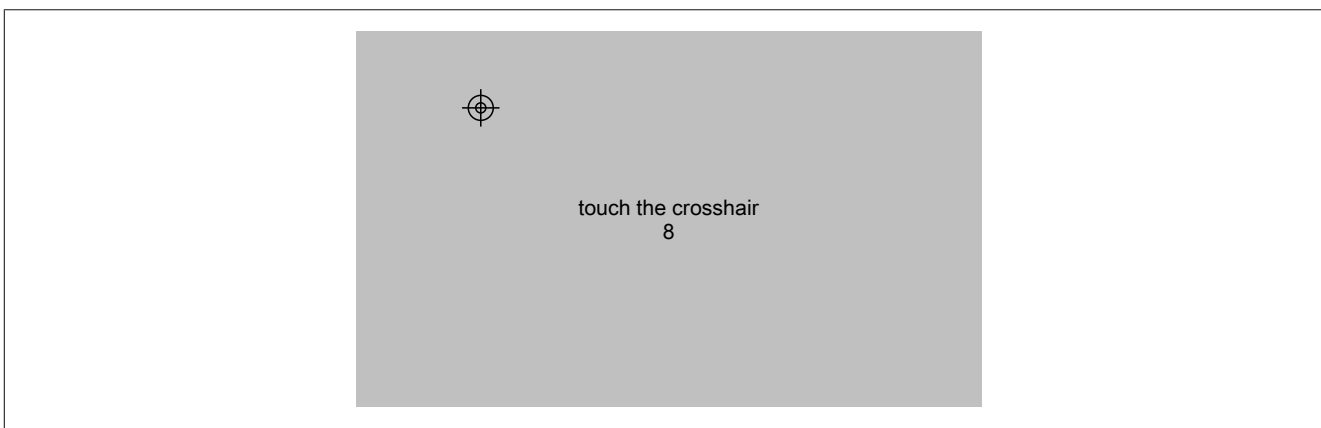
Figure: Touch screen calibration

Starting touch screen calibration on the service page

Touch screen calibration can be started via the service page *Screen → Calibrate touch* (see "Service page Screen" on page 63).

Starting touch screen calibration via the application

Touch screen calibration can also be started via the application using an RFB function.

See section "Starting touch screen calibration" on page 88.

4.3.3 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.

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

4.3.4 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 54)
- Using update:

  ⇨ Updating with Automation Studio and a USB flash drive (AS 4.2.1 and later)
  ⇨ 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:

- By pressing the left and right buttons of the mouse simultaneously for at least 2 seconds
- By pressing the Hand button, if it is configured accordingly (see "Configuring the Hand button" on page 67 as well as the description for the "touch screen" on page 51)
- Opened automatically after restarting the Power Panel if the corresponding *Start mode* mode is configured on service page *Startup* (see service page *"Startup" on page 58*)

Entering the service password

If a service password has been configured in the settings (see "Service page Security" on page 81), then this password must be entered each time the service pages are called before the respective service page is displayed.

Password	_____
[OK]	[Cancel]	[Update]
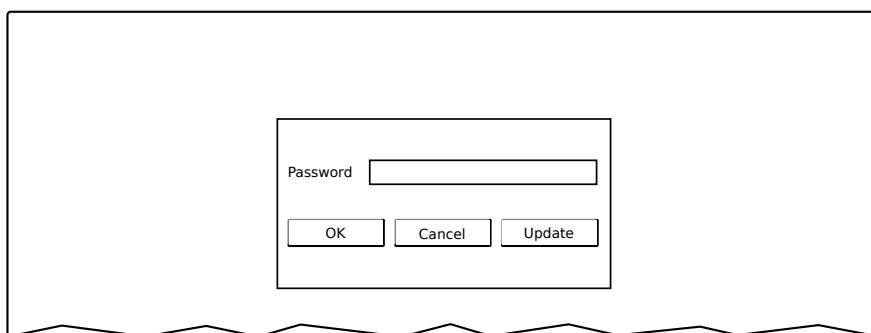
The service password must be entered in the corresponding text input field.

Button	Description
[OK]	Confirming password entry
[Cancel]	Canceling password entry
[Update]	Pressing the Update button 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 76). 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 58) 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:

Original Power Panel screenshot	Representation in this documentation
Startup Network Time Screen Audio Hand button VNC Web Storage Update Backup & Reset Security Save & Exit About & Info Hostname — Specify the name of the device on the network DHCP — Use automatic network configuration ☑ Activate DNS — Activate DNS service ☑ DNS suffix Get DNS from DHCP server ☑	Startup Network Time Screen Audio Hand button VNC Web Storage Update Backup & Reset Security Save & Exit About & Info Hostname — Specify the name of the device on the network DHCP — Use automatic network configuration ☑ Activate DNS — Activate DNS service ☑ DNS suffix Get DNS from DHCP server ☑

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 82.

> **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 `PPTConfig.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 80 and "Service page Update" on page 76).**

Input elements on the service pages
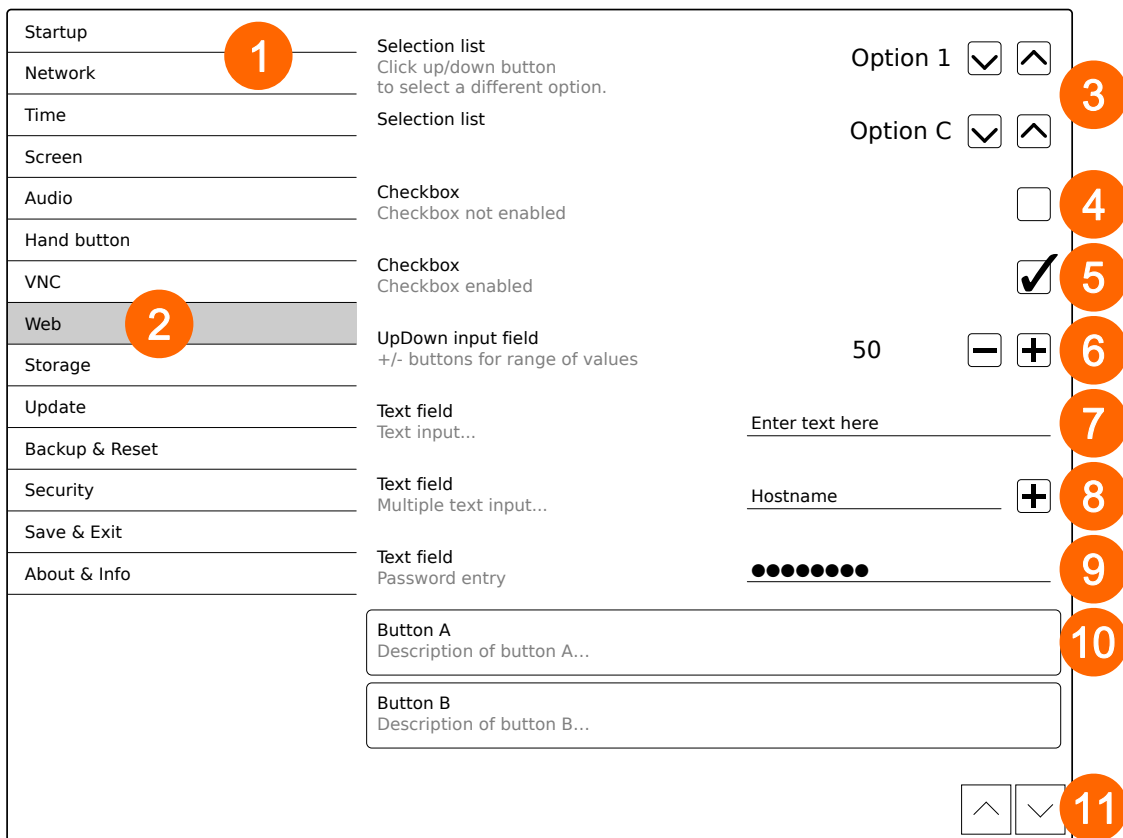
1	Menu for selecting individual service pages "Startup", "Network", etc. "About & Info".
2	The active or selected service page is marked in the menu using a different background color.
3	The selection list indicates the selected option. Pressing the up/down arrows moves between the available options.
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.

5.1.1 Overview

The following service pages are available:

Menu for the service pages	Menu option (English)	Description
Startup Network Time Screen Audio Hand button VNC Web Storage Update Backup & Reset Security 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
	Hand button	Functionality of *Hand buttons*
	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)
	Save & Exit	Saving the Power Panel settings and closing/exiting the servicepage.
	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	
Network		Service page ⌄ ⌃
Time		
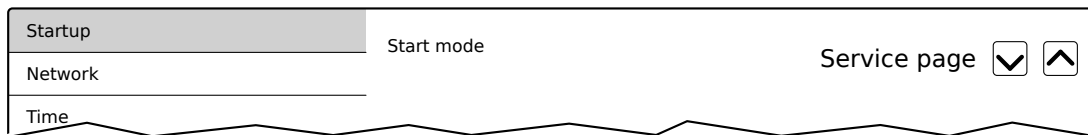
The start mode is configured the service page *Startup* and determines how the Power Panel behaves after being switched on. The Power Panel is started in one of the following modes (*Start mode*) in accordance with this setting:

- *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	
Network		VNC ⌄ ⌃
Time	Show boot logo	
Screen	Use boot logo / animation as VNC load screen	☐
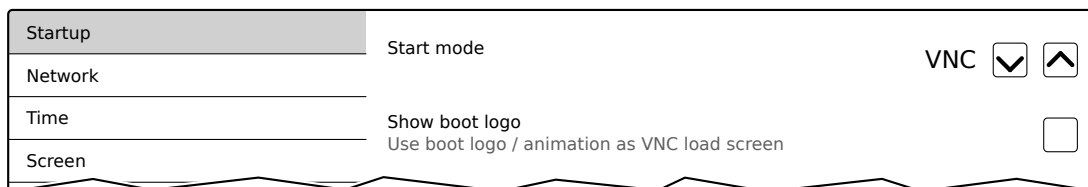
Start mode *Web*

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	
Network		Web ⌄ ⌃
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 89
- "Boot animation" on page 89

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	**Activate DNS** ✓
Hand button	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 82).**

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 61

Activate DNS[2]

Default setting: Enabled

If the two options *Activate DNS* and *DHCP* are enabled, then the device passes the defined hostname on to the DNS server. The hostname is thus entered in the DNS directory and the device can be identified within the network using the hostname and accessed by other devices.

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.

---

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

Information about this can be provided by the network administrator on request.

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 not available and are hidden:

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

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	Hostname	
Network	Specify the name of the device on the network	
Time		
Screen	DHCP Use automatic network configuration	✔
Audio	Activate DNS	
Hand button	Activate DNS service	✔
VNC	DNS suffix	
Web		
Storage	Get DNS from DHCP server	☐
Update		
Backup & Reset	Primary DNS server	
Security	Secondary DNS server	
Save & Exit		
About & Info	Third DNS server	

Primary DNS server / Secondary DNS server / Third 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		
Network	**Hostname** Specify the name of the device on the network	
Time		
Screen	**DHCP** Use automatic network configuration	☐
Audio	**Activate DNS** Activate DNS service	✔
Hand button		
VNC	**DNS suffix**	
Web		
Storage	**IP address**	
Update		
Backup & Reset	**Subnet mask**	
Security		
Save & Exit	**Default gateway**	
About & Info	**Primary DNS server**	
	Secondary DNS server	
	Third 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 59*

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* / *Third 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	Activate ntp client	☐
Network		
Time	Adjust clock for daylight saving	☐
Screen		
Audio	Time synchronization	
Hand button	(GMT) Dublin, Edinburgh, Lisbon, London	

Activate 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
Hand button	
VNC	NTP server 3
Web	
Storage	NTP server 4

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 0 to 100%	50	⊟ ⊞
Network				
Time		Screensaver		☐
Screen				
Audio		Calibrate touch Press to calibrate		
Hand button				
VNC		Start demo Press to show sample screens		
Web		Screen rotation Specify the screen rotation angle	0°	⌄ ⌃
Storage				
Update		Boot animation left pos Animation offset from left side in pixel	0	⊟ ⊞
Backup & Reset				
Security		Boot animation top pos Animation offset from top in pixel	0	⊟ ⊞
Save & Exit				
About & Info		Boot animation delay Delay of boot animation in ms	0	⊟ ⊞

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 82).

Setting 0% on the service page corresponds to a residual brightness of 20%:
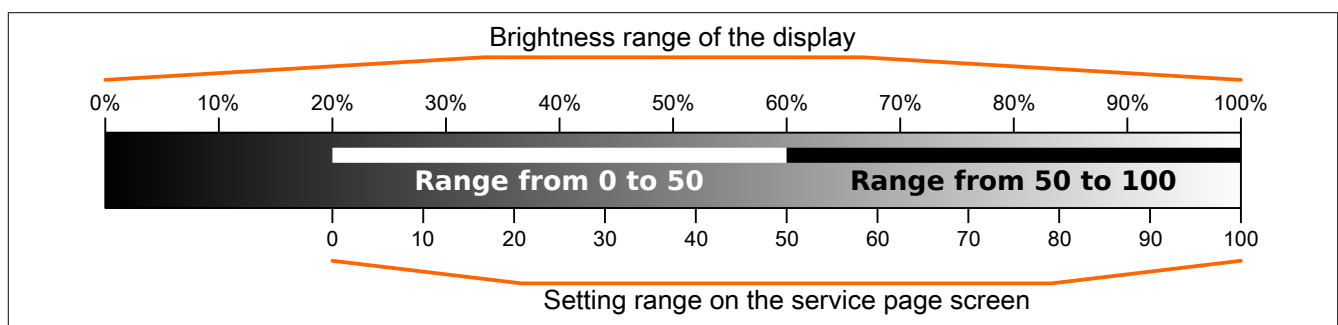
Brightness can also be controlled by the application (see "Adjusting display brightness" on page 88).

Screensaver

Default setting: Disabled

The options for the selected screen saver is described in the following section "Screensaver settings" on page 65 .

Calibrate touch (Button)

Function: Start touch calibration (see "Touch screen calibration" on page 52).

Start demo **(Button)**

Function: Show sample images

The sample images are displayed one after the other. A touch gesture shows the next sample image; and after the last image, the service page is shown again.

Screen rotation

Default setting: 0°

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

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.

If the device is used as a VNC terminal (see "Service page Startup" on page 58) with RFB extension and an HMI application that was created in Automation Studio, then the orientation of the HMI application (portrait or landscape) can also be defined using the visualization object in Automation Studio.

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
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
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 89	

5.1.5.1 Screensaver settings

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

Startup	Display brightness
Network	0 to 100%
Time	
Screen	Screensaver
Audio	Start screensaver after
Hand button	1 to 60 minutes
VNC	Screensaver type

Display brightness 0 to 100% — 50

Screensaver — ✓

Start screensaver after 1 to 60 minutes — 15

Screensaver type — Backlight off

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. A touch gesture exists the screensaver and the last active screen is 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		
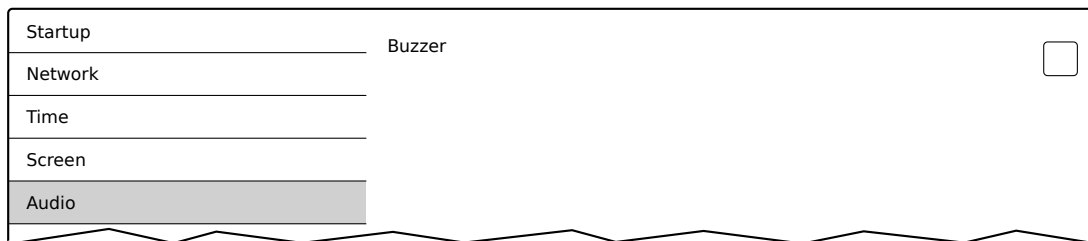
Buzzer

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 ⊟ ⊞
Hand button		
VNC	Buzzer duration 10 to 500ms	10 ⊟ ⊞
Web	Test buzzer Press to test	
Storage		
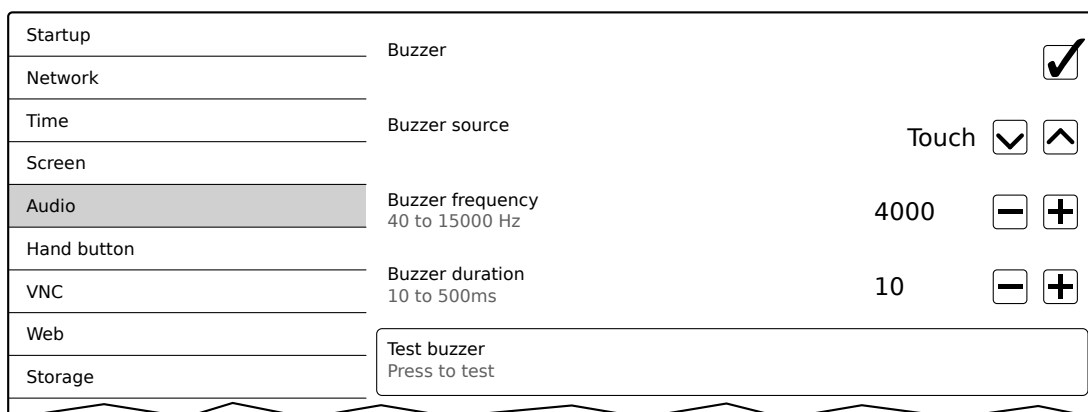
Buzzer source

Default setting: Touch

The following options are available for triggering a buzzer:

Touch	In VNC and Web mode, an audio signal is output for each touch 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 88

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 *Hand button*

The Hand button configured using the settings on this service:

Startup		Open service page	☑
Network			
Time		Use button in user application	☐
Screen			
Audio			
Hand button			
VNC			
Web			

Open service page

Default setting: Enabled

Enabled	In VNC/Web mode, the service page can be opened using the Hand button.
Disabled	In VNC/Web mode, the service page **cannot** be opened using the Hand button. A mouse must be connected in order to open the service page in VNC/Web mode (see "Mouse" on page 53).

Use button in user application

Default setting: Disabled

Enabled	The Hand button can be used for applications in the VNC/Web mode. If the Hand button is pressed, this information is transferred to the server (configuration in Automation Studio). The service page can be opened using the Hand button by pressing it for more that 5 seconds when option *Open service page* is enabled.
Disabled	The Hand button behaves as described in option *Open service page*.

Assign key code to button

This option is only shown if *Use button in user application* is enabled:

Startup		Open service page	☑
Network			
Time		Use button in user application	☑
Screen			
Audio		Assign key code to button	☐
Hand button			
VNC			
Web			

Default setting: Disabled

Enabled	Input field *Button key code* is shown.
Disabled	A key code is not sent to the application.

> ## Information:
> **The key code is only used for Web mode.**

Button key code

If option *Assign key code to button* is enabled, an additional input field is shown:

Startup			
Network	Open service page		☑
Time	Use button in user application		☑
Screen			
Audio	Assign key code to button		☑
Hand button			
VNC	Button key code	KEY_ENTER	
Web			

Default setting: EMPTY

Any key code can be entered in this text field, which will then be sent to the application when the home button is pressed.

If this input field is empty, no key code is sent to the application.

Key codes for input field *Button key code*

The following tables list key codes can be entered in field *Button key code*.

> **Information:**
>
> **When entering the key codes, it is important to ensure that the text or character that is listed for the desired character or key in the "key code" column in the following tables is entered.**

Upper and lower case letters

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

Table: Upper and lower case letters

Named keys *KEY_**

The following keys and characters can be assigned a name as a key code.

Special keys		Numbers	
Key code	**Description**	**Key code**	**Description**
KEY_ESC	Escape	**KEY_1**	1
KEY_BACKSPACE	Backspace key	**KEY_2**	2
KEY_TAB	Tab key	**KEY_3**	3
KEY_ENTER	Enter key	**KEY_4**	4
KEY_CAPSLOCK	Capslock key	**KEY_5**	5
KEY_LEFTSHIFT	Left shift key	**KEY_6**	6
KEY_RIGHTSHIFT	Right shift key	**KEY_7**	7
KEY_LEFTCTRL	Left Ctrl key	**KEY_8**	8
KEY_RIGHTALT	Right Ctrl key	**KEY_9**	9
KEY_LEFTALT	Left Alt key	**KEY_0**	0
KEY_HOME	Pos1/Home key	**Special characters**	
KEY_END	End key	**Key code**	**Description**
KEY_PAGEUP	Page up key	**KEY_-**	Minus
KEY_PAGEDOWN	Page down key	**-**	
KEY_UP	Up cursor key	**KEY_=**	Equals
KEY_DOWN	Down cursor key	**=**	
KEY_LEFT	Left cursor key	**KEY_LEFTBRACE**	Left square bracket
KEY_RIGHT	Right cursor key	**[**	
KEY_INSERT	Insert key	**KEY_RIGHTBRACE**	Right square bracket
KEY_DELETE	Delete key	**]**	
Function keys		**KEY_SEMICOLON**	Semicolon
Key code	**Description**	**;**	
KEY_F1	F1	**KEY_APOSTROPHE**	Apostrophe
KEY_F2	F2	**'**	
KEY_F3	F3	**KEY_GRAVE**	Accent (grave)
KEY_F4	F4	**`**	
KEY_F5	F5	**KEY_BACKSLASH**	Backslash
KEY_F6	F6	****	
KEY_F7	F7	**KEY_COMMA**	Comma
KEY_F8	F8	**,**	
KEY_F9	F9	**KEY_DOT**	Dot
KEY_F10	F10	**.**	
KEY_F11	F11	**KEY_SLASH**	Slash
KEY_F12	F12	**/**	
		KEY_SPACE	Spaces

Table: Special keys, function keys, other keys, numbers

Special characters

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

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

Table: Special characters

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
Hand button	
VNC	Encrypt password
Web	Save VNC password encrypted
Storage	Use RFB extension
Update	
Backup & Reset	Enable local window scaling
Security	
Save & Exit	vncserver1
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 server 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 PPTConfig.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 87

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 the *Web* service page 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 server 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 current web server is displayed in the 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 52).
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.

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. "`ppts30-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 USB1 (IF3).
	usbshare2	USB memory connected to USB2 (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 the *Storage* service page:
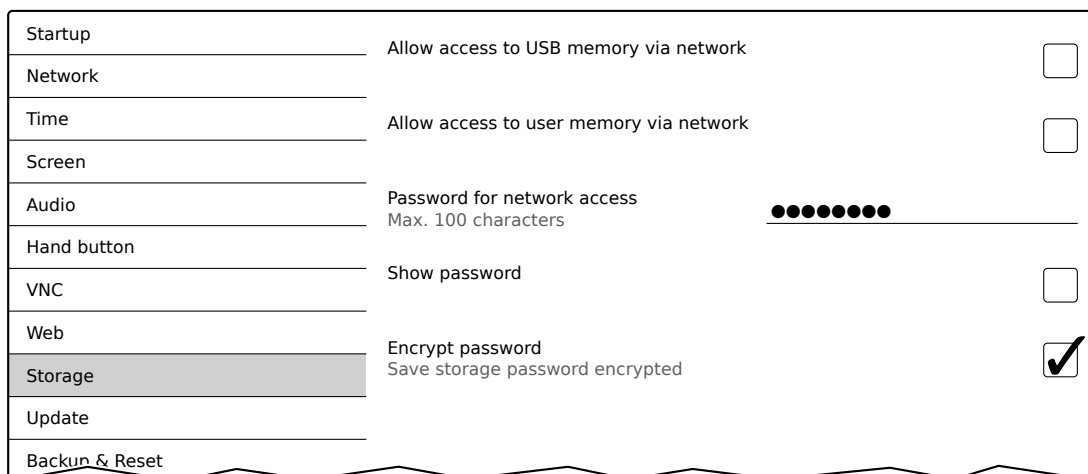
Allow access to USB memory via network

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 PPTConfig.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
Hand button	
VNC	**Load boot logo / animation** Press to load boot logo / animation from USB flash drive
Web	**Update server type** Specify the update server type TFTP ☑ ☒
Storage	
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 78)

The following update files are searched for:

File type	Filename
System	PPTImage.img.gz and PPTImage.md5
Settings	PPTConfig.xml
Boot logo	PPTLogo.bmp.gz (See "Boot logo" on page 89)

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 PPTConfig.xml must not be on the source media.**

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 PPTConfig.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 82).

Load configuration from PLC (Button)

With this function, controllers are searched for 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	
Screen	**Server 2** — IP 10.0.0.2 — MAC: 00 60 65 10 12 02
Audio	
Hand button	**Server 3** — IP 10.0.0.3 — MAC: 00 60 65 10 12 03
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	**Server 1** — IP 10.0.0.1 — MAC: 00 60 65 10 12 01
Network	
Time	Config1
Screen	Config2
Audio	Config3
	Config4
Hand button	
VNC	**Server 2** — IP 10.0.0.2 — MAC: 00 60 65 10 12 02
Web	

The names of the listed configurations match the names of the configurations in Automation Studio:
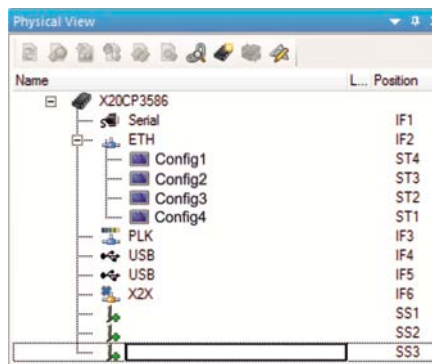
If a configuration entry is selected, a dialog box appears asking for installation of the configuration to be confirmed. After downloading the data, the application goes to the *Save & Exit* service page and the data can be stored using a corresponding command. Alternatively, the user can check and – 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 nomenclature must be used for file names:

File type	Filename
Boot logo	PPTLogo.bmp.gz (See "Boot logo" on page 89)
Boot animation	PPTLogoA.gif (See "Boot animation" on page 89)

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:

VNC	Press to load boot logo / animation from USB flash drive
Web	
Storage	Update server type — Specify the update server type — TFTP
Update	
Backup & Reset	Get Update Server from DHCP server ✓
Security	
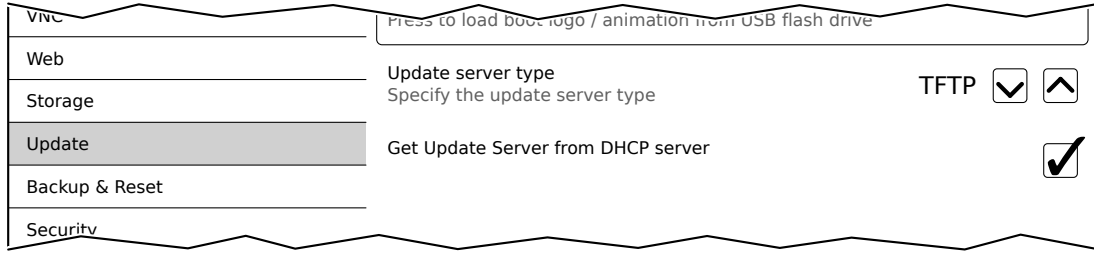
Update server type

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 has to be entered manually when the option is disabled (see the following two sections "Configuration of an update servers of type TFTP or FTP).

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 Configuration of an update server of type *TFTP*

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:
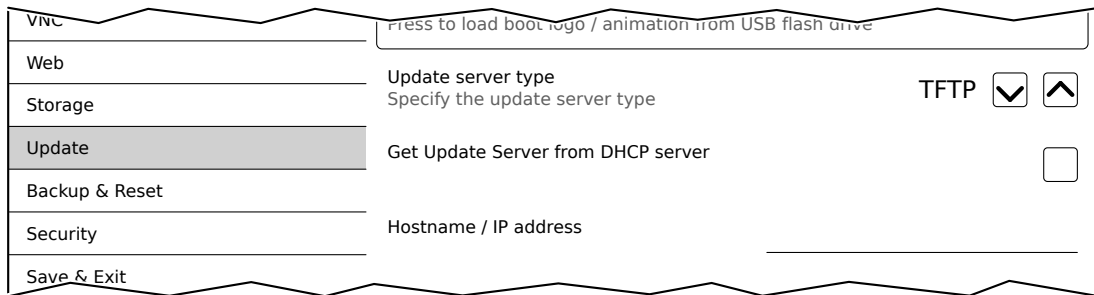
VNC	Press to load boot logo / animation from USB flash drive
Web	
Storage	Update server type — Specify the update server type — TFTP
Update	
Backup & Reset	Get Update Server from DHCP server
Security	Hostname / IP address
Save & Exit	

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 Configuration of an update server of type *FTP*

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:

> ## Information:
>
> **The update server type *FTP* is only available for devices with hardware revision C0 and later.**

FTP user

Default setting: EMPTY (No password 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 PPTConfig.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 (●●●●●●).

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
Hand button	
VNC	**Complete backup** Press to backup settings, boot logo / animation and system to USB flash drive
Web	
Storage	**Reset settings** Press to restore factory settings
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 (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 backup of the system, its settings and the boot - logo and stores it on the USB flash drive.

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	
Audio	**Show password** ☐
Hand button	
VNC	**Encrypt password**
Web	Save security password encrypted ✔
Storage	
Update	
Backup & Reset	
Security	
Save & Exit	
About & Info	

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 54).

The password is stored in configuration file PPTConfig.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.

5.1.14 Service page *Save & Exit*

On this page, the settings currently made or modified on service pages can be saved using the *Save button*. Use *Exit* to leave the service pages and the Power Panel starts in the configured start mode (see "Service page Startup" on page 58).

Startup
Network
Time
Screen
Audio
Hand button
VNC
Web
Storage
Update
Backup & Reset
Security
Save & Exit
About & Info

Save changes & exit
Press to save changes and exit

Save changes
Press to save changes

Exit without saving
Press to exit without saving changes

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 58)

Save changes (Button)

All changes made are saved. The service pages are 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 58).

5.1.15 Service page *About & Info*

Startup	**System time**
Network	20:16:11
Time	**Model number**
Screen	6PPT30.101G-20W
Audio	**Serial number**
Hand button	E0123456789
VNC	**Hardware revision**
Web	C3
Storage	**MAC address**
Update	01:23:45:67:89:ab
Backup & Reset	**IP address**
Security	123.45.67.89
Save & Exit	**Image version**
About & Info	1.1.1
	Bootloader version
	gf800fad
	Show license
	Press to show license

On this service page, the following Power Panel information is displayed:

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)
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 93).

5.2.1 Updating with Automation Studio and a USB flash drive (AS 4.2.1 and later)

Upgrade PPT Image in Automation Studio

Automation Studio

USB memory
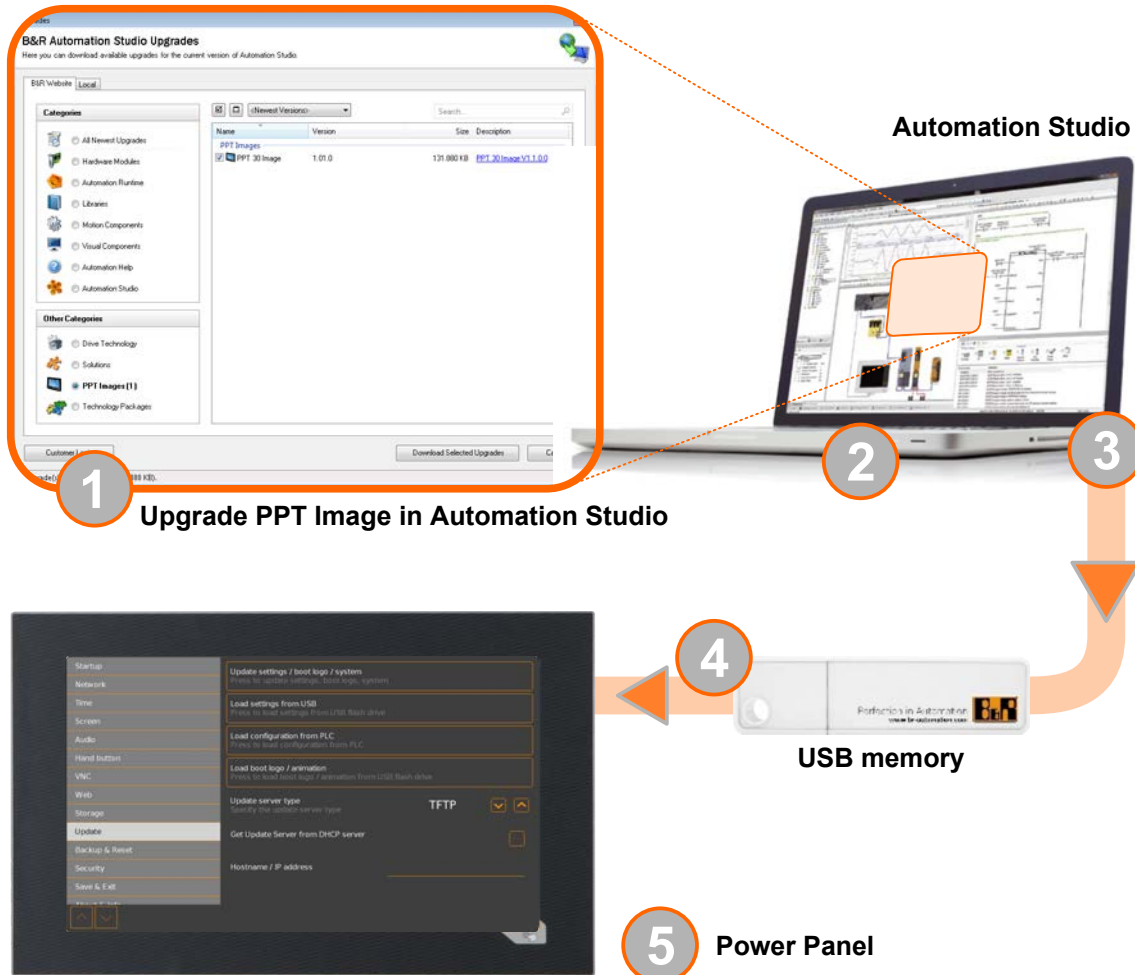
Power Panel

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:

    ° *Extras > Create remote install structure...*

   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:

    ° PPTImage.img.gz
    ° PPTImage.md5
    ° PPTConfig.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 the "PPT upgrades" section on the "Downloads" tab.
   ° On the download page under *Software > Automation Studio > Automation Studio 4.2* (or later version) in the "PPT upgrades" section.

   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:

   ° PPTImage.img.gz
   ° PPTImage.md5
   ° 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.

- RFB extension
- File formats

6.1 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:

- Evaluate additional control devices on the Power Panel (e.g. Hand button).
- 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
- Starting touch screen calibration
- Adjusting display brightness
- Audio signal output

6.1.1 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)
- Internal temperature of the Power Panels (Index 1: TemperatureEnvironmental)

Important!

In worst case, the temperature of the CPU housing can be over 100°C.

Use case

Under certain circumstances (e.g. specified distances to ventilation cannot be observed, see "Installation instructions" on page 43), it makes sense for the application to monitor the Power Panel temperature. The application can initiate appropriate corrective measures if a certain temperature is exceeded.

Important!

The temperature within the housing is not allowed to exceed 85°C .

6.1.2 Starting touch screen calibration

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

Function *RfbExtStartProcess()* is used to call the touch screen calibration process *touch-calib*. Here, parameter *pcmdLine* is used to call the command line process as follows:

Call syntax	`touch-calib [timeout]`
Parameter	timeout ... Touch screen calibration timeout in seconds. Valid range: 1 - 300 If `touch-calib` is called without a parameter, then touch screen calibration runs without a timeout.
Example	pcmdLine: `touch-calib 10` Touch screen calibration runs with a timeout of 10 seconds.
Implementation	The VNC-based HMI application must have a button that has been assigned a corresponding function, which calls *RfbExtStartProcess()* with the appropriate parameters.

See also the description for Touch screen calibration in section Installation.

6.1.3 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 54).

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 63).

6.1.4 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 *Screen* or in Automation Studio (see section "Configuration" on page 54).

> **Information:**
>
> **Emitting an audible tone with *beep* is always done independent of the setting on service page *Audio* (see "Service page Audio" on page 66).**

6.2 File formats

6.2.1 PPT image

Filename: PPTImage.img.gz and PPTImage.md5

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

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

6.2.2 System settings

Filename: PPTConfig.xml

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

6.2.3 Boot logo

Filename: PPTLogo.bmp.gz

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

If Startup is configured on the service page, 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. The size of the display on the Power Panel being used can be found in the "Technical data" section.
Name	PPTLogo.bmp.gz The bitmap must be compressed in GZ format (GNU zip).
Color depth	The color depth is limited to 24-bit.
Application	The boot animation is superimposed over an existing static boot logo.

6.2.4 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 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.

7 Maintenance

7.1 Cleaning

> ## Danger!
> **Power Panel devices must be switched off before cleaning 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 jets.

> ## Information:
> **Displays with a touch screen should be cleaned regularly.**

7.2 Screen burn-in on LCD/TFT monitors

Screen burn-in (afterimages, display memory effect, image retention or image sticking) occurs on LCD/TFT displays if a static image is displayed for a prolonged period of time. This static screen content causes the build-up of parasitic capacitances within the LCD components that prevent liquid crystal molecules from returning to their original state. This condition is unpredictable and can depend on the following factors:

- Type of image displayed
- Color composition of the image
- Length of time that the image is displayed
- Ambient temperature

Preventing screen burn-in

There is no perfect solution. There are ways to significantly reduce this effect, however:

- Avoid static images or screen content.
- Use non-static screensavers when the display is not in use.
- Frequent picture change
- Turn off the display when not in use.

Turning off the backlight does not help prevent screen burn-in.

7.3 Tips for extending the service life of the display

Service life

The maximum service life of the analog resistive touch screen is 10 million actuations.

The following graph shows the force required to activate the touch screen over the course of its service life. The requirements are similar to those for the specified 10 million actuations.
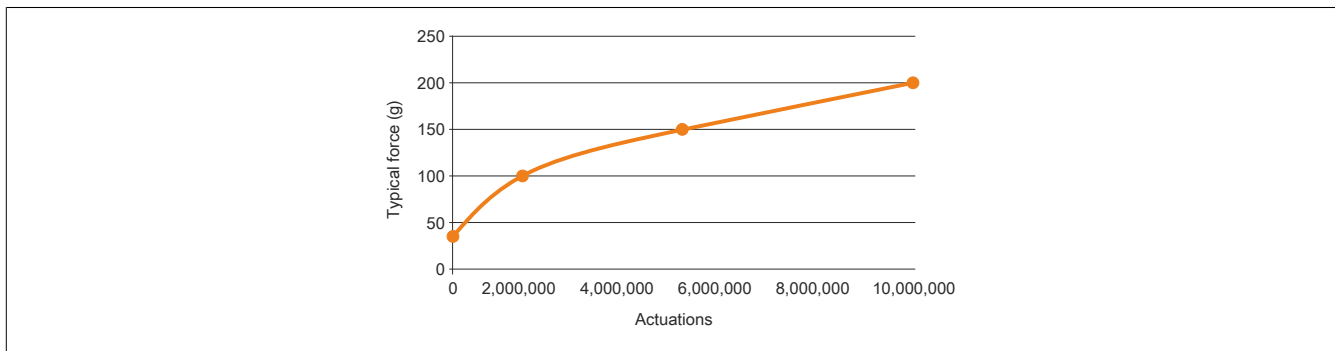
Backlight

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

How can the service life of the backlight be extended?

- By setting the display brightness to the lowest value that is still comfortable for the eyes
- By using dark images
- By reducing the brightness by 50% (can result in an approximate 50% increase of the half-brightness time)

Screen burn-in

Screen burn-in refers to the "burning in" of a static image on a display after being displayed for a prolonged period of time. Nevertheless, static images are not the only cause of screen burn-in. Screen burn-in is also referred to as burn-in effect, image retention, memory effect, memory sticking or ghost image.

There are basically 2 types:

- Area type: This type of screen burn-in is indicated by a dark gray image. The effect will disappear if the display is switched off for a long period of time.
- Line type: This type of screen burn-in can cause lasting damage.

What causes screen burn-in?

- Static images
- No screensaver
- Sharp transitions in contrast (e.g. black/white)
- High ambient temperatures
- Operation outside of specifications

How can screen burn-in be avoided?

- By constantly changing between static and dynamic images
- By avoiding excessive brightness differences between foreground and background elements
- By using colors with similar brightness
- By using complementary colors in follow-up images
- By using a screensaver

Pixel errors

> **Information:**
>
> **Displays may contain defective pixels (dead/stuck pixels) that result from the manufacturing process. These flaws are not grounds for reclamation or initiating a warranty claim.**

8 Accessories

8.1 Overview

Model number	Product ID	6PPT30.043x-20x	6PPT30.057x-20x	6PPT30.070x-20x	6PPT30.101x-20x	Page
Cage clamp terminal block						
0TB6102.2110-01	Accessory 2-pin cage clamp terminal block (3.81)	●	●	●	●	93
Screw clamp terminal block						
0TB6102.2010-01	Accessory 2-pin screw clamp (3.81)	●	●	●	●	93
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	●	●	●	●	93
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	●	●	●	●	93
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	POWERLINK connection cable, RJ45 to RJ45, 30 m	●	●	●	●	
X20CA0E61.0500	POWERLINK connection cable, RJ45 to RJ45, 50 m	●	●	●	●	
X20CA0E61.0600	POWERLINK connection cable, RJ45 to RJ45, 60 m	●	●	●	●	
Ethernet cable [1] **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	●	●	●	●	93
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	●	●	●	●	
Other accessories						
9A0013.01	Stylus pen for resistive touch screen	●	●	●	●	

Table 1: Overview

1) The POWERLINK cable from B&R can be used for the Ethernet connections.

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 2: 0TB6102.2010-01, 0TB6102.2110-01 - Order data

8.2.2 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for 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!)	Only copper wires (no aluminum wires!)
Distance between contacts	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 3: 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

Technical data and additional information about data storage device can be found in the respective documentation. This can be found and downloaded under the model number of the data storage device at www.br-automation.com.

8.4 Cable accessories

Technical data and additional information about cables can be found in the respective documentation. This can be found and downloaded under the model number of the cable on the B&R website at www.br-automation.com.

9 International and national certifications

Power Panel T30 devices satisfy the requirements of the listed certificates and their relevant standards. We pay particular attention to 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	Function	certificate authority	Region
CE	CE marking	Notified bodies	Europe (EU)
Ex	Explosion protection (ATEX)	Notified bodies	Europe (EU)
UL LISTED	Underwriters Laboratories Inc. (UL) (certification for Canada and USA)	UL	Canada USA

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

ATEX Directive 2014/34/EU

ATEX markings

II 3G Ex nA IIA T5 Gc
II 3D Ex tc IIIC T70°C Dc
TÜV 16 ATEX 7815 X

Power Panel T30 devices are suitable for use in the described environment or in non-explosive atmospheres.

Certification of these products is performed exclusively in cooperation with EU-authorized bodies (Notified Bodies).

Each device is also accompanied by an information sheet providing detailed installation and safety guidelines.

Europe (EU)

Applicable standards from this directive:

EN 60079-0	Explosive atmospheres Part 0: Equipment - General requirements
EN 60079-15	Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
EN 60079-31	Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"

The declaration of conformity and certificate can be downloaded 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 ATEX Power Panel T30

Certificate (type approval certificate)

Website > Downloads > Certificates > ATEX > Power Panel T30

Ex marking in detail:

Ex Zone 2 (gas zone)		Ex Zone 22 (dust zone)	
⟨Ex⟩	Markings for explosion protection (product complies with ATEX Directive 2014/34/EU)		⟨Ex⟩
II	Device group II (Ex areas other than mines susceptible to firedamp)		II
3G	Device category G (gases) / D (dusts)		3D
Ex	Ex protection in accordance with EN 60079-xx (-0, -15)	Ex protection in accordance with EN 60079-xx (-0, -31)	Ex
nA	Ignition protection "nA" (non-sparking equipment)	Ignition protection "tc" (protection through enclosure)	tc
IIA	Ex group II (gases)	Ex group III (dusts)	IIIC
T5	Temperature class T5 (≤100°C)	Maximum surface temperature (≤70°C)	T70°C
Gc	Equipment protection level (EPL)	Equipment protection level (EPL)	Dc
Type approval certificate: TÜV 16 ATEX 7815 X			
IP protection (EN 60529): IP65 front / IP20 back			
Ex ambient temperature range (Ta): -20 to 55°C			

In addition to the general installation guidelines, the instructions listed in section "Instructions for use in Ex zone 2 / 22" on page 49 must also be followed for use in explosive atmospheres!

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 60079-0	Explosive atmospheres Part 0: Equipment - General requirements
EN 60079-15	Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
EN 60079-31	Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"
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 measuring techniques - 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 d.c. 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	Test carried out in accordance with	Requirements in accordance with	
		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

Evaluation criteria for performance

Criteria	During testing	After testing
A	The PLC system shall continue to operate as intended. No loss of function or performance.	The PLC system must continue intended operation.
B	Degradation of performance accepted. No change of operating mode.	The PLC system must continue intended operation. 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 must resume intended operation, either autonomously, by a manual restart or after a power cycle.
D	Degradation or failure of function that can no longer be restored.	Operating equipment destroyed.

Electrostatic discharge (ESD)

Test carried out in accordance with EN 61000-4-2	Requirements in accordance with EN 61131-2 / Zone B	Requirements in accordance with EN 61000-6-2
Contact discharge (CD) To conductive external parts	±4 kV Criteria B	
Air discharge (AD) To isolating external parts	±8 kV Criteria B	

High-frequency electromagnetic fields (HF field)

Test carried out in accordance with EN 61000-4-3	Requirements in accordance with EN 61131-2 / Zone B	Requirements in accordance with 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)

Test carried out in accordance with EN 61000-4-4	Requirements in accordance with EN 61131-2 / Zone B	Requirements in accordance with 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)

Test carried out in accordance with EN 61000-4-5	Requirements in accordance with EN 61131-2 / Zone B	Requirements in accordance with 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

Test carried out in accordance with EN 61000-4-6	Requirements in accordance with EN 61131-2 / Zone B	Requirements in accordance with 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

Test carried out in accordance with EN 61000-4-8	Requirements in accordance with EN 61131-2 / Zone B	Requirements in accordance with 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

Test carried out in accordance with EN 61000-4-11	Requirements in accordance with EN 61131-2 / Zone B	Requirements in accordance with 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

Test carried out in accordance with EN 61000-4-11 / EN 61000-4-29	Requirements in accordance with EN 61131-2 / Zone B	Requirements in accordance with 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) 20 attempts Criteria A	-

1)   Mains frequency per manufacturer data

Voltage fluctuations

Test carried out in accordance with EN 61000-4-11 / EN 61000-4-29	Requirements in accordance with EN 61131-2 / Zone B	Requirements in accordance with 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	Test carried out in accordance with	Limits in accordance with	
		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

Test carried out in accordance with EN 55011 / EN 55022 / EN 55016-2-1	Limits in accordance with EN 61131-2 / Zone B	Limits in accordance with 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

Test carried out in accordance with EN 55011 / EN 55022 / EN 55016-2-3	Limits in accordance with EN 61131-2 / Zone B	Limits in accordance with 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	Test carried out in accordance with	Requirements in accordance with				
		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

Test carried out in accordance with EN 60068-2-6	Requirements in accordance with EN 61131-2		Requirements in accordance with EN 60721-3-3 / Class 3M4	
Vibration (sinusoidal) / Operation [1]	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

Test carried out in accordance with EN 60068-2-27	Requirements in accordance with EN 61131-2	Requirements in accordance with EN 60721-3-3 / Class 3M4
Shock / Operation [1]	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)

Test carried out in accordance with EN 60068-2-6	Requirements in accordance with EN 60721-3-2 / Class 2M1		Requirements in accordance with EN 60721-3-2 / Class 2M2		Requirements in accordance with EN 60721-3-2 / Class 2M3	
Vibration (sinusoidal) / Transport (packaged) [1]	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)

Test carried out in accordance with EN 60068-2-27	Requirements in accordance with EN 60721-3-2 / Class 2M1	Requirements in accordance with EN 60721-3-2 / Class 2M2
Shock / Transport (packaged) [1]	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)

Test carried out in accordance with EN 60068-2-31 [1]	Requirements in accordance with EN 61131-2 with shipping packaging		Requirements in accordance with EN 61131-2 with product packaging		Requirements in accordance with 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)

Test carried out in accordance with EN 60068-2-31	Requirements in accordance with EN 60721-3-2 / Class 2M1		Requirements in accordance with EN 60721-3-2 / Class 2M2		Requirements in accordance with 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 EN 61131-2	Definition per EN 60664-1
Overvoltage category II	Equipment in "Overvoltage category II" includes energy-consuming equipment supplied by the fixed installation

Pollution degree

Requirement per EN 61131-2	Definition per EN 60664-1
Pollution degree 2	Only non-conductive pollution occurs. Occasionally, however, temporary conductance may result from condensation.

Protection rating provided by enclosure (IP code)

Requirement per EN 61131-2	Meaning of codes per EN 60529	Protection of the operating equipment	Protection of personnel
≥IP20 on back	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 IP x**0**	Not protected.	-

Requirement per Manufacturer	Meaning of codes per EN 60529	Protection of the operating equipment	Protection of personnel
IP65 on front	First number IP **6**x	Dust-proof.	Protection against touching dangerous parts with conductor.
	Second number IP x**5**	Protection against water jets.	-

9.3 Underwriters Laboratories (UL)

UL markings

Underwriters Laboratories (UL)

Products with this mark have been tested by Underwriters Laboratories and are 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 systems in these regions.

Ind. Cont. Eq. E115267

Canada / USA

Standards applied:

UL 508	Standard for industrial control equipment
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. 142-M1987	Process 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

Imprint

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