

Automation Panel 900

User's Manual

Version: **2.10 (April 2013)**
Model no.: **MAAP900-ENG**

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Chapter 1 • General information

1 Manual history

Version	Date	Change
1.0 Preliminary	14-Dec-04	<ul style="list-style-type: none"> First version
1.1 Preliminary	22-Apr-05	<ul style="list-style-type: none"> Updated model numbers. Keypad devices Legend strip templates
1.2 Preliminary	31-Jan-06	<ul style="list-style-type: none"> Added USB interface cover (attached) 5AC900.1200-00. Added information regarding touch screen driver. Revised and corrected technical data for SDL cables (AWG, flex radius, etc.). Added 20-, 25- and 30-meter SDL cables (5CASDL.0200-00, 5CASDL.0250-00 and 5CASDL.0300-00). Conductor cross section and AWG modifications for the power connector. Added new front view photos of all Automation Panel devices. Updated information regarding general tolerances in accordance with DIN ISO 2768 medium in dimension diagrams. Revised safety notices. Changed service life of the AP920.1706-01 backlight to 50,000 hours (depends on revision). Updated display protection information with more detailed specifications (IP20 and IP65). Revised installation diagrams and tolerance information for dimensions.
1.30	30-Oct-06	<ul style="list-style-type: none"> Added "ESD" section to safety notices. Added SDL cables with 45° connector on one end 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01. Added SDL cables with extender 5CASDL.0300-10 and 5CASDL.0400-10. Revised Elo touch screen specification (see Appendix A). Implemented extensive changes to the technical data for Automation Panel display units. Updated section Chapter 5 "Standards and certifications". Updated HMI Drivers & Utilities DVD 5SWHMI.0000-00. Added information regarding the B&R Key Editor. Updated section 9 "Key and LED configurations". Updated section "Anschlussbeispiele". "Glossary" on page 222 updated. "USB flash drives" on page 175 updated. "SDL flex cables" on page 188 and "SDL flex cables with extender" on page 191 updated. Updated section Chapter 7 "Maintenance / Service" on page 204. Updated new clamping blocks and revised mounting instructions. Updated technical data for the 12.1" Automation Panel 5AP920.1214-01.
1.40	11-Dec-06	<ul style="list-style-type: none"> Updated 2 GB USB flash drive 5MMUSB.2048-00 from SanDisk. Modified cable overview of connection examples. Updated temperatures for devices in Rittal housings. Changed installation dimensions of 5AP920.1214-01. Changed description of viewing angle. Updated section 4 "Viewing angles" on page 213. Updated section 5 "Mounting compatibilities" on page 214. Revised glossary. Changed firmware names. Updated ambient temperatures of the 12.1" Automation Panel 5AP920.1214-01. Updated temperature humidity diagram for the 5AP920.1214-01 display unit. Modified figure 2 "Automation Panel and Automation Panel Link insert card".
1.50	15-Feb-07	<ul style="list-style-type: none"> Revised temperature and humidity specifications. Revised technical data for individual components. Changed figure "Figure 107: 5AP920.1706-01 - Temperature humidity diagram" on page 104. Updated photos of 5CASDL.0x00-13 SDL cables with an extender. Changed figure "Figure 177: 5CASDL.0xxx-03 - Pinout" on page 190. Deleted structure of 5CASDL.0xxx-03 SDL cables.
1.60	31-Oct-07	<ul style="list-style-type: none"> Removed cross-references in chapter 3 "Installation" (replaced by "See the APC620 user's manual"). Revised technical data (flex radius specifications) for SDL cables. 3 "SDL flex cable test description" on page 167 updated. Discontinued USB flash drive 5MMUSB.0256-00 and USB flash drive 5MMUSB.1024-00. Revised section 5 "USB flash drives" on page 175. Revised "Figure 181: Example of the signal direction for an SDL flex cable with extender" on page 194. Discontinued devices 5AP951.1043-01, 5AP951.1505-01, 5AP952.1043-01 and 5AP920.2138-01. Added connection examples for X855 CPU boards and the full-size system unit with 3 PCI slots. Added information regarding screen burn-in. Added information regarding touch calibration.

Table 1: Manual history

Version	Date	Change
1.70	26-Mar-08	<ul style="list-style-type: none"> Revised vibration/shock specifications. Revised all cable descriptions. Updated information about derating the ambient temperature depending on altitude.
1.80	01-Apr-09	<ul style="list-style-type: none"> Corrected spelling and sentence structure errors. Replaced text and changed formatting: Pressing more than 2 keys at a time may result in phantom keys and trigger unintended actions in some circumstances. Added 5CASDL.0430-13 SDL flex cable with extender. Updated model numbers for replacement backlights (fluorescent tubes). Corrected error regarding replacement fluorescent tubes. Fluorescent tubes for 10.4" and 21.3" devices can only be replaced at B&R. Updated section 2.7 "Environmentally friendly disposal" on page 13 in chapter Chapter 1 "General information". Changed formatting in "Table 92: Chemical resistance of the panel membrane". Revised "Figure X: Einbaulage_minus_45_Grad" and "Figure X: Einbaulage_plus_45_Grad". Updated CompactFlash entry in glossary. Changed spelling of "Compact Flash" to "CompactFlash" in German documentation. Changed formatting of the phantom key notice in the technical data. Revised section 4 "B&R Key Editor" on page 161. Revised hyperlinks. Removed content of delivery for USB flash drives. Revised wording in technical data throughout the document. Revised USB interface specifications in the technical data (quantity). Updated color for display types in the technical data. Revised figures in section 2 "Replacing the fluorescent tubes" on page 205. Revised BIOS settings sections in the connection examples. Updated cable dimensions (DVI, SDL, SDL with extender). Updated content of delivery for cables (SDL flex, SDL flex with extender). Updated labels in the cables section (in images and tables).
1.90	23-Nov-09	<ul style="list-style-type: none"> Added chapter name to border in chapters 4, 5 and 6. Changed "Temperature resistance" to "Ambient temperatures" (in the technical data for individual components). Changed notation for temperature specifications. Modified informational text ("Information") regarding the panel membrane and filter glass in Appendix A. Checked and revised wording in technical data throughout the document. Updated "Touch screen type" table entry in the technical data for the Automation Panel. Revised temperature humidity diagrams (Automation Panel, USB flash drives, touch screens). Corrected dimension diagrams for SDL cables 5CASDL.xxxx-03 and 5CASDL.0xx0-13. Corrected length tolerances and weight specifications for DVI and SDL cables (see section 6 "Cables" on page 179). Changed general name 5CASDL.0x00-13 to 5CASDL.0xx0-13 (in heading and informational text). Updated section 11 "Tips for extending the service life of the display" on page 154. Updated information/footnote regarding half-brightness time (technical data tables for 5AP9xx.xxxx-xx). Updated information regarding mounting orientation in "Table 5: Ambient temperature in relation to mounting orientation" on page 19. Revised section 4 "B&R Key Editor" on page 161 (version 2.80 changed to version 3.00).
2.00	23-Apr-10	<ul style="list-style-type: none"> Removed information about derating the ambient temperature depending on altitude after the temperature humidity diagrams. Updated information about halogen-free and fire resistance in the technical data for SDL and SDL flex cables. Updated Key Editor screenshots in appendix A. Revised "Figure 156: 5AP951.1505-01 / 5AP981.1505-01 - Hardware numbers" on page 151. Updated section 2.5 "Block diagrams" on page 22. Updated USB interface covers 5AC900.1200-01, 5AC900.1200-02 and 5AC900.1200-03. Discontinued USB interface cover 5AC900.1200-00.

Table 1: Manual history

Version	Date	Change
2.10	22-Apr-13	<ul style="list-style-type: none"> • Moved section 6 "Cables" to Chapter 6 "Accessories". • Updated Chapter 4 "Software". • Moved B&R Key Editor to Chapter 4 "Software". • Updated B&R USB flash drive in Chapter 6 "Accessories". • Updated section 12 "Pixel errors" on page 154 in Chapter 3 "Installation". • Changed section 4 "USB port cap" on page 173. • Updated Chapter 5 "Standards and certifications" on page 163. • Removed content of delivery for display units. • Modified section "Organization of safety notices" on page 14, updated descriptions for "Caution" and "Warning". • Updated section "Serial number sticker" on page 23. • Revised entire manual according to current formatting standards. • Updated sections "Connection examples" on page 139 and "Connecting peripheral USB devices" on page 146 in Chapter 3 "Installation". • Updated sections "B&R Automation Device Interface (ADI) - Control Center" on page 155, "B&R Automation Device Interface (ADI) Development Kit" on page 157 and "B&R Automation Device Interface (ADI) .NET SDK" on page 159 in Chapter 4 "Software". • Updated section "Tips for extending the service life of the display" on page 154 in Chapter 3 "Installation". • Updated section "Pixel errors" on page 154 in Chapter 3 "Installation".

Table 1: Manual history

2 Safety notices

2.1 Intended use

Programmable logic controllers (PLCs), operating/monitoring devices (industrial PCs, Power Panels, Mobile Panels, etc.), and B&R uninterruptible power supplies have been designed, developed, and manufactured for conventional use in industrial environments. They were not designed, developed and manufactured for any use involving serious risks or hazards that could lead to death, injury, serious physical 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.

2.2 Protection against electrostatic discharge

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

2.2.1 Packaging

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

2.2.2 Guidelines for proper ESD handling

Electrical components with a housing

- 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 applies 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 may only be touched on their narrow sides or front plate.
- Components should always be stored in a suitable medium (ESD packaging, conductive foam, etc.). 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.
- Measurement devices and equipment must be grounded.
- Measurement probes on potential-free measurement devices 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.

2.3 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), the safety precautions applying 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 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.

2.4 Transport and storage

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

2.5 Installation

- Installation must be performed according to this documentation using suitable equipment and tools.
- Devices may only be installed by qualified personnel without voltage applied. Before installation, voltage to the control cabinet must be switched off and prevented from being switched on again.
- General safety guidelines and national accident prevention regulations must be observed.
- Electrical installation must be carried out according to applicable guidelines (e.g. line cross sections, fuses, protective ground connections).

2.6 Operation

2.6.1 Protection against touching electrical parts

To operate programmable logic controllers, operating/monitoring devices or uninterruptible power supplies, it is necessary for certain parts to 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 equipment.

Before turning on the programmable logic controller, operating/monitoring devices or the 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 turning the device on, all parts that carry voltage must be securely covered. During operation, all covers must remain closed.

2.6.2 Environmental conditions - Dust, humidity, aggressive 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 aggressive gases can also lead to malfunctions. When combined with high temperature and humidity, aggressive 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 aggressive gases are blackened copper surfaces and cable ends on existing equipment.

For operation in dusty or humid 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 humidity and cleaned at suitable intervals.

2.6.3 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.

2.7 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.

2.7.1 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	Paper / cardboard recycling
Plastic packaging	Plastic recycling

Table 2: Environmentally friendly separation of materials

Disposal must comply with applicable legal regulations.

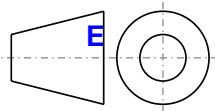
3 Organization of safety notices

Safety notices in this manual are organized as follows:

Safety notice	Description
Danger!	Disregarding these safety guidelines and notices can be life-threatening.
Warning!	Disregarding these safety guidelines and notices can result in severe injury or substantial damage to equipment.
Caution!	Disregarding these safety guidelines and notices can result in injury or damage to equipment.
Information:	This information is important for preventing errors.

Table 3: Description of the safety notices used in this documentation

4 Guidelines



European dimension standards apply to all dimension diagrams in this document.

All dimensions are specified in mm.

Range of nominal sizes	General tolerance according to DIN ISO 2768 (medium)
Up to 6 mm	± 0.1 mm
For 6 to 30 mm	± 0.2 mm
For 30 to 120 mm	± 0.3 mm
For 120 to 400 mm	± 0.5 mm
For 400 to 1000 mm	± 0.8 mm

Table 4: Range of nominal sizes

5 Overview

Product ID	Short description	on page
Accessories		
5AC804.MFLT-00	Mains filter	199
5AC900.104X-03	Legend Strips Template 10,4" for Automation Panel 5AP951.1043-01 and 5AP981.1043-01; for 1 device.	172
5AC900.104X-04	Legend Strips Template 10,4" for Automation Panel 5AP952.1043-01 and 5AP982.1043-01; for 1 device.	172
5AC900.104X-05	Legend Strips Template 10,4" for Automation Panel 5AP980.1043-01; for 3 devices.	172
5AC900.1200-00	USB Cover non-detachable; for Automation Panel and Panel PC.	173
5AC900.1200-01		173
5AC900.1201-00	USB port cap M20 IP65 flat	173
5AC900.1201-01	USB port cap M20 IP65 rounded, knurled	174
5AC900.150X-01	Legend Strips Template 15,0" for Automation Panel 5AP951.1505-01, 5AP980.1505-01 and 5AP981.1505-01 and Panel PC 5PC781.1505-00; for 4 devices.	172
9A0110.18	Backlight (spare part) for panels with Sharp LQ121S1DG41: 5AP920.1214-01 5PC720.1214-00 5PC720.1214-01 5PP120.1214-37 5PP120.1214-37A 5PP320.1214-39	198
9A0110.22	Backlight (spare part) for panels with Sharp LQ150X1LW71N: 4PP120.1505-31 From revision S0 4PP151.1505-31 From revision H0 4PP180.1505-31 From revision I0 4PP181.1505-31 From revision H0 4PP220.1505-75 From revision V0 4PP220.1505-B5 From revision W0 4PP251.1505-75 From revision I0 4PP251.1505-B5 From revision I0 4PP280.1505-75 From revision I0 4PP280.1505-B5 From revision I0 4PP281.1505-75 From revision I0 4PP281.1505-B5 From revision I0 4PP320.1505-31 From revision A0 4PP420.1505-75 From revision A0 4PP420.1505-B5 From revision A0 4PP480.1505-75 From revision A0 4PP480.1505-B5 From revision A0 4PP481.1505-75 From revision A0 5AP820.1505-00 From revision A0 5AP880.1505-00 From revision A0 5AP920.1505-01 From revision A0 5AP951.1505-01 From revision A0 5AP980.1505-01 From revision A0 5AP981.1505-01 From revision A0 5PC720.1505-00 From revision A0 5PC720.1505-01 From revision A0 5PC720.1505-02 From revision A0 5PC781.1505-00 From revision A0 5PP120.1505-37A From revision H0 5PP320.1505-39 From revision A0	198
DVI cable		
5CADVI.0018-00	DVI-D cable, 1.8 m.	179
5CADVI.0050-00	DVI-D cable, 5 m.	179
5CADVI.0100-00	DVI-D cable, 10 m.	179
Display Links		
5DLdVI.1000-01	Automation Panel Link DVI receiver; connections for DVI-D, RS232 and USB 2.0 (Type B); 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately).	164
5DLSDL.1000-01	Automation Panel Link SDL receiver; connection for SDL In; transmission of display, touch screen, USB 1.1, matrix key and service data; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately).	164
Display links		
5DLSDL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	126
Display units		
5AP920.1043-01	Automation Panel AP920; 10.4" VGA color TFT display with touch screen (resistive); 2 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (from front). 24 VDC.	25
5AP920.1214-01	Automation Panel AP920; 12.1" SVGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (from front). 24 VDC.	66
5AP920.1706-01	Automation Panel AP920 17" SXGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (from front). 24 VDC.	102
5AP920.2138-01	Automation Panel AP920 21,3" UXGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; slot for Automation Panel link; IP 65 protection (front side). 24 V DC.	115
5AP951.1043-01	Automation Panel AP951 10.4" VGA color TFT display; 10 softkeys; 28 function keys and 20 system keys; 2 USB 2.0 interfaces; slot for Automation Panel link; IP 65 protection (from front). 24 VDC.	31
5AP951.1505-01	Automation Panel AP951 15" XGA color TFT display with; 12 softkeys; 20 function keys and 92 system keys; 3 USB 2.0 interfaces; slot for Automation Panel link; IP 65 protection (front side). 24 VDC.	80
5AP952.1043-01	Automation Panel AP952 10.4" VGA color TFT display; 44 function keys and 20 system keys; 2 USB 2.0 interfaces; slot for Automation Panel link; IP 65 protection (from front). 24 VDC.	38
5AP980.1043-01	Automation Panel AP980; 10.4" VGA color TFT display with touch screen (resistive); 10 softkeys and 12 function keys; 2 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (front side). 24 VDC.	45
5AP980.1505-01	Automation Panel AP980; 15" XGA color TFT display with touch screen (resistive); 12 softkeys and 20 function keys; 3 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (front side). 24 VDC.	87
5AP981.1043-01	Automation Panel AP981; 10.4" VGA color TFT display with touch screen (resistive); 10 softkeys; 28 function keys and 20 system keys; 2 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (front side). 24 VDC.	53
5AP981.1505-01	Automation Panel AP981; 15" XGA color TFT display with touch screen (resistive); 12 softkeys; 20 function keys and 92 system keys; 3 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (front side). 24 VDC.	95
5AP982.1043-01	Automation Panel AP982; 10.4" VGA color TFT display with touch screen (resistive); 44 function keys and 20 system keys; 2 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (from front). 24 VDC.	59
Displayeinheiten		
5AP920.1505-01	Automation Panel AP920; 15" XGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; insert for Automation Panel Link; IP65 protection (from front). 24 VDC.	164
5AP920.1906-01	Automation Panel AP920; 19" SXGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; insert for Automation Panel Link; IP65 protection (from front). 24 VDC.	164
Other		
5SWHMI.0000-00	HMI Drivers & Utilities DVD	201
RS232 cable		
9A0014.02	RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m.	196
9A0014.05	RS232 extension cable for remote operating of a display unit with touch screen, 5 m.	196
9A0014.10	RS232 extension cable for remote operating of a display unit with touch screen, 10 m.	196
SDL cable - 45° connector		
5CASDL.0018-01	SDL cable; 45° connector, 1.8 m.	185

Product ID	Short description	on page
5CASDL.0050-01	SDL cable; 45° connector, 5 m.	185
5CASDL.0100-01	SDL cable; 45° connector, 10 m.	185
5CASDL.0150-01	SDL cable; 45° connector, 15 m.	185
	SDL cables	
5CASDL.0018-00	SDL cable, 1.8 m.	182
5CASDL.0050-00	SDL cable, 5 m.	182
5CASDL.0100-00	SDL cable, 10 m.	182
5CASDL.0150-00	SDL cable, 15 m.	182
5CASDL.0200-00	SDL cable, 20 m.	182
5CASDL.0250-00	SDL cable, 25 m.	182
5CASDL.0300-00	SDL cable, 30 m.	182
	SDL flex cable	
5CASDL.0018-03	SDL Cable flex, 1.8 m.	188
5CASDL.0050-03	SDL cable flex, 5 m.	188
5CASDL.0100-03	SDL cable flex, 10 m.	188
5CASDL.0150-03	SDL cable flex, 15 m.	188
5CASDL.0200-03	SDL cable flex, 20 m.	188
5CASDL.0250-03	SDL cable flex, 25 m.	188
5CASDL.0300-03	SDL cable flex, 30 m.	188
5CASDL.0300-13	SDL cable flex with extender, 30 m.	191
5CASDL.0400-13	SDL cable flex with extender, 40 m.	191
5CASDL.0430-13	SDL Cable flex with extender, 43 m.	191
	Terminal blocks	
0TB103.8	Connector, 24 VDC, 3-pin male, screw clamps 3.31 mm ² , protected against vibration by the screw flange	171
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm ² , protected against vibration by the screw flange	169
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm ² , protected against vibration by the screw flange	169
	USB accessories	
5MMUSB.2048-00	USB 2.0 Memory Stick, 2048 MB	175
5MMUSB.2048-01	USB 2.0 flash drive, 2048 MB, B&R	177
	USB cable	
5CAUSB.0018-00	USB 2.0 connecting cable type A - type B, 1.8 m.	195
5CAUSB.0050-00	USB 2.0 connecting cable type A - type B, 5 m.	195

Chapter 2 • Technical data

1 Introduction

The Automation Panel series is a generation of B&R display units ranging from 10.4" to 19" that opens up new ground with it comes to the modularity of interfaces to PC systems. This pioneering technology allows image information to be transferred independently of the display unit so that future innovations in the area of transmission technology can be implemented by simply adding new Automation Panel Link card.



2 Fully assembled device

Display units consist of two components: an Automation Panel and an Automation Panel Link insert card. Combined, these two components make up the fully assembled display unit.

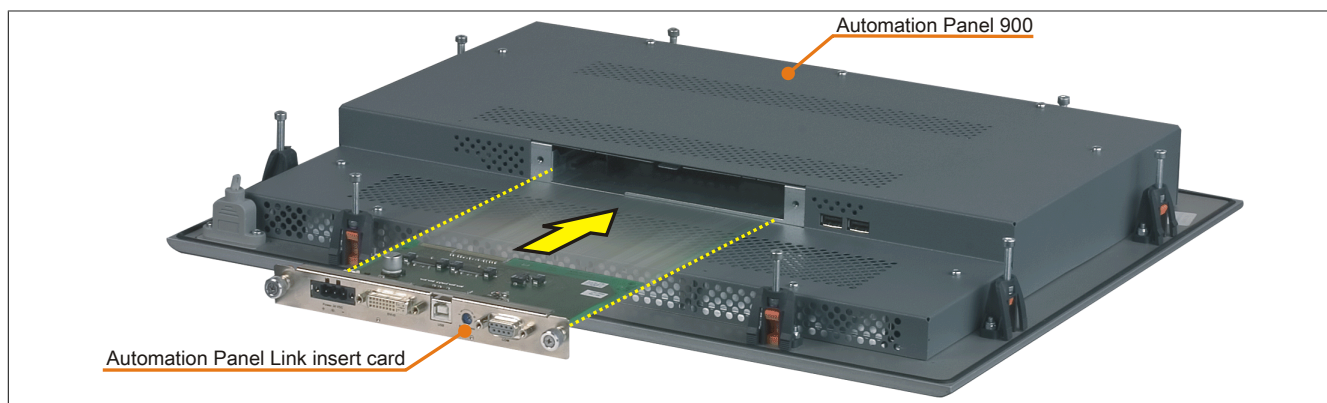


Figure 1: Automation Panel and Automation Panel Link insert card

Each device has at least one USB port on the front and back so that data can be easily exchanged with an industrial PC (e.g. using a UBS flash drive).

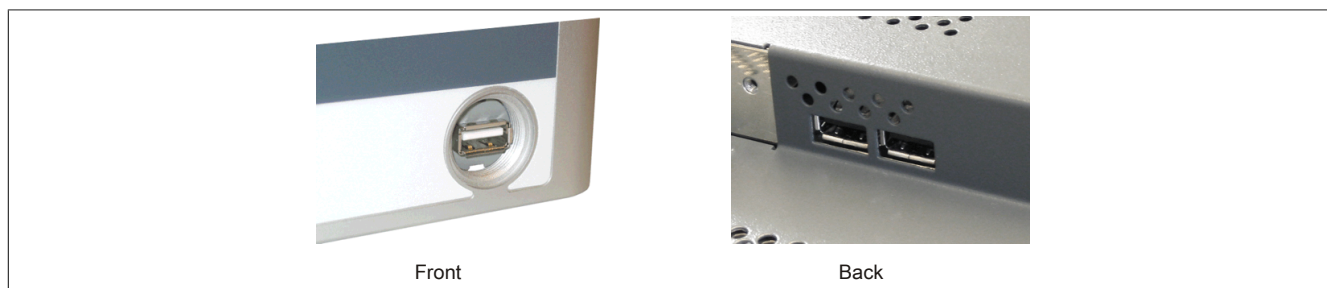


Figure 2: USB ports on the Automation Panel (front and back)

2.2 Temperature specifications

The following table lists the specifications for minimum and maximum ambient temperature for all available Automation Panel 900 variants during operation in relation to mounting orientation (for specifications, see "Mounting orientation" on page 131).

Information:

Temperature specifications refer to operation at 500 meters. The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).

Automation Panel 900 without Rittal housing	Automation Panel Link insert card		
	Mounting orientation 0°	Mounting orientations to -45° display above	Mounting orientations to +45° display below
5AP920.1043-01	0 to 50°C	0 to 50°C	0 to 50°C
5AP951.1043-01	0 to 55°C	0 to 55°C	0 to 55°C
5AP952.1043-01	0 to 55°C	0 to 55°C	0 to 55°C
5AP980.1043-01	0 to 50°C	0 to 50°C	0 to 50°C
5AP981.1043-01	0 to 50°C	0 to 50°C	0 to 50°C
5AP982.1043-01	0 to 50°C	0 to 50°C	0 to 50°C
5AP920.1214-01	0 to 50°C	0 to 50°C	0 to 50°C
5AP920.1505-01	0 to 50°C	0 to 50°C	0 to 45°C
5AP951.1505-01	0 to 50°C	0 to 50°C	0 to 45°C
5AP980.1505-01	0 to 50°C	0 to 50°C	0 to 45°C
5AP981.1505-01	0 to 50°C	0 to 50°C	0 to 45°C
5AP920.1706-01	0 to 40°C	0 to 45°C	0 to 35°C
5AP920.1906-01	0 to 40°C	0 to 40°C	0 to 40°C
5AP920.2138-01	0 to 35°C	0 to 35°C	0 to 30°C
Automation Panel 900 with Rittal housing	Automation Panel Link insert card		
	Mounting orientation 0°	Mounting orientations to -45° display above	Mounting orientations to +45° display below
5AP920.1043-01	0 to 50°C	0 to 45°C	0 to 45°C
5AP951.1043-01	0 to 50°C	0 to 45°C	0 to 45°C
5AP952.1043-01	0 to 50°C	0 to 45°C	0 to 45°C
5AP980.1043-01	0 to 50°C	0 to 45°C	0 to 45°C
5AP981.1043-01	0 to 50°C	0 to 45°C	0 to 45°C
5AP982.1043-01	0 to 50°C	0 to 45°C	0 to 45°C
5AP920.1505-01	0 to 40°C	0 to 40°C	0 to 40°C
5AP951.1505-01	0 to 40°C	0 to 40°C	0 to 40°C
5AP980.1505-01	0 to 40°C	0 to 40°C	0 to 40°C
5AP981.1505-01	0 to 40°C	0 to 40°C	0 to 40°C

Table 5: Ambient temperature in relation to mounting orientation

2.3 Humidity specifications

The following table displays the minimum and maximum relative humidity values for the individual components that are relevant for the humidity limitations of a fully assembled device. The lowest and highest common values are always used when establishing these limits.

Component	Operation	Storage / Transport
5AP920.1043-01	5 to 90%	5 to 90%
5AP951.1043-01	5 to 95%	5 to 95%
5AP952.1043-01	5 to 95%	5 to 95%
5AP980.1043-01	5 to 90%	5 to 90%
5AP981.1043-01	5 to 90%	5 to 90%
5AP982.1043-01	5 to 90%	5 to 90%
5AP920.1214-01	5 to 90%	5 to 90%
5AP920.1505-01	5 to 90%	5 to 90%
5AP951.1505-01	5 to 95%	5 to 95%
5AP980.1505-01	5 to 90%	5 to 90%
5AP981.1505-01	5 to 90%	5 to 90%
5AP920.1706-01	20 to 90%	5 to 90%
5AP920.1906-01	20 to 90%	5 to 90%
5AP920.2138-01	20 to 90%	5 to 90%
5DL DVI.1000-01	5 to 95%	5 to 95%
5DLSDL.1000-00	5 to 95%	5 to 95%
5DLSDL.1000-01	5 to 95%	5 to 95%

Table 6: Overview of humidity specifications for individual components

The specifications listed correspond to the relative humidity at an ambient temperature of 30°C. More detailed information about specific temperature-dependent humidity values can be found in the technical data for the individual components.

2.4 Power consumption

Total consumption is made up of the consumption of the Automation Panel 900 device as well as the power used by Automation Panel Link insert card.

The following table lists the typical consumption for each component. The sum of both equals the total consumption. Both values can also be found in the "Technical data" section for the individual components.

Component	Typical	Maximum	Maximum with USB
5AP920.1043-01	10 W	13 W	19 W
5AP951.1043-01	10 W	14 W	20 W
5AP952.1043-01	10 W	14 W	21 W
5AP980.1043-01	10 W	13 W	20 W
5AP981.1043-01	10 W	14 W	21 W
5AP982.1043-01	10 W	14 W	21 W
5AP920.1214-01	12 W	15 W	21 W
5AP920.1505-01	24 W	31 W	41 W
5AP951.1505-01	24 W	32 W	42 W
5AP980.1505-01	24 W	32 W	42 W
5AP981.1505-01	24 W	32 W	42 W
5AP920.1706-01	27 W	36 W	46 W
5AP920.1906-01	27 W	38 W	48 W
5AP920.2138-01	50 W	63 W	73 W
5DL DVI.1000-01	3 W	3 W	3 W
5DLSDL.1000-00	3 W	3 W	3 W
5DLSDL.1000-01	3 W	3 W	3 W
Total			

Table 7: Power management according to mounting orientation

Specifications for the starting current can be found in the "Technical data" for each Automation Panel 900 variant.

2.5 Block diagrams

2.5.1 AP900 block diagram

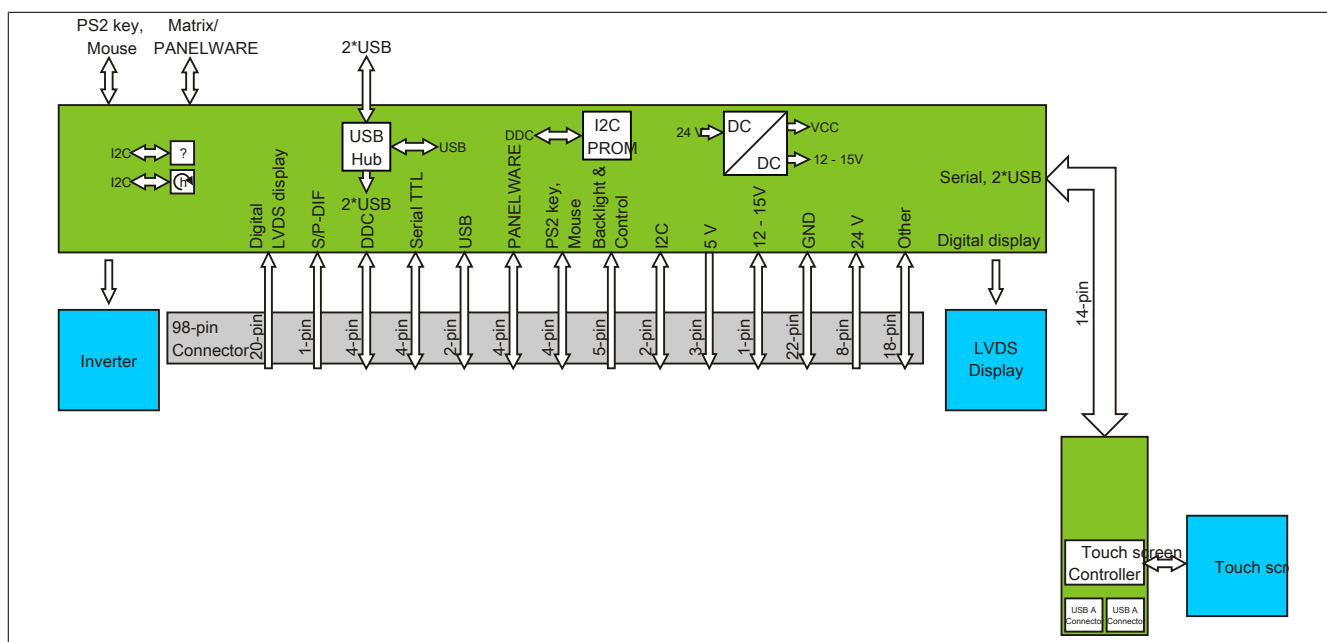


Figure 3: AP900 block diagram

2.5.2 AP900 block diagram with DVI Link

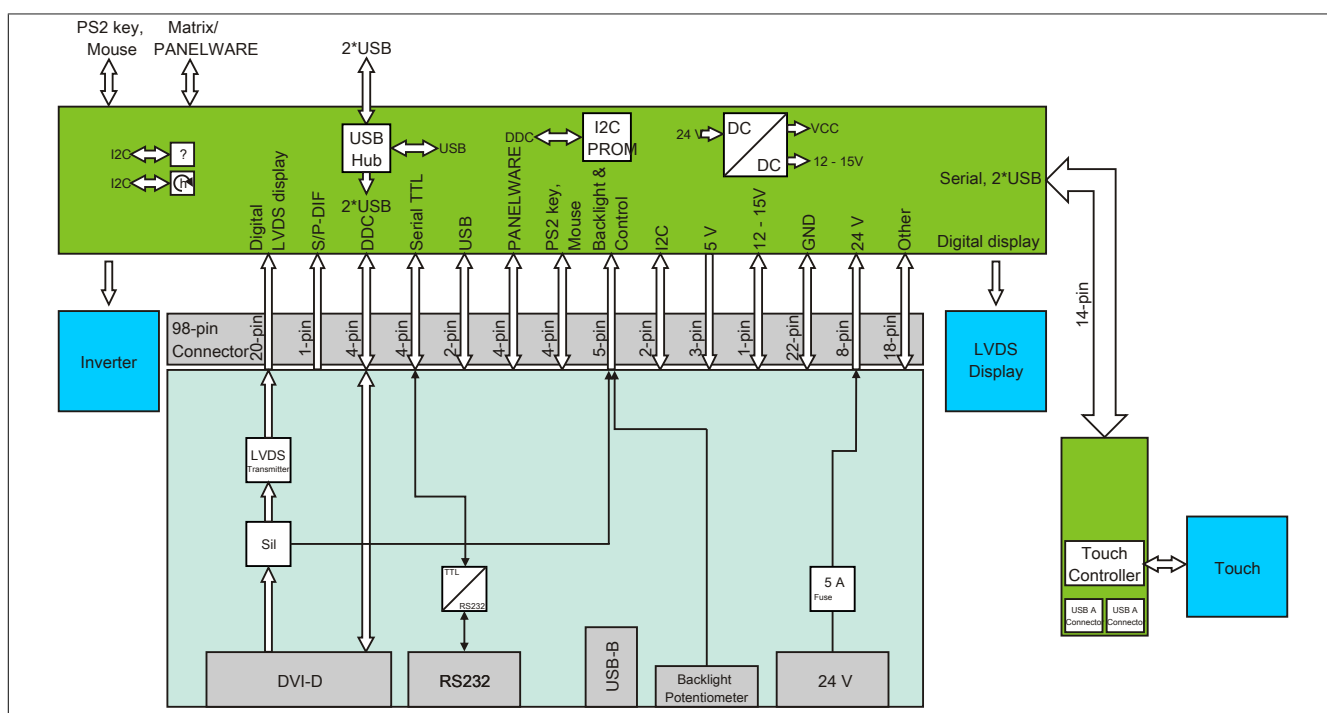


Figure 4: AP900 block diagram with DVI Link

2.6 Serial number sticker

A unique serial number sticker with a barcode (Code 128) is affixed to each B&R device for identification purposes. This serial number represents all of the individual components built into the system (model number, name, revision, serial number, delivery date and duration of warranty).

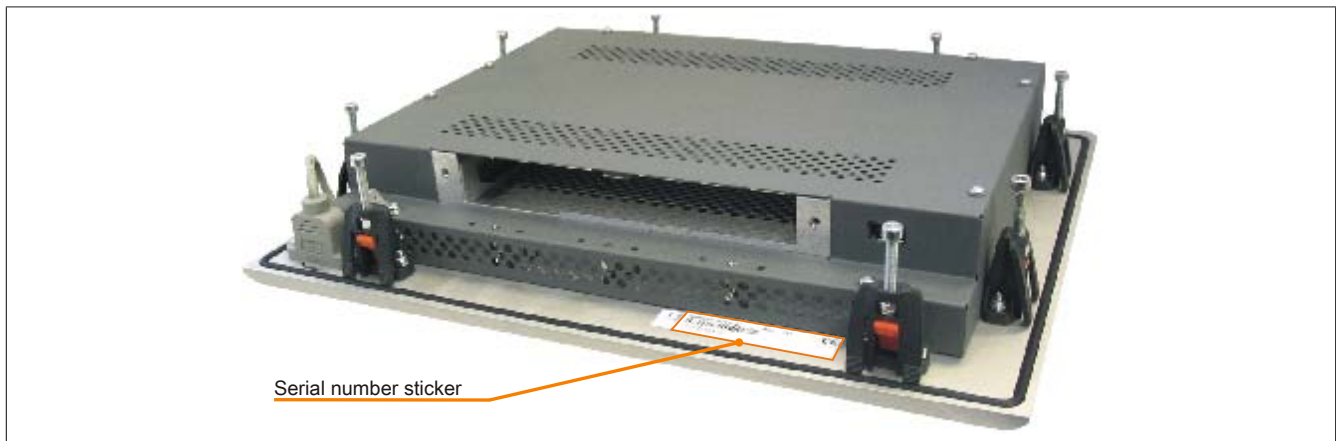


Figure 5: Serial number sticker (back)

This information can also be found on the B&R website by entering the serial number of the fully assembled device in the search field tab (after selecting the "Serial number" option) at the top of the homepage www.br-automation.com. The search provides a detailed list of the installed components.

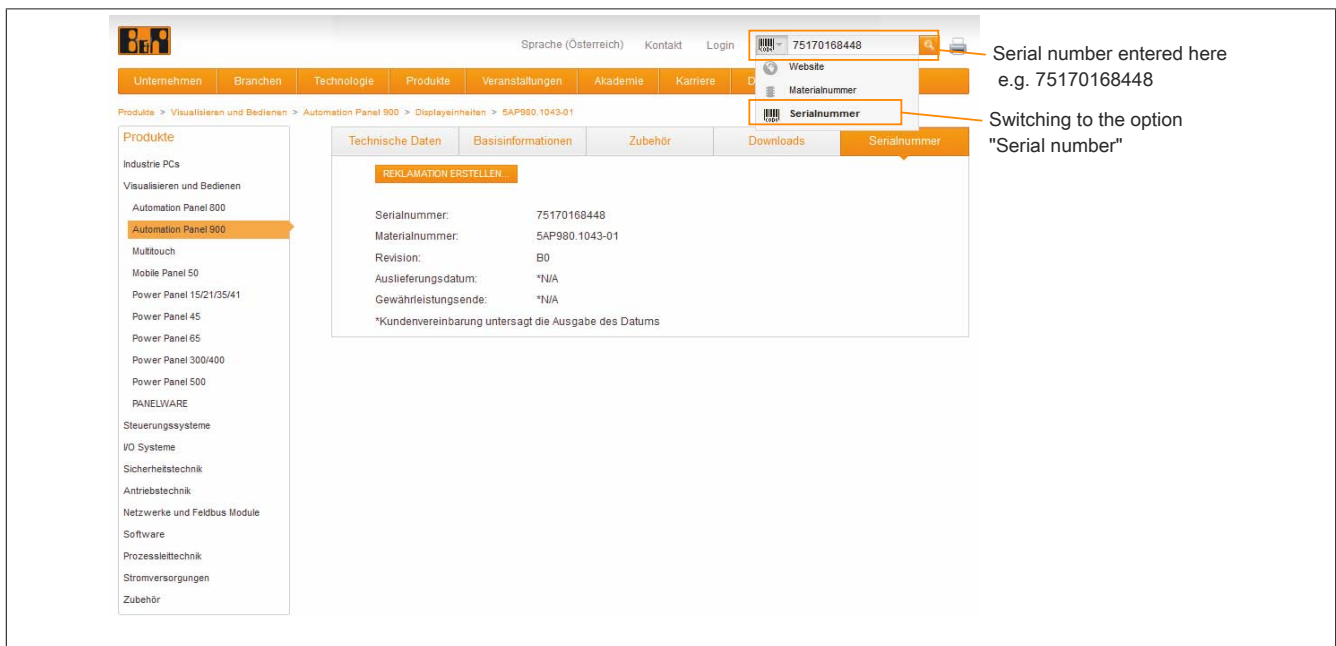


Figure 6: Example of serial number search

3 Individual components

3.1 Display units

3.1.1 Automation Panel 10.4" VGA

3.1.1.1 5AP920.1043-01

3.1.1.1.1 General information

- 10.4" VGA color TFT display
- Analog resistive touch screen
- Small installation depth
- Fan-free operation
- Can be upgraded with Display Link cards or PPC300

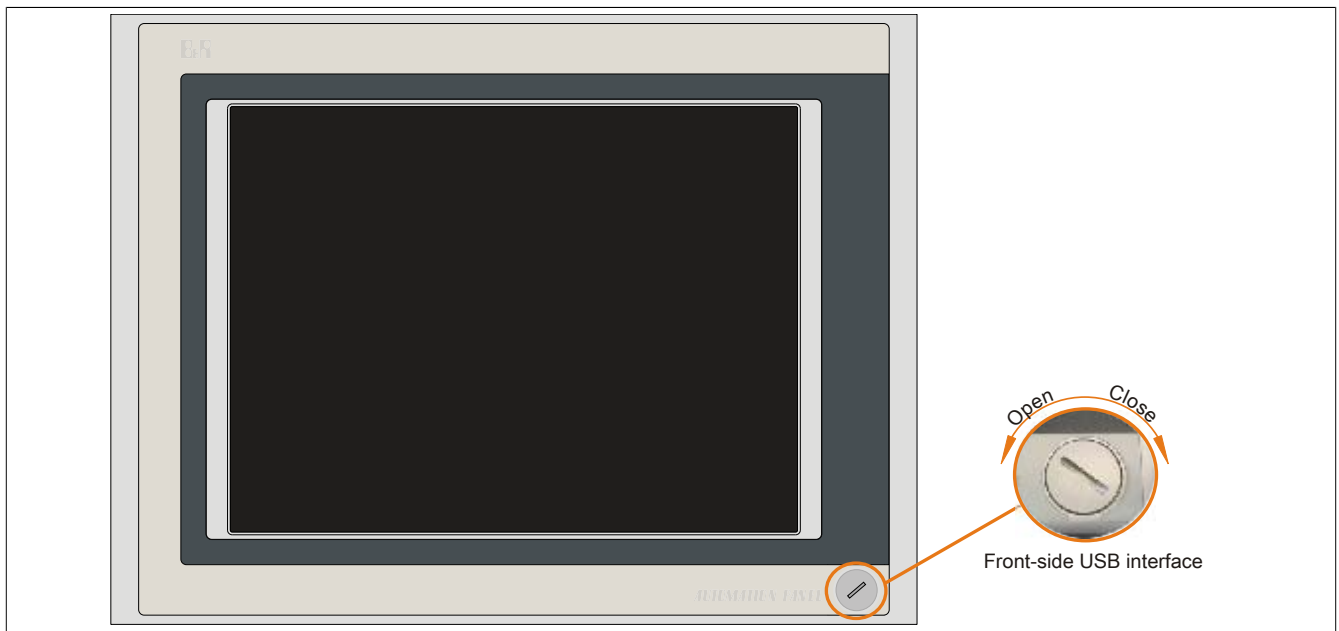


Figure 7: 5AP920.1043-01 - Front view



Figure 8: 5AP920.1043-01 - Rear view

3.1.1.1.2 Order data


Model number	Short description	Figure
Display units		
5AP920.1043-01	Automation Panel AP920; 10.4" VGA color TFT display with touch screen (resistive); 2 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (from front). 24 VDC.	
Required accessories		
Display links		
5DLDDVI.1000-01	Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLSDL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLSDL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
Terminal blocks		
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	
Optional accessories		
Panel PC 300 insert cards		
5PC310.L800-00	Panel PC 300 card for Automation Panel 900; 256 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5PC310.L800-01	Panel PC 300 card for Automation Panel 900; 512 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 8: 5AP920.1043-01 - Order data

3.1.1.1.3 Technical data

Product ID	5AP920.1043-01	
Revision	C0	D0
General information		
B&R ID code	\$1A09	
Certification		
CE	Yes	
cULus	Yes	
Interfaces		
USB ¹⁾		
Quantity	2	
Type	USB 2.0 ²⁾	
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current load	Max. 500 mA per connection	
Display		
Type	Color TFT	
Diagonal	10.4" (264 mm)	
Colors	262144	
Resolution	VGA, 640 x 480 pixels	
Contrast	300:1	
Viewing angles		
Horizontal	Direction R / Direction L = 70°	
Vertical	Direction U = 40°/ direction D = 70°	
Backlight		
Brightness	350 cd/m²	
Half brightness time ³⁾	50,000 h	
Filter glass		
Transmittance	-	
Coating	-	
Touch screen ⁴⁾		
Technologies	Analog, resistive	
Controller	Elo, serial, 12-bit	
Transmittance	Up to 78%	
Keys		
Function keys	No	

Table 9: 5AP920.1043-01, 5AP920.1043-01 - Technical data

Product ID	5AP920.1043-01	
Soft keys	No	
System keys	No	
Service life	-	
LED brightness	-	
LED brightness Yellow	-	
Inserts		
Compatible installation for PPC300 insert	No	Yes
Electrical characteristics		
Nominal voltage	24 VDC ±25%	
Nominal current	Max. 3.2 A ⁵⁾	
Starting current	Typ. 6 A, max. 30 A for <300 µs	
Power consumption	Typ. 10 W, max. 13 W or 19 W with USB (without insert)	
Electrical isolation	Yes	
Operating conditions		
Protection in accordance with EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection	
Environmental conditions		
Temperature Operation	Without Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 50°C Mounting orientations to +45° display below: 0 to 50°C	
Storage Transport	With Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 45°C Mounting orientations to +45° display below: 0 to 45°C -30 to 70°C -30 to 70°C	
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g 2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g	
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms	
Altitude Operation	Max. 3000 m ⁶⁾	
Mechanical characteristics		
Housing Material Paint	Metal Similar to Pantone432CV	
Front ⁷⁾ Frame Design Panel membrane Material Light background Dark gray border around display Gasket	Naturally anodized aluminum Gray Polyester Similar to Pantone 427CV Similar to Pantone432CV Flat gasket around display front	
Dimensions Width Height Depth	323 mm 260 mm 55 mm	
Weight	Approx. 2900 g	

Table 9: 5AP920.1043-01, 5AP920.1043-01 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link insert card being used.
- 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.
- 4) Touch screen drivers can be downloaded from the Downloads section of the B&R website (www.br-automation.com).
- 5) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 6) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 7) There may be visible deviations in the color and surface appearance depending on the process or batch.

3.1.1.1.4 Temperature humidity diagram

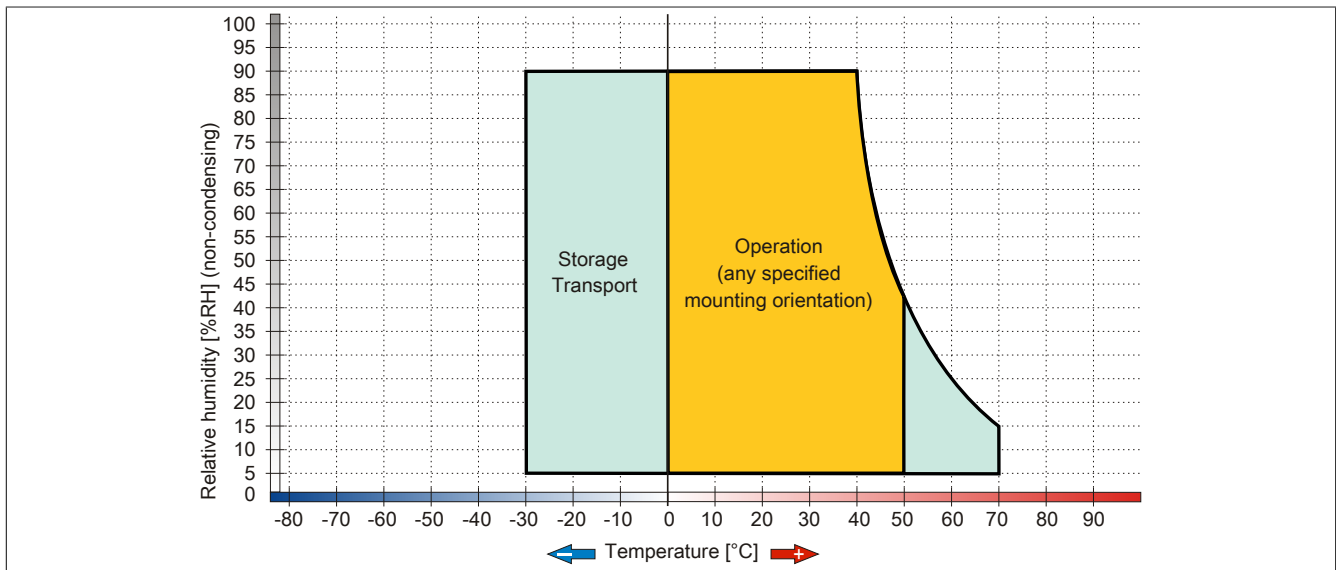


Figure 9: 5AP920.1043-01 - Temperature humidity diagram

3.1.1.1.5 Dimensions

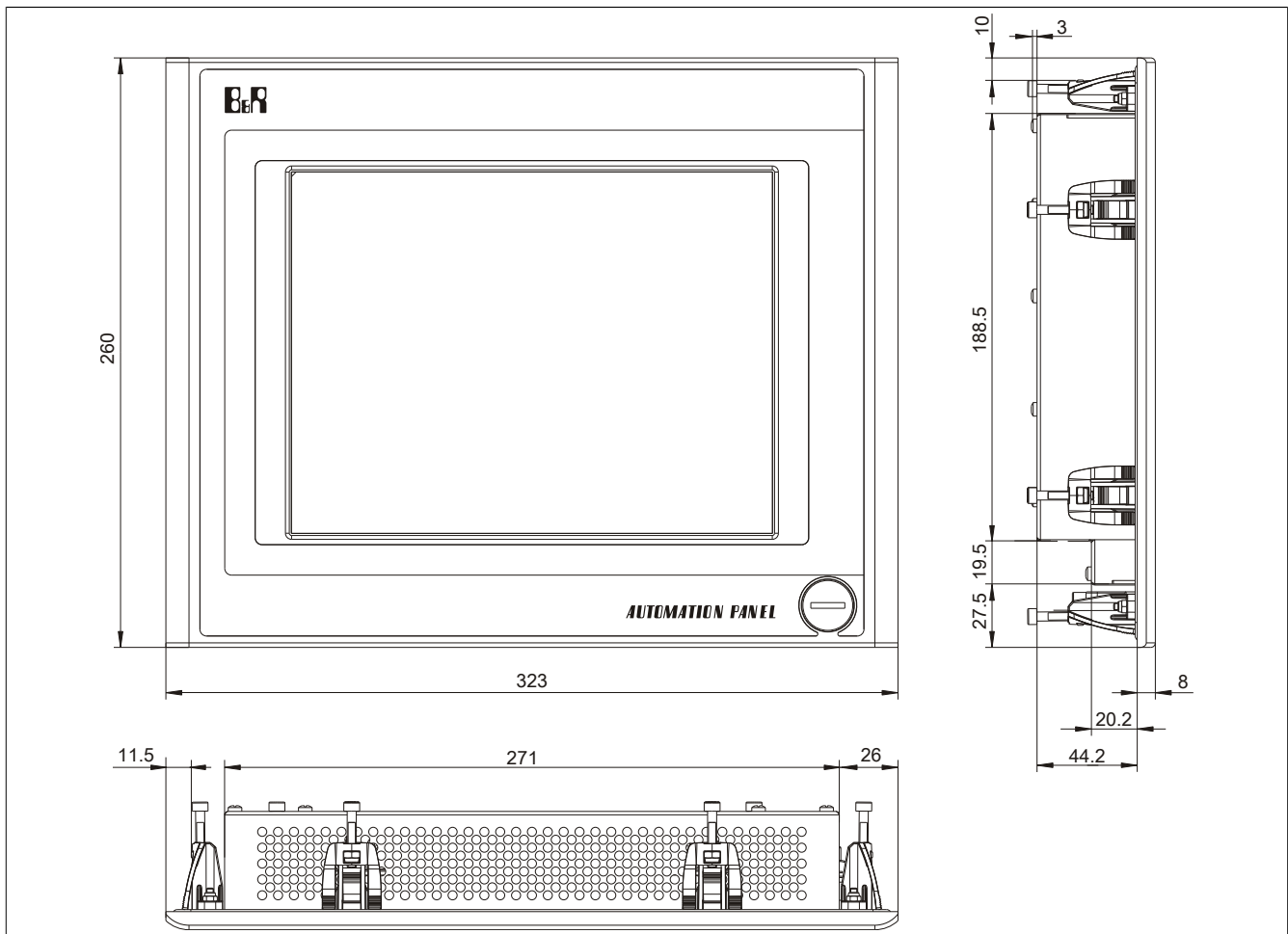


Figure 10: 5AP920.1043-01 - Dimensions

3.1.1.1.6 Cutout installation

The Automation Panel can be installed in a wall cutout using the pre-installed clamping blocks. To do so, it is necessary to make a cutout that corresponds to the following diagram.

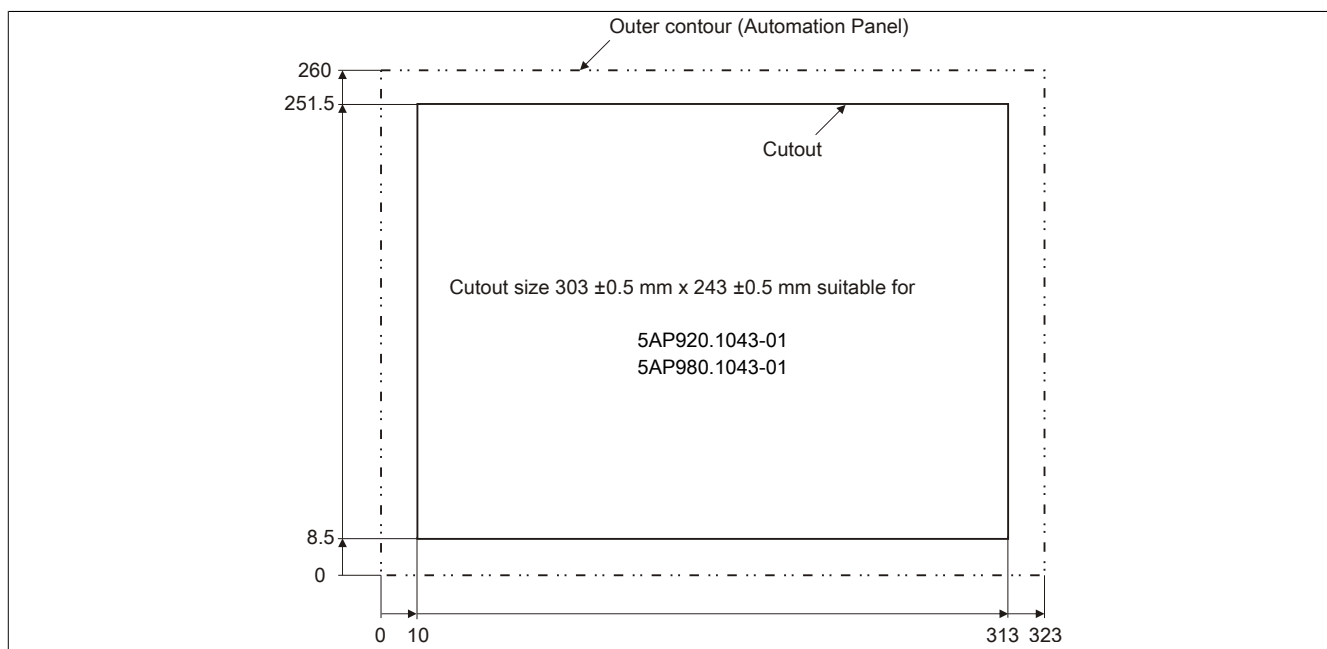


Figure 11: 5AP920.1043-01 - Cutout installation

For additional information regarding installation and mounting orientation, see "Installation" on page 130.

3.1.1.1.7 USB interfaces

Automation Panel devices have three USB interfaces (type A).

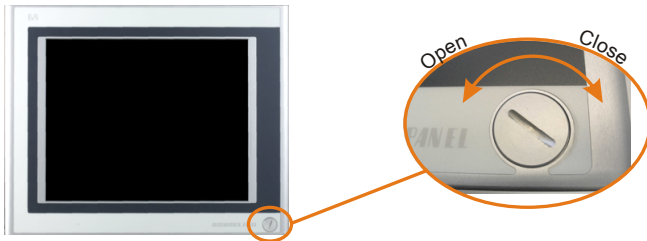


Figure 12: USB interfaces

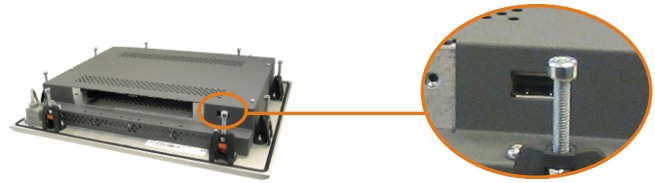


Figure 13: Back-side USB

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

USB transfer speed

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

Information:

With a DVI Automation Panel Link insert card, USB 2.0 is supported up to a cable length of 5 meters. SDL (Smart Display Link) Automation Panel Link insert card only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

3.1.1.1.8 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

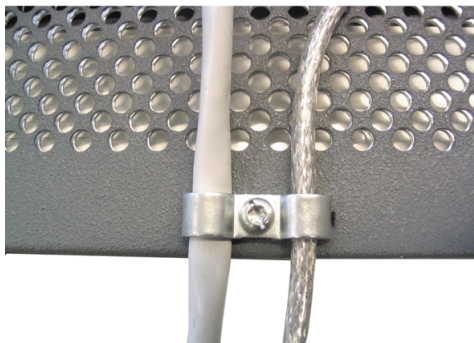


Figure 14: Cable clamps

3.1.1.1.9 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

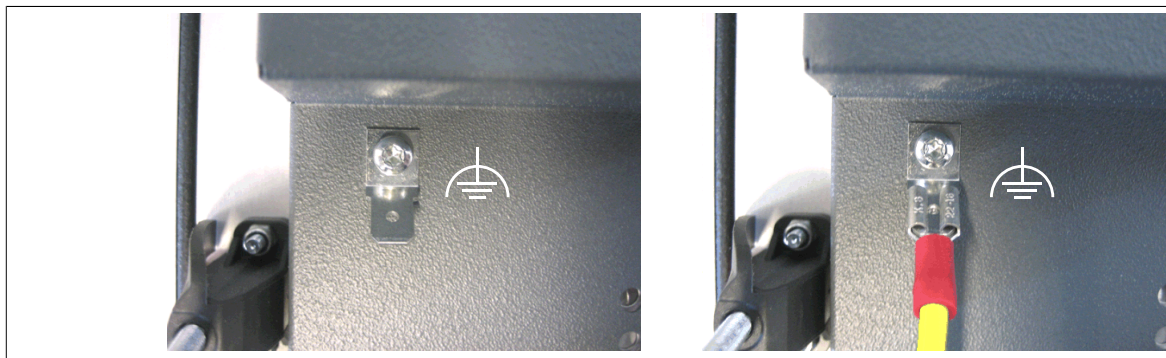


Figure 15: Functional grounding clip

3.1.1.2 5AP951.1043-01

3.1.1.2.1 General information

- 10.4" VGA color TFT display
- Function keys, system keys and soft keys
- Small installation depth
- Fan-free operation
- Can be upgraded using Display Link cards

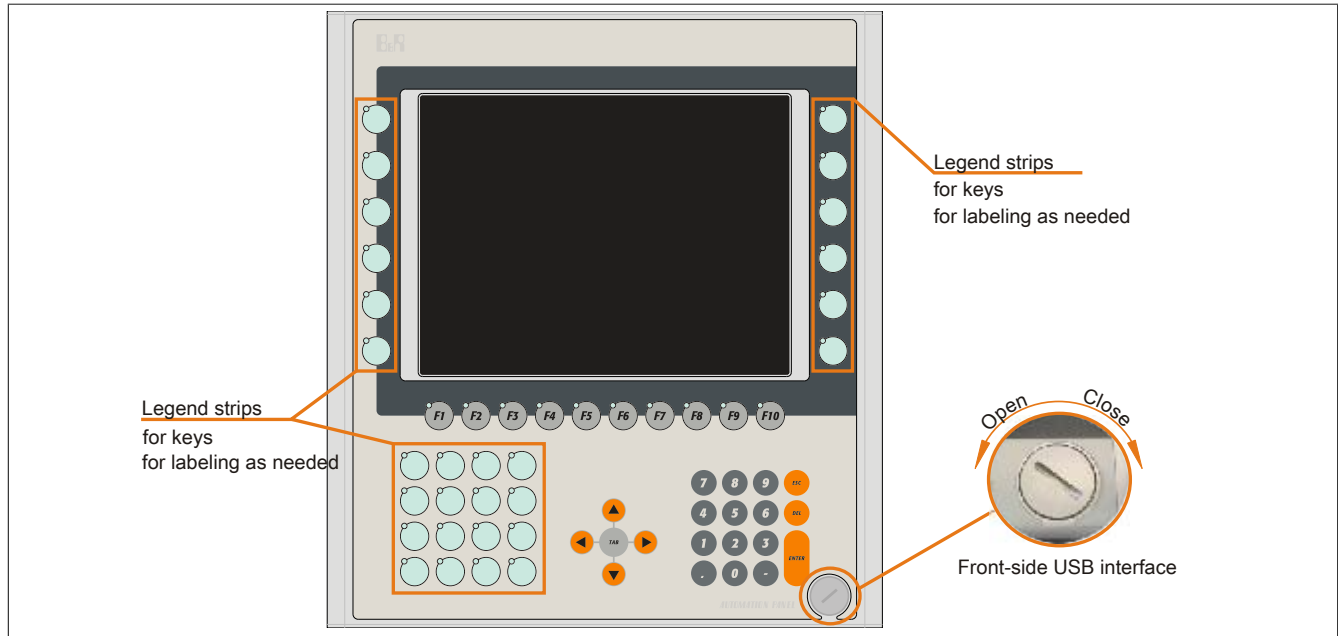


Figure 16: 5AP951.1043-01 - Front view

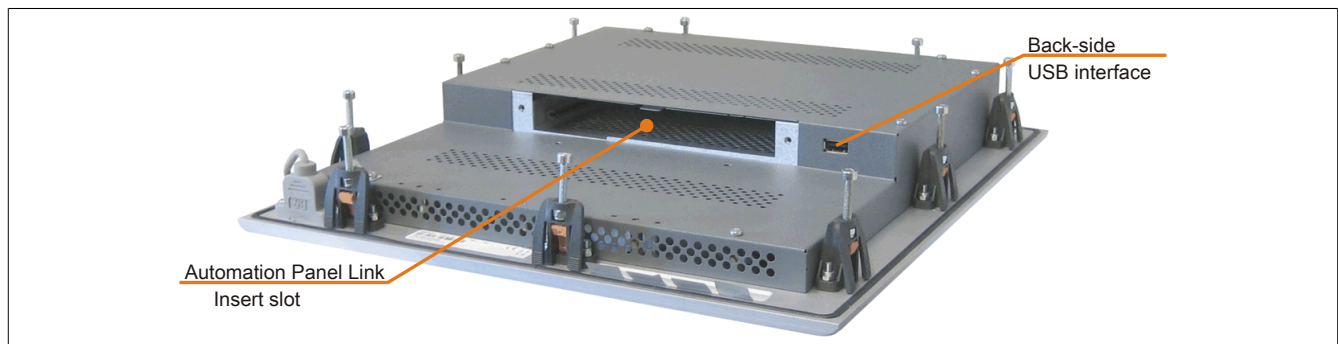


Figure 17: 5AP951.1043-01 - Rear view

3.1.1.2.2 Order data


Model number	Short description	<div>Figure</div> 
	Display units	
5AP951.1043-01	Automation Panel AP951 10.4" VGA color TFT display; 10 soft-keys; 28 function keys and 20 system keys; 2 USB 2.0 interfaces; slot for Automation Panel link; IP 65 protection (from front). 24 VDC.	
	Required accessories	
	Display links	
5DL DVI.1000-01	Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLSDL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLSDL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 10: 5AP951.1043-01 - Order data

Model number	Short description	Figure
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm ² , protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm ² , protected against vibration by the screw flange	
	Optional accessories	
	Accessories	
5AC900.104X-03	Legend Strips Template 10,4" for Automation Panel 5AP951.1043-01 and 5AP981.1043-01; for 1 device.	

Table 10: 5AP951.1043-01 - Order data

3.1.1.2.3 Technical data

Product ID	5AP951.1043-01
General information	
B&R ID code	\$1D5C
Certification CE	Yes
Interfaces	
USB ¹⁾	
Quantity	2
Type	USB 2.0 ²⁾
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	10.4" (264 mm)
Colors	262144
Resolution	VGA, 640 x 480 pixels
Contrast	300:1
Viewing angles	
Horizontal	Direction R / Direction L = 70°
Vertical	Direction U = 40° / direction D = 70°
Backlight	
Brightness	350 cd/m ²
Half brightness time ³⁾	50,000 h
Filter glass	
Transmittance	95%
Coating	On both sides
Touch screen	
Technologies	-
Controller	-
Transmittance	-
Keys	
Function keys	28 with LED (yellow)
Soft keys	10 with LED (yellow)
System keys	Numeric keys, cursor block
Service life	> 1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED brightness	
Yellow	Typ. 12 mcd
Inserts	
Compatible installation for PPC300 insert	No
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	Max. 3.2 A ⁴⁾
Starting current	Typ. 6 A, max. 30 A for <300 µs
Power consumption	Typ. 10 W (without LED), max. 14 W or 20 W with USB (without insert)
Electrical isolation	Yes
Operating conditions	
Protection in accordance with EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection

Table 11: 5AP951.1043-01 - Technical data

Product ID	5AP951.1043-01
Environmental conditions	
Temperature Operation	Without Rittal housing Mounting orientation 0°: 0 to 55°C Mounting orientations to -45° display above: 0 to 55°C Mounting orientations to +45° display below: 0 to 55°C With Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 45°C Mounting orientations to +45° display below: 0 to 45°C
Storage Transport	-30 to 70°C -30 to 70°C
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g 2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Altitude Operation	Max. 3000 m ⁵⁾
Mechanical characteristics	
Housing Material Paint	Metal Similar to Pantone432CV
Front ⁶⁾ Frame Design Panel membrane Material Light background Dark gray border around display Dark gray keys Orange keys Color legend strips Gasket	Naturally anodized aluminum Gray Polyester Similar to Pantone 427CV Similar to Pantone432CV Similar to Pantone 431CV Similar to Pantone 151CV Similar to Pantone 429CV Flat gasket around display front
Dimensions Width Height Depth	323 mm 358 mm 55 mm
Weight	Approx. 3600 g

Table 11: 5AP951.1043-01 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link insert card being used.
- 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.
- 4) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 5) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 6) There may be visible deviations in the color and surface appearance depending on the process or batch.

3.1.1.2.4 Temperature humidity diagram

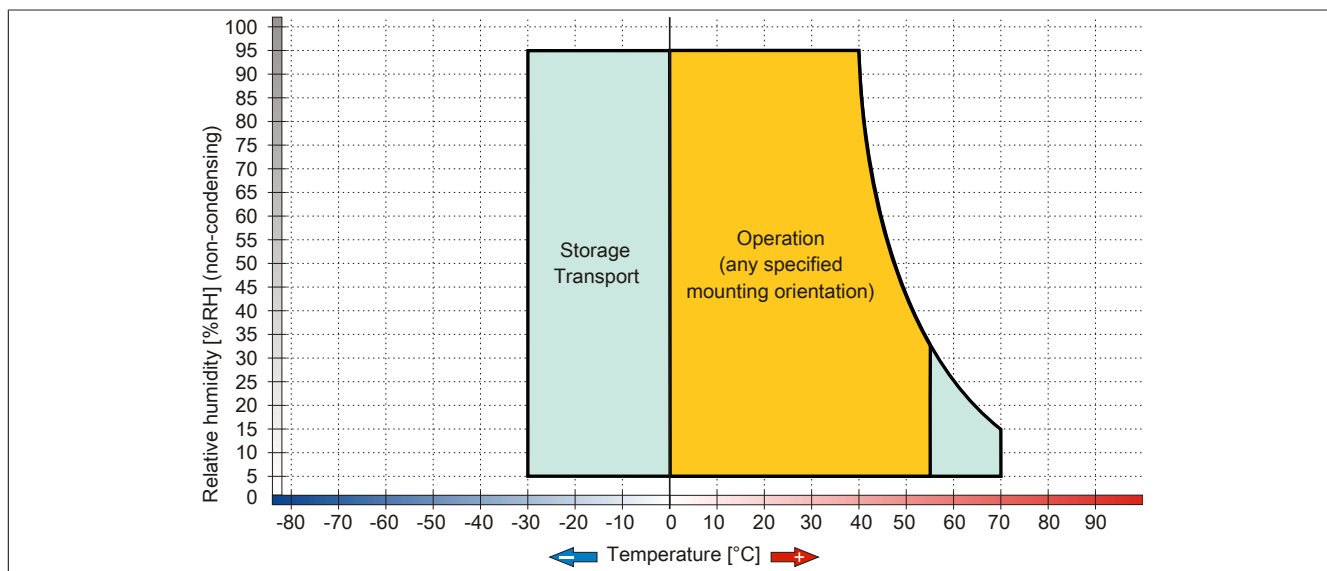


Figure 18: 5AP951.1043-01 - Temperature humidity diagram

3.1.1.2.5 Dimensions

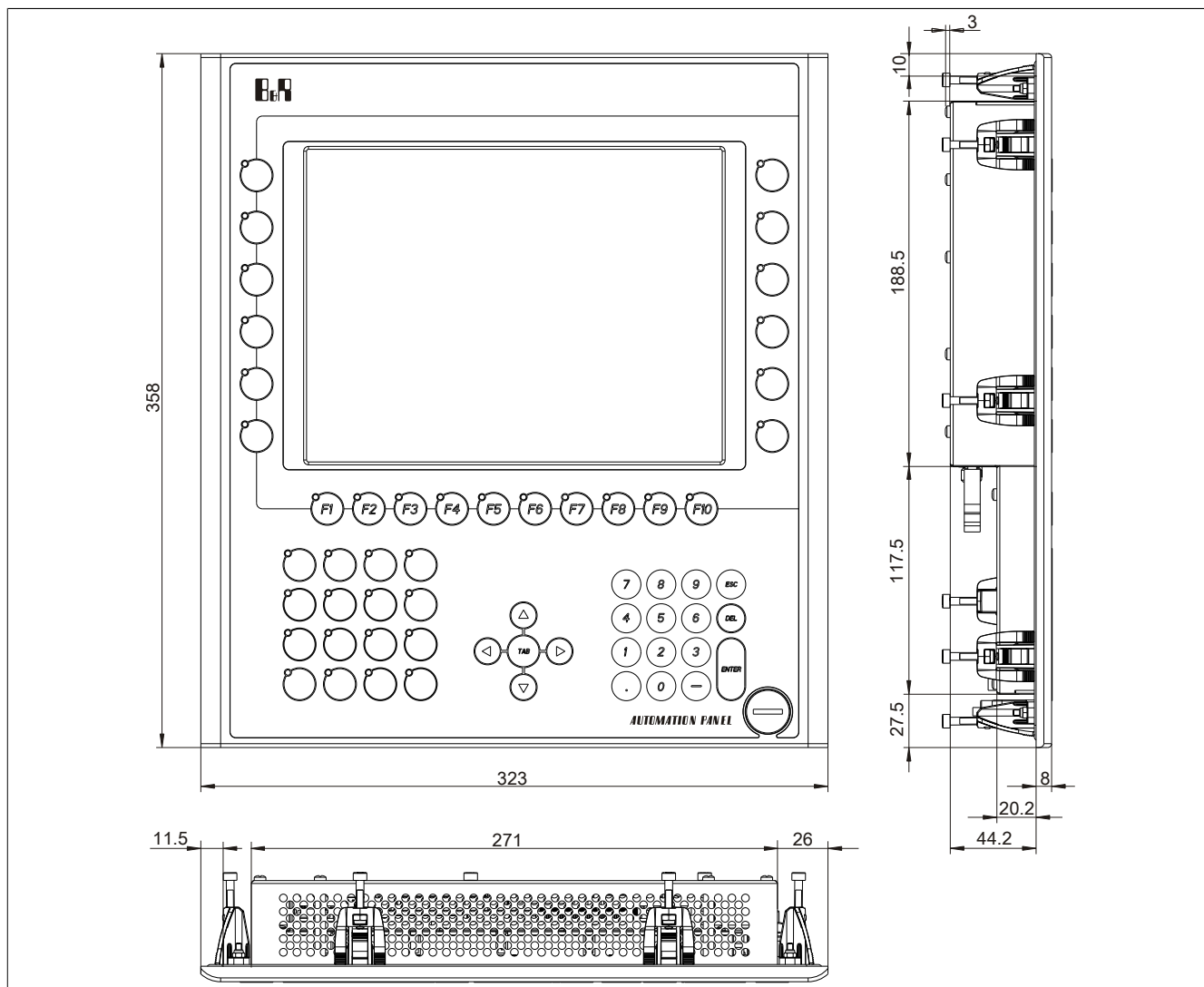


Figure 19: 5AP951.1043-01 - Dimensions

3.1.1.2.6 Cutout installation

The Automation Panel can be installed in a wall cutout using the pre-installed clamping blocks. To do so, it is necessary to make a cutout that corresponds to the following diagram.

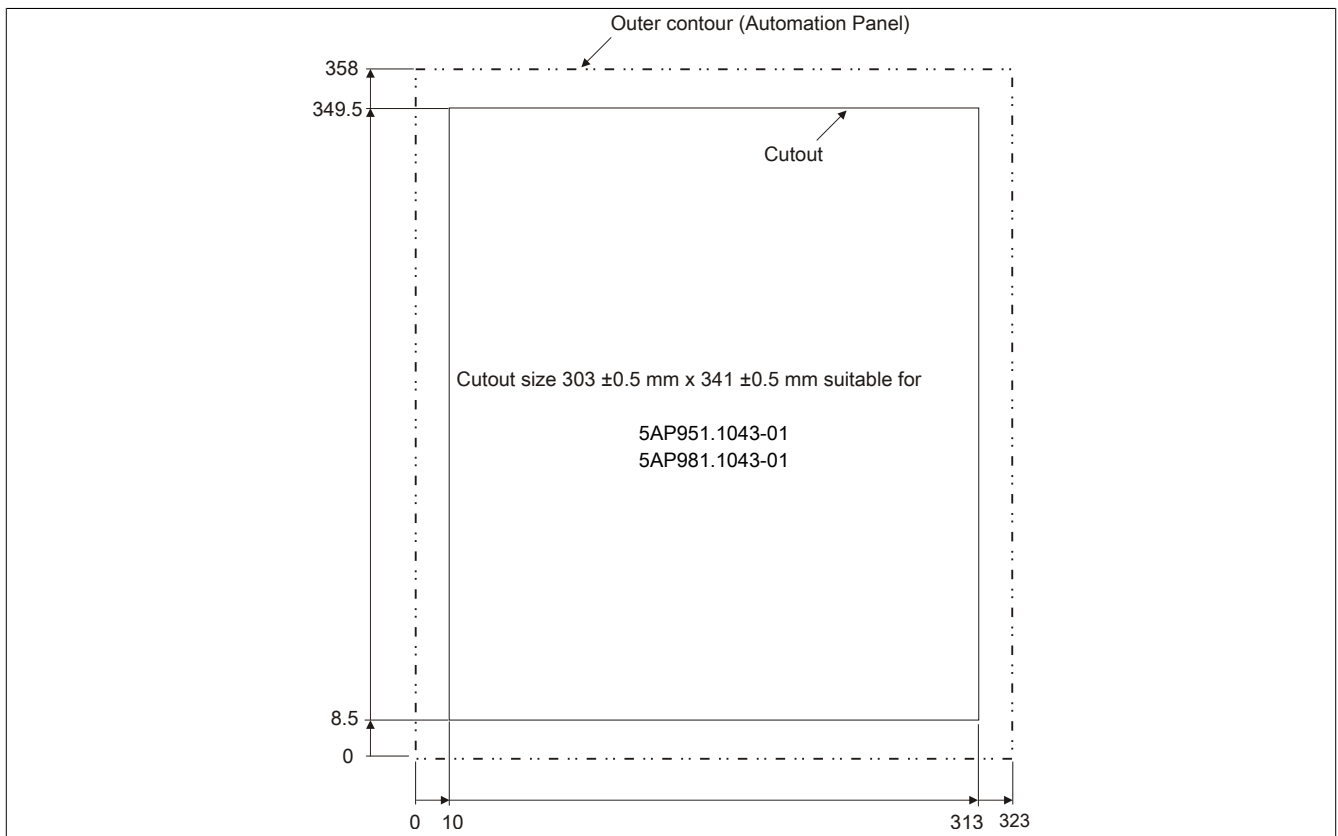


Figure 20: 5AP951.1043-01 - Cutout installation

For additional information regarding installation and mounting orientation, see "Installation" on page 130.

3.1.1.2.7 USB interfaces

Automation Panel devices have three USB interfaces (type A).

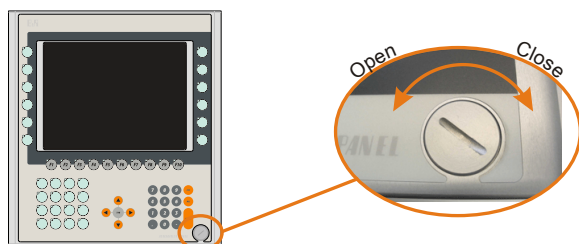


Figure 21: USB interfaces

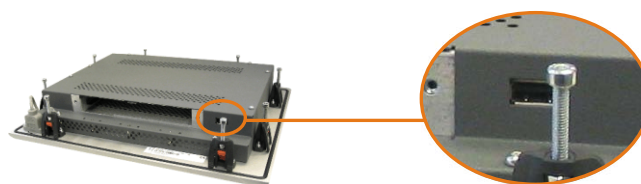


Figure 22: Back-side USB

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

USB transfer speed

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

Information:

With a DVI Automation Panel Link insert card, USB 2.0 is supported up to a cable length of 5 meters.

SDL (Smart Display Link) Automation Panel Link insert card only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

3.1.1.2.8 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

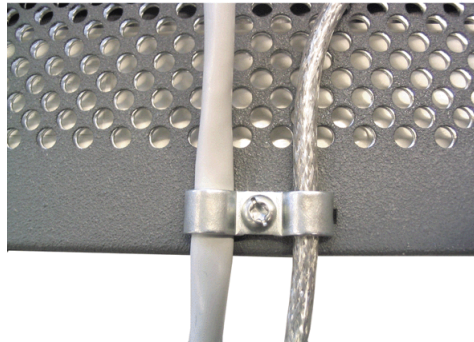


Figure 23: Cable clamps

3.1.1.2.9 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

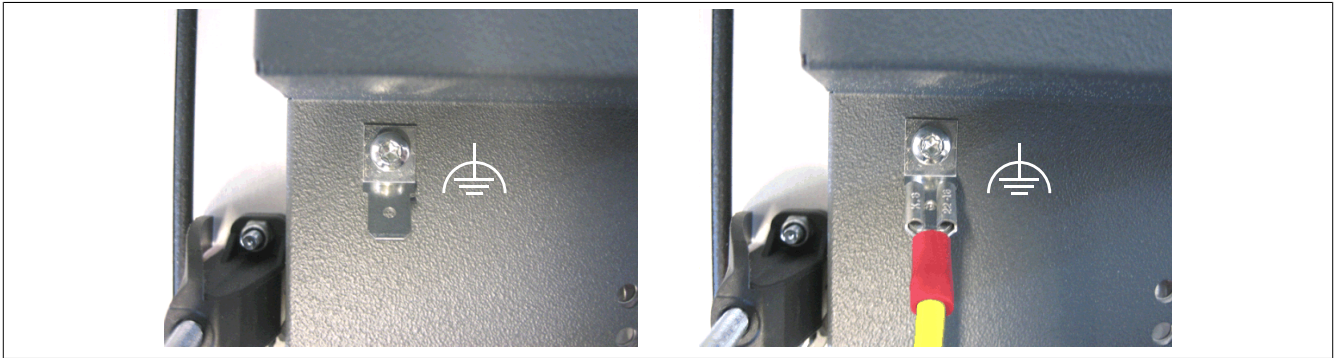


Figure 24: Functional grounding clip

3.1.1.3 5AP952.1043-01

3.1.1.3.1 General information

- 10.4" VGA color TFT display
- Function and system keys
- Small installation depth
- Fan-free operation
- Can be upgraded using Display Link cards

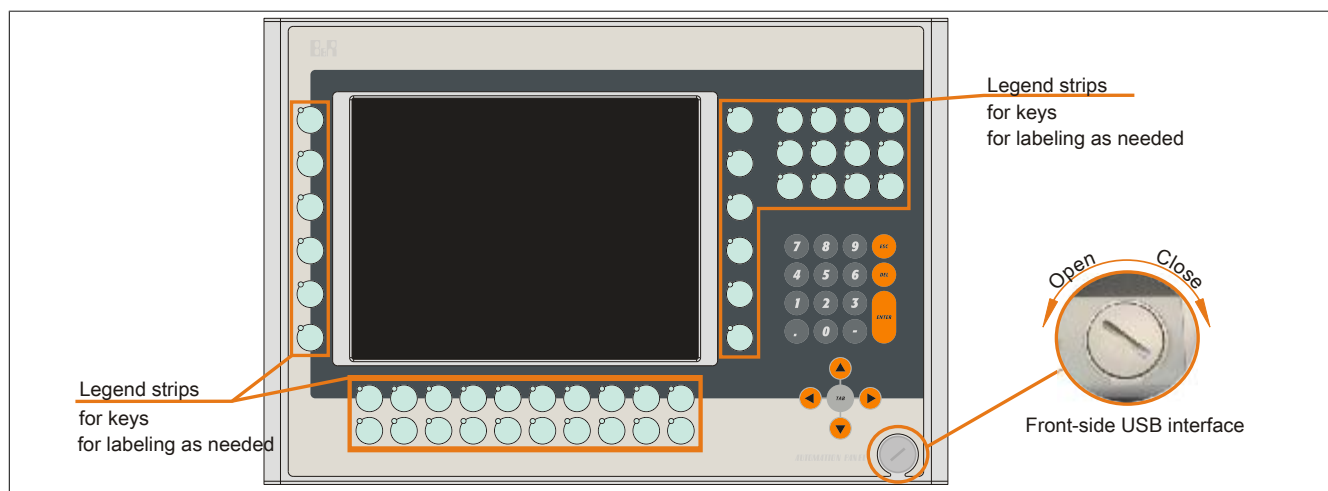


Figure 25: 5AP952.1043-01 - Front view

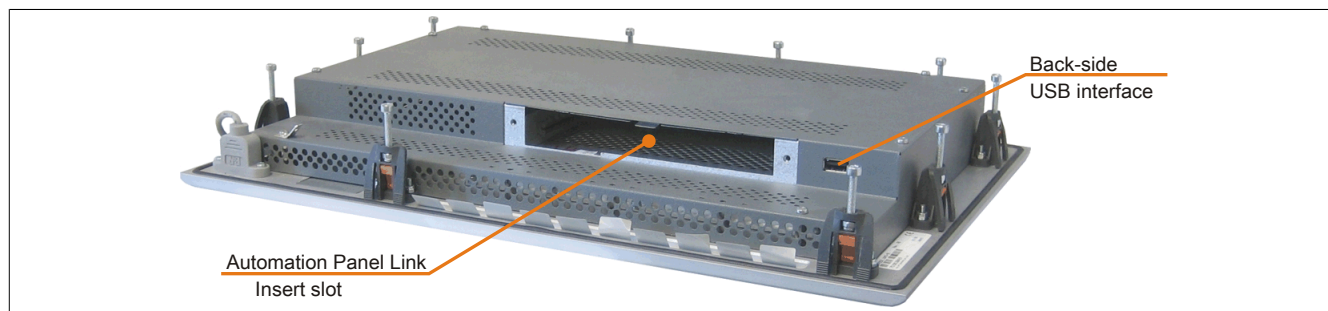


Figure 26: 5AP952.1043-01 - Rear view

3.1.1.3.2 Order data


Model number	Short description	<div>Figure</div> 
	Display units	
5AP952.1043-01	Automation Panel AP952 10.4" VGA color TFT display; 44 function keys and 20 system keys; 2 USB 2.0 interfaces; slot for Automation Panel link; IP 65 protection (from front). 24 VDC.	
	Required accessories	
	Display links	
5DL DVI.1000-01	Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLS DL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLS DL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	

Table 12: 5AP952.1043-01 - Order data

Model number	Short description	Figure
	Optional accessories	
	Accessories	
5AC900.104X-04	Legend Strips Template 10,4" for Automation Panel 5AP952.1043-01 and 5AP982.1043-01; for 1 device.	

Table 12: 5AP952.1043-01 - Order data

3.1.1.3.3 Technical data

Product ID	5AP952.1043-01
General information	
B&R ID code	\$1D5B
Certification CE	Yes
Interfaces	
USB ¹⁾	
Quantity	2
Type	USB 2.0 ²⁾
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	10.4" (264 mm)
Colors	262144
Resolution	VGA, 640 x 480 pixels
Contrast	300:1
Viewing angles	
Horizontal	Direction R / Direction L = 70°
Vertical	Direction U = 40° / direction D = 70°
Backlight	
Brightness	350 cd/m²
Half brightness time ³⁾	50,000 h
Filter glass	
Transmittance	95%
Coating	On both sides
Touch screen	
Technologies	-
Controller	-
Transmittance	-
Keys	
Function keys	44 with LED (yellow)
Soft keys	No
System keys	Numeric keys, cursor block
Service life	> 1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED brightness	
Yellow	Typ. 12 mcd
Inserts	
Compatible installation for PPC300 insert	No
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	Max. 3.2 A ⁴⁾
Starting current	Typ. 6 A, max. 30 A for <300 µs
Power consumption	Typ. 10 W (without LED), max. 14 W or 21 W with USB (without insert)
Electrical isolation	Yes
Operating conditions	
Protection in accordance with EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection
Environmental conditions	
Temperature	
Operation	Without Rittal housing Mounting orientation 0°: 0 to 55°C Mounting orientations to -45° display above: 0 to 55°C Mounting orientations to +45° display below: 0 to 55°C With Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 45°C Mounting orientations to +45° display below: 0 to 45°C
Storage	-30 to 70°C
Transport	-30 to 70°C

Table 13: 5AP952.1043-01 - Technical data

Product ID	5AP952.1043-01
Vibration	
Operation (continuous)	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g
Operation (occasional)	2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g
Storage	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Transport	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Altitude	
Operation	Max. 3000 m ⁵⁾
Mechanical characteristics	
Housing	
Material	Metal
Paint	Similar to Pantone432CV
Front ⁶⁾	
Frame	Naturally anodized aluminum
Design	Gray
Panel membrane	
Material	Polyester
Light background	Similar to Pantone 427CV
Dark gray border around display	Similar to Pantone432CV
Dark gray keys	Similar to Pantone 431CV
Orange keys	Similar to Pantone 151CV
Color legend strips	Similar to Pantone 429CV
Gasket	Flat gasket around display front
Dimensions	
Width	423 mm
Height	288 mm
Depth	55 mm
Weight	Approx. 3800 g

Table 13: 5AP952.1043-01 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link insert card being used.
- 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.
- 4) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 5) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 6) There may be visible deviations in the color and surface appearance depending on the process or batch.

3.1.1.3.4 Temperature humidity diagram

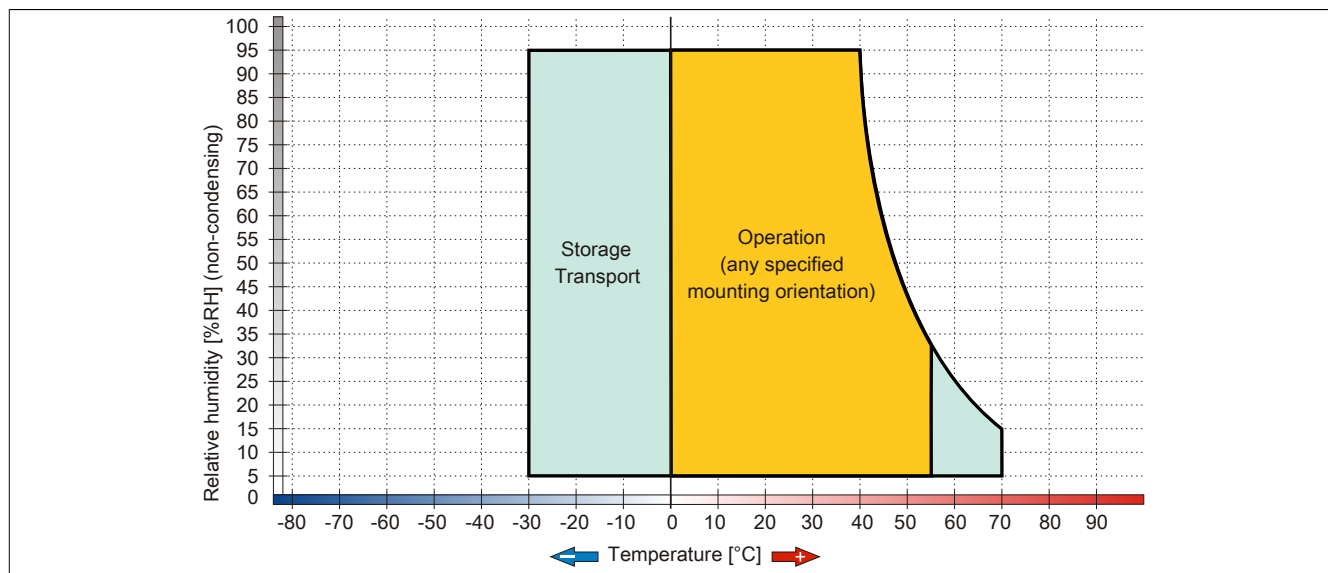


Figure 27: 5AP952.1043-01 - Temperature humidity diagram

3.1.1.3.5 Dimensions

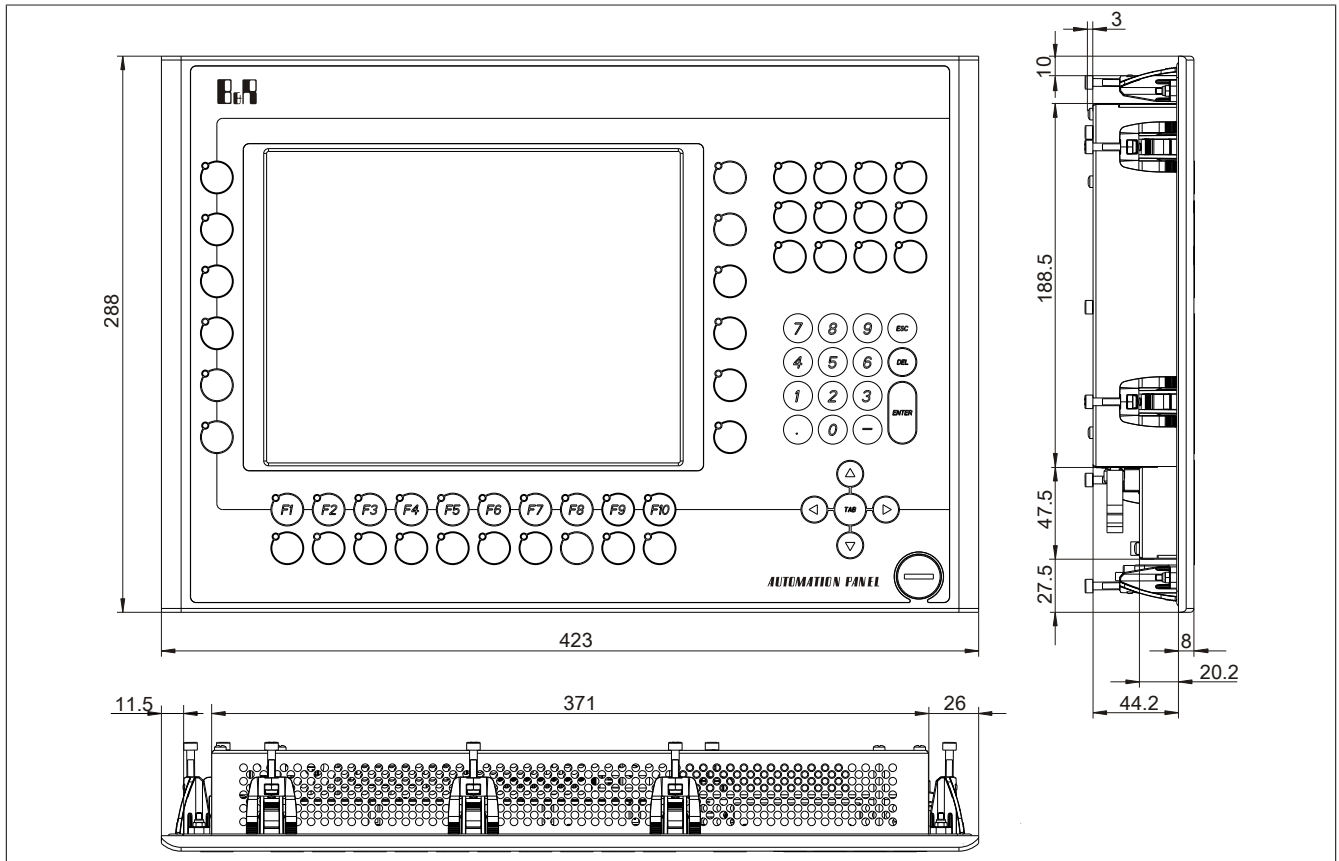


Figure 28: 5AP952.1043-01 - Dimensions

3.1.1.3.6 Cutout installation

The Automation Panel can be installed in a wall cutout using the pre-installed clamping blocks. To do so, it is necessary to make a cutout that corresponds to the following diagram.

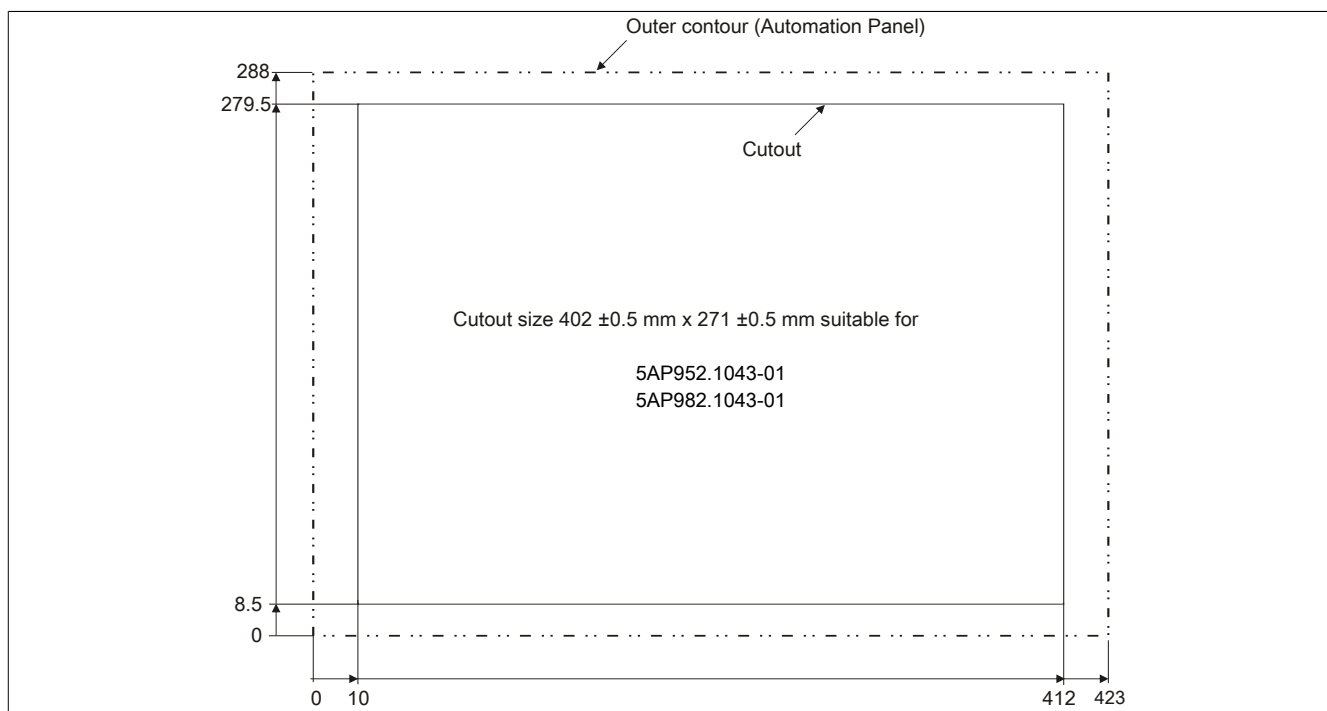


Figure 29: 5AP952.1043-01 - Cutout installation

For additional information regarding installation and mounting orientation, see "Installation" on page 130.

3.1.1.3.7 USB interfaces

Automation Panel devices have three USB interfaces (type A).

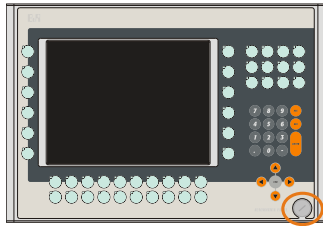


Figure 30: USB interfaces

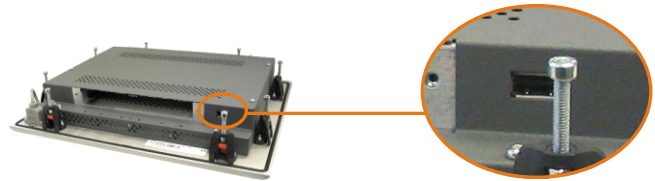


Figure 31: Back-side USB

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

USB transfer speed

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

Information:

With a DVI Automation Panel Link insert card, USB 2.0 is supported up to a cable length of 5 meters. SDL (Smart Display Link) Automation Panel Link insert card only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

3.1.1.3.8 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

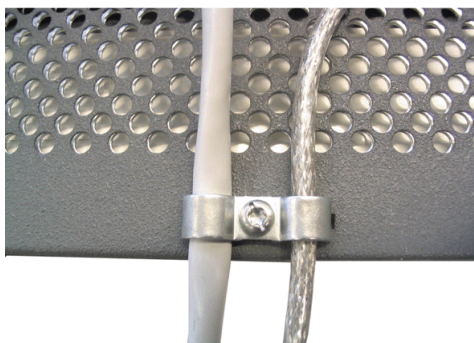


Figure 32: Cable clamps

3.1.1.3.9 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

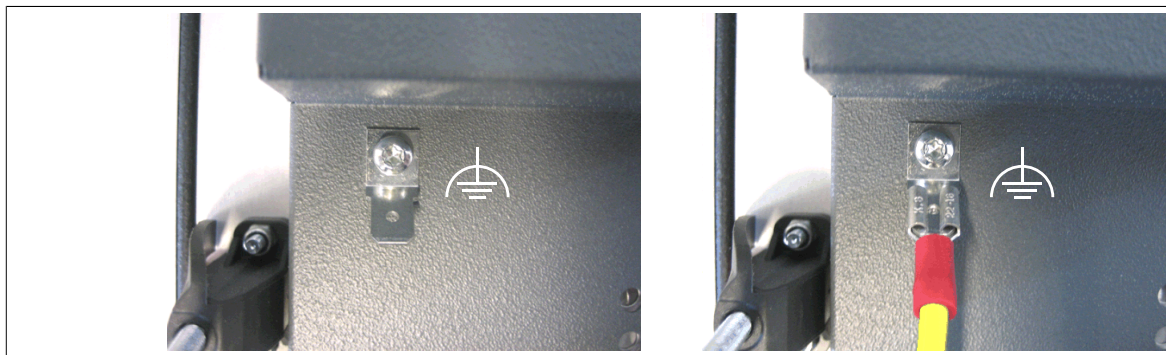


Figure 33: Functional grounding clip

3.1.1.4 5AP980.1043-01

3.1.1.4.1 General information

- 10.4" VGA color TFT display
- Analog resistive touch screen
- Function keys and soft keys
- Small installation depth
- Fan-free operation
- Can be upgraded with Display Link cards or PPC300

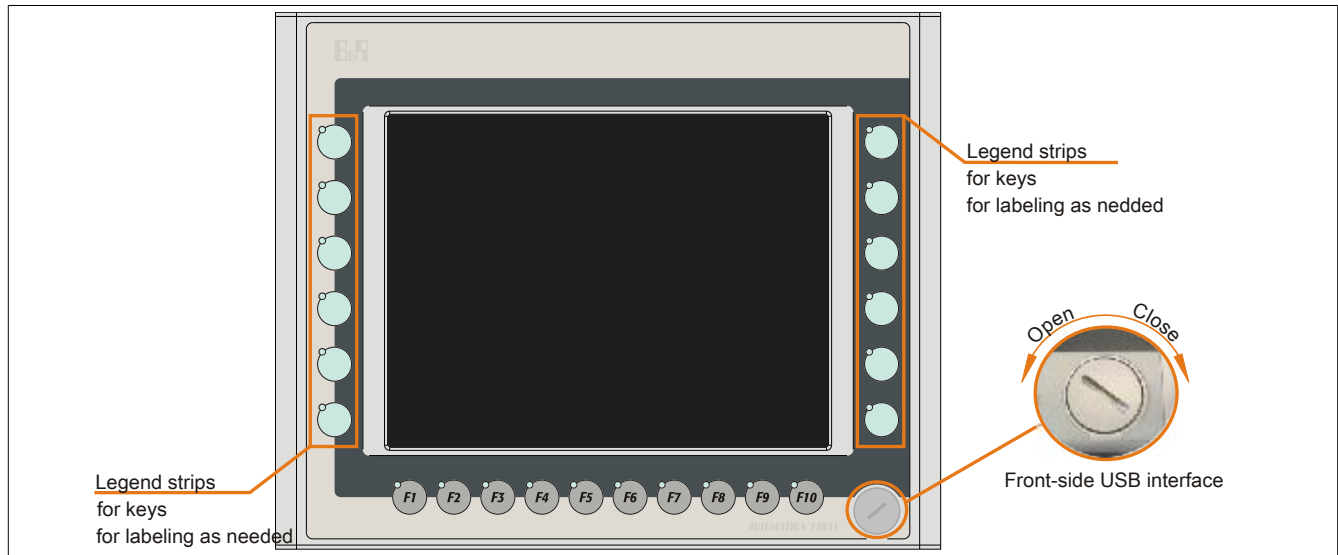


Figure 34: 5AP980.1043-01 - Front view

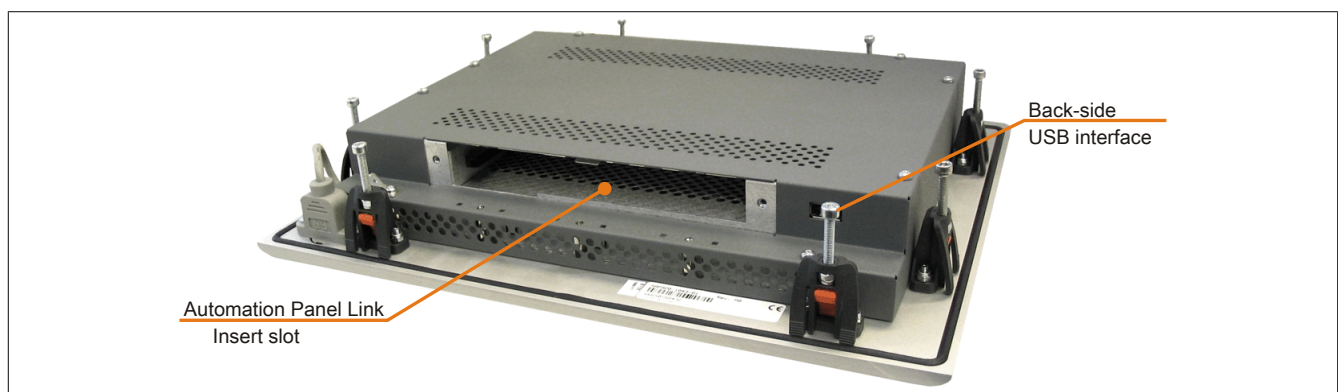


Figure 35: 5AP980.1043-01 - Rear view

3.1.1.4.2 Order data


Model number	Short description	Figure
	Display units	
5AP980.1043-01	Automation Panel AP980; 10.4" VGA color TFT display with touch screen (resistive); 10 softkeys and 12 function keys; 2 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (front side). 24 VDC.	
	Required accessories	
	Display links	
5DL DVI.1000-01	Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLS DL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLS DL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 14: 5AP980.1043-01 - Order data

Model number	Short description	Figure
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm ² , protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm ² , protected against vibration by the screw flange	
	Optional accessories	
	Accessories	
5AC900.104X-05	Legend Strips Template 10,4" for Automation Panel 5AP980.1043-01; for 3 devices.	
	Panel PC 300 insert cards	
5PC310.L800-00	Panel PC 300 card for Automation Panel 900; 256 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5PC310.L800-01	Panel PC 300 card for Automation Panel 900; 512 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 14: 5AP980.1043-01 - Order data

3.1.1.4.3 Technical data

Product ID	5AP980.1043-01	
Revision	C0	D0
General information		
B&R ID code	\$1D5D	
Certification		
CE	Yes	
cULus	Yes	
Interfaces		
USB ¹⁾		
Quantity	2	
Type	USB 2.0 ²⁾	
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current load	Max. 500 mA per connection	
Display		
Type	Color TFT	
Diagonal	10.4" (264 mm)	
Colors	262144	
Resolution	VGA, 640 x 480 pixels	
Contrast	300:1	
Viewing angles		
Horizontal	Direction R / Direction L = 70°	
Vertical	Direction U = 40° / direction D = 70°	
Backlight		
Brightness	350 cd/m²	
Half brightness time ³⁾	50,000 h	
Filter glass		
Transmittance	-	
Coating	-	
Touch screen ⁴⁾		
Technologies	Analog, resistive	
Controller	Elo, serial, 12-bit	
Transmittance	Up to 78%	
Keys		
Function keys	12 with LED (yellow)	
Soft keys	10 with LED (yellow)	
System keys	No	
Service life	> 1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force	
LED brightness		
Yellow	Typ. 12 mcd	
Inserts		
Compatible installation for PPC300 insert	No	Yes
Electrical characteristics		
Nominal voltage	24 VDC ±25%	
Nominal current	Max. 3.2 A ⁵⁾	
Starting current	Typ. 6 A, max. 30 A for <300 µs	
Power consumption	Typ. 10 W (without LED), max. 13 W or 20 W with USB (without insert)	
Electrical isolation	Yes	

Table 15: 5AP980.1043-01, 5AP980.1043-01 - Technical data

Product ID	5AP980.1043-01	
Operating conditions		
Protection in accordance with EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection	
Environmental conditions		
Temperature Operation	Without Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 50°C Mounting orientations to +45° display below: 0 to 50°C	
Storage Transport	With Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 45°C Mounting orientations to +45° display below: 0 to 45°C -30 to 70°C -30 to 70°C	
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g 2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g	
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms	
Altitude Operation	Max. 3000 m ⁶⁾	
Mechanical characteristics		
Housing Material Paint	Metal Similar to Pantone432CV	
Front ⁷⁾ Frame Design Panel membrane Material Light background Dark gray border around display Color legend strips Gasket	Naturally anodized aluminum Gray Polyester Similar to Pantone 427CV Similar to Pantone432CV Similar to Pantone 429CV Flat gasket around display front	
Dimensions Width Height Depth	323 mm 260 mm 55 mm	
Weight	Approx. 2900 g	Approx. 2600 g

Table 15: 5AP980.1043-01, 5AP980.1043-01 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link insert card being used.
- 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.
- 4) Touch screen drivers can be downloaded from the Downloads section of the B&R website (www.br-automation.com).
- 5) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 6) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 7) There may be visible deviations in the color and surface appearance depending on the process or batch.

3.1.1.4.4 Temperature humidity diagram

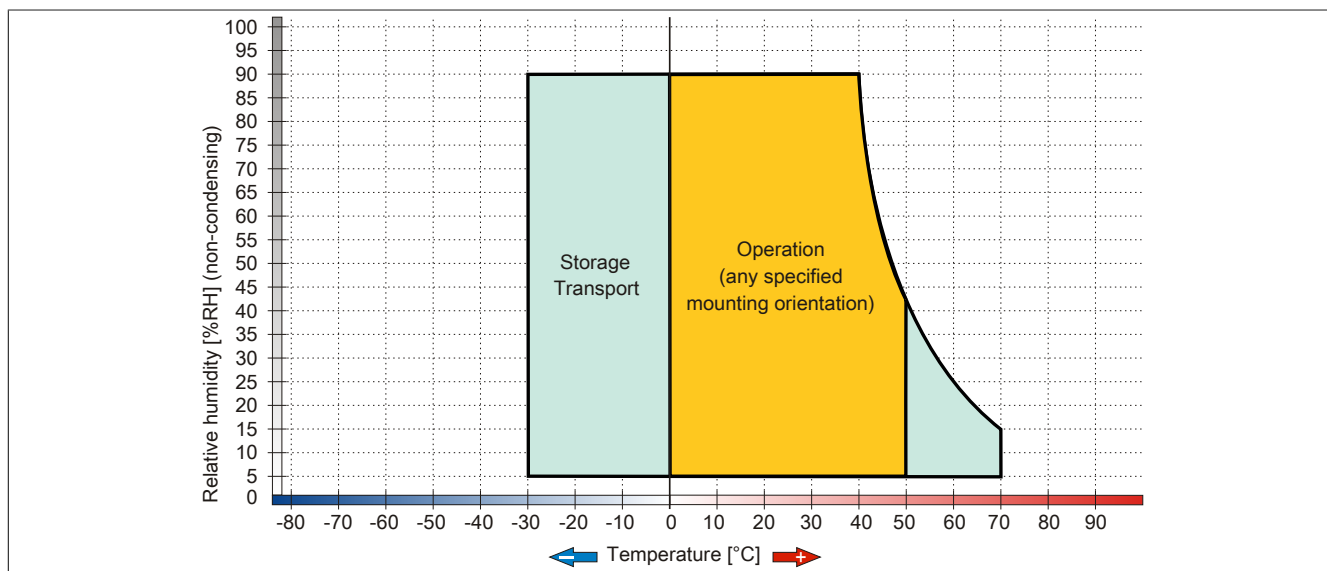


Figure 36: 5AP980.1043-01 - Temperature humidity diagram

3.1.1.4.5 Dimensions

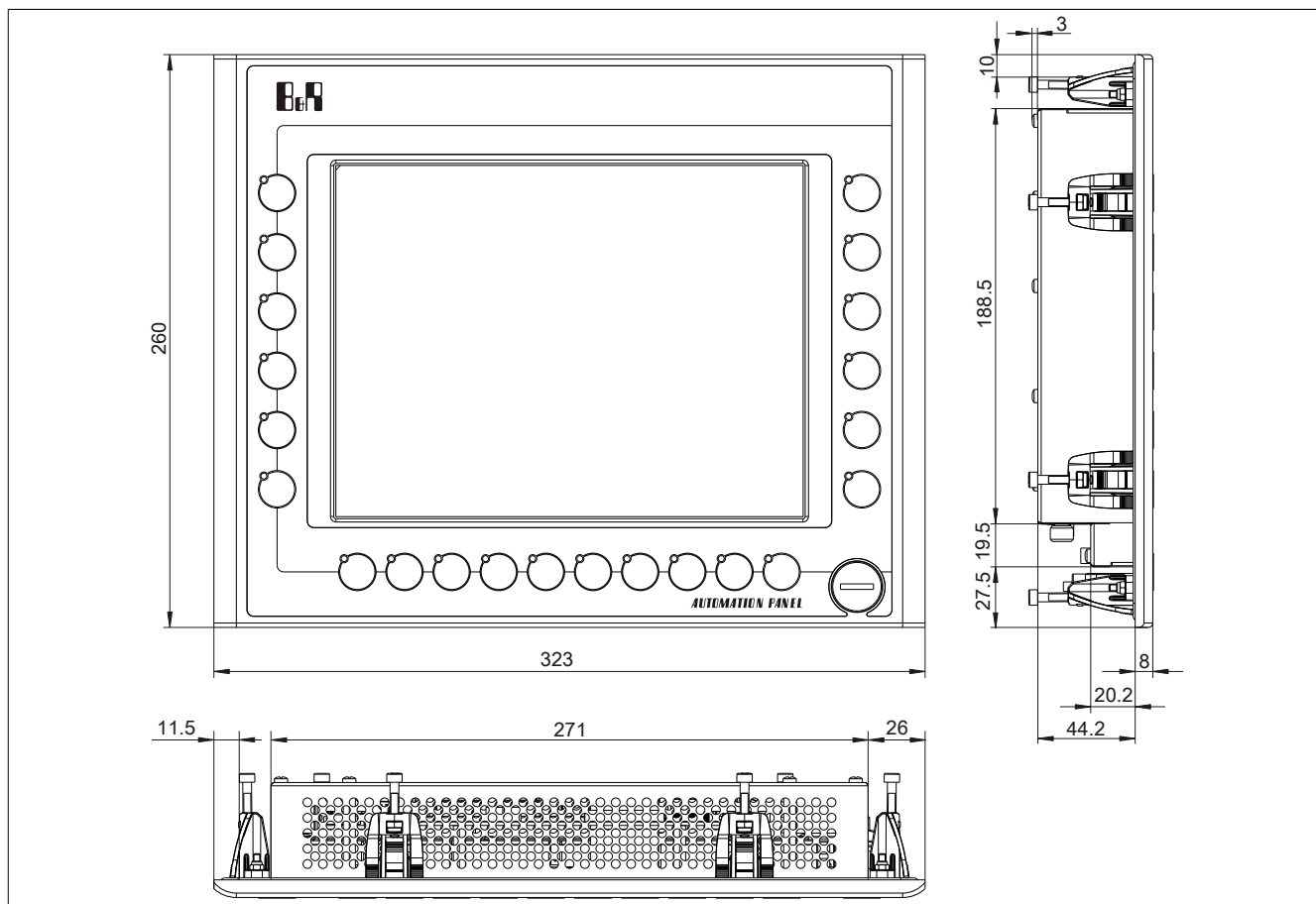


Figure 37: 5AP980.1043-01 - Dimensions

3.1.1.4.6 Cutout installation

The Automation Panel can be installed in a wall cutout using the pre-installed clamping blocks. To do so, it is necessary to make a cutout that corresponds to the following diagram.

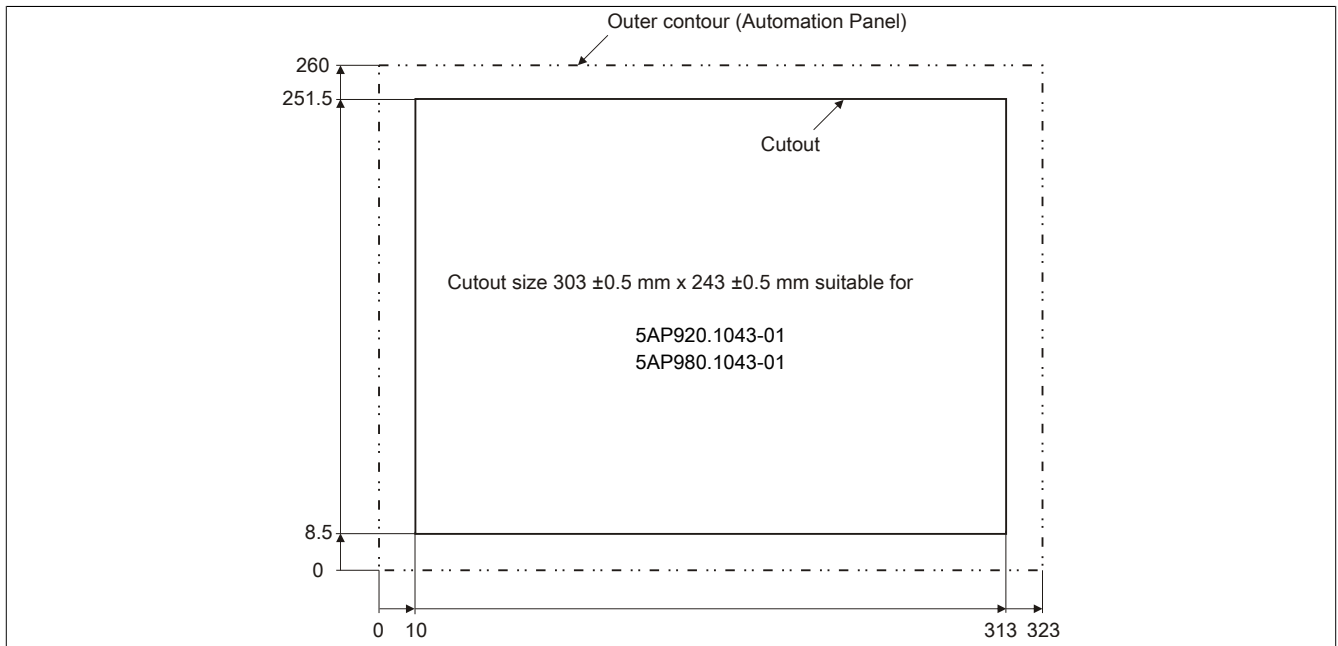


Figure 38: 5AP980.1043-01 - Cutout installation

For additional information regarding installation and mounting orientation, see "Installation" on page 130.

3.1.1.4.7 USB interfaces

Automation Panel devices have three USB interfaces (type A).

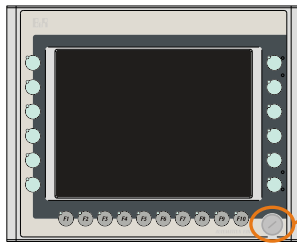


Figure 39: USB interfaces

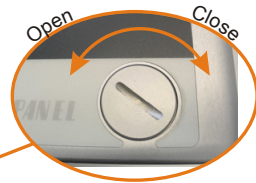


Figure 40: Back-side USB

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

USB transfer speed

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

Information:

With a DVI Automation Panel Link insert card, USB 2.0 is supported up to a cable length of 5 meters.
SDL (Smart Display Link) Automation Panel Link insert card only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

3.1.1.4.8 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

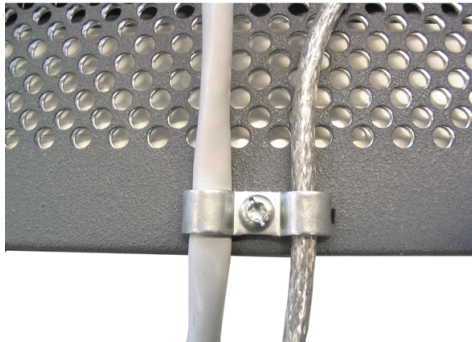


Figure 41: Cable clamps

3.1.1.4.9 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

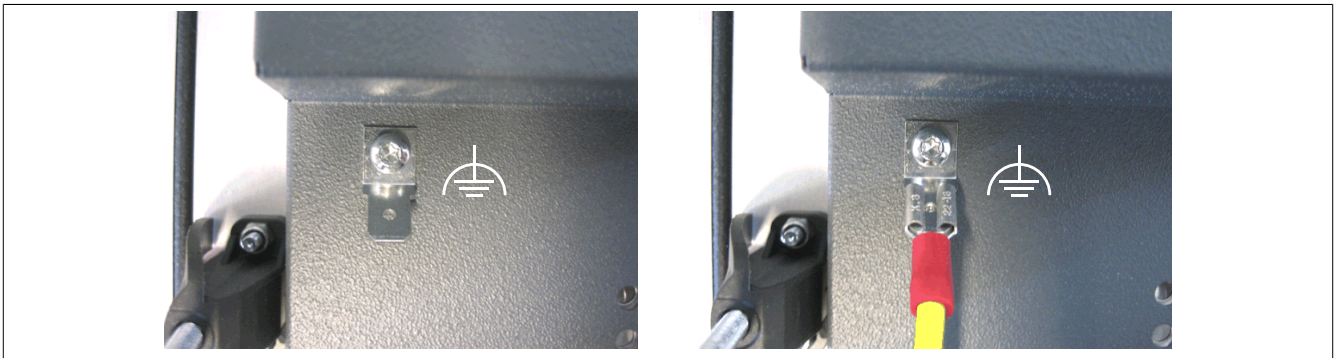


Figure 42: Functional grounding clip

3.1.1.5 5AP981.1043-01

3.1.1.5.1 General information

- 10.4" VGA color TFT display
- Analog resistive touch screen
- Function keys, system keys and soft keys
- Small installation depth
- Fan-free operation
- Can be upgraded with Display Link cards or PPC300

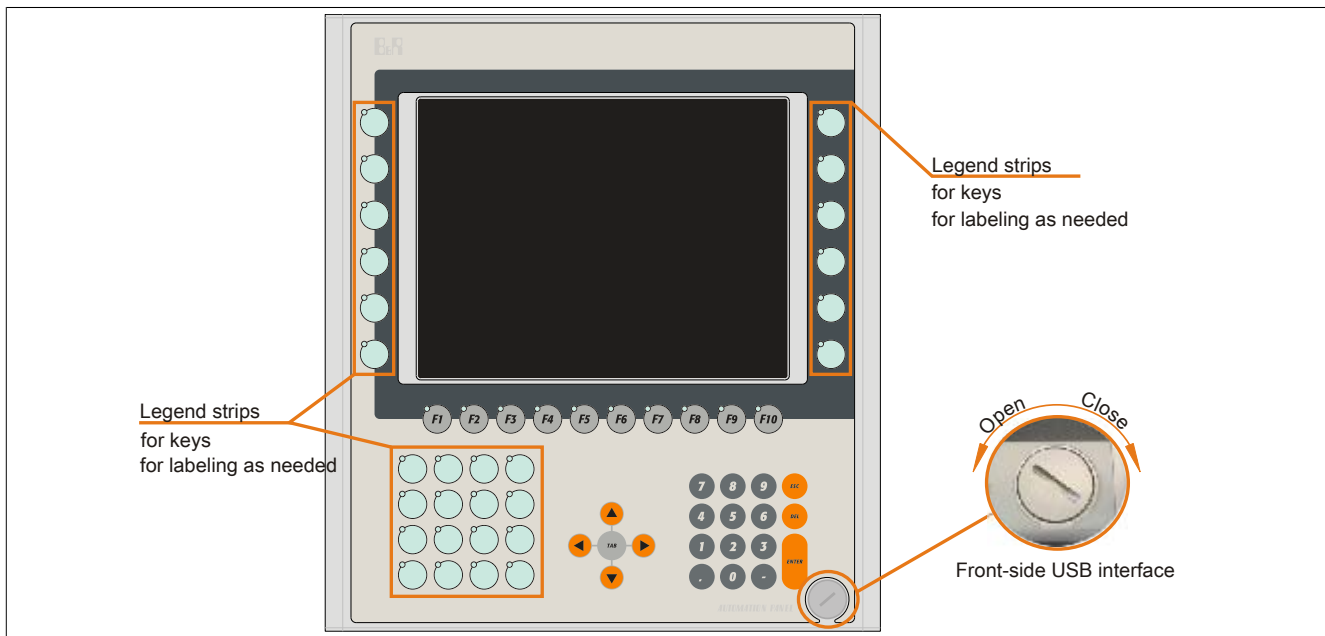


Figure 43: 5AP981.1043-01 - Front view

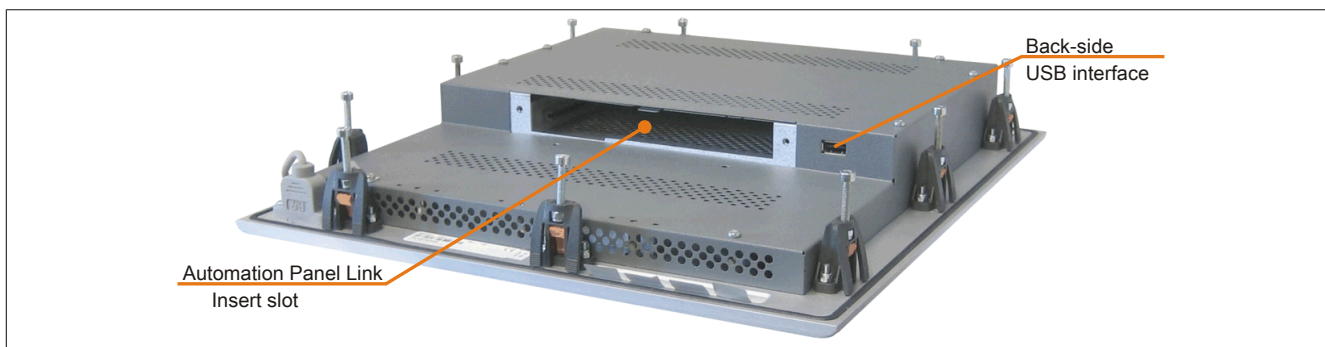


Figure 44: 5AP981.1043-01 - Rear view

3.1.1.5.2 Order data


Model number	Short description	<div>Figure</div> 
Display units		
5AP981.1043-01	Automation Panel AP981; 10.4" VGA color TFT display with touch screen (resistive); 10 softkeys; 28 function keys and 20 system keys; 2 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (front side). 24 VDC.	
Required accessories		
Display links		
5DLDMI.1000-01	Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLSL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLSL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
Terminal blocks		
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	
Optional accessories		
Accessories		
5AC900.104X-03	Legend Strips Template 10.4" for Automation Panel 5AP951.1043-01 and 5AP981.1043-01; for 1 device.	
Panel PC 300 insert cards		
5PC310.L800-00	Panel PC 300 card for Automation Panel 900; 256 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5PC310.L800-01	Panel PC 300 card for Automation Panel 900; 512 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 16: 5AP981.1043-01 - Order data

3.1.1.5.3 Technical data

Product ID	5AP981.1043-01	
Revision	C0	D0
General information		
B&R ID code	\$1C63	
Certification		
CE	Yes	
cULus	Yes	
Interfaces		
USB ¹⁾		
Quantity	2	
Type	USB 2.0 ²⁾	
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current load	Max. 500 mA per connection	
Display		
Type	Color TFT	
Diagonal	10.4" (264 mm)	
Colors	262144	
Resolution	VGA, 640 x 480 pixels	
Contrast	300:1	
Viewing angles		
Horizontal	Direction R / Direction L = 70°	
Vertical	Direction U = 40° / direction D = 70°	
Backlight		
Brightness	350 cd/m²	
Half brightness time ³⁾	50,000 h	
Filter glass		
Transmittance	-	
Coating	-	

Table 17: 5AP981.1043-01, 5AP981.1043-01 - Technical data

Product ID		5AP981.1043-01
Touch screen ⁴⁾ Technologies Controller Transmittance		Analog, resistive Elo, serial, 12-bit Up to 78%
Keys		
Function keys		28 with LED (yellow)
Soft keys		10 with LED (yellow)
System keys		Numeric keys, cursor block
Service life		> 1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED brightness Yellow		Typ. 12 mcd
Inserts		
Compatible installation for PPC300 insert	No	Yes
Electrical characteristics		
Nominal voltage		24 VDC ±25%
Nominal current		Max. 3.2 A ⁵⁾
Starting current		Typ. 6 A, max. 30 A for <300 µs
Power consumption		Typ. 10 W (without LED), max. 14 W or 21 W with USB (without insert)
Electrical isolation		Yes
Operating conditions		
Protection in accordance with EN 60529		Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection
Environmental conditions		
Temperature Operation		Without Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 50°C Mounting orientations to +45° display below: 0 to 50°C With Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 45°C Mounting orientations to +45° display below: 0 to 45°C
Storage Transport		-30 to 70°C -30 to 70°C
Vibration Operation (continuous) Operation (occasional) Storage Transport		2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g 2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Shock Operation Storage Transport		15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Altitude Operation		Max. 3000 m ⁶⁾
Mechanical characteristics		
Housing Material Paint		Metal Similar to Pantone432CV
Front ⁷⁾ Frame Design Panel membrane Material Light background Dark gray border around display Dark gray keys Orange keys Color legend strips Gasket		Naturally anodized aluminum Gray Polyester Similar to Pantone 427CV Similar to Pantone 432CV Similar to Pantone 431CV Similar to Pantone 151CV Similar to Pantone 429CV Flat gasket around display front
Dimensions Width Height Depth		323 mm 358 mm 55 mm
Weight		Approx. 3600 g

Table 17: 5AP981.1043-01, 5AP981.1043-01 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link insert card being used.
- 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.
- 4) Touch screen drivers can be downloaded from the Downloads section of the B&R website (www.br-automation.com).
- 5) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 6) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 7) There may be visible deviations in the color and surface appearance depending on the process or batch.

3.1.1.5.4 Temperature humidity diagram

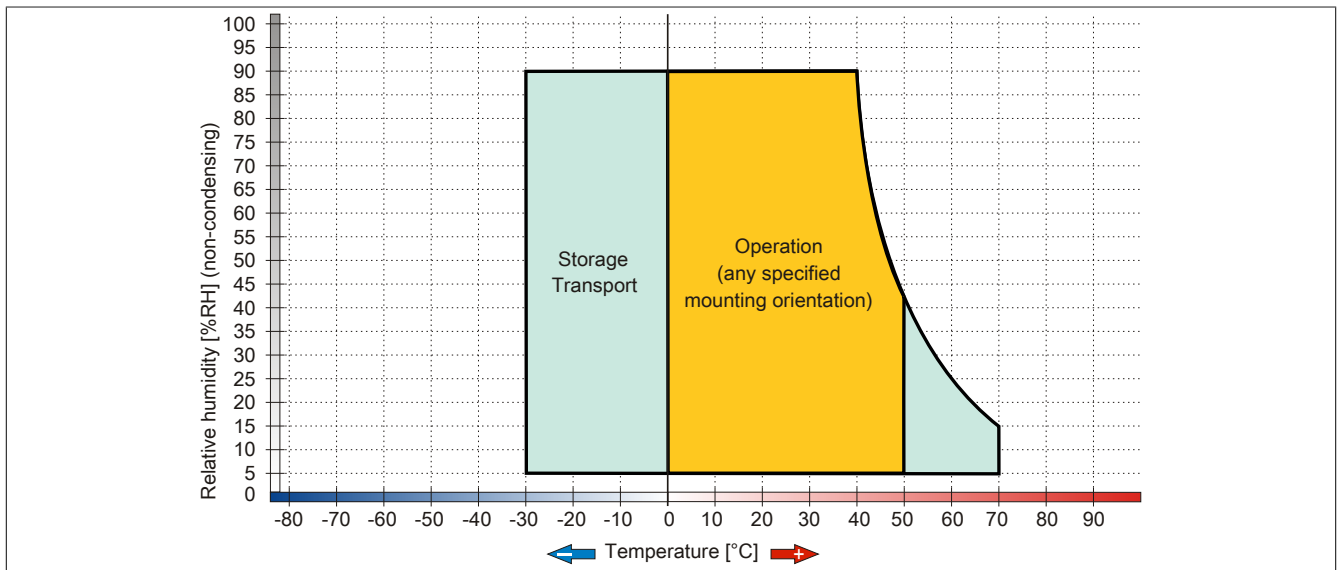


Figure 45: 5AP981.1043-01 - Temperature humidity diagram

3.1.1.5.5 Dimensions

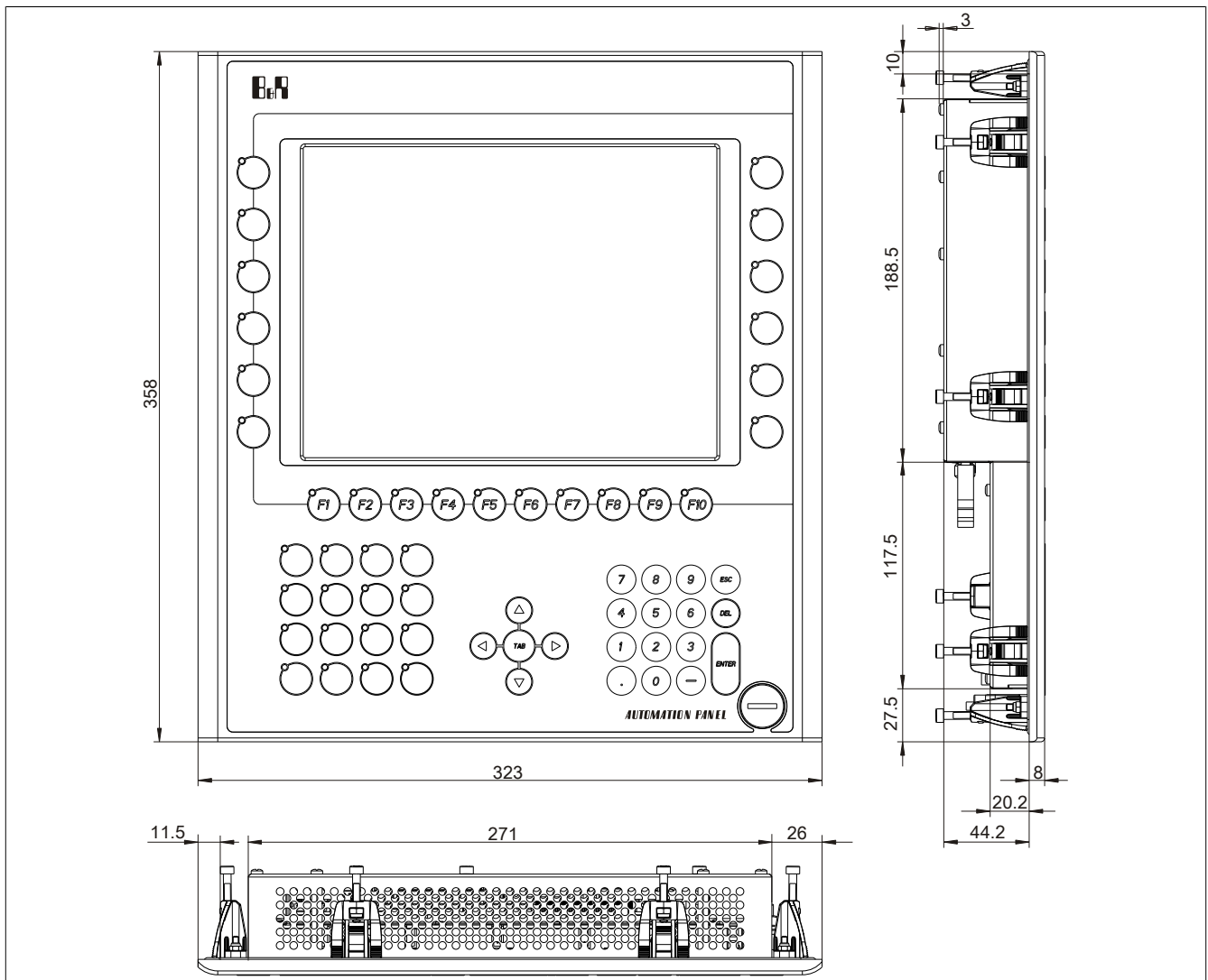


Figure 46: 5AP981.1043-01 - Dimensions

3.1.1.5.6 Cutout installation

The Automation Panel can be installed in a wall cutout using the pre-installed clamping blocks. To do so, it is necessary to make a cutout that corresponds to the following diagram.

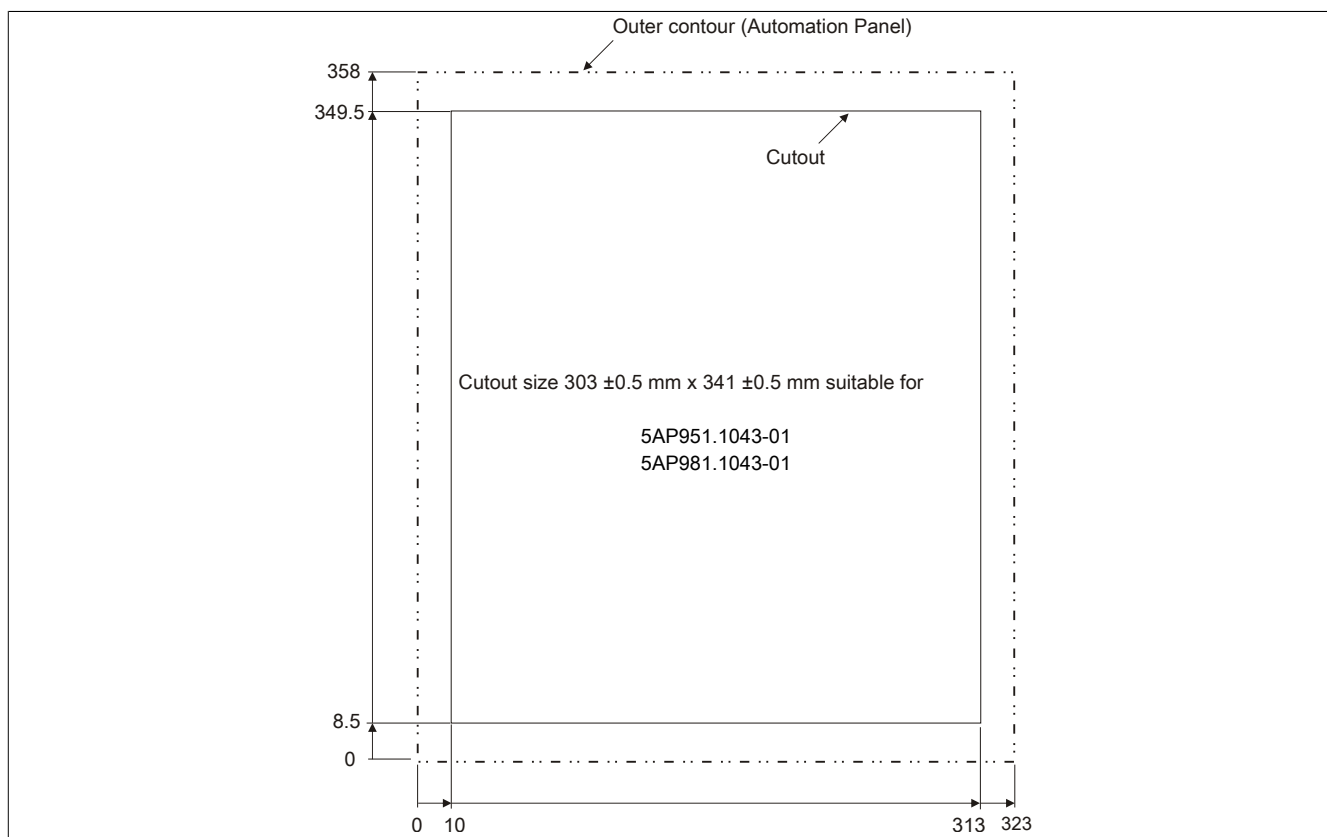


Figure 47: 5AP981.1043-01 - Cutout installation

For additional information regarding installation and mounting orientation, see "Installation" on page 130.

3.1.1.5.7 USB interfaces

Automation Panel devices have three USB interfaces (type A).

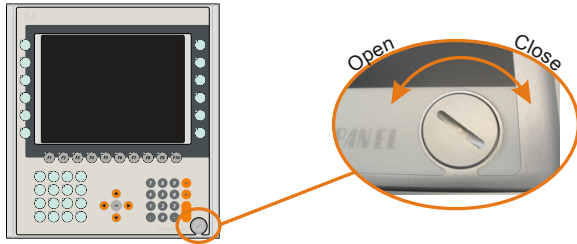


Figure 48: USB interfaces

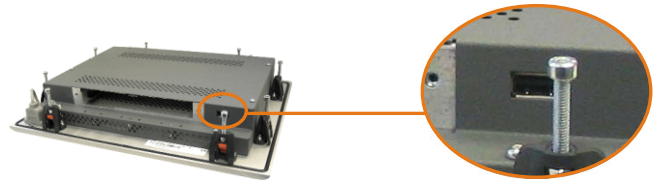


Figure 49: Back-side USB

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

USB transfer speed

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

Information:

With a DVI Automation Panel Link insert card, USB 2.0 is supported up to a cable length of 5 meters.

SDL (Smart Display Link) Automation Panel Link insert card only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

3.1.1.5.8 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

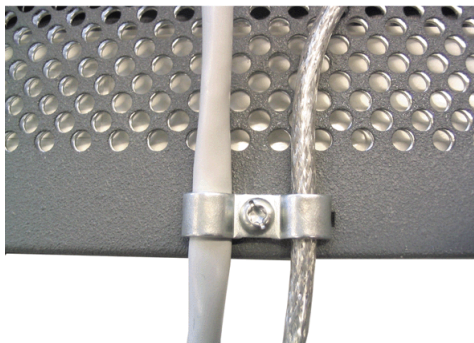


Figure 50: Cable clamps

3.1.1.5.9 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

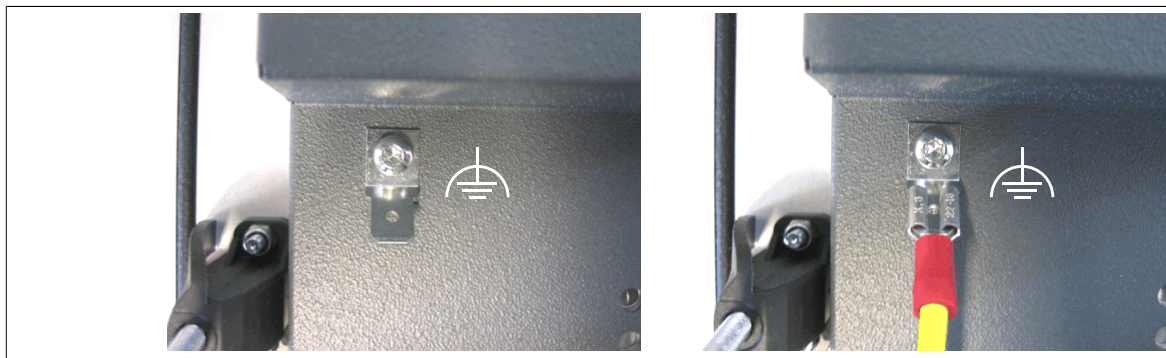


Figure 51: Functional grounding clip

3.1.1.6 5AP982.1043-01

3.1.1.6.1 General information

- 10.4" VGA color TFT display
- Analog resistive touch screen
- Function and system keys
- Small installation depth
- Fan-free operation
- Can be upgraded with Display Link cards or PPC300

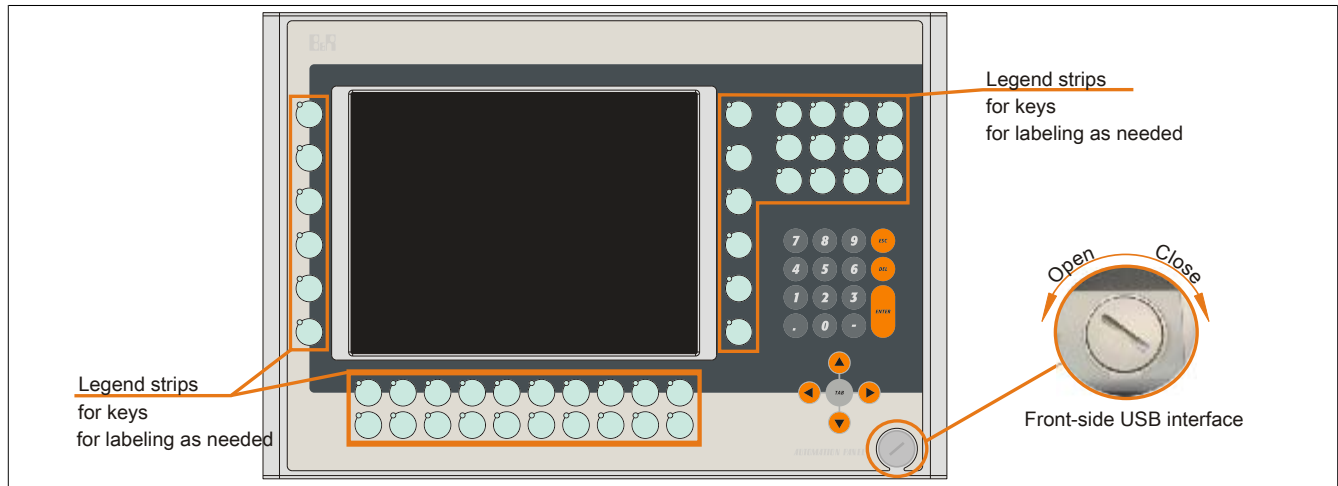


Figure 52: 5AP982.1043-01 - Front view

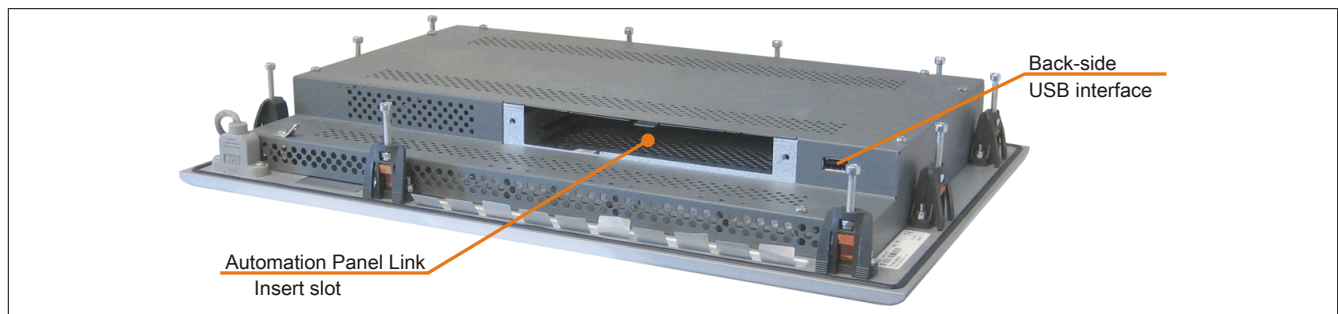


Figure 53: 5AP982.1043-01 - Rear view

3.1.1.6.2 Order data


Model number	Short description	<div>Figure</div> 
	Display units	
5AP982.1043-01	Automation Panel AP982; 10.4" VGA color TFT display with touch screen (resistive); 44 function keys and 20 system keys; 2 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (from front). 24 VDC.	
	Required accessories	
	Display links	
5DL DVI.1000-01	Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLSDL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLSDL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	

Table 18: 5AP982.1043-01 - Order data

Model number	Short description	Figure
	Optional accessories	
	Accessories	
5AC900.104X-04	Legend Strips Template 10,4" for Automation Panel 5AP952.1043-01 and 5AP982.1043-01; for 1 device.	
	Panel PC 300 insert cards	
5PC310.L800-00	Panel PC 300 card for Automation Panel 900; 256 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5PC310.L800-01	Panel PC 300 card for Automation Panel 900; 512 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 18: 5AP982.1043-01 - Order data

3.1.1.6.3 Technical data

Product ID	5AP982.1043-01	
Revision	C0	D0
General information		
B&R ID code	\$1D5A	
Certification		
CE	Yes	
cULus	Yes	
Interfaces		
USB ¹⁾		
Quantity	2	
Type	USB 2.0 ²⁾	
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current load	Max. 500 mA per connection	
Display		
Type	Color TFT	
Diagonal	10.4" (264 mm)	
Colors	262144	
Resolution	VGA, 640 x 480 pixels	
Contrast	300:1	
Viewing angles		
Horizontal	Direction R / Direction L = 70°	
Vertical	Direction U = 40°/ direction D = 70°	
Backlight		
Brightness	350 cd/m²	
Half brightness time ³⁾	50,000 h	
Filter glass		
Transmittance	-	
Coating	-	
Touch screen ⁴⁾		
Technologies	Analog, resistive	
Controller	Elo, serial, 12-bit	
Transmittance	Up to 78%	
Keys		
Function keys	44 with LED (yellow)	
Soft keys	No	
System keys	Numeric keys, cursor block	
Service life	> 1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force	
LED brightness		
Yellow	Typ. 12 mcd	
Inserts		
Compatible installation for PPC300 insert	No	Yes
Electrical characteristics		
Nominal voltage	24 VDC ±25%	
Nominal current	Max. 3.2 A ⁵⁾	
Starting current	Typ. 6 A, max. 30 A for <300 µs	
Power consumption	Typ. 10 W (without LED), max. 14 W or 21 W with USB (without insert)	
Electrical isolation	Yes	
Operating conditions		
Protection in accordance with EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection	

Table 19: 5AP982.1043-01, 5AP982.1043-01 - Technical data

Product ID	5AP982.1043-01
Environmental conditions	
Temperature Operation	Without Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 50°C Mounting orientations to +45° display below: 0 to 50°C With Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 45°C Mounting orientations to +45° display below: 0 to 45°C
Storage Transport	-30 to 70°C -30 to 70°C
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g 2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Altitude Operation	Max. 3000 m ⁶⁾
Mechanical characteristics	
Housing Material Paint	Metal Similar to Pantone432CV
Front ⁷⁾ Frame Design Panel membrane Material Light background Dark gray border around display Dark gray keys Orange keys Color legend strips Gasket	Naturally anodized aluminum Gray Polyester Similar to Pantone 427CV Similar to Pantone 432CV Similar to Pantone 431CV Similar to Pantone 151CV Similar to Pantone 429CV Flat gasket around display front
Dimensions Width Height Depth	423 mm 288 mm 55 mm
Weight	Approx. 3900 g

Table 19: 5AP982.1043-01, 5AP982.1043-01 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link insert card being used.
- 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.
- 4) Touch screen drivers can be downloaded from the Downloads section of the B&R website (www.br-automation.com).
- 5) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 6) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 7) There may be visible deviations in the color and surface appearance depending on the process or batch.

3.1.1.6.4 Temperature humidity diagram

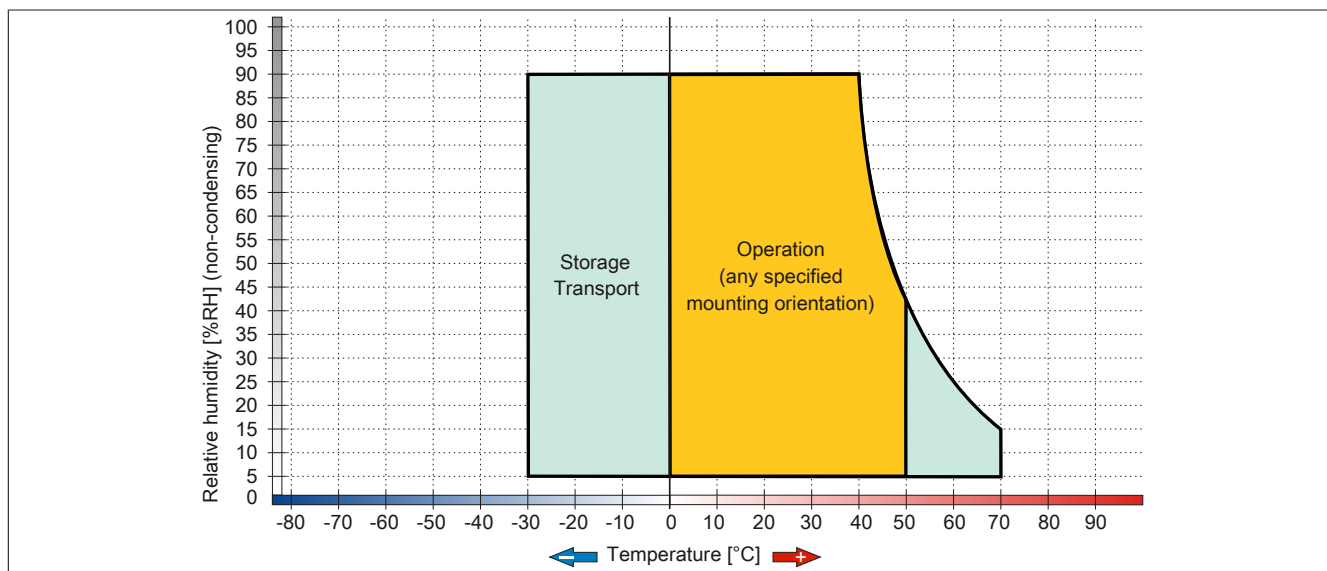


Figure 54: 5AP982.1043-01 - Temperature humidity diagram

3.1.1.6.5 Dimensions

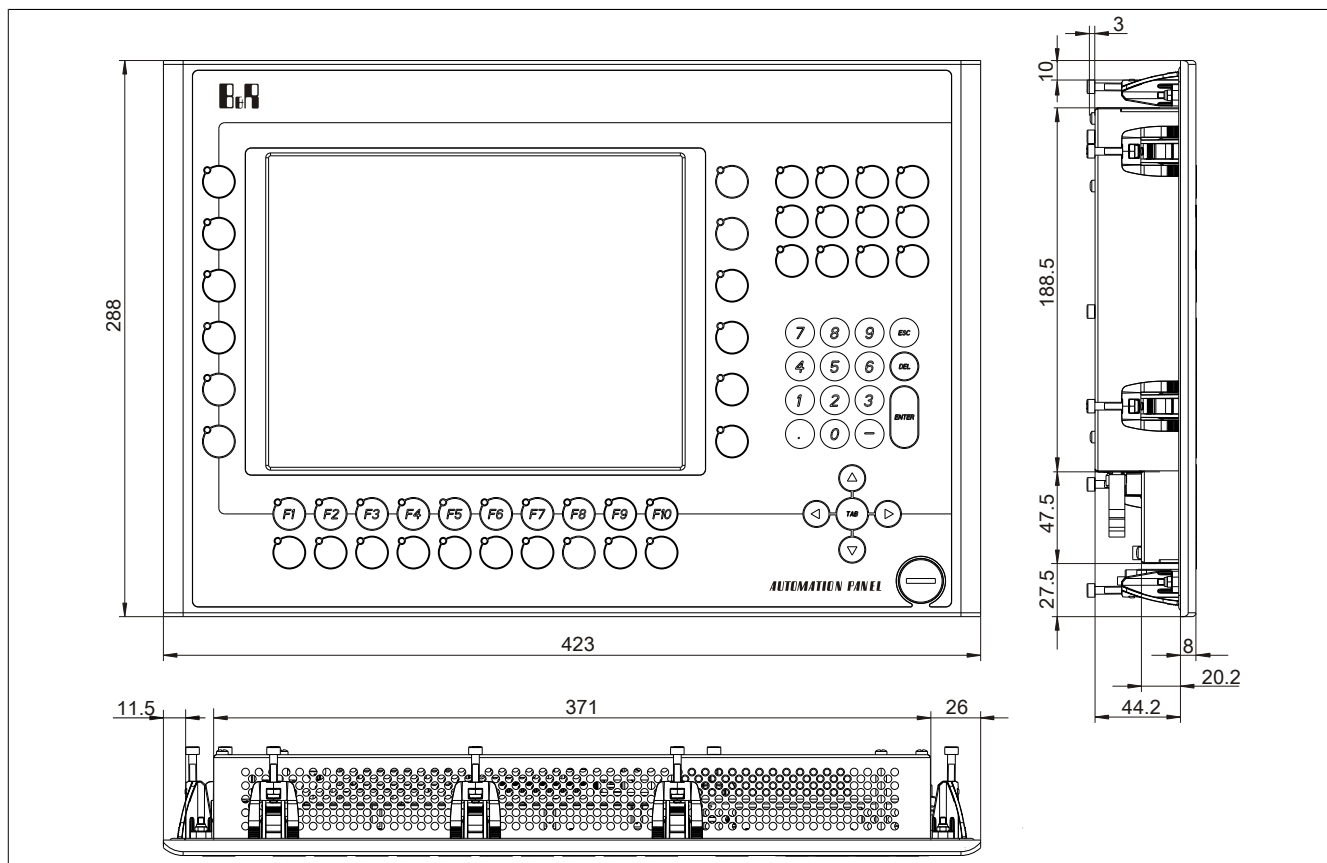


Figure 55: 5AP982.1043-01 - Dimensions

3.1.1.6.6 Cutout installation

The Automation Panel can be installed in a wall cutout using the pre-installed clamping blocks. To do so, it is necessary to make a cutout that corresponds to the following diagram.

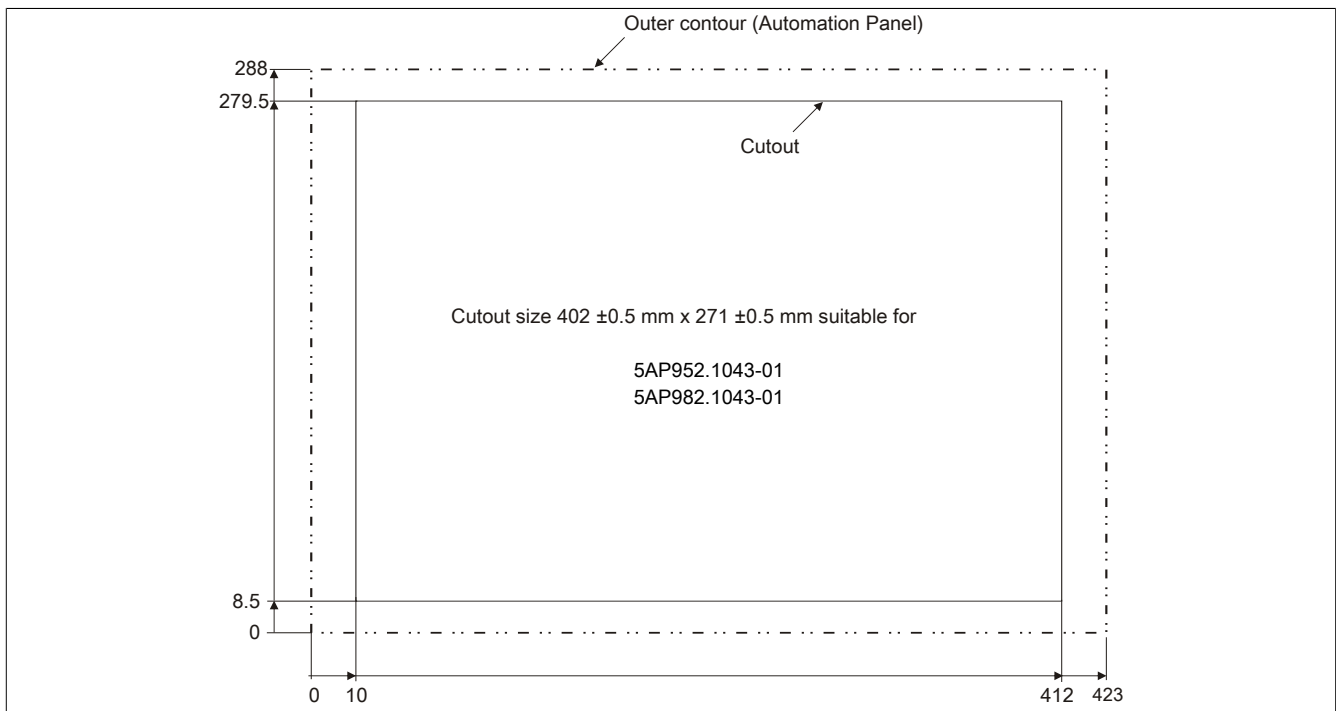


Figure 56: 5AP982.1043-01 - Cutout installation

For additional information regarding installation and mounting orientation, see "Installation" on page 130.

3.1.1.6.7 USB interfaces

Automation Panel devices have three USB interfaces (type A).

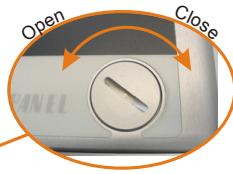
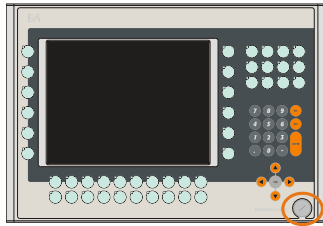


Figure 57: USB interfaces



Figure 58: Back-side USB

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

USB transfer speed

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

Information:

With a DVI Automation Panel Link insert card, USB 2.0 is supported up to a cable length of 5 meters. SDL (Smart Display Link) Automation Panel Link insert card only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

3.1.1.6.8 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

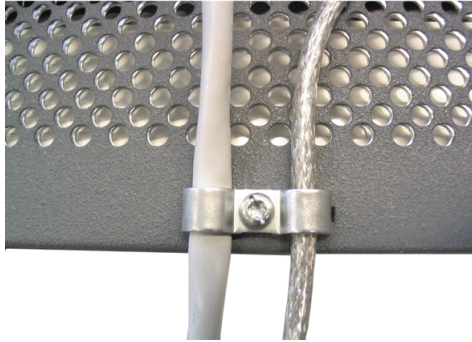


Figure 59: Cable clamps

3.1.1.6.9 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

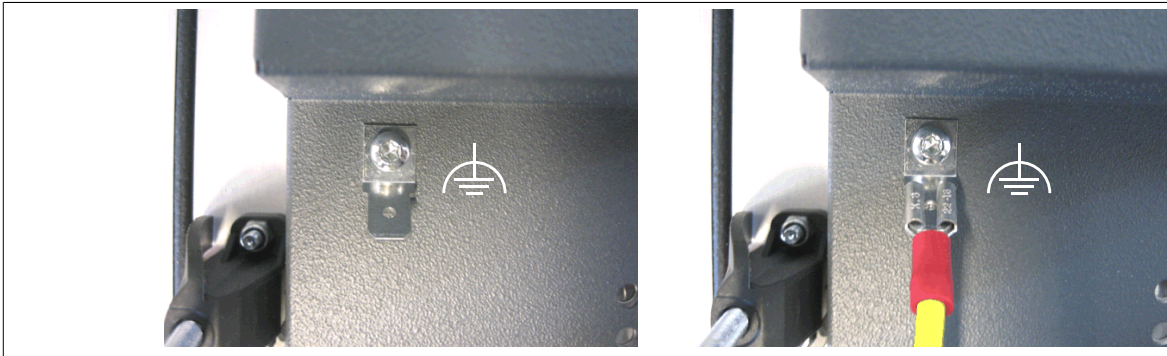


Figure 60: Functional grounding clip

3.1.2 Automation Panel 12.1" SVGA

3.1.2.1 5AP920.1214-01

3.1.2.1.1 General information

- 12.1" SVGA color TFT display
- Analog resistive touch screen
- Small installation depth
- Fan-free operation
- Can be upgraded with Display Link cards or PPC300

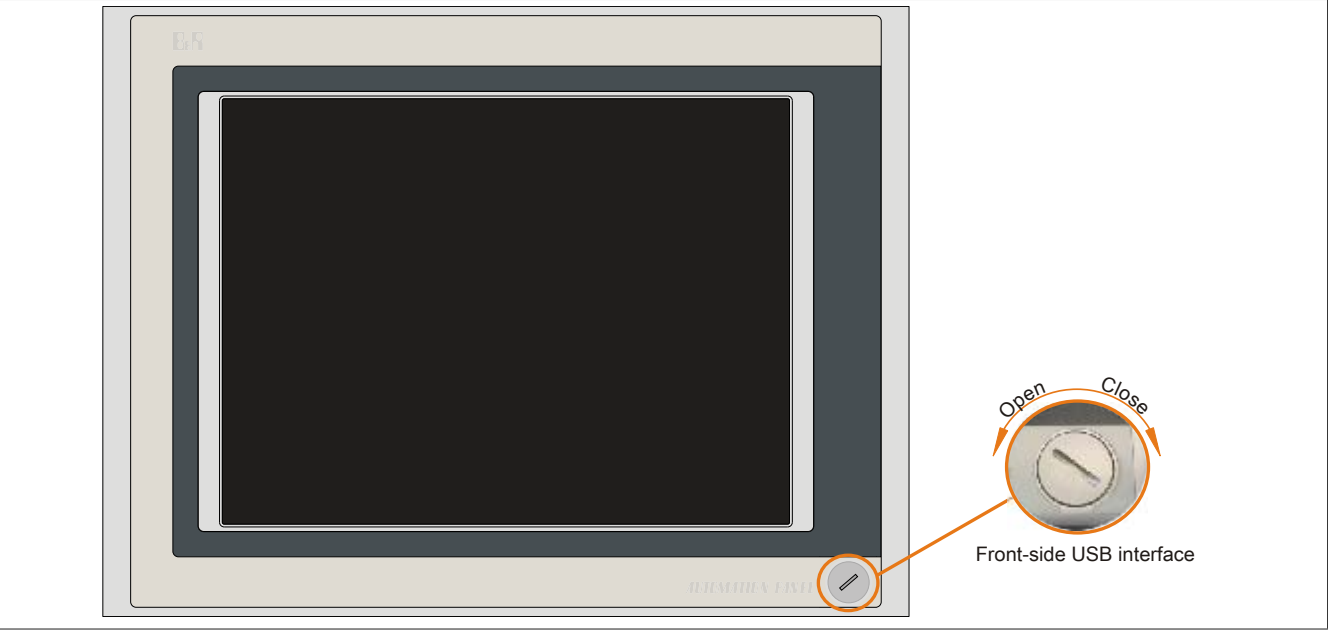


Figure 61: 5AP920.1214-01 - Front view



Figure 62: 5AP920.1214-01 - Rear view

3.1.2.1.2 Order data


Model number	Short description	Figure
Display units		
5AP920.1214-01	Automation Panel AP920; 12.1" SVGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (from front). 24 VDC.	
Required accessories		
Display links		
5DL DVI.1000-01	Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLS DL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 20: 5AP920.1214-01 - Order data

Model number	Short description	Figure
5DLSDL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm ² , protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm ² , protected against vibration by the screw flange	
	Optional accessories	
	Panel PC 300 insert cards	
5PC310.L800-00	Panel PC 300 card for Automation Panel 900; 256 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5PC310.L800-01	Panel PC 300 card for Automation Panel 900; 512 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 20: 5AP920.1214-01 - Order data

3.1.2.1.3 Technical data

Product ID	5AP920.1214-01
General information	
B&R ID code	\$2AE7
Certification	
CE	Yes
cULus	Yes
Interfaces	
USB ¹⁾	
Quantity	3
Type	USB 2.0 ²⁾
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	12.1" (307 mm)
Colors	262144
Resolution	SVGA, 800 x 600 pixels
Contrast	300:1
Viewing angles	
Horizontal	Direction R / Direction L = 70°
Vertical	Direction U = 50°/ direction D = 60°
Backlight	
Brightness	350 cd/m ²
Half brightness time ³⁾	50,000 h
Filter glass	
Transmittance	-
Coating	-
Touch screen ⁴⁾	
Technologies	Analog, resistive
Controller	Elo, serial, 12-bit
Transmittance	Up to 78%
Keys	
Function keys	No
Soft keys	No
System keys	No
Service life	-
LED brightness	-
LED brightness	-
Yellow	-
Inserts	
Compatible installation for PPC300 insert	Yes
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	Max. 3.2 A ⁵⁾
Starting current	Typ. 6 A, max. 30 A for <300 µs
Power consumption	Typ. 12 W, max. 15 W or 21 W with USB (without insert)
Electrical isolation	Yes

Table 21: 5AP920.1214-01 - Technical data

Product ID	5AP920.1214-01
Operating conditions	
Protection in accordance with EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection
Environmental conditions	
Temperature Operation	Without Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 50°C Mounting orientations to +45° display below: 0 to 50°C
Storage Transport	-30 to 70°C -30 to 70°C
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g 2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Altitude Operation	Max. 3000 m ⁶⁾
Mechanical characteristics	
Housing Material Paint	Metal Similar to Pantone432CV
Front ⁷⁾ Frame Design Panel membrane Material Light background Dark gray border around display Gasket	Naturally anodized aluminum Gray Polyester Similar to Pantone 427CV Similar to Pantone432CV Flat gasket around display front
Dimensions Width Height Depth	362 mm 284 mm 54 mm
Weight	Approx. 3400 g

Table 21: 5AP920.1214-01 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link insert card being used.
- 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.
- 4) Touch screen drivers can be downloaded from the Downloads section of the B&R website (www.br-automation.com).
- 5) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 6) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 7) There may be visible deviations in the color and surface appearance depending on the process or batch.

3.1.2.1.4 Temperature humidity diagram

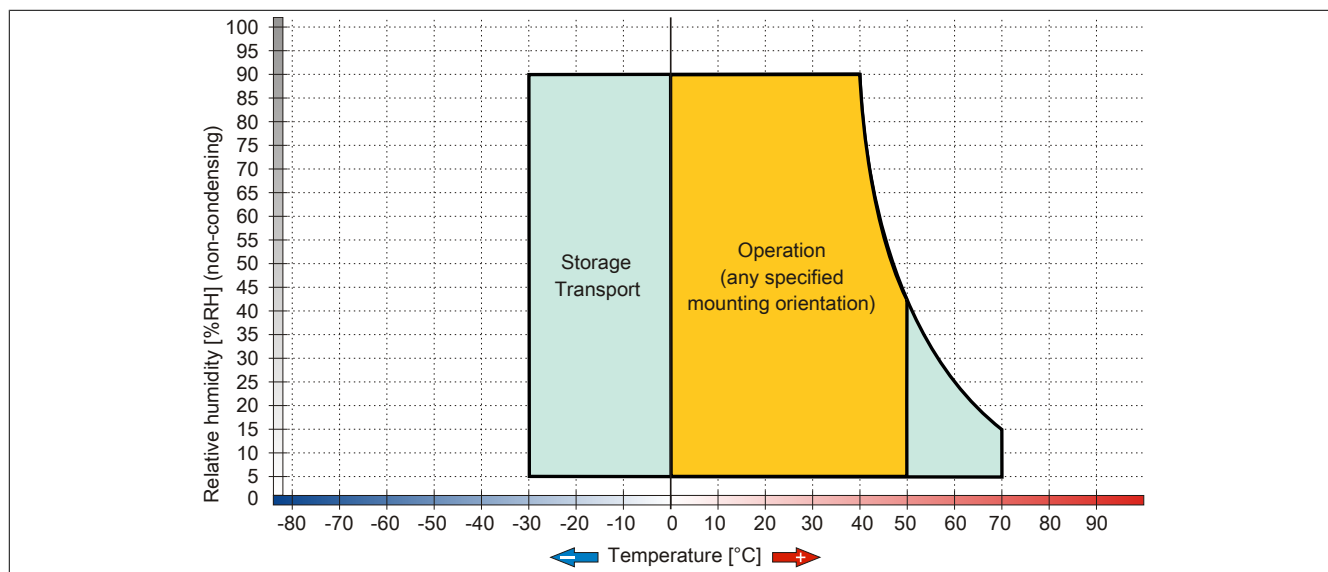


Figure 63: 5AP920.1214-01 - Temperature humidity diagram

3.1.2.1.5 Dimensions

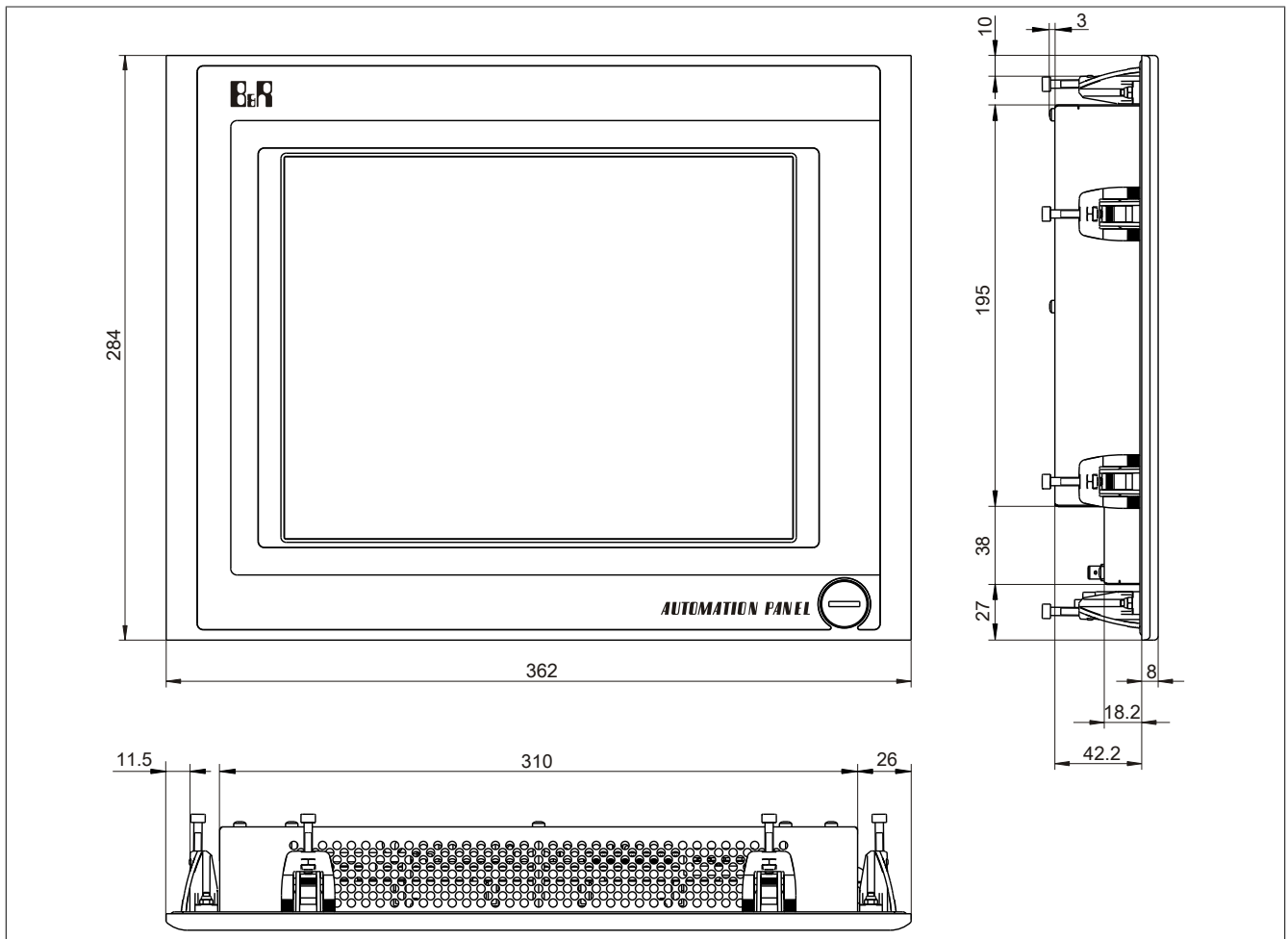


Figure 64: 5AP920.1214-01 - Dimensions

3.1.2.1.6 Cutout installation

The Automation Panel can be installed in a wall cutout using the pre-installed clamping blocks. To do so, it is necessary to make a cutout that corresponds to the following diagram.

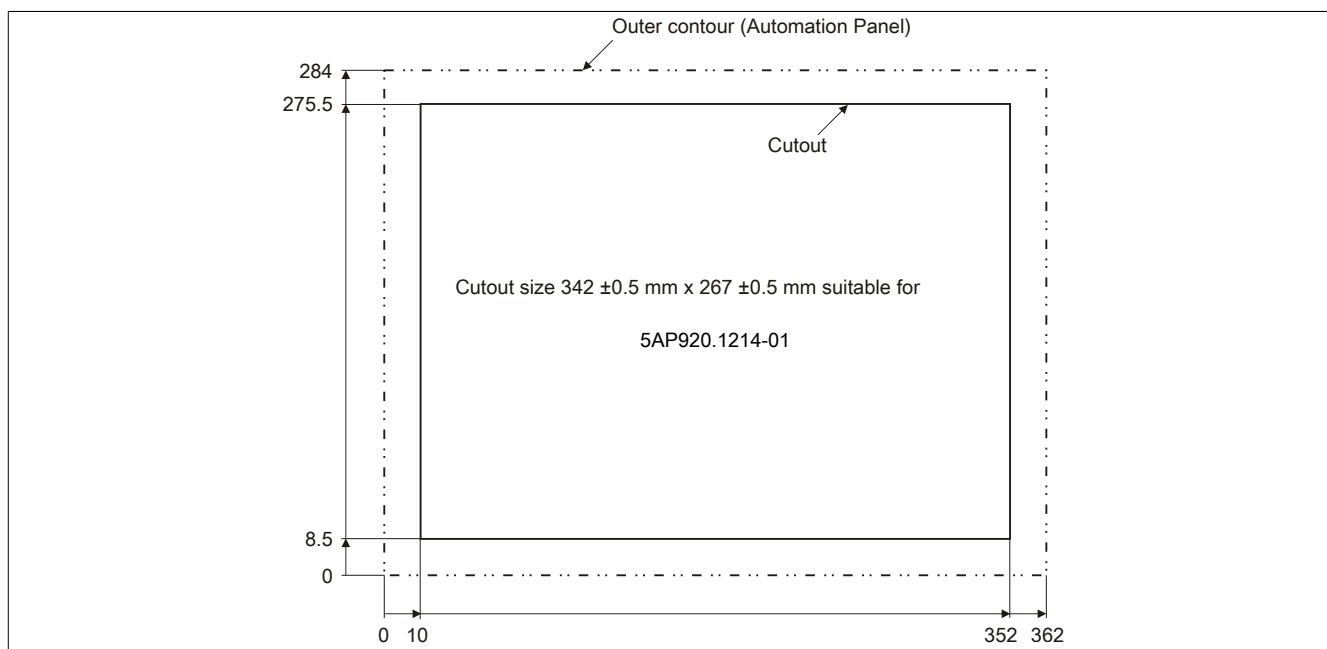


Figure 65: 5AP920.1214-01 - Cutout installation

For additional information regarding installation and mounting orientation, see "Installation" on page 130.

3.1.2.1.7 USB interfaces

Automation Panel devices have three USB ports (type A).

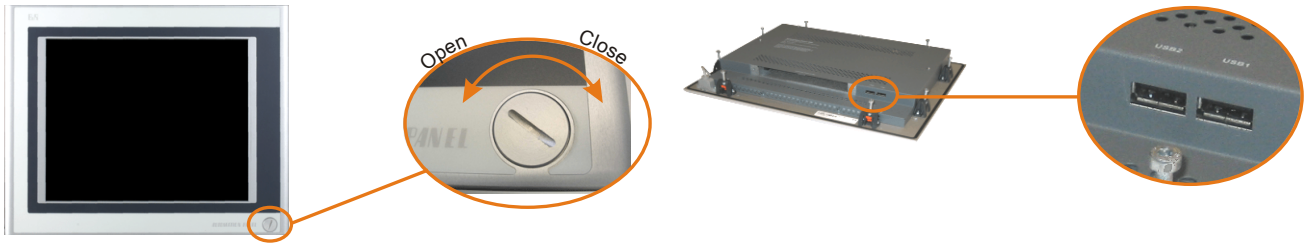


Figure 66: USB interfaces

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

USB transfer speed

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

Information:

With a DVI Automation Panel Link insert card, USB 2.0 is supported up to a cable length of 5 meters. SDL (Smart Display Link) Automation Panel Link insert card only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

3.1.2.1.8 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

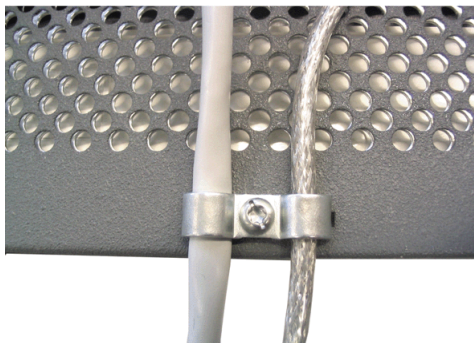


Figure 67: Cable clamps

3.1.2.1.9 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

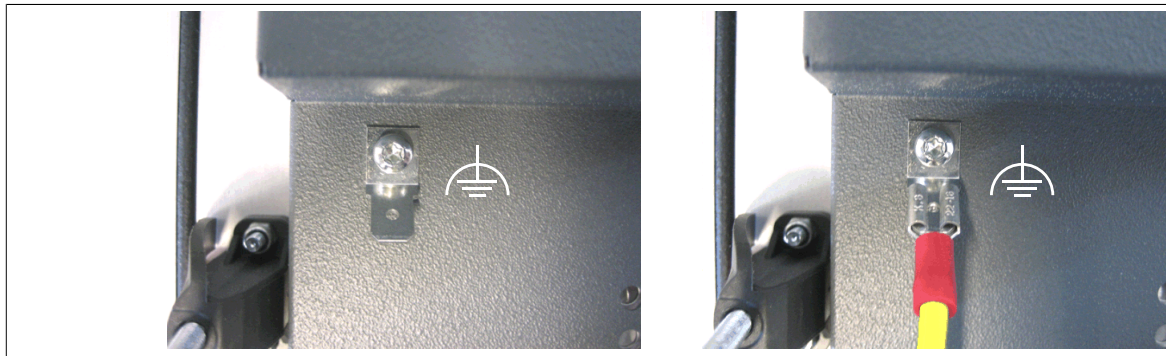


Figure 68: Functional grounding clip

3.1.3 Automation Panel 15" XGA

3.1.3.1 5AP920.1505-01

3.1.3.1.1 General information

- 15" XGA color TFT display
- Analog resistive touch screen
- Small installation depth
- Fan-free operation
- Can be upgraded with Display Link cards or PPC300

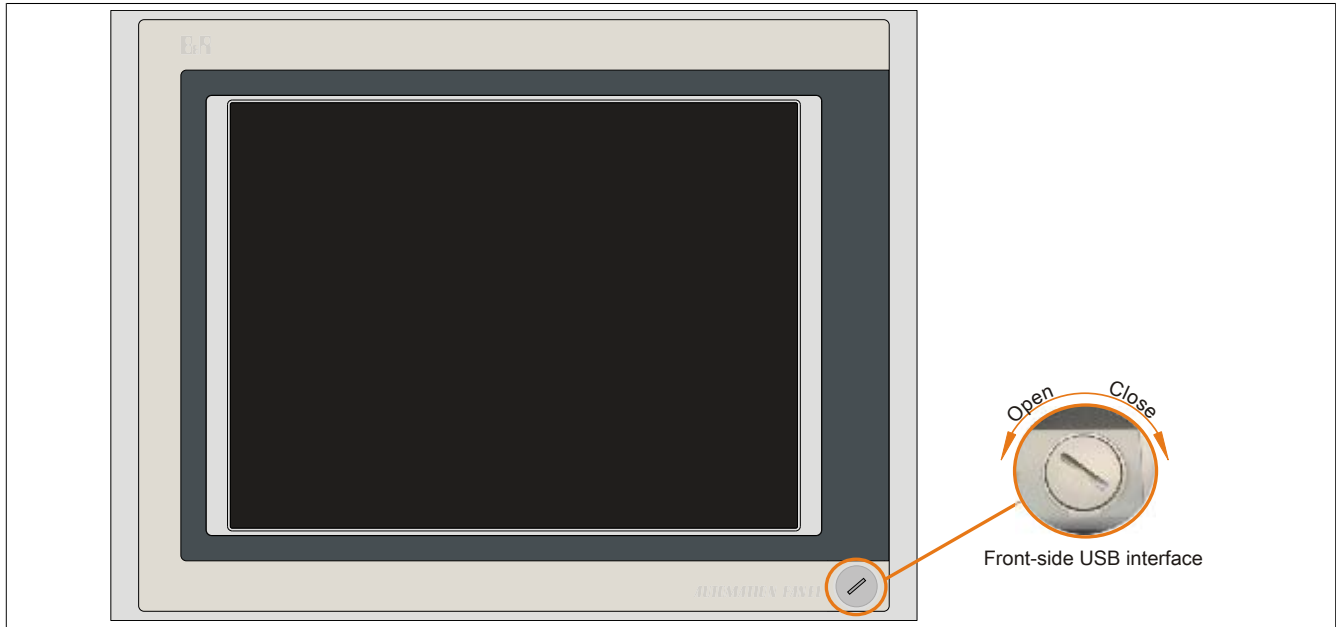


Figure 69: 5AP920.1505-01 - Front view

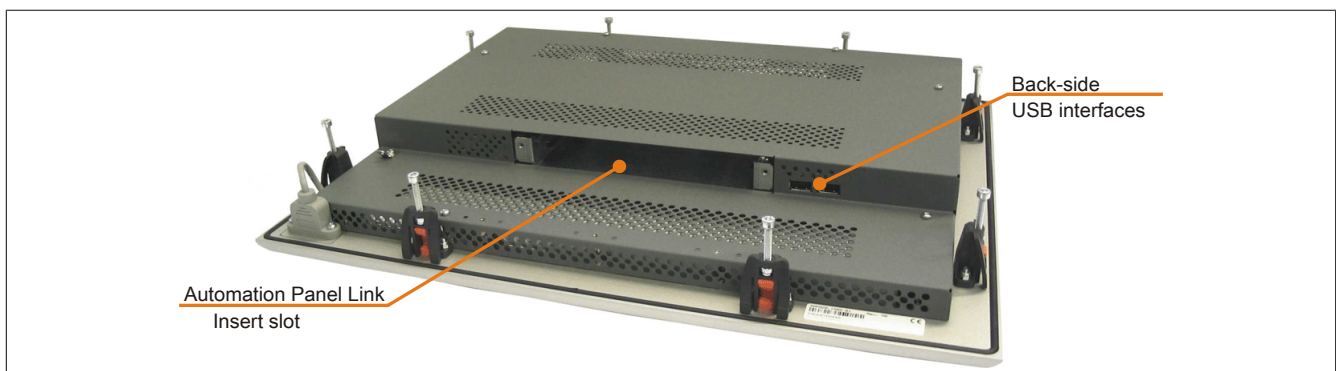


Figure 70: 5AP920.1505-01 - Rear view

3.1.3.1.2 Order data

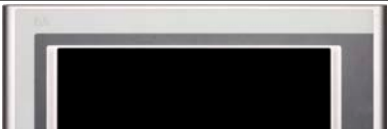
Model number	Short description	Figure
	Display units	
5AP920.1505-01	Automation Panel AP920; 15" XGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (from front). 24 VDC.	
	Required accessories	
	Display links	
5DL DVI.1000-01	Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLS DL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 22: 5AP920.1505-01 - Order data

Model number	Short description	Figure
5DLSDL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm ² , protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm ² , protected against vibration by the screw flange	
	Optional accessories	
	Panel PC 300 insert cards	
5PC310.L800-00	Panel PC 300 card for Automation Panel 900; 256 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5PC310.L800-01	Panel PC 300 card for Automation Panel 900; 512 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 22: 5AP920.1505-01 - Order data

3.1.3.1.3 Technical data

Product ID	5AP920.1505-01
General information	
B&R ID code	\$1942
Certification	
CE	Yes
cULus	Yes
GL	Yes
Interfaces	
USB ¹⁾	
Quantity	3
Type	USB 2.0 ²⁾
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	15" (381 mm)
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels
Contrast	400:1
Viewing angles	
Horizontal	Direction R / Direction L = 85°
Vertical	Direction U / direction D = 85°
Backlight	
Brightness	250 cd/m ²
Half brightness time ³⁾	50,000 h
Filter glass	
Transmittance	-
Coating	-
Touch screen ⁴⁾	
Technologies	Analog, resistive
Controller	Elo, serial, 12-bit
Transmittance	Up to 78%
Keys	
Function keys	No
Soft keys	No
System keys	No
Service life	-
LED brightness	-
LED brightness	-
Yellow	-
Inserts	
Compatible installation for PPC300 insert	Yes
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	Max. 3.2 A ⁵⁾
Starting current	Typ. 6 A, max. 30 A for <300 µs
Power consumption	Typ. 24 W, max. 31 W or 41 W with USB (without insert)
Electrical isolation	Yes

Table 23: 5AP920.1505-01 - Technical data

Product ID	5AP920.1505-01
Operating conditions	
Protection in accordance with EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection
Environmental conditions	
Temperature Operation	Without Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 50°C Mounting orientations to +45° display below: 0 to 45°C
Storage Transport	With Rittal housing Mounting orientation 0°: 0 to 40°C Mounting orientations to -45° display above: 0 to 40°C Mounting orientations to +45° display below: 0 to 40°C -25 to 60°C -25 to 60°C
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g 2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Altitude Operation	Max. 3000 m ⁶⁾
Mechanical characteristics	
Housing Material Paint	Metal Similar to Pantone432CV
Front ⁷⁾ Frame Design Panel membrane Material Light background Dark gray border around display Gasket	Naturally anodized aluminum Gray Polyester Similar to Pantone 427CV Similar to Pantone432CV Flat gasket around display front
Dimensions Width Height Depth	435 mm 330 mm 54 mm
Weight	Approx. 5100 g

Table 23: 5AP920.1505-01 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link insert card being used.
- 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.
- 4) Touch screen drivers can be downloaded from the Downloads section of the B&R website (www.br-automation.com).
- 5) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 6) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 7) There may be visible deviations in the color and surface appearance depending on the process or batch.

3.1.3.1.4 Temperature humidity diagram

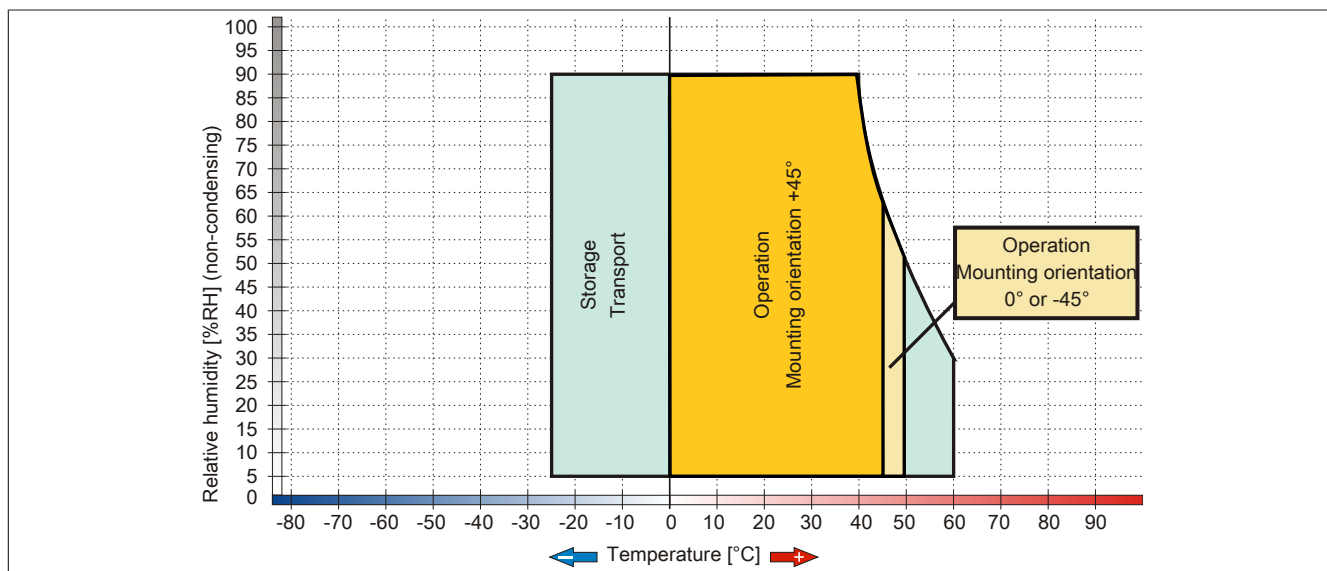


Figure 71: 5AP920.1505-01 - Temperature humidity diagram

3.1.3.1.5 Dimensions

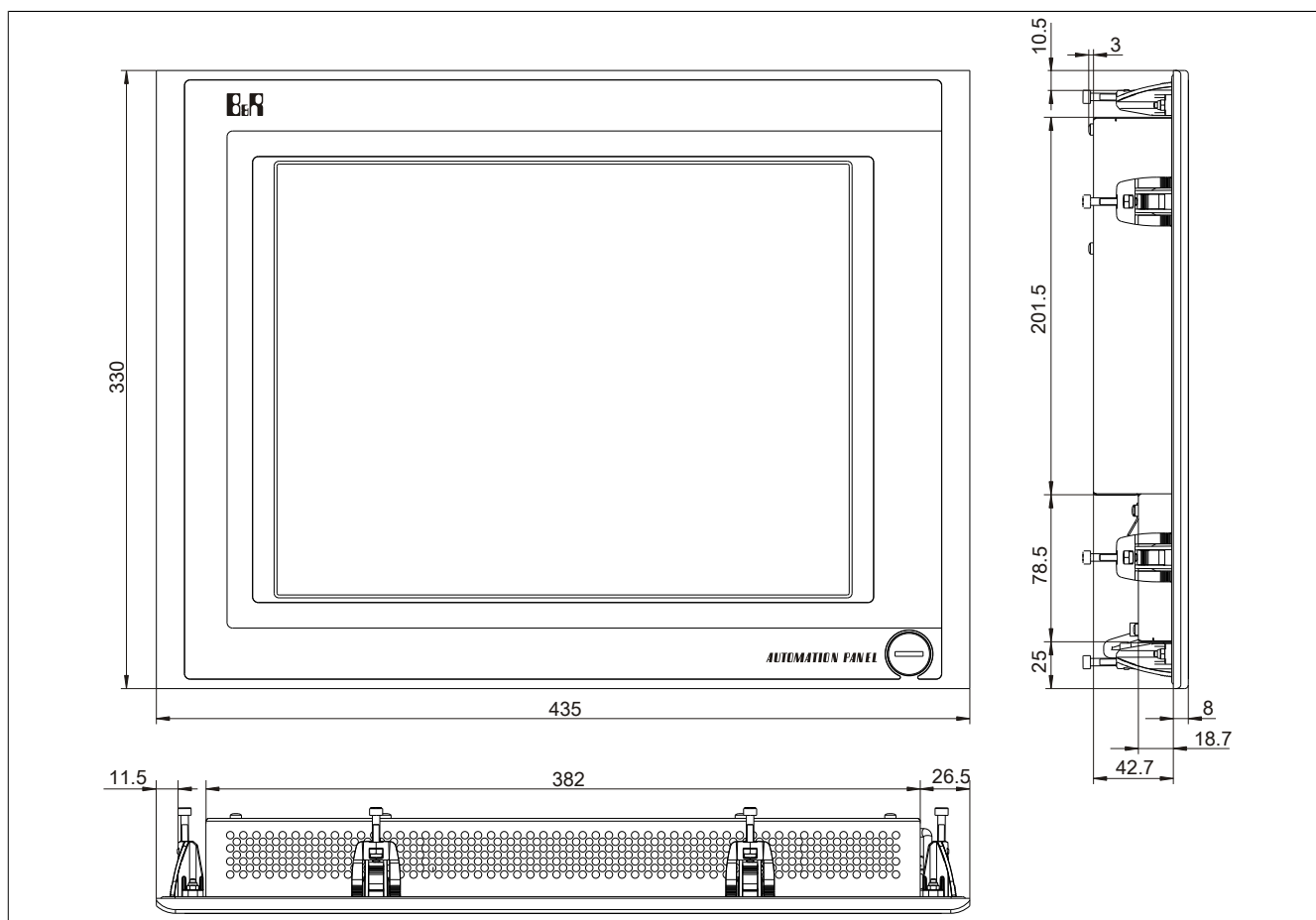


Figure 72: 5AP920.1505-01 - Dimensions

3.1.3.1.6 Cutout installation

The Automation Panel can be installed in a wall cutout using the pre-installed clamping blocks. To do so, it is necessary to make a cutout that corresponds to the following diagram.

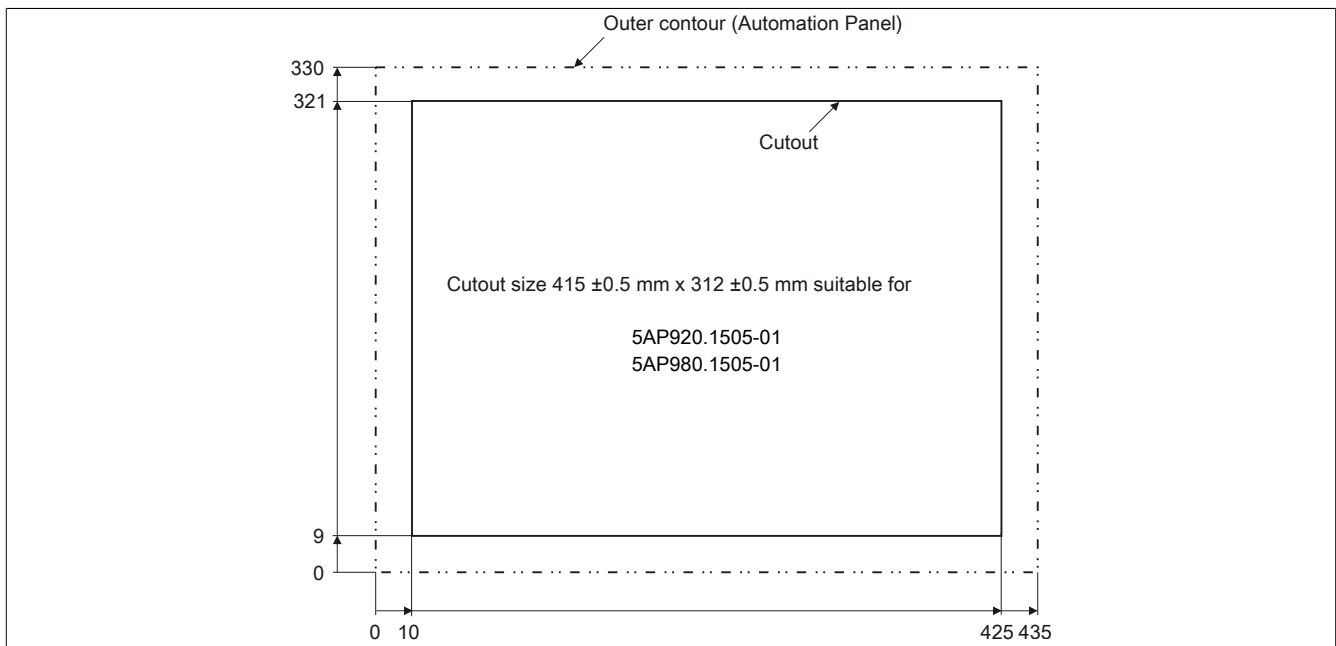


Figure 73: 5AP920.1505-01 - Cutout installation

For additional information regarding installation and mounting orientation, see "Installation" on page 130.

3.1.3.1.7 USB interfaces

Automation Panel devices have three USB ports (type A).

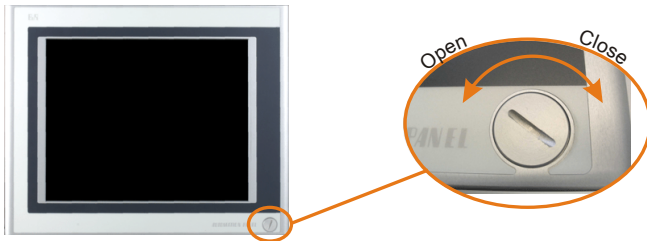


Figure 74: USB interfaces

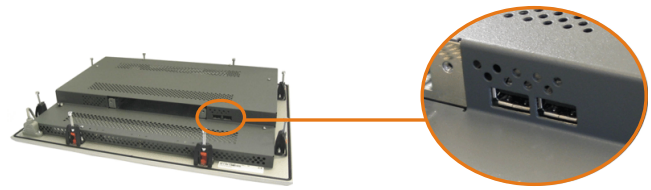


Figure 75: Back-side USB

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

USB transfer speed

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

Information:

With a DVI Automation Panel Link insert card, USB 2.0 is supported up to a cable length of 5 meters. SDL (Smart Display Link) Automation Panel Link insert card only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

3.1.3.1.8 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

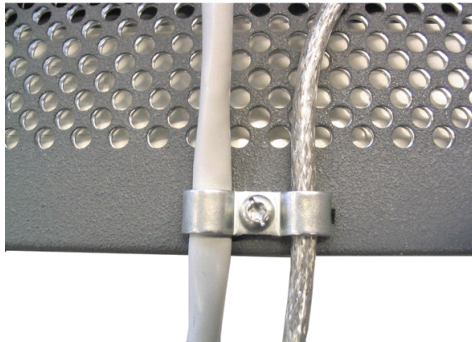


Figure 76: Cable clamps

3.1.3.1.9 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

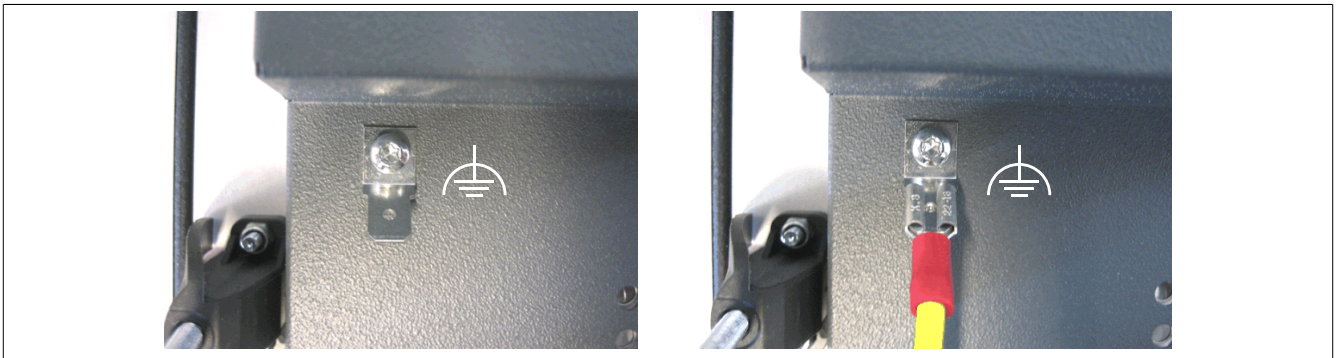


Figure 77: Functional grounding clip

3.1.3.2 5AP951.1505-01

3.1.3.2.1 General information

- 15" XGA color TFT display
- Function keys, system keys and soft keys
- Small installation depth
- Fan-free operation
- Can be upgraded with Display Link cards or PPC300

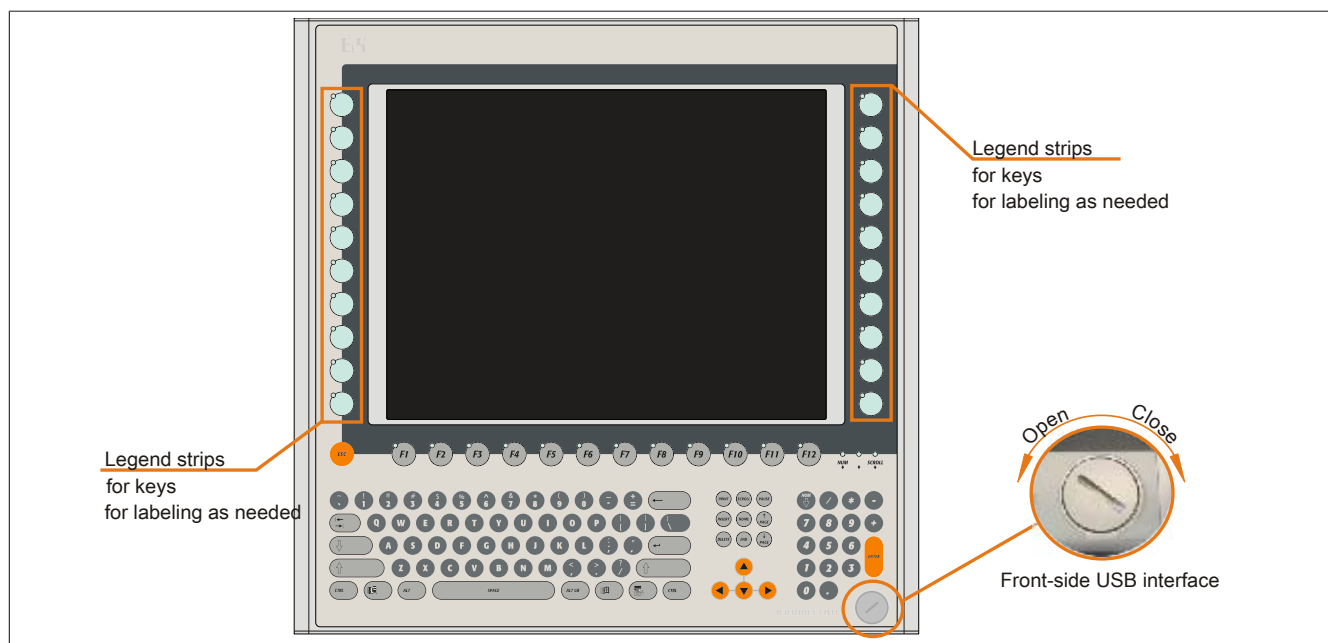


Figure 78: 5AP951.1505-01 - Front view

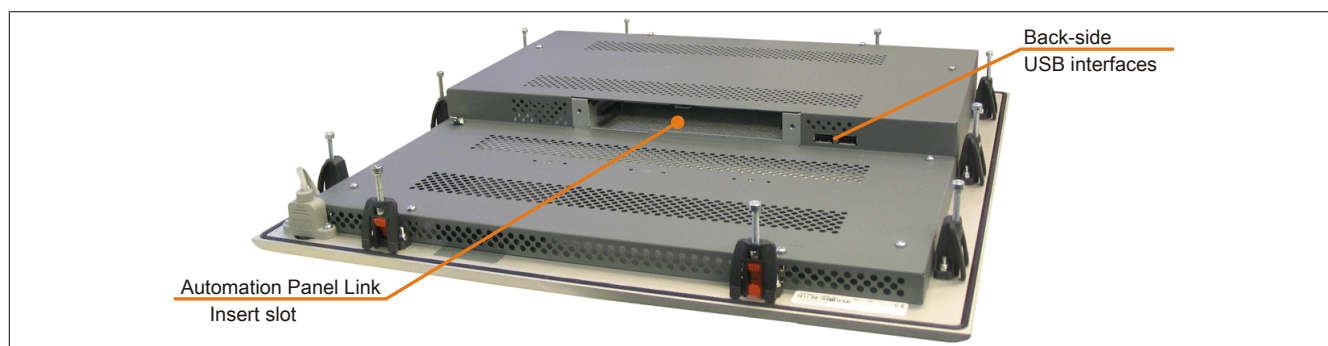


Figure 79: 5AP951.1505-01 - Rear view

3.1.3.2.2 Order data

Model number	Short description	Figure
	Display units	
5AP951.1505-01	Automation Panel AP951 15" XGA color TFT display with; 12 softkeys; 20 function keys and 92 system keys; 3 USB 2.0 interfaces; slot for Automation Panel link; IP 65 protection (front side). 24 VDC.	
	Required accessories	
	Display links	
5DL DVI.1000-01	Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLS DL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLS DL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 24: 5AP951.1505-01 - Order data

Model number	Short description	Figure
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm ² , protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm ² , protected against vibration by the screw flange	
	Optional accessories	
	Accessories	
5AC900.150X-01	Legend Strips Template 15,0" for Automation Panel 5AP951.1505-01, 5AP980.1505-01 and 5AP981.1505-01 and Panel PC 5PC781.1505-00; for 4 devices.	

Table 24: 5AP951.1505-01 - Order data

3.1.3.2.3 Technical data

Product ID	5AP951.1505-01
General information	
B&R ID code	\$1D5F
Certification CE	Yes
Interfaces	
USB ¹⁾	
Quantity	3
Type	USB 2.0 ²⁾
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	15" (381 mm)
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels
Contrast	400:1
Viewing angles	
Horizontal	Direction R / Direction L = 85°
Vertical	Direction U / direction D = 85°
Backlight	
Brightness	250 cd/m ²
Half brightness time ³⁾	50,000 h
Filter glass	
Transmittance	95%
Coating	On both sides
Touch screen	
Technologies	-
Controller	-
Transmittance	-
Keys	
Function keys	20 with LED (yellow)
Soft keys	12 with LED (yellow)
System keys	Alphanumeric keys, numeric keys, cursor block
Service life	> 1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED brightness	
Yellow	Typ. 12 mcd
Inserts	
Compatible installation for PPC300 insert	No
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	Max. 3.2 A ⁴⁾
Starting current	Typ. 6 A, max. 30 A for <300 µs
Power consumption	Typ. 24 W (without LED), max. 32 W or 42 W with USB (without insert)
Electrical isolation	Yes
Operating conditions	
Protection in accordance with EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection

Table 25: 5AP951.1505-01 - Technical data

Product ID	5AP951.1505-01
Environmental conditions	
Temperature Operation	Without Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 50°C Mounting orientations to +45° display below: 0 to 45°C With Rittal housing Mounting orientation 0°: 0 to 40°C Mounting orientations to -45° display above: 0 to 40°C Mounting orientations to +45° display below: 0 to 40°C
Storage Transport	-25 to 60°C -25 to 60°C
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g 2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Altitude Operation	Max. 3000 m ⁵⁾
Mechanical characteristics	
Housing Material Paint	Metal Similar to Pantone432CV
Front ⁶⁾ Frame Design Panel membrane Material Light background Dark gray border around display Dark gray keys Orange keys Color legend strips Gasket	Naturally anodized aluminum Gray Polyester Similar to Pantone 427CV Similar to Pantone432CV Similar to Pantone 431CV Similar to Pantone 151CV Similar to Pantone 429CV Flat gasket around display front
Dimensions Width Height Depth	435 mm 430 mm 54 mm
Weight	Approx. 5900 g

Table 25: 5AP951.1505-01 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link insert card being used.
- 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.
- 4) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 5) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 6) There may be visible deviations in the color and surface appearance depending on the process or batch.

3.1.3.2.4 Temperature humidity diagram

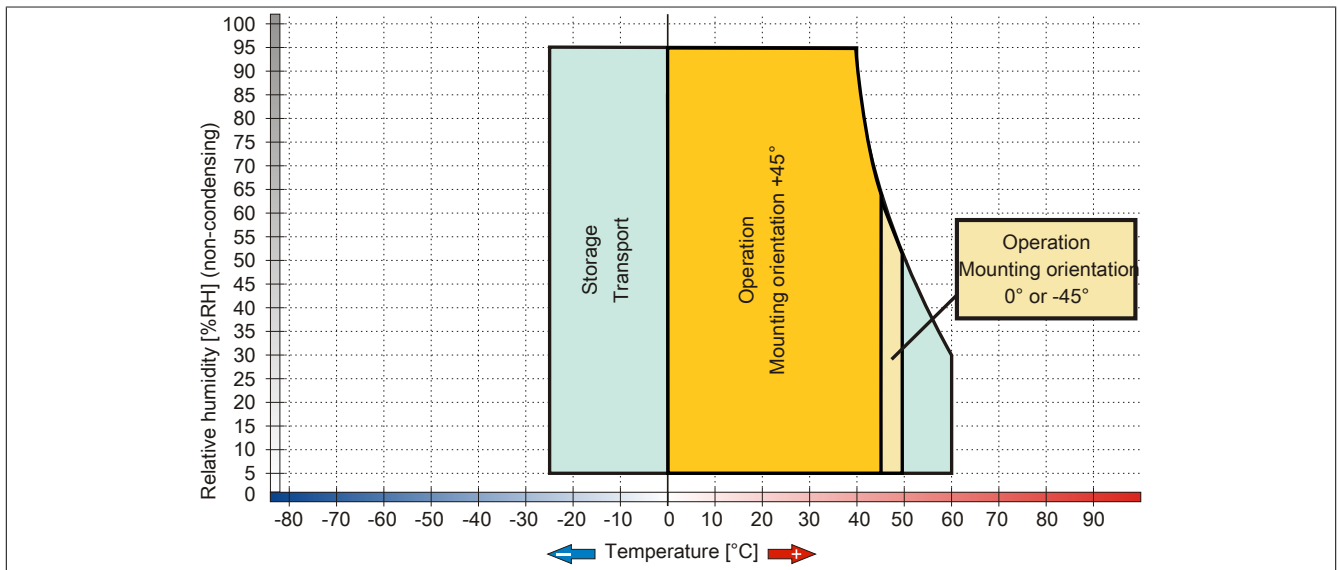


Figure 80: 5AP951.1505-01 - Temperature humidity diagram

3.1.3.2.5 Dimensions

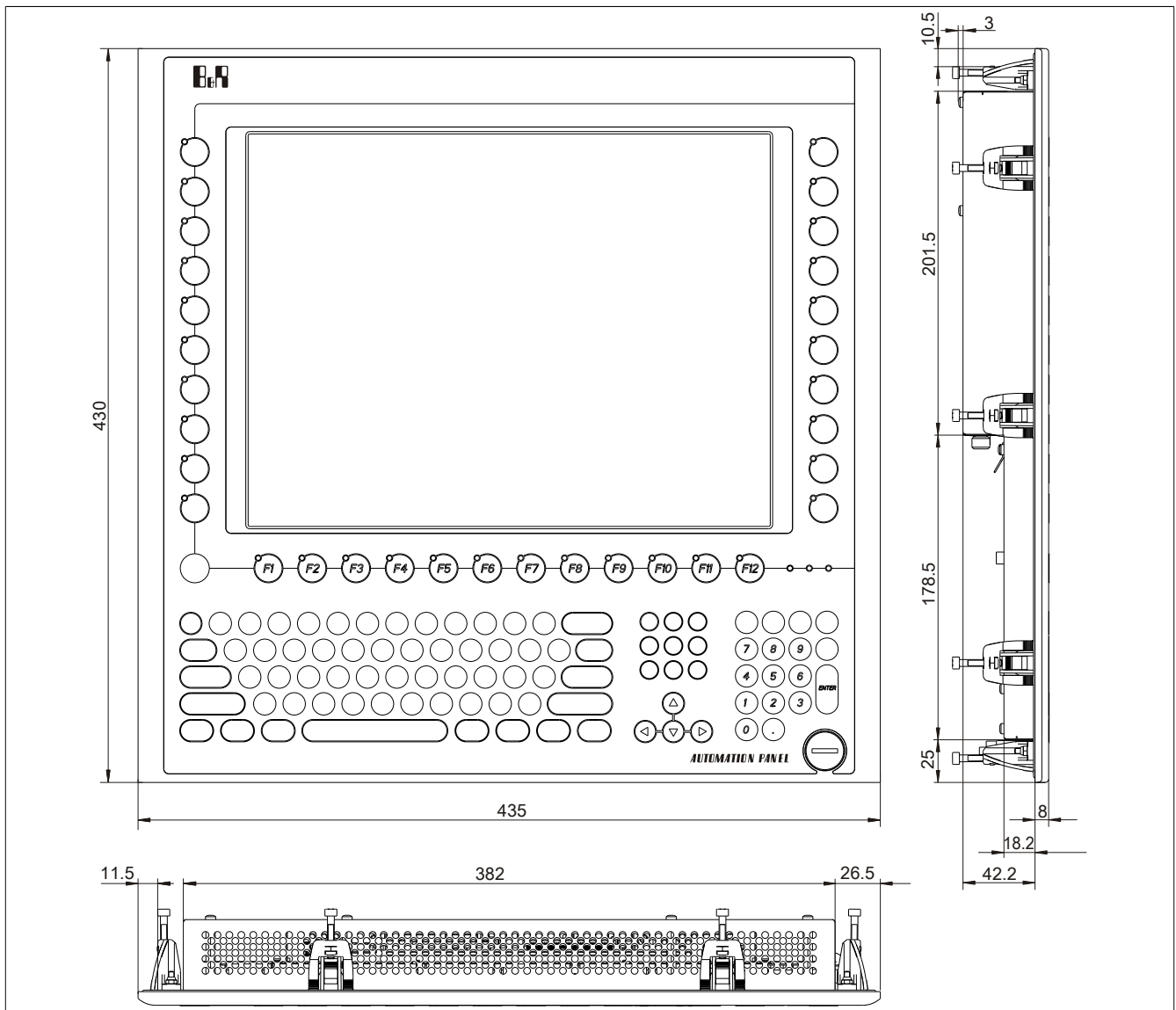


Figure 81: 5AP951.1505-01 - Dimensions

3.1.3.2.6 Cutout installation

The Automation Panel can be installed in a wall cutout using the pre-installed clamping blocks. To do so, it is necessary to make a cutout that corresponds to the following diagram.

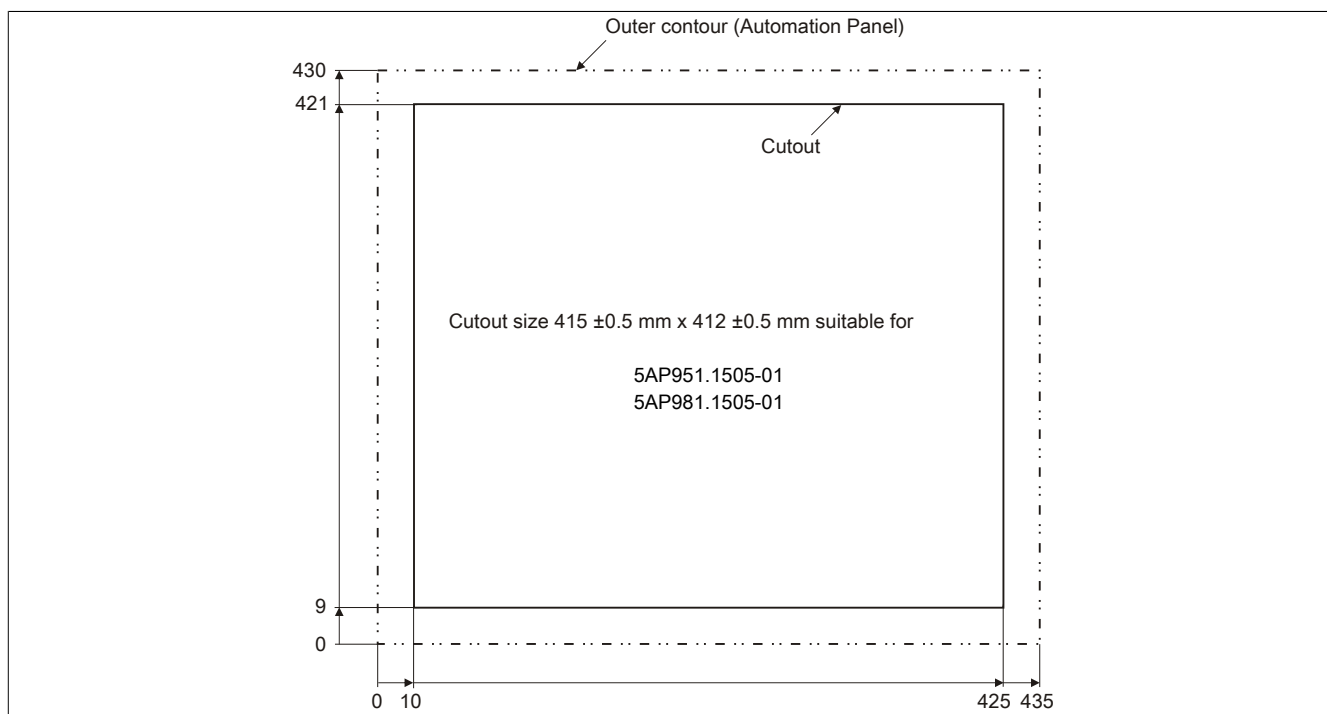


Figure 82: 5AP951.1505-01 - Cutout installation

For additional information regarding installation and mounting orientation, see "Installation" on page 130.

3.1.3.2.7 USB interfaces

Automation Panel devices have three USB ports (type A).

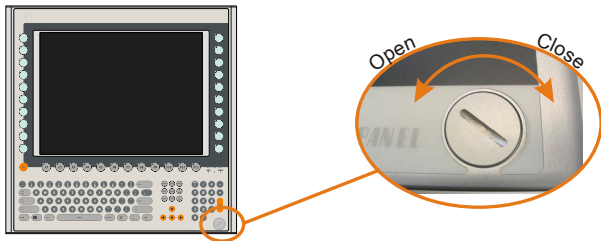


Figure 83: USB interfaces

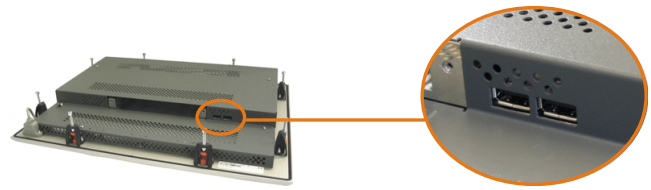


Figure 84: Back-side USB

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

USB transfer speed

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

Information:

With a DVI Automation Panel Link insert card, USB 2.0 is supported up to a cable length of 5 meters. SDL (Smart Display Link) Automation Panel Link insert card only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

3.1.3.2.8 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

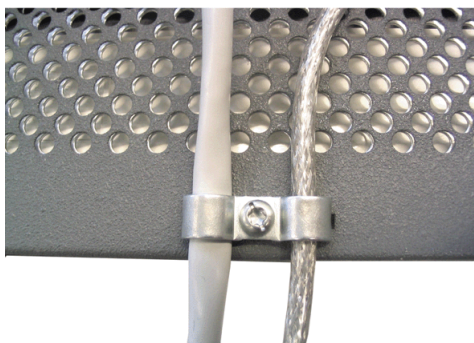


Figure 85: Cable clamps

3.1.3.2.9 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

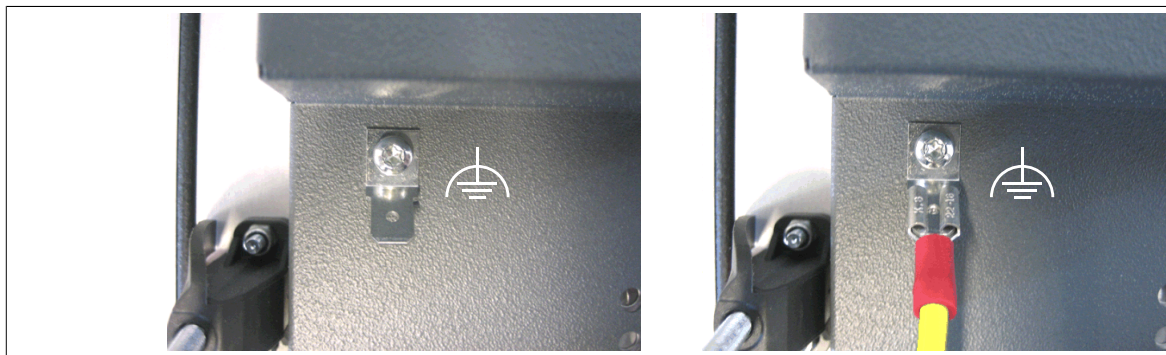


Figure 86: Functional grounding clip

3.1.3.3 5AP980.1505-01

3.1.3.3.1 General information

- 15" XGA color TFT display
- Analog resistive touch screen
- Function keys and soft keys
- Small installation depth
- Fan-free operation
- Can be upgraded with Display Link cards or PPC300

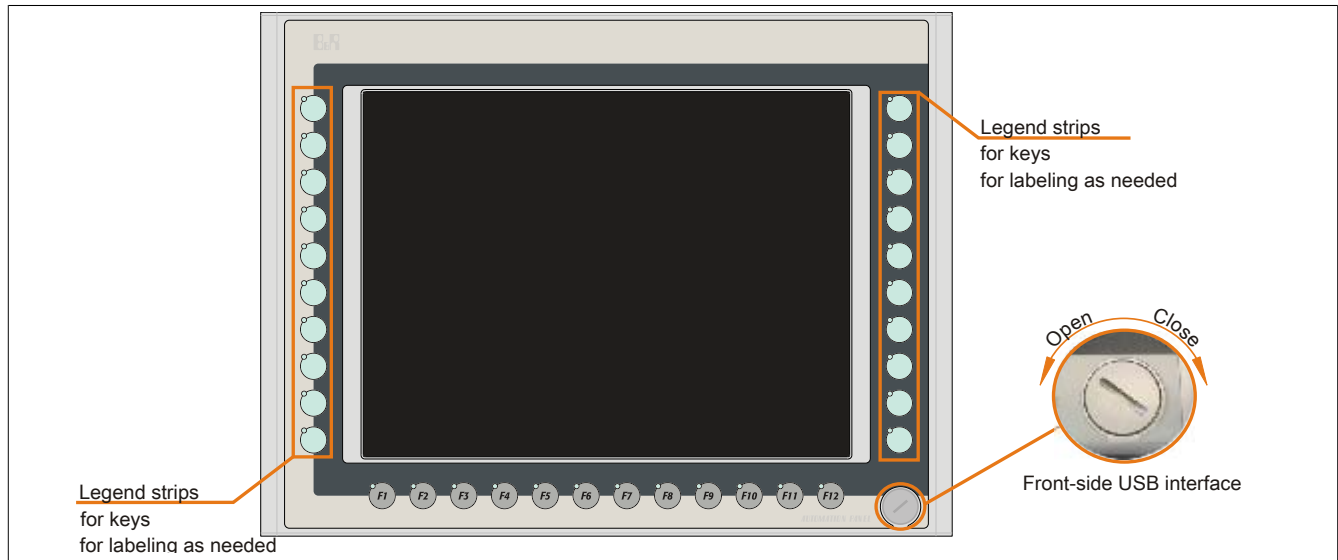


Figure 87: 5AP980.1505-01 - Front view

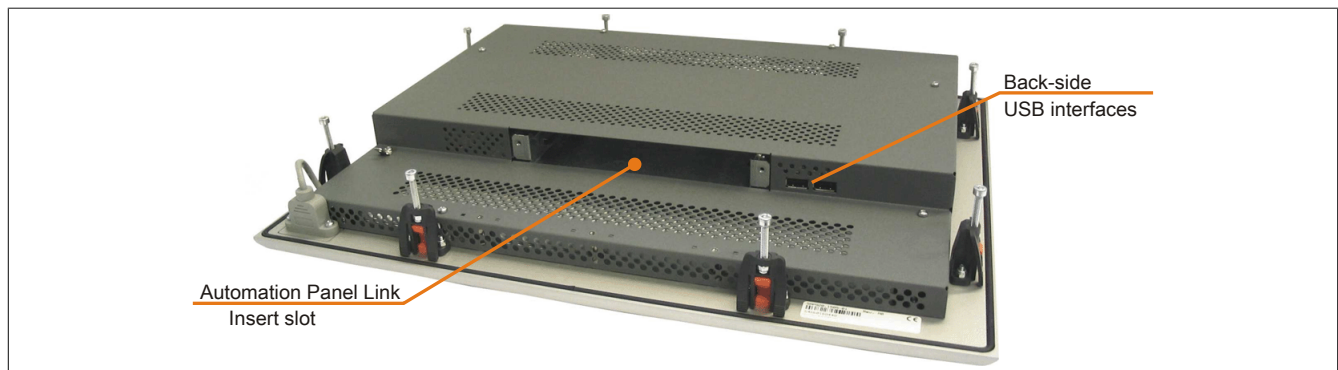


Figure 88: 5AP980.1505-01 - Rear view

3.1.3.3.2 Order data

Model number	Short description	Figure
5AP980.1505-01	Display units Automation Panel AP980; 15" XGA color TFT display with touch screen (resistive); 12 softkeys and 20 function keys; 3 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (front side). 24 VDC.	
	Required accessories	
5DL DVI.1000-01	Display links Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLS DL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLS DL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 26: 5AP980.1505-01 - Order data

Model number	Short description	Figure
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm ² , protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm ² , protected against vibration by the screw flange	
	Optional accessories	
	Accessories	
5AC900.150X-01	Legend Strips Template 15,0" for Automation Panel 5AP951.1505-01, 5AP980.1505-01 and 5AP981.1505-01 and Panel PC 5PC781.1505-00; for 4 devices.	
	Panel PC 300 insert cards	
5PC310.L800-00	Panel PC 300 card for Automation Panel 900; 256 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5PC310.L800-01	Panel PC 300 card for Automation Panel 900; 512 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 26: 5AP980.1505-01 - Order data

3.1.3.3.3 Technical data

Product ID	5AP980.1505-01
General information	
B&R ID code	\$1D5E
Certification	
CE	Yes
cULus	Yes
Interfaces	
USB ¹⁾	
Quantity	3
Type	USB 2.0 ²⁾
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	15" (381 mm)
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels
Contrast	400:1
Viewing angles	
Horizontal	Direction R / Direction L = 85°
Vertical	Direction U / direction D = 85°
Backlight	
Brightness	250 cd/m ²
Half brightness time ³⁾	50,000 h
Filter glass	
Transmittance	-
Coating	-
Touch screen ⁴⁾	
Technologies	Analog, resistive
Controller	Elo, serial, 12-bit
Transmittance	Up to 78%
Keys	
Function keys	20 with LED (yellow)
Soft keys	12 with LED (yellow)
System keys	No
Service life	> 1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED brightness	
Yellow	Typ. 12 mcd
Inserts	
Compatible installation for PPC300 insert	Yes
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	Max. 3.2 A ⁵⁾
Starting current	Typ. 6 A, max. 30 A for <300 µs
Power consumption	Typ. 24 W (without LED), max. 32 W or 42 W with USB (without insert)
Electrical isolation	Yes

Table 27: 5AP980.1505-01 - Technical data

Product ID	5AP980.1505-01
Operating conditions	
Protection in accordance with EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection
Environmental conditions	
Temperature Operation	Without Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 50°C Mounting orientations to +45° display below: 0 to 45°C
Storage Transport	With Rittal housing Mounting orientation 0°: 0 to 40°C Mounting orientations to -45° display above: 0 to 40°C Mounting orientations to +45° display below: 0 to 40°C -25 to 60°C -25 to 60°C
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g 2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Altitude Operation	Max. 3000 m ⁶⁾
Mechanical characteristics	
Housing Material Paint	Metal Similar to Pantone432CV
Front ⁷⁾ Frame Design Panel membrane Material Light background Dark gray border around display Color legend strips Gasket	Naturally anodized aluminum Gray Polyester Similar to Pantone 427CV Similar to Pantone432CV Similar to Pantone 429CV Flat gasket around display front
Dimensions Width Height Depth	435 mm 330 mm 54 mm
Weight	Approx. 5100 g

Table 27: 5AP980.1505-01 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link insert card being used.
- 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.
- 4) Touch screen drivers can be downloaded from the Downloads section of the B&R website (www.br-automation.com).
- 5) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 6) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 7) There may be visible deviations in the color and surface appearance depending on the process or batch.

3.1.3.3.4 Temperature humidity diagram

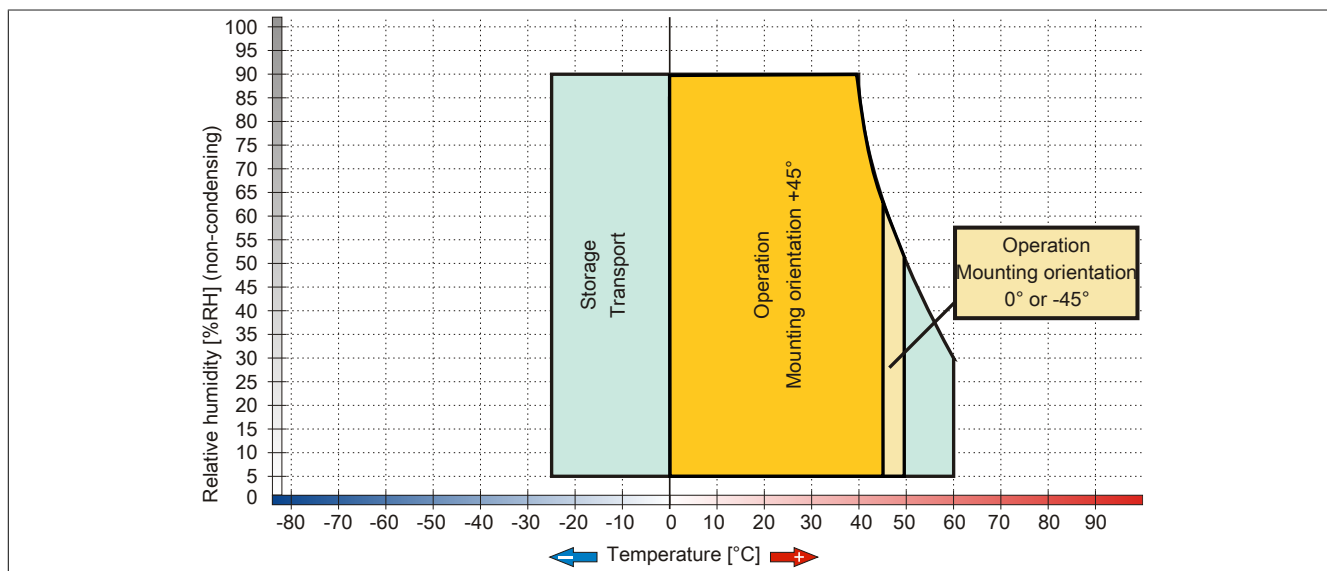


Figure 89: 5AP980.1505-01 - Temperature humidity diagram

3.1.3.3.5 Dimensions

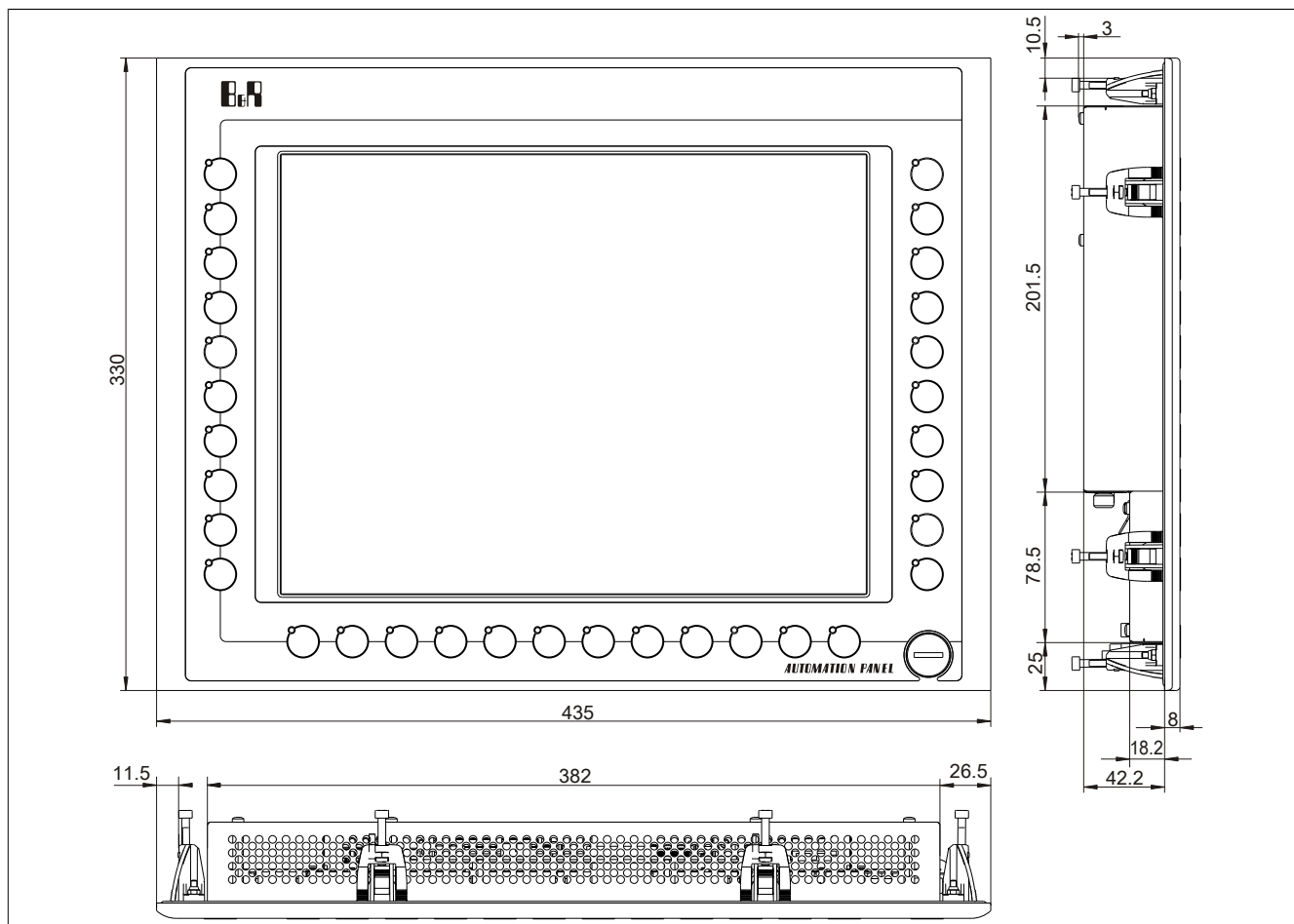


Figure 90: 5AP980.1505-01 - Dimensions

3.1.3.3.6 Cutout installation

The Automation Panel can be installed in a wall cutout using the pre-installed clamping blocks. To do so, it is necessary to make a cutout that corresponds to the following diagram.

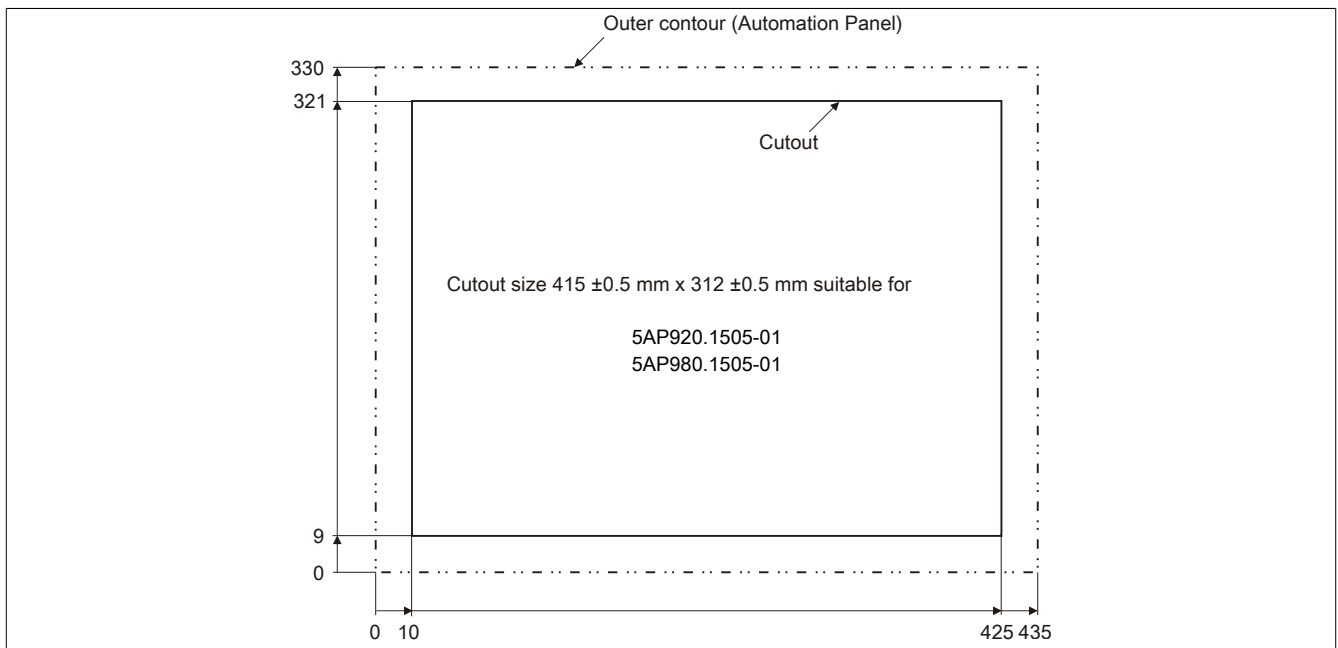


Figure 91: 5AP980.1505-01 - Cutout installation

For additional information regarding installation and mounting orientation, see "Installation" on page 130.

3.1.3.3.7 USB interfaces

Automation Panel devices have three USB ports (type A).

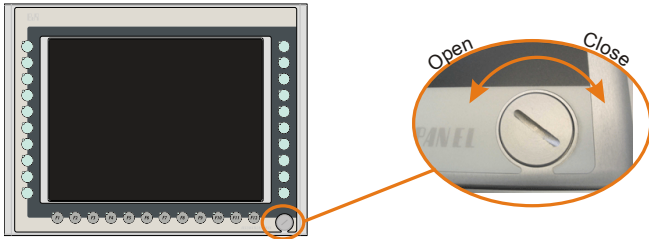


Figure 92: USB interfaces

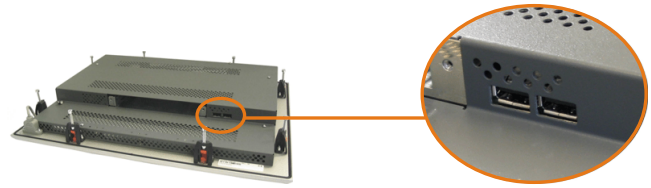


Figure 93: Back-side USB

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

USB transfer speed

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

Information:

With a DVI Automation Panel Link insert card, USB 2.0 is supported up to a cable length of 5 meters.
SDL (Smart Display Link) Automation Panel Link insert card only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

3.1.3.3.8 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

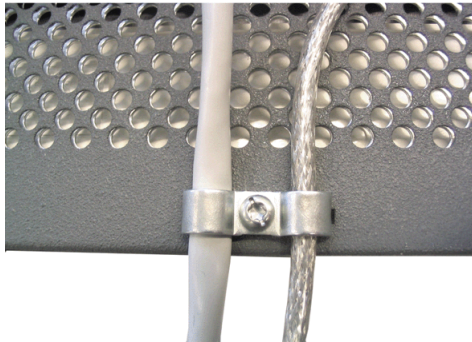


Figure 94: Cable clamps

3.1.3.3.9 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

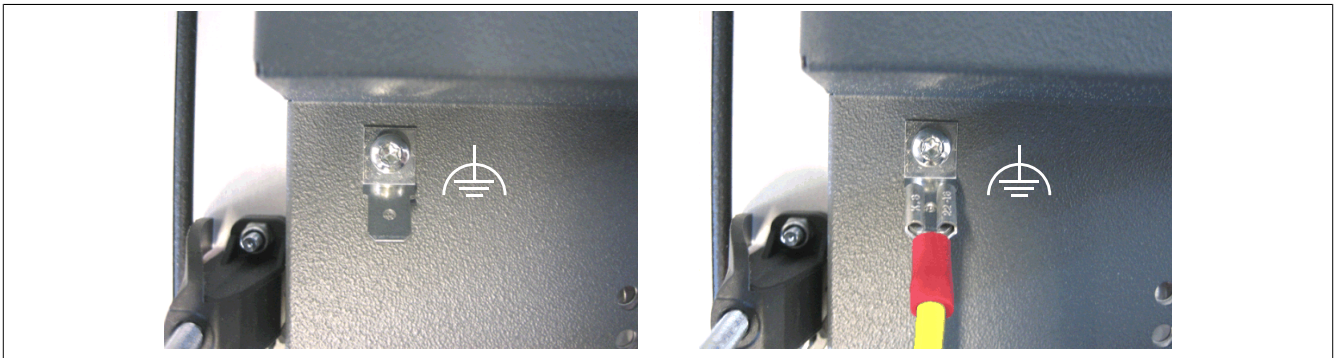


Figure 95: Functional grounding clip

3.1.3.4 5AP981.1505-01

3.1.3.4.1 General information

- 15" XGA color TFT display
- Analog resistive touch screen
- Function keys, system keys and soft keys
- Small installation depth
- Fan-free operation
- Can be upgraded with Display Link cards or PPC300

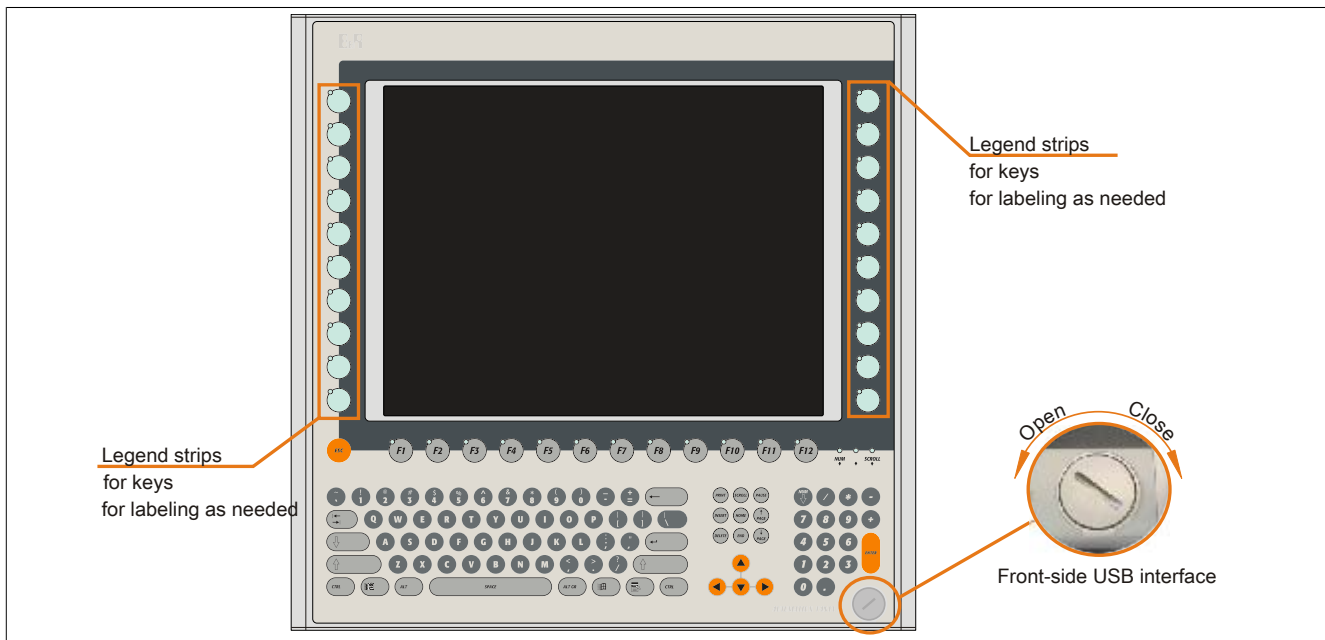


Figure 96: 5AP981.1505-01 - Front view

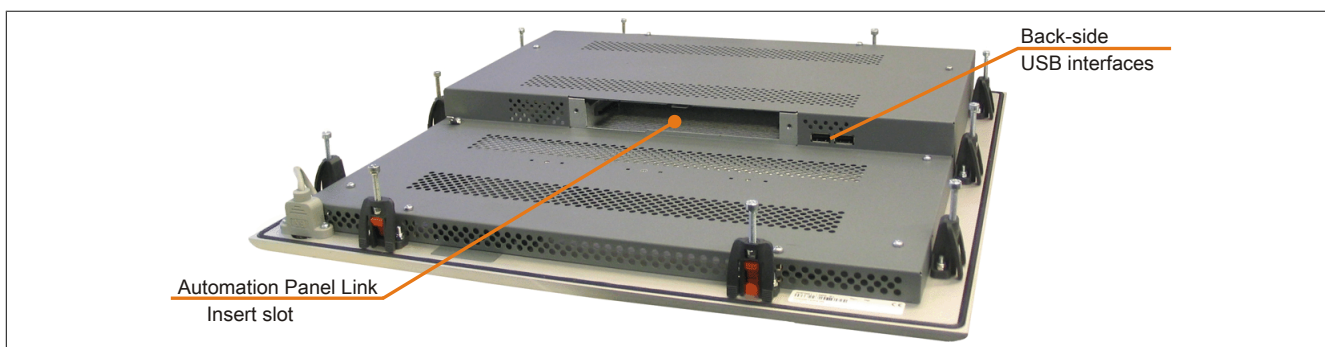


Figure 97: 5AP981.1505-01 - Rear view

3.1.3.4.2 Order data


Model number	Short description	<div>Figure</div> 
	Display units	
5AP981.1505-01	Automation Panel AP981; 15" XGA color TFT display with touch screen (resistive); 12 softkeys; 20 function keys and 92 system keys; 3 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (front side). 24 VDC.	
	Required accessories	
	Display links	
5DLDMI.1000-01	Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLSL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLSL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	
	Optional accessories	
	Accessories	
5AC900.150X-01	Legend Strips Template 15,0" for Automation Panel 5AP951.1505-01, 5AP980.1505-01 and 5AP981.1505-01 and Panel PC 5PC781.1505-00; for 4 devices.	
	Panel PC 300 insert cards	
5PC310.L800-00	Panel PC 300 card for Automation Panel 900; 256 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5PC310.L800-01	Panel PC 300 card for Automation Panel 900; 512 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 28: 5AP981.1505-01 - Order data

3.1.3.4.3 Technical data

Product ID	5AP981.1505-01
General information	
B&R ID code	\$1C64
Certification	
CE	Yes
cULus	Yes
Interfaces	
USB ¹⁾	
Quantity	3
Type	USB 2.0 ²⁾
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	15" (381 mm)
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels
Contrast	400:1
Viewing angles	
Horizontal	Direction R / Direction L = 85°
Vertical	Direction U / direction D = 85°
Backlight	
Brightness	250 cd/m ²
Half brightness time ³⁾	50,000 h
Filter glass	
Transmittance	-
Coating	-

Table 29: 5AP981.1505-01 - Technical data

Product ID	5AP981.1505-01
Touch screen ⁴⁾ Technologies Controller Transmittance	Analog, resistive Elo, serial, 12-bit Up to 78%
Keys	
Function keys	20 with LED (yellow)
Soft keys	12 with LED (yellow)
System keys	Alphanumeric keys, numeric keys, cursor block
Service life	> 1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED brightness Yellow	Typ. 12 mcd
Inserts	
Compatible installation for PPC300 insert	Yes
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	Max. 3.2 A ⁵⁾
Starting current	Typ. 6 A, max. 30 A for <300 µs
Power consumption	Typ. 24 W (without LED), max. 32 W or 42 W with USB (without insert)
Electrical isolation	Yes
Operating conditions	
Protection in accordance with EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection
Environmental conditions	
Temperature Operation	Without Rittal housing Mounting orientation 0°: 0 to 50°C Mounting orientations to -45° display above: 0 to 50°C Mounting orientations to +45° display below: 0 to 45°C With Rittal housing Mounting orientation 0°: 0 to 40°C Mounting orientations to -45° display above: 0 to 40°C Mounting orientations to +45° display below: 0 to 40°C
Storage Transport	-25 to 60°C -25 to 60°C
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g 2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Altitude Operation	Max. 3000 m ⁶⁾
Mechanical characteristics	
Housing Material Paint	Metal Similar to Pantone432CV
Front ⁷⁾ Frame Design Panel membrane Material Light background Dark gray border around display Dark gray keys Orange keys Color legend strips Gasket	Naturally anodized aluminum Gray Polyester Similar to Pantone 427CV Similar to Pantone 432CV Similar to Pantone 431CV Similar to Pantone 151CV Similar to Pantone 429CV Flat gasket around display front
Dimensions Width Height Depth	435 mm 430 mm 54 mm
Weight	Approx. 5900 g

Table 29: 5AP981.1505-01 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link insert card being used.
- 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.
- 4) Touch screen drivers can be downloaded from the Downloads section of the B&R website (www.br-automation.com).
- 5) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 6) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 7) There may be visible deviations in the color and surface appearance depending on the process or batch.

3.1.3.4.4 Temperature humidity diagram

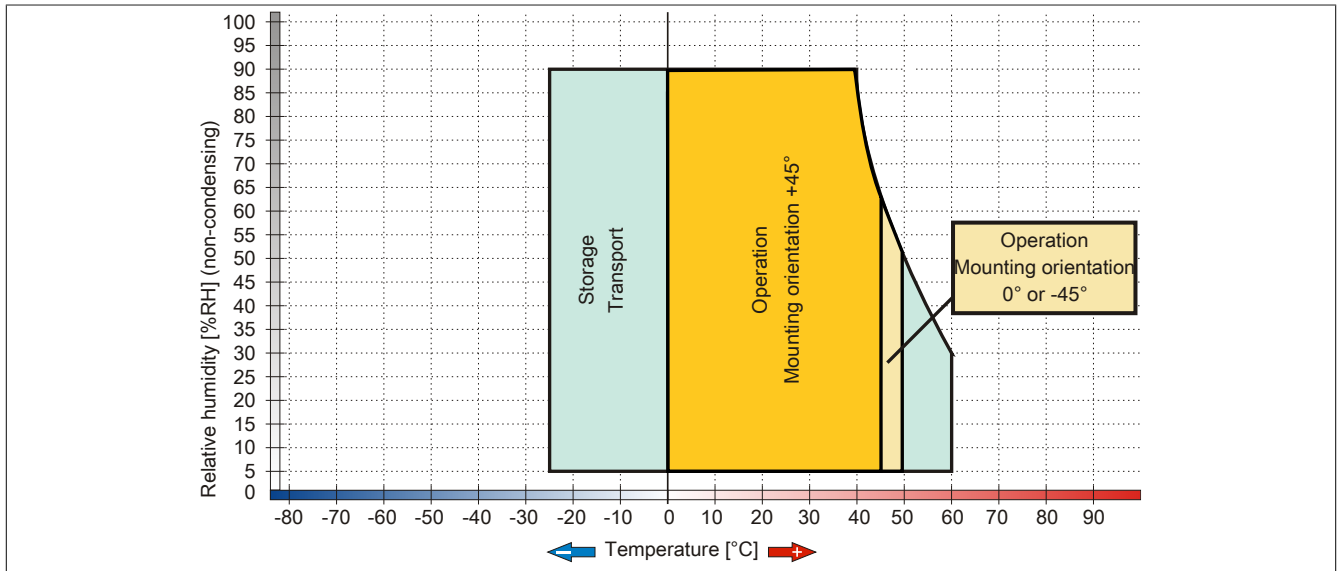


Figure 98: 5AP981.1505-01 - Temperature humidity diagram

3.1.3.4.5 Dimensions

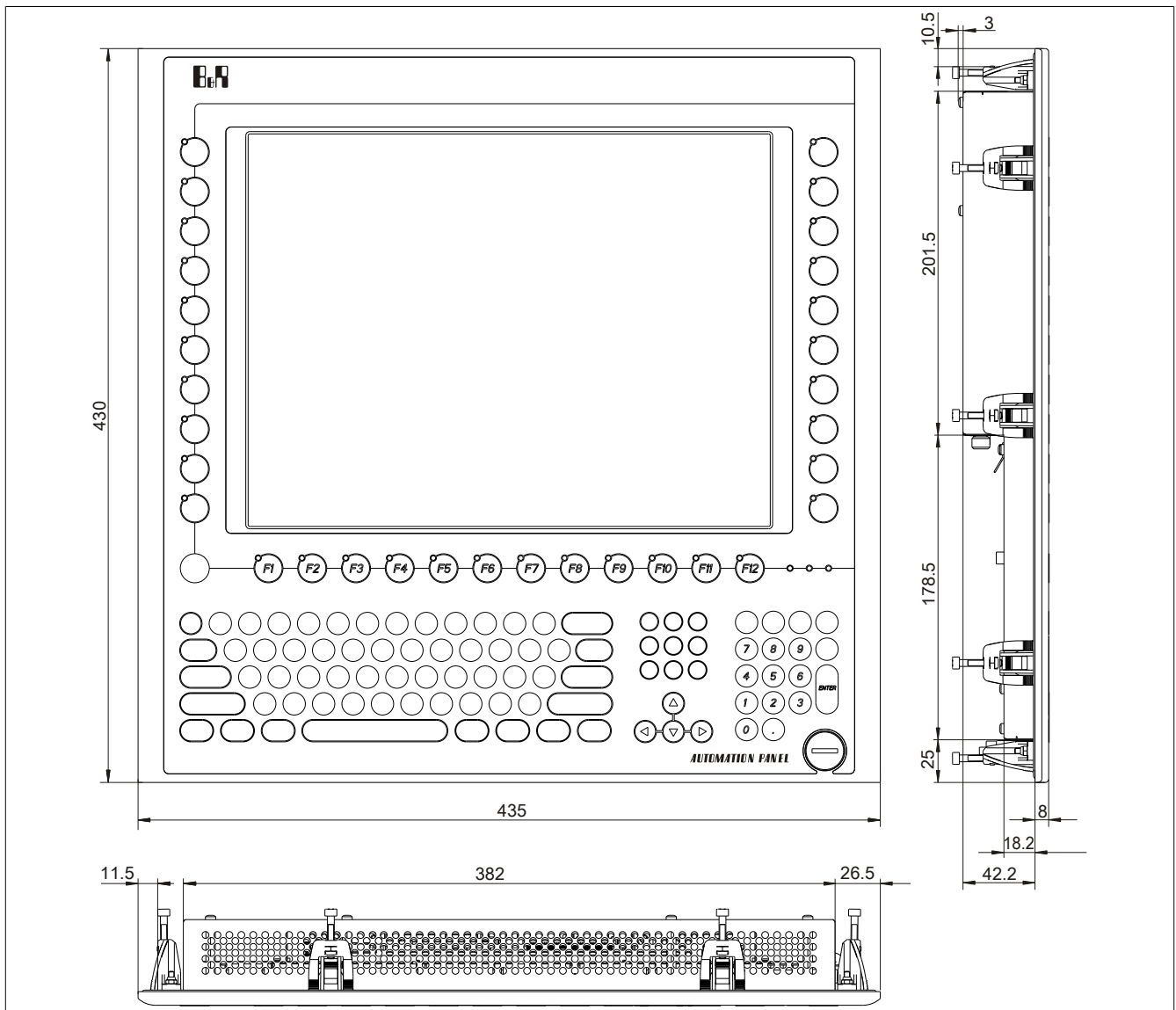


Figure 99: 5AP981.1505-01 - Dimensions

3.1.3.4.6 Cutout installation

The Automation Panel can be installed in a wall cutout using the pre-installed clamping blocks. To do so, it is necessary to make a cutout that corresponds to the following diagram.

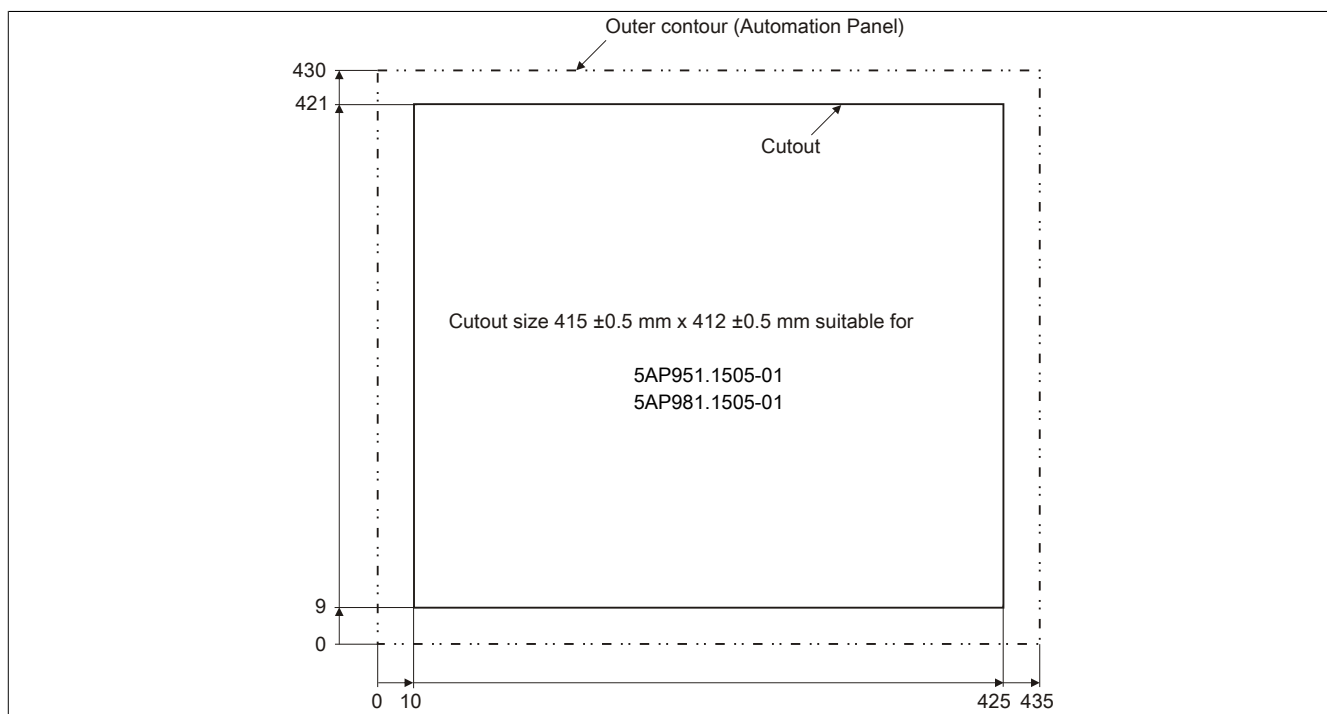


Figure 100: 5AP981.1505-01 - Cutout installation

For additional information regarding installation and mounting orientation, see "Installation" on page 130.

3.1.3.4.7 USB interfaces

Automation Panel devices have three USB ports (type A).

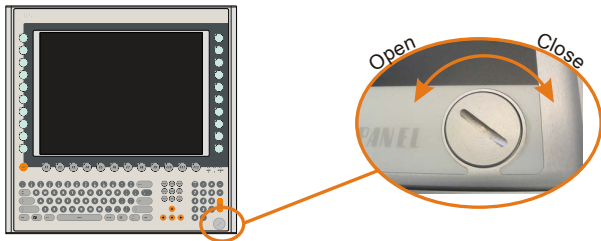


Figure 101: USB interfaces

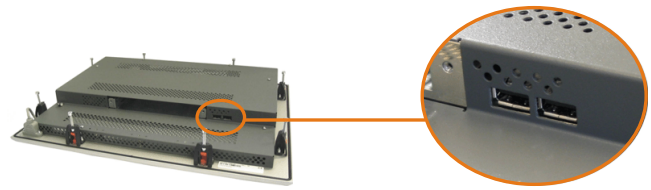


Figure 102: Back-side USB

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

USB transfer speed

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

Information:

With a DVI Automation Panel Link insert card, USB 2.0 is supported up to a cable length of 5 meters. SDL (Smart Display Link) Automation Panel Link insert card only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

3.1.3.4.8 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

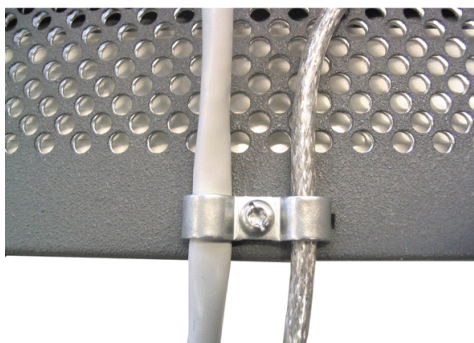


Figure 103: Cable clamps

3.1.3.4.9 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

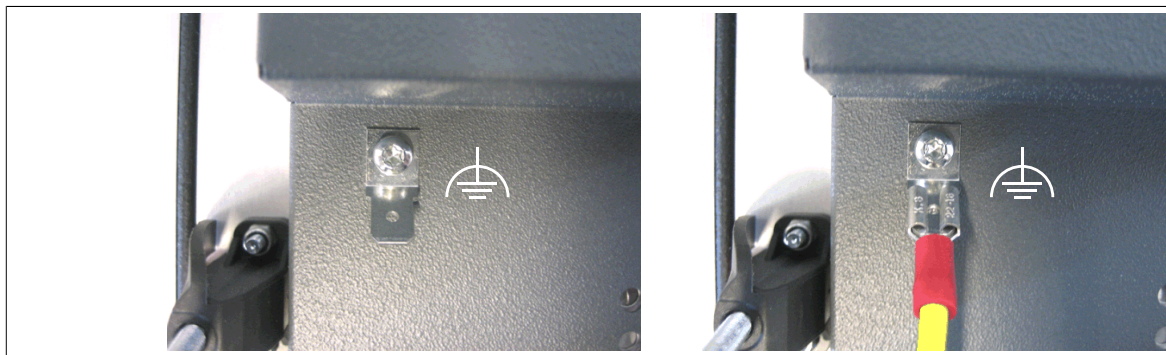


Figure 104: Functional grounding clip

3.1.4 Automation Panel 17" SXGA

3.1.4.1 5AP920.1706-01

3.1.4.1.1 General information

- 17" TFT SXGA color display
- Analog resistive touch screen
- Small installation depth
- Fan-free operation
- Can be upgraded with Display Link cards or PPC300

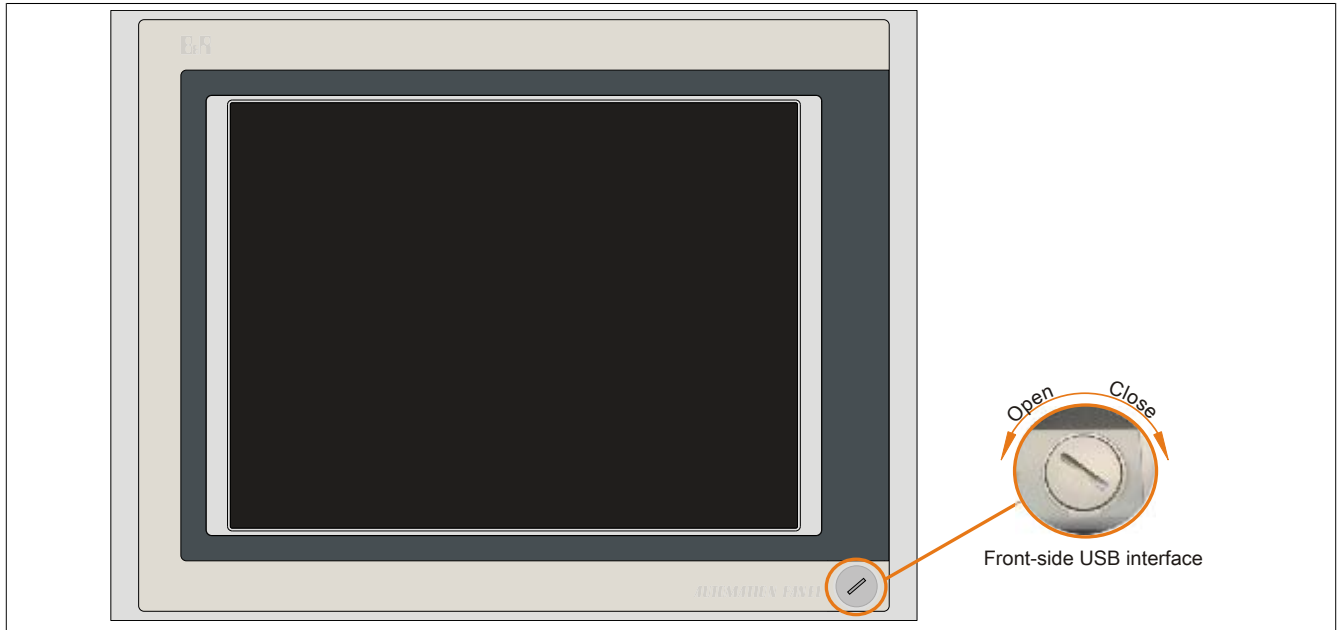


Figure 105: 5AP920.1706-01 - Front view

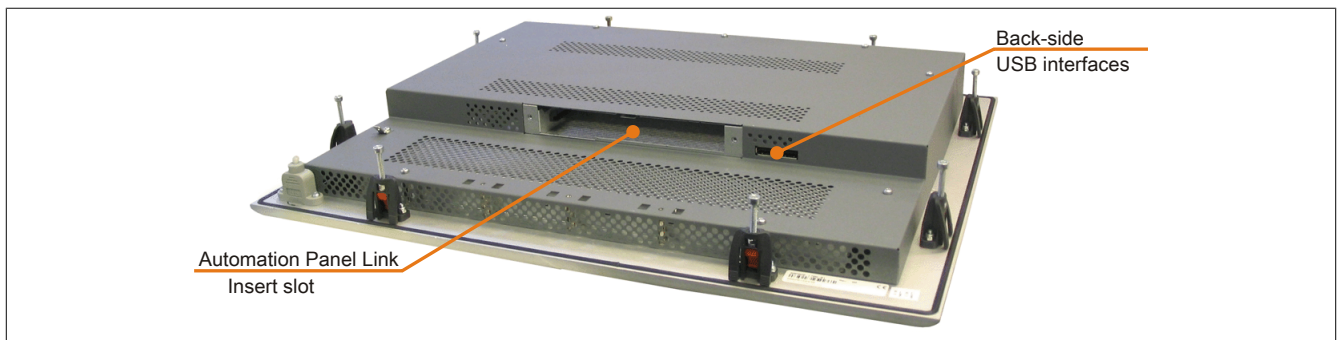


Figure 106: 5AP920.1706-01 - Rear view

3.1.4.1.2 Order data


Model number	Short description	Figure
Display units		
5AP920.1706-01	Automation Panel AP920 17" SXGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (from front). 24 VDC.	
Required accessories		
Display links		
5DLDDVI.1000-01	Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLSDL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLSDL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
Terminal blocks		
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	
Optional accessories		
Panel PC 300 insert cards		
5PC310.L800-00	Panel PC 300 card for Automation Panel 900; 256 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5PC310.L800-01	Panel PC 300 card for Automation Panel 900; 512 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 30: 5AP920.1706-01 - Order data

3.1.4.1.3 Technical data

Product ID	5AP920.1706-01	
Revision	C0	D0
General information		
B&R ID code	\$1A06	
Certification		
CE	Yes	
cULus	Yes	
Interfaces		
USB ¹⁾		
Quantity	3	
Type	USB 2.0 ²⁾	
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current load	Max. 500 mA per connection	
Display		
Type	Color TFT	
Diagonal	17" (431 mm)	
Colors	16.7 million	
Resolution	SXGA, 1280 x 1024 pixels	
Contrast	600:1	
Viewing angles		
Horizontal	Direction R / Direction L = 75°	
Vertical	Direction U = 75° / Direction D = 60°	
Backlight		
Brightness	250 cd/m²	
Half brightness time ³⁾	30,000 h	50,000 h
Filter glass		
Transmittance	-	
Coating	-	
Touch screen ⁴⁾		
Technologies	Analog, resistive	
Controller	Elo, serial, 12-bit	
Transmittance	Up to 78%	
Keys		
Function keys	No	

Table 31: 5AP920.1706-01, 5AP920.1706-01 - Technical data

Product ID	5AP920.1706-01
Soft keys	No
System keys	No
Service life	-
LED brightness Yellow	-
Inserts	
Compatible installation for PPC300 insert	Yes
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	Max. 3.2 A ⁵⁾
Starting current	Typ. 6 A, max. 30 A for <300 µs
Power consumption	Typ. 27 W, max. 36 W or 46 W with USB (without insert)
Electrical isolation	Yes
Operating conditions	
Protection in accordance with EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection
Environmental conditions	
Temperature Operation	Without Rittal housing Mounting orientation 0°: 0 to 40°C Mounting orientations to -45° display above: 0 to 45°C Mounting orientations to +45° display below: 0 to 35°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Vibration	
Operation (continuous)	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g
Operation (occasional)	2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g
Storage	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Transport	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Altitude	
Operation	Max. 3000 m ⁶⁾
Mechanical characteristics	
Housing	
Material	Metal
Paint	Similar to Pantone432CV
Front ⁷⁾	
Frame	Naturally anodized aluminum
Design	Gray
Panel membrane	
Material	Polyester
Light background	Similar to Pantone 427CV
Dark gray border around display	Similar to Pantone432CV
Gasket	Flat gasket around display front
Dimensions	
Width	477 mm
Height	390 mm
Depth	59 mm
Weight	Approx. 7000 g

Table 31: 5AP920.1706-01, 5AP920.1706-01 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link insert card being used.
- 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.
- 4) Touch screen drivers can be downloaded from the Downloads section of the B&R website (www.br-automation.com).
- 5) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 6) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 7) There may be visible deviations in the color and surface appearance depending on the process or batch.

3.1.4.1.4 Temperature humidity diagram

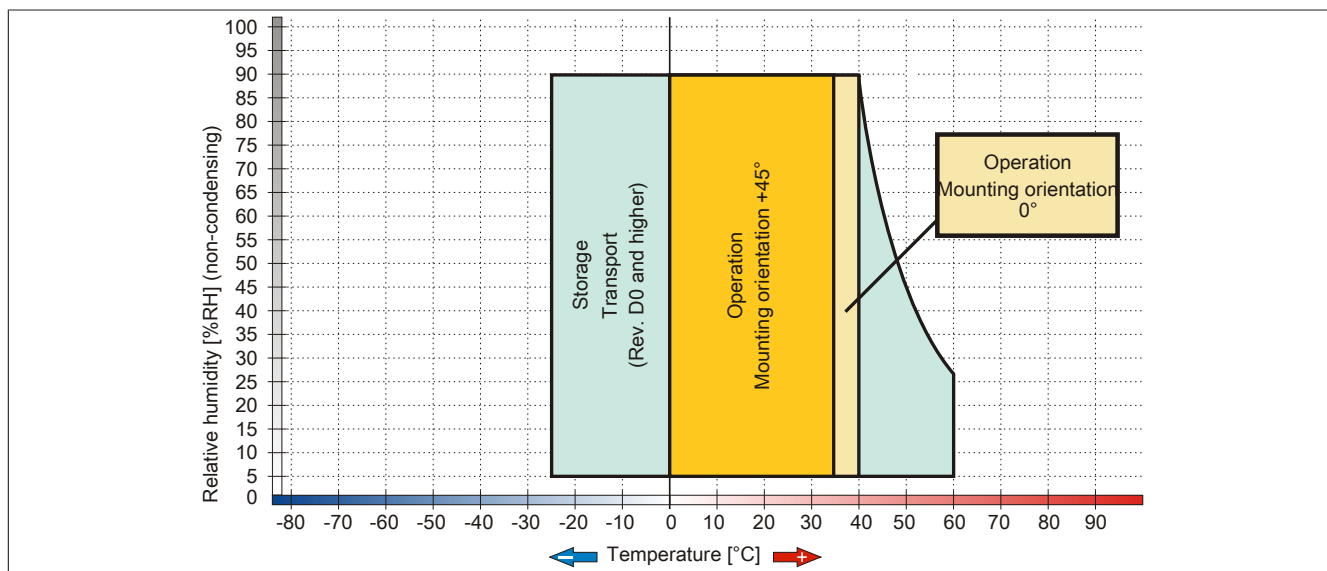


Figure 107: 5AP920.1706-01 - Temperature humidity diagram

3.1.4.1.5 Dimensions

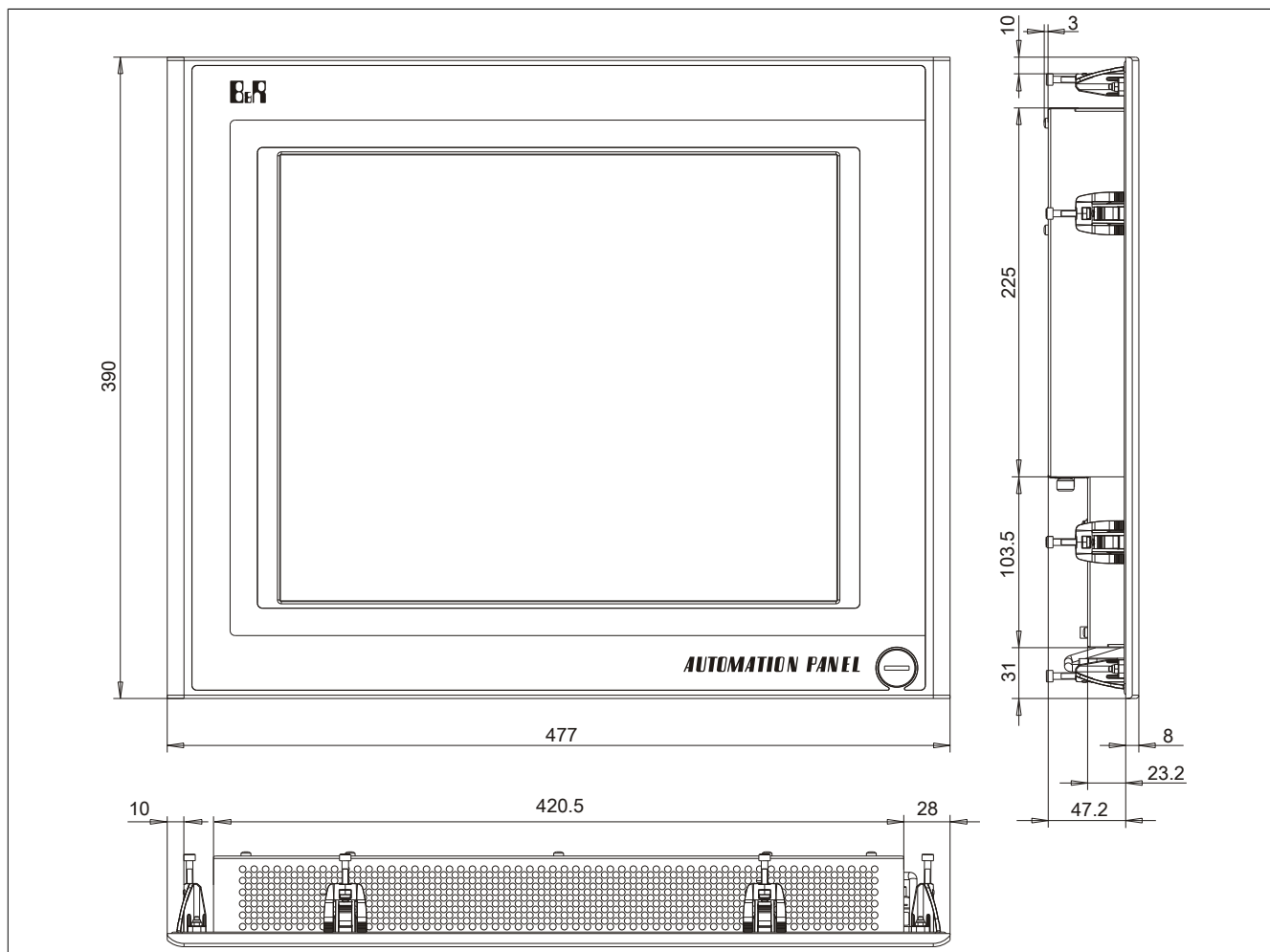


Figure 108: 5AP920.1706-01 - Dimensions

3.1.4.1.6 Cutout installation

The Automation Panel can be installed in a wall cutout using the pre-installed clamping blocks. To do so, it is necessary to make a cutout that corresponds to the following diagram.

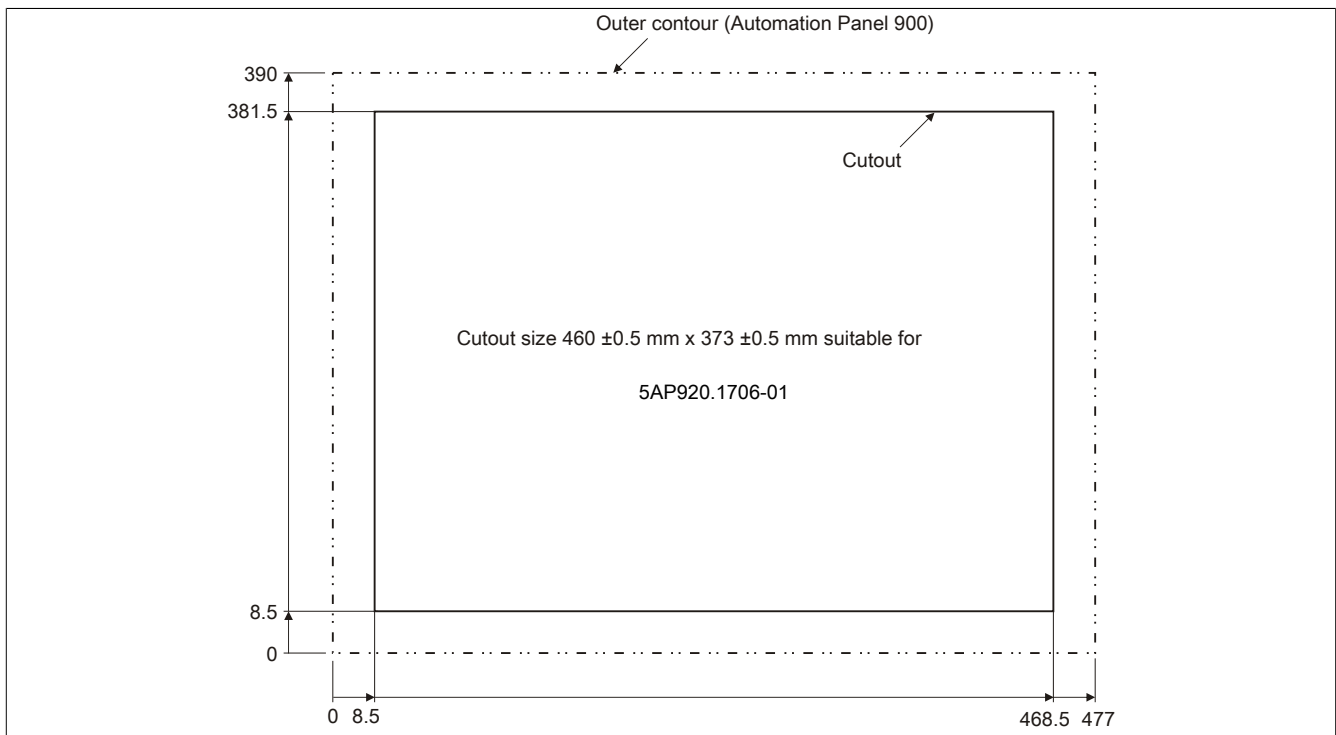


Figure 109: 5AP920.1706-01 - Cutout installation

For additional information regarding installation and mounting orientation, see "Installation" on page 130.

3.1.4.1.7 USB interfaces

Automation Panel devices have three USB ports (type A).

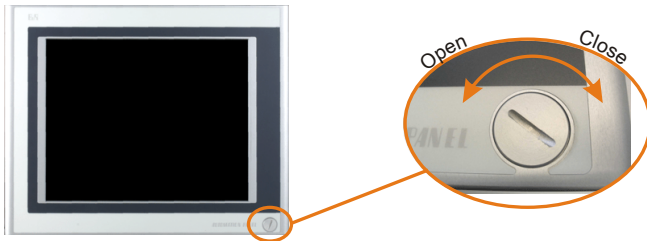


Figure 110: USB interfaces

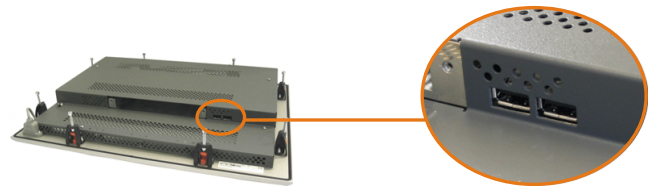


Figure 111: Back-side USB

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

USB transfer speed

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

Information:

With a DVI Automation Panel Link insert card, USB 2.0 is supported up to a cable length of 5 meters.
SDL (Smart Display Link) Automation Panel Link insert card only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

3.1.4.1.8 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

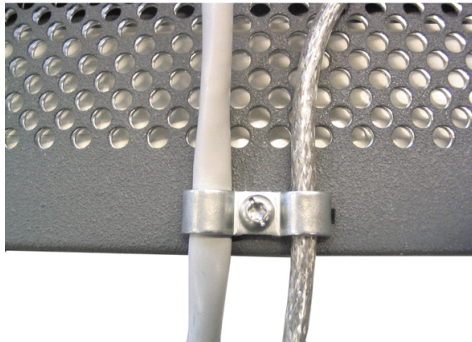


Figure 112: Cable clamps

3.1.4.1.9 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

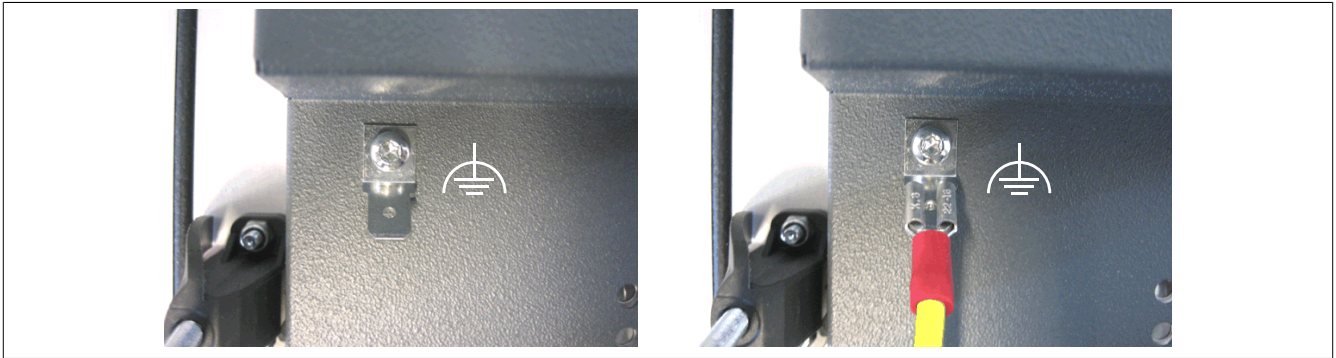


Figure 113: Functional grounding clip

3.1.5 Automation Panel 19" SXGA

3.1.5.1 5AP920.1906-01

3.1.5.1.1 General information

- 19" TFT SXGA color display
- Analog resistive touch screen
- Small installation depth
- Fan-free operation
- Can be upgraded with Display Link cards or PPC300

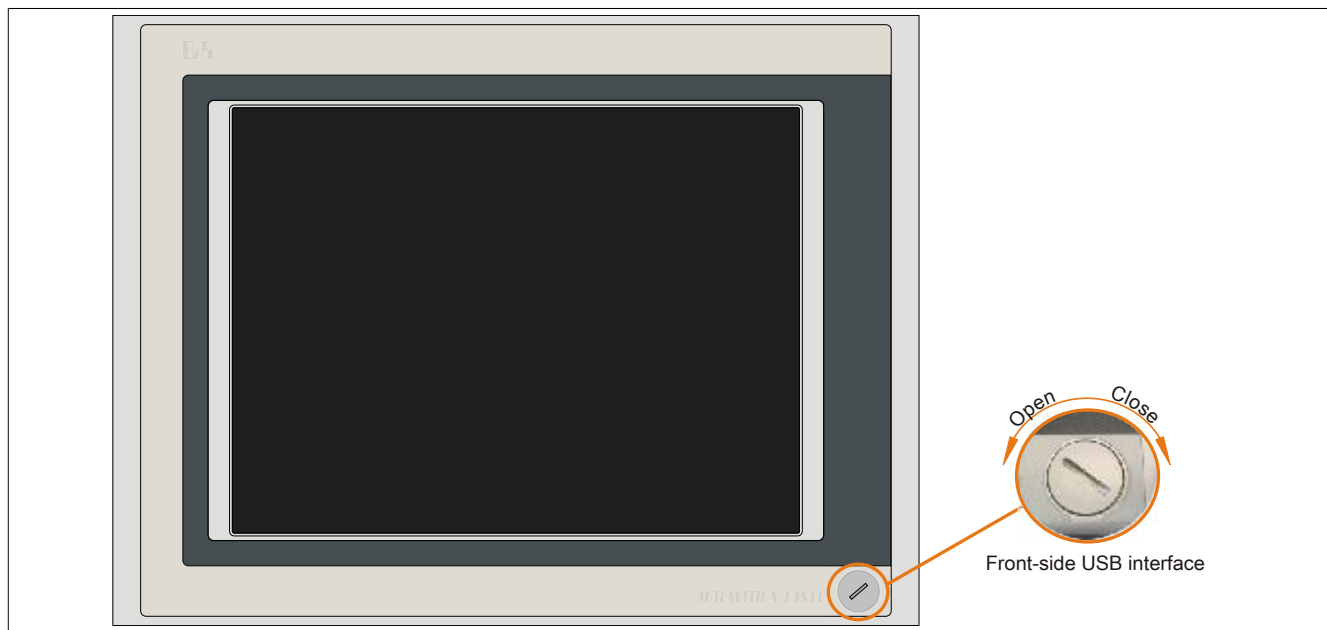


Figure 114: 5AP920.1906-01 - Front view

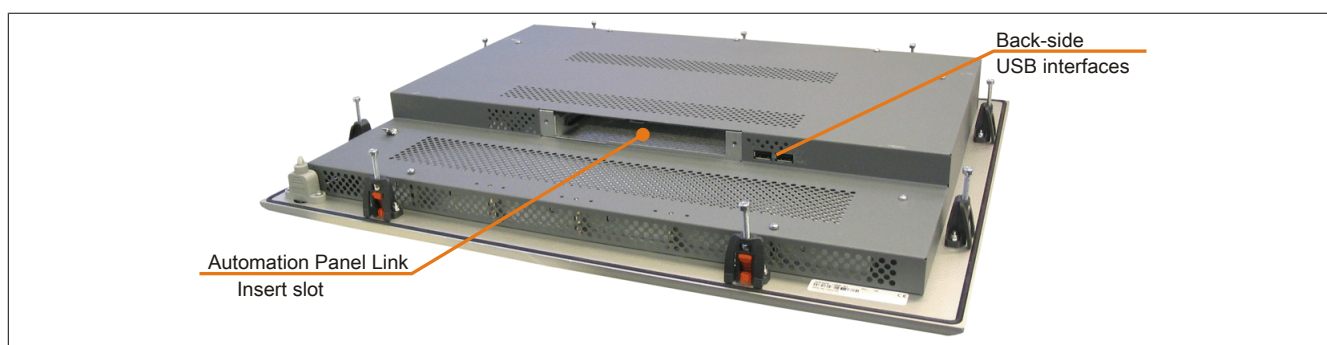


Figure 115: 5AP920.1906-01 - Rear view

3.1.5.1.2 Order data


Model number	Short description	Figure
	Display units	
5AP920.1906-01	Automation Panel AP920; 19" SXGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; slot for Automation Panel link; IP65 protection (from front). 24 VDC.	
	Required accessories	
	Display links	
5DL DVI.1000-01	Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLS DL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 32: 5AP920.1906-01 - Order data

Model number	Short description	Figure
5DLSDL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm ² , protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm ² , protected against vibration by the screw flange	
	Optional accessories	
	Panel PC 300 insert cards	
5PC310.L800-00	Panel PC 300 card for Automation Panel 900; 256 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5PC310.L800-01	Panel PC 300 card for Automation Panel 900; 512 MB SDRAM; CompactFlash slot (type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces of the Automation Panel) battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 32: 5AP920.1906-01 - Order data

3.1.5.1.3 Technical data

Product ID	5AP920.1906-01	
Revision	C0	D0
General information		
B&R ID code	\$1A07	
Certification		
CE	Yes	
cULus	Yes	
GL	Yes	
Interfaces		
USB ¹⁾		
Quantity	3	
Type	USB 2.0 ²⁾	
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current load	Max. 500 mA per connection	
Display		
Type	Color TFT	
Diagonal	19" (482 mm)	
Colors	16.7 million	
Resolution	SXGA, 1280 x 1024 pixels	
Contrast	600:1	
Viewing angles		
Horizontal	Direction R / Direction L = 75°	
Vertical	Direction U = 75°/ Direction D = 60°	
Backlight		
Brightness	250 cd/m²	
Half brightness time ³⁾	35,000 h	
Filter glass		
Transmittance	-	
Coating	-	
Touch screen ⁴⁾		
Technologies	Analog, resistive	
Controller	Elo, serial, 12-bit	
Transmittance	Up to 78%	
Keys		
Function keys	No	
Soft keys	No	
System keys	No	
Service life	-	
LED brightness		
Yellow	-	
Inserts		
Compatible installation for PPC300 insert	Yes	
Electrical characteristics		
Nominal voltage	24 VDC ±25%	
Nominal current	Max. 3.2 A ⁵⁾	
Starting current	Typ. 6 A, max. 30 A for <300 µs	
Power consumption	Typ. 27 W, max. 38 W or 48 W with USB (without insert)	
Electrical isolation	Yes	

Table 33: 5AP920.1906-01, 5AP920.1906-01 - Technical data

Product ID		5AP920.1906-01	
Operating conditions			
Protection in accordance with EN 60529		Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection	
Environmental conditions			
Temperature		Without Rittal housing Mounting orientation 0°: 0 to 40°C Mounting orientations to -45° display above: 0 to 40°C Mounting orientations to +45° display below: 0 to 40°C	
Operation			
Storage			
Transport			
		-20 to 60°C	-25 to 60°C
		-20 to 60°C	-25 to 60°C
Vibration			
Operation (continuous)		2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g	
Operation (occasional)		2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g	
Storage		2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g	
Transport		2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g	
Shock			
Operation		15 g, 11 ms	
Storage		30 g, 15 ms	
Transport		30 g, 15 ms	
Altitude			
Operation		Max. 3000 m ⁶⁾	
Mechanical characteristics			
Housing			
Material		Metal	
Paint		Similar to Pantone432CV	
Front ⁷⁾			
Frame		Naturally anodized aluminum	
Design		Gray	
Panel membrane			
Material		Polyester	
Light background		Similar to Pantone 427CV	
Dark gray border around display		Similar to Pantone432CV	
Gasket		Flat gasket around display front	
Dimensions			
Width		527 mm	
Height		421 mm	
Depth		62 mm	
Weight		Approx. 8100 g	

Table 33: 5AP920.1906-01, 5AP920.1906-01 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link insert card being used.
- 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.
- 4) Touch screen drivers can be downloaded from the Downloads section of the B&R website (www.br-automation.com).
- 5) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 6) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 7) There may be visible deviations in the color and surface appearance depending on the process or batch.

3.1.5.1.4 Temperature humidity diagram

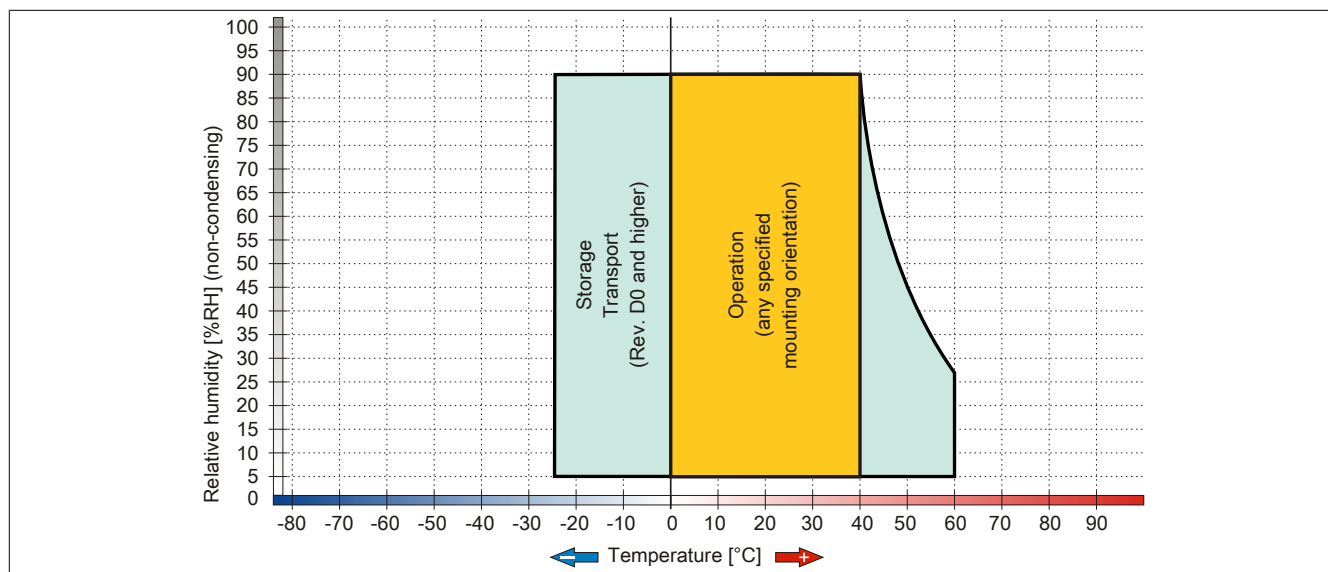


Figure 116: 5AP920.1906-01 - Temperature humidity diagram

3.1.5.1.5 Dimensions

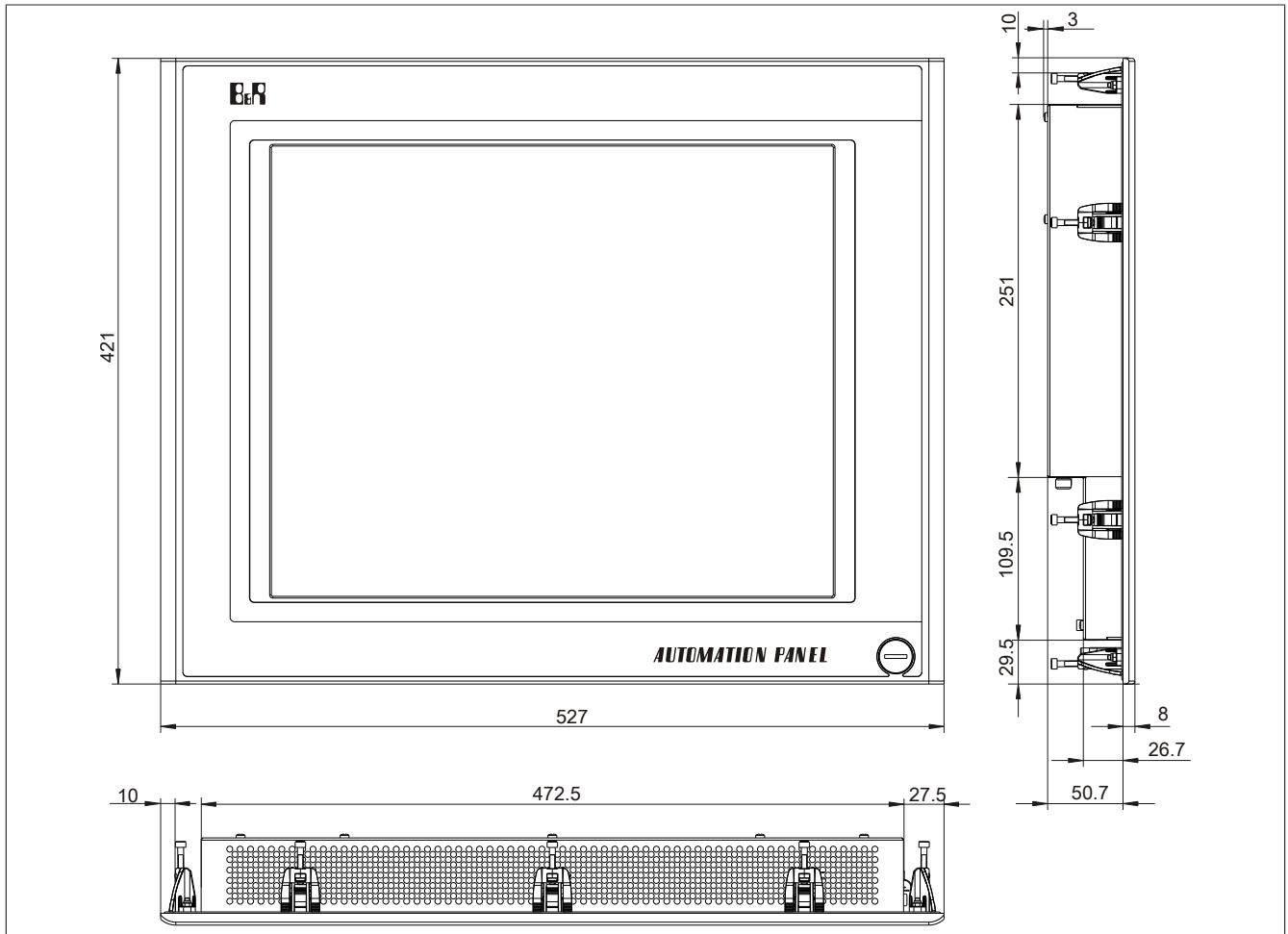


Figure 117: 5AP920.1906-01 - Dimensions

3.1.5.1.6 Cutout installation

The Automation Panel can be installed in a wall cutout using the pre-installed clamping blocks. To do so, it is necessary to make a cutout that corresponds to the following diagram.

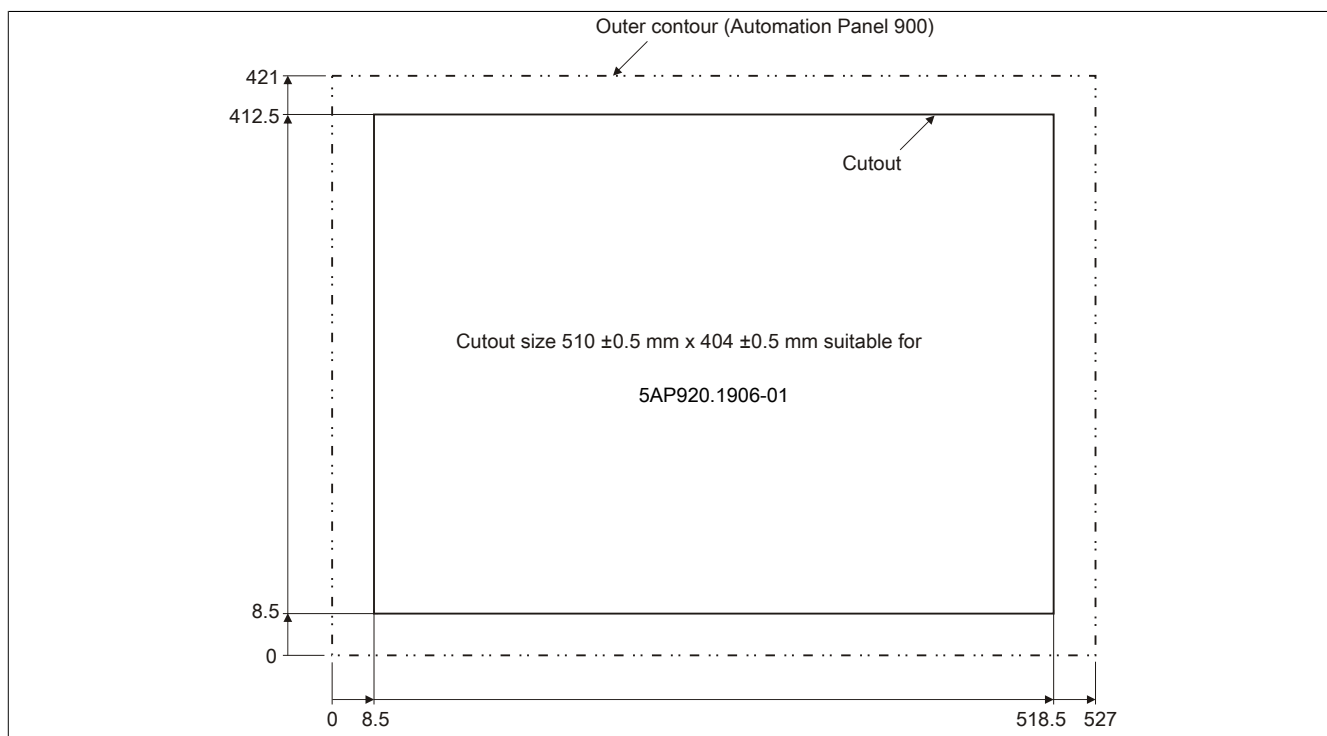


Figure 118: 5AP920.1906-01 - Cutout installation

For additional information regarding installation and mounting orientation, see "Installation" on page 130.

3.1.5.1.7 USB interfaces

Automation Panel devices have three USB ports (type A).

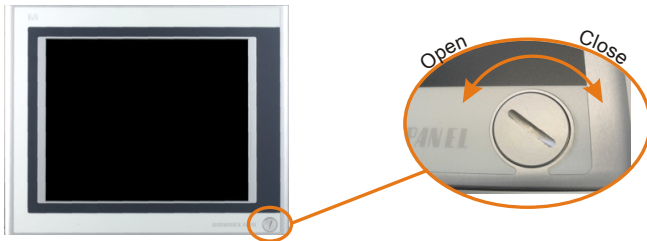


Figure 119: USB interfaces

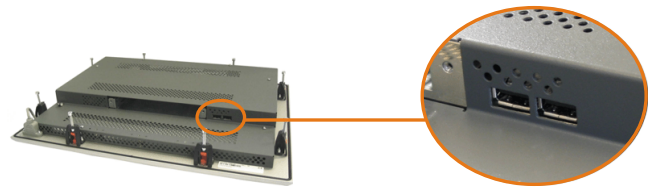


Figure 120: Back-side USB

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

USB transfer speed

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

Information:

With a DVI Automation Panel Link insert card, USB 2.0 is supported up to a cable length of 5 meters.
SDL (Smart Display Link) Automation Panel Link insert card only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

3.1.5.1.8 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

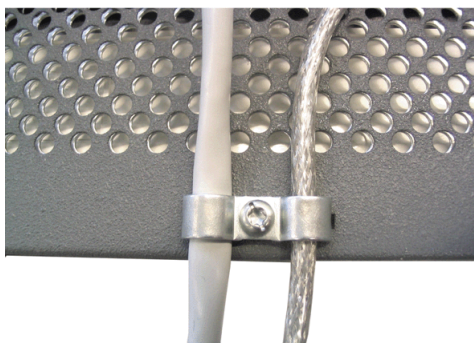


Figure 121: Cable clamps

3.1.5.1.9 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

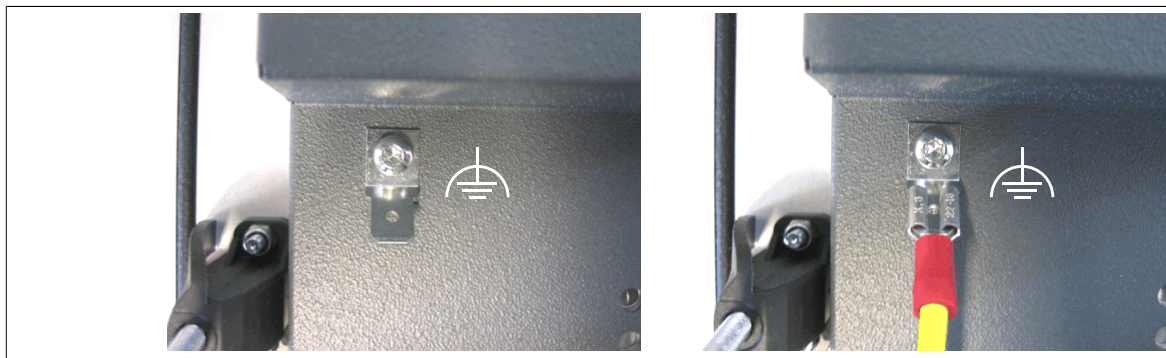


Figure 122: Functional grounding clip

3.1.6 Automation Panel 21.3" UXGA

3.1.6.1 5AP920.2138-01

3.1.6.1.1 General information

- 21.3" UXGA color TFT display
- Analog resistive touch screen
- Small installation depth
- Fan-free operation
- Can be upgraded with Display Link cards or PPC300

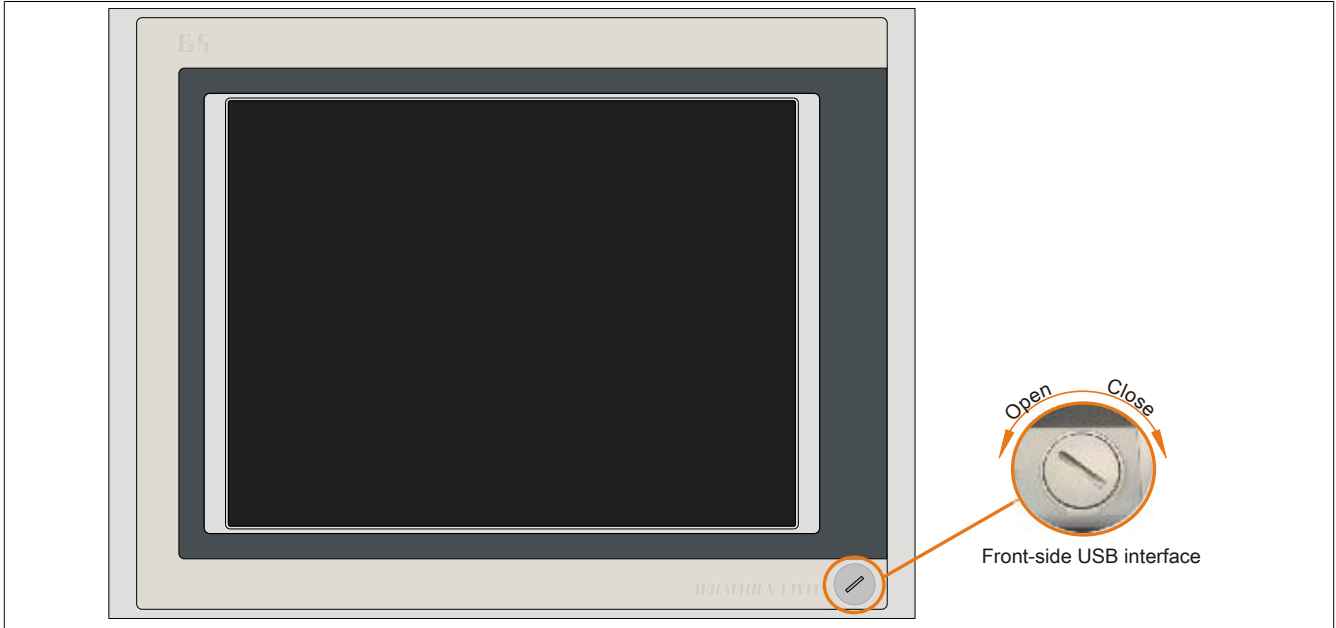


Figure 123: 5AP920.2138-01 - Front view

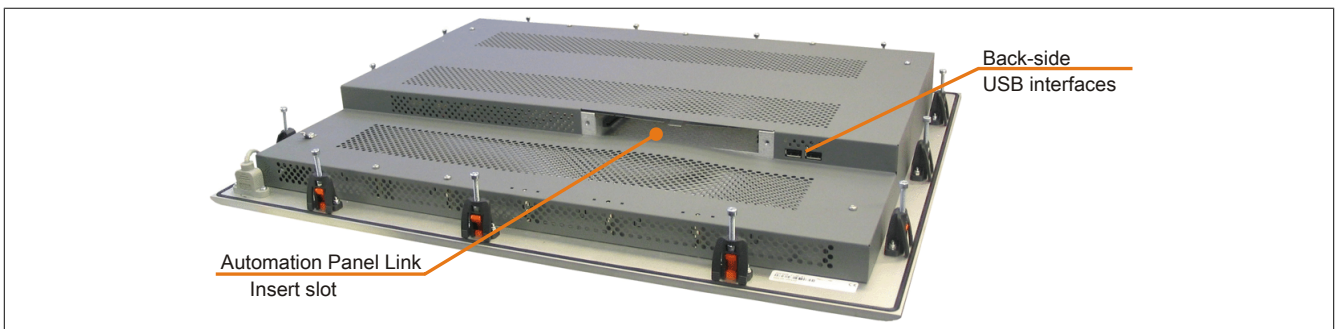


Figure 124: 5AP920.2138-01 - Rear view

3.1.6.1.2 Order data


Model number	Short description	Figure
	Display units	
5AP920.2138-01	Automation Panel AP920 21,3" UXGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; slot for Automation Panel link; IP 65 protection (front side). 24 V DC.	
	Required accessories	
	Display links	
5DL DVI.1000-01	Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
5DLS DL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	

Table 34: 5AP920.2138-01 - Order data

Model number	Short description	Figure
5DLSDL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm ² , protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm ² , protected against vibration by the screw flange	

Table 34: 5AP920.2138-01 - Order data

3.1.6.1.3 Technical data

Product ID	5AP920.2138-01
General information	
B&R ID code	\$1A08
Certification	
CE	Yes
cULus	Yes
Interfaces	
USB ¹⁾	
Quantity	3
Type	USB 2.0 ²⁾
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	21.3" (641 mm)
Colors	16.7 million
Resolution	UXGA, 1600 x 1200 pixels
Contrast	500:1
Viewing angles	
Horizontal	Direction R / Direction L = 60°
Vertical	Direction U / direction D = 60°
Backlight	
Brightness	250 cd/m ²
Half brightness time ³⁾	50,000 h
Filter glass	
Transmittance	-
Coating	-
Touch screen ⁴⁾	
Technologies	Analog, resistive
Controller	Elo, serial, 12-bit
Transmittance	Up to 78%
Keys	
Function keys	No
Soft keys	No
System keys	No
Service life	-
LED brightness	
Yellow	-
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	Max. 4.2 A ⁵⁾
Starting current	Typ. 8 A, max. 40 A for < 300 µs
Power consumption	Typ. 50 W, max. 63 W or 73 W with USB (without insert)
Electrical isolation	Yes
Operating conditions	
Protection in accordance with EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, dust and sprayed water protection
Environmental conditions	
Temperature	
Operation	Without Rittal housing Mounting orientation 0°: 0 to 35°C Mounting orientations to -45° display above: 0 to 35°C Mounting orientations to +45° display below: 0 to 30°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Vibration	
Operation (continuous)	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g
Operation (occasional)	2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g
Storage	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Transport	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g

Table 35: 5AP920.2138-01 - Technical data

Product ID	5AP920.2138-01
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Altitude	
Operation	Max. 3000 m ⁶⁾
Mechanical characteristics	
Housing	
Material	Metal
Paint	Similar to Pantone432CV
Front ⁷⁾	
Frame	Naturally anodized aluminum
Design	Gray
Panel membrane	
Material	Polyester
Light background	Similar to Pantone 427CV
Dark gray border around display	Similar to Pantone432CV
Gasket	Flat gasket around display front
Dimensions	
Width	583 mm
Height	464 mm
Depth	64 mm
Weight	Approx. 11000 g

Table 35: 5AP920.2138-01 - Technical data

- 1) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 2) Depends on the transmission technology, the transfer distance and the Automation Panel Link insert card being used.
- 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.
- 4) Touch screen drivers can be downloaded from the Downloads section of the B&R website (www.br-automation.com).
- 5) The specified value applies to Automation Panel devices with an inserted Automation Panel Link card.
- 6) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
- 7) There may be visible deviations in the color and surface appearance depending on the process or batch.

3.1.6.1.4 Temperature humidity diagram

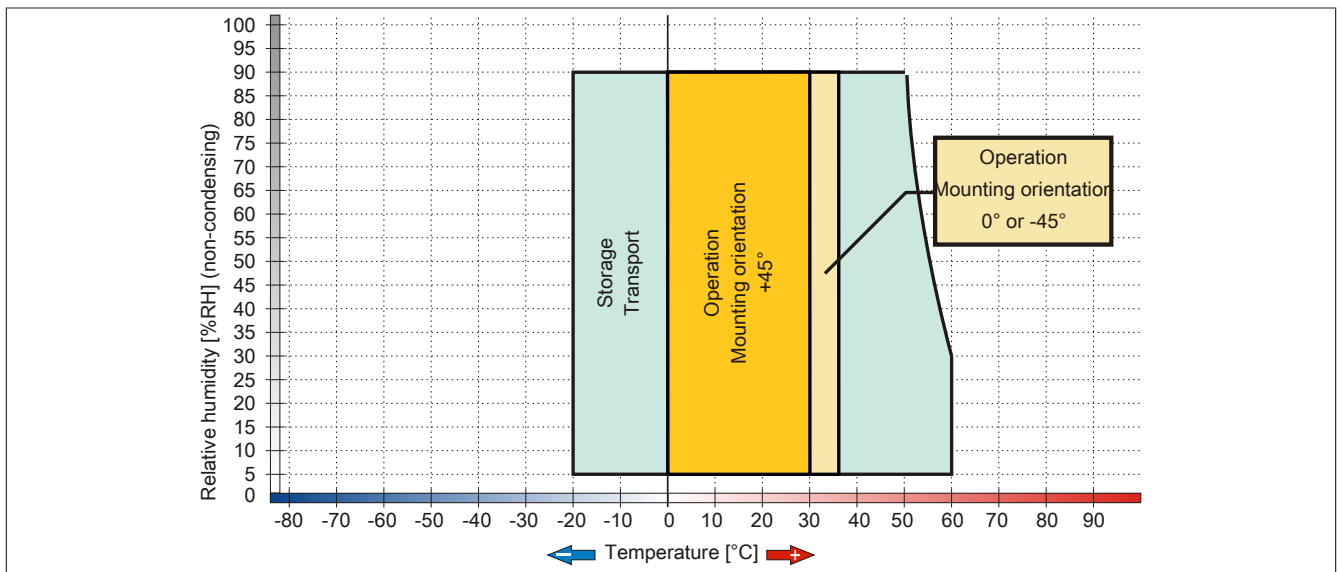


Figure 125: 5AP920.2138-01 - Temperature humidity diagram

3.1.6.1.5 Dimensions

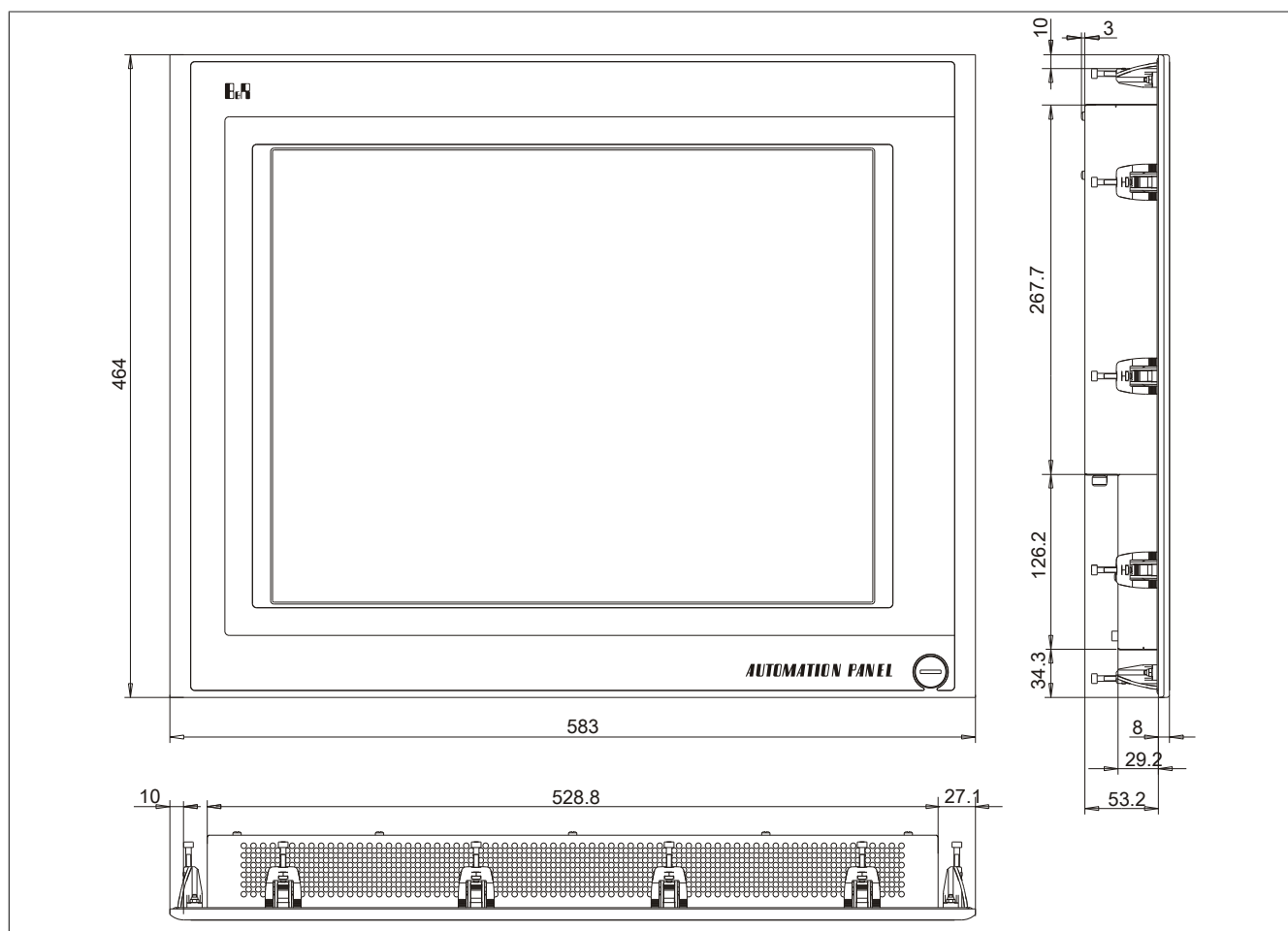


Figure 126: 5AP920.2138-01 - Dimensions

3.1.6.1.6 Cutout installation

The Automation Panel can be installed in a wall cutout using the pre-installed clamping blocks. To do so, it is necessary to make a cutout that corresponds to the following diagram.

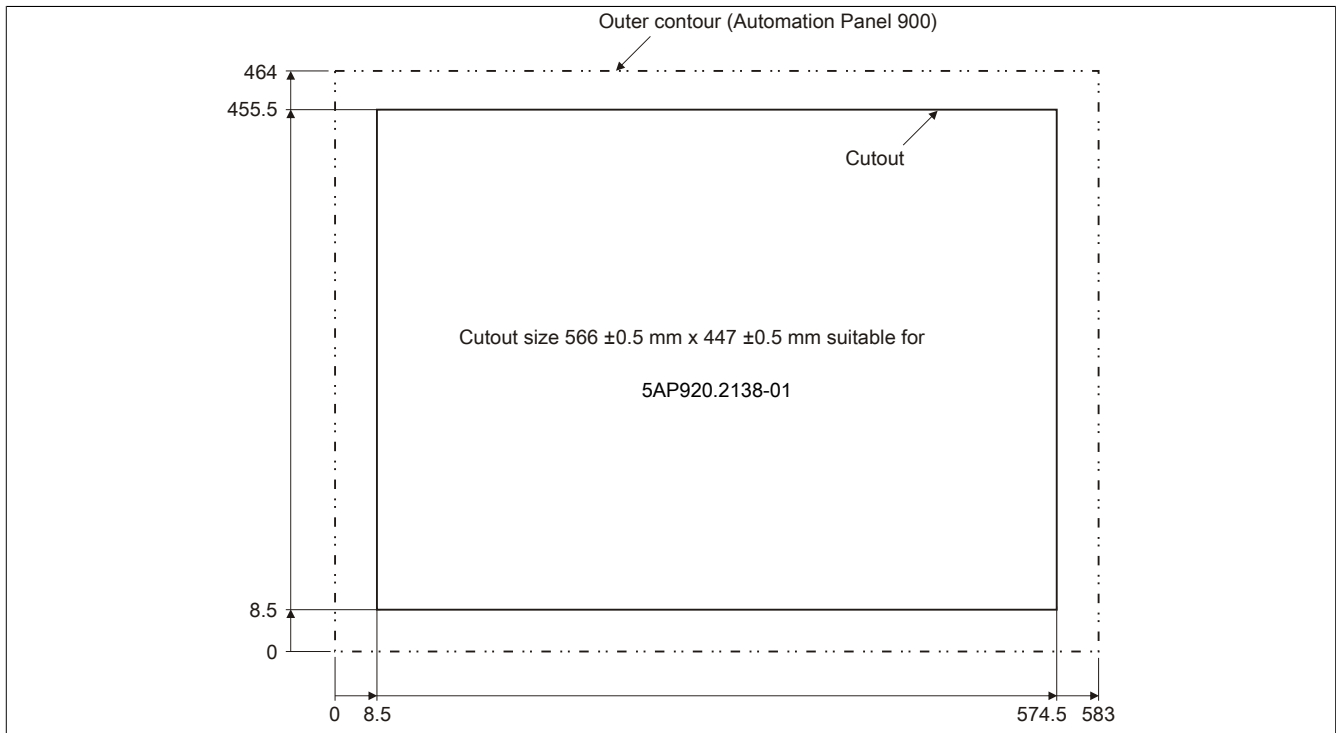


Figure 127: 5AP920.2138-01 - Cutout installation

For additional information regarding installation and mounting orientation, see "Installation" on page 130.

3.1.6.1.7 USB interfaces

Automation Panel devices have three USB ports (type A). They can be used if the Automation Panel Link insert card has been correctly connected to a USB interface on the slot CPU.

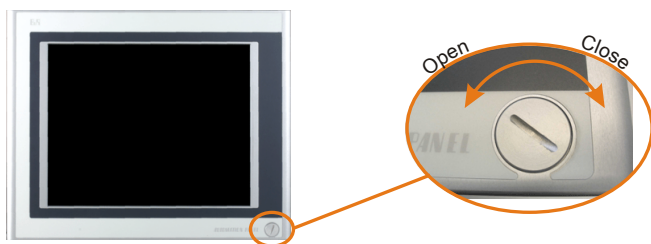


Figure 128: USB interfaces

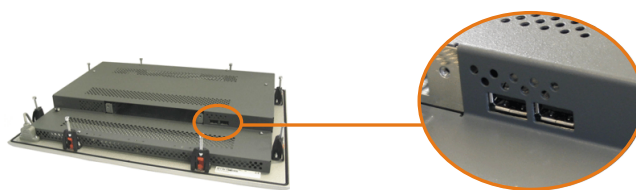


Figure 129: Back-side USB

USB devices can only be connected to the Automation Panel directly (i.e. without a hub).

USB transfer speed

The USB transfer rate depends on the type of Automation Panel Link card and transmission technology being used.

Information:

With a DVI Automation Panel Link insert card, USB 2.0 is supported up to a cable length of 5 meters.

SDL (Smart Display Link) Automation Panel Link insert card only support USB 1.1, regardless of the cable length. USB 2.0 is not supported.

3.1.6.1.8 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

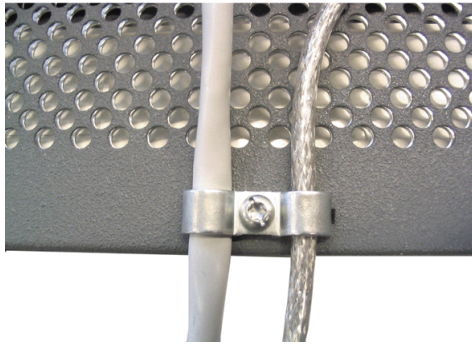


Figure 130: Cable clamps

3.1.6.1.9 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

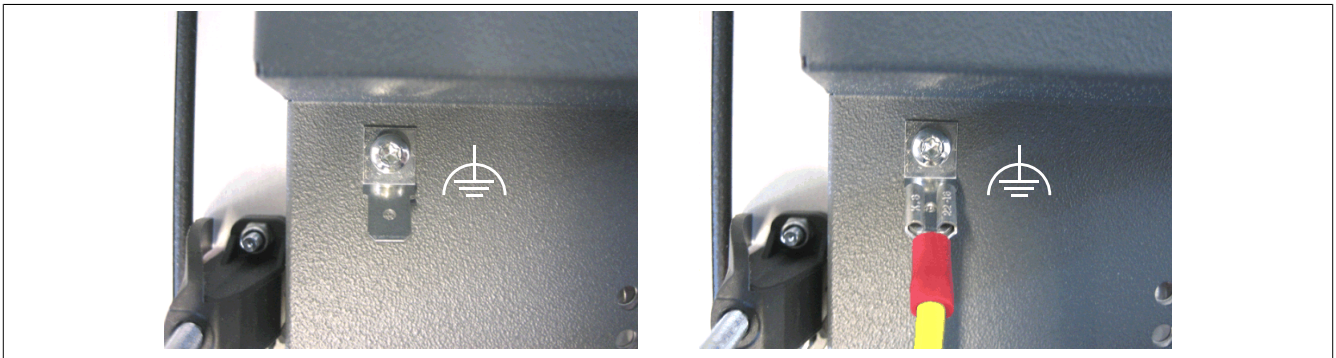


Figure 131: Functional grounding clip

3.2 Automation Panel Link insert cards

Automation Panel Link insert cards supply the interface between a B&R Industrial PC and the Automation Panel 900. These cards receive and process the graphics signals from the B&R Industrial PC (e.g. via the Automation PC 810 monitor/panel output) and then transmit them to the Automation Panel 900. Touch screen, USB and SDL data is transferred in the other direction to the respective interface on the B&R Industrial PC (e.g. Automation PC 810) via the cable.

An insert card is simply inserted into the Automation Panel 900 slot provided and fastened into place using the two locating screws (max. torque 0.5 Nm).

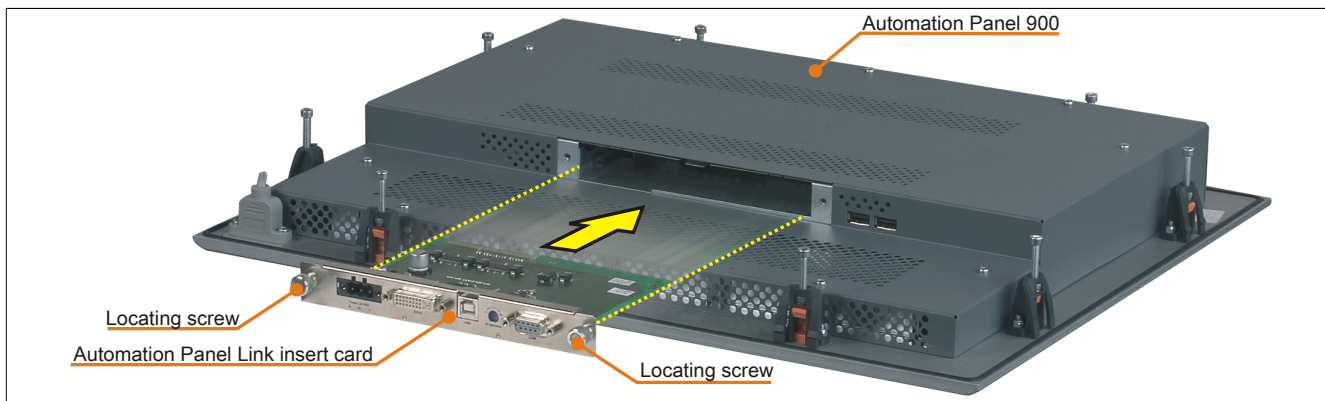


Figure 132: Automation Panel and Automation Panel Link insert card

3.2.1 5DLVDI.1000-01

3.2.1.1 General information

DVI stands for Digital Video Interface. DVI Link is the first choice whenever compatibility with a standard is important. With a DVI connection, the Automation Panel can also be used universally with systems from other manufacturers. This type of transfer supports the transmission of display data, USB 2.0 data and touch screen data over separate cables for each.

- Can be used in all Automation Panel 900 devices
- DVI-D, RS232 and USB 2.0 connections

3.2.1.2 Order data


Model number	Short description	Figure
	Display links	
5DLVDI.1000-01	Automation Panel Link DVI Receiver; Connectors for DVI-D, RS232 and USB 2.0 (type B); 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
	Required accessories	
	DVI cable	
5CADVI.0018-00	DVI-D cable, 1.8 m.	
5CADVI.0050-00	DVI-D cable, 5 m.	
5CADVI.0100-00	DVI-D cable, 10 m.	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm ² , protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm ² , protected against vibration by the screw flange	
	Optional accessories	
	RS232 cable	
9A0014.02	RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m.	
9A0014.05	RS232 extension cable for remote operating of a display unit with touch screen, 5 m.	
	USB cable	
5CAUSB.0018-00	USB 2.0 connecting cable type A - type B, 1.8 m.	
5CAUSB.0050-00	USB 2.0 connecting cable type A - type B, 5 m.	

Table 36: 5DLVDI.1000-01 - Order data

3.2.1.3 Technical data

Product ID	5DLVDI.1000-01
General information	
BL adjuster ¹⁾	Yes
Certification	
CE	Yes
cULus	Yes
GL	Yes
Interfaces	
COM1	
Type	RS232, not electrically isolated
Design	9-pin DSUB socket
Max. baud rate	115 kbit/s
USB	
Quantity	1
Type	USB 2.0 if cable length ≤5 m USB 1.1 if cable length >5 m
Design	Type B
Panel/Monitor interface	
Design	DVI-D socket
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current ²⁾	Max. 4.2 A
Power consumption	Typ. 3 W

Table 37: 5DLVDI.1000-01 - Technical data

Product ID	5DLDMI.1000-01
Mechanical characteristics	
Fastening screws	
Quantity	2
Max. fastening torque	0.5 Nm

Table 37: 5DLDMI.1000-01 - Technical data

- 1) Used to set the brightness of the backlighting on the AP900.
2) The listed value applies to the 19" Automation Panel device with an inserted Automation Panel Link card.

3.2.1.4 Interfaces

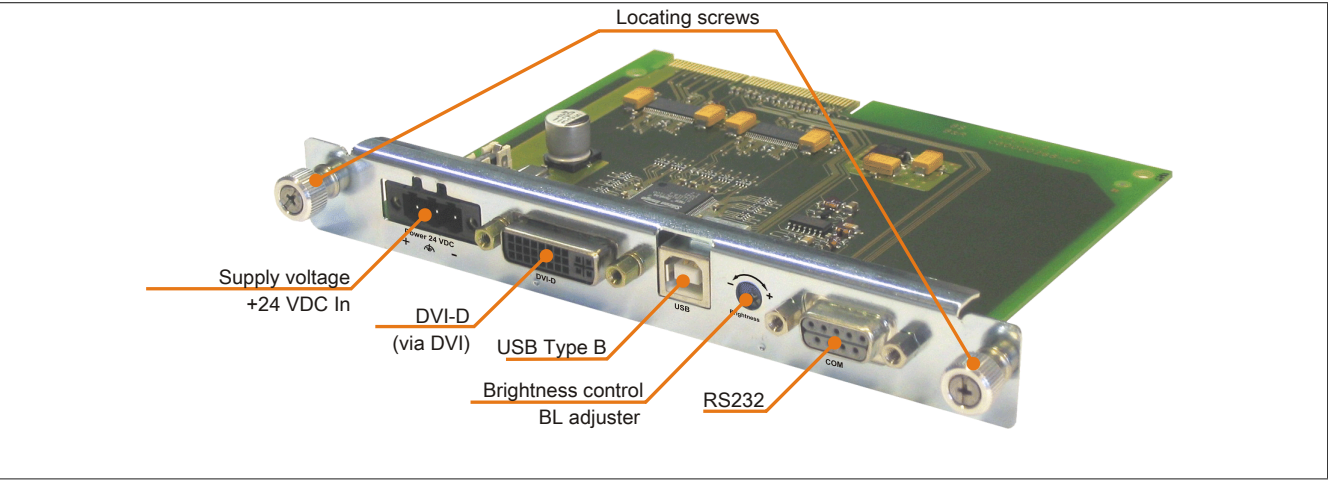


Figure 133: 5DLDMI.1000-01 - Interfaces

3.2.1.4.1 DVI-D

The Display Link insert card has one DVI digital input. As a result, only the digital signals from one graphics adapter connected with a single DVI digital cable can be processed. B&R offers DVI cables up to 10 meters in length (see "Cables" on page 179).

3.2.1.4.2 USB Type B

The USB Type B connector makes it possible to use a USB connection cable (B&R offers USB cables up to 5 meters in length, see "Cables" on page 179) to connect the Display Link insert card with a USB Type A output (e.g. on a B&R Slot CPU, B&R APC620 / APC810, B&R graphics adapter, etc.).

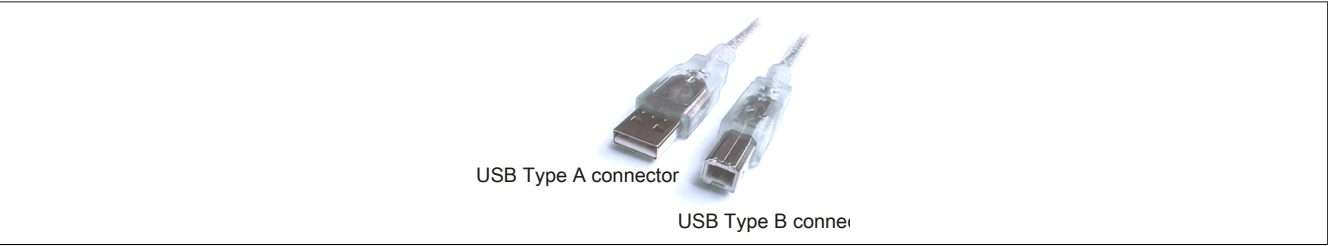


Figure 134: Comparison of USB Type A/B connectors

If the Display Link is connected correctly, then the Automation Panel 900 is equipped with one or more (depending on the type) USB ports (front and back).

Information:

USB 2.0 is supported for cables up to 5 meters in length.

3.2.1.4.3 BL adjuster

This adjuster can be used to control the brightness of the backlight on the Automation Panel 900.

3.2.1.4.4 COM Serial interface

The RS232 interface is used to transfer signals from the Automation Panel 900 touch screen.

B&R offers RS232 cables up to 10 meters in length (see "Cables" on page 179).

COM serial interface	
RS232	
Type	RS232, not electrically isolated
UART	16550-compatible, 16-byte FIFO
Transfer rate	Max. 115 kbit/s
Bus length	Max. 15 m
Pin	Assignment
1	NC
2	RXD
3	TXD
4	NC
5	GND
6	DSR
7	RTS
8	CTS
9	NC

9-pin DSUB connector

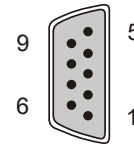


Table 38: COM - Pinout

3.2.1.4.5 +24 VDC supply voltage

The 3-pin connector required for the supply voltage connection is not included in delivery. It can be ordered from B&R using model number 0TB103.9 (screw clamp) or 0TB103.91 (cage clamp).

The pinout is listed in the following table and printed on the DVI receiver. When dimensioning the power supply, the maximum power consumption of the Automation Panel being used must be taken into consideration (see Chapter 2 "Technical data" on page 17).

Supply voltage	
Protected against reverse polarity	
Pin	Description
1	-
2	Functional ground
3	+
Required accessories	
Terminal blocks	
0TB103.9	Connector 24 V 5.08 3-pin screw clamp
0TB103.91	Connector 24 V 5.08 3-pin cage clamp

3-pin, male

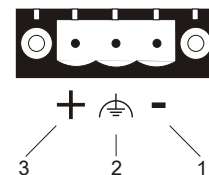


Table 39: Supply voltage connection 24 VDC

3.2.1.4.6 Grounding

The supply voltage connection (pin 2) must be connected to the ground using the largest possible wire (min. 2.5 mm²) via the shortest distance and with as little resistance as possible.

3.2.2 5DLSDL.1000-00

3.2.2.1 General information

SDL stands for "Smart Display Link". SDL allows all communication between the Automation Panel and a B&R Industrial PC to be handled using a single cable. In addition to display data, it also transmits touch screen, matrix key, LED and service data. The Automation Panel can be installed up to 40 m from the B&R Industrial PC. USB 1.1 is fully integrated in SDL and transferred over this distance as well without the need for external modules. A panel can be operated on a line using an SDL receiver.

- Can be used in all Automation Panel 900 devices
- SDL IN connections

3.2.2.2 Order data


Model number	Short description	Figure
	Display links	
5DLSDL.1000-00	Automation Panel Link SDL Receiver; Connector for SDL in; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
	Required accessories	
	SDL cable - 45° connector	
5CASDL.0018-01	SDL cable; 45° connector, 1.8 m.	
5CASDL.0050-01	SDL cable; 45° connector, 5 m.	
5CASDL.0100-01	SDL cable; 45° connector, 10 m.	
	SDL flex cable	
5CASDL.0018-03	SDL Cable flex, 1.8 m.	
5CASDL.0050-03	SDL cable flex, 5 m.	
5CASDL.0100-03	SDL cable flex, 10 m.	
5CASDL.0150-03	SDL cable flex, 15 m.	
5CASDL.0200-03	SDL cable flex, 20 m.	
5CASDL.0250-03	SDL cable flex, 25 m.	
5CASDL.0300-03	SDL cable flex, 30 m.	
5CASDL.0300-13	SDL cable flex with extender, 30 m.	
5CASDL.0400-13	SDL cable flex with extender, 40 m.	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm ² , protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm ² , protected against vibration by the screw flange	

Table 40: 5DLSDL.1000-00 - Order data

3.2.2.3 Technical data

Product ID	5DLSDL.1000-00
General information	
BL adjuster ¹⁾	No
Certification	
CE	Yes
cULus	Yes
GL	Yes
Interfaces	
Panel/Monitor interface	
Panel IN	SDL
Panel OUT	-
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current ²⁾	Max. 4.2 A
Power consumption	Typ. 3 W
Mechanical characteristics	
Fastening screws	
Quantity	2
Max. fastening torque	0.5 Nm

Table 41: 5DLSDL.1000-00 - Technical data

1) Used to set the brightness of the backlighting on the AP900.

2) The listed value applies to the 19" Automation Panel device with an inserted Automation Panel Link card.

3.2.2.4 Interfaces

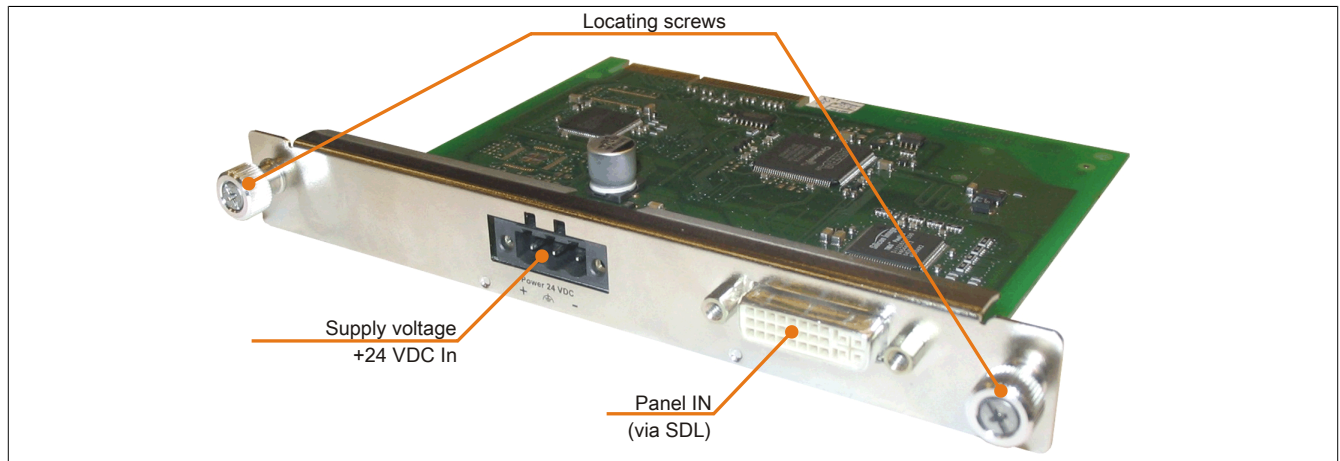


Figure 135: 5DLSDL.1000-00 - Interfaces

3.2.2.4.1 +24 VDC supply voltage

The 3-pin connector required for the supply voltage connection is not included in delivery. It can be ordered from B&R using model number 0TB103.9 (screw clamp) or 0TB103.91 (cage clamp).

The pinout is listed in the following table and printed on the DVI receiver. When dimensioning the power supply, the maximum power consumption of the Automation Panel being used must be taken into consideration (see Chapter 2 "Technical data" on page 17).



Supply voltage		3-pin, male
Protected against reverse polarity		
Pin	Description	
1	-	
2	Functional ground	
3	+	
Required accessories		
Terminal blocks		
0TB103.9	Connector 24 V 5.08 3-pin screw clamp	
0TB103.91	Connector 24 V 5.08 3-pin cage clamp	

Table 42: Supply voltage connection 24 VDC

3.2.2.4.2 Grounding

The supply voltage connection (pin 2) must be connected to the ground using the largest possible wire (min. 2.5 mm²) via the shortest distance and with as little resistance as possible.

3.2.2.4.3 Panel IN

This interface is intended for the SDL connection to a B&R Industrial PC. The necessary SDL cables are available separately from B&R (see "Cables" on page 179).

3.2.3 5DLSDL.1000-01

3.2.3.1 General information

This SDL transceiver makes it possible to connect an additional Automation Panel to the first Automation Panel. The second segment also provides an additional 40 meters in length although the maximum distance may be limited by the resolution. To achieve the maximum segment length, it is possible to use cables with an integrated extender that acts as an amplifier. Additional hardware is not required.

- Can be used in all Automation Panel 900 devices
- SDL IN and SDL OUT connections

3.2.3.2 Order data


Model number	Short description	Figure
	Display links	
5DLSDL.1000-01	Automation Panel Link SDL Transceiver; Connectors for SDL in and SDL out; Transmission of display data, touch screen, USB 1.1, matrix keys, service data; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
	Required accessories	
	SDL cable - 45° connector	
5CASDL.0018-01	SDL cable; 45° connector, 1.8 m.	
5CASDL.0050-01	SDL cable; 45° connector, 5 m.	
5CASDL.0100-01	SDL cable; 45° connector, 10 m.	
	SDL flex cable	
5CASDL.0018-03	SDL Cable flex, 1.8 m.	
5CASDL.0050-03	SDL cable flex, 5 m.	
5CASDL.0100-03	SDL cable flex, 10 m.	
5CASDL.0150-03	SDL cable flex, 15 m.	
5CASDL.0200-03	SDL cable flex, 20 m.	
5CASDL.0250-03	SDL cable flex, 25 m.	
5CASDL.0300-03	SDL cable flex, 30 m.	
5CASDL.0300-13	SDL cable flex with extender, 30 m.	
5CASDL.0400-13	SDL cable flex with extender, 40 m.	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	

Table 43: 5DLSDL.1000-01 - Order data

3.2.3.3 Technical data

Product ID	5DLSDL.1000-01
General information	
BL adjuster ¹⁾	No
Certification	
CE	Yes
cULus	Yes
Interfaces	
Panel/Monitor interface	
Panel IN	SDL
Panel OUT	SDL
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current ²⁾	Max. 4.2 A
Power consumption	Typ. 3 W
Mechanical characteristics	
Fastening screws	
Quantity	2
Max. fastening torque	0.5 Nm

Table 44: 5DLSDL.1000-01 - Technical data

1) Used to set the brightness of the backlighting on the AP900.

2) The listed value applies to the 19" Automation Panel device with an inserted Automation Panel Link card.

3.2.3.4 Interfaces

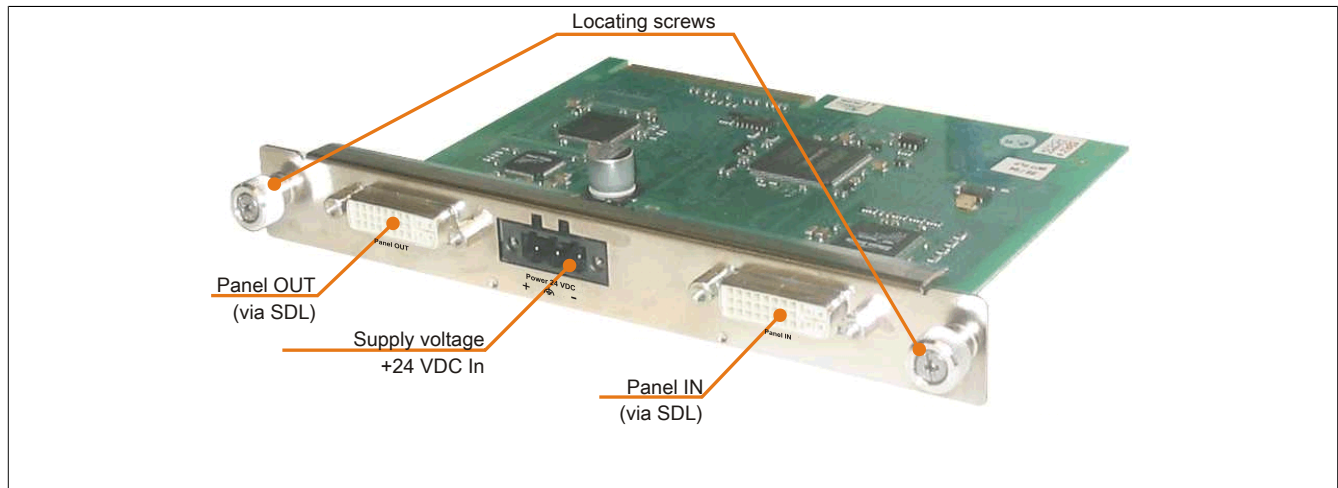


Figure 136: 5DLSDL.1000-01 - Interfaces

3.2.3.4.1 +24 VDC supply voltage

The 3-pin connector required for the supply voltage connection is not included in delivery. It can be ordered from B&R using model number 0TB103.9 (screw clamp) or 0TB103.91 (cage clamp).

The pinout is listed in the following table and printed on the DVI receiver. When dimensioning the power supply, the maximum power consumption of the Automation Panel being used must be taken into consideration (see Chapter 2 "Technical data" on page 17).



Supply voltage		3-pin, male
Protected against reverse polarity		
Pin	Description	
1	-	
2	Functional ground	
3	+	
Required accessories		
Terminal blocks		
0TB103.9	Connector 24 V 5.08 3-pin screw clamp	
0TB103.91	Connector 24 V 5.08 3-pin cage clamp	

Table 45: Supply voltage connection 24 VDC

3.2.3.4.2 Grounding

The supply voltage connection (pin 2) must be connected to the ground using the largest possible wire (min. 2.5 mm²) via the shortest distance and with as little resistance as possible.

3.2.3.4.3 Panel IN

This interface is intended for the SDL connection to a B&R Industrial PC. The necessary SDL cables are available separately from B&R (see "Cables" on page 179).

3.2.3.4.4 Panel OUT

This interface is intended for the SDL connection to an additional Automation Panel 900 device. The necessary SDL cables are available separately from B&R (see "Cables" on page 179).

Chapter 3 • Installation

1 Installation

B&R Industrial PCs are best mounted in a housing cutout using the retaining clips or clamping blocks found on the housing (design may vary).

1.1 Mounting with clamping blocks

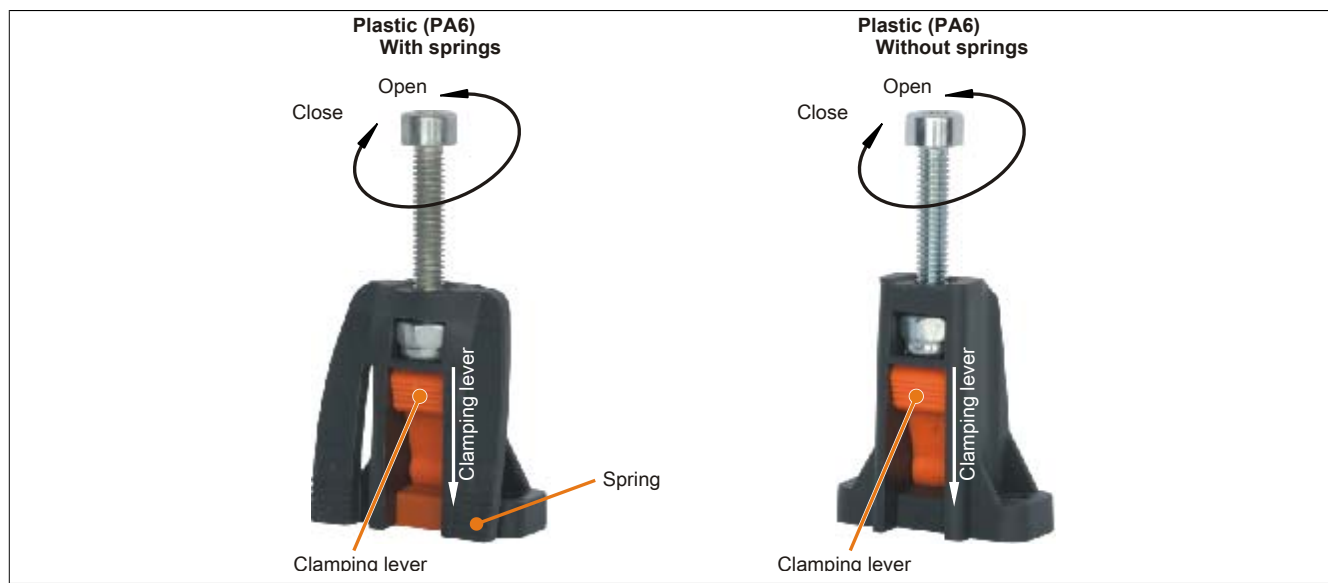


Figure 137: Clamping block

The clamping blocks are designed to clamp a maximum thickness of 10 mm and minimum thickness of 2 mm.

A hex key (3mm) is needed to tighten and loosen the screws. The maximum torque when tightening the clamp is 0.5Nm.

The device must be mounted to a flat surface; uneven areas can cause damage to the display when the screws are tightened.

2 Mounting orientation

The following diagrams show the approved mounting orientations for the Automation Panel 900.

2.1 Mounting orientation 0°

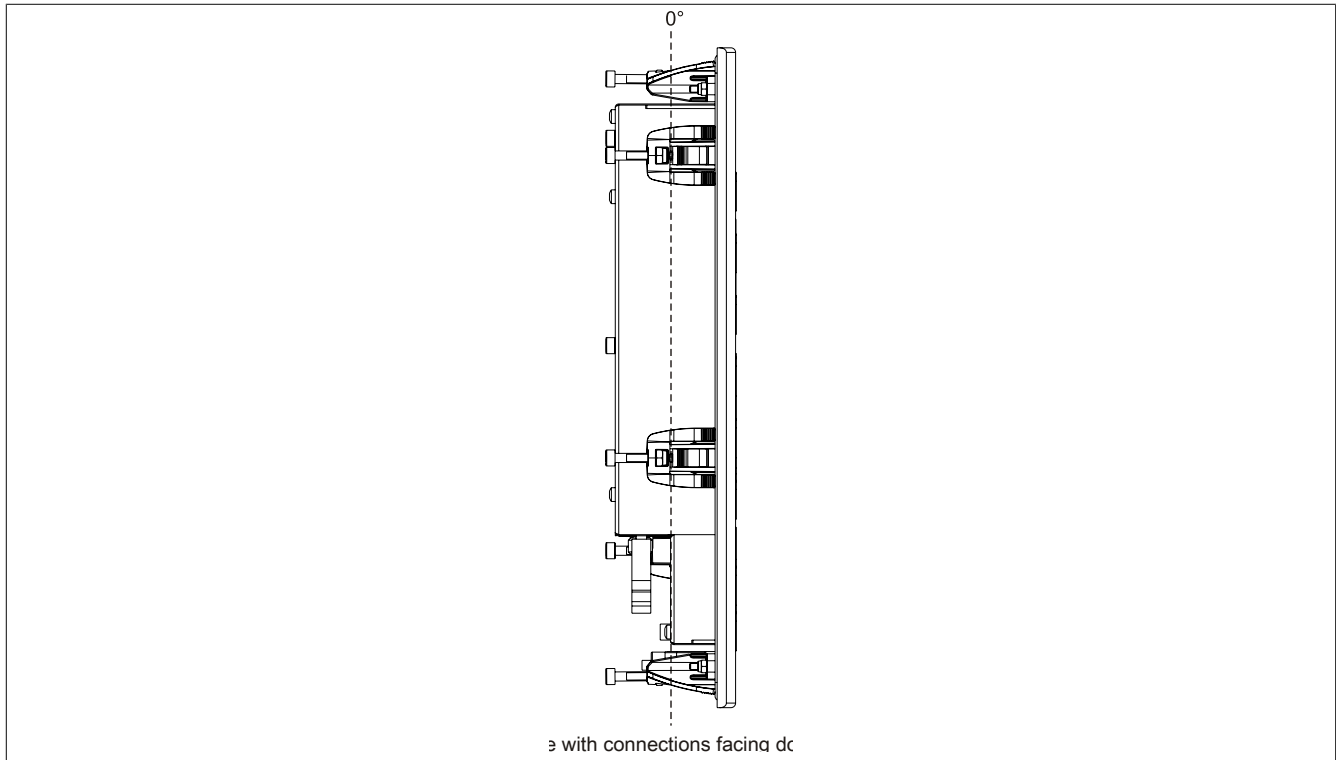


Figure 138: Mounting orientation 0°

2.2 Mounting orientation 45°

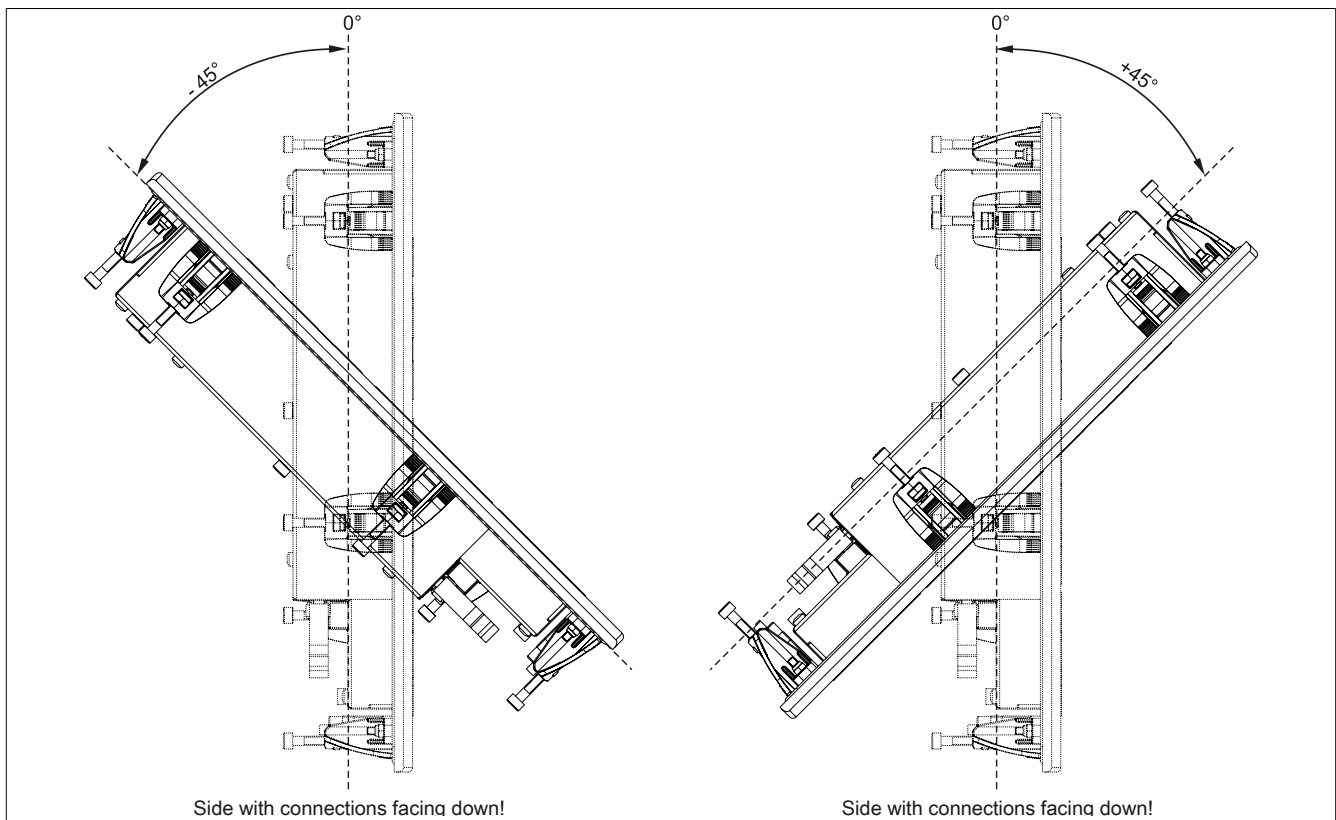


Figure 139: Mounting orientations -45° and +45°.

Warning!

Because of the changed thermal properties with +/- 45° mounting orientations, it is not possible to achieve the specified maximum ambient temperatures during operation for some Automation Panel 900 devices. Applicable limit values can be found in Chapter 2 "Technical data" on page 17.

3 Spacing for air circulation

In order to guarantee sufficient air circulation, allow the specified amount of space above, below, to the side and behind the Automation Panel. The minimum specified spacing is indicated in the following diagram.

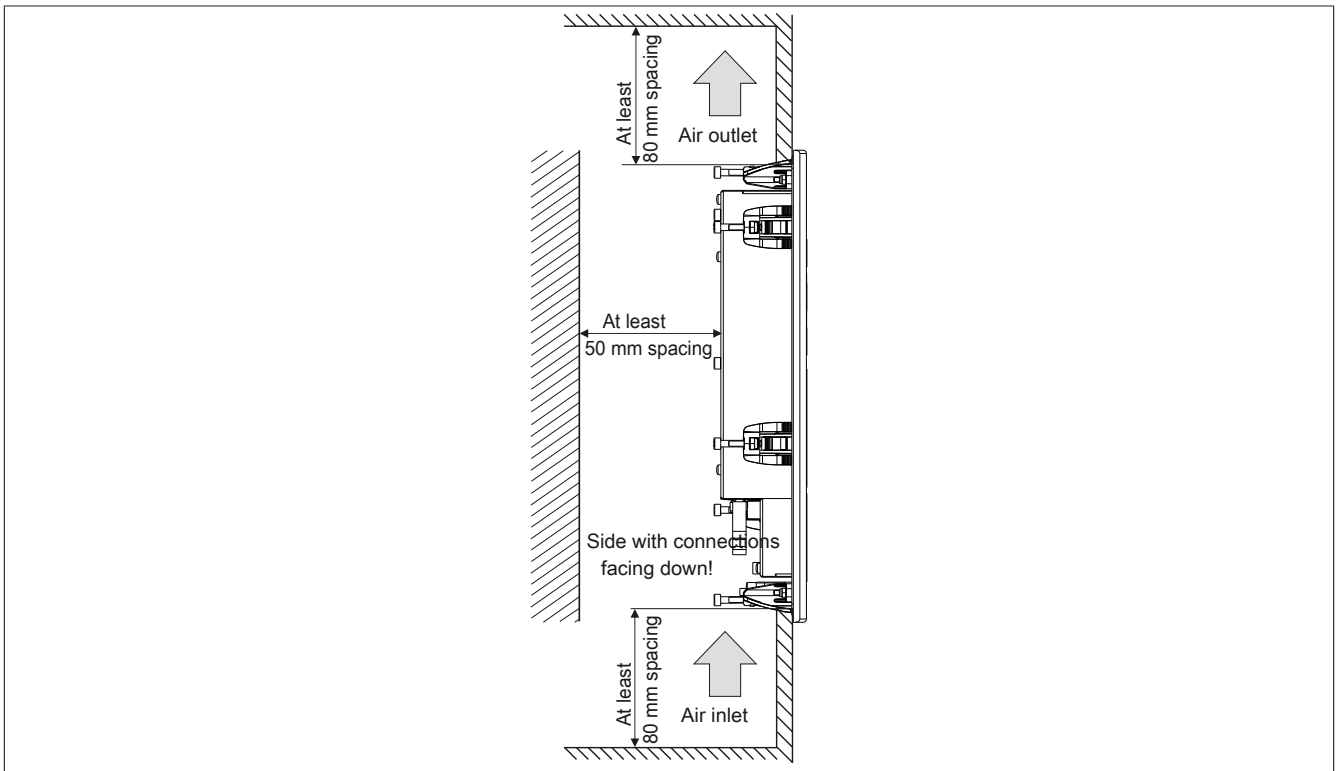


Figure 140: Spacing for air circulation - Side view

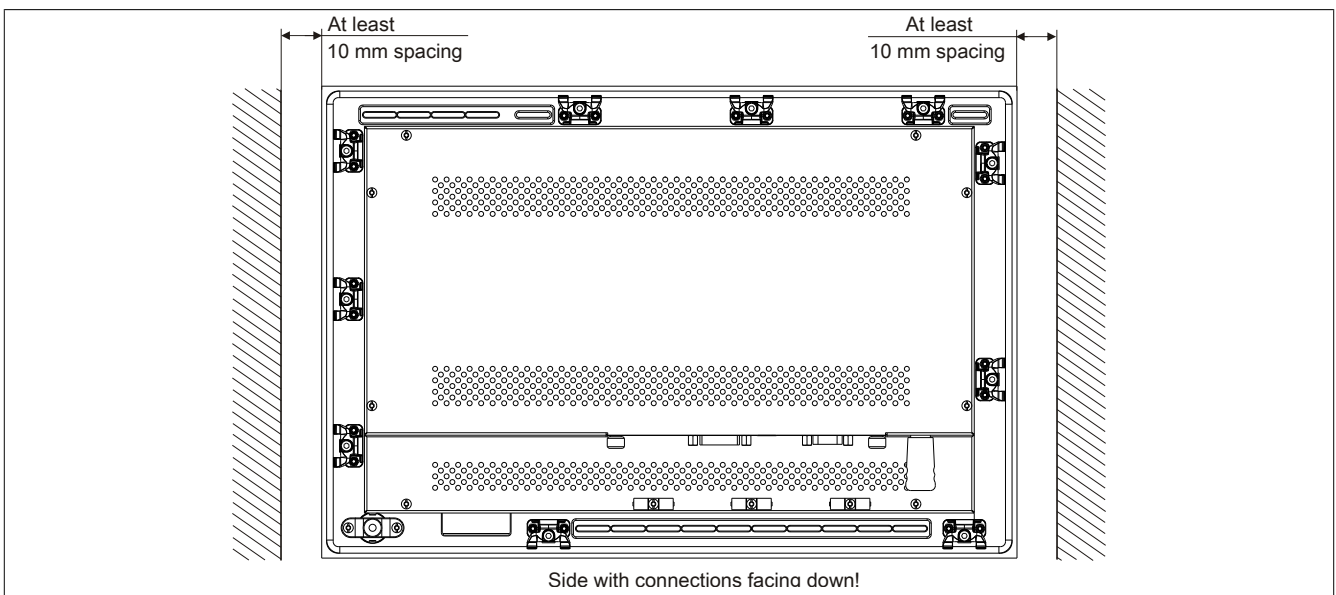


Figure 141: Spacing for air circulation - Rear view

4 Fastening cables

The Automation Panel comes with cable clamps that can be used to fasten connected cables to the back of the Automation Panel (on the bottom).

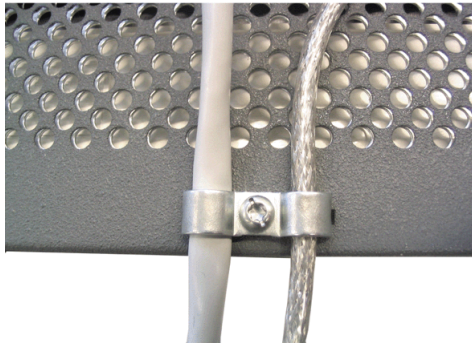


Figure 142: Cable clamps

5 Functional grounding clip

A functional grounding clip is located on the back of the device on the left next to the Automation Panel Link slot. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm²).

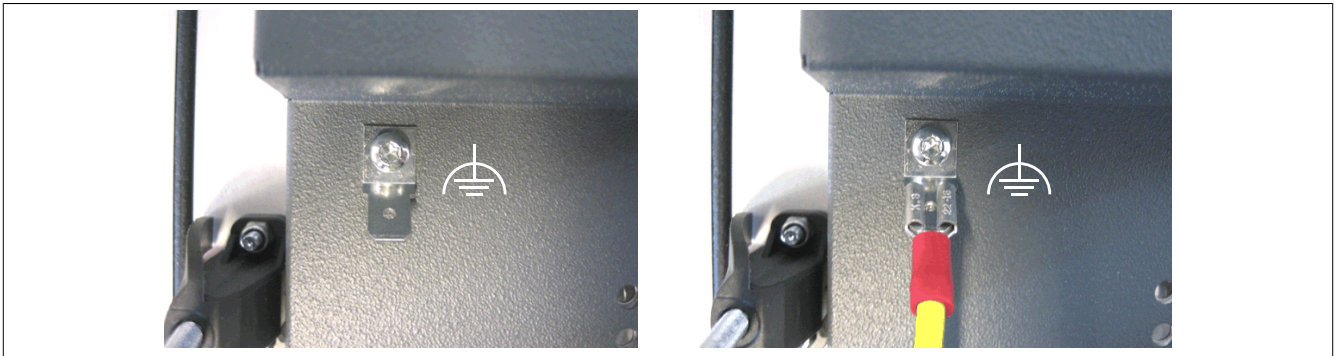


Figure 143: Functional grounding clip

6 General instructions for performing Temperature tests

The purpose of these instructions is to explain general procedures for performing application-specific temperature tests with B&R industrial PCs or Power Panels. However, these instructions are meant to serve only as a guideline.

6.1 Procedure

In order to obtain accurate results, the testing conditions should match the conditions in the field. This means that for the duration of the temperature tests, the target application should be running, the PC should be installed in the control cabinet that will be used, etc.

Additionally, a temperature sensor should be installed for the device being tested to provide live monitoring of the ambient temperature. In order to obtain accurate measurements, this sensor should be mounted at a distance of 5 to 10 cm from the B&R industrial PC, near the air intake (not near the exhaust).

All B&R industrial PCs and Power Panels are equipped with internal temperature sensors. These are installed in different locations for each series. The number of sensors and the temperature limits also vary from series to series.

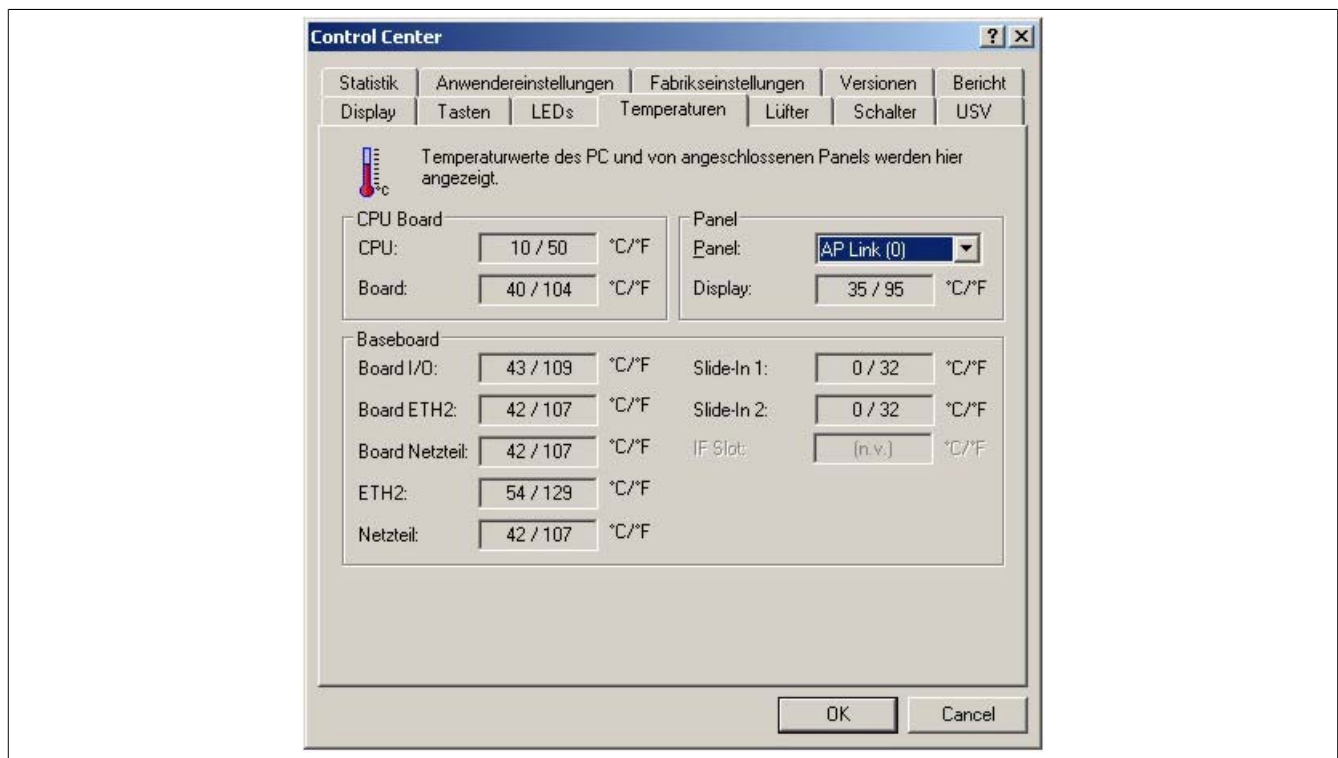
For information about the locations of temperature sensors and the maximum specified values, please see section "Temperature sensor locations" in Chapter 2 "Technical data".

To ensure a reliable evaluation of the temperature situation, a minimum of 8 hours are recommended for testing.

6.2 Evaluation of temperatures in Windows operating systems

6.2.1 Evaluation using the B&R Control Center

The B&R Control Center can be used to evaluate the temperatures. The temperatures can be viewed on the "Temperatures" tab. The B&R Control Center can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com). The B&R Control Center uses the B&R Automation Device Interface (ADI).



A new application can be created if a historic recording of the data is required.

Information:

Software development kits such as the ADI .NET SDK are available on the B&R website (www.br-automation.com).

6.2.2 Evaluation using the BurnIn tool from Passmark

If a separate application is not created or used for temperature evaluation, then B&R recommends using the BurnIn Test software tool from the company Passmark.

Standard and Professional versions of the BurnIn tool are available. In addition to the software package, there are also various loopback adapters (serial, parallel, USB, etc.) and test CDs/DVDs available. The exact software and loopback adapters used will determine the corresponding load that can be generated on the system and peripheral devices.

Information:

Loopback adapters are also available from Passmark. More information is available at www.passmark.com.

The following screenshots are based on Passmark BurnIn Pro Version V4 and an APC810 2-slot with DVD.

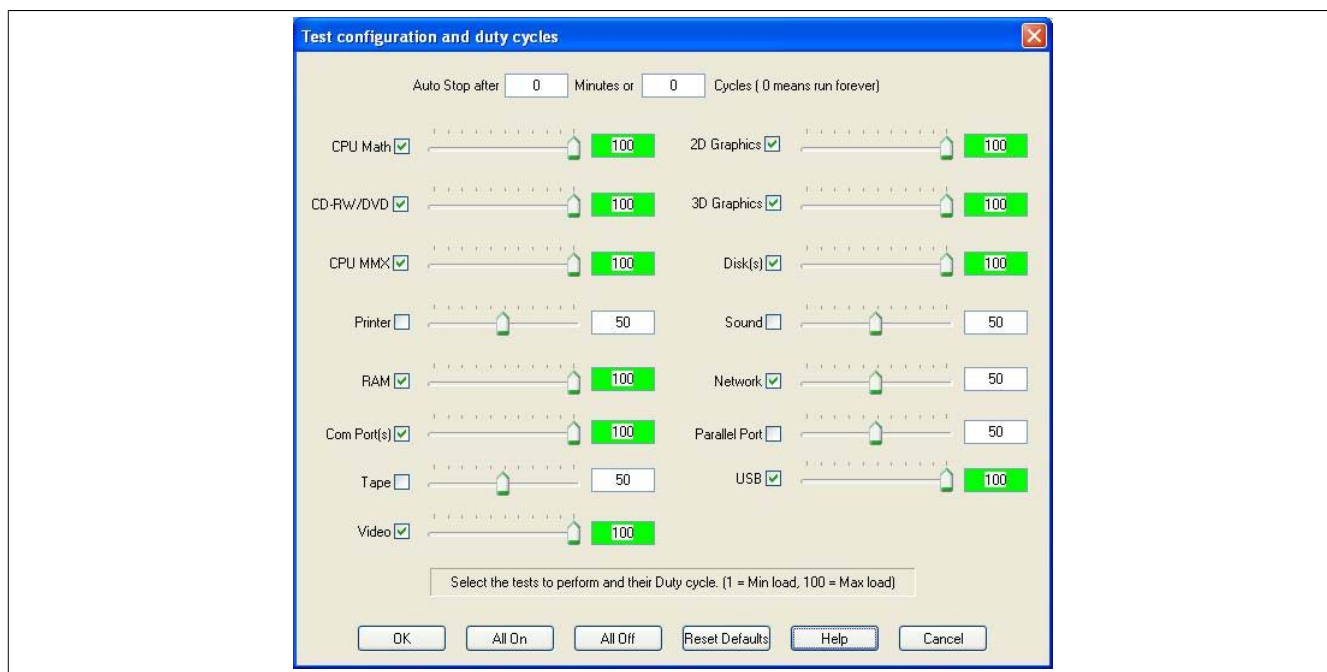


Figure 144: Settings for Passmark BurnIn Pro V4 with an APC810 2-slot with DVD

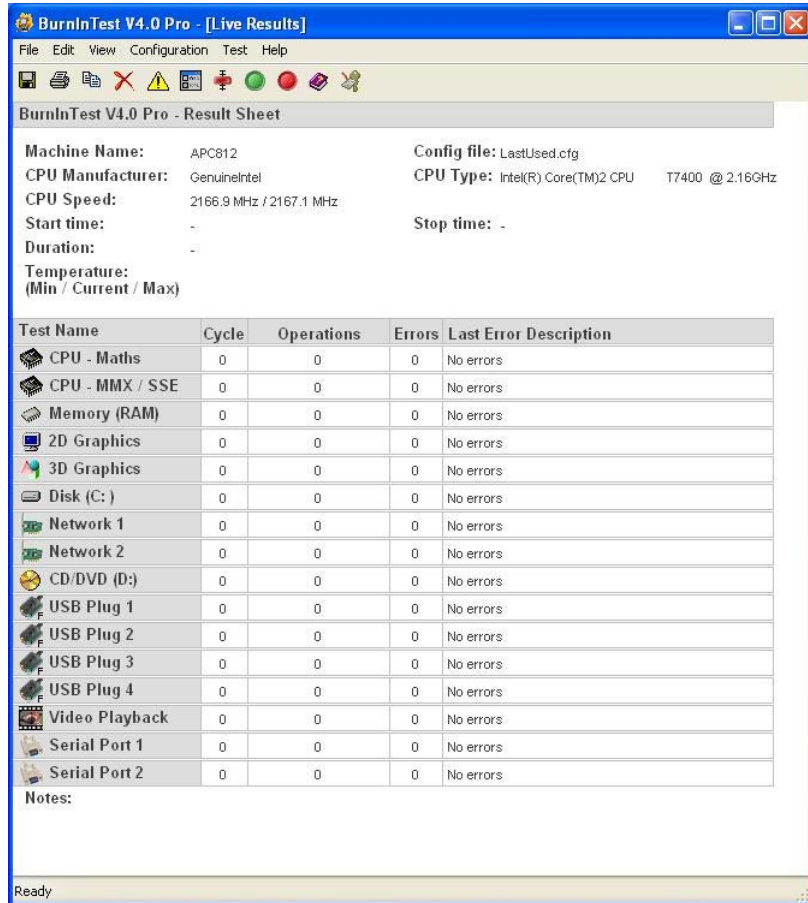


Figure 145: Test overview of an APC810 2-slot with DVD

The respective test properties may need to be fine tuned depending on the availability of a loopback adapter and DVDs.

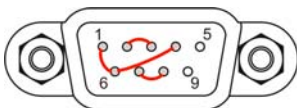
Information:

If there is no USB loopback adapter available, USB flash drives can also be used. The USB flash drives must be available in Windows as formatted drives. The test USB must then be deselected and the USB flash drives must be configured in the disk properties.



Information:

Serial loopback adapters are relatively easy to create yourself. Simply connect several pins on the serial interface with wires.



6.3 Evaluating the temperatures in an operating system other than Windows

For applications that don't use Windows, the temperatures can be evaluated using the B&R implementation guide. In addition to the implementation guide, there are also programs available in MS-DOS.

The implementation guide only describes the device-specific functions and not the main functions of the example programs.

If code from the sample programs is used, please observe the notes in the implementation guide regarding the TODO statements, I/O access functions, etc.

Information:

Sample programs and implementation guides for all B&R Industrial PCs and Power Panel can be downloaded at no cost from the B&R website (www.br-automation.com).

6.4 Evaluating the measurement results

The maximum temperature value recorded by each sensor must not exceed the temperature limits specified in the user's manuals.

If the temperature tests cannot be performed in a climate-controlled chamber, they can still be performed in an office environment. In this case, however, it is necessary to measure the ambient temperature. Experience at B&R has shown that values measured on passive systems (systems without a fan kit) can be projected linearly based on the ambient temperature. In order to be able to project the temperature values for systems with a fan kit, the fans must be running. It is also important to consider the speed, etc.

If the temperature tests are performed in a climate controlled chamber with fans, the devices will be cooled by these fans, and the results will be skewed. The measurement results for passive devices would therefore be unusable. In order to obtain accurate results in climate controlled chambers with fans, the chamber fans must be turned off and the device must be allowed to run for a sufficient amount of time (several hours) before beginning the test.

Example using an APC810 2-slot

The following example is only valid as long as the instructions for installation and mounting orientation provided in the user's manual are followed.

Temperature sensor	Measured temperature	Projected temperature	
Ambient temperature	20°C	35°C	45°C
CPU	48°C	63°C	73°C
CPU board	51°C	66°C	76°C
Board I/O	51°C	66°C	76°C
Board ETH2	52°C	67°C	77°C
Board power supply	51°C	66°C	76°C
ETH2	65°C	80°C	90°C
Power supply	51°C	66°C	76°C

Table 46: Evaluation example using an APC810 2-slot

7 Connection examples

An overview of configuration options available for connecting an Automation Panel 900 with a B&R Industrial PC can be found in the user's manual for the PC being used.

Information:

Automation Panel 900 devices can be connected to all B&R devices that support SDL.

Information:

The following examples illustrate how connection examples are portrayed in the respective user's manuals. Device-specific hardware, firmware and software requirements are also listed in the user's manuals for supported devices.

The following device families can be connected to the Automation Panel 900:

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Panel PC 700
- Panel PC 800
- Power Panel 500

7.1 Selecting the display units

If an Automation Panel 800 and an Automation Panel 900 should be connected on the same line, the devices must have the same display type. The following table lists the AP900 devices that can be connected on the same line with an AP800 device.

Automation Panel 800	Automation Panel 900
5AP820.1505-00	5AP920.1505-01 5AP951.1505-01 5AP980.1505-01 5AP981.1505-01
5AP880.1505-00	5AP920.1505-01 5AP951.1505-01 5AP980.1505-01 5AP981.1505-01

Table 47: Selecting the display units

7.2 One Automation Panel 900 via onboard DVI

An Automation Panel 900 with max. SXGA resolution is connected to the integrated DVI interface (onboard). As an alternative, an office TFT with DVI interface or an analog monitor (using adapter with model no. 5AC900.1000-00) can also be used. A separate cable is used for touch screen and USB. If USB devices are to be operated on the Automation Panel 900, the maximum distance is 5 meters. USB devices can only be connected directly to the Automation Panel (without a hub).

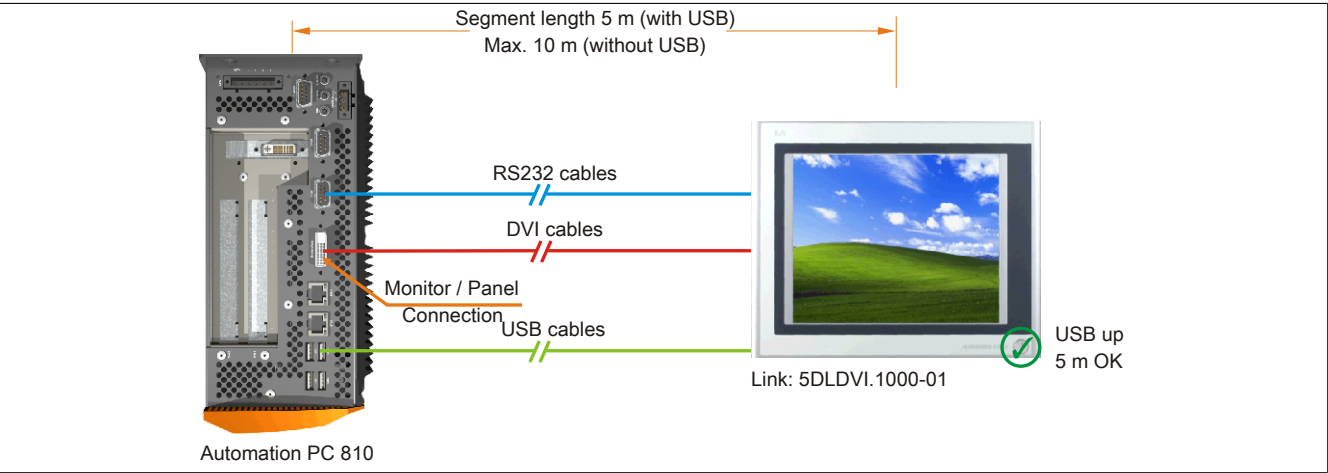


Figure 146: One Automation Panel 900 via onboard DVI (sample photo)

7.2.1 Base system requirements

Requirements for the base system and information about possible limitations to the maximum resolution can be found in the user's manual for the B&R Industrial PC being used.

7.2.2 Link modules

Information:

A corresponding link module must be selected for every device used.

Model number	Description	Note
5DL DVI.1000-01	Automation Panel Link DVI receiver connections for DVI-D, RS232 and USB 2.0 (Type B); 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900

Table 48: Link modules

7.2.3 Cables

Select one Automation Panel 900 cable each from the 3 required types.

Model number	Description	Length
5CADVI.0018-00	DVI-D cable, 1.8 m	1.8 m ±50 mm
5CADVI.0050-00	DVI-D cable, 5 m	5 m ±80 mm
5CADVI.0100-00	DVI-D cable, 10 m	10 m ±100 mm
9A0014.02	RS232 extension cable for remote operation of a display unit with touch screen, 1.8 m	1.8 m ±50 mm
9A0014.05	RS232 extension cable for remote operation of a display unit with touch screen, 5 m	5 m ±80 mm
9A0014.10	RS232 extension cable for remote operation of a display unit with touch screen, 10 m	10 m ±100 mm
5CAUSB.0018-00	USB 2.0 connection cable Type A - Type B, 1.8 m	1.8 m ±30 mm
5CAUSB.0050-00	USB 2.0 connection cable Type A - Type B, 5 m	5 m ±50 mm

Table 49: Cables for DVI configurations

Information:

Detailed technical data about cables is listed in the section "Cables" on page 179.

7.2.4 Possible Automation Panel units, resolutions and segment lengths

The following Automation Panel 900 units can be used. In rare cases, the segment length is limited according to the resolution.

Model number	Diagonal	Resolution	Touch screen	Keys	Max. segment length
5AP920.1043-01	10.4"	VGA	✓	-	5 m / 10 m ¹⁾
5AP920.1214-01	12.1"	SVGA	✓	-	5 m / 10 m ¹⁾
5AP920.1505-01	15.0"	XGA	✓	-	5 m / 10 m ¹⁾
5AP920.1706-01	17.0"	SXGA	✓	-	5 m / 10 m ¹⁾
5AP920.1906-01	19.0"	SXGA	✓	-	5 m / 10 m ¹⁾

Table 50: Possible Automation Panel units, resolutions and segment lengths

1) USB support is not possible on the Automation Panel 900 because USB is limited to 5 m.

Information:

The DVI transfer mode does not allow reading statistical values on Automation Panel 900 units.

7.2.5 BIOS settings

No special BIOS settings are necessary for operation.

7.3 One Automation Panel 900 via onboard SDL

An Automation Panel 900 is connected to the integrated SDL interface (onboard) via an SDL cable. USB devices can only be connected directly to the Automation Panel (without a hub).

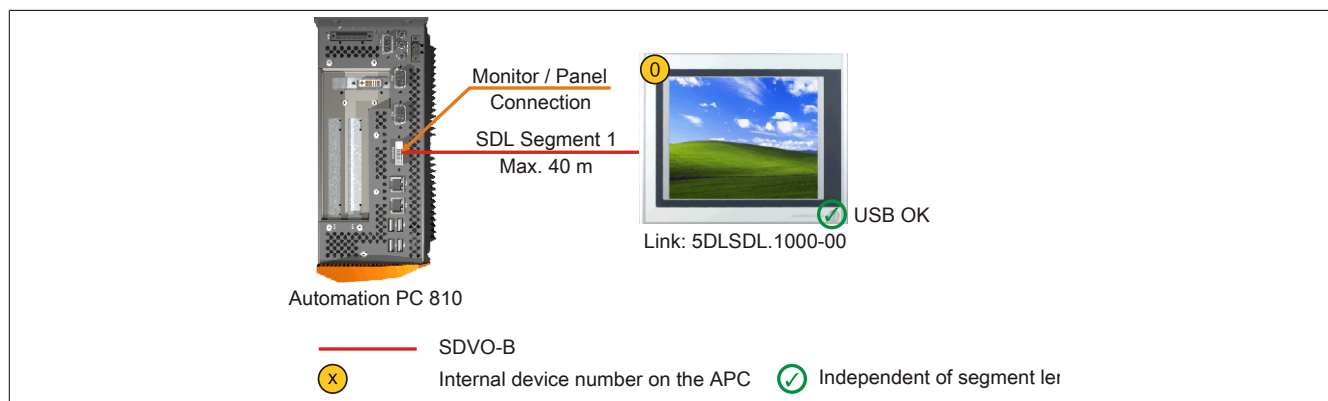


Figure 147: One Automation Panel 900 via onboard SDL (sample photo)

7.3.1 Base system requirements

Requirements for the base system and information about possible limitations to the maximum resolution can be found in the user's manual for the B&R Industrial PC being used.

7.3.2 Link modules

Information:

A corresponding link module must be selected for every device used.

Model number	Description	Note
5DLSDL.1000-00	Automation Panel Link SDL receiver Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900

Table 51: Link modules

7.3.3 Cables

Select an Automation Panel 900 cable from the following table.

Model number	Description	Length
5CASDL.0018-00	SDL cable, 1.8 m	1.8 m ±30 mm
5CASDL.0050-00	SDL cable, 5 m	5 m ±30 mm
5CASDL.0100-00	SDL cable, 10 m	10 m ±50 mm
5CASDL.0150-00	SDL cable, 15 m	15 m ±100 mm
5CASDL.0200-00	SDL cable, 20 m	20 m ±100 mm
5CASDL.0250-00	SDL cable, 25 m	25 m ±100 mm
5CASDL.0300-00	SDL cable, 30 m	30 m ±100 mm
5CASDL.0018-03	SDL flex cable, 1.8 m	1.8 m ±20 mm
5CASDL.0050-03	SDL flex cable, 5 m	5 m ±45 mm
5CASDL.0100-03	SDL flex cable, 10 m	10 m ±90 mm
5CASDL.0150-03	SDL flex cable, 15 m	15 m ±135 mm
5CASDL.0200-03	SDL flex cable, 20 m	20 m ±180 mm
5CASDL.0250-03	SDL flex cable, 25 m	25 m ±225 mm
5CASDL.0300-03	SDL flex cable, 30 m	30 m ±270 mm
5CASDL.0300-13	SDL flex cable with extender, 30 m	30 m ±280 mm
5CASDL.0400-13	SDL flex cable with extender, 40 m	40 m ±380 mm
5CASDL.0430-13	SDL flex cable with extender, 43 m	43 m ±410 mm
5CASDL.0018-01	SDL cable with 45° connector, 1.8 m	1.8 m ±30 mm
5CASDL.0050-01	SDL cable with 45° connector, 5 m	5 m ±50 mm
5CASDL.0100-01	SDL cable with 45° connector, 10 m	10 m ±100 mm
5CASDL.0150-01	SDL cable with 45° connector, 15 m	15 m ±100 mm

Table 52: Cables for SDL configurations

Information:

Detailed technical data about cables is listed in the section "Cables" on page 179.

7.3.3.1 Cable lengths and resolutions for SDL transmission

The following table lists the relationship between segment lengths and maximum resolution depending on the SDL cable being used:

SDL cables Segment length [m]	Resolution					
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200	FHD 1920 x 1080
1.8	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00
	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01
	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03
5	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00
	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01
	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03
10	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00
	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01
	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03
15	5CASDL.0150-00	5CASDL.0150-00	5CASDL.0150-00	5CASDL.0150-00	-	-
	5CASDL.0150-01	5CASDL.0150-01	5CASDL.0150-01	5CASDL.0150-01	-	-
	5CASDL.0150-03	5CASDL.0150-03	5CASDL.0150-03	5CASDL.0150-03	-	5CASDL.0150-03
20	5CASDL.0200-00	5CASDL.0200-00	5CASDL.0200-00	5CASDL.0200-00	-	-
	5CASDL.0200-03	5CASDL.0200-03	5CASDL.0200-03	5CASDL.0200-03	-	5CASDL.0200-03
25	5CASDL.0250-00	5CASDL.0250-00	5CASDL.0250-00	-	-	-
	5CASDL.0250-03	5CASDL.0250-03	5CASDL.0250-03	-	-	-
30	5CASDL.0300-00	5CASDL.0300-00	-	-	-	-
	5CASDL.0300-03	5CASDL.0300-03	5CASDL.0300-13	5CASDL.0300-13	-	5CASDL.0300-13
40	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	-	5CASDL.0400-13

Table 53: Cable lengths and resolutions for SDL transmission

7.3.4 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

Touch screen functionality

COM C must be enabled in BIOS in order to operate the panel touch screen connected to the monitor/panel interface ("Advanced - Baseboard / Panel features - Legacy devices").

7.4 Four Automation Panel 900 units via onboard SDL

An Automation Panel 900 is connected to the integrated SDL interface (onboard) via an SDL cable. Up to three other Automation Panels of the same type are connected to this Automation Panel and operated via SDL. All four of the panels show the same content (display clone).

USB is supported up to a maximum distance (SDL segment 1 + SDL segment 2) of 30 m on the first two panels (front and back side). From a distance of 30 m and longer, USB is only available for the first panel (front and back side). USB devices can only be connected directly to the Automation Panel (without a hub).

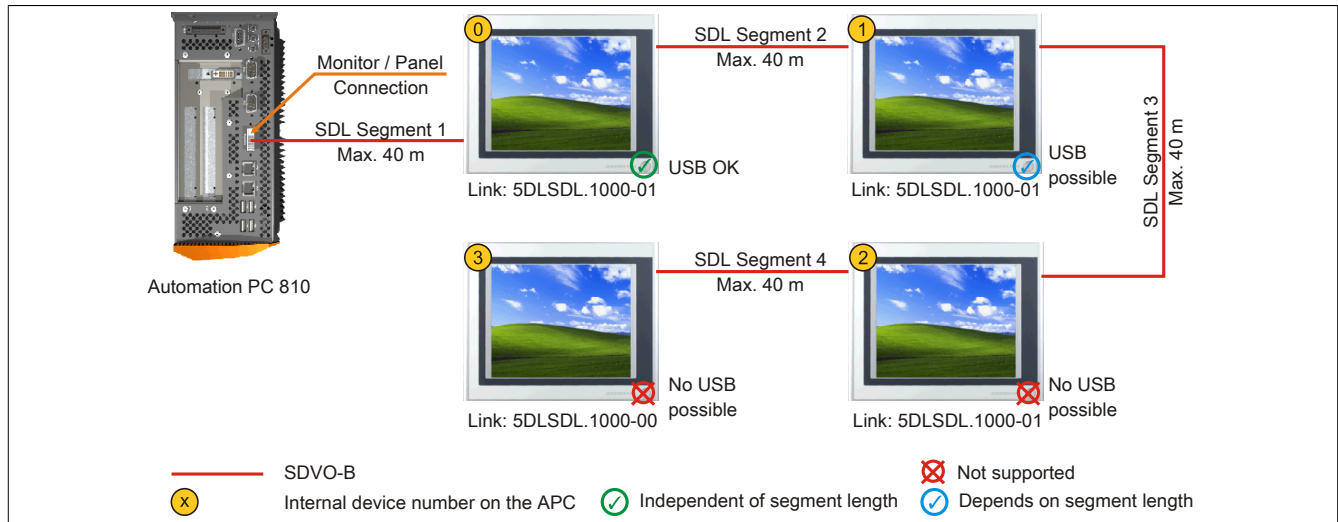


Figure 148: Four Automation Panel 900 units via onboard SDL (sample photo)

7.4.1 Base system requirements

Requirements for the base system and information about possible limitations to the maximum resolution can be found in the user's manual for the B&R Industrial PC being used.

7.4.2 Link modules

Information:

A corresponding link module must be selected for every device used.

Model number	Description	Note
5DLSDDL.1000-00	Automation Panel Link SDL receiver Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5DLSDDL.1000-01	Automation Panel Link SDL transceiver Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900

Table 54: Link modules

7.4.3 Cables

Select an Automation Panel 900 cable from the following table.

Model number	Description	Length
5CASDL.0018-00	SDL cable, 1.8 m	1.8 m ±30 mm
5CASDL.0050-00	SDL cable, 5 m	5 m ±30 mm
5CASDL.0100-00	SDL cable, 10 m	10 m ±50 mm
5CASDL.0150-00	SDL cable, 15 m	15 m ±100 mm
5CASDL.0200-00	SDL cable, 20 m	20 m ±100 mm
5CASDL.0250-00	SDL cable, 25 m	25 m ±100 mm
5CASDL.0300-00	SDL cable, 30 m	30 m ±100 mm
5CASDL.0018-03	SDL flex cable, 1.8 m	1.8 m ±20 mm
5CASDL.0050-03	SDL flex cable, 5 m	5 m ±45 mm
5CASDL.0100-03	SDL flex cable, 10 m	10 m ±90 mm
5CASDL.0150-03	SDL flex cable, 15 m	15 m ±135 mm
5CASDL.0200-03	SDL flex cable, 20 m	20 m ±180 mm
5CASDL.0250-03	SDL flex cable, 25 m	25 m ±225 mm

Table 55: Cables for SDL configurations

Model number	Description	Length
5CASDL.0300-03	SDL flex cable, 30 m	30 m ±270 mm
5CASDL.0300-13	SDL flex cable with extender, 30 m	30 m ±280 mm
5CASDL.0400-13	SDL flex cable with extender, 40 m	40 m ±380 mm
5CASDL.0430-13	SDL flex cable with extender, 43 m	43 m ±410 mm
5CASDL.0018-01	SDL cable with 45° connector, 1.8 m	1.8 m ±30 mm
5CASDL.0050-01	SDL cable with 45° connector, 5 m	5 m ±50 mm
5CASDL.0100-01	SDL cable with 45° connector, 10 m	10 m ±100 mm
5CASDL.0150-01	SDL cable with 45° connector, 15 m	15 m ±100 mm

Table 55: Cables for SDL configurations

Information:

Detailed technical data about cables is listed in the section "Cables" on page 179.

7.4.3.1 Cable lengths and resolutions for SDL transmission

The following table lists the relationship between segment lengths and maximum resolution depending on the SDL cable being used:

SDL cables Segment length [m]	Resolution					
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200	FHD 1920 x 1080
1.8	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00
	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01
	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03
5	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00
	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01
	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03
10	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00
	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01
	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03
15	5CASDL.0150-00	5CASDL.0150-00	5CASDL.0150-00	5CASDL.0150-00	-	-
	5CASDL.0150-01	5CASDL.0150-01	5CASDL.0150-01	5CASDL.0150-01	-	-
	5CASDL.0150-03	5CASDL.0150-03	5CASDL.0150-03	5CASDL.0150-03	-	5CASDL.0150-03
20	5CASDL.0200-00	5CASDL.0200-00	5CASDL.0200-00	5CASDL.0200-00	-	-
	5CASDL.0200-03	5CASDL.0200-03	5CASDL.0200-03	5CASDL.0200-03	-	5CASDL.0200-03
25	5CASDL.0250-00	5CASDL.0250-00	5CASDL.0250-00	-	-	-
	5CASDL.0250-03	5CASDL.0250-03	5CASDL.0250-03	-	-	-
30	5CASDL.0300-00	5CASDL.0300-00	-	-	-	-
	5CASDL.0300-03	5CASDL.0300-03	5CASDL.0300-13	5CASDL.0300-13	-	5CASDL.0300-13
40	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	-	5CASDL.0400-13

Table 56: Cable lengths and resolutions for SDL transmission

7.4.4 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

Touch screen functionality

COM C must be enabled in BIOS in order to operate the panel touch screen connected to the monitor/panel interface ("Advanced - Baseboard / Panel features - Legacy devices").

8 Connecting peripheral USB devices

Warning!

Peripheral USB devices can be connected to these USB ports. Due to the vast number of USB devices available on the market, B&R cannot guarantee their performance. B&R does ensure the performance of all USB devices that they provide.

8.1 Remote connection to Automation Panel 900 via DVI

Many different peripheral USB devices can be connected to the 2 or 3 USB ports on the Automation Panel 900. These can each handle a load of 500 mA. The maximum transfer rate is USB 2.0.

Information:

Only end devices (no hubs) can be connected to the Automation Panel 900.



Figure 149: Remote connection of USB peripheral devices on the APC900 via DVI

8.2 Remote connection to Automation Panel 800 / 900 via SDL

Many different peripheral USB devices can be connected to the 2 or 3 USB ports on Automation Panel 900 or the USB interfaces on Automation Panel 800 devices. These can each handle a load of 500 mA. The maximum transfer rate is USB 1.1.

Information:

Only end devices (no hubs) can be connected to the Automation Panel 800/900.



Figure 150: Remote connection of USB peripheral devices on the APC800/900 via SDL

9 Key and LED configurations

Each key or LED can be configured individually and adapted directly to the application. Various B&R tools are available for this purpose:

- B&R Key Editor for Windows operating systems
- Visual Components for Automation Runtime

Keys and LEDs from each device are processed by the matrix controller in a bit sequence of 128 bits each.

The positions of keys and LEDs in the matrix are shown as hardware numbers. These hardware numbers can be read directly from the target system using the B&R Key Editor or the B&R Control Center.

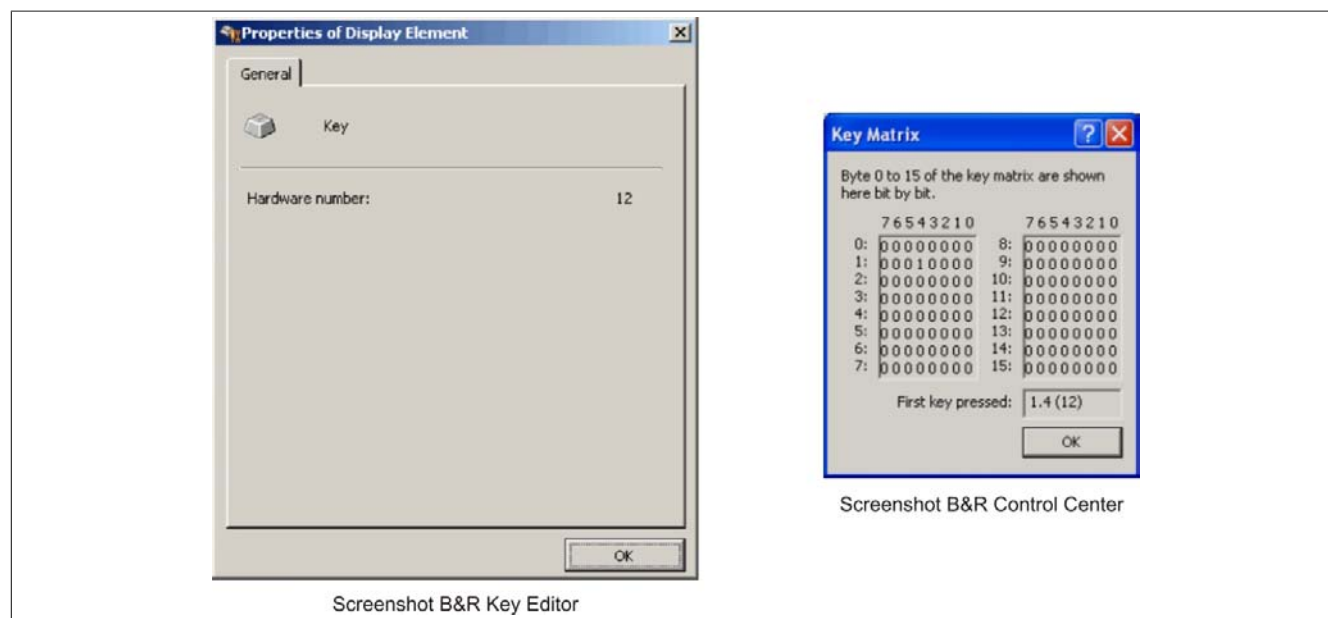


Figure 151: Hardware numbers in the B&R Key Editor and the B&R Control Center

The images below show the positions of keys and LEDs in the matrix. This information is indicated as follows.

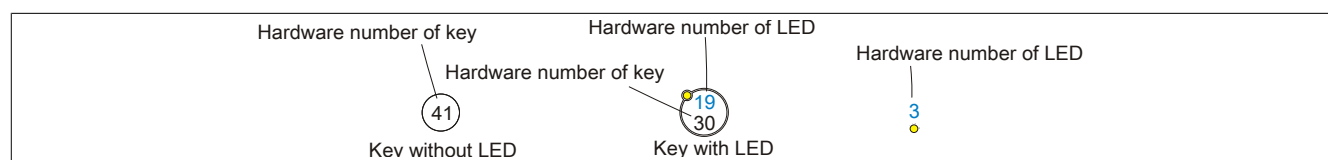


Figure 152: Keys and LEDs in the matrix

9.1 Automation Panel 10.4" VGA

9.1.1 Automation Panel 5AP951.1043-01 / 5AP981.1043-01

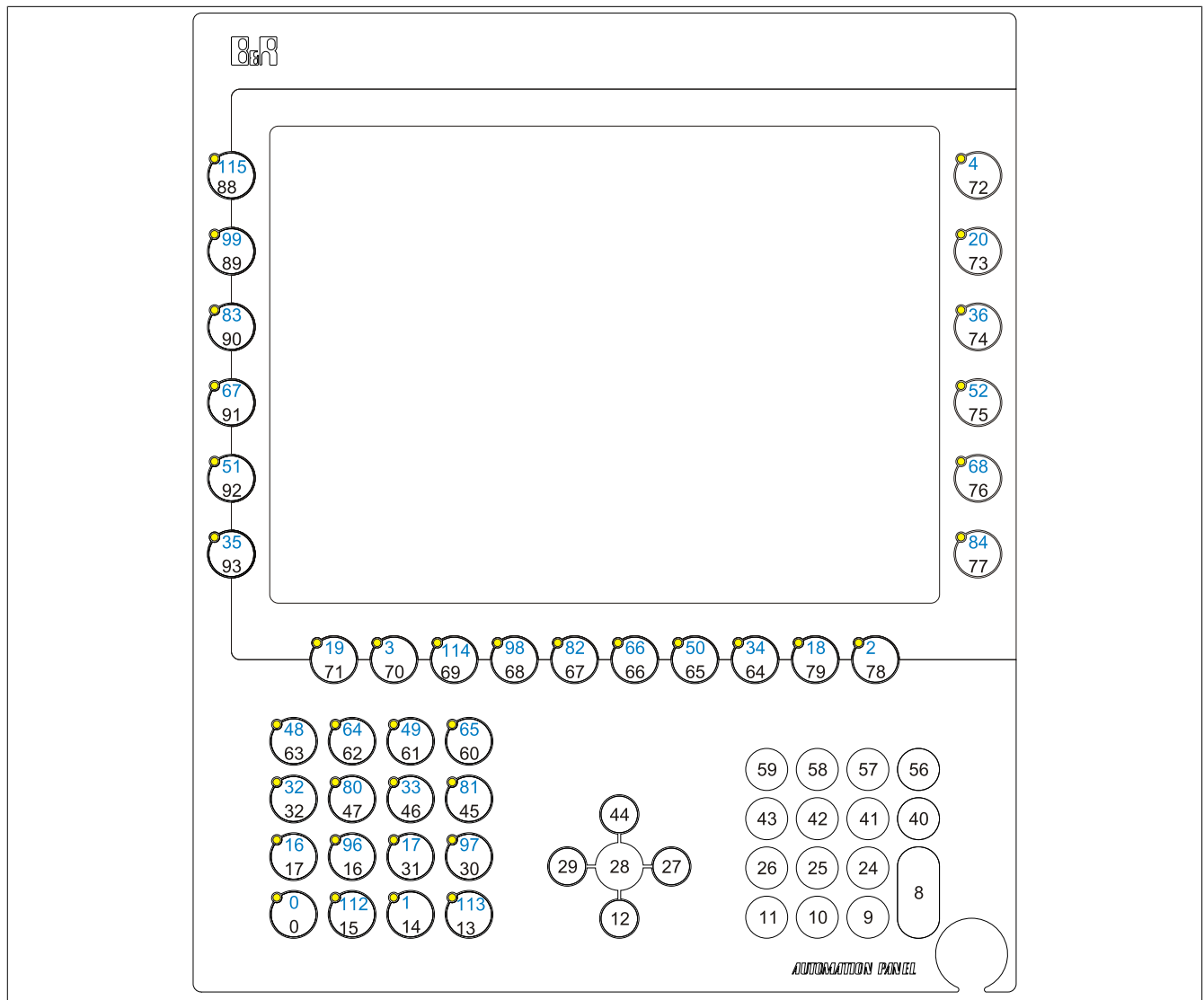


Figure 153: 5AP951.1043-01 / 5AP981.1043-01 - Hardware numbers

9.1.2 Automation Panel 5AP952.1043-01 / 5AP982.1043-01

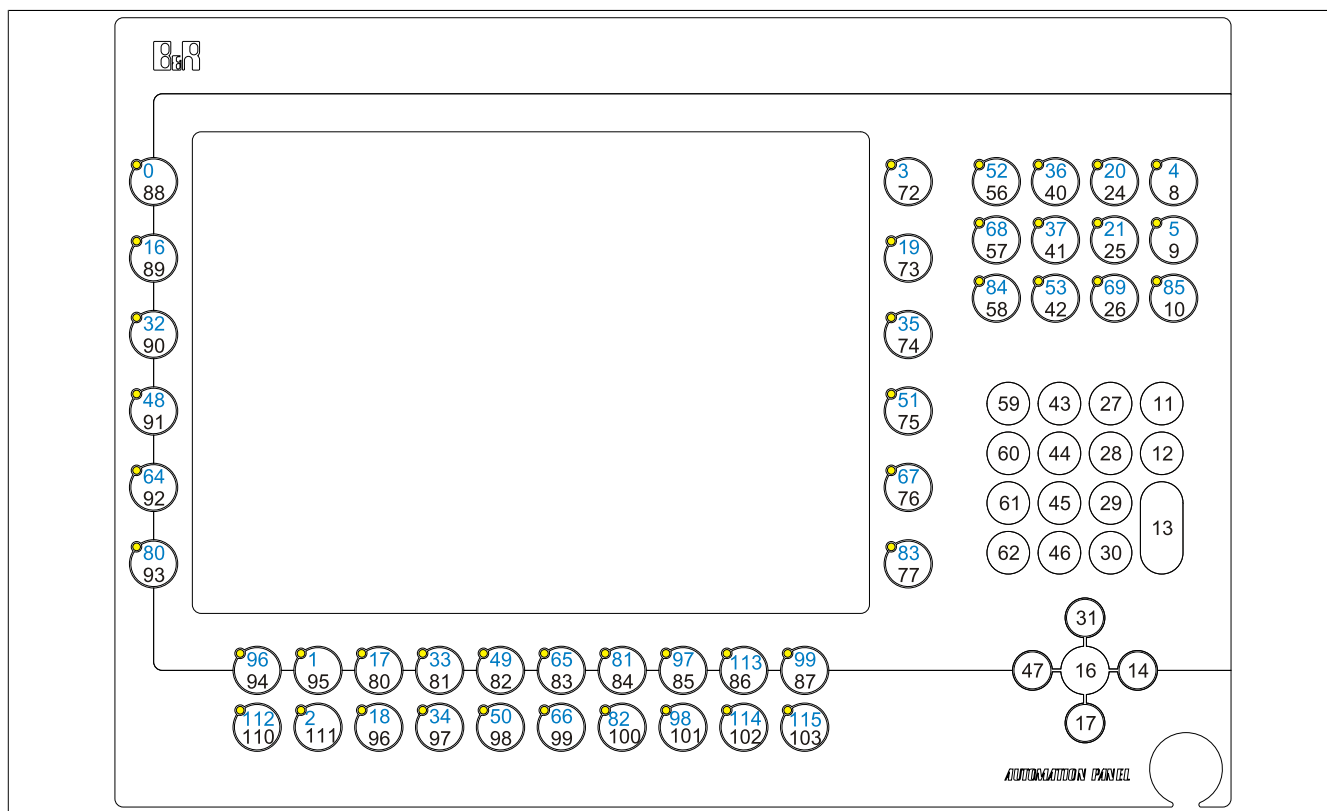


Figure 154: 5AP952.1043-01 / 5AP982.1043-01 - Hardware numbers

9.1.3 Automation Panel 5AP980.1043-01

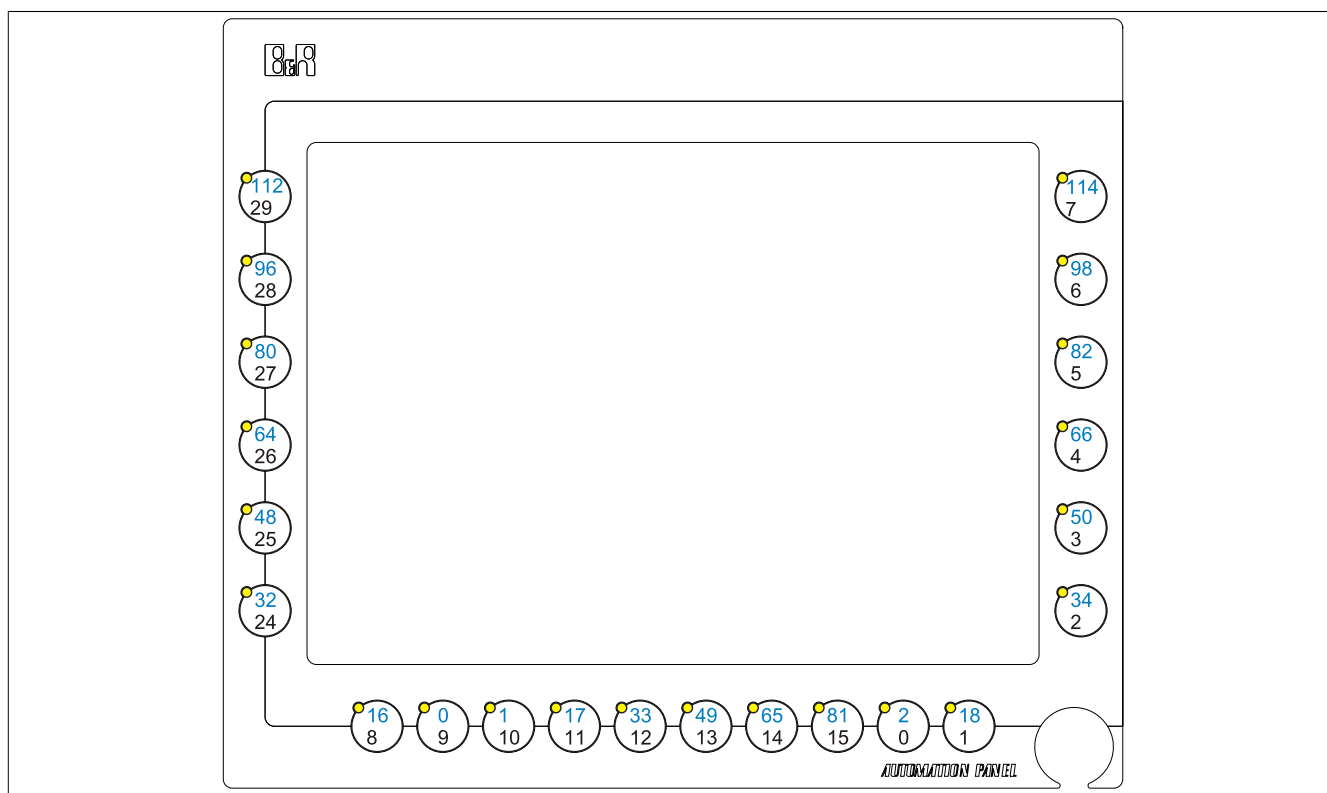


Figure 155: 5AP980.1043-01 - Hardware numbers

9.2 Automation Panel 15" XGA

9.2.1 Automation Panel 5AP951.1505-01 / 5AP981.1505-01

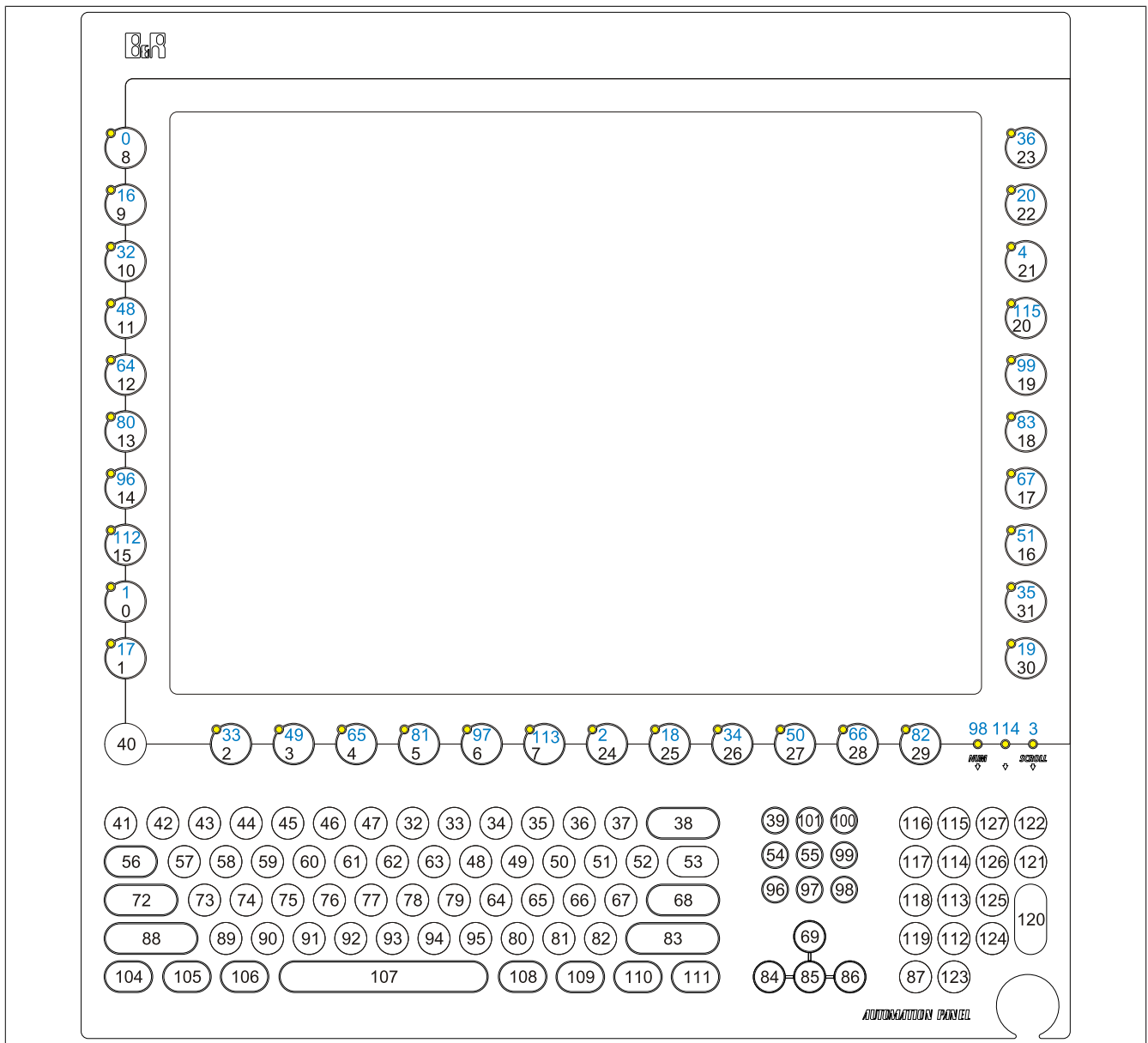


Figure 156: 5AP951.1505-01 / 5AP981.1505-01 - Hardware numbers

9.2.2 Automation Panel 5AP980.1505-01



Figure 157: 5AP980.1505-01 - Hardware numbers

10 Touch screen calibration

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

Regardless of this, the touch screen will have to be calibrated once during or following the installation of the touch screen driver.

10.1 Windows XP Professional

After installing Windows XP Professional on the device, the touch screen driver must be installed in order to operate the touch screen. The necessary driver is available in the Downloads section of the B&R website (www.br-automation.com).

10.2 Windows XP Embedded

After starting Windows XP Embedded on the device for the first time (first boot agent), the touch screen driver must be installed in order to operate the touch screen. The necessary driver is available in the Downloads section of the B&R website (www.br-automation.com).

10.3 Windows Embedded Standard 2009

After starting Windows Embedded Standard 2009 on the device for the first time (first boot agent), the touch screen driver must be installed in order to operate the touch screen. The necessary driver is available in the Downloads section of the B&R website (www.br-automation.com).

10.4 Windows Embedded Standard 7

A touch screen driver will be installed automatically if a touch controller is detected during the Windows Embedded Standard 7 installation.

If a touch controller is not detected during Windows Embedded Standard 7 installation, or if an Automation Panel 800/900 is connected later on, then the touch screen driver needs to be installed manually. The necessary driver is available in the Downloads section of the B&R website (www.br-automation.com).

10.5 Windows CE

Windows CE starts the touch screen calibration sequence during its first boot in its default configuration (i.e. delivered state).

10.6 Windows 7

After installing Windows 7 on the device, the touch screen driver must be installed in order to operate the touch screen. The necessary driver is available in the Downloads section of the B&R website (www.br-automation.com).

10.7 Automation Runtime / Visual Components

The touch screen must be calibrated once for the customer application when commissioning the device and project.

11 Tips for extending the service life of the display

11.1 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.

11.1.1 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%, which can result in an approximately 50% increase in the half-brightness time

11.2 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 two 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.

11.2.1 What causes screen burn-in?

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

11.2.2 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

12 Pixel errors

Information:

Displays may contain defective pixels (dead/stuck pixels) that result from the manufacturing process. These flaws are not grounds for claiming reclamation or warranty.

Chapter 4 • Software

1 B&R Automation Device Interface (ADI) - Control Center

The ADI (Automation Device Interface) enables access to specific functions on B&R devices. Settings for devices can be read and configured using the B&R Control Center applet in the Control Panel.

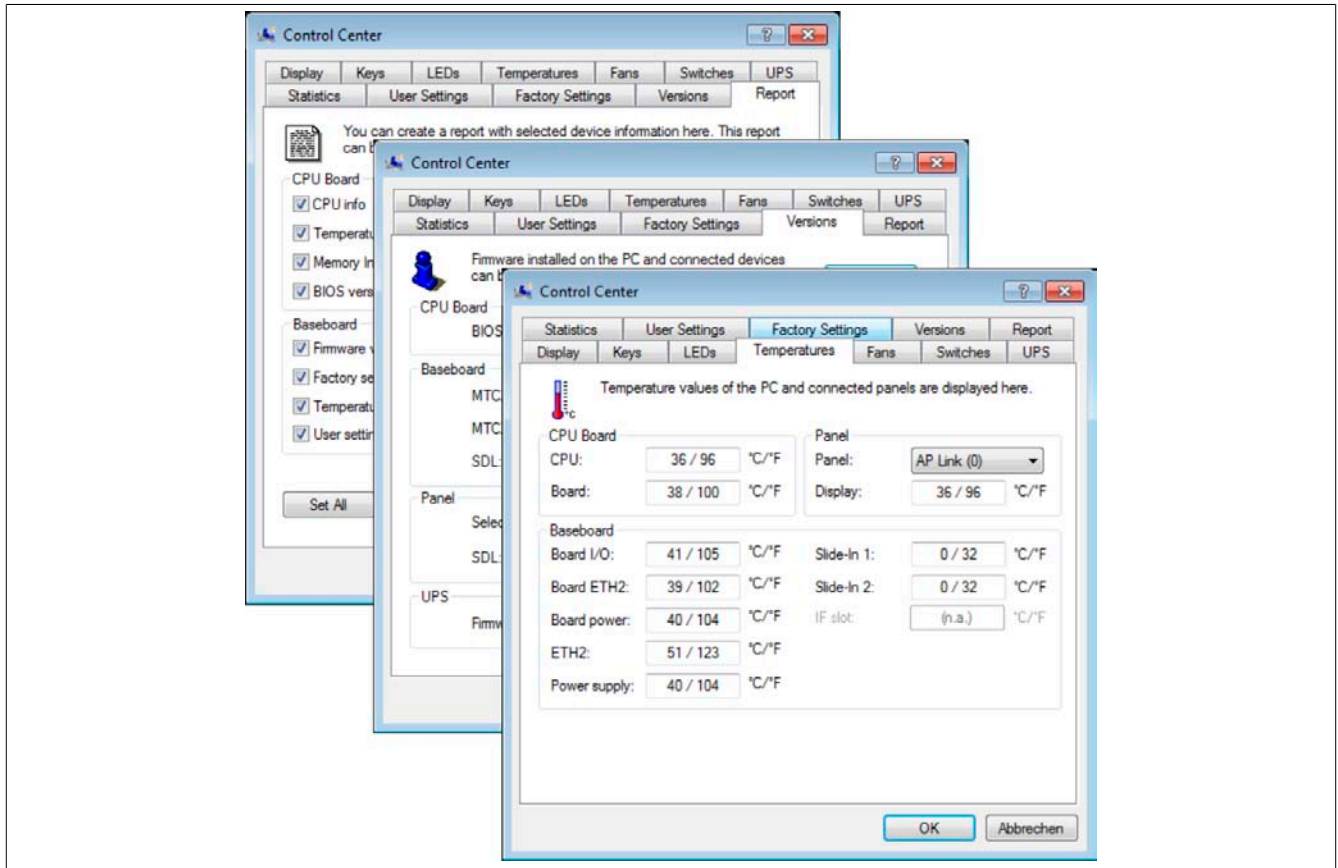


Figure 158: ADI Control Center screenshots - Examples

Information:

The temperature and voltage values (e.g. CPU temperature, core voltage, battery voltage) displayed in the corresponding ADI window represent uncalibrated values for informational purposes. They cannot be used to draw any conclusions about hardware alarms or error conditions. The hardware components used have automatic diagnostic functions that can be applied in the event of error.

1.1 Functions

Information:

The functions provided by the Automation Device Interface (ADI) - Control Center vary according to the device series.

- Changing display-specific parameters
- Reading device-specific keys
- Updating the key configuration
- Enabling device-specific LEDs on a membrane keypad
- Reading and calibrating input devices (e.g. key switches, handwheels, joysticks, potentiometers)
- Reading temperatures, fan speeds, statistical data and switch settings
- Read the operating hours (power on hours)

- Reading user and factory settings
- Reading software versions
- Updating and backing up BIOS and firmware
- Creating reports about the current system (support assistance)
- Setting the SDL equalizer value when adjusting SDL cables
- Changing the user serial ID

Supports the following systems:

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Panel PC 300
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500
- Mobile Panel 40/50
- Mobile Panel 100/200
- Connected Automation Panel 800
- Connected Automation Panel 900

1.2 Installation

A detailed description of the Control Center can be found in the integrated online help documentation. The B&R Automation Device Interface (ADI) driver (also contains Control Center) is available in the Downloads section of the B&R website (www.br-automation.com).

1. Download and unzip the .zip archive
2. Close all applications-
3. Run the Setup.exe file (e.g. double-click on it in Explorer).

Information:

The ADI driver is already included in B&R images of embedded operating systems.

If a more current ADI driver version exists (see the Downloads section of the B&R website), it can be installed later. It is important that Enhanced Write Filter (EWF) is disabled for this.

2 B&R Automation Device Interface (ADI) Development Kit

This software can be used to access B&R Automation Device Interface (ADI) functions directly from Windows applications created in one of the following development environments:

- Microsoft Visual C++ 6.0
- Microsoft Visual Basic 6.0
- Microsoft Embedded Visual C++ 4.0
- Microsoft Visual Studio 2005 (or newer)

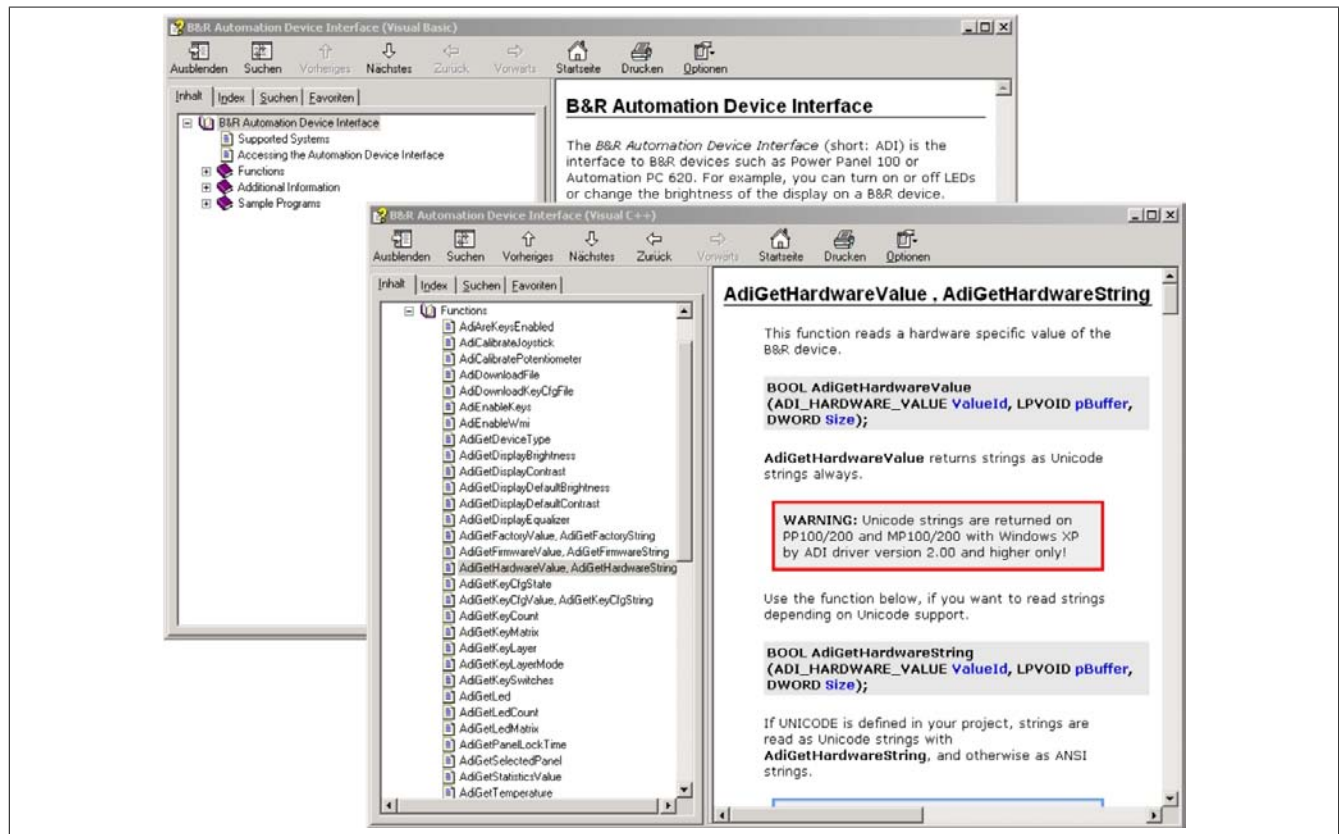


Figure 159: ADI Development Kit screenshots (version 3.40)

Features:

- One Microsoft Visual Basic module with ADI function declarations
- Header files and import libraries for Microsoft Visual C++
- Help files for Visual Basic and Visual C++
- Sample projects for Visual Basic and Visual C++
- ADI DLL (for application testing if no ADI driver is installed)

Supports the following systems (version 3.40 and higher):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500
- Mobile Panel 40/50

- Mobile Panel 100/200

The ADI driver installed on the stated product series must be suitable for that device. The ADI driver is already included in B&R images of embedded operating systems.

A detailed description of how to use ADI functions can be found in the online help documentation.

The B&R Automation Device Interface (ADI) development kit can be downloaded for free from the download area on the B&R website (www.br-automation.com).

3 B&R Automation Device Interface (ADI) .NET SDK

This software can be used to access B&R Automation Device Interface (ADI) functions directly from .NET applications created using Microsoft Visual Studio 2005 or later.

Supported programming languages:

- Visual Basic
- Visual C++
- Visual C#

System requirements

- Development system: PC with Windows XP/7 and
 - Microsoft Visual Studio 2005 (or newer)
 - Microsoft .NET Framework 2.0 and/or Microsoft .NET Compact Framework 2.0 (or newer)

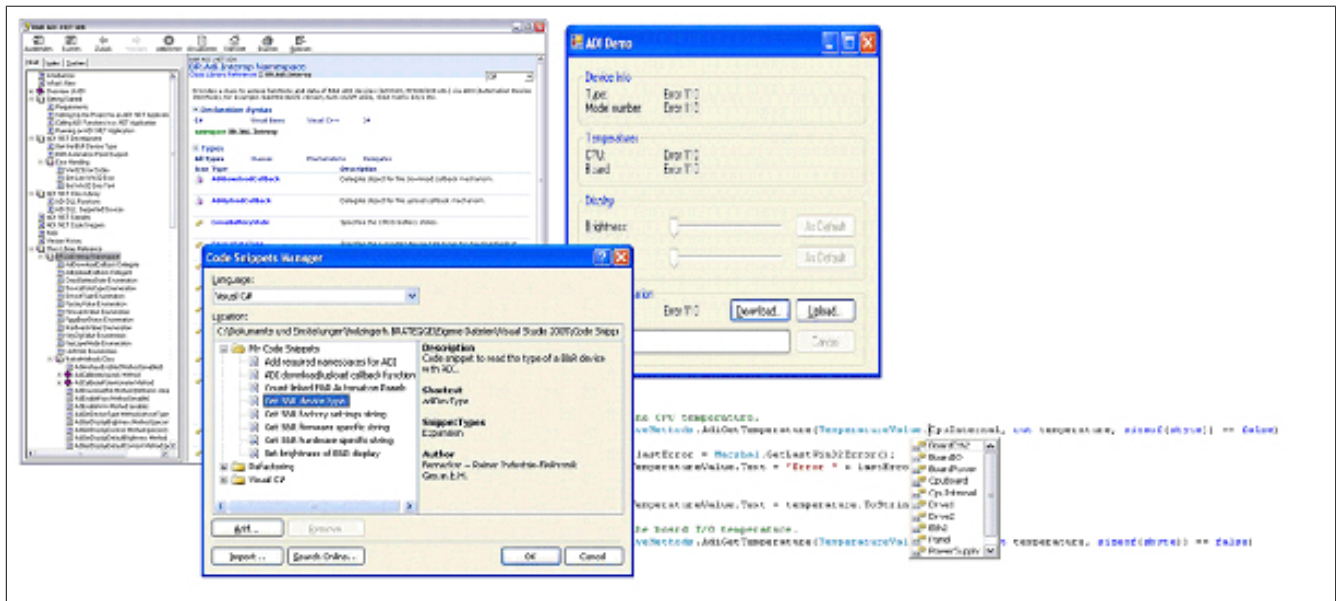


Figure 160: ADI .NET SDK screenshots (version 1.80)

Features (version 1.80 and higher)

- ADI .NET class library
- Help files in HTML Help 1.0 format (.chm file) and MS Help 2.0 format (.HxS file). (Help documentation is in English)
- Sample projects and code snippets for Visual Basic, Visual C++ and Visual C#
- ADI DLL (for application testing if no ADI driver is installed)

Supports the following systems (version 1.80 and higher):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500
- Mobile Panel 40/50
- Mobile Panel 100/200

The ADI driver installed on the stated product series must be suitable for that device. The ADI driver is already included in B&R images of embedded operating systems.

A detailed description of how to use ADI functions can be found in the online help documentation.

The ADI .NET SDK is available in the Downloads section of the B&R website (www.br-automation.com).

4 B&R Key Editor

On display devices, it is often necessary to adapt the function keys and LEDs directly to the application software being used. The B&R Key Editor makes it quick and easy to implement a unique configuration for the application.

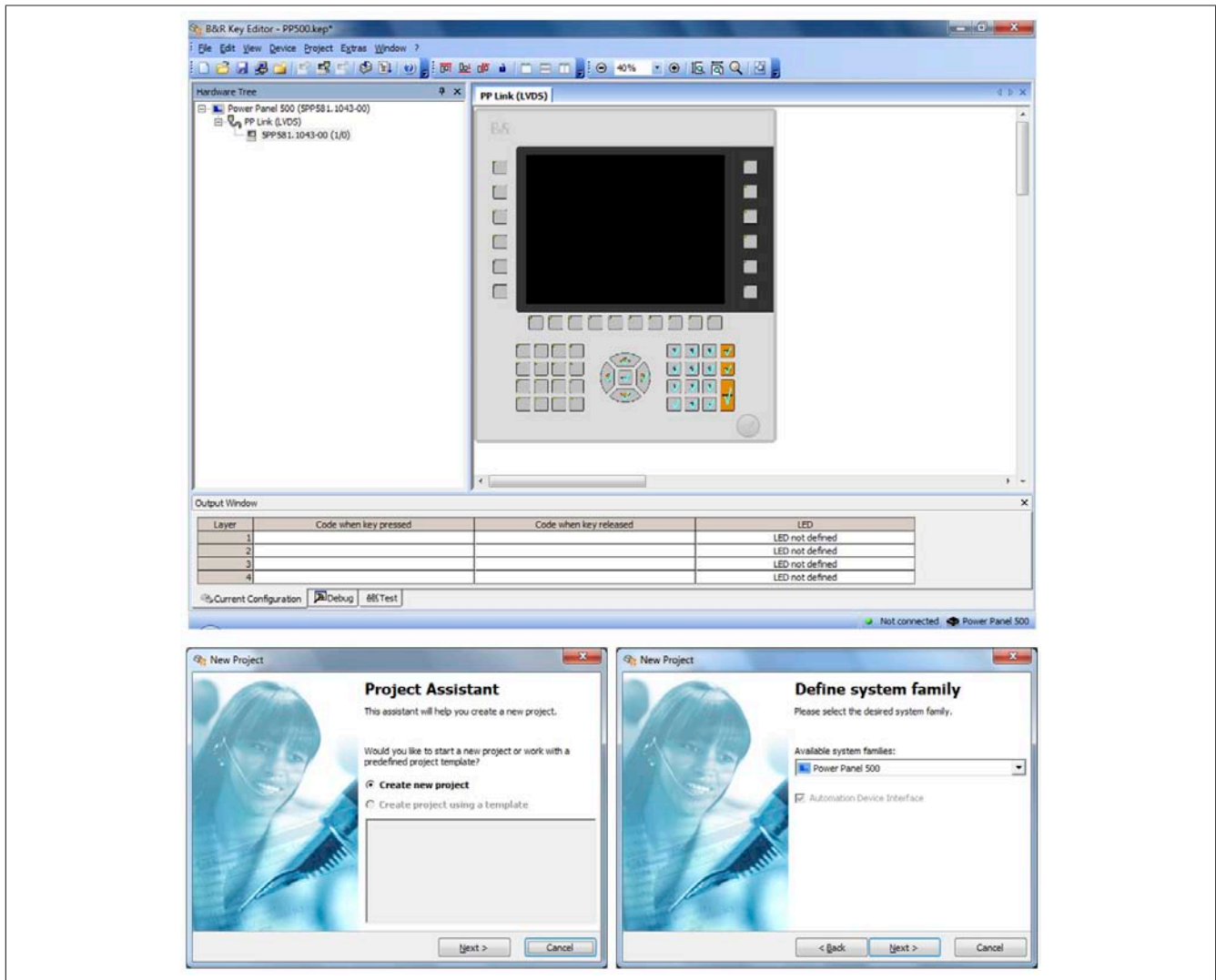


Figure 161: Screenshots of the B&R Key Editor V3.30

Features:

- Configuration of normal keyboard keys (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) using only one key
- Special key functions (change brightness, etc.)
- Assigning functions to LEDs (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the panel locking time when multiple Automation Panel 900 devices are connected to Automation PC and Panel PC devices.

Supports the following systems (version 3.30):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Automation Panel 800
- Automation Panel 830
- Automation Panel 900

- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500

A detailed guide for configuring keys and LEDs can be found in the B&R Key Editor's online help documentation. The B&R Key Editor is available at no cost in the Downloads section of the B&R website (www.br-automation.com). It can also be found on the B&R HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

Chapter 5 • Standards and certifications

1 Standards and guidelines

1.1 CE mark



This mark certifies that all harmonized EN standards for the applicable directives have been met for B&R products.

1.2 EMC directive

These devices meet the requirements of EC directive "2004/108/EC Electromagnetic compatibility" and are designed for the following areas:

EN 61131-2:2007	Programmable logic controllers - Part 2: Equipment requirements and tests
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) - part 6-2: Generic standard - Immunity to disturbances in the industrial sector
EN 61000-6-4:2007	Electromagnetic compatibility (EMC) - part 6-4: Generic standards; General emission standard for industrial environments

1.3 Low-voltage directive

These devices satisfy the requirements of EC directive "2006/95/EC Low-voltage directive" and are designed for the following areas:

EN 61131-2:2007	Programmable logic controllers - Part 2: Equipment requirements and tests
EN 60204-1:2006 + A1:2009	Machine safety - electrical equipment on machines - Part 1: General requirements

2 Certifications

Danger!

A fully assembled device can only receive certification if ALL of the individual components it includes have the applicable certifications. If an individual component is being used that DOES NOT have an applicable certification, then the fully assembled device will NOT RECEIVE certification.

B&R products and services comply with applicable standards. This includes international standards from organizations such as ISO, IEC and CENELEC, as well as national standards from organizations such as UL, CSA, FCC, VDE, ÖVE, etc. We are committed to ensuring the reliability of our products in an industrial environment.

Unless otherwise specified, the following certifications apply:

2.1 UL certification



Products with this label have been certified by Underwriters Laboratories and are listed as "Industrial Control Equipment". This mark is valid for the USA and Canada and simplifies the certification of your machines and systems in these areas.

Underwriters Laboratories (UL) in accordance with the UL508 standard - 17th Edition Canadian (CSA) standard in accordance with C22.2 No. 142-M1987

2.2 GL certification (Germanischer Lloyd)



Some B&R products have been certified by Germanischer Lloyd and are approved for use in maritime environments. GL certificates (type approval) are generally accepted by other classification societies during ship acceptance procedures.

Germanischer Lloyd (GL) in accordance with standard GL 2003 (Category C EMC 1)

Category C concerns devices that are protected from weather. EMC 1 defines the radiated and conducted emission limits for devices installed on a ship's bridge.

Information:

Line filter 5AC804.MFLT-00 is absolutely mandatory in the supply line when used in a maritime environment. Additional information can be found on page Connecting to the end device.

The following table lists revisions from which GL certification applies to individual components.

Model number	Short description	GL beginning with rev.
5AP920.1505-01	Automation Panel AP920; 15" XGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; insert for Automation Panel Link; IP65 protection (from front). 24 VDC.	K0
5AP920.1906-01	Automation Panel AP920; 19" SXGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; insert for Automation Panel Link; IP65 protection (from front). 24 VDC.	N0
5CADVI.0018-00	DVI-D cable, 1.8 m	D0
5CADVI.0050-00	DVI-D cable, 5 m	D0
5CADVI.0100-00	DVI-D cable, 10 m	D0
5CASDL.0018-00	SDL cable, 1.8 m	D0
5CASDL.0050-00	SDL cable, 5 m	D0
5CASDL.0100-00	SDL cable, 10 m	D0
5CASDL.0150-00	SDL cable, 15 m	D0
5CASDL.0200-00	SDL cable, 20 m	D0
5CASDL.0250-00	SDL cable, 25 m	D0
5CASDL.0300-00	SDL cable, 30 m	D0
5CASDL.0018-01	SDL cable with 45° connector, 1.8 m	D0
5CASDL.0050-01	SDL cable with 45° connector, 5 m	D0
5CASDL.0100-01	SDL cable with 45° connector, 10 m	D0
5CASDL.0150-01	SDL cable with 45° connector, 15 m	D0
5CASDL.0018-03	SDL flex cable, 1.8 m	D0
5CASDL.0050-03	SDL flex cable, 5 m	D0
5CASDL.0100-03	SDL flex cable, 10 m	D0

Table 57: GL certifications

Model number	Short description	GL beginning with rev.
5CASDL.0150-03	SDL flex cable, 15 m	D0
5CASDL.0200-03	SDL flex cable, 20 m	D0
5CASDL.0250-03	SDL flex cable, 25 m	D0
5CASDL.0300-03	SDL flex cable, 30 m	D0
5CASDL.0300-13	SDL flex cable with extender, 30 m	D0
5CASDL.0400-13	SDL flex cable with extender, 40 m	D0
5CASDL.0430-13	SDL flex cable with extender, 43 m	D0
5DL DVI.1000-01	Automation Panel Link DVI receiver; connections for DVI-D, RS232 and USB 2.0 (Type B); 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately).	D0
5DLSDL.1000-00	Automation Panel Link SDL receiver; connection for SDL In; transmission of display, touch screen, USB 1.1, matrix key and service data; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately).	F0
0TB103.9	24 VDC supply voltage plug, 3-pin female, 3.31 mm ² screw clamp, protected against vibration by the screw flange	D0
0TB103.91	24 VDC supply voltage plug, 3-pin female, 3.31 mm ² cage clamp, protected against vibration by the screw flange	D0
5AC804.MFLT-00	Line filter	D0

Table 57: GL certifications

Certificate no. 11 859 - 10 HH

<h1>Type Approval Certificate</h1>		
<p>This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.</p>		
Certificate No.	11 859 - 10 HH	
Company	Bernecker + Rainer Industrie-Elektronik GmbH B&R Straße 1 5142 Eggelsberg, Austria	
Product Description	Automation Panel	
Type	Automation Panel 920 15" and 19" Display	
Environmental Category	C, EMC1	
Technical Data / Range of Application	Display unit: 5AP920.1505-01 (15") 5AP920.1906-01 (19") Display link: 5DL DVI.XXXX-XX 5DLSDL.XXXX-XX Display cable: 5CADVI.XXXX-XX 5CASDL.XXXX-XX	
Test Standard	Guidelines for the Performance of Type Approvals Chapter 2, Edition 2003 Guidelines for the Use of Computers and Computer Systems, Edition 1994	
Documents	Test report : Mikes E34680-00-00HO, Mikes S34732-00-00MJ, Mikes E34679-00-00HO, Mikes S34733-00-00MJ, Prüfbeschreibung V 1.50 (06.10.2010)	
Remarks	Filter 5AC804.MFLT-00 to be used in DC power line	
Valid until	2016-01-03	
Page	1 of 1	Type Approval Symbol 
File No.	I.B.05	
Hamburg,	2011-01-04	
Germanischer Lloyd		
 Dr. Joannis Papanuskas		 Burkhard Lilienthal
<small>This certificate is issued on the basis of "Guidelines for the Performance of Type Approvals Part 1, Procedure".</small>		

Figure 162: GL certificate no. 11 859 - 10 HH

3 SDL flex cable test description

3.1 Torsion

3.1.1 Test structure

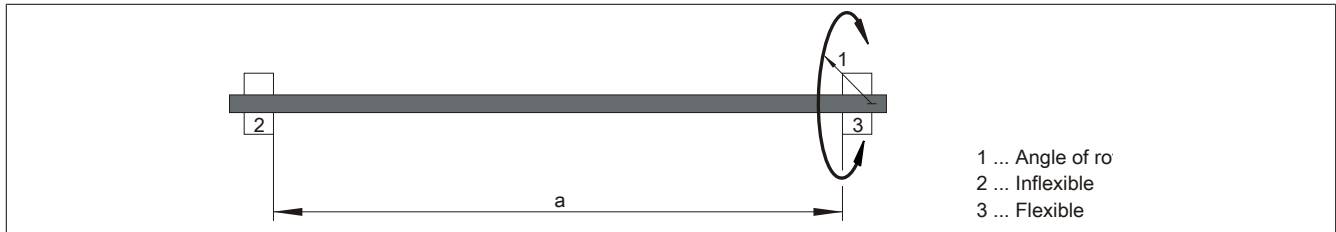


Figure 163: Test structure - Torsion

3.1.2 Test conditions

- Distance a: 450 mm
- Angle of rotation: $\pm 85^\circ$
- Speed: 50 cycles/minute
- Note: The cable was clamped down twice in the machine.

3.1.3 Individual tests

- Visible pixel errors: The minimum equalizer setting was determined at the beginning of the test. This is the value between 0-15 at which no more pixel errors are visible. Changes to the the equalizer setting caused by mechanical load are noted.
- Touch screen functionality
- USB mouse functionality
- Hot plugging functionality tested by disconnecting the USB cable
- After a test duration of 150,000 cycles, testing was concluded with a result of "OK".

3.2 Cable drag chain

3.2.1 Test structure

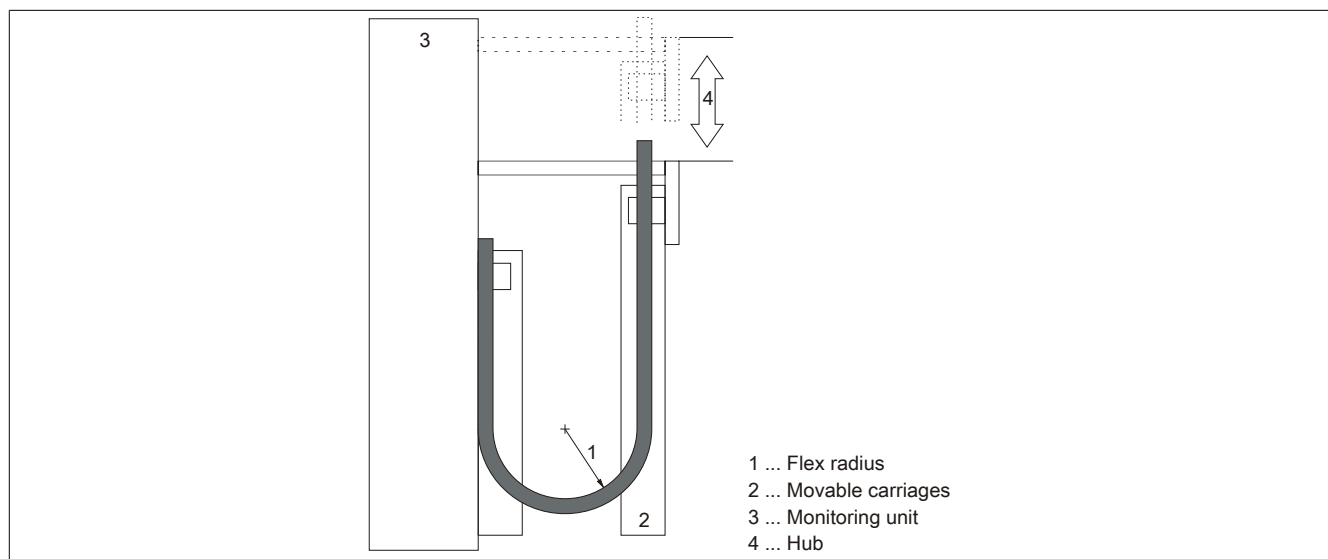


Figure 164: Test structure - Cable drag chain

3.2.2 Test conditions

- Flex radius: 180 mm (= 15 x cable diameter)
- Hub: 460 mm
- Speed: 4800 cycles / hour
- Note: The cable was clamped down twice in the machine.

3.2.3 Individual tests

- Visible pixel errors: The minimum equalizer setting was determined at the beginning of the test. This is the value between 0-15 at which no more pixel errors are visible. Changes to the the equalizer setting caused by mechanical load are noted.
- Touch screen functionality
- USB mouse functionality
- Hot plugging functionality tested by disconnecting the USB cable
- After a test duration of 300,000 cycles, testing was concluded with a result of "OK".

Chapter 6 • Accessories

The following accessories have successfully completed functional testing at B&R and are approved for use with this device. Nevertheless, it is important to observe any limitations that may apply to the fully assembled device when operated with other individual components. When operating the fully assembled device, the specifications for the individual components must be adhered to.

All components listed in this manual have been subjected to extensive system and compatibility testing and are approved for use. B&R can make no guarantee regarding the functionality of non-approved accessories.

1 Power connectors

1.1 0TB103.9x

1.1.1 General information

The single-row 3-pin terminal block 0TB103 is used to connect the supply voltage.

1.1.2 Order data


Model number	Short description	Figure
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm ² , protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm ² , protected against vibration by the screw flange	

Table 58: 0TB103.9, 0TB103.91 - Order data

1.1.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	0TB103.9		0TB103.91	
General information				
Certification	Yes			
CE				
cULus				
GL				
Terminal block				
Note	Protected against vibration by the screw flange Rated values according to UL			
Number of pins	3 (female)			
Type of terminal clamp	Screw clamps		Cage clamps ²⁾	
Cable type	Only copper wires (no aluminum wires!)			
Distance between contacts	5.08 mm			
Connection cross section	26 to 14 AWG 26 to 12 AWG 0.20 to 1.50 mm² 0.20 to 2.50 mm² 0.20 to 1.50 mm² 0.20 to 2.50 mm² 0.20 to 1.50 mm²			
AWG wire				
Wire end sleeves with plastic covering				
Solid wires				
Fine strand wires				
With wire end sleeves				
Fastening torque	0.4 Nm		-	

Table 59: 0TB103.9, 0TB103.91 - Technical data

Product ID	0TB103.9	0TB103.91
Electrical characteristics		
Nominal voltage	300 V	
Nominal current ¹⁾	10 A / contact	
Contact resistance	≤ 5 mΩ	

Table 59: 0TB103.9, 0TB103.91 - Technical data

- 1) The limit data for each I/O module must be taken into consideration.
2) The terminal block in the cage clamp design cannot be stringed together.

2 Terminal blocks

2.1 0TB103.8

2.1.1 General information

The single-row 3-pin terminal block 0TB103 is used to connect the supply voltage.

2.1.2 Order data


Model number	Short description	Figure
	Terminal blocks	
0TB103.8	Connector, 24 VDC, 3-pin male, screw clamps 3.31 mm ² , protected against vibration by the screw flange	

Table 60: 0TB103.8 - Order data

2.1.3 Technical data

Product ID	0TB103.8
General information	
Certification CE	Yes
Terminal block	
Note	Protected against vibration by the screw flange Rated values according to UL
Number of pins	3 (male)
Type of terminal clamp	Screw clamps
Cable type	Only copper wires (no aluminum wires!)
Distance between contacts	5.08 mm
Connection cross section	
AWG wire	22 to 12 AWG
Wire end sleeves with plastic covering	0.20 to 1.50 mm ²
Solid wires	0.20 to 2.50 mm ²
Fine strand wires	0.20 to 1.50 mm ²
With wire end sleeves	0.20 to 1.50 mm ²
Electrical characteristics	
Nominal voltage	300 V
Nominal current ¹⁾	10 A / contact
Contact resistance	≤ 5 mΩ

Table 61: 0TB103.8 - Technical data

1) The limit data for each I/O module must be taken into consideration.

3 Legend strip templates

3.1 5AC900.104X-xx

3.2 General information

Automation Panel devices with keys are delivered with slide-in labels, some of which are already captioned (F1, F2, etc.). The slide-in label slots are accessible on the back of the Automation Panel device (above and below).

Printable slide-in labels (A4 format) can be ordered from B&R (see Table 12 "Accessories - Model numbers" on page 25). They can be printed using a standard laser printer (b/w or color) in a temperature range from -40 to +125°C. A template for printing legend strips in CorelDRAW versions 7, 9 and 10 can be downloaded from the B&R website (www.br-automation.com). These print templates can also be found on the HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

3.3 Order data

Model number	Short description	Figure
	Accessories	Image not found for 5AC900.104X-03!
5AC900.104X-03	Legend Strips Template 10,4" for Automation Panel 5AP951.1043-01 and 5AP981.1043-01; for 1 device.	
5AC900.104X-04	Legend Strips Template 10,4" for Automation Panel 5AP952.1043-01 and 5AP982.1043-01; for 1 device.	
5AC900.104X-05	Legend Strips Template 10,4" for Automation Panel 5AP980.1043-01; for 3 devices.	
5AC900.150X-01	Legend Strips Template 15,0" for Automation Panel 5AP951.1505-01, 5AP980.1505-01 and 5AP981.1505-01 and Panel PC 5PC781.1505-00; for 4 devices.	

Table 62: 5AC900.104X-03, 5AC900.104X-04, 5AC900.104X-05, 5AC900.150X-01 - Order data

4 USB port cap

4.1 5AC900.1200-00

4.1.1 General information

Round front-side USB interface cover (with anti-loss strap) for Automation Panel 900 and Panel PC 700 devices.

4.1.2 Order data


Model number	Short description	Figure
	Accessories	
5AC900.1200-00	USB Cover non-detachable; for Automation Panel and Panel PC.	

Table 63: 5AC900.1200-00 - Order data

4.2 5AC900.1200-01

4.2.1 General information

Flat front-side USB interface cover for Automation Panel 900 and Panel PC 700 devices.

4.2.2 Order data

Model number	Short description	Figure
	Accessories	
5AC900.1200-01		

Table 64: 5AC900.1200-01 - Order data

4.3 5AC900.1201-00

4.3.1 General information

Front side, flat USB port cap for Automation Panel 900, Power Panel 500 and Panel PC 700 and Panel PC 800 devices.

4.3.2 Order data


Model number	Short description	Figure
	Accessories	
5AC900.1201-00	USB port cap M20 IP65 flat	

Table 65: 5AC900.1201-00 - Order data

4.4 5AC900.1201-01

4.4.1 General information

Front side, rounded, knurled USB port cap (with anti-loss strap) for Automation Panel 900, Power Panel 500 and Panel PC 700 and Panel PC 800 devices.

4.4.2 Order data


Model number	Short description	Figure
	Accessories	
5AC900.1201-01	USB port cap M20 IP65 rounded, knurled	

Table 66: 5AC900.1201-01 - Order data

5 USB flash drives

5.1 5MMUSB.2048-00

5.1.1 General information

USB flash drives are storage media that are easy to replace. Because of their fast data transfer (USB 2.0), USB flash drives are ideal for use as portable data storage. Without requiring additional drivers ("hot plugging", except in the case of Windows 98SE), the USB flash drive can immediately act as an additional drive where data can be read or written. Only USB flash drives from the memory specialists SanDisk are used.

Information:

Due to the vast quantity of USB flash drives available on the market as well as their short product life cycle, we reserve the right to supply alternative products at any time. The following measures may therefore be necessary in order to boot from these flash drives as well:

- The flash drive must be reformatted or in some cases even repartitioned (set active partition).
- The flash drive must be the first bootable device in the BIOS boot order; alternatively, the IDE controllers can be disabled in BIOS. This can be avoided in most cases if a "fdisk /mbr" command is also executed on the USB flash drive.

5.1.2 Order data

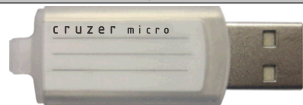
Model number	Short description	Figure
	USB accessories	
5MMUSB.2048-00	USB 2.0 Memory Stick, 2048 MB	

Table 67: 5MMUSB.2048-00 - Order data

5.1.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	5MMUSB.2048-00
General information	
Data retention	10 years
LEDs	1 LED (green) ¹⁾
MTBF	100,000 hours (at 25 °C)
Type	USB 1.1, USB 2.0
Maintenance	None
Certification CE	Yes
Interfaces	
USB	
Type	USB 1.1, USB 2.0
Connection	To each USB type A interface
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Sequential reading	Max. 8.7 MB/s
Sequential writing	Max. 1.7 MB/s
Support	
Operating systems	
Windows XP Professional	Yes
Windows XP Embedded	Yes
Windows ME	Yes
Windows 2000	Yes
Windows CE 5.0	Yes
Windows CE 4.2	Yes
Electrical characteristics	
Power consumption	650 µA sleep mode, 150 mA read/write

Table 68: 5MMUSB.2048-00 - Technical data

Product ID	5MMUSB.2048-00
Environmental conditions	
Temperature	
Operation	0 to 45°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	10 to 90%, non-condensing
Storage	5 to 90%, non-condensing
Transport	5 to 90%, non-condensing
Vibration	
Operation	10 to 500 Hz: 2 g (19.6 m/s ² 0-peak), oscillation rate 1/minute
Storage	10 to 500 Hz: 2 g (19.6 m/s ² 0-peak), oscillation rate 1/minute
Transport	10 to 500 Hz: 2 g (19.6 m/s ² 0-peak), oscillation rate 1/minute
Shock	
Operation	Max. 40 g (392 m/s ² 0-peak) and 11 ms length
Storage	Max. 80 g (784 m/s ² 0-peak) and 11 ms length
Transport	Max. 80 g (784 m/s ² 0-peak) and 11 ms length
Altitude	
Operation	Max. 3048 m
Storage	Max. 12192 m
Transport	Max. 12192 m
Mechanical characteristics	
Dimensions	
Width	19 mm
Length	52.2 mm
Height	7.9 mm

Table 68: 5MMUSB.2048-00 - Technical data

- 1) Signals data transfer (send and receive).

5.1.4 Temperature humidity diagram

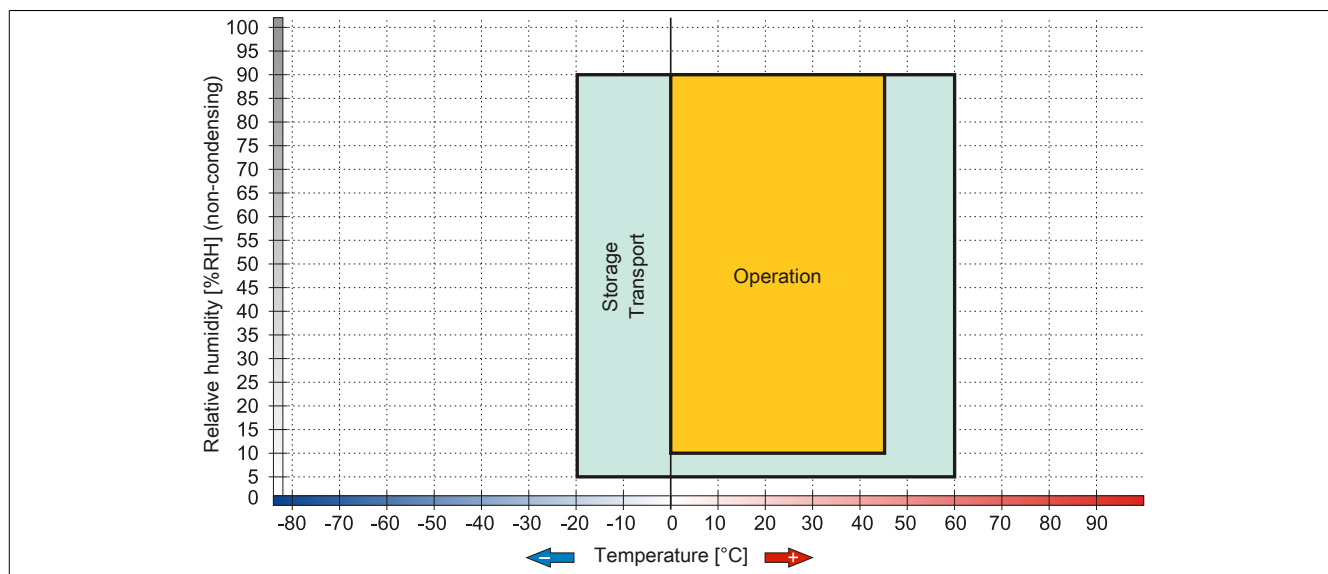


Figure 165: 5MMUSB.2048-00 - Temperature humidity diagram

5.2 5MMUSB.2048-01

5.2.1 General information

USB flash drives are storage media that are easy to replace. Because of their fast data transfer (USB 2.0), USB flash drives are ideal for use as portable data storage. Without requiring additional drivers ("hot plugging", except in the case of Windows 98SE), the USB flash drive can immediately act as an additional drive where data can be read or written.

Information:

Due to the vast quantity of USB flash drives available on the market as well as their short product life cycle, we reserve the right to supply alternative products at any time. The following measures may therefore be necessary in order to boot from these flash drives as well:

- The flash drive must be reformatted or in some cases even repartitioned (set active partition).
 - The flash drive must be the first bootable device in the BIOS boot order; alternatively, the IDE controllers can be disabled in BIOS. This can be avoided in most cases if the "fdisk /mbr" command is additionally executed on the USB flash drive.
- USB 1.1, USB 2.0
 - High transfer rate
 - High data storage
 - Ambient temperature during operation: 0 to 70°C

5.2.2 Order data


Model number	Short description	Figure
	USB accessories	
5MMUSB.2048-01	USB 2.0 flash drive, 2048 MB, B&R	

Table 69: 5MMUSB.2048-01 - Order data

5.2.3 Technical data

Product ID	5MMUSB.2048-01
General information	
Data retention	>10 years
LEDs	1 LED (green) ¹⁾
MTBF	>3,000,000 hours
Type	USB 1.1, USB 2.0
Maintenance	None
Certification	
CE	Yes
Interfaces	
USB	
Type	USB 1.1, USB 2.0
Connection	To each USB type A interface
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Sequential reading	Max. 31 MB/s
Sequential writing	Max. 30 MB/s
Support	
Operating systems	
Windows 7	Yes
Windows XP Professional	Yes
Windows XP Embedded	Yes
Windows ME	Yes
Windows 2000	Yes
Windows CE 5.0	Yes
Windows CE 4.2	Yes
Electrical characteristics	
Power consumption	Max. 500 µA sleep mode, max. 120 mA read/write
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-50 to 100°C
Transport	-50 to 100°C

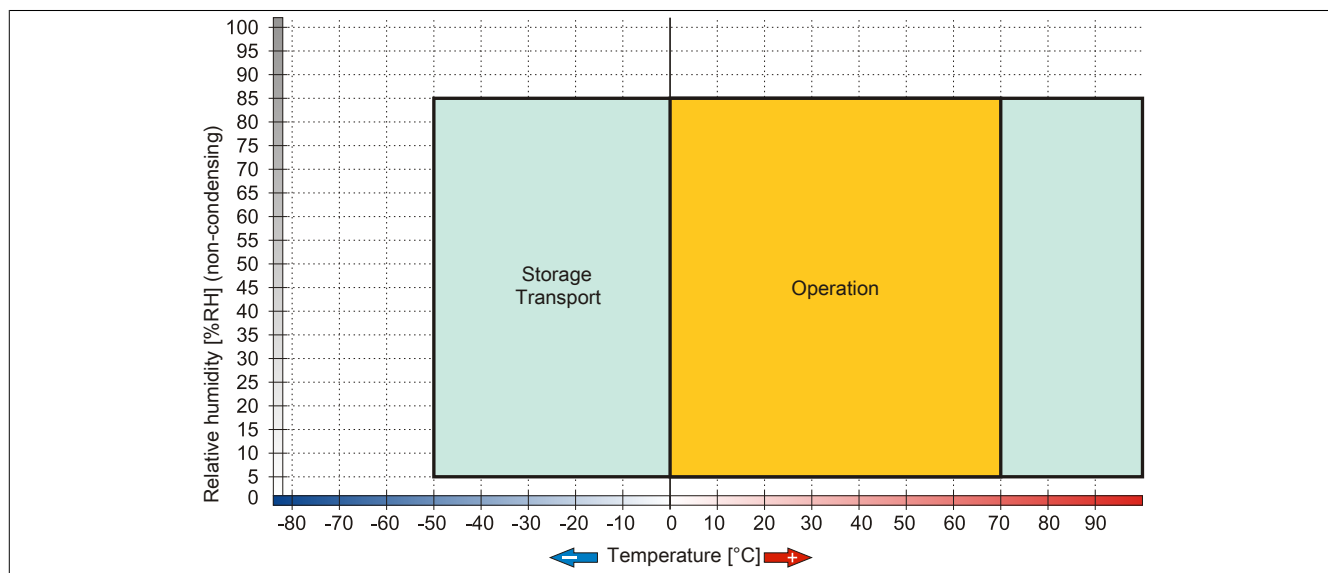
Table 70: 5MMUSB.2048-01 - Technical data

Product ID	5MMUSB.2048-01
Relative humidity	
Operation	85%, non-condensing
Storage	85%, non-condensing
Transport	85%, non-condensing
Vibration	
Operation	20 to 2000 Hz: 20 g (peak)
Storage	20 to 2000 Hz: 20 g (peak)
Transport	20 to 2000 Hz: 20 g (peak)
Shock	
Operation	max. 1500g (peak)
Storage	max. 1500g (peak)
Transport	max. 1500g (peak)
Altitude	
Operation	Max. 3048 m
Storage	Max. 12192 m
Transport	Max. 12192 m
Mechanical characteristics	
Dimensions	
Width	17.97 mm
Length	67.85 mm
Height	8.35 mm

Table 70: 5MMUSB.2048-01 - Technical data

1) Signals data transfer (send and receive).

5.2.4 Temperature humidity diagram



6 Cables

6.1 DVI cables

6.1.1 5CADVI.0xxx-00

6.1.1.1 General information

5CADVI.0xxx-00 DVI cables are designed to be used for inflexible applications.

Caution!

Power must be turned off before plugging in and unplugging cables.

6.1.1.2 Order data


Model number	Short description	Figure
	DVI cable	
5CADVI.0018-00	DVI-D cable, 1.8 m.	
5CADVI.0050-00	DVI-D cable, 5 m.	
5CADVI.0100-00	DVI-D cable, 10 m.	

Table 71: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Order data

6.1.1.3 Technical data

Product ID	5CADVI.0018-00	5CADVI.0050-00	5CADVI.0100-00
General information			
Certification			
CE	Yes		
cULus	Yes		
GL	Yes		
Cable structure			
Wire cross section	AWG 28		
Shield	Individual cable pairs and entire cable		
Cable shielding	Tinned Cu mesh, optical coverage > 86%		
Outer sheathing			
Material	PVC		
Color	Beige		
Labeling	AWM STYLE 20276 80°C 30V VW1 DVI DIGITAL SINGLE LINK DER AN		
Connector			
Type	2x DVI-D (18+1), male		
Connection cycles	100		
Electrical characteristics			
Conductor resistance	Max. 237 Ω/km		
Insulation resistance	Min. 100 MΩ/km		
Mechanical characteristics			
Dimensions			
Length	1.8 m ±50 mm	5 m ±80 mm	10 m ±100 mm
Diameter	Max. 8.5 mm		
Flex radius	≥ 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)		
Weight	Approx. 260 g	Approx. 460 g	Approx. 790 g

Table 72: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Technical data

6.1.1.4 Flex radius specifications

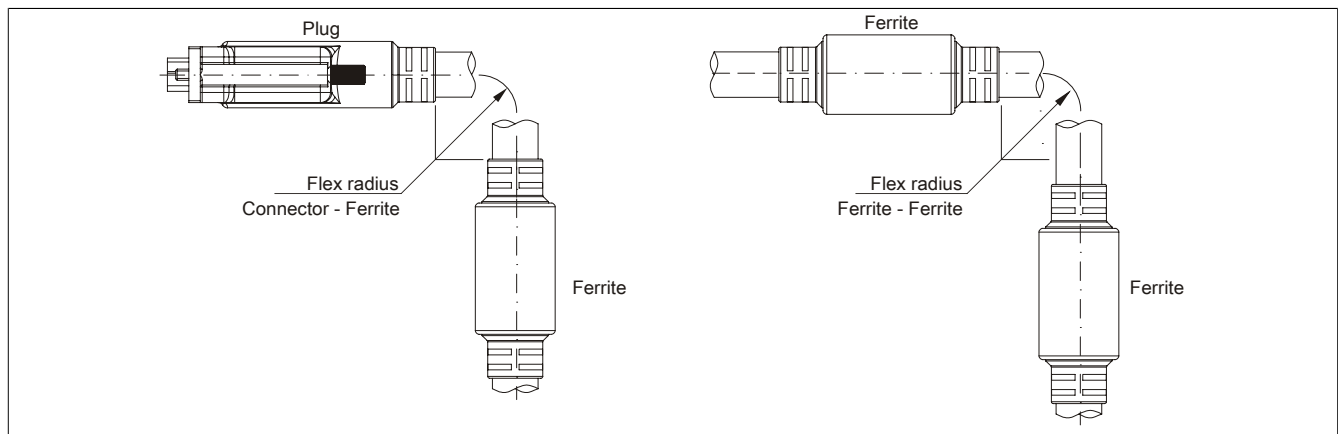


Figure 166: Flex radius specifications

6.1.1.5 Dimensions

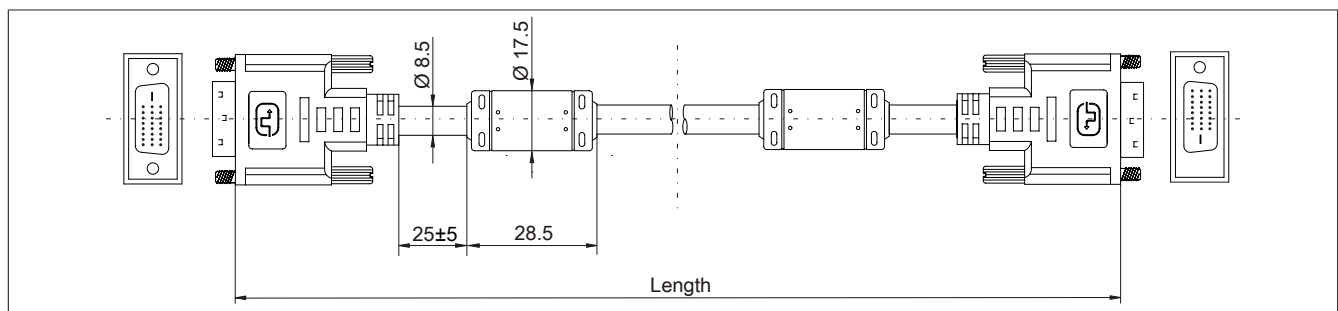


Figure 167: 5CADVI.0xxx-00 - Dimensions

6.1.1.6 Cable pinout

Warning!

If you choose to build a suitable cable yourself, it should be wired according to these specifications. If a self-built cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

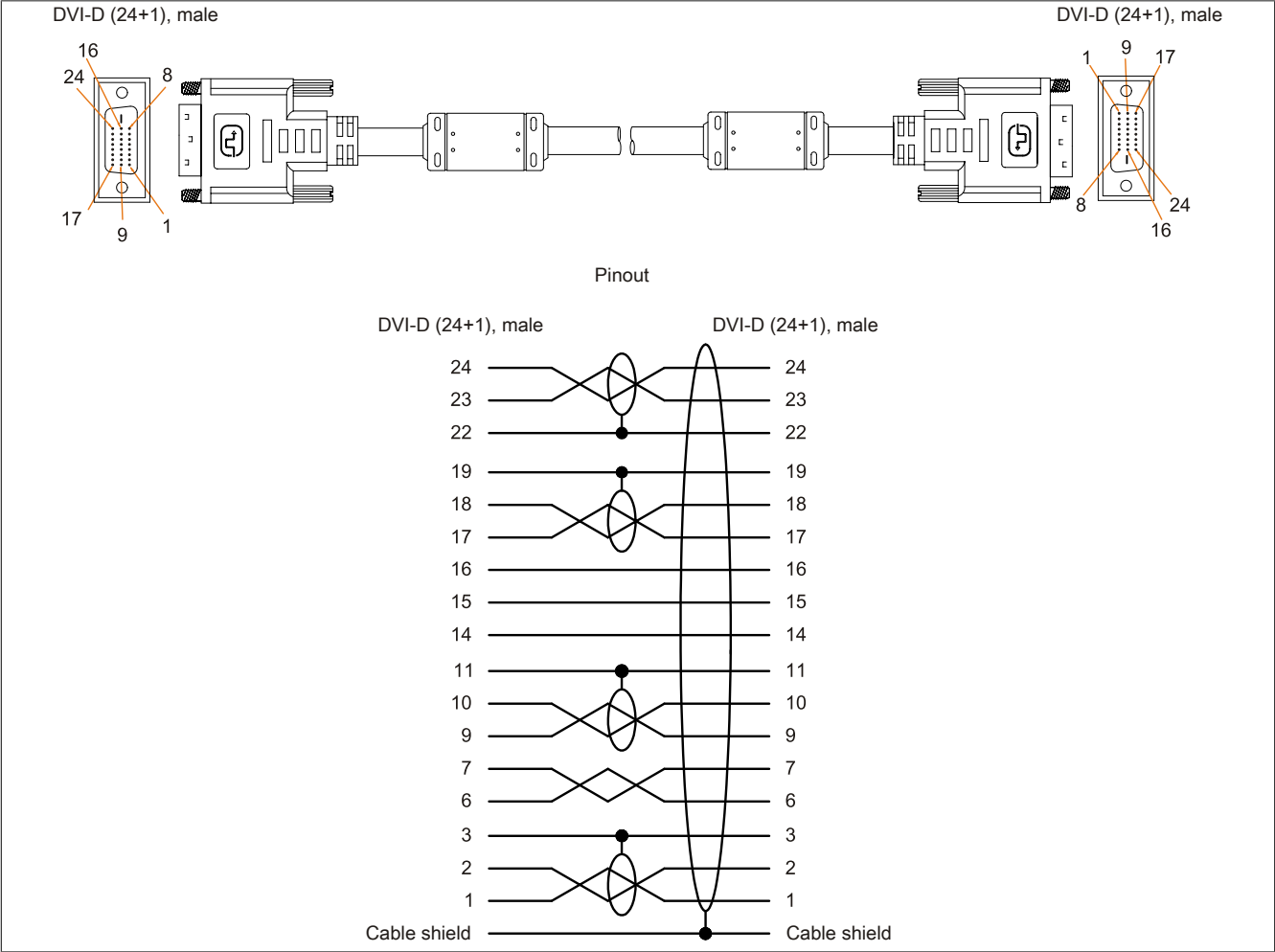


Figure 168: 5CADVI.0xxx-00 - Pinout

6.2 SDL cables

6.2.1 5CASDL.0xxx-00

6.2.1.1 General information

5CASDL.0xxx-00 SDL cables are designed to be used for inflexible applications. Use of the SDL flex cable 5CASDL.0xxx-03 is required for flexible applications (e.g. swing arm systems).

Caution!

Power must be turned off before plugging in and unplugging cables.

6.2.1.2 Order data


Model number	Short description	Figure
	SDL cables	
5CASDL.0018-00	SDL cable, 1.8 m.	
5CASDL.0050-00	SDL cable, 5 m.	
5CASDL.0100-00	SDL cable, 10 m.	
5CASDL.0150-00	SDL cable, 15 m.	
5CASDL.0200-00	SDL cable, 20 m.	
5CASDL.0250-00	SDL cable, 25 m.	
5CASDL.0300-00	SDL cable, 30 m.	

Table 73: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Order data

6.2.1.3 Technical data

Product ID	5CASDL. 0018-00	5CASDL. 0050-00	5CASDL. 0100-00	5CASDL. 0150-00	5CASDL. 0200-00	5CASDL. 0250-00	5CASDL. 0300-00
General information							
Certification	Yes						
CE							
cULus							
GL							
Cable structure							
Wire cross section	AWG 28		AWG 24				
Shield	Individual cable pairs and entire cable						
Cable shielding	Tinned Cu mesh, optical coverage > 85%						
Outer sheathing	PVC Black E74020-C (UL) AWM STYLE 20176 80°C 30V VW-1 DVI DIGITAL LINK						
Material							
Color							
Labeling							
Connector							
Type	2x DVI-D (24+1), male						
Connection cycles	100						
Contacts	Gold plated						
Mechanical protection	Metal cover with crimped stress relief						
Electrical characteristics							
Conductor resistance	- ≤93 Ω/km -						
AWG 24							
AWG 28							
Insulation resistance	Min. 10 MΩ/km						
Mechanical characteristics							
Dimensions	1.8 m ±30 mm 5 m ±30 mm 10 m ±50 mm 15 m ±100 mm 20 m ±100 mm 25 m ±100 mm 30 m ±100 mm Typ. 8.6 ±0.2 mm Max. 9 mm Typ. 11 ±0.2 mm Max. 11.5 mm						
Length							
Diameter							
Flex radius	≥ 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)						
Flexibility	Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute)						
Weight	Approx. 300 g	Approx. 580 g	Approx. 1500 g	Approx. 2250 g	Approx. 2880 g	Approx. 4800 g	Approx. 5520 g

Table 74: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Technical data

6.2.1.4 Flex radius specifications

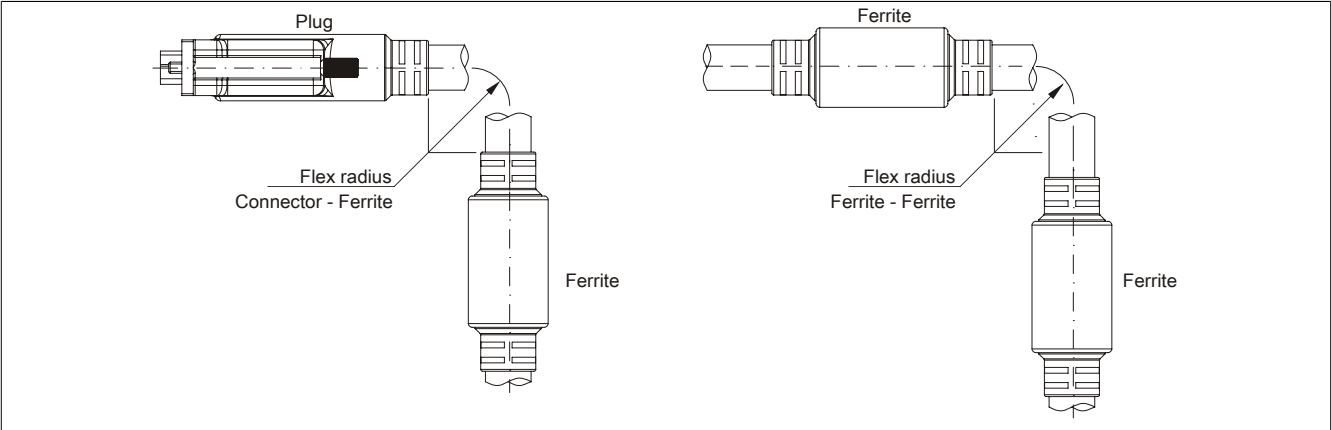


Figure 169: Flex radius specifications

6.2.1.5 Dimensions

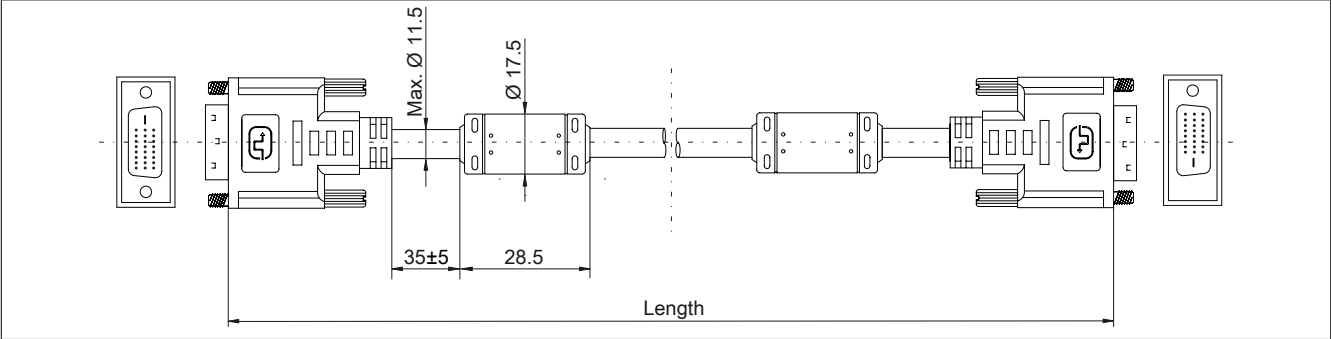


Figure 170: 5CASDL.0xxx-00- Dimensions

6.2.1.6 Cable pinout

Warning!

If you choose to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

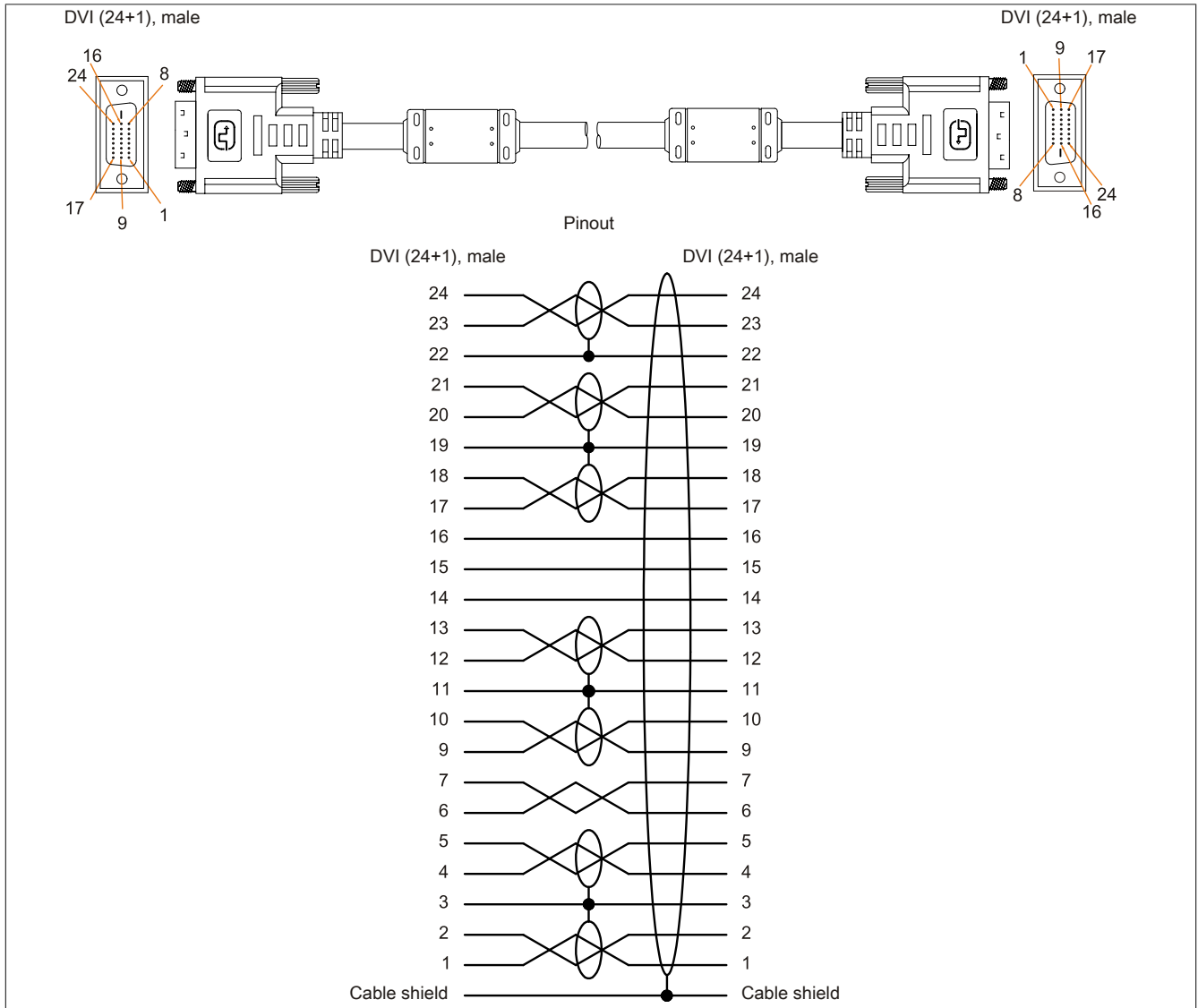


Figure 171: 5CASDL.0xxx-00 - Pinout

6.3 SDL cables with 45° connector

6.3.1 5CASDL.0xxx-01

6.3.1.1 General information

5CASDL.0xxx-01 SDL cables with 45° plugs are designed for a fixed layout.

Caution!

Power must be turned off before plugging in and unplugging cables.

6.3.1.2 Order data


Model number	Short description	Figure
	SDL cable - 45° connector	
5CASDL.0018-01	SDL cable; 45° connector, 1.8 m.	
5CASDL.0050-01	SDL cable; 45° connector, 5 m.	
5CASDL.0100-01	SDL cable; 45° connector, 10 m.	
5CASDL.0150-01	SDL cable; 45° connector, 15 m.	

Table 75: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Order data

6.3.1.3 Technical data

Product ID	5CASDL.0018-01	5CASDL.0050-01	5CASDL.0100-01	5CASDL.0150-01
General information				
Certification	Yes Yes Yes			
CE				
cULus				
GL				
Cable structure				
Wire cross section	AWG 28		AWG 24	
Shield	Individual cable pairs and entire cable			
Cable shielding	Tinned Cu mesh, optical coverage > 85%			
Outer sheathing	PVC Black			
Material				
Color				
Connector				
Type	2x DVI-D (24+1), male			
Connection cycles	100			
Contacts	Gold plated			
Mechanical protection	Metal cover with crimped stress relief			
Electrical characteristics				
Conductor resistance	- ≤93 Ω/km -			
AWG 24				
AWG 28				
AWG 28	≤237 Ω/km			
Insulation resistance	Min. 10 MΩ/km			
Mechanical characteristics				
Dimensions	1.8 m ±30 mm 5 m ±50 mm 10 m ±100 mm 15 m ±100 mm Max. 9 mm Max. 11.5 mm			
Length				
Diameter				
Flex radius	≥ 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)			
Fixed installation				
Flexibility	Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute)			
Weight	Approx. 300 g	Approx. 590 g	Approx. 2800 g	Approx. 2860 g

Table 76: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Technical data

6.3.1.4 Flex radius specifications

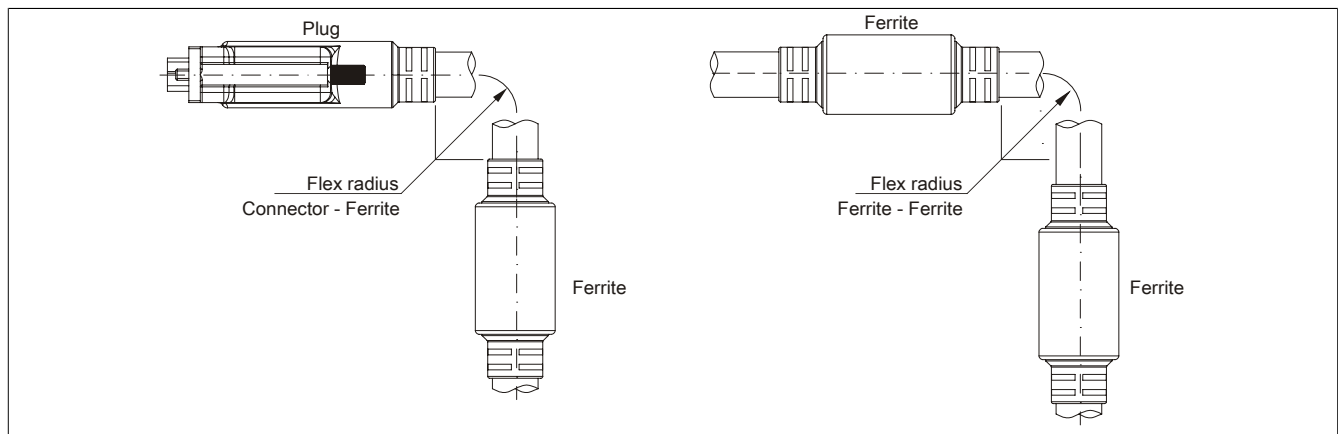


Figure 172: Flex radius specifications

6.3.1.5 Dimensions

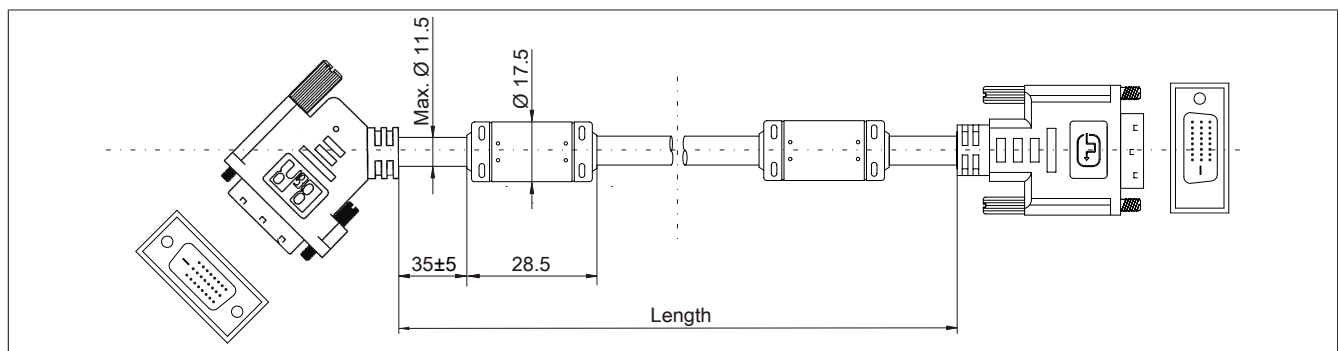


Figure 173: 5CASDL.0xxx-01 - Dimensions

6.3.1.6 Cable pinout

Warning!

If you choose to build a suitable cable yourself, it should be wired according to these specifications. If a self-built cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

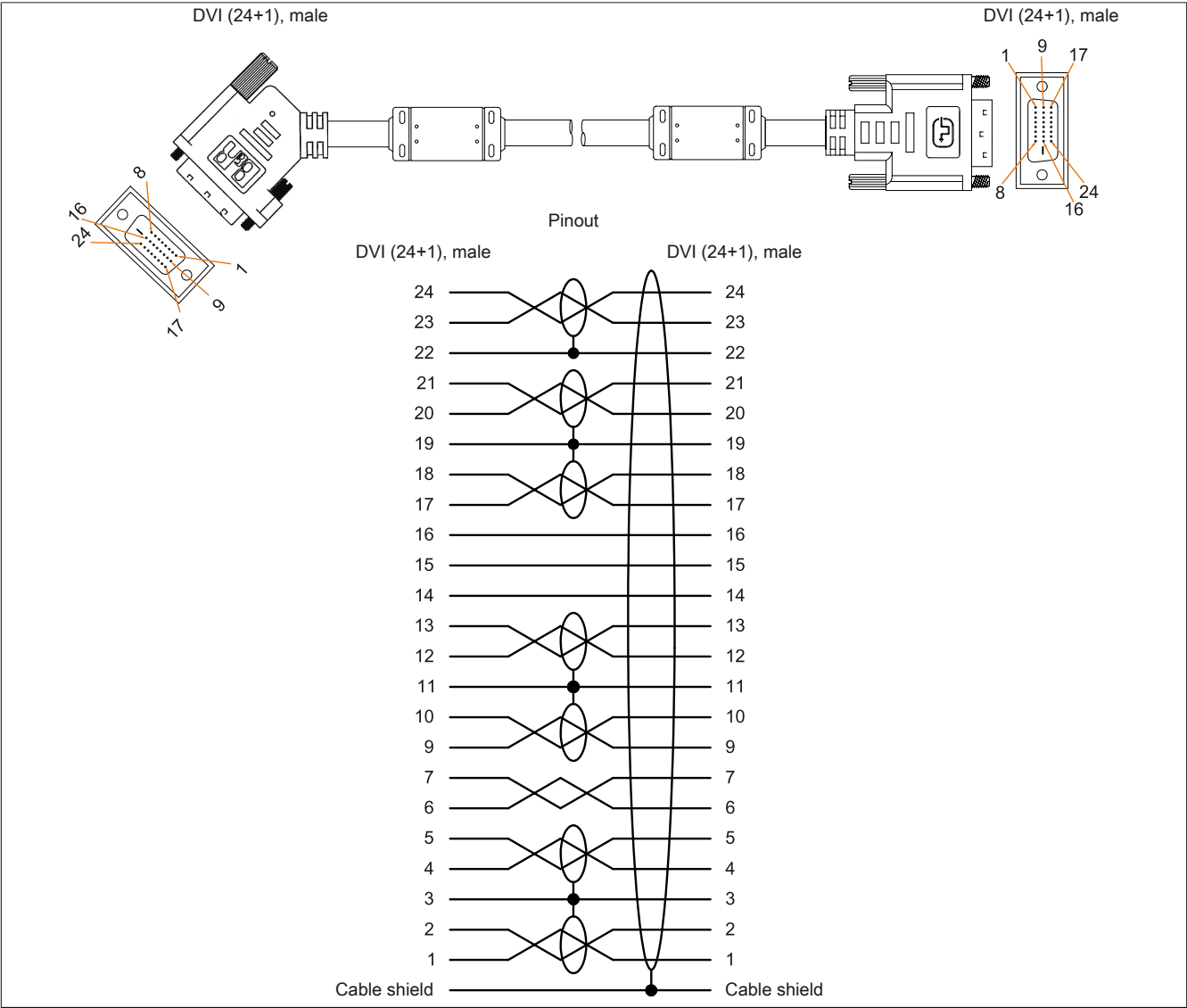


Figure 174: 5CASDL.0xxx-01 - Pinout

6.4 SDL flex cables

6.4.1 5CASDL.0xxx-03

6.4.1.1 General information

5CASDL.0xxx-03 SDL flex cables are designed for use in both inflexible and flexible applications (e.g. swing arm systems).

Caution!

Power must be turned off before plugging in and unplugging cables.

6.4.1.2 Order data


Model number	Short description	Figure
	SDL flex cable	
5CASDL.0018-03	SDL Cable flex, 1.8 m.	
5CASDL.0050-03	SDL cable flex, 5 m.	
5CASDL.0100-03	SDL cable flex, 10 m.	
5CASDL.0150-03	SDL cable flex, 15 m.	
5CASDL.0200-03	SDL cable flex, 20 m.	
5CASDL.0250-03	SDL cable flex, 25 m.	
5CASDL.0300-03	SDL cable flex, 30 m.	

Table 77: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Order data

6.4.1.3 Technical data

Product ID	5CASDL. 0018-03	5CASDL. 0050-03	5CASDL. 0100-03	5CASDL. 0150-03	5CASDL. 0200-03	5CASDL. 0250-03	5CASDL. 0300-03
General information							
Certification	Yes						
CE							
cULus							
GL	Yes						
Cable structure							
Wire cross section	AWG 24 (control wires) AWG 26 (DVI, USB, data)						
Properties	Free of halogen and silicon						
Shield	Individual cable pairs and entire cable						
Cable shielding	Aluminum foil clad + tinned copper mesh						
Outer sheathing	Special TMPU - semi gloss Black (B&R) SDL Cable (UL) AWM 20236 80°C 30V E 63216						
Material							
Color							
Labeling							
Connector							
Type	2x DVI-D (24+1), male						
Connection cycles	Min. 200						
Contacts	Gold plated						
Mechanical protection	Metal cover with crimped stress relief						
Electrical characteristics							
Operating voltage	≤ 30 V						
Test voltage	1 kV						
Wire/Wire							
Wire/Shield	0.5 kV						
Wave impedance	100 ±10 Ω						
Conductor resistance	≤95 Ω/km ≤145 Ω/km						
AWG 24							
AWG 26							
Insulation resistance	> 200 MΩ/km						
Operating conditions							
Approbation	UL AWM 20236 80 °C 30 V						
Flame resistant	In accordance with UL758 (cable vertical flame test)						
Oil and hydrolysis resistance	According to VDE 0282-10						

Table 78: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Technical data

Product ID	5CASDL. 0018-03	5CASDL. 0050-03	5CASDL. 0100-03	5CASDL. 0150-03	5CASDL. 0200-03	5CASDL. 0250-03	5CASDL. 0300-03
Environmental conditions							
Temperature							
Storage							
Moving							
Fixed installation							
Mechanical characteristics							
Dimensions	1.8 m ±20 mm 5 m ±45 mm 10 m ±90 mm 15 m ±135 mm 20 m ±180 mm 25 m ±225 mm 30 m ±270 mm Max. 12 mm						
Length							
Diameter							
Flex radius	≥ 6x cable diameter (from plug - ferrite magnet) ≥ 10x cable diameter (from ferrite magnet - ferrite magnet) ≥ 15x cable diameter (from ferrite magnet - ferrite magnet)						
Fixed installation							
Flexible installation							
Flexibility	Flexible; valid for ferrite magnet - ferrite magnet (tested 300,000 cycles with 15x cable diameter, 4800 cycles / hour)						
Drag chain data	300,000 4800 cycles/hour 180 mm; 15x cable diameter 460 mm						
Flex cycles							
Velocity							
Flex radius							
Hub							
Weight	Approx. 460 g	Approx. 1020 g	Approx. 1940 g	Approx. 2840 g	Approx. 3740 g	Approx. 4560 g	Approx. 5590 g
Tension							
During operation							
During installation							

Table 78: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Technical data

6.4.1.4 Flex radius specifications

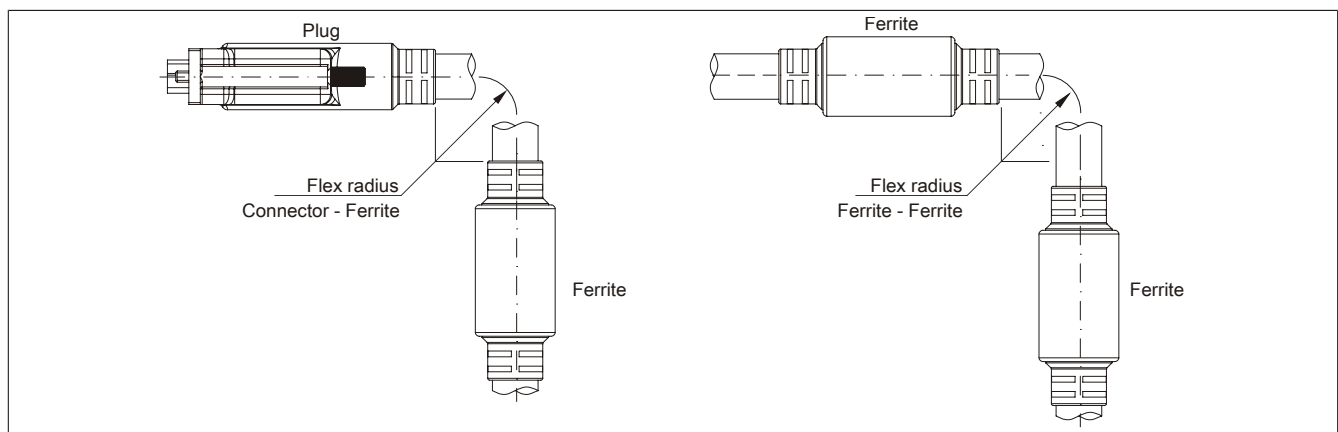


Figure 175: Flex radius specifications

6.4.1.5 Dimensions

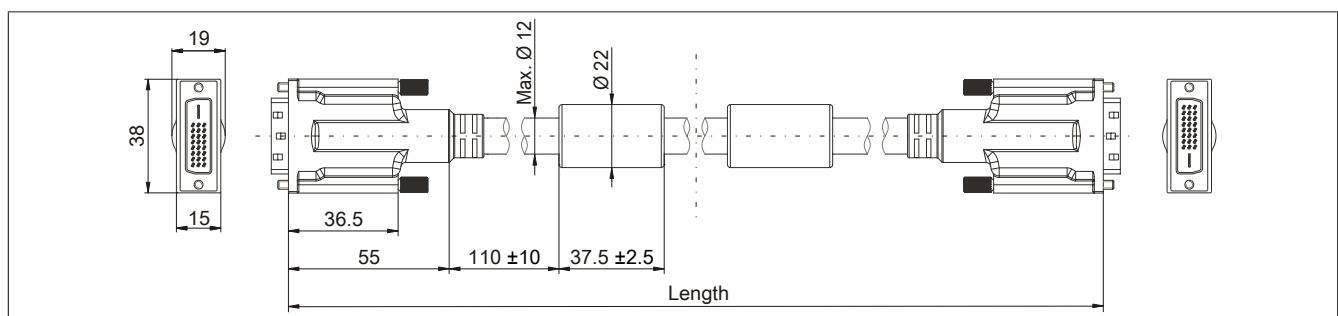


Figure 176: 5CASDL.0xxx-03 - Dimensions

6.4.1.6 Structure

Element	Assignment	Cross section	
DVI	TMDS data 0	26 AWG	
	TMDS data 1	26 AWG	
	TMDS data 2	26 AWG	
	TMDS cycle	26 AWG	
USB	XUSB0	26 AWG	
	XUSB1	26 AWG	
Data	SDL	26 AWG	
	DDC cycle	24 AWG	
Control wires	DDC data	24 AWG	
	+5 V	24 AWG	
	Mass	24 AWG	
	Hot plug detect	24 AWG	

Table 79: 5CASDL.0xxx-03 SDL flex cables - Structure

6.4.1.7 Cable pinout

Warning!

If you choose to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

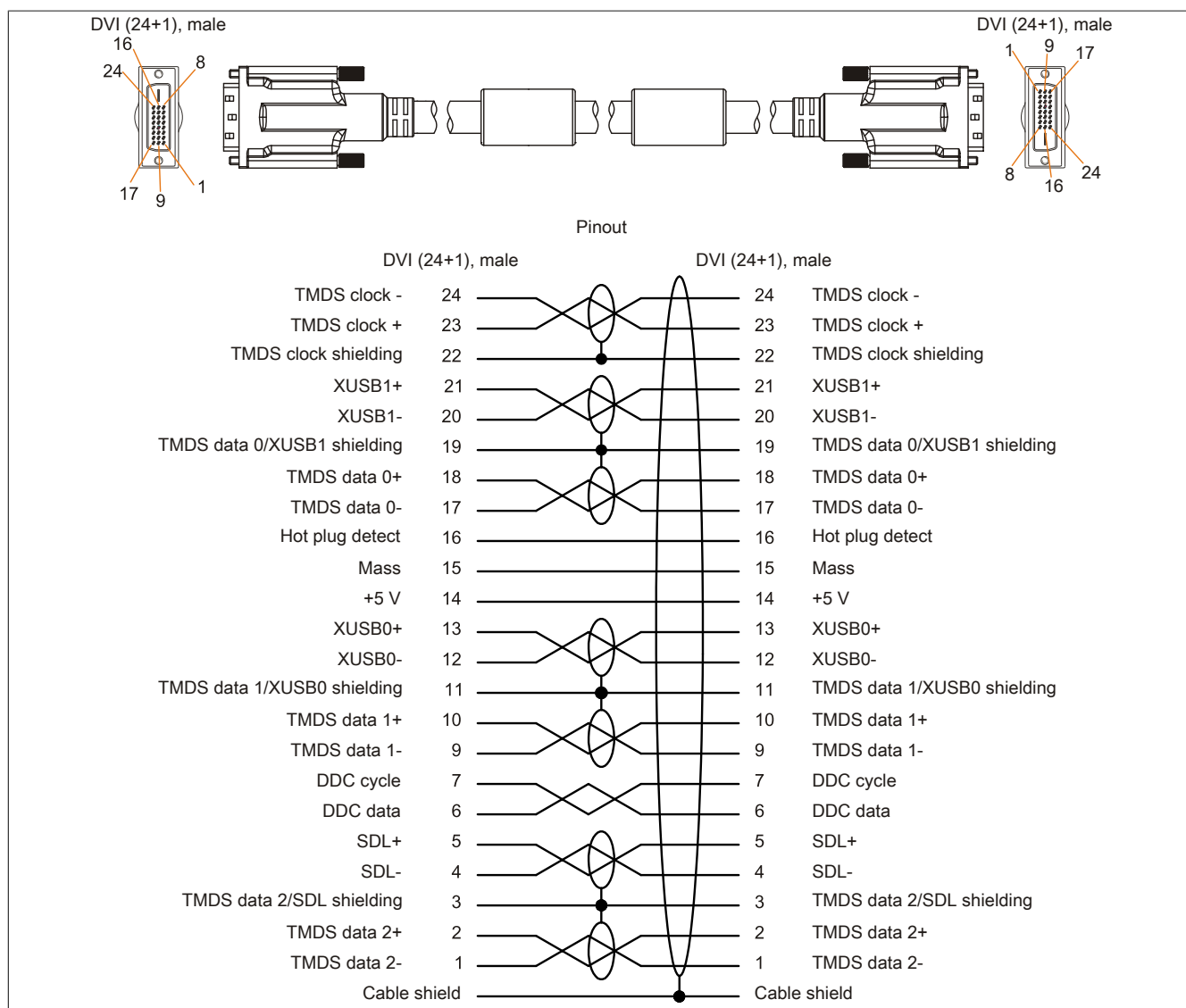


Figure 177: 5CASDL.0xxx-03 - Pinout

6.5 SDL flex cables with extender

6.5.1 5CASDL.0xx0-13

6.5.1.1 General information

5CASDL.0xx0-13 SDL flex cables with an extender are designed for use in both inflexible and flexible applications (e.g. swing arm systems).

Caution!

Power must be turned off before plugging in and unplugging cables.

6.5.1.2 Order data

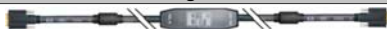
Model number	Short description	Figure
	SDL flex cable	
5CASDL.0300-13	SDL cable flex with extender, 30 m.	
5CASDL.0400-13	SDL cable flex with extender, 40 m.	
5CASDL.0430-13	SDL Cable flex with extender, 43 m.	

Table 80: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Order data

6.5.1.3 Technical data

Product ID	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
General information			
Certification			
CE	Yes		
cULus	Yes		
GL	Yes		
Cable structure			
Wire cross section	AWG 24 (control wires) AWG 26 (DVI, USB, data)		
Properties	Free of halogen and silicon		
Shield	Individual cable pairs and entire cable		
Cable shielding	Aluminum foil clad + tinned copper mesh		
Outer sheathing			
Material	Special TMPU - semi gloss		
Color	Black		
Labeling	(B&R) SDL cable (UL) AWM 20236 80°C 30V E63216		
Connector			
Type	2x DVI-D (24+1), male		
Connection cycles	Min. 200		
Contacts	Gold plated		
Mechanical protection	Metal cover with crimped stress relief		
Electrical characteristics			
Operating voltage	≤ 30 V		
Test voltage			
Wire/Wire	1 kV		
Wire/Shield	0.5 kV		
Wave impedance	100 ±10 Ω		
Conductor resistance			
AWG 24	≤95 Ω/km		
AWG 26	≤145 Ω/km		
Insulation resistance	> 200 MΩ/km		
Operating conditions			
Approbation	UL AWM 20236 80 °C 30 V		
Flame resistant	In accordance with UL758 (cable vertical flame test)		
Oil and hydrolysis resistance	According to VDE 0282-10		
Environmental conditions			
Temperature			
Storage	-20 to 60°C		
Moving	-5 to 60°C		
Fixed installation	-20 to 60°C		

Table 81: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

Product ID	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
Mechanical characteristics			
Dimensions			
Length	30 m ±280 mm	40 m ±380 mm	43 m ±410 mm
Diameter		Max. 12 mm	
Extender box			
Width		35 mm	
Length		125 mm	
Height		18.5 mm	
Flex radius			
Fixed installation	$\geq 6 \times$ cable diameter (from plug - ferrite magnet) $\geq 10 \times$ cable diameter (from ferrite magnet - ferrite magnet)		
Flexible installation	$\geq 15 \times$ cable diameter (from ferrite magnet - ferrite magnet)		
Flexibility	Flexible; valid for ferrite magnet - ferrite magnet (tested 300,000 cycles with 15x cable diameter, 4800 cycles / hour)		
Drag chain data			
Flex cycles	300,000		
Velocity	4800 cycles/hour		
Flex radius	180 mm; 15x cable diameter		
Hub	460 mm		
Weight	Approx. 5430 g	Approx. 7200 g	Approx. 7790 g
Tension			
During operation	≤ 50 N		
During installation	≤ 400 N		

Table 81: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

6.5.1.4 Flex radius specifications

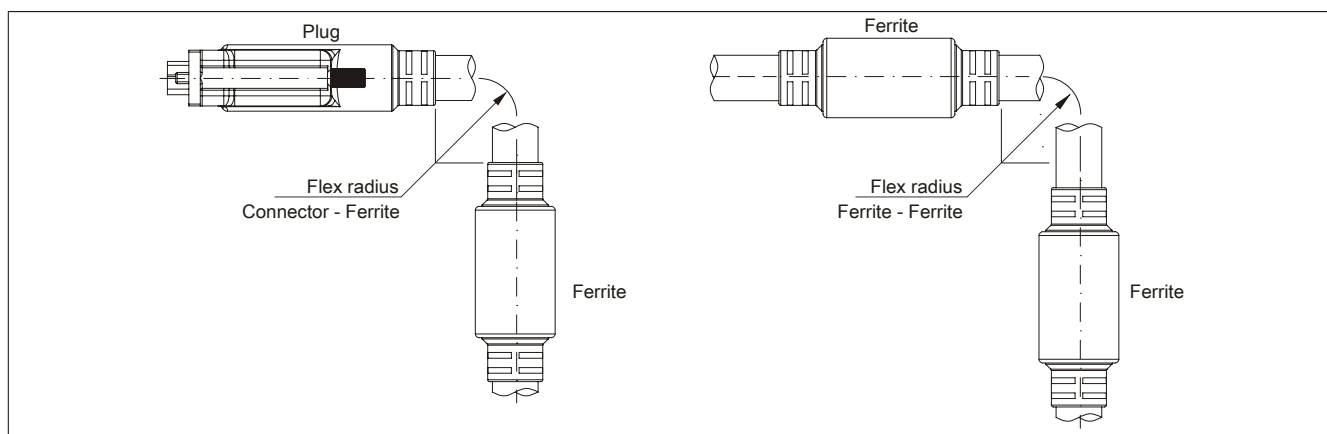


Figure 178: Flex radius specifications

6.5.1.5 Dimensions

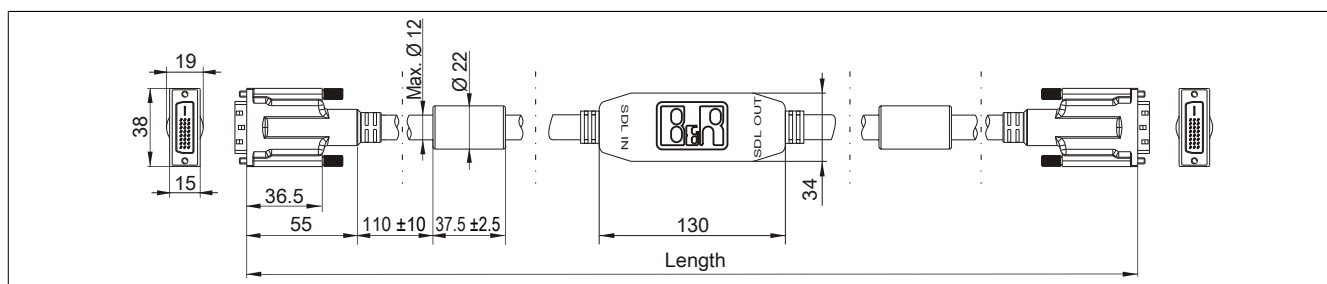


Figure 179: 5CASDL.0xx0-13- Dimensions

6.5.1.6 Cable pinout

Warning!

If you choose to build a suitable cable yourself, it should be wired according to these specifications. If a self-built cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

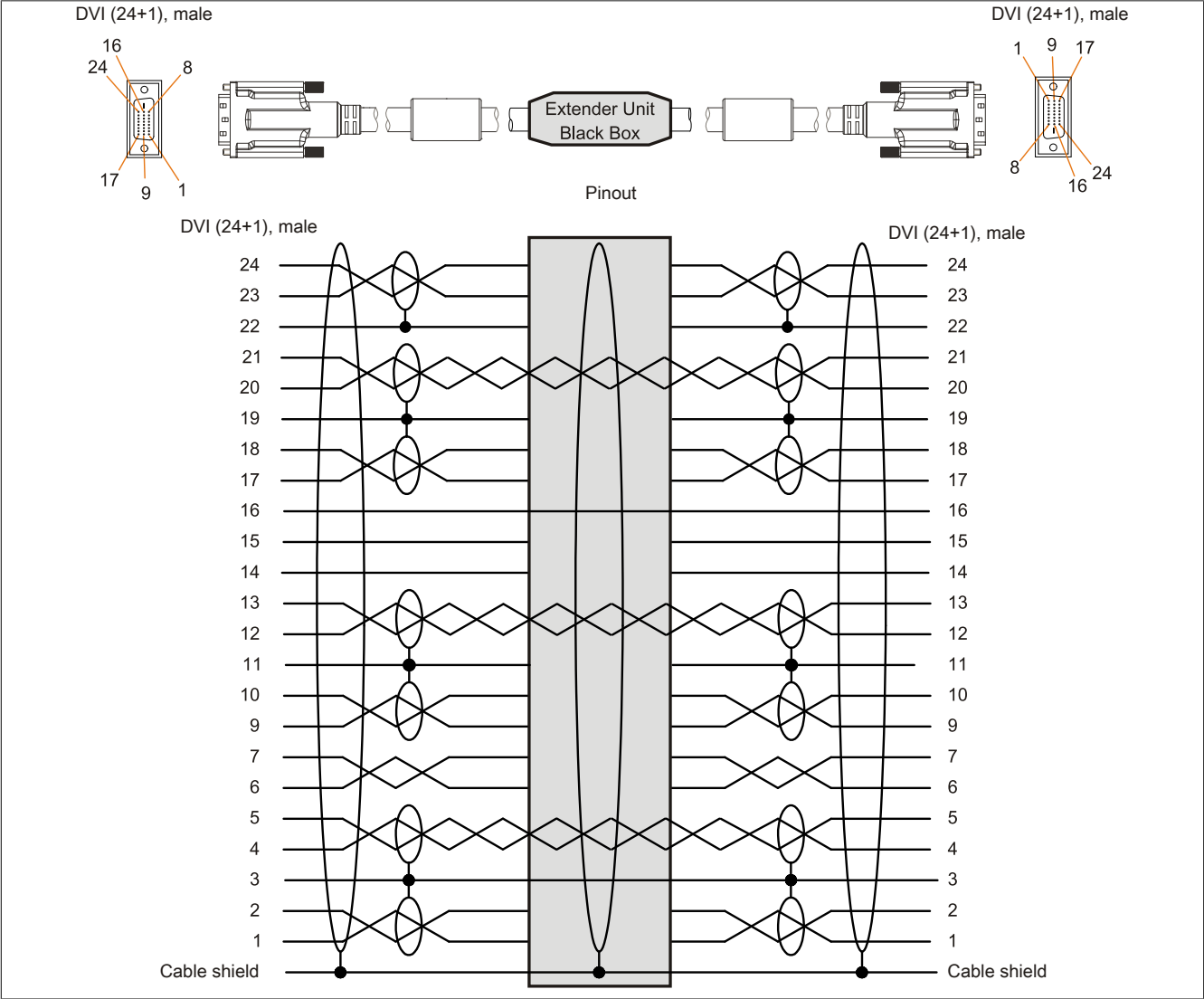


Figure 180: 5CASDL.0xx0-13 - Pinout

6.5.1.7 Cable connection

SDL flex cables with an extender must be connected between the B&R Industrial PC and the Automation Panel display unit in the correct direction. The signal direction is indicated on the extender for this purpose.

- Connect the end labeled "SDL IN" with the video output of the APC910 (monitor/panel output) or Panel OUT of an AP900 AP Link card.
- Connect the "SDL OUT" end to the display unit (e.g. Automation Panel 900) via the Automation Panel Link insert card (Panel IN).

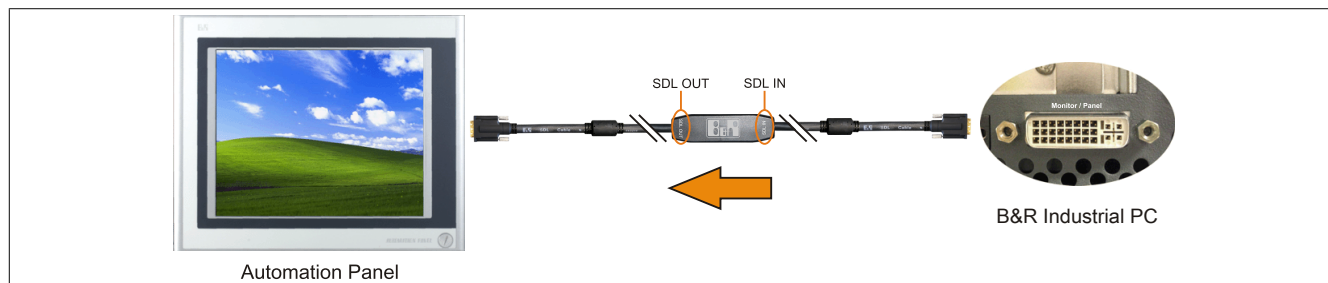


Figure 181: Example of the signal direction for an SDL flex cable with extender

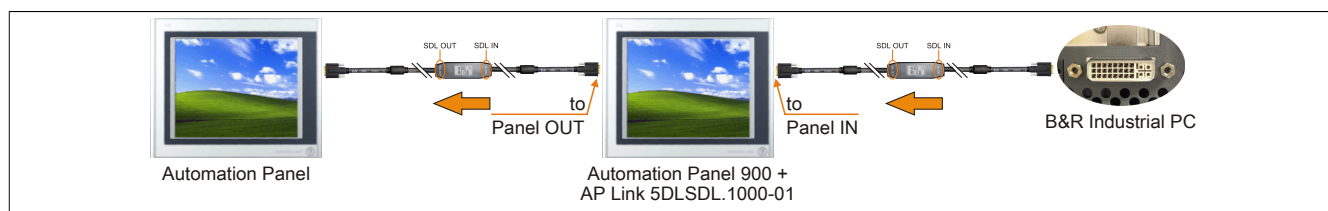


Figure 182: Example of the signal direction for an SDL flex cable with extender

6.6 USB cables

6.6.1 5CAUSB.00xx-00

6.6.1.1 General information

USB cables are designed to achieve USB 2.0 transfer speeds.

6.6.1.2 Order data


Model number	Short description	Figure
	USB cable	
5CAUSB.0018-00	USB 2.0 connecting cable type A - type B, 1.8 m.	
5CAUSB.0050-00	USB 2.0 connecting cable type A - type B, 5 m.	

Table 82: 5CAUSB.0018-00, 5CAUSB.0050-00 - Order data

6.6.1.3 Technical data

Product ID	5CAUSB.0018-00	5CAUSB.0050-00
General information		
Certification		
CE	Yes	
cULus	Yes	
Cable structure		
Wire cross section	AWG 24, 28	
Shield	Entire cable	
Outer sheathing		
Color	Beige	
Connector		
Type	USB type A male and USB type B male	
Mechanical characteristics		
Dimensions		
Length	1.8 m ±30 mm	5 m ±50 mm
Diameter	Max. 5 mm	
Flex radius	Min. 100 mm	

Table 83: 5CAUSB.0018-00, 5CAUSB.0050-00 - Technical data

6.6.1.4 Cable pinout

Warning!

If you choose to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

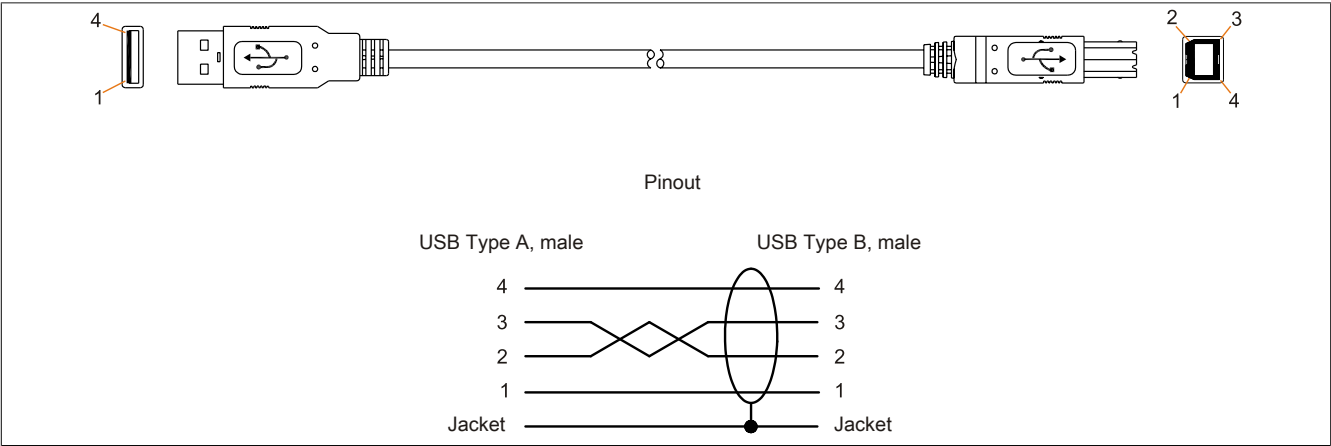


Figure 183: 5CAUSB.00xx-00 USB cables - Pinout

6.7 RS232 cables

6.7.1 9A0014.xx

6.7.1.1 General information

RS232 cables are used as extension cables between two RS232 interfaces.

6.7.1.2 Order data


Model number	Short description	Figure
	RS232 cable	
9A0014.02	RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m.	
9A0014.05	RS232 extension cable for remote operating of a display unit with touch screen, 5 m.	
9A0014.10	RS232 extension cable for remote operating of a display unit with touch screen, 10 m.	

Table 84: 9A0014.02, 9A0014.05, 9A0014.10 - Order data

6.7.1.3 Technical data

Product ID	9A0014.02	9A0014.05	9A0014.10
General information			
Certification CE	Yes		
Cable structure			
Wire cross section	AWG 26		
Shield	Entire cable		
Outer sheathing Color	Beige		
Connector			
Type	9-pin DSUB socket, male / female		
Mechanical characteristics			
Dimensions Length Diameter	1.8 m ±50 mm	5 m ±80 mm Max. 5 mm	10 m ±100 mm
Flex radius	Min. 70 mm		

Table 85: 9A0014.02, 9A0014.05, 9A0014.10 - Technical data

6.7.1.4 Cable pinout

Warning!

If you choose to build a suitable cable yourself, it should be wired according to these specifications. If a self-built cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

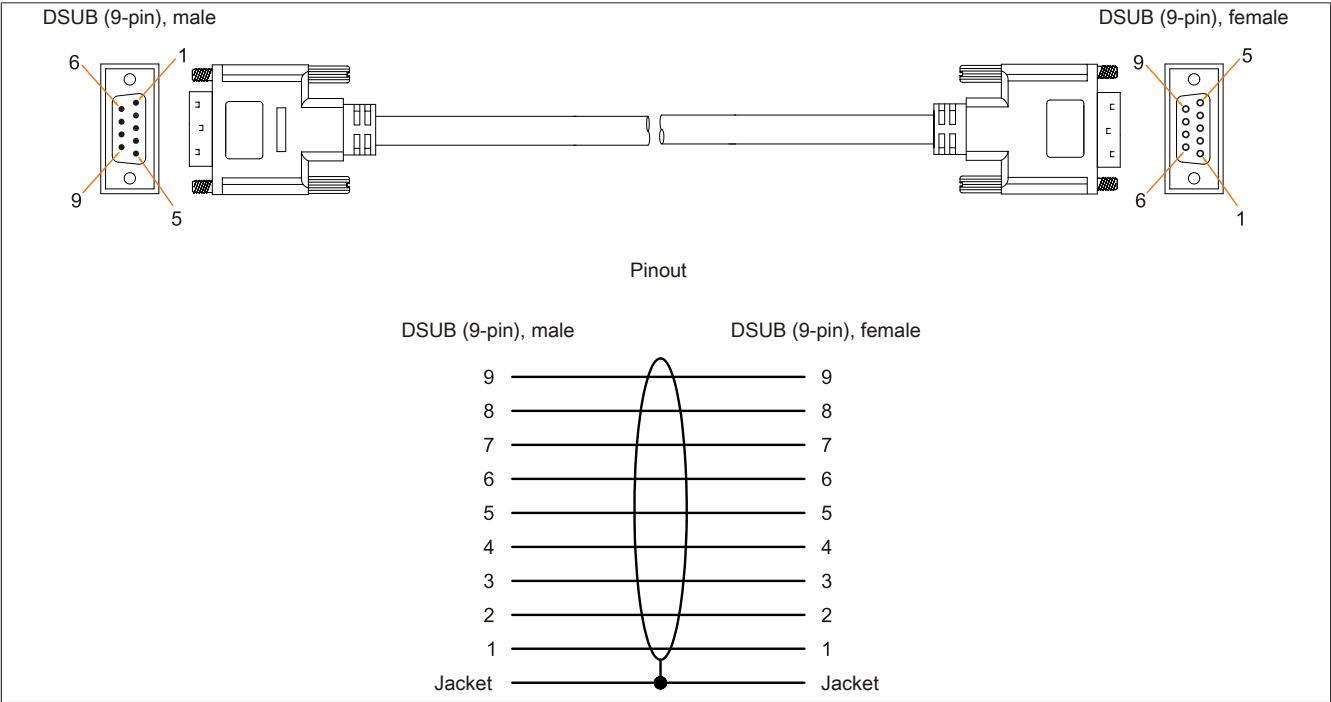


Figure 184: 9A0014.xx - RS232 cable pinout

7 AP900 fluorescent tubes

7.1 General information

The fluorescent tubes in TFT displays are subject to wear. They must therefore be replaced after several years depending on the number of operating hours (see Chapter 2 "Technical data" on page 17).

Fluorescent tubes can only be replaced on 12.1" and 15" Automation Panel 900 devices.

Information:

They cannot be replaced on 10.4", 17", 19" and 21.3" Automation Panel 900 devices!

The following table lists the fluorescent tubes that can be used for each panel.

Fluorescent tube	Panel	Starting with Rev.
9A0110.18 (for 12.1" devices)	5AP920.1214-01	
	5PC720.1214-00	
	5PC720.1214-01	
	5PP120.1214-37	
	5PP120.1214-37A	
	5PP320.1214-39	
9A0110.22 (for 15" devices)	4PP320.1505-31, 4PP420.1505-75, 4PP420.1505-B5, 4PP480.1505-75, 4PP480.1505-B5, 4PP481.1505-75, 5AP820.1505-00, 5AP880.1505-00, 5AP920.1505-01, 5AP951.1505-01, 5AP980.1505-01, 5AP981.1505-01, 5PC720.1505-00, 5PC720.1505-01, 5PC720.1505-02, 5PC781.1505-00, 5PP320.1505-39	A0
	4PP151.1505-31, 4PP181.1505-31, 5PP120.1505-37A	H0
	4PP251.1505-75, 4PP251.1505-B5, 4PP280.1505-75, 4PP280.1505-B5, 4PP281.1505-75, 4PP281.1505-B5, 4PP180.1505-31	I0
	4PP120.1505-31	S0
	4PP220.1505-75	V0
	4PP220.1505-B5	W0

Table 86: Overview of fluorescents tubes and panels

7.2 Order data

Model number	Short description	Figure
	Accessories	Image not found for 9A0110.18!
9A0110.18	Backlight (spare part) for panels with Sharp LQ121S1DG41: 5AP920.1214-01 5PC720.1214-00 5PC720.1214-01 5PP120.1214-37 5PP120.1214-37A 5PP320.1214-39	
9A0110.22	Backlight (spare part) for panels with Sharp LQ150X1LW71N: 4PP120.1505-31 From revision S0 4PP151.1505-31 From revision H0 4PP180.1505-31 From revision I0 4PP181.1505-31 From revision H0 4PP220.1505-75 From revision V0 4PP220.1505-B5 From revision W0 4PP251.1505-75 From revision I0 4PP251.1505-B5 From revision I0 4PP280.1505-75 From revision I0 4PP280.1505-B5 From revision I0 4PP281.1505-75 From revision I0 4PP281.1505-B5 From revision I0 4PP320.1505-31 From revision A0 4PP420.1505-75 From revision A0 4PP420.1505-B5 From revision A0 4PP480.1505-75 From revision A0 4PP480.1505-B5 From revision A0 4PP481.1505-75 From revision A0 5AP820.1505-00 From revision A0 5AP880.1505-00 From revision A0 5AP920.1505-01 From revision A0 5AP951.1505-01 From revision A0 5AP980.1505-01 From revision A0 5AP981.1505-01 From revision A0 5PC720.1505-00 From revision A0 5PC720.1505-01 From revision A0 5PC720.1505-02 From revision A0 5PC781.1505-00 From revision A0 5PP120.1505-37A From revision H0 5PP320.1505-39 From revision A0	

Table 87: 9A0110.18, 9A0110.22 - Order data

8 Line filter

8.1 5AC804.MFLT-00

8.1.1 General information

The 5AC804.MFLT-00 line filter may be necessary to satisfy requirements regarding conducted disturbances in supply lines in accordance with the 2003 edition of GL EMC1 (Germanischer Lloyd).

The line filter should be installed as close to the end device as possible; the supply line from the end device to the line filter should be kept as short as possible.

8.1.2 Order data


Model number	Short description	Figure
5AC804.MFLT-00	Accessories Mains filter	

Table 88: 5AC804.MFLT-00 - Order data

8.1.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	5AC804.MFLT-00
General information	
Certification	
CE	Yes
cULus	Yes
GL	Yes
Terminal block	
Connection cross section	
With wire end sleeves	1.5 mm ²
Flexible	0.2 to 1.5 mm ²
Inflexible	0.2 to 2.5 mm ²
Electrical characteristics	
Nominal voltage	24 VDC -25% / +30%
Nominal current	8 A
Environmental conditions	
Temperature	
Operation	-25 to 65°C
Storage	-25 to 65°C
Transport	-25 to 65°C
Mechanical characteristics	
Housing	
Material	Galvanized steel plate
Dimensions	
Width	54 mm
Length	94 mm
Depth	32.15 mm
Weight	205 g

Table 89: 5AC804.MFLT-00 - Technical data

8.1.4 Dimensions

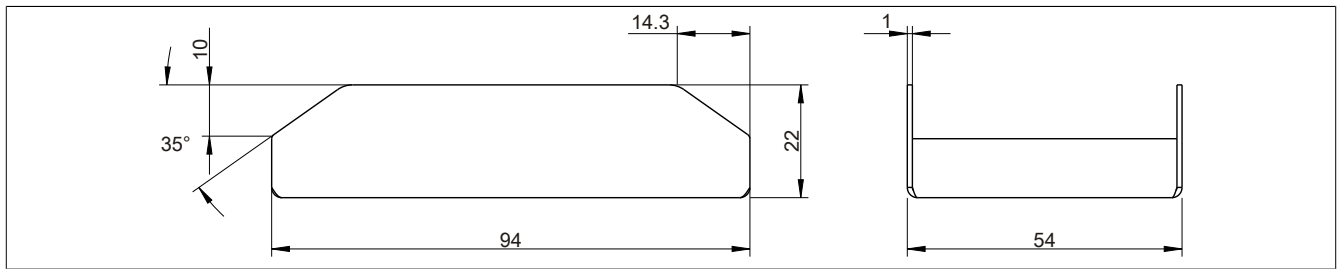


Figure 185: 5AC804.MFLT-00 - Dimensions

8.1.5 Drilling template

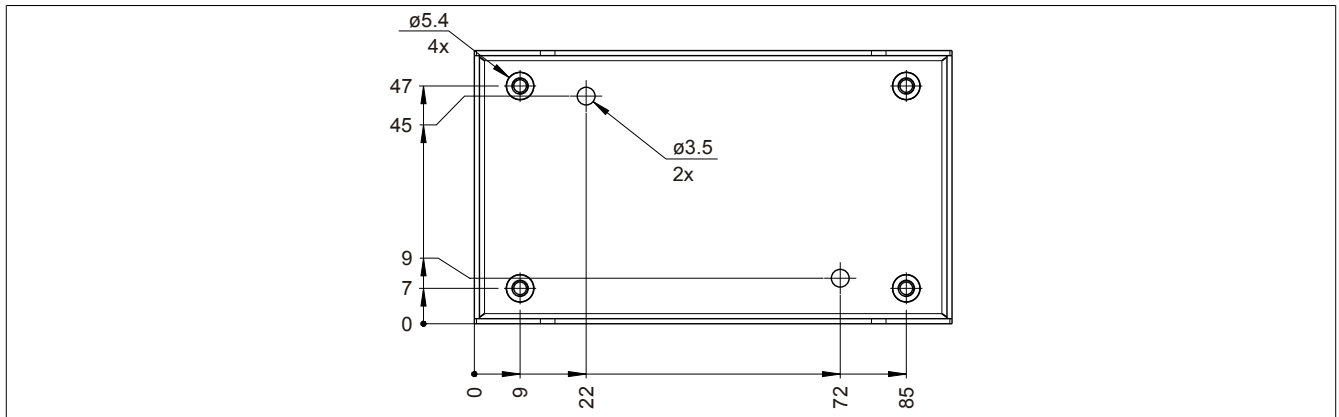


Figure 186: 5AC804.MFLT-00 - Drilling template

8.1.6 Connecting to the end device

The line filter must be connected between the supply voltage and the end device.

The following points must be observed:

- Use shielded, twisted wires.
- Keep the lines as short as possible (supply voltage - line filter - end device).
- The line filter must be installed on an unpainted, oil-free metallic surface.

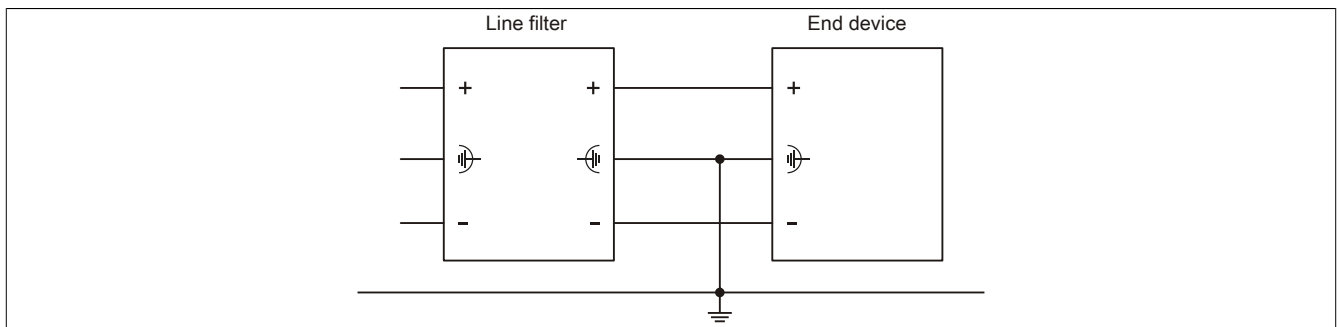


Figure 187: Connection example

9 HMI Drivers & Utilities DVD

9.1 5SWHMI.0000-00

9.1.1 General information

This DVD contains drivers, utilities, software upgrades and user's manuals for B&R panel system products (see the "Industrial PCs" or "Visualization and operation" section of the B&R website at www.br-automation.com).

At the time of its creation, the content of the DVD is identical to the files found in the download area of the B&R homepage (under Service – “Material Related Downloads”).

9.1.2 Order data


Model number	Short description	Figure
5SWHMI.0000-00	Other HMI Drivers & Utilities DVD	

Table 90: 5SWHMI.0000-00 - Order data

9.1.3 Contents (V2.10)

BIOS upgrades for the products

- Automation PC 620 / Panel PC 700 CPU Board 815E and 855GME BIOS
- Automation PC 620 / Panel PC 700 CPU Board X855GME BIOS
- Automation PC 620 / Panel PC 700 CPU Board 945GME N270 BIOS
- Automation PC 680
- Automation PC 810 / Automation PC 820 / Panel PC 800 B945GME BIOS
- Automation PC 810 / Panel PC 800 945GME N270 CPU Board BIOS
- Automation PC 810 / Panel PC 800 GM45 CPU Board BIOS
- Provit 2000 product family - IPC2000/2001/2002
- Provit 5000 product family - IPC5000/5600/5000C/5600C
- Power Panel 100 BIOS devices
- Mobile Panel 100 BIOS devices
- Power Panel 100 / Mobile Panel 100 user boot logo
- Power Panel 100 / Mobile Panel 100 REMHOST utility
- Power Panel 300/400 BIOS devices
- Power Panel 300/400 BIOS user boot logo
- Panel PC 310

Drivers for the devices

- Automation Device Interface (ADI)
- Audio
- Chipset
- CD-ROM
- LS120
- Graphics
- Network

- PCI / SATA RAID controller
- Touch screen
- Touchpad
- Interface board

Firmware upgrades

- Automation PC 620 / Panel PC 700 (MTCX, SDLR, SDLT)
- Automation PC 810 (MTCX, SDLR, SDLT)
- Automation PC 820 (MTCX, SDLR, SDLT)
- Mobile Panel 100 (SMCX)
- Panel PC 300 (MTCX)
- Power Panel 100 (aPCI)
- Power Panel 300/400 (aPCI)
- Power Panel 300/400 (MTCX)
- Panel PC 800 (MTCX, SDLR, SDLT)
- UPS firmware

Utilities / Tools

- B&R Embedded OS Installer
- Windows CE Tools
- User boot logo conversion program
- SATA RAID Installation Utility
- Automation Device Interface (ADI)
- CompactFlash lifespan calculator (Silicon Systems)
- Miscellaneous
- MTC utilities
- Key editor
- MTC & Mkey utilities
- Mkey utilities
- UPS configuration software
- ICU ISA configuration
- Intel PCI NIC boot ROM
- Diagnostics programs

Windows

- Windows CE 6.0
- Windows CE 5.0
- Windows CE 4.2
- Windows CE 4.1
- Windows CE Tools
- Windows Embedded Standard 2009
- Thin client
- Windows NT Embedded
- Windows XP Embedded
- VNC viewer

MCAD templates for

- Industrial PCs
- Visualization and operating devices
- Legend strip templates
- Custom designs

ECAD templates for

- Industrial PCs
- Automation PCs
- Automation Panel 900
- Panels (Power Panel)

Documentation for

- Automation PC 620
- Automation PC 680
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- Panel PC 310
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 15/21/35/41
- Power Panel 100/200
- Power Panel 300/400
- Mobile Panel 40/50
- Mobile Panel 100/200
- Mobile Panel connection box
- Provit 2000
- Provit 3030
- Provit 4000
- Provit 5000
- Provit Benchmark
- Provit Mkey
- Windows CE 5.0 Help
- Windows CE 6.0 Help
- Windows NT Embedded application guide
- Windows XP Embedded application guide
- Uninterruptible power supply
- Implementation guides
- B&R Hilscher fieldbus cards (CANopen, DeviceNet, PROFIBUS, PROFINET)

Service tools

- Acrobat Reader 5.0.5 (freeware in German, English and French)
- Power Archiver 6.0 (freeware in German, English and French)
- Internet Explorer 5.0 (German and English)
- Internet Explorer 6.0 (German and English)

Chapter 7 • Maintenance / Service

This chapter describes service/maintenance work that can be carried out by a qualified end user.

1 Cleaning

Danger!

The unit can only be cleaned when turned off in order to prevent unintentionally executing functions by actuating the touch screen or pressing keys.

A moist towel should be used to clean the device. When moistening the cloth, use only water with detergent, screen cleaning agent, or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand, not sprayed directly on the device! Aggressive solvents, chemicals, scouring agents, pressurized air or steam jets should never be used.

Information:

Displays with a touch screen should be cleaned regularly.

2 Replacing the fluorescent tubes

Danger!

Fluorescent tubes may only be replaced by qualified personnel when the Automation Panel 900 device and the entire system are both switched off.

2.1 Procedure

First step for all units (12.1" and 15"): Remove the cover. Remove the locating screws (1) and insert the card (2). Unscrew the screws on the cover (using a size 10 Torx screwdriver) and remove the cover (3).

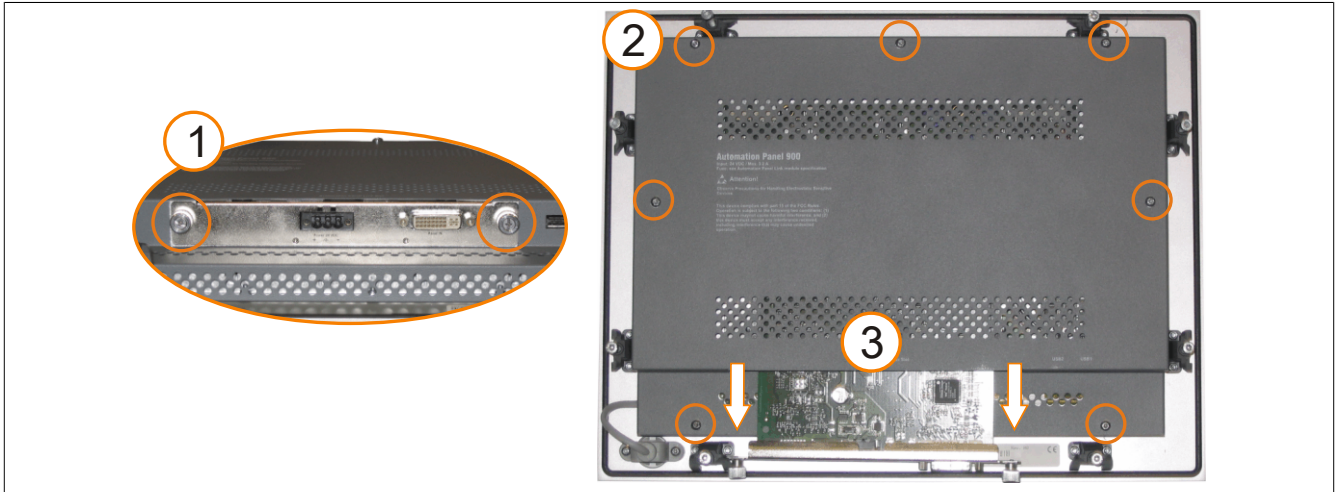


Figure 188: Removing the cover

2.1.1 General information

Warning!

To avoid damaging the fluorescent tubes during replacement, they should be removed by grasping the white plate (12.1" and 15" devices) using small flat-nose pliers. Do not pull on the cables since this can break the tubes.

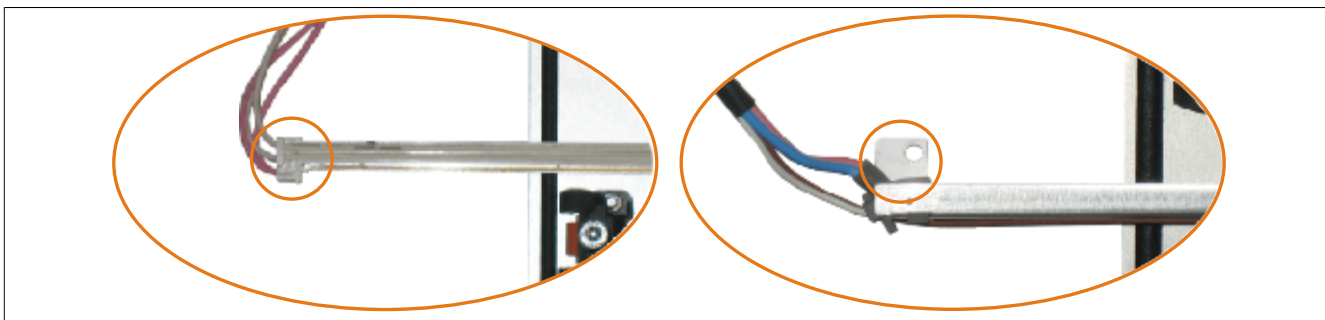


Figure 189: Warning - Replacing the fluorescent tubes

2.1.2 Procedure for 12.1" Automation Panels

- Using a small Phillips screwdriver, remove the screws and disconnect the fluorescent tube.

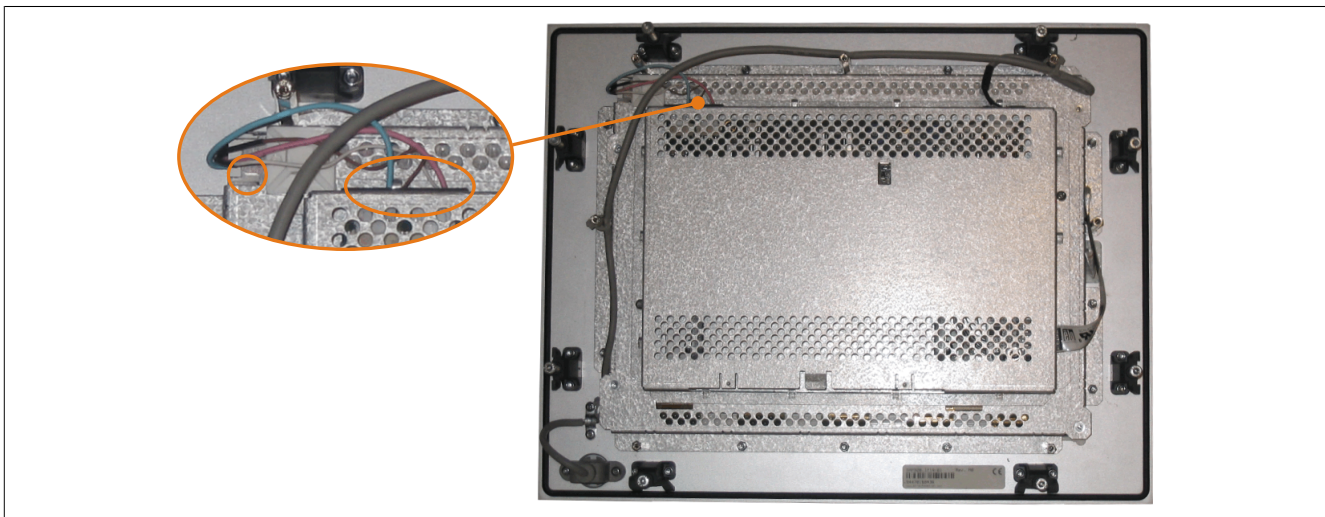


Figure 190: 12.1" Automation Panels - Unscrewing and disconnecting

- Replace the fluorescent tube. To do this, carefully pull the tube out of its holder and replace it with a new one.

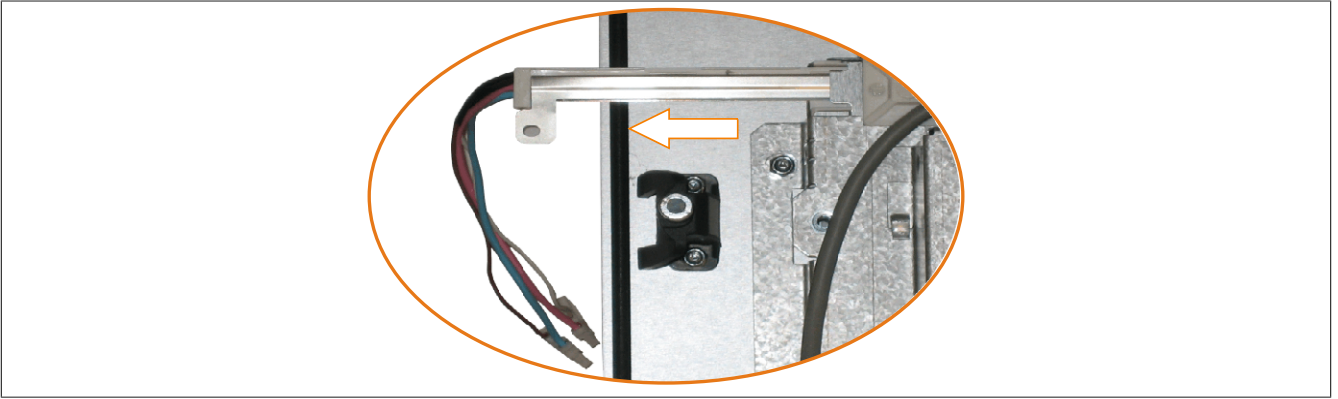


Figure 191: 12.1" Automation Panels - Replacing the fluorescent tube

2.1.3 Procedure for 15" Automation Panels

- Unplug the fluorescent tube (1). Remove the screws (2) from the fluorescent tubes using a small Phillips screwdriver, and remove the ground (3) from the housing using a size 10 Torx screwdriver.

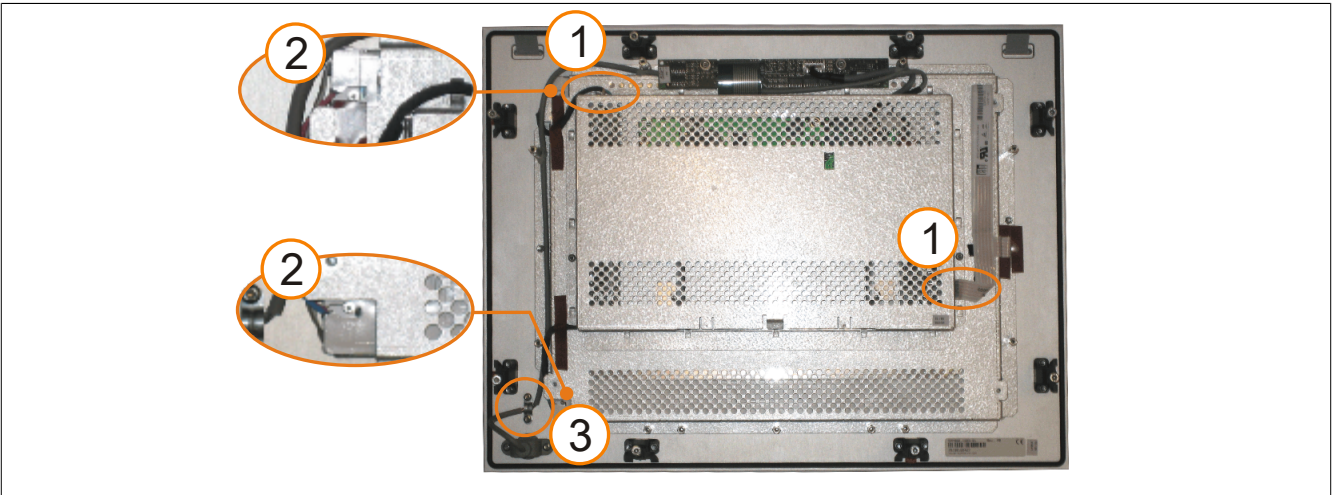


Figure 192: 15" Automation Panels - Unscrewing and disconnecting

- Disconnect the second fluorescent tube. Remove the screws (using a size 10 Torx screwdriver), push and raise the cover (1) and then disconnect the tube (2).

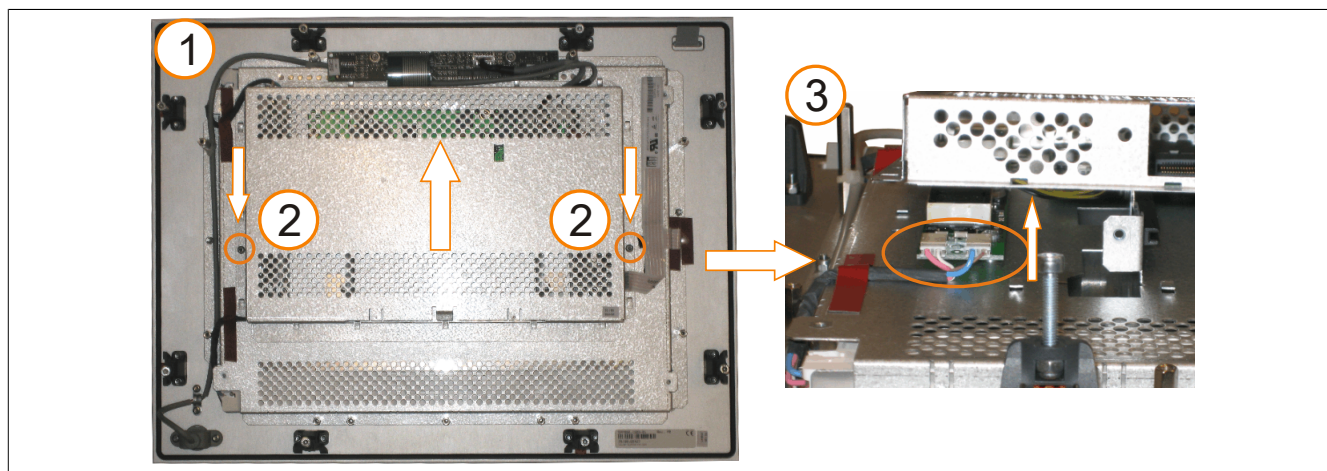


Figure 193: 15" Automation Panels - Removing the cover and disconnecting

- Replace the fluorescent tubes. To do this, carefully pull the tubes out of their holders and replace them with new ones.

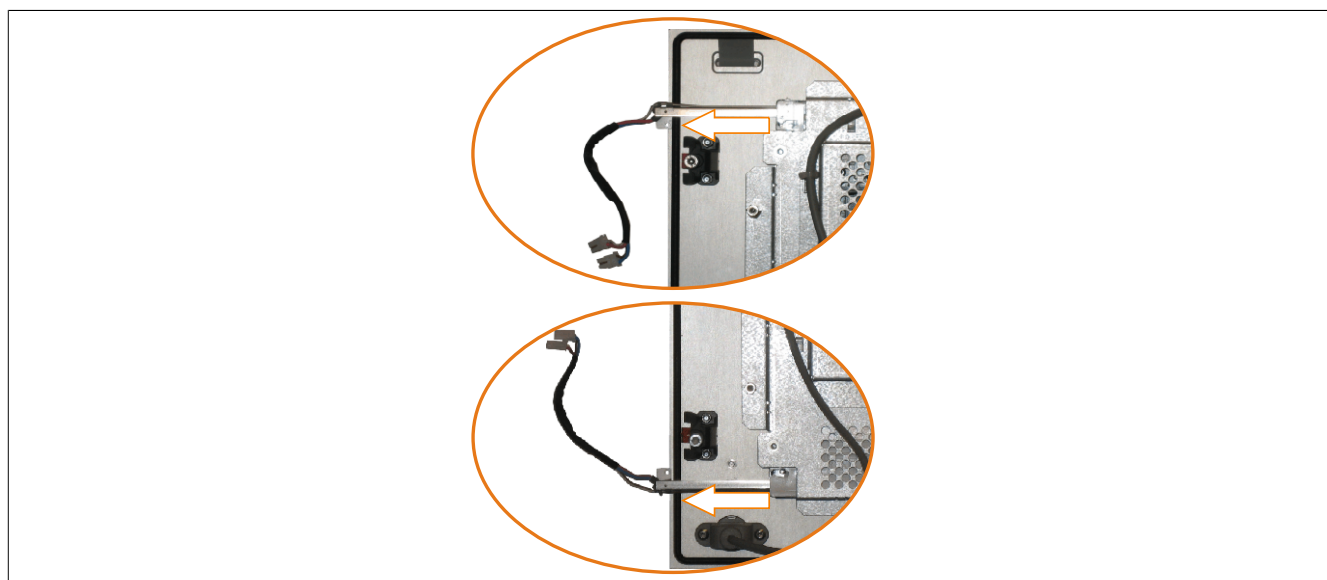


Figure 194: 15" Automation Panel - Replacing the fluorescent tubes

Appendix A

1 Elo AccuTouch screen

1.1 Technical data

Information:

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

Elo AccuTouch screen	Elo AccuTouch screen
General information	
Manufacturer	Elo
Accuracy	Typically <0.080 inches (2.032 mm) Maximum error in all directions 0.180 inches (4.752 mm) Maximum 1% of the diagonal for the active area of the touch screens
For diagonals <18"	
For diagonals >18"	
Response time	<10 ms
Release pressure	<113 gram
Resolution	4096 x 4096 touch contact points
Light permeability	Up to 80% ±5%
Environmental conditions	
Temperature	
Operation	- 10 to 50°C
Storage	- 40 to 71°C
Transport	- 40 to 71°C
Relative humidity	
Operation	Max. 90% at max. 35°C
Storage	Max. 90% at max. 35°C for 240 hours, non-condensing
Transport	Max. 90% at max. 35°C for 240 hours, non-condensing
Operating conditions	
Waterproofing	IP65
Service life	35 million touch operations at the same position
Chemical resistance ¹⁾	Acetone, ammonia-based glass cleaner, ordinary food and drink, hexane, methylene chloride, methylethylketone, mineral spirits, turpentine, isopropyl alcohol
Enabling	Finger, pointer, credit card, glove
Drivers	Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com). They can also be found on the B&R HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

Table 91: Elo AccuTouch screen - Technical data

- 1) The active area of the touch screen is resistant to these chemicals for a period of one hour at 21°C.

1.2 Temperature humidity diagram

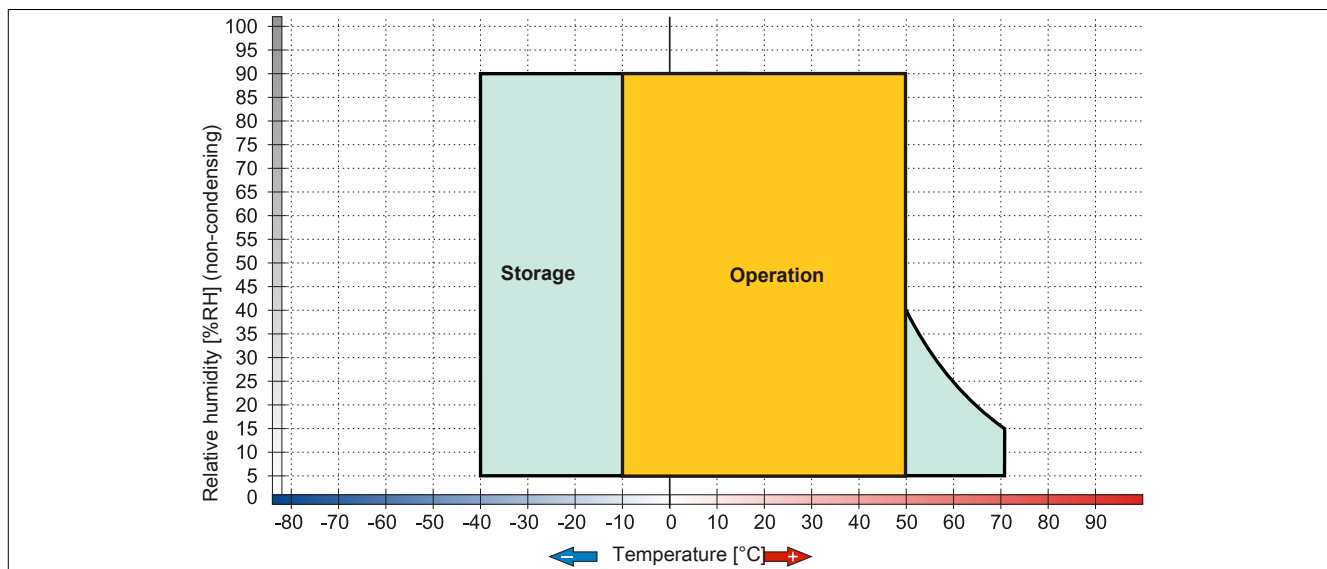


Figure 195: Elo AccuTouch screen (5-wire) - Temperature humidity diagram

1.3 Cleaning

Danger!

The unit can only be cleaned when turned off in order to prevent unintentionally executing functions by actuating the touch screen or pressing keys.

A moist towel should be used to clean the device. When moistening the cloth, use only water with detergent, screen cleaning agent, or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand, not sprayed directly on the device! Aggressive solvents, chemicals, scouring agents, pressurized air or steam jets should never be used.

Information:

Displays with a touch screen should be cleaned regularly.

2 Panel membrane

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

Information:

The following characteristics, features and limit values only apply to this individual component and can deviate from those specified for the fully assembled device.

Ethanol Cyclohexanol Diacetone alcohol Glycol Isopropanol Glycerine Methanol Triacetin Dowandol DRM/PM	Formaldehyde 37 to 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 MIBK Isophorone	Formic acid < 50% Acetic acid < 50% Phosphoric acid < 30% Hydrochloric acid < 36% Nitric acid < 10% Trichloroacetic acid < 50% Sulphuric acid < 10%	Sodium hypochlorite < 20% Hydrogen peroxide < 25% Potassium carbonate Washing agents Tenside Fabric conditioner Ferrous chloride (FeCl ₂) Ferrous chloride (FeCl ₃) Dibutyl phthalate Dioctyl phthalate Sodium carbonate
Ammonia < 40% Caustic soda < 40% Potassium hydroxide Alkali carbonate Bichromate Potassium Acetonitrile Sodium bisulphate	Cutting oil Diesel oil Linseed oil Paraffin oil Blown castor oil Silicon oil Turpentine oil substitute Brake fluid Aviation fuel Gasoline Water Sea water Decon	

Table 92: Chemical resistance of the panel membrane

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

3 Filter glass

Mechanical characteristics

Information:

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

Abrasion-resistant in accordance with DIN 52347

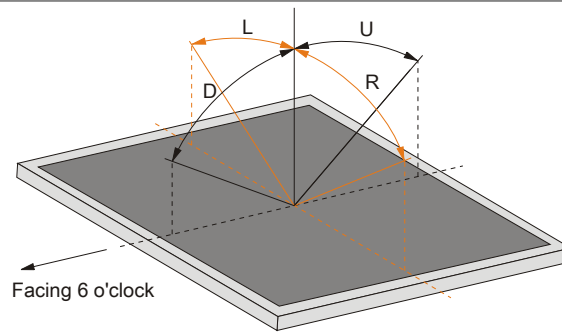
Adhesive strength in accordance with DIN 58 196-K2 (Part 6)

Chemical properties

Durability according to DIN 50021 - CASS

4 Viewing angles

Viewing angle specifications (R, L, U, D) for the display types are listed in the technical data for each device.



5 Mounting compatibilities

This section describes the compatibility of the installation dimensions for the Power Panel 100/200, Power Panel 300/400, Power Panel 500, Automation Panel 900, Automation Panel 700 and Panel PC 800 units according to the respective device diagonals.

The outer dimensions of the device types are identical for the respective diagonals.

The different device types are abbreviated as follows:

Device type	Abbreviation
Power Panel 100/200	PP100/200
Power Panel 300/400	PP300/400
Power Panel 500	PP500
Automation Panel 900	AP900
Panel PC 700	PPC700
Panel PC 800	PPC800

Table 93: Product abbreviations

5.1 Compatibility overview

The following table offers a brief overview of the devices PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800. Detailed information can be found in the section 5.2 "Compatibility details" on page 215.

Compatibility between the device types is represented on each line by matching symbols.

Size	Format	Compatible	PP100/200	PP300/400	PP500	AP900	PPC700	PPC800
5.7"	Horizontal1	Outer dimensions	■	■	■	-	-	-
		Installation dimensions	●	●	●	-	-	-
	Horizontal2	Outer dimensions	■	■	■	-	-	-
		Installation dimensions	●	●	●	-	-	-
	Vertical1	Outer dimensions	■	■	■	-	-	-
		Installation dimensions	●	●	▲	-	-	-
10.4"	Horizontal 1	Outer dimensions	■	■	■	■	■	-
		Installation dimensions	●	●	●	●	●	-
	Horizontal2	Outer dimensions	■	■	■	■	■	-
		Installation dimensions	●	●	▲	▲	▲	-
	Vertical1	Outer dimensions	■	■	■	■	■	-
		Installation dimensions	●	●	▲	▲	▲	-
12.1"	Horizontal1	Outer dimensions	■	■	■	■	■	-
		Installation dimensions	●	●	▲	▲	▲	-
15"	Horizontal1	Outer dimensions	■	■	■	■	■	■
		Installation dimensions	●	●	▲	●	●	●
	Vertical1	Outer dimensions	■	■	■	■	■	-
		Installation dimensions	●	●	▲	●	●	-
17"	Horizontal 1	Outer dimensions	-	-	-	■	■	-
		Installation dimensions	-	-	-	▲	▲	-
19"	Horizontal 1	Outer dimensions	-	-	-	■	■	-
		Installation dimensions	-	-	-	▲	-	-
21.3"	Horizontal 1	Outer dimensions	-	-	-	■	-	-
		Installation dimensions	-	-	-	▲	-	-

Table 94: Device compatibility overview

5.2 Compatibility details

5.2.1 Example

The measurement values (all in mm) in the following figures have the following meaning.

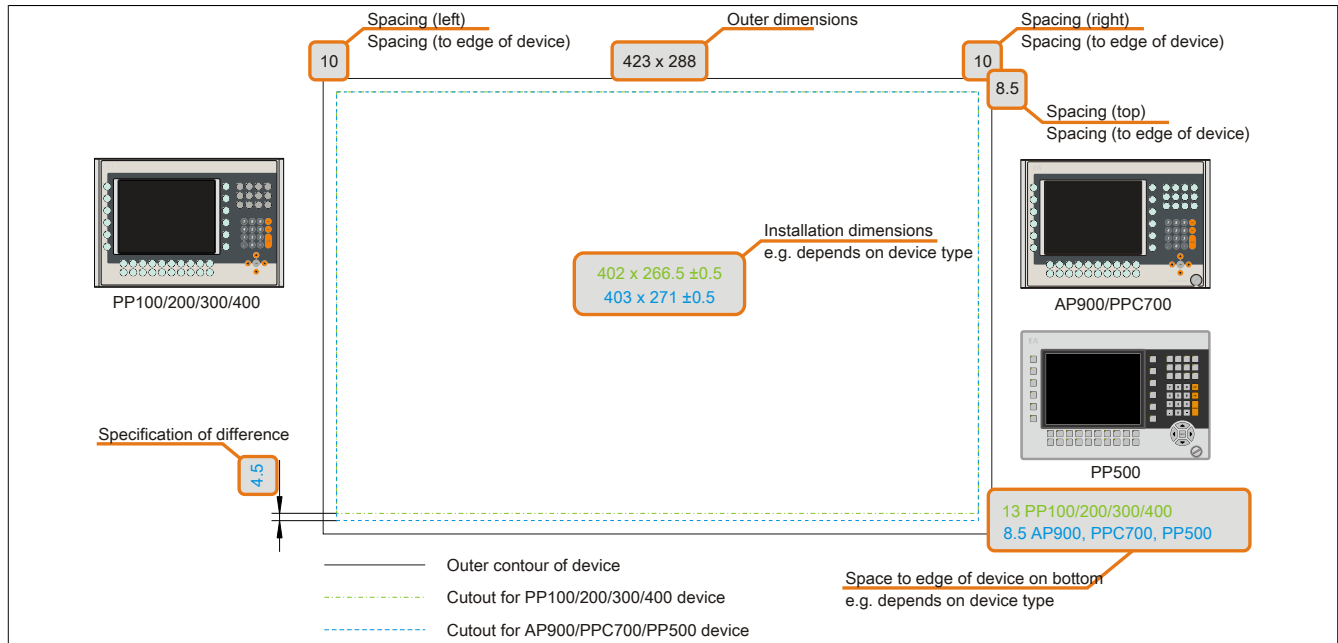


Figure 196: Overview of compatibility figures

5.2.2 5.7" devices

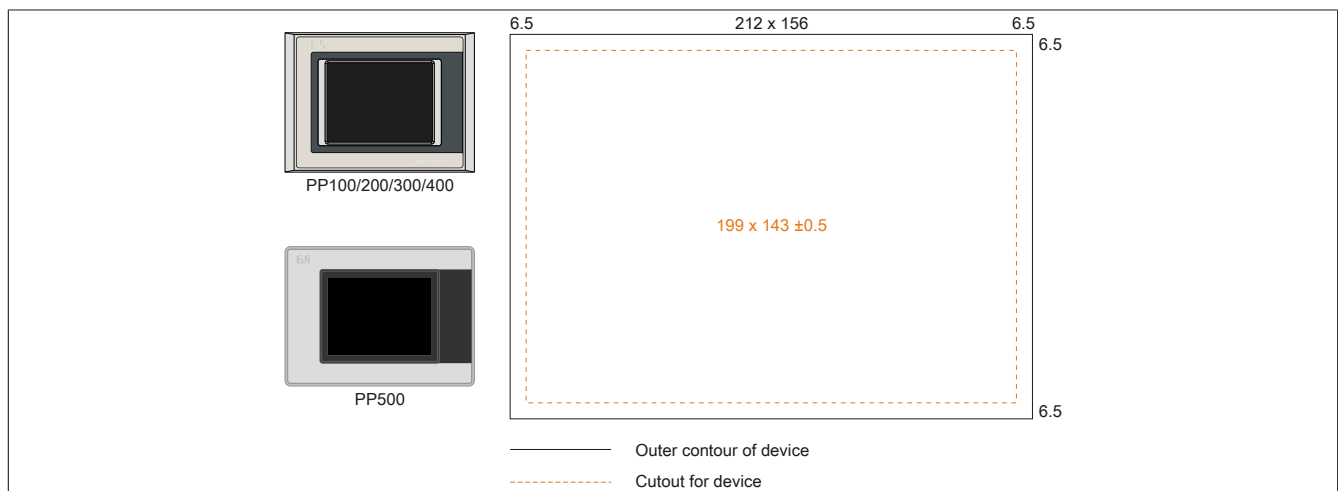


Figure 197: Mounting compatibility - 5.7" device - Horizontal1

5.7" Power Panel 500, Power Panel 300/400 and Power Panel 100/200 devices in Horizontal1 format are 100% mounting compatible.

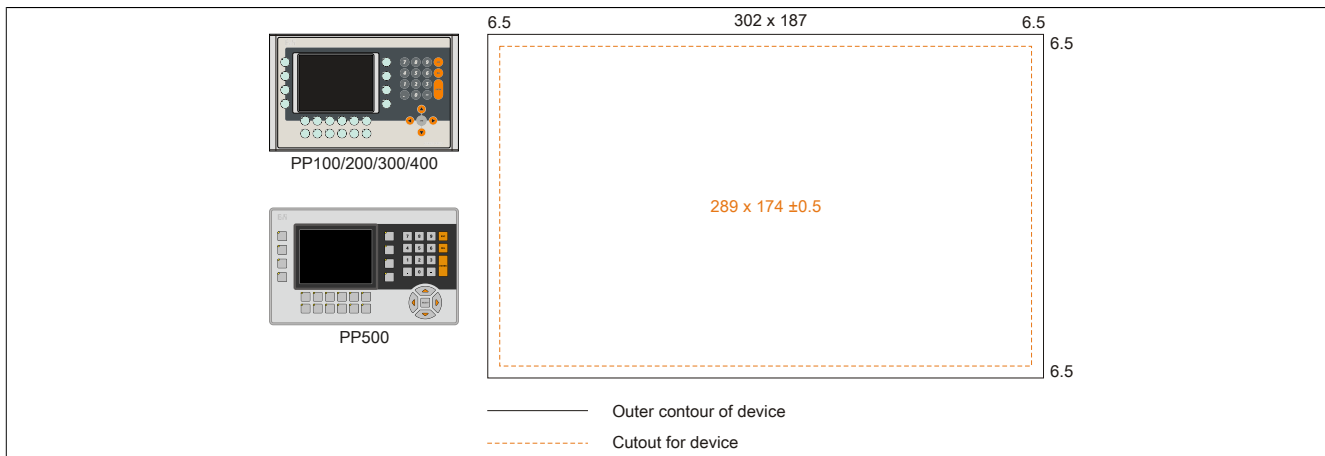


Figure 198: Mounting compatibility - 5.7" device - Horizontal2

5.7" Power Panel 500, Power Panel 300/400 and Power Panel 100/200 devices in Horizontal2 format are 100% mounting compatible.

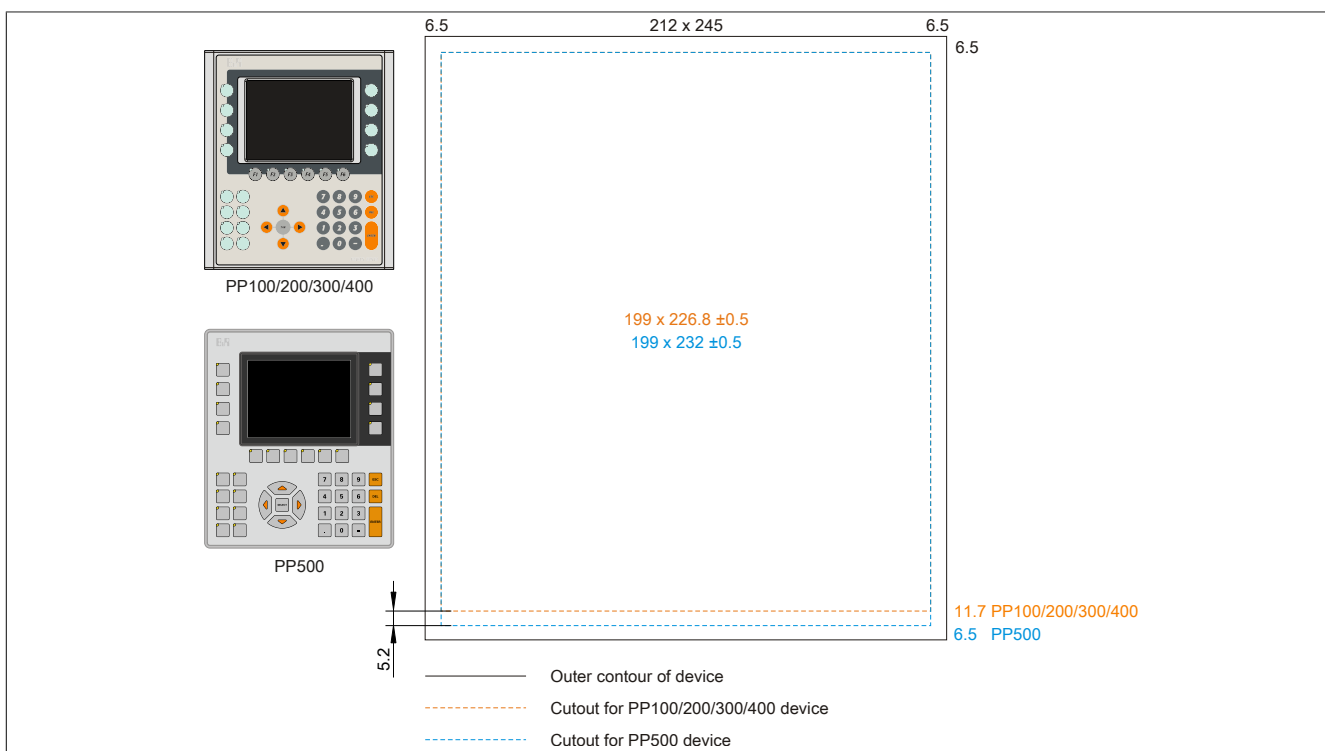


Figure 199: Mounting compatibility - 5.7" device - Vertical1

5.7" Power Panel 500 devices are not 100% mounting compatible with Power Panel 300/400 and Power Panel 100/200 devices in Vertical1 format. The Power Panel 500 devices require a cutout that is 5.2 mm higher (bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200 and PP300/400 devices are placed and mounted as close to the center of the cutout as possible. Failure to do so can prevent the retaining clips from holding firmly, which means that a firm seal is no longer guaranteed with the gasket (IP65).

5.2.3 10.4" devices

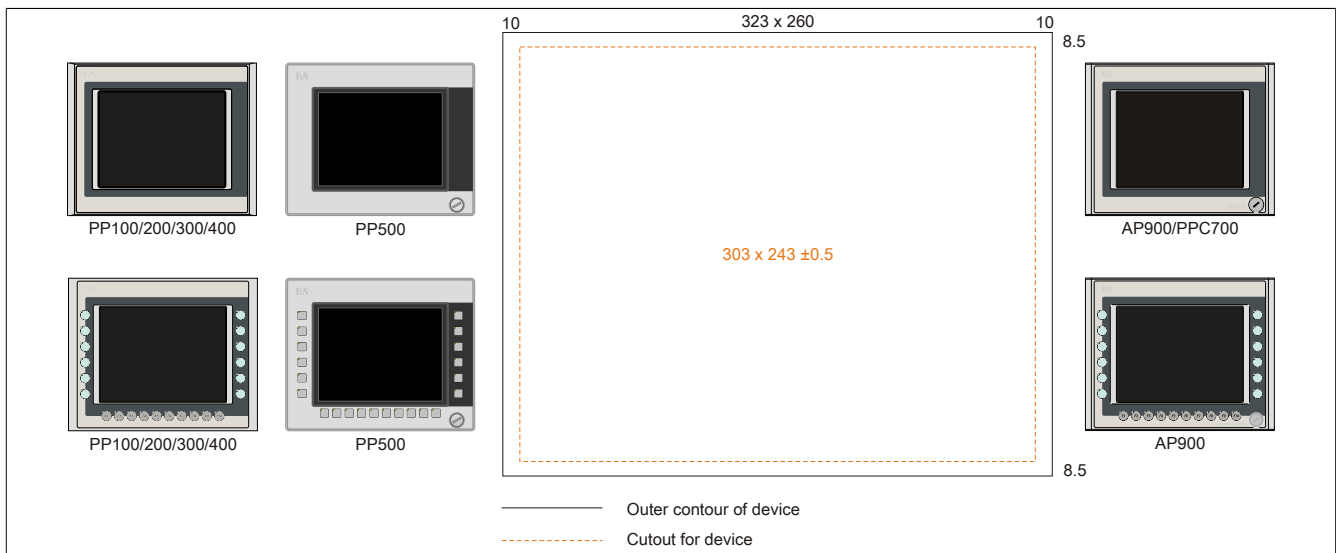


Figure 200: Mounting compatibility - 10.4" device - Horizontal1

10.4" Power Panel 500, Power Panel 300/400 and Power Panel 100/200 devices in Horizontal1 format are 100% mounting compatible.

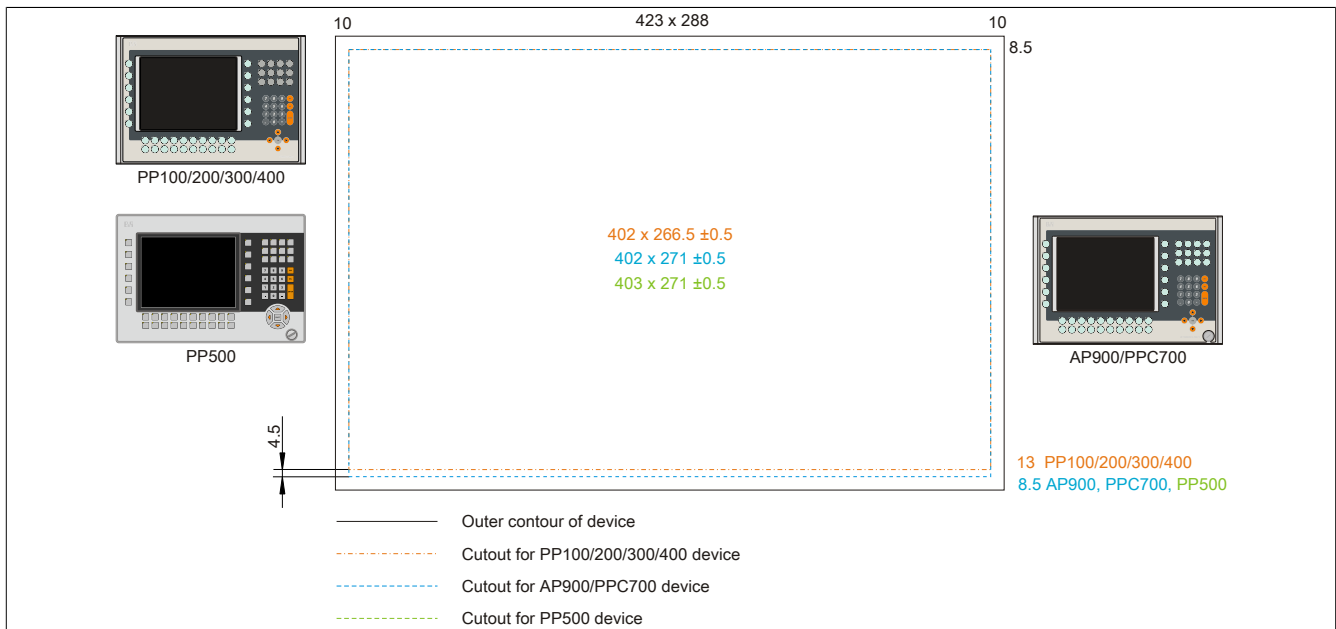


Figure 201: Mounting compatibility - 10.4" device - Horizontal2

The 10.4" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with the Power Panel 300/400 or Power Panel 100/200 device format Horizontal2. The Power Panel 500, Automation Panel 900 and Panel PC 700 devices require a cutout that is 4.5 mm higher (bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200 and PP300/400 devices are placed and mounted as close to the center of the cutout as possible. Failure to do so can prevent the retaining clips from holding firmly, which means that a firm seal is no longer guaranteed with the gasket (IP65).

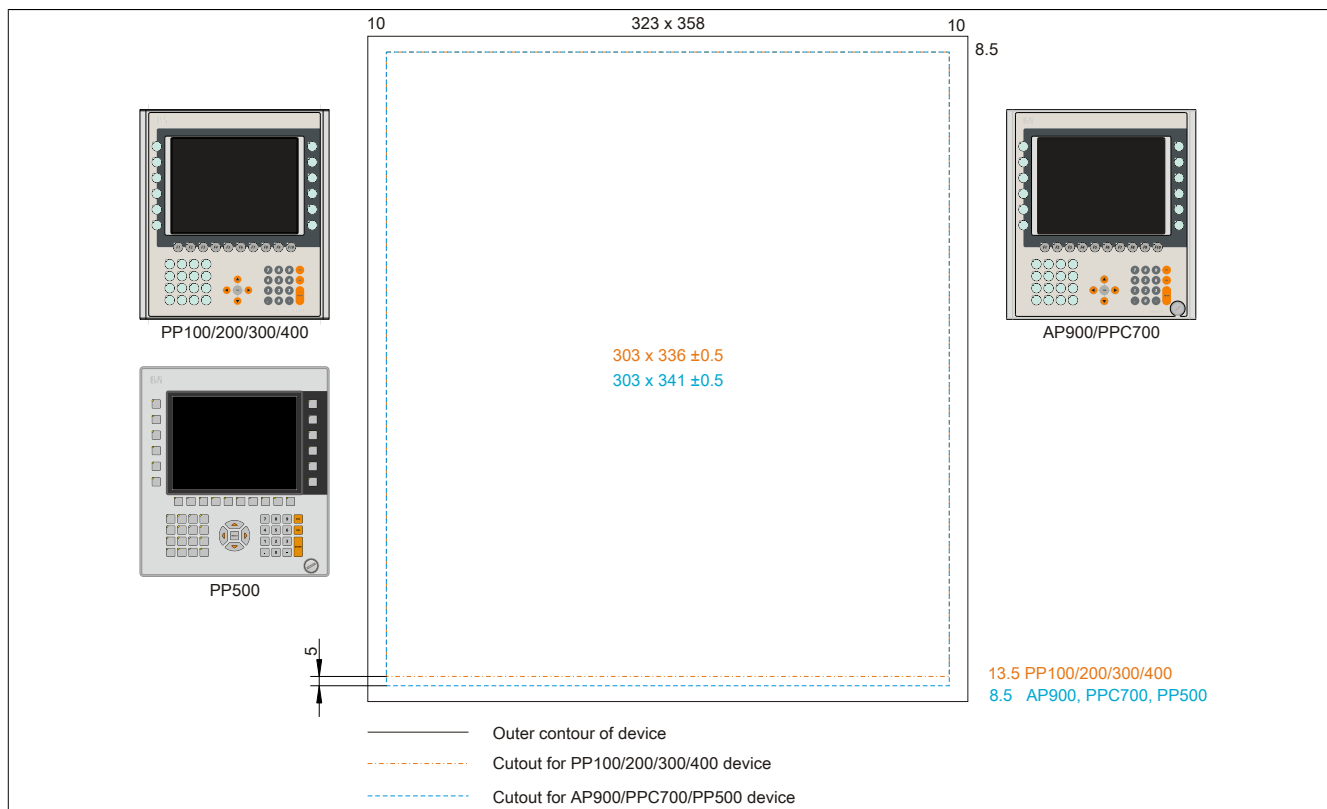


Figure 202: Mounting compatibility - 10.4" device - Vertical1

The 10.4" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with the Power Panel 300/400 or Power Panel 100/200 device format Vertical1. The Power Panel 500, Automation Panel 900 and Panel PC 700 devices require a cutout that is 5 mm higher (bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200/300/400 devices are placed and mounted as close to the center of the cutout as possible. Failure to do so can prevent the retaining clips from holding firmly, which means that a firm seal is no longer guaranteed with the gasket (IP65).

5.2.4 12.1" devices

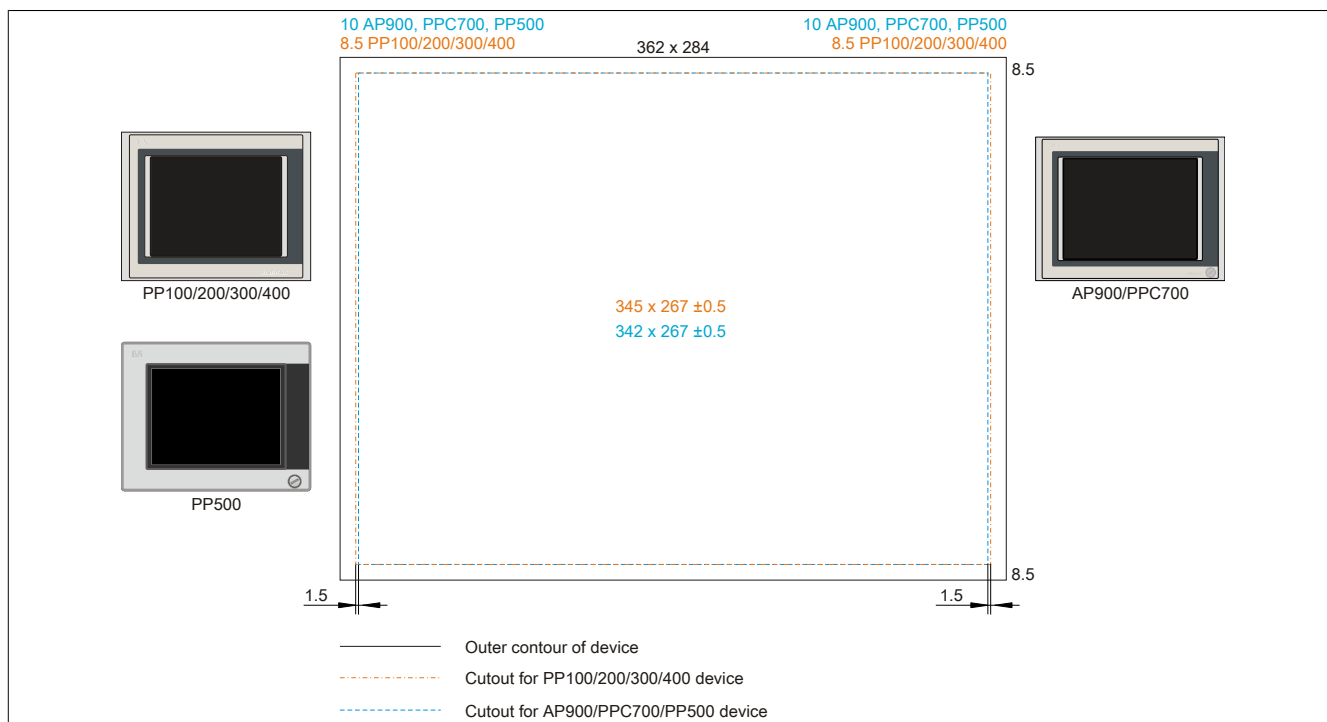


Figure 203: Mounting compatibility - 12.1" device - Horizontal1

The 12.1" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with the Power Panel 300/400 or Power Panel 100/200 device format Horizontal1. The Power Panel 300/400 and Power Panel 100/200 devices require a cut that is 1.5 mm wider (left and right).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP500, AP900 and PPC700 devices are mounted as close to the center of the cutout as possible.

5.2.5 15" devices

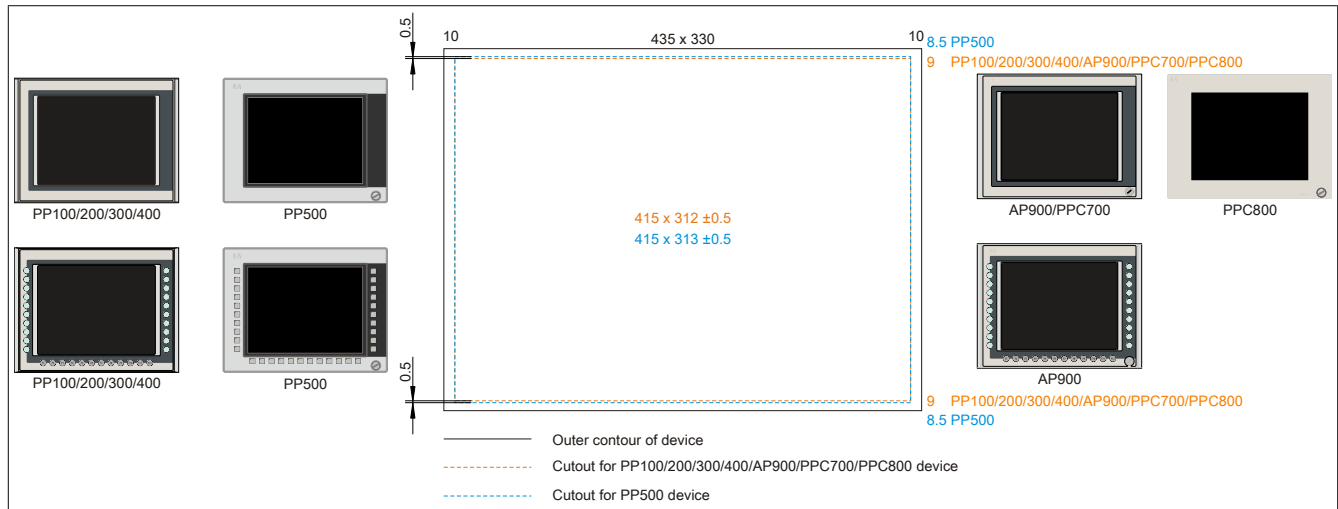


Figure 204: Mounting compatibility - 15" device - Horizontal1

15" Power Panel 500 devices are not 100% mounting compatible with the Power Panel 100/200, Power Panel 300/400, Automation Panel 900, Panel PC 700 and Panel PC 800 device format Vertical1. The Power Panel 500 devices require a cutout that is 0.5 mm higher (top and bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200, PP300/400, AP900, PPC700 and PPC800 devices are placed and mounted as close to the center of the cutout as possible. Failure to do so can prevent the retaining clips from holding firmly, which means that a firm seal is no longer guaranteed with the gasket (IP65).

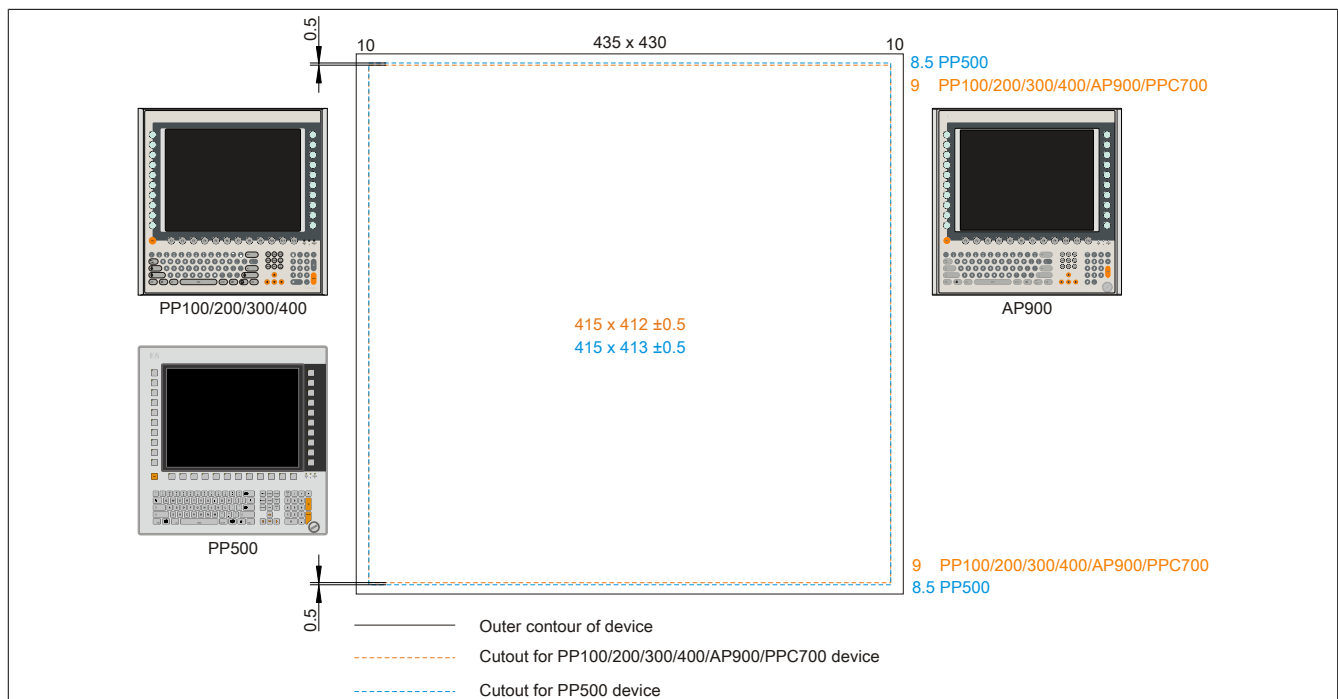


Figure 205: Mounting compatibility - 15" device - Vertical1

15" Power Panel 500 devices are not 100% mounting compatible with the Power Panel 100/200, Power Panel 300/400, Automation Panel 900 and Panel PC 700 device format Vertical1. The Power Panel 500 devices require a cutout that is 0.5 mm higher (top and bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200, PP300/400, AP900 and PPC700 devices are mounted as close to the center of the cutout as possible. Failure to do so can prevent the retaining clips from holding firmly, which means that a firm seal is no longer guaranteed with the gasket (IP65).

5.2.6 17" devices

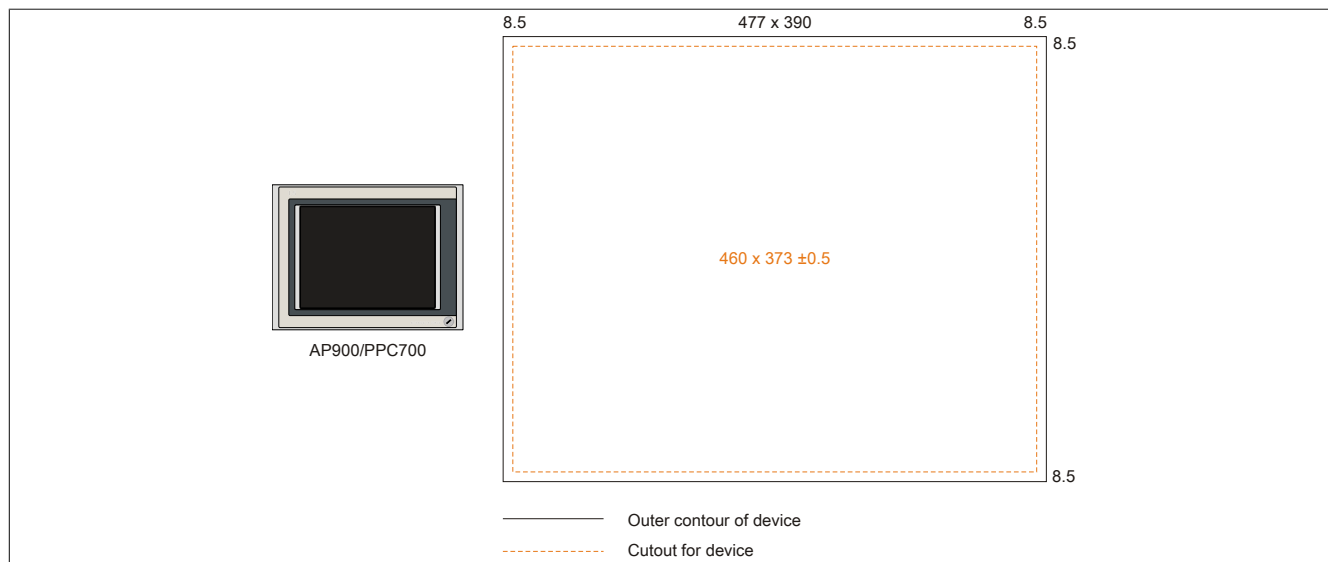


Figure 206: Mounting compatibility - 17" device - Horizontal1

17" Automation Panel 900 and Panel PC 700 in Horizontal1 format are 100% mounting compatible.

5.2.7 19" devices

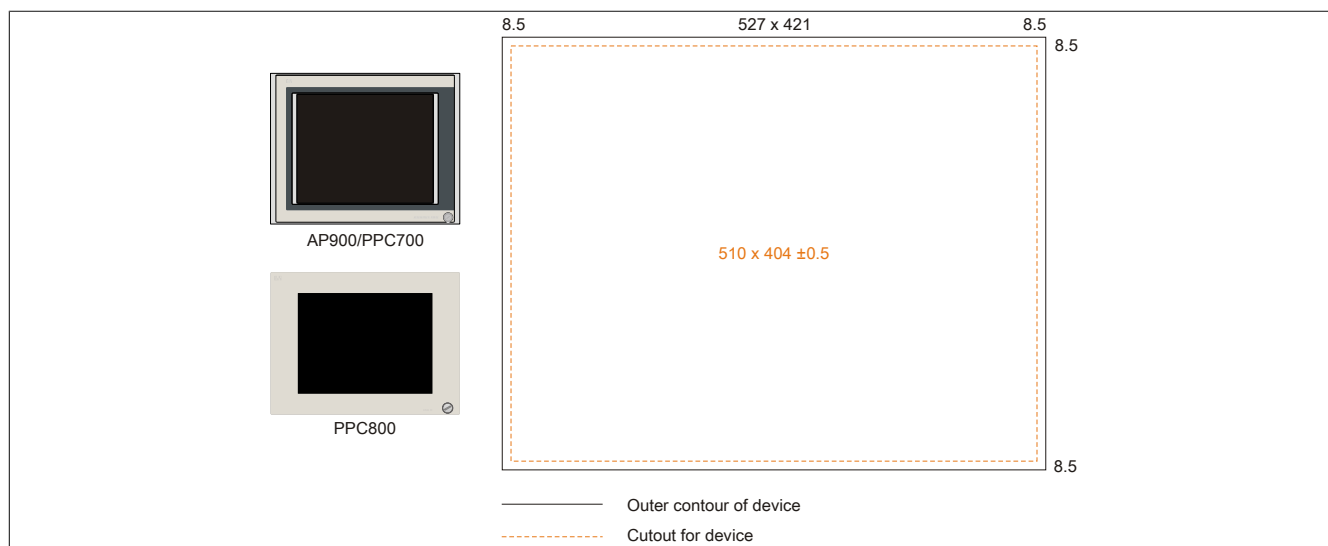


Figure 207: Mounting compatibility - 19" device - Horizontal1

19" Automation Panel 900, Panel PC 700 and Panel PC 800 in Horizontal1 format are 100% mounting compatible.

5.2.8 21.3" devices

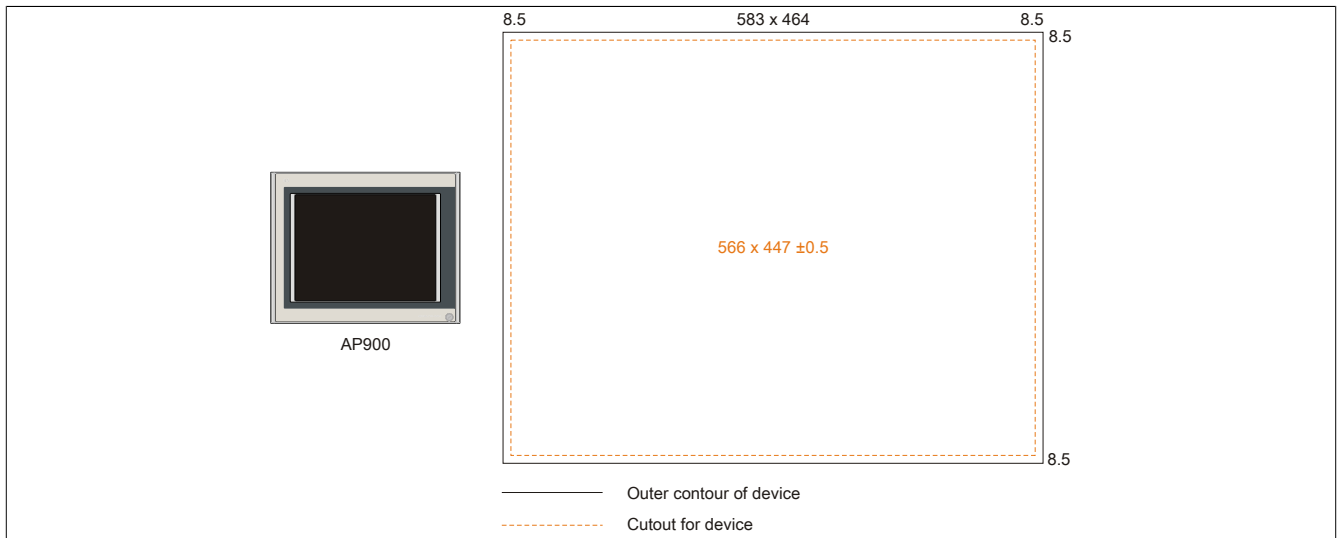


Figure 208: Mounting compatibility - 21.1" device - Horizontal1

6 Glossary

APC	Abbreviation for »Automation PC«
Application software	Software, which is not used for operation by the computer itself, but rather when a computer is used to process a concrete application problem. It sets up the system software and uses this for fulfilling individual tasks. Application software can be accommodated in standard software used by a large number of customers in a wide range of industries. Common examples are Word, Excel, PowerPoint, Paint, Matlab etc. Industrial software tailored to the respective problems of a certain industry and individual software created for solving the particular problems of an individual user.
Automation	According to Brockhaus: The application of technical means, using specific programs that (either partially or totally) do not require human intervention to perform operations.
Automation Runtime	A uniform runtime system for all B&R automation components.
Failure	Failure according to IEC 61508: A function unit loses the ability to perform a required function. In regards to safety-oriented systems, a distinction is made between dangerous and safe failures. This depends on whether the status of the system failure is considered dangerous or safe. The cause of the failure may be load related or age-related, and therefore a random failure, or related to a flaw inherent in the system. In this case, it is known as a systematic failure.

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