

Automation Panel 900

User's Manual

Version: **2.22 (January 2022)**
Order no.: **MAAP900-ENG**

Publishing information

B&R Industrial Automation GmbH

B&R Strasse 1

5142 Eggelsberg

Austria

Telephone: +43 7748 6586-0

Fax: +43 7748 6586-26

office@br-automation.com

Disclaimer

All information in this manual is current as of its creation. The contents of this manual are subject to change without notice. B&R Industrial Automation GmbH assumes unlimited liability in particular for technical or editorial errors in this manual only (i) in the event of gross negligence or (ii) for culpably inflicted personal injury. Beyond that, liability is excluded to the extent permitted by law. Liability in cases in which the law stipulates mandatory unlimited liability (such as product liability) remains unaffected. Liability for indirect damage, consequential damage, business interruption, loss of profit or loss of information and data is excluded, in particular for damage that is directly or indirectly attributable to the delivery, performance and use of this material.

B&R Industrial Automation GmbH notes that the software and hardware designations and brand names of the respective companies used in this document are subject to general trademark, brand or patent protection.

Hardware and software from third-party suppliers referenced in this manual is subject exclusively to the respective terms of use of these third-party providers. B&R Industrial Automation GmbH assumes no liability in this regard. Any recommendations made by B&R Industrial Automation GmbH are not contractual content, but merely non-binding information for which no liability is assumed. When using hardware and software from third-party suppliers, the relevant manuals of these third-party suppliers must additionally be consulted and, in particular, the safety guidelines and technical specifications contained therein must be observed. The compatibility of the products from B&R Industrial Automation GmbH described in this manual with hardware and software from third-party suppliers is not contractual content unless this has been separately agreed in individual cases; in this respect, warranty for such compatibility is excluded in any case, and it is the sole responsibility of the customer to verify this compatibility in advance.

1 General information.....	8
1.1 Manual history.....	8
1.2 General safety guidelines.....	11
1.2.1 Intended use.....	11
1.2.2 Protection against electrostatic discharge.....	11
1.2.2.1 Packaging.....	11
1.2.2.2 Regulations for proper ESD handling.....	11
1.2.3 Regulations and measures.....	12
1.2.4 Transport and storage.....	12
1.2.5 Installation.....	12
1.2.6 Operation.....	12
1.2.6.1 Protection against contact with electrical parts.....	12
1.2.6.2 Ambient conditions - Dust, moisture, aggressive gases.....	12
1.2.6.3 Programs, viruses and malicious programs.....	13
1.2.7 Cybersecurity disclaimer for products.....	13
1.3 Organization of safety notices.....	14
1.4 Guidelines.....	14
1.5 Overview.....	15
2 Technical data.....	17
2.1 Introduction.....	17
2.2 Complete system.....	18
2.2.2 Temperature specifications.....	19
2.2.2.1 Maximum ambient temperature.....	19
2.2.2.2 Minimum ambient temperature during operation.....	20
2.2.3 Humidity specifications.....	21
2.2.4 Power consumption.....	22
2.2.5 Block diagrams.....	23
2.2.5.1 AP900 block diagram.....	23
2.2.5.2 AP900 block diagram with DVI Link.....	23
2.2.5.3 AP900 with SDL receiver - Block diagram.....	24
2.2.5.4 AP900 with SDL transceiver - Block diagram.....	24
2.2.5.5 AP900 with SDL3 receiver - Block diagram.....	25
2.2.6 Serial number sticker.....	26
2.3 Individual components.....	27
2.3.1 Panels.....	27
2.3.1.1 Automation Panel 10.4" VGA.....	27
2.3.1.2 Automation Panel 12.1" SVGA.....	58
2.3.1.3 Automation Panel 15" XGA.....	63
2.3.1.4 Automation Panel 17" SXGA.....	84
2.3.1.5 Automation Panel 19" SXGA.....	90
2.3.1.6 Automation Panel 21.3" UXGA.....	96
2.3.2 Automation Panel Link plug-in cards.....	101
2.3.2.1 5DL DVI.1000-01.....	102
2.3.2.2 5DLSDL.1000-00.....	105
2.3.2.3 5DLSDL.1000-01.....	107
2.3.2.4 5DLSD3.1000-00.....	109
3 Commissioning.....	114
3.1 Installation.....	114
3.1.1 Important installation information.....	114
3.1.2 Installation with clamping blocks.....	114
3.2 Mounting orientation.....	115
3.2.1 Mounting orientation 0°.....	115
3.2.2 Mounting orientation 45°.....	115
3.3 Spacing for air circulation.....	116
3.4 Fastening cables.....	117

3.5 Functional grounding clip.....	117
3.6 General instructions for the temperature test procedure.....	118
3.6.1 Procedure.....	118
3.6.2 Evaluating temperatures in Windows operating systems.....	118
3.6.2.1 Evaluating with the B&R Control Center.....	118
3.6.2.2 Evaluating with the BurnInTest tool from Passmark.....	119
3.6.3 Evaluating temperatures in non-Windows operating systems.....	121
3.6.4 Evaluating the measurement results.....	121
3.7 Connection examples.....	122
3.7.1 Selecting display units.....	122
3.7.2 One Automation Panel 900 system via onboard DVI.....	123
3.7.2.1 Base system requirements.....	123
3.7.2.2 Link modules.....	123
3.7.2.3 Cables.....	123
3.7.2.4 Possible Automation Panel devices, resolutions and segment lengths.....	124
3.7.2.5 BIOS settings.....	124
3.7.3 One Automation Panel 900 system via onboard SDL.....	125
3.7.3.1 Base system requirements.....	125
3.7.3.2 Link modules.....	125
3.7.3.3 Cables.....	125
3.7.3.4 Settings in BIOS.....	126
3.7.4 Four Automation Panel 900 systems via onboard SDL.....	127
3.7.4.1 Base system requirements.....	127
3.7.4.2 Link modules.....	127
3.7.4.3 Cables.....	127
3.7.4.4 Settings in BIOS.....	128
3.7.5 One Automation Panel 900 via SDL3.....	129
3.7.5.1 Base system requirements.....	129
3.7.5.2 Link modules.....	129
3.7.5.3 Cables.....	129
3.7.5.4 Settings in BIOS.....	129
3.8 Connecting peripheral USB devices.....	131
3.8.1 Remote connection to Automation Panel 900 via DVI.....	131
3.8.2 Remote connection to Automation Panel 800 / 900 via SDL.....	132
3.8.3 Remote connection to Automation Panel 900 via SDL3.....	133
3.9 Key and LED configurations.....	134
3.9.1 Automation Panel 10.4" VGA.....	135
3.9.1.1 Automation Panel 5AP951.1043-01 / 5AP981.1043-01.....	135
3.9.1.2 Automation Panel 5AP952.1043-01 / 5AP982.1043-01.....	135
3.9.1.3 Automation Panel 5AP980.1043-01.....	136
3.9.2 Automation Panel 15" XGA.....	136
3.9.2.1 Automation Panel 5AP951.1505-01 / 5AP981.1505-01.....	136
3.9.2.2 Automation Panel 5AP980.1505-01.....	137
3.10 Touch screen calibration.....	138
3.10.1 Windows XP Professional.....	138
3.10.2 Windows XP Embedded.....	138
3.10.3 Windows Embedded Standard 2009.....	138
3.10.4 Windows Embedded Standard 7 Embedded / Premium.....	138
3.10.5 Windows CE.....	138
3.10.6 Windows 7 Professional / Ultimate.....	138
3.10.7 Windows Embedded 8.1 Industry Pro.....	138
3.10.8 Windows 10 IoT Enterprise.....	138
3.10.9 Automation Runtime / Visual Components.....	139
3.11 User tips for increasing the service life of the display.....	139
3.11.1 Backlight.....	139
3.11.1.1 Measures to maintain backlight service life.....	139
3.11.2 Image persistence.....	139

3.11.2.1 What causes image persistence?.....	139
3.11.2.2 How can image persistence be reduced?.....	139
3.12 Pixel errors.....	139
4 Software.....	140
4.1 B&R Automation Device Interface (ADI) - Control Center.....	140
4.1.1 Functions.....	140
4.1.2 Installation.....	141
4.2 B&R Automation Device Interface (ADI) Development Kit.....	142
4.3 B&R Automation Device Interface (ADI) .NET SDK.....	144
4.4 B&R Key Editor.....	146
5 Standards and certifications.....	148
5.1 Directives and declarations.....	148
5.1.1 CE marking.....	148
5.1.2 EMC directive.....	148
5.1.3 Low voltage directive.....	148
5.2 Certifications.....	149
5.2.1 UL certification.....	149
5.2.2 EAC.....	149
5.2.3 KC.....	149
5.2.4 GL certification (Germanischer Lloyd).....	150
5.3 SDL flex cable test description.....	151
5.3.1 Torsion.....	151
5.3.1.1 Test structure.....	151
5.3.1.2 Test conditions.....	151
5.3.1.3 Individual tests.....	151
5.3.2 Cable drag chain.....	152
5.3.2.1 Test structure.....	152
5.3.2.2 Test conditions.....	152
5.3.2.3 Individual tests.....	152
6 Accessories.....	153
6.1 OTB103.9x.....	154
6.1.1 General information.....	154
6.1.2 Order data.....	154
6.1.3 Technical data.....	154
6.2 Terminal blocks.....	155
6.2.1 OTB103.8.....	155
6.2.1.1 General information.....	155
6.2.1.2 Order data.....	155
6.2.1.3 Technical data.....	155
6.3 Legend strip templates.....	156
6.3.1 5AC900.104X-xx.....	156
6.3.2 General information.....	156
6.3.3 Order data.....	156
6.4 Cables.....	157
6.4.1 DVI cables.....	157
6.4.1.1 5CADVI.0xxx-00.....	157
6.4.2 SDL cables.....	160
6.4.2.1 5CASDL.0xxx-00.....	160
6.4.3 SDL cables with 45° connector.....	163
6.4.3.1 5CASDL.0xxx-01.....	163
6.4.4 SDL flex cables.....	166
6.4.4.1 5CASDL.0xxx-03.....	166
6.4.5 SDL flex cables with extender.....	169
6.4.5.1 5CASDL.0xx0-13.....	169

6.4.6 SDL3 cables.....	173
6.4.6.1 5CASD3.xxxx-00.....	173
6.4.7 USB cables.....	176
6.4.7.1 5CAUSB.00xx-00.....	176
6.4.8 RS232 cables.....	177
6.4.8.1 9A0014.xx.....	177
6.5 USB interface cover.....	179
6.5.1 5AC900.1200-00.....	179
6.5.1.1 General information.....	179
6.5.1.2 Order data.....	179
6.5.2 5AC900.1200-01.....	179
6.5.2.1 General information.....	179
6.5.2.2 Order data.....	179
6.5.3 5AC900.1201-00.....	179
6.5.3.1 General information.....	179
6.5.3.2 Order data.....	179
6.5.4 5AC900.1201-01.....	180
6.5.4.1 General information.....	180
6.5.4.2 Order data.....	180
6.6 USB flash drives.....	181
6.6.1 5MMUSB.2048-00.....	181
6.6.1.1 General information.....	181
6.6.1.2 Order data.....	181
6.6.1.3 Technical data.....	181
6.6.1.4 Temperature/Humidity diagram.....	182
6.6.2 5MMUSB.xxxx-01.....	183
6.6.2.1 General information.....	183
6.6.2.2 Order data.....	183
6.6.2.3 Technical data.....	183
6.6.2.4 Temperature/Humidity diagram.....	184
6.7 AP900 fluorescent tubes.....	185
6.7.1 General information.....	185
6.7.2 Order data.....	185
6.8 Line filter.....	186
6.8.1 5AC804.MFLT-00.....	186
6.8.1.1 General information.....	186
6.8.1.2 Order data.....	186
6.8.1.3 Technical data.....	186
6.8.1.4 Dimensions.....	187
6.8.1.5 Drilling template.....	187
6.8.1.6 Connecting to the end device.....	187
6.9 HMI Drivers & Utilities DVD.....	188
6.9.1 5SWHMI.0000-00.....	188
6.9.1.1 General information.....	188
6.9.1.2 Order data.....	188
6.9.1.3 Contents (V2.20).....	188
7 Servicing and maintenance.....	191
7.1 Cleaning.....	191
7.2 Replacing the fluorescent tubes.....	192
7.2.1 Procedure.....	192
7.2.1.1 General information.....	193
7.2.1.2 Procedure for 12.1" Automation Panels.....	193
7.2.1.3 Procedure for 15" Automation Panels.....	194
8 Environmentally friendly disposal.....	196
8.1 Separation of materials.....	196

A.1 Elo AccuTouch screen.....	197
A.1.1 Technical data.....	197
A.1.2 Temperature humidity diagram.....	197
A.1.3 Cleaning.....	198
A.2 5-wire AMT touch screen.....	199
A.2.1 Technical data.....	199
A.2.2 Temperature/Humidity diagram.....	199
A.2.3 Cleaning.....	199
A.3 Panel overlay.....	201
A.4 Filter glass.....	201
A.5 Viewing angles.....	202
A.6 Mounting compatibility.....	203
A.6.1 Compatibility overview.....	203
A.6.2 Compatibility details.....	204
A.6.2.1 Example.....	204
A.6.2.2 5.7" devices.....	204
A.6.2.3 10.4" devices.....	205
A.6.2.4 12.1" devices.....	207
A.6.2.5 15" devices.....	207
A.6.2.6 17" devices.....	208
A.6.2.7 19" devices.....	209
A.6.2.8 21.3" devices.....	209

1 General information

1.1 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 5 "Standards and certifications". Updated HMI Drivers & Utilities DVD 5SWHMI.0000-00. Added information regarding the B&R Key Editor. Updated section 3.9 "Key and LED configurations". Updated section Connection examples. "Glossary" on page updated. "USB flash drives" on page 181 updated. Updated "SDL flex cables" on page 166 and "SDL flex cables with extender" on page 169. Updated section 7 "Servicing and maintenance" on page 191. 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 A.5 "Viewing angles" on page 202. Updated section A.6 "Mounting compatibility" on page 203. 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 Fig. 67 "5AP920.1706-01 - Temperature/Humidity diagram > Rev. D0" on page 87. Updated photos of 5CASDL.0x00-13 SDL cables with an extender. Changed Fig. 127 "5CASDL.0xxx-03 - Pinout" on page 168. Deleted structure of 5CASDL.0xxx-03 SDL cables.

Table 1: Manual history

Version	Date	Change
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. 5.3 "SDL flex cable test description" on page 151 updated. Discontinued USB flash drive 5MMUSB.0256-00 and USB flash drive 5MMUSB.1024-00. Revised section 6.6 "USB flash drives" on page 181. Revised Fig. 131 "Example for the signal direction of the SDL flex cable with extender" on page 172. 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.
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. Added section 8 "Environmentally friendly disposal" on page 196 in chapter 1 "General information". Changed formatting in Tab. 103 "Chemical resistance of the panel overlay". Revised Fig. X "Einbaulagen 0°" and Fig. X "Einbaulagen 0°". 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 4.4 "B&R Key Editor" on page 146. 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 7.2 "Replacing the fluorescent tubes" on page 192. 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 total length tolerances and weight specifications of DVI and SDL cables (see section 6.4 "Cables" on page 157). Changed general name 5CASDL.0x00-13 to 5CASDL.0xx0-13 (in heading and informational text). Updated section 3.11 "User tips for increasing the service life of the display" on page 139. Updated information/footnote regarding half-brightness time (technical data tables for 5AP9xx.xxxx-xx). Updated information regarding mounting orientation in Fig. X "Ambient temperature in relation to mounting orientation" on page . Revised section 4.4 "B&R Key Editor" on page 146 (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 Fig. 108 "5AP951.1505-01 / 5AP981.1505-01 - Hardware numbers" on page 136. Updated section 2.2.5 "Block diagrams" on page 23. 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 6.4 "Cables" to 6 "Accessories". Updated 4 "Software". Moved B&R Key Editor to 4 "Software". Updated B&R USB flash drive in 6 "Accessories". Updated section 3.12 "Pixel errors" on page 139 in 3 "Commissioning". Changed section 6.5 "USB interface cover" on page 179. Updated 5 "Standards and certifications" on page 148. 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 26. Revised entire manual according to current formatting standards. Updated sections "Connection examples" on page 122 and "Connecting peripheral USB devices" on page 131 in 3 "Commissioning". Updated sections "B&R Automation Device Interface (ADI) - Control Center" on page 140, "B&R Automation Device Interface (ADI) Development Kit" on page 142 and "B&R Automation Device Interface (ADI) .NET SDK" on page 144 in 4 "Software". Updated section "User tips for increasing the service life of the display" on page 139 in 3 "Commissioning". Updated section "Pixel errors" on page 139 in 3 "Commissioning".
2.20	2014-09-02	<ul style="list-style-type: none"> Updated B&R USB flash drive 5MMUSB.4096-01, see "USB flash drives" on page 181. Corrected the pinout of the power connector in section "Automation Panel Link plug-in cards" on page 101. Updated GOST-R certification information in the technical data. Updated section "GOST-R" on page . Updated sections "B&R Automation Device Interface (ADI) Development Kit" on page 142, "B&R Automation Device Interface (ADI) .NET SDK" on page 144 and "B&R Key Editor" on page 146. Changed touch screen sensors from Elo to AMT, see technical data for all "Panels". Updated section "5-wire AMT touch screen" on page 199. Updated the AP Link card "5DLSD3.1000-00" on page 109. Updated SDL3 cables "5CASD3.xxxx-00" on page 173.
2.21	2015-03-18	<ul style="list-style-type: none"> Described new revisions of panels, see the technical data for the "Technical data" on page 91. Updated section "Block diagrams" on page 23.
2.22	January 2022	<ul style="list-style-type: none"> Updated technical data of the panels in section "Individual components" on page 27 and section "Standards and certifications" on page 148.

Table 1: Manual history

1.2 General safety guidelines

1.2.1 Intended use

In all cases, it is necessary to observe and comply with applicable national and international standards, regulations and safety measures!

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

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

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

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

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

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

1.2.2 Protection against electrostatic discharge

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

1.2.2.1 Packaging

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

1.2.2.2 Regulations for proper ESD handling

Electrical assemblies with housing

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

Electrical assemblies without housing

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

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

Individual components

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

1.2.3 Regulations and measures

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

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

All work such as installation, commissioning and servicing are only permitted to be carried out by qualified personnel. Qualified personnel are persons who are familiar with the transport, installation, assembly, commissioning and operation of the product and have the appropriate qualifications for their job (e.g. IEC 60364). National accident prevention regulations must be observed.

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

1.2.4 Transport and storage

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

1.2.5 Installation

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

1.2.6 Operation

1.2.6.1 Protection against contact with electrical parts

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

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

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

1.2.6.2 Ambient conditions - Dust, moisture, aggressive gases

The use of operating and monitoring devices (e.g. industrial PCs, Power Panels, Mobile Panels) and uninterruptible power supplies in dusty environments must be avoided. This can otherwise result in dust deposits that affect the functionality of the device, especially in systems with active cooling (fans), which may no longer ensure sufficient cooling.

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

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

1.2.6.3 Programs, viruses and malicious programs

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

1.2.7 Cybersecurity disclaimer for products

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

Information:

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

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

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

The aforementioned appropriate security measures include, for example:

- Segmentation of the network (e.g. separation of the IT network from the control network¹⁾)
- Use of firewalls
- Use of authentication mechanisms
- Encryption of data
- Use of anti-malware software

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

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

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

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

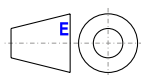
1.3 Organization of safety notices

Safety notices in this manual are organized as follows:

Safety notice	Description
Danger!	Failure to observe these safety guidelines and notices can result in death.
Warning!	Failure to observe these safety guidelines and notices can result in severe injury or substantial damage to property.
Caution!	Failure to observe these safety guidelines and notices can result in injury or damage to property.
Information:	These instructions are important for avoiding malfunctions.

Table 2: Description of the safety notices used in this documentation

1.4 Guidelines



European dimension standards apply to all dimension diagrams.

All dimensions in millimeters.

Unless otherwise specified, the following general tolerances apply:

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

1.5 Overview

Order number	Short description	Page
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin female - Screw clamp terminal block 3.31 mm ²	154
0TB103.91	Connector 24 VDC - 3-pin female - Cage clamp terminal block 3.31 mm ²	154
5AC804.MFLT-00	Line filter	186
5AC900.104X-03	Legend Strips Template 10,4" for Automation Panel 5AP951.1043-01 and 5AP981.1043-01; for 1 device.	156
5AC900.104X-04	Legend Strips Template 10,4" for Automation Panel 5AP952.1043-01 and 5AP982.1043-01; for 1 device.	156
5AC900.104X-05	Legend Strips Template 10,4" for Automation Panel 5AP980.1043-01; for 3 devices.	156
5AC900.1200-00	USB Cover non-detachable; for Automation Panel and Panel PC.	179
5AC900.1200-01	USBInterface cover - Flat - For AP920/98x and PPC700	179
5AC900.1201-00	USBInterface cover M20 IP65 flat	179
5AC900.1201-01	USBInterface cover M20 IP65 curved	180
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.	156
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	185
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	185
	DVI cables	
5CADVI.0018-00	DVI-D cable - 1.8 m	157
5CADVI.0050-00	DVI-D cable - 5 m	157
5CADVI.0100-00	DVI-D cable - 10 m	157
	Display links	
5DLDOI.1000-01	Automation Panel Link DVI receiver, connections for DVI-D, RS232 and USB 2.0 (type B), 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	150
5DLSDD.1000-00	Automation Panel Link module - SDL3 receiver - For Automation Panel 920/98x	110
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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	105
5DLSDL.1000-01	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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	150
	Display units	
5AP920.1043-01	Automation Panel AP920 10.4" TFT - 640 x 480 pixels (4:3) - Single-touch (analog resistive) - Landscape format - IP65 protection (front)	28
5AP920.1214-01	Automation Panel AP920 12.1" TFT - 800 x 600 pixels (4:3) - Single-touch (analog resistive) - Landscape format - IP65 protection (front)	59
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.	85
5AP920.2138-01	Automation Panel AP920 21.3" UXGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; insert for Automation Panel Link; IP65 protection (front). 24VDC.	96
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.	33
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.	69
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.	37
5AP980.1043-01	Automation Panel AP980, 10.4" VGA color TFT display with touch screen (resistive); 10 soft keys and 12 function keys; 2 USB 2.0 interfaces; insert for Automation Panel Link; IP65 protection (front). 24 VDC.	43
5AP980.1505-01	Automation Panel AP980, 15" XGA color TFT display with touch screen (resistive), 12 soft keys and 20 function keys, 3 USB 2.0 interfaces, slot for Automation Panel Link, IP65 protection (front). 24 VDC.	74
5AP981.1043-01	Automation Panel AP981; 10.4" VGA color TFT display with touch screen (resistive); 10 soft keys; 28 function keys and 20 system keys; 2 USB 2.0 interfaces; insert for Automation Panel Link; IP65 protection (front). 24 VDC.	48
5AP981.1505-01	Automation Panel AP981, 15" XGA color TFT display with touch screen (resistive), 12 soft keys, 20 function and 92 system keys, 3 USB 2.0 interfaces, slot for Automation Panel Link, IP65 protection (front). 24 VDC.	79
5AP982.1043-01	Automation Panel AP982; 10.4" VGA color TFT screen (resistive); 44 function keys and 20 system keys; 2 USB 2.0 interfaces; insert for Automation Panel Link; IP65 protection (from front). 24 VDC.	54
	Other	
5SWHMI.0000-00	HMI Drivers & Utilities DVD	188
	Panels	
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 (front). 24 VDC.	150
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 (front). 24 VDC.	150
	RS232 cables	
9A0014.02	RS232 extension cable for remote operation of a display unit with touch screen, 1.8 m	177
9A0014.05	RS232 extension cable for remote operation of a display unit with touch screen, 5 m	177
9A0014.10	RS232 extension cable for remote operation of a display unit with touch screen, 10 m	177

General information

Order number	Short description	Page
SDL cables		
5CASDL.0018-00	SDL cable - 1.8 m	160
5CASDL.0050-00	SDL cable - 5 m	160
5CASDL.0100-00	SDL cable, 10 m	160
5CASDL.0150-00	SDL cable, 15 m	160
5CASDL.0200-00	SDL cable, 20 m	160
5CASDL.0250-00	SDL cable, 25 m	160
5CASDL.0300-00	SDL cable, 30 m	160
SDL cables with 45° connectors		
5CASDL.0018-01	SDL cable - 45° connector - 1.8 m	163
5CASDL.0050-01	SDL cable with 45° male connector, 5 m	163
5CASDL.0100-01	SDL cable with 45° male connector, 10 m	163
5CASDL.0150-01	SDL cable with 45° male connector, 15 m	163
SDL flex cables		
5CASDL.0018-03	SDL flex cable - 1.8 m	166
5CASDL.0050-03	SDL flex cable, 5 m	166
5CASDL.0100-03	SDL flex cable, 10 m	166
5CASDL.0150-03	SDL flex cable, 15 m	166
5CASDL.0200-03	SDL flex cable, 20 m	166
5CASDL.0250-03	SDL flex cable, 25 m	166
5CASDL.0300-03	SDL flex cable, 30 m	166
5CASDL.0300-13	SDL flex cable with extender, 30 m	169
5CASDL.0400-13	SDL flex cable with extender, 40 m	169
5CASDL.0430-13	SDL flex cable with extender, 43 m	169
SDL3/SDL4/PoE cables		
5CASD3.0100-00	SDL3 cable, 10 m	173
5CASD3.0150-00	SDL3 cable, 15 m	173
5CASD3.0200-00	SDL3 cable, 20 m	173
5CASD3.0300-00	SDL3 cable, 30 m	173
5CASD3.0500-00	SDL3 cable, 50 m	173
5CASD3.1000-00	SDL3 cable, 100 m	173
Terminal blocks		
0TB103.8	Connector, 24 VDC, 3-pin male, screw clamp, 3.31 mm ² , protected against vibration by the screw flange	155
USB accessories		
5MMUSB.2048-00	USB 2.0 flash drive, 2048 MB	181
5MMUSB.2048-01	USB 2.0 flash drive, 2048 MB, B&R	183
5MMUSB.4096-01	USB 2.0 flash drive, 4096 MB, B&R	183
USB cables		
5CAUSB.0018-00	USB 2.0 connection cable type A - type B, 1.8 m	176
5CAUSB.0050-00	USB 2.0 connection cable type A - type B, 5 m	176

2 Technical data

2.1 Introduction

The Automation Panel series is a generation of B&R display units ranging from 10.4" to 19" that breaks new ground when it comes to the modularity of interfaces to PC systems. As a result, the transfer of image data is independent of the display unit. This allows future innovations in the area of transfer technology to be implemented using a new Automation Panel Link.



2.2 Complete system

Display units consist of two components: an Automation Panel and an Automation Panel Link plug-in card. Combined, these two components make up the complete display unit.

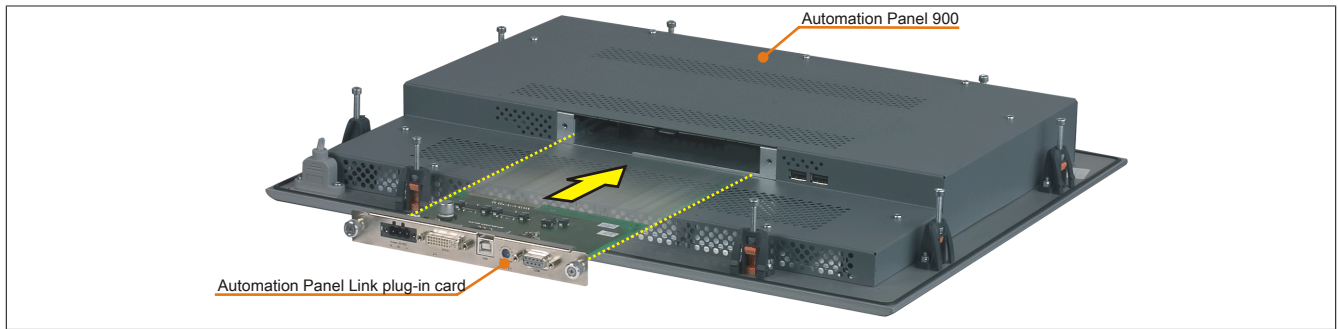


Figure 1: Automation Panel and Automation Panel Link plug-in card

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

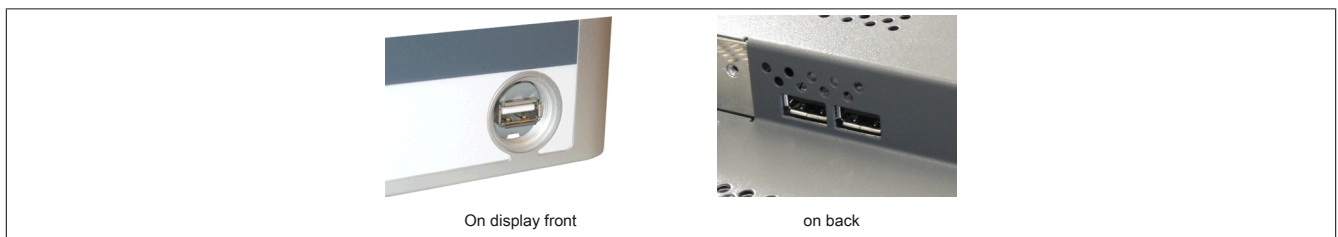


Figure 2: USB interfaces on the Automation Panel (front and back)

2.2.2 Temperature specifications

2.2.2.1 Maximum ambient temperature

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 115](#)).

Automation Panel 900 without Rittal housing

		Automation Panel Link											
		DVI receiver			SDL receiver			SDL transmitter			SDL3 receiver		
All temperature values in degrees Celsius (°C) at 500 m above sea level. The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).		5DL DVI.1000-01			5DL SDL.1000-00			5DL SDL.1000-01			5DL SDL3.1000-00		
Maximum ambient temperature		55	55	55	55	55	55	55	55	55	50	50	50
mounting orientation		0°	-45° ¹⁾	+45° ²⁾	0°	-45° ¹⁾	+45° ²⁾	0°	-45° ¹⁾	+45° ²⁾	0°	-45° ¹⁾	+45° ²⁾
What else can also be operated at the max. ambient temperature, or are there any limits?													
Display units	5AP920.1043-01	50	50	50	50	50	50	50	50	50	-	-	-
	5AP951.1043-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
	5AP952.1043-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
	5AP980.1043-01	50	50	50	50	50	50	50	50	50	✓	✓	✓
	5AP981.1043-01	50	50	50	50	50	50	50	50	50	✓	✓	✓
	5AP982.1043-01	50	50	50	50	50	50	50	50	50	✓	✓	✓
	5AP920.1214-01	50	50	50	50	50	50	50	50	50	✓	✓	✓
	5AP920.1505-01	50	50	45	50	50	45	50	50	45	✓	✓	45
	5AP951.1505-01	50	50	45	50	50	45	50	50	45	-	-	-
	5AP980.1505-01	50	50	45	50	50	45	50	50	45	✓	✓	45
	5AP981.1505-01	50	50	45	50	50	45	50	50	45	✓	✓	45
	5AP920.1706-01	40	45	35	40	45	35	40	45	35	-	-	-
	5AP920.1906-01	40	40	40	40	40	40	40	40	40	40	40	40
	5AP920.2138-01	35	35	30	35	35	30	35	35	30	-	-	-

1) -45°: Display, top

2) +45°: Display, bottom

Table 3: Ambient temperature - AP900 without Rittal housing

Automation Panel 900 with Rittal housing

		Automation Panel Link											
		DVI receiver			SDL receiver			SDL transmitter			SDL3 receiver		
All temperature values in degrees Celsius (°C) at 500 m above sea level. The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).		5DL DVI.1000-01			5DL SDL.1000-00			5DL SDL.1000-01			5DL SDL3.1000-00		
Maximum ambient temperature		50	45	45	50	45	45	50	45	45	45	40	40
mounting orientation		0°	-45° ¹⁾	+45° ²⁾	0°	-45° ¹⁾	+45° ²⁾	0°	-45° ¹⁾	+45° ²⁾	0°	-45° ¹⁾	+45° ²⁾
What else can also be operated at the max. ambient temperature, or are there any limits?													
Display units	5AP920.1043-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
	5AP951.1043-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
	5AP952.1043-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
	5AP980.1043-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	5AP981.1043-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	5AP982.1043-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	5AP920.1505-01	40	40	40	40	40	40	40	40	40	40	✓	✓
	5AP951.1505-01	40	40	40	40	40	40	40	40	40	-	-	-
	5AP980.1505-01	40	40	40	40	40	40	40	40	40	40	✓	✓
	5AP981.1505-01	40	40	40	40	40	40	40	40	40	40	✓	✓

1) -45°: Display, top

2) +45°: Display, bottom

Table 4: Ambient temperature - AP900 with Rittal housing

2.2.2.2 Minimum ambient temperature during operation

The minimum ambient temperature during operation is 0°C.

2.2.3 Humidity specifications

The following table lists the minimum and maximum relative humidity values for the individual components that are relevant for the humidity limitations of a complete system. 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%
5DLSD3.1000-00	5 to 95%	5 to 95%

Table 5: Overview of humidity specifications for individual components

The specifications listed correspond to the relative humidity at an ambient temperature of 30°C. For more detailed information about specific temperature-dependent humidity values, see the technical data for the individual components.

2.2.4 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
5DLSD3.1000-00	6 W	6 W	9 W
Total			

Table 6: Power management according to mounting orientation

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

2.2.5 Block diagrams

2.2.5.1 AP900 block diagram

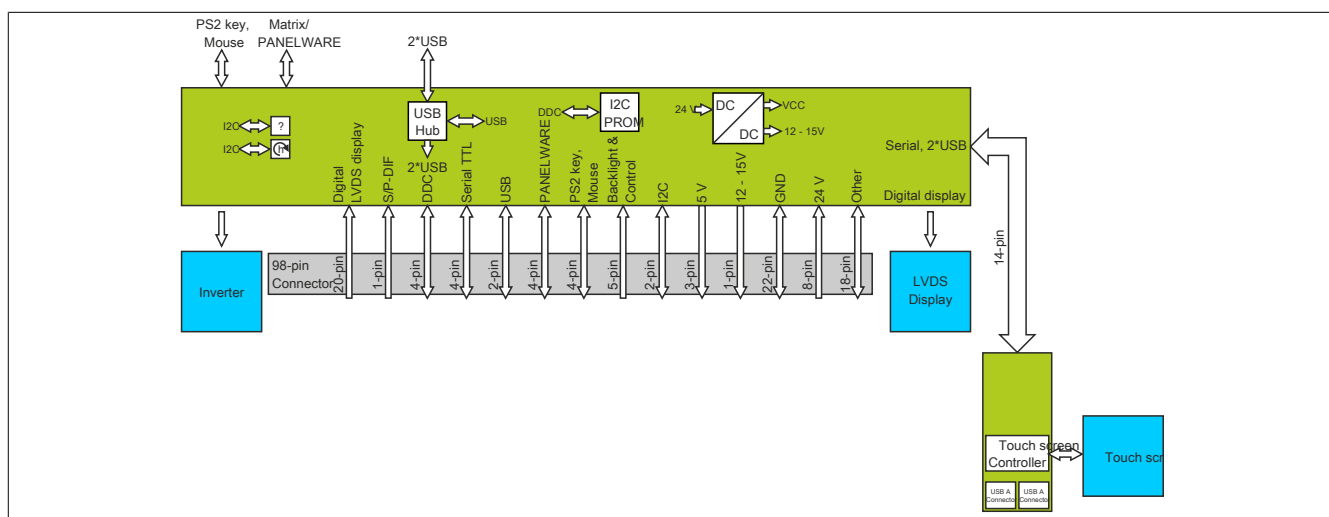


Figure 3: AP900 block diagram

2.2.5.2 AP900 block diagram with DVI Link

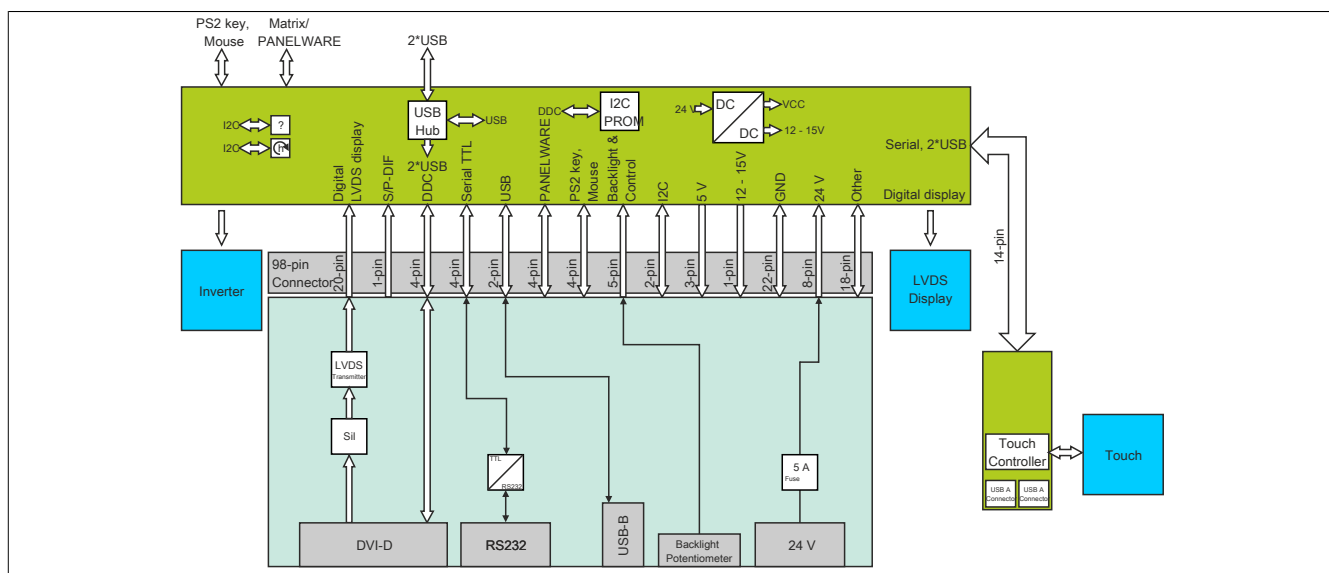


Figure 4: AP900 block diagram with DVI Link

2.2.5.3 AP900 with SDL receiver - Block diagram

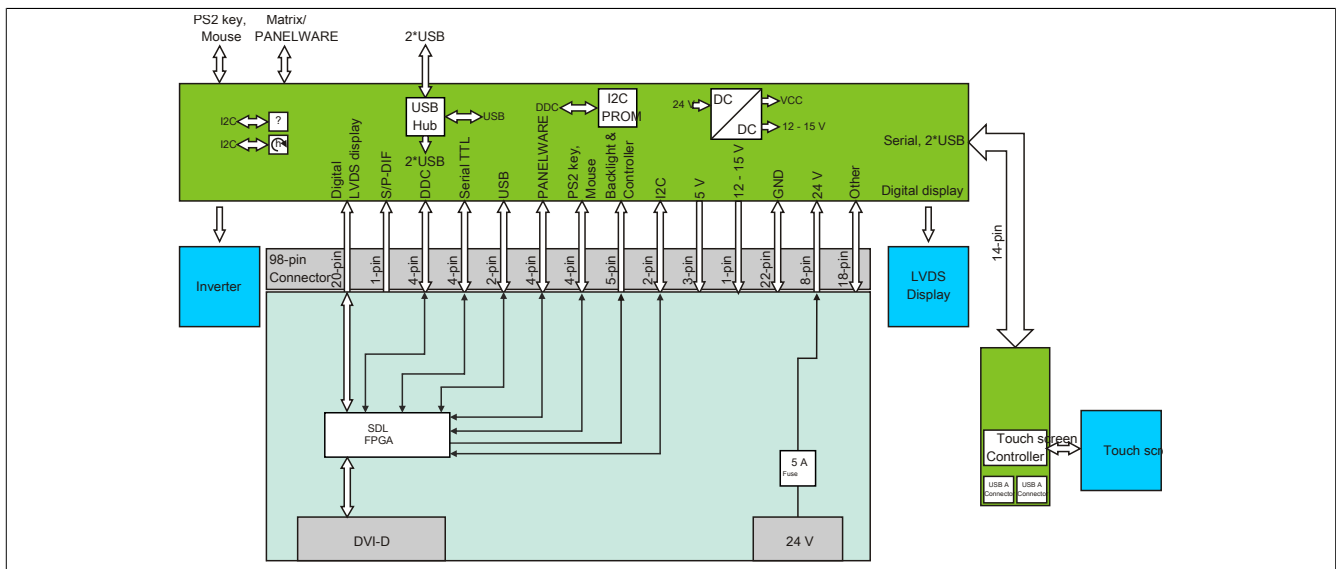


Figure 5: AP900 with SDL receiver - Block diagram

2.2.5.4 AP900 with SDL transceiver - Block diagram

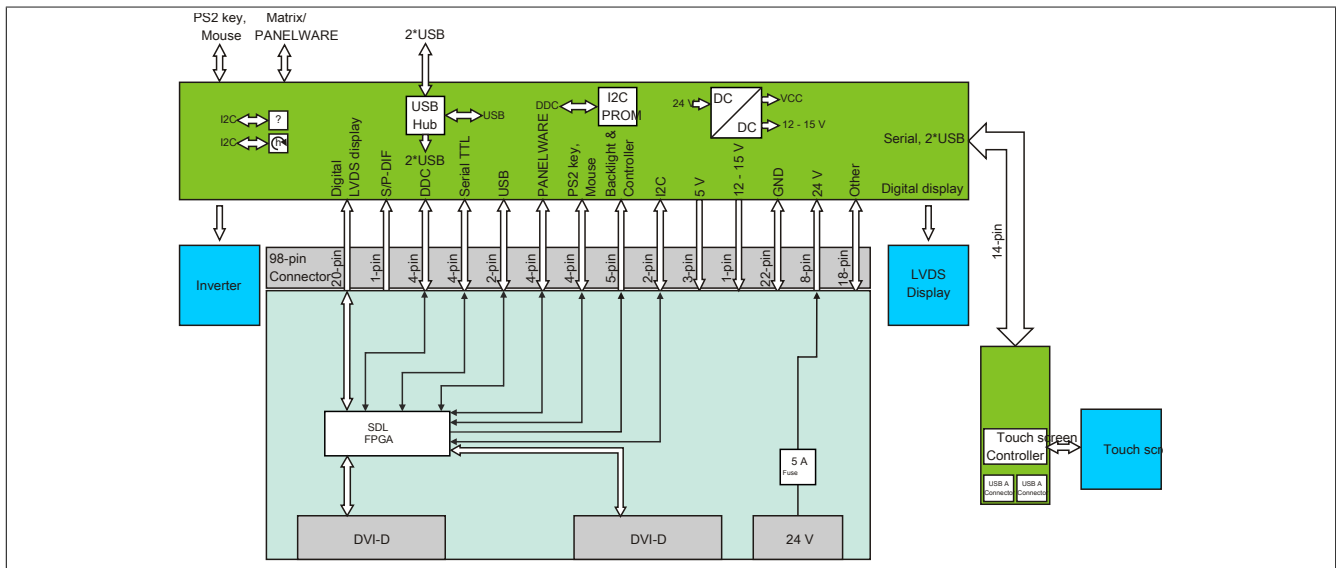


Figure 6: AP900 with SDL transceiver - Block diagram

2.2.5.5 AP900 with SDL3 receiver - Block diagram

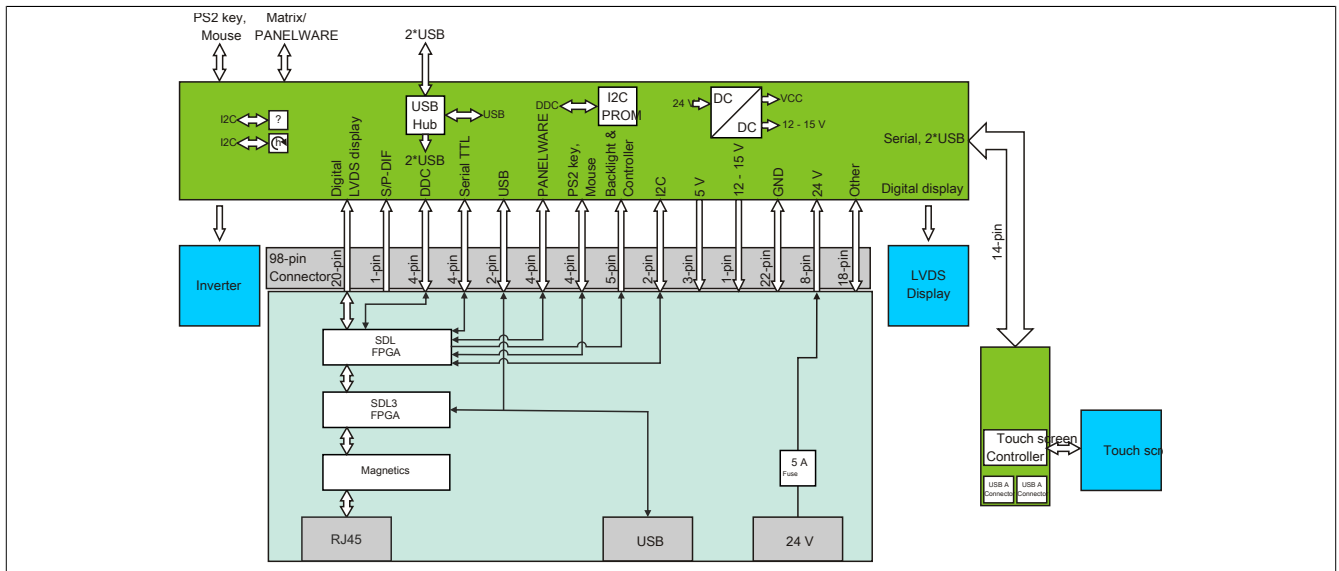


Figure 7: AP900 with SDL3 receiver - Block diagram

2.2.6 Serial number sticker

A unique serial number adhesive label 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).

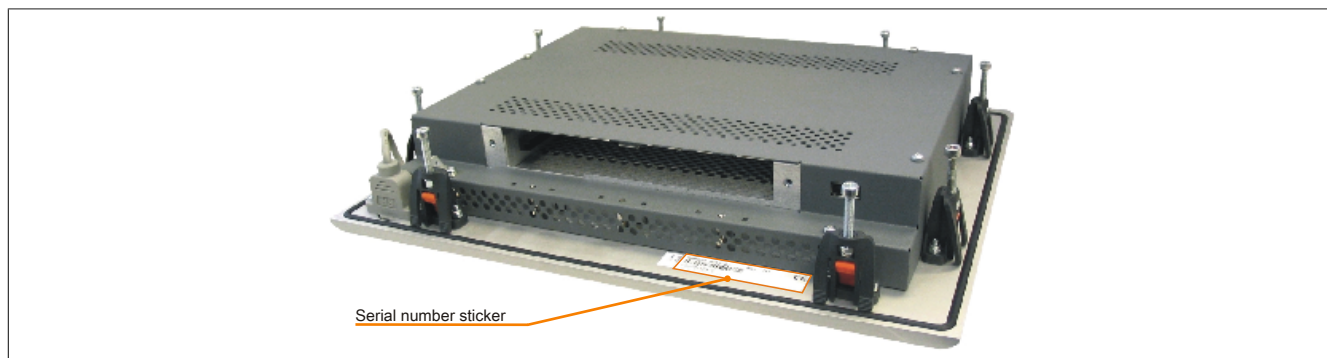


Figure 8: Serial number sticker (back)

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

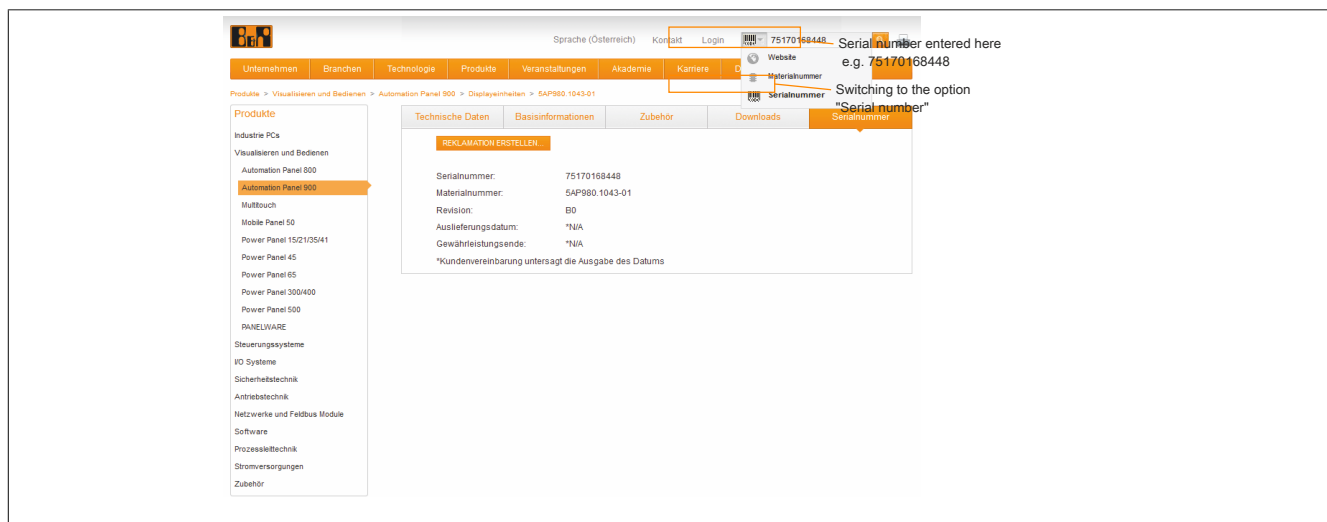


Figure 9: Example of serial number search

2.3 Individual components

Danger!

This device is only permitted to be supplied by a SELV/PELV power supply unit or with safety extra-low voltage (SELV) per IEC 61010-2-201.

2.3.1 Panels

2.3.1.1 Automation Panel 10.4" VGA

2.3.1.1.1 5AP920.1043-01

2.3.1.1.1.1 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

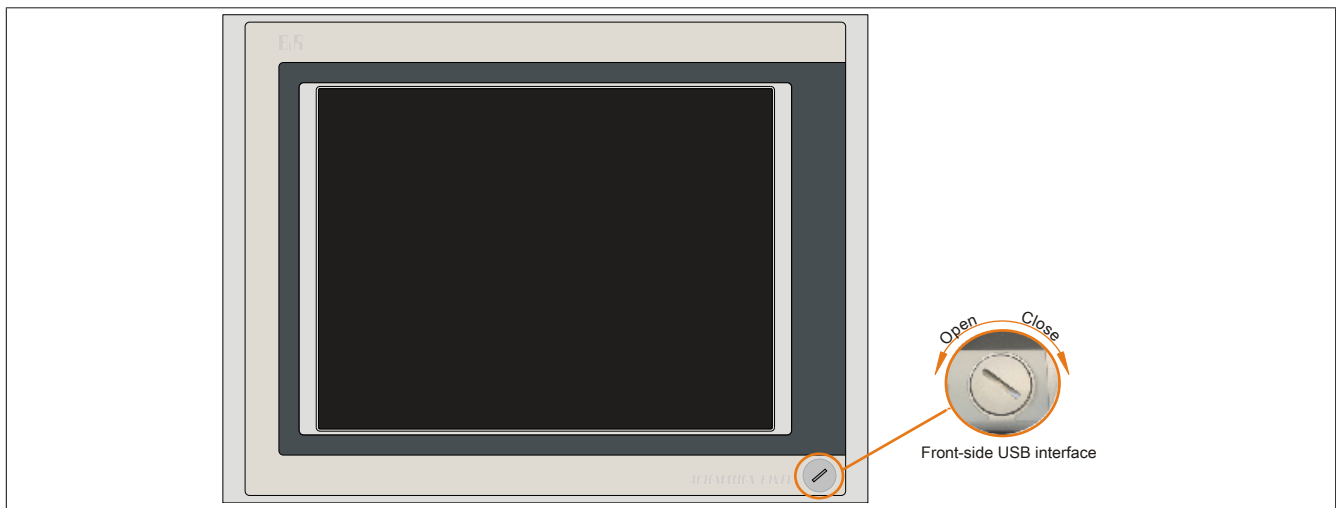


Figure 10: 5AP920.1043-01 - Front view

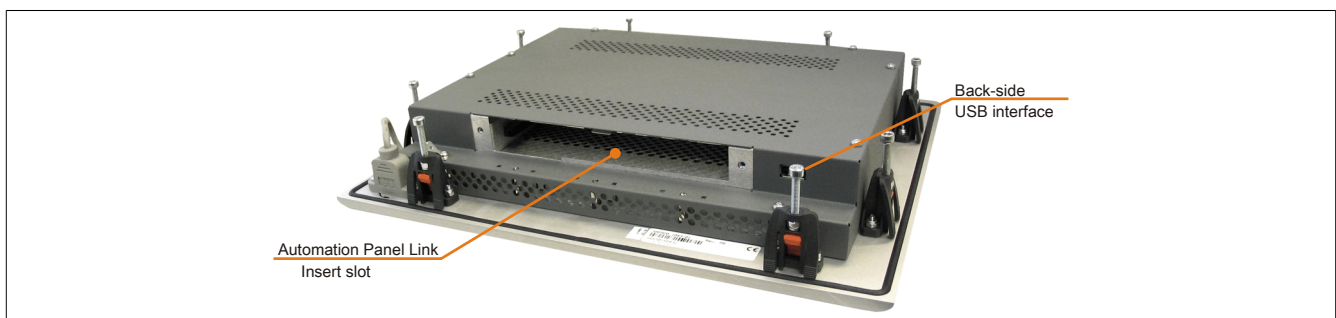


Figure 11: 5AP920.1043-01 - Rear view

2.3.1.1.1.2 Order data


Order number	Short description	 Figure
	Display units	
5AP920.1043-01	Automation Panel AP920 10.4" TFT - 640 x 480 pixels (4:3) - Single-touch (analog resistive) - Landscape format - IP65 protection (front)	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Display links	
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS DL.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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS DL.1000-01	Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
	Optional accessories	
	Panel PC 300 insert cards	
5PC310.L800-00	Panel PC 300 insert card for the Automation Panel 900; 256 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	
5PC310.L800-01	Panel PC 300 insert card for the Automation Panel 900; 512 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	

Table 7: 5AP920.1043-01 - Order data

2.3.1.1.1.3 Technical data

Order number	5AP920.1043-01			
Revision	C0	D0	H0	J0
General information				
B&R ID code	0x1A09			
Certifications				
CE	Yes			
UL	cULus E115267			
EAC	Industrial control equipment			
	Yes			
Display				
Type	TFT color			
Diagonal	10.4" (264 mm)			
Colors	262,144			16 million
Resolution	VGA, 640 x 480 pixels			
Contrast	300:1			700:1
Viewing angles				
Horizontal	Direction R = 70° / Direction L = 70°			Direction R = 80° / Direction L = 80°
Vertical	Direction U = 40° / Direction D = 70°			Direction U = 80° / Direction D = 60°
Backlight				
Type	CCFL			LED
Brightness	350 cd/m²			450 cd/m²
Half-brightness time ¹⁾	50,000 h			
Filter glass				
Transmittance	-			
Anti-glare coating	-			
Touch screen ²⁾				
Type	Elo AccuTouch		AMT	
Technology	Analog, resistive			
Controller	Elo, serial, 12-bit			
Transmittance	80% ±5%		81% ±3%	

Table 8: 5AP920.1043-01, 5AP920.1043-01, 5AP920.1043-01, 5AP920.1043-01 - Technical data

Order number	5AP920.1043-01			
Revision	C0	D0	H0	J0
Interfaces				
USB ³⁾				
Quantity	2			
Type	USB 2.0 ⁴⁾			
Variant	Type A			
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)			
Current-carrying capacity	Max. 500 mA per connection			
Keys				
Function keys	No			
Soft keys	No			
System keys	No			
Service life	-			
LED luminous intensity	-			
LED luminous intensity Yellow	-			
Slots				
Compatible installation for PPC300 slot	No	Yes		
Electrical properties				
Nominal voltage	24 VDC ±25%, SELV ⁵⁾			
Nominal current	Max. 3.2 A ⁶⁾			
Inrush current	Typ. 6 A, max. 30 A for < 300 µs			
Power consumption	Typ. 10 W, max. 13 W or 19 W with USB (without slot)			
Galvanic isolation	Yes			
Operating conditions				
Pollution degree per EN 61131-2	Pollution degree 2			
Degree of protection per EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, protected against dust and hose-directed water			
Ambient 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	-30 to 70°C			
Transport	-30 to 70°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			
Elevation				
Operation	Max. 3000 m ⁷⁾			
Mechanical properties				
Housing				
Material	Metal			
Coating	Similar to Pantone 432CV			
Front ⁸⁾				
Frame	Aluminum, naturally anodized			
Design	Gray			
Panel overlay				
Material	Polyester			
Light background color	Similar to Pantone 427CV			
Dark border color around display	Similar to Pantone 432CV			
Gasket	Flat gasket around display front			
Dimensions				
Width	323 mm			
Height	260 mm			
Depth	55 mm			
Weight	Approx. 2900 g			

Table 8: 5AP920.1043-01, 5AP920.1043-01, 5AP920.1043-01, 5AP920.1043-01 - Technical data

- 1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
- 3) USB devices can only be connected to the Automation Panel directly (without a hub).
- 4) Depends on the transfer technology, transfer distance and Automation Panel Link plug-in card being used.

- 5) IEC 61010-2-201 requirements must be observed.
- 6) The specified value applies to the Automation Panel device with a connected Automation Panel Link plug-in card.
- 7) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 8) Visual deviations in color and surface quality are possible due to process or batch conditions.

2.3.1.1.4 Temperature humidity diagram

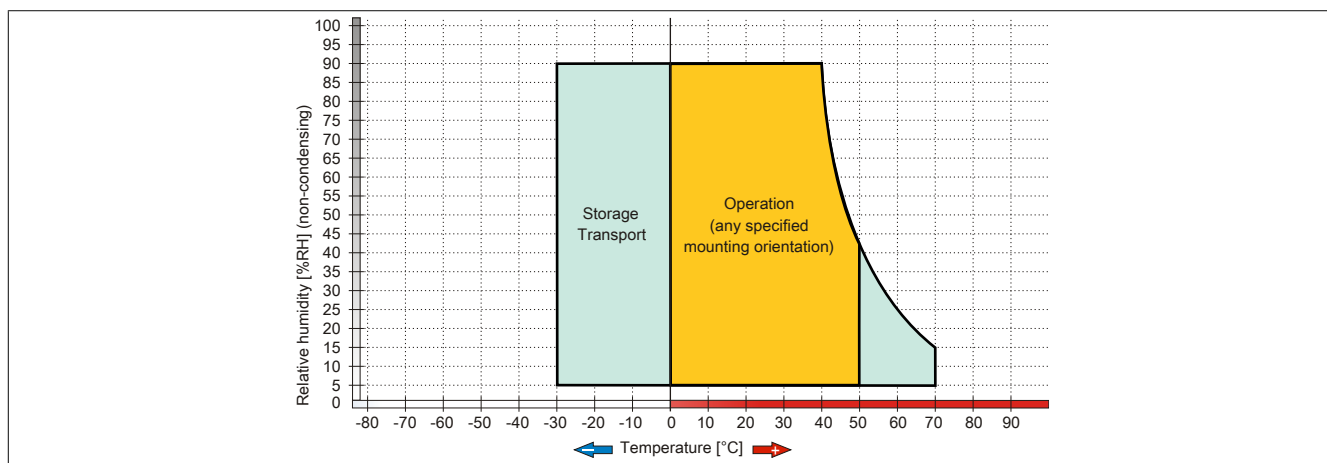


Figure 12: 5AP920.1043-01 - Temperature humidity diagram

2.3.1.1.5 Dimensions

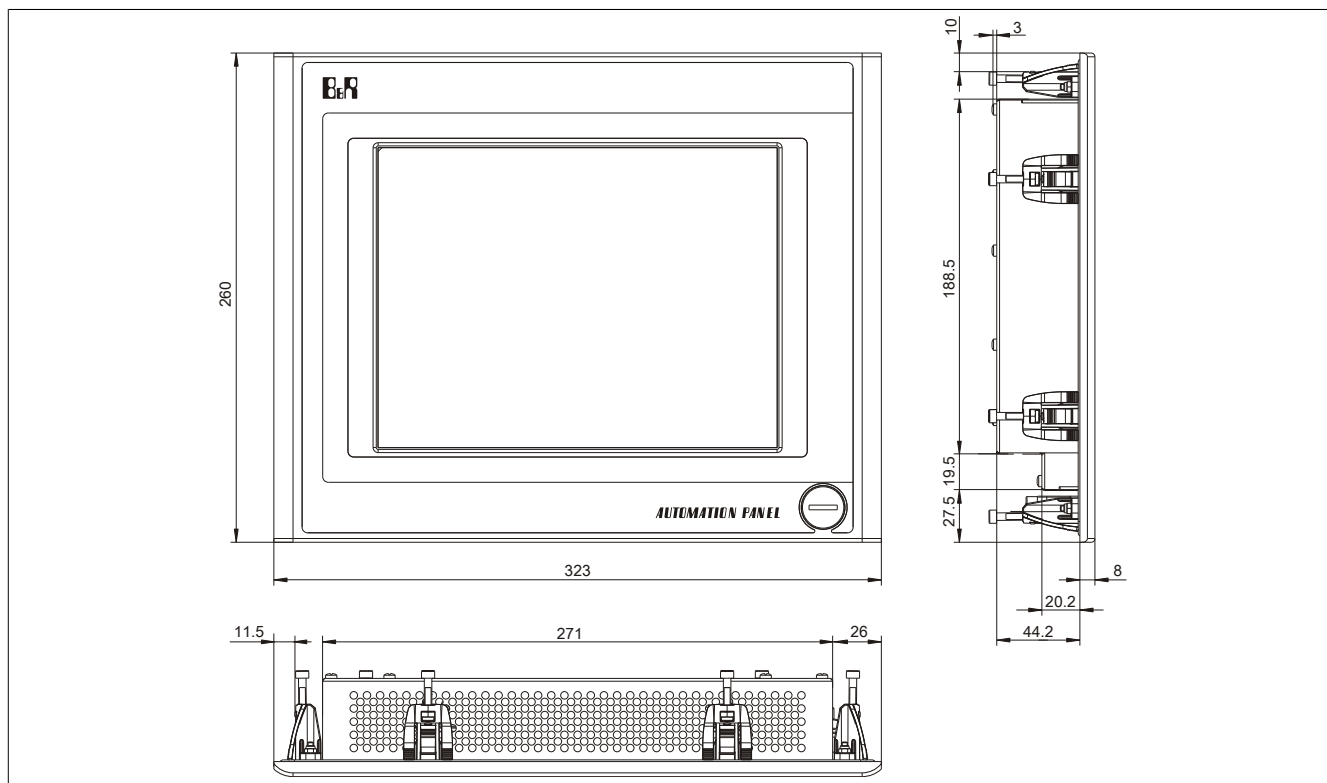


Figure 13: 5AP920.1043-01 - Dimensions

2.3.1.1.6 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.

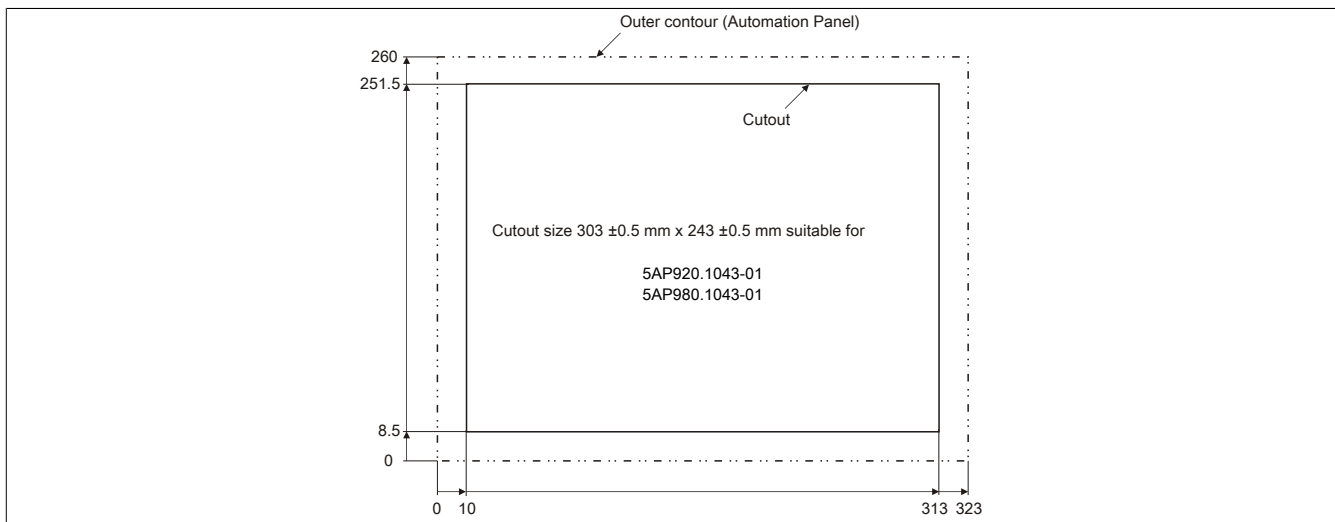


Figure 14: 5AP920.1043-01 - Cutout installation

For additional information regarding installation and mounting orientation, see ["Commissioning" on page 114](#).

2.3.1.1.2 5AP951.1043-01

2.3.1.1.2.1 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

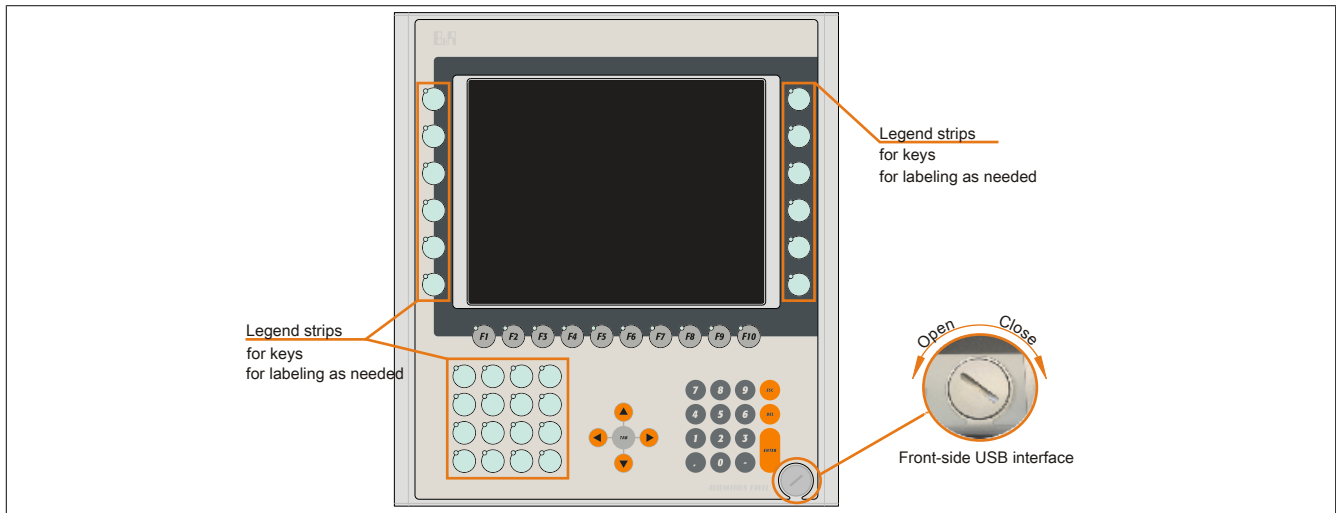


Figure 15: 5AP951.1043-01 - Front view

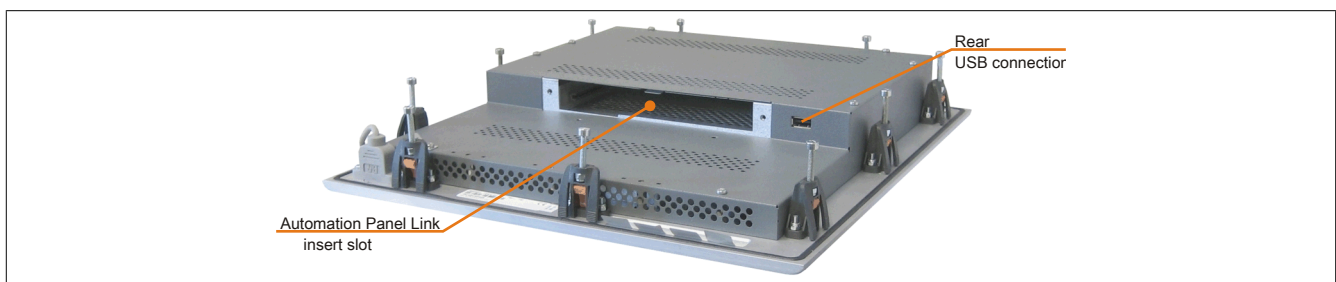


Figure 16: 5AP951.1043-01 - Rear view

2.3.1.1.2.2 Order data


Order number	Short description	
	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	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Display links	
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS DL.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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS DL.1000-01	Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
	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 9: 5AP951.1043-01 - Order data

2.3.1.1.2.3 Technical data

Order number	5AP951.1043-01
General information	
B&R ID code	0x1D5C
Certifications	
CE	Yes
EAC	Yes
Display	
Type	TFT color
Diagonal	10.4" (264 mm)
Colors	262,144
Resolution	VGA, 640 x 480 pixels
Contrast	300:1
Viewing angles	
Horizontal	Direction R = 70° / Direction L = 70°
Vertical	Direction U = 40° / Direction D = 70°
Backlight	
Type	CCFL
Brightness	350 cd/m ²
Half-brightness time ¹⁾	50,000 h
Filter glass	
Transmittance	95%
Anti-glare coating	On both sides
Touch screen	
Technology	-
Controller	-
Transmittance	-
Interfaces	
USB ²⁾	
Quantity	2
Type	USB 2.0 ³⁾
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA per connection
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

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

Technical data

Order number	5AP951.1043-01
LED luminous intensity	
Yellow	Typ. 12 mcd
Slots	
Compatible installation for PPC300 slot	No
Electrical properties	
Nominal voltage	24 VDC $\pm 25\%$, SELV ⁴⁾
Nominal current	Max. 3.2 A ⁵⁾
Inrush current	Typ. 6 A, max. 30 A for < 300 μ s
Power consumption	Typ. 10 W (without LED), max. 14 W or 20 W with USB (without slot)
Galvanic isolation	Yes
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, protected against dust and hose-directed water
Ambient 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
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
Elevation	
Operation	Max. 3000 m ⁶⁾
Mechanical properties	
Housing	
Material	Metal
Coating	Similar to Pantone 432CV
Front ⁷⁾	
Frame	Aluminum, naturally anodized
Design	Gray
Panel overlay	
Material	Polyester
Light background color	Similar to Pantone 427CV
Dark border color around display	Similar to Pantone 432CV
Dark gray keys color	Similar to Pantone 431CV
Orange keys color	Similar to Pantone 151CV
Color slide-in labels	Similar to Pantone 429CV
Gasket	Flat gasket around display front
Dimensions	
Width	323 mm
Height	358 mm
Depth	55 mm
Weight	Approx. 3600 g

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

- 1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 2) USB devices can only be connected to the Automation Panel directly (without a hub).
- 3) Depends on the transfer technology, transfer distance and Automation Panel Link plug-in card being used.
- 4) IEC 61010-2-201 requirements must be observed.
- 5) The specified value applies to the Automation Panel device with a connected Automation Panel Link plug-in card.
- 6) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 7) Visual deviations in color and surface quality are possible due to process or batch conditions.

2.3.1.1.2.4 Temperature humidity diagram

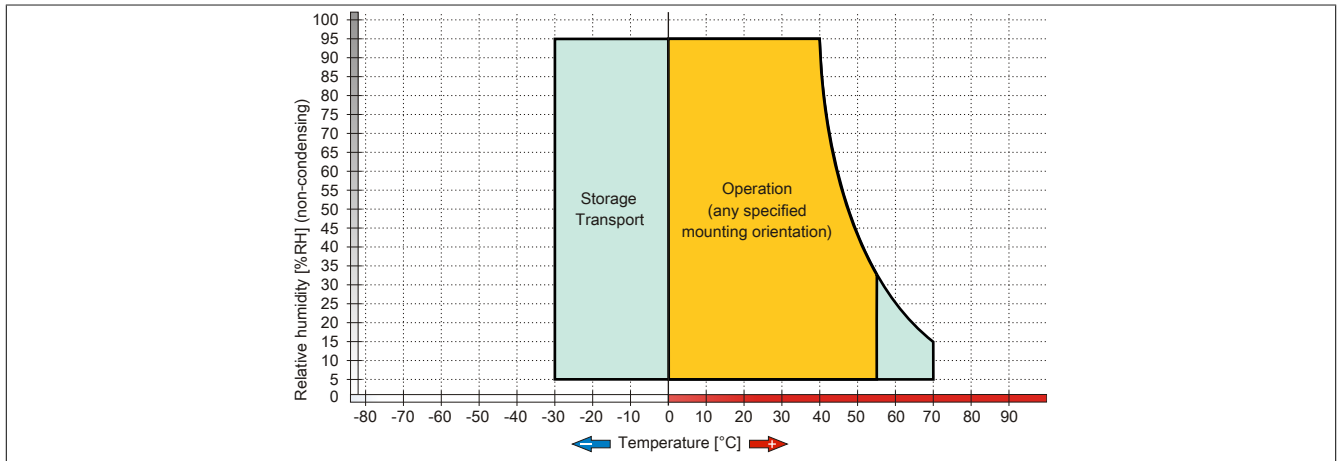


Figure 17: 5AP951.1043-01 - Temperature humidity diagram

2.3.1.1.2.5 Dimensions

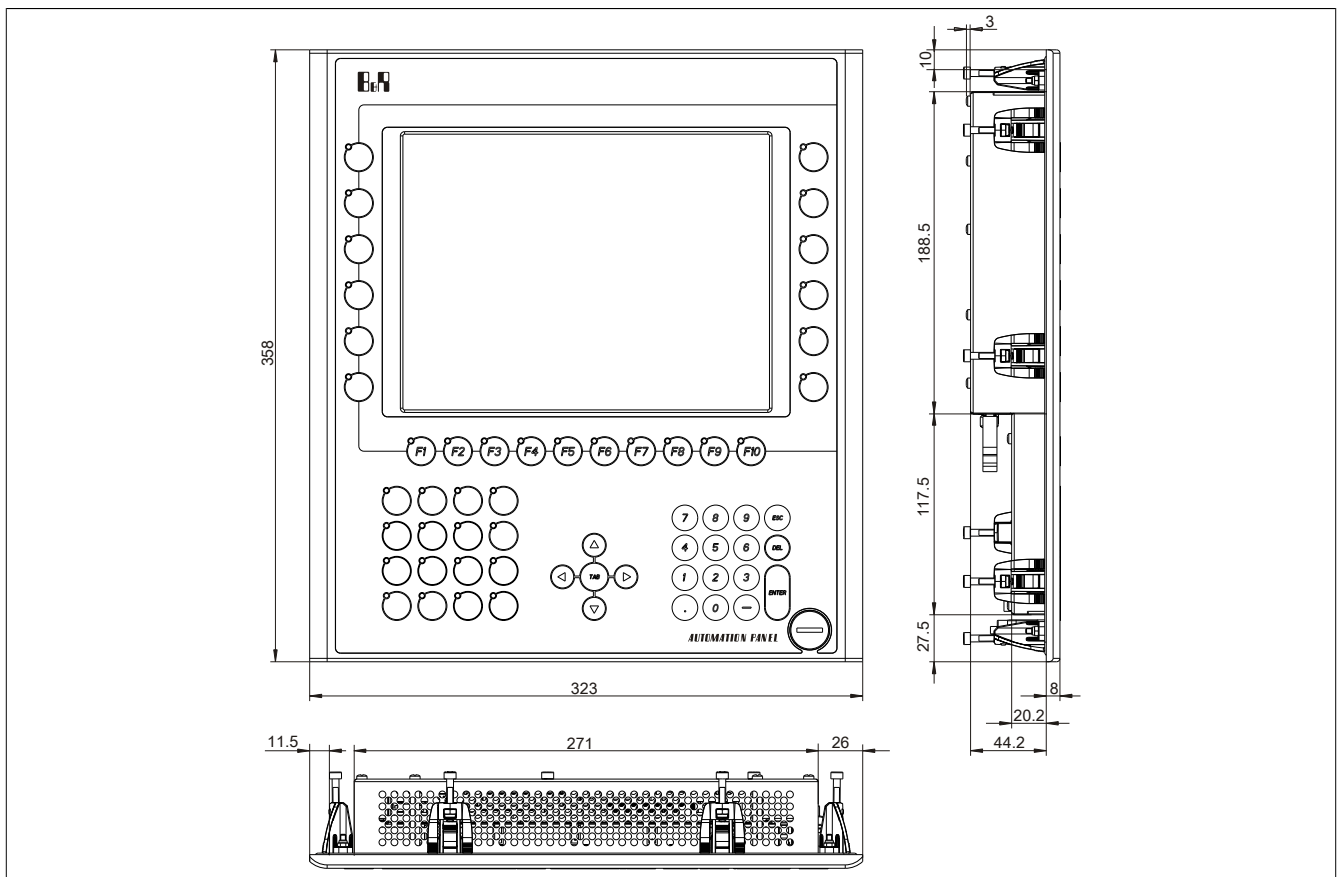


Figure 18: 5AP951.1043-01 - Dimensions

2.3.1.1.2.6 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.

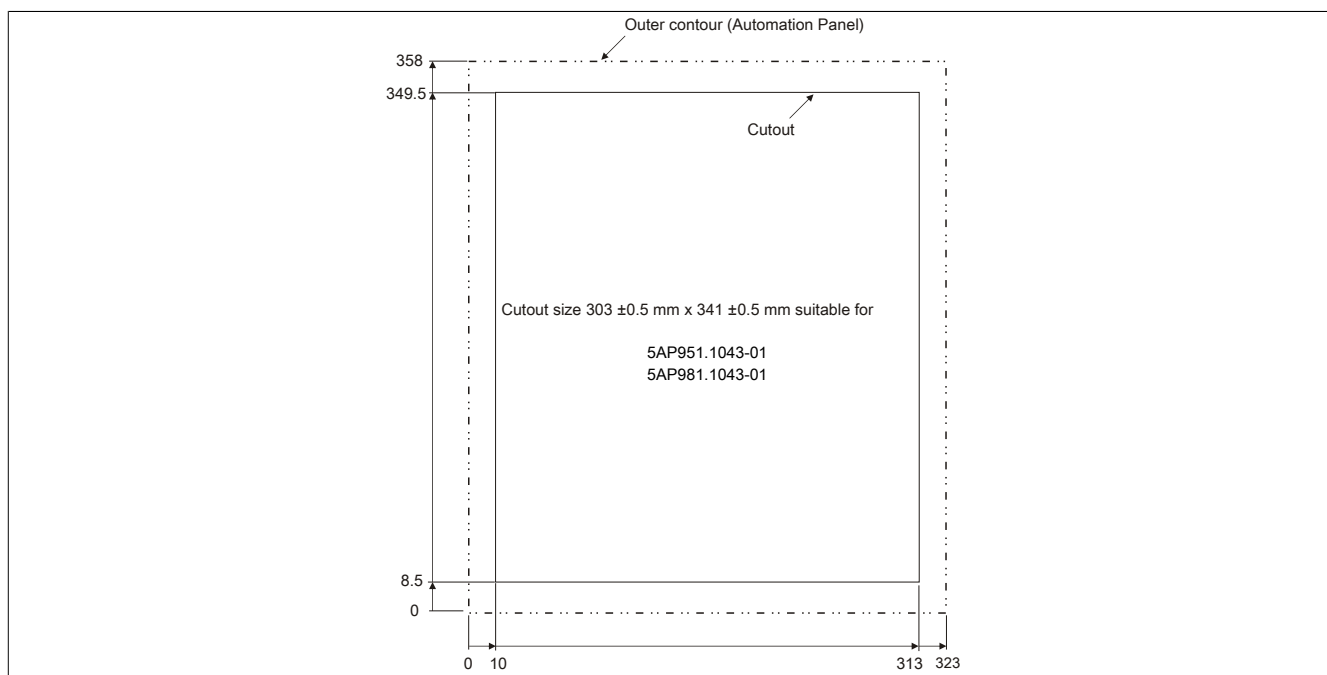


Figure 19: 5AP951.1043-01 - Cutout installation

For additional information regarding installation and mounting orientation, see ["Commissioning" on page 114](#).

2.3.1.1.3 5AP952.1043-01

2.3.1.1.3.1 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

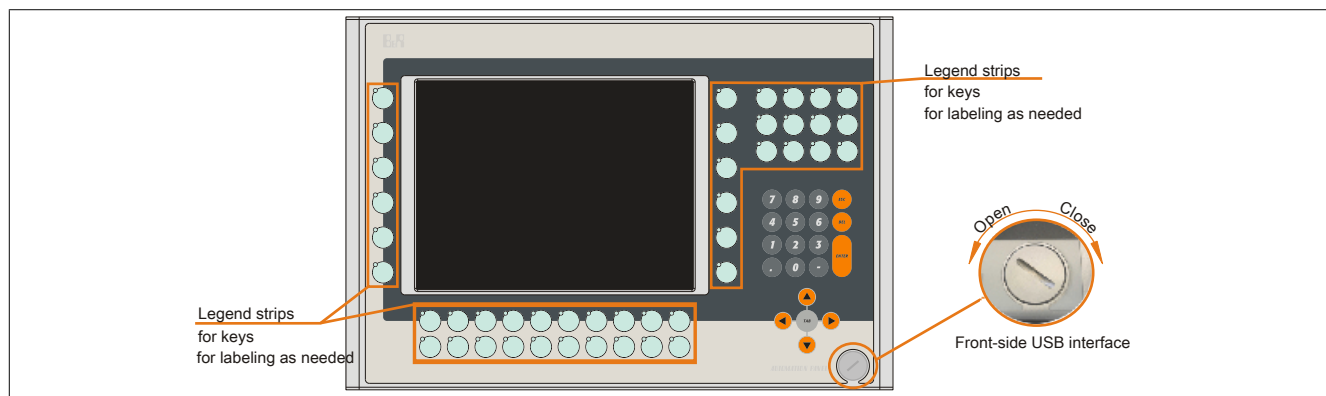


Figure 20: 5AP952.1043-01 - Front view

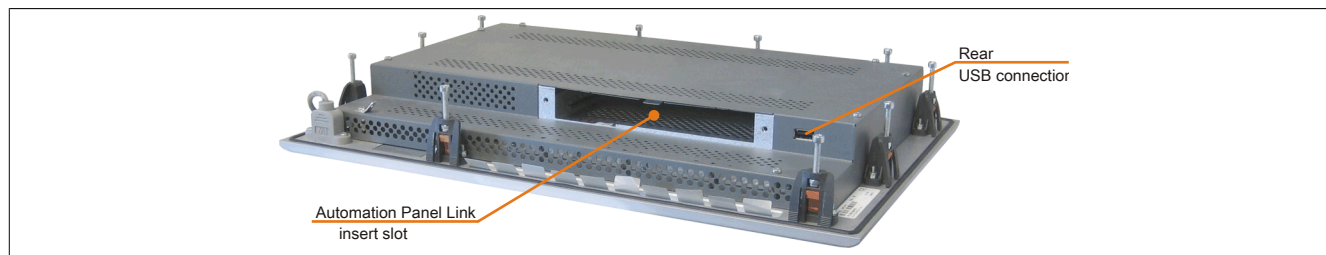


Figure 21: 5AP952.1043-01 - Rear view

2.3.1.1.3.2 Order data

Order number	Short description	Figure
	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	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Display links	
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS DL.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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS DL.1000-01	Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
	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 11: 5AP952.1043-01 - Order data

2.3.1.1.3.3 Technical data

Order number	5AP952.1043-01
General information	
B&R ID code	0x1D5B
Certifications	
CE	Yes
EAC	Yes
Display	
Type	TFT color
Diagonal	10.4" (264 mm)
Colors	262,144
Resolution	VGA, 640 x 480 pixels
Contrast	300:1
Viewing angles	
Horizontal	Direction R = 70° / Direction L = 70°
Vertical	Direction U = 40° / Direction D = 70°
Backlight	
Type	CCFL
Brightness	350 cd/m ²
Half-brightness time ¹⁾	50,000 h
Filter glass	
Transmittance	95%
Anti-glare coating	On both sides
Touch screen	
Technology	-
Controller	-
Transmittance	-
Interfaces	
USB ²⁾	
Quantity	2
Type	USB 2.0 ³⁾
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA per connection
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 luminous intensity	
Yellow	Typ. 12 mcd
Slots	
Compatible installation for PPC300 slot	No
Electrical properties	
Nominal voltage	24 VDC ±25%, SELV ⁴⁾
Nominal current	Max. 3.2 A ⁵⁾
Inrush 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 slot)
Galvanic isolation	Yes
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, protected against dust and hose-directed water
Ambient 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
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 12: 5AP952.1043-01 - Technical data

Order number	5AP952.1043-01
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Elevation	
Operation	Max. 3000 m ⁶⁾
Mechanical properties	
Housing	
Material	Metal
Coating	Similar to Pantone 432CV
Front ⁷⁾	
Frame	Aluminum, naturally anodized
Design	Gray
Panel overlay	
Material	Polyester
Light background color	Similar to Pantone 427CV
Dark border color around display	Similar to Pantone 432CV
Dark gray keys color	Similar to Pantone 431CV
Orange keys color	Similar to Pantone 151CV
Color slide-in labels	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 12: 5AP952.1043-01 - Technical data

- 1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 2) USB devices can only be connected to the Automation Panel directly (without a hub).
- 3) Depends on the transfer technology, transfer distance and Automation Panel Link plug-in card being used.
- 4) IEC 61010-2-201 requirements must be observed.
- 5) The specified value applies to the Automation Panel device with a connected Automation Panel Link plug-in card.
- 6) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 7) Visual deviations in color and surface quality are possible due to process or batch conditions.

2.3.1.1.3.4 Temperature humidity diagram

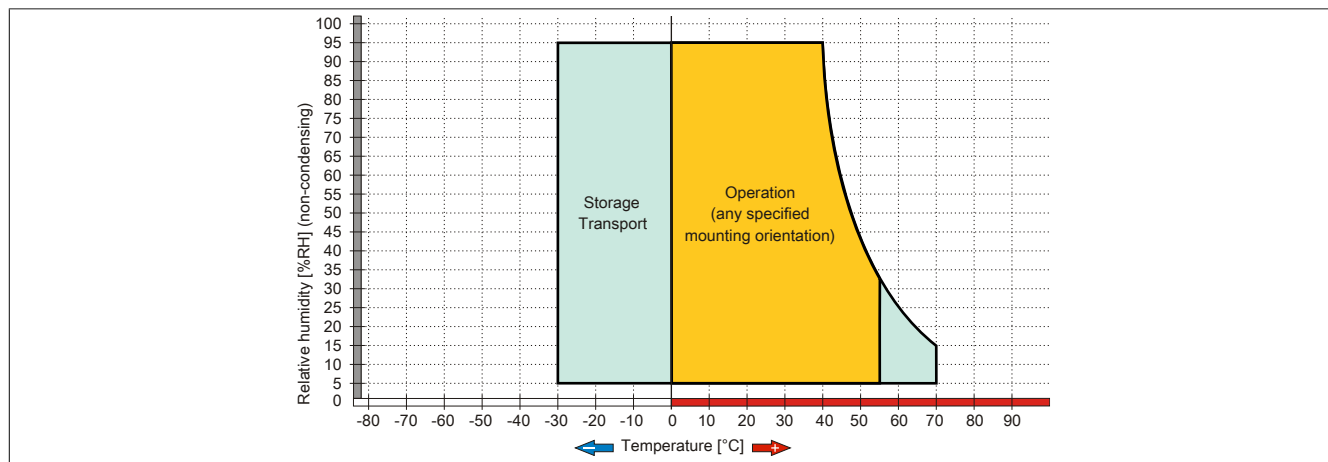


Figure 22: 5AP952.1043-01 - Temperature humidity diagram

2.3.1.1.3.5 Dimensions

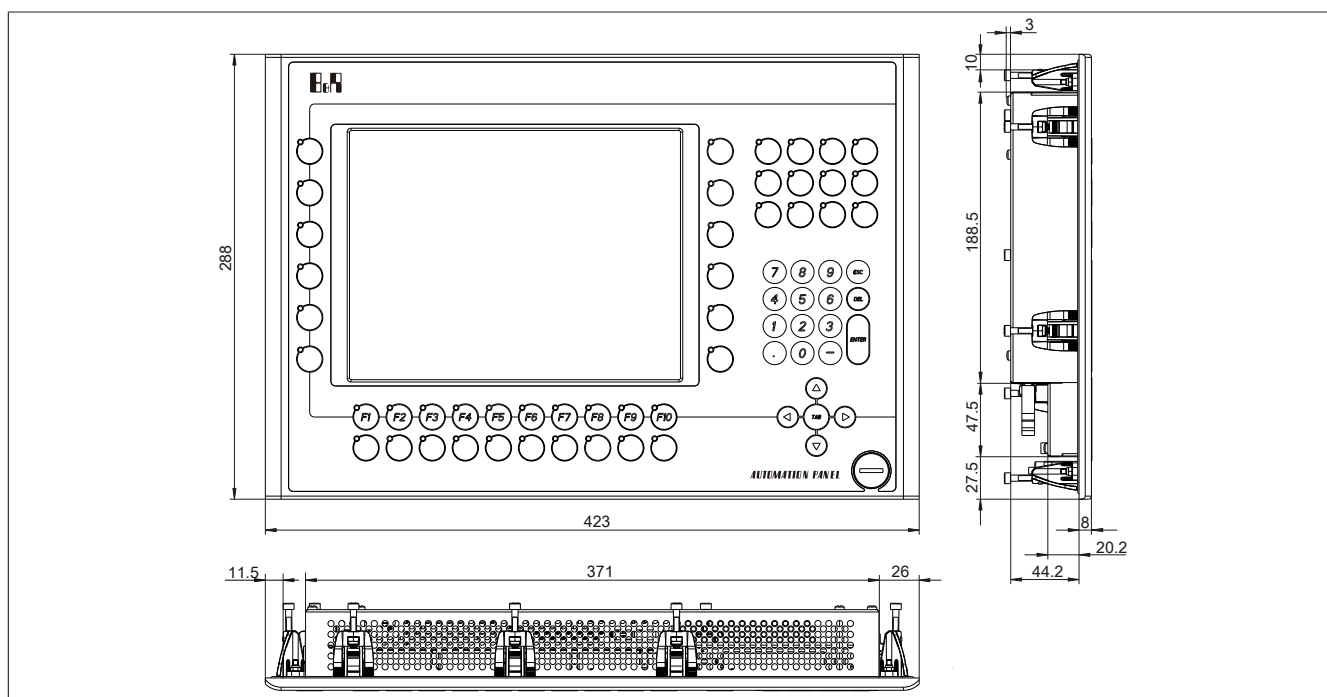


Figure 23: 5AP952.1043-01 - Dimensions

2.3.1.1.3.6 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.

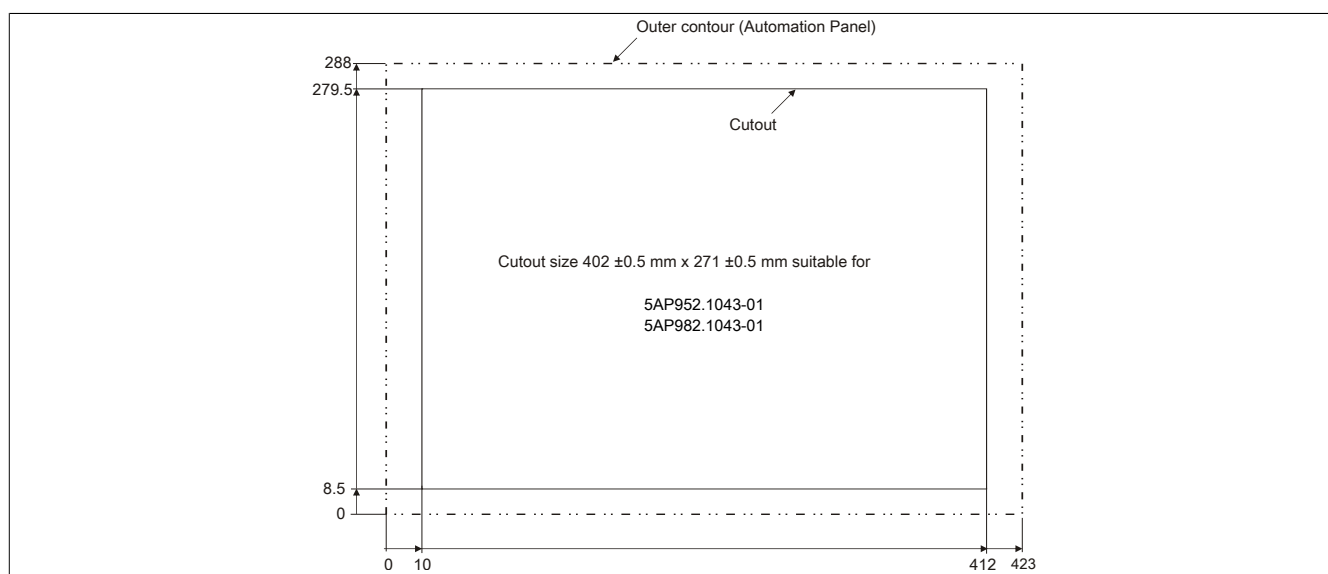


Figure 24: 5AP952.1043-01 - Cutout installation

For additional information regarding installation and mounting orientation, see ["Commissioning" on page 114](#).

2.3.1.1.4 5AP980.1043-01

2.3.1.1.4.1 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

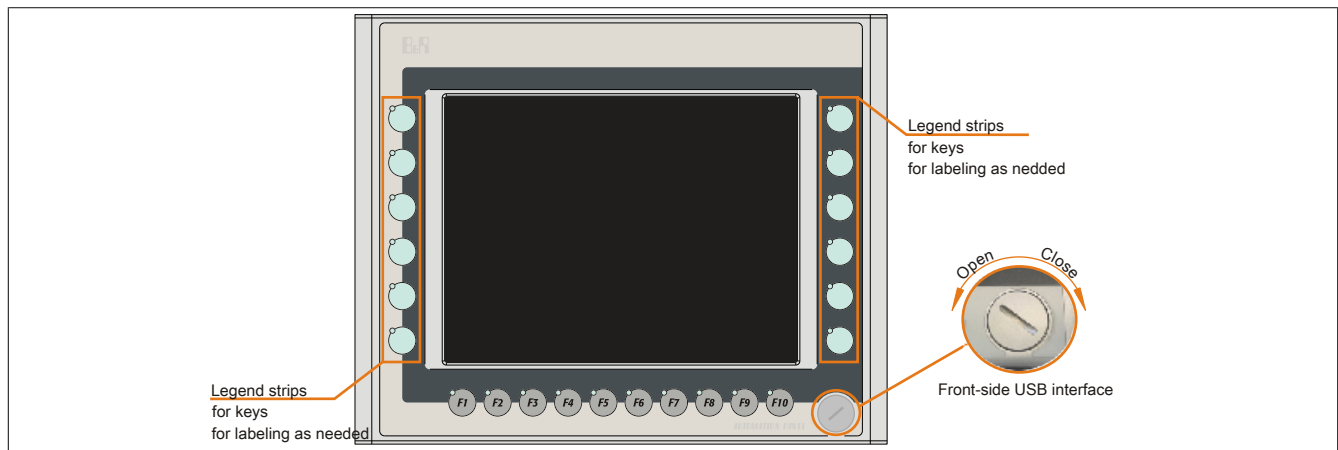


Figure 25: 5AP980.1043-01 - Front view

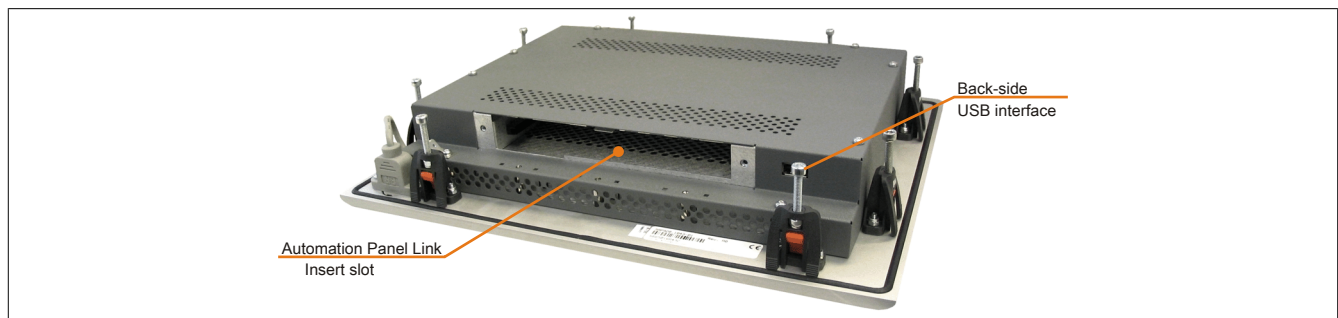


Figure 26: 5AP980.1043-01 - Rear view

2.3.1.1.4.2 Order data


Order number	Short description	<div>Figure</div> 
Display units		
5AP980.1043-01	Automation Panel AP980, 10.4" VGA color TFT display with touch screen (resistive); 10 soft keys and 12 function keys; 2 USB 2.0 interfaces; insert for Automation Panel Link; IP65 protection (front). 24 VDC.	
Required accessories		
Accessories		
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
Display links		
5DLDMI.1000-01	Automation Panel Link DVI receiver, connections for DVI-D, RS232 and USB 2.0 (type B), 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS3.1000-00	Automation Panel link module - SDL3 receiver - For Automation Panel 920/98x	
5DLS3.1000-00	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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS3.1000-01	Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
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 insert card for the Automation Panel 900; 256 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	
5PC310.L800-01	Panel PC 300 insert card for the Automation Panel 900; 512 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	

Table 13: 5AP980.1043-01 - Order data

2.3.1.1.4.3 Technical data

Order number	5AP980.1043-01			
Revision	C0	D0	G0	H0
General information				
B&R ID code	0x1D5D			
Certifications				
CE	Yes			
UL	cULus E115267 Industrial control equipment			
EAC	Yes			
Display				
Type	TFT color			
Diagonal	10.4" (264 mm)			
Colors	262,144			16 million
Resolution	VGA, 640 x 480 pixels			
Contrast	300:1			700:1
Viewing angles				
Horizontal	Direction R = 70° / Direction L = 70°			Direction R = 80° / Direction L = 80°
Vertical	Direction U = 40° / Direction D = 70°			Direction U = 80° / Direction D = 60°
Backlight				
Type	CCFL			LED
Brightness	350 cd/m²			450 cd/m²
Half-brightness time ¹⁾	50,000 h			
Filter glass				
Transmittance	-			
Anti-glare coating	-			

Table 14: 5AP980.1043-01, 5AP980.1043-01, 5AP980.1043-01, 5AP980.1043-01 - Technical data

Technical data

Order number	5AP980.1043-01			
Revision	C0	D0	G0	H0
Touch screen ²⁾				
Type	Elo AccuTouch		AMT	
Technology	Analog, resistive			
Controller	Elo, serial, 12-bit			
Transmittance	80% ±5%		81% ±3%	
Interfaces				
USB ³⁾				
Quantity	2			
Type	USB 2.0 ⁴⁾			
Variant	Type A			
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)			
Current-carrying capacity	Max. 500 mA per connection			
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 luminous intensity				
Yellow	Typ. 12 mcd			
Slots				
Compatible installation for PPC300 slot	No	Yes		
Electrical properties				
Nominal voltage	24 VDC ±25%, SELV ⁵⁾			
Nominal current	Max. 3.2 A ⁶⁾			
Inrush 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 slot)			
Galvanic isolation	Yes			
Operating conditions				
Pollution degree per EN 61131-2	Pollution degree 2			
Degree of protection per EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, protected against dust and hose-directed water			
Ambient 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	-30 to 70°C			
Transport	-30 to 70°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			
Elevation				
Operation	Max. 3000 m ⁷⁾			
Mechanical properties				
Housing				
Material	Metal			
Coating	Similar to Pantone 432CV			
Front ⁸⁾				
Frame	Aluminum, naturally anodized			
Design	Gray			
Panel overlay				
Material	Polyester			
Light background color	Similar to Pantone 427CV			
Dark border color around display	Similar to Pantone 432CV			
Color slide-in labels	Similar to Pantone 429CV			
Gasket	Flat gasket around display front			

Table 14: 5AP980.1043-01, 5AP980.1043-01, 5AP980.1043-01, 5AP980.1043-01 - Technical data

Order number	5AP980.1043-01			
Revision	C0	D0	G0	H0
Dimensions				
Width	323 mm			
Height	260 mm			
Depth	55 mm			
Weight	Approx. 2900 g		Approx. 2600 g	

Table 14: 5AP980.1043-01, 5AP980.1043-01, 5AP980.1043-01, 5AP980.1043-01 - Technical data

- 1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
- 3) USB devices can only be connected to the Automation Panel directly (without a hub).
- 4) Depends on the transfer technology, transfer distance and Automation Panel Link plug-in card being used.
- 5) IEC 61010-2-201 requirements must be observed.
- 6) The specified value applies to the Automation Panel device with a connected Automation Panel Link plug-in card.
- 7) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 8) Visual deviations in color and surface quality are possible due to process or batch conditions.

2.3.1.1.4.4 Temperature humidity diagram

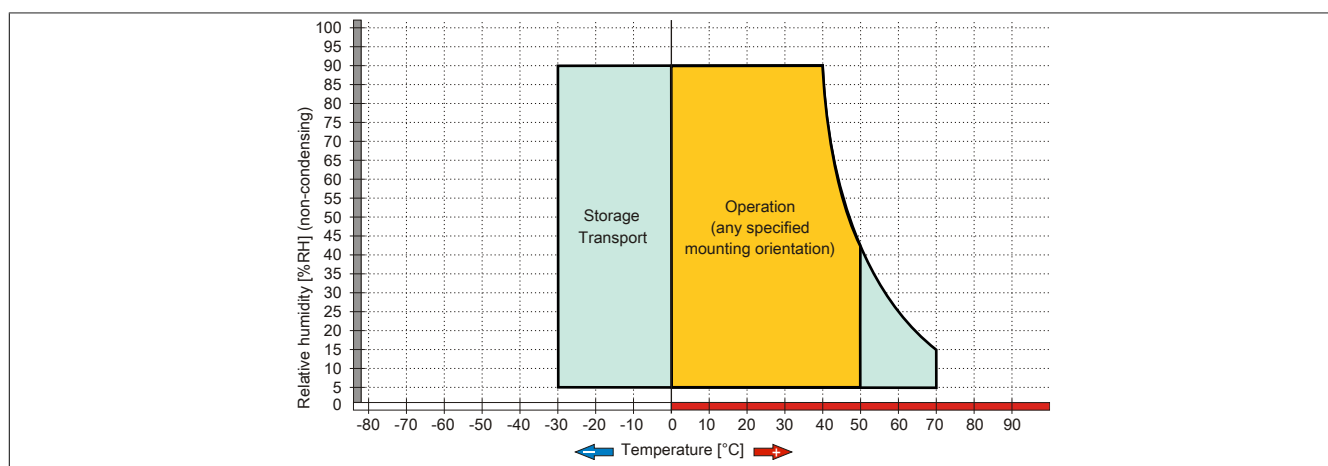


Figure 27: 5AP980.1043-01 - Temperature humidity diagram

2.3.1.1.4.5 Dimensions

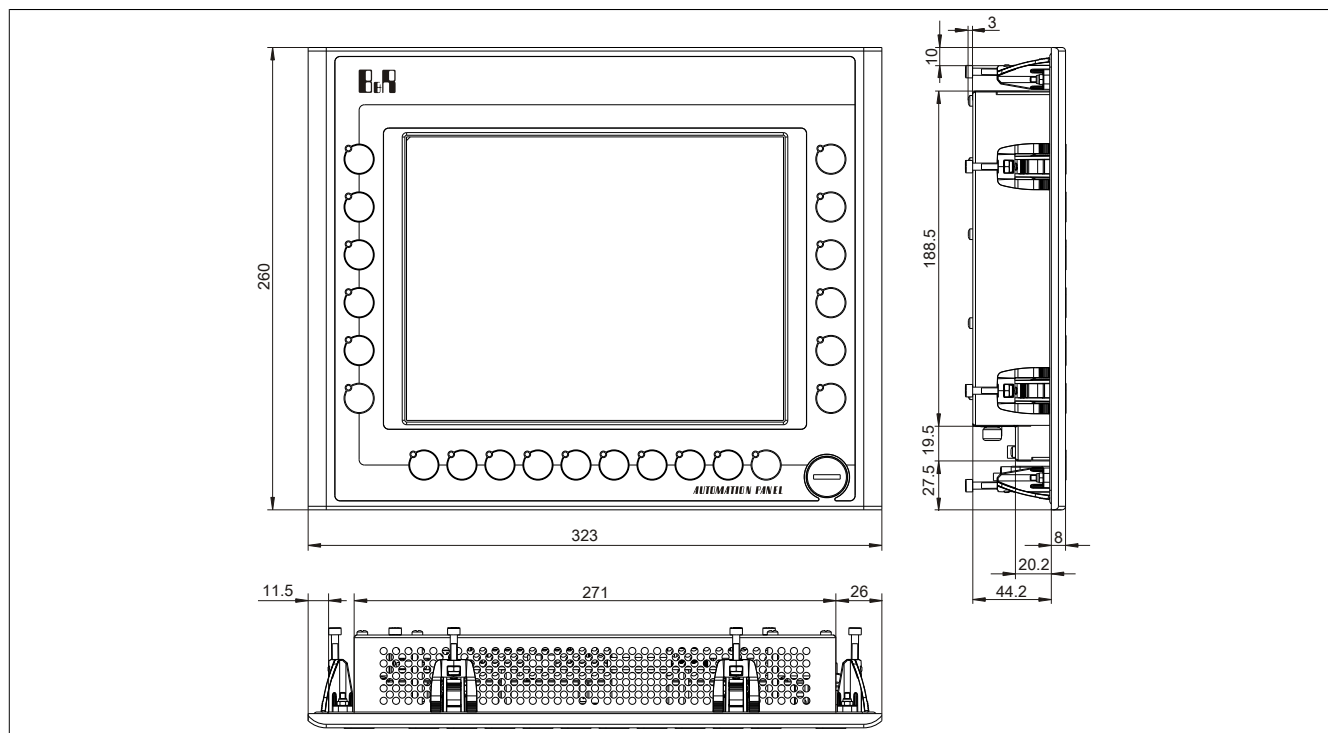


Figure 28: 5AP980.1043-01 - Dimensions

2.3.1.1.4.6 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.

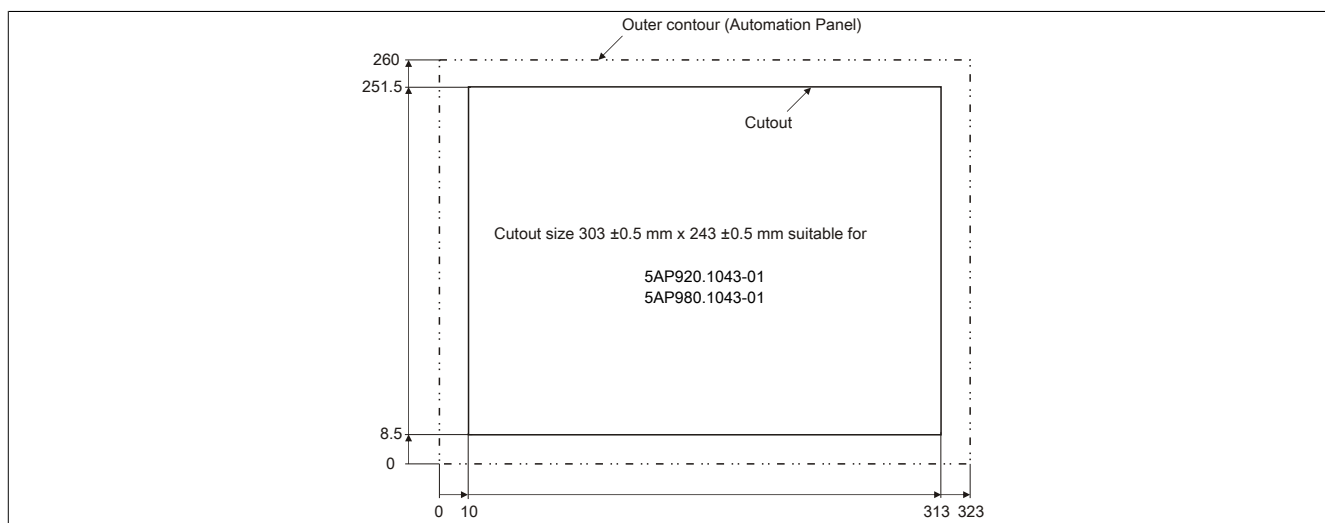


Figure 29: 5AP980.1043-01 - Cutout installation

For additional information regarding installation and mounting orientation, see ["Commissioning" on page 114](#).

2.3.1.1.5 5AP981.1043-01

2.3.1.1.5.1 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

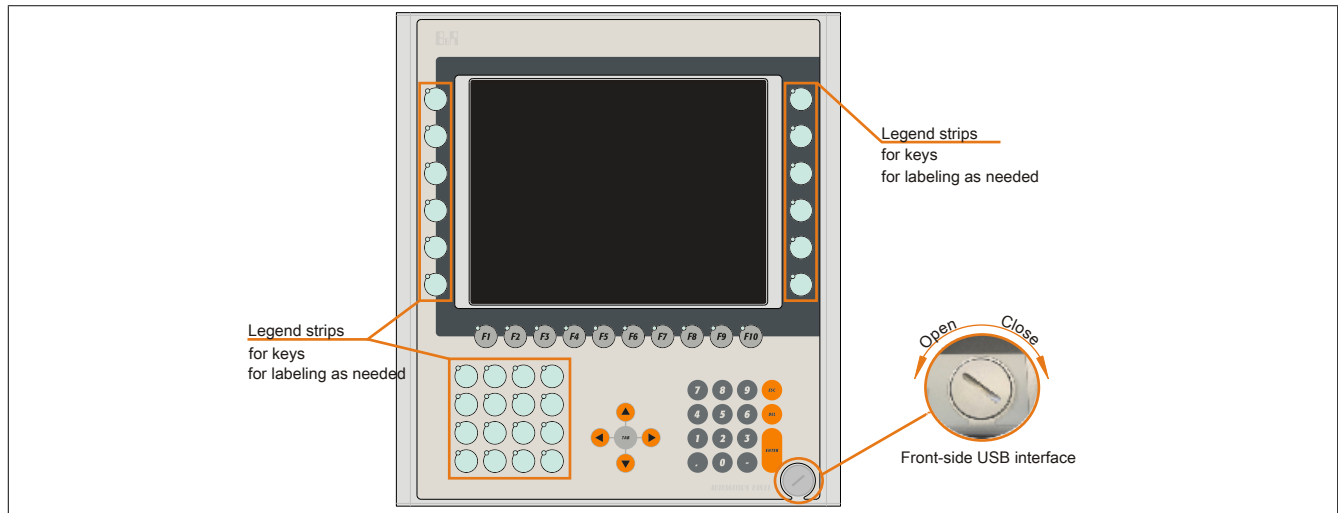


Figure 30: 5AP981.1043-01 - Front view

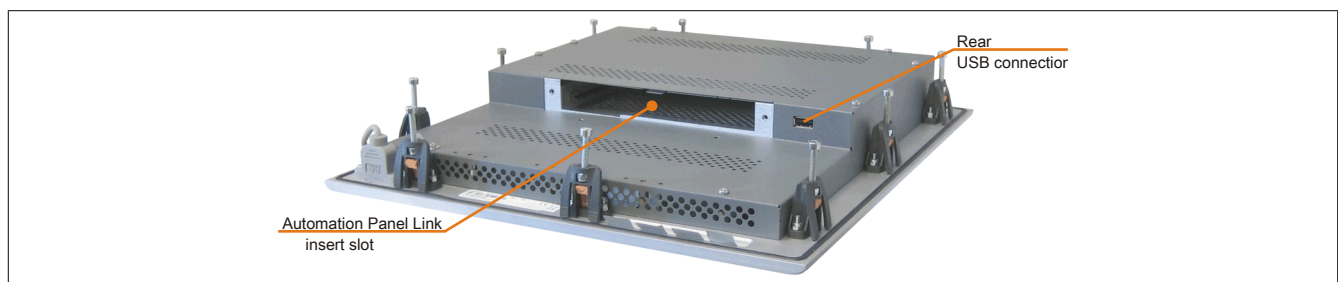


Figure 31: 5AP981.1043-01 - Rear view

2.3.1.1.5.2 Order data


Order number	Short description	Figure
	Display units	
5AP981.1043-01	Automation Panel AP981; 10.4" VGA color TFT display with touch screen (resistive); 10 soft keys; 28 function keys and 20 system keys; 2 USB 2.0 interfaces; insert for Automation Panel Link; IP65 protection (front). 24 VDC.	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Display links	
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLSD3.1000-00	Automation Panel link module - SDL3 receiver - For Automation Panel 920/98x	
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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLSDL.1000-01	Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
	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 insert card for the Automation Panel 900; 256 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	
5PC310.L800-01	Panel PC 300 insert card for the Automation Panel 900; 512 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	

Table 15: 5AP981.1043-01 - Order data

2.3.1.1.5.3 Technical data

Order number	5AP981.1043-01			
Revision	C0	D0	H0	I0
General information				
B&R ID code	0x1C63			
Certifications				
CE	Yes			
UL	cULus E115267 Industrial control equipment			
EAC	Yes			
Display				
Type	TFT color			
Diagonal	10.4" (264 mm)			
Colors	262,144			16 million
Resolution	VGA, 640 x 480 pixels			
Contrast	300:1			700:1
Viewing angles				
Horizontal	Direction R = 70° / Direction L = 70°			Direction R = 80° / Direction L = 80°
Vertical	Direction U = 40° / Direction D = 70°			Direction U = 80° / Direction D = 60°
Backlight				
Type	CCFL			LED
Brightness	350 cd/m²			450 cd/m²
Half-brightness time ¹⁾	50,000 h			
Filter glass				
Transmittance	-			
Anti-glare coating	-			

Table 16: 5AP981.1043-01, 5AP981.1043-01, 5AP981.1043-01, 5AP981.1043-01 - Technical data

Order number	5AP981.1043-01			
Revision	C0	D0	H0	I0
Touch screen ²⁾				
Type	Elo AccuTouch		AMT	
Technology	Analog, resistive			
Controller	Elo, serial, 12-bit			
Transmittance	80% ±5%		81% ±3%	
Interfaces				
USB ³⁾				
Quantity	2			
Type	USB 2.0 ⁴⁾			
Variant	Type A			
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)			
Current-carrying capacity	Max. 500 mA per connection			
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 luminous intensity				
Yellow	Typ. 12 mcd			
Slots				
Compatible installation for PPC300 slot	No	Yes		
Electrical properties				
Nominal voltage	24 VDC ±25%, SELV ⁵⁾			
Nominal current	Max. 3.2 A ⁶⁾			
Inrush 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 slot)			
Galvanic isolation	Yes			
Operating conditions				
Pollution degree per EN 61131-2	Pollution degree 2			
Degree of protection per EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, protected against dust and hose-directed water			
Ambient 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	-30 to 70°C			
Transport	-30 to 70°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			
Elevation				
Operation	Max. 3000 m ⁷⁾			
Mechanical properties				
Housing				
Material	Metal			
Coating	Similar to Pantone 432CV			
Front ⁸⁾				
Frame	Aluminum, naturally anodized			
Design	Gray			
Panel overlay				
Material	Polyester			
Light background color	Similar to Pantone 427CV			
Dark border color around display	Similar to Pantone 432CV			
Dark gray keys color	Similar to Pantone 431CV			
Orange keys color	Similar to Pantone 151CV			
Color slide-in labels	Similar to Pantone 429CV			
Gasket	Flat gasket around display front			

Table 16: 5AP981.1043-01, 5AP981.1043-01, 5AP981.1043-01, 5AP981.1043-01 - Technical data

Technical data

Order number	5AP981.1043-01			
Revision	C0	D0	H0	I0
Dimensions				
Width	323 mm			
Height	358 mm			
Depth	55 mm			
Weight	Approx. 3600 g			

Table 16: 5AP981.1043-01, 5AP981.1043-01, 5AP981.1043-01, 5AP981.1043-01 - Technical data

- 1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
- 3) USB devices can only be connected to the Automation Panel directly (without a hub).
- 4) Depends on the transfer technology, transfer distance and Automation Panel Link plug-in card being used.
- 5) IEC 61010-2-201 requirements must be observed.
- 6) The specified value applies to the Automation Panel device with a connected Automation Panel Link plug-in card.
- 7) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 8) Visual deviations in color and surface quality are possible due to process or batch conditions.

2.3.1.1.5.4 Temperature humidity diagram

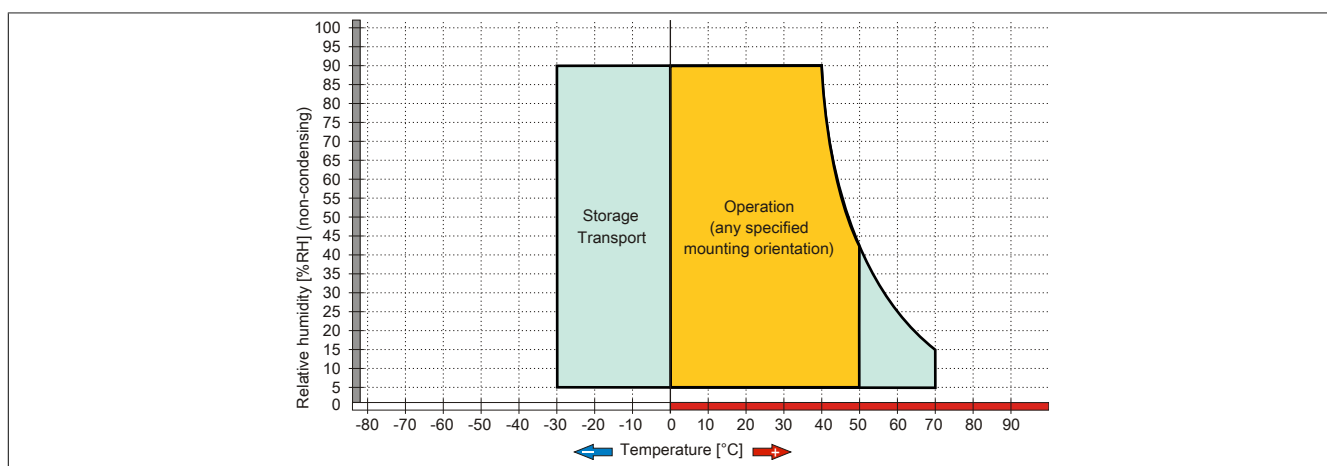


Figure 32: 5AP981.1043-01 - Temperature humidity diagram

2.3.1.1.5.5 Dimensions

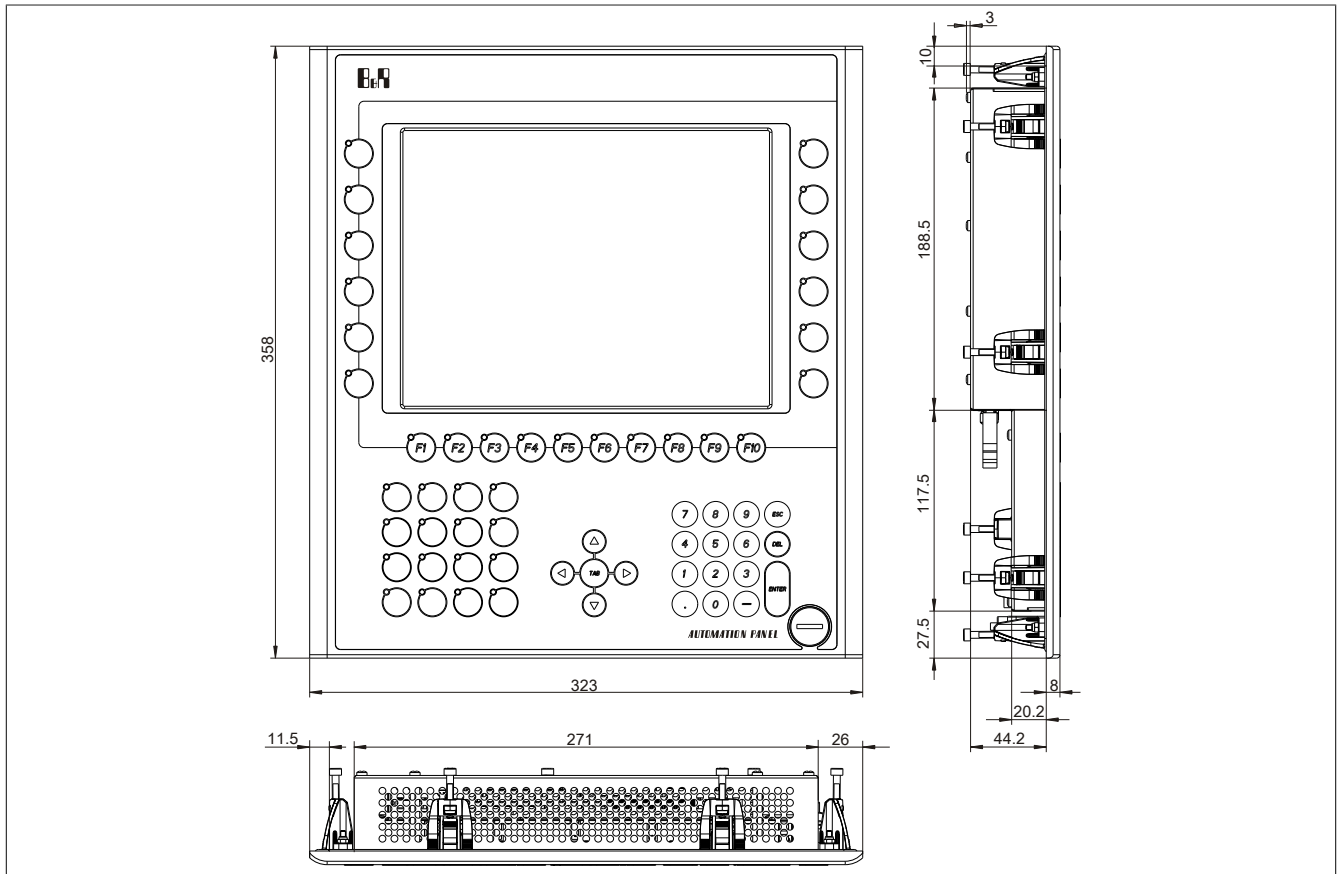


Figure 33: 5AP981.1043-01 - Dimensions

2.3.1.1.5.6 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.

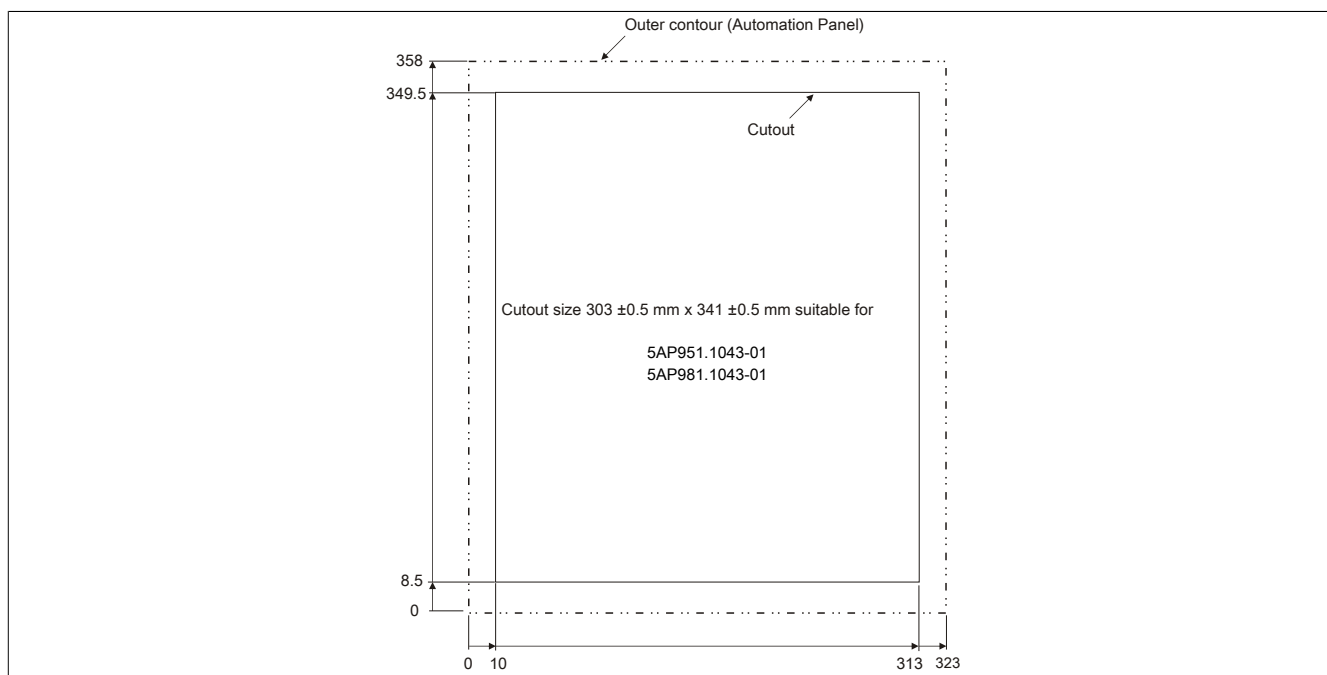


Figure 34: 5AP981.1043-01 - Cutout installation

For additional information regarding installation and mounting orientation, see ["Commissioning" on page 114](#).

2.3.1.1.6 5AP982.1043-01

2.3.1.1.6.1 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

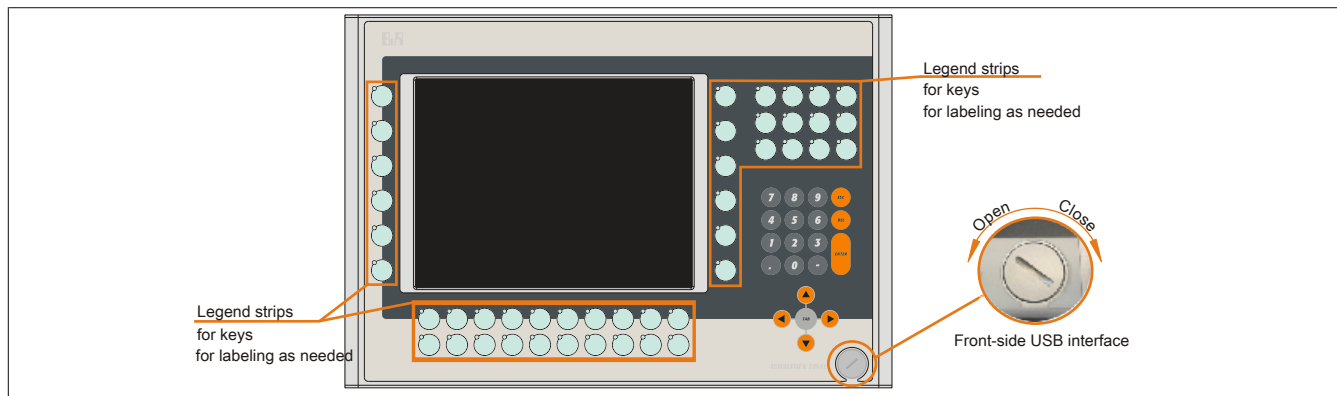


Figure 35: 5AP982.1043-01 - Front view

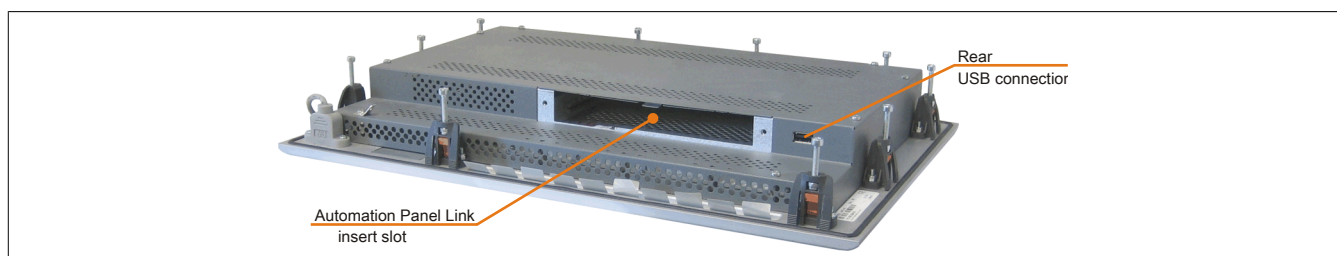


Figure 36: 5AP982.1043-01 - Rear view

2.3.1.1.6.2 Order data


Order number	Short description	<div>Figure</div> 
	Display units	
5AP982.1043-01	Automation Panel AP982; 10.4" VGA color TFT screen (resistive); 44 function keys and 20 system keys; 2 USB 2.0 interfaces; insert for Automation Panel Link; IP65 protection (from front). 24 VDC.	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Display links	
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLSD3.1000-00	Automation Panel link module - SDL3 receiver - For Automation Panel 920/98x	
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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLSDL.1000-01	Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
	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 insert card for the Automation Panel 900; 256 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	
5PC310.L800-01	Panel PC 300 insert card for the Automation Panel 900; 512 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	

Table 17: 5AP982.1043-01 - Order data

2.3.1.1.6.3 Technical data

Order number	5AP982.1043-01			
Revision	C0	D0	G0	H0
General information				
B&R ID code	0x1D5A			
Certifications				
CE	Yes			
UL	cULus E115267 Industrial control equipment			
EAC	Yes			
Display				
Type	TFT color			
Diagonal	10.4" (264 mm)			
Colors	262,144			16 million
Resolution	VGA, 640 x 480 pixels			
Contrast	300:1			700:1
Viewing angles				
Horizontal	Direction R = 70° / Direction L = 70°			Direction R = 80° / Direction L = 80°
Vertical	Direction U = 40° / Direction D = 70°			Direction U = 80° / Direction D = 60°
Backlight				
Type	CCFL			LED
Brightness	350 cd/m²			450 cd/m²
Half-brightness time ¹⁾	50,000 h			
Filter glass				
Transmittance	-			
Anti-glare coating	-			

Table 18: 5AP982.1043-01, 5AP982.1043-01, 5AP982.1043-01, 5AP982.1043-01 - Technical data

Order number	5AP982.1043-01			
Revision	C0	D0	G0	H0
Touch screen ²⁾				
Type	Elo AccuTouch		AMT	
Technology	Analog, resistive			
Controller	Elo, serial, 12-bit			
Transmittance	80% ±5%		81% ±3%	
Interfaces				
USB ³⁾				
Quantity	2			
Type	USB 2.0 ⁴⁾			
Variant	Type A			
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)			
Current-carrying capacity	Max. 500 mA per connection			
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 luminous intensity				
Yellow	Typ. 12 mcd			
Slots				
Compatible installation for PPC300 slot	No	Yes		
Electrical properties				
Nominal voltage	24 VDC ±25%, SELV ⁵⁾			
Nominal current	Max. 3.2 A ⁶⁾			
Inrush 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 slot)			
Galvanic isolation	Yes			
Operating conditions				
Pollution degree per EN 61131-2	Pollution degree 2			
Degree of protection per EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, protected against dust and hose-directed water			
Ambient 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	-30 to 70°C			
Transport	-30 to 70°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			
Elevation				
Operation	Max. 3000 m ⁷⁾			
Mechanical properties				
Housing				
Material	Metal			
Coating	Similar to Pantone 432CV			
Front ⁸⁾				
Frame	Aluminum, naturally anodized			
Design	Gray			
Panel overlay				
Material	Polyester			
Light background color	Similar to Pantone 427CV			
Dark border color around display	Similar to Pantone 432CV			
Dark gray keys color	Similar to Pantone 431CV			
Orange keys color	Similar to Pantone 151CV			
Color slide-in labels	Similar to Pantone 429CV			
Gasket	Flat gasket around display front			

Table 18: 5AP982.1043-01, 5AP982.1043-01, 5AP982.1043-01, 5AP982.1043-01 - Technical data

Order number	5AP982.1043-01			
Revision	C0	D0	G0	H0
Dimensions				
Width	423 mm			
Height	288 mm			
Depth	55 mm			
Weight	Approx. 3900 g			

Table 18: 5AP982.1043-01, 5AP982.1043-01, 5AP982.1043-01, 5AP982.1043-01 - Technical data

- 1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
- 3) USB devices can only be connected to the Automation Panel directly (without a hub).
- 4) Depends on the transfer technology, transfer distance and Automation Panel Link plug-in card being used.
- 5) IEC 61010-2-201 requirements must be observed.
- 6) The specified value applies to the Automation Panel device with a connected Automation Panel Link plug-in card.
- 7) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 8) Visual deviations in color and surface quality are possible due to process or batch conditions.

2.3.1.1.6.4 Temperature humidity diagram

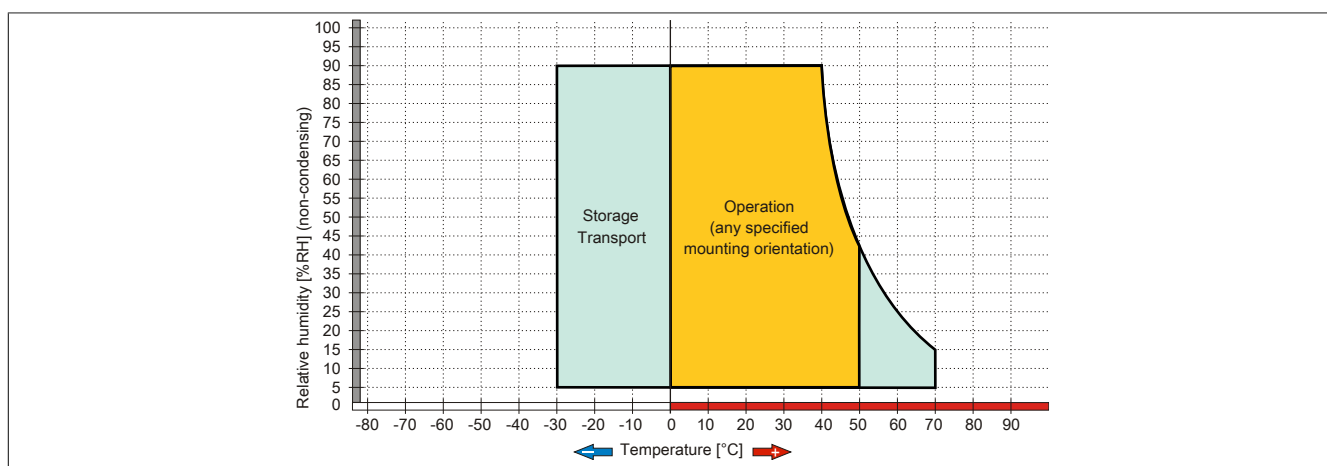


Figure 37: 5AP982.1043-01 - Temperature humidity diagram

2.3.1.1.6.5 Dimensions

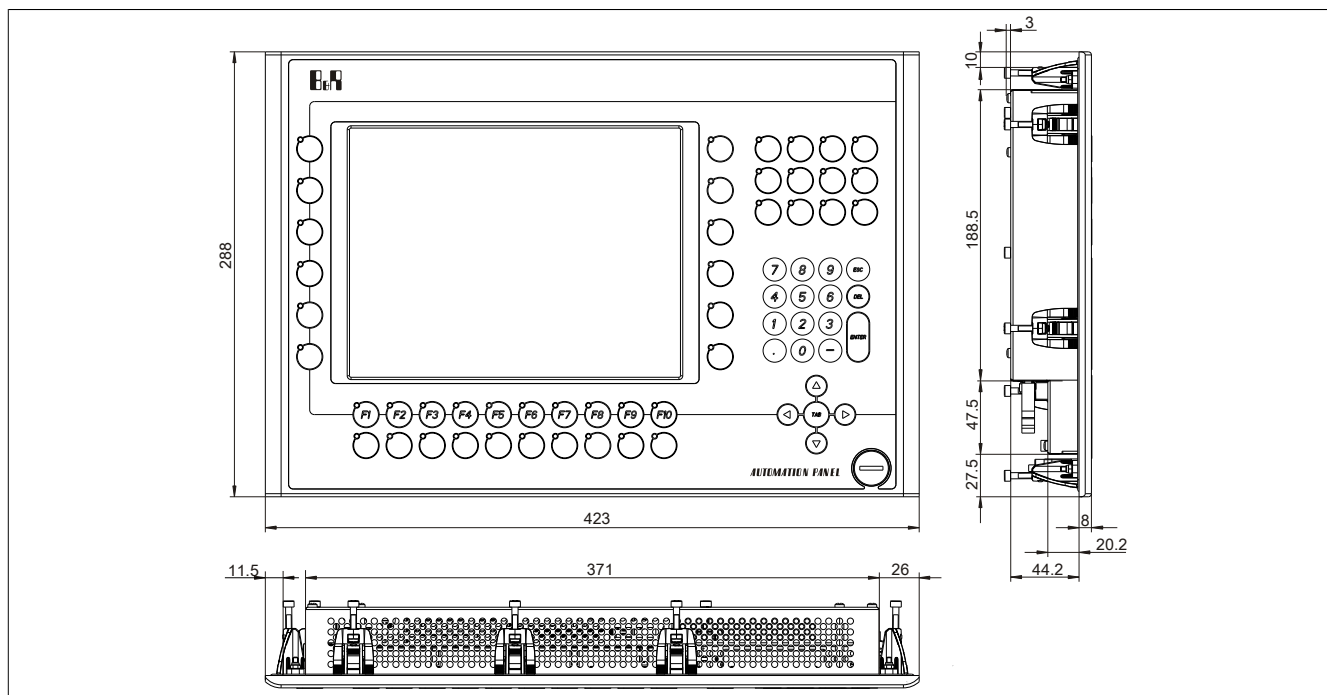


Figure 38: 5AP982.1043-01 - Dimensions

2.3.1.1.6.6 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.

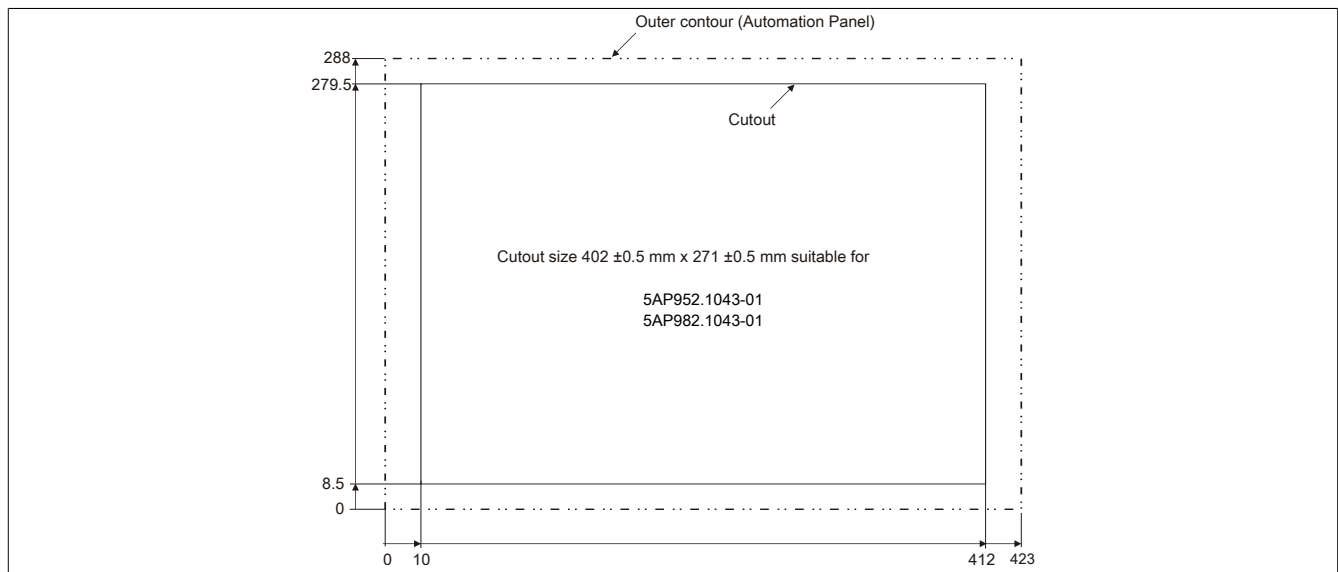


Figure 39: 5AP982.1043-01 - Cutout installation

For additional information regarding installation and mounting orientation, see ["Commissioning" on page 114](#).

2.3.1.2 Automation Panel 12.1" SVGA

2.3.1.2.1 5AP920.1214-01

2.3.1.2.1.1 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

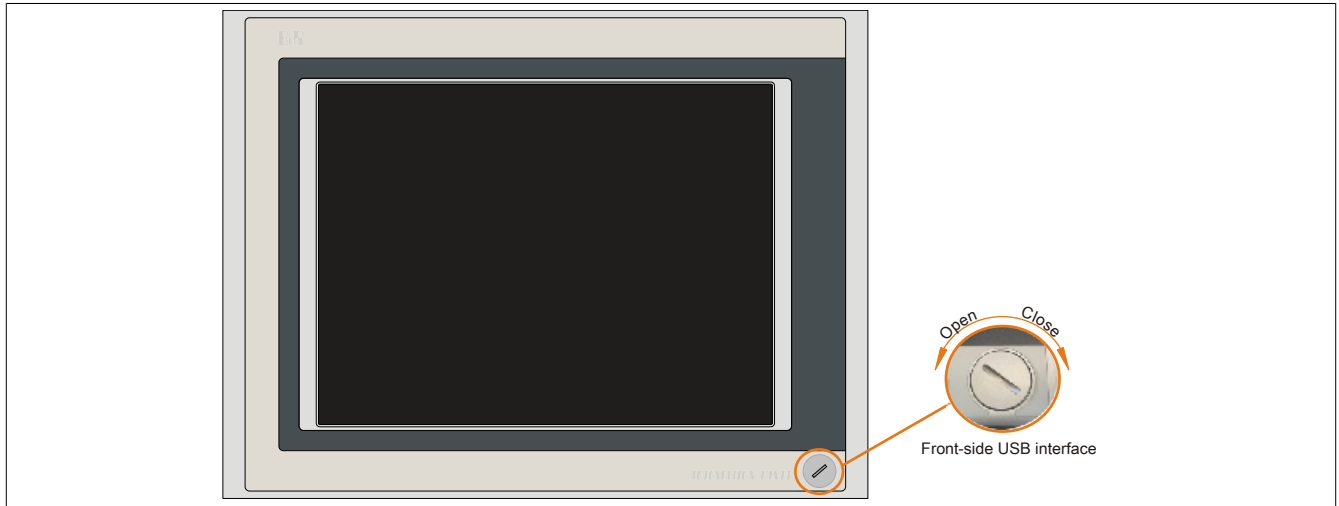


Figure 40: 5AP920.1214-01 - Front view

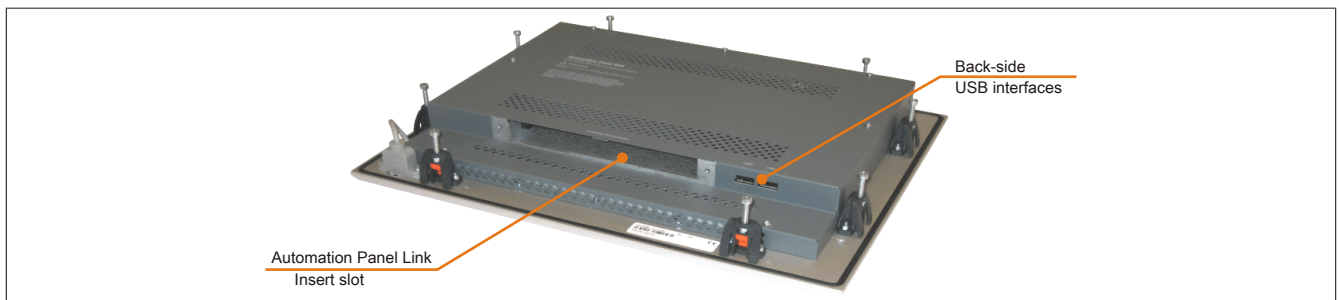


Figure 41: 5AP920.1214-01 - Rear view

2.3.1.2.1.2 Order data


Order number	Short description	Figure
Display units		
5AP920.1214-01	Automation Panel AP920 12.1" TFT - 800 x 600 pixels (4:3) - Single-touch (analog resistive) - Landscape format - IP65 protection (front)	
Required accessories		
Accessories		
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLSD3.1000-00	Automation Panel link module - SDL3 receiver - For Automation Panel 920/98x	
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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLSDL.1000-01	Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
Optional accessories		
Panel PC 300 insert cards		
5PC310.L800-00	Panel PC 300 insert card for the Automation Panel 900; 256 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	
5PC310.L800-01	Panel PC 300 insert card for the Automation Panel 900; 512 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	

Table 19: 5AP920.1214-01 - Order data

2.3.1.2.1.3 Technical data

Order number	5AP920.1214-01		
Revision	E0	F0	G0
General information			
B&R ID code	0x2AE7		
Certifications			
CE	Yes		
UL	cULus E115267 Industrial control equipment		
EAC	Yes		
Display			
Type	TFT color		
Diagonal	12.1" (307 mm)		
Colors	262,144		
Resolution	SVGA, 800 x 600 pixels		
Contrast	300:1		800:1
Viewing angles			
Horizontal	Direction R = 70° / Direction L = 70°		Direction R = 80° / Direction L = 80°
Vertical	Direction U = 50° / Direction D = 60°		Direction U = 60° / Direction D = 80°
Backlight			
Type	CCFL		LED
Brightness	350 cd/m²		450 cd/m²
Half-brightness time ¹⁾	50,000 h		
Filter glass			
Transmittance	-		
Anti-glare coating	-		

Table 20: 5AP920.1214-01, 5AP920.1214-01, 5AP920.1214-01 - Technical data

Technical data

Order number	5AP920.1214-01		
Revision	E0	F0	G0
Touch screen ²⁾			
Type	Elo AccuTouch	AMT	
Technology	Analog, resistive		
Controller	Elo, serial, 12-bit		
Transmittance	80% ±5%	81% ±3%	
Interfaces			
USB ³⁾			
Quantity	3		
Type	USB 2.0 ⁴⁾		
Variant	Type A		
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)		
Current-carrying capacity	Max. 500 mA per connection		
Keys			
Function keys	No		
Soft keys	No		
System keys	No		
Service life	-		
LED luminous intensity	-		
LED luminous intensity			
Yellow	-		
Slots			
Compatible installation for PPC300 slot	Yes		
Electrical properties			
Nominal voltage	24 VDC ±25%, SELV ⁵⁾		
Nominal current	Max. 3.2 A ⁶⁾		
Inrush current	Typ. 6 A, max. 30 A for < 300 µs		
Power consumption	Typ. 12 W, max. 15 W or 21 W with USB (without slot)		
Galvanic isolation	Yes		
Operating conditions			
Pollution degree per EN 61131-2	Pollution degree 2		
Degree of protection per EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, protected against dust and hose-directed water		
Ambient 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	-30 to 70°C		
Transport	-30 to 70°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		
Elevation			
Operation	Max. 3000 m ⁷⁾		
Mechanical properties			
Housing			
Material	Metal		
Coating	Similar to Pantone 432CV		
Front ⁸⁾			
Frame	Aluminum, naturally anodized		
Design	Gray		
Panel overlay			
Material	Polyester		
Light background color	Similar to Pantone 427CV		
Dark border color around display	Similar to Pantone 432CV		
Gasket	Flat gasket around display front		
Dimensions			
Width	362 mm		
Height	284 mm		
Depth	54 mm		
Weight	Approx. 3400 g		

Table 20: 5AP920.1214-01, 5AP920.1214-01, 5AP920.1214-01 - Technical data

- 1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
- 3) USB devices can only be connected to the Automation Panel directly (without a hub).
- 4) Depends on the transfer technology, transfer distance and Automation Panel Link plug-in card being used.

- 5) IEC 61010-2-201 requirements must be observed.
- 6) The specified value applies to the Automation Panel device with a connected Automation Panel Link plug-in card.
- 7) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 8) Visual deviations in color and surface quality are possible due to process or batch conditions.

2.3.1.2.1.4 Temperature humidity diagram

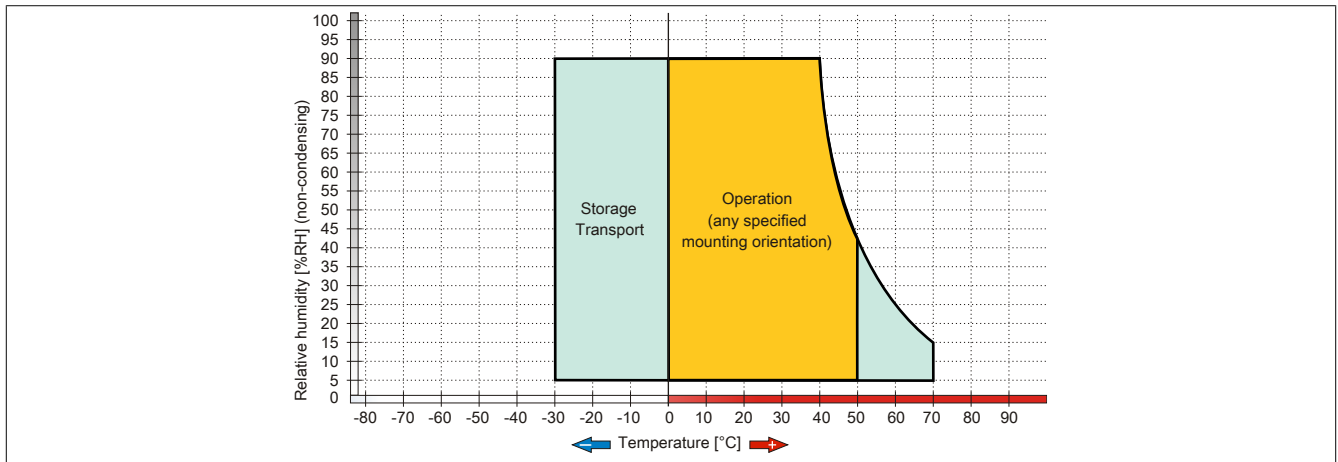


Figure 42: 5AP920.1214-01 - Temperature humidity diagram

2.3.1.2.1.5 Dimensions

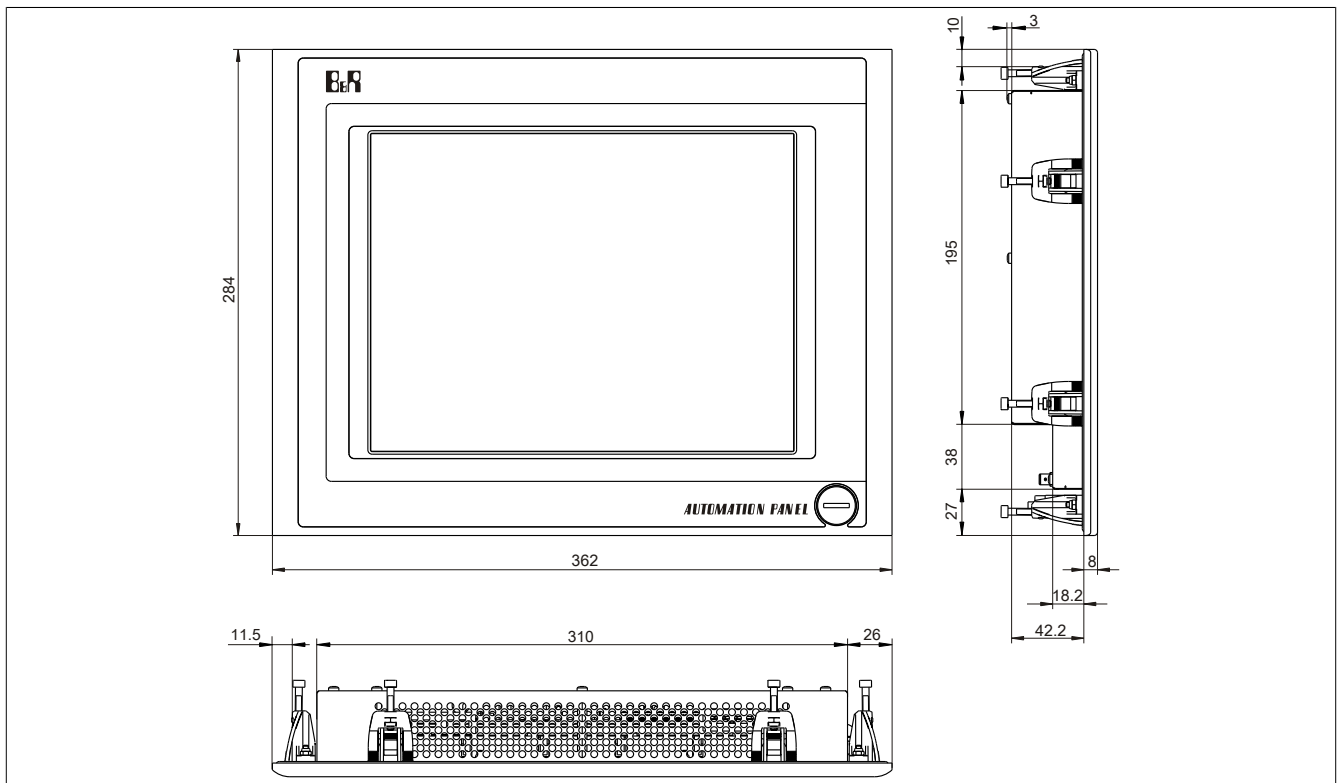


Figure 43: 5AP920.1214-01 - Dimensions

2.3.1.2.1.6 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.

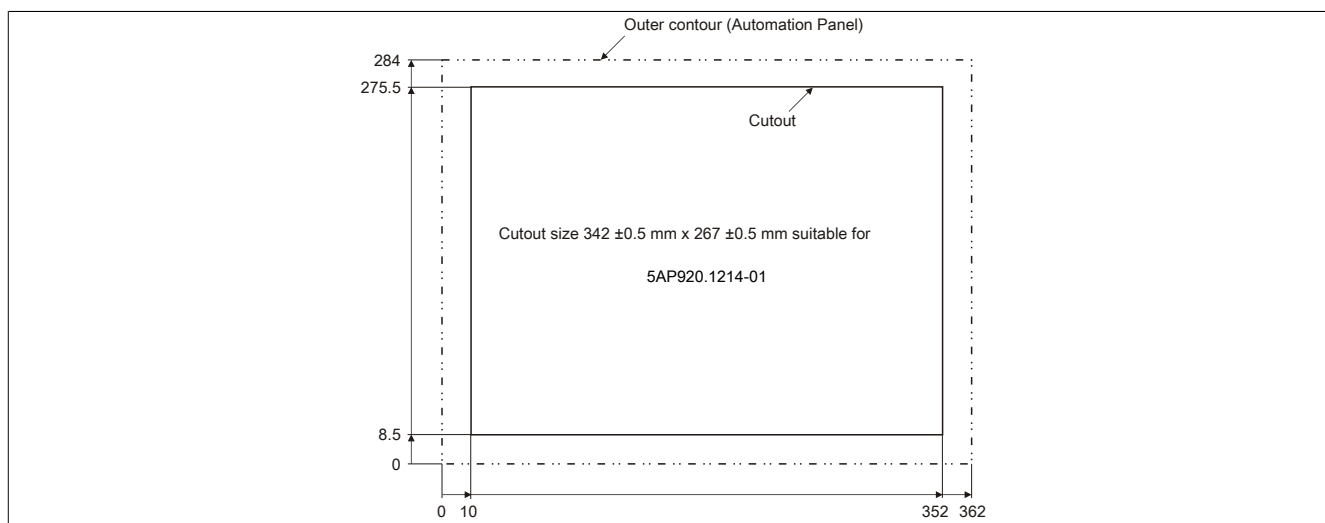


Figure 44: 5AP920.1214-01 - Cutout installation

For additional information regarding installation and mounting orientation, see ["Commissioning" on page 114](#).

2.3.1.3 Automation Panel 15" XGA

2.3.1.3.1 5AP920.1505-01

2.3.1.3.1.1 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

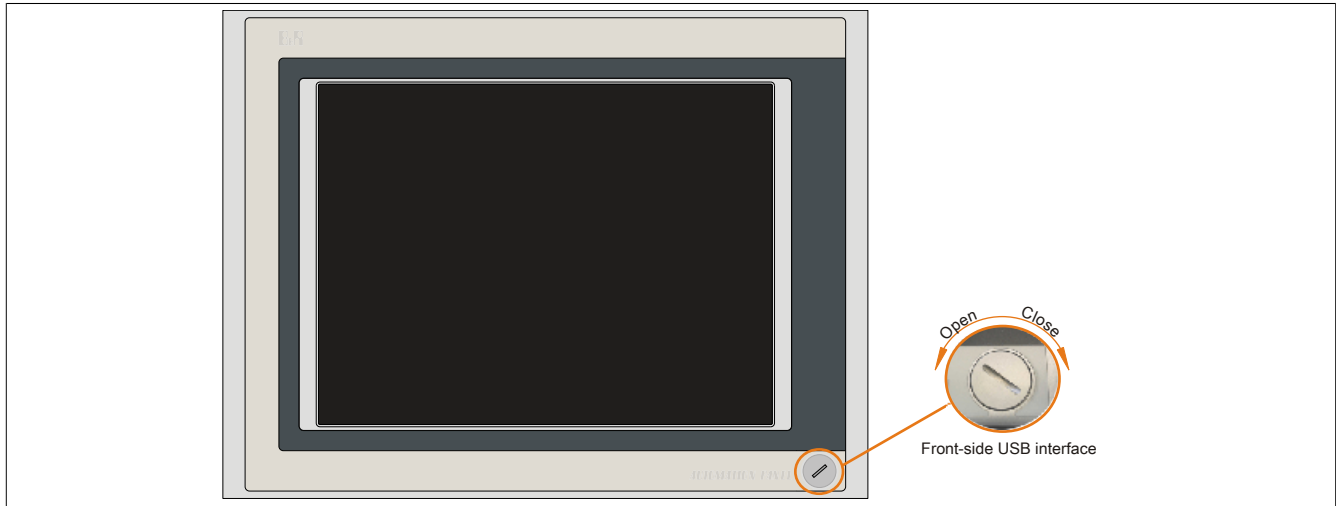


Figure 45: 5AP920.1505-01 - Front view



Figure 46: 5AP920.1505-01 - Rear view

2.3.1.3.1.2 Order data


Order 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 (front). 24 VDC.	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Display links	
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS D3.1000-00	Automation Panel link module - SDL3 receiver - For Automation Panel 920/98x	
5DLS DL.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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS DL.1000-01	Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
	Optional accessories	
	Panel PC 300 insert cards	
5PC310.L800-00	Panel PC 300 insert card for the Automation Panel 900; 256 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	
5PC310.L800-01	Panel PC 300 insert card for the Automation Panel 900; 512 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	

Table 21: 5AP920.1505-01 - Order data

2.3.1.3.1.3 Technical data

Order number	5AP920.1505-01		
Revision	I0	J0	M0
General information			
B&R ID code	0x1942		
Certifications			
CE	Yes		
UL	cULus E115267 Industrial control equipment		
DNV ¹⁾	Temperature: A (0 - 45°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (bridge and open deck)		
EAC	Yes		
KC	Yes		
Display			
Type	TFT color		
Diagonal	15" (381 mm)		
Colors	16.7 million		
Resolution	XGA, 1024 x 768 pixels		
Contrast	400:1	1000:1	
Viewing angles			
Horizontal	Direction R = 85° / Direction L = 85°		
Vertical	Direction U = 85° / Direction D = 85°		
Backlight			
Type	CCFL	LED	
Brightness	250 cd/m²	350 cd/m²	
Half-brightness time ²⁾	50,000 h	70,000 h	
Filter glass			
Transmittance	-		
Anti-glare coating	-		

Table 22: 5AP920.1505-01, 5AP920.1505-01, 5AP920.1505-01 - Technical data

Order number	5AP920.1505-01		
Revision	I0	J0	M0
Touch screen ³⁾			
Type	Elo AccuTouch	AMT	
Technology	Analog, resistive		
Controller	Elo, serial, 12-bit		
Transmittance	80% ±5%	81% ±3%	
Interfaces			
USB ⁴⁾			
Quantity	3		
Type	USB 2.0 ⁵⁾		
Variant	Type A		
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)		
Current-carrying capacity	Max. 500 mA per connection		
Keys			
Function keys	No		
Soft keys	No		
System keys	No		
Service life	-		
LED luminous intensity	-		
LED luminous intensity	-		
Yellow	-		
Slots			
Compatible installation for PPC300 slot	Yes		
Electrical properties			
Nominal voltage	24 VDC ±25%, SELV ⁶⁾		
Nominal current	Max. 3.2 A ⁷⁾		
Inrush current	Typ. 6 A, max. 30 A for < 300 µs		
Power consumption	Typ. 24 W, max. 31 W or 41 W with USB (without slot)		
Galvanic isolation	Yes		
Operating conditions			
Pollution degree per EN 61131-2	Pollution degree 2		
Degree of protection per EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, protected against dust and hose-directed water		
Ambient 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	-25 to 60°C		
Transport	-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		
Elevation			
Operation	Max. 3000 m ⁸⁾		
Mechanical properties			
Housing			
Material	Metal		
Coating	Similar to Pantone 432CV		
Front ⁹⁾			
Frame	Aluminum, naturally anodized		
Design	Gray		
Panel overlay			
Material	Polyester		
Light background color	Similar to Pantone 427CV		
Dark border color around display	Similar to Pantone 432CV		
Gasket	Flat gasket around display front		

Table 22: 5AP920.1505-01, 5AP920.1505-01, 5AP920.1505-01 - Technical data

Order number	5AP920.1505-01		
Revision	I0	J0	M0
Dimensions			
Width		435 mm	
Height		330 mm	
Depth		54 mm	
Weight		Approx. 5100 g	

Table 22: 5AP920.1505-01, 5AP920.1505-01, 5AP920.1505-01 - Technical data

- 1) Yes, but applies only if all components installed in the complete system have this certification.
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
- 4) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 5) Depends on the transfer technology, transfer distance and Automation Panel Link plug-in card being used.
- 6) IEC 61010-2-201 requirements must be observed.
- 7) The specified value applies to the Automation Panel device with a connected Automation Panel Link plug-in card.
- 8) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 9) Visual deviations in color and surface quality are possible due to process or batch conditions.

2.3.1.3.1.4 Temperature humidity diagram

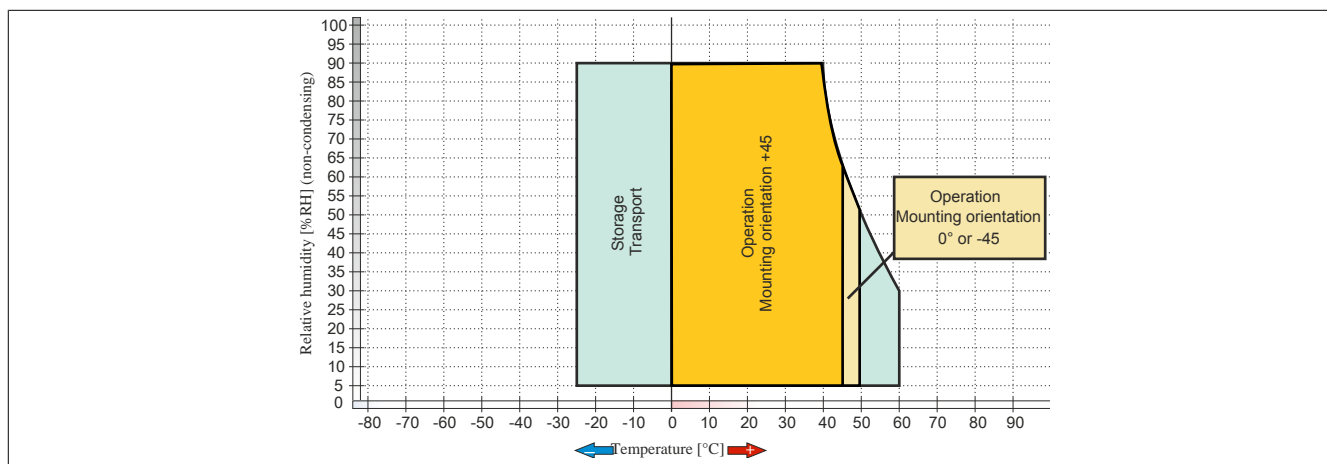


Figure 47: 5AP920.1505-01 - Temperature humidity diagram

2.3.1.3.1.5 Dimensions

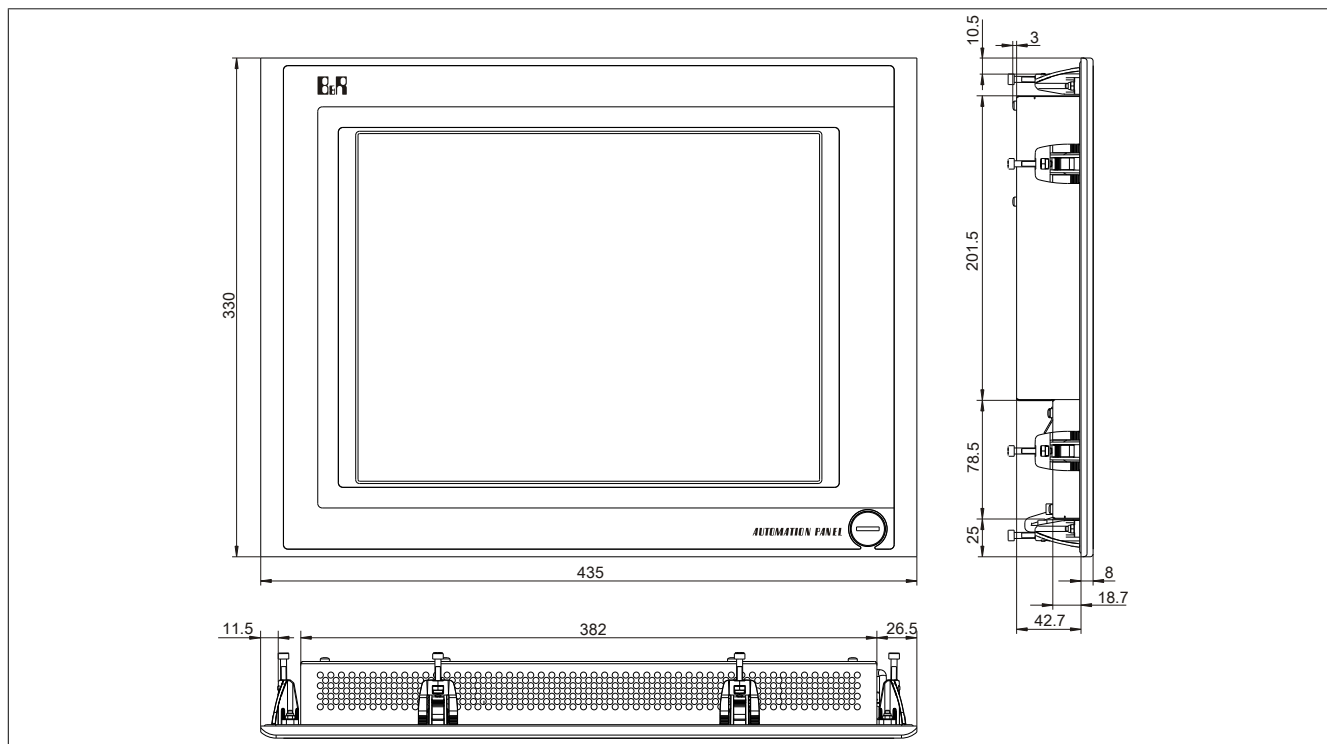


Figure 48: 5AP920.1505-01 - Dimensions

2.3.1.3.1.6 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.

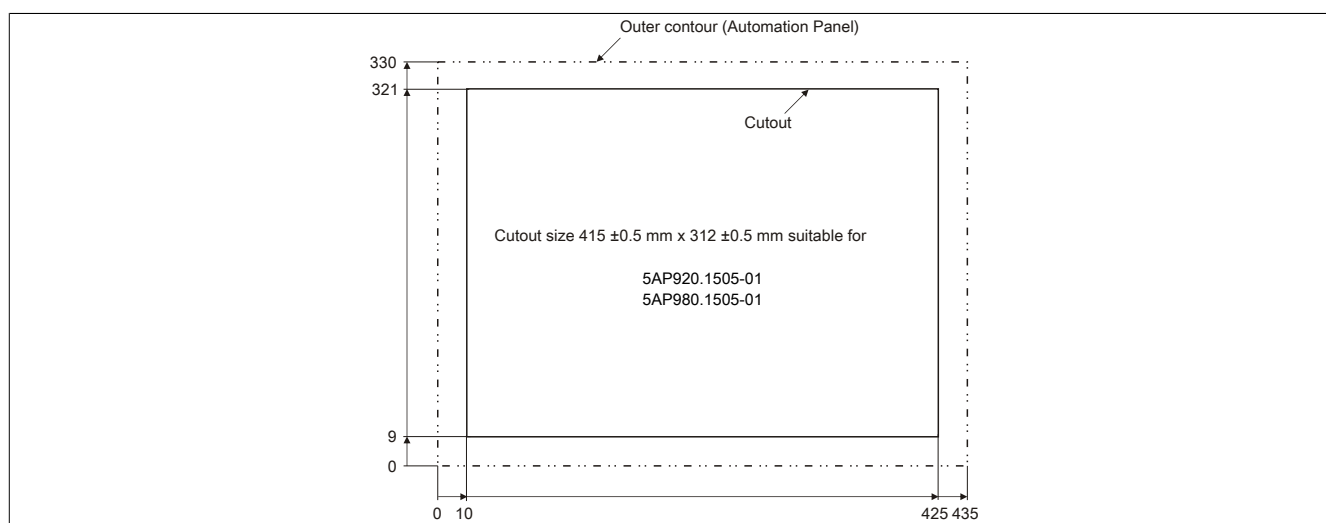


Figure 49: 5AP920.1505-01 - Cutout installation

For additional information regarding installation and mounting orientation, see ["Commissioning" on page 114](#).

2.3.1.3.2 5AP951.1505-01

2.3.1.3.2.1 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

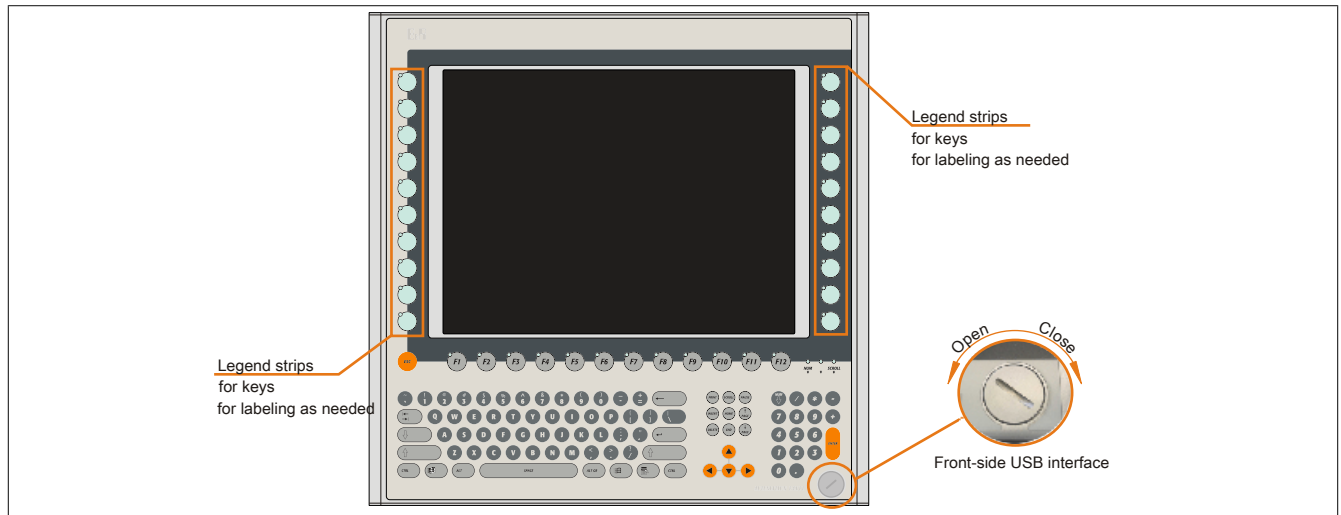


Figure 50: 5AP951.1505-01 - Front view

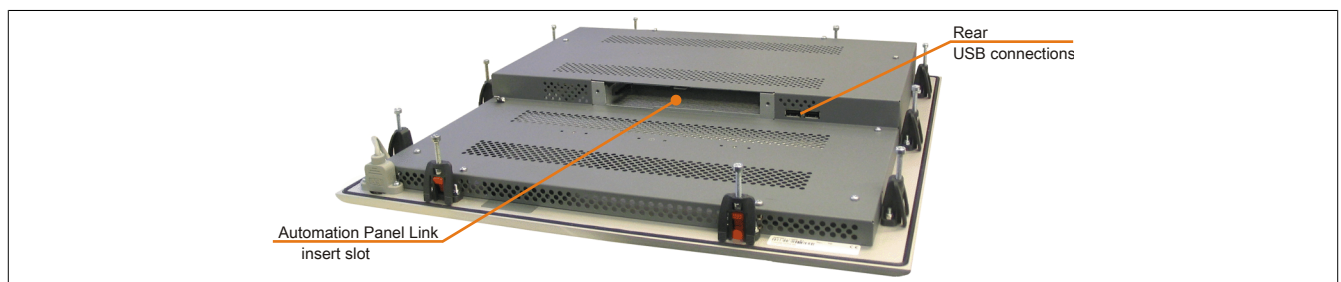


Figure 51: 5AP951.1505-01 - Rear view

2.3.1.3.2.2 Order data


Order number	Short description	<div>Figure</div> 
	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	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Display links	
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLSDL.1000-01	Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
	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 23: 5AP951.1505-01 - Order data

2.3.1.3.2.3 Technical data

Order number	5AP951.1505-01
General information	
B&R ID code	0x1D5F
Certifications	
CE	Yes
EAC	Yes
Display	
Type	TFT color
Diagonal	15" (381 mm)
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels
Contrast	400:1
Viewing angles	
Horizontal	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 85° / Direction D = 85°
Backlight	
Type	CCFL
Brightness	250 cd/m ²
Half-brightness time ¹⁾	50,000 h
Filter glass	
Transmittance	95%
Anti-glare coating	On both sides
Touch screen	
Technology	-
Controller	-
Transmittance	-
Interfaces	
USB ²⁾	
Quantity	3
Type	USB 2.0 ³⁾
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA per connection
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

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

Technical data

Order number	5AP951.1505-01
LED luminous intensity	
Yellow	Typ. 12 mcd
Slots	
Compatible installation for PPC300 slot	No
Electrical properties	
Nominal voltage	24 VDC $\pm 25\%$, SELV ⁴⁾
Nominal current	Max. 3.2 A ⁵⁾
Inrush current	Typ. 6 A, max. 30 A for < 300 μ s
Power consumption	Typ. 24 W (without LED), max. 32 W or 42 W with USB (without slot)
Galvanic isolation	Yes
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, protected against dust and hose-directed water
Ambient 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	-25 to 60°C
Transport	-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
Elevation	
Operation	Max. 3000 m ⁶⁾
Mechanical properties	
Housing	
Material	Metal
Coating	Similar to Pantone 432CV
Front ⁷⁾	
Frame	Aluminum, naturally anodized
Design	Gray
Panel overlay	
Material	Polyester
Light background color	Similar to Pantone 427CV
Dark border color around display	Similar to Pantone 432CV
Dark gray keys color	Similar to Pantone 431CV
Orange keys color	Similar to Pantone 151CV
Color slide-in labels	Similar to Pantone 429CV
Gasket	Flat gasket around display front
Dimensions	
Width	435 mm
Height	430 mm
Depth	54 mm
Weight	Approx. 5900 g

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

- 1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 2) USB devices can only be connected to the Automation Panel directly (without a hub).
- 3) Depends on the transfer technology, transfer distance and Automation Panel Link plug-in card being used.
- 4) IEC 61010-2-201 requirements must be observed.
- 5) The specified value applies to the Automation Panel device with a connected Automation Panel Link plug-in card.
- 6) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 7) Visual deviations in color and surface quality are possible due to process or batch conditions.

2.3.1.3.2.4 Temperature humidity diagram

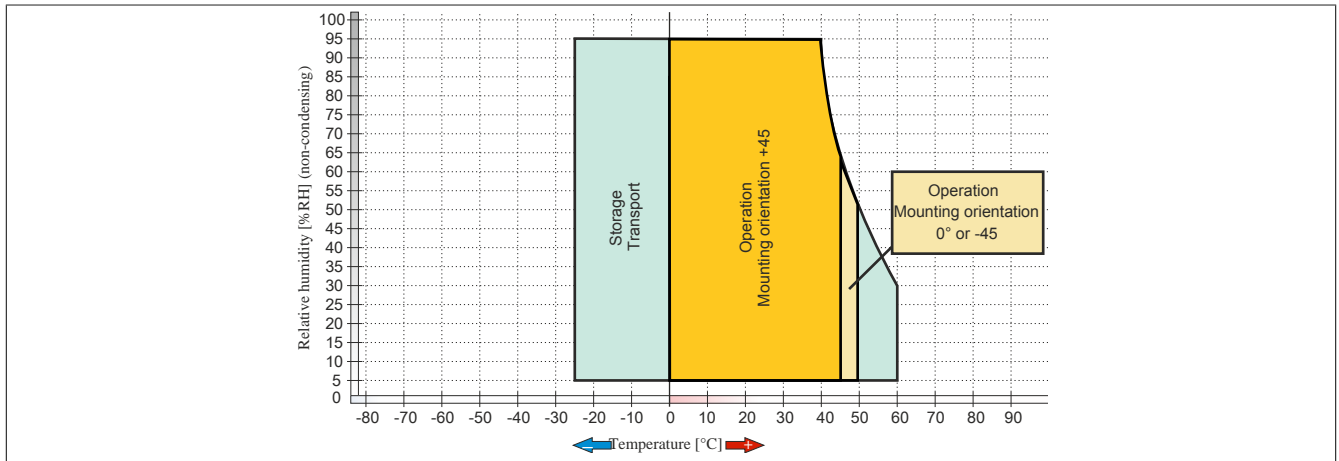


Figure 52: 5AP951.1505-01 - Temperature humidity diagram

2.3.1.3.2.5 Dimensions

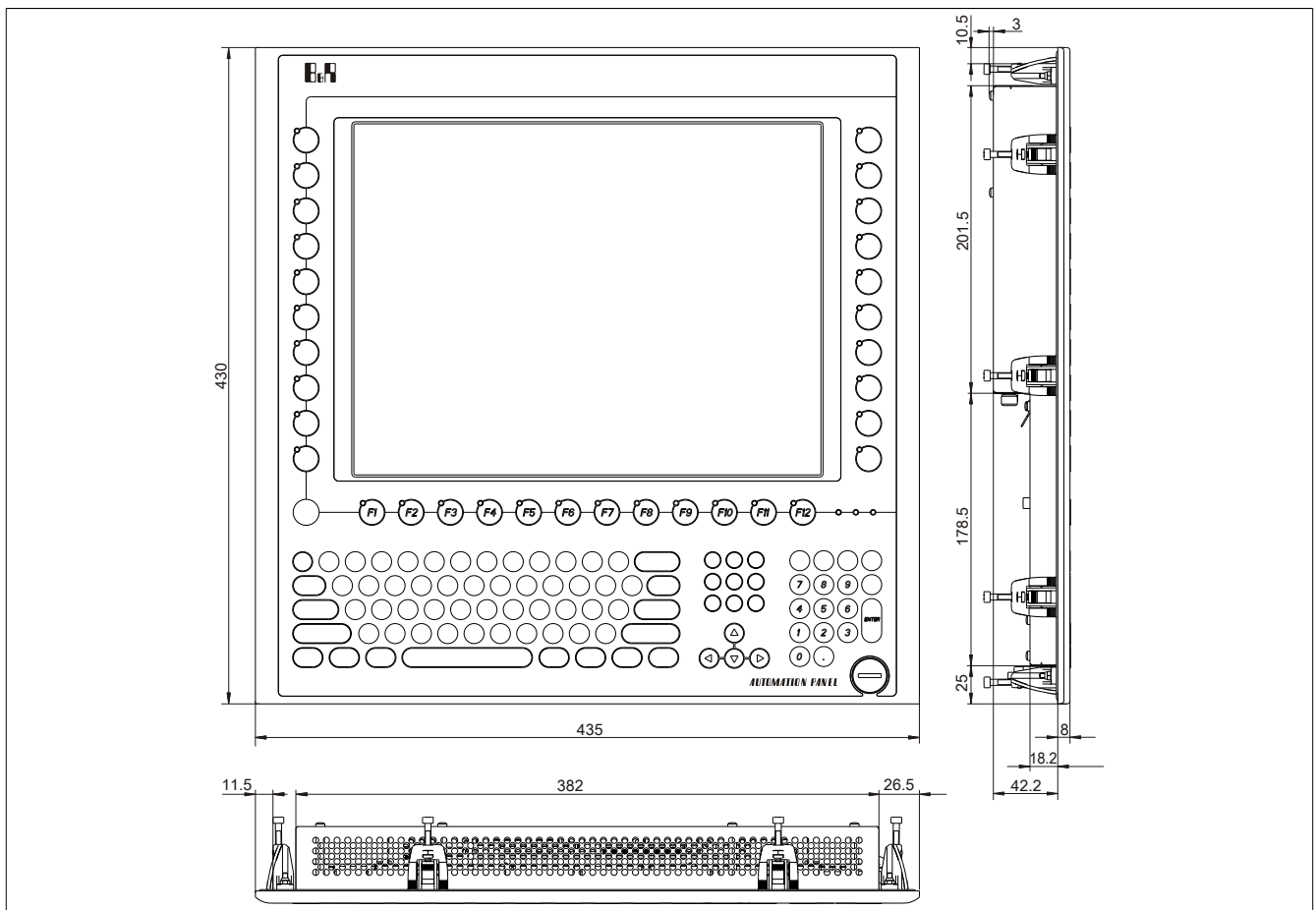


Figure 53: 5AP951.1505-01 - Dimensions

2.3.1.3.2.6 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.

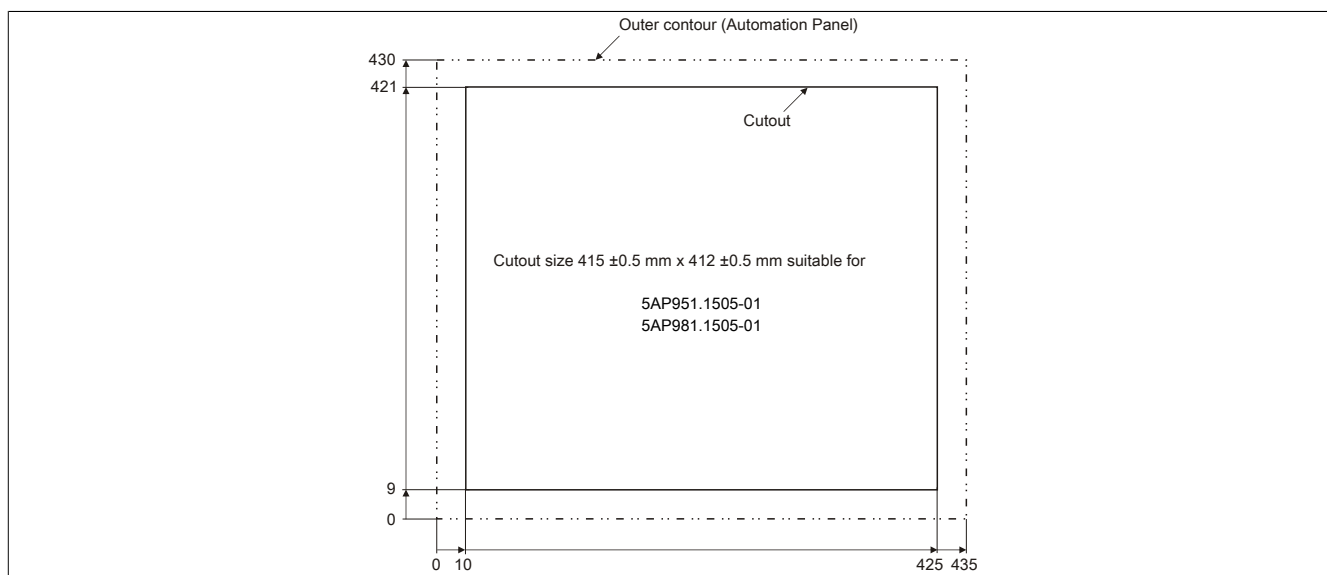


Figure 54: 5AP951.1505-01 - Cutout installation

For additional information regarding installation and mounting orientation, see ["Commissioning" on page 114](#).

2.3.1.3.3 5AP980.1505-01

2.3.1.3.3.1 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

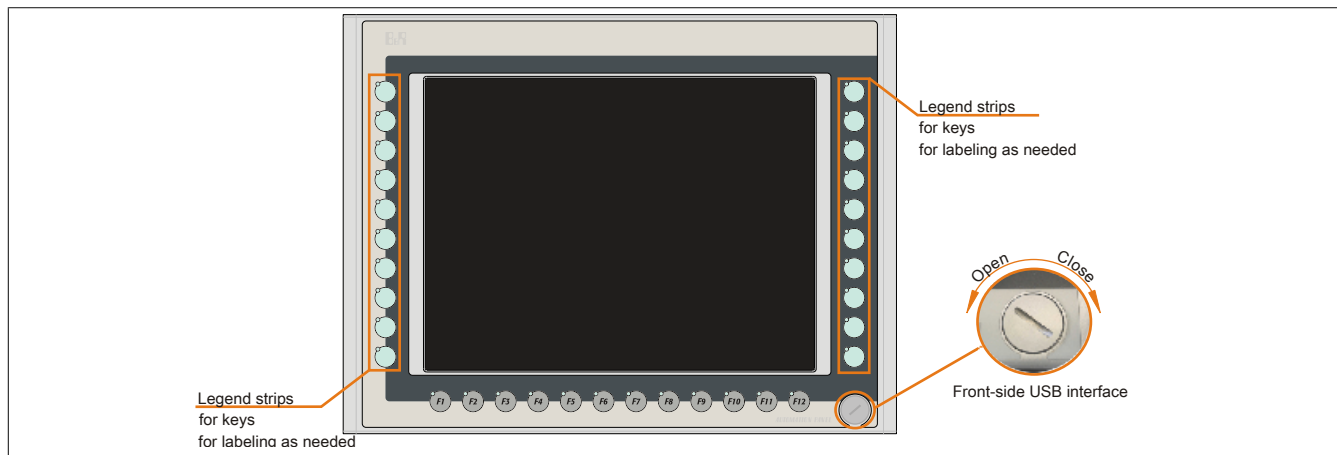


Figure 55: 5AP920.1505-01 - Front view

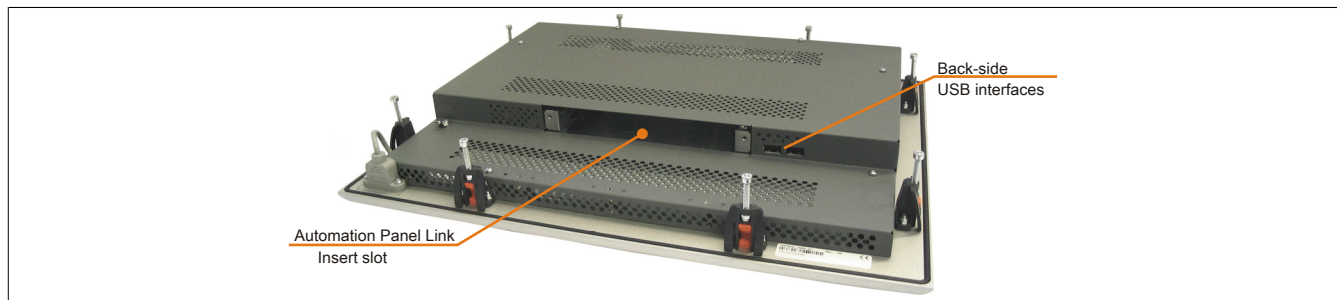


Figure 56: 5AP980.1505-01 - Rear view

2.3.1.3.3.2 Order data

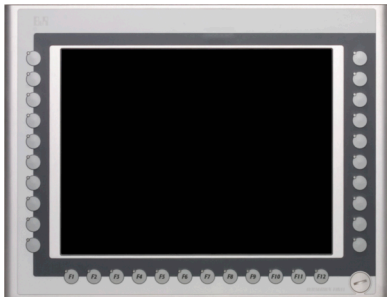
Order number	Short description	Figure
	Display units	
5AP980.1505-01	Automation Panel AP980, 15" XGA color TFT display with touch screen (resistive), 12 soft keys and 20 function keys, 3 USB 2.0 interfaces, slot for Automation Panel Link, IP65 protection (front). 24 VDC.	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Display links	
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLSD3.1000-00	Automation Panel link module - SDL3 receiver - For Automation Panel 920/98x	
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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLSDL.1000-01	Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
	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 insert card for the Automation Panel 900; 256 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	
5PC310.L800-01	Panel PC 300 insert card for the Automation Panel 900; 512 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	

Table 25: 5AP980.1505-01 - Order data

2.3.1.3.3.3 Technical data

Order number	5AP980.1505-01		
Revision	H0	I0	J0
General information			
B&R ID code	0x1D5E		
Certifications			
CE	Yes		
UL	cULus E115267 Industrial control equipment		
EAC	Yes		
Display			
Type	TFT color		
Diagonal	15" (381 mm)		
Colors	16.7 million		
Resolution	XGA, 1024 x 768 pixels		
Contrast	400:1		1000:1
Viewing angles			
Horizontal	Direction R = 85° / Direction L = 85°		
Vertical	Direction U = 85° / Direction D = 85°		
Backlight			
Type	CCFL		LED
Brightness	250 cd/m²		350 cd/m²
Half-brightness time ¹⁾	50,000 h		70,000 h
Filter glass			
Transmittance	-		
Anti-glare coating	-		

Table 26: 5AP980.1505-01, 5AP980.1505-01, 5AP980.1505-01 - Technical data

Order number	5AP980.1505-01		
Revision	H0	I0	J0
Touch screen ²⁾			
Type	Elo AccuTouch	AMT	
Technology	Analog, resistive		
Controller	Elo, serial, 12-bit		
Transmittance	80% ±5%	81% ±3%	
Interfaces			
USB ³⁾			
Quantity	3		
Type	USB 2.0 ⁴⁾		
Variant	Type A		
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)		
Current-carrying capacity	Max. 500 mA per connection		
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 luminous intensity			
Yellow	Typ. 12 mcd		
Slots			
Compatible installation for PPC300 slot	Yes		
Electrical properties			
Nominal voltage	24 VDC ±25%, SELV ⁵⁾		
Nominal current	Max. 3.2 A ⁶⁾		
Inrush 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 slot)		
Galvanic isolation	Yes		
Operating conditions			
Pollution degree per EN 61131-2	Pollution degree 2		
Degree of protection per EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, protected against dust and hose-directed water		
Ambient 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	-25 to 60°C		
Transport	-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		
Elevation			
Operation	Max. 3000 m ⁷⁾		
Mechanical properties			
Housing			
Material	Metal		
Coating	Similar to Pantone 432CV		
Front ⁸⁾			
Frame	Aluminum, naturally anodized		
Design	Gray		
Panel overlay			
Material	Polyester		
Light background color	Similar to Pantone 427CV		
Dark border color around display	Similar to Pantone 432CV		
Color slide-in labels	Similar to Pantone 429CV		
Gasket	Flat gasket around display front		

Table 26: 5AP980.1505-01, 5AP980.1505-01, 5AP980.1505-01 - Technical data

Technical data

Order number	5AP980.1505-01		
Revision	H0	I0	J0
Dimensions			
Width	435 mm		
Height	330 mm		
Depth	54 mm		
Weight	Approx. 5100 g		

Table 26: 5AP980.1505-01, 5AP980.1505-01, 5AP980.1505-01 - Technical data

- 1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
- 3) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 4) Depends on the transfer technology, transfer distance and Automation Panel Link plug-in card being used.
- 5) IEC 61010-2-201 requirements must be observed.
- 6) The specified value applies to the Automation Panel device with a connected Automation Panel Link plug-in card.
- 7) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 8) Visual deviations in color and surface quality are possible due to process or batch conditions.

2.3.1.3.3.4 Temperature humidity diagram

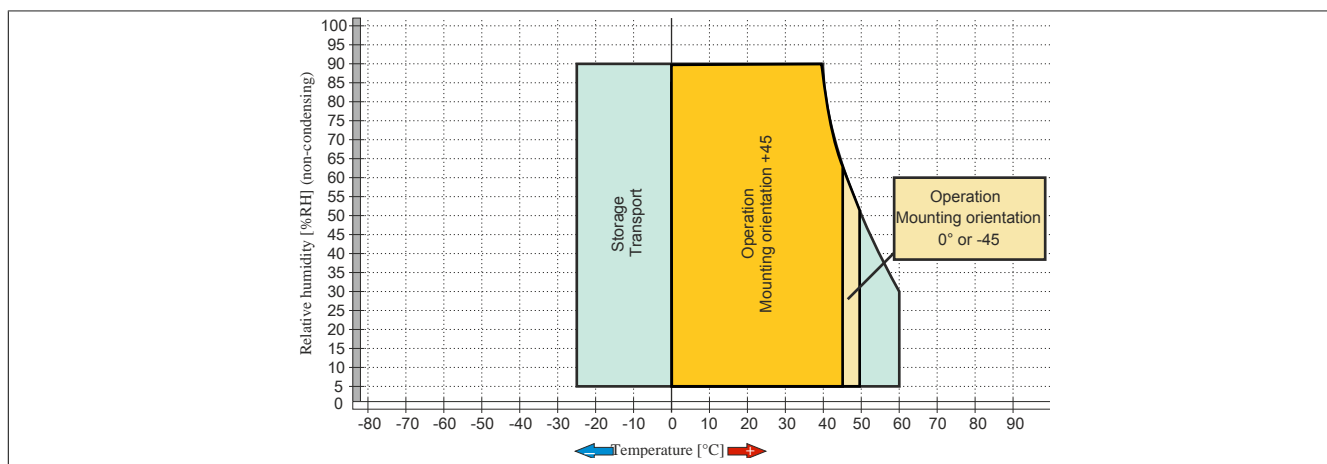


Figure 57: 5AP980.1505-01 - Temperature humidity diagram

2.3.1.3.3.5 Dimensions

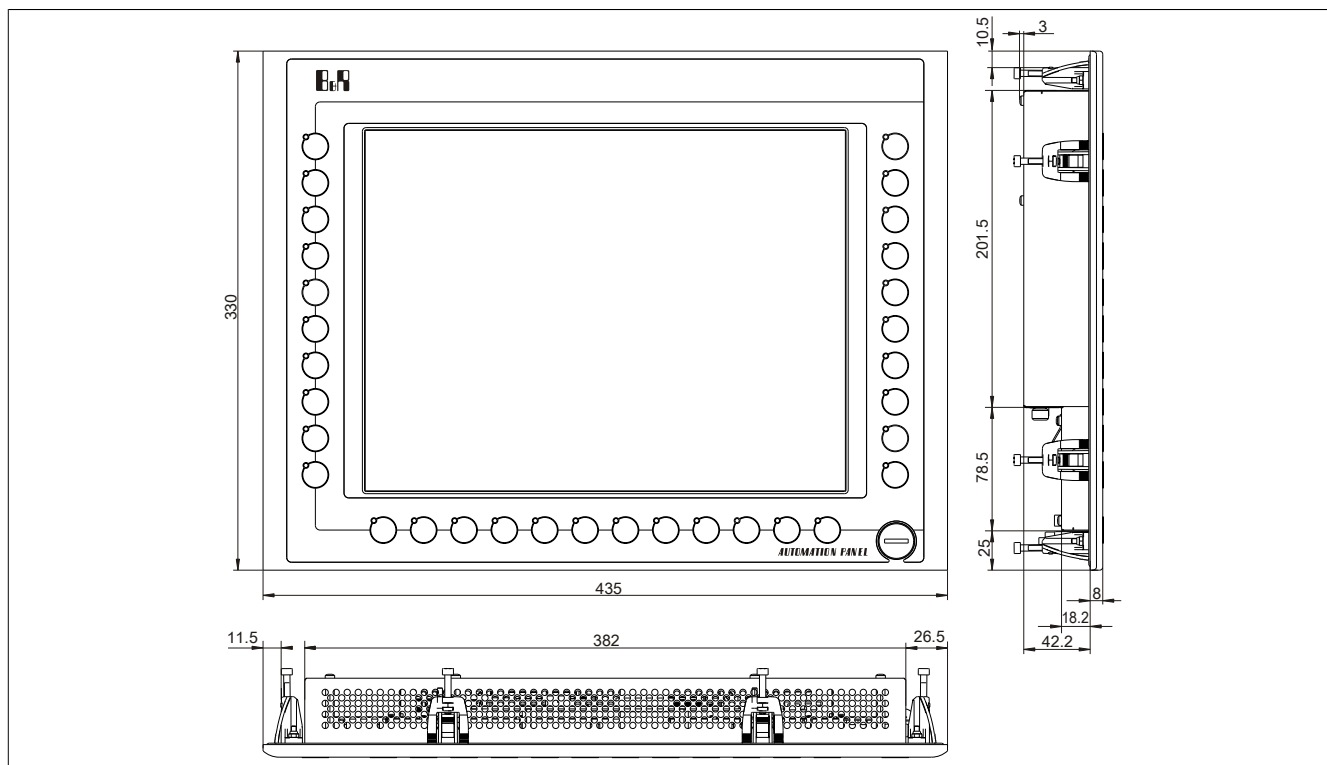


Figure 58: 5AP980.1505-01 - Dimensions

2.3.1.3.3.6 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.

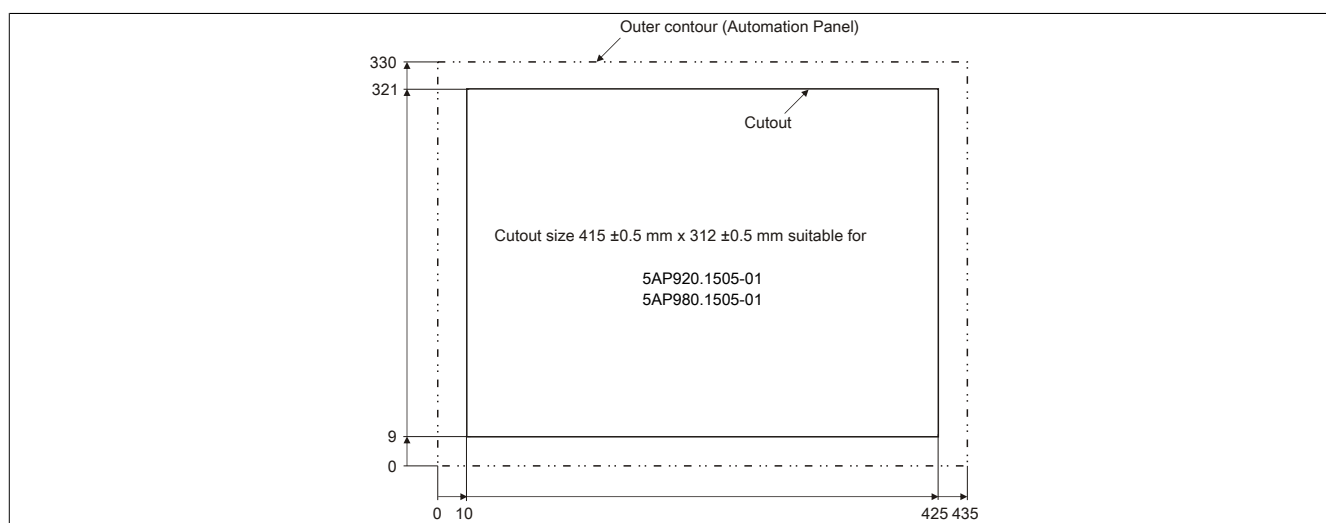


Figure 59: 5AP980.1505-01 - Cutout installation

For additional information regarding installation and mounting orientation, see ["Commissioning" on page 114](#).

2.3.1.3.4 5AP981.1505-01

2.3.1.3.4.1 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

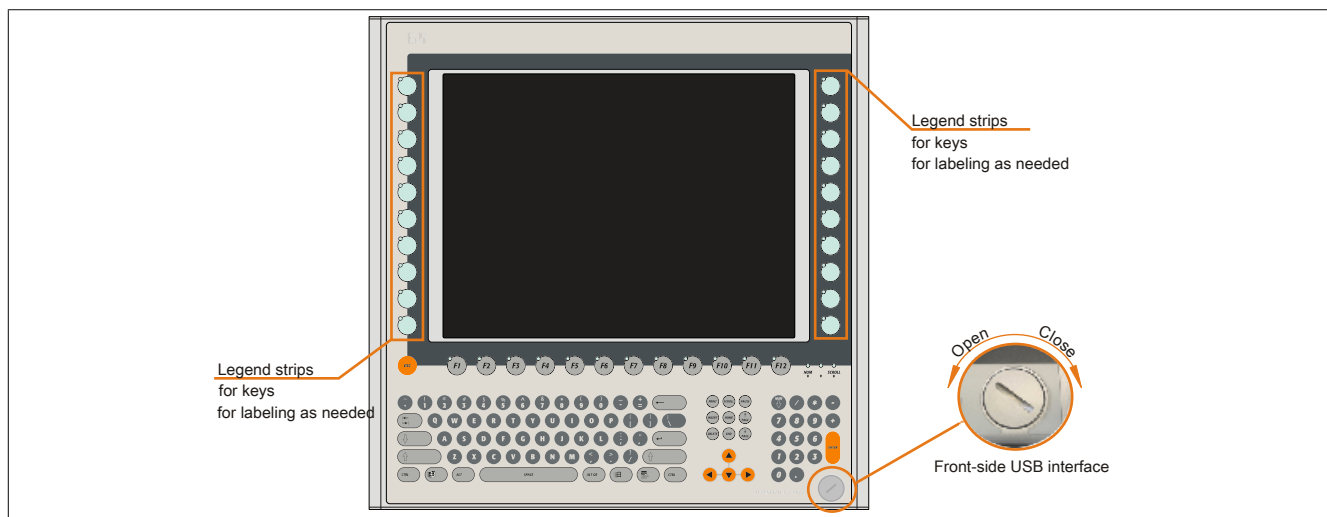


Figure 60: 5AP981.1505-01 - Front view

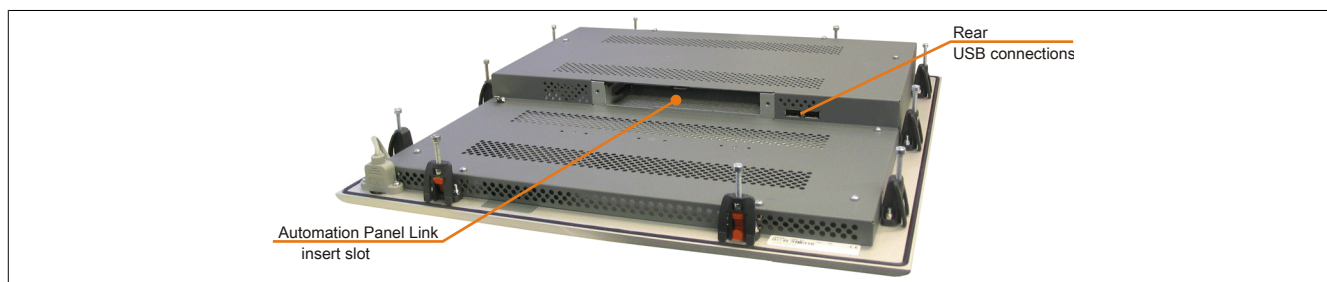


Figure 61: 5AP981.1505-01 - Rear view

2.3.1.3.4.2 Order data


Order number	Short description	
	Display units	
5AP981.1505-01	Automation Panel AP981, 15" XGA color TFT display with touch screen (resistive), 12 soft keys, 20 function and 92 system keys, 3 USB 2.0 interfaces, slot for Automation Panel Link, IP65 protection (front). 24 VDC.	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Display links	
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLSD3.1000-00	Automation Panel link module - SDL3 receiver - For Automation Panel 920/98x	
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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLSDL.1000-01	Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
	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 insert card for the Automation Panel 900; 256 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	
5PC310.L800-01	Panel PC 300 insert card for the Automation Panel 900; 512 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	

Table 27: 5AP981.1505-01 - Order data

2.3.1.3.4.3 Technical data

Order number	5AP981.1505-01		
Revision	J0	K0	M0
General information			
B&R ID code	0x1C64		
Certifications			
CE	Yes		
UL	cULus E115267 Industrial control equipment		
EAC	Yes		
KC	Yes		
Display			
Type	TFT color		
Diagonal	15" (381 mm)		
Colors	16.7 million		
Resolution	XGA, 1024 x 768 pixels		
Contrast	400:1	1000:1	
Viewing angles			
Horizontal	Direction R = 85° / Direction L = 85°		
Vertical	Direction U = 85° / Direction D = 85°		
Backlight			
Type	CCFL	LED	
Brightness	250 cd/m²	350 cd/m²	
Half-brightness time ¹⁾	50,000 h	70,000 h	
Filter glass			
Transmittance	-		
Anti-glare coating	-		

Table 28: 5AP981.1505-01, 5AP981.1505-01, 5AP981.1505-01 - Technical data

Technical data

Order number	5AP981.1505-01		
Revision	J0	K0	M0
Touch screen ²⁾			
Type	Elo AccuTouch	AMT	
Technology	Analog, resistive		
Controller	Elo, serial, 12-bit		
Transmittance	80% ±5%	81% ±3%	
Interfaces			
USB ³⁾			
Quantity	3		
Type	USB 2.0 ⁴⁾		
Variant	Type A		
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)		
Current-carrying capacity	Max. 500 mA per connection		
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 luminous intensity			
Yellow	Typ. 12 mcd		
Slots			
Compatible installation for PPC300 slot	Yes		
Electrical properties			
Nominal voltage	24 VDC ±25%, SELV ⁵⁾		
Nominal current	Max. 3.2 A ⁶⁾		
Inrush 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 slot)		
Galvanic isolation	Yes		
Operating conditions			
Degree of protection per EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, protected against dust and hose-directed water		
Ambient 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	-25 to 60°C		
Transport	-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		
Elevation			
Operation	Max. 3000 m ⁷⁾		
Mechanical properties			
Housing			
Material	Metal		
Coating	Similar to Pantone 432CV		
Front ⁸⁾			
Frame	Aluminum, naturally anodized		
Design	Gray		
Panel overlay			
Material	Polyester		
Light background color	Similar to Pantone 427CV		
Dark border color around display	Similar to Pantone 432CV		
Dark gray keys color	Similar to Pantone 431CV		
Orange keys color	Similar to Pantone 151CV		
Color slide-in labels	Similar to Pantone 429CV		
Gasket	Flat gasket around display front		

Table 28: 5AP981.1505-01, 5AP981.1505-01, 5AP981.1505-01 - Technical data

Order number	5AP981.1505-01		
Revision	J0	K0	M0
Dimensions			
Width		435 mm	
Height		430 mm	
Depth		54 mm	
Weight		Approx. 5900 g	

Table 28: 5AP981.1505-01, 5AP981.1505-01, 5AP981.1505-01 - Technical data

- 1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
- 3) USB devices can only be connected to the Automation Panel directly (i.e. without a hub).
- 4) Depends on the transfer technology, transfer distance and Automation Panel Link plug-in card being used.
- 5) IEC 61010-2-201 requirements must be observed.
- 6) The specified value applies to the Automation Panel device with a connected Automation Panel Link plug-in card.
- 7) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 8) Visual deviations in color and surface quality are possible due to process or batch conditions.

2.3.1.3.4.4 Temperature humidity diagram

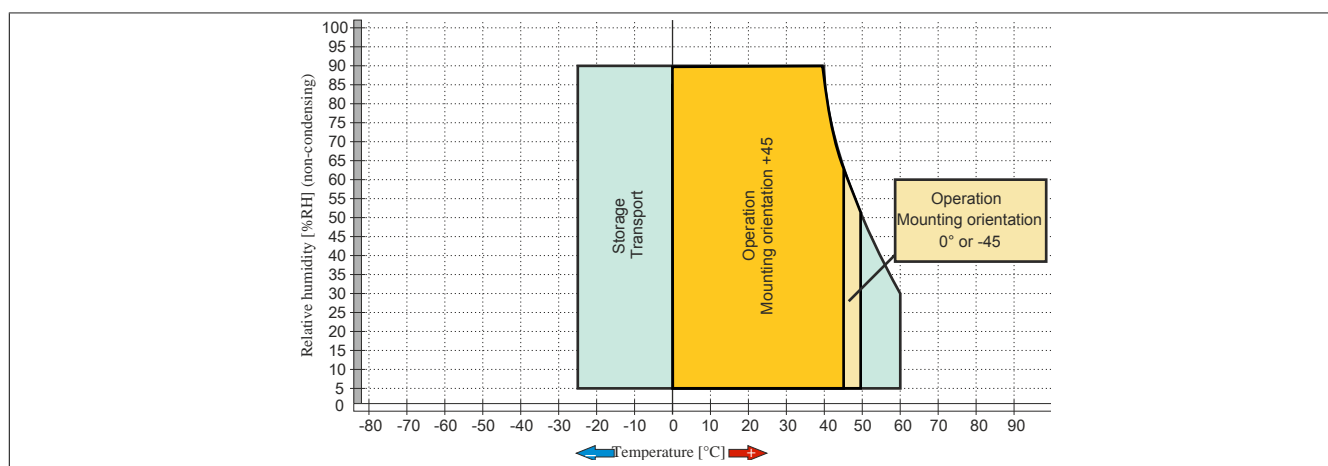


Figure 62: 5AP981.1505-01 - Temperature humidity diagram

2.3.1.3.4.5 Dimensions

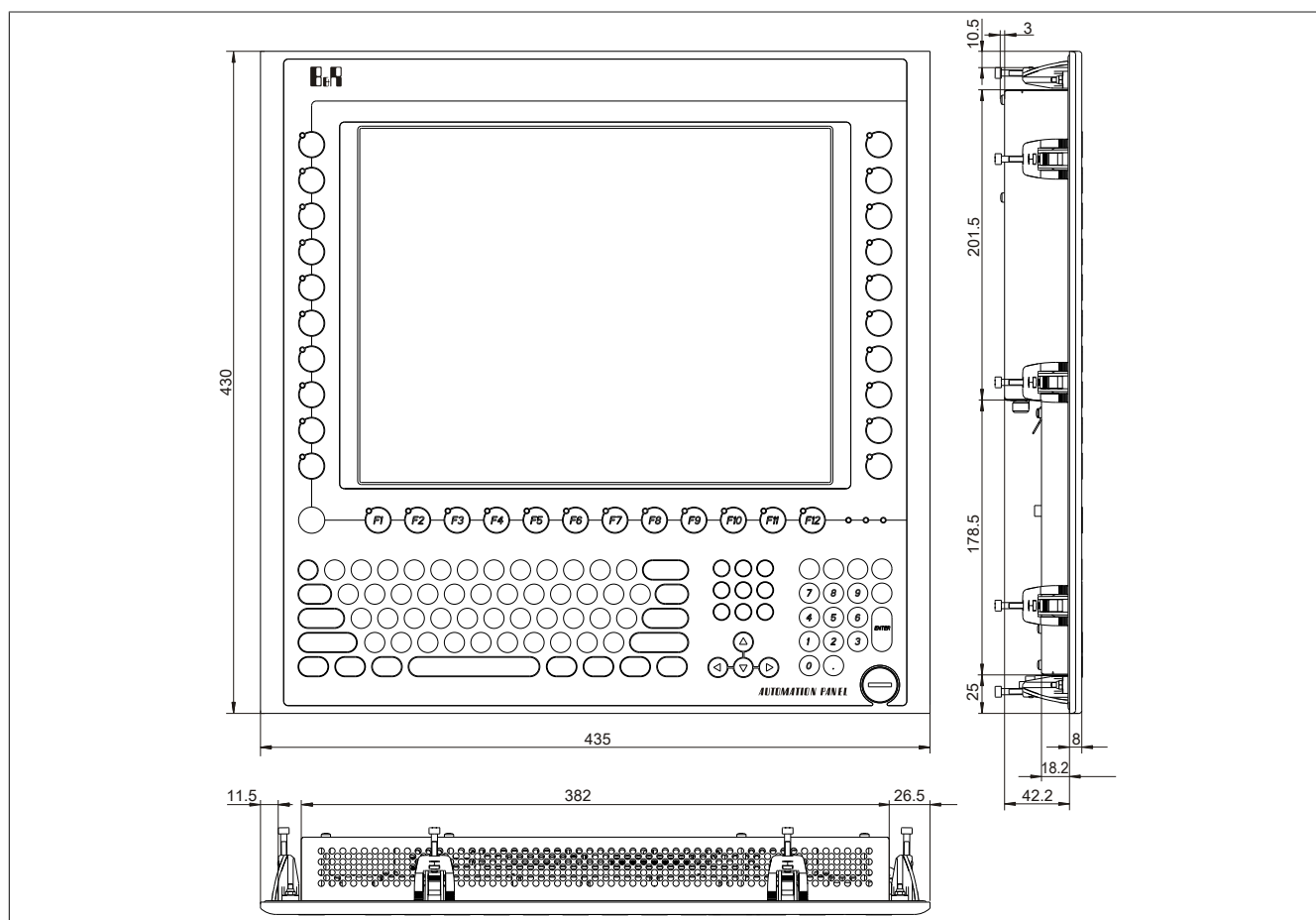


Figure 63: 5AP981.1505-01 - Dimensions

2.3.1.3.4.6 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.

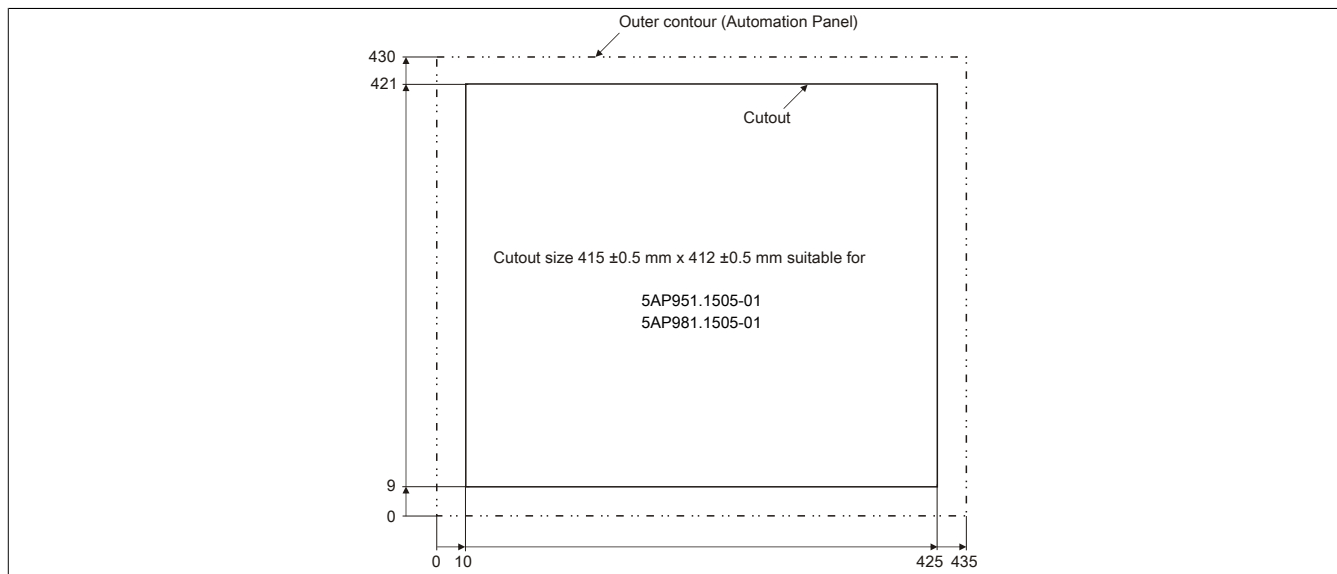


Figure 64: 5AP981.1505-01 - Cutout installation

For additional information regarding installation and mounting orientation, see ["Commissioning" on page 114](#).

2.3.1.4 Automation Panel 17" SXGA

2.3.1.4.1 5AP920.1706-01

2.3.1.4.1.1 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

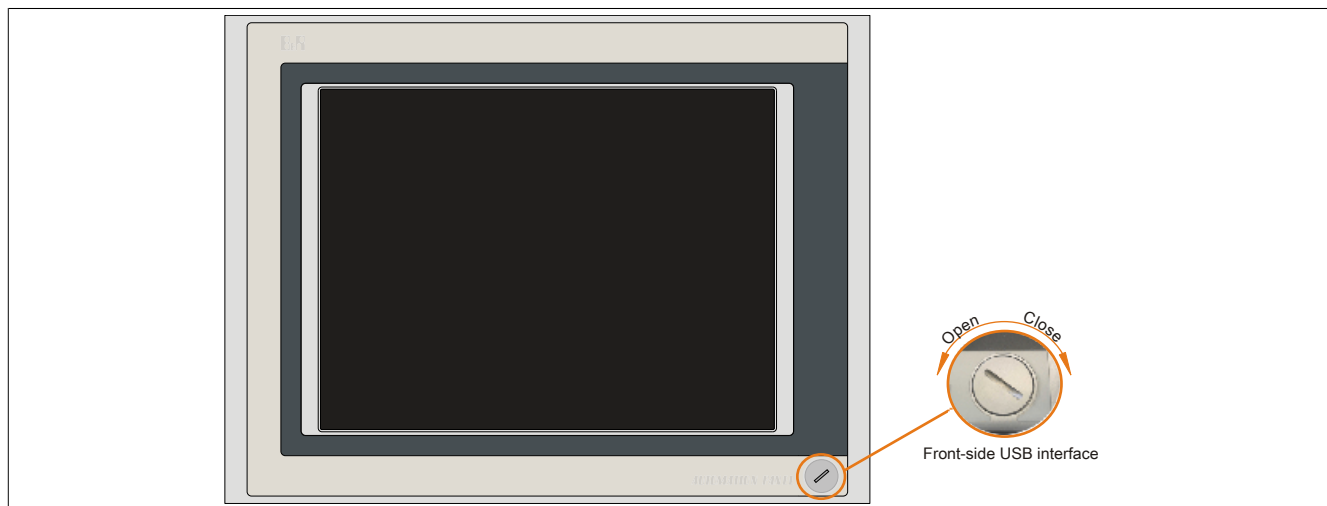


Figure 65: 5AP920.1706-01 - Front view

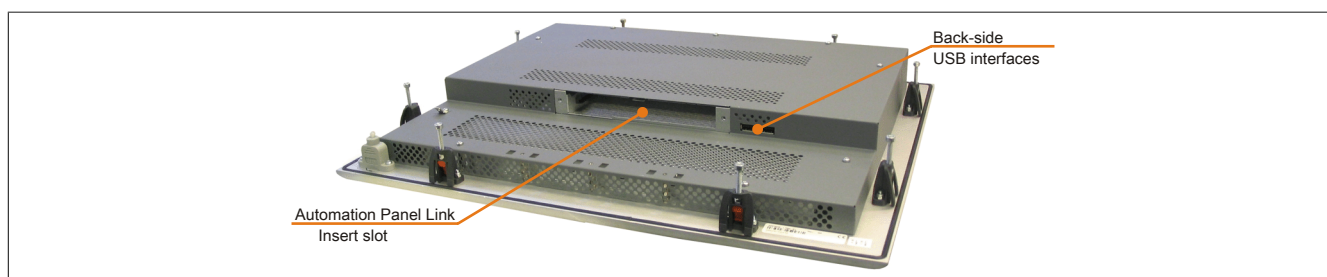


Figure 66: 5AP920.1706-01 - Rear view

2.3.1.4.1.2 Order data


Order 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		
Accessories		
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
Display links		
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS DL.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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS DL.1000-01	Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
Optional accessories		
Panel PC 300 insert cards		
5PC310.L800-00	Panel PC 300 insert card for the Automation Panel 900; 256 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	
5PC310.L800-01	Panel PC 300 insert card for the Automation Panel 900; 512 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	

Table 29: 5AP920.1706-01 - Order data

2.3.1.4.1.3 Technical data

Order number	5AP920.1706-01	
Revision	C0	D0
General information		
B&R ID code	0x1A06	
Certifications		
EAC	Yes	
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 = 75° / Direction L = 75°	
Vertical	Direction U = 75°/ direction D = 60°	
Backlight		
Type	CCFL	
Brightness	250 cd/m²	
Half-brightness time ¹⁾	30,000 h	50,000 h
Filter glass		
Transmittance	-	
Anti-glare coating	-	
Touch screen ²⁾		
Type	Elo AccuTouch	
Technology	Analog, resistive	
Controller	Elo, serial, 12-bit	
Transmittance	80% ±5%	

Table 30: 5AP920.1706-01, 5AP920.1706-01 - Technical data

Technical data

Order number	5AP920.1706-01	
Revision	C0	D0
Interfaces		
USB ³⁾		
Quantity	3	
Type	USB 2.0 ⁴⁾	
Variant	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current-carrying capacity	Max. 500mA per connection	
Keys		
Function keys	No	
Soft keys	No	
System keys	No	
Service life	-	
LED luminous intensity		
Yellow	-	
Slots		
Compatible installation for PPC300 slot	Yes	
Electrical properties		
Nominal voltage	24 VDC ±25%, SELV ⁵⁾	
Nominal current	Max. 3.2 A ⁶⁾	
Inrush 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)	
Galvanic isolation	Yes	
Operating conditions		
Pollution degree per EN 61131-2	Pollution degree 2	
Degree of protection per EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, protected against dust and hose-directed water	
Ambient 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	-25 to 60°C
Transport	-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	
Elevation		
Operation	Max. 3000 m ⁷⁾	
Mechanical properties		
Housing		
Material	Metal	
Coating	Similar to Pantone432CV	
Front ⁸⁾		
Frame	Naturally anodized aluminum	
Design	Gray	
Panel overlay		
Material	Polyester	
Light background color	Similar to Pantone 427CV	
Dark border color 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 30: 5AP920.1706-01, 5AP920.1706-01 - Technical data

- 1) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 2) Touch screen drivers can be downloaded from the download area on the B&R homepage (www.br-automation.com).
- 3) USB devices can only be connected directly to the Automation Panel (without a hub).
- 4) Depends on the transfer technology, the transfer distance and the Automation Panel Link insert card used.
- 5) IEC 61010-2-201 requirements must be observed.
- 6) The listed value applies to the Automation Panel device with an inserted Automation Panel Link card.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).
- 8) Depending on the process or batch, there may be visible deviations in the color and surface structure.

2.3.1.4.1.4 Temperature humidity diagram

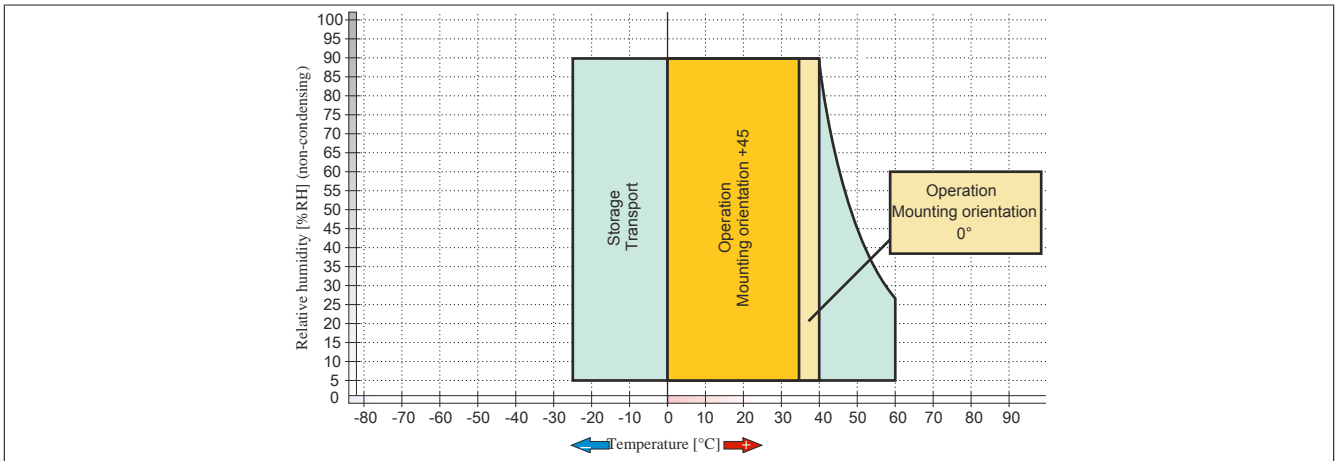


Figure 67: 5AP920.1706-01 - Temperature/Humidity diagram > Rev. D0

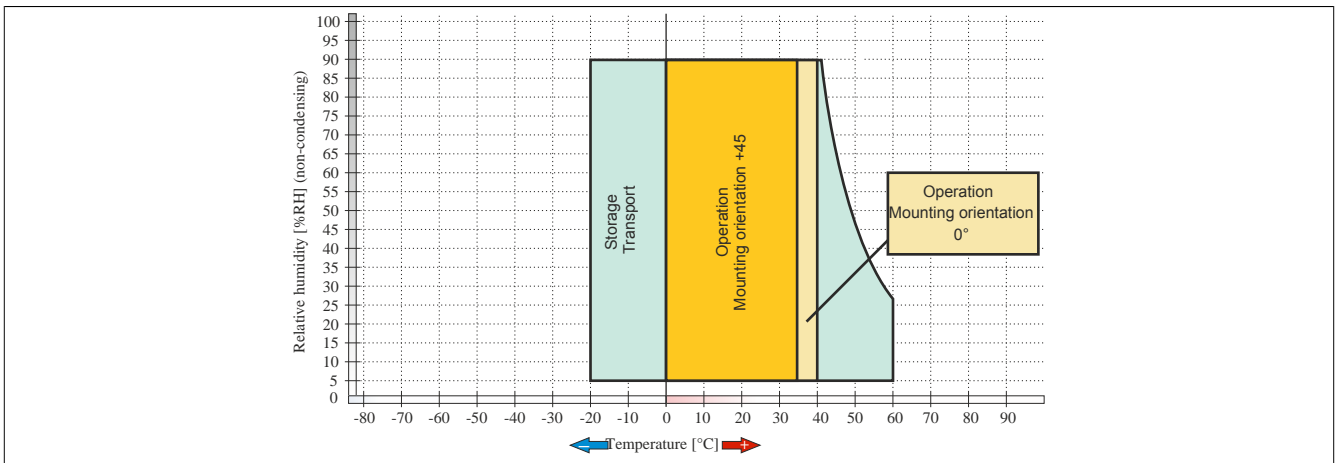


Figure 68: 5AP920.1706-01 - Temperature/Humidity diagram < Rev. C0

2.3.1.4.1.5 Dimensions

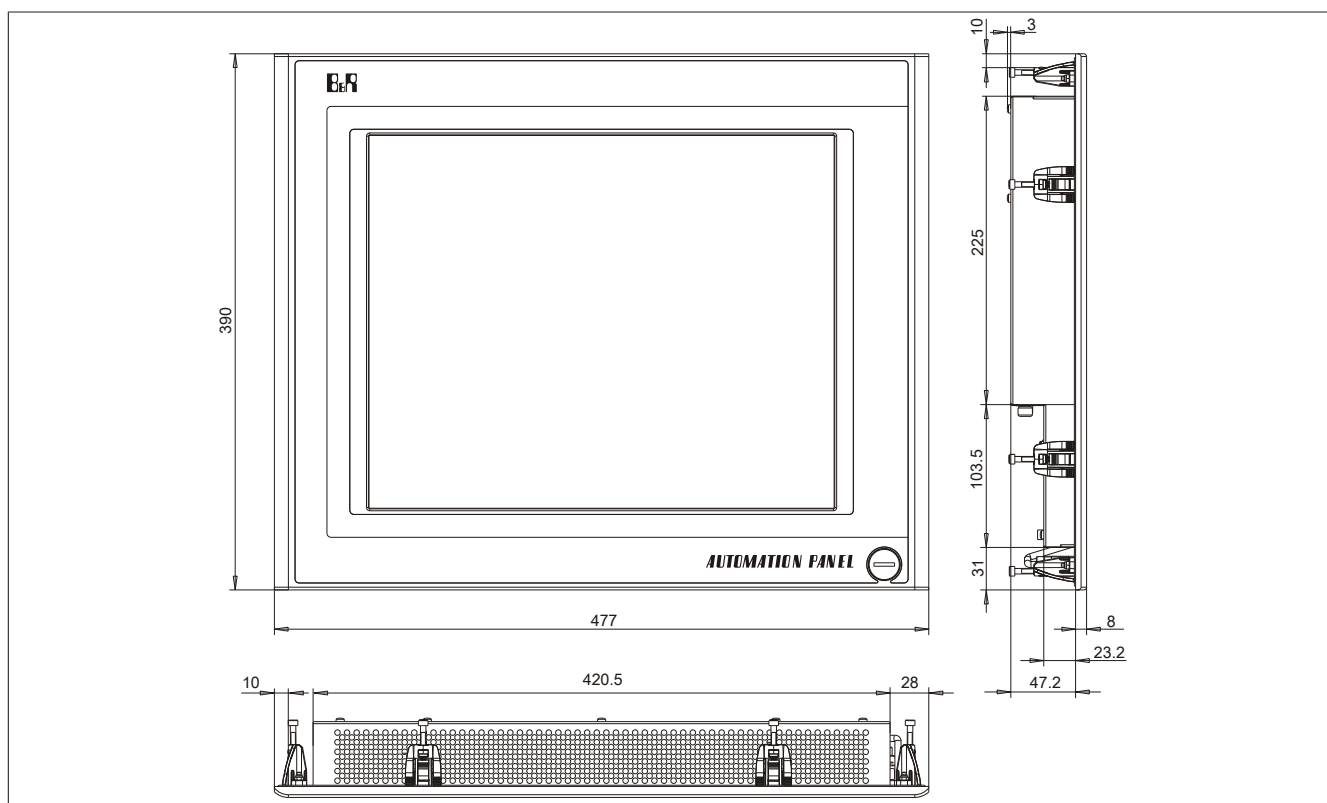


Figure 69: 5AP920.1706-01 - Dimensions

2.3.1.4.1.6 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.

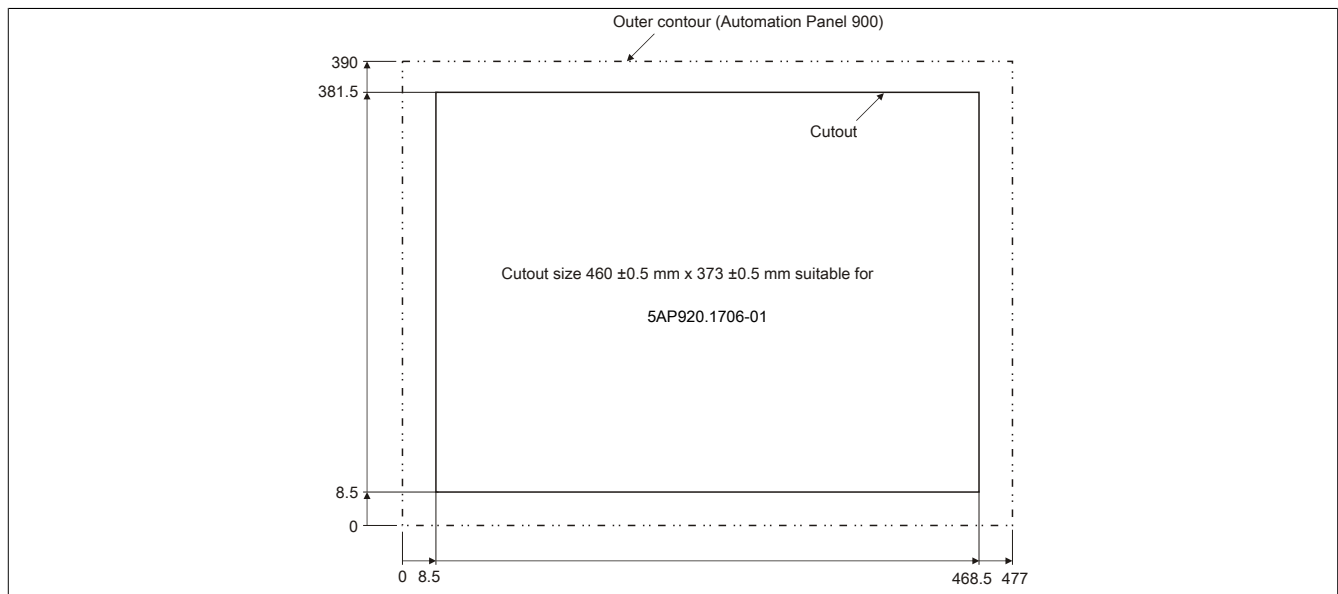


Figure 70: 5AP920.1706-01 - Cutout installation

For additional information regarding installation and mounting orientation, see ["Commissioning" on page 114](#).

2.3.1.5 Automation Panel 19" SXGA

2.3.1.5.1 5AP920.1906-01

2.3.1.5.1.1 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

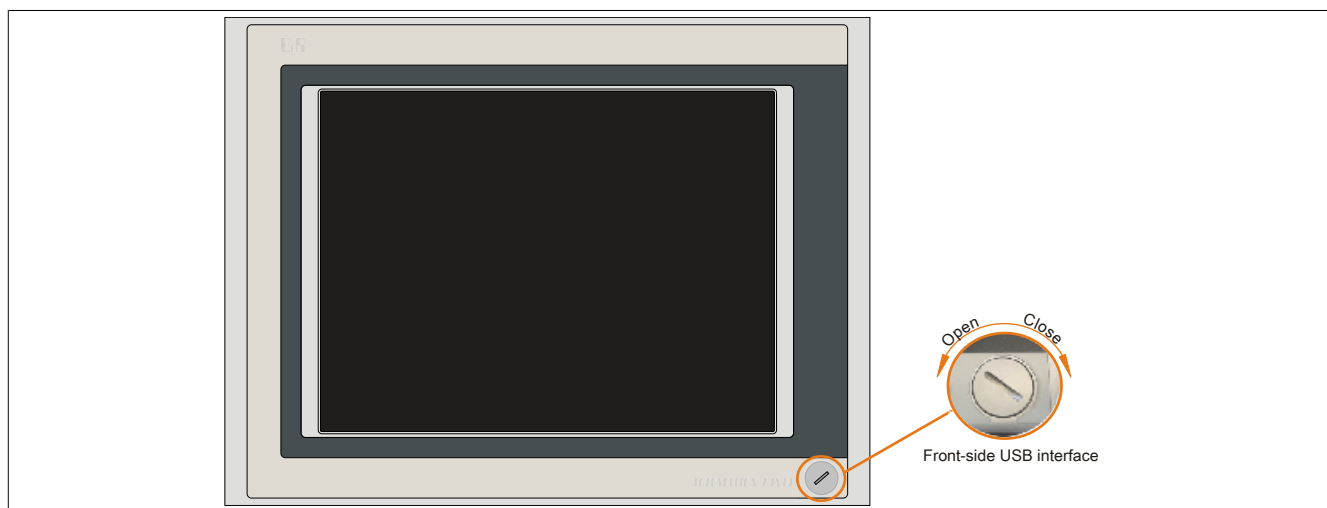


Figure 71: 5AP920.1906-01 - Front view

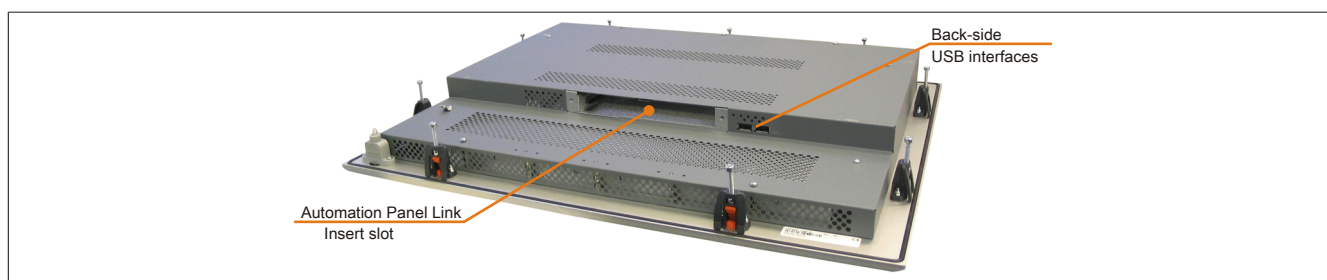


Figure 72: 5AP920.1906-01 - Rear view

2.3.1.5.1.2 Order data


Order 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 (front). 24 VDC.	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Display links	
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS D3.1000-00	Automation Panel link module - SDL3 receiver - For Automation Panel 920/98x	
5DLS DL.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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS DL.1000-01	Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
	Optional accessories	
	Panel PC 300 insert cards	
5PC310.L800-00	Panel PC 300 insert card for the Automation Panel 900; 256 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	
5PC310.L800-01	Panel PC 300 insert card for the Automation Panel 900; 512 MB SDRAM; CompactFlash slot (Type I); 2x ETH 10/100; RS232; USB 2.0 (via integrated USB 2.0 interfaces on the Automation Panel); battery; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	

Table 31: 5AP920.1906-01 - Order data

2.3.1.5.1.3 Technical data

Order number	5AP920.1906-01			
Revision	C0	D0	O0	P0
General information				
B&R ID code	0x1A07			
Certifications				
CE	Yes			
UL	cULus E115267 Industrial control equipment			
EAC	Yes			
KC	Yes			
Display				
Type	TFT color			
Diagonal	19" (482 mm)			
Colors	16.7 million			
Resolution	SXGA, 1280 x 1024 pixels			
Contrast	600:1			1000:1
Viewing angles				
Horizontal	Direction R = 75° / Direction L = 75°			Direction R = 89° / Direction L = 89°
Vertical	Direction U = 75° / Direction D = 60°			Direction U = 89° / Direction D = 89°
Backlight				
Type	CCFL			LED
Brightness	250 cd/m²			300 cd/m²
Half-brightness time ¹⁾	35,000 h			50,000 h
Filter glass				
Transmittance	-			
Anti-glare coating	-			

Table 32: 5AP920.1906-01, 5AP920.1906-01, 5AP920.1906-01, 5AP920.1906-01 - Technical data

Technical data

Order number	5AP920.1906-01			
Revision	C0	D0	O0	P0
Touch screen ²⁾				
Type	Elo AccuTouch		AMT	
Technology	Analog, resistive			
Controller	Elo, serial, 12-bit			
Transmittance	80% ±5%		81% ±3%	
Interfaces				
USB ³⁾				
Quantity	3			
Type	USB 2.0 ⁴⁾			
Variant	Type A			
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)			
Current-carrying capacity	Max. 500 mA per connection			
Keys				
Function keys	No			
Soft keys	No			
System keys	No			
Service life	-			
LED luminous intensity				
Yellow	-			
Slots				
Compatible installation for PPC300 slot	Yes			
Electrical properties				
Nominal voltage	24 VDC ±25%, SELV ⁵⁾			
Nominal current	Max. 3.2 A ⁶⁾			
Inrush current	Typ. 6 A, max. 30 A for < 300 µs			
Power consumption	Typ. 27 W, max. 38 W or 48 W with USB (without slot)			
Galvanic isolation	Yes			
Operating conditions				
Pollution degree per EN 61131-2	Pollution degree 2			
Degree of protection per EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, protected against dust and hose-directed water			
Ambient conditions				
Temperature				
Operation	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			
Storage	-20 to 60°C	-25 to 60°C		
Transport	-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			
Elevation				
Operation	Max. 3000 m ⁷⁾			
Mechanical properties				
Housing				
Material	Metal			
Coating	Similar to Pantone 432CV			
Front ⁸⁾				
Frame	Aluminum, naturally anodized			
Design	Gray			
Panel overlay				
Material	Polyester			
Light background color	Similar to Pantone 427CV			
Dark border color around display	Similar to Pantone 432CV			
Gasket	Flat gasket around display front			
Dimensions				
Width	527 mm			
Height	421 mm			
Depth	62 mm			
Weight	Approx. 8100 g			

Table 32: 5AP920.1906-01, 5AP920.1906-01, 5AP920.1906-01, 5AP920.1906-01 - Technical data

- 1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
- 3) USB devices can only be connected to the Automation Panel directly (without a hub).
- 4) Depends on the transfer technology, transfer distance and Automation Panel Link plug-in card being used.

- 5) IEC 61010-2-201 requirements must be observed.
- 6) The specified value applies to the Automation Panel device with a connected Automation Panel Link plug-in card.
- 7) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 8) Visual deviations in color and surface quality are possible due to process or batch conditions.

2.3.1.5.1.4 Temperature humidity diagram

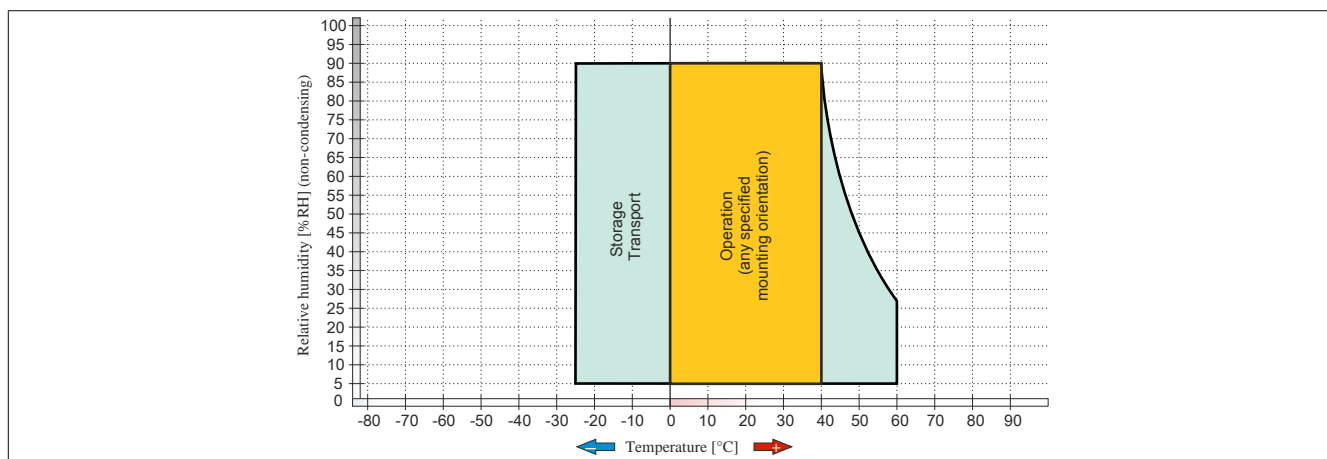


Figure 73: 5AP920.1906-01 - Temperature/Humidity diagram > Rev. D0

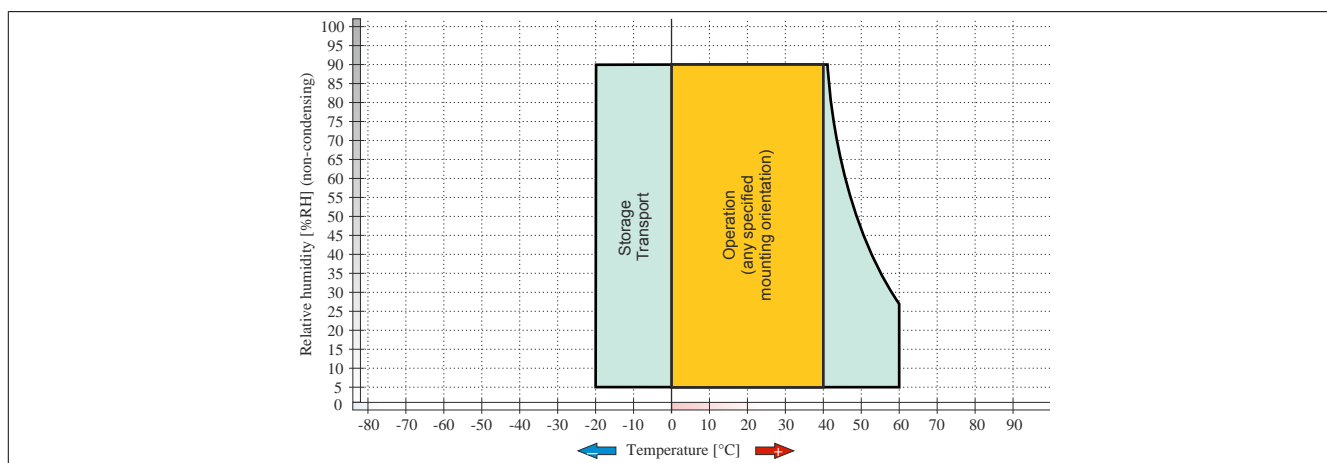


Figure 74: 5AP920.1906-01 - Temperature/Humidity diagram < Rev. C0

2.3.1.5.1.5 Dimensions

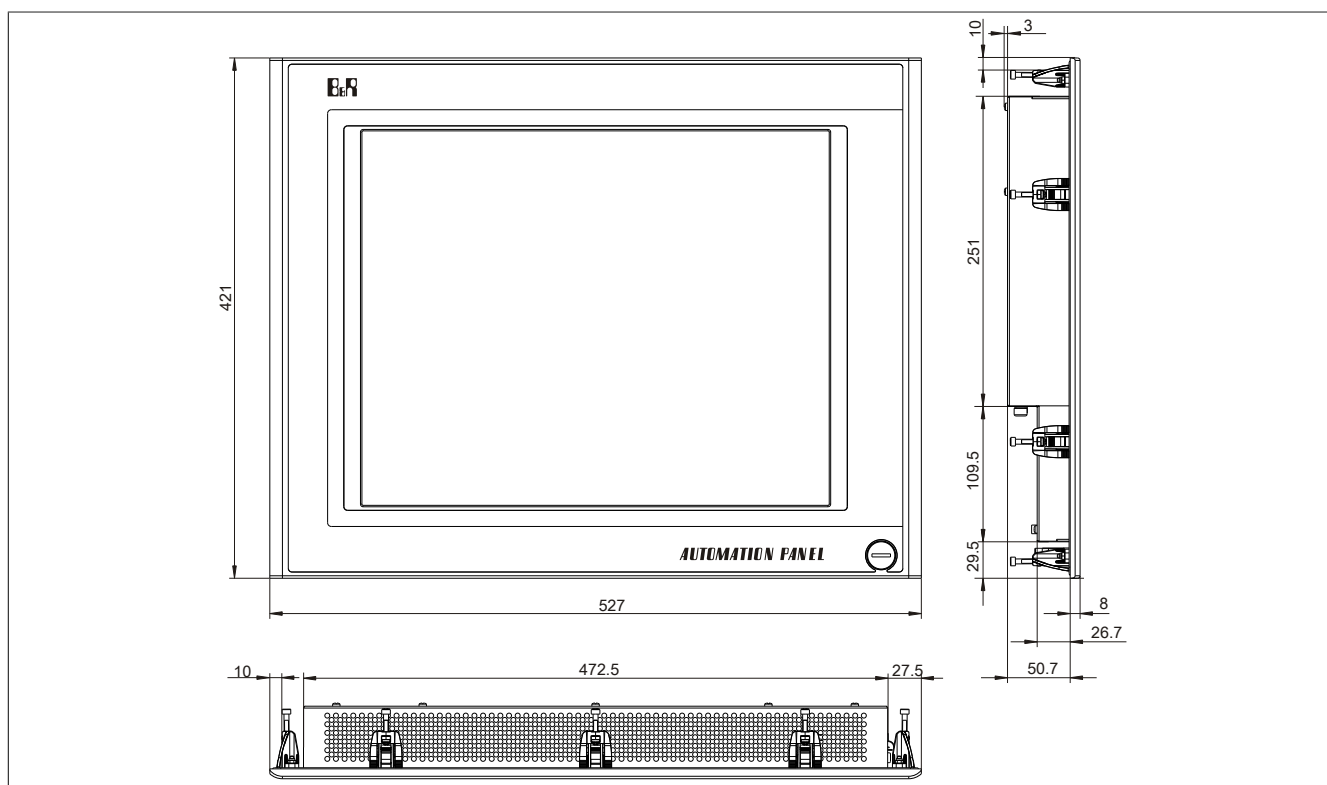


Figure 75: 5AP920.1906-01 - Dimensions

2.3.1.5.1.6 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.

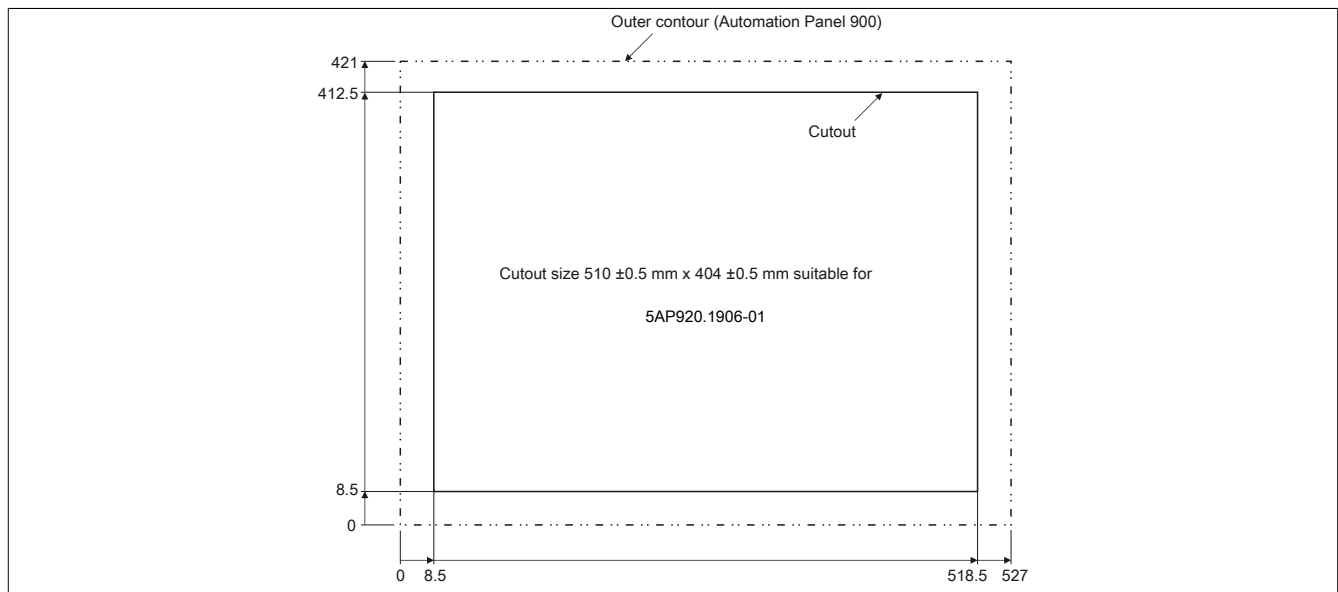


Figure 76: 5AP920.1906-01 - Cutout installation

For additional information regarding installation and mounting orientation, see ["Commissioning" on page 114](#).

2.3.1.6 Automation Panel 21.3" UXGA

2.3.1.6.1 5AP920.2138-01

2.3.1.6.1.1 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

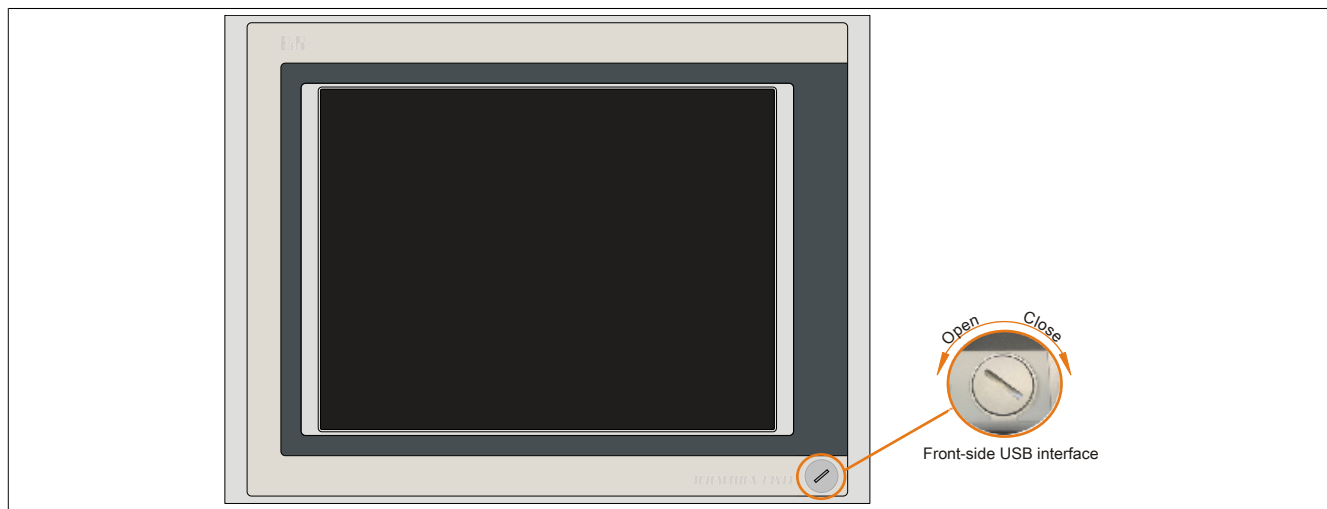


Figure 77: 5AP920.2138-01 - Front view

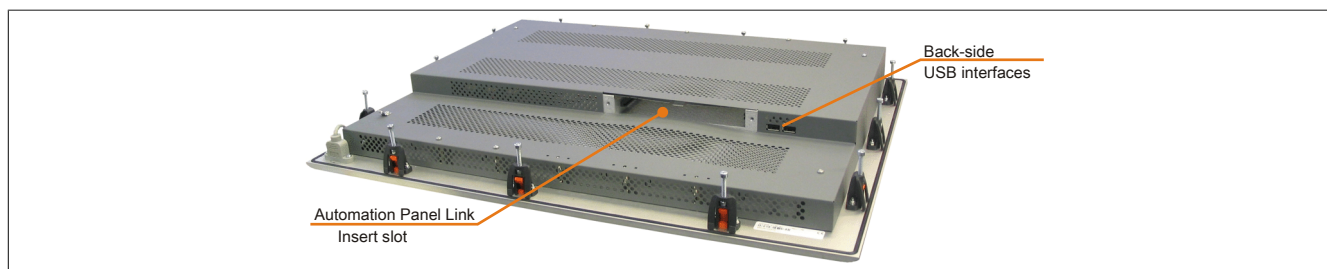


Figure 78: 5AP920.2138-01 - Rear view

2.3.1.6.1.2 Order data


Order 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; insert for Automation Panel Link; IP65 protection (front). 24VDC.	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Display links	
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS DL.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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
5DLS DL.1000-01	Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	

Table 33: 5AP920.2138-01 - Order data

2.3.1.6.1.3 Technical data

Order number	5AP920.2138-01
General information	
B&R ID code	0x1A08
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
EAC	Yes
Display	
Type	TFT color
Diagonal	21.3" (641 mm)
Colors	16.7 million
Resolution	UXGA, 1600 x 1200 pixels
Contrast	500:1
Viewing angles	
Horizontal	Direction R = 60° / Direction L = 60°
Vertical	Direction U = 60° / Direction D = 60°
Backlight	
Type	CCFL
Brightness	250 cd/m ²
Half-brightness time ¹⁾	50,000 h
Filter glass	
Transmittance	-
Anti-glare coating	-
Touch screen ²⁾	
Type	Elo AccuTouch
Technology	Analog, resistive
Controller	Elo, serial, 12-bit
Transmittance	80% ±5%
Interfaces	
USB ³⁾	
Quantity	3
Type	USB 2.0 ⁴⁾
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA per connection
Keys	
Function keys	No
Soft keys	No
System keys	No
Service life	-
LED luminous intensity	
Yellow	-
Electrical properties	
Nominal voltage	24 VDC ±25%, SELV ⁵⁾
Nominal current	Max. 4.2 A ⁶⁾
Inrush current	Typ. 8 A, max. 40 A for < 300 µs
Power consumption	Typ. 50 W, max. 63 W or 73 W with USB (without slot)
Galvanic isolation	Yes
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Back: IP20 (only with an inserted Automation Panel Link card) Front: IP65 / NEMA 250 type 4X indoor, protected against dust and hose-directed water
Ambient 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
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Elevation	
Operation	Max. 3000 m ⁷⁾

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

Order number	5AP920.2138-01
Mechanical properties	
Housing	
Material	Metal
Coating	Similar to Pantone 432CV
Front ⁸⁾	
Frame	Aluminum, naturally anodized
Design	Gray
Panel overlay	
Material	Polyester
Light background color	Similar to Pantone 427CV
Dark border color around display	Similar to Pantone 432CV
Gasket	Flat gasket around display front
Dimensions	
Width	583 mm
Height	464 mm
Depth	64 mm
Weight	Approx. 11000 g

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

- 1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
- 3) USB devices can only be connected to the Automation Panel directly (without a hub).
- 4) Depends on the transfer technology, transfer distance and Automation Panel Link plug-in card being used.
- 5) IEC 61010-2-201 requirements must be observed.
- 6) The specified value applies to the Automation Panel device with a connected Automation Panel Link plug-in card.
- 7) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 8) Visual deviations in color and surface quality are possible due to process or batch conditions.

2.3.1.6.1.4 Temperature humidity diagram

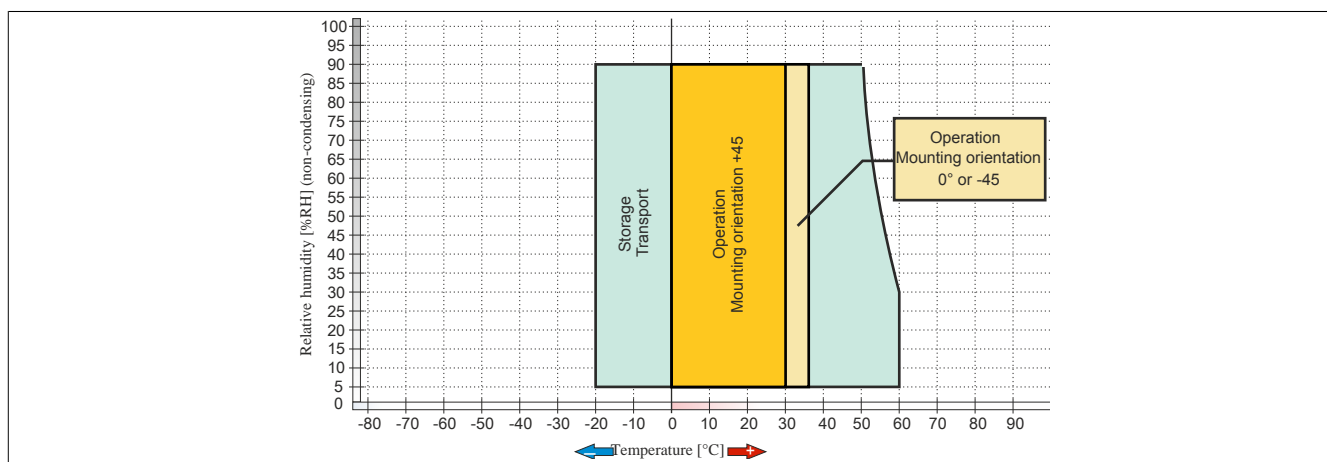


Figure 79: 5AP920.2138-01 - Temperature humidity diagram

2.3.1.6.1.5 Dimensions

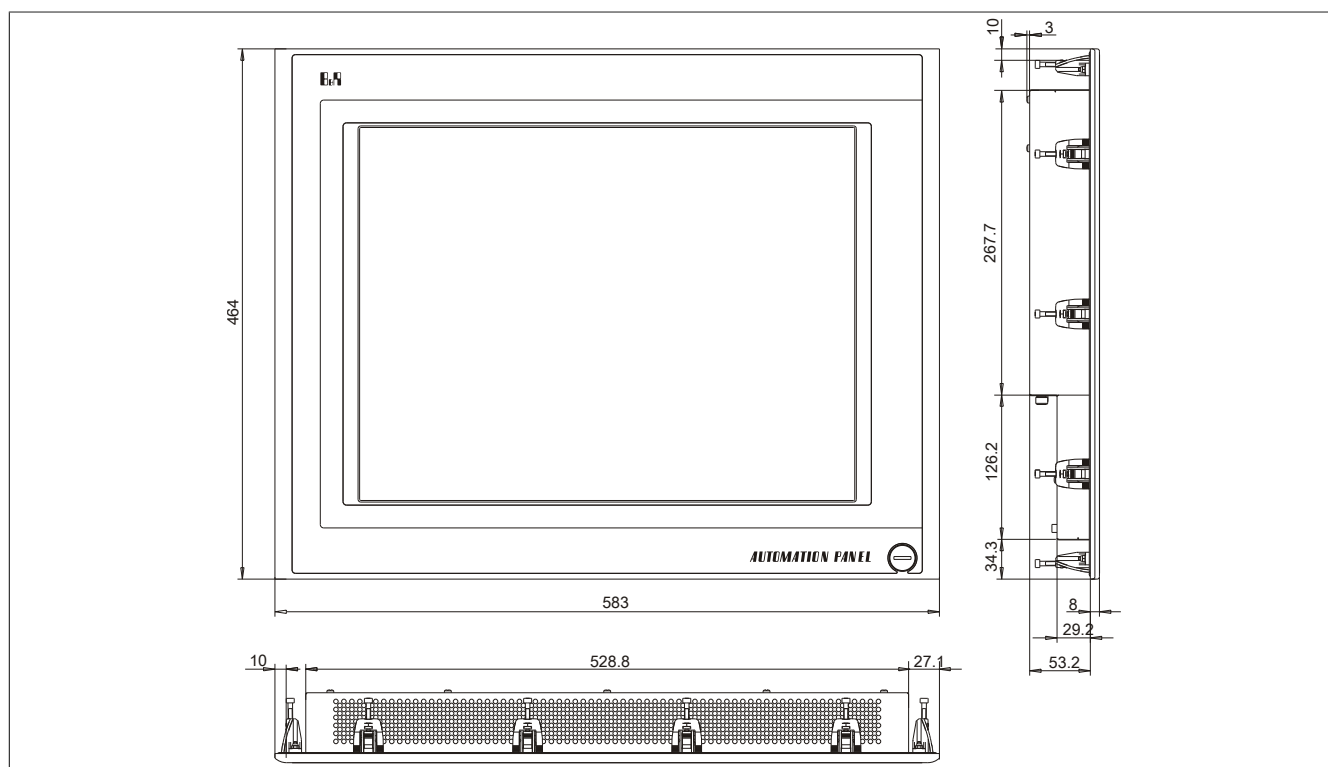


Figure 80: 5AP920.2138-01 - Dimensions

2.3.1.6.1.6 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.

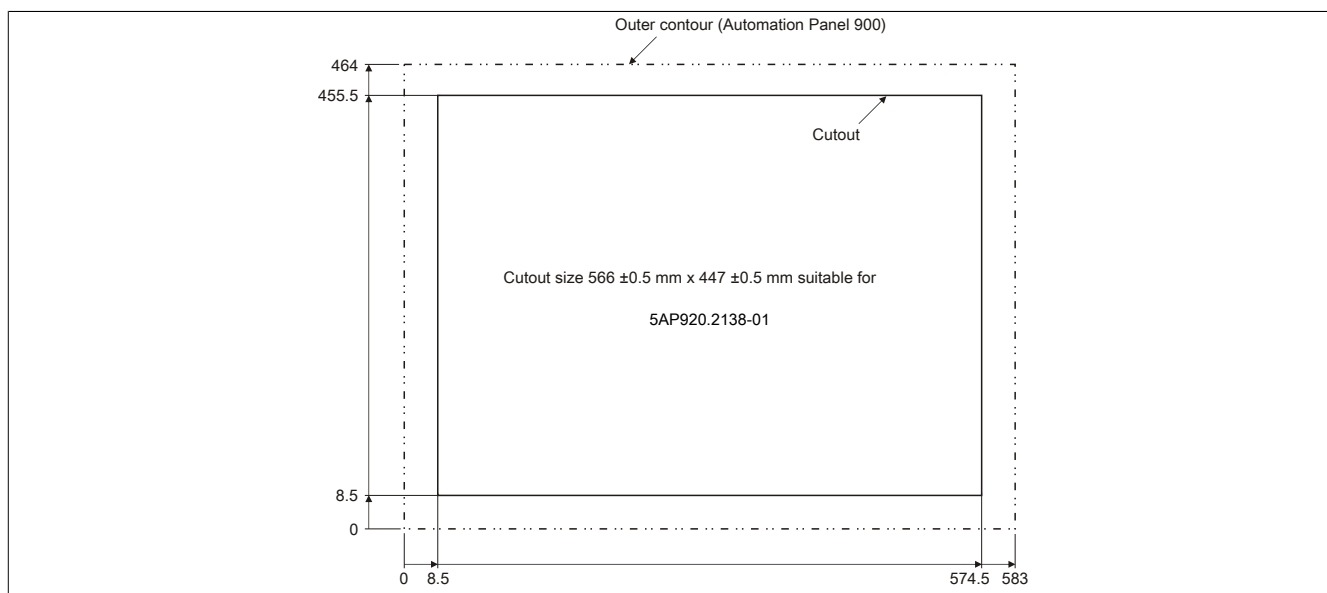


Figure 81: 5AP920.2138-01 - Cutout installation

For additional information regarding installation and mounting orientation, see ["Commissioning" on page 114](#).

2.3.2 Automation Panel Link plug-in cards

Automation Panel Link plug-in cards provide 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 pass them along 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.

A plug-in card is simply inserted into the Automation Panel 900 slot provided and fastened into place using the two locating screws (max. tightening torque 0.5 Nm).

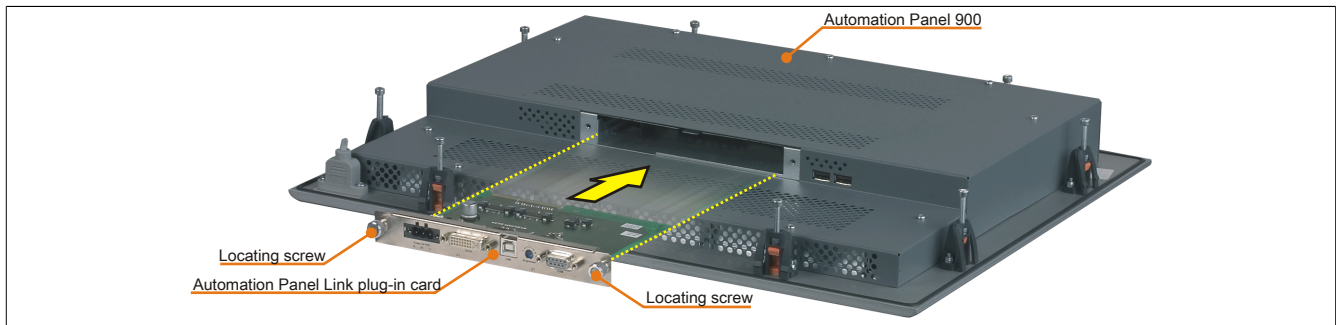


Figure 82: Automation Panel and Automation Panel Link plug-in card

2.3.2.1 5DL DVI.1000-01

2.3.2.1.1 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

2.3.2.1.2 Order data


Order number	Short description	Figure
	Display links	
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	DVI cables	
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	
	Optional accessories	
	RS232 cables	
9A0014.02	RS232 extension cable for remote operation of a display unit with touch screen, 1.8 m	
9A0014.05	RS232 extension cable for remote operation of a display unit with touch screen, 5 m	
	USB cables	
5CAUSB.0018-00	USB 2.0 connection cable - Type A - type B connector - 1.8 m	
5CAUSB.0050-00	USB 2.0 connection cable - Type A - type B connector - 5 m	

Table 35: 5DL DVI.1000-01 - Order data

2.3.2.1.3 Technical data

Order number	5DL DVI.1000-01
General information	
BL adjuster ¹⁾	Yes
B&R ID code	0x1A0B
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
DNV ²⁾	Temperature: A (0 - 45°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (bridge and open deck)
KC	Yes
Interfaces	
COM1	
Type	RS232, not galvanically isolated
Variant	DSUB, 9-pin, female
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
Variant	Type B
Panel In	
Variant	DVI-D
Type	SDL/DVI
Electrical properties	
Nominal voltage	24 VDC ±25%, SELV ³⁾
Nominal current ⁴⁾	Max. 4.2 A

Table 36: 5DL DVI.1000-01 - Technical data

Order number	5DL DVI.1000-01
Power consumption	Typ. 3 W
Mechanical properties	
Locating screws	
Quantity	2
Max. tightening torque	0.5 Nm

Table 36: 5DL DVI.1000-01 - Technical data

- 1) For setting the brightness of the AP900 backlight.
- 2) Yes, but applies only if all components installed in the complete system have this certification.
- 3) IEC 61010-2-201 requirements must be observed.
- 4) The specified value refers to an Automation Panel Link plug-in card connected in a 19" Automation Panel device.

2.3.2.1.4 Interfaces

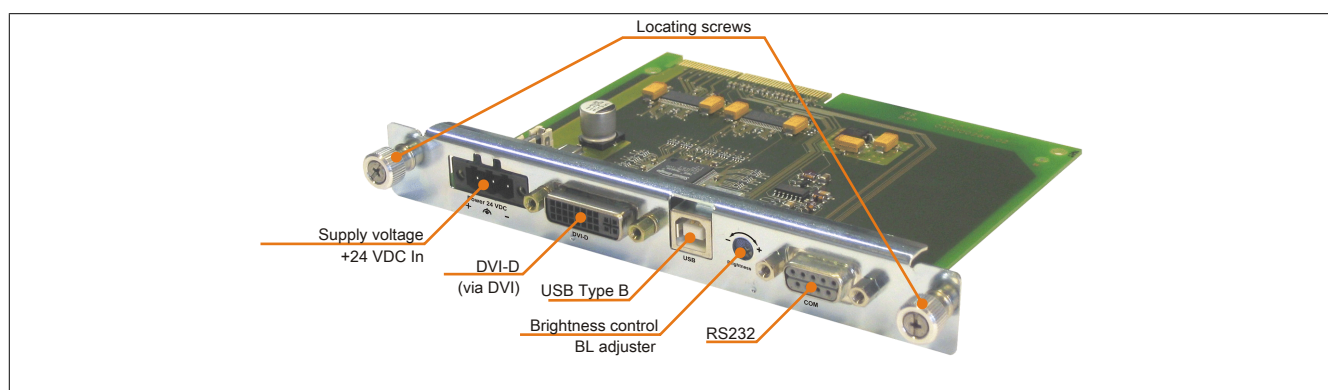


Figure 83: 5DL DVI.1000-01 - Interfaces

2.3.2.1.4.1 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 157](#)).

2.3.2.1.4.2 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 157](#)) 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.).

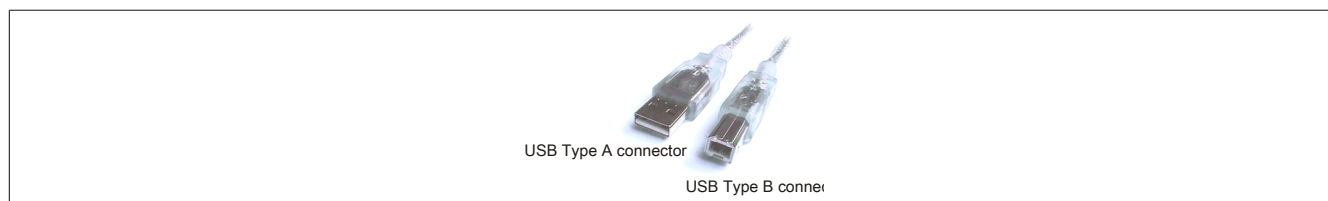


Figure 84: Comparison of USB Type A/B connectors

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.

2.3.2.1.4.3 BL adjuster

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

2.3.2.1.4.4 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 157).

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

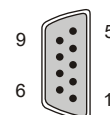


Table 37: COM - Pinout

2.3.2.1.4.5 +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 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

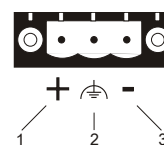


Table 38: Supply voltage connection 24 VDC

2.3.2.1.4.6 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.

2.3.2.2 5DLSDL.1000-00

2.3.2.2.1 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

2.3.2.2.2 Order data


Order number	Short description	Figure
5DLSDL.1000-00	Display links 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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm ²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm ²	
	SDL cables with 45° connector	
5CASDL.0018-01	SDL cable - 45-degree connector - 1.8 m	
5CASDL.0050-01	SDL cable - 45-degree connector - 5 m	
5CASDL.0100-01	SDL cable - 45-degree connector - 10 m	
	SDL flex cables	
5CASDL.0018-03	SDL flex cable - 1.8 m	
5CASDL.0050-03	SDL flex cable - 5 m	
5CASDL.0100-03	SDL flex cable - 10 m	
5CASDL.0150-03	SDL flex cable - 15 m	
5CASDL.0200-03	SDL flex cable - 20 m	
5CASDL.0250-03	SDL flex cable - 25 m	
5CASDL.0300-03	SDL flex cable - 30 m	
5CASDL.0300-13	SDL flex cable with extender - 30 m	
5CASDL.0400-13	SDL flex cable with extender - 40 m	

Table 39: 5DLSDL.1000-00 - Order data

2.3.2.2.3 Technical data

Order number	5DLSDL.1000-00
General information	
BL adjuster ¹⁾	No
B&R ID code	0x1C53
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
DNV ²⁾	Temperature: A (0 - 45°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (bridge and open deck)
KC	Yes
Interfaces	
Panel/Monitor interface	
Panel IN	SDL
Panel OUT	-
Electrical properties	
Nominal voltage	24 VDC ±25%, SELV ³⁾
Nominal current ⁴⁾	Max. 4.2 A
Power consumption	Typ. 3 W
Overvoltage category per EN 61131-2	II

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

Technical data

Order number	5DLSDL.1000-00
Mechanical properties	
Locating screws	
Quantity	2
Max. tightening torque	0.5 Nm

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

- 1) For setting the brightness of the AP900 backlight.
- 2) Yes, but applies only if all components installed in the complete system have this certification.
- 3) IEC 61010-2-201 requirements must be observed.
- 4) The specified value applies to an Automation Panel Link plug-in card being used in a 19" Automation Panel device.

2.3.2.2.4 Interfaces

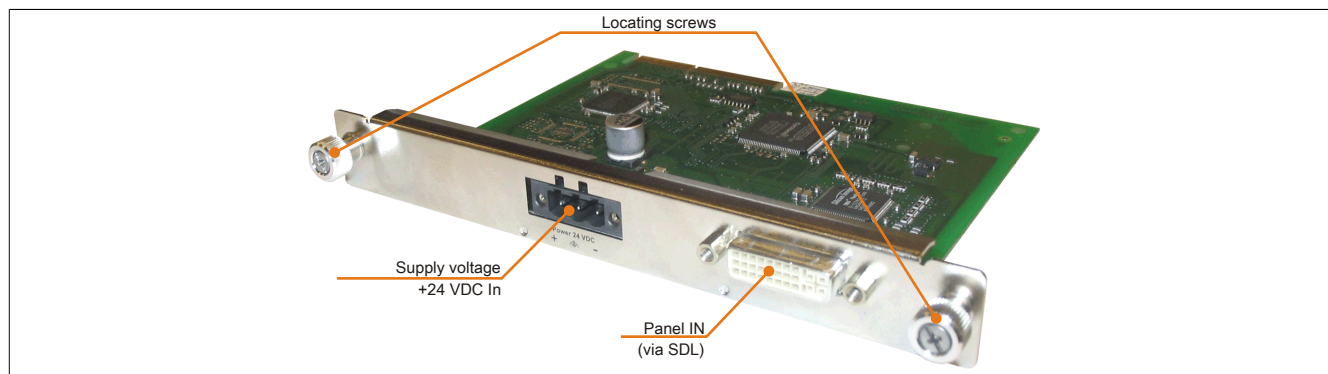


Figure 85: 5DLSDL.1000-00 - Interfaces

2.3.2.2.4.1 +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 [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 41: Supply voltage connection 24 VDC

2.3.2.2.4.2 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.

2.3.2.2.4.3 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 157](#)).

2.3.2.3 5DLSDL.1000-01

2.3.2.3.1 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

2.3.2.3.2 Order data


Order number	Short description	Figure
5DLSDL.1000-01	Display links Automation Panel Link SDL transceiver, connections for SDL In and SDL Out, transfer of display data, touch screen, USB 1.1, matrix keys and, service data, 24 VDC (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm ²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm ²	
	SDL cables with 45° connector	
5CASDL.0018-01	SDL cable - 45-degree connector - 1.8 m	
5CASDL.0050-01	SDL cable - 45-degree connector - 5 m	
5CASDL.0100-01	SDL cable - 45-degree connector - 10 m	
	SDL flex cables	
5CASDL.0018-03	SDL flex cable - 1.8 m	
5CASDL.0050-03	SDL flex cable - 5 m	
5CASDL.0100-03	SDL flex cable - 10 m	
5CASDL.0150-03	SDL flex cable - 15 m	
5CASDL.0200-03	SDL flex cable - 20 m	
5CASDL.0250-03	SDL flex cable - 25 m	
5CASDL.0300-03	SDL flex cable - 30 m	
5CASDL.0300-13	SDL flex cable with extender - 30 m	
5CASDL.0400-13	SDL flex cable with extender - 40 m	

Table 42: 5DLSDL.1000-01 - Order data

2.3.2.3.3 Technical data

Order number	5DLSDL.1000-01
General information	
BL adjuster ¹⁾	No
B&R ID code	0x1C52
Certifications	
CE	Yes
UL	cULus E115267
	Industrial control equipment
KC	Yes
Interfaces	
Panel/Monitor interface	
Panel IN	SDL
Panel OUT	SDL
Electrical properties	
Nominal voltage	24 VDC ±25%, SELV ²⁾
Nominal current ³⁾	Max. 4.2 A
Power consumption	Typ. 3 W
Overvoltage category per EN 61131-2	II
Mechanical properties	
Locating screws	
Quantity	2
Max. tightening torque	0.5 Nm

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

1) For setting the brightness of the AP900 backlight.

2) IEC 61010-2-201 requirements must be observed.

3) The specified value refers to an Automation Panel Link plug-in card connected in a 19" Automation Panel device.

2.3.2.3.4 Interfaces

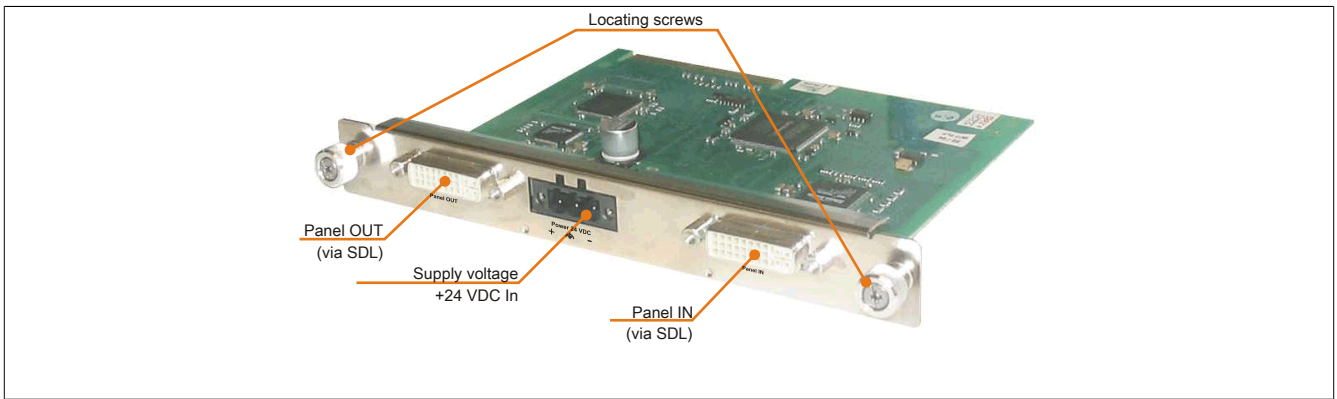


Figure 86: 5DLSDL.1000-01 - Interfaces

2.3.2.3.4.1 +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 OTB103.9 (screw clamp) or OTB103.91 (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 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 44: Supply voltage connection 24 VDC

2.3.2.3.4.2 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.

2.3.2.3.4.3 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 157).

2.3.2.3.4.4 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 157).

2.3.2.4 5DLSD3.1000-00

2.3.2.4.1 General information

- Link panel for Automation Panel 920/98x
- 1x SDL3 Panel In interface
- 1x USB 2.0 type A

2.3.2.4.1.1 SDL3 operation

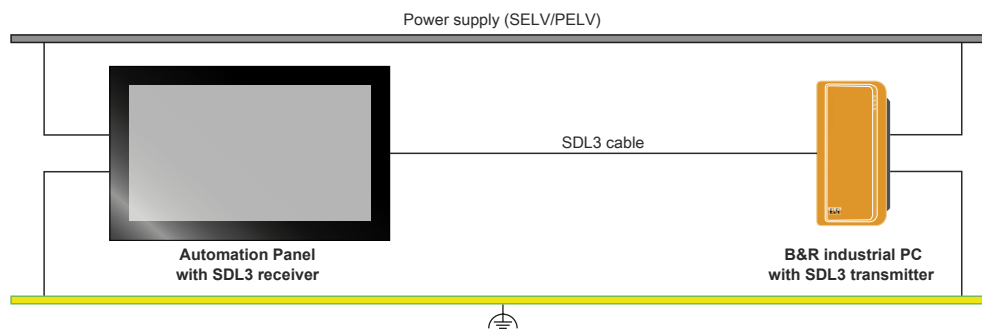
Smart Display Link 3 (SDL3) technology transfers all communication channels between a B&R industrial PC and panel up to 100 m over a standard Ethernet cable (min. Cat 6a). An RJ45 connector is used for the device connection, which is ideal for confined spaces in feed-throughs and swing arm systems.

SDL3 operation with SDL3 transmitter

In SDL3 operation with an SDL3 transmitter in the B&R industrial PC, all communication between the Automation Panel and B&R industrial PC takes place via a single SDL3 cable.

In addition to the display data, information from the touch screen, matrix keys, LEDs and service/diagnostic data is transferred. The Automation Panel can be installed up to 100 m away from the B&R industrial PC. USB 2.0 is also transferred over this distance and fully integrated into SDL3. External adapter modules are not required.

The brightness of the display can be set via the ADI Control Center.



Availability of interfaces on Automation Panels with an SDL3 receiver:

SDL3 interface	✓	USB1, USB2	✓	USB 2.0		Power supply	✓	Grounding	✓
----------------	---	------------	---	---------	--	--------------	---	-----------	---

Maximum cable length for SDL3: 100 m

Requirements

- Automation Panel with SDL3 receiver
- B&R industrial PC with SDL3 interface
- SDL3/SDL4 cable

2.3.2.4.2 Order data


Order number	Short description	
	Display links	
5DLS3.1000-00	Automation Panel Link module - SDL3 receiver - For Automation Panel 920/98x	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Optional accessories	
	SDL3/SDL4/PoE cables	
5CASD3.0050-00	SDL3/SDL4/FT50 cable - 5 m - FT50 including Power over Ethernet	
5CASD3.0100-00	SDL3/SDL4/FT50 cable - 10 m - FT50 including Power over Ethernet	
5CASD3.0150-00	SDL3/SDL4/FT50 cable - 15 m - FT50 including Power over Ethernet	
5CASD3.0200-00	SDL3/SDL4/FT50 cable - 20 m - FT50 including Power over Ethernet	
5CASD3.0300-00	SDL3/SDL4/FT50 cable - 30 m - FT50 including Power over Ethernet	
5CASD3.0500-00	SDL3/SDL4/FT50 cable - 50 m - FT50 including Power over Ethernet	
5CASD3.1000-00	SDL3/SDL4/FT50 cable - 100 m - FT50 including Power over Ethernet	

Table 45: 5DLS3.1000-00 - Order data

2.3.2.4.3 Technical data

Order number	5DLS3.1000-00
General information	
LEDs	Status, Link
B&R ID code	0xE401
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (max. 30 Mbit/s)
Current-carrying capacity	Max. 500 mA
SDL3 In	
Variant	RJ45, shielded
Type	SDL3
Electrical properties	
Nominal voltage	24 VDC ±25%, SELV ¹⁾
Nominal current ²⁾	Max. 4.2 A
Power consumption	Typ. 6 W
Overvoltage category per EN 61131-2	II
Mechanical properties	
Locating screws	
Quantity	2
Max. tightening torque	0.5 Nm

Table 46: 5DLS3.1000-00 - Technical data

1) IEC 61010-2-201 requirements must be observed.

2) The specified value refers to an Automation Panel Link plug-in card connected in a 19" Automation Panel device.

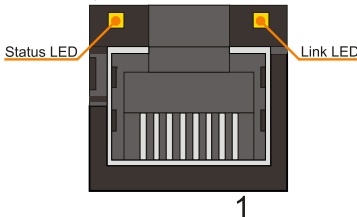
2.3.2.4.4 Interfaces

2.3.2.4.4.1 SDL3 In interface

The "SDL3 In" interface is a female RJ45 connector and operated with SDL3 transmission technology. For additional information, see section ["SDL3 operation" on page 109](#).

SDL3 In interface - SDL3	
The following overview lists the video signals available on the panel input. For additional details, see the technical data for the link module or display unit being used.	
Link module	Video signals
	SDL3

Female RJ45 connector



The diagram shows a top-down view of a female RJ45 connector. It is a dark grey rectangular port with a central 8-pin female D-sub connector. Two yellow LEDs are located on the top edge of the port. The left LED is labeled 'Status LED' and the right LED is labeled 'Link LED' with orange lines pointing to them. A large number '1' is centered below the connector.

Table 47: SDL3 In interface

Information:

The hardware and graphics drivers of approved operating systems support the hot-plugging of display devices to the panel interface for service purposes. The male panel connector is specified for 500 connection cycles.

Information:

If a display device with a touch screen is connected to the panel interface and then disconnected again during operation (hot-plugging), it may be necessary to recalibrate the touch screen.

2.3.2.4.4.2 SDL3 In LEDs

The SDL3 In LEDs are integrated in the SDL3 In interface and indicate SDL3 activity.

SDL3 In LEDs			
LED	Color	Status	Function
Link	Yellow	On	Indicates an active SDL3 connection.
		Off	No active SDL3 connection.
Status	Yellow	On	The SDL3 connection has been established and is OK.
		Off	No active SDL3 connection.
		Blinking	The SDL3 connection is OK, but a firmware image is corrupt.

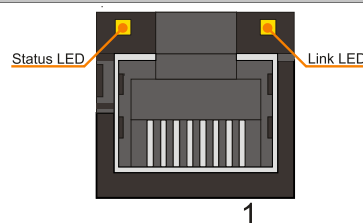


Table 48: SDL3 In LEDs

2.3.2.4.4.3 USB interface

The link module features a USB 2.0 (Universal Serial Bus) host controller with multiple USB interfaces, 1 of which is accessible externally for the user.

Warning!

USB peripheral devices can be connected to the USB interfaces. Due to the variety of USB devices available on the market, B&R cannot guarantee their functionality. The functionality of USB devices available from B&R is ensured.

Caution!

Because this interface is designed according to general PC specifications, extreme care should be exercised with regard to EMC, cable routing, etc.

USB

The USB interface is a USB 2.0 type A interface and is available to the user for USB devices.

Universal Serial Bus (USB1) ¹⁾	
Type	USB 2.0
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (max. 30 Mbit/s)
Current load ²⁾ USB	Max. 500 mA
Cable length USB 2.0	Max. 5 m (without hub)

1x USB type A, female



Table 49: USB1 interface

- 1) The interfaces, etc. available on the device or module have been numbered as such for easy identification. This numbering may differ from that used by the particular operating system.
- 2) Each USB interface is protected by a maintenance-free "USB current-limiting circuit breaker" (total max. 500 mA).

2.3.2.4.4.4 +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 2 "Technical data" on page 17).

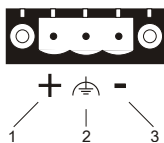
Supply voltage		<div>3-pin, male</div> 
Protected against reverse polarity		
Pin	Description	
1	+	
2	Functional ground	
3	-	
Required accessories		
Terminal blocks		
0TB103.9	Connector 24 V 5.08 3-pin screw clamp	
0TB103.91	Connector 24 V 5.08 3-pin cage clamp	

Table 50: Supply voltage connection 24 VDC

2.3.2.4.4.5 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.

2.3.2.4.5 Known problems/issues

The following display units cannot be used with the SDL3 receiver:

- 5AP920.1043-01
- 5AP951.1043-01
- 5AP952.1043-01
- 5AP980.1043-01 ≤ Rev. E0
- 5AP981.1043-01 ≤ Rev. E0
- 5AP982.1043-01 ≤ Rev. E0
- 5AP920.1214-01 ≤ Rev. D0
- 5AP951.1505-01
- 5AP920.1505-01 ≤ Rev. H0
- 5AP980.1505-01 ≤ Rev. G0
- 5AP981.1505-01 ≤ Rev. I0
- 5AP920.1706-01
- 5AP920.1906-01 ≤ Rev. L0
- 5AP920.2138-01

3 Commissioning

3.1 Installation

Danger!

- The entire power supply must be disconnected before removing any covers or components from the device and installing or removing any accessories, hardware or cables.
- Remove the power cable from the device and from the power supply.
- All covers and components, accessories, hardware and cables must be installed or secured before the device is connected to the power supply and switched on.

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

3.1.1 Important installation information

- Environmental conditions must be taken into consideration.
- When installed in an enclosure, enough space must be available for air to circulate sufficiently.
- This device must be installed on a flat, clean and burr-free surface.
- This device is only certified for operation in enclosed rooms.
- This device must not be subjected to direct sunlight.
- Ventilation holes must not be covered.
- This device must be installed using one of the approved mounting orientations.
- The wall or control cabinet must be able to withstand four times the total weight of the device.
- The bend radius of connected cables (DVI, SDL, USB, etc.) must not be exceeded.
- This device must be installed in a position that minimizes glare on the screen.
- This device must be installed in a position and orientation that make viewing as easy as possible for the operator.

3.1.2 Installation with clamping blocks

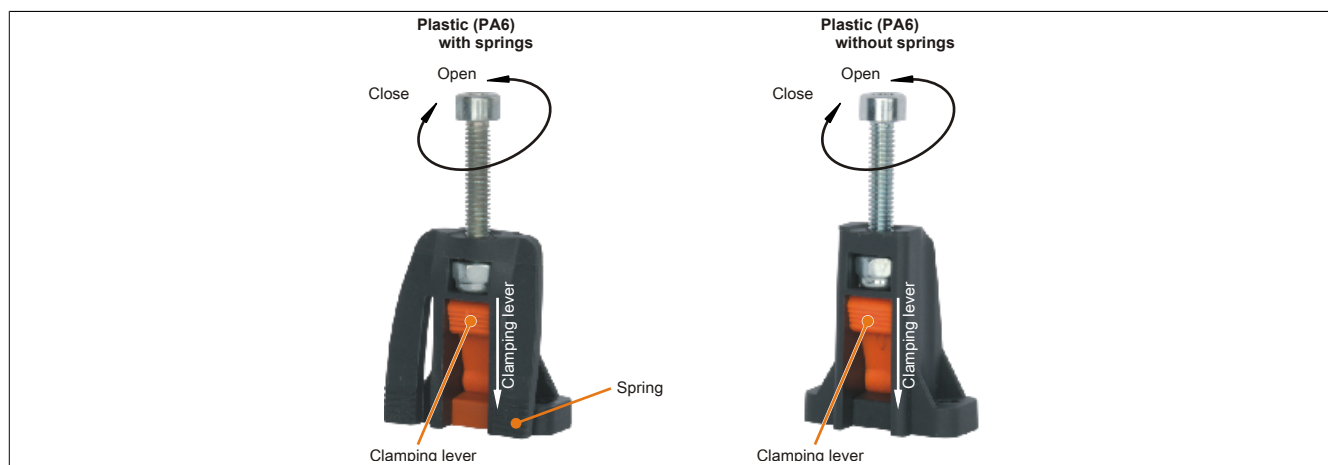


Figure 87: Clamping blocks

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

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

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

3.2 Mounting orientation

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

3.2.1 Mounting orientation 0°

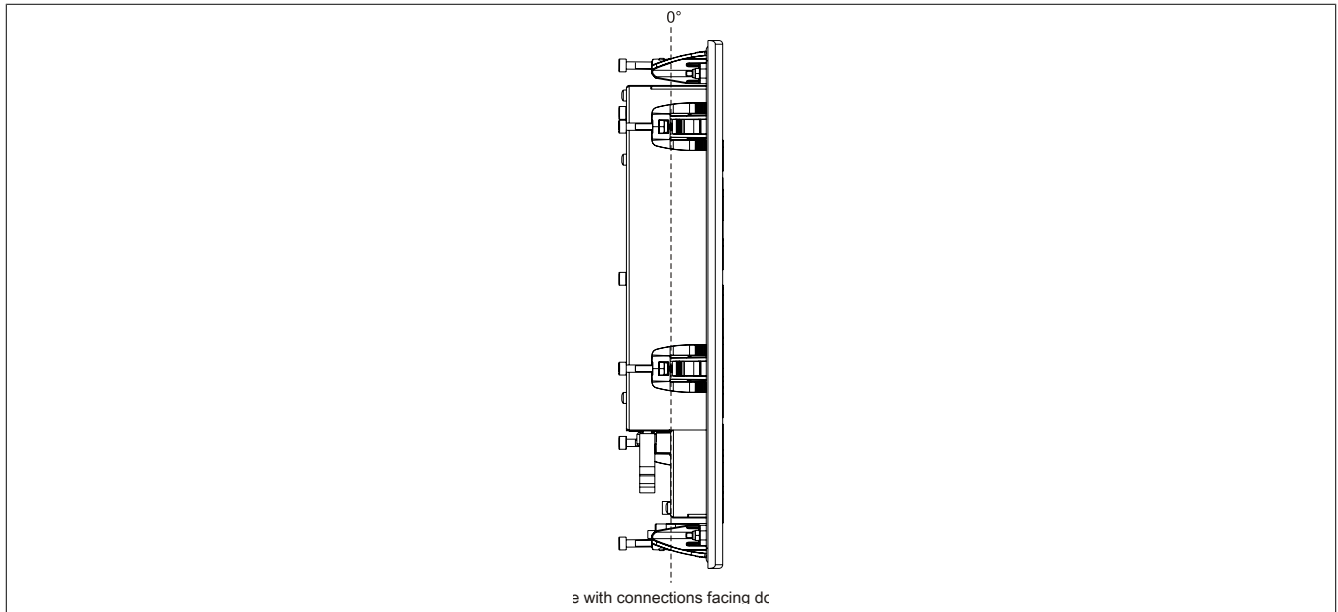


Figure 88: Mounting orientation 0°

3.2.2 Mounting orientation 45°

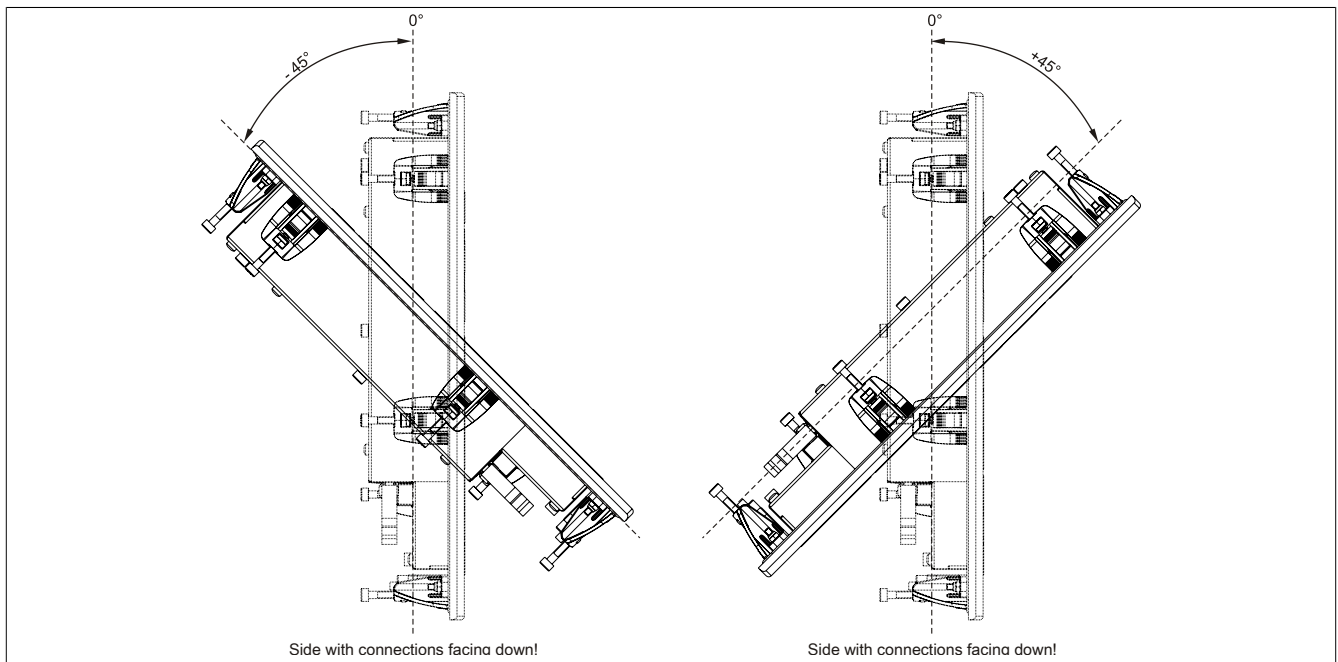


Figure 89: Mounting orientations -45° and +45°.

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 [2 "Technical data" on page 17](#).

3.3 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.

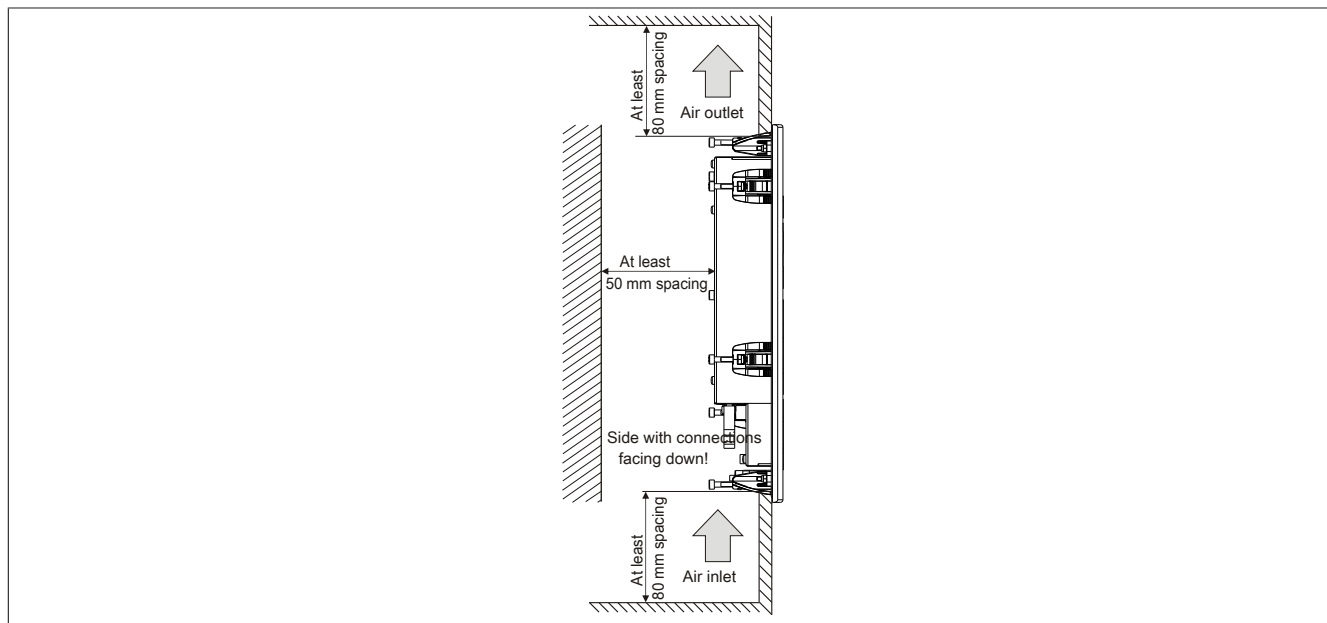


Figure 90: Spacing for air circulation - Side view

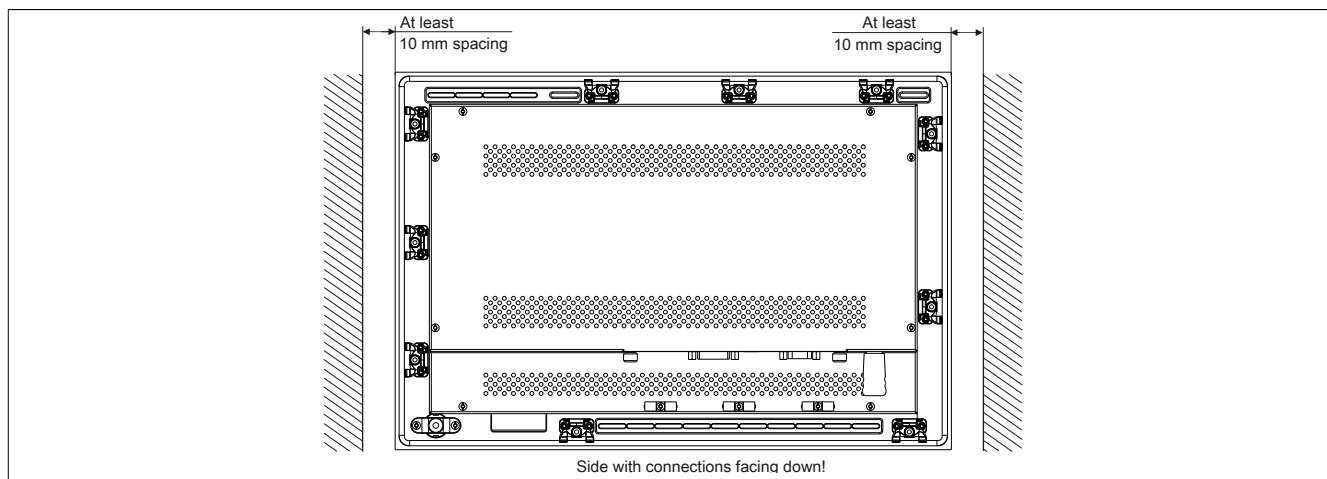


Figure 91: Spacing for air circulation - Rear view

3.4 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).

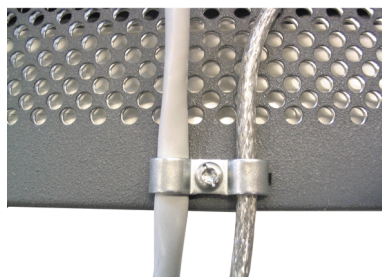


Figure 92: Cable clamp fixing

3.5 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 path with the least resistance possible (e.g. copper strip, at least 2.5 mm²).



Figure 93: Functional grounding clip

3.6 General instructions for the temperature test procedure

The purpose of these instructions is to explain the general procedure for application-specific temperature tests with B&R industrial PCs or Power Panels. These instructions are only guidelines, however.

3.6.1 Procedure

In order to obtain accurate results, test conditions should match 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 later, etc.

In addition, a temperature sensor should be installed for the device being tested to constantly monitor the ambient temperature. In order to obtain correct values, it should be placed at a distance of approx. 5 to 10 cm from the B&R industrial PC near the air intake (not near the exhaust).

Every B&R industrial PCs and Power Panel is equipped with internal temperature sensors. They are positioned in different locations depending on the device family. Their number as well as the temperature limits also vary depending on the device family.

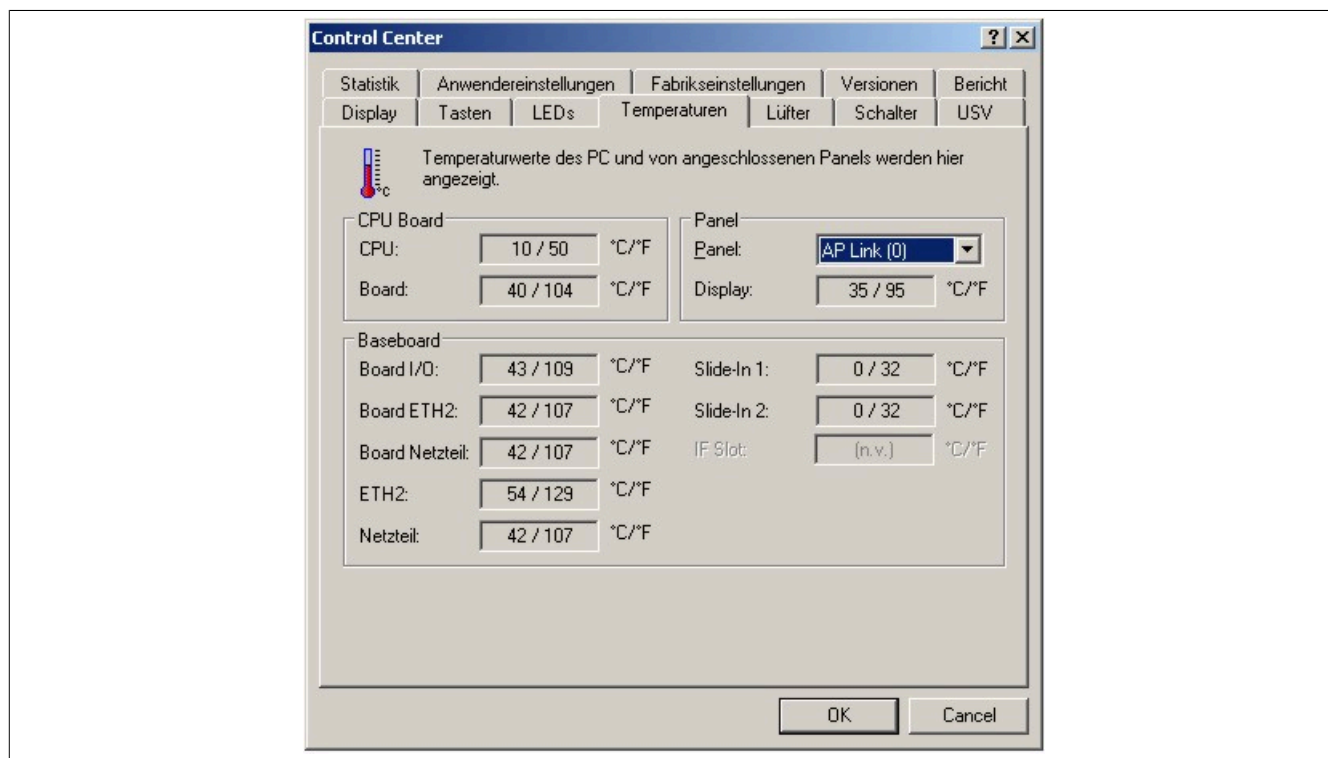
For information about the location of temperature sensors as well as their maximum specified temperatures, see section "Temperature sensor positions" in 2 "Technical data".

A minimum testing time of 8 hours is recommended for an optimal determination and assessment of the temperature situation.

3.6.2 Evaluating temperatures in Windows operating systems

3.6.2.1 Evaluating with the B&R Control Center

The B&R Control Center can be used to evaluate the temperatures. Temperatures can be viewed on the "Temperatures" property page. The B&R Control Center is available at no cost in 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 separate application can be developed if it is necessary to collect historical data.

Information:

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

3.6.2.2 Evaluating with the BurnInTest tool from Passmark

If a separate application is not created or used to evaluate the temperature, then B&R recommends using the BurnInTest software tool from Passmark.

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

Information:

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

The following screenshots are based on Passmark BurnInTest Pro V4 and a 2-slot APC810 with DVD.

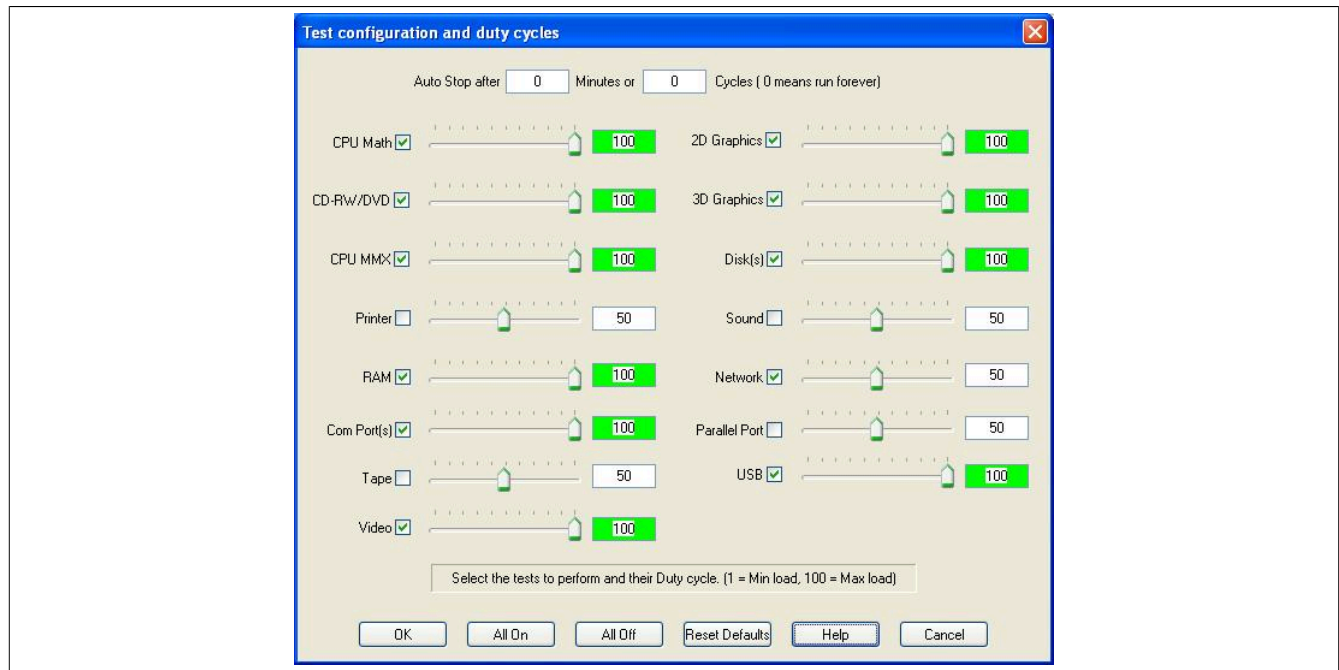


Figure 94: Settings for Passmark BurnInTest Pro V4 and a 2-slot APC810 with DVD

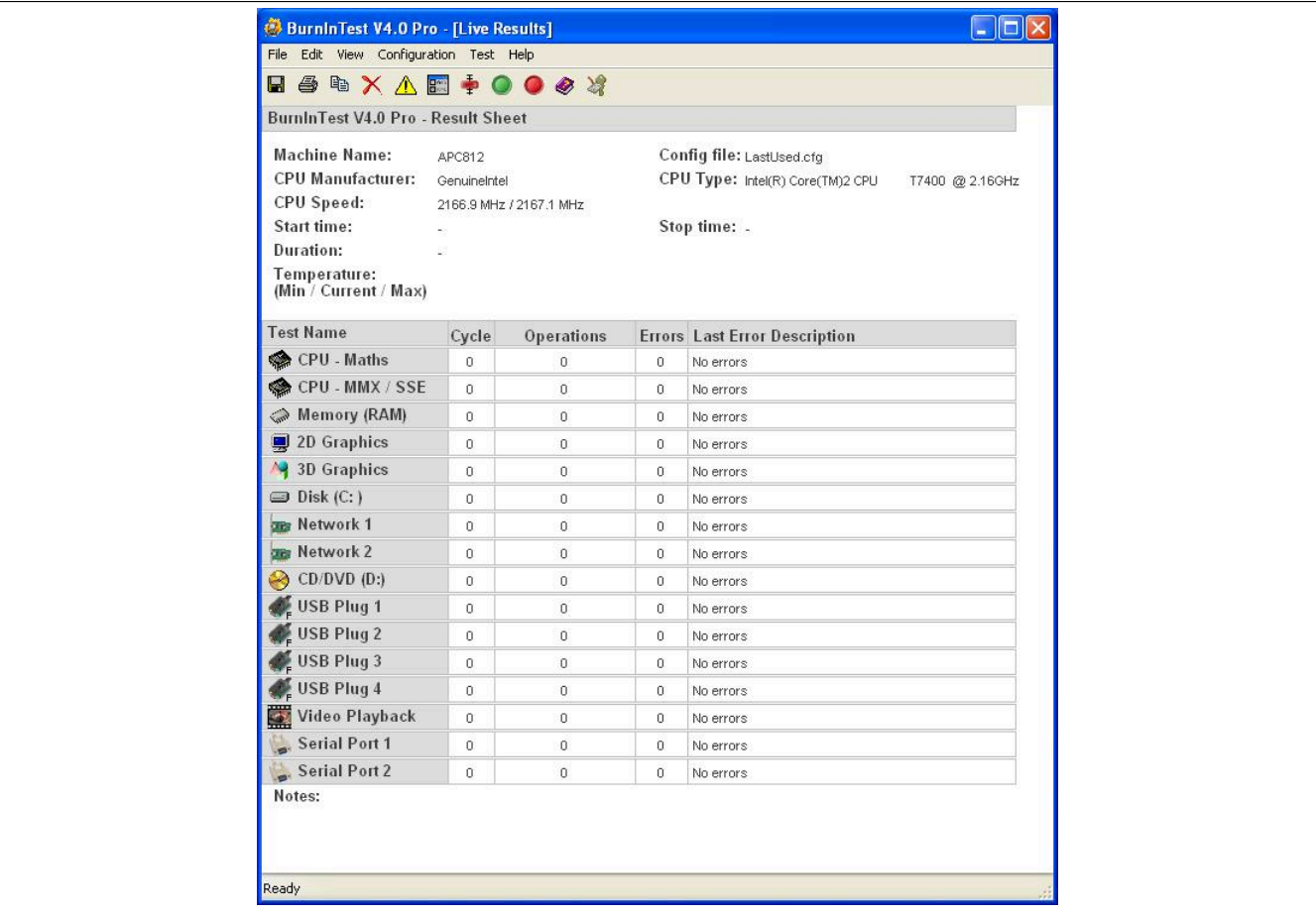


Figure 95: Test overview of a 2-slot APC810 with DVD

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

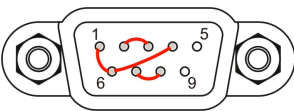
Information:

USB flash drives can also be used if a USB loopback plug is not available. The USB flash drives must be detected as formatted drives in Windows. The test USB must then be deselected, and the USB flash drives must be configured as the testing device in the disk properties.



Information:

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



3.6.3 Evaluating temperatures in non-Windows operating systems

For applications that do not run in Windows, temperatures can be evaluated using the B&R implementation guide. In addition to the implementation guide, programs in MS-DOS are also available.

The implementation guide only describes device-specific functions, not the main functions of the sample programs.

If code from the sample programs is used, it is important to take into account the notes in the implementation guide regarding TODO comments, I/O access functions, etc.

Information:

Sample programs and implementation instructions can be downloaded at no cost from the B&R website (www.br-automation.com) for each B&R industrial PC or Power Panel.

3.6.4 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 take values such as speed into consideration.

If the temperature tests are performed in a climate-controlled chamber with fans, the fans will cool the devices and skew the results. Measurement results for passive devices would therefore be unusable in this case. In order to obtain accurate results in climate-controlled chambers with fans, the 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 a 2-slot APC810

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

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 51: Evaluation example using a 2-slot APC810

3.7 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

3.7.1 Selecting display units

In order to connect an Automation Panel 800 and an Automation Panel 900 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 52: Selecting display units

3.7.2 One Automation Panel 900 system 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 a DVI interface or analog monitor (using adapter 5AC900.1000-00) can also be used. A separate cable is used for both the touch screen and USB data. 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 (i.e. without a hub).

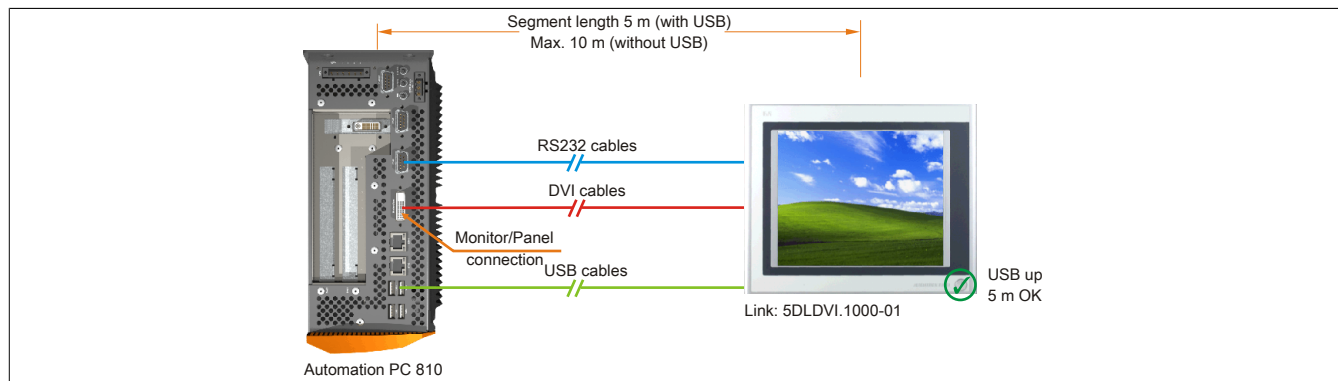


Figure 96: One Automation Panel 900 system via onboard DVI

3.7.2.1 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.

3.7.2.2 Link modules

Information:

A corresponding Link module must be selected for each 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 (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	For Automation Panel 900

Table 53: Link modules

3.7.2.3 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 54: Cables for DVI configurations

Information:

Detailed technical data about cables is listed in the section "Cables" on page 157.

3.7.2.4 Possible Automation Panel devices, resolutions and segment lengths

The following Automation Panel 900 devices can be used. In rare cases, segment length is limited by the resolution.

Model number	Display size	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 55: Possible Automation Panel devices, resolutions and segment lengths

1) USB support is not possible on the Automation Panel 900 in these cases since USB is limited to 5 m.

Information:

When transferring data via DVI, it is not possible to read statistical values from Automation Panel 900 devices.

3.7.2.5 BIOS settings

No special BIOS settings are necessary for operation.

3.7.3 One Automation Panel 900 system 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 (i.e. without a hub).

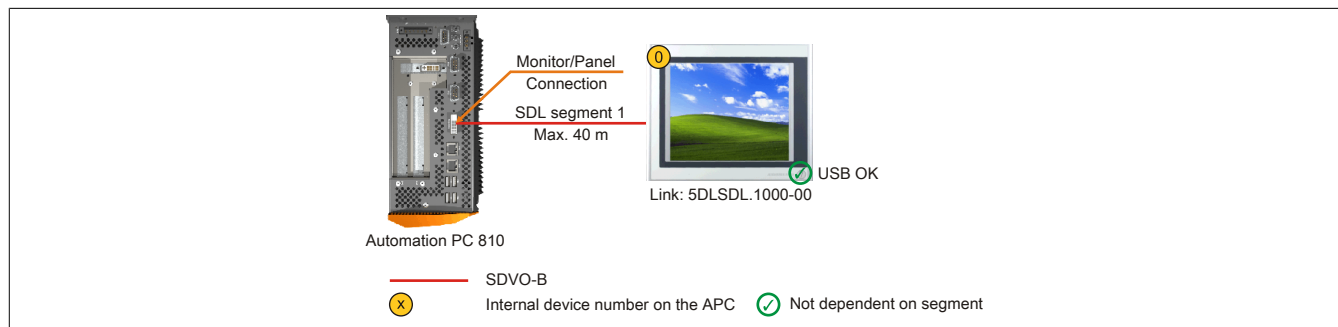


Figure 97: One Automation Panel 900 system via onboard SDL

3.7.3.1 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.

3.7.3.2 Link modules

Information:

A corresponding Link module must be selected for each device used.

Model number	Description	Note
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)	For Automation Panel 900

Table 56: Link modules

3.7.3.3 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 57: Cables for SDL configurations

Information:

Detailed technical data about cables is listed in the section "Cables" on page 157.

3.7.3.3.1 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 cable Segment length [m]	Resolution						
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	HD 1366 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.0018-00
	5CASDL.0018-01	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	5CASDL.0018-03
5	5CASDL.0050-00	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.0050-01
	5CASDL.0050-03	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.0100-00
	5CASDL.0100-01	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	5CASDL.0100-03
15	5CASDL.0150-00	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.0150-01	-	-
	5CASDL.0150-03	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.0200-00	-	-
	5CASDL.0200-03	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.0250-00	-	-	-
	5CASDL.0250-03	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	-	5CASDL.0300-13
40	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	-	5CASDL.0400-13

Table 58: Cable lengths and resolutions for SDL transmission

3.7.3.4 Settings in BIOS

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R Industrial PC being 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").

3.7.4 Four Automation Panel 900 systems 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). Past a distance of 30 m, USB is only available for the first panel (front and back). USB devices can only be connected directly to the Automation Panel (i.e. without a hub).

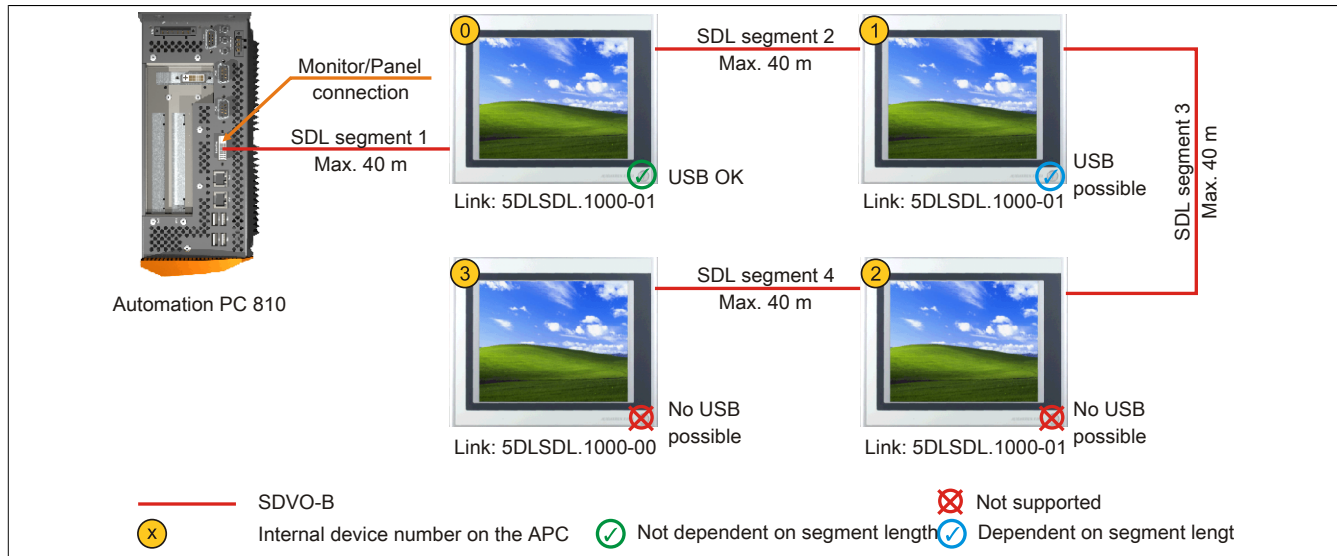


Figure 98: Four Automation Panel 900 systems via onboard SDL

3.7.4.1 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.

3.7.4.2 Link modules

Information:

A corresponding Link module must be selected for each device used.

Model number	Description	Note
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)	For Automation Panel 900
5DLSDL.1000-01	Automation Panel Link SDL transceiver Connections for SDL In and SDL Out; 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)	For Automation Panel 900

Table 59: Link modules

3.7.4.3 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

Table 60: Cables for SDL configurations

Model number	Description	Length
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 60: Cables for SDL configurations

Information:

Detailed technical data about cables is listed in the section **"Cables"** on page 157.

3.7.4.3.1 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 cable Segment length [m]	Resolution						
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	HD 1366 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.0018-00
	5CASDL.0018-01	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	5CASDL.0018-03
5	5CASDL.0050-00	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.0050-01
	5CASDL.0050-03	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.0100-00
	5CASDL.0100-01	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	5CASDL.0100-03
15	5CASDL.0150-00	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.0150-01	-	-
	5CASDL.0150-03	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.0200-00	-	-
	5CASDL.0200-03	5CASDL.0200-03	5CASDL.0200-03	5CASDL.0200-03	5CASDL.0200-03	-	5CASDL.0200-03
	5CASDL.0250-00	5CASDL.0250-00	5CASDL.0250-00	5CASDL.0250-00	-	-	-
25	5CASDL.0250-03	5CASDL.0250-03	5CASDL.0250-03	5CASDL.0250-03	-	-	-
	5CASDL.0300-00	5CASDL.0300-00	-	-	-	-	-
	5CASDL.0300-03	5CASDL.0300-03	5CASDL.0300-13	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	-	5CASDL.0400-13

Table 61: Cable lengths and resolutions for SDL transmission

3.7.4.4 Settings in BIOS

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R Industrial PC being 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").

3.7.5 One Automation Panel 900 via SDL3

One Automation Panel 900 is connected to the optional SDL3 interface via an SDL3 cable. USB devices can only be connected directly to the Automation Panel (i.e. without a hub).

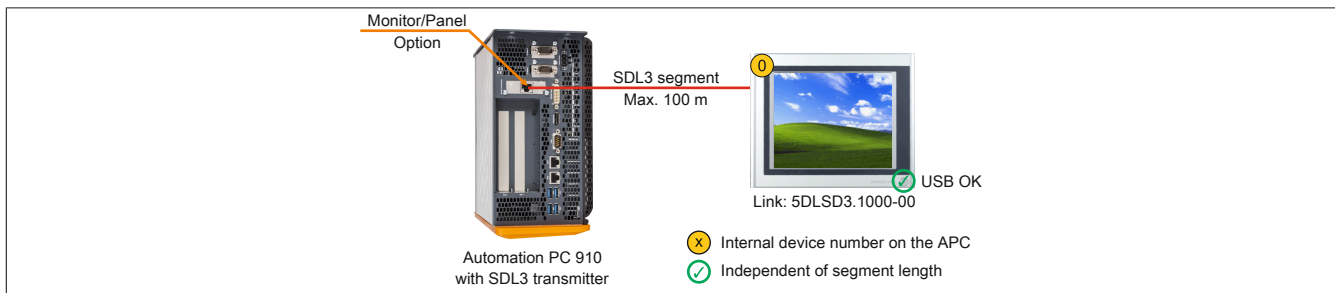


Figure 99: One Automation Panel 900 via SDL3 (sample photo)

3.7.5.1 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.

3.7.5.2 Link modules

Information:

A corresponding Link module must be selected for each device used.

Model number	Description	Note
5DLSD3.1000-00	Automation Panel Link SDL3 receiver	for Automation Panel 900

Table 62: Link modules

3.7.5.3 Cables

Select an Automation Panel 900 cable from the following table.

Model number	Description	Length
5CASD3.0100-00	SDL3 cable, 10 m	10 m
5CASD3.0150-00	SDL3 cable, 15 m	15 m
5CASD3.0200-00	SDL3 cable, 20 m	20 m
5CASD3.0300-00	SDL3 cable, 30 m	30 m
5CASD3.0500-00	SDL3 cable, 50 m	50 m
5CASD3.1000-00	SDL3 cable, 100 m	100 m

Table 63: Cables for SDL3 configurations

Information:

Detailed technical data about cables is listed in the section "[Cables](#)" on page 157.

3.7.5.3.1 Cable lengths and resolutions for SDL3 transmission

The following table lists the relationship between segment lengths and maximum resolution depending on the SDL3 cable being used:

SDL3 cable Segment length [m]	Resolution						
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	HD 1366 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200	FHD 1920 x 1080
10	5CASD3.0100-00	5CASD3.0100-00	5CASD3.0100-00	5CASD3.0100-00	5CASD3.0100-00	5CASD3.0100-00	5CASD3.0100-00
15	5CASD3.0150-00	5CASD3.0150-00	5CASD3.0150-00	5CASD3.0150-00	5CASD3.0150-00	5CASD3.0150-00	5CASD3.0150-00
20	5CASD3.0200-00	5CASD3.0200-00	5CASD3.0200-00	5CASD3.0200-00	5CASD3.0200-00	5CASD3.0200-00	5CASD3.0200-00
30	5CASD3.0300-00	5CASD3.0300-00	5CASD3.0300-00	5CASD3.0300-00	5CASD3.0300-00	5CASD3.0300-00	5CASD3.0300-00
50	5CASD3.0500-00	5CASD3.0500-00	5CASD3.0500-00	5CASD3.0500-00	5CASD3.0500-00	5CASD3.0500-00	5CASD3.0500-00
100	5CASD3.1000-00	5CASD3.1000-00	5CASD3.1000-00	5CASD3.1000-00	5CASD3.1000-00	5CASD3.1000-00	5CASD3.1000-00

Table 64: Cable lengths and resolutions for SDL3 transmission

3.7.5.4 Settings in BIOS

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R Industrial PC being 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").

3.8 Connecting peripheral USB devices

Warning!

Peripheral USB devices can be connected to the USB interfaces. Due to the large number of USB devices available on the market, B&R cannot guarantee their functionality. USB devices from B&R are guaranteed to function properly, however.

3.8.1 Remote connection to Automation Panel 900 via DVI

Many different peripheral USB devices can be connected to the 2 or 3 USB interfaces 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 (not hubs) can be connected to the Automation Panel 900.



Figure 100: Remote connection of USB peripheral devices on the APC900 via DVI

3.8.2 Remote connection to Automation Panel 800 / 900 via SDL

Many different peripheral USB devices can be connected to the 2 or 3 USB interfaces 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 101: Remote connection of USB peripheral devices on the APC800/900 via SDL

3.8.3 Remote connection to Automation Panel 900 via SDL3

Many different peripheral USB devices can be connected to the 2 or 3 USB interfaces 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 (not hubs) can be connected to the Automation Panel 900.



Figure 102: Remote connection of USB peripheral devices to the 900 via SDL3

3.9 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.

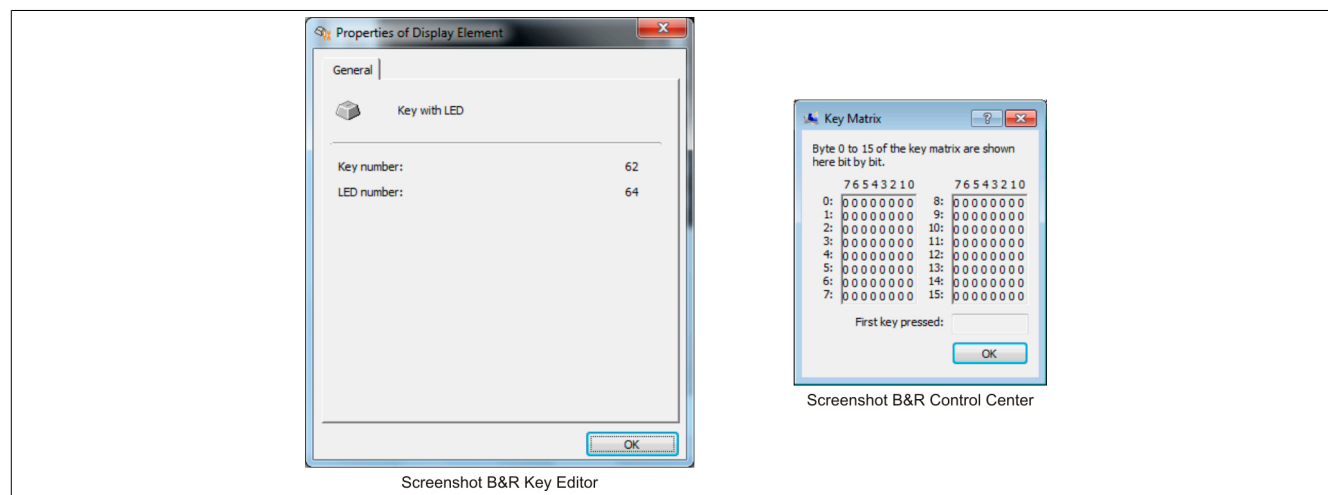


Figure 103: Hardware numbers in the B&R Key Editor and B&R Control Center - Example

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

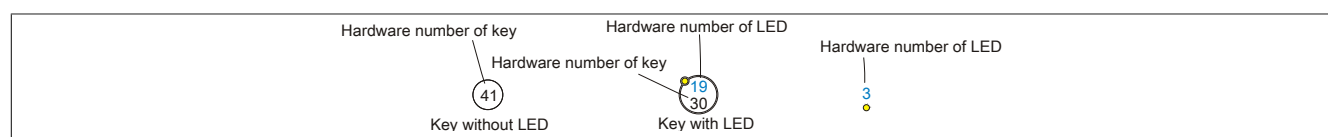


Figure 104: Keys and LEDs in the matrix

3.9.1 Automation Panel 10.4" VGA

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

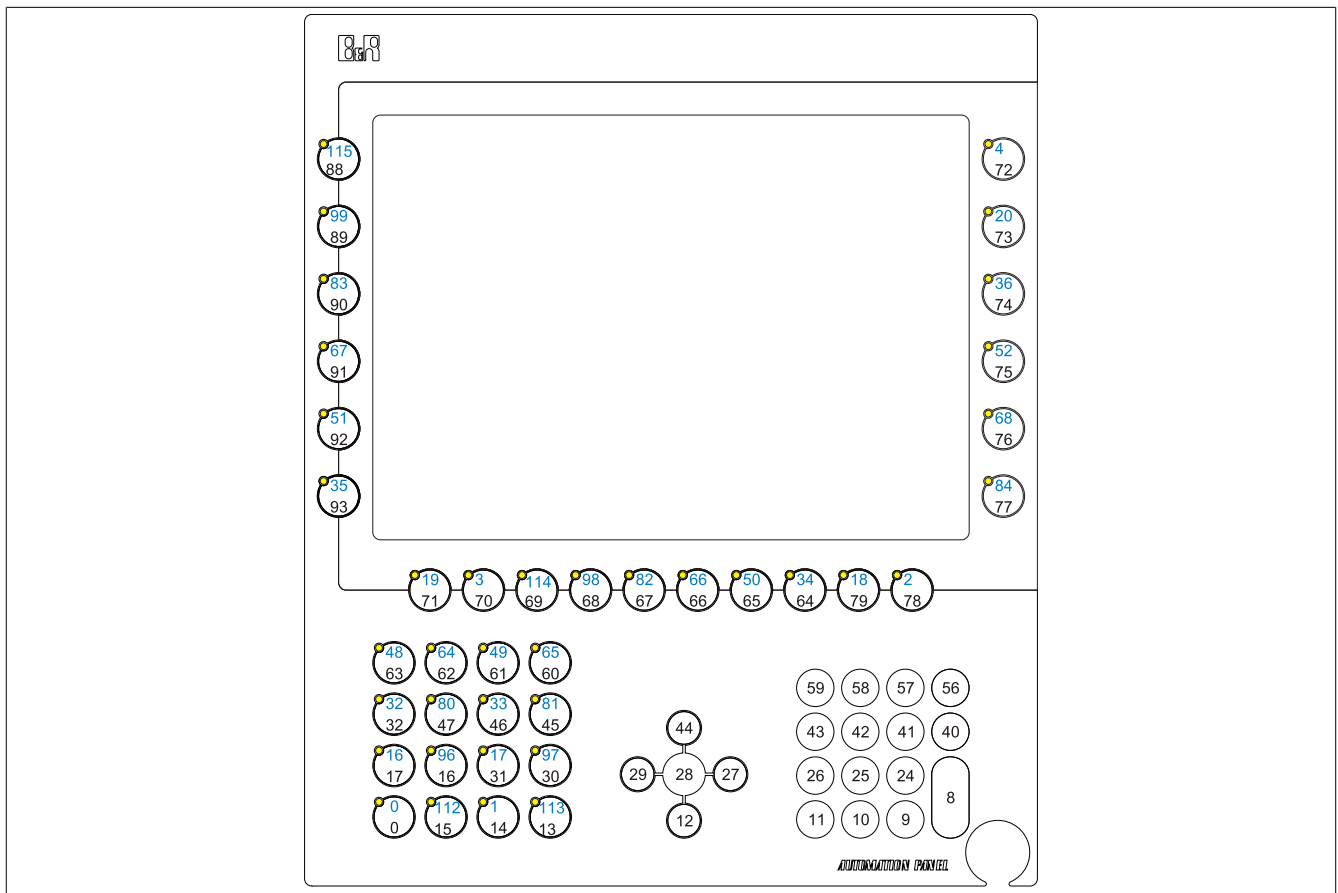


Figure 105: 5AP951.1043-01 / 5AP981.1043-01 - Hardware numbers

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

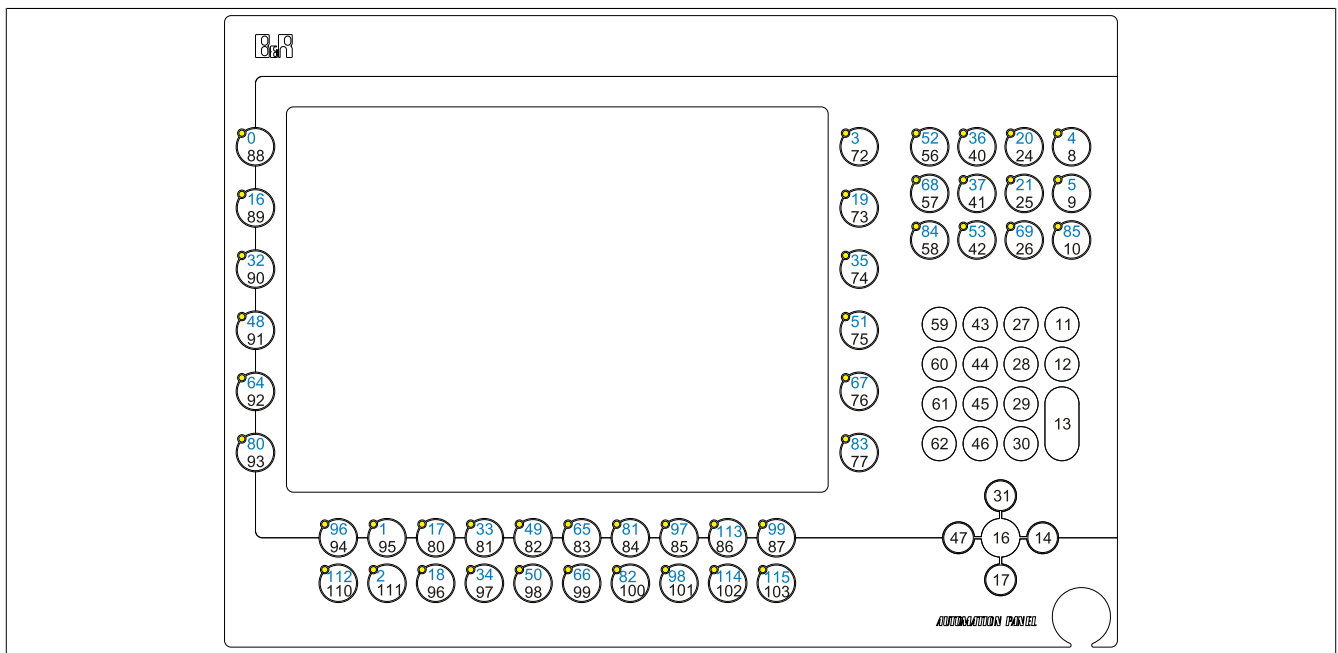


Figure 106: 5AP952.1043-01 / 5AP982.1043-01 - Hardware numbers

3.9.1.3 Automation Panel 5AP980.1043-01

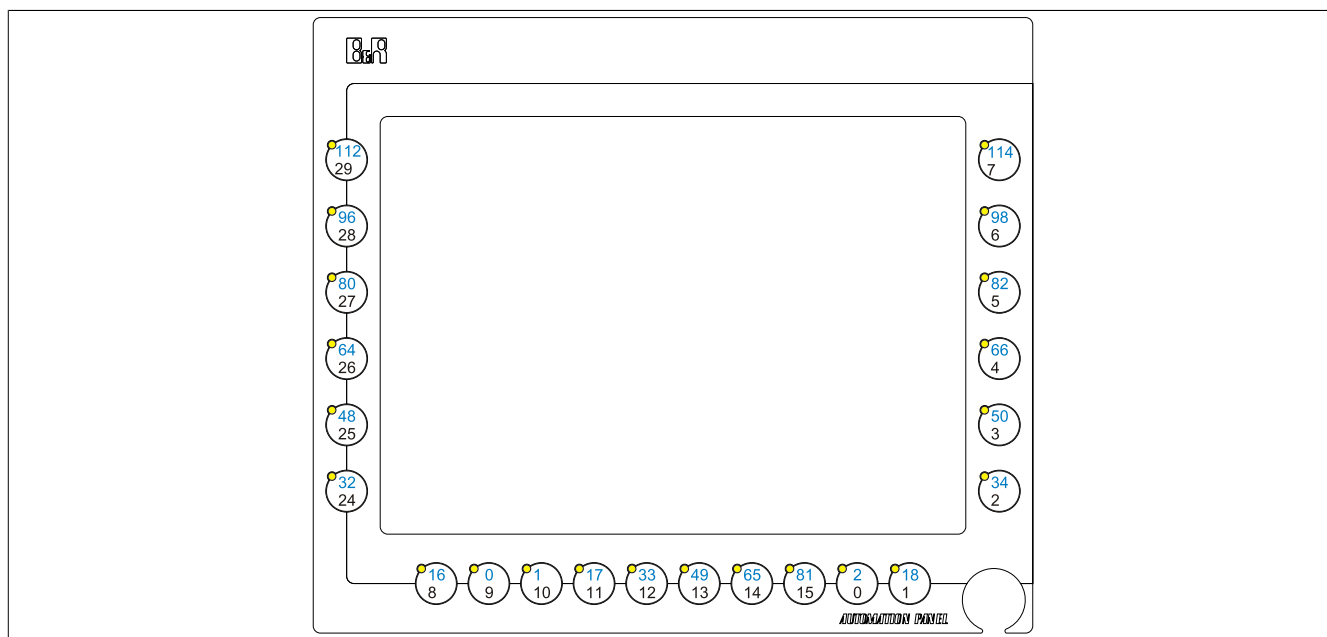


Figure 107: 5AP980.1043-01 - Hardware numbers

3.9.2 Automation Panel 15" XGA

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

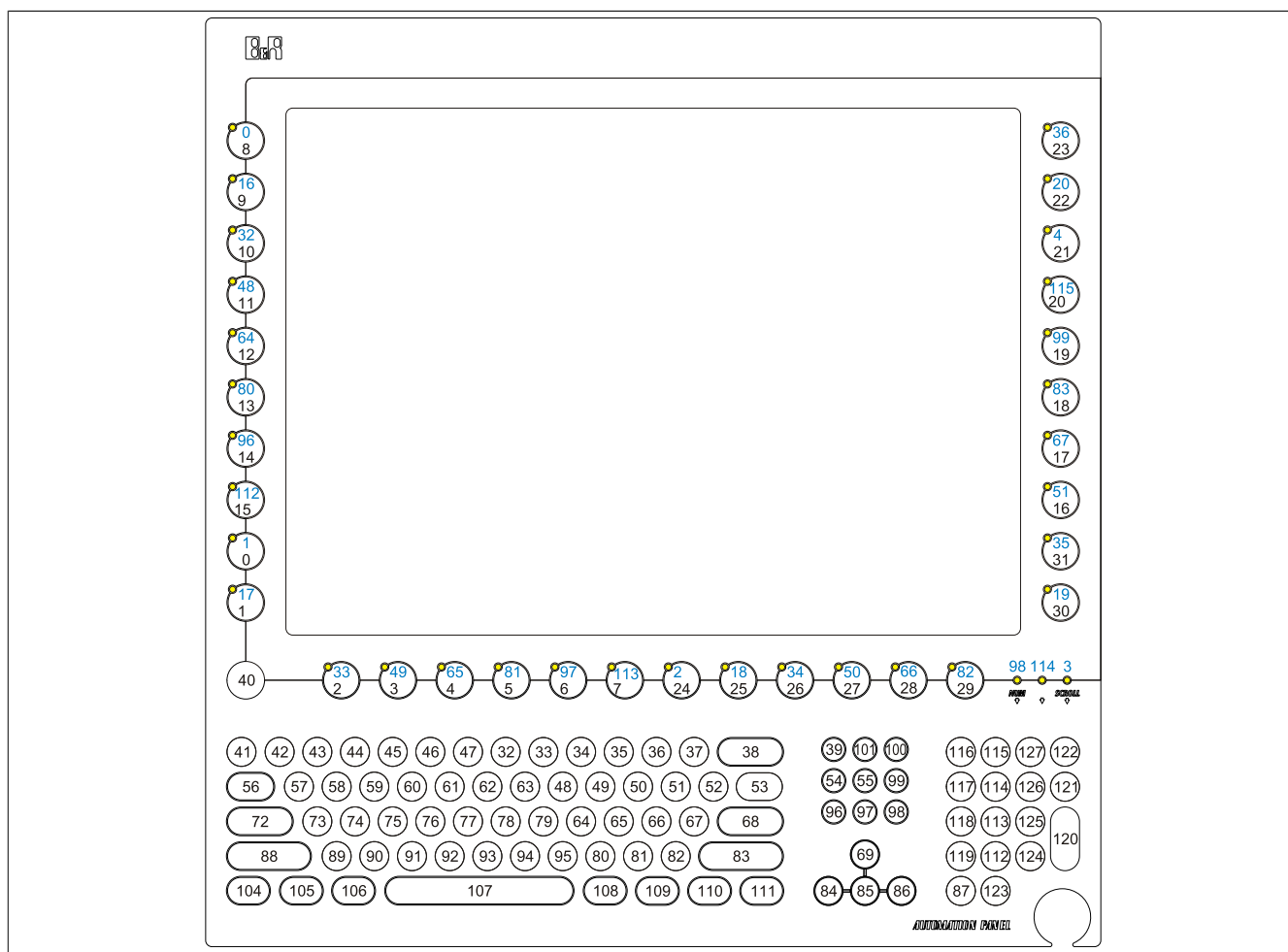


Figure 108: 5AP951.1505-01 / 5AP981.1505-01 - Hardware numbers

3.9.2.2 Automation Panel 5AP980.1505-01



Figure 109: 5AP980.1505-01 - Hardware numbers

3.10 Touch screen calibration

B&R touch screen devices are equipped with a touch controller that supports hardware calibration. This means that devices are pre-calibrated when delivered. This is a beneficial property when replacing devices of the same model or type since the new device does not require recalibration. 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 driver requires calibration during or after installation.

3.10.1 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 appropriate driver is available for download in the Downloads section of the B&R website (www.br-automation.com).

3.10.2 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).

3.10.3 Windows Embedded Standard 2009

After starting Windows Embedded Standard 2009 on the Panel PC or Power Panel for the first time (first boot agent), the corresponding touch screen driver is installed automatically.

On all other devices, the touch screen driver must be subsequently installed to operate the touch screen. The appropriate driver is available for download in the Downloads section of the B&R website (www.br-automation.com).

3.10.4 Windows Embedded Standard 7 Embedded / Premium

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

The touch screen driver must be installed manually if a touch controller was not detected when installing Windows Embedded Standard 7 or if an Automation Panel 800/900/9x3/9xD has been connected after installation. The necessary driver is available in the Downloads section of the B&R website (www.br-automation.com).

3.10.5 Windows CE

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

3.10.6 Windows 7 Professional / Ultimate

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

3.10.7 Windows Embedded 8.1 Industry Pro

After starting Windows Embedded 8.1 Industry Pro on the Panel PC for the first time, the corresponding touch screen driver is installed automatically.

On all other devices, the touch screen driver must be subsequently installed to operate the touch screen. The appropriate driver is available for download in the Downloads section of the B&R website (www.br-automation.com).

3.10.8 Windows 10 IoT Enterprise

After starting Windows 10 IoT Enterprise on a Panel PC for the first time, the appropriate touch screen driver is installed automatically.

On all other devices, the touch screen driver must be subsequently installed to operate the touch screen. The appropriate driver is available for download in the Downloads section of the B&R website (www.br-automation.com).

3.10.9 Automation Runtime / Visual Components

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

3.11 User tips for increasing the service life of the display

3.11.1 Backlight

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

3.11.1.1 Measures to maintain backlight service life

- The display brightness can be set to the lowest level that is comfortable for the user's eyes.
- Bright images should be avoided as far as possible.
- A 50% reduction in brightness can increase the half-brightness time by about 50%.

3.11.2 Image persistence

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

There are 2 different types:

- Area type: This type can be seen in a dark gray image. The effect disappears if the display is switched off for a long time.
- Line type: This can result in permanent damage.

3.11.2.1 What causes image persistence?

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

3.11.2.2 How can image persistence be reduced?

- Switch continuously between static and dynamic images.
- Prevent excessive differences in brightness between foreground and background elements.
- Use colors with similar brightness.
- Use complementary colors for subsequent images.
- Use screensavers.

3.12 Pixel errors

Information:

Displays can contain faulty pixels (pixel errors) due to the manufacturing process. They are not grounds for initiating a complaint or warranty claim.

4 Software

4.1 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.

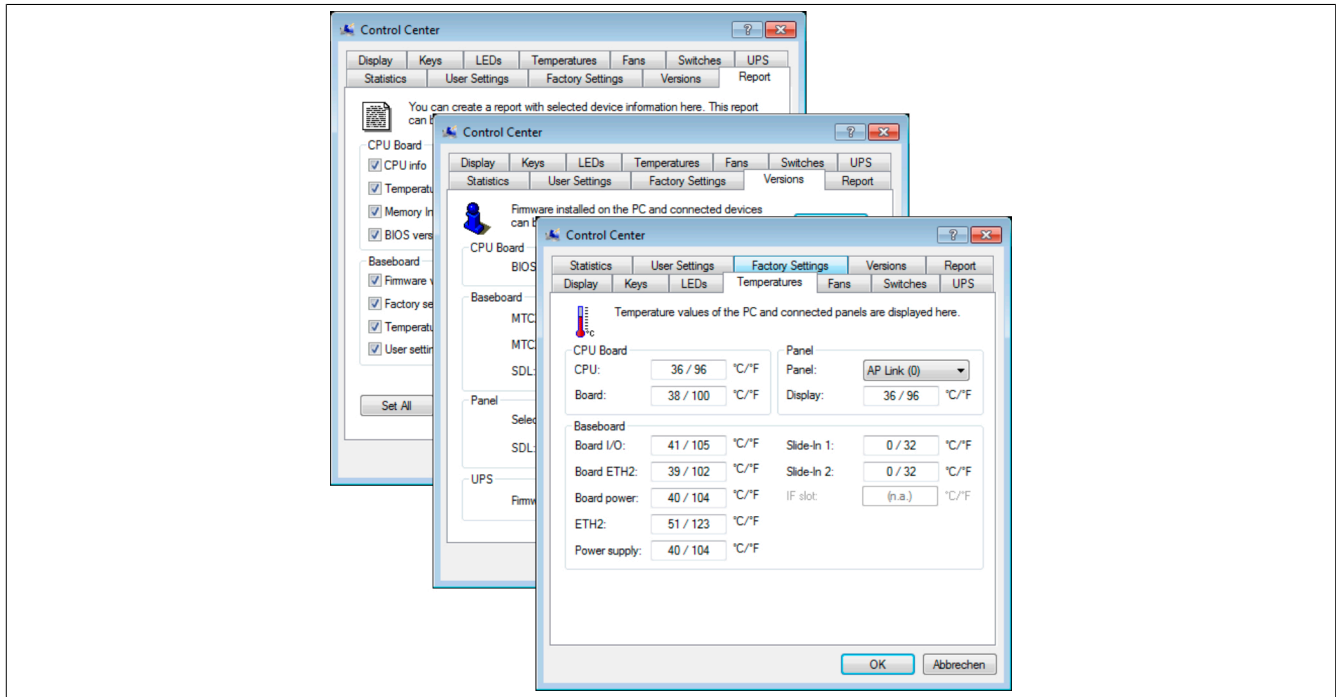


Figure 110: ADI Control Center screenshots - Examples

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 conclusions about possible hardware alarms or error states. The hardware components being used include automatic diagnostic functions in the event of error.

4.1.1 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 or keys
- Reading and calibrating control devices (e.g. key switches, handwheels, joysticks, potentiometers)
- Reading temperatures, fan speeds, statistical data and switch settings
- Reading 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
- Automation PC 2100
- Panel PC 300
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Panel PC 900
- Panel PC 2100
- 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

4.1.2 Installation

A detailed description of the Control Center can be found in the integrated help system. The B&R Automation Device Interface (ADI) driver (also includes the Control Center) is available at no charge 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.

4.2 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 2008 (or newer)

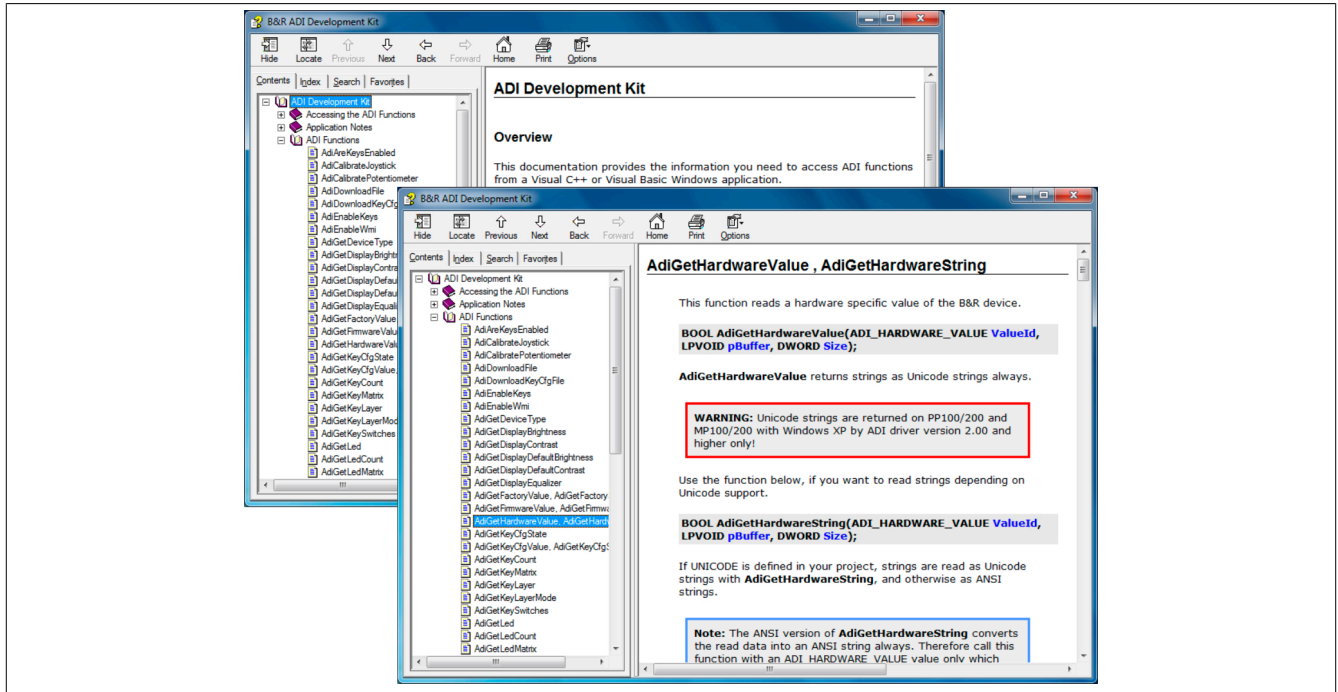


Figure 111: ADI Development Kit screenshots (version 3.70)

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)

The following systems are supported (version 3.70 and higher):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Automation PC 2100
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Panel PC 900
- Panel PC 2100
- 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 help system.

The B&R Automation Device Interface (ADI) development kit is available at no cost in the Downloads section of the B&R website (www.br-automation.com).

4.3 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 or Windows 7 and
 - Microsoft Visual Studio 2005 (or newer)
 - Microsoft .NET Framework 2.0 and/or Microsoft .NET Compact Framework 2.0 (or newer)

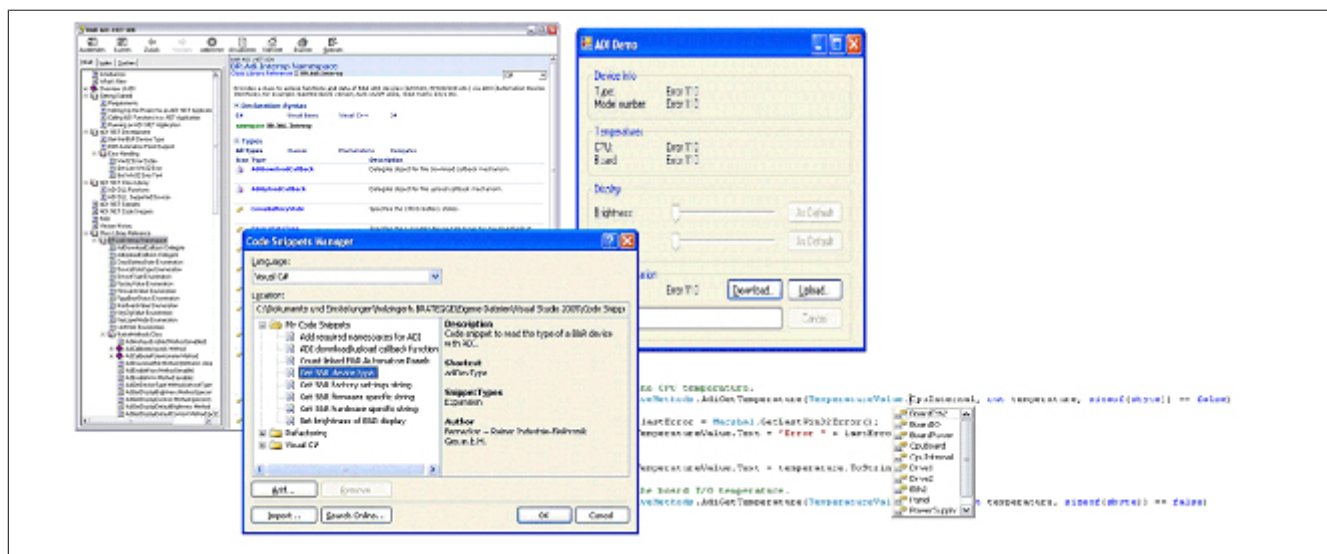


Figure 112: ADI .NET SDK screenshots (version 2.10)

Features (version 2.10 and higher)

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

The following systems are supported (version 2.10 and higher):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Automation PC 2100
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Panel PC 900
- Panel PC 2100
- 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 help system.

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

4.4 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.

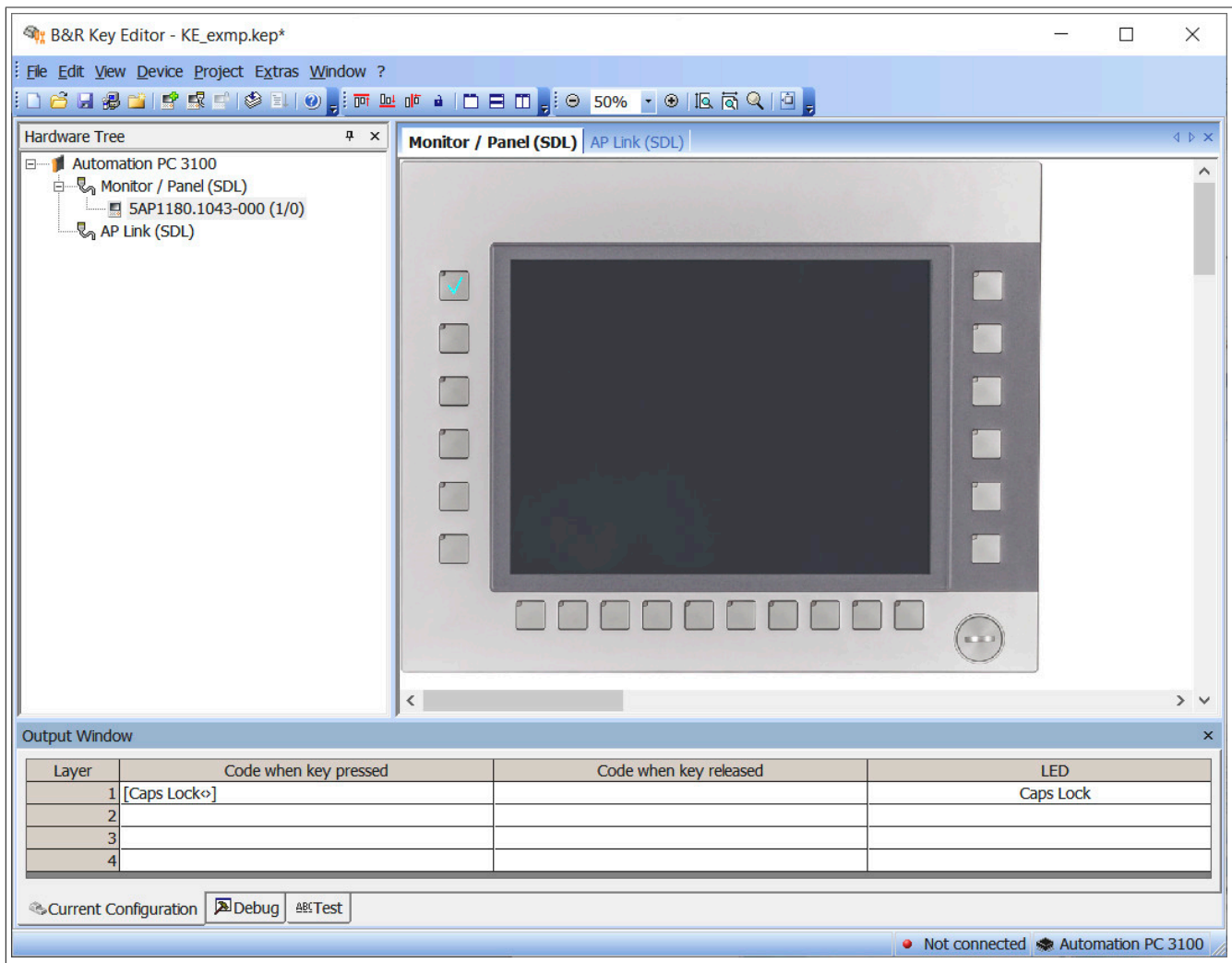


Figure 113: B&R Key Editor screenshots (version 3.50)

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.)
- Assignment of 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.

The following systems are supported (version 3.50):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Automation PC 2100
- Automation Panel 800
- Automation Panel 830
- Automation Panel 900

- Automation Panel 9x3 / 9xD
- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Panel PC 900
- Panel PC 2100
- 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 help system. 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).

5 Standards and certifications

5.1 Directives and declarations

5.1.1 CE marking



All directives applicable to the respective product and their harmonized EN standards are met.

5.1.2 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 standards - Immunity for industrial environments
EN 61000-6 -4:2007	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

5.1.3 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	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

5.2 Certifications

Danger!

A complete system can only receive certification if all individual components installed and connected in it have the corresponding certifications. If an individual component is used that does not have the corresponding certification, the complete system will also not be certified.

B&R products and services comply with applicable standards. These are 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 pay special attention to the reliability of our products in the industrial sector.

Information:

The certifications valid for the respective product are available on the website and in the user's manual under the technical data in section "Certifications" or in the associated certificates.

5.2.1 UL certification



Ind.Cont.Eq.
E115267

Products with this mark are tested by Underwriters Laboratories and listed as "industrial control equipment". This mark is valid for the USA and Canada and simplifies the certification of your machines and manufacturing systems in this economic region.

Underwriters Laboratories (UL) per standard UL 508
Canadian (CSA) standard per C22.2 No. 142-M1987

UL certificates are available on the B&R website under [Downloads - Certificates - UL](#).

It is important to note that the device is classified as "open type" when used in the area of "Industrial control equipment" per UL 508. The device must therefore be installed in a UL508-compliant housing as a requirement for certification or operation per UL 508.

5.2.2 EAC



Products with this mark are tested by an accredited test laboratory and permitted to be imported into the Eurasian Customs Union (based on EU conformity).

5.2.3 KC



Products with this mark are tested by an accredited test laboratory and permitted to be introduced into the Korean market (based on EU conformity).

5.2.4 GL certification (Germanischer Lloyd)



Products with this certification are certified by the classification society Germanischer Lloyd (GL) and suitable for use in the maritime sector. GL certificates (type approvals) 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 the effects of weather. EMC 1 defines the radiated and conducted emission limits for devices installed on a ship's bridge.

Products used on a ship's bridge must be dimmable using software in accordance with the regulations and guidelines from the respective classification society.

GL certificates with information about permissible ambient conditions are available on the B&R website ().

Information:

The line filter 5AC804.MFLT-00 in the power supply line is mandatory for use in the maritime environment. For additional information, see page [see "Connecting to the end device"](#).

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

Order number	Short description	GL starting with Rev.
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 (front). 24 VDC.	K0
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 (front). 24 VDC.	N0
Information: Starting with Rev. Q0, panel 5AP920.1906-01 no longer has DNV certification!		
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° male connector, 1.8 m.	D0
5CASDL.0050-01	SDL cable with 45° male connector, 5 m.	D0
5CASDL.0100-01	SDL cable with 45° male connector, 10 m.	D0
5CASDL.0150-01	SDL cable with 45° male 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
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 terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	D0
5DLS DL.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 (order screw clamp terminal block 0TB103.9 or cage clamp terminal block 0TB103.91 separately).	F0
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm ² , protected against vibration by the screw flange	D0
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamp terminal block 3.31 mm ² , protected against vibration by the screw flange	D0
5AC804.MFLT-00	Line filter	D0

Table 65: DNV certifications

5.3 SDL flex cable test description

5.3.1 Torsion

5.3.1.1 Test structure

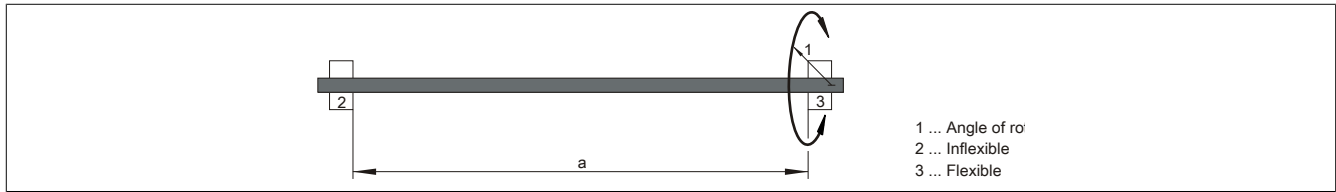


Figure 114: Test structure - Torsion

5.3.1.2 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.

5.3.1.3 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".

5.3.2 Cable drag chain

5.3.2.1 Test structure

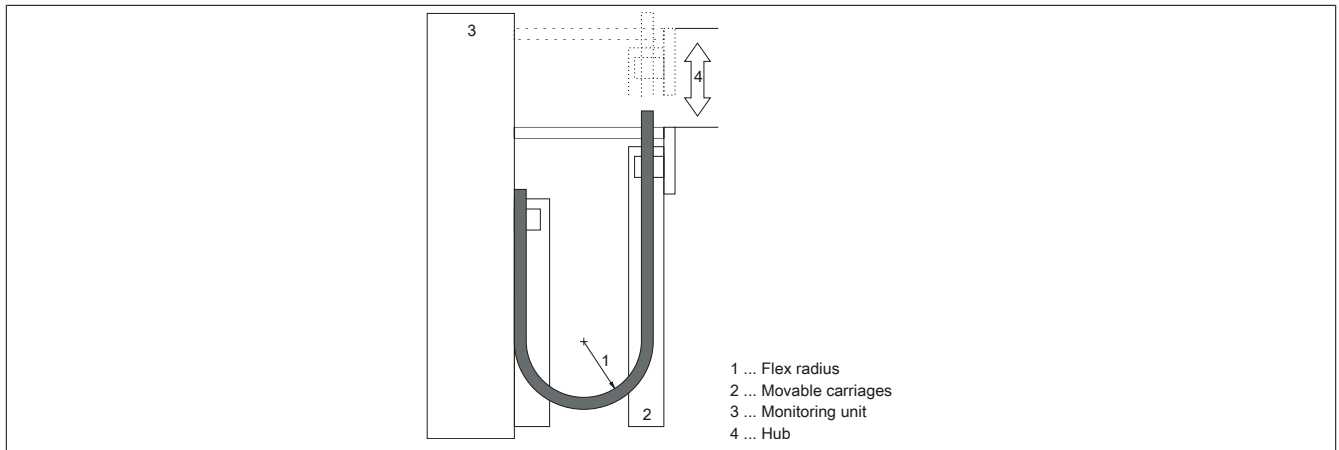


Figure 115: Test structure - Cable drag chain

5.3.2.2 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.

5.3.2.3 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".

6 Accessories

The following accessories have undergone functional testing by B&R in connection with the device used and can be operated with this device. Possible limitations regarding operation with individual components other than the complete system must be taken into account, however. All individual specifications of the components must be observed when operating the complete system.

All components listed in this manual have undergone intensive system and compatibility testing and been approved accordingly. B&R cannot assume any functional warranty for accessories that have not been approved.

6.1 0TB103.9x

6.1.1 General information

1-row 3-pin terminal block 0TB103 is used for the power supply.

6.1.2 Order data


Order number	Short description	Figure
0TB103.9	Connector 24 VDC - 3-pin female - Screw clamp terminal block 3.31 mm ²	
0TB103.91	Connector 24 VDC - 3-pin female - Cage clamp terminal block 3.31 mm ²	

Table 66: 0TB103.9, 0TB103.91 - Order data

6.1.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	0TB103.9		0TB103.91
General information			
Certifications			
CE	Yes		
EAC	Yes		
UL	cULus E115267 Industrial control equipment		
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾		
DNV GL	Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (bridge and open deck) ²⁾		
Terminal block			
Note	Protected against vibration by the screw flange Nominal data per UL		
Number of pins	3 (female)		
Type of terminal block	Screw clamp terminal block variant	Cage clamp terminal block variant ³⁾	
Cable type	Only copper wires (no aluminum wires!)		
Pitch	5.08 mm		
Connection cross section			
AWG wire	26 to 14 AWG	26 to 12 AWG	
Wire end sleeves with plastic covering	0.20 to 1.50 mm²		
Solid wires	0.20 to 2.50 mm²		
Fine-stranded wires	0.20 to 1.50 mm²	0.20 to 2.50 mm²	
With wire end sleeves	0.20 to 1.50 mm²		
Tightening torque	0.4 Nm	-	
Electrical properties			
Nominal voltage	300 V		
Nominal current ⁴⁾	10 A / contact		
Contact resistance	≤5 mΩ		
Operating conditions			
Pollution degree per EN 61131-2	Pollution degree 2		

Table 67: 0TB103.9, 0TB103.91 - Technical data

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV GL certificate for the product family.
- 3) The cage clamp terminal block cannot be used side by side.
- 4) The respective limit data of the I/O modules must be taken into account!

6.2 Terminal blocks

6.2.1 0TB103.8

6.2.1.1 General information

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

6.2.1.2 Order data

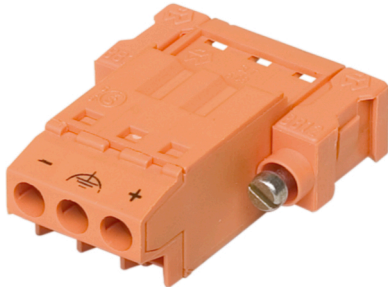
Order number	Short description	Figure
	Terminal blocks	
0TB103.8	Connector, 24 VDC, 3-pin male, screw clamp, 3.31 mm ² , protected against vibration by the screw flange	

Table 68: 0TB103.8 - Order data

6.2.1.3 Technical data

Order number	0TB103.8
General information	
Certifications	
CE	Yes
Terminal block	
Note	Protected against vibration by the screw flange Nominal values according to UL
Number of pins	3 (male)
Type of terminal block	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-stranded wires	0.20 to 1.50 mm ²
With wire end sleeves	0.20 to 1.50 mm ²
Electrical properties	
Nominal voltage	300 V
Nominal current ¹⁾	10 A / contact
Contact resistance	≤5 mΩ

Table 69: 0TB103.8 - Technical data

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

6.3 Legend strip templates

6.3.1 5AC900.104X-xx

6.3.2 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).

6.3.3 Order data

Order number	Short description	Figure
	Accessories	
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 70: 5AC900.104X-03, 5AC900.104X-04, 5AC900.104X-05, 5AC900.150X-01 - Order data

6.4 Cables

6.4.1 DVI cables

6.4.1.1 5CADVI.0xxx-00

6.4.1.1.1 General information

5CADVI.0xxx-00 DVI cables are designed for use in fixed installations.

Caution!

The cable is only permitted to be connected/disconnected when the power is switched off.

6.4.1.1.2 Order data


Order number	Short description	Figure
	DVI cables	
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

6.4.1.1.3 Technical data

Order number	5CADVI.0018-00		5CADVI.0050-00	5CADVI.0100-00
General information				
Certification				
CE	Yes			
cULus	Yes			
GOST-R	Yes			
GL	Yes ¹⁾			
Cable construction				
Wire cross section	AWG 28			
Shield	Individual cable pairs and entire cable			
Complete shielding	Tinned copper braiding, 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			
Locating screw tightening torque	Max. 0.5 Nm			
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 (male connector - ferrite bead and ferrite bead - ferrite bead)			
Weight	Approx. 260 g	Approx. 460 g		Approx. 790 g

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

¹⁾ Yes, although applies only if all components installed within the complete system have this certification.

6.4.1.1.4 Flex radius specifications

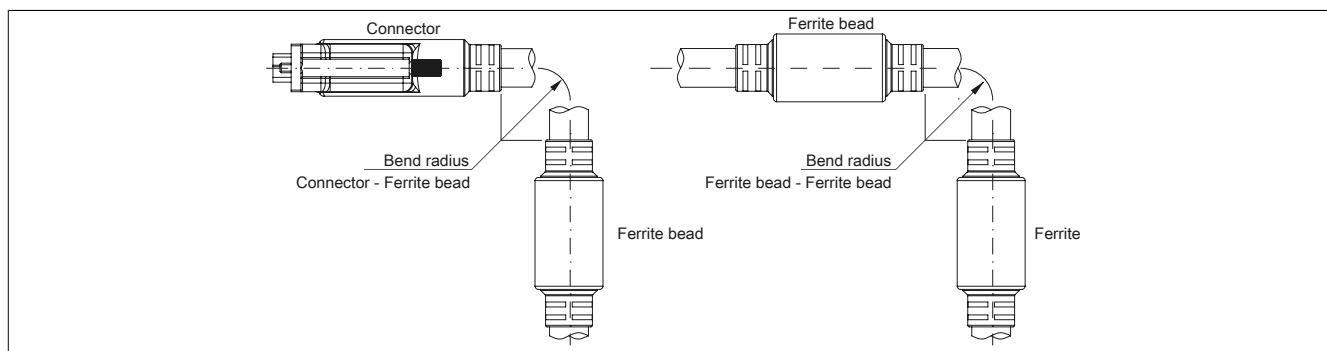


Figure 116: Bend radius specification

6.4.1.1.5 Dimensions

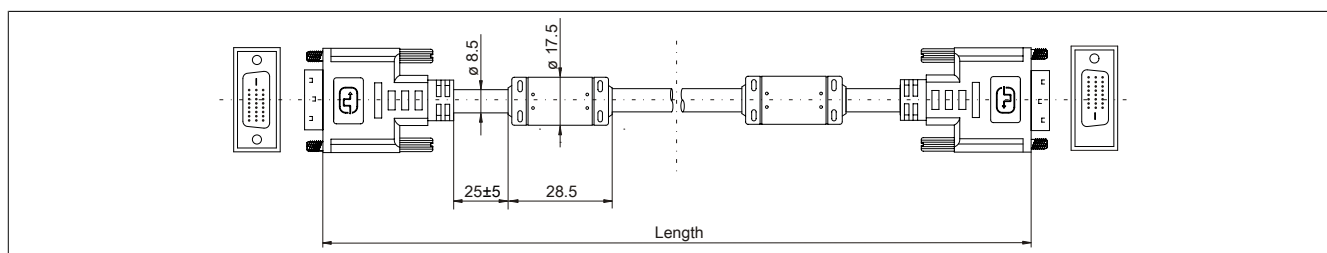


Figure 117: 5CADVI.0xxx-00 - Dimensions

6.4.1.1.6 Cable pinout

Warning!

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

If a field-assembled cable is used, B&R cannot guarantee its functionality. Functionality is only guaranteed for the cables available from B&R.

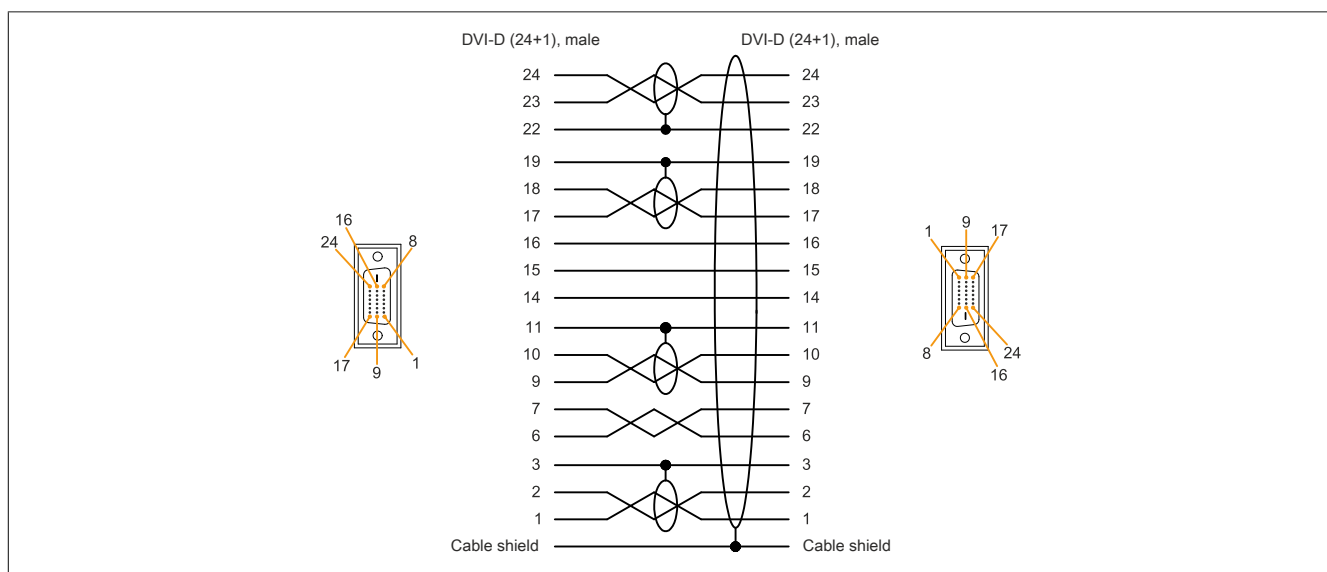


Figure 118: 5CADVI.0xxx-00 - Pinout

6.4.2 SDL cables

6.4.2.1 5CASDL.0xxx-00

6.4.2.1.1 General information

5CASDL.0xxx-00 SDL cables are designed for use in inflexible applications. 5CASDL.0xxx-03 SDL flex cables are required for flexible applications (e.g. swing arm systems).

Caution!

The cable is only permitted to be connected/disconnected when the power is switched off.

6.4.2.1.2 Order data


Order 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

6.4.2.1.3 Technical data

Order number	5CASDL. 0018-00	5CASDL. 0050-00	5CASDL. 0100-00	5CASDL. 0150-00	5CASDL. 0200-00	5CASDL. 0250-00	5CASDL. 0300-00
General information							
Certification							
CE	Yes						
cULus	Yes						
GOST-R	Yes						
GL	Yes ¹⁾						
Cable construction							
Wire cross section	AWG 28		AWG 24				
Shield	Individual cable pairs and entire cable						
Complete shielding	Tinned copper braiding, optical coverage >85%						
Outer sheathing							
Material	PVC						
Color	Black						
Labeling	E74020-C (UL) AWM STYLE 20176 80°C 30V VW-1 DVI DIGITAL LINK						
Connector							
Type	2x DVI-D (24+1), male						
Connection cycles	100						
Contacts	Gold-plated						
Mechanical protection	Metal cover with crimped stress relief						
Locating screw tightening torque	Max. 0.5 Nm						
Electrical characteristics							
Conductor resistance							
AWG 24	-	≤93 Ω/km					
AWG 28	≤237 Ω/km		-				
Insulation resistance	Min. 10 MΩ/km						
Mechanical characteristics							
Dimensions							
Length	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
Diameter	Typ. 8.6 ±0.2 mm Max. 9 mm		Typ. 11 ±0.2 mm Max. 11.5 mm				
Flex radius	≥5x cable diameter (male connector - ferrite bead and ferrite bead - ferrite bead)						
Flexibility	Limited flexibility, valid for ferrite bead - ferrite bead (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

¹⁾ Yes, although applies only if all components installed within the complete system have this certification.

6.4.2.1.4 Flex radius specifications

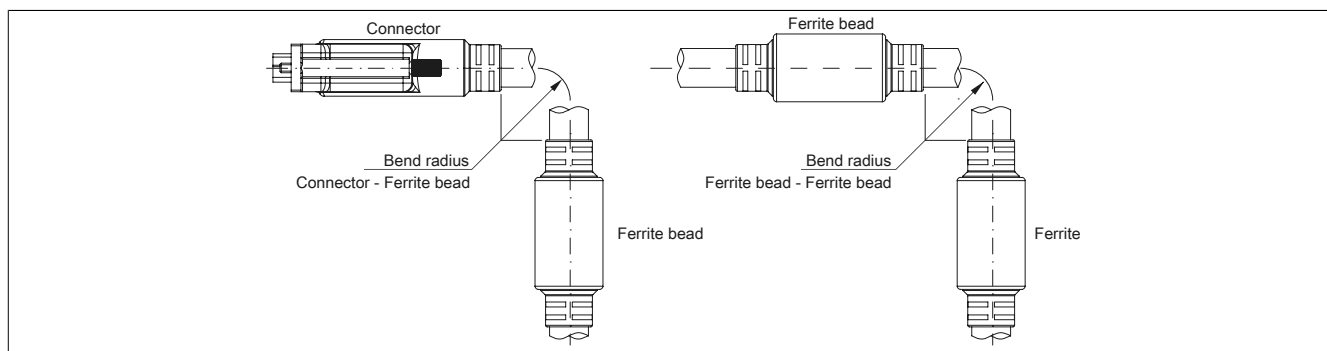


Figure 119: Bend radius specification

6.4.2.1.5 Dimensions

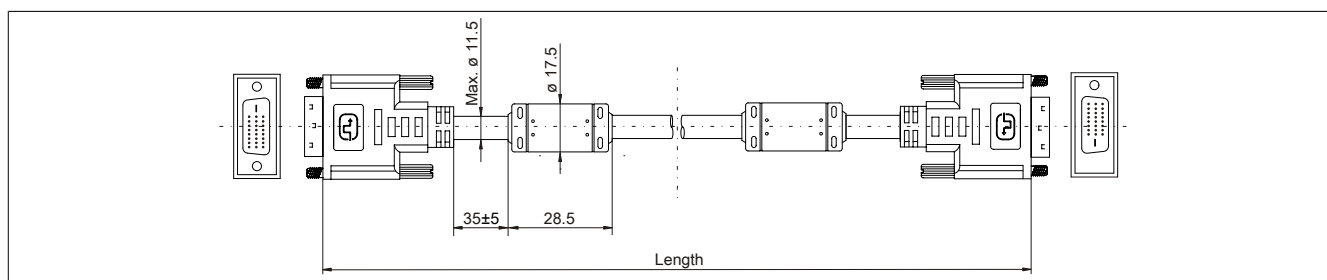


Figure 120: 5CASDL.0xxx-00- Dimensions

6.4.2.1.6 Cable pinout

Warning!

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

If a field-assembled cable is used, B&R cannot guarantee its functionality. Functionality is only guaranteed for the cables available from B&R.

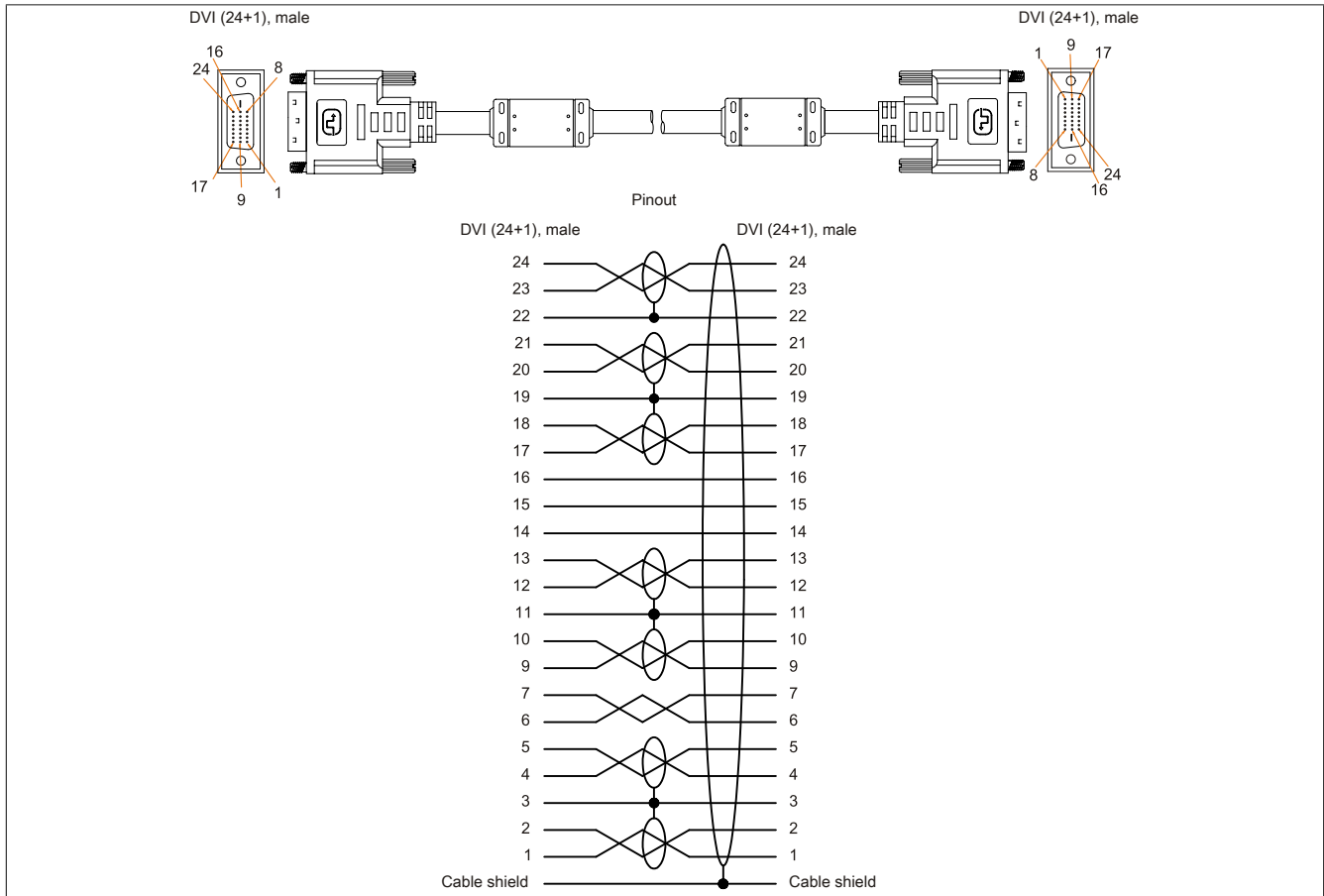


Figure 121: 5CASDL.0xxx-00 - Pinout

6.4.3 SDL cables with 45° connector

6.4.3.1 5CASDL.0xxx-01

6.4.3.1.1 General information

5CASDL.0xxx-01 SDL cables with 45° connector are designed for use in fixed installations.

Caution!

The cable is only permitted to be connected/disconnected when the power is switched off.

6.4.3.1.2 Order data

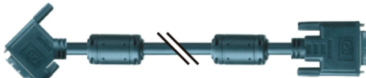
Order number	Short description	Figure
	SDL cables with 45° connectors	
5CASDL.0018-01	SDL cable - 45° connector - 1.8 m	
5CASDL.0050-01	SDL cable with 45° male connector, 5 m	
5CASDL.0100-01	SDL cable with 45° male connector, 10 m	
5CASDL.0150-01	SDL cable with 45° male connector, 15 m	

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

6.4.3.1.3 Technical data

Order number	5CASDL.0018-01	5CASDL.0050-01	5CASDL.0100-01	5CASDL.0150-01
General information				
Certification				
CE	Yes			
cULus	Yes			
GOST-R	Yes			
GL	Yes ¹⁾			
Cable construction				
Wire cross section	AWG 28		AWG 24	
Shield	Individual cable pairs and entire cable			
Complete shielding	Tinned copper braiding, optical coverage >85%			
Outer sheathing				
Material	PVC			
Color	Black			
Connector				
Type	2x DVI-D (24+1), male			
Connection cycles	100			
Contacts	Gold-plated			
Mechanical protection	Metal cover with crimped stress relief			
Locating screw tightening torque	Max. 0.5 Nm			
Electrical characteristics				
Conductor resistance				
AWG 24	-		≤93 Ω/km	
AWG 28	≤237 Ω/km		-	
Insulation resistance	Min. 10 MΩ/km			
Mechanical characteristics				
Dimensions				
Length	1.8 m ±30 mm	5 m ±50 mm	10 m ±100 mm	15 m ±100 mm
Diameter	Max. 9 mm		Max. 11.5 mm	
Flex radius				
Fixed installation	≥5x cable diameter (male connector - ferrite bead and ferrite bead - ferrite bead)			
Flexibility	Limited flexibility, valid for ferrite bead - ferrite bead (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

1) Yes, although applies only if all components installed within the complete system have this certification.

6.4.3.1.4 Flex radius specifications

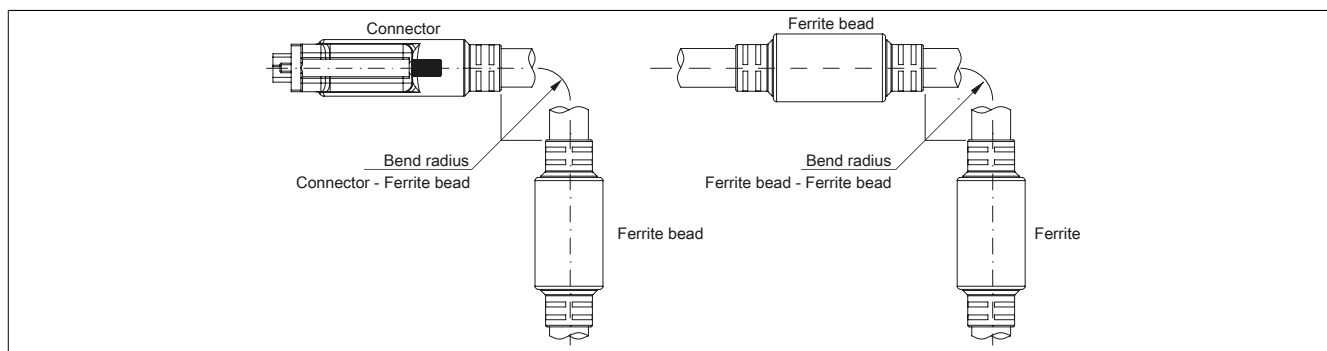


Figure 122: Bend radius specification

6.4.3.1.5 Dimensions

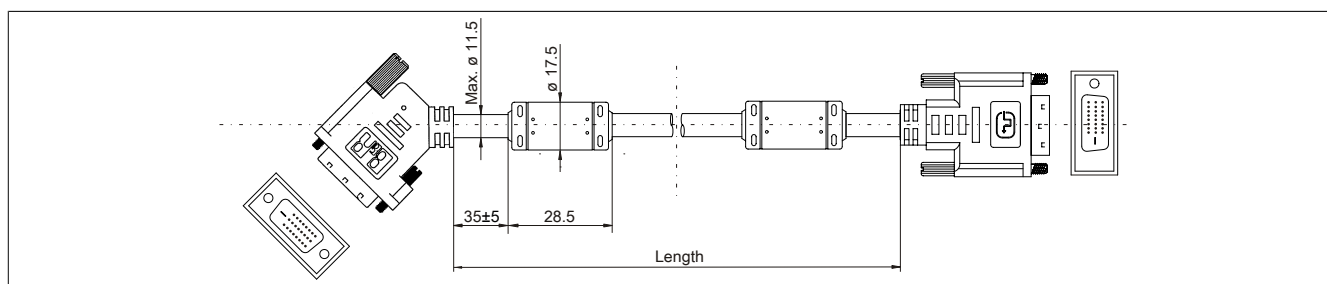


Figure 123: 5CASDL.0xxx-01 - Dimensions

6.4.3.1.6 Cable pinout

Warning!

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

If a field-assembled cable is used, B&R cannot guarantee its functionality. Functionality is only guaranteed for the cables available from B&R.

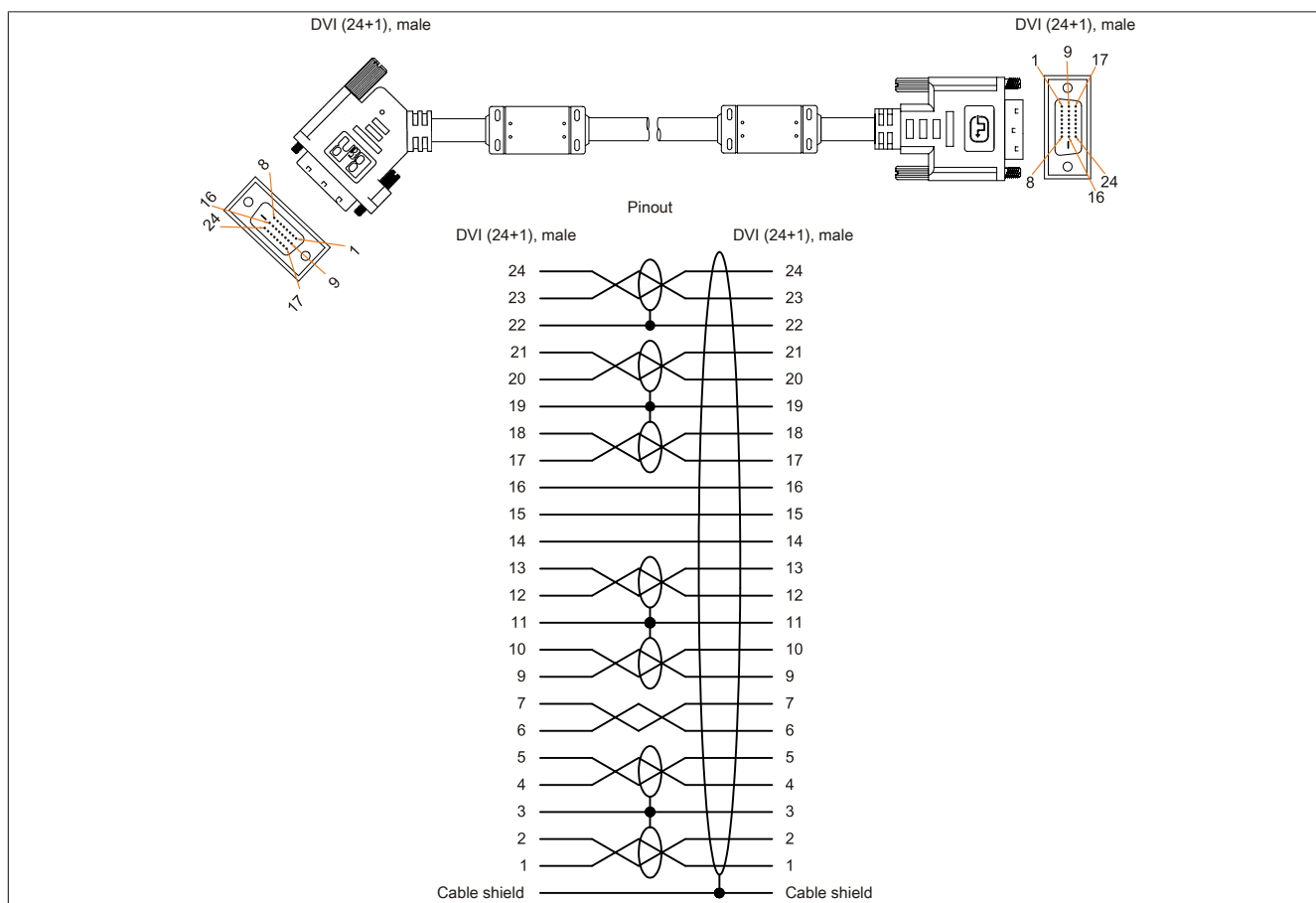


Figure 124: 5CASDL.0xxx-01 - Pinout

6.4.4 SDL flex cables

6.4.4.1 5CASDL.0xxx-03

6.4.4.1.1 General information

5CASDL.0xxx-03 SDL flex cables are designed for use in fixed as well as flexible installations (e.g. swing arm systems).

Caution!

The cable is only permitted to be connected/disconnected when the power is switched off.

6.4.4.1.2 Order data


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

6.4.4.1.3 Technical data

Order number	5CASDL. 0018-03	5CASDL. 0050-03	5CASDL. 0100-03	5CASDL. 0150-03	5CASDL. 0200-03	5CASDL. 0250-03	5CASDL. 0300-03
General information							
Certification							
CE	Yes						
cULus	Yes						
GOST-R	Yes						
GL	Yes ¹⁾						
Cable construction							
Wire cross section	AWG 24 (control wires) AWG 26 (DVI, USB, data)						
Features	Silicone- and halogen-free						
Shield	Individual cable pairs and entire cable						
Complete shielding	Aluminum-clad foil + tinned copper braiding						
Outer sheathing							
Material	Special semi-glossy TPU						
Color	Black						
Labeling	(B&R) SDL Cable (UL) AWM 20236 80°C 30V E 63216						
Connector							
Type	2x DVI-D (24+1), male						
Connection cycles	Min. 200						
Contacts	Gold-plated						
Mechanical protection	Metal cover with crimped stress relief						
Locating screw tightening torque	Max. 0.5 Nm						
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-retardant	In accordance with UL758 (cable vertical flame test)						
Oil and hydrolysis resistance	In accordance with 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

Order number	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	-20 to 80°C						
Fixed installation	-20 to 80°C						
Flexible installation	-5 to 60°C						
Mechanical characteristics							
Dimensions							
Length	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
Diameter	Max. 12 mm						
Flex radius							
Fixed installation	≥6x cable diameter (from male connector - ferrite bead) ≥10x cable diameter (from ferrite bead - ferrite bead)						
Flexible installation	≥15x cable diameter (from ferrite bead - ferrite bead)						
Flexibility	Flexible, valid for ferrite bead - ferrite bead (tested 300,000 cycles with 15x cable diameter, 4800 cycles/hour)						
Drag chain data							
Flex cycles	300,000						
Speed	4800 cycles/hour						
Flex radius	180 mm, 15x cable diameter						
Hub	460 mm						
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	≤50 N						
During installation	≤400 N						

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

- 1) Yes, although applies only if all components installed within the complete system have this certification.

6.4.4.1.4 Flex radius specifications

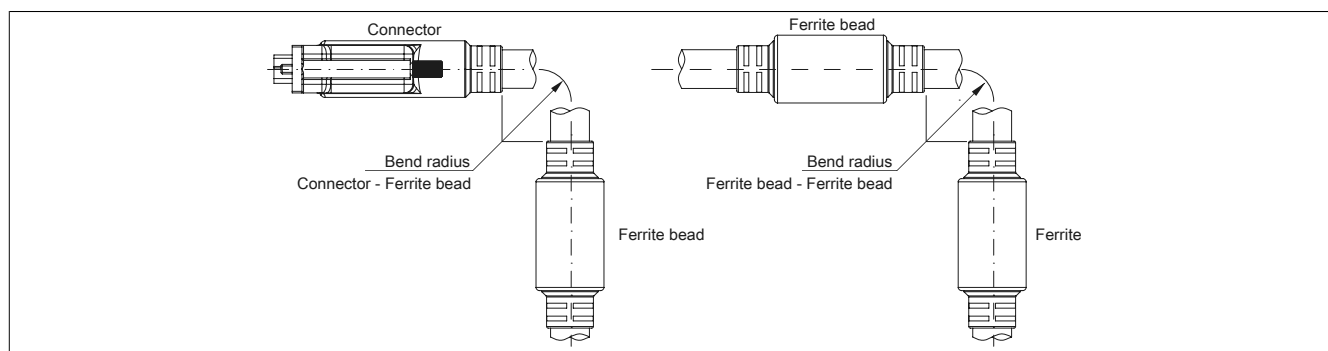


Figure 125: Bend radius specification

6.4.4.1.5 Dimensions

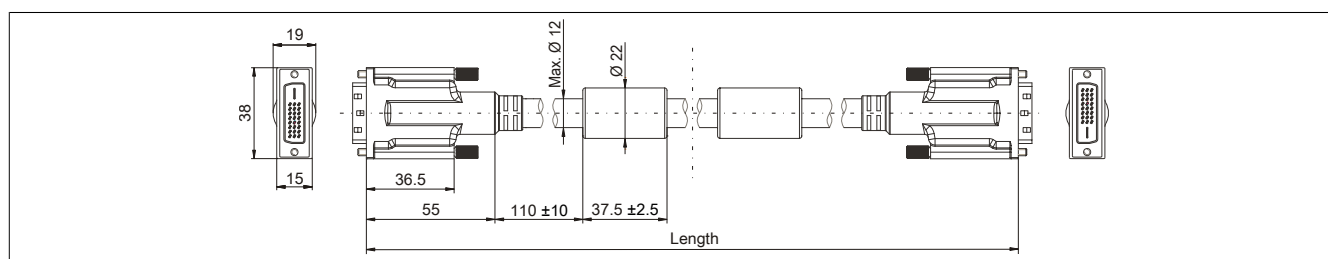


Figure 126: 5CASDL.0xxx-03 - Dimensions

6.4.4.1.6 Construction

Element	Pinout	Cross section	
DVI	TMDS data 0	26 AWG	
	TMDS data 1	26 AWG	
	TMDS data 2	26 AWG	
	TMDS clock	26 AWG	
USB	XUSB0	26 AWG	
	XUSB1	26 AWG	
Data	SDL	26 AWG	
Control wires	DDC clock	24 AWG	
	DDC data	24 AWG	
	+5 V	24 AWG	
	Ground	24 AWG	
	Hot plug detection	24 AWG	

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

6.4.4.1.7 Cable pinout

Warning!

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

If a field-assembled cable is used, B&R cannot guarantee its functionality. Functionality is only guaranteed for the cables available from B&R.

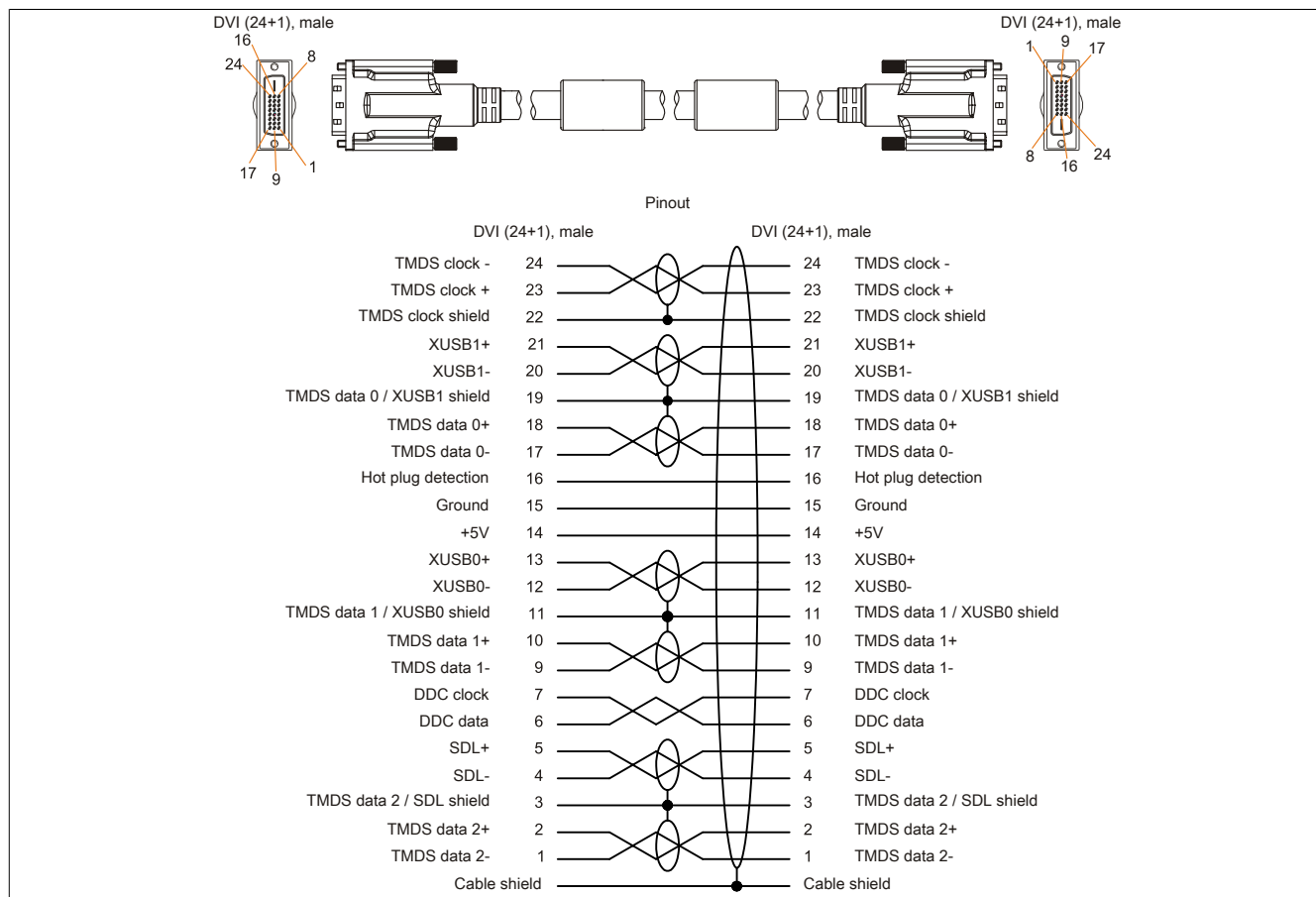


Figure 127: 5CASDL.0xxx-03 - Pinout

6.4.5 SDL flex cables with extender

6.4.5.1 5CASDL.0xx0-13

6.4.5.1.1 General information

5CASDL.0xx0-13 SDL flex cables with extender are designed for use in fixed as well as flexible installations (e.g. swing arm systems).

Caution!

The cable is only permitted to be connected/disconnected when the power is switched off.

6.4.5.1.2 Order data


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

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

6.4.5.1.3 Technical data

Order number	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
General information			
Certification			
CE		Yes	
cULus		Yes	
GOST-R		Yes	
GL		Yes ¹⁾	
Cable construction			
Wire cross section		AWG 24 (control wires) AWG 26 (DVI, USB, data)	
Features		Silicone- and halogen-free	
Shield		Individual cable pairs and entire cable	
Complete shielding		Aluminum-clad foil + tinned copper braiding	
Outer sheathing			
Material		Special semi-glossy TMPU	
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	
Locating screw tightening torque		Max. 0.5 Nm	
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-retardant		In accordance with UL758 (cable vertical flame test)	
Oil and hydrolysis resistance		In accordance with VDE 0282-10	
Environmental conditions			
Temperature			
Storage		-20 to 60°C	
Fixed installation		-20 to 60°C	
Flexible installation		-5 to 60°C	

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

Order number	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	≥6x cable diameter (from male connector - ferrite bead) ≥10x cable diameter (from ferrite bead - ferrite bead)		
Flexible installation	≥15x cable diameter (from ferrite bead - ferrite bead)		
Flexibility	Flexible, valid for ferrite bead - ferrite bead (tested 300,000 cycles with 15x cable diameter, 4800 cycles/hour)		
Drag chain data			
Flex cycles	300,000		
Speed	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

- 1) Yes, although applies only if all components installed within the complete system have this certification.

6.4.5.1.4 Flex radius specifications

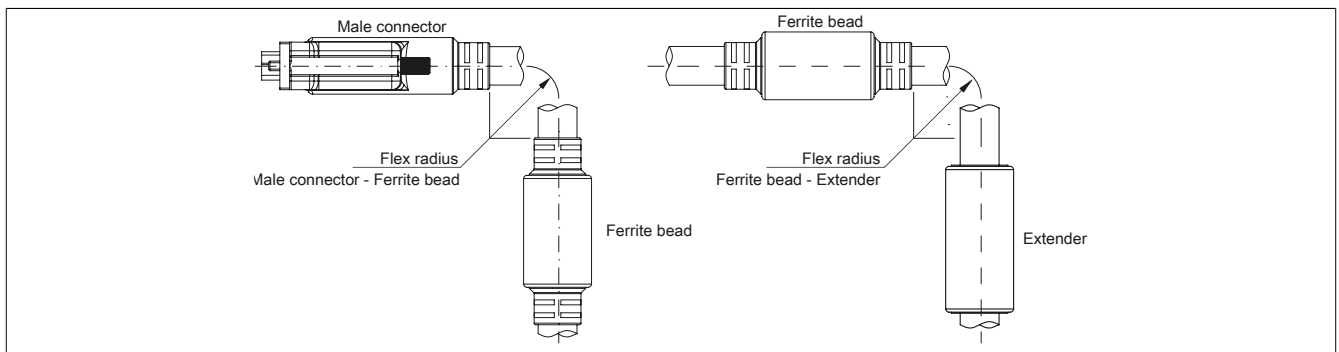


Figure 128: Flex radius specification with extender

6.4.5.1.5 Dimensions

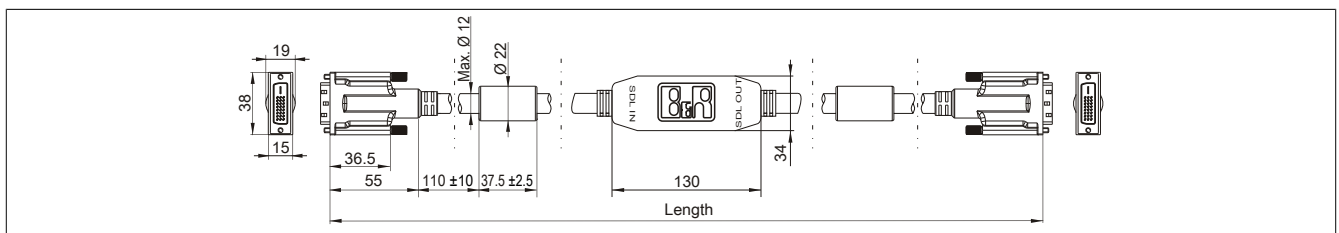


Figure 129: 5CASDL.0xx0-13 - Dimensions

6.4.5.1.6 Cable pinout

Warning!

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

If a field-assembled cable is used, B&R cannot guarantee its functionality. Functionality is only guaranteed for the cables available from B&R.

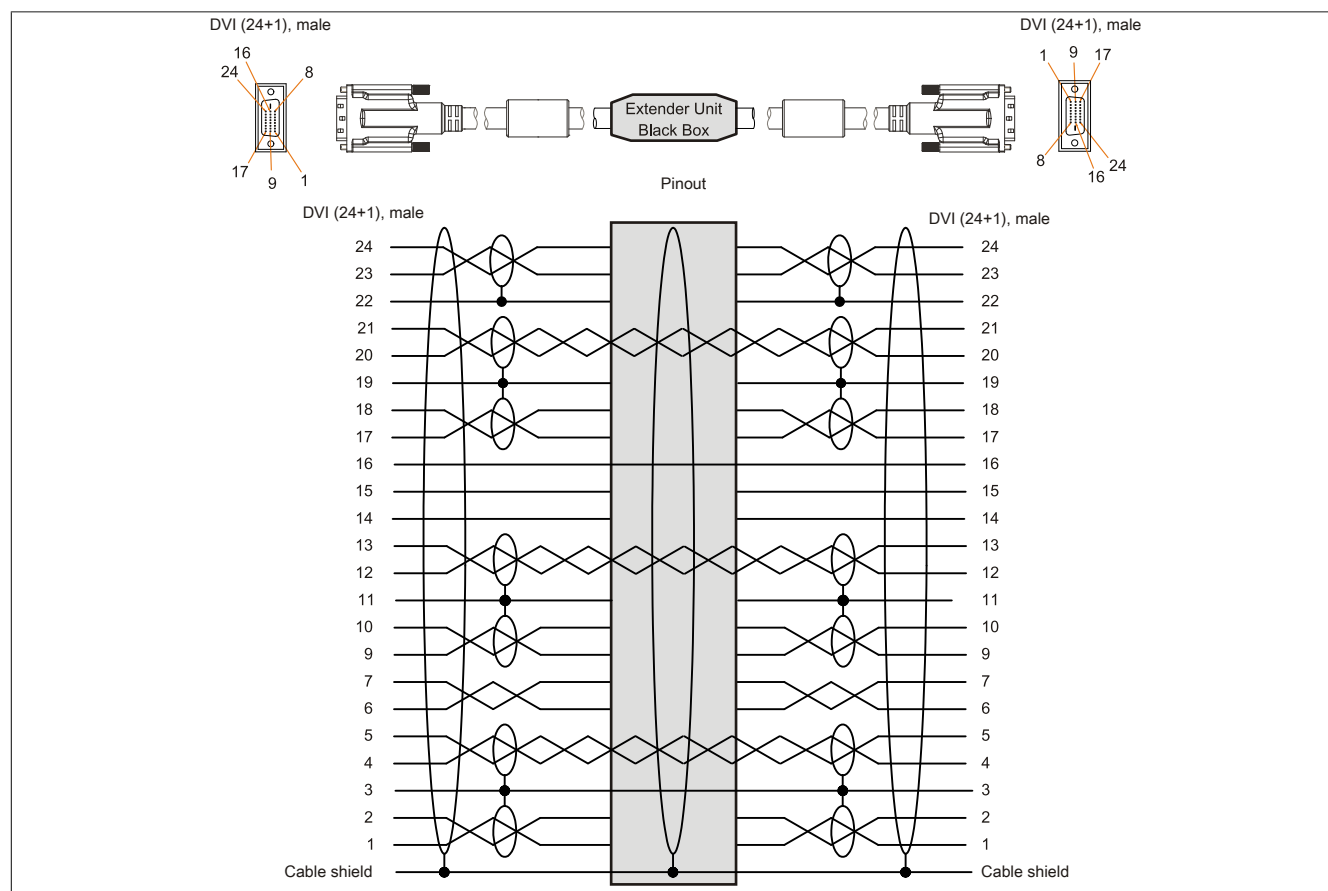


Figure 130: 5CASDL.0xx0-13 - Pinout

6.4.5.1.7 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 proper signal direction is indicated on the extender.

- 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 plug-in card (Panel IN).

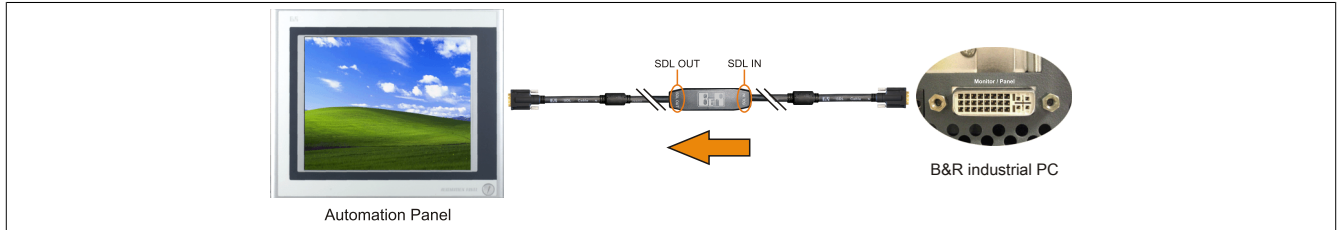


Figure 131: Example for the signal direction of the SDL flex cable with extender



Figure 132: Example for signal direction "Display - Display" of the SDL flex cable with extender

6.4.6 SDL3 cables

6.4.6.1 5CASD3.xxxx-00

6.4.6.1.1 General information

5CASD3.xxxx-00 SDL3 cables are designed to transfer SDL3 data and very easy to install. An RJ45 connector allows these cables to be connected in very narrow spaces, for example in swing arm shafts.

Caution!

The cable is only permitted to be connected/disconnected when the power is switched off.

6.4.6.1.2 Order data


Order number	Short description	Figure
	SDL3/SDL4/PoE cables	
5CASD3.0100-00	SDL3 cable, 10 m	
5CASD3.0150-00	SDL3 cable, 15 m	
5CASD3.0200-00	SDL3 cable, 20 m	
5CASD3.0300-00	SDL3 cable, 30 m	
5CASD3.0500-00	SDL3 cable, 50 m	
5CASD3.1000-00	SDL3 cable, 100 m	

Table 82: 5CASD3.0100-00, 5CASD3.0150-00, 5CASD3.0200-00, 5CASD3.0300-00, 5CASD3.0500-00, 5CASD3.1000-00 - Order data

6.4.6.1.3 Technical data

Order number	5CASD3.0100-00	5CASD3.0150-00	5CASD3.0200-00	5CASD3.0300-00	5CASD3.0500-00	5CASD3.1000-00
General information						
Certification						
CE	Yes					
cULus	Yes					
Cable construction						
Wire cross section	4x 2x 26/7 AWG			4x 2x 23/1 AWG		
Features	Flame-resistant, halogen-free, lead-free					
Outer sheathing						
Material	Polyurethane (PUR)					
Color	Yellow, RAL 1021					
Labeling	HARTING INDUSTRIAL CABLE S/FTP CAT 6A PUR 4x 2x 26/7 AWG			HARTING INDUSTRIAL INSTALLATION CA- BLE S/FTP CAT 7 PUR 4x 2x 23/1 AWG		
Lines						
Wire insulation	Polyethylene (PE)					
Wire colors	Green/white-green, orange/white-orange, blue/white-blue, brown/white-brown					
Shield	Aluminum foil and braided wire shield made of tinned copper wires					
Type	Unprotected copper wire, 4x 2x 26/7 AWG			Unprotected copper wire, 4x 2x 23/1 AWG		
Connector						
Type	2x RJ45, male					
Connection cycles	Min. 750					
Contacts	8					
Electrical characteristics ¹⁾						
Operating voltage	≤100 V			≤125 V		
Conductor resistance	≤290 Ω/km			≤75 Ω/km		
Wave impedance	100 ±5 Ω (at 100 MHz)					
Transfer properties	Category 6A / Class EA up to 500 MHz in accordance with ISO/IEC 11801 (EN 50173-1), ISO/IEC 24702 (EN 50173-3)			Category 7 / Class F up to 600 MHz in accordance with ISO/IEC 11801 (EN 50173-1), ISO/IEC 24702 (EN 50173-3)		
Insulation resistance	≥ 500 MΩ/km			≥5 GΩ/km		
Operating conditions						
Flame-retardant	IEC 60332-1-2					
Oil and hydrolysis resistance	EN 60811-2-1 (90°C / 7x24 h)					
EN 60529 protection						
Cables	IP20					
RJ45 connector	IP20, only when connected properly					
Environmental conditions						
Temperature						
Storage	-40 to 70°C					
Fixed installation	-40 to 70°C					
Flexible installation	-40 to 70°C			-10 to 50°C		

Table 83: 5CASD3.0100-00, 5CASD3.0150-00, 5CASD3.0200-00, 5CASD3.0300-00, 5CASD3.0500-00, 5CASD3.1000-00 - Technical data

Order number	5CASD3.0100-00	5CASD3.0150-00	5CASD3.0200-00	5CASD3.0300-00	5CASD3.0500-00	5CASD3.1000-00
Mechanical characteristics						
Dimensions						
Length	10 m	15 m	20 m	30 m	50 m	100 m
Diameter	6.7 mm			8.3 mm		
Flex radius						
Fixed installation	≥5x diameter			≥4x diameter		
Flexible installation	≥10x diameter			≥8x diameter		
Weight	500 g	700 g	950 g	2150 g	3500 g	6950 g
Tension						
During operation	≤70 N			≤110 N		
During installation	≤70 N			≤110 N		

Table 83: 5CASD3.0100-00, 5CASD3.0150-00, 5CASD3.0200-00, 5CASD3.0300-00, 5CASD3.0500-00, 5CASD3.1000-00 - Technical data

1) At an ambient temperature of 20°C.

6.4.6.1.4 Flex radius specifications

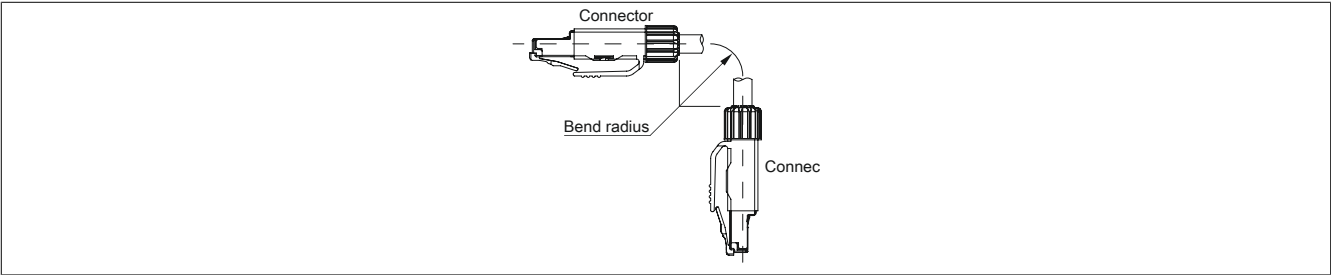


Figure 133: SDL3 - Bend radius specification

6.4.6.1.5 Dimensions

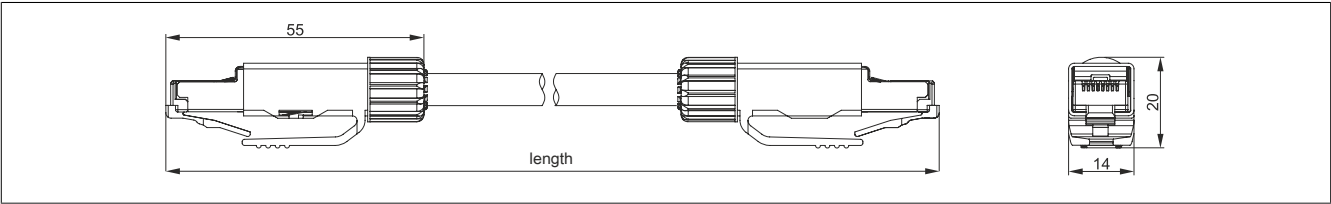


Figure 134: 5CASD3.xxxx-00 - Dimensions

6.4.6.1.6 Cable pinout

Warning!

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout. If a field-assembled cable is used, B&R cannot guarantee its functionality. Functionality is only guaranteed for the cables available from B&R.

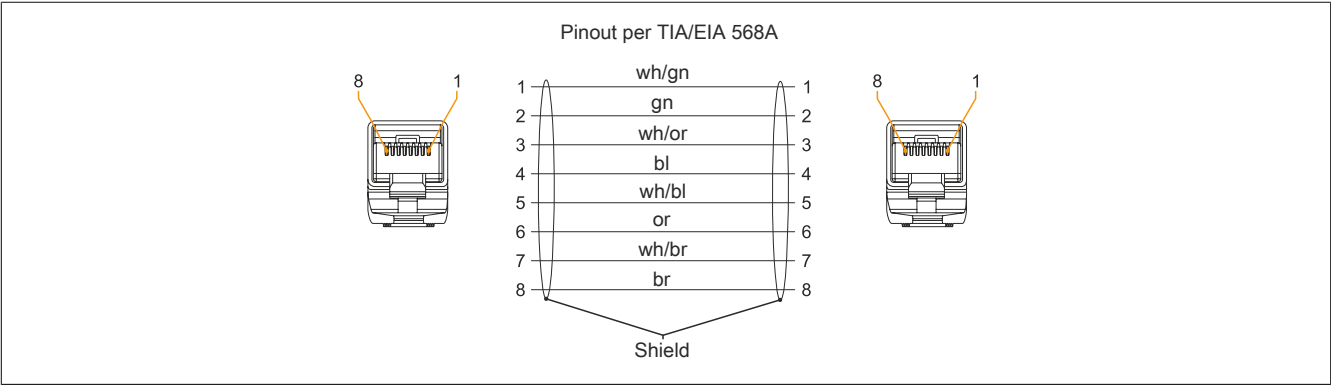


Figure 135: 5CASD3.xxxx-00 - Pinout

6.4.6.1.7 Cabling

The following information and figure apply when using a field-assembled cable that is not directly connected to a B&R device, but to an RJ45 network interface (e.g. patch panel).

Cables must meet category 6a (Cat6a) or category 7 (Cat7) requirements. Exceeding the maximum total length of 100 m is not permitted.

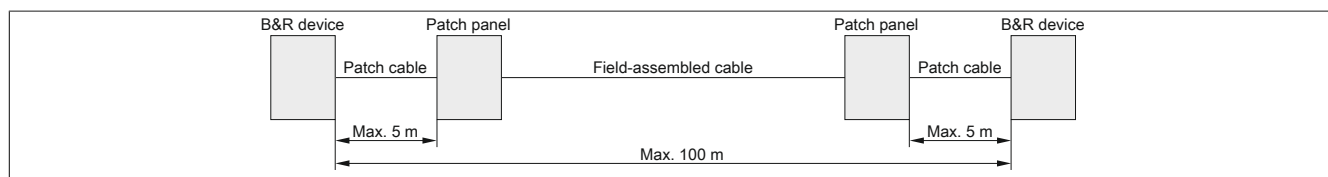


Figure 136: Wiring with a field-assembled cable

6.4.7 USB cables

6.4.7.1 5CAUSB.00xx-00

6.4.7.1.1 General information

USB cables are designed for USB 2.0 transfer rates.

6.4.7.1.2 Order data


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

Table 84: 5CAUSB.0018-00, 5CAUSB.0050-00 - Order data

6.4.7.1.3 Technical data

Order number	5CAUSB.0018-00	5CAUSB.0050-00
General information		
Certification		
CE	Yes	
cULus	Yes	
GOST-R	Yes	
Cable construction		
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 85: 5CAUSB.0018-00, 5CAUSB.0050-00 - Technical data

6.4.7.1.4 Cable pinout

Warning!

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

If a field-assembled cable is used, B&R cannot guarantee its functionality. Functionality is only guaranteed for the cables available from B&R.

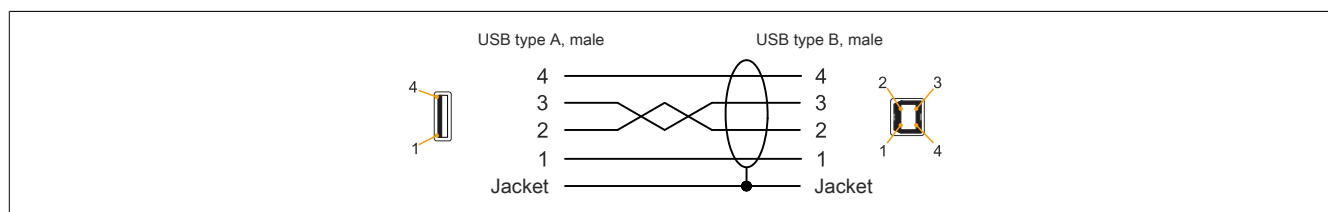


Figure 137: 5CAUSB.00xx-00 USB cables - Pinout

6.4.8 RS232 cables

6.4.8.1 9A0014.xx

6.4.8.1.1 General information

RS232 cables serve as extension cables between two RS232 interfaces.

6.4.8.1.2 Order data


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

Table 86: 9A0014.02, 9A0014.05, 9A0014.10 - Order data

6.4.8.1.3 Technical data

Order number	9A0014.02	9A0014.05	9A0014.10
General information			
Certification			
CE		Yes	
GOST-R	-		Yes
Cable construction			
Wire cross section		AWG 26	
Shield		Entire cable	
Outer sheathing			
Color		Beige	
Connector			
Type		9-pin male/female DSUB connector	
Locating screw tightening torque		Max. 0.5 Nm	
Mechanical characteristics			
Dimensions			
Length	1.8 m ±50 mm	5 m ±80 mm	10 m ±100 mm
Diameter		Max. 5 mm	
Flex radius		Min. 70 mm	

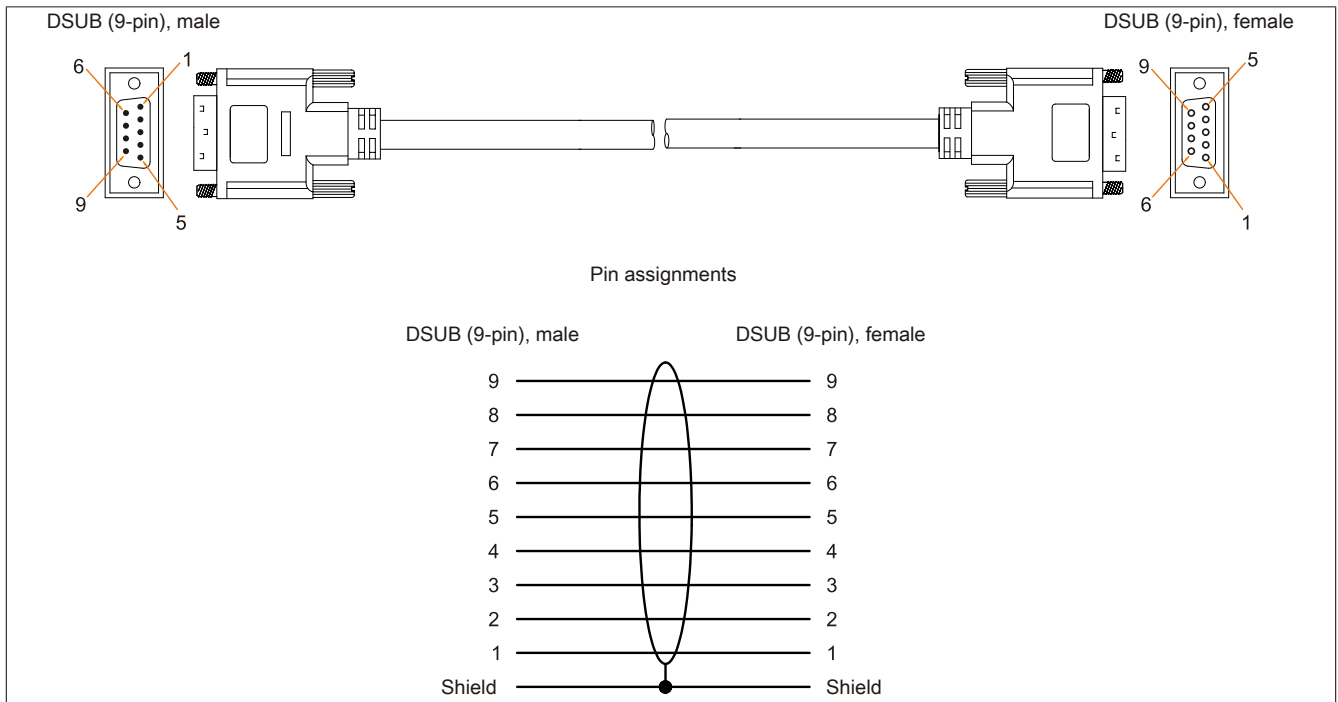
Table 87: 9A0014.02, 9A0014.05, 9A0014.10 - Technical data

6.4.8.1.4 Cable pinout

Warning!

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

If a field-assembled cable is used, B&R cannot guarantee its functionality. Functionality is only guaranteed for the cables available from B&R.



6.5 USB interface cover

6.5.1 5AC900.1200-00

6.5.1.1 General information

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

6.5.1.2 Order data


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

Table 88: 5AC900.1200-00 - Order data

6.5.2 5AC900.1200-01

6.5.2.1 General information

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

6.5.2.2 Order data


Order number	Short description	Figure
	Accessories	
5AC900.1200-01	USB interface cover - Flat - For AP920/98x and PPC700	

Table 89: 5AC900.1200-01 - Order data

6.5.3 5AC900.1201-00

6.5.3.1 General information

Flat front-side USB interface cover for Automation Panel 900, Power Panel 500, Panel PC 700 and Panel PC 800 devices.

6.5.3.2 Order data


Order number	Short description	Figure
	Accessories	
5AC900.1201-00	USB interface cover M20 IP65 flat	

Table 90: 5AC900.1201-00 - Order data

6.5.4 5AC900.1201-01

6.5.4.1 General information

Round front-side knurled USB interface cover (with anti-loss strap) for Automation Panel 900, Power Panel 500, Panel PC 700 and Panel PC 800 devices.

6.5.4.2 Order data


Order number	Short description	Figure
Accessories		
5AC900.1201-01	USB interface cover M20 IP65 curved	

Table 91: 5AC900.1201-01 - Order data

6.6 USB flash drives

6.6.1 5MMUSB.2048-00

6.6.1.1 General information

USB flash drives are easily exchangeable data storage devices. Because of their high-speed data transfer (USB 2.0), USB flash drives are ideal for use as portable storage media. Without additional drivers ("hot plugging", except in Windows 98SE), the USB flash drive is immediately registered as a drive for reading and writing data.

Information:

Due to the large number of USB flash drives available on the market as well as their short product lifecycle, we reserve the right to provide alternative products. The following measures may therefore be necessary in order to also boot from these USB flash drives:

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

6.6.1.2 Order data


Order number	Short description	Figure
USB accessories		
5MMUSB.2048-00	USB 2.0 flash drive, 2048 MB	

Table 92: 5MMUSB.2048-00 - Order data

6.6.1.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	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 any 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	
Current consumption	650 µA sleep mode, 150 mA read/write

Table 93: 5MMUSB.2048-00 - Technical data

Order number	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 duration
Storage	Max. 80 g (784 m/s ² 0-peak) and 11 ms duration
Transport	Max. 80 g (784 m/s ² 0-peak) and 11 ms duration
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 93: 5MMUSB.2048-00 - Technical data

1) Indicates data being transferred (sending and receiving).

6.6.1.4 Temperature/Humidity diagram

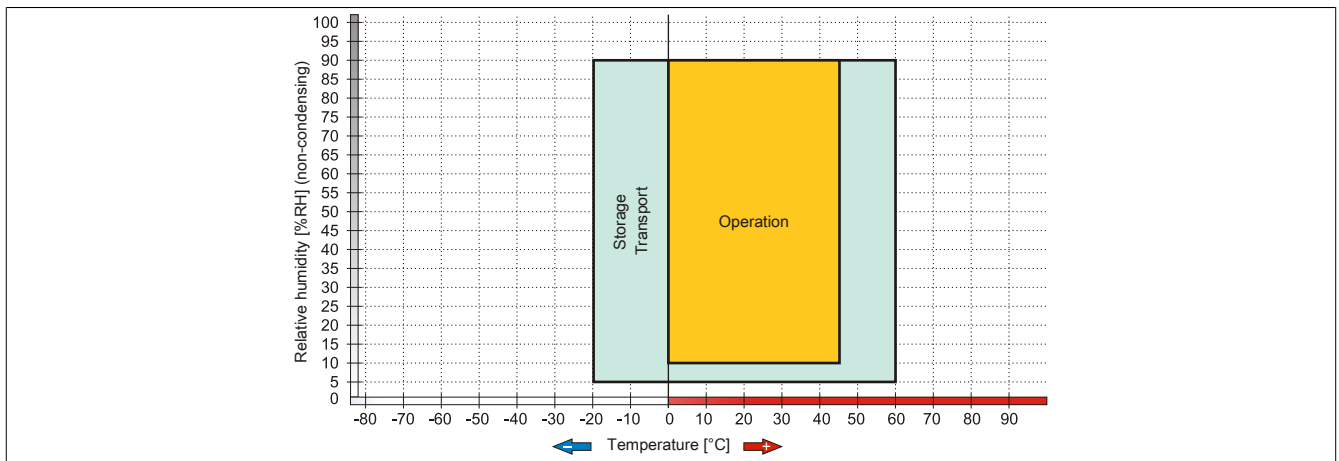


Figure 138: 5MMUSB.2048-00 - Temperature/Humidity diagram

6.6.2 5MMUSB.xxxx-01

6.6.2.1 General information

USB flash drives are easily exchangeable data storage devices. Because of their high-speed data transfer (USB 2.0), USB flash drives are ideal for use as portable storage media. Without additional drivers ("hot plugging", except in Windows 98SE), the USB flash drive is immediately registered as a drive for reading and writing data.

Information:

Due to the large number of USB flash drives available on the market as well as their short product lifecycle, we reserve the right to provide alternative products. The following measures may therefore be necessary in order to also boot from these USB flash drives:

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

6.6.2.2 Order data

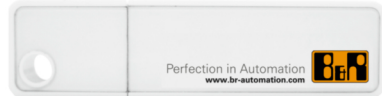
Order number	Short description	Figure
	USB accessories	
5MMUSB.2048-01	USB 2.0 flash drive, 2048 MB, B&R	
5MMUSB.4096-01	USB 2.0 flash drive, 4096 MB, B&R	

Table 94: 5MMUSB.2048-01, 5MMUSB.4096-01 - Order data

6.6.2.3 Technical data

Order number	5MMUSB.2048-01	5MMUSB.4096-01
General information		
Capacity	2 GB	4 GB
LEDs	1 LED (green) ¹⁾	
MTBF	>3,000,000 hours	
Type	USB 1.1, USB 2.0	
Maintenance	None	
Default file system	FAT16	FAT32
Certification		
CE	Yes	
GOST-R	Yes	
Interfaces		
USB		
Type	USB 1.1, USB 2.0	
Connection	To any USB type A interface	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Sequential reading	Full speed max. 1 MB/s, high speed max. 32 MB/s	
Sequential writing	Full speed max. 0.9 MB/s, high speed max. 23 MB/s	
Endurance		
SLC flash	Yes	
Data retention	>10 years	
Data reliability	<1 unrecoverable error in 10 ¹⁴ bit read accesses	
Connection cycles	>1,500	
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		
Current consumption	Max. 500 uA sleep mode, max. 120 mA read/write	

Table 95: 5MMUSB.2048-01, 5MMUSB.4096-01 - Technical data

Order number	5MMUSB.2048-01	5MMUSB.4096-01
Environmental conditions		
Temperature		
Operation		0 to 70°C
Storage		-50 to 100°C
Transport		-50 to 100°C
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. 1500 g (peak)
Storage		Max. 1500 g (peak)
Transport		Max. 1500 g (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 95: 5MMUSB.2048-01, 5MMUSB.4096-01 - Technical data

1) Indicates data being transferred (sending and receiving).

6.6.2.4 Temperature/Humidity diagram

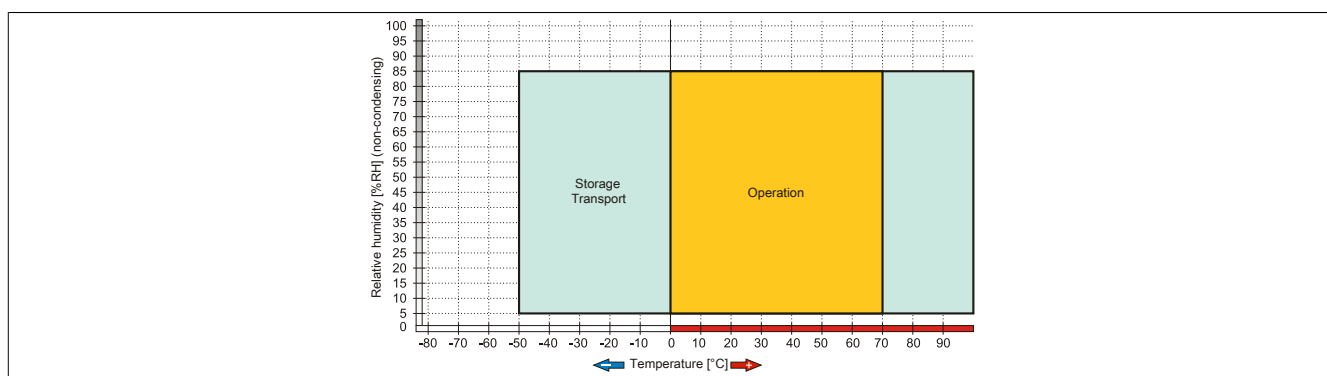


Figure 139: 5MMUSB.xxxx-01 - Temperature/Humidity diagram

6.7 AP900 fluorescent tubes

6.7.1 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 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 96: Overview of fluorescents tubes and panels

6.7.2 Order data


Order number	Short description	Figure
	Accessories	
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 LQ150X1L-W71N: 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 97: 9A0110.18, 9A0110.22 - Order data

6.8 Line filter


6.8.1 5AC804.MFLT-00

6.8.1.1 General information

Line filter 5AC804.MFLT-00 may be necessary to meet maritime requirements regarding conducted interference emissions in power supply line per DNV.

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.

6.8.1.2 Order data

Order number	Short description	Figure
5AC804.MFLT-00	Accessories Line filter	

6.8.1.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5AC804.MFLT-00
General information	
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
DNV	Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (bridge and open deck) ²⁾
EAC	Product family certification
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 properties	
Nominal voltage	24 VDC (-25% / +30%), SELV ³⁾
Nominal current	8 A
Overvoltage category per EN 61131-2	II
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	-25 to 65°C
Storage	-25 to 65°C
Transport	-25 to 65°C
Mechanical properties	
Housing	
Material	Galvanized plate

Order number	5AC804.MFLT-00
Dimensions	
Width	54 mm
Length	94 mm
Depth	32.15 mm
Weight	205 g

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
- 3) IEC 61010-2-201 requirements must be observed.

6.8.1.4 Dimensions

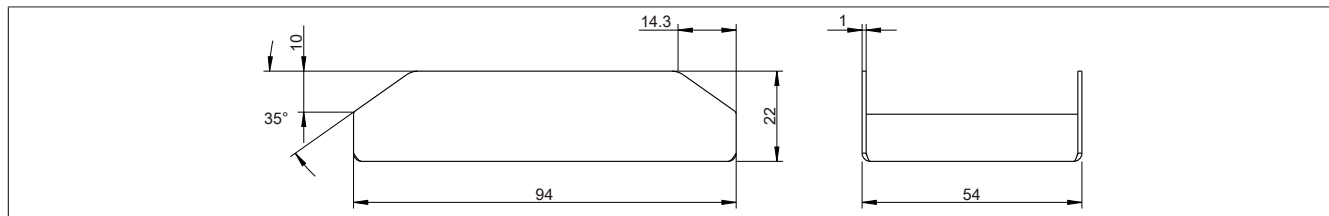


Figure 140: 5AC804.MFLT-00 - Dimensions

6.8.1.5 Drilling template

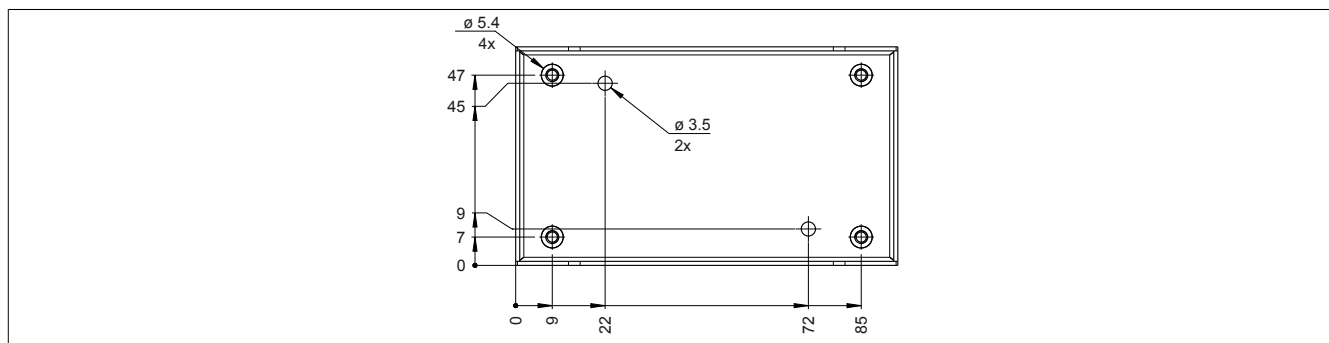


Figure 141: 5AC804.MFLT-00 - Drilling template

6.8.1.6 Connecting to the end device

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

The following points must be observed:

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

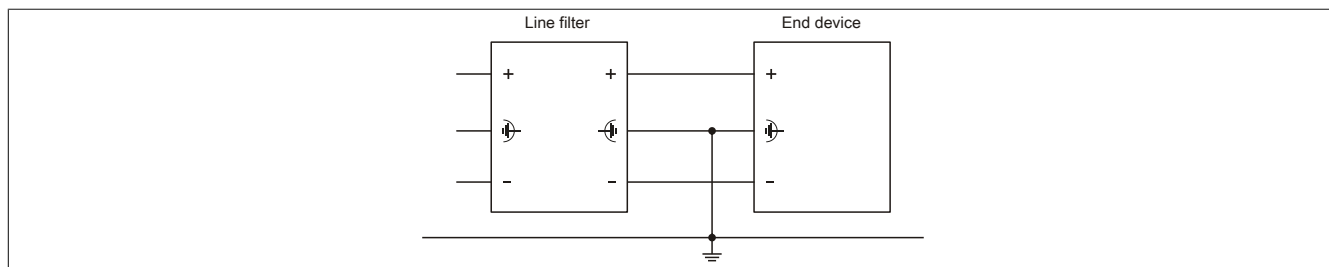


Figure 142: Connection example

6.9 HMI Drivers & Utilities DVD

6.9.1 5SWHMI.0000-00

6.9.1.1 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).

When the DVD is created, its contents are identical to the files found in the Downloads section of the B&R website (Service / Material-related downloads).

6.9.1.2 Order data


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

Table 100: 5SWHMI.0000-00 - Order data

6.9.1.3 Contents (V2.20)

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 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
- Power Panel 500 / Automation PC 510 / Automation PC 511 BIOS
- Panel PC 310

Driver 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)
- Power Panel 500 / Automation PC 510 / Automation PC 511 (MTCX, SDLR, I/O board)
- 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 service life calculator (Silicon Systems)
- Miscellaneous
- MTC Utilities
- Key Editor
- MTC & Mkey Utilities
- Mkey Utilities
- UPS configuration software
- ICU ISA configuration
- Intel PCI NIC boot ROM
- Diagnostic 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
- Windows Embedded Standard 7
- Thin client
- Windows NT Embedded
- Windows XP Embedded
- VNC viewer

MCAD templates for

- Industrial PCs
- HMI devices
- Slide-in label templates
- Customized designs

ECAD templates for

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

Documentation for

- Automation PC 511
- 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
- Power Panel 500
- 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 documentation
- Windows CE 6.0 help documentation
- 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)

7 Servicing and maintenance

This chapter describes the servicing/maintenance work that is possible to be carried out by a trained and qualified end user.

7.1 Cleaning

Danger!

The device is only permitted to be cleaned when it is switched off in order to avoid triggering unintentional functions by touching the touch screen or pressing keys.

Use a damp cloth to clean the device. Use only water with detergent, screen cleaner or alcohol (ethanol) to moisten the cleaning cloth. Apply the cleaning agent to the cloth first; do not spray it directly onto the device! Never use aggressive solvents, chemicals, abrasive cleaners, compressed air or steam cleaners.

Information:

Displays with a touch screen should be cleaned at regular intervals.

7.2 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.

7.2.1 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).

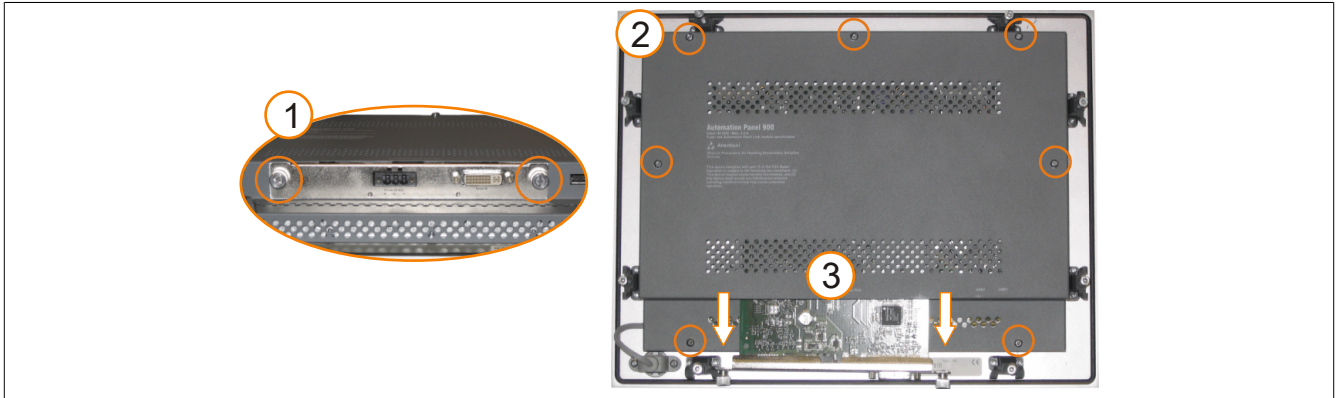


Figure 143: Removing the cover

7.2.1.1 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.

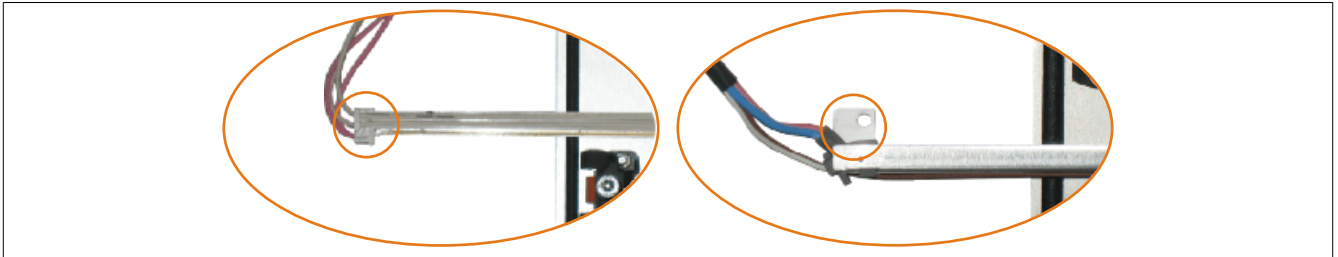


Figure 144: Warning - Replacing the fluorescent tubes

7.2.1.2 Procedure for 12.1" Automation Panels

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

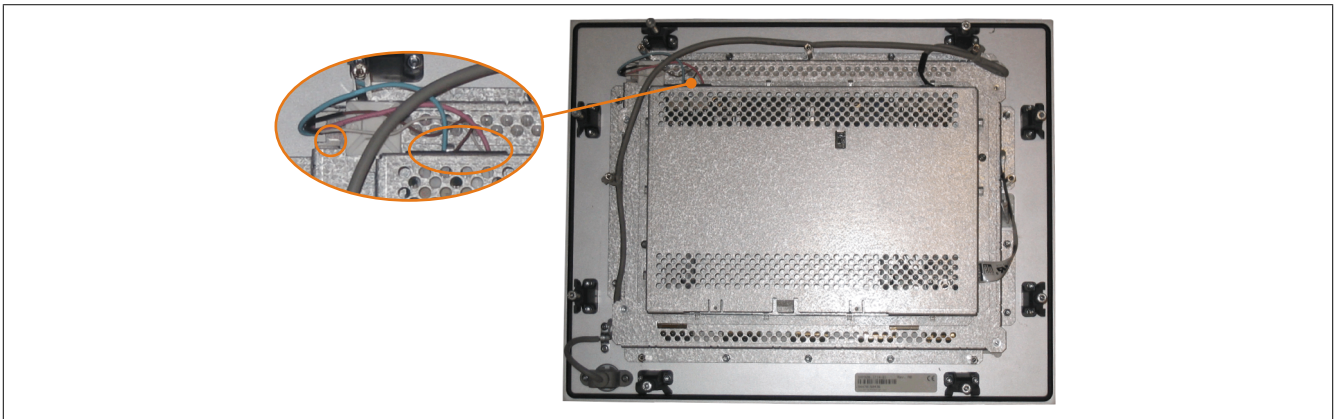


Figure 145: 12.1" Automation Panels - Unscrewing and disconnecting

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

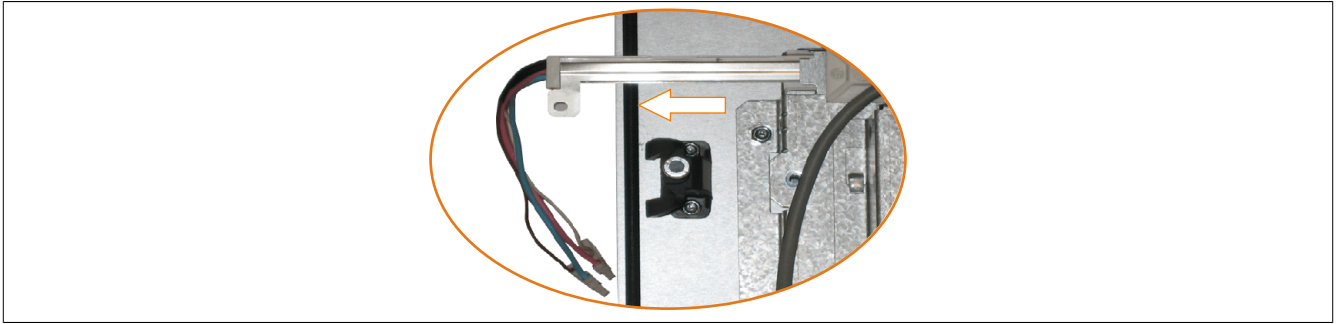


Figure 146: 12.1" Automation Panels - Replacing the fluorescent tube

7.2.1.3 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.

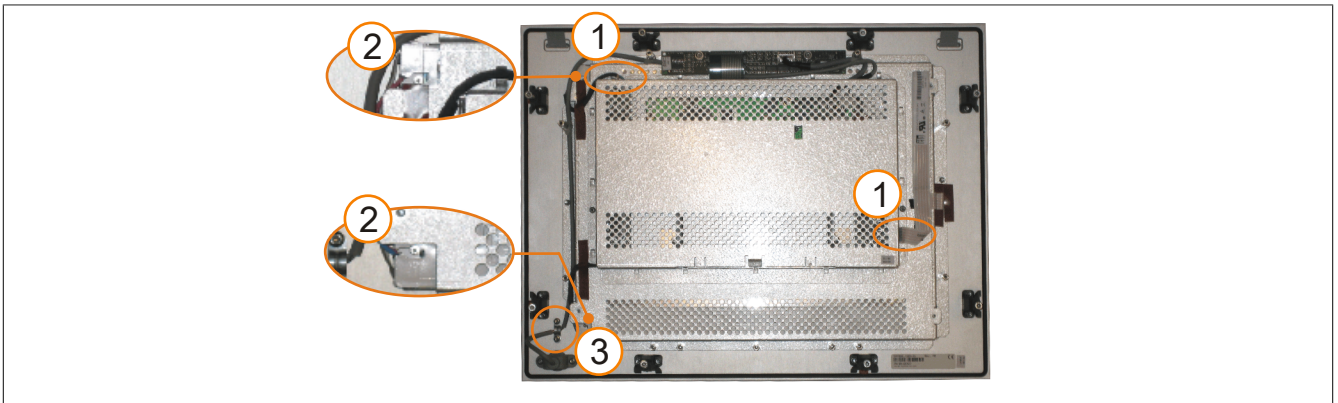


Figure 147: 15" Automation Panels - Unscrewing and disconnecting

- 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).

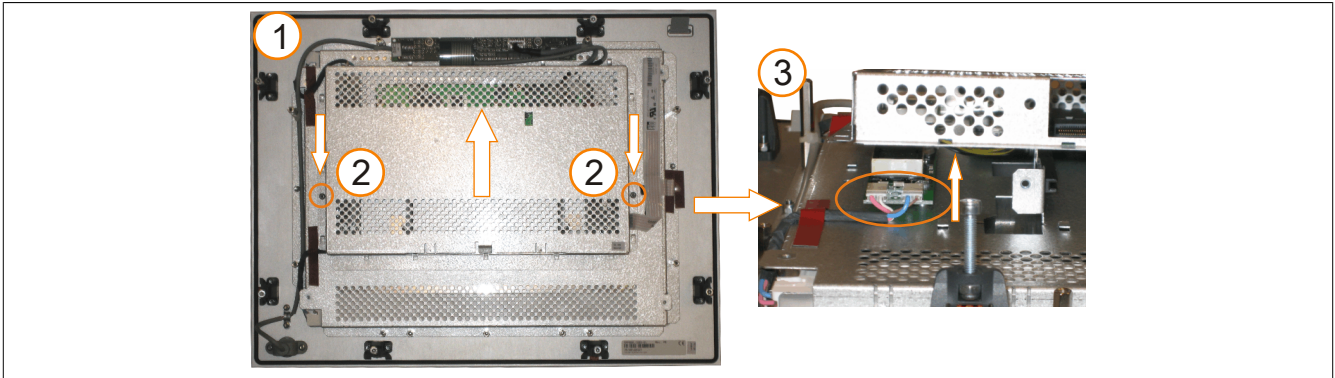


Figure 148: 15" Automation Panels - Removing the cover and disconnecting

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

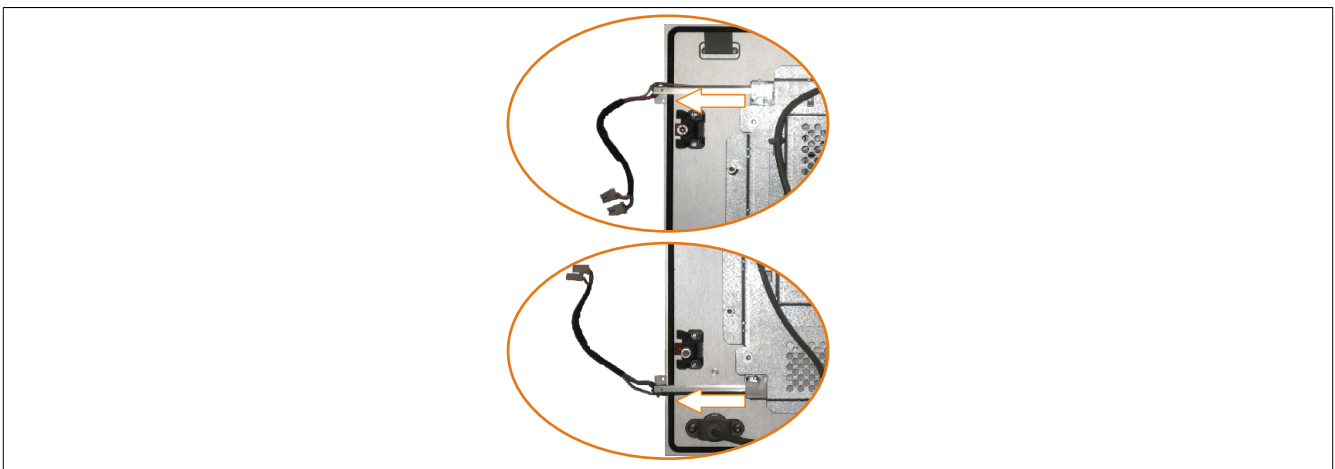


Figure 149: 15" Automation Panel - Replacing the fluorescent tubes

8 Environmentally friendly disposal

All programmable logic controllers, operating and monitoring devices and uninterruptible power supplies from B&R are designed to have as little impact on the environment as possible.

8.1 Separation of materials

To ensure that devices can be recycled in an environmentally friendly manner, it is necessary to separate out the different materials.

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

Disposal must be carried out in accordance with applicable legal regulations.

Appendix A

A.1 Elo AccuTouch screen

A.1.1 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

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 101: 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.

A.1.2 Temperature humidity diagram

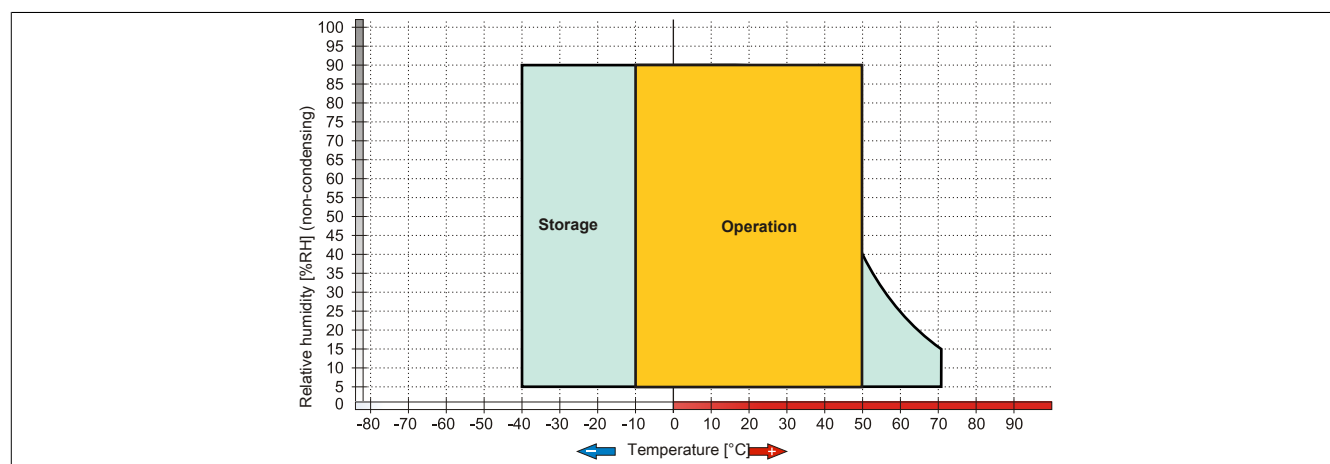


Figure 150: Elo AccuTouch screen (5-wire) - Temperature humidity diagram

A.1.3 Cleaning

Danger!

The device is only permitted to be cleaned when it is switched off in order to avoid triggering unintentional functions by touching the touch screen or pressing keys.

Use a damp cloth to clean the device. Use only water with detergent, screen cleaner or alcohol (ethanol) to moisten the cleaning cloth. Apply the cleaning agent to the cloth first; do not spray it directly onto the device! Never use aggressive solvents, chemicals, abrasive cleaners, compressed air or steam cleaners.

Information:

Displays with a touch screen should be cleaned at regular intervals.

A.2 5-wire AMT touch screen

A.2.1 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Product ID	5-wire AMT touch screen
General information	
Certification	
CE	Yes
c-UL-us	Yes
Manufacturer	AMT
Release pressure	< 1 N
Light permeability	81 ±3%
Environmental conditions	
Temperature	
Operation	- 20 to 70°C
Storage	- 40 to 80°C
Transport	- 40 to 80°C
Relative humidity	
Operation	90% at max. 50°C
Storage	90% RH at max. 60°C for 504 hours
Transport	90% RH at max. 60°C for 504 hours
Operating conditions	
Service life	36 million touch operations at the same position (release pressure: 250 g, interval: 2x per second)
Chemical resistance ¹⁾	Acetone, methylene chloride, methyl ethyl ketone, isopropyl alcohol, hexane, turpentine, mineral spirits, unleaded gasoline, diesel, motor oil, gear lubricating oil, antifreeze, ammonia-based glass cleaner, chemical cleaning agents, household cleaning agents, vinegar, coffee, tea, lubricant, cooking oil, salt
Enabling	Finger, pointer, credit card, glove
driver	Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com).

Table 102: 5-wire AMT touch screen - Technical data

1)

A.2.2 Temperature/Humidity diagram

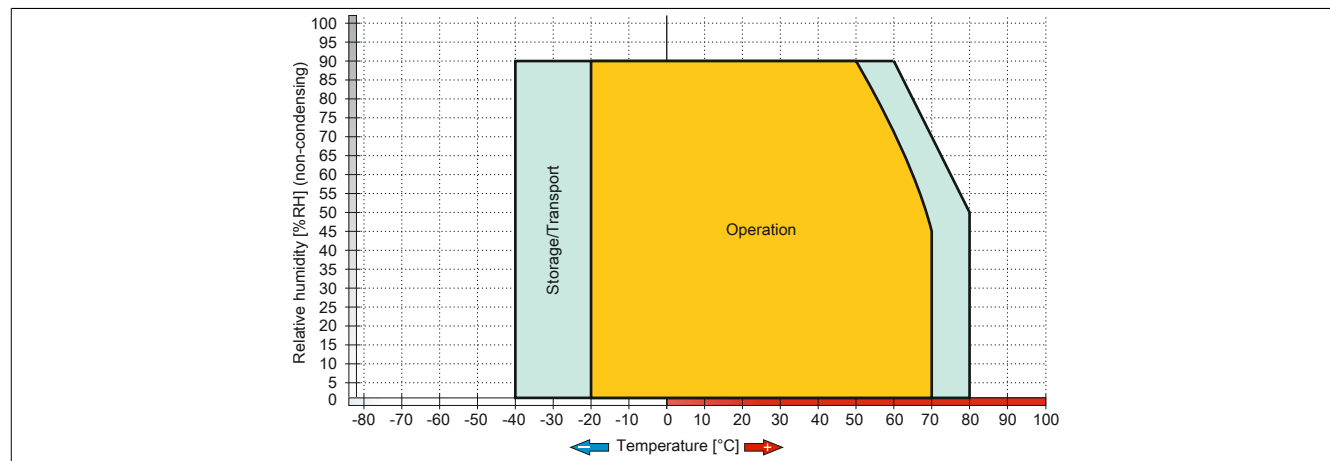


Figure 151: 5-wire AMT touch screen - Temperature/Humidity diagram

A.2.3 Cleaning

Danger!

The device is only permitted to be cleaned when it is switched off in order to avoid triggering unintentional functions by touching the touch screen or pressing keys.

Use a damp cloth to clean the device. Use only water with detergent, screen cleaner or alcohol (ethanol) to moisten the cleaning cloth. Apply the cleaning agent to the cloth first; do not spray it directly onto the device! Never use aggressive solvents, chemicals, abrasive cleaners, compressed air or steam cleaners.

Information:

Displays with a touch screen should be cleaned at regular intervals.

A.3 Panel overlay

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

Information:

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

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 Diocetyl 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 103: Chemical resistance of the panel overlay

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

A.4 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

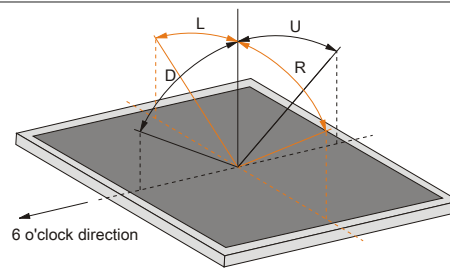
Adhesive strength in accordance with DIN 58 196-K2 (Part 6)

Chemical properties

Durability according to DIN 50021 - CASS

A.5 Viewing angles

For viewing angle specifications (R, L, U, D) of the display types, see the technical data of the individual components.



A.6 Mounting compatibility

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

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

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 104: Product abbreviations

A.6.1 Compatibility overview

The following table provides an overview of PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800 devices. Detailed information can be found in the section [A.6.2 "Compatibility details" on page 204](#).

Compatibility between 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 105: Overview of device compatibility

A.6.2 Compatibility details

A.6.2.1 Example

The dimensions (all in mm) shown in this image apply to the other figures below.

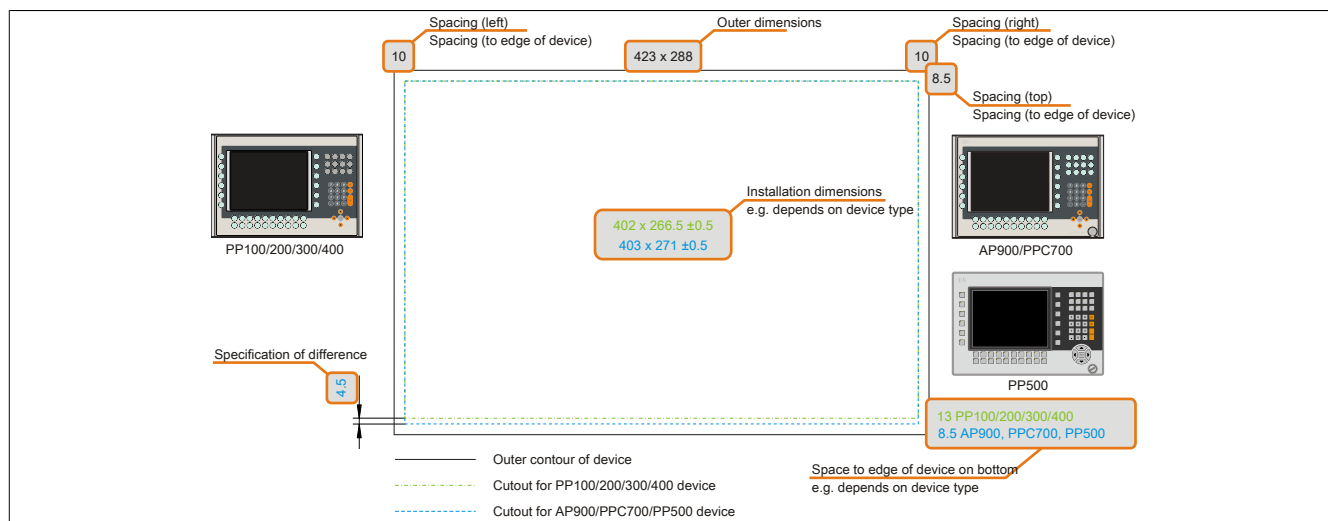


Figure 152: Overview of compatibility figures

A.6.2.2 5.7" devices

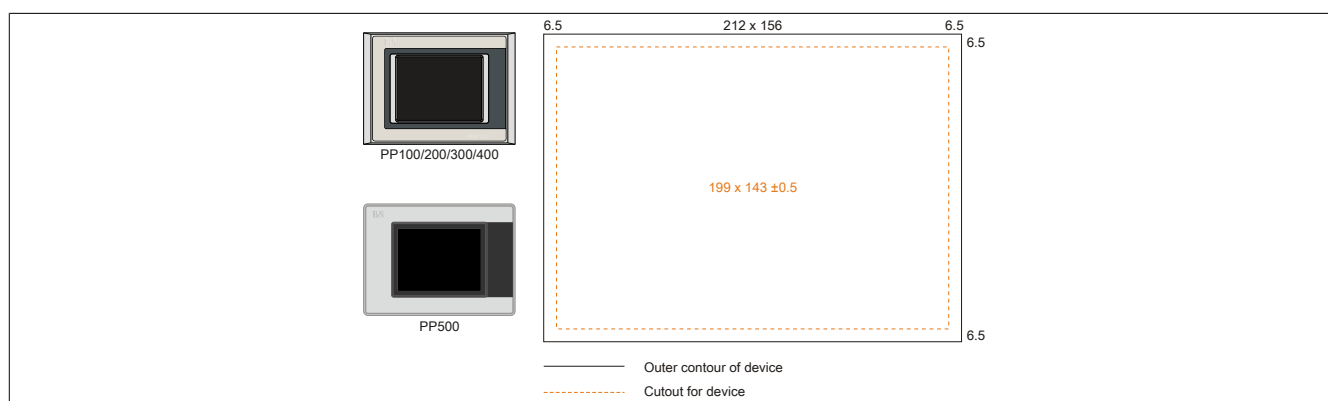


Figure 153: Mounting compatibility - 5.7" device - Horizontal1

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

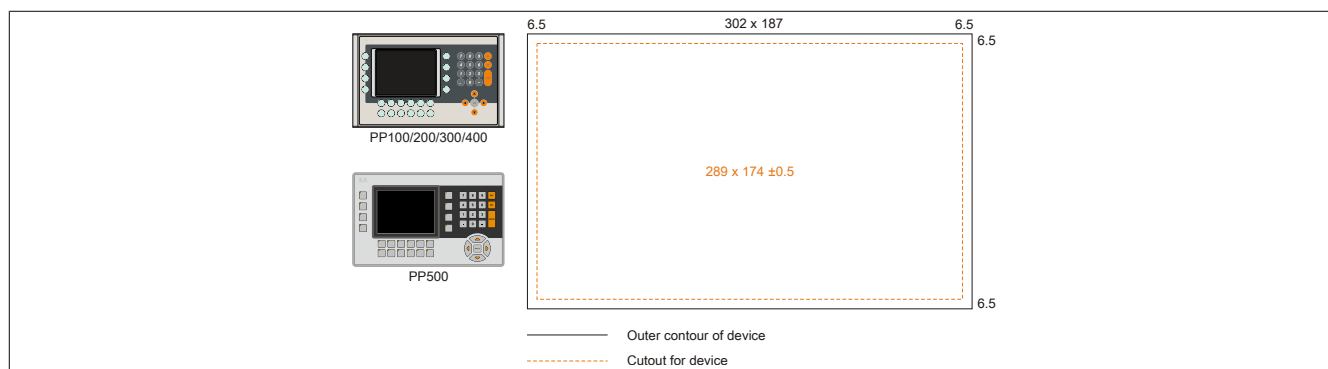


Figure 154: Mounting compatibility - 5.7" device - Horizontal2

5.7" Power Panel 500 devices and Power Panel 100/200300/400 devices are 100% mounting compatible in the Horizontal2 format.

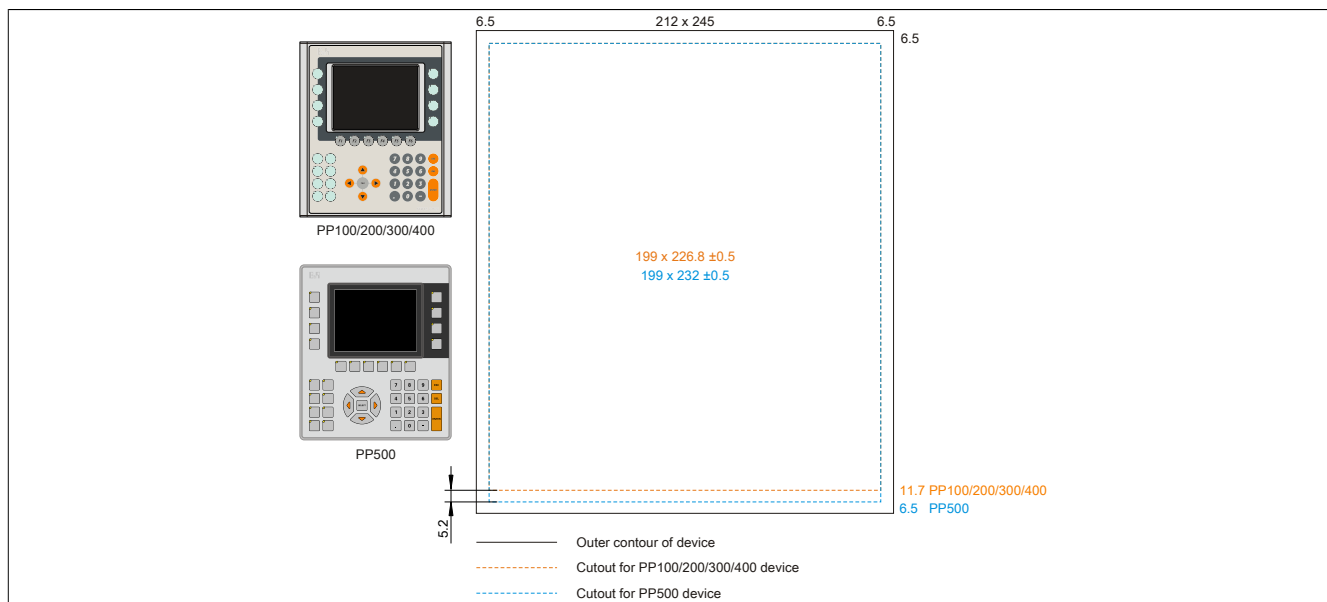


Figure 155: Mounting compatibility - 5.7" device - Vertical1

5.7" Power Panel 500 devices are not 100% mounting compatible with Power Panel 100/200/300/400 devices in the Vertical1 format. 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 PP100/200/300/400 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).

A.6.2.3 10.4" devices

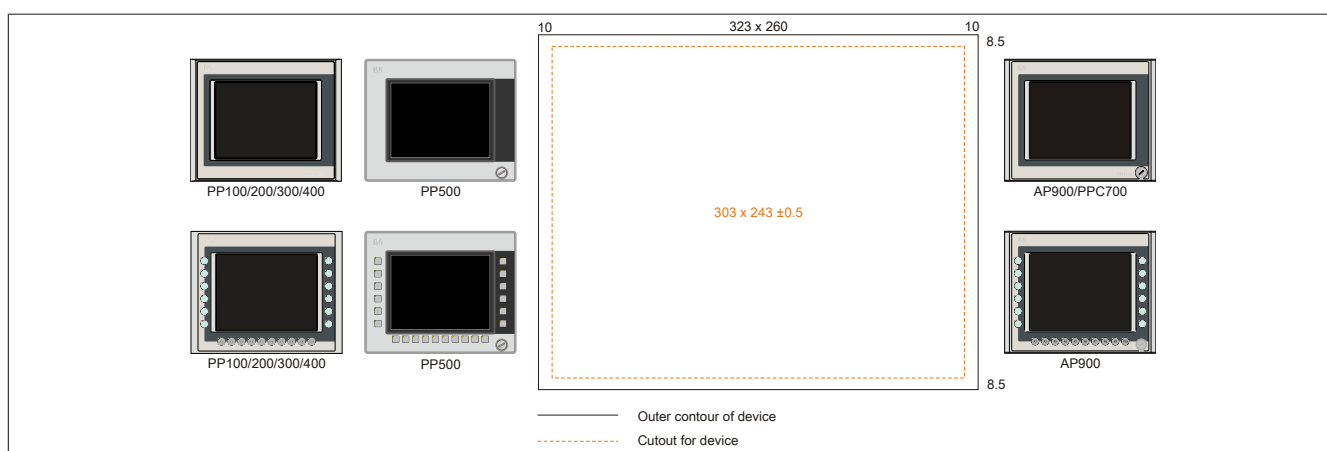


Figure 156: Mounting compatibility - 10.4" device - Horizontal1

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

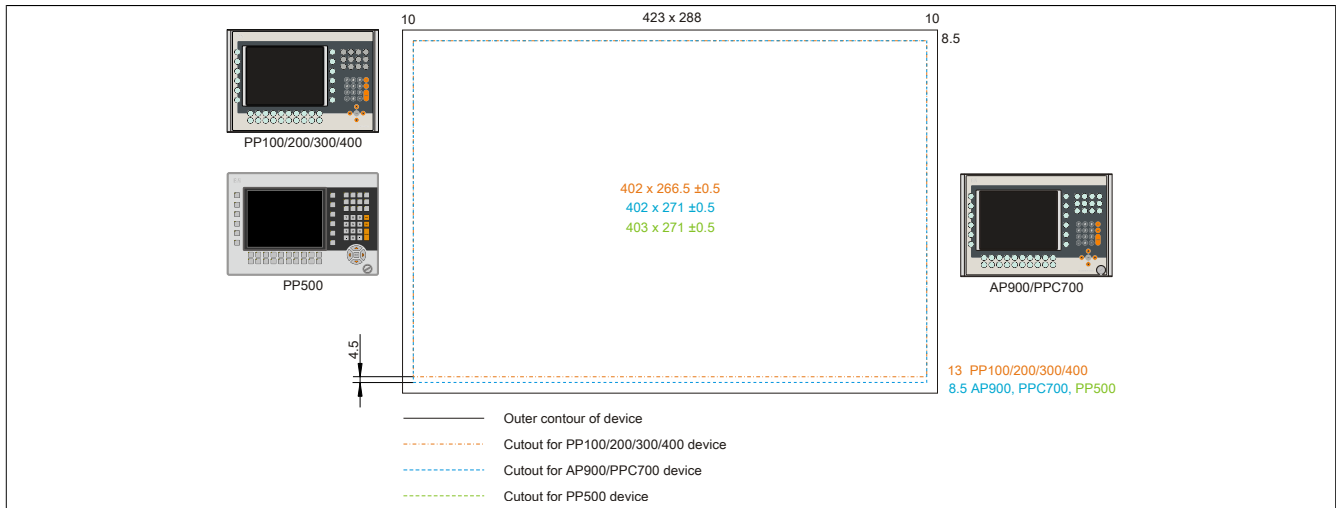


Figure 157: Mounting compatibility - 10.4" device - Horizontal2

10.4" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with Power Panel 100/200/300/400 devices in the Horizontal2 format. 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 PP100/200/300/400 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).

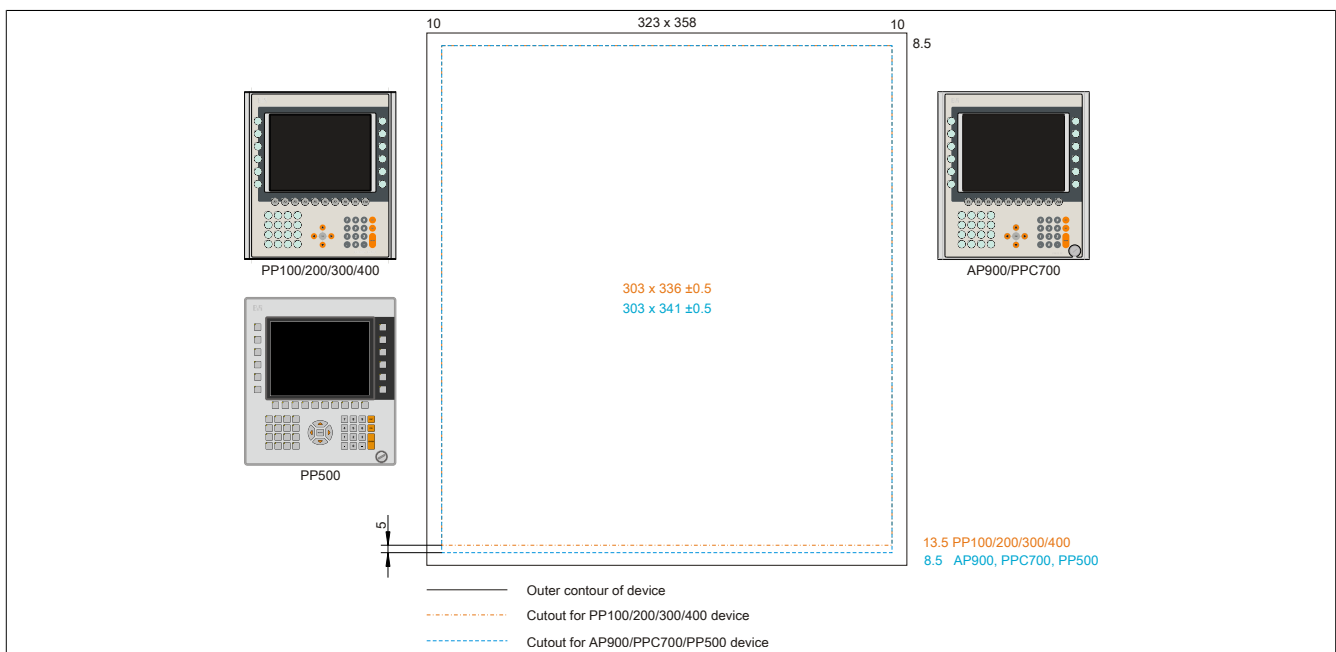


Figure 158: Mounting compatibility - 10.4" device - Vertical1

10.4" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with Power Panel 100/200/300/400 devices in Vertical1 format. 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).

A.6.2.4 12.1" devices

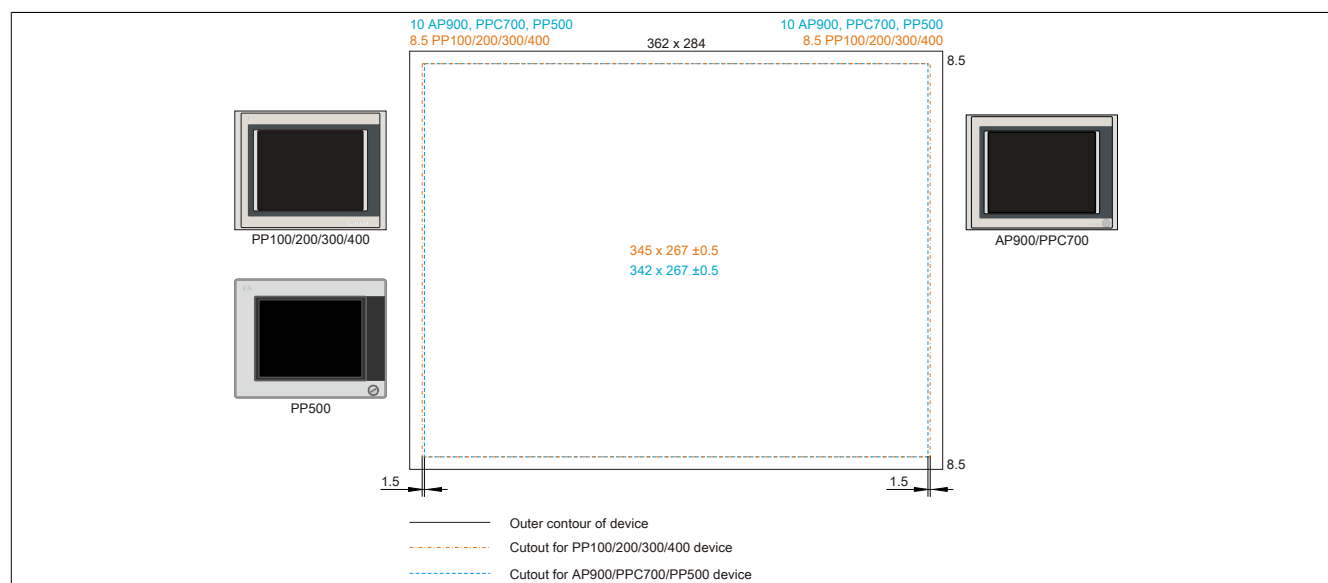


Figure 159: Mounting compatibility - 12.1" device - Horizontal1

12.1" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with Power Panel 100/200/300/400 devices in Horizontal1 format. 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.

A.6.2.5 15" devices

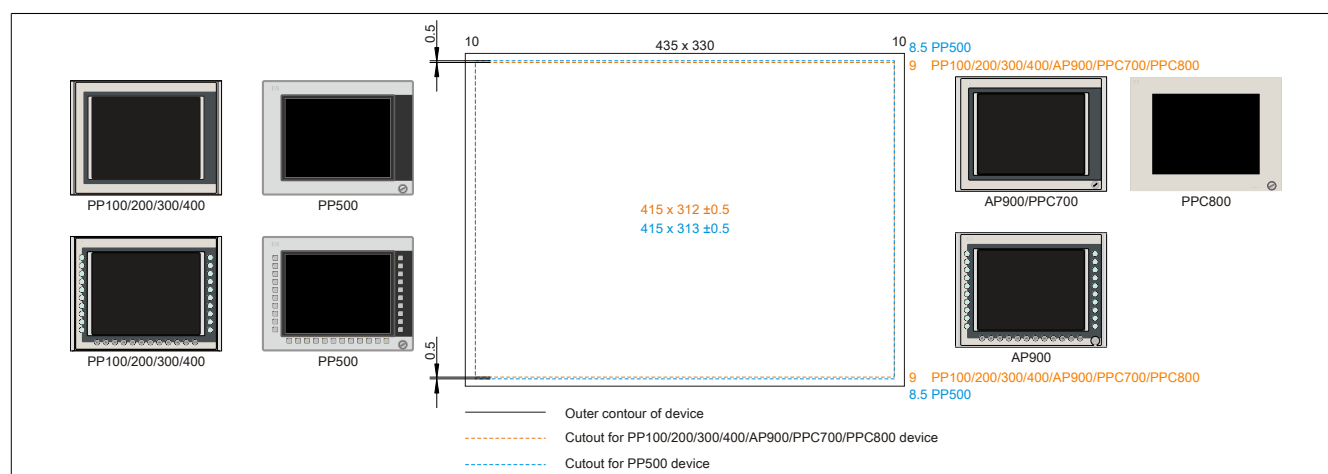


Figure 160: Mounting compatibility - 15" device - Horizontal1

15" Power Panel 500 devices are not 100% mounting compatible with Power Panel 100/200/300/400, Automation Panel 900, Panel PC 700 and Panel PC 800 devices in the Vertical1 format. 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).

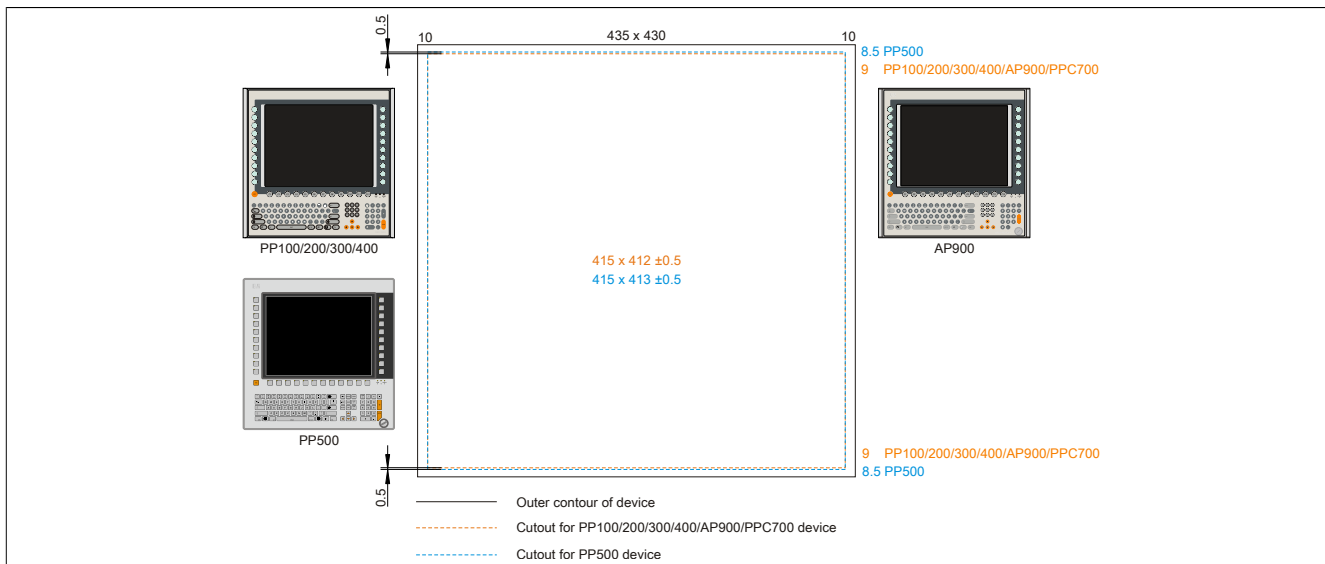


Figure 161: Mounting compatibility - 15" device - Vertical1

15" Power Panel 500 devices are not 100% mounting compatible with Power Panel 100/200/300/400, Automation Panel 900 and Panel PC 700 devices in the Vertical1 format. 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).

A.6.2.6 17" devices

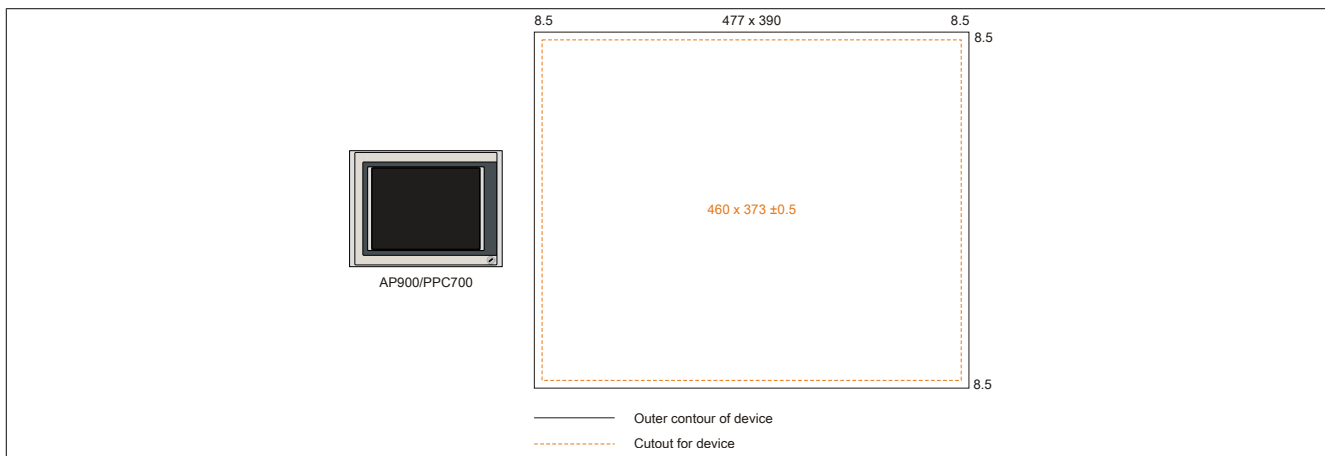


Figure 162: Mounting compatibility - 17" device - Horizontal1

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

A.6.2.7 19" devices

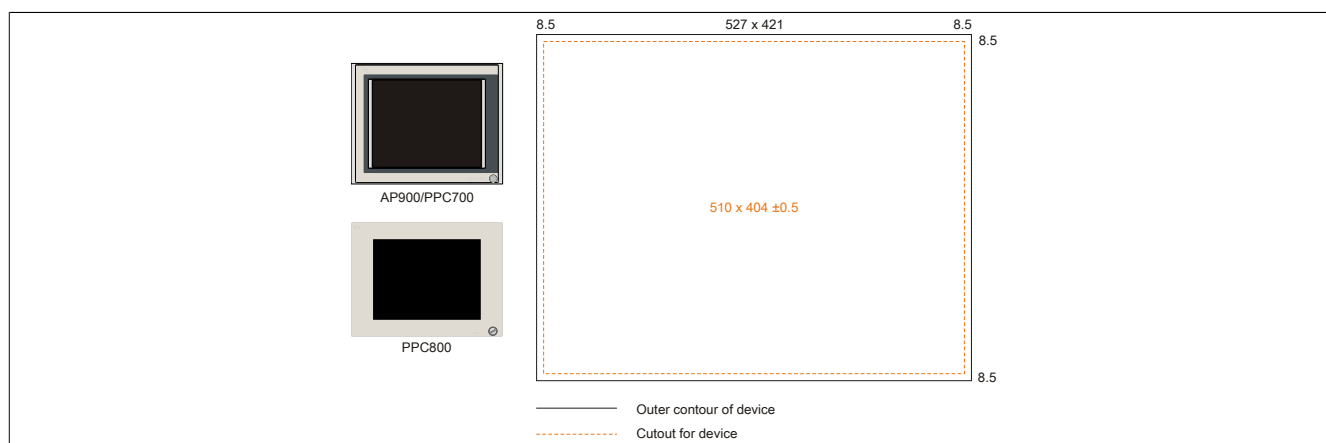


Figure 163: Mounting compatibility - 19" device - Horizontal1

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

A.6.2.8 21.3" devices

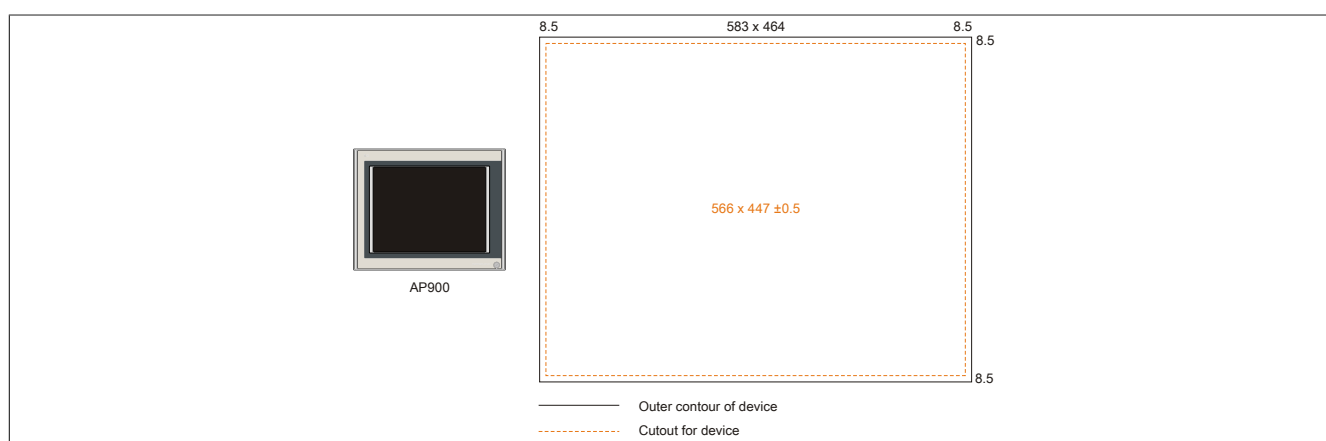


Figure 164: Mounting compatibility - 21.1" device - Horizontal1