

Automation Panel 800

User's Manual

Version: **1.30 (November 2006)**

Model No.: **MAAP800-ENG**

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Chapter 1: General information

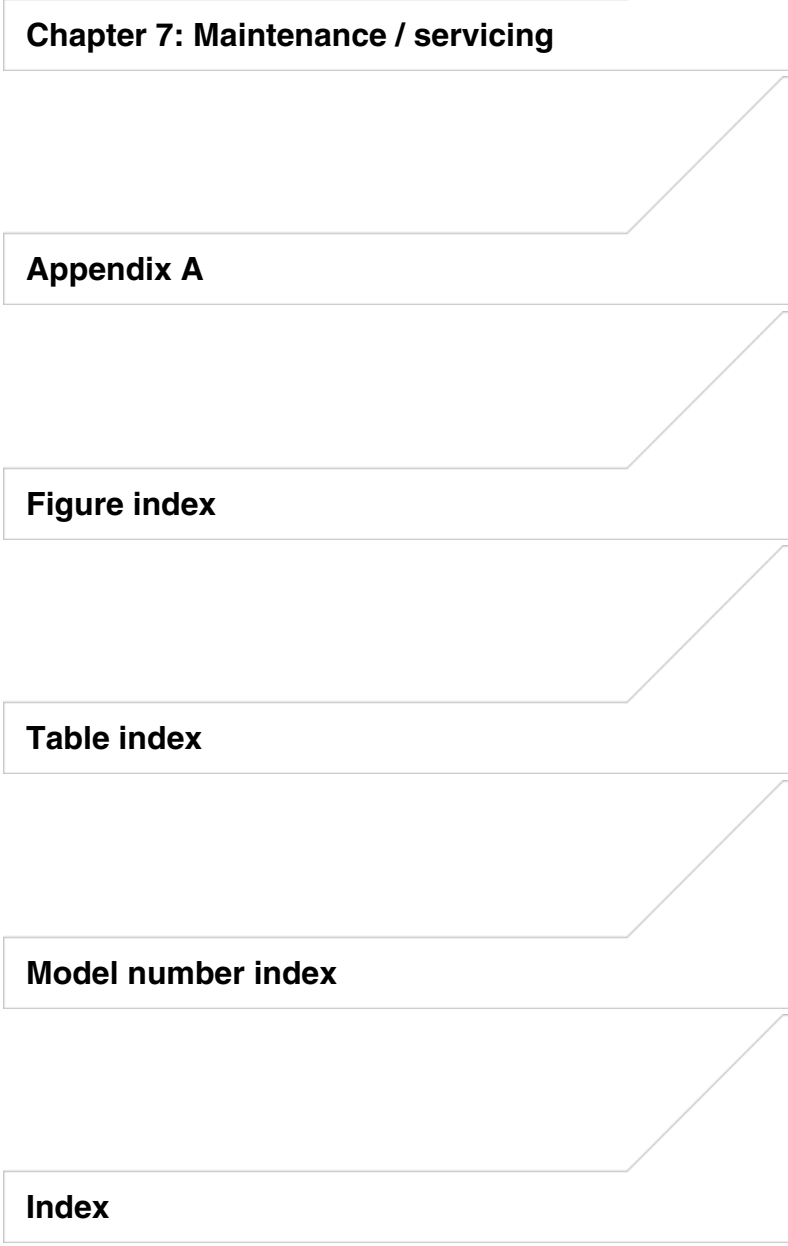
Chapter 2: Technical data

Chapter 3: Commissioning

Chapter 4: Software

Chapter 5: Standards and certifications

Chapter 6: Accessories



Chapter 7: Maintenance / servicing

Appendix A

Figure index

Table index

Model number index

Index

Chapter 1: General information	11
1. Manual history	11
2. Safety guidelines	12
2.1 Intended use	12
2.2 Protection against electrostatic discharges	12
2.2.1 Packaging	12
2.2.2 Guidelines for proper ESD handling	12
2.3 Policy and procedures	13
2.4 Transport and storage	13
2.5 Mounting	14
2.6 Operation	14
2.6.1 Protection against touching electrical parts	14
2.6.2 Programs, viruses and dangerous programs	14
3. Organization of safety notices	15
4. Guidelines	15
5. Model numbers	16
5.1 Display units	16
5.2 Extension units	16
5.3 Cables	17
5.4 Accessories	18
5.4.1 USB memory sticks	18
5.4.2 Legend strip templates	18
5.4.3 Miscellaneous	19
Chapter 2: Technical data	21
1. General information	21
1.1 Features	22
1.2 System components / Configuration	23
1.2.1 Selection guide - basic system	23
1.2.2 Selection guide - optional components	24
2. Configuration	25
2.1 Example 1	27
2.1.1 Overview of the required components	28
2.2 Example 2	29
2.2.1 Overview of the required components	30
2.3 Example 3	31
2.3.1 Overview of the required components	32
3. Individual components	33
3.1 Display units	33
3.1.1 5AP820.1505-00	33
3.1.2 5AP880.1505-00	37
3.1.3 Pin assignments	42
3.2 Extension units	44
3.2.1 Extension keyboard 5AC800.EXT1-00	44
3.2.2 F key extension left 5AC800.EXT2-00	48
3.2.3 F key extension right 5AC800.EXT2-01	51

Table of contents

3.2.4 C key extension 8PB left 5AC800.EXT3-00	54
3.2.5 C key extension 8PB right 5AC800.EXT3-01	57
3.2.6 C key extension 12PB ES left 5AC800.EXT3-02	60
3.2.7 C key extension 12PB ES right 5AC800.EXT3-03	64
3.2.8 C key extension 8PB ES left 5AC800.EXT3-04	68
3.2.9 C key extension 8PB ES right 5AC800.EXT3-05	72
3.3 Extension connector / flange	76
3.3.1 Extension cover 5AC800.COV1-00	76
3.3.2 USB extension cover 5AC800.COV2-00	78
3.3.3 Extension connector 5AC800.CON1-00	80
3.3.4 Extension connector (60°) 5AC800.CON2-00	82
3.3.5 Extension flange 5AC800.FLG1-00	84
3.4 Cables	86
3.4.1 Overview	86
3.4.2 SDL cable 5CASDL.0xxx-20 Rev. < A5	87
3.4.3 SDL cable with extender 5CASDL.0xxx-30 Rev. < A5	89
3.4.4 SDL cable 5CASDL.0xxx-20 Rev. ≥ A5	91
3.4.5 SDL cable with extender 5CASDL.0xxx-30 Rev. ≥ A5	93
3.4.6 Voltage supply cable 5CAPWR.0xxx-20	95
3.4.7 X2X cable 5CAX2X.0xxx-00	97

Chapter 3: Commissioning 99

1. X2X wiring diagram	99
2. X2X functionality if the PC crashes	100
3. E-stop wiring diagram	101
3.1 Without extension unit	102
3.2 Extension unit with E-stop	103
3.3 Extension unit without E-stop	104
3.4 Current load	104
4. Installation	105
4.1 Mounting orientation	106
5. Connection examples	108
5.1 Selecting the display units	108
5.2 An Automation Panel 800 via SDL (onboard)	109
5.2.1 Basic system requirements	109
5.2.2 Cable	110
5.2.3 BIOS settings	111
5.2.4 Windows graphics driver settings	111
5.2.5 Settings - Windows touch driver	111
5.3 An AP900 and an AP800 via SDL (onboard)	112
5.3.1 Basic system requirements	112
5.3.2 Cable	113
5.3.3 BIOS settings	114
5.3.4 Windows graphics driver settings	114
5.3.5 Settings - Windows touch driver	114
5.4 Three AP900 devices with an AP800 via SDL (onboard)	115

5.4.1 Basic system requirements	115
5.4.2 Cable	116
5.4.3 BIOS settings	117
5.4.4 Windows graphics driver settings	117
5.4.5 Settings - Windows touch driver	117
5.5 Six AP900 and two AP800 devices via SDL (onboard) and SDL (AP Link)	118
5.5.1 Basic system requirements	119
5.5.2 Cable	119
5.5.3 BIOS settings	121
5.5.4 Windows graphics driver settings	121
5.5.5 Settings - Windows touch driver	121
5.6 Internal numbering of the extension units	122
6. Key and LED configurations	123
6.1 Display unit	124
6.1.1 5AP880.1505-00	124
6.2 Extension units	125
6.2.1 Extension keyboard 5AC800.EXT1-00	125
6.2.2 F key extension left 5AC800.EXT2-00 / right 5AC800.EXT2-01	125
6.2.3 C key extension 8PB left 5AC800.EXT3-00 / right 5AC800.EXT3-01	126
6.2.4 C key extension 12PB left 5AC800.EXT3-02 / right 5AC800.EXT3-03	127
6.2.5 C key extension 8PB left 5AC800.EXT3-04 / right 5AC800.EXT3-05	128
Chapter 4: Software	129
1. B&R Key Editor information	129
2. HMI Drivers & Utilities DVD 5SWHMI.0000-00	131
Chapter 5: Standards and certifications	135
1. Applicable European guidelines	135
2. Overview of standards	135
3. Emission requirements	136
3.1 Network related emissions	136
3.2 Emissions, electromagnetic emissions	138
4. Requirements for immunity to disturbances	139
4.1 Electrostatic discharge (ESD)	140
4.2 High-frequency electromagnetic fields (HF field)	140
4.3 High-speed transient electrical disturbances (burst)	141
4.4 Surge voltages (Surge)	141
4.5 Conducted disturbances	141
4.6 Magnetic fields with electrical frequencies	142
4.7 Damped vibration	142
5. Climate conditions	143
5.1 Dry heat	143
6. Safety	143
6.1 Leakage current	143
6.2 Voltage range	144
6.3 Protection type	144

7. International certifications	145
Chapter 6: Accessories	147
1. Overview	147
2. USB flash drive	148
2.1 General information	148
2.2 Order data	148
2.3 Technical data	149
2.3.1 Temperature humidity diagram for operation and storage	150
2.4 Contents of delivery	151
2.5 Creating a bootable USB flash drive	152
2.5.1 Requirements	152
2.5.2 Procedure	152
3. Legend strip templates	153
3.1 Order data	154
Chapter 7: Maintenance / servicing	155
1. Cleaning	155
Appendix A	157
1. E-stop button	157
2. Key switch	159
2.1 Rotation angle	160
3. Touch screen	161
3.1 Elo	161
3.1.1 Temperature humidity diagram for operation and storage	162
3.1.2 Cleaning	162
4. Mylar	163
5. Perspectives	164
6. Glossary	165

Chapter 1 • General information

1. Manual history

version	Date	Change
0.01 Preliminary	17.07.2006	- First version
1.00	28.08.2006	Changes / new features - Chapter "Standards and certifications" on page 135 added. - Chapter "Software" on page 129 added. - Chapter "Commissioning" on page 99 added. - Chapter "Accessories" on page 147 added. - "Glossary" on page 165 added. - Table "Technical data - key switch switching element and key switch" on page 159 added. - Model number overview revised. - Accessories added. - Safety guidelines "Protection against electrostatic discharges" on page 12 added. - "Pin assignments" on page 42 added. - Dimensions of extension units added. - Selection guide added, (see section "System components / Configuration" on page 23).
1.10	30.08.2006	Changes / new features - Key dimensions added. - Numbering of the extensions corrected (see "Connection examples" on page 108). - X2X cable pin assignments added. - "X2X functionality if the PC crashes" on page 100 added. - "Internal numbering of the extension units" on page 122 added. - Cable photos added.
1.20	03.10.2006	Changes / new features - "SDL cable with extender 5CAsDL.0xxx-30 Rev. < A5" on page 89 added. - "Extension flange 5AC800.FLG1-00" on page 84 changed. - "Key and LED configurations" on page 123 changed. - "USB extension cover 5AC800.COV2-00" on page 78 and "Dimensions - USB extension cover 5AC800.COV2-00" on page 79 added. - Touch screen precision changed. - "Selecting the display units" on page 108 added. - Chapter 7 "Maintenance / servicing" on page 155 added. - Mounting orientation revised, +45° and -45° added. - Connection examples revised (description of USB support, graphics). - Cable pin assignments revised and corrected. - Plug measurements (ODU Minisnap) added. - 30° extension connector changed to 60° extension connector and dimensions changed.
1.30	15.11.2006	Changes / new features - "Pin assignments - X2X cable 5CAX2X.0xxx-00" on page 98 changed. - 2 USB flash drive 5MMUSB.2048-00 from SanDisk added. - Pin assignments - X2X / E-stop cable connection changed (pin 7 and pin 8). - Perspective description modified. - Key switch information modified. - German terminology for key switch changed. - Technical data on pages 52 and 74 added. - Technical data on page 95 added.

Table 1: Manual history

2. Safety guidelines

2.1 Intended use

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

2.2 Protection against electrostatic discharges

Electrical components that are vulnerable to electrostatic discharge (ESD) must be handled accordingly.

2.2.1 Packaging

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

2.2.2 Guidelines for proper ESD handling

Electrical components with housing

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

Electrical components without housing

In addition to the requirements listed under "Electrical components with housing", the following also applies:

- Any persons handling electrical components or devices that will be installed in the electrical components must be grounded.
- Components can only be touched on the small sides or on the front plate.
- Components should always be stored in a suitable medium (ESD packaging, conductive foam, etc.).
Metallic surfaces are not suitable storage surfaces!

- Electrostatic discharges should be avoided on the components (e.g. through charged plastics).
- A minimum distance of 10 cm must be kept from monitors and TV sets.
- Measurement devices and equipment must be grounded.
- Measurement probes on potential-free measurement devices must be discharged on sufficiently grounded surfaces before taking measurements.

Individual components

- ESD protective measures for individual components are thoroughly integrated at B&R (conductive floors, footwear, arm bands, etc.).

The increased ESD protective measures for individual components are not necessary for our customers for handling B&R products.

2.3 Policy and procedures

Electronic devices are generally not failsafe. In the event of a failure on the programmable control system, operating or monitoring device, or uninterruptible power supply, the user is responsible for ensuring that other devices that may be connected, e.g. motors, are in a secure state.

Both when using programmable logic controllers and when using operating and monitoring devices as control systems in conjunction with a soft PLC (e.g. B&R Automation Runtime or comparable products) or a slot PLC (e.g. B&R LS251 or comparable products), the safety precautions applying to industrial control systems (e.g. the provision of safety devices such as emergency stop circuits, etc.) must be observed in accordance with applicable national and international regulations. The same applies for all other devices connected to the system, such as drives.

All tasks such as installation, commissioning, and maintenance are only permitted to be carried out by qualified personnel. Qualified personnel are persons who are familiar with the transport, mounting, installation, commissioning, and operation of the product and who have the appropriate qualifications (e.g. IEC 60364). National accident prevention guidelines must be followed.

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

2.4 Transport and storage

During transport and storage, devices must be protected from excessive stress (mechanical load, temperature, humidity, aggressive atmosphere, etc.).

2.5 Mounting

- Installation must take place according to the documentation using suitable equipment and tools.
- Devices may only be installed without voltage applied and by qualified personnel.
- General safety regulations and nationally applicable accident prevention guidelines must be observed.
- Electrical installation must be carried out according to the relevant guidelines (e.g. line cross section, fuse, protective ground connection).

2.6 Operation

2.6.1 Protection against touching electrical parts

To operate programmable logic controllers, operating and monitoring devices, and uninterruptible power supplies, certain components must carry dangerous voltage levels of over 42 VDC. A life-threatening electrical shock could occur if you come into contact with these parts. This could result in death, severe injury, or material damage.

Before turning on the programmable logic controller, the operational and monitoring devices and the uninterruptible power supply, ensure that the housing is properly grounded (PE rail). The ground connection must be established when testing the operating and monitoring devices or the uninterruptible power supply, even when operating them for only a short time.

Before turning the device on, make sure that all voltage-carrying parts are securely covered. During operation, all covers must remain closed.

2.6.2 Programs, viruses and dangerous programs

The system is subject to potential danger each time data is exchanged or software is installed from a data medium (e.g. diskette, CD-ROM, USB flash drive, etc.), a network connection, or the Internet. The user is responsible for assessing these dangers, implementing preventative measures such as virus protection programs, firewalls, etc. and obtaining software from reliable sources.

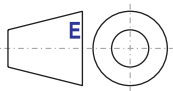
3. Organization of safety notices

The safety notices in this manual are organized as follows:

Safety notice	Description
Danger!	Disregarding the safety regulations and guidelines can be life-threatening.
Caution!	Disregarding the safety regulations and guidelines can result in severe injury or major damage to material.
Warning!	Disregarding the safety regulations and guidelines can result in injury or damage to material.
Information:	Important information for preventing errors.

Table 2: Organization of safety notices

4. Guidelines



European dimension standards apply to all dimensions (e.g. dimension diagrams, etc.).

5. Model numbers

5.1 Display units

Model number	Short description	Note
5AP820.1505-00	TFT C¹⁾ XGA 15" T²⁾ Automation Panel AP820; 15" XGA color TFT display with touch screen (resistive); painted housing; connection for Smart Display Link; IP 65 protection ³⁾ . 24 VDC.	See page 33
5AP880.1505-00	TFT C¹⁾ XGA 15" FT⁴⁾ Automation Panel AP880; 15" XGA color TFT display with touch screen (resistive); 40 function keys; painted housing; connection for Smart Display Link; IP 65 protection ³⁾ . 24 VDC.	See page 37

Table 3: Model numbers - display units

- 1) C ... Color
 2) T ... Touch screen
 3) Assembled
 4) FT ... function keys and touch screen

5.2 Extension units

Model number	Short description	Note
5AC800.COV1-00	Extension cover Cover for an unused extension slot on an AP800 display unit; IP65 protection; painted.	See page 76
5AC800.COV2-00	USB extension cover Cover for an unused extension slot on an AP800 display unit with additional USB interface; IP65 protection; painted.	See page 78
5AC800.CON1-00	Extension connector Straight connector; for connecting keyboard attachments to the Automation Panel 800; IP65 protection; painted.	See page 80
5AC800.CON2-00	60° extension connector 60° angled connector; for connecting keyboard attachments to the Automation Panel 800; IP65 protection; painted.	See page 82
5AC800.EXT1-00	Keyboard extension Keyboard extension for the Automation Panel 800; USB interface; IP65 protection; painted housing.	See page 44
5AC800.EXT2-00	F key extension - left Keyboard attachment for the left side of the Automation Panel 800; 20 function keys with LEDs and 20 system keys; IP65 protection; painted housing.	See page 48
5AC800.EXT2-01	F key extension - right Keyboard attachment for the right side of the Automation Panel 800; 20 function keys with LEDs and 20 system keys; IP65 protection; painted housing.	See page 51
5AC800.EXT3-00	C key extension 8PB¹⁾ - left Keyboard attachment for the left side of the Automation Panel 800; 16 function keys with LEDs and 8 illuminated ring keys; IP65 protection; painted housing.	See page 54

Table 4: Model numbers - extensions and accessories

Model number	Short description	Note
5AC800.EXT3-01	C key extension 8PB¹⁾ - right Keyboard attachment for the right side of the Automation Panel 800; 16 function keys with LEDs and 8 illuminated ring keys; IP65 protection; painted housing.	See page 57
5AC800.EXT3-02	C key extension 12PB¹⁾ ES²⁾ left Keyboard attachment for the left side of the Automation Panel 800; 4 function keys with LEDs and 12 illuminated ring keys; E-stop; key switch; IP65 protection; painted housing.	See page 60
5AC800.EXT3-03	C key extension 12PB¹⁾ ES²⁾ right Keyboard attachment for the right side of the Automation Panel 800; 4 function keys with LEDs and 12 illuminated ring keys; E-stop; key switch; IP65 protection; painted housing.	See page 64
5AC800.EXT3-04	C key extension 8PB¹⁾ ES²⁾ left Keyboard attachment for the left side of the Automation Panel 800; 12 function keys with LEDs and 8 illuminated ring keys; E-stop; key switch; IP65 protection; painted housing.	See page 68
5AC800.EXT3-05	C key extension 8PB¹⁾ ES²⁾ right Keyboard attachment for the right side of the Automation Panel 800; 12 function keys with LEDs and 8 illuminated ring keys; E-stop; key switch; IP65 protection; painted housing.	See page 72
5AC800.FLG1-00	Extension flange Flange for Automation Panel 800 and standard swing arm systems (e.g. Rittal CP-S); painted housing.	See page 84

Table 4: Model numbers - extensions and accessories (cont.)

1) PB ... Push button

2) ES ... Emergency stop

5.3 Cables

Model number	Short description	Note
5CASDL.0018-20	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 1.8 meters.	See page 87 / 91
5CASDL.0050-20	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 5 meters.	See page 87 / 91
5CASDL.0100-20	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 10 meters.	See page 87 / 91
5CASDL.0150-20	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 15 meters.	See page 87 / 91
5CASDL.0200-20	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 20 meters.	See page 87 / 91
5CASDL.0250-20	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 25 meters.	See page 87 / 91
5CASDL.0300-30	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 30 meters with extender.	See page 89 / 93
5CASDL.0400-30	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 40 meters with extender.	See page 89 / 93
5CAPWR.0018-20	Voltage supply cable for Automation Panel 800; length 1.8 meters.	See page 95
5CAPWR.0050-20	Voltage supply cable for Automation Panel 800; length 5 meters.	See page 95
5CAPWR.0100-20	Voltage supply cable for Automation Panel 800; length 10 meters.	See page 95
5CAPWR.0150-20	Voltage supply cable for Automation Panel 800; length 15 meters.	See page 95
5CAPWR.0200-20	Voltage supply cable for Automation Panel 800; length 20 meters.	See page 95
5CAPWR.0250-20	Voltage supply cable for Automation Panel 800; length 25 meters.	See page 95
5CAPWR.0300-20	Voltage supply cable for Automation Panel 800; length 30 meters.	See page 95
5CAPWR.0400-20	Voltage supply cable for Automation Panel 800; length 40 meters.	See page 95

Table 5: Model numbers - cables

General information • Model numbers

Model number	Short description	Note
5CAX2X.0018-00	X2X cable for Automation Panel 800; length 1.8 meters.	See page 97
5CAX2X.0050-00	X2X cable for Automation Panel 800; length 5 meters.	See page 97
5CAX2X.0100-00	X2X cable for Automation Panel 800; length 10 meters.	See page 97
5CAX2X.0150-00	X2X cable for Automation Panel 800; length 15 meters.	See page 97
5CAX2X.0200-00	X2X cable for Automation Panel 800; length 20 meters.	See page 97
5CAX2X.0250-00	X2X cable for Automation Panel 800; length 25 meters.	See page 97
5CAX2X.0300-00	X2X cable for Automation Panel 800; length 30 meters.	See page 97
5CAX2X.0400-00	X2X cable for Automation Panel 800; length 40 meters.	See page 97

Table 5: Model numbers - cables (cont.)

5.4 Accessories

5.4.1 USB memory sticks

Model number	Short description	Note
5MMUSB.0128-00	USB flash drive 128 MB SanDisk USB 2.0 flash drive 128 MB	Cancelled since 12/2005 See page 148
5MMUSB.0256-00	USB flash drive 256 MB SanDisk USB 2.0 flash drive 256 MB	See page 148
5MMUSB.0512-00	USB flash drive 512 MB SanDisk USB 2.0 flash drive 512 MB	See page 148
5MMUSB.1024-00	USB flash drive 1 GB SanDisk USB 2.0 flash drive 1 GB	See page 148
5MMUSB.2048-00	USB flash drive 2 GB SanDisk USB 2.0 flash drive 2 GB	See page 148

Table 6: Model numbers - USB memory sticks

5.4.2 Legend strip templates

Model number	Short description	Note
5AC800.EXTX-00	Legend strip template for AP800 extension for 5AC800.EXT2-00, 5AC800.EXT2-01, for 3 devices.	See page 153
5AC800.EXTX-01	Legend strip template for AP800 extension 1 for 5AC800.EXT3-00, 5AC800.EXT3-01, for 2 devices.	See page 153
5AC800.EXTX-02	Legend strip template for AP800 extension 2 for 5AC800.EXT3-04, 5AC800.EXT3-05, for 1 device right and device left.	See page 153
5AC800.EXTX-03	Legend strip template for AP800 extension 3 for 5AC800.EXT3-02, 5AC800.EXT3-03, for 3 devices.	See page 153
5AC800.150x-00	Legend strip template for AP800 display for 5AP800.1505-00, for 3 devices.	See page 153

Table 7: Model numbers - legend strip templates

5.4.3 Miscellaneous

Model number	Short description	Note
5SWHMI.0000-00	HMI Drivers & Utilities DVD Contains drivers, utilities, software upgrades and user manuals for B&R Panel system products (see B&R homepage – Industrial PCs, Visualization and Operation).	See page 131

Table 8: Model numbers - other items

Chapter 2 • Technical data

1. General information

Automation Panel 800 (AP800) devices are fully closed display units. When installed on a swing arm system, the operator panel can be placed in the most ergonomic position.

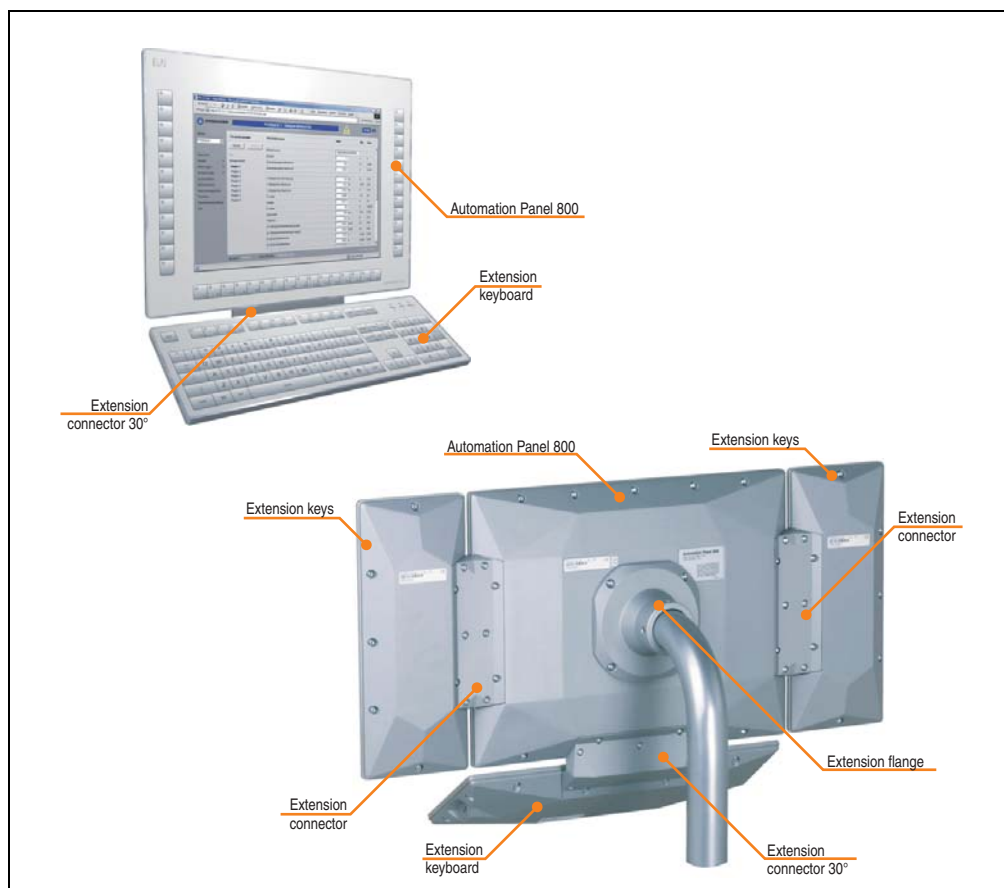


Figure 1: Component overview - Automation Panel 800 with extension units

1.1 Features

- Fully closed system
- Touch screen
- Industrial high-density plug
- USB interface ¹⁾
- Expandable using extension units
- E-stop¹⁾
- Key switch ¹⁾
- Illuminated ring keys¹⁾
- SDL (Smart Display Link) transfer technology up to 40 meters
- Function keys are easily configured using the B&R Key Editor ²⁾

1) Depends on the device configuration.

2) Can be downloaded from the B&R homepage (www.br-automation.com).

1.2 System components / Configuration

The AP800 system can be assembled according to individual requirements and operational conditions.

1.2.1 Selection guide - basic system

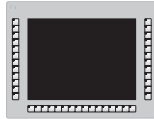
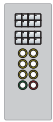
Configuration - basic system			
Display The basic system consists of a display unit. Types: Display without keys Display with keys		Select 1	
 5AP820.1505-00		 5AP880.1505-00	
Extension units An extension unit can be connected to the left and right sides of the basic unit.			
 F keys left 5AC800.EXT2-00 F keys right 5AC800.EXT2-01	 C keys 8PB left 5AC800.EXT3-00 C keys 8PB right 5AC800.EXT3-01	 C keys 12PB left 5AC800.EXT3-02 C keys 12PB right 5AC800.EXT3-03	 C keys 8PB left 5AC800.EXT3-04 C keys 8PB right 5AC800.EXT3-05
An extension keyboard can be connected to the bottom of the basic unit.			
 5AC800.EXT1-00			
Extension connector An extension connector is needed to connect each extension unit with the AP800 display.			
 Extension connector 60° 5AC800.CON1-00		 Extension connector 5AC800.CON1-00	
Extension Abdeckungen An extension cover must be mounted on each extension unit slot on the AP800 display that is not being used.			
 Extension cover 5AC800.COV1-00		 Extension cover USB 5AC800.COV2-00	

Figure 2: Configuration - basic system

Explanation:

- 1) Select the basic system (select 1).
- 2) Select the extension units according to requirements.

- 3) Make selection depending on the number of extension units, extension connectors and extension covers.
- 4) Select optional components

1.2.2 Selection guide - optional components

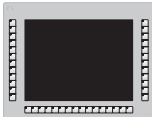
Configuration - optional			
Display			
The basic system consists of a display unit. Types: Display without keys Display with keys			
	5AP820.1505-00	5AP880.1505-00	
Extension flange			
For mounting, an extension flange is installed on the back of the display.			
5AC800.FLG1-00			
Cable (select 1)			
	1.8m - 25m		30m - 40m
Select SDL cable in the desired length. Types: SDL cable without extender SDL cable with extender		5CASDL.0018-20 5CASDL.0050-20 5CASDL.0100-20 5CASDL.0150-20 5CASDL.0200-20 5CASDL.0250-20	 5CASDL.0300-30 5CASDL.0400-30
Select voltage supply cable in the desired length.		5CAPWR.0018-20 5CAPWR.0050-20 5CAPWR.0100-20 5CAPWR.0150-20 5CAPWR.0200-20 5CAPWR.0250-20	 5CAPWR.0300-20 5CAPWR.0400-20
Select X2X cable in the desired length.		5CAX2X.0018-00 5CAX2X.0050-00 5CAX2X.0100-00 5CAX2X.0150-00 5CAX2X.0200-00 5CAX2X.0250-00	 5CAX2X.0300-00 5CAX2X.0400-00

Figure 3: Selection guide - optional components

Information:

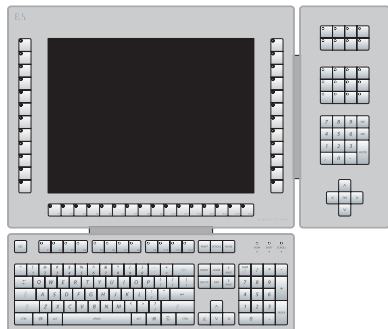
The optional components are required for installation and commissioning.

2. Configuration

The following three examples should be helpful for the configuration of AP800 systems. They will explain which components are required for the respective configuration.

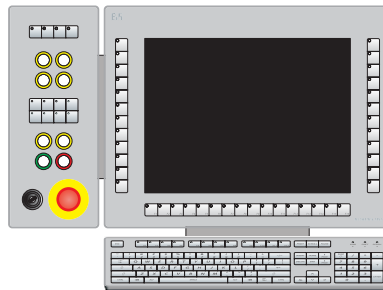
Example 1

Automation Panel 800 with extensions to the right and below



Example 2

Automation Panel 800 with extensions to the left and angled (60°) below extra USB connection on the right of the Automation Panel 800



Example 3

Automation Panel 800 with extensions to the right, left and angled (60°) below

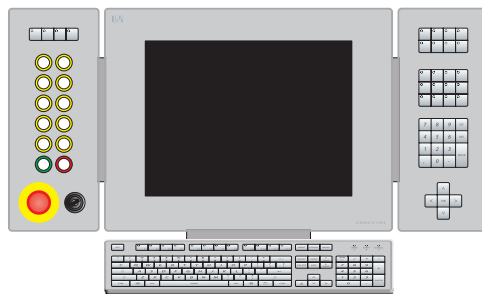


Figure 4: Example configurations

This page is only used as a place holder.

2.1 Example 1

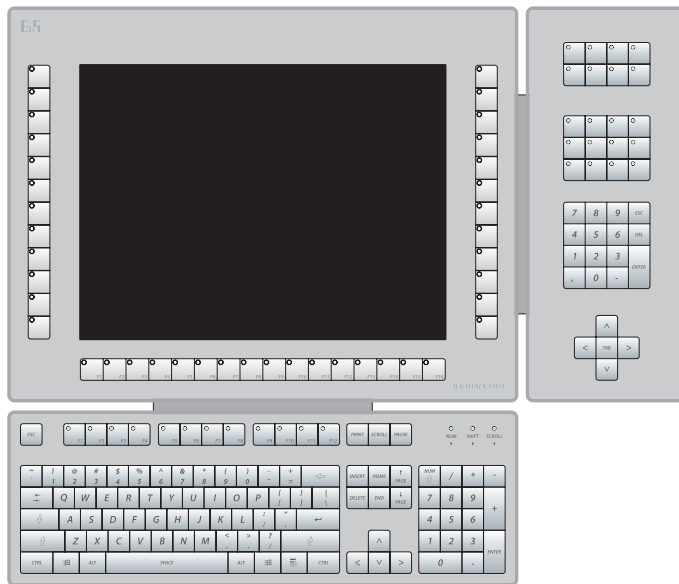


Figure 5: Configuration - Example 1

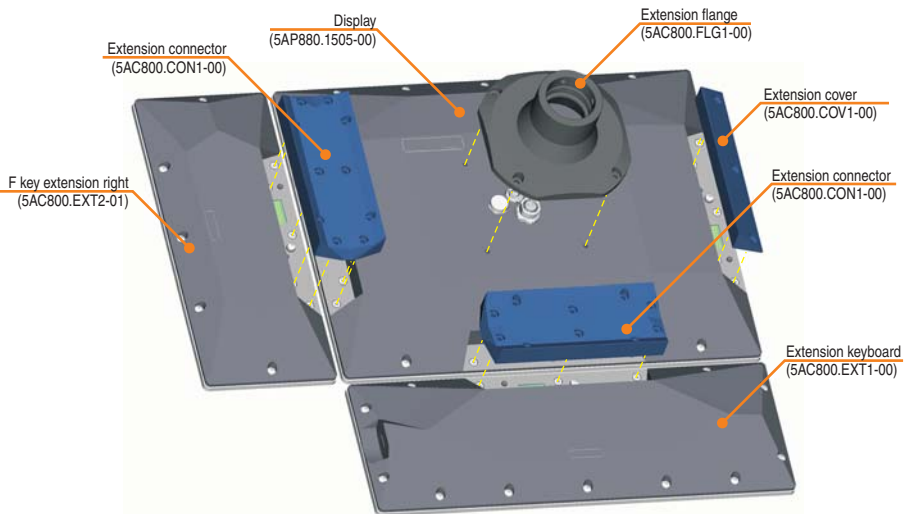


Figure 6: Required components - Example 1

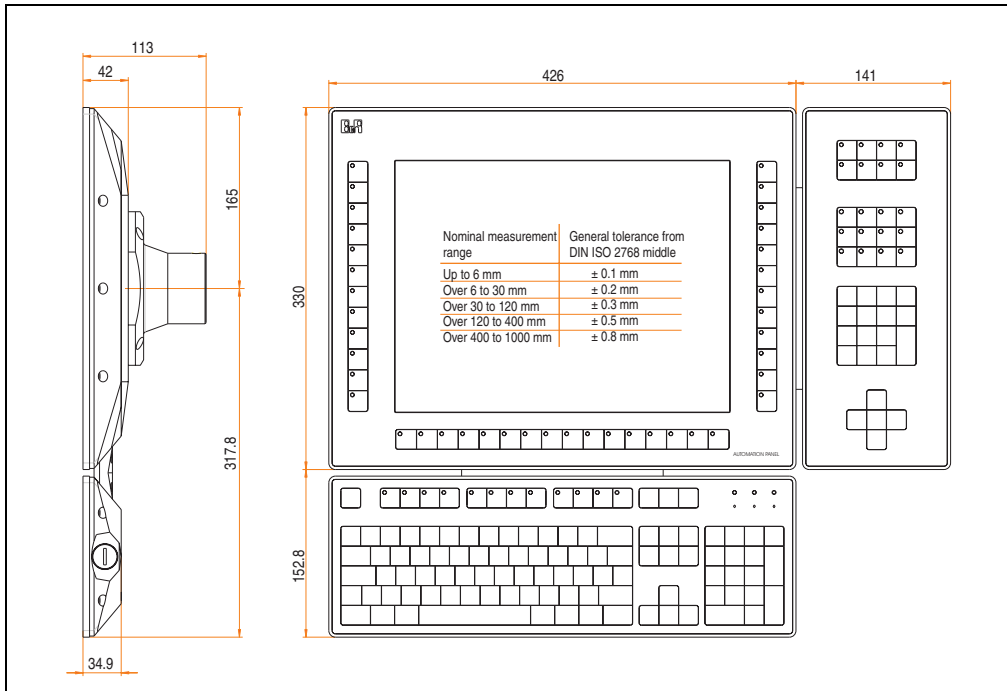


Figure 7: Dimensions - Example 1

2.1.1 Overview of the required components

Model number	Short description	Number
5AP880.1505-00	TFT C XGA 15in FT	1
5AC800.EXT1-00	Keyboard extension	1
5AC800.EXT2-01	F key extension - right	1
5AC800.CON1-00	Extension connector	2
5AC800.COV1-00	Extension cover	1
5AC800.FLG1-00	Extension flange	1
5CASDL.0xxx-20	SDL cable for Automation Panel 800 - length can be selected from 1.8 to 40 meters - see table 5 "Model numbers - cables" on page 17.	1
5CAPWR.0xxx-20	Voltage supply cable for Automation Panel 800 - length can be selected from 1.8 to 40 meters - see table 5 "Model numbers - cables" on page 17.	1
5CAX2X.0xxx-00	X2X cable for Automation Panel 800 - length can be selected from 1.8 to 40 meters - see table 5 "Model numbers - cables" on page 17.	1

Table 9: Overview of the required components - Example 1

2.2 Example 2

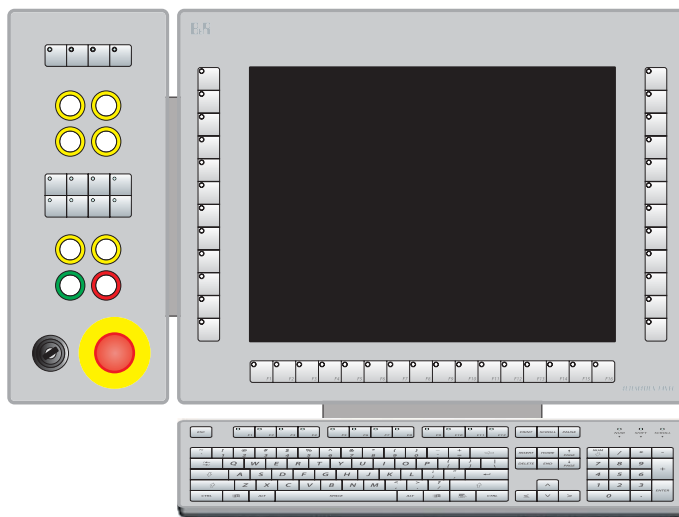


Figure 8: Configuration - Example 2

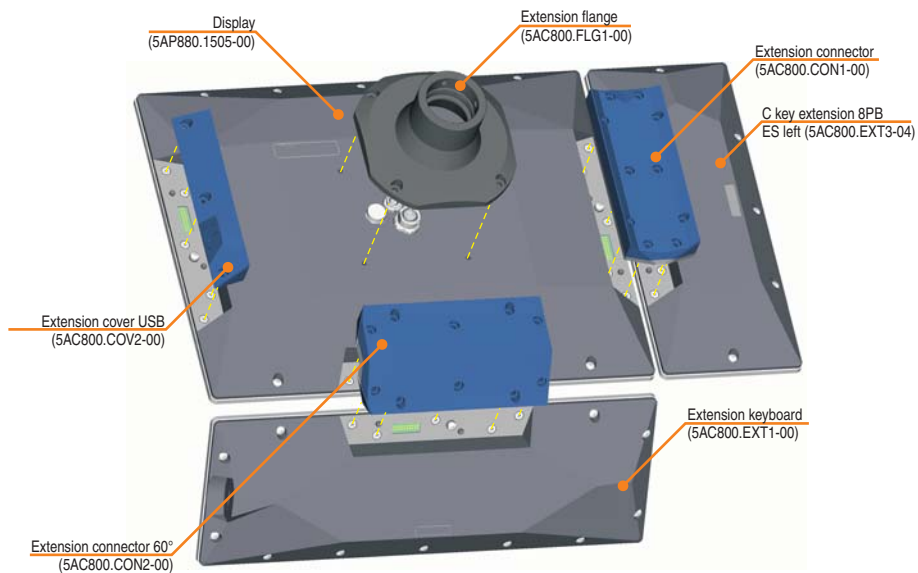


Figure 9: Required components - Example 2

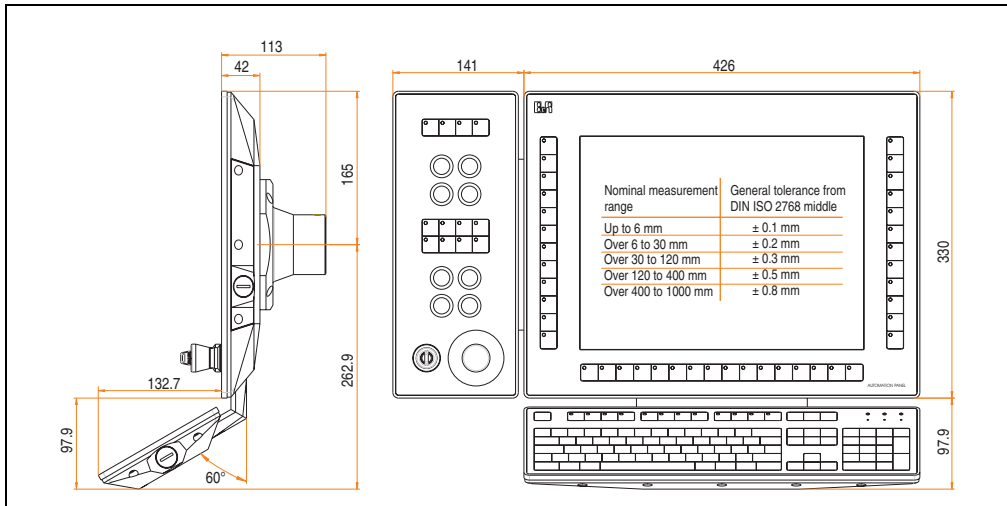


Figure 10: Dimensions - Example 2

2.2.1 Overview of the required components

Model number	Short description	Number
5AP880.1505-00	TFT C XGA 15" FT	1
5AC800.EXT1-00	Keyboard extension	1
5AC800.EXT3-04	C key extension 8PB ES left	1
5AC800.CON1-00	Extension connector	1
5AC800.CON2-00	60° extension connector	1
5AC800.COV2-00	USB extension cover	1
5AC800.FLG1-00	Extension flange	1
5CASDL.0xxx-20	SDL cable for Automation Panel 800 - length can be selected from 1.8 to 40 meters - see table 5 "Model numbers - cables" on page 17.	1
5CAPWR.0xxx-20	Voltage supply cable for Automation Panel 800 - length can be selected from 1.8 to 40 meters - see table 5 "Model numbers - cables" on page 17.	1
5CAX2X.0xxx-00	X2X cable for Automation Panel 800 - length can be selected from 1.8 to 40 meters - see table 5 "Model numbers - cables" on page 17.	1

Table 10: Overview of the required components - Example 2

2.3 Example 3

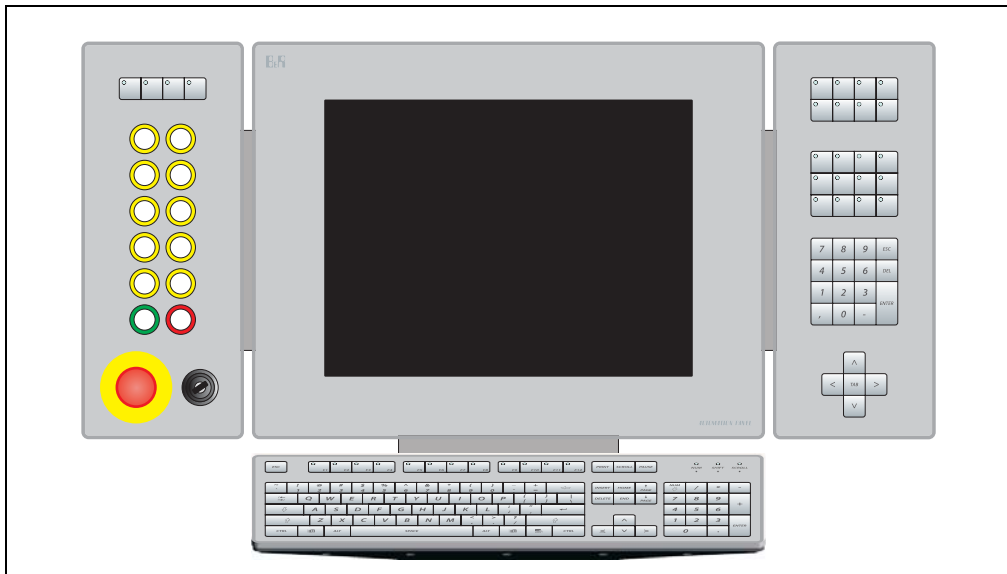


Figure 11: Configuration - Example 3

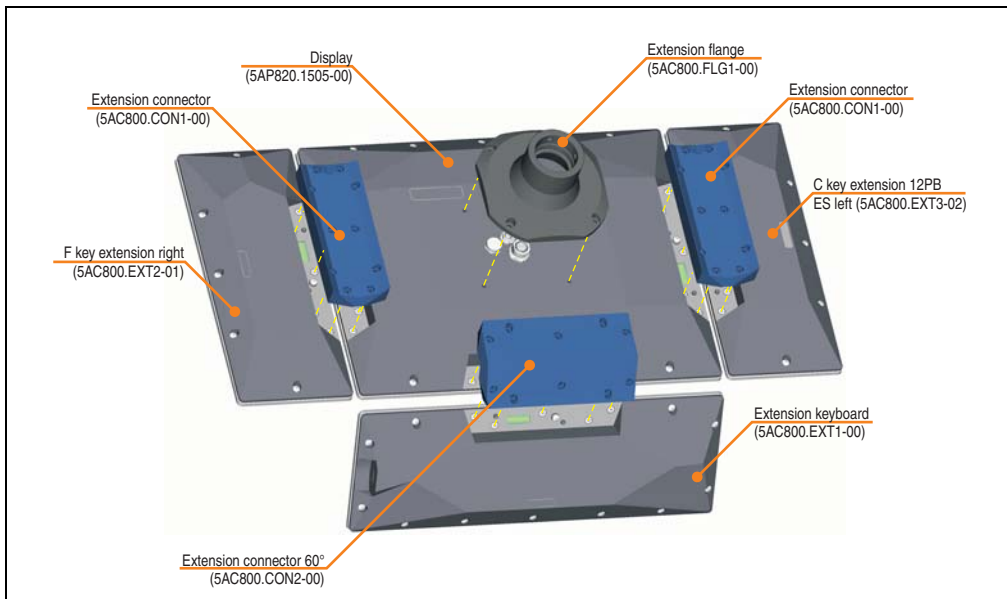


Figure 12: Required components - Example 3

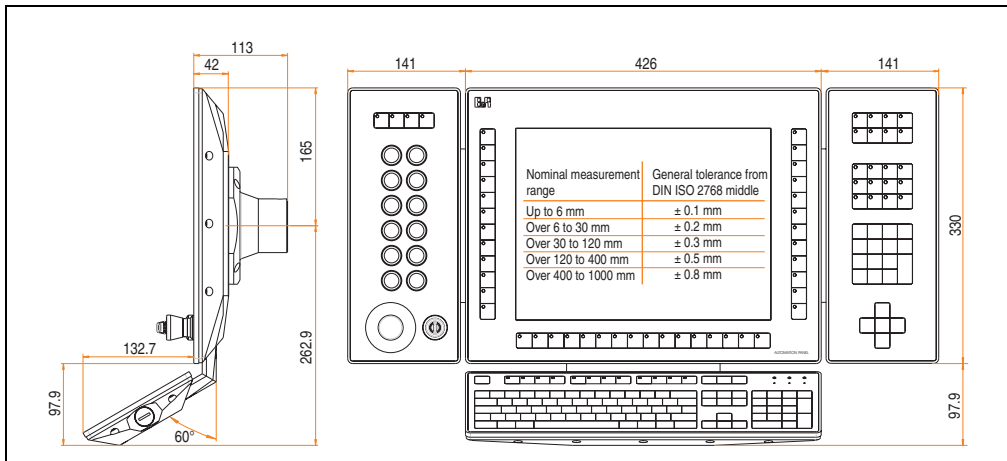


Figure 13: Dimensions - Example 3

2.3.1 Overview of the required components

Model number	Short description	Number
5AP820.1505-00	TFT C XGA 15" T	1
5AC800.EXT2-01	F key extension - right	1
5AC800.EXT3-02	C key extension 12PB ES left	1
5AC800.EXT1-00	Keyboard extension	1
5AC800.CON1-00	Extension connector	2
5AC800.CON2-00	60° extension connector	1
5AC800.FLG1-00	Extension flange	1
5CASDL.0xxx-20	SDL cable for Automation Panel 800 - length can be selected from 1.8 to 40 meters - see table 5 "Model numbers - cables" on page 17.	1
5CAPWR.0xxx-20	Voltage supply cable for Automation Panel 800 - length can be selected from 1.8 to 40 meters - see table 5 "Model numbers - cables" on page 17.	1
5CAX2X.0xxx-00	X2X cable for Automation Panel 800 - length can be selected from 1.8 to 40 meters - see table 5 "Model numbers - cables" on page 17.	1

Table 11: Overview of the required components - Example 3

3. Individual components

3.1 Display units

3.1.1 5AP820.1505-00



Figure 14: Front view - 5AP820.1505-00

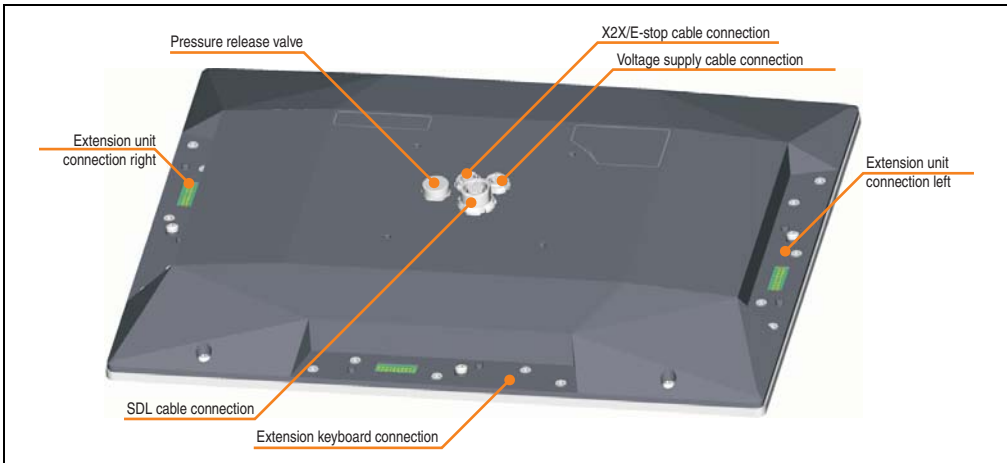


Figure 15: Rear view - 5AP820.1505-00

Technical data

Features	5AP820.1505-00
Display Type Diagonal Colors Resolution Contrast Perspective (see page 164) Horizontal Vertical Background lighting Brightness Half-brightness time	TFT colors 15" (381 mm) 16 million colors XGA, 1024 x 768 pixels 400:1 Direction a / direction b = 85° Direction c / direction d = 85° 250 cd/m² 50000 hours
Touch screen ¹⁾ Technology Controller Degree of transmission	Analog, resistive Elo, serial, 12-bit 78 %
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-
Connections using separate cable for SDL ²⁾ Supply voltage X2X	Pin assignments see page 42 Pin assignments see page 43 Pin assignments see page 43
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption	24 VDC ±25% 3.2 A 5 A typical, maximal 30 A for < 300 µs 27 W typical, maximal 35 W
X2X supply bus Rated voltage Power consumption	12 - 20 VDC Maximum 5 W
Mechanical characteristics	
Front Frame Design Membrane Light background	Aluminum, naturally anodized ³⁾ Gray Polyester Similar to Pantone 427CV ³⁾
Housing Material Gasket Paint	Aluminum (ADC12) Foam perimeter seal Similar to silver metallic ³⁾ (semi-matt)

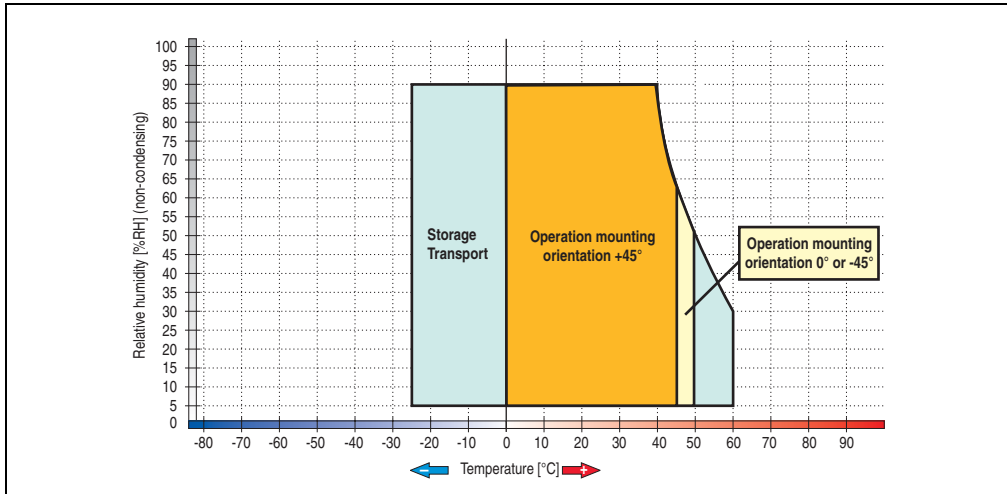
Table 12: Technical data - 5AP820.1505-00

Mechanical characteristics	5AP820.1505-00
Outer dimensions	
Width	426 mm
Height	330 mm
Depth (without flange)	41.3 mm
Weight	Approx. 5 kg
Environmental characteristics	
Ambient temperature	
Operation	0 .. +50 °C
Mounting orientation 0° ⁴⁾	0 .. +50 °C
Mounting orientation up to -45° ⁴⁾	0 .. +45 °C
Mounting orientation up to +45° ⁴⁾	-25 .. +60 °C
Storage	-25 .. +60 °C
Transportation	-25 .. +60 °C
Relative humidity	
Operation / Storage / Transport	T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak)
Storage / Transport	Max. 10 - 57 Hz and 0.075 mm amplitude Max. 58 - 500 Hz and 1 g (9.8 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms continuous
Storage / Transport	Max. 50 g (490 m/s² 0-peak) and 11 ms continuous
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (from all sides)
Altitude	Max. 3000 m

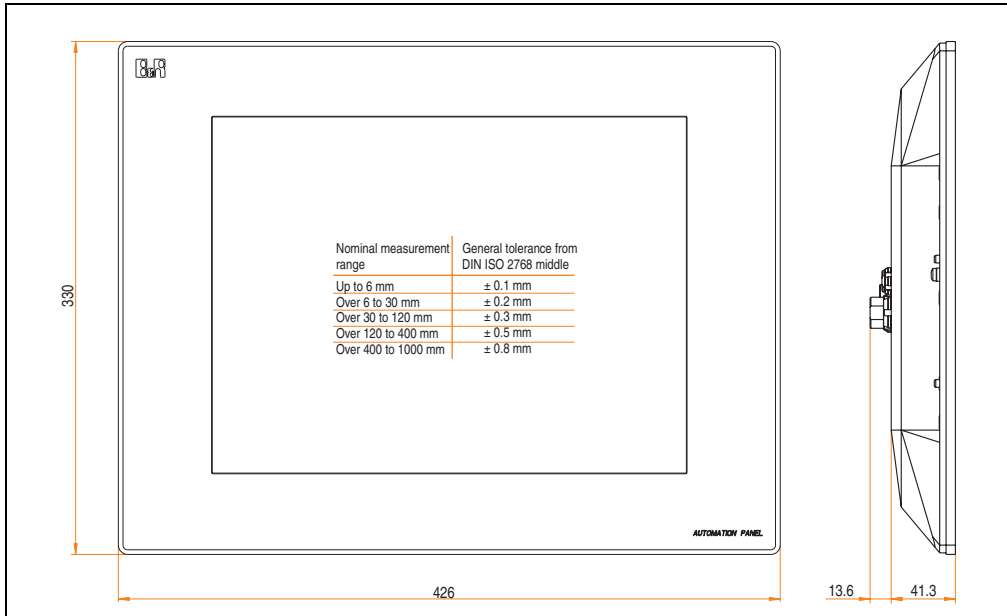
Table 12: Technical data - 5AP820.1505-00 (cont.)

- 1) The necessary drivers can be downloaded from the download area on the B&R homepage (www.br-automation.com).
- 2) SDL ... Smart Display Link
- 3) Depending on the process or batch, there may be visual deviations in the color and surface structure.
- 4) Specified mounting orientation - see chapter 3 "Commissioning", section 4.1 "Mounting orientation" on page 106 .

Temperature humidity diagram for operation and storage



Dimensions



3.1.2 5AP880.1505-00

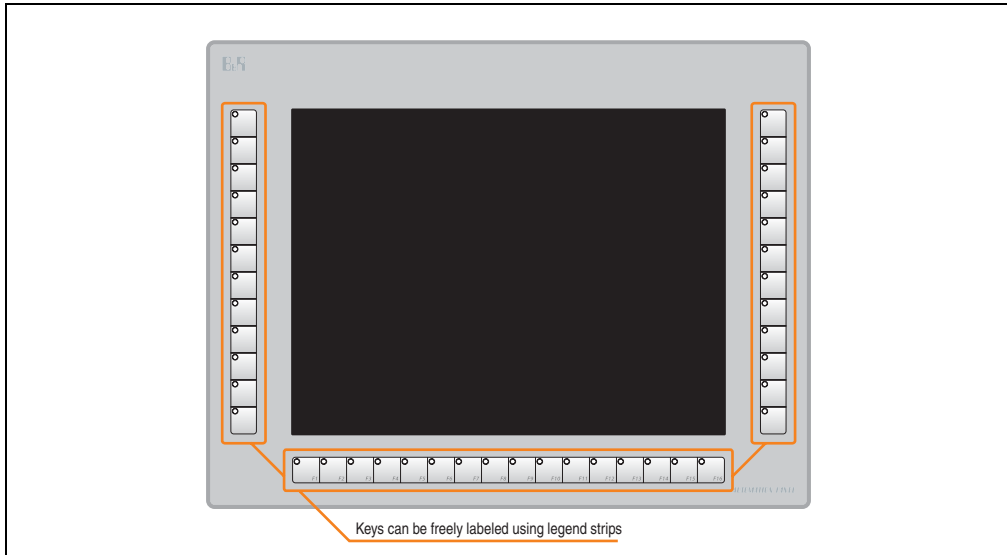


Figure 18: Front view - 5AP880.1505-00

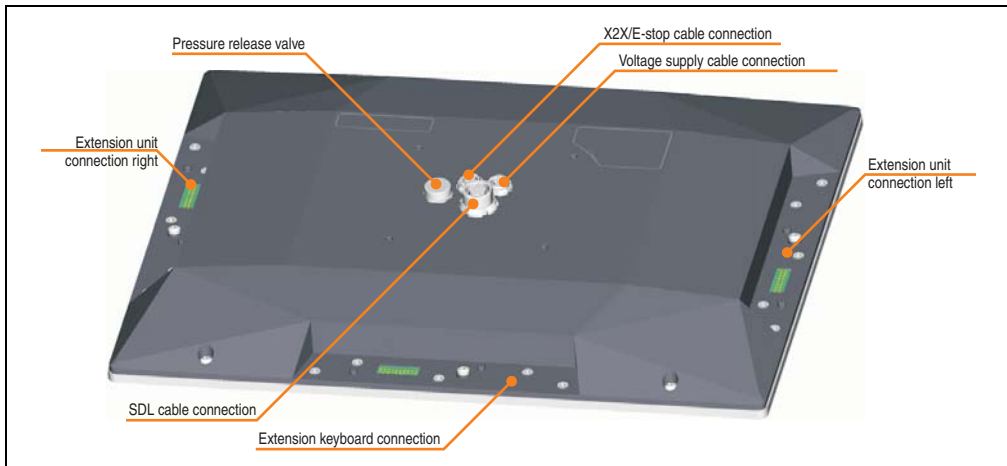


Figure 19: Rear view - 5AP880.1505-00

Technical data

Features	5AP880.1505-00
Display Type Diagonal Colors Resolution Contrast Perspective (see page 164) Horizontal Vertical Background lighting Brightness Half-brightness time	TFT colors 15" (381 mm) 16 million colors XGA, 1024 x 768 pixels 400:1 Direction a / direction b = 85° Direction c / direction d = 85° 250 cd/m² 50000 hours
Touch screen ¹⁾ Technology Controller Degree of transmission	Analog, resistive Elo, serial, 12-bit 78 %
Keys/LED ²⁾ Function keys Operated using Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	40 with LED (yellow) PC - - - - > 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 60 mcd (yellow)
Connections using separate cable forConnections using separate cable for SDL ³⁾ Supply voltage X2X	Pin assignments see page 42 Pin assignments see page 43 Pin assignments see page 43
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption	24 VDC ±25% 3.2 A 5 A typical, maximal 30 A for < 300 µs 27 W typical, maximal 36 W
X2X supply bus Rated voltage Power consumption	12 - 20 VDC Maximum 5 W
Mechanical characteristics	
Front Frame Design Membrane Light background Color legend strips (color gradients)	Aluminum, naturally anodized ⁴⁾ Gray ⁴⁾ Polyester Similar to Pantone 427CV ⁴⁾ Similar to Pantone white to Pantone 429CV ⁴⁾
Housing Material Gasket Paint	Aluminum (ADC12) Foam perimeter seal Similar to silver metallic ⁴⁾ (semi-matt)

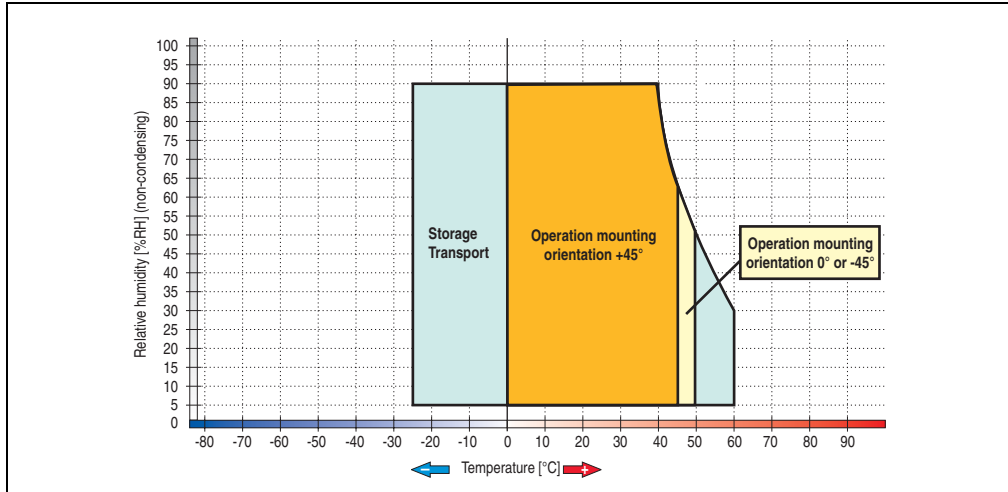
Table 13: Technical data - 5AP880.1505-00

Mechanical characteristics	5AP880.1505-00
Outer dimensions	
Width	426 mm
Height	330 mm
Depth (without flange)	41.3 mm
Weight	Approx. 5 kg
Environmental characteristics	
Ambient temperature	
Operation	
Mounting orientation 0° ⁵⁾	0 .. +50 °C
Mounting orientation up to -45° ⁵⁾	0 .. +50 °C
Mounting orientation up to +45° ⁵⁾	0 .. +45 °C
Storage	-25 .. +60 °C
Transportation	-25 .. +60 °C
Relative humidity	
Operation / Storage / Transport	T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak)
Storage / Transport	Max. 10 - 57 Hz and 0.075 mm amplitude Max. 58 - 500 Hz and 1 g (9.8 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms continuous
Storage / Transport	Max. 50 g (490 m/s² 0-peak) and 11 ms continuous
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (from all sides)
Altitude	Max. 3000 m

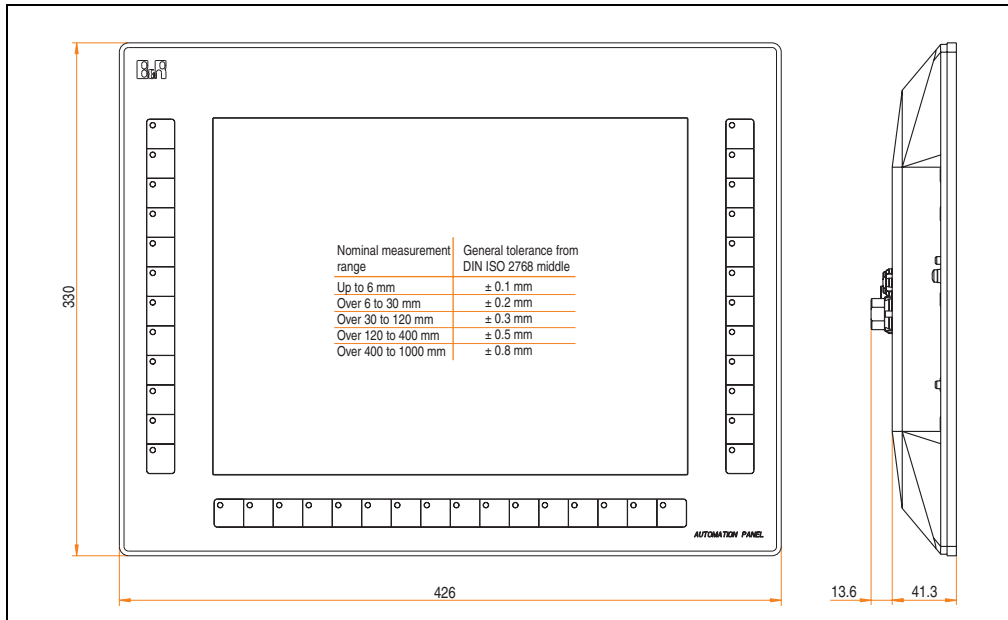
Table 13: Technical data - 5AP880.1505-00 (cont.)

- 1) The necessary drivers can be downloaded from the download area on the B&R homepage (www.br-automation.com).
- 2) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (www.br-automation.com) or on the B&R HMI Driver & Utilities DVD (Mod. No. 5SWHMI.0000-00).
- 3) SDL ... Smart Display Link
- 4) Depending on the process or batch, there may be visual deviations in the color and surface structure.
- 5) Specified mounting orientation - see chapter 3 "Commissioning", section 4.1 "Mounting orientation" on page 106 .

Temperature humidity diagram for operation and storage



Dimensions



Key dimensions

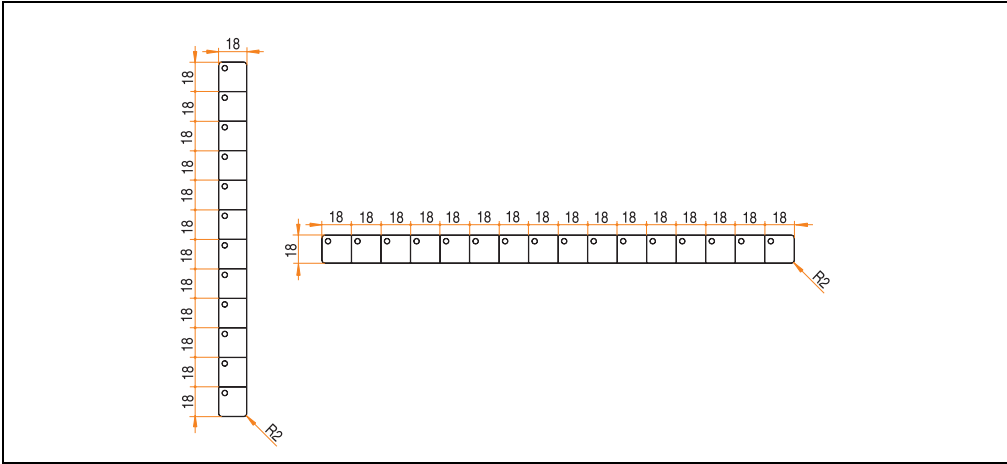


Figure 22: Key dimensions - 5AP880.1505-00

3.1.3 Pin assignments

Information:

The following information is valid for both display units (5AP820.1505-00, 5AP880.1505-00).

SDL cable connection

Caution!

SDL cables can only be plugged in and unplugged when the APC620 or PPC700 and display device (Automation Panel 800) are turned off.

Pin assignments for SDL cable connection			
ODU Minisnap 24-pin			
Pin	Assignment	Pin	Assignment
1	XUSB1-	16	T.M.D.S. data 0+
2	XUSB0-	17	T.M.D.S. DATA 1/XUSB0 shield
3	n.c.	18	DDC Clock T.M.D.S. DATA 1-
4	T.M.D.S. clock shield	19	DDC Data T.M.D.S. DATA 1+
5	XUSB1+	20	Ground (return for + 5V, HSync and VSync)
6	+ 5 V power ¹⁾	21	T.M.D.S. data 2-
7	XUSB0+	22	T.M.D.S. data 2+
8	Hot Plug detect	23	T.M.D.S. data 2/SDL shield
9	DDC clock	24	SDL-
10	DDC data		
11	SDL+		
12	T.M.D.S. clock -		
13	T.M.D.S. clock +		
14	T.M.D.S. DATA 0/XUSB1 shield		
15	T.M.D.S. data 0-		



Table 14: Pin assignments - SDL cable connection

1) Protected internally by a multifuse

Supply voltage

Pin assignments for supply voltage	
ODU Minisnap 3-pin Electrically isolated	
Pin	Assignment
1	+
2	-
3	Functional grounding



Table 15: Pin assignments - SDL cable connection

X2X / E-stop cable connection

Pin assignments for X2X / E-stop cable connection	
ODU Minisnap 10-pin Electrically isolated	
Pin	Assignment
1	E-stop normally closed contact 1 (12)
2	E-stop normally closed contact 2 (22)
3	X2X_+24V (bus supply +)
4	E-stop normally closed contact 1 (11)
5	E-stop normally closed contact 2 (21)
6	X2X_0V (bus supply -)
7	n. c.
8	n. c.
9	X2X\ (IN)
10	X2X (IN)

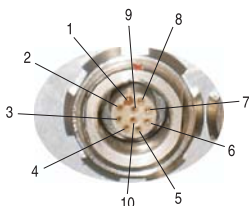


Table 16: Pin assignments - X2X / E-stop cable connection

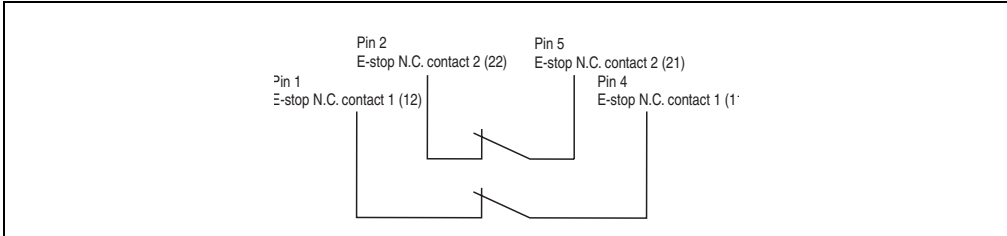


Figure 23: E-stop circuit connections

3.2 Extension units

3.2.1 Extension keyboard 5AC800.EXT1-00



Figure 24: Front view - 5AC800.EXT1-00



Figure 25: Rear view - 5AC800.EXT1-00

Technical data

Features	5AC800.EXT1-00
Keys/LED ¹⁾ Cursor keys Number block Other keys Other LED Operated using Key lifespan LED brightness	Total of 104 keys / 15 LEDs 4 without LED 17 without LED 83 (12 with LED - yellow) 3 green PC > 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 60 mcd (yellow) and 35 mcd (green)
USB interface Type Number Transfer rate Connection Current load	USB 1.1 1 (left) Low speed (1.5 MBit/s), full speed (12 MBit/s) Type A Max. 500 mA
Electrical characteristics	
Power consumption	Max. 4W
Mechanical characteristics	
Front Frame Design Membrane Light background Color (color gradients)	Aluminum, naturally anodized ²⁾ Gray ⁴⁾ Polyester Similar to Pantone 427CV ⁴⁾ Similar to Pantone white ⁴⁾ to Pantone 429CV ⁴⁾
Housing Material Gasket Paint	Aluminum (ADC12) Foam perimeter seal Similar to silver metallic ⁴⁾ (semi-matt)
Outer dimensions Width Height Depth	426 mm 146.8 mm 34.9 mm
Weight	Approx. 1.6 kg
Connection	Required for installation below an Automation Panel 800 display
Environmental characteristics	
Ambient temperature Operation (0°, -45°, +45°) Storage Transportation	0 .. +50 °C -25 .. +60 °C -25 .. +60 °C
Relative humidity Operation / Storage / Transport	T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration Operation (continuous) Operation (occasional) Storage / Transport	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0.5 g (4.9 m/s² 0-peak) 5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak) Max. 10 - 57 Hz and 0.075 mm amplitude Max. 58 - 500 Hz and 1 g (9.8 m/s² 0-peak)

Table 17: Technical data - 5AC800.EXT1-00

Technical data • Individual components

Environmental characteristics	5AC800.EXT1-00
Shock Operation Storage / Transport	Max. 15 g (147 m/s² 0-peak) and 11 ms continuous Max. 50 g (490 m/s² 0-peak) and 11 ms continuous
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (from all sides)
Altitude	Max. 3000 m

Table 17: Technical data - 5AC800.EXT1-00

- 1) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (www.br-automation.com) or on the B&R HMI Driver & Utilities DVD (Mod. No. 5SWHMI.0000-00).
- 2) Depending on the process or batch, there may be visual deviations in the color and surface structure.

Dimensions

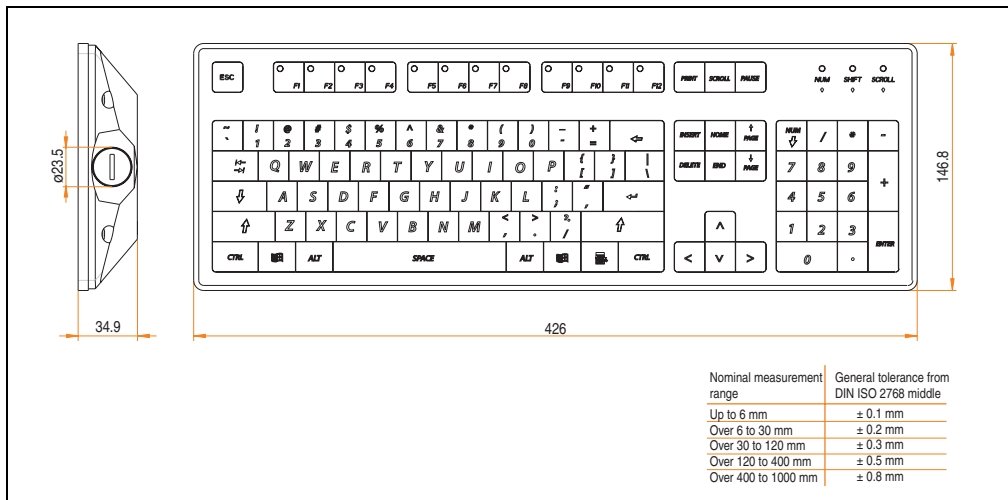
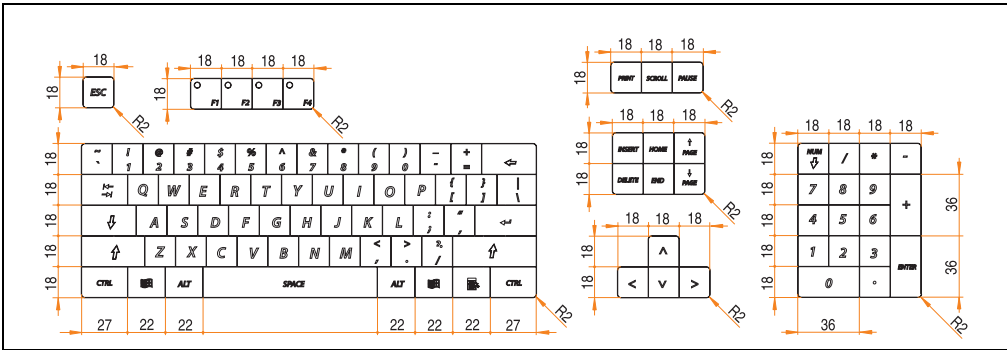


Figure 26: Dimensions - 5AC800.EXT1-00

Key dimensions



3.2.2 F key extension left 5AC800.EXT2-00

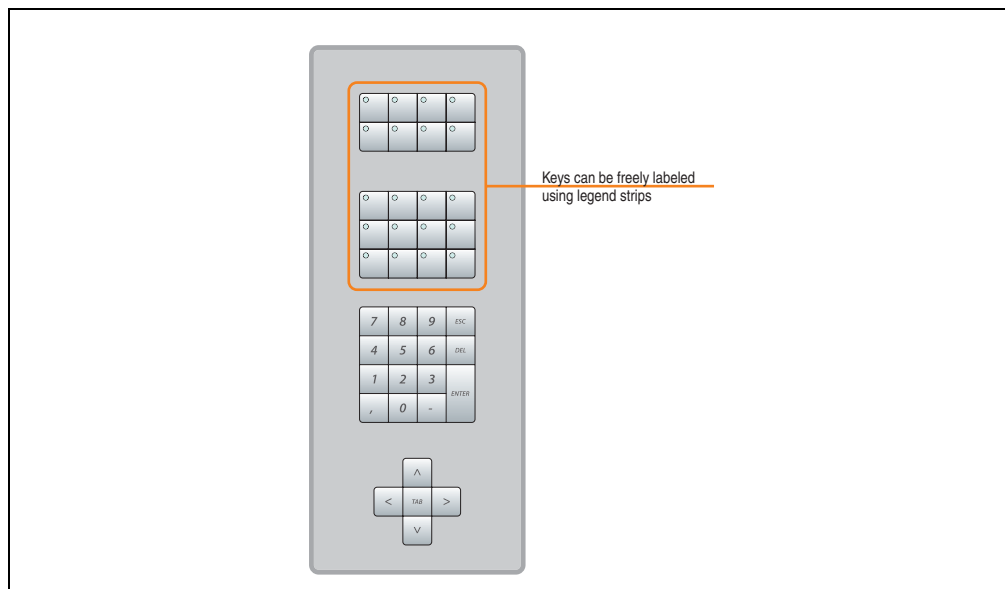


Figure 28: Front view - 5AC800.EXT2-00



Figure 29: Rear view - 5AC800.EXT2-00

Technical data

Features	5AC800.EXT2-00
Keys/LED ¹⁾ Function keys Operated using Cursor keys Number block Other keys Key lifespan LED brightness	20 with LED (yellow) PC 4 without LED 15 without LED - - > 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 60 mcd (yellow)
Electrical characteristics	
Power consumption	Max. 1W
Mechanical characteristics	
Front Frame Design Membrane Light background Color (color gradients) Color legend strips (color gradients)	Aluminum, naturally anodized ²⁾ Gray ²⁾ Polyester Similar to Pantone 427CV ²⁾ Similar to Pantone white to Pantone 429CV ²⁾ Similar to Pantone white to Pantone 429CV ²⁾
Housing Material Gasket Paint	Aluminum (ADC12) Foam perimeter seal Similar to silver metallic ⁴⁾ (semi-matt)
Outer dimensions Width Height Depth	135 mm 330 mm 34.9 mm
Weight	Approx. 1.1 kg
Connection	Required for installation to the left of an Automation Panel 800 display
Environmental characteristics	
Ambient temperature Operation (0°, -45°, +45°) Storage Transportation	0 .. +50 °C -25 .. +60 °C -25 .. +60 °C
Relative humidity Operation / Storage / Transport	T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration Operation (continuous) Operation (occasional) Storage / Transport	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0.5 g (4.9 m/s² 0-peak) 5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak) Max. 10 - 57 Hz and 0.075 mm amplitude Max. 58 - 500 Hz and 1 g (9.8 m/s² 0-peak)
Shock Operation Storage / Transport	Max. 15 g (147 m/s² 0-peak) and 11 ms continuous Max. 50 g (490 m/s² 0-peak) and 11 ms continuous
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (from all sides)

Table 18: Technical data - 5AC800.EXT2-00

Technical data • Individual components

Environmental characteristics	5AC800.EXT2-00
Altitude	Max. 3000 m

Table 18: Technical data - 5AC800.EXT2-00

- 1) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (www.br-automation.com) or on the B&R HMI Driver & Utilities DVD (Mod. No. 5SWHMI.0000-00).
- 2) Depending on the process or batch, there may be visual deviations in the color and surface structure.

Dimensions

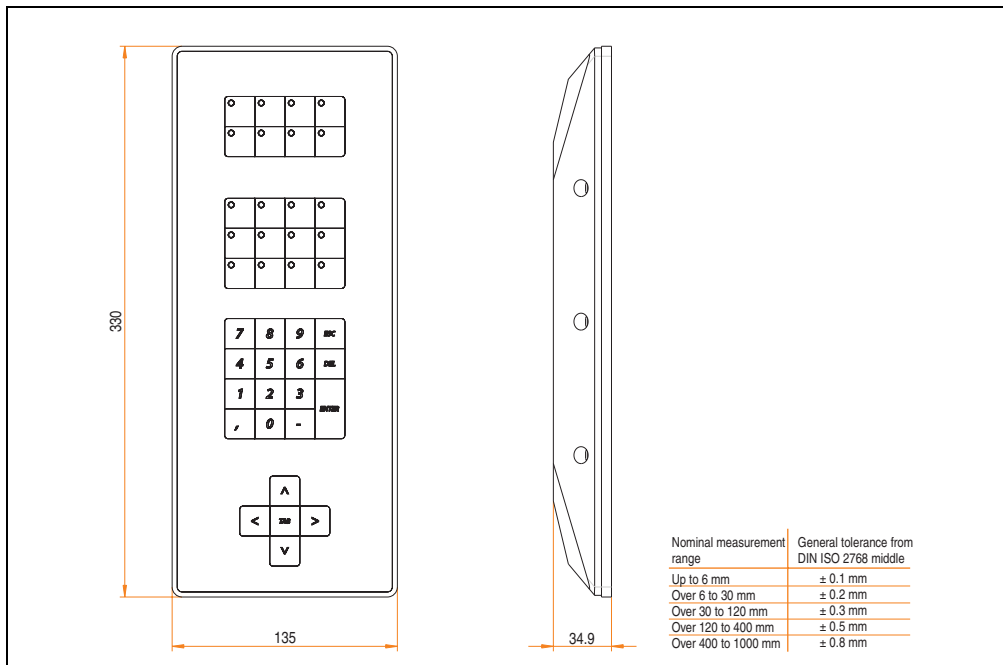


Figure 30: Dimensions - 5AC800.EXT2-00

Key dimensions

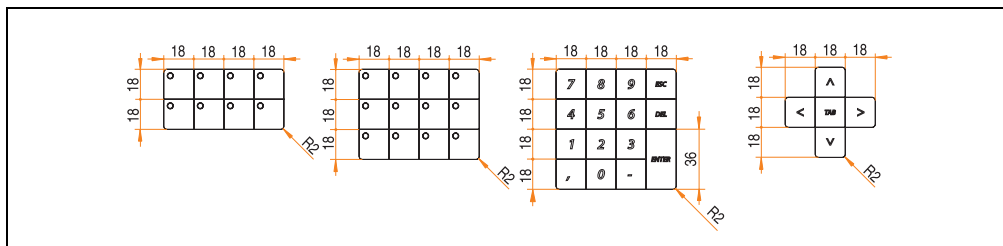


Figure 31: Key dimensions - 5AV800.EXT2-00

3.2.3 F key extension right 5AC800.EXT2-01

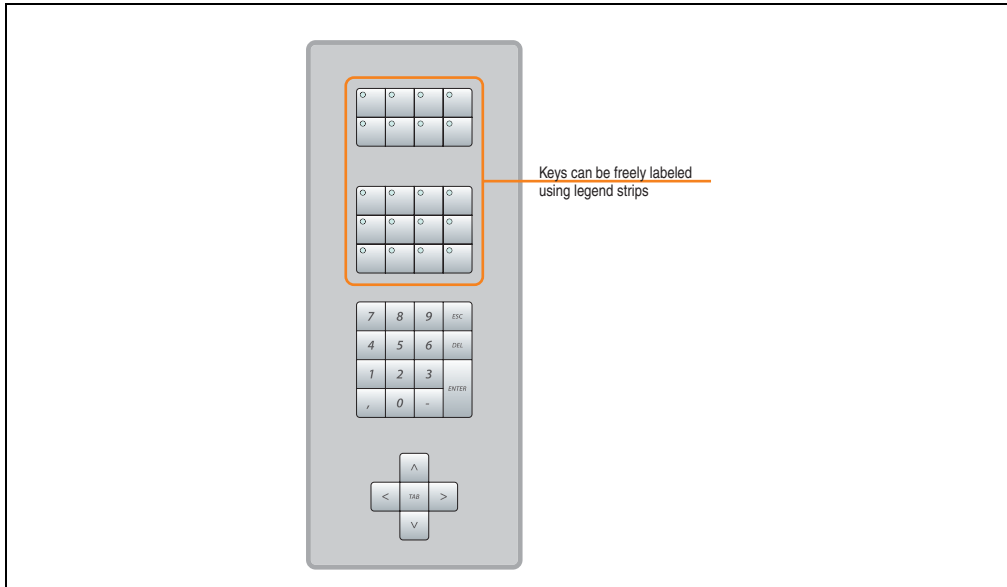


Figure 32: Front view - 5AC800.EXT2-01

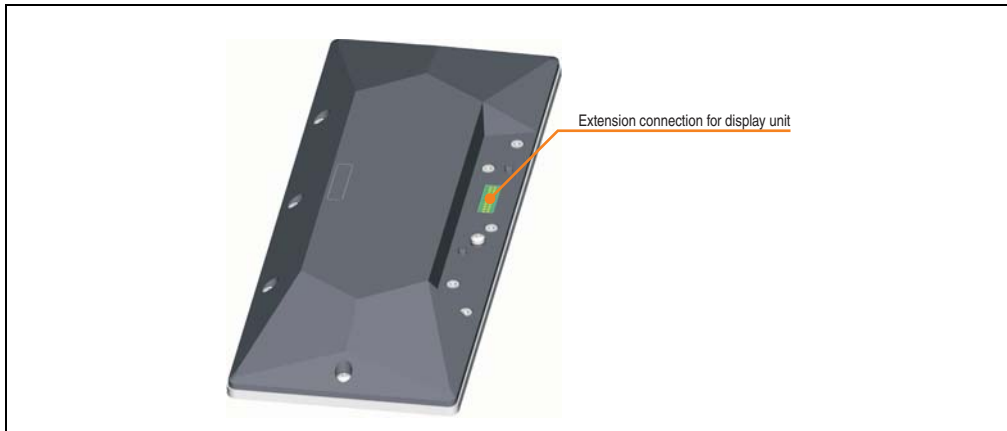


Figure 33: Rear view - 5AC800.EXT2-01

Technical data

Features	5AC800.EXT2-01
Keys/LED ¹⁾ Function keys Operated using Cursor keys Number block Other keys Key lifespan LED brightness	20 with LED (yellow) PC 4 without LED 15 without LED - - > 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 60 mcd (yellow)
Electrical characteristics	
Power consumption	Max. 1W
Mechanical characteristics	
Front Frame Design Membrane Light background Color (color gradients) Color legend strips (color gradients)	Aluminum, naturally anodized ²⁾ Gray ²⁾ Polyester Similar to Pantone 427CV ²⁾ Similar to Pantone white to Pantone 429CV ²⁾ Similar to Pantone white to Pantone 429CV ²⁾
Housing Material Gasket Paint	Aluminum (ADC12) Foam perimeter seal Similar to silver metallic ²⁾ (semi-matt)
Outer dimensions Width Height Depth	135 mm 330 mm 34.9 mm
Weight	Approx. 1.1 kg
Connection	Required for installation to the right of an Automation Panel 800 display
Environmental characteristics	
Ambient temperature Operation (0°, -45°, +45°) Storage Transportation	0 .. +50 °C -25 .. +60 °C -25 .. +60 °C
Relative humidity Operation / Storage / Transport	T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration Operation (continuous) Operation (occasional) Storage / Transport	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0.5 g (4.9 m/s ² 0-peak) 5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s ² 0-peak) Max. 10 - 57 Hz and 0.075 mm amplitude Max. 58 - 500 Hz and 1 g (9.8 m/s ² 0-peak)
Shock Operation Storage / Transport	Max. 15 g (147 m/s ² 0-peak) and 11 ms continuous Max. 50 g (490 m/s ² 0-peak) and 11 ms continuous
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (from all sides)

Table 19: Technical data - 5AC800.EXT2-01

Environmental characteristics	5AC800.EXT2-01
Altitude	Max. 3000 m

Table 19: Technical data - 5AC800.EXT2-01

- 1) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (www.br-automation.com) or on the B&R HMI Driver & Utilities DVD (Mod. No. 5SWHMI.0000-00).
- 2) Depending on the process or batch, there may be visual deviations in the color and surface structure.

Dimensions

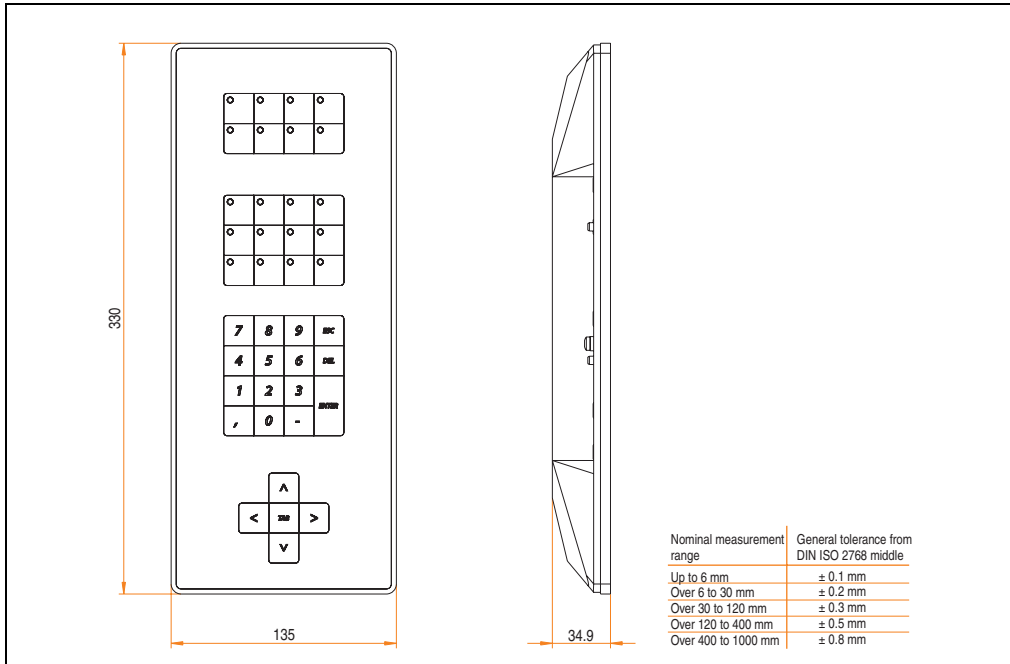


Figure 34: Dimensions - 5AC800.EXT2-01

Key dimensions

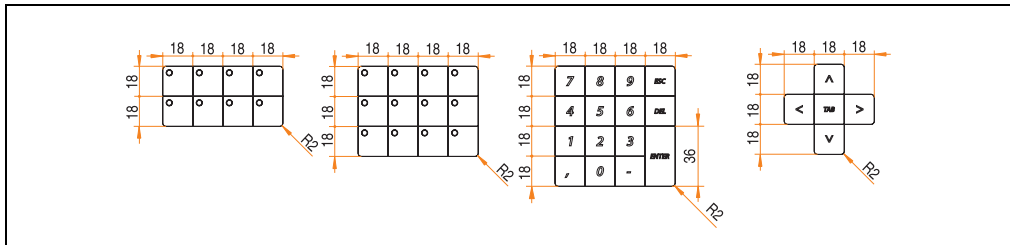


Figure 35: Key dimensions - 5AC800.EXT2-01

3.2.4 C key extension 8PB left 5AC800.EXT3-00

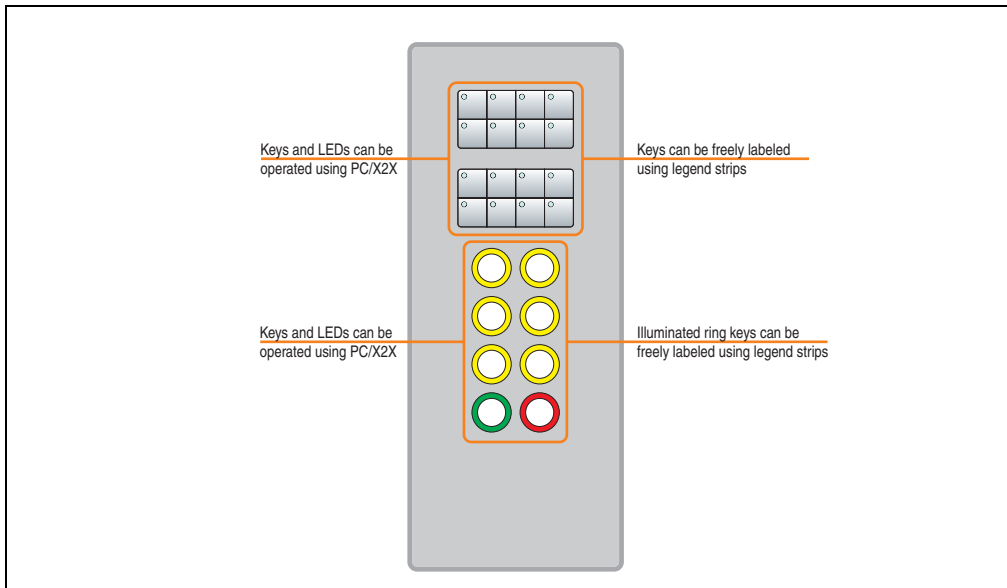


Figure 36: Front view - 5AC800.EXT3-00

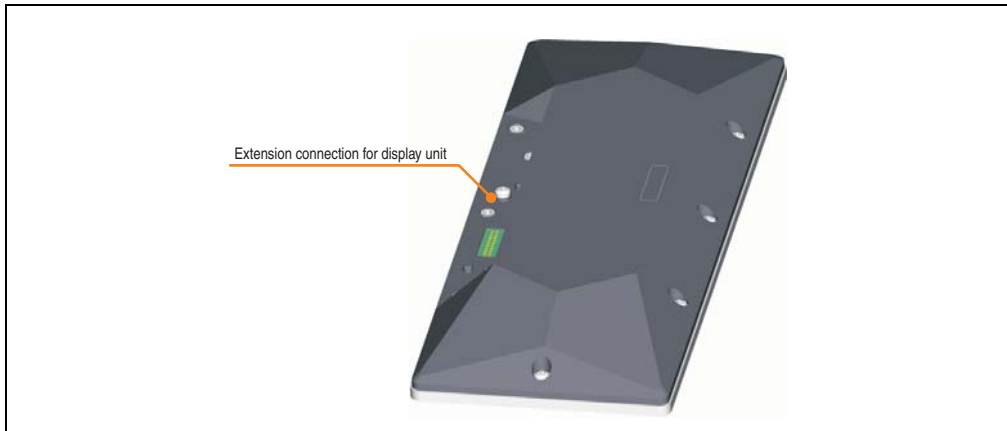


Figure 37: Rear view - 5AC800.EXT3-00

Technical data

Features	5AC800.EXT3-00
Keys/LED ¹⁾	
Function keys	16 with LED (yellow)
Operated using	PC, X2X
Cursor keys	-
Number block	-
Other keys	8 illuminated ring keys (PB - Push Button)
Operated using	PC, X2X
Key lifespan	1000000 actuations with 3.5 -0.5 to 3.5 +0.7 N operating force
Key lifespan	> 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	
Yellow	Typ. 60 mcd
Green	Typ. 35 mcd
Red	Typ. 54 mcd
Electrical characteristics	
Power consumption	Max. 7W
Mechanical characteristics	
Front	
Frame	Aluminum, naturally anodized ²⁾
Design	Gray ²⁾
Membrane	Polyester
Light background	Similar to Pantone 427CV ²⁾
Color legend strips (color gradients)	Similar to Pantone white to Pantone 429CV ²⁾
Housing	
Material	Aluminum (ADC12)
Gasket	Foam perimeter seal
Paint	Similar to silver metallic ²⁾ (semi-matt)
Outer dimensions	
Width	135 mm
Height	330 mm
Depth	34.9 mm
Weight	Approx. 1.1 kg
Connection	Required for installation to the left of an Automation Panel 800 display
Environmental characteristics	
Ambient temperature	
Operation (0°, -45°, +45°)	0 .. +50 °C
Storage	-25 .. +60 °C
Transportation	-25 .. +60 °C
Relative humidity	
Operation / Storage / Transport	T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0.5 g (4.9 m/s ² 0-peak)
Operation (occasional)	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s ² 0-peak)
Storage / Transport	Max. 10 - 57 Hz and 0.075 mm amplitude Max. 58 - 500 Hz and 1 g (9.8 m/s ² 0-peak)

Table 20: Technical data - 5AC800.EXT3-00

Technical data • Individual components

Environmental characteristics	5AC800.EXT3-00
Shock Operation Storage / Transport	Max. 15 g (147 m/s ² 0-peak) and 11 ms continuous Max. 50 g (490 m/s ² 0-peak) and 11 ms continuous
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (from all sides)
Altitude	Max. 3000 m

Table 20: Technical data - 5AC800.EXT3-00

- 1) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (www.br-automation.com) or on the B&R HMI Driver & Utilities DVD (Mod. No. 5SWHMI.0000-00).
- 2) Depending on the process or batch, there may be visual deviations in the color and surface structure.

Dimensions

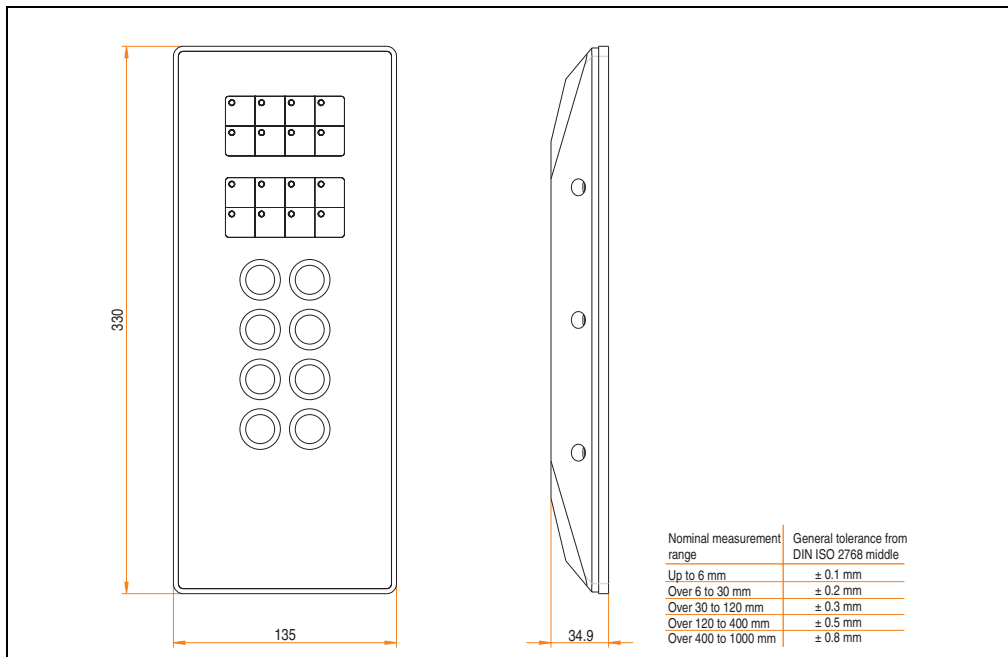


Figure 38: Dimensions - 5AC800.EXT3-00

Key dimensions

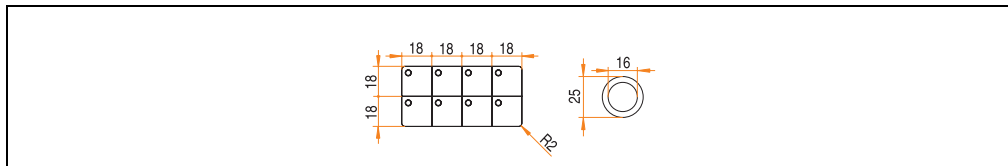


Figure 39: Key dimensions - 5AC800.EXT3-00

3.2.5 C key extension 8PB right 5AC800.EXT3-01

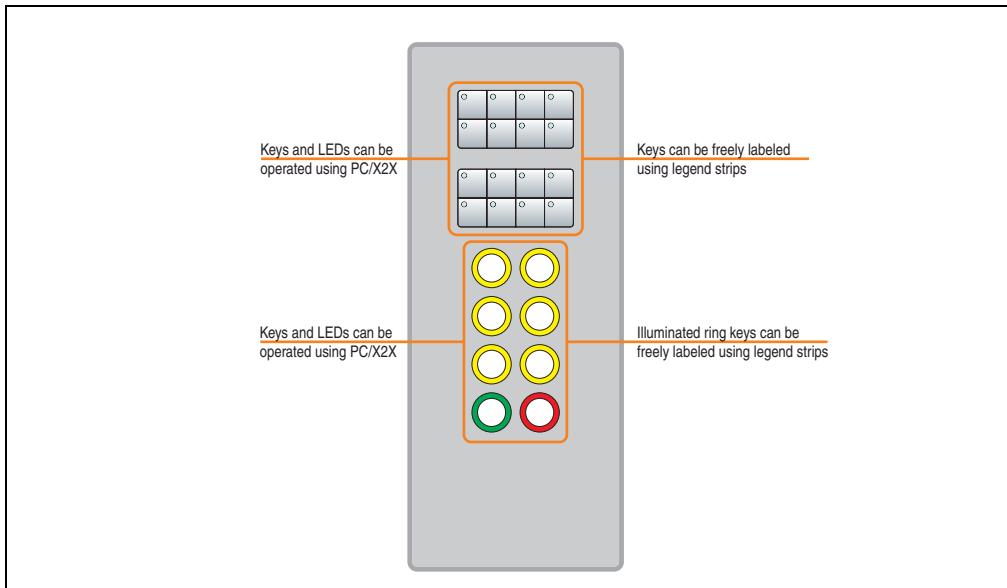


Figure 40: Front view - 5AC800.EXT3-01

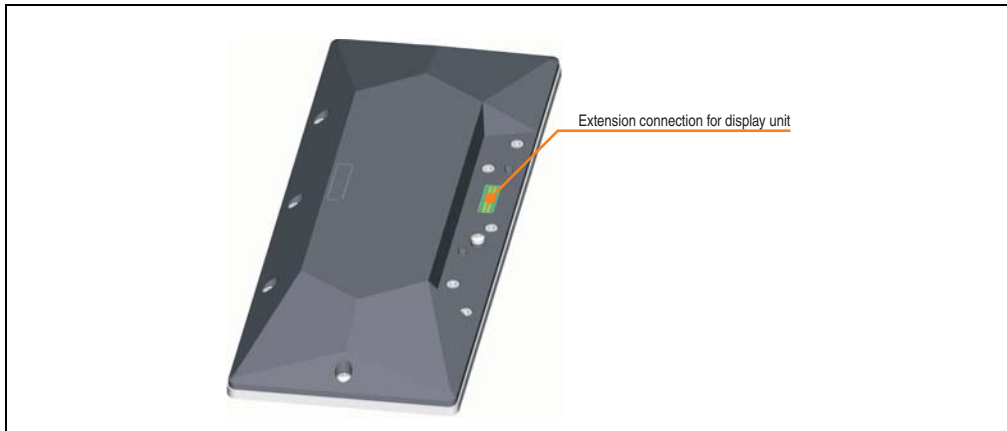


Figure 41: Rear view - 5AC800.EXT3-01

Technical data

Features	5AC800.EXT3-01
Keys/LED ¹⁾ Function keys Operated using Cursor keys Number block Other keys Operated using Key lifespan Key lifespan LED brightness Yellow Green Red	16 with LED (yellow) PC, X2X - - 8 illuminated ring keys (PB - Push Button) PC, X2X 1,000,000 actuations with 3.5 -0.5 to 3.5 +0.7 N operating force > 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 60 mcd Typ. 35 mcd Typ. 54 mcd
Electrical characteristics	
Power consumption	Max. 7W
Mechanical characteristics	
Front Frame Design Membrane Light background Color legend strips (color gradients)	Aluminum, naturally anodized ²⁾ Gray ²⁾ Polyester Similar to Pantone 427CV ²⁾ Similar to Pantone white to Pantone 429CV ²⁾
Housing Material Gasket Paint	Aluminum (ADC12) Foam perimeter seal Similar to silver metallic ²⁾ (semi-matt)
Outer dimensions Width Height Depth	135 mm 330 mm 34.9 mm
Weight	Approx. 1.1 kg
Connection	Required for installation to the right of an Automation Panel 800 display
Environmental characteristics	
Ambient temperature Operation (0°, -45°, +45°) Storage Transportation	0 .. +50 °C -25 .. +60 °C -25 .. +60 °C
Relative humidity Operation / Storage / Transport	T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration Operation (continuous) Operation (occasional) Storage / Transport	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0.5 g (4.9 m/s ² 0-peak) 5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s ² 0-peak) Max. 10 - 57 Hz and 0.075 mm amplitude Max. 58 - 500 Hz and 1 g (9.8 m/s ² 0-peak)

Table 21: Technical data - 5AC800.EXT3-01

Environmental characteristics	5AC800.EXT3-01
Shock Operation Storage / Transport	Max. 15 g (147 m/s ² 0-peak) and 11 ms continuous Max. 50 g (490 m/s ² 0-peak) and 11 ms continuous
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (from all sides)
Altitude	Max. 3000 m

Table 21: Technical data - 5AC800.EXT3-01

- 1) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (www.br-automation.com) or on the B&R HMI Driver & Utilities DVD (Mod. No. 5SWHMI.0000-00).
- 2) Depending on the process or batch, there may be visual deviations in the color and surface structure.

Dimensions

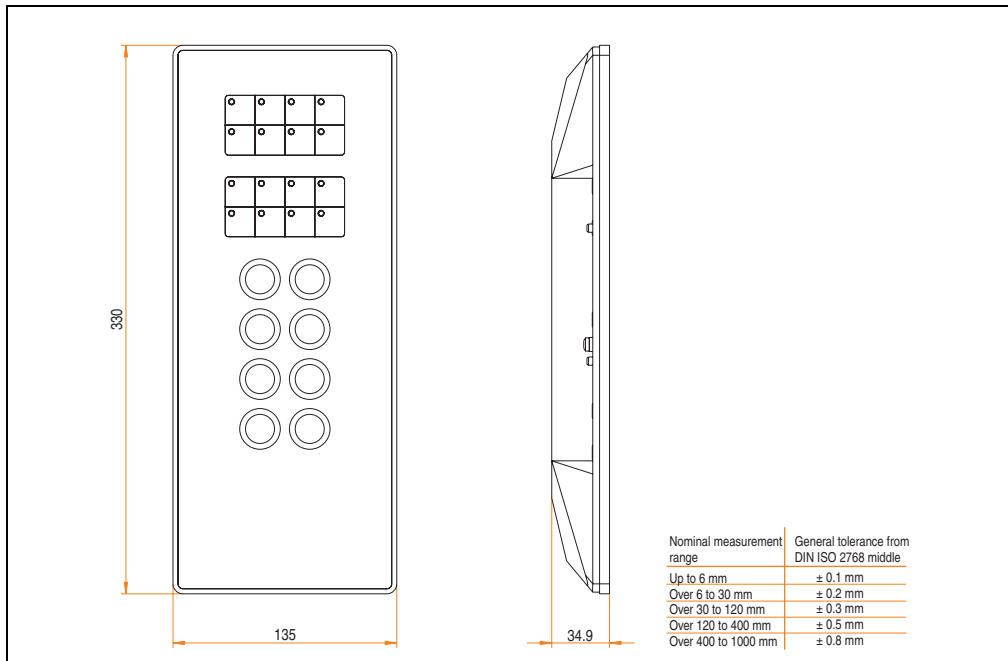


Figure 42: Dimensions - 5AC800.EXT3-01

Key dimensions

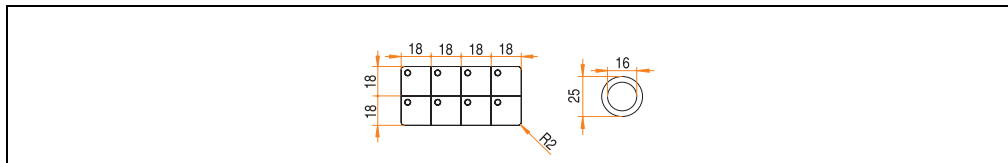


Figure 43: Key dimensions - 5AC.EXT3-01

3.2.6 C key extension 12PB ES left 5AC800.EXT3-02

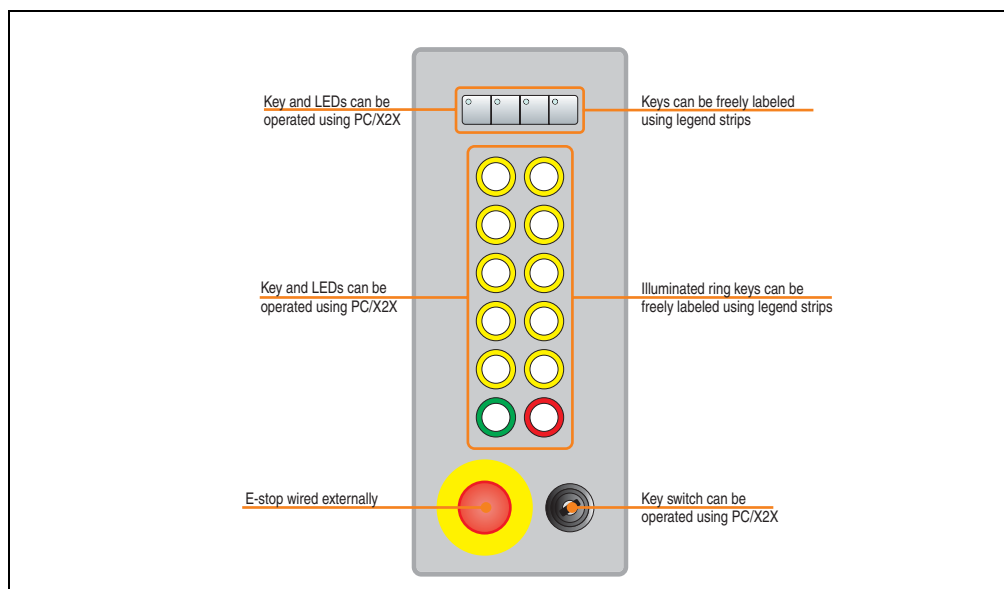


Figure 44: Front view - 5AC800.EXT3-02

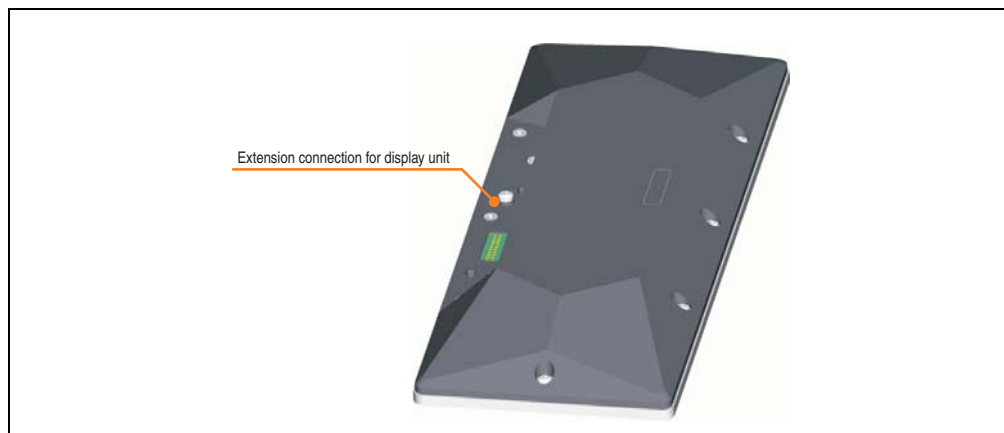


Figure 45: Rear view - 5AC800.EXT3-02

Technical data

Features	5AC800.EXT3-02
Keys/LED ¹⁾ Function keys Operated using Cursor keys Number block Other keys Operated using Key lifespan Key lifespan LED brightness Yellow Green Red	4 with LED (yellow) PC, X2X - - 12 illuminated ring keys (PB - Push Button) PC, X2X 1,000,000 actuations with 3.5 -0.5 to 3.5 +0.7 N operating force > 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 60 mcd Typ. 35 mcd Typ. 54 mcd
E-stop	See also Appendix A, section 1 "E-stop button" on page 157 2 N.C. contacts, left position
Key switch	See also Appendix A, section 2 "Key switch" on page 159 1 N.O. contact, right position
Electrical characteristics	
Power consumption	Max. 8W
Mechanical characteristics	
Front Frame Design Membrane Light background Color legend strips (color gradients)	Aluminum, naturally anodized ²⁾ Gray ²⁾ Polyester Similar to Pantone 427CV ²⁾ Similar to Pantone white to Pantone 429CV ²⁾
Housing Material Gasket Paint	Aluminum (ADC12) Foam perimeter seal Similar to silver metallic ²⁾ (semi-matt)
Outer dimensions Width Height Depth	135 mm 330 mm 34.9 mm
Weight	Approx. 1.1 kg
Connection	Required for installation to the left of an Automation Panel 800 display
Environmental characteristics	
Ambient temperature Operation (0°, -45°, +45°) Storage Transportation	0 .. +50 °C -25 .. +60 °C -25 .. +60 °C
Relative humidity Operation / Storage / Transport	T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing

Table 22: Technical data - 5AC800.EXT3-02

Technical data • Individual components

Environmental characteristics	5AC800.EXT3-02
Vibration Operation (continuous) Operation (occasional) Storage / Transport	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0.5 g (4.9 m/s ² 0-peak) 5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s ² 0-peak) Max. 10 - 57 Hz and 0.075 mm amplitude Max. 58 - 500 Hz and 1 g (9.8 m/s ² 0-peak)
Shock Operation Storage / Transport	Max. 15 g (147 m/s ² 0-peak) and 11 ms continuous Max. 50 g (490 m/s ² 0-peak) and 11 ms continuous
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (from all sides)
Altitude	Max. 3000 m

Table 22: Technical data - 5AC800.EXT3-02

- 1) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (www.br-automation.com) or on the B&R HMI Driver & Utilities DVD (Mod. No. 5SWHMI.0000-00).
- 2) Depending on the process or batch, there may be visual deviations in the color and surface structure.

Dimensions

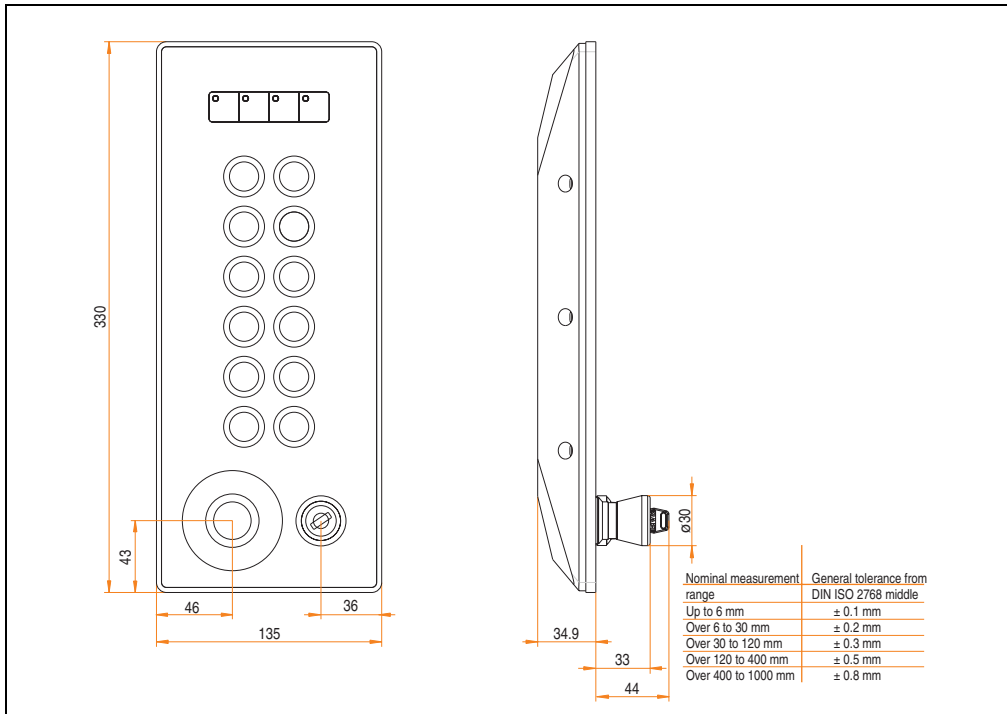


Figure 46: Dimensions - 5AC800.EXT3-02

Key dimensions

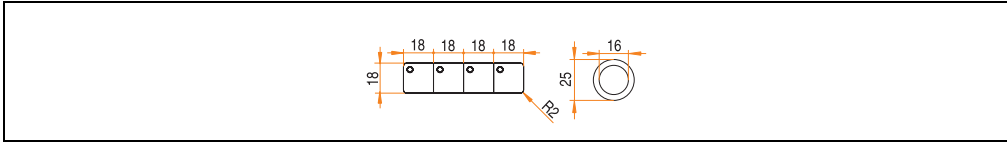


Figure 47: Key dimensions - 5AC800.EXT3-02

3.2.7 C key extension 12PB ES right 5AC800.EXT3-03

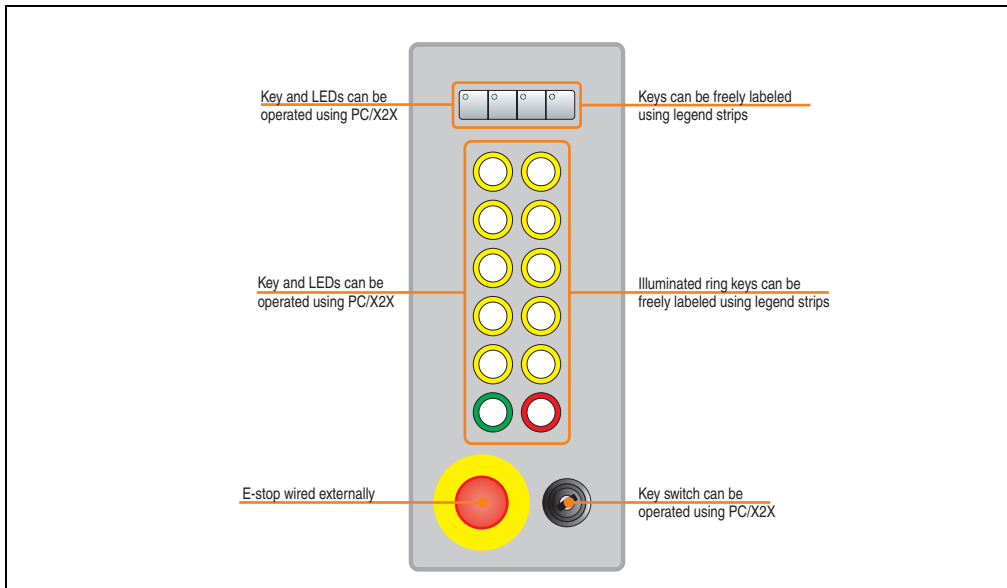


Figure 48: Front view - 5AC800.EXT3-03

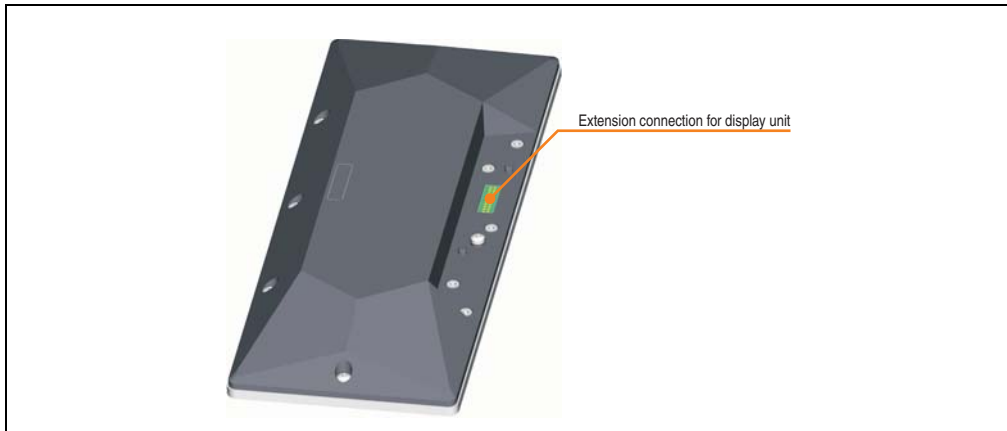


Figure 49: Rear view - 5AC800.EXT3-03

Technical data

Features	5AC800.EXT3-03
Keys/LED ¹⁾	
Function keys	4 with LED (yellow)
Operated using	PC, X2X
Cursor keys	-
Number block	-
Other keys	12 illuminated ring keys (PB - Push Button)
Operated using	PC, X2X
Key lifespan	1,000,000 actuations with 3.5 -0.5 to 3.5 +0.7 N operating force
Key lifespan	> 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	
Yellow	Typ. 60 mcd
Green	Typ. 35 mcd
Red	Typ. 54 mcd
E-stop	See also Appendix A, section 1 "E-stop button" on page 157 2 N.C. contacts, left position
Key switch	See also Appendix A, section 2 "Key switch" on page 159 1 N.O. contact, right position
Electrical characteristics	
Power consumption	Max. 8W
Mechanical characteristics	
Front	
Frame	Aluminum, naturally anodized ²⁾
Design	Gray ²⁾
Membrane	Polyester
Light background	Similar to Pantone 427CV ²⁾
Color legend strips (color gradients)	Similar to Pantone white to Pantone 429CV ²⁾
Housing	
Material	Aluminum (ADC12)
Gasket	Foam perimeter seal
Paint	Similar to silver metallic ²⁾ (semi-matt)
Outer dimensions	
Width	135 mm
Height	330 mm
Depth	34.9 mm
Weight	Approx. 1.1 kg
Connection	Required for installation to the right of an Automation Panel 800 display
Environmental characteristics	
Ambient temperature	
Operation (0°, -45°, +45°)	0 .. +50 °C
Storage	-25 .. +60 °C
Transportation	-25 .. +60 °C
Relative humidity	
Operation / Storage / Transport	T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing

Table 23: Technical data - 5AC800.EXT3-03

Technical data • Individual components

Environmental characteristics	5AC800.EXT3-03
Vibration Operation (continuous) Operation (occasional) Storage / Transport	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0.5 g (4.9 m/s ² 0-peak) 5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s ² 0-peak) Max. 10 - 57 Hz and 0.075 mm amplitude Max. 58 - 500 Hz and 1 g (9.8 m/s ² 0-peak)
Shock Operation Storage / Transport	Max. 15 g (147 m/s ² 0-peak) and 11 ms continuous Max. 50 g (490 m/s ² 0-peak) and 11 ms continuous
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (from all sides)
Altitude	Max. 3000 m

Table 23: Technical data - 5AC800.EXT3-03

- 1) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (www.br-automation.com) or on the B&R HMI Driver & Utilities DVD (Mod. No. 5SWHMI.0000-00).
- 2) Depending on the process or batch, there may be visual deviations in the color and surface structure.

Dimensions

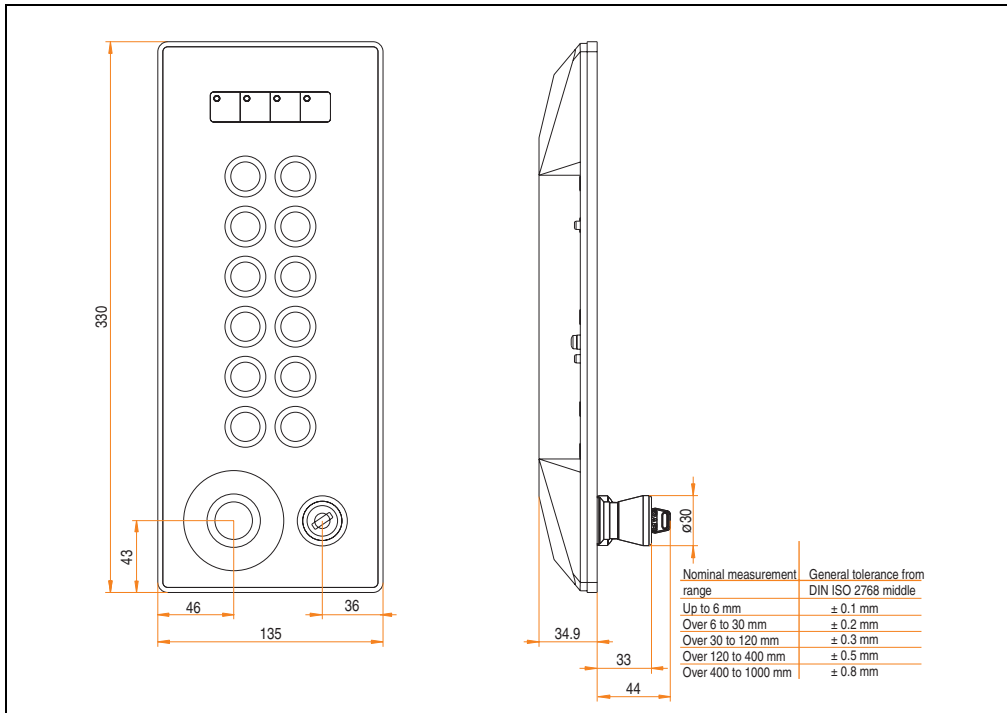


Figure 50: Dimensions - 5AC800.EXT3-03

Key dimensions

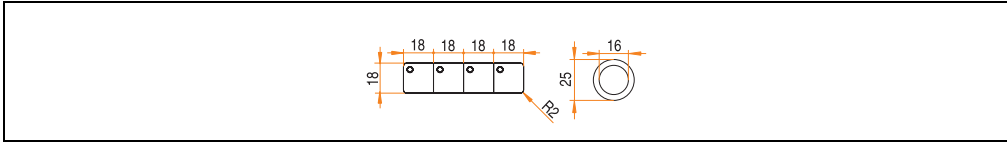


Figure 51: Key dimensions - 5AC800.EXT3-03

3.2.8 C key extension 8PB ES left 5AC800.EXT3-04

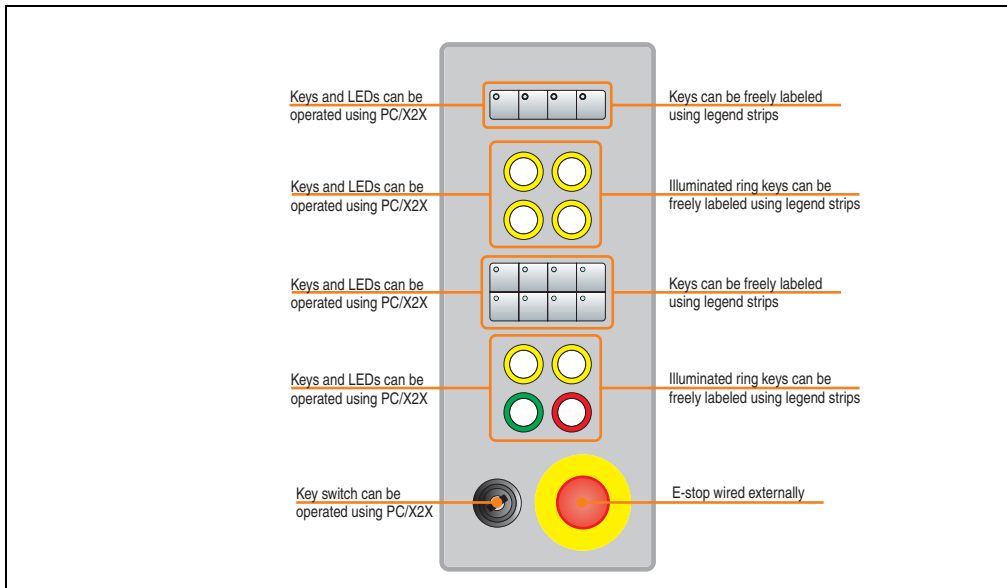


Figure 52: Front view - 5AC800.EXT3-04

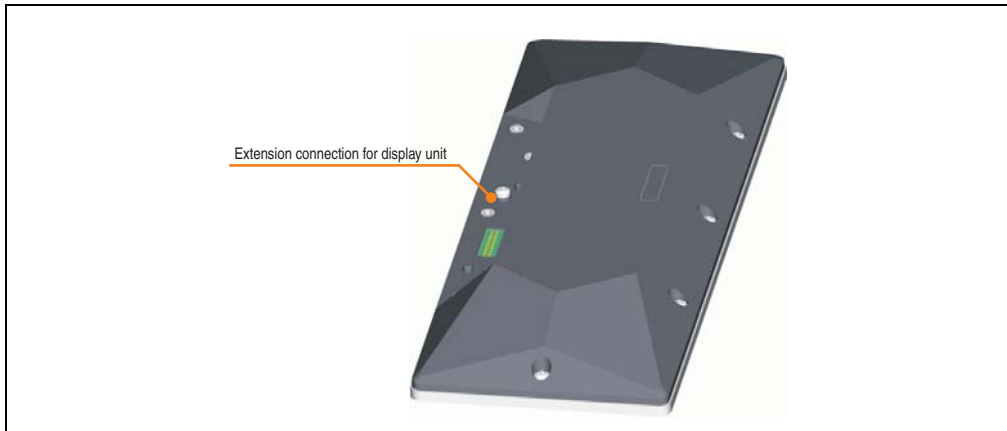


Figure 53: Rear view - 5AC800.EXT3-04

Technical data

Features	5AC800.EXT3-04
Keys/LED ¹⁾	
Function keys	12 with LED (yellow)
Operated using	PC, X2X
Cursor keys	-
Number block	-
Other keys	8 illuminated ring keys (PB - Push Button)
Operated using	PC, X2X
Key lifespan	1000000 actuations with 3.5 -0.5 to 3.5 +0.7 N operating force
Key lifespan	> 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	
Yellow	Typ. 60 mcd
Green	Typ. 35 mcd
Red	Typ. 54 mcd
E-stop	also see Appendix A, section 1 "E-stop button" on page 157 2 N.C. contacts, right position
Key switch	also see Appendix A, section 2 "Key switch" on page 159 1 N.O. contact, left position
Electrical characteristics	
Power consumption	Max. 7W
Mechanical characteristics	
Front	
Frame	Aluminum, naturally anodized ²⁾
Design	Gray ²⁾
Membrane	Polyester
Light background	Similar to Pantone 427CV ²⁾
Color legend strips (color gradients)	Similar to Pantone white to Pantone 429CV ²⁾
Housing	
Material	Aluminum (ADC12)
Gasket	Foam perimeter seal
Paint	Similar to silver metallic ²⁾ (semi-matt)
Outer dimensions	
Width	135 mm
Height	330 mm
Depth	34.9 mm
Weight	Approx. 1.1 kg
Connection	Required for installation to the left of an Automation Panel 800 display
Environmental characteristics	
Ambient temperature	
Operation (0°, -45°, +45°)	0 .. +50 °C
Storage	-25 .. +60 °C
Transportation	-25 .. +60 °C
Relative humidity	
Operation / Storage / Transport	T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing

Table 24: Technical data - 5AC800.EXT3-04

Technical data • Individual components

Environmental characteristics	5AC800.EXT3-04
Vibration Operation (continuous) Operation (occasional) Storage / Transport	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0.5 g (4.9 m/s ² 0-peak) 5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s ² 0-peak) Max. 10 - 57 Hz and 0.075 mm amplitude Max. 58 - 500 Hz and 1 g (9.8 m/s ² 0-peak)
Shock Operation Storage / Transport	Max. 15 g (147 m/s ² 0-peak) and 11 ms continuous Max. 50 g (490 m/s ² 0-peak) and 11 ms continuous
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (from all sides)
Altitude	Max. 3000 m

Table 24: Technical data - 5AC800.EXT3-04

- 1) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (www.br-automation.com) or on the B&R HMI Driver & Utilities DVD (Mod. No. 5SWHMI.0000-00).
- 2) Depending on the process or batch, there may be visual deviations in the color and surface structure.

Dimensions

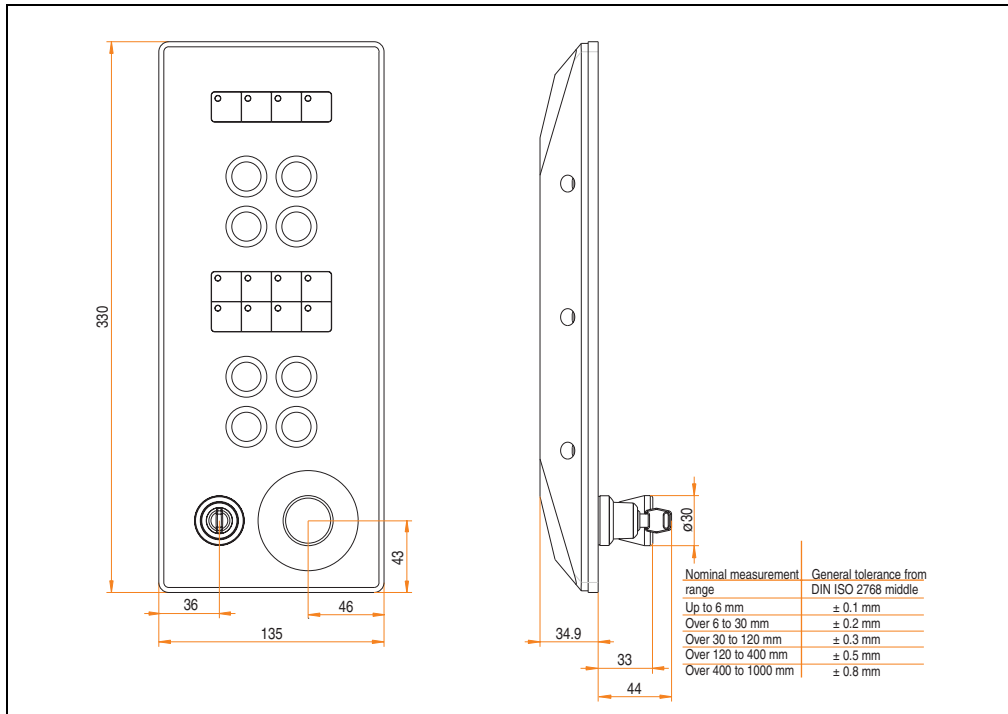


Figure 54: Dimensions - 5AC800.EXT3-04

Key dimensions

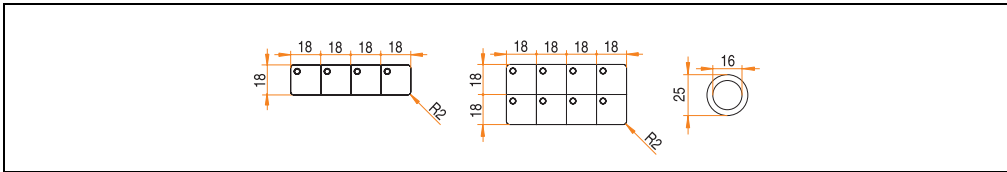


Figure 55: Key dimensions - 5AC800.EXT3-04

3.2.9 C key extension 8PB ES right 5AC800.EXT3-05

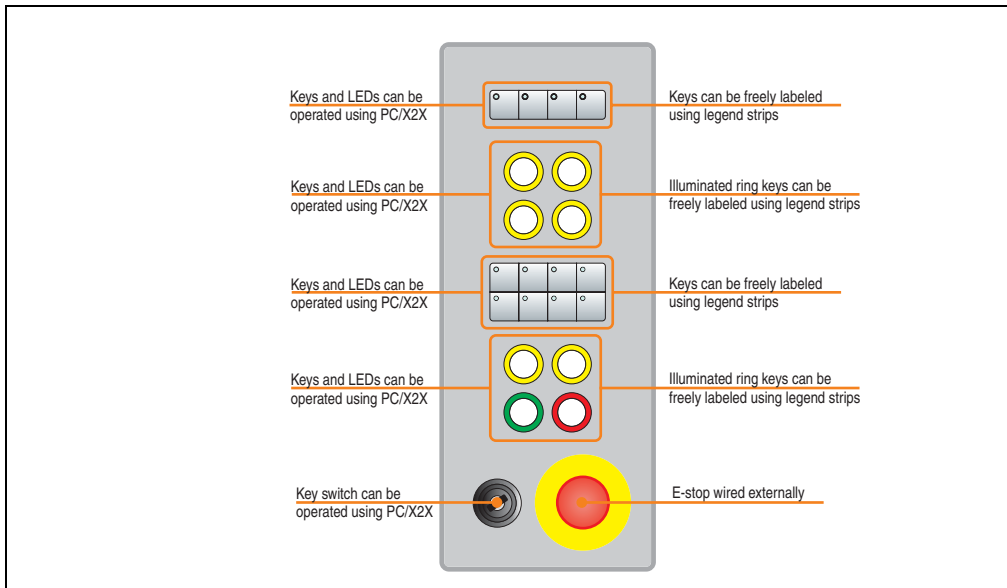


Figure 56: Front view - 5AC800.EXT3-05

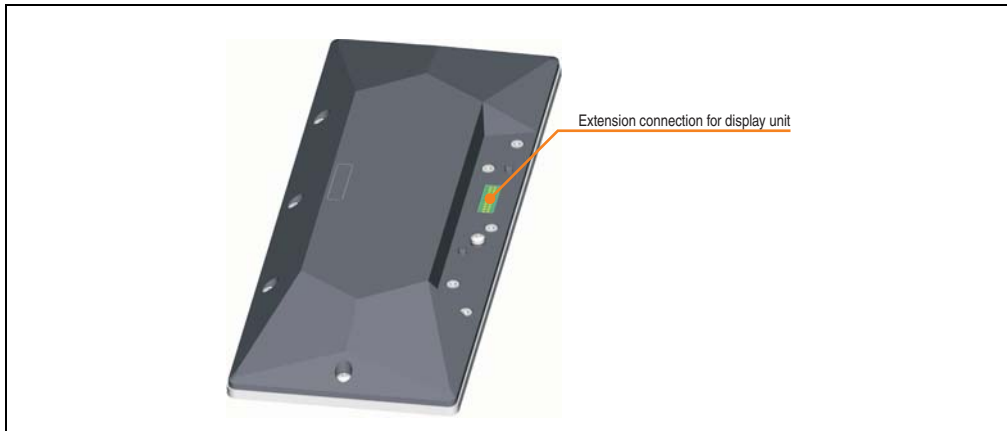


Figure 57: Rear view - 5AC800.EXT3-05

Technical data

Features	5AC800.EXT3-05
Keys/LED ¹⁾	
Function keys	12 with LED (yellow)
Operated using	PC, X2X
Cursor keys	-
Number block	-
Other keys	8 illuminated ring keys (PB - Push Button)
Operated using	PC, X2X
Key lifespan	1000000 actuations with 3.5 -0.5 to 3.5 +0.7 N operating force
Key lifespan	> 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	
Yellow	Typ. 60 mcd
Green	Typ. 35 mcd
Red	Typ. 54 mcd
E-stop	also see Appendix A, section 1 "E-stop button" on page 157 2 N.C. contacts, right position
Key switch	also see Appendix A, section 2 "Key switch" on page 159 1 N.O. contact, left position
Electrical characteristics	
Power consumption	Max. 7W
Mechanical characteristics	
Front	
Frame	Aluminum, naturally anodized ²⁾
Design	Gray ²⁾
Membrane	Polyester
Light background	Similar to Pantone 427CV ²⁾
Color legend strips (color gradients)	Similar to Pantone white to Pantone 429CV ²⁾
Housing	
Material	Aluminum (ADC12)
Gasket	Foam perimeter seal
Paint	Similar to silver metallic ²⁾ (semi-matt)
Outer dimensions	
Width	135 mm
Height	330 mm
Depth	34.9 mm
Weight	Approx. 1.1 kg
Connection	Required for installation to the right of an Automation Panel 800 display
Environmental characteristics	
Ambient temperature	
Operation (0°, -45°, +45°)	0 .. +50 °C
Storage	-25 .. +60 °C
Transportation	-25 .. +60 °C
Relative humidity	
Operation / Storage / Transport	T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing

Table 25: Technical data - 5AC800.EXT3-05

Technical data • Individual components

Environmental characteristics	5AC800.EXT3-05
Vibration Operation (continuous) Operation (occasional) Storage / Transport	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0.5 g (4.9 m/s ² 0-peak) 5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s ² 0-peak) Max. 10 - 57 Hz and 0.075 mm amplitude Max. 58 - 500 Hz and 1 g (9.8 m/s ² 0-peak)
Shock Operation Storage / Transport	Max. 15 g (147 m/s ² 0-peak) and 11 ms continuous Max. 50 g (490 m/s ² 0-peak) and 11 ms continuous
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (from all sides)
Altitude	Max. 3000 m

Table 25: Technical data - 5AC800.EXT3-05

- 1) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (www.br-automation.com) or on the B&R HMI Driver & Utilities DVD (Mod. No. 5SWHMI.0000-00).
- 2) Depending on the process or batch, there may be visual deviations in the color and surface structure.

Dimensions

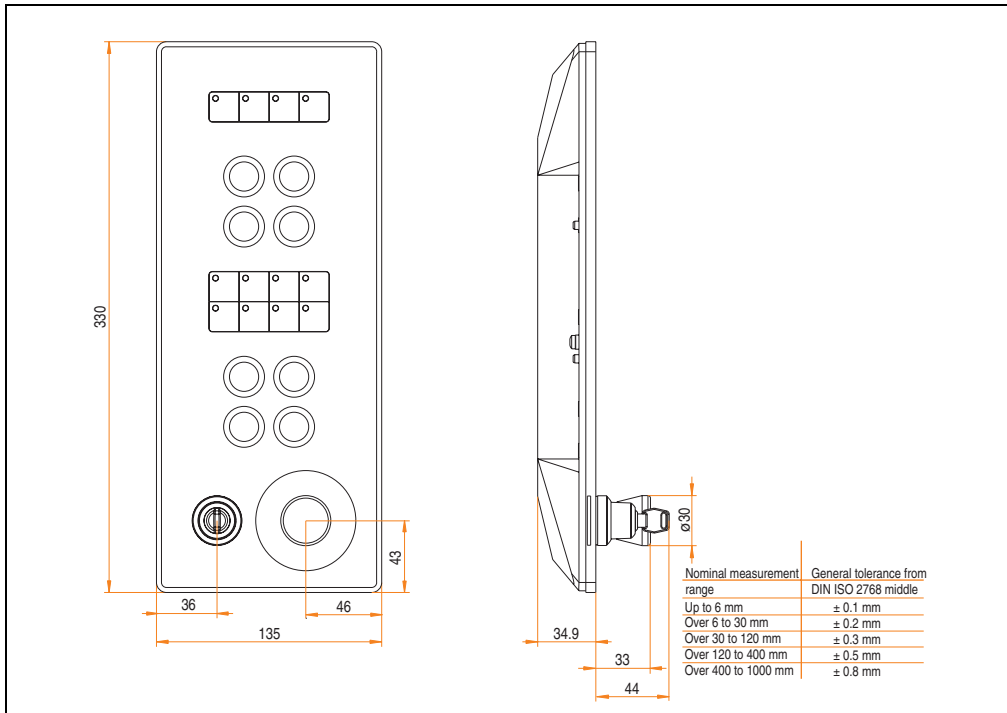


Figure 58: Dimensions - 5AC800.EXT3-05

Key dimensions

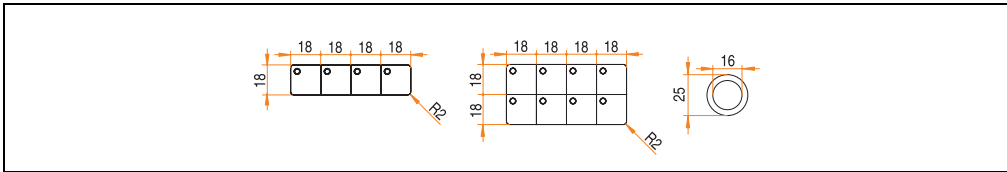


Figure 59: Key dimensions - EXT3-05

3.3 Extension connector / flange

3.3.1 Extension cover 5AC800.COV1-00

The cover must be mounted on each extension unit connection slot that is not being used on the AP800 display.

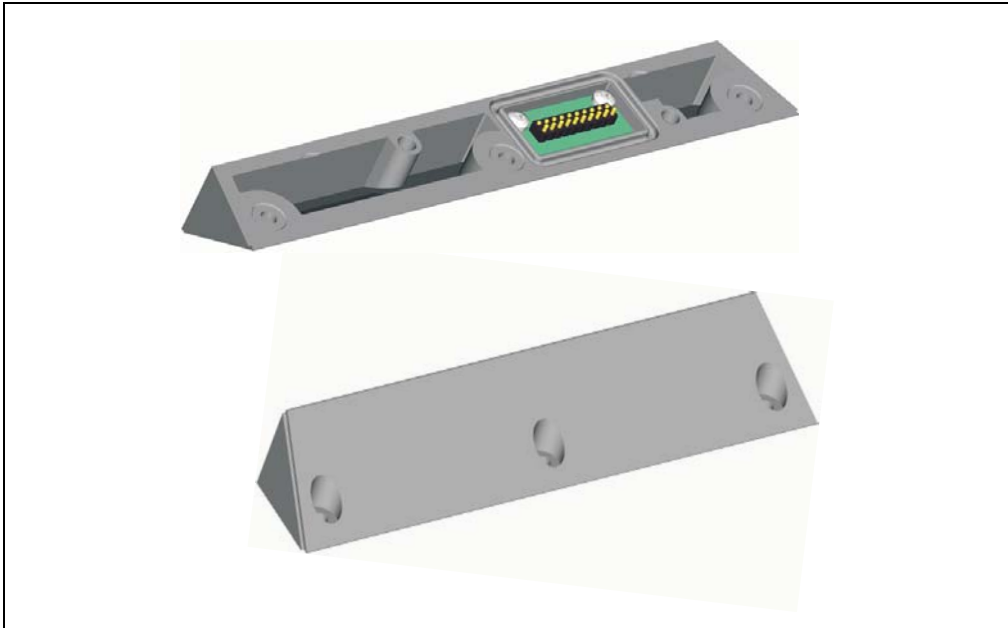


Figure 60: Extension cover 5AC800.COV1-00

Technical data

Features	5AC800.COV1-00
Housing	
Material	Aluminum (ADC12)
Gasket	Foam perimeter seal
Paint	Similar to silver metallic ¹⁾ (semi-matt)
Weight	Approx. 0.1 kg

Table 26: Technical data - 5AC800.COV1-00

1) Depending on the process or batch, there may be visual deviations in the color and surface structure.

Dimensions

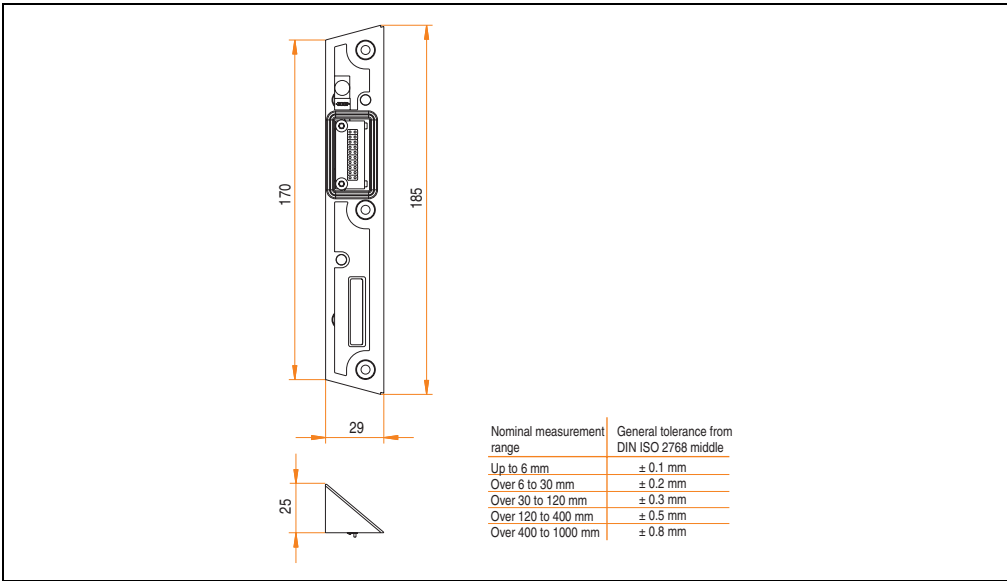


Figure 61: Dimensions - extension cover 5AC800.COV1-00

3.3.2 USB extension cover 5AC800.COV2-00

The cover must be mounted on each extension unit connection slot that is not being used on the AP800 display. With this design, a USB flash drive can be connected to the AP800 display.

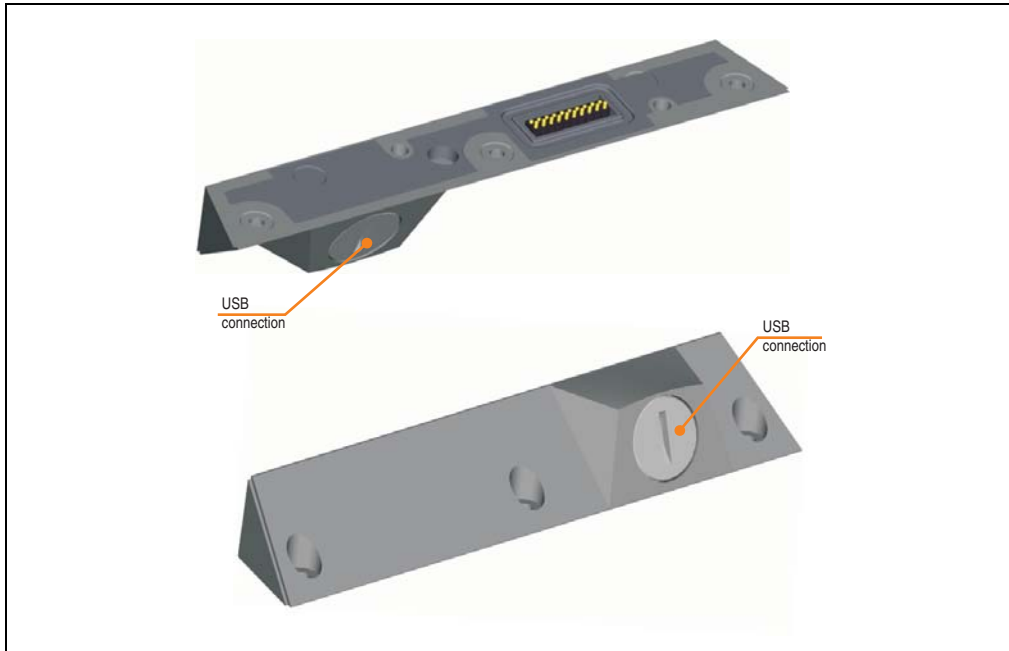


Figure 62: USB extension cover 5AC800.COV2-00

Technical data

Features	5AC800.COV2-00
Housing	
Material	Aluminum (ADC12)
Gasket	Foam perimeter seal
Paint	Similar to silver metallic ¹⁾ (semi-matt)
Weight	Approx. 0.1 kg

Table 27: Technical data - 5AC800.COV2-00

1) Depending on the process or batch, there may be visual deviations in the color and surface structure.

Dimensions

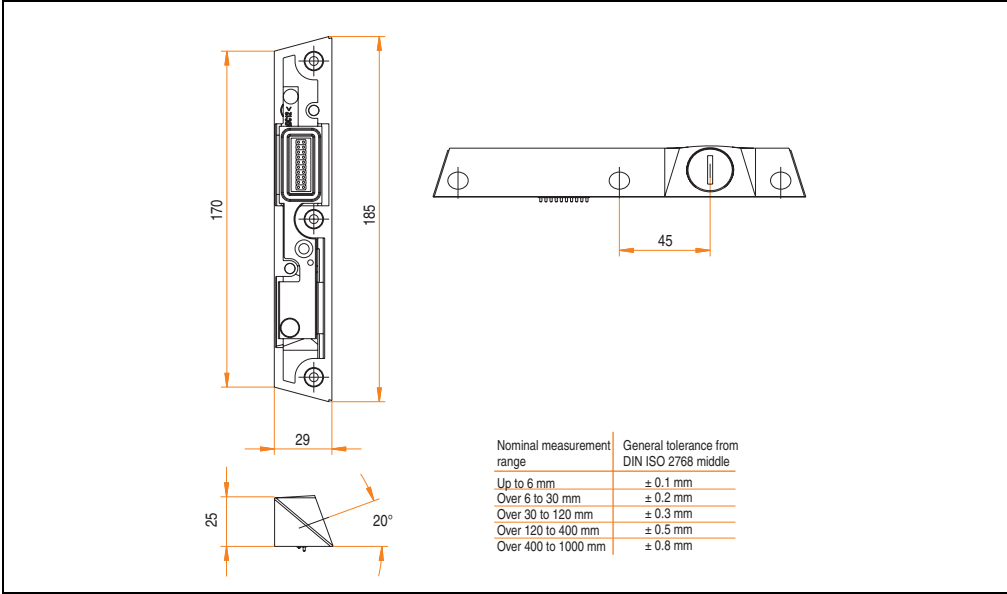


Figure 63: Dimensions - USB extension cover 5AC800.COV2-00

3.3.3 Extension connector 5AC800.CON1-00

This extension connector is required to connect AP800 displays and extension units. Straight design.

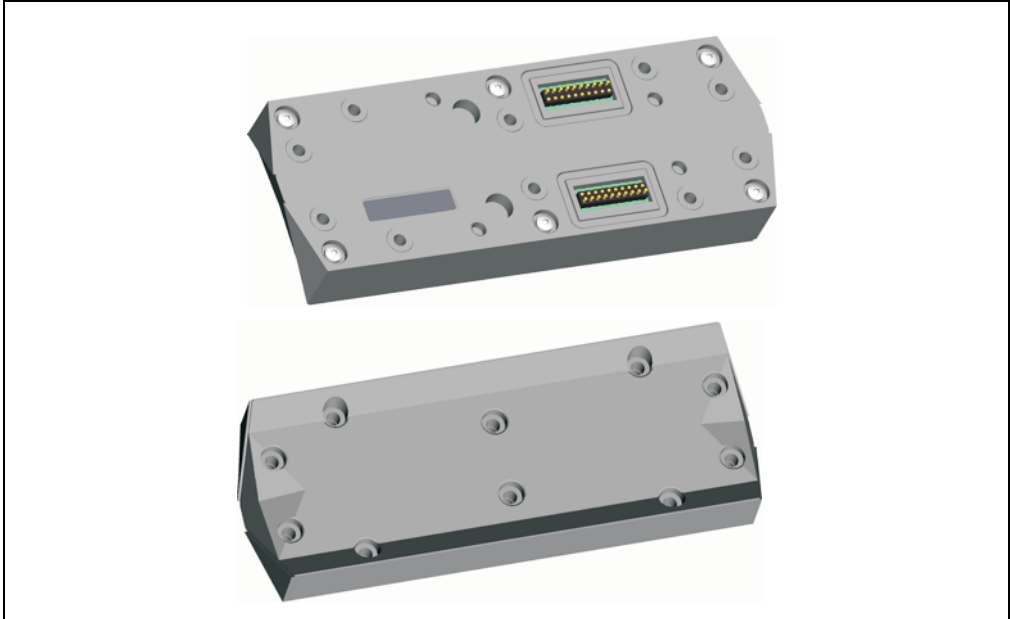


Figure 64: Extension connector 5AC800.CON1-00

Technical data

Features	5AC800.CON1-00
Housing	
Material	Aluminum (ADC12)
Gasket	Foam perimeter seal
Paint	Similar to silver metallic ¹⁾ (semi-matt)
Weight	Approx. 0.3 kg

Table 28: Technical data - 5AC800.CON1-00

1) Depending on the process or batch, there may be visual deviations in the color and surface structure.

Dimensions

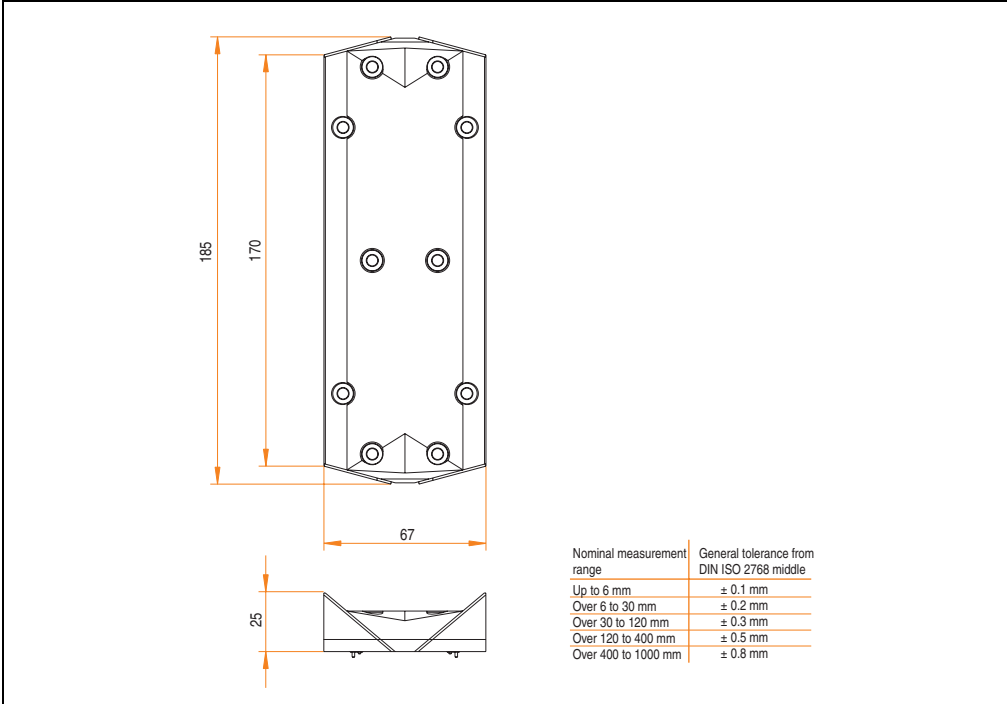


Figure 65: Dimensions - extension connector 5AC800.CON1-00

3.3.4 Extension connector (60°) 5AC800.CON2-00

This connector is required to connect AP800 displays and extension units at a 60° angle.



Figure 66: Extension connector (60°) 5AC800.CON2-00

Technical data

Features	5AC800.CON2-00
Housing	Aluminum (ADC12)
Material	Foam perimeter seal
Gasket	Similar to silver metallic ¹⁾ (semi-matt)
Paint	
Weight	Approx. 0.5 kg

Table 29: Technical data - 5AC800.CON2-00

1) Depending on the process or batch, there may be visual deviations in the color and surface structure.

Dimensions

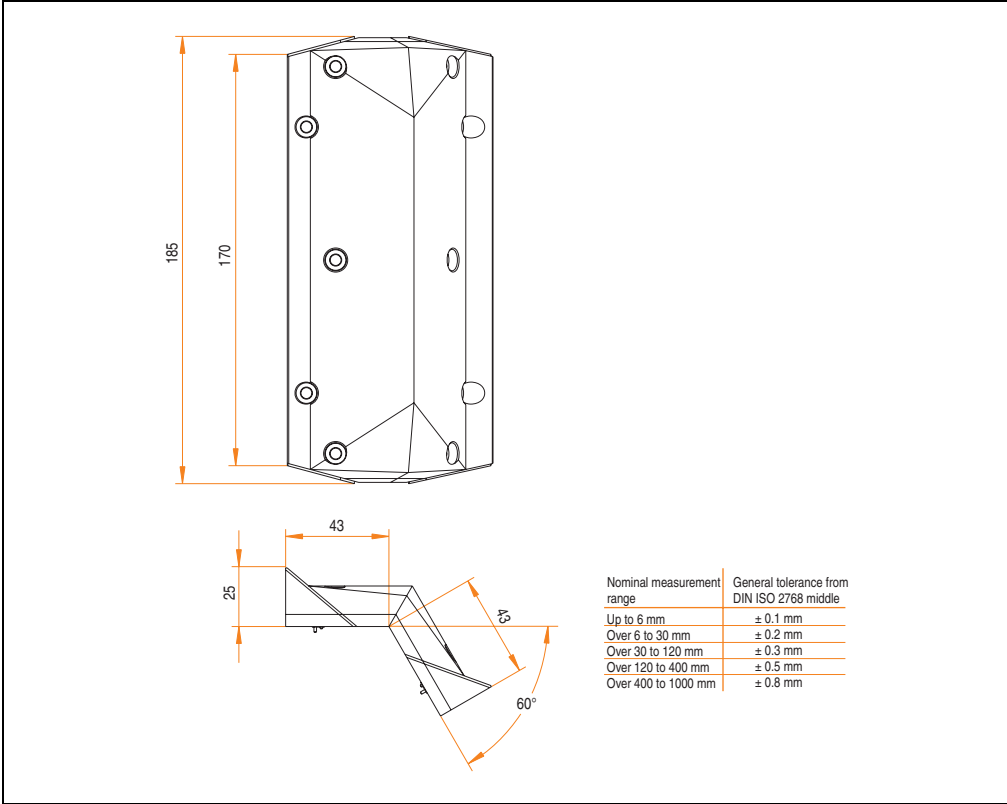


Figure 67: Dimensions - extension connector 60° 5AC800.CON2-00

3.3.5 Extension flange 5AC800.FLG1-00



Figure 68: Extension flange 5AC800.FLG1-00

Technical data

Features	5AC800.FLG1-00
Housing	
Material	Aluminum (ADC12)
Gasket	Foam perimeter seal
Paint	Similar to silver metallic ¹⁾ (semi-matt)
Weight	Approx. 0.6 kg

Table 30: Technical data - 5AC800.FLG1-00

1) Depending on the process or batch, there may be visual deviations in the color and surface structure.

Dimensions

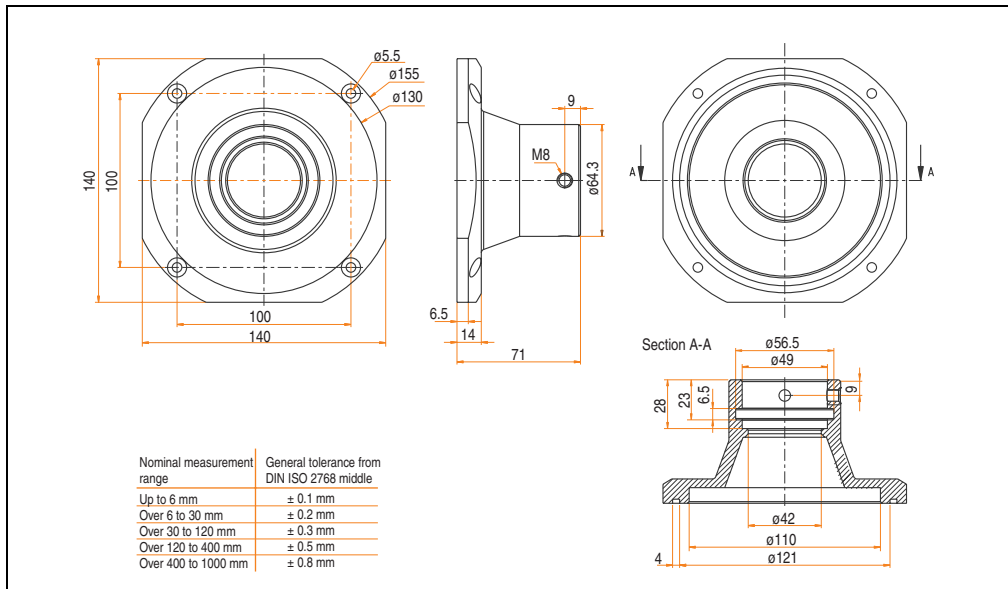


Figure 69: Dimensions - extension flange 5AC800.FLG1-00

3.4 Cables

3.4.1 Overview

Model number	Short description	Note
5CASDL.0018-20	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 1.8 meters.	
5CASDL.0050-20	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 5 meters.	
5CASDL.0100-20	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 10 meters.	
5CASDL.0150-20	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 15 meters.	
5CASDL.0200-20	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 20 meters.	
5CASDL.0250-20	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 25 meters.	
5CASDL.0300-30	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 30 meters with extender.	
5CASDL.0400-30	SDL cable for Automation Panel 800; Rev. < A5 / Rev. ≥ A5; length 40 meters with extender.	
5CAPWR.0018-20	Voltage supply cable for Automation Panel 800; length 1.8 meters.	
5CAPWR.0050-20	Voltage supply cable for Automation Panel 800; length 5 meters.	
5CAPWR.0100-20	Voltage supply cable for Automation Panel 800; length 10 meters.	
5CAPWR.0150-20	Voltage supply cable for Automation Panel 800; length 15 meters.	
5CAPWR.0200-20	Voltage supply cable for Automation Panel 800; length 20 meters.	
5CAPWR.0250-20	Voltage supply cable for Automation Panel 800; length 25 meters.	
5CAPWR.0300-20	Voltage supply cable for Automation Panel 800; length 30 meters.	
5CAPWR.0400-20	Voltage supply cable for Automation Panel 800; length 40 meters.	
5CAX2X.0018-00	X2X cable for Automation Panel 800; length 1.8 meters.	
5CAX2X.0050-00	X2X cable for Automation Panel 800; length 5 meters.	
5CAX2X.0100-00	X2X cable for Automation Panel 800; length 10 meters.	
5CAX2X.0150-00	X2X cable for Automation Panel 800; length 15 meters.	
5CAX2X.0200-00	X2X cable for Automation Panel 800; length 20 meters.	
5CAX2X.0250-00	X2X cable for Automation Panel 800; length 25 meters.	
5CAX2X.0300-00	X2X cable for Automation Panel 800; length 30 meters.	
5CAX2X.0400-00	X2X cable for Automation Panel 800; length 40 meters.	

Table 31: Model numbers - cables

3.4.2 SDL cable 5CASDL.0xxx-20 Rev. < A5

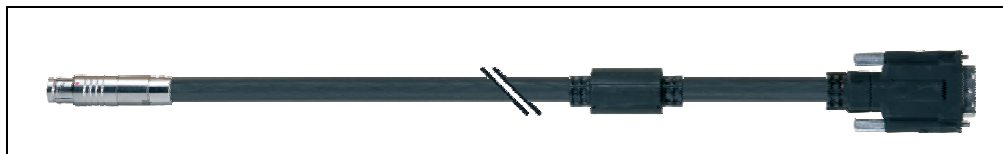


Figure 70: SDL cable 5CASDL.0xxx-20 Rev. < A5

Caution!

SDL cables can only be plugged in and unplugged when the device is turned off.

Technical data

Features	5CASDL.0018-20	5CASDL.0050-20	5CASDL.0100-20	5CASDL.0150-20	5CASDL.0200-20	5CASDL.0250-20
Length	1.8 m ± 50 mm	5 m ± 200 mm	10 m ± 100 mm	15 m ± 120 mm	20 m ± 150 mm	25 m ± 200 mm
Outer diameter	Max. 9 mm		Max. 11.5 mm			
Shielding	Individual cable pairs and entire cable					
Connector type	ODU Minisnap 24-pin, DVI-D (24+1), male					
Wire cross section	AWG 28		AWG 24			
Line resistance	Max. 237 Ω/km		Max. 93 Ω/km			
Insulation resistance	Min. 10 MΩ/km					
Flexibility	Flexible (not for use in drag chain installations)					
Flex radius	Min. 172 mm		Min. 220 mm			
Plug connection cycles	100					
Weight	Approx. 300 g	Approx. 590 g	Approx. 2100 g	Approx. 3000 g	Approx. 4100 g	Approx. 5100 g

Table 32: Technical data - SDL cable 5CASDL.0xxx-20 Rev. < A5

Plug dimensions (ODU Minisnap).

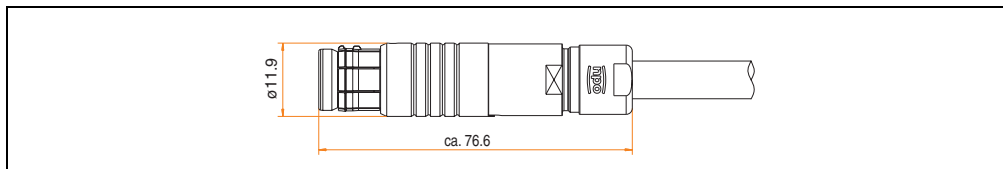


Figure 71: Plug dimensions (ODU Minisnap) - SDL cable 5CASDL.0xxx-20 Rev. < A5

Cable specifications

The following figure shows the cable assignments for the SDL cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

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

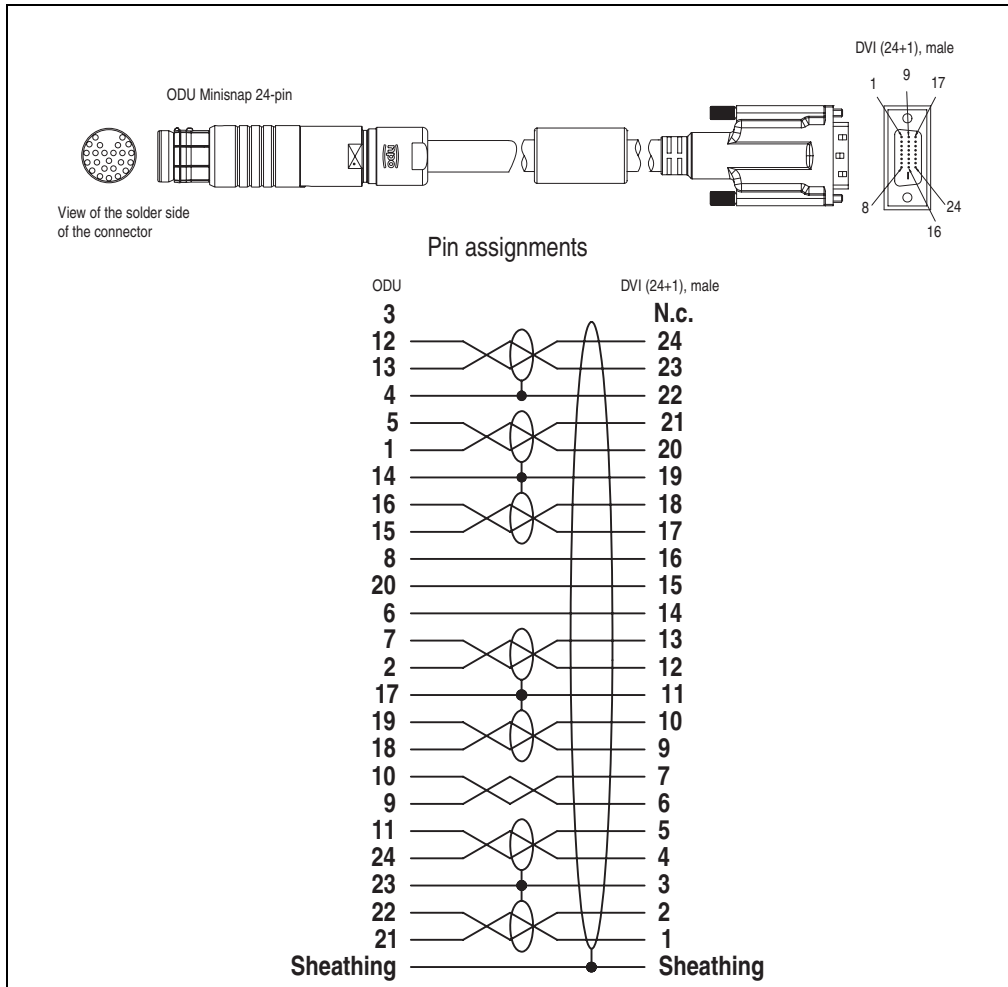


Figure 72: Pin assignments - SDL cable 5CASDL.0xxx-20 Rev. < A5

3.4.3 SDL cable with extender 5CASDL.0xxx-30 Rev. < A5



Figure 73: SDL cable with extender 5CASDL.0xxx-30 Rev. < A5

Caution!

SDL cables with extender can only be plugged in and unplugged when the device is turned off.

Technical data

Features	5CASDL.0300-30	5CASDL.0400-30
Length	30 m ± 280 mm	40 m ± 380 mm
Dimensions of extender box	Height 20 mm, width 34 mm, length 125 mm	
Outer diameter	Max. 11.5 mm	
Shielding	Individual cable pairs and entire cable	
Connector type	ODU Minisnap 24-pin, DVI-D (24+1), male	
Wire cross section	AWG 24	
Line resistance	Max. 93 Ω/km	
Insulation resistance	Min. 10 MΩ/km	
Flexibility	Flexible (not for use in drag chain installations)	
Flex radius	Min. 220 mm	
Plug connection cycles	100	
Weight	Approx. 6250 g	Approx. 8250 g

Table 33: Technical data - SDL cable with extender 5CASDL.0xxx-30 Rev. < A5

Plug dimensions (ODU Minisnap)

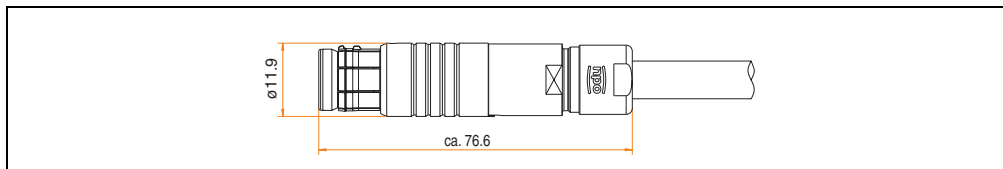


Figure 74: Plug dimensions (ODU Minisnap) - SDL cable 5CASDL.0xxx-30 Rev. < A5

Cable specifications

The following figure shows the cable assignments for the SDL cable with extender available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

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

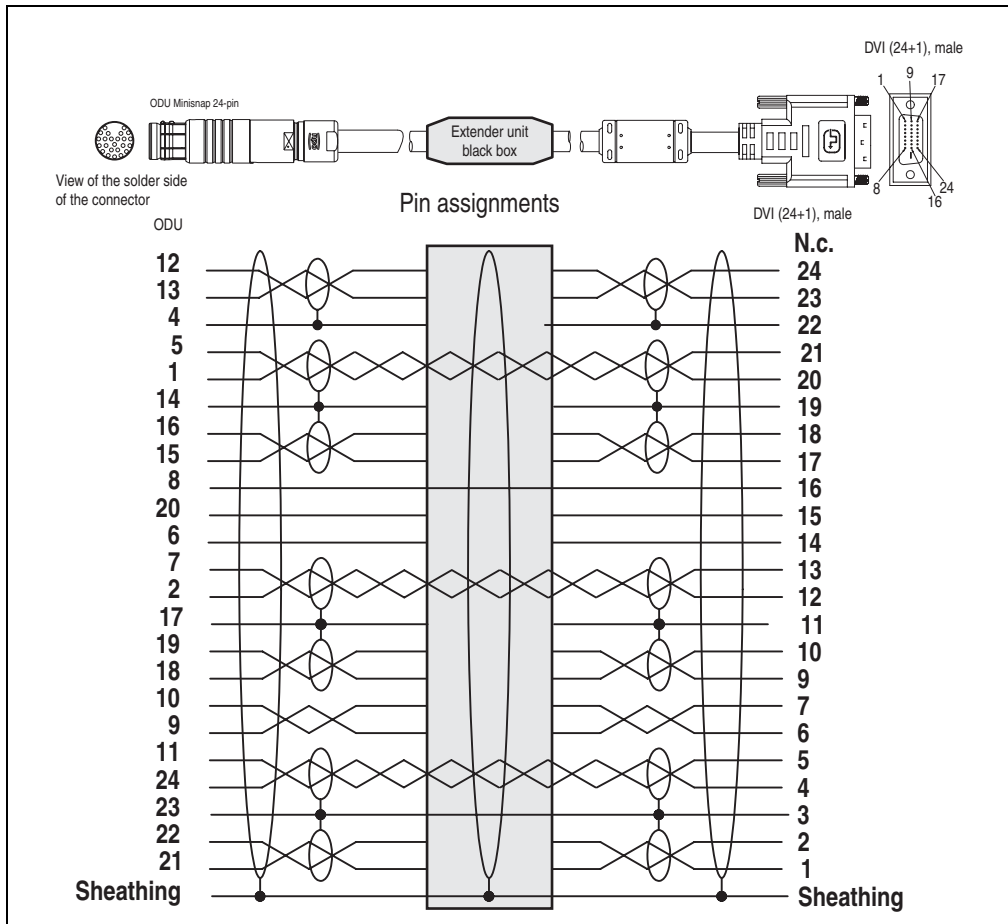


Figure 75: Pin assignments - SDL cable with extender 5CASDL.0xxx-30 Rev. < A5

3.4.4 SDL cable 5CASDL.0xxx-20 Rev. ≥ A5

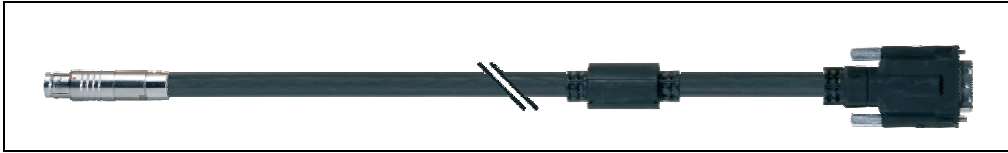


Figure 76: SDL cable 5CASDL.0xxx-20 Rev. ≥ A5

Caution!

SDL cables can only be plugged in and unplugged when the device is turned off.

Technical data

Features	5CASDL.0018-20	5CASDL.0050-20	5CASDL.0100-20	5CASDL.0150-20	5CASDL.0200-20	5CASDL.0250-20
Length	1.8 m ± 50 mm	5 m ± 200 mm	10 m ± 100 mm	15 m ± 120 mm	20 m ± 150 mm	25 m ± 200 mm
Outer diameter	Max. 9 mm		Max. 11.5 mm			
Shielding	Individual cable pairs and entire cable					
Connector type	ODU Minisnap 24-pin, DVI-D (24+1), male					
Wire cross section	AWG 28		AWG 24			
Line resistance	Max. 237 Ω/km		Max. 93 Ω/km			
Insulation resistance	Min. 10 MΩ/km					
Flexibility	Semi-flexible, occasional movement (limited use in cable drag chains)					
Flex radius Single Moving	≥ 10 x cable diameter ≥ 15 x cable diameter					
Max. tension During installation During operation	≤400 N ≤50 N					
Plug connection cycles	100					
Weight	Approx. 300 g	Approx. 590 g	Approx. 2100 g	Approx. 3000 g	Approx. 4100 g	Approx. 5100 g

Table 34: Technical data - SDL cable 5CASDL.0xxx-20 Rev. ≥ A5

Plug dimensions (ODU Minisnap)

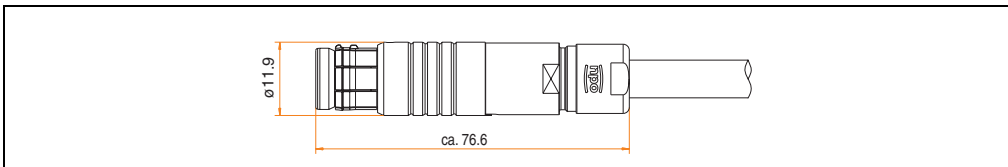


Figure 77: Plug dimensions (ODU Minisnap) - SDL cable 5CASDL.0xxx-20 Rev. ≥ A5

Cable specifications

The following figure shows the cable assignments for the SDL cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

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

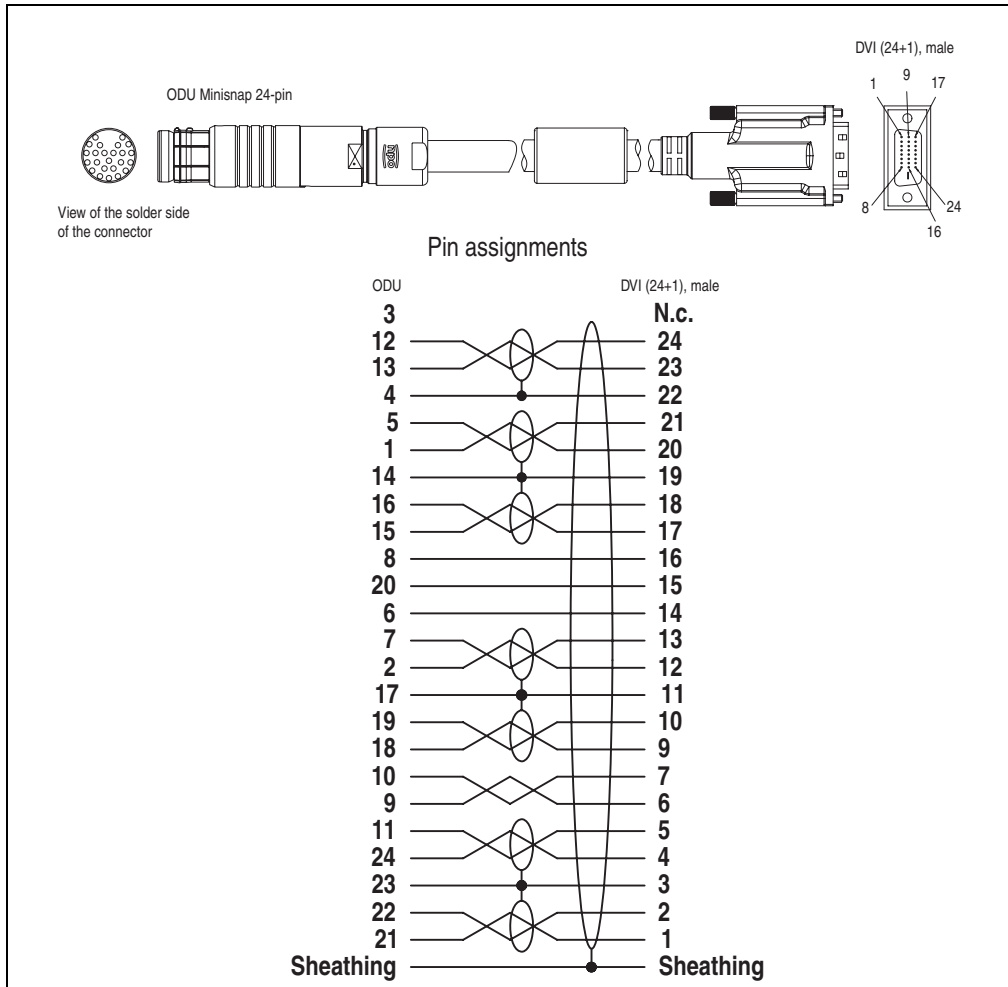


Figure 78: Pin assignments - SDL cable 5CASDL.0xxx-20 Rev. ≥ A5

3.4.5 SDL cable with extender 5CASDL.0xxx-30 Rev. $\geq$ A5



Figure 79: SDL cable with extender 5CASDL.0xxx-30 Rev. $\geq$ A5

Caution!

SDL cables with extender can only be plugged in and unplugged when the device is turned off.

Technical data

Features	5CASDL.0300-30	5CADSDL.0400-30
Length	30 m $\pm$ 280 mm	40 m $\pm$ 380 mm
Dimensions of extender box	Height 20 mm, width 34 mm, length 125 mm	
Outer diameter	Max. 11.5 mm	
Shielding	Individual cable pairs and entire cable	
Connector type	ODU Minisnap 24-pin, DVI-D (24+1), male	
Wire cross section	AWG 24	
Line resistance	Max. 93 Ω /km	
Insulation resistance	Min. 10 M Ω /km	
Flexibility	Semi-flexible, occasional movement (limited use in cable drag chains)	
Flex radius Single Moving	$\geq 10 \times$ cable diameter $\geq 15 \times$ cable diameter	
Max. tension During installation During operation	≤ 400 N ≤ 50 N	
Plug connection cycles	100	
Weight	Approx. 6250 g	Approx. 8250 g

Table 35: Technical data - SDL cable with extender 5CASDL.0xxx-30 Rev. $\geq$ A5

Plug dimensions (ODU Minisnap)

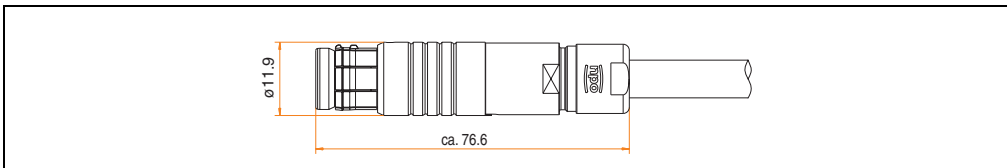


Figure 80: Plug dimensions (ODU Minisnap) - SDL cable 5CASDL.0xxx-30 Rev. $\geq$ A5

Cable specifications

The following figure shows the cable assignments for the SDL cable with extender available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

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

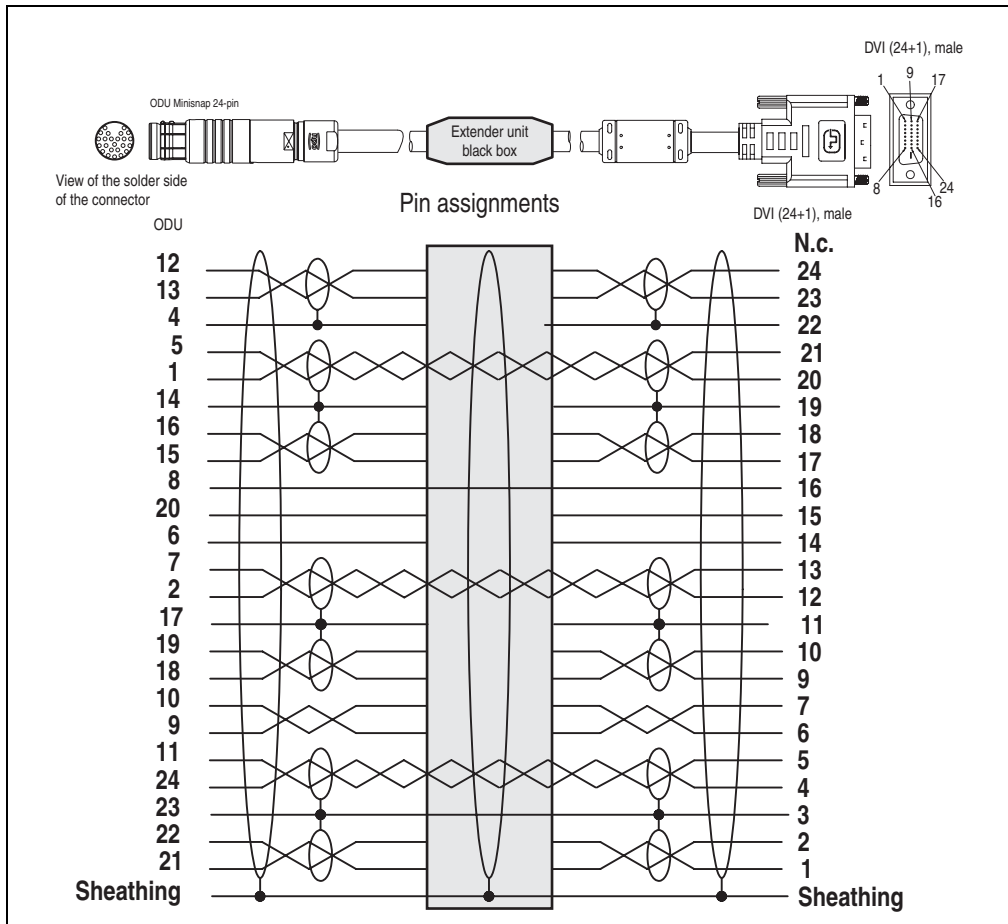


Figure 81: Pin assignments - SDL cable with extender 5CASDL.0xxx-30 Rev. ≥ A5

3.4.6 Voltage supply cable 5CAPWR.0xxx-20

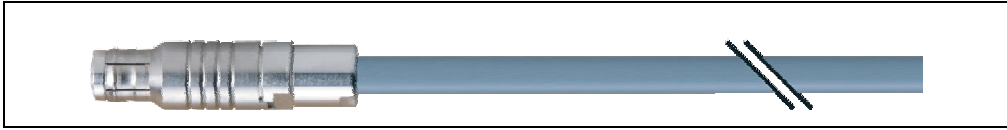


Figure 82: Voltage supply cable 5CAPWR.0xxx-20

Technical data

Features	5CAPWR.00 18-20	5CAPWR.00 50-20	5CAPWR.01 00-20	5CAPWR.01 50-20	5CAPWR.02 00-20	5CAPWR.02 50-20	5CAPWR.03 00-20	5CAPWR.04 00-20
Length	1.8 m ± TBD mm	5 m ± 45 mm	10 m ± TBD mm	15 m ± TBD mm	20 m ± TBD mm	25 m ± TBD mm	30 m ± TBD mm	40 m ± TBD mm
Connector type	ODU Minisnap 3-pin							
Weight kg/km	80.0							
Cable diameter	6.6 mm							
Flexibility	Flexible (not for use in drag chain installations)							
Flex radius	15x AD (outer diameter)							
Materials Cable shielding Color	Aluminum foil clad + tinned copper mesh Gray (similar to RAL 7001)							
Wire cross section	1.00 mm ² / AWG 17							
Line resistance	Max. 19.5 Ω/km							
Insulation resistance	Min. 200 MΩ/km at +20°C							
Test voltage	2000 V							
Operating voltage	Max. 500 V							
Current load	16.0 A at +25°C							

Table 36: Technical data - voltage supply cable 5CAPWR.0xxx-20

Plug dimensions (ODU Minisnap)

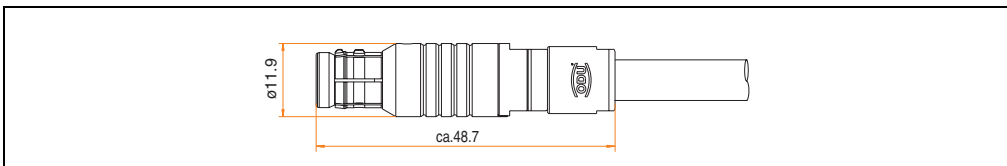


Figure 83: Plug dimensions (ODU Minisnap) - voltage supply cable 5CAPWR.0xxx-20

Cable specifications

The following figure shows the cable assignments for the voltage supply cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications. The maximum length is also 40 m for self-built cables.

Warning!

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

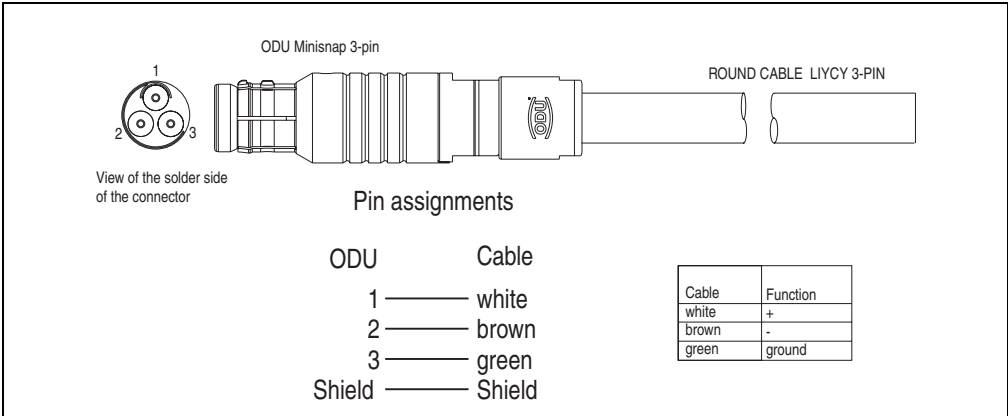


Figure 84: Pin assignments - voltage supply cable 5CAPWR.0xxx-20

3.4.7 X2X cable 5CAX2X.0xxx-00

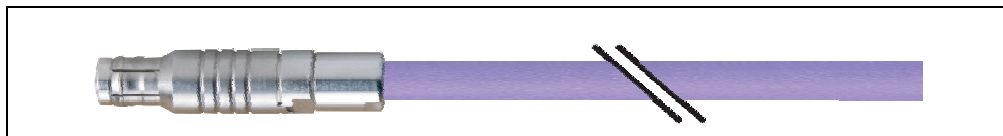


Figure 85: X2X cable 5CAX2X.0xxx-00

Technical data

Features	5CAX2X.00 18-00	5CAX2X.00 50-00	5CAX2X.01 00-00	5CAX2X.01 50-00	5CAX2X.02 00-00	5CAX2X.02 50-00	5CAX2X.03 00-00	5CAX2X.04 00-00
Length	1.8 m ± 20mm	5 m ± 45mm	10 m ± 90mm	15 m ± 135mm	20 m ± 180mm	25 m ± 230mm	30 m ± 280mm	40 m ± 380mm
Connector type	ODU Minisnap 10-pin							
Weight kg/km	60 kg/km							
Cable diameter	6.8 mm							
Flexibility	Semi-flexible							
Flex radius Single Moving	10xAD (outer diameter) 15xAD (outer diameter)							
Materials Cable shielding Color	Aluminum foil clad + tinned copper mesh Violet (similar to RAL 4001)							
Wire cross section Device Net data pair 6 wires	AWG 24 AWG 28							
Line resistance AWG 24 AWG 28	Max. 89 Ω/km Max. 220 Ω/km							
Insulation resistance	Min. 200MΩ/km							
Test voltage	1000 V							
Operating voltage	Max. 30V							
Current load	TBD A							

Table 37: Technical data - X2X cable 5CAX2X.0xxx-00

Plug dimensions (ODU Minisnap).

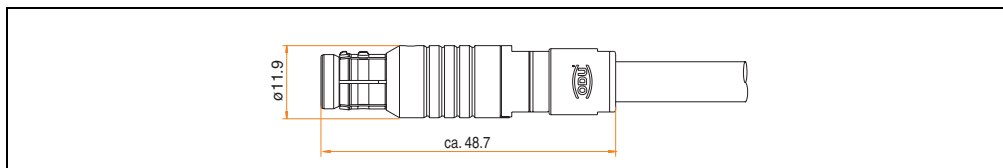


Figure 86: Plug dimensions (ODU Minisnap) - X2X cable 5CAX2X.0xxx-00

Cable specifications

The following figure shows the cable assignments for the X2X cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

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

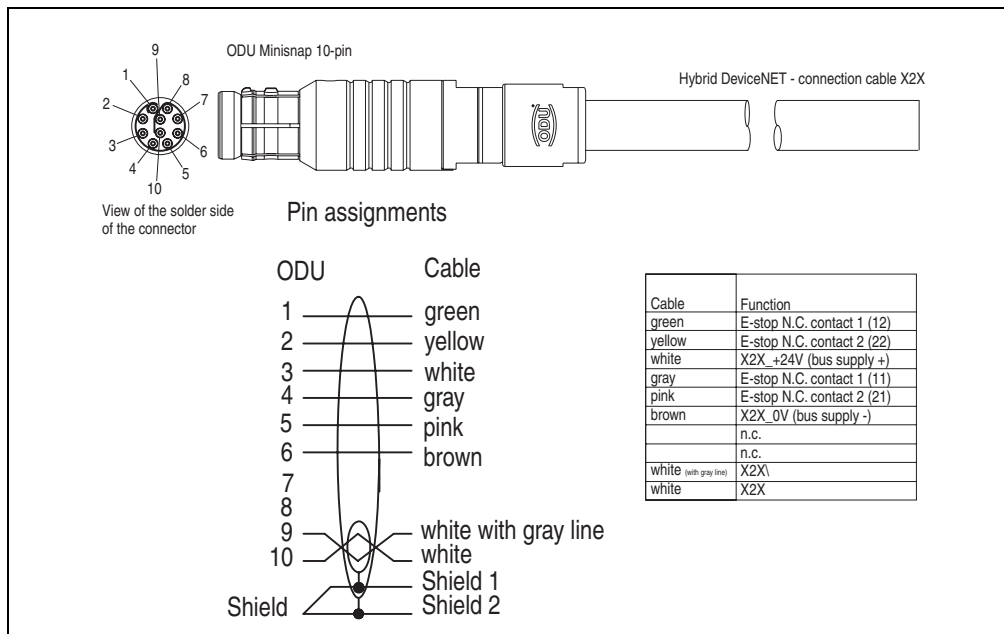


Figure 87: Pin assignments - X2X cable 5CAX2X.0xxx-00

Chapter 3 • Commissioning

1. X2X wiring diagram

The X2X Link bus connection uses an RS485 half-duplex point-to-point connection; transfer is unidirectional. X2X topology uses a point-to-point connection. A series connection is made to each extension unit connection slot from the X2X/E-stop cable connector on the main unit. The link has a specified direction for transferring data. The transfer rate is 12 Mbaud.

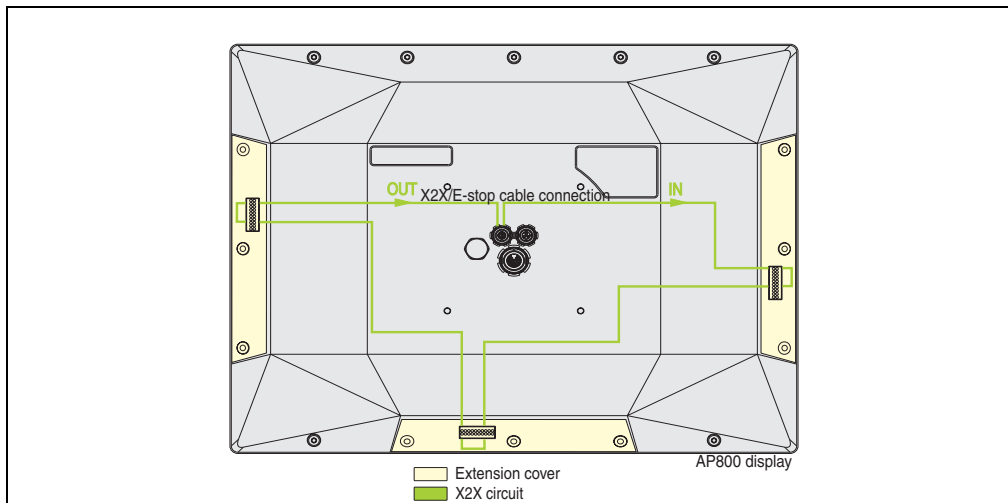


Figure 88: X2X circuit - rear view

The AP800 is always at the end of the bus connection, i.e.: The bus connection cannot be forwarded to any other X2X nodes after the AP800.

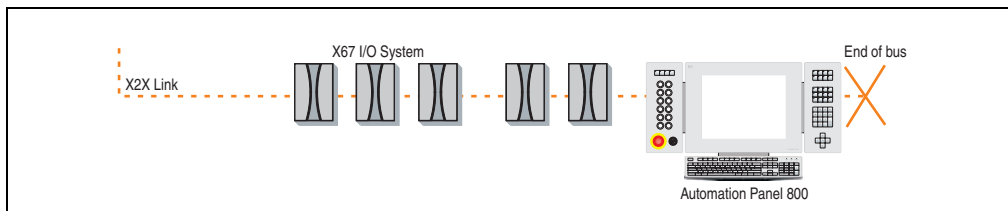


Figure 89: X2X Link topology

2. X2X functionality if the PC crashes

The Automation Panel 800 device is connected to the PC using an SDL connection. The supply and the X2X Link bus connection are both connected to the AP800 device independent of the SDL connection.

For X2X functionality, the supply and the X2X Link bus connection are required. If this is the case, extension units that can be operated via the PC and X2X (C key extensions) can also be accessed and operated without a connection to the PC. This means the machine or system stays operational.

3. E-stop wiring diagram

Each extension unit can have an individual E-stop button.

To guarantee that the E-stop functions properly, a two-channel E-stop series connection is made to each extension unit connection slot from the X2X/E-stop cable connector on the main unit.

The following wiring diagrams provide a more detailed explanation of various configurations.

- 1) Without extension unit;
- 2) With extension unit, with E-stop button;
- 3) With extension unit, without E-stop button;

3.1 Without extension unit

An extension cover must be mounted on each extension unit connection slot that is not being used. The cover uses a spring contact on an intermediate circuit board to connect the E-stop series circuit and therefore guarantees that it functions properly.

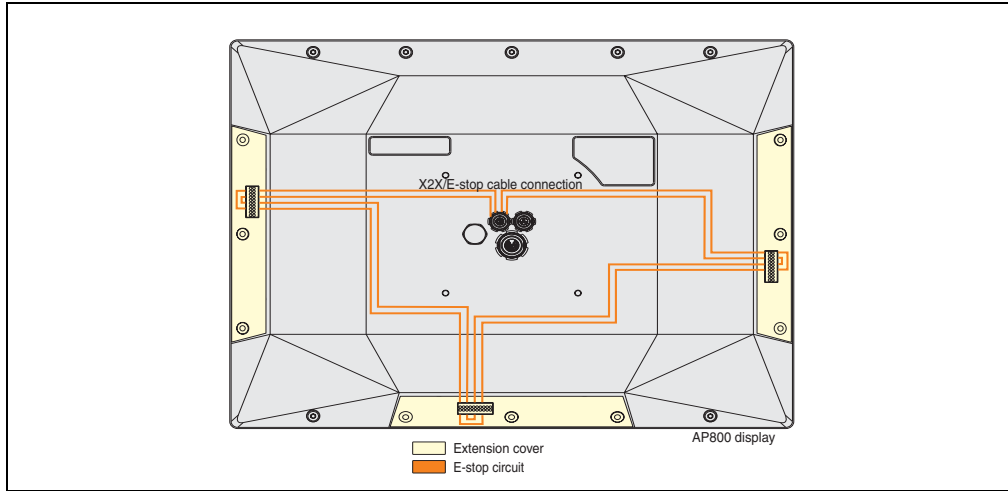


Figure 90: E-stop wiring diagram for the extension cover - rear view

3.2 Extension unit with E-stop

For an extension unit (in this case C key extension right) with an E-stop button, the connection from the AP800 display to the extension unit is made using an extension connector with spring contacts on an intermediate circuit board. The E-stop button is on the extension unit, and both N.C. contacts on the E-stop switching element (and therefore the E-stop series circuit) are closed when it is not activated.

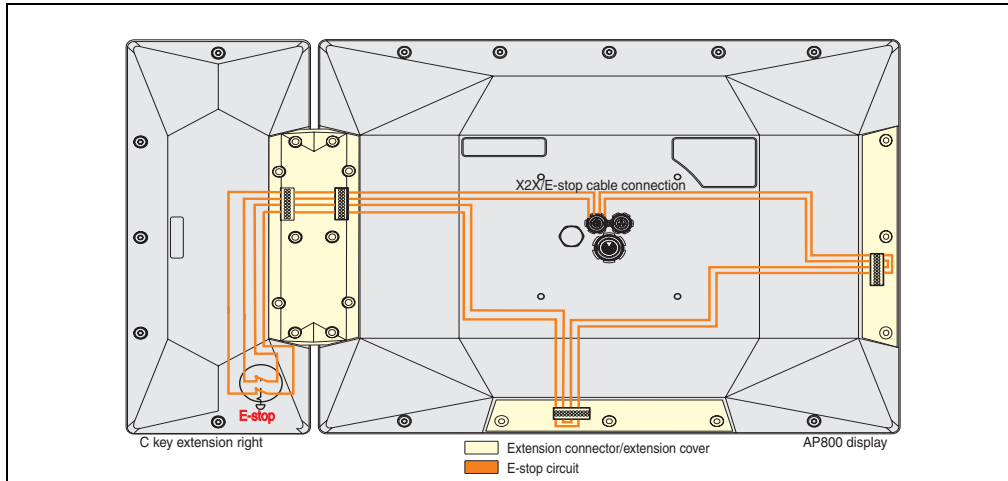


Figure 91: E-stop wiring diagram for the extension unit with E-stop - rear view

3.3 Extension unit without E-stop

For an extension unit (in this case extension keyboard) without an E-stop button, the connection from the AP800 display to the extension unit is made using an extension connector with two spring contacts on an intermediate circuit board. The E-stop contacts are connected so that the E-stop series circuit remains intact.

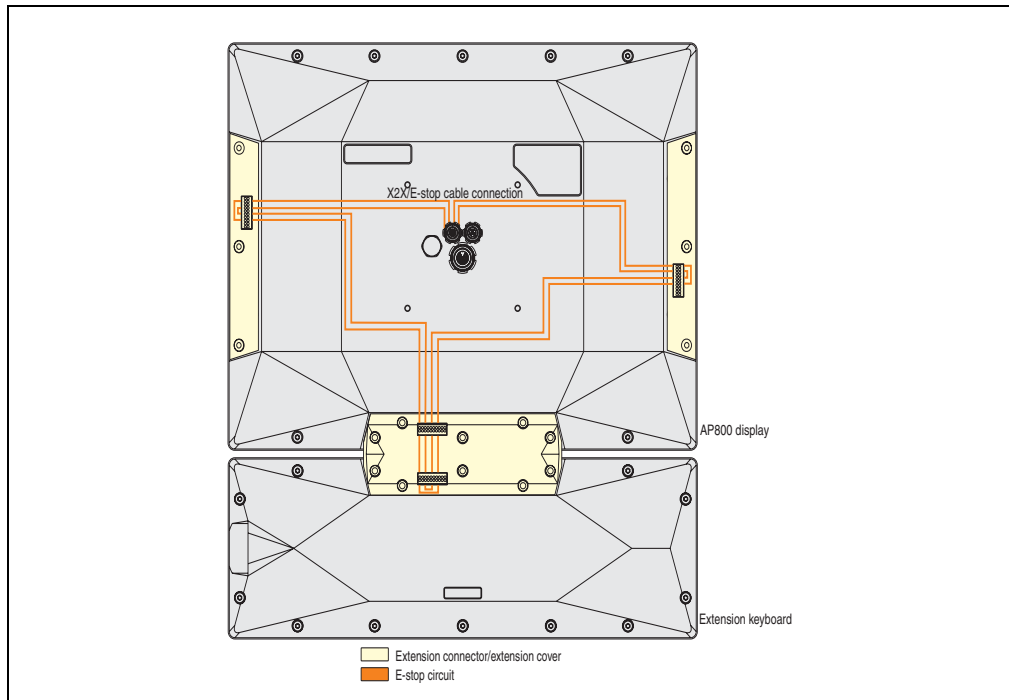


Figure 92: E-stop wiring diagram for the extension unit without E-stop - rear view

3.4 Current load

Warning!

Pay attention to the max. permitted current load of the E-stop circuit!

	Max. current load	Max. voltage
E-Stop circuit	0.4 A	32 VDC

Table 38: E-stop circuit current load

4. Installation

An Automation Panel 800 device is primarily mounted on a swing arm system. For this reason, the extension flange is installed on the back of the display (also see chapter 2 "Extension flange 5AC800.FLG1-00" on page 84).

The tubing of the swing arm system cannot be bent immediately after the end of the flange; it must be straight for a min. of 50 mm so that the plugs can be connected. The bending radius of the cables must also be taken into consideration (see "Cables" on page 86).

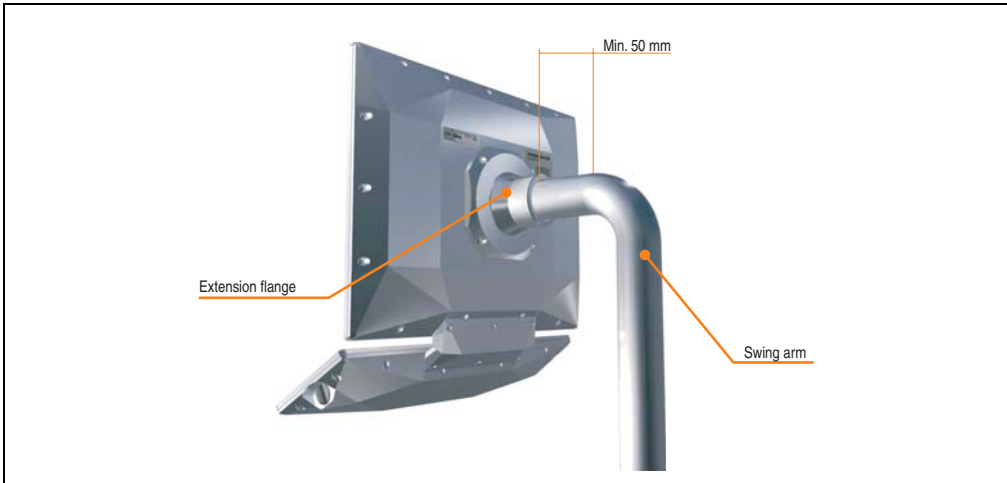


Figure 93: Swing arm system mounting

The cables run through the tubing and the plugs are covered by the extension flange. The plugs must be connected to the respective sockets.

The plugs and the sockets are marked with a red dot to ensure proper connection (see "Pin assignments" on page 42).

4.1 Mounting orientation

The following diagrams show the specified mounting orientation for the Automation Panel 800 device.

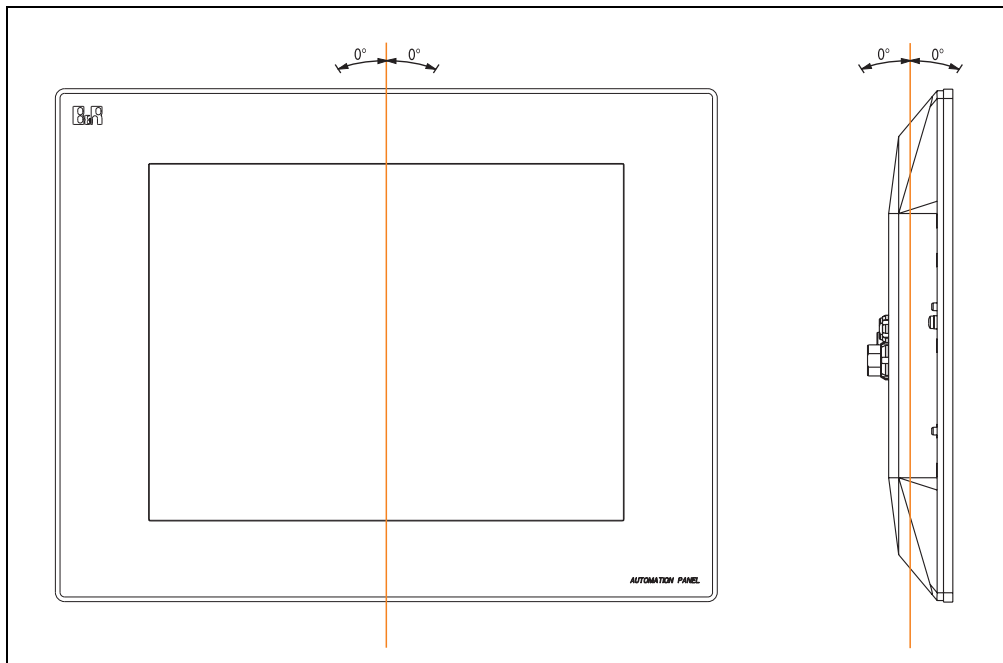
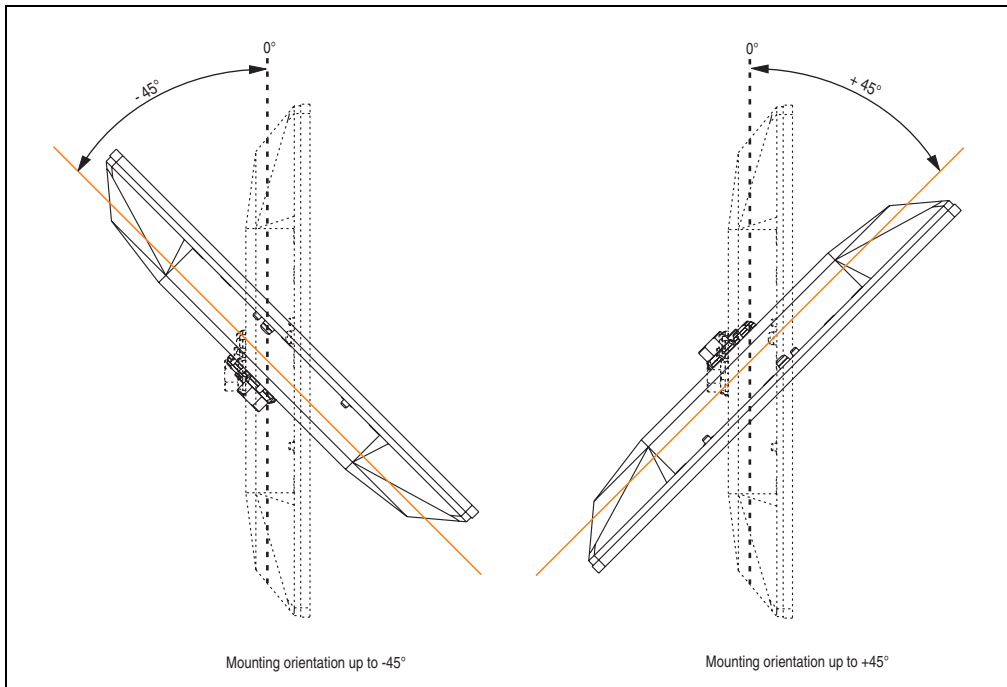


Figure 94: Mounting orientation 0°

Figure 95: Mounting orientation -45° and $+45^\circ$.

Warning!

Because of the changed thermal properties with some mounting orientations, e.g. $\pm 45^\circ$, the maximum ambient temperature of the Automation Panel 800 specified for 0° mounting orientation cannot be achieved during operation. The limit values that are valid in this situation can be found in the technical data for the Automation Panel device.

5. Connection examples

The following examples provide an overview of the configuration options for connecting Automation Panel 800 and Automation Panel 900 devices with the APC620. The following questions will be answered:

- How are Automation Panel 800 devices connected to the monitor / panel output of the APC620, and what needs to be considered?
- How are Automation Panel 800 and Automation Panel 900 devices connected to the monitor / panel output of the APC620, and what needs to be considered?
- What are "Display Clone" and "Extended Desktop" modes?
- How many Automation Panel 800 and Automation Panel 900 devices can be connected per line?
- How are the connected Automation Panel 800 and Automation Panel 900 devices numbered internally?
- Are there limitations to the segment length and if so, what are they?
- Which cables are required?
- Do BIOS settings have to be changed for a specific configuration?

5.1 Selecting the display units

If an Automation Panel 800 and an Automation Panel 900 should be connected on the same line, the devices must have the same display type.

The following table lists the AP900 devices that can be connected on the same line with an AP800 device.

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

Table 39: Selecting the display units

5.2 An Automation Panel 800 via SDL (onboard)

An Automation Panel 800 is connected to the integrated SDL interface (onboard) via an SDL cable. USB devices can only be connected directly to the extension keyboard (without a hub).

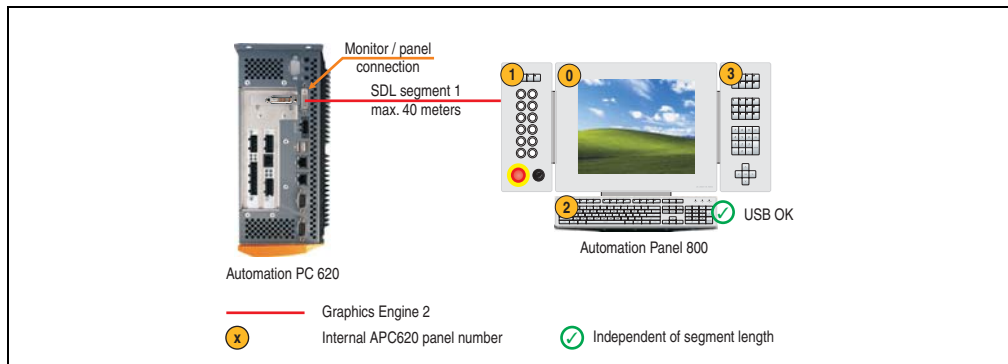


Figure 96: Configuration - An Automation Panel 800 via SDL (onboard)

5.2.1 Basic system requirements

The following table displays the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table.

CPU board	With system unit					Limitation
	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SX05-00	5PC600.SX05-01	Resolution
5PC600.E855-00	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-01	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-02	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-03	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-04	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-05	✓	✓	✓	✓	✓	Max. UXGA

Table 40: Possible combinations of system unit and CPU board

5.2.2 Cable

Select an SDL cable from the following table.

Model number	Type	Length
5CASDL.0018-20	SDL w/o extender	1.8 m
5CASDL.0050-20	SDL w/o extender	5 m
5CASDL.0100-20	SDL w/o extender	10 m
5CASDL.0150-20	SDL w/o extender	15 m
5CASDL.0200-20	SDL w/o extender	20 m
5CASDL.0250-20	SDL w/o extender	25 m
5CASDL.0300-30	SDL w/ extender	30 m
5CASDL.0400-30	SDL w/ extender	40 m

Table 41: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

Cable Segment length [m]	Resolution
	XGA 1024 x 768
1.8	5CASDL.0018-20
5	5CASDL.0050-20
10	5CASDL.0100-20
15	5CASDL.0150-20
20	5CASDL.0200-20 ¹⁾
25	5CASDL.0250-20 ¹⁾
30	5CASDL.0300-30 ²⁾
40	5CASDL.0400-30 ²⁾

Table 42: Segment lengths, resolutions and SDL cable

1) See table 43 "Requirements for SDL cable with automatic cable adjustment (equalizer)"

2) See table 44 "Requirements for SDL cable with extender and automatic cable adjustment (equalizer)"

The cable types and resolutions shown with a footnote 1) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) V01.10 , available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	

Table 43: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown with a footnote 2) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) V01.10 , available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
Hardware	Name	Revision	Note
5PC600.SX01-00	System 1 PCI	Rev. E0	-
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	-
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	-
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	-
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	-

Table 44: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

5.2.3 BIOS settings

No special BIOS settings are necessary for operation.

5.2.4 Windows graphics driver settings

"Digital display" must be defined as output device in the graphics driver.
For detailed information, see the APC620 user's manual.

5.2.5 Settings - Windows touch driver

For detailed information, see the APC620 user's manual.

5.3 An AP900 and an AP800 via SDL (onboard)

An Automation Panel 900 and an Automation Panel 800 are connected to the integrated SDL interface (onboard) via SDL.

USB is supported on both displays up to a maximum distance (segment 1 + segment 2) of 30 m. Starting at a distance of 30 m, USB is only available on the first display (front and back) up to a maximum of 40 m. USB devices can only be connected directly to the Automation Panel 900 or extension keyboard (without a hub).

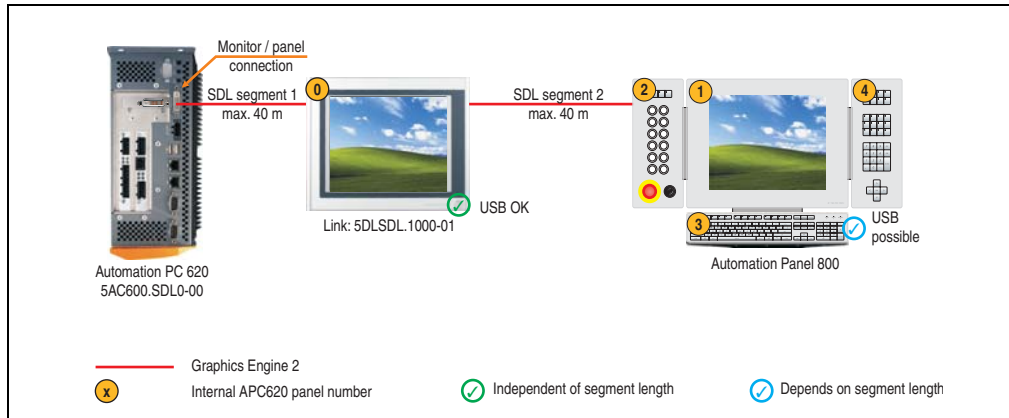


Figure 97: Configuration - An AP900 and an AP800 via SDL (onboard)

5.3.1 Basic system requirements

The following table displays the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table.

CPU board	With system unit					Limitation
	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SX05-00	5PC600.SX05-01	Resolution
5PC600.E855-00	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-01	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-02	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-03	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-04	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-05	✓	✓	✓	✓	✓	Max. UXGA

Table 45: Possible combinations of system unit and CPU board

5.3.2 Cable

Selecting an SDL cable for the connection of the AP800 display to the AP900 display. The selection table for the cable used to connect the AP900 displays can be found in the AP900 user's manual or the APC620 user's manual.

Information:

The following model numbers are only for connecting the AP800 display. Cables for the other SDL segments can be found in the APC620 user's manual.

Model number	Type	Length
5CASDL.0018-20	SDL w/o extender	1.8 m
5CASDL.0050-20	SDL w/o extender	5 m
5CASDL.0100-20	SDL w/o extender	10 m
5CASDL.0150-20	SDL w/o extender	15 m
5CASDL.0200-20	SDL w/o extender	20 m
5CASDL.0250-20	SDL w/o extender	25 m
5CASDL.0300-30	SDL w/ extender	30 m
5CASDL.0400-30	SDL w/ extender	40 m

Table 46: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

Cable Segment length [m]	Resolution
	XGA 1024 x 768
1.8	5CASDL.0018-20
5	5CASDL.0050-20
10	5CASDL.0100-20
15	5CASDL.0150-20
20	5CASDL.0200-20 ¹⁾
25	5CASDL.0250-20 ¹⁾
30	5CASDL.0300-30 ²⁾
40	5CASDL.0400-30 ²⁾

Table 47: Segment lengths, resolutions and SDL cable

1) See table 48 "Requirements for SDL cable with automatic cable adjustment (equalizer)"

2) See table 49 "Requirements for SDL cable with extender and automatic cable adjustment (equalizer)"

Commissioning • Connection examples

The cable types and resolutions shown with a footnote 1) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) V01.10 , available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	

Table 48: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown with a footnote 2) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) V01.10 , available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
Hardware	Name	Revision	Note
5PC600.SX01-00	System 1 PCI	Rev. E0	-
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	-
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	-
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	-
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	-

Table 49: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

5.3.3 BIOS settings

No special BIOS settings are necessary for operation.

5.3.4 Windows graphics driver settings

"Digital display" must be defined as output device in the graphics driver.
For detailed information, see the APC620 user's manual.

5.3.5 Settings - Windows touch driver

For detailed information, see the APC620 user's manual.

5.4 Three AP900 devices with an AP800 via SDL (onboard)

Up to four Automation Panels can be connected to the integrated SDL interface (onboard). At the fourth location, an Automation Panel 800 can be operated via SDL. All four displays show the same content (Display Clone).

USB is supported up to a maximum distance (segment 1 + segment 2) of 30 m on the first two displays. Starting at a distance of 30 m, USB is only available on the first display (front and back) up to a maximum of 40 m. USB devices can only be connected directly to Automation Panel 900 devices (without a hub).

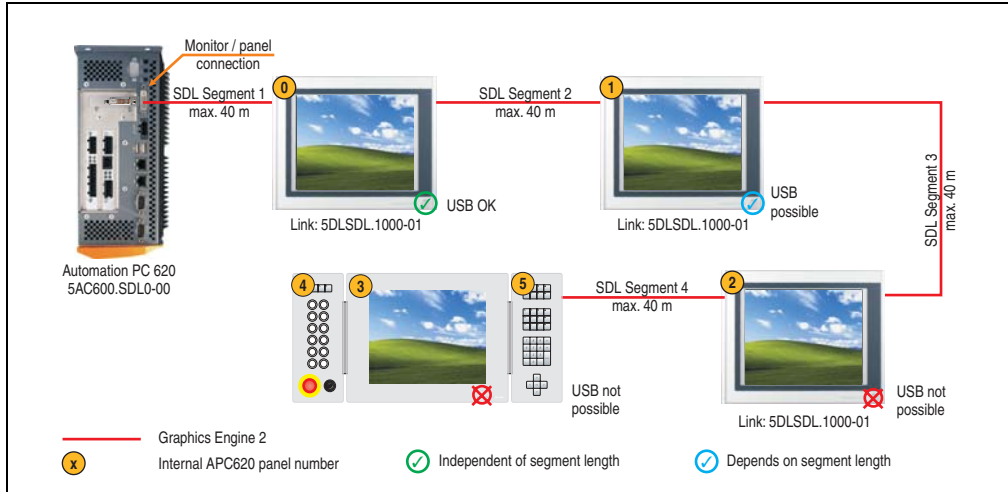


Figure 98: Configuration - Three AP900 devices and an AP800 via SDL (onboard)

5.4.1 Basic system requirements

The following table displays the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table.

CPU board	With system unit					Limitation Resolution
	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SX05-00	5PC600.SX05-01	
5PC600.E855-00	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-01	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-02	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-03	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-04	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-05	✓	✓	✓	✓	✓	Max. UXGA

Table 50: Possible combinations of system unit and CPU board

5.4.2 Cable

Selecting an SDL cable for the connection of the AP800 display to the last AP900 display. The selection table for the cable used to connect the AP900 displays can be found in the AP900 user's manual or the APC620 user's manual.

Information:

The following model numbers are only for connecting the AP800 display. Cables for the other SDL segments can be found in the APC620 user's manual.

Model number	Type	Length
5CASDL.0018-20	SDL w/o extender	1.8 m
5CASDL.0050-20	SDL w/o extender	5 m
5CASDL.0100-20	SDL w/o extender	10 m
5CASDL.0150-20	SDL w/o extender	15 m
5CASDL.0200-20	SDL w/o extender	20 m
5CASDL.0250-20	SDL w/o extender	25 m
5CASDL.0300-30	SDL w/ extender	30 m
5CASDL.0400-30	SDL w/ extender	40 m

Table 51: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

Cable Segment length [m]	Resolution
	XGA 1024 x 768
1.8	5CASDL.0018-20
5	5CASDL.0050-20
10	5CASDL.0100-20
15	5CASDL.0150-20
20	5CASDL.0200-20 ¹⁾
25	5CASDL.0250-20 ¹⁾
30	5CASDL.0300-30 ²⁾
40	5CASDL.0400-30 ²⁾

Table 52: Segment lengths, resolutions and SDL cable

1) See table 53 "Requirements for SDL cable with automatic cable adjustment (equalizer)"

2) See table 54 "Requirements for SDL cable with extender and automatic cable adjustment (equalizer)"

The cable types and resolutions shown with a footnote 1) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) V01.10 , available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	

Table 53: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown with a footnote 2) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) V01.10 , available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
Hardware	Name	Revision	Note
5PC600.SX01-00	System 1 PCI	Rev. E0	-
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	-
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	-
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	-
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	-

Table 54: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

5.4.3 BIOS settings

No special BIOS settings are necessary for operation.

5.4.4 Windows graphics driver settings

"Digital display" must be defined as output device in the graphics driver.
For detailed information, see the APC620 user's manual.

5.4.5 Settings - Windows touch driver

For detailed information, see the APC620 user's manual.

5.5 Six AP900 and two AP800 devices via SDL (onboard) and SDL (AP Link)

Four Automation Panels (max. UXGA) are connected to the integrated SDL interface (onboard) via SDL. Four additional Automation Panels (max. UXGA) are connected to the optional SDL transmitter. The Automation Panels in each line must be the same type. The display content of the two lines is different (Extended Desktop), but the displays in the same line show the same content (Display Clone).

USB is supported up to a maximum distance (segment 1 + segment 2) of 30 m on the first two displays. Starting at a distance of 30 m, USB is only available on the first display (front and back) up to a maximum of 40 m. USB devices can only be connected directly to Automation Panel 900 devices (without a hub).

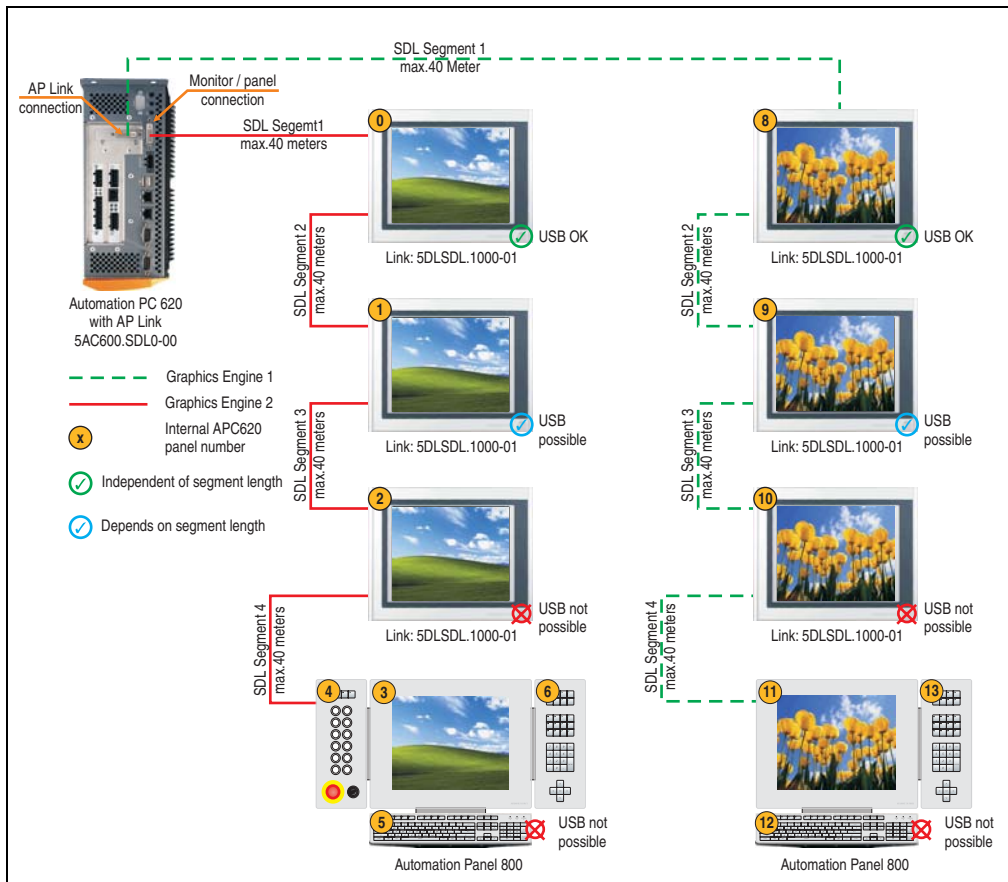


Figure 99: Configuration - Six AP900 and two AP800 devices via SDL (onboard) and SDL (AP Link)

5.5.1 Basic system requirements

The following table displays the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table.

CPU board	With system unit					Limitation
	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SX05-00	5PC600.SX05-01	Resolution
5PC600.E855-00	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-01	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-02	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-03	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-04	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-05	✓	✓	✓	✓	✓	Max. UXGA

Table 55: Possible combinations of system unit and CPU board

5.5.2 Cable

Selecting an SDL cable for the connection of the AP800 display to the last AP900 display. The selection table for the cable used to connect the AP900 displays can be found in the AP900 user's manual or the APC620 user's manual.

Information:

The following model numbers are only for connecting the AP800 display. Cables for the other SDL segments can be found in the APC620 user's manual.

Model number	Type	Length
5CASDL.0018-20	SDL w/o extender	1.8 m
5CASDL.0050-20	SDL w/o extender	5 m
5CASDL.0100-20	SDL w/o extender	10 m
5CASDL.0150-20	SDL w/o extender	15 m
5CASDL.0200-20	SDL w/o extender	20 m
5CASDL.0250-20	SDL w/o extender	25 m
5CASDL.0300-30	SDL w/ extender	30 m
5CASDL.0400-30	SDL w/ extender	40 m

Table 56: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

Cable Segment length [m]	Resolution
	XGA 1024 x 768
1.8	5CASDL.0018-20
5	5CASDL.0050-20
10	5CASDL.0100-20
15	5CASDL.0150-20
20	5CASDL.0200-20 ¹⁾
25	5CASDL.0250-20 ¹⁾
30	5CASDL.0300-30 ²⁾
40	5CASDL.0400-30 ²⁾

Table 57: Segment lengths, resolutions and SDL cable

1) See table 58 "Requirements for SDL cable with automatic cable adjustment (equalizer)"

2) See table 59 "Requirements for SDL cable with extender and automatic cable adjustment (equalizer)"

The cable types and resolutions shown with a footnote 1) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) V01.10 , available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	

Table 58: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown with a footnote 2) in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Name	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) V01.10 , available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
Hardware	Name	Revision	Note
5PC600.SX01-00	System 1 PCI	Rev. E0	-
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	-
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	-

Table 59: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

Firmware	Name	Version	Note
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	-
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	-

Table 59: Requirements for SDL cable with extender and automatic cable adjustment (equalizer) (cont.)

5.5.3 BIOS settings

No special BIOS settings are necessary for operation.

5.5.4 Windows graphics driver settings

"Digital display" must be defined as output device in the graphics driver.
For detailed information, see the APC620 user's manual.

5.5.5 Settings - Windows touch driver

For detailed information, see the APC620 user's manual.

5.6 Internal numbering of the extension units

An extension unit for an AP800 device is numbered like another device. The numbering of the extension units starts from the display unit and goes in the counter-clockwise direction; all extension unit slots that are not used are left out.

The following graphic shows numbering examples.

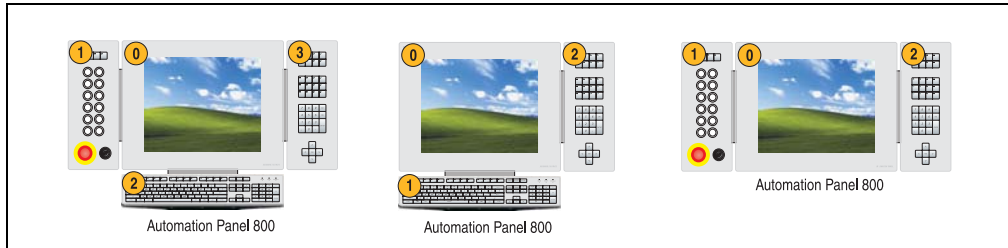


Figure 100: Examples - internal numbering of the extension units

6. Key and LED configurations

Each key or LED can be configured individually and therefore adjusted to suit 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 the keys and LEDs in the matrix are shown as hardware numbers. The hardware numbers can be read directly on the target system, for example with the B&R Key Editor and the B&R Control Center.

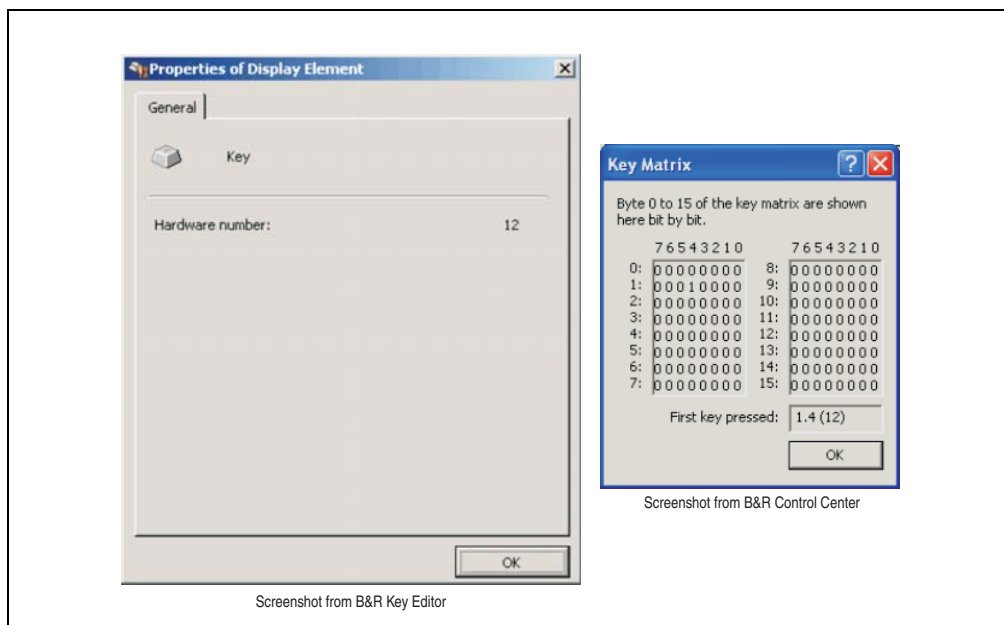


Figure 101: Example - Hardware number in the B&R Key Editor or in the B&R Control Center

The following graphics show the positions of the keys and LEDs in the matrix. They are shown as follows.

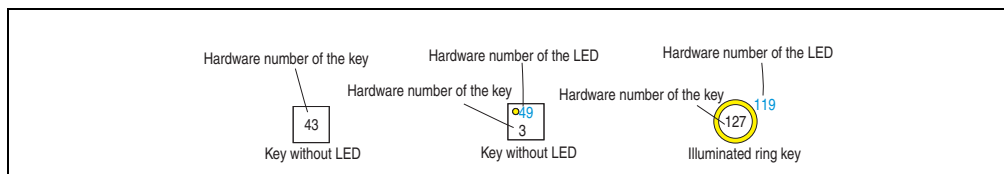


Figure 102: Display - keys and LEDs in the matrix

6.1 Display unit

6.1.1 5AP880.1505-00

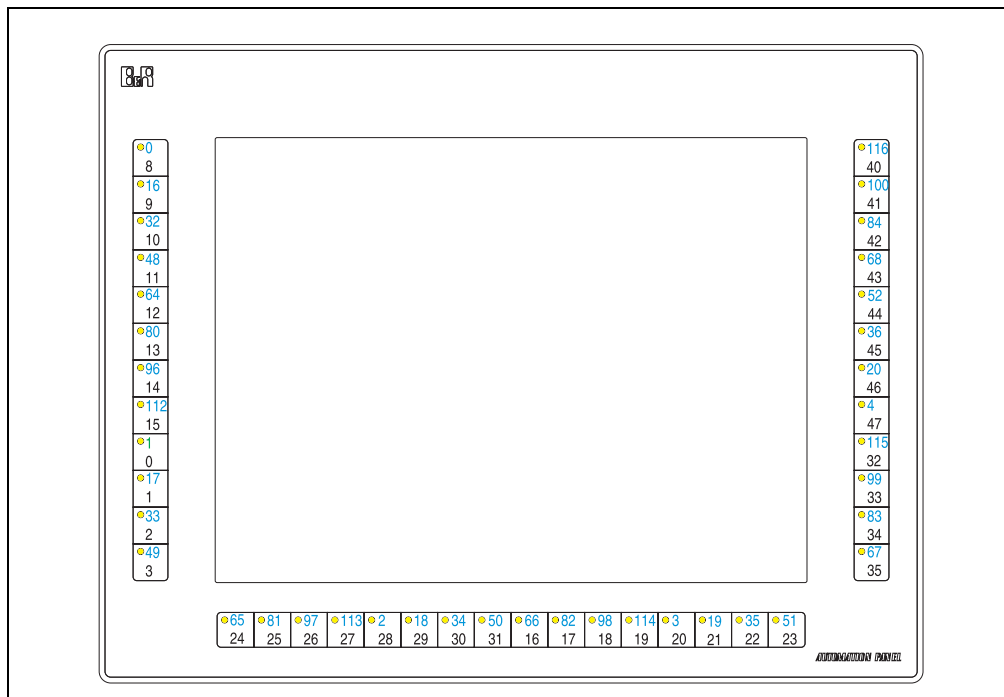


Figure 103: Hardware number - 5AP880.1505-00

6.2 Extension units

6.2.1 Extension keyboard 5AC800.EXT1-00

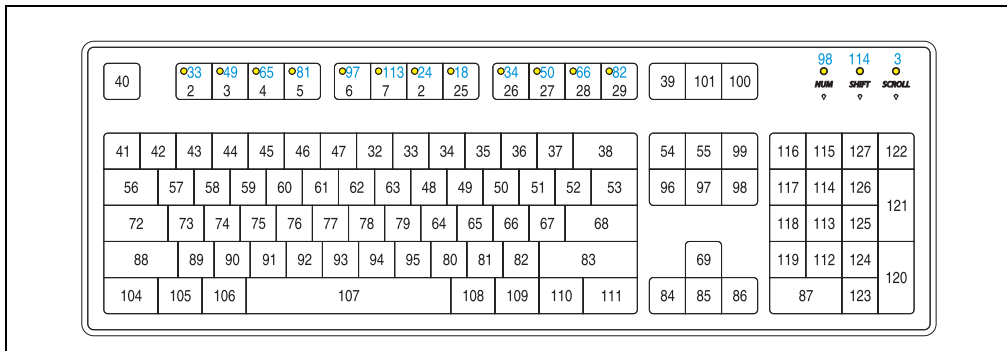


Figure 104: Hardware numbers - 5AC800.EXT1-00

6.2.2 F key extension left 5AC800.EXT2-00 / right 5AC800.EXT2-01

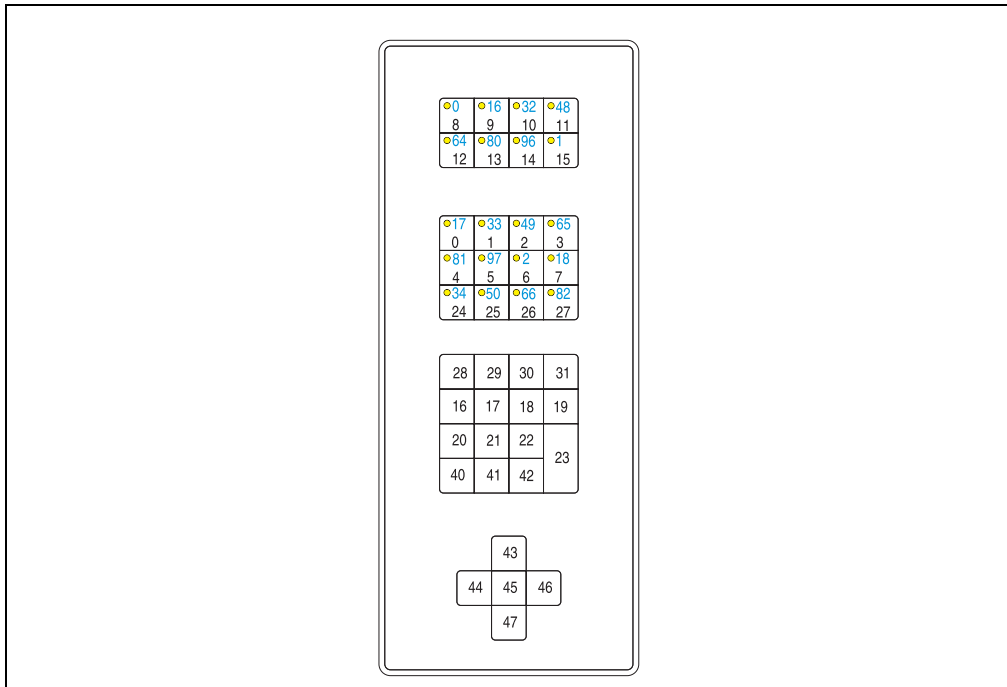


Figure 105: Hardware numbers - 5AC800.EXT2-00 / 5AC800.EXT2-01

6.2.3 C key extension 8PB left 5AC800.EXT3-00 / right 5AC800.EXT3-01

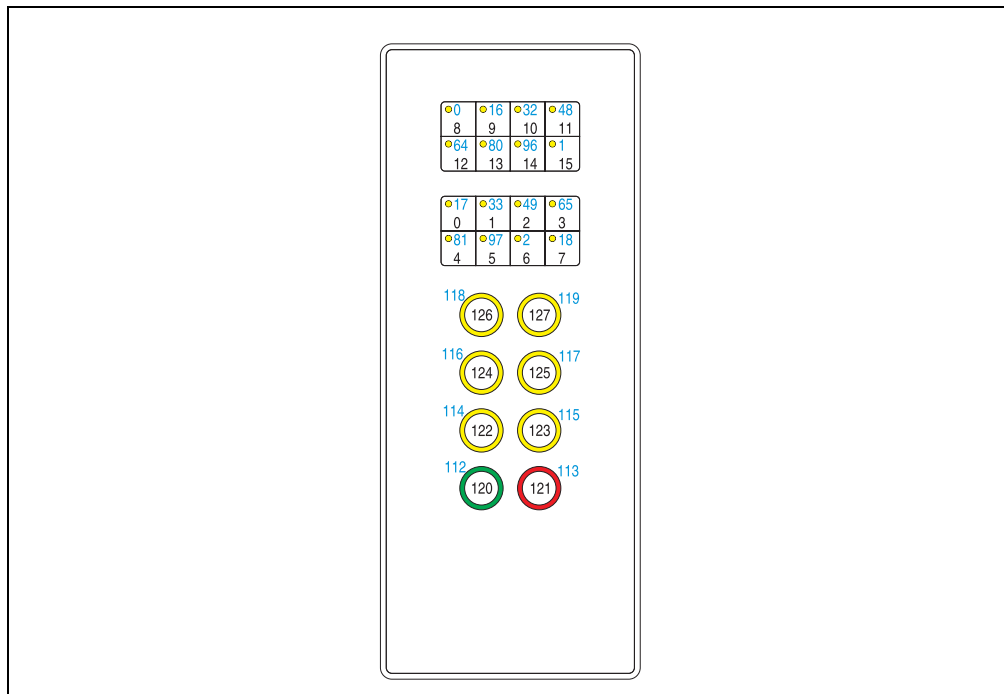


Figure 106: Hardware numbers - 5AC800.EXT3-00 / 5AC800.EXT3-01

6.2.4 C key extension 12PB left 5AC800.EXT3-02 / right 5AC800.EXT3-03

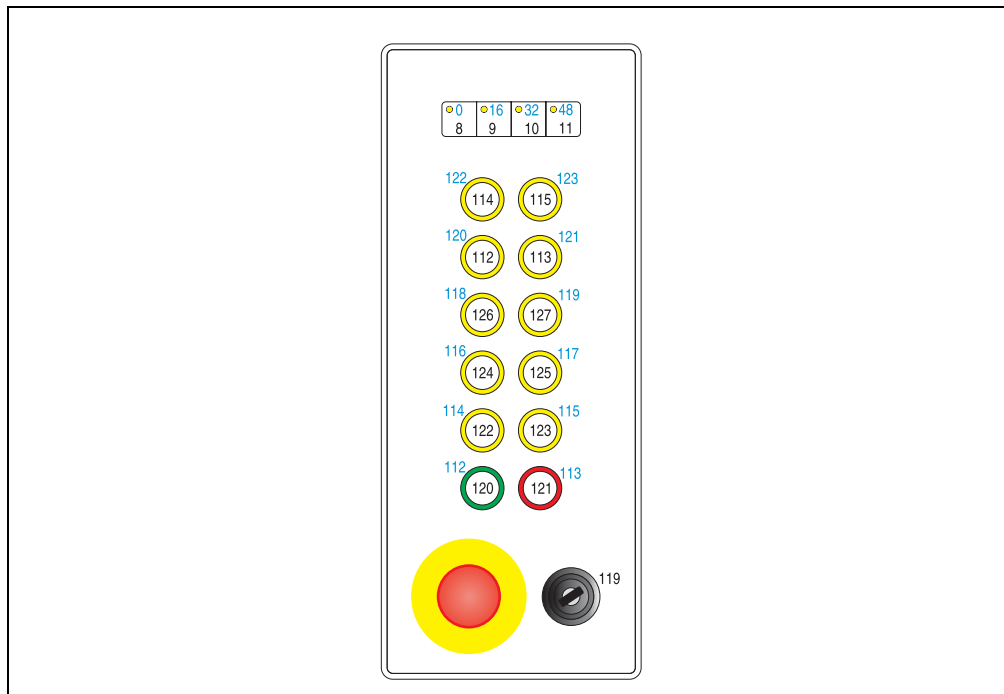


Figure 107: Hardware numbers - 5AC800.EXT3-02 / 5AC800.EXT3-03

6.2.5 C key extension 8PB left 5AC800.EXT3-04 / right 5AC800.EXT3-05

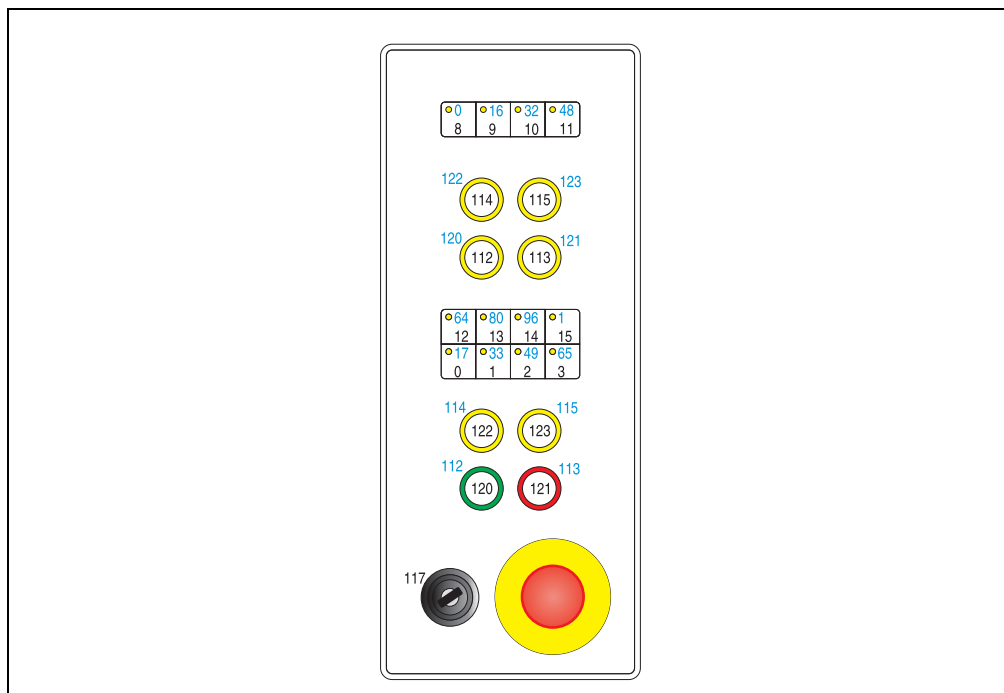


Figure 108: Hardware numbers - 5AC800.EXT3-04 / 5AC800.EXT3-05

Chapter 4 • Software

1. B&R Key Editor information

On display units, it is often necessary to adjust the function keys and LEDs for the application software being used. With the B&R Key Editor, it is possible to quickly and easily set up the application individually. Automation Panel 800 devices are supported starting with B&R Key Editor Version 2.50.

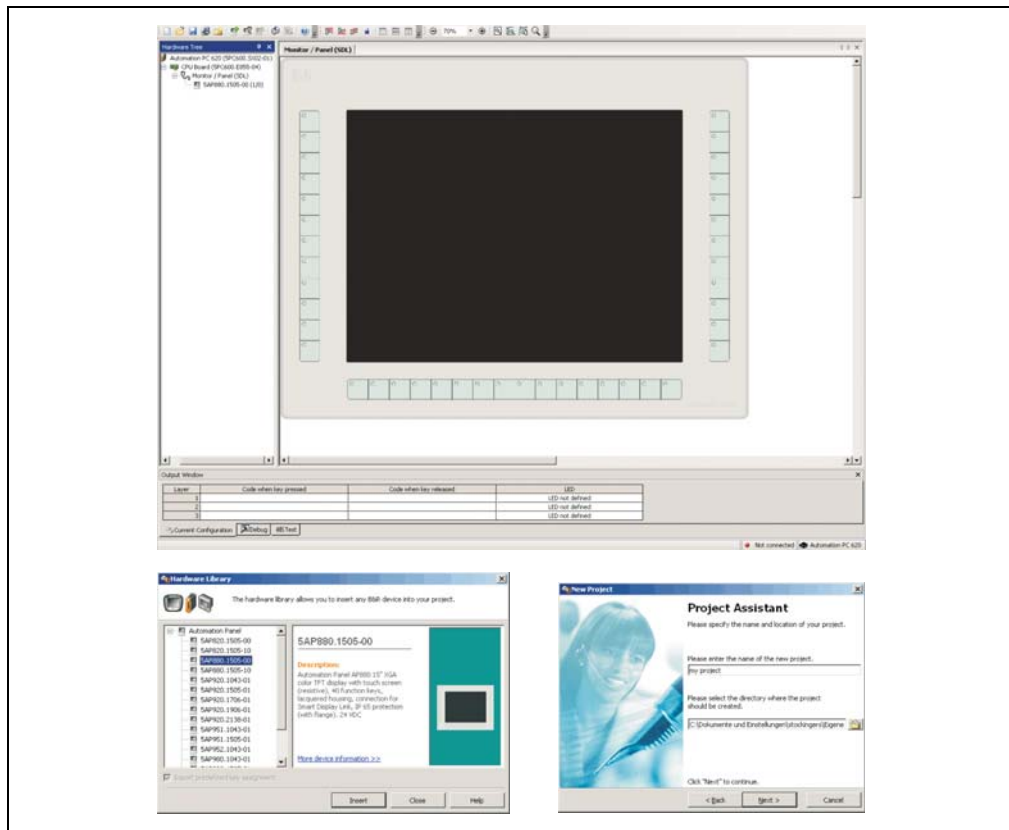


Figure 109: B&R Key Editor screenshots (Version 2.50)

Features:

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Key combinations/shortcuts (CTRL+C, SHIFT+DEL, etc.) on one key
- Special key functions (change brightness, etc.)
- Assign functions to LEDs (HDD access, power, etc.)
- 4 assignments per key possible (using layer function)
- Configuration of panel locking time when multiple Automation Panel 900 devices are connected to Automation PC 620 and Panel PC 700 devices.

Supports following systems:

- Automation Panel 800
- Automation Panel 900
- Automation PC 620
- Panel PC 700
- Provit 2000
- Provit 5000
- Power Panel BIOS devices
- Mobile Panel BIOS devices

A detailed guide for configuring keys and LEDs can be found in the B&R Key Editor's online help.

The B&R Key Editor can be downloaded for free from the download area on the B&R homepage (www.br-automation.com). Additionally, it can also be found on the B&R HMI Driver and Utilities DVD (Mod. No. 5SWHMI.0000-00).

2. HMI Drivers & Utilities DVD 5SWHMI.0000-00



Figure 110: HMI Drivers & Utilities DVD 5SWHMI.0000-00

Model number	Short description	Note
5SWHMI.0000-00	HMI Drivers & Utilities DVD Contains drivers, utilities, software upgrades and user manuals for B&R Panel system products (see B&R homepage – Industrial PCs, Visualization and Operation).	

Table 60: Model number for HMI Drivers & Utilities DVD

This DVD contains drivers, utilities, software upgrades and user manuals for B&R Panel system products (see B&R homepage – Industrial PCs, Visualization and Operation).
Information in detail:

BIOS upgrades for the products

- Automation PC 620
- Panel PC 700
- Automation PC 680
- Provit 2000 product family - IPC2000/2001/2002
- Provit 5000 product family - IPC5000/5600/5000C/5600C
- Power Panel 100 BIOS device
- Mobile Panel 100 BIOS devices
- Power Panel 100 / Mobile Panel 100 User Boot Logo
- Power Panel 100 / Mobile Panel 100 REMHOST Utility

Drivers for the devices

- Automation Device Interface (ADI)

- Audio
- Chipset
- CD-ROM
- LS120
- Graphics
- Network
- PCI RAID Controller
- Touch screen
- Touchpad
- Interface board

Updates

- Firmware Upgrades (e.g. MTCX, SMXC)

Utilities/Tools

- Automation Device Interface (ADI)
- Miscellaneous
- MTC Utilities
- Key Editor
- MTC & Mkey Utilities
- Mkey Utilities
- UPS Configuration Software
- ICU ISA Configuration
- Intel PCI NIC Boot ROM
- Diagnostics
- CompactFlash lifespan calculation for Silicon Systems CompactFlash cards 5CFCRD.xxxx-03

Windows and embedded operating systems

- Thin client
- Windows CE
- Windows NT Embedded
- Windows XP Embedded

MCAD templates for

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

Documentation for

- Automation Panel 800
- B&R Windows CE
- Automation PC 620
- Automation PC 680
- Automation Panel 900
- Panel PC 700
- Power Panel 15/21/35/41
- Power Panel 100/200
- Provit 2000
- Provit 3030
- Provit 4000
- Provit 5000
- Provit Benchmark
- Provit Mkey
- Windows NT Embedded Application Guide
- Windows XP Embedded Application Guide
- Uninterruptible power supply

Service tools

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

Chapter 5 • Standards and certifications

1. Applicable European guidelines

- EMC guidelines 89/336/EWG
- Low-voltage guidelines 73/23/EWG
- Machine guidelines 98/37/EG
- Personal Protection Equipment 93/68/EWG, 93/95/EWG and 96/58/EG

2. Overview of standards

Standard	Description
EN 55022 Class A, B	Electromagnetic compatibility (EMC), radio disturbance characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 55024	Electromagnetic compatibility (EMC), immunity characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 61000-4-2	Electromagnetic compatibility (EMC) - part 4-2: Testing and measuring techniques; electrostatic discharge immunity test
EN 61000-4-3	Electromagnetic compatibility (EMC) - part 4-3: Testing and measuring techniques; radiated radio-frequency electromagnetic field immunity test
EN 61000-4-4	Electromagnetic compatibility (EMC) - part 4-4: Testing and measuring techniques; electrical fast transient/burst immunity test
EN 61000-4-5	Electromagnetic compatibility (EMC) - part 4-5: Testing and measuring techniques; surge immunity test
EN 61000-4-6	Electromagnetic compatibility (EMC) - part 4-6: Testing and measuring techniques; immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8	Electromagnetic compatibility (EMC) - part 4-8: Testing and measuring techniques; power frequency magnetic field immunity test
EN 61000-4-12	Electromagnetic compatibility (EMC) - part 4-12: Testing and measuring techniques; oscillatory waves immunity test
EN 61000-4-17	Electromagnetic compatibility (EMC) - part 4-12: Testing and measuring techniques; ripple on DC input power port immunity test
EN 61000-6-2 (EN 50082-2)	Electromagnetic compatibility (EMC), generic immunity standard - part 2: industrial environments (EN 50082-2 has been replaced by EN 61000-6-2)
EN 61000-6-4 (EN 50081-2)	Electromagnetic compatibility (EMC), generic emission standard - part 2: industrial environments (EN 50081-2 has been replaced by EN 61000-6-4)

Table 61: Overview of standards

Standards and certifications • Emission requirements

Standard	Description
EN 61131-2 IEC 61131-2	Product standard, programmable logic controllers - part 2: equipment requirements and tests
47 CFR	Federal Communications Commission (FCC), 47 CFR Part 15 Subpart B Class A

Table 61: Overview of standards (cont.)

3. Emission requirements

Emission	Test carried out according to	Limits according to
Network-related emissions	EN 55022	EN 55022: Information technology equipment (ITE devices), class B (residential areas)
		EN 61000-6-4: Generic standard (industrial areas)
		EN 55022: Information technology equipment (ITE devices), class A (industrial areas)
		EN 61131-2: Programmable logic controllers
		47 CFR Part 15 Subpart B Class A (FCC)
Emissions	EN 55022	EN 55022: Information technology equipment (ITE devices), class B (residential areas)
		EN 61000-6-4: Generic standard (industrial areas)
		EN 55022: Information technology equipment (ITE devices), class A (industrial areas)
		EN 61131-2: Programmable logic controllers
		47 CFR Part 15 Subpart B Class A (FCC)

Table 62: Overview of limits and testing guidelines for emissions

3.1 Network related emissions

Test carried out according to EN 55022	Limits according to EN 61000-6-4	Limits according to EN 55022 class A
Power mains connections 150 kHz - 500 kHz	-	79 dB (µV) quasi-peak value 66 dB (µV) average
Power mains connections 500 kHz - 30 MHz	-	73 dB (µV) quasi-peak value 60 dB (µV) average
Test carried out according to EN 55022	Limits according to EN 61000-6-4	Limits according to EN 55022 class A
AC mains connections 150 kHz - 500 kHz	79 dB (µV) quasi-peak value 66 dB (µV) average	-

Table 63: Test requirements - network-related emissions for industrial areas

AC mains connections 500 kHz - 30 MHz	73 dB (μV) quasi-peak value 60 dB (μV) average	-
Other connections 150 kHz - 500 kHz	-	97 - 87 dB (μV) and 53 - 43 dB (μA) quasi-peak value 84 - 74 dB (μV) and 40 - 30 dB (μA) average
Other connections 500 kHz - 30 MHz	-	87 dB (μV) and 43 dB (μA) quasi-peak value 74 dB (μV) and 30 dB (μA) average
Test carried out according to EN 55022	Limits according to EN 61131-2	Limits according to 47 CFR Part 15 Subpart B class A
Power mains connections ¹⁾ 150 kHz - 500 kHz	79 dB (μV) quasi-peak value 66 dB (μV) average	-
Power mains connections 500 kHz - 30 MHz	73 dB (μV) quasi-peak value 60 dB (μV) average	-
AC mains connections 150 kHz - 500 kHz	-	79 dB (μV) quasi-peak value 66 dB (μV) average
AC mains connections 500 kHz - 30 MHz	-	73 dB (μV) quasi-peak value 60 dB (μV) average
Other connections 150 kHz - 500 kHz	Only informative for cable lengths > 10 m 40 - 30 dB (μA) quasi-peak value 30 - 20 dB (μA) average	-
Other connections 500 kHz - 30 MHz	Only informative for cable lengths > 10 m 30 dB (μA) quasi-peak value 20 dB (μA) average	-

Table 63: Test requirements - network-related emissions for industrial areas (cont.)

1) AC network connections only with EN 61131-2

3.2 Emissions, electromagnetic emissions

Test carried out according to EN 55022	Limits according to EN 61000-6-4	Limits according to EN 55022 class A
30 MHz - 230 MHz measured in 10 m distances	< 40 dB (μV/m) quasi-peak value	< 40 dB (μV/m) quasi-peak value
230 MHz - 1 GHz measured in 10 m distances	< 47 dB (μV/m) quasi-peak value	< 47 dB (μV/m) quasi-peak value
Test carried out according to EN 55022	Limits according to EN 61131-2	
30 MHz - 230 MHz measured in 10 m distances	< 40 dB (μV/m) quasi-peak value	
230 MHz - 1 GHz measured in 10 m distances	< 47 dB (μV/m) quasi-peak value	
Test carried out	Limits according to 47 CFR Part 15 Subpart B class A	
30 MHz - 88 MHz measured in 10 m distances	< 90 dB (μV/m) quasi-peak value	
88 MHz - 216 MHz measured in 10 m distances	< 150 dB (μV/m) quasi-peak value	
216 MHz - 960 MHz measured in 10 m distances	< 210 dB (μV/m) quasi-peak value	
>960 MHz measured in 10 m distances	< 300 dB (μV/m) quasi-peak value	

Table 64: : Test requirements - electromagnetic emissions for industrial areas

4. Requirements for immunity to disturbances

Immunity	Test carried out according to	Limits according to
Electrostatic discharge (ESD)	EN 61000-4-2	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity against high-frequency electromagnetic fields (HF field)	EN 61000-4-3	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to high-speed transient electrical disturbances (burst)	EN 61000-4-4	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to surge voltages	EN 61000-4-5	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to conducted disturbances	EN 61000-4-6	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity against magnetic fields with electrical frequencies	EN 61000-4-8	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to voltage dips, short-term interruptions and voltage fluctuations		EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to damped vibration	EN 61000-4-12	EN 61000-6-2: Generic standard (industrial areas)
		EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)

Table 65: Overview of limits and testing guidelines for immunity

Evaluation criteria according to EN 61000-6-2

Criteria A:

The operating equipment must continue to work as intended **during** the test. There should be no interference in the operating behavior and no system failures below a minimum operating quality as defined by the manufacturer.

Criteria B:

The operating equipment must continue to work as intended **after** the test. There should be no interference in the operating behavior and no system failures below a minimum operating quality as defined by the manufacturer.

Criteria C:

A temporary function failure is permitted when the function restores itself, or the function can be restored by activating configuration and control elements.

Criteria D:

Impairment or failure of the function, which can no longer be established (operating equipment destroyed).

4.1 Electrostatic discharge (ESD)

Test carried out according to EN 61000-4-2	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
Contact discharge to powder-coated and bare metal housing parts	± 4 kV, 10 discharges, criteria B	± 4 kV, 10 discharges, criteria B	± 4 kV, 10 discharges, criteria B
Discharge through the air to plastic housing parts	± 8 kV, 10 discharges, criteria B	± 8 kV, 10 discharges, criteria B	± 8 kV, 10 discharges, criteria B

Table 66: Test requirements - electrostatic discharge (ESD)

4.2 High-frequency electromagnetic fields (HF field)

Test carried out according to EN 61000-4-3	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
Housing, completely wired	80 MHz - 1 GHz, 10 V/m, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A	80 MHz - 1 GHz, 1,4 - 2 GHz, 10 V/m, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A 800-960 MHz (GSM), 10 V/m, pulse modulation with 50 % duty cycle, criteria A	80 MHz - 1 GHz, 1,4 - 2 GHz, 3 V/m, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A

Table 67: Test requirements - high-frequency electromagnetic fields (HF field)

4.3 High-speed transient electrical disturbances (burst)

Test carried out according to EN 61000-4-4	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
AC power I/O	± 2 kV, criteria B	-	± 1 kV, criteria B
AC power inputs	-	± 2 kV, criteria B	-
AC power outputs	-	± 1 kV, criteria B	-
DC power I/O >10 m ¹⁾	± 2 kV, criteria B	-	± 0.5 kV, criteria B
DC power inputs >10 m	-	± 2 kV, criteria B	-
DC power outputs >10 m	-	± 1 kV, criteria B	-
Functional ground connections, signal lines and I/Os >3 m	± 1 kV, criteria B	± 1 kV, criteria B	± 0.5 kV, criteria B
Unshielded AC I/O >3 m	-	± 2 kV, criteria B	-
Analog I/O	± 1 kV, criteria B	± 1 kV, criteria B	-

Table 68: Test requirements - high-speed transient electrical disturbances (burst)

1) For EN 55024 without length limitation.

4.4 Surge voltages (Surge)

Test carried out according to EN 61000-4-5	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
AC power I/O, L to L	± 1 kV, criteria B	± 1 kV, criteria B	± 1 kV, criteria B
AC power I/O, L to PE	± 2 kV, criteria B	± 2 kV, criteria B	± 2 kV, criteria B
DC power I/O, L+ to L-, >10 m	± 0.5 kV, criteria B	-	-
DC power I/O, L to PE, >10 m	± 0.5 kV, criteria B	-	± 0.5 kV, criteria B
DC power inputs, L+ to L-	-	± 0.5 kV, criteria B	-
DC power inputs, L to PE	-	± 1 kV, criteria B	-
DC power outputs, L+ to L-	-	± 0.5 kV, criteria B	-
DC power outputs, L to PE	-	± 0.5 kV, criteria B	-
Signal connections >30 m	± 1 kV, criteria B	± 1 kV, criteria B	± 1 kV, criteria B
All shielded cables	-	± 1 kV, criteria B	-

Table 69: Test requirements - surge voltages

4.5 Conducted disturbances

Test carried out according to EN 61000-4-6	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
AC power I/O	150 kHz - 80 MHz, 10 V, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, criteria A

Table 70: Test requirements - conducted disturbances

Standards and certifications • Requirements for immunity to disturbances

Test carried out according to EN 61000-4-6	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
DC power I/O	150 kHz - 80 MHz, 10 V, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, criteria A
Functional ground connections	0,15 - 80 MHz, 10 V, 80 % amplitude modulation with 1 kHz, Length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A	-
Signal connections >3 m	0,15 - 80 MHz, 10 V, 80 % amplitude modulation with 1 kHz, Length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, criteria A

Table 70: Test requirements - conducted disturbances (cont.)

4.6 Magnetic fields with electrical frequencies

Test carried out according to EN 61000-4-8	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
Test direction x, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	50 Hz, 1 A/m, criteria A
Test direction y, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	50 Hz, 1 A/m, criteria A
Test direction z, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	50 Hz, 1 A/m, criteria A

Table 71: Test requirements - magnetic fields with electrical frequencies

4.7 Damped vibration

Test carried out according to EN 61000-4-12	Limits according to EN 61131-2		
Power I/O, L to L	± 1 kV, 1 MHz, repeat rate 400/seconds, length 2 seconds, connection lengths 2 m, criteria B		
Power I/O, L to PE	± 2.5 kV, 1 MHz, repeat rate 400/seconds, length 2 seconds, connection lengths 2 m, criteria B		

Table 72: Test requirements - damped vibration

5. Climate conditions

Temperature / humidity	Test carried out according to	Limits according to
Dry heat	EN 60068-2-2	EN 61131-2: Programmable logic controllers

Table 73: Overview of limits and test guideline standards for temperature and humidity

5.1 Dry heat

Test carried out according to EN 60068-2-2	Limits according to EN 61131-2		
Dry heat	16 hours at +70 °C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours		

Table 74: Test requirements - dry heat

6. Safety

Safety	Test carried out according to	Limits according to
Ground resistance	EN 61131-2	EN 61131-2: Programmable logic controllers
Residual voltage	EN 61131-2	EN 61131-2: Programmable logic controllers

Table 75: Overview of limits and testing guidelines for safety

6.1 Leakage current

Test carried out	B&R		
Leakage current: Phase to ground	< 1 mA		

Table 76: Test requirements - leakage current

6.2 Voltage range

Test carried out according to	Limits according to EN 61131-2	
	Measurement value	Tolerance min/max
Supply voltage	24 VDC 48 VDC 125 VDC	-15 % +20 %
	24 VAC 48 VAC 100 VAC 110 VAC 120 VAC 200 VAC 230 VAC 240 VAC 400 VAC	15 % +10 %

Table 77: Test requirements - voltage range

6.3 Protection type

Test carried out according to	Limits according to EN 60529		
Protection of the operating equipment	IP6 Protection against large solid foreign bodies: dust-proof		
Protection of personnel	IP6 Protection against touching dangerous parts with conductor		
Protection against water permeation with damaging consequences	IP5 Protected against sprayed water		

Table 78: Test requirements - protection

7. International certifications

B&R products and services comply with applicable standards. They 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 give special consideration to the reliability of our products in an industrial environment.

Certifications	
USA and Canada 	All important B&R products are tested and listed by Underwriters Laboratories and checked quarterly by a UL Inspector. This mark is valid for the USA and Canada and simplifies certification of your machines and systems in these areas.
Europe 	All harmonized EN standards for the valid guidelines are met.

Table 79: International certifications

Chapter 6 • Accessories

1. Overview

Model number	Product ID	Note
5MMUSB.0128-00	USB flash drive 128 MB SanDisk USB 2.0 flash drive 128 MB	<i>Cancelled since 12/2005</i>
5MMUSB.0256-00	USB flash drive 256 MB SanDisk USB 2.0 flash drive 256 MB	
5MMUSB.0512-00	USB flash drive 512 MB SanDisk USB 2.0 flash drive 512 MB	
5MMUSB.1024-00	USB flash drive 1 GB SanDisk USB 2.0 flash drive 1 GB	
5MMUSB.2048-00	USB flash drive 2 GB SanDisk USB 2.0 flash drive 2 GB	
5AC800.EXTX-00	Legend strip template for AP800 extension for 5AC800.EXT2-00, 5AC800.EXT2-01, for 3 devices.	
5AC800.EXTX-01	Legend strip template for AP800 extension 1 for 5AC800.EXT3-00, 5AC800.EXT3-01, for 2 devices.	
5AC800.EXTX-02	Legend strip template for AP800 extension 2 for 5AC800.EXT3-04, 5AC800.EXT3-05, for 1 device right and device left.	
5AC800.EXTX-03	Legend strip template for AP800 extension 3 for 5AC800.EXT3-02, 5AC800.EXT3-03, for 3 devices.	
5AC800.150x-00	Legend strip template for AP800 display for 5AP880.1505-00, for 3 devices.	

Table 80: Model numbers - accessories

2. USB flash drive

Information:

We reserve the right to supply alternative products, due to the vast quantity of flash drives available on the market and their corresponding short product lifecycle. Therefore, the following measures might be necessary in order to boot from these flash drives (e.g. the SanDisk Cruzer Micro Flash Drive with 512 MB):

- The flash drive must be reformatted or in some cases even re-partitioned (set active partition).
- The flash drive must be at the top of the BIOS boot order, or alternatively the IDE controllers can also be deactivated in the BIOS. This can be avoided in most cases if a "fdisk /mbr" is also executed on the USB flash drive.

2.1 General information

USB flash drives are easy-to-exchange memory media. Because of the fast data transfer (USB 2.0), the USB flash drives are ideal for use as a portable memory medium. Without requiring additional drivers ("Hot Plug & Play" - except with Windows 98SE), the USB flash drive can be converted immediately into an additional drive where data can be read or written. Only USB flash drives from the memory specialists [SanDisk](#) are used.

2.2 Order data

Model number	Description	Image
5MMUSB.0128-00	USB flash drive 128 MB SanDisk Cruzer Mini	 SanDisk Cruzer® Mini SanDisk Cruzer® Micro
5MMUSB.0256-00	USB flash drive 256 MB SanDisk Cruzer Mini	
5MMUSB.0512-00	USB flash drive 512 MB SanDisk Cruzer Mini up to rev. E0 or Cruzer Micro starting with rev. E0	
5MMUSB.1024-00	USB flash drive 1 GB SanDisk Cruzer Mini up to rev. C0 or Cruzer Micro starting with rev. C0	
5MMUSB.2048-00	USB flash drive 2 GB SanDisk Cruzer Micro	

Table 81: Order data - USB flash drives

2.3 Technical data

Information:

The following defined characteristics, features and limit values are only valid for this accessory and can deviate from the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.

Features	5MMUSB.0128-00	5MMUSB.0256-00	5MMUSB.0512-00	5MMUSB.1024-00	5MMUSB.2048-00
LED Cruzer Mini / Cruzor Micro	1 LED (green), signals data transfer (send and receive)				
Power supply Current requirements Cruzor Mini / Cruzor Micro	via the USB port 650 µA sleep mode, 150 mA read/write				
Interface Cruzor Mini / Cruzor Micro Type Transfer rate Sequential reading Sequential writing Connection	USB specification 2.0 high speed device, mass storage class, USB-IF and WHQL certified USB 1.1 and 2.0-compatible Up to 480 MBit (high speed) Max. 8.7 MB/second Max. 1.7 MB/second To each USB type A interface				
MTBF (at 25 °C) Cruzer Mini / Cruzor Micro	100,000 hours				
Data retention Cruzer Mini / Cruzor Micro	10 years				
Maintenance Cruzer Mini / Cruzor Micro	None				
Operating system support Cruzer Mini Cruzer Micro	Windows CE 4.1, CE 4.2, 98SE ¹⁾ , ME, 2000, XP, Mac OS 9.1.x and Mac OS X 10.1.2 Windows CE 4.2, CE 5.0, ME, 2000, XP and Mac OS 9.1.x+, OS X v10.1.2+				
Mechanical characteristics					
Dimensions Height - Cruzor Mini / Cruzor Micro Width - Cruzor Mini / Cruzor Micro Depth - Cruzor Mini / Cruzor Micro	62 mm / 52.2 mm 19 mm / 19 mm 11 mm / 7.9 mm				
Environmental characteristics					
Environmental temperature Cruzor Mini / Cruzor Micro Operation Storage Transportation	0 °C .. +45 °C -20 °C .. +60 °C -20 °C .. +60 °C				
Humidity Cruzor Mini / Cruzor Micro Operation Storage Transportation	10 % .. 90 %, non-condensing 5 % .. 90 %, non-condensing 5 % .. 90 %, non-condensing				
Vibration Cruzor Mini / Cruzor Micro Operation Storage Transportation	at 10 - 500 Hz: 2 g (19.6 m/s ² 0 peak), oscillation rate 1/minute at 10 - 500 Hz: 4 g (39.2 m/s ² 0 peak), oscillation rate 1/minute at 10 - 500 Hz: 4 g (39.2 m/s ² 0 peak), oscillation rate 1/minute				

Table 82: Technical data - USB flash drive 5MMUSB.xxxx-00

Features	5MMUSB.0128-00	5MMUSB.0256-00	5MMUSB.0512-00	5MMUSB.1024-00	5MMUSB.2048-00
Shock Cruiser Mini / Cruiser Micro Operation Storage Transportation	Max. 40 g (392 m/s ² 0-peak) and 11 ms length Max. 80 g (784 m/s ² 0-peak) and 11 ms length Max. 80 g (784 m/s ² 0-peak) and 11 ms length				
Altitude Cruiser Mini / Cruiser Micro Operation Storage Transportation	3048 meters 12192 meters 12192 meters				

Table 82: Technical data - USB flash drive 5MMUSB.xxxx-00 (cont.)

1) For Win 98SE, a driver can be downloaded from the [SanDisk](#) homepage.

2.3.1 Temperature humidity diagram for operation and storage

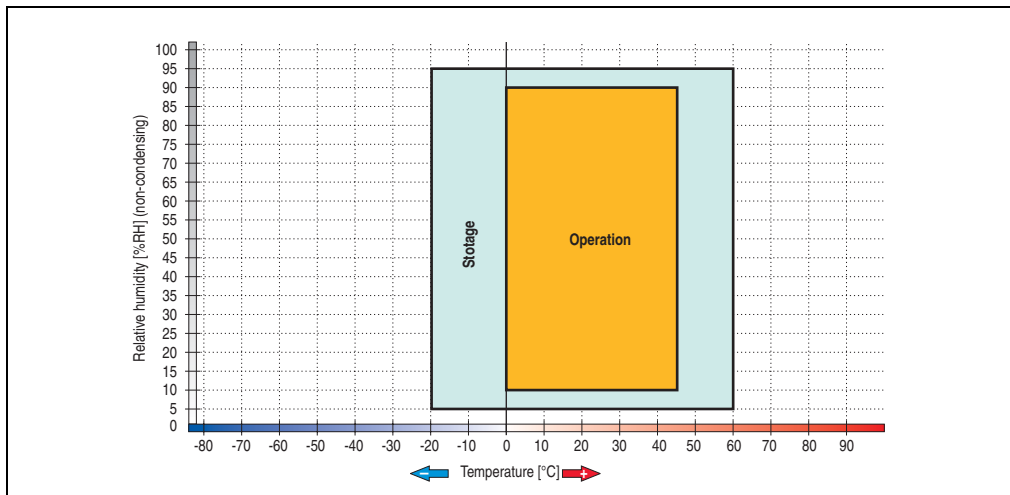


Figure 111: Temperature humidity diagram for USB flash drive - 5MMUSB.xxxx-00

2.4 Contents of delivery

SanDisk Cruzer Mini
1 USB flash drive in desired size + 1 strap

SanDisk Cruzer Micro
1 USB flash drive in desired size + 2 replacement covers (blue and pink) + 1 strap


Table 83: Contents of delivery - USB flash drives 5MMUSB.xxxx-00

2.5 Creating a bootable USB flash drive

When used in connection with an Automation PC 620 / Panel PC 700, it is possible to boot the system from one of the flash drives available from B&R (5MMUSB.0128-00, 5MMUSB.0256-00, 5MMUSB.0512-00 and 5MMUSB.124-00). The flash drive must be specially prepared for this.

2.5.1 Requirements

The following peripherals are required for creating a bootable flash drive:

- B&R USB flash drive (see model number "USB Flash Drives", on page 30)
- Automation PC 620 or Panel PC 700
- USB floppy drive (external or slide-in USB floppy 5AC600.FDDS-00)
- PS/2 or USB keyboard
- A start disk created using MS-DOS 6.22 or Windows 98 - 1.44MB HDD (Windows Millennium, NT4.0, 2000, XP start disks cannot be used).
The tools "format.com" and "fdisk.exe" must be located on the diskette!

2.5.2 Procedure

- Plug in the flash drive and boot from the start disk.
- Set active partition on the flash drive using "fdisk" and follow the further instructions.
- Reboot the system from the start disk.
- Format and simultaneously transfer the system files to the flash drive with the command "format c: /s".

3. Legend strip templates

Automation Panel 800 devices with keys and the extension units are delivered with partially pre-labeled key legend strips (F1, F2, etc.). The key legend strip slots are accessible on the back of the Automation Panel 800 display and extension units (above and below).

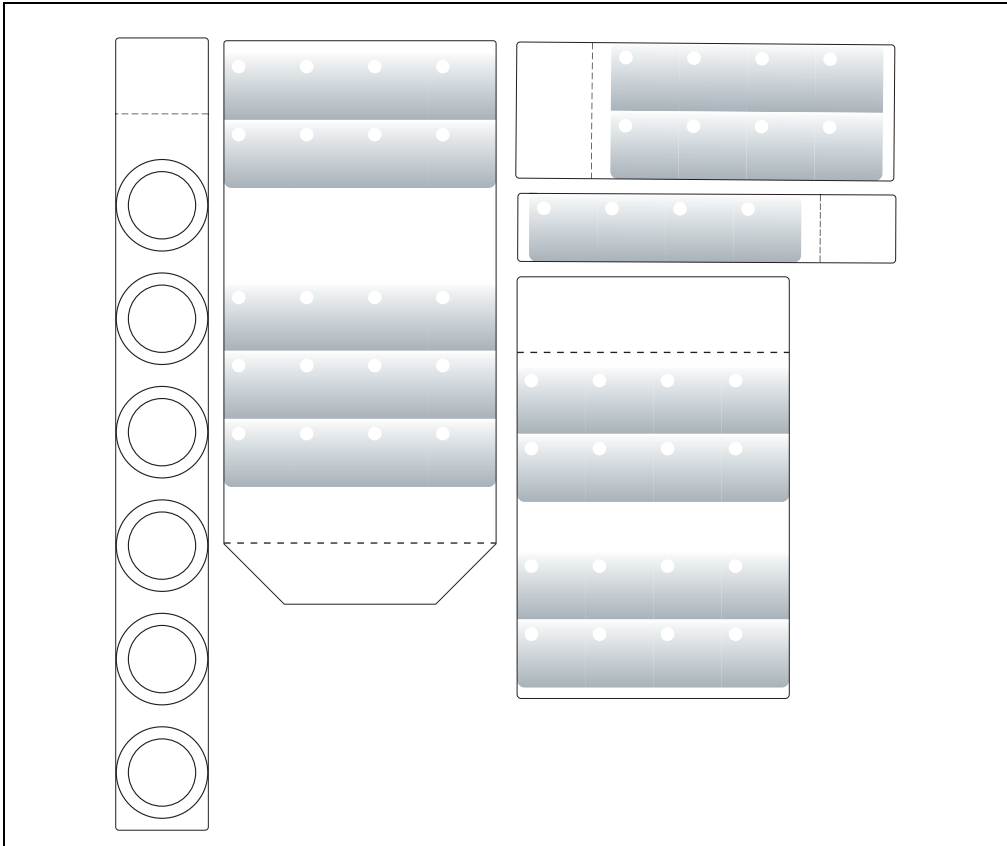


Figure 112: Legend strip samples

Printable legend strips in A4 format for the extension units and in A3 format for display unit 5AP880.1505-00 can be ordered from B&R. They can be printed using a standard laser printer (b/w or color) in a temperature range from -40 °C to +125 °C. A print template (available for Corel Draw version 7, 9 and 10) for the respective legend strip template can be downloaded from the B&R homepage www.br-automation.com. The print templates can also be found on the HMI Drivers & Utilities DVD (Mod. No. 5SWHMI.0000-00).

3.1 Order data

Model number	Short description	Note
5AC800.EXTX-00	Legend strip template for AP800 extension for 5AC800.EXT2-00, 5AC800.EXT2-01, for 3 devices.	
5AC800.EXTX-01	Legend strip template for AP800 extension 1 for 5AC800.EXT3-00, 5AC800.EXT3-01, for 2 devices.	
5AC800.EXTX-02	Legend strip template for AP800 extension 2 for 5AC800.EXT3-04, 5AC800.EXT3-05, for 1 device right and 1 device left.	
5AC800.EXTX-03	Legend strip template for AP800 extension 3 for 5AC800.EXT3-02, 5AC800.EXT3-03, for 3 devices.	
5AC800.150x-00	Legend strip template for AP800 display for 5AP880.1505-00, for 3 devices.	

Table 84: Order data - legend strip template

Chapter 7 • Maintenance / servicing

1. Cleaning

Danger!

Automation Panel 800 devices may only be cleaned when switched off. This is to prevent unintended functions from being triggered when touching the touch screen or pressing the buttons or entry devices.

A moist towel should be used to clean the Automation Panel 800 device. When moistening the cloth, use only water with detergent, screen cleaning agent, or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand, not sprayed directly on the Automation Panel 800 device! Never use aggressive solvents, chemicals, scouring agents, pressurized air or steam jet.

Information:

Displays with touch screens should be cleaned at regular intervals.

Appendix A

1. E-stop button

The E-stop unit consists of an E-stop switching element and an E-stop button.

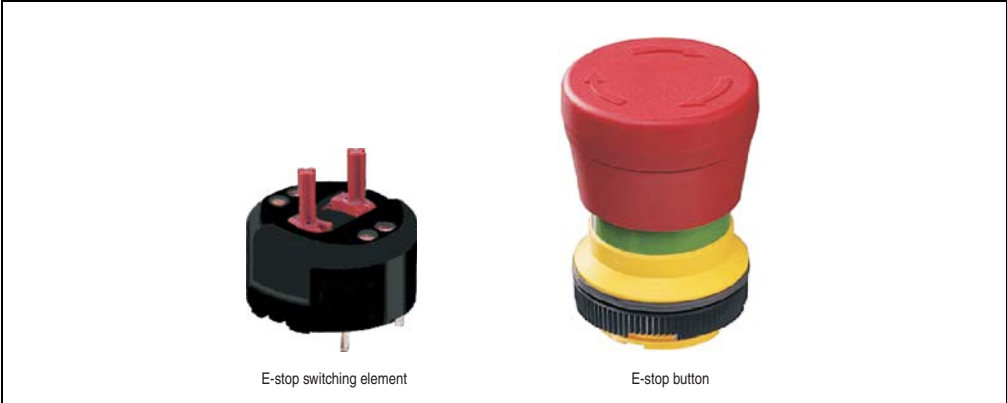


Figure 113: E-stop unit

Information:

The following characteristics, features and limit values are only valid for these individual components and can deviate from those for the entire device. For the entire device in which these individual components are used, refer to the data given specifically for the entire device.

Property	E-stop switching element	E-stop button
Manufacturer	RAFI	RAFI
Type	22FS switching element E-stop, 2 N.C. contacts	22FS E-stop, not illuminated
Operating voltage AC/DC	Max. 120 V	-
Operating current AC/DC	Max. 550 mA	-
Contact system	Self-cleaning bridge contact	-

Table 85: Technical data - E-stop switching element and E-stop button

E-stop button

Property	E-stop switching element	E-stop button
Standards	Positive opening contact according to IEC 947-5-1	-
Normally closed contact	-	According to IEC 68-1-2, 2-2 and 2-30
Weathering resistance	-	According to IEC 68-2-11
Salt mist	-	IP65
Protection (front side)	-	IEC 947, 1058; UL 508; CSA 22.2;
Approbations	-	EU-NSR 73/23; ULc
Impact resistance	At least 100 N	
Operating force	Approx. 5 N per contact element	-
Lifespan	1 million actuations at 10 mA/24 VDC	50000 actuations
Ambient temperature		
Operation	-25 °C to +70 °C	
Storage	-40 °C to +80 °C	
Transportation	-40 °C to +80 °C	

Table 85: Technical data - E-stop switching element and E-stop button (cont.)

2. Key switch

The key switch unit consists of a key switch switching element and a key switch.



Figure 114: Key switch unit

Information:

The following characteristics, features and limit values are only valid for these individual components and can deviate from those for the entire device. For the entire device in which these individual components are used, refer to the data given specifically for the entire device.

Property	Key switch switching element	Key switch
Manufacturer	RAFI	RAFI
Type	22FS universal switching element, 1 N.O. contact	22FS key switch, round collar
Contact function	Key	
Operating voltage AC/DC	Max. 42 V	-
Operating current AC/DC	Max. 100 mA	-
Contact system	Self-cleaning bridge contact	-
Standards		
Normally open contact	-	-
Weathering resistance	-	According to IEC 68-1-2, 2-2 and 2-30
Salt mist	-	According to IEC 68-2-11
Protection (front side)	-	IP65
Approbations	-	IEC 947, 1058; UL 508; CSA 22.2; EU-NSR 73/23; ULc
Impact resistance	At least 100 N	
Rotation angle	1 x 40 degrees, clockwise	
Outlet position for the key	0	

Table 86: Technical data - key switch switching element and key switch

Key switch

Property	Key switch switching element	Key switch
Lifespan	1 million actuations at 10 mA/24 VDC	0.3 million, operations
Ambient temperature	-25 °C to +70 °C -40 °C to +80 °C -40 °C to +80 °C	
Operation		
Storage		
Transportation		

Table 86: Technical data - key switch switching element and key switch (cont.)

2.1 Rotation angle

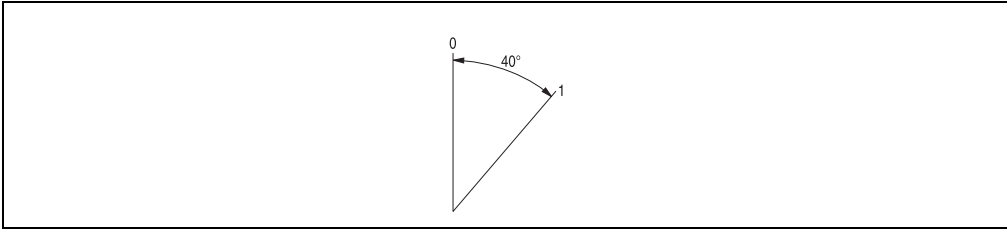


Figure 115: Angle of rotation - key switch

3. Touch screen

3.1 Elo

Information:

The following characteristics, features and limit values are only valid for these individual components and can deviate from those for the entire device. For the entire device in which these individual components are used, refer to the data given specifically for the entire device.

Elo Accu touch screen	Specifications
Manufacturer	Elo
Accuracy For < 18" diagonals For > 18" diagonals	Typically < than 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
Reaction time	< 10 ms
Release pressure	< 113 grams
Resolution	4096 x 4096 touch points
Light permeability	Up to 80 % $\pm$ 5 %
Temperature Operation Storage Transportation	- 10 °C to + 50 °C - 40 °C to + 71 °C - 40 °C to + 71 °C
Relative humidity Operation Storage Transportation	Max. 90 % at max. 35 °C Max. 90 % at max. 35 °C for 240 hours, non-condensing Max. 90 % at max. 35 °C for 240 hours, non-condensing
Waterproofing	IP65
Lifespan	35 million contacts on the same point
Chemical resistance ¹⁾	Acetone, ammonia-based glass cleaner, normal food and drinks, hexane, methylene chloride, methyl ethyl ketone, mineral spirits, turpentine, isopropyl alcohol
Activation	Finger, pointer, credit card, glove
Drivers	Touch screen drivers can be downloaded from the download area on the B&R homepage (www.br-automation.com). Additionally, they can also be found on the B&R HMI Driver and Utilities DVD (Mod. No. 5SWHMI.0000-00).

Table 87: Technical data - Elo Accu touch screen 5-wire

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

3.1.1 Temperature humidity diagram for operation and storage

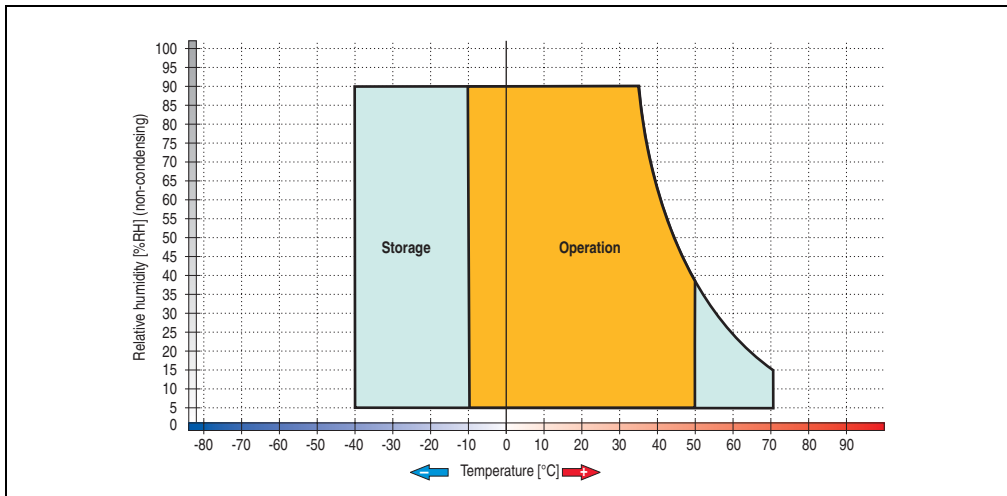


Figure 116: Temperature humidity diagram for Elo Accu touch screen 5-wire

3.1.2 Cleaning

The touch screen should be cleaned with a moist lint-free cloth. When moistening the cloth, use only water with detergent, screen cleaning agent, or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand and not sprayed directly onto the touch screen itself. Never use aggressive solvents, chemicals, scouring agents, pressurized air or steam jet.

4. Mylar

Information:

The following characteristics, features and limit values are only valid for these individual components and can deviate from those for the entire device. For the entire device in which these individual components are used, refer to the data given specifically for the entire device.

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

Alcohol Cyclohexanol Diacetone alcohol Glycol Isopropanol Glycerin Methanol Triacetin Dowandol DRM/PM	Formaldehyde 37%-42% Acetaldehyde Aliphatic hydrocarbons Toluene Xylene White spirits	1.1.1.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 powders Fabric conditioner Ferric chloride 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 Universal brake fluid Aviation fuel Petrol Water Sea water Decon	

Table 88: Chemical resistance of the Mylar

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

5. Perspectives

The perspectives can be seen in the technical data for the display units.

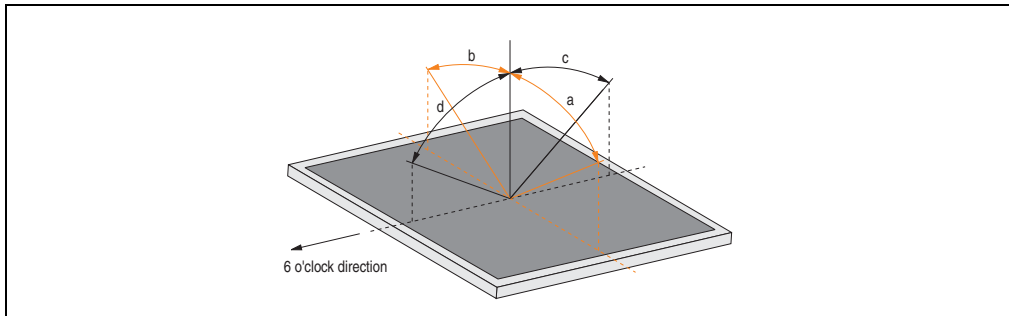


Figure 117: Perspectives

6. Glossary

A

APC

Abbreviation for »Automation **PC**«

Automation Runtime

A uniform runtime system for all B&R automation components.

B

Baud rate

Measurement unit for data transfer speed. It indicates the number of states for a transferred signal per second and is measured using the baud unit of measurement. 1 baud = 1 bit/sec or 1 bps.

BIOS

An abbreviation for »**B**asic **I**nput/**O**utput **S**ystem«. Core software for computer systems with essential routines for controlling input and output processes on hardware components, for performing tests after system start and for loading the operating system. Although BIOS is used to configure a system's performance, the user does not usually come into contact with it.

Bit

Binary digit > binary position, binary character, binary digit smallest discrete information unit. A bit can have the value 0 or 1.

Bit rate

The number of bits that can be transferred within a specified time unit. 1 bit/sec = 1 baud.

Bootstrap loader

A program that automatically runs when the computer is switched on or restarted. After some basic hardware tests have been carried out, the bootstrap loader starts a larger loader and hands over control to it, which in turn boots the operating system. The bootstrap loader is typically found in ROM on the computer.

Bus unit

Provit bus units consist of the housing, interface board slots and the power supply for the system units.

Byte

Data format [1 byte = 8 bit] and a unit for characterizing information amounts and memory capacity. The following units are the commonly used units of progression : KB, MB, GB.

B&R Automation Runtime

Windows-based program for creating installation disks to install B&R Automation Runtime™ on the target system.

B&R Automation Studio

B&R Automation Studio™ is the integrated software development environment which includes tools for all parts of an automation project, making it the foundation for applications of any size and scope. Regardless of which stage a project is in – planning, implementation, testing, production, commissioning, or service – this same environment always makes up the interface to the machine.

C

CD-ROM

Abbreviation for »**C**ompact **D**isc **R**ead-**O**nly **M**emory« A removable data medium with a high capacity of ~700 MB. CD-ROMs are optically scanned.

CE mark

A CE mark for a product. It consists of the letters 'CE' and indicates conformity to all EU guidelines for the labeled product. It indicates that the individual or corporate body, who has performed or attached the label, assures that the product conforms to all EU guidelines for the complete harmonization. It also indicates that all mandatory conformity evaluation procedures have taken place.

CompactFlash®

CompactFlash memory cards [CF cards] are exchangeable nonvolatile mass memory systems with very small dimensions [43 x 36 x 3.3 mm, approximately half the size of a credit card]. In addition to the Flash memory chips, the controller is also accommodated on the cards. CF cards provide complete PC Card-ATA functionality and compatibility. A 50-pin CF card can be simply inserted in a passive 68-pin type II adapter card. It conforms to all electrical and mechanical PC Card interface specifications. CF cards were launched by SanDisk back in 1994. Currently, memory capacities reach up to 8 GB per unit. Since 1995, Compact Flash Association [CFA] has been looking after standardization and the worldwide distribution of CF technology

CPU

An abbreviation for »**C**entral **P**rocessing **U**nit« Interprets and executes commands. It is also known as a "microprocessor" or "processor" for short. A processor is able to receive, decode and execute commands, as well as transfer information to and from other resources via the computer bus.

CRT

An abbreviation for »**C**athode **R**ay **T**ube« The main component of a television set or a standard computer screen. A cathode ray tube consists of a vacuum tube, in which one or more electron guns are installed. Each electron gun creates a horizontal electron beam, which appears on the

front of the tube (the screen). The inner surface of the screen is coated with phosphor, which is lit when hit by the electrons. Each of the electron beams move in a line from top to bottom. In order to prevent flickering, the screen content is updated at least 25 times per second. The sharpness of the picture is determined by the number of pixels on the screen.

D

DMA

Direct Memory Access > Accelerated direct access to a computer's RAM through by-passing the CPU.

DRAM

An abbreviation for »**D**ynamic **R**andom **A**ccess **M**emory« Dynamic RAM consists of an integrated semiconductor circuit, which stores information based on the capacitor principle. Capacitors lose their charge in a relatively short time. Therefore, dynamic RAM circuit boards must contain a logic that allows continual recharging of RAM chips. Since the processor cannot access dynamic RAM while it is being recharged, one or more waiting states can occur when reading or writing data. Although it is slower, dynamic RAM is used more often than static RAM, because the simple design of the circuits means that it can store four times more data than static RAM.

DVD

An abbreviation for »**D**igital **V**ersatile **D**isc« The next generation of optic data carrier technology. Using this technology it is possible to code video, audio and computer data on CD. DVDs can store a higher volume of data than conventional CDs. Standard DVDs , which have a single coating, can hold 4.7 GB. Double coated DVDs can hold 8.5 GB. Double sided DVDs can hold up to 17 GB. A special drive is needed for DVDs. Conventional CDs can also be played on DVD drives.

E

EMC

»**E**lectromagnetic **C**ompatib**i**lity« The ability of a device or a system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment [IEV 161-01-07])

EPROM

Erasable PROM > (complete with ultraviolet light)

Ethernet

An IEEE 802.3 standard for networks. Ethernet uses bus or star topology and controls the traffic on communication lines using the access procedure CSMA/CD (Carrier Sense Multiple Access with Collision Detection). Network nodes are connected using coaxial cables, optical fiber cables

or twisted pair cabling. Data transfer on an Ethernet network takes place in frames of variable lengths, which consist of supply and controller information as well as 1500 bytes of data. The Ethernet standard provides base band transfers at 10 megabit and 100 megabit per second.

ETHERNET Powerlink

is an enhancement of standard Ethernet. It enables data exchange under strict real-time conditions with cycle times down to 200 μ s and jitter under 1 μ s. This makes Ethernet power available on all communication levels of Automation technology – from control levels to I/O. Ethernet Powerlink was initialized by the company B&R Industrie-Elektronik and is now managed by the open end-user and vendor association, EPSG - ETHERNET Powerlink Standardization Group (www.ethernet-powerlink.org).

F

FDD

Abbreviation for »**F**loppy **D**isk **D**rive« Reading device for removable magnetic memory from the early days of PC technology. Due to their sensitivity and moving components, FDDs have been almost completely replaced by CompactFlash memory in modern automation solutions.

Firmware

Programs stored permanently in read-only memory. Firmware is software used to operate computer-controlled devices, which generally stays in the device throughout its lifespan or over a long period of time. Such software includes operating systems for CPUs and application programs for industrial-PCs as well as programmable logic controllers, (i.e. the software in a washing machine controller). This software is written in read-only memory (ROM, PROM, EPROM) and cannot be easily replaced.

Floppy

Also known as a diskette. A round plastic disk with an iron oxide coating, which can store a magnetic field. When the floppy disk is inserted in a disk drive, it rotates, so that the different areas (or sectors) of the disk's surface are moved under the read-write head, allowing the magnetic orientation of the particle to be modified and recorded. Orientation in one direction represents binary 1, while the reverse orientation represents binary 0.

FPC

An abbreviation for »**F**lat **P**anel **C**ontroller«

FPD

An abbreviation for »**F**lat **P**anel **D**isplay«

FTP

»**File Transfer Protocol**« Rules for transferring data over a network from one computer to another computer. This protocol is based on TCP/IP, which has established itself as quasi standard for the transfer of data via Ethernet networks. FTP is one of the most-used protocols on the Internet. It is defined in RFC 959 in the official regulations for Internet communication.

G

GB

Gigabyte (1 GB = 230 or 1,073,741,824 bytes)

H, I, K

HDD

An abbreviation for »**Hard Disk Drive**« ; Fixed magnetic mass memory with high capacities e.g. 120 GB.

Illuminated ring keys

They are luminous rings developed by B&R. The LEDs are available in red, yellow, and green, and can be combined as one-tone or two-tone illuminated key rings. Keys are labeled using legend strips.

Interface

From the hardware point of view, an interface is the connection point between two modules/devices/systems. The units on both sides of the interface are connected by the interface lines so that data, addresses and control signals can be exchanged. The term interface includes all functional, electrical and constructive conditions [coding, signal level, pin assignments], which characterize the connection point between the modules, devices or systems. Depending on the type of data transfer, a differentiation is made between parallel [e.g. Centronics, IEEE 488] and serial interfaces [e.g. V.24, TTY, RS232, RS422, RS485], which are set up for different transfer speeds and transfer distances. From the point of view of software, the term interface describes the transfer point between program modules using specified rules for transferring the program data.

Keypad modules

Keypad modules are divided into two groups: **Standard Keypad Modules** (can be cascaded to a controller) and **Special Keypad Modules** (must be connected by an electrician according to the function e.g. Emergency Stop).

L

LCD

An abbreviation for »**Liquid Crystal Display**« A display type, based on liquid crystals which have a polarized molecular structure and are enclosed between two transparent electrodes as a thin layer. If an electrical field is applied to the electrodes, the molecules align themselves with the

Glossary

field and form crystalline arrangements, which polarize the light passing through. A polarization filter, which is arranged using lamellar electrodes, blocks the polarized light. In this way, a cell (pixel) containing liquid crystals can be switched on using electrode gates, thus coloring this pixel black. Some LCD displays have an electroluminescent plate behind the LCD screen for lighting. Other types of LCD displays can use color.

LED

An abbreviation for »Light Emitting Diode« A semiconductor diode which converts electrical energy into light. LEDs work on the principle of electroluminescence. They are highly efficient because they do not produce much heat in spite of the amount of light they emit. For example, "operational status indicators" on floppy disk drives are LEDs.

M

MB

Megabyte (1 MB = 220 or 1,048,576 bytes)

Microprocessor

Highly integrated circuit with the functionality of a CPU, normally housed on a single chip. It comprises a control unit, arithmetic and logic unit, several registers and a link system for connecting memory and peripheral components. The main performance features are the internal and external data bus and address bus widths, the command set and the clock frequency. Additionally, a choice can be made between CISC and RISC processors. The first commercially available worldwide microprocessor was the Intel 4004. It came on the market in 1971.

Modem

Modulator/demodulator > modulation/demodulation equipment, an add-on card or external device, which allows information to be exchanged between computers over the telephone network using digital/analog or analog/digital signal conversion.

Motherboard

A circuit board, which houses the main components of a computer such as the CPU switching circuit, co-processors, RAM, ROM for firmware, interface circuits and expansion slots for hardware expansions.

Multitasking

Multitasking is an operating mode in an operating system, which allows several computer tasks to be executed parallel and simultaneously.

N

.NET

DOTNET - Microsoft's new development platform provides a common runtime library and a type system for all programming languages. DOTNET is the umbrella term for the following products, strategies and technologies; .NET framework, a new software platform, Visual Studio .NET, a new development environment that supports several .NET programming languages (e.g. C# or VB.NET especially created for .NET), .NET My Services, a group of services taking over functions such as authentication, .NET Enterprise Server, which apart from the names, is independent of the other technologies and includes the products Exchange Server 2000, Application Center 2000, SQL Server 2000. .NET devices, supported by a slimmed down version of the .NET framework (.NET Compact Framework).

P**Panel**

A common term for B&R display units (with or without keys).

Panelware

A generic term given for standard and special keypad modules offered by B&R.

Powerlink

See "ETHERNET Powerlink".

PROFIBUS-DP

PROFIBUS for "decentralized peripherals". PROFIBUS-DP can be used to allow simply digital and analog I/O modules as well as intelligent signal and data processing units to be installed in the machine room, which among other things can significantly reduce cabling costs. Many used for time-critical factory automation applications.

R**RAM**

An abbreviation for »**R**andom **A**ccess **M**emory« A semiconductor memory which can be read or written to by the microprocessor or other hardware components. Memory locations can be accessed in any order. The various ROM memory types do allow random access, however they cannot be written to. The term RAM refers to a more temporary memory that can be written to as well as read.

Real-time

A system is operating in real-time or has real-time capability, if the input sizes [e.g. signals, data] are received and processed in a defined time period, and the results are made available in real-time for a partner system or the system environment. See also 'Real-time Demands' and 'Real-time System'.

ROM

Glossary

An abbreviation for »**Read-Only Memory**« A semiconductor in which programs or data have already been permanently stored during the production process.

RS485

Recommended Standard Number 485; Interface standard upgraded from RS422; High level: 1.5 ...-6 V, Low level: +1,5 ... +6 V; 2-wire connection [half duplex operation] or 4-wire connection [full duplex operation]; cable lengths up to 1200 m, transfer rates up to 10 Mbit/s. Up to 32 participants can be connected to an RS485 bus [sender/receiver].

S

SDRAM

An abbreviation for »**Synchronous Dynamic Random Access Memory**« A construction of dynamic semiconductor components (DRAM), which can operate with higher clock rates than conventional DRAM switching circuits. This is made possible using block access. For each access, the DRAM determines the next memory addresses to be accessed.

SRAM

An abbreviation for »**Static Random Access Memory**« A semiconductor memory (RAM) made up of certain logic circuits (flip-flop), which only keeps stored information while the operating voltage is active. In computers, static RAM is generally only used for the cache memory.

T

Task

Program unit, which is assigned a specific priority by the real-time operating system. It contains a complete process and can consist of several modules.

TCP/IP

Transmission Control Protocol/Internet Suit of Protocols; Network protocol, generally accepted standard for data exchange in heterogeneous networks. TCP/IP is used both in local networks for communication between various computer and also for LAN to WAN access.

Touch screen

Screen with touch sensors for activating an item with the finger.

U

UART

An abbreviation for »**Universal Asynchronous Receiver-Transmitter**« Generally, a module consisting of a single integrated circuit, which combines the circuits required for asynchronous serial communication for both sending and receiving. UART represents the most common type of circuit in modems for connection to a personal computer.

USB

An abbreviation for "**U**niversal **S**erial **B**us". A serial bus with a bandwidth of up to 12 megabits per second (Mbit/s) for connecting a peripheral device to a microcomputer. Up to 127 devices can be connected to the system using a single multipurpose connection, the USB bus (e.g. external CD drives,

Printer, modems, mouse and keyboard. This is done by connecting the devices in a row. USB allows devices to be changed when the power supply is switched on (hot plugging) and multi-layered data flow.

V

Visual Components

Integrated in B&R Automation Studio. Visual Components can be used to configure visualization projects which use text and graphics.

W

Windows CE

Compact 32-bit operating system with multitasking and multithreading, that Microsoft developed especially for the OEM market. It can be ported for various processor types and has a high degree of real-time capability. The development environment uses proven, well established development tools. It is an open and scalable Windows operating system platform for many different devices. Examples of such devices are handheld PCs, digital wireless receivers, intelligent mobile phones, multimedia consoles, etc. In embedded systems, Windows CE is also an excellent choice for automation technology.

X

XGA

An abbreviation for »**EX**tended **G**raphics **A**rray« An expanded standard for graphic controllers and monitors which was introduced by IBM in 1990. This standard supports a 640 * 480 resolution with 65,536 colors or a 1024 * 768 resolution with 256 colors. This standard is generally used in workstation systems.

Figure 1:	Component overview - Automation Panel 800 with extension units.....	21
Figure 2:	Configuration - basic system.....	23
Figure 3:	Selection guide - optional components	24
Figure 4:	Example configurations.....	25
Figure 5:	Configuration - Example 1.....	27
Figure 6:	Required components - Example 1.....	27
Figure 7:	Dimensions - Example 1.....	28
Figure 8:	Configuration - Example 2.....	29
Figure 9:	Required components - Example 2.....	29
Figure 10:	Dimensions - Example 2.....	30
Figure 11:	Configuration - Example 3.....	31
Figure 12:	Required components - Example 3.....	31
Figure 13:	Dimensions - Example 3.....	32
Figure 14:	Front view - 5AP820.1505-00.....	33
Figure 15:	Rear view - 5AP820.1505-00.....	33
Figure 16:	Temperature humidity diagram - 5AP820.1505-00.....	36
Figure 17:	Dimensions - 5AP820.1505-00.....	36
Figure 18:	Front view - 5AP880.1505-00.....	37
Figure 19:	Rear view - 5AP880.1505-00.....	37
Figure 20:	Temperature humidity diagram - 5AP880.1505-00.....	40
Figure 21:	Dimensions - 5AP880.1505-00.....	40
Figure 22:	Key dimensions - 5AP880.1505-00.....	41
Figure 23:	E-stop circuit connections	43
Figure 24:	Front view - 5AC800.EXT1-00.....	44
Figure 25:	Rear view - 5AC800.EXT1-00.....	44
Figure 26:	Dimensions - 5AC800.EXT1-00.....	46
Figure 27:	Key dimensions - 5AC800.EXT1-00.....	47
Figure 28:	Front view - 5AC800.EXT2-00.....	48
Figure 29:	Rear view - 5AC800.EXT2-00.....	48
Figure 30:	Dimensions - 5AC800.EXT2-00.....	50
Figure 31:	Key dimensions - 5AV800.EXT2-00.....	50
Figure 32:	Front view - 5AC800.EXT2-01.....	51
Figure 33:	Rear view - 5AC800.EXT2-01.....	51
Figure 34:	Dimensions - 5AC800.EXT2-01.....	53
Figure 35:	Key dimensions - 5AC800.EXT2-01.....	53
Figure 36:	Front view - 5AC800.EXT3-00.....	54
Figure 37:	Rear view - 5AC800.EXT3-00.....	54
Figure 38:	Dimensions - 5AC800.EXT3-00.....	56
Figure 39:	Key dimensions - 5AC800.EXT3-00.....	56
Figure 40:	Front view - 5AC800.EXT3-01.....	57
Figure 41:	Rear view - 5AC800.EXT3-01.....	57
Figure 42:	Dimensions - 5AC800.EXT3-01.....	59
Figure 43:	Key dimensions - 5AC.EXT3-01.....	59
Figure 44:	Front view - 5AC800.EXT3-02.....	60
Figure 45:	Rear view - 5AC800.EXT3-02.....	60
Figure 46:	Dimensions - 5AC800.EXT3-02.....	62
Figure 47:	Key dimensions - 5AC800.EXT3-02.....	63

Figure index

Figure 48:	Front view - 5AC800.EXT3-03	64
Figure 49:	Rear view - 5AC800.EXT3-03	64
Figure 50:	Dimensions - 5AC800.EXT3-03	66
Figure 51:	Key dimensions - 5AC800.EXT3-03	67
Figure 52:	Front view - 5AC800.EXT3-04	68
Figure 53:	Rear view - 5AC800.EXT3-04	68
Figure 54:	Dimensions - 5AC800.EXT3-04	70
Figure 55:	Key dimensions - 5AC800.EXT3-04	71
Figure 56:	Front view - 5AC800.EXT3-05	72
Figure 57:	Rear view - 5AC800.EXT3-05	72
Figure 58:	Dimensions - 5AC800.EXT3-05	74
Figure 59:	Key dimensions - EXT3-05	75
Figure 60:	Extension cover 5AC800.COV1-00	76
Figure 61:	Dimensions - extension cover 5AC800.COV1-00	77
Figure 62:	USB extension cover 5AC800.COV2-00	78
Figure 63:	Dimensions - USB extension cover 5AC800.COV2-00	79
Figure 64:	Extension connector 5AC800.CON1-00	80
Figure 65:	Dimensions - extension connector 5AC800.CON1-00	81
Figure 66:	Extension connector (60°) 5AC800.CON2-00	82
Figure 67:	Dimensions - extension connector 60° 5AC800.CON2-00	83
Figure 68:	Extension flange 5AC800.FLG1-00	84
Figure 69:	Dimensions - extension flange 5AC800.FLG1-00	85
Figure 70:	SDL cable 5CASDL.0xxx-20 Rev. < A5	87
Figure 71:	Plug dimensions (ODU Minisnap) - SDL cable 5CASDL.0xxx-20 Rev. < A5	87
Figure 72:	Pin assignments - SDL cable 5CASDL.0xxx-20 Rev. < A5	88
Figure 73:	SDL cable with extender 5CASDL.0xxx-30 Rev. < A5	89
Figure 74:	Plug dimensions (ODU Minisnap) - SDL cable 5CASDL.0xxx-30 Rev. < A5	89
Figure 75:	Pin assignments - SDL cable with extender 5CASDL.0xxx-30 Rev. < A5	90
Figure 76:	SDL cable 5CASDL.0xxx-20 Rev. ≥ A5	91
Figure 77:	Plug dimensions (ODU Minisnap) - SDL cable 5CASDL.0xxx-20 Rev. ≥ A5	91
Figure 78:	Pin assignments - SDL cable 5CASDL.0xxx-20 Rev. ≥ A5	92
Figure 79:	SDL cable with extender 5CASDL.0xxx-30 Rev. ≥ A5	93
Figure 80:	Plug dimensions (ODU Minisnap) - SDL cable 5CASDL.0xxx-30 Rev. ≥ A5	93
Figure 81:	Pin assignments - SDL cable with extender 5CASDL.0xxx-30 Rev. ≥ A5	94
Figure 82:	Voltage supply cable 5CAPWR.0xxx-20	95
Figure 83:	Plug dimensions (ODU Minisnap) - voltage supply cable 5CAPWR.0xxx-20	95
Figure 84:	Pin assignments - voltage supply cable 5CAPWR.0xxx-20	96
Figure 85:	X2X cable 5CAX2X.0xxx-00	97
Figure 86:	Plug dimensions (ODU Minisnap) - X2X cable 5CAX2X.0xxx-00	97
Figure 87:	Pin assignments - X2X cable 5CAX2X.0xxx-00	98
Figure 88:	X2X circuit - rear view	99
Figure 89:	X2X Link topology	99
Figure 90:	E-stop wiring diagram for the extension cover - rear view	102
Figure 91:	E-stop wiring diagram for the extension unit with E-stop - rear view	103
Figure 92:	E-stop wiring diagram for the extension unit without E-stop - rear view	104
Figure 93:	Swing arm system mounting	105
Figure 94:	Mounting orientation 0°	106

Figure 95:	Mounting orientation -45° and +45°.....	107
Figure 96:	Configuration - An Automation Panel 800 via SDL (onboard).....	109
Figure 97:	Configuration - An AP900 and an AP800 via SDL (onboard).....	112
Figure 98:	Configuration - Three AP900 devices and an AP800 via SDL (onboard)	115
Figure 99:	Configuration - Six AP900 and two AP800 devices via SDL (onboard) and SDL (AP Link).....	118
Figure 100:	Examples - internal numbering of the extension units.....	122
Figure 101:	Example - Hardware number in the B&R Key Editor or in the B&R Control Center 123	
Figure 102:	Display - keys and LEDs in the matrix.....	123
Figure 103:	Hardware number - 5AP880.1505-00	124
Figure 104:	Hardware numbers - 5AC800.EXT1-00	125
Figure 105:	Hardware numbers - 5AC800.EXT2-00 / 5AC800.EXT2-01	125
Figure 106:	Hardware numbers - 5AC800.EXT3-00 / 5AC800.EXT3-01	126
Figure 107:	Hardware numbers - 5AC800.EXT3-02 / 5AC800.EXT3-03	127
Figure 108:	Hardware numbers - 5AC800.EXT3-04 / 5AC800.EXT3-05	128
Figure 109:	B&R Key Editor screenshots (Version 2.50)	129
Figure 110:	HMI Drivers & Utilities DVD 5SWHMI.0000-00	131
Figure 111:	Temperature humidity diagram for USB flash drive - 5MMUSB.xxxx-00	150
Figure 112:	Legend strip samples	153
Figure 113:	E-stop unit	157
Figure 114:	Key switch unit	159
Figure 115:	Angle of rotation - key switch	160
Figure 116:	Temperature humidity diagram for Elo Accu touch screen 5-wire.....	162
Figure 117:	Perspectives.....	164

Table 1:	Manual history	11
Table 2:	Organization of safety notices	15
Table 3:	Model numbers - display units	16
Table 4:	Model numbers - extensions and accessories	16
Table 5:	Model numbers - cables	17
Table 6:	Model numbers - USB memory sticks	18
Table 7:	Model numbers - legend strip templates	18
Table 8:	Model numbers - other items	19
Table 9:	Overview of the required components - Example 1	28
Table 10:	Overview of the required components - Example 2	30
Table 11:	Overview of the required components - Example 3	32
Table 12:	Technical data - 5AP820.1505-00	34
Table 13:	Technical data - 5AP880.1505-00	38
Table 14:	Pin assignments - SDL cable connection	42
Table 15:	Pin assignments - SDL cable connection	43
Table 16:	Pin assignments - X2X / E-stop cable connection	43
Table 17:	Technical data - 5AC800.EXT1-00	45
Table 18:	Technical data - 5AC800.EXT2-00	49
Table 19:	Technical data - 5AC800.EXT2-01	52
Table 20:	Technical data - 5AC800.EXT3-00	55
Table 21:	Technical data - 5AC800.EXT3-01	58
Table 22:	Technical data - 5AC800.EXT3-02	61
Table 23:	Technical data - 5AC800.EXT3-03	65
Table 24:	Technical data - 5AC800.EXT3-04	69
Table 25:	Technical data - 5AC800.EXT3-05	73
Table 26:	Technical data - 5AC800.COV1-00	76
Table 27:	Technical data - 5AC800.COV2-00	78
Table 28:	Technical data - 5AC800.CON1-00	80
Table 29:	Technical data - 5AC800.CON2-00	82
Table 30:	Technical data - 5AC800.FLG1-00	84
Table 31:	Model numbers - cables	86
Table 32:	Technical data - SDL cable 5CASDL.0xxx-20 Rev. < A5	87
Table 33:	Technical data - SDL cable with extender 5CASDL.0xxx-30 Rev. < A5	89
Table 34:	Technical data - SDL cable 5CASDL.0xxx-20 Rev. ≥ A5	91
Table 35:	Technical data - SDL cable with extender 5CASDL.0xxx-30 Rev. ≥ A5	93
Table 36:	Technical data - voltage supply cable 5CAPWR.0xxx-20	95
Table 37:	Technical data - X2X cable 5CAX2X.0xxx-00	97
Table 38:	E-stop circuit current load	104
Table 39:	Selecting the display units	108
Table 40:	Possible combinations of system unit and CPU board	109
Table 41:	Cables for SDL configurations	110
Table 42:	Segment lengths, resolutions and SDL cable	110
Table 43:	Requirements for SDL cable with automatic cable adjustment (equalizer)	111
Table 44:	Requirements for SDL cable with extender and automatic cable adjustment (equalizer)	111
Table 45:	Possible combinations of system unit and CPU board	112
Table 46:	Cables for SDL configurations	113

Table index

Table 47:	Segment lengths, resolutions and SDL cable	113
Table 48:	Requirements for SDL cable with automatic cable adjustment (equalizer)	114
Table 49:	Requirements for SDL cable with extender and automatic cable adjustment (equalizer)	114
Table 50:	Possible combinations of system unit and CPU board	115
Table 51:	Cables for SDL configurations	116
Table 52:	Segment lengths, resolutions and SDL cable	116
Table 53:	Requirements for SDL cable with automatic cable adjustment (equalizer)	117
Table 54:	Requirements for SDL cable with extender and automatic cable adjustment (equalizer)	117
Table 55:	Possible combinations of system unit and CPU board	119
Table 56:	Cables for SDL configurations	119
Table 57:	Segment lengths, resolutions and SDL cable	120
Table 58:	Requirements for SDL cable with automatic cable adjustment (equalizer)	120
Table 59:	Requirements for SDL cable with extender and automatic cable adjustment (equalizer)	120
Table 60:	Model number for HMI Drivers & Utilities DVD	131
Table 61:	Overview of standards	135
Table 62:	Overview of limits and testing guidelines for emissions	136
Table 63:	Test requirements - network-related emissions for industrial areas	136
Table 64:	: Test requirements - electromagnetic emissions for industrial areas	138
Table 65:	Overview of limits and testing guidelines for immunity	139
Table 66:	Test requirements - electrostatic discharge (ESD)	140
Table 67:	Test requirements - high-frequency electromagnetic fields (HF field)	140
Table 68:	Test requirements - high-speed transient electrical disturbances (burst)	141
Table 69:	Test requirements - surge voltages	141
Table 70:	Test requirements - conducted disturbances	141
Table 71:	Test requirements - magnetic fields with electrical frequencies	142
Table 72:	Test requirements - damped vibration	142
Table 73:	Overview of limits and test guideline standards for temperature and humidity	143
Table 74:	Test requirements - dry heat	143
Table 75:	Overview of limits and testing guidelines for safety	143
Table 76:	Test requirements - leakage current	143
Table 77:	Test requirements - voltage range	144
Table 78:	Test requirements - protection	144
Table 79:	International certifications	145
Table 80:	Model numbers - accessories	147
Table 81:	Order data - USB flash drives	148
Table 82:	Technical data - USB flash drive 5MMUSB.xxxx-00	149
Table 83:	Contents of delivery - USB flash drives 5MMUSB.xxxx-00	151
Table 84:	Order data - legend strip template	154
Table 85:	Technical data - E-stop switching element and E-stop button	157
Table 86:	Technical data - key switch switching element and key switch	159
Table 87:	Technical data - Elo Accu touch screen 5-wire	161
Table 88:	Chemical resistance of the Mylar	163

Symbole

.NET 170

A

ACOPOS 165
ACPI 165
APC 165
API 165
Assembled 16
Automation Runtime 165

B

B&R Automation Runtime 166
B&R Automation Studio 166
B&R Key Editor information 129
Baud rate 165
BIOS 165
Bit 165
Bit rate 165
Bootstrap loader 173
Bus unit 165
Byte 165

C

Cache 166
CAN 166
CD-ROM 166
CE mark 166
Certifications 145
CMOS 166
CompactFlash 166
Connection cycles 87, 89, 91, 93
CPU 166
CRT 166
CTS 167

D

Dimension standards 15
DIMM 167
DMA 167

DOTNET 171
DRAM 167
DSR 167
DTR 167
DVD 167
DVI 167
DVI-A 167
DVI-D 167

E

EDID 167
EDO-RAM 167
EIDE 167
EMC 167
EPROM 167
ESD 12
 Electrical components with housing 12
 Electrical components without housing .. 12
 Individual components 13
 Packaging 12
 Proper handling 12
E-stop button 157
Ethernet 167
ETHERNET Powerlink 168
Extended desktop 108, 118

F

FDD 168
FIFO 168
Firmware 168
Floppy 168
FPC 168
FPD 168
FTP 168

G

GB 169

H

HDD 169

I

Illuminated ring keys	170
Interface	169

K

Key switch	159
Keypad modules	169

L

LAD	169
LCD	169
LED	170
Locking time	130

M

Manual history	11
MB	170
Membrane	163
Microprocessor	170
Model numbers	16
Modem	170
Motherboard	170
Multitasking	170

N

Network-related emissions	136
---------------------------------	-----

O

Overview	147
----------------	-----

P

Panel	171
Panelware	171
POH	171
POST	171
Power Panel	171
Powerlink	171
PP21	171
PROFIBUS	171

R

RAM	171
Real-time	171
ROM	171, 172
RTS	172
RXD	172

S

Safety guidelines	12
Installation	14
Intended use	12
Operation	14
Organization	15
Policy and procedures	13
Programs	14
Protection against electrostatic discharges	
12	
Touching electrical parts	14
Transport and storage	13
Viruses	14
SDL cable	
Cable specifications	88, 92
SDRAM	172
See	120
SFC	172
Special keypad modules	172
SRAM	172
Standards	135
SXGA	172
System units	172

T

Task	172
TCP/IP	172
TFT display	172
Touch screen	161, 172

U

UART	172
USB	173
USB flash drive	148
General information	148

Order data	148
Technical data	149

WSXGA	173
-------------	-----

W

Windows CE	173
------------------	-----

X

XGA	173
-----------	-----

5

5AC800.150x-00.....	18, 147, 154	5CAPWR.0200-20.....	17, 86
5AC800.CON1-00.....	16, 80	5CAPWR.0250-20.....	17, 86
5AC800.CON2-00.....	16, 82	5CAPWR.0300-20.....	17, 86
5AC800.COV1-00.....	16, 76	5CAPWR.0400-20.....	17, 86
5AC800.COV2-00.....	16, 78	5CASDL.0018-20.....	17, 86
5AC800.EXT1-00.....	16, 44	5CASDL.0050-20.....	17, 86
5AC800.EXT2-00.....	16, 48	5CASDL.0100-20.....	17, 86
5AC800.EXT2-01.....	16, 51	5CASDL.0150-20.....	17, 86
5AC800.EXT3-00.....	16, 54	5CASDL.0200-20.....	17, 86
5AC800.EXT3-01.....	17, 57	5CASDL.0250-20.....	17, 86
5AC800.EXT3-02.....	17, 60	5CASDL.0300-30.....	17, 86
5AC800.EXT3-03.....	17, 64	5CASDL.0400-30.....	17, 86
5AC800.EXT3-04.....	17, 68	5CAX2X.0018-00.....	18, 86
5AC800.EXT3-05.....	17, 72	5CAX2X.0050-00.....	18, 86
5AC800.EXTX-00.....	18, 147, 154	5CAX2X.0100-00.....	18, 86
5AC800.EXTX-01.....	18, 147, 154	5CAX2X.0150-00.....	18, 86
5AC800.EXTX-02.....	18, 147, 154	5CAX2X.0200-00.....	18, 86
5AC800.EXTX-03.....	18, 147, 154	5CAX2X.0250-00.....	18, 86
5AC800.FLG1-00.....	17, 84	5CAX2X.0300-00.....	18, 86
5AP820.1505-00.....	16, 33	5CAX2X.0400-00.....	18, 86
5AP880.1505-00.....	16, 37	5MMUSB.0128-00.....	18, 147, 148
5CAPWR.0018-20.....	17, 86	5MMUSB.0256-00.....	18, 147, 148
5CAPWR.0050-20.....	17, 86	5MMUSB.0512-00.....	18, 147, 148
5CAPWR.0100-20.....	17, 86	5MMUSB.1024-00.....	18, 147, 148
5CAPWR.0150-20.....	17, 86	5MMUSB.2048-00.....	18, 147, 148
		5SWHMI.0000-00.....	19, 131

