Mobile Panel 40/50

User's manual

Version: **1.80 (December 2018)**
Model no.: **MAMP40.50-ENG**

Translation of the original documentation

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1 General information

Information:

This document is not intended for end customers! The safety guidelines required for end customers must be incorporated into the operating instructions for end customers in the respective national language by the machine manufacturer or system provider.

1.1 Manual history

Version	Date	Change
0.10 Preliminary	October 2006	• First version
1.00	2007-02-13	• Updated 3 "Commissioning" on page 66, 4 "Software" on page 80, 5 "Standards and certifications" on page 88, 6 "Accessories" on page 102 and 7 "Servicing/Maintenance" on page 127. • Completed 2 "Technical data" on page 15.
1.10	2007-03-26	• Discontinued USB flash drive 5MMUSB.0256-00 and USB flash drive 5MMUSB.1024-00. • Updated model numbers of control devices. • Moved connection box and box cable to 6 "Accessories". • Revised 5 "Standards and certifications". • Updated images. • Updated Windows CE order numbers. • Updated description of "Attachment cables" on page 57. • Changed emergency switch-off to stop button.
1.20	2007-04-18	• Revised introduction. • Revised section "Complete system" on page 17. • Revised figures. • Revised technical data of the complete system and individual components. • Changed membrane keypad description. • Updated "Storing the Mobile Panel device" on page 111. • Updated "Connecting a Mobile Panel 100/200" on page 72. • Revised section "USB interface" on page 73. • Revised 4 "Software". • Revised 6 "Accessories". • Updated section "Viewing angles" on page 137. • Updated section 7 in "Connection example for stop button" on page 70. • Updated 1 "General information".
1.30	2007-07-18	• Updated section "Serial number adhesive label" on page 30. • Updated technical data of the devices (ambient temperatures, humidity, sea level) • Updated "Temperature/Humidity diagram" on page 36. • Revised technical data of control devices (Ethernet controllers). • Revised brief description of devices in the model number overview. • Revised technical data of 5CAMPH.0xxx-30 attachment cables. • Updated new Windows CE model numbers and revised section "Windows CE" on page 80. • Updated section "Touch screen calibration" on page 78. • Updated information about temperature/humidity diagrams. • Added note in appendix.
1.40	2007-10-17	• Changed viewing angle definition (a, b, c, d changed to R, L, U, D). • Updated information to avoid screen burn-in. • Updated ADI Control Center description (see section "B&R Automation Device Interface (ADI) Control Center" on page 82). • Updated information for touch screen calibration. • Updated information about loop resistance of stop circuits. • Updated section "Date/Time setting" on page 78. • Revised index. • Updated section "B&R Key Editor". • Updated section "Key configuration" on page 78. • Updated Windows CE description (see section "Windows CE" on page 80). • Updated section "Configuring Windows CE ProPlus Thin Client Automation Runtime (TCAR)" on page 81.
1.41	2007-11-06	• Changed structure of the "Serial number adhesive label" on page 30. • Replaced API with ADI (Automation Device Interface). • Removed UL approval for robotics applications (UL 1740:1998).

Table 1: Manual history

Version	Date	Change
1.42	2008-01-28	• Corrected manual version number error in page footnote. • Updated warning notice for the Tab. 49 "Overview of safety categories" on page 95. • Textual changes in 5 "Standards and certifications" Replaced EN 418 with EN ISO 13850. Replaced EN 775 with EN ISO 10218-1. Replaced EN 60204 with EN 60204-1. Replaced 89/336/EEC with 2004/108/EC. Changed EN 60204-1/11.98 to EN 60204-1:2006. Changed EN 951-1/03.97 to EN 954-1:1996. Changed EN 1037/04.96 to EN 1037:1995. Corrected date of issue for some standards.
1.43	2008-03-28	• Corrected positioning error of figure "5CAMPC.0020-10" on page 60. • Updated preconfiguration of membrane keypads (see "Mobile Panel 40" on page 25 and "Mobile Panel 50" on page 28).
1.44	2008-09-05	• Corrected spelling and grammar errors. • Updated "MP40/50 buffer accumulator" on page 121. • Updated "Installing the buffer accumulator" on page 128.
1.50	2009-02-11	• Moved section "B&R Key Editor" from Software to Appendix A. • Corrected connector pinout on page 58. • Corrected error in Fig. 42 "Attachment shaft" on page 68. • Updated figures for typical topologies (previously application examples). • Added small MP connection box in 6 "Accessories" section of 6.4.2 "4MPCBX.0001-00" on page 116. • Updated section "Environmentally friendly disposal" on page 12 in 1 "General information". • Updated key matrix numbering of individual keys. • Removed scope of delivery of USB flash drive. • Corrected supply circuit fuse specification from 1.5 A to 3.15 A. • Corrected model numbers of control cabinet cables, see 2.3.2.2.1.2 "Order data" and "Order data" on page 63. • Updated differences between WinCE versions. • Changed technical data of the displays.
1.55	2009-05-08	• Corrected pinout of power supply wires of control cabinet cable 5CAMPC.0020-11. • Changed Fig. 35 "5CAMPH.0xxx-30 - Cable pinout for attachment cables" on page 58, Fig. 37 "5CAMPC.0020-10 - Control cabinet cable - Pinout" on page 61 and Fig. 40 "5CAMPC.0020-11 - Control cabinet cable - Pinout" on page 64. The front view of the connectors is now shown in the figures; in previous versions, the connectors were shown from behind. • Updated section 2.1.1 "Configuration" on page 16.
1.60	2009-11-19	• Updated/Adjusted requirements regarding Machinery Directive 2006/42/EC, EN ISO 13849-1, ZT 05. • Updated information about the stop button and enable switch in "Stop button" on page 129 and "Enable switch" on page 130 in A "Appendix A". • Corrected Fig. 37 "5CAMPC.0020-10 - Control cabinet cable - Pinout" on page 61 and figure Fig. 40 "5CAMPC.0020-11 - Control cabinet cable - Pinout" on page 64. • Updated section "User tips for increasing the service life of the display" on page 79 in chapter 3 "Commissioning". • Updated section "Stop button" on page 24. • Updated section "Chemical resistance" on page 131. • Updated section "Connection example for enable switch" on page 71. • Updated section "Touch screen stylus pen" on page 123 in 6 "Accessories". • Updated information about the "B&R Key Editor" on page 86. • Updated information in section "Differences between CE versions (Pro - ProPlus - ProPlusTCAR)" on page 80.
1.61	2009-12-16	• Updated serial number adhesive label.
1.65	2009-12-21	• Renamed section "Serial number adhesive label" to "Nameplate", see "Serial number adhesive label" on page 30. • Removed warning on page 95. • Removed column "Safety integrity level - SIL (per IEC 61508-1)" of "Overview of safety categories" on page 94 and "Overview of safety categories" on page 95. • Changed information text in section 5.4.4 "Safety categories in accordance with EN 954-1:1996 (Safety of machinery - Safety-related parts of control systems - Part 1: General design principles)" on page 95. • Changed information or contents in section 5.5 "Information about MRL 2006/42/EC" on page 98. • Corrected values in Tab. 52 "EN ISO 13849-1:2015, table 3 - Performance levels (PL)" on page 99. • Changed definition of the performance level in Tab. 53 "Abbreviations" on page 99. • Changed term "EC conformity certificate" to "EC declaration of conformity", see "EC declaration of conformity" on page 100. • Changed term "type examination certificate" to "EC type examination certificate", see "EC type examination certificate" on page 101.

Table 1: Manual history

Version	Date	Change
1.66	2010-02-01	• Updated section 5.6.1 "EC declaration of conformity" on page 100. • Updated section 5.6.2 "EC type examination certificate" on page 101.
1.70	2013-05-22	• Changed section "Organization of notices" on page 13. Updated descriptions for cautions and warnings. • Revised section "USB flash drives" on page 102 (removed 5MMUSB.0256-00, 5MMUSB.0512-00 and 5MMUSB.1024-00; updated 5MMUSB.2048-01). • Revised section 6.2 "Protective cover" on page 107. • Updated and moved "HMI Drivers & Utilities DVD" from appendix A to "Accessories". • Removed section "Preventing screen burn-in on LCD/TFT monitors" from chapter 7 "Service and maintenance". • Moved "B&R Key Editor" from appendix A to Software. • Revised "B&R Automation Device Interface (ADI) Control Center" on page 82. • Updated "B&R Automation Device Interface (ADI) Development Kit" on page 84. • Changed section "Adhesive labels" to "Serial number adhesive label" and revised it. • Revised Fig. 50 "Keys and LEDs in the matrix" on page 74. • Moved "Wall mount" from Technical data to Accessories. • Updated the following sections in 3 "Commissioning": "User tips for increasing the service life of the display" on page 79, "Pixel errors" on page 79. • Revised entire manual according to current formatting standards.
1.71	2013-11-12	• Revised section "Recommended monitoring devices" and renamed to "Connection examples". • Revised section "Stop button" on page 129. A different stop button is installed on MP50 devices with revision J0 or later. • Updated "B&R Automation Device Interface (ADI) .NET SDK" on page 85 to V2.00. • Updated "B&R Automation Device Interface (ADI) Development Kit" on page 84 to V3.60. • Updated "HMI Drivers & Utilities DVD" on page 124 to version 2.20. • Updated B&R USB flash drive 5MMUSB.4096-01, see "5MMUSB.xxxx-01" on page 104.
1.80	2018-12-05	• Updated section "B&R KCF Editor" on page 87. • Removed figure index, table index, model number index, index and register markings. • Updated approved fuse per UL 248 in section Commissioning from a safety point of view as well as a reference to this note in the technical data under Control device.

Table 1: Manual history

1.2 Safety guidelines

1.2.1 Intended use

Programmable logic controllers, operating and monitoring devices (such as industrial PCs, Power Panels, Mobile Panels, etc.) as well as the uninterruptible power supply from B&R have been designed, developed and manufactured for normal use in industry. They have not been designed, developed and manufactured for use that involves fatal risks or hazards that could result in death, injury, serious physical harm or other loss without the assurance of exceptionally stringent safety precautions. In particular, this includes the use of these systems to monitor nuclear reactions in nuclear power plants, flight control systems, air traffic control, the control of mass transport vehicles, medical life support systems and the control of weapon systems.

1.2.2 Protection against electrostatic discharge

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

1.2.2.1 Packaging

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

1.2.2.2 Regulations for proper ESD handling

Electrical assemblies with housing

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

Electrical assemblies without housing

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

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

Individual components

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

1.2.3 Regulations and measures

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

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

All work such as installation, commissioning and servicing are only permitted to be carried out by qualified personnel. Qualified personnel are persons who are familiar with the transport, installation, assembly, commissioning and operation of the product and have the appropriate qualifications for their job (e.g. IEC 60364). National accident prevention regulations must be observed.
The safety guidelines, information about connection conditions (nameplate and documentation) and limit values specified in the technical data must be read carefully before installation and commissioning and must be strictly observed.

1.2.4 Transport and storage

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

1.2.5 Installation

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

1.2.6 Operation

1.2.6.1 Protection against contact with electrical parts

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

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

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

1.2.6.2 Ambient conditions - Dust, moisture, aggressive gases

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

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

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

1.2.6.3 Programs, viruses and malicious programs

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

1.2.7 Environmentally friendly disposal

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

1.2.7.1 Separation of materials

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

Component	Disposal
Programmable logic controllers Operating and monitoring devices Uninterruptible power supply Batteries and accumulators Cables	Electronics recycling
Cardboard/Paper packaging	Paper/Cardboard recycling
Plastic packaging material	Plastics recycling

Table 2: Environmentally friendly disposal

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

1.2.8 Security concept

To secure plants, systems, machines and networks against cyber threats, it is required to implement (and continuously maintain) a holistic security concept that is state of the art. B&R products and solutions are only one component of such a concept.

The user is responsible for preventing unauthorized access to plants, systems, machines and networks. Systems, machines and components should only be connected to the corporate network or Internet if and only to the extent necessary and if appropriate protective measures (e.g. use of firewalls and network segmentation) have been taken.

B&R products and solutions are constantly being further developed to make them even more secure. B&R expressly recommends that updates be performed as soon as the corresponding updates are available and that only current product versions be used. Using outdated or no longer supported versions can increase the risk of cyber threats.

1.2.9 Third-party updates

This product includes third-party software (drivers, etc.). B&R only assumes warrants for updates/patches to third-party software if they have been officially released by B&R. Otherwise, updates/patches are performed at your own risk.

1.2.10 Administrator accounts

A user with administrator rights has extensive options for accessing and manipulating the system.

Therefore, make sure that administrator accounts are adequately secured in order to prevent unauthorized changes. To do this, use secure passwords and a standard user account for regular operation. Additional measures such as the use of security policies must be applied as needed.

1.3 Organization of notices

Safety notices

Contain **only** information that warns of dangerous functions or situations.

Signal word	Description
Danger!	Failure to observe these safety guidelines and notices will result in death, severe injury or substantial damage to property.
Warning!	Failure to observe these safety guidelines and notices can result in death, severe injury or substantial damage to property.
Caution!	Failure to observe these safety guidelines and notices can result in minor injury or damage to property.
Notice!	Failure to observe these safety guidelines and notices can result in damage to property.

Table 3: Organization of safety notices

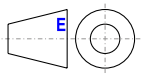
General notices

Contain **useful** information for users and instructions for avoiding malfunctions.

Signal word	Description
Information:	Useful information, application tips and instructions for avoiding malfunctions.

Table 4: Organization of general notices

1.4 Guidelines



European dimension standards apply to all dimension diagrams.

All dimensions in mm.

Unless otherwise specified, the following general tolerances apply:

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

Table 5: Nominal dimension ranges

1.5 Overview

Model number	Short description	Page
	Accessories	
4MPBRA.0000-01	MP40/50 wall mount.	110
4MPCBX.0000-00	Mobile Panel connection box - For cables with push-pull circular connectors	112
4MPCBX.0001-00	Mobile Panel small connection box - For cables with push-pull circular connectors	116
5AC900.1100-01	Mobile Panel touch screen stylus pen - 5 pcs. - For MP40/50/7100	123
5CAMPB.0100-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	118
5CAMPP.0000-10	Protective cover for Mobile Panel cables with circular connector.	107
5CAMPP.0001-10	Protective cover for Mobile Panel control cabinet cables with circular connector.	108
5MPBAT.0000-00	MP40/50 buffer accumulator	121
	Attachment cables	
5CAMPH.0018-30	MP40/50 attachment cable with push-pull circular connector, 1.8 m	57
5CAMPH.0050-30	MP40/50 attachment cable with push-pull circular connector, 5 m	57
5CAMPH.0100-30	MP40/50 attachment cable with push-pull circular connector, 10 m	57
5CAMPH.0150-30	MP40/50 attachment cable with push-pull circular connector, 15 m	57
5CAMPH.0200-30	MP40/50 attachment cable with push-pull circular connector, 20 m	57
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet crossover - 2 m	60
5CAMPC.0020-11	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet straight-through - 2 m	63
	Other	
5SWHMI.0000-00	HMI Drivers & Utilities DVD	124
	System units	
5MP040.0381-01	Mobile Panel MP40, 3.8" QVGA LCD m display, Intel PXA 270 processor, 256 MB DRAM, 128 MB flash memory, ETH 10/100, USB 1.1, 51 system keys, stop button, 2 integrated 3-position enable switches, handle. Order cables and operating system separately.	33
5MP040.0381-02	Mobile Panel MP40, 3.8" QVGA LCD m display, Intel PXA 270 processor, 256 MB DRAM, 128 MB flash memory, ETH 10/100, USB 1.1, 51 system keys, stop button, handwheel, key switch, 2 integrated 3-position enable switches, handle. Order cables and operating system separately.	37
5MP050.0653-01	Mobile Panel MP50, 6.5" VGA TFT color display with touch screen (analog resistive), Intel PXA 270 processor, 256 MB DRAM, 128 MB flash memory, ETH 10/100, USB 1.1, 31 system keys, stop button, handwheel, push-button, 2 integrated 3-position enable switches, handle. Delivered as an assembly (order cables and operating system separately).	41
5MP050.0653-02	Mobile Panel MP50, 6.5" VGA TFT color display with touch screen (analog resistive), Intel PXA 270 processor, 256 MB DRAM, 128 MB flash memory, ETH 10/100, USB 1.1, 31 system keys, stop button, joystick, key switch, 2 integrated 3-position enable switches, handle. Delivered as an assembly (order cables and operating system separately).	45
5MP050.0653-03	Mobile Panel MP50, 6.5" VGA TFT color display with touch screen (analog resistive), Intel PXA 270 processor, 256 MB DRAM, 128 MB flash memory, ETH 10/100, USB 1.1, 31 system keys, stop button, handwheel, override potentiometer, 2 integrated 3-position enable switches, handle. Delivered as an assembly (order cables and operating system separately).	49
5MP050.0653-04	Mobile Panel MP50, 6.5" VGA TFT color display with touch screen (analog resistive), Intel PXA 270 processor, 256 MB DRAM, 128 MB flash memory, ETH 10/100, USB 1.1, 31 system keys, stop button, handwheel, key switch, 2 integrated 3-position enable switches, handle. Delivered as an assembly (order cables and operating system separately).	53
	USB accessories	
5MMUSB.2048-00	USB 2.0 flash drive 2048 MB	102
5MMUSB.2048-01	USB 2.0 flash drive 2048 MB B&R	104
5MMUSB.4096-01	USB 2.0 flash drive 4096 MB B&R	104
	Windows CE 5.0	
5SWWCE.0524-ENG	Microsoft OEM Windows CE 5.0 Professional, English; for Mobile Panel MP40.	80
5SWWCE.0525-ENG	Microsoft OEM Windows CE 5.0 Professional, English; for Mobile Panel MP50.	80
5SWWCE.0624-ENG	Microsoft OEM Windows CE 5.0 Professional Plus, English, for Mobile Panel MP40.	80
5SWWCE.0625-ENG	Microsoft OEM Windows CE 5.0 Professional Plus, English, for Mobile Panel MP50.	80
5SWWCE.0724-ENG	Microsoft OEM Windows CE 5.0 Professional plus, English; Terminal Client Automation Runtime for Mobile Panel MP40.	80
5SWWCE.0725-ENG	Microsoft OEM Windows CE 5.0 Professional, English; Automation Runtime terminal client for Mobile Panel MP50.	80

2 Technical data

2.1 Introduction

The Mobile Panel is a portable operating and display device featuring a rugged design and Windows CE-compatible electronics. Equipped with a powerful processor and Ethernet, the Mobile Panel is optimally suited for many different applications (see "Proper use of the machine or system" on page 66).

Depending on the variant, Mobile Panel devices can have a 3.8" QVGA grayscale display without a touch screen or a 6.5" VGA color display with a touch screen.

Onboard flash blocks are available on the Mobile Panel in place of rotating mass storage devices that are not suitable for use in harsh operating environments (e.g. diskettes and hard disks). The Mobile Panel offers a Windows CE platform for executing applications.

In addition, it is possible to connect the Mobile Panel to a Windows NT, Windows 2000 or Windows XP server as a RDP (Remote Desktop Protocol) client or use it to access Automation Runtime-based Visual Components applications as a VNC (Virtual Network Computing) viewer.

By including optional operating and control elements, the Mobile Panel can be easily adapted to any particular application.

2.1.1 Configuration

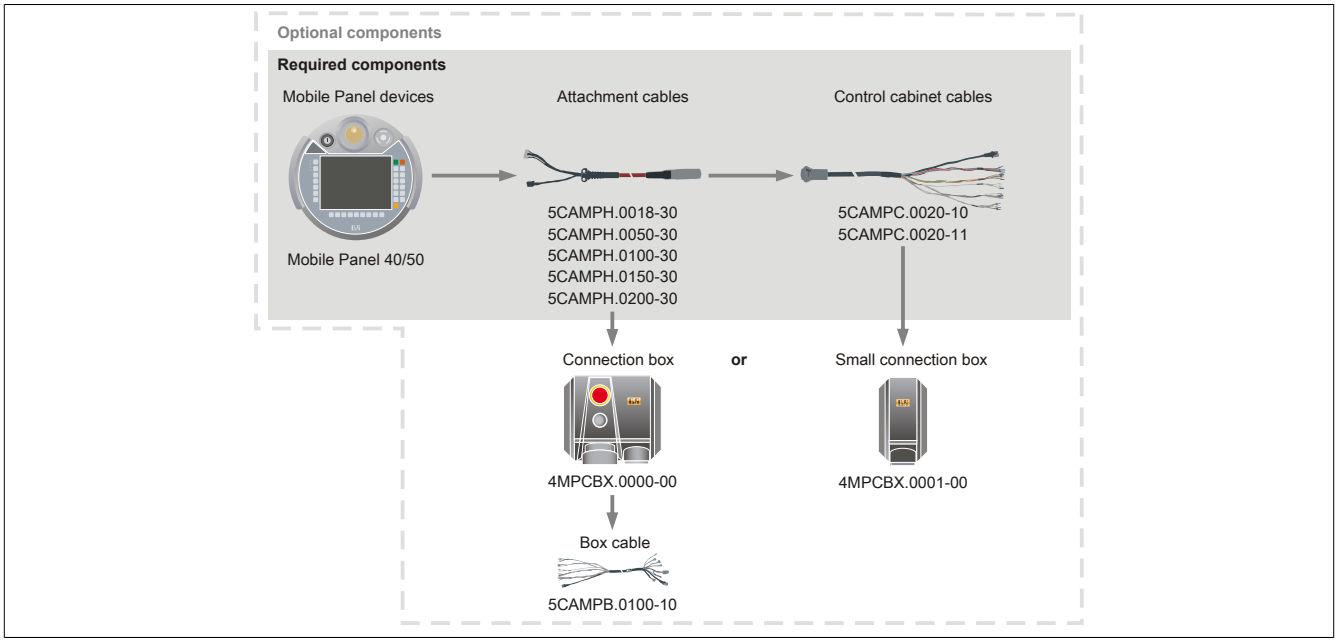


Figure 1: Mobile Panel selection guide

The attachment cable for the Mobile Panel 40/50 is available in various lengths (5CAMPH.xxxx-30). Once the desired cable length has been selected, there are 2 variants to choose from:

- Direct cable connection to the control cabinet (5CAMPC.0020-10 or 5CAMPC.0020-11) with optional small connection box (4MPCBX.0001-00)
- Large connection box (4MPCBX.0000-00) and corresponding box cable (5CAMPB.0100-10)

2.2 Complete system

2.2.1 Construction

Mobile Panel devices are wired systems, i.e. they are connected to the control cabinet using a cable. The following individual components are needed for operation:

- Control device including handle
- Attachment cables

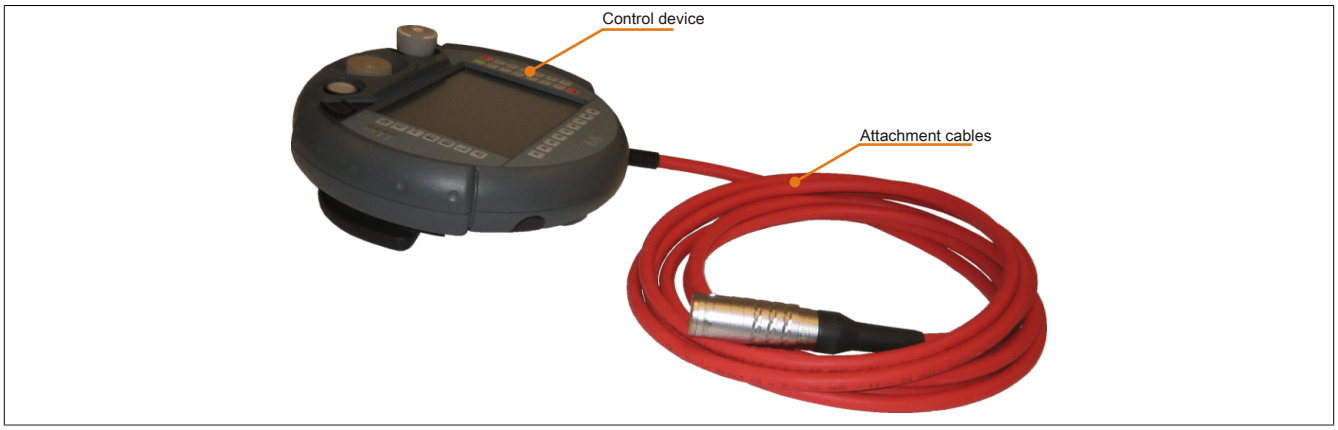


Figure 2: Construction

2.2.1.1 Ergonomics

- Functional multigrip
- Round housing
- Various handling positions
- Left- and right-handed operation
- Desktop operation
- Wall mount operation
- Cable outlet position (on handle) easily adjustable to left or right side of housing
- Easy-to-read display

2.2.1.2 Housing

- Vibration- and shock-resistant
- Housing made from non-flammable material (UL 94V-0), impact-resistant with protection against water, cleaning agents (alcohol and surfactants), oils, cutting oils (drilling oils), grease and lubricants
- Double-walled, extremely rugged housing. Drop-tested from height of 1.5 m onto industrial floor.

2.2.1.3 Control and display panel

- Membrane keys with mechanical pressure point
- 4 (on MP40) or 7 (on MP50) LED status indicators
- Buzzer

2.2.1.4 Electronics

- CPU Intel PXA270/416 MHz
- Memory expansion:
    - SDRAM: 256 MB
    - FLASH: 128 MB

2.2.1.5 Interfaces

- Ethernet (10/100 Mbit)
- USB host for connecting various USB flash drives (with protective cover to ensure IP65 protection when closed)
- USB client in cable duct (debug and ActiveSync device)

2.2.1.6 Touch screen stylus pen

The touch screen stylus pen is easy to access on the right side of the Mobile Panel touch screen housing.

Figure 3: Touch screen stylus pen

2.2.2 Enabling devices

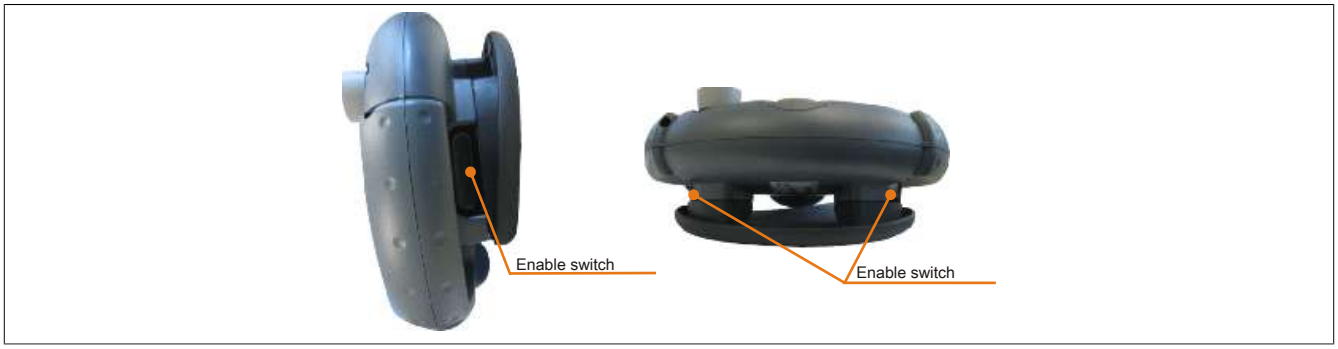


Figure 4: Enabling devices

The Mobile Panel is equipped with two enable switches that are arranged on both sides of the device. It allows both left- and right-handed operation. Both enable switches are connected in parallel and have the exact safe effect on the shared safety circuits in the attachment cable. Only one enable switch must be enabled. The enable switch consists of a three-position control element and separate evaluation electronics. An important feature is the uniform dual-circuit design that spans everything from the control elements to the connection terminals. The evaluation circuits have been implemented using various technologies and switching circuitry. The electronic design of the switching contacts means that their service life remains independent of the load up to their rated values (resistive, inductive and capacitive).

Enable switch elements are protected against reverse polarity. The outputs of both circuits are protected against short circuit and overload:

- Circuit 1: Thermal protective circuit
- Circuit 2: Foldback characteristic curve

2.2.2.1 Functionality

The control element is composed of two symmetrically arranged rocker switches, the position of which is determined using electrical sensing devices before being passed on to the evaluation electronics.

The enable switch can have three different switch positions:

Switch position	Function	Enable switch	Switching contact
1	Zero position	Not actuated	Off (opened)
2	Enable	Actuated	On (closed)
3	Panic	Fully actuated	Off (opened)

Table 6: Enable switch positions

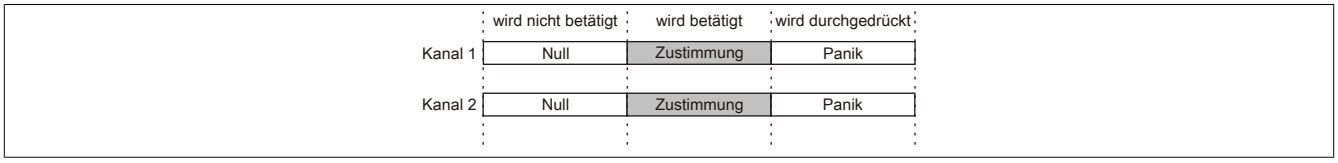


Figure 5: Possible enable switch positions

Warning!

The enable switch must be tested periodically (every 6 months) by switching it to the panic position. This test must be performed to determine whether the panic position is functional.

Information:

Only one enable switch must be actuated for the monitoring device to determine that the switch position is in order.

Positions "Zero" and "Panic" must trigger a category 0 or 1 stop command.

2.2.2.1.1 Zero position

When not actuated, the enable switch returns to the zero position (not enabled).

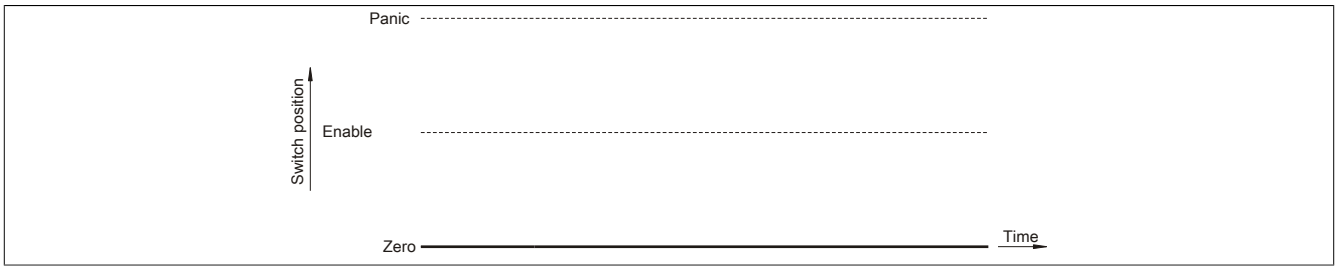


Figure 6: Enable switch - Zero position

2.2.2.1.2 Enable

Position "Enable" is the normal operating mode for the enable switch. In this position, it is possible to initiate an axis movement by subsequently pressing a direction key, for example.

When actuated, the enable switch moves from position "Zero" to position "Enable". When released, it returns to position "Zero".

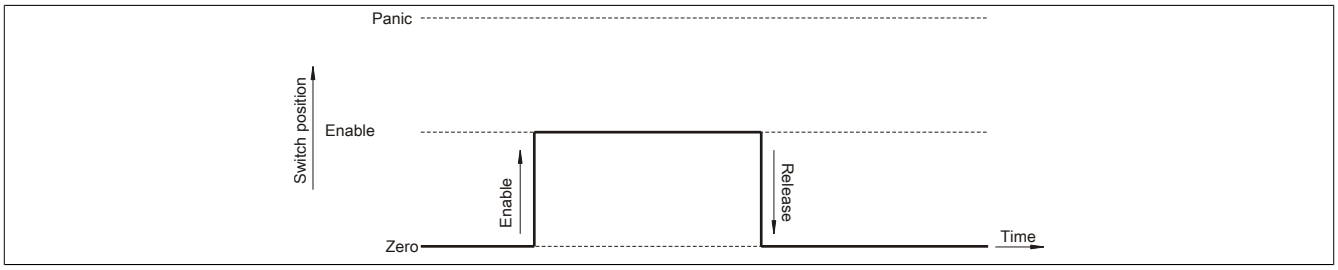


Figure 7: Enable switch - Enable

2.2.2.1.3 Panic

If the enable switch is fully actuated (position "Enable" to position "Panic") and released, then the switch will return to position "Zero" by skipping over position "Enable".

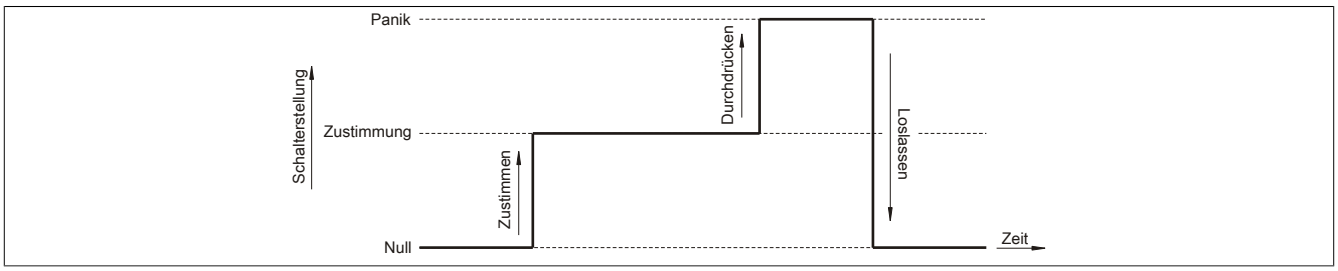


Figure 8: Enable switch - Panic

Safety category 3 PL d can be achieved per EN ISO 13849-1:2008 by implementing the enabling device with 2 circuits and suitable monitoring for short circuits and cross faults of these circuits.

Safety category 3 PL d means that 1 fault is not permitted to lead to a loss of safety and whenever reasonably practicable, the individual fault is detected.

Connection examples "Connection example for stop button" on page 70 and "Connection example for enable switch" on page 71 show how safety category 3 PL d can be achieved with the Mobile Panel and its safety-related components. It is important to note that the entire concept of the machine must be designed for this.

Simultaneity monitoring by the monitoring device is required because otherwise an undetected accumulation of errors could occur that would lead to a loss of safety:

Example:

If one channel of the enabling equipment switches to "Enabled" due to an error and, after an unspecified amount of time, another error causes the second channel to also switch to "Enabled", then the enable switch would no longer be able to cut off the system.

EN 60204-1 also stipulates that the enabling device must be connected to a category 0 or 1 stop, i.e. that the energy must be cut off.

To calculate the PL of the enabling safety function, the PL and B_{10d} values of the involved components must be included in the calculation. For details about calculating the PL for the entire safety function, see EN ISO 13849-1 (see section "Selecting the performance level and category per EN ISO 13849-1" on page 96).

2.2.2.2 Reasonably foreseeable misuse of the enable switch

"Reasonably foreseeable misuse" refers to the unauthorized use of other materials to hold the enable switch in the enable position. This reasonably foreseeable misuse must be minimized.

> **Warning!**
>
> - **The enable switch is only suitable as a protective function if the person activating it is able to recognize danger to personnel early enough to immediately take appropriate action to prevent it! As an additional measure, reduced speed of the movement may be required. The permissible speed must be determined by a risk assessment.**
> - **Using the enable switch by itself to issue commands that initiate dangerous states is not permitted. A second intentional start command is required for this (key on control device).**
> - **The only person permitted in the danger zone is the person actuating the enable switch.**
> - **See chapter "Standards and certifications" on page 88 for additional important information regarding the enabling device.**

Device with 1 enable switch

The following measures are therefore recommended for stopping the machine during manual operation:

- Querying the enable switch when switching on the machine/system and when switching from automatic to manual mode (the enable switch is not permitted to be in position "Enable").
- Setting up a mechanism whereby the enable switch must be released within a predetermined period of time and only then brought back to position "Enable". The length of this time frame can be chosen according to the task at hand.

Device with 2 enable switches

The following measures are therefore recommended for stopping the machine during manual operation:

- If one of the enable switches is already pressed when switching on manual operation, the enabling signal at the output will not be enabled.
- If an enable switch is held down in the enabling position for more than 15 minutes during operation, the enabling signal is canceled. The enabling signal is canceled until the enable switch is released and pressed again.

2.2.3 Options

This section describes the various options possible for the Mobile Panel.

> **Information:**
>
> **For detailed technical data of the control devices, see "Appendix A" on page 129.**

2.2.3.1 Override potentiometer

If the Mobile Panel is equipped with an override potentiometer, then it is evaluated using software and can be read by a program via the Mobile Panel ADI (Automation Device Interface library).

The override potentiometer can be used in various application such as setting the spindle speed or configuring the infeed on machine tools.

- Resolution: 0 to 127, linear

2.2.3.2 Handwheel

If the Mobile Panel is equipped with a handwheel, then the handwheel pulses are evaluated in the processor and can be read by a program via the Mobile Panel ADI (Automation Device Interface library).

50 pulses are counted per revolution. A clockwise rotation of the handwheel increments, a counterclockwise rotation decrements the counter value 0 to 65535 (16-bit value).

Key features:

- 1 pulse/latching
- 50 notchings/revolution

> **Information:**
>
> **If the Mobile Panel falls to the floor, the mechanical placement of the control knob must be checked. If necessary, the control knob can be reattached by pushing it into place from the top.**

2.2.3.3 Illuminated pushbutton

If the Mobile Panel is equipped with an illuminated button, then it can be evaluated using software and read by a program using the Mobile Panel ADI (ADI library). Illuminated pushbuttons are designed as momentary contact pushbuttons.

2.2.3.4 Key switch

If the Mobile Panel is equipped with a key switch, then it is evaluated using software and can be read by a program via the Mobile Panel ADI (Automation Device Interface library).

The key switch has 3 positions, each of which clicks into place.

Removal: The key can be removed from any of the 3 positions.

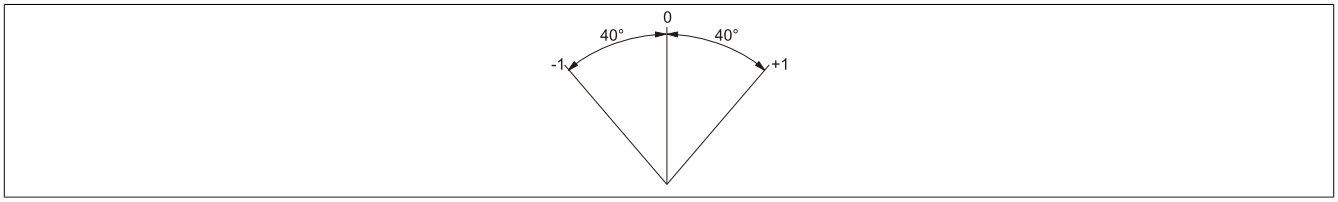


Figure 9: Key switch - Angle of rotation

2 keys are delivered with each device with key switch.

2.2.3.5 Joystick

If the Mobile Panel is equipped with a joystick, then it is evaluated using software and can be read by a program via the Mobile Panel ADI (Automation Device Interface library). The joystick has a short design in order to protect it if dropped. It can be used to perform actions such as moving robot axes.

Range of values: -15 to +15 per axis (31 increments)

2.2.3.6 Buffer accumulator

For more information about the buffer accumulator, see section 6.6 "MP40/50 buffer accumulator" on page 121 in "Accessories".

2.2.4 Stop button

The stop button has a dual-circuit design with normally closed contacts.

The gray stop button on the Mobile Panel satisfies the requirements of EN ISO 13850. It must be able to trigger a category 0 or category 1 stop in accordance with the risk assessment of the machine. The wiring of the positively driven N.C. switching contacts must satisfy the category (according to EN ISO 13849-1) determined during the machine's risk assessment (according to EN ISO 14121-1).

The gray stop switch has essentially the same function as the red-yellow emergency stop. Its color is intended to help prevent the emergency stop from being used if the hand terminal is disconnected when a hazard occur (since the emergency stop has no effect when the hand terminal is unplugged).

> **Warning!**
>
> **Handheld control devices with a gray stop button that are not connected to a machine should be kept out of view in order to prevent confusion with functional devices in the event of emergency.**
>
> **Resetting the stop device is not permitted to result in an uncontrolled restart.**
>
> **The stop button is not a substitute for safety equipment.**
>
> **The stop button on the handheld device is not a substitute for the emergency stop switch directly on the machine. Certain mechanical faults in the stop button can only be detected when the button is actuated. In the event of severe impact to the device (e.g. the device is dropped), the stop button must be inspected to ensure functionality. In addition, stop functionality must be tested periodically (every 6 months) by actuating the stop button.**
>
> **See "Standards and certifications" on page 88 for additional important information about the stop button.**

2.2.5 Membrane keypad

2.2.5.1 Mobile Panel 40

How keys/LEDs are assigned depends on how they will be used by the customer. Almost all keys are factory preconfigured (PS/2/ code). Keys can be configured at any time using B&R Key Editor and then transferred to the device using the ADI Control Center (included in Windows CE).

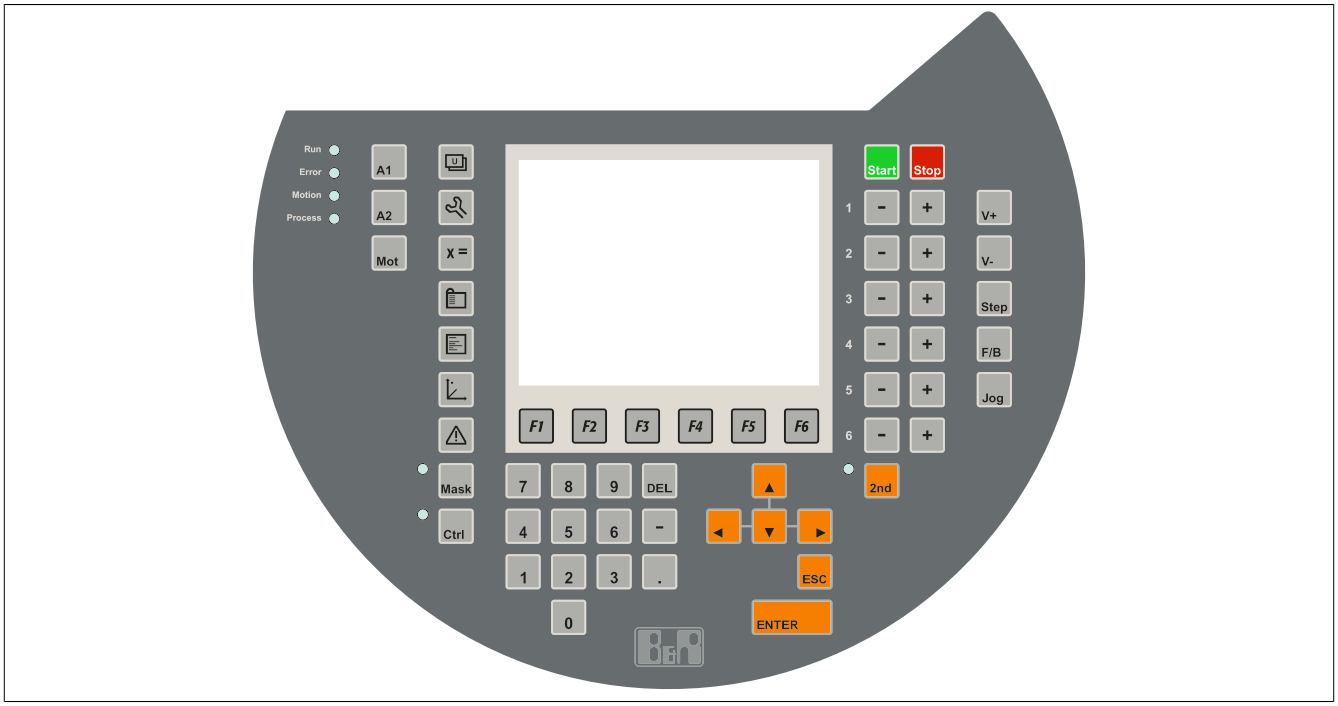


Figure 10: MP40 - Membrane keypad

2.2.5.1.1 Keys/LEDs

Symbol	Possible use	Factory key configuration (PS/2 code)
	Application screen 1	Not preset
	Servicing	Not preset
	Variable monitor	Not preset
	Project screen	Not preset
	Program screen	CONTEXT
	Positioning screen	Not preset
	Alarm screen	Not preset
	Mask	Not preset
	Ctrl	LEFT CTRL
	F1	F1
	F2	F2

Table 7: MP40 - Membrane keypad labels

Symbol	Possible use	Factory key configuration (PS/2 code)
	F3	F3
	F4	F4
	F5	F5
	F6	F6
	A1	ALT
	A2	Not preset
	Axis release	Not preset
	Start	Left Windows key
	Stop	Not preset
	Jog key	-
	Jog key	+
	Layer 2	LEFT SHIFT
	Number 1	1
	Number 2	2
	Number 3	3
	Number 4	4
	Number 5	5
	Number 6	6
	Number 7	7
	Number 8	8
	Number 9	9
	Number 0	0
	Comma	.
	Up arrow	CURSOR UP

Table 7: MP40 - Membrane keypad labels

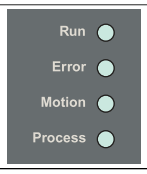
Symbol	Possible use	Factory key configuration (PS/2 code)
	Down arrow	CURSOR DOWN
	Left	CURSOR LEFT
	Right	CURSOR RIGHT
	ENTER	RETURN
	Cancel	ESC
	Coordinate system selection	Not preset
	Forward/Backward	Not preset
	Operating mode selection	TAB
	Speed -	PAGE DOWN
	Speed +	PAGE UP
	Application running Error in application Robot controller ready Process controller ready (cell/system ready)	

Table 7: MP40 - Membrane keypad labels

2.2.5.2 Mobile Panel 50

How keys/LEDs are assigned depends on how they will be used by the customer.

Almost all keys are factory preconfigured (PS/2/ code). Keys can be configured at any time using B&R Key Editor and then transferred to the device using the ADI Control Center (included in Windows CE).

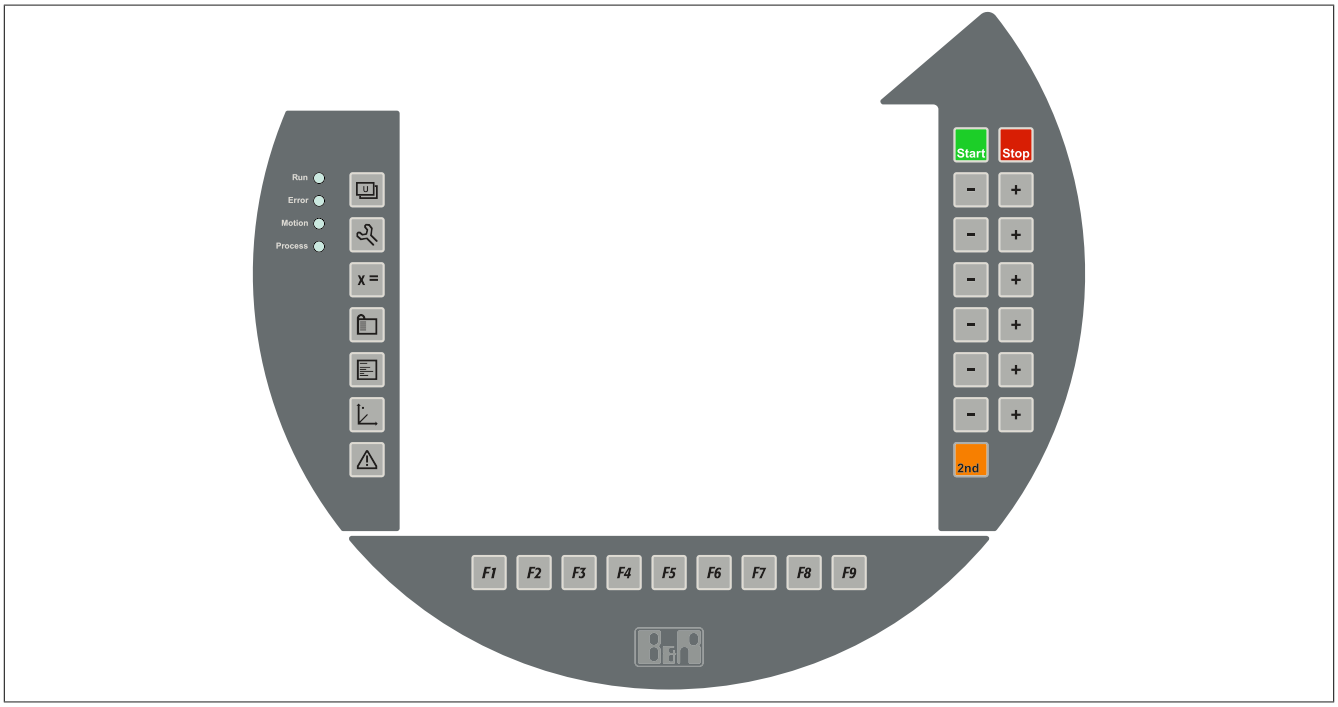


Figure 11: MP50 - Membrane keypad

2.2.5.2.1 Keys/LEDs

Symbol	Possible use	Factory key configuration (PS/2 code)
	Application screen 1	Not preset
	Servicing	Not preset
	Variable monitor	Not preset
	Project screen	Not preset
	Program screen	CONTEXT
	Positioning screen	Not preset
	Alarm screen	Not preset
	F1	F1
	F2	F2
	F3	F3
	F4	F4

Table 8: MP50 - Membrane keypad labels

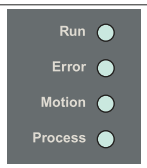
Symbol	Possible use	Factory key configuration (PS/2 code)
	F5	F5
	F6	F6
	F7	F7
	F8	F8
	F9	F9
	Start	Left Windows key
	Stop	Not preset
	Jog key	-
	Jog key	+
	Layer 2	LEFT SHIFT
	Application running Error in application Robot controller ready Process controller ready (cell/system ready)	

Table 8: MP50 - Membrane keypad labels

2.2.6 Serial number adhesive label

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

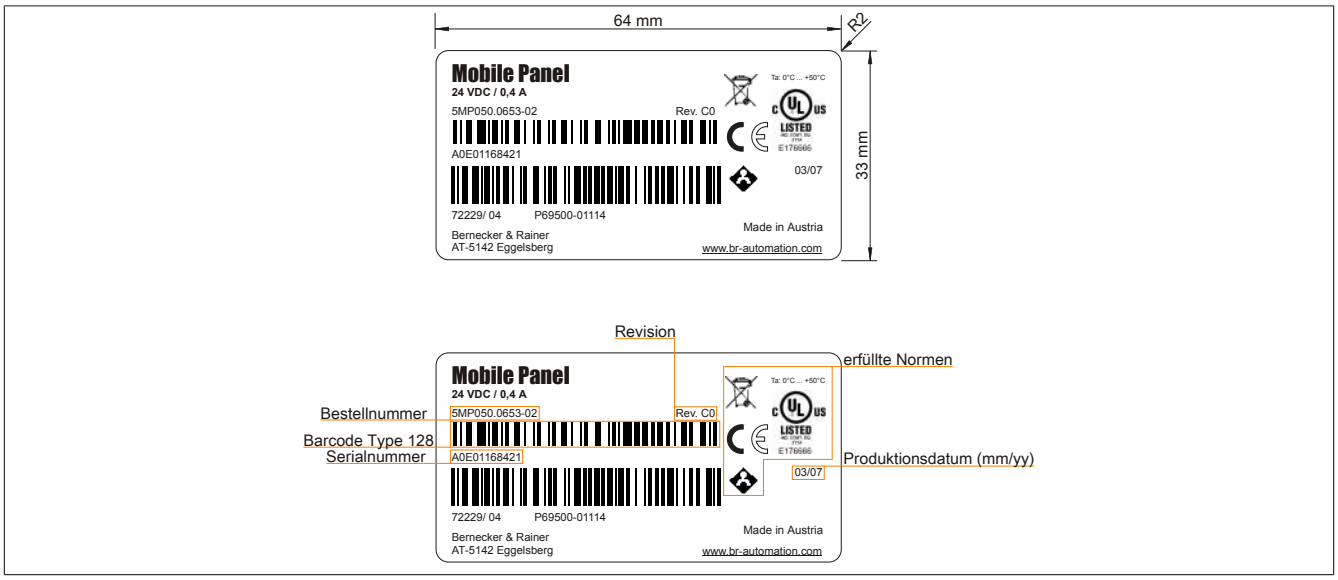


Figure 12: Nameplate - Design/Dimensions

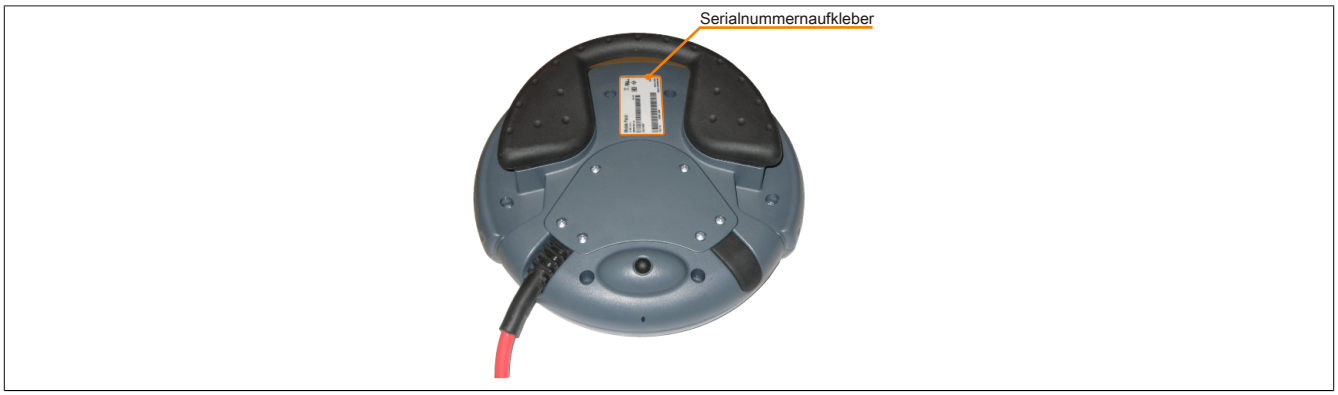


Figure 13: Serial number adhesive label (back)

The serial number represents all of the individual components built into the system (serial number, model number, revision, delivery date and duration of warranty). This information is located on the B&R website. On the homepage (www.br-automation.com), enter the serial number of the complete system in the search field and switch to tab "Serial number". The search provides a detailed list of installed components.

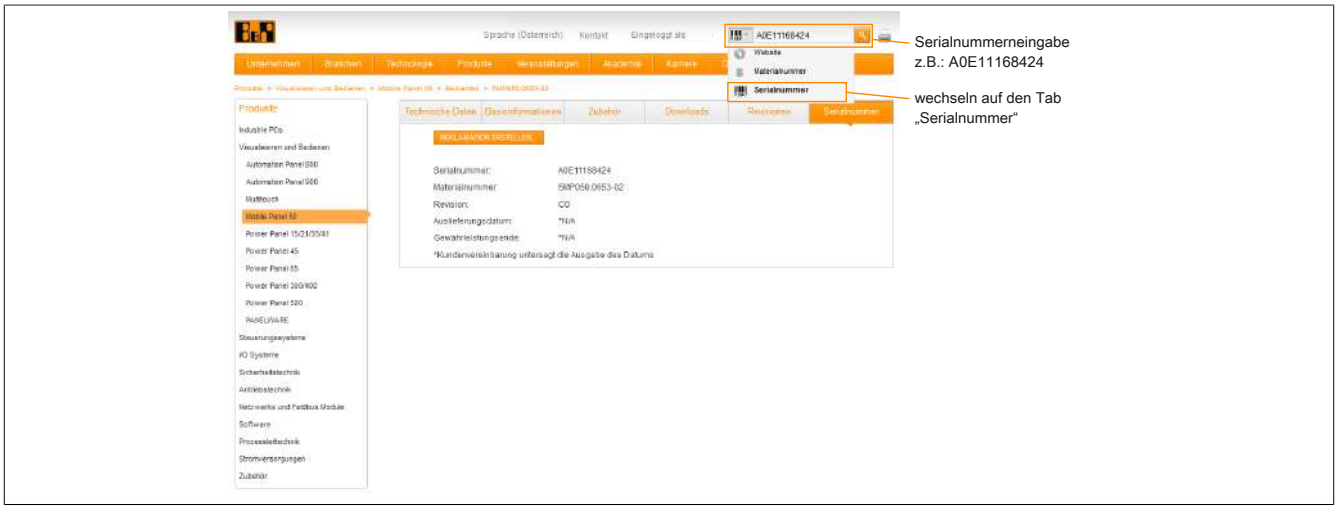


Figure 14: Serial number search - Example

2.3 Individual components

2.3.1 Control device

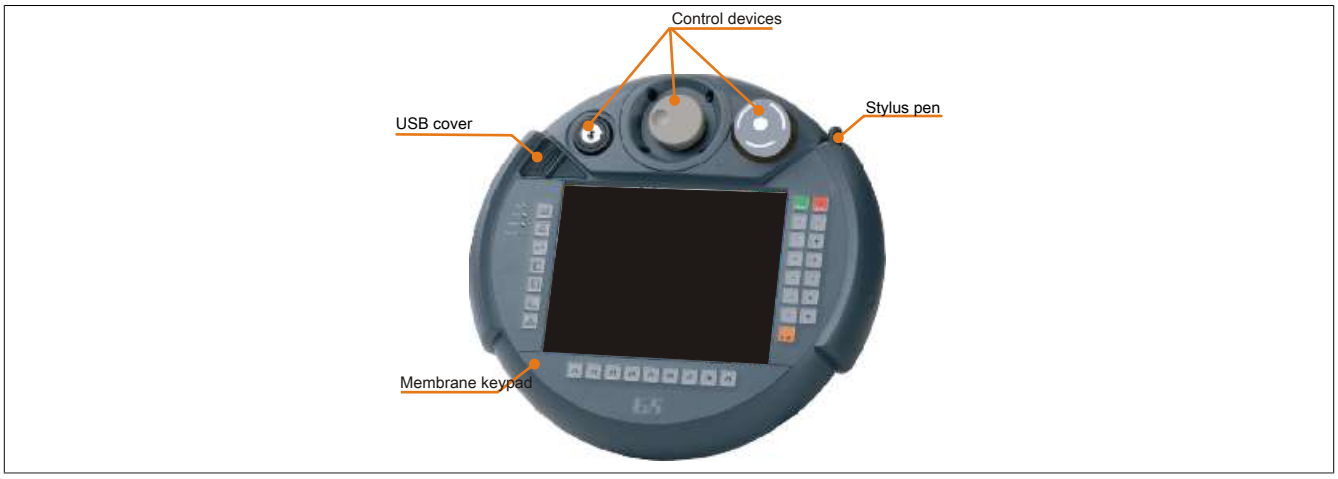


Figure 15: Mobile Panel control device

The control device contains all of the electronics such as the display, the control devices and the membrane keypad. A USB 1.1 interface accessible from the outside is available on the front behind the USB cover for data backup or data exchange. The interface is designed for USB flash drives only.

The surface of the control device is resistant to alcohol (e.g. ethanol, glycol, isopropanol, glycerine, methanol), diluted acids (e.g. vinegar-based cleaning agents), soap, cleaning agents used in auto maintenance or industrial facilities (usually short-term exposure during the cleaning process) and normal foodstuffs (e.g. beer, wine, coffee, fruit). For information about cleaning the device, see "Cleaning" on page 127.

2.3.1.1 5MP040.0381-01

2.3.1.1.1 General information

- 3.8" QVGA LCD m display
- Intel PXA 270 processor
- 51 system keys
- Stop button
- 2 integrated 3-position enable switches

2.3.1.1.2 Order data

Model number	Short description	Figure
	System units	
5MP040.0381-01	Mobile Panel MP40, 3.8" QVGA LCD m display, Intel PXA 270 processor, 256 MB DRAM, 128 MB flash memory, ETH 10/100, USB 1.1, 51 system keys, stop button, 2 integrated 3-position enable switches, handle. Order cables and operating system separately.	
	Required accessories	
	Attachment cables	
5CAMPH.0018-30	MP40/50 attachment cable with push-pull circular connector, 1.8 m	
5CAMPH.0050-30	MP40/50 attachment cable with push-pull circular connector, 5 m	
5CAMPH.0100-30	MP40/50 attachment cable with push-pull circular connector, 10 m	
5CAMPH.0150-30	MP40/50 attachment cable with push-pull circular connector, 15 m	
5CAMPH.0200-30	MP40/50 attachment cable with push-pull circular connector, 20 m	
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet crossover - 2 m	
5CAMPC.0020-11	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet straight-through - 2 m	
	Optional accessories	
	Accessories	
4MPBRA.0000-01	MP40/50 wall mount.	
4MPCBX.0000-00	Mobile Panel connection box - For cables with push-pull circular connectors	
4MPCBX.0000-C01	SIT MP connection box PP	
4MPCBX.0001-00	Mobile Panel small connection box - For cables with push-pull circular connectors	
5CAMPB.0050-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	
5CAMPB.0100-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	
5MPBAT.0000-00	MP40/50 buffer accumulator	
	Windows CE 5.0	
5SWWCE.0524-ENG	Microsoft OEM Windows CE 5.0 Professional, English; for Mobile Panel MP40.	
5SWWCE.0624-ENG	Microsoft OEM Windows CE 5.0 Professional Plus, English, for Mobile Panel MP40.	
5SWWCE.0724-ENG	Microsoft OEM Windows CE 5.0 Professional plus, English; Terminal Client Automation Runtime for Mobile Panel MP40.	

Table 9: 5MP040.0381-01 - Order data

2.3.1.1.3 Components

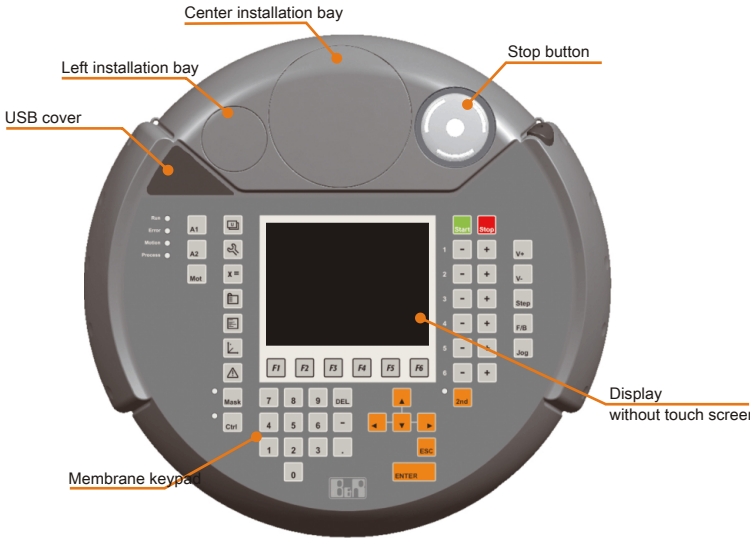


Figure 16: 5MP040.0381-01 - Components

2.3.1.1.4 Technical data

Information:

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

Model number	5MP040.0381-01
General information	
Reset button	Yes
Controller	
Processor	
Type	Intel PXA 270
Clock frequency	416 MHz
Mode/Node switches	No
Graphics	
Controller	Intel PXA
SRAM	
Size	-
Battery-backed	-
Interfaces	
USB	
Quantity	1
Type	USB 1.1
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s)
Current-carrying capacity	Max. 500 mA
Ethernet	
Quantity	1 [1)]
Controller	SMSC11X
Design	Shielded RJ45 port
Transfer rate	10/100 Mbit/s
Max. baud rate	100 Mbit/s
Display	
Type	Monochrome LCD
Diagonal	3.8" (96.5 mm)
Colors	16 shades of gray [2)]
Resolution	QVGA, 320 x 240 pixels
Contrast	20:1
Viewing angles	
Horizontal	Direction R / Direction L = 45°
Vertical	Direction U = 30° / Direction D = 60°
Backlight	
Brightness	110 cd/m²
Half-brightness time	50,000 h

Table 10: 5MP040.0381-01 - Technical data

Model number	5MP040.0381-01
Touch screen	
Technology	-
Keys	
Function keys	No
Soft keys	6
System keys	51 numeric keys, cursor block
3-axis joystick	No
Electronic handwheel	No
Illuminated button	No
Stop button	Yes (2 normally closed contacts, right position)
Enable switch	Yes (2 3-position buttons, left and right position)
Override potentiometer	No
Key switch	No
LED status indicators	7
Electrical characteristics	
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) [3]
Inrush current	Max. 5.6 A (current limiting available)
Power consumption	4.8 W (200 mA at 24 VDC)
Max. interruption of power supply	≤10 ms
Electrical isolation	No
Operating conditions	
Drop height	1.5 m to industrial floor
Flame-retardant	UL94V-0
Degree of protection per EN 60529	IP65
Rated protection	Class 3 per EN 61131-2 or EN 50178
Environmental conditions	
Temperature	
Operation	0 to 50°C [4]
Storage	-20 to 70°C
Transport	-20 to 70°C
Relative humidity	
Operation	Max. 95%, non-condensing
Storage	Max. 95%, non-condensing
Transport	Max. 95%, non-condensing
Vibration	
Operation	5 to 9 Hz: 7 mm amplitude / 9 to 150 Hz: 2 g
Shock	
Operation	15 g (147 m/s² 0-peak) and 11 ms duration
Elevation	
Operation	Max. 3000 m
Mechanical characteristics	
Housing	
Material	ABS
Coating	Similar to RAL 7011
Front	
Keypad overlay	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1100 g

Table 10: 5MP040.0381-01 - Technical data

1) Connection via Mobile Panel cable.
2) The actual number of available colors depends on the graphics memory, configured graphics mode and graphics driver being used.
3) Connection via Mobile Panel cable.
For details regarding appropriate protection of the device, see chapter 3.1 "Commissioning from a safety point of view"
4) When used with a buffer accumulator (5MPBAT.0000-00), the maximum temperature during operation is 45°C.

2.3.1.1.5 Temperature/Humidity diagram

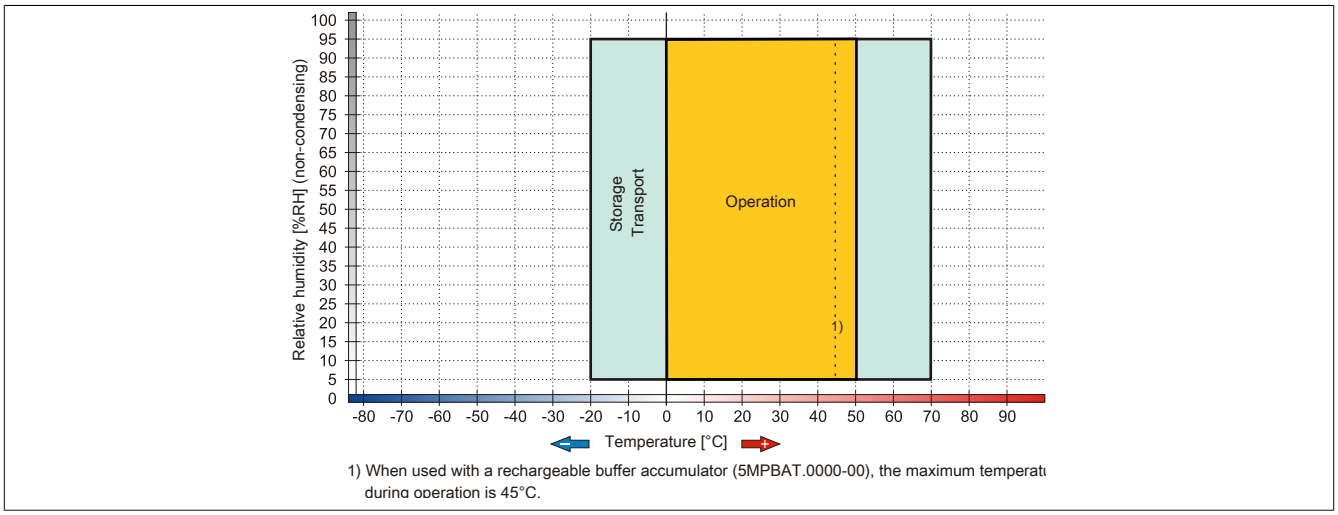


Figure 17: 5MP040.0381-01 - Temperature/Humidity diagram

2.3.1.1.6 Dimensions

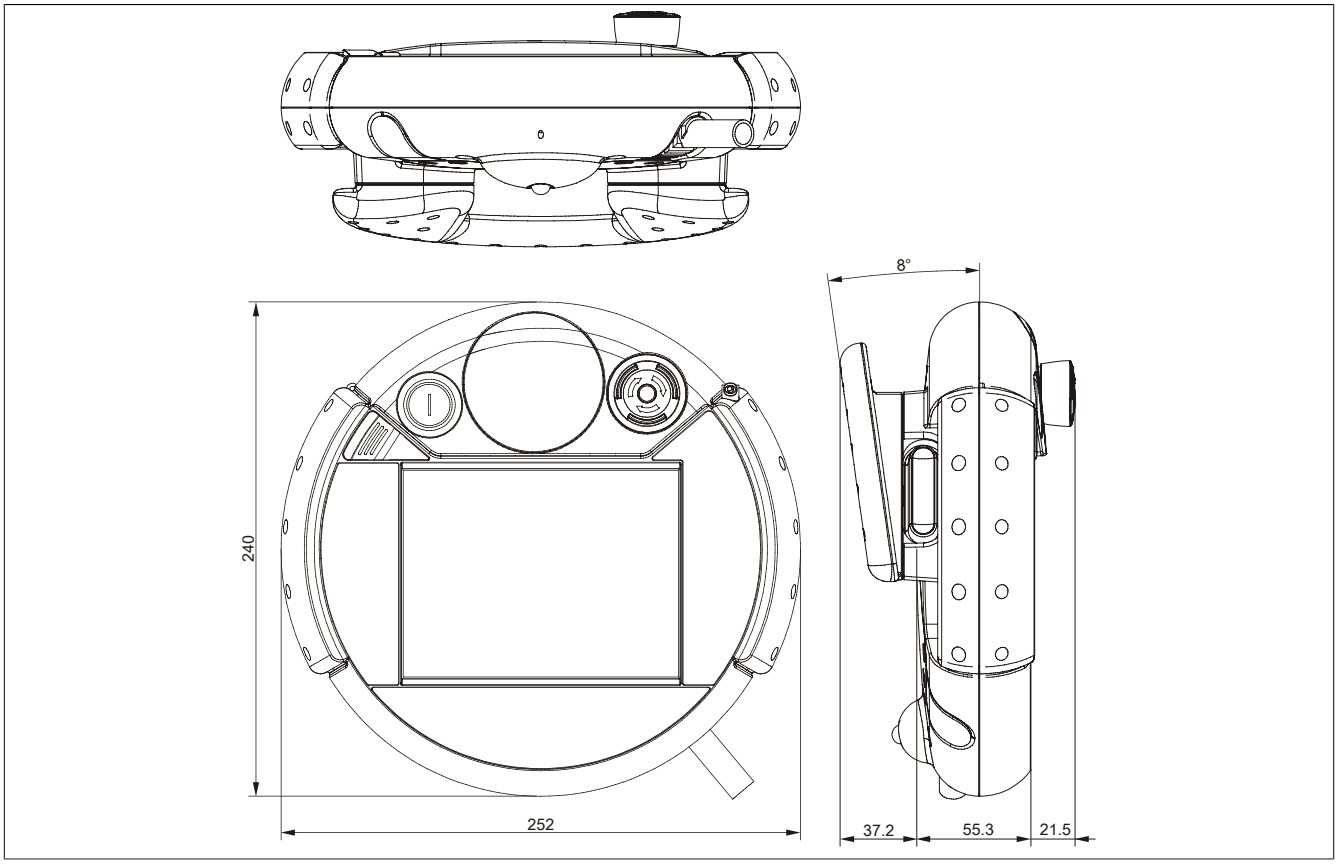


Figure 18: 5MP040.0381-01 - Dimensions

2.3.1.2 5MP040.0381-02

2.3.1.2.1 General information

- 3.8" QVGA LCD m display
- Intel PXA 270 processor
- 51 system keys
- Stop button
- Handwheel
- Key switch
- 2 integrated 3-position enable switches

2.3.1.2.2 Order data

Model number	Short description	Figure
	System units	
5MP040.0381-02	Mobile Panel MP40, 3.8" QVGA LCD m display, Intel PXA 270 processor, 256 MB DRAM, 128 MB flash memory, ETH 10/100, USB 1.1, 51 system keys, stop button, handwheel, key switch, 2 integrated 3-position enable switches, handle. Order cables and operating system separately.	
	Required accessories	
	Attachment cables	
5CAMPH.0018-30	MP40/50 attachment cable with push-pull circular connector, 1.8 m	
5CAMPH.0050-30	MP40/50 attachment cable with push-pull circular connector, 5 m	
5CAMPH.0100-30	MP40/50 attachment cable with push-pull circular connector, 10 m	
5CAMPH.0150-30	MP40/50 attachment cable with push-pull circular connector, 15 m	
5CAMPH.0200-30	MP40/50 attachment cable with push-pull circular connector, 20 m	
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet crossover - 2 m	
5CAMPC.0020-11	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet straight-through - 2 m	
	Optional accessories	
	Accessories	
4MPBRA.0000-01	MP40/50 wall mount.	
4MPCBX.0000-00	Mobile Panel connection box - For cables with push-pull circular connectors	
4MPCBX.0000-C01	SIT MP connection box PP	
4MPCBX.0001-00	Mobile Panel small connection box - For cables with push-pull circular connectors	
5CAMPB.0050-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	
5CAMPB.0100-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	
5MPBAT.0000-00	MP40/50 buffer accumulator	
	Windows CE 5.0	
5SWWCE.0524-ENG	Microsoft OEM Windows CE 5.0 Professional, English; for Mobile Panel MP40.	
5SWWCE.0624-ENG	Microsoft OEM Windows CE 5.0 Professional Plus, English, for Mobile Panel MP40.	
5SWWCE.0724-ENG	Microsoft OEM Windows CE 5.0 Professional plus, English; Terminal Client Automation Runtime for Mobile Panel MP40.	

Table 11: 5MP040.0381-02 - Order data

2.3.1.2.3 Components

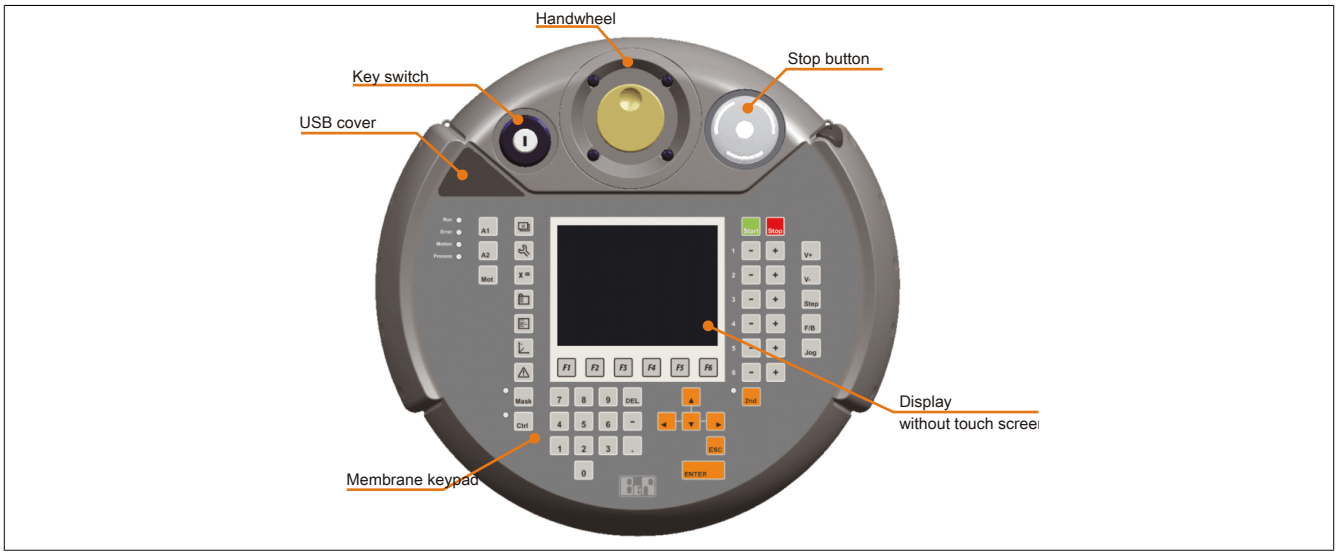


Figure 19: 5MP040.0381-02 - Components

2.3.1.2.4 Technical data

Information:

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

Model number	5MP040.0381-02
General information	
Reset button	Yes
Controller	
Processor	
Type	Intel PXA 270
Clock frequency	416 MHz
Mode/Node switches	No
Graphics	
Controller	Intel PXA
SRAM	
Size	-
Battery-backed	-
Interfaces	
USB	
Quantity	1
Type	USB 1.1
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s)
Current-carrying capacity	Max. 500 mA
Ethernet	
Quantity	1 [1)]
Controller	SMSC11X
Design	Shielded RJ45 port
Transfer rate	10/100 Mbit/s
Max. baud rate	100 Mbit/s
Display	
Type	Monochrome LCD
Diagonal	3.8" (96.5 mm)
Colors	16 shades of gray [2)]
Resolution	QVGA, 320 x 240 pixels
Contrast	20:1
Viewing angles	
Horizontal	Direction R / Direction L = 45°
Vertical	Direction U = 30° / Direction D = 60°
Backlight	
Brightness	110 cd/m²
Half-brightness time	50,000 h

Table 12: 5MP040.0381-02 - Technical data

Model number	5MP040.0381-02
Touch screen	
Technology	-
Keys	
Function keys	No
Soft keys	6
System keys	51 numeric keys, cursor block
3-axis joystick	No
Electronic handwheel	Yes
Illuminated button	No
Stop button	Yes (2 normally closed contacts, right position)
Enable switch	Yes (2 3-position buttons, left and right position)
Override potentiometer	No
Key switch	Yes
LED status indicators	7
Electrical characteristics	
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) 3)
Inrush current	Max. 5.6 A (current limiting available)
Power consumption	4.8 W (200 mA at 24 VDC)
Max. interruption of power supply	≤10 ms
Electrical isolation	No
Operating conditions	
Drop height	1.5 m to industrial floor
Flame-retardant	UL94V-0
Degree of protection per EN 60529	IP65
Rated protection	Class 3 per EN 61131-2 or EN 50178
Environmental conditions	
Temperature	
Operation	0 to 50°C 4)
Storage	-20 to 70°C
Transport	-20 to 70°C
Relative humidity	
Operation	Max. 95%, non-condensing
Storage	Max. 95%, non-condensing
Transport	Max. 95%, non-condensing
Vibration	
Operation	5 to 9 Hz: 7 mm amplitude / 9 to 150 Hz: 2 g
Shock	
Operation	15 g (147 m/s² 0-peak) and 11 ms duration
Elevation	
Operation	Max. 3000 m
Mechanical characteristics	
Housing	
Material	ABS
Coating	Similar to RAL 7011
Front	
Keypad overlay	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1100 g

Table 12: 5MP040.0381-02 - Technical data

1) Connection via Mobile Panel cable.
2) The actual number of available colors depends on the graphics memory, configured graphics mode and graphics driver being used.
3) Connection via Mobile Panel cable.
For details regarding appropriate protection of the device, see chapter 3.1 "Commissioning from a safety point of view"
4) When used with a buffer accumulator (5MPBAT.0000-00), the maximum temperature during operation is 45°C.

2.3.1.2.5 Temperature/Humidity diagram

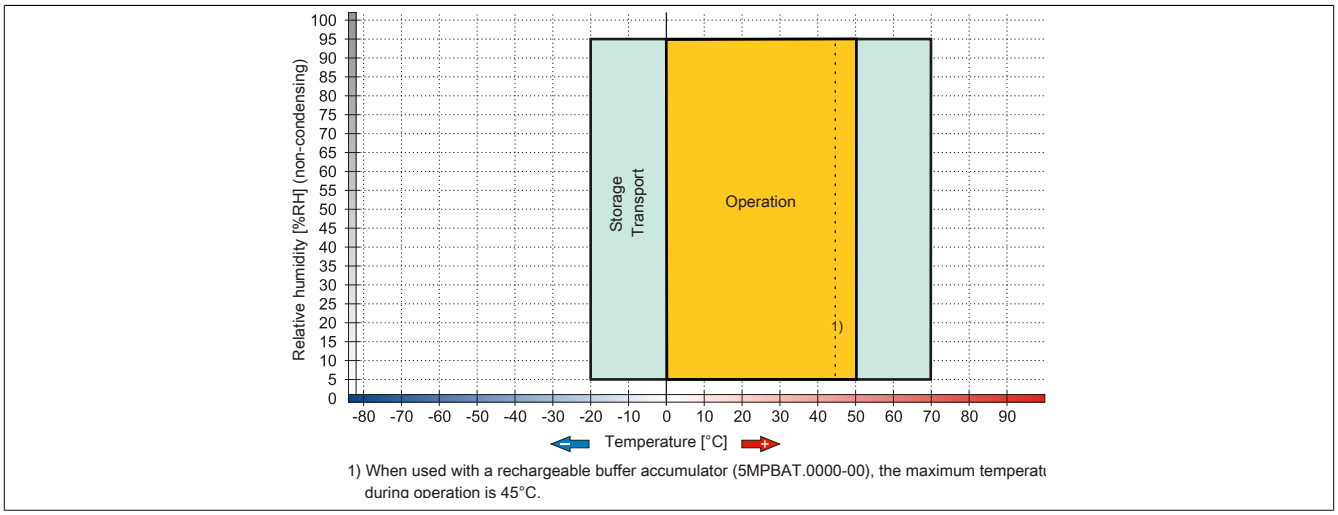


Figure 20: 5MP040.0381-02 - Temperature/Humidity diagram

2.3.1.2.6 Dimensions

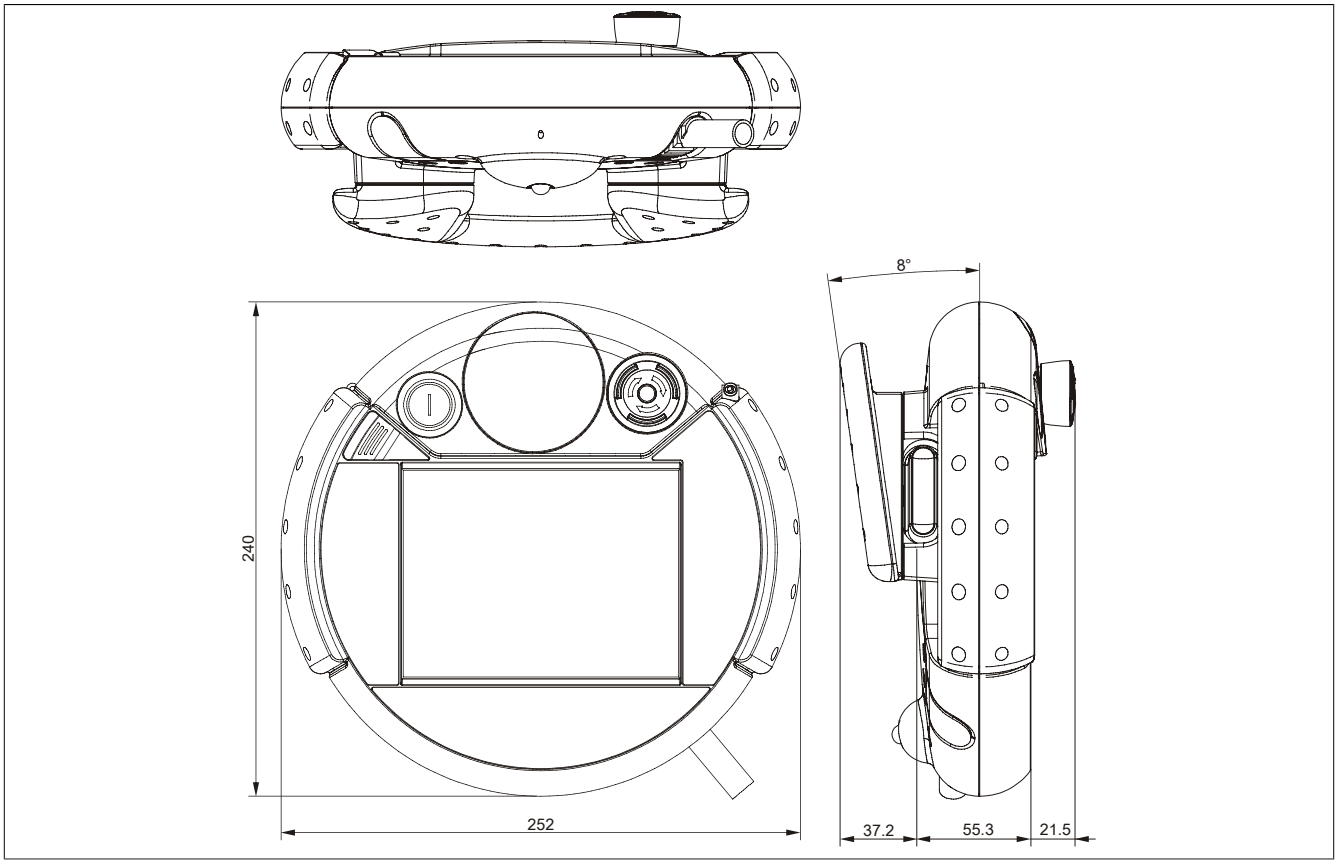


Figure 21: 5MP040.0381-02 - Dimensions

2.3.1.3 5MP050.0653-01

2.3.1.3.1 General information

- 6.5" VGA TFT color display
- Analog resistive touch screen
- Intel PXA 270 processor
- 31 system keys and soft keys
- Stop button
- Handwheel
- Pushbutton (illuminated pushbutton)
- 2 integrated 3-position enable switches

2.3.1.3.2 Order data

Model number	Short description	Figure
	System units	
5MP050.0653-01	Mobile Panel MP50, 6.5" VGA TFT color display with touch screen (analog resistive), Intel PXA 270 processor, 256 MB DRAM, 128 MB flash memory, ETH 10/100, USB 1.1, 31 system keys, stop button, handwheel, pushbutton, 2 integrated 3-position enable switches, handle. Delivered as an assembly (order cables and operating system separately).	
	Required accessories	
	Attachment cables	
5CAMPH.0018-30	MP40/50 attachment cable with push-pull circular connector, 1.8 m	
5CAMPH.0050-30	MP40/50 attachment cable with push-pull circular connector, 5 m	
5CAMPH.0100-30	MP40/50 attachment cable with push-pull circular connector, 10 m	
5CAMPH.0150-30	MP40/50 attachment cable with push-pull circular connector, 15 m	
5CAMPH.0200-30	MP40/50 attachment cable with push-pull circular connector, 20 m	
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet crossover - 2 m	
5CAMPC.0020-11	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet straight-through - 2 m	
	Optional accessories	
	Accessories	
4MPBRA.0000-01	MP40/50 wall mount.	
4MPCBX.0000-00	Mobile Panel connection box - For cables with push-pull circular connectors	
4MPCBX.0000-C01	SIT MP connection box PP	
4MPCBX.0001-00	Mobile Panel small connection box - For cables with push-pull circular connectors	
5CAMPB.0050-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	
5CAMPB.0100-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	
5MPBAT.0000-00	MP40/50 buffer accumulator	

Table 13: 5MP050.0653-01 - Order data

2.3.1.3.3 Components

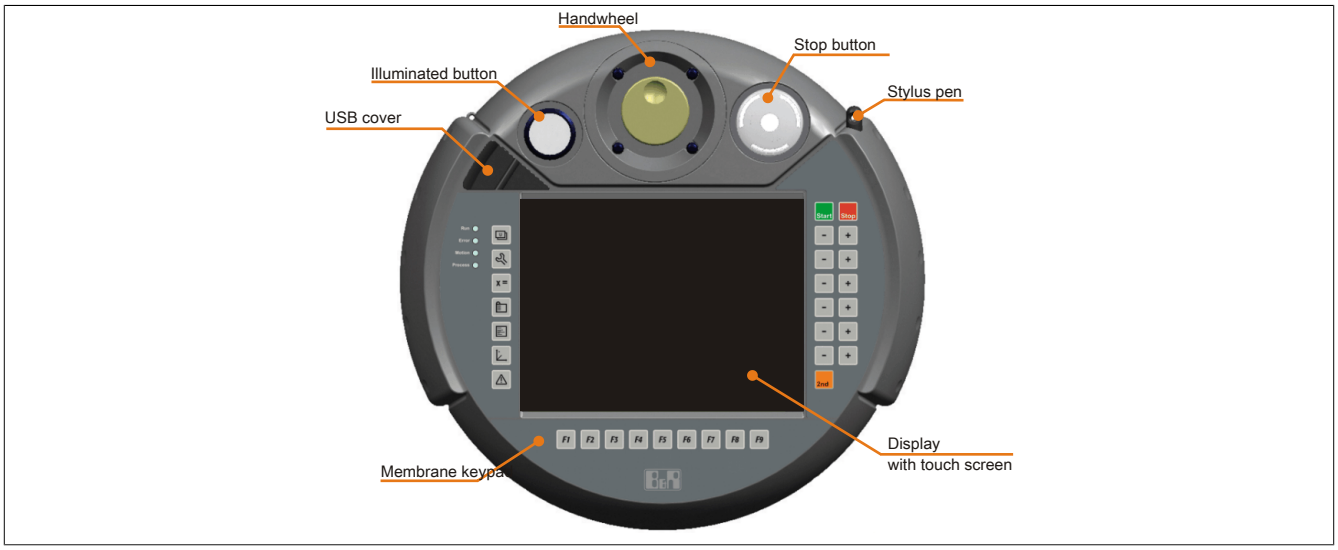


Figure 22: 5MP050.0653-01 - Components

2.3.1.3.4 Technical data

Information:

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

Model number	5MP050.0653-01
General information	
Reset button	Yes
Certifications	
CE	Yes
KC	Yes
GOST-R	Yes
Controller	
Processor	
Type	Intel PXA 270
Clock frequency	416 MHz
Mode/Node switches	No
Graphics	
Controller	Intel PXA
SRAM	
Size	-
Battery-backed	-
Interfaces	
USB	
Quantity	1
Type	USB 1.1
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s)
Current-carrying capacity	Max. 500 mA
Ethernet	
Quantity	1 [1)]
Controller	SMSC11X
Design	Shielded RJ45 port
Transfer rate	10/100 Mbit/s
Max. baud rate	100 Mbit/s
Display	
Type	TFT color
Diagonal	6.5" (165 mm)
Colors	65,535 [2)]
Resolution	VGA, 640 x 480 pixels
Contrast	300:1
Viewing angles	
Horizontal	Direction R / Direction L = 55°
Vertical	Direction U = 30° / Direction D = 60°

Table 14: 5MP050.0653-01 - Technical data

Model number	5MP050.0653-01
Backlight	
Brightness	500 cd/m²
Half-brightness time	100,000 h
Touch screen	
Technology	Analog, resistive
Keys	
Function keys	No
Soft keys	9
System keys	22
3-axis joystick	No
Electronic handwheel	Yes
Illuminated button	Yes (white)
Stop button	Yes (2 normally closed contacts, right position)
Enable switch	Yes (2 3-position buttons, left and right position)
Override potentiometer	No
Key switch	No
LED status indicators	4
Electrical characteristics	
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) 3)
Inrush current	Max. 5.6 A (current limiting available)
Power consumption	9.6 W (400 mA at 24 VDC)
Max. interruption of power supply	≤10 ms
Electrical isolation	No
Operating conditions	
Drop height	1.5 m to industrial floor
Flame-retardant	UL94V-0
Degree of protection per EN 60529	IP65
Rated protection	Class 3 per EN 61131-2 or EN 50178
Environmental conditions	
Temperature	
Operation	0 to 50°C 4)
Storage	-20 to 70°C
Transport	-20 to 70°C
Relative humidity	
Operation	Max. 95% if T ≤ 40°C, non-condensing
Storage	Max. 95% if T ≤ 55°C, non-condensing
Transport	Max. 95% if T ≤ 55°C, non-condensing
Vibration	
Operation	5 to 9 Hz: 7 mm amplitude / 9 to 150 Hz: 2 g
Shock	
Operation	15 g (147 m/s² 0-peak) and 11 ms duration
Elevation	
Operation	Max. 3000 m
Mechanical characteristics	
Housing	
Material	ABS
Coating	Similar to RAL 7011
Front	
Keypad overlay	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1250 g

Table 14: 5MP050.0653-01 - Technical data

1) Connection via Mobile Panel cable.
2) The actual number of available colors depends on the graphics memory, configured graphics mode and graphics driver being used.
3) Connection via Mobile Panel cable.
For details regarding appropriate protection of the device, see chapter 3.1 "Commissioning from a safety point of view"
4) When used with a buffer accumulator (5MPBAT.0000-00), the maximum temperature during operation is 45°C.

2.3.1.3.5 Temperature/Humidity diagram

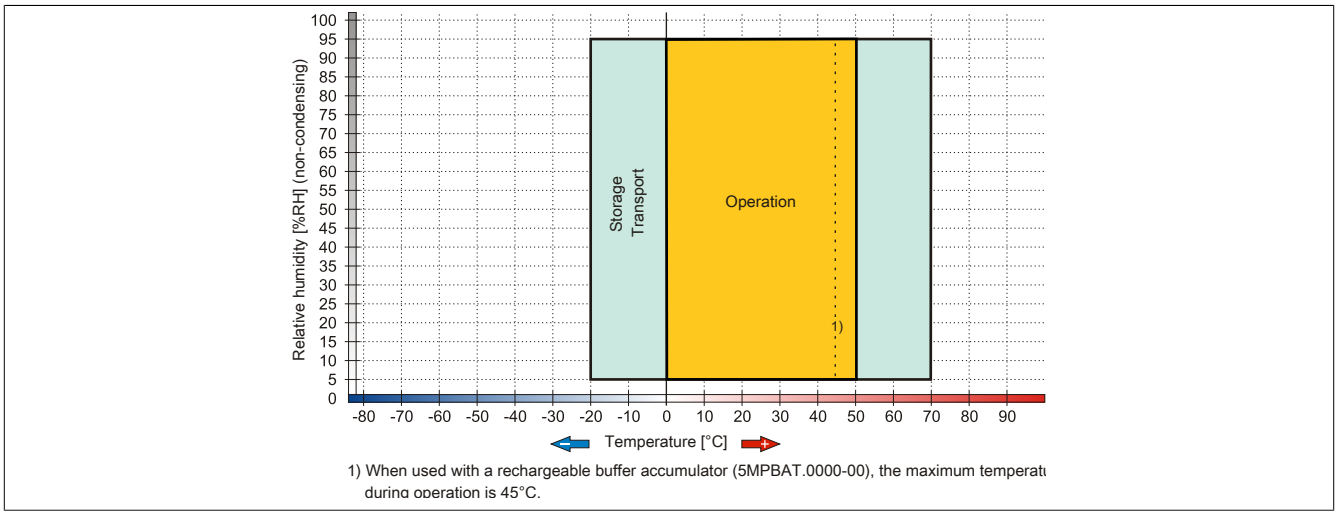


Figure 23: 5MP050.0653-01 - Temperature/Humidity diagram

2.3.1.3.6 Dimensions

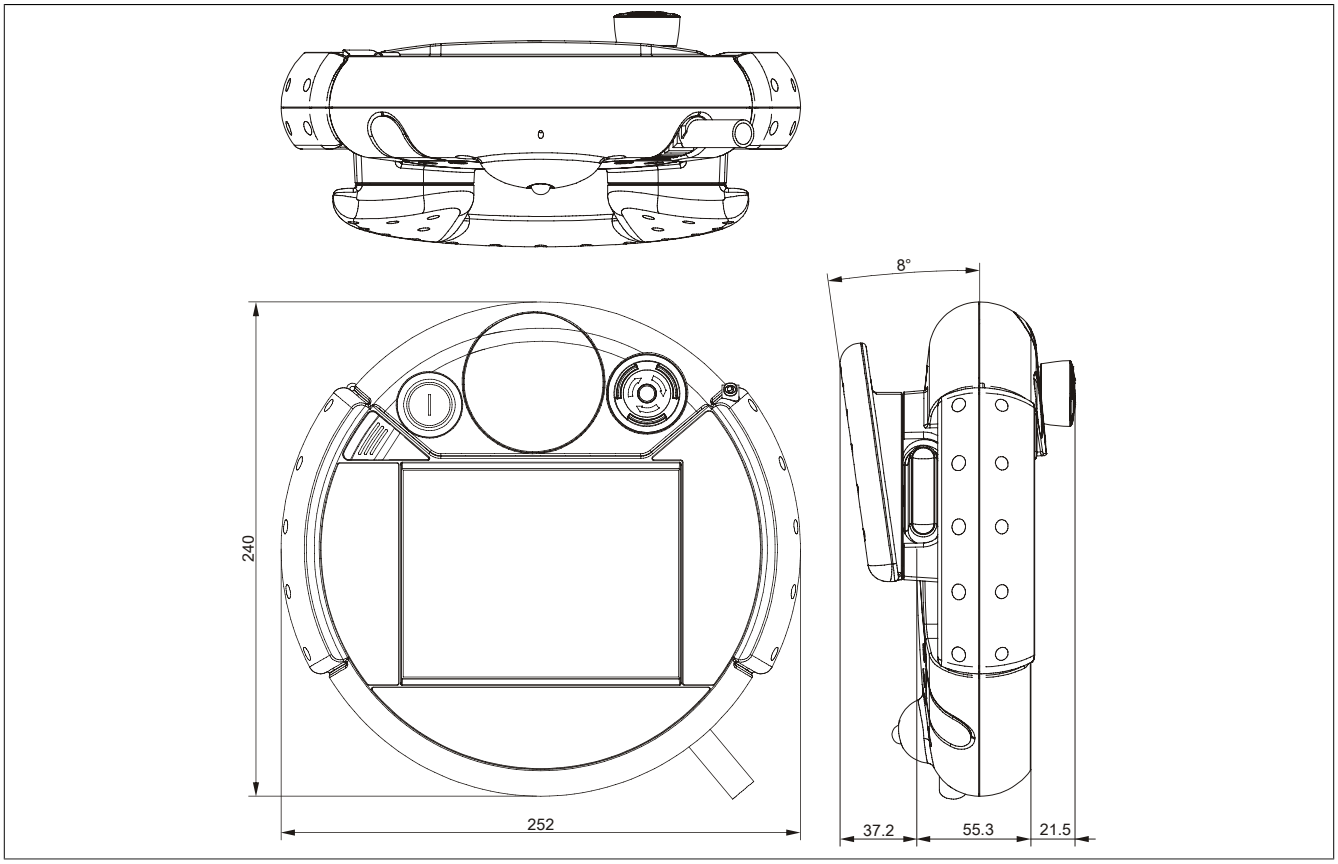


Figure 24: 5MP050.0653-01 - Dimensions

2.3.1.4 5MP050.0653-02

2.3.1.4.1 General information

- 6.5" VGA TFT color display
- Analog resistive touch screen
- Intel PXA 270 processor
- 31 system keys and soft keys
- Stop button
- Joystick
- Key switch
- 2 integrated 3-position enable switches

2.3.1.4.2 Order data

Model number	Short description	Figure
	System units	
5MP050.0653-02	Mobile Panel MP50, 6.5" VGA TFT color display with touch screen (analog resistive), Intel PXA 270 processor, 256 MB DRAM, 128 MB flash memory, ETH 10/100, USB 1.1, 31 system keys, stop button, joystick, key switch, 2 integrated 3-position enable switches, handle. Delivered as an assembly (order cables and operating system separately).	
	Required accessories	
	Attachment cables	
5CAMPH.0018-30	MP40/50 attachment cable with push-pull circular connector, 1.8 m	
5CAMPH.0050-30	MP40/50 attachment cable with push-pull circular connector, 5 m	
5CAMPH.0100-30	MP40/50 attachment cable with push-pull circular connector, 10 m	
5CAMPH.0150-30	MP40/50 attachment cable with push-pull circular connector, 15 m	
5CAMPH.0200-30	MP40/50 attachment cable with push-pull circular connector, 20 m	
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet crossover - 2 m	
5CAMPC.0020-11	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet straight-through - 2 m	
	Optional accessories	
	Accessories	
4MPBRA.0000-01	MP40/50 wall mount.	
4MPCBX.0000-00	Mobile Panel connection box - For cables with push-pull circular connectors	
4MPCBX.0000-C01	SIT MP connection box PP	
4MPCBX.0001-00	Mobile Panel small connection box - For cables with push-pull circular connectors	
5CAMPB.0050-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	
5CAMPB.0100-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	
5MPBAT.0000-00	MP40/50 buffer accumulator	

Table 15: 5MP050.0653-02 - Order data

2.3.1.4.3 Components

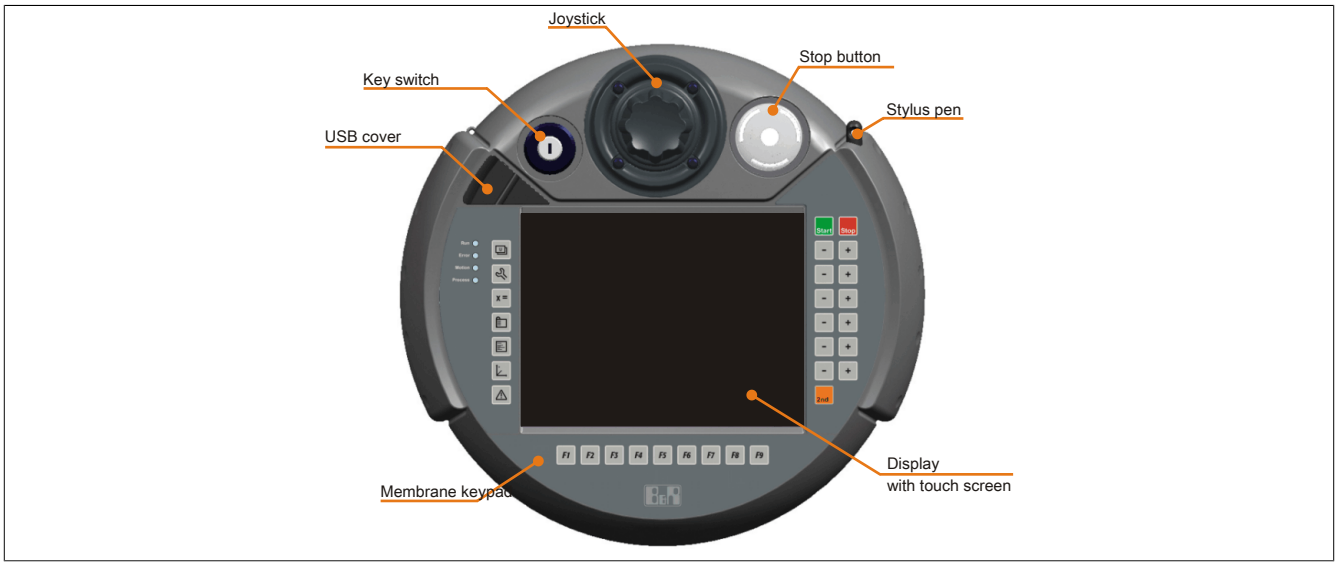


Figure 25: 5MP050.0653-02 - Components

2.3.1.4.4 Technical data

Information:

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

Model number	5MP050.0653-02
General information	
Reset button	Yes
Certifications	
CE	Yes
GOST-R	Yes
Controller	
Processor	
Type	Intel PXA 270
Clock frequency	416 MHz
Mode/Node switches	No
Graphics	
Controller	Intel PXA
SRAM	
Size	-
Battery-backed	-
Interfaces	
USB	
Quantity	1
Type	USB 1.1
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s)
Current-carrying capacity	Max. 500 mA
Ethernet	
Quantity	1 [1)]
Controller	SMSC11X
Design	Shielded RJ45 port
Transfer rate	10/100 Mbit/s
Max. baud rate	100 Mbit/s
Display	
Type	TFT color
Diagonal	6.5" (165 mm)
Colors	65,535 [2)]
Resolution	VGA, 640 x 480 pixels
Contrast	300:1
Viewing angles	
Horizontal	Direction R / Direction L = 55°
Vertical	Direction U = 30° / Direction D = 60°

Table 16: 5MP050.0653-02 - Technical data

Model number	5MP050.0653-02
Backlight	
Brightness	500 cd/m²
Half-brightness time	100,000 h
Touch screen	
Technology	Analog, resistive
Keys	
Function keys	No
Soft keys	9
System keys	22
3-axis joystick	Yes
Electronic handwheel	No
Illuminated button	No
Stop button	Yes (2 normally closed contacts, right position)
Enable switch	Yes (2 3-position buttons, left and right position)
Override potentiometer	No
Key switch	Yes
LED status indicators	4
Electrical characteristics	
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) 3)
Inrush current	Max. 5.6 A (current limiting available)
Power consumption	9.6 W (400 mA at 24 VDC)
Max. interruption of power supply	≤10 ms
Electrical isolation	No
Operating conditions	
Drop height	1.5 m to industrial floor
Flame-retardant	UL94V-0
Degree of protection per EN 60529	IP65
Rated protection	Class 3 per EN 61131-2 or EN 50178
Environmental conditions	
Temperature	
Operation	0 to 50°C 4)
Storage	-20 to 70°C
Transport	-20 to 70°C
Relative humidity	
Operation	Max. 95%, non-condensing
Storage	Max. 95%, non-condensing
Transport	Max. 95%, non-condensing
Vibration	
Operation	5 to 9 Hz: 7 mm amplitude / 9 to 150 Hz: 2 g
Shock	
Operation	15 g (147 m/s² 0-peak) and 11 ms duration
Elevation	
Operation	Max. 3000 m
Mechanical characteristics	
Housing	
Material	ABS
Coating	Similar to RAL 7011
Front	
Keypad overlay	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1250 g

Table 16: 5MP050.0653-02 - Technical data

1) Connection via Mobile Panel cable.
2) The actual number of available colors depends on the graphics memory, configured graphics mode and graphics driver being used.
3) Connection via Mobile Panel cable.
For details regarding appropriate protection of the device, see chapter 3.1 "Commissioning from a safety point of view"
4) When used with a buffer accumulator (5MPBAT.0000-00), the maximum temperature during operation is 45°C.

2.3.1.4.5 Temperature/Humidity diagram

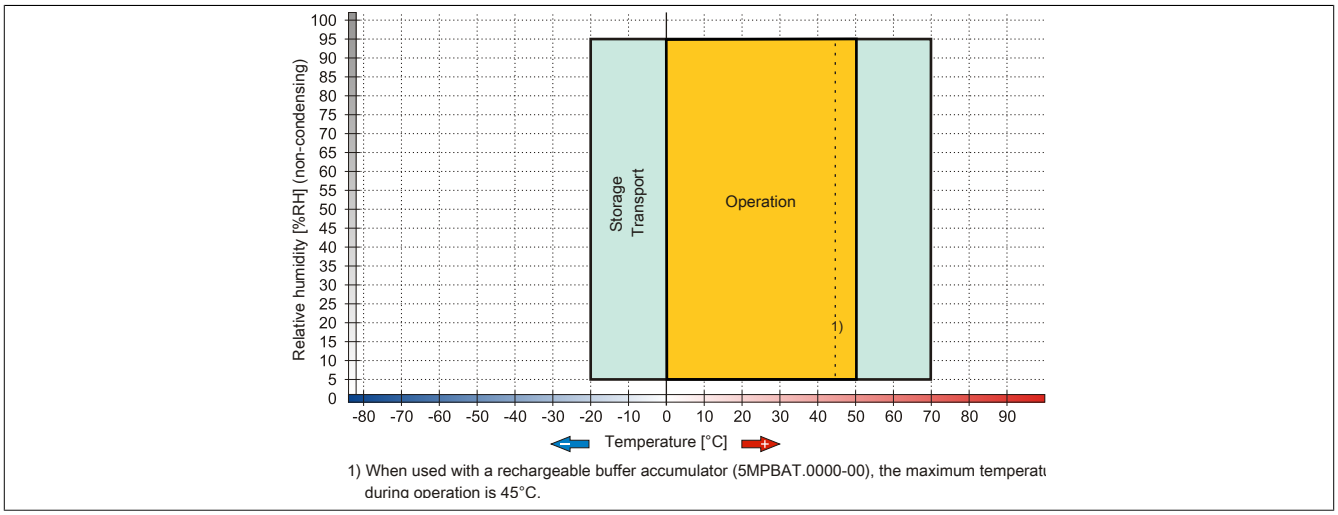


Figure 26: 5MP050.0653-02 - Temperature/Humidity diagram

2.3.1.4.6 Dimensions

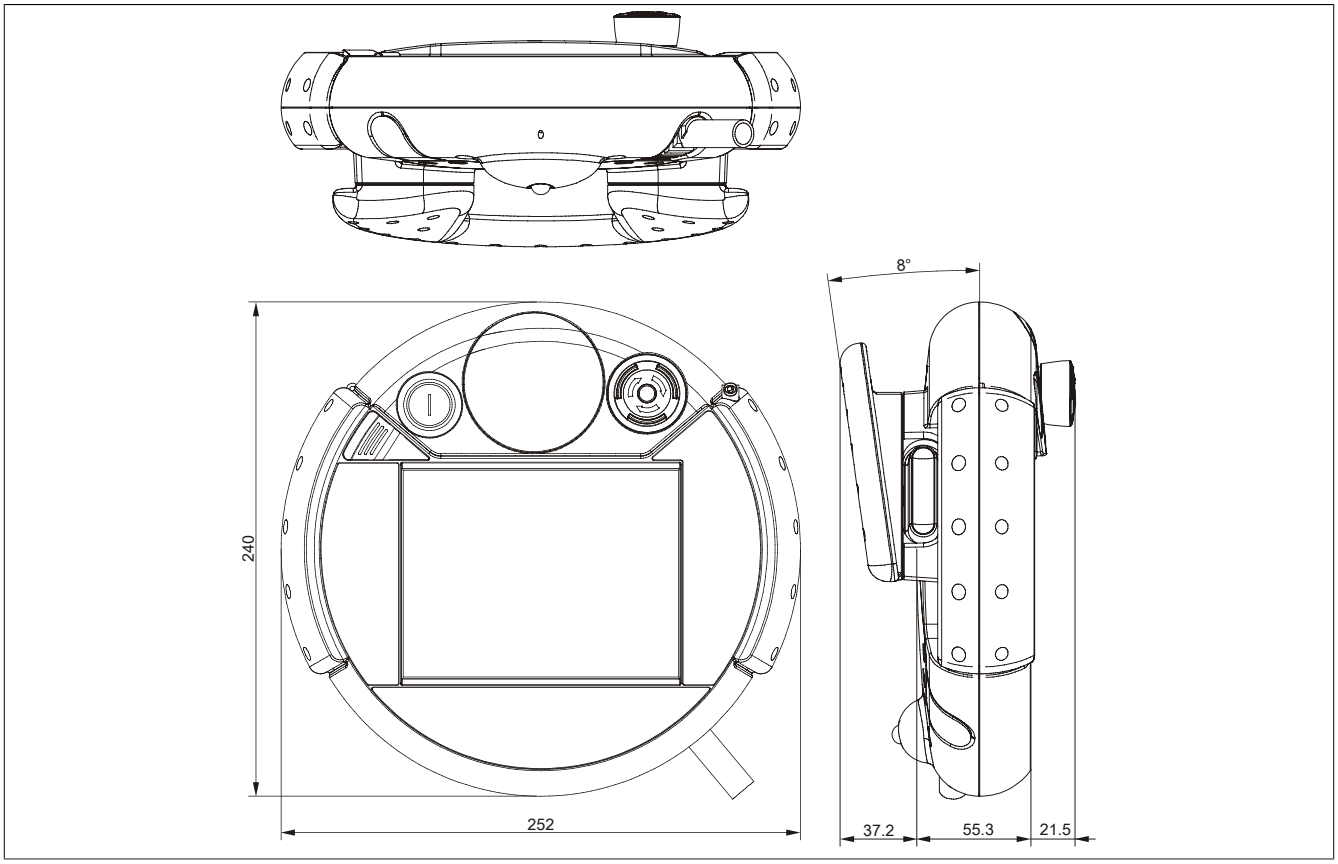


Figure 27: 5MP050.0653-02 - Dimensions

2.3.1.5 5MP050.0653-03

2.3.1.5.1 General information

- 6.5" VGA TFT color display
- Analog resistive touch screen
- Intel PXA 270 processor
- 31 system keys and soft keys
- Stop button
- Handwheel
- Override potentiometer
- 2 integrated 3-position enable switches

2.3.1.5.2 Order data

Model number	Short description	Figure
	System units	
5MP050.0653-03	Mobile Panel MP50, 6.5" VGA TFT color display with touch screen (analog resistive), Intel PXA 270 processor, 256 MB DRAM, 128 MB flash memory, ETH 10/100, USB 1.1, 31 system keys, stop button, handwheel, override potentiometer, 2 integrated 3-position enable switches, handle. Delivered as an assembly (order cables and operating system separately).	
	Required accessories	
	Attachment cables	
5CAMPH.0018-30	MP40/50 attachment cable with push-pull circular connector, 1.8 m	
5CAMPH.0050-30	MP40/50 attachment cable with push-pull circular connector, 5 m	
5CAMPH.0100-30	MP40/50 attachment cable with push-pull circular connector, 10 m	
5CAMPH.0150-30	MP40/50 attachment cable with push-pull circular connector, 15 m	
5CAMPH.0200-30	MP40/50 attachment cable with push-pull circular connector, 20 m	
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet crossover - 2 m	
5CAMPC.0020-11	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet straight-through - 2 m	
	Optional accessories	
	Accessories	
4MPBRA.0000-01	MP40/50 wall mount.	
4MPCBX.0000-00	Mobile Panel connection box - For cables with push-pull circular connectors	
4MPCBX.0000-C01	SIT MP connection box PP	
4MPCBX.0001-00	Mobile Panel small connection box - For cables with push-pull circular connectors	
5CAMPB.0050-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	
5CAMPB.0100-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	
5MPBAT.0000-00	MP40/50 buffer accumulator	

Table 17: 5MP050.0653-03 - Order data

2.3.1.5.3 Components

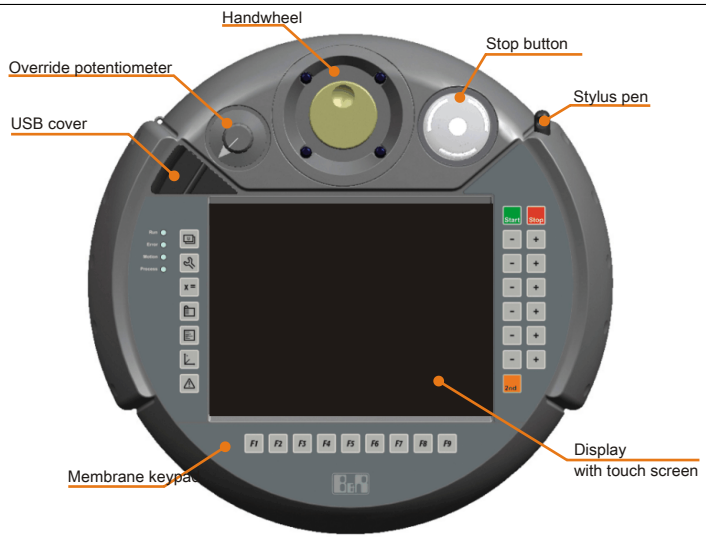


Figure 28: 5MP050.0653-03 - Components

2.3.1.5.4 Technical data

Information:

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

Model number	5MP050.0653-03
General information	
Reset button	Yes
Certifications	
CE	Yes
GOST-R	Yes
Controller	
Processor	
Type	Intel PXA 270
Clock frequency	416 MHz
Mode/Node switches	No
Graphics	
Controller	Intel PXA
SRAM	
Size	-
Battery-backed	-
Interfaces	
USB	
Quantity	1
Type	USB 1.1
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s)
Current-carrying capacity	Max. 500 mA
Ethernet	
Quantity	1 [1)]
Controller	SMSC11X
Design	Shielded RJ45 port
Transfer rate	10/100 Mbit/s
Max. baud rate	100 Mbit/s
Display	
Type	TFT color
Diagonal	6.5" (165 mm)
Colors	65,535 [2)]
Resolution	VGA, 640 x 480 pixels
Contrast	300:1
Viewing angles	
Horizontal	Direction R / Direction L = 55°
Vertical	Direction U = 30° / Direction D = 60°

Table 18: 5MP050.0653-03 - Technical data

Model number	5MP050.0653-03
Backlight	
Brightness	500 cd/m²
Half-brightness time	100,000 h
Touch screen	
Technology	Analog, resistive
Keys	
Function keys	No
Soft keys	9
System keys	22
3-axis joystick	No
Electronic handwheel	Yes
Illuminated button	No
Stop button	Yes (2 normally closed contacts, right position)
Enable switch	Yes (2 3-position buttons, left and right position)
Override potentiometer	Yes
Key switch	No
LED status indicators	4
Electrical characteristics	
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) 3)
Inrush current	Max. 5.6 A (current limiting available)
Power consumption	9.6 W (400 mA at 24 VDC)
Max. interruption of power supply	≤10 ms
Electrical isolation	No
Operating conditions	
Drop height	1.5 m to industrial floor
Flame-retardant	UL94V-0
Degree of protection per EN 60529	IP65
Rated protection	Class 3 per EN 61131-2 or EN 50178
Environmental conditions	
Temperature	
Operation	0 to 50°C 4)
Storage	-20 to 70°C
Transport	-20 to 70°C
Relative humidity	
Operation	Max. 95%, non-condensing
Storage	Max. 95%, non-condensing
Transport	Max. 95%, non-condensing
Vibration	
Operation	5 to 9 Hz: 7 mm amplitude / 9 to 150 Hz: 2 g
Shock	
Operation	15 g (147 m/s² 0-peak) and 11 ms duration
Elevation	
Operation	Max. 3000 m
Mechanical characteristics	
Housing	
Material	ABS
Coating	Similar to RAL 7011
Front	
Keypad overlay	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1250 g

Table 18: 5MP050.0653-03 - Technical data

1) Connection via Mobile Panel cable.
2) The actual number of available colors depends on the graphics memory, configured graphics mode and graphics driver being used.
3) Connection via Mobile Panel cable.
For details regarding appropriate protection of the device, see chapter 3.1 "Commissioning from a safety point of view"
4) When used with a buffer accumulator (5MPBAT.0000-00), the maximum temperature during operation is 45°C.

2.3.1.5.5 Temperature/Humidity diagram

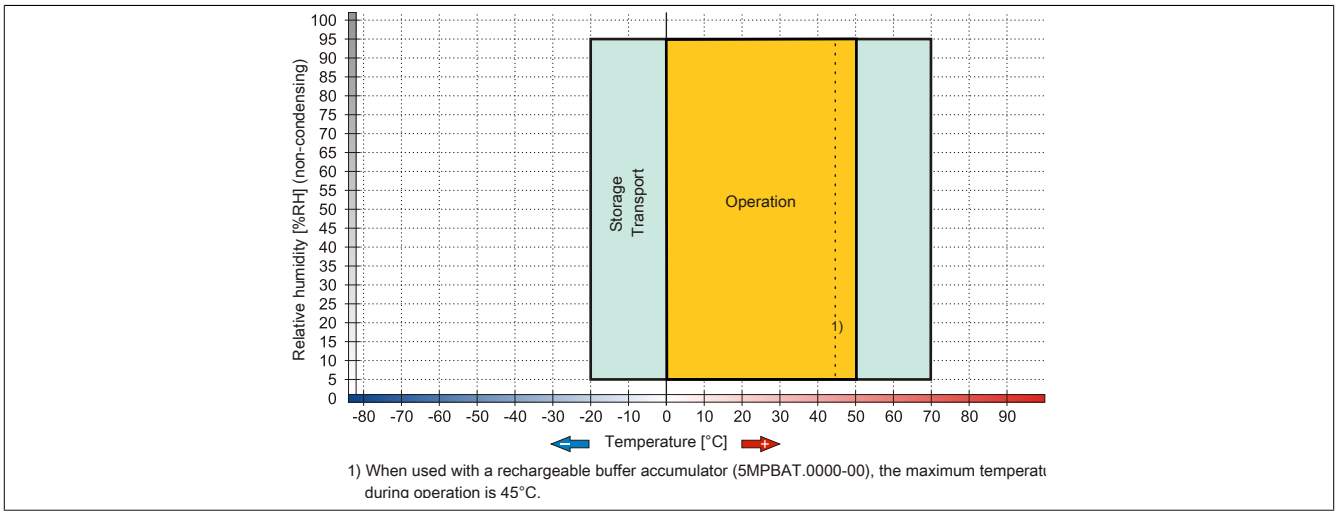


Figure 29: 5MP050.0653-03 - Temperature/Humidity diagram

2.3.1.5.6 Dimensions

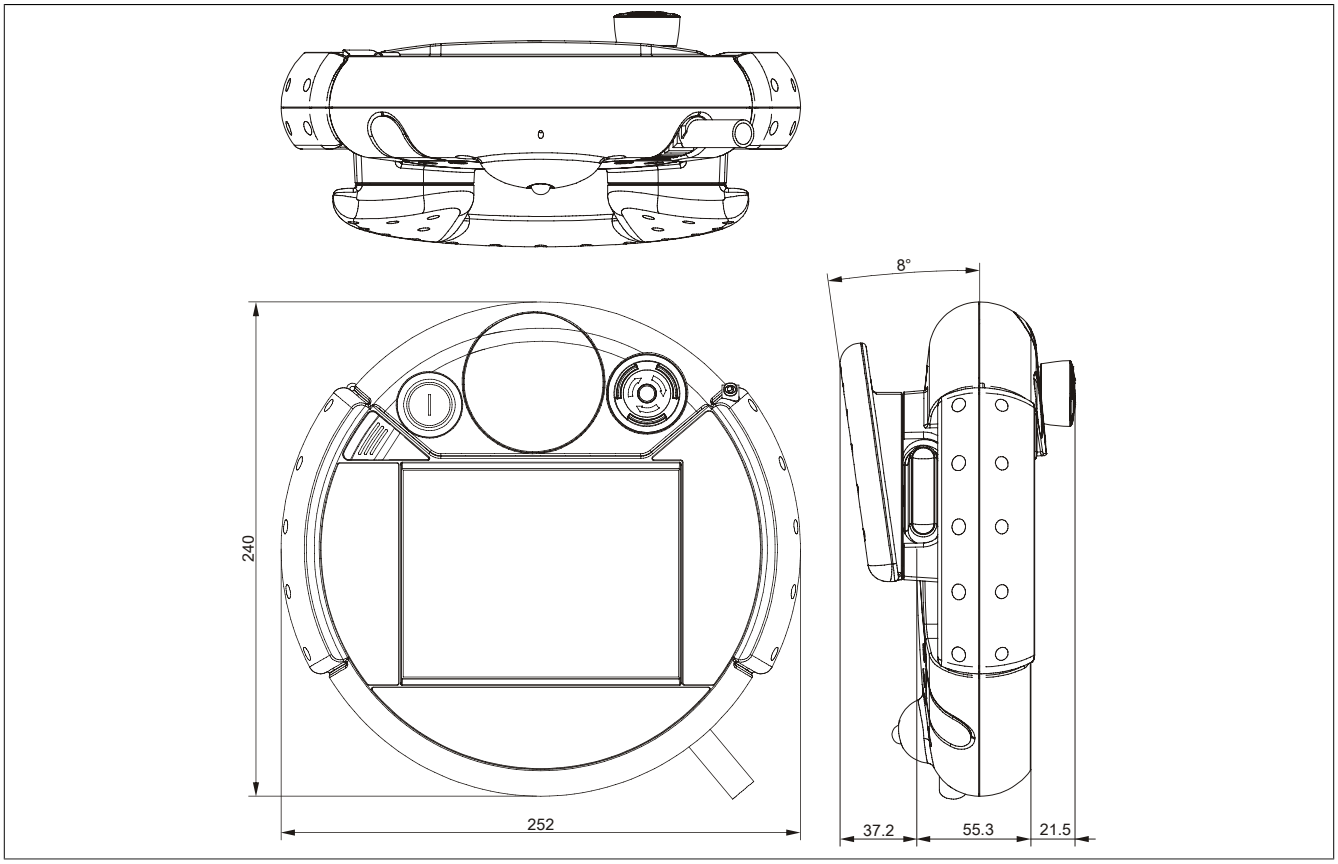


Figure 30: 5MP050.0653-03 - Dimensions

2.3.1.6 5MP050.0653-04

2.3.1.6.1 General information

- 6.5" VGA TFT color display
- Analog resistive touch screen
- Intel PXA 270 processor
- 31 system keys and soft keys
- Stop button
- Handwheel
- Key switch
- 2 integrated 3-position enable switches

2.3.1.6.2 Order data

Model number	Short description	Figure
	System units	
5MP050.0653-04	Mobile Panel MP50, 6.5" VGA TFT color display with touch screen (analog resistive), Intel PXA 270 processor, 256 MB DRAM, 128 MB flash memory, ETH 10/100, USB 1.1, 31 system keys, stop button, handwheel, key switch, 2 integrated 3-position enable switches, handle. Delivered as an assembly (order cables and operating system separately).	
	Required accessories	
	Attachment cables	
5CAMPH.0018-30	MP40/50 attachment cable with push-pull circular connector, 1.8 m	
5CAMPH.0050-30	MP40/50 attachment cable with push-pull circular connector, 5 m	
5CAMPH.0100-30	MP40/50 attachment cable with push-pull circular connector, 10 m	
5CAMPH.0150-30	MP40/50 attachment cable with push-pull circular connector, 15 m	
5CAMPH.0200-30	MP40/50 attachment cable with push-pull circular connector, 20 m	
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet crossover - 2 m	
5CAMPC.0020-11	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet straight-through - 2 m	
	Optional accessories	
	Accessories	
4MPBRA.0000-01	MP40/50 wall mount.	
4MPCBX.0000-00	Mobile Panel connection box - For cables with push-pull circular connectors	
4MPCBX.0000-C01	SIT MP connection box PP	
4MPCBX.0001-00	Mobile Panel small connection box - For cables with push-pull circular connectors	
5CAMPB.0050-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	
5CAMPB.0100-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	
5MPBAT.0000-00	MP40/50 buffer accumulator	

Table 19: 5MP050.0653-04 - Order data

2.3.1.6.3 Components

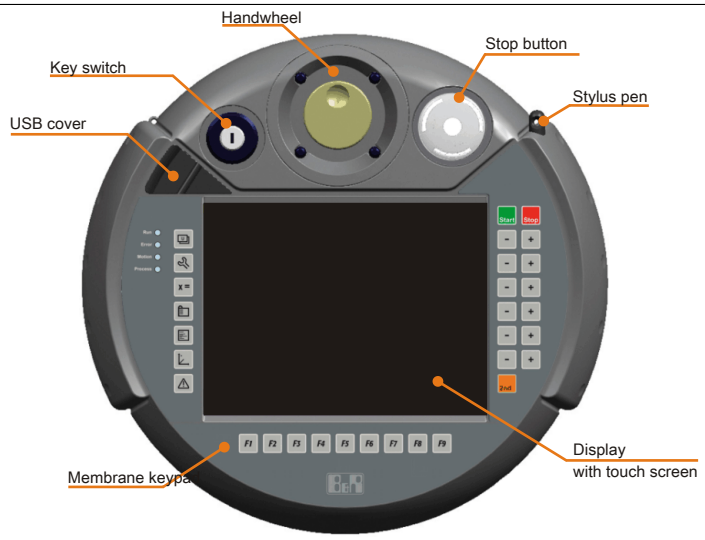


Figure 31: 5MP050.0653-04 - Components

2.3.1.6.4 Technical data

Information:

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

Model number	5MP050.0653-04
General information	
Reset button	Yes
Certifications	
CE	Yes
KC	Yes
GOST-R	Yes
Controller	
Processor	
Type	Intel PXA 270
Clock frequency	416 MHz
Mode/Node switches	No
Graphics	
Controller	Intel PXA
SRAM	
Size	-
Battery-backed	-
Interfaces	
USB	
Quantity	1
Type	USB 1.1
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s)
Current-carrying capacity	Max. 500 mA
Ethernet	
Quantity	1 [1)]
Controller	SMSC11X
Design	Shielded RJ45 port
Transfer rate	10/100 Mbit/s
Max. baud rate	100 Mbit/s
Display	
Type	TFT color
Diagonal	6.5" (165 mm)
Colors	65,535 [2)]
Resolution	VGA, 640 x 480 pixels
Contrast	300:1
Viewing angles	
Horizontal	Direction R / Direction L = 55°
Vertical	Direction U = 30° / Direction D = 60°

Table 20: 5MP050.0653-04 - Technical data

Model number	5MP050.0653-04
Backlight	
Brightness	500 cd/m²
Half-brightness time	100,000 h
Touch screen	
Technology	Analog, resistive
Keys	
Function keys	No
Soft keys	9
System keys	22
3-axis joystick	No
Electronic handwheel	Yes
Illuminated button	No
Stop button	Yes (2 normally closed contacts, right position)
Enable switch	Yes (2 3-position buttons, left and right position)
Override potentiometer	No
Key switch	Yes
LED status indicators	4
Electrical characteristics	
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) 3)
Inrush current	Max. 5.6 A (current limiting available)
Power consumption	9.6 W (400 mA at 24 VDC)
Max. interruption of power supply	≤10 ms
Electrical isolation	No
Operating conditions	
Drop height	1.5 m to industrial floor
Flame-retardant	UL94V-0
Degree of protection per EN 60529	IP65
Rated protection	Class 3 per EN 61131-2 or EN 50178
Environmental conditions	
Temperature	
Operation	0 to 50°C 4)
Storage	-20 to 70°C
Transport	-20 to 70°C
Relative humidity	
Operation	Max. 95%, non-condensing
Storage	Max. 95%, non-condensing
Transport	Max. 95%, non-condensing
Vibration	
Operation	5 to 9 Hz: 7 mm amplitude / 9 to 150 Hz: 2 g
Shock	
Operation	15 g (147 m/s² 0-peak) and 11 ms duration
Elevation	
Operation	Max. 3000 m
Mechanical characteristics	
Housing	
Material	ABS
Coating	Similar to RAL 7011
Front	
Keypad overlay	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1250 g

Table 20: 5MP050.0653-04 - Technical data

1) Connection via Mobile Panel cable.
2) The actual number of available colors depends on the graphics memory, configured graphics mode and graphics driver being used.
3) Connection via Mobile Panel cable.
For details regarding appropriate protection of the device, see chapter 3.1 "Commissioning from a safety point of view"
4) When used with a buffer accumulator (5MPBAT.0000-00), the maximum temperature during operation is 45°C.

2.3.1.6.5 Temperature/Humidity diagram

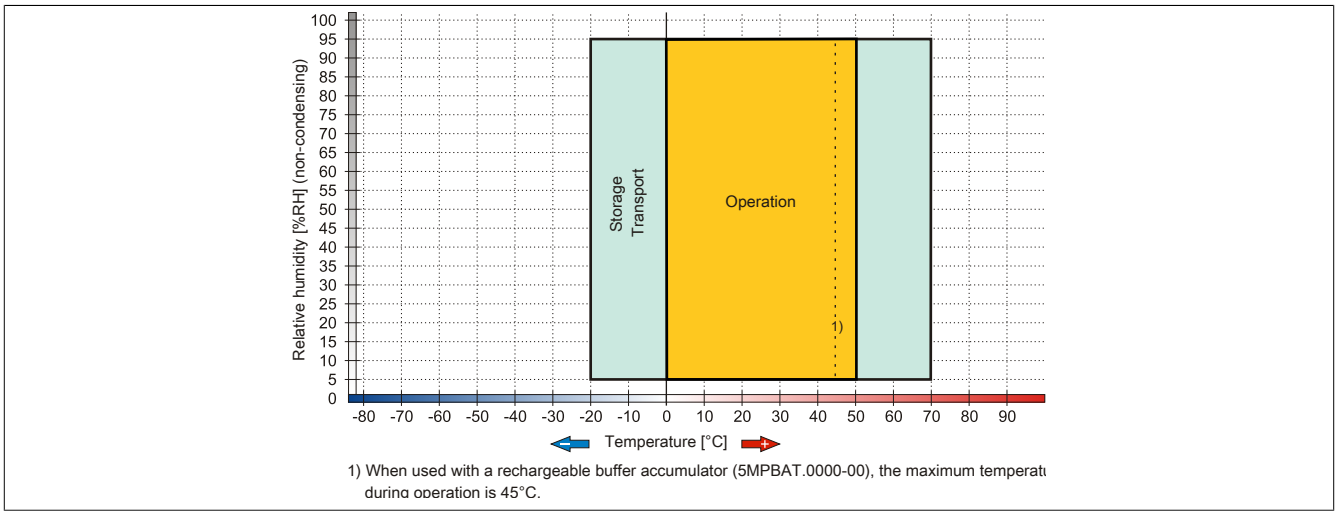


Figure 32: 5MP050.0653-04 - Temperature/Humidity diagram

2.3.1.6.6 Dimensions

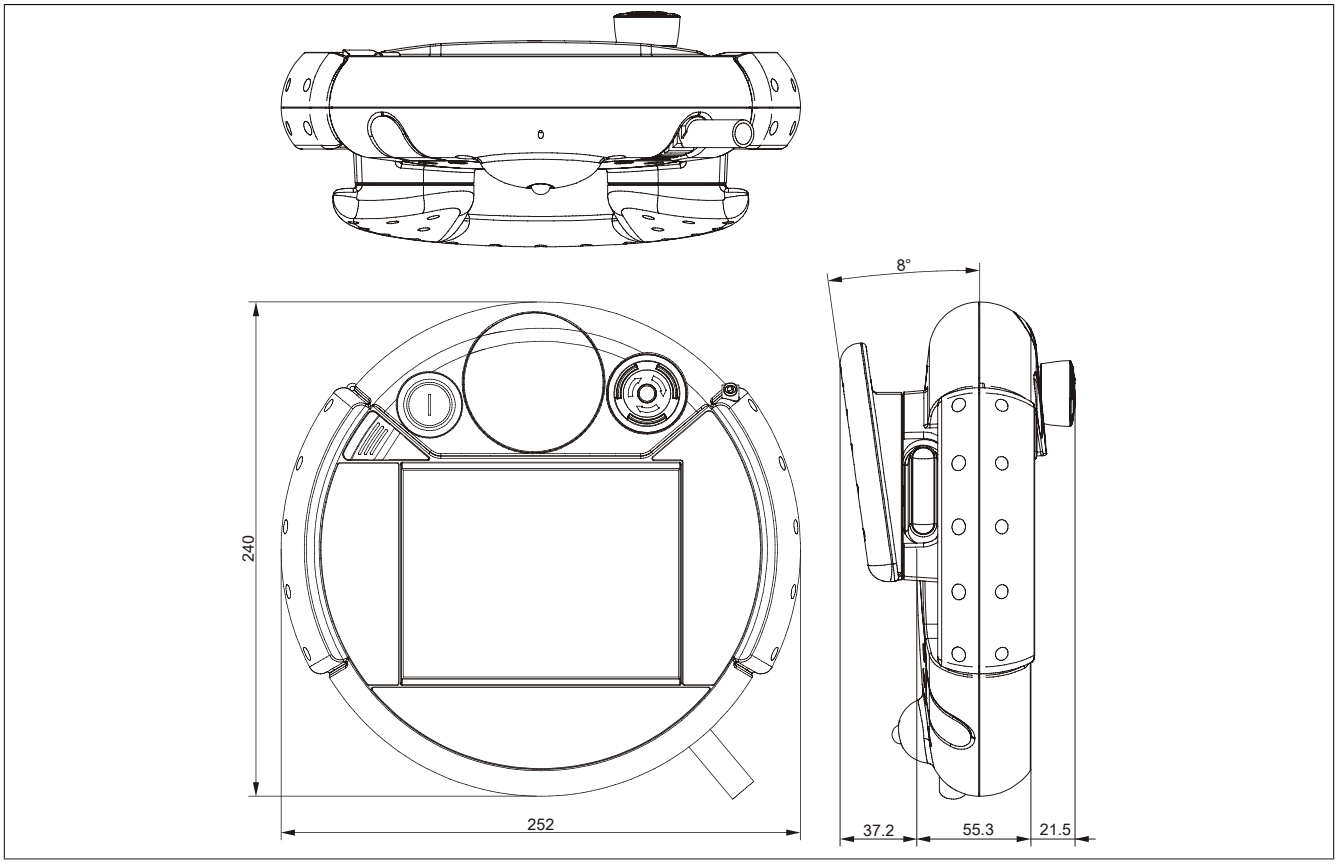


Figure 33: 5MP050.0653-04 - Dimensions

2.3.2 Cables

2.3.2.1 Attachment cables

2.3.2.1.1 5CAMPH.0xxx-30

2.3.2.1.1.1 General information

An attachment cable establishes the electrical and mechanical connection between the control cabinet and device. It contains lines for the network (Ethernet 10/100 Mbit/s) as well as for the control devices and 24 VDC power supply[1].

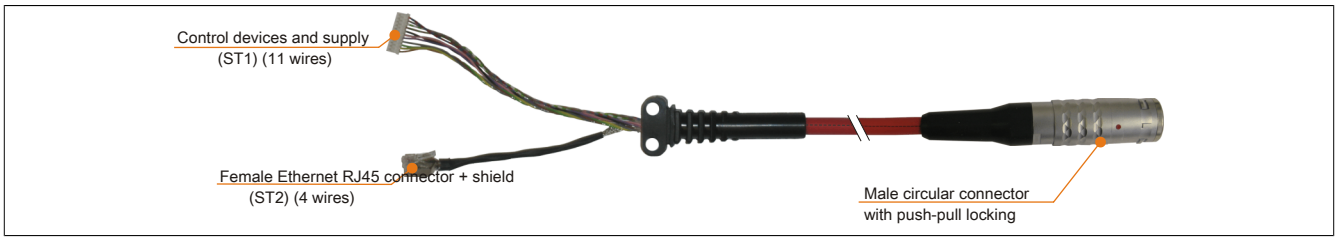


Figure 34: 5CAMPH.0xxx-30 - Attachment cables

The surface is protected against water, oil (lubricating and hydraulic oils per EN 60811 Part 2-1) and cooling lubricant.

The attachment cable is installed in the attachment shaft on the Mobile Panel device side. The control cabinet end of the attachment cable has a circular connector. Attachment cables are available in different lengths. For information about how to connect the attachment cable, see "Commissioning" on page 66.

2.3.2.1.1.2 Order data

Model number	Short description	Figure
	Attachment cables	
5CAMPH.0018-30	MP40/50 attachment cable with push-pull circular connector, 1.8 m	
5CAMPH.0050-30	MP40/50 attachment cable with push-pull circular connector, 5 m	
5CAMPH.0100-30	MP40/50 attachment cable with push-pull circular connector, 10 m	
5CAMPH.0150-30	MP40/50 attachment cable with push-pull circular connector, 15 m	
5CAMPH.0200-30	MP40/50 attachment cable with push-pull circular connector, 20 m	
	Required accessories	
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet crossover - 2 m	
5CAMPC.0020-11	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet straight-through - 2 m	
	Optional accessories	
	Accessories	
4MPCBX.0000-00	Mobile Panel connection box - For cables with push-pull circular connectors	
4MPCBX.0000-C01	SIT MP connection box PP	
4MPCBX.0001-00	Mobile Panel small connection box - For cables with push-pull circular connectors	

Table 21: 5CAMPH.0018-30, 5CAMPH.0050-30, 5CAMPH.0100-30, 5CAMPH.0150-30, 5CAMPH.0200-30 - Order data

2.3.2.1.1.3 Technical data

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

[1] EN 60950 requirements must be observed; see section "+24 VDC power supply" of the user's manual.

Model number	5CAMPH.0018-30	5CAMPH.0050-30	5CAMPH.0100-30	5CAMPH.0150-30	5CAMPH.0200-30
General information					
Durability	Mechanical properties per DIN VDE 0472 section 603 test type H (100,000 cycles)				
Certifications					
CE	Yes				
GOST-R	Yes				
Cable construction					
Type	Hybrid cable, 25 wires				
Supply lines					
Material	Tinned copper stranded wire				
Outer jacket					
Material	Silicone- and halogen-free, flame-retardant PUR outer jacket				
Color	Similar to RAL 7012				
Cable elements					
Network	Twisted pair cable for Ethernet (10/100 Mbit/s) (4 wires, male RJ45 connector)				
Stop button	Direct connection between stop button and monitoring device (4 wires)				
Power supply	Supply voltage +24 VDC and ground (3 wires)				
Enable switch	Direct connection between enable switch and monitoring device (4 wires)				
Connector					
Type	ODU circular connector with push-pull locking				
Electrical characteristics					
Operating voltage	Max. 30 VDC				
Conductor resistance	≤30 Ω/km				
Operating conditions					
Flame-retardant	Per IEC 60332-1 and VW1 / FT1 in accordance with C-UL				
Shield attenuation	Per IEC 60096-1, Amendment 2				
Oil and hydrolysis resistance	Per VDE 0282-10				
Environmental conditions					
Temperature					
Moving	-5 to 60°C				
Static	-20 to 80°C				
Mechanical characteristics					
Dimensions					
Length	1.8 m ±0.1 m	5 m ±0.1 m	10 m ±0.1 m	15 m ±0.15 m	20 m ±0.15 m
Diameter	10 mm				
Bend radius	Min. 60 mm				
Weight	153 g/m				
Tension	Max. 140 N				

Table 22: 5CAMPH.0018-30, 5CAMPH.0050-30, 5CAMPH.0100-30, 5CAMPH.0150-30, 5CAMPH.0200-30 - Technical data

2.3.2.1.1.4 Cable pinout

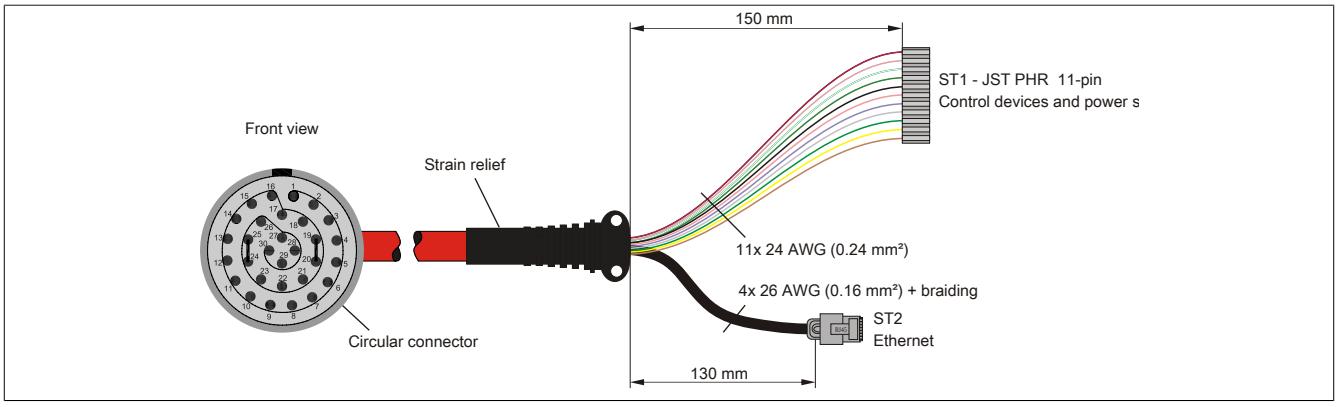


Figure 35: 5CAMPH.0xxx-30 - Cable pinout for attachment cables

ST1 control devices and power supply		Attachment cable - Wire colors	Pinout for grommet housing
C 1	Pin 1	Brown	Pin 4
NO 1	Pin 2	Yellow	Pin 5
C 2	Pin 3	Green	Pin 9
NO 2	Pin 4	Gray	Pin 8
not used	Pin 5	Violet	-
+24 VDC	Pin 6	Pink	Pin 3
GND	Pin 7	Black	Pin 14
Stop NC11	Pin 8	Brown-Green	Pin 1
Stop NC12	Pin 9	White-Green	Pin 15
Stop NC21	Pin 10	Gray-Pink	Pin 2
Stop NC22	Pin 11	Red-Blue	Pin 16

Table 23: 5CAMPH.0xxx-30 - Cable pinout

ST1 control devices and power supply		**Attachment cable - Wire colors**	**Pinout for grommet housing**
Ethernet screen		-	-
ST2 Ethernet		**Attachment cable - Wire colors**	**Pinout for grommet housing**
TX	Pin 1	Blue	Pin 27
TX\	Pin 2	White	Pin 29
RX	Pin 3	Orange	Pin 28
n.c.	Pin 4	-	-
n.c.	Pin 5	-	-
RX\	Pin 6	Red	Pin 30
n.c.	Pin 7	-	-
n.c.	Pin 8	-	-
Shielding	Housing	Braiding	-

Table 23: 5CAMPH.0xxx-30 - Cable pinout

2.3.2.2 Control cabinet cables

2.3.2.2.1 5CAMPC.0020-10

2.3.2.2.1.1 General information

A crossover control cabinet cable is required for the wiring inside the control cabinet.
The pinout of the crossover Ethernet connector makes it possible to connect it directly to a B&R controller (e.g. X20) or the 1st Ethernet interface (MDIX) on B&R Ethernet hub AC808.

If a different Ethernet hub is used, it must support crossed over RX and TX lines.

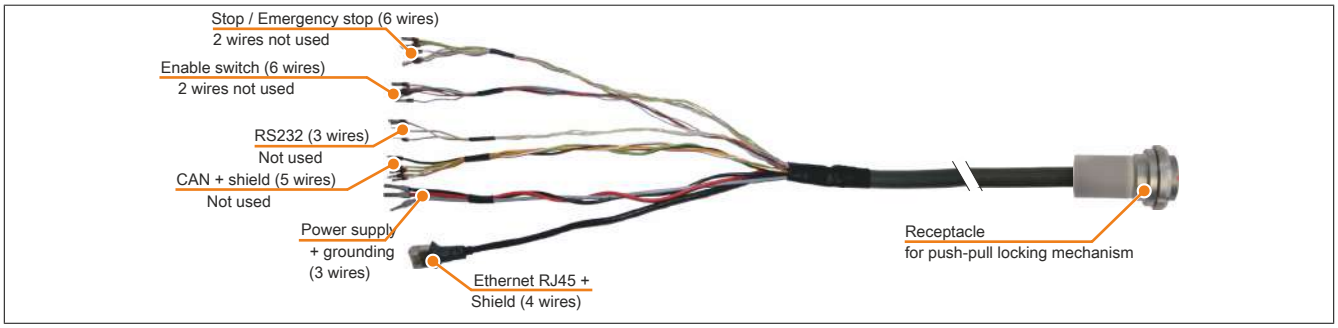


Figure 36: 5CAMPC.0020-10 - Mobile Panel control cabinet cable

Information:

A control cabinet cable is used for the Mobile Panel 7100, Mobile Panel 40/50 and Mobile Panel 100/200 product series. Not all wires are used when wiring Mobile Panel 7100 and Mobile Panel 40/50 devices, which limits their functionality compared to Mobile Panel 100/200 devices.

The surface is protected against water, oil (lubricating and hydraulic oils per EN 60811 Part 2-1) and cooling lubricant.

The control cabinet cable is fastened to the control cabinet door via the connection housing (see Fig. 38 "Receptacle - Drilling template" on page 62). The other end of the control cabinet cable has a pre-assembled RJ45 Ethernet connector. The remaining lines have an open end with wire end sleeves to make it easier to wire to safety equipment and other interfaces.

2.3.2.2.1.2 Order data

Model number	Short description	Figure
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet crossover - 2 m	
	Optional accessories	
	Accessories	
4MPCBX.0000-00	Mobile Panel connection box - For cables with push-pull circular connectors	
4MPCBX.0000-C01	SIT MP connection box PP	
4MPCBX.0001-00	Mobile Panel small connection box - For cables with push-pull circular connectors	

Table 24: 5CAMPC.0020-10 - Order data

2.3.2.2.1.3 Technical data

Information:

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

Model number	5CAMPC.0020-10
General information	
Certifications	
CE	Yes
GOST-R	Yes
Cable construction	
Type	Crossover

Table 25: 5CAMPC.0020-10 - Technical data

Model number	5CAMPC.0020-10
Supply lines	
Conductor resistance	≤30 Ω/km
Material	Tinned copper stranded wire
Permissible operating voltage	30 VDC
Outer jacket	
Material	Silicone- and halogen-free, flame-retardant PUR outer jacket
Color	Similar to RAL 7012
Cable elements	
Control devices	Direct connection between control devices and the monitoring device (6 wires) (2 wires not used on MP 40/50 and MP7100)
CAN	2 pairs with shielding (5 wires) (not used on MP40/50 and MP7100)
Network	Twisted pair cable for Ethernet (10/100 Mbit/s) (4 wires, male RJ45 connector)
Series	3 wires (not used on MP40/50 and MP7100)
Power supply	+24 VDC supply voltage and grounding (3 wires), SELV [1]
Enable switch	Direct connection between enable switch and monitoring device (6 wires) (2 wires not used on MP 40/50 and MP7100)
Connector	
Type	Receptacle for push-pull locking connection
Operating conditions	
Flame-retardant	Per IEC 60332-1 and VW1 / FT1 in accordance with C-UL
Shield attenuation	Per IEC 60096-1, Amendment 2
Oil and hydrolysis resistance	Per VDE 0282-10
Environmental conditions	
Temperature	
Moving	-5 to 60°C
Static	-20 to 80°C
Mechanical characteristics	
Dimensions	
Length	2 m ±0.05 m
Diameter	10 mm
Bend radius	Min. 60 mm
Weight	153 g/m
Tension	Max. 140 N

Table 25: 5CAMPC.0020-10 - Technical data

1) EN 60950 requirements must be observed; see section "+24 VDC power supply" of the user's manual.

2.3.2.2.1.4 Cable pinout

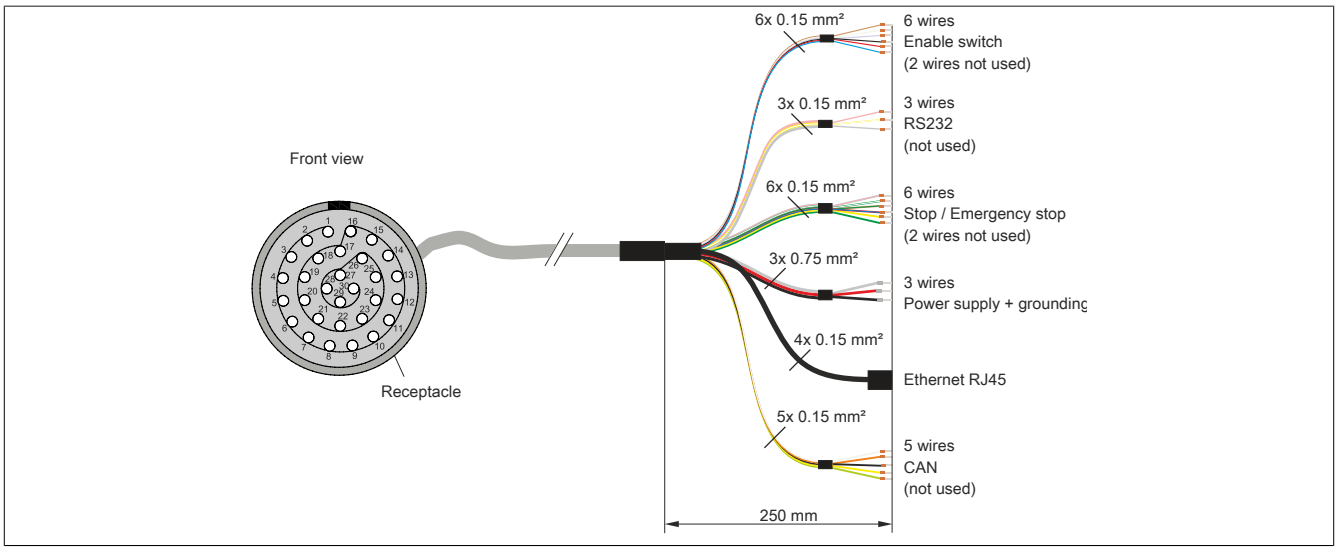


Figure 37: 5CAMPC.0020-10 - Control cabinet cable - Pinout

Receptacle - Pinout	Control cabinet cable - Wire colors	Enable switch wires	
4	Brown	C 1	
5	White	NO 1	
6	Violet	NC 1	Not used on the MP40/50
9	Black	C 2	
8	Red	NO 2	
7	Blue	NC 2	Not used on the MP40/50
Receptacle - Pinout	**Control cabinet cable - Wire colors**	**RS232 wires**	
21	Pink	RxD	Not used on the MP40/50
22	White-Yellow	GND	
23	Gray	TxD	

Table 26: 5CAMPC.0020-10 - Cable pinout

Receptacle - Pinout	Control cabinet cable - Wire colors	Control device wires	
1	Gray-Pink	Stop / Emergency stop normally closed contact 1 (11)	
2	Brown-Green	Stop / Emergency stop normally closed contact 2 (21)	
15	White-Green	Stop / Emergency stop normally closed contact 1 (12)	
16	Red-Blue	Stop / Emergency stop normally closed contact 2 (22)	
18	Yellow	Button (S13)	
26	Green	Button (S14)	
Receptacle - Pinout	**Control cabinet cable - Wire colors**	**Power supply wires**	
3	Red	+24 VDC power supply	
14	Black	Ground	
17	Gray	Shielding	
Receptacle - Pinout	**Control cabinet cable - Wire colors**	**Ethernet RJ45 connector**	
27	Green	Pin 3 (RX)	
28	Pink	Pin 1 (TX)	
29	Yellow	Pin 6 (RX\)	
30	Blue	Pin 2 (TX\)	
Ethernet shield	Shielding	Shielding	
Receptacle - Pinout	**Control cabinet cable - Wire colors**	**CAN wires**	
10	White	CAN 1 High	Not used on the MP40/50
11	Orange	CAN 1 Low	
12	Yellow	CAN 2 High	
13	Green	CAN 2 Low	
CAN shield	Black	Shielding	

Table 26: 5CAMPC.0020-10 - Cable pinout

Information:

When installing the control cabinet cable, make sure that it is not too loose or too tight in the control cabinet.

2.3.2.2.1.5 Receptacle - Drilling template

A cutout or drill hole must be made (e.g. in a control cabinet door) according to the following diagram to fasten the receptacle.

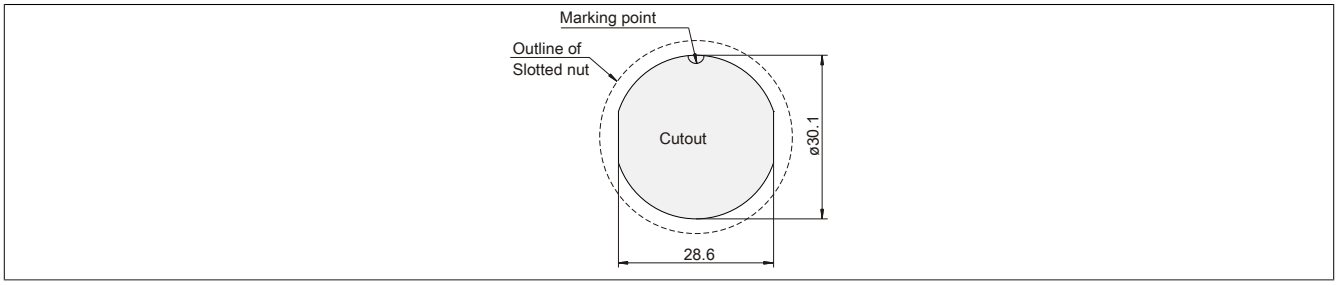


Figure 38: Receptacle - Drilling template

2.3.2.2.2 5CAMPC.0020-11

2.3.2.2.2.1 General information

A straight-through control cabinet cable is required for the wiring inside the control cabinet.
The pinout of the Ethernet connector (1:1) makes it possible to connect directly to a standard Ethernet hub.

If the first Ethernet interface on B&R Ethernet hub AC808 (model number 0AC808.9) is used, it is important to make sure that crossover (MDIX) is not enabled.

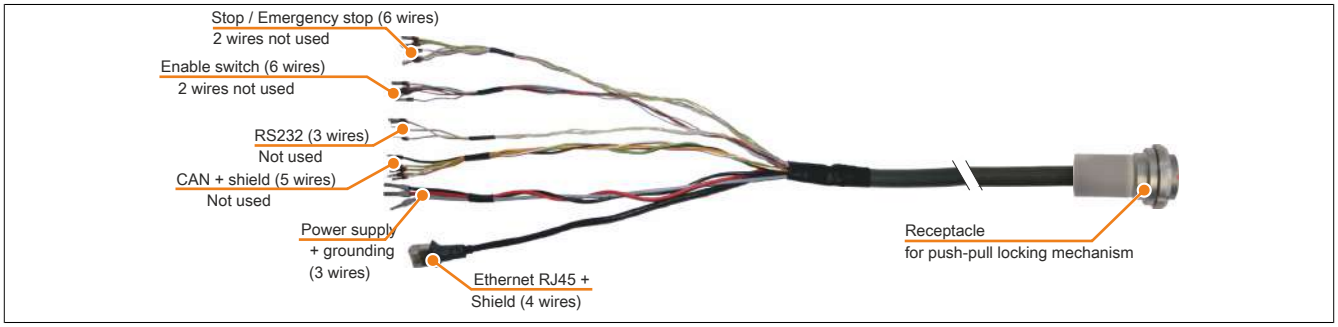


Figure 39: 5CAMPC.0020-11 - Mobile Panel control cabinet cable

Information:

A control cabinet cable is used for the Mobile Panel 7100, Mobile Panel 40/50 and Mobile Panel 100/200 product series. Not all wires are used when wiring Mobile Panel 7100 and Mobile Panel 40/50 devices, which limits their functionality compared to Mobile Panel 100/200 devices.

The surface is protected against water, oil (lubricating and hydraulic oils per EN 60811 Part 2-1) and cooling lubricant.

The control cabinet cable is fastened to the control cabinet door via the connection housing (see Fig. 41 "Receptacle - Drilling template" on page 65). The other end of the control cabinet cable has a pre-assembled RJ45 Ethernet connector. The remaining lines have an open end with wire end sleeves to make it easier to wire to safety equipment and other interfaces.

2.3.2.2.2.2 Order data

Model number	Short description	Figure
	Control cabinet cables	
5CAMPC.0020-11	Mobile Panel control cabinet cable - Push-Pull circular connector - Ethernet straight-through - 2 m	
	Optional accessories	
	Accessories	
4MPCBX.0000-00	Mobile Panel connection box - For cables with push-pull circular connectors	
4MPCBX.0000-C01	SIT MP connection box PP	
4MPCBX.0001-00	Mobile Panel small connection box - For cables with push-pull circular connectors	

Table 27: 5CAMPC.0020-11 - Order data

2.3.2.2.2.3 Technical data

Information:

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

Model number	5CAMPC.0020-11
General information	
Certifications	
CE	Yes
GOST-R	Yes
Cable construction	
Type	Straight-through

Table 28: 5CAMPC.0020-11 - Technical data

Model number	5CAMPC.0020-11
Supply lines	
Conductor resistance	≤30 Ω/km
Material	Tinned copper stranded wire
Permissible operating voltage	30 VDC
Outer jacket	
Material	Silicone- and halogen-free, flame-retardant PUR outer jacket
Color	Similar to RAL 7012
Cable elements	
Control devices	Direct connection between control devices and the monitoring device (6 wires) (2 wires not used on MP 40/50 and MP7100)
CAN	2 pairs with shielding (5 wires) (not used on MP40/50 and MP7100)
Network	Twisted pair cable for Ethernet (10/100 Mbit/s) (4 wires, male RJ45 connector)
Series	3 wires (not used on MP40/50 and MP7100)
Power supply	+24 VDC supply voltage and grounding (3 wires), SELV [1]
Enable switch	Direct connection between enable switch and monitoring device (6 wires) (2 wires not used on MP 40/50 and MP7100)
Connector	
Type	Receptacle for push-pull locking connection
Operating conditions	
Flame-retardant	Per IEC 60332-1 and VW1 / FT1 in accordance with C-UL
Shield attenuation	Per IEC 60096-1, Amendment 2
Oil and hydrolysis resistance	Per VDE 0282-10
Environmental conditions	
Temperature	
Moving	-5 to 60°C
Static	-20 to 80°C
Mechanical characteristics	
Dimensions	
Length	2 m ±0.05 m
Diameter	10 mm
Bend radius	Min. 60 mm
Weight	153 g/m
Tension	Max. 140 N

Table 28: 5CAMPC.0020-11 - Technical data

1) EN 60950 requirements must be observed; see section "+24 VDC power supply" of the user's manual.

2.3.2.2.2.4 Cable pinout

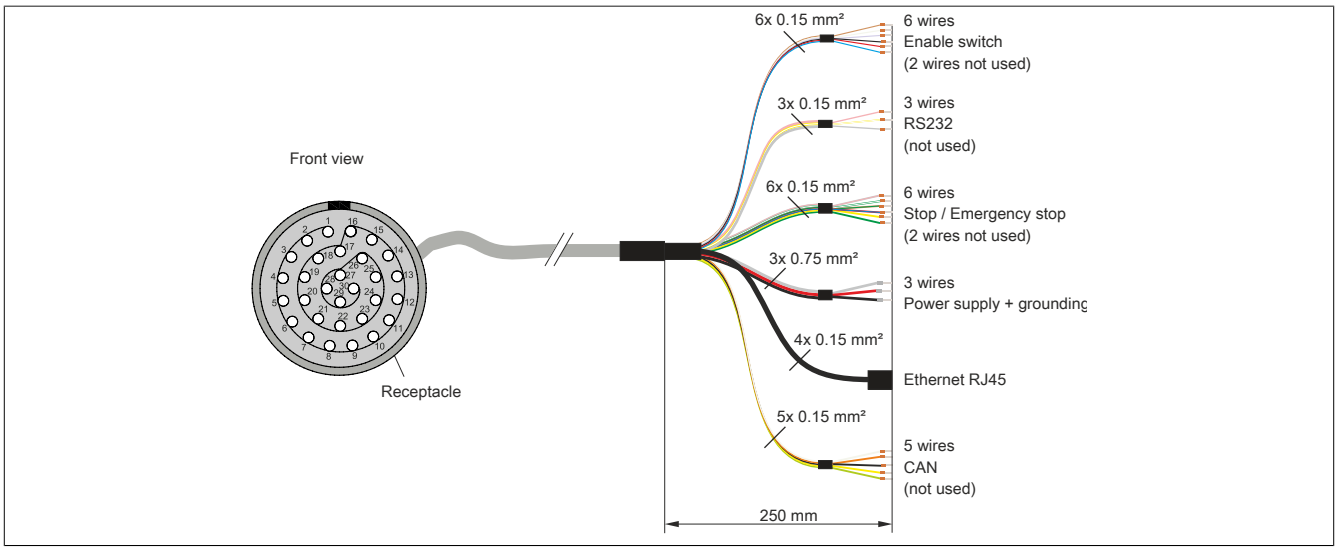


Figure 40: 5CAMPC.0020-11 - Control cabinet cable - Pinout

Connection housing - Pinout	Control cabinet cable - Wire colors	Enable switch wires	
4	Brown	C 1	
5	White	NO 1	
6	Violet	NC 1	Not used on the MP40/50
9	Black	C 2	
8	Red	NO 2	
7	Blue	NC 2	Not used on the MP40/50
Connection housing - Pinout	**Control cabinet cable - Wire colors**	**RS232 wires**	
21	Pink	RxD	Not used on the MP40/50
22	White-Yellow	GND	
23	Gray	TxD	

Table 29: 5CAMPC.0020-11 - Cable pinout

Connection housing - Pinout	Control cabinet cable - Wire colors	Control device wires	
1	Gray-Pink	Stop / Emergency stop normally closed contact 1 (11)	
2	Brown-Green	Stop / Emergency stop normally closed contact 2 (21)	
15	White-Green	Stop / Emergency stop normally closed contact 1 (12)	
16	Red-Blue	Stop / Emergency stop normally closed contact 2 (22)	
18	Yellow	Button (S13)	
26	Green	Button (S14)	
Receptacle - Pinout	**Control cabinet cable - Wire colors**	**Power supply wires**	
3	Red	+24 VDC power supply	
14	Black	Ground	
17	Gray	Shielding	
Connection housing - Pinout	**Control cabinet cable - Wire colors**	**Ethernet RJ45 connector**	
27	Green	Pin 1 (TX)	
28	Pink	Pin 3 (RX)	
29	Yellow	Pin 2 (TX\)	
30	Blue	Pin 6 (RX\)	
Ethernet shield	Shielding	Shielding	
Connection housing - Pinout	**Control cabinet cable - Wire colors**	**CAN wires**	
10	White	CAN 1 High	Not used on the MP40/50
11	Orange	CAN 1 Low	
12	Yellow	CAN 2 High	
13	Green	CAN 2 Low	
CAN shield	Black	Shielding	

Table 29: 5CAMPC.0020-11 - Cable pinout

Information:

When installing the control cabinet cable, make sure that it is not too loose or too tight in the control cabinet.

2.3.2.2.2.5 Receptacle - Drilling template

A cutout or drill hole must be made (e.g. in a control cabinet door) according to the following diagram to fasten the receptacle.

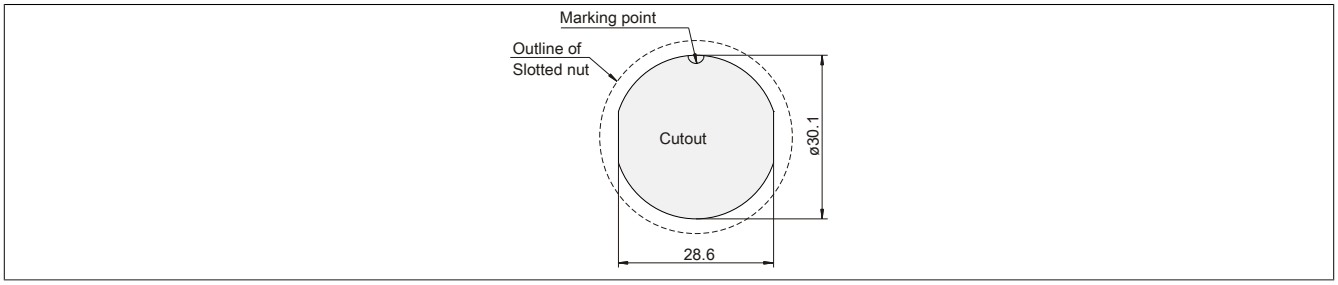


Figure 41: Receptacle - Drilling template

3 Commissioning

3.1 Commissioning from a safety point of view

This handheld terminal was developed, manufactured, tested and documented in accordance with ergonomic guidelines and relevant safety standards. When the guidelines for intended use and safety functionality are observed, there is no danger of damage to property or injury to personnel under normal operating conditions.

The instructions contained in this manual must be observed exactly in every case. Otherwise, hazard sources may be created or the integrated safety equipment in the handheld terminal may be disabled.

In addition to the safety guidelines in this manual, all applicable occupational safety and accident prevention guidelines must be observed.

Danger!

In the end application, the 24 VDC power supply of the device must be adequately protected! A fuse with max. 3.15 A and UL 248 certification must be used for this.

Warning!

The machine manufacturer must configure the handheld control device properly according to the danger and risk assessment. The following safety aspects must be considered:

- Correct cable length for restricting the work area

- Stop button necessary or permitted

- Sufficient safety category for the respective application

- **The device is only permitted to be operated in good order and condition and in accordance with the instructions in this manual.**
- **The user must possess the required level of training and detailed knowledge of the intended use as specified in the user's manual.**
- **The safety guidelines in the following chapters must be taken into account.**
- **Additional important information regarding safety and EMC is provided in chapter "Standards and certifications" and must be observed.**

3.1.1 Proper use of the machine or system

Mobile Panel devices are intended for use in monitoring, configuring and operating machinery. Examples include:

- Injection molding machines
- Robots
- Machine tools
- Textile machines
- Printing machines
- Theater backdrops
- Etc.

Intended use in normal operating modes, for example:

- Automatic

Intended use in special semiautomatic or manual special operating modes, for example:

- Setup
- Teach-in
- Test runs
- Etc.

An enabling device with one or two enable switches and a stop button are available as safety functions.

All safety functions have a dual-circuit design so that up to safety category 3 PL d can be achieved per EN ISO 13849-1:2008

It is the machine manufacturer's responsibility to select a handheld terminal suitable for the machine and to configure any additional add-on options in accordance with the legally required danger and risk assessment.

The information in chapter "European Union directives" on page 91 regarding the intended use of the handheld terminal must also be observed.

3.2 Operating the Mobile Panel

Caution!

- **When routing or laying cables, make sure that there is no danger of tripping that could cause the Mobile Panel device to fall to the ground.**
- **The Mobile Panel attachment cable is not permitted to be crushed or run over sharp edges that which can damage or chafe the cable jacket.**
- **Operating a Mobile Panel with a damaged attachment or control cabinet cable is not permitted.**
- **When the Mobile Panel is not in use, it should be safely stowed away on the intended wall mount. If the Mobile Panel device is stored on a wall mount in the machine's danger zone, stop button functionality must be ensured, i.e. the attachment cable must be connected.**
- **If temporarily putting down the Mobile Panel device, do not place it face down in a way that could damage the control devices or inadvertently trigger actions.**
- **The touch screen is not permitted to be operated with sharp objects such as ballpoint pens, knives, screwdrivers, etc. These objects will cause irreparable damage to the touch screen. The ideal object for operating the touch screen is the integrated touch screen stylus pen (2.2.1.6 "Touch screen stylus pen" on page 18). The touch screen can also be operated with a finger.**
- **Only one point on the touch screen is permitted to be touched at a time. Touching several places simultaneously can trigger unintended actions.**
- **Placing objects on top of the touch screen is not permitted.**
- **Never lay the device down on unstable surfaces or shelves. It could fall and become damaged.**
- **Never expose the device to heat sources or direct sunlight.**
- **Ensure that no foreign bodies or liquids penetrate the interior of the device.**
- **Pressing several function or system keys simultaneously can trigger unintended actions in some circumstances.**

Information:

- **All protective coverings, housing screws, cable grommets and the device housing must be checked periodically for damage.**
- **For instructions on how to clean the Mobile Panel device, see "Cleaning" on page 127.**

3.3 Connection

The Mobile Panel is connected using the Mobile Panel attachment cable (see "Attachment cables" on page 57).

3.3.1 Attachment shaft

The attachment cable is connected to the ST1 (control devices and power supply) and ST2 (Ethernet) connectors in the attachment shaft.

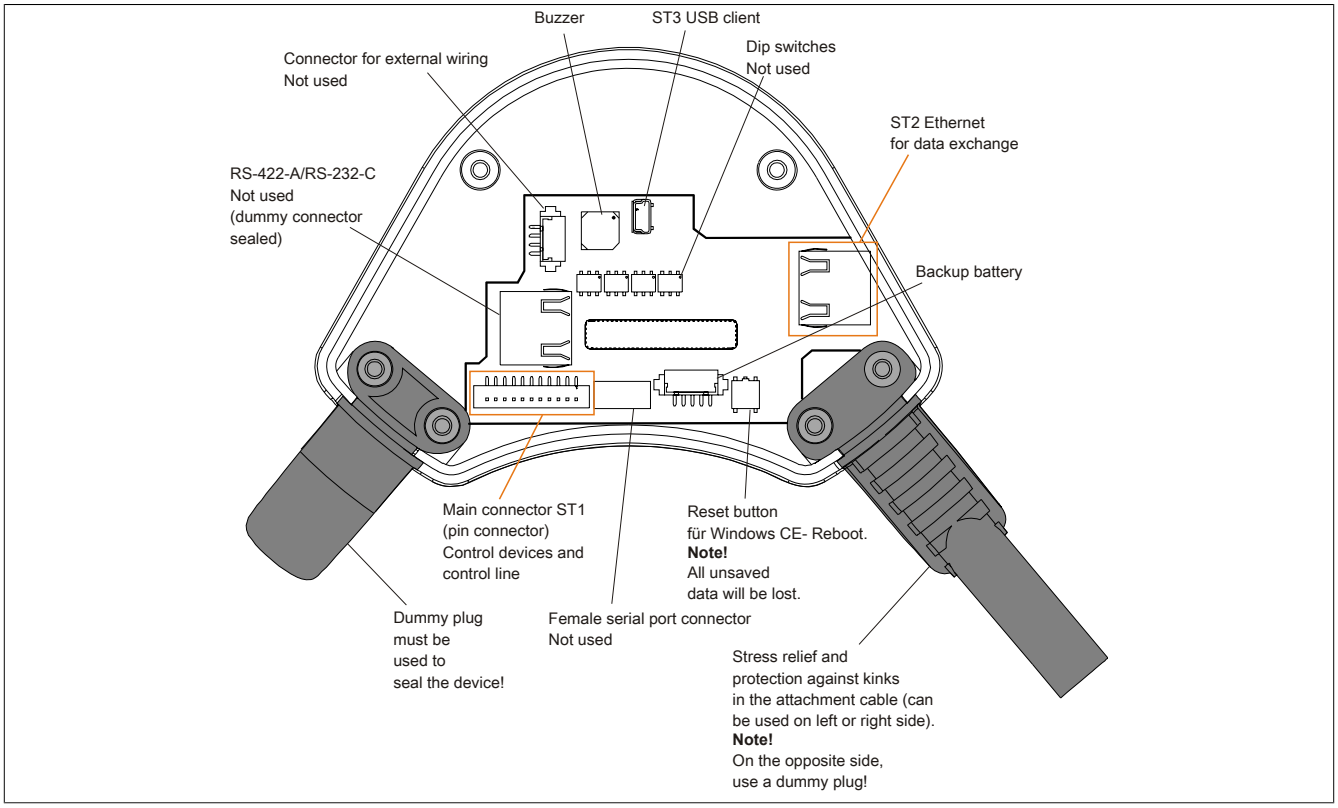


Figure 42: Attachment shaft

3.3.2 Installing cables in the attachment shaft

After opening the attachment shaft, the connecting lines can be installed as shown in the following section.

3.3.2.1 Tips for opening the attachment shaft

- Place the Mobile Panel device on a clean flat surface with the display facing down in a away that does not damage the Mobile Panel or its operating elements (e.g. ESD mat).
- Loosen the screws with a size 2 Phillips head screwdriver.

3.3.2.2 Notes regarding changes to the attachment shaft

- Disconnect the main connector (ST1) by pulling carefully on its wires with your fingers (do not use sharp objects to help).
- When disconnecting the RJ45 connector (ST2), make sure that the locking lever is pushed down.

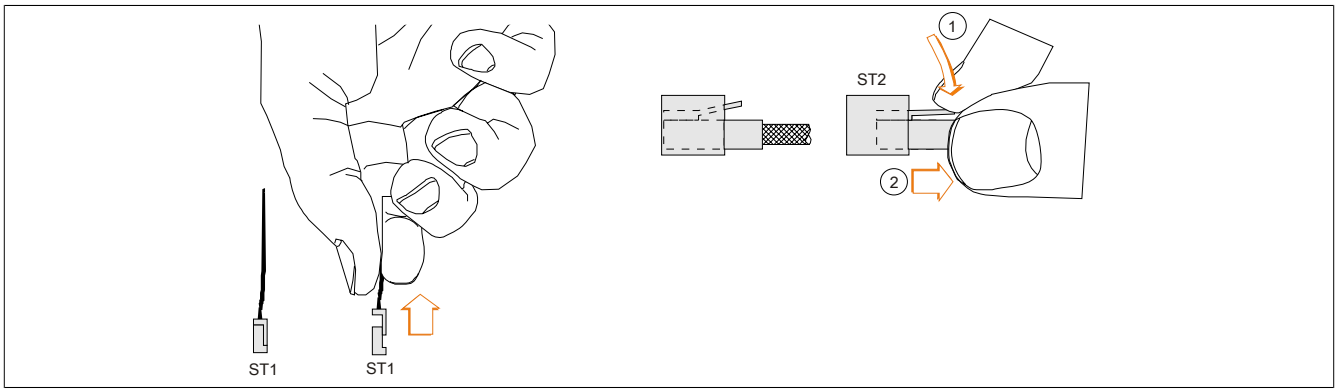


Figure 43: Disconnecting ST1 and ST2

- Make sure that the connector locks into place.

3.3.2.3 Note for closing the attachment shaft

- The gasket must be clean, undamaged and positioned correctly in the attachment shaft cover.
- Pinched cables are not permitted.
- The attachment shaft cover must be refastened with all 6 screws (torque: 0.4 to 0.5 Nm). Only then can the corresponding degree of protection be ensured again.

3.3.3 Cable outlet

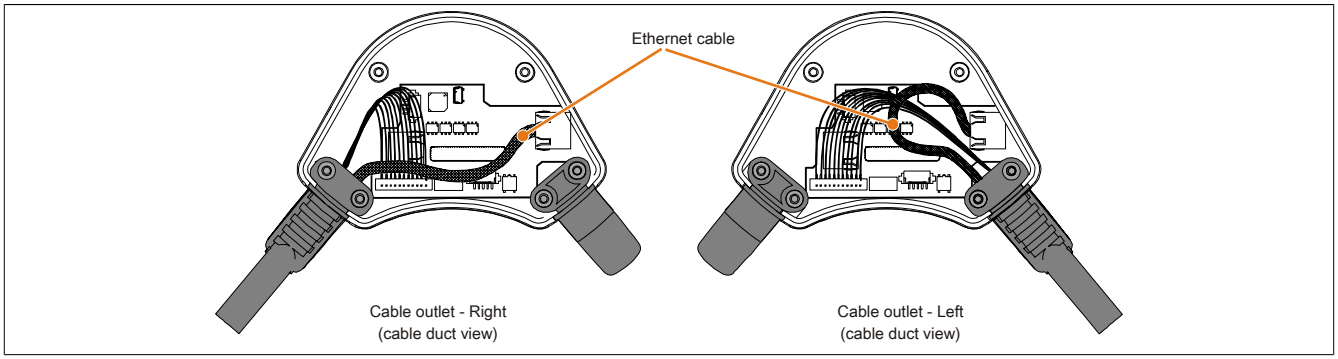


Figure 44: Cable outlet

3.4 Connection examples

Information:

The monitoring device and subsequent components must also be included when calculating the entire enabling safety function.

A suitable monitoring device must be used to detect short and cross faults in the connecting cable.

3.4.1 Connection example for stop button

Connection example with monitoring device for safety circuits up to category 3 PL d per EN ISO 13849-1:2008.

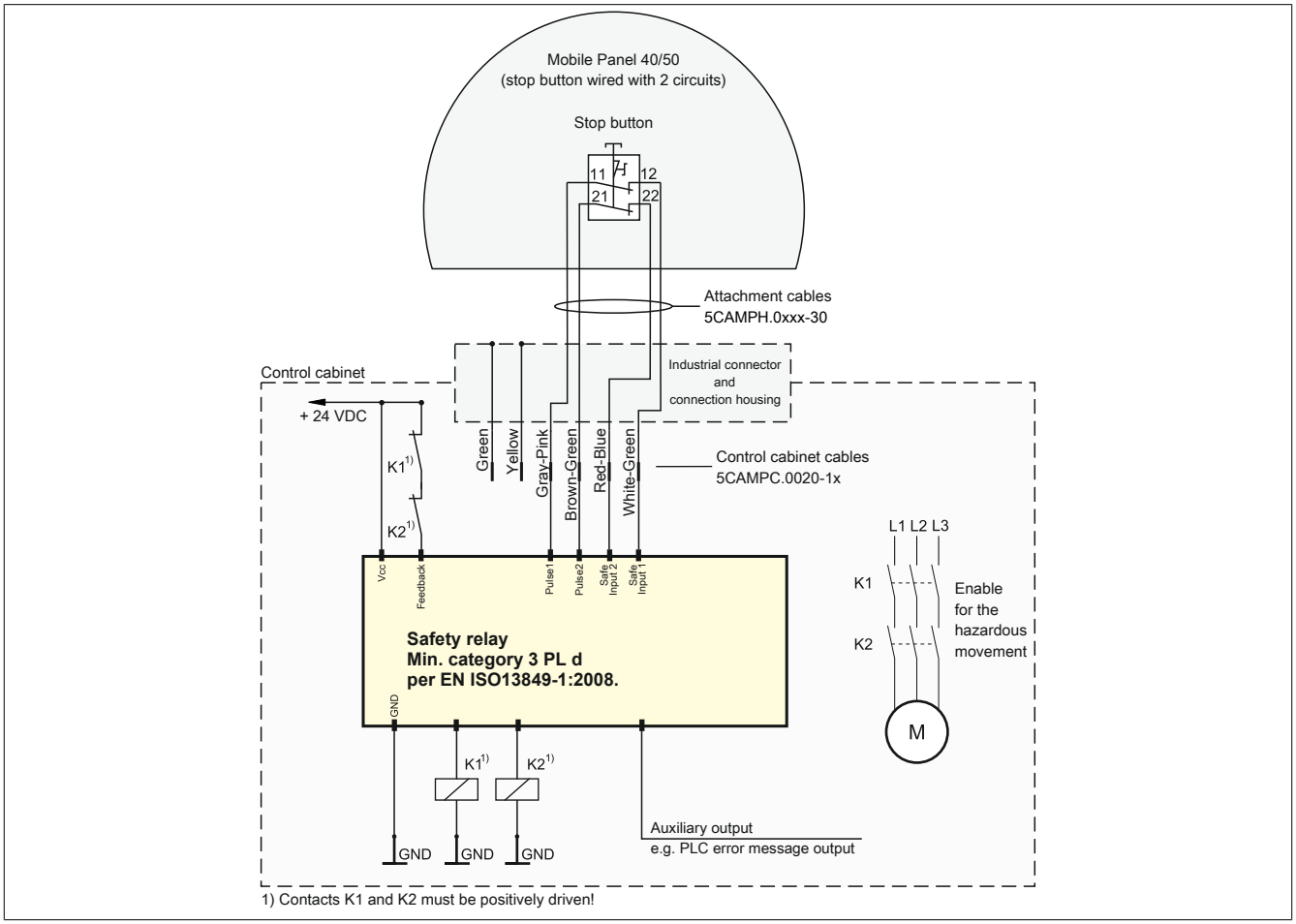


Figure 45: Connection example for stop button

3.4.2 Connection example for enable switch

Connection example with monitoring device for safety circuits up to category 3 PL d per EN ISO 13849-1:2008.

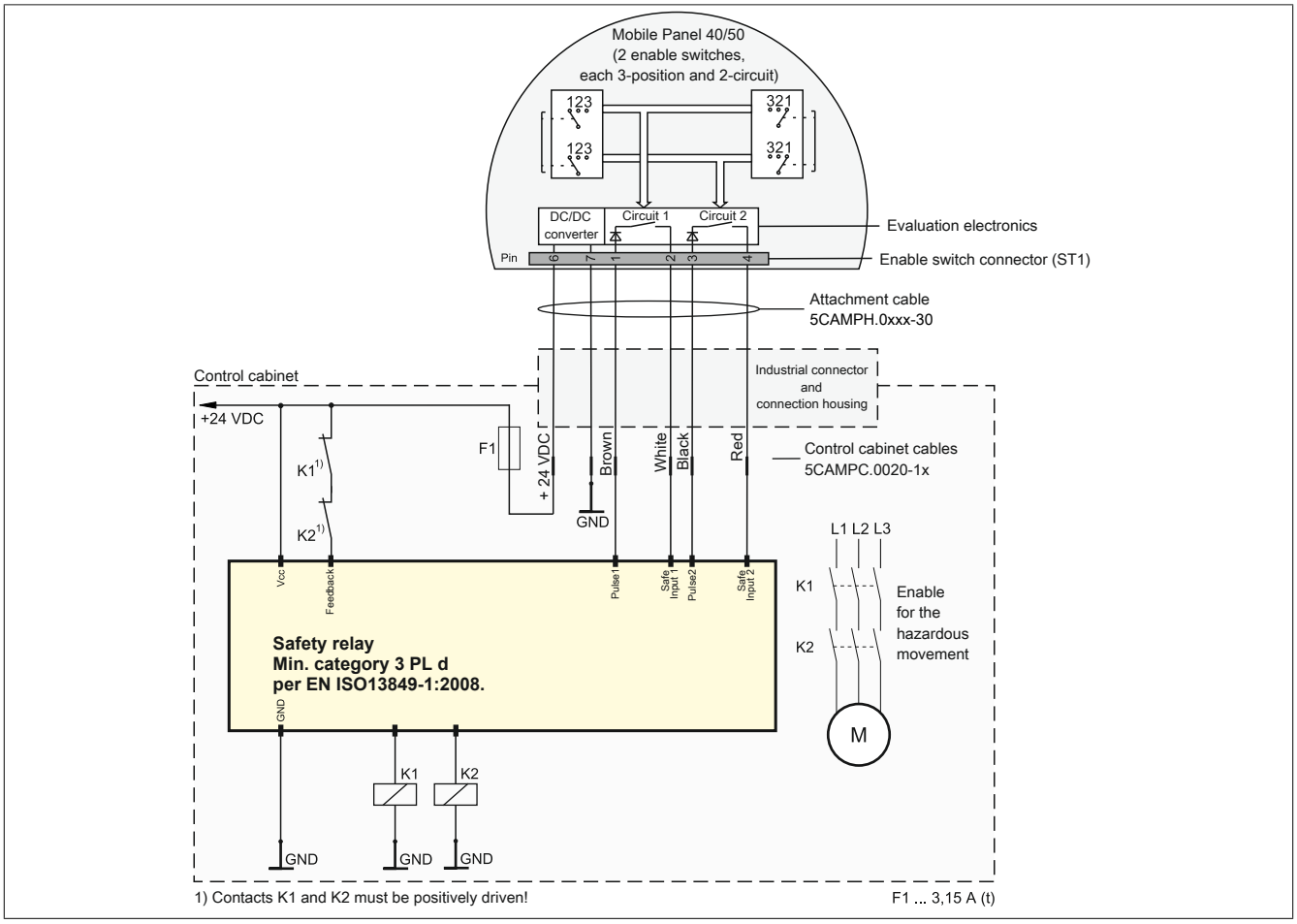


Figure 46: Connection example for enable switch

3.5 Connecting a Mobile Panel 100/200

An MP100/200 can be connected to the system in place of an MP40/50. The attachment cables feature the same circular connectors allowing for simple exchange by removing and inserting.

When connecting an MP40/50, the differences between the devices must be taken into consideration.

3.5.1 Differences between the Mobile Panel 100/200 and Mobile Panel 40/50

Mobile Panel 100/200	Mobile Panel 40/50
Safety category: Devices support safety circuits up to category 4. If using a single channel, then safety category 1 is supported. If a connection box is used, then safety circuits up to category 3 are supported.	Safety category: Safety circuits up to category 3 are supported by these devices.
Connections: Control devices (emergency stop, key switch) Enable switch Power supply + grounding Interfaces: Ethernet RS232 CAN	Connections: Control devices (stop button) Enable switch Power supply + grounding All other control devices (joystick, handwheel, override potentiometer, etc.) are accessed using software. Interfaces: Ethernet - -
Enabling device: One 3-position, dual-channel enable switch centrally located on the front of the handle	Enabling device: Two 3-position, dual-channel enable switches located on both sides of the device

Table 30: Differences between MP100/200 and MP40/50

3.6 USB interface

The front-side USB interface (accessible behind the protective cover) is designed solely for the use of USB flash drives.

Warning!

Only USB devices tested and approved by B&R are permitted to be connected to the USB interface.

1. Open the protective cover.

Figure 47: USB interface - Opening the protective cover

2. Connect the USB flash drive until it clicks into place.

Figure 48: USB interface - Inserting a flash drive

Information:

IP65 protection is no longer guaranteed when a USB device is connected.

3.7 Key and LED configuration

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

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

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

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

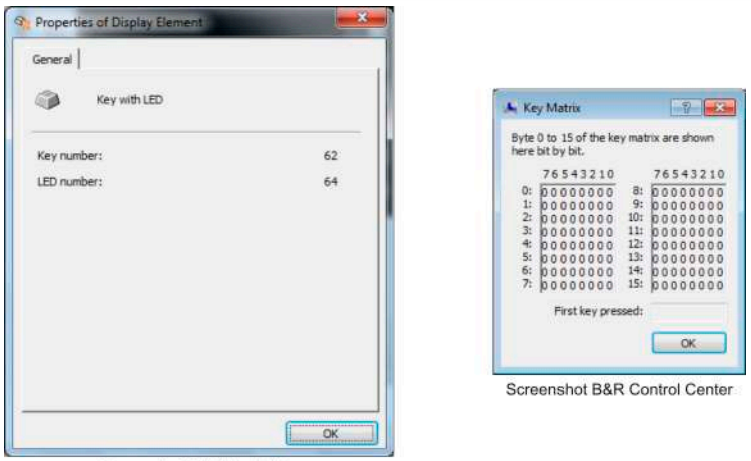


Figure 49: Hardware numbers in the B&R Key Editor and B&R Control Center

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

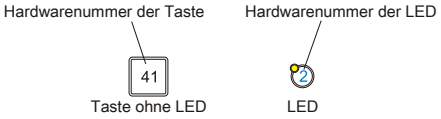


Figure 50: Keys and LEDs in the matrix

3.7.1 Mobile Panel 40

3.7.1.1 Mobile Panel 5MP040.0381-01

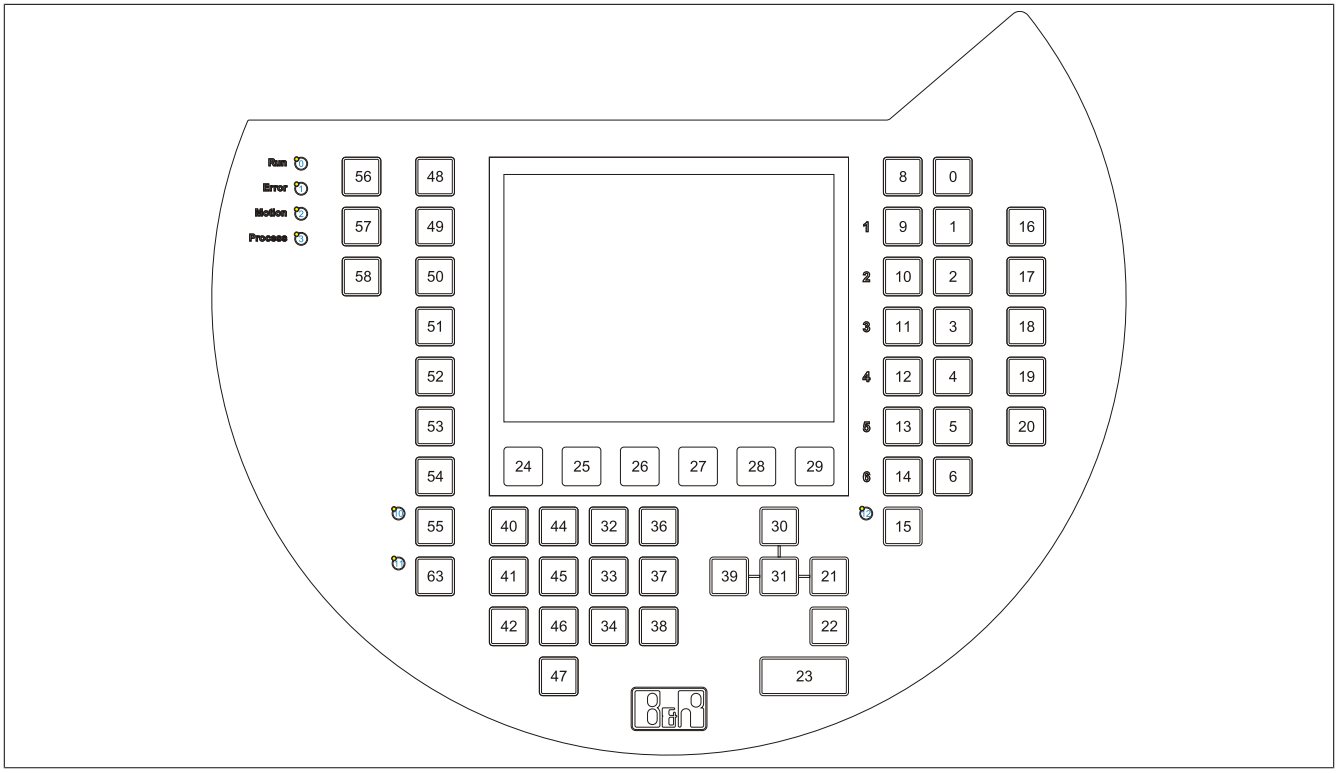


Figure 51: 5MP040.0381-01 - Hardware numbers

3.7.1.2 Mobile Panel 5MP040.0381-02

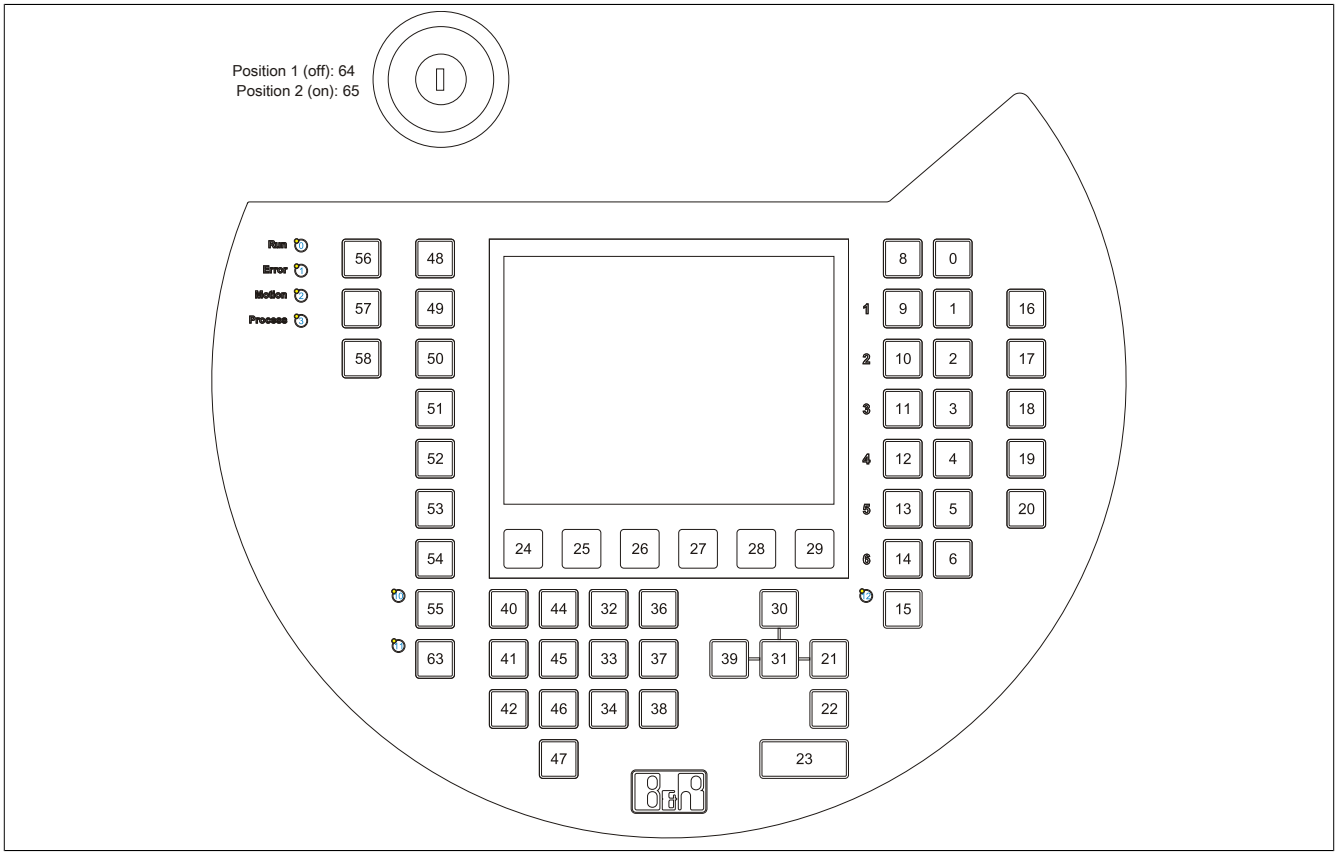


Figure 52: 5MP040.0381-02 - Hardware numbers

3.7.2 Mobile Panel 50

3.7.2.1 Mobile Panel 5MP050.0653-01

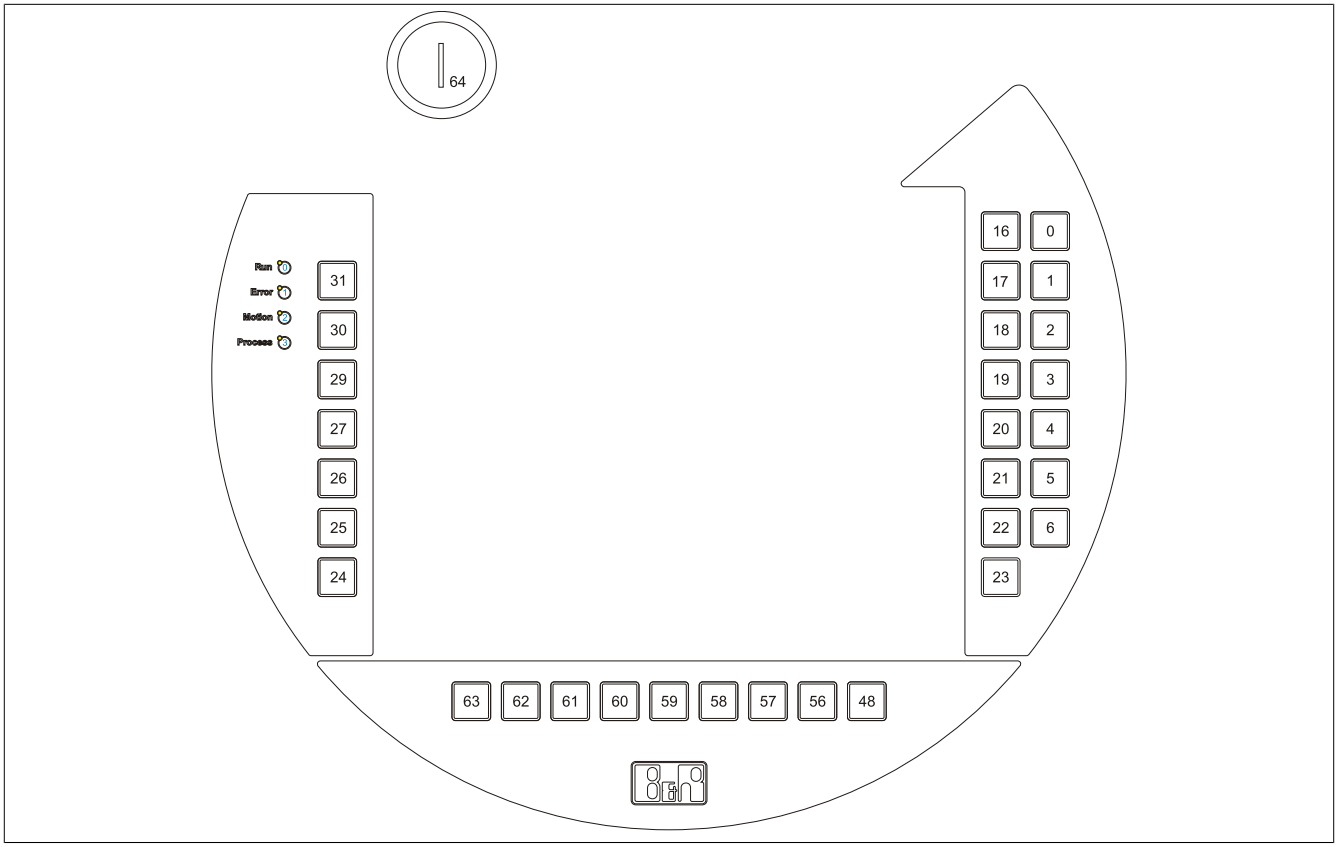


Figure 53: 5MP050.0653-01 - Hardware numbers

3.7.2.2 Mobile Panel 5MP050.0653-02

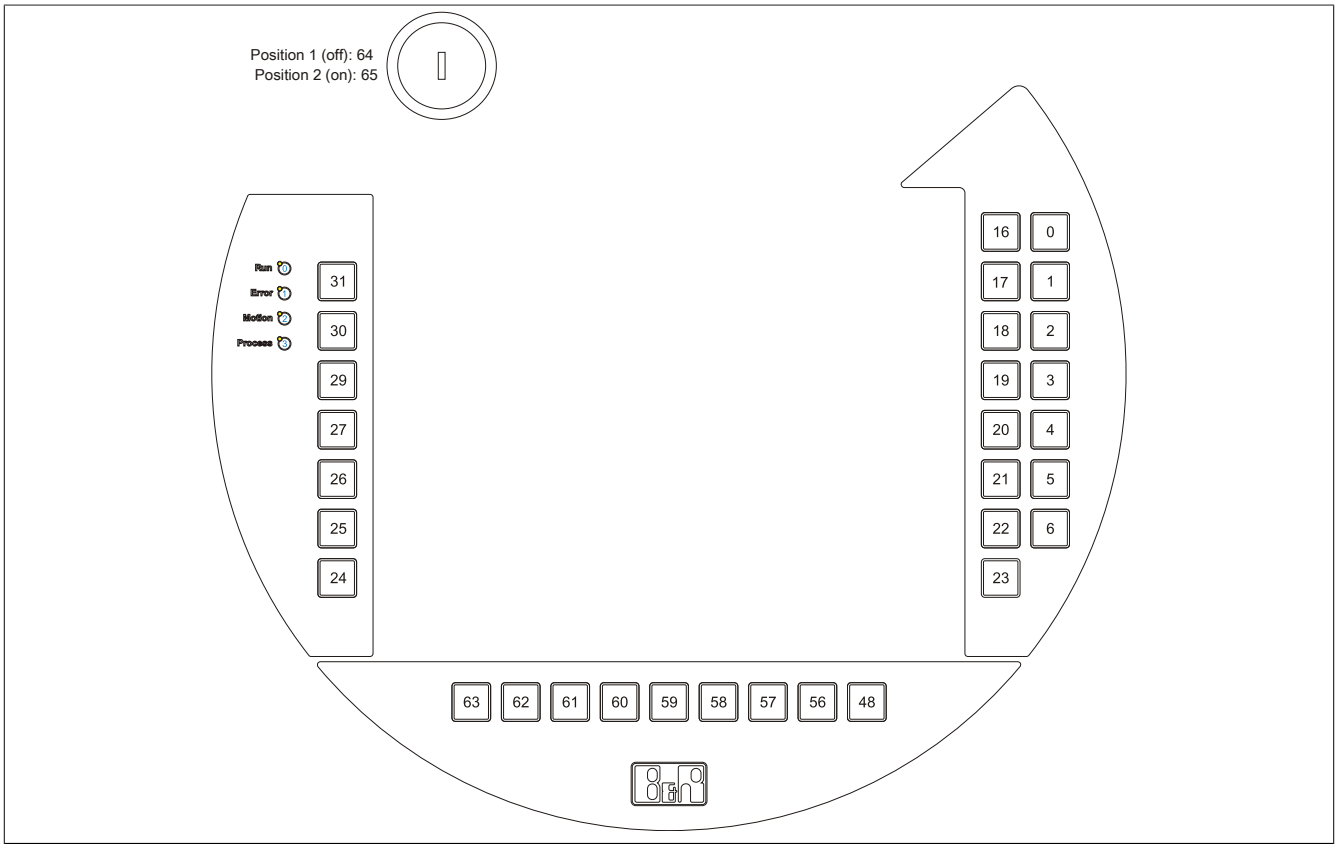


Figure 54: 5MP050.0653-02 - Hardware numbers

3.7.2.3 Mobile Panel 5MP050.0653-03

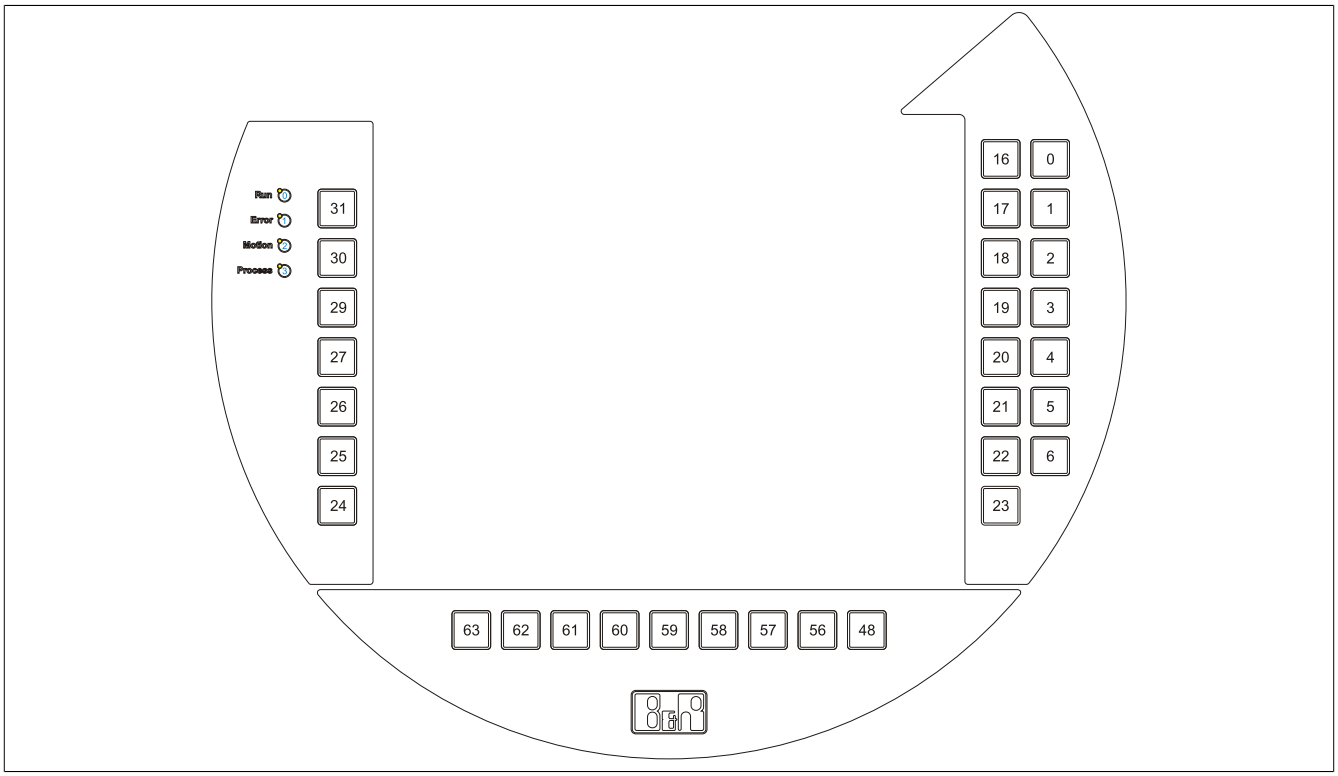


Figure 55: 5MP050.0653-03 - Hardware numbers

3.7.2.4 Mobile Panel 5MP050.0653-04

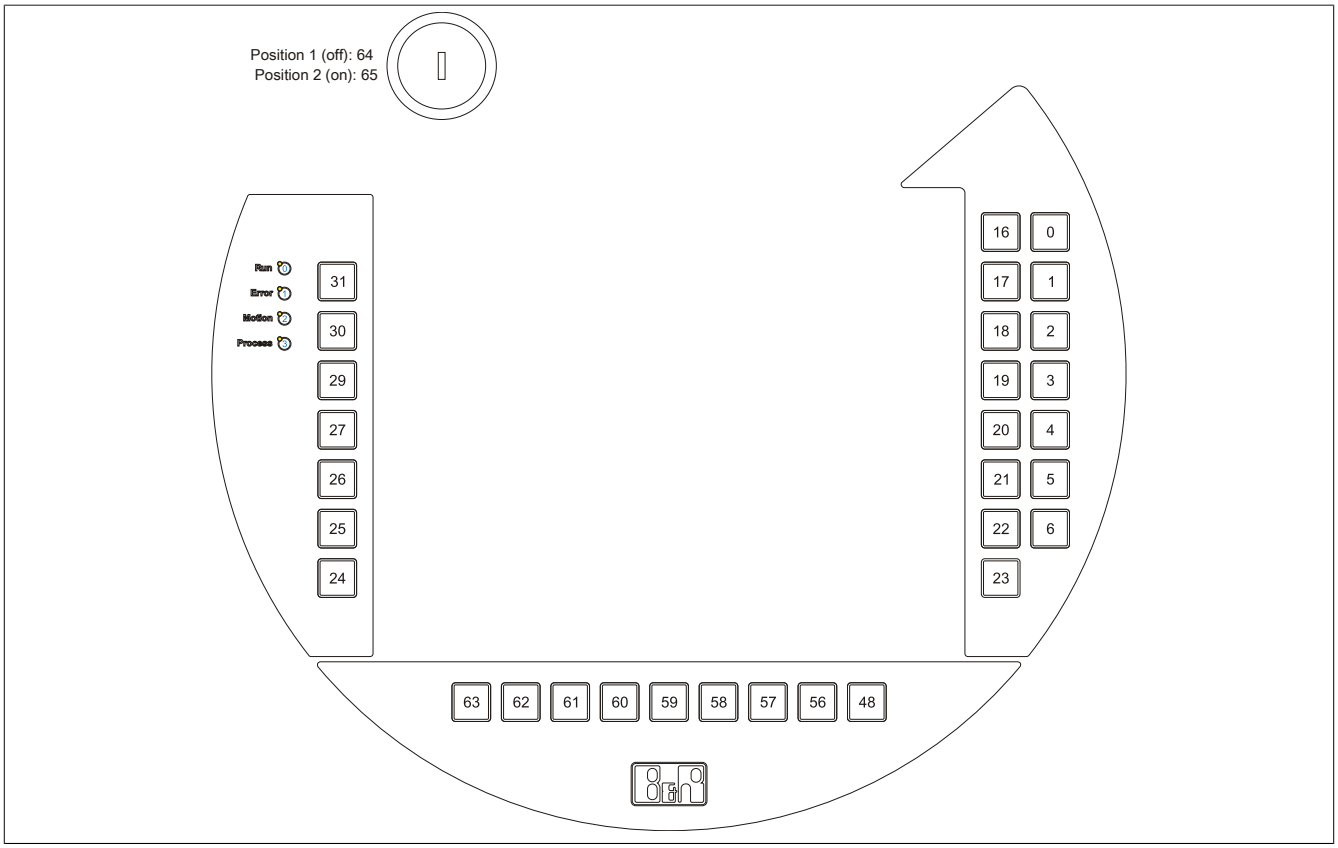


Figure 56: 5MP050.0653-04 - Hardware numbers

3.8 Touch screen calibration

B&R touch screen devices are equipped with a touch screen controller that supports hardware calibration. This means that these devices are pre-calibrated at the factory. This feature offers great advantages especially for replacement parts since recalibration is usually no longer required when replacing a device (identical model/type). We still recommend calibration for best results and to adapt the touch screen to the needs of the user.

Regardless of this, the touch driver requires a one-time calibration during or after installation.

3.8.1 Windows CE

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

3.9 Date/Time setting

The real-time clock in the Mobile Panel 40/50 is not backed by a battery. If necessary, the time must be set each time the device is restarted (disconnection of power supply or restart).

The time can be set by double-clicking the time display on the desktop or via **Start > Settings > Control Panel > Date/Time**.

3.10 Key configuration

Not all keys are predefined in the factory setting for Mobile Panel devices. Keys can be configured easily with the B&R Key Editor (version 2.60 or later) - see "B&R Key Editor" on page 86.

Following configuration with the B&R Key Editor and creation of the project, the new key configuration file (.kcf) can be transferred to the device via online "update" using the Control Center (**Start > Settings > Control Panel > Control Center**, tab **Keys**, e.g. using a USB flash drive.

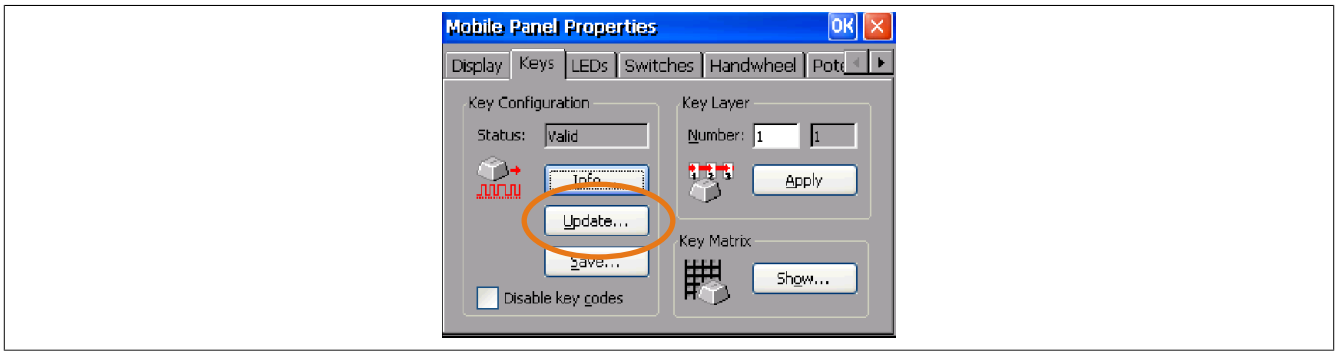


Figure 57: Key configuration update

3.11 User tips for increasing the service life of the display

3.11.1 Backlight

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

3.11.1.1 How can the service life of backlights be extended?

- Set the display brightness to the lowest value comfortable for the eyes.
- Use dark images.
- Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.

3.11.2 Image persistence

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

There are 2 different types:

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

3.11.2.1 What causes image persistence?

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

3.11.2.2 How can image persistence be reduced?

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

3.12 Pixel errors

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

4 Software

4.1 Windows CE

4.1.1 Order data

Model number	Short description	Figure
	Windows CE 5.0	
5SWWCE.0524-ENG	Microsoft OEM Windows CE 5.0 Professional, English; for Mobile Panel MP40.	
5SWWCE.0525-ENG	Microsoft OEM Windows CE 5.0 Professional, English; for Mobile Panel MP50.	
5SWWCE.0624-ENG	Microsoft OEM Windows CE 5.0 Professional Plus, English, for Mobile Panel MP40.	
5SWWCE.0625-ENG	Microsoft OEM Windows CE 5.0 Professional Plus, English, for Mobile Panel MP50.	
5SWWCE.0724-ENG	Microsoft OEM Windows CE 5.0 Professional plus, English; Terminal Client Automation Runtime for Mobile Panel MP40.	
5SWWCE.0725-ENG	Microsoft OEM Windows CE 5.0 Professional, English; Automation Runtime terminal client for Mobile Panel MP50.	

Table 31: 5SWWCE.0524-ENG, 5SWWCE.0525-ENG, 5SWWCE.0624-ENG, 5SWWCE.0625-ENG, 5SWWCE.0724-ENG, 5SWWCE.0725-ENG - Order data

4.1.2 General information

B&R Windows CE is an operating system that is optimally tailored to B&R's devices, i.e. it includes only the functions and modules that are required by each device. This makes this operating system extremely robust and stable. A further advantage of B&R Windows CE compared to other operating systems are the low licensing costs.

4.1.3 Differences between CE versions (Pro - ProPlus - ProPlusTCAR)

Features	Pro 5SWWCE.0524-ENG 5SWWCE.0525-ENG	ProPlus 5SWWCE.0624-ENG 5SWWCE.0625-ENG	ProPlusTCAR 5SWWCE.0724-ENG 5SWWCE.0725-ENG
Windows CE version	5.0	5.0	5.0
Supported screen resolution	MP40 = QVGA MP50 = VGA	MP40 = QVGA MP50 = VGA	MP40 = QVGA MP50 = VGA
Color depth[1]	MP40 = 8-bit / 16 colors MP50 = 16-bit / 65,536 colors	MP40 = 8-bit / 16 colors MP50 = 16-bit / 65,536 colors	MP40 = 8-bit / 16 colors MP50 = 16-bit / 65,536 colors
Boot time / Startup time	Approx. 25 seconds	Approx. 25 seconds	Approx. 20 seconds
Web browser	Supported	Supported	B&R Windows CE operating systems with TCAR support have been optimized for thin client operation on B&R Automation Runtime devices. The B&R VNC Viewer with B&R extensions is used as the client.
.NET	Supported	Supported	
Customized key configuration	Supported	Supported	
PVI	Supported	Supported	
Automation Device Interface	Supported	Supported	
Remote Desktop Protocol for thin clients	Supported	Supported	
B&R VNC Viewer	Supported	Supported	
B&R Task Manager	Supported	Supported	
B&R Picture Viewer	Not supported	Supported	
Compatible with zenOn	Yes	Yes	
Compatible with Wonderware	No	No	
Serial interfaces for free use[2]	1	1	
PDF, Excel, Word, PowerPoint and Image Viewer	Not supported	Supported	

Table 32: Differences - CE versions (Pro - ProPlus - ProPlusTCAR)

1) The color depth depends on the display being used.
2) Only if Ethernet is not used.

4.1.4 Installation / Update / Save

Windows CE is usually preinstalled at B&R on the internal flash memory (128 MB).

The Windows CE version can most easily be updated or backed up (saved) using the B&R Control Center (see "B&R Automation Device Interface (ADI) Control Center" on page 82).

This is done by accessing **Start > Settings > Control Panel > Control Center** and selecting the "Update" page.

Figure 58: Control Center - Updating / Saving

4.1.5 Configuring Windows CE ProPlus Thin Client Automation Runtime (TCAR)

1. Make sure that you are using a B&R Automation Runtime device with an installed Visual Components project. This Visual Components project must include a **VNC server component from the MP40/50 family** because only then can the image content on the B&R Windows CE thin client device be transferred. If you want to use a handwheel or keys on your thin client, the VNC server in the Visual Components project must support B&R library **"AS_RfbExt"**.
2. Connect the B&R Windows CE thin client device with the B&R Automation Runtime device via Ethernet.
3. Start the B&R Windows CE device and hold the hotkey down while it boots. When delivered, the **hotkey** is the red **stop** button on an MP 40/50.
   Note: The hotkey can be changed with the "Thin client" applet in the Control Panel.
4. If the hotkey was recognized, the system will ask for a password after booting. Enter the thin client password. When delivered, the password is **1234**.
   Note: The thin client password can be changed with the Thin client applet in the Control Panel.
5. Open the **Start > Settings > Control Panel > Network and dial-up connection** dialog box. Configure the properties of your network card (DHCP, gateway, etc.). Check for correct functionality by pinging, for example.
6. Open up the **Start > Settings > Control Panel > Thin client** dialog box and configure the password and hotkey.
7. Start the program **Start > Programs > Accessories > B&R VNC Viewer**. Establish a VNC connection to your Automation Runtime device. Configure the VNC viewer options according to your needs.
   Note: Regardless of the settings in dialog box "Options", options "Full-screen mode" and "Hide menu bar" are always enabled in thin client mode.

> **Information:**
>
> **For detailed configuration options for the B&R Windows CE VNC Viewer, see the Windows CE help documentation starting with version 3.30. This can be downloaded at no cost from the service area of the B&R website (www.br-automation.com).**

8. Open the **Start > Settings > Control Panel > Configuration Manager** dialog box and save the registry.
9. Restart the B&R Windows CE device.

4.2 B&R Automation Device Interface (ADI) Control Center

The Automation Device Interface (ADI) allows access to specific functions of B&R devices. The settings of these devices can be read out and changed in Windows using the B&R Control Center in the Control Panel.

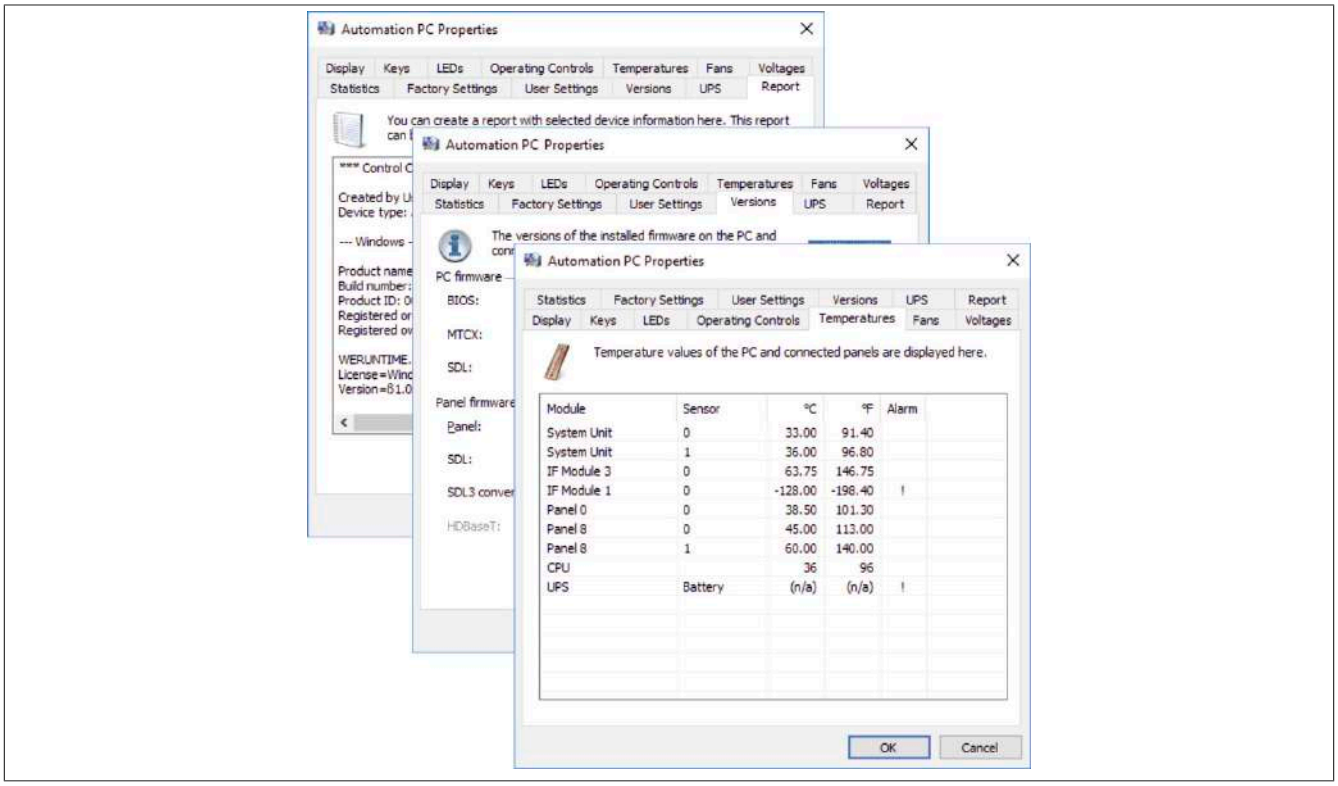


Figure 59: B&R Control Center screenshots - Examples

Information:

The displayed temperature and voltage values (e.g. CPU temperature, core voltage, battery voltage) represent uncalibrated information values. No conclusions about possible alarms or hardware malfunctions can be drawn from this. The hardware components used have automatic diagnostic functions in the event of error.

4.2.1 Functions

Information:

The functions available in the Control Center depend on the device family.

- Changing display-specific parameters
- Reading out device-specific keys
- Updating the key configuration
- Testing keys or device-specific LEDs of a membrane keypad
- Reading out or calibrating control devices (e.g. key switch, handwheel, joystick, potentiometer)
- Reading out temperatures, fan speeds, switch positions and statistical data
- Reading out operating hours (power-on hours)
- Reading user settings and factory settings
- Reading software versions
- Updating and backing up BIOS and firmware
- Creating reports for the current system (support)
- Setting the SDL equalizer value for the SDL cable adjustment
- Changing the user serial ID

Depending on the version, a detailed description of the Control Center is available either in the integrated help documentation or in the user documentation.

4.2.2 Installation

The Control Center is included in every B&R Windows CE image and does not have to be installed separately.

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

This software allows functions of the B&R Automation Device Interface (ADI) to be accessed from Windows applications created with Microsoft Visual Studio, for example:

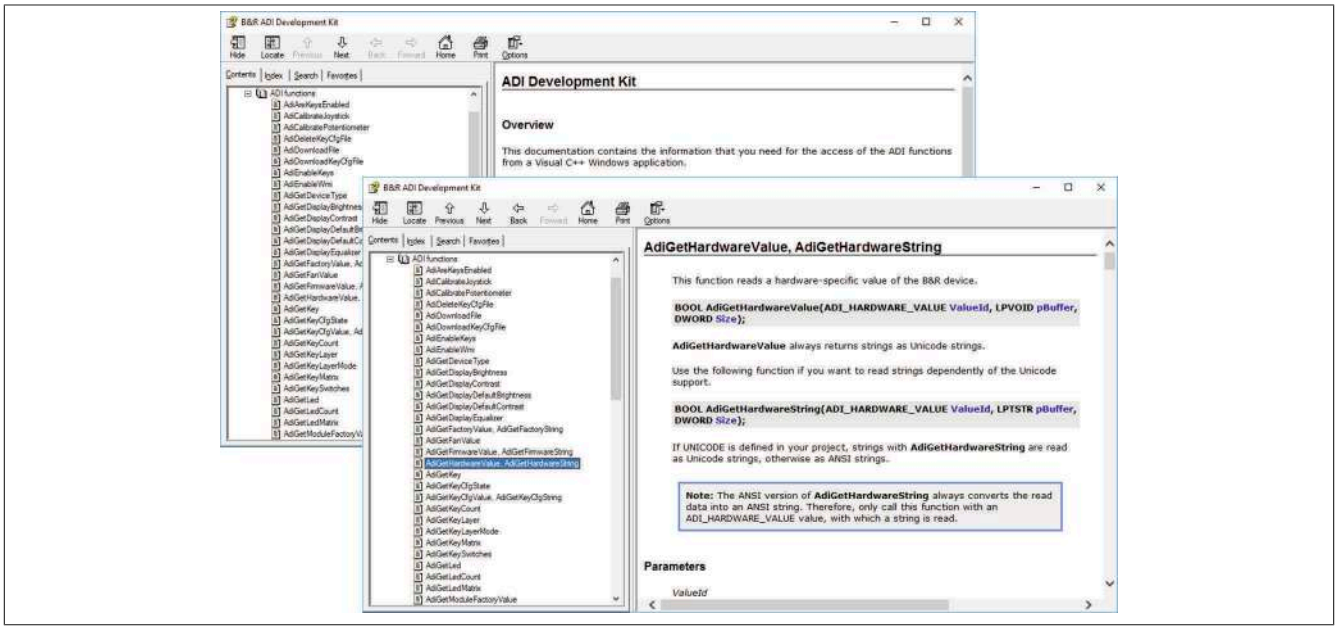


Figure 60: ADI Development Kit screenshots

Features:

- Header files and import libraries
- Help files
- Example projects
- ADI DLL (for testing applications if no ADI driver is installed)

The appropriate ADI driver for the device must be installed on the mentioned product family. The ADI driver is already included in B&R images of embedded operating systems.

For a detailed description of how to use ADI functions, see Automation Help.

The B&R Automation Device Interface (ADI) Development Kit can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com).

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

This software allows functions of the B&R Automation Device Interface (ADI) to be accessed from .NET applications created with Microsoft Visual Studio.

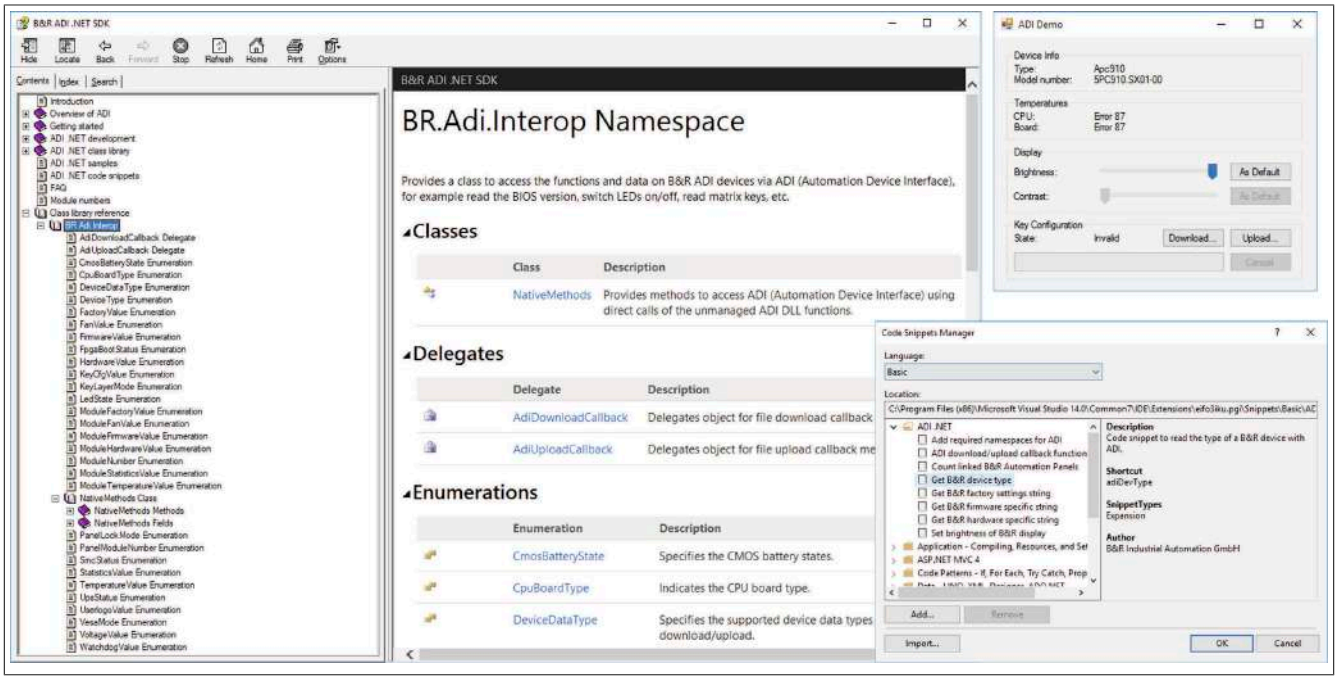


Figure 61: ADI .NET SDK screenshots

Features:

- ADI .NET class library
- Help files (help documentation is in English)
- Sample projects and code snippets
- ADI DLL (for testing applications if no ADI driver is installed)

The appropriate ADI driver for the device must be installed on the mentioned product family. The ADI driver is already included in B&R images of embedded operating systems.

For a detailed description of how to use ADI functions, see Automation Help.

The ADI .NET SDK can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com).

4.5 B&R Key Editor

A frequently occurring requirement for panels is adapting function keys and LEDs to the application software. With the B&R Key Editor, individual adaptation to the application is possible quickly and easily.

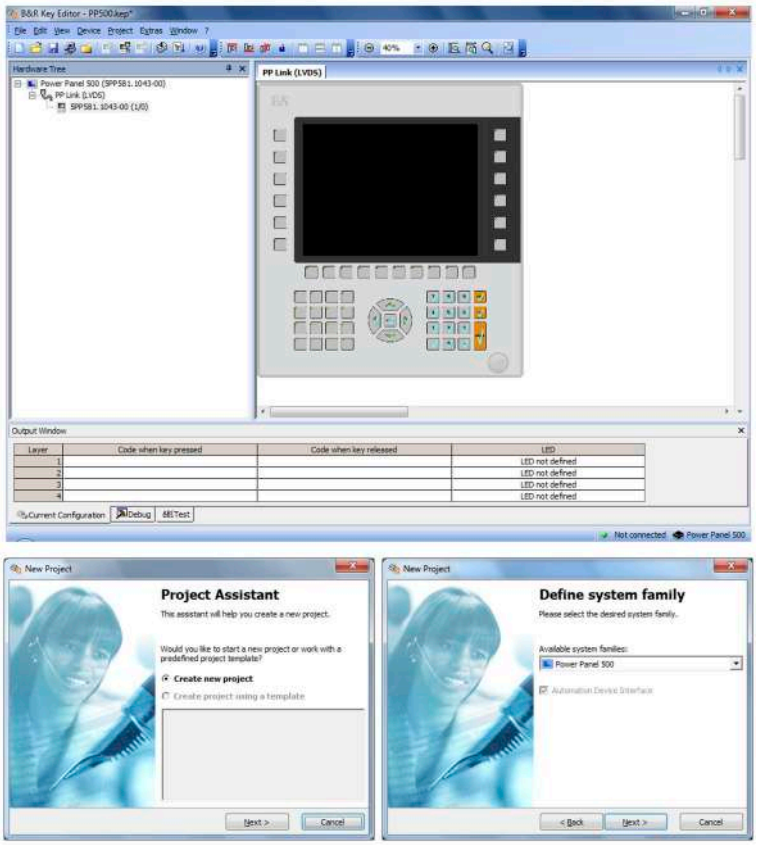


Figure 62: B&R Key Editor screenshots

Features:

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) on one key
- Special key functions (change brightness, etc.)
- Assignment of LED functions (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the panel locking time when connecting several Automation Panel devices to Automation PCs and Panel PCs

For detailed instructions about configuring keys and LEDs and installing the key configuration on the target system, see the help documentation for the B&R Key Editor. The B&R Key Editor and help documentation can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com).

4.6 B&R KCF Editor

The B&R KCF Editor can be used as a simple alternative to the B&R Key Editor. It can also be used to adapt function keys and LEDs to the application software. In contrast to the B&R Key Editor, operation does not take place using a graphical representation of the device, but via a simple Windows dialog box. The B&R KCF Editor can therefore also be used for devices that are not yet supported in the B&R Key Editor. The B&R KCF Editor is a "portable" application and can be started directly from a USB flash drive without installation on the target device, for example. An installed ADI driver is required for the full range of functions.

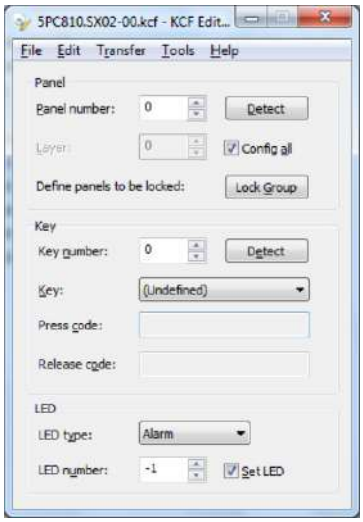


Figure 63: B&R KCF Editor version 1.0 screenshot

Features

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Special key functions (change brightness, etc.)
- Assignment of LED functions (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the panel locking time when connecting several Automation Panel devices to B&R PCs.
- Export and import of the configuration (via INI files)
- Save configuration as report (text file)

Additional features if the KCF Editor is executed on the target device[2)]

- Panel and key detection
- LED test
- Download/Upload the configuration

[2)] The ADI driver must be installed on the B&R PC for these features.

5 Standards and certifications

5.1 List of applicable EC directives and standards

5.1.1 EC directives

This user's manual corresponds to machinery directive 2006/42/EC. To avoid confusion for the user, the terms from the old 98/37/EC machinery directive will continue to be used.

Standard	Description
98/37/EC	Machinery Directive with changes to 98/79/EC
2006/42/EC	Machinery Directive (effective as of 2009-12-29 and replacing Machinery Directive 98/37/EC)
2004/108/EC	EMC Directive

Table 33: EC directives

5.1.2 Standards

The following legally non-binding European standards were used to verify the Mobile Panel's conformity to these directives.

5.1.3 Verifying the conformity to machine directives

Standard	Description
EN ISO 13850:2006	Safety of machinery - Emergency stop - Principles for design
EN ISO 13849-1:2008	Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design
EN 60204-1:2006 Ch. 9, Ch. 10	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

Table 34: Verifying the conformity to machine directives

5.1.4 Verifying conformity with the EMC Directive

Standard	Description
EN 61131-2:2003 Ch. 8, 9	Programmable controllers - Part 2: Equipment requirements and tests

Table 35: Verifying conformity with the EMC Directive

The requirements of the following standards are also satisfied:

Standard	Description
EN 61000-6-2:2001	Electromagnetic compatibility (EMC): Generic standards - Immunity for industrial environments
EN 61000-6-4:2001	Electromagnetic compatibility (EMC): Generic standards - Emission standard for industrial environments

Table 36: Verifying conformity with the EMC Directive

5.1.5 Other standards

The following legally non-binding European standards were also consulted in part when planning the safety concept:

5.1.5.1 General procedures and safety principles

Standard	Description
EN ISO 12100-1:2003	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology
EN ISO 12100-2:2003	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles

Table 37: General procedures and safety principles

5.1.5.2 Design of the enabling device

Standard	Description
EN ISO 13849-1:2008	Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design
EN 60204-1:2006	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1:2006	Robots and robotic devices - Safety requirements for industrial robots

Table 38: Design of the enabling device

5.1.5.3 Design of the stop button

Standard	Description
EN ISO 13850:2006	Safety of machinery - Emergency stop - Principles for design
EN 60204-1:2006 Ch. 9, 10	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

Table 39: Design of the stop button

5.1.5.4 Ergonomics

Standard	Description
EN 614-1:2006	Safety of machinery - Ergonomic design principles - Part 1: Terminology and general principles
EN 894-1:1997	Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 1: General principles for human interactions with displays and control actuators
EN 894-2:1997	Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 2: Displays
EN 894-3:2000	Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 3: Control actuators

Table 40: Ergonomics

5.1.5.5 Stability and impermeability of the housing

Standard	Description
EN 60529:1991	Degrees of protection provided by enclosures
EN 61131-2:2003 Ch. 12	Programmable controllers - Part 2: Equipment requirements and tests

Table 41: Stability and impermeability of the housing

5.1.5.6 Electrical safety and fire protection

Standard	Description
EN 61131-2:2003 Ch. 11	Programmable controllers - Part 2: Equipment requirements and tests
EN 50178:1997	Electronic equipment for use in power installations

Table 42: Electrical safety and fire protection

5.1.5.7 Requirements for ambient conditions

Standard	Description
EN 61131-2:2003 Ch. 4	Programmable controllers - Part 2: Equipment requirements and tests
EN 50178:1997	Electronic equipment for use in power installations

Table 43: Requirements for ambient conditions

The following standards have also been taken into consideration for the American market:

5.1.5.8 UL testing of industrial control equipment

Standard	Description
UL 508, 17th edition (CSA C22.2 no. 14)	Industrial Control Equipment (NRAQ, NRAQ7)

Table 44: UL testing of industrial control equipment

5.2 European Union directives

A fundamental goal of the European Union is the establishment of a single European market and the removal of trade barriers.

To achieve this goal, the "four freedoms" are guaranteed in European contracts:

- Free movement of goods
- Free movement of people
- Free movement of services
- Free movement of capital

Free movement of goods signifies that quantitative import restrictions of goods between member states is forbidden.

Excluded from this are goods that threaten personal or environmental safety. Such products can be stopped when entering the territory of member states.

In order to guarantee the free movement of these products, the national safety regulations of member states are harmonized by way of directives set forth by the European Union.

These directives exist for several product classes, e.g. machinery, medical products and even toys. Appropriate directives have also been developed for additional product safety aspects, such as electrical protection, explosion protection and electromagnetic compatibility.

These directives are directed at member states, who must then implement them into national law. As a result, these directives are legally binding.

With the "CE" label, the manufacture certifies that all of the obligations stipulated in the corresponding EU directives with regard to the product have been fulfilled.

The "CE" label printed on the product by the manufacturer is the product's "passport" within the EU and is checked by the respective monitoring authorities.

In addition, conformity with EU directives can be verified by independent accredited certification organizations and certified with an EC type examination certificate.

In addition to the EMC directive (EMC RL 2004/108/EC), the machinery directive (MD 2006/42/EC) applies to the hand terminal.

5.3 International certifications

B&R products and services comply with applicable standards. These are international standards from organizations such as ISO, IEC and CENELEC, as well as national standards from organizations such as UL, CSA, FCC, VDE, ÖVE, etc. We pay special attention to the reliability of our products in the industrial sector.

Certifications	
USA and Canada 	All important B&R products are tested and listed by Underwriters Laboratories and checked quarterly by a UL inspector. The mark is valid for the USA and Canada and facilitates the certification of your machines and systems in this economic area.
Europe 	This mark certifies that all harmonized EN standards for the applicable directives have been met.

Table 45: International certifications

5.4 Safety technology standards and definitions

5.4.1 Stop functions per EN 60204-1:2006 (Electrical equipment of machines - Part 1: General requirements)

There are three categories of stop functions:

Category	Description
0	Stopping by immediate removal of power to the machine actuators (i.e. an uncontrolled stop).
1	A controlled stop with power left available to the machine actuators to allow for stopping. Power is only interrupted when standstill is achieved.
2	A controlled stop with power left available to the machine actuators.

Table 46: Overview of stop function categories

The necessary stop functions must be determined based on a risk assessment of the machine. Category 0 and category 1 stop functions must be functional regardless of operating mode. A category 0 stop must have priority. Stop functions must have priority over assigned start functions. Resetting the stop function is not permitted to trigger a dangerous state.

5.4.2 Emergency stops per EN 60204-1:2006 (Electrical equipment of machines - Part 1: General requirements)

In addition to the requirements for stop functions, the emergency stop function has the following requirements:

- It shall override all other functions and operations in all modes.
- Power to the machine actuators that can cause a hazardous situation shall be removed as quickly as possible without creating other hazards.
- A reset is not permitted to initiate a restart.
- The stop function is not permitted to reduce the effectiveness of the safety devices equipment or of equipment with safety-related functions.
- The stop function is not permitted to interfere with equipment designed to free personnel from hazardous situations.

Emergency stops must be category 0 or category 1 stop functions. The necessary stop function must be determined based on a risk assessment of the machine.

Only hardwired electromechanical equipment is permitted to be used for stop category 0 emergency stop functions. In addition, this functionality is not permitted to depend on electronic switching logic (hardware or software) or the transfer of commands via a communication network or data connection.[1)]

With a stop category 1 emergency stop function, it must be ensured that the power to the machine actuators is completely switched off. This switching off must take place using electromechanical equipment.

[1)] In accordance with the national foreword of the applicable German-language version of EN 60204-1:2006, electronic equipment – and especially emergency stop systems – are permitted to be used regardless of the stop category if the same degree of safety is provided by applying standard EN ISO 13849-1:2015 and/or IEC 61508, for example, as is required by EN 60204-1.

5.4.3 Safety categories in accordance with EN ISO 13849-1:2015 (Safety of machinery - Safety-related parts of control systems - Part 1: General design principles)

Safety category (per EN 13849-1:2015)	Short description	System behavior
B	SRP/CS and/or their protective equipment, as well as their components, shall be designed, constructed, selected, assembled and combined in accordance with relevant standards so that they can withstand the expected influence. Basic safety principles shall be used.	**Caution!** **The occurrence of a fault can lead to the loss of the safety function.**
1	Requirements of B shall apply. Well-tried components and well-tried safety principles shall be used.	**Caution!** **The occurrence of a fault can lead to the loss of the safety function but the probability of occurrence is lower than for category B.**
2	Requirements of B and the use of well-tried safety principles shall apply. Safety function shall be checked at suitable intervals by the machine control system.	**Caution!** **The occurrence of a fault can lead to the loss of the safety function between the checks.** **The loss of safety function is detected by the check.**
3	Requirements of B and the use of well-tried safety principles shall apply. Safety-related parts shall be designed so that: • A single fault in any of these parts does not lead to the loss of the safety function. • Whenever reasonably practicable, the single fault is detected.	**Caution!** **When a single fault occurs, the safety function is always performed.** **Some but not all faults will be detected.** **Accumulation of undetected faults can lead to the loss of the safety function.**
4	Requirements of B and the use of well-tried safety principles shall apply. Safety-related parts shall be designed so that: • A single fault in any of these parts does not lead to the loss of the safety function. • The single fault is detected at or before the next demand upon the safety function. If this detection is not possible, an accumulation of undetected faults is not permitted to lead to the loss of the safety function.	**Information:** **When a single fault occurs, the safety function is always performed.** **Detection of accumulated faults reduces the probability of the loss of the safety function (high DC).** **The faults will be detected in time to prevent the loss of the safety function.**

Table 47: Overview of safety categories

The following risk graph (per EN 13849-1:2015, annex A) provides a simplified procedure for risk assessment:

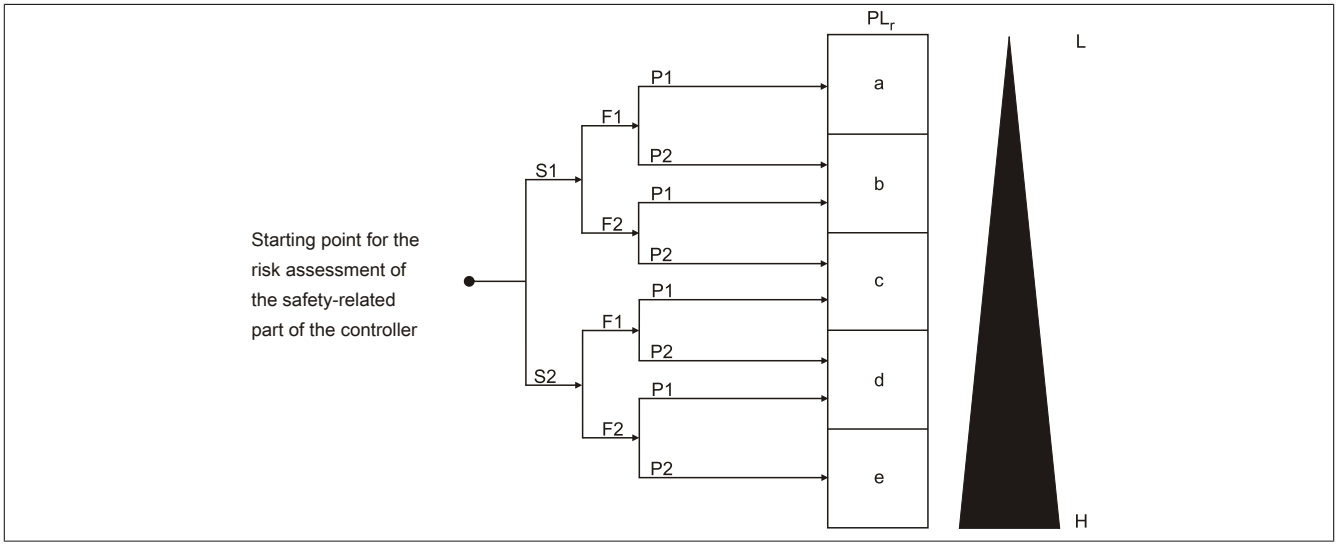


Figure 64: Risk graph for determining the PLr for each safety function

Parameter S ... Severity of injury	
S1	Slight (normally reversible injury).
S2	Serious (normally irreversible injury or death)
Parameter F ... Frequency and/or exposure to hazard	
F1	Seldom to less often and/or exposure time is short.
F2	Frequent to continuous and/or exposure time is long.
Parameter P ... Possibility of avoiding hazard or limiting harm	
P1	Possible under specific conditions.
P2	Scarcely possible.
Other	
L	Low contribution to risk reduction
H	High contribution to risk reduction
PL_r	Required performance level

Table 48: Legend for the risk graph

5.4.4 Safety categories in accordance with EN 954-1:1996 (Safety of machinery - Safety-related parts of control systems - Part 1: General design principles)

The safety-related parts of control systems must meet one or more of the requirements for five defined safety categories. These safety categories define the required behavior of safety-related controller parts with regard to their resistance to errors.

Safety category (per EN 954-1)	Short description	System behavior
B	Safety-related components must be designed and built in such a way that they can meet the expected operational requirements (no specific safety measures are implemented).	**Caution!** **The occurrence of a fault can lead to the loss of the safety function.**
1	Safety related parts must be designed and built so that only reliable components and safety principles are used. (e.g. preventing short circuits by using sufficient distances, reducing the probability of errors by using oversized components, defining the failure route - bias current fail-safe, etc.)	**Caution!** **The occurrence of a fault can lead to the loss of the safety function.**
2	Safety related parts shall be designed so that their safety functions shall be checked at suitable intervals by the machine control system (e.g. automatic or manual check during startup).	**Caution!** **An error between checks can result in the loss of the safety function. The loss of the safety function is detected during the check.**
3	Safety-related parts shall be designed so that a single fault does not lead to the loss of the safety function. Individual errors should – if possible – be detected the next time (or before) the safety function is required.	**Caution!** **The safety function is always retained when a fault occurs. Some but not all errors are detected. An accumulation of undetected errors can result in loss of the safety function.**
4	Safety-related parts shall be designed so that a single fault does not lead to the loss of the safety function. Individual errors must be detected the next time (or before) the safety function is required. If this type of detection is not possible, an accumulation of faults is not permitted to result in the loss of the safety function.	**Information:** **The safety function is always retained when a fault occurs. The faults are detected in time to prevent loss of the safety function.**

Table 49: Overview of safety categories

These considerations lead to a safety category (B, 1, 2, 3, 4) that specifies how the safety-related parts on a machine must be designed and implemented.

> **Information:**
>
> **The wiring of the stop buttons and enable switches is carried out per EN 954-1 in the same way as is carried out in the connection example per EN ISO 13849-1. This is the case since the categories of EN 954-1 have been applied to EN ISO 13849-1. It is important to note that the entire concept of the machine system must be designed for this.**

The safety category must be selected based on a risk assessment. This risk assessment is a part of the total risk assessment for the machine.

The following risk graph (per EN 954-1, annex B) provides a simplified procedure for risk assessment:

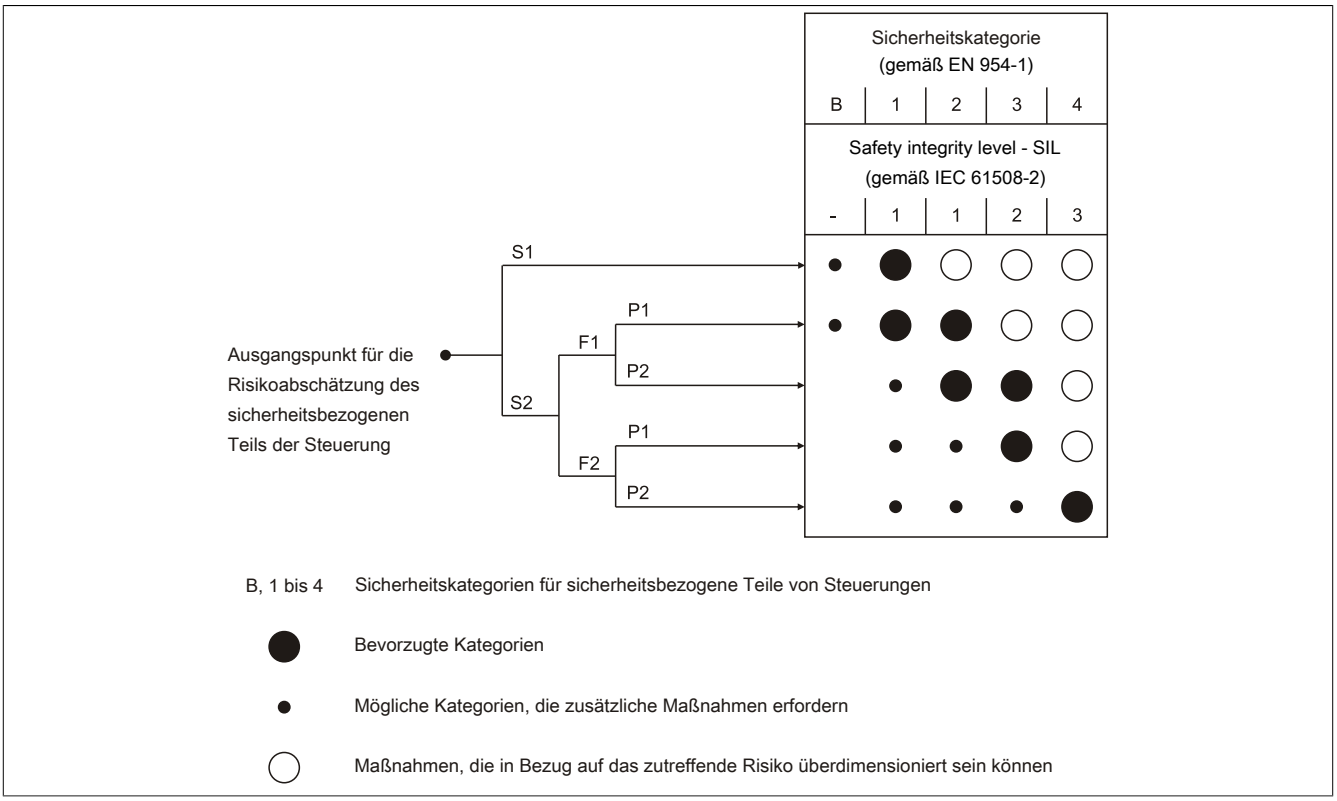


Figure 65: Risk graph per EN 954-1, annex B

The safety category to be used is determined by starting at the specified starting point and taking the parameters S, F and P into consideration.

Parameter S ... Severity of injury	
S1	Slight (normally reversible injury).
S2	Severe (usually irreversible) injury.
Parameter F ... Frequency and/or exposure to hazard	
F1	Seldom to slightly more frequent and/or short exposure duration.
F2	Frequent to continuous and/or long exposure duration.
Parameter P ... Possibility of preventing danger	
P1	Possible under specific conditions.
P2	Scarcely possible.

Table 50: Parameters S, F and P lead you to the safety category to be used

5.4.5 Selecting the performance level and category per EN ISO 13849-1

The machinery directive dictates that a defect in the logic of the control loop – or disturbance or damage to the control loop itself – is not permitted to result in a dangerous situation. This general approach is standardized in EN ISO 13849-1 "Safety-related parts of control systems", which defines performance levels (PL a to e) for safety-related control systems. The PL depends on the category, the $MTTF_d$ value and the DC of the corresponding safety circuit. The CCF examination must also be performed.

As in the earlier EN 954-1 standard, the category describes the structure of the safety functions. What is new is the performance level (PL), which describes the safety function's probability of failure and ability to detect faults.

The PL is selected by the machine manufacturer according to the actual potential for hazardous situations determined by the danger and risk assessment. At a minimum, PL d is normally required for dangers that can result in irreversible injury or death.

The category specified with the PL provides information about the following:

- Whether the system is designed as a 1-channel system, in which case a fault could lead to a loss of the safety function but component availability is high (category 1)
- Whether the system is designed as a 1-channel system, in which case a fault could lead to a loss of the safety function but the fault is detected by the system and indicated in one form or another (category 2)
- Whether the system is designed as a 2-channel system and a fault will not lead to a loss of the safety function (category 3)
- Whether the system is designed as a 2-channel system and an accumulation of faults will not lead to a loss of the safety function (category 4)

In this regard, it is important to note that in category 3 and later, single faults must be detected promptly in order to prevent an accumulation of faults, which could then lead to a loss of the safety function.

In electrical and electronic systems, faults that must be detected include cross faults between circuits, interruptions, short circuits or stuck contacts. Specially certified safety relays with their own specific PL are often used for detecting faults in the individual safety circuits. The overall PL necessary for the safety function is only achieved, however, if the connection with the corresponding circuits has also been implemented for the respective PL in accordance with the product description and the PL of all components contributing to the safety function have been taken into account.

The PL for an overall safety function must therefore always be calculated from the individual components or modules.

Standard EN ISO 13849-1 provides guidelines for more easily determining the PL for a safety function consisting of multiple components.

Note that with safety components connected in series, the PL of the safety function is determined by the safety component with the lowest PL in the safety function. For example, a safety function consisting of 3 components with category 4 PL e, category 3 PL d and category 2 PL c would result in a performance level of PL c for the overall safety function. Further note that a fault would result in the loss of the safety function even though category 4 PL e components are integrated in the safety function. This is because one of the components being used is only category 2.

Combining several PLs can reduce the overall PL.

A FMEA (failure mode and effects analysis) can ensure that a fault will not lead to the loss of the safety function. This is done by theoretically, or even practically, running through all possible faults and showing that the requirements of the category are sufficiently fulfilled.

5.4.6 Restart interlock per EN 1037:1995 (Safety of machinery - Prevention of unexpected start-up)

Keeping a machine in a state of rest while personnel are working in the danger zone is one of the most important requirements for safely operating machines.

Startup refers to the transition of a machine or its parts from a state of rest to a moving state. A startup is considered unexpected if caused by one of the following:

- A startup command generated due to controller failure or external influences on the controller.
- A startup command generated due to incorrect operation of a startup control actuator or another part of the machine.
- Restoration of the power supply after an interruption.
- External/Internal influences on parts of the machine.

To prevent unexpected startup of machines or parts of machines, power should be removed and dissipated. If this is not practical (e.g. frequent brief interventions in danger zones), other measures must be taken:

- Measures to prevent randomly generated startup commands.
- Measures to prevent randomly generated startup commands from causing unexpected startup.
- Measures to automatically stop the dangerous part of the machine before a dangerous situation can be caused by unexpected startup.

5.5 Information about MRL 2006/42/EC

Machinery directive (MD) 2006/42/EC is effective starting 2009-12-29 (without a transitional period). This directive requires all machines and safety components commissioned after this date to comply with the new MD and harmonized standards.

For handheld control devices from B&R, this means that in addition to the new guideline, standard EN ISO 13849-1:2008 is also specified (EN 954-1, which is valid until 2012-12-31 also applies in parallel). EN ISO 13849-1 requires the category and performance level (PL) to be specified for the safety-relevant "enable switch" component as well as the B_{10d} value for the gray stop switch. These values are specified in section "Stop button" on page 129 or "Enable switch" on page 130.

5.5.1 Which devices have to satisfy the new MD?

Valid for B&R as well as for our customers:

- The date of applicability of the directive depends on the date the product was brought into circulation. If the Mobile Panel is delivered to the end user after 2009-12-29, then this is the date the product was brought into circulation, even if it was sold by B&R at an earlier date.
- Devices in accordance with the old MD that are received by B&R for repairs can still be repaired and returned according to the old MD.
- If an old device is sent in for repairs, then the same or equivalent device will be returned to the customer.
- Devices for which the new MD applies that are received by B&R for repairs must be repaired and returned according to the new MD.

5.5.2 Quantitative safety specifications for the stop button and release control device (enabling equipment)

5.5.2.1 Stop button:

B&R provides a B_{10d} value. B&R cannot provide other values (e.g. SIL, PL, category).

Reason: B&R provides only the switching element, not an evaluation of it. The customer is responsible for connecting the stop button in their application. The way in which the stop button is implemented in the machine determines the SIL or category with PL for the customer.

The B_{10d} value is specified in the user's manual under "Emergency stop or gray stop button" on page .

5.5.2.2 Enabling control device (enabling device):

B&R specifies a category and a PL per EN ISO 13849-1. This is then used to specify a PFH and $MTTF_d$ value per EN ISO 13849-1.

This is because the enable switch was assessed per EN ISO 13849-1. There is no B_{10d} value for the enable switch since the switch consists of the mechanical element and the electronic evaluation. The electronic evaluation means that B&R specifies the values $MTTF_d$ and DC as well as the resulting category, PL and PFH for the entire enable switch (from the switch element to the terminals in the connection box).

5.5.3 Relationship between performance level and safety integrity level

When assessing safety functions per IEC 61508-1, PL values can be translated into SIL values according to table 4 of standard EN ISO 13849-1:2015.

Performance level (PL) per EN ISO 13849-1	Safety integrity level (SIL) per IEC 61508-1
a	No correspondence
b	1
c	1
d	2
e	3

Table 51: EN ISO 13849-1:2015, table 4 - Relationship between performance level (PL) and safety integrity level (SIL)

Performance level (PL)	Probability of dangerous failure per hour
a	$\geq 10^{-5}$ to $<10^{-4}$
b	$\geq 3 \times 10^{-6}$ to $<10^{-5}$
c	$\geq 10^{-6}$ to $<3 \times 10^{-6}$
d	$\geq 10^{-7}$ to $<10^{-6}$
e	$\geq 10^{-8}$ to $<10^{-7}$

Table 52: EN ISO 13849-1:2015, table 3 - Performance levels (PL)

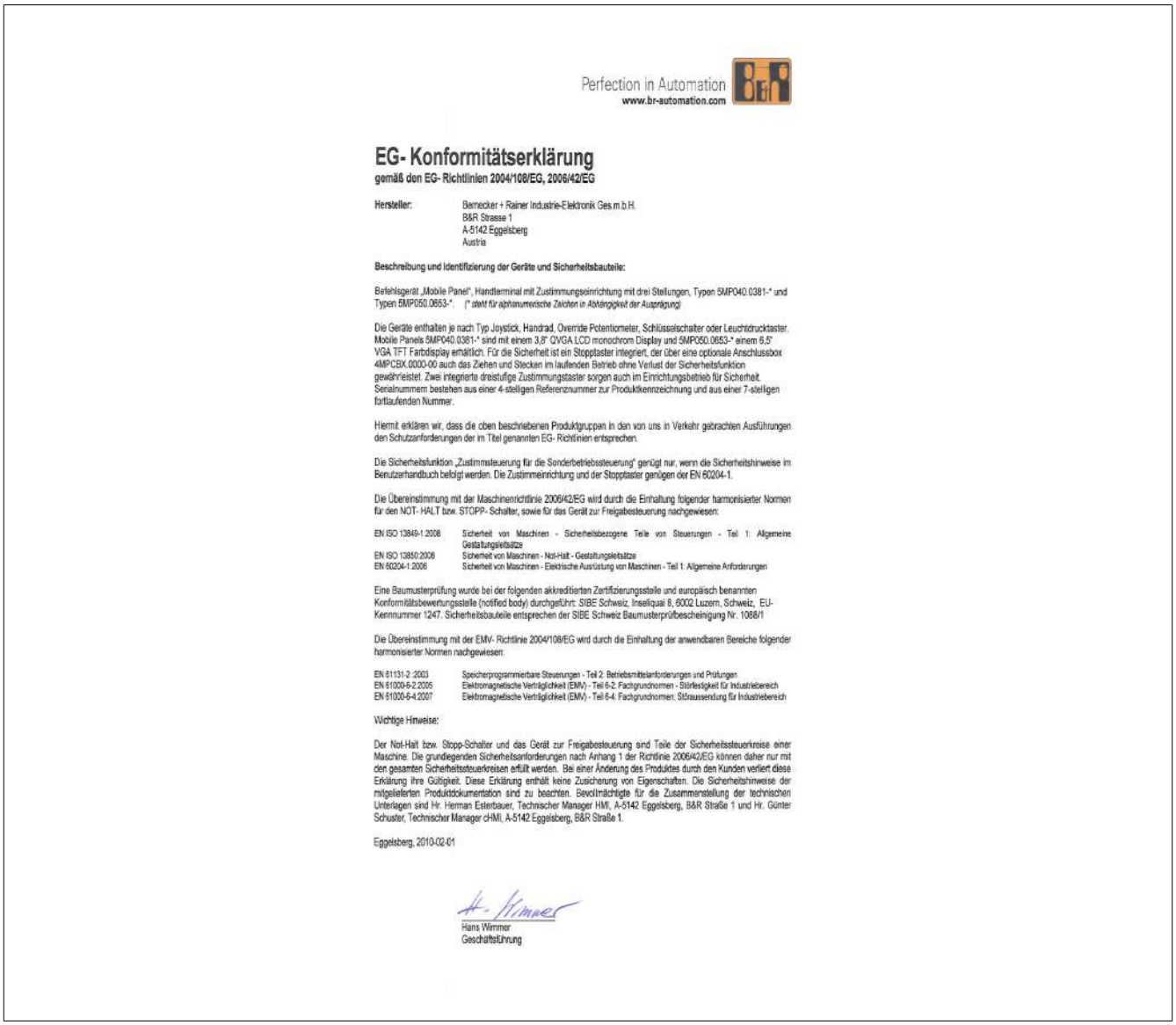
5.5.4 Abbreviations

Abbreviations	Term	Explanation
B_{10d}	-	Number of cycles before 10% of the components have experienced hazardous failure (per channel)
$MTTF_d$	Mean time to dangerous failure	Average time before hazardous failure occurs (per channel)
DC	Diagnostic coverage	Degree of error detection
PL	Performance level	Discrete level that specifies the ability of safety-related parts of a controller to perform a safety function under foreseeable conditions
PFH	Probability of failure per hour	Probability of a failure per hour
SIL	Safety integrity level	Safety integrity level

Table 53: Abbreviations

5.6 Conformity and type certificate

5.6.1 EC declaration of conformity



Perfection in Automation
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EG- Konformitätserklärung
gemäß den EG- Richtlinien 2004/108/EG, 2006/42/EG

Hersteller: Bernecker + Rainer Industrie-Elektronik Ges.m.b.H.
B&R Strasse 1
A-5142 Eggelsberg
Austria

Beschreibung und Identifizierung der Geräte und Sicherheitsbauteile:

Befehlsgerät „Mobile Panel", Handterminal mit Zustimmungseinrichtung mit drei Stellungen, Typen 5MP040.0381-* und Typen 5MP050.0653-*. (* steht für alphanumerische Zeichen in Abhängigkeit der Ausprägung)

Die Geräte enthalten je nach Typ Joystick, Handrad, Override Potentiometer, Schlüsselschalter oder Leuchtdrucktaster. Mobile Panels 5MP040.0381-* sind mit einem 3,8" QVGA LCD monochrom Display und 5MP050.0653-* einem 6,5" VGA TFT Farbdisplay erhältlich. Für die Sicherheit ist ein Stopptaster integriert, der über eine optionale Anschlussbox 4MPCBX.0000-00 auch das Ziehen und Stecken im laufenden Betrieb ohne Verlust der Sicherheitsfunktion gewährleistet. Zwei integrierte dreistufige Zustimmungstaster sorgen auch im Einrichtungsbetrieb für Sicherheit. Seriennummern bestehen aus einer 4-stelligen Referenznummer zur Produktkennzeichnung und aus einer 7-stelligen fortlaufenden Nummer.

Hiermit erklären wir, dass die oben beschriebenen Produktgruppen in den von uns in Verkehr gebrachten Ausführungen den Schutzanforderungen der im Titel genannten EG- Richtlinien entsprechen.

Die Sicherheitsfunktion „Zustimmsteuerung für die Sonderbetriebssteuerung" genügt nur, wenn die Sicherheitshinweise im Benutzerhandbuch befolgt werden. Die Zustimmeinrichtung und der Stopptaster genügen der EN 60204-1.

Die Übereinstimmung mit der Maschinenrichtlinie 2006/42/EG wird durch die Einhaltung folgender harmonisierter Normen für den NOT- HALT bzw. STOPP- Schalter, sowie für das Gerät zur Freigabesteuerung nachgewiesen:

EN ISO 13849-1:2008	Sicherheit von Maschinen - Sicherheitsbezogene Teile von Steuerungen - Teil 1: Allgemeine Gestaltungsleitsätze
EN ISO 13850:2008	Sicherheit von Maschinen - Not-Halt - Gestaltungsleitsätze
EN 60204-1:2006	Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 1: Allgemeine Anforderungen

Eine Baumusterprüfung wurde bei der folgenden akkreditierten Zertifizierungsstelle und europäisch benannten Konformitätsbewertungsstelle (notified body) durchgeführt: SIBE Schweiz, Inseliquai 8, 6002 Luzern, Schweiz, EU-Kennnummer 1247. Sicherheitsbauteile entsprechen der SIBE Schweiz Baumusterprüfbescheinigung Nr. 1068/1

Die Übereinstimmung mit der EMV- Richtlinie 2004/108/EG wird durch die Einhaltung der anwendbaren Bereiche folgender harmonisierter Normen nachgewiesen:

EN 61131-2:2003	Speicherprogrammierbare Steuerungen - Teil 2: Betriebsmittelanforderungen und Prüfungen
EN 61000-6-2:2005	Elektromagnetische Verträglichkeit (EMV) - Teil 6-2: Fachgrundnormen - Störfestigkeit für Industriebereich
EN 61000-6-4:2007	Elektromagnetische Verträglichkeit (EMV) - Teil 6-4: Fachgrundnormen; Störaussendung für Industriebereich

Wichtige Hinweise:

Der Not-Halt bzw. Stopp-Schalter und das Gerät zur Freigabesteuerung sind Teile der Sicherheitssteuerkreise einer Maschine. Die grundlegenden Sicherheitsanforderungen nach Anhang 1 der Richtlinie 2006/42/EG können daher nur mit den gesamten Sicherheitssteuerkreisen erfüllt werden. Bei einer Änderung des Produktes durch den Kunden verliert diese Erklärung ihre Gültigkeit. Diese Erklärung enthält keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten. Bevollmächtigte für die Zusammenstellung der technischen Unterlagen sind Hr. Herman Esterbauer, Technischer Manager HMI, A-5142 Eggelsberg, B&R Straße 1 und Hr. Günter Schuster, Technischer Manager cHMI, A-5142 Eggelsberg, B&R Straße 1.

Eggelsberg, 2010-02-01

H. Wimmer

Hans Wimmer
Geschäftsführung

Figure 66: EC declaration of conformity

5.6.2 EC type examination certificate

SCESp 046

SCHWEIZERISCHER ZERTIFIZIERUNGSDIENST
SERVICE SUISSE DE CERTIFICATION
SERVIZIO SVIZZERO DI CERTIFICAZIONE
SWISS CERTIFICATION SERVICE

Zertifizierungsstelle
SIBE Schweiz

Akkreditierte Zertifizierungsstelle nach EN 45011
Europäisch bezeichnete Konformitätsbewertungsstelle (Notified Body), EU-Kennnummer: 1247

Baumusterprüfbescheinigung Nr. 1088 / 1

Produkt	Befehlsgerät Handterminal mit Zustimmungseinrichtung mit 3 Stellungen
Marke	B&R
Type	5MP050.0653-* 5MP040.0381-* *a steht für alphanumerische Zeichen in Abhängigkeit der Ausprägung
Sicherheitsangaben	EN ISO 13849-1:2008 Kategorie 3 PL d Die Sicherheitsfunktion Zustimmeinrichtung für die Sonderbetriebssteuerung genügen nur, wenn die Sicherheitshinweise im Benutzerhandbuch befolgt werden. Die Zustimmeinrichtung und der Stopp-Taster genügen der EN 60204-1.
Herstelleradresse	Bernecker + Rainer Industrie Elektronik Ges.m.b.H B&R Strasse 1 A-5142 Eggelsberg
Gesuchstelleradresse	Bernecker + Rainer Industrie Elektronik Ges.m.b.H B&R Strasse 1 A-5142 Eggelsberg
Ablaufdatum	29. Dezember 2014

Das überprüfte Baumuster entspricht den einschlägigen Bestimmungen der Richtlinie 2006/42/EG vom 17. Mai 2006 über Maschinen.

Diese Bescheinigung gilt zusammen mit den allenfalls vorstehend erwähnten Beilagen sowie den auf der Rückseite aufgeführten allgemeinen Bestimmungen.

Ausstelldatum
21. Dezember 2009

gültig ab
29. Dezember 2009

Zertifizierungsstelle
NSBIV AG
Zertifizierungsstelle SIBE Schweiz
Postfach 3518
CH-6002 Luzern

Sicherheitsingenieur
M. Luzzatto

Zertifizierungsstellenleiter
P. Keller

Figure 67: EC type examination certificate

6 Accessories

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

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

6.1 USB flash drives

6.1.1 5MMUSB.2048-00

6.1.1.1 General information

USB flash drives are easily replaceable storage media. Due to the fast data transfer (USB 2.0), USB flash drives offer optimal values for use as portable storage media. Without additional drivers, the USB flash drive immediately reports itself as another drive from which data can be read or to which data can be written (hot plugging).

Information:

Due to the large number of USB flash drives available on the market and their short lifecycles, we reserve the right to supply alternative products. It may therefore be necessary to take the following measures in order to also boot from these USB flash drives:

- **The USB flash drive must be reformatted or, in some cases, repartitioned (set partition as active).**
- **The USB flash drive must be in the first position in the boot order; alternatively, the IDE controllers can be disabled in BIOS. In most cases, this can be avoided by running "fdisk / mbr" on the USB flash drive.**

6.1.1.2 Order data

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

Table 54: 5MMUSB.2048-00 - Order data

6.1.1.3 Technical data

Information:

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

Model number	5MMUSB.2048-00
General information	
Data retention	10 years
LED status indicators	1 LED (green) [1]
MTBF	100,000 hours (at 25°C)
Type	USB 1.1, USB 2.0
Maintenance	None
Certifications	
CE	Yes

Table 55: 5MMUSB.2048-00 - Technical data

Model number	5MMUSB.2048-00
Interfaces	
USB	
Type	USB 1.1, USB 2.0
Connection	To any USB type A interface
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Sequential reading	Max. 8.7 MB/s
Sequential writing	Max. 1.7 MB/s
Support	
Operating systems	
Windows XP Professional	Yes
Windows XP Embedded	Yes
Windows ME	Yes
Windows 2000	Yes
Windows CE 5.0	Yes
Windows CE 4.2	Yes
Electrical characteristics	
Current consumption	650 µA sleep mode, 150 mA read/write
Environmental conditions	
Temperature	
Operation	0 to 45°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	10 to 90%, non-condensing
Storage	5 to 90%, non-condensing
Transport	5 to 90%, non-condensing
Vibration	
Operation	10 to 500 Hz: 2 g (19.6 m/s² 0-peak), oscillation rate 1/minute
Storage	10 to 500 Hz: 2 g (19.6 m/s² 0-peak), oscillation rate 1/minute
Transport	10 to 500 Hz: 2 g (19.6 m/s² 0-peak), oscillation rate 1/minute
Shock	
Operation	Max. 40 g (392 m/s² 0-peak) and 11 ms duration
Storage	Max. 80 g (784 m/s² 0-peak) and 11 ms duration
Transport	Max. 80 g (784 m/s² 0-peak) and 11 ms duration
Elevation	
Operation	Max. 3048 m
Storage	Max. 12192 m
Transport	Max. 12192 m
Mechanical properties	
Dimensions	
Width	19 mm
Length	52.2 mm
Height	7.9 mm

Table 55: 5MMUSB.2048-00 - Technical data

1) Signals data transfer (reception and transmission).

6.1.1.4 Temperature/Humidity diagram

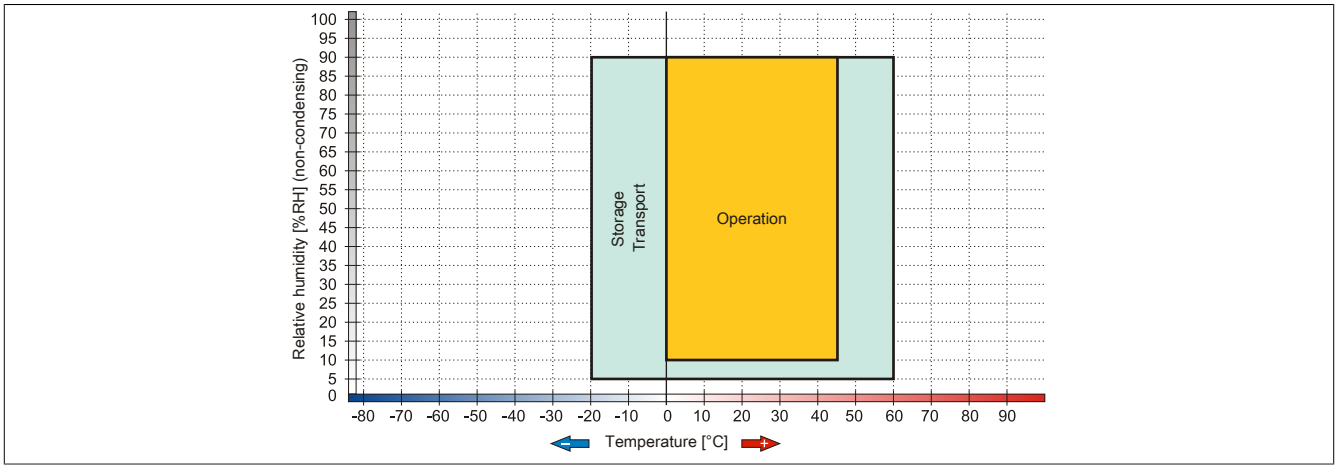


Figure 68: 5MMUSB.2048-00 - Temperature/Humidity diagram

6.1.2 5MMUSB.xxxx-01

6.1.2.1 General information

USB flash drives are easily replaceable storage media. Due to the fast data transfer (USB 2.0), USB flash drives offer optimal values for use as portable storage media. Without additional drivers, the USB flash drive immediately reports itself as another drive from which data can be read or to which data can be written (hot plugging).

Information:

Due to the large number of USB flash drives available on the market and their short lifecycles, we reserve the right to supply alternative products. It may therefore be necessary to take the following measures in order to also boot from these USB flash drives:

- **The USB flash drive must be reformatted or, in some cases, repartitioned (set partition as active).**
- **The USB flash drive must be in the first position in the boot order; alternatively, the IDE controllers can be disabled in BIOS. In most cases, this can be avoided by running "fdisk / mbr" on the USB flash drive.**

6.1.2.2 Order data

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

Table 56: 5MMUSB.2048-01, 5MMUSB.4096-01 - Order data

6.1.2.3 Technical data

Information:

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

Model number	5MMUSB.2048-01	5MMUSB.4096-01
General information		
Capacity	2 GB	4 GB
LED status indicators	1 LED (green) 1)	
MTBF	>3,000,000 hours	
Type	USB 1.1, USB 2.0	
Maintenance	None	
Default file system	FAT32	
Certifications		
CE	Yes	
GOST-R	Yes	
Interfaces		
USB		
Type	USB 1.1, USB 2.0	
Connection	To any USB type A interface	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)	
Sequential reading	Full speed: Max. 1 MB/s High speed: Max. 32 MB/s	
Sequential writing	Full speed: Max. 0.9 MB/s High speed: Max. 23 MB/s	
Endurance		
SLC flash	Yes	
Data retention	>10 years	
Data reliability	<1 unrecoverable error per 10^{14} bits read	
Connection cycles	>1500	

Table 57: 5MMUSB.2048-01, 5MMUSB.4096-01 - Technical data

Model number	5MMUSB.2048-01	5MMUSB.4096-01
Support		
Operating systems		
Windows 10 IoT Enterprise LTSB 64-bit	Yes	
Windows Embedded 8.1 Industry Pro 32-bit	Yes	
Windows Embedded 8.1 Industry Pro 64-bit	Yes	
Windows 7 32-bit	Yes	
Windows 7 64-bit	Yes	
Windows Embedded Standard 7 32-bit	Yes	
Windows Embedded Standard 7 64-bit	Yes	
Windows XP Professional	Yes	
Windows XP Embedded	Yes	
Windows 2000	Yes	
Windows CE 5.0	Yes	
Windows CE 4.2	Yes	
B&R Linux 9	Yes	
B&R Linux 8	Yes	
Electrical characteristics		
Current consumption	Max. 500 µA in sleep mode, max. 120 mA read/write	
Environmental conditions		
Temperature		
Operation	0 to 70°C [2]	0 to 70°C [2]
Storage	-50 to 100°C	
Transport	-50 to 100°C	
Relative humidity		
Operation	85%, non-condensing	
Storage	85%, non-condensing	
Transport	85%, non-condensing	
Vibration		
Operation	20 to 2000 Hz: 20 g (peak)	
Storage	20 to 2000 Hz: 20 g (peak)	
Transport	20 to 2000 Hz: 20 g (peak)	
Shock		
Operation	Max. 1500 g (peak)	
Storage	Max. 1500 g (peak)	
Transport	Max. 1500 g (peak)	
Elevation		
Operation	Max. 3048 m [2]	Max. 3048 m [2]
Storage	Max. 12192 m	
Transport	Max. 12192 m	
Mechanical properties		
Dimensions		
Width	17.97 mm	
Length	67.85 mm	
Height	8.35 mm	

Table 57: 5MMUSB.2048-01, 5MMUSB.4096-01 - Technical data

1) Signals data transfer (reception and transmission).
2) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.

6.1.2.4 Temperature/Humidity diagram

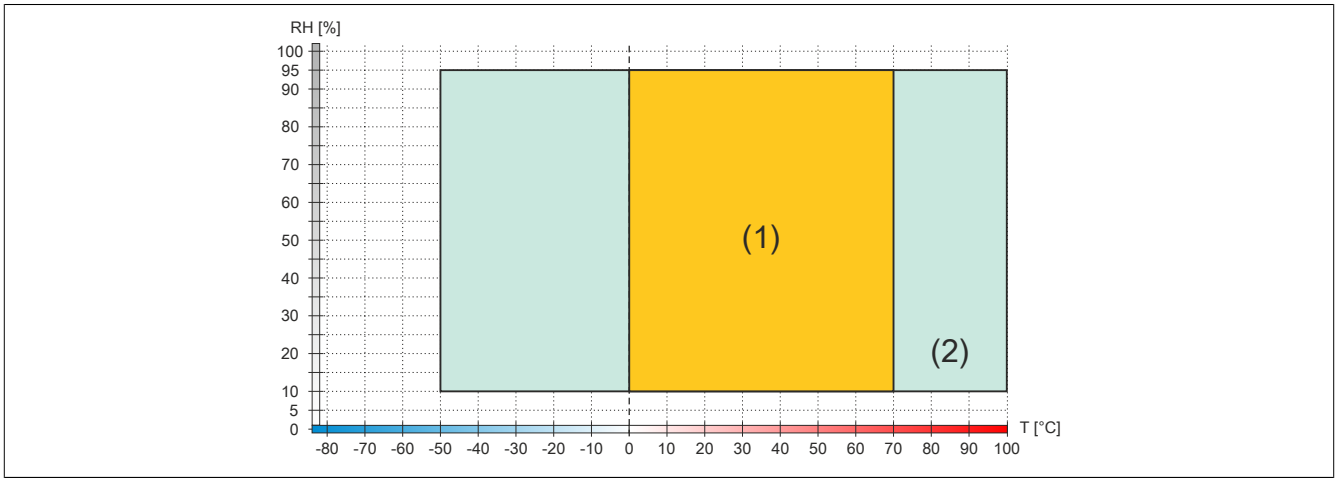


Figure 69: 5MMUSB.xxxx-01 - Temperature/Humidity diagram

Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

6.2 Protective cover

6.2.1 5CAMPP.0000-10

6.2.1.1 General information

This protective cover protects all Mobile Panel attachment cable connectors during transport, with each cover secured to the cable with an anti-loss strap. The protective cover ensures IP65 protection.

6.2.1.2 Order data

Model number	Short description	Figure
	Accessories	
5CAMPP.0000-10	Protective cover for Mobile Panel cables with circular connector.	

Table 58: 5CAMPP.0000-10 - Order data

6.2.1.3 Installation

1. Thread the loop of the protective cover over the circular connector onto the cable.

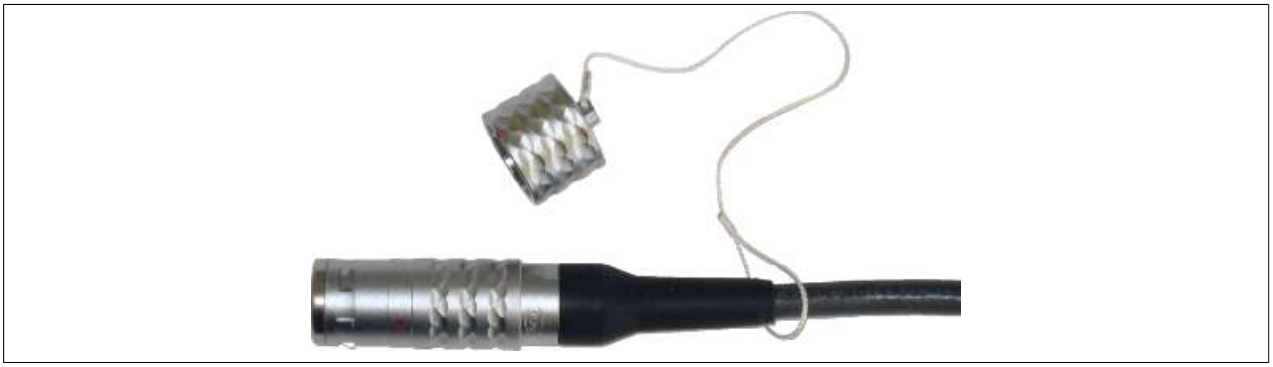


Figure 70: 5CAMPP.0000-10 - Feeding the connector through the loop

2. Pull the loop tight with a pair of pliers and put the cover on the end of the circular connector (the red dot indicates how the cover must go on).

Figure 71: 5CAMPP.0000-10 - Closing the protective cover

6.2.2 5CAMPP.0001-10

6.2.2.1 General information

This protective cover protects Mobile Panel control cabinet cable connectors and Mobile Panel connection box connectors, with each cover secured to the cable with an anti-loss strap. The protective cover ensures IP65 protection.

6.2.2.2 Order data

Model number	Short description	Figure
	Accessories	
5CAMPP.0001-10	Protective cover for Mobile Panel control cabinet cables with circular connector.	

Table 59: 5CAMPP.0001-10 - Order data

6.2.2.3 Installation

Install the protective cover near the control cabinet cable and connect it after the attachment cable has been disconnected.

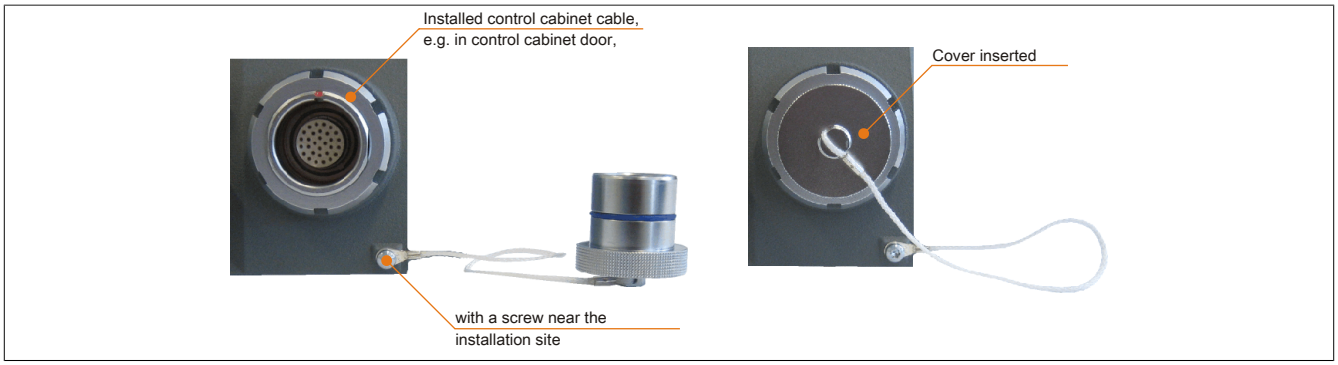


Figure 72: Attaching the control cabinet cable protective cover

6.3 Wall mount

6.3.1 4MPBRA.0000-01

6.3.1.1 General information

Wall mount 4MPBRA.0000-01 is used to store the Mobile Panel device together with the Mobile Panel attachment cable and is only intended for suspended vertical installation.

Drilling holes for attaching the wall mount must be made per diagram "4MPBRA.0000-01 - Dimensions" on page 110.

Caution!

The wall mount should be installed in a location where the Mobile Panel is not exposed to direct heat sources or direct sunlight. The wall mount should also be positioned in a way that does not impair operation of the stop button.

Danger!

If the Mobile Panel device is stored on a wall mount in the machine's danger zone, stop button functionality must be ensured, i.e. the attachment cable and control cabinet cable must be completely connected.

6.3.1.1.1 Components

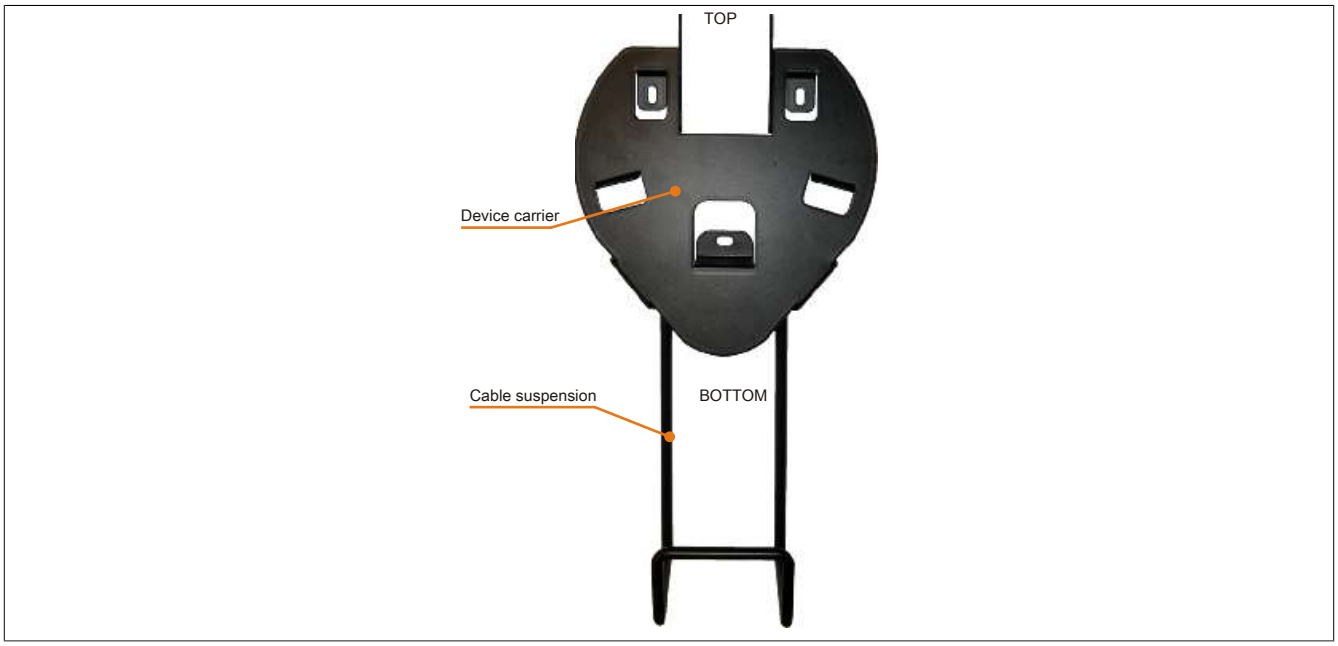


Figure 73: 4MPBRA.0000-01 - Components

6.3.1.2 Order data

Model number	Short description	Figure
	Accessories	
4MPBRA.0000-01	MP40/50 wall mount.	

Table 60: 4MPBRA.0000-01 - Order data

6.3.1.3 Dimensions

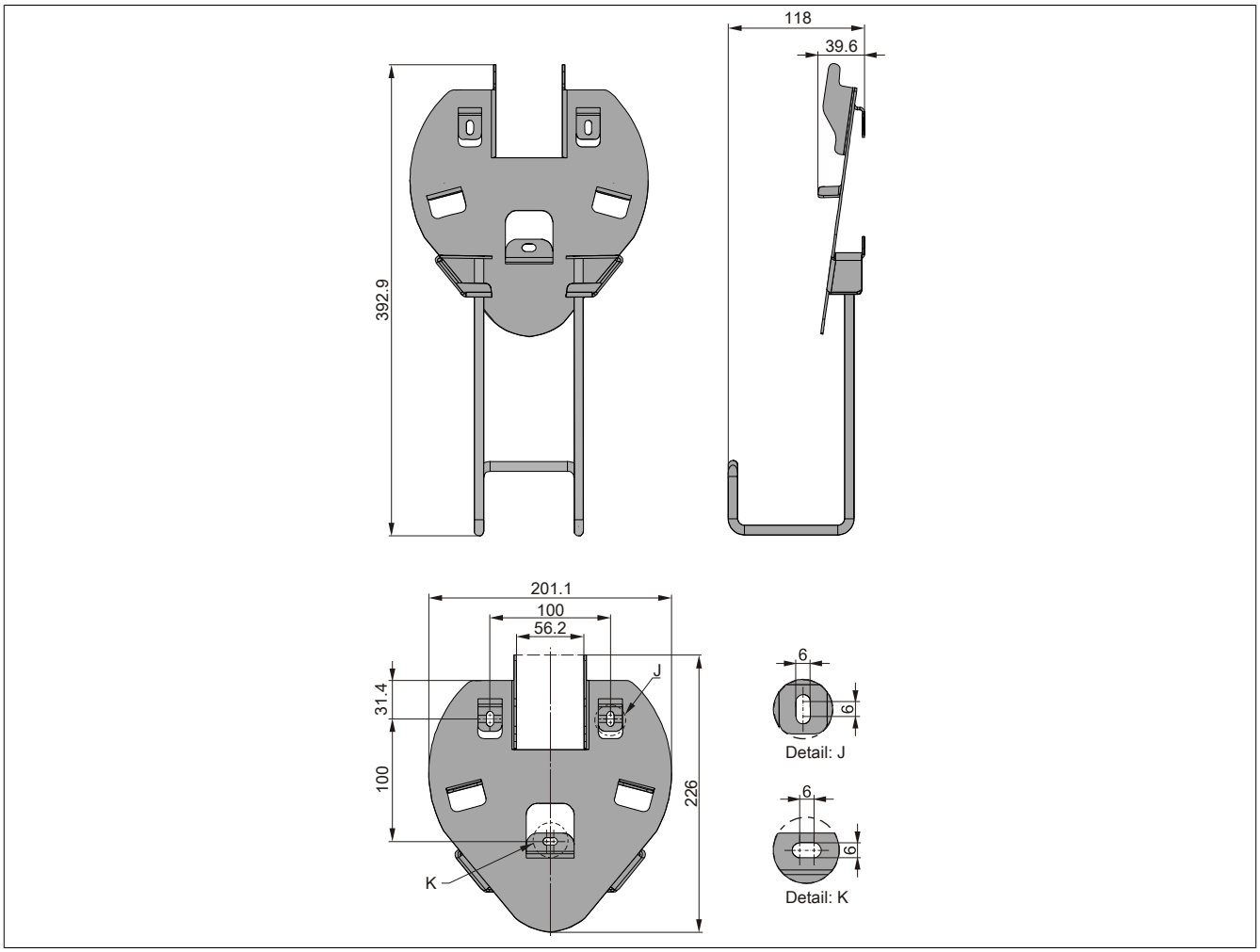


Figure 74: 4MPBRA.0000-01 - Dimensions

6.3.1.4 Storing the Mobile Panel device

The following images illustrate the proper way to store a Mobile Panel device on the wall mount.

Figure 75: Storing a Mobile Panel device on a wall mount

6.4 Connection boxes

6.4.1 4MPCBX.0000-00

6.4.1.1 General information

Connection box 4MPCBX.0000-00 makes it possible to set up a configuration where Mobile Panel 7100, Mobile Panel 40/50 or Mobile Panel 100/200 can be operated at various system connection points while still remaining integrated in the emergency stop circuit.

- Compatible for connections with Mobile Panel 7100, Mobile Panel 40/50 and Mobile Panel 100/200
- Emergency stop circuit not interrupted when disconnecting and connecting the Mobile Panel during operation
- IP65 protection
- Satisfies EN ISO 13849-1:2006 category 3, performance level (PL) d requirements
- Circular connector with push-pull locking
- Emergency stop button
- Hot plug button
- Compact dimensions
- Robust

6.4.1.2 Order data

Model number	Short description	Figure
	Accessories	
4MPCBX.0000-00	Mobile Panel connection box - For cables with push-pull circular connectors	
	Required accessories	
	Accessories	
5CAMPB.0050-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	
5CAMPB.0100-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	

Table 61: 4MPCBX.0000-00 - Order data

6.4.1.3 Interfaces

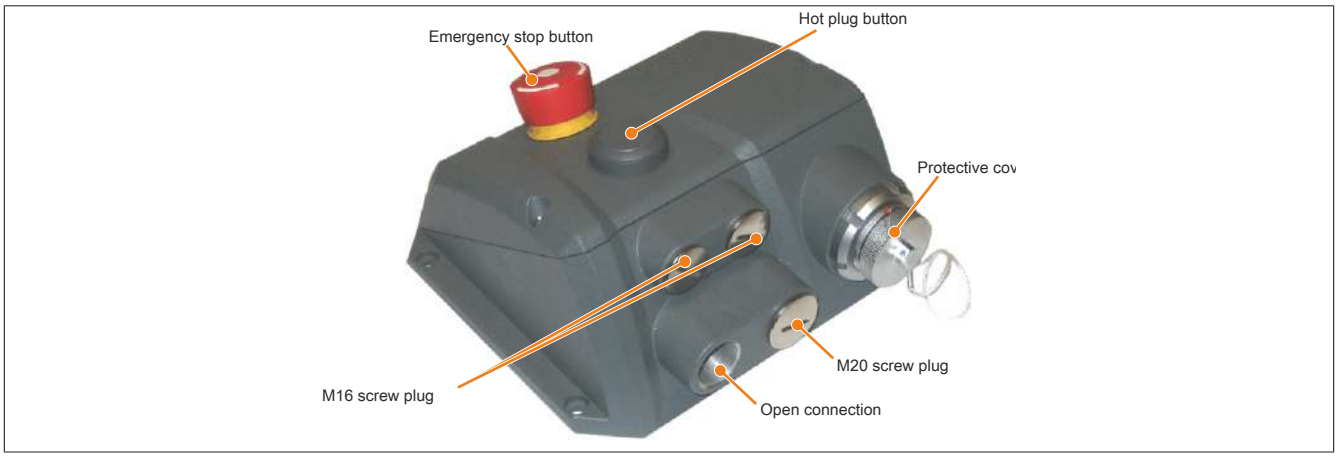


Figure 76: 4MPCBX.0000-00 - Interfaces

6.4.1.4 Technical data

Information:

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

Model number	4MPCBX.0000-00
General information	
Certifications	
CE	Yes
Functional safety[1)]	Yes
GOST-R	Yes
Keys	
Hot plug button	1 button, 2 normally closed contacts
Emergency stop	1 button, 2 normally closed contacts
Connector	
Internal connector [2)]	Key switch or pushbutton Emergency stop Enable switch RS232 Power supply CAN Ethernet
Additional connectors	Slot ID (monitoring contacts) Enable switch Key switch or pushbutton Emergency stop contacts Power supply
Push-pull connector	For connecting the Mobile Panel 7100, Mobile Panel 40/50 or Mobile Panel 100/200
Electrical characteristics	
Nominal voltage	18 to 30 VDC
Nominal current	150 mA
Power consumption	Approx. 2 W
Operating conditions	
Degree of protection per EN 60529	IP65 (only with installed screw plugs, installed protective cover or with connected Mobile Panel 7100, Mobile Panel 40/50 or Mobile Panel 100/200)
Environmental conditions	
Temperature	
Operation	0 to 50°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	0 to 95%, non-condensing
Storage	0 to 95%, non-condensing
Transport	0 to 95%, non-condensing
Vibration	
Operation (continuous)	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g
Operation (occasional)	2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g
Storage	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Transport	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Mechanical characteristics	
Housing	
Material	GK-AlSi11Mg (gravity die casting)
Coating	Powdered RAL 7012, fine structure
Cover plate [3)]	
Material	GK-AlSi9Mg (gravity die casting)
Dimensions	
Width	172.5 mm
Height	158.7 mm
Depth	81.7 mm
Weight	Approx. 1600 g (without attachment cable)

Table 62: 4MPCBX.0000-00 - Technical data

1) Achievable safety classifications (safety integrity level, safety category, performance level) are documented in the user's manual (section "Safety technology").
2) For the box cable.
3) The protective cover must be in place when a Mobile Panel 7100, Mobile Panel 40/50 or Mobile Panel 100/200 is not connected.

6.4.1.5 Safety characteristics

Criteria	Characteristic value
Maximum performance level (PL) per EN ISO 13849-1:2015	PL d
$MTTF_d$ (mean time to dangerous failure)	>100 years (high)
DC_{avg} (diagnostic coverage)	60% < DC < 90% (low)
PFH_D (probability of dangerous failure per hour)	$<6.4 \times 10^{-8}$
Mission time	20 years

Table 63: 4MPCBX.0000-00 - Safety characteristics

6.4.1.6 Dimensions

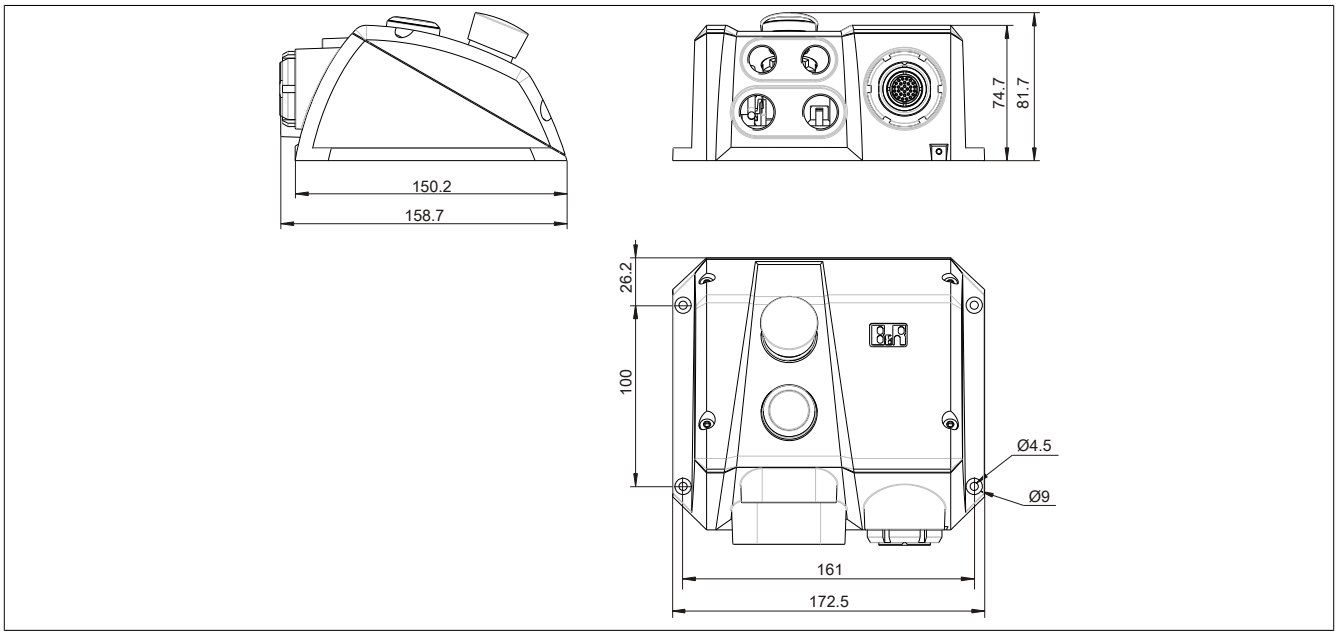


Figure 77: 4MPCBX.0000-00 - Dimensions

6.4.1.7 Drilling template

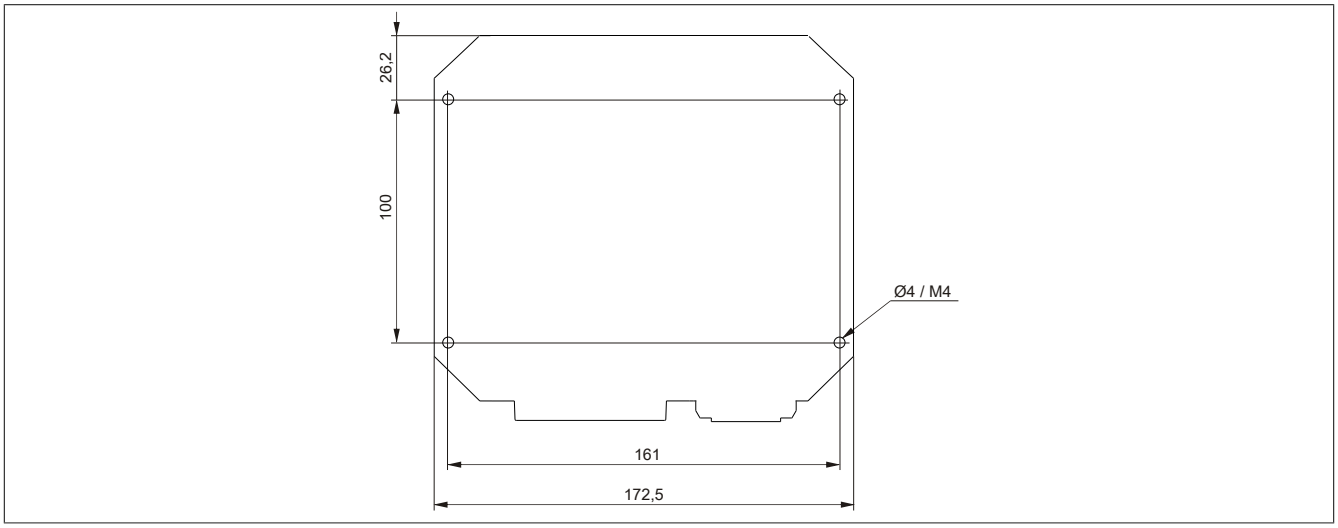


Figure 78: 4MPCBX.0000-00 - Drilling template

6.4.1.8 Content of delivery

Quantity	Component
1	Connection box 4MPCBX.0000-00
2	Screw plugs M16x1.5 (screwed on)
1	Screw plugs M20x1.5 (screwed on)
1	Protective cover in place (design similar to 5CAMPP.0001-10)

Table 64: 4MPCBX.0000-00 - Content of delivery

The box cable (model number 5CAMPB.0xxx-10) is necessary to establish the electrical connection between the control cabinet and connection box.

6.4.2 4MPCBX.0001-00

6.4.2.1 General information

Connection box 4MPCBX.0001-00 makes it easy for the control cabinet cable to exit the control cabinet vertically, but it does not have emergency stop hot plugging functionality.

- Vertical connection of the Mobile Panel attachment cable to the control cabinet
- IP65 protection
- Compact dimensions
- Robust

6.4.2.2 Order data

Model number	Short description	Figure
	Accessories	
4MPCBX.0001-00	Mobile Panel small connection box - For cables with push-pull circular connectors	
	Optional accessories	
	Accessories	
5CAMPP.0001-10	Protective cover for Mobile Panel control cabinet cables with circular connector.	

Table 65: 4MPCBX.0001-00 - Order data

6.4.2.3 Technical data

Information:

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

Model number	4MPCBX.0001-00
General information	
Certification	
CE	Yes
GOST-R	Yes
Keys	
Hot plug button	No
Emergency stop	No
Operating conditions	
EN 60529 protection	IP65 (only with protective cover or connected Mobile Panel 7100, Mobile Panel 40/50 or Mobile Panel 100/200)
Mechanical characteristics	
Housing	
Material	GK-AlSi11Mg (gravity die casting)
Coating	Powdered RAL 7012, fine structure
Cover plate	
Material	GK-AlSi9Mg (gravity die casting)
Dimensions	
Width	90 mm
Height	74.2 mm
Depth	150 mm
Weight	Approx. 500 g

Table 66: 4MPCBX.0001-00 - Technical data

6.4.2.4 Dimensions

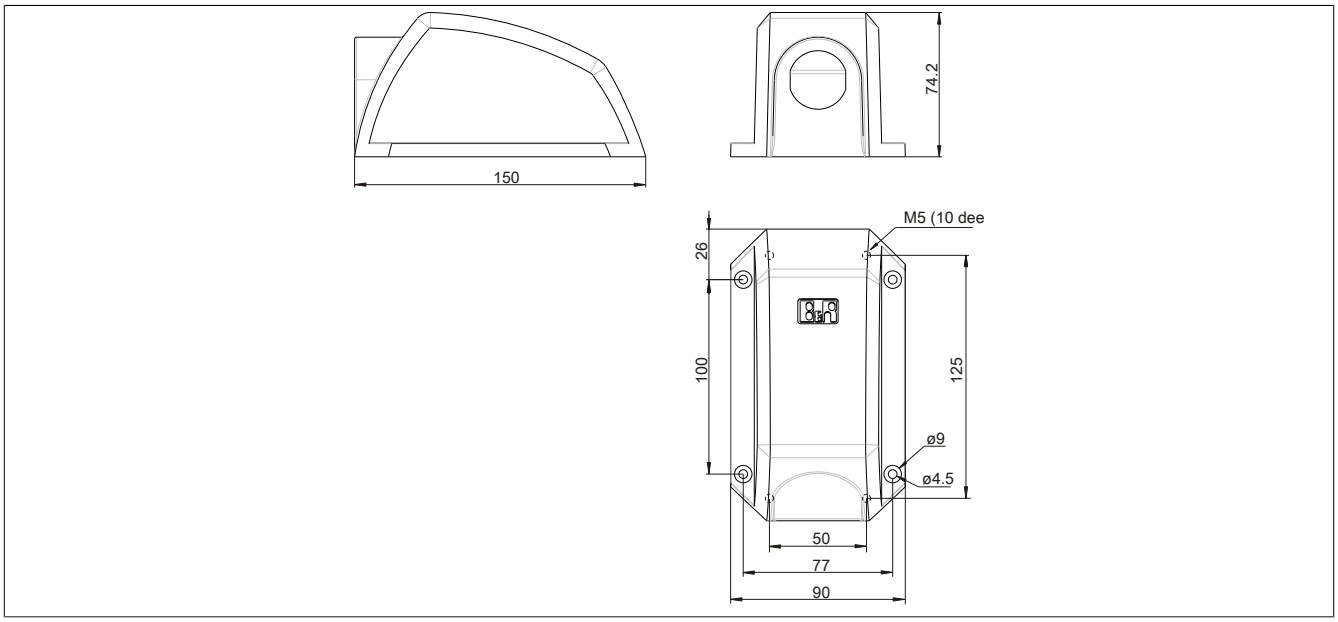


Figure 79: 4MPCBX.0001-00 - Dimensions

6.4.2.5 Drilling template

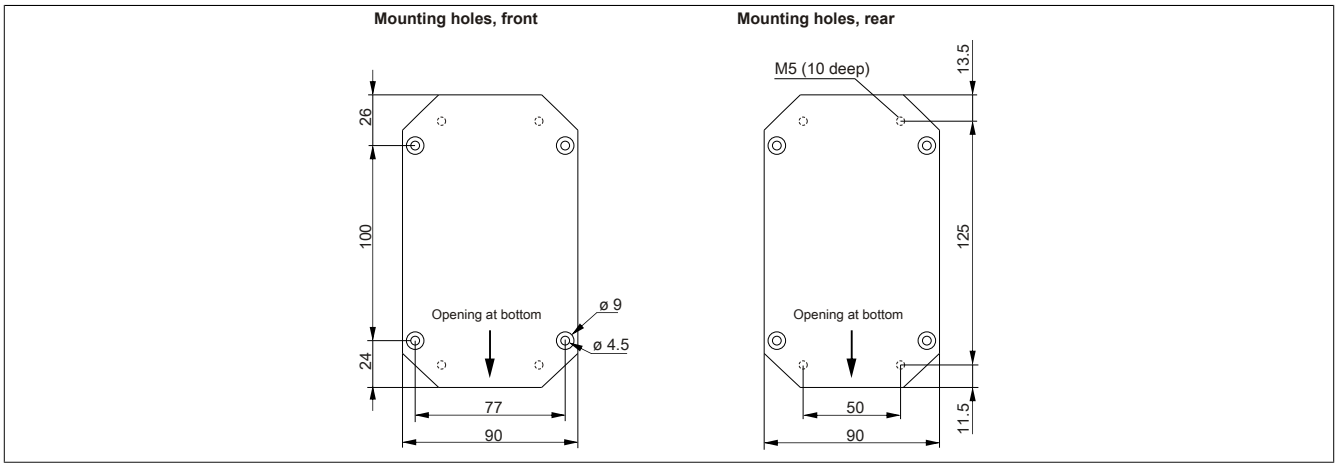


Figure 80: 4MPCBX.0000-01 - Drilling template

6.4.2.6 Content of delivery

Quantity	Component
1	Connection box 4MPCBX.0001-00

Table 67: 4MPCBX.0001-00 - Content of delivery

6.5 Box cable

6.5.1 5CAMPB.0100-10

6.5.1.1 General information

A box cable establishes the electrical connection between the control cabinet and connection box 4MPCBX.0000-00. It includes lines for the network (Ethernet 10/100 Mbit/s), 24 VDC power supply[3)], control devices or stop / emergency stop and key switches or pushbuttons, enable switches, serial transfer and CAN.

The connection side has a pre-assembled RJ45 Ethernet connector. The remaining lines have an open end and wire end sleeves to make it easier to wire to safety equipment and other interfaces. The box cable is installed in the connection box on the other side (connection box side).

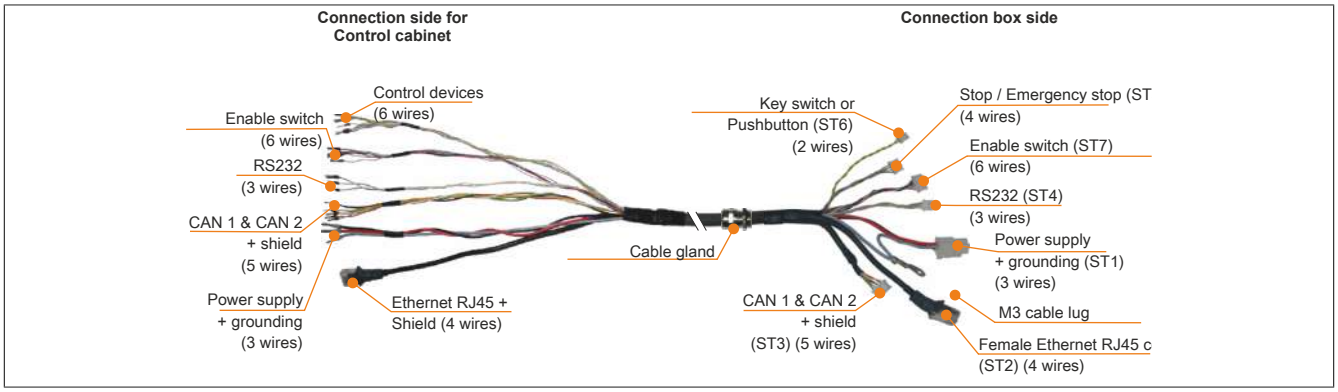


Figure 81: 5CAMPB.0xxx-10 - Connections

The pinout of the Ethernet RJ45 connector (crossover) makes it possible to connect it directly to a B&R controller or to the 1st Ethernet connection (MDIX) on B&R Ethernet hub AC808 (model number 0AC808.9).
If a different Ethernet hub is used, it must support crossed over RX and TX lines.

The surface is protected against water, oil (lubricating and hydraulic oils per EN 60811 Part 2-1) and cooling lubricant.

6.5.1.2 Order data

Model number	Short description	Figure
	Accessories	
5CAMPB.0100-10	Mobile Panel box cable - With wire end sleeves - With connector contacts	

Table 68: 5CAMPB.0100-10 - Order data

6.5.1.3 Technical data

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

Model number	5CAMPB.0100-10
General information	
Certifications	
CE	Yes
GOST-R	Yes
Cable construction	
Type	Hybrid cable, 25 wires
Properties	Halogen- and silicone-free
Supply lines	
Material	Tinned copper stranded wire
Permissible operating voltage	30 VDC

Table 69: 5CAMPB.0100-10 - Technical data

3) EN 60950 requirements must be observed; see section "+24 VDC power supply" of the user's manual.

Model number	5CAMPB.0100-10
Outer jacket	
Material	Flame-retardant PUR
Color	Similar to RAL 7012
Cable elements	
Control devices	Direct connection between control devices and monitoring device (6 wires)
CAN	2 pairs with shielding (5 wires)
Ethernet	Twisted pair cable for Ethernet (10/100 Mbit/s) (4 wires, male RJ45 connector)
Series	3 wires
Power supply	+24 VDC supply voltage and grounding (3 wires), SELV [1]
Enable switch	Direct connection between enable switch and monitoring device (6 wires)
Connector	
Type	FA. Jacob GmbH type: PERFECT 50.620 M
Electrical characteristics	
Conductor resistance	≤140 Ω/km (0.15 mm² conductor) ≤27 Ω/km (0.75 mm² conductor)
Insulation resistance	≤500 Ω/km
Operating conditions	
Flame-retardant	Per IEC 60332-1 and VW1 / FT1 in accordance with C-UL
Shield attenuation	Per IEC 60096-1, Amendment 2
Oil and hydrolysis resistance	Per VDE 0282-10
Environmental conditions	
Temperature	
Moving	-20 to 60°C
Static	-20 to 80°C
Mechanical characteristics	
Dimensions	
Length	10 m ±20 cm
Diameter	10 mm
Bend radius	
Moving	60 mm
Fixed installation	30 mm
Weight	160 g/m
Tension	Max. 140 N

Table 69: 5CAMPB.0100-10 - Technical data

1) EN 60950 requirements must be observed; see section "+24 VDC power supply" of the user's manual.

6.5.1.4 Cable pinout

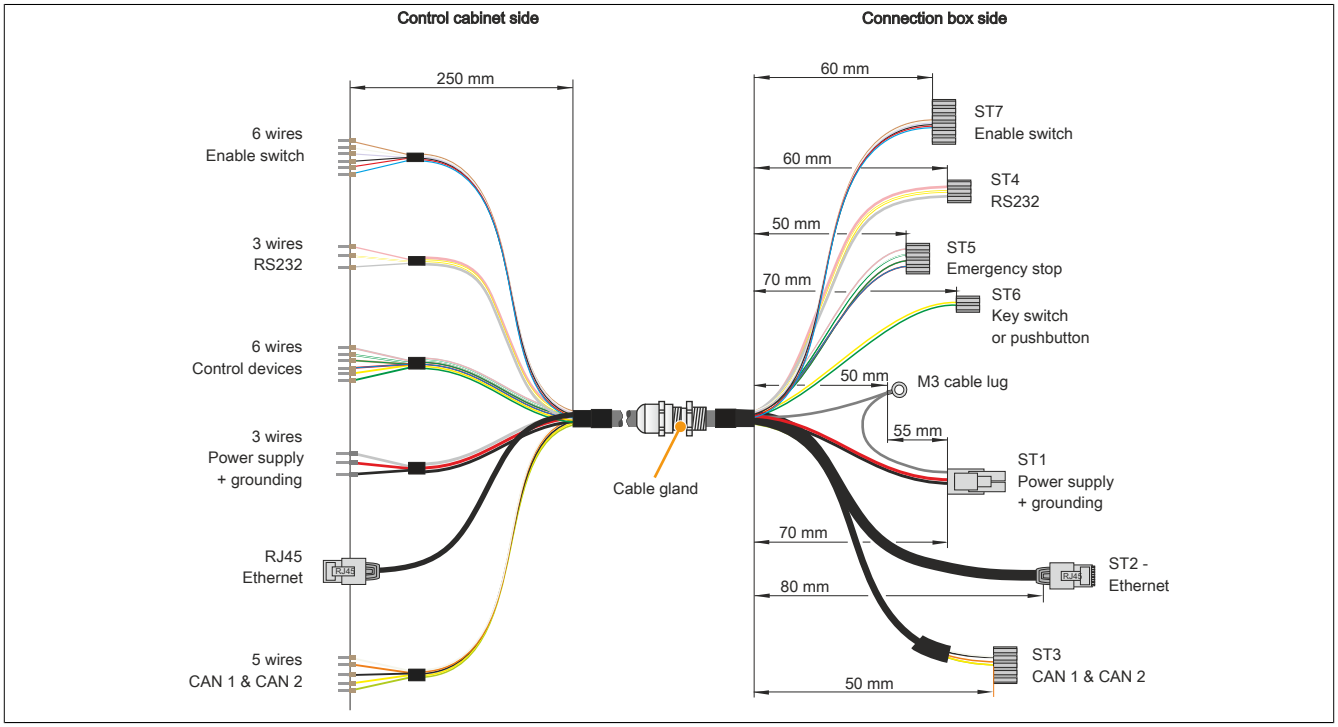


Figure 82: 5CAMPB.0xxx-10 - Cable pinout

ST7 enable switch, 6-pin male connector (connection box side)			**Wire colors**
C1	Pin 1		Brown
NO1	Pin 2		White
NC1	Pin 3		Violet
C2	Pin 4		Black
NO2	Pin 5		Red
NC2	Pin 6		Blue
ST4 RS232, 3-pin male connector (connection box side)			**Wire colors**
RxD	Pin 1		Pink
RS232_GND	Pin 2		White-Yellow
TxD	Pin 3		Gray
ST5 emergency stop (connection box side) Emergency stop control devices (connection side), 4-pin male connector			**Wire colors**
Stop / Emergency stop normally closed contact 1 (11)	Pin 1		Gray-Pink
Stop / Emergency stop normally closed contact 2 (21)	Pin 2		Brown-Green
Stop / Emergency stop normally closed contact 1 (12)	Pin 3		White-Green
Stop / Emergency stop normally closed contact 2 (22)	Pin 4		Red-Blue
ST6 key switch or pushbutton (connection box side) Key switch or pushbutton control devices (connection side)			**Wire colors**
Button S13	Pin 1		Yellow
Button S14	Pin 2		Green
ST1 power supply + grounding (connection box side)			**Wire colors**
+24 VDC power supply	Pin 1		Red
Shielding	Pin 2		Gray
Ground	Pin 3		Black
n.c.	Pin 4		-
ST2 Ethernet RJ45 connector (connection box side)		**Ethernet RJ45 connector (connection side)**	**Wire colors**
TX	Pin 1	Pin 3	Green
TX\	Pin 2	Pin 6	Yellow
RX	Pin 3	Pin 1	Pink
n.c.	Pin 4	Pin 4	-
n.c.	Pin 5	Pin 5	-
RX\	Pin 6	Pin 2	Blue
n.c.	Pin 7	Pin 7	-
n.c.	Pin 8	Pin 8	-
Shielding	Shielding	Shielding	Shielding
ST3 CAN, 5-pin male connector			**Wire colors**
CAN 1 High	Pin 1		White
CAN 1 Low	Pin 2		Orange
Shielding	Pin 3		Black
CAN 2 High	Pin 4		Yellow
CAN 2 Low	Pin 5		Green

Table 70: 5CAMPB.0xxx-10 - Cable pinout

6.6 MP40/50 buffer accumulator

6.6.1 5MPBAT.0000-00

6.6.1.1 General information

The accumulator in the Mobile Panel prevents the operator panel from restarting when the connection box or control cabinet is being changed. The Mobile Panel is therefore immediately ready for operation again after connecting.

The accumulator buffers for up to 15 minutes. If the Mobile Panel is connected to a connection box or control cabinet, then the accumulator is charged automatically. When fully charged, it will last for 4 cycles of 15 minutes. When disconnected, the display switches off; keys, input devices and the USB interface cannot be operated. If the Mobile Panel is not connected within 15 minutes, the control device shuts itself off. Installing the accumulator is described in more detail in section "Installing the buffer accumulator" on page 128 of 7 "Servicing/Maintenance".

Warning!

Charging or discharging the battery improperly can cause a fire or explosion, e.g. due to reversed polarity or short circuit. It is only permitted to charge the accumulator in the Mobile Panel.

The following safety guidelines apply to the Li-Ion accumulator:

- **Do not squeeze.**
- **Do not heat or burn.**
- **Do not short circuit.**
- **Do not disassemble.**
- **Do not submerge in liquid (the accumulator may rupture).**

Information:

The accumulator is provided uncharged and must therefore be charged for at least 4 hours.

It should be noted that an accumulator discharges when not in use. If the accumulator is not used for a long time, it may lose its charge completely.

6.6.1.2 Order data

Model number	Short description	Figure
	Accessories	
5MPBAT.0000-00	MP40/50 buffer accumulator	

Table 71: 5MPBAT.0000-00 - Order data

6.6.1.3 Technical data

Information:

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

Model number	5MPBAT.0000-00
General information	
Initial charging duration	At least 4 hours
Service life	500 charging cycles
Battery	
Design	Lithium ion
Certifications	
CE	Yes
GOST-R	Yes

Table 72: 5MPBAT.0000-00 - Technical data

Model number	5MPBAT.0000-00
Electrical characteristics	
Nominal voltage	3.6 V
Battery current	1950 mAh
Power failure bypass	Max. 15 minutes
Environmental conditions	
Temperature	
Operation	0 to 45°C (charging) -20 to 60°C (discharging)
Storage	-20°C to70°C (ideal temperature: 20 to25°C)
Transport	-20°C to70°C (ideal temperature: 20 to25°C)

Table 72: 5MPBAT.0000-00 - Technical data

6.7 Touch screen stylus pen

6.7.1 5AC900.1100-01

6.7.1.1 General information

The ideal object for operating the touch screen is a touch screen stylus pen.

6.7.1.2 Order data

Model number	Short description	Figure
	Accessories	
5AC900.1100-01	Mobile Panel touch screen stylus pen - 5 pcs. - For MP40/50/7100	

Table 73: 5AC900.1100-01 - Order data

6.8 HMI Drivers & Utilities DVD

6.8.1 5SWHMI.0000-00

6.8.1.1 General information

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

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

6.8.1.2 Order data

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

Table 74: 5SWHMI.0000-00 - Order data

6.8.1.3 Contents (V2.20)

BIOS upgrades for the products

- Automation PC 620 / Panel PC 700 CPU board 815E and 855GME BIOS
- Automation PC 620 / Panel PC 700 CPU board X855GME BIOS
- Automation PC 620 / Panel PC 700 CPU board 945GME BIOS
- Automation PC 620 / Panel PC 700 CPU board 945GME N270 BIOS
- Automation PC 680
- Automation PC 810 / Automation PC 820 / Panel PC 800 B945GME BIOS
- Automation PC 810 / Panel PC 800 945GME N270 CPU board BIOS
- Automation PC 810 / Panel PC 800 GM45 CPU board BIOS
- Provit 2000 product family - IPC2000/2001/2002
- Provit 5000 product family - IPC5000/5600/5000C/5600C
- Power Panel 100 BIOS devices
- Mobile Panel 100 BIOS devices
- Power Panel 100 / Mobile Panel 100 user boot logo
- Power Panel 100 / Mobile Panel 100 REMHOST utility
- Power Panel 300/400 BIOS devices
- Power Panel 300/400 BIOS user boot logo
- Power Panel 500 / Automation PC 510 / Automation PC 511 BIOS
- Panel PC 310

Driver for the devices

- Automation Device Interface (ADI)
- Audio
- Chipset
- CD-ROM

- LS120
- Graphics
- Network
- PCI/SATA RAID controller
- Touch screen
- Touchpad
- Interface board

Firmware upgrades

- Automation PC 620 / Panel PC 700 (MTCX, SDLR, SDLT)
- Automation PC 810 (MTCX, SDLR, SDLT)
- Automation PC 820 (MTCX, SDLR, SDLT)
- Mobile Panel 100 (SMCX)
- Panel PC 300 (MTCX)
- Power Panel 100 (aPCI)
- Power Panel 300/400 (aPCI)
- Power Panel 300/400 (MTCX)
- Power Panel 500 / Automation PC 510 / Automation PC 511 (MTCX, SDLR, I/O board)
- Panel PC 800 (MTCX, SDLR, SDLT)
- UPS firmware

Utilities/Tools

- B&R Embedded OS Installer
- Windows CE tools
- User boot logo conversion program
- SATA RAID installation utility
- Automation Device Interface (ADI)
- CompactFlash service life calculator (Silicon Systems)
- Miscellaneous
- MTC Utilities
- Key Editor
- MTC & Mkey Utilities
- Mkey Utilities
- UPS configuration software
- ICU ISA configuration
- Intel PCI NIC boot ROM
- Diagnostic programs

Windows

- Windows CE 6.0
- Windows CE 5.0
- Windows CE 4.2
- Windows CE 4.1
- Windows CE tools
- Windows Embedded Standard 2009
- Windows Embedded Standard 7
- Thin client
- Windows NT Embedded
- Windows XP Embedded
- VNC viewer

MCAD templates for

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

ECAD templates for

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

Documentation for

- Automation PC 511
- Automation PC 620
- Automation PC 680
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- Panel PC 310
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 15/21/35/41
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500
- Mobile Panel 40/50
- Mobile Panel 100/200
- Mobile Panel connection box
- Provit 2000
- Provit 3030
- Provit 4000
- Provit 5000
- Provit Benchmark
- Provit Mkey
- Windows CE 5.0 help documentation
- Windows CE 6.0 help documentation
- Windows NT Embedded application guide
- Windows XP Embedded application guide
- Uninterruptible power supply
- Implementation guides
- B&R Hilscher fieldbus cards (CANopen, DeviceNet, PROFIBUS, PROFINET)

Service tools

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

7 Servicing/Maintenance

The following chapter describes the servicing and maintenance work that can be carried out by a qualified and trained end user.

> **Information:**
>
> **Only components approved by B&R are permitted to be used for servicing and maintenance work.**

7.1 Cleaning

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

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

> **Information:**
>
> **Displays with a touch screen should be cleaned at regular intervals.**

7.2 Installing the buffer accumulator

Information:

The Mobile Panel is not permitted to be connected to a connection box or control cabinet.

1. Disconnect the power supply to the Mobile Panel.
2. Remove the cover of the attachment shaft on the rear side by removing the 6 marked screws (Phillips screwdriver).

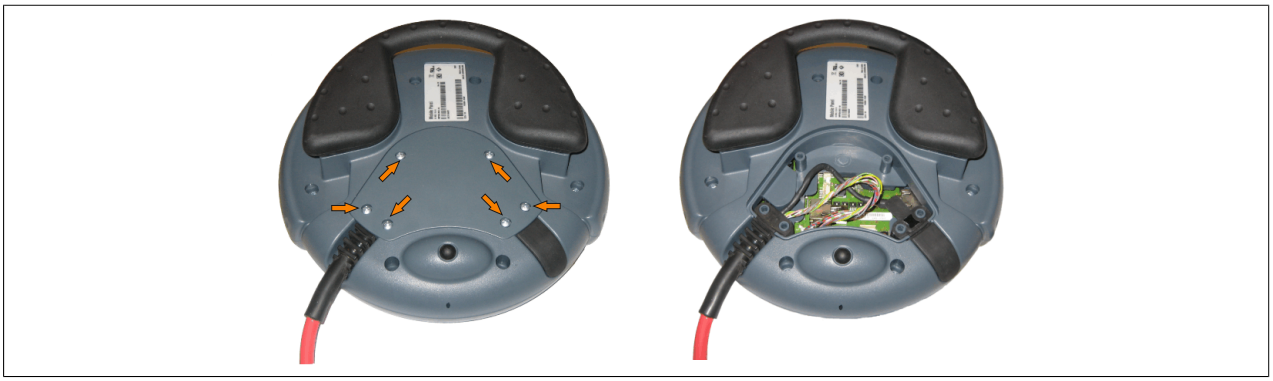


Figure 83: Removing the cover of the attachment shaft

3. Connect the accumulator cable to the marked female connector and place the accumulator into position (as shown in the image). Be sure that the cables are installed properly to prevent them from becoming pinched.

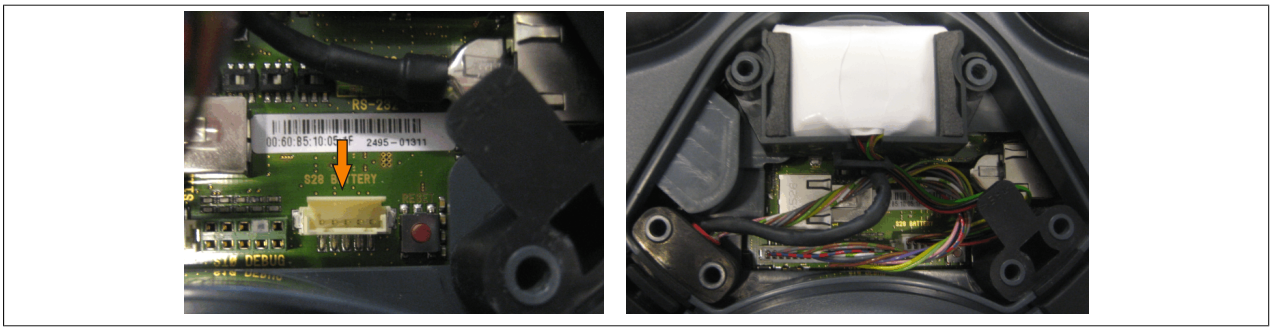


Figure 84: Connecting the cables

4. Install the cover.

Appendix A

A.1 Stop button

Stop button for Mobile Panel 40/50 revisions ≤ I0

The following stop button is installed on Mobile Panel 40/50 devices for revisions ≤ I0:

Figure 85: Stop button up to revision ≤ I0

Information:

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

Properties	Stop button EAO BR 84
Power supply	
Nominal voltage	24 VDC
Minimum current	10 mA (per contact)
Maximum current-carrying capacity	1000 mA (per contact)
Utilization category	DC-13 (per IEC 60947-5-1)
EAO BR 84	B_{10d}: 100.000

Table 75: EAO BR 84 stop button - Technical data

Stop button on Mobile Panel 40/50 revisions ≥ J0

The following stop button is installed on Mobile Panel 40/50 devices with revisions ≤ J0:

Figure 86: Stop button in revisions ≥ J0

Information:

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

Properties	SCHLEGEL BR FRVK stop button
Power supply	
Nominal voltage	24 VDC
Minimum current	10 mA (per contact)
Maximum current-carrying capacity	1000 mA (per contact)
Utilization category	DC-13 (per IEC 60947-5-1)
SCHLEGEL BR FRVK	B_{10d}: 250.000

Table 76: SCHLEGEL BR FRVK stop button - Technical data

A.2 Enable switch

Information:

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

Properties	Enable switch
Output type	Solid-state output
Switchable nominal voltage	24 VDC (voltage tolerance 19.2 VDC to 30 VDC per EN 61131-2)
Switchable nominal current	500 mA (max.)
Maximum interrupting current	
Circuit 1	1.5 A
Circuit 2	0.8 A
Maximum inductive load	
Circuit 1	145 mJ / 1.16 H @ 24 VDC, 500 mA (comparable to DC13 per EN 60947-5-1)
Circuit 2	145 mJ / 1.16 H @ 24 VDC, 500 mA (comparable to DC13 per EN 60947-5-1)
Reverse polarity protection	
Circuit 1	Yes
Circuit 2	Yes
Short circuit and overload protection	
Circuit 1	Yes (integrated in output FET)
Circuit 2	Yes (by protective circuit)
Switching cycles	
Switch position 2	10^5
Switch position 3	$5x\ 10^4$
Actuating force	
From switch position 1 to 2	Typically 5 N
From switch position 2 to 3	Typically 20 N
Specifications for EN ISO 13849-1:2008	
Enable	
Category	3
Performance level	d
Proof test interval	20 years
$MTTF_d$ symmetrized per D.2 of EN ISO 13849-1	78 years
PFH_d	$1.57x\ 10^{-7}$
Panic	
Category	3
Performance level	d
Proof test interval	20 years
$MTTF_d$ symmetrized per D.2 of EN ISO 13849-1	88 years
PFH_d	$1.35x\ 10^{-7}$

1) The monitoring device is not accounted for in the $MTTF_d$ specifications. See also TBD.

A.3 Chemical resistance

A.3.1 Test description

A.3.1.1 Test 1

The test specimens are placed in a sealable box (365 x 260 x 200). A cotton ball moistened with approximately 5 ml of solvent is placed on top of the test object. A cup (250 ml) is put over the cotton ball to prevent the solvent from evaporating too quickly. The cup and the cotton ball are then removed after 10 minutes. The residue solvent is not wiped off of the test object. The box is closed back up immediately. The test object is left in the closed box for at least 24 hours.

This test is performed at 20°C.

A.3.1.2 Test 2

The test specimens are placed in a sealable box (365 x 260 x 200). Approximately 5 ml of solvent are sprayed on the test object. The box is then closed back up. The test object is left in the closed box for at least 24 hours.

This test is performed at 20°C.

A.3.2 Test results

Substance	Test passed	Problems / Not tested
Cutting oil - Test 1 • LO-Smoke Levex 5047 • Superfin 100 • DIE-KOTE 7270-M	• Handle • ZT rubber • Nameplate • Keyboard • Dummy plugs • Attachment cables • Illuminated button • Key switch • Stop button • Display seal • Housing seal • Cover seal	• Housing parts - Not tested • Handwheel rotary knob - Not tested • Potentiometer rotary knob - Not tested • Slot covers - Not tested
Cutting oil - Test 2 • LO-Smoke Levex 5047 • Superfin 100 • DIE-KOTE 7270-M		Not tested
Unleaded gasoline - Test 1	• Handle • ZT rubber • Nameplate • Keyboard • Dummy plugs • Attachment cables • Illuminated button • Key switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotary knob • Potentiometer rotary knob • Slot covers	• Housing - Material becomes lighter in color, white stains appear

Table 77: Chemical resistance test - Test results

Substance	Test passed	Problems / Not tested
Unleaded gasoline - Test 2	• Handle • Attachment cables • Key switch • Illuminated pushbutton installation ring • Stop button switch actuator • Potentiometer rotary knob	• Housing - Reduced hardness, part becomes pasty, reduced tensile strength, plastic becomes malleable • ZT rubber - Strong swelling, loss of elasticity, tears with minimal effort • Nameplate - Adhesive dissolves, possible to wipe off printing • Keypad - Adhesive dissolves • Dummy plug - Strong swelling, loss of elasticity, tears with minimal effort • Illuminated pushbutton cover - Heavy turbidity • Illuminated button attachment - Strong swelling • Illuminated button mounting ring seal - Strong swelling • Emergency stop seal - Strong swelling • Display seal - Strong swelling • Housing seal - Strong swelling • Cover seal - Strong swelling • Handwheel dial - Reduced hardness, part becomes pasty, reduced tensile strength, plastic becomes malleable • Slot covers - Not tested
Diesel - Test 1	• Housing • Handle • ZT rubber • Nameplate • Keyboard • Dummy plugs • Attachment cables • Illuminated button • Key switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotary knob • Potentiometer rotary knob • Slot covers	
Diesel - Test 2	• Housing • Keyboard • Attachment cables • Illuminated pushbutton cover • Illuminated pushbutton installation ring • Key switch • Stop button switch actuator • Display seal • Housing seal • Cover seal • Handwheel rotary knob • Potentiometer rotary knob • Slot covers	• Handle - Slight swelling • ZT rubber - Slight swelling • Nameplate - Adhesive dissolves, possible to wipe off printing • Dummy plugs - Slight swelling • Illuminated button seals - Slight swelling • Stop button attachment seal - Slight swelling • Display seal - Slight swelling • Housing seal - Slight swelling • Cover seal - Slight swelling

Table 77: Chemical resistance test - Test results

Substance	Test passed	Problems / Not tested
Transmission fluid - Test 1	• Housing • Handle • ZT rubber • Nameplate • Keyboard • Dummy plugs • Attachment cables • Illuminated button • Key switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotary knob • Potentiometer rotary knob • Slot covers	
Transmission fluid - Test 2	• Housing • Handle • ZT rubber • Keyboard • Dummy plugs • Attachment cables • Illuminated button • Key switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotary knob • Potentiometer rotary knob • Slot covers	• Nameplate - Adhesive dissolves, possible to wipe off printing
Silicone spray - Test 1	• Housing • Handle • ZT rubber • Nameplate • Keyboard • Dummy plugs • Attachment cables • Illuminated button • Key switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotary knob • Potentiometer rotary knob • Slot covers	
Silicone spray - Test 2	• Housing • Handle • ZT rubber • Keyboard • Dummy plugs • Attachment cables • Illuminated button • Key switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotary knob • Potentiometer rotary knob • Slot covers	• Nameplate - Adhesive dissolves, possible to wipe off printing

Table 77: Chemical resistance test - Test results

Substance	Test passed	Problems / Not tested
Window cleaner CLINIL - Test 1	• Housing • Handle • ZT rubber • Nameplate • Keyboard • Dummy plugs • Attachment cables • Illuminated button • Key switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotary knob • Potentiometer rotary knob • Slot covers	
Window cleaner CLINIL - Test 2	• Housing • Handle • ZT rubber • Dummy plugs • Attachment cables • Illuminated pushbutton cover • Illuminated pushbutton installation ring • Illuminated pushbutton switch actuator • Illuminated pushbutton switch actuator seal • Key switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotary knob • Slot covers	• Nameplate - Adhesive dissolves, possible to wipe off printing • Keypad - Adhesive dissolves • Illuminated button mounting ring seal - Strong swelling • Potentiometer rotary knob - Surface attacked
Methyl - Test 1		Not tested
Methyl - Test 2	• Housing • Handle • ZT rubber • Keyboard • Dummy plugs • Illuminated button • Stop button switch actuator seal • Display seal • Housing seal • Cover seal • Handwheel rotary knob • Potentiometer rotary knob • Slot covers	• Nameplate - Adhesive dissolves, possible to wipe off printing • Attachment cable - Loss of color • Key switch - Reduced hardness, part becomes pasty, reduced tensile strength, plastic becomes malleable • Stop button attachment - Loss of color
Ethyl 96% - Test 1		Not tested
Ethyl 96% - Test 2	• Housing • Handle • ZT rubber • Keyboard • Dummy plugs • Illuminated button • Stop button switch actuator seal • Display seal • Housing seal • Cover seal • Handwheel rotary knob • Potentiometer rotary knob • Slot covers	• Nameplate - Adhesive dissolves, possible to wipe off printing • Attachment cable - Loss of color • Key switch - Reduced hardness, part becomes pasty, reduced tensile strength, plastic becomes malleable • Illuminated button mounting ring seal - Strong swelling • Stop button attachment - Loss of color

Table 77: Chemical resistance test - Test results

Substance	Test passed	Problems / Not tested
Isopropanol - Test 1		Not tested
Isopropanol - Test 2	• Housing • Handle • ZT rubber • Dummy plugs • Attachment cables • Illuminated button • Stop button switch actuator seal • Display seal • Housing seal • Cover seal • Handwheel rotary knob • Slot covers	• Nameplate - Adhesive dissolves, possible to wipe off printing • Keypad - Adhesive dissolves • Key switch - Reduced hardness, part becomes pasty, reduced tensile strength, plastic becomes malleable • Illuminated button mounting ring seal - Strong swelling • Stop button attachment - Loss of color • Potentiometer rotary knob - Printed area attacked
MEK (Methyl ethyl ketone), Toluene (Toluolum DAB 74), Xylene (Xyluolum OAB 90) -Test 1	• Handle • ZT rubber • Keyboard • Dummy plugs • Attachment cables • Illuminated pushbutton (remaining parts) • Stop button • Display seal • Housing seal • Cover seal	• Housing - Not tested • Nameplate - Adhesive dissolves, possible to wipe off printing • Key switch - Reduced hardness, part becomes pasty, reduced tensile strength, plastic becomes malleable • Illuminated pushbutton cover - Plastic softened immediately • Potentiometer rotary knob - Not tested • Handwheel rotary knob - Not tested • Handwheel, potentiometer slot covers - Not tested
MEK (Methyl ethyl ketone), Toluene (Toluolum DAB 74), Xylene (Xyluolum OAB 90) -Test 2		Not tested

Table 77: Chemical resistance test - Test results

A.3.3 Touch screen - Tested by manufacturer

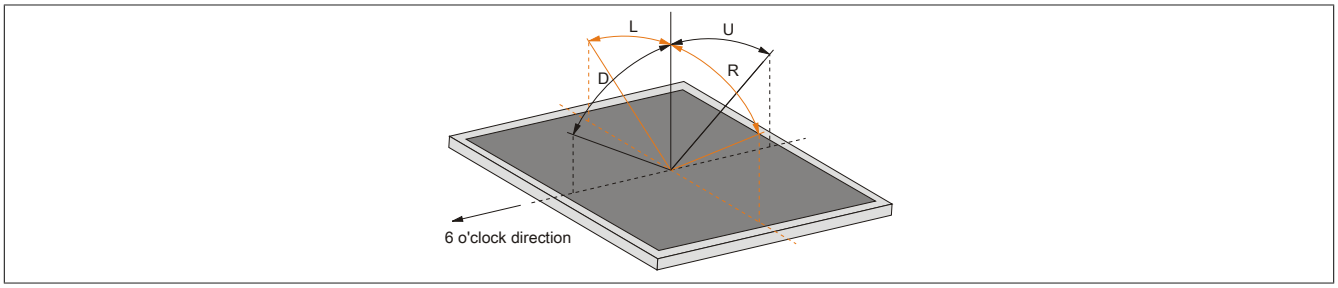
Test duration: 1 hour

Chemicals:

- Coke
- Orange juice
- Coffee
- Vinegar
- Formula 409 cleaner
- Soda
- Beer
- Tea
- Alcohol
- Ink
- Lysol
- Naphtha
- Acetone
- Isopropyl alcohol (IPA)
- Chloral
- Methyl ethyl ketone
- Methanol
- Xylene
- Dimethyformamide
- Hydrochloric acid (pH = 3)
- Toluene
- Ethanol

A.4 Viewing angles

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



A.5 Abbreviations

Abbreviation	Stands for	Description
NC	Normally closed	Stands for a normally closed relay contact.
	Not connected	Used in pinout descriptions if a terminal or pin is not connected on the module side.
ND	Not defined	Stands for an undefined value in technical data tables. This may be because the cable manufacturer has not provided a value for certain technical data.
NO	Normally open	Stands for a normally open relay contact.
TBD	To be defined	Used in technical data tables if there is currently no value for specific technical data. The value will be supplied later.
MTBF	Mean time between failures	The expected value of the operating time between two consecutive failures.

Table 78: Abbreviations used in this user's manual

A.6 Glossary

NC	*Numerical Control* > Numerical Control
Nominal current	The nominal current is the RMS value for the phase current (current in the motor supply line) when generating the nominal torque at the nominal speed. This is possible for any length of time if the environmental conditions are correct.
BIOS	*Basic Input/Output System* is abbreviated as BIOS. 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.
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/s or 1 bps
Bit	A *binary digit* is the smallest discrete information unit. A bit can have the value 0 or 1.
Browser	A software tool for searching and reading websites. The most famous browsers are Microsoft Internet Explorer and Netscape Navigator.
B&R Automation Runtime	Windows-based program for creating installation disks to install B&R Automation Runtime™ on the target system.
CPU	A *Central Processing Unit* is the processing and control unit of a computer; the unit which interprets and executes commands. Also known as the central processor or microprocessor. A CPU has the capability to load commands, to decode and to execute, as well as to transfer information to and from other resources.
CAN	*Controller Area Network* is a serial bus system. Structure according to ISO 11898; Bus medium: twisted pair. Good transfer properties in short distances less than 40 m with a 1 Mbit/sec data transfer rate. Maximum number of stations: Theoretically unlimited, but practically limited up to 64. Real-time capable (i.e. defined maximum latency times for messages with high priority). High reliability using error detection, error handling, troubleshooting. Hamming distance.
Controller	A device component which allows access to other devices on a computer subsystem. A disk controller, for example, allows access to hard disks and disk drives and is responsible both for physical and logic drive access.
Dial-up	*Remote data transfer* takes place over the telephone network using a modem or an ISDN adapter.
DRAM	*Dynamic Random Access Memory* is a form of dynamic RAM consisting of an integrated semiconductor circuit that 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 since the simple design of the circuits means that it can store four times more data than static RAM.
ECAD	*Electrical CAD* systems are configuration tools which allow the efficient creation and processing of electrical circuit diagrams and schematic diagrams as well as the automatic generation of cross-reference maps, cable and terminal diagrams, parts lists as well as order and manufacturing documents.
EMC	*Electromagnetic Compatibility* represents 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].
EN	*European Norm* see CENELEC
ESD	*Electrostatic discharge* > Discharge of static electricity. ESD is a process for charge equalization between solid, liquid or gaseous media, which are electrically charged in a different way. It is usually accompanied by a surface, brush, spark discharge or also flashing discharge phenomenon. However, it can also take place via a contact point (excluding line-conducted), and only when the potential difference before the contact does not exceed 330 volts. Sparking can cause flammable gases and vapors or explosive compounds to ignite and through the discharge of currents and fields can damage or destroy electronic components or interfere with the functions of their electronic operating equipment. The first-named effect falls into the jurisdiction of Fire and Explosions Protection and Technical Safety. The second-named area is the responsibility of the protection of Electrostatic Discharge Sensitive components (ESDS) and Electromagnetic Compatibility (EMC). Possible human body discharge from handling switching circuits, circuit boards, control elements, and container surfaces in transport, installation, testing, operating, repairs and service are particularly important issues for people dealing with electronic device technology. The following electrical values should be calculated: Energy content 10 to 30 mJ, electrostatic voltage 0.1 to 20 kV, strength of discharge current up to 30 A (pulse amplitude, current change speed up to 100 A/ns, electrical field strength 1 to 4 kV/m, magnetic field strength up to 15 A/m within centimeters of the discharge).
Electrical safety	*Protection against risks caused by electricity* > Safe operation of electrical and electronic modules, components, devices, machines, equipment and systems must be guaranteed for the users and operators through applicable safety regulations and standards.
Electromagnetic compatibility	*Electromagnetic compatibility* > In accordance with EMVG: 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])
Ground	In the context of electro-technical theory, the term ‘ground’ is more or less understood as good conductive ground, which does not have any potential differences outside the area of influence or any other electrical phenomena.
Ergonomics	A word derived from the Greek words ‘Ergon’ [work] and ‘nomos’ [rules, law]. Part of the work sciences, ergonomics is a scientific discipline that examines the interaction between humans and their work environment. The goal is to improve the working conditions and reduce work-related stresses and strains.
Ethernet	*Baseband bus system* from RANK XEROX. Originally developed for linking minicomputers in the early 1970s. Ethernet is based on the CSMA/CD access procedure. Coaxial cables and/or twisted pair cables [twisted copper wire pairs] serve as transfer medium. Transfer speeds: 10 Mbps [Ethernet], 100 Mbps [Fast Ethernet] as well as 1 Gbps and 10 Gbps [Gigabit Ethernet], widely growing technology used for networking computers in a LAN, standardized since 1985 [IEEE 802.3 and ISO 8802-3]. Ethernet technology has established itself in office usage. After the enabling the possibility of extremely tough real-time demands and the adaptation of the device technology [bus cable, path fields, connection boxes] to the operating conditions of the industrial world, which are considerably tougher than those in the area of office use, Ethernet is further advancing into the area of automation technology.
Errors	*Fault* > in accordance with IEC 61508: Abnormal operation, which can reduce or prevent the capability of a functional unit to perform a required function.
Fieldbus	Bus system in the area close to the process, for directly connecting sensors and actuators with own intelligence. On a fieldbus, small amounts of data are transferred between sensors, actuators and control devices in digital form. Transfer must occur as fast as possible (i.e. near real-time). Furthermore, a fixed minimum and maximum response time must be guaranteed. Serial fieldbuses are replacing conventional wiring more and more in modern automation systems. Serial networking of the components saves time during planning and installation. Additionally, the size of control cabinets is reduced and failure and maintenance times are shortened, thereby achieving better system availability. System expansions, changes and updates are easy to implement.

Firewall	*Literal meaning: Wall that provides fire protection* > A term used for an electronic, hardware and/or software-based security system between two networks, (i.e. Intranet and Internet), which protects the computer or internal company network from unauthorized access from the Internet. Only data for specific, authorized services are allowed to pass through the security barrier at a strictly defined point.
Firmware	Firmware is software used to operate computer-controlled devices that 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 (e.g. the software in a washing machine controller). This software is written in read-only memory (ROM, PROM, EPROM) and cannot be easily replaced.
Functional safety	Safety against the dangers resulting from device malfunction (aggregate, machine, operating equipment, system). In accordance with IEC 61508: Part of the overall safety, based on the control object [EUC] and its control system, which depends on the proper functioning of the E/E/PE safety-related system, safety systems from other technologies and external devices for risk minimization. This is achieved while the planning, configuring, operating and maintaining the system by avoiding and/or handling potential malfunctions and by preventing dangerous system failures.
Floppy	*Diskette* > A round plastic disk with an iron oxide coating that 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. This allows 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.
GB	*Gigabyte* > 1 GB = 1024 MB or 1,073,741,824 bytes
Gateway	Device used to connect two networks that have different protocols. For example, when using INTERBUS a gateway represents a component, which couples other transfer systems to the INTERBUS.
Device	In common usage, the word "device" is a synonym for an apparatus, instrument, piece of equipment, appliance, tool or utensil. This mostly refers to fixed or mobile equipment with relatively small spatial dimensions, with a specific function or special area of use that is generally designated using a preceding word such as in the phrases sporting device, medical device, kitchen device, hearing device, measuring device, control device, automation device, peripheral device etc. Furthermore, there are fixed and mobile large devices, such as those used in the military (tanks, aircraft, ships), medical (MRI scanners), geological (earth drilling equipment, and conveyor bridges) as well as those used in research (e.g. particle accelerator). From a technical standpoint (DIN 40150), devices are made up of components, units and modules. According to regulations regarding electromagnetic compatibility of devices, a device is considered any electrical or electronic apparatus, system, construction or network, which contains electrical or electronic parts. This device definition contradicts guidelines that are well-established and also documented in DIN standards [see above] and widely accepted by engineers, and therefore causes many misunderstandings when using the regulations regarding electromagnetic compatibility of devices.
HDD	*Hard Disk Drive* > Fixed magnetic mass memory with high capacities, e.g. 120 GB.
HTTP	*Hyper Text Transfer Protocol* > Data transfer protocol for HTML pages and all types of files coupled to them. It is the protocol that the entire WWW is based on. That means, it controls the interaction between web browser and web server. It becomes active with each mouse-click on a hyperlink and ensures that the browser is provided the respective information. www.w3c.org/Protocols
Host	*Host*> On computer systems with multiple CPUs and bus masters, this refers to the device with the arbitration unit and host CPU or the device that has control of the complete system. With regard to the Internet, a constantly available network server is called a host. *Hot Swap* > Changing computer components during operation. There are three different level: basic hot swap, full hot swap and the high availability model. Basic hot swap is the simplest form in which the module to be exchanged is deactivated or the computer configuration is changed using the computer keyboard. Computer specialists are normally needed. With full hot swap, software installed on the components being exchanged handles activation and deactivation. An integrated switch on the front of the component signals the computer that removing the component will start or that inserting the new component is complete. An LED on the front side shows that the component can be removed or that the new component has been inserted. The high availability model is used in computer systems with high availability requirements. Here, the hot swap software does not control each component individually, instead it uses a separate hot swap controller [HSC]. This allows faulty boards to be automatically deactivated and prevents crashes.
Hub	In this context, a hub is a central connection point in a network with star formed topology, which distributes incoming data packets to all connected end devices [similar to the way a multiple power socket distributes power].
IDE	*Integrated Device Electronics* > Interface for mass memory, such as HDDs, in which the controller electronics are found in the drive itself.
IEC	*International Electrotechnical Commission* > International standards organization that includes all national electro-technical committees. It specifies electro-technical standards worldwide; location: Geneva. www.iec.ch
ISA	*Industry Standard Architecture* > Early bus system for expansion slots allowing installation of add-on PC cards. In modern PC architectures, it has mostly been replaced by the PCI bus.
ISO	*International Organization for Standardization* > Worldwide federation of national standardization institutions from over 130 countries. ISO is not an acronym for the name of the organization; it is derived from the Greek word isos, meaning "equal". www.iso.ch
Internet	*International Network* > Worldwide collection of computers and computer networks of various sizes and architectures that work with various operating systems. Information is stored remote computers [servers] that can be accessed by anyone at any time from their computers [clients]. It has developed in steps in resent decades and now is the basis for the worldwide exchange of data, for example via e-mail. It is currently the most popular network in the world with approximately 500 million users. www.isoc.org
LCD	*Liquid Crystal Display*> LCDs are not lit themselves, they reflect light from their environment or allow light to pass through from behind.
LED	*Light Emitting Diode*> Illuminated diodes
MB	*Megabyte* > 1 MB = 220 or 1,048,576 bytes
MTBF	*Mean Time Between Failures* > The mean time between two failures for repairable objects and reliability parameters.
MTC	*Maintenance Controller* > A standalone processor system in B&R industrial PCs, which provides additional functions for system monitoring and availability.

Machine	According to machine regulations, a machine is understood to be an entire collection of interconnected components, with at least one being movable. Along with the mechanical components, the actuator, controller and energy components are also part of a machine. See also Automation Object.
Machinery directive	Machine guideline 89/392/EEC has the task of ensuring the free movement of goods for machines in the European Union (with this machine systems and removable equipment are also meant), separately introduced safety components as well as load absorption equipment. This has led to harmonized structural demands and conformity evaluation processes, which must be fulfilled by the people responsible for this. This particularly concerns safety requirements and health protection in relation to machine construction. www.maschinenrichtlinie.de
MTCX	*Maintenance Controller Extended* > The MTCX is an independent processor system that provides additional functions for a B&R Industrial PC that are not available with a normal PC. The MTC communicates with the B&R Industrial PC via the ISA bus (using a couple register).
Mkey	*Module keyblock* > A common term given to keys found on Provit display units. They can be freely configured with Mkey utilities.
OEM	*Original Equipment Manufacturer* > A company that integrates third-party and in-house manufactured components into their own product range and then distributes these products under its own name.
Object	A material thing that can be seen and touched. A person or thing to which a specified action or feeling is directed. In the context of software, it is a self-contained unit that contains specific data [attributes] and functions [operations].
Protocol	Colloquially: 1. Synonym for record or meeting minutes. 2. The original draft of a diplomatic document. In the area of Information technology (IT): Specifications regarding data formats and control procedures for communication between two devices or processes. The protocol can be implemented as hardware or software and mainly includes the following aspects: the type of error detection used, the data compression method (if used) and the way the sender indicates the end of the information sent and the receiver indicates that the information has been received.
Power Panel	Devices from this B&R product family combine visualization, control and I/O components in one compact device.
Process	Action, event or procedure in which continuous or discontinuous, quantitative or qualitative changes to parameters or states of a real or virtual object or media being observed take place. Every process has a defined start and a defined end. Depending on what happens during a process or which objects undergo the process, it is possible to differentiate between many types of economic and industrial processes such as value-added processes [production and manufacturing processes], service processes [logistics, maintenance and repair processes], management processes [planning and maneuvering processes], etc. For technological processes, a differentiation is often made between continuous processes, discontinuous processes and charge processes depending on the continuity of the main process activity.
Provit	*PROcessVIsualizationTerminal* >Product family name for B&R Industrial PCs.
Provit 2000	Product family name for B&R Industrial PCs. It is divided into the following products: IPC2000, IPC2001, Compact IPC (IPC2002) and the display units belonging to them.
Provit 5000	Product family name for B&R Industrial PCs. It is divided into the following products: IPC5000, IPC5600, IPC5000C, IPC5600C and the display units belonging to them.
QVGA	*Quarter Video Graphics Array* > Generally a screen resolution of 320×240.
ROM	*Read Only Memory* > Nonvolatile memory. Contents of the memory are stored by the chip manufacturer in final mask step [also called mask-programmed ROM]. It can only be read and constantly remains in the same form.
RS232	*Recommended Standard Number 232* > Oldest and most widespread interface standard, also called a V.24 interface. All signals are referenced to ground making this an imbalanced interface. High level: -3 to -30 V, low level: +3 to +30 V; Cable lengths up to 15 m, transfer rates up to 20 kbit/s. For point-to-point connections between 2 participants.
Terminals	Terminals are used to connect or attach electrical conductors. Terminals can be arranged in a row and usually have two separate poles (connection points). Single or multi-pole terminals (terminal blocks) can be grouped as terminal strips.
Relays	An electric device that causes a defined change in one or more electrical output circuits when a change occurs to a value on the input circuit [current, voltage or their derivatives over time, as well as the sum, difference, product or quotient of several electrical values]. The following types are differentiated between according to DIN VDE 0435 depending on their functioning principle: Electromechanical relay, if they function according to the movement of mechanical elements resulting from the effects of an electric current on the input circuit; Electrothermal relay *[thermal or bimetal relay]*, if they function according to the deformation of thermal elements (directly or indirectly caused by the bimetal strips being heated by the input current); Static relay, if they function according to electronic, magnetic, optical or other methods without moving mechanical elements or thermal elements. Switching relays and measurement relays are also differentiated between depending on their use. Switching relays are used as control relays, auxiliary relays, intermediate relays, timing relays, stepping relays, indicator relays and in other specifications for creating simple control applications. Measurement relays are used as protective relays, overload relays, monitoring relays, differential relays, distance relays, negative-phase-sequence relays and in other designs as monitoring, protective and diagnostics functions.
RXD	*Receive (RX) Data* > A line for transferring serial data received from one device to another, e.g. from a modem to a computer. For connections complying with the RS-232-C standard, the RXD is connected to pin 3 of the plug.
SDRAM	*Synchronic Dynamic Random Access Memory* > A form of dynamic RAM semiconductor modules that can be operated at high clock rates.
PLC	*Programmable Logic Controller* > Computer-based control device that functions using an application program. The application program is relatively easy to create using standardized programming languages [IL, FBD, LAD, AS, ST]. Because of its serial functionality, response times are slower compared to connection-oriented control. Today, PLCs are available in device families with matched modular components for all levels of an automation hierarchy.
SRAM	*Static Random Access Memory* > A high-speed RAM semiconductor type that is mostly used in computers for cache memory. Using a backup battery, the contents of this memory can also be retained during a power failure.
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, pinout], 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.

Safety	Brockhaus: The absence of danger or the knowledge that an individual or group is protected from potential dangers. When referring to technology, safety is the characteristic of an object [component, device, machine, system] to not present unacceptable dangers to people, equipment or the environment when operated according to specifications. Handling security issues takes place in two ways: Firstly, under the premise that the object will function as it should; secondly, under the premise that the object will not function correctly (complete failure). The first aspect mainly concerns issues of health, working conditions and fire and is regulated by many laws and guidelines. The second aspect is part of technical safety measures that are set up to minimize dangerous situations and risks associated with system failures (at least below an acceptable limiting risk level) based on the probability of a failure and the possible extent of damages. These issues are included in the topic of functional safety. For automation technology, the corresponding standards are IEC 61508 and EN 954-1. As a footnote, there is no such thing as absolute safety without any risks, neither in technology or nature.
Signal	Physical value that changes over time, e.g. a voltage or current with a parameter [amplitude, frequency, phase position] that provides concrete information about changes to another physical value. The respective parameter is called an information parameter. For example, an electric tachometer measures the rotational speed of a mechanical shaft, i.e. it is indicated by the amplitude of the tachometer output voltage. In this case, the amplitude of the output voltage is the information parameter providing information about the rotational speed of the machine shaft over time according to the signal definition. It is possible to differentiate between different basic signal types depending on the number of values, availability over time and the number of information parameters. Analog, binary and digital signals are most important for automation technology.
Slot PLC	PC insert card that has full PLC functionality. On the PC, it is coupled via a DPR with the Process using a fieldbus connection. It is programmed externally or using the host PC.
Software	SoftPLC; All programs including the respective documentation available for the operation of data processing systems, computer systems and computer-based devices of all types. Software is implemented on hardware as the non-physical functional elements of a computer system. Using the term software when referring to computer programs was initiated in 1958 by mathematician John Tukey, Princeton University. Software can be grouped as system software and application software.
Control	Targeted interaction with values in a system that can be influenced. The system being influenced is known as the controlled system and in this case is a device, machine or system in which material and/or energy are subject to one or more possible handling forms, such as extracting, transferring, converting, saving or using as desired.
Switch	Device, similar to a hub, that takes data packets received in a network and, unlike a hub, does not pass them on to all network nodes, instead only to the respective addressee. Unlike a hub, a switch provides targeted communication within a network that only takes place between sender and receiver. Other network nodes are not involved.
Actuator	*Actuating components*, such as servo motors, switching clutches, solenoids, power switches, etc., for interact with the process, i.e. using information to influence material or energy flow in a controlled object.
Application software	Software, which is not used for operation by the computer itself, but rather when a computer is used to process a concrete application problem. It sets up the system software and uses this for fulfilling individual tasks. Application software can be accommodated in standard software used by a large number of customers in a wide range of industries. Common examples are Word, Excel, PowerPoint, Paint, Matlab etc. Industrial software tailored to the respective problems of a certain industry and individual software created for solving the particular problems of an individual user.
API	*Application Program Interface* is an interface that allows applications to communicate with other applications or with the operating system.
Failure	*Failure in accordance with IEC 61508* indicates that a functional unit loses the ability to perform a required function. In regards to safety-oriented systems, a distinction is made between dangerous and safe failures. This depends on whether the status of the system failure is considered dangerous or safe. The cause of the failure may be load related or age-related, and therefore a random failure, or related to a flaw inherent in the system. In this case, it is known as a systematic failure.
Automation Runtime	A uniform runtime system for all B&R automation components.
Automation	According to Brockhaus: The application of technical means, using specific programs that (either partially or totally) do not require human intervention to perform operations.
Symbol	From the point of view of linguistics, a symbol is a "thing" [mark, indicator, etc.] that represents "something else" [in the real or virtual world]. A "symbol" has a defined relationship with the object being referenced, an "icon" has a visual similarity with the object being referenced and an "index" is a reference to a fact or conclusion. For technical terminology [i.e. DIN 44300], characters are symbols that represent certain information [letters, numbers, special characters, etc.].
Reliability	In a technical context, reliability represents the ability to correctly operate at a continual performance level within defined probability limits and time spans. Characteristic reliability parameters are: A for availability, MTBF of repairable devices, MTTF for non-repairable systems and failure rate for modules or components, which can be used to establish the failure rate.
Twisted pair	Pair of copper wires twisted together. Transfer media for signals.
Task	Program unit that is assigned a specific priority by the real-time operating system. It contains a complete process can consist of several modules.
Touch screen	Screen with touch sensors for selecting options in a displayed menu using the tip of the finger.
TXD	*Transmit (TX) Data* > A line for the transfer of serial data sent from one device to another, e.g. from a computer to a modem. For connections complying with the RS-232-C standard, the TXD is connected to pin 2 of the plug.
USB	*Universal Serial Bus* > Cost-effective serial interface for PCs; IBM standard supported by Intel, Compaq and Microsoft and other well-known companies; up to 127 peripheral devices [mouse, keyboard, printer, scanner, digital cameras, modems, CDROM drives, telephones, etc.] can be connected to a single USB interface. The connected devices are also supplied with power via the 4-wire bus cable. The version on the market since 2001 (Version USB 2.0) allows data transfer rates up to 480 Mbps and is therefore also useful for transferring video data and for high-speed disk drives. www.usb.org
UPS	*Uninterruptible Power Supply* > see UPS

VDE	*The Association for Electrical, Electronic & Information Technologies (Verband der Elektrotechnik Elektronik Informationstechnik e.V.)* www.vde.de
VGA	*Video Graphics Adapter*
Availability	[A] The probability that a system will be functioning at a certain point in time. Reliability parameter for repairable systems. The stationary availability is defined using the following formula: A = 1/[1 + MDT/MTBF]. To achieve the highest possible availability values, it is necessary to perfect all quality assurance measures regarding reliability. However, this procedure has its technical and economical limits for given production conditions. When the automation plan is not sufficient to achieve the required reliability parameters, the principle of error tolerance, which is based on the shortest error detection and reconfiguration times, can allow the availability value to be increased.
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.