Mobile Panel 40/50

User's Manual
Translation of the original operating instructions

Version: **1.70 (May 2013)**
Model no.: **MAMP40.50-ENG**

Chapter 1 • General information

1 Manual history

Version	Date	Change
0.10 preliminary	October 2006	• First version
1.00	13-Feb-07	• Chapter 3 "Commissioning" on page 67, Chapter 4 "Software" on page 85, Chapter 5 "Standards and certifications" on page 95, Chapter 6 "Accessories" on page 109 and Chapter 7 "Maintenance / Service" on page 132 added. • Chapter 2 "Technical data" on page 16 completed.
1.10	26-Mar-07	• USB flash drive 5MMUSB.0256-00 and USB flash drive 5MMUSB.1024-00 canceled. • Operating unit model numbers expanded. • Connection box and box cable moved to chapter Chapter 6 "Accessories". • Chapter 5 "Standards and certifications" revised. • Images updated. • Windows CE order numbers added. • Description of the "Attachment cable" on page 58 added. • E-stop changed to stop button.
1.20	18-Apr-07	• Introduction updated. • Revised section "Fully assembled device" on page 18. • Figures revised. • Technical data for entire device and individual components revised. • Mylar keypad description updated. • "Storing the Mobile Panel device" on page 117 added. • "Connecting a Mobile Panel 100/200" on page 74 added. • Revised section "USB interface" on page 75. • Chapter 4 "Software" revised. • Chapter 6 "Accessories" revised. • Updated section "Viewing angles" on page 142. • Section 7 in "Connection example for stop button" on page 72 added. • Chapter 1 "General information" added.
1.30	18-Jul-07	• Updated section "Serial number sticker" on page 31. • Technical data of device expanded (ambient temperatures, humidity, altitude) • "Temperature humidity diagram" on page 37 added. • Technical data of operating units updated (Ethernet controller). • Short description of devices in model number overview revised. • Technical data of attachment cable 5CAMPH.0xxx-30 revised. • New model numbers for Windows CE and section "Windows CE" on page 85 revised. • Updated section Chapter 8. • Additional temperature humidity diagram information. • Note added to Appendix chapter.
1.40	17-Oct-07	• Viewing angle definition changed (a, b, c, d to R, L, U, D) • Information for avoiding burn-in effect expanded. • ADI control center description (see section "B&R Automation Device Interface (ADI) - Control Center" on page 87) expanded. • Information on touch calibration expanded. • Information on stop circuit loop resistance expanded. • Updated section "Date / time settings" on page 83. • Index revision. • Updated section "B&R Key Editor". • Updated section "Key configuration" on page 83. • Windows CE description (see section "Windows CE" on page 85) expanded. • Updated section "Configuring Windows CE ProPlus Thin Client Automation Runtime (TCAR)" on page 86.
1.41	06-Nov-07	• Structure of "Serial number sticker" on page 31 modified. • API replaced by ADI (Automation device interface). • UL test for robotic applications (UL 1740:1998) removed.

Table 1: Manual history

Version	Date	Change
1.42	28-Jan-08	• Manual version number error in the page footer corrected. • Warning for the table "Table 48: Safety category overview" on page 102 added. • Changes made to text in Chapter 5 "Standards and certifications" EN 418 has been replaced by EN ISO 13850 EN 775 has been replaced by EN ISO 10218-1 EN 60204 has been replaced by EN 60204-1 89/336/EEC has been replaced by 2004/108/EC EN 60204-1/11.98 was changed to EN 60204-1:2006 EN 951-1/03.97 was changed to EN 954-1:1996 EN 1037/04.96 was changed to EN 1037:1995 Version date was corrected for some standards
1.43	28-Mar-08	• Positioning of image "5CAMPC.0020-10" on page 61 corrected. • Preconfiguration of membrane keypads updated, (see "Mobile Panel 40" on page 26 and "Mobile Panel 50" on page 29).
1.44	05-Sep-08	• Corrected spelling and sentence structure errors. • Updated "MP40/50 buffer battery" on page 126. • Updated "Installing the buffer battery" on page 133.
1.50	11-Feb-09	• "B&R Key Editor" on page 93 moved from Software chapter to Appendix chapter. • Corrected pinout on page Cable pinout. • Corrected error in figure "Figure 42: Attachment shaft" on page 69. • Updated graphics of typical topologies (previously application examples). • Added MP connection box small to Chapter 6 "Accessories", section 4.2 "4MPCBX.0001-00" on page 121. • Updated section "Environmentally friendly disposal" on page 13 in Chapter 1 "General information". • Updated key matrix numbering for the individual keys. • Removed contents of delivery for USB flash drives. • Corrected supply circuit fuse specification from 1.5 A to 3.15 A. • Corrected model numbers for control cabinet cable, see see "Order data" on page 61 and see "Order data" on page 64. • Updated differences in WinCE versions. • Changed technical data for the displays.
1.55	08-May-09	• Corrected pinout for the supply wires of the control cabinet cable 5CAMPC.0020-11. • Changed figure "Figure 35: 5CAMPH.0xxx-30 - Attachment cable pinout" on page 59, "Figure 37: 5CAMPC.0020-10 - Control cabinet cable layout" on page 62 and Figure 40: 5CAMPC.0020-11 - Control cabinet cable layout - the front side of the plugs is now shown in the images, whereas the plugs were displayed from behind in previous versions. • Updated section 1.1 "Configuration" on page 17.
1.60	19-Nov-09	• Added and adjusted requirements regarding the machine directive 2006/42/EC, EN ISO 13849-1, ZT 05. • Updated information about the stop and enable switch in "Stop button" on page 134 and "Enabling switch" on page 135 in Appendix A "Appendix A". • Corrected figure "Figure 37: 5CAMPC.0020-10 - Control cabinet cable layout" on page 62 and "Figure 40: 5CAMPC.0020-11 - Control cabinet cable layout" on page 65. • Updated section "Tips for extending the service life of the display" on page 84 in Chapter 3 "Commissioning". • Updated section "Stop button" on page 25. • Updated section "Chemical resistance" on page 136. • Updated section "Connection example - Enable switch" on page 73. • Updated section "Touch screen stylus pen" on page 128 in Chapter 6 "Accessories". • Updated information about "B&R Key Editor" on page 93. • Updated information in section "Differences - CE versions (Pro - PropPlus - ProPlusTCAR)" on page 85.
1.61	16-Dec-09	• Updated serial number sticker.
1.65	21-Dec-09	• Renamed section "Serial number sticker" to "Type plate", see "Serial number sticker" on page 31. • Removed warning on page Safety categories in accordance with EN 954-1:1996 (Safety of Machinery – Safety-related Parts of Control Systems, Part 1: General Design Principles). • Removed the column "Safety integrity level - SIL (in accordance with IEC 61508-1)" from the tables "Table 46: Safety category overview" on page 100 and "Table 48: Safety category overview" on page 102. • Changed information text in section 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 102. • Changed information and content in section 5 "Information regarding MD 2006/42/EC" on page 105. • Corrected values in the table "Table 51: (EN ISO 13849-1:2006, table 3) - Performance Level (PL)" on page 106. • Changed definition of the Performance Level in the table "Table 52: Abbreviations" on page 106. • The term "EC certificate of conformity" was changed to "EC declaration of conformity", see page "EC declaration of conformity" on page 107. • Changed the term "type examination certificate" to "EC type examination certificate", see "EC type approval certificate" on page 108.
1.66	01-Feb-10	• Added EC declaration of conformity, see section 6.1 "EC declaration of conformity" on page 107. • Added EC type examination certificate, see section 6.2 "EC type approval certificate" on page 108.

Table 1: Manual history

Version	Date	Change
1.70	22-May-13	• Revised section "Organization of safety notices" on page 14, updated descriptions for cautions and warnings. • Revised section 109 USB flash drive (removed 5MMUSB.0256-00, 5MMUSB.0512-00 and 5MMUSB.1024-00; updated 5MMUSB.2048-01). • Revised section 2 "Protective cap" on page 113. • "HMI Drivers & Utilities DVD" moved from Appendix A to "Accessories". • Removed section "Preventing screen burn-in on LCD / TFT displays" from chapter 7, Service and Maintenance. • "B&R Key Editor" moved from Appendix A to Chapter 4 "Software". • "B&R Automation Device Interface (ADI) - Control Center" on page 87 revised. • "B&R Automation Device Interface (ADI) Development Kit" on page 89 added. • Revised and changed sticker section to "Serial number sticker". • Revised image "Figure 51: Display - Keys and LEDs in the matrix" on page 76. • Moved wall mount from Chapter 2 "Technical data" to Chapter 6 "Accessories". • Updated following sections in Chapter 3 "Commissioning": "Tips for extending the service life of the display" on page 84, "Pixel errors" on page 84. • Revised entire manual according to current formatting standards.

Table 1: Manual history

2 Safety notices

2.1 Intended use

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

2.2 Protection against electrostatic discharge

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

2.2.1 Packaging

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

2.2.2 Guidelines for proper ESD handling

Electrical components with a housing

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

Electrical components without a housing

The following applies in addition to the points listed under "Electrical components with a housing":

- Any persons handling electrical components or devices with installed electrical components must be grounded.
- Components may only be touched on their narrow sides or front plate.
- Components should always be stored in a suitable medium (ESD packaging, conductive foam, etc.). Metallic surfaces are not suitable storage surfaces!
- Components should not be subjected to electrostatic discharge (e.g. through the use of charged plastics).
- Ensure a minimum distance of 10 cm from monitors and TV sets.
- Measurement devices and equipment must be grounded.
- Measurement probes on potential-free measurement devices must be discharged on sufficiently grounded surfaces before taking measurements.

Individual components

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

2.3 Policies and procedures

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

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

All tasks such as the installation, commissioning and servicing of devices are only permitted to be carried out by qualified personnel. Qualified personnel are those familiar with the transport, mounting, installation, commissioning and operation of of devices who also have the appropriate qualifications (e.g. IEC 60364). National accident prevention regulations must be observed.
The safety notices, connection descriptions (type plate and documentation) and limit values listed in the technical data are to be read carefully before installation and commissioning and must be observed.

2.4 Transport and storage

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

2.5 Installation

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

2.6 Operation

2.6.1 Protection against touching electrical parts

To operate programmable logic controllers, operating/monitoring devices or uninterruptible power supplies, it is necessary for certain parts to carry dangerous voltage levels over 42 VDC. Touching one of these parts can result in a life-threatening electric shock. This could lead to death, severe injury or damage to equipment.

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

Before turning the device on, all parts that carry voltage must be securely covered. During operation, all covers must remain closed.

2.6.2 Environmental conditions - Dust, humidity, aggressive gases

The use of operating/monitoring devices (e.g. industrial PCs, Power Panels, Mobile Panels, etc.) and uninterruptible power supplies in very dusty environments should be avoided. Dust collection on the devices can affect functionality and may prevent sufficient cooling, especially in systems with active cooling systems (fans).

The presence of aggressive gases can also lead to malfunctions. When combined with high temperature and humidity, aggressive gases – e.g. with sulfur, nitrogen and chlorine components – can induce chemical reactions that can damage electronic components very quickly. Signs of the presence of aggressive gases are blackened copper surfaces and cable ends on existing equipment.

For operation in dusty or humid conditions, correctly installed (e.g. cutout installations) operating/monitoring devices like the Automation Panel or Power Panel are protected on the front. The back of all devices must be protected from dust and humidity and cleaned at suitable intervals.

2.6.3 Viruses and dangerous programs

This system is subject to potential risk each time data is exchanged or software is installed from a data medium (e.g. diskette, CD-ROM, USB flash drive, etc.), a network connection or the Internet. The user is responsible for assessing these dangers, implementing preventive measures such as virus protection programs, firewalls, etc. and making sure that software is only obtained from trusted sources.

2.7 Environmentally friendly disposal

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

2.7.1 Separation of materials

It is necessary to separate different materials so the device can undergo an environmentally friendly recycling process.

Component	Disposal
Programmable logic controllers Operating/monitoring devices Uninterruptible power supply Batteries and rechargeable batteries Cables	Electronics recycling
Cardboard box / paper packaging	Paper / cardboard recycling
Plastic packaging	Plastic recycling

Table 2: Environmentally friendly separation of materials

Disposal must comply with applicable legal regulations.

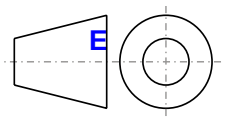
3 Organization of safety notices

Safety notices in this manual are organized as follows:

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

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

4 Guidelines



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

All dimensions are specified in mm.

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

Table 4: Range of nominal sizes

5 Overview

Product ID	Short description	on page
	Accessories	
4MPBRA.0000-01	MP40/50 Wall Bracket.	116
4MPCBX.0000-00	Mobile Panel Connection Box for cables with Push Pull connector.	118
4MPCBX.0001-00	Mobile Panel Connection Box Small for cables with Push Pull connector.	121
5CAMPB.0100-10	Mobile Panel Box cable, with wire tip sleeves for connection in the switching cabinet; with plug contacts for wiring in the connection box, 10 m.	123
5CAMPP.0000-10	Protection cover for Mobile Panel cable with circular connector.	113
5CAMPP.0001-10	Protection cover for Mobile Panel cabinet cable with circular connector.	114
5MPBAT.0000-00	MP40/50 Back-up Battery	126
	Attachment cables	
5CAMPH.0018-30	MP40/50 Connecting Cable with Push Pull connector, 1.8 m.	58
5CAMPH.0050-30	MP40/50 Connecting Cable with Push Pull connector, 5 m.	58
5CAMPH.0100-30	MP40/50 Connecting Cable with Push Pull connector, 10 m.	58
5CAMPH.0150-30	MP40/50 Connecting Cable with Push Pull connector, 15 m.	58
5CAMPH.0200-30	MP40/50 Connecting Cable with Push Pull connector, 20 m.	58
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel Cabinet Cable Ethernet Crossover with Push Pull conncector, 2 m.	61
5CAMPC.0020-11	Mobile Panel Cabinet Cable Ethernet straight through with Push Pull connector, 2 m.	64
	Other	
5SWHMI.0000-00	HMI Drivers & Utilities DVD	129
	System units	
5MP040.0381-01	Mobile Panel MP40; 3,8" QVGA LCD m display, Intel PXA 270 processor, 256 MB DRAM, 128 MB Flash; ETH 10/100, USB 1.1; 51 system keys, Stop button, 2 integrated 3-step enabling switches, handle. Please order cables and operating system separately.	34
5MP040.0381-02	Mobile Panel MP40; 3,8" QVGA LCD m display, Intel PXA 270 processor, 256 MB DRAM, 128 MB Flash; ETH 10/100, USB 1.1; 51 system keys, Stop button, hand wheel, key switch; 2 integrated 3-step enabling switches, handle. Please order cables and operating system separately.	38
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; ETH 10/100, USB 1.1; 31 system keys, stop button, hand wheel, push button; 2 integrated 3-step enabling switches, handle. Delivered pre-assembled (please order cables and operating system separately).	42
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; ETH 10/100, USB 1.1; 31 system keys, stop button, joystick, key switch; 2 integrated 3-step enabling switches, handle. Delivered pre-assembled (please order cables and operating system separately).	46
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; ETH 10/100, USB 1.1; 31 system keys, stop button, hand wheel, override potentiometer; 2 integrated 3-step enabling switches, handle. Delivered pre-assembled (please order cables and operating system separately).	50
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; ETH 10/100, USB 1.1; 31 system keys, stop button, hand wheel, key switch; 2 integrated 3-step enabling switches, handle. Delivered pre-assembled (please order cables and operating system separately).	54
	USB accessories	
5MMUSB.2048-00	USB 2.0 Memory Stick, 2048 MB	109
5MMUSB.2048-01	USB 2.0 flash drive, 2048 MB, B&R	111
	Undefined	
5AC900.1100-01		128
5SWWCE.0524-ENG	Microsoft OEM Windows CE 5.0 Professional, English; for Mobile Panel MP40.	85
5SWWCE.0624-ENG	Microsoft OEM Windows CE 5.0 Professional plus, English; for Mobile Panel MP40.	85
5SWWCE.0724-ENG	Microsoft OEM Windows CE 5.0 professional plus, English; Terminal Client Automation Runtime for Mobile Panel MP40.	85
	Windows CE 5.0	
5SWWCE.0525-ENG	Microsoft OEM Windows CE 5.0 Professional, English; for Mobile Panel MP50.	85
5SWWCE.0625-ENG	Microsoft OEM Windows CE 5.0 Professional plus, English; for Mobile Panel MP50.	85
5SWWCE.0725-ENG	Microsoft OEM Windows CE 5.0 professional, English; Terminal Client Automation Runtime for Mobile Panel MP50.	85

Chapter 2 • Technical data

1 Introduction

The Mobile Panel is a portable operating and display device featuring a robust design and Windows CE compatible electronics. Equipped with a powerful processor and Ethernet, the Mobile Panel is optimally suited for many different applications (see "Intended use" on page 67).

Depending on the model, Mobile Panel devices can have a 3.8" QVGA grey step display without a touch screen or an 6.5" VGA color display with a touch screen.

Onboard FLASH function blocks are available on the Mobile Panel in place of rotating mass memory that is not designed for use in harsh environments (diskette- and hard drives). The Mobile Panel offers a Windows CE platform on which applications can be set up.

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

With its optional operating and control elements, the Mobile Panel can be easily adjusted for each individual application.

1.1 Configuration

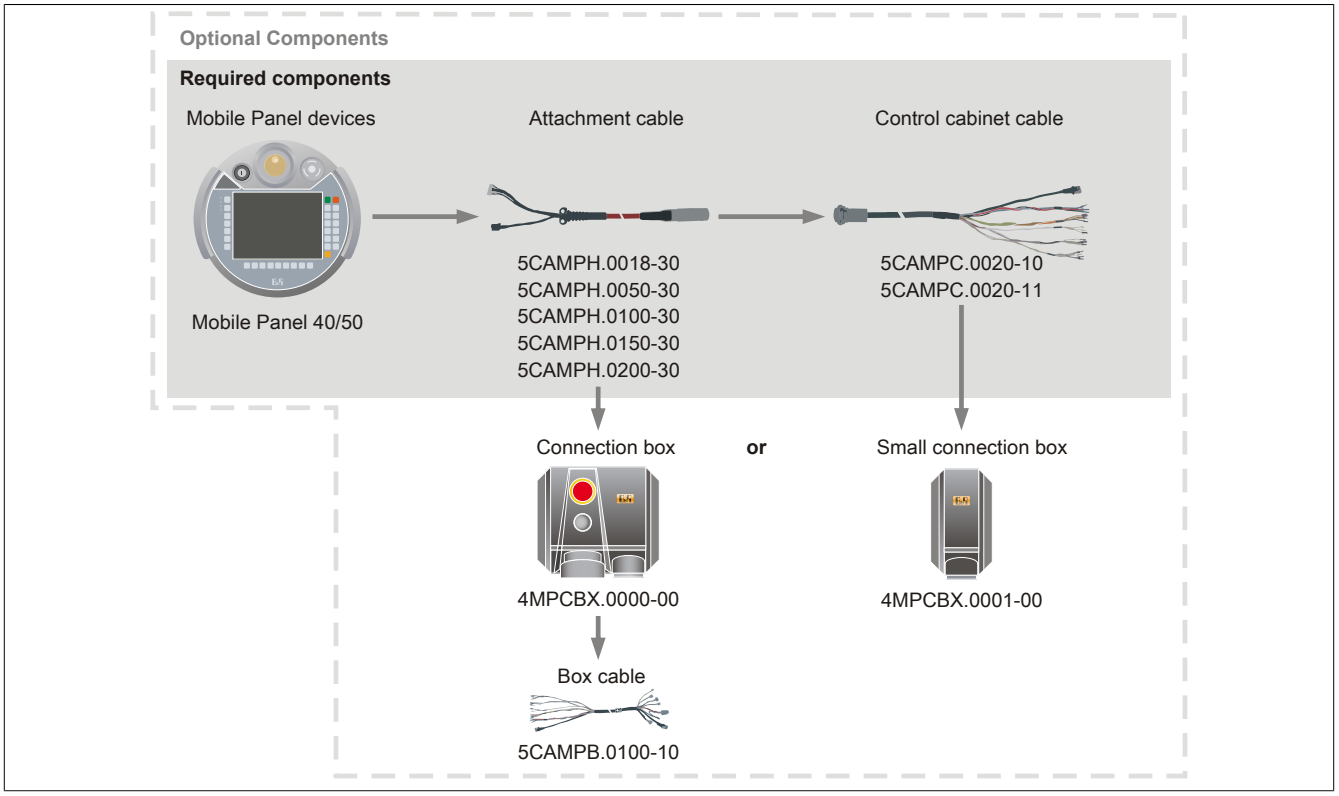


Figure 1: Mobile Panel selection guide

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

- Direct cable to control cabinet (5CAMPC.0020-10 or 5CAMPC.0020- 11) with an optional small connection box (4MPCBX.0001-00).
- Alternatively, a large connection box (4MPCBX.0000-00) and the corresponding box cable (5CAMPB.0100-10) can be used.

2 Fully assembled device

2.1 Structure

Mobile Panel devices are cable connected, which means they are connected to the control cabinet using a cable. For operation, the following components are needed:

- Operating unit including handle
- Attachment cable

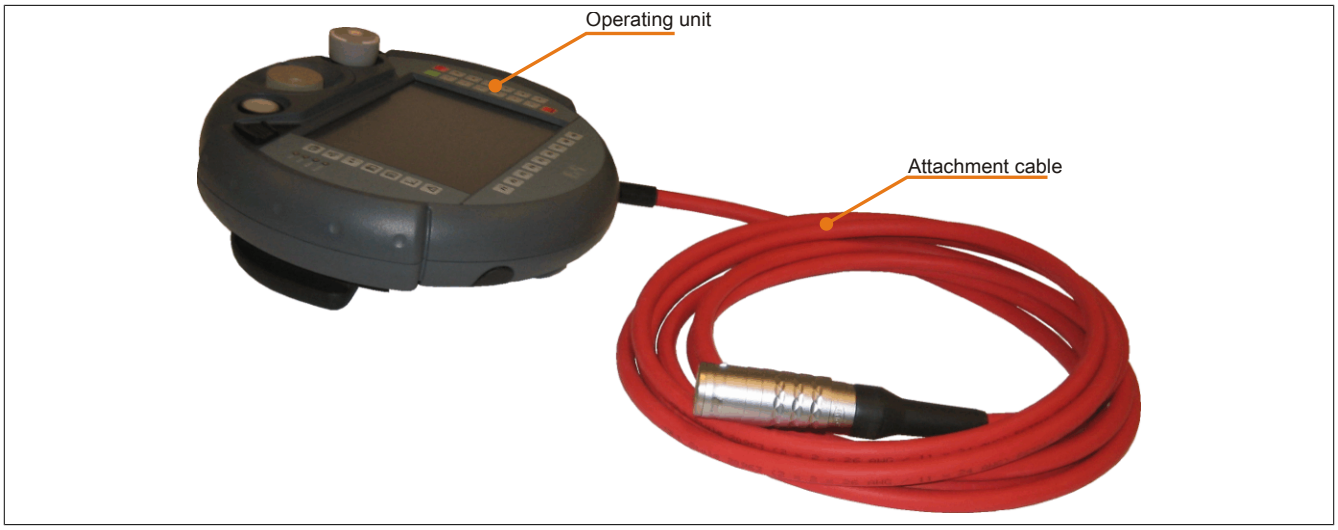


Figure 2: Structure

2.1.1 Ergonomic

- Functional multi grip
- Round housing
- Various gripping positions
- Left and right handed operation
- Operation on table
- Operation from wall mounts
- Position of cable outlet (on handle) left or right of the housing by simple, custom adjustment
- Clear display

2.1.2 Housing

- Vibration- and shock resistant
- Housing made from non-flammable material (UL 94V-0), impact-resistant, water-resistant, cleaning agents (alcohol and fabric conditioner), oils, cutting oils (drilling oils), fat and lubricants
- double-walled, extremely robust housing. Drop-tested from 1.5 m height onto industrial floor

2.1.3 Operating and display field

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

2.1.4 Electronics

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

2.1.5 Interfaces

- Ethernet 10/100 Mbit
- USB host for connection of different USB flash drives (with protective cap to guarantee IP65 protection when closed)
- USB client in cable shaft (Debug und ActiveSync device)

2.1.6 Touch screen stylus pen

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

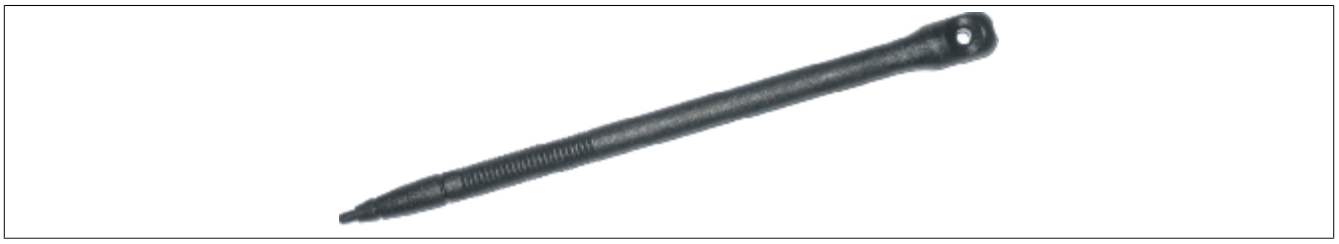


Figure 3: Touch screen stylus pen

2.2 Enabling devices

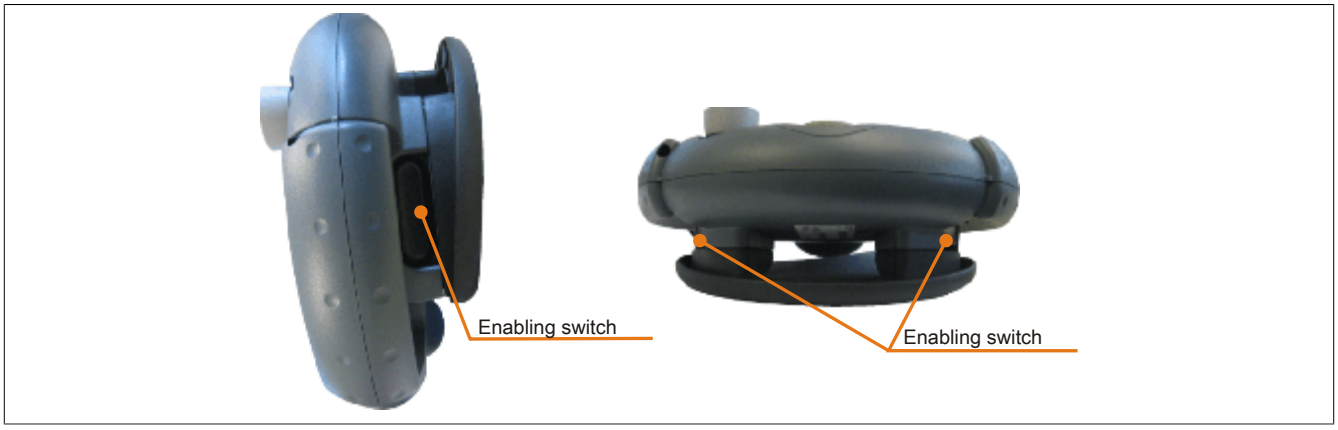


Figure 4: Enabling devices

The Mobile Panel features two enable switches located on the sides of the device. This allows both left- and right-handed operation. Both enable switches are parallel-connected and have a similar effect on the overall safety circuits in the attachment cable. Only one enable switch has to be activated. The enable switch is comprised of a three-step display element and separate evaluation electronics. An important feature is the integrated, double circuit design, from the operating elements to the connection terminals. The evaluation circuits have been implemented with various technologies and circuits. The lifespan of the switching contacts is independent from the load through to the rated values (resistive, inductive and capacitive) because of their electronic implementation.

Enable switch - switching 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: Fold-back characteristics

2.2.1 Operation

The operating element is composed of two symmetrically arranged rocker-actuated switches, whose position is determined using electrical buttons and 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 pressed	Off (opened)
2	Enable	Pressed	On (engaged)
3	Panic	Pushed all the way in	Off (opened)

Table 5: Switch positions for the enable switch

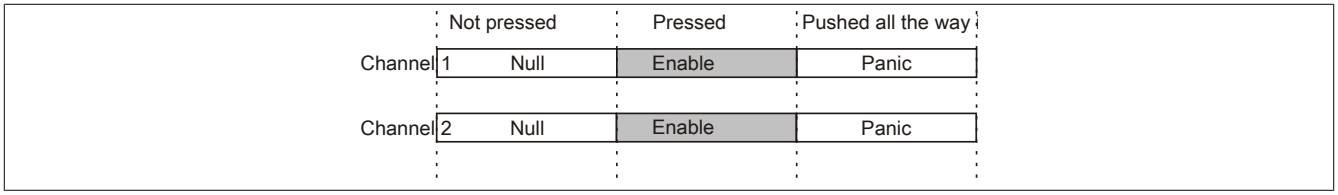


Figure 5: Possible enable switch positions

Warning!

The enable switch must be tested cyclically (every 6 months) by switching to the panic position. The test must determine whether or not the panic position is functional.

Information:

An enable switch must be activated so the normal switching position is recognized by the monitoring device.

The positions "null" and "panic" must trigger a category 0 or 1 stop command.

2.2.1.1 Zero position

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

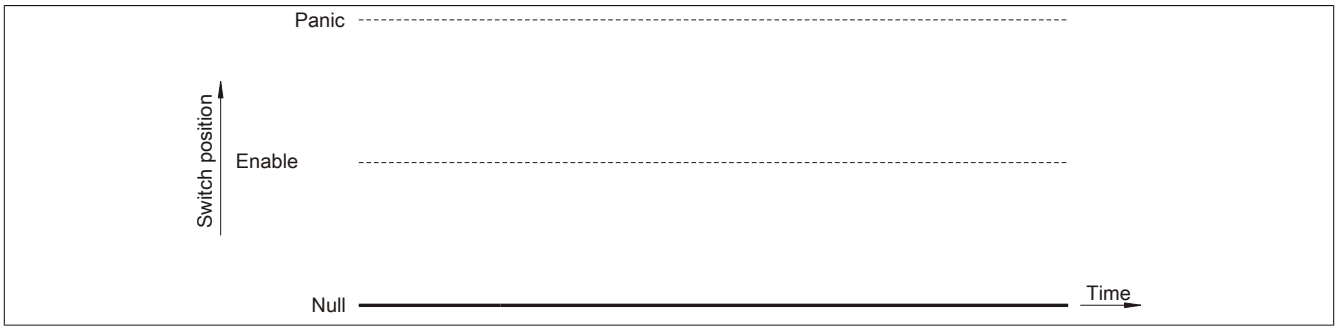


Figure 6: Enable switch - zero position

2.2.1.2 Enable

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

The enable switch is pressed from the null position to the enable position. After being released, it goes back to the null position again.

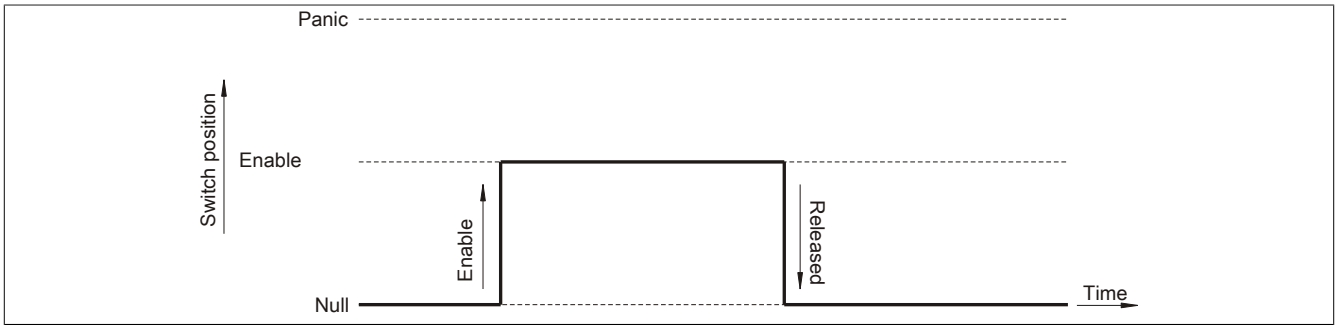


Figure 7: Enable switch - enable

2.2.1.3 Panic

If the enable switch is pushed all the way in (from enable position to panic position) and released, the enable position is skipped and it goes directly back to the zero position.

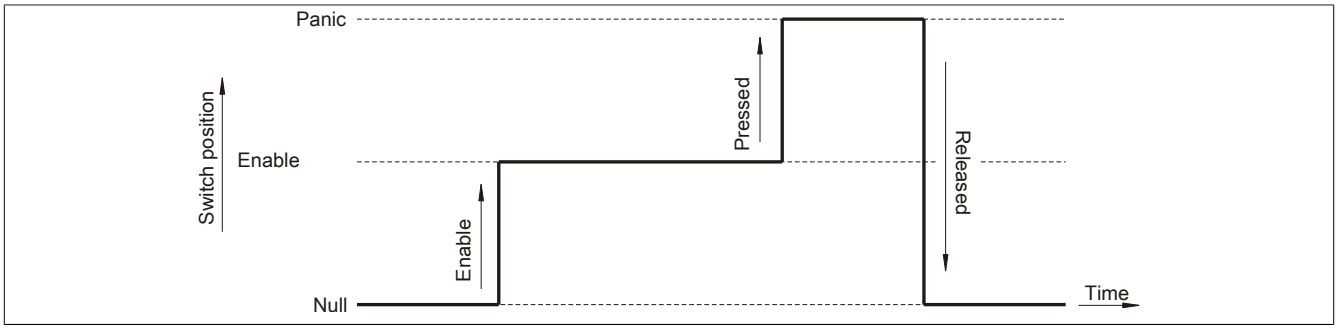


Figure 8: Enable switch - panic

Safety category 3 PL d in accordance with EN ISO 13849-1:2008 can be achieved by implementing enabling equipment with 2-circuits and a suitable monitor for short-circuits and cross faults of this circuit.

Safety category 3 PL d means that an error will not lead to the loss of safety and that individual errors can be appropriately detected when necessary.

Connection examples "Connection example for stop button" on page 72 and "Connection example - Enable switch" on page 73 illustrate how safety category 3 PL d can be achieved using Mobile Panel and its safety-related parts. Take note that the entire system concept must be designed accordingly.

Simultaneous operation monitoring by the monitoring device is necessary because otherwise an undetected accumulation of errors could occur which would result in a loss of safety:

Example:

If one channel of the enabling equipment changes to "enable" because of an error and after a certain amount of time, the second channel then also changes to "enable" because of an error, then the enable switch would no longer be able to shutdown the system.

EN 60204-1 requires that the enabling equipment must be connected to a category 0 or 1 stop (i.e. that the power must be switched off).

The PL and B_{10d} values of the components involved must be included when calculating the PL of the enable safety function. Details for calculating the PL for the entire safety function can be found in EN ISO 13849-1 provided in Chapter see "Standards and certifications" on page 95, section 4.5 "Selecting Performance Level and Category in accordance with EN ISO 13849-1" on page 103.

2.2.2 Foreseeable misuse of the enable switch

Predictable misuse refers to the unauthorized use of other materials to hold the enable switch in the enable position. This misuse should be minimized. The following measures are recommended for stopping the machine during manual operation:

- Query the enable switch when switching on the machine/system and when changing the operating mode from automatic to manual. (enable switch should not be in the enable position)
- The enable switch must be released within a predetermined timeframe and reset in its enable position. The length of the time frame is chosen according to the task at hand.

Warning!

- **The enable switch is only suitable as a protective function if the person activating the enable switch can recognize the danger in time and immediately take appropriate action! Reducing the speed of movement can be employed as an additional measure. The allowable speed must be determined by a risk analysis.**
- **Commands for dangerous states must not be initiated by the enable switch alone. A second conscious start command is required here (key on operating unit).**
- **The only person permitted in the danger area is the person activating the enable switch.**
- **See chapter "Standards and certifications" on page 95 for further information regarding the enabling device.**

2.3 Options

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

> **Information:**
>
> **For detailed technical data on the command device see "Appendix A" on page 134.**

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 in the Mobile Panel ADI (Automation Device Interface Library).

The override potentiometer can be used for various application possibilities, e.g. setting the spindle speed and the feed on machine tools.

- Resolution: 0 – 127 linear

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 in the Mobile Panel ADI (Automation Device Interface Library).

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

Important Features:

- 1 pulse / notch
- 50 notches / rotation

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

2.3.3 Illuminated button

If the Mobile Panel is equipped with an illuminated button, then it is evaluated according to software and can be read by a program in the Mobile Panel ADI (Automation Device Interface Library). The Illuminated buttons are momentary-contact buttons.

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 in the Mobile Panel ADI (Automation Device Interface Library).

The key switch has three positions - each of which clicks into place.

Removal position: the key can be removed from any of the three positions.

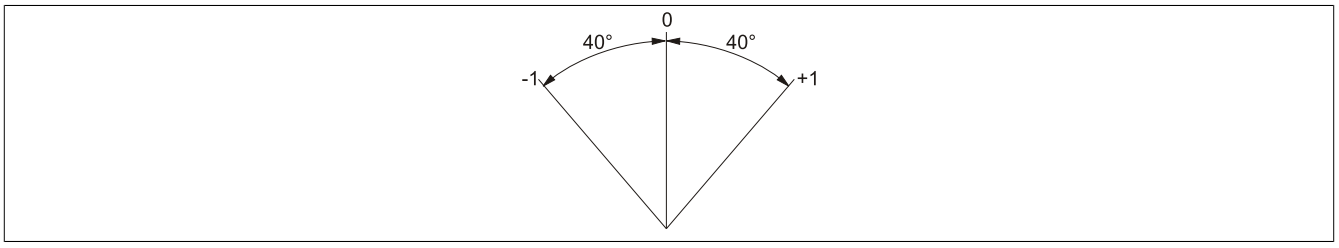


Figure 9: Key switch - Angle of rotation

Two key switches are delivered with each device.

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 in the Mobile Panel ADI (Automation Device Interface Library). The stick of the joystick is short for drop protection. The joystick can be used to do things such as moving robot axes.

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

2.3.6 Buffer battery

For more information about the buffer battery, see chapter "Accessories", section 6 "MP40/50 buffer battery" on page 126.

2.4 Stop button

The stop button is wired with two circuits and N.C. contacts.

The gray stop button on the MobilePanel meets the requirements of EN ISO 13850. Its operation must be designed for the machine according to risk evaluation as a category 0 or category 1 stop. Wiring of the positively driven N.C. switching contacts must satisfy the category (according to EN ISO 13849-1) determined in the machine's risk analysis (according to EN ISO 14121-1).

The gray stop switch has essentially the same function as the red-yellow E-stop. Its color should help prevent use of the E-stop when the hand terminal is unplugged should a hazard occur (because the E-stop has no effect when the hand terminal is unplugged).

Warning!

Handheld operating units with gray stop buttons, which are not connected to a machine, should also be kept out of view so as to prevent confusion with functional devices in the case of an emergency.

Releasing the stopping device must never cause 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 E-stop switch directly on the machine. Certain mechanical errors in the stop button can only be detected when the button is pressed. In the event of severe impact to the device (e.g. dropping the device), the stop button must be checked for functionality. Furthermore, the stopping functionality must be tested cyclically (every 6 months) by pressing the stop button.

See "Standards and certifications" on page 95 for further information regarding the stop button.

2.5 Membrane keypad

2.5.1 Mobile Panel 40

The assignments of the keys/LEDs depend on the intended use by the customer. Almost all keys are factory preconfigured (PS/2/ code). The keys can be configured at any time using the B&R Key Editor, and then transferred to the device using the ADI Control Center (included in Windows CE).

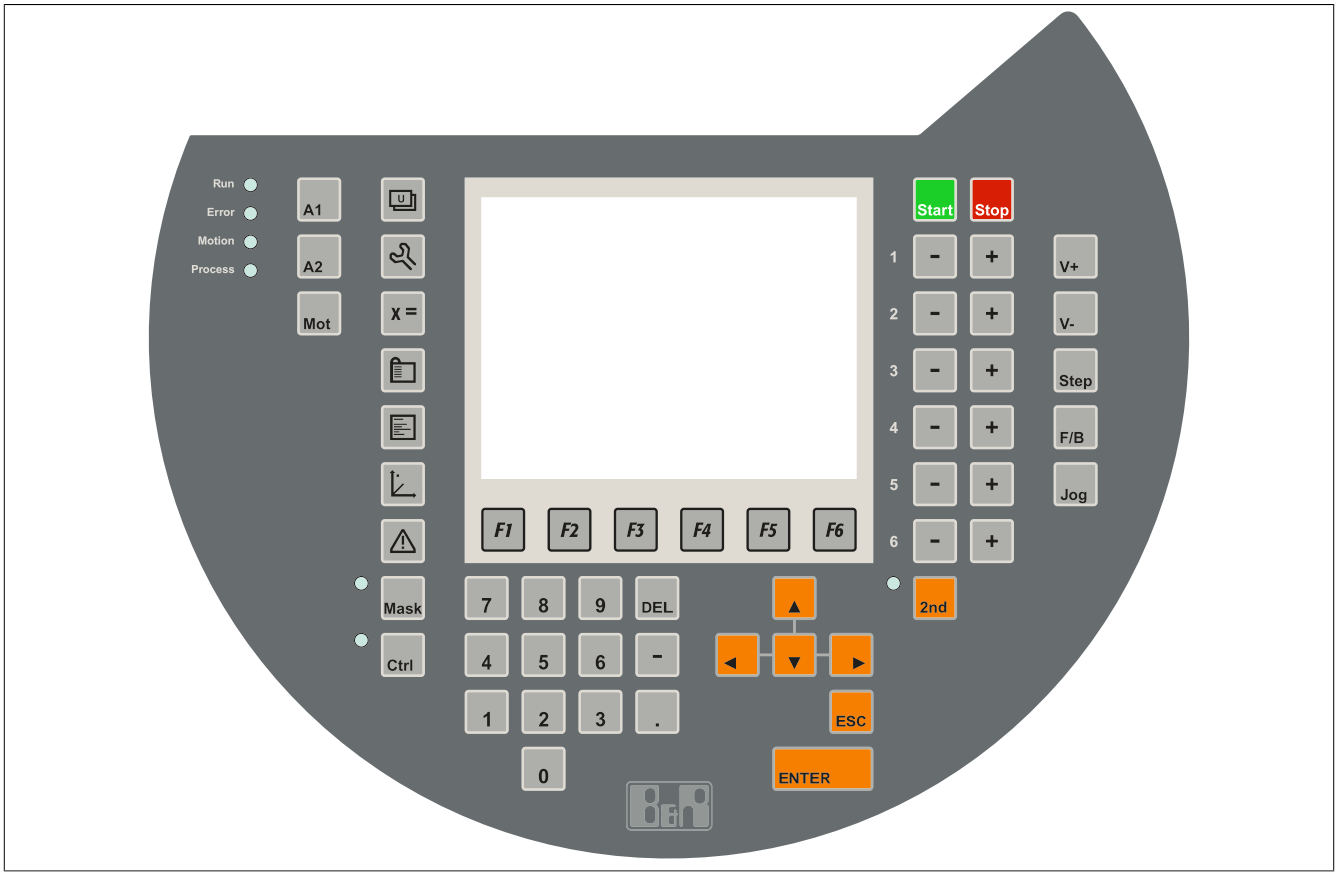


Figure 10: MP40 membrane keypad

2.5.1.1 Keys/LEDs

Icon	Possible use	Factory key configuration (PS/2 code)
	Application mask 1	No presetting
	Services	No presetting
	Variable monitor	No presetting
	Project mask	No presetting
	Program mask	CONTEXT
	Position mask	No presetting
	Alarm mask	No presetting

Table 6: MP40 mylar keypad symbols

Icon	Possible use	Factory key configuration (PS/2 code)
	Mask	No presetting
	Ctrl	CTRL LEFT
	F1	F1
	F2	F2
	F3	F3
	F4	F4
	F5	F5
	F6	F6
	A1	OLD
	A2	No presetting
	Axis enabling	No presetting
	Start	Left Windows key
	Stop	No presetting
	Jog key	-
	Jog key	+
	2. Layer	SHIFT LEFT
	Number 1	1
	Number 2	2
	Number 3	3
	Number 4	4

Table 6: MP40 mylar keypad symbols

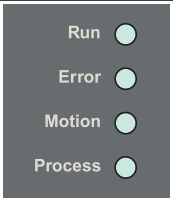
Icon	Possible use	Factory key configuration (PS/2 code)
	Number 5	5
	Number 6	6
	Number 7	7
	Number 8	8
	Number 9	9
	Number 0	0
	Comma	.
	Up arrow	CURSOR UP
	Down	CURSOR DOWN
	Left arrow	CURSOR LEFT
	Right arrow	CURSOR RIGHT
	ENTER	RETURN
	Cancel	ESC
	Coordination system selection	No presetting
	Foreword/backward	No presetting
	Operating mode selection	TAB
	Speed -	PAGE DOWN
	Speed +	PAGE UP
	Application running Error in the application Robot controller ready Process controller ready (cell/system ready)	

Table 6: MP40 mylar keypad symbols

2.5.2 Mobile Panel 50

The assignments of the keys/LEDs depend on the intended use by the customer.

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

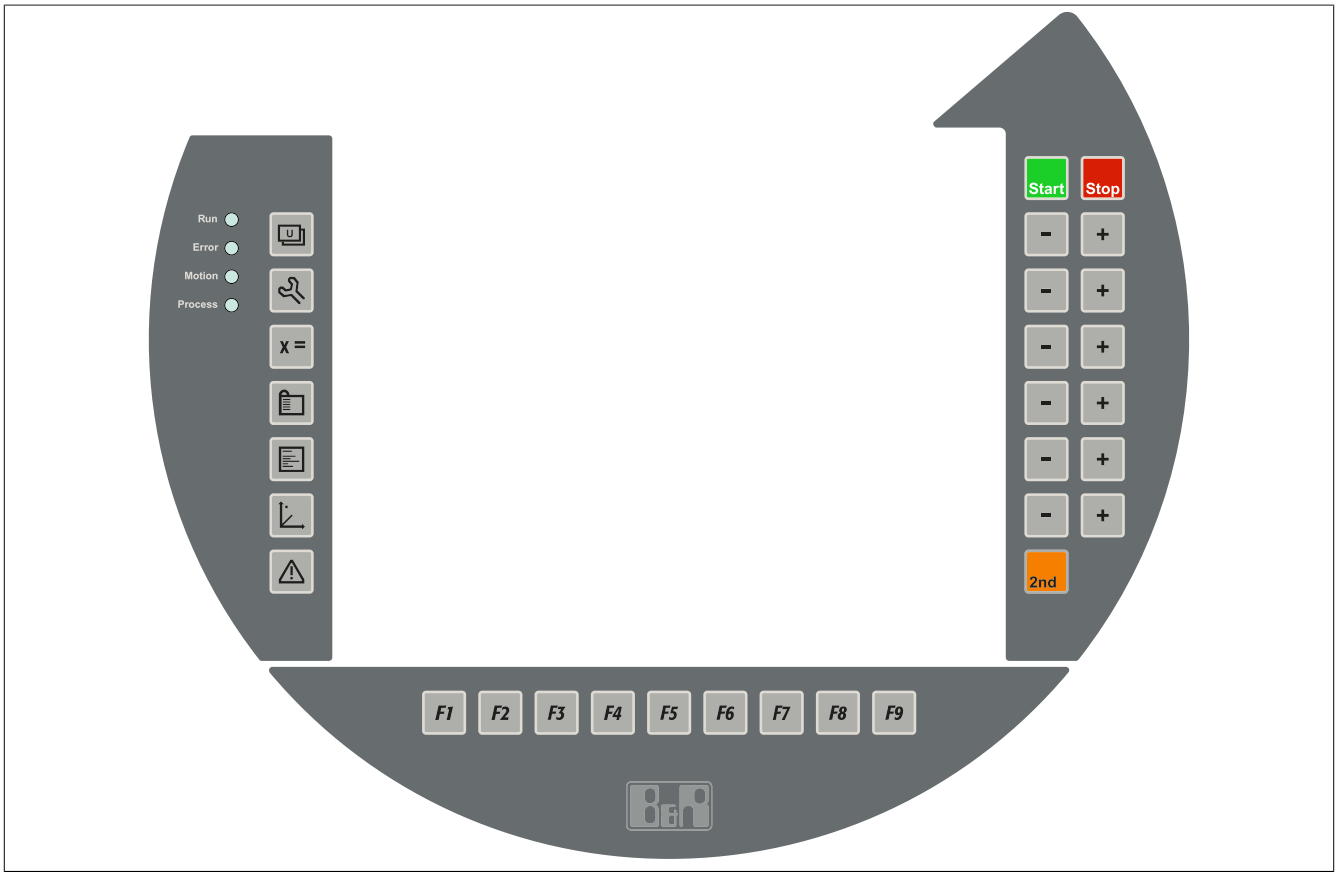


Figure 11: MP50 membrane keypad

2.5.2.1 Keys/LEDs

Icon	Possible use	Factory key configuration (PS/2 code)
	Application mask 1	No presetting
	Services	No presetting
	Variable monitor	No presetting
	Project mask	No presetting
	Program mask	CONTEXT
	Position mask	No presetting
	Alarm mask	No presetting

Table 7: MP50 mylar keypad symbols

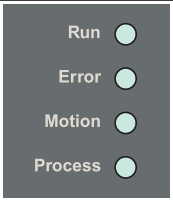
Icon	Possible use	Factory key configuration (PS/2 code)
	F1	F1
	F2	F2
	F3	F3
	F4	F4
	F5	F5
	F6	F6
	F7	F7
	F8	F8
	F9	F9
	Start	Left Windows key
	Stop	No presetting
	Jog key	-
	Jog key	+
	2. Layer	SHIFT LEFT
	Application running Error in the application Robot controller ready Process controller ready (cell/system ready)	

Table 7: MP50 mylar keypad symbols

2.6 Serial number sticker

A unique serial number sticker with a bar code (type 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).

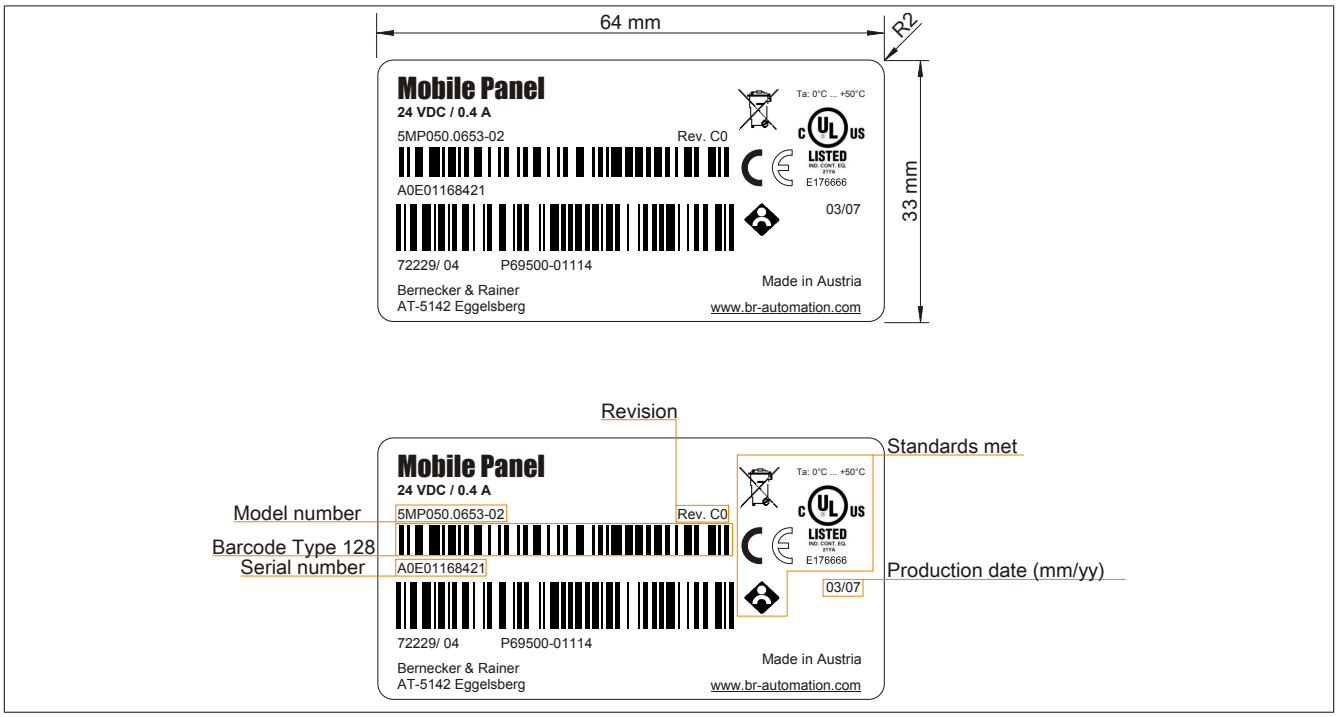


Figure 12: Design / dimensions - Type plate

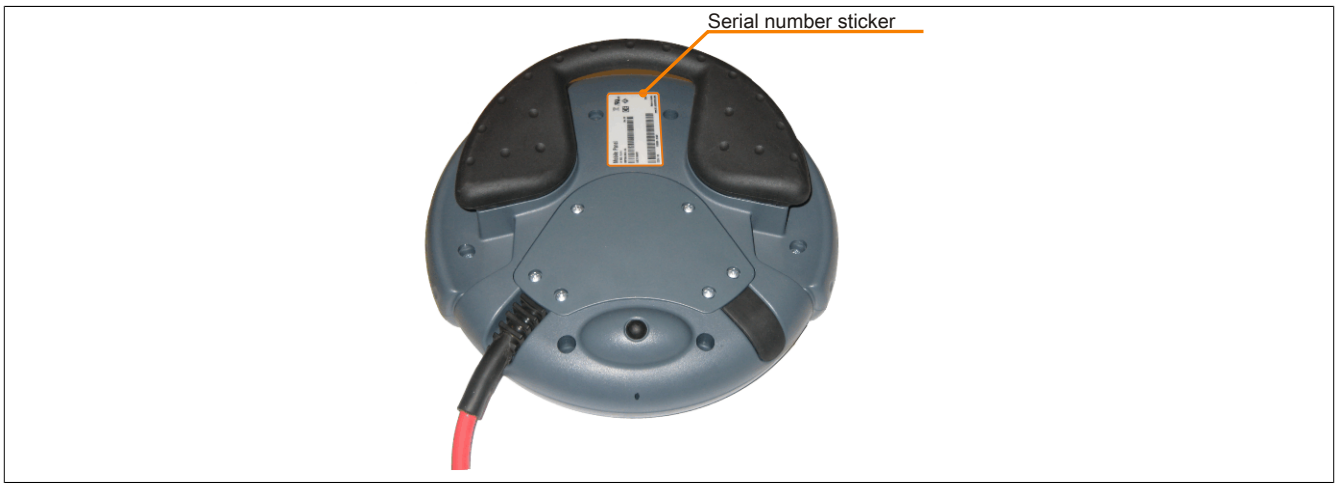


Figure 13: Serial number sticker (back)

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

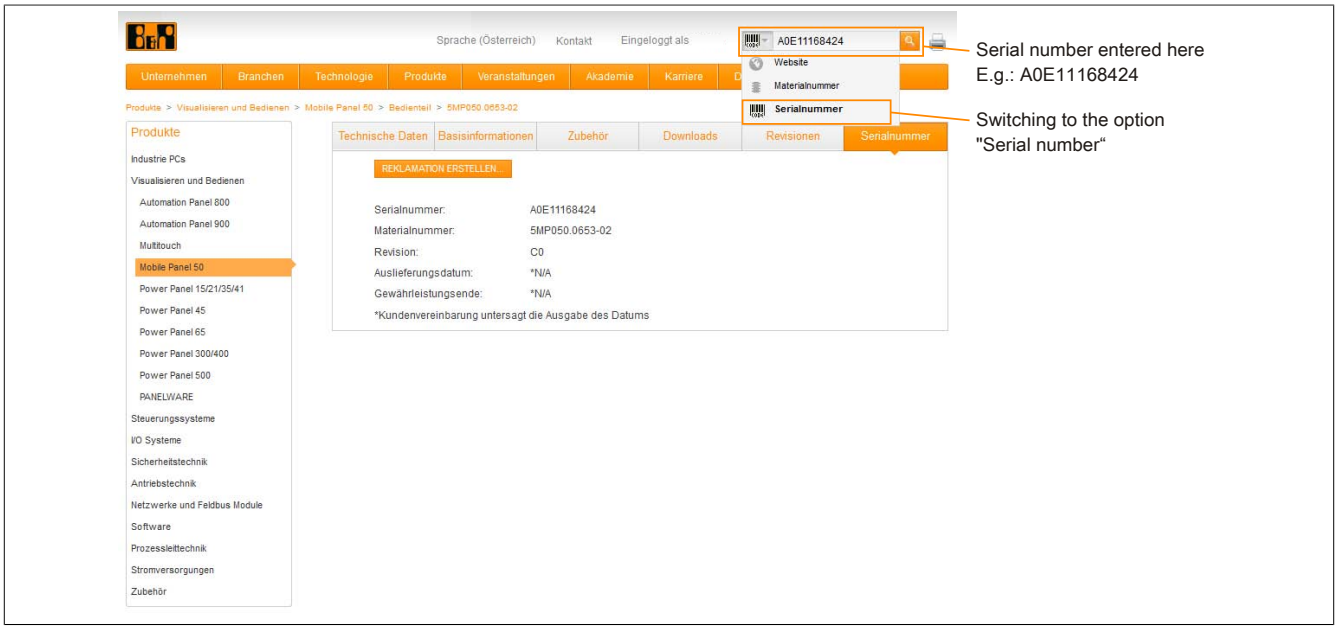


Figure 14: Example of serial number search

3 Individual components

3.1 Operating unit

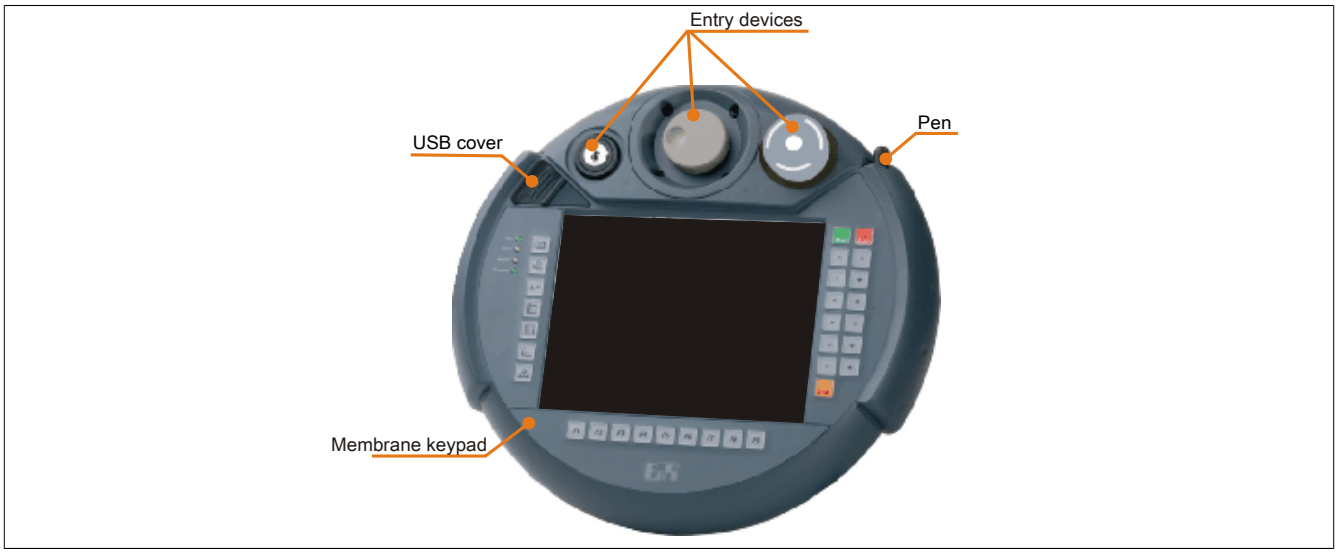


Figure 15: Mobile Panel operating unit

The operating unit contains all the electronics such as the display, the command devices and the membrane keypad. An external USE 1.1 interface is present on the front side behind the USB cover for data backup and/or data exchange. The interface is specified for USB flash drives only.

The user interface for the operating unit is resistant to alcohol (e.g. ethanol, glycol, isopropanol, glycerine, methanol), diluted acids (e.g. vinegar-based cleaning agent), soap, cleaning agents as 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 instructions how to clean the device, see "Cleaning" on page 132.

3.1.1 5MP040.0381-01

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 switch

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; ETH 10/100, USB 1.1; 51 system keys, Stop button, 2 integrated 3-step enabling switches, handle. Please order cables and operating system separately.	
	Required accessories	
	Attachment cables	
5CAMPH.0018-30	MP40/50 Connecting Cable with Push Pull connector, 1.8 m.	
5CAMPH.0050-30	MP40/50 Connecting Cable with Push Pull connector, 5 m.	
5CAMPH.0100-30	MP40/50 Connecting Cable with Push Pull connector, 10 m.	
5CAMPH.0150-30	MP40/50 Connecting Cable with Push Pull connector, 15 m.	
5CAMPH.0200-30	MP40/50 Connecting Cable with Push Pull connector, 20 m.	
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel Cabinet Cable Ethernet Crossover with Push Pull conncector, 2 m.	
5CAMPC.0020-11	Mobile Panel Cabinet Cable Ethernet straight through with Push Pull connector, 2 m.	
	Optional accessories	
	Accessories	
4MPBRA.0000-01	MP40/50 Wall Bracket.	
4MPCBX.0000-00	Mobile Panel Connection Box for cables with Push Pull connector.	
4MPCBX.0001-00	Mobile Panel Connection Box Small for cables with Push Pull connector.	
5CAMPB.0100-10	Mobile Panel Box cable, with wire tip sleeves for connection in the switching cabinet; with plug contacts for wiring in the connection box, 10 m.	
5MPBAT.0000-00	MP40/50 Back-up Battery	
	Undefined	
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 8: 5MP040.0381-01 - Order data

3.1.1.3 Components

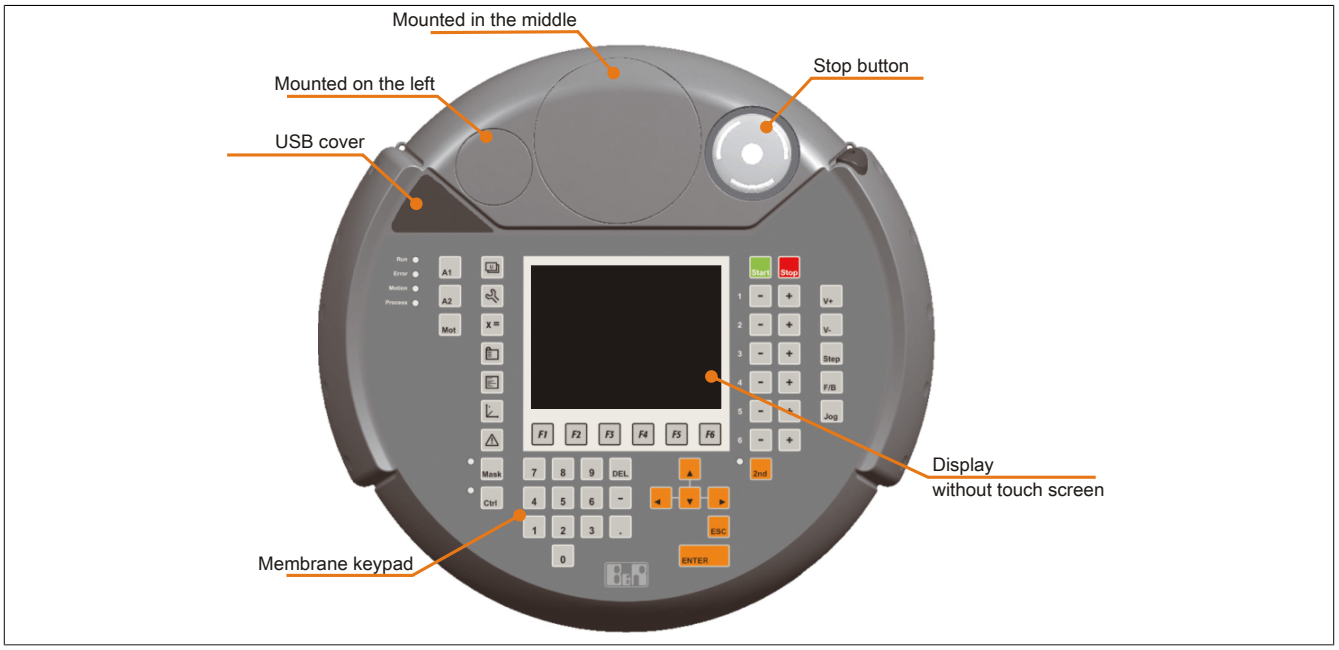


Figure 16: 5MP040.0381-01 - Components

3.1.1.4 Technical data

Information:

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

Product ID	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-buffered	-
Memory	
Type	SDRAM
Size	256 MB
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 load	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

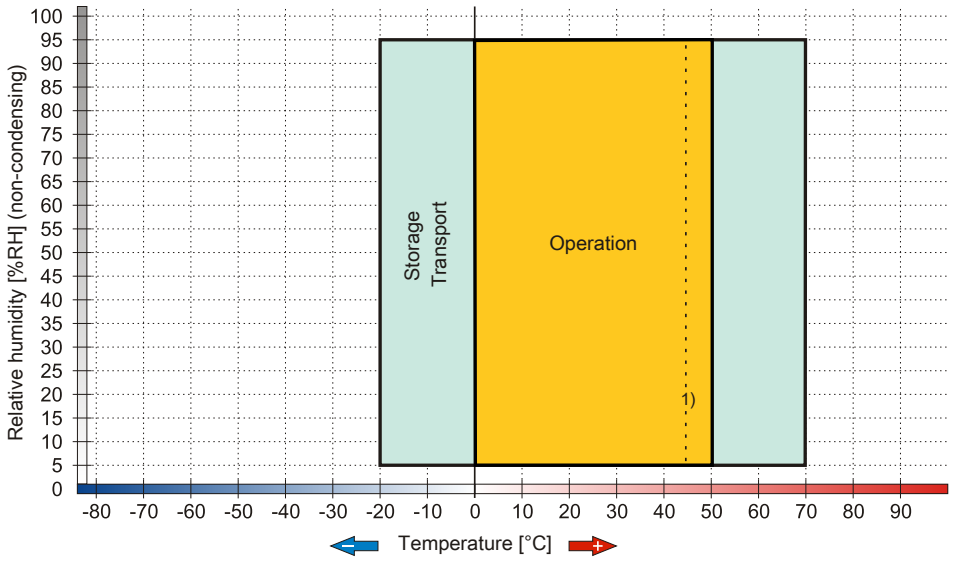
Table 9: 5MP040.0381-01 - Technical data

Product ID	5MP040.0381-01
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
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 N.C., right position)
Enabling switch	Yes (two 3-step switches, left and right position)
Override potentiometer	No
Key Switch	No
LEDs	7
Electrical characteristics	
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) 1)
Starting current	max. 5,6 A (current limitation present)
Power consumption	4.8 W (200 mA at 24 VDC)
Max. interruption of the supply	≤ 10 ms
Electrical isolation	No
Operating conditions	
Height of drop	1.5 m to industrial floor
Flame resistant	UL94V-0
Protection in accordance with EN 60529	IP65
Protection class	Class 3 in accordance with EN 61131-2 or EN 50178
Environmental conditions	
Temperature	
Operation	0 to 50°C 3)
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 length
Altitude	
Operation	Max. 3000 m
Mechanical characteristics	
Housing	
Material	ABS
Paint	similar to RAL7011
Front	
Panel membrane	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1100 g

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

1) Connection via Mobile Panel cable.
2) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
3) When used with a buffer battery (5MPBAT.0000-00) the maximum temperature during operation is 45°C.

3.1.1.5 Temperature humidity diagram



1) When used with a buffer battery (5MPBAT.0000-00) the maximum temperature during operation is 45°C.

Figure 17: 5MP040.0381-01 - Temperature humidity diagram

3.1.1.6 Dimensions

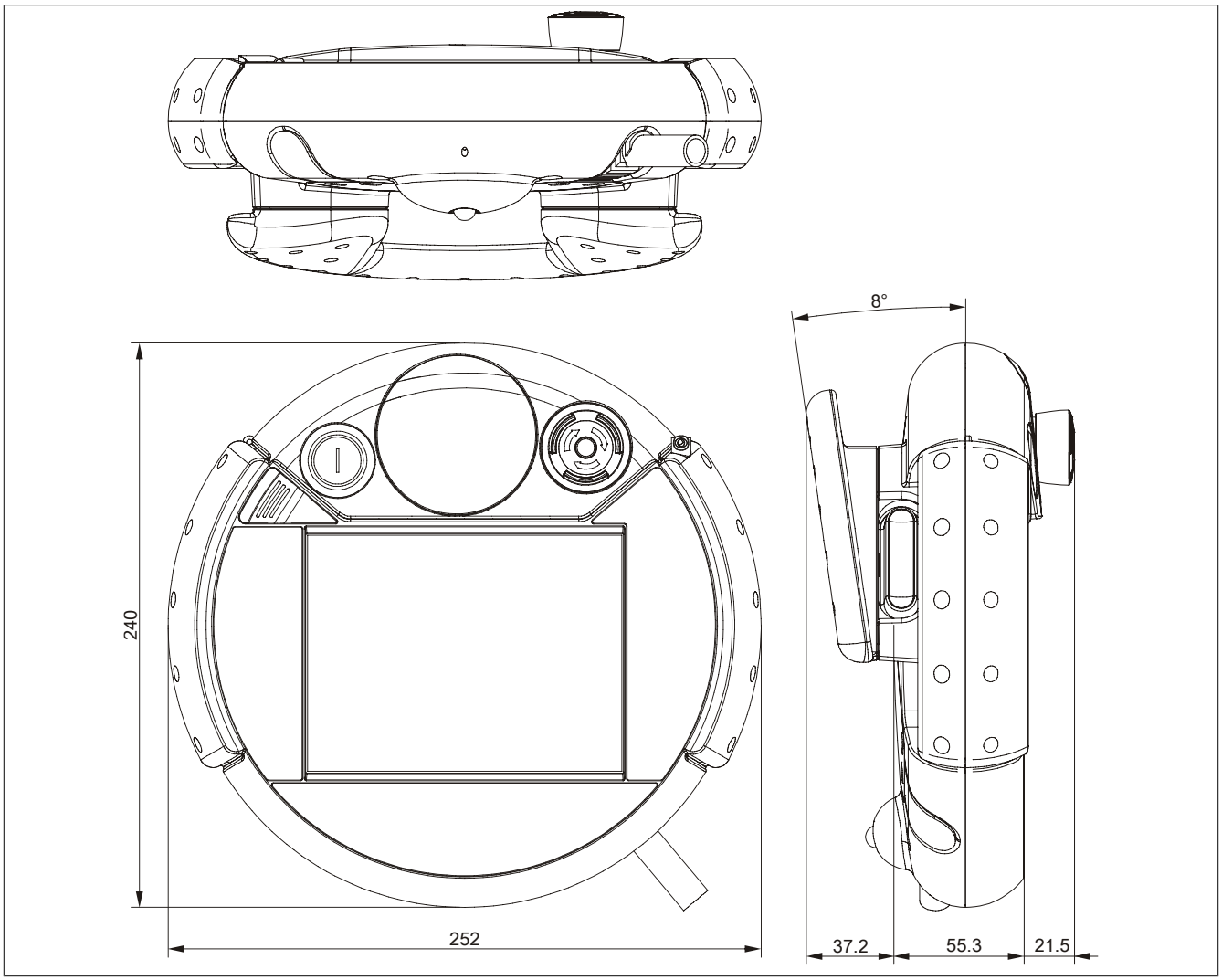


Figure 18: 5MP040.0381-01 - Dimensions

3.1.2 5MP040.0381-02

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 switch

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; ETH 10/100, USB 1.1; 51 system keys, Stop button, hand wheel, key switch; 2 integrated 3-step enabling switches, handle. Please order cables and operating system separately.	
	Required accessories	
	Attachment cables	
5CAMPH.0018-30	MP40/50 Connecting Cable with Push Pull connector, 1.8 m.	
5CAMPH.0050-30	MP40/50 Connecting Cable with Push Pull connector, 5 m.	
5CAMPH.0100-30	MP40/50 Connecting Cable with Push Pull connector, 10 m.	
5CAMPH.0150-30	MP40/50 Connecting Cable with Push Pull connector, 15 m.	
5CAMPH.0200-30	MP40/50 Connecting Cable with Push Pull connector, 20 m.	
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel Cabinet Cable Ethernet Crossover with Push Pull conncector, 2 m.	
5CAMPC.0020-11	Mobile Panel Cabinet Cable Ethernet straight through with Push Pull connector, 2 m.	
	Optional accessories	
	Accessories	
4MPBRA.0000-01	MP40/50 Wall Bracket.	
4MPCBX.0000-00	Mobile Panel Connection Box for cables with Push Pull connector.	
4MPCBX.0001-00	Mobile Panel Connection Box Small for cables with Push Pull connector.	
5CAMPB.0100-10	Mobile Panel Box cable, with wire tip sleeves for connection in the switching cabinet; with plug contacts for wiring in the connection box, 10 m.	
5MPBAT.0000-00	MP40/50 Back-up Battery	
	Undefined	
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 10: 5MP040.0381-02 - Order data

3.1.2.3 Components

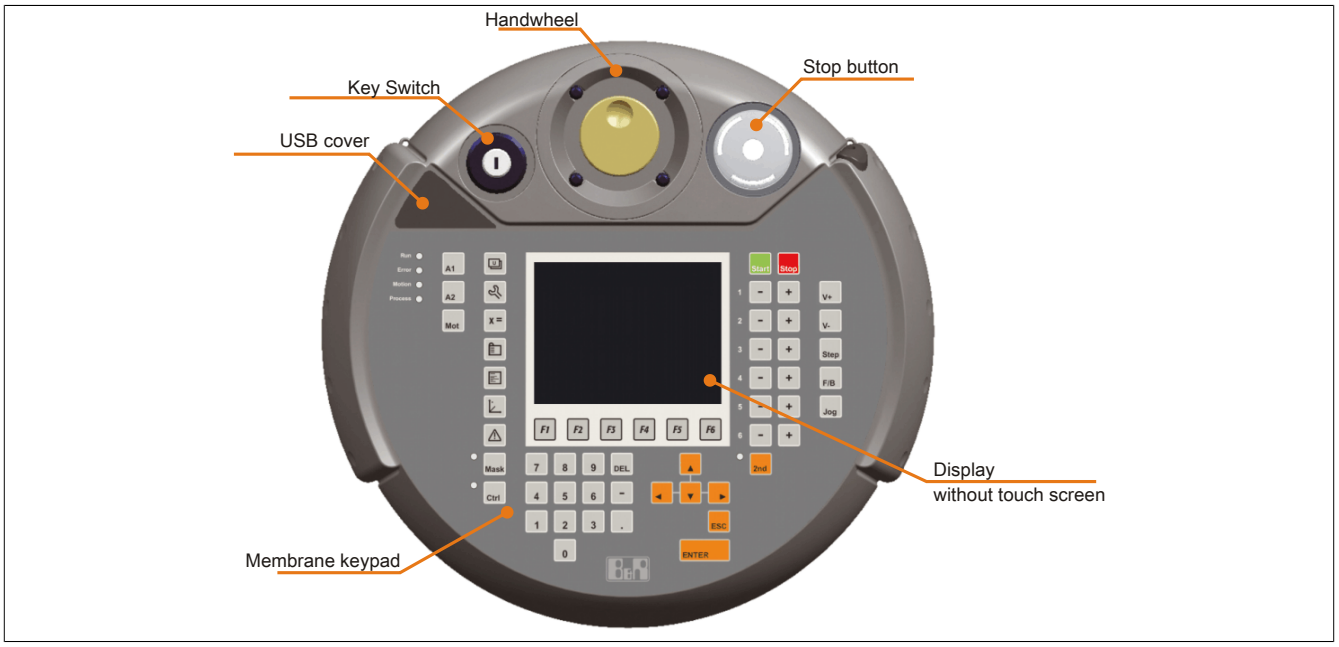


Figure 19: 5MP040.0381-02 - Components

3.1.2.4 Technical data

Information:

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

Product ID	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-buffered	-
Memory	
Type	SDRAM
Size	256 MB
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 load	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

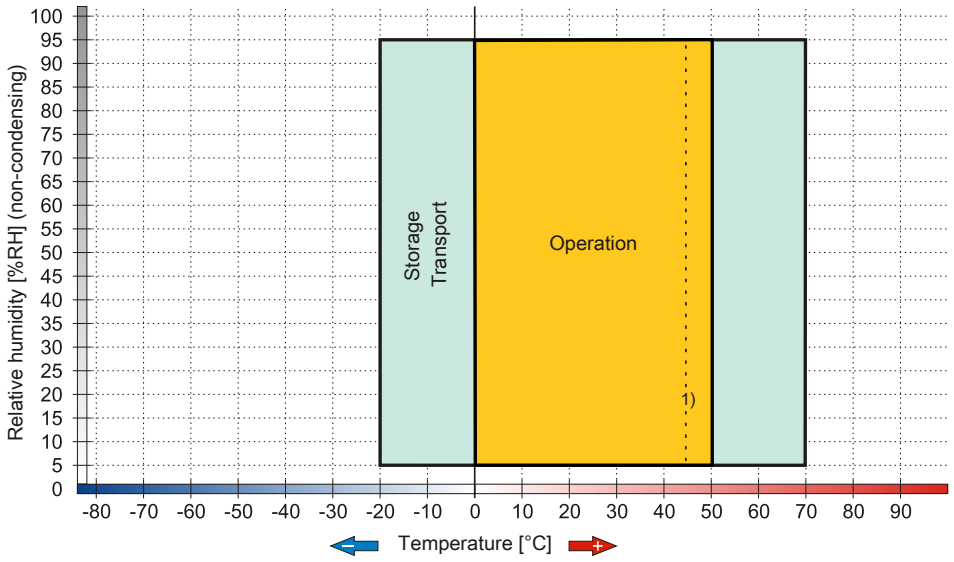
Table 11: 5MP040.0381-02 - Technical data

Product ID	5MP040.0381-02
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
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 N.C., right position)
Enabling switch	Yes (two 3-step switches, left and right position)
Override potentiometer	No
Key Switch	Yes
LEDs	7
Electrical characteristics	
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) 1)
Starting current	max. 5,6 A (current limitation present)
Power consumption	4.8 W (200 mA at 24 VDC)
Max. interruption of the supply	≤ 10 ms
Electrical isolation	No
Operating conditions	
Height of drop	1.5 m to industrial floor
Flame resistant	UL94V-0
Protection in accordance with EN 60529	IP65
Protection class	Class 3 in accordance with EN 61131-2 or EN 50178
Environmental conditions	
Temperature	
Operation	0 to 50°C 3)
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 length
Altitude	
Operation	Max. 3000 m
Mechanical characteristics	
Housing	
Material	ABS
Paint	similar to RAL7011
Front	
Panel membrane	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1100 g

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

1) Connection via Mobile Panel cable.
2) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
3) When used with a buffer battery (5MPBAT.0000-00) the maximum temperature during operation is 45°C.

3.1.2.5 Temperature humidity diagram



1) When used with a buffer battery (5MPBAT.0000-00) the maximum temperature during operation is 45°C.

Figure 20: 5MP040.0381-02 - Temperature humidity diagram

3.1.2.6 Dimensions

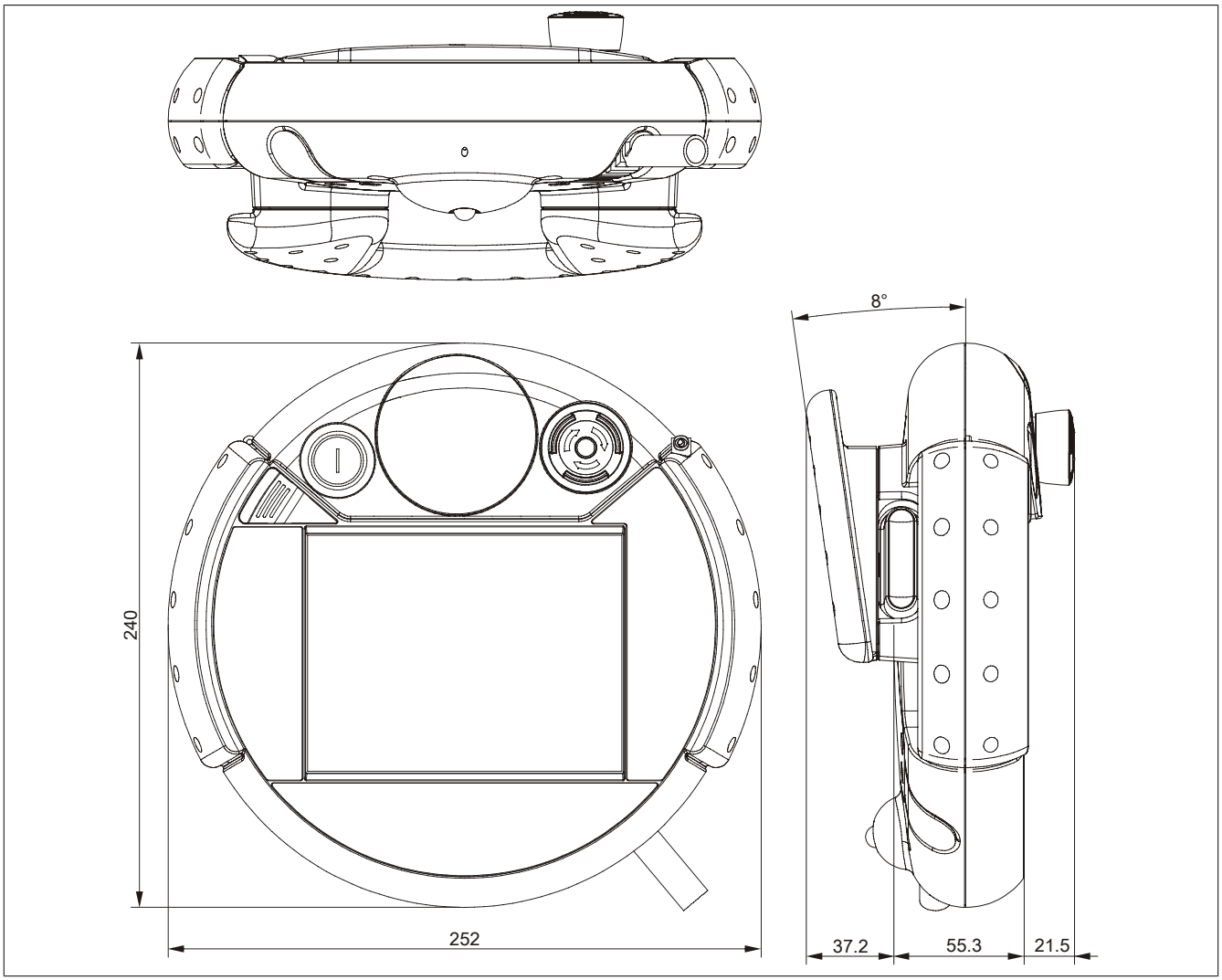


Figure 21: 5MP040.0381-02 - Dimensions

3.1.3 5MP050.0653-01

3.1.3.1 General information

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

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; ETH 10/100, USB 1.1; 31 system keys, stop button, hand wheel, push button; 2 integrated 3-step enabling switches, handle. Delivered pre-assembled (please order cables and operating system separately).	
	Required accessories	
	Attachment cables	
5CAMPH.0018-30	MP40/50 Connecting Cable with Push Pull connector, 1.8 m.	
5CAMPH.0050-30	MP40/50 Connecting Cable with Push Pull connector, 5 m.	
5CAMPH.0100-30	MP40/50 Connecting Cable with Push Pull connector, 10 m.	
5CAMPH.0150-30	MP40/50 Connecting Cable with Push Pull connector, 15 m.	
5CAMPH.0200-30	MP40/50 Connecting Cable with Push Pull connector, 20 m.	
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel Cabinet Cable Ethernet Crossover with Push Pull conncector, 2 m.	
5CAMPC.0020-11	Mobile Panel Cabinet Cable Ethernet straight through with Push Pull connector, 2 m.	
	Optional accessories	
	Accessories	
4MPBRA.0000-01	MP40/50 Wall Bracket.	
4MPCBX.0000-00	Mobile Panel Connection Box for cables with Push Pull connector.	
4MPCBX.0001-00	Mobile Panel Connection Box Small for cables with Push Pull connector.	
5CAMPB.0100-10	Mobile Panel Box cable, with wire tip sleeves for connection in the switching cabinet; with plug contacts for wiring in the connection box, 10 m.	
5MPBAT.0000-00	MP40/50 Back-up Battery	

Table 12: 5MP050.0653-01 - Order data

3.1.3.3 Components

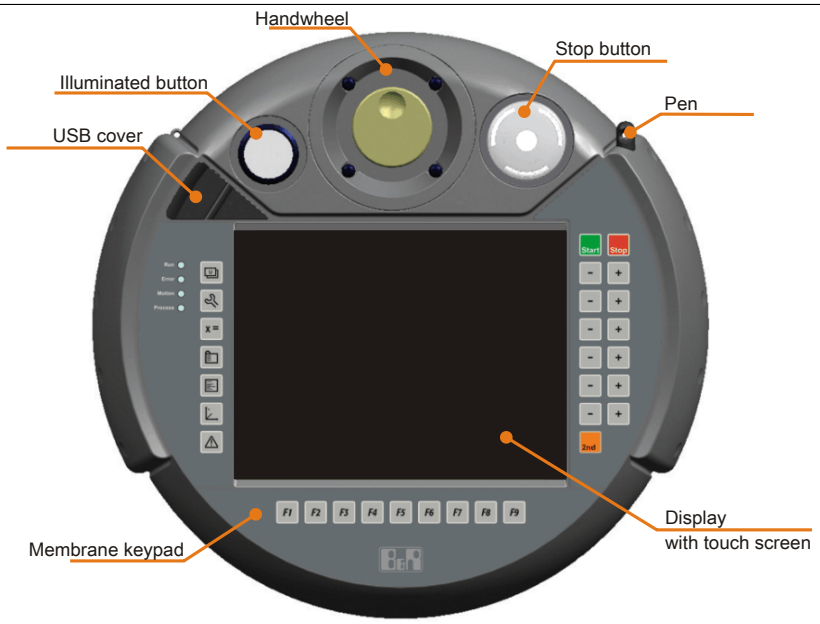


Figure 22: 5MP050.0653-01 - Components

3.1.3.4 Technical data

Information:

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

Product ID	5MP050.0653-01
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-buffered	-
Memory	
Type	SDRAM
Size	256 MB
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 load	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	Color TFT
Diagonal	6.5" (165 mm)
Colors	65,535 [2)]
Resolution	VGA, 640 x 480 pixels
Contrast	300:1

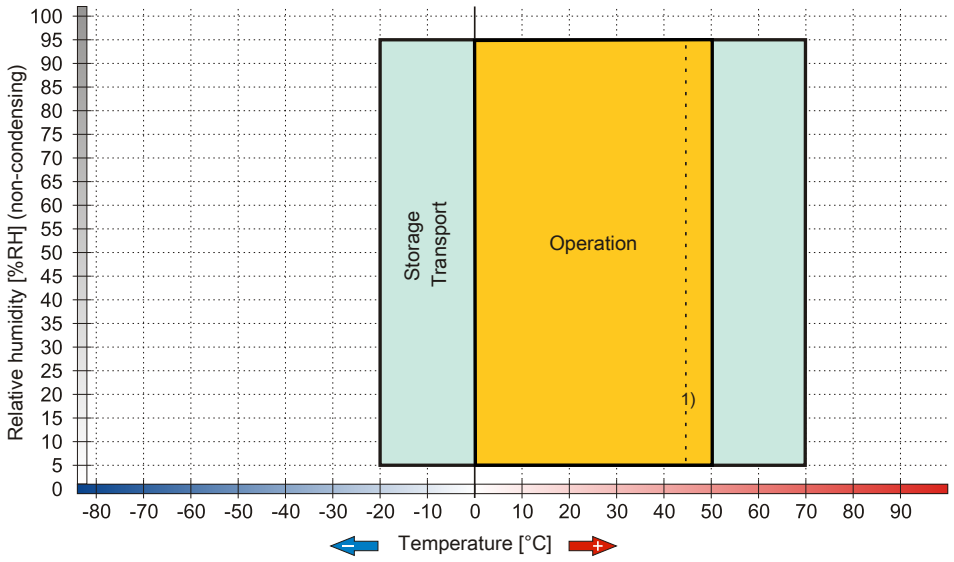
Table 13: 5MP050.0653-01 - Technical data

Product ID	5MP050.0653-01
Viewing angles	
Horizontal	Direction R / Direction L = 55°
Vertical	Direction U = 30°/ direction D = 60°
Backlight	
Brightness	400 cd/m²
Half brightness time	50,000 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 N.C., right position)
Enabling switch	Yes (two 3-step switches, left and right position)
Override potentiometer	No
Key Switch	No
LEDs	4
Electrical characteristics	
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) 1)
Starting current	max. 5,6 A (current limitation present)
Power consumption	9.6 W (400 mA at 24 VDC)
Max. interruption of the supply	≤ 10 ms
Electrical isolation	No
Operating conditions	
Height of drop	1.5 m to industrial floor
Flame resistant	UL94V-0
Protection in accordance with EN 60529	IP65
Protection class	Class 3 in accordance with EN 61131-2 or EN 50178
Environmental conditions	
Temperature	
Operation	0 to 50°C 3)
Storage	-20 to 70°C
Transport	-20 to 70°C
Relative humidity	
Operation	Max. 95% at T ≤ 40°C, non-condensing
Storage	Max. 95% at T ≤ 55°C, non-condensing
Transport	Max. 95% at 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 length
Altitude	
Operation	Max. 3000 m
Mechanical characteristics	
Housing	
Material	ABS
Paint	similar to RAL7011
Front	
Panel membrane	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1250 g

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

1) Connection via Mobile Panel cable.
2) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
3) When used with a buffer battery (5MPBAT.0000-00) the maximum temperature during operation is 45°C.

3.1.3.5 Temperature humidity diagram



1) When used with a buffer battery (5MPBAT.0000-00) the maximum temperature during operation is 45°C.

Figure 23: 5MP050.0653-01 - Temperature humidity diagram

3.1.3.6 Dimensions

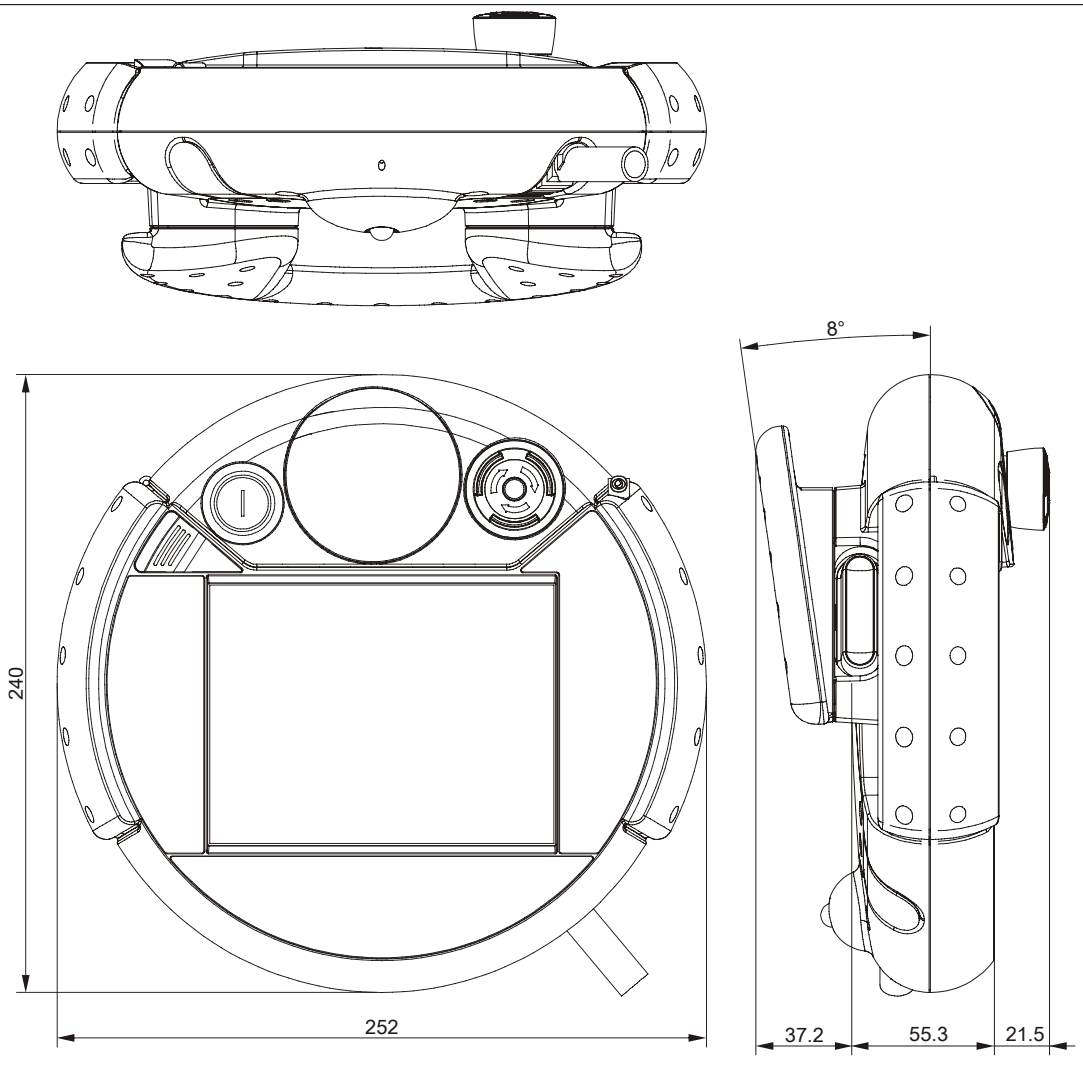


Figure 24: 5MP050.0653-01 - Dimensions

3.1.4 5MP050.0653-02

3.1.4.1 General information

- 6.5" VGA color TFT 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 switch

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; ETH 10/100, USB 1.1; 31 system keys, stop button, joystick, key switch; 2 integrated 3-step enabling switches, handle. Delivered pre-assembled (please order cables and operating system separately).	
	Required accessories	
	Attachment cables	
5CAMPH.0018-30	MP40/50 Connecting Cable with Push Pull connector, 1.8 m.	
5CAMPH.0050-30	MP40/50 Connecting Cable with Push Pull connector, 5 m.	
5CAMPH.0100-30	MP40/50 Connecting Cable with Push Pull connector, 10 m.	
5CAMPH.0150-30	MP40/50 Connecting Cable with Push Pull connector, 15 m.	
5CAMPH.0200-30	MP40/50 Connecting Cable with Push Pull connector, 20 m.	
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel Cabinet Cable Ethernet Crossover with Push Pull conncector, 2 m.	
5CAMPC.0020-11	Mobile Panel Cabinet Cable Ethernet straight through with Push Pull connector, 2 m.	
	Optional accessories	
	Accessories	
4MPBRA.0000-01	MP40/50 Wall Bracket.	
4MPCBX.0000-00	Mobile Panel Connection Box for cables with Push Pull connector.	
4MPCBX.0001-00	Mobile Panel Connection Box Small for cables with Push Pull connector.	
5CAMPB.0100-10	Mobile Panel Box cable, with wire tip sleeves for connection in the switching cabinet; with plug contacts for wiring in the connection box, 10 m.	
5MPBAT.0000-00	MP40/50 Back-up Battery	

Table 14: 5MP050.0653-02 - Order data

3.1.4.3 Components

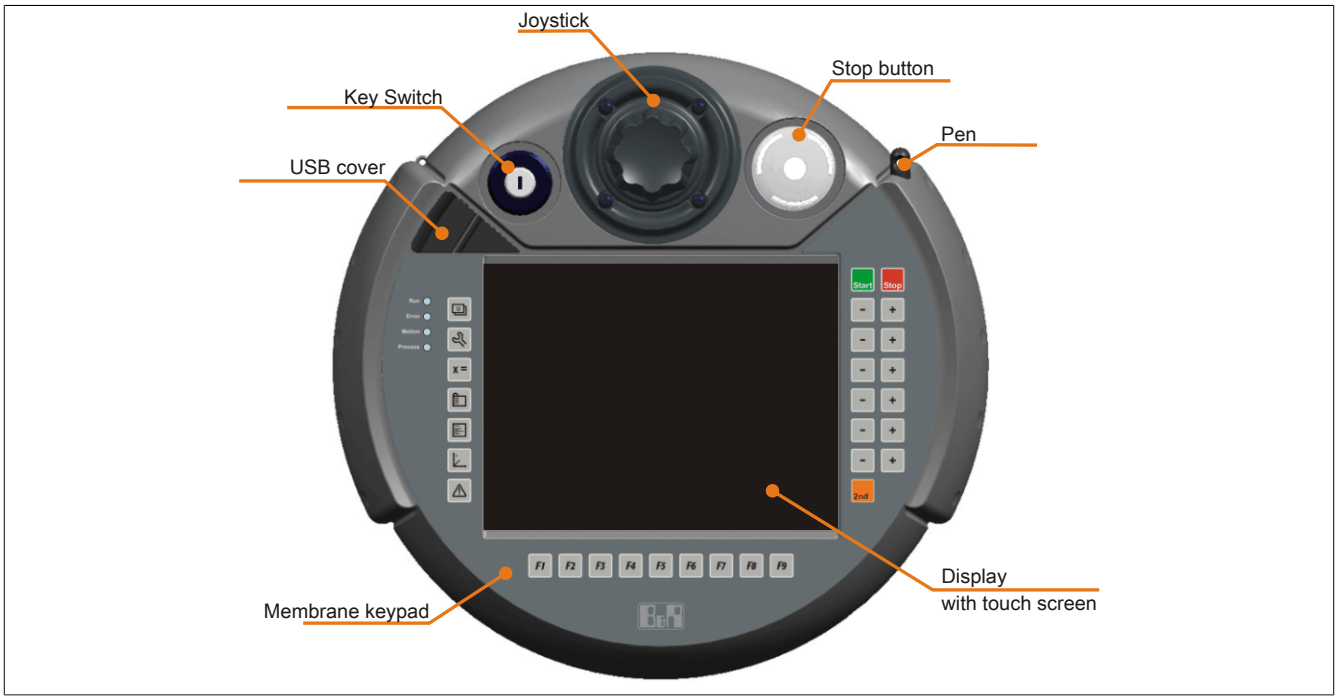


Figure 25: 5MP050.0653-02 - Components

3.1.4.4 Technical data

Information:

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

Product ID	5MP050.0653-02
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-buffered	-
Memory	
Type	SDRAM
Size	256 MB
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 load	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	Color TFT
Diagonal	6.5" (165 mm)
Colors	65,535 [2)]
Resolution	VGA, 640 x 480 pixels

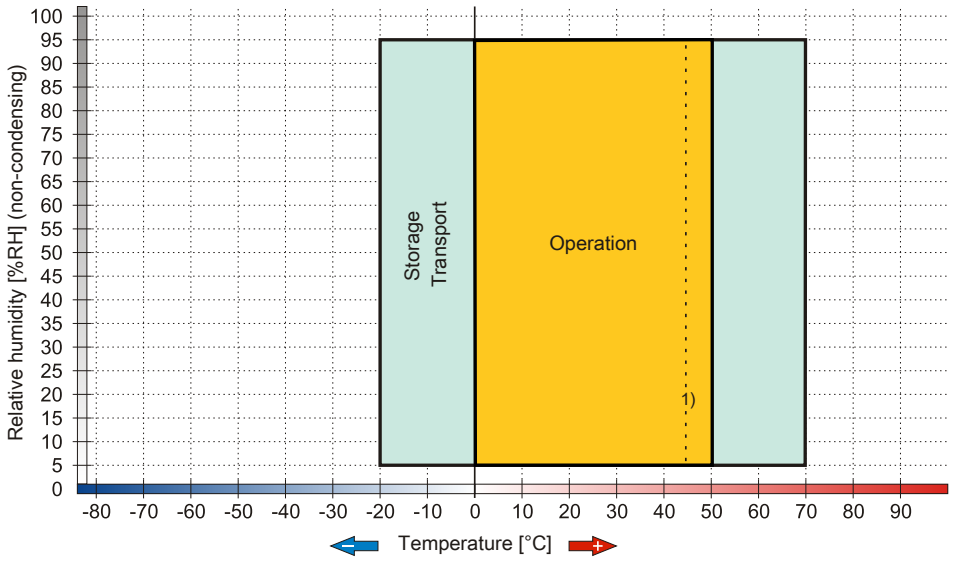
Table 15: 5MP050.0653-02 - Technical data

Product ID	5MP050.0653-02
Contrast	300:1
Viewing angles	
Horizontal	Direction R / Direction L = 55°
Vertical	Direction U = 30°/ direction D = 60°
Backlight	
Brightness	400 cd/m²
Half brightness time	50,000 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 N.C., right position)
Enabling switch	Yes (two 3-step switches, left and right position)
Override potentiometer	No
Key Switch	Yes
LEDs	4
Electrical characteristics	
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) 1)
Starting current	max. 5,6 A (current limitation present)
Power consumption	9.6 W (400 mA at 24 VDC)
Max. interruption of the supply	≤ 10 ms
Electrical isolation	No
Operating conditions	
Height of drop	1.5 m to industrial floor
Flame resistant	UL94V-0
Protection in accordance with EN 60529	IP65
Protection class	Class 3 in accordance with EN 61131-2 or EN 50178
Environmental conditions	
Temperature	
Operation	0 to 50°C 3)
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 length
Altitude	
Operation	Max. 3000 m
Mechanical characteristics	
Housing	
Material	ABS
Paint	similar to RAL7011
Front	
Panel membrane	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1250 g

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

1) Connection via Mobile Panel cable.
2) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
3) When used with a buffer battery (5MPBAT.0000-00) the maximum temperature during operation is 45°C.

3.1.4.5 Temperature humidity diagram



1) When used with a buffer battery (5MPBAT.0000-00) the maximum temperature during operation is 45°C.

Figure 26: 5MP050.0653-02 - Temperature humidity diagram

3.1.4.6 Dimensions

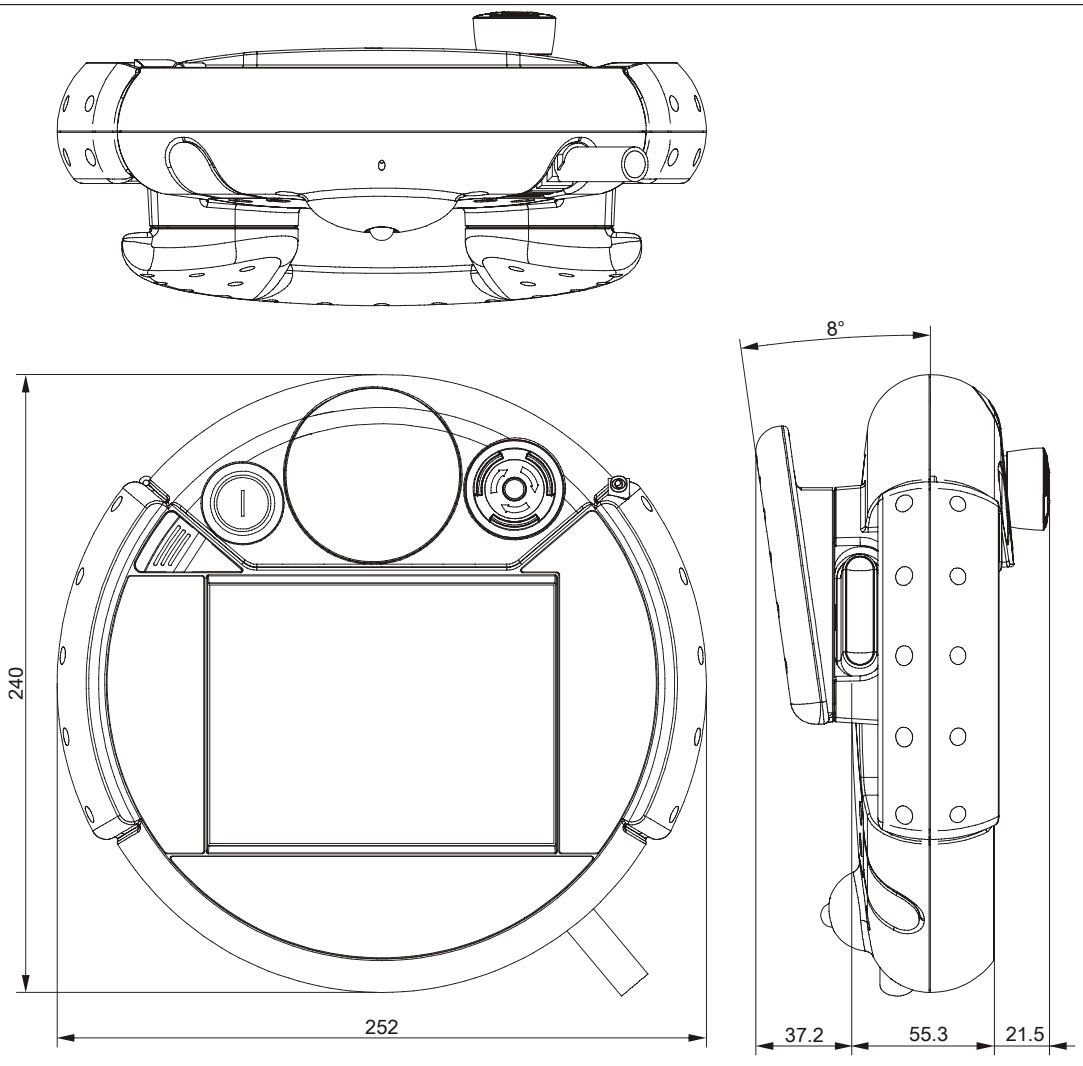


Figure 27: 5MP050.0653-02 - Dimensions

3.1.5 5MP050.0653-03

3.1.5.1 General information

- 6.5" VGA color TFT 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 switch

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; ETH 10/100, USB 1.1; 31 system keys, stop button, hand wheel, override potentiometer; 2 integrated 3-step enabling switches, handle. Delivered pre-assembled (please order cables and operating system separately).	
	Required accessories	
	Attachment cables	
5CAMPH.0018-30	MP40/50 Connecting Cable with Push Pull connector, 1.8 m.	
5CAMPH.0050-30	MP40/50 Connecting Cable with Push Pull connector, 5 m.	
5CAMPH.0100-30	MP40/50 Connecting Cable with Push Pull connector, 10 m.	
5CAMPH.0150-30	MP40/50 Connecting Cable with Push Pull connector, 15 m.	
5CAMPH.0200-30	MP40/50 Connecting Cable with Push Pull connector, 20 m.	
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel Cabinet Cable Ethernet Crossover with Push Pull conncector, 2 m.	
5CAMPC.0020-11	Mobile Panel Cabinet Cable Ethernet straight through with Push Pull connector, 2 m.	
	Optional accessories	
	Accessories	
4MPBRA.0000-01	MP40/50 Wall Bracket.	
4MPCBX.0000-00	Mobile Panel Connection Box for cables with Push Pull connector.	
4MPCBX.0001-00	Mobile Panel Connection Box Small for cables with Push Pull connector.	
5CAMPB.0100-10	Mobile Panel Box cable, with wire tip sleeves for connection in the switching cabinet; with plug contacts for wiring in the connection box, 10 m.	
5MPBAT.0000-00	MP40/50 Back-up Battery	

Table 16: 5MP050.0653-03 - Order data

3.1.5.3 Components

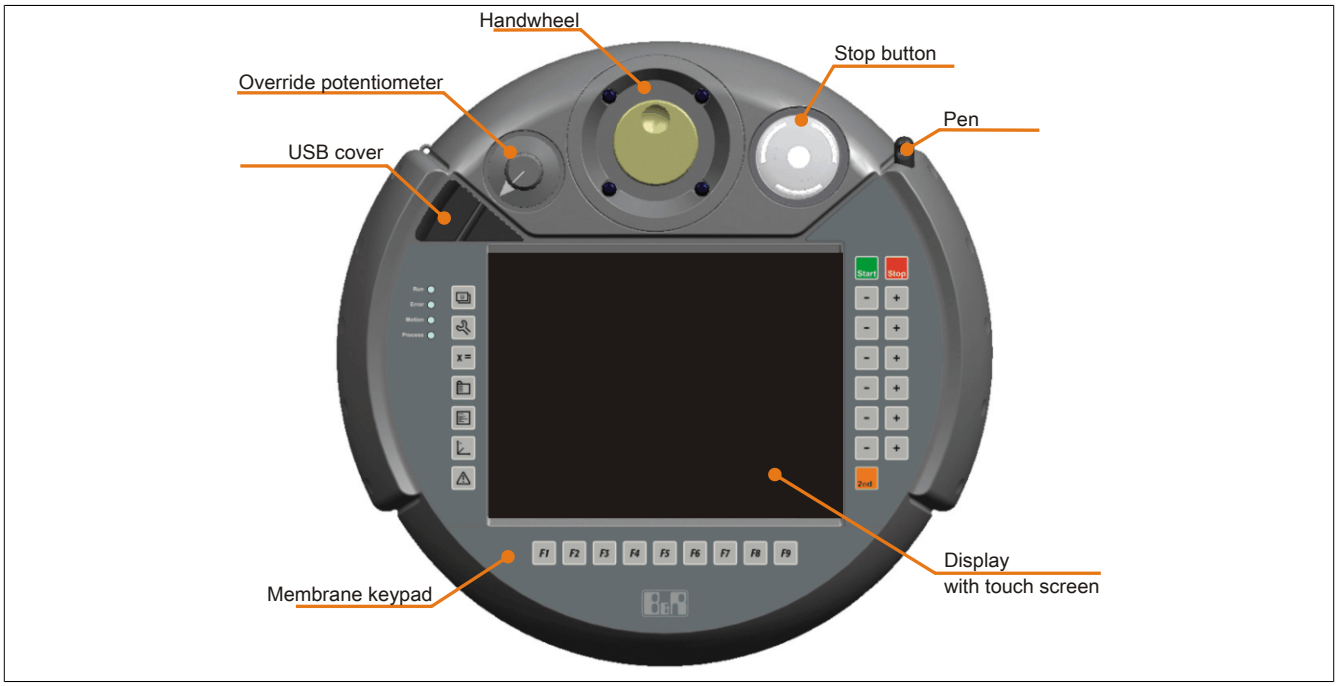


Figure 28: 5MP050.0653-03 - Components

3.1.5.4 Technical data

Information:

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

Product ID	5MP050.0653-03
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-buffered	-
Memory	
Type	SDRAM
Size	256 MB
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 load	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	Color TFT
Diagonal	6.5" (165 mm)
Colors	65,535 [2)]
Resolution	VGA, 640 x 480 pixels

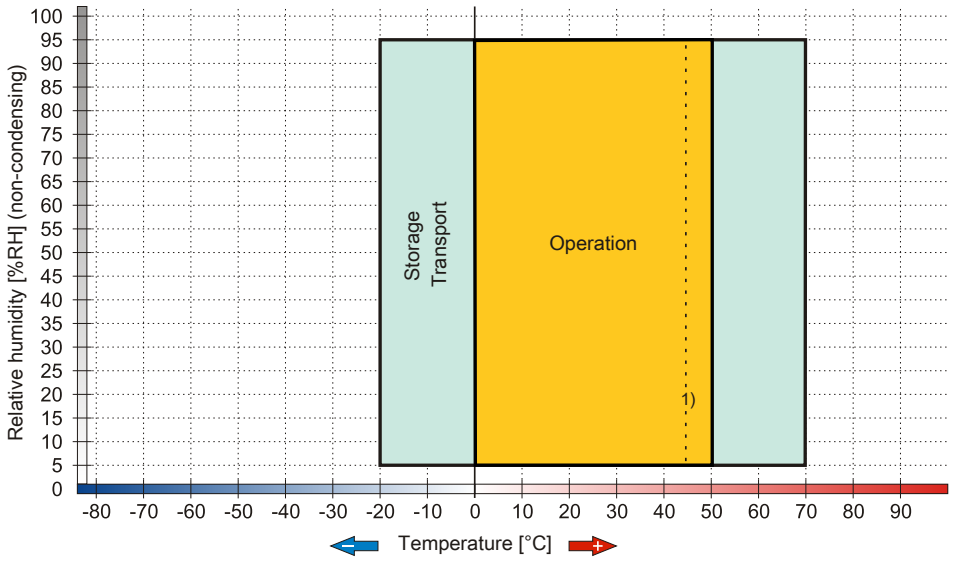
Table 17: 5MP050.0653-03 - Technical data

Product ID	5MP050.0653-03
Contrast	300:1
Viewing angles	
Horizontal	Direction R / Direction L = 55°
Vertical	Direction U = 30°/ direction D = 60°
Backlight	
Brightness	400 cd/m²
Half brightness time	50,000 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 N.C., right position)
Enabling switch	Yes (two 3-step switches, left and right position)
Override potentiometer	Yes
Key Switch	No
LEDs	4
Electrical characteristics	
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) 1)
Starting current	max. 5,6 A (current limitation present)
Power consumption	9.6 W (400 mA at 24 VDC)
Max. interruption of the supply	≤ 10 ms
Electrical isolation	No
Operating conditions	
Height of drop	1.5 m to industrial floor
Flame resistant	UL94V-0
Protection in accordance with EN 60529	IP65
Protection class	Class 3 in accordance with EN 61131-2 or EN 50178
Environmental conditions	
Temperature	
Operation	0 to 50°C 3)
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 length
Altitude	
Operation	Max. 3000 m
Mechanical characteristics	
Housing	
Material	ABS
Paint	similar to RAL7011
Front	
Panel membrane	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1250 g

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

1) Connection via Mobile Panel cable.
2) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
3) When used with a buffer battery (5MPBAT.0000-00) the maximum temperature during operation is 45°C.

3.1.5.5 Temperature humidity diagram



1) When used with a buffer battery (5MPBAT.0000-00) the maximum temperature during operation is 45°C.

Figure 29: 5MP050.0653-03 - Temperature humidity diagram

3.1.5.6 Dimensions

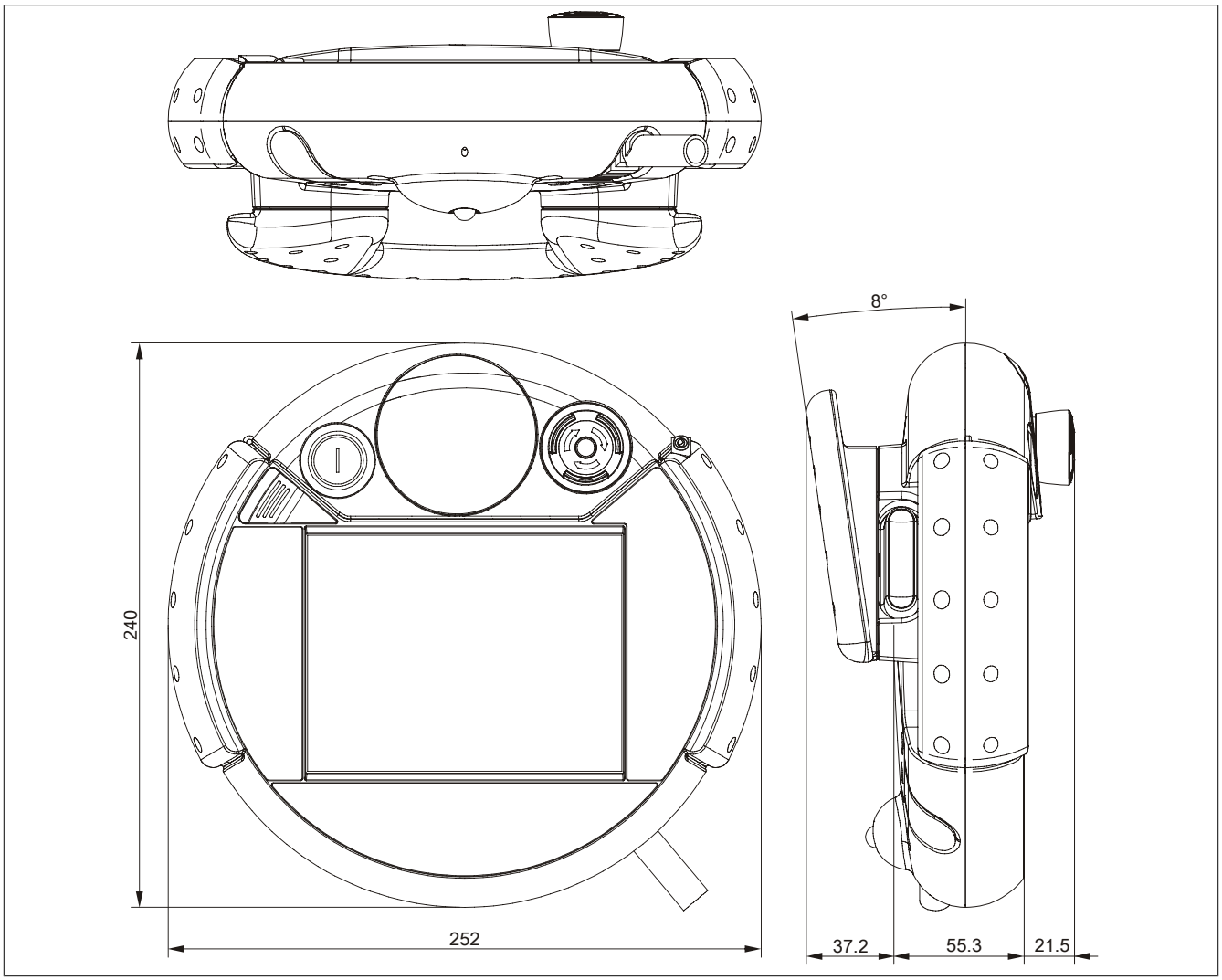


Figure 30: 5MP050.0653-03 - Dimensions

3.1.6 5MP050.0653-04

3.1.6.1 General information

- 6.5" VGA color TFT 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 switch

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; ETH 10/100, USB 1.1; 31 system keys, stop button, hand wheel, key switch; 2 integrated 3-step enabling switches, handle. Delivered pre-assembled (please order cables and operating system separately).	
	Required accessories	
	Attachment cables	
5CAMPH.0018-30	MP40/50 Connecting Cable with Push Pull connector, 1.8 m.	
5CAMPH.0050-30	MP40/50 Connecting Cable with Push Pull connector, 5 m.	
5CAMPH.0100-30	MP40/50 Connecting Cable with Push Pull connector, 10 m.	
5CAMPH.0150-30	MP40/50 Connecting Cable with Push Pull connector, 15 m.	
5CAMPH.0200-30	MP40/50 Connecting Cable with Push Pull connector, 20 m.	
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel Cabinet Cable Ethernet Crossover with Push Pull conncector, 2 m.	
5CAMPC.0020-11	Mobile Panel Cabinet Cable Ethernet straight through with Push Pull connector, 2 m.	
	Optional accessories	
	Accessories	
4MPBRA.0000-01	MP40/50 Wall Bracket.	
4MPCBX.0000-00	Mobile Panel Connection Box for cables with Push Pull connector.	
4MPCBX.0001-00	Mobile Panel Connection Box Small for cables with Push Pull connector.	
5CAMPB.0100-10	Mobile Panel Box cable, with wire tip sleeves for connection in the switching cabinet; with plug contacts for wiring in the connection box, 10 m.	
5MPBAT.0000-00	MP40/50 Back-up Battery	

Table 18: 5MP050.0653-04 - Order data

3.1.6.3 Components

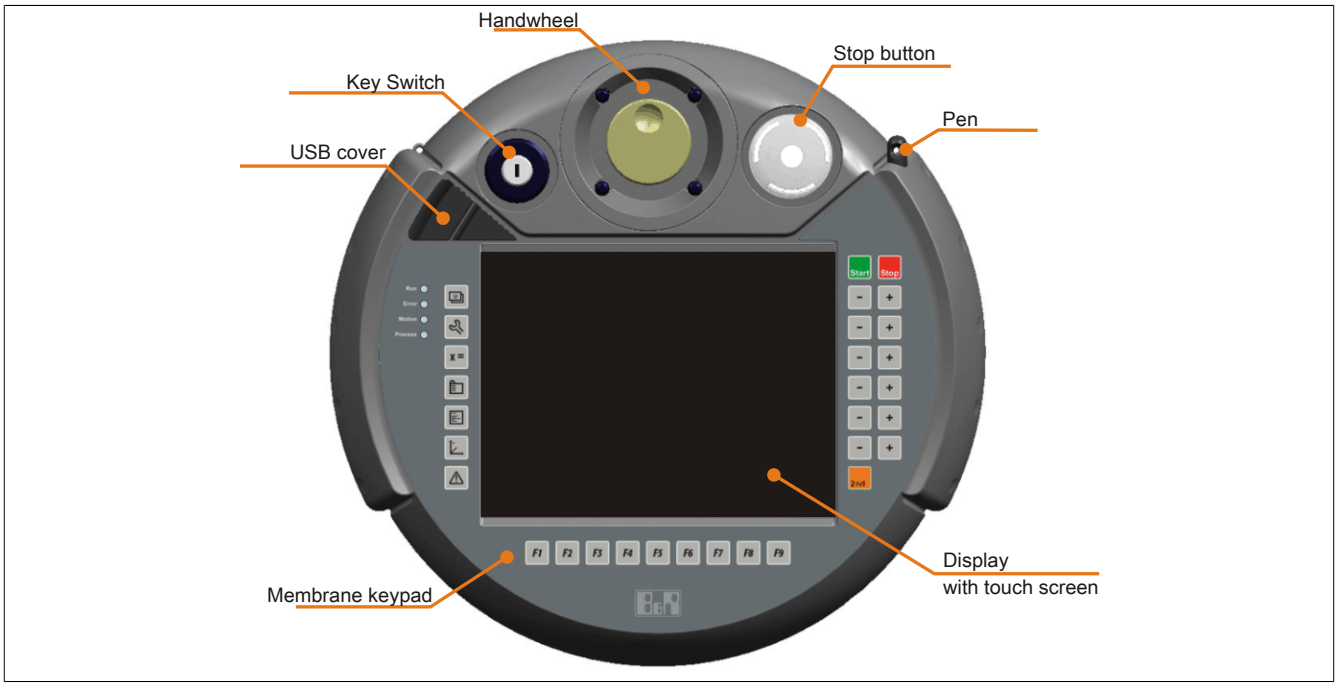


Figure 31: 5MP050.0653-04 - Components

3.1.6.4 Technical data

Information:

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

Product ID	5MP050.0653-04
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-buffered	-
Memory	
Type	SDRAM
Size	256 MB
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 load	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	Color TFT
Diagonal	6.5" (165 mm)
Colors	65,535 [2)]
Resolution	VGA, 640 x 480 pixels

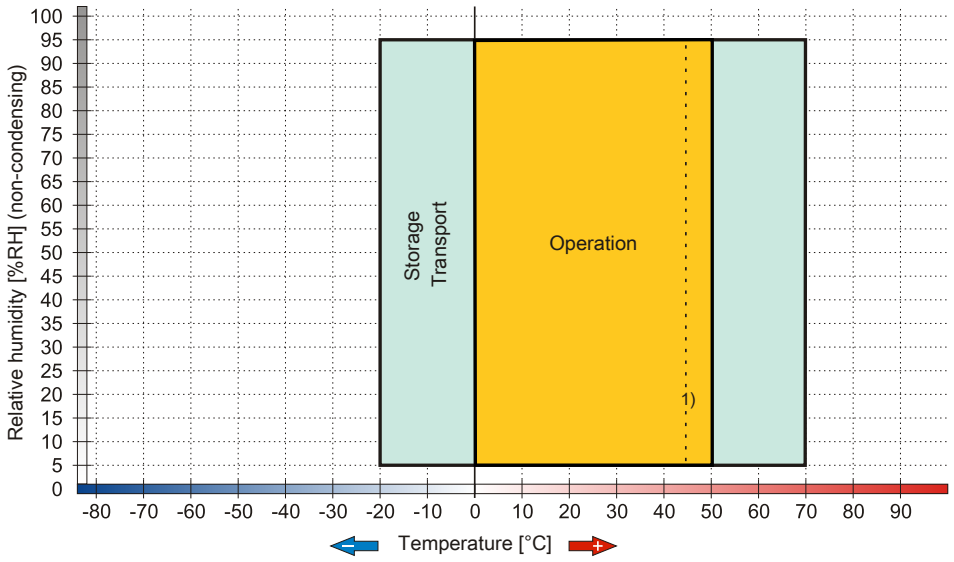
Table 19: 5MP050.0653-04 - Technical data

Product ID	5MP050.0653-04
Contrast	300:1
Viewing angles	
Horizontal	Direction R / Direction L = 55°
Vertical	Direction U = 30°/ direction D = 60°
Backlight	
Brightness	400 cd/m²
Half brightness time	50,000 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 N.C., right position)
Enabling switch	Yes (two 3-step switches, left and right position)
Override potentiometer	No
Key Switch	Yes
LEDs	4
Electrical characteristics	
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) 1)
Starting current	max. 5,6 A (current limitation present)
Power consumption	9.6 W (400 mA at 24 VDC)
Max. interruption of the supply	≤ 10 ms
Electrical isolation	No
Operating conditions	
Height of drop	1.5 m to industrial floor
Flame resistant	UL94V-0
Protection in accordance with EN 60529	IP65
Protection class	Class 3 in accordance with EN 61131-2 or EN 50178
Environmental conditions	
Temperature	
Operation	0 to 50°C 3)
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 length
Altitude	
Operation	Max. 3000 m
Mechanical characteristics	
Housing	
Material	ABS
Paint	similar to RAL7011
Front	
Panel membrane	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1250 g

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

1) Connection via Mobile Panel cable.
2) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
3) When used with a buffer battery (5MPBAT.0000-00) the maximum temperature during operation is 45°C.

3.1.6.5 Temperature humidity diagram



1) When used with a buffer battery (5MPBAT.0000-00) the maximum temperature during operation is 45°C.

Figure 32: 5MP050.0653-04 - Temperature humidity diagram

3.1.6.6 Dimensions

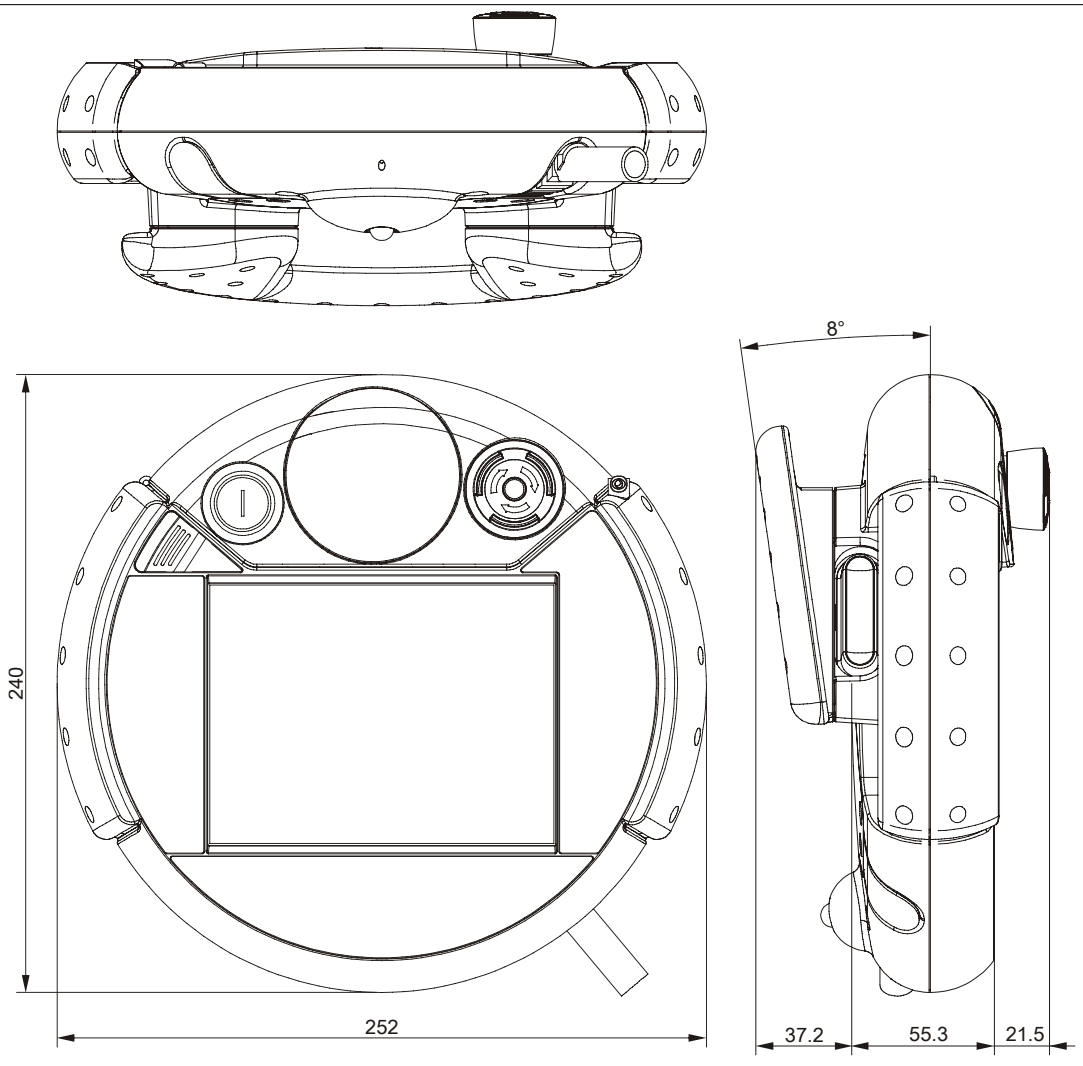


Figure 33: 5MP050.0653-04 - Dimensions

3.2 Cables

3.2.1 Attachment cable

3.2.1.1 5CAMPH.0xxx-30

3.2.1.1.1 General information

The attachment cable establishes the electrical and mechanical connection between the switching cabinet and device. It contains lines for the network (Ethernet 10/100 MBit/s) as well as for the command devices and 24 VDC supply.

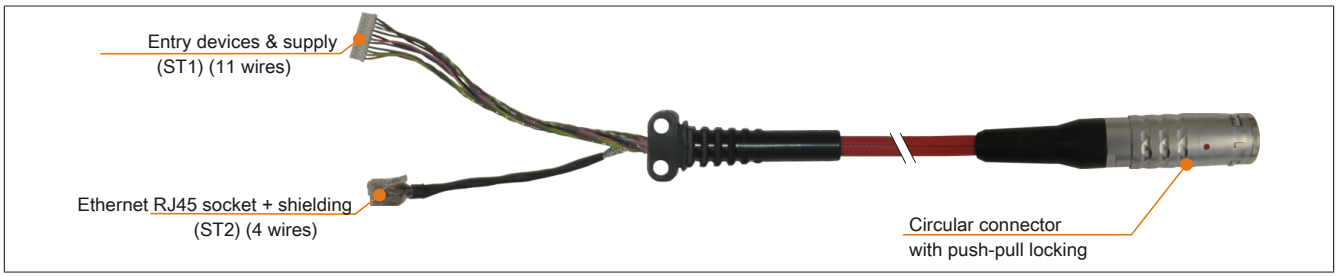


Figure 34: 5CAMPH.0xxx-30 - Attachment cable

The surface is protected against water, oil (lubricating and hydraulic oils in accordance with EN60811, section 2-1) and cooling lubricant.

On the Mobile Panel, the attachment cable is mounted into the attachment shaft. On the control cabinet end, the attachment cable has a circular plug. The attachment cable is available in different lengths. For information regarding the procedure for connecting the attachment cable see "Commissioning" on page 67.

3.2.1.1.2 Order data

Model number	Short description	Figure
	Attachment cables	
5CAMPH.0018-30	MP40/50 Connecting Cable with Push Pull connector, 1.8 m.	
5CAMPH.0050-30	MP40/50 Connecting Cable with Push Pull connector, 5 m.	
5CAMPH.0100-30	MP40/50 Connecting Cable with Push Pull connector, 10 m.	
5CAMPH.0150-30	MP40/50 Connecting Cable with Push Pull connector, 15 m.	
5CAMPH.0200-30	MP40/50 Connecting Cable with Push Pull connector, 20 m.	
	Required accessories	
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel Cabinet Cable Ethernet Crossover with Push Pull conncector, 2 m.	
5CAMPC.0020-11	Mobile Panel Cabinet Cable Ethernet straight through with Push Pull connector, 2 m.	
	Optional accessories	
	Accessories	
4MPCBX.0000-00	Mobile Panel Connection Box for cables with Push Pull connector.	
4MPCBX.0001-00	Mobile Panel Connection Box Small for cables with Push Pull connector.	

Table 20: 5CAMPH.0018-30, 5CAMPH.0050-30, 5CAMPH.0100-30, 5CAMPH.0150-30, 5CAMPH.0200-30 - Order data

3.2.1.1.3 Technical data

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

Product ID	5CAMPH.0018-30	5CAMPH.0050-30	5CAMPH.0100-30	5CAMPH.0150-30	5CAMPH.0200-30
General information					
Durability	Mechanical characteristics according to DIN VDE 0472 section 603 test type H (100000 cycles)				Mechanical characteristics according to DIN VDE 0472 section 603 test type H (100,000 cycles)

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

Product ID	5CAMPH.0018-30	5CAMPH.0050-30	5CAMPH.0100-30	5CAMPH.0150-30	5CAMPH.0200-30
Certification					
CE			-		Yes
Cable structure					
Type			Hybrid cable, 25-wire		
Supply lines					
Material			Tinned copper wires		
Outer sheathing					
Material			Silicon and halogen free, flame retardant PUR outer sheathing		
Color			Similar to RAL 7012		
Cable elements					
Networks			Twisted pair cable for Ethernet (10/100 Mbit/s) (4 wires, RJ45 plug)		
Stop button			Direct connection between the stop button and the monitoring device (4 wires)		
Power supply			Supply voltage +24 VDC and ground (3 wires)		
Enabling switch			Direct connection between the enable switch and the monitoring device (4 wires)		
Connector					
Type			ODU circular plug with push-pull locking		
Electrical characteristics					
Operating voltage			Max. 30 VDC		
Conductor resistance			≤30 Ω/km		
Operating conditions					
Flame resistant			according to IEC 60332-1 and VW1 / FT1 according to C-UL		in accordance with IEC 60332-1 and VW1 / FT1 according to C-UL
Shield attenuation			According to IEC 60096-1, Amendment 2		In accordance with IEC 60096-1, Amendment 2
Oil and hydrolysis resistance			According to 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		
Flex radius			Min. 60 mm		
Weight			153 g/m		
Tension			Max. 140 N		

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

3.2.1.1.4 Cable pinout

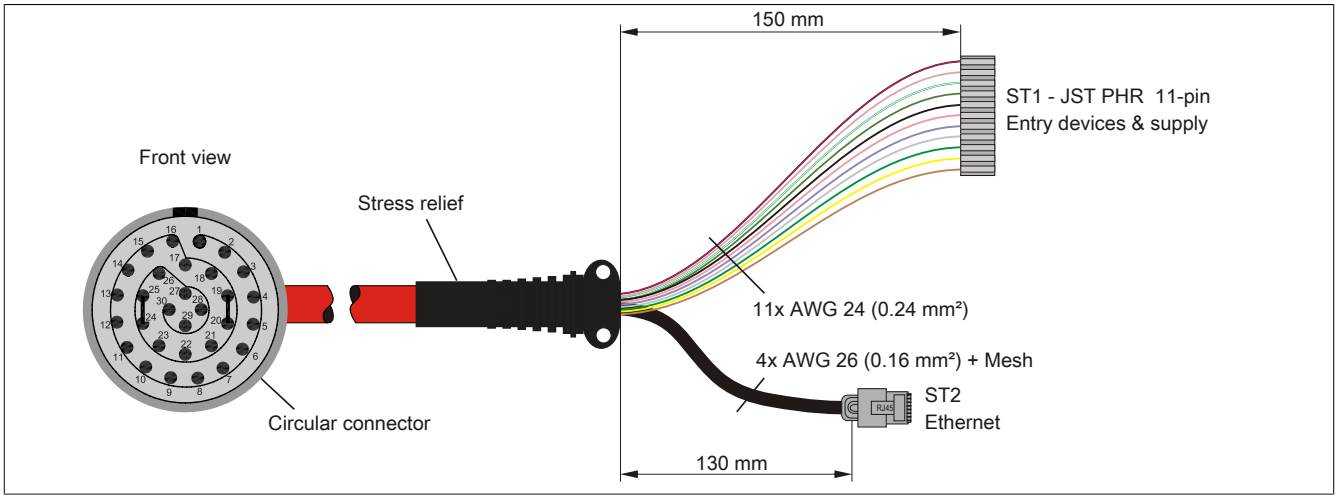


Figure 35: 5CAMPH.0xxx-30 - Attachment cable pinout

ST1 entry devices & supply		Wire colors in attachment cable	Connection housing pinout
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	Purple	-
+24 VDC	Pin 6	Pink	Pin 3
GND	Pin 7	Black	Pin 14
Stop O11	Pin 8	Brown-Green	Pin 1

Table 22: 5CAMPH.0xxx-30 - Cable pinout

ST1 entry devices & supply		Wire colors in attachment cable	Connection housing pinout
Stop O12	Pin 9	White-Green	Pin 15
Stop O21	Pin 10	Gray-Pink	Pin 2
Stop O22	Pin 11	Red-Blue	Pin 16
Ethernet shield		-	-
ST2 Ethernet		**Wire colors in attachment cable**	**Connection housing pinout**
TX	Pin 1	Blue	Pin 27
TX\	Pin 2	White	Pin 29
RX	Pin 3	Orange	Pin 28
NC	Pin 4	-	-
NC	Pin 5	-	-
RX\	Pin 6	Red	Pin 30
NC	Pin 7	-	-
NC	Pin 8	-	-
Shielding	Housing	Mesh	-

Table 22: 5CAMPH.0xxx-30 - Cable pinout

3.2.2 Control cabinet cable

3.2.2.1 5CAMPC.0020-10

3.2.2.1.1 General information

The crossover control cabinet cable is required for the wiring inside the control cabinet.
The pinout of the Ethernet plug (crossover) make it possible to connect directly to a B&R controller e.g. X20 or to the first Ethernet connection (MDIX) on the B&R Ethernet Hub AC808.

If a different Ethernet hub is used, it must support the crossover of the RX and TX lines.

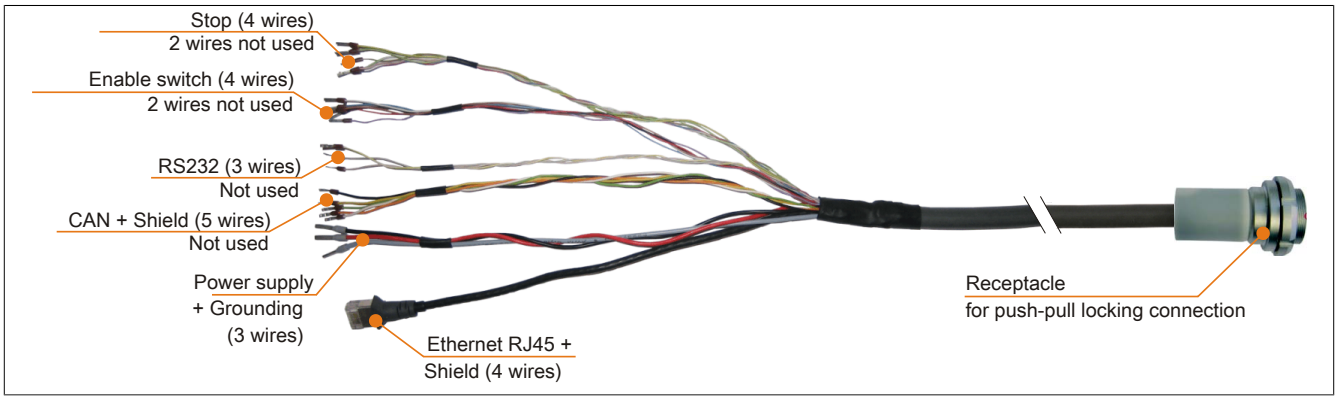


Figure 36: 5CAMPC.0020-10 - Mobile Panel control cabinet cable

Information:

The control cabinet cable is used in the Mobile Panel 40/50 as well as in Mobile Panel 100/200 product series. Not all wires are used in the Mobile Panel 40/50 wiring, which limits its functionality compared to Mobile Panel 100/20 devices.

The surface is protected against water, oil (lubricating and hydraulic oils in accordance with EN60811, section 2-1) and cooling lubricant.

The connection housing is used to connect the control cabinet cable to the control cabinet door (see "Figure 38: Drilling template - Receptacle" on page 63). The other end of the control cabinet cable has a pre-assembled RJ45 Ethernet plug. The rest of the lines have an open end with wire tip sleeves. This makes it easier to wire the cable to safety equipment and the other connections.

3.2.2.1.2 Order data

Model number	Short description	Figure
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel Cabinet Cable Ethernet Crossover with Push Pull conncector, 2 m.	
	Optional accessories	
	Accessories	
4MPCBX.0000-00	Mobile Panel Connection Box for cables with Push Pull connector.	
4MPCBX.0001-00	Mobile Panel Connection Box Small for cables with Push Pull connector.	

Table 23: 5CAMPC.0020-10 - Order data

3.2.2.1.3 Technical data

Information:

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

Product ID	5CAMPC.0020-10
General information	
Durability	Mechanical characteristics according to DIN VDE 0472 section 603 test type H (100,000 cycles)
Certification CE	 Yes

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

Product ID	5CAMPC.0020-10
Cable structure	
Type	Crossover
Supply lines	
Conductor resistance	≤30 Ω/km
Material	Tinned copper wires
Permissible operating voltage	30 VDC
Outer sheathing	
Material	Silicon and halogen free, flame retardant PUR outer sheathing
Color	Similar to RAL 7012
Cable elements	
Entry devices	Direct connection between the entry device and the monitoring device (6 wires)
CAN	2 pairs with shielding (5 wires) (not used in MP40/50)
Networks	Twisted pair cable for Ethernet (10/100 Mbit/s) (4 wires, RJ45 plug)
Serial	3 wires (not used in MP40/50)
Power supply	Supply voltage +24 VDC and ground (3 wires)
Enabling switch	Direct connection of the enable switch to the monitoring device (6 wires) (2 wires not used in MP40/50)
Connector	
Type	Receptacle for push-pull locking connection
Operating conditions	
Flame resistant	in accordance with IEC 60332-1 and VW1 / FT1 according to C-UL
Shield attenuation	In accordance with IEC 60096-1, Amendment 2
Oil and hydrolysis resistance	According to 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
Flex radius	Min. 60 mm
Weight	153 g/m
Tension	Max. 140 N

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

3.2.2.1.4 Cable pinout

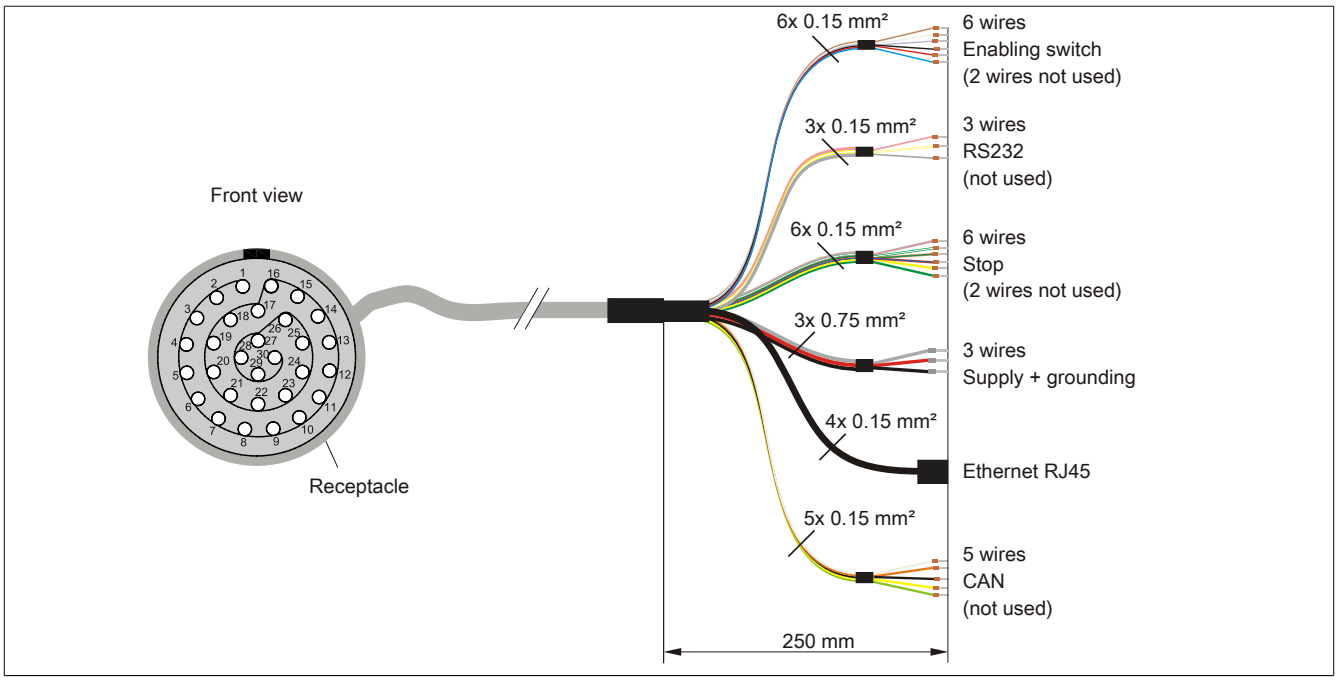


Figure 37: 5CAMPC.0020-10 - Control cabinet cable layout

Pinout - Receptacle	Wire colors in control cabinet cable	Enable switch wires	
4	Brown	C 1	
5	White	NO 1	
6	Purple	NC 1	not used on MP40/50
9	Black	C 2	
8	Red	NO 2	
7	Blue	NC 2	not used on MP40/50

Table 25: 5CAMPC.0020-10 - Cable pinout

Pinout - Receptacle	Wire colors in control cabinet cable	RS232 wires	
21	Pink	RxD	
22	White-Yellow	GND	not used on MP40/50
23	Gray	TxD	
Pinout - Receptacle	**Wire colors in control cabinet cable**	**Command device wires**	
1	Gray-Pink	Stop/normally closed contact 1 (11)	
2	Brown-Green	Stop/normally closed contact 2 (21)	
15	White-Green	Stop/normally closed contact 1 (12)	
16	Red-Blue	Stop/normally closed contact 2 (22)	
18	Yellow	Button (S13)	
26	Green	Button (S14)	
Pinout - Receptacle	**Wire colors in control cabinet cable**	**Supply wires**	
3	Red	+24 VDC supply	
14	Black	Ground	
17	Gray	Shielding	
Pinout - Receptacle	**Wire colors in control cabinet cable**	**Ethernet RJ45 plug**	
27	Green	Pin 3 (RX)	
28	Pink	Pin 1 (TX)	
29	Yellow	Pin 6 (RX\)	
30	Blue	Pin 2 (TX\)	
Ethernet shield	Shielding	Shielding	
Pinout - Receptacle	**Wire colors in control cabinet cable**	**CAN wires**	
10	White	CAN 1 High	
11	Orange	CAN 1 Low	
12	Yellow	CAN 2 High	not used on MP40/50
13	Green	CAN 2 Low	
CAN shield	Black	Shielding	

Table 25: 5CAMPC.0020-10 - Cable pinout

Information:

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

3.2.2.1.5 Drilling template - Receptacle

Drilling holes and a cutout must be made according to the following diagram for mounting the receptacle (e.g. to a control cabinet door).

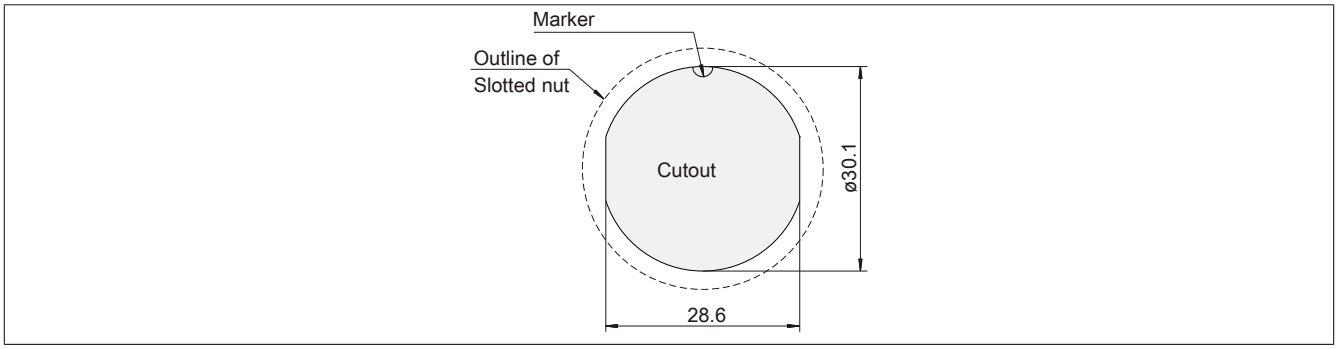


Figure 38: Drilling template - Receptacle

3.2.2.2 5CAMPC.0020-11

3.2.2.2.1 General information

The straight through switching cabinet cable is required for the wiring inside the switching cabinet.
The pin assignments for the Ethernet plug (1:1) make it possible to connect directly to a standard Ethernet hub.

If the first Ethernet connection on B&R Ethernet hub AC808 (model number 0AC808.9) is used, make sure that the crossover (MDIX) is not activated.

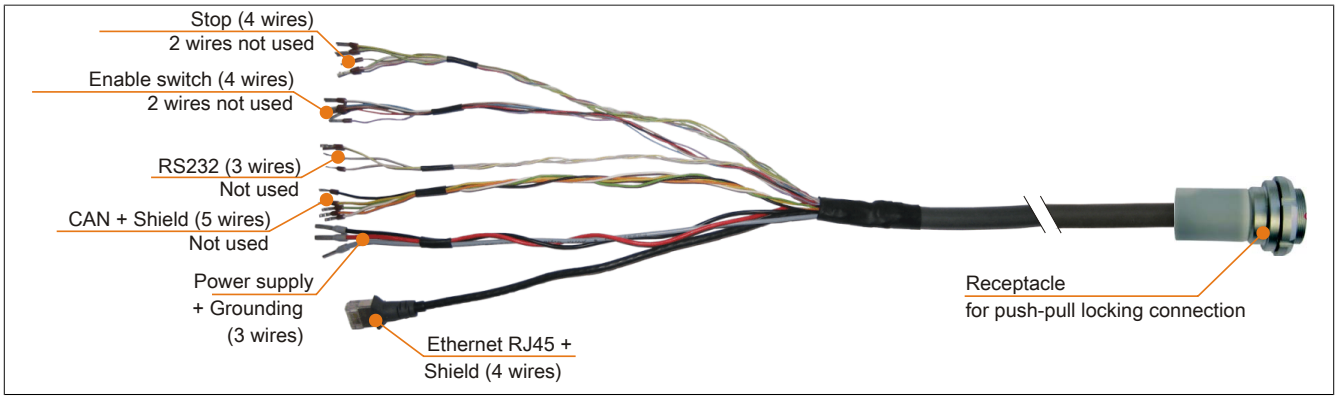


Figure 39: 5CAMPC.0020-11 - Mobile Panel control cabinet cable

Information:

The control cabinet cable is used in the Mobile Panel 40/50 as well as in Mobile Panel 100/200 product series. Not all wires are used in the Mobile Panel 40/50 wiring, which limits its functionality compared to Mobile Panel 100/20 devices.

The surface is protected against water, oil (lubricating and hydraulic oils in accordance with EN60811, section 2-1) and cooling lubricant.

The connection housing is used to connect the control cabinet cable to the control cabinet door (see "Figure 38: Drilling template - Receptacle" on page 63). The other end of the control cabinet cable has a pre-assembled RJ45 Ethernet plug. The rest of the lines have an open end with wire tip sleeves. This makes it easier to wire the cable to safety equipment and the other connections.

3.2.2.2.2 Order data

Model number	Short description	Figure
	Control cabinet cables	
5CAMPC.0020-11	Mobile Panel Cabinet Cable Ethernet straight through with Push Pull connector, 2 m.	
	Optional accessories	
	Accessories	
4MPCBX.0000-00	Mobile Panel Connection Box for cables with Push Pull connector.	
4MPCBX.0001-00	Mobile Panel Connection Box Small for cables with Push Pull connector.	

Table 26: 5CAMPC.0020-11 - Order data

3.2.2.2.3 Technical data

Information:

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

Product ID	5CAMPC.0020-11
General information	
Durability	Mechanical characteristics according to DIN VDE 0472 section 603 test type H (100,000 cycles)
Certification CE	Yes
Cable structure	
Type	Straight through

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

Product ID	5CAMPC.0020-11
Supply lines	
Conductor resistance	≤30 Ω/km
Material	Tinned copper wires
Permissible operating voltage	30 VDC
Outer sheathing	
Material	Silicon and halogen free, flame retardant PUR outer sheathing
Color	Similar to RAL 7012
Cable elements	
Entry devices	Direct connection between the entry device and the monitoring device (6 wires)
CAN	2 pairs with shielding (5 wires) (not used in MP40/50)
Networks	Twisted pair cable for Ethernet (10/100 Mbit/s) (4 wires, RJ45 plug)
Serial	3 wires (not used in MP40/50)
Power supply	Supply voltage +24 VDC and ground (3 wires)
Enabling switch	Direct connection of the enable switch to the monitoring device (6 wires) (2 wires not used in MP40/50)
Connector	
Type	Receptacle for push-pull locking connection
Operating conditions	
Flame resistant	in accordance with IEC 60332-1 and VW1 / FT1 according to C-UL
Shield attenuation	In accordance with IEC 60096-1, Amendment 2
Oil and hydrolysis resistance	According to 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
Flex radius	Min. 60 mm
Weight	153 g/m
Tension	Max. 140 N

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

3.2.2.2.4 Cable pinout

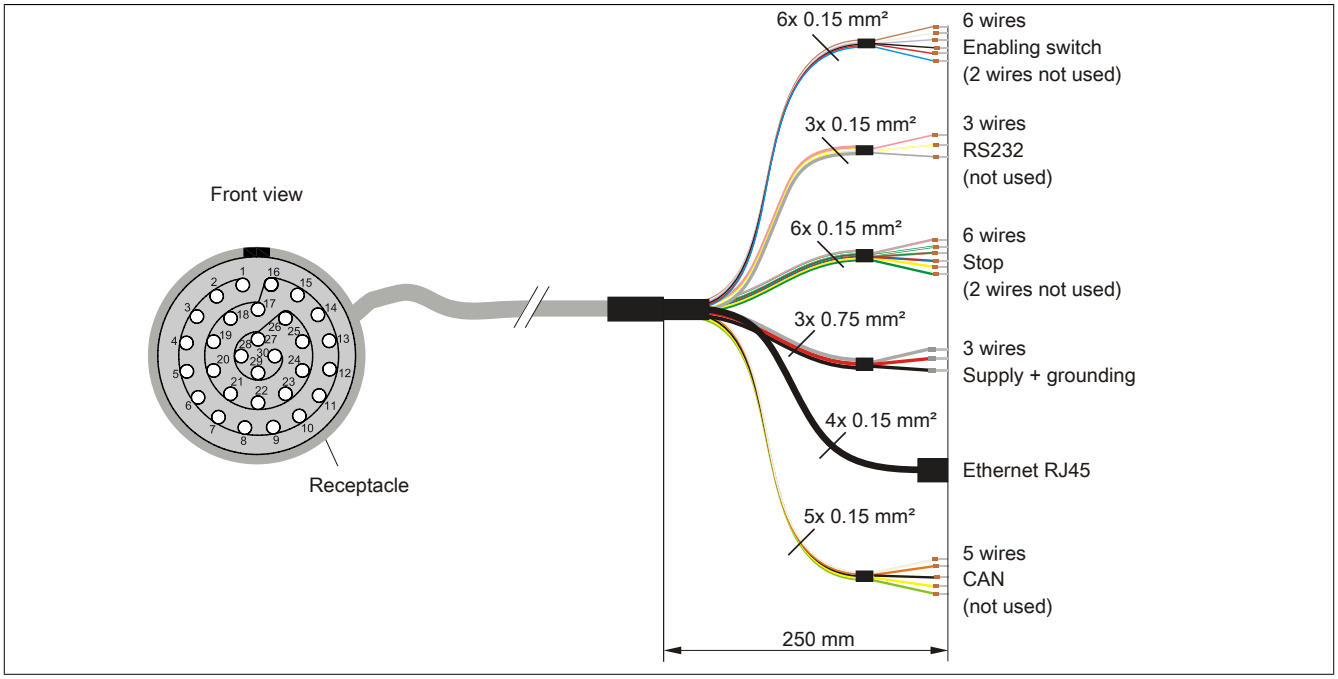


Figure 40: 5CAMPC.0020-11 - Control cabinet cable layout

Assignments in connection housing	Wire colors in control cabinet cable	Enable switch wires	
4	Brown	C 1	
5	White	NO 1	
6	Purple	NC 1	not used on MP40/50
9	Black	C 2	
8	Red	NO 2	
7	Blue	NC 2	not used on MP40/50

Table 28: 5CAMPC.0020-11 - Cable pinout

Assignments in connection housing	Wire colors in control cabinet cable	RS232 wires	
21	Pink	RxD	
22	White-Yellow	GND	not used on MP40/50
23	Gray	TxD	
Assignments in connection housing	**Wire colors in control cabinet cable**	**Command device wires**	
1	Gray-Pink	E-stop N.C. contact 1 (11)	
2	Brown-Green	E-stop N.C. contact 2 (21)	
15	White-Green	E-stop N.C. contact 1 (12)	
16	Red-Blue	E-stop N.C. contact 2 (22)	
18	Yellow	Button (S13)	
26	Green	Button (S14)	
Pinout - Receptacle	**Wire colors in control cabinet cable**	**Supply wires**	
3	Red	+24 VDC supply	
14	Black	Ground	
17	Gray	Shielding	
Assignments in connection housing	**Wire colors in control cabinet cable**	**Ethernet RJ45 plug**	
27	Green	Pin 1 (RX)	
28	Pink	Pin 3 (TX)	
29	Yellow	Pin 2 (RX\)	
30	Blue	Pin 6 (TX\)	
Ethernet shield	Shielding	Shielding	
Assignments in connection housing	**Wire colors in control cabinet cable**	**CAN wires**	
10	White	CAN 1 High	
11	Orange	CAN 1 Low	
12	Yellow	CAN 2 High	not used on MP40/50
13	Green	CAN 2 Low	
CAN shield	Black	Shielding	

Table 28: 5CAMPC.0020-11 - Cable pinout

Information:

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

3.2.2.2.5 Drilling template - Receptacle

Drilling holes and a cutout must be made according to the following diagram for mounting the receptacle (e.g. to a control cabinet door).

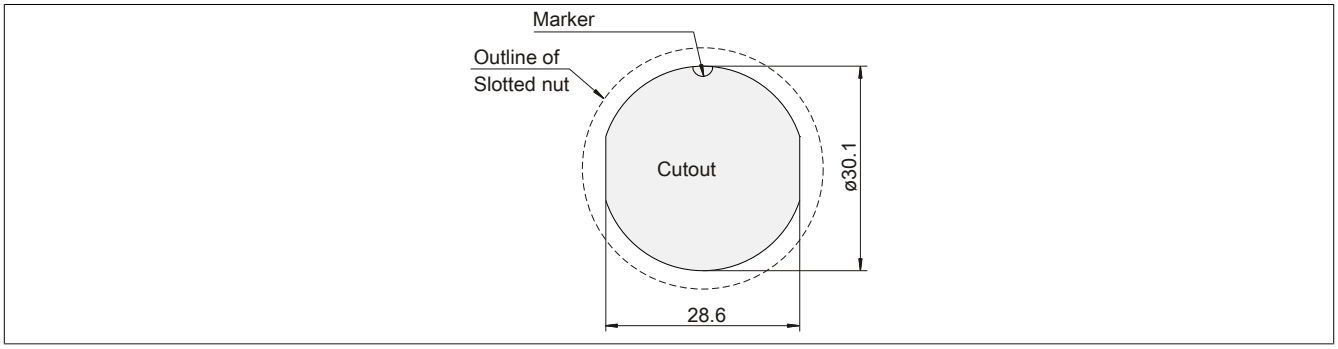


Figure 41: Drilling template - Receptacle

Chapter 3 • Commissioning

1 Commissioning from a safety perspective

The hand terminal was developed, manufactured, examined and documented in compliance with ergonomic guidelines and relevant safety standards. Given the instructions for intended use and safety information, no danger exists under normal product circumstances with regard to damage to property or personal injury.

The information contained in this manual must be followed in every case. Otherwise, dangerous situations may result or the integrated safety equipment in the hand terminal may prove ineffective.

Independent from the safety information in this manual, there are work safety and accident prevention guidelines that must be noted.

Warning!

The machine manufacturer must correctly configure the handheld device according to the danger- and risk analysis. The following safety aspects must be considered:

- Correct cable length for limiting the working area

- Stop button necessary (allowed)

- Satisfactory safety category for each use

- **The device must only be driven under the proper conditions with regard to the user's manual.**
- **The user must possess the required educational training as well as a detailed knowledge of the intended use as specified in the user's manual.**
- **The safety information in the following chapters must be considered.**
- **Important additional information regarding safety and EMC is present in the "Standards and certifications" and must be followed.**

1.1 Intended use

The intended use of the MobilePanel spans from monitoring and configuration to operating machines, for example:

- Injection molding machines
- Robots
- Machine tools
- Textile machines
- Printing machines
- Theater backdrops
- and similar

normal operating modes, for example

- Automatic

as well as semi-automatic or manual special operating modes, for instance

- Setup
- Teach In
- Test run
- and others.

An enable switch and a stop button are available for safety functions.

All safety functions have a double circuit design so a safety category 3 PL d in accordance with EN ISO 13849-1:2008 is possible.

Selection of the hand terminal designed for the machine as well as configuration of possible additional options must take place based on legally required danger- and risk evaluations performed by the machine manufacturer.

Refer to the chapter "European Union directives" on page 98 for information regarding intended use of the hand terminal.

2 Operating the MobilePanel

Caution!

- **Make sure that cables are safely out of the way on the floor to prevent any tripping which may result in the Mobile Panel device falling to the ground.**
- **The Mobile Panel attachment cable must not be pinched or come into contact with sharp corners, which would result in damage to the cable or its sheathing.**
- **Operating a Mobile Panel with a damaged attachment or control cabinet cable is not permitted.**
- **When not using the Mobile Panel, it should be safely stowed away on its wall mount. When the MobilePanel device is stored on its wall mount in a dangerous area around the machine, the attachment cable must still be connected so that the stop button can be activated if necessary.**
- **When laying down the Mobile Panel device for a short period of time, do not place it in such a way that its operating face could be damaged or where it may inadvertently trigger an action.**
- **The touch screen must not be operated with sharp objects such as ballpoint pens, knives, screwdrivers, etc. These objects will permanently damage the touch screen. The ideal object for operating the touch screen is the touch screen stylus pen (2.1.6 "Touch screen stylus pen" on page 19). The touch screen can also be operated with a finger.**
- **When operating the touch screen, only touch one point at a time. Touching several places at once can cause unintended actions.**
- **Do not place objects on top of the touch screen.**
- **Never lay the device on unstable surfaces / storage shelves. It could fall and become damaged.**
- **Make sure that the device is never exposed to heat sources or direct sunlight.**
- **Ensure that no foreign substances or liquids access the interior of the device.**
- **Pressing several function or system keys at the same time may trigger unintended actions.**

Information:

- **Protective coverings on the device, housing screws, housing and cables should all be checked periodically for damage.**
- **For instructions on cleaning the MobilePanel device, see "Cleaning" on page 132.**

3 Connection

The Mobile Panel is connected using the Mobile Panel attachment cable (see "Attachment cable" on page 58).

3.1 Attachment shaft

The attachment cable is connected using the ST1 (entry devices + supply) and ST2 (Ethernet) plugs in the attachment shaft.

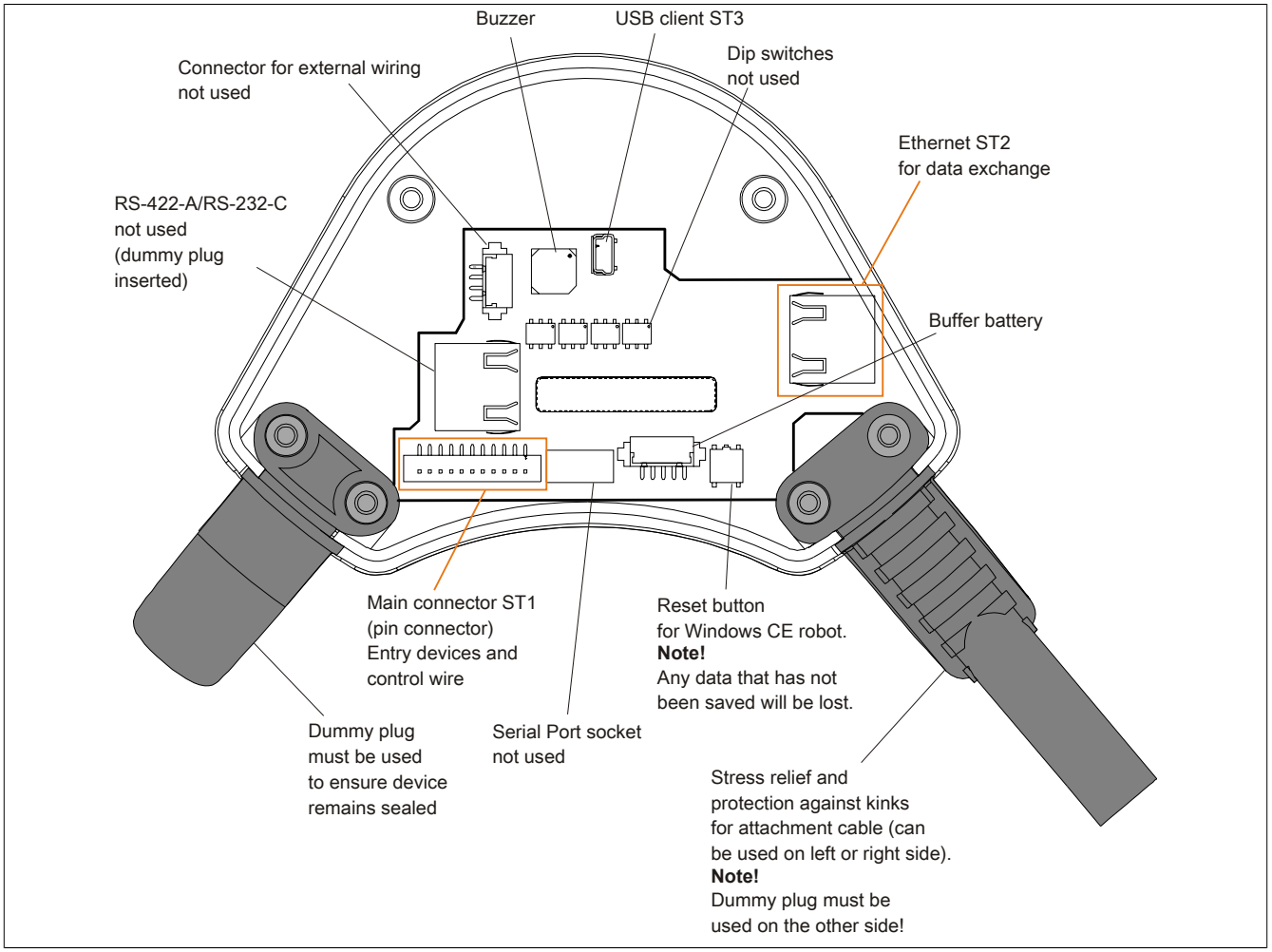


Figure 42: Attachment shaft

3.2 Cable extension in the attachment shaft

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

3.2.1 Tips for opening the attachment shaft

- Place the Mobile Panel device on a clean flat surface with the display facing down so that the Mobile Panel and its operating elements are not damaged (e.g. ESD mat).
- Loosen the screws with a size 2 Phillips head screwdriver

3.2.2 Notes on changes in the attachment shaft

- Make sure the main connector (ST1) is removed by pulling the wire with the fingers (do not use any sharp objects).
- When removing the RJ-45 plug (ST2), make sure that the locking lever is pushed down.

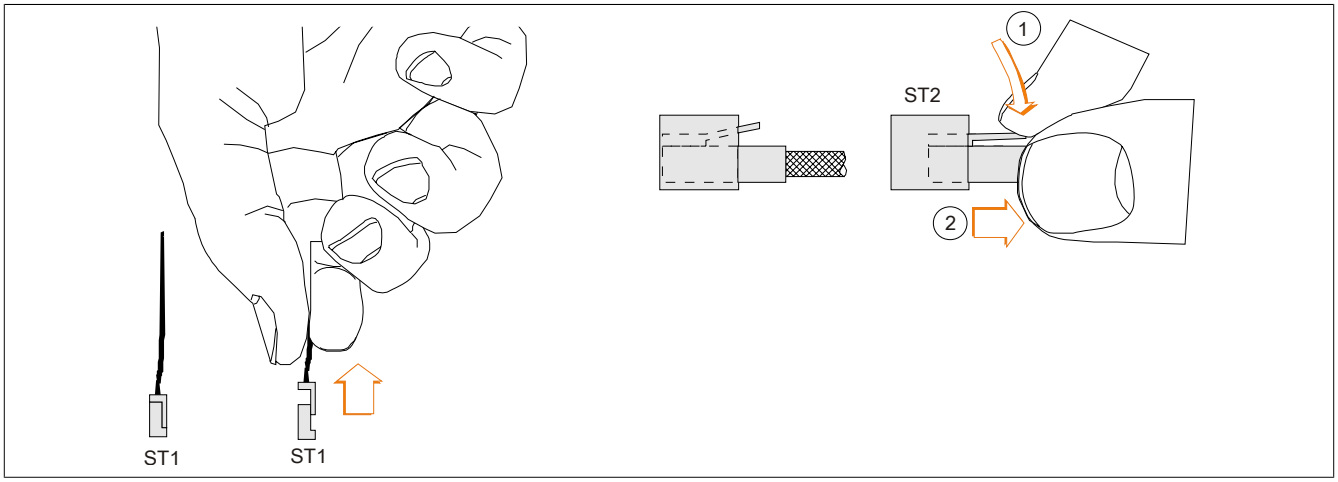


Figure 43: Removing ST1 and ST2

- Make sure that the lock clicks on the connector

3.2.3 Note for closing the attachment shaft

- The seal must be clean, undamaged and located on the correct position in the attachment shaft cover.
- Cables are not permitted.
- The attachment shaft cover must be refastened with all 6 screws (torque: 0.4 bis 0.5 Nm). Only then can the corresponding protection type be guaranteed.

3.3 Cable outlet

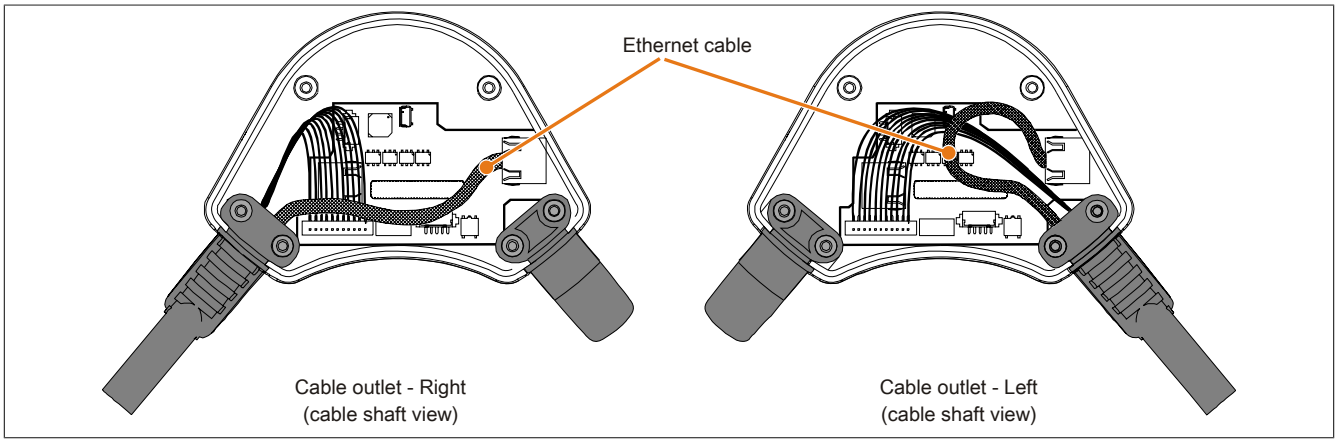


Figure 44: Cable outlet

4 Recommended monitoring devices

B&R recommends using PILZ PNOZ e1.1 and PNOZ s6.1 safety relays from the Pilz company (www.pilz.com) in order to achieve Safety Category 3 PL d in accordance with EN ISO 13849-1:2008.

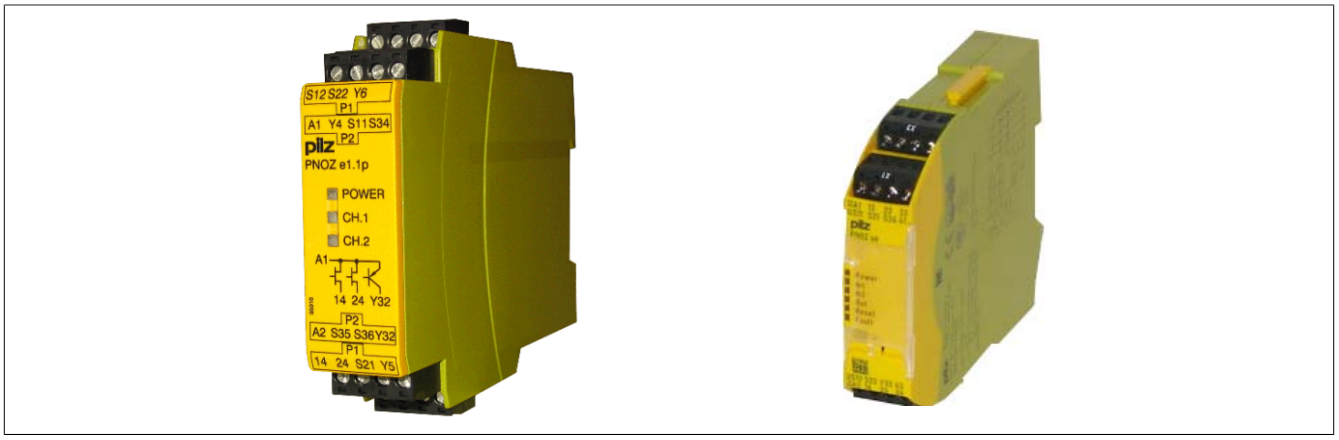


Figure 45: Pilz PNOZ e1.1p (left) and Pilz PNOZ s6.1 (right)

Information:

The operating instructions provided by PILZ for the devices PNOZ e1.1 and PNOZ s6.1 must also be consulted.

The monitoring device and subsequent components must also be accounted for when calculating the overall safety functionality.

4.1 Connection example for stop button

Connection example with monitoring device PILZ PNOZ e1.1p for safety circuits up to category 3 PL d in accordance with EN ISO 13849-1:2008.

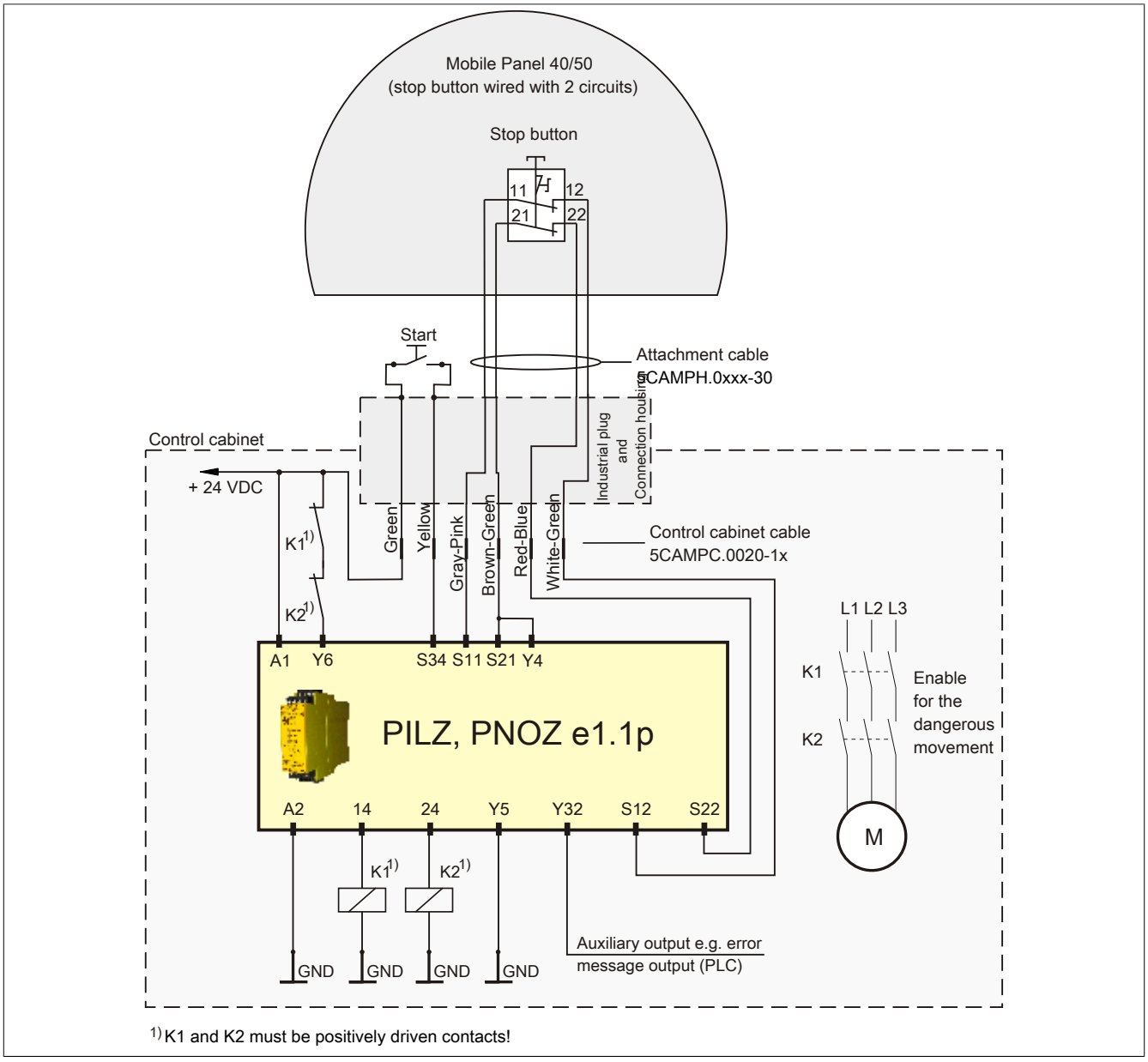


Figure 46: Connection example for stop button

4.2 Connection example - Enable switch

Connection example with monitoring device PILZ PNOZ s6.1 for safety circuits up to category 3 PL d in accordance with EN ISO 13849-1:2008.

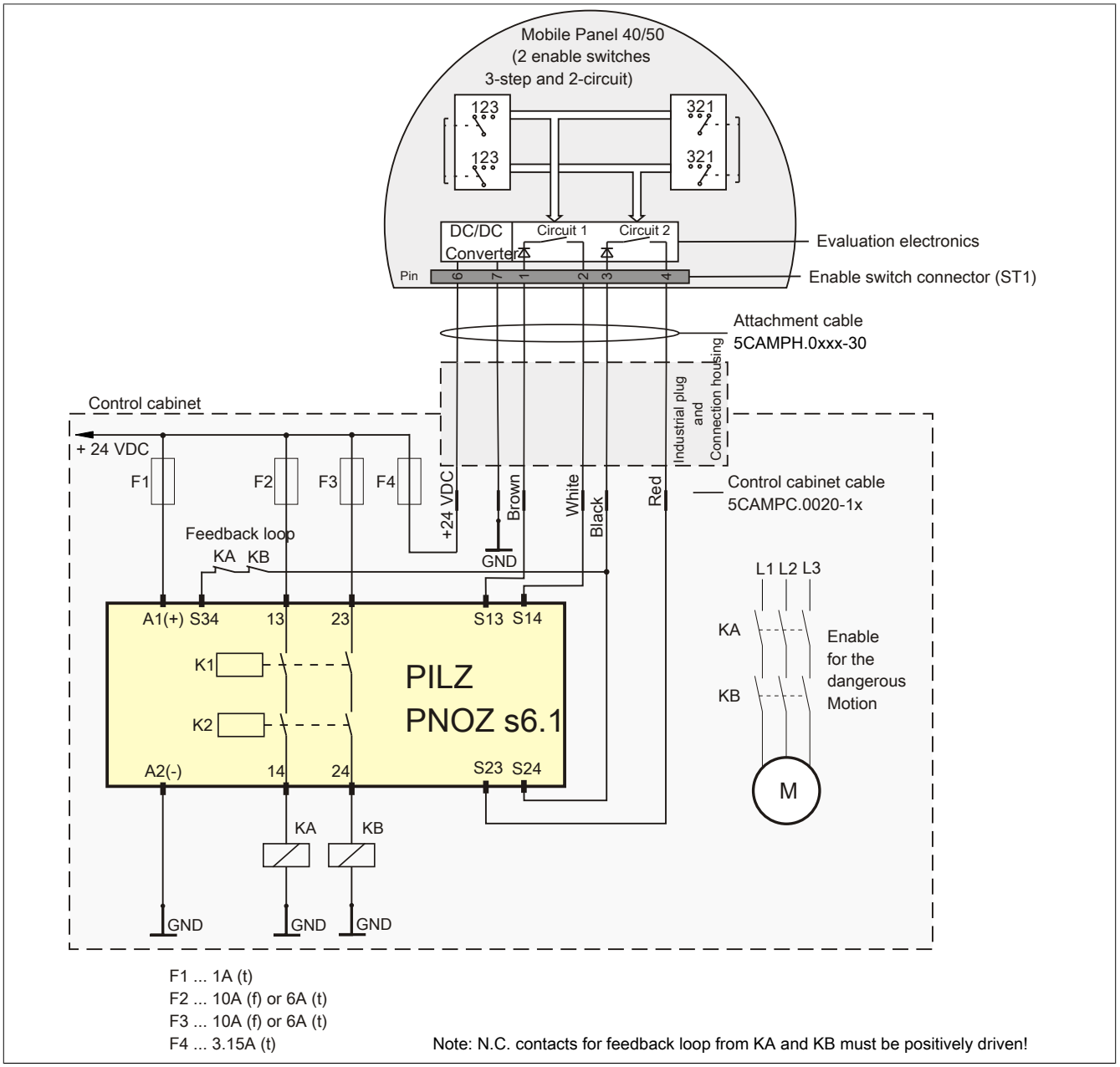


Figure 47: Connection example - Enable switch

5 Connecting a Mobile Panel 100/200

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

When connecting an MP40/50, the differences of the device must be noted.

5.1 Differences between Mobile Panel 100/200 and Mobile Panel 40/50

Mobile Panel 100/200	Mobile Panel 40/50
Safety category: The devices support safety circuits up to category 4, a single-channel supports safety category 1 and, if a connection box is used, the safety circuits are supported up to category 3.	Safety category: Safety circuits up to category 3 are supported by the devices.
Connections: Entry devices (E-stop, key switch) Enabling switch Supply + grounding Interfaces: Ethernet RS232 CAN	Connections: Entry devices (stop button) Enabling switch Supply + grounding All other command devices (joystick, handwheel, override potentiometer, etc.) addressed using the software. Interfaces: Ethernet - -
Enabling equipment: A 3-step, 2 channel enable switch centrally located on the front side of the handle.	Enabling equipment: Two 3-step, 2-channel enable switches located on both sides of the device.

Table 29: Differences MP100/200 - MP40/50

6 USB interface

The front-side USB port (accessible behind the protective cap) is specified solely for use of USB flash drives.

Warning!

Only USB devices tested and approved by B&R may be connected to the USB port.

1. Open protective cap.

Figure 48: USB port - open protective cap

2. Insert USB flash drive until it clicks.

Figure 49: USB port - insert flash drive

Information:

When a USB device is inserted, IP65 protection is no longer guaranteed.

7 Key and LED configuration

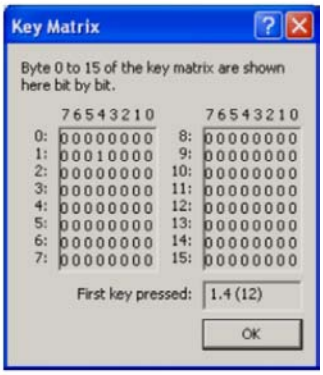
Each key or LED can be configured individually and adapted directly to the application. Various B&R tools are available for this purpose:

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

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

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

Screenshot B&R Key Editor



Screenshot B&R Control Center

Figure 50: Hardware numbers in the B&R Key Editor and the B&R Control Center

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

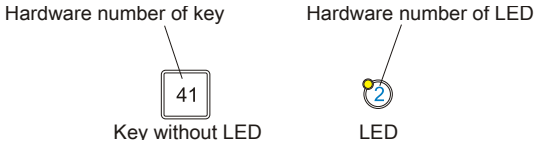


Figure 51: Display - Keys and LEDs in the matrix

7.1 Mobile Panel 40

7.1.1 Mobile Panel 5MP040.0381-01

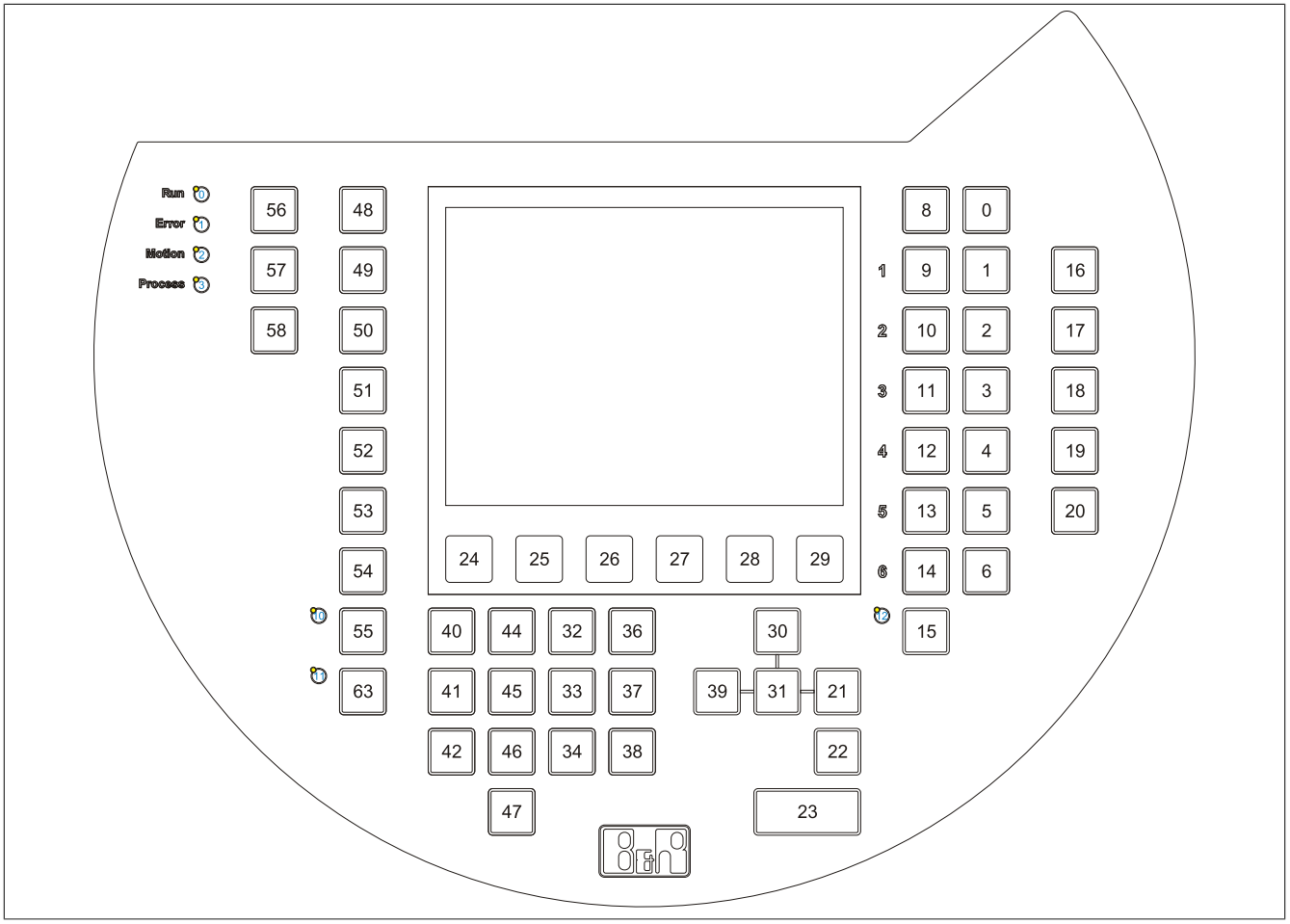


Figure 52: 5MP040.0381-01 - Hardware numbers

7.1.2 Mobile Panel 5MP040.0381-02

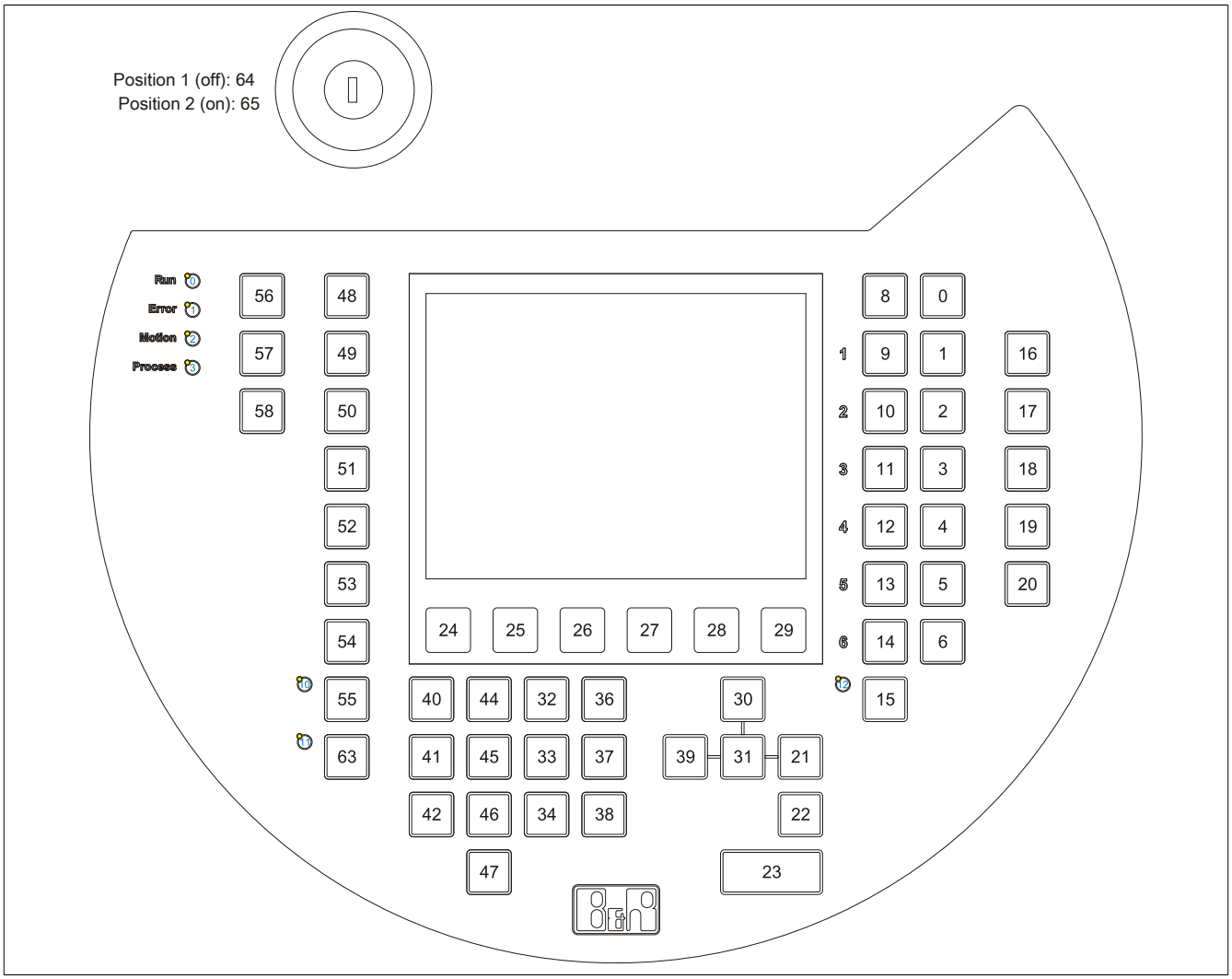


Figure 53: 5MP040.0381-02 - Hardware numbers

7.2 Mobile Panel 50

7.2.1 Mobile Panel 5MP050.0653-01

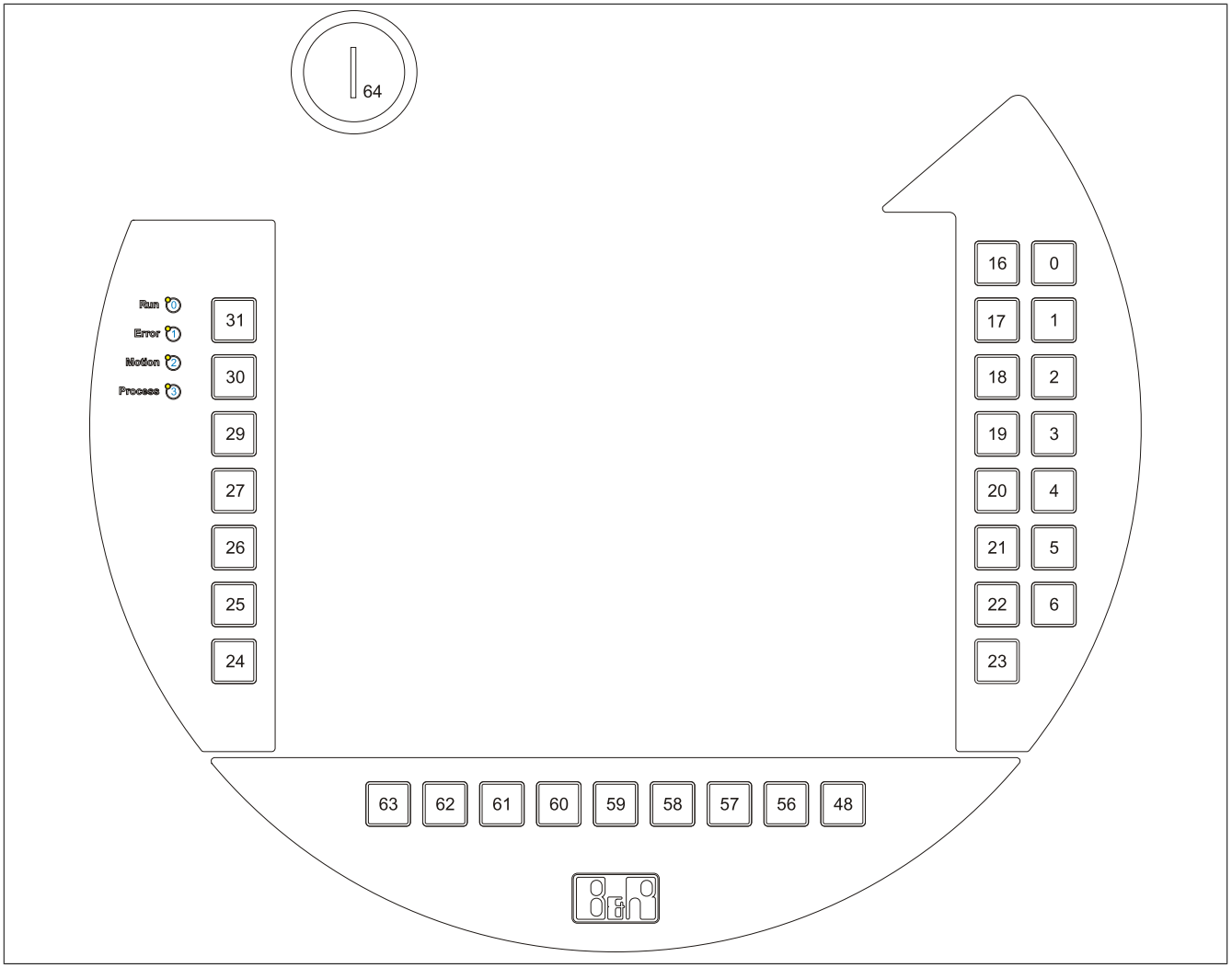


Figure 54: 5MP050.0653-01 - Hardware numbers

7.2.2 Mobile Panel 5MP050.0653-02

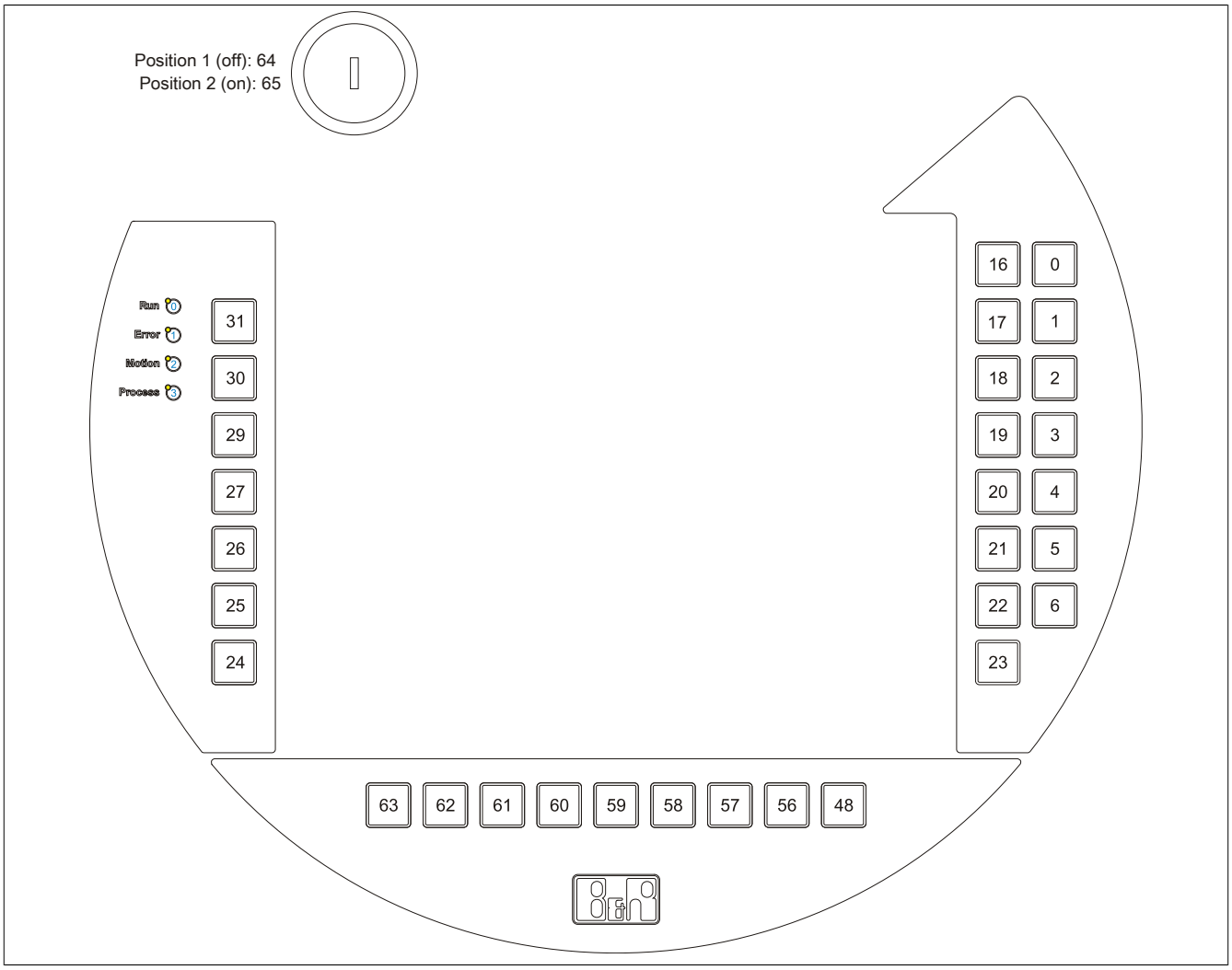


Figure 55: 5MP050.0653-02 - Hardware numbers

7.2.3 Mobile Panel 5MP050.0653-03

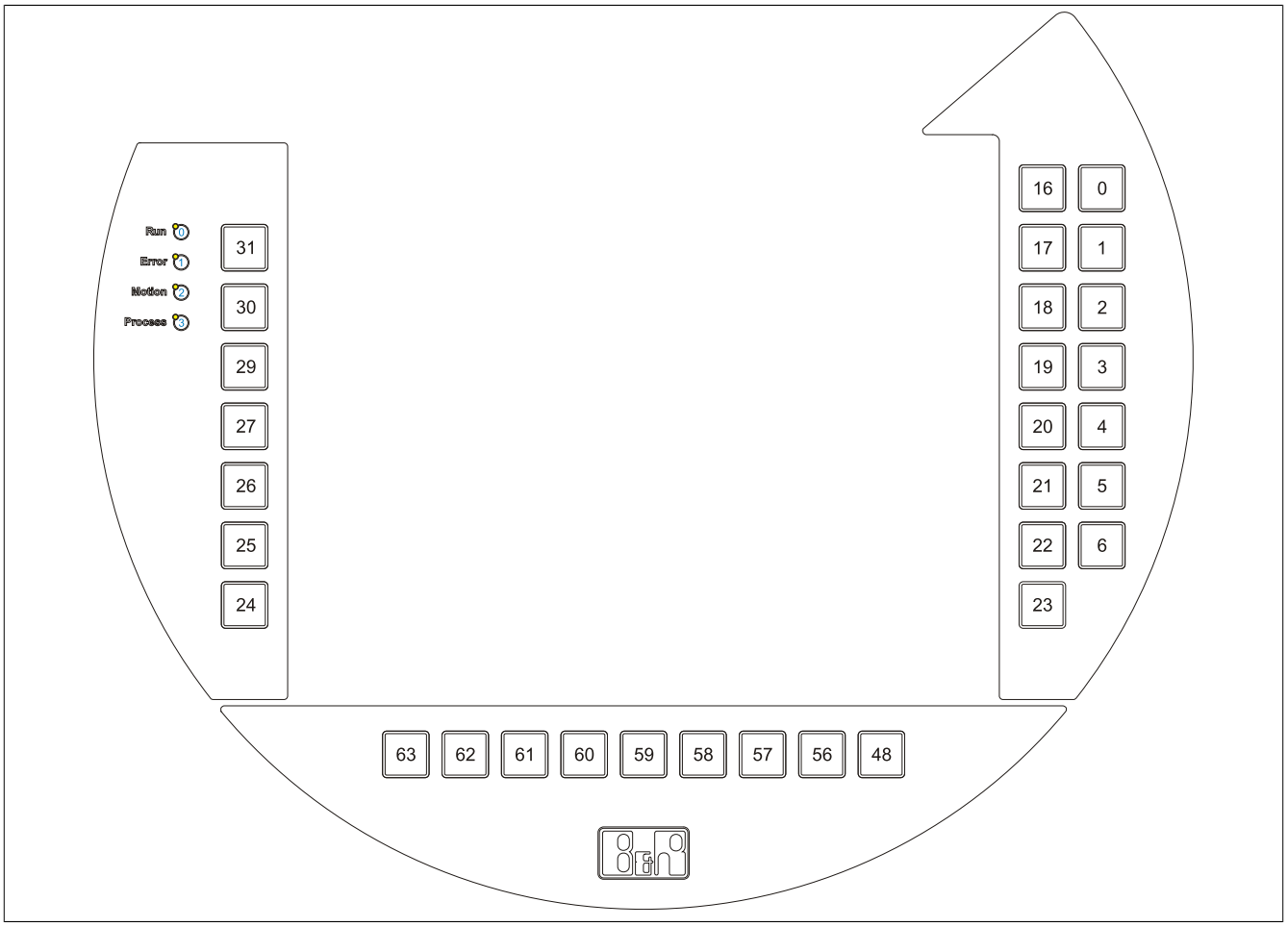


Figure 56: 5MP050.0653-03 - Hardware numbers

7.2.4 Mobile Panel 5MP050.0653-04

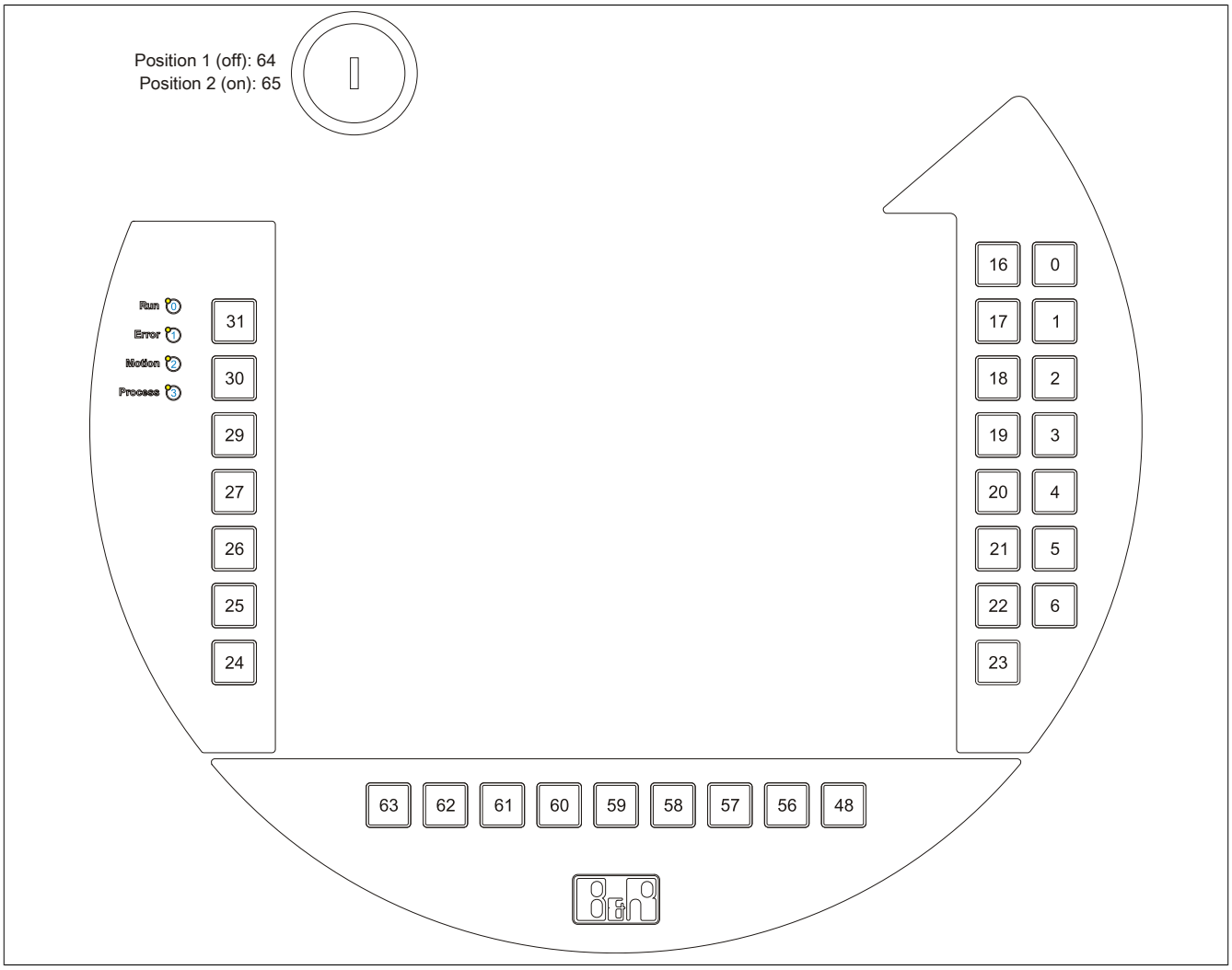


Figure 57: 5MP050.0653-04 - Hardware numbers

8 Touch screen calibration

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

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

8.1 Windows CE

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

9 Date / time settings

The real-time clock in the MobilePanel 40/50 is not backed by a battery. The time must be reset each time the MobilePanel 40/50 is restarted (loss of supply voltage or restart).

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

10 Key configuration

Not all keys are predefined when the MobilePanel device is delivered. The keys can be configured easily with the B&R Key Editor (Version 2.60 or higher) - see "B&R Key Editor" on page 93.

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

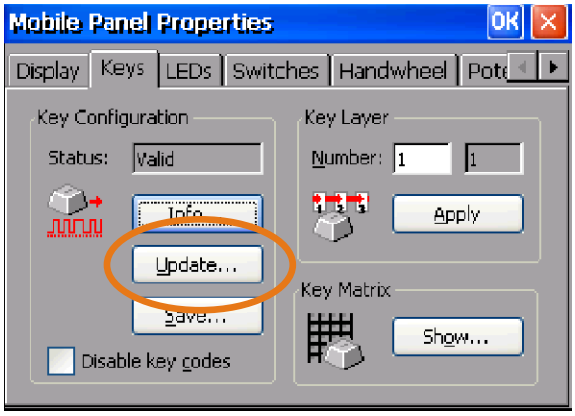


Figure 58: Key configuration update

11 Tips for extending the service life of the display

11.1 Backlight

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

11.1.1 How can the service life of the backlight be extended?

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

11.2 Screen burn-in

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

There are basically two types:

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

11.2.1 What causes screen burn-in?

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

11.2.2 How can screen burn-in be avoided?

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

12 Pixel errors

Information:

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

Chapter 4 • Software

1 Windows CE

1.1 Order data

Model number	Short description	Figure
	Undefined	
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; Terminal Client Automation Runtime for Mobile Panel MP50.	

Table 30: 5SWWCE.0524-ENG, 5SWWCE.0525-ENG, 5SWWCE.0624-ENG, 5SWWCE.0625-ENG, 5SWWCE.0724-ENG, 5SWWCE.0725-ENG - Order data

1.2 General information

B&R Windows CE is an operating system which is optimally tailored to B&R's devices. It includes only the functions and modules which 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.

1.3 Differences - CE versions (Pro - PropPlus - 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 resolutions	MP40 = QVGA MP50 = VGA	MP40 = QVGA MP50 = VGA	MP40 = QVGA MP50 = VGA
Color depth[1]	MP40 = 8-bit / 16 colors MP50 = 16-bit / 65536 colors	MP40 = 8-bit / 16 colors MP50 = 16-bit / 65536 colors	MP40 = 8-bit / 16 colors MP50 = 16-bit / 65536 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 were optimized for Thin Client operation on B&R Automation Runtime devices. The B&R VNC Viewer with B&R extensions is used as client.
.NET	Supported	Supported	
Customer-specific 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 any use[2]	1	1	
PDF, Excel, Word, Power Point and Image Viewer	Not supported	Supported	

Table 31: Differences - CE versions (Pro - PropPlus - ProPlusTCAR)

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

1.4 Installation / Update / Save

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

An update or save of the Windows CE version can take place easily via the B&R Control Center (see page B&R Automation Device Interface (ADI) - Control Center).

Access via **Start > Settings > Control Panel > Control Center** select "Update" tab.

Figure 59: Control Center - Update / Save

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 a Visual Components project installed on it. This visual components project must contain 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 hand wheel or keys on your thin client, the VNC server in the Visual Components project must support the 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 up the **Start > Settings > Control Panel > Network and dial-up connections** dialog box. Configure the properties of your network card (DHCP, gateway, etc.). Check for correct functionality by e.g. pinging.
6. Open up the **Start > Settings > Control Panel > Configuration Manager** 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 VNC viewer options according to your needs.
   Note: Depending on your settings in the Options dialog box, the options "Full-screen mode" and "Hide menu bar" will always be enabled in thin client mode.

> **Information:**
>
> **Detailed setting options for the B&R Windows CE VNC Viewer are available in the Windows CE Help (Version 3.30 or higher). This can be downloaded for free from the service area of the B&R homepage (www.br-automation.com).**

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

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

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

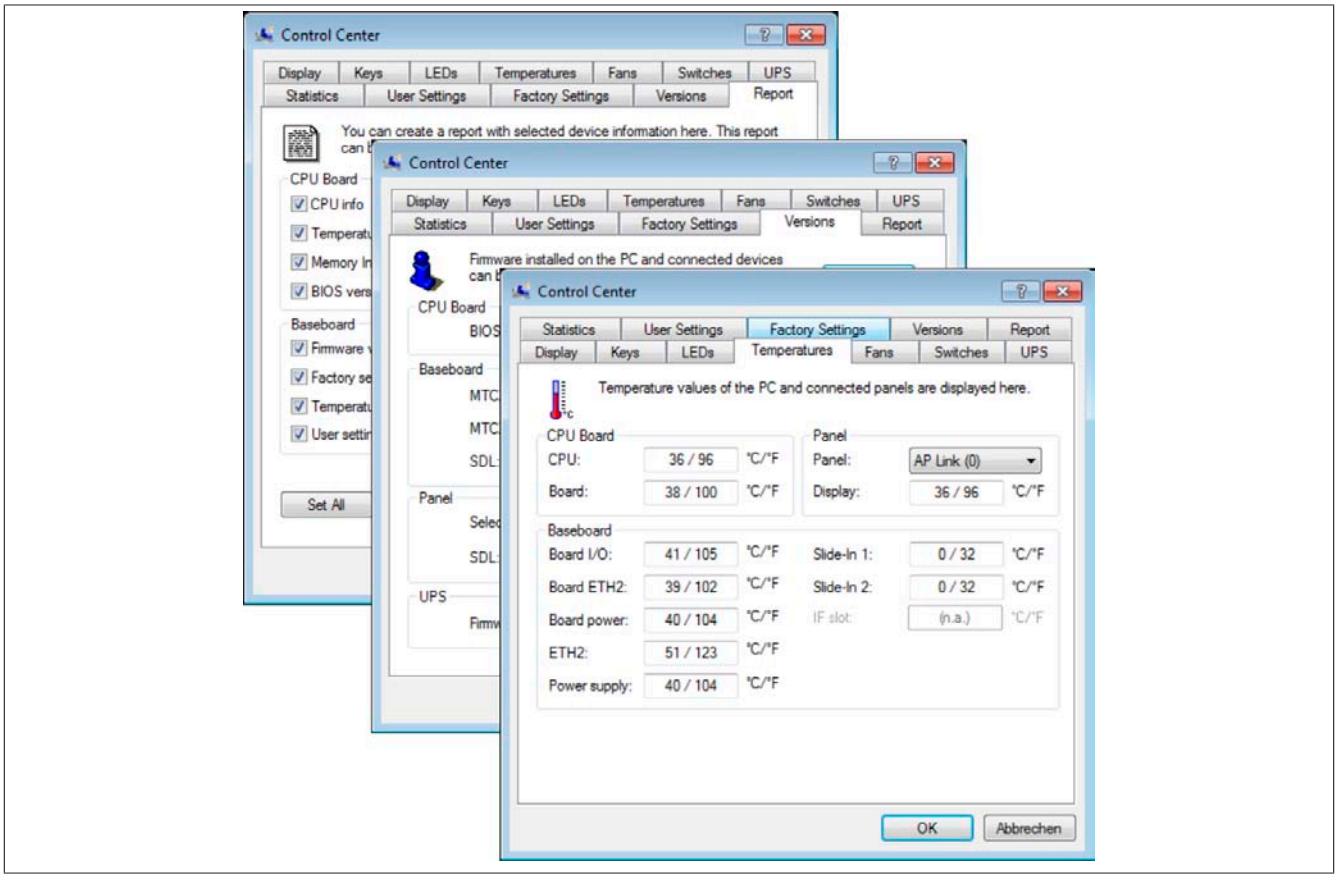


Figure 60: ADI Control Center screenshots - Examples

Information:

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

2.1 Functions

Information:

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

- Changing display-specific parameters
- Reading device-specific keys
- Updating the key configuration
- Enabling device-specific LEDs on a membrane keypad
- Reading and calibrating input devices (e.g. key switches, handwheels, joysticks, potentiometers)
- Reading temperatures, fan speeds, statistical data and switch settings
- Read the operating hours (power on hours)
- Reading user and factory settings
- Reading software versions
- Updating and backing up BIOS and firmware
- Creating reports about the current system (support assistance)
- Setting the SDL equalizer value when adjusting SDL cables
- Changing the user serial ID

Supports the following systems:

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

2.2 Installation

Control Center is already contained in every B&R Windows CE image and must not be separately installed.

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

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

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

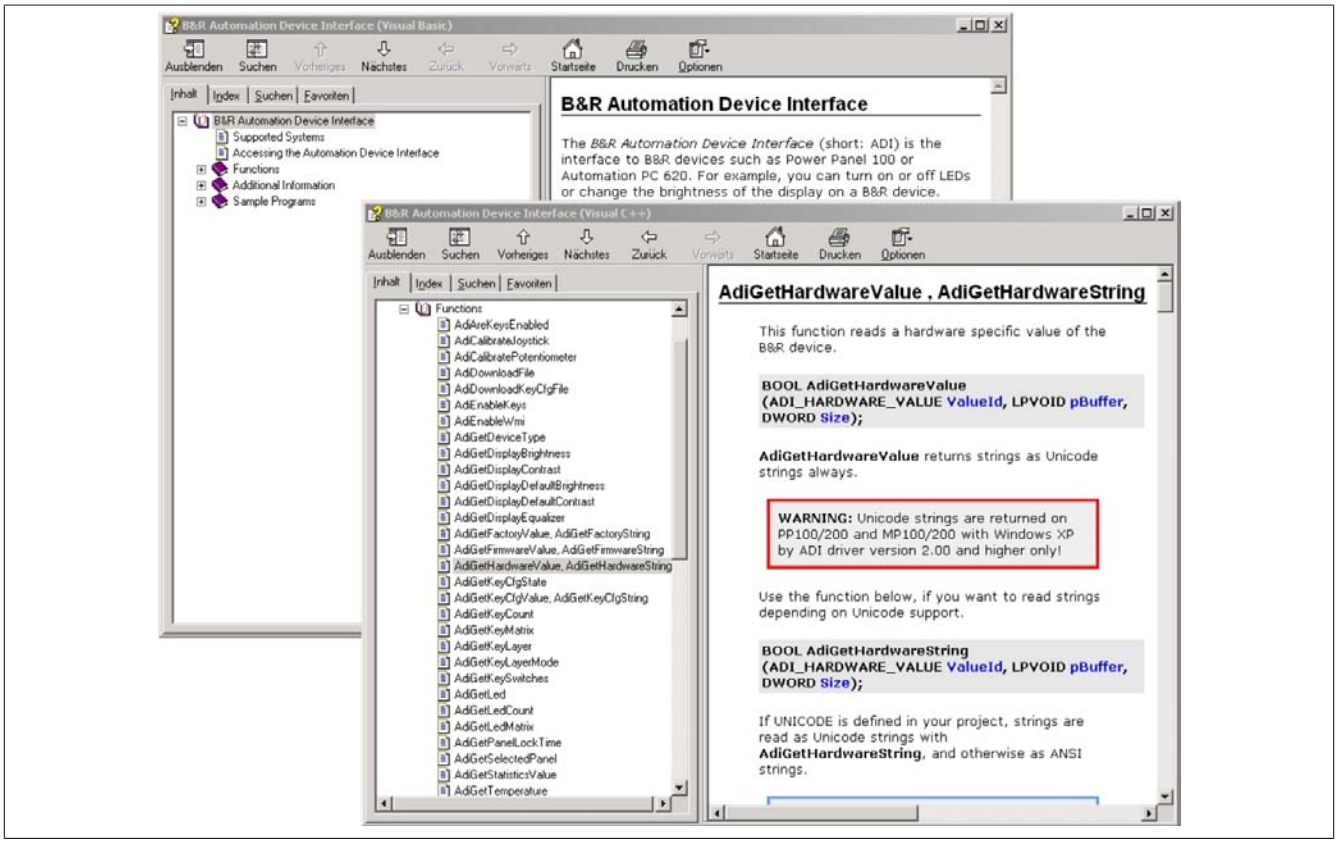


Figure 61: ADI Development Kit screenshots (version 3.40)

Features:

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

Supports the following systems (version 3.40 and higher):

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

- Mobile Panel 100/200

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

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

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

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

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

Supported programming languages:

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

System requirements

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

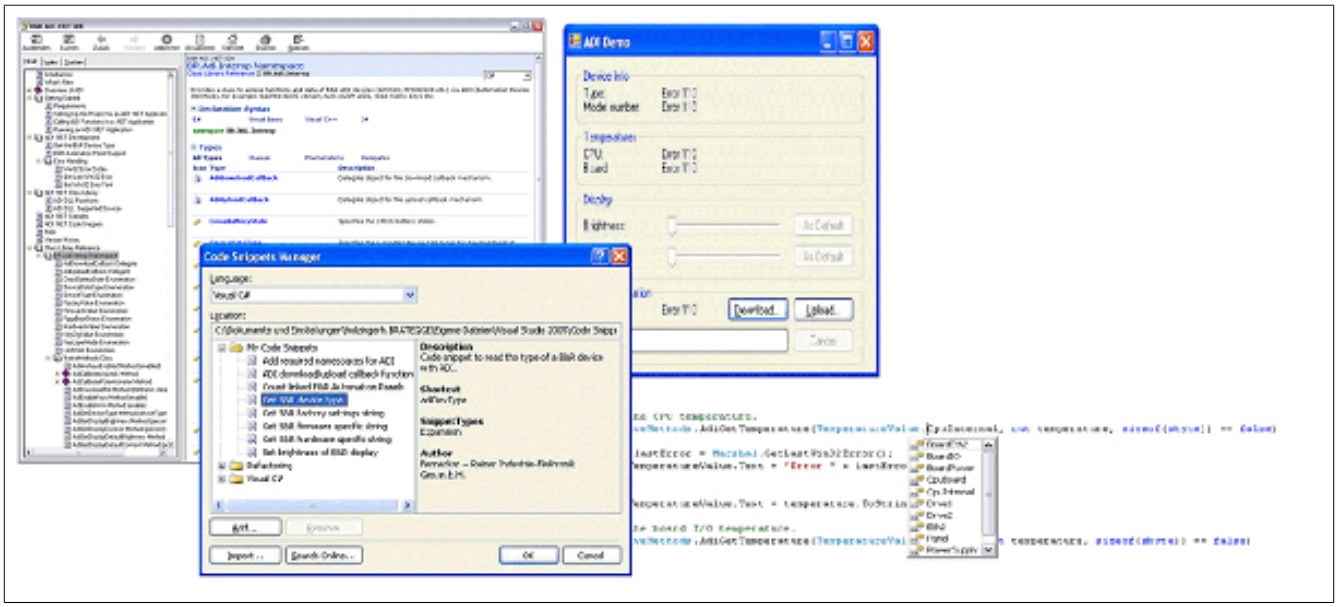


Figure 62: ADI .NET SDK screenshots (version 1.80)

Features (version 1.80 and higher)

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

Supports the following systems (version 1.80 and higher):

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

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

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

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

5 B&R Key Editor

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

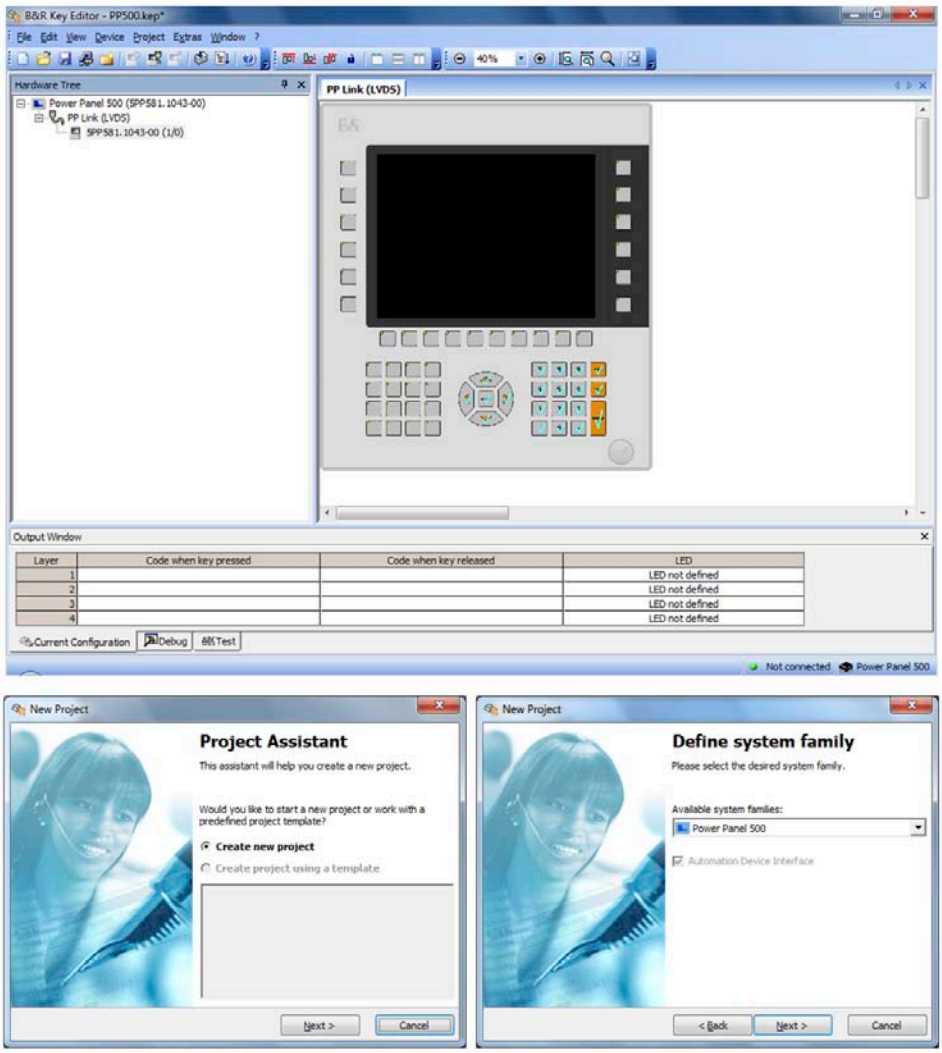


Figure 63: Screenshots of the B&R Key Editor V3.30

Features:

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

Supports the following systems (version 3.30):

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

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

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

Chapter 5 • Standards and certifications

1 List of applicable EC directives and standards

1.1 EC directives

This user's manual is in accordance with the machine directive 2006/42/EC. In order to avoid confusion for the user, the terms from the old MD 98/37/EC will continue to be used.

Standard	Description
98/37/EC	Machine directive with changes to 98/79/EC
2006/42/EC	Machine directive (effective starting December 29, 2009 and replaces the machine directive 98/37/EC)
2004/108/EC	EMC directive

Table 32: EC directives

1.2 Standards

The following legally non-binding European standards were used to examine the MobilePanel's conformity to the directives.

1.3 Examining the conformity to machine directives

Standard	Description
EN ISO 13850:2006	Safety of machines, E-stop equipment, functional aspects, design principles
EN ISO 13849-1:2008	Safety of machinery – safety-related controller components - Part 1: General design principles
EN 60204-1:2006 Ch. 9, Ch. 10	Machine safety - electrical equipment on machines - Part 1: General requirements

Table 33: Examining the conformity to machine directives

1.4 Examining the conformity to EMC directives

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

Table 34: Examining the conformity to EMC directives

Conformity is also given with the following standards:

Standard	Description
EN 61000-6-2:2001	EMC generic standard -- immunity to disturbances in the industrial sector
EN 61000-6-4:2001	EMC generic standard -- emission standard in the industrial sector

Table 35: Examining the conformity to EMC directives

1.5 Other standards

The following legally non-binding European standards were consulted during planning of the safety concept:

1.5.1 General procedures and safety principles

Standard	Description
EN ISO 12100-1:2003	Machine safety - basic concepts, general design guidelines - Part 1 Basic terminology, methods
EN ISO 12100-2:2003	Machine safety - basic concepts, general design guidelines - Part 2 Technical guidelines

Table 36: General procedures and safety principles

1.5.2 Activating the enabling equipment

Standard	Description
EN ISO 13849-1:2008	Safety of machinery – safety-related controller components - Part 1: General design principles
EN 60204-1:2006	Machine safety - electrical equipment on machines - Part 1: General requirements
ISO 10218-1:2006	Manipulating industrial robots - Safety

Table 37: Activating the enabling equipment

1.5.3 Activating the stop button

Standard	Description
EN ISO 13850:2006	Machine safety, stop equipment, functional aspects, design principles
EN 60204-1:2006 Ch. 9, 10	Machine safety - electrical equipment on machines - Part 1: General requirements

Table 38: Activating the stop button

1.5.4 Ergonomic

Standard	Description
EN 614-1:2006	Machine safety - ergonomic design principles - Part 1: Terminology and general guidelines
EN 894-1:1997	Machine safety - ergonomic requirements for designing displays and controls - Part 1: General guidelines for user interaction with displays and controls
EN 894-2:1997	Machine safety - ergonomic requirements for designing displays and controls - Part 2: Status indicators
EN 894-3:2000	Machine safety - ergonomic requirements for designing displays and controls - Part 3: Controls

Table 39: Ergonomic

1.5.5 Stability and water tightness of the housing

Standard	Description
EN 60529:1991	Degree of protection provided by housing
EN 61131-2:2003 Ch. 12	Programmable logic controllers - Part 2: Requirements and tests

Table 40: Stability and water tightness of the housing

1.5.6 Electrical safety and fire prevention

Standard	Description
EN 61131-2:2003 Ch. 11	Programmable logic controllers - Part 2: Requirements and tests
EN 50178:1997	Electronic equipment for high voltage systems

Table 41: Electrical safety and fire prevention

1.5.7 Requirements for environmental specifications

Standard	Description
EN 61131-2:2003 Ch. 4	Programmable logic controllers - Part 2: Requirements and tests
EN 50178:1997	Electronic equipment for high voltage systems

Table 42: Requirements for environmental specifications

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

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 43: UL testing of industrial control equipment

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 the European contracts:

- Free movement of goods
- Freedom of establishment
- Free trade 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 member states' territories.

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

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

The directives are directed at member states, who must transpose them into national laws. Therefore, the directives provide substance for laws.

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, placed on the product by the manufacturer, is the "passport" within the EU and is present for the monitoring authorities.

Additionally, the conformity with EU directives can be examined by independent and accredited certification organizations and certified with an EC type-examination certificate.

In addition to the EMC directive (EMC RL 2004/108/EC), the machine directive (MD 2006/42/EC) should be applied for the hand terminal.

3 International certifications

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

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

Table 44: International certifications

4 Standards and definitions for safety technology

4.1 Stop functions in accordance with IEC 60204-1:2006 (Electrical Equipment for Machines, Part 1: General Requirements)

The following three stop function categories exist:

Category	Description
0	Stop by immediately switching off the power to the machine drive elements (i.e. uncontrolled stop).
1	A controlled stop where the power to the machine drive elements remains on until the stop procedure is completed. The power is switched off after the stop is complete.
2	A controlled stop, the power to the machine drive elements is not switched off.

Table 45: Overview of stop function categories

The necessary stop functions must be determined based on a risk assessment of the machine. Stop functions in Category 0 and Category 1 must be able to function regardless of the operating mode. A Category 0 stop must have priority. Stop functions must have priority over assigned start functions. Resetting the stop function must never result in a dangerous state.

4.2 Emergency stops in accordance with IEC 60204-1:2006 (Electrical Equipment for Machines, Part 1: General Requirements)

The following requirements are valid for an emergency stop in addition to the requirements for stop functions:

- It must have priority over all other functions and operations in all operating modes.
- The power to the machine drive elements which can cause a dangerous state must be switched off as quickly as possible without creating other dangers.
- Resetting is not permitted to cause a restart.
- The stop function must not reduce the effectiveness of the safety equipment or of equipment with safety-related functions.
- The stop function must not interfere with equipment designed to free personnel from dangerous situations.

Emergency stops must be Category 0 or Category 1 stop functions. The stop function required must be determined based on a risk assessment for the machine.

For Category 0 emergency stop functions, only hard-wired electromechanical equipment can be used. Additionally, 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)]

When using a Category 1 emergency stop function, it must be guaranteed that the power to the machine drive elements is completely switched off. These elements must be switched off using electromechanical equipment.

4.3 Safety categories in accordance with EN ISO 13849-1:2008 (Safety of Machinery – Safety-related Parts of Control Systems, Part 1: General Design Principles)

Safety category (in accordance with EN 13849-1:2008)	Short description	System behavior
B	In accordance with the applicable standards, SRP/CS devices and/or their safety equipment and components must be designed, built, selected, assembled and combined so that they can meet the expected operational requirements. Fundamental safety principles must be applied.	**Caution!** **An error can cause the loss of safety functionality.**
1	The requirements of B must be fulfilled. Reliable components and proven safety principles must be used.	**Caution!** **Errors can result in the loss of safety functions, but the probability of their occurrence is less than in Category B.**

Table 46: Safety category overview

1) In accordance with the national foreword of the valid German-language version of IEC 60204-1:2006, electronic equipment (and especially emergency stop systems) may be used regardless of the stop category, if e.g. it provides the same safety using the standards EN ISO 13849-1:2008 and/or IEC 61508 as required by EN 60204-1.

Safety category (in accordance with EN 13849-1:2008)	Short description	System behavior
2	The requirements of B must be fulfilled, and proven safety principles must be used. Safety functions must be tested at appropriate intervals by the machine controller.	**Caution!** **An error between tests can cause the safety function to fail.** **If the safety function fails, it will be recognized during the test.**
3	The requirements of B must be fulfilled, and proven safety principles must be used. Safety related parts must be implemented so that: • a single error in each of the parts doesn't result in a loss of safety function, and • when possible within reason, the error is detected.	**Caution!** **The safety function remains active when a single error occurs.** **Some but not all errors are recognized.** **A buildup of errors can cause the safety function to fail.**
4	The requirements of B must be fulfilled, and proven safety principles must be used. Safety related parts must be implemented so that: • a single error in each of the parts doesn't result in a loss of safety function, and • the single error must be detected the next time (or before) the safety function is required. If this type of detection is not possible, a buildup of errors must not cause the safety function to fail.	**Information:** **The safety function remains active when a single error occurs.** **Detection of error buildup reduces the probability of losing safety function (high DC).** **Errors are recognized in time to prevent the safety function from failing.**

Table 46: Safety category overview

The following risk graph (in accordance with EN 13849-1:2008, Appendix A) provides a simplified procedure for risk assessment:

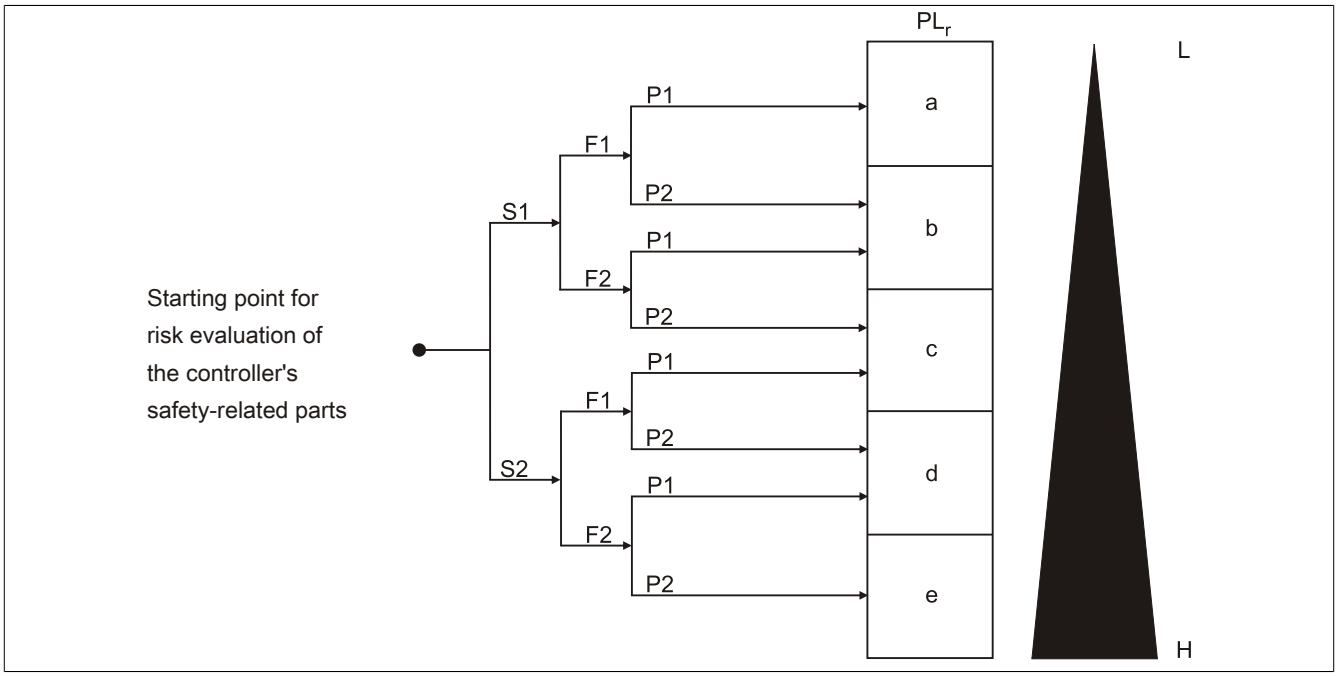


Figure 64: Risk diagram to determine the PLr for every safety function

Parameter S ... Severity of injury	
S1	Light (usually reversible) injury.
S2	Serious (normally irreversible injury or death).
Parameter F ... Frequency and/or duration of the exposure to the hazard	
F1	Rare to often and/or short exposure to the hazard.
F2	Frequent to continuous and/or long exposure.
Parameter P ... Possibility to circumvent the danger or limit the damage	
P1	Possible under some conditions.
P2	Nearly impossible.
Other	
L	Low impact on risk reduction.
H	High impact on risk reduction.
PL_r	Required performance level.

Table 47: Legend for risk graph

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. The safety categories define the required behavior of safety related controller parts regarding their resistance to errors.

Safety category (in accordance with EN 954-1)	Short description	System behavior
B	Safety-related components must be designed and built so that they can meet the expected operational requirements. (No specific safety measures are implemented.)	**Caution!** **An error can cause the loss of safety functionality.**
1	Safety-related components must be designed and built in such a way that only reliable components and safety principles are used. (e.g. prevention of short circuits through sufficient spacing, reducing the probability of errors by using oversized components, defining the failure route - bias current fail-safe, etc.)	**Caution!** **An error can cause the loss of safety functionality.**
2	Safety-related components must be designed in such a way that their safety functionality is checked at suitable intervals by the machine controller. (e.g. automatic or manual check during startup)	**Caution!** **An error between checks can cause the loss of safety functionality. The loss of safety functionality will be detected during the check.**
3	Safety-related components must be designed in such a way that individual errors do not cause the loss of safety functionality. Individual errors should – if possible – be recognized the next time (or before) the safety function is required.	**Caution!** **Safety functionality remains active when an error occurs. Some but not all errors are recognized. A buildup of errors can cause the safety functionality to fail.**
4	Safety-related components must be designed in such a way that individual errors do not cause the loss of safety functionality. Individual errors must be recognized the next time (or before) the safety function is required. If this type of recognition is not possible, a buildup of errors is not permitted to cause the safety functionality to fail.	**Information:** **Safety functionality remains active when an error occurs. Errors are recognized in time to prevent safety functionality from failing.**

Table 48: Safety category overview

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

Information:

The stop button and enable switch are connected in accordance with EN 954-1 in the same manner illustrated in accordance with EN ISO 13849-1 in the connection example. This is relevant because the EN 954-1 categories have been added to the EN ISO 13849-1. Take note that the entire system concept must be designed accordingly.

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

The following risk graph (in accordance with EN 954-1, Appendix B) provides a simplified procedure for risk evaluation:

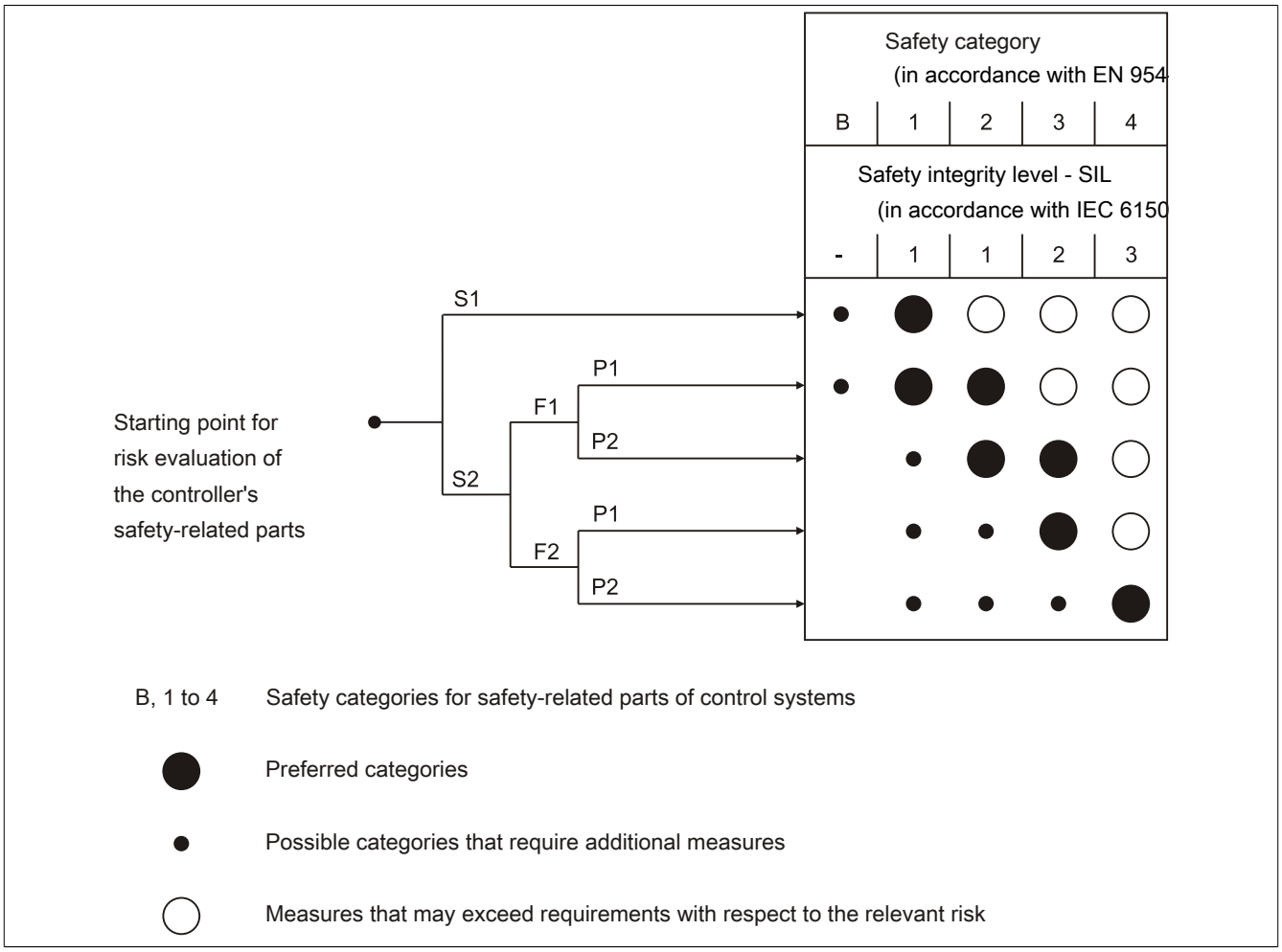


Figure 65: Risk diagram in accordance with EN 954-1, Appendix B

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	Light (usually reversible) injury.
S2	Serious (usually irreversible) injury.
Parameter F ... Frequency and/or duration of the exposure to the hazard	
F1	Seldom to slightly more frequent and/or short exposure duration.
F2	Frequent to continuous and/or long exposure duration.
Parameter P ... Possibility to prevent danger	
P1	Possible under some conditions.
P2	Nearly impossible.

Table 49: Parameters S, F and P lead you to the safety category to be used

4.5 Selecting Performance Level and Category in accordance with EN ISO 13849-1

The machine directive dictates that a defect, disturbance or damage in the control loop logic must not cause a dangerous situation. This general statement is clarified in EN ISO 13849-1 "Safety-related parts of machine controllers", which defined Performance Levels (PL a to e) for safety-related control components. The PL depends on the category, the $MTTF_d$ value and on the DC of the corresponding safety circuit. The CCF examination must also be fulfilled.

As in the preceding standard EN 954-1, the category describes the structure of the safety functions. The new addition is the Performance Level (PL), which describes the safety function's probability of failure and ability to detect errors.

The selection of the PL is made by the machine manufacturer according to the actual potential for dangerous situations, which is determined using the danger and risk analysis. Generally, at least PL d is required for dangers that can result in irreversible injury or death.

The category specified with the PL provides information about whether

- the system is designed as single-channel, in which case an error could result in loss of safety, but the component availability is high (Category 1)
- the system is designed as single-channel, in which case an error could result in loss of safety, but the error can be detected and indicated in some manner by the system (Category 2)
- the system is designed as two-channel, and an error will not result in loss of safety (Category 3)
- or the system is designed as two-channel, and even an accumulation of errors will not result in loss of safety (Category 4).

It is important to note that in Category 3 and higher, individual errors must be detected promptly in order to prevent an accumulation of errors, which could lead to loss of safety.

In electrical and electronic systems, errors that must be detected include cross faults between loops, interruptions, short-circuits or stuck contacts. Specially certified safety switching devices, with their own specific PL, are often used for detecting errors in the individual safety circuits. However, the overall PL required for the safety function is only achieved if the connection with the corresponding loops is also implemented for the respective PL in accordance with the product description, and the PL of all components that are associated with the safety function have been accounted for.

Therefore, the PL must always be calculated from the individual components or parts for an overall safety function.

The standard EN ISO 13849-1 offers guidance for determining the PL for a safety function that is made up of multiple components.

Be aware that in a series circuit of safety components, 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 made up of 3 components with category 4 PL e, category 3 PL d and the third component with category 2 PL c would result in PL c for the overall safety function. It should be further noted that an error would result in the loss of safety even though category 4 PL e components are integrated in the safety function, because one of the components being used only has category 2.

A combination of multiple PLs can result in a reduction of the overall PL.

A FMEA (Failure Mode and Effects Analysis) can ensure that an error will not result in the loss of safety. This is done by theoretically, or even actually running through all possible errors and showing that the requirements for the category are sufficiently fulfilled.

4.6 Restart inhibit in accordance with EN 1037:1995 (Safety of Machinery – Prevention of Unexpected Startup)

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

Starting refers to the transition of a machine or its parts from a state of rest to a moving state. Any start is unexpected if it is caused by:

- A startup command sent because of a controller failure or because of external influences on the controller.
- A startup command sent because of incorrect operation of a start element or another part of the machine
- Restoration of 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, short interventions in danger zone), other measures must be taken:

- Measures to prevent random startup commands
- Measures to prevent random startup commands from causing unexpected startup
- Measures to automatically stop dangerous parts of the machine before a dangerous situation can be caused by unexpected startup

5 Information regarding MD 2006/42/EC

The machine directive (MD) 2006/42/EC is effective starting December 29, 2009 (without transitional period). This directive requires that all machines and safety components commissioned after this date must comply with the new MD and harmonized standards.

For B&R hand- held operating units, this means that in addition to the new directive, the standard EN ISO 13849-1:2008 must also be specified (EN 954-1, which is valid through to December 31, 2012, also applies). The EN ISO 13849-1 standard requires the category and performance level (PL) to be listed for the safety-related component, "enable switch, and the B_{10d} value to be listed for the grey stop switches. These values are provided in the Chapter Appendix A in section "Stop button" on page 134 and Enabling switch.

5.1 Which devices have to meet the new MD?

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

- The date that the directive is to be used depends on the date the product was brought into circulation. If the Mobile Panel is delivered to the end-user after December 29, 2009, 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 to the old MD that are received by B&R for repairs, can be repaired and returned according to the old MD.
- If an old device is sent in for repairs, then the same device, or an equivalent device will be sent back to the customer.
- Devices in accordance to the new MD that are received by B&R for repairs, must be repaired and returned according to the new MD.

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

5.2.1 Stop button:

B&R provides a B_{10d} value. B&R is not able to provide other values (e.g. SIL, PL, Category).

Reason: B&R only supplies the switching element, but no element evaluation. The customer is responsible for connecting the stop button to their application. The manner in which the stop button is implemented in the machine determines the SIL or Category with PL for the customer.

5.2.2 Release control device (enabling equipment):

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

Reason: The enable switch was rated in accordance with EN ISO 13849-1. There is no B_{10d} value for the enable switch because 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).

5.3 Relationship between Performance Level and Safety Integrity Level

When evaluating safety functions in accordance with IEC 61508-1, the values in PL can be implemented in SIL according to the EN ISO 13849-1:2006, equivalence table 4.

Performance Level (PL) acc. to EN ISO 13849-1	Safety Integrity Level (SIL) acc. to IEC 61508-1
a	No equivalence
b	1
c	1
d	2
e	3

Table 50: (EN ISO 13849-1:2006, table 4) - Relationship between the Performance Level (PL) and the Safety Integrity Level (SIL)

Performance Level (PL)	Probability of a dangerous failure per hour
a	≥ 10^{-5} to < 10^{-4}
b	≥ 3 x 10^{-6} to < 10^{-5}
c	≥ 10^{-6} to < 3 x 10^{-6}
d	≥ 10^{-7} to < 10^{-6}
e	≥ 10^{-8} to < 10^{-7}

Table 51: (EN ISO 13849-1:2006, table 3) - Performance Level (PL)

5.4 Abbreviations

Abbreviations	Term	Description
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 to which diagnostic coverage is provided
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	Level of safety integrity provided

Table 52: Abbreviations

6 Conformity and type examination certificate

6.1 EC declaration of conformity

Perfection in Automation
www.br-automation.com

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. Serialnummern 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. 1088/1

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.

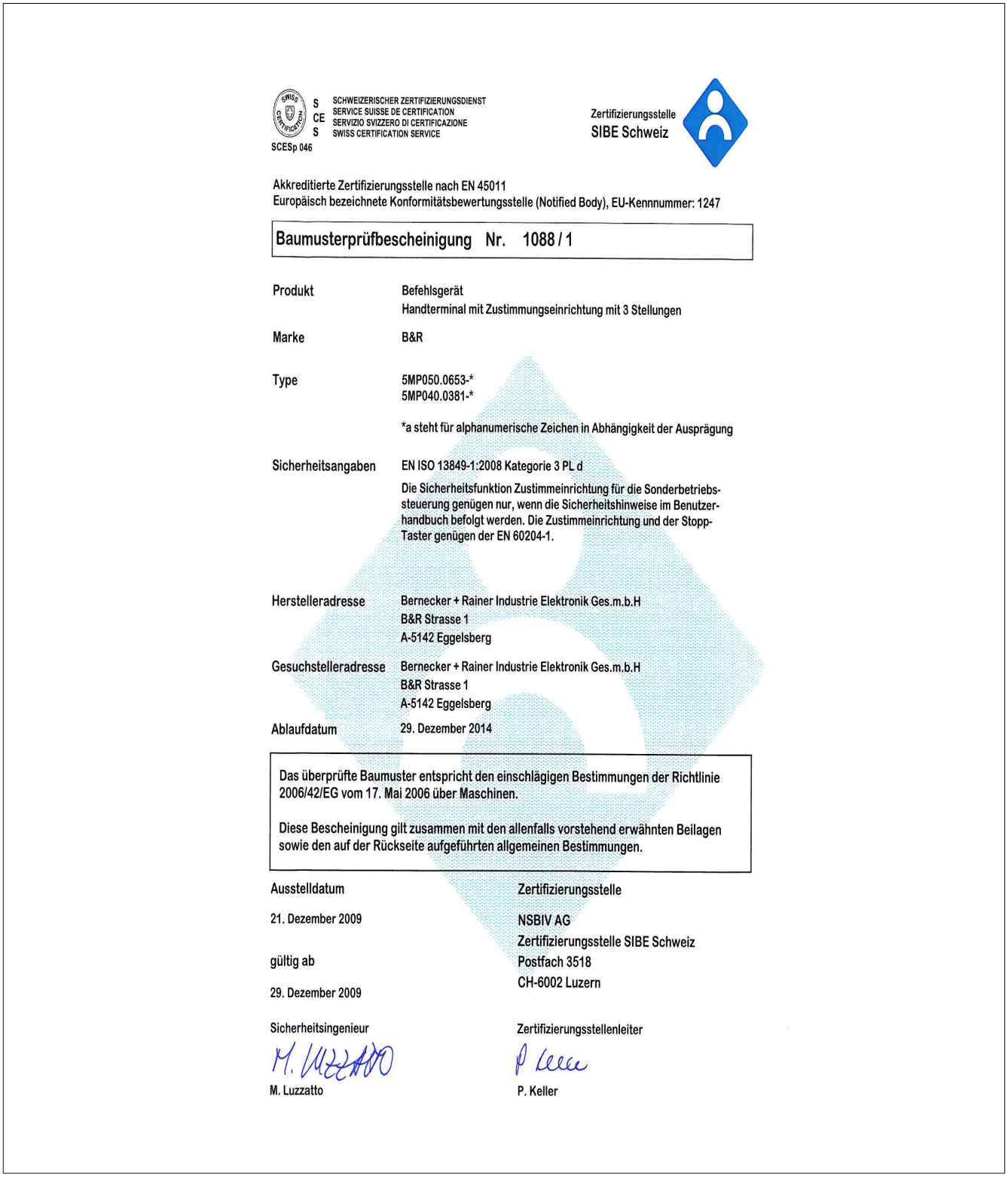
Eggelsberg, 2010-02-01

H. Wimmer

Hans Wimmer
Geschäftsführung

Figure 66: EC declaration of conformity

6.2 EC type approval certificate



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

SCESp 046

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 Sonderbetriebs-steuerung genügen nur, wenn die Sicherheitshinweise im Benutzer-handbuch 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

Chapter 6 • Accessories

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

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

1 USB flash drives

1.1 5MMUSB.2048-00

1.1.1 General information

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

Information:

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

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

1.1.2 Order data

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

Table 53: 5MMUSB.2048-00 - Order data

1.1.3 Technical data

Information:

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

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

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

Product ID	5MMUSB.2048-00
Interfaces	
USB	
Type	USB 1.1, USB 2.0
Connection	To each USB type A interface
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Sequential reading	Max. 8.7 MB/s
Sequential writing	Max. 1.7 MB/s
Support	
Operating systems	
Windows XP Professional	Yes
Windows XP Embedded	Yes
Windows ME	Yes
Windows 2000	Yes
Windows CE 5.0	Yes
Windows CE 4.2	Yes
Electrical characteristics	
Power consumption	650 µA sleep mode, 150 mA read/write
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 length
Storage	Max. 80 g (784 m/s² 0-peak) and 11 ms length
Transport	Max. 80 g (784 m/s² 0-peak) and 11 ms length
Altitude	
Operation	Max. 3048 m
Storage	Max. 12192 m
Transport	Max. 12192 m
Mechanical characteristics	
Dimensions	
Width	19 mm
Length	52.2 mm
Height	7.9 mm

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

1) Signals data transfer (send and receive).

1.1.4 Temperature humidity diagram

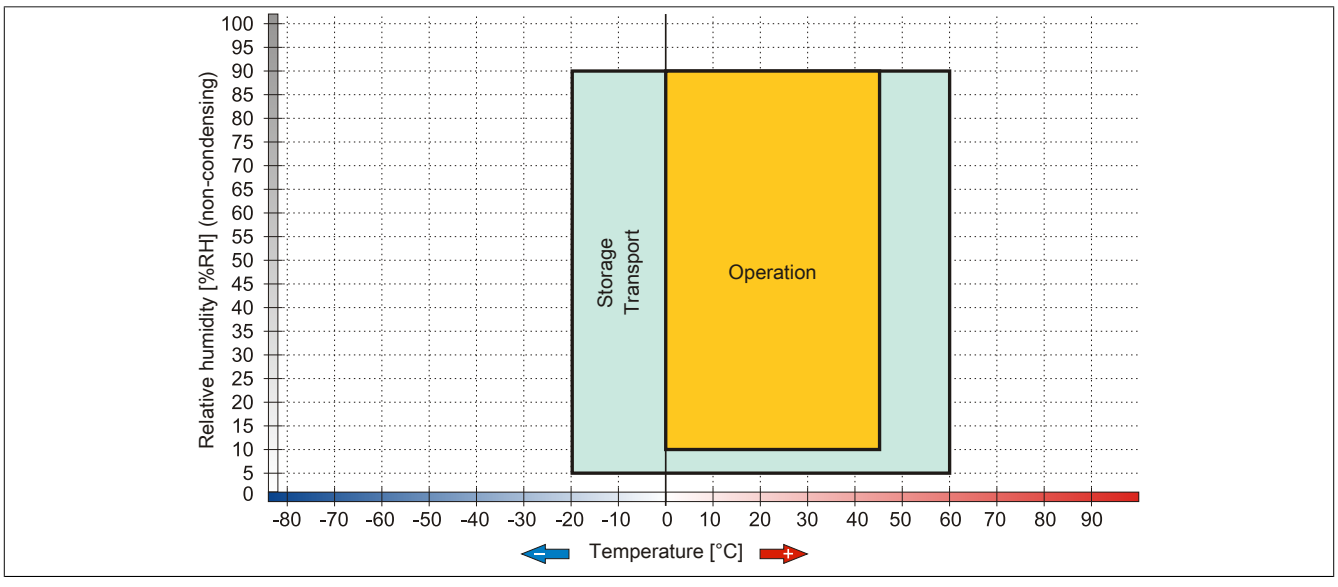


Figure 68: 5MMUSB.2048-00 - Temperature humidity diagram

1.2 5MMUSB.2048-01

1.2.1 General information

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

Information:

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

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

- USB 1.1, USB 2.0
- High transfer rate
- High data storage
- Ambient temperature during operation: 0 to 70°C

1.2.2 Order data

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

Table 55: 5MMUSB.2048-01 - Order data

1.2.3 Technical data

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

Table 56: 5MMUSB.2048-01 - Technical data

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

Table 56: 5MMUSB.2048-01 - Technical data

1) Signals data transfer (send and receive).

1.2.4 Temperature humidity diagram

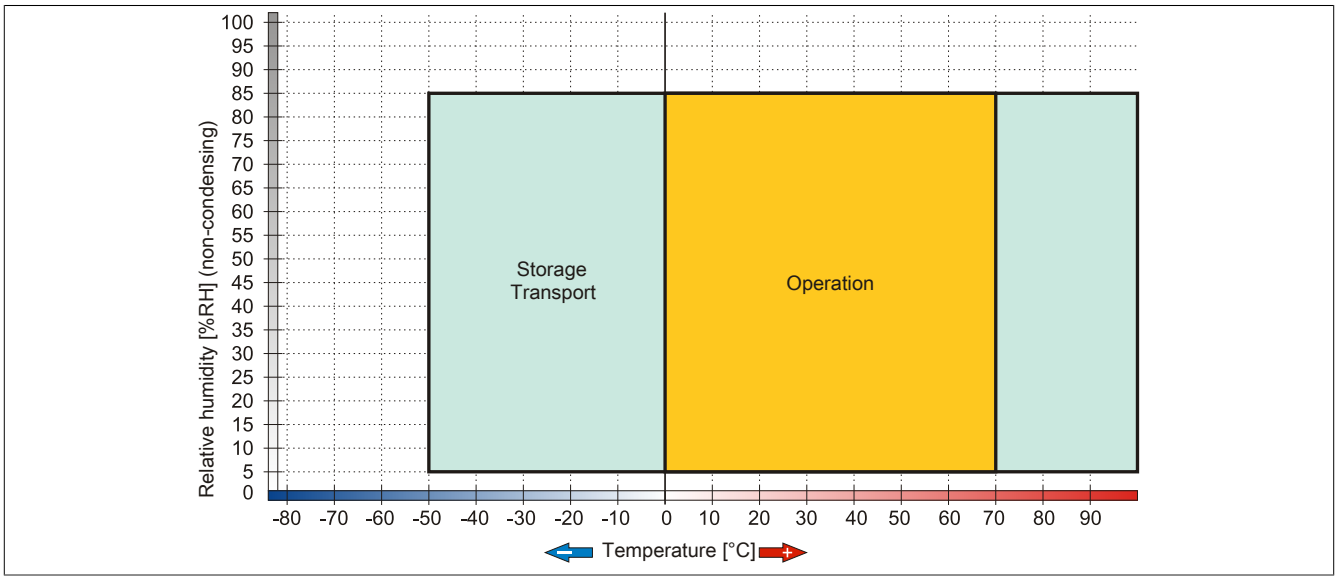


Figure 69: 5MMUSB.2048-01 - Temperature humidity diagram

2 Protective cap

2.1 5CAMPP.0000-10

2.1.1 General information

The protective cap protects all Mobile Panel attachment cable plugs during transport, and each cap is secured to the cable with a strap so it cannot be lost. The protective cap ensures IP65 protection.

2.1.2 Order data

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

Table 57: 5CAMPP.0000-10 - Order data

2.1.3 Installation

1. Feed the circular plug through the loop.

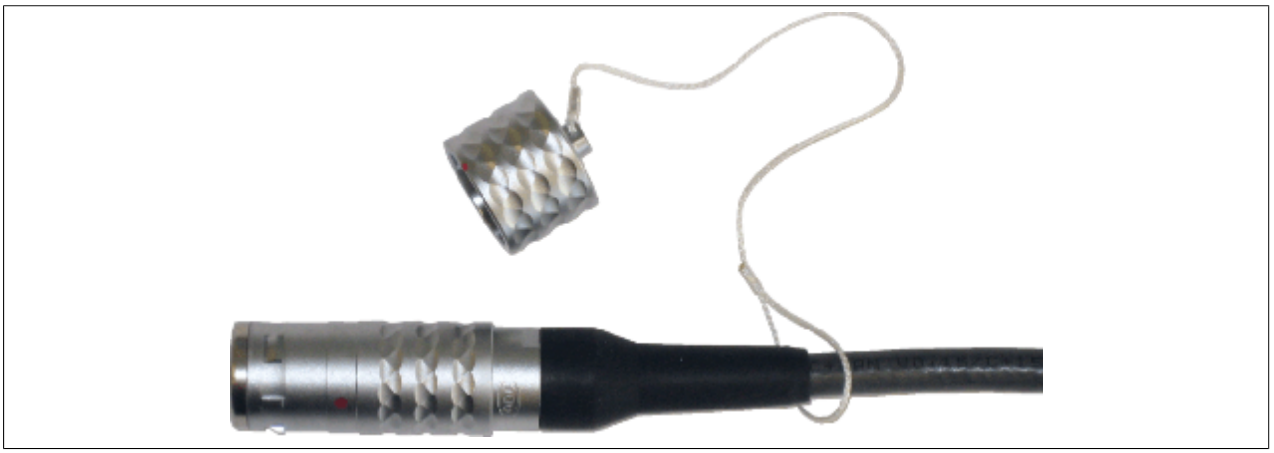


Figure 70: 5CAMPP.0000-10 - Feeding the plug through the loop

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

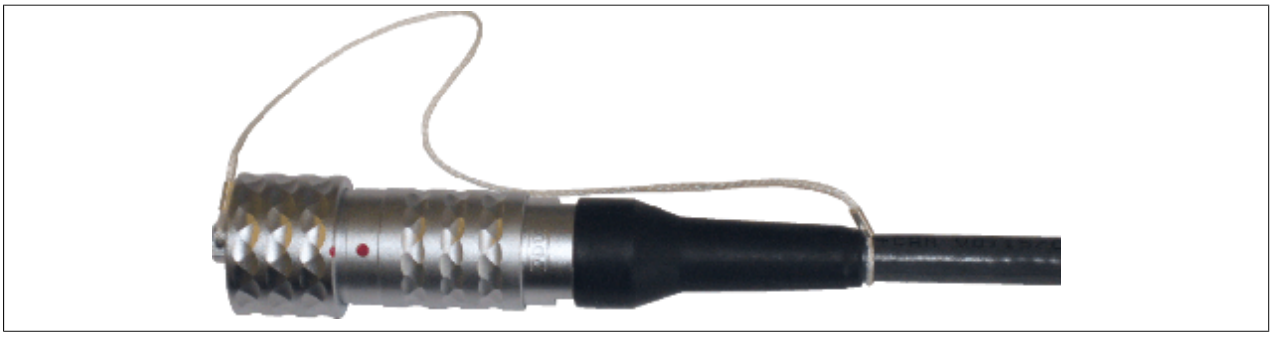


Figure 71: 5CAMPP.0000-10 - Closing the plug

2.2 5CAMPP.0001-10

2.2.1 General information

The protective cap protects the Mobile Panel control cabinet cable connectors and Mobile Panel connection box connectors, and each cap is secured to the cable with a strap so it cannot be lost. The protective cap ensures IP65 protection.

2.2.2 Order data

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

Table 58: 5CAMPP.0001-10 - Order data

2.2.3 Installation

Mount the cap near the control cabinet cable and insert it after removing the cable.

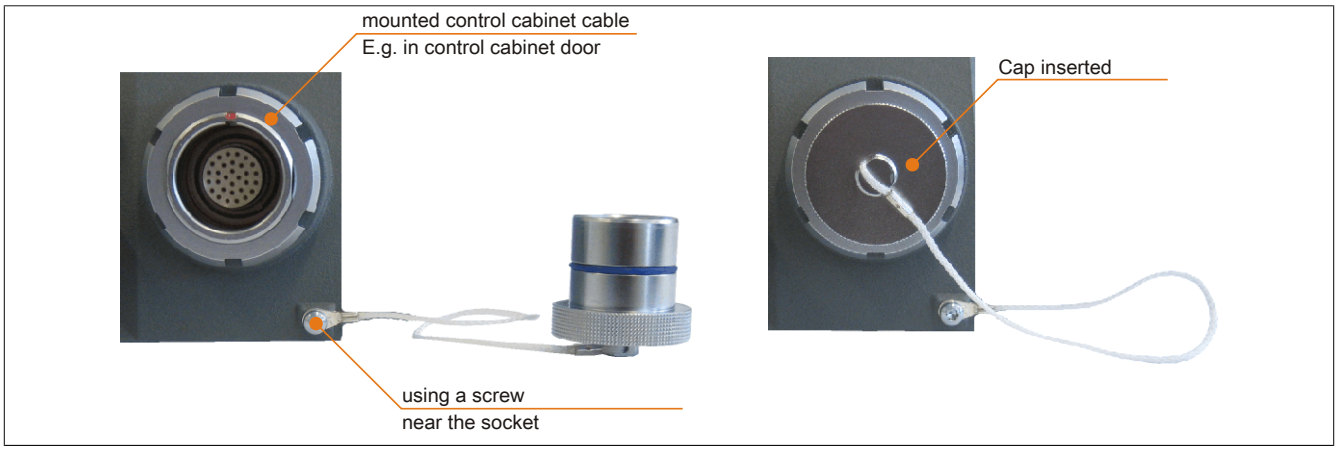


Figure 72: Attaching the control cabinet cable protective cap

3 Wall mount

3.1 4MPBRA.0000-01

3.1.1 General information

The wall mount 4MPBRA.0000-01 is used for storing the Mobile Panel (operating unit + handle) together with the Mobile Panel attachment cable and is only intended for upright, hanging installation.

Drilling holes for attaching the wall mount must be made in accordance with the diagram "Figure 74: 4MP-BRA.0000-01 - Dimensions" on page 116.

Caution!

The mounting location for the wall mount should be selected so that the Mobile Panel is not directly subjected to sources of heat or sunlight. The wall mount should also be positioned so that operation of the stop button is not impaired.

Danger!

When the Mobile Panel device is stored on its wall mount and located in a dangerous machine area, the attachment cable and the control cabinet cable must still be completely connected so that the stop button can be activated.

3.1.1.1 Components

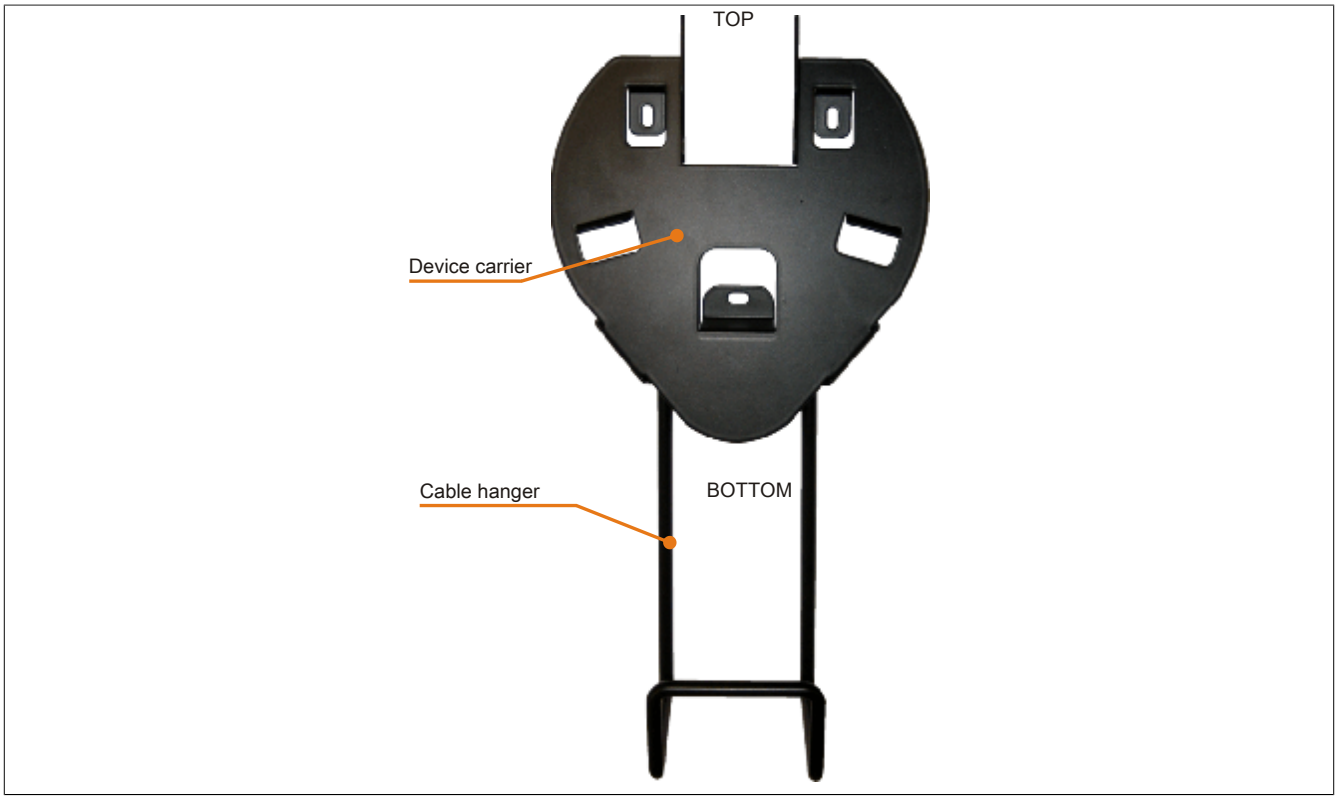


Figure 73: 4MPBRA.0000-01 - Components

3.1.2 Order data

Model number	Short description	Figure
	Accessories	
4MPBRA.0000-01	MP40/50 Wall Bracket.	

Table 59: 4MPBRA.0000-01 - Order data

3.1.3 Dimensions

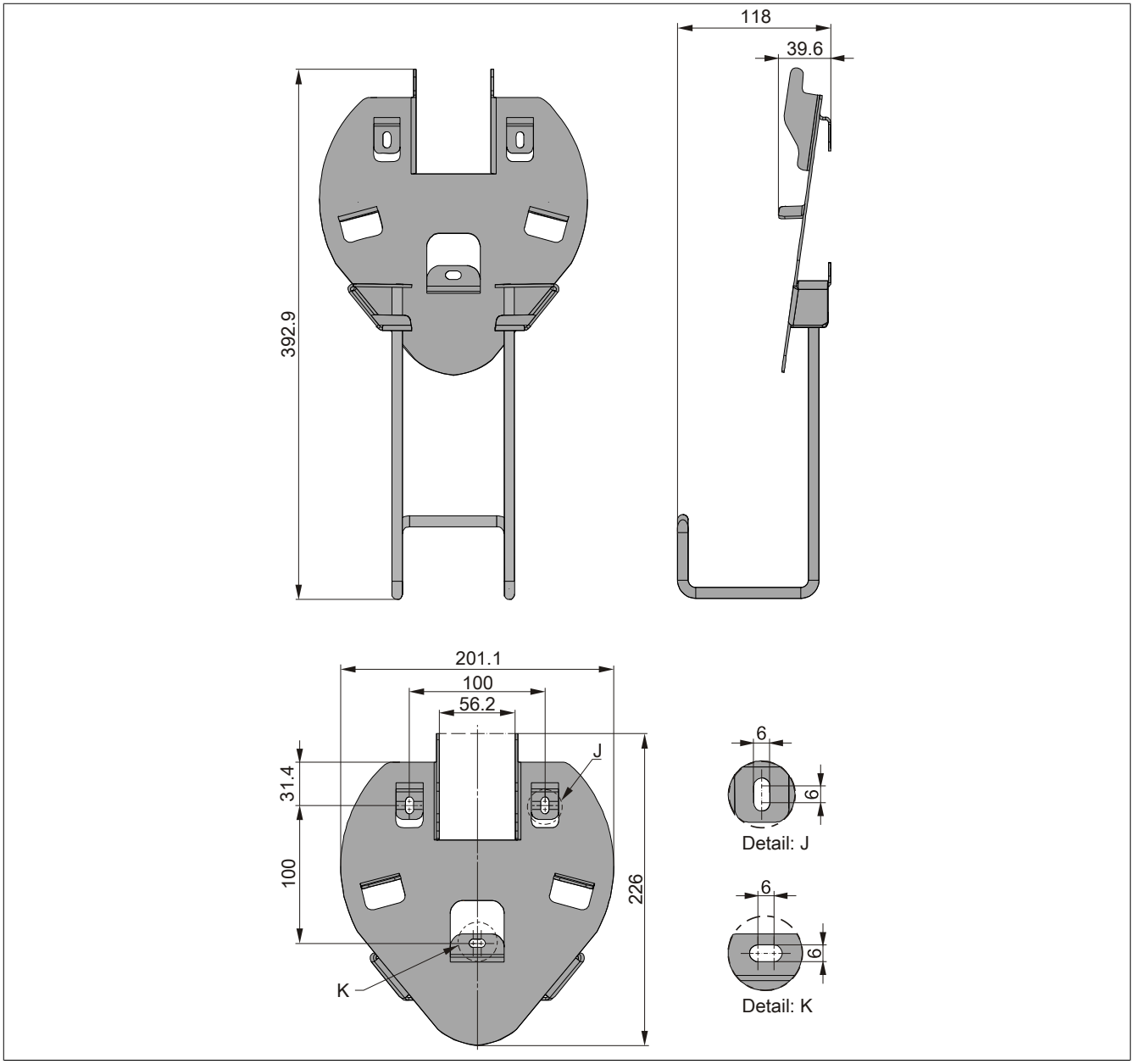


Figure 74: 4MPBRA.0000-01 - Dimensions

3.1.4 Storing the Mobile Panel device

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

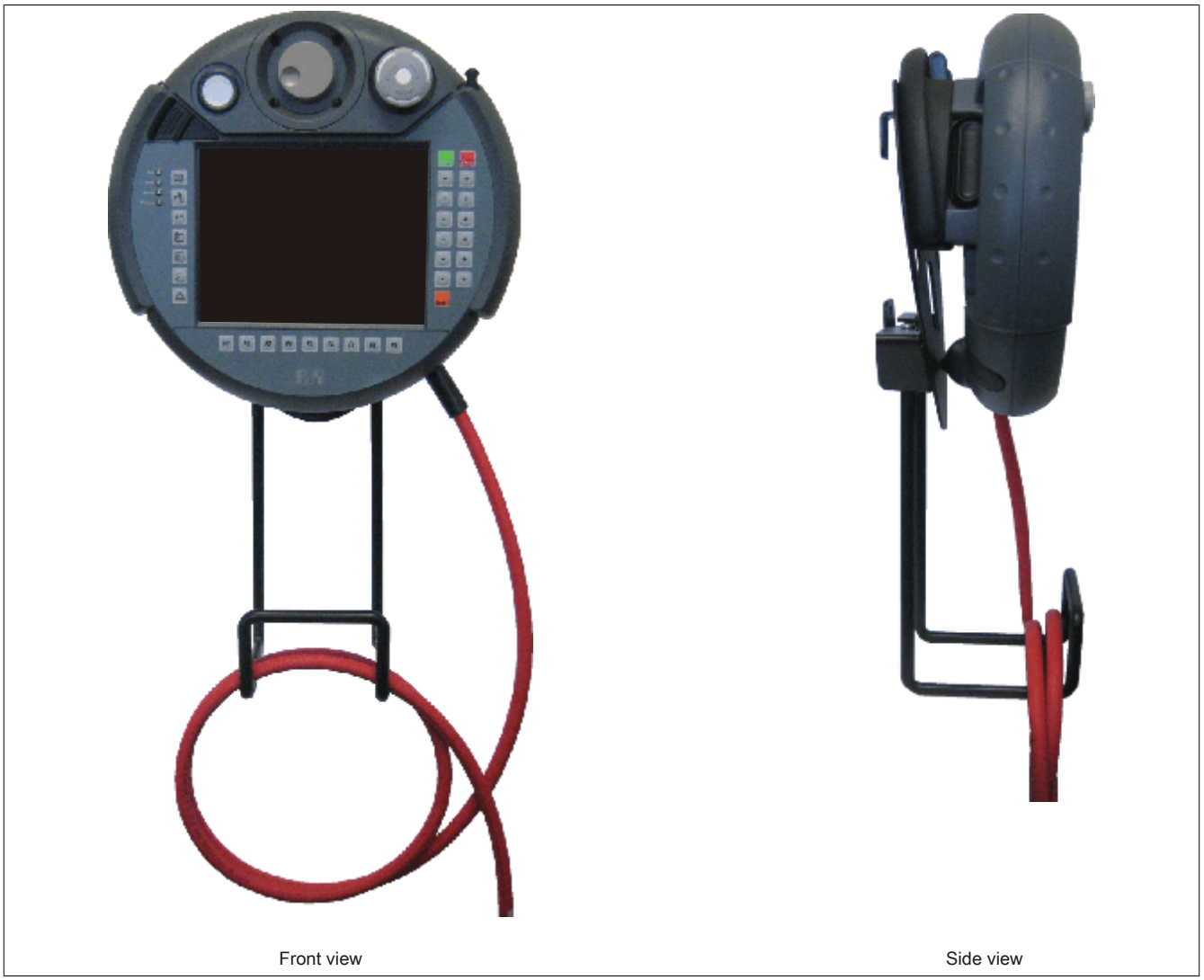


Figure 75: Storing a Mobile Panel device on a wall mount

4 Connection boxes

4.1 4MPCBX.0000-00

4.1.1 General information

The Connection box 4MPCBX.0000-00 enables a configuration where a Mobile Panel 40/50 or Mobile Panel 100/200 can be operated at various system connection points while remaining integrated in the E-stop circuit.

- Compatible for connections with Mobile Panel 40/50 (limited connectivity) and Mobile Panel 100/200 devices
- Disconnecting and connecting the Mobile Panel during operation - the E-stop circuit is not interrupted
- IP65 protection
- Classified in accordance with EN ISO 13849-1:2006 Category 3, Performance Level (PL) d
- Circular plug with Push-pull locking
- E-stop button
- Hot plug button
- Slot ID
- Easy to use
- 4 cable outlets, vertical
- Compact dimensions
- Robust

4.1.2 Order data

Model number	Short description	Figure
	Accessories	
4MPCBX.0000-00	Mobile Panel Connection Box for cables with Push Pull connector.	
	Required accessories	
	Accessories	
5CAMPB.0100-10	Mobile Panel Box cable, with wire tip sleeves for connection in the switching cabinet; with plug contacts for wiring in the connection box, 10 m.	

Table 60: 4MPCBX.0000-00 - Order data

4.1.3 Interfaces

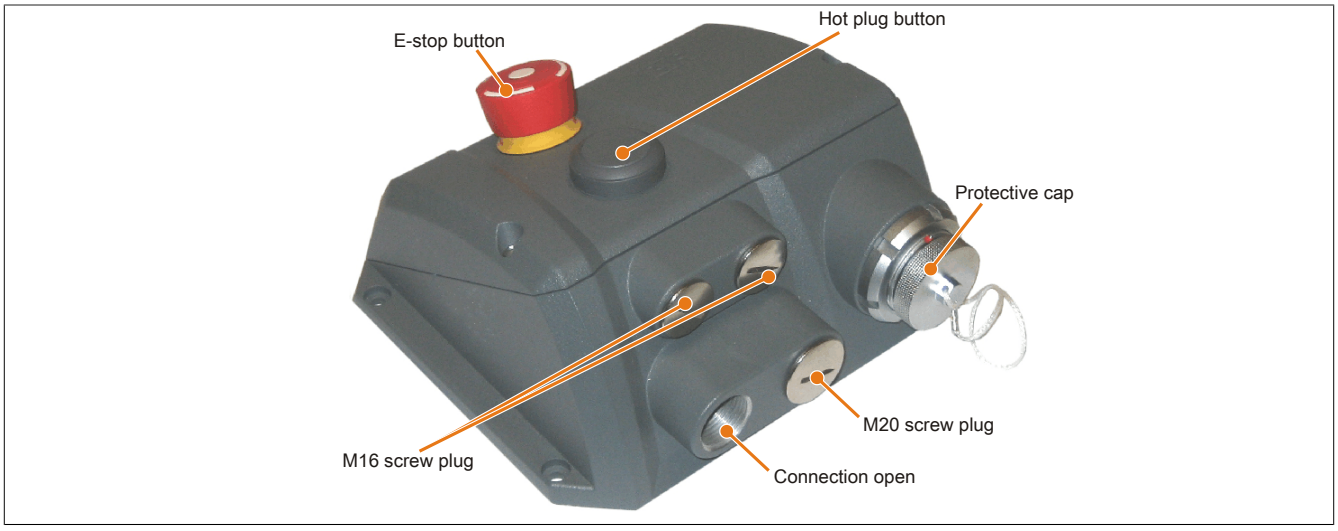


Figure 76: 4MPCBX.0000-00 - Interfaces

4.1.4 Technical data

Product ID	4MPCBX.0000-00
General information	
Certification	
CE	Yes
Keys	
Hot plug button	1 button, 2 N.C. contacts
E-stop	1 button, 2 N.C. contacts
Connector	
Connection plug, internal 1)	Key switch or push button E-stop Enabling switch RS232 Power supply CAN Ethernet
Additional connection plugs	Slot ID (monitoring contacts) Enabling switch Key switch or push button E-stop contacts Power supply
Push-pull plug	For connecting the 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	
Protection in accordance with EN 60529	IP65 (only with mounted screw plugs, mounted protective cap or with connected 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 (chill casting)
Paint	Powdered RAL7012 fine structure
Cover plate 2)	
Material	GK-AlSi9Mg (chill casting)
Dimensions	
Width	172.5 mm
Height	158.7 mm
Depth	81.7 mm
Weight	Approx. 1600 g (without attachment cable)

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

1) For the box cable
2) The protective cap must be closed when a Mobile Panel 40/50 or Mobile Panel 100/200 is not connected.

4.1.5 Safety characteristics

Criteria	Characteristic value
Maximum Performance Level (PL) acc. EN ISO 13849-1:2006	PL d
$MTTF_d$ (Mean Time To Failure dangerous)	> 100 years (high)
DC_{avg} (Diagnostic Coverage)	60% < DC < 90% (low)
PFH_D (Probability of dangerous Failure per Hour)	< 6.4 x 10^{-8}
Mission time	20 years

Table 62: 4MPCBX.0000-00 - Safety characteristics

4.1.6 Dimensions

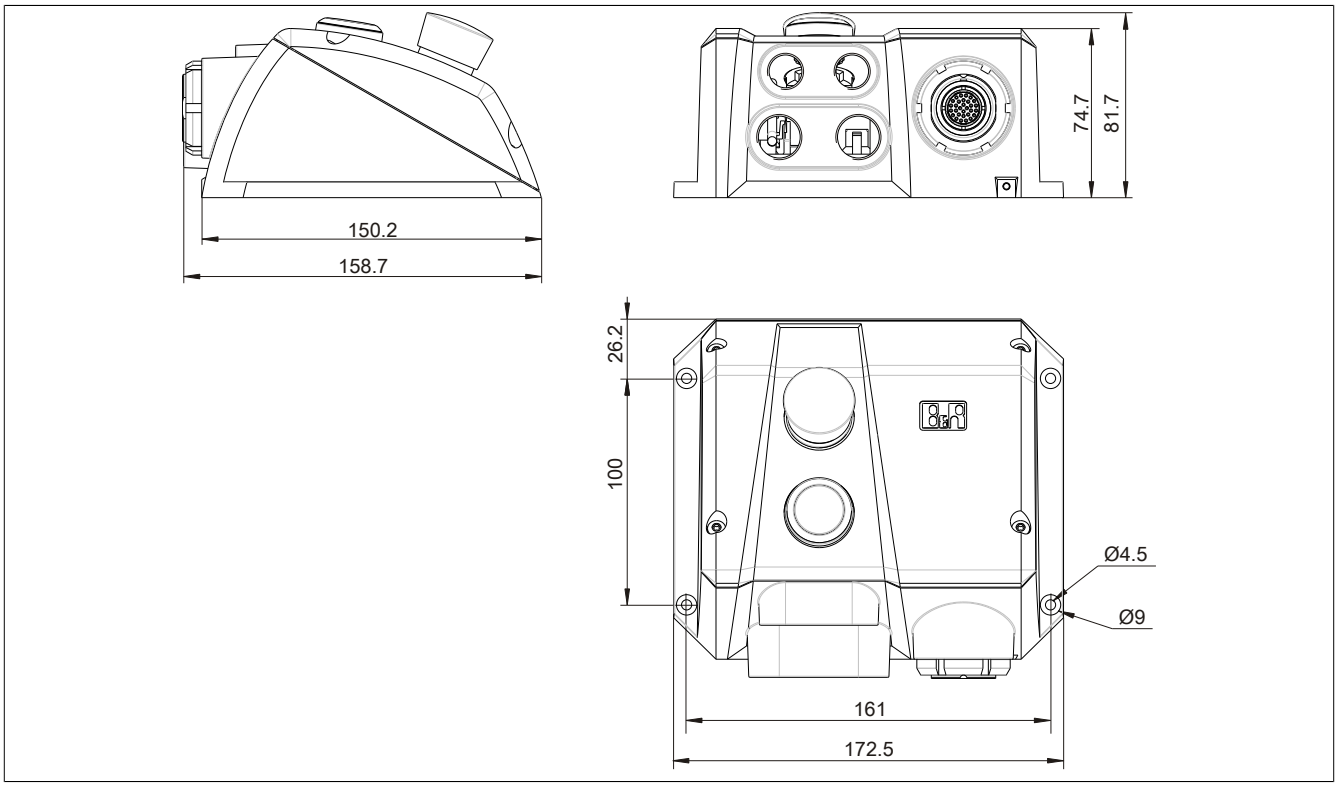


Figure 77: 4MPCBX.0000-00 - Dimensions

4.1.7 Drilling template

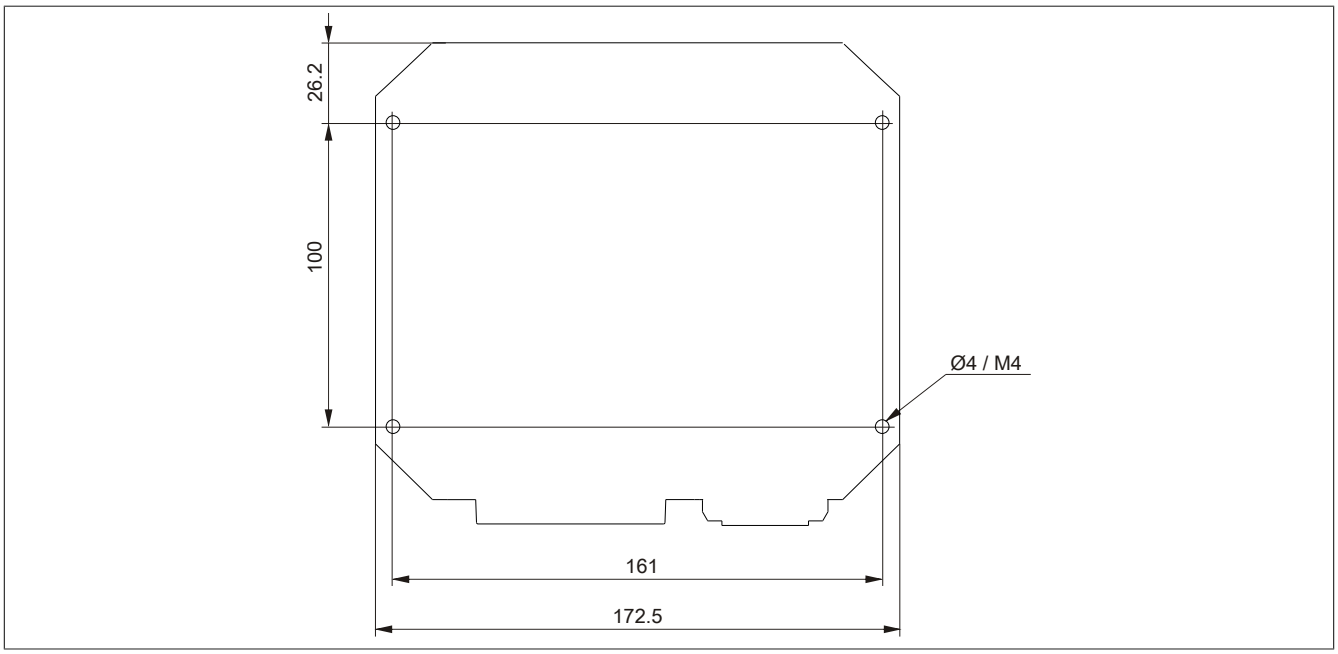


Figure 78: 4MPCBX.0000-00 - Drilling template

4.1.8 Contents 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 cap plugged in (design similar to 5CAMPP.0001-10)

Table 63: 4MPCBX.0000-00 - Contents of delivery

The box cable (model number 5CAMPB.0100-10)is needed to establish the electrical connection between the control cabinet and the connection box.

4.2 4MPCBX.0001-00

4.2.1 General information

The Connection box 4MPCBX.0001-00 enables simple vertical outlet of the control cabinet cable but does not feature an E-stop "Hot Plug" function.

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

4.2.2 Order data

Model number	Short description	Figure
	Accessories	
4MPCBX.0001-00	Mobile Panel Connection Box Small for cables with Push Pull connector.	
	Optional accessories	
	Accessories	
5CAMPP.0001-10	Protection cover for Mobile Panel cabinet cable with circular connector.	

Table 64: 4MPCBX.0001-00 - Order data

4.2.3 Technical data

Product ID	4MPCBX.0001-00
General information	
Certification	
CE	Yes
Keys	
Hot plug button	No
E-stop	No
Operating conditions	
Protection in accordance with EN 60529	IP65 (only with protective cap or with connected Mobile Panel 40/50 or Mobile Panel 100/200)
Mechanical characteristics	
Housing	
Material	GK-AlSi11Mg (chill casting)
Paint	Powdered RAL7012 fine structure
Cover plate	
Material	GK-AlSi9Mg (chill casting)
Dimensions	
Width	90 mm
Height	74.2 mm
Depth	150 mm
Weight	Approx. 500 g

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

4.2.4 Dimensions

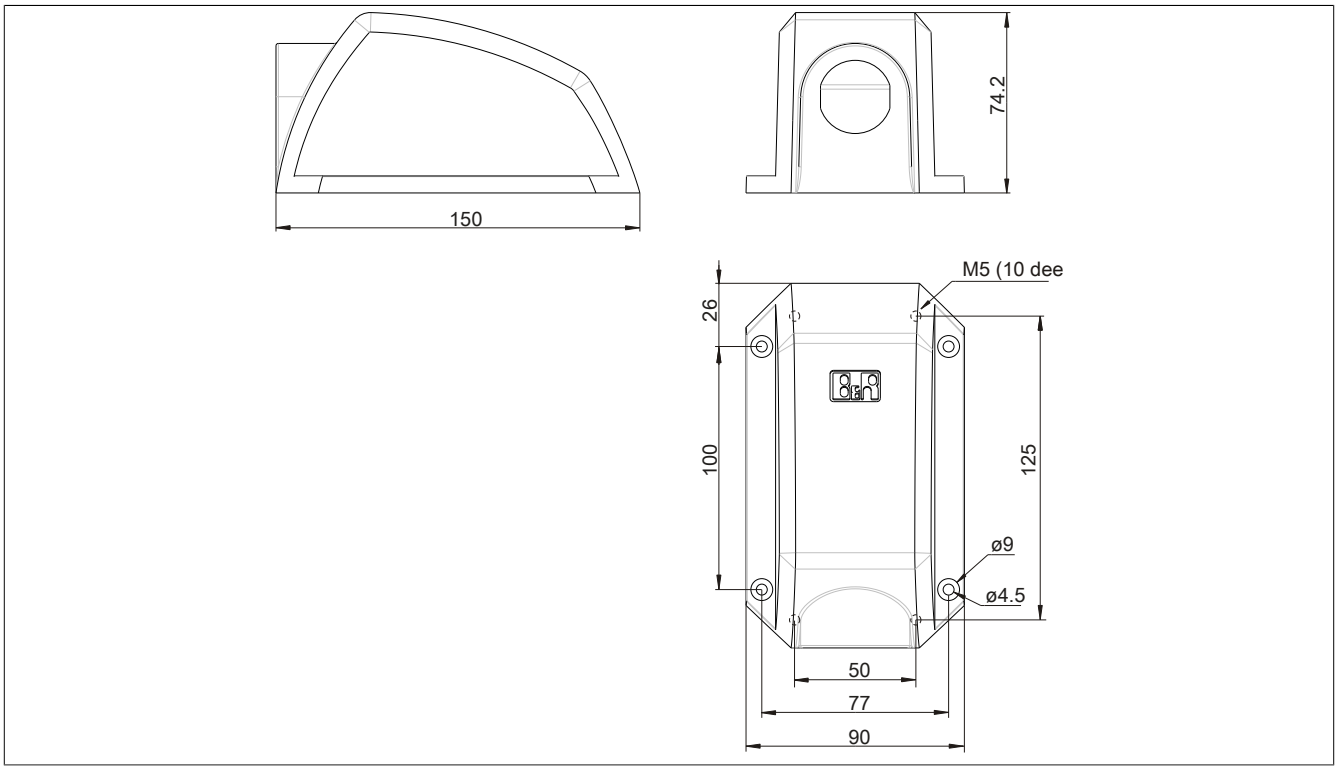


Figure 79: 4MPCBX.0001-00 - Dimensions

4.2.5 Drilling template

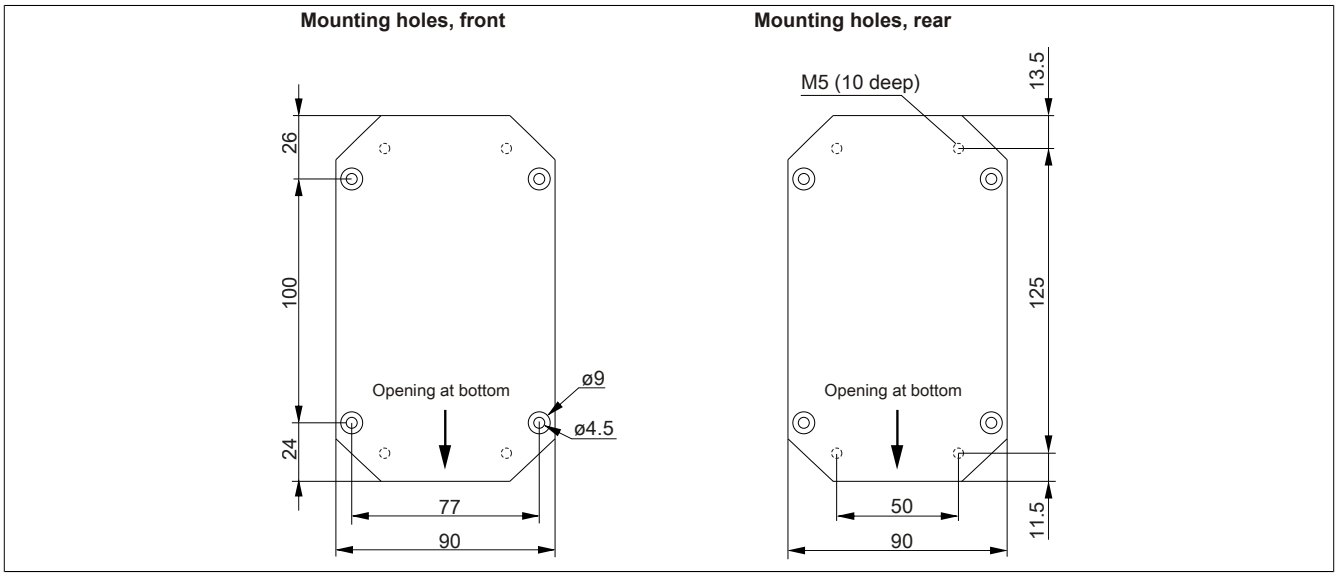


Figure 80: 4MPCBX.0000-01 - Drilling template

4.2.6 Contents of delivery

Quantity	Component
1	Connection box 4MPCBX.0001-00

Table 66: 4MPCBX.0001-00 - Contents of delivery

5 Box cable

5.1 5CAMPB.0100-10

5.1.1 General information

The box cable establishes the electrical connection between the control cabinet and the 4MPCBX.0000-00 connection box. It includes lines for the network (Ethernet 10/100 Mbit/s), 24 VDC supply, command devices / E-stop and key switch or push button, enable switch, serial data transfer and CAN.

The connection end has a pre-assembled RJ45 Ethernet plug. The rest of the lines have an open end with wire tip sleeves. This makes it easier to wire the cable to safety equipment and the other connections. The box cable is installed in the connection box on the other side (connection box side).

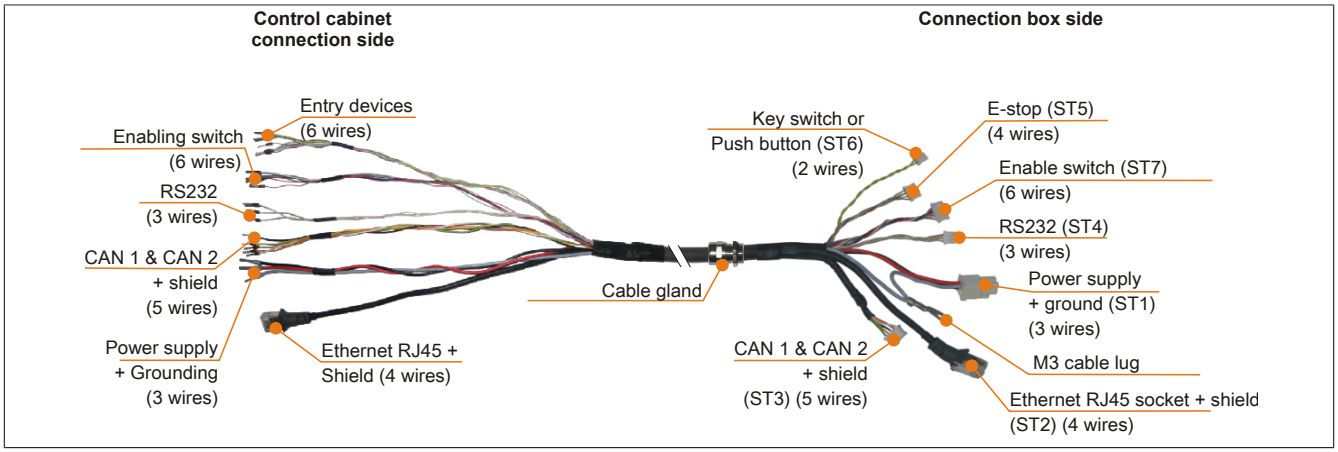


Figure 81: 5CAMPB.0100-10 - Connections

The pinout of the Ethernet plug RJ45 (crossover) make it possible to connect directly to a B&R controller or to the first Ethernet connection (MDIX) on the B&R Ethernet Hub AC808 (Mod. No. 0AC808.9).
If a different Ethernet hub is used, it must support the crossover of the RX and TX lines.

The surface is protected against water, oil (lubricating and hydraulic oils in accordance with EN60811, section 2-1) and cooling lubricant.

5.1.2 Order data

Model number	Short description	Figure
	Accessories	
5CAMPB.0100-10	Mobile Panel Box cable, with wire tip sleeves for connection in the switching cabinet; with plug contacts for wiring in the connection box, 10 m.	

Table 67: 5CAMPB.0100-10 - Order data

5.1.3 Technical data

Information:

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

Product ID	5CAMPB.0100-10
General information	
Durability	Mechanical characteristics according to DIN VDE 0472 section 603 test type H (100,000 cycles)
Certification CE	 Yes
Cable structure	
Type	Hybrid cable, 25-wire
Properties	Free of halogen and silicon
Supply lines Material Permissible operating voltage	 Tinned copper wires 30 VDC

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

Product ID	5CAMPB.0100-10
Outer sheathing	
Material	Flame-retardant PUR
Color	Similar to RAL 7012
Cable elements	
Entry devices	Direct connection between the entry device and the monitoring device (6 wires)
CAN	2 pairs with shielding (5 wires)
Ethernet	Twisted pair cable for Ethernet (10/100 Mbit/s) (4 wires, RJ45 plug)
Serial	3 wires
Power supply	Supply voltage +24 VDC and ground (3 wires)
Enabling switch	Direct connection between the enable switch and the monitoring device (6 wires)
Connector	
Type	FA. Jacob GmbH Typ: PERFECT 50.620 M
Electrical characteristics	
Conductor resistance	≤ 140 Ω/km (0.15mm² conductor) ≤ 27 Ω/km (0.75mm² conductor)
Insulation resistance	≤500 Ω/km
Operating conditions	
Flame resistant	in accordance with IEC 60332-1 and VW1 / FT1 according to C-UL
Shield attenuation	In accordance with IEC 60096-1, Amendment 2
Oil and hydrolysis resistance	According to 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
Flex radius	
Moving	60 mm
Fixed installation	30 mm
Weight	160 g/m
Tension	Max. 140 N

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

5.1.4 Cable pinout

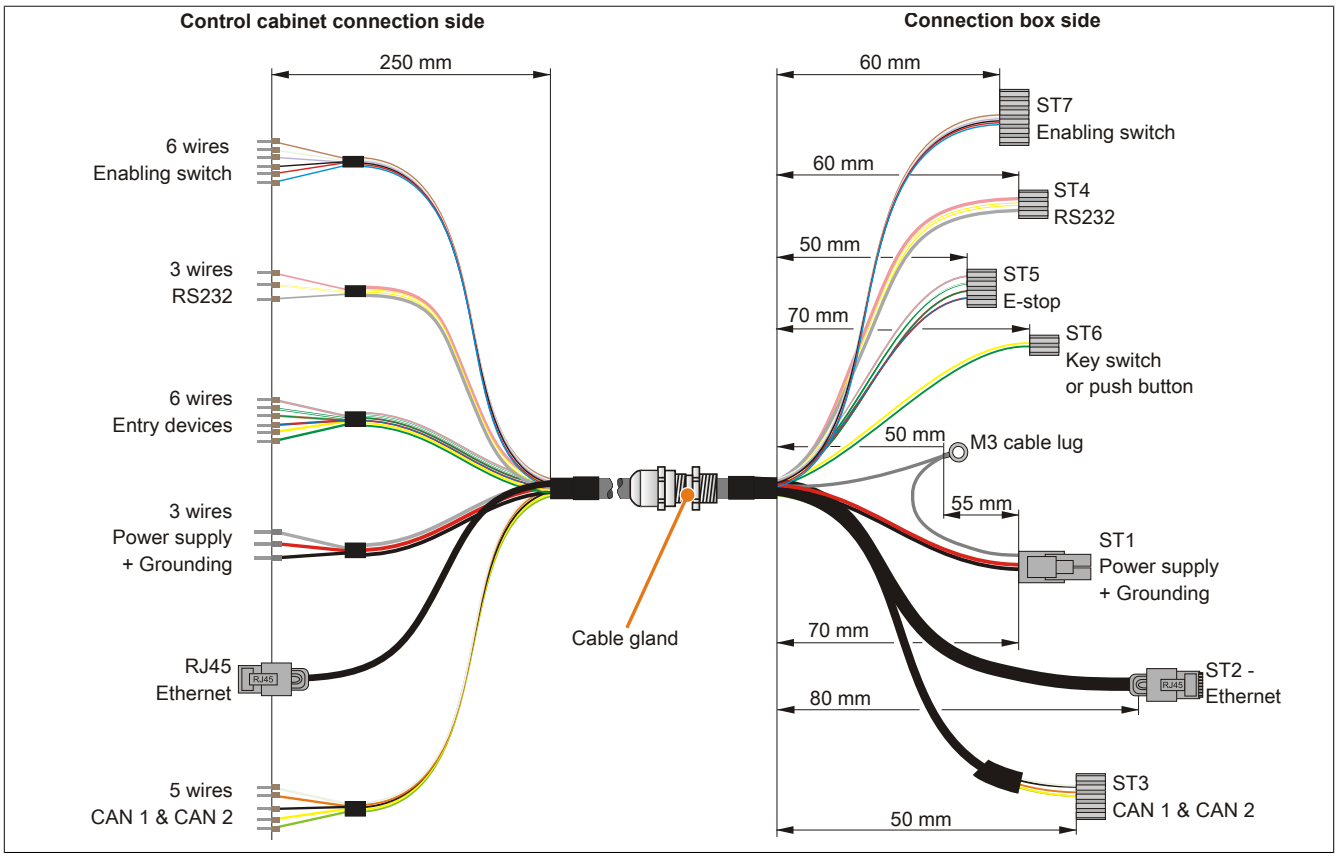


Figure 82: 5CAMPB.0100-10 - Cable pinout

ST7 enable switch, 6-pin male connector (connection box side)			**Wire colors**
C1	Pin 1		Brown
NO1	Pin 2		White
NC1	Pin 3		Purple
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 E-stop (connection box side) E-stop entry devices (connection side), 4-pin male connector			**Wire colors**
E-stop N.C. contact 1 (11)	Pin 1		Gray-Pink
E-stop N.C. contact 2 (21)	Pin 2		Brown-Green
E-stop N.C. contact 1 (12)	Pin 3		White-Green
E-stop N.C. contact 2 (22)	Pin 4		Red-Blue
ST6 key switch or push button (connection box side) Entry devices for key switch or push button (connection side)			**Wire colors**
Button S13	Pin 1		Yellow
Button S14	Pin 2		Green
ST1 supply + ground (connection box side)			**Wire colors**
+24 VDC supply	Pin 1		Red
Shielding	Pin 2		Gray
Ground	Pin 3		Black
NC	Pin 4		-
ST2 Ethernet RJ45 connector (connection box side)		**Ethernet RJ45 plug (connection side)**	**Wire colors**
TX	Pin 1	Pin 3	Green
TX\	Pin 2	Pin 6	Yellow
RX	Pin 3	Pin 1	Pink
NC	Pin 4	Pin 4	-
NC	Pin 5	Pin 5	-
RX\	Pin 6	Pin 2	Blue
NC	Pin 7	Pin 7	-
NC	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 69: 5CAMPB.0100-10 - Cable pinout

6 MP40/50 buffer battery

6.1 5MPBAT.0000-00

6.1.1 General information

The battery in the Mobile Panel prevents the operator panel from restarting when the connection box or control cabinet is changed. The Mobile Panel can therefore be operated immediately once connected.

The battery buffers for up to 15 minutes. If the Mobile Panel is connected to a connection box or a control cabinet, the battery is charged automatically. When fully loaded, it will last for 4 cycles of 15 minutes. When unplugged, the display shuts off, and the keys, entry devices, and the USB port cannot be used. If the Mobile Panel is not connected within 15 minutes, the operating panel shuts itself off. A more detailed description of how to install the battery can be found in Chapter 7 "Maintenance / Service", section "Installing the buffer battery" on page 133.

Warning!

Charging or discharging the battery improperly can cause fire or explosion, e.g. due to reversed polarity or short circuit. The battery must only be charged in the Mobile Panel.

The following safety guidelines apply to Li-Ion batteries:

- **do not crush**
- **do not heat or burn**
- **do not short circuit**
- **do not take apart**
- **do not submerge in liquid - the battery may rupture**

Information:

The battery is not charged when delivered, and must therefore initially be charged for 4 hours.

It should be noted that a battery will discharge itself when not used. If the battery is not used for a long time, it may lose its charge completely.

6.1.2 Order data

Model number	Short description	Figure
	Accessories	
5MPBAT.0000-00	MP40/50 Back-up Battery	

Table 70: 5MPBAT.0000-00 - Order data

6.1.3 Technical data

Information:

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

Product ID	5MPBAT.0000-00
General information	
Initial charging duration	At least 4 hours
Lifespan	500 charge cycles
Battery Design	 Lithium Ion
Certification CE	 Yes
Electrical characteristics	
Nominal voltage	3.6 V

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

Product ID	5MPBAT.0000-00
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 to 70°C (ideal temperature: 20 to 25°C)
Transport	-20 to 70°C (ideal temperature: 20 to 25°C)

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

7 Touch screen stylus pen

7.1 5AC900.1100-01

7.1.1 General information

To prevent damaging the touch screen, the ideal object for operating the touch screen is the touch screen stylus pen.

7.1.2 Order data

Model number	Short description	Figure
	Undefined	
5AC900.1100-01		

Table 72: 5AC900.1100-01 - Order data

8 HMI Drivers & Utilities DVD

8.1 5SWHMI.0000-00

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 "Visualization and operation" section of the B&R website at www.br-automation.com).

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

8.1.2 Order data

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

Table 73: 5SWHMI.0000-00 - Order data

8.1.3 Contents (V2.10)

BIOS upgrades for the products

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

Drivers for the devices

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

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

Firmware upgrades

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

Utilities / Tools

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

Windows

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

MCAD templates for

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

ECAD templates for

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

Documentation for

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

Service tools

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

Chapter 7 • Maintenance / Service

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

1 Cleaning

Danger!

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

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

Information:

Displays with a touch screen should be cleaned regularly.

2 Installing the buffer battery

Information:

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

1. Disconnect the power supply to the Mobile Panel.
2. Remove the cover to the connection compartment on the back by removing the 6 marked screws (using a Phillips screwdriver).

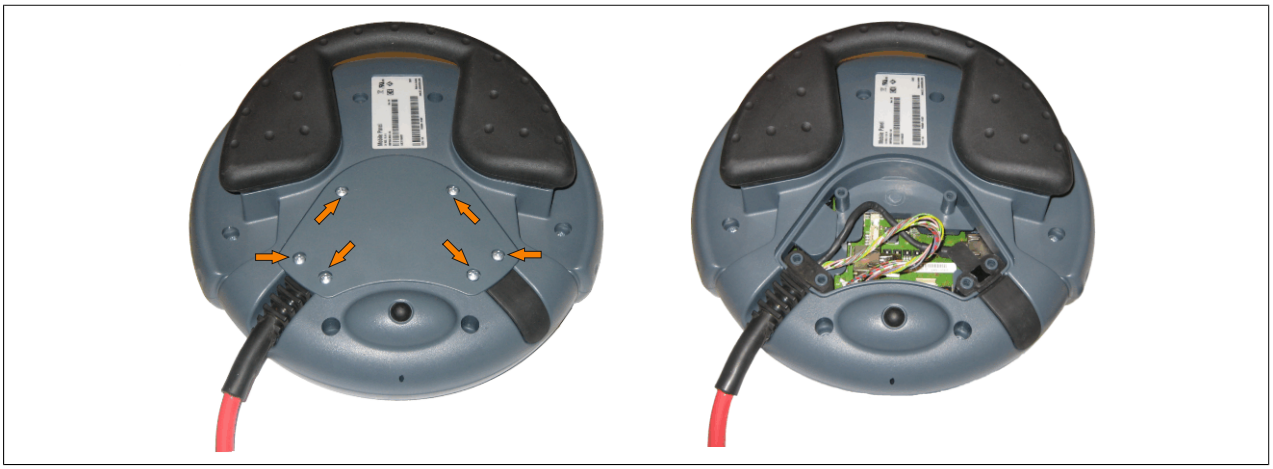


Figure 83: Remove the cover of the connection compartment

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

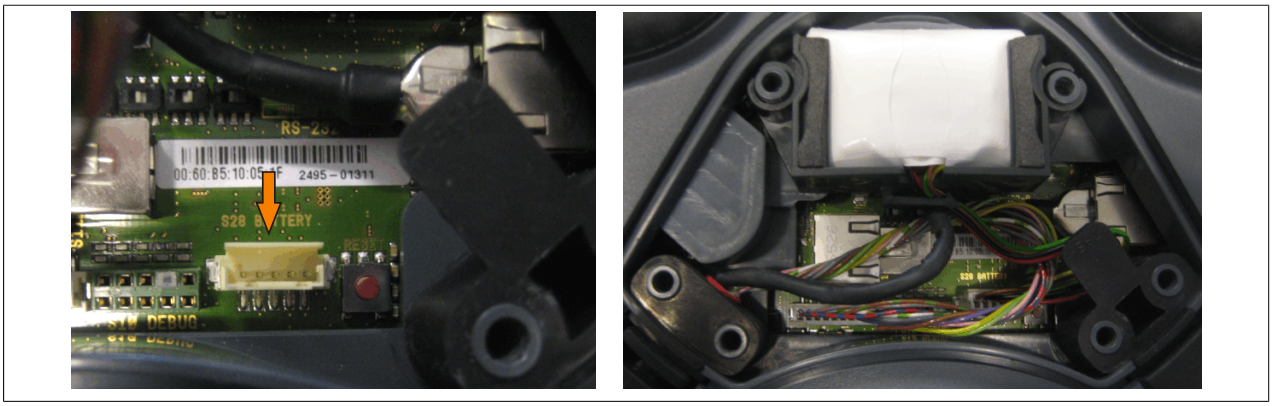


Figure 84: Connecting the cables

4. Attach the cover.

Appendix A

1 Stop button

Information:

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

Features	Stop button
Power supply	
Nominal voltage	24 VDC
minimum current	10 mA (per contact)
maximum current load	1000 mA (per contact)
Utilization category	DC-13 (in accordance with IEC 60947-5-1)
EAO BR 84	B_{10d}: 100,000
IDEC XA series	B_{10d}: 100,000

Table 74: Stop button - Technical data

2 Enabling switch

Information:

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

Features	Enabling switch
Output type	Solid-state output
Switchable nominal voltage	24 VDC (voltage tolerance 19.2 VDC to 30 VDC in accordance with EN 61131-2)
Switchable nominal current	500 mA (max.)
Maximum breaking current	
Circuit 1	1.5 A
Circuit 2	0.8 A
Maximum inductive load	
Circuit 1	145mJ / 1.16 H @ 24 V DC, 500 mA (similar to DC13 in accordance with EN 60947-5-1)
Circuit 2	145mJ / 1.16 H @ 24 VDC, 500 mA (similar to DC13 in accordance with 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 (through protective circuit)
Switching cycles	
Switch position 2	10^5
Switch position 3	$5x\ 10^4$
Operating forces	
from switch position 1 to 2	Typically 5N
from switch position 2 to 3	Typically 20N
Specifications for EN ISO 13849-1 : 2008	
Enable	
Category	3
Performance Level	d
Proof Test Interval	20 years
$MTTF_d$ symmetrized in accordance with D.2 of EN ISO 13849-1	78 years[1)]
PFH_d	$1.57x\ 10^{-7}$
Panic	
Category	3
Performance Level	d
Proof Test Interval	20 years
$MTTF_d$ symmetrized in accordance with D.2 of EN ISO 13849-1	88 years[1)]
PFH_d	$1.35x\ 10^{-7}$

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

3 Chemical resistance

3.1 Test description

3.1.1 Test 1

The devices under test are placed in a box that can be sealed (365x260x200). 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 24h.

The test is performed at 20°C.

3.1.2 Test 2

The devices under test are placed in a box that can be sealed (365x260x200). Approximately 5 ml solvent are sprayed on the test object. The box is sealed. The test object is left in the closed box for at least 24h.

The test is performed at 20°C.

3.2 Test results

Substance	Test passed	Problems / Not tested
Cutting oil - Test 1 • LO-Smoke level 5047 • Superfine 100 • DIE-KOTE 7270-M	• Handle • ZT rubber • Type plate • Keyboard • Dummy plug • Attachment cable • Illuminated button • Key Switch • Stop button • Display seal • Housing seal • Cover seal	• Housing parts - Not tested • Handwheel rotating knob - Not tested • Potentiometer rotating knob - Not tested • Slot covers - Not tested
Cutting oil - Test 2 • LO-Smoke level 5047 • Superfine 100 • DIE-KOTE 7270-M		Not tested
Unleaded gasoline - Test 1	• Handle • ZT rubber • Type plate • Keyboard • Dummy plug • Attachment cable • Illuminated button • Key Switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotating knob • Potentiometer rotating knob • Slot covers	• Housing - Material becomes lighter in color and white spots are formed

Table 75: Chemical resistance test - Test results

Substance	Test passed	Problems / Not tested
Unleaded gasoline - Test 2	• Handle • Attachment cable • Key Switch • Illuminated button mounting ring • Stop button attachment • Potentiometer rotating knob	• Housing - Reduced hardness, part becomes doughy; reduced tensile strength; plastically deformable • ZT rubber - Strong swelling; loss of elasticity; tears with minimal force • Type plate - Adhesive dissolves; print wipes off • Keyboard - Glue dissolves • Dummy plug - Strong swelling; loss of elasticity; tears with minimal force • Illuminated button cover - Heavy clouding • Illuminated button attachment - Strong swelling • Illuminated button mounting ring seal - Strong swelling • E-stop seal - Strong swelling • Display seal - Strong swelling • Housing seal - Strong swelling • Cover seal - Strong swelling • Handwheel rotating knob - Reduced hardness, part becomes doughy; reduced tensile strength; plastically deformable • Slot covers - Not tested
Diesel - Test 1	• Housing • Handle • ZT rubber • Type plate • Keyboard • Dummy plug • Attachment cable • Illuminated button • Key Switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotating knob • Potentiometer rotating knob • Slot covers	
Diesel - Test 2	• Housing • Keyboard • Attachment cable • Illuminated button cover • Illuminated button mounting ring • Key Switch • Stop button attachment • Display seal • Housing seal • Cover seal • Handwheel rotating knob • Potentiometer rotating knob • Slot covers	• Handle - Slight swelling • ZT rubber - Slight swelling • Type plate - Adhesive dissolves; print wipes off • Dummy plug - 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
Gear oil - Test 1	• Housing • Handle • ZT rubber • Type plate • Keyboard • Dummy plug • Attachment cable • Illuminated button • Key Switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotating knob • Potentiometer rotating knob • Slot covers	

Table 75: Chemical resistance test - Test results

Substance	Test passed	Problems / Not tested
Gear oil - Test 2	• Housing • Handle • ZT rubber • Keyboard • Dummy plug • Attachment cable • Illuminated button • Key Switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotating knob • Potentiometer rotating knob • Slot covers	• Type plate - Adhesive dissolves; print wipes off
Silicon spray - Test 1	• Housing • Handle • ZT rubber • Type plate • Keyboard • Dummy plug • Attachment cable • Illuminated button • Key Switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotating knob • Potentiometer rotating knob • Slot covers	
Silicon spray - Test 2	• Housing • Handle • ZT rubber • Keyboard • Dummy plug • Attachment cable • Illuminated button • Key Switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotating knob • Potentiometer rotating knob • Slot covers	• Type plate - Adhesive dissolves; print wipes off
Window cleaner CLINIL - Test 1	• Housing • Handle • ZT rubber • Type plate • Keyboard • Dummy plug • Attachment cable • Illuminated button • Key Switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotating knob • Potentiometer rotating knob • Slot covers	

Table 75: Chemical resistance test - Test results

Substance	Test passed	Problems / Not tested
Window cleaner CLINIL - Test 2	• Housing • Handle • ZT rubber • Dummy plug • Attachment cable • Illuminated button cover • Illuminated button mounting ring • Illuminated button attachment • Illuminated button attachment seal • Key Switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel rotating knob • Slot covers	• Type plate - Adhesive dissolves; print wipes off • Keyboard - Glue dissolves • Illuminated button mounting ring seal - Strong swelling • Potentiometer rotating knob - Surface corrosion
Methyl - Test 1		Not tested
Methyl - Test 2	• Housing • Handle • ZT rubber • Keyboard • Dummy plug • Illuminated button • Stop button attachment seal • Display seal • Housing seal • Cover seal • Handwheel rotating knob • Potentiometer rotating knob • Slot covers	• Type plate - Adhesive dissolves; print wipes off • Attachment cable - Loss of color • Key switch - Reduced hardness, part becomes doughy; reduced tensile strength; plastically deformable • Stop button attachment seal - Loss of color
Ethyl 96% - Test 1		Not tested
Ethyl 96% - Test 2	• Housing • Handle • ZT rubber • Keyboard • Dummy plug • Illuminated button • Stop button attachment seal • Display seal • Housing seal • Cover seal • Handwheel rotating knob • Potentiometer rotating knob • Slot covers	• Type plate - Adhesive dissolves; print wipes off • Attachment cable - Loss of color • Key switch - Reduced hardness, part becomes doughy; reduced tensile strength; plastically deformable • Illuminated button mounting ring seal - Strong swelling • Stop button attachment seal - Loss of color
Isopropanol - Test 1		Not tested
Isopropanol - Test 2	• Housing • Handle • ZT rubber • Dummy plug • Attachment cable • Illuminated button • Stop button attachment seal • Display seal • Housing seal • Cover seal • Handwheel rotating knob • Slot covers	• Type plate - Adhesive dissolves; print wipes off • Keyboard - Glue dissolves • Key switch - Reduced hardness, part becomes doughy; reduced tensile strength; plastically deformable • Illuminated button mounting ring seal - Strong swelling • Stop button attachment seal - Loss of color • Potentiometer rotating knob - Print corrosion

Table 75: Chemical resistance test - Test results

Substance	Test passed	Problems / Not tested
MEK (Methyl ethyl ketone), Tolouene (Toluolum DAB 74), Xylene (Xyluolum OAB 90) -Test 1	• Handle • ZT rubber • Keyboard • Dummy plug • Attachment cable • Illuminated button (remaining parts) • Stop button • Display seal • Housing seal • Cover seal	• Housing - Not tested • Type plate - Adhesive dissolves; print wipes off • Key switch - Reduced hardness, part becomes doughy; reduced tensile strength; plastically deformable • Illuminated button cover - Plastic softens immediately • Potentiometer rotating knob - Not tested • Handwheel rotating knob - Not tested • Handwheel, potentiometer slot covers - Not tested
MEK (Methyl ethyl ketone), Tolouene (Toluolum DAB 74), Xylene (Xyluolum OAB 90) -Test 2		Not tested

Table 75: Chemical resistance test - Test results

3.3 Touch screen - Tested by manufacturer

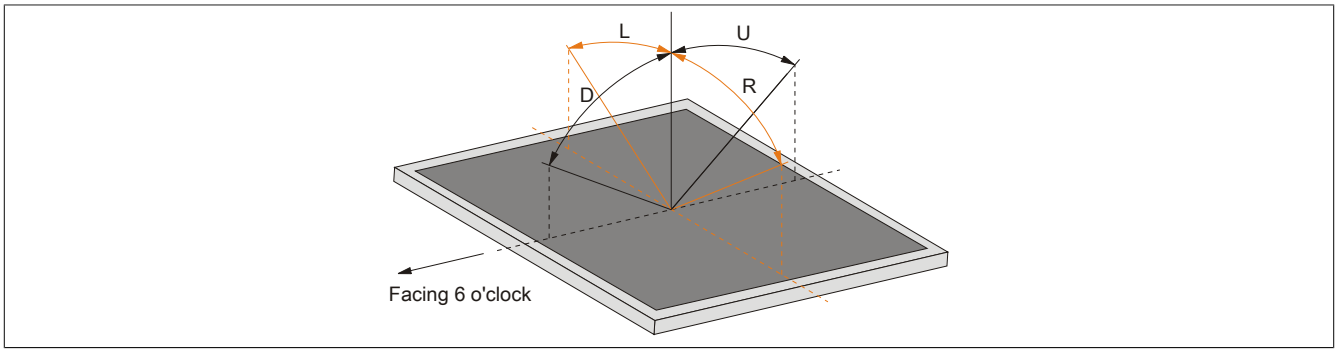
Length of test: 1 hour

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

4 Viewing angles

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



5 Abbreviations

Abbreviation	Stands for	Description
NC	Normally closed	A normally closed relay contact.
	Not connected	Used in pinout descriptions if a terminal or pin is not connected to a module
ND	Not defined	In data tables, this stands for a value that has not been defined. This may be because a cable manufacturer does not provide certain technical data, for example.
NO	Normally open	A normally open relay contact
TBD	To be defined	Used in technical data tables when certain information is not yet available. The value will be provided later.

Table 76: Abbreviations used in this user's manual

6 Glossary

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

A

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C

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W