Mobile Panel 40/50

User's Manual
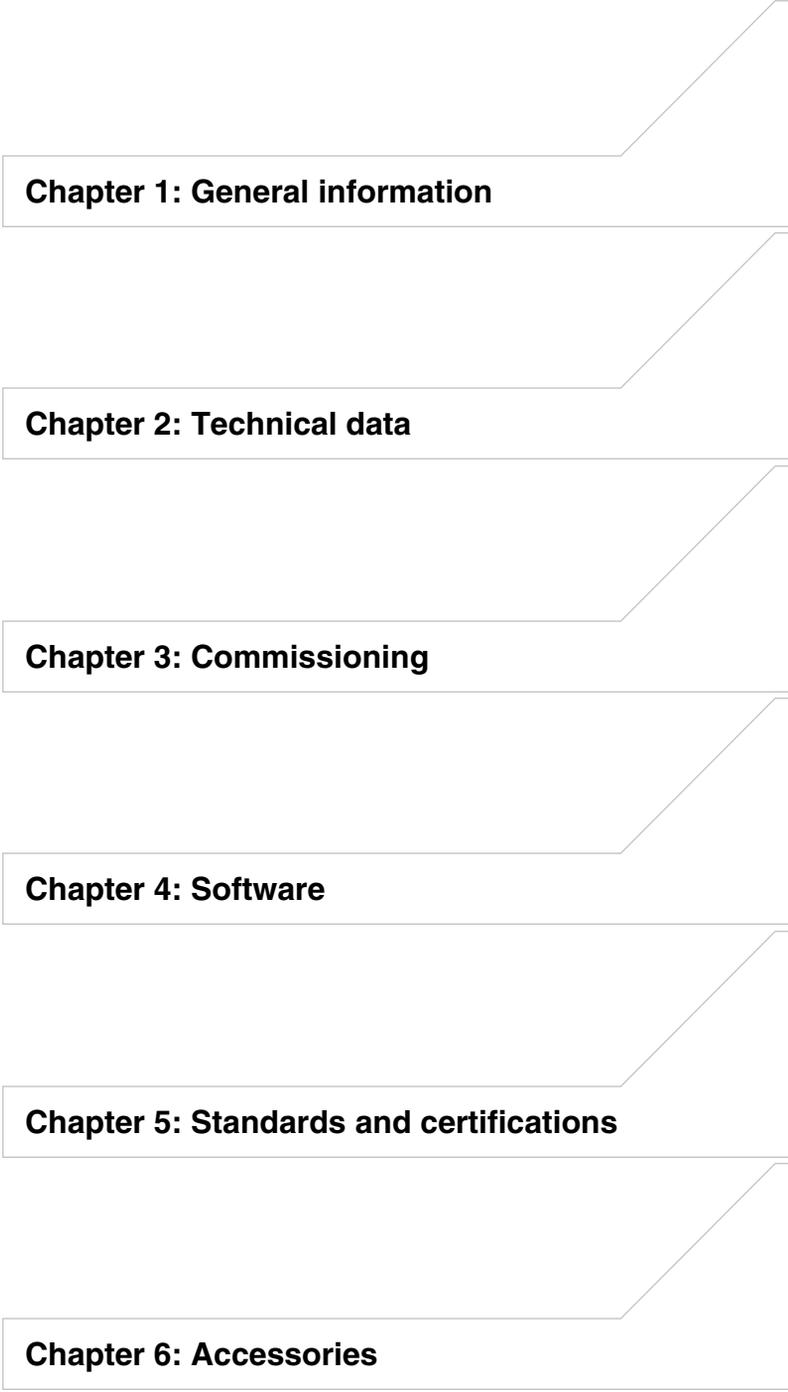
Version:	**1.66 (March 2010)**
Model number:	**MAMP40.50-ENG**

Translation of the original operating instructions

Chapter 1: General information

Chapter 2: Technical data

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Chapter 4: Software

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Chapter 1 • General information

Information:

B&R does its best to keep the printed versions of its user's manuals as current as possible. However, any newer versions of the User's Manual can always be downloaded in electronic form (pdf) from the B&R homepage www.br-automation.com.

1. Manual history

Version	Date	Change
0.10 Preliminary	October 2006	- First version
1.00	13.02.2007	- Chapter 3 "Commissioning", chapter 4 "Software", chapter 5 "Standards and certifications", chapter 6 "Accessories" and chapter 7 "Maintenance / Servicing" expanded. - Chapter 2 "Technical data" completed.
1.10	26.03.2007	- USB flash drive 5MMUSB.0256-00 and USB flash drive 5MMUSB.1024-00 cancelled - Operating unit model numbers expanded. - Connection box and box cable moved to chapter 6 "Accessories" on page 139. - Chapter "Standards and certifications" on page 121 updated. - Images updated. - Windows CE order numbers added. - Description of "Operating unit 5MP050.0653-02" on page 67 expanded. - E-stop changed to stop button.
1.20	18.04.2007	- Introduction updated. - Section "Entire device" updated. - Diagrams updated. - Technical data for entire device and individual components revised. - Mylar keypad description updated. - "Storing the Mobile Panel device" on page 89 added. - "Connecting a MobilePanel 100/200" on page 101 added. - Section 5 "USB interface" on page 102 updated. - Chapter 4 "Software" on page 115 updated. - Chapter 6 "Accessories" on page 139 updated. - Section 4 "Viewing angle" on page 166 added - Section 7 application examples on page95 updated. - "Features" on page 146 added.

Table 1: Manual history

Version	Date	Change
1.30	18.07.2007	- Section 2.5 "Stickers" on page 41 added - Technical data of device expanded (ambient temperatures, humidity, altitude) - "Temperature humidity diagram - Operation and storage" on page 40 added. - Technical data of operating units updated (Ethernet controller). - Short description of devices in model number overview revised. Technical data of connection cable 5CAMPH.0xxx-30 revised. - New model numbers for Windows CE and section "Windows CE" on page 115 revised. - Section 7 "Touch screen calibration" on page 110 added - Section 2 "Preventing after-image effect in LCD/TFT monitors" on page 154 added - Additional temperature humidity diagram information - Note in chapter "Appendix A" on page 157 expanded.
1.40	17.10.2007	- Typical topologies from page 95 expanded ("Mobile operation and monitoring" and "The mobile thin client"). - 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 "Automation Device Interface (ADI) driver - B&R Control Center" on page 119) expanded. - Information on touch calibration expanded. - Information on stop circuit loop resistance expanded. - Section "Date / time settings" on page 110 added - Index Revision: - B&R Key Editor section expanded. - Section "Key configuration" on page 111 added - Windows CE description (see section "Windows CE" on page 115) expanded. - Section "Configuring Windows CE ProPlus Thin Client Automation Runtime (TCAR)" on page 118 added
1.41	06.11.2007	-Makeup of the serial number sticker changed (see section "Design/Dimensions" on page 41). -API replaced by ADI (Automation device interface). - UL test for robotic applications (UL 1740:1998) removed.

1.42	28.01.2008	- Manual version number error in the page footer corrected.
		- Warning for the tables 42 "Safety category overview" on page 129 added.
		- Text changes in chapter "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/EWG 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	28.03.2008	- Positioning of image "Mobile Panel switching cabinet cable 5CAMPC.0020-11" on page 83 corrected. - Preconfiguration of foil keypads updated, (see "Foil keypadMP40" on page 44 and "Foil keypadMP50" on page 49).
1.44	05.09.2008	- Spelling and grammar errors corrected. - Info on page 95 corrected. - Addition "MP40/50 buffer battery" on page 149. - Addition "Installing the buffer battery" on page 155.

Table 1: Manual history (cont.)

Version	Date	Change
1.50	11.02.2009	- B&R Key Editor moved from the Software chapter to "Appendix A", on page 167. - Pin assignments on page 78 corrected. - Error in the image 37 "Attachment shaft" on page 95 corrected. - Application examples from the Commissioning chapter moved to Chapter 1 "General information" 6 "Typical topologies" on page 28. - Graphics of typical topologies updated (previously application examples). - MP connection box small (4MPCBX.0001-00) added to Chapter 6 "Accessories", Section 4.2 "MP connection box small- 4MPCBX.0001-00" on page 147. - Section 2.7 "Environmentally-friendly disposal" in chapter 1 "General information" added. - Key matrix numbering updated for the individual keys. - Contents of delivery for USB flash drives removed. - Supply circuit fuse specification on page 17 corrected from 1.5 A to 3.15 A. - Switching cabinet cable model numbers on pages 79 and 83 corrected. - Differences in WinCE versions updated. - Technical data for the displays changed.
1.55	08.05.2009	- Pin assignments corrected for the supply wires of the switching cabinet cable 5CAMPC.0020-11. - Figure 28 "Cable specifications - Attachment cable 5CAMPH.0xxx-30", 30 "Cable layout - switching cabinet cable 5CAMPC.0020-10" and 33 "Cable layout - switching cabinet cable 5CAMPC.0020-11" changed - the front side of the plugs is now shown in the images, whereas the plugs were displayed from behind in previous versions. - Section 1.1 "Selection guide" on page 33 added
1.60	19.11.2009	- Requirements regarding the machine directive 2006/42/EC, EN ISO 13849-1, ZT 05 added and adjusted. - Information about the stop and enable switch added on pages 157 and 158 in the Chapter "Appendix A". - Figure 30 "Cable layout - switching cabinet cable 5CAMPC.0020-10" on page 81 and figure 33 "Cable layout - switching cabinet cable 5CAMPC.0020-11" on page 85 corrected. - Section 10 "User tips for increasing the display lifespan" on page 112 in chapter 3 "Commissioning" added. - Section 3.1.3 "Stop button" on page 52 added - Section 3 "Chemical resistance" on page 159 in "Appendix A" added. - Section 4.2 "Connection example - Enable switch" on page 100 updated. - Section 6 "Touch screen pen" on page 152 in chapter 6 "Accessories" added. - Key Editor information updated. - Information in section 1.2 "Differences - CE versions (Pro - PropPlus - ProPlusTCAR)" on page 116 updated.
1.61	16.12.2009	- Serial number sticker updated.
1.65	21.12.2009	- Section "Serial number sticker" renamed to "Type plate", see page 41. - The column "Safety integrity level - SIL (according to IEC 61508-1)" removed from the tables "Safety category overview" on page 127 and "Safety category overview" on page 129. - The warning on page 129 was removed. - Information text in section 4.4 "Safety category according to EN 954-1:1996 (safety of machines - safety related parts of control systems, part 1: general design principles)" changed. - Information and content in section 5 "Information regarding MD 2006/42/EC" on page 133 changed. - Values in the table 45 "(EN ISO 13849-1:2006, table 3) - Performance Level (PL)" on page 134 were corrected. - Definition of the Performance Level in the table 46 "Abbreviations" on page 134 changed. - The term "EC certificate of conformity" was changed to "EC declaration of conformity", see page 135. - The term "type examination certificate" was changed to "EC type examination certificate", see page 136.
1.66	01.02.2010	- EC declaration of conformity added, see section 6.1 "EC declaration of conformity" on page 135. - EC type examination certificate added, see section 6.2 "EC type examination certificate" on page 136.

Table 1: Manual history (cont.)

2. Safety guidelines

Information:

The instructions in this manual regarding the wiring and devices that are used to ensure safety must be followed precisely at all times. Failure to do so may result in dangerous situations in which the safety equipment integrated in the MobilePanel device is made ineffective.

Danger!

The specific safety guidelines for safety and accident prevention regulations must also be reviewed with respect to the particular operating environment in addition to and independent of this document.

2.1 Intended use

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

2.2 Protection against electrostatic discharges

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

2.2.1 Packaging

- Electrical components with housing
  … do not require special ESD packaging, but must be handled properly
  (see "Electrical components with housing").

- Electrical components without housing
  … must be protected by ESD-suitable packaging.

2.2.2 Guidelines for proper ESD handling

Electrical components with housing

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

Electrical components without housing

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

- Any persons handling electrical components or devices that will be installed in the electrical components must be grounded.
- Components can only be touched on the small sides or on the front plate.
- Components should always be stored in a suitable medium (ESD packaging, conductive foam, etc.).
  Metallic surfaces are not suitable storage surfaces!
- Electrostatic discharges should be avoided on the components (e.g. through charged plastics).
- A minimum distance of 10 cm must be kept from monitors and TV sets.
- Measurement devices and equipment must be grounded.
- Measurement probes on potential-free measurement devices must be discharged on sufficiently grounded surfaces before taking measurements.

Individual components

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

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

2.3 Policy and procedures

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

Both when using programmable logic controllers and when using operating and monitoring devices as control systems in conjunction with a soft PLC (e.g. B&R Automation Runtime or comparable products) or a slot PLC (e.g. B&R LS251 or comparable products), the safety precautions applying to industrial control systems (e.g. the provision of safety devices such as

emergency stop circuits, etc.) must be observed in accordance with applicable national and international regulations. The same applies for all other devices connected to the system, such as drives.

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

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

2.4 Transport and storage

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

2.4.1 Transport conditions

The following transport conditions must be upheld so the device is not damaged during an additional or return transfer:

- Always use original packaging during transport.
- Environmental conditions (see "Technical data" of the individual components) for the device must be maintained during transport.

2.5 Installation

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

Chapter 1
General information

2.6 Operation

Warning!

- **When operating a system with a MobilePanel, ensure that operation is only possible using the MobilePanel and is not possible from any other point in the system.**

- **If the safety equipment (safety door, etc.) is not active, movements may only be carried out using the MobilePanel at reduced speed and with the enable switch activated.**

Danger!

When using an E-stop circuit or stop circuit in compliance with EN ISO 13849-1:2008, functionality should be checked at least once per month.

2.6.1 Supply voltage

Caution!

- **The device conforms to safety class III in compliance with EN61131-2, or EN50178. All supply voltages and interfaces must be operated using safety extra low voltage circuits (in compliance with EN 50178 and EN 61131-2).**

- **The 24VDC supply must be separated from the low voltage signals in a secure manner to provide protection from dangerous voltages. This can be done, for example, using a safety transformer or similar equipment.**

- **When dimensioning the supply, the voltage drop on the MobilePanel attachment cable must be taken into consideration.**

- **The supply circuit must be protected using a max. 3.15 A (slow-blow) fuse.**

Warning!

- **The project engineer for a machine or system must take steps to ensure that an interrupted program is started again properly following voltage dips and power failures. No potentially dangerous operating states should be permitted to occur - not even temporarily.**

- **Errors that occur on automation systems can cause personal injury and damage to materials; therefore, additional measures must be taken to ensure safe operation of the entire system even when errors occur.**

- **The functionality of the safety-related equipment (e.g. stop button and enable switch) must be monitored cyclically.**

- **After heavy loads, e.g. shock to the device or dropping the device, the safety-related equipment must be checked.**

2.6.2 Stop system

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

The grey 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. The connection of the positive opening switching contacts must meet the particular category (according to EN ISO 13849-1) determined for the machine in the risk evaluation (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!

Hand-held operating devices 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 hand-held 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 chapter 5 "Standards and certifications" on page 121 for further information regarding the stop button.

2.6.3 Enable switch

The enabling equipment consists of two enable buttons and is part of the MobilePanel safety equipment.

The enabling functionality is described in EN 60204-1. The 3-step enable switch is state-of-the-art technology. The "Null" and "Panic" positions on the enable switch represent off functions. Only the "Enable" position allows activation. The standards EN 60204-1 and IEC 60204-1 are identical, which provides the 3-step enabling switch with international significance.

Warning!

When applicable, the enable function should be limited on the controller according to time or program step.

The electromechanical enable switch and equipment are to be linked with the controller so that the safety-related circuit requirements are met according to EN ISO 10218-1, DIN EN 60204-1, EN ISO 13849-1:2008, DIN EN 1088 and VDI 2854.

Any cables and lines used to set up the system (except for protective ground conductors) that are accessible or open to other conductive parts without opening or removing a cover must either have double or reinforced insulation between the wires and the surface. Otherwise, they must have a metal sheath that can handle the current if a short-circuit occurs between the wire and sheath.

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!**

- **Commands for dangerous states must not be initiated by the enable switch alone. A second conscious start command is required here. The only person permitted in the danger area is the person activating the enable switch.**

An enable switch connection example for a monitoring device can be found in Chapter 3 "Commissioning", Section 4.2 "Connection example - Enable switch" on page 100.

2.7 Environmentally-friendly disposal

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

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 and monitoring devices Uninterruptible power supply Accu 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 the respective legal regulations.

3. Organization of safety notices

The safety notices in this manual are organized as follows:

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

Table 3: Organization of safety notices

4. Directives
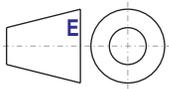
All dimension diagrams (e.g. dimension diagrams, etc.) are drawn according to European dimension standards.

5. Model numbers

5.1 Operating unit

Model number	Product ID	Note
5MP040.0381-01	**MP40 LCD B/W QVGA 3.8in F SB** Operating unit with 3 8in QVGA LC-Displays; 51 system keys; 7 LEDs; 256 MB SDRAM; USB; stop button; IP65 protection.	See page 58
5MP040.0381-02	**MP40 LCD B/W QVGA 3.8in F SB KS HW** Operating unit with 3 8in QVGA LC-Displays; 51 system keys; 7 LEDs; 256 MB SDRAM; USB; stop button; key switch; handwheel; IP65 protection.	See page 61
5MP050.0653-01	**MP50 TFT C VGA 6.5in FT SB PB HW** Operating unit with 6.5" VGA color LCD with touch screen (resistive); 31 system keys; 4 LEDs; 256 MB SDRAM; USB; stop button; illuminated button; handwheel; IP65 protection.	See page 64
5MP050.0653-02	**MP50 TFT C VGA 6.5in FT SB KS JS** Operating unit with 6.5" VGA color LCD with touch screen (resistive); 31 system keys; 4 LEDs; 256 MB SDRAM; USB; stop button; key switch; joystick; IP65 protection.	See page 67
5MP050.0653-03	**MP50 TFT C VGA 6.5in FT SB OP HW** Operating unit with 6.5" VGA color LCD with touch screen (resistive); 31 system keys; 4 LEDs; 256 MB SDRAM; USB; stop button; override potentiometer; handwheel; IP65 protection.	See page 70
5MP050.0653-04	**MP50 TFT C VGA 6.5in FT SB KS HW** Operating unit with 6.5" VGA color LCD with touch screen (resistive); 31 system keys; 4 LEDs; 256 MB SDRAM; USB; stop button; key switch; handwheel; IP65 protection.	See page 73

Table 4: Model numbers - MobilePanel operating units

5.2 Cables

Model number	Product ID	Note
5CAMPH.0018-30	**Mobile Panel attachment cable, 1.8 m** MobilePanel attachment cable, 1.8 meters long; with plug contacts for cabling the MobilePanel and a circular plug for the switching cabinet cable.	See page 67
5CAMPH.0050-30	**Mobile Panel attachment cable, 5 m** MobilePanel attachment cable, 5 meters long; with plug contacts for cabling the MobilePanel and a circular plug for the switching cabinet cable.	See page 67
5CAMPH.0100-30	**Mobile Panel attachment cable, 10 m** MobilePanel attachment cable, 10 meters long; with plug contacts for cabling the MobilePanel and a circular plug for the switching cabinet cable.	See page 67
5CAMPH.0150-30	**Mobile Panel attachment cable, 15 m** MobilePanel attachment cable, 15 meters long; with plug contacts for cabling the MobilePanel and a circular plug for the switching cabinet cable.	See page 67
5CAMPH.0200-30	**Mobile Panel attachment cable, 20 m** MobilePanel attachment cable, 20 meters long; with plug contacts for cabling the MobilePanel and a circular plug for the switching cabinet cable.	See page 67
5CAMPC.0020-10	**Switching cabinet cable crossover 2 m** Switching cabinet cable, 2 meters long; with wire tip sleeves for connection in the switching cabinet and receptacle for the MobilePanel attachment cable.	See page 79

Table 5: Model numbers - Cables

Model number	Product ID	Note
5CAMPC.0020-11	**Switching cabinet cable 2 m (straight thru)** Switching cabinet cable, 2 meters long; with wire tip sleeves for connection in the switching cabinet and receptacle for the MobilePanel attachment cable.	See page 83

Table 5: Model numbers - Cables

5.3 Wall mount

Model number	Product ID	Note
4MPBRA.0000-01	**Wall mount** Wall mount with cable supports for storing MobilePanel device;	See page 87

Table 6: Model numbers - MobilePanel wall mount

5.4 Accessories

Model number	Product ID	Note
5MMUSB.0256-00	**USB flash drive 256 MB SanDisk** USB 2.0 flash drive 256 MB	Cancelled since 03/2007 Replaced by 5MMUSB.2048-00
5MMUSB.0512-00	**USB flash drive 512 MB SanDisk** USB 2.0 flash drive 512 MB	Cancelled since 07/2007 Replaced by 5MMUSB.2048-00
5MMUSB.1024-00	**USB flash drive 1 GB SanDisk** USB 2.0 flash drive 1 GB	Cancelled since 03/2007 Replaced by 5MMUSB.2048-00
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	See page 140
5CAMPP.0000-10	**Protective cap for circular plug (attachment cable)** Protective caps for MobilePanel connection cable with circular plug.	See page 143
5CAMPP.0001-10	**Switching cabinet cable protective cap** Protective cap for MobilePanel switching cabinet cable with circular plug and MobilePanel connection box.	See page 145
4MPCBX.0000-00	**MP connection box** Connection box for adapting the connection points for Mobile Panel devices.	See page 146
4MPCBX.0001-00	**MP connection box, small** Connection box for connecting Mobile Panel devices vertically at the connection point.	See page 147
5CAMPB.0100-10	**MP box cable, 10m PP** Box cable crossover, 10 meters long; with wire tip sleeves for connection in the switching cabinet; with plug contacts for wiring in the connection box.	See page 148
5MPBAT.0000-00	**MP40/50 buffer battery**	See page 149
5AC900.1100-00	**Touch screen pen (5x)**	

Table 7: Model numbers - Accessories

5.5 Software

Model number	Product ID	Note
5SWWCE.0524-ENG	**WinCE5.0 Pro MP40 PXA270** Microsoft Windows CE 5.0 Professional, English, including license; for MP40 BIOS devices 5MP040.0381-01, 5MP040.0381-02.	
5SWWCE.0525-ENG	**WinCE5.0 Pro MP50 PXA270** Microsoft Windows CE 5.0 Professional, English, including license for MP50 BIOS devices 5MP050.0653-01, 5MP050.0653-02, 5MP050.0653-03, 5MP050.0653-04.	
5SWWCE.0624-ENG	**WinCE5.0 ProPlus MP40 PXA270** Microsoft Windows CE 5.0 Professional Plus, English, including license; for 5MP040.0381-01, 5MP040.0381-02.	
5SWWCE.0625-ENG	**WinCE5.0 ProPlus MP50 PXA270** Microsoft Windows CE 5.0 Professional, English, including license for MP50 BIOS devices 5MP050.0653-01, 5MP050.0653-02, 5MP050.0653-03, 5MP050.0653-04.	
5SWWCE.0724-ENG	**WinCE5.0 ProPlusTCAR MP40 PXA270** Microsoft Windows CE 5.0 Professional Plus, English, including license,VNC Viewer; for MP40 BIOS devices 5MP040.0381-01, 5MP040.0381-02.	
5SWWCE.0725-ENG	**WinCE5.0 ProPlusTCAR MP50 PXA270** Microsoft Windows CE 5.0 Professional Plus English, including license, VNC Viewer; for MP50 BIOS devices 5MP050.0653-01, 5MP050.0653-02, 5MP050.0653-03, 5MP050.0653-04.	

Table 8: Model numbers - Software

6. Typical topologies

6.1 Mobile control and visualization

The control program and the visualization run on the Mobile Panel 200. I/O peripherals and drives are connected via CAN bus. Communication to higher-level systems is handled by Ethernet.
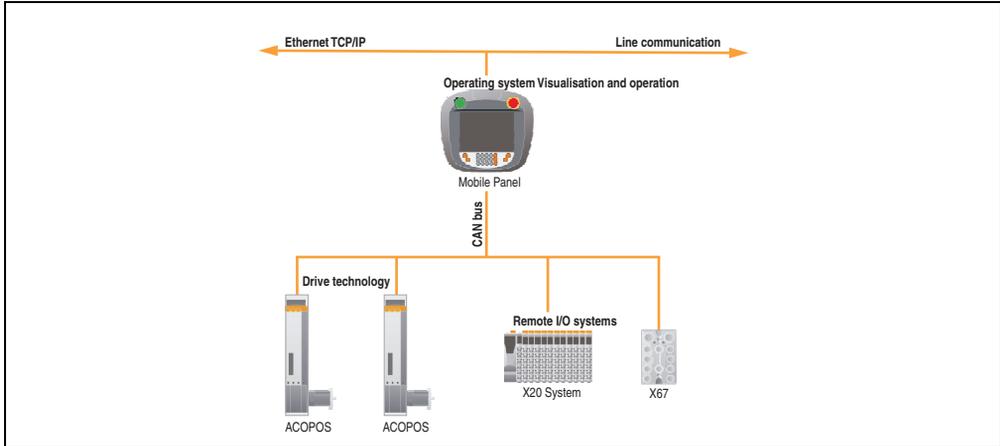
Figure 1: Mobile control and visualization

6.2 Mobile operation and monitoring

Control programs are distributed and run over several PLC stations. Fieldbus systems are used to connect I/O systems and drives to the PLCs. Machine operation and visualization take place on a central Mobile Panel, which communicates with the controller via Ethernet.
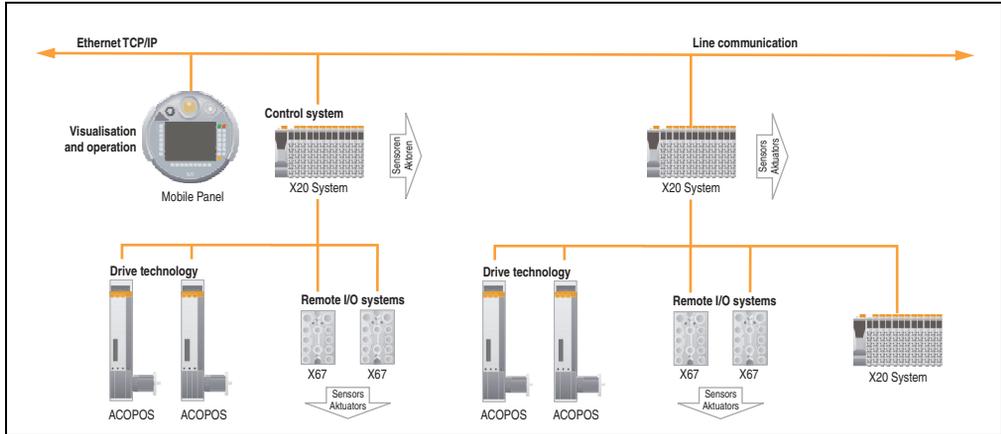
Figure 2: Mobile operation and monitoring

6.3 Mobile thin client

The Mobile Panel with the Windows CE operating system is connected as a thin client to an APC620 or APC810 with Windows XP Professional/Embedded. Communication takes place via Remote Desktop Protocol (RDP). The control program runs on the industrial PC, and I/O peripherals and drives are connected to the industrial PC via a fieldbus.
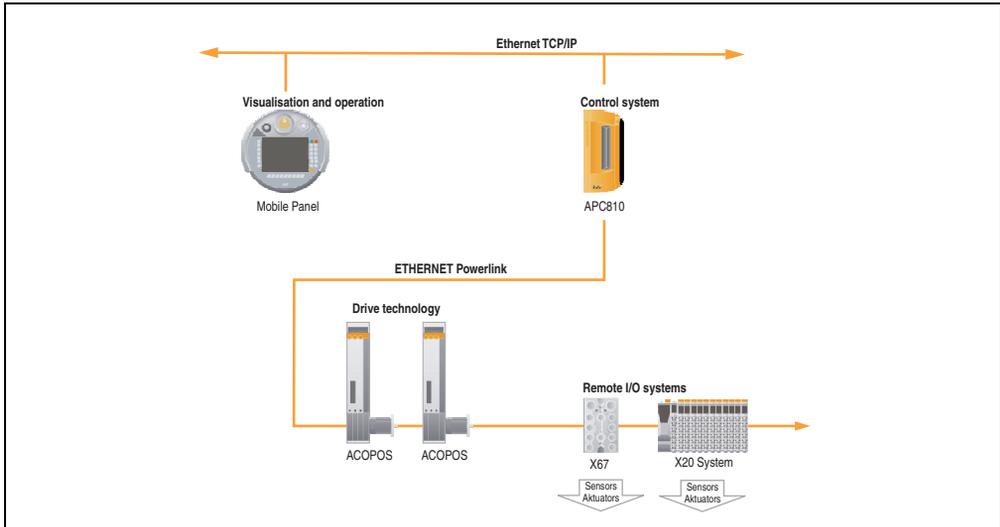
Figure 3: Mobile thin client

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 92).

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.

Figure 4: Examples - MP40/50

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.

Chapter 2
Technical data

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

1.1 Selection guide
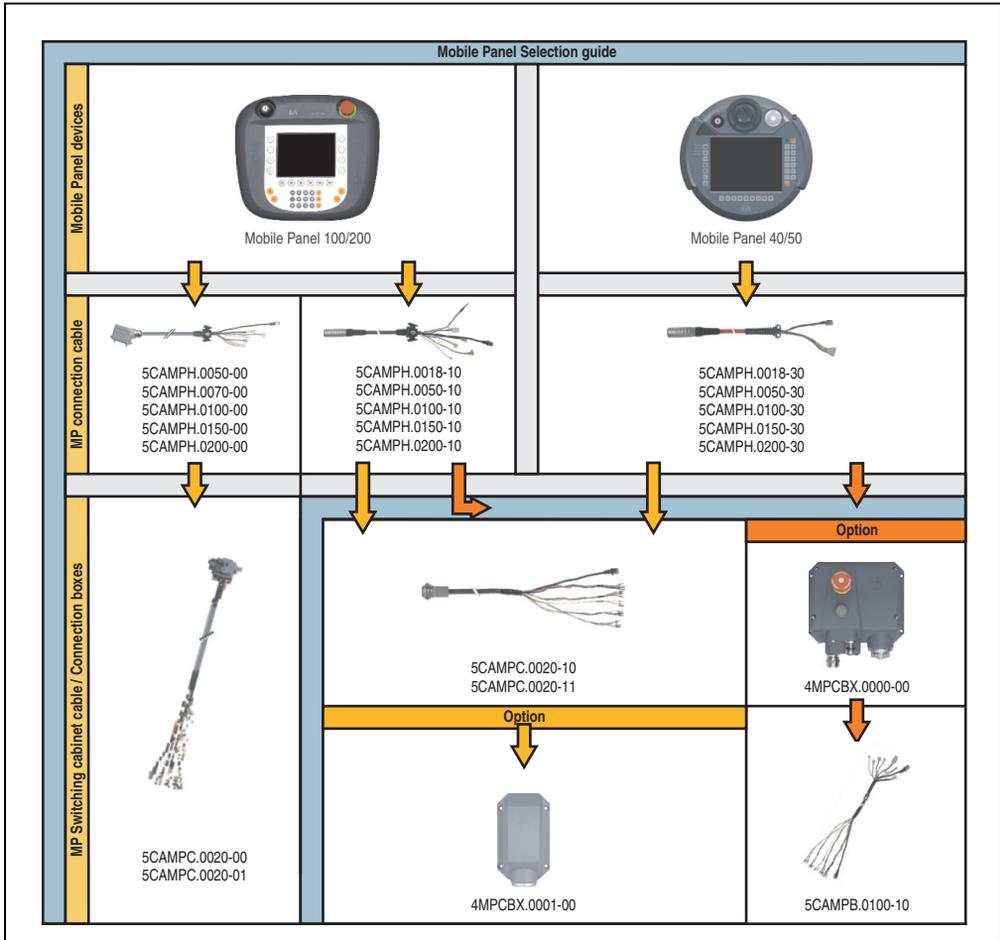
Figure 5: Mobile Panel selection guide

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 switching 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. Entire device

2.1 Structure

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

- Operating unit including handle
- Attachment cable
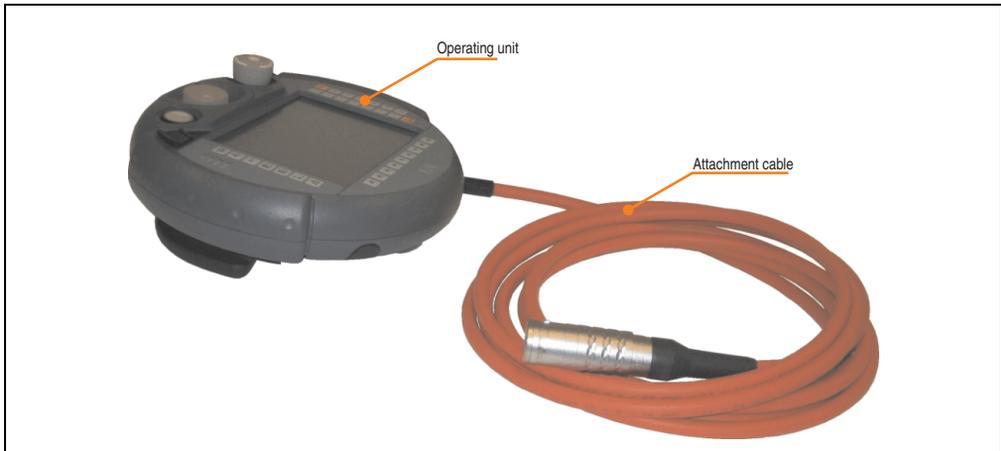
Figure 6: Construction

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

- Covered 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 10/100MBit
- 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 pen

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

Figure 7: Touch screen pen

2.2 Options

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

Information:

For detailed technical data on the entry device see "Appendix A" on page 157.

2.2.1 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

2.2.2 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.

2.2.3 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.

2.2.4 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 placements - each of which clicks into place.
Removal position: the key can be removed from any of the three positions.
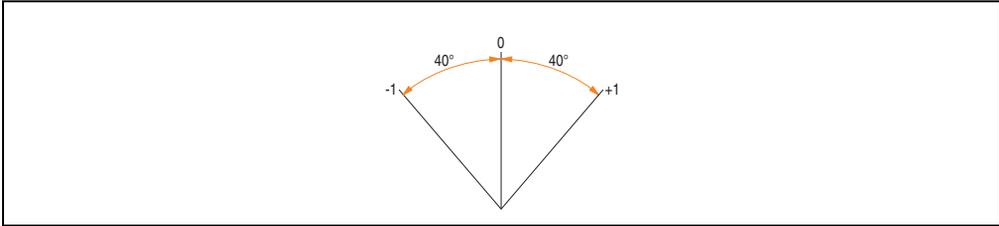
Figure 8: Key switch - Angle of rotation

Two key switches are delivered with each device.

2.2.5 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 permits e.g.: operation of robot axes.
Value range: -15 to +15 per axis (31 increments)

2.2.6 Buffer battery

For more information about the buffer battery, see chapter 6 "Accessories", section 5 "MP40/50 buffer battery" on page 149.

Chapter 2
Technical data

2.3 Dimensions

Figure 9: Entire device - Dimensions
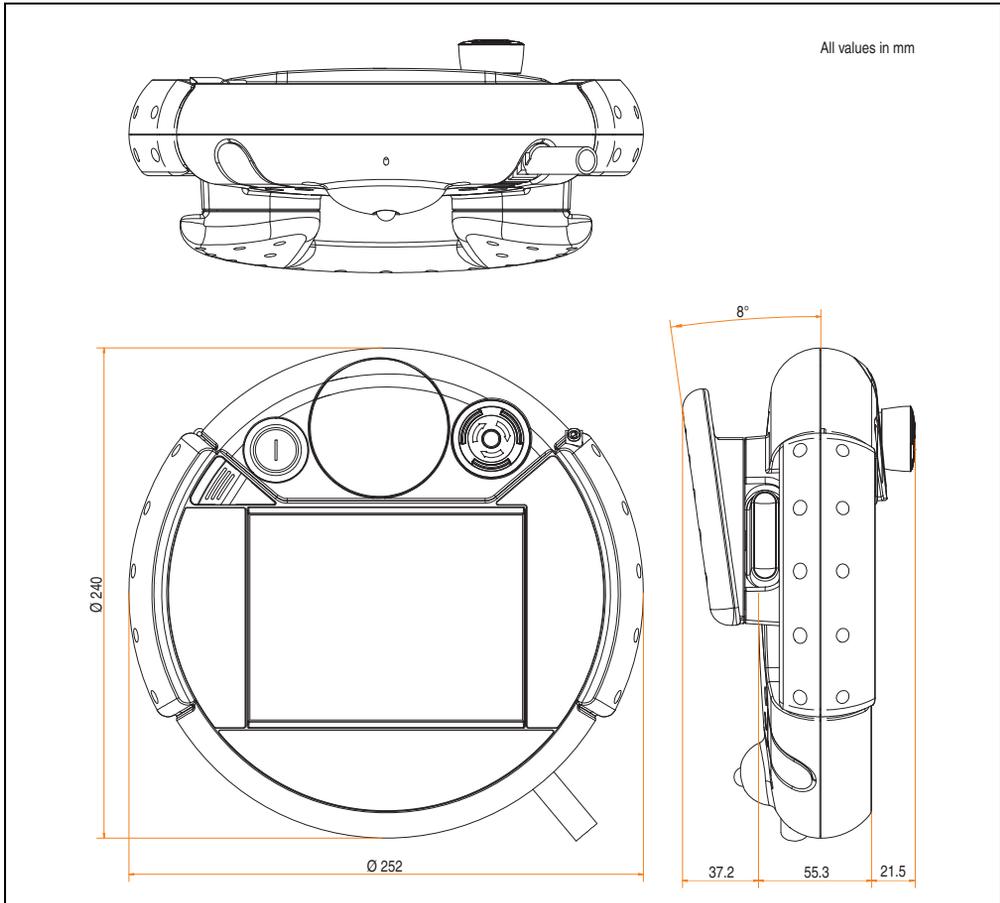
2.4 Technical data

Features	MP40 3.8" display versions	MP50 6.5" display versions

Power supply
    Rated voltage
    max. duration of supply interruption
    Starting current
    Electrical isolation
	24 VDC ±25% (integrated reverse polarity protection)
	≤10 ms
	max. 5.6 A (current limitation present)
	-	

Safety elements / entry devices
    Stop button
    Enable switch
    Additional entry devices
	2 N.C., located on right side of operating unit
	3 step, 2-channel, 2 buttons on both sides of the device
	different according to operating unit version	

Loop resistance per stop circuit	$\leq 10\Omega$[1]	
Mains failure bridging	Only together with a buffer battery (5MPBAT.0000-00), see page 149.	
Mechanics		

Operating unit
    Item
    Paint, color
	Housing from ABS
	similar to RAL7011	

Outer dimensions
    Diameter
    Total height
	250 mm
	114 mm	

Weight (with stop button, with key switch, without handwheel override potentiometer and cable)	Approx. 1100 g	Approx. 1250 g
Environment[2]		

Ambient temperature
    Operation
    Bearings
    Transport
	0 to +50°C[3]
	-20 to +70°C
	-20 to +70°C	

Relative humidity
    Operation
    Bearings
    Transport
	Max. 95%, non-condensing
	Max. 95%, non-condensing
	Max. 95%, non-condensing	

Vibration Operation	5 - 9 Hz: 7 mm amplitude / 9 - 150 Hz: 2 g	
Shock Operation	15 g (147 m/s² 0-peak) and 11 ms length	
Altitude[4] (operation)	3000 m	
Drop height	1.5 m to industrial floor	
Flame resistant	UL94V-0	
Protection	IP65	

Table 9: Entire device

1) Measured section: Mobile Panel device + 20 m attachment cable + 2 m switching cabinet cable; the exact value of the loop resistance can be determined with a loop resistance measuring device.

2) For test requirements and limits for mechanical and climate conditions, see chapter 5 "Standards and certifications" starting on page 121.

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

4) Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

Chapter 2
Technical data

2.4.1 Temperature humidity diagram - Operation and storage
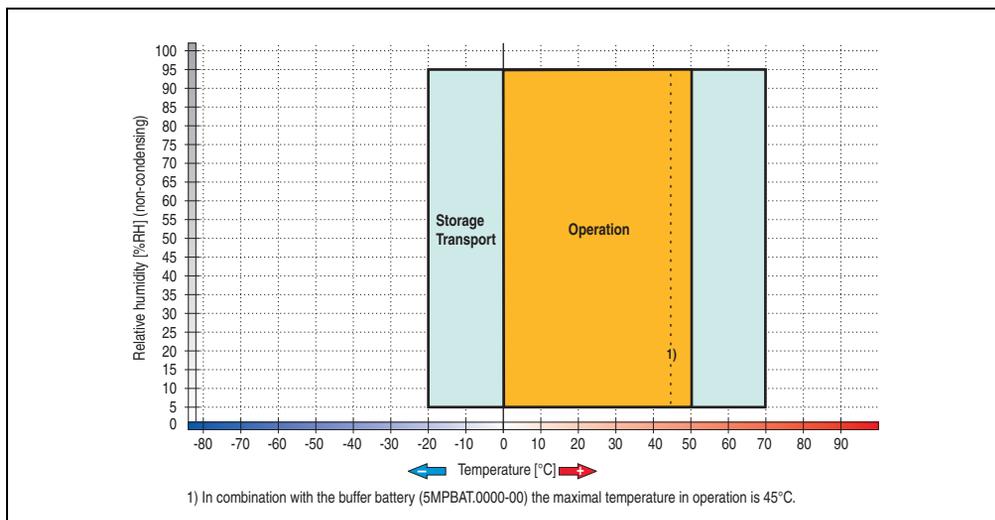
Figure 10: Temperature humidity diagram

Temperature data is for operation at 500 meters.

2.5 Stickers

2.5.1 Type plate

General information

Each B&R device is given a unique type plate (serial number sticker) with a barcode that allows the device to be clearly identified.

Design/Dimensions
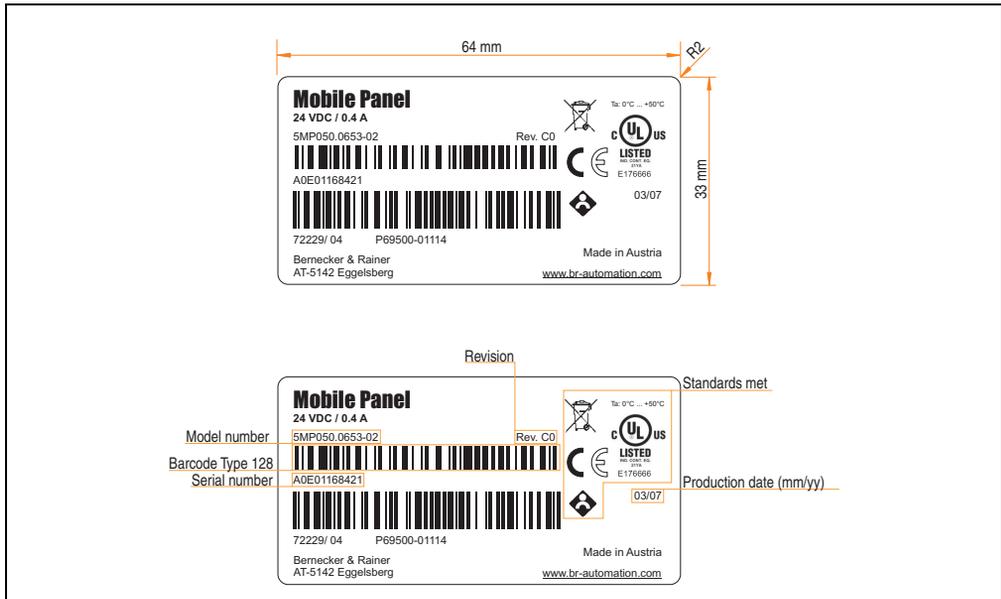
Figure 11: Design / dimensions - Type plate

Chapter 2
Technical data

Information on the Internet

Information about each device can also be found on the B&R homepage. Enter the device's serial number in the serial number search field on the start page **www.br-automation.com**. The search also works if you enter the model number or the material number in the material number search field. The search provides you with a detailed list of the individual components.
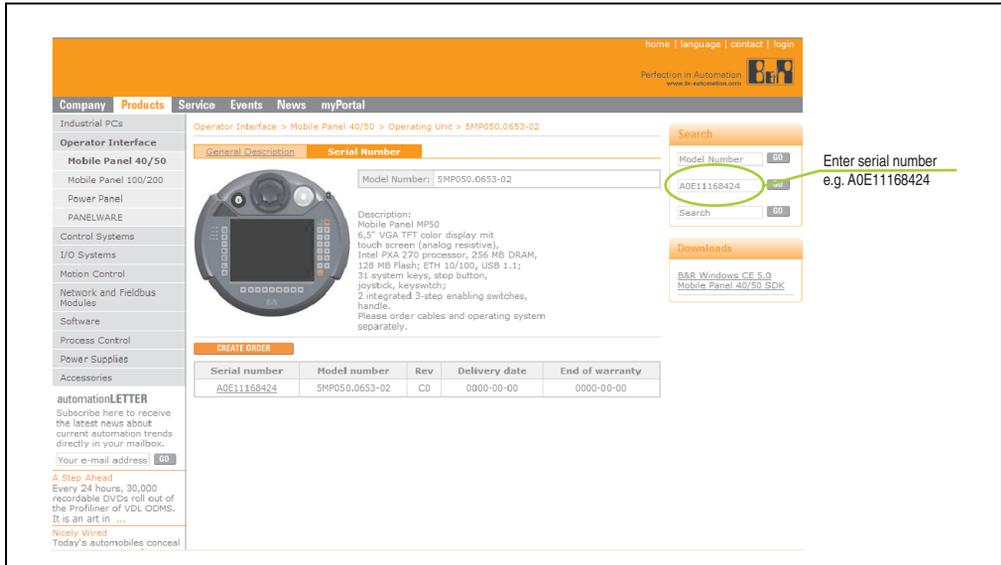
Figure 12: Example of serial number search: A0E11168424

3. Individual components

3.1 Operating unit
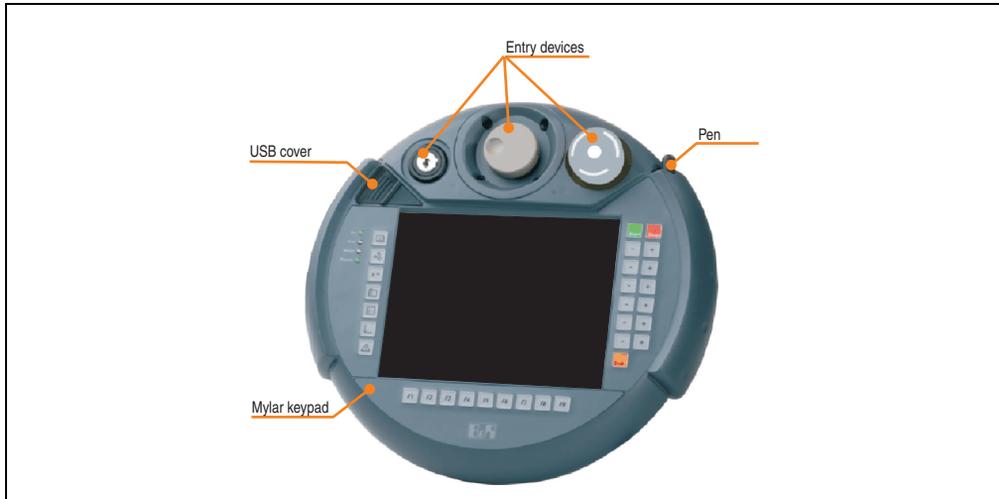
Figure 13: Mobile Panel operating unit

The operating unit contains all the electronics such as the display, the command devices and the foil 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 Memory Sticks 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 section "Cleaning" on page 153.

Chapter 2
Technical data

3.1.1 Foil keypadMP40

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).
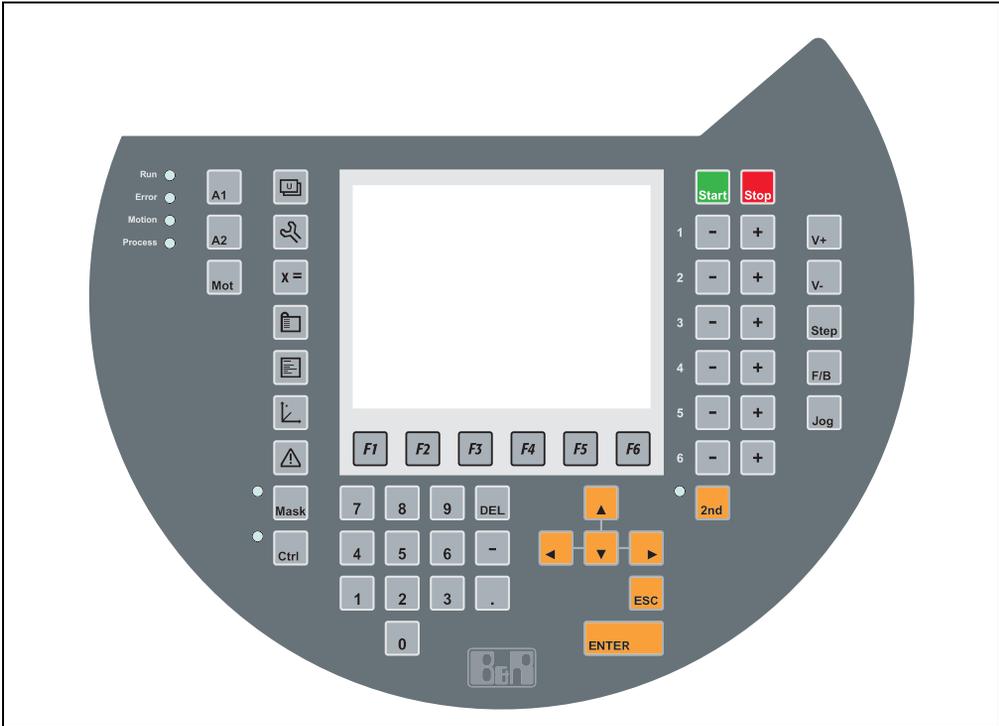
Figure 14: MP40 foil keypad

Keys/LEDs

Symbol	Possible use	Factory key configuration (PS/2 code)
	Application mask 1	No presetting
	Services	No presetting

Table 10: MP40 mylar keypad symbols

Symbol	Possible use	Factory key configuration (PS/2 code)
X =	Variable monitor	No presetting
	Project mask	No presetting
	Program mask	CONTEXT
	Position mask	No presetting
	Alarm mask	No presetting
Mask	Mask	No presetting
Ctrl	Ctrl	CTRL LEFT
F1	F1	F1
F2	F2	F2
F3	F3	F3
F4	F4	F4
F5	F5	F5
F6	F6	F6
A1	A1	OLD

Table 10: MP40 mylar keypad symbols (cont.)

Symbol	Possible use	Factory key configuration (PS/2 code)
A2	A2	No presetting
Mot	Axis enabling	No presetting
Start	Start	Left Windows key
Stop	Stop	No presetting
-	Jog key	-
+	Jog key	+
2nd	2. Layer	SHIFT LEFT
1	Number 1	1
2	Number 2	2
3	Number 3	3
4	Number 4	4
5	Number 5	5
6	Number 6	6
7	Number 7	7

Table 10: MP40 mylar keypad symbols (cont.)

Symbol	Possible use	Factory key configuration (PS/2 code)
8	Number 8	8
9	Number 9	9
0	Number 0	0
.	Comma	.
▲	Up	CURSOR UP
▼	Down	CURSOR DOWN
◄	Left	CURSOR LEFT
►	Right	CURSOR RIGHT
ENTER	ENTER	RETURN
ESC	Cancel	ESC
Jog	Coordination system selection	No presetting
F/B	Foreword/backward	No presetting
Step	Operating mode selection	TAB
V-	Speed -	PAGE DOWN

Table 10: MP40 mylar keypad symbols (cont.)

Symbol	Possible use	Factory key configuration (PS/2 code)
V+	Speed +	PAGE UP
Run ⬤ Error ⬤ Motion ⬤ Process ⬤	Application running Error in the application Robot controller ready Process controller ready (cell/system ready)	

Table 10: MP40 mylar keypad symbols (cont.)

3.1.2 Foil keypadMP50

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).
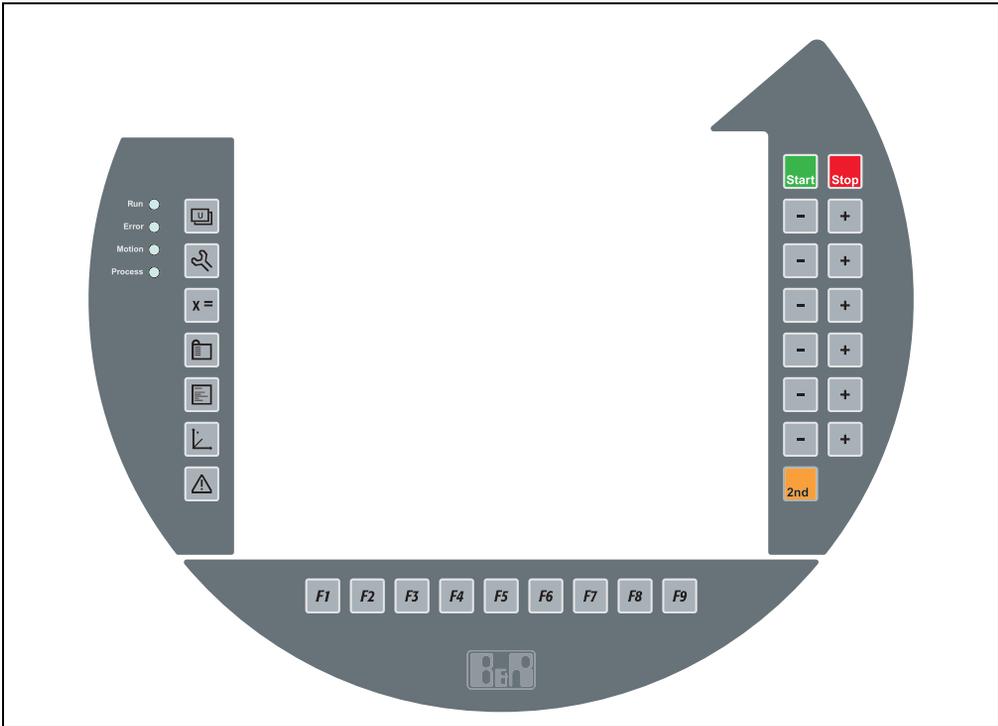
Figure 15: MP50 foil keypad

Key labels

Symbol	Possible use	Factory key configuration (PS/2 code)
	Application mask 1	No presetting
	Services	No presetting

Table 11: MP50 mylar keypad symbols

Symbol	Possible use	Factory key configuration (PS/2 code)
X =	Variable monitor	No presetting
	Project mask	No presetting
	Program mask	CONTEXT
	Position mask	No presetting
	Alarm mask	No presetting
F1	F1	F1
F2	F2	F2
F3	F3	F3
F4	F4	F4
F5	F5	F5
F6	F6	F6
F7	F7	F7
F8	F8	F8
F9	F9	F9

Table 11: MP50 mylar keypad symbols (cont.)

Symbol	Possible use	Factory key configuration (PS/2 code)
Start	Start	Left Windows key
Stop	Stop	No assignment
–	Jog key	-
+	Jog key	+
2nd	2. Layer	SHIFT LEFT
Run ◯ Error ◯ Motion ◯ Process ◯	Application running Error in the application Robot controller ready Process controller ready (cell/system ready)	

Table 11: MP50 mylar keypad symbols (cont.)

Chapter 2
Technical data

3.1.3 Stop button

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

The grey 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. The connection of the positive opening switching contacts must meet the particular category (according to EN ISO 13849-1) determined for the machine in the risk evaluation (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!

Hand-held operating devices 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 hand-held 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 chapter 5 "Standards and certifications" on page 121 for further information regarding the stop button.

3.1.4 Enabling equipment
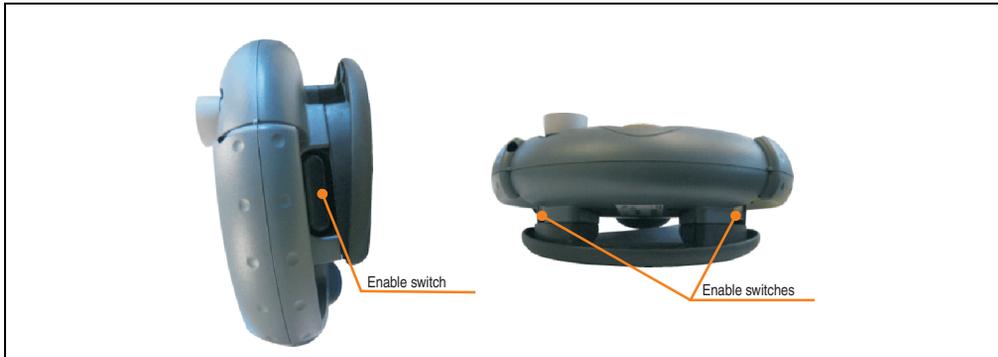
Figure 16: Enabling device

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

Functionality

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 12: Switch positions for the enable switch
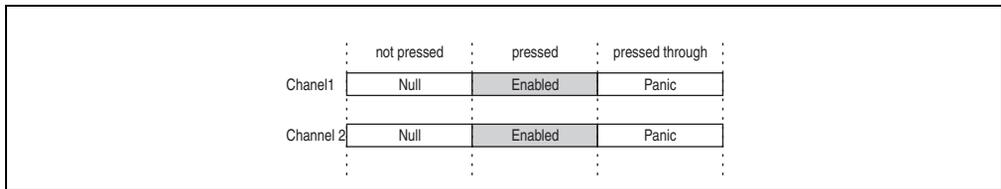
Figure 17: Possible enable switch positions

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.

Zero position

When not pressed, the enable switch returns to the zero position (not enabled).
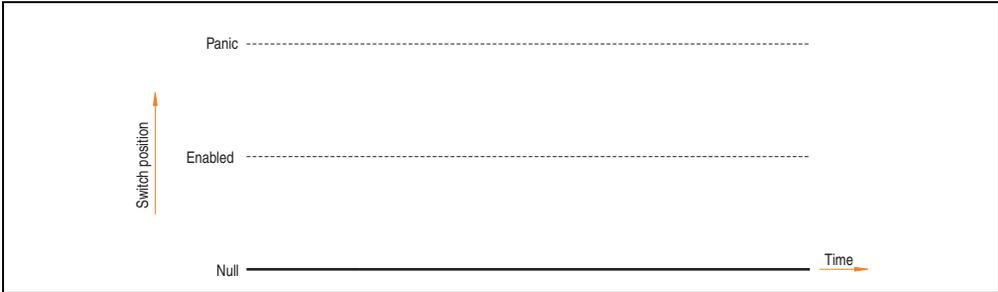
Figure 18: Enable switch - zero position

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.
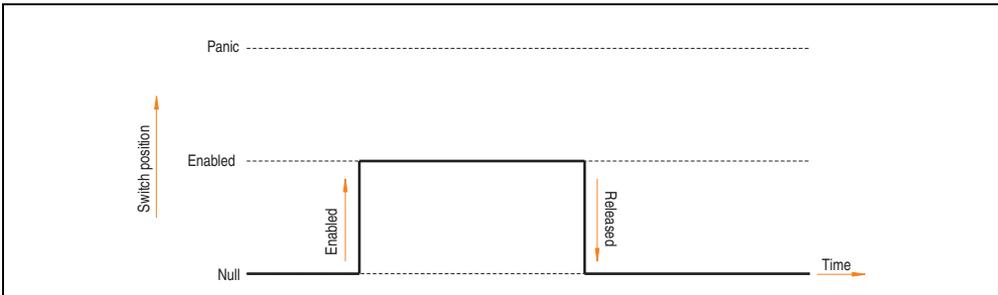
Figure 19: Enable switch - enable

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.
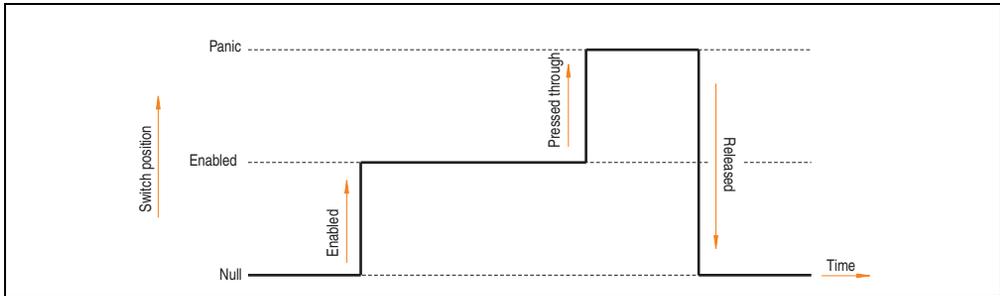
Figure 20: Enable switch - panic

Safety category 3 PL d according to EN ISO 13849-1:2008 can be achieved by implementing enabling equipment with 2-circuits and a suitable monitor for short-circuits and cross-circuits 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 99 and "Connection example - Enable switch" on page 100 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 5 "Standards and certifications", section 4.5 "Selecting Performance Level and Category according to EN ISO 13849-1" on page 131.

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.**

- **Refer to chapter "Standards and certifications" on page 121 for further information regarding enabling equipment.**

Chapter 2
Technical data

3.1.5 Technical data - operating unit

Operating unit 5MP040.0381-01

Figure 21: Operating unit 5MP040.0381-01

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	5MP040.0381-01
Boot loader / Operating system	Yes / Windows CE
Processor Type Cooling	Intel PXA 270/416 MHz Passive cooling
Flash	128 MB

Memory
    Type
    Quantity
	SDRAM
	256 MB

Graphics Controller	Intel PXA

Table 13: Technical data 5MP040.0381-01

Features	5MP040.0381-01

Ethernet
    Controller
    Transfer rate
    Connection
    Cables
	
	SMSC11X
	10/100 Mbit/s
	RJ45 twisted pair (10 Base T / 100 Base T)
	S/STP (Category 5, using Mobile Panel cable)

USB interface
    Type
    Amount
    Transfer rate
    Connection
    Current load
USB client
	Accessible on the front, behind the cover
	USB 1.1
	1
	1.5 Mbit/s (low speed), 12 Mbit/s (full speed)
	Type A
	500 mA
	Accessible in cable shaft

Reset button	Yes (in cable shaft)

Keyboard
    System keys
    Softkeys
    LEDs
	
	51
	6
	7

Caution!

Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Display
    Type
    Diagonal
    Colors
    Resolution
    Contrast
    Viewing angle (see page 166)
        Horizontal
        Vertical
Background lighting
    Brightness
    Half-brightness time
	
	LCD monochrome
	3.8 inch (96.5 mm)
	16 shades of gray
	QVGA, 320 x 240 pixels
	20:1
	
	Direction R / direction L =45°
	Direction U = 30°/ direction D = 60°
	
	110 cd/m^2
	50,000 hours

Touch screen Technology	-

Power supply
    Rated voltage
    Max. interruption of the supply
    Starting current
    Power consumption
    Electrical isolation
	
	24 VDC ±25% (integrated reverse polarity protection)
	≤10 ms
	max. 5.6 A (current limitation present)
	4.8 W (200 mA at 24 VDC)
	-

Safety Standard	Class 3 according to EN 61131-2, or EN 50178
Mechanics	
Operating unit Paint, color	Housing from ABS similar to RAL7011
Stop button	Yes (2 normally closed), right position
Enable switch	Yes (two 3-step switches), left and right position

Mounted in the middle
    Electronic handwheel
    3 axes joystick
	
	-
	-

Mechanics	**5MP040.0381-01**

Table 13: Technical data 5MP040.0381-01 (cont.)

Mounted on the left
    Illuminated button
    Key switch
    Override potentiometer
	-
	-
	-

Outer dimensions
    Diameter
    Total height
	250 mm
	114 mm

Weight (without cable)	Approx. 1100 g
Environment	

Ambient temperature
    Operation
    Bearings
    Transport
	0 to +50°C[1]
	-20 to +70°C
	-20 to +70°C

Relative humidity
    Operation
    Bearings
    Transport
	Max. 95%, non-condensing
	Max. 95%, non-condensing
	Max. 95%, non-condensing

Vibration Operation	5 - 9 Hz: 7 mm amplitude / 9 - 150 Hz: 2 g
Shock Operation	15 g (147 m/s² 0-peak) and 11 ms length
Altitude	3000 m
Environment	
Drop height	1.5 m to industrial floor
Protection type	IP65
Flame resistant	UL94V-0

Table 13: Technical data 5MP040.0381-01 (cont.)

1) When used with a buffer battery (5MPBAT.0000-00) the maximum temperature during operation is 45°C.
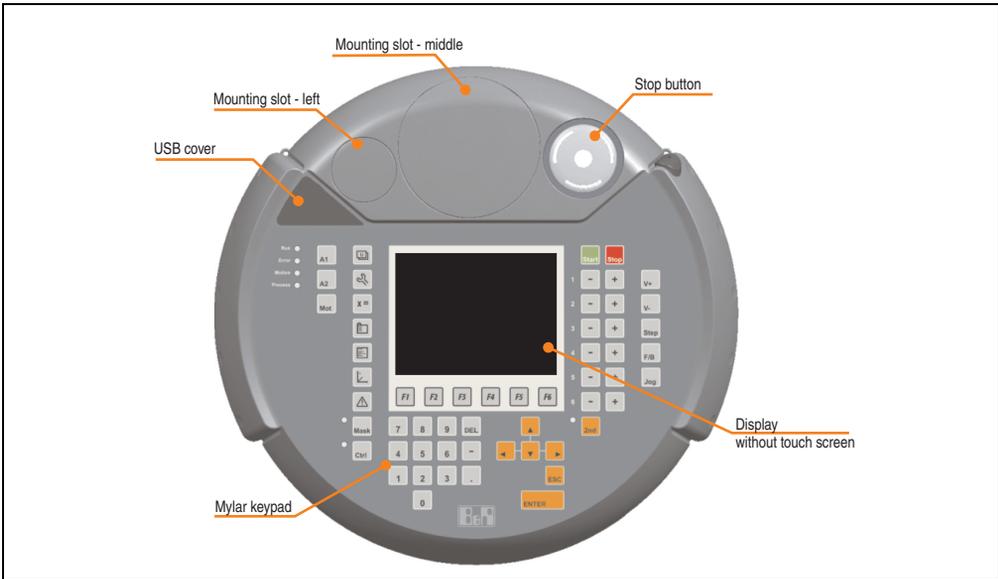
Operating unit 5MP040.0381-02
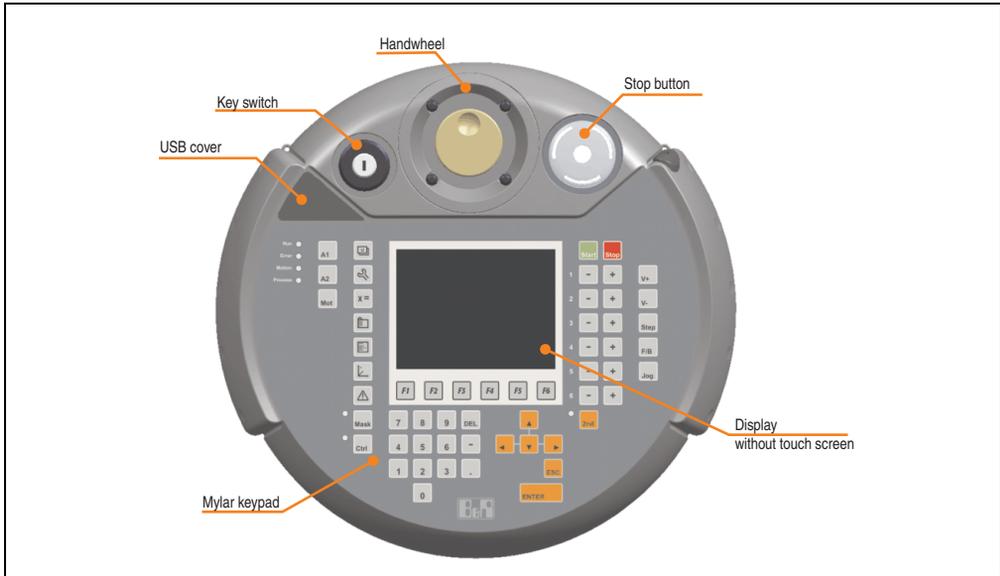
Figure 22: Operating unit 5MP040.0381-02

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	5MP040.0381-02
Boot loader / Operating system	Yes / Windows CE
Processor Type Cooling	Intel PXA 270/416 MHz Passive cooling
Flash	128 MB

Memory
    Type
    Quantity
	SDRAM
	256 MB

Graphics Controller	Intel PXA

Table 14: Technical data - 5MP040.0381-02

Features	5MP040.0381-02

Ethernet
   Controller
   Transfer rate
   Connection
   Cables
	
	SMSC11X
	10/100 Mbit/s
	RJ45 twisted pair (10 Base T / 100 Base T)
	S/STP (Category 5, using Mobile Panel cable)

USB interface
   Type
   Amount
   Transfer rate
   Connection
   Current load
USB client
	Accessible on the front, behind the cover
	USB 1.1
	1
	1.5 Mbit/s (low speed), 12 Mbit/s (full speed)
	Type A
	500 mA
	Accessible in cable shaft

Reset button	Yes (in cable shaft)

Keyboard
   System keys
   Softkeys
   LEDs
	
	51
	6
	7

Caution!

Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Features	5MP040.0381-02

Display
   Type
   Diagonal
   Colors
   Resolution
   Contrast
   Viewing angle (see page 166)
      Horizontal
      Vertical
Background lighting
   Brightness
   Half-brightness time
	
	LCD monochrome
	3.8 inch (96.5 mm)
	16 shades of gray
	QVGA, 320 x 240 pixels
	20:1
	
	Direction R / direction L =45°
	Direction U = 30°/ direction D = 60°
	
	110 cd/m^2
	50,000 hours

Touch screen Technology	-

Power supply
   Rated voltage
   Max. interruption of the supply
   Starting current
   Power consumption
   Electrical isolation
	
	24 VDC ±25% (integrated reverse polarity protection)
	≤10 ms
	max. 5.6 A (current limitation present)
	4.8 W (200 mA at 24 VDC)
	-

Safety Standard	Class 3 according to EN 61131-2, or EN 50178
Mechanics	
Operating unit Paint, color	Housing from ABS similar to RAL7011
Stop button	Yes (2 normally closed), right position
Enable switch	Yes (two 3-step switches), left and right position

Mounted in the middle
   Electronic handwheel
   3 axes joystick
	
	Yes
	-

Table 14: Technical data - 5MP040.0381-02 (cont.)

Mechanics	5MP040.0381-02

Mounted on the left
    Illuminated button
    Key switch
    Override potentiometer
	-
	Yes
	-

Outer dimensions
    Diameter
    Total height
	250 mm
	114 mm

Weight (without cable)	Approx. 1100 g
Environment	

Ambient temperature
    Operation
    Bearings
    Transport
	0 to +50°C[1]
	-20 to +70°C
	-20 to +70°C

Relative humidity
    Operation
    Bearings
    Transport
	Max. 95%, non-condensing
	Max. 95%, non-condensing
	Max. 95%, non-condensing

Vibration Operation	5 - 9 Hz: 7 mm amplitude / 9 - 150 Hz: 2 g
Shock Operation	15 g (147 m/s² 0-peak) and 11 ms length
Altitude	3000 m
Environment	
Drop height	1.5 m to industrial floor
Protection type	IP65
Flame resistant	UL94V-0

Table 14: Technical data - 5MP040.0381-02 (cont.)

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

Chapter 2
Technical data

Operating unit 5MP050.0653-01
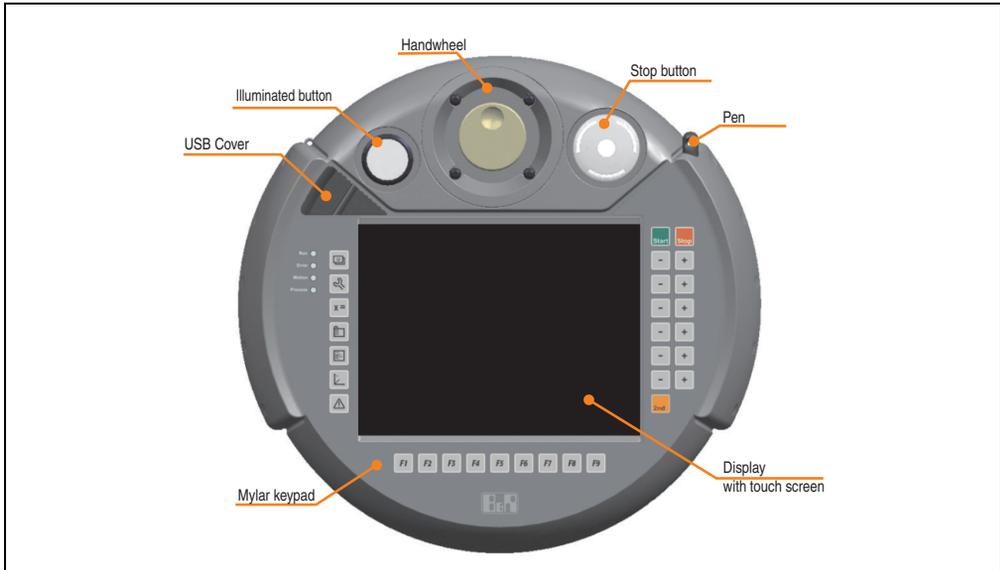
Figure 23: Operating unit 5MP050.0653-01

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	5MP050.0653-01
Boot loader / Operating system	BIOS
Processor Type Cooling	Intel PXA 270/416 MHz Passive cooling
Flash	128 MB

Memory
    Type
    Quantity
	SDRAM
	256 MB

Graphics Controller	Intel PXA

Table 15: Technical data - 5MP050.0653-01

Features	5MP050.0653-01

Ethernet
  Controller
  Transfer rate
  Connection
  Cables
	
	SMSC11X
	10/100 Mbit/s
	RJ45 twisted pair (10 Base T / 100 Base T)
	S/STP (Category 5, using Mobile Panel cable)

USB interface
  Type
  Amount
  Transfer rate
  Connection
  Current load
USB client
	Accessible on the front, behind the cover
	USB 1.1
	1
	1.5 Mbit/s (low speed), 12 Mbit/s (full speed)
	Type A
	500 mA
	Accessible in cable shaft

Reset button	Yes (in cable shaft)

Keyboard
  System keys
  LEDs
	
	31
	4

Caution!

Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Display
  Type
  Diagonal
  Colors
  Resolution
  Contrast
  Viewing angle (see page 166)
    Horizontal
    Vertical
Background lighting
  Brightness
  Half-brightness time
	
	Color TFT
	6.5 inch (165 mm)
	65,535 colors
	VGA, 640 x 480 pixels
	300:1
	
	Direction R / direction L =55°
	Direction U = 30°/ direction D = 60°
	
	400 cd/m^2
	50,000 hours

Touch screen Technology	 Analog, resistive

Power supply
  Rated voltage
  Max. interruption of the supply
  Starting current
  Power consumption
  Electrical isolation
	
	24 VDC ±25% (integrated reverse polarity protection)
	≤10 ms
	max. 5.6 A (current limitation present)
	9.6 W (400 mA at 24 VDC)
	-

Safety Standard	Class 3 according to EN 61131-2, or EN 50178
Mechanics	
Operating unit Paint, color	Housing from ABS similar to RAL7011
Stop button	Yes (2 normally closed), right position
Enable switch	Yes (two 3-step switches), left and right position

Mounted in the middle
  Electronic handwheel
  3 axes joystick
	
	Yes
	-

Table 15: Technical data - 5MP050.0653-01 (cont.)

Chapter 2
Technical data

Mechanics	5MP050.0653-01

Mounted on the left
   Illuminated button
   Key switch
   Override potentiometer
	Yes (white)
	-
	-

Outer dimensions
   Diameter
   Total height
	250 mm
	114 mm

Weight (without cable)	Approx. 1100 g
Environment	

Ambient temperature
   Operation
   Bearings
   Transport
	0 to +50°C[1]
	-20 to +70°C
	-20 to +70°C

Relative humidity
   Operation
   Bearings
   Transport
	Max. 95% at T $\leq$ 40°C, non-condensing
	Max. 95% at T $\leq$ 55°C, non-condensing
	Max. 95% at T $\leq$ 55°C, non-condensing

Vibration Operation	5 - 9 Hz: 7 mm amplitude / 9 - 150 Hz: 2 g
Shock Operation	15 g (147 m/s² 0-peak) and 11 ms length
Altitude	3000 m
Environment	
Drop height	1.5 m to industrial floor
Protection type	IP65
Flame resistant	UL94V-0

Table 15: Technical data - 5MP050.0653-01 (cont.)

1) When used with a buffer battery (5MPBAT.0000-00) the maximum temperature during operation is 45°C.
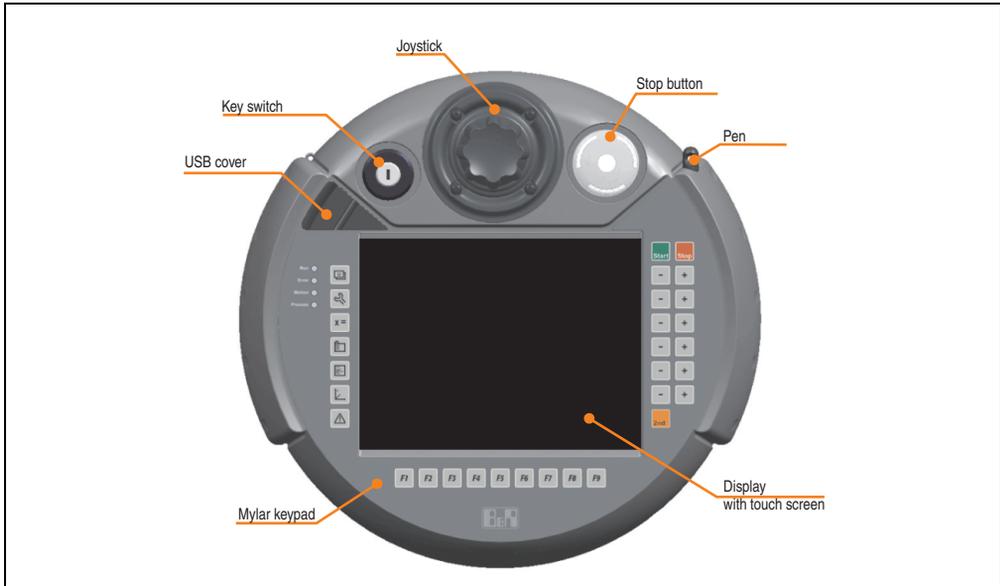
Operating unit 5MP050.0653-02

Figure 24: Operating unit 5MP050.0653-02

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	5MP050.0653-02
Boot loader / Operating system	Yes / Windows CE
Processor Type Cooling	Intel PXA 270/416 MHz Passive cooling
Flash	128 MB

Memory
    Type
    Quantity
	SDRAM
	256 MB

Graphics Controller	Intel PXA

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

Features	5MP050.0653-02

Ethernet
    Controller
    Transfer rate
    Connection
    Cables
	
	SMSC11X
	10/100 Mbit/s
	RJ45 twisted pair (10 Base T / 100 Base T)
	S/STP (Category 5, using Mobile Panel cable)

USB interface
    Type
    Amount
    Transfer rate
    Connection
    Current load
USB client
	Accessible on the front, behind the cover
	USB 1.1
	1
	1.5 Mbit/s (low speed), 12 Mbit/s (full speed)
	Type A
	500 mA
	Accessible in cable shaft

Reset button	Yes (in cable shaft)

Keyboard
    System keys
    LEDs
	
	31
	4

Caution!

Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Display
    Type
    Diagonal
    Colors
    Resolution
    Contrast
    Viewing angle (see page 166)
        Horizontal
        Vertical
Background lighting
    Brightness
    Half-brightness time
	
	Color TFT
	6.5 inch (165 mm)
	65,535 colors
	VGA, 640 x 480 pixels
	300:1
	
	Direction R / direction L =55°
	Direction U = 30°/ direction D = 60°
	
	400 cd/m^2
	50,000 hours

Touch screen Technology	 Analog, resistive

Power supply
    Rated voltage
    Max. interruption of the supply
    Starting current
    Power consumption
    Electrical isolation
	
	24 VDC ±25% (integrated reverse polarity protection)
	≤10 ms
	max. 5.6 A (current limitation present)
	9.6 W (400 mA at 24 VDC)
	-

Safety Standard	Class 3 according to EN 61131-2, or EN 50178
Mechanics	
Operating unit Paint, color	Housing from ABS similar to RAL7011
Stop button	Yes (2 normally closed), right position
Enable switch	Yes (two 3-step switches), left and right position

Mounted in the middle
    Electronic handwheel
    3 axes joystick
	
	-
	Yes

Table 16: Technical data - 5MP050.0653-02 (cont.)

Mechanics	5MP050.0653-02

Mounted on the left
   Illuminated button
   Key switch
   Override potentiometer
	
	-
	Yes
	-

Outer dimensions
   Diameter
   Total height
	
	250 mm
	114 mm

Weight (without cable)	 Approx. 1100 g
Environment	

Ambient temperature
   Operation
   Bearings
   Transport
	
	0 to +50°C[1]
	-20 to +70°C
	-20 to +70°C

Relative humidity
   Operation
   Bearings
   Transport
	
	Max. 95%, non-condensing
	Max. 95%, non-condensing
	Max. 95%, non-condensing

Vibration Operation	 5 - 9 Hz: 7 mm amplitude / 9 - 150 Hz: 2 g
Shock Operation	 15 g (147 m/s² 0-peak) and 11 ms length
Altitude	3000 m
Environment	
Drop height	1.5 m to industrial floor
Protection type	IP65
Flame resistant	UL94V-0

Table 16: Technical data - 5MP050.0653-02 (cont.)

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

Chapter 2
Technical data

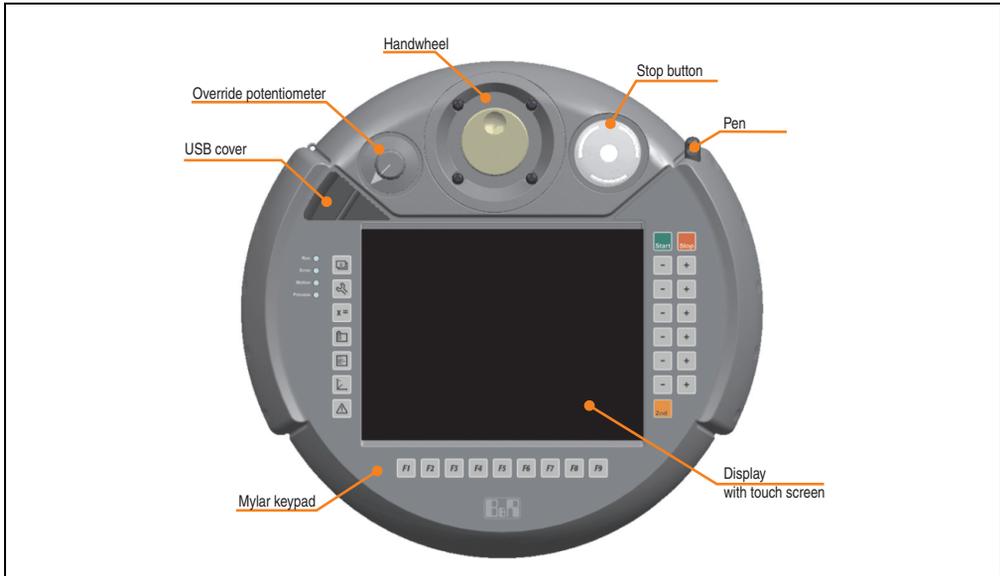## Operating unit 5MP050.0653-03

Figure 25: Operating unit 5MP050.0653-03

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	5MP050.0653-03
Boot loader / Operating system	Yes / Windows CE
Processor Type Cooling	Intel PXA 270/416 MHz Passive cooling
Flash	128 MB

Memory
    Type
    Quantity
	SDRAM
	256 MB

Graphics Controller	Intel PXA

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

Features	5MP050.0653-03

Ethernet
    Controller
    Transfer rate
    Connection
    Cables
	SMSC11X
	10/100 Mbit/s
	RJ45 twisted pair (10 Base T / 100 Base T)
	S/STP (Category 5, using Mobile Panel cable)

USB interface
    Type
    Amount
    Transfer rate
    Connection
    Current load
USB client
	Accessible behind the cover
	USB 1.1
	1
	1.5 Mbit/s (low speed), 12 Mbit/s (full speed)
	Type A
	500 mA
	Accessible in cable shaft

Reset button	Yes (in cable shaft)

Keyboard
    System keys
    LEDs
	31
	4

Caution!

Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Display
    Type
    Diagonal
    Colors
    Resolution
    Contrast
    Viewing angle (see page 166)
        Horizontal
        Vertical
Background lighting
    Brightness
    Half-brightness time
	Color TFT
	6.5 inch (165 mm)
	65,535 colors
	VGA, 640 x 480 pixels
	300:1
	
	Direction R / direction L =55°
	Direction U = 30°/ direction D = 60°
	
	400 cd/m^2
	50,000 hours

Touch screen Technology	Analog, resistive

Power supply
    Rated voltage
    Max. interruption of the supply
    Starting current
    Power consumption
    Electrical isolation
	24 VDC ±25% (integrated reverse polarity protection)
	≤10 ms
	max. 5.6 A (current limitation present)
	9.6 W (400 mA at 24 VDC)
	-

Safety Standard	Class 3 according to EN 61131-2, or EN 50178
Mechanics	
Operating unit Paint, color	Housing from ABS similar to RAL7011
Stop button	Yes (2 normally closed), right position
Enable switch	Yes (two 3-step switches), left and right position

Mounted in the middle
    Electronic handwheel
    3 axes joystick
	Yes
	-

Table 17: Technical data - 5MP050.0653-03 (cont.)

Mechanics	5MP050.0653-03

Mounted on the left
    Illuminated button
    Key switch
    Override potentiometer
	-
	-
	Yes

Outer dimensions
    Diameter
    Total height
	250 mm
	114 mm

Weight (without cable)	Approx. 1100 g
Environment	

Ambient temperature
    Operation
    Bearings
    Transport
	0 to +50°C[1]
	-20 to +70°C
	-20 to +70°C

Relative humidity
    Operation
    Bearings
    Transport
	Max. 95%, non-condensing
	Max. 95%, non-condensing
	Max. 95%, non-condensing

Vibration Operation	5 - 9 Hz: 7 mm amplitude / 9 - 150 Hz: 2 g
Shock Operation	15 g (147 m/s² 0-peak) and 11 ms length
Altitude	3000 m
Environment	
Drop height	1.5 m to industrial floor
Protection type	IP65
Flame resistant	UL94V-0

Table 17: Technical data - 5MP050.0653-03 (cont.)

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

Operating unit 5MP050.0653-04
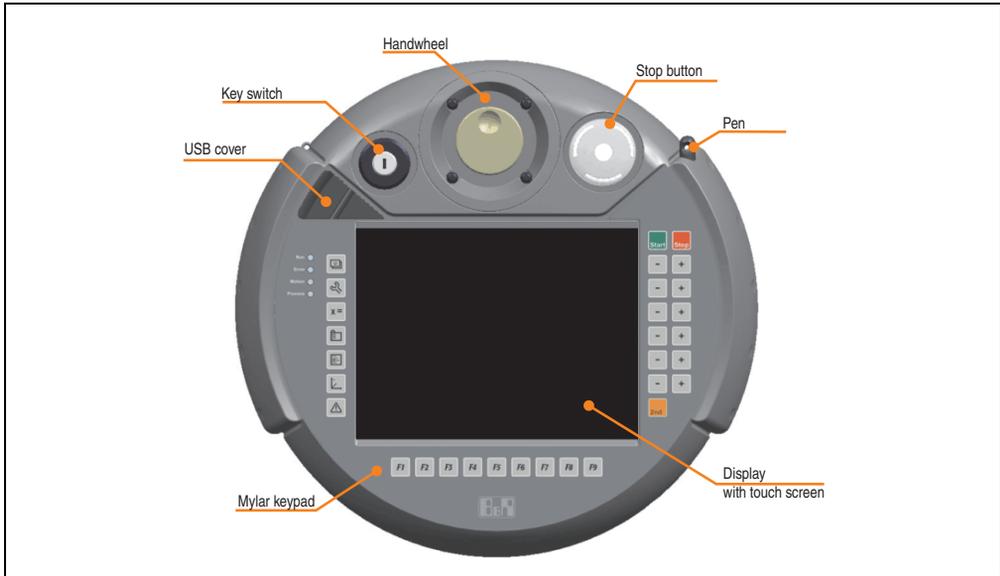
Figure 26: Operating unit 5MP050.0653-04

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	5MP050.0653-04
Boot loader / Operating system	Yes / Windows CE
Processor Type Cooling	Intel PXA 270/416 MHz Passive cooling
Flash	128 MB

Memory
   Type
   Quantity
	SDRAM
	256 MB

Graphics Controller	Intel PXA

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

Features	5MP050.0653-04

Ethernet
  Controller
  Transfer rate
  Connection
  Cables
	
	SMSC11X
	10/100 Mbit/s
	RJ45 twisted pair (10 Base T / 100 Base T)
	S/STP (Category 5, using Mobile Panel cable)

USB interface
  Type
  Amount
  Transfer rate
  Connection
  Maximum current load
USB client
	Accessible on the front, behind the cover
	USB 1.1
	1
	1.5 Mbit/s (low speed), 12 Mbit/s (full speed)
	Type A
	500 mA
	Accessible in cable shaft

Reset button	Yes (in cable shaft)

Keyboard
  System keys
  LEDs
	
	31
	4

Caution! **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**	

Display
  Type
  Diagonal
  Colors
  Resolution
  Contrast
  Viewing angle (see page 166)
    Horizontal
    Vertical
Background lighting
  Brightness
  Half-brightness time
	
	Color TFT
	6.5 inch (165 mm)
	65,535 colors
	VGA, 640 x 480 pixels
	300:1
	
	Direction R / direction L =55°
	Direction U = 30°/ direction D = 60°
	
	400 cd/m^2
	50,000 hours

Touch screen Technology	 Analog, resistive

Power supply
  Rated voltage
  Max. interruption of the supply
  Starting current
  Power consumption
  Electrical isolation
	
	24 VDC ±25% (integrated reverse polarity protection)
	≤10 ms
	max. 5.6 A (current limitation present)
	9.6 W (400 mA at 24 VDC)
	-

Safety Standard	Class 3 according to EN 61131-2, or EN 50178
Mechanics	
Operating unit Paint, color	Housing from ABS similar to RAL7011
Stop button	Yes (2 normally closed), right position
Enable switch	Yes (two 3-step switches), left and right position

Mounted in the middle
  Electronic handwheel
  3 axes joystick
	
	Yes
	-

Table 18: Technical data - 5MP050.0653-04 (cont.)

Mechanics	5MP050.0653-04

Mounted on the left
   Illuminated button
   Key switch
   Override potentiometer
	
	-
	Yes
	-

Outer dimensions
   Diameter
   Total height
	
	250 mm
	114 mm

Weight (without cable)	 Approx. 1100 g
Environment	

Ambient temperature
   Operation
   Bearings
   Transport
	
	0 to +50°C[1]
	-20 to +70°C
	-20 to +70°C

Relative humidity
   Operation
   Bearings
   Transport
	
	Max. 95%, non-condensing
	Max. 95%, non-condensing
	Max. 95%, non-condensing

Vibration Operation	 5 - 9 Hz: 7 mm amplitude / 9 - 150 Hz: 2 g
Shock Operation	 15 g (147 m/s² 0-peak) and 11 ms length
Altitude	3000 m
Environment	
Drop height	1.5 m to industrial floor
Protection type	IP65
Flame resistant	UL94V-0

Table 18: Technical data - 5MP050.0653-04 (cont.)

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

Chapter 2
Technical data

3.2 Cables

3.2.1 Attachment cable 5CAMPH.0xxx-30

Entry devices & supply
(ST1) (11 wires)

Ethernet RJ45 + shield
(ST2) (4 wires)

Circular connector
with push-pull locking

Figure 27: Attachment cable 5CAMPH.0xxx-30

The attachment cable establishes the electrical and mechanical connection between the switching cabinet and Mobile Panel. It contains lines for the network (Ethernet 10/100 MBit/s) and for the entry devices & 24 VDC supply.

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

On the Mobile Panel, the attachment cable is mounted into the attachment shaft. On the switching cabinet end, the attachment cable has a circular plug. The attachment cable is available in different lengths (see table 5 "Mobile Panel attachment cable model numbers", on page 23). Information regarding the procedure for connecting the attachment cable can be found in chapter 3 "Commissioning", section 3 "Connection" on page 95.

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.**

Features	5CAMPH.0018-30	5CAMPH.0050-30	5CAMPH.0100-30	5CAMPH.0150-30	5CAMPH.0200-30
Length and tolerance	1.8 m ±10 cm	5 m ±10 cm	10 m ±10 cm	15 m ±15 cm	20 m ±15 cm
Connector Industrial plug	Push-Pull circular plug (ODU circular plug with Push-Pull locking)				

Cables
   Total diameter
   Weight per meter
   Sheathing material
   Minimum flex radius
   Supply lines
      Permissible
      operating voltage
      Item
      Conductor resistance
   Max. tension stress
   Color
	Hybrid cable, 25 wire
	10 mm
	153 g
	Silicon and halogen free, flame retardant PUR outer sheathing
	60 mm
	
	30 VDC
	Tinned copper wires
	$\leq 30\ \Omega/km$
	
	140 N
	Similar to RAL 7012				

Cable elements
   Network
   Enable switch
   Stop button
   Power supply
	Twisted pair cable for Ethernet (10/100 Mbit/s) (4-wire RJ45 plug)
	Direct connection between the enable switch and the monitoring device (4-wire)
	Direct connection between the stop button and the monitoring device (4-wire)
	Supply voltage + 24 VDC (3-wire)				

Environment					

Operating temperature
   Non-moving
   Moving
	-20 to +80°C
	-5 to +60°C				

Standards	Flame retardant according to IEC 60332-1 and VW1 / FT1 according to C-UL Shield damping according to IEC 60096-1, amendment 2 Mechanical characteristics according to DIN VDE 0472 section 603 test type H (100,000 cycles) Oil resistant, hydrolysis resistant according to DIN VDE 0282 section 10				
Protection type	IP65 (connected or with attached cover 5CAMPP.0000-10.				

Table 19: Technical data - Mobile Panel cable 5CAMPH.0xxx-30

Cable specifications
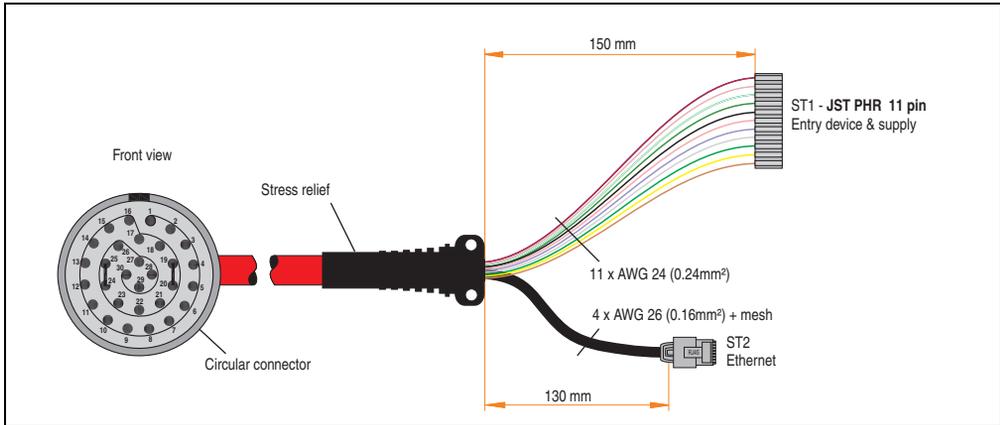
Figure 28: Cable specifications - Attachment cable 5CAMPH.0xxx-30

ST1 entry devices & supply		Wire colors - Attachment cable	Connection housing assignments
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
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 - Attachment cable**	**Connection housing assignments**
TX	Pin 1	Blue	Pin 27
TX\	Pin 2	White	Pin 29
RX	Pin 3	Orange	Pin 28
n.c.	Pin 4	-	-
n.c.	Pin 5	-	-
RX\	Pin 6	Red	Pin 30
n.c.	Pin 7	-	-
n.c.	Pin 8	-	-
Shielding	Housing	Mesh	-

3.2.2 Switching cabinet cable crossover 5CACMPC.0020-10

The pin assignments for 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 (Mod.No. 0AC808.9).

If a different Ethernet hub is used, it must support the crossover of the RX and TX lines.
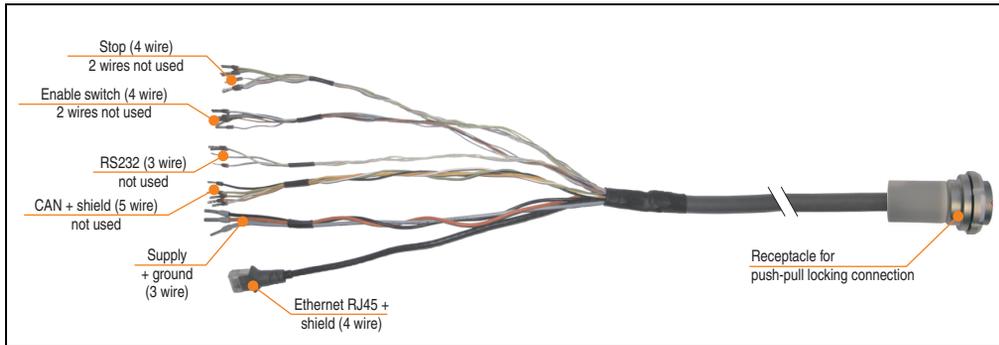
Figure 29: Mobile Panel switching cabinet cable 5CAMPC.0020-10

The switching cabinet cable is required for the wiring inside the switching cabinet.

Information:

The switching 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 (protected against lubricating and hydraulic oils according to EN 60811 section 2-1) and cooling lubricant.

The connection housing is used to connect the switching cabinet cable to the switching cabinet door (see image 31 "Drilling template - Receptacle" on page 82). The other end of the switching 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.

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.**

Features	5CAMPC.0020-10
Length and tolerance	2 m ±5 cm
Connector Industrial socket	Receptacle for push-pull locking connection

Cables
    Total diameter
    Weight per meter
    Sheathing material
    Minimum flex radius
    Supply lines
        Permissible operating voltage
        Item
        Conductor resistance
    Max. tension stress
    Color
	Hybrid cable, 25 wire
	10 mm
	153 g
	Silicon and halogen free, flame retardant PUR outer sheathing
	60 mm
	
	30 VDC
	Tinned copper wires
	$\leq$ 30 Ω/km
	140 N
	Similar to RAL 7012

Cable elements
    Network
    Enable switch
 	
    2 x CAN bus
    Entry devices
    Power supply
    Serial connection (RxD / TxD)
	Twisted pair cable for Ethernet (10/100 Mbit/s) (4-wire)
	Direct connection of the enable switch to the monitoring device (6 wires - 2 wires not used in MP40/50)
	2 pairs with shielding (5 wires not used in MP40/50)
	Direct connection between the entry device and the monitoring device (6-wire)
	Supply voltage 24 VDC and ground (3-wire)
	3 wires (not used in MP40/50)

Environment	

Permissible operating temperature
    Non-moving
    Moving
	-20 to +80°C
	-5 to +60°C

Standards	Flame retardant according to IEC 60332-1 and VW1 / FT1 according to C-UL Shield damping according to IEC 60096-1, amendment 2 Mechanical characteristics according to DIN VDE 0472 section 603 test type H (100,000 cycles) Oil resistant, hydrolysis resistant according to DIN VDE 0282 section 10
Protection type	IP65 (connected or with attached cover 5CAMPP.0001-10.

Table 20: Technical data - Switching cabinet cable 5CAMPC.0020-10

Cable specifications
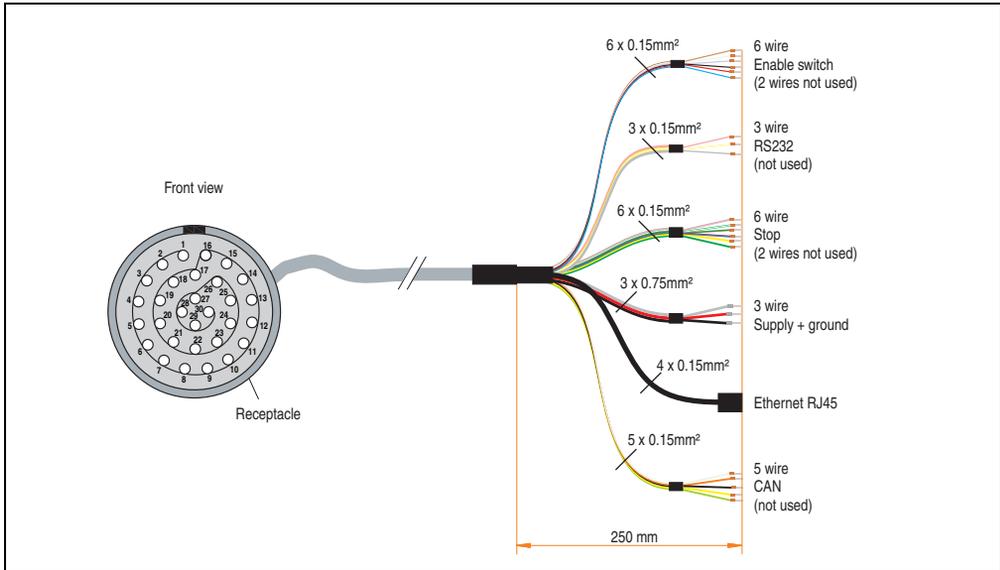
Figure 30: Cable layout - switching cabinet cable 5CAMPC.0020-10

Pin assignments - Receptacle	Wire color - Switching cabinet cable	Enable switch wires	
4	Brown	C1	
5	White	NO1	
6	Purple	NC1	Not used
9	Black	C2	
8	Red	NO2	
7	Blue	NC2	Not used
Pin assignments - Receptacle	**Wire color - Switching cabinet cable**	**RS232 wires**	
21	Pink	RxD	
22	White-Yellow	GND	Not used
23	Gray	TxD	
Pin assignments - Receptacle	**Wire color - Switching cabinet cable**	**Entry 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)	

Pin assignments - Receptacle	Wire color - Switching cabinet cable	Supply wires	
3	Red	+ 24 VDC supply	
14	Black	Ground	
17	Gray	Shielding	
Pin assignments - Receptacle	**Wire color - Switching 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	
Pin assignments - Receptacle	**Wire color - Switching cabinet cable**	**CAN wires**	
10	White	CAN 1 High	Not used
11	Orange	CAN 1 Low	
12	Yellow	CAN 2 High	
13	Green	CAN 2 Low	
CAN shield	Black	Shielding	

Information:

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

Drilling template for the receptacle

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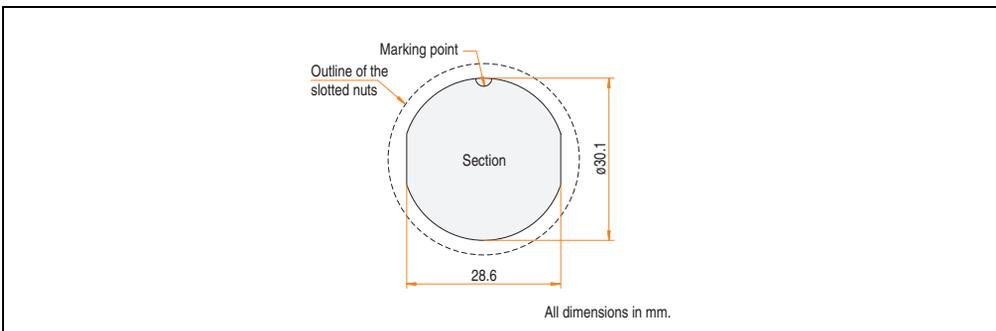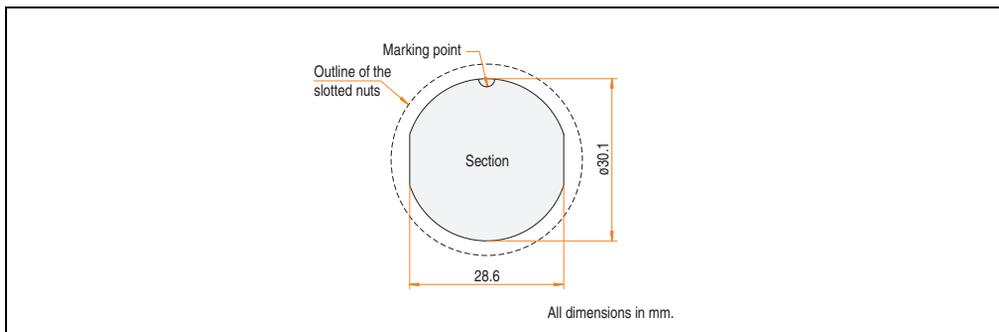

Figure 31: Drilling template - Receptacle

3.2.3 Switching cabinet cable straight thru 5CACMPC.0020-11

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.
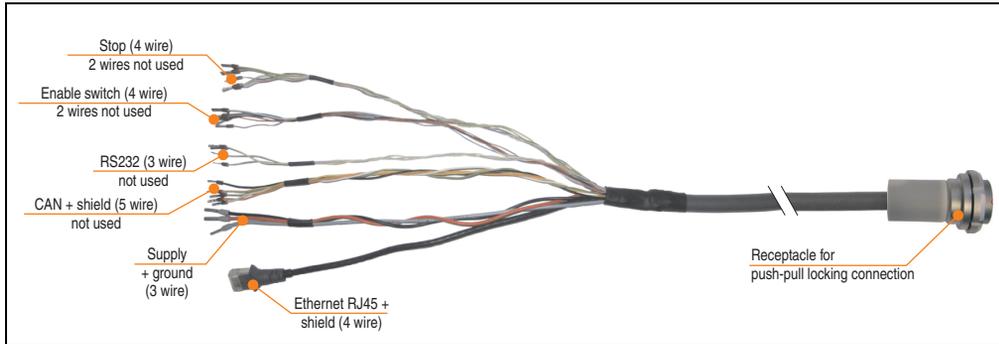
Figure 32: Mobile Panel switching cabinet cable 5CAMPC.0020-11

The switching cabinet cable is required for the wiring inside the switching cabinet.

Information:

The switching 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 according to EN 60811 section 2-1) and cooling lubricant.

The connection housing is used to connect the switching cabinet cable to the switching cabinet door (see image 34 "Drilling template - Receptacle" on page 86). The other end of the switching 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.

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.**

Features	5CAMPC.0020-11
Length and tolerance	2 m ±5 cm
Connector Industrial socket	 Receptacle for push-pull locking connection

Cables
   Total diameter
   Weight per meter
   Sheathing material
   Minimum flex radius
   Supply lines
      Permissible operating voltage
      Item
      Conductor resistance
   Max. tension stress
   Color
	Hybrid cable, 25 wire
	10 mm
	153 g
	Silicon and halogen free, flame retardant PUR outer sheathing
	60 mm
	
	30 VDC
	Tinned copper wires
	$\leq 30\ \Omega/\text{km}$
	140 N
	Similar to RAL 7012

Cable elements
   Network
   Enable switch
 	
   2 x CAN bus
   Entry devices
   Power supply
   Serial connection (RxD / TxD)
	
	Twisted pair cable for Ethernet (10/100 Mbit/s) (4-wire)
	Direct connection of the enable switch to the monitoring device (6 wires - 2 wires not used in MP40/50)
	2 pairs with shielding (5 wires not used in MP40/50)
	Direct connection between the entry device and the monitoring device (6-wire)
	Supply voltage 24 VDC and ground (3-wire)
	3 wires (not used in MP40/50)

Environment	

Permissible operating temperature
   Non-moving
   Moving
	
	-20 to +80°C
	-5 to +60°C

Standards	Flame retardant according to IEC 60332-1 and VW1 / FT1 according to C-UL Shield damping according to IEC 60096-1, amendment 2 Mechanical characteristics according to DIN VDE 0472 section 603 test type H (100,000 cycles) Oil resistant, hydrolysis resistant according to DIN VDE 0282 section 10

Table 21: Technical data - Switching cabinet cable 5CAMPC.0020-11

Cable specifications
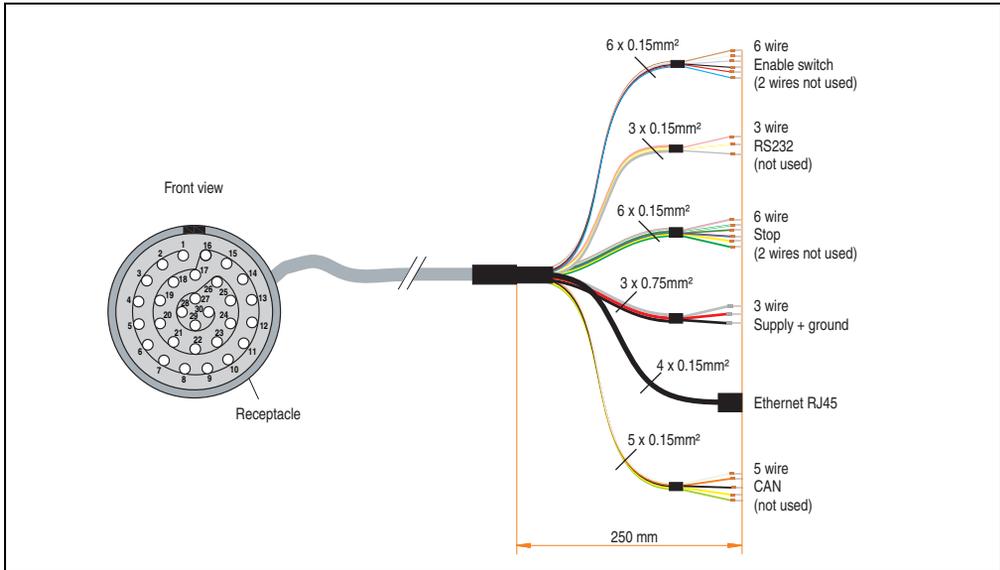
Figure 33: Cable layout - switching cabinet cable 5CAMPC.0020-11

Assignments in connection housing	Wire color - Switching cabinet cable	Enable switch wires	
4	Brown	C1	
5	White	NO1	
6	Purple	NC1	Not used
9	Black	C2	
8	Red	NO2	
7	Blue	NC2	Not used
Assignments in connection housing	**Wire color - Switching cabinet cable**	**RS232 wires**	
21	Pink	RxD	
22	White-Yellow	GND	Not used
23	Gray	TxD	
Assignments in connection housing	**Wire color - Switching cabinet cable**	**Entry 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)	

Assignments in connection housing	Wire color - Switching cabinet cable	Supply wires	
3	Red	+ 24 VDC supply	
14	Black	Ground	
17	Gray	Shielding	
Assignments in connection housing	**Wire color - Switching 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 color - Switching cabinet cable**	**CAN wires**	
10	White	CAN 1 High	
11	Orange	CAN 1 Low	
12	Yellow	CAN 2 High	Not used
13	Green	CAN 2 Low	
CAN shield	Black	Shielding	

Information:

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

Drilling template - Receptacle

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

Figure 34: Drilling template - Receptacle

4. Wall mount

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.

Figure 35: Wall mount 4MPBRA.0000-01

Drilling holes for attaching the wall mount must be made in accordance with the diagram "Dimensions - Wall mount 4MPBRA.0000-01" on page 88.

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 switching cabinet cable must still be completely connected so that the stop button can be activated.

4.1 Dimensions

All values in mm

118

39.6

392.9

201.1

100

56.2

31.4

100

226

J

K

6

6

Detail: J

6

6

Detail: K
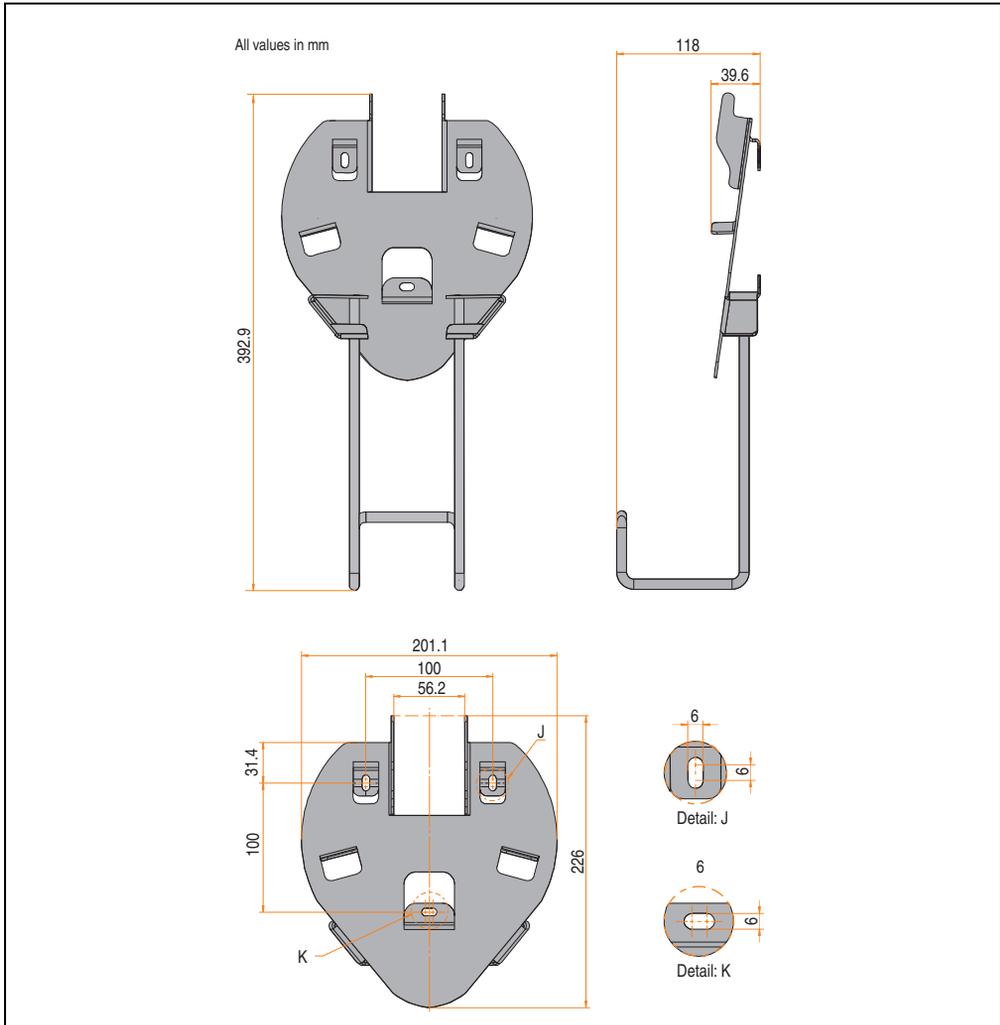
Figure 36: Dimensions - Wall mount 4MPBRA.0000-01

4.2 Storing the Mobile Panel device

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

View from front	Side view

Table 22: Storing a Mobile Panel device on a wall mount

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 hand-held 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 chapter "CE conformity, standards and directives" and must be noted.**

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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 according to 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 chapter "CE conformity, standards and directives" 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 switching 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 pen (see "Touch screen pen" on page 35). 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.

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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 153.**

3. Connection

The Mobile Panel is connected using the Mobile Panel attachment cable (see section "Operating unit 5MP050.0653-02" on page 67).

3.1 Attachment shaft

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

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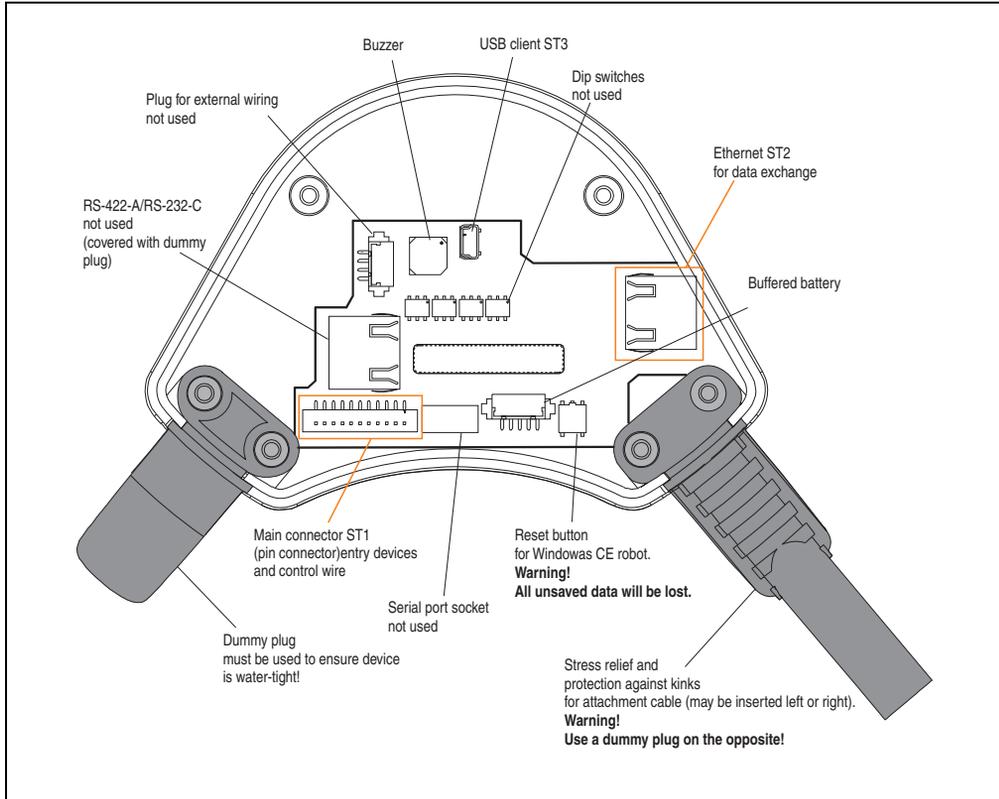
Figure 37: Attachment shaft

3.1.1 Cable extension in the attachment shaft

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

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

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:
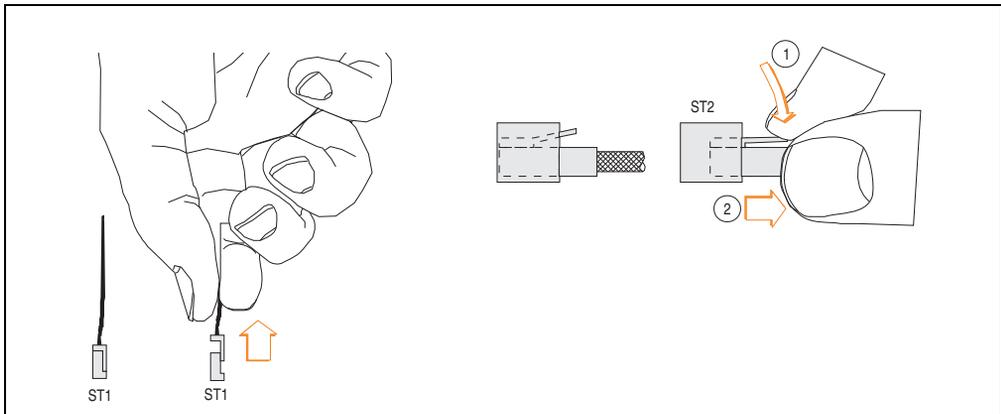
Figure 38: Removing ST1 and ST2

- Make sure that the lock clicks on the connector

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 to 0.5 Nm). Only then can the corresponding protection type be guaranteed.

3.1.2 Cable outlet

Figure 39: Cable outlet

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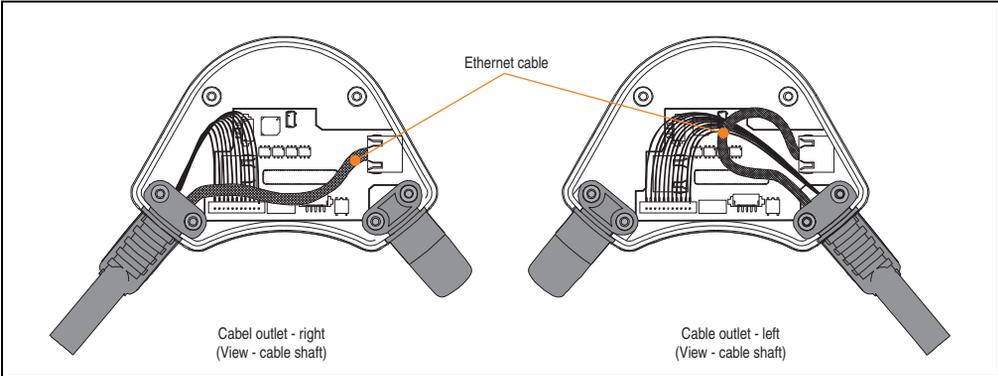
4. Recommended monitoring devices

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 40: 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.
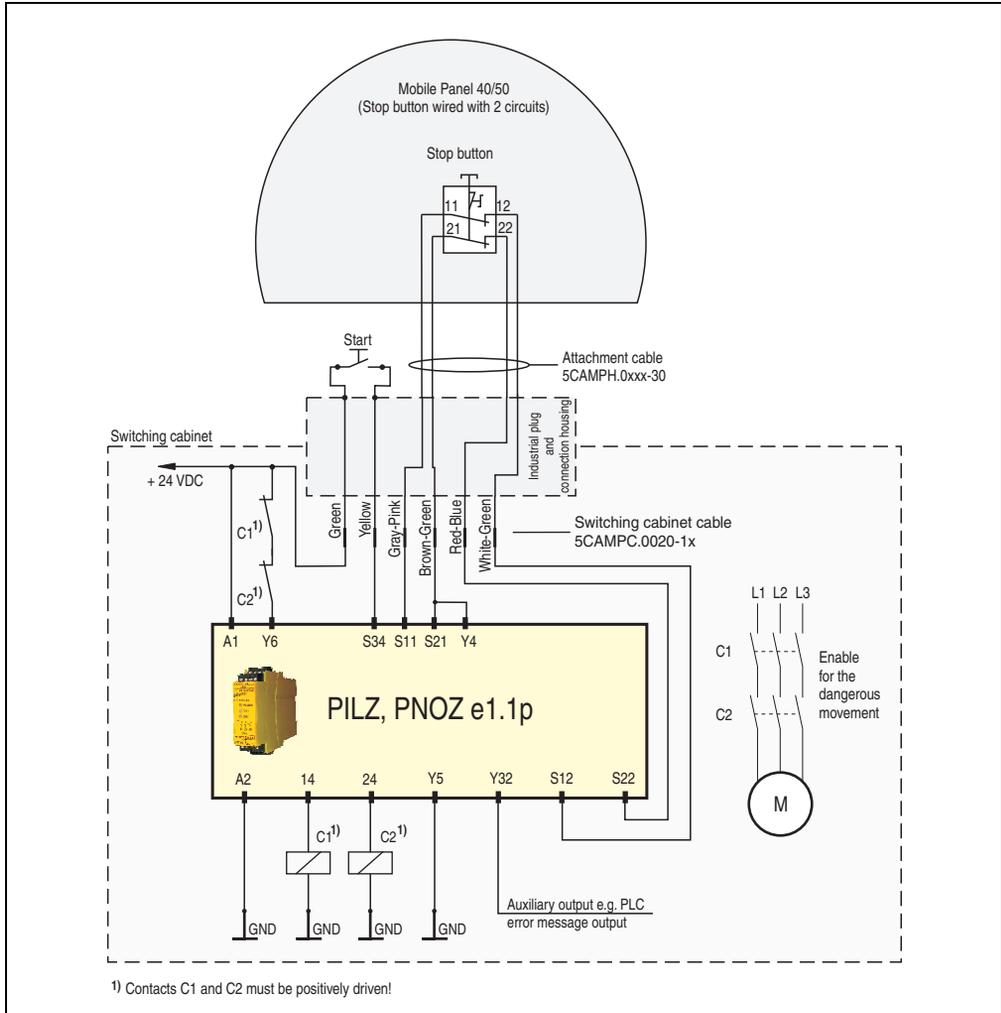
Figure 41: Connection example for stop button

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.
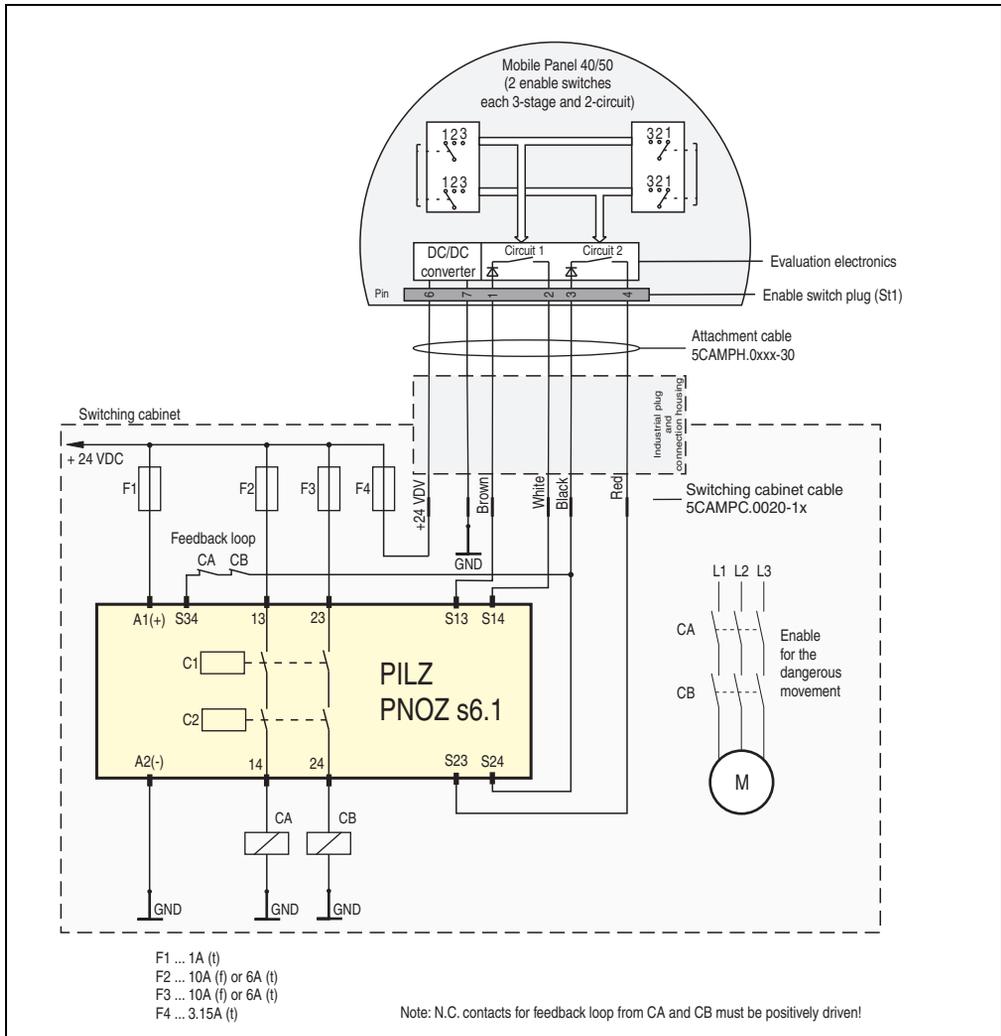
Figure 42: Connection example - Enable switch

4.3 Connecting a MobilePanel 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.

4.3.1 Differences between MobilePanel 100/200 and MobilePanel 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)
Enable switch
Supply + grounding
 	
Interfaces:
Ethernet
RS232
CAN
	Connections:
	Entry devices
	  (Stop button)
	Enable switch
	Supply + grounding
	All other entry devices (joystick, handwheel, override potentiometer, ect.) 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 23: Differences MP100/200 - MP40/50

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5. USB interface

The front-side USB interface (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 interface.

1) Open protective cap.

Figure 43: USB interface - open protective cap

2) Insert USB flash drive until it clicks.

Figure 44: USB interface - insert flash drive

Information:

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

6. Key and LED configuration

Each key or LED can be configured individually and adjusted to suit the application. Two different 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 position of the keys and LEDs in the matrix is shown as hardware numbers. The hardware numbers can be read directly on the target system, for example with the B&R Key Editor and the B&R Control Center.
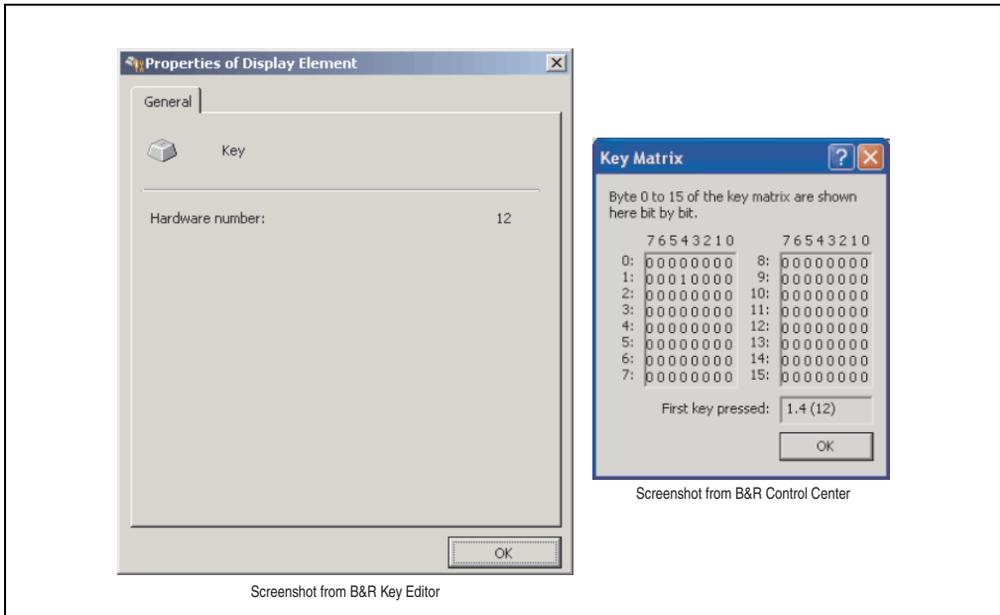
Figure 45: Example - Hardware number in the B&R Key Editor or in the B&R Control Center

The following graphics show the positions of the keys and LEDs in the matrix. They are shown as follows:
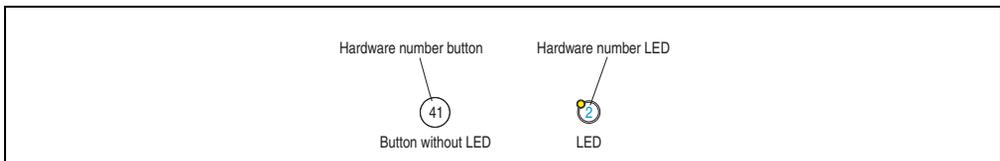
Figure 46: Display - Keys and LEDs in the matrix

6.1 Mobile Panel 40, 200

6.1.1 Mobile Panel 5MP040.0381-01
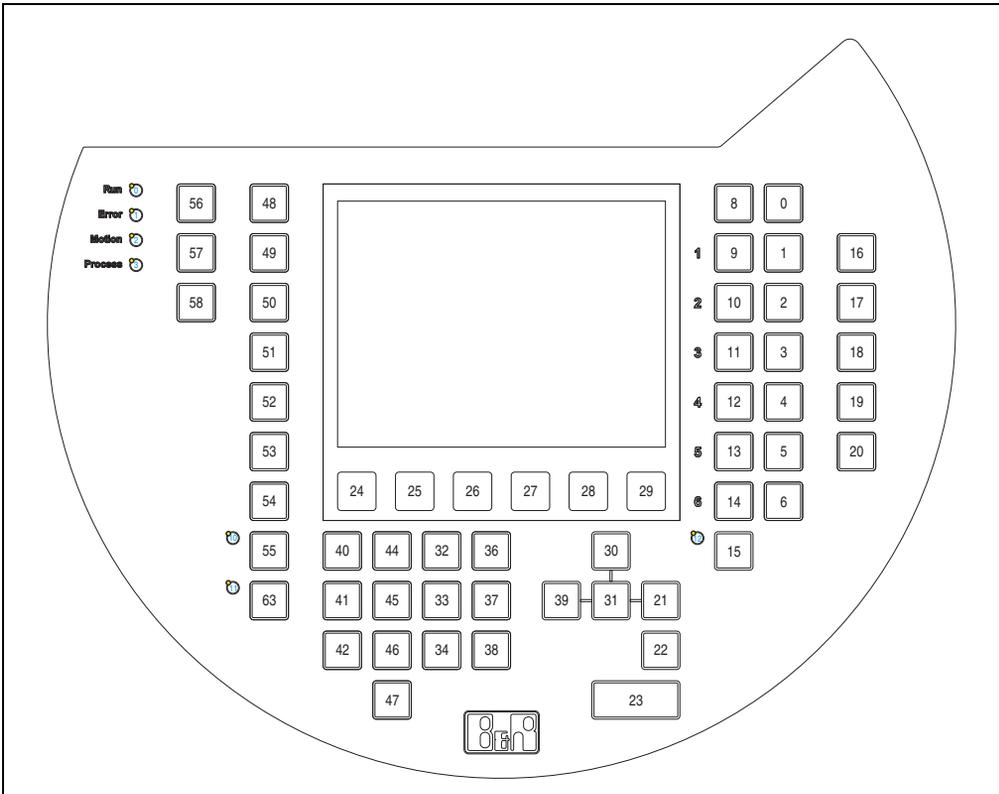
Figure 47: Hardware numbers - 5MP040.0381-01

6.1.2 Mobile Panel - 5MP040.0381-02
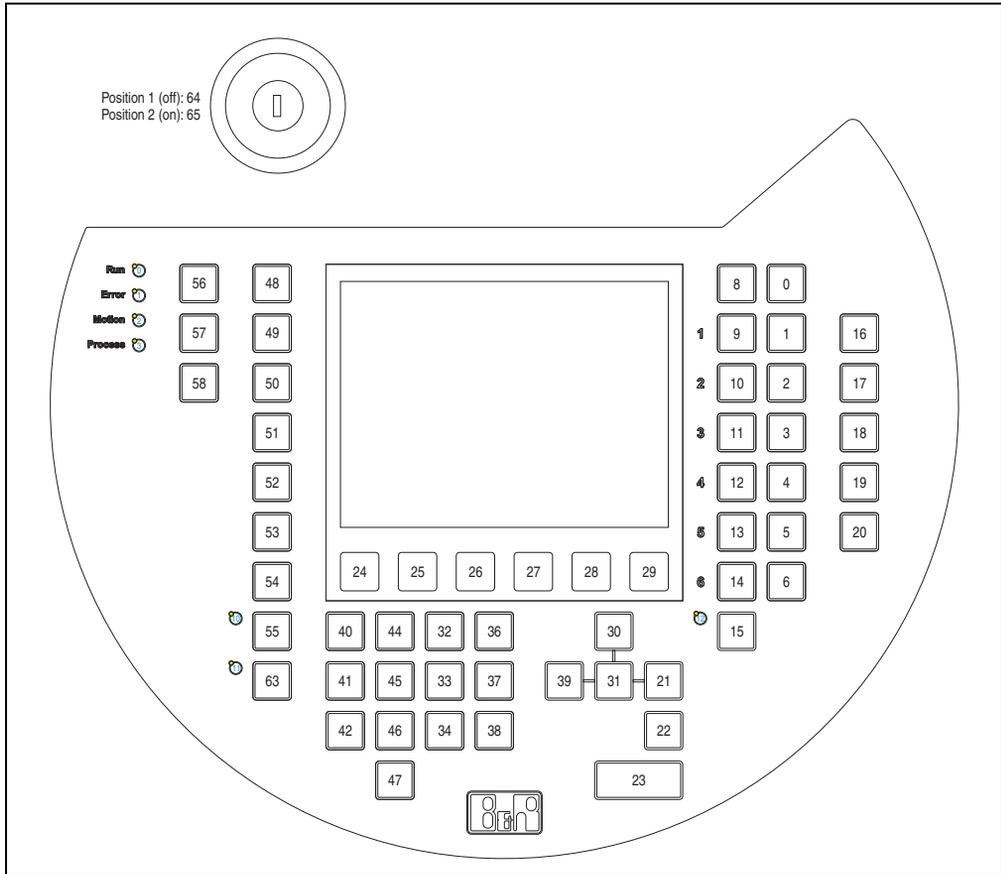
Figure 48: Hardware numbers - 5MP040.0381-02

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6.2 Mobile Panel 50, 200

6.2.1 Mobile Panel - 5MP050.0653-01
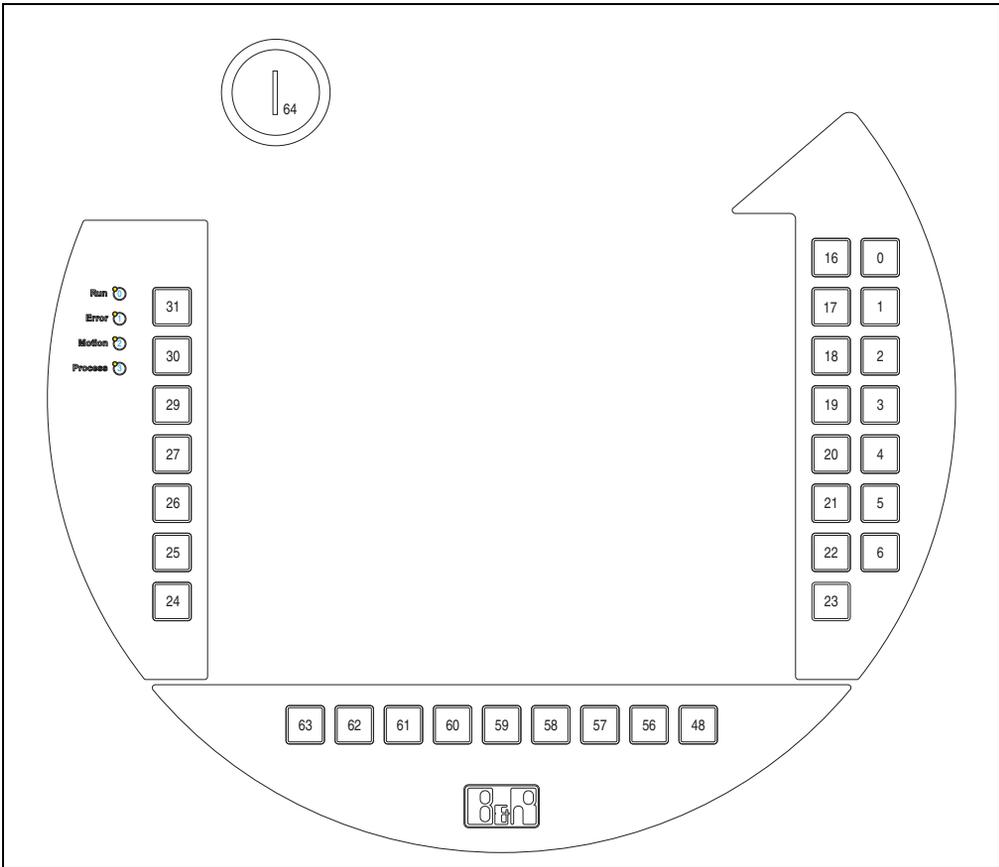
Figure 49: Hardware numbers - 5MP050.0653-01

6.2.2 Mobile Panel - 5MP050.0653-02
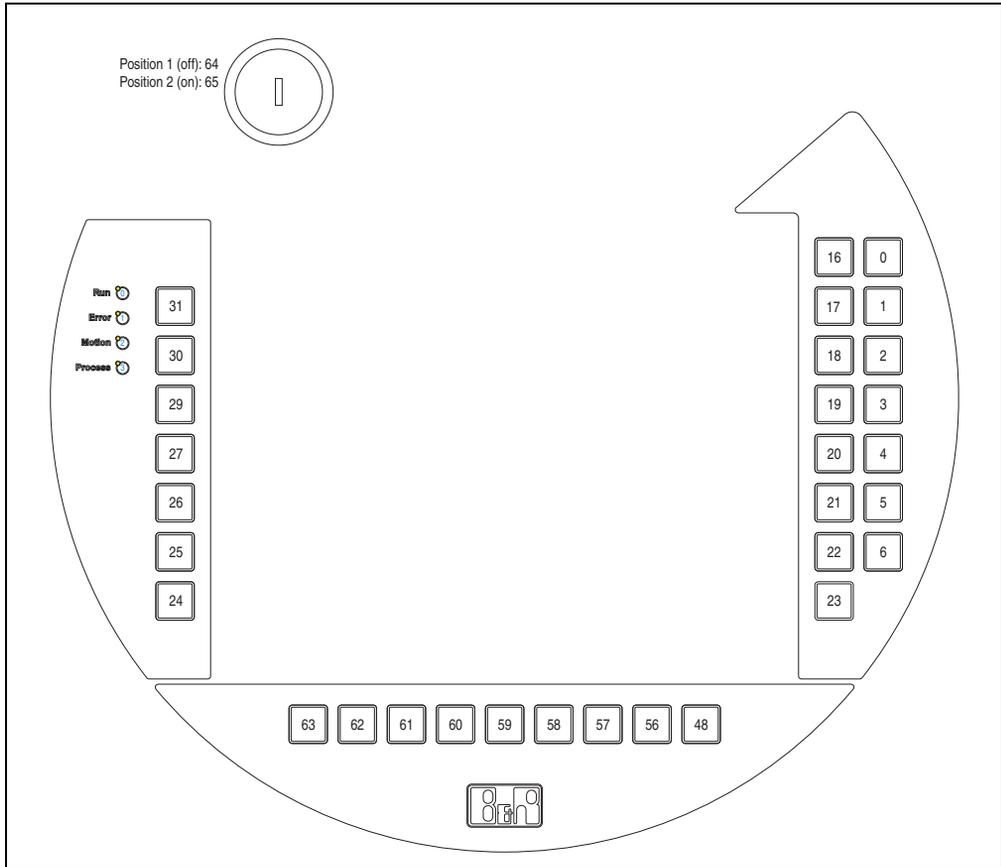
Figure 50: Hardware numbers - 5MP050.0653-02

6.2.3 Mobile Panel - 5MP050.0653-03
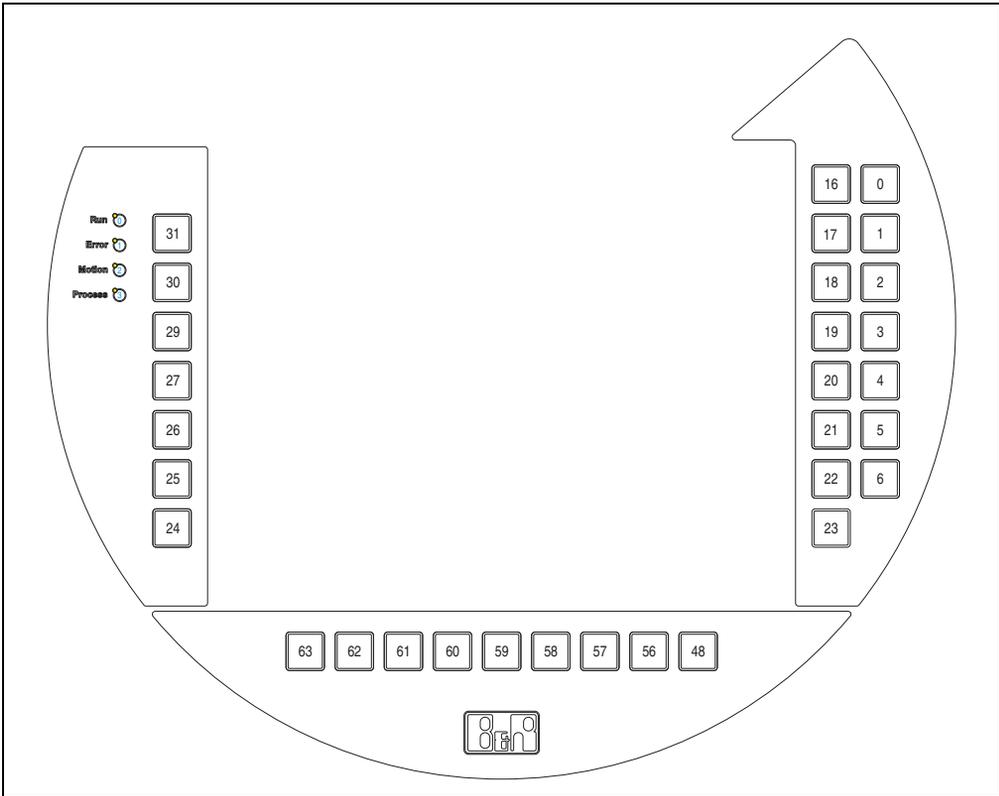
Figure 51: Hardware numbers - 5MP050.0653-03

6.2.4 Mobile Panel - 5MP050.0653-04
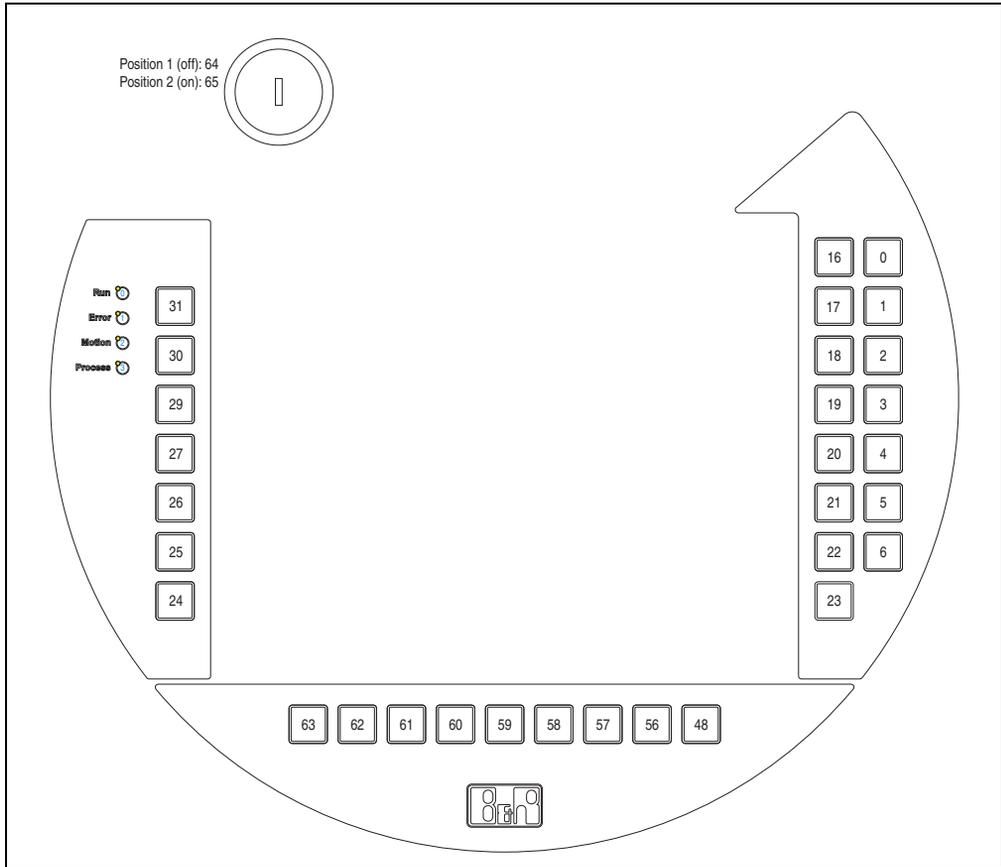
Figure 52: Hardware numbers - 5MP050.0653-04

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7. Touch screen calibration

B&R touch screen devices are equipped with a touch controller, which supports hardware calibration. This means that the devices are pre-calibrated from stock (pre-calibration). This feature proves advantageous in the case of a replacement part because a new calibration is no longer required when exchanging devices (identical model / type). Nevertheless, we recommend calibrating the device in order to achieve the best results and to better readjust the touch screen to the user's preferences.

Regardless of this, the touch screen driver requires calibration following installation.

7.1 Windows CE

Windows CE starts the touch screen calibration sequence during its first boot in the default configuration / delivered state.

The touch screen can also be configured via **Start > Settings > Control Panel > Touch Screen**.

8. 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**.

9. 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 also section "B&R Key Editor information" on page 167.

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)).
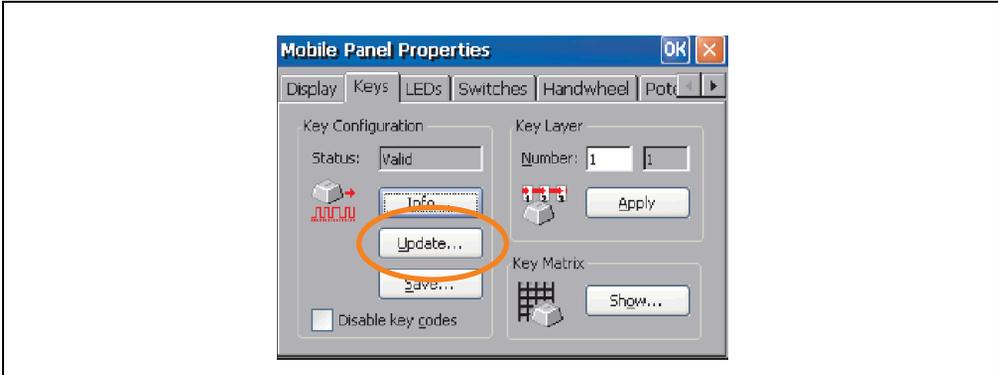
Figure 53: Key configuration update

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10. User tips for increasing the display lifespan

10.1 Backlight

The lifespan of the backlight is specified in "Half Brightness Time". An operating time of 50,000 hours would mean that the display brightness would still be 50% after this time.

10.1.1 How can the lifespan of backlights be extended?

- Set the display brightness to the lowest value that is still comfortable for the eyes
- Use dark images
- Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.

10.2 Image sticking

Image sticking is the "burning in" of a static image on a display after being displayed

for a prolonged period of time. However, this does not only occur with static images. Image sticking is known in technical literature as the "burn-in effect", "image retention", "memory effect", "memory sticking" or "ghost image".

There are 2 types of this:

- Area type: This is seen with a dark gray image. The effect disappears if the display is switched off for a longer period of time.
- Line type: This can cause lasting damage.

10.2.1 What causes image sticking?

- Static images
- Screensaver not enabled
- Sharp contrast transitions (e.g. black / white)
- High ambient temperatures
- Operation outside of the specifications

10.2.2 How can image sticking be avoided?

- continual change between static and dynamic images
- avoiding excessive brightness contrast between foreground and background display
- use of colors with similar brightness
- use of complementary colors in subsequent images
- use of screensavers

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Chapter 4 • Software

1. Windows CE

Figure 54: Windows CE logo

Model number	Short description	Note
5SWWCE.0524-ENG	**WinCE5.0 Pro MP40 PXA270** Microsoft OEM Windows CE 5.0 Professional, English, including license; for MP40 BIOS devices 5MP040.0381-01, 5MP040.0381-02.	
5SWWCE.0525-ENG	**WinCE5.0 Pro MP50 PXA270** Microsoft OEM Windows CE 5.0 Professional, English, including license for MP50 BIOS devices 5MP050.0653-01, 5MP050.0653-02, 5MP050.0653-03, 5MP050.0653-04.	
5SWWCE.0624-ENG	**WinCE5.0 ProPlus MP40 PXA270** Microsoft OEM Windows CE 5.0 Professional Plus, English, including license; for MP40 BIOS devices 5MP040.0381-01, 5MP040.0381-02.	
5SWWCE.0625-ENG	**WinCE5.0 ProPlus MP50 PXA270** Microsoft OEM Windows CE 5.0 Professional, English, including license for MP50 BIOS devices 5MP050.0653-01, 5MP050.0653-02, 5MP050.0653-03, 5MP050.0653-04.	
5SWWCE.0724-ENG	**WinCE5.0 ProProTCAR MP40 PXA270** Microsoft OEM Windows CE 5.0 Professional Plus, English, including license,VNC Viewer; for MP40 BIOS devices 5MP040.0381-01, 5MP040.0381-02.	
5SWWCE.0725-ENG	**WinCE5.0 ProPlusTCAR MP50 PXA270** Microsoft OEM Windows CE 5.0 Professional Plus, English, including license, VNC Viewer; for MP50 BIOS devices 5MP050.0653-01, 5MP050.0653-02, 5MP050.0653-03, 5MP050.0653-04.	

Table 24: Model numbers - Windows CE

Chapter 4
Software

1.1 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.

1.2 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 25: Differences - CE versions (Pro - PropPlus - ProPlusTCAR)

1) The color depth depends on the display being used.

2) Only if Ethernet is not used.

1.3 Installation / Update / Save

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

An update or save of the Windows CE version can take place easily via the B&R Control Center (see page 119).

Access via **Start > Settings > Control Panel > Control Center** select "Update" tab.
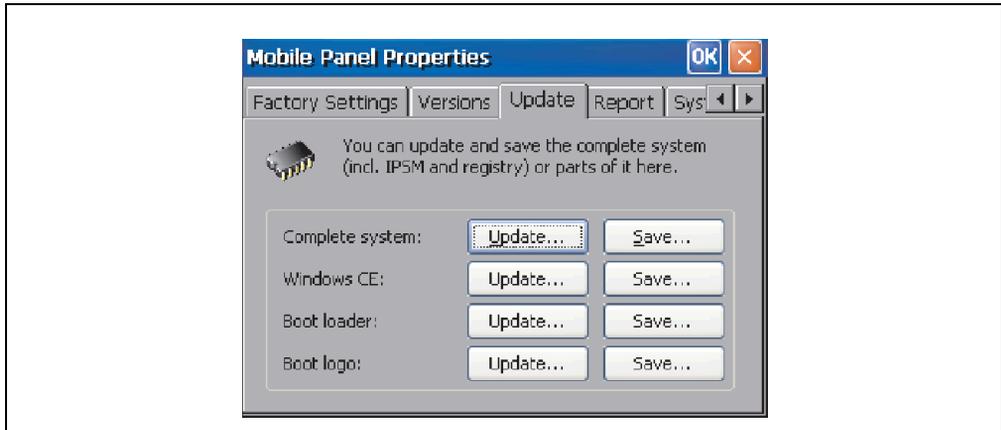
Figure 55: Control Center - Update / Save

1.4 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. The password is always **1234** when delivered.
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. Automation Device Interface (ADI) driver - B&R Control Center

The ADI (Automation Device Interface) driver enables access to specific functions of MP40/50 devices. The settings of these devices can be read and changed by the B&R Control Center applet (found under **Start > Settings > Control Panel > Control Center**). Control Center is already contained in every B&R Windows CE image and must not be separately installed.
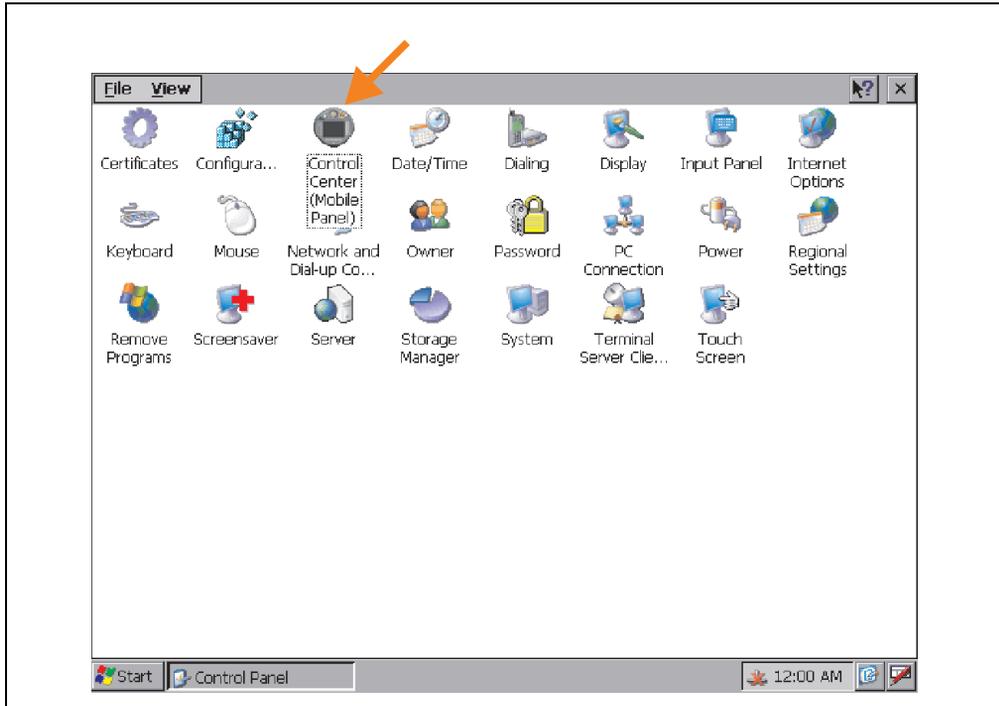
Figure 56: ADI Control Center icon in Control Panel

2.1 Control Center functions
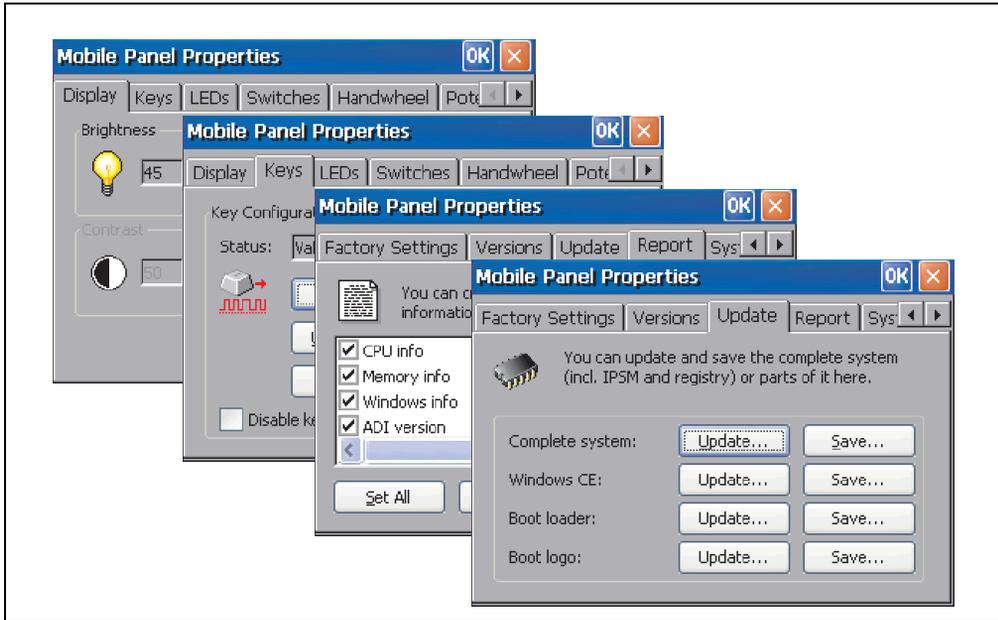
Figure 57: Control Center tabs - Examples

- Change display brightness / contrast
- Read/update the key configuration (can be set up with the B&R key editor)
- LED activation
- Read or calibrate the entry devices (key switch, handwheel, joystick, potentiometer)
- Read the operating hours / power on hours
- Read user settings and factory settings
- Read Software versions (Windows CE B&R image)
- Update or save the the software versions (systems, Windows CE, boot loader and boot logo)
- Create reports about the current system (support assistance)

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 directives

Table 26: 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 27: 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 28: Examining the conformity to EMC directives

Conformity is also given with the following standards:

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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 29: 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 30: 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 31: 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 32: 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: Indicators
EN 894-3:2000	Machine safety - ergonomic requirements for designing displays and controls - Part 3: Controls

Table 33: 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 34: 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 35: 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 36: 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 37: UL testing of industrial control equipment

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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. They are international standards from organizations such as ISO, IEC and CENELEC, as well as national standards from organizations such as UL, CSA, FCC, VDE, ÖVE, etc. We give special consideration to the reliability of our products in an industrial environment.

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

Table 38: International certifications

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4. Standards and definitions for safety technology

4.1 Stop functions according to EN 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, 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 39: Overview of stop function categories

The necessary stop functions must be determined based on a risk evaluation for 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 according to EN 60204-1:2006 (Electrical equipment for machines, Part 1: General requirements)

The following requirements are valid for emergency stops in addition to the requirements for the 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 evaluation for the machine.

For emergency stop functions in stop category 0, only hard wired, electromechanical equipment can be used. Additionally, the function 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]

---

1) In accordance to the national foreword for the valid German version of IEC 60204-1:2006, it is determined that electronic equipment (and especially emergency stop systems) can 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.

When using a category 1 stop function for the 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[1] .

4.3 Safety category according to EN ISO 13849-1:2008 (safety of machines - safety related parts of control systems, Part 1: General design principles)

Safety function (according to 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 safety function to fail.**
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.**
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 detected.** **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 40: Safety category overview

The following risk graph (according to EN 13849-1:2008, Appendix A) provides a simplified procedure for risk evaluation:

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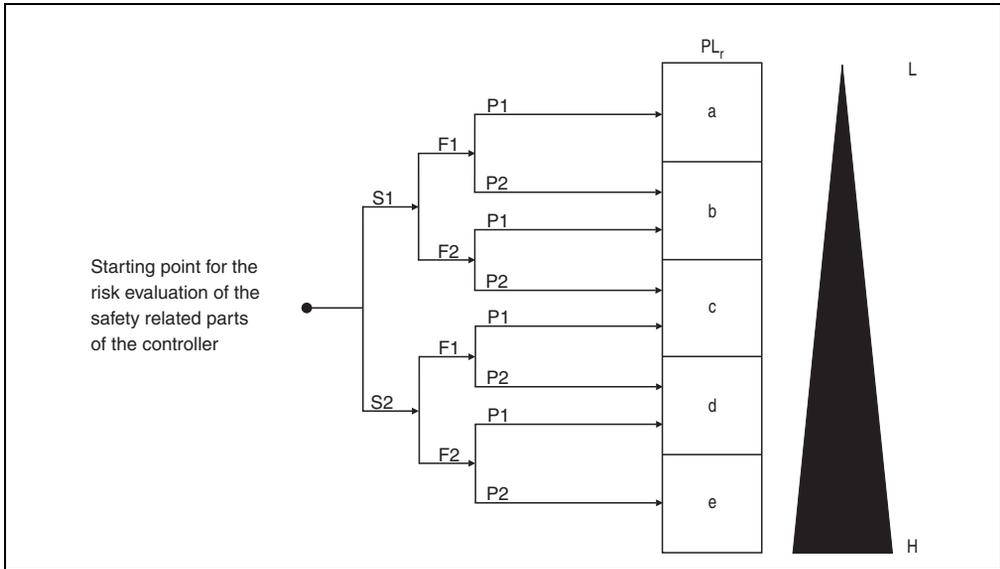
Figure 58: Risk diagram to determine the PL$_r$ for every safety function

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 danger exposure	
F1	Seldom-to-less-often and/or exposure time is short.
F2	Frequent-to-continuous and/or exposure time is long.
Parameter P ... possibility to circumvent the danger or limit the damage	
P1	Possible under some conditions.
P2	Nearly impossible.
Miscellaneous	
L	Low impact on risk reduction.
H	High impact on risk reduction.
PL$_r$	Required performance level.

Table 41: Legend for risk graph

4.4 Safety category according to EN 954-1:1996 (safety of machines - safety related parts of control systems, part 1: general design principles) [1]

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 (according to EN 954-1)	Short description	System behavior
B	Safety related parts 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 safety function to fail.
1	Safety related parts must be designed and built so that only reliable components and safety principles are used. (e.g. prevention of short circuits by using sufficient distances, reducing the probability of errors caused by using oversized components, defining the failure route - bias current fail-safe, etc.)	**Caution!** An error can cause the safety function to fail.
2	Safety related parts must be designed so that their safety functions are checked in suitable intervals by the machine controller. (e.g. automatic or manual check during start-up)	**Caution!** An error between checks can cause the safety function to fail. If the safety function fails, it will be recognized during the check.
3	Safety related parts must be designed so that individual errors do not cause the safety function to fail. Individual errors should - if possible - be recognized the next time (or before) the safety function is required.	**Caution!** The safety function remains active when an error occurs. Some, but not all errors are recognized. A buildup of errors can cause the safety function to fail.
4	Safety related parts must be designed so that individual errors do not cause the safety function to fail. 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 function to fail.	**Information:** The safety function remains active when an error occurs. Errors are recognized in time to prevent the safety function from failing.

Table 42: 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 according to 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.**

1) To prevent confusing EN 954-1 categories with IEC 60204-1 stop categories, the term "safety categories" was used in the text shown above for EN 954-1 categories.

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

The following risk graph (according to EN 954-1, Appendix B) provides a simplified procedure for risk evaluation:
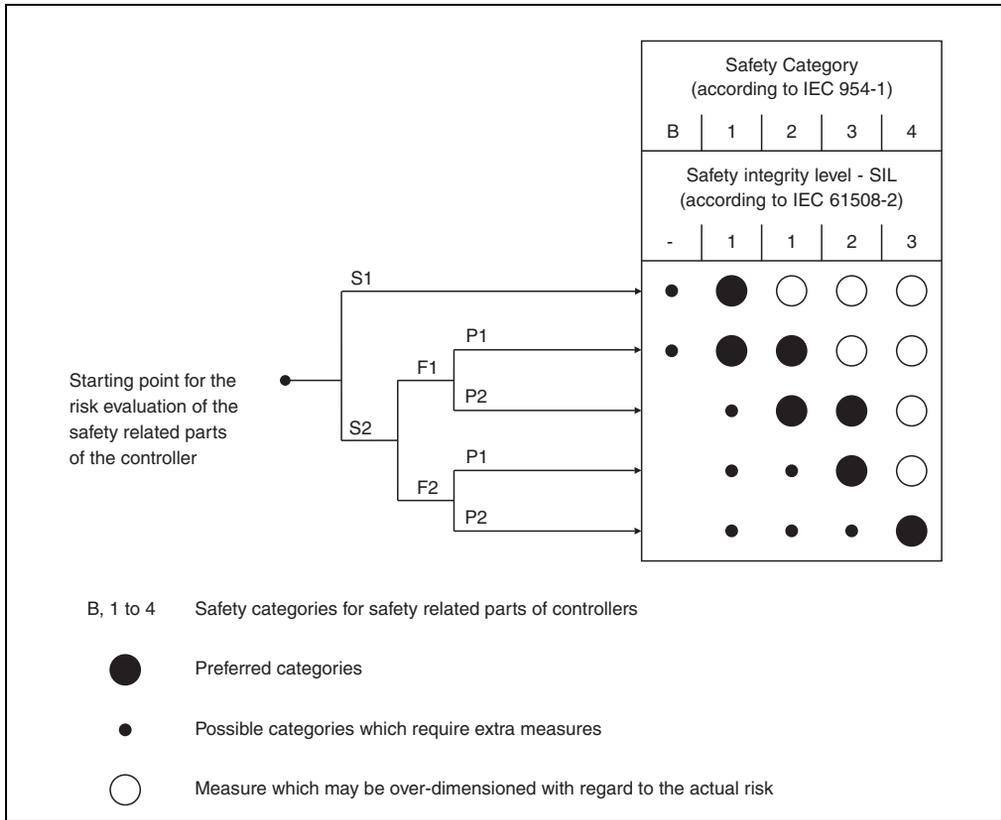
Figure 59: Risk graph according to EN 954-1, Appendix B

Begin at the starting point shown and follow the parameters S, F and P to the safety category to be used.

Parameter S ... Severity of injury	
S1	Light (usually reversible) injury.
S2	Serious (usually irreversible) injury.
Parameter F ... Frequency and/or duration of the danger exposure	
F1	Seldom to slightly more frequent and/or short exposure duration.
F2	Frequent to continuous and/or long exposure duration.

Table 43: Parameters S, F and P lead you to the safety category to be used

Parameter S ... Severity of injury	
Parameter P ... Possibility to prevent danger	
P1	Possible under some conditions.
P2	Nearly impossible.

Table 43: Parameters S, F and P lead you to the safety category to be used (cont.)

4.5 Selecting Performance Level and Category according to 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-circuits 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.

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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 according to EN 1037:1995 (Safety of machinery - prevention of unexpected start-up)

Keeping a machine in an idle state when people are working in the danger zone is one of the most important requirements for safe operation of machines.

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

- A start command sent because of a controller failure or because of external influences on the controller.
- A start 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 starting of machines or parts of machines, power should be removed and dissipated. If this is not practical (e. g. frequent, short work in danger zone), other measures must be taken:

- Measures to prevent random start commands.
- Measures to prevent that random start commands cause unexpected starting.
- Measures to automatically stop dangerous parts of the machine before a dangerous situation can be caused by unexpected starting.

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 handheld operating devices, 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 the section 1 "Stop button" on page 157 and section 2 "Enable switch" on page 158.

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.

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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 und 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 44: (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	$\geq 10^{-5}$ to $< 10^{-4}$
b	$\geq 3 \times 10^{-6}$ to $< 10^{-5}$
c	$\geq 10^{-6}$ to $< 3 \times 10^{-6}$
d	$\geq 10^{-7}$ to $< 10^{-6}$
e	$\geq 10^{-8}$ to $< 10^{-7}$

Table 45: (EN ISO 13849-1:2006, table 3) - Performance Level (PL)

5.4 Abbreviations

Abbreviation	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 46: Abbreviations

6. Conformity and type examination certificate

6.1 EC declaration of conformity

Figure 60: EC declaration of conformity

6.2 EC type examination certificate

SWISS CERTIFICATION

S
CE
S
SCESp 046

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

Certifying Body
SIBE Schweiz

Accredited Certification Body SIBE Schweiz in accordance with EN 45011
Designated European Conformity Assessment Body (Notified Body), EC-Identification No: 1247

Type-Examination Certificate No.   1088 / 1

Product	Command Device Handheld Terminal with 3-Position Enabling Switch
Brand	B&R
Type	5MP050.0653-* 5MP040.0381-* *a is an alphanumeric placeholder depending on the design
Safety specifications	EN ISO 13849-1:2008 Categorie 3 PL d The safety functions of this special operating mode control are only been given, if the remarks in the user manual are followed. The 3-position enabling switch and the stop button meets the request according to EN 60204-1.
Manufacturer's address	Bernecker + Rainer Industrie Elektronik Ges.m.b.H B&R Strasse 1 A-5142 Eggelsberg
Applicant's address	Bernecker + Rainer Industrie Elektronik Ges.m.b.H B&R Strasse 1 A-5142 Eggelsberg
Valid until	29 December 2014

The examined type complies with the relevant provisions of the Directive 2006/42/EC of 17 may 2006 on machinery.

The validity of this certificate is based as well on all attachments named herein and the general provisions outlined on the reverse side.

Date of issue

21 December 2009

Valid from

29 December 2009

Certification Body

NSBIV AG
Certification Body SIBE Schweiz
P.O. Box 3518
CH-6002 Lucerne, Switzerland

Safety Engineer

M. Luzzatto (signature)

M. Luzzatto

Head of Certification Body

P. Keller (signature)

P. Keller

Figure 61: EC type examination certificate

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Chapter 6 • Accessories

1. Overview

Model number	Product ID	Note
5MMUSB.0256-00	**USB flash drive 256 MB SanDisk** USB 2.0 flash drive 256 MB	Cancelled since 03/2007 Replaced by 5MMUSB.2048-00
5MMUSB.0512-00	**USB flash drive 512 MB SanDisk** USB 2.0 flash drive 512 MB	Cancelled since 07/2007 Replaced by 5MMUSB.2048-00
5MMUSB.1024-00	**USB flash drive 1 GB SanDisk** USB 2.0 flash drive 1 GB	Cancelled since 03/2007 Replaced by 5MMUSB.2048-00
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	
5CAMPP.0000-10	**Protective cap for circular plug (attachment cable)** Protective caps for MobilePanel connection cable with circular plug.	
5CAMPP.0001-10	**Switching cabinet cable protective cap** Protective cap for MobilePanel switching cabinet cable with circular plug and MobilePanel connection box.	
4MPCBX.0000-00	**MP connection box** Connection box for adapting the connection points for Mobile Panel devices.	
4MPCBX.0001-00	**MP connection box, small** Connection box for connecting Mobile Panel devices vertically at the connection point.	
5CAMPB.0100-10	**MP box cable, 10m PP** Box cable, 10 meters long; with wire tip sleeves for connection in the switching cabinet; with plug contacts for wiring in the connection box.	
5MPBAT.0000-00	**MP40/50 buffer battery**	
5AC900.1100-00	**Touch screen pen (5x)**	

Table 47: Model numbers - Accessories

2. USB flash drive

Information:

We reserve the right to supply alternative products due to the vast quantity of flash drives available on the market and their corresponding short product lifecycle.

2.1 General information

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

2.2 Order data

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

Table 48: Order data - USB flash drives

2.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.

Features	5MMUSB.0256-00	5MMUSB.0512-00	5MMUSB.1024-00	5MMUSB.2048-00
LED Cruzer Mini / Cruzer Micro	1 LED (green), signals data transfer (send and receive)			

Power supply
    Current requirements Cruzer Mini / Cruzer
    Micro
	Via the USB port
	650 µA sleep mode, 150 mA read/write			

Interface Cruzer Mini / Cruzer Micro
 	
    Type
    Transfer rate
    Sequential reading
    Sequential writing
    Connection
	USB specification 2.0 high speed device, mass storage class, USB-IF and WHQL certified
	USB 1.1 and 2.0 compatible
	Up to 480 MBit (high speed)
	Max. 8.7 MB/second
	Max. 1.7 MB/second
	To each USB type A interface			

MTBF (at 25°C) Cruzer Mini / Cruzer Micro	100,000 hours			
Data retention Cruzer Mini / Cruzer Micro	10 years			
Maintenance Cruzer Mini / Cruzer Micro	None			

Operating system support
    Cruzer Mini
    Cruzer Micro
	Windows CE 4.1, CE 4.2, 98SE[1] , ME, 2000, XP, Mac OS 9.1.x and Mac OS X 10.1.2
	Windows CE 4.2, CE 5.0, ME, 2000, XP and Mac OS 9.1.x+, OS X v10.1.2+			

Mechanical characteristics				

Dimensions
    Height - Cruzer Mini / Cruzer Micro
    Width - Cruzer Mini / Cruzer Micro
    Depth - Cruzer Mini / Cruzer Micro
	62 mm / 52.2 mm
	19 mm / 19 mm
	11 mm / 7.9 mm			

Environmental characteristics				

Environmental temperature Cruzer Mini / Cruzer
Micro
    Operation
    Bearings
    Transport
	0 to +45°C
	-20 to +60°C
	-20 to +60°C			

Humidity Cruzer Mini / Cruzer Micro
    Operation
    Bearings
    Transport
	10 to 90%, non-condensing
	5 to 90%, non-condensing
	5 to 90%, non-condensing			

Vibration Cruzer Mini / Cruzer Micro
    Operation
    Bearings
    Transport
	At 10 - 500 Hz: 2 g (19.6 m/s^2 0 peak), oscillation rate 1/minute
	At 10 - 500 Hz: 4 g (39.2 m/s^2 0 peak), oscillation rate 1/minute
	At 10 - 500 Hz: 4 g (39.2 m/s^2 0 peak), oscillation rate 1/minute			

Shock Cruzer Mini / Cruzer Micro
    Operation
    Bearings
    Transport
	Max. 40 g (392 m/s^2 0-peak) and 11 ms length
	Max. 80 g (784 m/s^2 0-peak) and 11 ms length
	Max. 80 g (784 m/s^2 0-peak) and 11 ms length			

Altitude - Cruzer Mini / Cruzer Micro[2]
    Operation
    Bearings
    Transport
	3048 meters
	12192 meters
	12192 meters			

Table 49: Technical data - USB flash drive 5MMUSB.xxxx-00

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

2) Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

Chapter 6
Accessories

2.3.1 Temperature humidity diagram - Operation and storage
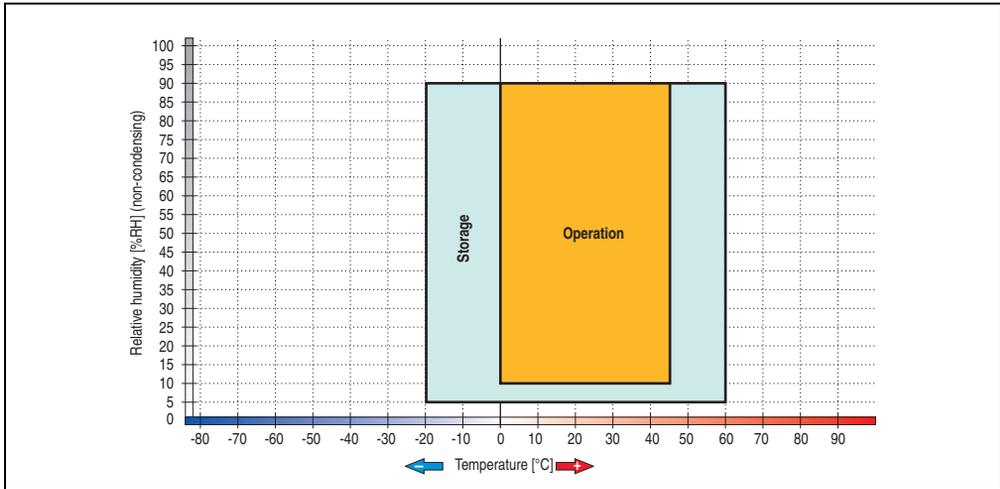
Figure 62: Temperature humidity diagram - USB flash drive - 5MMUSB.xxxx-00

Temperature data is for operation at 500 meters.

3. Protective cap

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

Model number	Description	Use
5CAMPP.0000-10	**Protective cap for circular plug (attachment cable)** Protective caps for MobilePanel connection cable with circular plug.	"Operating unit 5MP050.0653-02" on page 67
5CAMPP.0001-10	**Switching cabinet cable protective cap** Protective cap for MobilePanel switching cabinet cable with circular plug and MobilePanel connection box.	"Switching cabinet cable crossover 5CACMPC.0020-10" on page 79 "Switching cabinet cable straight thru 5CACMPC.0020-11" on page 83

Table 50: Protective cap - Model number

3.1 Attachment cable protective cap 5CAMPP.0000-10

Figure 63: Attachment cable protective cap 5CAMPP.0000-10

Chapter 6
Accessories

3.1.1 Installation

- Feed the circular plug through the loop.
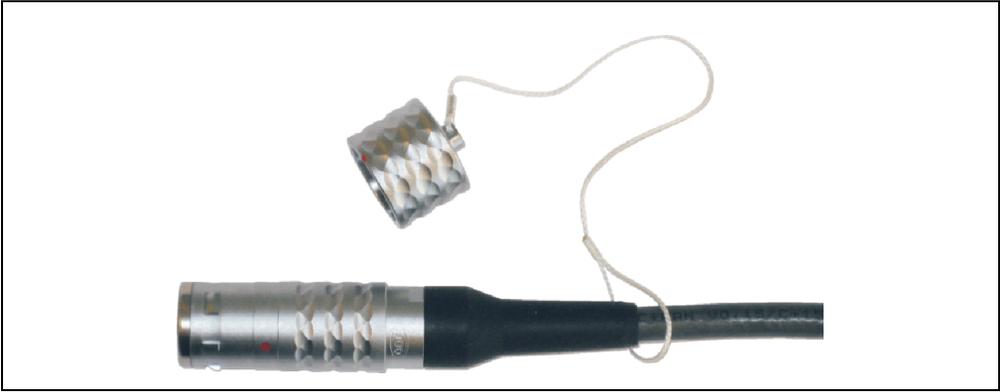
Figure 64: Attaching the protective cap - feed plug through loop

- 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 65: Attaching the protective cap - pull tight

3.2 Switching cabinet cable protective cap 5CAMPP.0001-10

Figure 66: Switching cabinet cable protective cap 5CAMPP.0001-10

3.2.1 Mounting on the switching cabinet cable

Mount the cap near the switching cabinet cable and insert it after removing the cable.
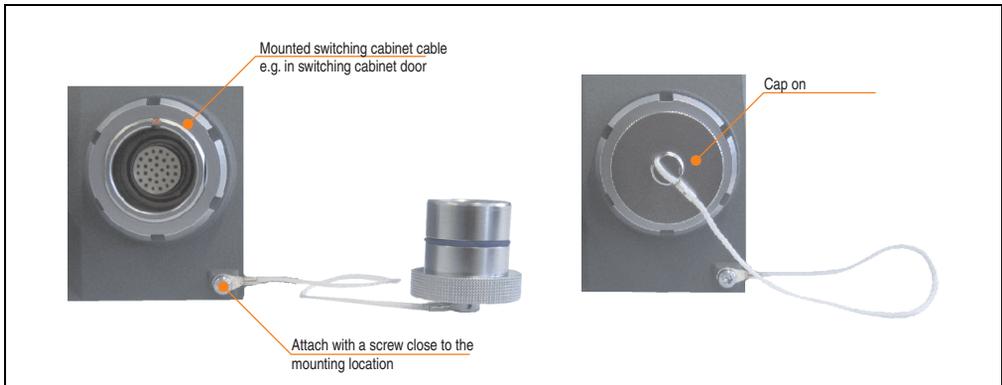
Figure 67: Attaching the switching cabinet cable protective cap

Chapter 6
Accessories

4. Connection box

4.1 MP connection box - 4MPCBX.0000-00

> # Information:
>
> **For more detailed information about the connection box, see the Mobile Panel Connection Box User's Manual. This can be downloaded from the B&R homepage (www.br-automation.com).**

The connection box 4MPCBX.0000-00 enables a configuration where the Mobile Panel can be operated at various connection points while remaining integrated in the E-stop circuit.

The E-stop circuit remains closed, regardless of whether the Mobile Panel is connected or not. If the Mobile Panel is disconnected during operation, the E-stop circuit in the connection box is automatically closed, and no E-stop is triggered.
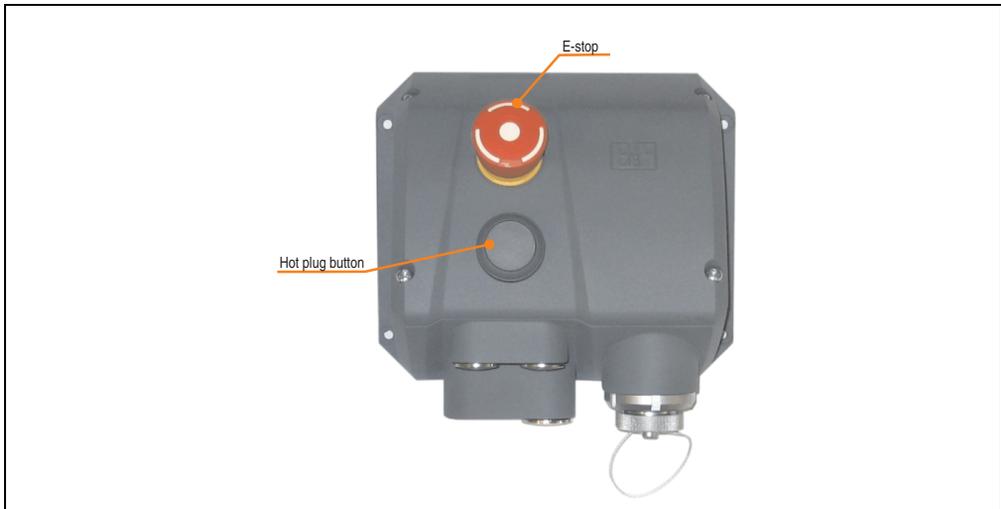
Figure 68: Connection box 4MPCBX.0000-00

4.1.1 Features

- Plug and unplug during operation
- Mounting compatible
- Circular plug with push-pull locking
- Integrated E-stop
- Hot-plug button

- IP65 protection
- Safety category 3 PL d according to EN ISO 13849-1:2008

4.2 MP connection box small- 4MPCBX.0001-00

Information:

For more detailed information about the connection box, see the Mobile Panel Connection Box User's Manual. This can be downloaded from the B&R homepage (www.br-automation.com).

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

Figure 69: Connection box 4MPCBX.0001-00

4.2.1 Features:

- Enables simple vertical connection of the Mobile Panel connection cable to the switching cabinet
- IP65 protection
- Compact dimensions
- Robust

Chapter 6
Accessories

4.3 Boxcable 5CAMPB.0100-10

The box cable establishes the electrical connection between the switching cabinet the connection box. It includes lines for the network (Ethernet 10/100 Mbit/s), 24 VDC supply, entry devices / E-stop and key switch or push button, enable switch and CAN.

For info on exchanging and installing the box cable, see the Mobile Panel Connection Box User's Manual. The manual can be downloaded from the B&R homepage (**www.br-automation.com**).

5. MP40/50 buffer battery

5.1 General information

The battery in the Mobile Panel prevents the operator panel from restarting when the connection box or switching 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 switching 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 interface 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 / Servicing", section 3 "Installing the buffer battery" on page 155.

5.2 Order data

Model number	Description	
5MPBAT.0000-00	**MP40/50 buffer battery**	

Table 51: Buffer battery - Order data
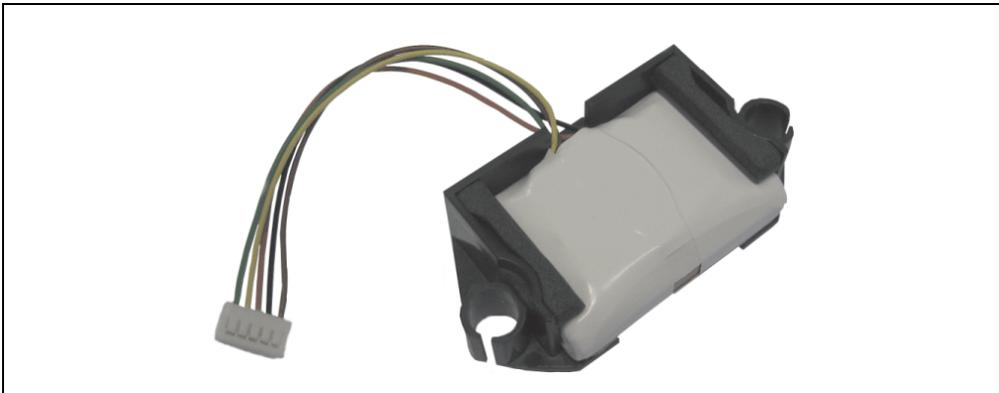
Figure 70: Buffer battery 5MPBAT.0000-00

5.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.

Features	5MPBAT.0000-00
Battery type	Li-Ion

Electrical characteristics
    Voltage
    Capacity
	3.6V
	1950mAh

Environmental characteristics	

Ambient temperature
    Operation
        Load
        Discharge
    Bearings
    Transport
	0 to +45°C
	-20 to +60°C
	-20 to +70°C (ideal temperature: +20 to +25°C)
	-20 to +70°C (ideal temperature: +20 to +25°C)

Lifespan	500 charge cycles
Duration of initial charging	At least 4 hours
Mains failure bridging	Maximum 15 minutes

Table 52: Buffer battery - Technical data

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.

Chapter 6
Accessories

6. Touch screen pen

6.1 Order data

Model number	Description	Figure
5AC900.1100-01	**MP40/50 - Touch screen pen, 5 pcs.**	

Table 53: Order data - Touch screen pen

Chapter 7 • Maintenance / Servicing

1. Cleaning

Danger!

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

A moist towel should be used to clean the MobilePanel 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 MobilePanel device! Never use aggressive solvents, chemicals, or scouring agents.

Information:

Displays with touch screens should be cleaned at regular intervals.

In order to clean the touch screen during operation with Windows CE, the touch screen can be deactivated for 20 seconds. This function can be activated under **Start >Settings > Control Panel > Touch Screen Screen Cleaning** tab.

2. Preventing after-image effect in LCD/TFT monitors

Burn-in effect (after images, display memory effect, image retention or also image sticking) occurs in LCD/TFT monitors when a static image is displayed for a long period of time. This static screen content causes the build-up of parasitic capacities within the LCD components that prevent the liquid crystal molecules from returning to their original states. This condition may arise, is not predictable and depends on the following factors:

- Type of image displayed
- Color composition of the image
- Length of image output
- Ambient temperature

2.1 What measures can be taken against this?

There is no total solution, however, measures can be taken to significantly reduce this effect:

- Avoid static pictures or screen content
- Use screen savers (moving) when the display is not in use
- Frequent picture change
- Shut off the display when not in use

Turning off the background lighting (backlight) does not influence the prevention of the after-image effect.

3. Installing the buffer battery

Information:

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

- Disconnect the power supply to the Mobile Panel.

- Remove the cover to the connection compartment on the back by removing the 6 marked screws (using a Phillips screwdriver).

Figure 71: Remove the cover of the connection compartment

- 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.
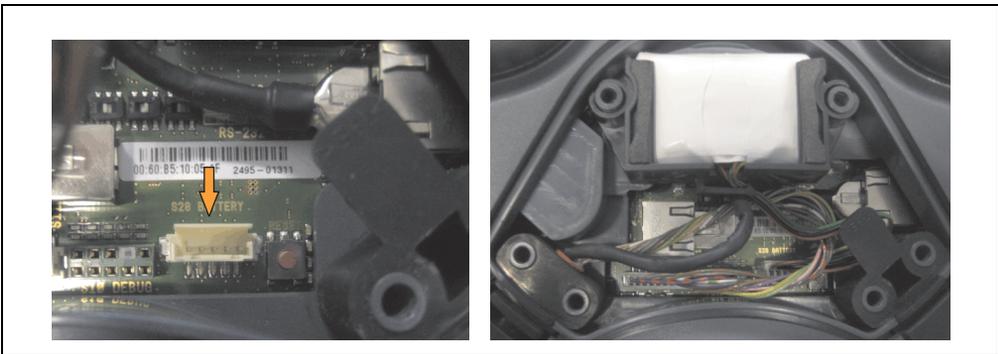
Figure 72: Plug in cable

- 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.

Property	

Power supply
    Rated voltage
    minimum current
    maximum current load
	24 VDC
	10 mA (per contact)
	1000 mA (per contact)

Utilization category	DC-13 (according to IEC 60947-5-1)
EAO BR 84	B_{10d}: 100.000
IDEC XA series	B_{10d}: 100.000

Table 54: Technical data - Stop button

2. Enable 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.

Characteristics	
Output type	Solid-state output
Switchable nominal voltage	24 VDC (voltage tolerance 19.2 V DC to 30 V DC in accordance with EN 61131-2)
Switchable nominal current	500 mA (max.)

Maximum breaking current
    Circuit 1
    Circuit 2
	
	1.5 A
	0.8 A

Maximum inductive load
    Circuit 1
 	
    Circuit 2
	
	145mJ / 1.16 H @ 24 V DC, 500 mA
	(similar to DC13 in accordance with EN 60947-5-1)
	145mJ / 1.16 H @ 24 V DC, 500 mA
	(similar to DC13 in accordance with EN 60947-5-1)

Reverse polarity protection
    Circuit 1
    Circuit 2
	
	Circle 1 yes
	Circle 2 yes

Short circuit and overload protection
    Circuit 1
    Circuit 2
	
	Circle 1 yes (integrated in output-FET)
	Circle 2 yes (through protective circuit)

Switching cycles
    Switch position 2
    Switch position 3
	
	10^5
	5×10^4

Operating forces
    from switch position 1 to 2
    from switch position 2 to 3
	
	Typically 5 N
	Typically 20 N

Specifications for EN ISO 13849-1 : 2008	

Enable
    Category
    Performance Level
    Proof Test Interval
    $MTTF_d$ symmetrized in accordance
    with D.2 of EN ISO 13849-1
    PFH_d
	
	3
	d
	20 years
	
	78 years [1]
	1.57×10^{-7}

Panic
    Category
    Performance Level
    Proof Test Interval
    $MTTF_d$ symmetrized in accordance
    with D.2 of EN ISO 13849-1
    PFH_d
	
	3
	d
	20 years
	
	88 years [1]
	1.35×10^{-7}

Table 55: Technical data - Enable switch

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

The test is performed at 20°C.

3.1.2 Test 2

The test objects are placed in a sealable box (365 x 260 x 200). 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 • Superfin 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

Table 56: Chemical resistance test - Test results

Substance	Test passed	Problems / 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
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

Table 56: Chemical resistance test - Test results

Substance	Test passed	Problems / 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 56: 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

Table 56: Chemical resistance test - Test results

Substance	Test passed	Problems / Not tested
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	
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

Table 56: Chemical resistance test - Test results

Substance	Test passed	Problems / 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
MEK (Methyl ethyl ketone), Toluene (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), Toluene (Toluolum DAB 74), Xylene (Xyluolum OAB 90) - Test 2		Not tested

Table 56: 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 angle

The viewing angle information (R, L, U, D) can be seen in the technical data for the individual components.
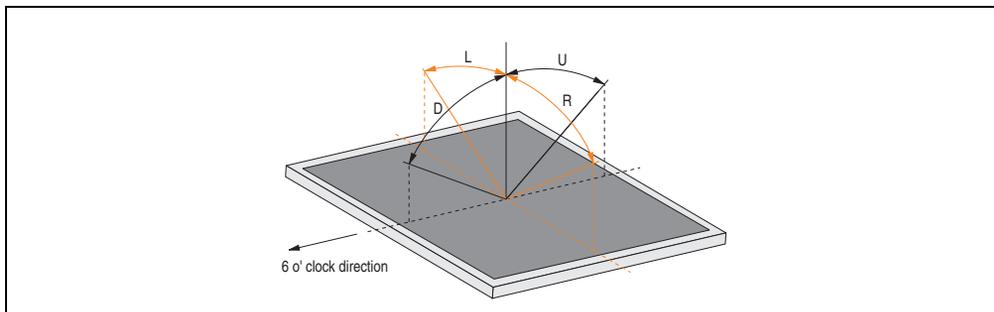
Figure 73: Viewing angle definition

5. B&R Key Editor information

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

Figure 74: B&R Key Editor screenshots (Version 3.00)

Features:

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Key combinations/shortcuts (CTRL+C, SHIFT+DEL, etc.) on one key
- Special key functions (change brightness, etc.)
- Assign functions to LEDs (HDD access, power, etc.)
- 4 assignments per key possible (using layer function)
- Configuration of panel locking time when multiple Automation Panel 900 devices are
- connected to Automation PC 620, Automation PC 810 and Panel PC 700 devices.

Supports following systems (Version 3.00):

- Automation PC 620 (ETX, XTX, Embedded)
- Automation PC 800
- Automation PC 820
- Panel PC 300
- Panel PC 700 (ETX, XTX)
- Panel PC 800
- Power Panel 65
- Power Panel 100.200
- Power Panel 300/400
- Mobile Panel 100, 200
- Mobile Panel 40/50
- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C

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

The B&R Key Editor can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**). Additionally, it can also be found on the B&R HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

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

Figure 75: HMI Drivers & Utilities DVD 5SWHMI.0000-00

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

Table 57: Model number - HMI Drivers & Utilities DVD

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

Information in detail:

BIOS upgrades for the products

- Automation PC 620
- Panel PC 700
- Automation PC 680
- Provit 2000 product family - IPC2000/2001/2002
- Provit 5000 product family - IPC5000/5600/5000C/5600C
- Power Panel 100 BIOS devices
- Mobile Panel 100 BIOS devices
- Power Panel 100 / Mobile Panel 100 user boot logo
- Power Panel 100 / Mobile Panel 100 REMHOST utility

Drivers for the devices

Appendix A

- Automation Device Interface (ADI)
- Audio
- Chipset
- CD-ROM
- LS120
- Graphics
- Network
- PCI RAID controller
- Touch screen
- Touchpad
- Interface board

Updates

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

Utilities/Tools

- Automation Device Interface (ADI)
- Miscellaneous
- MTC utilities
- Key editor
- MTC & Mkey utilities
- Mkey utilities
- UPS configuration software
- ICU ISA configuration
- Intel PCI NIC boot ROM
- Diagnostics
- CompactFlash lifespan calculation for Silicon Systems CompactFlash cards 5CFCRD.xxxx-03

Windows and embedded operating systems

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

MCAD templates for

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

Documentation for

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

Service tools

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

Appendix A

7. Glossary

A

ACPI

Abbreviation for "**A**dvanced **C**onfiguration and **P**ower **I**nterface". Configuration interface that enables the operating system to control the power supply for each device connected to the PC. With ACPI, the computer's BIOS is only responsible for the details of communication with the hardware.

ADI

Abbreviation for »Automation Device Interface« The ADI interface allows access to specific functions (e.g. brightness control, firmware updates, static value read) of B&R devices. The settings can be read or changed in the Control Panel with the B&R Control Center Applet (already included in the B&R embedded operating system).

APC

Abbreviation for "**A**utomation **PC**".

API

Abbreviation for "**A**pplication **P**rogram **I**nterface" The interface, which allows applications to communicate with other applications or with the operating system.

Automation Runtime

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

B

Baud rate

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

BIOS

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

Bit

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

Bit rate

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

Byte

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

B&R Automation Runtime

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

Appendix A

C

Cache

Background memory, also known as non-addressable memory or fast buffer memory. It is used to relieve the fast main memory of a computer. For example, data that should be output to slower components by the working memory (e.g. disk storage, printers) is stored temporarily in cache memory and output from there at an appropriate speed for the target devices.

CE mark

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

CPU

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

E

EMC

"**E**lectro**m**agnetic **C**ompatibility". The ability of a device or a system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment [IEV 161-01-07].

Ethernet

An IEEE 802.3 standard for networks. Ethernet uses bus or star topology and controls the traffic on communication lines using the access procedure CSMA/CD (Carrier Sense Multiple Access with Collision Detection). Network nodes are connected using coaxial cables, fiber optic cables or twisted pair cabling. Data transfer on an Ethernet network takes place in frames of variable lengths that consist of supply and controller information as well as 1500 bytes of data. The Ethernet standard provides base band transfers at 10 megabit and 100 megabit per second.

Ethernet POWERLINK

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

F

Firmware

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

FTP

"**F**ile **T**ransfer **P**rotocol". Rules for transferring data over a network from one computer to another computer. This protocol is based on TCP/IP, which has established itself as the standard for transferring data over Ethernet networks. FTP is one of the most used protocols on the Internet. It is defined in RFC 959 in the official regulations for Internet communication.

I

ISA

An abbreviation for "**I**ndustry **S**tandard **A**rchitecture". A term given for the bus design which allows expansion of the system with plug-in cards that can be inserted in PC expansion slots.

ISO

International Organization for Standardization > Worldwide federation of national standardization institutions from over 130 countries. ISO is not an acronym for the name of the organization; it is derived from the Greek word "isos", meaning "equal" (**www.iso.ch**).

L

LCD

An abbreviation for "**L**iquid **C**rystal **D**isplay". A display type, based on liquid crystals that have a polarized molecular structure and are enclosed between two transparent electrodes as a thin layer. If an electrical field is applied to the electrodes, the molecules align themselves with the field and form crystalline arrangements that polarize the light passing through. A polarization filter, which is arranged using lamellar electrodes, blocks the polarized light. In this way, a cell (pixel) containing liquid crystals can be switched on using electrode gates, thus coloring this pixel black. Some LCD displays have an electroluminescent plate behind the LCD screen for lighting. Other types of LCD displays can use color.

LED

An abbreviation for "**L**ight **E**mitting **D**iode". A semiconductor diode which converts electrical energy into light. LEDs work on the principle of electroluminescence. They are highly efficient because they do not produce much heat in spite of the amount of light they emit. For example, "operational status indicators" on floppy disk drives are LEDs.

M

MB

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

MTBF

An abbreviation for "**M**ean **t**ime **b**etween **f**ailure". The average time which passes before a hardware component fails and repair is needed. This time is usually expressed in thousands or ten thousands of hours, sometimes known as power-on hours (POH).

MTCX

An abbreviation for »**M**ain**t**enance **C**ontroller E**X**tended«. The MTCX is an independent processor system that provides additional functions for a B&R industrial PC that are not available with a normal PC. The MTC communicates with the B&R industrial PC via the ISA bus (using a couple register).

Multitasking

Multitasking is an operating mode in an operating system that allows several computer tasks to be executed virtually simultaneously.

Appendix A

O

OEM

Abbreviation for "**O**riginal **E**quipment **M**anufacturer". A company that integrates third-party and in-house manufactured components into their own product range and then distributes these products under its own name.

P

PnP

An abbreviation for "**P**lug and **P**lay". Specifications developed by Intel. Using Plug and Play allows a PC to automatically configure itself so that it can communicate with peripheral devices (e.g. monitors, modems, and printers). Users can connect a peripheral device (plug) and it immediately runs (play) without having to manually configure the system. A Plug and Play PC requires a BIOS that supports Plug and Play and a respective expansion card.

POH

An abbreviation for "**P**ower **O**n **H**ours". See MTBF.

Power Panel

Power Panel is part of the B&R product family and is a combination of an operator panel and controller in one device. This covers products PP21 and PP41.

POWERLINK

See "Ethernet POWERLINK".

R

RAM

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

Real time

A system is operating in real time or has real-time capability if the input sizes (e.g. signals, data) are received and processed in a defined time period, and the results are made available in real time for a partner system or the system environment. See also "real-time demands" and "real-time system".

A system is operating in real-time or has real-time capability, if the input sizes (e.g. signals, data) are received and processed in a defined time period, and the results are made available in real-time for a partner system or the system environment. See also "real-time demands" and "real-time system".

S

Interface

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

SDRAM

An abbreviation for "**S**ynchronous **D**ynamic **R**andom **A**ccess **M**emory". A construction of dynamic semiconductor components (DRAM) that can operate with higher clock rates than conventional DRAM switching circuits. This is made possible using block access. For each access, the DRAM determines the next memory addresses to be accessed.

SRAM

An abbreviation for "**S**tatic **R**andom **A**ccess **M**emory". A semiconductor memory (RAM) made up of certain logic circuits (flip-flop) that only keeps stored information while powered. In computers, static RAM is generally only used for cache memory.

T

Task

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

TCP/IP

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

TFT display

LCD (Liquid Crystal Display) technology where the display consists of a large grid of LCD cells. Each pixel is represented by a cell, whereby electrical fields produced in the cells are supported by thin film transistors (TFT) that result in an active matrix. In its simplest form, there is exactly one thin film transistor per cell. Displays with an active matrix are generally used in laptops and notebooks because they are thin, offer high-quality color displays and can be viewed from all angles.

Touch screen

Screen with touch sensors for selecting options in a displayed menu using the tip of the finger.

U

Bootstrap loader

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

USB

An abbreviation for »**U**niversal **S**erial **B**us« A serial bus with a bandwidth of up to 12 megabits per second (Mbit/s) for connecting a peripheral device to a microcomputer. Up to 127 devices can be connected to the system using a single multipurpose connection, the USB bus (e.g. external CD drives, printers, modems as well as the mouse and keyboard). This is done by connecting the devices in a row. USB allows devices to be changed when the power supply is switched on (hot plugging) and multi-layered data flow.

V

VGA

An abbreviation for "**V**ideo **G**raphics **A**dapter". A video adapter which can handle all EGA (Enhanced Graphics Adapter) video modes and adds several new modes.

W

Windows CE

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

Appendix A

Figure index