

Mobile Panel 40/50

User's Manual

Original operating instructions

Version: **1.71 (November 2013)**
Model no.: **MAMP40.50-ENG**

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Chapter 1 • General information

1 Manual history

Version	Date	Change
0.10 Preliminary	October 2006	<ul style="list-style-type: none"> First version
1.00	13-Feb-07	<ul style="list-style-type: none"> 3 "Installation" on page 67, 4 "Software" on page 84, 5 "Standards and certifications" on page 94, 6 "Accessories" on page 108 and 7 "Maintenance and service" on page 132 added. 2 "Technical data" on page 16 updated.
1.10	26-Mar-07	<ul style="list-style-type: none"> Discontinued USB flash drive 5MMUSB.0256-00 and USB flash drive 5MMUSB.1024-00. Updated operating unit model numbers. Moved connection box and box cable to chapter 6 "Accessories". 5 "Standards and certifications" revised. Updated images. Updated Windows CE model numbers. Updated description of the "Attachment cables" on page 58. Changed E-stop to stop button.
1.20	18-Apr-07	<ul style="list-style-type: none"> Introduction updated. Revised section "Complete system" on page 18. Revised figures. Revised technical data for the complete system and individual components. Modified description of membrane keypad. "Storing the Mobile Panel device" on page 116 updated. "Connecting a Mobile Panel 100/200" on page 73 updated. Revised section "USB interface" on page 74. 4 "Software" revised. 6 "Accessories" revised. Updated section "Viewing angles" on page 142. Updated section 7 in "Connection example - Stop button" on page 71. 1 "General information" updated.
1.30	18-Jul-07	<ul style="list-style-type: none"> Updated section "Serial number sticker" on page 31. Updated technical data of devices (ambient temperatures, humidity, elevation) "Temperature humidity diagram" on page 37 updated. Revised technical data of operating units (Ethernet controllers). Revised short description of devices in the model number overview. Revised technical data of attachment cable 5CAMPH.0xxx-30. Revised new model numbers for Windows CE and section "Windows CE" on page 84. Updated section Chapter 8. Additional temperature humidity diagram information. Added note to appendix.
1.40	17-Oct-07	<ul style="list-style-type: none"> Modified viewing angle definition (a, b, c, d to R, L, U, D). Updated information for avoiding screen burn-in. Updated ADI Control Center description (see section "B&R Automation Device Interface (ADI) - Control Center" on page 86). Updated information on touch calibration. Updated information on loop resistance of the stop circuit. Updated section "Date/Time settings" on page 82. Revised index. Updated section "B&R Key Editor". Updated section "Key configuration" on page 82. Updated Windows CE description (see section "Windows CE" on page 84). Updated section "Configuring Windows CE ProPlus Thin Client Automation Runtime (TCAR)" on page 85.
1.41	06-Nov-07	<ul style="list-style-type: none"> Modified layout of "Serial number sticker" on page 31. Replaced API with ADI (Automation Device Interface). Removed UL examination for robotic applications (UL 1740:1998).

Table 1: Manual history

Version	Date	Change
1.42	28-Jan-08	<ul style="list-style-type: none"> Corrected manual version number error in page footer. Added warning notice for Table 48 "Overview of safety categories" on page 101. Modified text: 5 "Standards and certifications" Replaced EN 418 with EN ISO 13850. Replaced EN 775 with EN ISO 10218-1. Replaced EN 60204 with EN 60204-1. Replaced 89/336/EEC with 2004/108/EC. Changed EN 60204-1/11.98 to EN 60204-1:2006. Changed EN 951-1/03.97 to EN 954-1:1996. Changed EN 1037/04.96 to to EN 1037:1995. Corrected issue date for some standards.
1.43	28-Mar-08	<ul style="list-style-type: none"> Corrected positioning of figure "5CAMPC.0020-10" on page 61. Updated preconfiguration of membrane keypads (see "Mobile Panel 40" on page 26 and "Mobile Panel 50" on page 29).
1.44	05-Sep-08	<ul style="list-style-type: none"> Corrected spelling and sentence structure errors. Updated "MP40/50 rechargeable backup battery" on page 126. Updated "Installing the backup battery" on page 133.
1.50	11-Feb-09	<ul style="list-style-type: none"> "B&R Key Editor" on page 92 moved from Software chapter to appendix. Corrected pinout on page Cable pinout. Corrected error in figure Figure 42 "Attachment shaft" on page 69. Updated figures for typical topologies (previously application examples). Added MP small connection box to 6 "Accessories", section 4.2 "4MPCBX.0001-00" on page 121. Updated section "Environmentally friendly disposal" on page 13 in chapter 1 "General information". Updated key matrix numbering for individual keys. Removed content of delivery for USB flash drives. Corrected supply circuit fuse specification from 1.5 A to 3.15 A. Corrected model numbers for control cabinet cables, see "Order data" on page 61 and see "Order data" on page 64. Updated differences in WinCE versions. Modified technical data for displays.
1.55	08-May-09	<ul style="list-style-type: none"> Corrected pinout for the supply wires of control cabinet cable 5CAMPC.0020-11. Changed Figure 35 "5CAMPH.0xxx-30 - Attachment cable pinout" on page 59, Figure 37 "5CAM-PC.0020-10 - Control cabinet cable pinout" on page 62 and 5CAMPC.0020-11 - Control cabinet cable pinout. Figures now show the front of the connector (previously displayed from behind). Updated section 1.1 "Configuration" on page 17.
1.60	19-Nov-09	<ul style="list-style-type: none"> Updated and adjusted requirements regarding machinery directives 2006/42/EC, EN ISO 13849-1, ZT 05. Updated information about the stop and enable switch in "Stop button" on page 134 and "Enabling switch" on page 135 in A "Appendix A". Corrected Figure 37 "5CAMPC.0020-10 - Control cabinet cable pinout" on page 62 and Figure 40 "5CAMPC.0020-11 - Control cabinet cable pinout" on page 65. Updated section "Tips for extending the service life of the display" on page 83 in chapter 3 "Installation". Updated section "Stop button" on page 25. Updated section "Chemical resistance" on page 136. Updated section "Connection example - Enable switch" on page 72. Updated section "Touch screen stylus pen" on page 128 in chapter 6 "Accessories". Updated information regarding "B&R Key Editor" on page 92. Updated information in section "Differences between CE versions (Pro - ProPlus - ProPlusTCAR)" on page 84.
1.61	16-Dec-09	<ul style="list-style-type: none"> Updated serial number sticker.
1.65	21-Dec-09	<ul style="list-style-type: none"> Renamed section "Serial number sticker" to "Type plate", see "Serial number sticker" on page 31. Removed warning in section "Safety categories in accordance with EN 954-1:1996 (Safety of machinery – Safety-related parts of control systems - Part 1: General design principles)". Removed "Safety integrity level - SIL (in accordance with IEC 61508-1)" column from tables "Overview of safety categories" on page 99 and "Overview of safety categories" on page 101. Modified informational text in section 4.4 "Safety categories in accordance with EN 954-1:1996 (Safety of machinery – Safety-related parts of control systems - Part 1: General design principles)" on page 101. Modified contents of section 5 "Information regarding MD 2006/42/EC" on page 104. Corrected values in Table 51 "(EN ISO 13849-1:2006, table 3) - Performance Level (PL)" on page 105. Modified definition of performance level in Table 52 "Abbreviations" on page 105. Changed "EC certificate of conformity" to "EC declaration of conformity", see "EC declaration of conformity" on page 106. Changed the term "type examination certificate" to "EC type examination certificate", see "EC type approval certificate" on page 107.
1.66	01-Feb-10	<ul style="list-style-type: none"> Added EC declaration of conformity, see section 6.1 "EC declaration of conformity" on page 106. Added EC type examination certificate, see section 6.2 "EC type approval certificate" on page 107.

Table 1: Manual history

Version	Date	Change
1.70	22-May-13	<ul style="list-style-type: none"> Modified section "Organization of safety notices" on page 14. Updated descriptions for cautions and warnings. Revised USB flash drives on page 108 (removed 5MMUSB.0256-00, 5MMUSB.0512-00 and 5MMUSB.1024-00; updated 5MMUSB.2048-01). Revised section 2 "Protective cover" on page 112. "HMI Drivers & Utilities DVD" moved from appendix A to "Accessories". Removed section "Preventing screen burn-in on LCD / TFT displays" from chapter 7 "Service and maintenance". "B&R Key Editor" moved from appendix A to 4 "Software". "B&R Automation Device Interface (ADI) - Control Center" on page 86 revised. "B&R Automation Device Interface (ADI) Development Kit" on page 88 updated. Revised and modified "Sticker" section to "Serial number sticker". Revised Figure 50 "Keys and LEDs in the matrix" on page 75. Moved wall mount from 2 "Technical data" to 6 "Accessories". Updated the following sections in 3 "Installation": "Tips for extending the service life of the display" on page 83, "Pixel errors" on page 83. Revised entire manual according to current formatting standards.
1.71	12-Nov-13	<ul style="list-style-type: none"> Revised section "Recommended monitoring devices" and renamed to "Connection examples". Revised section "Stop button" on page 134. A different stop button has been added to MP50 devices with revision J0 or higher. "B&R Automation Device Interface (ADI) .NET SDK" on page 90 updated to V2.00. "B&R Automation Device Interface (ADI) Development Kit" on page 88 updated to V3.60. Updated "HMI Drivers & Utilities DVD" on page 129 to version 2.20. Updated B&R USB flash drive 5MMUSB.4096-01, see "5MMUSB.xxxx-01" on page 110.

Table 1: Manual history

2 Safety guidelines

2.1 Intended use

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

2.2 Protection against electrostatic discharge

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

2.2.1 Packaging

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

2.2.2 Guidelines for proper ESD handling

Electrical components with a housing

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

Electrical components without a housing

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

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

Individual components

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

2.3 Policies and procedures

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

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

All tasks such as the installation, commissioning and servicing of devices are only permitted to be carried out by qualified personnel. Qualified personnel are those familiar with the transport, mounting, installation, commissioning and operation of devices who also have the appropriate qualifications (e.g. IEC 60364). National accident prevention regulations must be observed.

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

2.4 Transport and storage

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

2.5 Installation

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

2.6 Operation

2.6.1 Protection against touching electrical parts

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

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

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

2.6.2 Environmental conditions - Dust, humidity, aggressive gases

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

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

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

2.6.3 Viruses and dangerous programs

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

2.7 Environmentally friendly disposal

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

2.7.1 Separation of materials

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

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

Table 2: Environmentally friendly separation of materials

Disposal must comply with applicable legal regulations.

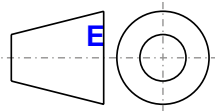
3 Organization of safety notices

Safety notices in this manual are organized as follows:

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

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

4 Guidelines



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

All dimensions are specified in mm.

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

Table 4: Range of nominal sizes

5 Overview

Product ID	Short description	on page
Accessories		
4MPBRA.0000-01	MP40/50 wall mount	115
4MPCBX.0000-00	Mobile Panel connection box for cables with push-pull circular connector	117
4MPCBX.0001-00	Mobile Panel small connection box for cables with push-pull circular connector	121
5CAMPB.0100-10	Mobile Panel box cable, with wire end sleeves for control cabinet connection; with connector contacts for wiring in the connection box, 10 m	123
5CAMPP.0000-10	Protective cover for Mobile Panel cables with circular connector	112
5CAMPP.0001-10	Protective cover for Mobile Panel control cabinet cables with circular connector	113
5MPBAT.0000-00	MP40/50 rechargeable backup battery	126
Attachment cables		
5CAMPH.0018-30	MP40/50 attachment cable with push-pull circular connector, 1.8 m	58
5CAMPH.0050-30	MP40/50 attachment cable with push-pull circular connector, 5 m	58
5CAMPH.0100-30	MP40/50 attachment cable with push-pull circular connector, 10 m	58
5CAMPH.0150-30	MP40/50 attachment cable with push-pull circular connector, 15 m	58
5CAMPH.0200-30	MP40/50 attachment cable with push-pull circular connector, 20 m	58
Control cabinet cables		
5CAMPC.0020-10	Mobile Panel Ethernet crossover control cabinet cable with push-pull circular connector, 2 m	61
5CAMPC.0020-11	Mobile Panel Ethernet straight through control cabinet cable with push-pull circular connector, 2 m	64
Other		
5SWHMI.0000-00	HMI Drivers & Utilities DVD	129
System units		
5MP040.0381-01	Mobile Panel MP40; 3.8" QVGA LCD m display, Intel PXA 270 processor, 256 MB DRAM, 128 MB flash; ETH 10/100, USB 1.1; 51 system keys, stop button, 2 integrated 3-position enable switches, handle. Cables and operating system must be ordered separately.	34
5MP040.0381-02	Mobile Panel MP40; 3.8" QVGA LCD m display, Intel PXA 270 processor, 256 MB DRAM, 128 MB flash; ETH 10/100, USB 1.1; 51 system keys, stop button, handwheel, key switch; 2 integrated 3-position enable switches, handle. Cables and operating system must be ordered separately.	38
5MP050.0653-01	Mobile Panel MP50; 6.5" VGA color TFT display with touch screen (analog resistive), Intel PXA 270 processor, 256 MB DRAM, 128 MB flash; ETH 10/100, USB 1.1; 31 system keys, stop button, handwheel, push button; 2 integrated 3-position enable switches, handle. Delivered as an assembly (cable and operating system must be ordered separately).	42
5MP050.0653-02	Mobile Panel MP50; 6.5" VGA color TFT display with touch screen (analog resistive), Intel PXA 270 processor, 256 MB DRAM, 128 MB flash; ETH 10/100, USB 1.1; 31 system keys, stop button, joystick, key switch; 2 integrated 3-position enable switches, handle. Delivered as an assembly (cable and operating system must be ordered separately).	46
5MP050.0653-03	Mobile Panel MP50; 6.5" VGA color TFT display with touch screen (analog resistive), Intel PXA 270 processor, 256 MB DRAM, 128 MB flash; ETH 10/100, USB 1.1; 31 system keys, stop button, handwheel, override potentiometer; 2 integrated 3-position enable switches, handle. Delivered as an assembly (cable and operating system must be ordered separately).	50
5MP050.0653-04	Mobile Panel MP50; 6.5" VGA color TFT display with touch screen (analog resistive), Intel PXA 270 processor, 256 MB DRAM, 128 MB flash; ETH 10/100, USB 1.1; 31 system keys, stop button, handwheel, key switch; 2 integrated 3-position enable switches, handle. Delivered as an assembly (cable and operating system must be ordered separately).	54
USB accessories		
5MMUSB.2048-00	USB 2.0 flash drive, 2048 MB	108
5MMUSB.2048-01	USB 2.0 flash drive, 2048 MB, B&R	110
5MMUSB.4096-01	USB 2.0 flash drive, 4096 MB, B&R	110
Undefined		
5AC900.1100-01	Mobile Panel 40/50 touch screen stylus pen - 5 pcs.	128
Windows CE 5.0		
5SWWCE.0524-ENG	Microsoft OEM Windows CE 5.0 Professional, English; for Mobile Panel MP40.	84
5SWWCE.0525-ENG	Microsoft OEM Windows CE 5.0 Professional, English; for Mobile Panel MP50.	84
5SWWCE.0624-ENG	Microsoft OEM Windows CE 5.0 Professional plus, English; for Mobile Panel MP40.	84
5SWWCE.0625-ENG	Microsoft OEM Windows CE 5.0 Professional Plus, English; for Mobile Panel MP50.	84
5SWWCE.0724-ENG	Microsoft OEM Windows CE 5.0 Professional plus, English; Terminal Client Automation Runtime for Mobile Panel MP40.	84
5SWWCE.0725-ENG	Microsoft OEM Windows CE 5.0 Professional, English; Automation Runtime terminal client for Mobile Panel MP50.	84

Chapter 2 • Technical data

1 Introduction

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

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



Onboard flash modules 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 for executing applications.

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

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

1.1 Configuration

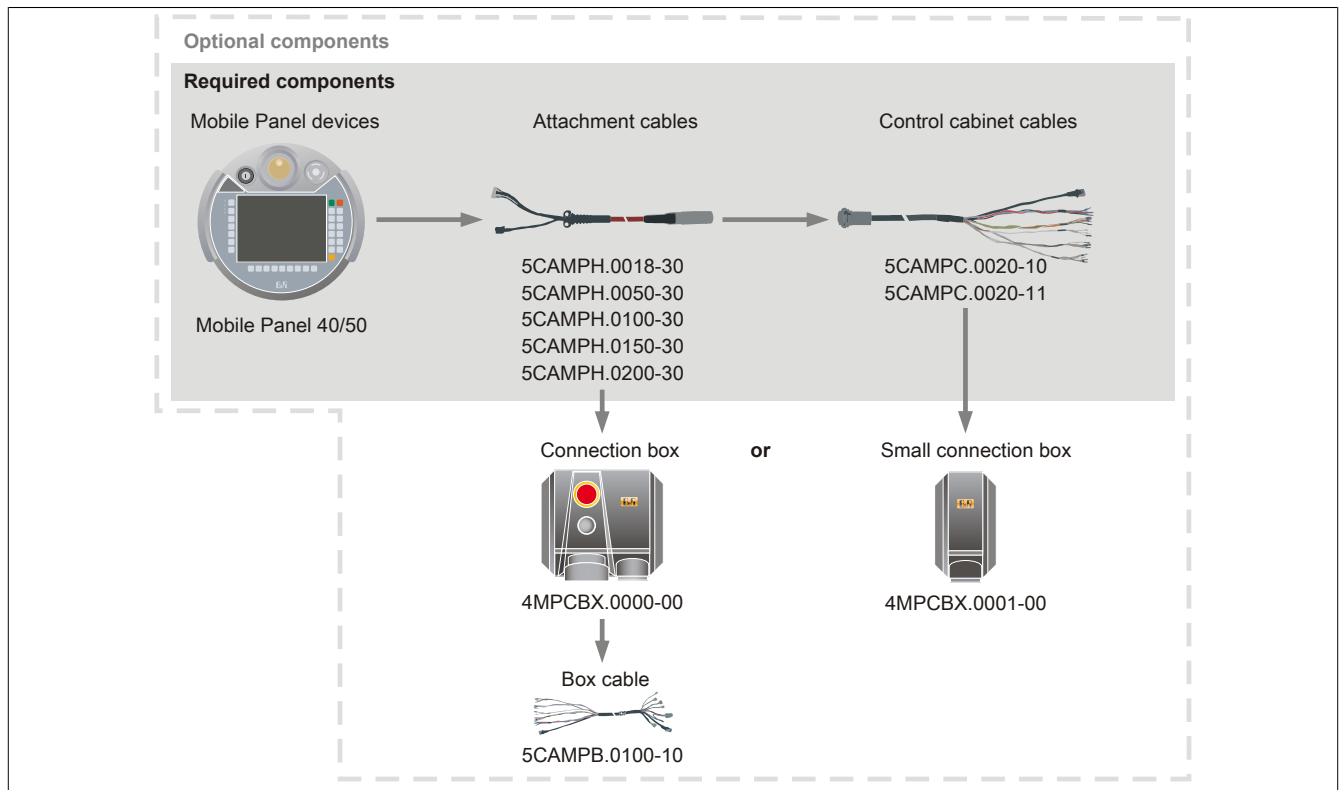


Figure 1: Mobile Panel selection guide

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

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

2 Complete system

2.1 Design

Mobile Panel are connected to the control cabinet using a cable. The following components are needed for operation:

- Operating unit including handle
- Attachment cable

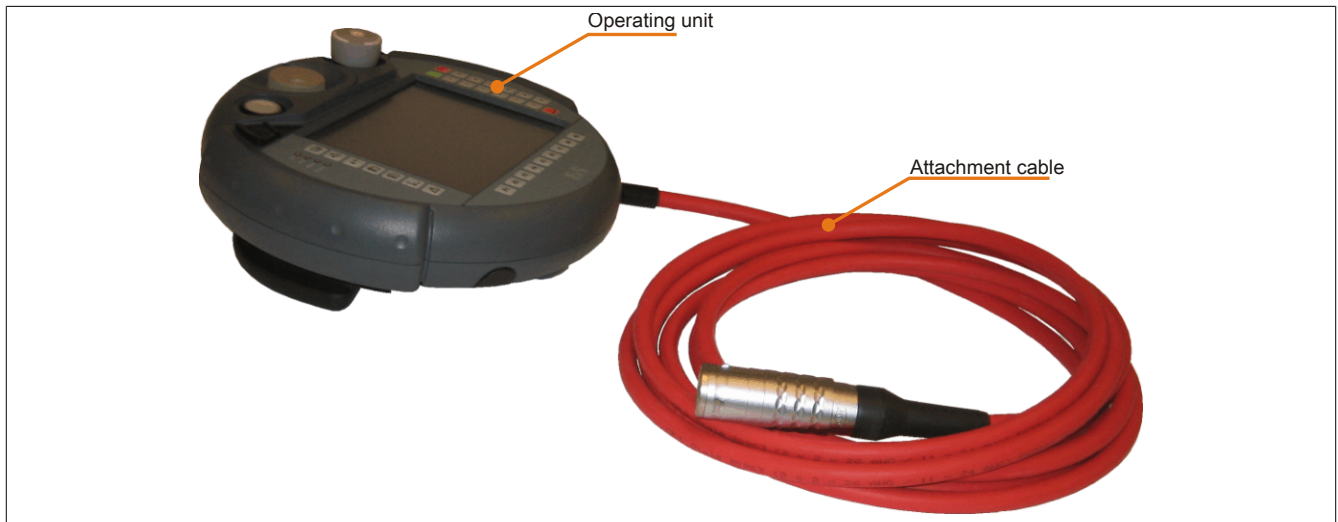


Figure 2: Design

2.1.1 Ergonomics

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

2.1.2 Housing

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

2.1.3 Control and display panel

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

2.1.4 Electronics

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

2.1.5 Interfaces

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

2.1.6 Touch screen stylus pen

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



Figure 3: Touch screen stylus pen

2.2 Enabling devices

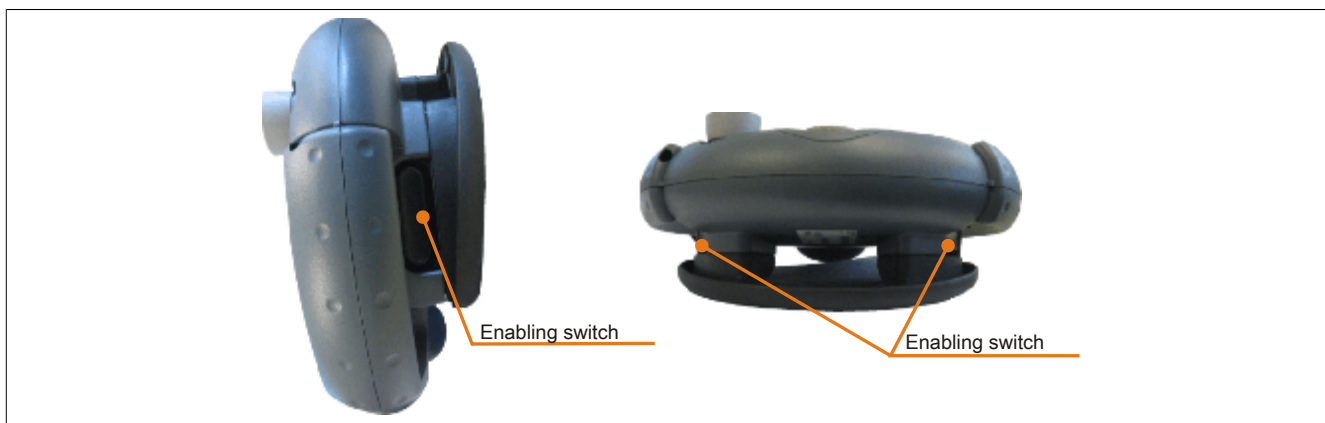


Figure 4: Enabling devices

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

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

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

2.2.1 Functionality

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

The enable switch can have three different switch positions:

Switch position	Function	Enable switch	Switching contact
1	Zero position	Not pressed	Off (opened)
2	Enable	Pressed	On (closed)
3	Panic	Pushed all the way in	Off (opened)

Table 5: Switch positions for the enable switch

		Not pressed	Pressed	Pushed all the way in
Channel 1	1	Zero	Enable	Panic
Channel 2	2	Zero	Enable	Panic

Figure 5: Possible enable switch positions

Warning!

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

Information:

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

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

2.2.1.1 Zero position

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

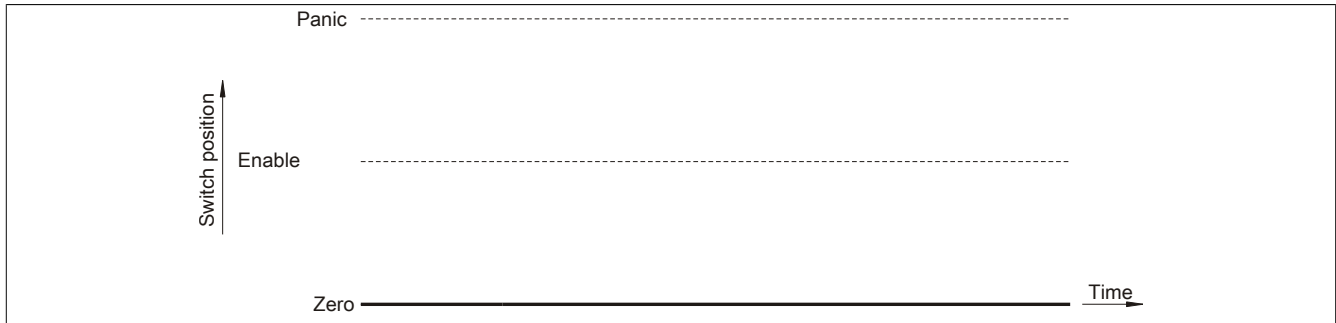


Figure 6: Enable switch - Zero position

2.2.1.2 Enabled

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

The enable switch is pressed from the "Zero" position to the "Enabled" position. When released, it returns to the "Zero" position.

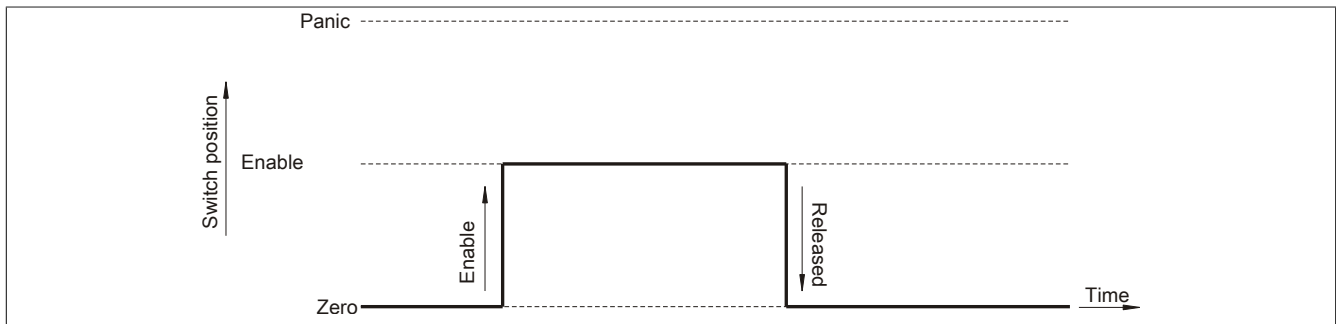


Figure 7: Enable switch - Enabled

2.2.1.3 Panic

If the enable switch is pushed all the way in (from the "Enabled" position to the "Panic" position) and released, then the switch will return to the "Zero" position by skipping over "Enabled".

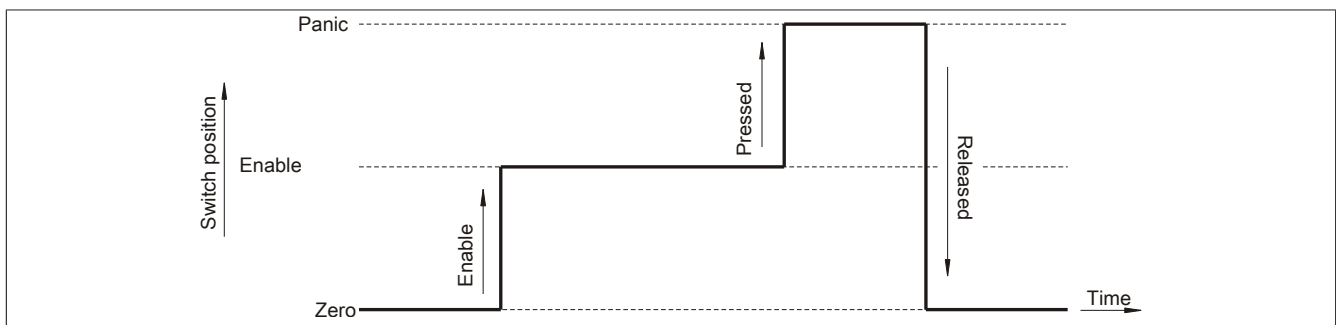


Figure 8: Enable switch - Panic

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

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

The "Connection example - Stop button" on page 71 and "Connection example - Enable switch" on page 72 illustrate how safety category 3 PL d can be achieved using Mobile Panel and its safety-related components. It is important to note that the machine's entire system concept must be designed accordingly.

Simultaneous monitoring by the monitoring device is necessary because otherwise an undetected accumulation of errors could occur that would result in a loss of safety functionality.

Example:

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

In addition, EN 60204-1 requires that the enabling equipment be connected to a category 0 or 1 stop (i.e. the power must be cut 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 (see "Standards and certifications" on page 94, section 4.5 "Selecting the performance level and category in accordance with EN ISO 13849-1" on page 102).

2.2.2 Intended misuse of the enable switch

Intended misuse refers to the unauthorized use of other materials to hold the enable switch in the enable position. This intended misuse should be minimized. To aid in this, the following measures are recommended for stopping the machine during manual operation:

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

Warning!

- **The enable switch is only suitable as a protective function if the person activating it is able to recognize danger to personnel in time and immediately take appropriate action to prevent it! Reducing the speed of movement may be a necessary additional measure. The permissible speed must be determined by a risk assessment.**
- **It must not be possible to issue commands that may bring about dangerous states using the enable switch by itself. A second intentional start command is required for this (key on operating unit).**
- **The only person permitted in the high-risk area is the person activating the enable switch.**
- **See the chapter "Standards and certifications" on page 94 for additional information regarding the enabling device.**

2.3 Options

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

Information:

For detailed technical data about control devices, see "Appendix A" on page 134.

2.3.1 Override potentiometer

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

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

- Resolution: 0 – 127 linear

2.3.2 Handwheel

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

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

Important features:

- 1 pulse / notch
- 50 notches / rotation

Information:

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

2.3.3 Illuminated button

If the Mobile Panel is equipped with an illuminated button, then it is evaluated using software and can be read by a program via the Mobile Panel ADI (Automation Device Interface library). Illuminated buttons are available as momentary contact push-buttons.

2.3.4 Key switch

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

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

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

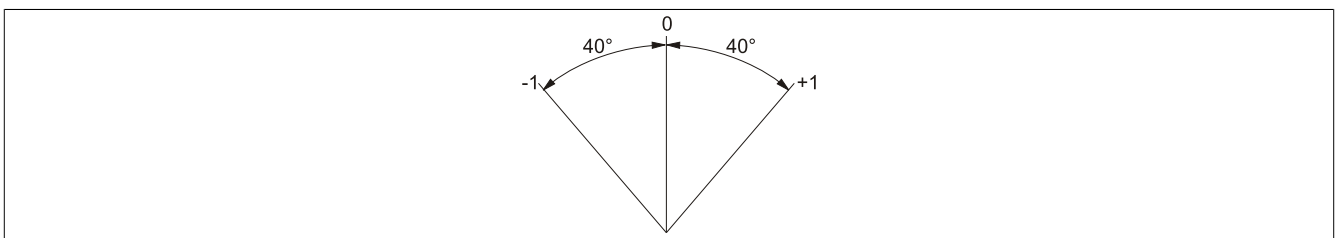


Figure 9: Key switch - Angle of rotation

Two keys are delivered with each device that comes equipped with a key switch.

2.3.5 Joystick

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

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

2.3.6 Backup battery

For more information about the backup battery, see chapter "Accessories", section 6 "MP40/50 rechargeable back-up battery" on page 126.

2.4 Stop button

The stop button has a dual-circuit design with N.C. contacts.

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

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

Warning!

Handheld operating units with gray stop buttons that are not connected to a machine should be kept out of view in order to prevent confusion with functional devices in cases of emergency.

Releasing the stopping equipment must never be allowed to cause an uncontrolled restart.

The stop button is not a substitute for safety equipment.

The stop button on the handheld device is not a substitute for the E-stop switch directly on the machine. Certain mechanical errors in the stop button can only be detected when the button is pressed. In the event of severe impact to the device (e.g. dropping the device), the stop button must be checked to ensure functionality. In addition, the stopping functionality must be tested periodically (every 6 months) by pressing the stop button.

See "Standards and certifications" on page 94 for further information about the stop button.

2.5 Membrane keypad

2.5.1 Mobile Panel 40

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

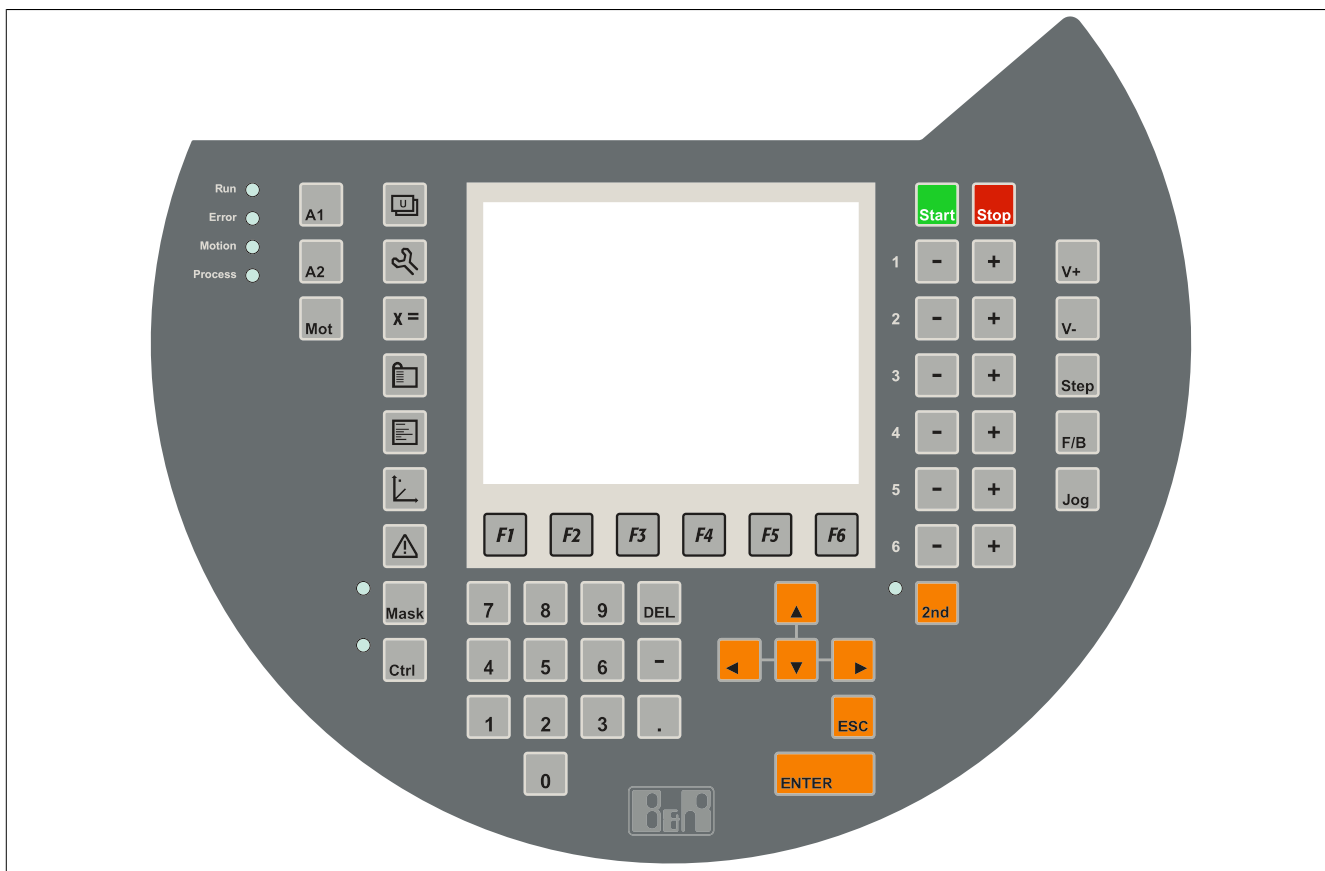


Figure 10: MP40 membrane keypad

2.5.1.1 Keys/LEDs








Symbol	Possible use	Factory key configuration (PS/2 code)
	Application screen 1	Not preset
	Services	Not preset
	Variable monitor	Not preset
	Project screen	Not preset
	Program screen	CONTEXT
	Position screen	Not preset
	Alarm screen	Not preset

Table 6: MP40 membrane keypad labels













Symbol	Possible use	Factory key configuration (PS/2 code)
	Screen	Not preset
	Ctrl	LEFT CTRL
	F1	F1
	F2	F2
	F3	F3
	F4	F4
	F5	F5
	F6	F6
	A1	OLD
	A2	Not preset
	Axis enable	Not preset
	Start	Left Windows key
	Stop	Not preset
	Jog key	-
	Jog key	+
	2nd layer	LEFT SHIFT
	Number 1	1
	Number 2	2
	Number 3	3
	Number 4	4

Table 6: MP40 membrane keypad labels

Symbol	Possible use	Factory key configuration (PS/2 code)
	Number 5	5
	Number 6	6
	Number 7	7
	Number 8	8
	Number 9	9
	Number 0	0
	Comma	,
	Up arrow	CURSOR UP
	Down arrow	CURSOR DOWN
	Left arrow	CURSOR LEFT
	Right arrow	CURSOR RIGHT
	ENTER	RETURN
	Cancel	ESC
	Coordination system selection	Not preset
	Forward/Backward	Not preset
	Operating mode selection	TAB
	Speed -	PAGE DOWN
	Speed +	PAGE UP
	Application running Error in the application Robot controller ready Process controller ready (cell/system ready)	

Table 6: MP40 membrane keypad labels

2.5.2 Mobile Panel 50

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

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

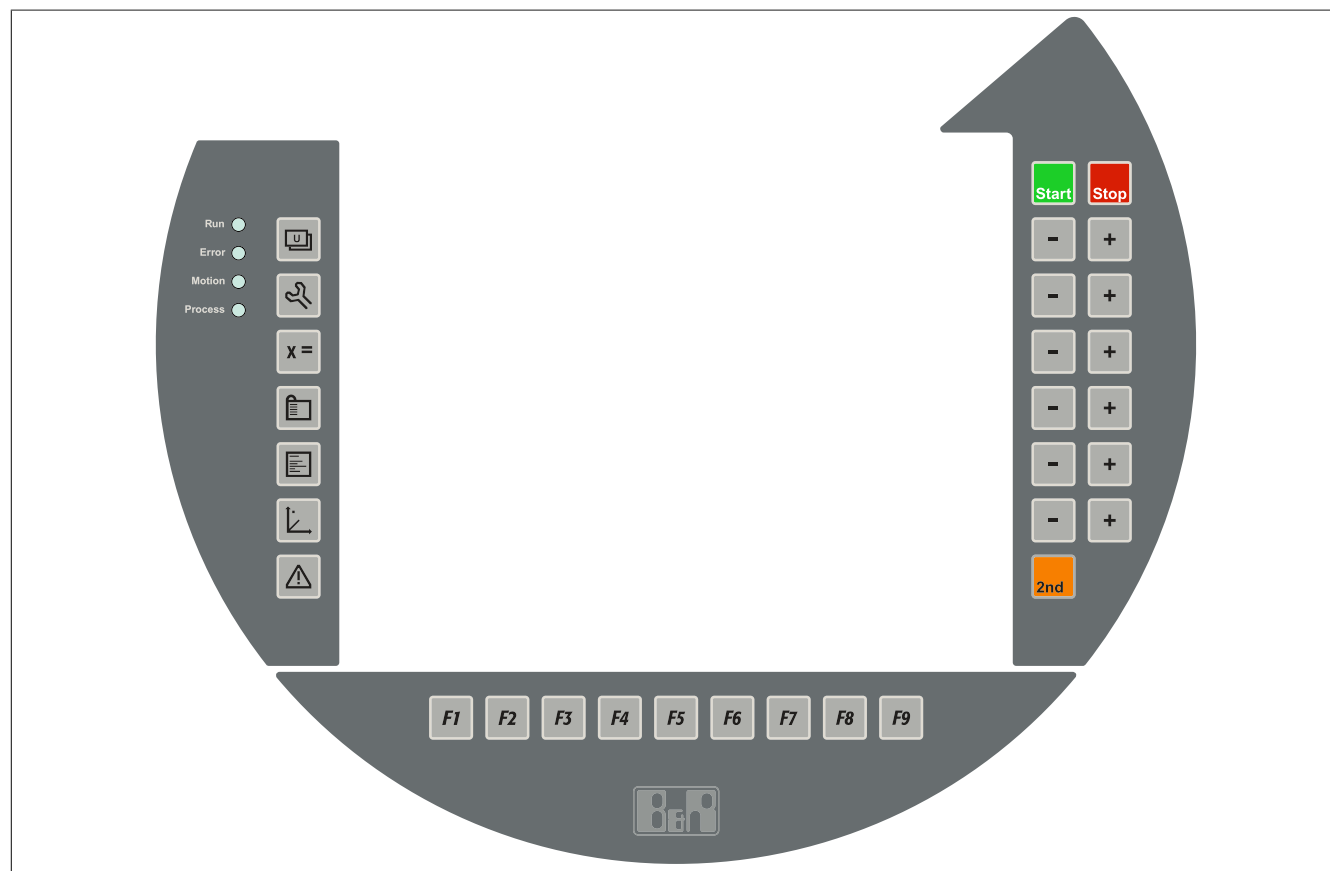


Figure 11: MP50 membrane keypad

2.5.2.1 Keys/LEDs








Symbol	Possible use	Factory key configuration (PS/2 code)
	Application screen 1	Not preset
	Services	Not preset
	Variable monitor	Not preset
	Project screen	Not preset
	Program screen	CONTEXT
	Position screen	Not preset
	Alarm screen	Not preset

Table 7: MP50 membrane keypad labels









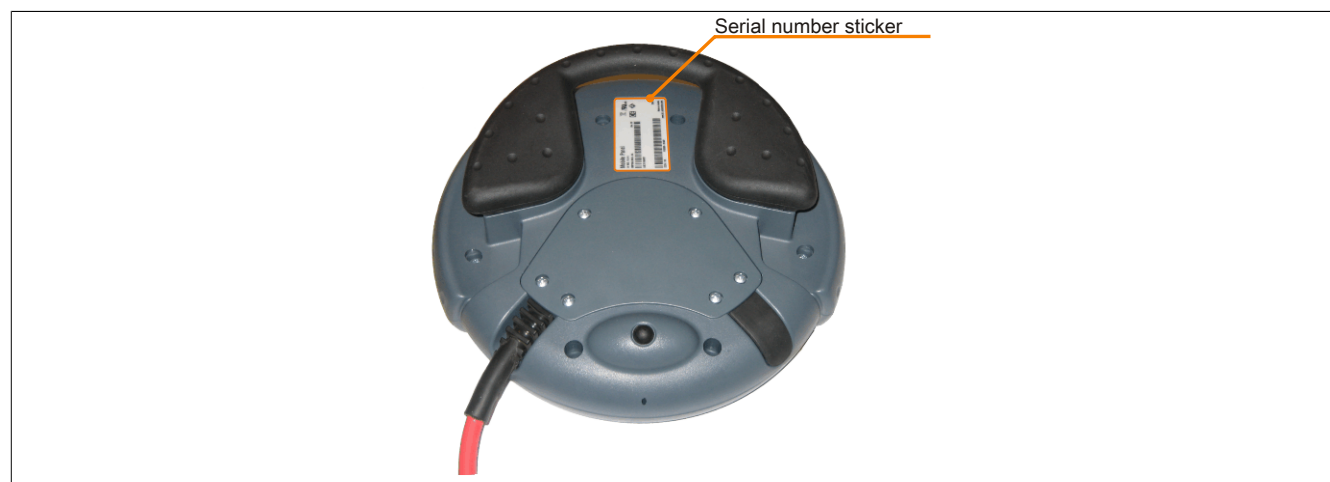
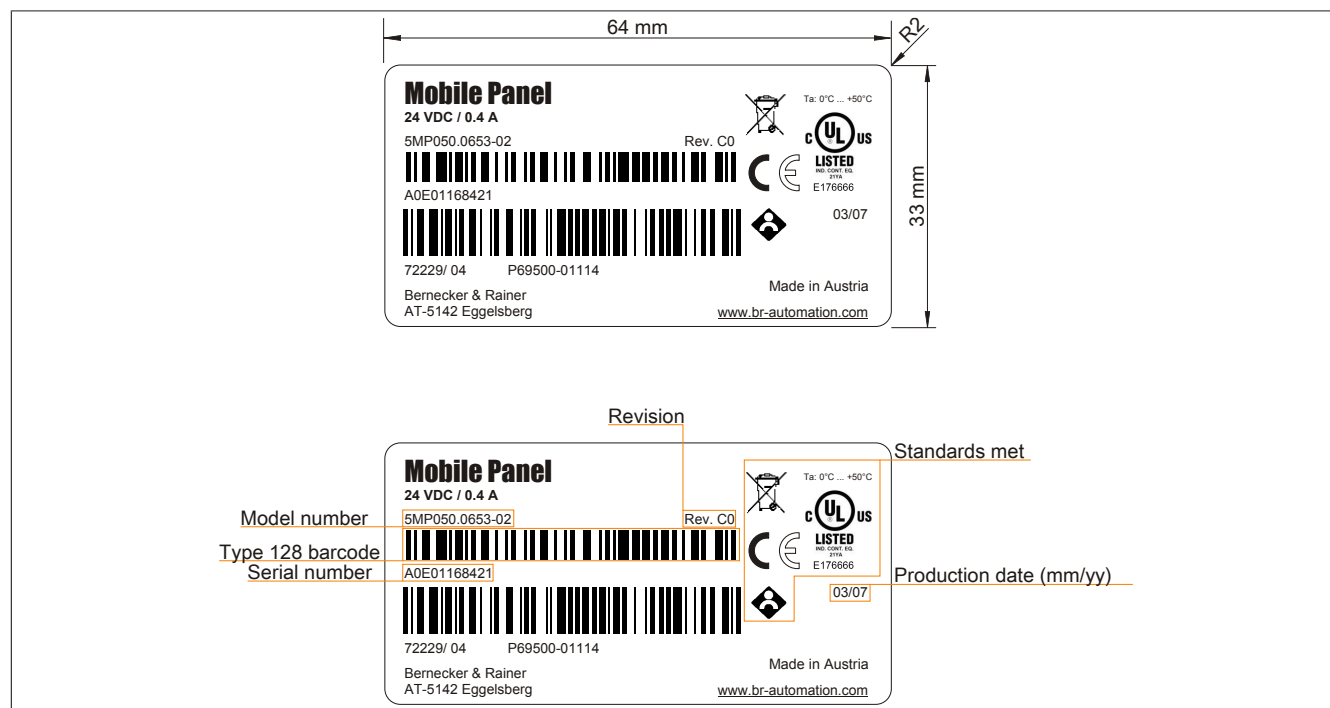
Symbol	Possible use	Factory key configuration (PS/2 code)
	F1	F1
	F2	F2
	F3	F3
	F4	F4
	F5	F5
	F6	F6
	F7	F7
	F8	F8
	F9	F9
	Start	Left Windows key
	Stop	Not preset
	Jog key	-
	Jog key	+
	2. Layer	LEFT SHIFT
<div> <div>Run</div> <div>Error</div> <div>Motion</div> <div>Process</div> </div> 	Application running Error in the application Robot controller ready Process controller ready (cell/system ready)	

Table 7: MP50 membrane keypad labels

2.6 Serial number sticker

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



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

The screenshot shows the B&R website interface. At the top right, there is a search bar with the text "A0E11168424" entered. Below the search bar, there is a navigation bar with tabs: "Technische Daten", "Basisinformationen", "Zubehör", "Downloads", "Revisionen", and "Serialnummer". The "Serialnummer" tab is currently selected. The search results display the following information:

Serialnummer:	A0E11168424
Materialnummer:	5MP050.0653-02
Revision:	C0
Auslieferungsdatum:	*N/A
Gewährleistungsende:	*N/A

Below the table, there is a note: "*Kundenvereinbarung untersagt die Ausgabe des Datums". On the left side of the page, there is a sidebar with a list of products. The "Mobile Panel 50" product is highlighted.

Serial number entered here
e.g. A0E11168424

Switching to the option
"Serial number"

Figure 14: Example of serial number search

3 Individual components

3.1 Operating unit

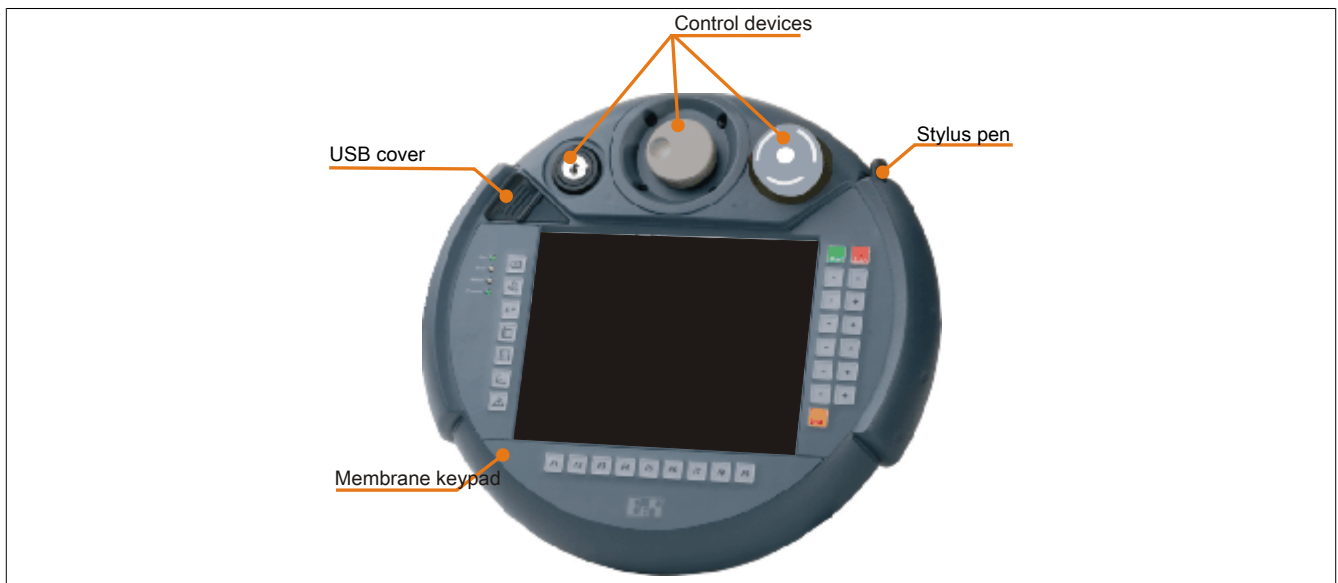


Figure 15: Mobile Panel operating unit

The operating unit contains all of the electronics such as the display, the control devices and the membrane keypad. An external USB 1.1 interface is located on the front behind the USB cover for backing up and/or exchanging data. The interface is designed for USB flash drives only.

The surface of the operating unit is resistant to alcohol (e.g. ethanol, glycol, isopropanol, glycerine, methanol), diluted acids (e.g. vinegar-based cleaning agents), soap, cleaning agents used in auto maintenance or industrial facilities (usually short-term exposure during the cleaning process) and normal foodstuffs (e.g. beer, wine, coffee, fruit). For instructions about how to clean the device, see "Cleaning" on page 132.

3.1.1 5MP040.0381-01

3.1.1.1 General information

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

3.1.1.2 Order data


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

Table 8: 5MP040.0381-01 - Order data

3.1.1.3 Components

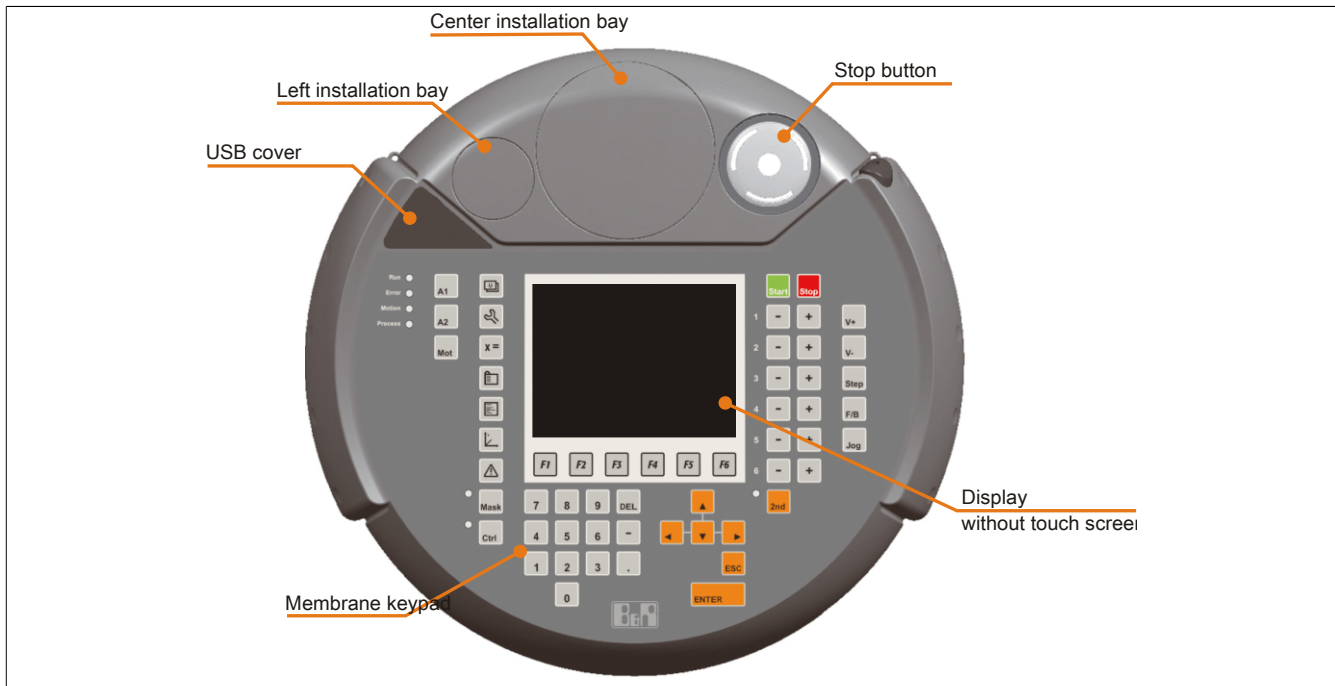


Figure 16: 5MP040.0381-01 - Components

3.1.1.4 Technical data

Information:

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

Product ID	5MP040.0381-01
General information	
Reset button	Yes
Controller	
Processor	
Type	Intel PXA 270
Clock frequency	416 MHz
Mode/Node switches	No
Graphics	
Controller	Intel PXA
SRAM	
Size	-
Battery-buffered	-
Memory	
Type	SDRAM
Size	256 MB
Interfaces	
USB	
Quantity	1
Type	USB 1.1
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s)
Current load	Max. 500 mA
Ethernet	
Quantity	1 ¹⁾
Controller	SMSC11X
Design	Shielded RJ45 port
Transfer rate	10/100 Mbit/s
Max. baud rate	100 Mbit/s
Display	
Type	Monochrome LCD
Diagonal	3.8" (96.5 mm)
Colors	16 shades of gray ²⁾
Resolution	QVGA, 320 x 240 pixels

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

Product ID	5MP040.0381-01
Contrast	20:1
Viewing angles	
Horizontal	Direction R / Direction L = 45°
Vertical	Direction U = 30° / Direction D = 60°
Backlight	
Brightness	110 cd/m ²
Half-brightness time	50,000 h
Touch screen	
Technologies	-
Keys	Keys
Function keys	No
Soft keys	6
System keys	51 numeric keys, cursor block
3-axis joystick	No
Electronic handwheel	No
Illuminated button	No
Stop button	Yes (2 N.C., right position)
Enabling switch	Yes (two 3-position switches on left and right)
Override potentiometer	No
Key switch	No
LEDs	7
Electrical characteristics	Electrical characteristics
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) ¹⁾
Starting current	Max. 5.6 A (current limiting present)
Power consumption	4.8 W (200 mA at 24 VDC)
Max. interruption of the supply	≤10 ms
Electrical isolation	No
Operating conditions	Operating conditions
Height of drop	1.5 m to industrial floor
Flame resistant	UL94V-0
EN 60529 protection	IP65
Rated protection	Class 3 in accordance with EN 61131-2 or EN 50178
Environmental conditions	Environmental conditions
Temperature	
Operation	0 to 50°C ³⁾
Storage	-20 to 70°C
Transport	-20 to 70°C
Relative humidity	
Operation	Max. 95%, non-condensing
Storage	Max. 95%, non-condensing
Transport	Max. 95%, non-condensing
Vibration	
Operation	5 to 9 Hz: 7 mm amplitude / 9 to 150 Hz: 2 g
Shock	
Operation	15 g (147 m/s ² 0-peak) and 11 ms duration
Altitude	
Operation	Max. 3000 m
Mechanical characteristics	Mechanical characteristics
Housing	
Material	ABS
Paint	Similar to RAL 7011
Front	
Panel membrane	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1100 g

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

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

3.1.1.5 Temperature humidity diagram

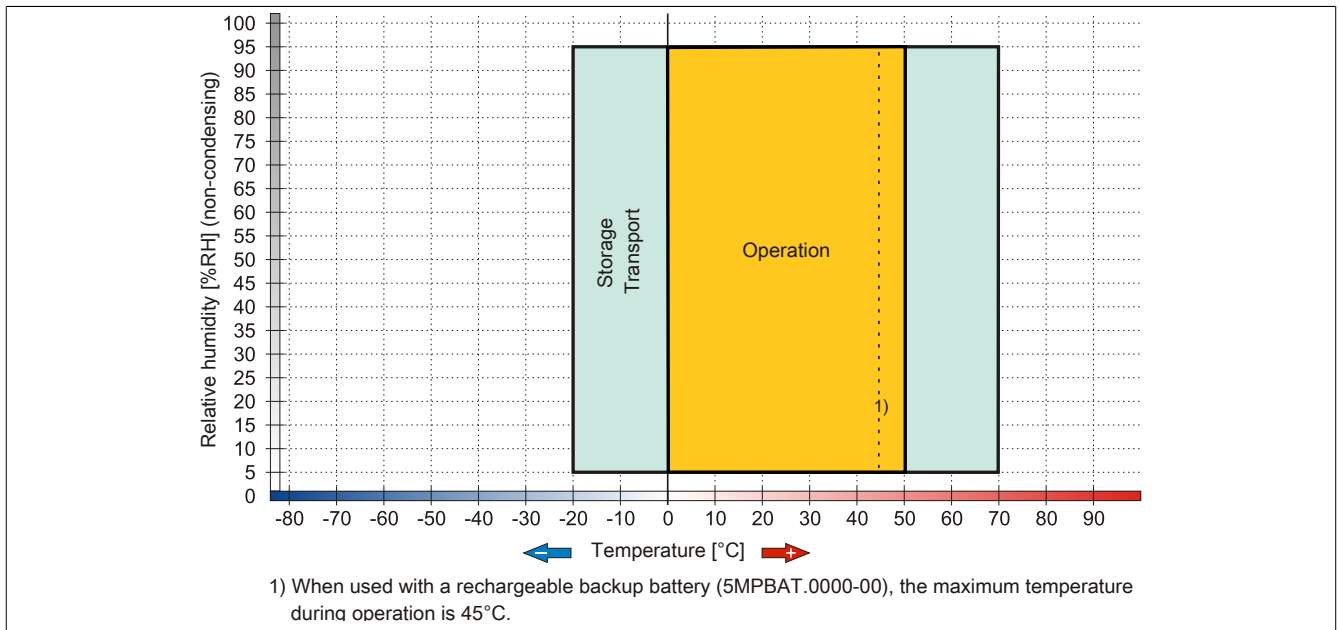


Figure 17: 5MP040.0381-01 - Temperature humidity diagram

3.1.1.6 Dimensions

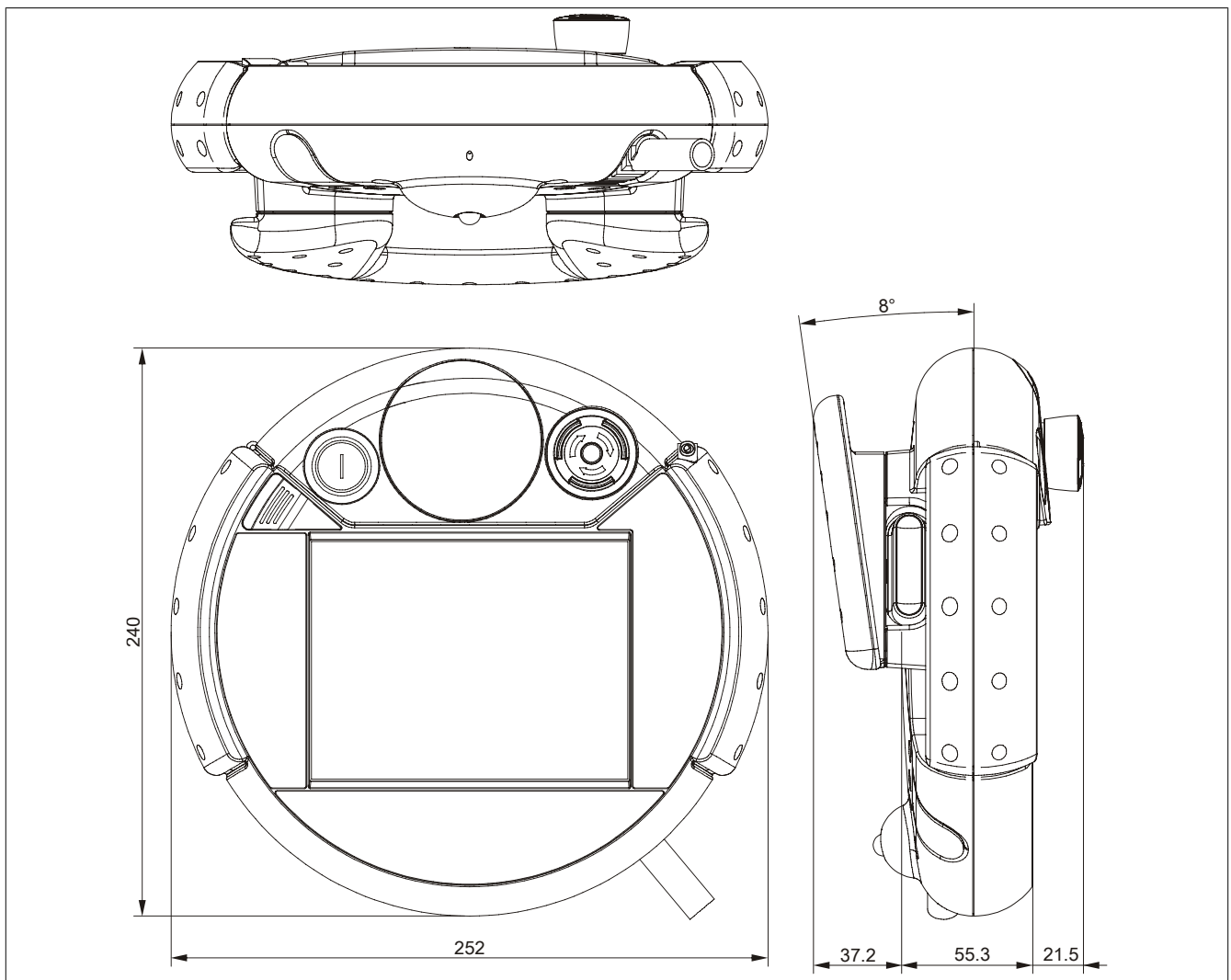


Figure 18: 5MP040.0381-01 - Dimensions

3.1.2 5MP040.0381-02

3.1.2.1 General information

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

3.1.2.2 Order data


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

Table 10: 5MP040.0381-02 - Order data

3.1.2.3 Components

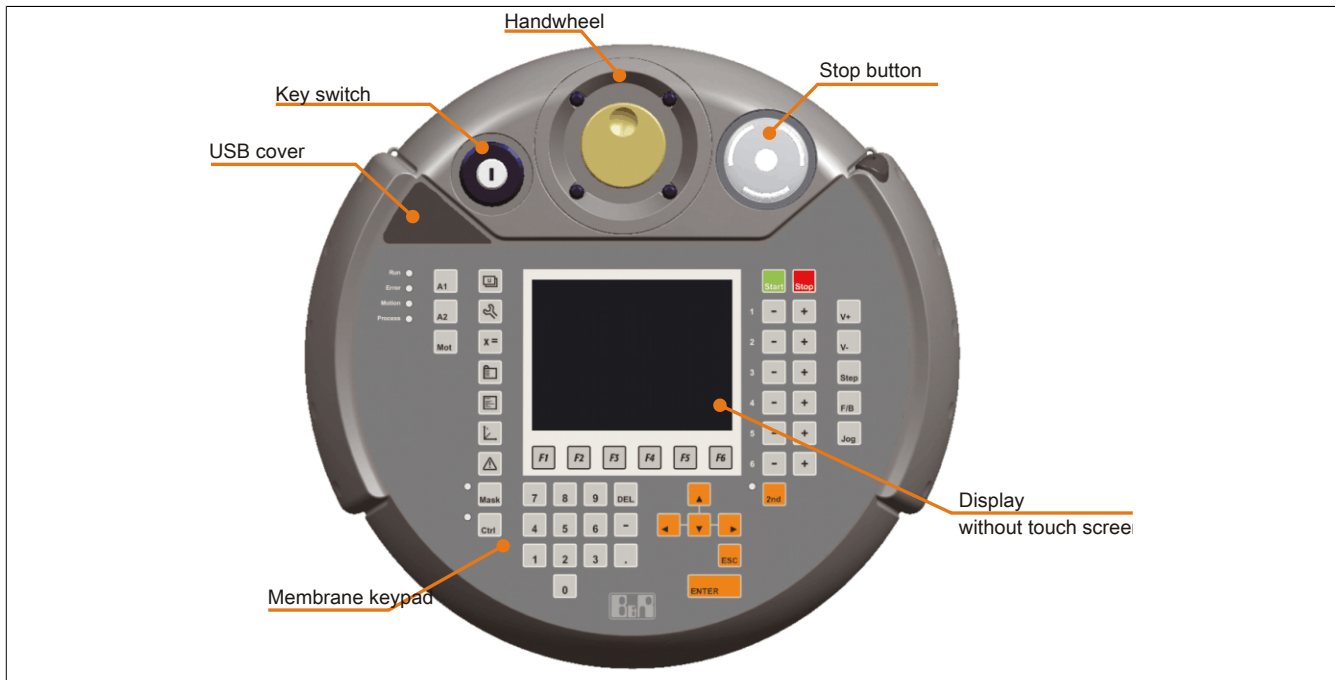


Figure 19: 5MP040.0381-02 - Components

3.1.2.4 Technical data

Information:

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

Product ID	5MP040.0381-02
General information	
Reset button	Yes
Controller	
Processor	
Type	Intel PXA 270
Clock frequency	416 MHz
Mode/Node switches	No
Graphics	
Controller	Intel PXA
SRAM	
Size	-
Battery-buffered	-
Memory	
Type	SDRAM
Size	256 MB
Interfaces	
USB	
Quantity	1
Type	USB 1.1
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s)
Current load	Max. 500 mA
Ethernet	
Quantity	1 ¹⁾
Controller	SMSC11X
Design	Shielded RJ45 port
Transfer rate	10/100 Mbit/s
Max. baud rate	100 Mbit/s
Display	
Type	Monochrome LCD
Diagonal	3.8" (96.5 mm)
Colors	16 shades of gray ²⁾
Resolution	QVGA, 320 x 240 pixels

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

Product ID	5MP040.0381-02
Contrast	20:1
Viewing angles	
Horizontal	Direction R / Direction L = 45°
Vertical	Direction U = 30° / Direction D = 60°
Backlight	
Brightness	110 cd/m ²
Half-brightness time	50,000 h
Touch screen	
Technologies	-
Keys	Keys
Function keys	No
Soft keys	6
System keys	51 numeric keys, cursor block
3-axis joystick	No
Electronic handwheel	Yes
Illuminated button	No
Stop button	Yes (2 N.C., right position)
Enabling switch	Yes (two 3-position switches on left and right)
Override potentiometer	No
Key switch	Yes
LEDs	7
Electrical characteristics	Electrical characteristics
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) ¹⁾
Starting current	Max. 5.6 A (current limiting present)
Power consumption	4.8 W (200 mA at 24 VDC)
Max. interruption of the supply	≤10 ms
Electrical isolation	No
Operating conditions	Operating conditions
Height of drop	1.5 m to industrial floor
Flame resistant	UL94V-0
EN 60529 protection	IP65
Rated protection	Class 3 in accordance with EN 61131-2 or EN 50178
Environmental conditions	Environmental conditions
Temperature	
Operation	0 to 50°C ³⁾
Storage	-20 to 70°C
Transport	-20 to 70°C
Relative humidity	
Operation	Max. 95%, non-condensing
Storage	Max. 95%, non-condensing
Transport	Max. 95%, non-condensing
Vibration	
Operation	5 to 9 Hz: 7 mm amplitude / 9 to 150 Hz: 2 g
Shock	
Operation	15 g (147 m/s ² 0-peak) and 11 ms duration
Altitude	
Operation	Max. 3000 m
Mechanical characteristics	Mechanical characteristics
Housing	
Material	ABS
Paint	Similar to RAL 7011
Front	
Panel membrane	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1100 g

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

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

3.1.2.5 Temperature humidity diagram

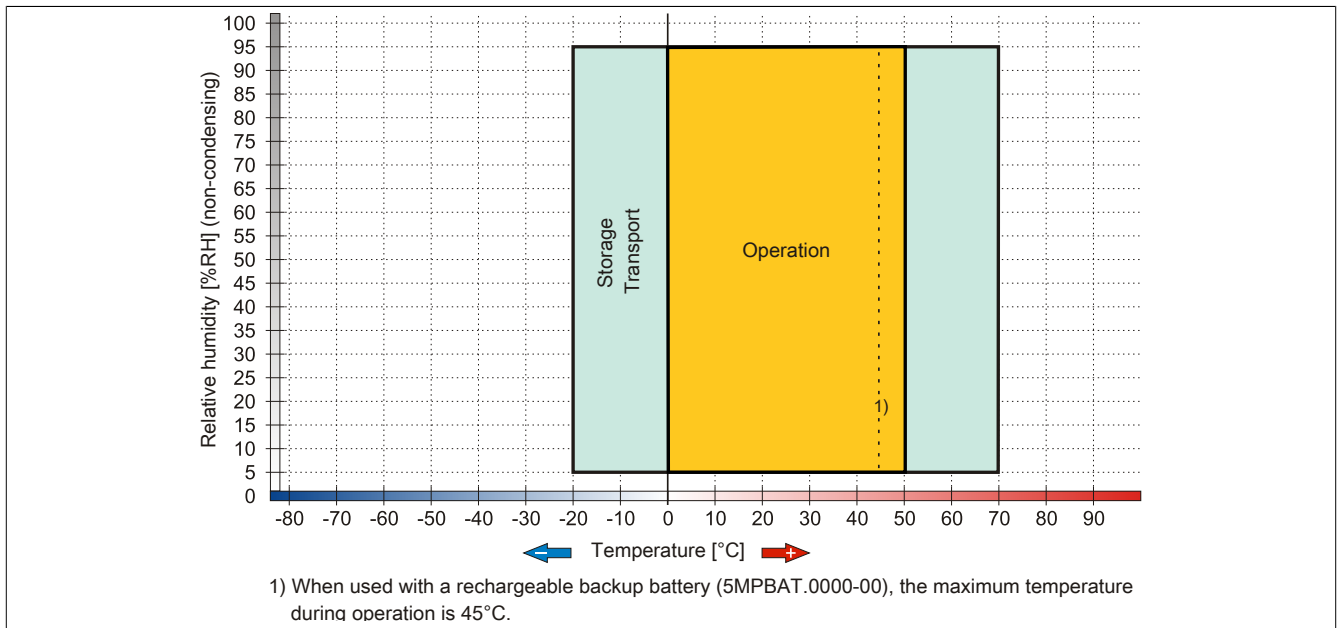


Figure 20: 5MP040.0381-02 - Temperature humidity diagram

3.1.2.6 Dimensions

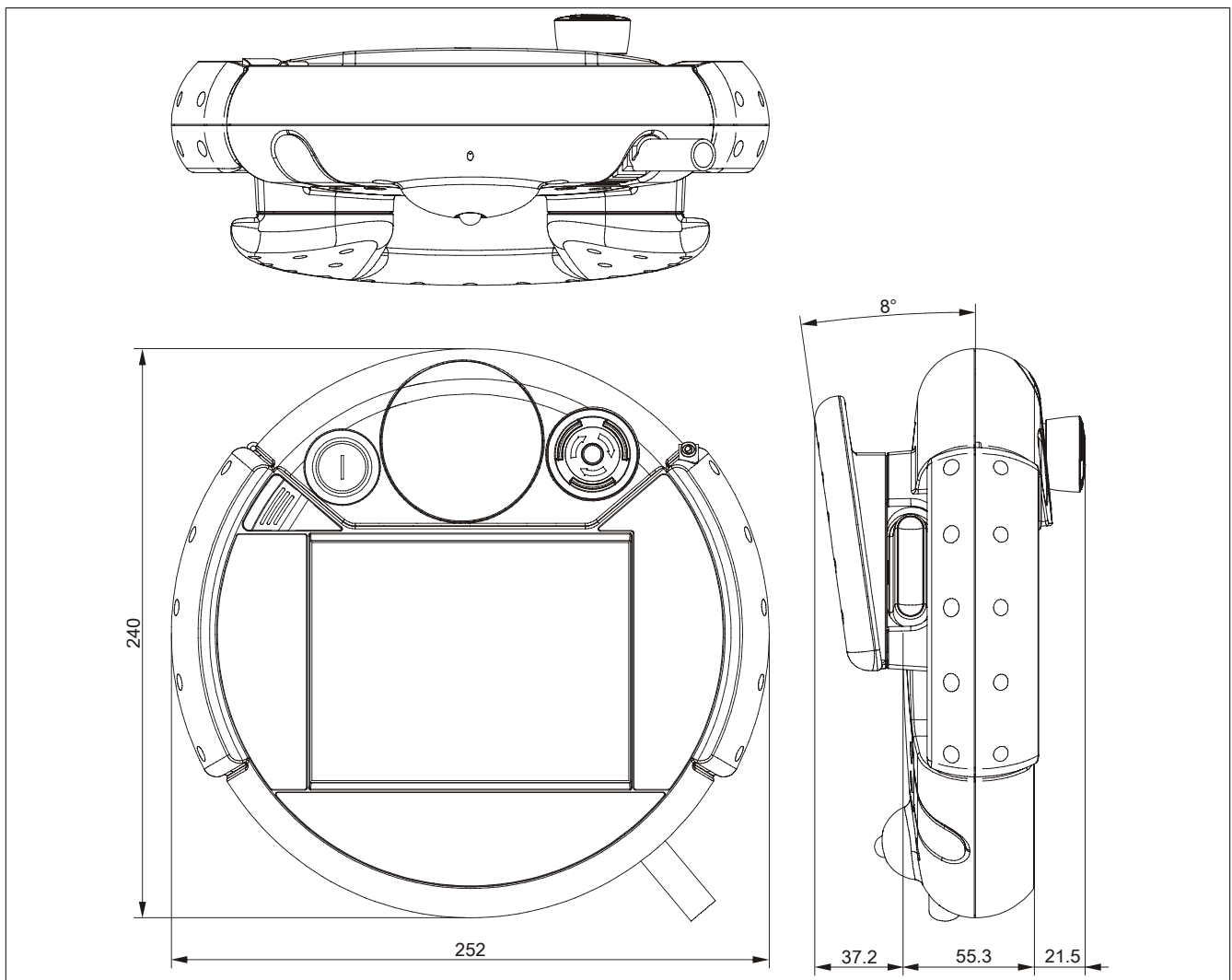


Figure 21: 5MP040.0381-02 - Dimensions

3.1.3 5MP050.0653-01

3.1.3.1 General information

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

3.1.3.2 Order data


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

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

3.1.3.3 Components

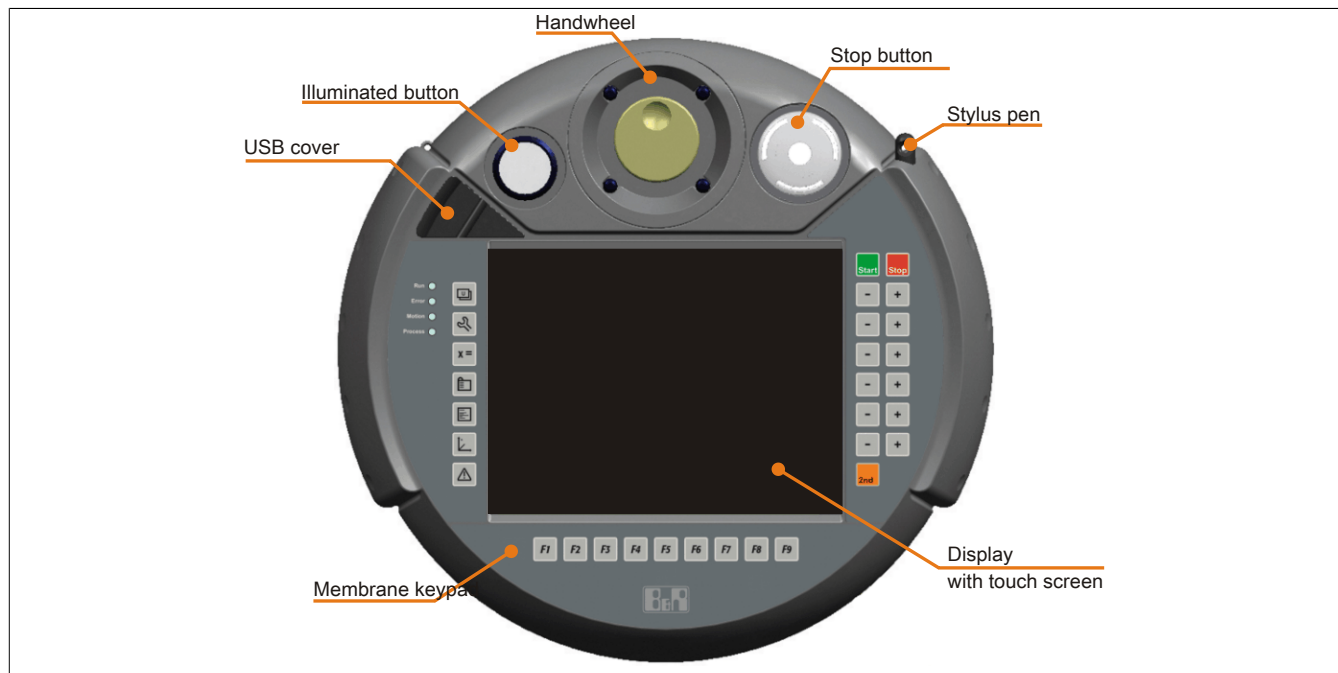


Figure 22: 5MP050.0653-01 - Components

3.1.3.4 Technical data

Information:

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

Product ID	5MP050.0653-01
General information	
Reset button	Yes
Controller	
Processor	
Type	Intel PXA 270
Clock frequency	416 MHz
Mode/Node switches	No
Graphics	
Controller	Intel PXA
SRAM	
Size	-
Battery-buffered	-
Memory	
Type	SDRAM
Size	256 MB
Interfaces	
USB	
Quantity	1
Type	USB 1.1
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s)
Current load	Max. 500 mA
Ethernet	
Quantity	1 ¹⁾
Controller	SMSC11X
Design	Shielded RJ45 port
Transfer rate	10/100 Mbit/s
Max. baud rate	100 Mbit/s
Display	
Type	Color TFT
Diagonal	6.5" (165 mm)
Colors	65,535 ²⁾
Resolution	VGA, 640 x 480 pixels
Contrast	300:1

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

Product ID	5MP050.0653-01
Viewing angles Horizontal Vertical	Direction R / Direction L = 55° Direction U = 30° / Direction D = 60°
Backlight Brightness Half-brightness time	400 cd/m² 50,000 h
Touch screen Technologies	Analog, resistive
Keys	Keys
Function keys	No
Soft keys	9
System keys	22
3-axis joystick	No
Electronic handwheel	Yes
Illuminated button	Yes (white)
Stop button	Yes (2 N.C., right position)
Enabling switch	Yes (two 3-position switches on left and right)
Override potentiometer	No
Key switch	No
LEDs	4
Electrical characteristics	Electrical characteristics
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) ¹⁾
Starting current	Max. 5.6 A (current limiting present)
Power consumption	9.6 W (400 mA at 24 VDC)
Max. interruption of the supply	≤10 ms
Electrical isolation	No
Operating conditions	Operating conditions
Height of drop	1.5 m to industrial floor
Flame resistant	UL94V-0
EN 60529 protection	IP65
Rated protection	Class 3 in accordance with EN 61131-2 or EN 50178
Environmental conditions	Environmental conditions
Temperature Operation Storage Transport	0 to 50°C ³⁾ -20 to 70°C -20 to 70°C
Relative humidity Operation Storage Transport	Max. 95% at T ≤ 40°C, non-condensing Max. 95% at T ≤ 55°C, non-condensing Max. 95% at T ≤ 55°C, non-condensing
Vibration Operation	5 to 9 Hz: 7 mm amplitude / 9 to 150 Hz: 2 g
Shock Operation	15 g (147 m/s² 0-peak) and 11 ms duration
Altitude Operation	Max. 3000 m
Mechanical characteristics	Mechanical characteristics
Housing Material Paint	ABS Similar to RAL 7011
Front Panel membrane Material	Polyester
Dimensions Width Height Depth	252 mm 114 mm 240 mm
Weight	Approx. 1250 g

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

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

3.1.3.5 Temperature humidity diagram

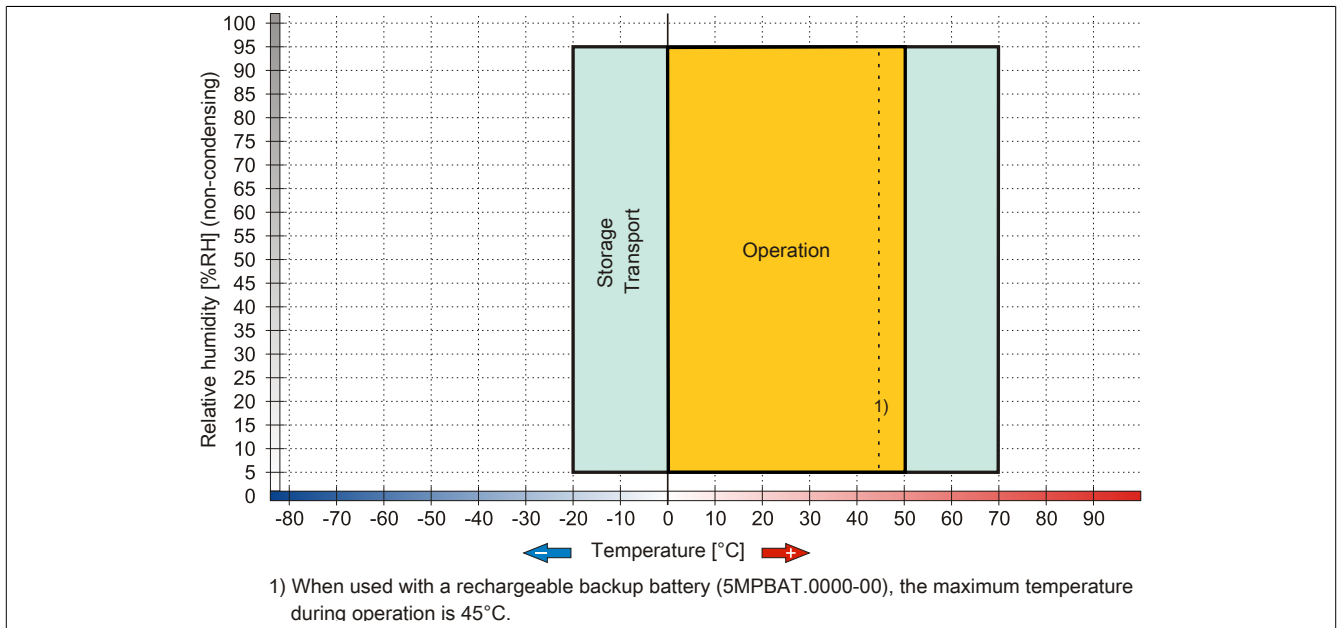


Figure 23: 5MP050.0653-01 - Temperature humidity diagram

3.1.3.6 Dimensions

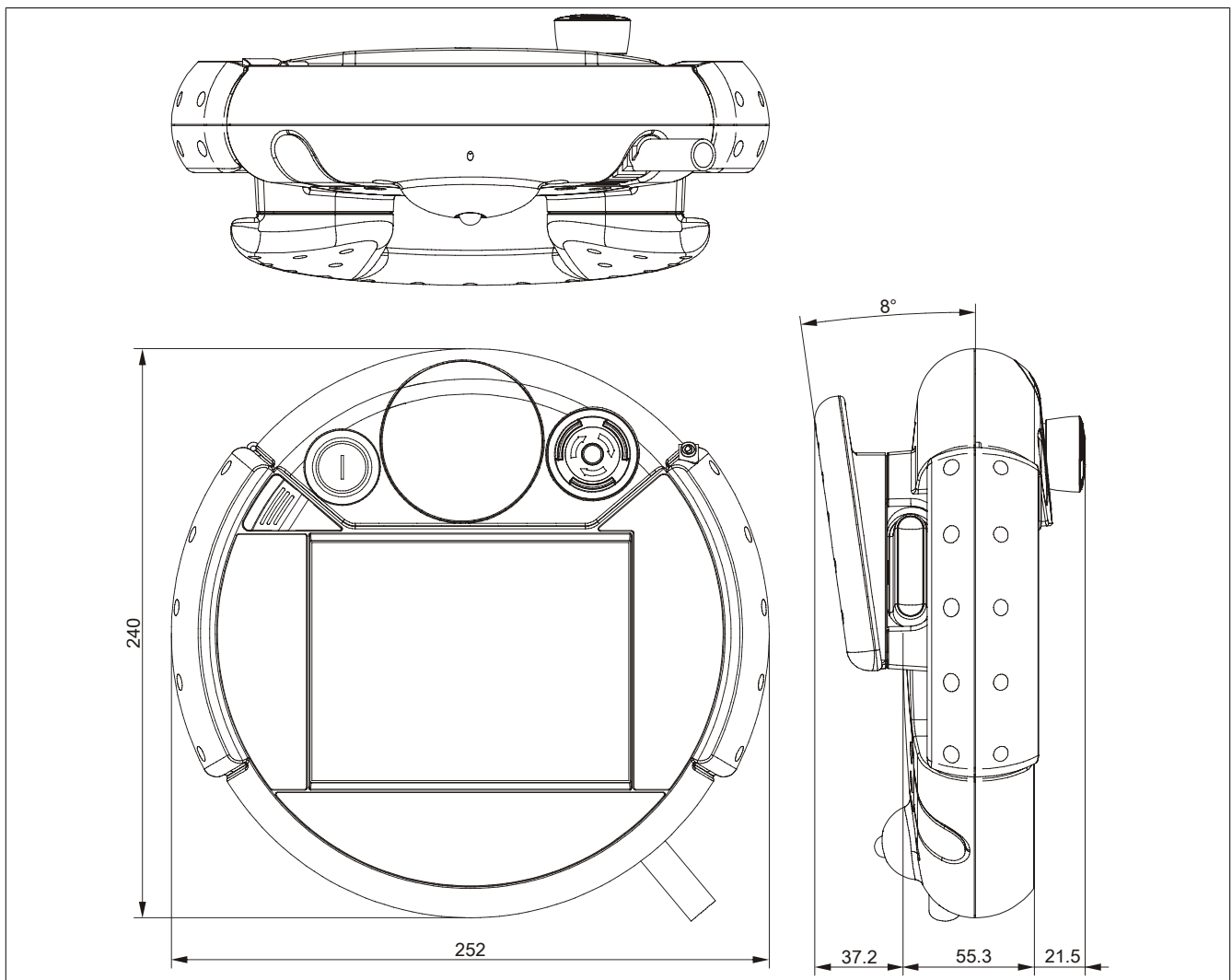


Figure 24: 5MP050.0653-01 - Dimensions

3.1.4 5MP050.0653-02

3.1.4.1 General information

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

3.1.4.2 Order data


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

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

3.1.4.3 Components

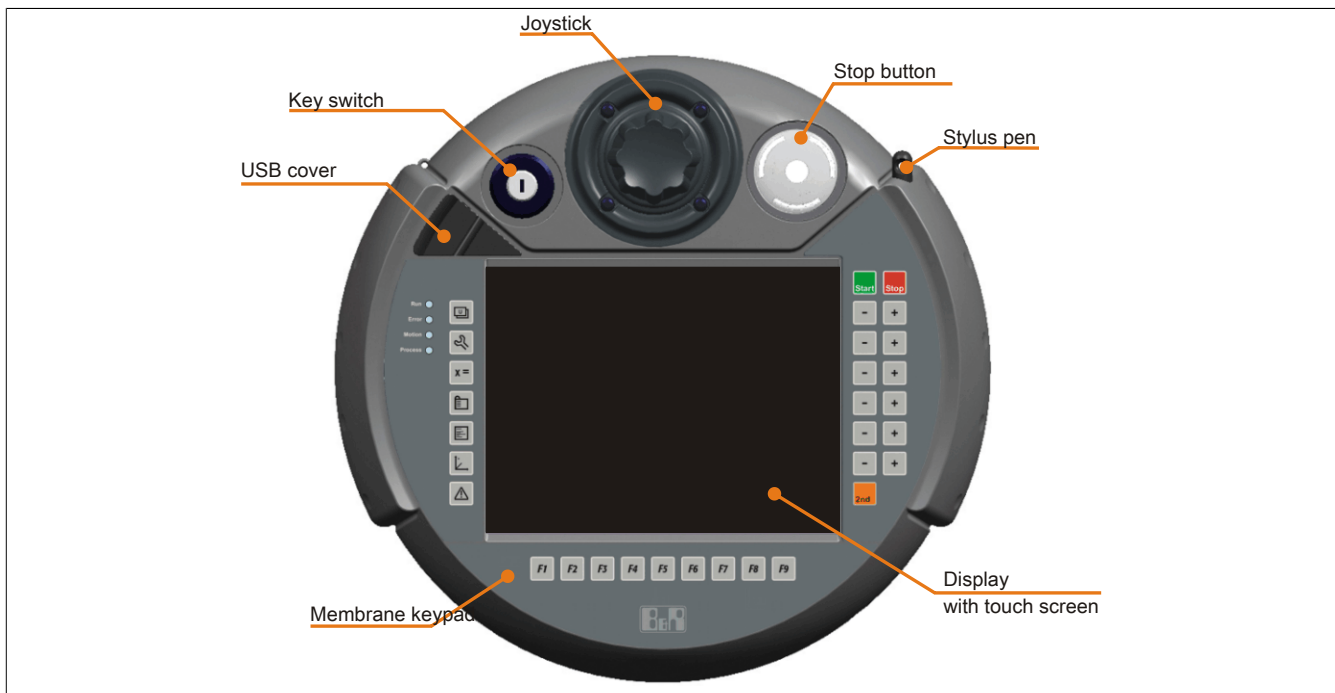


Figure 25: 5MP050.0653-02 - Components

3.1.4.4 Technical data

Information:

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

Product ID	5MP050.0653-02
General information	
Reset button	Yes
Controller	
Processor	
Type	Intel PXA 270
Clock frequency	416 MHz
Mode/Node switches	No
Graphics	
Controller	Intel PXA
SRAM	
Size	-
Battery-buffered	-
Memory	
Type	SDRAM
Size	256 MB
Interfaces	
USB	
Quantity	1
Type	USB 1.1
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s)
Current load	Max. 500 mA
Ethernet	
Quantity	1 ¹⁾
Controller	SMSC11X
Design	Shielded RJ45 port
Transfer rate	10/100 Mbit/s
Max. baud rate	100 Mbit/s
Display	
Type	Color TFT
Diagonal	6.5" (165 mm)
Colors	65,535 ²⁾
Resolution	VGA, 640 x 480 pixels

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

Product ID	5MP050.0653-02
Contrast	300:1
Viewing angles	
Horizontal	Direction R / Direction L = 55°
Vertical	Direction U = 30° / Direction D = 60°
Backlight	
Brightness	400 cd/m ²
Half-brightness time	50,000 h
Touch screen	
Technologies	Analog, resistive
Keys	Keys
Function keys	No
Soft keys	9
System keys	22
3-axis joystick	Yes
Electronic handwheel	No
Illuminated button	No
Stop button	Yes (2 N.C., right position)
Enabling switch	Yes (two 3-position switches on left and right)
Override potentiometer	No
Key switch	Yes
LEDs	4
Electrical characteristics	Electrical characteristics
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) ¹⁾
Starting current	Max. 5.6 A (current limiting present)
Power consumption	9.6 W (400 mA at 24 VDC)
Max. interruption of the supply	≤10 ms
Electrical isolation	No
Operating conditions	Operating conditions
Height of drop	1.5 m to industrial floor
Flame resistant	UL94V-0
EN 60529 protection	IP65
Rated protection	Class 3 in accordance with EN 61131-2 or EN 50178
Environmental conditions	Environmental conditions
Temperature	
Operation	0 to 50°C ³⁾
Storage	-20 to 70°C
Transport	-20 to 70°C
Relative humidity	
Operation	Max. 95%, non-condensing
Storage	Max. 95%, non-condensing
Transport	Max. 95%, non-condensing
Vibration	
Operation	5 to 9 Hz: 7 mm amplitude / 9 to 150 Hz: 2 g
Shock	
Operation	15 g (147 m/s ² 0-peak) and 11 ms duration
Altitude	
Operation	Max. 3000 m
Mechanical characteristics	Mechanical characteristics
Housing	
Material	ABS
Paint	Similar to RAL 7011
Front	
Panel membrane	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1250 g

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

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

3.1.4.5 Temperature humidity diagram

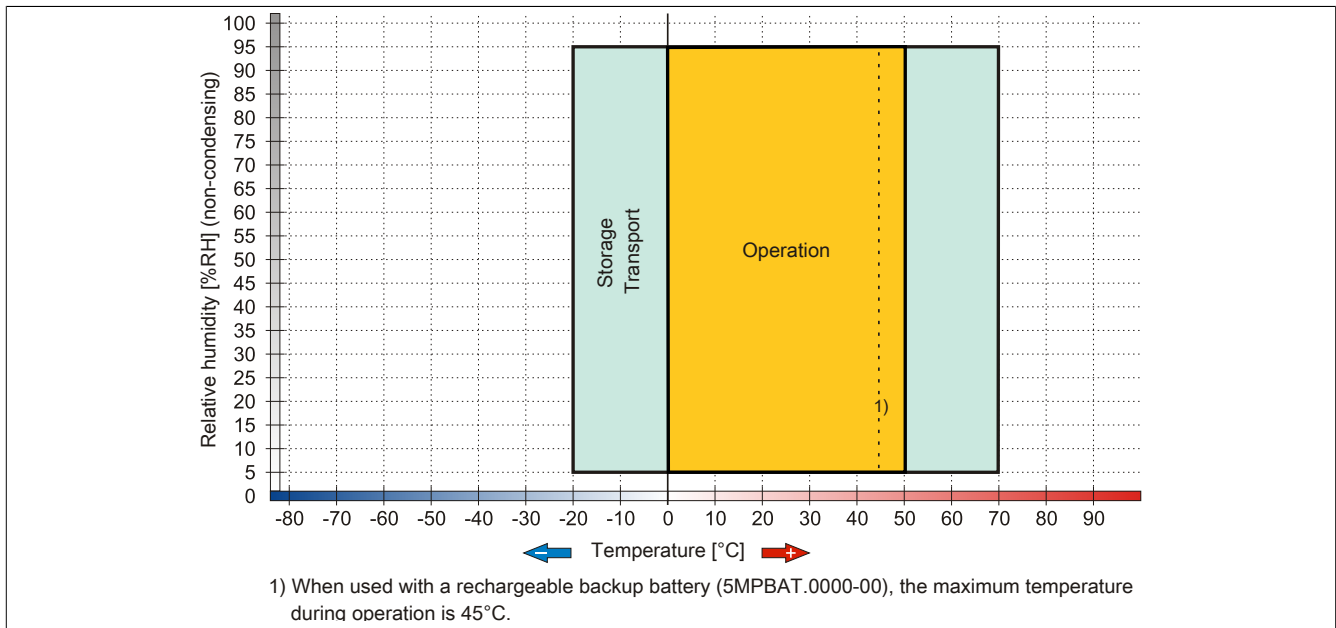


Figure 26: 5MP050.0653-02 - Temperature humidity diagram

3.1.4.6 Dimensions

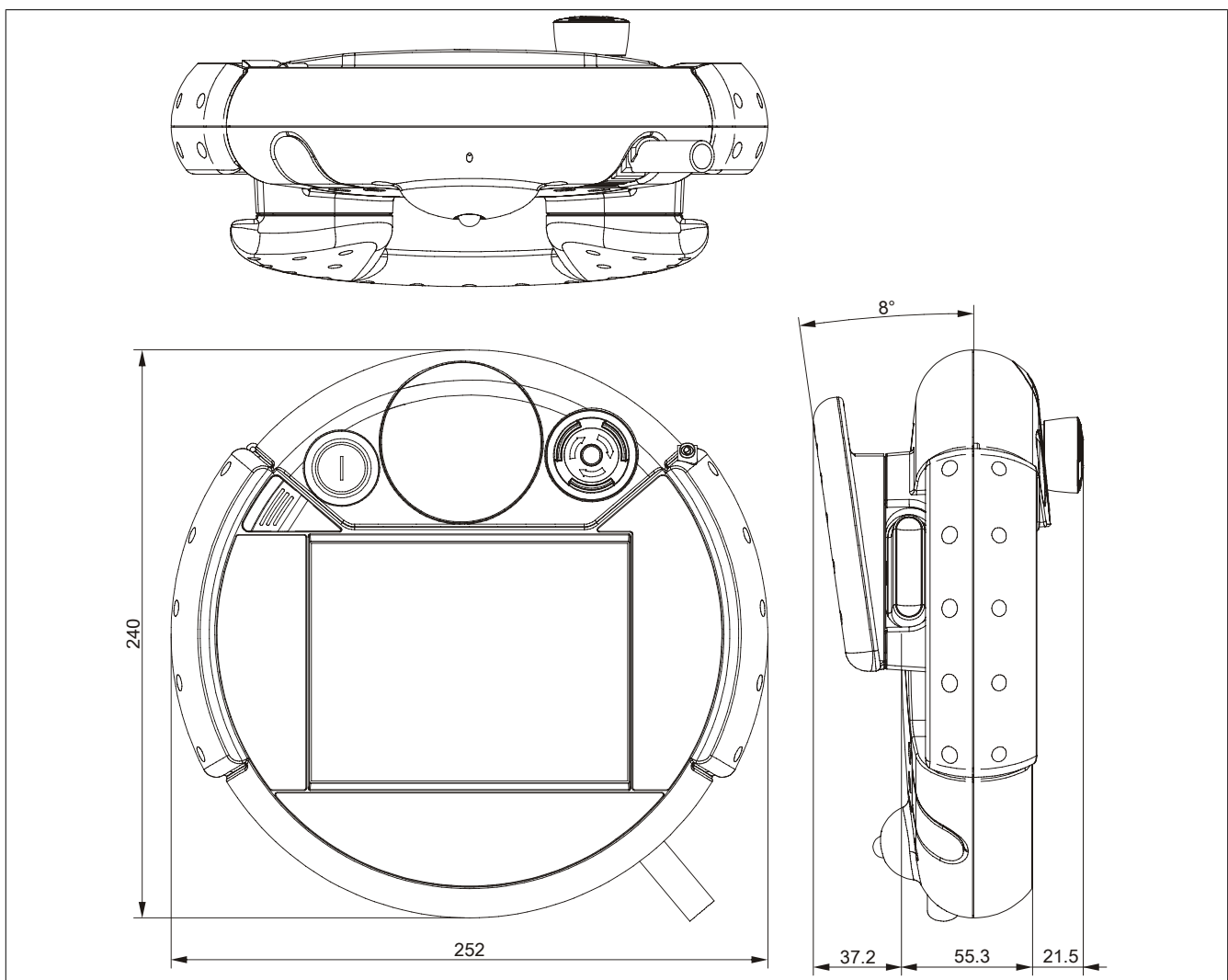


Figure 27: 5MP050.0653-02 - Dimensions

3.1.5 5MP050.0653-03

3.1.5.1 General information

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

3.1.5.2 Order data


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

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

3.1.5.3 Components

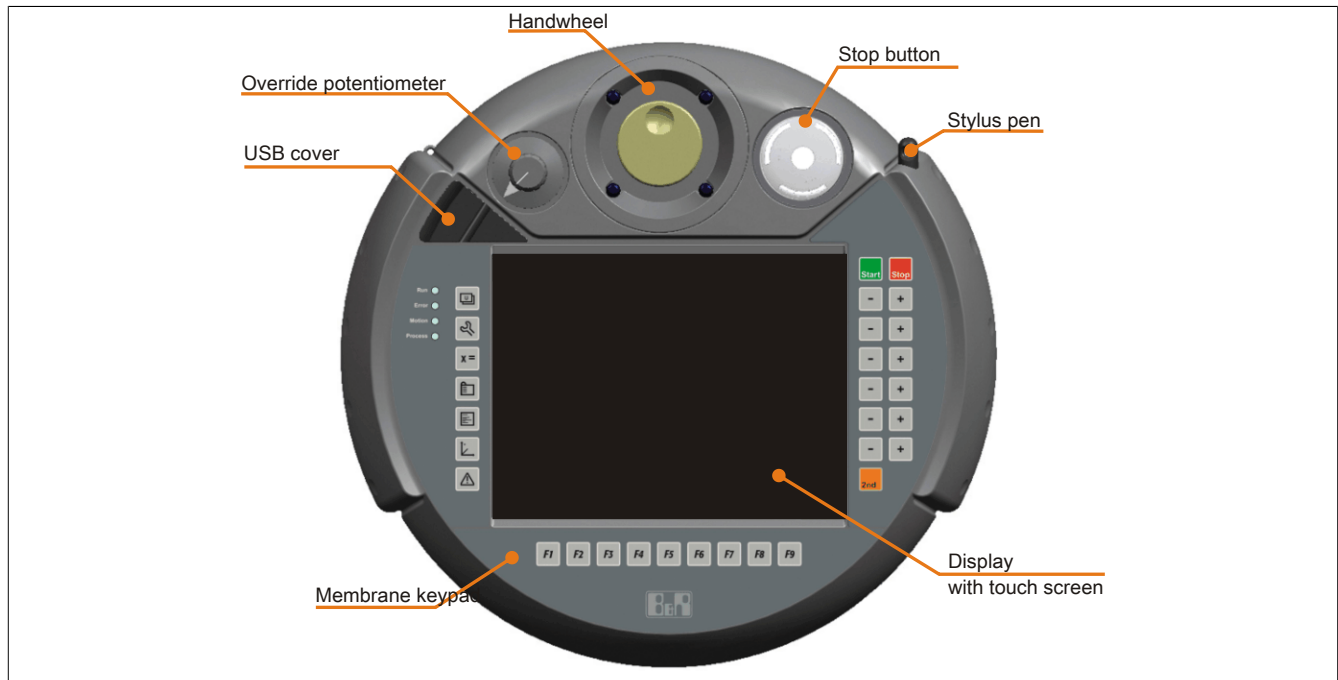


Figure 28: 5MP050.0653-03 - Components

3.1.5.4 Technical data

Information:

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

Product ID	5MP050.0653-03
General information	
Reset button	Yes
Controller	
Processor	
Type	Intel PXA 270
Clock frequency	416 MHz
Mode/Node switches	No
Graphics	
Controller	Intel PXA
SRAM	
Size	-
Battery-buffered	-
Memory	
Type	SDRAM
Size	256 MB
Interfaces	
USB	
Quantity	1
Type	USB 1.1
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s)
Current load	Max. 500 mA
Ethernet	
Quantity	1 ¹⁾
Controller	SMSC11X
Design	Shielded RJ45 port
Transfer rate	10/100 Mbit/s
Max. baud rate	100 Mbit/s
Display	
Type	Color TFT
Diagonal	6.5" (165 mm)
Colors	65,535 ²⁾
Resolution	VGA, 640 x 480 pixels

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

Product ID	5MP050.0653-03
Contrast	300:1
Viewing angles	
Horizontal	Direction R / Direction L = 55°
Vertical	Direction U = 30° / Direction D = 60°
Backlight	
Brightness	400 cd/m ²
Half-brightness time	50,000 h
Touch screen	
Technologies	Analog, resistive
Keys	Keys
Function keys	No
Soft keys	9
System keys	22
3-axis joystick	No
Electronic handwheel	Yes
Illuminated button	No
Stop button	Yes (2 N.C., right position)
Enabling switch	Yes (two 3-position switches on left and right)
Override potentiometer	Yes
Key switch	No
LEDs	4
Electrical characteristics	Electrical characteristics
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) ¹⁾
Starting current	Max. 5.6 A (current limiting present)
Power consumption	9.6 W (400 mA at 24 VDC)
Max. interruption of the supply	≤10 ms
Electrical isolation	No
Operating conditions	Operating conditions
Height of drop	1.5 m to industrial floor
Flame resistant	UL94V-0
EN 60529 protection	IP65
Rated protection	Class 3 in accordance with EN 61131-2 or EN 50178
Environmental conditions	Environmental conditions
Temperature	
Operation	0 to 50°C ³⁾
Storage	-20 to 70°C
Transport	-20 to 70°C
Relative humidity	
Operation	Max. 95%, non-condensing
Storage	Max. 95%, non-condensing
Transport	Max. 95%, non-condensing
Vibration	
Operation	5 to 9 Hz: 7 mm amplitude / 9 to 150 Hz: 2 g
Shock	
Operation	15 g (147 m/s ² 0-peak) and 11 ms duration
Altitude	
Operation	Max. 3000 m
Mechanical characteristics	Mechanical characteristics
Housing	
Material	ABS
Paint	Similar to RAL 7011
Front	
Panel membrane	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1250 g

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

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

3.1.5.5 Temperature humidity diagram

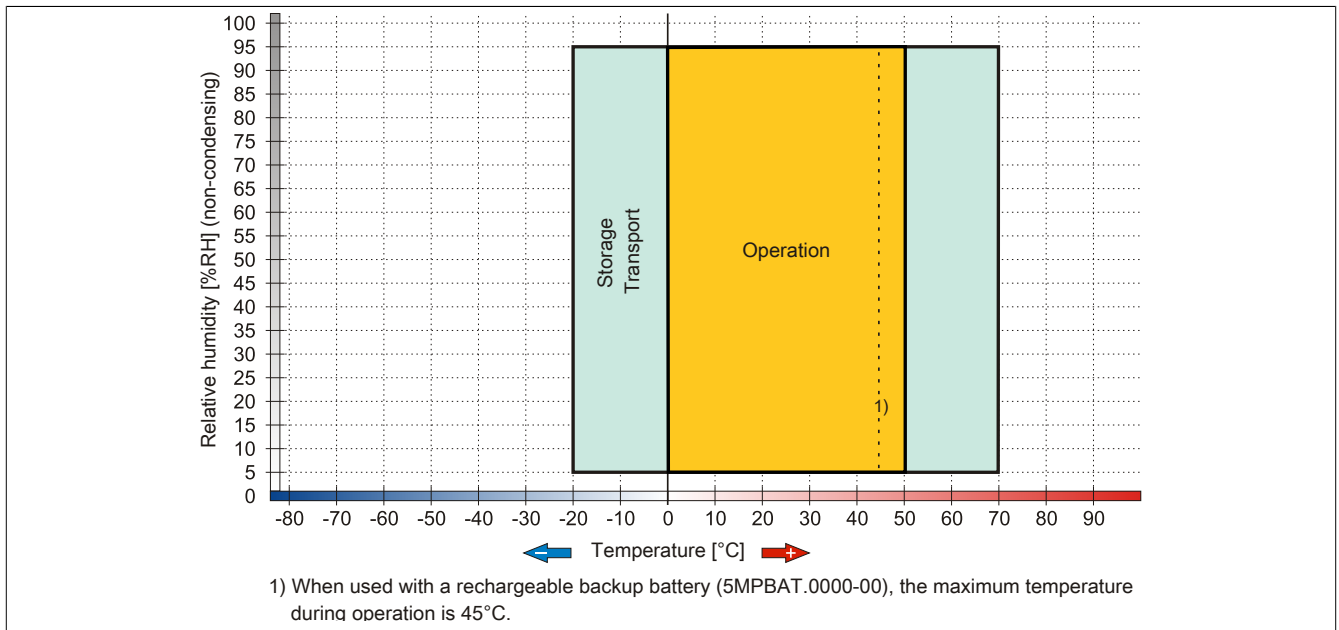


Figure 29: 5MP050.0653-03 - Temperature humidity diagram

3.1.5.6 Dimensions

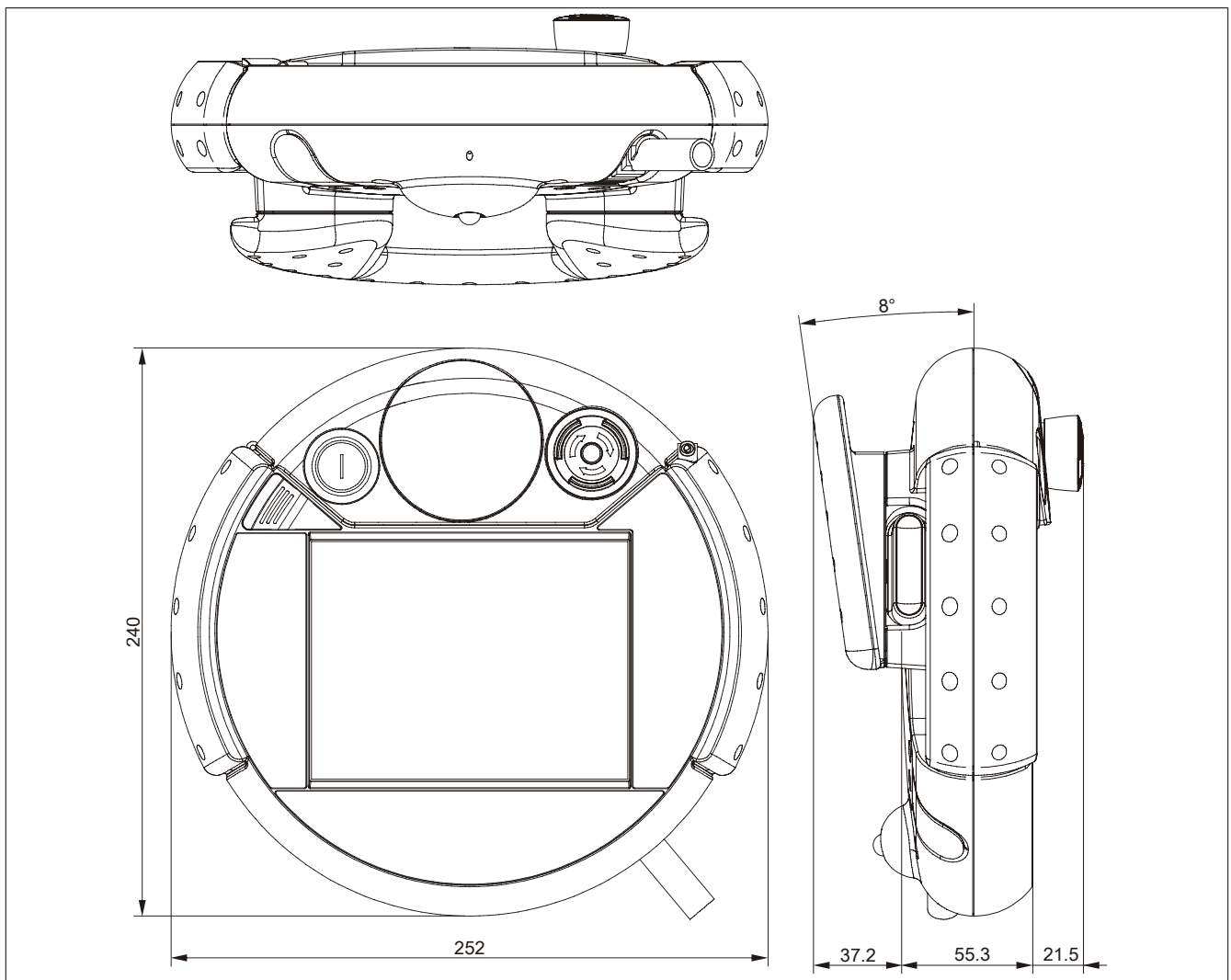


Figure 30: 5MP050.0653-03 - Dimensions

3.1.6 5MP050.0653-04

3.1.6.1 General information

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

3.1.6.2 Order data


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

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

3.1.6.3 Components

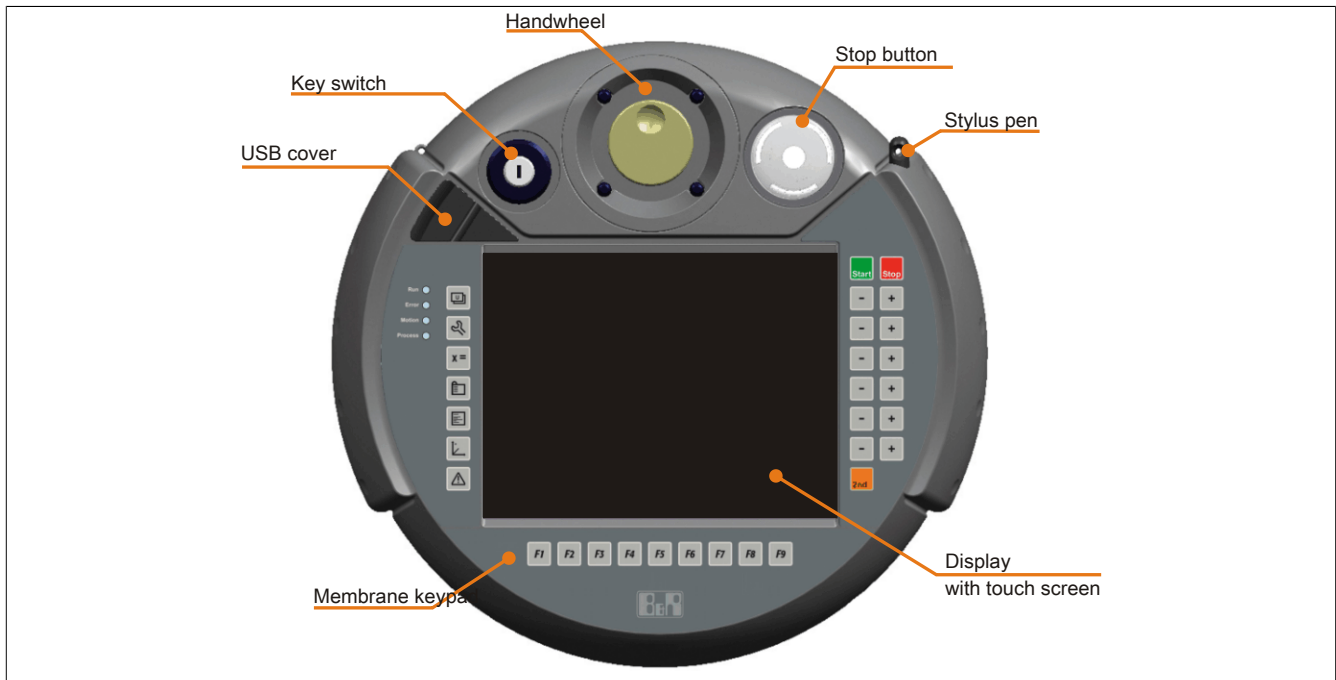


Figure 31: 5MP050.0653-04 - Components

3.1.6.4 Technical data

Information:

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

Product ID	5MP050.0653-04
General information	
Reset button	Yes
Controller	
Processor	
Type	Intel PXA 270
Clock frequency	416 MHz
Mode/Node switches	No
Graphics	
Controller	Intel PXA
SRAM	
Size	-
Battery-buffered	-
Memory	
Type	SDRAM
Size	256 MB
Interfaces	
USB	
Quantity	1
Type	USB 1.1
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s)
Current load	Max. 500 mA
Ethernet	
Quantity	1 ¹⁾
Controller	SMSC11X
Design	Shielded RJ45 port
Transfer rate	10/100 Mbit/s
Max. baud rate	100 Mbit/s
Display	
Type	Color TFT
Diagonal	6.5" (165 mm)
Colors	65,535 ²⁾
Resolution	VGA, 640 x 480 pixels

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

Product ID	5MP050.0653-04
Contrast	300:1
Viewing angles	
Horizontal	Direction R / Direction L = 55°
Vertical	Direction U = 30° / Direction D = 60°
Backlight	
Brightness	400 cd/m ²
Half-brightness time	50,000 h
Touch screen	
Technologies	Analog, resistive
Keys	Keys
Function keys	No
Soft keys	9
System keys	22
3-axis joystick	No
Electronic handwheel	Yes
Illuminated button	No
Stop button	Yes (2 N.C., right position)
Enabling switch	Yes (two 3-position switches on left and right)
Override potentiometer	No
Key switch	Yes
LEDs	4
Electrical characteristics	Electrical characteristics
Nominal voltage	24 VDC ±25% (integrated reverse polarity protection) ¹⁾
Starting current	Max. 5.6 A (current limiting present)
Power consumption	9.6 W (400 mA at 24 VDC)
Max. interruption of the supply	≤10 ms
Electrical isolation	No
Operating conditions	Operating conditions
Height of drop	1.5 m to industrial floor
Flame resistant	UL94V-0
EN 60529 protection	IP65
Rated protection	Class 3 in accordance with EN 61131-2 or EN 50178
Environmental conditions	Environmental conditions
Temperature	
Operation	0 to 50°C ³⁾
Storage	-20 to 70°C
Transport	-20 to 70°C
Relative humidity	
Operation	Max. 95%, non-condensing
Storage	Max. 95%, non-condensing
Transport	Max. 95%, non-condensing
Vibration	
Operation	5 to 9 Hz: 7 mm amplitude / 9 to 150 Hz: 2 g
Shock	
Operation	15 g (147 m/s ² 0-peak) and 11 ms duration
Altitude	
Operation	Max. 3000 m
Mechanical characteristics	Mechanical characteristics
Housing	
Material	ABS
Paint	Similar to RAL 7011
Front	
Panel membrane	
Material	Polyester
Dimensions	
Width	252 mm
Height	114 mm
Depth	240 mm
Weight	Approx. 1250 g

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

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

3.1.6.5 Temperature humidity diagram

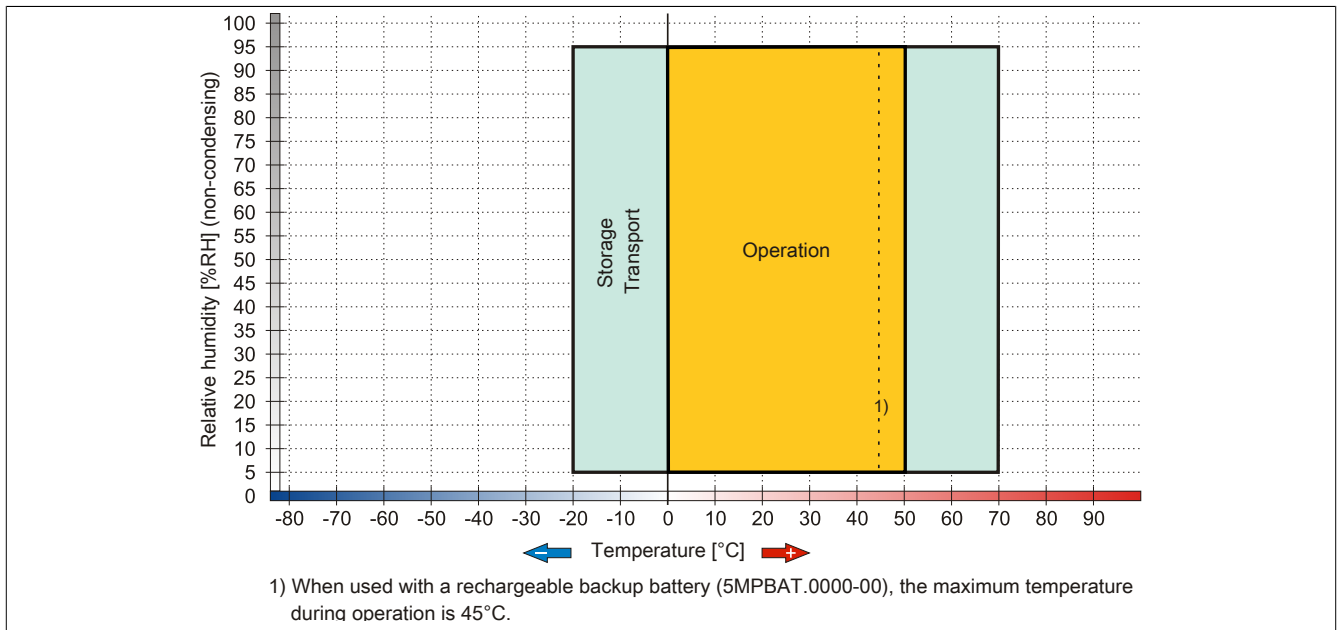


Figure 32: 5MP050.0653-04 - Temperature humidity diagram

3.1.6.6 Dimensions

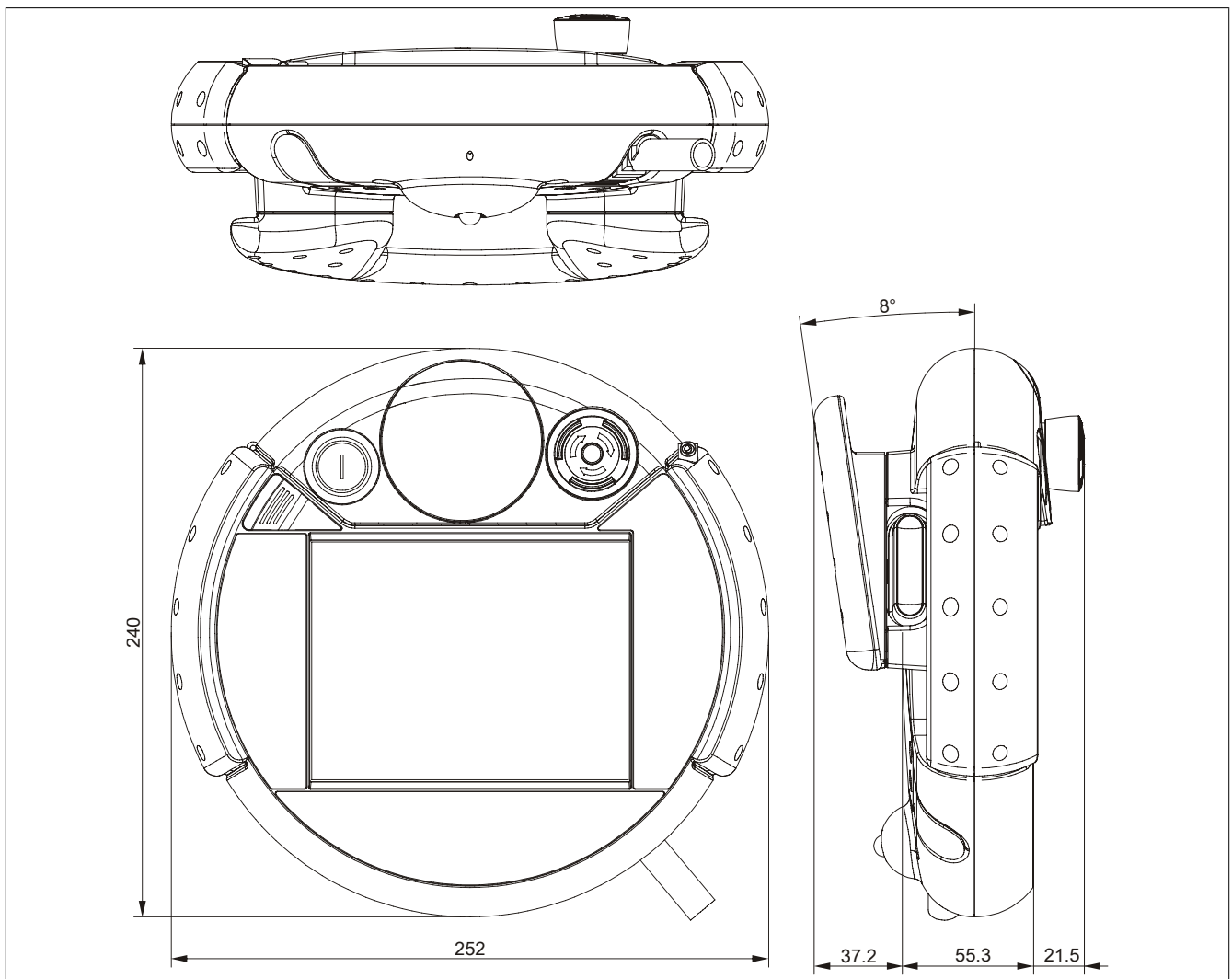


Figure 33: 5MP050.0653-04 - Dimensions

3.2 Cables

3.2.1 Attachment cables

3.2.1.1 5CAMPH.0xxx-30

3.2.1.1.1 General information

Attachment cables establish the electrical and mechanical connection between the control cabinet and the device. They contain the lines for the network (Ethernet 10/100 Mbit/s) as well as for the control devices and 24 VDC supply.



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

The surface is protected against water, oil (lubricating and hydraulic oils in accordance with EN 60811, part 2-1) and cooling lubricant.

On the Mobile Panel, the attachment cable is connected in the attachment shaft. On the control cabinet side, the attachment cable has a male circular connector. Attachment cables are available in different lengths. For information about how to connect the attachment cable, see "Installation" on page 67.

3.2.1.1.2 Order data


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

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

3.2.1.1.3 Technical data

Information:

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

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

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

3.2.1.1.4 Cable pinout

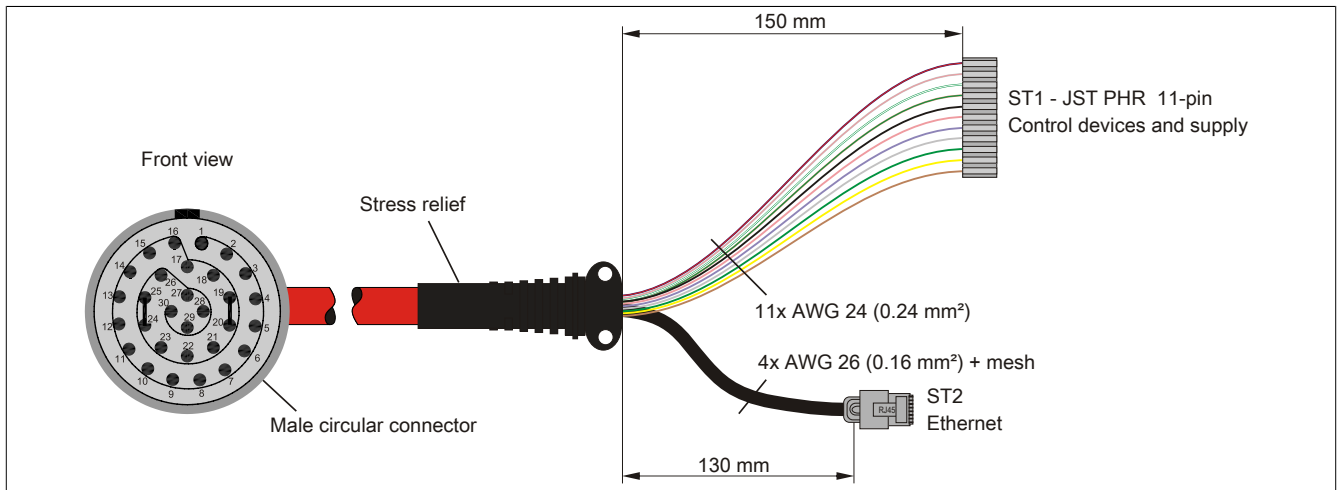


Figure 35: 5CAMPH.0xxx-30 - Attachment cable pinout

ST1 control devices and supply		Wire colors in attachment cable	Connection housing pinout
C 1	Pin 1	Brown	Pin 4
NO 1	Pin 2	Yellow	Pin 5
C 2	Pin 3	Green	Pin 9
NO 2	Pin 4	Gray	Pin 8
Not used	Pin 5	Purple	-
+24 VDC	Pin 6	Pink	Pin 3
GND	Pin 7	Black	Pin 14
Stop O11	Pin 8	Brown-Green	Pin 1
Stop O12	Pin 9	White-Green	Pin 15
Stop O21	Pin 10	Gray-Pink	Pin 2

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

ST1 control devices and supply		Wire colors in attachment cable	Connection housing pinout
Stop O22	Pin 11	Red-Blue	Pin 16
Ethernet shield		-	-
ST2 Ethernet		Wire colors in attachment cable	Connection housing pinout
TX	Pin 1	Blue	Pin 27
TX\	Pin 2	White	Pin 29
RX	Pin 3	Orange	Pin 28
NC	Pin 4	-	-
NC	Pin 5	-	-
RX\	Pin 6	Red	Pin 30
NC	Pin 7	-	-
NC	Pin 8	-	-
Shielding	Housing	Mesh	-

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

3.2.2 Control cabinet cables

3.2.2.1 5CAMPC.0020-10

3.2.2.1.1 General information

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

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

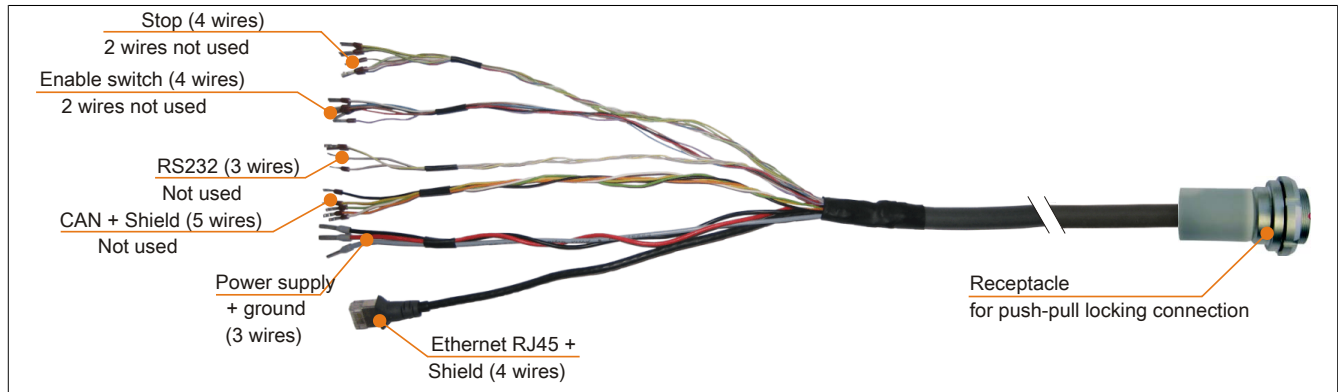


Figure 36: 5CAMPC.0020-10 - Mobile Panel control cabinet cable

Information:

The control cabinet cable is used in the Mobile Panel 40/50 as well as the 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 100/200 devices.

The surface is protected against water, oil (lubricating and hydraulic oils in accordance with EN 60811, part 2-1) and cooling lubricant.

The control cabinet cable is connected to the control cabinet door via the connection housing (see Figure 38 "Drilling template - Receptacle" on page 63). The other end of the control cabinet cable has a preassembled RJ45 Ethernet connector. The rest of the lines have an open end with wire end sleeves, making it easier to wire the cable to safety equipment and other interfaces.

3.2.2.1.2 Order data


Model number	Short description	Figure
	Control cabinet cables	
5CAMPC.0020-10	Mobile Panel Ethernet crossover control cabinet cable with push-pull circular connector, 2 m	
	Optional accessories	
	Accessories	
4MPCBX.0000-00	Mobile Panel connection box for cables with push-pull circular connector	
4MPCBX.0001-00	Mobile Panel small connection box for cables with push-pull circular connector	

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

3.2.2.1.3 Technical data

Information:

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

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

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

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

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

3.2.2.1.4 Cable pinout

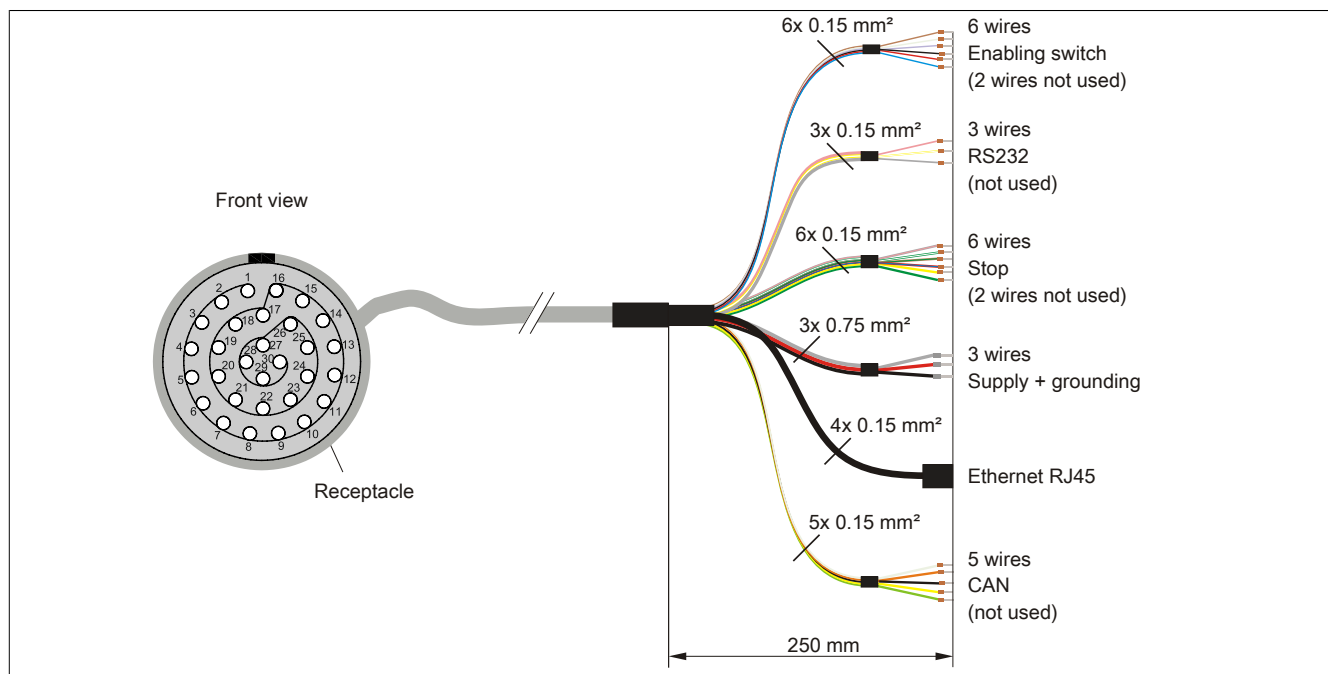


Figure 37: 5CAMPC.0020-10 - Control cabinet cable pinout

Pinout - Receptacle	Wire colors in control cabinet cable	Enable switch wires
4	Brown	C 1
5	White	NO 1
6	Purple	NC 1
9	Black	C 2
8	Red	NO 2
7	Blue	NC 2

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

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

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

Information:

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

3.2.2.1.5 Drilling template - Receptacle

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

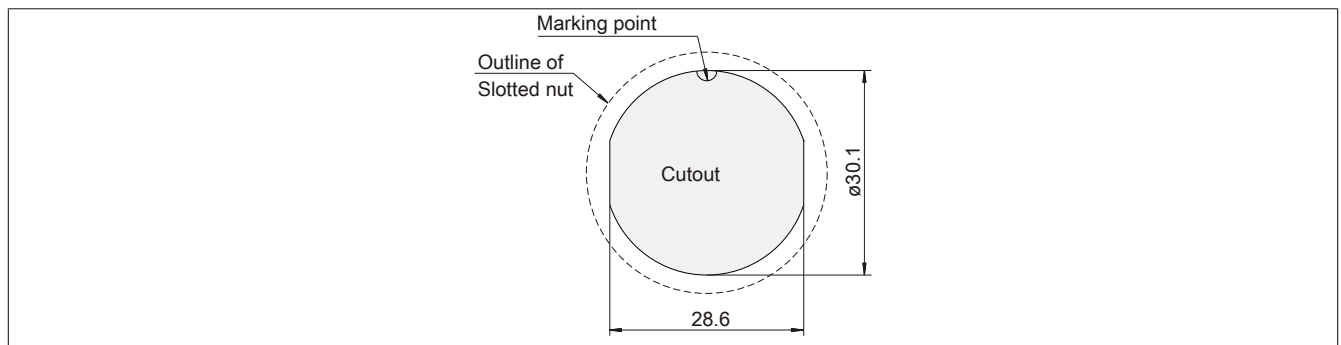


Figure 38: Drilling template - Receptacle

3.2.2.2 5CAMPC.0020-11

3.2.2.2.1 General information

Straight through control cabinet cables are required for the wiring inside the control cabinet.

The pinout of the Ethernet connector (1:1) makes it possible to connect directly to a standard Ethernet hub.

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

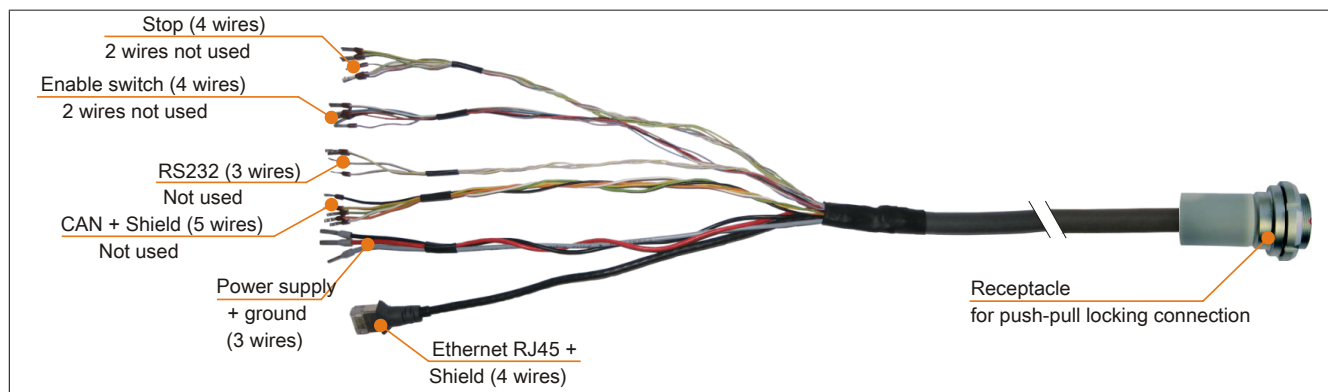


Figure 39: 5CAMPC.0020-11 - Mobile Panel control cabinet cable

Information:

The control cabinet cable is used in the Mobile Panel 40/50 as well as the 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 100/200 devices.

The surface is protected against water, oil (lubricating and hydraulic oils in accordance with EN 60811, part 2-1) and cooling lubricant.

The control cabinet cable is connected to the control cabinet door via the connection housing (see Figure 38 "Drilling template - Receptacle" on page 63). The other end of the control cabinet cable has a preassembled RJ45 Ethernet connector. The rest of the lines have an open end with wire end sleeves, making it easier to wire the cable to safety equipment and other interfaces.

3.2.2.2.2 Order data

Model number	Short description	Figure
5CAMPC.0020-11	Control cabinet cables Mobile Panel Ethernet straight through control cabinet cable with push-pull circular connector, 2 m	
	Optional accessories	
	Accessories	
4MPCBX.0000-00	Mobile Panel connection box for cables with push-pull circular connector	
4MPCBX.0001-00	Mobile Panel small connection box for cables with push-pull circular connector	

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

3.2.2.2.3 Technical data

Information:

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

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

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

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

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

3.2.2.2.4 Cable pinout

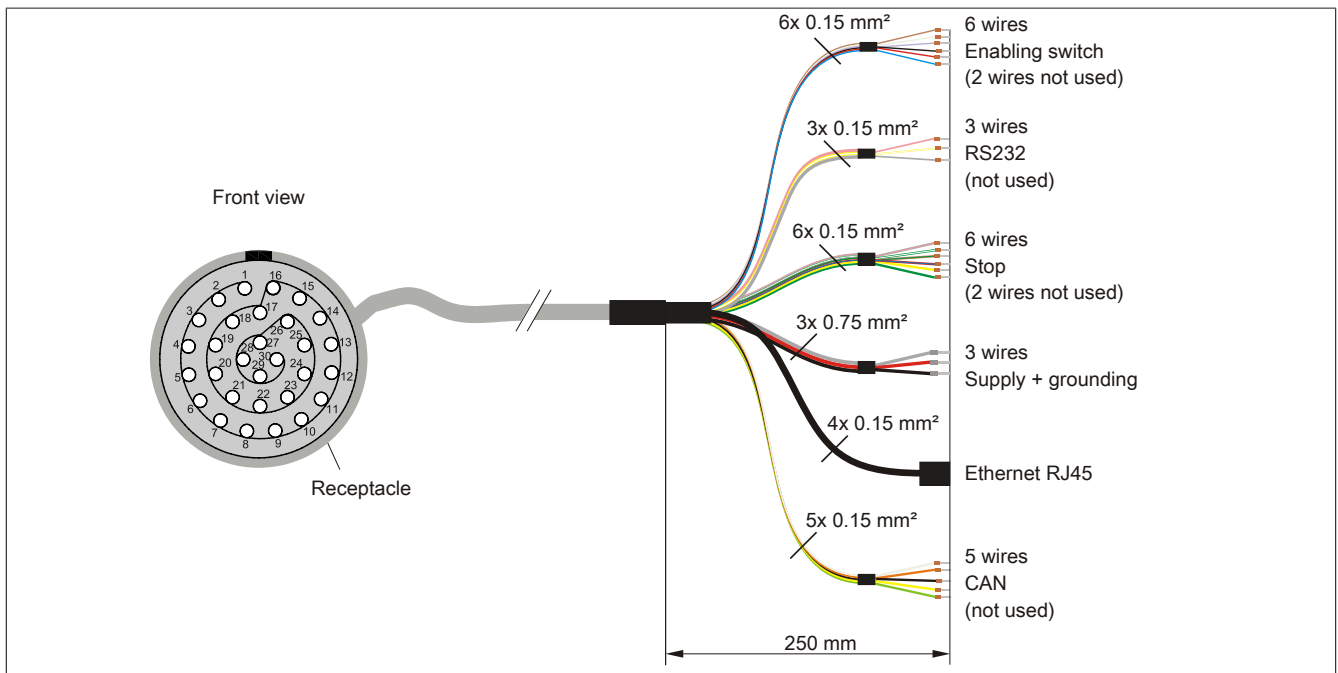


Figure 40: 5CAMPC.0020-11 - Control cabinet cable pinout

Assignments in connection housing	Wire colors in control cabinet cable	Enable switch wires
4	Brown	C 1
5	White	NO 1
6	Purple	NC 1
9	Black	C 2
8	Red	NO 2
7	Blue	NC 2

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

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

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

Information:

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

3.2.2.2.5 Drilling template - Receptacle

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

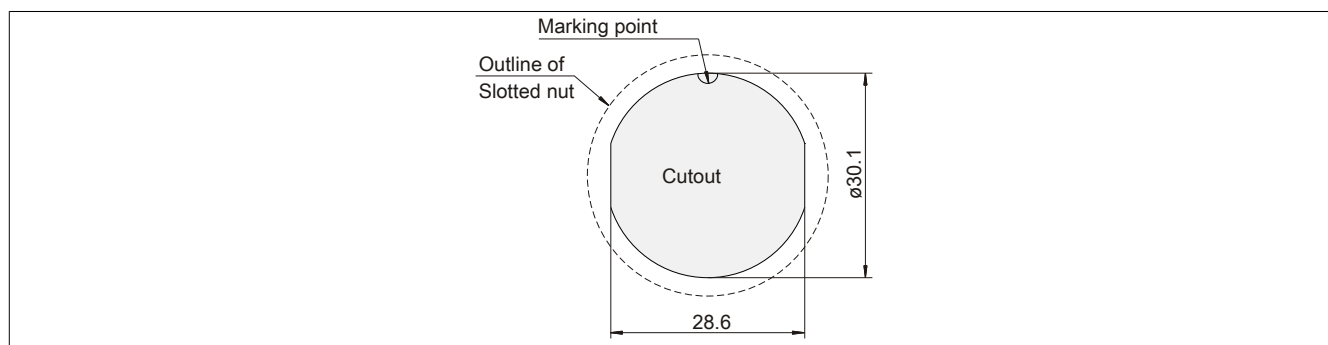


Figure 41: Drilling template - Receptacle

Chapter 3 • Installation

1 Installation from a safety perspective

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

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

In addition to the safety information in this manual, there are work safety and accident prevention guidelines that must also be observed.

Warning!

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

- Correct cable length for restricting the work area
- Stop button necessary or permitted
- Satisfactory safety category for each use
 - The device is only permitted to be operated under the proper conditions and in accordance with the guidelines in this manual.
 - The user must possess the required 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 taken into account.
 - Additional important information regarding safety and EMC can be found in the chapter "Standards and certifications" and must be observed.

1.1 Intended use

Mobile Panel devices can be used to monitor, configure and operate machines. Examples include:

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

Operating modes include:

- Automatic

Other operating modes include semi-automatic and special manual operating modes, such as:

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

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

All safety functions have a dual-circuit design so that safety category 3 PL d can be achieved in accordance with EN ISO 13849-1:2008.

Selecting a hand terminal suitable for the machine and configuring any additional add-on options that may be needed is only possible based on the legally required danger and risk assessment undertaken by the machine manufacturer.

Refer to the section "European Union directives" on page 97 for information regarding intended use of the hand terminal.

2 Operating the Mobile Panel

Caution!

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

Information:

- Protective coverings on the device, housing screws, housing and cables should all be checked periodically for damage.
- For instructions on how to clean the Mobile Panel device, see "Cleaning" on page 132.

3 Connection

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

3.1 Attachment shaft

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

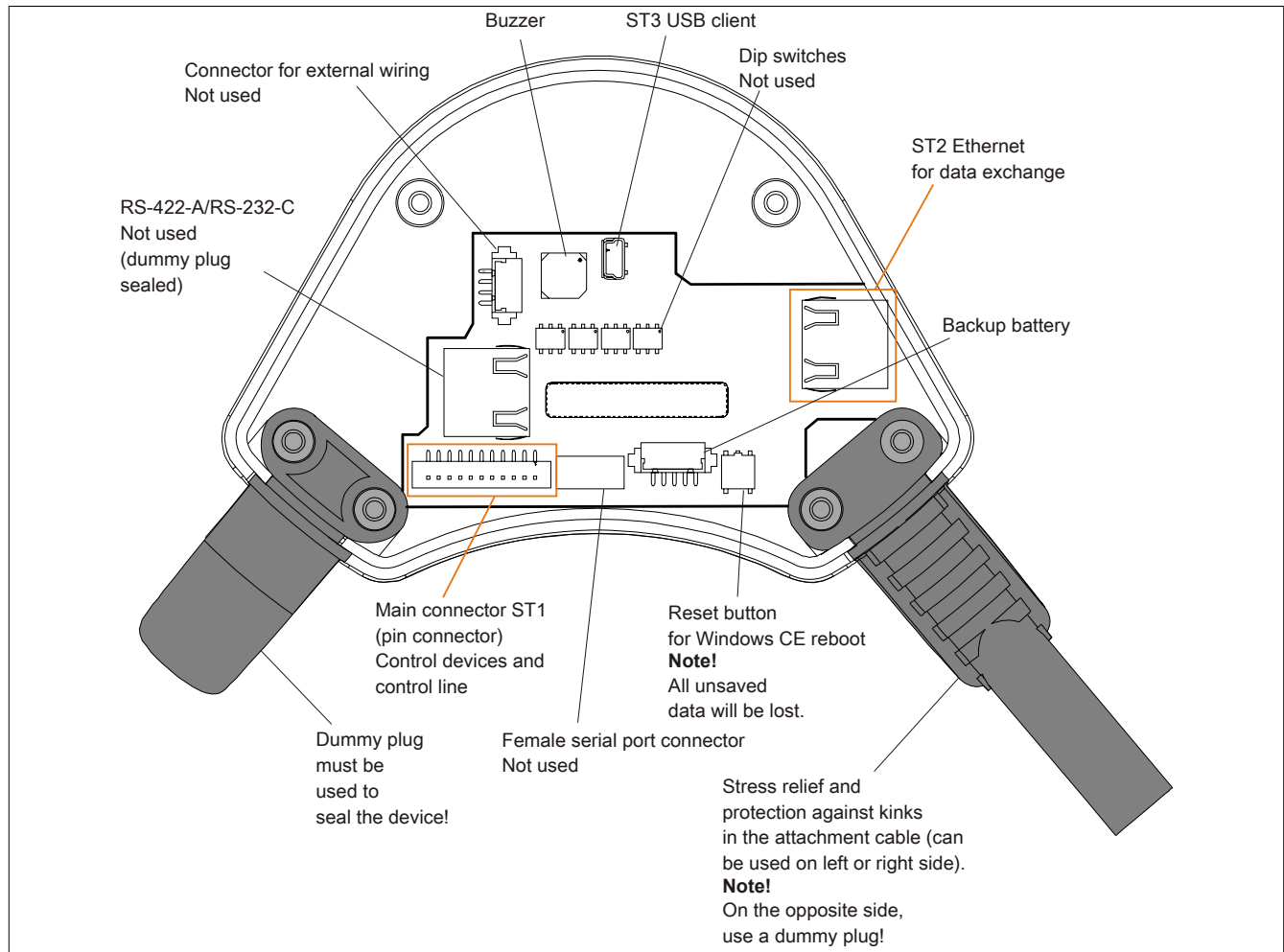


Figure 42: Attachment shaft

3.2 Installing cables in the attachment shaft

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

3.2.1 Tips for opening the attachment shaft

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

3.2.2 Notes on changes in the attachment shaft

- Make sure the main connector (ST1) is removed by pulling the wire with the fingers (do not use sharp objects).
- When removing the RJ45 connector (ST2), make sure that the locking lever is pushed down.

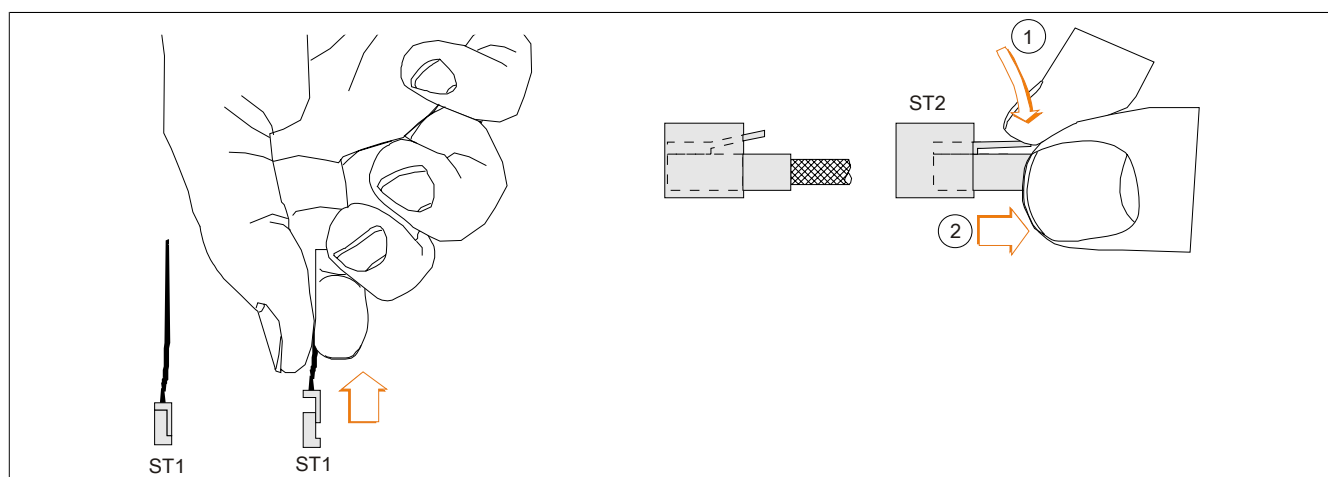


Figure 43: Disconnecting ST1 and ST2

- Make sure that the connector locks into place.

3.2.3 Note for closing the attachment shaft

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

3.3 Cable outlet

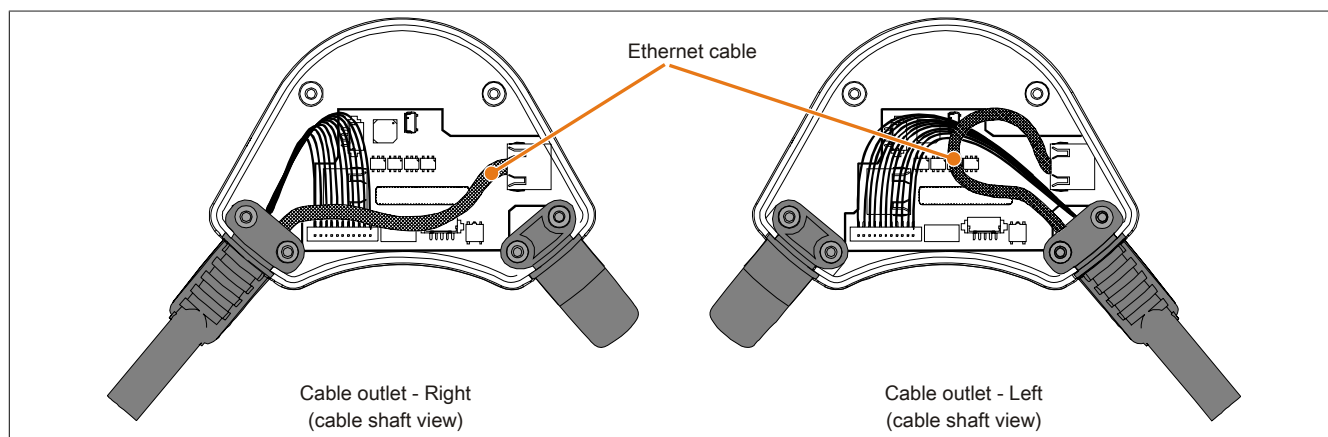


Figure 44: Cable outlet

4 Connection examples

Information:

The monitoring device and subsequent components must be taken into account when calculating the overall enable safety functionality.

4.1 Connection example - Stop button

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

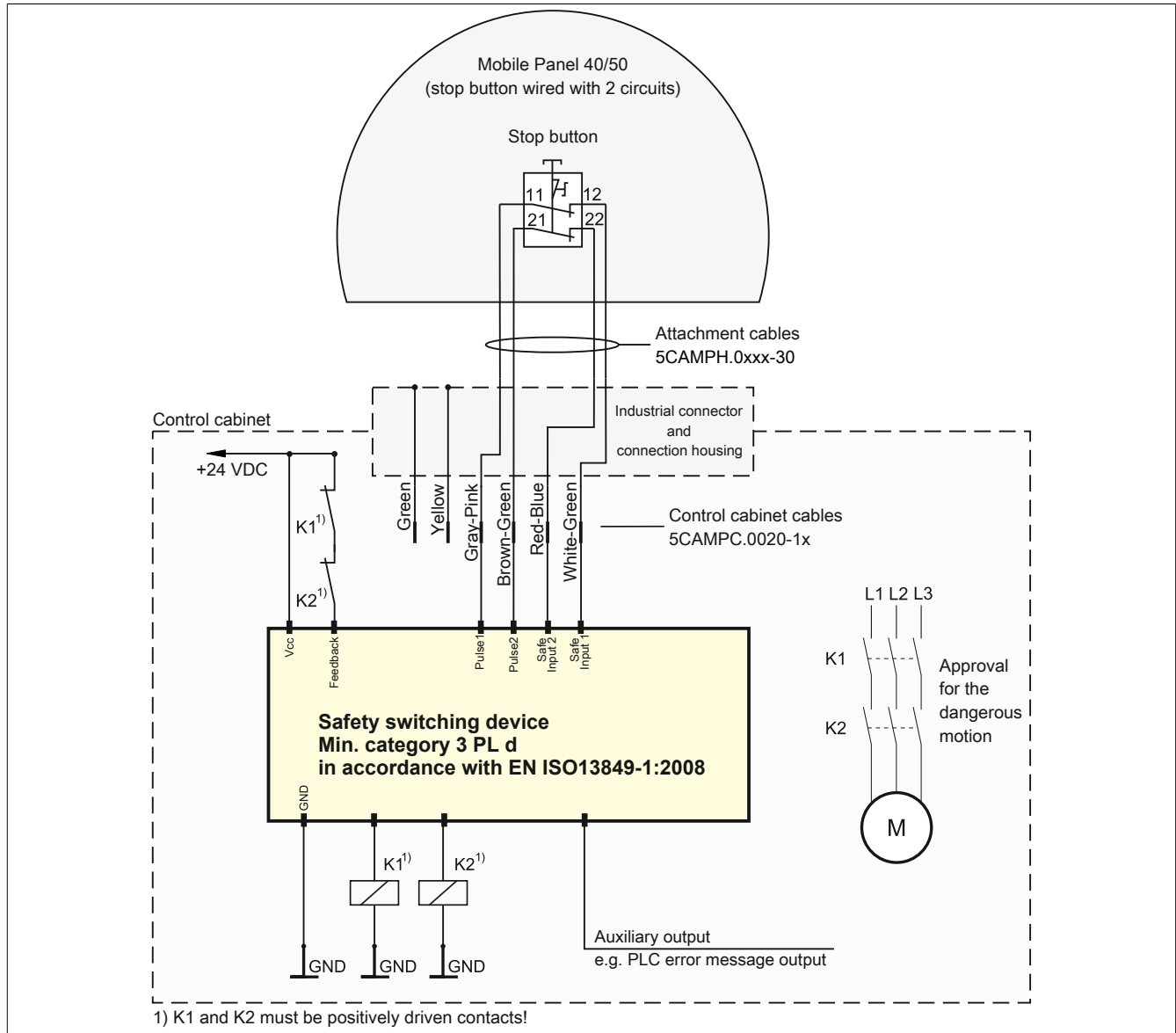


Figure 45: Connection example - Stop button

4.2 Connection example - Enable switch

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

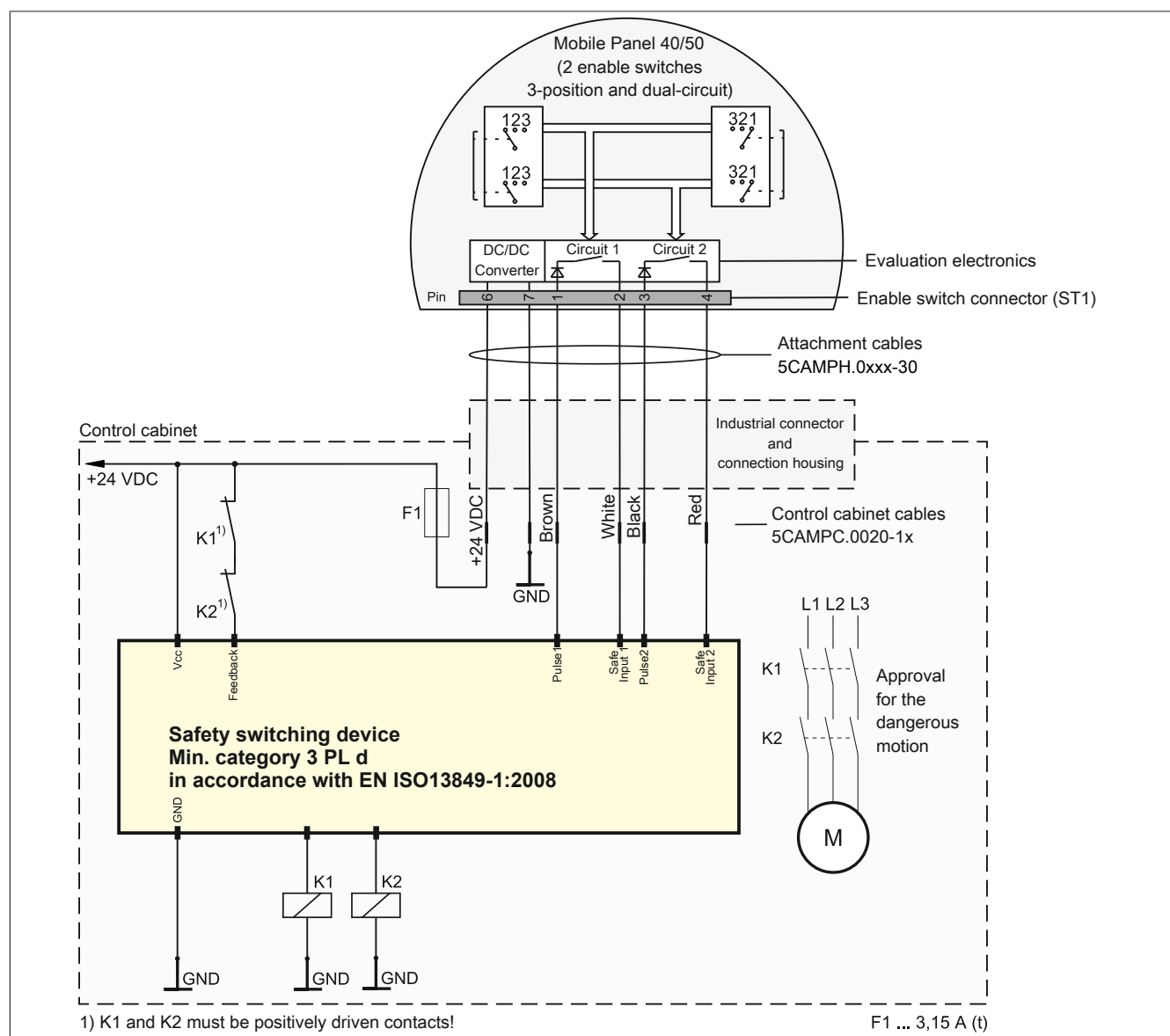


Figure 46: Connection example - Enable switch

5 Connecting a Mobile Panel 100/200

An MP100/200 can be connected to the system in place of an MP40/50. The attachment cables feature the same circular connectors, making it easy to replace devices by simply disconnecting and connecting them.

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

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

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

Table 29: Differences MP100/200 - MP40/50

6 USB interface

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

Warning!

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

1. Open the protective cover.



Figure 47: USB interface - Opening the protective cover

2. Insert the USB flash drive until it catches.



Figure 48: USB interface - Inserting a flash drive

Information:

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

7 Key and LED configuration

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

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

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

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

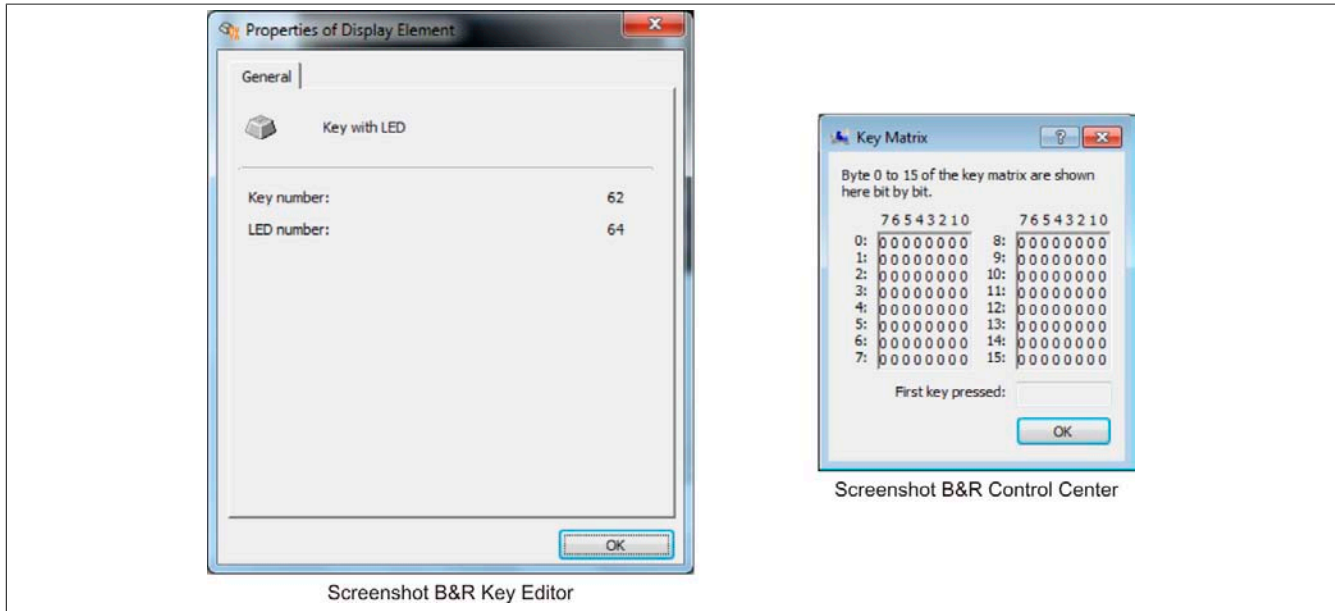


Figure 49: Hardware numbers in the B&R Key Editor and B&R Control Center

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

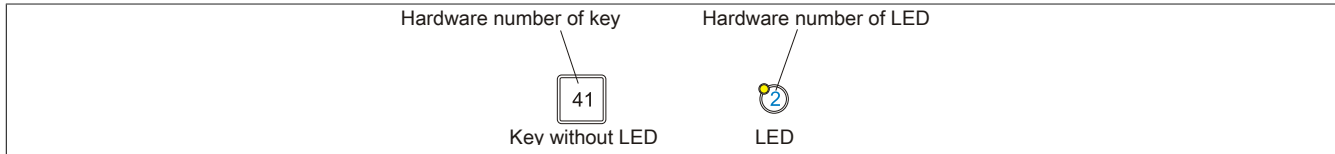


Figure 50: Keys and LEDs in the matrix

7.1 Mobile Panel 40

7.1.1 Mobile Panel 5MP040.0381-01

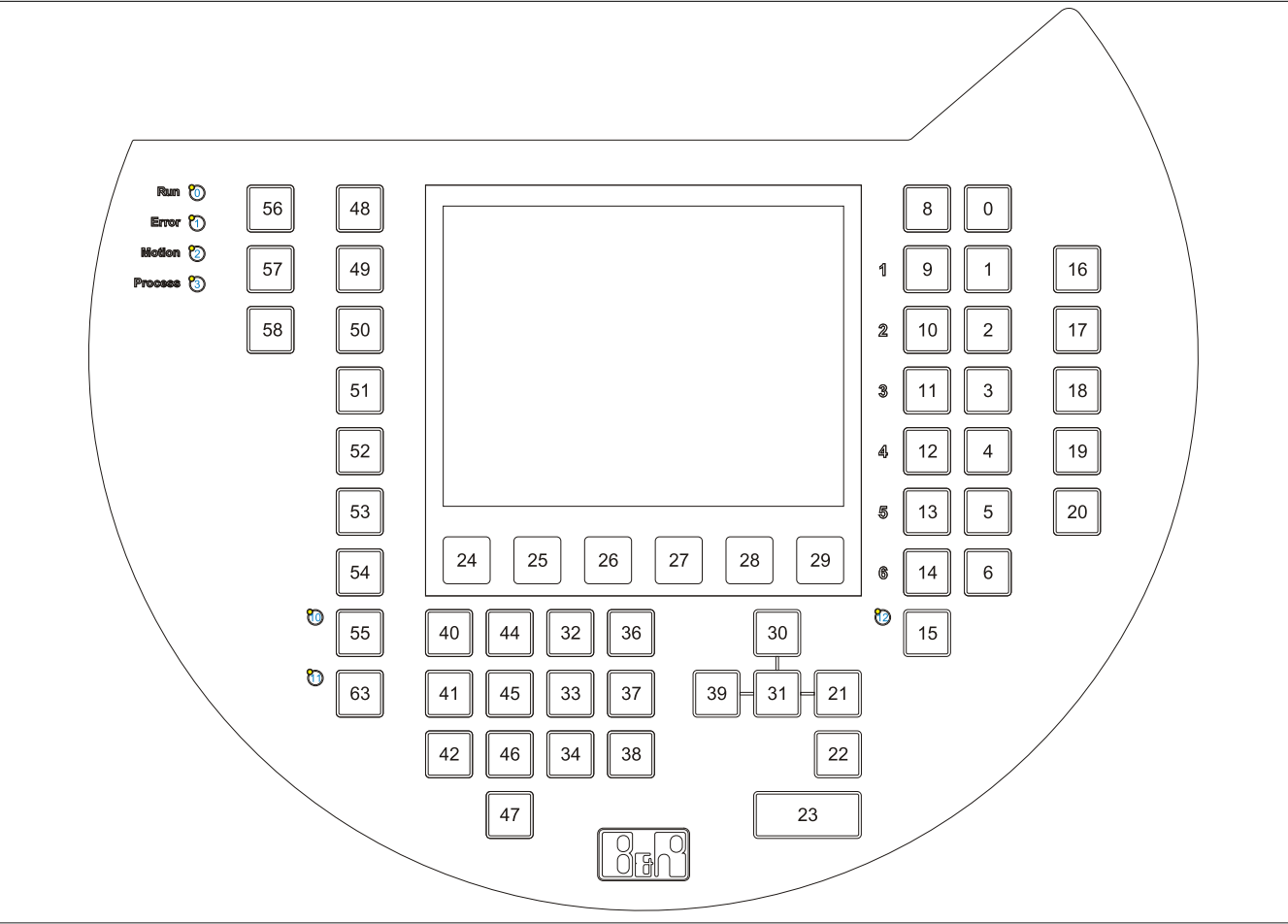


Figure 51: 5MP040.0381-01 - Hardware numbers

7.1.2 Mobile Panel 5MP040.0381-02

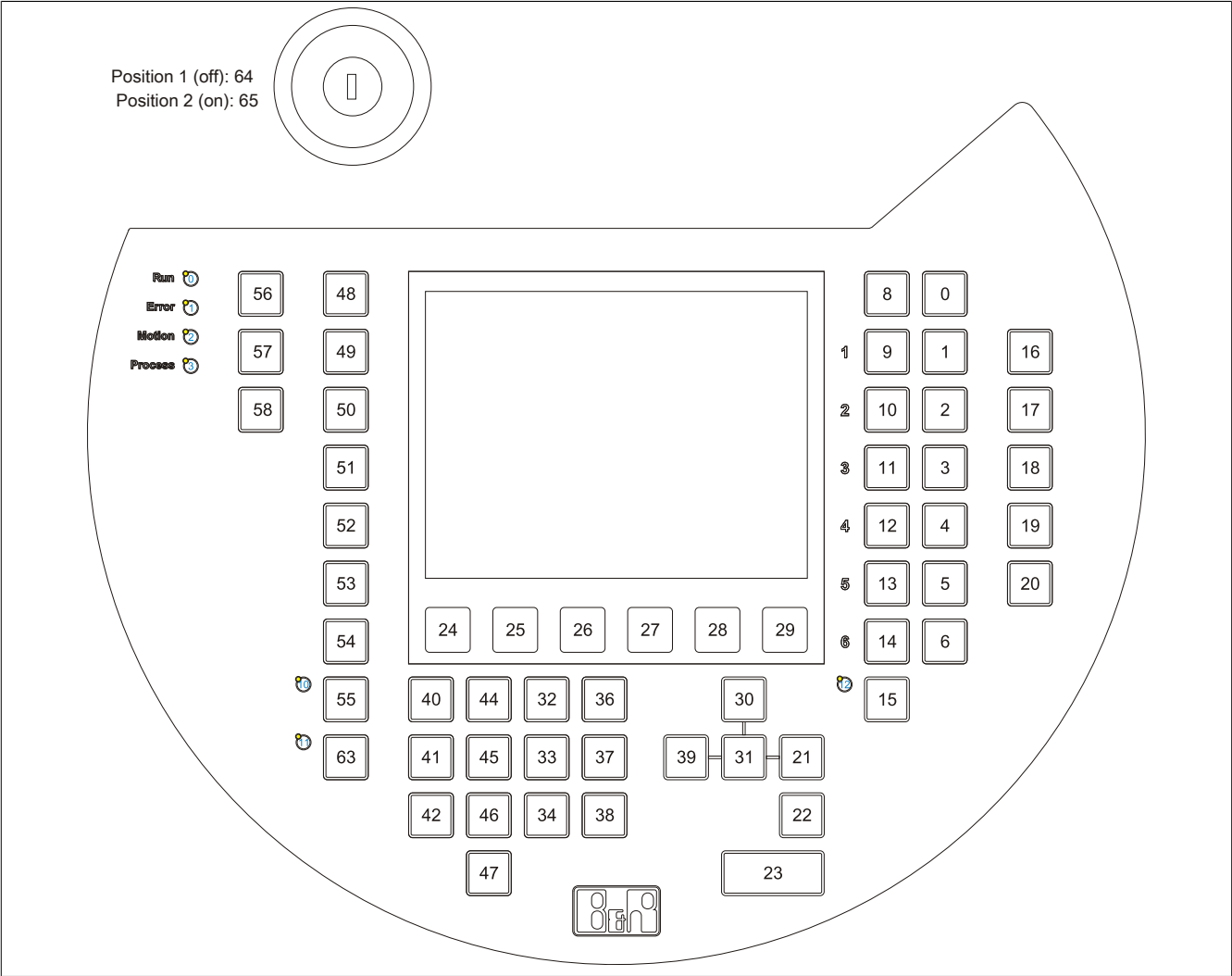


Figure 52: 5MP040.0381-02 - Hardware numbers

7.2 Mobile Panel 50

7.2.1 Mobile Panel 5MP050.0653-01

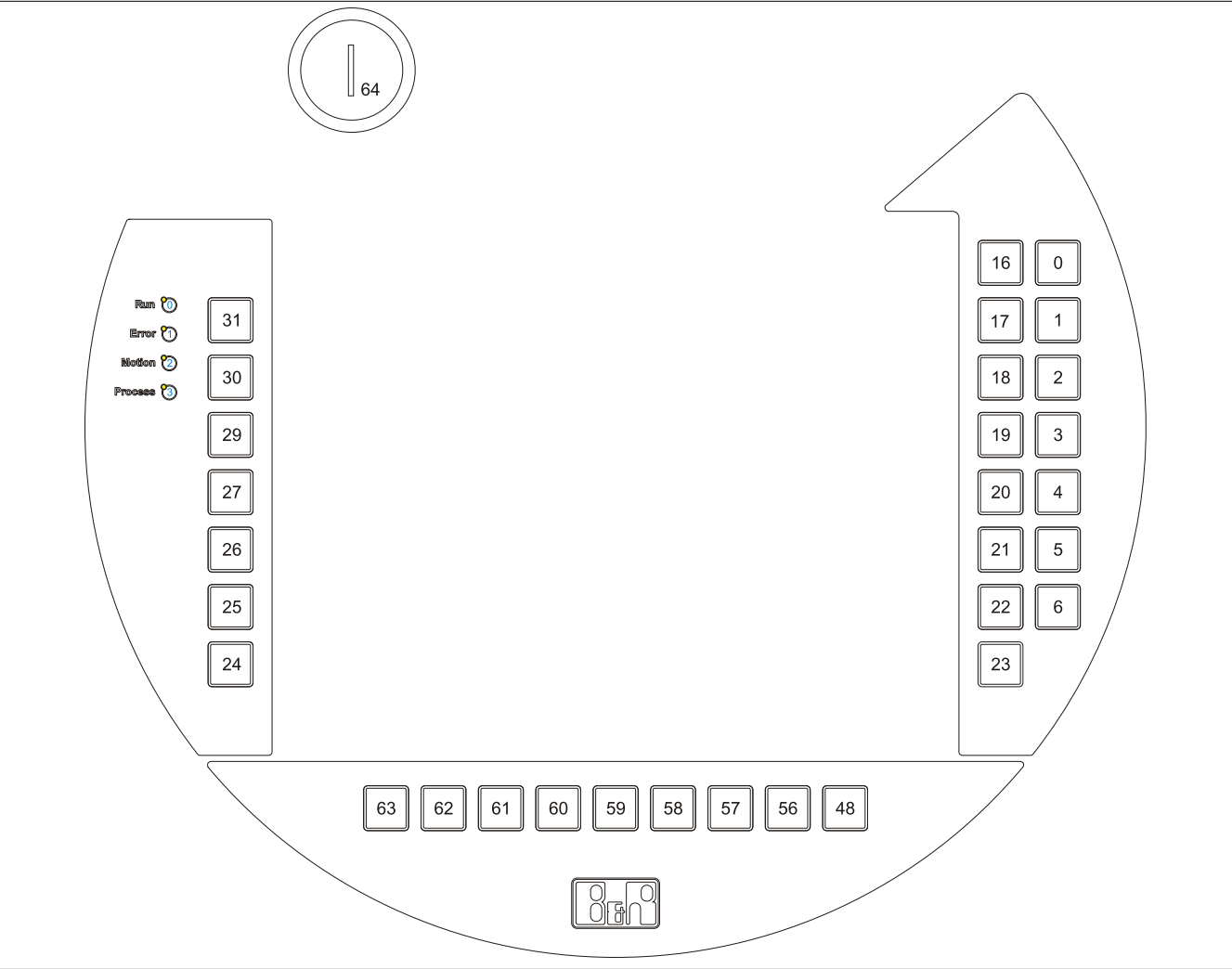


Figure 53: 5MP050.0653-01 - Hardware numbers

7.2.2 Mobile Panel 5MP050.0653-02

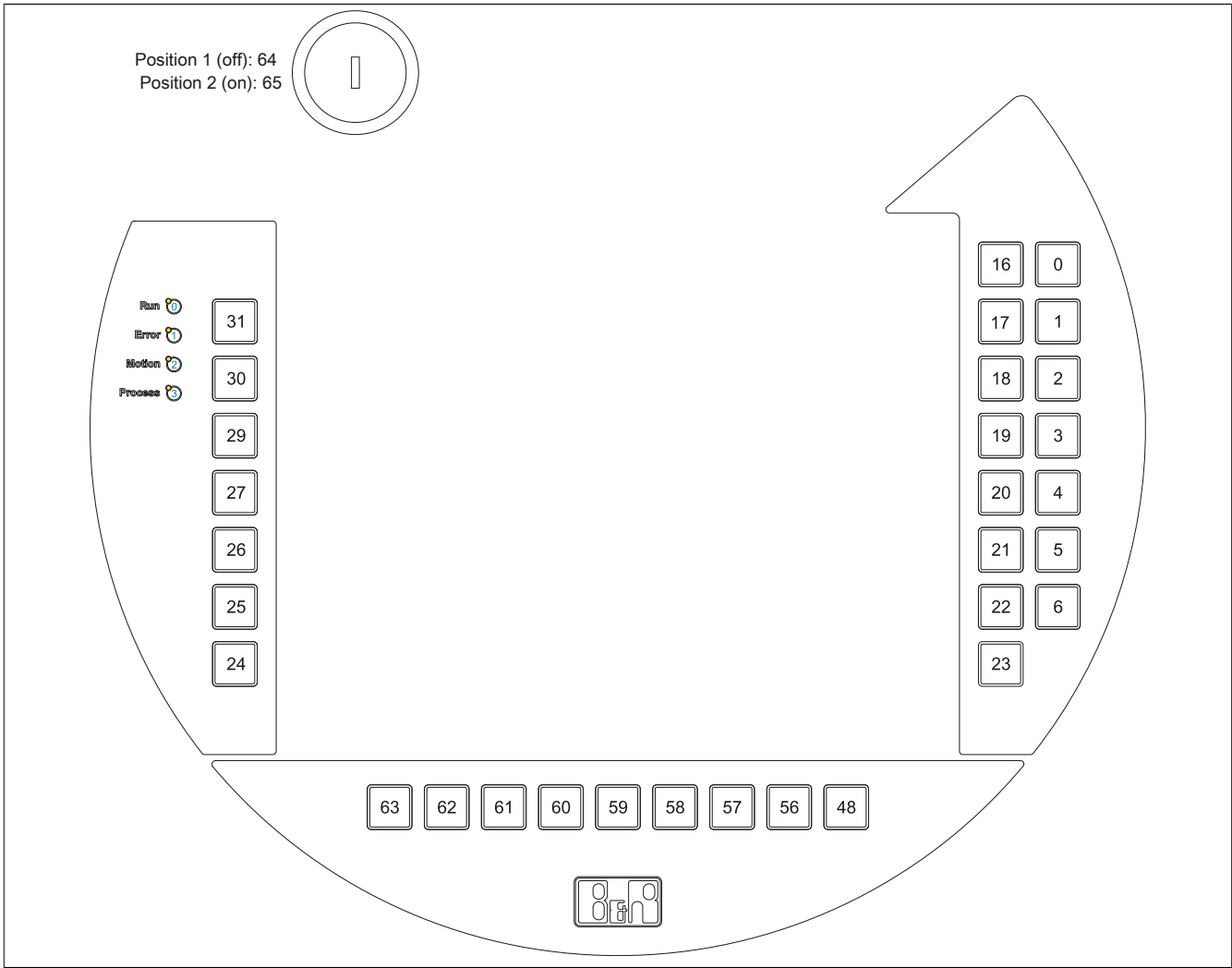


Figure 54: 5MP050.0653-02 - Hardware numbers

7.2.3 Mobile Panel 5MP050.0653-03

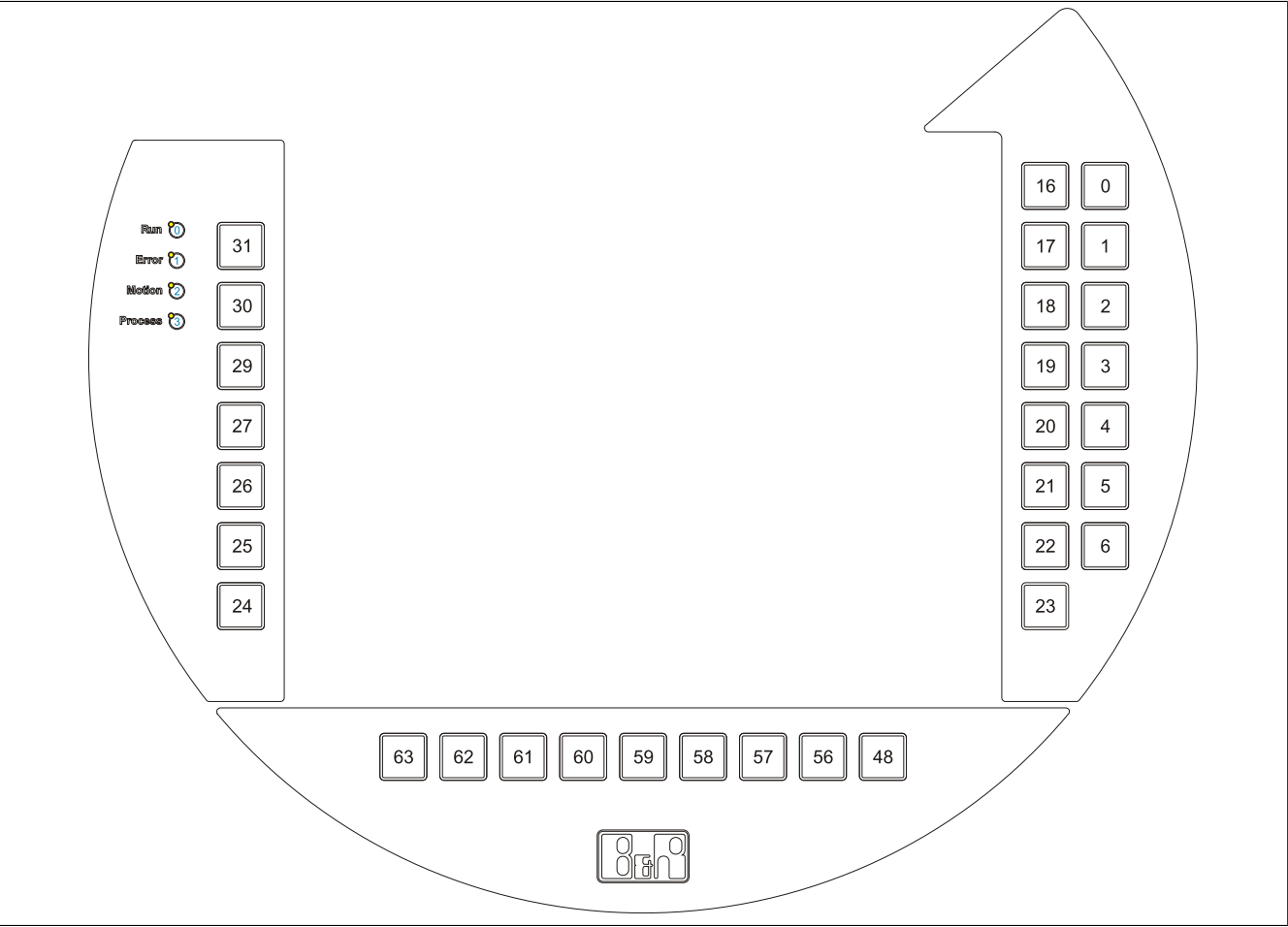


Figure 55: 5MP050.0653-03 - Hardware numbers

7.2.4 Mobile Panel 5MP050.0653-04

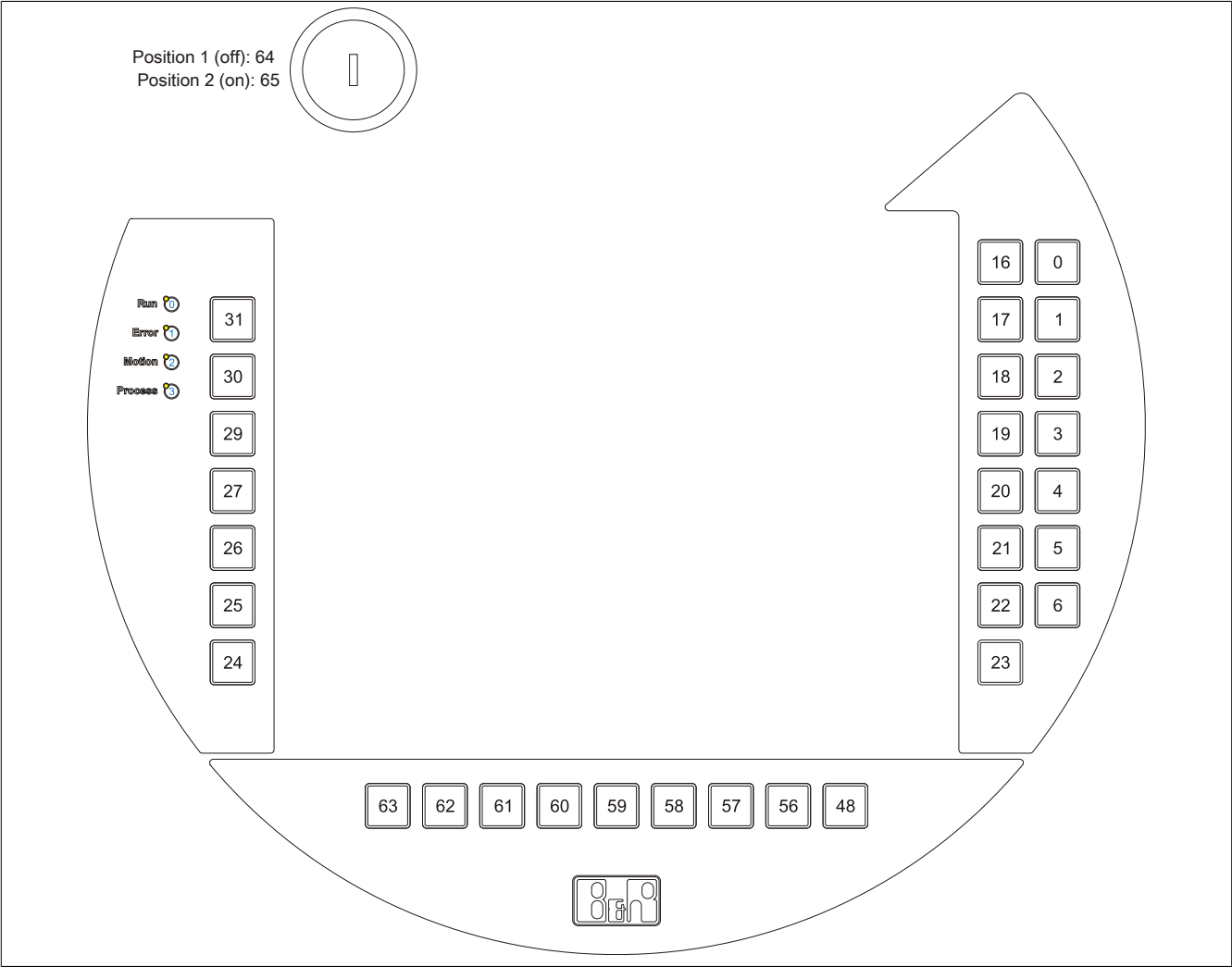


Figure 56: 5MP050.0653-04 - Hardware numbers

8 Touch screen calibration

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

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

8.1 Windows CE

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

9 Date/Time settings

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

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

10 Key configuration

Not all keys are predefined when the Mobile Panel device is delivered. Keys can be configured easily with the B&R Key Editor (version 2.60 or higher) - see "B&R Key Editor" on page 92.

After making the B&R Key Editor configuration and creating the project, the new .kcf (key configuration file) can be transferred to the device using the Control Center (**Start > Settings > Control Panel > Control Center, Keys** page, "Update" (e.g. using flash drive)).

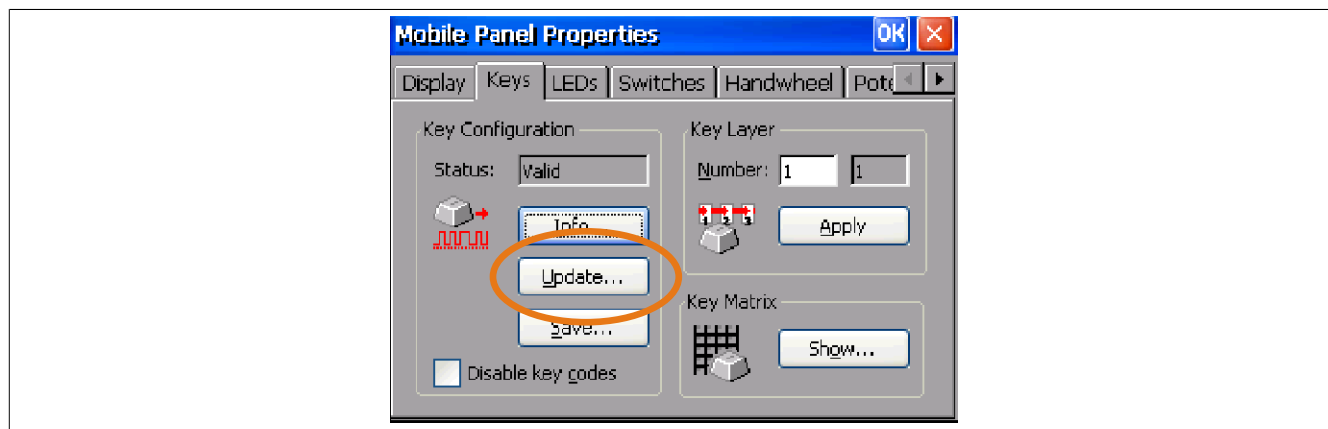


Figure 57: Updating the key configuration

11 Tips for extending the service life of the display

11.1 Backlight

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

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

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

11.2 Screen burn-in

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

There are basically two types:

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

11.2.1 What causes screen burn-in?

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

11.2.2 How can screen burn-in be avoided?

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

12 Pixel errors

Information:

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

Chapter 4 • Software

1 Windows CE

1.1 Order data


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

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

1.2 General information

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

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

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

Table 31: Differences between CE versions (Pro - ProPlus - ProPlusTCAR)

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

1.4 Installing / Updating / Saving

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

The Windows CE version can be easily updated or saved using the B&R Control Center (see "B&R Automation Device Interface (ADI) - Control Center").

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

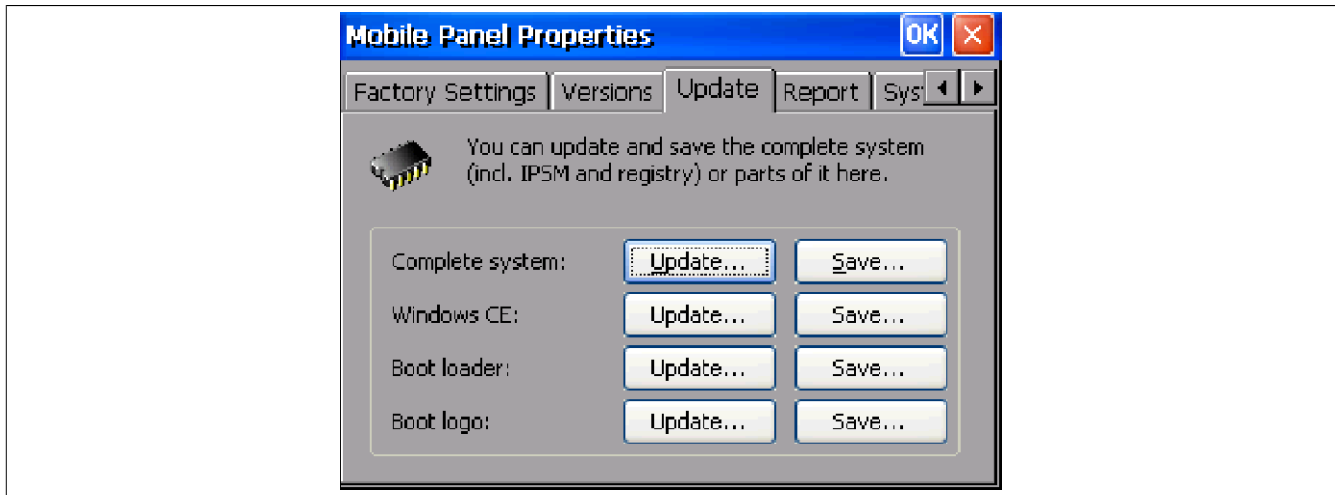


Figure 58: Control Center - Updating / Saving

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

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

Information:

Detailed configuration options for the B&R Windows CE VNC Viewer are available in the Windows CE help documentation (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 the **Start > Settings > Control Panel > Configuration Manager** dialog box and save the registry.
9. Restart the B&R Windows CE device.

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

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

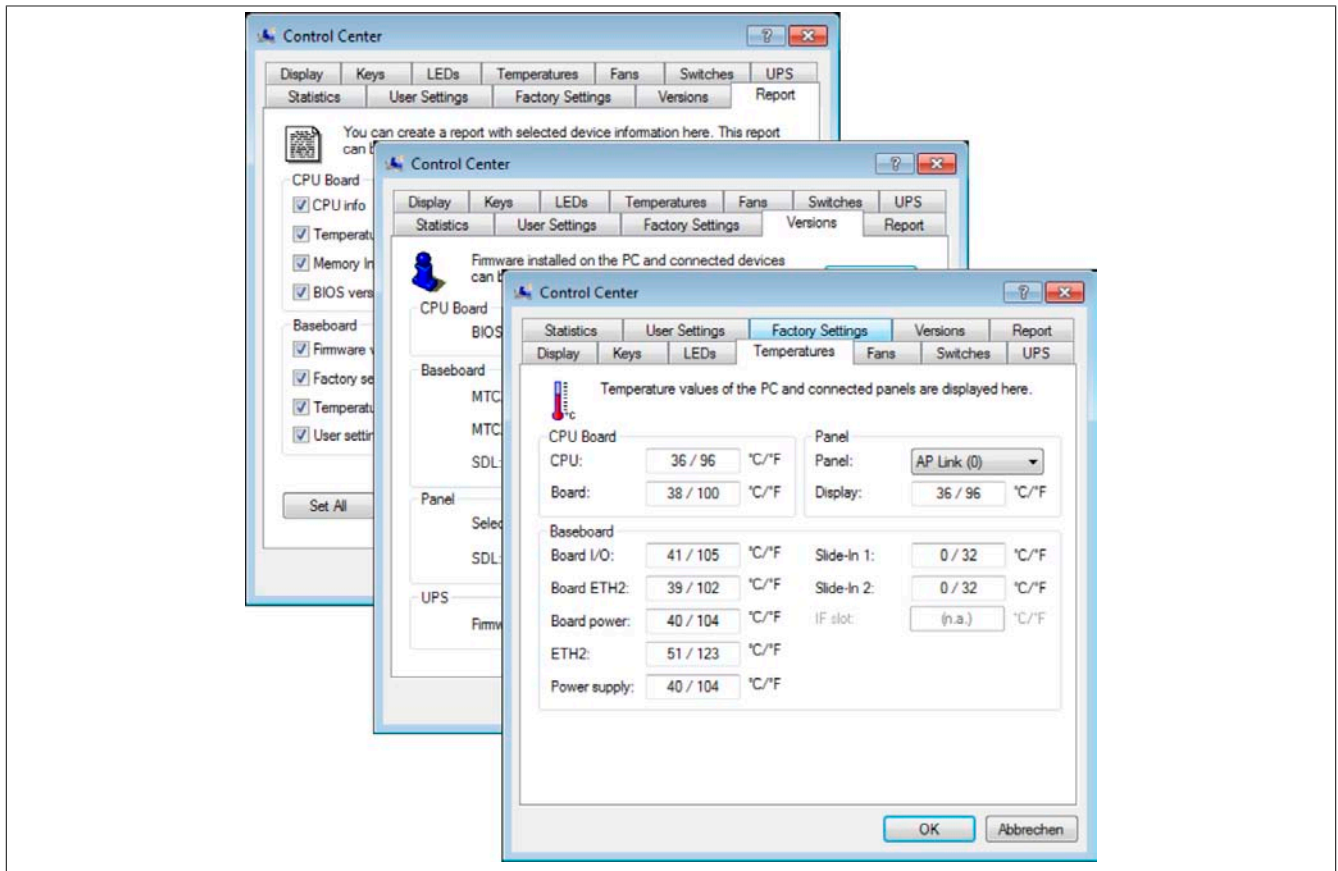


Figure 59: ADI Control Center screenshots - Examples

Information:

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

2.1 Functions

Information:

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

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

Supports the following systems:

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

2.2 Installation

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

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

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

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

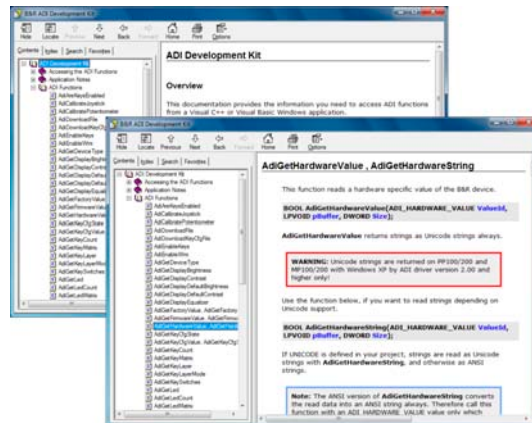


Figure 60: ADI Development Kit screenshots (version 3.60)

Features:

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

Supports the following systems (version 3.60 and higher):

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

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

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

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

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

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

Supported programming languages:

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

System requirements

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

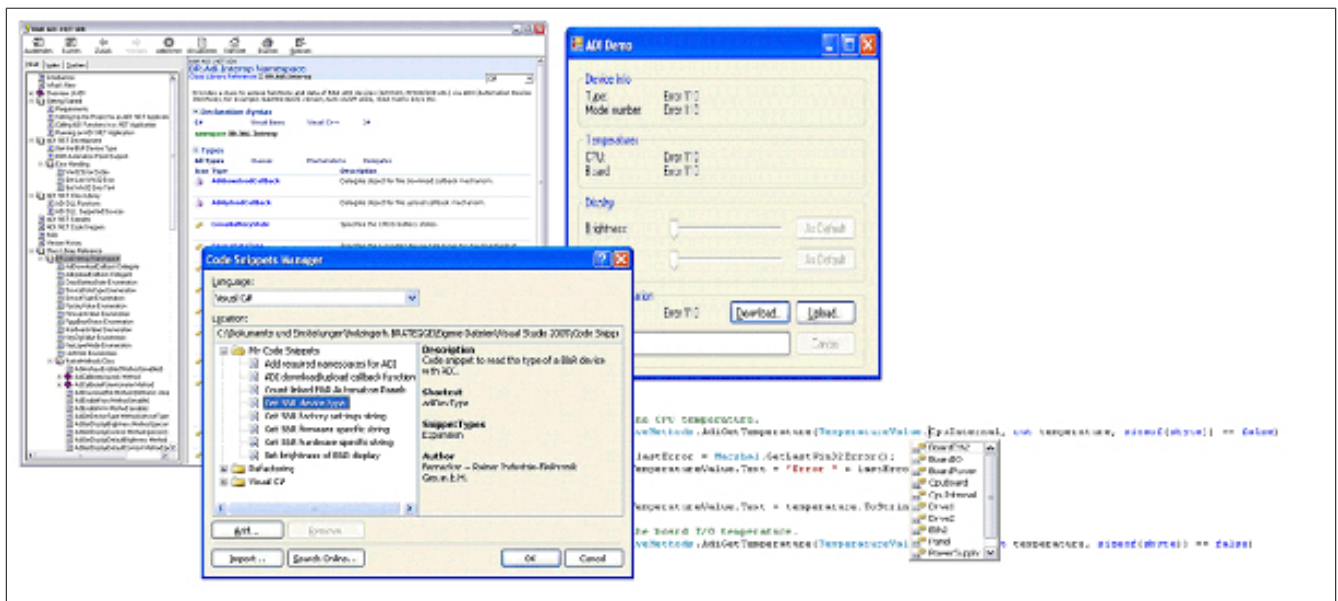


Figure 61: ADI .NET SDK screenshots (version 2.00)

Features (version 2.00 and higher):

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

Supports the following systems (version 2.00 and higher):

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

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

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

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

5 B&R Key Editor

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

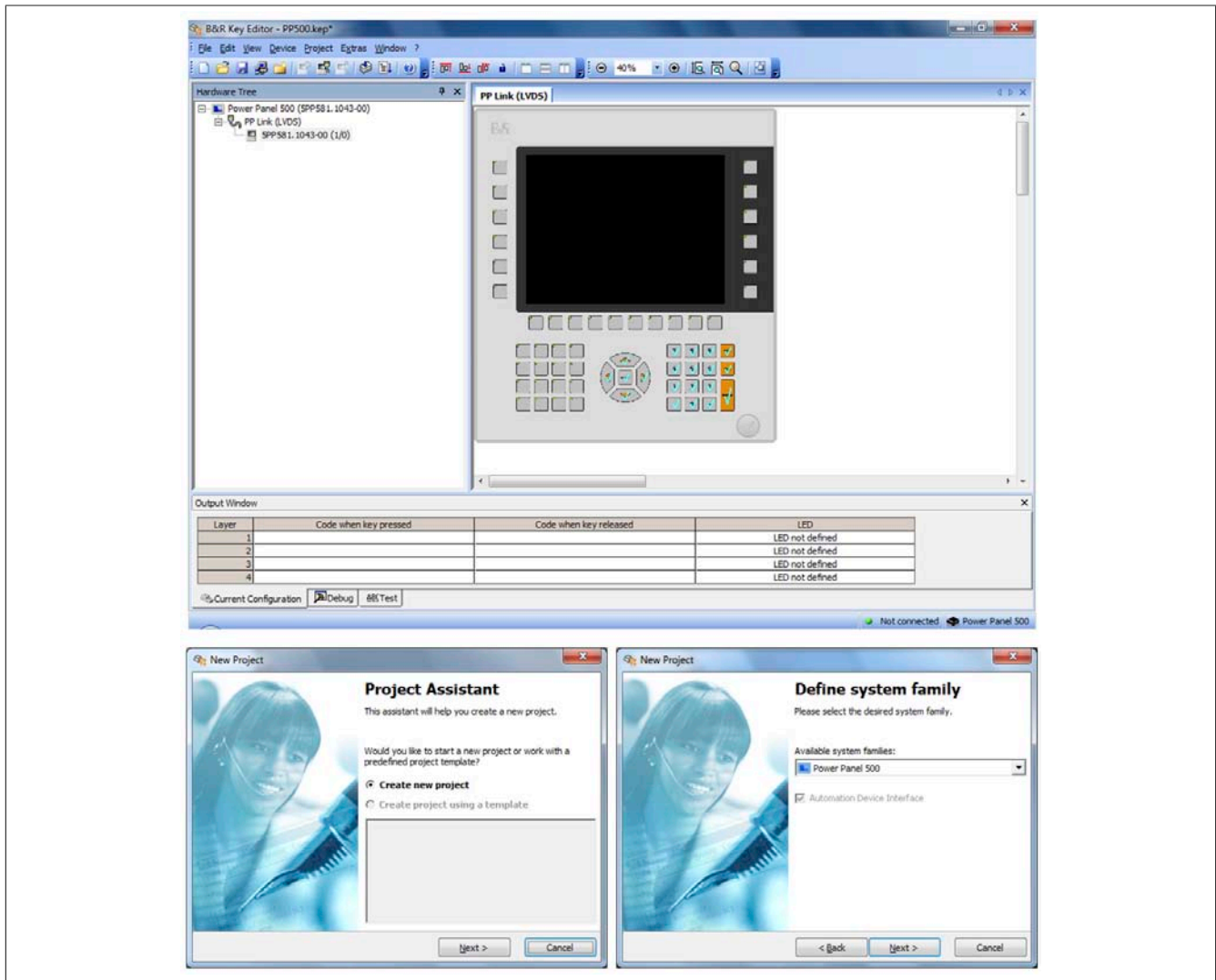


Figure 62: B&R Key Editor screenshots (version 3.30)

Features:

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

Supports the following systems (version 3.30):

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

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

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

Chapter 5 • Standards and certifications

1 List of applicable EC directives and standards

1.1 EC directives

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

Standard	Description
98/37/EC	Machinery directive with changes to 98/79/EC
2006/42/EC	Machinery directive (effective starting December 29, 2009 and replacing machinery directive 98/37/EC)
2004/108/EC	EMC directive

Table 32: EC directives

1.2 Standards

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

1.3 Verifying the conformity to machine directives

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

Table 33: Verifying the conformity to machine directives

1.4 Verifying conformity to EMC directives

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

Table 34: Verifying conformity to EMC directives

The requirements of the following standards are also satisfied:

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

Table 35: Verifying conformity to EMC directives

1.5 Other standards

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

1.5.1 General procedures and safety principles

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

Table 36: General procedures and safety principles

1.5.2 Activating the enabling equipment

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

Table 37: Activating the enabling equipment

1.5.3 Activating the stop button

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

Table 38: Activating the stop button

1.5.4 Ergonomics

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

Table 39: Ergonomics

1.5.5 Stability and impermeability of the housing

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

Table 40: Stability and impermeability of the housing

1.5.6 Electrical safety and fire prevention

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

Table 41: Electrical safety and fire prevention

1.5.7 Requirements for environmental specifications

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

Table 42: Requirements for environmental specifications

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

1.5.8 UL testing of industrial control equipment

Standard	Description
UL 508, 17th edition (=CSA C22.2 No.14)	Industrial control equipment (NRAQ, NRAQ7)

Table 43: UL testing of industrial control equipment

2 European Union directives

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

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

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

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

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

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

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

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

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

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

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

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

3 International certifications

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


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

Table 44: International certifications

4 Standards and definitions for safety technology

4.1 Stop functions in accordance with EN 60204-1:2006 (Electrical equipment for machines, Part 1: General requirements)

There are three categories for stop functions:

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

Table 45: Overview of stop function categories

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

4.2 Emergency stops in accordance with IEC 60204-1:2006 (Electrical equipment for machines - Part 1: General requirements)

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

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

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

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

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

4.3 Safety categories in accordance with EN ISO 13849-1:2008 (Safety of machinery – Safety-related parts of control systems - Part 1: General design principles)

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

Table 46: Overview of safety categories

¹⁾ In accordance with the national foreword of the valid German-language edition of IEC 60204-1:2006, electronic equipment (and especially emergency stop systems) may be used regardless of the stop category if, for example, the same safety is provided under the EN ISO 13849-1:2008 and/or IEC 61508 standards as is required by EN 60204-1.

Safety category (in accordance with EN 13849-1:2008)	Short description	System behavior
2	The requirements of B must be fulfilled, and proven safety principles must be used. Safety functions must be tested at appropriate intervals by the machine controller.	Caution! An error can cause the loss of safety functionality to fail between tests. The loss of safety functionality will be detected during the test.
3	The requirements of B must be fulfilled, and proven safety principles must be used. Safety-related parts must be implemented in such a way that: <ul style="list-style-type: none"> A single error in each of the parts does not result in a loss of safety functionality. The error is detected whenever possible within reason. 	Caution! Safety functionality remains active if a single error occurs. Some but not all errors are detected. A buildup of undetected errors can cause safety functionality to fail.
4	The requirements of B must be fulfilled, and proven safety principles must be used. Safety-related parts must be implemented in such a way that: <ul style="list-style-type: none"> A single error in each of the parts does not result in a loss of safety functionality. A single error must be detected the next time (or before) the safety function is requested. If this type of detection is not possible, a buildup of undetected errors is not permitted to cause safety functionality to fail. 	Information: Safety functionality remains active if a single error occurs. Detection of error buildup reduces the probability of losing safety function (high DC). Errors are detected in time to prevent safety functionality from failing.

Table 46: Overview of safety categories

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

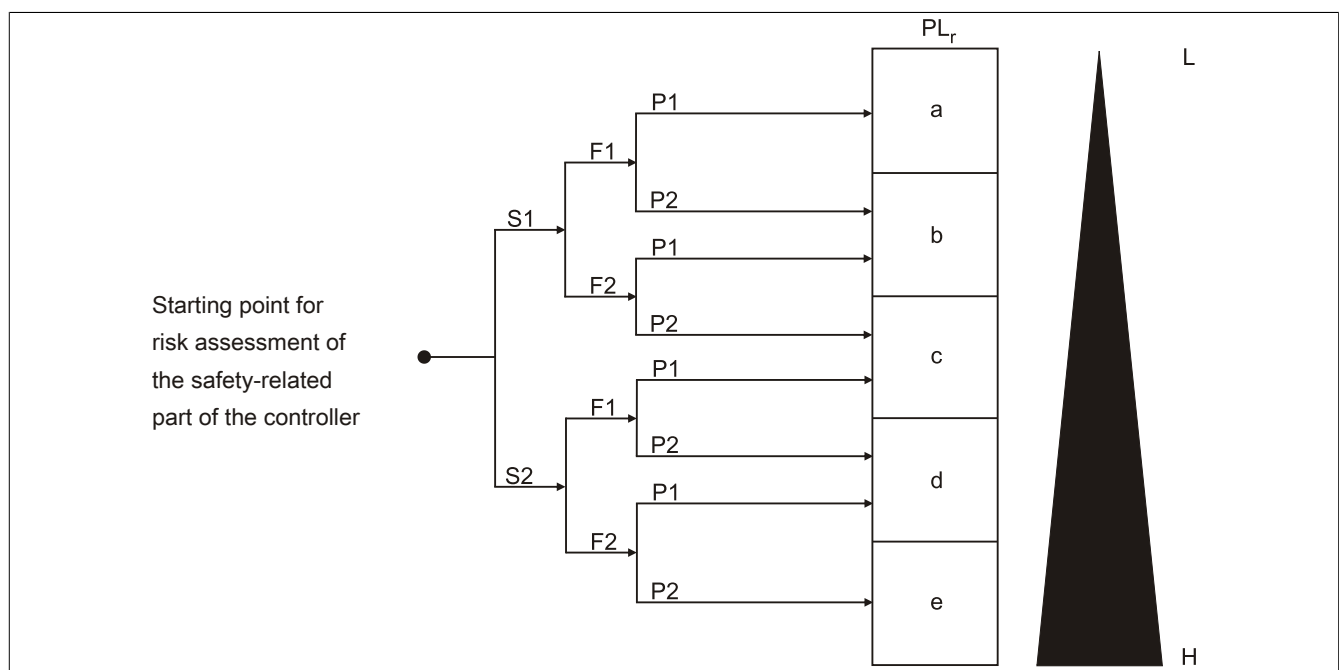


Figure 63: Risk diagram to determine the PLr for every safety function

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

Table 47: Legend for risk graph

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

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

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

Table 48: Overview of safety categories

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

Information:

The stop button and enable switches are connected in accordance with EN 954-1 in the same manner as illustrated in accordance with EN ISO 13849-1 in the connection example. This also applies since the EN 954-1 categories have been added to the EN ISO 13849-1 standard. Please note that the entire system concept must be designed accordingly.

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

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

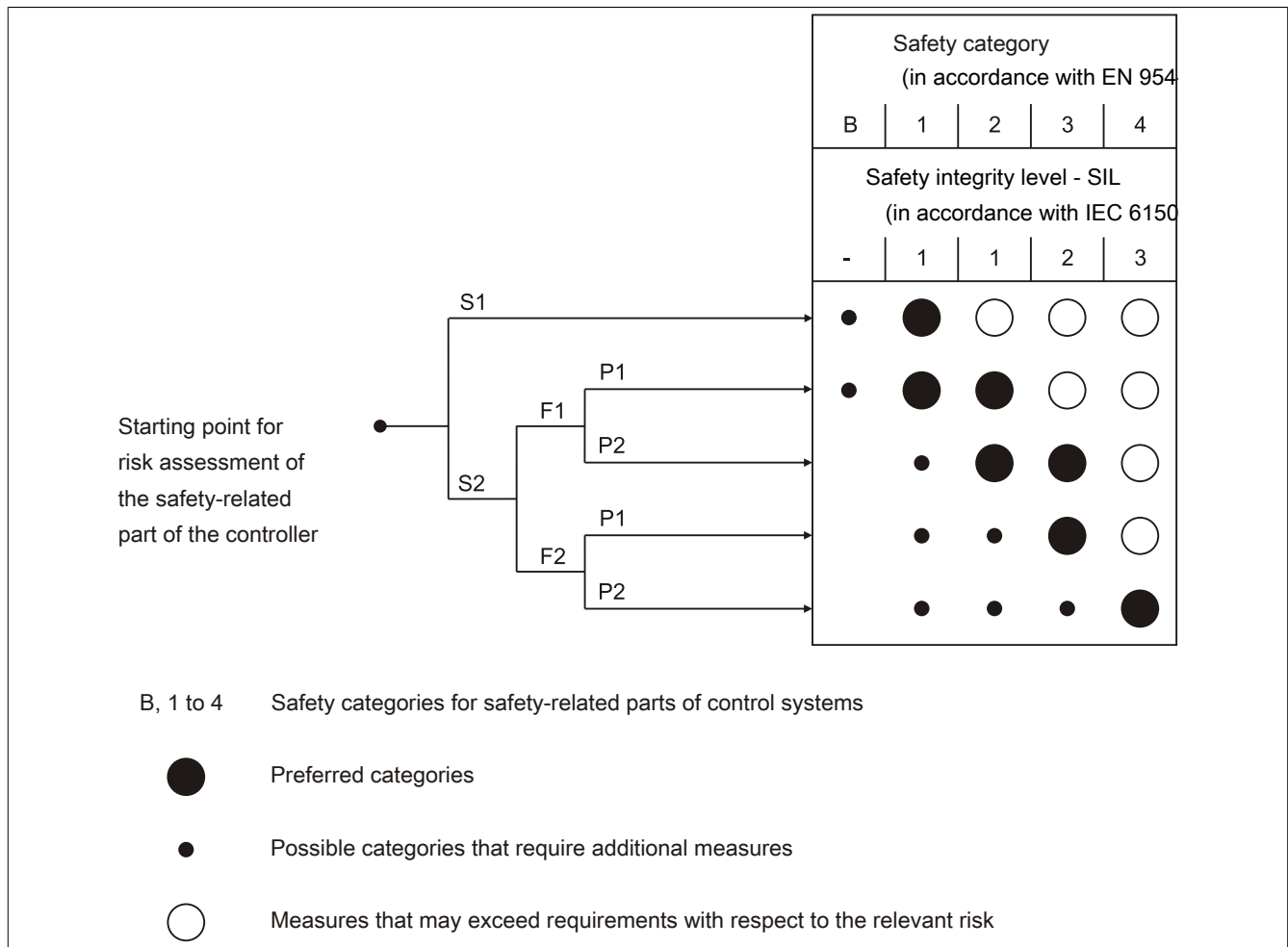


Figure 64: Risk diagram in accordance with EN 954-1, Appendix B

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

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

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

4.5 Selecting the performance level and category in accordance with EN ISO 13849-1

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

As in the earlier EN 954-1 standard, 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 determined by the danger and risk assessment. At least PL d is generally required for dangers that can result in irreversible injury or death.

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

- Whether the system is designed as a single-channel system, in which case an error could result in a loss of safety functionality, but where component availability is high (category 1)

- Whether the system is designed as a single-channel system, in which case an error could result in a loss of safety functionality, but where the error can be detected and indicated in some manner by the system (category 2)
- Whether the system is designed as a dual-channel system, where an error will not result in a loss of safety functionality (category 3)
- Whether the system is designed as a dual-channel system, where even an accumulation of errors will not result in a loss of safety functionality (category 4).

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

In electrical and electronic systems, errors that must be detected include cross faults between loops, interruptions, short circuits or stuck contacts. Specially certified safety switching devices with their own specific PL are often used for detecting errors in individual safety circuits. The overall PL required for the safety function is only achieved, however, 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 associated with the safety function have been taken into consideration.

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

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

Please note that with safety components connected in series, the PL of the safety function is determined by the safety component with the lowest PL in the safety function. For example, a safety function made up of 3 components with categories 4 PL e, 3 PL d and 2 PL c would result in a performance level of PL c for the overall safety function. It should be further noted that an error would result in the loss of safety functionality even though category 4 PL e components are integrated in the safety function since one of the components being used only has a category 2 performance level.

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 a loss of safety functionality. This is done by theoretically, or even practically, running through all possible errors and showing that the requirements for the category are sufficiently fulfilled.

4.6 Restart inhibit in accordance with EN 1037:1995 (Safety of machinery – Prevention of unexpected startup)

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

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

- A startup command sent because of a controller failure or because of external influences on the controller
- A startup command sent because of incorrect operation of a start element or another part of the machine
- Restoration of the power supply after an interruption
- External/Internal influences on parts of the machine

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

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

5 Information regarding MD 2006/42/EC

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

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

5.1 Which devices have to satisfy the new MD?

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

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

5.2 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).

This is because B&R only supplies the switching element, but no way to evaluate the element. The customer is responsible for connecting the stop button to their application. The way in which the stop button is implemented in the machine determines the SIL or category with PL for the customer.

5.2.2 Enable 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.

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

5.3 Relationship between the performance level and safety integrity level

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

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

Table 50: (Table 4 of EN ISO 13849-1:2006) - Relationship between the performance level (PL) and 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 51: (EN ISO 13849-1:2006, table 3) - Performance Level (PL)

5.4 Abbreviations

Abbreviations	Term	Description
B_{10d}	-	Number of cycles before 10% of the components have experienced hazardous failure (per channel)
$MTTF_d$	Mean Time to Dangerous Failure	Average time before hazardous failure occurs (per channel)
DC	Diagnostic Coverage	Degree to which diagnostic coverage is provided
PL	Performance Level	Discrete level that specifies the ability of safety-related parts of a controller to perform a safety function under foreseeable conditions
PFH	Probability of Failure per Hour	Probability of failure per hour
SIL	Safety Integrity Level	Level of safety integrity provided

Table 52: Abbreviations

6 Conformity and type examination certificate

6.1 EC declaration of conformity

Perfection in Automation
 www.br-automation.com
 

EG- Konformitätserklärung

gemäß den EG- Richtlinien 2004/108/EG, 2006/42/EG

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

Beschreibung und Identifizierung der Geräte und Sicherheitsbauteile:

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

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

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

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

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

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

Eine Baumusterprüfung wurde bei der folgenden akkreditierten Zertifizierungsstelle und europäisch benannten Konformitätsbewertungsstelle (notified body) durchgeführt: SIBE Schweiz, Inselquai 8, 6002 Luzern, Schweiz, EU- Kennnummer 1247. Sicherheitsbauteile entsprechen der SIBE Schweiz Baumusterprübscheinigung Nr. 1088/1

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

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

Wichtige Hinweise:

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

Eggelsberg, 2010-02-01


 Hans Wimmer
 Geschäftsführung

Figure 65: EC declaration of conformity

6.2 EC type approval certificate

	
Akkreditierte Zertifizierungsstelle nach EN 45011 Europäisch bezeichnete Konformitätsbewertungsstelle (Notified Body), EU-Kennnummer: 1247	
Baumusterprüfbescheinigung Nr. 1088 / 1	
Produkt	Befehlsgerät Handterminal mit Zustimmungseinrichtung mit 3 Stellen
Marke	B&R
Type	5MP050.0653- [*] 5MP040.0381- [*] [*] a steht für alphanumerische Zeichen in Abhängigkeit der Ausprägung
Sicherheitsangaben	EN ISO 13849-1:2008 Kategorie 3 PL d Die Sicherheitsfunktion Zustimmungseinrichtung für die Sonderbetriebssteuerung genügen nur, wenn die Sicherheitshinweise im Benutzerhandbuch befolgt werden. Die Zustimmungseinrichtung und der Stopp-Taster genügen der EN 60204-1.
Herstelleradresse	Bernecker + Rainer Industrie Elektronik Ges.m.b.H B&R Strasse 1 A-5142 Eggelsberg
Gesuchstelleradresse	Bernecker + Rainer Industrie Elektronik Ges.m.b.H B&R Strasse 1 A-5142 Eggelsberg
Ablaufdatum	29. Dezember 2014
Das überprüfte Baumuster entspricht den einschlägigen Bestimmungen der Richtlinie 2006/42/EG vom 17. Mai 2006 über Maschinen. Diese Bescheinigung gilt zusammen mit den allenfalls vorstehend erwähnten Beilagen sowie den auf der Rückseite aufgeführten allgemeinen Bestimmungen.	
Ausstelldatum	Zertifizierungsstelle
21. Dezember 2009	NSBIV AG
gültig ab	Zertifizierungsstelle SIBE Schweiz
29. Dezember 2009	Postfach 3518 CH-6002 Luzern
Sicherheitsingenieur	Zertifizierungsstellenleiter
 M. Luzzatto	 P. Keller

Figure 66: EC type approval certificate

Chapter 6 • Accessories

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

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

1 USB flash drives

1.1 5MMUSB.2048-00

1.1.1 General information

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

Information:

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

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

1.1.2 Order data

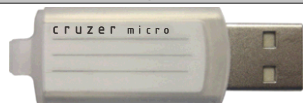
Model number	Short description	Figure
5MMUSB.2048-00	USB 2.0 flash drive, 2048 MB	

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

1.1.3 Technical data

Information:

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

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

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

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

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

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

1.1.4 Temperature humidity diagram

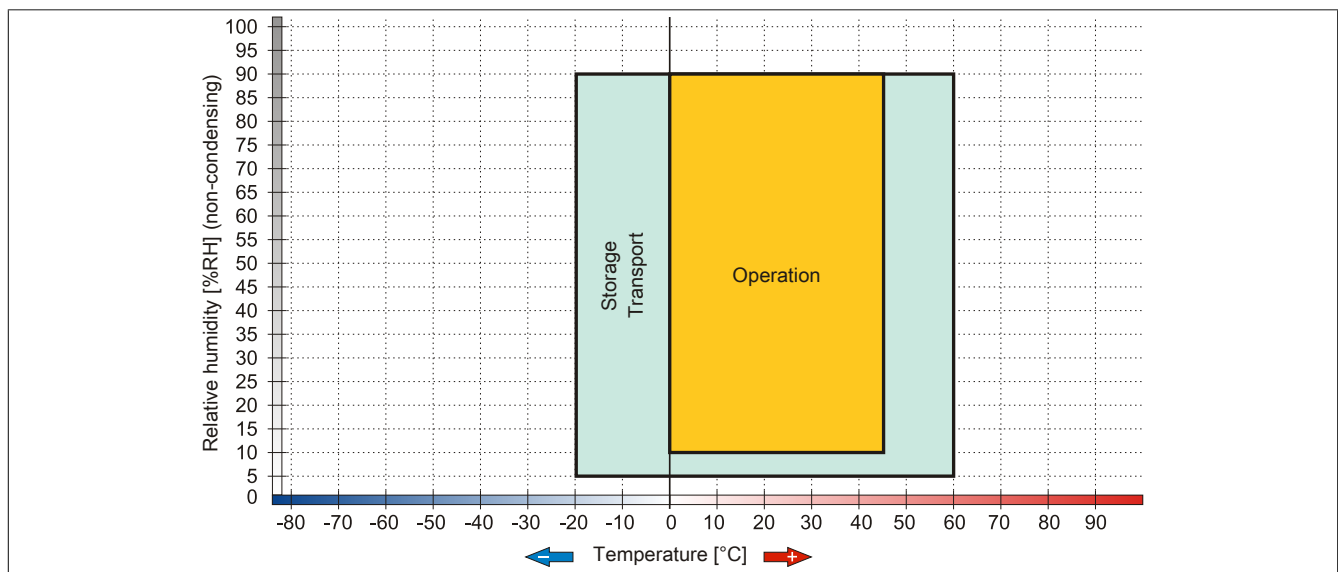


Figure 67: 5MMUSB.2048-00 - Temperature humidity diagram

1.2 5MMUSB.xxxx-01

1.2.1 General information

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

Information:

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

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

1.2.2 Order data


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

Table 55: 5MMUSB.2048-01, 5MMUSB.4096-01 - Order data

1.2.3 Technical data

Product ID	5MMUSB.2048-01	5MMUSB.4096-01
General information		
Capacity	2 GB	4 GB
Data retention	>10 years	
LEDs	1 LED (green) ¹⁾	
MTBF	>3,000,000 hours	
Type	USB 1.1, USB 2.0	
Maintenance	None	
Default file system	FAT16	FAT32
Certification CE	Yes	
Interfaces		
USB	USB 1.1, USB 2.0	
Type	To any USB type A interface	
Connection	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Transfer rate	Full speed max. 1 MB/s, High speed max. 32 MB/s	
Sequential reading	Full speed max. 0.9 MB/s, High speed max. 23 MB/s	
Sequential writing		
Support		
Operating systems		
Windows 7	Yes	
Windows XP Professional	Yes	
Windows XP Embedded	Yes	
Windows ME	Yes	
Windows 2000	Yes	
Windows CE 5.0	Yes	
Windows CE 4.2	Yes	
Electrical characteristics		
Power consumption	Max. 500 µA sleep mode, max. 120 mA read/write	
Environmental conditions		
Temperature		
Operation	0 to 70°C	
Storage	-50 to 100°C	
Transport	-50 to 100°C	

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

Product ID	5MMUSB.2048-01	5MMUSB.4096-01
Relative humidity		
Operation		85%, non-condensing
Storage		85%, non-condensing
Transport		85%, non-condensing
Vibration		
Operation		20 to 2000 Hz: 20 g (peak)
Storage		20 to 2000 Hz: 20 g (peak)
Transport		20 to 2000 Hz: 20 g (peak)
Shock		
Operation		Max. 1500 g (peak)
Storage		Max. 1500 g (peak)
Transport		Max. 1500 g (peak)
Altitude		
Operation		Max. 3048 m
Storage		Max. 12192 m
Transport		Max. 12192 m
Mechanical characteristics		
Dimensions		
Width		17.97 mm
Length		67.85 mm
Height		8.35 mm

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

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

1.2.4 Temperature humidity diagram

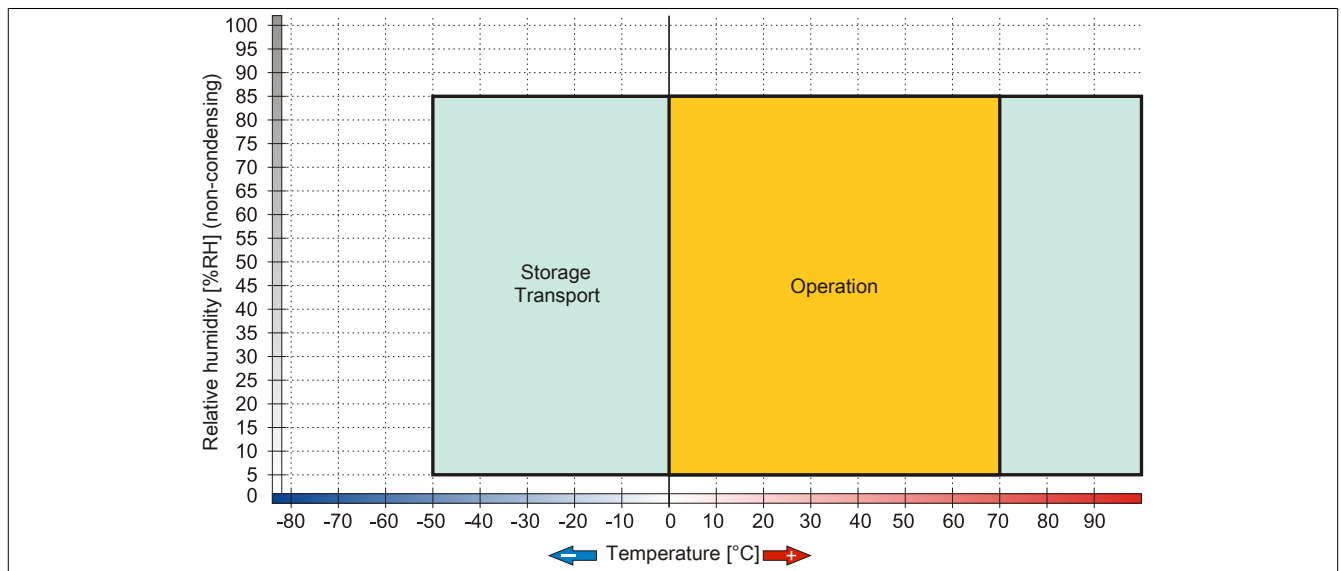


Figure 68: 5MMUSB.xxxx-01 - Temperature humidity diagram

2 Protective cover

2.1 5CAMPP.0000-10

2.1.1 General information

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

2.1.2 Order data


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

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

2.1.3 Installation

- 1. Feed the circular connector through the loop.

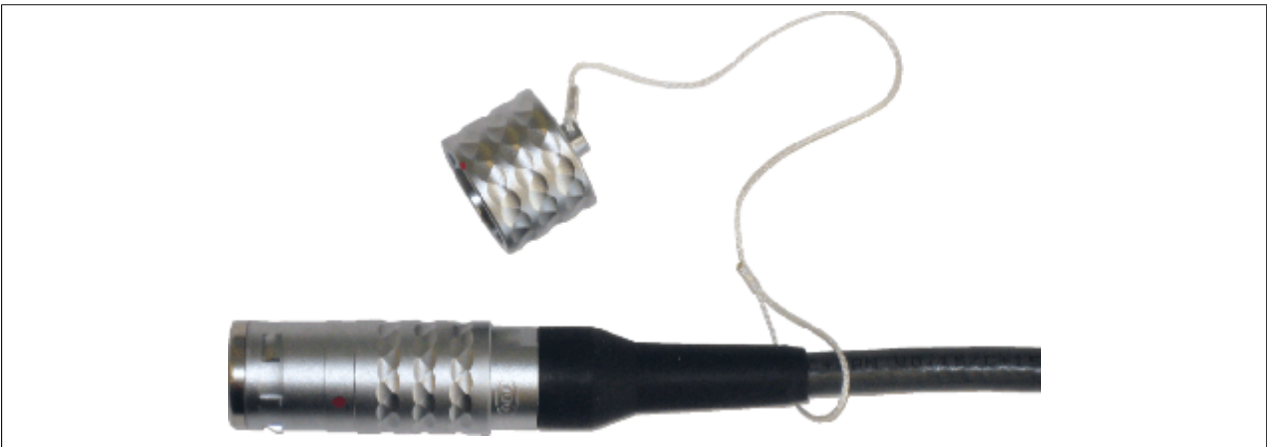


Figure 69: 5CAMPP.0000-10 - Feeding the connector through the loop

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

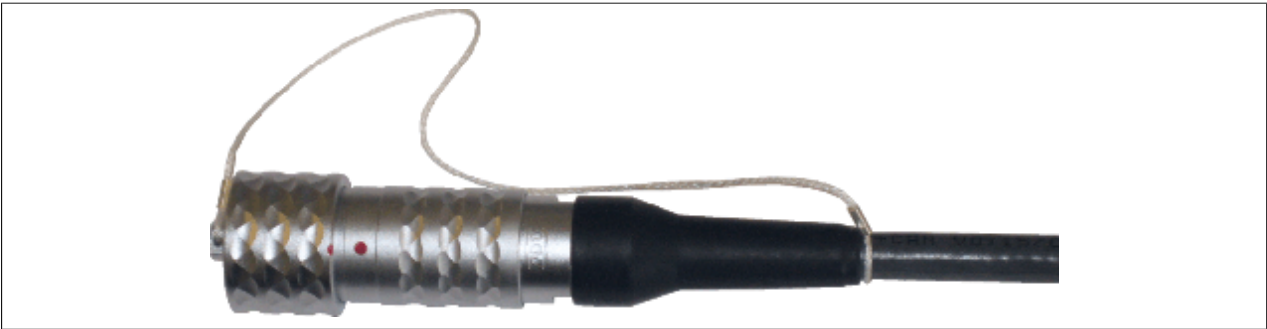


Figure 70: 5CAMPP.0000-10 - Covering the connector

2.2 5CAMPP.0001-10

2.2.1 General information

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

2.2.2 Order data


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

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

2.2.3 Installation

Install the cover near the control cabinet cable and insert it after the cable has been removed.

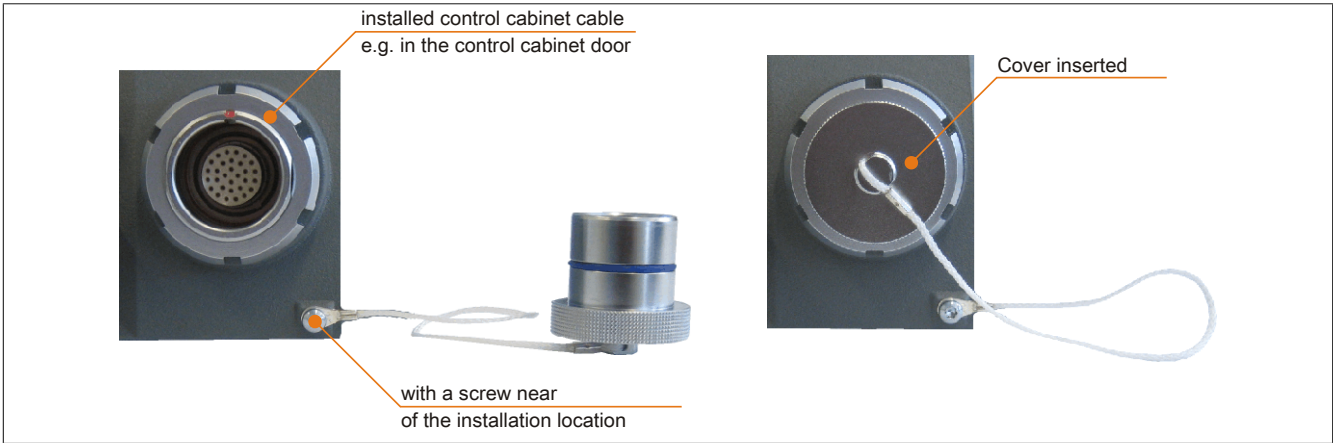


Figure 71: Attaching the control cabinet cable protective cover

3 Wall mount

3.1 4MPBRA.0000-01

3.1.1 General information

The 4MPBRA.0000-01 wall mount is used to store the Mobile Panel together with the Mobile Panel attachment cable and is only intended for upright hanging installations.

Drilling holes for attaching the wall mount must be made in accordance with the diagram "4MPBRA.0000-01 - Dimensions" on page 115.

Caution!

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

Danger!

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

3.1.1.1 Components

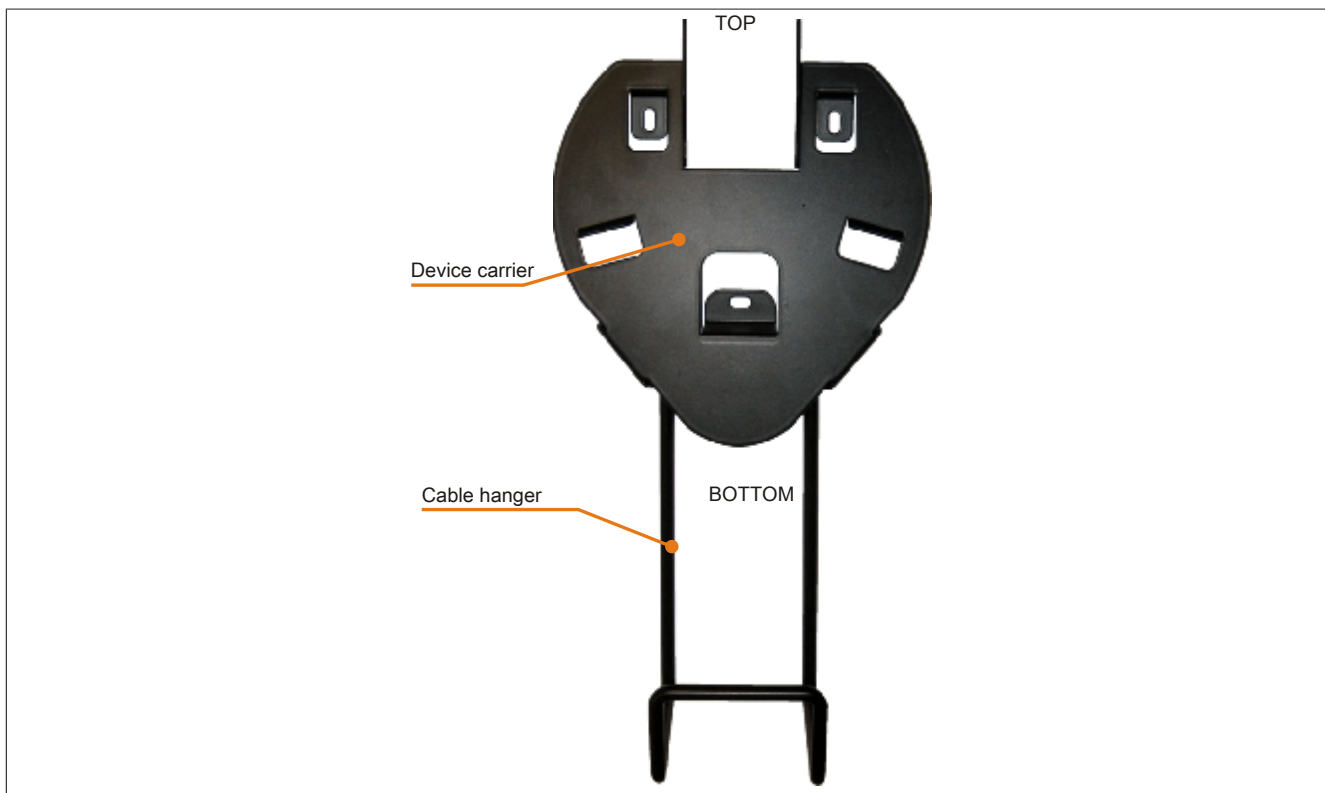


Figure 72: 4MPBRA.0000-01 - Components

3.1.2 Order data


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

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

3.1.3 Dimensions

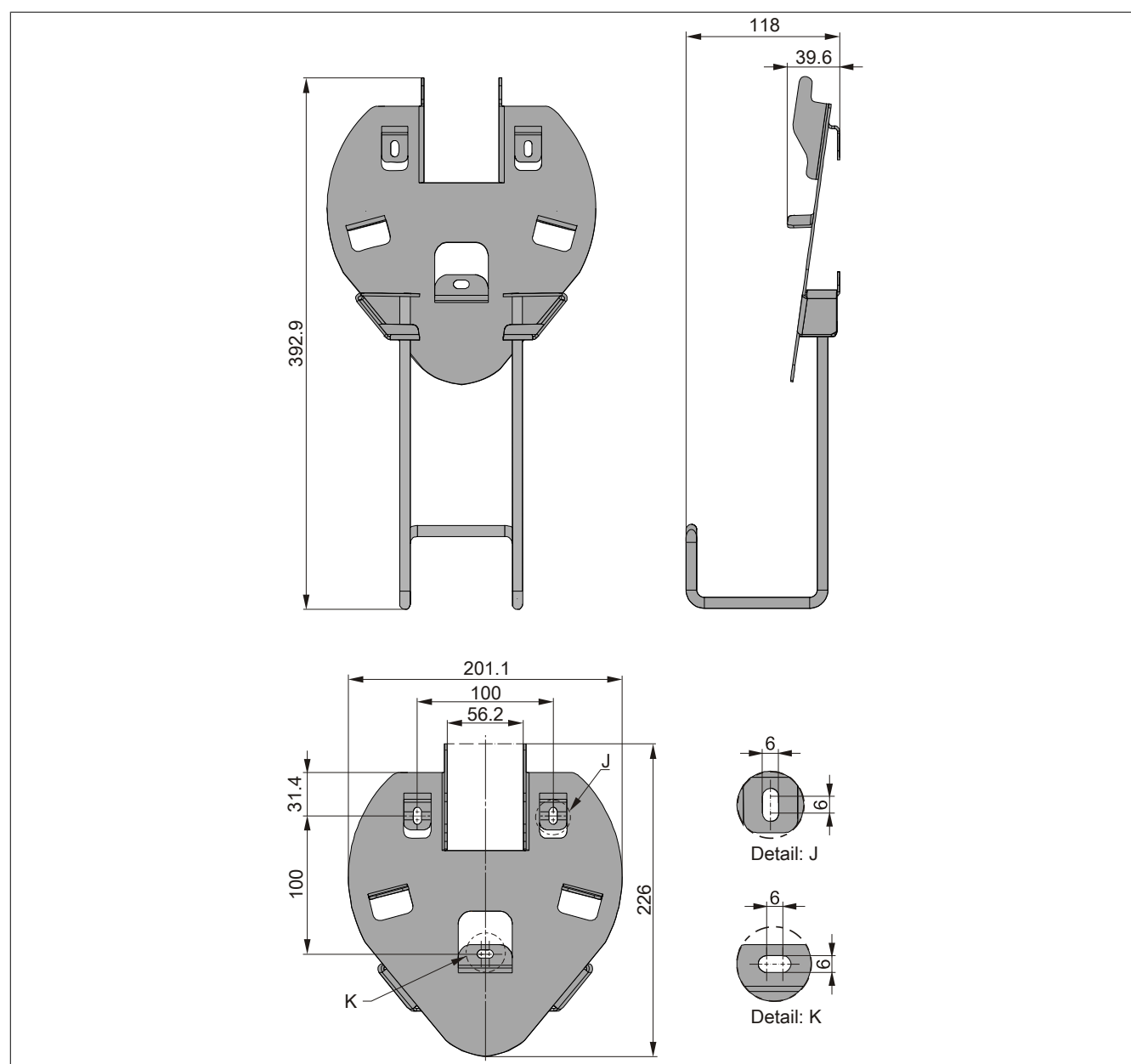


Figure 73: 4MPBRA.0000-01 - Dimensions

3.1.4 Storing the Mobile Panel device

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

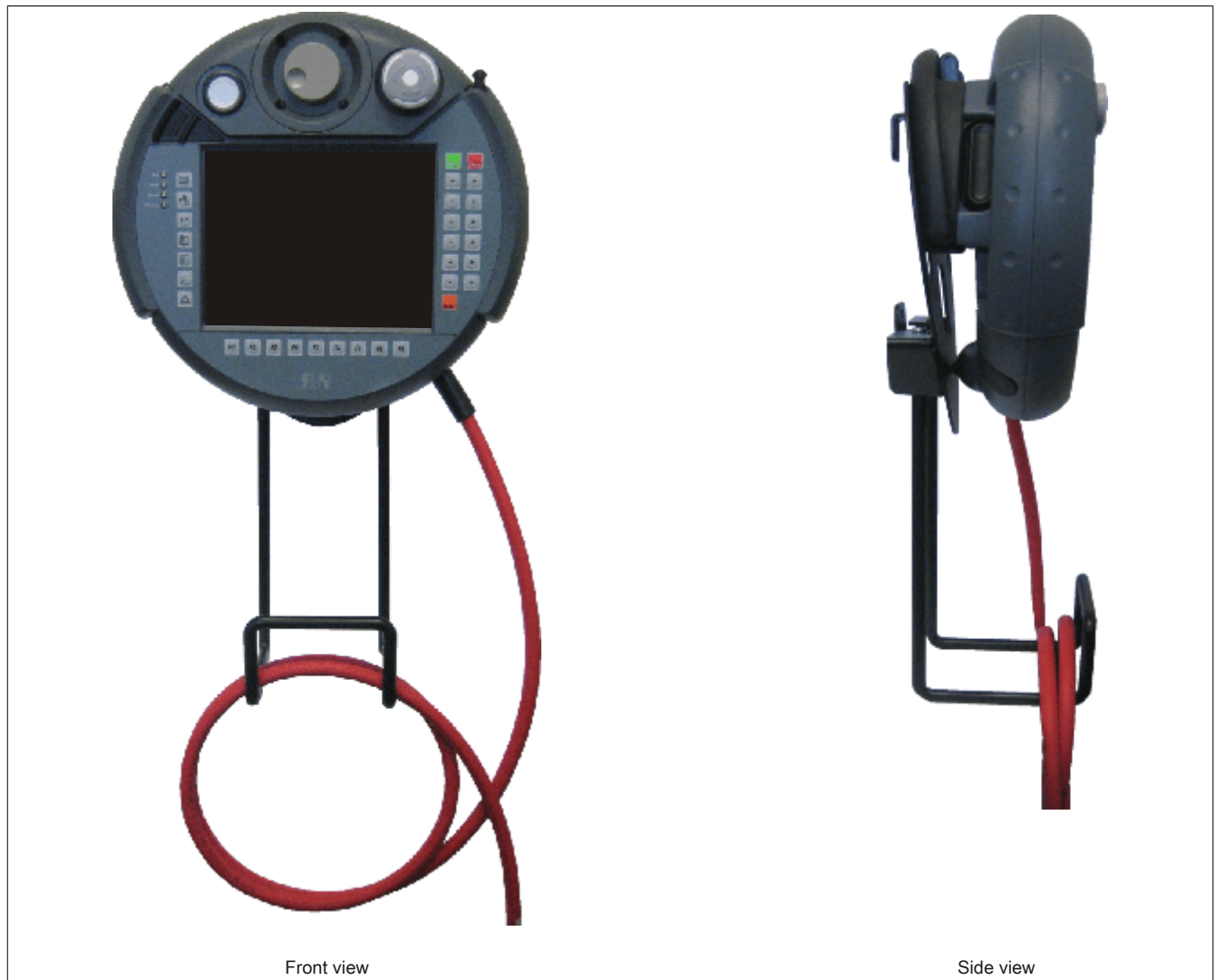


Figure 74: Storing a Mobile Panel device on a wall mount

4 Connection boxes

4.1 4MPCBX.0000-00

4.1.1 General information

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

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

4.1.2 Order data


Model number	Short description	Figure
	Accessories	
4MPCBX.0000-00	Mobile Panel connection box for cables with push-pull circular connector	
	Required accessories	
	Accessories	
5CAMPB.0100-10	Mobile Panel box cable, with wire end sleeves for control cabinet connection; with connector contacts for wiring in the connection box, 10 m	

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

4.1.3 Interfaces

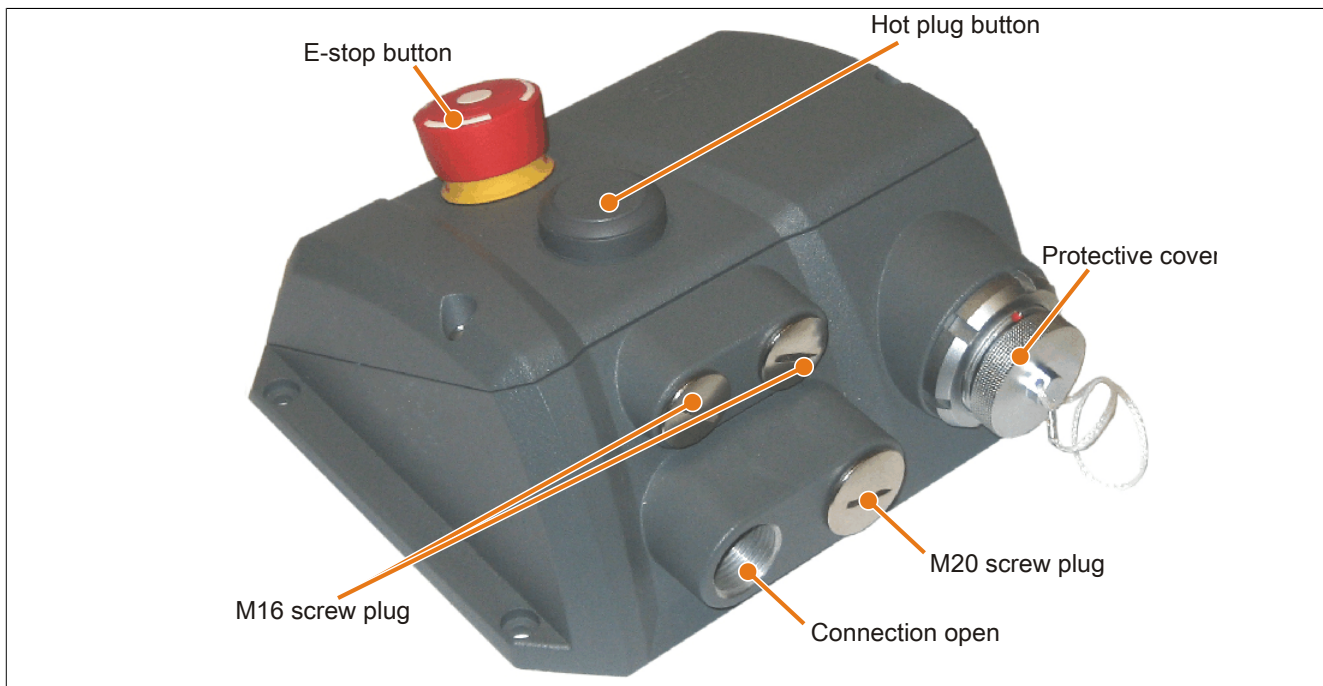


Figure 75: 4MPCBX.0000-00 - Interfaces

4.1.4 Technical data

Product ID	4MPCBX.0000-00
General information	
Certification CE	Yes
Keys	
Hot plug button	1 button, 2 N.C. contacts
E-stop	1 button, 2 N.C. contacts
Connector	
Internal connection plug ¹⁾	Key switch or push button E-stop Enabling switch RS232 Power supply CAN Ethernet
Additional connection plugs	Slot ID (monitoring contacts) Enabling switch Key switch or push button E-stop contacts Power supply
Push-pull plug	For connecting the Mobile Panel 40/50 or Mobile Panel 100/200
Electrical characteristics	
Nominal voltage	18 to 30 VDC
Nominal current	150 mA
Power consumption	Approx. 2 W
Operating conditions	
EN 60529 protection	IP65 (only with mounted screw plugs, an installed protective cover or with a connected Mobile Panel 40/50 or Mobile Panel 100/200 system)
Environmental conditions	
Temperature	
Operation	0 to 50°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	0 to 95%, non-condensing
Storage	0 to 95%, non-condensing
Transport	0 to 95%, non-condensing
Vibration	
Operation (continuous)	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g
Operation (occasional)	2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g
Storage	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Transport	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g

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

Product ID	4MPCBX.0000-00
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Mechanical characteristics	
Housing	
Material	GK-AlSi11Mg (gravity die casting)
Paint	Powdered RAL 7012, fine structure
Cover plates ²⁾	
Material	GK-AlSi9Mg (gravity die casting)
Dimensions	
Width	172.5 mm
Height	158.7 mm
Depth	81.7 mm
Weight	Approx. 1600 g (without attachment cable)

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

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

4.1.5 Safety characteristics

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

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

4.1.6 Dimensions

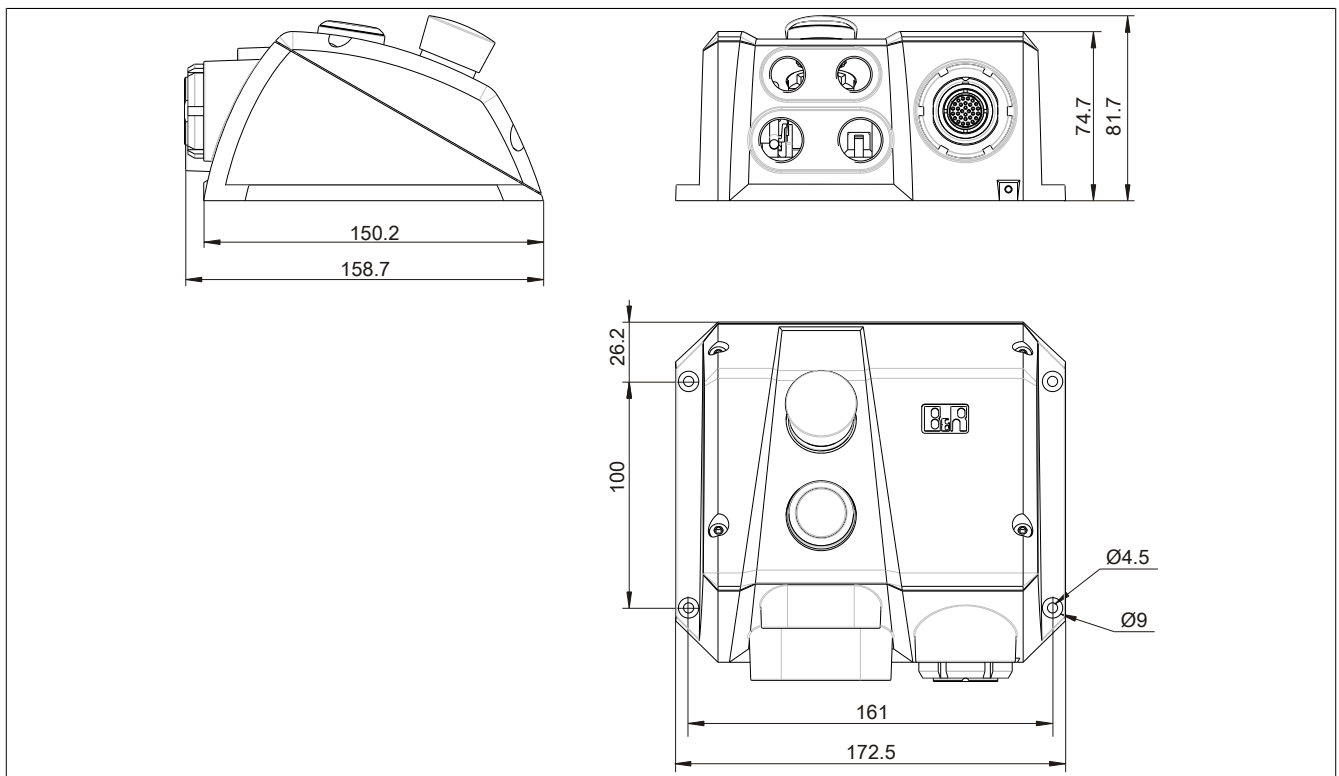


Figure 76: 4MPCBX.0000-00 - Dimensions

4.1.7 Drilling template

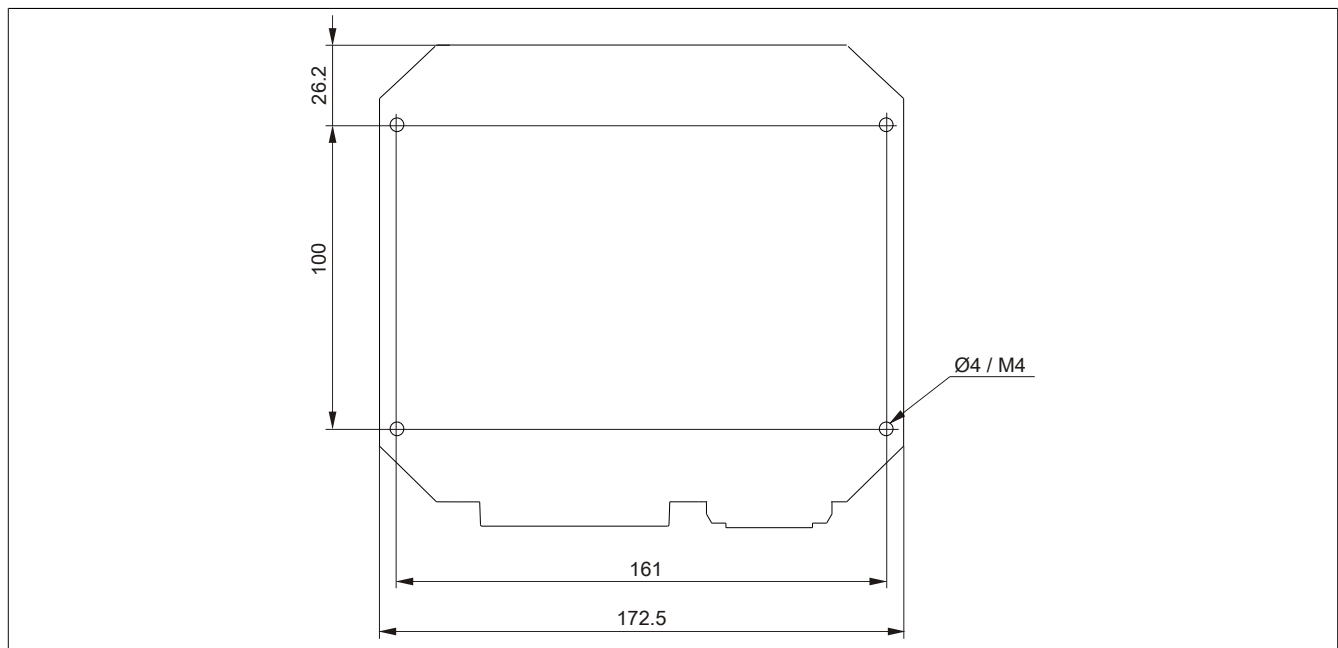


Figure 77: 4MPCBX.0000-00 - Drilling template

4.1.8 Contents of delivery

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

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

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

4.2 4MPCBX.0001-00

4.2.1 General information

The 4MPCBX.0001-00 connection box makes it easy for the control cabinet cable to exit the control cabinet vertically, but it does not feature E-stop hot plugging functionality.

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

4.2.2 Order data


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

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

4.2.3 Technical data

Product ID	4MPCBX.0001-00
General information	
Certification CE	Yes
Keys	
Hot plug button	No
E-stop	No
Operating conditions	
EN 60529 protection	IP65 (only with protective cover or connected Mobile Panel 40/50 or Mobile Panel 100/200)
Mechanical characteristics	
Housing	
Material	GK-ALSi11Mg (gravity die casting)
Paint	Powdered RAL 7012, fine structure
Cover plates	
Material	GK-ALSi9Mg (gravity die casting)
Dimensions	
Width	90 mm
Height	74.2 mm
Depth	150 mm
Weight	Approx. 500 g

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

4.2.4 Dimensions

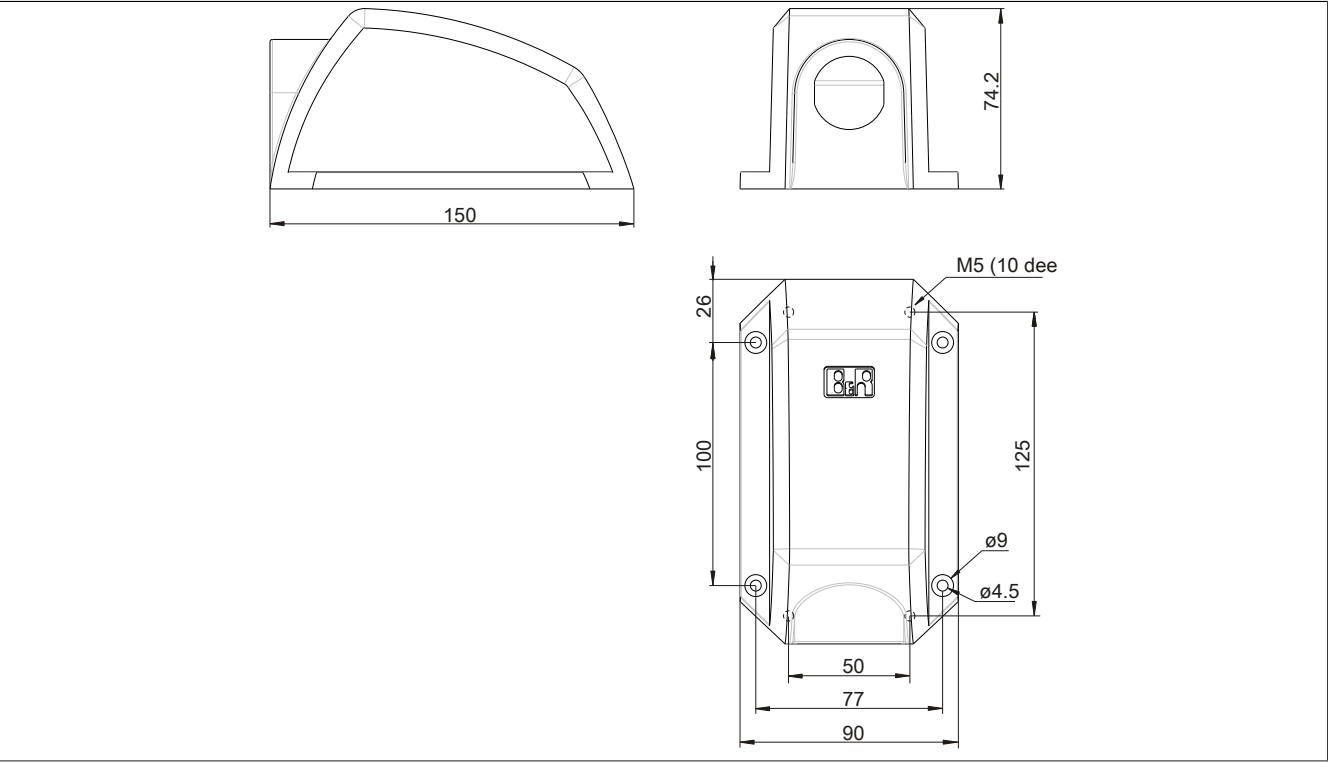


Figure 78: 4MPCBX.0001-00 - Dimensions

4.2.5 Drilling template

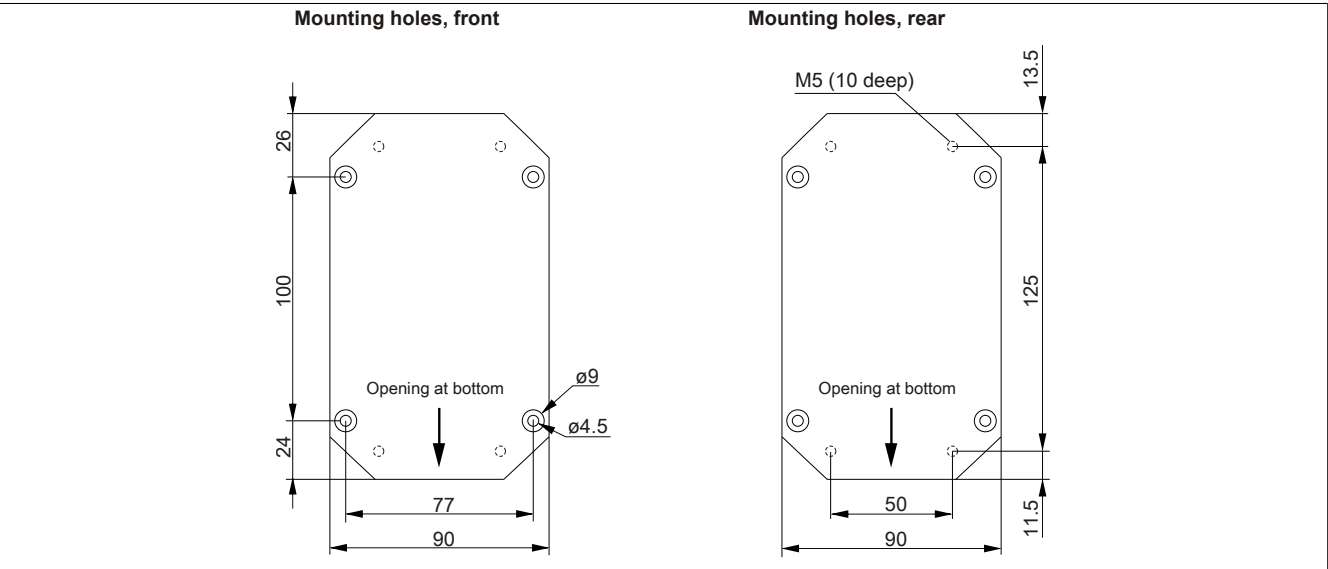


Figure 79: 4MPCBX.0000-01 - Drilling template

4.2.6 Contents of delivery

Quantity	Component
1	Connection box 4MPCBX.0001-00

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

5 Box cable

5.1 5CAMPB.0100-10

5.1.1 General information

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

The connection end of the control cabinet cable has a preassembled RJ45 Ethernet connector. The rest of the lines have an open end with wire end sleeves, making it easier to wire the cable to safety equipment and other interfaces. The box cable is installed in the connection box on the other side (connection box side).

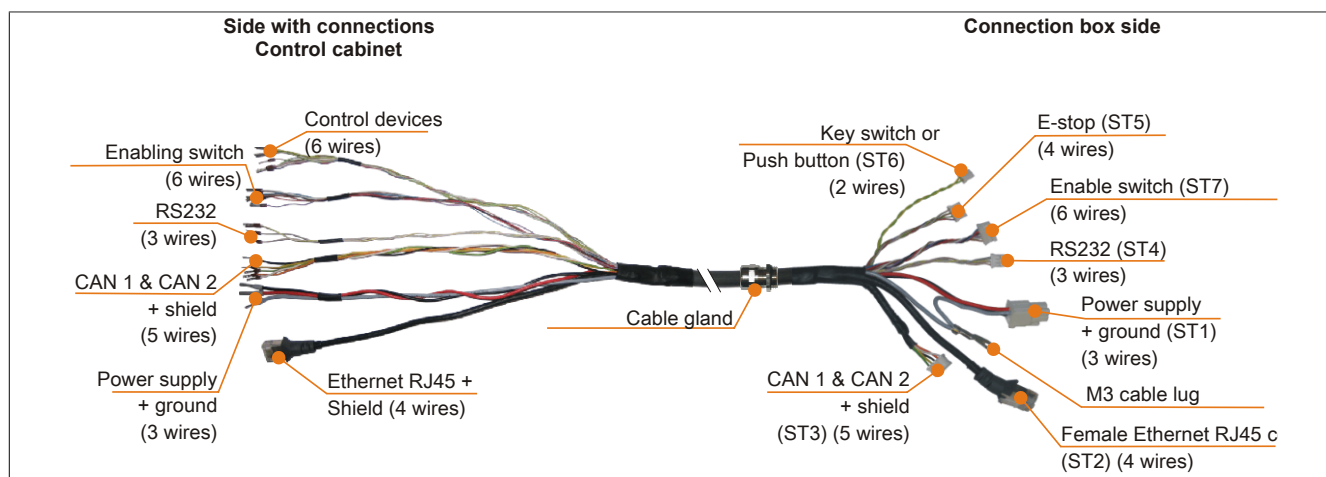


Figure 80: 5CAMPB.0100-10 - Connections

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

The surface is protected against water, oil (lubricating and hydraulic oils in accordance with EN 60811, part 2-1) and cooling lubricant.

5.1.2 Order data

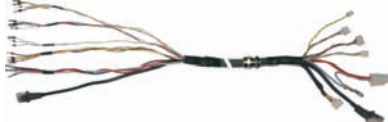
Model number	Short description	Figure
5CAMPB.0100-10	Accessories	
	Mobile Panel box cable, with wire end sleeves for control cabinet connection; with connector contacts for wiring in the connection box, 10 m	

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

5.1.3 Technical data

Information:

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

Product ID	5CAMPB.0100-10
General information	
Durability	Mechanical characteristics in accordance with DIN VDE 0472 section 603 test type H (100,000 cycles)
Certification CE	Yes
Cable structure	
Type	Hybrid cable, 25-wire
Properties	Silicone- and halogen-free

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

Product ID	5CAMPB.0100-10
Supply lines	
Material	Tinned copper stranded wire
Permissible operating voltage	30 VDC
Outer sheathing	
Material	Flame-retardant PUR
Color	Similar to RAL 7012
Cable elements	
Entry devices	Direct connection between the control devices and monitoring device (6 wires)
CAN	2 pairs with shielding (5 wires)
Ethernet	Twisted pair cable for Ethernet (10/100 Mbit/s) (4 wires, male RJ45 connector)
Serial	3 wires
Power supply	Supply voltage +24 VDC and ground (3 wires)
Enabling switch	Direct connection between the enable switch and monitoring device (6 wires)
Connector	
Type	FA. Jacob GmbH Typ: PERFECT 50.620 M
Electrical characteristics	
Conductor resistance	$\leq 140 \Omega/\text{km}$ (0.15 mm ² conductor) $\leq 27 \Omega/\text{km}$ (0.75 mm ² conductor)
Insulation resistance	$\leq 500 \Omega/\text{km}$
Operating conditions	
Flame resistant	In accordance with IEC 60332-1 and VW1 / FT1 in accordance with C-UL
Shield attenuation	In accordance with IEC 60096-1, Amendment 2
Oil and hydrolysis resistance	In accordance with VDE 0282-10
Environmental conditions	
Temperature	
Moving	-20 to 60°C
Static	-20 to 80°C
Mechanical characteristics	
Dimensions	
Length	10 m \pm 20 cm
Diameter	10 mm
Flex radius	
Moving	60 mm
Fixed installation	30 mm
Weight	160 g/m
Tension	Max. 140 N

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

5.1.4 Cable pinout

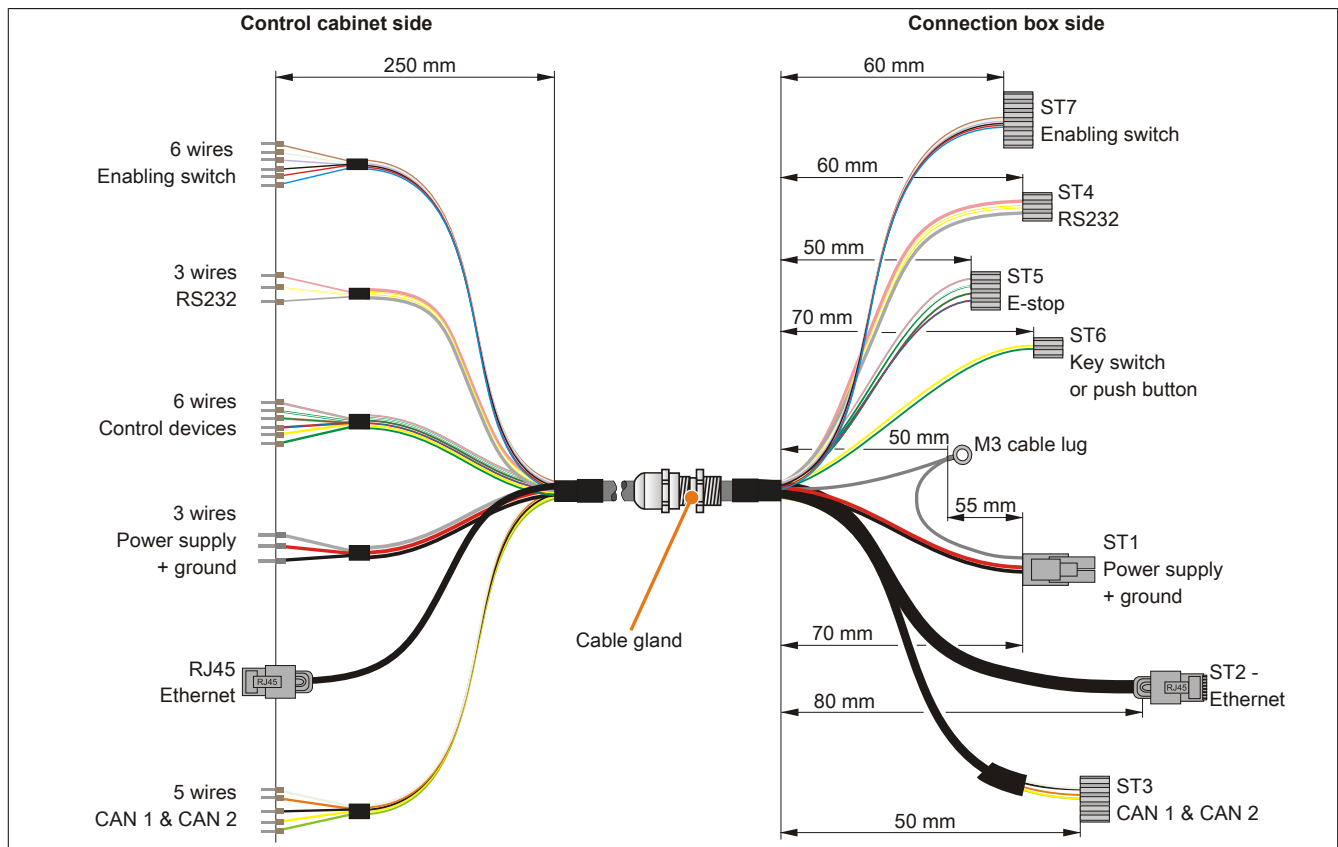


Figure 81: 5CAMPB.0100-10 - Cable pinout

ST7 enable switch, 6-pin male connector (connection box side)			Wire colors
C1		Pin 1	Brown
NO1		Pin 2	White
NC1		Pin 3	Purple
C2		Pin 4	Black
NO2		Pin 5	Red
NC2		Pin 6	Blue
ST4 RS232, 3-pin male connector (connection box side)			Wire colors
RxD		Pin 1	Pink
RS232_GND		Pin 2	White-Yellow
TxD		Pin 3	Gray
ST5 E-stop (connection box side)			Wire colors
E-stop control devices (connection side), 4-pin male connector			
E-stop N.C. contact 1 (11)		Pin 1	Gray-Pink
E-stop N.C. contact 2 (21)		Pin 2	Brown-Green
E-stop N.C. contact 1 (12)		Pin 3	White-Green
E-stop N.C. contact 2 (22)		Pin 4	Red-Blue
ST6 key switch or push button (connection box side)			Wire colors
Control devices for key switch or push button (connection side)			
Button S13		Pin 1	Yellow
Button S14		Pin 2	Green
ST1 supply + ground (connection box side)			Wire colors
+24 VDC supply		Pin 1	Red
Shielding		Pin 2	Gray
Ground		Pin 3	Black
NC		Pin 4	-
ST2 Ethernet RJ45 connector (connection box side)		Ethernet RJ45 connector (connection side)	Wire colors
TX	Pin 1	Pin 3	Green
TX\	Pin 2	Pin 6	Yellow
RX	Pin 3	Pin 1	Pink
NC	Pin 4	Pin 4	-
NC	Pin 5	Pin 5	-
RX\	Pin 6	Pin 2	Blue
NC	Pin 7	Pin 7	-
NC	Pin 8	Pin 8	-
Shielding	Shielding	Shielding	Shielding
ST3 CAN, 5-pin male connector			Wire colors
CAN 1 High		Pin 1	White
CAN 1 Low		Pin 2	Orange
Shielding		Pin 3	Black
CAN 2 High		Pin 4	Yellow
CAN 2 Low		Pin 5	Green

Table 69: 5CAMPB.0100-10 - Cable pinout

6 MP40/50 rechargeable backup battery

6.1 5MPBAT.0000-00

6.1.1 General information

The battery in the Mobile Panel prevents the operator panel from restarting when the connection box or control cabinet is being 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 control cabinet, then the battery will be charged automatically. When fully charged, it will last for 4 cycles of 15 minutes. When unplugged, the display shuts off, and the keys, input devices and 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 7 "Maintenance and service", section "Installing the backup battery" on page 133.

Warning!

Charging or discharging the battery improperly can cause a fire or explosion, e.g. due to reversed polarity or short circuit. It is only permitted to charge the battery 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 be initially charged for at least 4 hours.

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

6.1.2 Order data


Model number	Short description	Figure
	Accessories	
5MPBAT.0000-00	MP40/50 rechargeable backup battery	

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

6.1.3 Technical data

Information:

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

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

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

Product ID	5MPBAT.0000-00
Battery current	1950 mAh
Power failure bypass	Max. 15 minutes
Environmental conditions	
Temperature	
Operation	0 to 45°C (charging) -20 to 60°C (discharging)
Storage	-20 to 70°C (ideal temperature: 20 to 25°C)
Transport	-20 to 70°C (ideal temperature: 20 to 25°C)

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

7 Touch screen stylus pen

7.1 5AC900.1100-01

7.1.1 General information

To prevent damage to the touch screen, the best object for operating the touch screen is the touch screen stylus pen.

7.1.2 Order data


Model number	Short description	Figure
	Undefined	
5AC900.1100-01	Mobile Panel 40/50 touch screen stylus pen - 5 pcs.	

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

8 HMI Drivers & Utilities DVD

8.1 5SWHMI.0000-00

8.1.1 General information

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

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

8.1.2 Order data

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

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

8.1.3 Contents (V2.20)

BIOS product upgrades

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

Device drivers

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

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

Firmware upgrades

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

Utilities/Tools

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

Windows

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

MCAD templates for

- Industrial PCs

- Visualization and operating devices
- Slide-in label templates
- Custom designs

ECAD templates for

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

Documentation for

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

Service tools

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

Chapter 7 • Maintenance and service

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

1 Cleaning

Danger!

This device can only be cleaned when switched off in order to prevent unintended functions from being triggered when handling the touch screen or pressing keys.

This device should be cleaned with a moist cloth. The cloth should be moistened with water and detergent, a screen cleaning agent or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand, not sprayed directly on the device! Aggressive solvents, chemicals, scouring agents, pressurized air or steam jets should never be used.

Information:

Displays with a touch screen should be cleaned regularly.

2 Installing the backup battery

Information:

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

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

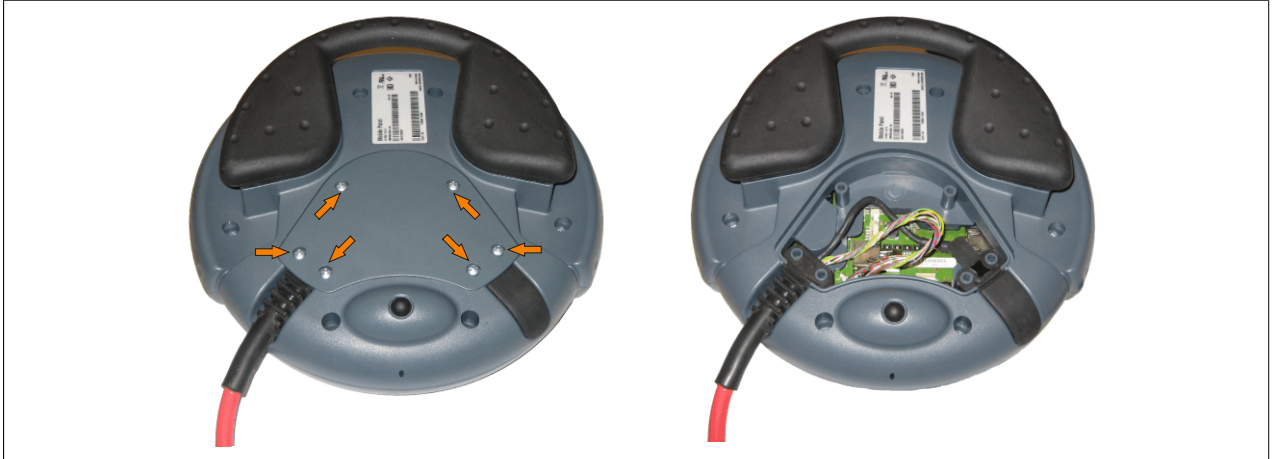


Figure 82: Removing the cover of the connection compartment

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

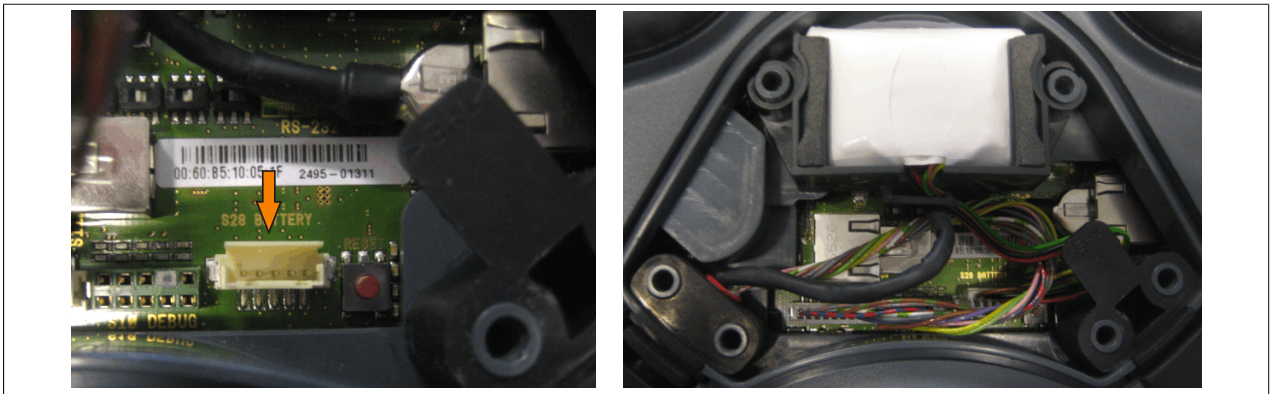


Figure 83: Connecting the cables

4. Attach the cover.

Appendix A

1 Stop button

Stop button for Mobile Panel 40/50 revisions \leq I0

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



Figure 84: Stop button for revisions \leq I0

Information:

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

Features	EAO BR 84 stop button
Power supply	
Nominal voltage	24 VDC
Minimum current	10 mA (per contact)
Maximum current load	1000 mA (per contact)
Utilization category	DC-13 (in accordance with IEC 60947-5-1)
EAO BR 84	B _{10d} : 100,000

Table 74: EAO BR 84 stop button - Technical data

Stop button on Mobile Panel 40/50 revisions \geq J0

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



Figure 85: Stop button for revisions \geq J0

Information:

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

Features	SCHLEGEL BR FRVK stop button
Power supply	
Nominal voltage	24 VDC
Minimum current	10 mA (per contact)
Maximum current load	1000 mA (per contact)
Utilization category	DC-13 (in accordance with IEC 60947-5-1)
SCHLEGEL BR FRVK	B _{10d} : 250,000

Table 75: SCHLEGEL BR FRVK stop button - Technical data

2 Enabling switch

Information:

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

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

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

3 Chemical resistance

3.1 Test description

3.1.1 Test 1

The devices under test are placed in a box that can be sealed (365x260x200). A cotton ball moistened with approximately 5 ml of solvent is placed on top of the test object. A cup (250 ml) is put over the cotton ball to prevent the solvent from evaporating too quickly. The cup and the cotton ball are then removed after 10 minutes. The residue solvent is not wiped off of the test object. The box is closed back up immediately. The test object is left in the closed box for at least 24 hours.

This test is performed at 20°C.

3.1.2 Test 2

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

This test is performed at 20°C.

3.2 Test results

Substance	Test passed	Problems / Not tested
Cutting oil - Test 1 <ul style="list-style-type: none"> • LO-Smoke level 5047 • Superfine 100 • DIE-KOTE 7270-M 	<ul style="list-style-type: none"> • Handle • ZT rubber • Type plate • Keyboard • Dummy plug • Attachment cable • Illuminated button • Key switch • Stop button • Display seal • Housing seal • Cover seal 	<ul style="list-style-type: none"> • Housing parts - Not tested • Handwheel dial - Not tested • Potentiometer dial - Not tested • Slot covers - Not tested
Cutting oil - Test 2 <ul style="list-style-type: none"> • LO-Smoke level 5047 • Superfine 100 • DIE-KOTE 7270-M 		Not tested
Unleaded gasoline - Test 1	<ul style="list-style-type: none"> • Handle • ZT rubber • Type plate • Keyboard • Dummy plug • Attachment cable • Illuminated button • Key switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel dial • Potentiometer dial • Slot covers 	<ul style="list-style-type: none"> • Housing - Material becomes lighter in color, white stains appear

Table 76: Chemical resistance test - Test results

Substance	Test passed	Problems / Not tested
Unleaded gasoline - Test 2	<ul style="list-style-type: none"> Handle Attachment cable Key switch Illuminated button mounting ring Stop button attachment Potentiometer dial 	<ul style="list-style-type: none"> Housing - Reduced hardness, part becomes pasty, reduced tensile strength, plastic becomes malleable ZT rubber - Strong swelling, loss of elasticity, tears with minimal effort Type plate - Adhesive dissolves, possible to wipe off printing Keyboard - Adhesive dissolves Dummy plug - Strong swelling, loss of elasticity, tears with minimal effort 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 dial - Reduced hardness, part becomes pasty, reduced tensile strength, plastic becomes malleable Slot covers - Not tested
Diesel - Test 1	<ul style="list-style-type: none"> Housing Handle ZT rubber Type plate Keyboard Dummy plug Attachment cable Illuminated button Key switch Stop button Display seal Housing seal Cover seal Handwheel dial Potentiometer dial Slot covers 	
Diesel - Test 2	<ul style="list-style-type: none"> Housing Keyboard Attachment cable Illuminated button cover Illuminated button mounting ring Key switch Stop button attachment Display seal Housing seal Cover seal Handwheel dial Potentiometer dial Slot covers 	<ul style="list-style-type: none"> Handle - Slight swelling ZT rubber - Slight swelling Type plate - Adhesive dissolves, possible to wipe off printing 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	<ul style="list-style-type: none"> Housing Handle ZT rubber Type plate Keyboard Dummy plug Attachment cable Illuminated button Key switch Stop button Display seal Housing seal Cover seal Handwheel dial Potentiometer dial Slot covers 	

Table 76: Chemical resistance test - Test results

Substance	Test passed	Problems / Not tested
Gear oil - Test 2	<ul style="list-style-type: none"> • Housing • Handle • ZT rubber • Keyboard • Dummy plug • Attachment cables • Illuminated button • Key switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel dial • Potentiometer dial • Slot covers 	<ul style="list-style-type: none"> • Type plate - Adhesive dissolves, possible to wipe off printing
Silicon spray - Test 1	<ul style="list-style-type: none"> • Housing • Handle • ZT rubber • Type plate • Keyboard • Dummy plug • Attachment cable • Illuminated button • Key switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel dial • Potentiometer dial • Slot covers 	
Silicon spray - Test 2	<ul style="list-style-type: none"> • Housing • Handle • ZT rubber • Keyboard • Dummy plug • Attachment cable • Illuminated button • Key switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel dial • Potentiometer dial • Slot covers 	<ul style="list-style-type: none"> • Type plate - Adhesive dissolves, possible to wipe off printing
Window cleaner CLINIL - Test 1	<ul style="list-style-type: none"> • Housing • Handle • ZT rubber • Type plate • Keyboard • Dummy plug • Attachment cable • Illuminated button • Key switch • Stop button • Display seal • Housing seal • Cover seal • Handwheel dial • Potentiometer dial • Slot covers 	

Table 76: Chemical resistance test - Test results

Substance	Test passed	Problems / Not tested
Window cleaner CLINIL - Test 2	<ul style="list-style-type: none"> 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 dial Slot covers 	<ul style="list-style-type: none"> Type plate - Adhesive dissolves, possible to wipe off printing Keyboard - Adhesive dissolves Illuminated button mounting ring seal - Strong swelling Potentiometer dial - Surface corrosion
Methyl - Test 1		Not tested
Methyl - Test 2	<ul style="list-style-type: none"> Housing Handle ZT rubber Keyboard Dummy plug Illuminated button Stop button attachment seal Display seal Housing seal Cover seal Handwheel dial Potentiometer dial Slot covers 	<ul style="list-style-type: none"> Type plate - Adhesive dissolves, possible to wipe off printing Attachment cable - Loss of color Key switch - Reduced hardness, part becomes pasty, reduced tensile strength, plastic becomes malleable Stop button attachment - Loss of color
Ethyl 96% - Test 1		Not tested
Ethyl 96% - Test 2	<ul style="list-style-type: none"> Housing Handle ZT rubber Keyboard Dummy plug Illuminated button Stop button attachment seal Display seal Housing seal Cover seal Handwheel dial Potentiometer dial Slot covers 	<ul style="list-style-type: none"> Type plate - Adhesive dissolves, possible to wipe off printing Attachment cable - Loss of color Key switch - Reduced hardness, part becomes pasty, reduced tensile strength, plastic becomes malleable Illuminated button mounting ring seal - Strong swelling Stop button attachment - Loss of color
Isopropanol - Test 1		Not tested
Isopropanol - Test 2	<ul style="list-style-type: none"> Housing Handle ZT rubber Dummy plug Attachment cable Illuminated button Stop button attachment seal Display seal Housing seal Cover seal Handwheel dial Slot covers 	<ul style="list-style-type: none"> Type plate - Adhesive dissolves, possible to wipe off printing Keyboard - Adhesive dissolves Key switch - Reduced hardness, part becomes pasty, reduced tensile strength, plastic becomes malleable Illuminated button mounting ring seal - Strong swelling Stop button attachment - Loss of color Potentiometer dial - Print corrosion

Table 76: Chemical resistance test - Test results

Substance	Test passed	Problems / Not tested
MEK (Methyl ethyl ketone), Toluene (Toluolum DAB 74), Xylene (Xyluolum OAB 90) -Test 1	<ul style="list-style-type: none"> • Handle • ZT rubber • Keyboard • Dummy plug • Attachment cable • Illuminated button (remaining parts) • Stop button • Display seal • Housing seal • Cover seal 	<ul style="list-style-type: none"> • Housing - Not tested • Type plate - Adhesive dissolves, possible to wipe off printing • Key switch - Reduced hardness, part becomes pasty, reduced tensile strength, plastic becomes malleable • Illuminated button cover - Plastic softens immediately • Potentiometer dial - Not tested • Handwheel dial - 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 76: Chemical resistance test - Test results

3.3 Touch screen - Tested by manufacturer

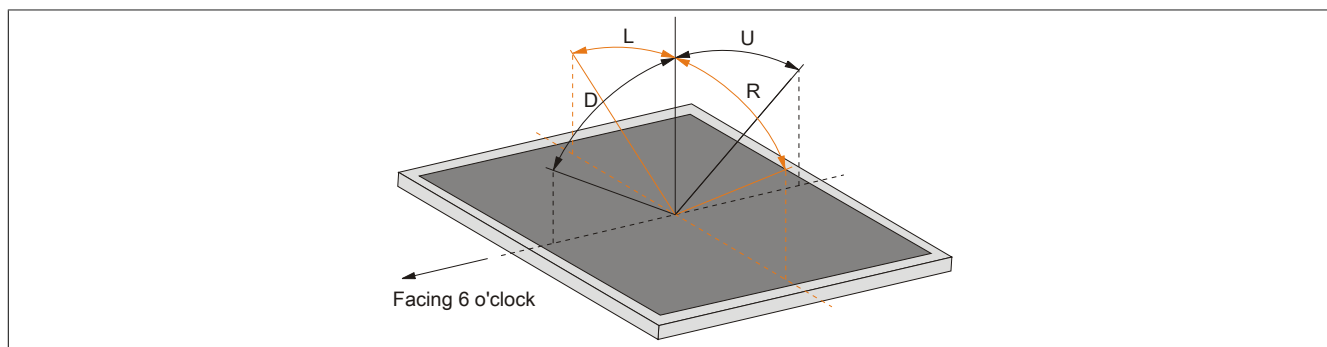
Length of test: 1 hour

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
- Dimethylformamide
- Hydrochloric acid (pH = 3)
- Toluene
- Ethanol

4 Viewing angles

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



5 Abbreviations

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

Table 77: Abbreviations used in this user's manual

6 Glossary

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

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