SIEMENS

SIMATIC HMI

HMI device
Mobile Panel 177 (WinCC flexible)

Operating Instructions (Compact)

Foreword

Overview 1

Safety instructions and general notes 2

Planning Use 3

Mounting and Connection 4

Operator elements and displays 5

Specifications 6

Appendix A

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Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

Danger

indicates that death or severe personal injury **will** result if proper precautions are not taken.

Warning

indicates that death or severe personal injury **may** result if proper precautions are not taken.

Caution

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

Notice

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:

Warning

This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

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Foreword

Operational reliability and safety regulations

Detailed information on the operational reliability and safety regulations can be found in the "Mobile Panel 177" operating instructions.

Voltage supply

Warning

The HMI device conforms to protection class III in accordance with EN 61131-2 or EN 50178. The 24 VDC supply must be ensured by safe separation of extra low voltage from dangerous contact voltages, e.g., using a safety isolation transformer or equivalent devices.

The supply circuit must be protected against short circuits with a 3.15 A fuse.

Therefore, when sizing the supply, you must pay attention to the voltage drop on the connecting cable.

Operating instructions (compact) - for the professional

Important information on Mobile Panel 177 is summarized in the available operating instructions (compact).

Operating Instructions

Detailed information on Mobile Panel 177 can be found in the "Mobile Panel 177" operating instructions.

The "Mobile Panel 177" operating instructions and further documentation are available for download on the internet under "http://www.siemens.com/automation/service".

Table of contents

Foreword ..... **i**

1 Overview **1-1**

1.1 Design 1-1

1.2 Mobile Panel 177 1-2

1.3 Connecting cables 1-4

1.4 Terminal box 1-6

1.5 Wall holder 1-9

2 Safety instructions and general notes **2-1**

2.1 Operating safety 2-1

2.2 Risk analysis 2-2

3 Planning Use **3-1**

3.1 Mounting positions and type of fixation 3-1

3.2 Preparing mounting 3-2

4 Mounting and Connection **4-1**

4.1 Mounting the terminal box and wall holder 4-1

4.2 Connecting the terminal box 4-3
4.2.1 Opening and closing the terminal box 4-3
4.2.2 Interfaces to the Terminal Box DP 4-5
4.2.3 Interfaces to the Terminal Box PN 4-6
4.2.4 Setting the box ID at the terminal box 4-7
4.2.5 Stripping the insulation of cables 4-9
4.2.6 Connecting the equipotential bonding circuit 4-10
4.2.7 Connecting a Power Supply 4-11
4.2.8 Connecting the PLC 4-13
4.2.9 Connecting the configuration computer 4-16

4.3 Connecting Mobile Panel 177 4-18
4.3.1 Opening and closing the terminal compartment 4-18
4.3.2 Interfaces on the Mobile Panel 177 DP 4-20
4.3.3 Interfaces on Mobile Panel 177 PN 4-21
4.3.4 Connecting the connecting cable 4-22
4.3.5 Connecting the configuration computer 4-24

5 Operator elements and displays **5-1**

5.1 Mobile Panel 5-1
5.1.1 Operator control elements 5-1
5.1.2 Front-side operator control elements 5-2
5.1.3 Enable switch 5-3
5.1.4 STOP button 5-5
5.1.4.1 Overview 5-5

5.1.4.2 STOP button on Terminal Box Plus 5-7
5.1.4.3 STOP button on Terminal Box Basic 5-8
5.1.5 Hand wheel 5-10
5.1.6 Key-operated switch 5-11
5.1.7 Illuminated pushbutton 5-12

5.2 Terminal Box PN 5-13

6 Specifications 6-1

6.1 Dimensional drawings 6-1
6.1.1 Mobile Panel 6-1
6.1.2 Wall holder 6-3
6.1.3 Terminal Box DP 6-4
6.1.4 Terminal Box PN 6-5

6.2 Technical data 6-6
6.2.1 Mobile Panel 6-6
6.2.2 Terminal Box DP 6-7
6.2.3 Terminal Box PN 6-8

6.3 Interface allocation Mobile Panel 177 DP 6-9
6.3.1 RS 485 (IF 2) 6-9
6.3.2 RJ45 6-9
6.3.3 Female header 6-10

6.4 Interface assignment Mobile Panel 177 PN 6-10
6.4.1 RS 485 (IF 2) 6-10
6.4.2 RJ45 6-11
6.4.3 Female header 6-11

6.5 Interface assignment Terminal Box DP 6-12

6.6 Interface assignment Terminal Box PN 6-16

6.7 Connection examples for Enable switch and STOP button 6-18

A Appendix A-1

A.1 Connection point recognition A-1
A.1.1 Overview A-1
A.1.2 Connection point recognition via box ID A-2

A.2 Evaluation of the operator control elements A-5
A.2.1 Overview A-5
A.2.2 Evaluating operator control elements as direct keys A-6
A.2.3 Evaluating operator control elements via WinCC flexible system functions A-9
A.2.3.1 LED control of the softkeys A-9
A.2.3.2 Basic procedure A-10
A.2.3.3 Illuminated pushbutton A-13
A.2.3.4 Key-operated switch A-14
A.2.3.5 Hand wheel A-14

Index Index-1

Overview

1

1.1 Design

Design

The following figure shows the Mobile Panel 177 with a terminal box. For stationary operation, the Mobile Panel 177 can be securely placed in a wall holder (not shown).

Figure 1-1 Mobile Panel design, example Mobile Panel 177 DP

① Mobile Panel 177 DP
② Terminal Box DP
③ Connecting cable DP
④ Cable for power supply and safety functions
⑤ Cable for process connection

Cables for process connection are available in different lengths and must be purchased separately.

Cables for the power supply and safety functions must be selected specifically for the system.

1.2 Mobile Panel 177

Introduction

The Mobile Panel 177 comes equipped in the following three ways:

- With enabling switches
- With enabling switches and STOP button
- With enabling switches, STOP button, handwheel, key-operated switch, and illuminated pushbutton

  This variant is shown in the following illustrations.

Views of the Mobile Panel 177

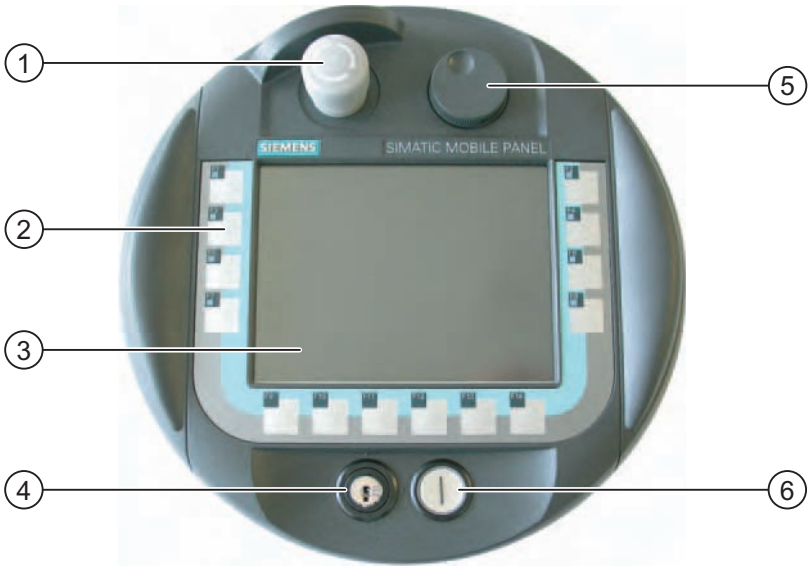


Figure 1-2 Front view

① STOP button, optional
② Control keys
③ Display / Touch screen
④ Key-operated switch, optional
⑤ Handwheel, optional
⑥ Illuminated pushbutton, optional

Figure 1-3 Side view

① Fall protection for the STOP pushbutton
② STOP button, optional
③ Enabling switches, located on both sides of the Mobile Panel 177
④ Grip

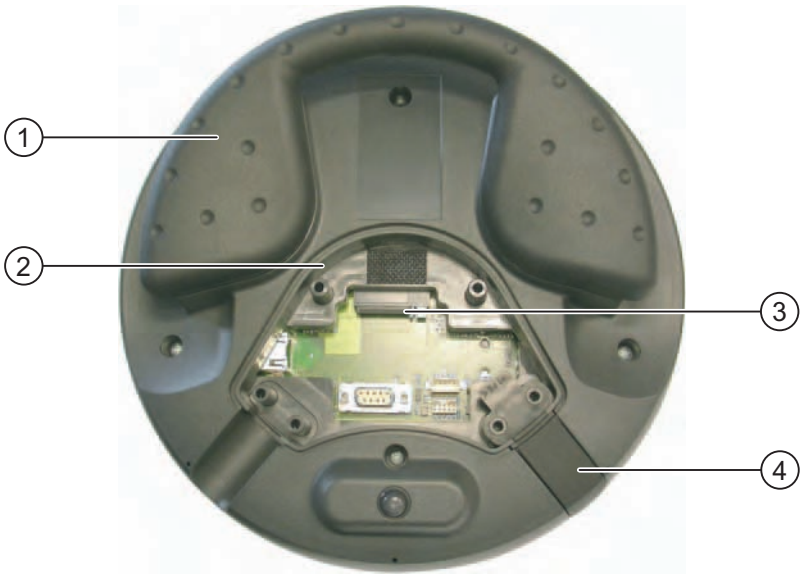


Figure 1-4 Rear view with opened terminal compartment on Mobile Panel 177 DP

① Grip
② Terminal compartment
③ Slot for MultiMediaCard
④ Sealing plug, to guarantee maintenance of protection class IP65

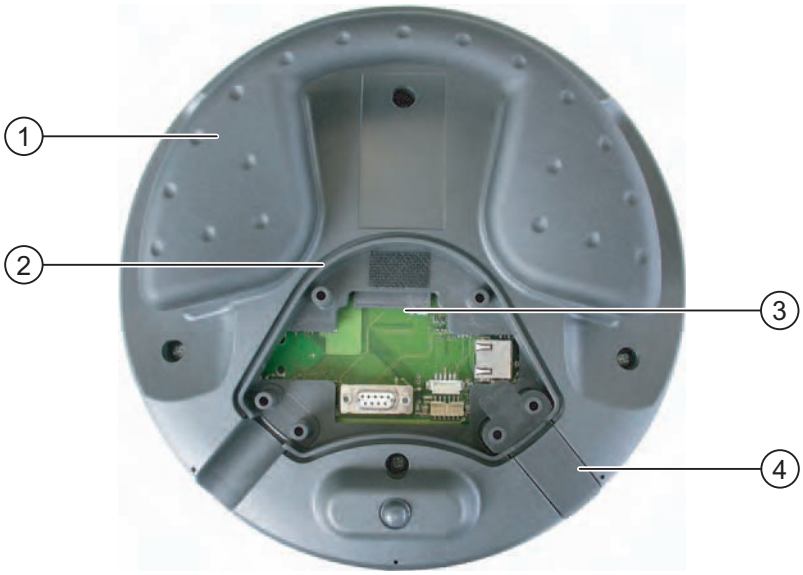


Figure 1-5 Rear view with opened terminal compartment on Mobile Panel 177 PN

① Grip
② Terminal compartment
③ Slot for MultiMediaCard
④ Sealing plug, to guarantee maintenance of protection class IP65

1.3 Connecting cables

Introduction

The connecting cable is connected to the Mobile Panel 177 and is plugged with a quick-connect plug connector to the terminal box. The connecting cable is an industrial cable and, thus, resistant to many solvents and lubricants. The flexural strength of the connecting cable is geared to the actual usage conditions.

The connecting cable is available in two models:

- Connecting cable DP

  For connecting the Mobile Panel 177 DP to the terminal box DP.

- Connecting cable PN

  For connecting the Mobile Panel 177 PN to the terminal box PN.

The connecting cables are available in different lengths. Further information can be found in the Siemens ST 80 catalog.

Design of the connecting cable

Figure 1-6 Connecting cable DP

Figure 1-7 Connecting cable PN

① Metallic push-pull circular connector
② Strain relief and kink protection for connecting cable
③ RJ45 plug
④ Plug connector

Connections on the Mobile Panel 177 DP

- RJ45, 8-pin
- Plug connector, 10-pin

Connections on the Mobile Panel 177 PN:

- RJ45, 8-pin
- Plug connector, 12-pin

Connections on the terminal box side:

- Metallic push-pull circular connector, 22-pin

Note

Protection class

When inserted, the circular connector guarantees the rating of protection class IP65.

1.4 Terminal box

Design

Figure 1-8 Terminal Box DP

① Screwed joint for process data line
② Screwed joint for power supply cable and shield
③ Screwed joint for cable with supplementary Stop and enabling switch signals and for PLC-accompanying signals
④ Connecting socket for the connecting cable
⑤ Dummy cap

Figure 1-9 Terminal Box PN

① Screwed joint for process data line
② LED displays
③ Screwed joint for power supply cable and shield
④ Screwed joint for cable with supplementary Stop and enabling switch signals and for PLC-accompanying signals
⑤ Connecting socket for the connecting cable – covered with dummy cap

Notice

Protection class IP65

Protection class IP65 at the terminal box is ensured with plugged-in Mobile Panel 177 or plugged-in dummy cap.

Variants

The terminal boxes are available in the following variants:

- Terminal Box Basic
- Terminal Box Plus

The two types of terminal boxes differ in the manner in which the circuit evaluates the Stop Circuit or Emergency Stop signal of the system to be monitored and the corresponding response to the system itself that is being monitored.

Note

The exterior of the terminal box variants differ only in the printing on the side.

Note

Recovery time

Wait for approx. one second after you have removed the connecting cable from the terminal box before you plug the connecting cable back in.

After power failures of less than one second the connecting cable has to be disconnected.

Division of the system into zones

You can divide a system into several zones or functional areas by using several terminal boxes, whereby the safety functions can also be set up to be zone-specific. This means that both enabling switches and STOP buttons can act in only one particular zone and not in others.

Connection point recognition

You can set an individual box ID for each terminal box. The box ID allows connection point recognition to be implemented.

Combination of connecting cable and terminal box

It is ensured by mechanical means that only the following combinations can be plugged:

- Mobile Panel 177 DP with connecting cable DP to the terminal box DP
- Mobile Panel 177 PN with connecting cable PN to the terminal box PN

Compatibility with the Mobile Panel 170

You can operate a Mobile Panel 170 on a terminal box DP for the Mobile Panel 177 DP. The additional features of the new terminal box, for example the box ID, cannot be used with the Mobile Panel 170.

You can operate a Mobile Panel 177 DP on a terminal box for the Mobile Panel 170.

1.5 Wall holder

Function

The wall holder is used to securely mount the Mobile Panel 177 for stationary operation.

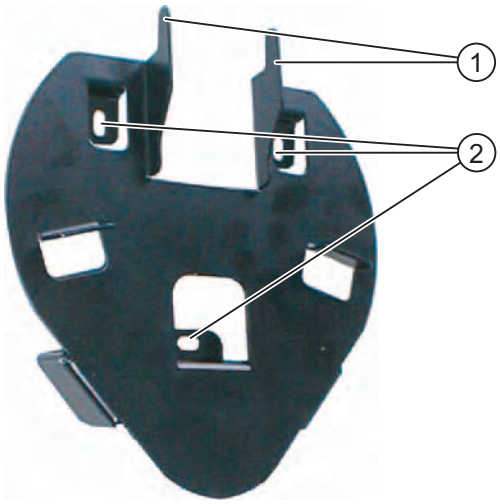


Figure 1-10 Wall holder

① Hook for the grip on the HMI device
② Screw-on hole

Safety instructions and general notes

2

2.1 Operating safety

Standards

The HMI device complies with the following standards:

- EN 60204-1

  Safety of Machinery – Electrical Equipment of Machines
- EN 61131-1 and EN 61131-2

  Programmable Logic Controllers
- The HMI device was tested for EMC in accordance with the following standards:
  - EN 50081-2, EMC – Emitted Interference
  - EN 61000-6-2, Generic standard, Immunity, industrial environments
  - IEC 61131-2, Draft 10.03.02, Programmable logic controllers
- STOP button for fast machine stops:

  EN 60947-5-1:1997, K 2.2, Low-voltage Switchgear and Control Gear, Positive-Opening Contacts

  EN 954 Category 3 can be achieved with an external monitoring device. Two floating break contacts for connection of external I/O, rated voltage of 24 V (safety extra-low voltage in accordance with EN 61131-2 or EN 50179, Equipment of Electrical Power Installations with Electronic Devices), maximum current of 500 mA
- Enabling equipment in accordance with EN 60204-1 in safety categories defined in EN 954-1:1996, Safety-Related Parts of Control Systems:
  - EN 954 Category 3 can be achieved with an external monitoring device.
  - 2 parallel switched floating make contacts for connection of external I/O, rated voltage of 24 VDC (safety extra-low voltage in accordance with EN 61131-2 or EN 50178), maximum current of 400 mA.

If the HMI device is used in a system, the following standards are fulfilled:

- prEN 1921, Industrial Automation Systems – Safety of Integrated Manufacturing Systems
- EN 12417:2001, Machine Tools – Safety - Machining Centers
- UL 508, Industrial Control Equipment
- CSA C22.2 No.14, Industrial Control Equipment

2.2 Risk analysis

Carrying out a risk analysis

The following standards must be used to perform the risk analysis:

- EN 292, General Machinery Directives
- EN 1050 Risk Assessment for Machinery
- EN 954-1 Safety of Machinery

These considerations lead to a safety category (B, 1, 2, 3, 4) in accordance with EN 954-1 that ultimately dictates how the safety-related aspects of the system to be monitored are to be furnished.

The connection examples with three different monitoring devices show how Category 3 in accordance with EN 954-1 can be achieved with the safety-related features of the Mobile Panel 177. Attention must be paid that the overall concept of the system is designed with this in mind.

Planning Use

3

3.1 Mounting positions and type of fixation

Mounting position

The wall holder is designed for vertical mounting.

The terminal box is designed for surface mounting independently of cabinets or control panels.

The terminal box is self-ventilated and is approved for all mounting positions. Note that the guaranteed protection rating is only ensured if the connecting cable or the dummy cap is plugged into the terminal box.

3.2 Preparing mounting

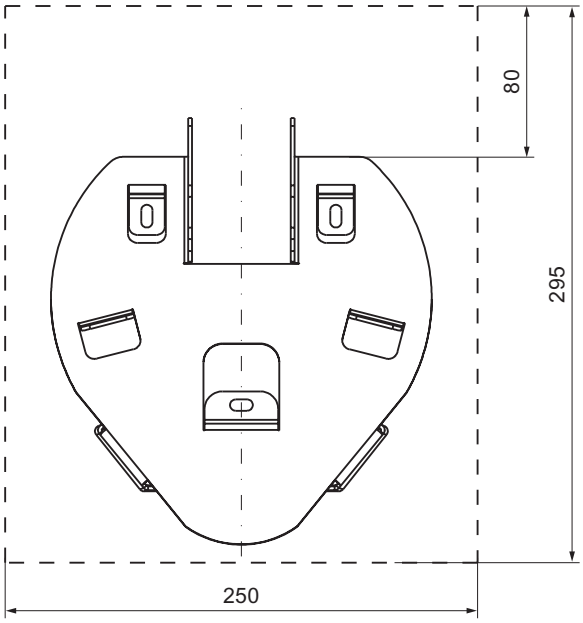
Selecting the mounting location for the HMI device holder

Observe the following points when selecting the mounting location:

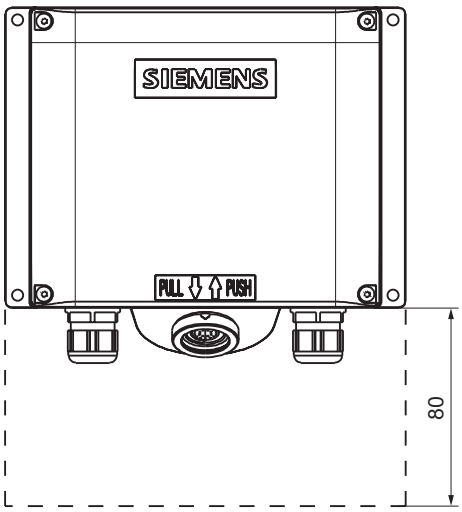
- Position the wall holder so that the display of the hooked-in HMI device is not exposed to direct sunlight.
- Position the wall holder so that the HMI device can be hooked in ergonomically by the user. Choose a suitable mounting height.

Maintaining clearances

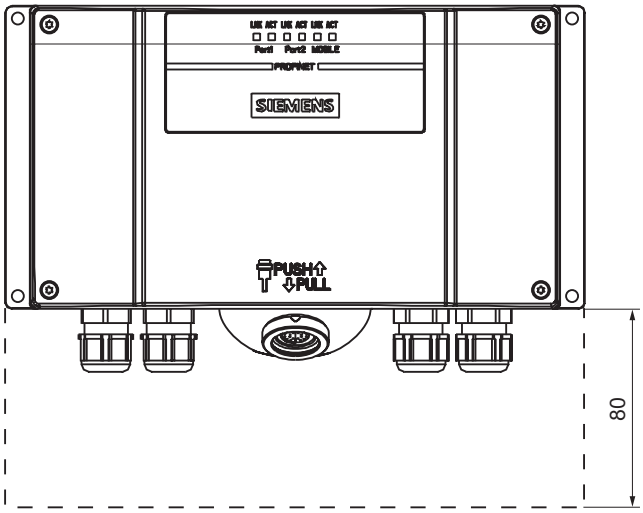
The following clearances are required around the wall holder:



The following clearances are required around the Terminal Box DP:



The following clearances are required around the Terminal Box PN.



Mounting and Connection

4

4.1 Mounting the terminal box and wall holder

Requirements

The following are required for mounting:

- Three M5 cylinder head screws for the wall mounting of the HMI device
- Four M4 cylinder head screws for the terminal box

If the HMI device is to be operated while hooked into the wall holder, ensure that the connecting cable is sufficiently long.

Procedure – mounting the wall holder

Notice

In order to ensure that the HMI device can be hooked in securely, select a vertical surface or one inclined slightly to the rear as the mounting surface.

For HMI device with STOP button:

The HMI device can fall down if it cannot be hooked in securely. In the process the STOP button can be triggered unintentionally, thus causing the machine or system to stop.

Note

Positioning

A position at eye level is recommended. This permits the Mobile Panel 177 to be operated even if it is hooked into the wall holder.

Proceed as follows:

1. Select a position for the wall holder that can be reached easily and without danger.
2. Place the wall holder onto the mounting surface from the front.
3. Mark the mounting holes using a scriber.
4. Drill three through holes or three M5 threaded holes
5. Fasten the wall holder

Procedure – mounting the terminal box

Note

Length of the connecting cable

Take into account the maximum length of the connecting cable when selecting the position for the terminal box.

Proceed as follows:

1. Select a position for the terminal box that can be reached easily and without danger.
2. Place the terminal box onto the mounting surface from the front.
3. Mark the mounting holes with a scriber.
4. Drill four through holes or four M4 threaded holes

   Notice

   Permissible torque

   The terminal box housing is made of plastic. Do not exceed 0.4 to 0.5 Nm of torque when tightening the screws.

5. Fastening the terminal box

See also

Mounting positions and type of fixation (Page 3-1)

4.2 Connecting the terminal box

4.2.1 Opening and closing the terminal box

Introduction

Please note:

Caution

Short circuits in the terminal box can impair the function of the Mobile Panel 177.

When carrying out work in the opened terminal box ensure that conductive materials, such as cable residues, do not come into contact with electrical circuits.

Caution

When working in the open housing, ensure that current-carrying conductors do not come into contact with electrical circuits.

Note the ESD instructions.

Requirements

Torx screwdriver, Size 2

Procedure

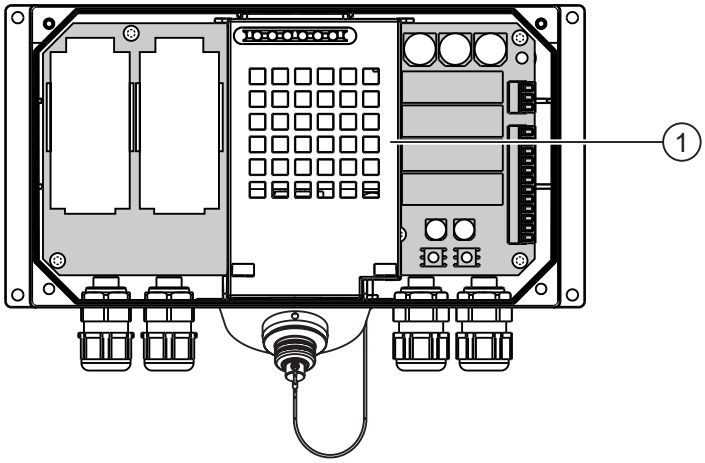
Figure 4-1 Opening the terminal box – example with Terminal Box DP

① Screws
② Cover
③ Screwed connections

Proceed as follows:

1. Loosen the four screws
2. Put down the screws and cover
3. Put the opened terminal box down securely

Protective cover of the Terminal Box PN



① Protective cover

Note

Protective cover

Do not remove the protective cover, because otherwise the electronics of the terminal box may be damaged or destroyed.

Notes on closing

Notice

Permissible torque

The terminal box housing is made of plastic. Therefore, the mounting hole threads cannot handle the same amount of stress as a comparable metallic housing. Do not exceed 0.4 to 0.5 Nm of torque when tightening the screws.

If the screws are tightened more than 20 times, there is risk of damage to the threads.

Protection class IP65

Upon conclusion of your work on the connections, check to make sure that the unused threaded cable entry holes are fitted with rubber seals. Otherwise, protection class IP65 is not guaranteed.

4.2.2 Interfaces to the Terminal Box DP

The following interfaces are available on the terminal box:

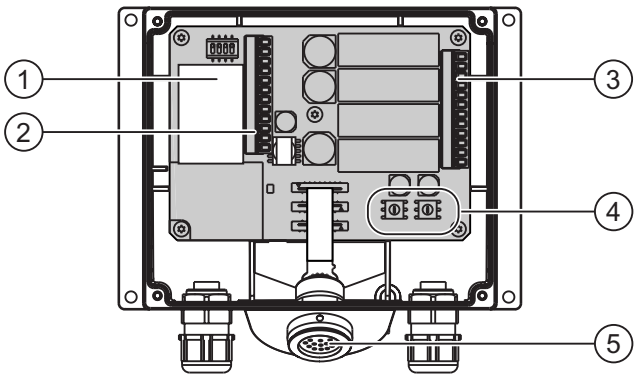


Figure 4-2 Interfaces to the Terminal Box DP

① Fast connector
② Terminal strip 1 for RS 232, RS 422, RS 485 and power supply
③ Terminal strip 2 for safety function for STOP button and Enable switch and for additional control system functions
④ Rotary encoder switch for entering the box ID
⑤ Socket for the connecting cable

Two PROFIBUS cables can be connected to the Fast Connector in order to loop the PROFIBUS through.

4.2.3 Interfaces to the Terminal Box PN

The following interfaces are available on the terminal box:

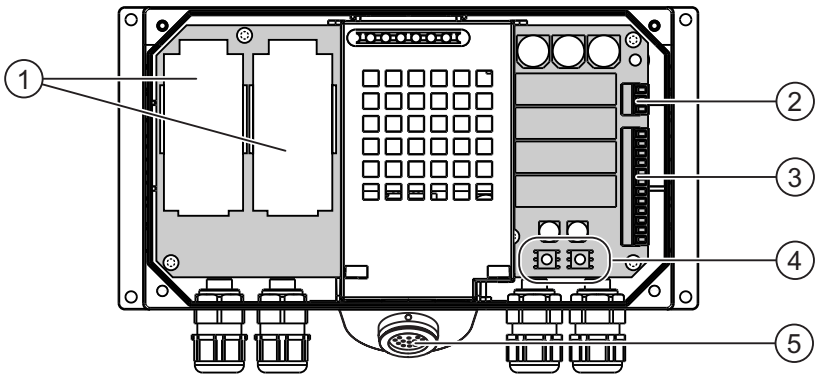


Figure 4-3 Interfaces to the Terminal Box PN

① Fast connector
② Terminal strip 1 for supply voltage
③ Terminal strip 2 for safety function for STOP button and Enable switch and for additional control system functions
④ Rotary encoder switch for entering the box ID
⑤ Socket for the connecting cable

Two PROFINET cables can be connected to each Fast Connector in order to loop the PROFINET through.

4.2.4 Setting the box ID at the terminal box

Introduction

You can set a unique box ID for station identification in each terminal box. If configured correspondingly, the box ID can be read out of the HMI device and transmitted to the controller.

Rotary encoder switch

The following figures show the position of the two rotary encoder switches in the terminal box:

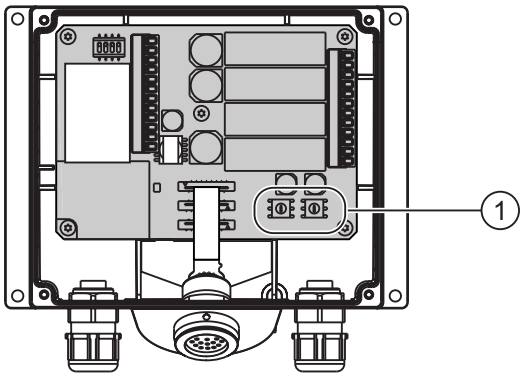


Figure 4-4 Terminal Box DP

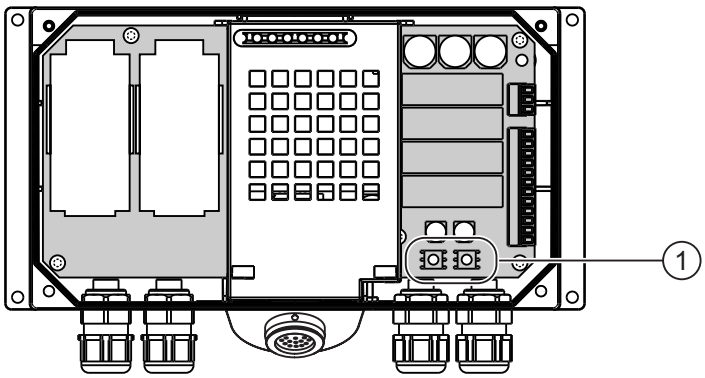


Figure 4-5 Terminal Box PN

① Rotary encoder switch

Example for setting the box ID

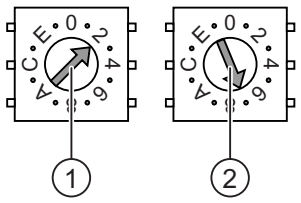


Figure 4-6 Example for the address "27H"

① Rotary encoding switch for more significant bits
② Rotary encoding switch for less significant bits

The figure shows the set address 27H, which is the same as address 39 in decimal format.

Procedure

Proceed as follows:

1. Open the terminal box.
2. Use a screwdriver to set the box ID

   The input is in hexadecimal format Values between 0 and 255 can be set in decimal format.
3. Closing the terminal box

Result

The box ID is set.

See also

Opening and closing the terminal box (Page 4-3)

4.2.5 Stripping the insulation of cables

Stripping the insulation

Strip the insulation of the cables in accordance with the following figures

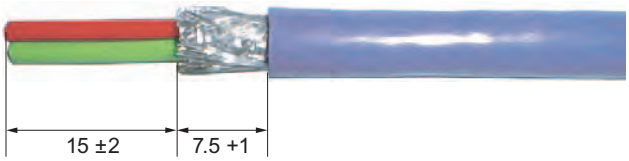


Figure 4-7 Stripping the insulation from the MPI/PROFIBUS-DP cable

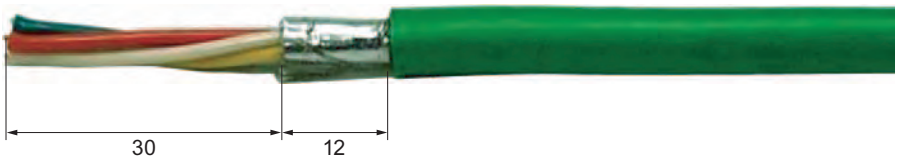


Figure 4-8 Stripping the PROFINET cable

Note

Use the cable stripper listed in the Siemens IK 10 catalog in order to enable you to strip the insulation from the cables faster and to the proper length.

4.2.6 Connecting the equipotential bonding circuit

Potential differences

Differences in potential between spatially separated system parts can lead to high equalizing currents via the data cables and therefore to the destruction of their interfaces. This situation may arise if the cable shields are fitted at both ends and grounded at different system parts.

Potential differences may develop when a system is connected to different network inputs.

General requirements of equipotential bonding

Potential differences must be reduced by means of equipotential bonding in order to ensure trouble-free operation of the relevant components of the electronic system. The following must therefore be observed when installing the equipotential bonding circuit:

- The effectiveness of equipotential bonding increases as the impedance of the equipotential bonding conductor decreases or as the size of its cross-section increases.
- If two system parts are connected to each other via shielded data lines with shielding connected to the grounding/protective conductor on both sides, the impedance of the additionally installed equipotential bonding cables may not exceed 10% of the shielding impedance.
- The cross-section of a selected equipotential bonding conductor must be capable of handling the maximum equalizing current. Experience shows that the best results for equipotential bonding between cabinets are achieved with a minimum conductor cross-section of 16 mm^2.
- Use equipotential bonding conductors made of copper or galvanized steel. Establish a large-surface contact between the equipotential bonding conductors and the grounding/protective conductor and protect these from corrosion.
- Clamp the shielding of the data cable on the HMI device onto the equipotential bonding strip so that it is flush and near using suitable cable clamps.
- Route the equipotential bonding conductor and data cables in parallel with minimum clearance between these.

Notice

Equipotential bonding conduction

Cable shielding is not suitable for equipotential bonding. Always use the prescribed equipotential bonding conductors. The minimum cross-section of a conductor used for equipotential bonding is 16 mm^2. When you install MPI and PROFIBUS DP networks, always use cables with a sufficient crosssection since otherwise the interface modules may be damaged or destroyed.

4.2.7 Connecting a Power Supply

Introduction

The supply voltage for the HMI device is connected to a terminal strip in the terminal box. The terminal block is designed for cables with a maximum cross-section of 1,5 mm^2.

Connect the ground terminal of the terminal box to the cabinet ground.

Note

Polarity reversal protection

The terminal box has polarity reversal protection.

Wiring diagram

The following figures show the connection of the power supply to the terminal box.

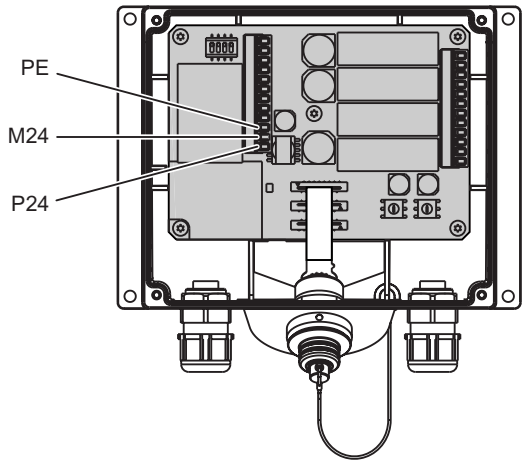


Figure 4-9 Connecting the power supply to the Terminal Box DP

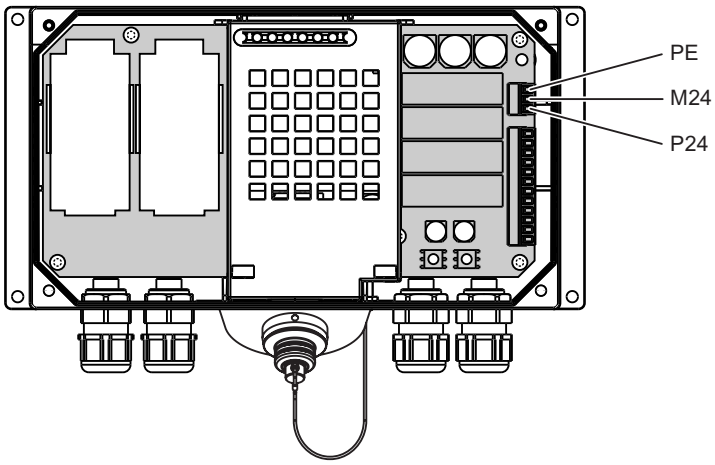


Figure 4-10 Connecting the power supply to the Terminal Box PN

The abbreviations in the figure are defined as follows:

- PE stands for equipment grounding conductor
- M stands for ground
- P24 stands for +24 VDC

Please refer to Technical Data for information on the voltage supply requirements.

Warning

24 V DC -supply

Personal injury and equipment damage can occur. Rate the 24 V DC power supply of the Mobile Panel 177 correctly. Otherwise components of your automation system can be damaged and persons can be injured.

Use only voltage generated as safety extra-low voltage (SELV) for the 24 VDC supply of the Mobile Panel 177.

Caution

Safe electrical isolation

When using a 24 VDC supply, make sure that the extra-low voltage is isolated safely. Always use power supply modules that conform to IEC 364-4-41 or HD 384.04.41 (VDE 0100, Part 410).

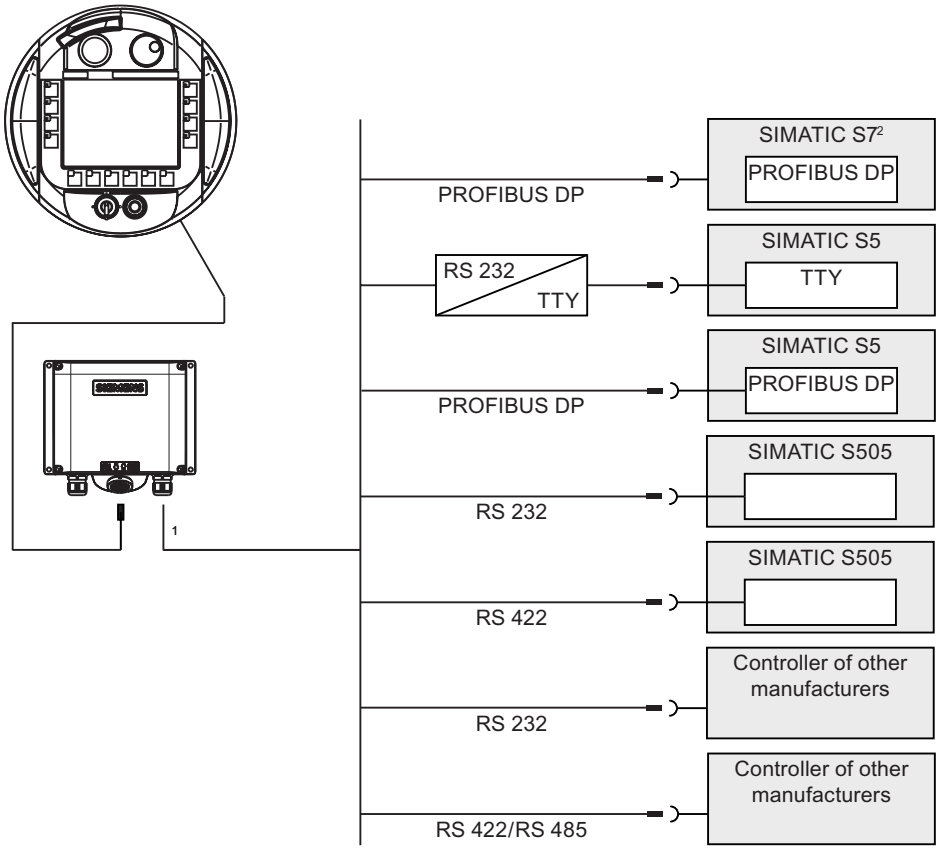
The supply voltage must be within the specified range. Otherwise malfunctions in the HMI device may result.

The 24 V output of the power supply must be connected to the equipotential bonding; because the potential difference between the PLC and the HMI device can destroy the communication interface.

4.2.8 Connecting the PLC

Connecting a PLC to a Terminal Box DP

The following figure shows the connection of the PLC to the Terminal Box DP.



1 When a serial interface is used during operation, IF1 (RS 232) and (RS 422/485) may only be connected alternately at the terminal box

2 Use only the cables approved for that purpose to connect to a SIMATIC S7.

Notice

Protection rating

The adapter must be set up in such a way the an IP65 protection rating is ensured.

Always use the approved cables to connect a SIMATIC S7 PLC. Note also the maximum permissible cable lengths for the process interface. Standard cables are available for the connection. For further information, refer to the SIMATIC HMI Catalog ST 80.

Configure the interfaces IF1 on the Terminal Box DP

The IF1 interface can be configured using the DIL switch.

The figure below shows the position of the DIL switch.

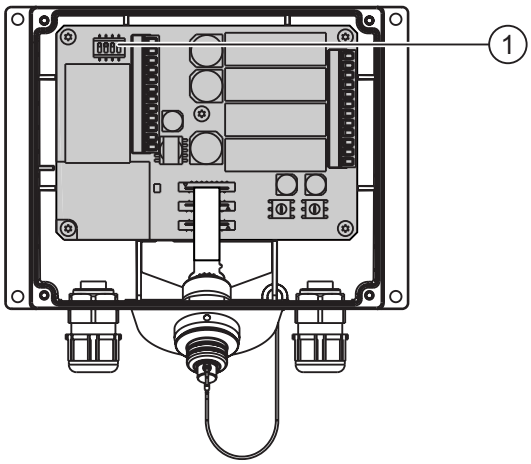


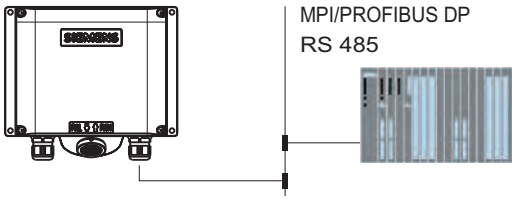
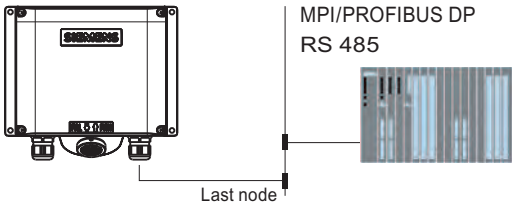
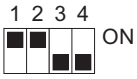
Figure 4-11 Position of the DIL switch

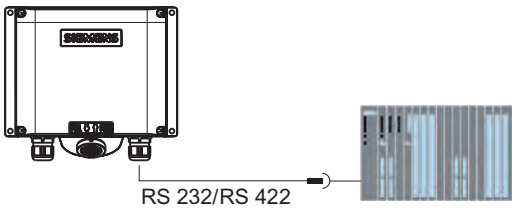
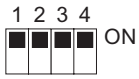
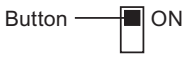
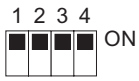
① DIL switch

Note

Note the diagrams of the DIL switch settings on the inside of the cover.

The following table shows the settings of the DIL switch. The transmitting and receiving direction is switched internally with the RTS signal.

Communication	Switch setting
	
	

Communication	Switch setting
	
	

Compressing the internal program memory with SIMATIC S5

Caution

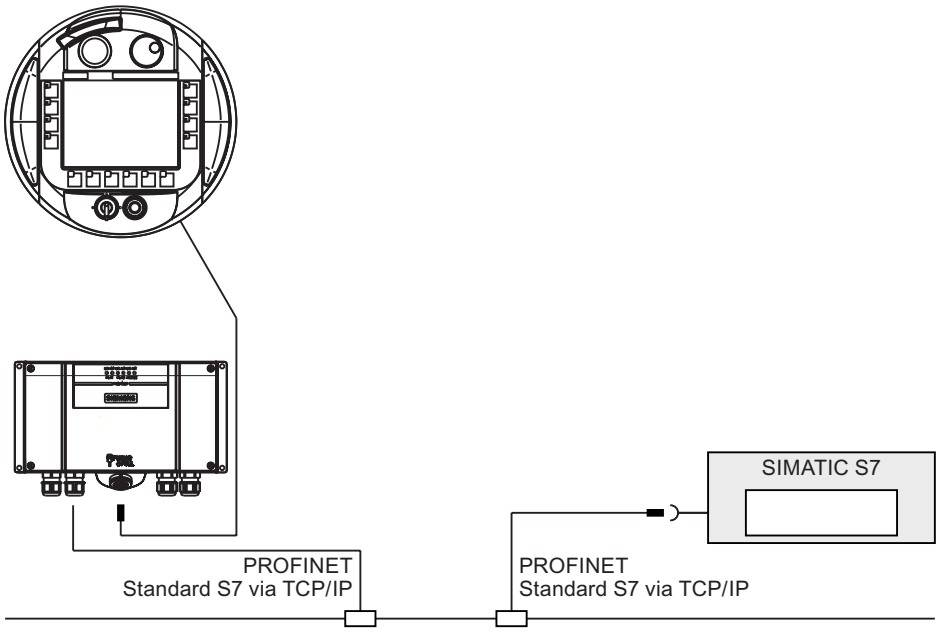
Compressing the internal program memory

Compressing the internal program memory of the SIMATIC S5 PLC ("Compress" PU function, integrated FB COMPR) is not permitted if an HMI device is connected! When memory is compressed, the absolute addresses of the blocks in the program memory change. Since the HMI device only reads the address list during startup, it does not recognize the address change and accesses the wrong memory areas.

If you cannot avoid compressing memory during operation, turn off the HMI device before running the compress function.

Connecting a PLC to a Terminal Box PN

The following figure shows the connection of the PLC to the Terminal Box PN.



4.2.9 Connecting the configuration computer

Introduction

Standard cables are available for the connections shown (refer to the Siemens ST80 catalog).

Connection configurator

The following figures show the connection between the terminal box and the configuration computer via the network.

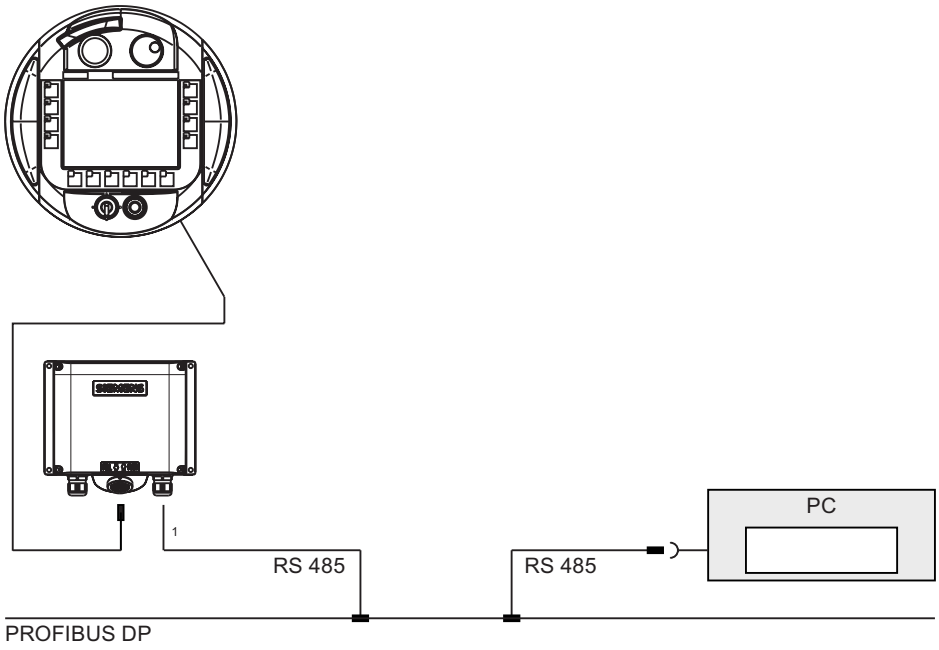


Figure 4-12 Connect the configuration computer via MPI/PROFIBUS DP to a Terminal Box DP

1 When a serial interface is used during operation, IF1 (RS 232) and (RS 422/485) may only be connected alternately. IF1 is positioned on Terminal strip 1 of the Terminal Box DP.

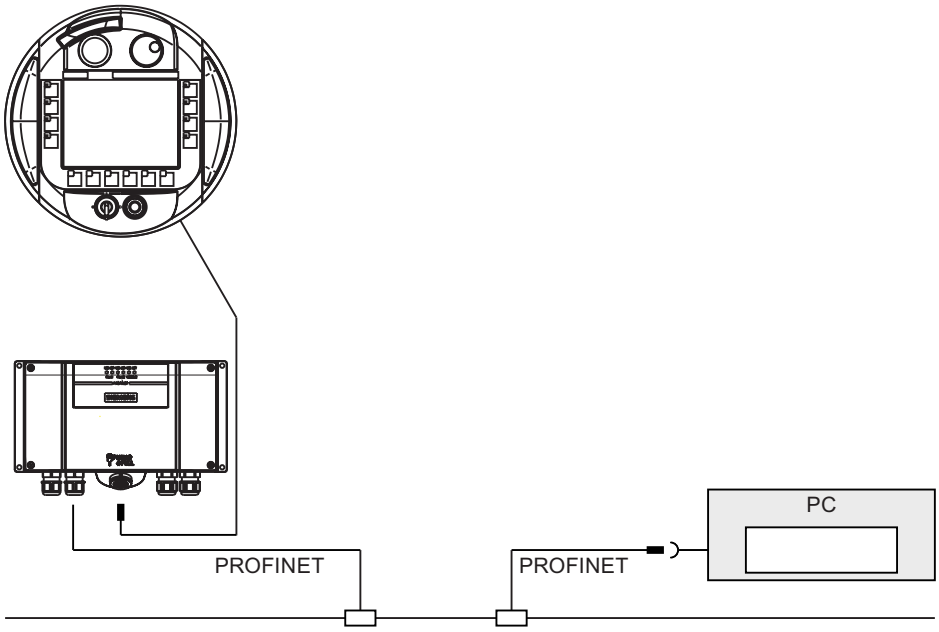


Figure 4-13 Connect the configuration computer via PROFINET to a Terminal Box PN

4.3 Connecting Mobile Panel 177

4.3.1 Opening and closing the terminal compartment

Introduction

Before you begin:

Caution

Malfunctions

If the HMI device lies on its front, the STOP button can trigger. Other operating elements (key-operated switches, illuminated pushbuttons) can be triggered unintentionally, thus causing malfunctions.

If you open the terminal compartment, you must therefore remove the connecting cable belonging to the Mobile Panel 177 from the terminal box.

ESD guidelines

Note the ESD instructions.

Note

Pay attention to cleanliness. Foreign bodies or liquids must not come into contact with the printed circuit board or penetrate the inside of the HMI device.

Place the HMI device with the front side on a flat, clean surface to protect against damage.

Requirements

Crosstip screwdriver, Size 2

Procedure

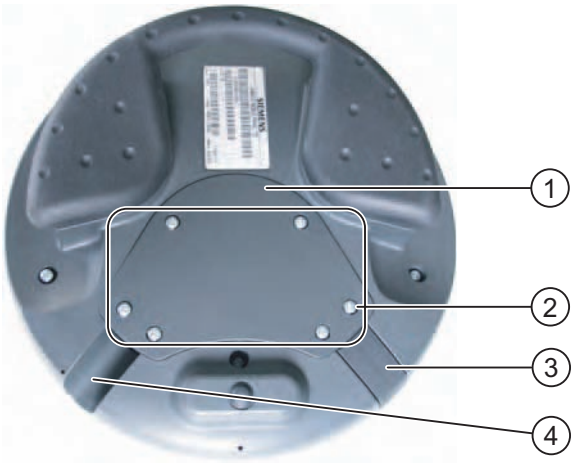


Figure 4-14 Opening the terminal compartment

① Cover
② Screws on the cover
③ Plugs
④ Outlet

Proceed as follows:

1. Screw out the six screws of the cover about 1 cm

   The cover is designed in such a way that the screws cannot be lost. Therefore, do not screw the screws out further than 1 cm. They can then be removed together with the cover where they will remain intact.
2. Lay down the cover with the screws
3. Plug the plug into the outlet that is not used

Notes for closing

Notice

Permissible torque

The housing of the Mobile Panel 177 is made of plastic. Therefore, the mounting hole threads cannot handle the same amount of stress as a comparable metallic housing. Do not exceed 0.4 to 0.5 Nm of torque when tightening the screws.

If the screws are tightened more than 20 times, there is risk of damage to the threads.

Protection class IP65

Ensure that the seal belonging to the cover is present during mounting. Upon conclusion of your work on the connections, check to make sure that the unused outlet is fitted with the plug. Otherwise, protection class IP65 is not guaranteed.

4.3.2 Interfaces on the Mobile Panel 177 DP

The following interfaces are available on the Mobile Panel 177 DP:

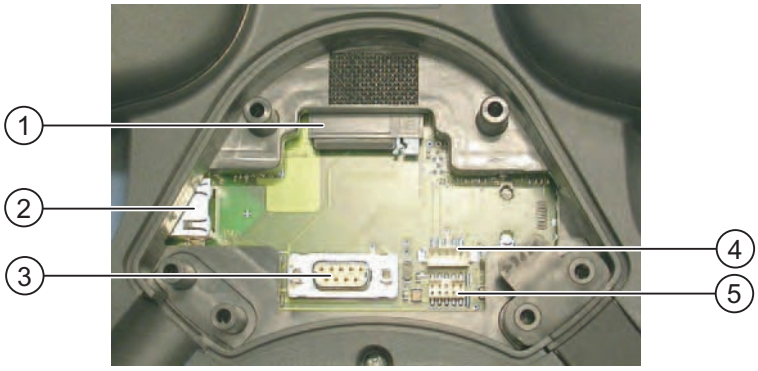


Figure 4-15 Interfaces on the Mobile Panel 177 DP

① Slot with a MultiMediaCard
② RJ45 connector for the connecting cable
③ RS 485 interface (IF 2)
④ Connection for optional accumulator
⑤ Female header, 10-pin for the connecting cable

Note

RJ45 connector

Use the RJ45 connector only for the connecting cable to the terminal box.

4.3.3 Interfaces on Mobile Panel 177 PN

The following interfaces are available on the Mobile Panel 177 PN:

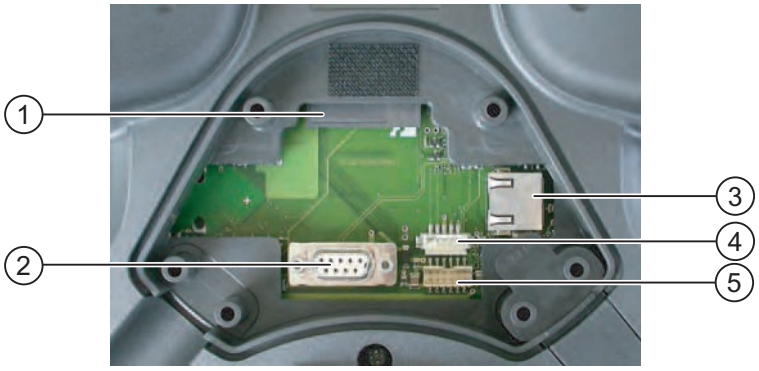


Figure 4-16 Interfaces on Mobile Panel 177 PN

① Slot with MultiMediaCard
② RS 485 interface (IF 2)
③ RJ45 connector for the connecting cable
④ Connection for optional accumulator
⑤ Female header, 12-pin for the connecting cable

Note

RJ45 connector

Use the RJ45 connector only for the connecting cable to the terminal box.

4.3.4 Connecting the connecting cable

Introduction

The connecting cable can be connected to the terminal box using the plug connector (metallic push-pull circular connector). The plug connector is coded anti-rotationally using a slot and key system.

Interlocking mechanism

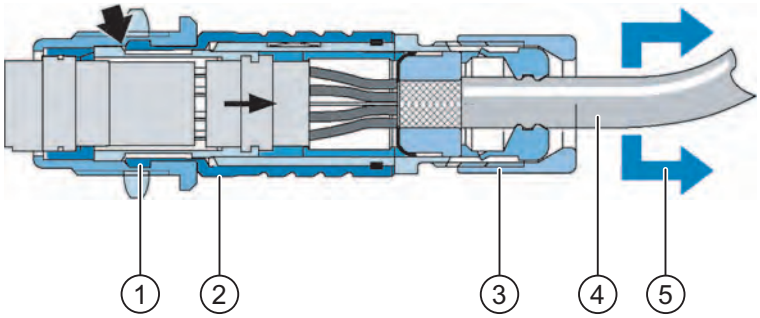


Figure 4-17 Interlocking mechanism

① Interlocking claws
② Outer sleeve
③ Clamping nut
④ Cable
⑤ Strain direction

If you pull on the cable or the clamping nut, the taper sleeve moves under the interlocking claws and presses them into the interlocking slot. The plug connection cannot be separated.

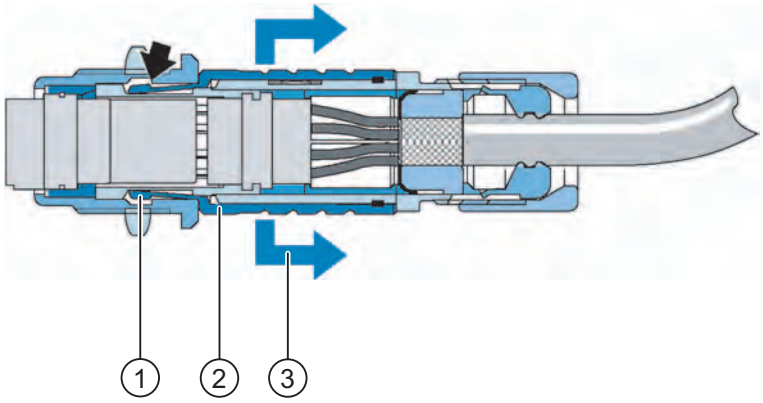


Figure 4-18 Detaching the plug connector

① Interlocking claws
② Outer sleeve
③ Strain direction

If you pull on the outer sleeve, the interlocking claws slide out of the interlocking slot. The plug connection can be separated.

Procedure – plugging the connector

Proceed as follows:

1. Pull back the outer sleeve on the plug connector
2. With the outer sleeve retracted, insert the plug connector into the socket of the terminal box.
3. Release the outer sleeve

   This automatically slides in the direction of the terminal box, thereby interlocking the plug connector.

Procedure – removing the connector

Proceed as follows:

1. Pull back the outer sleeve on the plug connector
2. With the outer sleeve retracted, pull the plug connector out of the socket of the terminal box.

If you do not intend to use the Mobile Panel 177 on another terminal box, place the Mobile Panel 177 securely in the wall holder.

4.3.5 Connecting the configuration computer

Requirements

- The cover of the terminal compartment at the Mobile Panel 177 is removed.
- The Mobile Panel 177 is connected to the terminal box.

Wiring diagram

The following figure shows the serial connection via RS 485 between the HMI device and the configuration computer for transferring the image, project and other project data.

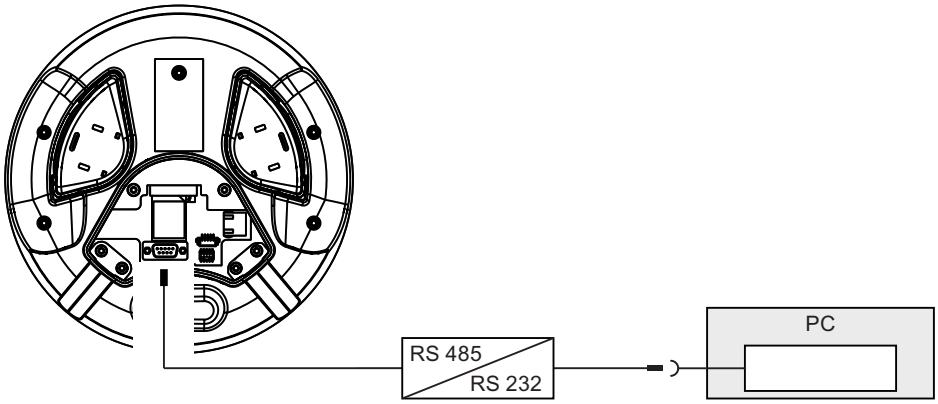


Figure 4-19 Connecting the configuration computer to the Mobile Panel 177, example Mobile Panel 177 PN

For the conversion from RS 232 to RS 485, order the PC-PPI adapter, Order No. 6ES7 901- 3CB30-0XA0, from Siemens AG.

The interfaces are described in the Technical Data.

Notice

You cannot fasten the cover of the terminal compartment while a configuration computer is connected directly to the Mobile Panel 177.

Therefore only connect a configuration computer briefly directly to the Mobile Panel 177, for example during commissioning.

Operator elements and displays

5

5.1 Mobile Panel

5.1.1 Operator control elements

The Mobile Panel 177 has the following operator control elements:

- Color STN-LC display, Q-VGA, with touch screen, analog, resistive
- Membrane keyboard
- Enable switch

The Mobile Panel 177 offers the following optional elements:

- Handwheel
- STOP button
- Illuminated pushbutton
- Key-operated switch

5.1.2 Front-side operator control elements

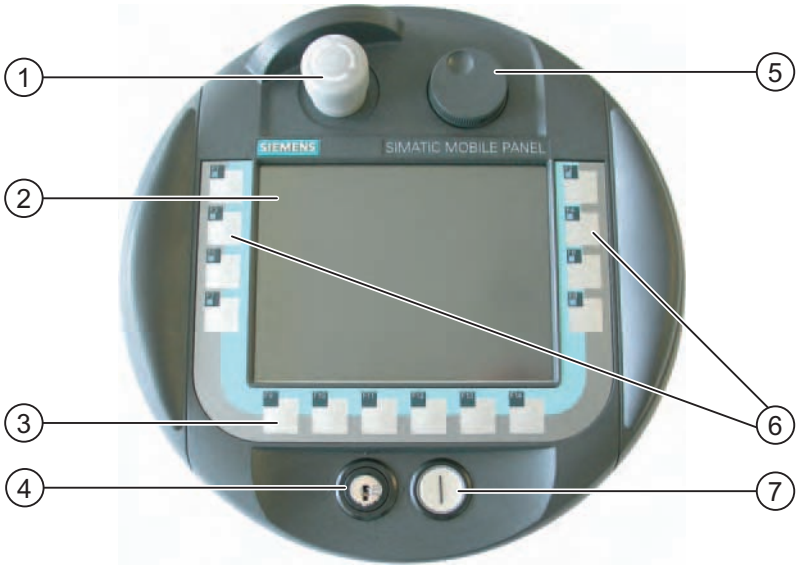


Figure 5-1 Operator control elements of the Mobile Panel 177

① STOP button
② Display with touch screen
③ Function keys without LED
④ Key-operated switch
⑤ Handwheel
⑥ Function keys with LED
⑦ Illuminated pushbutton

The standard input unit on the HMI device is the touch screen. All operator control objects required for touch operation are displayed on the touch screen once the HMI device has started.

The function assigned to a specific softkey is defined during configuration. The softkeys do not have any function outside projects.

The state of the softkeys is evaluated in the project or as a direct button. The state of the LEDs of the softkeys can be set by the controller.

Notice

Damaging the touch screen

Touching the touch screen with hard, sharp or pointed iobjects or applying excessive pressure when operating the touch screen will substantially reduce its useful life and can even lead to total failure.

Always operate the HMI touch screen with your fingers or with a touch pen.

Keyboard damage

Only use your fingers to operate the HMI device keys.

Pressing the keys with hard instruments considerably reduces the service life of the key mechanism.

5.1.3 Enable switch

Introduction

Enabling equipment consists of two enabling switches arranged on both sides of the Mobile Panel 177. The switch setting of the two enabling switches is determined by electrical momentary contact switches. The associated evaluating logic involves two channels for each enabling switch. Each channel converts the information of the enabling switch into digital and analog information (diversity).

Figure 5-2 Enable switch

① Enable switch

Operation

You only have to activate one enabling switch. No feedback is provided to the PLC on whether the Mobile Panel 177 is operated with one hand or two hands.

Note

Because there is no electrical connection between the enabling switch and the membrane keyboard, the enabling switches and the membrane keyboard can be operated simultaneously.

When an external monitoring device is used, the enabling switches satisfy Category 3 safety requirements as defined in EN 954.

Switch settings

The primary function of the evaluating logic is to recognize the three switch settings:

Switch setting	Function	Enable switch	Switch state
1	Neutral position	Not activated	OFF (open)
2	Enable	Activated	ON (closed)
3	Panic	Pressed	OFF (open)

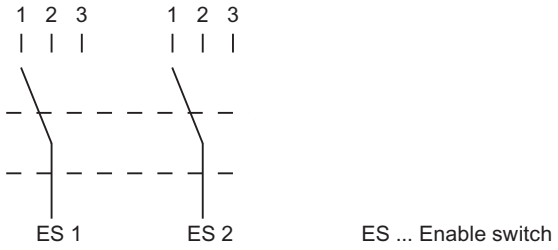


Figure 5-3 Switch settings of enabling switch

When the enabling switch is activated, the following switch sequences are possible:

Normal activation

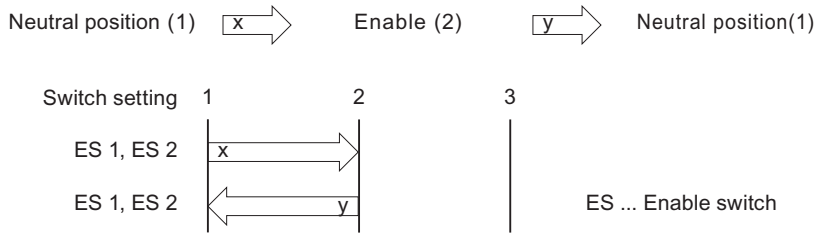


Figure 5-4 Interlinking of switch settings for normal operation

Panic activation

If the operator has pressed the enabling switch through to the "Panic" setting, the "Enable" setting will be skipped when the switch is released.

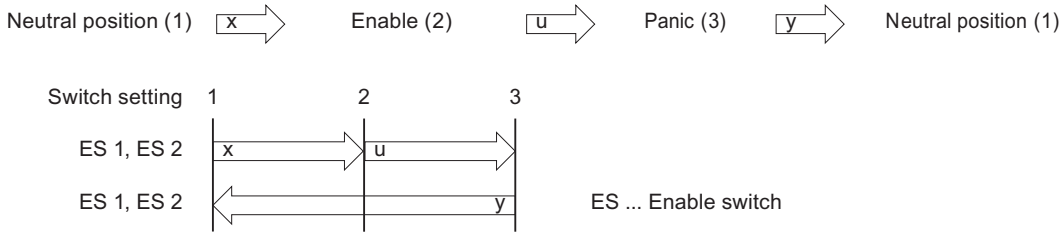


Figure 5-5 Interlinking of switch settings for panic activation

The signals of the enabling switch are fed to the terminal box via the connecting cable. For manual special operating modes, these signals must be interconnected from the terminal box to the safety circuit using two channels for power interruption.

The position of the enabling switch can be scanned in the Mobile Panel 177 via the CPU and evaluated for non-safety relevant functions by the software.

The safety shutdown does not require an acknowledgement when an enabling switch is released or pressed through to the panic setting!

5.1.4 STOP button

5.1.4.1 Overview

Introduction

The STOP button is an optional control element on Mobile Panel 177. The STOP button is designed with 2 circuits and allows a safety-related stop of the system being monitored.

When an external monitoring device is used, the STOP button fulfils Category 3 safety requirements as defined in EN 954. For further safety instructions please refer to the safety instructions and general notes chapter.

Depending on the terminal box utilized, the stop circuit will be opened when the Mobile Panel 177 is unplugged or the circuit will be automatically short-circuited by the terminal box.

Possible application areas for the STOP button:

- The STOP button can be used to quickly stop the system being monitored (system, machine, or machine zone) according to the process cycle. The Stop operation can occur with or without a power shutdown.

  Advantages:

  - Containing the sphere of action
  - Faster restart
  - No loss of machine coordinates and, thus, no recalibration upon restart
  - Preservation of tool and workpiece
- Triggering the Emergency Stop function of a system being monitored by looping it in in the Emergence Stop circuit.

  Advantage:

  Simple integration in an existing Emergency Stop circuit when the system to be monitored has no option for a fast process stop.

Figure 5-6 STOP button

① Fall protection
② STOP button

Due to its placement, the STOP button is equally accessible to both left-handed and right-handed individuals.

Due to its profiled design, the STOP button is easily accessible. The STOP button is fall protected by a special collar. As a result, while the STOP button can still be triggered if the Mobile Panel 177 is dropped, it is nonetheless largely protected from damage.

Operation

The STOP button is operated by pressing the button. Once the stop operation has been initiated, the STOP button remains engaged in the stop position.

Note

The STOP button engages compulsorily when activated.

Releasing the STOP button

Warning

If you activate the STOP button, thus bringing the system being monitored to a standstill, you may only release the STOP button if the reason for stopping the system has been eliminated and a safe restart is provided for.

To release the STOP button, it must be turned in a clockwise direction. The STOP button then returns on its own to the starting position.

5.1.4.2 STOP button on Terminal Box Plus

Introduction

A Terminal Box Plus differs from a Terminal Box Basic due to four relays that are mounted on the board.

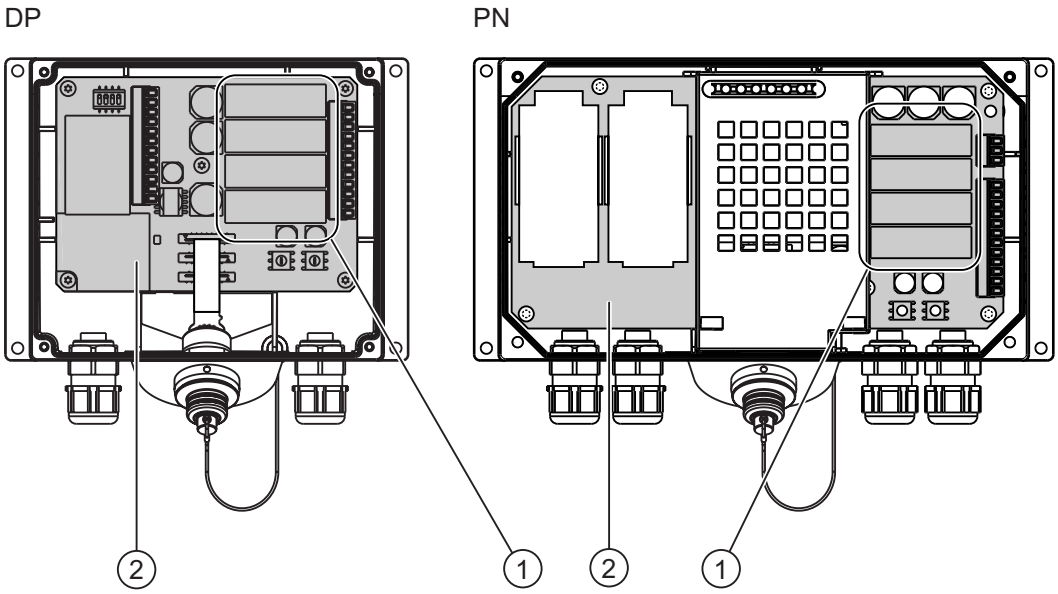


Figure 5-7 Terminal Box Plus

① Relay
② Board

Switching states of the Stop or Emergency Stop circuit with Terminal Box Plus

The Stop or Emergency Stop circuit switching statuses for a connected Mobile Panel 177 with a STOP button and Terminal Box Plus are:

Mobile Panel 177	STOP button	Status of the Stop or Emergency Stop circuit
Connected	Not pressed	The Stop or Emergency Stop circuit remains closed.
Connected	Pressed	The Stop or Emergency Stop circuit is open. The system being monitored is shut down.
Not connected	-	The Stop or Emergency Stop circuit remains closed.

The Stop or Emergency Stop circuit switching statuses for a connected Mobile Panel 177 without a STOP button and Terminal Box Plus are:

Mobile Panel 177	STOP button	Status of the Stop or Emergency Stop circuit
Connected	Not present	The Stop or Emergency Stop circuit remains closed.
Not connected	Not present	The Stop or Emergency Stop circuit remains closed.

Warning

Disconnecting the Mobile Panel 177

If you disconnect the Mobile Panel 177 from the Terminal Box Plus, the Stop or Emergency Stop circuit is closed and the Stop status of the system being monitored will be nullified. This occurs irrespective of whether the STOP button has been pressed on the Mobile Panel 177.

Notice

Approximately 100 ms elapse between the time the STOP button is pressed and the Stop contacts respond at the Terminal Box Plus.

5.1.4.3 STOP button on Terminal Box Basic

Introduction

In contrast to the Terminal Box Plus, the "Stop loop through" function is not implemented on the Terminal Box Basic. Relays, such as those contained on the Terminal Box Plus are thus not required.

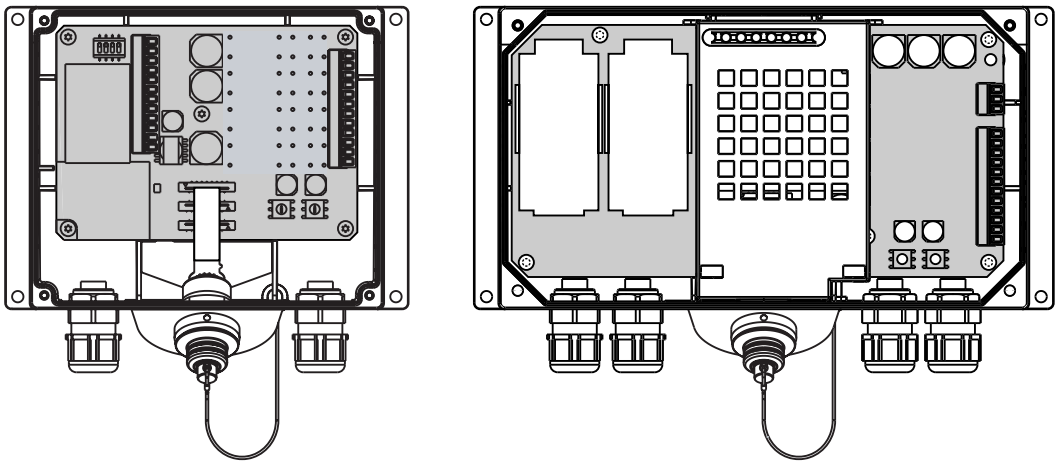


Figure 5-8 Terminal Box Basic

Caution

If the Mobile Panel 177 is connected, the Stop or Emergency Stop circuit is controlled via the STOP button. If the connecting cable of the Mobile Panel 177 is disconnected from the Terminal Box Basic, the Stop or Emergency Stop circuit is interrupted and a safe shutdown of the system being monitored or Emergency Stop is executed.

Switching states of the Stop or Emergency Stop circuit with Terminal Box Basic

The Stop or Emergency Stop circuit switching statuses for a connected Mobile Panel 177 with a STOP button and Terminal Box Basic are:

Mobile Panel 177	STOP button	Status of the Stop or Emergency Stop circuit
Connected	Not pressed	The Stop or Emergency Stop circuit remains closed.
Connected	Pressed	The Stop or Emergency Stop circuit is open. The system being monitored is shut down.
Not connected	-	The Stop or Emergency Stop circuit is open. The system being monitored is shut down.

The stop circuit switch states for a connected Mobile Panel 177 without a STOP button and Terminal Box Basic are:

Mobile Panel 177	STOP button	Status of the Stop or Emergency Stop circuit
Connected	Not present	The Stop or Emergency Stop circuit remains closed.
Not connected	Not present	The Stop or Emergency Stop circuit is open. The system being monitored is shut down.

Warning

If you have shut down the system, you can only release the STOP button or place the system being monitored back into operation if the condition triggering the Stop function has been corrected and a safe restart is provided for.

5.1.5 Hand wheel

Introduction

The hand wheel is an optional control element at the Mobile Panel 177. The hand wheel can be turned without a stop and does not have a zero position.

You can use the hand wheel to input incremental values.

The status of the hand wheel is evaluated as a direct button or via WinCC flexible system functions.

Figure 5-9 Hand wheel

① Hand wheel with recess

Operation

To facilitate operation, the hand wheel has a small recess.

5.1.6 Key-operated switch

Introduction

The key switch is an optional control element of the Mobile Panel 177. The key switch is used to lock functions that are triggered by the Mobile Panel 177.

The status of the key switch is evaluated as a direct button or via WinCC flexible system functions.

Figure 5-10 Key-operated switch

① Key-operated switch

Operation

The key-operated switch has three positions: I-0-II.

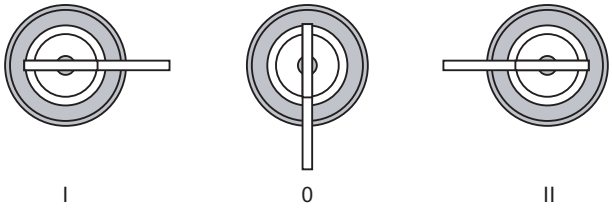


Figure 5-11 Key-operated switch settings

The key can be removed in the Switch Setting 0.

Remove the key after use. This avoids possible damage to the key if the HMI device falls.

Note

The key for the key-operated switch is enclosed with the HMI device. Its coding is not specific to the device. Therefore, the key can be used for any Mobile Panel 177.

5.1.7 Illuminated pushbutton

Introduction

The illuminated pushbutton is an optional control element on the Mobile Panel 177. The illuminated pushbutton is available for rapid digital inputs.

The status of the illuminated pushbutton is evaluated as a direct button or via WinCC flexible system functions. The state of the LEDs of the illuminated pushbuttons can be set by the controller.

Figure 5-12 Illuminated pushbutton

① Illuminated pushbutton

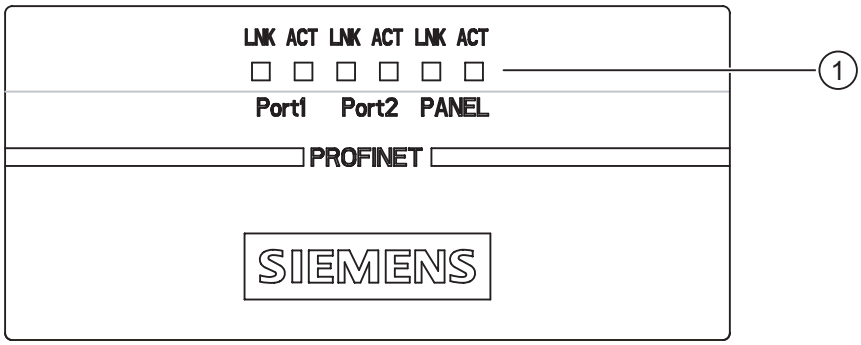
Operation

The illuminated pushbutton acts by touch-control.

5.2 Terminal Box PN

Introduction

Six LEDs that display the communication status are positioned on the front of the Terminal Box PN



① LED displays (green LED "LNK", yellow LED "ACT")

Two LED displays "LNK" and "ACT" each exist for the following connections:

- PROFINET connection Port1
- PROFINET connection Port2
- Mobile Panel 177

Meaning of the LED displays

- The LED "LNK" lights up if a cable is connected and the connection is error-free at the corresponding interface of the Terminal Box PN.
- The LED "ACT" flashes when data are being transferred via the corresponding interface.

Specifications

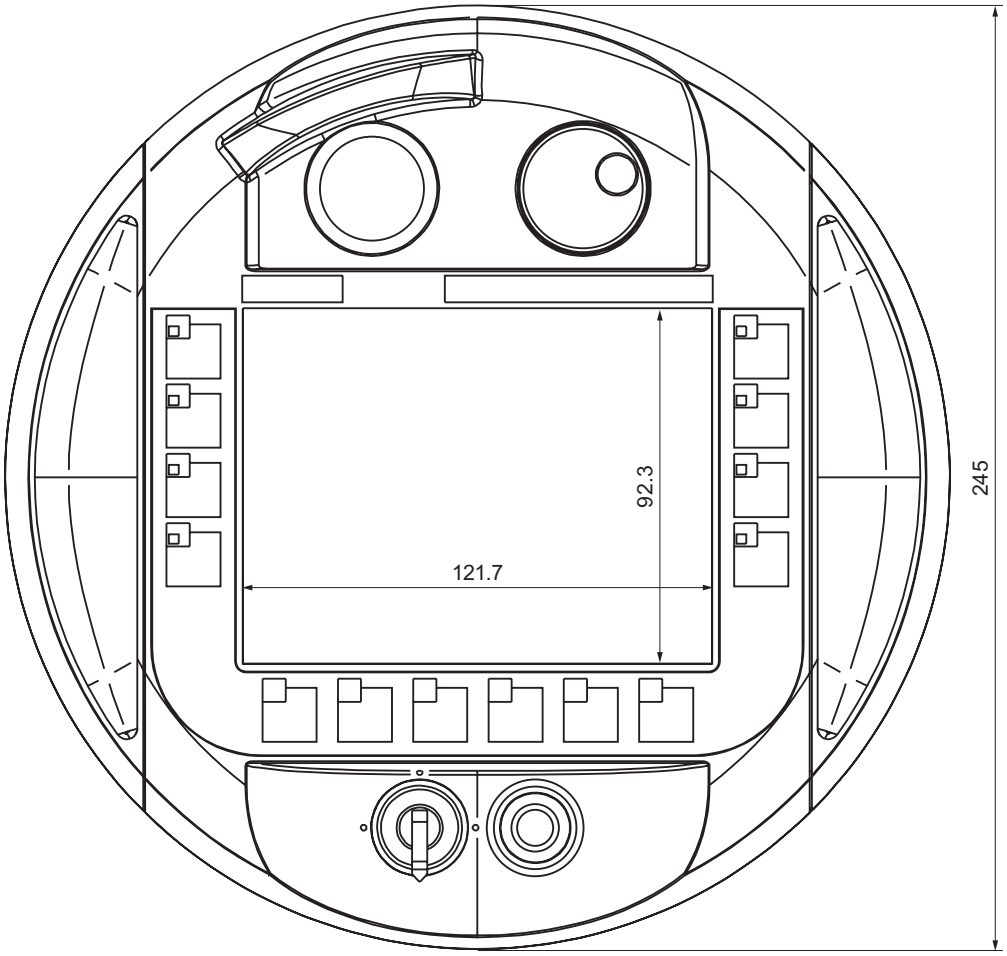
6

6.1 Dimensional drawings

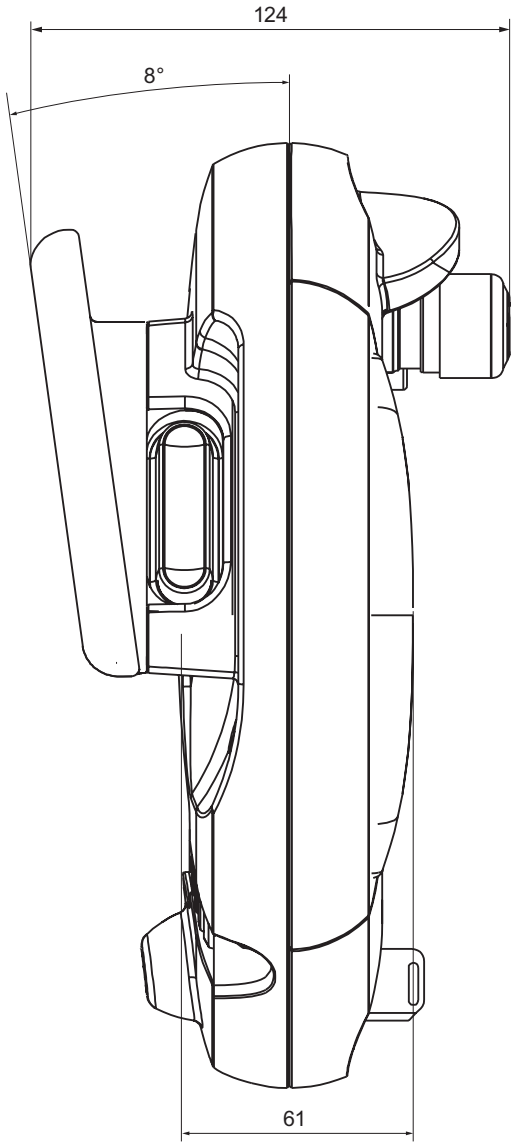
6.1.1 Mobile Panel

Device dimensions

Dimensions of Mobile Panel 177



Overall dimensions of the Mobile Panel 177 HMI device in the front view



Overall dimensions of the Mobile Panel 177 HMI device in the side view

6.1.2 Wall holder

Device dimensions

Dimensions of wall mount

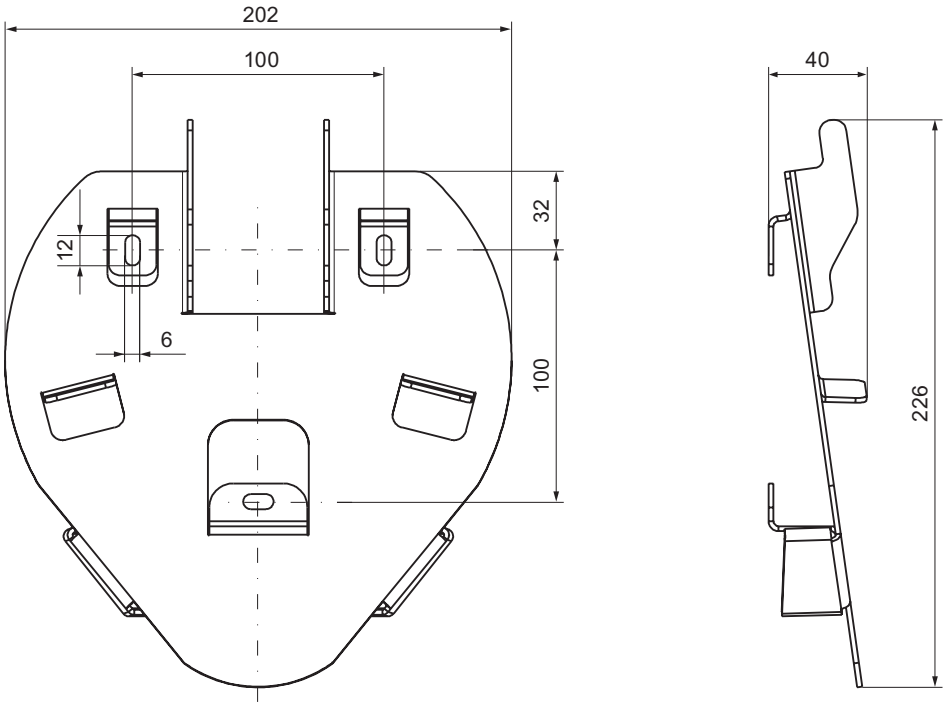


Figure 6-1 Dimensions of wall mount

6.1.3 Terminal Box DP

Device dimensions

Dimensions of terminal box

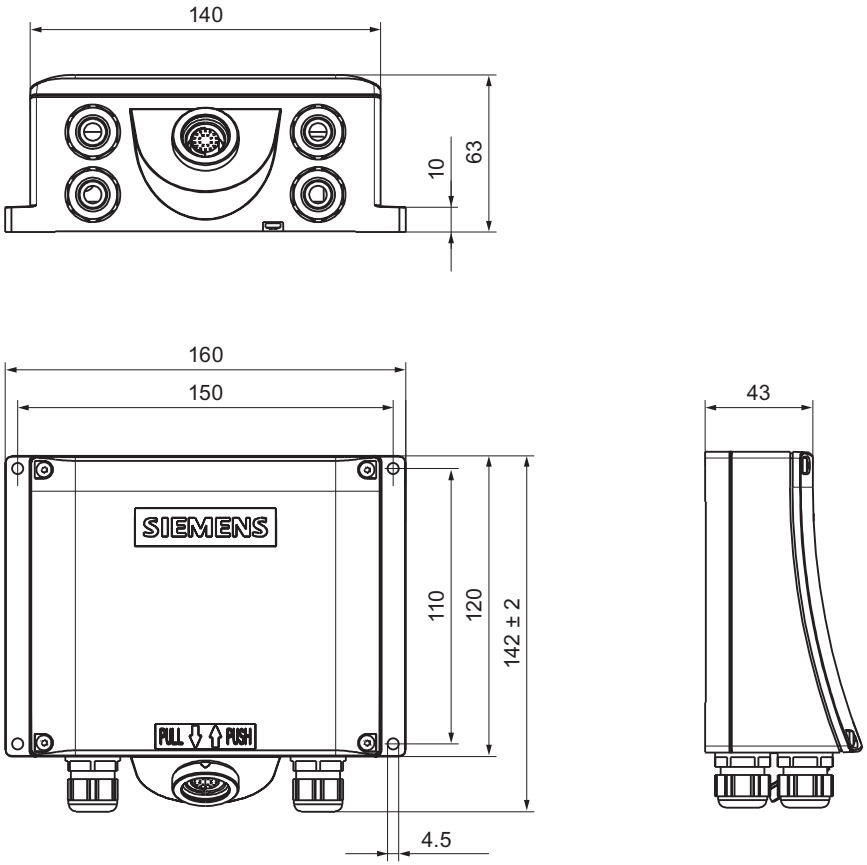


Figure 6-2 Dimensions of terminal box

6.1.4 Terminal Box PN

Device dimensions

Dimensions of the Terminal Box PN

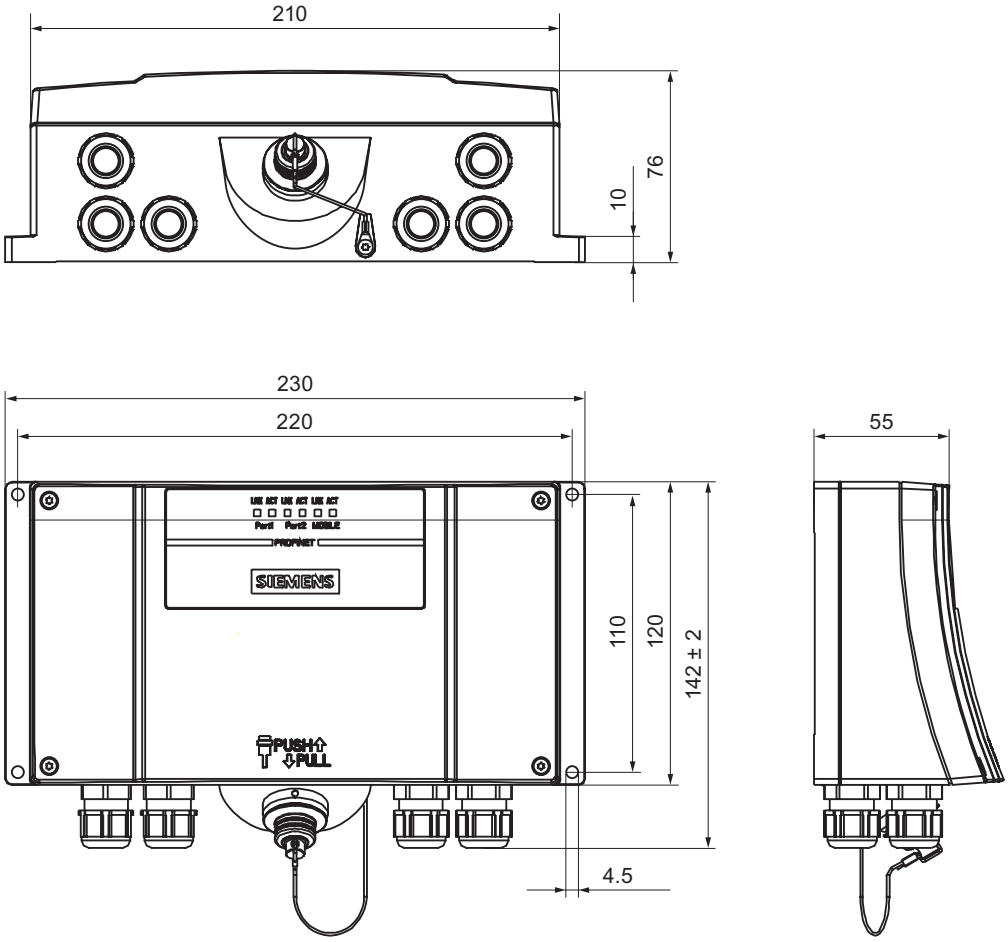


Figure 6-3 Dimensions of the Terminal Box PN

6.2 Technical data

6.2.1 Mobile Panel

HMI device

Weight without packaging	Approx. 1.3 kg

Display

Type	Color-STN LCD
Display area, active	115 mm x 86 mm (5.7")
Resolution	320 x 240 pixels
Colors, displayable	256 colors
Contrast control	Yes
Back-lighting Half Brightness Life Time, typical	CCFL 50 000 h

Input unit

Type	Touch screen, analog, resistive Membrane keyboard
Softkeys	14 (F1 to F8 with LED)
Enable switch	2-circuit, 3-stage supply voltage: 24 V DC amperage, max.: 400 mA amperage, min.: 10 mA
STOP button (optional)	2-circuit supply voltage: 24 V DC amperage, max.: 500 mA amperage, min.: 10 mA These are normally closed contacts.
Handwheel (optional)	–
Key-operated switch (optional)	3 switch settings
Illuminated pushbutton (optional)	–

Memory

Application memory	2048 KB

Voltage supply

Voltage supply	Via terminal box

Additional specifications

Fall height	max. 1.5 m

6.2.2 Terminal Box DP

Terminal Box DP

Weight without packaging	Approx. 500 g

Voltage supply

Nominal voltage Range, permissible	+24 V DC 20.4 V to 28.8 V (–15%, +20%)
Transients, maximum permissible	35 V (500 msec)
Time between two transients, minimum	50 s
Current consumption Terminal Box DP without panel • Typical • Constant current, maximum • Power on current surge I^2t	 • Approx. 100 mA • Approx. 150 mA • Approx. 0.5 A^2s
Current consumption Terminal Box DP with panel • Typical • Constant current, maximum • Power on current surge I^2t	 • Approx. 350 mA • Approx. 450 mA • Approx. 0.5 A^2s
Fuse protection, internal	Electronic
Current load PLC-accompanying signals	Max. 100 mA

Note

Recovery time

Wait for approx. one second after you have removed the connecting cable from the terminal box before you plug the connecting cable back into the terminal box.

After power failures lasting less than one second the connecting cable has to be disconnected.

6.2.3 Terminal Box PN

Terminal Box PN

Weight without packaging	Approx. 700 g

Voltage supply

Nominal voltage Range, permissible	+24 V DC 20.4 V to 28.8 V (–15%, +20%)
Transients, maximum permissible	35 V (500 msec)
Time between two transients, minimum	50 s
Current consumption Terminal Box PN without panel • Typical • Constant current, maximum • Power on current surge I^2t	 • Approx. 100 mA • Approx. 150 mA • Approx. 0.5 A^2s
Current consumption Terminal Box PN with panel • Typical • Constant current, maximum • Power on current surge I^2t	 • Approx. 450 mA • Approx. 500 mA • Approx. 0.5 A^2s
Fuse protection, internal	Electronic
Current load PLC-accompanying signals	Max. 100 mA

Note

Recovery time

Wait for approx. one second after you have removed the connecting cable from the terminal box before you plug the connecting cable back into the terminal box.

After power failures lasting less than one second the connecting cable has to be disconnected.

6.3 Interface allocation Mobile Panel 177 DP

6.3.1 RS 485 (IF 2)

Sub-d socket, 9-pin, with screw lock

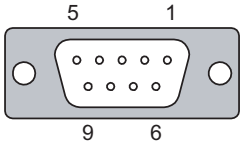


Figure 6-4 RS 485 interface pin assignment

PIN	Assignment
1	n. c.
2	GND 24 V
3	Data channel B (+)
4	n. c.
5	GND 5 V, floating potential
6	+5 V DC, floating potential
7	+24 V DC, out (max. 100 mA)
8	Data channel A (–)
9	n. c.

6.3.2 RJ45

RJ45 connector for the connecting cable

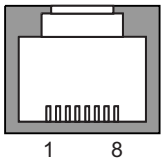


Figure 6-5 Pin assignment of the RJ45 connector

PIN	Assignment
1	RxD-B
2	RxD-A
3	CTS-B / ID-
4	RTS-B / IC-
5	RTS-A / IC+
6	CTS-A / ID+
7	TxD-B
8	TxD-A

6.3.3 Female header

Female header for the connecting cable

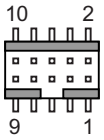


Figure 6-6 Pin assignment of 10-pin female header

PIN	Assignment	Circuit
1	+24 V DC	Power supply
2	GND 24 V	
3	Stop 23	Stop circuit
4	Stop 24	
5	Stop 13	
6	Stop 14	
7	Enable 1+	Enable circuit
8	Enable 1–	
9	Enable 2+	
10	Enable 2–	

6.4 Interface assignment Mobile Panel 177 PN

6.4.1 RS 485 (IF 2)

Sub-d socket, 9-pin, with screw lock

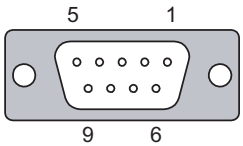


Figure 6-7 RS 485 interface pin assignment

PIN	Assignment
1	n. c.
2	GND 24 V
3	Data channel B (+)
4	n. c.
5	GND 5 V, floating potential
6	+5 V DC, floating potential
7	+24 V DC, out (max. 100 mA)
8	Data channel A (–)
9	n. c.

6.4.2 RJ45

RJ45 connector for the connecting cable

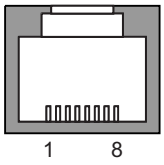


Figure 6-8 Pin assignment of the RJ45 connector

PIN	Assignment
1	TD+
2	TD-
3	RD+
4	n. c.
5	n. c.
6	RD-
7	ICD+
8	ICD–

6.4.3 Female header

Female header for the connecting cable

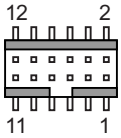


Figure 6-9 Pin assignment of 12-pin female header

PIN	Assignment	Circuit
1	+24 V DC	Power supply
2	GND 24 V	
3	Stop 23	Stop circuit
4	Stop 24	
5	Stop 13	
6	Stop 14	
7	Enable 1+	Enable circuit
8	Enable 1–	
9	Enable 2+	
10	Enable 2–	
11	ICD+	Box ID
12	ICD–	

6.5 Interface assignment Terminal Box DP

Position of the ports

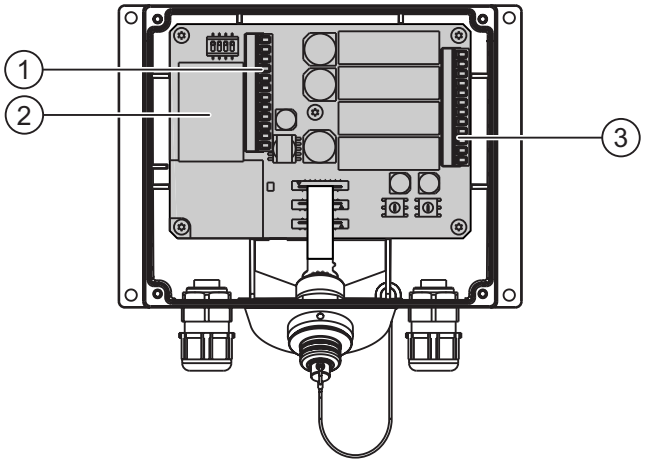


Figure 6-10 Position of the ports

① Terminal strip 1
② Fast connector
③ Terminal strip 2

Caution

When connecting the cables to the terminal strips ensure that the assignments for Terminal strips 1 and 2 are not reversed.

Terminal strip 1: IF1 and power supply

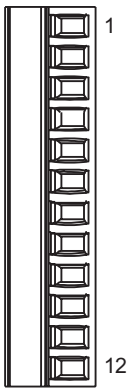


Figure 6-11 Assignment of 12-pin terminal strip 1

Pin	RS 232 IF 1A 9-pin pin	RS 232 IF 1A 15-pin socket	RS 422 IF 1B 9-pin socket	RS 485 IF 1B 9-pin socket	Power supply
1	CTS (8)	CTS (5)	n. c.	n. c.	n. c.
2	RTS (7)	RTS (10)	n. c.	n. c.	n. c.
3	TxD (3)	TxD (4)	n. c.	n. c.	n. c.
4	RxD (2)	RxD (3)	n. c.	n. c.	n. c.
5	M (5)	M (15)	M (5)	M (5)	n. c.
6	n. c.	n. c.	TxD+ (3)	Bus + (B) (3)	n. c.
7	n. c.	n. c.	TxD– (8)	Bus - (A) (8)	n. c.
8	n. c.	n. c.	RxD+ (4)	n. c.	n. c.
9	n. c.	n. c.	RxD– (9)	n. c.	n. c.
10	PI	PE	PE	PE	PE
11	n. c.	n. c.	n. c.	n. c.	M24
12	n. c.	n. c.	n. c.	n. c.	P24

The values in parentheses in the table correspond to the pin numbers of the standard cables described in the WinCC flexible online help for each coupling.

Fast connector

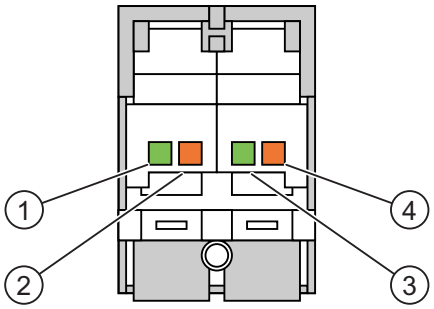


Figure 6-12 Assignment of 4-pin Fast Connector

Pin	Assignment
1	LTG-A (–) IN
2	LTG-B (+) IN
3	LTG-A (–) OUT
4	LTG-B (+) OUT

Terminal strip 2: Safety Functions and Supplemental Functions

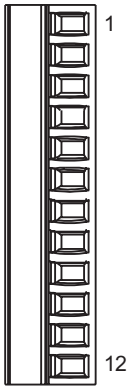


Figure 6-13 Assignment of 12-pin terminal strip 2

Pin	Internal interconnection	Name	Circuit
1		Stop 13	STOP button
2		Stop 14	See Female header
3		Stop 23	
4		Stop 24	
5		+24 V[1)]	PLC-accompanying signals
6		STOP button depressed 32 [1)]	
7		Mobile Panel plugged 31	
8		+24 V[1)]	

Pin	Internal interconnection	Name	Circuit
9		Enable 2+	Enable switch
10		Enable 1–	See Female header
11		Enable 1+	
12		Enable 2–	

1) Applies to Terminal Box Plus

The Terminal Box Basic does not have the "STOP button pressed" signal.

The "STOP button depressed" signal has no error detection and, therefore, must not be used for safety-critical applications!

"Mobile Panel plugged" signal

Mobile Panel on the Terminal Box	Signal at the digital input of the controller
Not plugged	"0"
Plugged	"1"

Note

The "Mobile Panel plugged" output of the Terminal Box Basic is connected to the power supply. In the case of the Terminal Box Plus, this output is fed to a relay using two pins.

Observe the following points when connecting the "Mobile Panel plugged" signal:

- Connect terminal strip 2, pin 7 of the terminal box to the digital input of the controller
- Terminal Box Basic Terminal strip 2, pin 8 of the terminal box remains free
- Terminal Box Plus: +24 V have to be supplied to terminal strip 2, pin 8

6.6 Interface assignment Terminal Box PN

Position of the ports

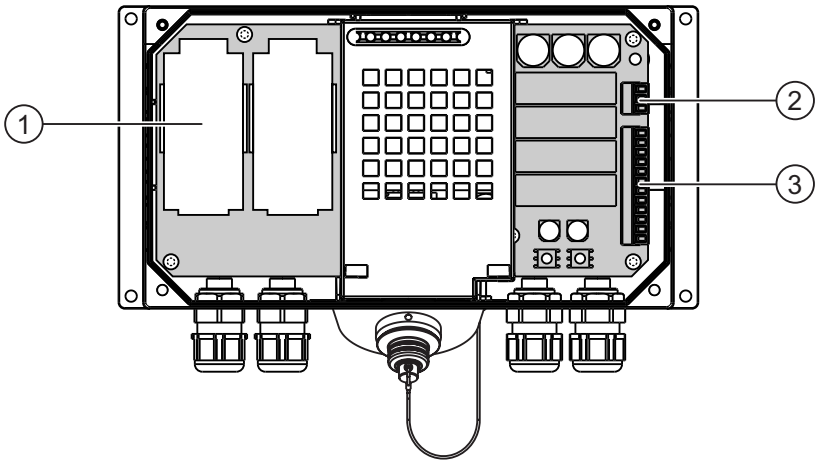


Figure 6-14 Position of the ports

① Fast connector
② Terminal strip 1
③ Terminal strip 2

Fast connector

The terminal box contains two fast connectors for connecting to PROFINET.

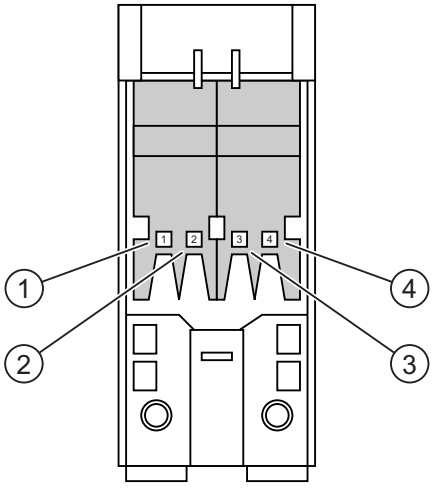


Figure 6-15 Assignment of 4-pin fast connector

Pin	Assignment
1	TD+
2	RD+
3	TD-
4	RD-

Terminal strip 1: Power supply

Figure 6-16 Assignment of 3-pin terminal strip 1

Pin	Power supply
1	PE
2	M24
3	P24

Terminal strip 2: Safety Functions and supplemental functions

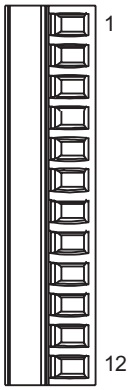


Figure 6-17 Assignment of 12-pin terminal strip 2

Pin	Internal interconnection	Name	Circuit
1		Stop 13	STOP button
2		Stop 14	See female header
3		Stop 23	
4		Stop 24	
5		+24 V[1)]	PLC-accompanying signals
6		STOP button depressed 32 [1)]	
7		Mobile Panel plugged 31	
8		+24 V[1)]	
9		Enable 2+	Enable switch
10		Enable 1–	See female header
11		Enable 1+	
12		Enable 2–	

1) Applies to Terminal Box Plus

The Terminal Box Basic does not have the "STOP button pressed" signal.

The "STOP button depressed" signal has no error detection and, therefore, must not be used for safety-critical applications!

"Mobile Panel plugged" signal

Mobile Panel on the Terminal Box	Signal at the digital input of the controller
Not plugged	"0"
Plugged	"1"

Note

The "Mobile Panel plugged" output of the Terminal Box Basic is connected to the power supply. In the case of the Terminal Box Plus, this output is fed to a relay using two pins.

Observe the following points when connecting the "Mobile Panel plugged" signal:

- Connect terminal strip 2, pin 7 of the terminal box to the digital input of the controller
- Terminal Box Basic Terminal strip 2, pin 8 of the terminal box remains free
- Terminal Box Plus: +24 V have to be supplied to terminal strip 2, pin 8

6.7 Connection examples for Enable switch and STOP button

Introduction

This section presents connection examples for the Enable switch and STOP button for safety category 3 in accordance with EN 954-1.

All KA and KB contacts must be positively driven.

Notice

To ensure safety category 3 in accordance with EN 954-1, be sure to follow the operating instructions for the monitoring device being used.

Connection example 1: Enabling switch with monitoring device ELAN SRB-NA-R-C.27/S1

The following figure shows the connection of a monitoring device ELAN SRB-NA-R-C.27/S1 to the enabling switch of the Mobile Panel.

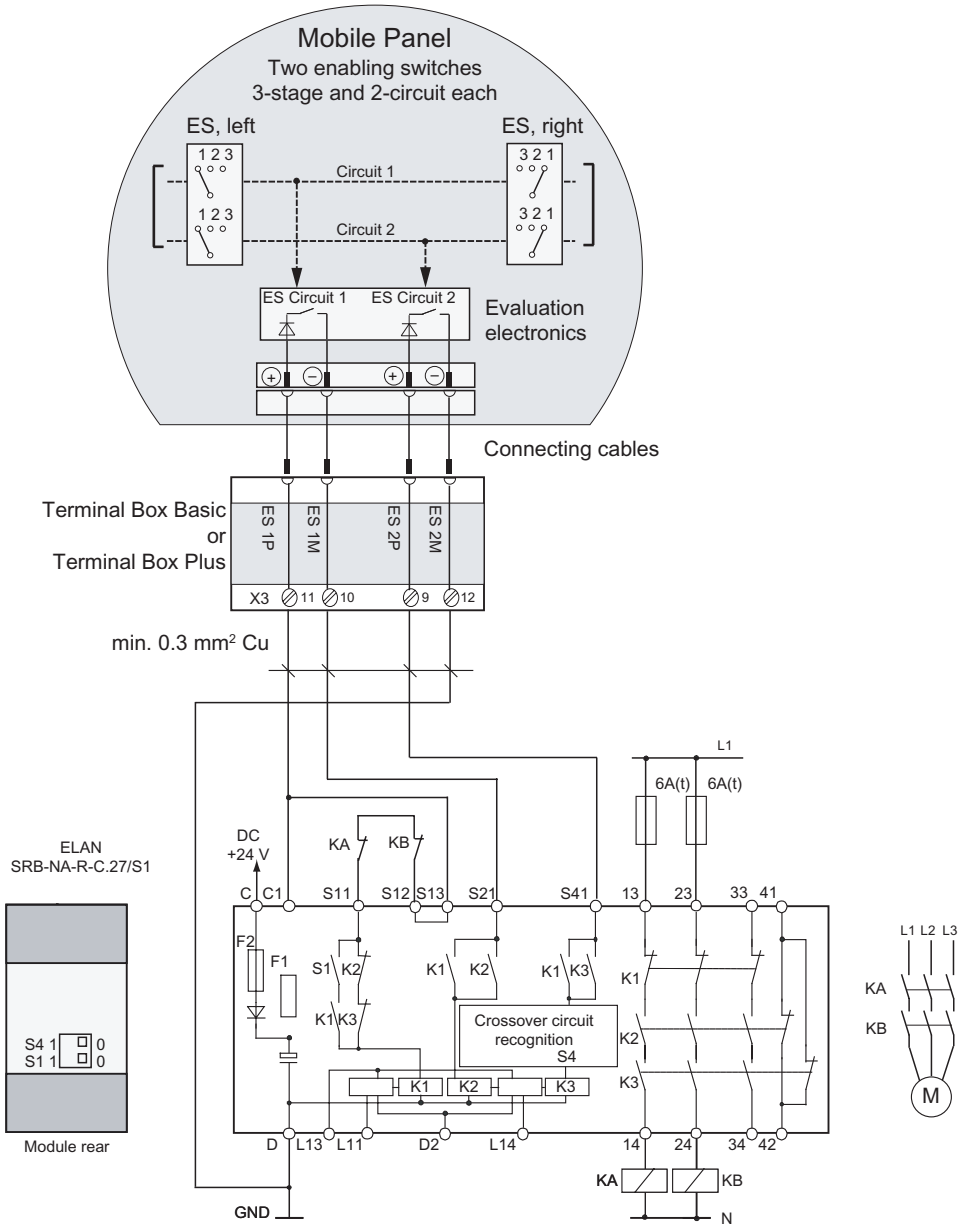


Figure 6-18 Wiring diagram: Enabling switch with monitoring device ELAN SRB-NA-R-C.27/S1

S1 and S4 switches on the rear of the module must be at Position 0.

Connection example 2: Enabling switch on monitoring device PILZ PST1

The following figure shows the connection of a monitoring device PILZ PST1 to the enabling switch of the Mobile Panel.

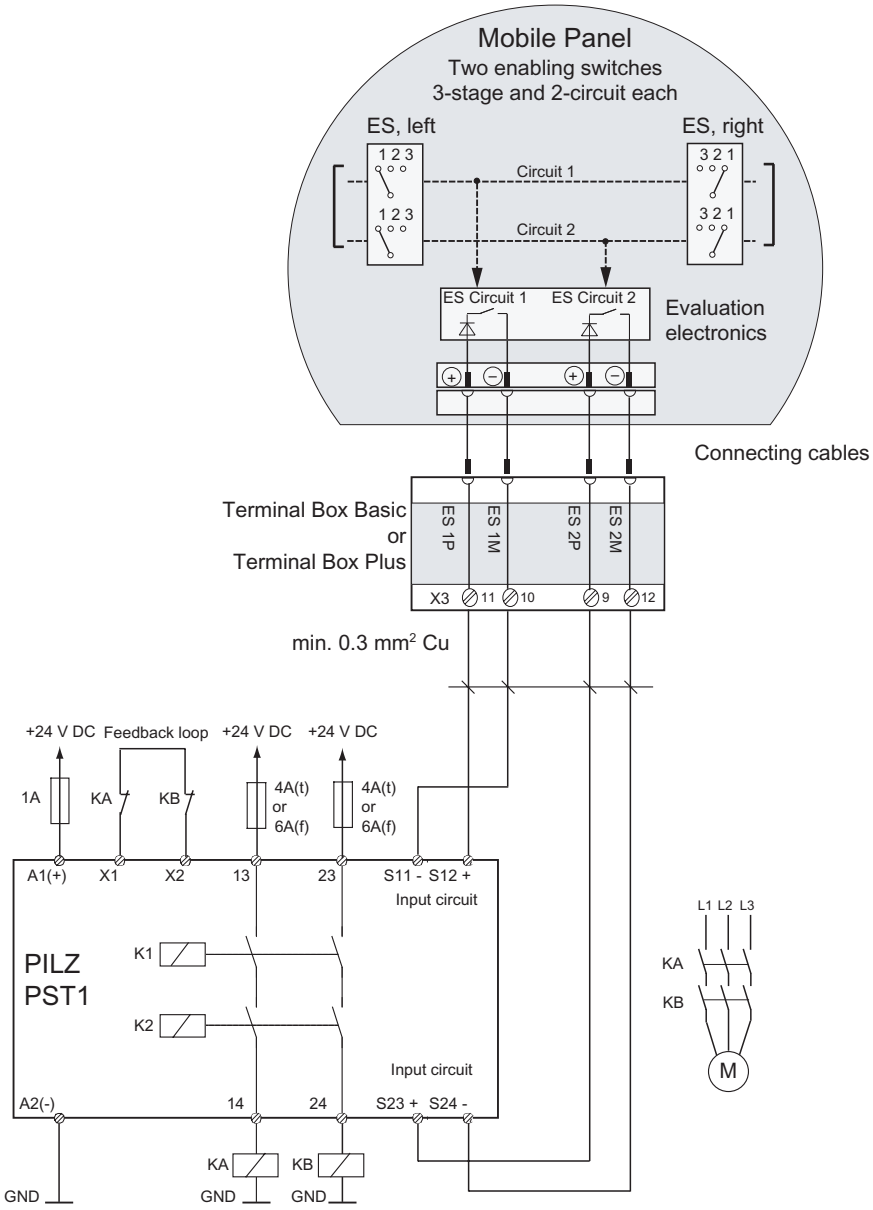


Figure 6-19 Wiring diagram: Enabling switch on monitoring device PILZ PST1

Connection example 3: STOP button with SIGUARD 3TK2840 monitoring device

The following figure shows the connection of a monitoring device SIGUARD 3TK2840 to the STOP button of the Mobile Panel.

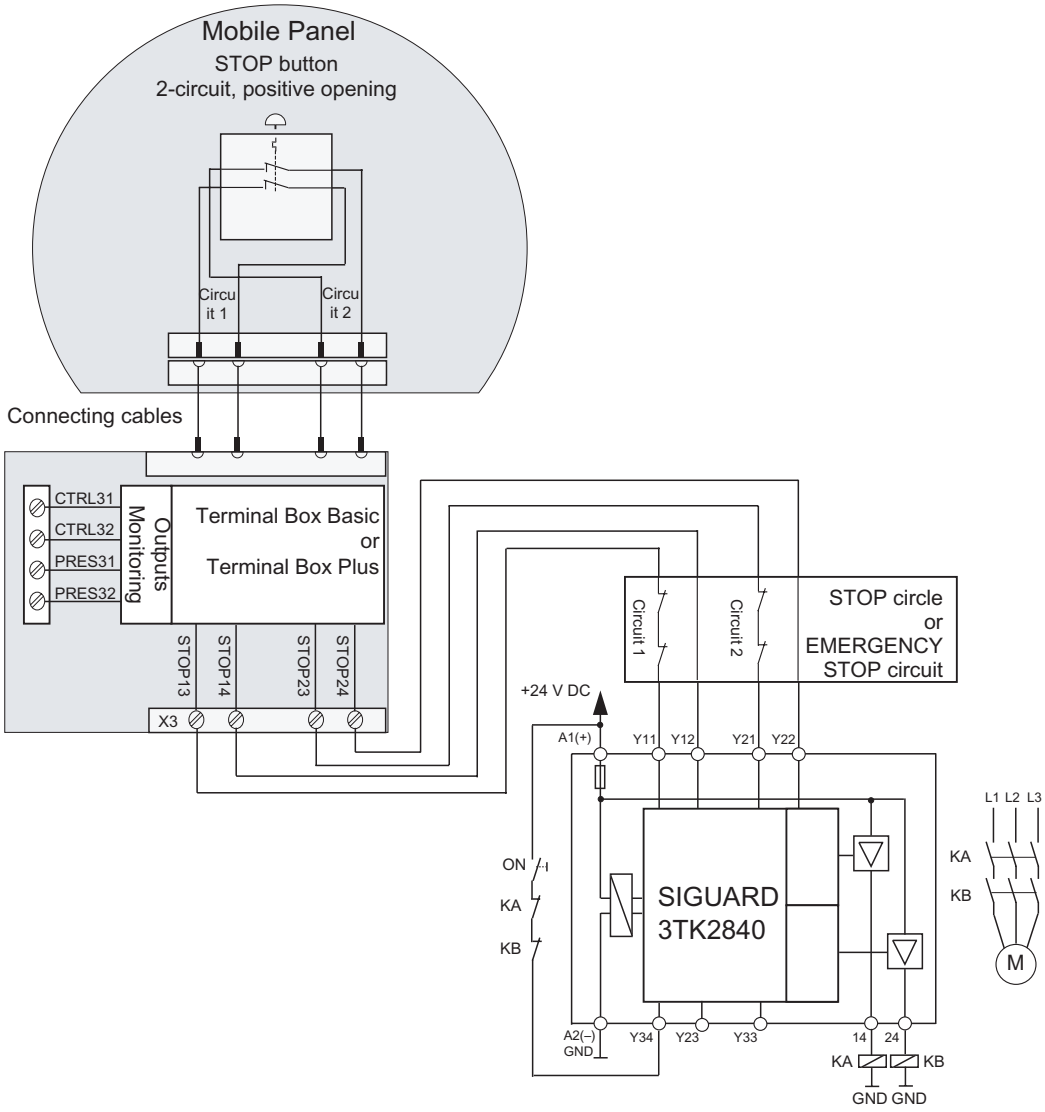


Figure 6-20 Wiring diagram: STOP button with SIGUARD 3TK2840 monitoring device

Monitoring outputs may not be used for safety-related functions.

Appendix

A

A.1 Connection point recognition

A.1.1 Overview

Introduction

You can divide a system into several zones or functional areas by using several terminal boxes. For this purpose it may be necessary for different system screens to be displayed, depending on the terminal box used.

This is achieved by means of connection point recognition.

Note

The following sections are intended for the configuring engineer of the HMI device.

Note

If the same screens and functions are used predominantly for all PLCs and the PLCs are of the same type, the configuration can be designed in such a way that only one PLC connection is configured.

The configuring engineer can enable you to switch between the various PLCs usig a single operating object.

Connection point recognition

You can implement the connection point recognition as follows:

- Reading out of the box ID set in the terminal box by the HMI device
- Wiring the terminal box to a digital input of the PLC.

Note

Connection point recognition via box ID

The solution with box ID functions for different system configurations.

Note

The "Project ID" range pointer can be used to ensure that the HMI device is connected to the PLC that forms the basis of the project.

The "Project ID" range pointer can be assigned to only one PLC for each project (see "WinCC flexible Communication" user manual).

Note

A box ID cannot be set in a terminal box of the Mobile Panel 170. In this case connection point recognition is only possible via the digital input of the controller.

A.1.2 Connection point recognition via box ID

Box ID

You can read out the box ID of the terminal box to which the Mobile Panel 177 is connected in the project.

Note

If you connect the Mobile Panel 177 to a terminal box of the Mobile Panel 170, the value 255 is always supplied as the box ID.

Requirements

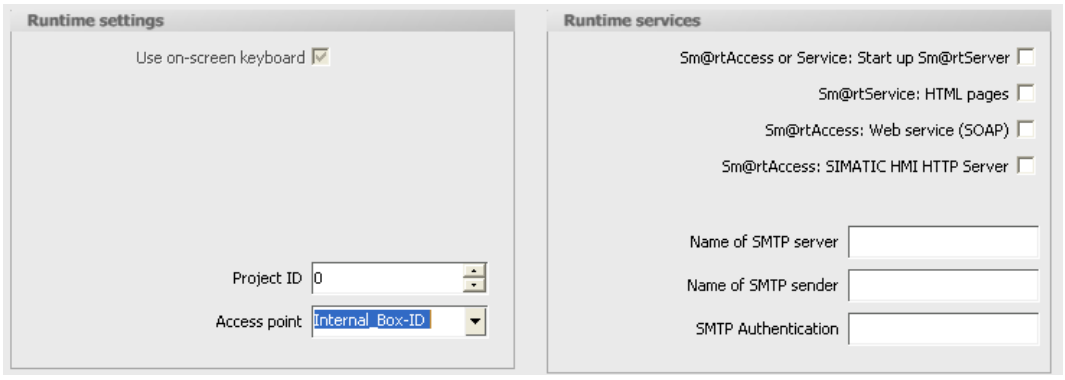
You have set the respective box ID in each of the terminal boxes. Each terminal box must have a unique box ID assigned to it.

Example for the evaluation of the current box ID

In order to ensure that the box ID is transferred correctly to the controller when the HMI device is plugged in, proceed as follows when carrying out configuration in WinCC flexible:

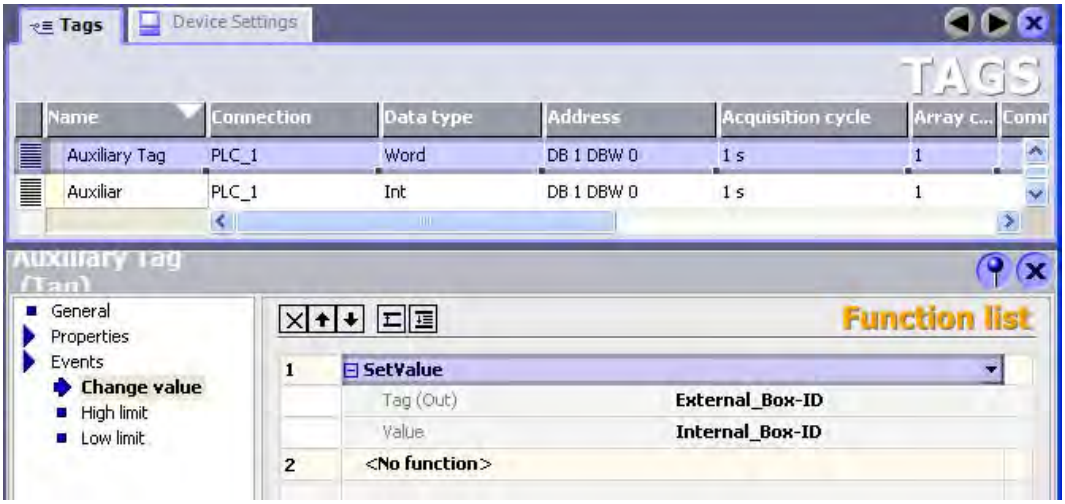
1. Specify the connection to the PLC in the "Connections" editor. Activate the "Coordination" area pointer to ensure that the live bit is available on the PLC side.
2. Create three tags in the "Tag" editor.
   - Internal tag: "Internal_Box-ID"
   - External tag: "Auxiliary Tag"
   - External tag: "External_Box-ID"
3. Open the "Device settings" editor.

4. Select the "Internal_Box-ID" tag in the "Settings for runtime" section at the "Access point". When you connect the HMI device to the terminal box, the box ID is written automatically into the "Internal_Box-ID" tag.



5. When communication is established between the HMI device and controller, the old value currently existing in the controller is then written automatically into the "External_Box-ID" tag. The "Auxiliary Tag" is required so that the current value of the box ID can be transferred to the PLC.
6. A program in the PLC evaluates the live bit. After the control program has determined that communication has been established, the control program changes the current value of the "Auxiliary_ Tag" tag once in order to induce a change in value.
7. The value change in the "Auxiliary_ Tag" executes the "SetValue" system function. The system function now re-assigns the value of the "Internal_Box-ID" tags to the "External_Box-ID" tags.
8. To configure this system function open the properties view of the "Auxiliary Tag". Click "Change value" in the properties view of the "Auxiliary_Tag" tag in the "Events" group. The "Function list" dialog box opens. Click the first line of the function list. The list opens, showing the system functions available in the project.

9. Select the system function "SetValue" from the "Calculation" group. Select the "External_Box-ID" tag at "Tag (output)". Select the "Internal_Box-ID" tag at "Value".



Result

The box ID of the terminal box to which the Mobile Panel 177 is connected is transferred to the controller.

See also

Setting the box ID at the terminal box (Page 4-7)

A.2 Evaluation of the operator control elements

A.2.1 Overview

Operator control elements

The following information can be transferred between the HMI device and the controller:

- Direction pulses of the handwheel
- Status of the softkeys
- Status of the key-operated switch
- Status of the illuminated pushbutton
- Status of the LEDs of softkeys and illuminated pushbuttons

There are two alternatives:

- Direct keys
- System functions of WnCC flexible

Note

The following sections are intended for the configuring engineer of the HMI device.

A.2.2 Evaluating operator control elements as direct keys

Introduction

You can configure the operator control elements of the HMI device as direct keys.

Direction pulses of the handwheel and the switch state of the softkeys, key-operated switch, or illuminated pushbutton are then directly available in the I/O area of the PLC.

Byte assignment

The following figure shows the byte assignment in the I/O area for the operator control elements of the HMI device.

Button bits							
7	6	5	4	3	2	1	0
F8	F7	F6	F5	F4	F3	F2	F1
		F14	F13	F12	F11	F10	F9
					T0	S1	S0
I7	I6	I5	I4	I3	I2	I1	I0
D7	D6	D5	D4	D3	D2	D1	D0

Byte
n
n+ 1
n+ 2
n+ 3
n+ 4

LED bits							
7	6	5	4	3	2	1	0
F8	F7	F6	F5	F4	F3	F2	F1
							T1

Figure A-1 Byte assignment of the keys and LEDs in the I/O area of the PLC

F Bit for softkey
S Bit for key-operated switch
T Bit for illuminated pushbutton
I Bit for handwheel pulses, forwards
D Bit for handwheel pulses, backwards

Bit coding

The following tables show the bit coding for softkeys, key-operated switch, illuminated pushbutton and handwheel:

- Bit coding of fsoftkeys

Status	F1 to F14
Not pressed	0
Pressed	1

- Bit coding of LEDs of softkeys

Status	F1 to F8
LED not illuminated	0
LED is illuminated	1

- Bit coding of key-operated switch

Status	S1	S0	Key position
Position 0	0	0	In middle position
Position I	0	1	Turned clockwise to the end stop
Position II	1	0	Turned counterclockwise to the end stop

- Bit coding of illuminated pushbutton

Status	T0
Not pressed	0
Pressed	1

LED status	T1
Off	0
Continuously illuminated	1

- Bit coding of handwheel
  - A setpoint is not specified for the handwheel.
  - After startup of the HMI device, bytes n+3 to n+4 (see figure) are set to zero.

    Rotation of the handwheel produces positive or negative pulses depending on the rotation direction. The number of positive pulses is stored in bits I0-I7, and the number of negative pulses is stored in Bits D0-D7.

    Values are entered in binary format, whereby Bit 0 is the least significant bit and Bit 7 is the most significant bit.

    A complete handwheel revolution yields 50 pulses.
  - Each pulse of the handwheel is added to the appropriate byte (n+3 or n+4), depending on the direction or rotation. There are no negative values. If the possible value range is exceeded, an overflow occurs.

    If a value of 255 is increased by one pulse, a value of 0 results.

Example of bit coding for handwheel

The following table contains an example showing how to determine the rotation direction using pulses stored in Bytes n+3 and n+4 that were measured between time t_1 and t_4.

The numbers in the following table represent a byte in the PLC.

Evaluation time	Handwheel		Evaluation
	Pulses, forwards	Pulses, backwards	
t_1	255 (≙ -1)	245 (≙= -11)	--
t_2	10	245 (≙ -11)	Pulses, forwards: 11 Pulses, backwards: 0 Resulting value: +11
t_3	10	4	Pulses, forwards: 0 Pulses, backwards: 15 Resulting value: -15
t_4	15	5	Pulses, forwards: 5 Pulses, backwards: 1 Resulting value: +4

Based on the difference in pulses at times t_n and t_{n+1}, the resulting value and, thus, the rotation direction can be determined. From the table, take the number of pulses forwards and pulses backwards

- at the tim t_n and
- at time t_{n+1}.

From this, you determine the resulting value. This is calculated as:

Resulting value =

pulses, forwards, t_{n+1} - pulses, backwards, t_n - (pulses, backwards, t_{n+1} - pulses, backwards, t_n)

Response time

Bytes n+3 and n+4 must be scanned on the PLC side within a second and cyclically. This ensures that no more than 256 pulses can be added between two scans of the handwheel. For 256 pulses, approximately 4.5 revolutions of the handwheel are required.

The rotary pulse encoder supplies a maximum of 200 pulses per second.

Notice

The input pulses should take effect immediately on the PLC and cause a response in the system. Therefore, set up a scan cycle <= 100 ms in the PLC to achieve this.

A.2.3 Evaluating operator control elements via WinCC flexible system functions

A.2.3.1 LED control of the softkeys

Application

LEDs are integrated in the softkeys F1 to F8 of the Mobile Panel 177. The integrated LEDs can be activated by the controller.

The LED can assume the following states:

- Off
- Slow flashing
- Rapid flashing
- On

This allows the LED to signalise to the operatorthat he should press the softkey in an active project.

Bit assignment

The following table shows the bit assignment for the LED tag of the softkey LEDs:

Bit n+1	Bit n	LED status
0	0	Off
0	1	Rapid flashing
1	0	Slow flashing
1	1	On (continuous)

A.2.3.2 Basic procedure

Introduction

You can use WinCC flexible system functions to evaluate the operator control elements of the HMI device or to control the LEDs of the softkeys and of the illuminated pushbutton.

Direction pulses of the handwheel and the switch state of the softkeys, key-operated switch, or illuminated pushbutton are then transferred via tags to the PLC.

Consistent data

If tags with process interface are assigned directly to the operator control elements, this may, for example, result in inconsistent values of the operator control elements between operator control element, HMI device and PLC.

1. The HMI device is connected directly to the terminal box.
2. The HMI device starts.
3. The values of the operator control elements are determined and entered in the tags in the HMI device.
4. Communication between the HMI device and PLC is established.
5. After communication has been established, the old values of the tags are transferred from the PLC into the tags of the HMI device.
6. Not until a change has been carried out to an operator control element, is the valid value written into the tag of the HMI device and transferred to the PLC.

Procedure

In order to ensure consistent values for the operator control elements, proceed as follows when configuring in WinCC flexible:

1. Specify the connection to the PLC in the "Connections" editor. Activate the "Coordination" area pointer to ensure that the live bit is available to the PLC side.
2. Create three tags in the "Tag" editor.
   - Internal tag: "Status_Control_Element"
   - External tag: "Auxiliary_Tag"
   - External tag: "Control_Element_PLC"

3. For illuminated pushbuttons, key-operated switches and handwheels (global assignment): Open the template in the "Screens" editor. Select the operator control element in the template. Click on the "General" group in the properties window. Select the "Status_Control_Element" tag at "Tag" in the "Settings" section. When you operate the operator control element, the value is written into the "Status_Control_Element" tag. For illuminated pushbuttons you can additionally configure the "LED_Tag" tag in order to control the integrated LED.

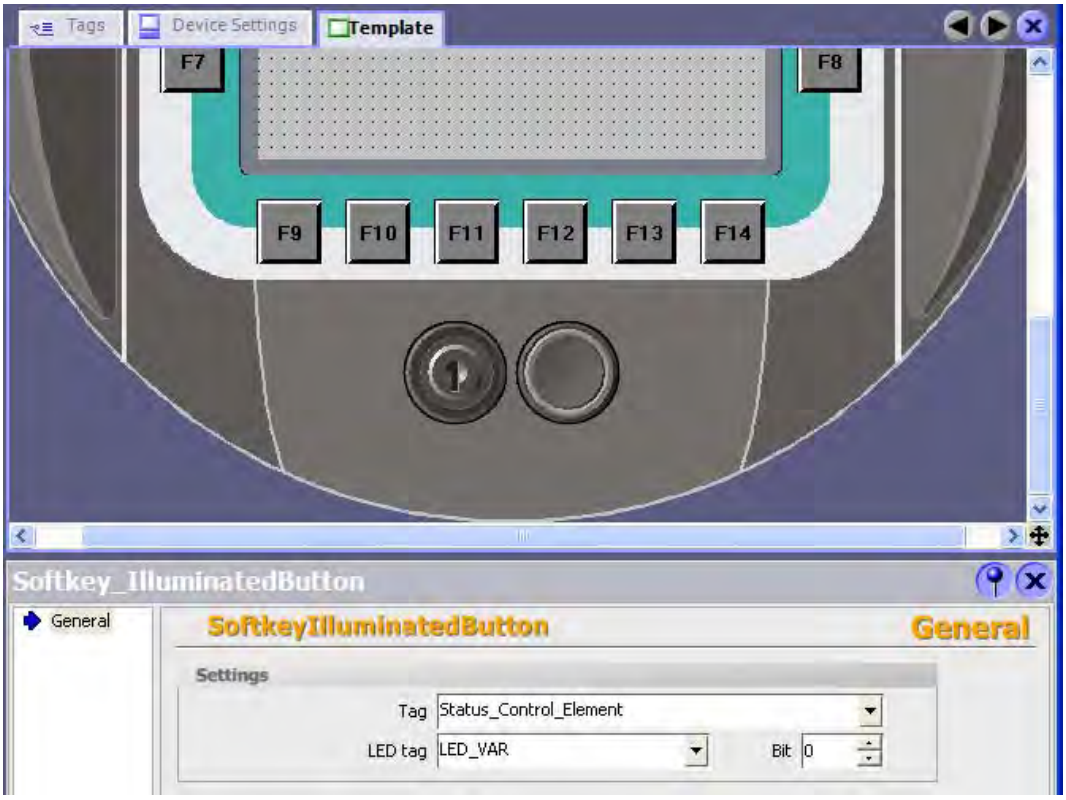
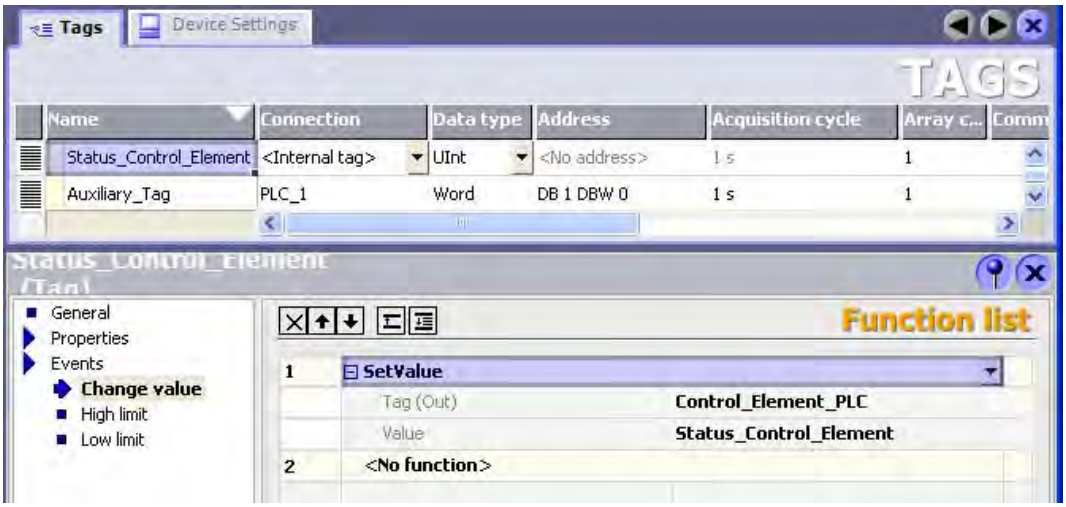


Figure A-2 Tag assignment using illuminated pushbuttons as an example

4. For a handwheel (local assignment):
   Open the screen in which you want to assign the handwheel locally in the "Screens" editor. Configure the function "ConnectTagWithHandwheel" on a command button or directly into the screen structure. Select the "Status_Control_Element" tag at "Value". When you operate the operator control element, the value is written into the "Status_Control_Element" tag.
5. The "Control_Element_PLC" tag writes the value of the "Status_Control_Element" tags into the PLC. The "SetValue" system function has to configured at the "Status_Control_Element" tag in order for the value to be transferred.
6. Open the properties window of the "Status_Control_Element" tag. Click "Change value" in the properties view of the "Status_Control_Element" tag in the "Events" group. The "Function list" dialog box opens. Click the first line of the function list. The list appears, showing the available project functions.

7. Select the system function "SetValue" from the "Calculation" group. Select the "Control_Element_PLC" tag at "Tag (output)". Select the "Status_Control_Element" tag at "Value".



8. When communication is established, the possibly old value currently existing in the controller is then written automatically into the "Control_Element_PLC" tag. The "Auxiliary Tag" is required for transfer of the current status of the operator control element to the PLC.
9. A program in the PLC evaluates the live bit. After the control program has determined that communication has been established, the control program changes the current value of the "Auxiliary_Tag" tag once in order to induce a change in value. The value change in the "Auxiliary_Tag" triggers performance of the "SetValue" system function. The system function assigns the value of the "Status_Control_Element" tag again to the "Control_Element_PLC" tag. In order to configure the system function, open the properties window of the "Auxiliary Tag".
10. Click "Change value" in the properties window of the "Auxiliary_Tag" tag in the "Events" group. The "Function list" dialog box appears. Click the first line of the function list. The list opens, showing the available project functions.
11. Select the system function "SetValue" from the "Calculation" group. Select the "Control_Element_PLC" tag at "Tag (output)". Select the "Status_Control_Element" tag at "Value".

Result

The values for the operator control elements are consistent between operator control element, HMI device and PLC.

A.2.3.3 Illuminated pushbutton

Application

The illuminated pushbutton is an optional operator control element of the Mobile Panel 177. The integrated LED can be actuated from the PLC.

The LED can assume the following states:

- Off
- Slow flashing
- Rapid flashing
- On

This allows the LED to signalise to the operator that he should operate the illuminated pushbutton in the active project.

Bit assignment

The following table shows the bit assignment for the status tag of the illuminated pushbutton:

Bit 0	Status of the illuminated pushbutton
0	Pressed
1	Not pressed

The following table shows the bit assignment for the LED tag of the illuminated pushbutton:

Bit n+1	Bit n	LED status
0	0	Off
0	1	Rapid flashing
1	0	Slow flashing
1	1	On (continuous)

A.2.3.4 Key-operated switch

Application

The key-operated switch is an optional operator control element of the Mobile Panel 177. In an active project the key-operated switch is used to lock functions that are triggered by the Mobile Panel 177.

Bit assignment

The following table shows the bit assignment for the tag of the key-operated switch:

Bit 1	Bit 0	Key position
0	0	In central position
1	0	Turned clockwise to the end stop
0	1	Turned counterclockwise to the end stop

Note

If you use a tag of the "Boolean" type for the key-operated switch, the following assignment applies:

- Status "0": Central position of the key-operated switch
- Status "1": Key-operated switch turned clockwise or counterclockwise to the end stop

A.2.3.5 Hand wheel

Application

The handwheel is an optional operator control element of the Mobile Panel 177. In an active project you can input incremental values with the handwheel.

Evaluation of the incremental values

If the signals of the handwheel are assigned to a WinCC flexible tag, the forwards and backwards increments are offset against each other and the absolute value of the increments is specified. The maximum or minimum value of the increments until an overflow depends on the type of tags assigned.

A complete handwheel revolution yields 50 pulses. The rotary pulse encoder supplies a maximum of 200 pulses per second.

Example

The handwheel has a starting value of 120 increments.

The wheel rotates 10 increments forwards and 3 increments backwards.

This results in a new value of 127 increments.

Index

A

Application
  Handwheel, A-14
  Illuminated pushbutton, A-13
  Key-operated switch, A-14
  LED of the softkeys, A-9

B

Box ID, A-1
Byte assignment, A-6

C

Cable cross section, 4-11
Compatibility, 1-8
Configuration computer
  Connecting to the terminal box, 4-16
Configuring
  Interfaces, 4-14
Connecting
  Configuration computer, 4-16, 4-24
  Connecting cables, 4-22
  Controller, 4-15
  Equipotential bonding, 4-10
Connecting the configuration computer
  Connection configurator, 4-24
Connecting the connecting cable, 4-22
Connecting the PLC
  Wiring diagram, 4-15
Connection configurator
  Configuration computer, 4-16, 4-24
  MPI/PROFIBUS DP, 4-16
Connection examples, 6-18
  For safety category 3: enabling switch, 6-19, 6-20
  For safety category 3: STOP button, 6-21
Connection point recognition, 1-8, A-1
Controller
  Configuring the interface, 4-14

D

Design, 1-1
  Wall holder, 1-9
Direct keys, A-5
Display, 6-6

E

Enable switch, 5-3
  Normal activation, 5-4
  Panic activation, 5-4
  Switch settings, 5-4
Equipotential bonding
  Connecting, 4-10
  Requirements, 4-10
Equipotential bonding cable, 4-10

F

Fast connector
  Assignment, 6-14, 6-16
Front view, 1-2

H

Hand wheel, 5-10
Handwheel
  Application, A-14
  Evaluation of incremental values, A-14
HMI device, 6-6, 6-7, 6-8
  Front view, 1-2
  Interfaces, 4-20, 4-21
  Mounting position, 3-1, 4-1
  Side view, 1-3

I

IF1 interface
Assignment, 6-13, 6-17
Illuminated pushbutton, 5-12
Application, A-13
Bit assignment, A-13
Input unit, 6-6
Installation
Configuration computer, 4-16
Interfaces, 4-5, 4-6, 4-16, 4-20, 4-21
Configuring, 4-14
Interlocking mechanism, 4-22

K

Key-operated switch, 5-11
Application, A-14
Bit assignment, A-14

L

LED display, 5-13
LED softkey
Bit assignment, A-9
LED softkeys, A-9

M

Memory, 6-6
Mobile Panel 177
Enable switch, 5-3
Operator control elements, 5-1
STOP button, 5-5
Monitoring device
ELAN SRB-NA-R-C.27/S, 6-19
PILZ PST1, 6-20
SIGUARD 3TK2840, 6-21
Mounting position, 4-1
HMI device, 3-1

O

Opening the terminal box, 4-3
Operating safety
Standards, 2-1
Operation
Enable switch, 5-3
Hand wheel, 5-10
Illuminated pushbutton, 5-12
Key-operated switch, 5-11
STOP button, 5-5
Operator control elements, 5-1, 5-2
Overall dimensions
Mobile Panel 177, 6-1, 6-2

P

Panic activation, 5-4
PC
Connecting, 4-16
Pin assignment
Female header, 6-10, 6-11
RJ45 plug connector, 6-9
RJ45 plug connector, 6-11
RS 485 interface, 6-9, 6-10
Polarity reversal protection, 4-11
Potential differences, 4-10
Power supply
Cable cross section, 4-11
Wiring diagram, 4-11
Protective cover, 4-4

R

Recovery time, 1-8, 6-7, 6-8
Response time
Handwheel, A-9
Risk analysis, 2-2

S

Safety
Operating safety, 2-1
Safety category 3
Connection examples, 6-18
Security
Voltage supply, i
Setting the box ID, 4-8
Setting the station number, 4-8
Side view, 1-3
Standards, 2-1, 2-2
STOP button, 5-5
Stripping insulation
MPI/PROFIBUS-DP cable, 4-9
PROFINET cables, 4-9
System functions, A-5

T

Technical data
Female header, 6-10, 6-11
RJ45 plug connector, 6-9
RJ45 plug connector, 6-11

Technical specifications
Display, 6-6
HMI device, 6-6, 6-7, 6-8
Input unit, 6-6
Memory, 6-6
Overall dimensions, 6-1, 6-2
RS 485 interface, 6-9, 6-10
Voltage supply, 6-7, 6-8
Terminal box
DIL switch, 4-14
Fast connector, 6-16
IF1 interface, 6-17
Interfaces, 4-5, 4-6
Terminal strip 1, 6-17
Terminal strip 2, 6-17
Variants, 1-7
Terminal Box DP
Fast connector, 6-14
IF1 interface, 6-13
Terminal strip 1, 6-13
Terminal strip 2, 6-14
Terminal Box PN
LED display, 5-13
Touch screen
Note, 5-2

V

Voltage supply, i, 6-7, 6-8

W

Wiring diagram
Connecting the PLC, 4-15
Connecting the Power Supply, 4-11