SIEMENS

SIMATIC HMI

HMI device
Mobile Panel 277 (WinCC flexible)

Operating Instructions (Compact)

05/2006
A5E00356143-01

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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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Preface

Operational reliability and safety regulations

Detailed information on the operational reliability and safety regulations can be found in the "Mobile Panel 277" 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 277 is summarized in the available operating instructions (compact).

Operating instructions

Detailed information on Mobile Panel 277 can be found in the "Mobile Panel 277" operating instructions. If there is any uncertainty, the information in the Operating Instructions "Mobile Panel 277" is binding.

The "Mobile Panel 277" operating instructions and additional documentation are available for download on the internet under "http://www.siemens.com/automation/support".

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Overview

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1.1 Product Overview

Expanded application options – with Mobile Panel 277

SIMATIC Mobile Panels offer the option of making safety functions available on a mobile basis at any point of a machine or plant.

The Mobile Panel 277 compliments the product range at the high-performance end of the spectrum, in relation to the well-known 170 and 177 series mobile HMI devices.

The Mobile Panel 277 enables you to use text or graphically based projects even more efficiently for simple and medium-complexity control and monitoring tasks on machines and plants.

The Mobile Panel 277 is characterized by short commissioning times, a large user memory, high-performance, and is flexibly optimized for projects based on WinCC.

In addition, the Mobile Panel 277 comes with the following features:

- PROFIBUS and Ethernet ports
- 7.5" TFT screen with 64k colors
- 18 function keys with LED
- Extended HMI functions

1.2 Design of the HMI device

1.2.1 Overview

The following figure shows the Mobile Panel 277 connected to a Connection Box DP. This can vary, depending on the delivery status of the Mobile Panel 277.

① Mobile Panel 277
② Connection Box DP
③ Connecting cable DP
④ Cable for power supply and safety functions
⑤ Cable for process connection

Combinations

You can connect the Mobile Panel 277 to PROFIBUS DP or PROFINET.

The following table shows which Connection Box and which connecting cable can be combined. Combinations other than those shown in the table are not possible.

Data network	Connection Box	Connecting cables
PROFIBUS DP	Connection Box DP Basic Connection Box DP Plus	Connecting cable DP
PROFINET	Connection Box PN Basic Connection Box PN Plus	Connecting cable PN

The cables for the process connection, the safety functions and the power supply are all available separately and in various lengths. Carry out the cabling for the power supply and safety functions plant-specifically.

The Mobile Panel 277 can be securely stored in its wall holder.

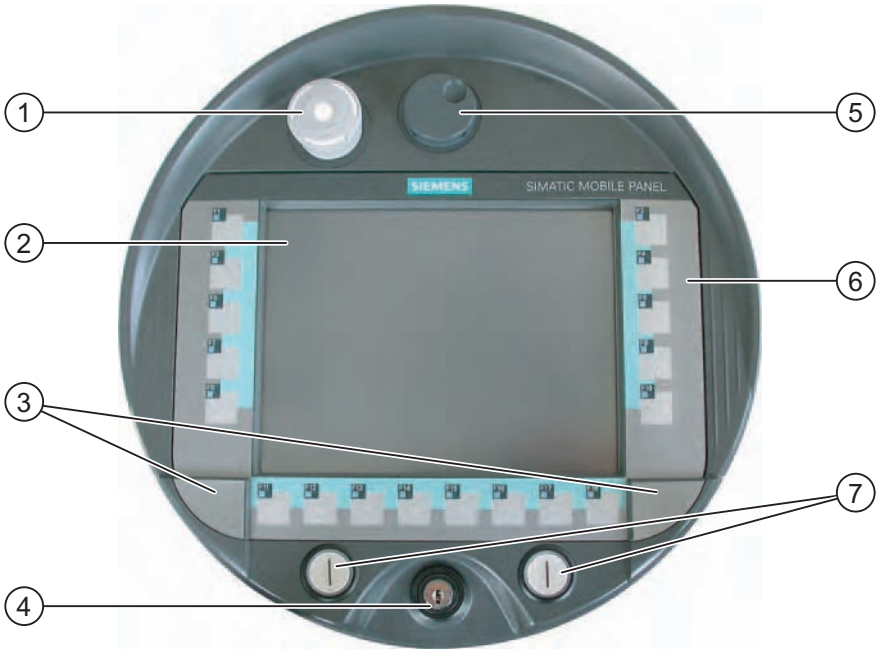
1.2.2 Mobile Panel 277

Introduction

The Mobile Panel 277 is available in three design variations:

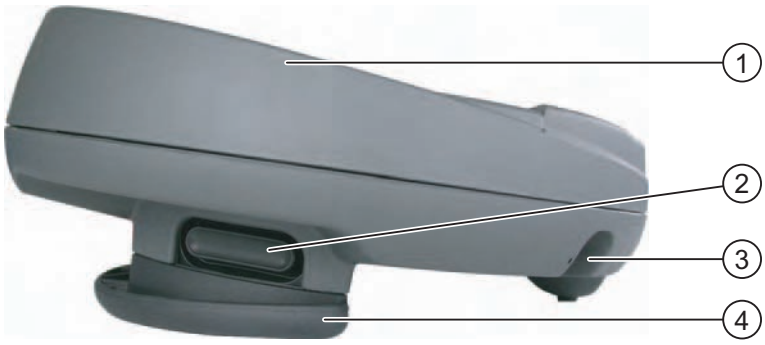
- With enabling switch
- With enabling switch and STOP button
- With enabling switch, STOP button, handwheel, key-operated switch and two illuminated pushbuttons.

Front view



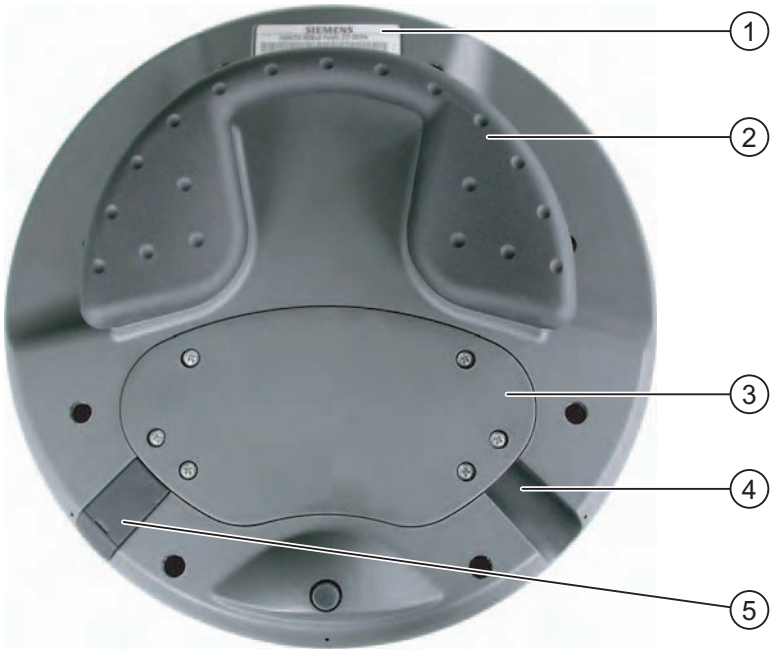
① STOP button, optional
② Display with touch screen
③ Covers for the labeling strip guides
④ Key-operated switch, optional
⑤ Handwheel, optional
⑥ Membrane keyboard
⑦ Illuminated pushbutton, optional

Side view



① Fall protection for the STOP button
② Enabling switches, positioned on both sides of the Mobile Panel 277
③ Cable inlet
④ Grip

Rear view



① Rating label
② Grip
③ Connection bay cover
④ Cable inlet
⑤ USB port and plugs

1.2.3 Connecting Cable

Introduction

Connect the connecting cable to the Mobile Panel 277 so that it is not detachable. The connection to the Connection Box is achieved by means of a detachable connector. 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 277 to the Connection Box DP
- Connecting cable PN

  For connecting the Mobile Panel 277 to the Connection 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

The following figure shows the connecting cable DP.

① Metallic push-pull circular connector
② Strain relief and antikink device for the connection cable
③ RJ45 connector
④ Plug connector, 10-pin

The following figure shows the connecting cable PN.

① Metallic push-pull circular connector
② Strain relief and antikink device for the connection cable
③ RJ45 connector
④ Plug connector, 12-pin

Note

Degree of protection

When inserted, the circular connector guarantees protection class IP65.

1.2.4 Connection Box

Configuration

The following figure shows the Connection Box DP.

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

The following figure shows the Connection Box PN.

① Screwed joint for process data line
② LED displays
③ Threaded assembly for power supply cable
④ Threaded assembly 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

IP65 degree of protection

Degree of protection IP65 is guaranteed for the Connection Box when the Mobile Panel 277 is connected or when a dummy cap is inserted.

Variants

The Connection Boxes are available in the following variants:

- Connection Box Basic
- Connection Box Plus

The difference between the two variants lies in the switching-technical evaluation of the signals from the stop or Emergency Stop circuits of the plant.

Note

The exterior of the Connection 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 Connection Box before you plug the connecting cable back in.

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

Division of the system into zones

You can divide a system into various zones or functional areas by using numerous Connection Boxes. You can also set up the safety functions zone-dependently. 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 Connection Box. The box ID allows connection point recognition to be implemented.

Combination of connecting cable and Connection Box

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

- Mobile Panel 277 with connecting cable DP on the Connection Box DP
- Mobile Panel 277 with connecting cable PN on the Connection Box PN

Compatibility with the Mobile Panel 170

You can connect and operate a Mobile Panel 170 to a "Connection Box DP for Mobile Panel 277". The additional features of this Connection Box, e.g. the box ID, are however not available on the Mobile Panel 170.

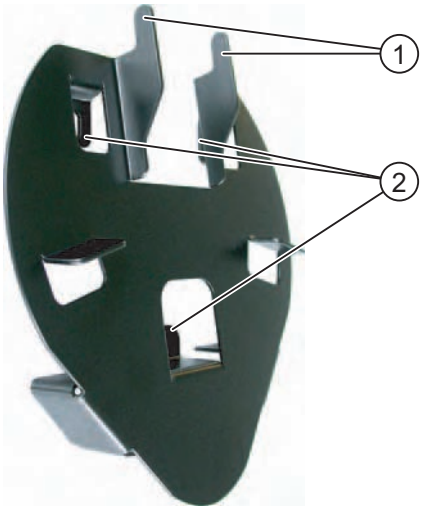
You can connect and operate a Mobile Panel 277 with a connecting cable DP to the following Mobile Panel 170 Connection Boxes:

- Connection Box Basic
- Connection Box Plus

The Mobile Panel 170 Connection Boxes do not have the option to set a box ID. If you connect a Mobile Panel 277 to a Mobile Panel 170 Connection Box, the box ID will always deliver the value 255.

1.2.5 Wall Holder

The wall holder ensures the secure storage of the Mobile Panel 277 when it is being used for fixed operation. You can also use the wall holder for the Mobile Panel 177.



① Hook for the grip on the HMI device
② Screw flange

1.3 Accessories

Accessory kit

The accessory kit is supplied with the HMI device.

The accessory kit contains the following:

- Cover cap with rubber seal
- Screws for fixing the cover cap
- Label for cover cap

Additional documents may be enclosed with the accessory kit.

PC/PPI cable

The cable is required when updating the operating system by bootstrapping. You can also use the cable for transfer. Connect the PC/PPI cable to the RS 422/RS 485 port. The cable converts the input signals to RS 232 signals.

The cable is not supplied with the HMI device. The cable can be ordered separately under the order number 6ES7 901-3CB30-0XA0.

Note

If the connection fails during the operating system update, set the system to a lower bit rate. If you use a higher bit rate, you must use the PC/PPI cable release 3 or better. The version code is printed on the cable (e.g. "E-Stand 3" corresponds to version 3).

Cover foil

A cover foil set is available for the Mobile Panel 277 under order number 6AV6671-5BC00-0AX0.

The protective foil prevents the touch screen from being scratched or soiled.

Labeling strips

Labeling strips are available as an accessory. Stickers for the cover caps can also be supplied, in addition to the labeling strips. The protective caps cover the slot openings for the labeling strips.

Memory card

Only use the SD memory cards tested and released by Siemens or MultiMedia cards. More information can be found in the SIMATIC HMI catalog ST 80.

1.4 Accumulator Option Pack

Purpose

The rechargeable battery is an optional accessory. The rechargeable battery prevents the need for a restart of the Mobile Panel when changing between different Connection Boxes. Rechargeable battery operation is only activated when a project is running on the Mobile Panel.

The buffer time amounts to a maximum of 10 minutes. The rechargeable battery is able to bridge the buffer time 5 times without recharging. During the buffer time, the backlight of the display is switched off.

When the Mobile Panel is connected to a Connection Box, the rechargeable battery is charged automatically.

Notice

Recharging and discharging the rechargeable battery

There is a risk of fire and in extreme cases, explosion, when undertaking the following procedure!

- In the event of improper charging and discharging of the rechargeable battery
- By reversing polarity
- By short-circuit

The rechargeable battery may only be recharged in the Mobile Panel.

Note

Replug HMI device

The HMI device may supply the same system alarms as it would do in the event of communication interrupt, when replugging the HMI device to another Connection Box.

Safety instructions

The rechargeable battery is a Li-ion rechargeable battery. The following safety notes apply for these rechargeable batterys:

- Do not crush.
- Do not expose to heat and do not burn.
- Do not short-circuit.
- Do not take apart.
- Do not submerge in liquids - the rechargeable battery could crack or explode.

Charge-level indicator

When the Mobile Panel is not connected to a Connection Box, the rechargeable battery charge level is displayed as follows:

- The LED on function key F1 flashes for the final 2 minutes of the buffer time. If you fail to connect the Mobile Panel to a Connection Box before this time expires, the current project will be ended and the Mobile Panel will be switched off.
- The charge level of the rechargeable battery is displayed by means of the LEDs of function keys F2, F4, F6, F8 and F10.

  The number of lit LEDs corresponds to a charge level of 20% to 100%. Two lit LEDs means, for example, a 40% rechargeable battery charge level.

1.5 Functional Scope with WinCC flexible

The following tables show the objects that can be integrated into a project for a Mobile Panel 277.

Alarms

Object	Specification	Mobile Panel 277
Alarm	Number of discrete alarms	4,000
	Number of analog alarms	200
	Length of the alarm text	80 characters
	Number of tags in an alarm	Max. 8
	Display	Alarm line, Alarm window, Alarm view
	Acknowledge error alarms individually	Yes
	Acknowledge several error alarms simultaneously (group acknowledgement of alarm groups)	16 alarm groups
	Edit alarm	Yes
	Alarm indicator	Yes
ALARM_S	Display S7 alarms	Yes
Alarm buffer remanent	Alarm buffer capacity	512 alarms
	Simultaneously queued alarm events	Max. 250
	View alarm	Yes
	Delete alarm buffer	Yes
	Line-by-line printing of alarms	Yes

Tags, values and lists

Object	Specification	Mobile Panel 277
Tag	Number	2,048
Limit value monitoring	Input/Output	Yes
Linear Scaling	Input/Output	Yes
Text list	Number	500 [1)]
Graphics list	Number	400 [1)]

[1)] The maximum total of text and graphics lists is 500.

Screens

Object	Specification	Mobile Panel 277
screen	Number	500
	Fields per screen	200
	Tags per screen	200
	Complex objects per screen (e.g. bars)	10
	Template	Yes

Recipes

Object	Specification	Mobile Panel 277
Recipe	Number	300
	Data records per recipe	500
	Entries per recipe	1,000
	Recipe memory	64 KB
	Memory location	• Memory card 1) • USB memory stick 1) • Network drive

1) The number of recipe data records might be restricted by the capacity of the storage medium.

Logs

Note

The HMI devices are suitable for the logging of relatively small volumes of data.

Manage the data in several adjacent archives in a segmented circular archive. The use of a large circular archive has a negative effect on performance.

Object	Specification	Mobile Panel 277
Logs	Number of logs	20
	Number of sub-archives with segmented circular log	400
	Entries in each log including all partial logs	10,000
	Filing format	CSV with ANSI character set
	Memory location	• Memory card 1) • USB memory stick 1) • Network drive

1) The number of entries in the log may be restricted by the capacity of the storage medium.

Safety

Object	Specification	Mobile Panel 277
Safety	Number of user groups	50
	Number of users	50
	Number of authorizations	32

Infotexts

Object	Specification	Mobile Panel 277
Infotext	Length (no. of characters)	320 (depending on font)
	For alarms	Yes
	For screens	Yes
	For screen objects (for example for IO field, switch, button, invisible button)	Yes

Additional functions

Object	Specification	Mobile Panel 277
Monitor setting	Touch screen calibration	Yes
	Brightness setting	Yes
Language change	Number of languages	16
VBScript	User-specific extension of the functionality	Yes
	Number of scripts	50
Graphic object	Vector and pixel graphics	Yes
Trends	Number	300
Task planner	Number of tasks	48
Text objects	Number	10,000
Direct Keys	PROFIBUS DP direct keys	Yes
	PROFINET IO direct keys	Yes

1.6 Software Options

The following software options are available for the Mobile Panel 277:

- Sm@rtService

  The Sm@rtService option enables you to access a remote HMI device from the HMI device or PC via Ethernet.

- Sm@rtAccess

  The Sm@rtAccess option enables you to set up communication between different HMI systems.

- /Audit

  The /Audit option extends the HMI device to include functions for recording operations in an audit trail and electronic signature.

- OPC-Server (OPC XML)

  The OPC-Server option enables you to create communications to OPC-capable applications from an HMI device or PC via Ethernet.

1.7 Communications

Number of connections

Connection	Mobile Panel 277
Number using a bus connection	6
Number of connections based on "SIMATIC HMI HTTP Protocol"	8

Note

In the following cases, you may not enable PROFINET IO in the Control Panel:

- Use of PLCs from other manufacturers
- Use of SIMATIC 500/505 via NITP
- Use of SIMATIC S5 via AS511

PLCs

The following table shows the PLCs which can be used with the HMI devices and the protocols or profiles which can be used.

PLC	Protocol	Mobile Panel 277
SIMATIC S7	• PPI • MPI [1] • PROFIBUS DP • TCP/IP (Ethernet)	Yes
SIMATIC S5	• PROFIBUS DP • AS 511	Yes
SIMATIC 500/505	• NITP • PROFIBUS DP	Yes
SIMATIC HMI HTTP Protocol	• HTTP/HTTPS (Ethernet)	Yes
Allen-Bradley	PLC series SLC500, SLC501, SLC502, SLC503, SLC504, SLC505, MicroLogix and PLC5/11, PLC5/20, PLC5/30, PLC5/40, PLC5/60, PLC5/80 • DF1 [2] [5] • DH+ via KF2 module [3] • DH485 via KF3 module [4] • DH485 [4]	Yes
GE Fanuc Automation	PLC series 90–30, 90–70, VersaMax Micro • SNP	Yes
LG Industrial Systems (Lucky Goldstar) / IMO	PLC series GLOFA GM (GM4, GM6 and GM7) / Series G4, G6 and G7 • Dedicated communication	Yes
Mitsubishi Electric	PLC series MELSEC FX and MELSEC FX0 • FX	Yes
Mitsubishi Electric	PLC series MELSEC FX0, FX1n, FX2n, AnA, AnN, AnS, AnU, QnA and QnAS • Protocol 4	Yes
OMRON	PLC series SYSMAC C, SYSMAC CV, SYSMAC CS1, SYSMAC alpha and CP • Hostlink/Multilink (SYSMAC Way)	Yes
Modicon (Schneider Automation)	PLC series Modicon 984, TSX Quantum and TSX Compact • Modbus RTU [5] PLC series Quantum, Momentum, Premium and Micro PLC series Compact and 984 via Ethernet bridge • Modbus TCP/IP (Ethernet)	Yes

[1] Not possible for connection to S7–212

[2] Applies to PLCs SLC503, SLC504, SLC505, PLC5, MicroLogix

[3] Applies to PLCs SLC504, PLC5 over DF1

[4] Applies to PLCs SLC500 to SLC 505 and MicroLogix

[5] Only with converter RS 422-RS 232 6AV6 671-8XE00-0AX0 (Option)

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.

Safety instructions and general notes

2

2.1 Safety Instructions

Safety regulations

Warning

Strictly observe all instructions in these operating instructions at all times. Otherwise, hazardous situations can arise or the safety mechanisms in the HMI device can be rendered ineffective.

Observe the safety and accident prevention instructions applicable to your application in addition to the safety instructions given in this manual.

Warning

The configuring engineer for a machine or system PLC must take precautions so that an interrupted program can be restarted normally after voltage dips or power failures. Dangerous operating conditions may not occur, even temporarily.

If faults in the system may cause bodily injury or significant property damage, additional measures must be taken outside of the system. These measures must also ensure safe operating conditions in the system in the event of a fault.

The system's configuring engineer must take precautions so that memory changes that could lead to a dangerous situation, can only be undertaken by authorized persons.

The STOP button must be checked periodically for proper functioning.

Warning

After a hard impact to the HMI device, check the safety-relevant features for functional capability, e.g. in the event that the HMI device is dropped.

Manual actions performed with the HMI device may only occur in conjunction with the enabling switches and at reduced velocity.

If the system is operated with the HMI device:

Ensure that current operation is only possible by means of the HMI device and not from any other point on the system.

Proper use

Warning

Commissioning of the HMI device is forbidden until it has been absolutely ensured that the machine in which the HMI device is to be installed complies with Directive 98/37/EC.

High frequency radiation

Notice

Unintentional operating situations

High-frequency radiation, e.g. from cellular phones, can lead to unintentional operating situations.

2.2 Standards, Cetificates and Approvals

Approvals

Caution

The following overview shows possible approvals.

The only valid approvals for the HMI device and the Connection Box itself are those shown on the label on the rear panel.

CE approval

CE

The HMI device and the Connection Box fulfill the requirements and protection goals of the following EC guidelines. The HMI device and the Connection Box fulfill the harmonized European standards (EN), as published in the official gazettes of the European Union for stored-program PLCs:

- 89/336/EWG "Electro-magnetic compatibility" (EMC guideline)
- 98/37/EG Directive of the European Parliament and Council of 22 June 1998 on the approximation of the laws and administrative regulations of the Member States concerning machinery

EC Declaration of Conformity

The EC Declarations of Conformity are kept available for the responsible authorities at the following address:

Siemens Aktiengesellschaft
Automation & Drives
A&D AS RD ST PLC
PO Box 1963
D-92209 Amberg, Germany

CE approval

Underwriters Laboratories Inc. conforming to

- UL 508 (Industrial Control Equipment)
- CSA C22.2 No. 142, (Process Control Equipment)

FM Approval

Factory Mutual Research (FM) conforming to

- Approval Standard Class Number 3611, 3600, 3810

Approved for use in

- Class I, Division 2, Group A, B, C, D T4
- Class I, Zone 2, Group IIC T4

Label for Australia

The HMI device and the Connection Box fulfill the requirements of standard AS/NZS 2064 (Class A).

SIBE Switzerland Certification Service

The HMI device and the Connection Box fulfill Safety Category 3 in accordance with EN 954-1.

The enabling system safety function for special operation control and the STOP buttons fulfill the following requirements:

- Safety category 3 according to EN 954-1
- Requirements of EN 60204-1, under compliance with the safety instructions detailed in the operating instructions

IEC 61131

The HMI device fulfills the requirements and criteria conforming to IEC 61131-2, Programmable Logic PLCs, Part 2: Operating resource requirements and tests.

2.3 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

  Stored-program PLCs
- The HMI device was tested for EMC in accordance with the following standards:
  - EN 50081-2, EMC – Unwanted emissions
  - EN 61000-6-2, Generic standard, Immunity, industrial environments
  - EN 61131-2, Stored-program PLCs
- STOP button for fast machine stop

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

  EN 954-1 category 3 is achievable with an external monitoring device. Two potential-free switches for the connection of external I/O devices for a rated voltage of 24 V and max. current 500 mA (safety low voltage according to EN 61131-2 or EN 50178, equipment for power installations with electronic resources).

- Enabling equipment in accordance with EN 60204-1 in safety categories according to EN 954-1:1996, safety-related features of PLCs
  - EN 954-1, category 3 is achievable 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

2.4 Voltage Supply

Safety specifications

Warning

The HMI device corresponds to protection class III according to EN 61131-2 or EN 50178. The 24 VDC supply must be isolated from touch-hazardous voltages, e.g. by means of a safety isolation transformer or similar equipment.

Protect the power supply circuit with a 3.15 A fuse.

Consider the loss of voltage on the connection cable during dimensional analysis of the supply!

2.5 Notes about Usage

Usage in industry

The HMI device is designed for industrial use. For this reason, the following standards are met:

- Requirements for unwanted emissions EN 61000-6-4: 2001
- Requirements for interference immunity EN 61000-6-2: 2001

Residential Use

If the HMI device is used in a residential area, you must take measures to achieve Limit Class B conforming to EN 55011 for RF interference.

A suitable measure for achieving the required RF interference level for Limit Class B includes e.g.:

- Use of filters in electrical supply lines

Individual acceptance is required.

2.6 Risk Analysis

Carrying out a risk analysis

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

- EN ISO 12100-1 and EN ISO 12100-2, General design guidelines for machines
- 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 the safety-related parts of the Mobile Panel 277 can achieve safety category 3 according to EN 954-1. Attention must be paid that the overall concept of the system is designed with this in mind.

2.7 Enabling Switch

Introduction

The enabling equipment comprises the two enabling switches mounted on both sides of the Mobile Panel 277.

Numerically controlled machines and systems are equipped with the operating modes "Automatic mode" and "Special operation".

Safety is ensured in automatic mode by means of closed, isolating protective devices and/or with functional non-isolating protective devices that block access.

In special operation, safety has to be ensured in a different manner than in automatic mode. In special operation mode, the danger zones of the machine or system are entered, where controlled movements have to be possible.

Special operation

A reduced speed on the machine or in the system has to be specified for special operation based on the risk assessment. An action must be possible only when the enabling equipment is activated. The operator must have the necessary qualifications and be acquainted with the details of the intended application.

Safety instructions

The safety-related aspects of the velocity reduction control and those for the enabling equipment are designed in such a way that they satisfy the EN 954-1 safety category determined by the risk analysis.

Safety Category 3 in accordance with EN 954-1:1996 can be achieved by implementing enabling equipment with two circuits. The draft C standard for machine tools notes the following:

"Enabling equipment can either be a 2-position command device in conjunction with a Stop device or a 3-position command device. The 3-position command device is preferable."

The operating principles of enabling equipment are described in EN 60204. Through the findings from accident investigations and the existence of technical solutions, the 3-stage enabling switch became state of the art. Positions 1 and 3 of the enabling switch are Off functions. Only the middle position allows the enabling function. EN 60204-1:1997 is identical to IEC 60204-1, whereby the 3-stage enabling switch is gaining international importance.

The Stop category of the enabling equipment must be selected on the basis of a risk assessment and correspond to a Category 0 or 1 Stop.

Warning

Enabling switches may only be used if the person activating them promptly recognizes a danger to personnel and can immediately take steps to avoid the danger!

Commands for unsafe conditions are not permitted to be issued with one enabling switch alone. For this purpose, a secondary, conscious start command by means of a button on the Mobile Panel 277 is required. The only person allowed to remain in the danger zone is the person who is activating the enabling switch.

In special operating modes, safety is achieved through use of the enabling switch in combination with reduction in the velocity of the drives that are posing the danger.

Risk from improper use

To avoid risk from improper use of the enabling switches, the following actions must be deliberately taken:

- Scan the enabling switches.

  The scan has to be carried out for the following processes:

  - When the system being monitored is being switched on
  - When the operating mode changes from "Automatic" to "Manual mode"

  In both cases, the enabling function may not be used.
- The enabling switch must be released within a specified time frame and returned to the "Enable" setting.

  Select the time frame according to the activity on the system being monitored.

2.8 STOP Button

Safety instructions

The STOP button on the HMI device brings about a safety-related stop of the system or machine in accordance with EN 60204-1:1997, Section 9.2.5.3. You have the option of implementing a Category 0, 1, or 2 Stop function in accordance with EN 60204-1: 1997, Section 9.2.2. The stop function category must be selected on the basis of a risk assessment.

The Stop function of the HMI device can, therefore, be used as a reliable machine stop as well as for looping in the Emergency Stop circuit of the system.

The signals of the STOP button are connected up differently in the ^ Plus and in the Connection Box Basic.

- Connection Box Plus

  With the Connection Box, the signals control the Stop or Emergency Stop circuits of the plant or machine. When the HMI device is not connected, the Stop or Emergency Stop circuit is closed.

- Connection Box Basic

  With the Connection Box Basic the signals of the Stop or Emergency Stop circuit are controlled via the STOP button. When the Mobile Panel 277 is not connected, the Stop or Emergency Stop circuits of the plant or machine are open.

Stop loop through

The Stop or Emergency Stop circuit of the system or machine is looped through the Connection Box Plus and not interrupted. The Stop or Emergency Stop circuit will be interrupted in the following cases:

- The Stop button is pressed when the Mobile Panel 277 is connected.
- A Mobile Panel 277 with pressed STOP button is connected.

This functionality is only available in the Connection Box Plus.

Warning

HMI device with STOP button

If the HMI device is equipped with a STOP button and is not connected to the Connection Box, a Stop cannot be initiated using the HMI device. The STOP button of the HMI device is then ineffective!

Install stationary Emergency Off buttons that are available at all times in the system.

Category 0 or 1 stop

If a Category 0 or 1 stop circuit is implemented, the stop function must be in effect regardless of the operating mode. A Category 0 Stop must have precedence. The release of a STOP button may not cause a hazardous situation (see also EN 60204:1997 chapter 9.2.5.3).

The stop function is not to be used as a replacement for safety equipment.

Notice

Connection Boxes in a system

Install Connection Boxes of only one variant - in other words, only Connection Box Plus or Connection Box Basic.

Mobile Panel 277 connected

If the Mobile Panel 277 is connected to the Connection Box, the STOP button on the Mobile Panel 277 can trip if it comes off, thus causing the system to come to a standstill.

See also

STOP Button on the Connection Box Plus (Page 5-9)

STOP Button on the Connection Box Basic (Page 5-11)

2.9 Electromagnetic Compatibility

Introduction

The HMI device fulfils, among other things, the requirements of the EMC laws pertaining to the European domestic market.

EMC-compliant installation

The EMC-compliant installation of the Connection Box and the application of interference-proof cable is the basis for interference-free operation. The "Guidelines for interference-free installation of stored-program PLCs" description and the "PROFIBUS Networks" manual also apply to the installation of Connection Boxes.

Pulse-shaped Interference

The table below shows the electromagnetic compatibility of modules in relation to pulse-shaped interference. This requires the HMI device to meet the specifications and directives for electrical installation.

Pulse-shaped interference	Tested with	Corresponds to test intensity
Electrostatic discharge conforming to IEC 61000-4-2	Air discharge: 8 kV Contact discharge: 6 kV	3
Burst pulses (high-speed transient interference) conforming to IEC 61000-4-4	2 KV power supply cable 2 KV signal cable, > 30 m 1 KV signal cable, < 30 m	3
High-power surge pulses conforming to IEC 61000-4-5, external protective circuit required (refer to S7 300 PLC, Installation, chapter “Lightning and Overvoltage Protection”).		
• Asymmetric coupling	2 kV power cable DC voltage with protective elements 2 KV signal/data cable, > 30 m, with protective elements as required	3
• Symmetric coupling	1 kV power cable DC voltage with protective elements 1 KV signal cable, > 30 m, with protective elements as required	3

Sinusoidal Interference

The table below shows the EMC properties of the modules with respect to sinusoidal interference. This requires the HMI device to meet the specifications and directives for electrical installation.

Sinusoidal interference	Test values	Corresponds to test intensity
HF radiation (electromagnetic fields) according to IEC 61000-4-3	• 80% amplitude modulation at 1 kHz with 10 V/m in the range of 80 MHz to 1 GHz with 3 V/m in the range 1.4 GHz to 2 GHz with 1 V/m the range 2 GHz to 2.7 GHz • 10 V/m with 50 % pulse modulation at 900 MHz 10 V/m with 50 % pulse modulation at 1.89 GHz	3
RF interference current on cables and cable shielding conforming to IEC 61000-4-6	Test voltage 10 V at 80% amplitude modulation of 1 kHz in the range from 9 kHz to 80 MHz	3

Emission of Radio Interference

The following table shows the unwanted emissions from electro-magnetic fields according to EN 55011,
limit class A, group 1, measured at a distance of 10 m.

From 30 to 230 MHz	< 40 dB (V/m) quasi-peak
From 230 to 1000 MHz	< 47 dB (V/m) quasi-peak

Additional measures

Before you connect an HMI device to the public network, ensure that it is compliant with Limit Class B conforming to EN 55022.

2.10 Transport and Storage Conditions

Mechanical and Climatic Transport and Storage Conditions

The transport and storage conditions of this HMI device exceed requirements conforming to IEC 61131-2. The following specifications apply to the transport and storage of an HMI device in its original packing.

The climatic conditions comply to the following standards:

- IEC 60721-3-3, Class 3K7 for storage
- IEC 60721-3-2, Class 2K4 for transport

The mechanical conditions are compliant with IEC 60721-3-2, Class 2M2.

The following table shows the transportation and storage conditions for the HMI device.

Type of condition	Permitted range
Drop test (in transport package)	≤ 1 m
Temperature	From –20 to +60 C
Atmospheric pressure	from 1080 to 660 hPa, corresponds to an elevation –1000 to 3500 m
Relative humidity	From 10 to 90 %, without condensation
Sinusoidal vibration conforming to IEC 60068-2-6	5 Hz to 9 Hz: 3.5 mm 9 to 500 Hz: 9.8 m/s^2
Shock conforming to IEC 60068-2-29	250 m/s^2, 6 ms, 1000 shocks

The following table shows the transportation and storage conditions for the terminal device.

Type of condition	Permitted range
Drop test (in transport package)	≤ 1 m
Temperature	From –20 to +70°C
Atmospheric pressure	from 1080 to 660 hPa, corresponds to an elevation –1000 to 3500 m
Relative humidity	from 35% to 85%, without condensation
Sinusoidal vibration conforming to IEC 60068-2-6	5 Hz to 9 Hz: 3.5 mm 9 to 500 Hz: 9.8 m/s^2
Shock conforming to IEC 60068-2-29	250 m/s^2, 6 ms, 1000 shocks

Notice

In the following cases, ensure that no moisture can settle on or in the HMI device (dew).

- Transportation of the HMI device in low temperatures
- Under extreme temperature variations

The HMI device must have acquired room temperature before it is put into operation. Do not expose the HMI device to direct radiation from a heater in order to warm it up. If dewing has developed, wait approximately four hours until the HMI device has dried completely before switching it on.

The following points must be adhered to in order to ensure a fault-free and safe operation of the HMI device:

- Proper transportation and storage
- Proper installation and mounting
- Careful operation and maintenance

The warranty for the HMI device will be deemed void if these stipulations are not heeded.

Planning application

3

3.1 Notes about Usage

Mechanical and Climatic Conditions of Use

The HMI device is designed for use in a location protected from the weather. The conditions of use are compliant with requirements to DIN IEC 60721-3-3:

- Class 3M3 (mechanical requirements)
- Class 3K3 (climatic requirements)

Use with additional measures

Examples of applications where the use of the HMI device requires additional measures:

- In locations with a high degree of ionizing radiation
- In locations with difficult operating conditions - for example due to:
  - Corrosive vapors, gases, oils or chemicals
  - Electrical or magnetic fields of high intensity
- In systems that require special monitoring - for example:
  - Elevator systems
  - Systems in especially hazardous rooms

Mechanical ambient conditions

The following table shows the mechanical ambient conditions for the HMI device in the form of sinusoidal vibration.

Frequency range in Hz	Constant	Occasional
$10 \leq f \leq 58$	Amplitude 0.0375 mm	Amplitude 0.075 mm
$58 \leq f \leq 150$	Constant acceleration 0.5 g	Constant acceleration 1 g

Reduction of Vibration

If the HMI device is subjected to greater shocks or vibrations, you must take appropriate measures to reduce acceleration or amplitudes.

We recommend fitting the HMI device to vibration-absorbent material (on metal shock absorbers, for example).

Testing for Mechanical Ambient Conditions

The following table provides information on the type and scope of tests for mechanical ambient conditions.

Tested for	Test Standard	Comments
Vibrations	Vibration test conforming to IEC 60068, part 2–6 (sinusoidal)	Type of vibration: Transitional rate of the frequency: 1 octave/minute. $10 \leq f \leq 58$, constant amplitude 0.075 mm $58 \leq f \leq 150$, Constant acceleration 1 g Vibration duration: 10 frequency cycles per axis in each of the three mutually vertical axes.
Shock	Shock testing in accordance with IEC 60068, Part 2 –29	Type of shock: Half-sine Shock intensity: Peak value 5 g, duration 11 ms Direction of impact: 3 shocks in ± directions in each of the three mutually vertical axes
Falling	Fall test according to EN 60068-2-32EN 60068-2-32	

Climatic ambient conditions for the Mobile Panel

The following table shows the permitted climatic ambient conditions for the usage of the Mobile Panel.

Ambient conditions	Permitted range	Comments
Temperature • Operation • Storage/Transport	 • From 0 to 40 °C • From –20 to 60 °C	See the "Mounting Positions and Type of Fixation" section
Relative humidity	10 to 90 %, no condensation	Corresponds to relative humidity, load degree 2 according to IEC 61131, part 2
Atmospheric pressure	1080 to 795 hPa	Corresponds to an elevation of –1,000 to 2,000 m
Pollutant concentration	SO_2: < 0.5 ppm; Relative humidity < 60 %, no condensation	Check: 10 cm^3/m^3; 10 days
	H_2S: < 0.1 ppm; Relative humidity < 60 %, no condensation	Check: 1 cm^3/m^3; 10 days

Climatic ambient conditions for the Connection Box

The following table shows the permitted climatic ambient conditions for the usage of the Connection Box.

Ambient conditions	Permitted range	Comments
Temperature • Operation • Storage/Transport	 • From 0 to 50 °C • From –20 to 70 °C	See the "Mounting Positions and Type of Fixation" section
Relative humidity • Operation • Storage/Transport	 • 35 to 85 % • 35 to 85 %	Without condensation, corresponds to a relative humidity, stress class 2 conforming to IEC 61131, part 2
Atmospheric pressure	1080 to 795 hPa	Corresponds to an elevation of –1,000 to 2,000 m
Pollutant concentration	SO_2: < 0.5 ppm; Relative humidity < 60 %, no condensation	Check: 10 cm^3/m^3; 10 days
	H_2S: < 0.1 ppm; Relative humidity < 60 %, no condensation	Check: 1 cm^3/m^3; 10 days

3.2 Mounting Positions and Type of Fixation

Mounting position

The wall holder is designed for vertical mounting.

The Connection Box is designed for surface mounting independently of cabinets or control panels.

The Connection 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 Connection Box.

See also

Mounting the Connection Box and Wall Holder (Page 4-1)

3.3 Preparing for Mounting

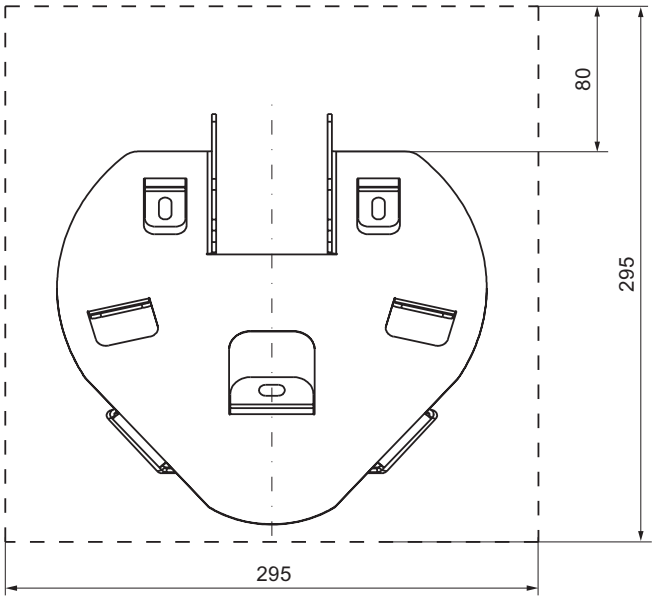
Choose the mounting location for the wall holder

Observe the following points when selecting the mounting location:

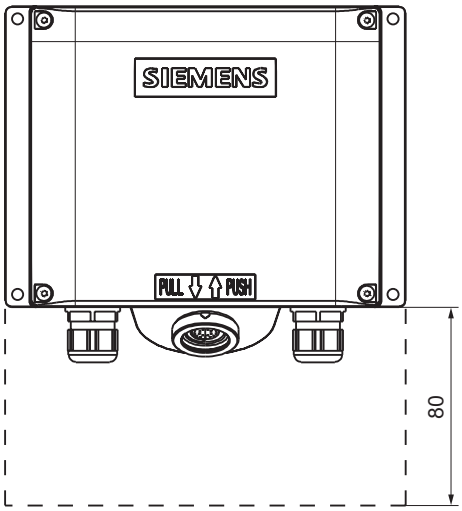
- Position the wall holder so that the display of the hooked-in HMI device is not exposed to direct sunlight.
- Position the wall holder so that the HMI device can be ergonomically inserted by the user. Choose a suitable mounting height.

Maintaining clearances

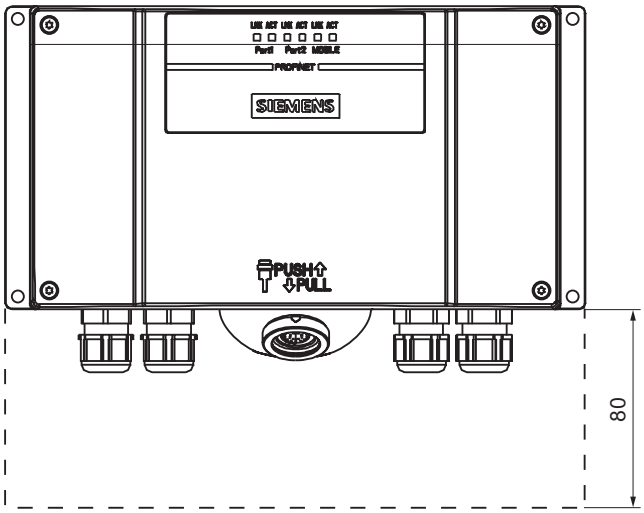
The following clearances are required around the wall holder:



The following clearances are required around the Connection Box DP:



The following clearances are required around the Connection Box PN:



3.4 Specifications for Insulation Tests, Protection Class and Degree of Protection

Test voltages

Insulation strength is demonstrated in the type test with the following test voltages conforming to IEC 61131-2:

Circuits with a nominal voltage of U_e to other circuits or ground	Test voltage
< 50 V	500 VDC

Protection class

Protection Class I conforming to IEC 60536, i.e. equipotential bonding conductor to profile rail required!

Protection against Foreign Objects and Water

Protection class according to IEC 60529	Explanation
Front panel and rear panel	In installed status: • IP65 Only for the Connection Box: • NEMA 4X/NEMA 12 (indoor use only)

3.5 Rated Voltages

The table below shows the rated voltage and the corresponding tolerance range.

Rated voltage	Tolerance range
+24 VDC	20.4 to 28.8 V (–15 %, +20 %)

Installation and connection

4

4.1 Checking the Package Contents

Check the package contents for visible signs of transport damage and for completeness.

Notice

Do not install parts damaged during shipment. In the case of damaged parts, contact your Siemens representative.

Keep the supplied documentation in a safe place. The documentation belongs to the HMI device and is required for subsequent commissioning.

4.2 Mounting the Connection Box and Wall Holder

Requirements

The following are required for mounting:

- Three M5 cylinder head screws for the wall holder of the HMI device
- Four M4 cylinder head screws for the Connection 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 is not securely hooked in. 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 enables the Mobile Panel 277 to be operated when it is hooked in to the wall holder.

Proceed as follows:

1. Select a position for the wall holder that is easy and safe to reach.
2. Place the wall holder from the front onto the mounting surface.
3. Mark the mounting holes with a marking tool.
4. Drill three through holes or three threaded holes M5.
5. Attach the wall holder.

Procedure - mounting the Connection Box

Note

Length of the connecting cable

Take into account the maximum length of the connecting cable when selecting the position for the Connection Box.

Proceed as follows:

1. Select a position for the Connection Box that is easy and safe to reach.
2. Place the Connection Box from the front onto the mounting surface.
3. Mark the mounting holes with a marking tool.
4. Drill four through holes or four threaded holes M4.

Notice

Permissible torque

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

5. Attach the Connection Box.

4.3 Electrical Installation

Electrical connections

The electrical installation comprises the components:

- Mobile Panel 277
- Connection Box

You can connect the following devices or HMI devices to these components:

Device/Control element	Mobile Panel 277	Connection Box
Configuring PC	Yes	Yes
Printer	–	Yes [1]
PLC	–	Yes
Supply voltage	–	Yes
Connection to Stop circuit	–	Yes
Monitoring signal of the STOP button	–	Yes
Connection to Enable circuit	–	Yes
Cable for input bit for connection detection	–	Yes

[1] Applies to Mobile Panel 277 with network printer

4.4 Connecting the connection box

4.4.1 Overview

Requirements

- The Connection Box is mounted in accordance with the specifications of these operating instructions.
- Only shielded standard cables may be used.

Note

The maximum length of the cable for connecting the Stop button and the Enabling switch may not exceed 30 m.

For further information, refer to the SIMATIC HMI catalog ST 80.

Connection sequence

Connect the Connection Box in the following sequence:

1. Equipotential bonding
2. Supply voltage
3. PLC / Configuring PC if needed

Notice

Connection sequence

Always follow the correct sequence for connecting the Connection Box. Non-observance can cause damage to the Connection Box.

4.4.2 Opening and Closing the Connection Box

Introduction

Please note:

Caution

Short circuit in the Connection Box

A short-circuit in the Connection Box can influence the functioning of the Mobile Panel 277.

Take care when working on the opened Connection Box, that conducting materials, such as scraps of cable, do not come into contact with the electrical circuits.

ESD

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 10

Procedure

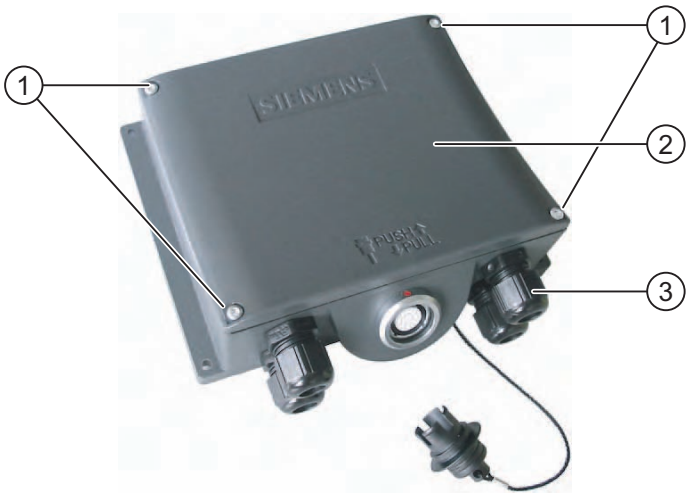


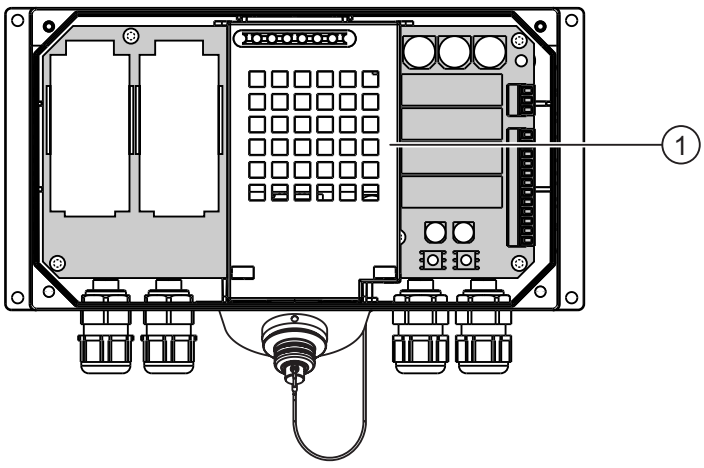
Figure 4-1 Open Connection Box - example with Connection Box DP

① Screws
② Cover
③ Screwed connections

Proceed as follows:

1. Loosen the four marked screws.
2. Remove the screws and the cover.

Protective covering of the Connection Box PN



① Protective cover

Note

Protective cover

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

Notes for closing

Notice

Permissible torque

The Connection 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.

IP65 degree of protection

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 ensured.

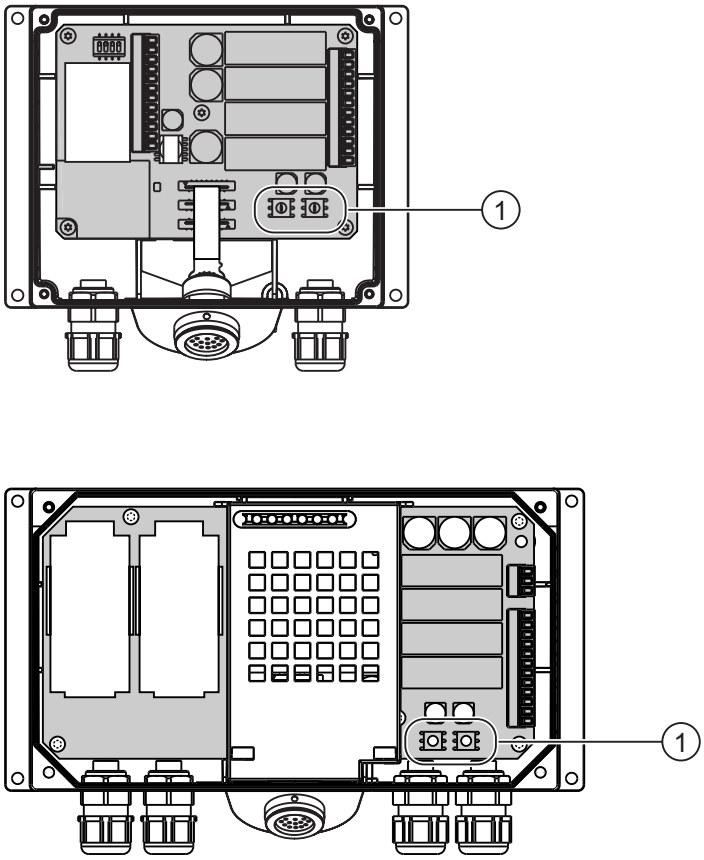
4.4.3 Setting the Box ID at the Connection Box

Introduction

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

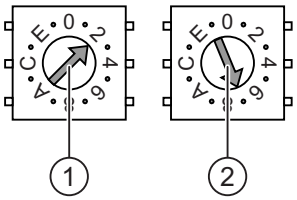
Rotary encoder switch

The following figuresshow the position of both rotary encoder switches in the Connection Box DP and the Connection Box PN.



① Rotary encoder switch

Example for setting the box ID



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

The figure shows the set box ID 27H, e.g. 39 in decimal format.

Procedure

Proceed as follows:

1. Open the Connection Box.
2. Set the Box ID with the help of a screw driver.

   The input is in hexadecimal format Values between 0 and 255 can be set in decimal format.
3. Close the Connection Box.

Result

The box ID is set.

See also

Opening and Closing the Connection Box (Page 4-4)

4.4.4 Stripping the Insulation of Cables

Stripping insulation

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

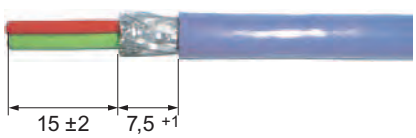


Figure 4-2 Stripping the insulation from the MPI/PROFIBUS-DP cable

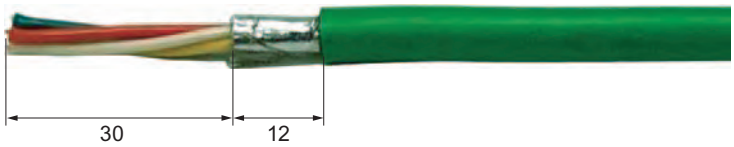


Figure 4-3 Stripping the PROFINET cable

Note

In order to ensure a quick and correct length of stripping, use a wire stripper as specified in Siemens catalog IK 10.

4.4.5 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 ports. This situation may arise if the cable shielding is terminated at both ends and grounded at different system parts.

Differences in potential may develop when a system is connected to different grid feeds.

General Requirements for Equipotential Bonding

Differences in potential 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 its cross-section increases.
- If two parts of the system are connected to each other by means of shielded data cables, and its shielding is connected at both ends with the grounding / protective grounding conductor, then the impedance of the additionally-laid equipotential bonding may amount to a maximum of 10% of the screened impedance.
- The cross-section of a selected equipotential bonding conductor must be capable of handling the maximum equalizing current. Between switching cabinets, equipotential bonding conductors as detailed in the "Guidelines for interference-free installation of stored-program PLCs" description and the "PROFIBUS Networks" manual have proven themselves reliable in practice.
- 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 flush and near the equipotential busbar using suitable cable clamps.
- Route the equipotential bonding conductor and data cables in parallel with minimum clearance between these.

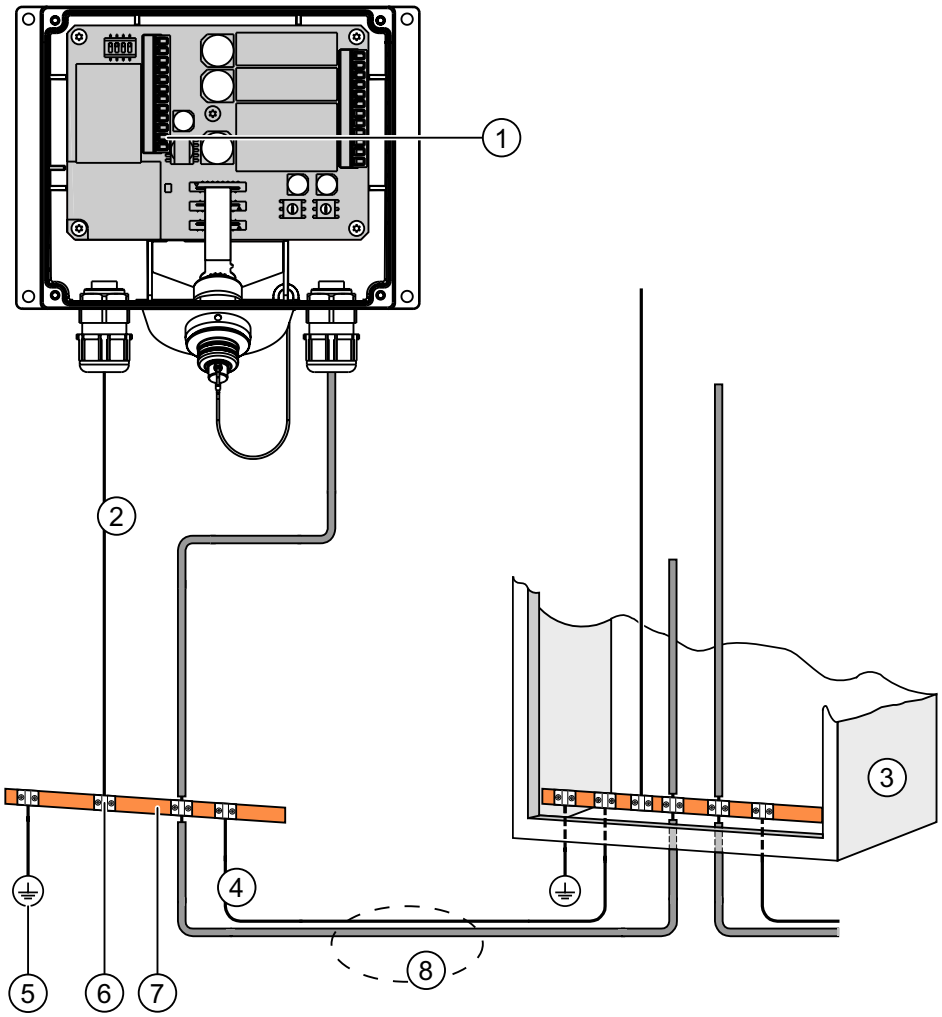
Notice

Grounding conductor

Cable shielding is not suitable for equipotential bonding. Always use the prescribed equipotential bonding conductors. 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.

Connection graphic

The following figure shows the connection of the equipotential bonding to the Connection Box DP.



① Grounding on the Connection Box (example)
② Equipotential bonding conductor, cross-section: 2.5 mm²
③ Switching cabinet
④ Equipotential bonding conductor cross-section: min. 16 mm²
⑤ Ground connection
⑥ Cable clip
⑦ Voltage bus
⑧ Parallel routing of the equipotential bonding conductor and data cable

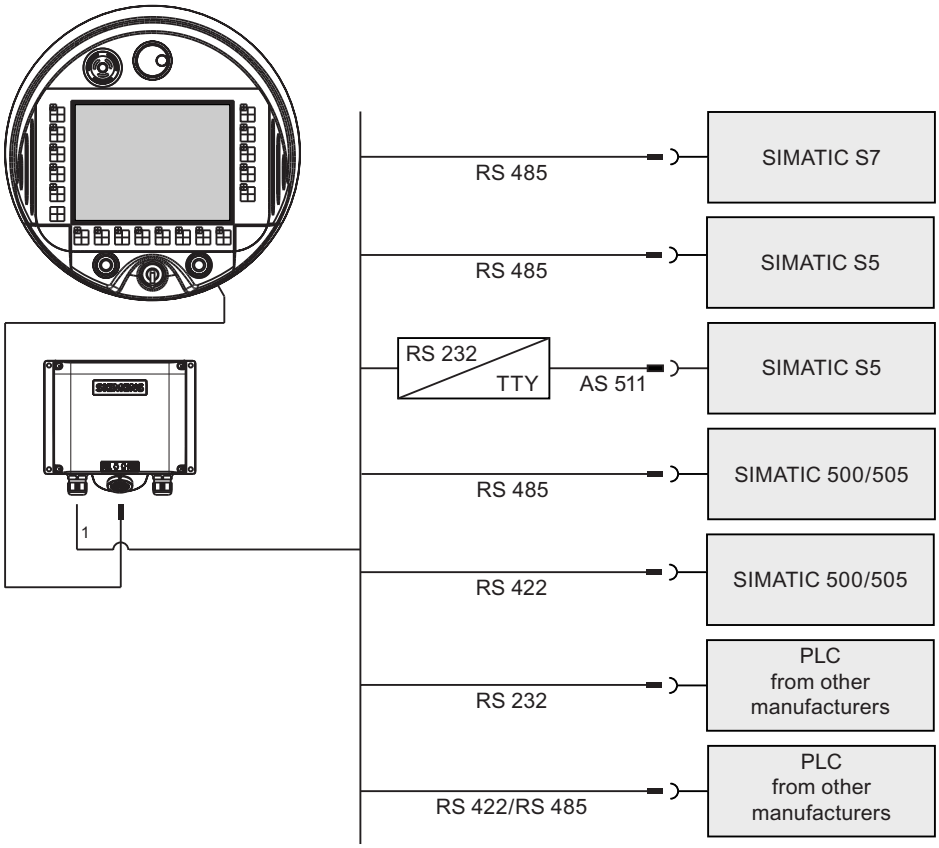
4.4.6 Connecting the PLC

Introduction

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. More information can be found in the SIMATIC HMI catalog ST 80.

Connection graphic - Connecting a PLC to a Connection Box DP.

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



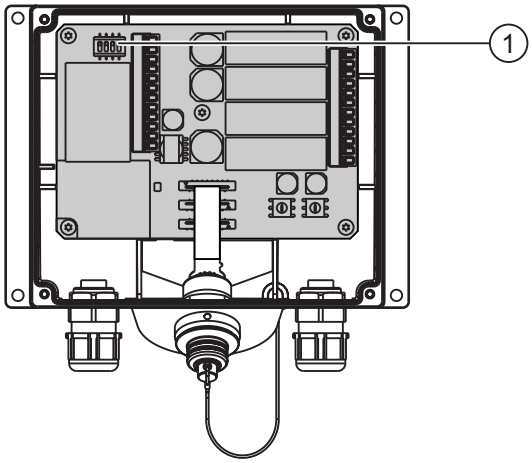
1 When operated on port IF1, RS 232 and RS 422/485 may only be connected alternatively. IF1 is located on terminal strip 1 of the Connection Box DP.

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

Configure the port IF1 on the Connection Box DP

The IF1 port can be configured using the DIL switch.

The figure below shows the position of the DIL switch.

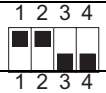


① DIL switch

Note

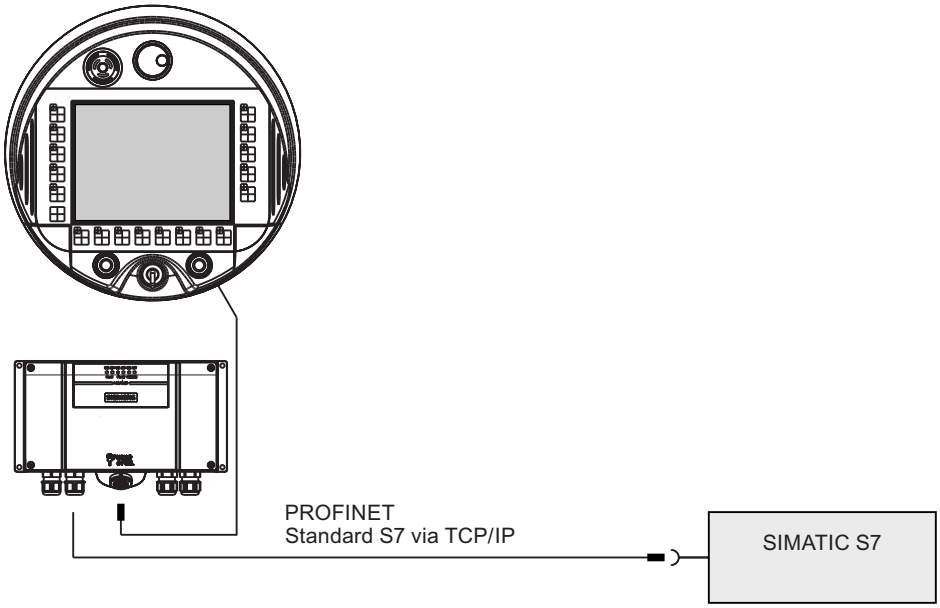
Note the diagrams of the DIL switch settings on the inside of the cover.

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	Meaning
RS 485		Connection Box not last node in the data network, terminal resistance not activated (Default setting)
RS 485		Connection Box last node in the data network, terminal resistance activated
RS 232/RS 422		For third-party PLCs

Connection graphic - Connecting a PLC to a Connection Box PN.

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



Notice

PROFINET IO

If you use PROFINET IO direct keys, the HMI device must be connected with a switch. For detailed instructions regarding the installation of PROFINET networks, please refer to the PROFINET system description manual.

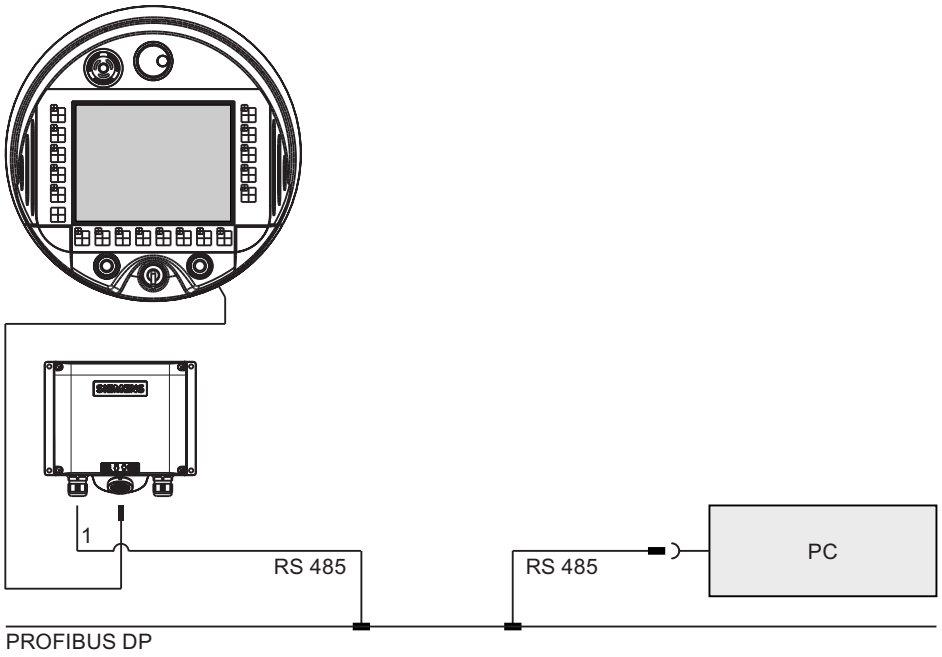
4.4.7 Connecting a Configuring PC

Introduction

Standard cables are available for the connections shown (see SIMATIC HMI catalog ST80).

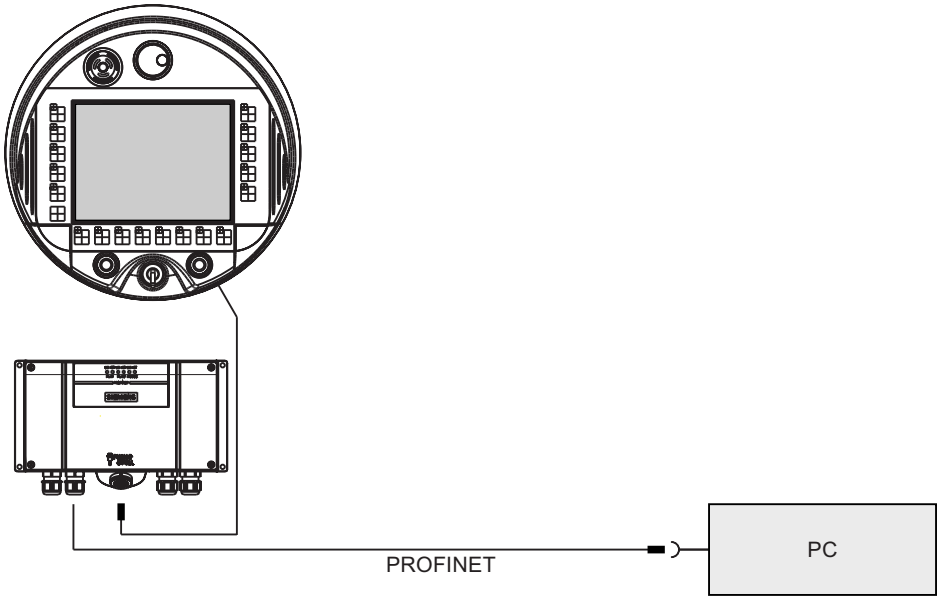
Connection graphic

The following figure shows the connection between a Connection Box and a Configuring PC via PROFIBUS DP.



1 When operated on port IF1, RS 232 and RS 422/485 may only be connected alternatively. IF1 is located on terminal strip 1 of the Connection Box DP.

The following figure shows the connection between a Connection Box and a Configuring PC via PROFINET.



4.4.8 Connecting a Printer to a Connection Box PN

Introduction

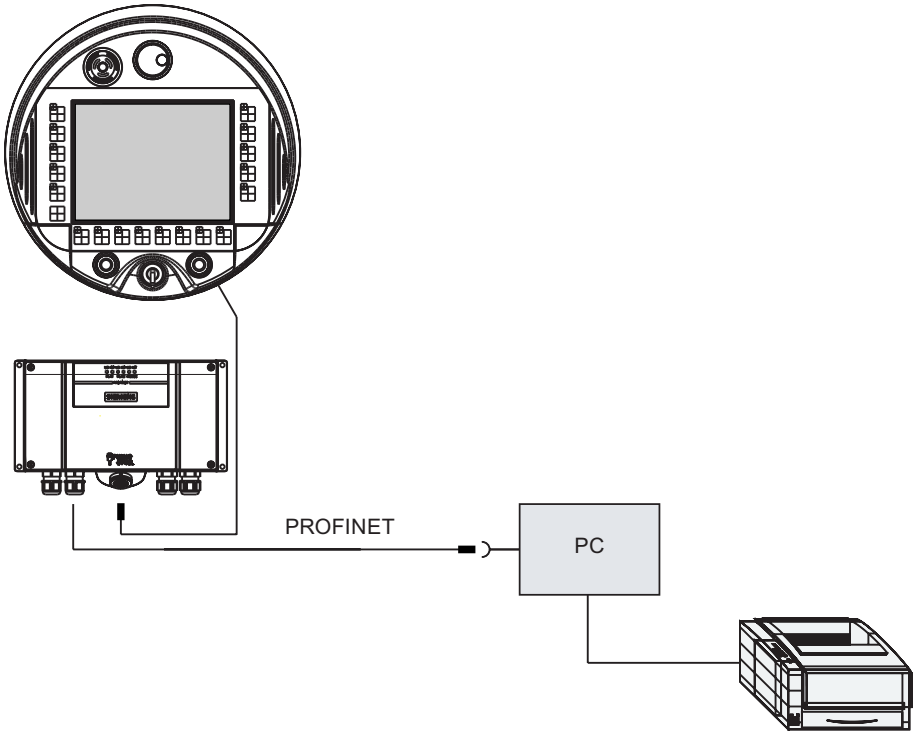
You can connect a printer to the Connection Box PN via PROFINET.

The current list of recommended printers for the HMI devices can be found on the Internet under http://support.automation.siemens.com/WW/view/de/11376409.

Observe the supplied printer documentation when you connect the printer.

Connection graphic

The following figure shows the connection between the Connection Box PN and a printer.



4.4.9 Connecting the Power Supply

Introduction

The supply voltage for the HMI device is connected to a terminal strip in the Connection Box. The terminal block is designed for cables with a maximum cross-section of 1.5 mm^2.

Connect the protective conductor connection of the Connection Box with the cabinet casing or equipotential bonding.

Note

Reverse polarity protection

The Connection Box has polarity reversal protection.

Connection graphic

The following figures show the connection of the power supply to the Connection Box.

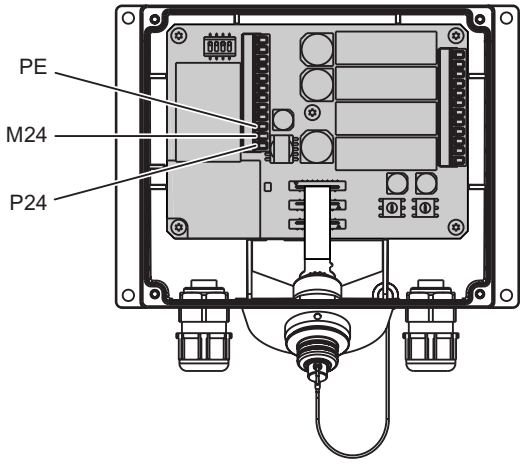


Figure 4-4 Connecting the power supply to the Connection Box DP

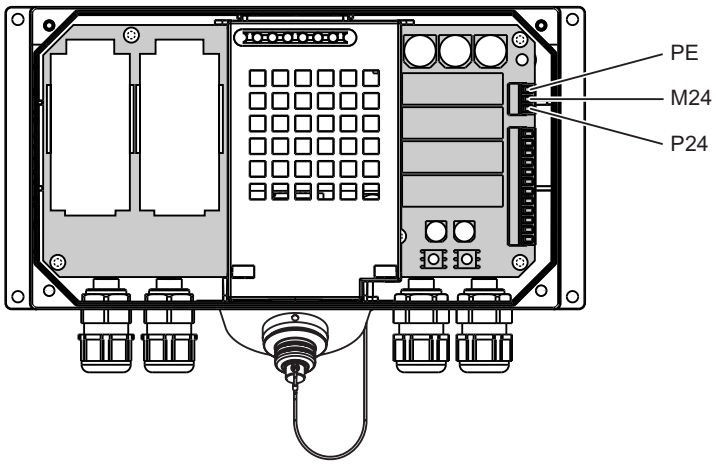


Figure 4-5 Connecting the power supply to the Connection Box PN

The abbreviations in the figure are defined as follows:

- PE stands for protective conductor.
- M24 stands for ground.
- P24 stands for +24 VDC.

Please refer to the technical data for the supply voltage requirements.

Warning

24 VDC supply

Personal injury and equipment damage can occur. Configure the 24 VDC supply for the Mobile Panel 277 correctly, otherwise components of your automation system can be damaged and persons may be injured.

Use only voltage generated as safety extra-low voltage (SELV) for the 24V DC supply of the Mobile Panel 277.

Caution

Safety isolation

Use only power supply units with safety isolation complying with IEC 60364-4-41 or HD 384.04.41 (VDE 0100, Part 410), for example according to the PELV standard, for the 24 VDC supply.

The supply voltage must be within the specified voltage range. Malfunctions in the HMI device may otherwise result.

Applies to floating system design:

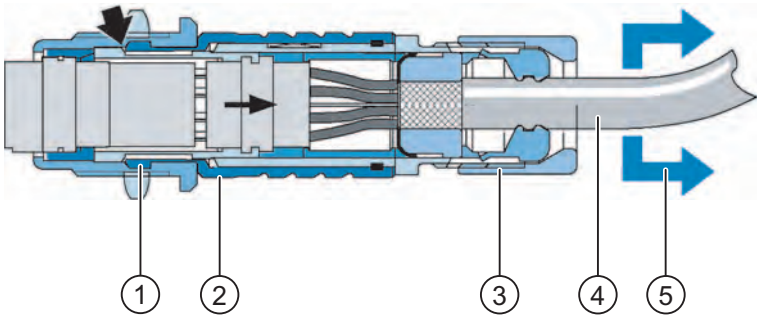
Connect the connection for GND 24 V from the 24 V power supply output to equipotential bonding for uniform reference potential.

4.4.10 Connecting the Connecting Cable

Introduction

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

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.

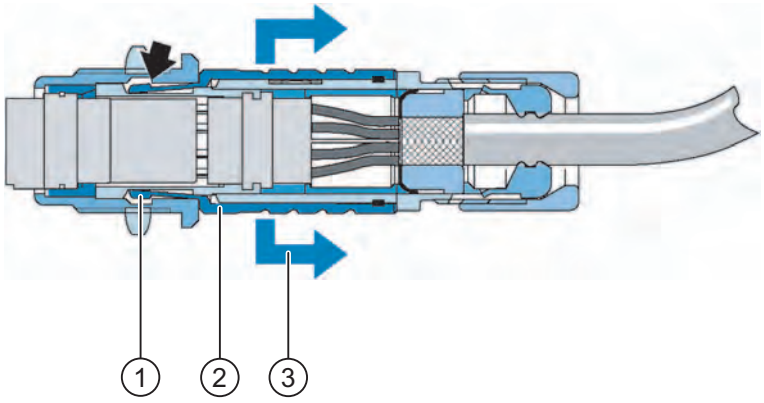


Figure 4-6 Detaching the plug connector

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 - plug connector in

Proceed as follows:

1. Retract the outer sleeve on the plug connector.
2. Plug the connector with retracted outer sleeve into the socket of the Connection Box.
3. Now release the outer sleeve.

   The outer sleeve glides automatically in the direction of the Connection Box and thereby locks the connector.

Procedure - remove connector

Proceed as follows:

1. Retract the outer sleeve on the plug connector.
2. Pull the connector with retracted outer sleeve out of the socket of the Connection Box.

If you do not intend to use the Mobile Panel 277 with a different Connection Box, lay the Mobile Panel 277 safely into its wall holder.

4.5 Connecting Mobile Panel 277

4.5.1 Connecting the HMI Device

Connecting the Cables

When connecting the cables, ensure that the contact pins are not bent. Secure the connectors with screws.

The pin assignment of the ports is described in the technical specifications.

4.5.2 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 switch, illuminated pushbuttons) can be triggered unintentionally, thus causing malfunctions.

When you open the terminal compartment, you must remove the connecting cable belonging to the Mobile Panel 277 from the Connection Box.

Mobile Panel with rechargeable battery

Note that a Mobile Panel with inserted rechargeable battery will not switch off before approx. 10 minutes have elapsed if a project is running.

ESD guideline

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

Cross-head screwdriver, size 2

Procedure

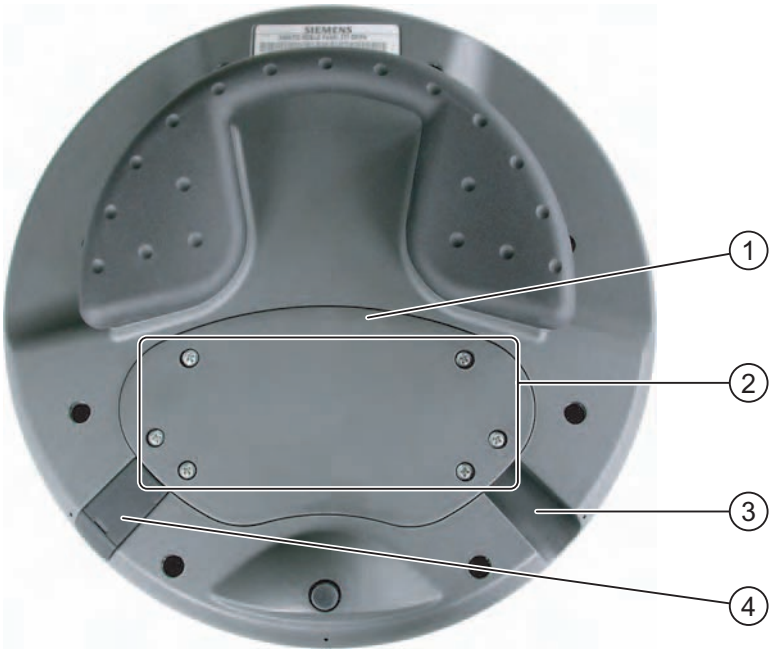


Figure 4-7 Opening the terminal compartment

① Cover
② Screws on the cover
③ Cable inlet
④ Plugs

Proceed as follows:

1. Unscrew the six screws approximately 1 cm out of the cover.

   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. The screws can then be removed together with the cover.

2. Put the cover with the screws to one side.

Notes for closing:

1. Place the plugs into the cable inlets which are not used.

Notes for closing

Notice

Permissible torque

The housing of the Mobile Panel 277 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.

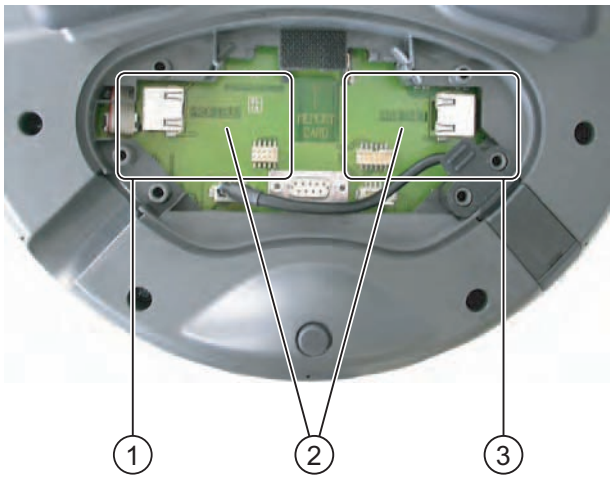
IP65 degree of protection

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 threaded cable entry holes are fitted with rubber plugs. Otherwise protection class IP65 is not ensured.

4.5.3 Mobile Panel 277 Ports

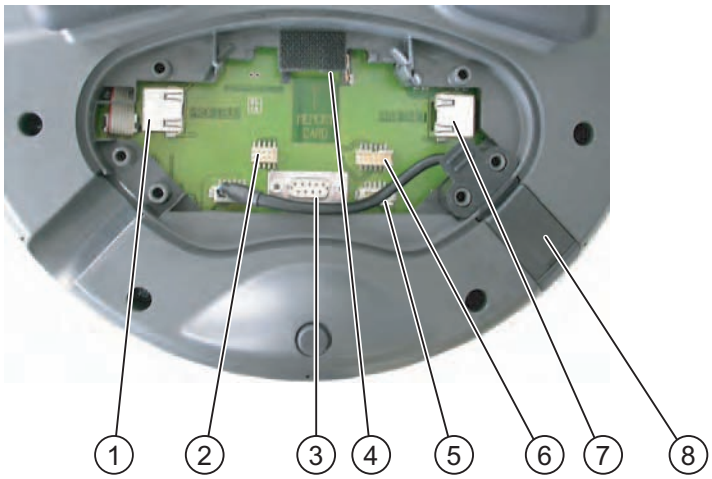
For reasons of clarity, the following figuresdepict the terminal compartment without the Velcro strip for fastening the memory card.

The following figure shows the port area for the data network.



① Ports for PROFIBUS DP
② Port designation
③ PROFINET ports

The following figure shows the available ports on the Mobile Panel 277.



① RJ45 socket for the connecting cable DP
② Post-connector, 10-pole for the DP connecting cable
③ RS 485 port (IF 2)
④ Slot for a memory card
⑤ Connection for the rechargeable battery
⑥ Post-connector, 12-pole for the PN connecting cable
⑦ RJ45 socket for the connecting cable PN
⑧ USB socket

Caution

RJ45 socket

Only use the RJ45 socket for the Connection Box's connecting cable.

Please note when connecting, that the functional efficiency of the Mobile Panel 277 is only ensured by means of the connecting cable's RJ45 socket. Note the warning signs in the opened Mobile Panel 277.

USB socket

The USB socket is selected in the form of a plug. You can deploy the USB socket in either of the two cable inlets.

① USB socket
② Cap
③ Cable inlet

Caution

Degree of protection

Degree of protection IP65 is only guaranteed if the cap on the USB socket is plugged and sealed tight.

Connection sequence

Connect the connecting cable's connector in the following sequence:

1. Place the USB socket in the other cable inlet if necessary.
2. Plug the connecting cable in.
3. Connect the connector for the power supply.
4. Connect the connector for the data communication.

4.5.4 Connecting a Configuring PC

Requirements

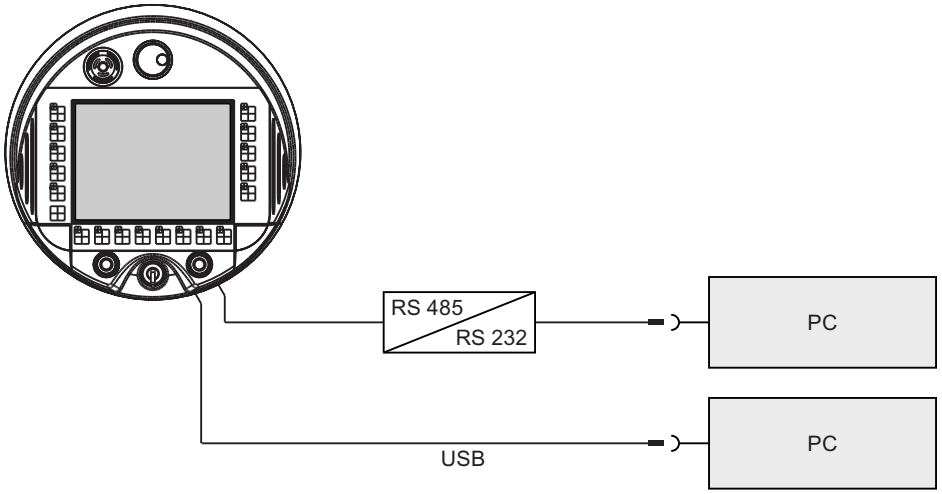
- The Mobile Panel 277 is connected to the Connection Box.
- For connection via RS 485:

  The cover of the terminal compartment on the Mobile Panel 277 is removed.

Connection graphic

The following figure shows the connection between HMI device and a Configuring PC via RS 485. You can transfer the following data between the HMI device and a Configuring PC:

- Project
- HMI device image
- Additional project data



A Siemens AG tested and released PC/PPI cable should be used to convert from RS 232 to RS 485. You can order the PC/PPI cable from a Siemens dealer or from Siemens directly. The order number for PC/PPI cable is 6ES7 901-3CB30-0XA0.

Note

If the connection fails during the operating system update, set the system to a lower bit rate. If you use a higher bit rate, you must use the PC/PPI cable release 3 or better. The version code is printed on the cable (e.g. "E-Stand 3" corresponds to version 3).

The ports are described in the specifications.

Notice

When a Configuring PC is connected directly to the Mobile Panel 277, you cannot attach the cover to the terminal compartment.

Only connect a Configuring PC temporarily to the Mobile Panel 277, e.g. for commissioning.

4.6 Switching on and Testing the HMI Device

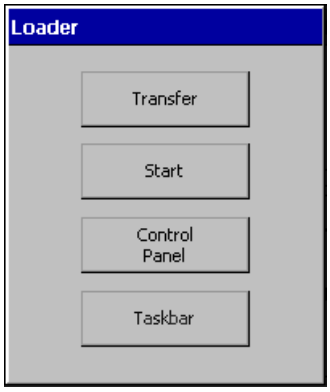
Procedure

Proceed as follows:

1. Switch on the power supply.

   The display lights up after power is switched on. A progress bar is displayed during startup.

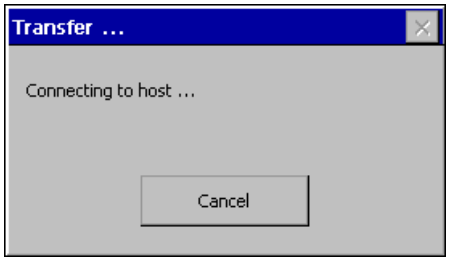
   If the HMI device does not start, it is possible the wires on the terminal block have been crossed. Check the connected wires and change the connections if necessary. The loader is displayed once the operating system has started.



   The HMI device automatically switches to "Transfer" mode during initial startup under the following conditions:

   – No project is loaded on the device.
   – At least one data channel has been configured.

   During this process the following dialog appears:



2. Press "Cancel" to stop the transfer.

Result

The Loader appears again.

Note

When restarting the system, a project may already be loaded on the HMI device. The system then skips "Transfer" mode and starts the project.

Use the relevant operator control to close the project.

Further information on this may be available in your plant documentation.

Function test

Perform a function test following commissioning. The HMI device is fully functional when one of the following states is indicated:

- The "Transfer" dialog is displayed.
- The Loader appears.
- A project is started.

Switching off the HMI Device

The following procedure applies if an rechargeable battery is not installed.

Terminate the project at the HMI device before switching it off.

You have the following options for switching off the HMI device:

- Switch off the power supply.
- Pull out the connecting cable from the Connection Box.

Note

Recovery time

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

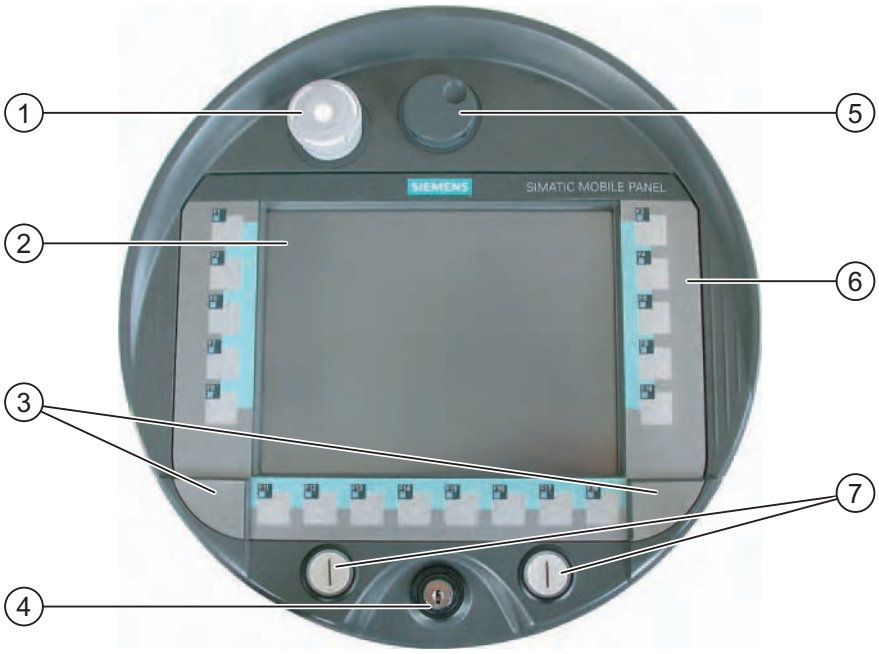
Wait approx. one second after switching off the power supply before you switch it back on again.

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

5 Operator controls and displays

5.1 Operator controls and displays on the Mobile Panel 277

5.1.1 Overview



① STOP button
② Display with touch screen
③ Covers for the labeling strip guides
④ Key-operated switch
⑤ Handwheel
⑥ Membrane keyboard
⑦ Illuminated pushbutton

Operator control functions

The functions assigned to the function keys, the handwheel, the key-operated switch and the illuminated pushbuttons are determined during configuration. The above mentioned operator controls are functionless outside of a project.

Evaluation and selection of the operator controls

You can flexibly evaluate and select the following operator controls as direct keys or via WinCC system functions:

- Status of the function keys
- Function key LEDs
- Handwheel
- Key-operated switch
- Illuminated pushbutton
- Illuminated pushbutton LEDs

Standard input unit

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.

Notice

Damage to the touch screen

Never touch the touch screen with pointed or sharp objects. Avoid applying excessive pressure to the touch screen with hard objects. Both these will substantially reduce the useful life of the touch screen and 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.

5.1.2 Enabling Switch

Introduction

The enabling equipment comprises the two enabling switches mounted on both sides of the Mobile Panel 277. The switch setting of the two enabling switches is determined by electrical momentary contact switches. The associated evaluation logic is dual-channel. This means that one channel processes the enabling switch information digitally and the second channel analogously (diversity).

① Enabling switch

Operation

You only have to activate one enabling switch. It is not possible for the PLC to evaluate whether the Mobile Panel 277 is operated with one hand or two.

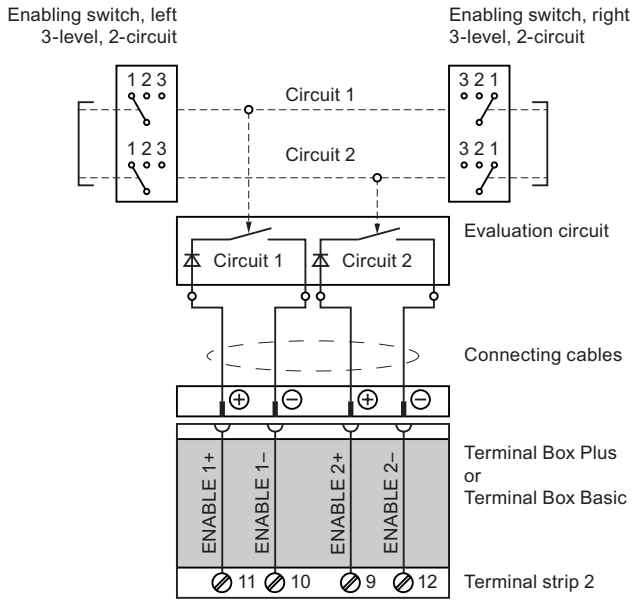
Note

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.

The enabling switches fulfill the requirements of safety category 3 according to EN 954-1 when used in combination with an external monitoring device.

Circuit diagram

The figure below shows the operating positions and interconnections of the enabling switch.

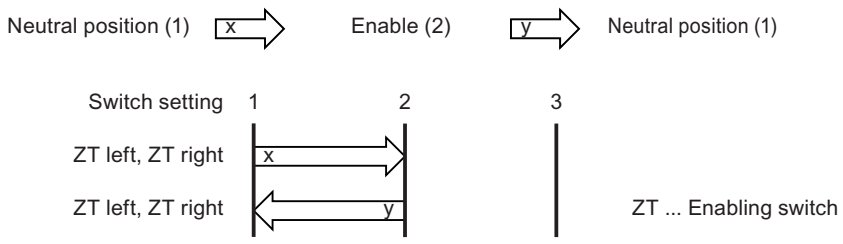


Switch settings

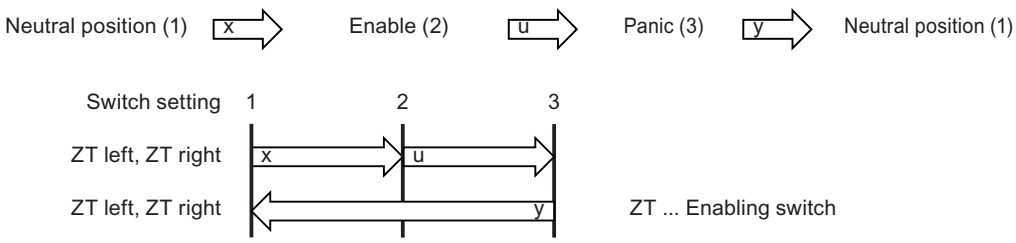
The primary function of the evaluating logic is to recognize the three switch settings:

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

The following figure shows the switching sequence during normal usage.



The following figure shows the switching sequence during panic usage.



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

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

Note

Releasing the enabling button or pressing through in Panic position does not require acknowledgement of the safety cut-out.

5.1.3 STOP button

5.1.3.1 Overview

Introduction

The STOP button is an optional operating element on the Mobile Panel 277. The STOP button is a dual-circuit design and enables a safety-relevant stop of the system being monitored.

The STOP button fulfils safety category 3 according to EN 954-1 when used in combination with an external monitoring device. Please refer to the safety information and general instructions chapters for further safety instructions.

When you unplug the Mobile Panel 277 from the Connection Box, the Stop circuit is either opened or automatically bridged. This is dependant on the type of Connection Box used.

Possible application areas for the STOP button:

- The STOP button can be used to initiate a process-cycle-specific rapid stop of a monitored system (plant, machine or machine zone). The Stop operation can occur with or without a power shutdown.

  Advantages:

  - Containing the sphere of action
  - Fast restart
  - No loss of machine coordinates and, thus, no recalibration upon restart
  - Preservation of tool and workpiece

- Triggering of the Emergency Stop function of a monitored system by means of looping in the Emergency 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.

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. A collared enclosure serves as protection if the device falls. However, the STOP button can nevertheless be triggered if the Mobile Panel 277 falls down. The STOP button is, however, still largely protected against 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 have activated the STOP button and thereby brought the monitored system to a still stand, the STOP button may only be released under the following conditions:

- The reasons for the stop have been eliminated.
- A safe restart is possible.

In order to release the STOP button, turn it in a clockwise direction. The STOP button then returns on its own to the starting position.

5.1.3.2 Safety Functions of the STOP Button

A STOP button is available as an optional operator control element on the Mobile Panel 277.

The STOP button on the Mobile Panel 277 brings about a safety-related Stop of the system being monitored in accordance with EN 60204-1:1997, Section 9.2.5.3. You have the option of implementing a Category 0, 1, or 2 Stop function in accordance with EN 60204-1: 1997, Section 9.2.2. The stop function category must be selected on the basis of a risk assessment.

The Mobile Panel 277's stop function can, therefore, be used as a reliable machine stop as well as for looping in the Emergency Stop circuit of the system to be monitored.

The signals of the STOP button are wired differently in the two versions of the Connection Box. In the Connection Box Plus, the signals control the Stop or Emergency Stop circuit of the system being monitored. If the Mobile Panel 277 is not connected, the Stop or Emergency Stop circuit is closed. In the Connection Box Basic, on the other hand, the signals of the Stop or Emergency Stop circuit are fed via the STOP button. If the Mobile Panel 277 is not connected, the Stop or Emergency Stop circuit of the system being monitored is open.

The term "Stop loop through" has the following meaning:

The Stop or Emergency Stop circuit of the system or machine is looped through the Connection Box Plus and is not interrupted. This is independent of whether the Mobile Panel 277 is connected to the Connection Box or not (and STOP button not activated).

This functionality is only available in the Connection Box Plus.

Warning

Mobile Panel 277 with STOP button

If the Mobile Panel 277 is equipped with a STOP button and is not connected to the Connection Box, a Stop cannot be initiated using the Mobile Panel 277. The STOP button of the Mobile Panel 277 is then ineffective!

Install stationary Emergency Off buttons that are available at all times on the system being monitored.

Category 0 or 1 stop

If a Category 0 or 1 stop circuit is implemented, the stop function must be in effect regardless of the operating mode. A Category 0 Stop must have precedence. Releasing the STOP button must not initiate a dangerous situation (see also EN 60204-1:1997, Section 9.2.5.3).

The stop function is not to be used as a replacement for safety equipment.

Notice

Several Connection Boxes

Install only one type of Connection Box (i.e. Connection Box Plus or Connection Box Basic) for monitoring your system.

Notice

STOP button can trigger when falling down

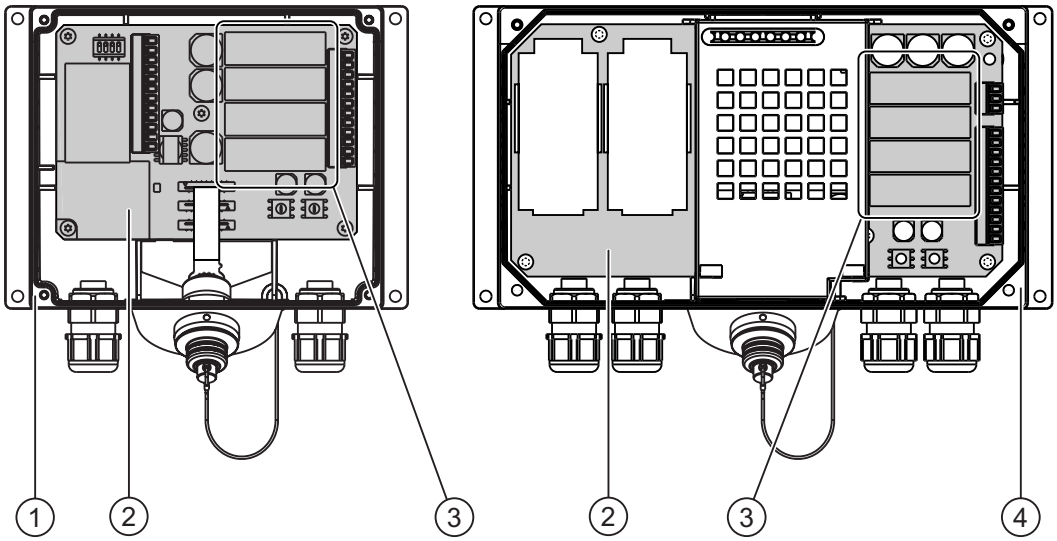
The standstill of the monitored system can be triggered under the following conditions:

The Mobile Panel 277 is connected to the Connection Box and the STOP button is triggered due to the Mobile Panel 277 falling down.

5.1.3.3 STOP Button on the Connection Box Plus

Introduction

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



① Connection Box DP
② Board
③ Relay
④ Connection Box PN

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

The Stop or Emergency Stop circuit switching statuses for a connected Mobile Panel 277 with a STOP button and Connection Box Plus are:

Mobile Panel 277	STOP button	Status of the Stop or Emergency Stop circuit
Is connected	Not pressed	The Stop or Emergency Stop circuit remains closed.
Is connected	Pressed	The Stop or Emergency Stop circuit is open. The system being monitored is shut down.
Is not connected	–	The Stop or Emergency Stop circuit remains closed.

The Stop or Emergency Stop circuit switching statuses for a connected Mobile Panel 277 without a STOP button and Connection Box Plus are:

Mobile Panel 277	STOP button	Status of the Stop or Emergency Stop circuit
Is connected	Not available	The Stop or Emergency Stop circuit remains closed.
Is not connected	Not available	The Stop or Emergency Stop circuit remains closed.

Warning

Disconnecting the Mobile Panel 277

If you disconnect the Mobile Panel 277 from the Connection Box Plus, the Stop or Emergency Stop circuit is closed and the Stop status of the system being monitored will be nullified. This is independent of whether the STOP button was pressed on the Mobile Panel 277 or not!

Notice

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

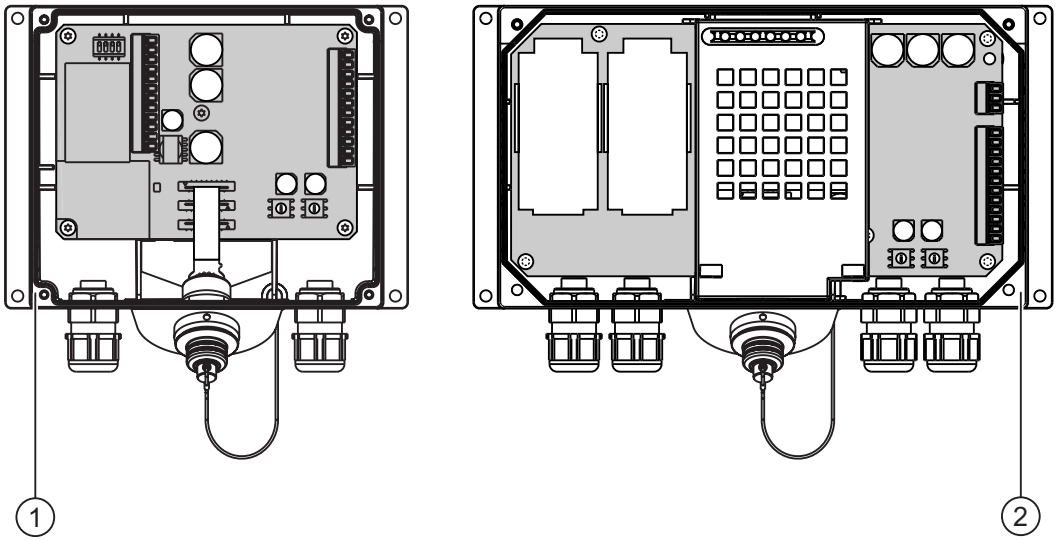
See also

STOP Button (Page 2-7)

5.1.3.4 STOP Button on the Connection Box Basic

Introduction

The "Stop loop through" function is not implemented on the Connection Box Basic. Relays, such as on the Connection Box Plus, are therefore not required.



① Connection Box DP
② Connection Box PN

Caution

If the Mobile Panel 277 is connected, the Stop or Emergency Stop circuit is controlled via the STOP button. If you unplug the Mobile Panel 277's connecting cable from the Connection Box Basic, the following occurs:

- The Stop or Emergency Stop circuit will be interrupted.
- A safe machine stop or Emergency Stop of the system being monitored will be carried out.

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

The Stop or Emergency Stop circuit switching statuses for a connected Mobile Panel 277 with a STOP button and Connection Box Basic are:

Mobile Panel 277	STOP button	Status of the Stop or Emergency Stop circuit
Is connected	Not pressed	The Stop or Emergency Stop circuit remains closed.
Is connected	Pressed	The Stop or Emergency Stop circuit is open. The system being monitored is shut down.
Is 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 277 without a STOP button and Connection Box Basic are:

Mobile Panel 277	STOP button	Status of the Stop or Emergency Stop circuit
Is connected	Not available	The Stop or Emergency Stop circuit remains closed.
Is not connected	Not available	The Stop or Emergency Stop circuit is open. The system being monitored is shut down.

Warning

Releasing the STOP button

The following applies, if you have shut down the monitored system:

You may only release the STOP button and restart the system being monitored under the following conditions:

- The reasons for the stop have been eliminated.
- A safe restart is possible.

See also

STOP Button (Page 2-7)

5.1.4 Handwheel

Introduction

The handwheel is an optional control element on the Mobile Panel 277. The handwheel has no mechanical stop and has no zero position.

① Handwheel with recess

Operation

To facilitate operation, the handwheel has a small recess.

See also

Overview (Page 5-1)

5.1.5 Key-operated Switch

Introduction

The key-operated switch is an optional control element of the Mobile Panel 277. The key-operated switch is used to lock functions that are triggered by the Mobile Panel 277.

① Key-operated switch

Operation

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

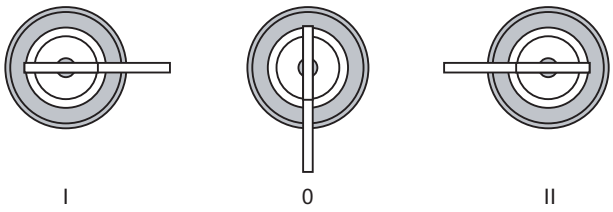


Figure 5-1 Key-operated switch settings

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 to the key-operated switch is supplied together with the HMI device. The key does not have an HMI device-dependent coding. This means the key is usable on any Mobile Panel 277.

See also

Overview (Page 5-1)

5.1.6 Illuminated Pushbutton

Introduction

The illuminated pushbuttons are optional control elements on the Mobile Panel 277. The illuminated pushbuttons are available for quick digital inputs.

① Illuminated pushbutton

Operation

The illuminated pushbuttons operate by pressing.

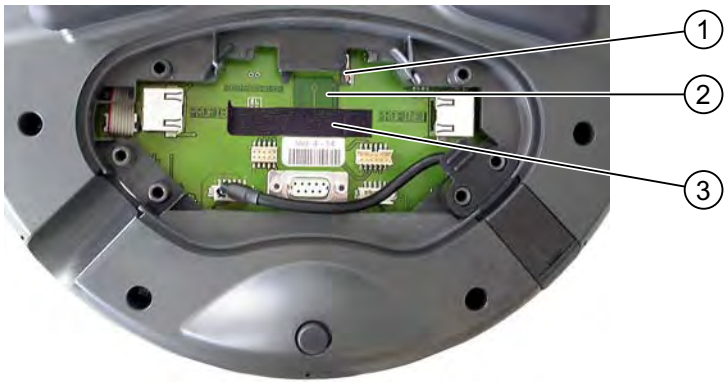
See also

Overview (Page 5-1)

5.1.7 Using Memory Cards

Requirements

The terminal compartment of the Mobile Panel 277 is open.



① slot
② Memory card symbol
③ Velcro strip for fastening the memory card

Procedure – Inserting a Memory Card

Proceed as follows:

1. Remove the Velcro strip.
2. Insert the memory card into the slot.

   Pay attention to the memory card symbol when inserting the memory card. An arrow on the memory card indicates the front side and the direction of insertion. When the memory card is correctly inserted into the slot, it stands approx. 3mm proud of the slot.
3. Close the Velcro strip.

Procedure - unplugging a memory card

Proceed as follows:

1. Remove the Velcro strip.
2. Pull the memory card out of the slot.
3. Deposit the memory card in a safe place.

See also

Opening and Closing the Terminal Compartment (Page 4-19)

5.2 Labeling the Function Keys

Introduction

You can label the function keys as required for your project. Use labeling strips to do so.

Notice

Do not write on the keyboard to label the function keys.

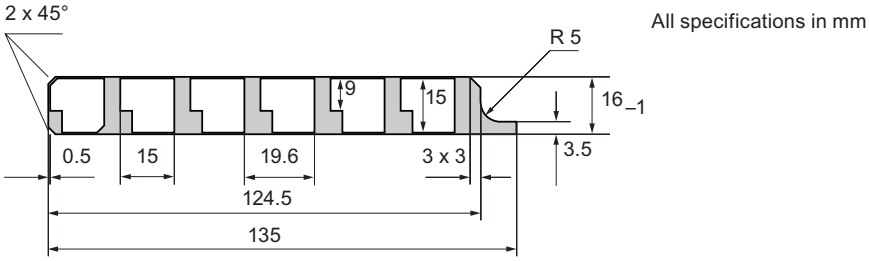
Printing Labeling Strips

WinCC flexible comes with a range of labeling strip templates. You will find further information regarding the location of the templates in the WinCC Online Help.

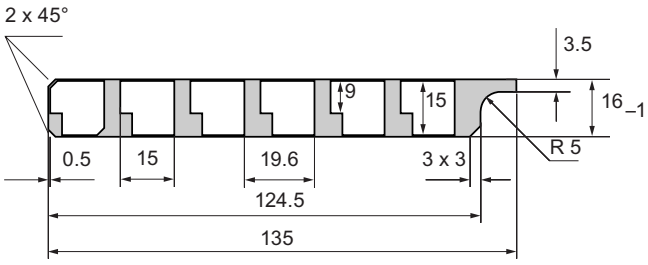
Any printable and writable foil can be used as labeling strips. Use transparent foil so that the LEDs of the function keys can be seen. Permitted thickness of the labeling strip: 0.13 mm. Paper should not be used as labeling strips.

Labeling strip dimensions

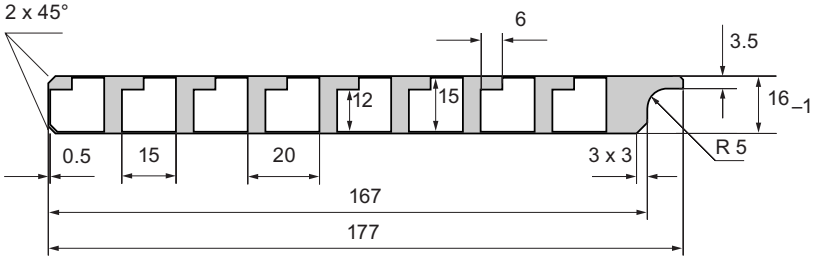
Labeling strips right:



Labeling strips left:



Labeling strips bottom:



Procedure - attaching labeling strips

The following steps apply for the initial attaching of labeling strips.

Proceed as follows:

1. Lay down the Mobile Panel 277 on its back.
2. Remove the sticker from the cover cap.

3. Unscrew both cover caps.
4. Pull the labeling strips out of the guides.
5. Inscribe the labeling strips plant-specifically.
   Wait for the printed labeling strips to dry before you insert them.
6. Push the labeling strips into the guides.
7. Screw both cover caps back on.
   Screwed on cover caps with inserted rubber seals satisfy protection class IP65.
8. Place the sticker on to the cover caps.

Procedure - exchanging labeling strips

Should the exchange of labeling strips become necessary, these can be reordered.

See also

Accessories (Page 1-10)

5.3 Holding and Placing the Mobile Panel

Holding the Mobile Panel

Figure 5-2 Example of forearm holding position for right or left-handed persons with Mobile Panel 177

The depicted method of holding enables you, for example, to undertake movements while servicing the monitored system.

The depicted forearm holding method enables both right and left-handed persons to use the HMI device with equal ease. The free hand can be used to operate the control elements on the front side. The hand holding the HMI device can also be used to activate the enabling switch. The acknowledgement of the control input is also given if you only press one of the enabling switches.

The enabling switch is required for the confirmation of axis movements. The enabling switch is optimally reachable. The enabling switch triggers a safety shutdown in event of a panic reaction to danger (release or clinching).

The STOP button can also be quickly reached with your free hand.

Holding the Mobile Panel for data entry by the membrane keyboard

Notice

If you are manually controlling potentially dangerous movements in the special operating modes, you must use the above shown forearm holding method. This forearm holding method enables you to, for example, quickly reach the STOP button or the enabling button in the event of a dangerous situation.

The following figure shows the holding method, which is only permitted for the entry of data on the system being monitored.

Figure 5-3 Example of two-hand holding on Mobile Panel 177

Placing the Mobile Panel 277

A wall holder is available for secure and location-specific placement of the HMI device. The Mobile Panel 277 can be used as a stationary HMI device when it is hooked into the wall holder.

Figure 5-4 Mobile Panel 277 in the wall holder

Notice

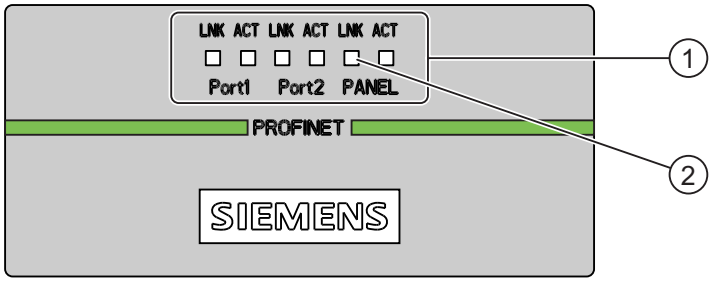
Operability

If the Mobile Panel 277 is hooked into the wall holder, the operability of the STOP button can be impaired.

5.4 Displays on the Connection Box PN

Introduction

There are six LEDs on the front side of the Connection Box PN, which indicate the state of communication.



① LED displays
② LED

There is an "LNK" and "ACT" LED available for the following connections:

- PROFINET connection Port1
- PROFINET connection Port2
- Mobile Panel 277

Meaning of the LED displays

- LED "LNK"

  The LED is permanently lit, if the associated port of the Connection Box PN is connected to a cable and the connection is faultless.

- LED "ACT"

  The LED flashed when data is transferred via the associated port of the Connection Box PN.

Technical specifications

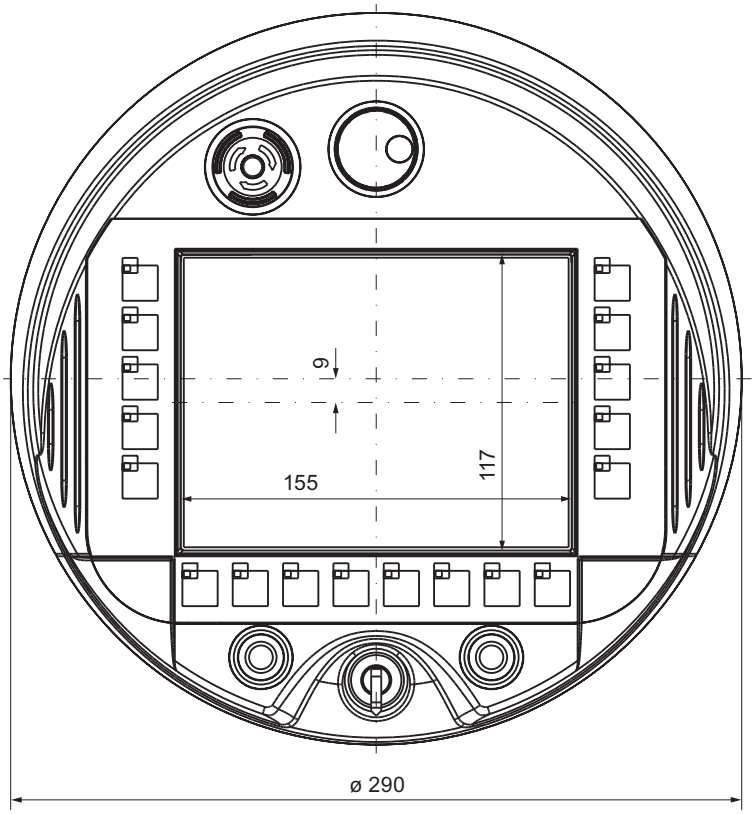
6

6.1 Dimensional drawings

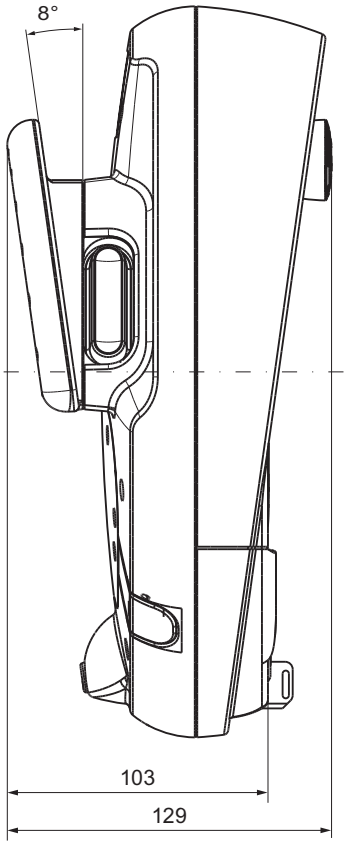
6.1.1 Mobile Panel 277

Front view

All specifications in mm

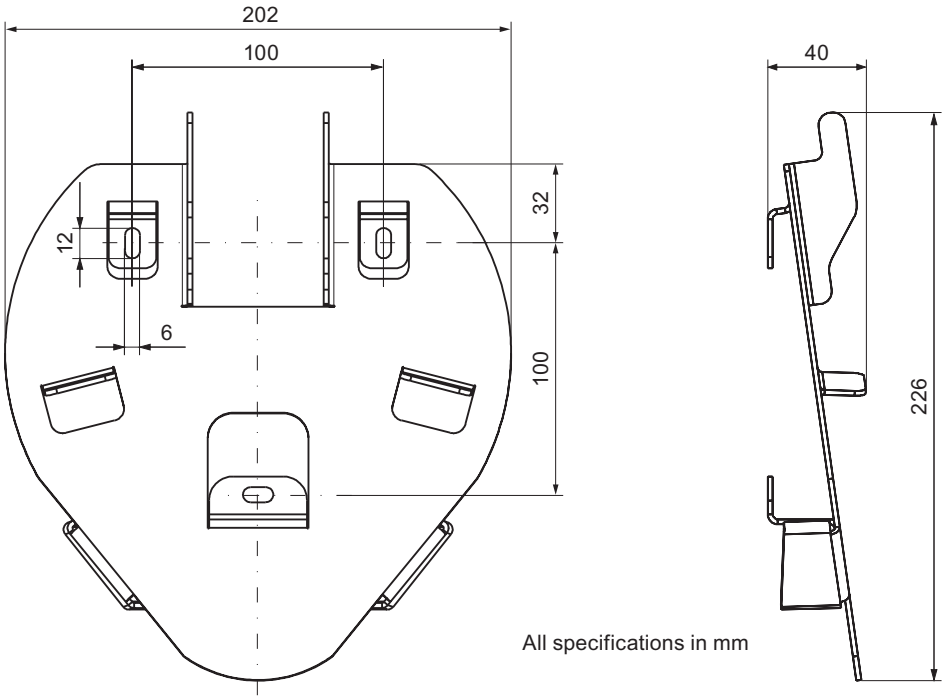


Side view



All specifications in mm

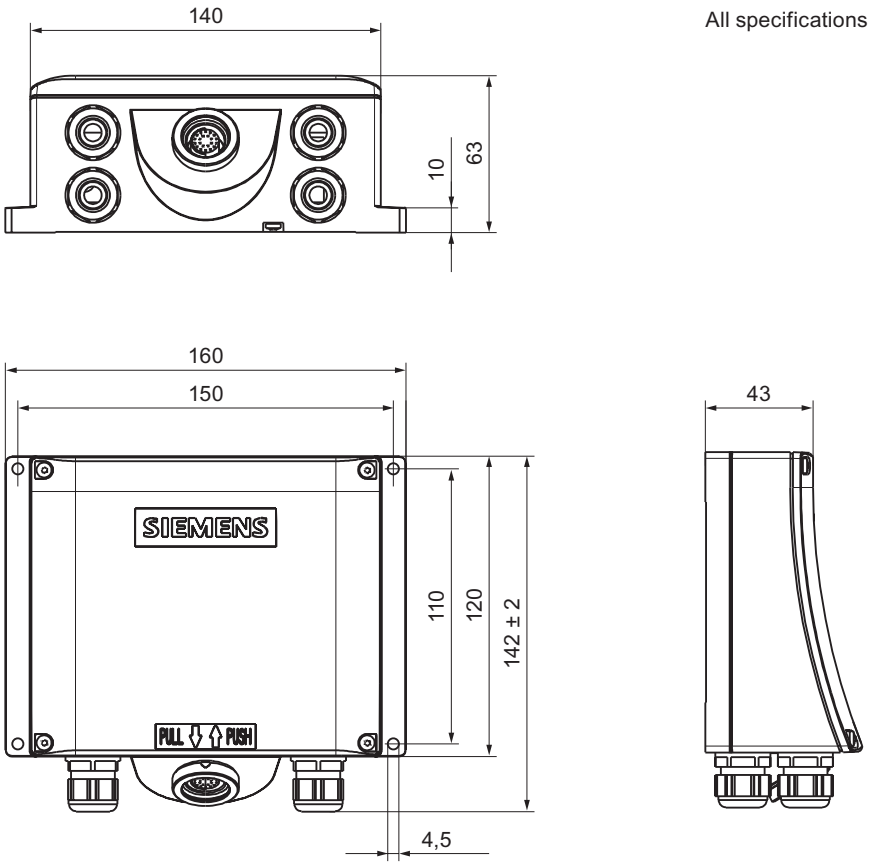
6.1.2 Wall Holder



All specifications in mm

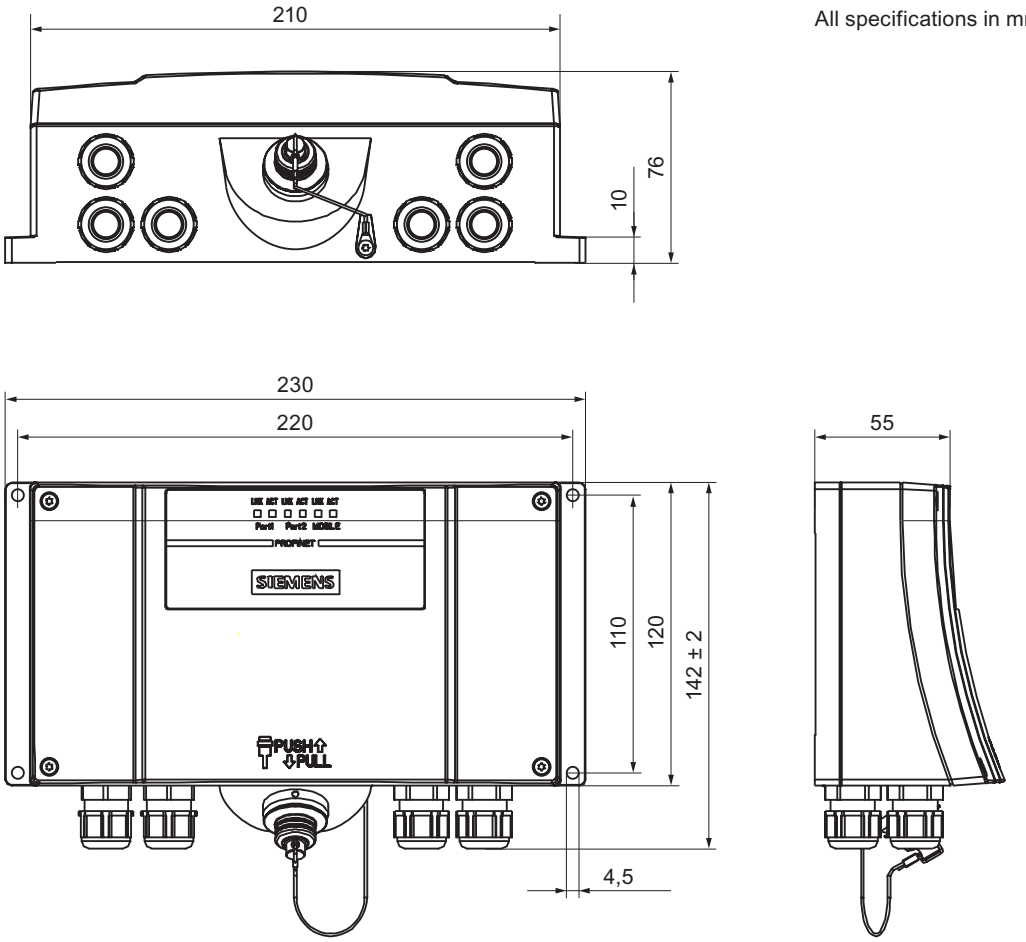
6.1.3 Connection Box DP

All specifications in mm



6.1.4 Connection Box PN

All specifications in mm



6.2 Technical specifications

6.2.1 Mobile Panel 277

HMI device

Weight without packing	Approx. 1.7 kg, max. 1.8 kg

Display

Type	Color TFT-LC Display
Display area, active	151.66 mm x 113.74 mm (7.5")
Resolution	640 x 480 pixels
Colors, displayable	64k colors
Brightness control	Yes
Back-lighting Half Brightness Life Time, typical	CCFL 50,000 h

Input unit

Type	Touch-Screen, analog, resistive Membrane keyboard
Function keys	18, with LEDs
Enabling switch	2-circuit, 3-level Connection voltage: 24 VDC Amperage, max.: 400 mA Amperage, min.: 10 mA
STOP button (optional)	2-circuit Connection voltage: 24 VDC amperage, max.: 500 mA Amperage, min.: 10 mA These are normally closed contacts.
Handwheel (optional)	1 50 Impulses per rotation
Key-operated switch (optional)	1 3 switch settings
Illuminated pushbutton (optional)	2 LED separately controllable

Memory

Application memory	6 MB

Ports

1 x RS 485	Max. 12 Mbps
1 x USB	• USB host; conforms to USB standard 1.1 (supporting low-speed and full-speed USB devices) • Maximum load 500 mA
1 x RS 45	for PROFIBUS DP
1 x plug-in terminal strips (10-pin)	for PROFIBUS DP
1 x RS 45	for PROFINET
1 x plug-in terminal strips (12-pin)	for PROFINET

Supply voltage

Supply voltage	Via Connection Box

Additional specifications

Fall height	Max. 1.2 m
Buffer time with internal clock • Without rechargeable battery • With rechargeable battery	 Approx. 3 days Approx. 6 months

6.2.2 Connection Box DP

Weight

Weight without packing	Approx. 500 g

Supply voltage

Rated voltage Range, permissible	+24 VDC 20.4 to 28.8 V (–15 %, +20 %)
Transients, maximum permissible	35 V (500 ms)
Time between two transients, minimum	50 s
Power consumption Connection Box DP without Mobile Panel • Typical • Constant current, maximum • Power on current surge I^2t	 • Approx. 100 mA • Approx. 150 mA • Approx. 0.5 A^2s
Power consumption Connection Box DP with Mobile Panel • Typical • Constant current, maximum • Power on current surge I^2t	 • Approx. 600 mA • Approx. 750 mA • Approx. 0.6 A^2s
Enabling switch • Connection voltage • Amperage, max. Amperage, min.	 • 24 VDC • 400 mA • 10 mA
STOP button (optional) • Connection voltage • amperage, max.: • amperage, min.:	 • 24 VDC • 500 mA • 10 mA
Fuse, internal	Electronic
Current load PLC-accompanying signals	Max. 100 mA
Recovery time	After 1 s

Note

Recovery time

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

Power failure

It is necessary to remove and replace the connection cable in the event of power failures lasting less than a second, in order to eliminate possible malfunctions.

6.2.3 Connection Box PN

Weight

Weight without packing	Approx. 700 g

Supply voltage

Rated voltage Range, permissible	+24 VDC 20.4 to 28.8 V (–15 %, +20 %)
Transients, maximum permissible	35 V (500 ms)
Time between two transients, minimum	50 s
Power consumption Connection Box PN without Mobile Panel • Typical • Constant current, maximum • Power on current surge I^2t	 • Approx. 100 mA • Approx. 150 mA • Approx. 0.5 A^2s
Power consumption Connection Box PN with Mobile Panel • Typical • Constant current, maximum • Power on current surge I^2t	 • Approx. 600 mA • Approx. 750 mA • Approx. 0.6 A^2s
Enabling switch • Connection voltage • Amperage, max. Amperage, min.	 • 24 VDC • 400 mA • 10 mA
STOP button (optional) • Connection voltage • amperage, max.: • amperage, min.:	 • 24 VDC • 500 mA • 10 mA
Fuse, internal	Electronic
Current load PLC-accompanying signals	Max. 100 mA
Recovery time	After 1 s

Note

Recovery time

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

Power failure

It is necessary to remove and replace the connection cable in the event of power failures lasting less than a second, in order to eliminate possible malfunctions.

6.3 Mobile Panel 277 port assignments

6.3.1 RS 485 (IF 2)

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

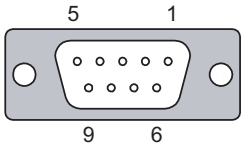


Figure 6-1 RS 485 port pin assignment

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

6.3.2 USB

USB socket

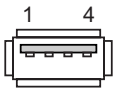


Figure 6-2 Pin assignment of the USB port

Pin	Assignment
1	+5 VDC, out (max. 500 mA)
2	USB-DN
3	USB-DP
4	GND

6.3.3 RJ45 for Connecting Cable DP

RJ45 plug connector, 8-pin

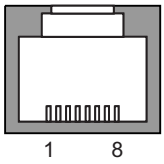


Figure 6-3 Pin assignment of the RJ45 connector for the connecting cable DP

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

6.3.4 RJ45 for Connecting Cable PN

RJ45 plug connector, 8-pin

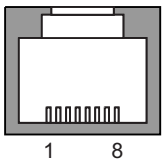


Figure 6-4 Pin assignment of the RJ45 connector for the connecting cable PN

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

6.3.5 Post Connector for Connecting Cable DP

Post connector, 10-pin

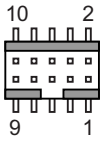


Figure 6-5 Pin assignment of the post connector for the connecting cable DP

Pin	Assignment	Circuit
1	+24 VDC	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–	

6.3.6 Post Connector for Connecting Cable PN

Post connector, 12-pin

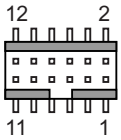
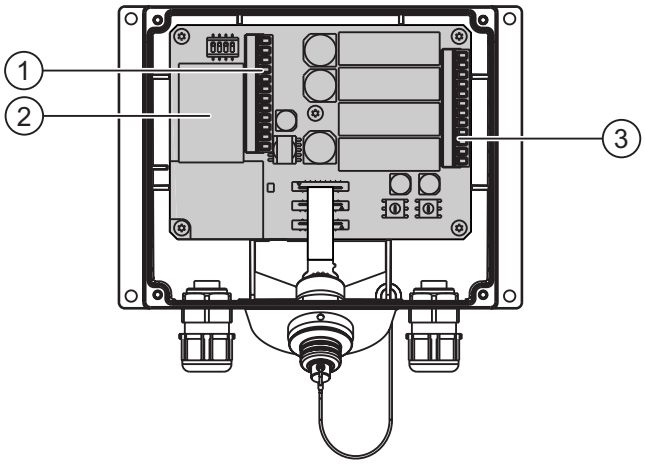


Figure 6-6 Pin assignment of the post connector for the connecting cable PN

Pin	Assignment	Circuit
1	+24 VDC	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–	

6.4 Port Assignment on the Connection Box DP

Location 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, 12-pin

IF1 and the power supply are connected to the terminal strip. The terminal strip has a mechanical coding, in order to prevent mix up with terminal strip 2.

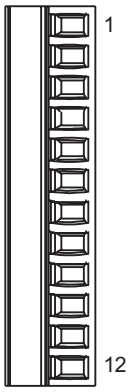


Figure 6-7 Assignment of terminal strip 1

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	PE	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 parenthesis in the table refer to the pin numbers in the WinCC flexible Online Help described standard cables for the individual couplings.

Fast Connector, 4-pin

The Connection Box contains two Fast Connectors for connecting the PROFIBUS DP data cables.

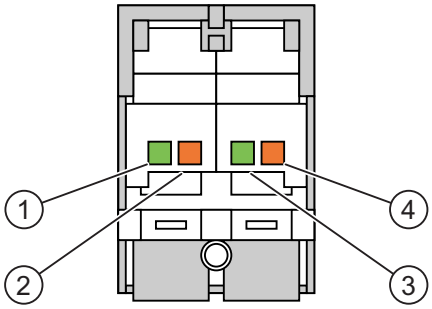


Figure 6-8 Pin Assignment of the Fast Connector

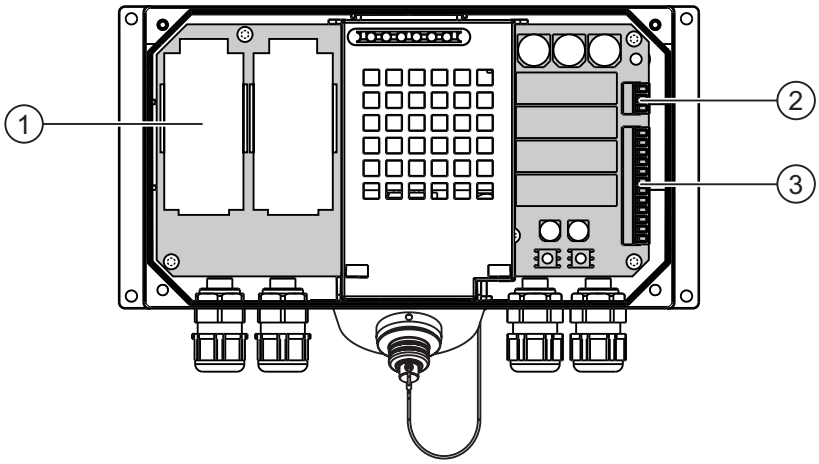
Pin	Assignment
1	LTG-A (–) IN
2	LTG-B (+) IN
3	LTG-A (–) OUT
4	LTG-B (+) OUT

See also

Port Assignment on the Connection Box DP and Connection Box PN (Page 6-18)

6.5 Port Assignment on the Connection Box PN

Location of the ports



① Fast connector
② Terminal strip 1
③ Terminal strip 2

Fast Connector, 4-pin

The Connection Box contains two Fast Connectors for connecting the PROFINET data cables.

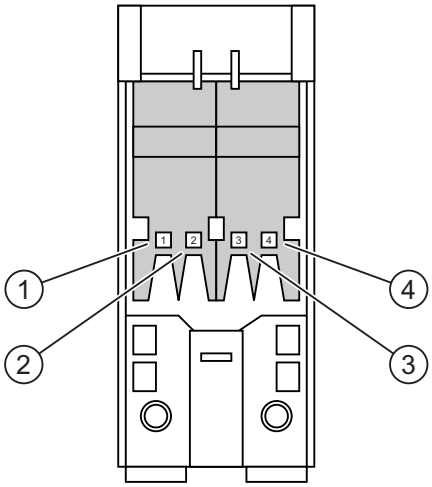


Figure 6-9 Pin Assignment of the Fast Connector

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

Terminal strip 1, for power supply, 3-pin

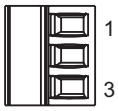


Figure 6-10 Assignment of terminal strip 1

Pin	Power supply
1	PE
2	M24
3	P24

6.6 Port Assignment on the Connection Box DP and Connection Box PN

Terminal strip 2, 12-pin

The safety and additional functions are connected to this terminal strip. The terminal strip has a mechanical coding, in order to prevent mix up with terminal strip 1.

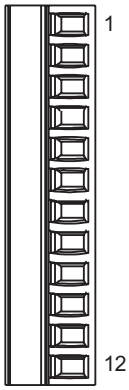


Figure 6-11 Assignment of terminal strip 2

Pin	Connection Box Plus	Connection Box Basic	Circuit
1	STOP13	STOP13	STOP button See also post connectors
2	STOP14	STOP14	
3	STOP23	STOP23	
4	STOP24	STOP24	
5	CTL31 1)	n. c.	PLC-accompanying signals
6	CTL32 1)	n. c.	
7	PRESENT31 2)	24 VDC, if active	
8	PRESENT32	n. c.	
9	ENABLE2+		Enabling switch See also post connectors and connection examples
10	ENABLE1–		
11	ENABLE1+		
12	ENABLE2–		

1) Active, if Emergency Stop pressed

2) Active, if Mobile Panel connected

The "STOP button pressed" signal is not available on the Connection Box Basic.

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

Signal "Mobile Panel connected" on a SIMATIC S7

Mobile Panel on the Connection Box	Signal on the digital input of a SIMATIC S7
Not connected	"0"
Inserted	"1"

Note

Output "Mobile Panel connected"

The output "Mobile Panel connected" on the Connection Box Basic is associated with the power supply. On the Connection Box Plus, this output is managed on a dual-pole relay.

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

- Connect terminal strip 2, pin 7 of the Connection Box to the digital input of the PLC.
- Connection Box Basic

  Terminal strip 2, pin 8 of the Connection Box remains free.
- Connection Box Plus

  Terminal strip 2, pin 8 must be fed with +24 V.

Connection Box Plus Wiring examples

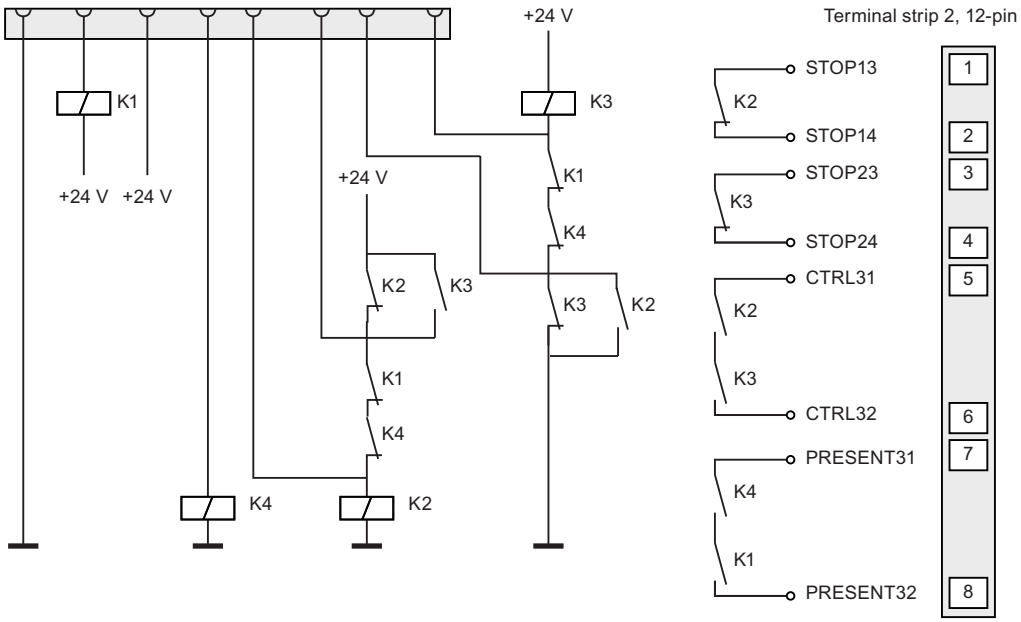


Figure 6-12 Mobile Panel 277 not connected and power supply switched on

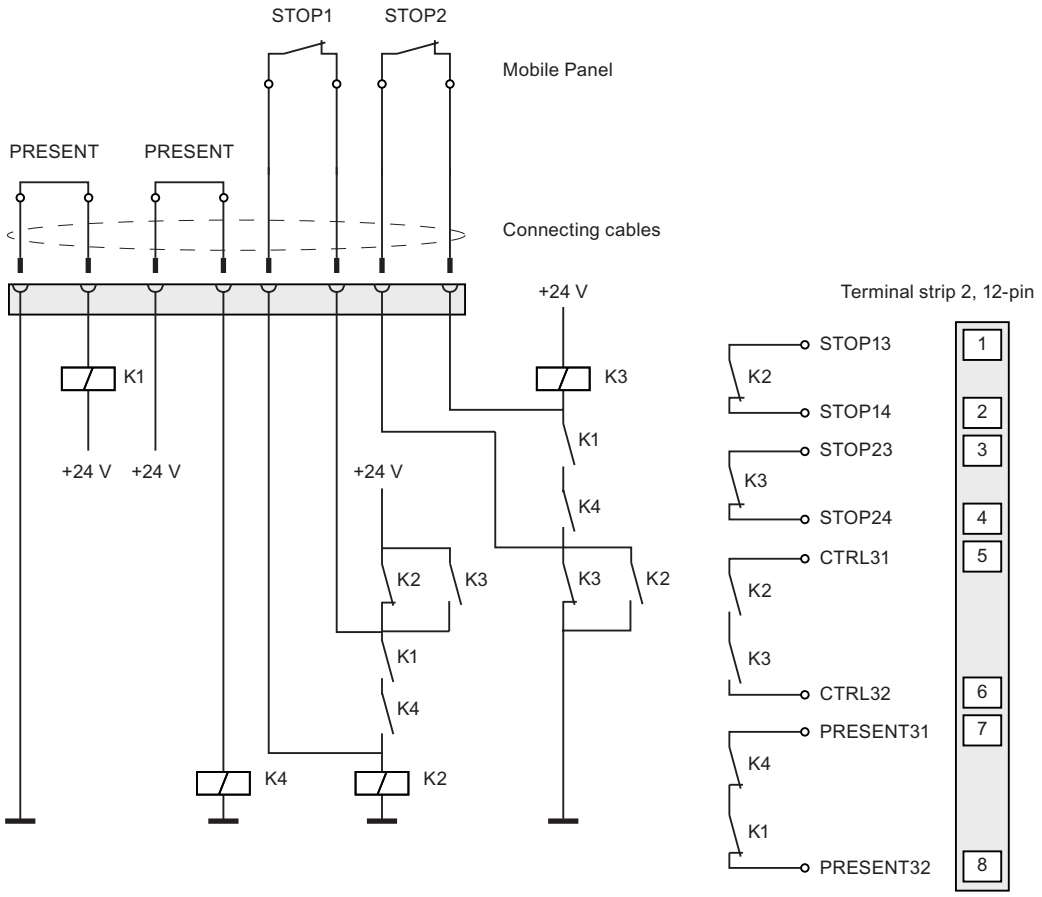


Figure 6-13 Mobile Panel 277 connected, power supply switched on and Emergency Stop inactive

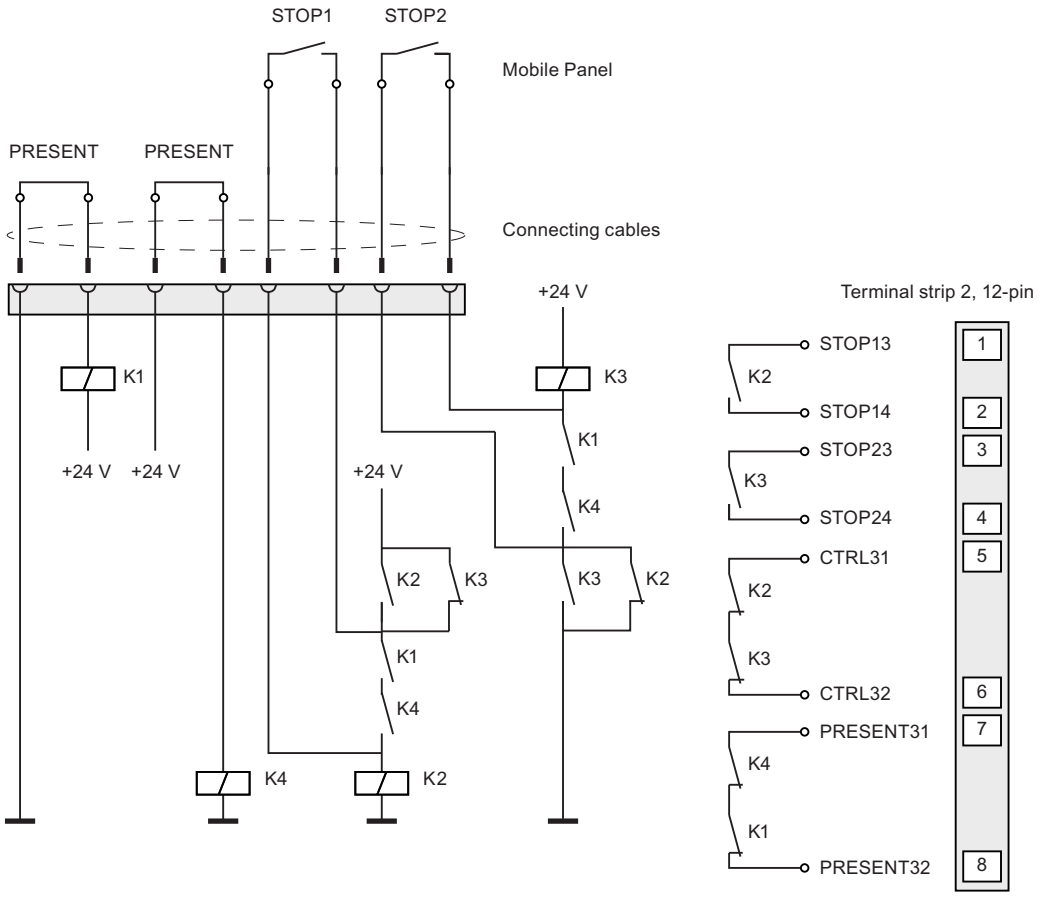


Figure 6-14 Mobile Panel 277 connected, power supply switched on and Emergency Stop active

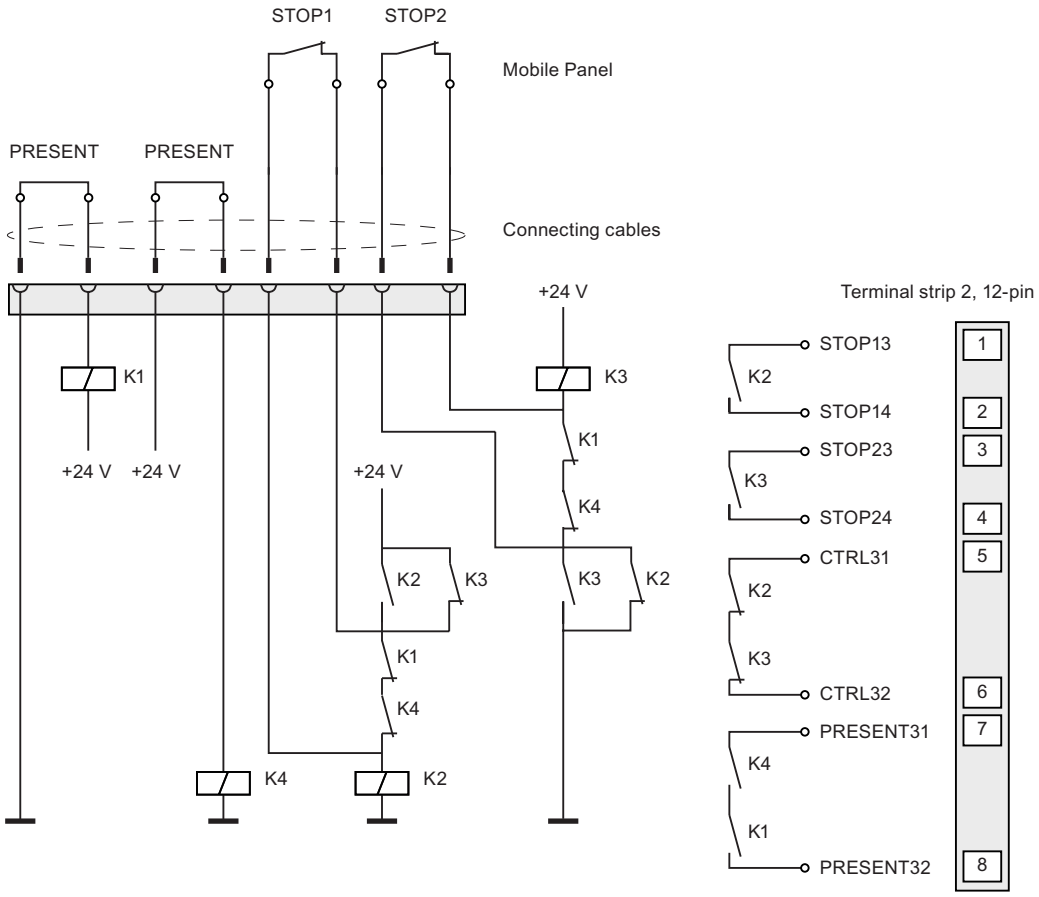


Figure 6-15 Power supply switched off

Connection Box Basic wiring examples

In contrast to the Connection Box Plus, the following circuit diagram applies to the Connection Box Basic.

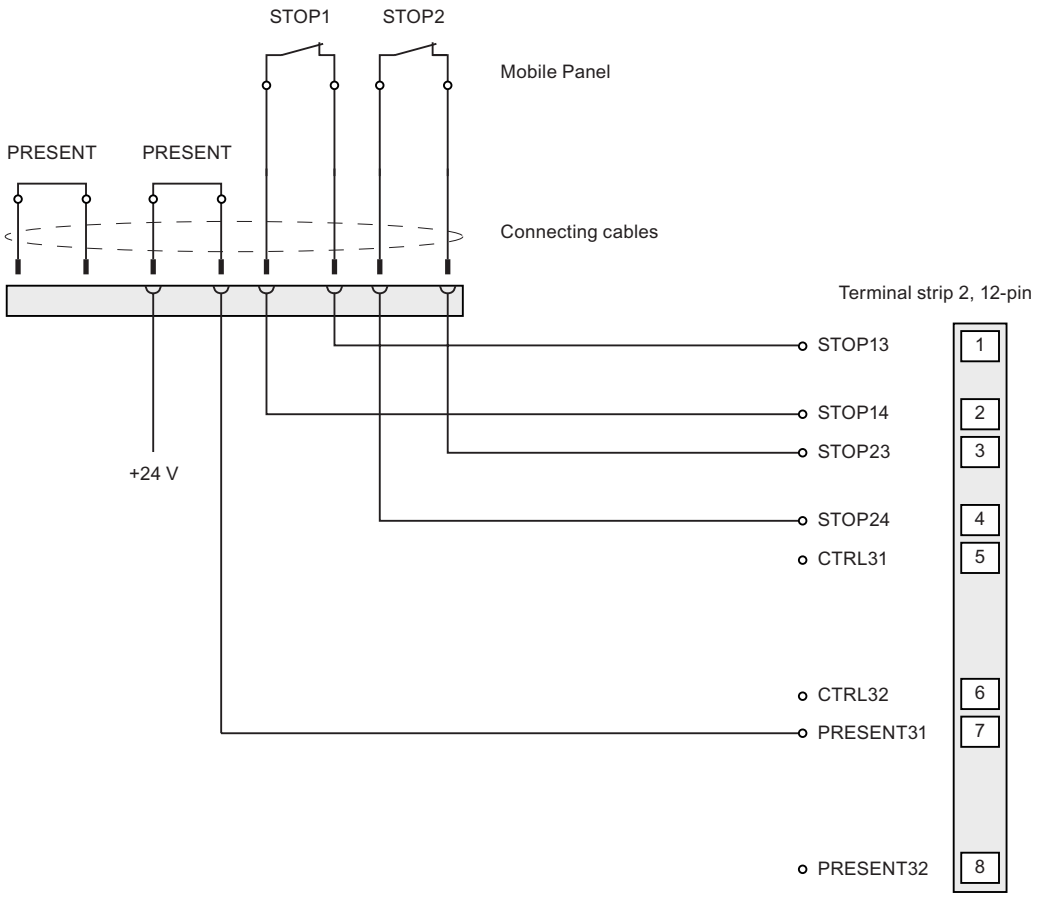


Figure 6-16 Power supply switched off

See also

Port Assignment on the Connection Box DP (Page 6-13)

6.7 Wiring Examples for Enabling Switch and STOP Button

Introduction

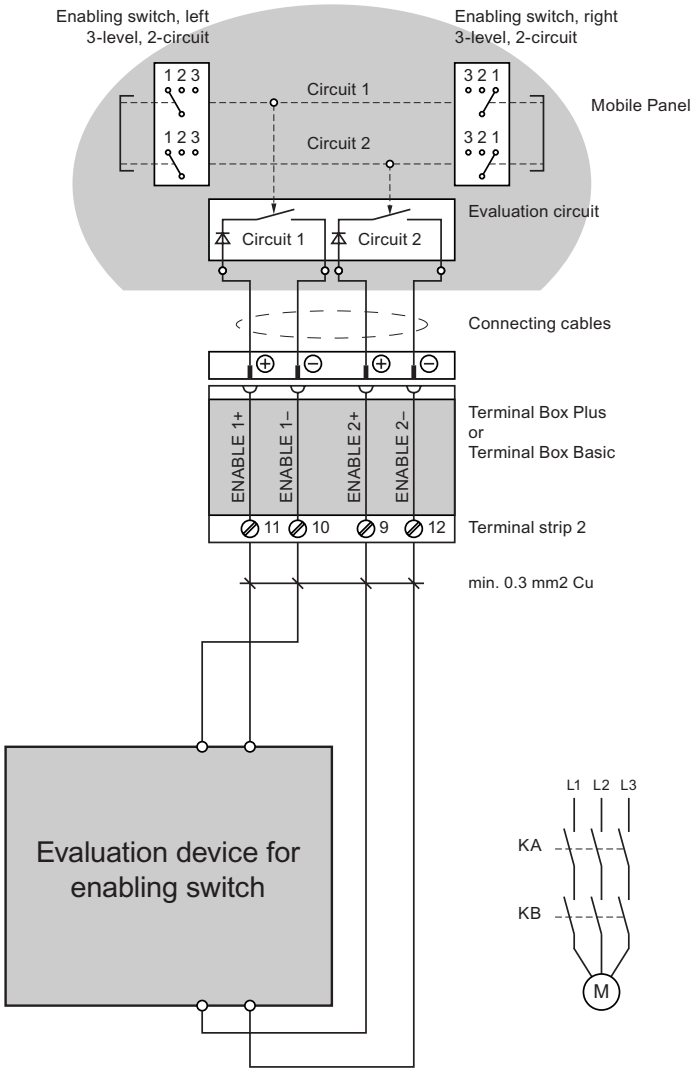
This chapter contains connection examples for Enable and STOP buttons corresponding to safety category 3 according to EN 954-1.

Notice

In order to guarantee safety category 3 according to EN 954-1, please also consider the operating instructions of the monitoring device used.

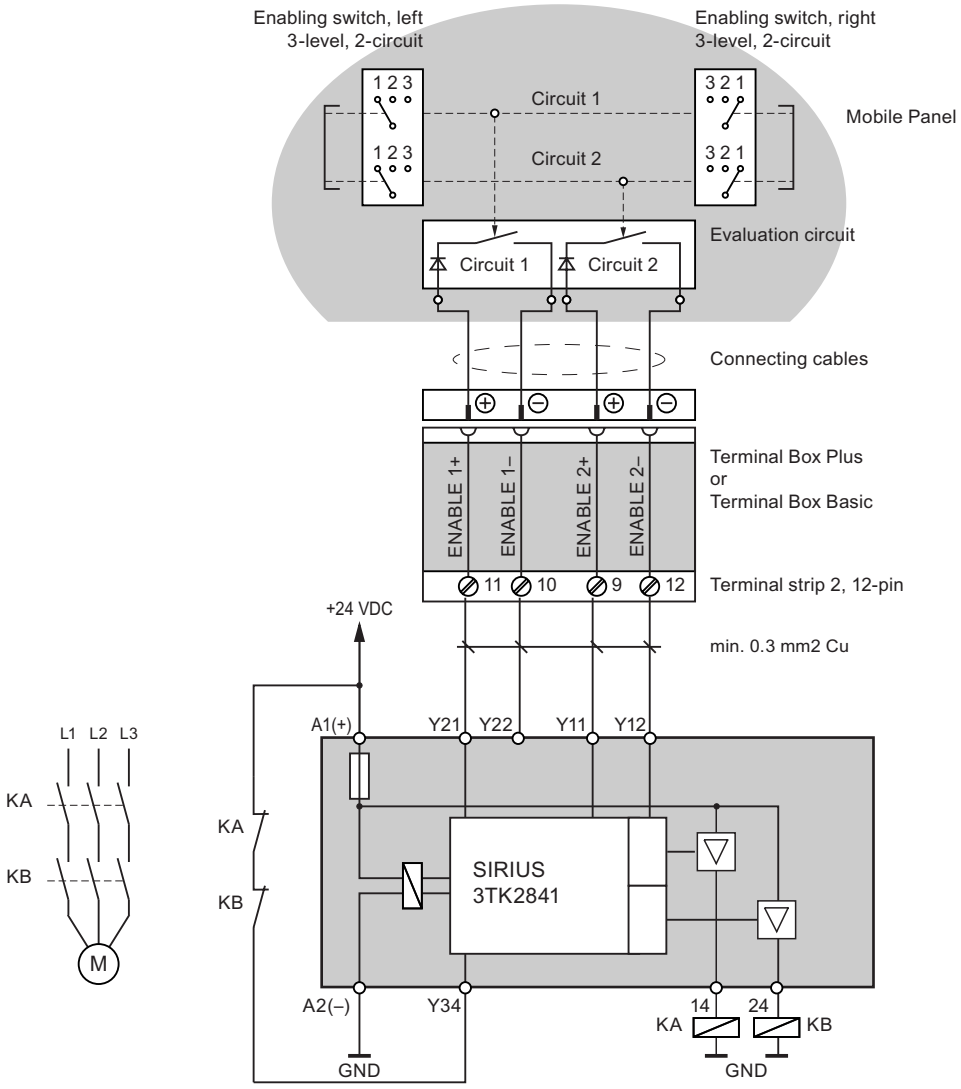
Connection - Enabling switch with evaluation device

The following figure shows the connection of a evaluating device to the Enabling switch of the Mobile Panel. All contacts of the safety relay (contactor) KA and KB are fitted with rail-guided contacts according to EN 50205.



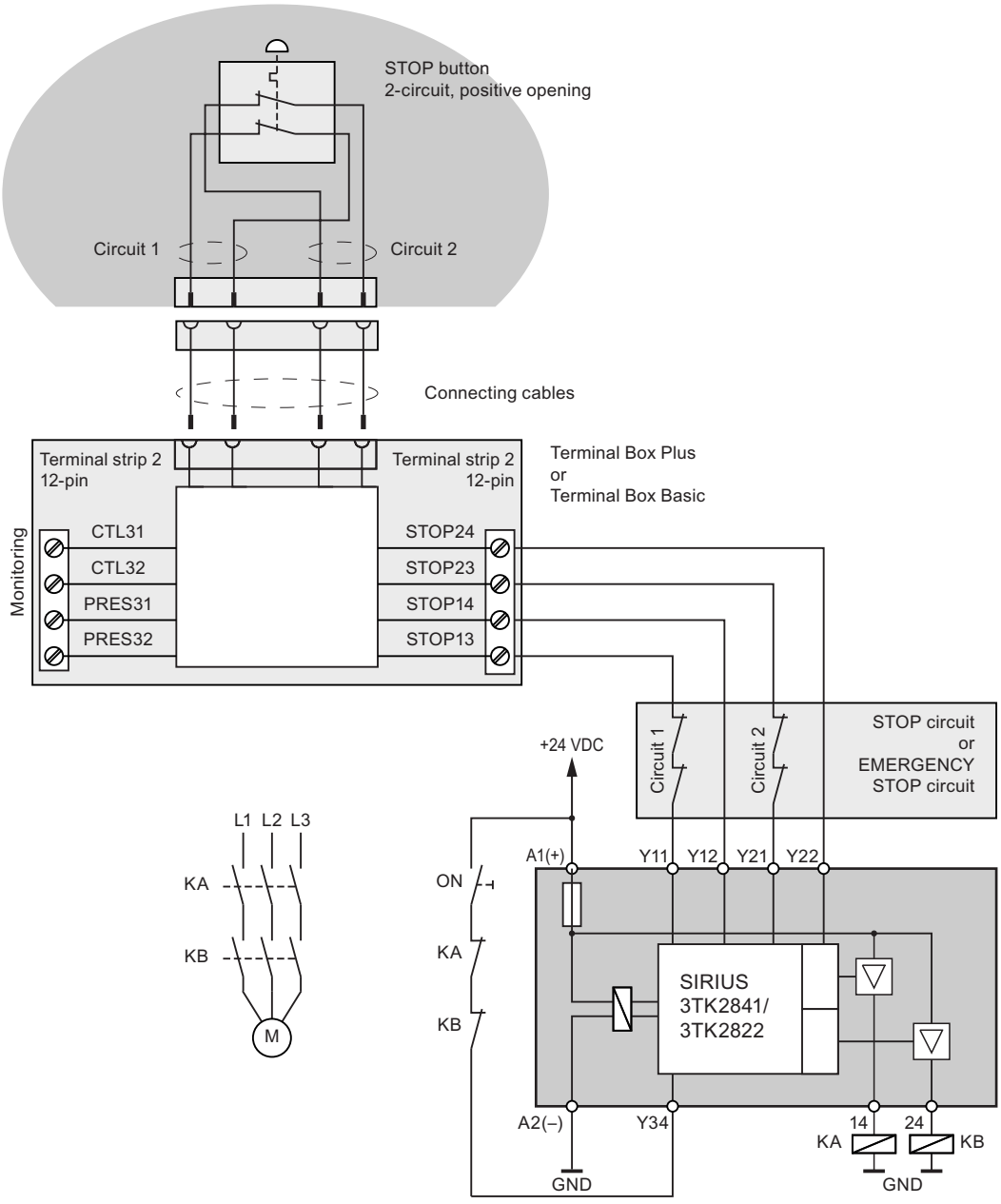
Connection example 1 - Enabling switch with safety circuit device

The following figure shows the connection of a SIRIUS 3TK2841 safety circuit device to the Enabling switch of the Mobile Panel. All contacts of the safety relay (contactor) KA and KB are fitted with rail-guided contacts according to EN 50205.



Connection example 2 – STOP button with safety circuit device

The following figure shows the connection of a SIRIUS 3TK2822 or SIRIUS 3TK2841 to the STOP button of the Mobile Panel. All contacts of the safety relay (contactor) KA and KB are fitted with rail-guided contacts according to EN 50205.



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 Connection Boxes. For this purpose it may be necessary for different system screens to be displayed, depending on the Connection 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 switching between various PLCs by means of a control object.

Connection point recognition

You can implement connection point recognition as follows:

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

Note

Connection point recognition via box ID

The solution with Box ID works with various plant configurations.

Note

The "Project recognition" area pointer ensures that the HMI device is connected to the PLC which supports the project.

The "Project recognition" area pointer can only be associated with one PLC per project. You will find further information in the "WinCC flexible communication" manual.

Note

A Box ID cannot be set up on a Mobile Panel 170 Connection Box. In this case connection point recognition is only possible via the digital input of the PLC.

A.1.2 Connection Point Recognition via Box ID

Box ID

You can read out the Box ID of the Connection Box to which the Mobile Panel in connected in the project.

Note

If you connect a Mobile Panel 277 to a Mobile Panel 170 Connection Box, the box ID will always deliver the value 255.

Requirements

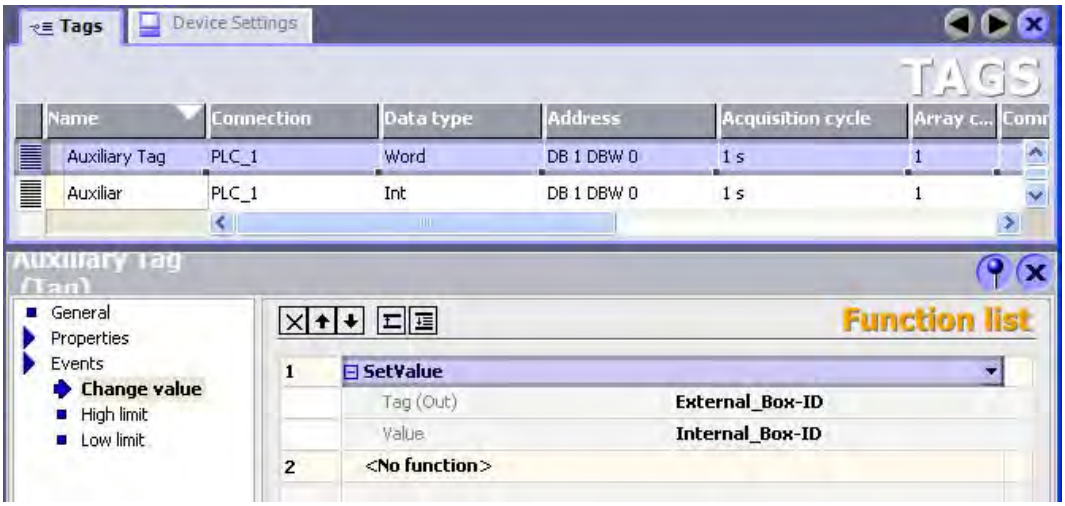
You have set the respective box ID in each of the Connection Boxes. Each Connection Box must have a unique box ID assigned to it.

Example for the evaluation of the current box ID

In order to ensure that the Box ID is forwarded to the PLC correctly when the HMI device is connected, undertake the configuration in WinCC flexible as follows:

1. Specify the connection to the PLC in the "Connections" editor. Activate the "Coordination" area pointer to ensure that the life bit is available to 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 Connection Box, the box ID is written automatically into the "Internal_Box-ID" tag.

5. When communication between the HMI device and the PLC has been made, the current PLC old value will be automatically written to 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 recognized the creation of communication, the control program changes the current value once in the "Auxiliary Tag" tag. This brings about a change of value.
7. The value change in the "Auxiliary_Tag" triggers performance of the "SetValue" system function. The system function allocates the "Externe_Box-ID" the value of the "Interne_Box-ID" tag.
8. To configure this system function open the properties view of the "Auxiliary Tag". Click "Change value" in the properties window 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 Connection Box to which the Mobile Panel in connected is transferred to the PLC.

See also

Setting the Box ID at the Connection Box (Page 4-6)

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 PLC:

- Direction pulses of the handwheel
- Status of the function keys
- Status of the key-operated switch
- State of the illuminated pushbuttons
- State of the function keys and illuminated pushbutton LEDs

There are two alternatives:

- Direct Keys
- System functions of WinCC flexible

Note

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

A.2.2 Evaluating Operator Control Elements as Drect Keys

Introduction

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

The states of the following control elements are available directly in the I/O area of the PLC:

- Direction pulses of the handwheel
- The switching state of the function keys
- The switching state of the key-operated switch
- The switching state of the illuminated pushbuttons

Byte assignment

The following figure shows the assignment of the keys and LEDs to the bytes in the PLC process image.

Further information may be available in your plant documentation.

Button bits							
7	6	5	4	3	2	1	0
F8	F7	F6	F5	F4	F3	F2	F1
F16	F15	F14	F13	F12	F11	F10	F9
						F18	F17
			T2		T1	S1	S0
I7	I6	I5	I4	I3	I2	I1	I0
D7	D6	D5	D4	D3	D2	D1	D0
7	6	5	4	3	2	1	0
15	14	13	12	11	10	9	8
23	22	21	20	19	18	17	16
31	30	29	28	27	26	25	24

Byte
n
n + 1
n + 2
n + 3
n + 4
n + 5
n + 6
n + 7
n + 8
n + 9

LED bits							
7	6	5	4	3	2	1	0
F8	F7	F6	F5	F4	F3	F2	F1
F16	F15	F14	F13	F12	F11	F10	F9
						F18	F17
					T2	T1	

F	Bit for function key
S	Bit for key-operated switch
T1	Bit for left illuminated pushbutton
T2	Bit for right illuminated pushbutton
I	Bit for handwheel pulses, forwards
D	Bit for handwheel pulses, backwards

The bytes "n+6" to "n+9" contain the direct key bits for the touch buttons.

Bit coding

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

- Bit coding of function keys

State	F1 to F18
Not pressed	0
Pressed	1

- Bit coding of function key LEDs

State	F1 to F18
LED not illuminated	0
LED is illuminated	1

- Bit coding of key-operated switch

State	S1	S0	Key position
Position 0	0	0	In middle position
Position I	0	1	Turned in clockwise direction up to mechanical stop
Position II	1	0	Turned counter-clockwise up to mechanical stop

- Bit coding of illuminated pushbuttons

State	T1	T2
Not pressed	0	0
Pressed	1	1

- Bit coding of illuminated pushbutton LEDs

LED status	T1	T2
Off	0	0
On permanently	1	1

- Bit coding of handwheel
  - A setpoint is not specified for the handwheel.
  - After start-up of the HMI device, the bytes "n+4" to "n+5" (see figure) are set to zero.

    Rotation of the handwheel produces positive or negative pulses depending on the rotation direction. The number of positive impulses are stored in bits I0 to I7. The number of negative impulses are stored in bits D0 to D7. The values are entered in binary format, where bit 0 is the lowest and bit 7 is the highest valued bit.

    A complete handwheel revolution yields 50 pulses.
  - Every impulse of the handwheel is added to byte "n+4" or "n+5" depending on the direction of rotation. There are no negative values. When the possible value range is exceeded, there is an overflow:

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

Example of bit coding for handwheel

The following table includes an example for rotation direction determination. The impulses are stored in bytes "n+4" and "n+5" and are measured during the points in time t_1 to 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. Please take the number of impulses forwards and the impulses backwards from the table.

- To point in time t_n and
- To point in 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)

Reaction time

The bytes "n+4" and "n+5" must be retrieved 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

Sample cycle time

The input pulses should take effect immediately on the PLC and cause a response in the system. Set up a sample cycle on the PLC of <= 100 ms in order to achieve this.

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

A.2.3.1 Controlling Function Key LEDs

Application

LEDs are integrated in the Mobile Panel's function keys F1 to F18. The integrated LEDs can be controlled from the PLC.

The LEDs can assume the following states:

- Off
- Flashing slowly
- Flashing quickly
- ON

You can signal to the user that a function key should be pressed, in a running project.

Bit assignment

The following table shows the possible states of the LEDs and the corresponding entries in bit n+1 and bit n of the LED tags.

Bit n+1	Bit n	LED status
0	0	Off
0	1	Flashing quickly
1	0	Flashing slowly
1	1	ON (continuous)

A.2.3.2 Consistent Values with Optional Control Elements

Introduction

With the WinCC flexible system functions, you can evaluate the control elements of the HMI device and control the LEDs of the function keys and the illuminated pushbuttons.

The states of the following control elements are then transferred to the PLC via tags:

- Direction pulses of the handwheel
- The switching state of the function keys
- The switching state of the key-operated switch
- The switching state of the illuminated pushbuttons

data consistency

If the control elements are directly associated to tags with a process connection, then it is possible that, for example as in the following sequence, inconsistencies occur in control element values between the control elements, HMI device and PLC:

1. The HMI device is connected to the Connection Box.
2. The HMI device starts.
3. The values of the operator control elements are determined and entered in tags on 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 control elements, undertake the configuration in WinCC flexible as follows:

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 view. 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. You can additionally configure the "LED-Tag" tag for the illuminated pushbuttons, in order to control the integrated LEDs.

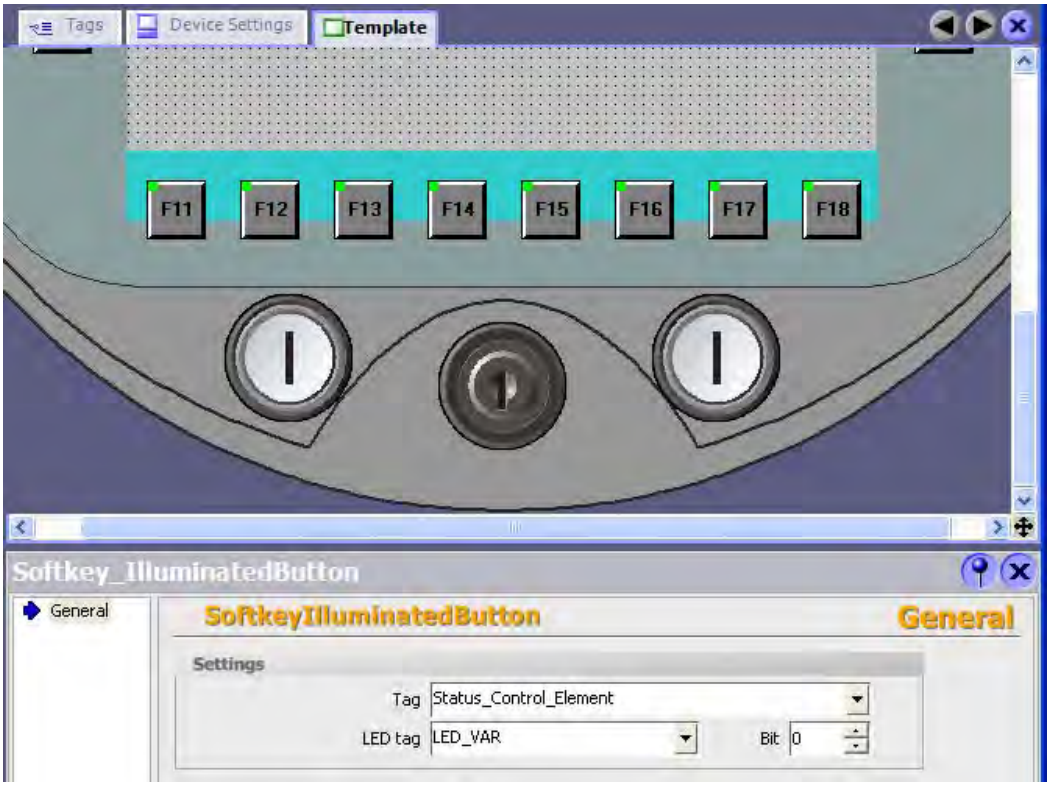
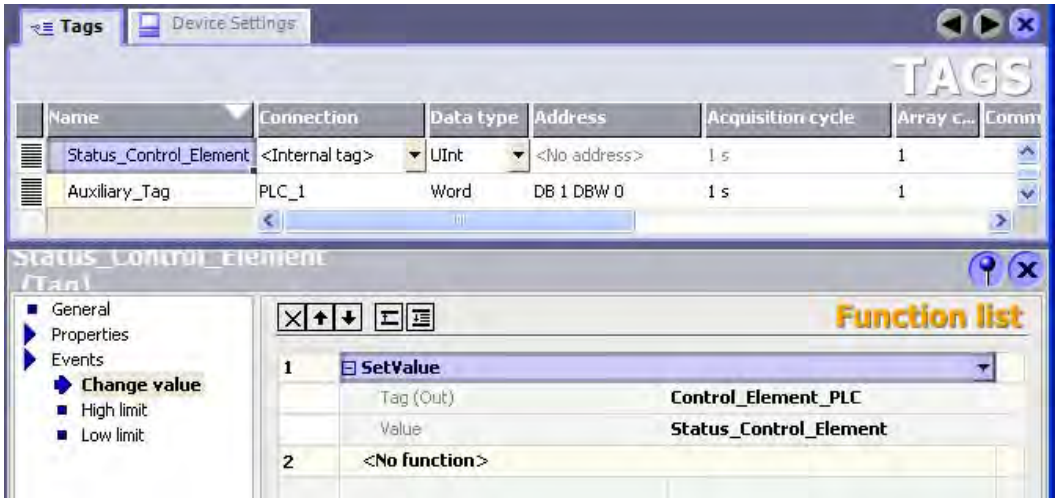


Figure A-1 Tag assignment using illuminated pushbuttons as an example

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 opens, showing the system functions available in the project.

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 between the HMI device and the PLC has been made, the current PLC old value will be automatically written to 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.
9. A program in the PLC evaluates the live bit. After the control program has recognized the creation of communication, the control program changes the current value once in the "Auxiliary Tag" tag. This causes 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. To configure the system function, open the Properties view 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 opens. Click the first line of the function list. The list opens, showing the system functions available in the project.
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 Evaluate Handwheel

Application

The handwheel is an optional control element of the Mobile Panel. You can enter incremental values in a running project with a handwheel.

Note

Do not configure limit values in WinCC flexible for tags associated with the handwheel.

Evaluation of the incremental values

If the signals of the handwheel are associated to a WinCC flexible tag, then the forward and backward increments will be set off against each other and the absolute value of the increments will be given. 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.

A.2.3.4 Evaluate Key-operated Switch

Application

The key-operated switch is an optional control element of the Mobile Panel. The key-operated switch serves to lock functions in a running project which can be triggered by means of the Mobile Panel.

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
0	1	Turned in clockwise direction up to mechanical stop
1	0	Turned counter-clockwise up to mechanical 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 Evaluate Illuminated Pushbutton

Application

The illuminated pushbutton is an optional control element of the Mobile Panel. The integrated LEDs can be controlled from the PLC.

The LEDs can assume the following states:

- Off
- Flashing slowly
- Flashing quickly
- ON

You can signal to the user that an illuminated pushbutton should be pressed, in a running project.

Bit assignment

The following table shows the bit assignment for the status tags of the illuminated pushbuttons:

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

The following table shows the bit assignment for the LED tags of the illuminated pushbuttons:

Bit n+1	Bit n	LED status
0	0	Off
0	1	Flashing quickly
1	0	Flashing slowly
1	1	On (continuous)

Abbreviations

B

ANSI	American National Standards Institution
CPU	Central Processing Unit
CSV	Comma Separated Values
CTS	Clear To Send
DC	Direct Current
DCD	Data Carrier Detect
DHCP	Dynamic Host Configuration Protocol
DIL	Dual-in-Line (electronic chip housing design)
DNS	Domain Name System
DP	Distributed I/O
DSN	Data Source Name
DSR	Data Set Ready
DTR	Data Terminal Ready
IO	Input and Output
ESD	Electrostatic Discharge, the components and modules endangered by such
EMC	Electromagnetic Compatibility
EN	European standard
ES	Engineering System
ESD	Electrostatic Sensitive Device
GND	Ground
HF	High Frequency
HMI	Human Machine Interface
IEC	International Electronic Commission
IF	Interface
IP	Internet Protocol
LED	Light Emitting Diode
MAC	Media Access Control
MOS	Metal Oxide Semiconductor
MPI	Multipoint Interface (SIMATIC S7)
MS	Microsoft
MTBF	Mean Time Between Failures
n. c.	Not connected
OP	Operator Panel
PC/	Personal Computer

PG	Programming device
PPI	Point-to-Point Interface (SIMATIC S7)
RAM	Random Access Memory
PELV	Protective Extra Low Voltage
RJ45	Registered Jack Type 45
RTS	Request To Send
RxD	Receive Data
SD Card	Security Digital Card
SELV	Safety Extra Low Voltage
SP	Service Pack
PLC	Programmable Logic Controller
STN	Super Twisted Nematic
Sub-D	Subminiature D (plug)
TAB	Tabulator
TCP/IP	Transmission Control Protocol/Internet Protocol
TFT	Thin Film Transistor
TTY	Teletype
TxD	Transmit Data
UL	Underwriter's Laboratory
USB	Universal Serial Bus
WINS	Windows Internet Naming Service

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