

SIEMENS

SINUMERIK

SINUMERIK ONE / SINUMERIK 840D sl Handheld Terminal HT 10

Equipment Manual

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Valid for:
Control
SINUMERIK ONE
SINUMERIK 840D sl / 840DE sl

Legal information

Warning notice system

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
--

indicates that minor personal injury can result if proper precautions are not taken.
--

NOTICE

indicates that property damage can result if proper precautions are not taken.
--

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 product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING
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Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.
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Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

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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Fundamental safety instructions

1.1 General safety instructions



WARNING

Electric shock and danger to life due to other energy sources

Touching live components can result in death or severe injury.

- Only work on electrical devices when you are qualified for this job.
- Always observe the country-specific safety rules.

Generally, the following steps apply when establishing safety:

1. Prepare for disconnection. Notify all those who will be affected by the procedure.
2. Isolate the drive system from the power supply and take measures to prevent it being switched back on again.
3. Wait until the discharge time specified on the warning labels has elapsed.
4. Check that there is no voltage between any of the power connections, and between any of the power connections and the protective conductor connection.
5. Check whether the existing auxiliary supply circuits are de-energized.
6. Ensure that the motors cannot move.
7. Identify all other dangerous energy sources, e.g. compressed air, hydraulic systems, or water. Switch the energy sources to a safe state.
8. Check that the correct drive system is completely locked.

After you have completed the work, restore the operational readiness in the inverse sequence.



WARNING

Electric shock due to connection to an unsuitable power supply

When equipment is connected to an unsuitable power supply, exposed components may carry a hazardous voltage. Contact with hazardous voltage can result in severe injury or death.

- Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV- (Protective Extra Low Voltage) output voltages for all connections and terminals of the electronics modules.



WARNING

Electric shock due to equipment damage

Improper handling may cause damage to equipment. For damaged devices, hazardous voltages can be present at the enclosure or at exposed components; if touched, this can result in death or severe injury.

- Ensure compliance with the limit values specified in the technical data during transport, storage and operation.
- Do not use any damaged devices.



WARNING

Electric shock due to unconnected cable shields

Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields.

- As a minimum, connect cable shields and the cores of cables that are not used at one end at the grounded housing potential.



WARNING

Electric shock if there is no ground connection

For missing or incorrectly implemented protective conductor connection for devices with protection class I, high voltages can be present at open, exposed parts, which when touched, can result in death or severe injury.

- Ground the device in compliance with the applicable regulations.

NOTICE

Damage to equipment due to unsuitable tightening tools.

Unsuitable tightening tools or fastening methods can damage the screws of the equipment.

- Be sure to only use screwdrivers which exactly match the heads of the screws.
- Tighten the screws with the torque specified in the technical documentation.
- Use a torque wrench or a mechanical precision nut runner with a dynamic torque sensor and speed limitation system.

**WARNING****Spread of fire from built-in devices**

In the event of fire outbreak, the enclosures of built-in devices cannot prevent the escape of fire and smoke. This can result in serious personal injury or property damage.

- Install built-in units in a suitable metal cabinet in such a way that personnel are protected against fire and smoke, or take other appropriate measures to protect personnel.
- Ensure that smoke can only escape via controlled and monitored paths.

**WARNING****Unexpected movement of machines caused by radio devices or mobile phones**

Using radio devices or mobile telephones in the immediate vicinity of the components can result in equipment malfunction. Malfunctions may impair the functional safety of machines and can therefore put people in danger or lead to property damage.

- Therefore, if you move closer than 20 cm to the components, be sure to switch off radio devices or mobile telephones.
- Use the "SIEMENS Industry Online Support app" only on equipment that has already been switched off.

**WARNING****Fire due to inadequate ventilation clearances**

Inadequate ventilation clearances can cause overheating of components with subsequent fire and smoke. This can cause severe injury or even death. This can also result in increased downtime and reduced service lives for devices/systems.

- Ensure compliance with the specified minimum clearance as ventilation clearance for the respective component.

NOTICE**Overheating due to inadmissible mounting position**

The device may overheat and therefore be damaged if mounted in an inadmissible position.

- Only operate the device in admissible mounting positions.



WARNING

Unexpected movement of machines caused by inactive safety functions

Inactive or non-adapted safety functions can trigger unexpected machine movements that may result in serious injury or death.

- Observe the information in the appropriate product documentation before commissioning.
- Carry out a safety inspection for functions relevant to safety on the entire system, including all safety-related components.
- Ensure that the safety functions used in your drives and automation tasks are adjusted and activated through appropriate parameterizing.
- Perform a function test.
- Only put your plant into live operation once you have guaranteed that the functions relevant to safety are running correctly.

Note

Important safety notices for Safety Integrated functions

If you want to use Safety Integrated functions, you must observe the safety notices in the Safety Integrated manuals.

1.2 Equipment damage due to electric fields or electrostatic discharge

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.



NOTICE

Equipment damage due to electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g. conductive foam rubber or aluminum foil.
- Only touch components, modules and devices when you are grounded by one of the following methods:
 - Wearing an ESD wrist strap
 - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

1.3 Warranty and liability for application examples

Application examples are not binding and do not claim to be complete regarding configuration, equipment or any eventuality which may arise. Application examples do not represent specific customer solutions, but are only intended to provide support for typical tasks.

As the user you yourself are responsible for ensuring that the products described are operated correctly. Application examples do not relieve you of your responsibility for safe handling when using, installing, operating and maintaining the equipment.

1.4 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit

<https://www.siemens.com/industrialsecurity> (<https://www.siemens.com/industrialsecurity>).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under

<https://www.siemens.com/industrialsecurity> (<https://new.siemens.com/global/en/products/services/cert.html#Subscriptions>).

Further information is provided on the Internet:

Industrial Security Configuration Manual (<https://support.industry.siemens.com/cs/ww/en/view/108862708>)



WARNING

Unsafe operating states resulting from software manipulation

Software manipulations, e.g. viruses, Trojans, or worms, can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

- Keep the software up to date.
- Incorporate the automation and drive components into a holistic, state-of-the-art industrial security concept for the installation or machine.
- Make sure that you include all installed products into the holistic industrial security concept.
- Protect files stored on exchangeable storage media from malicious software by with suitable protection measures, e.g. virus scanners.
- On completion of commissioning, check all security-related settings.

1.5 Residual risks of power drive systems

When assessing the machine- or system-related risk in accordance with the respective local regulations (e.g., EC Machinery Directive), the machine manufacturer or system installer must take into account the following residual risks emanating from the control and drive components of a drive system:

1. Unintentional movements of driven machine or system components during commissioning, operation, maintenance, and repairs caused by, for example,
 - Hardware and/or software errors in the sensors, control system, actuators, and cables and connections
 - Response times of the control system and of the drive
 - Operation and/or environmental conditions outside the specification
 - Condensation/conductive contamination
 - Parameterization, programming, cabling, and installation errors
 - Use of wireless devices/mobile phones in the immediate vicinity of electronic components
 - External influences/damage
 - X-ray, ionizing radiation and cosmic radiation
2. Unusually high temperatures, including open flames, as well as emissions of light, noise, particles, gases, etc., can occur inside and outside the components under fault conditions caused by, for example:
 - Component failure
 - Software errors
 - Operation and/or environmental conditions outside the specification
 - External influences/damage

3. Hazardous shock voltages caused by, for example:
 - Component failure
 - Influence during electrostatic charging
 - Induction of voltages in moving motors
 - Operation and/or environmental conditions outside the specification
 - Condensation/conductive contamination
 - External influences/damage
4. Electrical, magnetic and electromagnetic fields generated in operation that can pose a risk to people with a pacemaker, implants or metal replacement joints, etc., if they are too close
5. Release of environmental pollutants or emissions as a result of improper operation of the system and/or failure to dispose of components safely and correctly
6. Influence of network-connected communication systems, e.g. ripple-control transmitters or data communication via the network

For more information about the residual risks of the drive system components, see the relevant sections in the technical user documentation.

Description

2.1 Characteristics

The HT 10 mobile handheld terminal combines the functions of an operator panel and a machine control panel in one device, permitting complete operator control and monitoring of machines. It can be used according to the principle of a Thin Client (see also the Equipment Manual: "TCU 30.3") as a supplementary main operator panel or as a secondary control panel.



Note

Siemens AG declares that this device complies with the requirements and other regulations of the directives 2006/42/EC (Machinery Directive) and 2004/108/EC (EMC Directive).

You can find all HT 10 declarations in the Siemens Industry Online Support at: (<https://support.industry.siemens.com/cs/products?mfn=ps&lc=en-WW>)

Enter the MLFB in the search field.

Validity

The following description applies to the following components:

Designation	Features	Article number
HT 10	Enabling button, emergency stop button, override rotary switch	6FC5403-0AA21-0AA1
HT 10H	Enabling button, emergency stop button, override rotary switch, handwheel	6FC5403-0AA21-1AA1

Characteristics**Device front:**

- Pixel-graphics 10.1" TFT color display
 - 1280 x 800 (WXGA) color TFT
 - LED backlight
- Multi-touch operation and gesture control via touch screen, can also be actuated when operators are wearing gloves.
- Touch keys: Keys on predefined, reserved area of the screen
- Unlit emergency stop button (2-channel)
- 7 mechanical function keys with colored replaceable caps, tactile feedback and LED checkback signal above each key
- Easy hot swapping during operation (hot plug and play) possible without tripping the emergency stop in combination with the "SIMATIC PN advanced" connection box and without an additional, manual actuating element / keyswitch
- Rotary override switch (19 positions)
- Handwheel (only with 6FC5403-0AA21-1AA1)

Device rear:

- Power supply (+24 V)
- 1 enabling button (2-channel, 3-stage)
- Cover with option of installing a connecting cable (can be ordered separately) to the connection box/connection module (24 V)
- Customer interfaces:
 - HT 10 connecting cable to connection box / connection module
 - USB interface 3.0 (with dummy plug)

Optional:

Wall holder (accessory): The HT 10 can be kept safely and operated in a stationary manner in the wall holder.

2.2 Representation

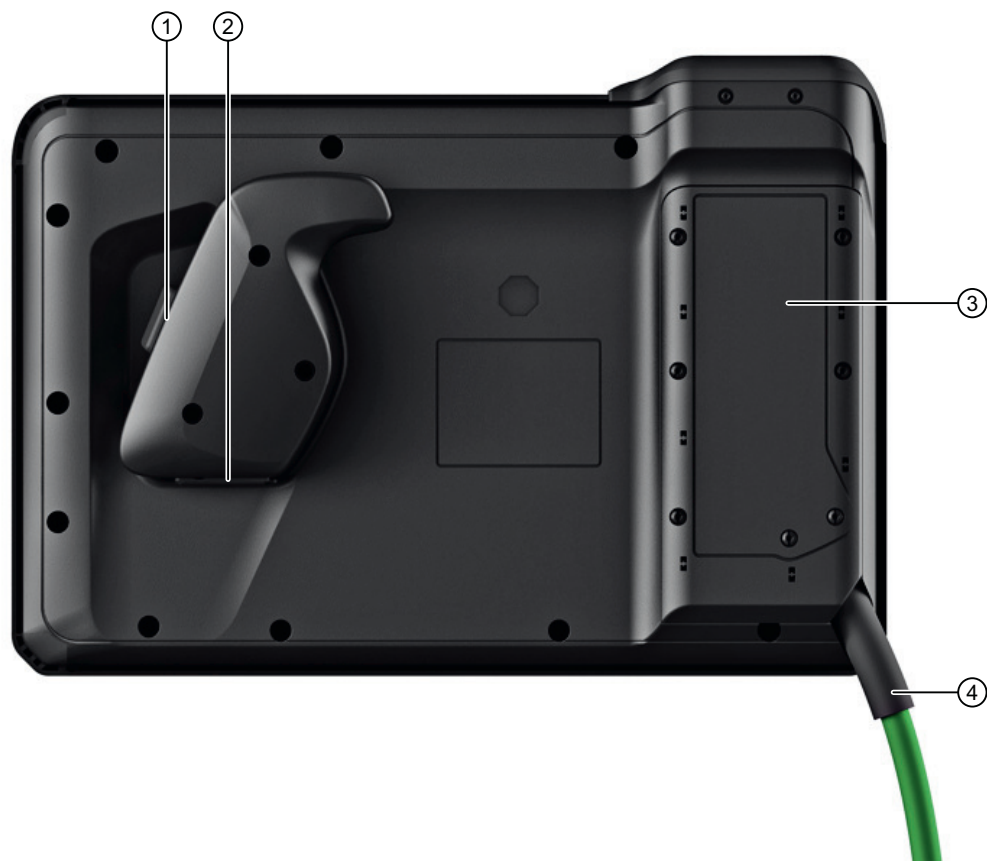
Front



- ① Emergency Stop button
- ② Display / touch screen
- ③ Handwheel (optional)
- ④ Rot. over. switch
- ⑤ LED function keys

Figure 2-1 HT 10 with handwheel and wall holder

Rear

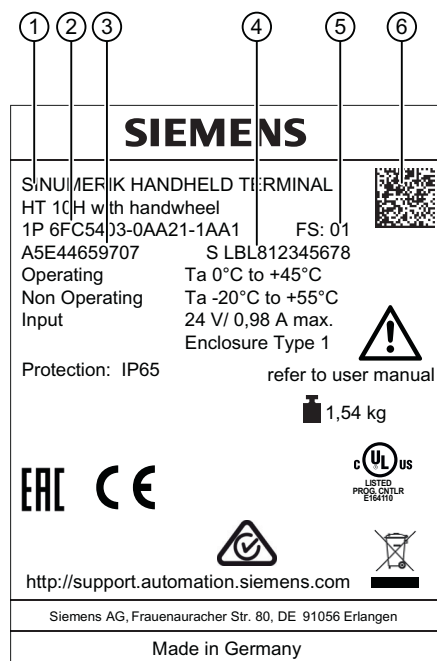


- ① Enabling button
- ② USB interface with protective cover
- ③ Cover
- ④ Connection cable (order separately)

Figure 2-2 Rear of the HT 10

2.3 Type plate

The following diagram shows you all the information provided on the nameplate.



- ① Component name
- ② Article number
- ③ Material number
- ④ Serial number
- ⑤ Version (functional state)
- ⑥ Product code

2.4 Operator control and display elements

Display / touch screen

The industrial display has LED backlighting.

All application-specific functions are displayed on the touch-sensitive display (projected capacitive). A particular function is initiated by touching the appropriate location in the display with the finger. The front glass is toughened and bonded to the touch sensor and display by optical bonding to form one unit.

Advantages of optical bonding:

- Improved view of the displayed contents without parallax
- Larger viewing angle
- Good transparency

- Low reflection
- Increased contrast
- Particles cannot penetrate between display and touch sensor

NOTICE**Damage to the display by pointed or hard objects**

Touch the display only with the fingers or gloves, and not with pointed or hard objects as this can damage it, sometimes beyond repair.

Mechanical keys

There are 7 keys on the front of the HT 10:

- -
- +
- RAPID
- U (User button)
- CYCLE STOP
- CYCLE START
- RESET

Further information can be found at Figure 2-1 HT 10 with handwheel and wall holder (Page 15).

Emergency Stop button

The red emergency stop mushroom pushbutton has a yellow ring.

Directly under the mushroom pushbutton, there is also a black ring, which identifies the position status of the emergency stop button.

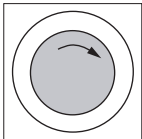
	State	
Ring (black)	Visible	Not visible
Emergency Stop button	Not pressed	Pressed

The pushbutton latches in when an emergency stop is tripped. To unlock the pushbutton, turn it to the right.

Press the red button in emergencies when:

- people are at risk.
- there is the danger of machines or the workpiece being damaged.

As a rule, when operating the Emergency Stop button, all drives are brought to a standstill with max. braking torque.



The signals are sent via the connecting cable to the connection box or connection module, and are available for further wiring.

Note

Lock away the HT 10 after removing it.

Emergency stop buttons that are inactive must not be identified as such or must be inaccessible. This is to prevent an emergency stop button from being used inadvertently.

Rotary override switch

The rotary override switch of the HT 10 has 19 positions.

The evaluation scale (0 to max.) is specified by the machine's manufacturer in the form of machine data.

Enabling button

The HT 10 has an enabling button.

The enabling button is designed as a 3-position switch for the following pushbutton positions:

- Released (no activation)
- Enable (center position)
- Panic (completely pushed in - without enabling on release)

Note**Monitoring the enabling function**

To avoid permanent override of the acknowledgment button, the enabling duration must be monitored externally. After a maximum of 30 minutes of continuous enabling, enabling should be cancelled (configure system accordingly).

The signals are sent via the connecting cable to the connection box or the connection module, and are available there for further wiring.

Connection examples of the enabling and emergency stop button can be found in the Chapter "Connection examples of the enabling and emergency stop button" in the "Handheld Terminal HT 2" Equipment Manual.

Handwheel

The HT 10 is available with a handwheel.

The handwheel operates with 50 pulses/revolution.

HT 10 operated with a handwheel

An HT 10 with a handwheel behaves in the same way as an MCP 483C PN (in Ethernet mode) with a handwheel. The handwheel pulses are transmitted via Ethernet to the NCK in the HT 10 MCP process image.

NOTICE**Lack of care for traversing can cause damage to the tool/workpiece**

A handwheel on a mobile HT 10 has 50 increments per revolution. There are 100 increments/revolution on a stationary device. This difference results in traverse paths of differing lengths.

See also

Representation (Page 15)

2.5 Touch operation

The HT 10 is operated by touching the touch-sensitive glass surface with fingers or gloves (projected capacitive) or with a touch pen for capacitive user interfaces:

- Depending on the application-specific functions shown in the display area, for example, by:
 - pressing a softkey or a displayed button
 - Gestures with up to 5 fingers

**WARNING****Unexpected machine movements caused by incorrect operation**

Incorrect operation of devices with a touch screen can lead to unexpected machine movements. This can result in death, serious injury and material damage.

- Prevent unintentional incorrect operation by appropriate configuration of the user interface, e.g. by placing the buttons for starting and stopping machine components far enough apart.
- Configure the machine so that safety-related functions are not operated with the touch screen.

Note**Notes on operation of the touch-sensitive glass surface with multi-finger operation function using gestures**

Observe the following notes in order to avoid incorrect operation of the touch-sensitive glass surface with multi-finger operation function. Otherwise, entries made at the device will either be incorrectly identified/implemented - or not at all.

- Safety-related functions must not be implemented in the touch-sensitive glass user interface.
- The touch-sensitive glass surface reacts to contact with its surface, not to pressure. Therefore, do not subsequently attach a protective film to the touch-sensitive glass surface. Also remove all protective and packaging films, as these have a negative impact/prevent data from being entered and initiate incorrect operator entries.
- Only operate the touch-sensitive glass user interface with your finger tips.
- Touch the touch-sensitive glass surface either perpendicularly or at a maximum angle of 45° to the surface.
- Avoid unintentional multiple touches, e.g. with the knuckles or by leaning on or against the display.
- Make sure that the surface of the touch-sensitive glass screen is free of dirt.

Always check whether the executed operator actions have been recognized by the device.

Note

Note the valid C standards for the particular machine type (e.g. for turning machines: EN ISO 23125-2010, pages 36 and 49). This states that a button that initiates motion with the protective door open must be implemented using an additional acknowledgment device; this is because for single-channel keyboards generally no PL (performance level) level "d" can be achieved.

Displaying the TCU menu

To display the TCU menu, simultaneously touch the left-hand and right-hand lower corner of the active display area in order to display the TCU menu.

Gloves

You can wear thin gloves made of cotton or gloves for touch-sensitive glass user interfaces with capacitive contact function when operating the touch-sensitive glass user interface.

You can wear the following gloves for operating the touch-sensitive glass user interface of the operator panel front:

- Dermatril L
- Camatril Velours Art. 730
- Uvex Profas Profi ENB 20A
- Comasec PU 900 (4342)
- Camapur Comfort Antistatic type 619
- KCL Men at Work Art. 301

2.7 Screen brightness control

- Carex Art. 1505/k (leather)
- Reusable gloves, medium, white, cotton: BM Polyco

Note

The gloves listed above are recommendations only. The type designations can change.

Information about third-party software used

This product contains open source software. License information can be obtained via the shortcut "License files" on your SINUMERIK PCU desktop, or navigate to the SINUMERIK Operate Readme OSS path "Setup/system data: System CF card/siemens/oss-license" on your SINUMERIK NCU and read the appropriate OSS file for this device.

2.6 Interfaces

Interface	Interface designation
X51	24 V power supply and control signals
X23	(Reserved for the SD card)
X3	Ethernet (IE / PN (optional))
X5	USB 3.0 SuperSpeed (for service purposes only)

2.7 Screen brightness control

If a screen with high contrast is displayed unchanged for longer than 1 hour, the screen brightness control must be activated (screen switched dark) in order to protect the TFT display against a phenomenon known as "burn-in" of the last displayed screen.

The activated screen brightness control switches the backlight off if it is inactive for a lengthy period. Switching off the backlight prevents excessive heating of the device and lengthens the service life of the backlight.

For more information see:

- IM9 Commissioning Manual SINUMERIK Operate
- IM4 HMI-Advanced Commissioning Manual

Dimension drawings

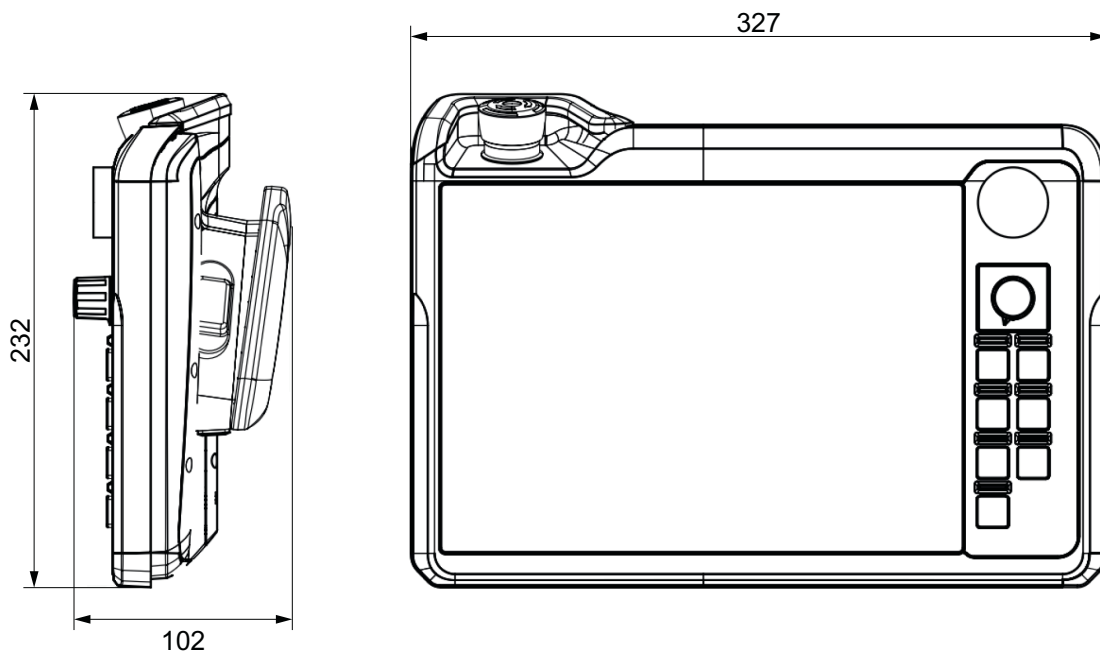


Figure 3-1 Front and side view of HT 10 (all dimensions in mm)

Connecting

4

4.1 Overview

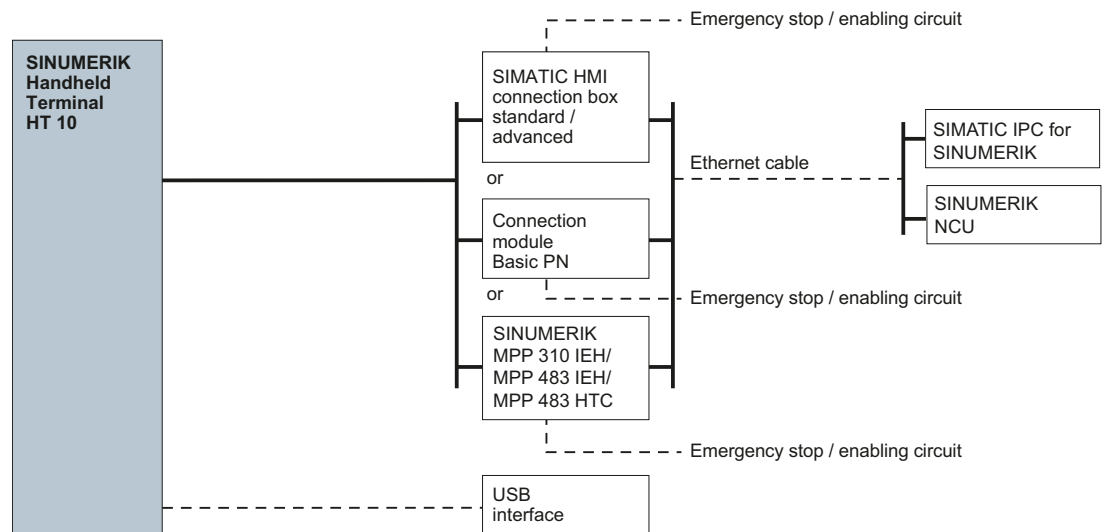


Figure 4-1 Connection overview of the HT 10

The HT 10 is designed for communication in an Ethernet network. The following connection options are available:

- SIMATIC HMI connection box standard/connection box advanced
- PN Basic connection module (for control cabinet installation) or
- MPP 310 IEH / MPP 483 IEH / MPP 483 HTC

HT 10 with		
SIMATIC HMI connection boxes standard and advanced	PN Basic connection module	MPP 483 HTC

Connection via the SIMATIC HMI connection box advanced allows quick connection and disconnection during machine operation without tripping an emergency stop.

NOTICE**Damage through regenerative feedback**

Regenerative feedback of voltage to ground by a connected or installed component can damage the device.

Connected or built-in I/Os, for example a USB drive, are not permitted to supply any voltage to the device. Regenerative feedback is generally not permitted.

4.2 Pin assignment of the interfaces

I	Signal input
O	Signal output
B	Bi-directional signal
V	Supply voltage
K	Contact
VI	Voltage input
VO	Voltage output

See also

Pin assignment of the interfaces (Page 26)

4.2.1 Power supply

Connector designation:	X 51
Connector type:	12-pole connector plug with coding and locking

Pin	Signal name	Signal type	Signal type
1	nc		
2	nc		
3	ENABLE 2+	(Enabling button channel 2, digital)	I
4	ENABLE 2-	(Enabling button channel 2, digital)	O
5	ENABLE 1+	Enabling button channel 1, digital	I
6	ENABLE 1-	Enabling button channel 1, digital	O
7	STOP -13	EMERGENCY STOP circuit 2	K
8	STOP -14	EMERGENCY STOP circuit 2	K

Pin	Signal name	Signal type	Signal type
9	STOP -23	EMERGENCY STOP circuit 1	K
10	STOP -24	EMERGENCY STOP circuit 1	K
11	P24	+24 V power supply	VI
12	M24	External ground	VI

4.2.2 USB interfaces

X5: USB interface

The USB interface conforms to the specification for USB 3.0 Hi-Speed type A.

Connector designation:	X5
Connector type:	Type A socket
Current carrying capacity	0.9 A
Max. cable length	5 m

Pin	Signal name	Signal type	Signal type
1	Shield	Shield	
2	+5 V	Power supply for external devices	VO
3	USB-DN	USB data - channel 1	B
4	USB-DP	USB data + channel 1	B
5	0 V	Ground	VO
6	Shield	Shield	

NOTICE

Damage to the connector caused by missing protective cap

Replace the USB connector if its protective cap is torn, because the connector is no longer protected against dirt.

NOTICE

Damage to the inserted USB FlashDrive should the HT 10 fall to the ground

An inserted USB FlashDrive can be damaged or broken off if the device falls.

Hot-plugging-capable devices are connected during operation and are identified automatically.

Note

Correct identification is only guaranteed for USB I/Os that comply to 100% with the USB specification.

USB sticks

If you want to connect a USB stick to the USB interface, preferably use the tested SIMATIC USB stick 16 GB for this purpose (Article No.: 6ES7648-0DC60-0AA0). Alternatively, you can use a USB stick with any memory size. It must, however, meet the following minimum requirements:

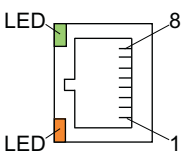
- File system: FAT16 or FAT32
- Partitioning: only in PC partition format (MBR)

USB sticks that deviate from these requirements have not been tested and may not be recognized.

4.2.3 Ethernet RJ45 interface

Connector type:	Standard RJ45 socket
Max. data transmission rate:	10/100 Mbps
Max. cable length:	100 m

Table 4-1 Assignment of the Ethernet RJ45 interface 10/100 Mbit/s

Connector	Pin	Name	Type	Remark
	1	TxD+	O	Transmit data
	2	TxD-		
	3	RxD+	I	Receive data
	4/5	GND	-	(terminated internally with 75 Ω; not required for data transmission)
	6	RD-	I	Receive data
	7/8	GND	-	(terminated internally with 75 Ω; not required for data transmission)
	Shield	-	-	On connector housing
	-	Green LED (right)	-	Illuminated: 10 or 100 Mbit/s Off: No or faulty connection
	-	Orange LED (left)	-	Illuminated: Data exchange Off: No data exchange

Note

Connection only on LAN, not on telecommunication networks!

4.3 Power supply

Power is supplied to the HT 10 from a connection box through the connecting cable. The following power consumption values for an HT 10 provide a configuration basis for calculating the 24 V DC power supply supply.

Table 4-2 Input voltage specification

Typ. power consumption	Max. power consumption
0.6 A	3 A (short-time)

Note

When using external power supplies (e.g. SITOP), the ground potential of the power supply must be connected to the protective conductor connection of the system (SELV/PELV).

Note

Ground potential and enclosure (PE) are connected internally to one another with low impedance.

Interface characteristics

The following special requirements apply to the connecting cables:

- The 24 V DC cable must be approved for temperatures up to 70 °C.
- Observe the permissible bending radius of the cables.
- Route all the cables so that they cannot be crushed or pinched.
- Route all the cables so that they cannot come into contact with chafing edges.

Les câbles de raccordement doivent répondre aux conditions suivantes :

- Le câble 24 V CC doit être autorisé pour des températures jusqu'à 70 °C.
- Tenir compte du rayon de courbure admissible des câbles.
- Pose les câbles de manière à ce qu'ils ne pincient pas les câbles.
- Pose les câbles en évitant tout contact avec des arrêtes abrasives.

**WARNING****Warning for areas subject to NEC or CEC:**

Safety notice for connectors with Ethernet marking:

A Ethernet or Ethernet segment, with all its associated interconnected equipment, shall be entirely contained within a single low-voltage power distribution and within a single building. The Ethernet is considered to be in an "environment A" according IEEE802.3 or "environment 0" according IEC TR 62102, respectively.

Never make direct electrical connection to TNV-circuits (Telephone Network) or WAN (Wide Area Network).

Note

When connecting an external 24 V DC power supply to the interfaces, it must meet the requirements of a protective extra low voltage (SELV/PELV) according to UL 61010. A series fuse must also be used, which reliably trips within 120 seconds when a short-circuit occurs at an ambient temperature of 0 °C.

For a primary supply of the power supply used from OVC III circuits up to 600 V AC (line to neutral voltage), it must be ensured that the contact gap of the fuse – or the individual fault-proof circuit – is 3.0 mm according to UL 61010.

When using an external power supply, ensure that the fuse used has a trip rating that corresponds to the maximum possible short-term short-circuit current of the power supply unit being used.

4.4 SIMATIC connection box

4.4.1 Description

Two versions of the SIMATIC connection box are available.

- **Connection box standard**
The connection box standard is intended for use outside the control cabinet.
The connection box standard can be used if hot plugging is not required. The Emergency Stop circuit can be overridden here by external mechanisms.
- **Connection box advanced**
The connection box advanced is intended for use outside the control cabinet.
The connection box advanced can be hot plugged. This means that it is possible to connect and disconnect during operation without any disruption.
The emergency stop circuit is automatically maintained during the switching of connectors.
The connection box advanced also has:
 - Real-time Ethernet
 - F signal override

The connection boxes have two rotary coding switches (S1 and S2) for setting a unique ID for station identification. See Chapter interfaces (Page 54).

NOTICE

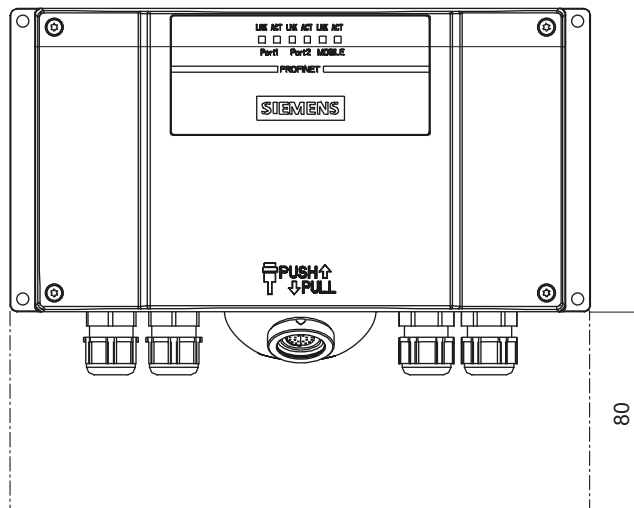
Versions of the connection box

If you install connection boxes with and without an emergency stop override in your fail-safe automation system, there is a risk of inadvertently tripping a disconnection when switching the connectors an HMI device.

Therefore use only the "standard" or "advanced" versions of the connection box in a fail-safe automation system.

Clearance

The connection boxes standard and advanced require the following clearances:



Note

Degree of protection IP65 is ensured on the connection box if an HT 10 or a dummy cap is inserted.

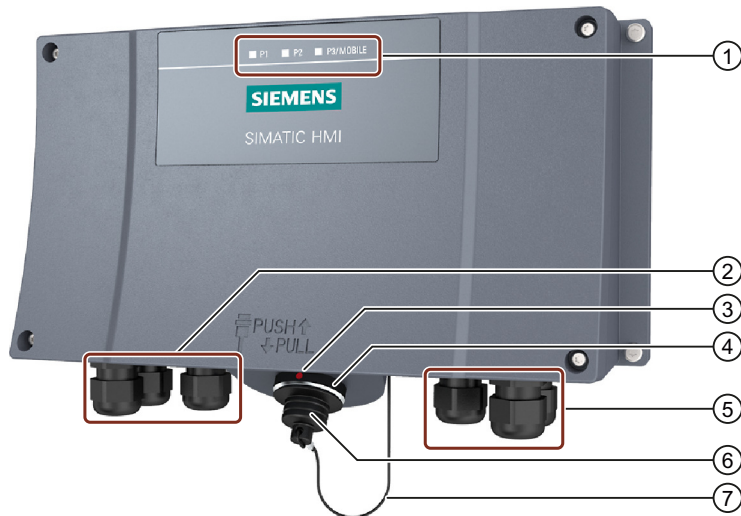
Additional references

You can find a detailed description in the Operating Instructions for the "SIMATIC HMI Mobile Panels 2nd Generation":

<http://support.automation.siemens.com/WW/view/de/109477845/>

4.4.2 Connection box standard

In contrast to the connection box advanced, the "Stop loop through" function is not implemented in the connection box standard. Relays are so not required.



① LED display

② Screw glands for the data cables

③ Position mark

There is also a red position mark on the connecting cable. Align this with the position mark on the connection box when connecting.

④ Connection socket for the connecting cable

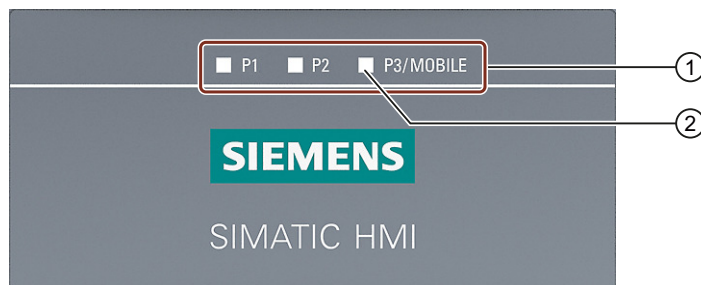
⑤ Screw glands for the power supply cables and F signal cables

⑥ Sealing cap of the connection socket

⑦ Safety strap

Figure 4-2 Connection box standard

On the front of the connection box, there are 3 LEDs which indicate the state of communication.



① LED display of the three Ethernet ports:

- P1: Fast Connector X1
- P2: Fast Connector X2
- P3: Connection socket for the HT 10

② LED

Basic functions of the LEDs:

- LED lights up green: Link present, no data transmission
- LED flashes yellow green or lights up yellow: Link present, transmitting data

Further information about the possible states of the LEDs can be found in the following document:

"SCALANCE X-200" Operating Instructions (<https://support.industry.siemens.com/cs/document/102051962/simatic-net%3A-industrial-ethernet-switches-scalance-x-200?dti=0&lc=en-WW>)

Switching states of the emergency stop circuit

HT 10	Emergency Stop button	Switching status, emergency stop circuit
Connected	Not pressed	Emergency stop circuit in the connection box remains closed.
Connected	Pressed	The emergency stop circuit in the connection box is open. The monitored system is stopped.
Not connected	-	The emergency stop circuit in the connection box is open. The monitored system is stopped.

Note

The emergency stop circuit is controlled via the emergency stop button when the HT 10 is inserted. If the connecting cable of the HT 10 is unplugged from the connection box standard, the emergency stop circuit is interrupted. This leads to a safe machine stop or an Emergency Stop of the monitored system.

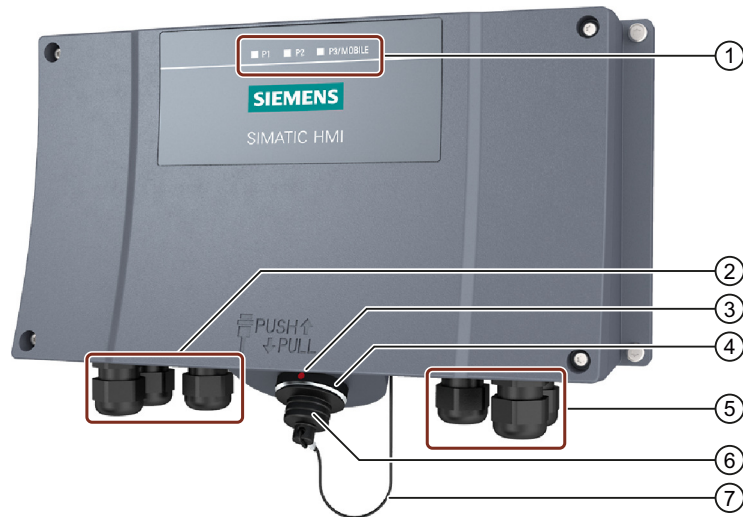
WARNING

Danger of death resulting from the premature emergency stop unlocking

Premature unlocking of the emergency stop can lead to death, serious injury and/or machine damage.

If you have shut down the monitored system, you can only release the emergency stop button or put the monitored system back into operation if the conditions that tripped the emergency stop have been eliminated and a safe restart is ensured.

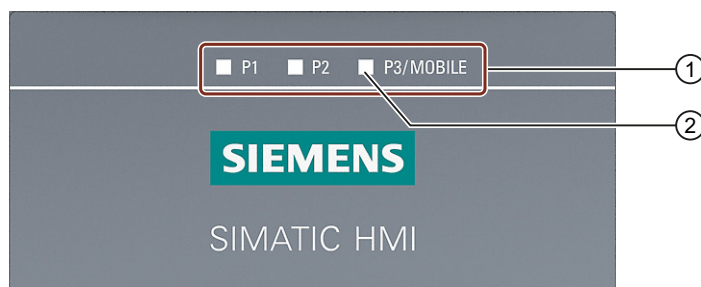
4.4.3 Connection box advanced



- ① LED display
- ② Screw glands for the data cables
- ③ Position mark
There is also a red position mark on the connecting cable. Align this with the position mark on the connection box when connecting.
- ④ Connection socket for the connecting cable
- ⑤ Screw glands for the power supply cables and F signal cables
- ⑥ Sealing cap of the connection socket
- ⑦ Safety strap

Figure 4-3 Connection box advanced

On the front of the connection box, there are 3 LEDs which indicate the state of communication.



- ① LED display of the three Ethernet ports:
 - P1: Fast Connector X1
 - P2: Fast Connector X2
 - P3: Connection socket for the HT 10
- ② LED

Basic functions of the LEDs:

- LED lights up green: Link present, no data transmission
- LED flashes yellow green or lights up yellow: Link present, transmitting data

Further information about the possible states of the LEDs can be found in the following document:

"SCALANCE X-200" Operating Instructions (<https://support.industry.siemens.com/cs/ww/en/view/102051962>)

NOTICE

Removing the HT 10 from the connection box advanced

Removing the HT 10 from the connection box advanced closes the emergency stop circuit and cancels the stop state of the monitored system, irrespective of whether the emergency stop button on the HT 10 had been pressed.

Switching states of the emergency stop circuit

HT 10	Emergency Stop button	Switching status, emergency stop circuit
Connected	Not pressed	Emergency stop circuit in the connection box remains closed.
Connected	Pressed	The emergency stop circuit in the connection box is open. The monitored system is stopped.
Not connected	-	Emergency stop circuit in the connection box is closed. The monitored system continues to run.



WARNING

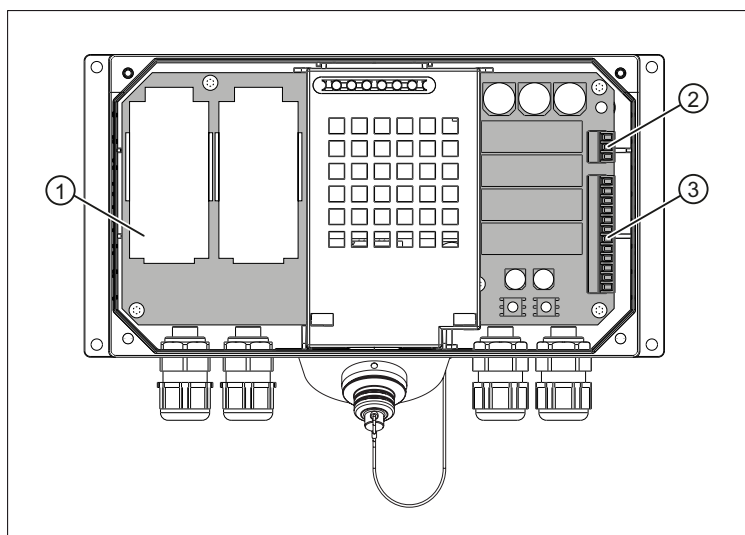
Danger of death resulting from the premature emergency stop unlocking

Premature unlocking of the emergency stop can lead to death, serious injury and/or machine damage.

If you have shut down the monitored system, you can only release the emergency stop button or put the monitored system back into operation if the conditions that tripped the emergency stop have been eliminated and a safe restart is ensured.

4.4.4 Interface assignment

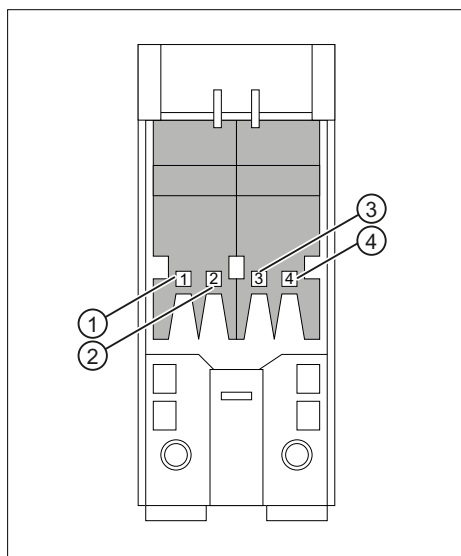
Location of the interfaces



- ① Fast connector
- ② Terminal strip 1
- ③ Terminal strip 2

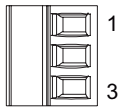
Fast Connector, 4-pin

The connection box contains two fast connectors for connecting the PROFINET data cables. The figure below illustrates the assignment of the fast connector:



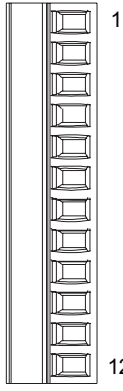
Pin	Signal name
1	RD+
2	TD+
3	RD–
4	TD–

Terminal strip 1, for power supply, 3-pin

	Pin	Signal name
	1	PE
	2	M24
	3	P24

Terminal strip 2, 12-pin

The safety and additional functions are connected to this terminal strip. The terminal strip is mechanically coded to prevent it from being confused with terminal strip 1.

	Pin	Internal interconnection	Signal name	Circuit
	1		STOP13	Emergency Stop button
	2		STOP14	
	3		STOP23	
	4		STOP24	
	5		+24 V ¹⁾	Accompanying control signals
	6		CTRL32 ^{1) 2)}	
	7		PRESENT31 ³⁾	
	8		+24 V ¹⁾	
	9		ENABLE2+	Enabling button
	10		ENABLE1–	
	11		ENABLE1+	
	12		ENABLE2–	

¹⁾ Applies only to the connection box advanced

²⁾ Active, if the Emergency Stop pushbutton is pressed

³⁾ Active if HT 10 is inserted

HT 10 on the connection box	Signal at digital input of the control
Not connected	"0"
Connected	"1"

Note

The "Emergency Stop button pressed" signal has no error detection facility and must, therefore, not be used for safety-critical applications.

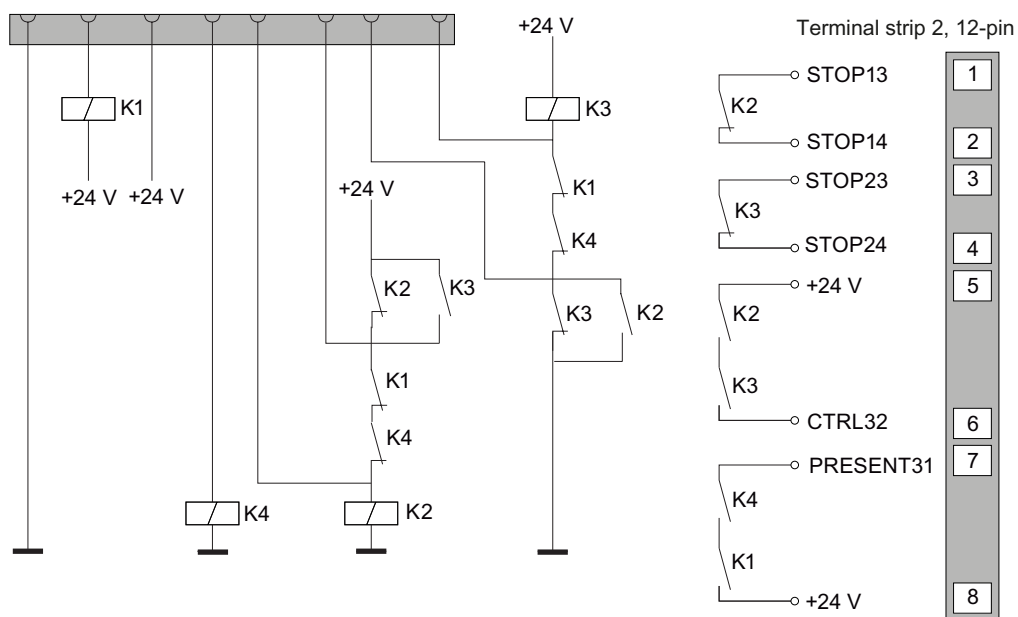
Circuit examples of the connection box advanced

Figure 4-4 Circuit example 1: HT 10 not inserted and power supply switched on

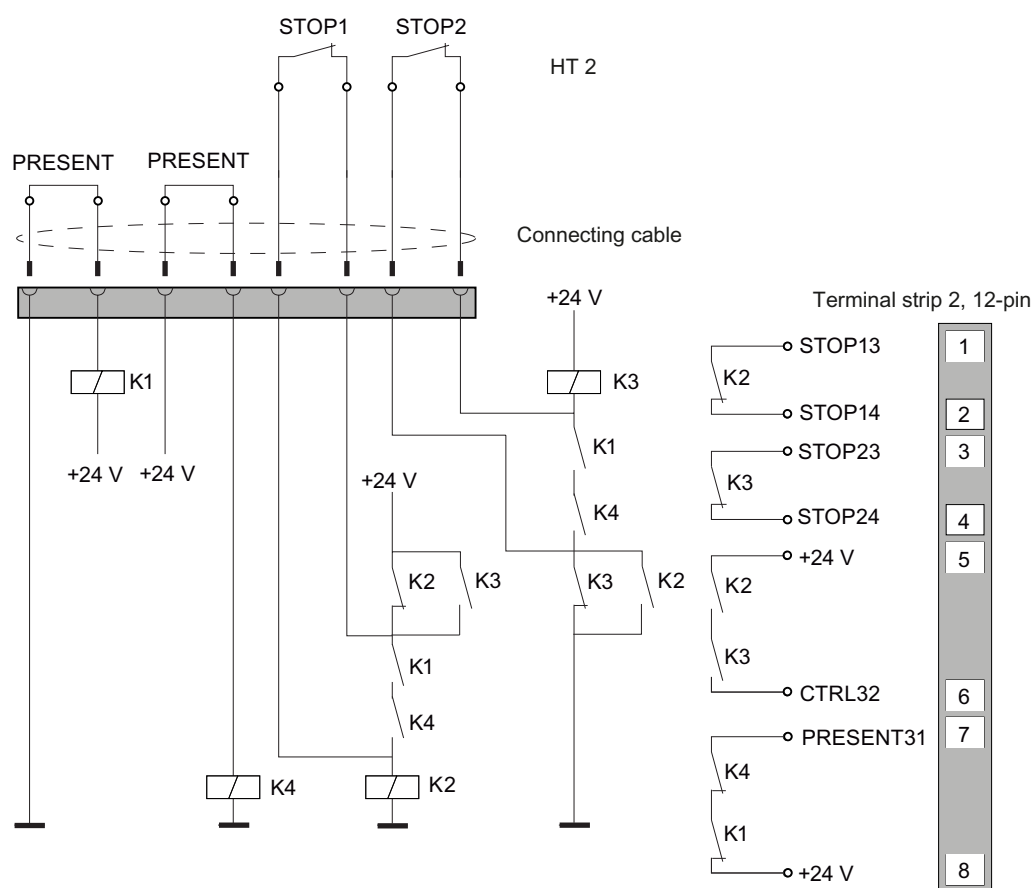


Figure 4-5 Circuit example 2: HT 10 inserted, power supply switched on and emergency stop inactive

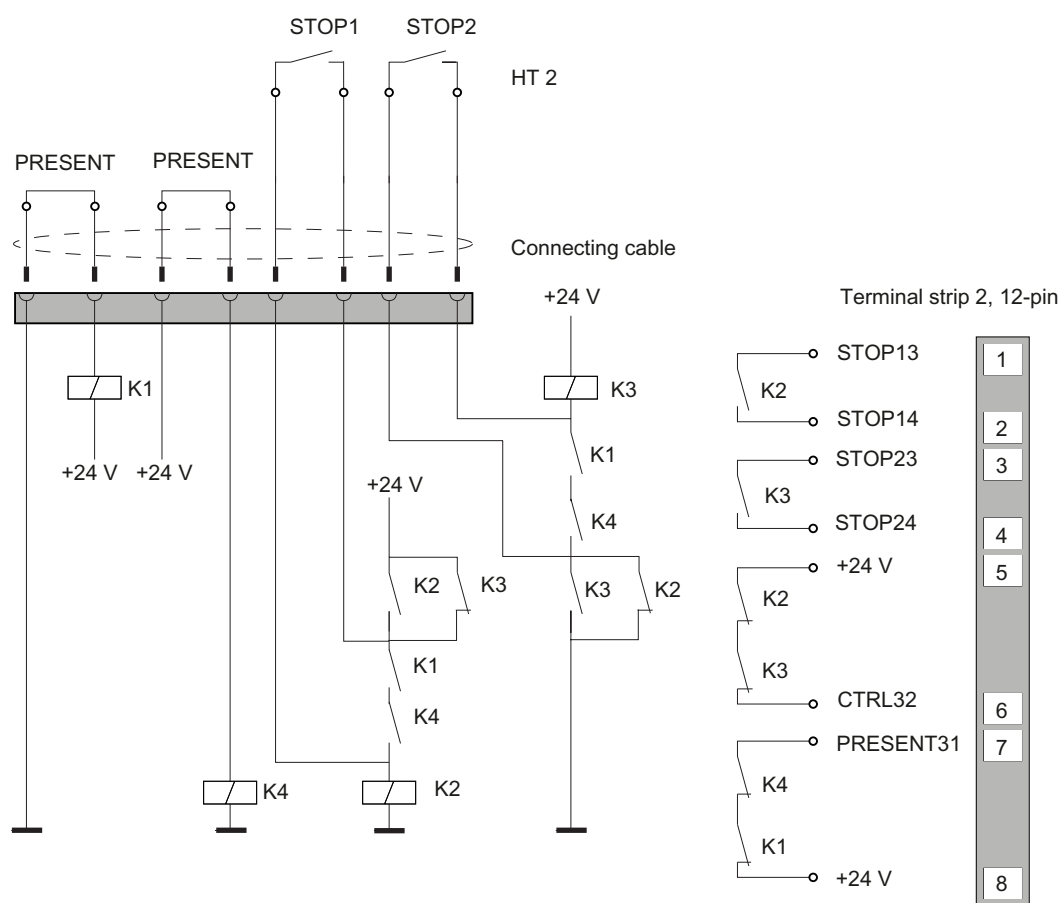


Figure 4-6 Circuit example 3: HT 10 inserted, power supply switched on and emergency stop active

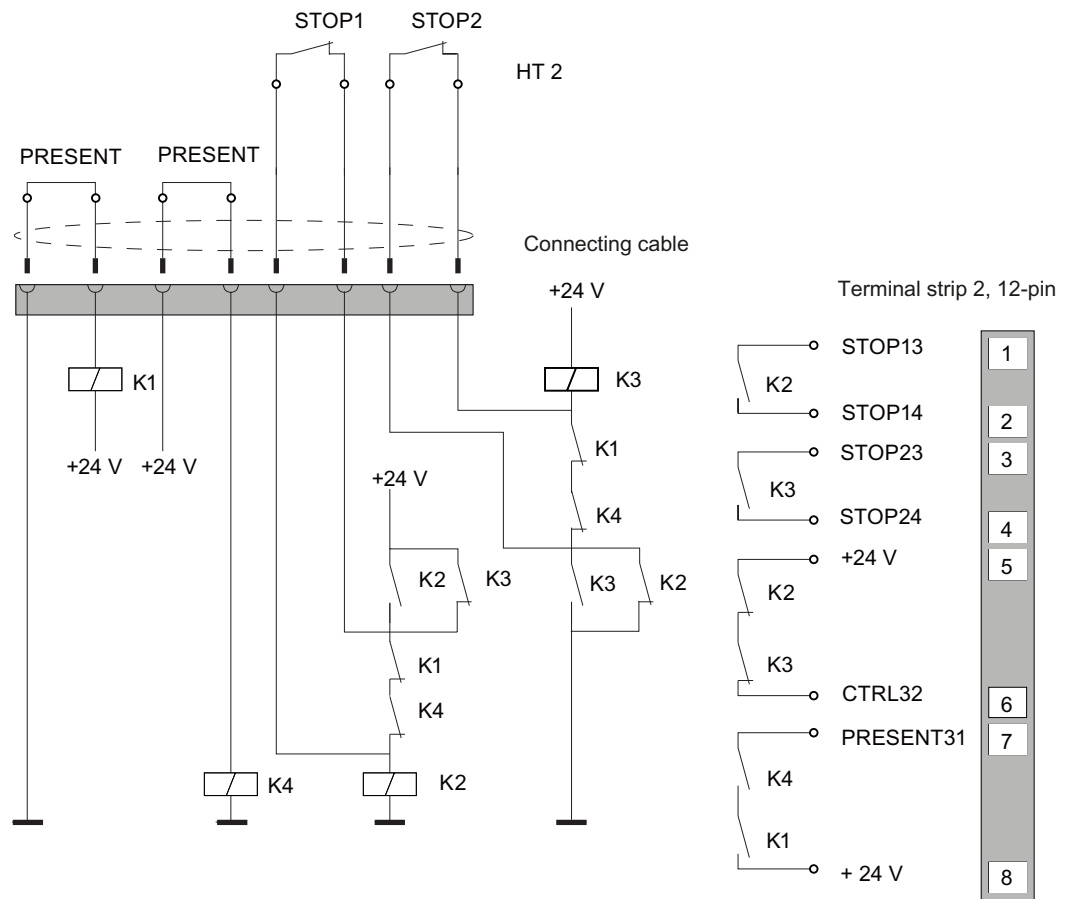


Figure 4-7 Circuit example 4: Power supply switched off

The "CTRL32 / STOP button pressed" signal is not available with the connection box standard. The signal has no error detection facility and must, therefore, not be used for safety-critical applications.

Observe the following when connecting the signal "Present31 HT 10 inserted":

- Connect Pin 7 of the connection box to the digital input of the control
- Connection box standard: Pin 8 of the connection box remains not assigned
- Connection box advanced: +24 V must be supplied at Pin 8

4.4.5 Connecting a connection box

4.4.5.1 Connection information

NOTICE
Foreign objects or liquids Foreign objects or liquids can cause a short-circuit inside the connection box and damage the connection box or HMI device accordingly. Pay attention to cleanliness. Keep foreign objects and liquids away while working on the connection box. Take care when working on the connection box that conducting materials, such as bare cable leads, do not come into contact with the electrical circuits.

NOTICE
Observe local installation regulations Observe the local installation regulations and the local installation conditions, such as protective wiring for power supply cables, when connecting the cables. Short-circuit and overload protection Different measures for short-circuit and overload protection are required when setting up an entire plant. The type of components and the level of obligation for the protective measures depends on the regulation that applies to your plant configuration.

Connection sequence

NOTICE
Potential damage to property with incorrect connection sequence Failure to adhere to the connection sequence can damage the connection box.

Connect the connection box in the following sequence:

1. Functional grounding
2. Power supply
3. Control via PROFINET (LAN)
4. Other Ethernet devices, such as an additional connection box

4.4.5.2 Opening and closing connection box standard and connection box advanced

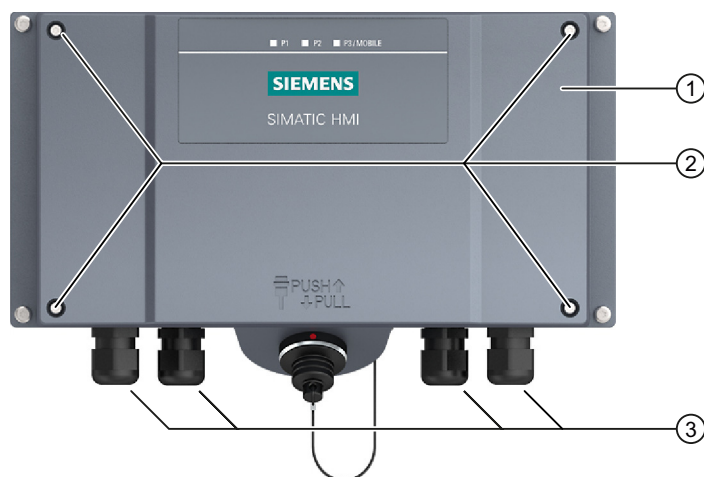
The connection boxes standard and advanced must be opened for connecting and setting the box ID.

Requirement

- The connection box is de-energized.
- Torque screwdriver with T10 insert

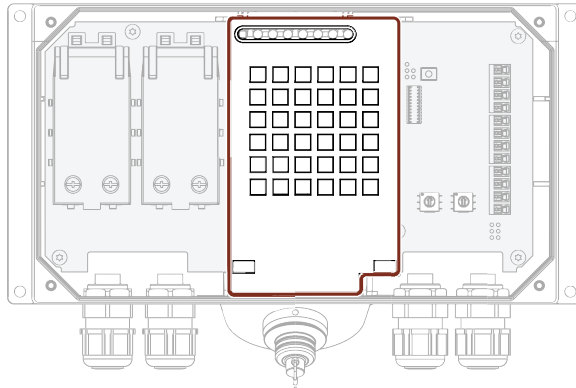
Procedure

Open



- ① Cover
- ② Screws
- ③ Screw glands M16x1.5 for cable diameters 5 to 10 mm

1. Loosen the 4 screws ②.
2. Lift the cover ① carefully, because the seal may stick to the lid and can be pulled out.
3. Remove the screws and the cover.
The following protective cover is visible:

**NOTICE****Damage to the connection box**

Without a protective cover, there is a risk that the electronics of the connection box are damaged or destroyed.

Do not remove the protective cover.

Close

Follow the steps for opening in reverse order.

NOTICE**Permissible torque**

The connection box enclosure is made of plastic. Therefore, the mounting hole threads cannot handle the same amount of stress as a comparable metallic enclosure. If the screws are tightened with too great a torque or more than 20 times, there is risk of damage to the thread.

Do not exceed 0.4 to 0.5 Nm of torque when tightening the screws.

Note

During assembly, make sure that the seal for the cover is inserted and not damaged. Otherwise the specified degrees of protection cannot be guaranteed.

4.4.5.3 Equipotential bonding of connection boxes

Potential differences

Differences in potential between separated plant components can lead to high equalizing currents over the data cables, destroying the circuits. This situation may arise if the cable shielding is terminated at both ends and grounded at different system parts.

Differences in potential can also be caused by different mains supplies.

General requirements for equipotential bonding

Differences in potential must be reduced far enough with equipotential bonding conductors to ensure error-free operation of the relevant electronic components. The following information must therefore be observed when installing the equipotential bonding:

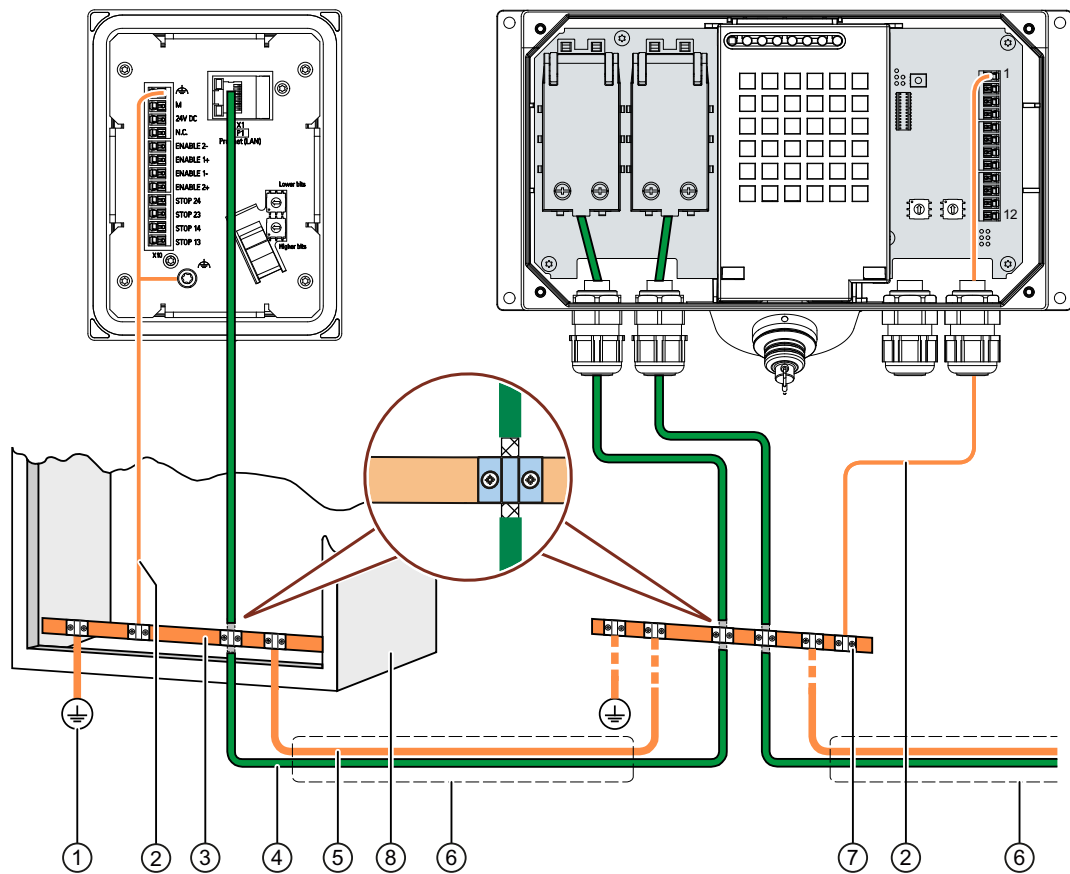
- The effectiveness of equipotential bonding increases as the impedance of the equipotential bonding conductor decreases or as its cross-section increases.
- If two plant sections are interconnected by means of shielded data cables and their shielding is connected at both ends to the grounding/protective conductor, the impedance of the additionally installed equipotential bonding conductor must not exceed 10% of the shielding impedance.
- The cross-section of a selected equipotential bonding conductor must be capable of handling the maximum equalizing current.
Equipotential bonding cables are required between two control cabinets with a minimum conductor cross-section of 16 mm².
- Use equipotential bonding conductors made of copper or galvanized steel. Connect the equipotential bonding conductors to the ground / protective conductor over a wide area. Protect the equipotential bonding conductors against 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 them.

Note

Cable shielding is not suitable for equipotential bonding. Always use the prescribed equipotential bonding conductors. When installing PROFINET networks, always use cables with a sufficient cross-section. Otherwise, there is a risk that interface components will be damaged or destroyed.

Connection graphic

The figure below shows how to connect the equipotential bonding of the connection boxes to the equipotential busbars.



- ① Ground connection
- ② Equipotential bonding conductor, cross-section 1.5 mm²
- ③ Equipotential busbar for equipotential bonding cables, grounding connection and shield support of the data cables
- ④ Ethernet cable
- ⑤ Equipotential bonding conductor, cross-section ≥ 16 mm²
- ⑥ Parallel routing of the equipotential bonding conductor and data cable
- ⑦ Cable clip
- ⑧ Control cabinet

4.4.5.4 Connecting the functional grounding and power supply to the connection box

The power supply for the HMI device is connected to a terminal strip in the connection box. The connection box has reverse polarity protection.



WARNING

24 V DC power supply

If the supply voltage is outside the specified range, it may cause the HMI device to malfunction. This can result in personal injury or material damage.

Use a 24 V DC power supply with the following properties for the connection box:

- Safe electrical isolation according to IEC 60364-4-41 or HD 384.04.41 (VDE 0100, Part 410).
- The power supply provides safety extra-low voltage according to SELV/PELV up to a maximum of 36 V DC and also does not exceed $U_m = 36$ V DC in case of fault. Refer to the information in the data sheet for overvoltage protection in the event of an internal error or take appropriate voltage-limiting measures, such as the use of a surge protection device.

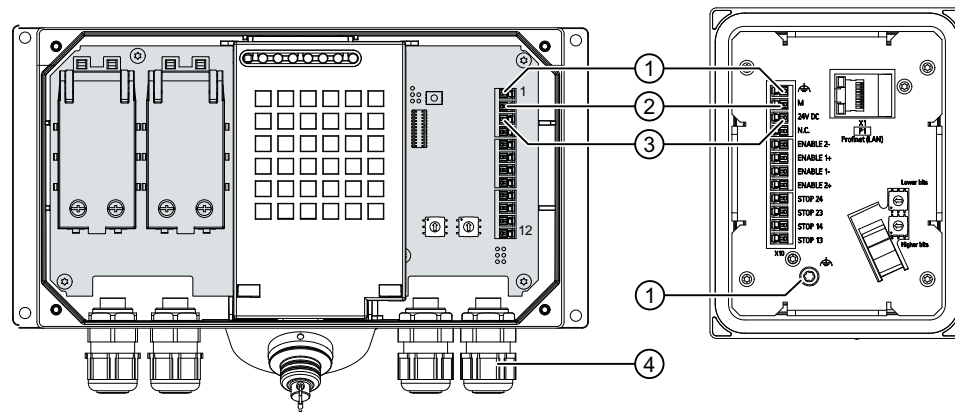
Requirement

- The power supply meets the requirements set out in "Power supply (Page 29)".
- The connection box standard or advanced is open.
- Power supply cables and equipotential bonding conductor
- The wires of the power supply cable have been stripped by 8 mm.
- Matching ferrules when using flexible cables

Procedure

1. For connection box standard and connection box advanced: Thread the cables through the corresponding screw glands.
2. When you use flexible cables, place a wire end ferrule on each wire to be connected.

- Insert the wire ends into the associated spring-loaded terminal as shown in the figures below. The figure below shows the contacts to be connected to the X10 terminal of the connection box and the cable glands for cable entry.



- ① Connection for functional ground
- ② M24
- ③ P24
- ④ Screw gland

- Connect the equipotential bonding conductor to the equipotential busbar.
- Connect the equipotential bonding conductor to the terminal for the functional ground of the connection box.
Connect the equipotential bonding conductor of the connection box as described in the section "Equipotential bonding of connection boxes (Page 45)".

Note

Applies to floating system design:

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

- For connection box standard and connection box advanced:
When all the required work has been completed in the connection box, close it.

4.4.5.5 Connecting cables for a hardwired F-system

The signals for the emergency stop / stop button and the enabling button must be wired for a hardwired F-system.

NOTICE

Length of the data cables to the connection box

If the permissible length of the data cables and signal cables between a connection box and the plant is exceeded, malfunctions may occur. Keep the permissible length of ≤ 30 m for cables between the connection box and the evaluation unit.

Note

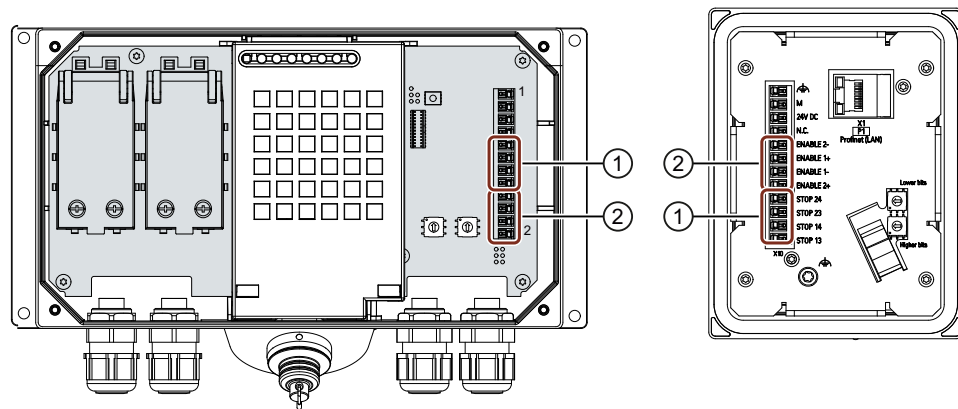
If a connection box is to be operated in "E-stop button evaluated by PROFIsafe" mode, the connection box cannot be wired according to a hardwired F-system.

Requirement

- The connection box standard or advanced is open.
- Required number of connecting cables
- The wires of the connection cables have been stripped by 8 mm.
- Matching ferrules when using flexible cables

Procedure

1. Connection boxes standard and advanced:
Thread the cables through the corresponding screw glands.
2. When you use flexible cables, place a wire end ferrule on each wire to be connected.
3. Insert the wire ends into the associated spring-loaded terminal as shown in the figures below.
The figure below shows the terminals to be connected to the connection box.



- ① Terminal for the emergency stop / stop button
- ② Terminal for the enabling button

4. Connect the cables.
5. For connection box standard and connection box advanced:
When all the required work has been completed in the connection box, close it.

4.4.5.6 Connecting Ethernet to the connection box

Note**Using an Ethernet data transmission rate of 100 Mbps**

The Ethernet data transmission rate of 10 Mbps is not supported by 2nd generation Mobile Panels.

Use a data transmission rate of 100 Mbps for communication with the Mobile Panel.

Maximum cable lengths

Ethernet cable	Connection box used	Maximum cable length including connecting cable
Between Mobile Panel and connection box	• Connection box standard • Connection box advanced	25 m
Between Mobile Panel and PRO-FINET/PROFIsafe station	• Connection box standard • Connection box advanced	125 m

Requirement

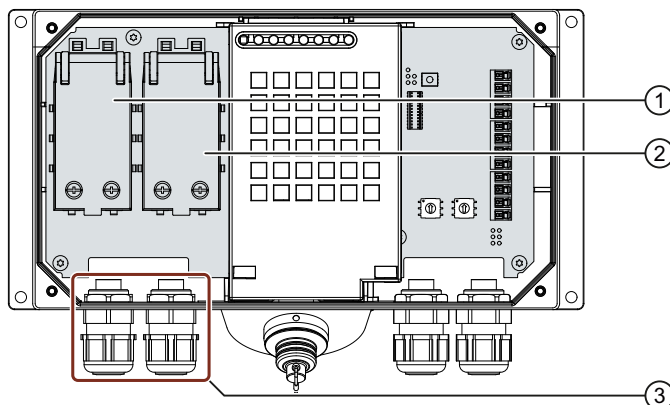
- The connection box is mounted.
- The connection box is open.
- 1 Ethernet cable (not preassembled)
- 1 screwdriver, PZ 2
- 1 stripping tool

Procedure

1. Strip the insulation on the Ethernet cable as shown in the figure below.



2. Open fast connector 1.



- ① Fast connector 1
- ② Fast connector 2
- ③ Screw gland

3. Push the Ethernet cable through the screw gland and connect the wires.
4. Close the fast connector.
Closing the fast connector establishes the contact to the wires in the Ethernet cable.
5. Tighten the screw cap on the screw gland.
The specified degrees of protection are only met when the screw cap has been tightened.
6. Once all the required work in the connection box has been completed, close it.

4.4.5.7 Setting the box ID of the connection box

You need to set a box ID for each connection box. If configured, the box ID can be read by the HMI device and transmitted to the PLC.

The box ID allows connection point detection.

Note

You need to set a box ID for each connection box. Do not assign the same box ID twice.

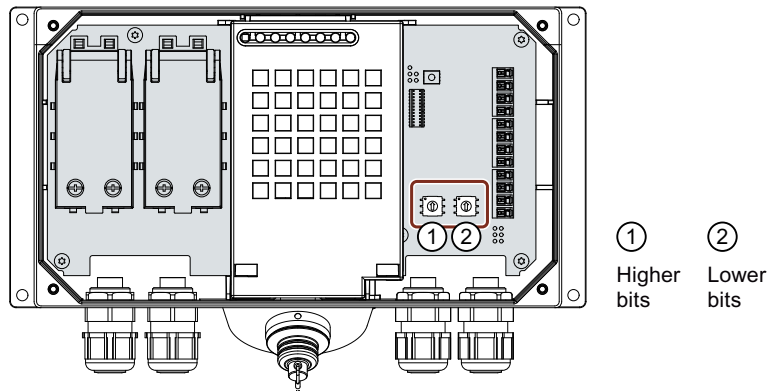
Note**Changing the box ID of a connection box**

Observe the following information when changing the box ID of a connection box:

- If you want to change the box ID of a connection box, remove the connection box from its power supply before you set the box ID with the rotary coding switch.
- After you have confirmed the changed box ID in the dialog "Safety operation", unplug the HMI-device connecting cable from the connection box and then plug it into the connection box again.

Rotary encoder switch

Position of the rotary coding switch in the connection box standard and advanced:

**Requirement**

- The connection box is open.
- The connection box is disconnected from its power supply.
- A suitable tool made of plastic

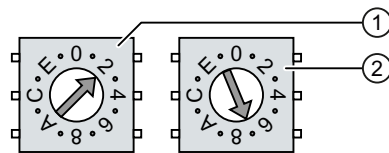
Procedure

1. Rotate the arrows of the rotary coding switch to the required hexadecimal value using a suitable tool.
Values from "00" to "FF" (0 to 255 in decimal form) can be set with the rotary coding switches.
When setting the box ID:

- Use the value "00" only for the "Stop button evaluated by safety relay" operating mode.
- The value "FF" (255) is reserved and may not be used.

Example:

The figure below shows an example of the rotary coding switch for a connection box standard. "27H" (39 in decimal form) is set for the box ID as an example.



- ① Rotary encoding switch for more significant bits
In the connection boxes standard and advanced, it is the left rotary coding switch.
- ② Rotary encoding switch for less significant bits

2. Once all the required work in the connection box has been completed, close it.

4.4.5.8 Secure cables and seal screw glands

After you have connected all cables to the connection box, close and secure the screw glands.

Requirement

For the connection box compact:

- 1 cable tie
- 1 diagonal cutter
- The connection box is closed.

Procedure

1. Check whether the cover is located in the cable glands that are not in use.
2. If a cover is missing, replace it.
3. Tighten the screw cap.



This will ensure IP65 degree of protection for the connection box standard or the connection box advanced.

4.5 PN Basic connection module

4.5.1 Description

The connection module Basic PN was specially developed for installation in the control cabinet. The terminating connector protrudes through the panel of the control cabinet so that the HT 10 can be connected from the outside.

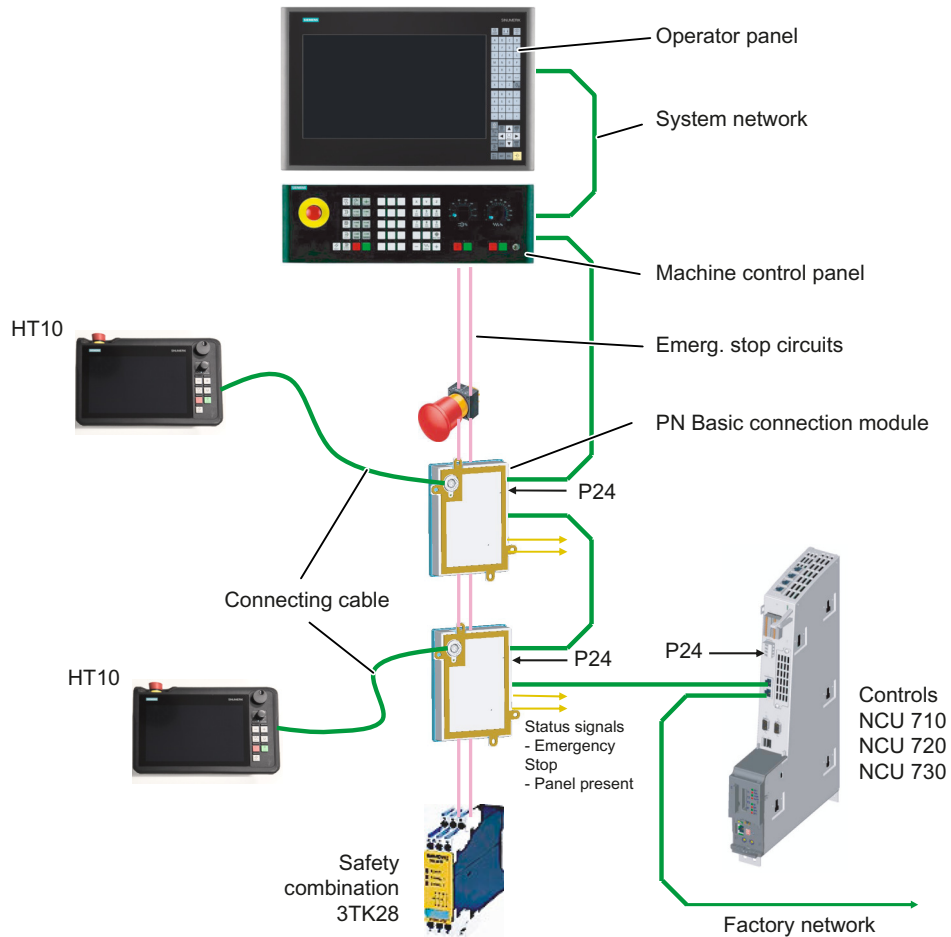


Figure 4-8 System configuration (example)

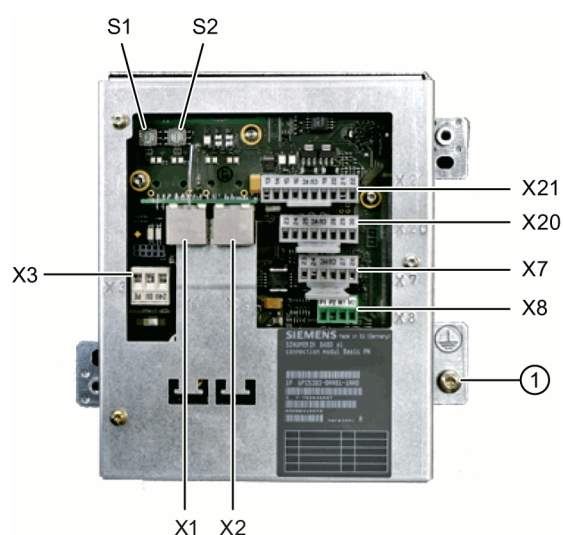
The connection module Basic PN is not hot plug-capable.

The HT 10 can be connected either directly to the NCU or to the PCU as a Thin Client.

4.5.2 interfaces

The connector for the HT 10 is located on the front of the Basic PN connection module.

The other interfaces of the connection module are located at the rear:



① Grounding screw M5 for potential equalization connection

Figure 4-9 Rear of the Basic PN connection module

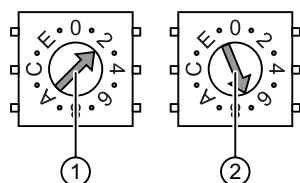
Setting the box ID

You can use rotary coding switches S1 and S2 to set a unique ID on any connection module for station identification purposes.

Use a screwdriver to set the IDs.

The setting is entered in hexadecimal format. Values in the decimal format between 0 and 255 can be entered.

By way of an example, the figure below illustrates address 27H, which corresponds to decimal address 39.



① Rotary coding switch for higher-order bits (S1)

② Rotary coding switch for lower-order bits (S2)

Figure 4-10 Example for address "27H"

Connector pin assignments

Signal type:

- I** Input
- O** Output
- B** Bi-directional signals
- P** Potential

X1, X2: Ethernet interfaces

The pin assignment of the Ethernet interfaces X1 and X2 can be found in the Chapter: "Connecting", Section: "Pin assignment of the interfaces (Page 26)".

X3: Power supply

For the pin assignments of the power supply interface X3, refer to Chapter: "Connecting", Section: "Pin assignment of the interfaces (Page 26)".

X7: Panel Present

Connector designation: **X7**

Connector type: 6-pin Phoenix terminal

Table 4-3 Assignment of the interface Panel Present X7

Pin	Signal name	Signal type	Meaning
1	PRES	O	"High": Panel (HT 10) inserted
2	XCTL	O	"Low": EMER STOP button pressed ¹⁾
3	XFAULT	O	"Low": Error in emergency stop electronics ¹⁾
4	N.C.	-	Not connected
5	N.C.	-	Not connected
6	M	P	Ground

¹⁾ Function not implemented in Basic PN variant, output is not switched to "High"

X8: Emergency Stop wiring terminal

Connector designation: **X8**

Connector type: 4-pin Phoenix terminal

Table 4-4 Assignment of the emergency stop wiring terminal X8

Pin	Protective circuit
1	On-board jumper between 1 and 2
2	
3	On-board jumper between 3 and 4
4	

Note

Use this terminal for simple routing of the emergency stop cables, optional.

The connector is only used to assist looping through. The connected pins 1 and 2 as well as 3 and 4 have no additional function on the connection module.

X20: Enabling buttons

Connector designation: **X20**

Connector type: 8-pin Phoenix terminal

Table 4-5 Assignment of the interface enabling buttons X20

Pin	Signal name	Signal type	Meaning
1	ZUST1P	I	Enabling button 1 P
2	ZUST1M	O	Enabling button 1 M
3	ZUST2P	I	Enabling button 2 P
4	ZUST2M	O	Enabling button 2 M
5	N.C.	-	Not connected
6	N.C.	-	Not connected
7	N.C.	-	Not connected
8	N.C.	-	Not connected

X21: Emergency Stop and key-operated switch

Connector designation: **X21**

Connector type: 10-pin Phoenix terminal

Table 4-6 Assignment of the interface Emergency Stop and Module Supply Voltage

Pin	Signal name	Signal type	Meaning
1	STOP23	B	Emergency Stop circuit
2	STOP24		Emergency Stop circuit
3	STOP13		Emergency Stop circuit
4	STOP14		Emergency Stop circuit
5	M	P	Ground
6	N.C.	-	-
7	IN_E9	P	Connected P24 (jumped to Pin8 during operation)
8	P24_FILT		Filtered 24 V module power supply
9	IN_E9_EXT	O	Feedback signal via connected P24
10	IN_E12_EXT		"High": Terminating connector plugged in

Note

Pins 7 and 8 must be jumpered in order to supply a handheld terminal with power.

4.5.3 Dimension drawing

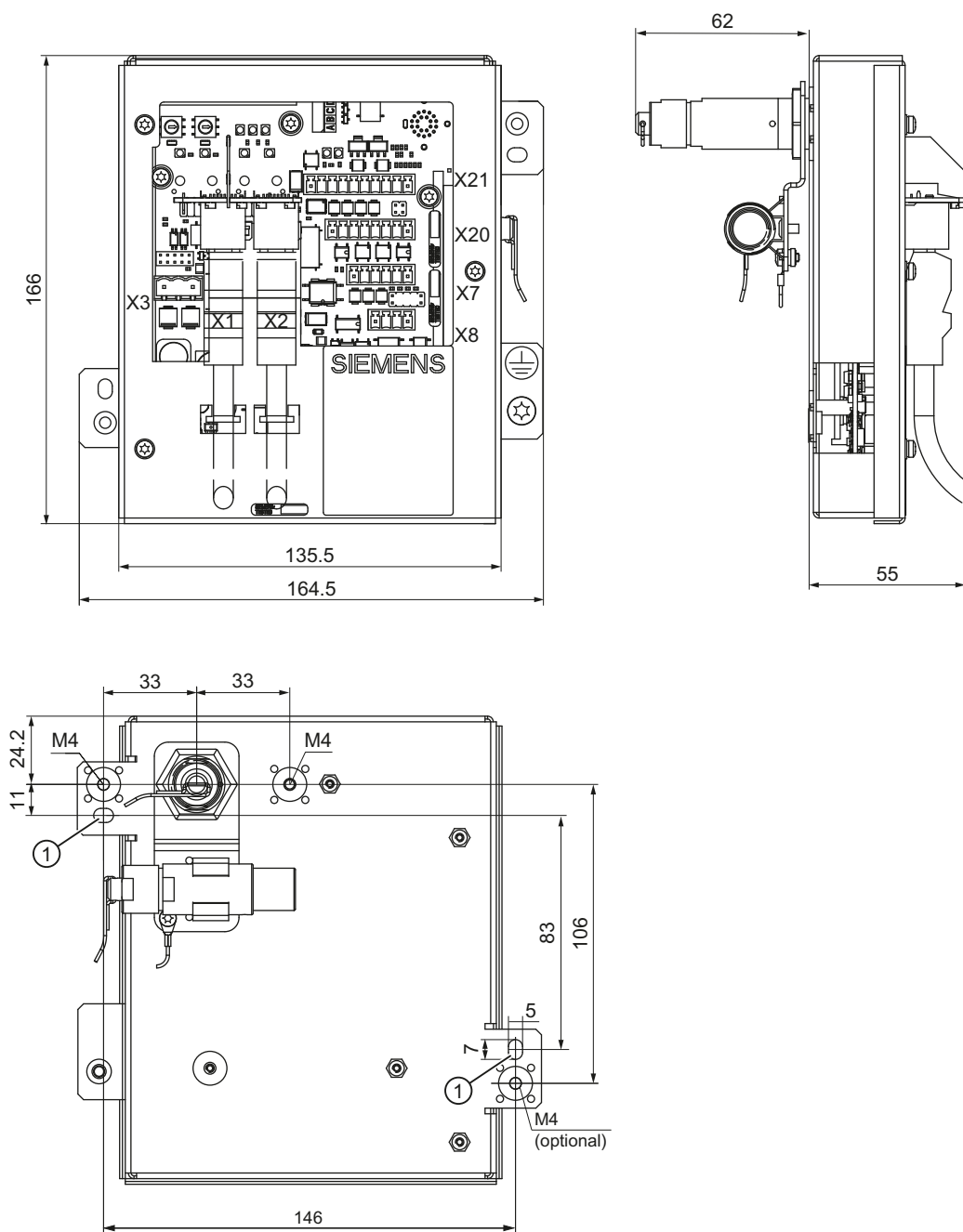


Figure 4-11 Connection module Basic PN - dimension drawing for control cabinet installation

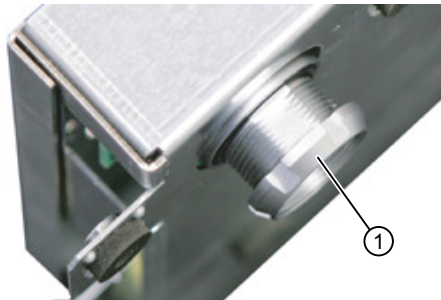
4.5.4 Installing the terminating connector

Procedure

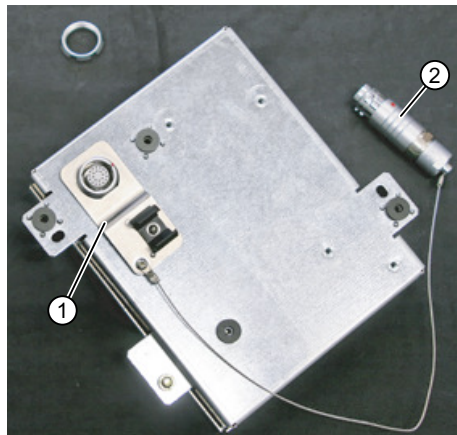
Note

If you never remove the HT 10 from the connection module, it is not necessary to attach the terminating connector.

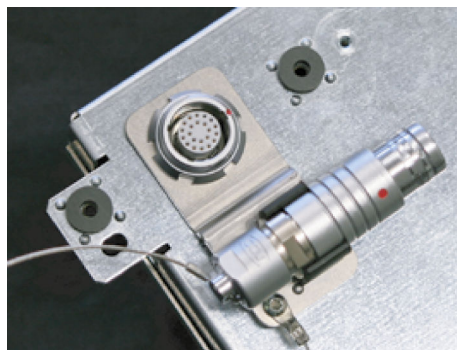
1. Unscrew the fastening nut ①.



2. Attach the bracket ① for the terminating connector ②.



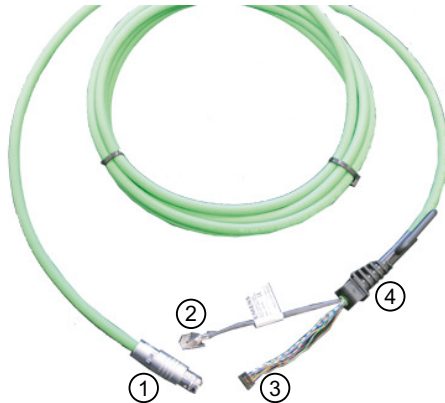
3. Tighten the fastening nut and insert the terminating connector into the bracket.



4.6 Connecting cable

The connecting cable is an industrial cable, can tolerate bending in-line with what is required in practice – and is resistant to many solvents and lubricants.

The connecting cable is available in various lengths. More detailed information is provided in the Chapter "Accessories (Page 93)".



- ① Metallic push-pull round connector (ODU connector)
- ② RJ45 plug to connect to the Ethernet
- ③ Plug connector for enabling button, Emergency Stop, 24 V and safety signals
- ④ Strain relief device and kink protection

Figure 4-12 Connecting cable for the HT 10

The connecting cable is connected to the HT 10 with the RJ45 connector ② and connector ③. The ODU connector ① is used to connect the connecting cable to the connection box / module. The tightening torque for the nut of the ODU socket is 6.5 Nm.

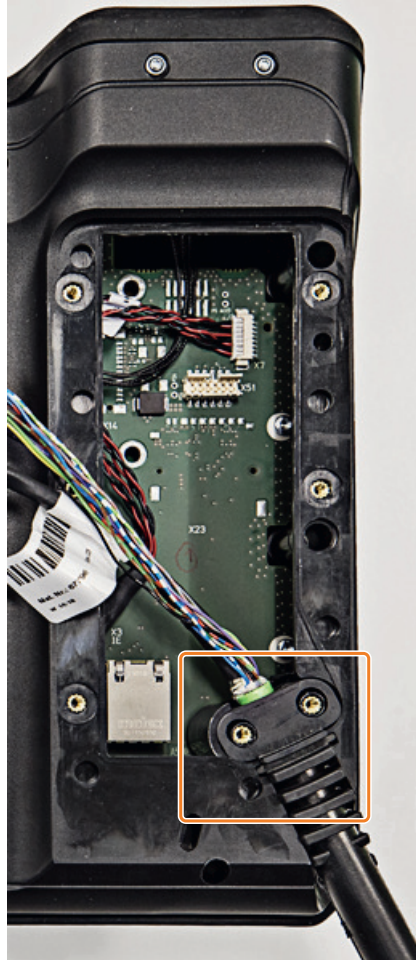
Routing the connecting cable

1. Grease the connecting cable at the entry point with Vaseline.
This ensures a better seal and makes it easier to insert the connecting cable.
2. Insert the connecting cable into the entry.

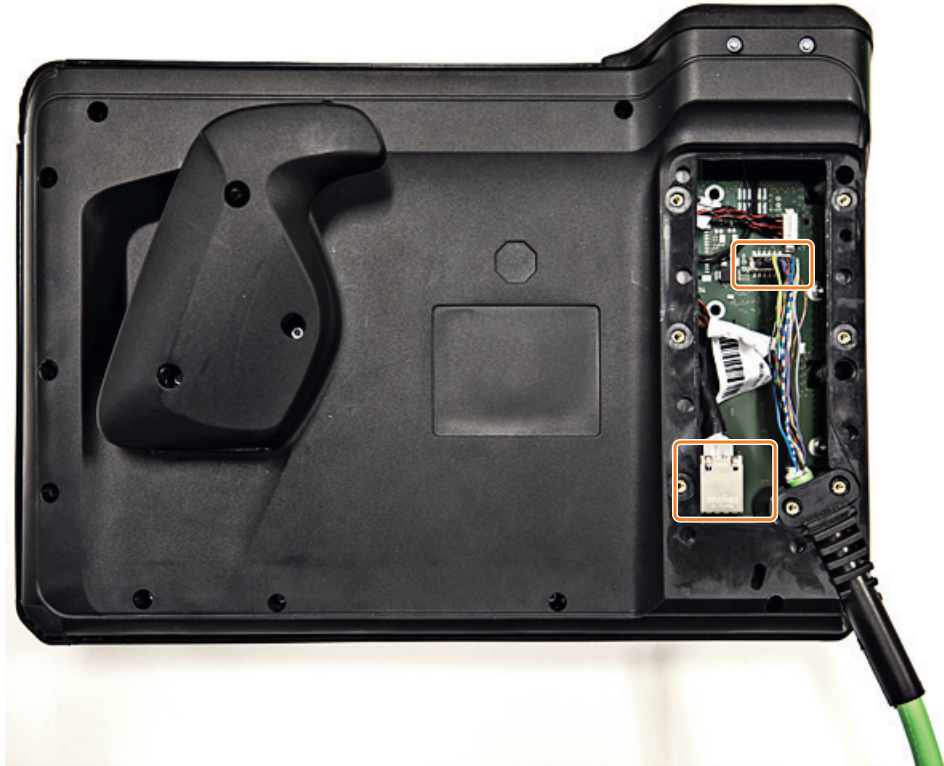
Note

Ensure correct orientation of the connecting cable. The convex side of the anti-kink protection must face away from the device as otherwise the cover will not lie flush on the housing when screwed on.

3. Press the cable lightly downwards until it rests completely on the fastening lugs and is flush with the housing.



4. Press the plug connector firmly into the power supply socket.



NOTICE

Improper installation of the cable can result in failure of the safety functions.

Please observe the following before you reattach the cover:

- Check to ensure that all of the conductors are aligned and straight and check the firm seating of the plug connector.
- Make sure that the connecting cable sleeve is installed correctly.

5. Connect the RJ-45 connector to the Ethernet socket.
6. Mount the cover by screwing in the seven PT screws (4 x 20 mm) for about 1 cm with a torque of 0.3 Nm.
Use a 0.8 x 5.00 mm torx or cross-tip screwdriver for this.

**NOTICE****Damage to the enclosure**

The enclosure of the HT 10 is made of plastic. Therefore, the mounting hole threads cannot handle the same amount of stress as a comparable metal enclosure. Therefore, do not exceed the permissible torque of 0.3 Nm when tightening the screws (also to protect the connecting cable).

If you use a power screwdriver, do not exceed the max. speed of 600 rpm (torque: 1 Nm).

The screws of the cover may only be loosened or tightened a maximum of 20 times. Otherwise, there is the danger that the threads might become damaged and the seal of the enclosure compromised, which could lead to failure of the device.

4.7 Unplugging/plugging during operation

Detectability of an inserted HT 10 in the PLC

1. **HW solution:**

The X7 interface of the Basic PN connection module signals "HT 10 Present" at pin 1 for the "active" connection module (see interfaces (Page 54)).

If the connection module is "inactive", this signal is not set.

This makes the "active" connection module detectable in the PLC by wiring pin 1 of all connection modules with digital I/Os to PLC I/O modules in the PLC.

2. **Permanently configured MCPs / HT 10s connected to one control:**

If only permanently configured MCPs / HT 10s are present on a control, removing the MCPs or HT 10s trips the PLC alarm "400260 Machine Control Panel failed".

Based on this an "active" or "inactive" MCP / HT 10 in the PLC can be detected.

The failure of an MCP / HT 10 is, however, only detected in the PLC if a max. of 2 MCPs / HT 10s are permanently configured and there is no MCP switchover using FB9 (e.g. tripped when operator focus is switched on the operator panel).

Note

Removing an HT 10 where the integrated machine control panel is active

Depending at which interface in the PLC (FB1: MCP1 or MCP2) the HT 10 is configured, the transmission of machine control panel signals must be stopped before the HT 10 is removed. This is possible as a direct access via data block DB7 (instance of the FB1).

To do this, set the corresponding interface signal to "true":

- 1st interface: DB7.DBX62.1 (MCP1Stop)
- 2nd interface: DB7.DBX62.2 (MCP2Stop)

If the machine control panel signals are not stopped, the message "400260 machine control panel x failed" appears on the user interface:

Transmission of the machine control panel signals can be restarted after inserting the HT 10. To do this, set e.g. the PLC interface signal DB7.DBX62.1 (MCP1Stop) to "false".

Commissioning

5.1 Activating/deactivating the virtual keyboard

The virtual keyboard is configured in the file "slguiconfig.ini".

Procedure

1. Copy the "slguiconfig.ini" file from the folder
/siemens/sinumerik/hmi/template/cfg.
2. Insert the copy into the folder:
/oem/sinumerik/hmi/cfg or /user/sinumerik/hmi/cfg.
3. Open the file in the editor.
4. To activate or deactivate the keyboard, make the following settings:
 - Activating the virtual keyboard:
In the section [TouchPanel], EnableTouch = true
In the section [Keyboard], EnableVirtualKeyBoard = true
 - Deactivating the virtual keyboard:
In the section [TouchPanel], EnableTouch = true
In the section [Keyboard], EnableVirtualKeyBoard = false
5. Double click in the input field to display the keyboard.

5.2 Configuring user-specific key labeling

Labeling of the keys on the HT 10

The texts of the CPF menu (CPF: Control Panel Function) for the HT 10 can be labeled with your own texts in the particular language of the country.

The texts are created in the "slck_XXX.ts" file.

"XXX" = language code for the corresponding language-specific labeling.

You can create and edit this file using the HMI or also externally on a PC.

Note

If you wish to create or edit the file on a PC, use an editor that supports UTF-8 coding.

Language code in file names "xxx"

Language	Language code
German	deu
English	eng
French	fra
Spanish	esp
Italian	ita
Chinese	chs

Creating key labeling

Tag	Meaning
source	Designation for the user softkey. "SK_USERKEY1" to "SK_USERKEY16" are possible, whereby the names may not be changed.
comment	User-specific description of the key assignment.
translation	Text that should be shown on the key. - A maximum of 10 characters are possible per line. 2-line labeling is possible, whereby the line break is set using "%n".
remark	Remark for key assignment.
chars	Number of characters. A maximum of 10 characters per line are possible.
lines	Number of lines. 2 lines are possible.

Procedure

1. You can copy the sample file "oem_slck_deu.ts" from the following folder: **/siemens/sinumerik/hmi/template/lng**.
2. Store or create the file in the **/oem/sinumerik/hmi/lng** or **/user/sinumerik/hmi/lng** directory.
3. Give the file a name, e.g. for German texts: "slck_deu.ts".
If you wish to create the key labeling for additional languages, then a separate file must be created for each language. Save the file with the appropriate language code in the file name. To do this, use the language codes specified above.
4. Open the file and in the <message> and </message> area, define the key labeling.
5. Restart the HMI.
In order that the key labeling is displayed during the program runtime, the file must be converted into a binary format. This conversion is only executed when the HMI powers up.

Example of a key label

```
<!DOCTYPE TS><TS>
<context>
  <name>SlCkDialog</name>
  <message>
```

5.3 Configuring the function display at user-specific keys (U keys)

```

<source>SK_USERKEY1</source>
<comment></comment>
<translation>U1</translation>
<remark>User key 1</remark>
<chars>10</chars>
<lines>2</lines>
<languageIndependent>true</languageIndependent>
</message>
<message>
  <source>SK_USERKEY2</source>
  <comment></comment>
  <translation>U2</translation>
  <remark>User key 2</remark>
  <chars>10</chars>
  <lines>2</lines>
  <languageIndependent>true</languageIndependent>
</message>
<message>
  .....
</message>
</context>
</TS>

```

5.3 Configuring the function display at user-specific keys (U keys)

Function

Active functions can be displayed at the configurable user keys via the PLC. For instance, small LEDs can be emulated on the softkeys.

You configure the function in the "slckcpf.ini" file.

Interface signals

The PLC bits are in the output image of the PLC/HT 10 interface and are analogous to those in the input image.

Signals to the MCP1 (or MCP2) Interface PLC → HT 10								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
AB n + 1		U4	U3		U2	U1		
AB n + 4	U9	U10	U11	U12	U13	U14	U15	U16
AB n + 5		U8	U7	U6	U5			

Adapt the display in the "slckcpf.ini" file

Section	Description	
UserKeyLEDIcon	Name of the icon file. Standard entry: led_green.png	
	OFF	Deactivates the icon display.
	PRESSED	Displays the active functions by pressing down the softkey.
UserKeyLEDIconAlignment	Specifies the position of the icon. Standard position: AlignLeft AlignTop Horizontal and vertical alignments can be combined. The two names are separated by the " " character. The following alignments are possible:	
	AlignLeft	Left
	AlignRight	Right
	AlignHCenter	Horizontal, center
	AlignTop	Top
	AlignBottom	Bottom
	AlignVCenter	Vertical, center
UserKeyLEDMap	Specifies the start address of the output image. Entries can be made in the following form: "DBx.DBBy", "ABx", "MBx". Default setting: The start address is determined using DB7 MCP1Out (or MCP2Out).	
U1LED ... U16LED	The status bit address can be defined - different from the output image - using these entries. Note: The offsets from the HT 10 output image, for one or more softkeys, are not taken into consideration.	
VarIncLED		
SBLLED		
WCSLED		
showVarIncLED	true	When the increment mode is active, the icon is also displayed on the "[VAR]" softkey.
	false	The icon is not displayed.
showSBLLED	true	When the SingleBlock mode is active, then the icon is also displayed on the "Single Block" softkey.
	false	The icon is not displayed.
showWCSLED	true	When the SingleBlock mode is active, then the icon is also displayed on the "Single Block" softkey.
	false	The icon is not displayed.

1. You can copy the sample file "slckcpf.ini" from the following folder: **/siemens/sinumerik/hmi/template/cfg**
2. Store the file in the **/oem/sinumerik/hmi/cfg** or **/user/sinumerik/hmi/cfg** directory.
3. If you have your own icon, place it, together with the corresponding resolution for HT 10 in the folder: **/oem/sinumerik/hmi/ico/ico800** or **/user/sinumerik/hmi/ico/ico800**.
4. Open the file and make the appropriate settings.

Sample file "slckcpf.ini"

```
Template for the configuration of the
; HT 10 control panel function menu
;
; To activate the settings remove the
; commentary ';' at the beginning of the line
;; Display settings of the user key softkey leds
[UserKeyLED]
; Filename of the LED icon
;UserKeyLEDIcon = led_green.png
; Alignment of the LED icon
;UserKeyLEDIconAlignment= AlignLeft | AlignTop

; Use following led map start address instead of calculating
DB7.MCP1Out
;UserKeyLEDMap = AB0
; Use the following settings to use this status bits instead of the
led map for a specific sk
;U1LED=/channel/parameter/R[U1,1]
;....
;U16LED=/channel/parameter/R[U1,16]
;VarIncLED = DB11.DBX8.5
;SBLLED = DB21.DBX0.4
;WCSLED = DB19.DBX0.7

; Show a LED for the var inc sk
;showVarIncLED = true
; Show a LED for the var single block sk
;showSBLLED = true
; Show a LED for the var wcs/mcs sk
;showWCSLED = true
```

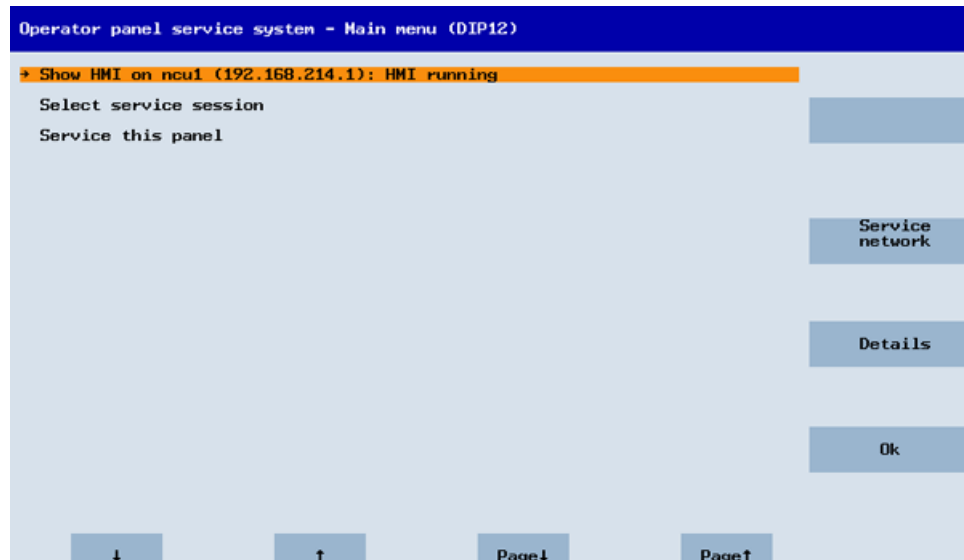
5.4 Dimming the display

In the settings, you can configure the unmanned period after which the display is first slightly dimmed, and strongly dimmed after another unmanned time period. Unmanned periods are periods during which no operator actions are made on the device. Operator actions include, for example, touching the display, making keyboard inputs or modifying the position of the device.

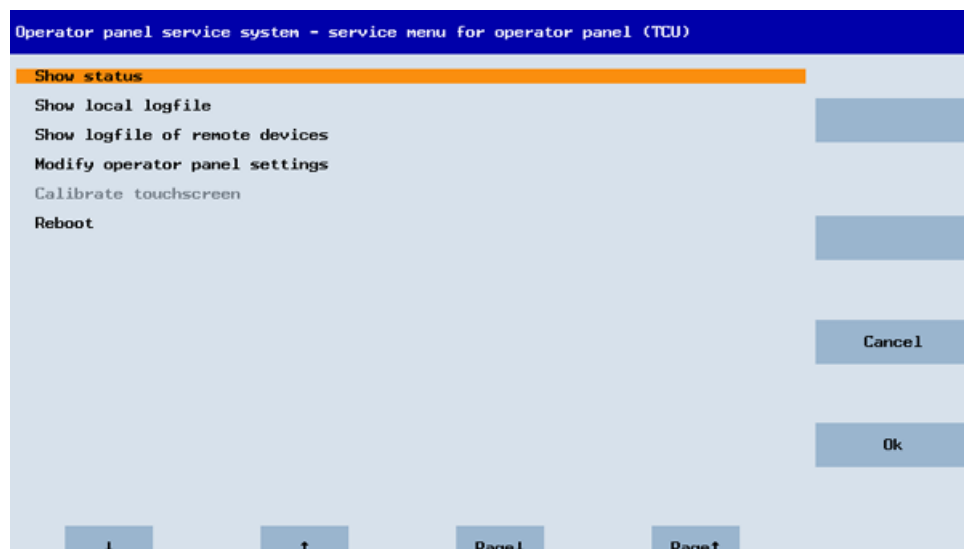
Setting unmanned period

1. Open the TCU menu by simultaneously pressing the F9 and F10 keys, or touch the two lower corners of the display .

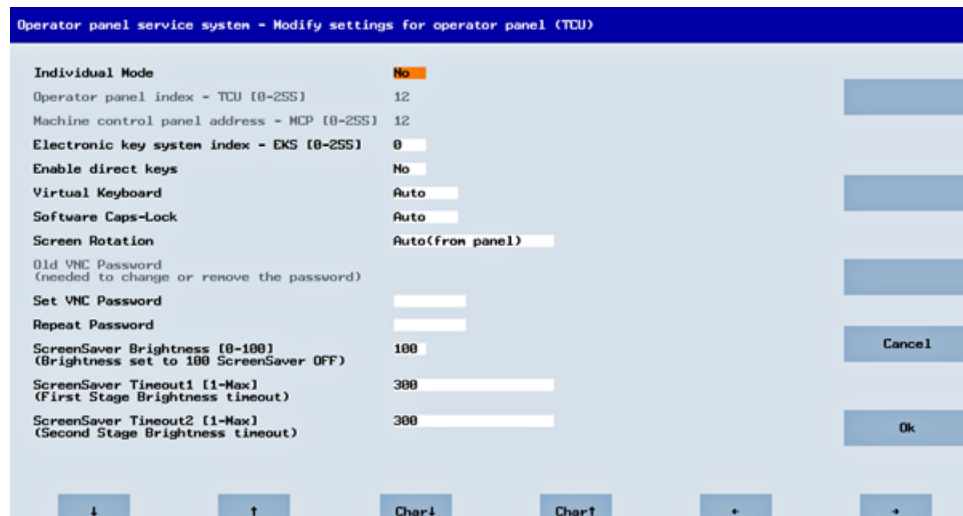
The TCU menu "Main menu" opens.



2. Select the option ""Service this panel" and confirm your selection with "Ok".
The menu ""Service menu for operator panel (TCU)" opens.



3. Select the option "Modify operator panel setting" and confirm your selection with "Ok".
The menu "Modify settings for operator panel (TCU)" opens.



In the menu "Modify settings for operator panel (TCU)", you can configure the display dimming options:

- ScreenSaver Timeout1 and ScreenSaver Timeout 2
This option allows you to configure the two-phase display dimming option. ScreenSaver Timeout 1 is the unmanned time until the display is dimmed to the ScreenSaver Brightness value set. ScreenSaver Timeout 2 is the unmanned time starting at the end of ScreenSaver Timeout 1. After the unmanned period of ScreenSaver Timeout 2, the display is strongly dimmed. By default, the value is set to "300".
- ScreenSaver Brightness
This option allows you to configure the display brightness which is set when the unmanned time period set under ScreenSaver Timeout 1 has expired. By default, this setting is "100". The value "100" means that the screen saver is deactivated.

Restoring the original display brightness

The following entries restore the original display brightness:

- Touching the display
- Movement of the mouse or a device (monitored using an acceleration sensor)
- Press of a button

5.5 Troubleshooting

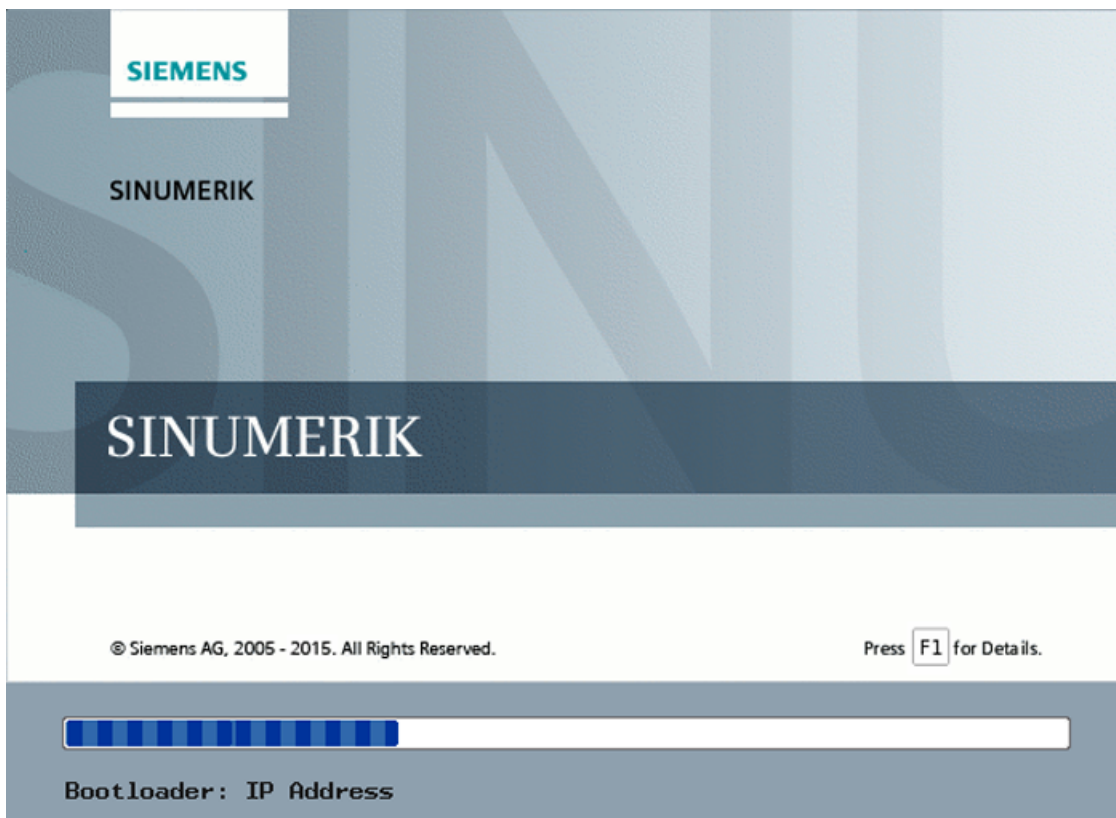
If errors occur while booting, an appropriate message is displayed.

5.5.1 Messages during booting

Messages when booting

While the TCU boots, a progress indicator is displayed with messages showing the current status after the BIOS has been loaded and before the operating system is started. While the IP address is being determined via DHCP and the TFTP is being downloaded (boot image), a progress bar indicates that booting of the TCU is not yet complete, or that a fault has occurred.

The figure below shows the structure of these messages:



You can see the current boot phase below the progress bar. If a fault occurs, you can call further information by touching the "F1" field.

5.5.2 Diagnostics options during booting

Diagnostics while booting supplementary conditions

In the following supplementary conditions, the diagnostics window is displayed and booting of the TCU is interrupted:

- When the <1 / F1> function is selected during booting
- When a warning message is displayed
- When a fault occurs

You can select functions <1 / F1> to <8 / F8> mentioned below by tapping on the Panel. Alternatively, you can do this via the corresponding function keys of a connected USB keyboard.

Using the <1 / F1> function

```
Thin Client Bootloader V05.00.45.00

Boot Progress

BIOS Version V15.00.00.00
MAC Address 08:06:00:F1:F7:F8
Hardware-ID 7.9.2.0
Network link 1000MB, full duplex
Boot from USB no device found
IP Address 192.168.214.14
Netmask 255.255.255.0
DHCP Server 192.168.214.1
Boot Server 192.168.214.1
Image Metadata 71 bytes
Image Version V05.00.46.00
Linux Image (linux.bin) 3295436 bytes
Image Kind from boot server
Booting ready

<1/F1> protocol <2/F2> Readme_OSS <7/F7> continue <8/F8> reboot
```

Key / text	Meaning
F1 protocol	Display detailed information
F2 Readme_OSS	Details of the Open Source licenses
F7 continue	Continue booting of the TCU
F8 reboot	Restart the TCU

Press <1 / F1> to continue

If you select function <F1> in the diagnostics window, the, detailed diagnostic information is output.

Key / text	Meaning
F1 ... F6	Navigate within the window (alternatively, the relevant keys on the OP can be used).
F7 -detail	Display less information
F8 +detail	Display more information
F9 back	Return to diagnostics window

Maintenance and Service

Cleaning the device

Use a soft cloth moistened with either water or a mild cleaning agent to clean the enclosure, display and operator control elements of the HT 10.

Checking the device

To prevent foreign bodies or liquids entering the HT 10, regularly check the device:

- that all the housing screws are in place and tight
- for damage to the housing
- for damage to the cable cover or cable entry

Protect the device from environmental effects

Protect the HT 10 against the following environmental effects:

- Direct solar radiation and heat sources
- Mechanical vibration and shock
- Dust
- Humidity
- Strong magnetic fields

Checking the emergency stop button and the enabling button

Check the emergency stop button regularly to ensure that it functions correctly.

Check the enabling button regularly to ensure that it functions correctly in the enable and panic position.

Note

Check the functionality in the event of shock

Check the functioning of the emergency stop button and the enabling button immediately if the device has been subject to severe shock (e.g. because it was dropped).

Technical specifications

7.1 Handheld Terminal HT 10

Handheld Terminal HT 10

Safety		
Safety class	III according to UL 61010-2-201	
Degree of protection according to DIN EN 60529	IP65	
Approvals	CE/cULus/EAC/KC/RCM	
Electrical data		
Input voltage	24 V DC (20.4 V ... 28.8 V)	
Input current	0.98 A	
Current carrying capacity	Enabling button:	10 ... 250 mA / 1-channel, 3-stage
	Emergency Stop button:	10 - 1000 mA / 2-channel
Max. current carrying capacity	USB interface:	900 mA
Mechanical data		
Dimensions (W x H x D)	327 mm x 102 mm x 232 mm (enclosure dimensions only)	
Weight	1.5 kg	
Fall height, max.	1.20 m	
Display		
Size	10.1" TFT	
Resolution	1280 x 800 pixels	
Service life	At ambient temperatures of > 40° C and long periods of non-use, it is advisable to activate the screen saver function.	

Emergency Stop button

Rated voltage	24 V DC
Current rating, max.	1 A
Current rating, min.	18 mA
Switching capacity	DC 13 according to EN 60947-5-1
Conditional rated short-circuit current	10 A gL/gG according to EN 60947-5-1
B _{10d} (if a connection box is not used)	250000
When using the connection box advanced:	
PFH _d	1.01 * 10 ⁻⁷
Service life	20 years
Forced dormant error detection interval (mechanical actuation to the test the emergency stop)	1 year

7.2 Connection module Basic PN

Category	3
Performance Level	PL d

Note

The quantitative assessment of the emergency stop safety function must be based on the B_{10d} value corresponding to the used standards (e.g. ISO 13849-1) under consideration of the respective application (frequency of the actuation, service life, diagnostics by the evaluation unit, etc.). The B_{10d} value only applies when the technical properties of the emergency stop button are taken into account.

When using the connection box advanced, the specified failure probability (PFH_d) must be taken into account. This value only applies if the technical properties of the connection box advanced and the quantitative conditions specified here (e.g. service life) are observed.

Enabling button

		1-circuit, 3-stage
Supply voltage		24 V DC
Current rating, max.		250 mA
Current rating, min.		10 mA
Operating cycles	Switch position 2	10^5
	Switch position 3	$5 \cdot 10^4$
Actuation forces	From switch position 1 to 2, typically	3 N
	From switch position 2 to 3, typically	17 N
Functional safety		
EN ISO 13849-1:2008	Category	4
	Performance Level (PL)	PL e
	Proof test interval (operating duration)	20 years
EN 61508	Safety Integrity Level (SIL)	SIL 3
	PFH_d	$5.07 \cdot 10^{-9}$
Forced dormant error detection interval (mechanical actuation to the test the enable and panic position)		1 year

Note

The PFH_d value only applies when the technical properties of the enabling button and the quantitative conditions specified here (e.g. service life) are observed.

The permissible number of switching cycles must also be observed in the application.

7.2 Connection module Basic PN

Safety	
Safety class	III according to IEC 60536

Degree of protection according to EN 60529	IP54		
Approvals	CE / cULus		
Electrical data			
Input voltage	24 VDC (via X3 connector)		
Current carrying capacity	Enabling button contacts (X20 connector)	2-channel / 0.25 A max. for each	
	Emergency stop button contacts (X21 connector)	2-channel / 1.0 A max. for each	
Max. power consumption	Connection module without external loading	0.3 A	
	Panel (HT 10)	0.7 A	
	5 status signals (X7 and X21)	2.5 A (0.5 A each)	
	Total:	4.4 A	
Max. total power consumption	105.6 W		
Mechanical data			
Dimensions	Height (without holder for terminating connector): 66 mm	Width: 165 mm	Length: 166 mm
Weight	0.75 kg		

Note

Further information about the ambient conditions can be found in the Chapter "Climatic and mechanical ambient conditions" (Page 86).

7.3 Connection box

General data		
Weight without packaging	Connection box compact	approx. 250 g
	Connection box standard, connection box advanced	approx. 750 g
Degree of protection according to EN 60529		IP65 (with HT 10 or dummy cap inserted)
Electrical data		
Rated voltage		+24 V DC
Range, permissible		20.4 V to 28.8 V
Transients, maximum permissible		35 V (500 ms)
Time between two transients, minimum		≥50 s
Connection box standard and advanced without HT 10	Typical	approx. 100 mA
	Continuous current, maximum	approx. 150 mA
	Inrush current I²t	Approx. 0.5 A²s

7.4 Supplementary electrical conditions

Connection box standard and advanced with HT 10, typical	approx. 600 mA
Fuse, internal	Electronic
Current load PLC-accompanying signals	Max. 100 mA

Note

Recovery time

After unplugging the connecting cable from the connection box wait for approximately one second before reinserting it.

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

7.4 Supplementary electrical conditions

Ambient conditions	Remarks
Overvoltage category	OVC 2
EMC conducted / radiation	Class C2 according to EN 61800-3

Note

The user must consider radio interference for the complete system. Particular attention should be paid to cabling. Please contact your sales representative for assistance and support.

Note

Disturbance of radio communication services due to radio (frequency) interferences in residential environments

In a residential environment, this product can cause high-frequency interference, which may make interference suppression measures necessary.

This device is not designed for unrestricted operation in the first environment (residential environment), and may not be used in the first environment without suitable interference suppression measures.

- Have the installation and commissioning with appropriate radio interference suppression measures performed by qualified personnel.

7.4.1 Power supply

Requirements for DC power supplies

**WARNING****Electric shock due to connection of an unsuitable power supply**

If equipment is connected to an unsuitable power supply and/or insufficiently grounded or rear cover, exposed components may carry a hazardous voltage that might result in serious injury or death.

- Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage) output voltages acc. to UL 61010 for all connections and terminals of the electronics modules.

**WARNING****Inadequately fused supply cables can be life-threatening**

If power supply cables are inadequately protected, then lightning strikes can result in a surge voltage. This can result in death, serious injury and material damage.

In the case of supply lines > 10 m, protectors must be installed at the device input in order to protect against lightning (surge).

The DC power supply must be connected to the ground/shield of the NC for EMC and/or functional reasons. For EMC reasons, this connection should only be made at one point. As a rule, the connection is provided as standard in the S7-300 I/Os. In exceptional circumstances when this is not the case, the ground connection should be made on the grounding rail of the NC cabinet (also refer to /EMC/EMC Installation Guide.)

**WARNING****Electric shock in the event of an individual error if the rear cover is missing**

If the rear cover is missing when mounting the device in an environment with a hazardous voltage, a conductor with a hazardous voltage can come loose in the event of a normative permissible individual error and touch parts of the printed-circuit board and cause electric shocks. Due to its design, the printed-circuit board cannot trigger the overcurrent protection of the circuit with hazardous voltage.

For this reason, protect areas of the printed-circuit board that are not adequately enclosed by grounded sheet metal parts, or with a secure cover when installed in an environment with hazardous voltages. If this cover is made of conductive material, it must be safely grounded. See "Electric shock in the event of an individual error when grounding is insufficient".

To avoid electric shocks, mount a rear cover on the device when installing it in an environment with a hazardous voltage.

7.4 Supplementary electrical conditions

Table 7-1 DC power supply requirements according to EN 61131-2

Rated voltage	According to EN 61131-2 Voltage range (mean value) Voltage ripple, peak/peak Ramp-up time when switched on	24 VDC 20.4 VDC to 28.8 VDC 5% (unsmoothed 6-pulse rectification) any
Non-periodic overvoltages	Period of overvoltage Recover time Events per hour	≤ 35 V ≤ 500 ms ≥ 50 s ≤ 10
Transient voltage interruptions	Downtime Recovery time Events per hour	≤ 3 ms ≥ 10 s ≤ 10

7.4.2 Grounding concept

Components

SINUMERIK ONE and SINUMERIK 840D sl systems consist of a number of individual components, which have been designed so that, as a system, they comply with the relevant EMC and safety standards. The individual system components are:

- Numerical Control Unit (NCU)
- Machine Control Panel (MCP), Machine Pushbutton Panel (MPP)
- Keyboard
- Operator panels (operator panel front + TCU/PCU)
- Distributor box and handheld unit
- S7-300 I/O with IM 153 interface module

Grounding measures

The individual modules are attached to a metal cabinet panel. Insulating paints on the mounting points (e.g. tension jacks) must be removed.

It is permissible to cluster the operator control components regarding connection/potential bonding.

Example: The control panel on the swivel arm.

It is sufficient in this instance to connect the ground connections of, for example, the PCU, TCU, and operator panel front using a cable and to route a shared grounding conductor to the central ground connection in the control cabinet.

Please note that interruption of the grounding during maintenance work is not permissible.

Note

The HT 10 is not affected by these grounding measures, which concern the connection box / distribution box to which the HT 10 is connected.

Additional references

EMC Design Guidelines

7.4.3 RI suppression measures

In addition to the protective grounding of system components, special precautions must be taken to ensure safe, fault-free operation of the system. These measures include shielded signal lines, special equipotential bonding connections, and isolation and shielding measures.

Shielded signal cables

- Use the specified cables for safe and fault-free operation of the system.
- Connect the shield conductively at both ends to the housing for digital signal transmission.

Cable definition

Definition:

- Signal cables (example)
 - Data cables (Ethernet, PROFIBUS, sensor cables, etc.)
 - Digital I/Os
 - Cables for safety functions (emergency stop, enabling)
- Power cables (example)
 - Low-voltage supply lines (230 VAC, +24 VDC, etc.)
 - Motor cables

Rules for routing cables

In order to achieve the greatest possible EMC compatibility for the complete system (control, power unit, machine), the following EMC measures must be carefully observed:

- If necessary, signal and power cables may cross one another (if possible at an angle of 90°), but must never be laid close or parallel to one another.
- Only use cables approved by SIEMENS for the signal lines from and to the Control Unit.
- Signal cables must not be routed close to strong external magnetic fields (e.g. motors and transformers).
- If signal lines cannot be routed a sufficient distance away from other cables, they must be installed in grounded cable ducts (metal).
- The operator panel fronts, MCPs, MPPs, and full keyboards must be installed in metallically enclosed EMC-compatible housings.

Further information on RFI suppression measures and the connection of shielded cables can be found in the EMC Installation Guidelines.

7.4.4 EMC limiting values in South Korea

EMC limit values in South Korea

이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
For sellers or other users, please bear in mind that this device is an A-grade electromagnetic wave device.
This device is intended to be used in areas other than at home.

The EMC limit values to be complied with for South Korea correspond to the limit values of the EMC product standard for variable-speed electric drives EN 61800-3, Category C2, or limit value class A, Group 1 according to EN 55011. By applying suitable supplementary measures, the limit values according to Category C2 or according to limit value class A, Group 1, are maintained. Further, additional measures may be required, for instance, using an additional radio interference suppression filter (EMC filter).

The measures for EMC-compliant design of the system are described in detail in this manual respectively in the Installation Guideline EMC.

Please note that the final statement on compliance with the standard is given by the respective label attached to the individual unit.

7.4.5 EMF assessments for 24 V components

The 24 V components, e.g. control systems (NCU, MCU, PPU), PCUs/IPCs, operator panels, handheld terminals and machine control panels do not generate any appreciable electromagnetic fields.

No minimum clearance has to be maintained for 24 V components.

7.5 Climatic and mechanical ambient conditions

7.5.1 Shipping and storage conditions

In respect of shipping and storage conditions, the components surpass the requirements of EN 61800-2.

The following data applies under the following conditions:

- Long-term storage in the transport and product packaging:
At weather-protected locations that have continuous contact with outside air through openings.
- Transport in the transport packaging:
 - In unventilated containers under conditions not protected from weather effects.
 - In the "cold" in accordance with outside air.
 - Air transport in the air-conditioned cargo hold.

Table 7-2 Ambient conditions during storage and transport

Type of condition	Permissible range/class
Classification	EN 60721-3-1
Climate class	1K4
Ambient temperature	From -20 °C to +55 °C
Biological environmental conditions	1B1 ¹⁾
Chemically active environmental conditions	1C2 ²⁾
Maximum permissible temperature change	30 K/h
Relative humidity	5 to 95%
Precipitation, rain	Not permitted
Water other than rain	Not permissible ³⁾
Condensation, splash water, icing, salt spray	Not permissible ³⁾

1) Mold growth, slime, animal pests, rodents, termites and other animal vermin are not permissible.

2) In marine- and weather-resistant transport packaging (container).

3) For storage in the product packaging.

Note

Remove the transport protective foil and packaging material before installing the components.

Note

If you want to transport the HT10 as air freight in a completely assembled state including the connecting cable, you should leave the USB opening free. This enables pressure compensation to take place safely and prevents damage from occurring.

7.5.2 Operating conditions

The components are intended for use in a weatherproof, fixed location. The documented environmental conditions apply to the climate in the immediate vicinity of the units and to the entry of the cooling air. The following standards are complied with: EN 60204-1, EN 61800-2, EN 61131-2 and IEC 62477-1.

Table 7-3 Ambient conditions for operation

Ambient conditions	Application areas	Remarks
Climatic environmental conditions		
Climate class	Better than class 3K3	According to EN 60721-3-3
Limit temperatures at 100% load	0 °C ... 45 °C ¹⁾	From an altitude of 2000 m, the max. ambient temperature decreases by 7 °C for every 1000 m increase in altitude - derating.

7.5 Climatic and mechanical ambient conditions

Ambient conditions	Application areas	Remarks
Relative humidity (without condensation)	5% to 95% (60% when corrosive gases and/or dusts are present)	
Condensation, icing, drip, spray and splash water	Not permitted	
Max. installation altitude	Up to 4 000 m (13 123 ft) above sea level	
Air pressure	620 ... 1060 hPa	
Biological, chemical and mechanical influences, pollutants		
Biological environmental conditions	Class 3B1 according to EN 60 721-3-3: Mold, mold growth, slime, rodents, termite and other animal vermin are not permissible.	
Mechanically active environmental conditions	Class 3S1 according to EN 60721-3-3: Conductive dust not permitted.	
Classification of the mechanical environment	3M3 for components on the machine 3M1 / 3M2 for components in the control cabinet	
Vibratory load	Frequency range: 10 ... 150 Hz Deflection at 10 – 58 Hz: 0.075 mm Acceleration at 58 ... 150 Hz: 1 g	
Shock load with shock-sensitive components	Acceleration: 5 g Shock duration: 30 ms Load: 3 x in each direction	
Pollution degree	2 (for indoor use only)	
Type of enclosure	Type 1	
Overvoltage category	OVC 2	
EMC conducted / radiation	Class C2 according to EN 61800-3	

1) At an ambient air temperature of 45 °C, exposed parts of the device may heat up to 65 °C.

Note

The user must consider radio interference for the complete system. Particular attention should be paid to cabling. Please contact your sales representative for assistance and support.

Note

In a residential environment, this product can cause high-frequency interference, which may make interference suppression measures necessary.

- Have the installation and commissioning with appropriate radio interference suppression measures performed by qualified personnel.

7.6

Recycling and disposal



For environmentally friendly recycling and disposal of your old device, please contact a company certified for the disposal of electrical and electronic waste and dispose of the device in accordance with the regulations in your country.

7.7

Standards and approvals

Approvals

CE approval



Figure 7-1 CE marking

The operator panels and the safety-relevant accessories satisfy the requirements and protection objectives of the following EC directives. The operator panels and the safety-relevant accessories comply with the harmonized European standards (EN), promulgated in the Official Journals of the European Community:

- 2004/108/EC "Electromagnetic Compatibility" (EMC directive)
- Directive 2006/42/EC of the European Parliament and Council of May 17, 2006, on machinery, and Directive 95/16/EC (amendment)

China RoHS

The products comply with the China RoHS directive. Further information can be found in the Internet at the following link: SIOS (<https://support.industry.siemens.com/cs/document/109738656/china-rohs-manufacturer?dti=0&lc=en-WW>)

Risk assessment

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

- EN ISO 12100-1:2003 and EN ISO 12100-2:2003, General Design Guidelines for Machines
- EN ISO 14121-1:2007, Risk Assessment for Machinery
- EN ISO 13849-1:2008, Safety-related Parts of Machines

These considerations result in a category (B, 1, 2, 3, 4) and a performance level (PL a to e) in accordance with EN ISO 13849-1:2008 that ultimately dictate how the safety-related parts of the system to be monitored must be constructed.

The connection examples with different monitoring units in "Handheld units", Section: "HT 2", Section: "Connections" → "Connection examples for acknowledgment button and Emergency Stop button" can also be used for other operator panels and demonstrate how Category 3, PL d according to EN ISO 13849-1:2008 can be attained with the safety-related parts of the operator panels. Note that the overall concept of the installation must be designed with this in mind.

Spare parts

The following service set is available for SIMATIC connection boxes:

Designation	Remark	Qty.	Article number
Service set for Mobile Panels	Dummy plugs for cable compartment	1	6AV6574-1AA04-4AA0
	PG screw glands for connection box	2	
	Blanking cover for connecting a handheld terminal	1	
	Terminal strips for connection box	3	

Accessories

9.1 Overview

The following accessories are available for the HT 10:

Designation	Remark	Quantity	Article number
Connection box advanced	With automatic emergency stop override for mounting in the system	1	6AV2125-2AE23-0AX0 *)
Connection box standard	Without automatic emergency stop override for mounting in the system	1	6AV2125-2AE13-0AX0 *)
PN Basic connection module	Without automatic emergency stop override for mounting in the control cabinet	1	6FC5303-0AA01-1AA0 *)
HT10 wall holder	For safekeeping, also suitable for stationary operation	1	6FC5348-0AA20-0AA0
Protective membrane	For 10.1" touch display, type 10	2	6AV6671-5BC00-0AX0
Straight connecting cable	Length: 2 m	1	6XV1440-4BH20 *)
	Length: 5 m	1	6XV1440-4BH50 *)
	Length: 8 m	1	6XV1440-4BH80 *)
	Length: 10 m	1	6XV1440-4BN10 *)
	Length: 15 m	1	6XV1440-4BN15 *)
	Length: 20 m	1	6XV1440-4BN20 *)
	Length: 25 m	1	6XV1440-4BN25 *)
Spiral connection cable	1.5 m long, can be extended to 3.5 m	1	6FC5348-0AA08-3AA0
Touch pen system	For capacitive or resistive touch screen pen incl. holder, 22.5 mm	1	6AV2181-8AV20-0AX0

*) Safety related accessories

9.2 HT10 wall holder

The HT 10 can be safely kept and operated in a stationary manner in the wall holder



Figure 9-1 HT 10 wall holder - view

Ensure that you position the wall holder in such a manner that

- When the HT 10 is hooked in, its display is not exposed to direct solar radiation.
- The HT 10 can be hooked-in in an ergonomic position. Therefore, choose a suitable mounting height.

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