

SIEMENS

SIMATIC HMI

HMI device Wireless Teach Pendant F IWLAN V2

Operating Instructions

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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
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.
CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.
NOTICE
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

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

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation for the specific task, 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
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 adhered to. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of the 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.

Preface

Purpose of the operating instructions

These operating instructions provide information for manuals derived from the requirements for mechanical engineering documentation according to DIN EN 62079. This information relates to the place of use, transport, storage, mounting, use and maintenance.

These operating instructions are intended for:

- Users
- Commissioning engineers
- Maintenance personnel

Pay particular attention to the section "Safety instructions and standards (Page 35)".

You can find more information such as operating instructions, examples and reference information in the online help of WinCC flexible.

Required knowledge

General knowledge of automation technology and process communication is needed to understand the operating instructions.

It is also assumed that those using the manual have experience in using personal computers and an understanding of Microsoft operating systems.

Scope of this manual

The manual applies to the "Wireless Teach Pendant F IWLAN V2" HMI device in combination with the following software:

- STEP 7 V5.4, as of SP2
- Add-on package "S7 Distributed Safety", V5.4, as of SP3
- WinCC flexible 2008, SP2

NOTICE
Manual belongs to HMI device
The supplied manual belongs to the HMI device and is also required to repeat commissioning. Keep all supplied and supplementary documentation for the entire service life of the HMI device.
Provide all stored documents to subsequent owners of the HMI device.

Trademarks

The following names marked with the ® symbol are registered trademarks of Siemens AG:

- HMI®
- SIMATIC®
- WinCC®

Style conventions

This manual uses the following style conventions.

Style Convention	Scope
"Add screen"	<ul style="list-style-type: none"> • Terminology that appears in the user interface, for example dialog names, tabs, buttons, menu commands • Required input, for example, limits, tag values. • Path information
"File > Edit"	Operational sequences, for example, shortcut menu commands
<F1>, <Alt+P>	Keyboard operation

Please observe notes labeled as follows:

Note

A note contains important information about the product described in the manual and its use, or a specific section of the manual to which you should pay particular attention.

Naming conventions

This manual uses the following naming conventions.

Term	Applies to
Plant	<ul style="list-style-type: none"> • System • Machining center • One or more machines
Actuate	<ul style="list-style-type: none"> • By means of the touch screen on the HMI device • By operating a mouse on the HMI device
Range name	<ul style="list-style-type: none"> • Describes an effective range which is recognized by an HMI device

Figures

This manual contains illustrations of the described devices. The illustrations can deviate from the described device as originally supplied.

Technical Support

Technical support for the products covered in the manual is available in the Internet at:

- Technical Support
(<http://support.automation.siemens.com>)
- Support Request
(<http://support.automation.siemens.com/WW/view/en/16605654>)
- Service
(<http://support.automation.siemens.com/WW/view/en/16604318>)
- Contacts and office locations
(<http://www.automation.siemens.com/mcms/aspa-db/en/Pages/default.aspx>)
- Training center
(<http://sitrain.automation.siemens.com/sitrain/default.aspx?AppLang=en>)

Additional information on SIMATIC products is available in the Internet at:

- Industry Portal
(http://www.automation.siemens.com/_en/portal/index.htm)
- Overall SIMATIC documentation
(http://www.automation.siemens.com/simatic/portal/html_76/techdoku.htm)

Recycling and disposal

The products described in this manual are recyclable because of the low level of contaminants in its components. Contact a certified disposal service company for environmentally sound recycling and disposal of your old devices.

Used batteries and rechargeable batteries

Used batteries and lithium ion batteries are hazardous waste. Always dispose of used batteries and lithium ion batteries in accordance with the regulations in effect. Identify the container provided for this purpose with the label, "Used batteries and rechargeables".

Note

Batteries and rechargeables do not belong in the garbage. The user is legally obliged to return used batteries and rechargeable batteries. You can deposit used batteries and rechargeables at any public collection site and anywhere batteries or rechargeables of similar type are sold.

You can also send batteries and rechargeables to the following address:

Siemens AG
Industry Sector
Returns Center
Siemensstr. 2
90766 Fürth
Germany

Approval according to FCC

This device complies with Part 15 of the FCC Rules

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation.

IEEE802.11b or g operation of this product in the USA is firmware-limited to channels 1 through 11.

Notice

Changes or modifications made to this equipment not expressly approved by SIEMENS may void the FCC authorization to operate this equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Professional Installation Notice:

To comply with FCC Part 15 rules in the United States, the system must be professionally installed to ensure compliance with the Part 15 certification. It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in the United States. The use of the system in any other combination (such as co-located antennas transmitting the same information) is expressly forbidden.

Within the 5.15-5.25 GHz band, this device is only for indoor use operations to reduce any potential for harmful interference to co-channel MSS operations.

RSS-210 of Industry Canada

"Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device."

"This device has been designed to operate with internal antennas with a maximum gain of 2 dBi and an antenna impedance of 50 Ohms. Other antennas are strictly prohibited for use with this device."

"To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication."

"That the device for the band 5150-5250 MHz is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems."

"Users should also be cautioned to take note that high power radars are allocated as primary users (meaning they have priority) of 5250-5350 MHz and 5650-5850 MHz and these radars could cause interference and/or damage to LE-LAN devices."

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Overview

1.1 Product overview

Additional application scenarios with Wireless Teach Pendant F IWLAN

The Wireless Teach Pendant F IWLAN offers the option of implementing mobile safety functions ("EMERGENCY STOP" and "Enabling") anywhere in the plant. The HMI device communicates with the F-CPU via WLAN. The operator can operate the plant without disturbing cables.

Safety-related control and monitoring in the fail-safe mode occurs within a protection zone on a machine that is logged onto the Wireless Teach Pendant F IWLAN.

The Wireless Teach Pendant F IWLAN is characterized by short commissioning times, a large user memory and high performance, and is optimized for projects based on WinCC flexible.

Wireless Teach Pendant F IWLAN has the following features:

- Safety-related operator controls:
 - EMERGENCY STOP button
 - Enabling button
- Wireless operation with:
 - IWLAN interface via PROFINET
 - RFID
 - Rechargeable battery
- 6.5" TFT screen with 65536 colors
- Extended HMI functions

1.2 Scope of delivery

The scope of delivery includes:

- 1 Wireless Teach Pendant F IWLAN with built-in buffer battery
- 1 main rechargeable battery
- 1 neck strap
- 1 grip strap
- 1 data medium

1.3 Wireless Teach Pendant F IWLAN

Front view and side view



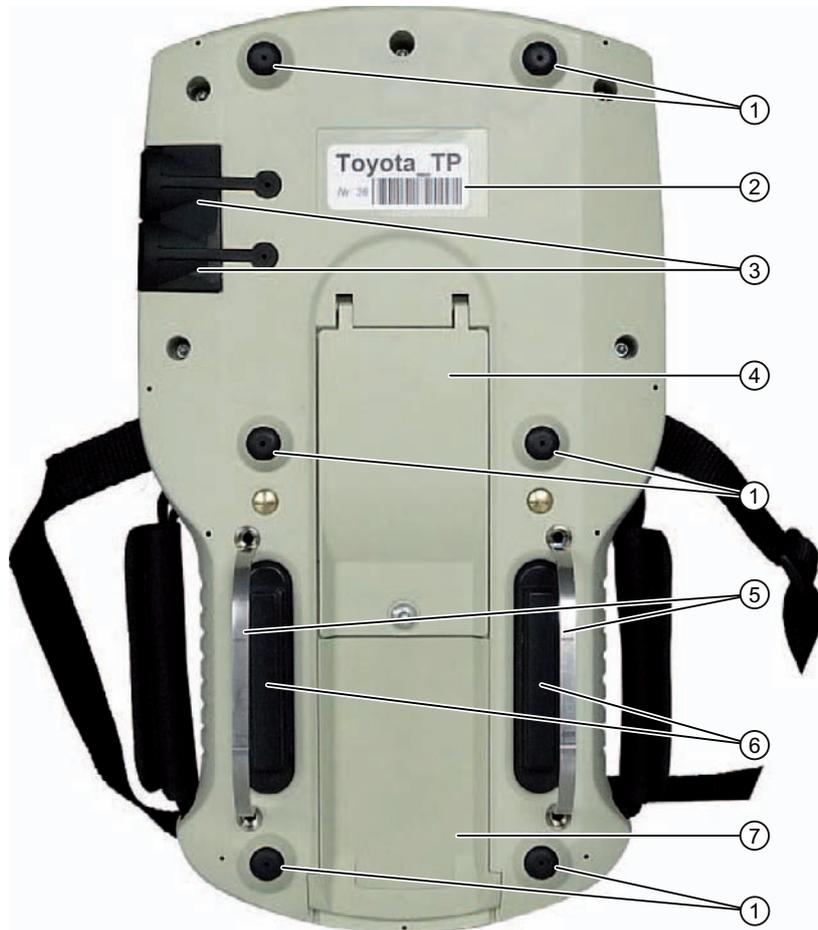
- ① Rotary switch
- ② EMERGENCY STOP button
- ③ Illuminated pushbutton
- ④ Display with touch screen
- ⑤ LED display
- ⑥ Carrying strap
- ⑦ Safety bar
- ⑧ Membrane keyboard
- ⑨ Enabling button
- ⑩ Grip straps, left or right on the HMI device for securing

Wireless Teach Pendant F IWLAN is available in six models. The models are distinguished by a different labeling on the membrane keyboard in the following languages:

- Japanese
- English
- French
- Chinese
- Czech
- Russian

The Wireless Teach Pendant F IWLAN works wirelessly on battery power, or it can be mounted in the docking station.

Rear view



- ① Tray foot
- ② Nameplate
- ③ USB port with cover
- ④ Cover for connection compartment
- ⑤ Safety bars
- ⑥ Enabling button
- ⑦ Battery compartment cover

1.4 Main rechargeable battery



- ① Ribbon
- ② Nameplate
- ③ Button to switch on the LED display
- ④ Contact side
- ⑤ LED display

1.5 Accessories

The accessory can be ordered from the Internet at Industry Mall (<http://mall.automation.siemens.com>).

- Main rechargeable battery

The main rechargeable battery supplies power to the HMI device.

Order number: 6AV6645-7BF26-0TA0

- Protective foil

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

The set contains 10 protective foils.

Order number: 6AV6645-7BF25-0TA0

- Memory card

Only use SD memory cards that have been tested and approved for used by Siemens AG for the Wireless Teach Pendant F IWLAN.

Note

The MicroMemory card of the SIMATIC S7 controller is not suited for use with this HMI device.

Order number: 6AV6671-1CB00-0TA0

- USB Flash drive for SIMATIC PC

The USB Flash drive for SIMATIC PC is a mobile data storage device with a high data throughput, designed for industrial use.

1.6 Equipment for HMI device and plant

1.6.1 Overview

The following devices are needed for the HMI device and for fail-safe operation of a plant:

- HMI device
 - Docking station
 - Charger
 - Power supply unit
- Plant
 - RFID tag
 - Access point
 - Signal lamp, optional
 - Security systems, optional

The devices listed are not included in the scope of delivery of the HMI device. Order these devices separately.

You can find order information on the Internet at Industry Mall (<http://mall.automation.siemens.com>).

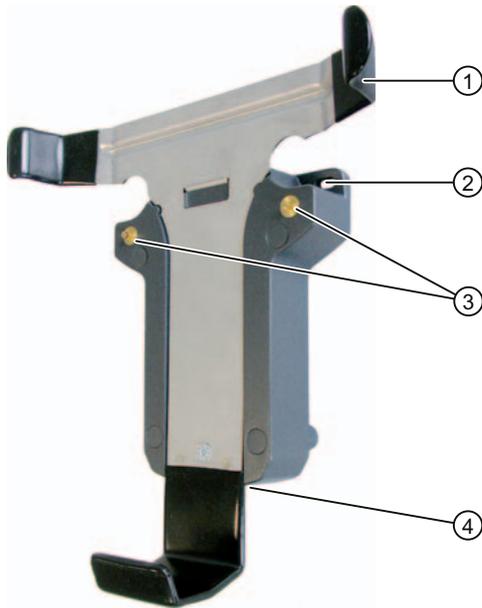
1.6.2 Docking station

The docking station is used for secure storage of the Wireless Teach Pendant F IWLAN. When the Wireless Teach Pendant F IWLAN rests in the docking station, the rechargeable batteries, i.e. main battery and backup battery, will be charged.

The docking station is not included in the HMI device scope of delivery. The docking station can be ordered with the order number 6AV6645-7BF28-0TA0.

Overview

1.6 Equipment for HMI device and plant



- ① Retention latch
- ② Mounting hole, left and right
- ③ Charge contact
- ④ Connection socket for the power unit (on the bottom)

Read the relevant documentation.

1.6.3 Charger°

The charger is used to charge and store the main batteries for the Wireless Teach Pendant F IWLAN. You can charge one main battery in each of the two charger sections.

NOTICE

Chargers suited for office environments only

If you use the charger in ambient conditions that do not correspond to an office environment, malfunctions may occur.

Use the charger only in an office environment.

The charger is not included in the HMI device scope of delivery. The charger is available under the order number 6AV6645-7BF27-0TA0.



- ① Connection socket for the power unit
- ② Charging compartment
- ③ Contact strip
- ④ LED display

Read the relevant documentation.

1.6.4 Power supply unit

The power supply unit provides electricity to the docking station and charger. The power supply unit can be used in 120 and 230 V AC power networks. The setting of the voltage range takes place automatically. The output voltage is 24 VDC.



- ① "Power" LED
- ② Connecting cable
- ③ Power supply unit
- ④ Power supply cable

Order number: 6AV6671-5CN00-0TA0

Overview

1.6 Equipment for HMI device and plant

The power supply unit is provided with four power supply cables with plugs for the following regions:

- Europe
- Asia
- North America
- United Kingdom of Great Britain and Northern Ireland

Read the relevant documentation.

1.6.5 RFID tag

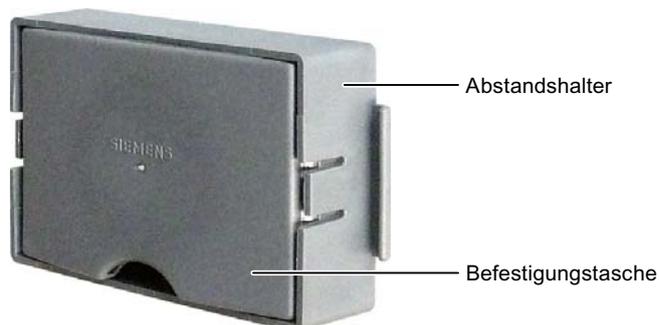
The RFID tag is required to log onto a machine. The RFID tag is a MDS D100 mobile data storage unit.



Order number: 6GT2600-0AD10

The RFID tag includes the following accessories:

- Spacer
Order number: 6GT2190-0AA00
- Fixing pocket
Order number: 6GT2190-0AB00



1.6.6 Access point

The access point is needed for the WLAN. The access point serves as a gateway between the wireless and wired network.



To use the function iPCF-MC for Rapid Roaming, you need an access point with two radio interfaces of the type SCALANCE W78x-2RR and firmware version V4.3.

We recommend the following access points for operation with the HMI device.

Designation	Number of WLAN interfaces	Antenna	iPCF-MC / Rapid roaming	Order number
SCALANCE W784-1	1	External	No	6GK5 784-1AA30-2AA0 6GK5 784-1AA30-2AB0 ¹⁾
SCALANCE W786-1PRO	1	Internal	No	6GK5 786-1BA60-2AA0 6GK5 786-1BA60-2AB0 ¹⁾
SCALANCE W786-2RR	2	Internal	Yes	6GK5 786-2BA60-6AA0 6GK5 786-2BA60-6AB0 ¹⁾
SCALANCE W788-1PRO	1	External	No	6GK5 788-1AA60-2AA0 6GK5 788-1AA60-2AB0 ¹⁾
SCALANCE W788-2RR	2	External	Yes	6GK5 788-2AA60-6AA0 6GK5 788-2AA60-6AB0 ¹⁾
SCALANCE W786-1PRO	1	Internal	No	6GK5 786-1BA60-2AA0 6GK5 786-1BA60-2AB0 ¹⁾
SCALANCE W786-2RR	2	Internal	Yes	6GK5 786-2BA60-6AA0 6GK5 786-2BA60-6AB0 ¹⁾
SCALANCE W786-2RR	2	External	Yes	6GK5 786-2AA60-6AA0 6GK5 786-2AA60-6AB0 ¹⁾

1) US version

Read the relevant documentation.

Additional access points and WLAN products are available in the Internet at: Industry Mall (<http://mall.automation.siemens.com>)

1.7 Communication and approved controllers

Number of communication connections

Communication link	Wireless Teach Pendant F IWLAN V2
Quantity, max.	6

Approved PLCs

NOTICE
<p>Safety-related communication</p> <p>A non-fail-safe controller cannot ensure safety-related communication.</p> <p>A SIMATIC S7F PLC is required for safety-related communication.</p>

Approved protocols

The HMI device uses the following protocols for communication with the controller:

- PROFINET
- PROFIsafe Mode V2.0

1.8 Software requirements

You need the following software for fail-safe operation:

- WinCC flexible 2008, SP2
- STEP 7 V5.4, as of SP2
- "SIMATIC S7 Distributed Safety V5.4" as of SP3 option package
- Customer-specific WinCC flexible 2008 SP2 add-on for the Wireless Teach Pendant F IWLAN

1.9 Supported WinCC flexible objects

The following tables contain the maximum number of objects you can use with the HMI device in a project.

Note

The maximum number of multiple objects used simultaneously can affect the performance of the active WinCC flexible project.

Alarms

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

Tags, values and lists

Object	Specification	HMI device
Tag	Number	2 048
Limit value monitoring	Input/Output	Yes
Linear scaling	Input/Output	Yes
Text list	Number	500 ¹⁾
Graphics list	Number	400 ¹⁾

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

Overview

1.9 Supported WinCC flexible objects

HMI screens

Object	Specification	HMI device
Screen	Number	500
	Fields per screen	200
	Tags per screen	200
	Complex objects per screen (for example bars)	10
	Template	Yes

Recipes

Object	Specification	HMI device
Recipe	Number	300
	Data records per recipe	500
	Entries per recipe	1 000
	Recipe memory	64 KB
	Location ¹⁾	Memory card USB stick Network drive

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

Logs

NOTICE

Logging

The HMI device is suitable for logging small volumes of data. The use of a large circular log has a negative effect on performance.

In order to log larger amounts of data, use segmented circular logs with multiple sequential logs.

Object	Specification	HMI device
Logs	Number of logs	20
	Number of partial logs in a segmented circular log	400
	Entries in each log including all partial logs	10 000
	Filing format	CSV with ANSI character set
	Location ¹⁾	Memory card USB stick Network drive

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

Safety

Object	Specification	HMI device
User administration	Number of user groups	50
	Number of users	50
	Number of authorizations	32

Infotexts

Object	Specification	HMI device
Infotext	Length (no. of characters)	320 (depending on font)
	For alarms	Yes
	For screens	Yes
	For screen objects (for example for I/O field, switch, button, invisible button)	Yes

Additional functions

Object	Specification	HMI device
Monitor setting	Touch screen calibration	Yes
	Brightness setting	Yes
Language change	Number of languages	16
VBScript	User-specific extension of the functionality	Yes
	Number of scripts	50
Graphics objects	Vector and pixel graphics	Yes
Trends	Number	300
Task planner	Number of tasks	48
Text objects	Number	10 000
Direct keys	PROFINET IO direct keys	Yes

Device-specific functions

Object	Specification	HMI device
Main rechargeable battery	Showing the battery charge	Yes
WLAN quality	Displaying WLAN quality	Yes
Effective range (RFID) name	Display effective range name	Yes

Functions for RFID tag system

Configuration	
Number of RFID tags in the project, maximum	127
Number of effective ranges in the project, maximum	127
Number of RFID tags per effective range, maximum	127
Number of HMI devices with logon authorization per effective range, when using F_FB_RNG_4 ¹⁾ , maximum	4 HMI devices
Number of devices with logon authorization per effective range, when using F_FB_RNG_16 ¹⁾ , maximum	16 HMI devices

1) F_FB: Fail-safe function block

1.10 Configuration and process control phases

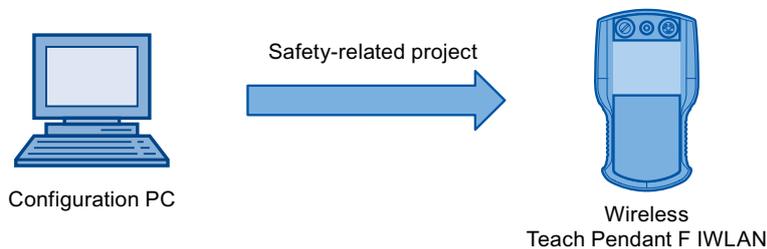
You must follow the phases below in order to use an HMI device in the system:

- Configuration phase
- Process control phase

Configuration phase

The configuration phase consists of the following operations:

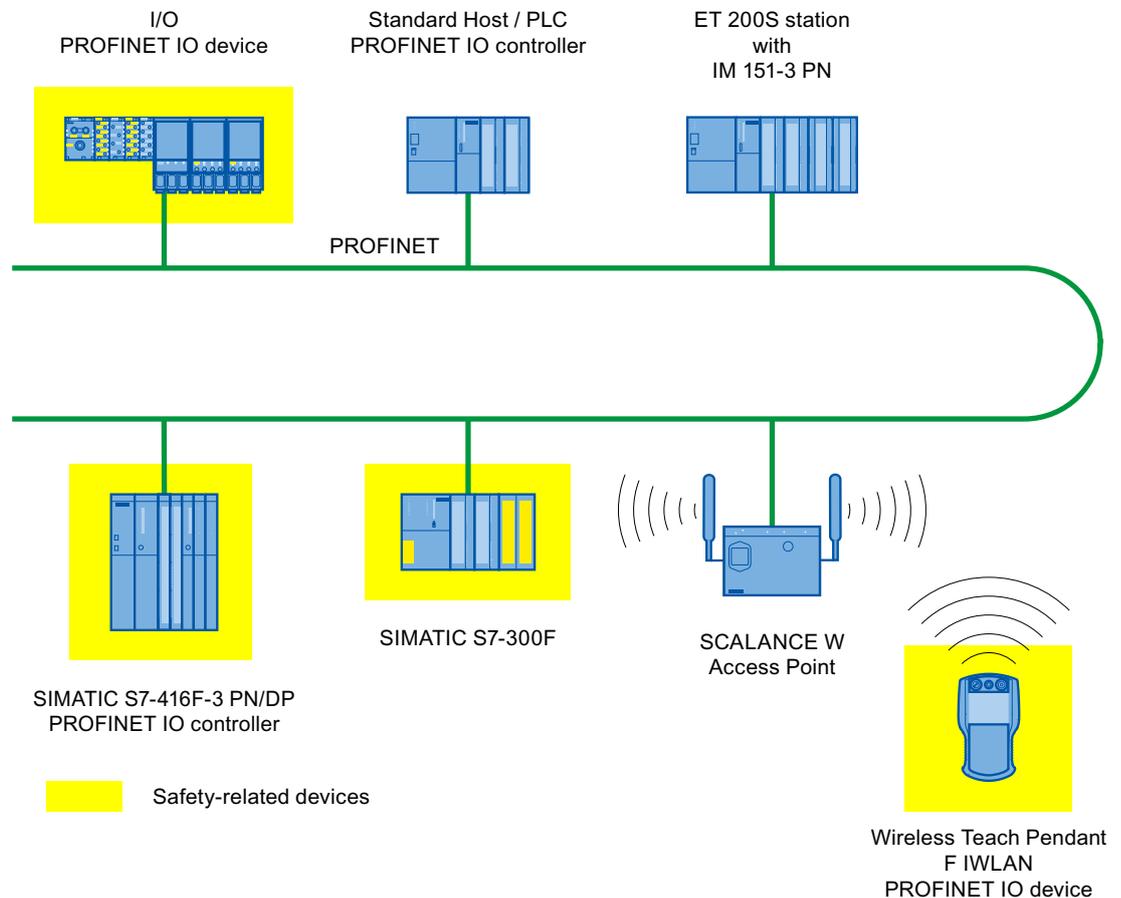
- Create project
- Transferring a project
- Accept project – determine checksum
- Test project
- Simulate project
- Save project



Process control phase

The process control phase includes operation and monitoring of active production processes with the HMI device. The HMI screens on the HMI device visualize the production process.

The following figure shows an example configuration of a plant control system which is operated with a Wireless Teach Pendant F IWLAN.



1.11 Areas in the RFID tag system

The following areas are available in a plant for fail-safe operation with RFID tag logon:

- WLAN for communication between a fail-safe controller and HMI device
- Effective range of the RFID tag for logging onto a machine
- RFID transmission and reception range of an HMI device for logging onto a machine

WLAN/iWLAN

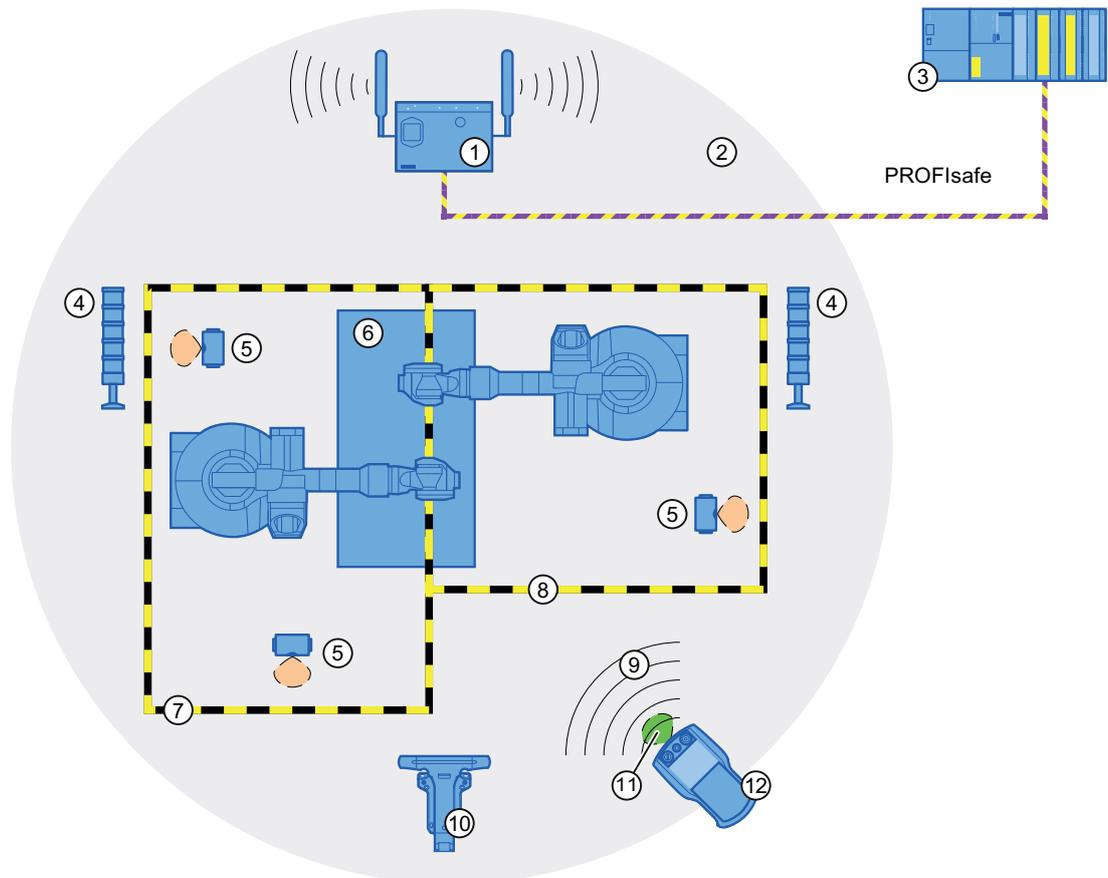
Fail-safe controller and HMI device communicate over the radio cell of the access point. The access point serves as a gateway between the wireless and wired network.

The WLAN or iWLAN in the plant is provided by at least one access point.

The figure below shows an example of the various areas.

Overview

1.11 Areas in the RFID tag system



- ① SCALANCE W access point
- ② Cell of the access point
- ③ Fail-safe controller
- ④ Signal lamp
- ⑤ RFID tag with effective range
- ⑥ Plant
- ⑦ Protection zone limit of protection zone 1
- ⑧ Protection zone limit of protection zone 2
- ⑨ WLAN of the HMI device
- ⑩ Docking station
- ⑪ RFID transmission and reception range of the HMI device
- ⑫ HMI device

RFID tag with effective range

The RFID tag is a storage device for a configured ID. The ID of the RFID tag is required for a HMI device to log onto a machine. The RFID transmission and reception range of the HMI device is brought into the effective range of the RFID tag in order to log on.

A signal lamp indicates whether an HMI device is logged onto a machine.

Protection zone

The protection zone is the area in the plant in which one or more machines are operated in fail-safe mode. The protection zone of the plant is demarcated by a security system and organizational measures.

The protection zone is **not** an object that can be configured.

Security system and organizational measures

The security system consists of one or more technical protection devices for the protection zone, e.g.:

- Mesh fence with access
- Light barrier
- Contact pressure mat

The security system can be controlled by a safety program, such as a program for robot control conforming to a robotics directive.

1.12 Rapid roaming

The wireless range of an iWLAN system can be expanded through the use of multiple access points. If an HMI device moves beyond the range of a SCALANCE W78x and into the range of another SCALANCE W78x, the wireless connection remains intact (roaming).

Capabilities provided by iPCF

In the industrial environment, there are applications that require deterministic behavior for a large number of participants and high data throughput in a cell. In addition, deterministic behavior is required for cell cross-overs with handover times of less than 100 milliseconds.

The iPCF extension (Industrial Point Coordination Function) was developed to meet these requirements.

iPCF ensures that all data traffic runs in coordinated fashion in a wireless cell, controlled by the access point. It also optimizes the throughput with a high number of participants by avoiding collisions. iPCF also facilitates very fast cell changes.

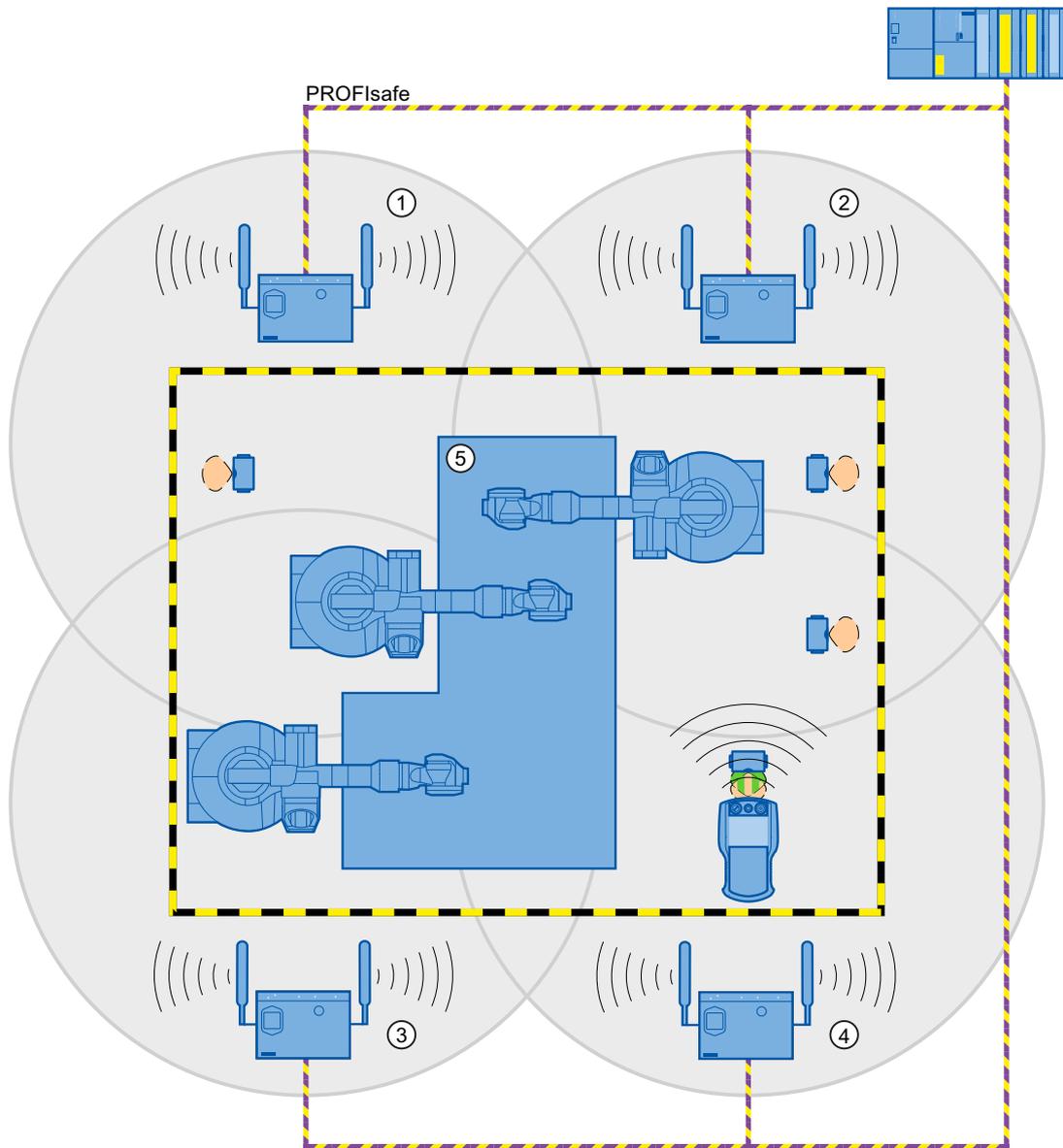
Special features provided by iPCF-MC

iPCF-MC was designed to enable free-moving participants to exploit the special advantages provided by iPCF, which allows communication independent of an RCoax line or directional antennas. With iPCF-MC, the client looks for potentially suitable access points even when it is receiving iPCF queries from the access point and the existing connection to an access point is functioning correctly. This makes it possible to switch to another access point very quickly if it becomes necessary. Unlike iPCF, with iPCF-MC the handover times do not depend on the number of radio channels in use.

Overview

1.12 Rapid roaming

The following figure shows an example of a plant with four WLAN areas.



- ① Radio cell of access point 1
- ② Radio cell of access point 2
- ③ Radio cell of access point 3
- ④ Radio cell of access point 4
- ⑤ Plant

For rapid roaming with iPCF-MC, you will require a suitable access point – see section "Access point (Page 21)".

We always recommend that you activate iPCF or iPCF-MC mode for PNIO communication.

For stable PNIO communication, a WLAN client should be located at all times in a radio cell with a signal strength $> 60\%$ or > -65 dBm. This can be checked by switching the various segments on and off.

This does not mean that the client needs to change over at a signal strength $< 60\%$ or < -65 dBm. Make sure that a segment is available with a sufficiently powerful signal.

Limitations due to iPCF-MC

iPCF-MC is an in-house development of the Siemens AG that will only work with participants in which iPCF-MC has been installed.

Operating principle of iPCF-MC

iPCF-MC uses both radio interfaces of the access point differently: One interface works as management interface and sends a beacon every five milliseconds. The other interface transmits the user data.

The following requirements have to be met to use iPCF-MC:

- All "RR" versions of the SCALANCE W-700 access points with at least two WLAN interfaces can be used as access point. The HMI device and all SCALANCE W-700 "RR" versions are suited as clients.
- You have to operate the management interface and the data interface in the same frequency band; they also have to match in their radio coverage. iPCF-MC will not work if both radio interfaces are equipped with directional antenna the cover different areas.
- The management interfaces of all access points that a client is to access must use the same channel. A client will only scan this one channel to find all available access points.
- You cannot use the transmission method to IEEE 802.11h for the management interface. 802.11h is possible for the data interface.

1.13 Terms for fail-safe operation

Fail-safe automation system

A fail-safe automation system is required in a plant with high safety requirements.

In an EMERGENCY STOP, the fail-safe automation system brings the plant to a safe operating state regardless of the situation. Shutdown of the plant therefore does not pose a danger to people or the plant.

Fail-safe operation

The HMI device registers signals from the EMERGENCY STOP button and the enabling button during fail-safe operation. The controller and the HMI device communicate via PROFIsafe.

Configuration of the safety functions in STEP 7 with the "SIMATIC S7 Distributed Safety" add-on package can achieve fail-safe operation according to SIL 3 or Performance Level e and Category 4 for the HMI device.

Integration and removal

- Integrating

Integration means to establish safety-related communication between the HMI device and the fail-safe controller via PROFIsafe.

The EMERGENCY STOP button is enabled in integrated operating mode.

- Removing

Removal means to intentionally stop safety-related communication between the HMI device and the fail-safe controller via PROFIsafe.

Logging on the HMI device

The HMI device must be logged onto a machine in order to operate the machine after integration in fail-safe operation with the enabling button. The logon is performed with an RFID tag.

Logging off an HMI device

Logging off an HMI device from a machine terminates fail-safe operation with the enabling button.

- Forced logoff

If the security system is triggered, for example by the operator leaving the protection zone without logging off, a forced logoff is performed by the machine. The HMI device revokes the operator authorization for the enabling button. The operator is prompted to confirm the "Forced logoff" dialog.

- Automatic logoff in the event of a communication error

If a communication error occurs, the HMI device is removed from the safety-related communication. The HMI device is automatically logged off the machine. The fail-safe controller brings the plant to a safe operating state.

Shutdown response of the plant

- The following shutdown response of the plant applies regardless of whether or not the HMI device is logged onto a machine.
 - EMERGENCY STOP
EMERGENCY STOP is a procedure that is intended to stop a process or movement associated with danger in accordance to EN 60204-1, Appendix D. An EMERGENCY STOP immediately stops all parts of the plant controlled by the fail-safe controller via a safety program. The EMERGENCY STOP button is always enabled when there is PROFIsafe communication between HMI device and fail-safe controller, i.e. when the HMI device is integrated in the PROFIsafe communication.
 - Global rampdown
A global rampdown is the intentional stopping of the plant. The global rampdown is independent of the area.
The global rampdown is triggered by the fail-safe controller, for example, if an error occurs with an HMI device integrated in the PROFIsafe communication.
- The following shutdown response of the plant applies when the HMI device is logged onto a machine.
 - Local rampdown
A local rampdown is the intentional stopping of a plant section by the fail-safe controller. The local rampdown is triggered, for example, when the operator leaves the protection zone without logging off via a security system.
 - Shutdown
The shutdown is triggered when the F-CPU has detected a communication error with an HMI device that is logged onto a machine. Shutdown is the immediate stop of all machinery being operated in fail-safe mode.

Communication error

A communication error occurs when the communication between HMI device and fail-safe controller is interrupted. Additional information is available in the section "Communication error for the integrated HMI device (Page 256)".

Overview

1.13 Terms for fail-safe operation

Safety instructions and standards

2.1 Safety instructions

 WARNING
Injury or material damage If you do not exactly adhere to the safety regulations and procedural instructions contained in this manual, hazards may arise and safety features be rendered ineffective. This can result in personal injuries or material damage. Closely follow closely the safety regulations and procedural instructions in each situation.

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

Project security

 WARNING
Injury or material damage The configuration engineer for plant control must take precautions to ensure that an interrupted program will be correctly integrated again after communication failures, voltage dips or power outages. A dangerous operating state must not be allowed to occur - not even temporarily - during the entire execution of the control program, even during a troubleshooting.

Safety during commissioning and operation

 WARNING
Installation according to the instructions Commissioning of the HMI device is prohibited until it has been absolutely ensured that the machine to be operated with the HMI device complies with Directive 2006/42/EC. Verify before commissioning that the provisions of Directive 2006/42/EC are fulfilled.

Safety during operation

 WARNING
HMI device failure A strong shock or impact can impede the functionality of the HMI device. After a strong mechanical action, ensure the HMI device and the safety-related parts are in working order.
Danger of injury Manual movements controlled with the HMI should only be executed in conjunction with the enabling buttons and at reduced velocity.
Exclusive operating right The simultaneous operation of the plant with multiple HMI devices is not allowed. Prevent simultaneous operation through the appropriate configuration.

Note

The function of the EMERGENCY STOP button must be checked periodically.

High-frequency radiation, for example from cellular phones, can lead to undesirable operating states in a plant.

2.2 Approvals

Note

The following overview shows possible approvals.

The only valid approvals for the HMI device, the docking station, the power supply module and the RFID tag are those shown on the label on the rear panel.

CE approval



The HMI device, the docking station, the power supply and the RFID tag conform to the European standards for programmable logic controllers as published in the official journals of the European Union:

- 2004/108/EC "Electromagnetic Compatibility" (EMC Directive)
- 1999/5/ECG "Directive of the European Parliament and of the Council from March 9, 1999 relating to Radio Equipment and Telecommunications Terminal Equipment and the Mutual Recognition of their Conformity"

EC Declaration of Conformity

The EC Declarations of Conformity are available to the relevant authorities at the following address:

Siemens AG
Industry Sector
I IA AS RD ST
PO Box 1963
92209 Amberg
Germany

UL approval



Underwriters Laboratories Inc. in accordance with:

- UL 60950 (Safety of Information Technology Equipment)
- CAN/CSA-C22.2 No. 60950-00 (Safety of Information Technology Equipment)

Requirements of the approval are only met if the device is operated with the main rechargeable battery or in stationary mode in the docking station.

Marking for Australia



The HMI device, the docking station, the power supply module and the RFID tag meet requirements to AS/NZS 2064 (Class A).

Wireless approval

The national approvals for the HMI device are listed on the back of the device and in the product information for "Wireless Teach Pendant F IWLAN" in the Internet (<http://support.automation.siemens.com/WW/view/en/30360848/133300>).

Requesting certificates

A copy of the certificates and associated reports is available upon request from the following address:

Siemens AG
Industry Sector
I IA AS RD ST
PO Box 1963
92209 Amberg
Germany

2.3 Standards on operating safety

The HMI device meets the following standards for use in a plant:

Standard	Title	Version
EN 12417	Machine Tools - Safety - Machining Centres	01.07.2009
EN 60950	Information Technology Equipment (General Requirements)	01.11.2006
UL 60950	Safety of Information Technology Equipment	11.12.2000
CAN/CSA-C22.2 No. 60950-00	Safety of Information Technology Equipment	01.12.1990

EMC testing

The values of the EMC test for the HMI device conform to the following standards:

Standard	Title	Version
EN 61000-6-2	EMC – Part 6-2: Generic standards - Immunity for industrial environments	01.05.2006
EN 61000-6-4	EMC – Part 6-4: Generic standards - Emission standard for industrial environments	01.11.2007
DIN EN 50360	Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human safety in electromagnetic fields (300 MHz to 3 GHz)	01.05.2002
DIN EN 50371	Generic standard to demonstrate compliance of low power electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)	01.11.2002
DIN EN 61131-2	Programmable Logic Controllers – Part 2: Equipment requirements and testing	01.01.2009
DIN EN 300440-1	Electromagnetic compatibility and radio spectrum matters	01.08.2009
DIN EN 301893	Broadband Radio Access Networks (BRAN)	01.05.2009
EN 50385	Product standard to demonstrate the compliance of radio base stations and fixed terminal stations for wireless telecommunication systems	01.05.2003
EN 300328	Electromagnetic compatibility and radio spectrum matters	01.03.2009
EN 300330	Electromagnetic compatibility and radio spectrum matters (ERM)	01.08.2006
EN 301489-1	Electromagnetic compatibility and radio spectrum matters (ERM)	01.01.2010
EN 301489-3	Electromagnetic compatibility and radio spectrum matters (ERM)	01.01.2003
EN 301489-17	Electromagnetic compatibility and radio spectrum matters	01.07.2009
FCC	OET 65, RSS-210, Part 15247, 15407 radio authorization	
FCC	RFID 15225, RSS 210	

TÜV

The TÜV confirms that the HMI device satisfies the requirements of the following standards with regard to its safety functions.

Standard	Title	Version
DIN EN 60204-1	Safety of machinery – Electrical equipment of machines – Part 1: General Requirements	01.10.2009
DIN IEC 62061	Safety of machinery – Functional safety of electrical, electronic and programmable control systems for machinery	01.04.2009
IEC 61508-1 to 4	Safety Integrity Level 3	01.01.2005
ISO 13850	Safety of machinery - EMERGENCY STOP - Principles for design	01.01.2009
ISO 13849-1	Performance Level e and Category 4	01.09.2009

Additional measurements

Additional measurements were made for:

- Japan
 - Table/Annex No 43,44,45 – Test Method for Radio Equipment mentioned in Certification Regulations Article, Item 19, 19-2, 19-3 and 19-3-2
 - Table/Annex No 47 – Test Method for Radio Equipment mentioned in Certification Regulations Article, Item 19-5 and 19-11
 - RFID – ARIB STD T-82
- Taiwan
 - LP0002

2.4 Operating conditions

The national approvals for the HMI device are listed on the back of the device and in the product information for "Wireless Teach Pendant F IWLAN V2" in the Internet (<http://support.automation.siemens.com/WW/view/en/30360848/133300>).

NOTICE
<p>Wireless control device</p> <p>A wireless control device may cause interference.</p> <p>If a wireless control device is used, the following must be ensured:</p> <ul style="list-style-type: none"> • That other systems at the site are not disturbed by the wireless control device • That other systems at the site do not disturb the wireless control device

Use in industry

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

- Interference emission requirements, paragraph 7.3, DIN EN 60947-1, Environment A
- Interference immunity requirements DIN EN 61326

Residential use

NOTICE

Interference to radio and TV reception

The HMI device is not suitable for use in residential areas: Operation of HMI devices in residential areas can cause interference to radio and television reception.

If the HMI device is used in a residential area, you must take measures to achieve Limit Class B conforming to EN 55016 for RF interference.

To achieve radio interference suppression class B, for example, install filters in power supply lines.

Individual acceptance is required.

2.5 Risk analysis of the plant

The following rules apply to the risk analysis of the plant:

- ISO 12100-1 and ISO 12100-2, General design guidelines for machines
- ISO 13849-1, Safety of machinery - Safety-related parts of control systems - General principles for design
- ISO 14121-1, Safety of machinery – Risk assessment – Part 1: Principles

These considerations result in a performance levels a to e in accordance with ISO 13849-1, which dictate how the safety-related parts of the system must be furnished.

The safety-related parts of the HMI device meet:

- SIL 3 in accordance with IEC 61508
- Performance level e and Category 4 in accordance with ISO 13849-1

Take the plant configuration as a whole into consideration in the risk analysis and not just the separate sections. For additional information on risk analysis and risk mitigation, refer to the "Safety Technology in SIMATIC S7" system manual (<http://support.automation.siemens.com/WW/view/en/12490443>).

See also

Safety-related operator controls (Page 88)

2.6 Safety functions of the EMERGENCY STOP button

The EMERGENCY STOP button on the HMI device brings about a safety-related stop of the plant in accordance with IEC 60204-1, Section 9.2.5.3. You can implement a Category 0, 1, or 2 stop function in accordance with IEC 60204-1, Section 9.2.2. The stop function category must be selected on the basis of a risk assessment.

The following requirements must be met in order to render the EMERGENCY STOP button effective:

- The HMI device must be operated in the docking station or with the main rechargeable battery.
- A project is running on the HMI device.
- The HMI device must be integrated in the safety program of the F-CPU.

If these prerequisites are satisfied the following applies:

- The "SAFE" LED on the HMI device is lit.
- The EMERGENCY STOP button is enabled.

As soon as the PROFIsafe communication between the HMI device and controller is established within the WLAN range, the EMERGENCY STOP button on the HMI device becomes active. The EMERGENCY STOP button is enabled within the WLAN regardless of whether or not the HMI device is logged onto a machine.

 WARNING
EMERGENCY STOP button not available The EMERGENCY STOP button on the HMI device may not be used as a replacement for a permanently-wired EMERGENCY STOP or EMERGENCY OFF on the machine. Install stationary EMERGENCY STOP buttons that will be available at all times on the configured system.
EMERGENCY STOP button not enabled If a communication error triggers a global rampdown, the EMERGENCY STOP button will no longer be available on the affected HMI device. You have the option of interconnecting the "Global Rampdown" signal so that an EMERGENCY STOP is triggered.
EMERGENCY STOP button out of service when HMI device is removed If the HMI device is not integrated in the safety program of the F-CPU, the EMERGENCY STOP button will be out of service. To avoid confusion between HMI devices with enabled and disabled EMERGENCY STOP buttons during an emergency, only one integrated HMI device should be freely accessible. If an HMI device is not integrated and not in use, store the HMI device in a location with protected access.
Category 0 or 1 Stop If a Category 0 or 1 stop circuit is implemented, the stop function must be effective regardless of the operating mode. A Category 0 stop must have precedence. Release of the EMERGENCY STOP button must not cause a hazardous situation (see also EN 60204-1, Section 9.2.5.3). The stop function is not to be used as a replacement for safety equipment.

Note

The EMERGENCY STOP button is evaluated when the HMI device is integrated in the safety program of the F-CPU. The EMERGENCY STOP button can be triggered unintentionally in the following situations:

- If the HMI device falls down
 - When opening one of the coverings on the rear of the HMI device
-

2.7 Safety functions of the enabling mechanism

In a numerically controlled system, the "Special mode" operating mode requires an enabling mechanism. The enabling mechanism is comprised of two enabling buttons mounted on both sides of the HMI device.

Special mode

During special mode, safety has to be ensured in a different manner than in automatic mode. During special mode, personnel enter danger zones of the plant in which controlled movements must be possible.

Depending on the risk assessment of the plant, movement needs to occur at reduced speed for special mode. Movement of the plant parts should only be possible when the enabling mechanism is activated. The operator must be accordingly qualified and know details of use in accordance with safety regulations.

Safety instructions

The safety-related parts of the controller for speed reduction and those for the enabling mechanism are designed in such a way that they satisfy the requirements for the safety category as determined by the risk assessment.

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

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

<p> WARNING</p> <p>Injury or material damage</p> <p>Enabling buttons should only be used when the following applies for the person activating the enabling button:</p> <ul style="list-style-type: none"> • The person can see the danger zone. • The person is capable of recognizing personal injury hazards in good time. • The person is capable of taking immediate measures to avoid danger. <p>The only person allowed to remain in the danger zone is the person who is activating the enabling button.</p> <p>Commands for unsafe conditions are not permitted to be issued with one enabling button alone. To accomplish this, a secondary, conscious start command using a button on the HMI device is required.</p>

<p>NOTICE</p> <p>Risk from improper use</p> <p>An enabling button can be fixed without permission.</p> <p>To avoid the risk of unauthorized fixation, fully press both enabling buttons each time the project starts. Release the enabling buttons.</p>

Note

The enabling button only has an effect when the HMI device is logged onto a machine and the "RNG" LED on the HMI device is lit.

See also

Risk analysis of the plant (Page 40)

2.8 Electromagnetic compatibility

The HMI device, docking station, power supply and RFID tag meet the requirements of the EMC regulations pertaining to the European domestic market and more. The enhanced testing and limit value levels defined by CDV 61326-3-1/Ed. 1 have been taken into account during the type test

EMC-compliant installation

Conditions for fault-free operation include EMC-conform assembly of the docking station and RFID tag, as well as the use of interference-proof cables. The following documents also apply to the installation of the docking station:

- Description "Directives for interference-free installation of PLCs" (<http://support.automation.siemens.com/WW/view/de/1064706>), German
- System manual "Basics on Setting up an Industrial Wireless LAN" (<http://support.automation.siemens.com/WW/view/en/9975764>)

Pulse-shaped disturbance

The following table shows the electromagnetic compatibility of modules with regard to pulse-shaped interference. The table applies to the docking station, with and without an attached HMI device.

Pulse-shaped disturbance	Tested with	Degree of severity
Electrostatic discharge in accordance with IEC 61000-4-2	Air discharge: 8 kV Contact discharge: 6 kV	3
Burst pulses (high-speed transient interference) in accordance with IEC 61000-4-4	2 kV supply line	3

An external safety circuit is required for the "Surge immunity test according to IEC 61000-4-5". The safety circuit is described in the Installation manual "Automation System S7-300 – Installation" (<http://support.automation.siemens.com/WW/view/en/15390415>), section "Lightning and overvoltage protection".

Pulse-shaped disturbance	Tested with	Degree of severity
Asymmetrical coupling	2 kV power cable DC voltage with protective elements	3
Symmetrical coupling	1 kV power cable DC voltage with protective elements	3

Sinusoidal interference

The following table shows the EMC behavior of the modules with respect to sinusoidal interference.

The table applies to the HMI device, docking station and power supply.

Sinusoidal interference	Test values	Degree of severity
HF radiation (in electromagnetic fields) in accordance with IEC 61000-4-3	80% amplitude modulation at 1 kHz <ul style="list-style-type: none"> • Up to 10 V/m in the 80 MHz to 1 GHz range • Up to 10 V/m in the 1.4 GHz to 2 GHz range • Up to 1 V/m in the 2 GHz to 2.7 GHz range 	3
RF interference current on cables and cable shielding conforming to IEC 61000-4-6	Test voltage 10 V, with 80% amplitude modulation of 1 kHz in the 9 kHz to 80 MHz range	3

Emission of radio interference

The following table shows the interference emissions from electromagnetic fields in accordance with EN 55016, Limit Value Class A, Group 1, measured at a distance of 10 m.

30 to 230 MHz	< 40 dB (V/m) quasi-peak
230 to 1 000 MHz	< 47 dB (V/m) quasi-peak

Note

Before you connect the HMI device to the public electrical network, ensure that it is compliant with Limit Value Class B in accordance with EN 55022.

2.9 Transport and storage conditions

The shipping conditions of this HMI device exceed requirements in accordance with IEC 61131-2. The following specifications apply to devices that are shipped and stored in the original packaging.

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

The following table shows the transport and storage conditions for the HMI device, docking station, power supply unit and RFID tag.

Type of condition	Permitted range
Drop test (in transport package)	≤ 1 m
Temperature	–20 to +60 °C
Atmospheric pressure	1140 hPa to 660 hPa, corresponds to an elevation of –1000 to 3500 m
Relative humidity	Applies to HMI device: 10 to 90%, without condensation Applies to docking station: 35 to 85%, without condensation
Sinusoidal vibration in accordance with IEC 60068-2-6	5 Hz to 9 Hz: 3.5 mm 9 Hz to 500 Hz: 9.8 m/s ²
Shock in accordance with IEC 60068-2-29	250 m/s ² , 6 ms, 1000 shocks

NOTICE

Equipment failure

Moisture in the form of condensation on or in the device is formed:

- When transporting a device at low temperatures
- Under extreme temperature variations

Moisture and condensation lead to malfunction.

Bring the device to room temperature before operating.

Condensation

When condensation is on the device, do not expose the HMI device to direct radiation from a heater.

If condensation has developed, wait approximately 4 hours until the HMI device has dried completely before switching it on.

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

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

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

Planning the use

3.1 Checklist

Perform the following tasks when planning fail-safe operation. Confirm each task by checking it off in the following list.

Task	Additional information	Check
Check the ambient conditions at the site.	Operating conditions (Page 48)	
Plan access routes to the plant.	–	
Plan operator locations at the plant where WLAN will be needed.	WLAN properties (Page 51)	
Plan the WLAN. Determine the installation locations for the access points based on this. Special programs are available for planning the WLAN. We strongly recommend you check the local wireless conditions before beginning start-up.	System manual "Basics on Setting up an Industrial Wireless LAN" (http://support.automation.siemens.com/WW/view/en/9975764) "SINEMA E" planning program (http://www.siemens.com/sinema) Guideline for the Use of Industrial Wireless LAN in a PROFINET IO Environment (http://support.automation.siemens.com/WW/view/en/31938420)	
Plan for information security.	Planning information security (Page 59)	
Plan the configuration of the PROFINET and PROFIsafe communication.	System manual "Communication with SIMATIC" (http://support.automation.siemens.com/WW/view/en/25074283) Programming and operation manual "S7 Distributed Safety - Configuring and Programming" (http://support.automation.siemens.com/WW/view/en/22099875)	
Plan the installation locations for the RFID tags.	Planning an installation location for RFID tags (Page 54)	
Plan the installation location and clearance for the docking station.	Planning the installation location and clearance of the docking station (Page 56)	
Plan the location for the signal lamps.	Planning the installation location of signal lamps (Page 57)	

3.2 Operating conditions

Mechanical and climatic ambient conditions

The HMI device is designed for use in a location protected from the effects of the weather. The ambient conditions meet the requirements for DIN IEC 60721-3-3:

- Mechanical requirements according to class 3M3
The following table applies to the HMI device and docking station.
- Climatic requirements according to class 3K3

Use with additional protective measures

You may only use the HMI device at the following locations with additional protective measures:

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

Damping shock and vibration

If the HMI device is subjected to impermissibly strong shocks or vibrations, you must take appropriate measures to reduce amplitudes or acceleration. In such situations, use vibration damping or vibration absorber systems for the HMI device and accessories.

NOTICE
Setting down the HMI device
If you place the HMI device on a surface with a high natural frequency, malfunctions may occur as a result.
Do not place the HMI device on a surface with a high natural frequency.

Testing mechanical ambient conditions

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

Test	Physical variable	Value
Vibrations IEC 60068-2-6 Test Fc	Vibration	1 octave/min 10 cycles per axis
	Frequency band	5 to 8.4 Hz: Deflection 3.5 mm
		8.4 to 150 Hz Vibration acceleration 9.8 m/s
Shock IEC 60068-2-27	Shock form	Half sine
	Shock amplitude	15 g
	Shock duration	11 ms
	Number of shocks	3 per axis
Impact IEC 60068-2-75	Impact stress	1 Nm, once With an impact test device similar to DIN VDE 0740, Part 1, Section 19.2 at room temperature.
Drop test EN 60068-2-31	Fall height	0.5 m Applies to the HMI device, with and without battery

Climatic ambient conditions for the HMI device

The following table shows the permitted ambient climatic conditions for use of the HMI device.

Ambient condition	Permitted range	Comment
Operating temperature	0 to 40° C	–
Humidity, relative	5 to 85 %, no condensation	Stress level 2, according to IEC 61131-2
Humidity, absolute	1 to 25 g/m ³	–
Atmospheric pressure	1060 to 700 hPa	Corresponds to an elevation of –1000 to 2000 m
Pollutant concentration	SO ₂ < 0.5 vpm, relative humidity < 60%, no condensation	Test: 10 cm ³ /m ³ ; 10 days
	H ₂ S < 0.1 vpm, relative humidity < 60%, no condensation	Test: 1 cm ³ /m ³ ; 10 days

Planning the use

3.3 Insulation resistance, protection class and degree of protection

Ambient climatic conditions for the docking station

The following table shows the permitted ambient climatic conditions for use of the docking station.

Ambient condition	Permitted range	Comment
Operating temperature	0 to 40° C	–
Humidity, relative	5 to 85%, no condensation	Stress level 2, according to IEC 61131-2
Humidity, absolute	1 to 25 g/m ³	–
Atmospheric pressure	1060 to 700 hPa	Corresponds to an elevation of –1000 to 2000 m
Pollutant concentration	SO ₂ < 0.5 vpm, relative humidity < 60%, no condensation	Test: 10 cm ³ /m ³ ; 10 days
	H ₂ S < 0.1 vpm, relative humidity < 60%, no condensation	Test: 1 cm ³ /m ³ ; 10 days

Ambient climatic conditions for the RDIF tag

The following table shows the permitted ambient climatic conditions for use of the RFID tag.

Ambient condition	Permitted range	Comment
Operating temperature	–25 to 80° C	–

3.3 Insulation resistance, protection class and degree of protection

insulation resistance

Insulation resistance is demonstrated in the type test with the following test voltages in accordance with IEC 61131-2:

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

Protection class of the HMI device



HMI device	Protection class according to IEC 60417-DB-HS
Front and rear panel	Protection class III

Degree of protection of the HMI device

NOTICE
<p>Degree of protection IP65 for HMI device</p> <p>When enclosure openings or the connection compartment are not closed, the HMI device does not meet the specified degree of protection.</p> <p>Ensure that the enclosure is closed as specified by the regulations.</p>

Device	Degree of protection in accordance with IEC 60529
HMI device, front and rear panel	IP65
RFID tag	IP65

3.4 WLAN properties

Adhere to the installation guidelines when installing the WLAN. You can find more additional information in the System manual "Basics on Setting up an Industrial Wireless LAN" (<http://support.automation.siemens.com/WW/view/en/9975764>).

Plan the WLAN for a maximum of four HMI devices.

When adding a WLAN participant, make sure that you observe the conditions described in the document "Wireless LAN in a PROFINET IO Environment". The conditions vary depending on the operating mode and the requirement for PNIO refresh times. See Guideline for the Use of Industrial Wireless LAN in a PROFINET IO Environment (<http://support.automation.siemens.com/WW/view/en/31938420>).

NOTICE
<p>Communication interference possible</p> <p>Communication interference cannot be excluded if you do not check the local wireless conditions prior to start-up.</p> <p>Check your local wireless conditions prior to start-up. When planning the wireless channels, mode 802.11a is preferable.</p>

Ad hoc network

An ad hoc network cannot be used in conjunction with the HMI device.

3.5 Planning protection zones in the RFID tag system

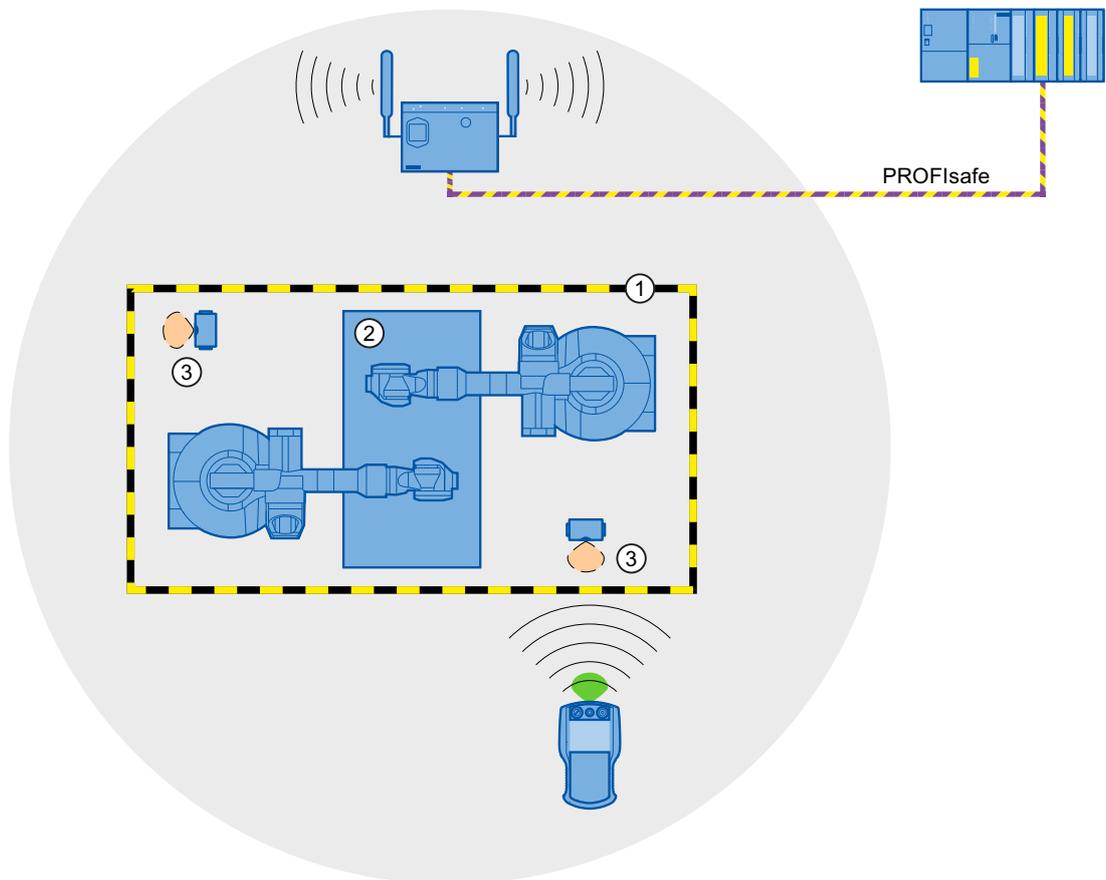
At least one protected area must be set up in an RFID tag system. The protection zone is the area of the plant in which a plant section is operated in fail-safe mode.

The protection zone requires low-barrier access for the operator to the plant section that is located within the protection zone. The HMI device must be logged onto a machine within the protection zone in order to operate the machine after integration in the fail-safe mode with the enabling button.

Note

You can also operate the HMI device outside a protection zone without logging onto a machine. However, operation in the fail-safe mode with the enabling button is then not possible.

The following figure shows a plant with a protection zone.



- ① Protection zone limit
- ② Plant section in the protection zone
- ③ RFID tag with effective range

Relationship between protection zone and RFID tag

The protection zone limit is defined by a clear spatial demarcation.

If the HMI device is logged onto a machine in the protected area with a RFID tag, it is possible to operate the machine in fail-safe mode with an enabling button within the protected area.

Requirements for the protection zone

The protection zone must meet the following requirements:

- The protection zone must be completely demarcated and protected.
- Protection zones may not overlap.
- The protection zone must be fully visible to the operating personnel.
- A hazardous location must be visible from every point of the protection zone.

You can find a configuration example in the Appendix.

- The protection zone must be protected by a security system that prevents unauthorized or erroneous use of the HMI device. The security system must have a safety category that is sufficient to meet the plant requirements.

The following security systems are suitable:

- Mesh fence with access

If you use a mesh fence for the protection zone, you can protect access through an additional security system, for example, a light barrier or a contact pressure mat. This allows open access for an escape route during operation of the plant.

- Light barrier
- Contact pressure mat

The security system can be controlled by a safety program, such as a program for robot control conforming to a robotics directive.

See also

Example of an application (Page 267)

3.6 Planning an installation location for RFID tags

Installation location for the RFID tag

Observe the following when selecting the RFID tag installation location:

- You will need at least one RFID tag for each machine operated in fail-safe mode with the enabling button.
- The installation surface of the RFID tag must have a level foundation.
- The installation surface must be non-metallic.

When mounting on metallic base, a spacer is required.

- Select an installation location that is clearly visible for the signs of the RFID tags with an associated ID.

Influence on communication

Note the following:

- The use of an MDS D100 directly on metal is not permitted.
Metal influences the field data and thus the communication.
- Flush installation of a MDS D100 in metal reduces the field data.
- Metallic objects must not reduce the effective range.
- A test is necessary in critical applications.

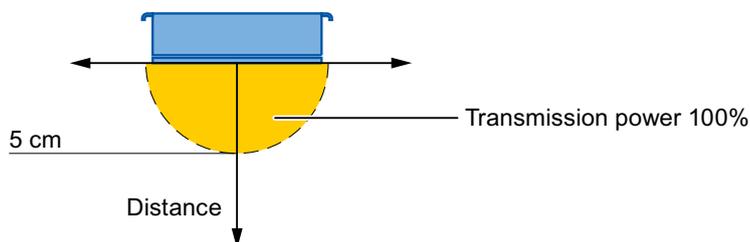
You can find more information in the manual "MOBY D, System Manual, Edition 11/2006".

Function of the RFID tag

The HMI device uses the RFID tag to log onto a machine within a protected area.

Effective range of the RFID tag

The radius of the effective range of an RFID tag is a maximum of 5 cm.



Planning the number of RFID tags

The following rules apply in a WinCC flexible project:

- A maximum of 127 effective ranges can be configured.

Specify a name and a plant-wide unique ID for each effective range - in a values range from 1 to 65534. Write down the name and ID of the effective ranges on the plant map for the commissioning.

- A maximum of 127 RFID tags can be configured for each effective range.

The mapping of the protected area to the RFID tag is defined in the project.

Planning the RFID tag mapping

The following rules apply:

- Safe access is required to the RFID tag.
- The distance between two RFID tags must be at least 10 cm.
- An RFID tag cannot be assigned to two machines.
- To log onto a machine, the distance between the HMI device and the RFID tag may not be more than 5 cm.

3.7 Planning the installation location and clearance of the docking station

Selecting the mounting location

The docking station is designed for vertical installation.

WARNING

Installing the docking station

When the HMI device is operated in the plant and docking station is mounted, the EMERGENCY STOP button must be enabled. The EMERGENCY STOP button is not enabled when the docking station is in a plant area with insufficient wireless coverage.

The docking station must be installed in either a plant section with sufficiently wide WLAN coverage or a separate service area.

CAUTION

Stopping the plant

The HMI device can fall down if it is not securely hooked in. This can accidentally trigger the EMERGENCY STOP button.

Install the docking station on a vertical surface or one that is slightly inclined towards the back.

The location of the docking station must be free of vibrations.

If the docking station vibrates while the HMI device is resting in it, the HMI device may come off.

Find a location without vibration for installation of the docking station. For additional information, see Section Operating conditions (Page 48).

NOTICE

Charging the rechargeable battery

When charging a rechargeable battery, the ambient temperature or battery temperature should not exceed 40 °C. The higher the temperature, the longer it will take for the rechargeable battery to fully charge.

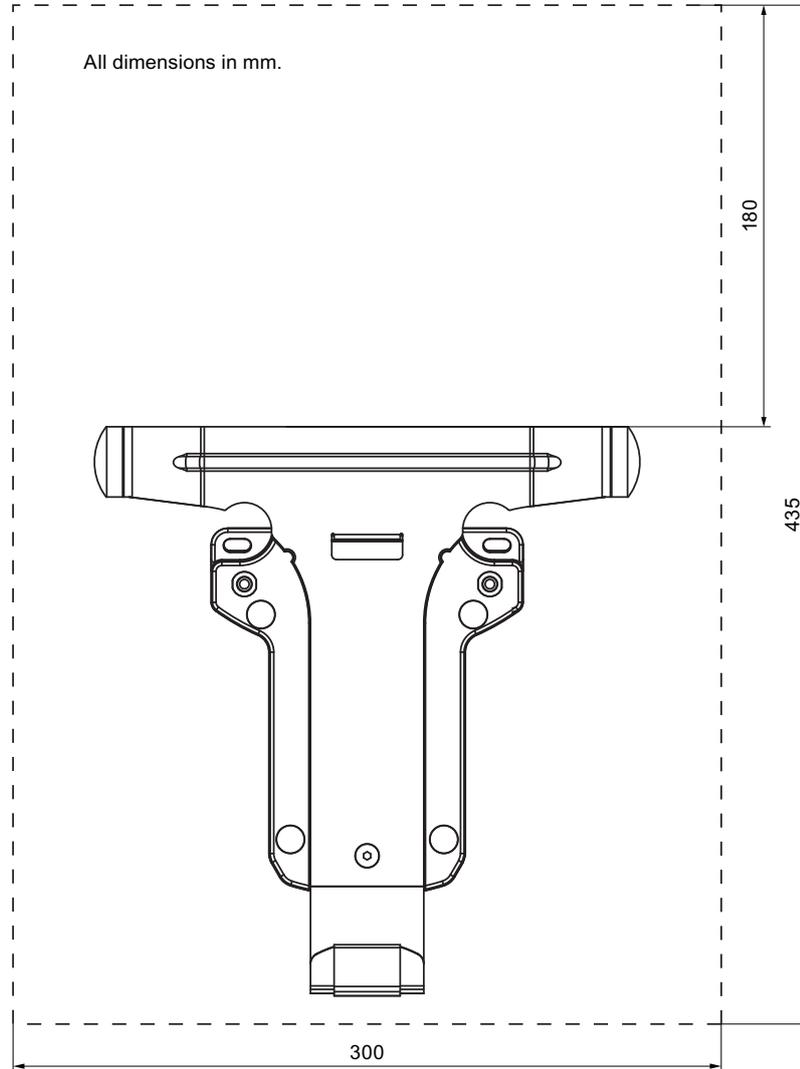
Find a place with a cool ambient temperature for the docking station.

Select a location with the following characteristics for installing the docking station:

- Easily and safely accessible
- No exposure to direct sunlight
- It is easy to hook in and remove the HMI device in the docking station
- Ergonomic operation of the HMI device in the docking station is ensured

Maintaining clearances

The following clearance is required around the docking station:



3.8 Planning the installation location of signal lamps

You will need a signal lamp for a machine operated in fail-safe mode with the enabling button. The signal lamp notifies the operator that he/she has logged on to the machine.

Plan a clearly visible installation location for the signal lamp that is assigned to a machine.

3.9 Coexistence of the frequency bands

Coexistence in the 2.4 band

The use of the HMI device does not affect the communication with other devices or only negligibly so. This applies to the following communication networks:

- WLAN

When adding a WLAN participant, make sure that you observe the conditions described in the document "Wireless LAN in a PROFINET IO Environment". The conditions vary depending on the operating mode and the requirement for PNIO refresh times. See Guideline for the Use of Industrial Wireless LAN in a PROFINET IO Environment (<http://support.automation.siemens.com/WW/view/en/31938420>).

- Standard RFID system according to ISO 15693
- Communication protocols that are used for office networks, smoke detectors, bar code scanners etc. in the 2.4 GHz range

You need to plan the radio channels when operating such devices simultaneously in the 2.4 GHz band – see "SCALANCE W-700" configuration manual (<http://support.automation.siemens.com/WW/view/en/32816761>). Otherwise sufficient bandwidth for communications cannot be guaranteed.

- ZigBee devices

Coexistence with other communication networks

Moreover, coexistence is ensured for the following communication networks:

- Coexistence in the 5 band

Planning for the radio channels of all WLAN systems in use is required to ensure sufficient bandwidth for communication.

- WirelessHART

You need to plan for the radio channels for simultaneous operation of Industrial Wireless LAN systems and WirelessHART systems in the 2.4 GHz band. Avoid simultaneous use of overlapping frequency ranges. There is overlapping between Industrial Wireless LAN and WirelessHART – see "SCALANCE W-700" configuration manual (<http://support.automation.siemens.com/WW/view/en/32816761>), section 2.3.

See also

WLAN properties (Page 51)

3.10 Planning information security

Information security is a vital aspect in automation engineering particularly to ensure the availability and interference-free operation of industrial plants. To ensure communication and information security via WLAN for the HMI device, you need to protect the communication system from attack.

Expect:

- Attacks from the outside

To protect against external attacks, you must protect the WLAN in the same way you would protect office communication, namely with a firewall.

- Attacks from the inside

Investigations have shown that the majority of attacks on information security are executed from inside the plant. To ensure information security, you need to take action for:

- Configuration and parameter settings

Possible objectives of an attack are the project and the parameter settings of the HMI device.

- Productive operation data

The productive data can be manipulated, for example by sending a series of false PROFIsafe message frames which prevent the plant from being switched off.

Data transfer between HMI device and access point is protected by the AES encryption mechanism. Manipulation of productive data is prevented in this manner.

Organizational measures

The organizational measures to ensure information security are described in the following documents:

- IEC 61784-3-3:2007 Functional safety field busses – Additional specifications for CPF 3
- PROFIsafe - Environmental Requirements

Specify the organizational measures you must implement in accordance with your plant's requirements to achieve the highest possible information security for communication via WLAN. In doing so, take into consideration:

- Configuration phase
- Process control phase

Check the interplay of the specified measures.

Checklist

Perform the following tasks for application planning and confirm the implementation of each step in the following checklist. The tasks only conditionally required for PROFIsafe compliance are marked *italic* in the checklist.

- Access point

Task	Additional information	Check
<i>Select the installation site and antenna characteristics of the access point in such a manner that only the desired area is supplied with wireless capacity. In this regard note that wireless waves spread out horizontally as well as vertically.</i>	Access point operating instructions "SINEMA E" planning program (http://www.siemens.com/sinema)	
Install the access points at locations secured against attack, for example, in suspended ceilings. This can prevent manipulation at the access point or at the Ethernet connection to the LAN.	–	
Always use cable connections to configure access points.	–	
<i>Change the administrative password set.</i>	"SCALANCE W-700" configuration manual (http://support.automation.siemens.com/WW/view/en/32816761)	
Hidden SSID Configure the access point so that the SSID of the radio cell remains hidden.	"SCALANCE W-700" configuration manual (http://support.automation.siemens.com/WW/view/en/32816761)	
Change the SSID setting.	Entering and deleting a password (Page 114)	

- **Communication network**

Task	Additional information	Check
Examine the application environment with a spectrum analyzer and via WLAN measurement programs for possible radio interference. If you detect sources of interference, specify the appropriate remedial measures. Log the results.	–	
Only operate the communication network in the infrastructure mode.	System manual "Basics on Setting up an Industrial Wireless LAN" (http://support.automation.siemens.com/WW/view/en/9975764), "Network architecture" section	
Isolate the automation networks from all other networks. Use routers and firewalls or VPNs at points where connections to these networks are needed. Limit the communication between the networks to the absolute minimum required.	Operating Instructions "SCALANCE X-400" (http://support.automation.siemens.com/WW/view/en/19625216) Operating Instructions "SCALANCE S and SOFTNET Security Client" (http://support.automation.siemens.com/WW/view/en/21719299)	
Prevent unauthorized participation in the wireless communication using authentication mechanisms.	"SCALANCE W-700" configuration manual (http://support.automation.siemens.com/WW/view/en/32816761)	

- **HMI device**

Task	Additional information	Check
Use a password to protect the Control Panel and Taskbar of the HMI device against unauthorized access.	Section "Entering and deleting a password (Page 114)"	
Enable the data channel used to transfer the project to the HMI device only during the transfer of the project.	Section "Programming the data channel (Page 142)"	
Enable encryption for data transmission in the WLAN configuration. Change the default password for accessing the WLAN configuration in the Web Based management.	Section "Configuring the WLAN connection (Page 116)"	

Planning the use

3.10 Planning information security

• F-CPU and safety program

Task	Additional information	Check
Use passwords to protect access to the F CPU and safety program.	Programming and operation manual "S7 Distributed Safety - Configuring and Programming" (http://support.automation.siemens.com/WW/view/en/22099875), section "Protection against attack"	

• WinCC flexible ES

Task	Additional information	Check
<p><i>Protect WinCC flexible Es with general IT technologies.</i></p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • <i>Protect the PC where the ES is installed on the operating system level with a password.</i> • <i>Use a suitable encryption program to encrypt files, folders, and partitions.</i> • <i>Assign the access right for a drive only to a specific group of people.</i> • <i>Encrypt the data with mechanisms provided by MS Windows.</i> 	–	
<p><i>Use a password to protect the "Effective range name" object.</i></p>	WinCC flexible Information System	

You can find addition information on the topic of data security in the following publications:

- System manual "Fundamentals - Industrial Wireless LAN", section "Information security of wireless communication in accordance with IEEE 802.11".
- Brochure "Wireless Communication Systems and their Security Aspects" published by the German Federal Agency for Security in Information Technology

4

Mounting and connection

4.1 Check the scope of delivery

Check the scope of delivery for completeness and visible signs of transport damage.

<p>NOTICE</p> <p>Do not use damaged parts</p> <p>If you use defective parts from the scope of delivery, you may experience malfunctions.</p> <p>If you find defective parts in the scope of delivery, contact your Siemens partner. Only install undamaged parts.</p>

4.2 Installing an RFID tag

Requirement

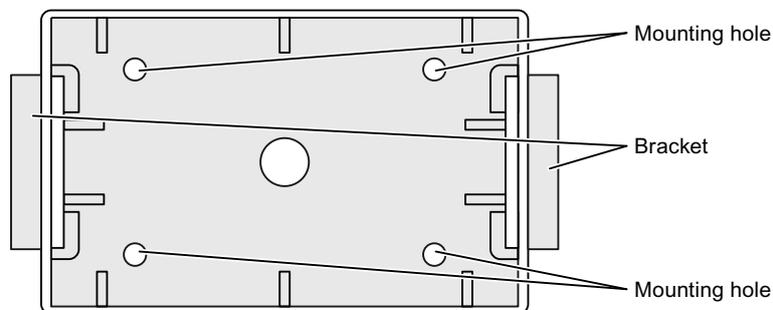
- 1 RFID tag
- 1 fixing pocket
- 2 M4 cylinder head screws with nuts, if required
- An installation location has been selected for the RFID tag as described in the section, "Planning an installation location for RFID tags (Page 54)".

If installing on a metallic base:

- 1 spacer
- 4 M4 cylinder head screws with nuts, if required

Note

The mounting brackets on both sides of the spacer permit fixation with cable ties.



Mounting and connection

4.3 Installing the docking station

Procedure- with a metallic installation location

Proceed as follows:

1. Position the spacer on the installation location.
2. Mark the fastening holes with a marking-off tool.
3. Drill two through-holes or two threaded holes, M4.
4. Mount the spacer.
5. Bend the tabs on the fixing pocket to the rear at right angles.
6. Slide the RFID tag into the fixing pocket.
7. Slide the tabs of the fixing pocket into the spacer.

The tabs snap into place and are secured by studs.

Procedure – with a non-metallic installation location

Proceed as follows:

1. Position the fixing pocket on the installation location.
2. Mark the fastening holes with a marking-off tool.
3. Drill two through-holes or two threaded holes, M4.
4. Fasten the fixing pocket.
5. Slide the RFID tag into the fixing pocket.

4.3 Installing the docking station

Requirement

- 2 M5 cylinder head screws with nuts, if required

Read the section "Planning the installation location and clearance of the docking station (Page 56)".

Procedure

Proceed as follows:

1. Place the docking station on the mounting surface.
2. Mark the fastening holes with a marking-off tool.
3. Drill two through holes or two threaded holes M5.
4. Mount the docking station.

4.4 Connecting the docking station and charger

The power supply provides electricity to the docking station and charger.

NOTICE

Use only approved power supplies

If you use an unapproved power supply, damage may occur to the HMI device.

Only use the power supply approved for the HMI device.

Danger of overheating

There is danger of overheating if you cover the power supply and thereby inhibit the air circulation.

Do not cover the power supply unit.

Note

Unplug the mains connector of the power supply to ensure complete electrical isolation.

The power supply is designed for operation on grounded power supply networks (TN systems to VDE 0100, Part 300, or IEC 364-3).

Operation is not authorized on ungrounded or impedance-grounded power networks (IT systems).

Read the section "ESD guideline (Page 251)".

Requirement

- The docking station is installed or the charger is ready for operation.
- The power supply is ready.

Procedure – disconnection

Proceed as follows:

1. Store the power supply unit in a safe place.
2. Insert the plug of the 24 V power cable into the socket of the docking station or charger.
3. Connect the power supply unit to the mains.

Procedure – disconnection

Proceed as follows:

1. Pull the plug of the 24 V power cable out of the socket of the docking station or out of the charger.
2. Disconnect the power supply unit from the mains.

See also

Power supply unit (Page 19)

4.5 Connecting the HMI device

4.5.1 Safety instructions

CAUTION
<p>Use only approved devices</p> <p>Non-approved devices may cause malfunctions.</p> <p>Only operate the HMI device with approved devices as specified in the section, "Overview (Page 13)".</p> <p>Malfunction possible</p> <p>If the HMI device is switched on and lying on its front, any one of the operator controls can trigger a malfunction.</p> <p>Switch off the HMI device whenever possible.</p> <p>Damage to the HMI device by foreign objects and liquids</p> <p>Damage may occur to the HMI device if it is opened by unauthorized personnel. Foreign bodies or liquids must not penetrate the interior of the HMI device or come into contact with the printed circuit board.</p> <p>The connection and battery compartments therefore may only be opened by professional personnel for servicing.</p>

NOTICE
<p>Do not exceed the bridging time</p> <p>If the main rechargeable battery is removed, the HMI device supplied by the rechargeable buffer battery. The maximum bridging time is 20 seconds. If you exceed the bridging time, the HMI device may switch off automatically. This triggers a shutdown or rampdown of an integrated HMI device.</p> <p>Do not exceed the bridging time!</p> <p>Opening the connection or battery compartment</p> <p>The HMI device does not meet degree of protection IP65 when the connection or battery compartment is open.</p> <p>Do not open the connection or battery compartment if dust or moisture can enter the device. Close an open compartment completely.</p>

See also

ESD guideline (Page 251)

4.5.2 Opening and closing the terminal compartment

The connection compartment may not be opened while the HMI device is in operation.
Opening the connection compartment does not interrupt the power supply to the HMI device.

Note

Read the section "Safety instructions (Page 66)".

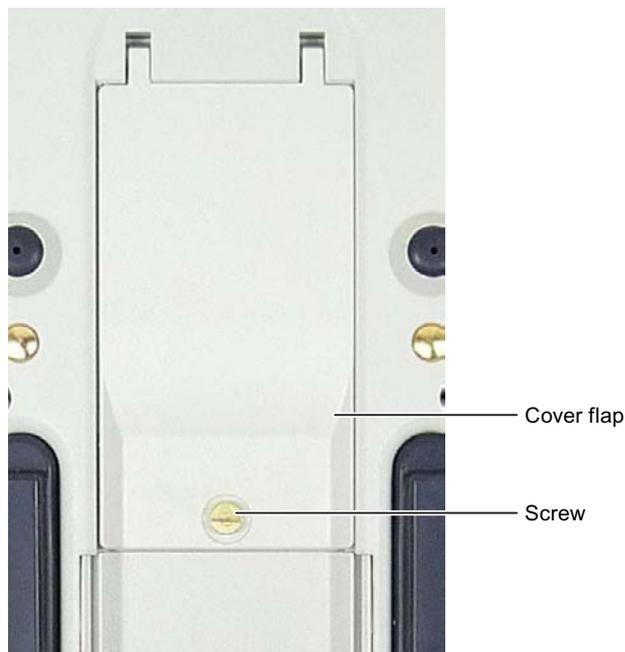
Requirement

- Screwdriver, size 6.5 x 150

Procedure – opening the connection compartment

Proceed as follows:

1. Lay the HMI device on its front side.
2. Loosen the screws.



3. Lift the cover.
The connection compartment opens.

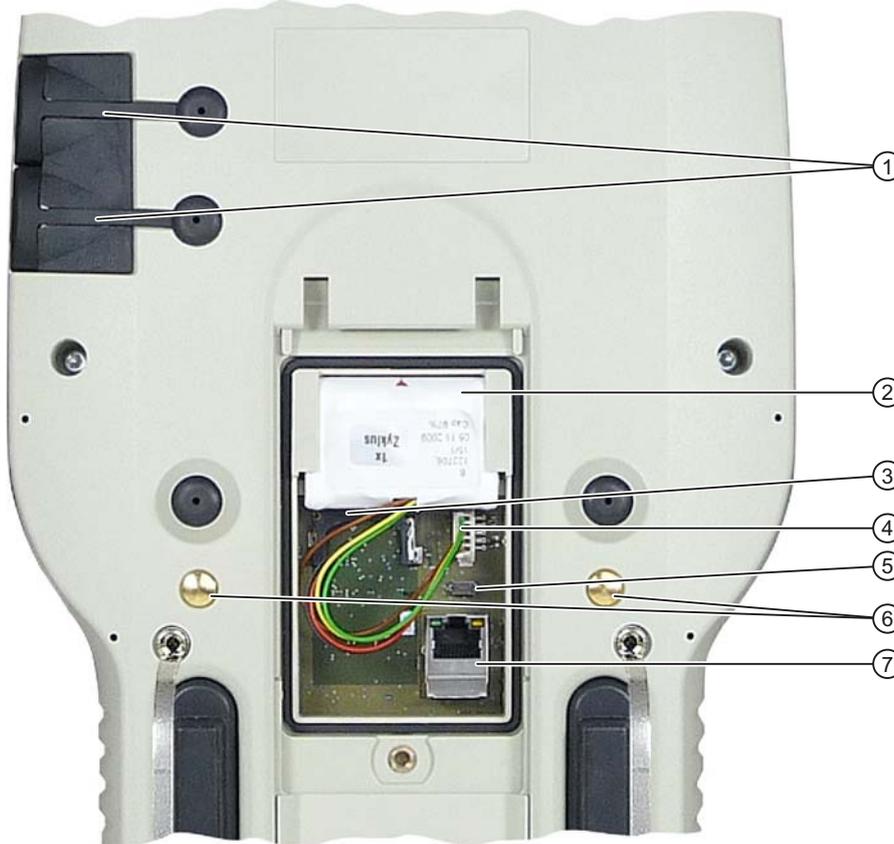
Procedure – closing the connection compartment

Proceed as follows:

1. Close the cover of the connection compartment.
When closing the connection compartment, ensure that:
 - The seal is present and properly positioned.
 - The connection cables of the rechargeable buffer battery are not pinched.
2. Tighten the screws.
The connection compartment is open.

4.5.3 Ports and reset button

The following figure shows the interfaces and reset button of the HMI device.



- ① USB port with cover
- ② Rechargeable buffer battery
- ③ Memory card slot
- ④ Plug and socket for the rechargeable buffer battery
- ⑤ Reset button
- ⑥ Contact for the power supply
- ⑦ RJ45 socket for LAN

Note

The RJ45 interface is only suitable for commissioning.

If you want to use the RJ45 port, the connection compartment must be open. The IP65 degree of protection is no longer met for the Wireless Teach Pendant F IWLAN when the connection compartment is open.

Do not open the connection compartment if dust or water could enter the device.

All unsaved data will be lost when you press the reset button. Press the reset button only when the HMI device is no longer working properly and no longer responds to input.

4.5.4 Inserting a memory card

Only use memory cards approved for use with the HMI device, see section Accessories (Page 16).

The following can be saved to the memory card of the HMI device:

- Operating system
- Applications
- Data

The memory card can be inserted and removed during operation. Do not remove the memory card while data is being accessed, for example during data backup or recipe transfer.

Requirement

- The connection compartment opens.

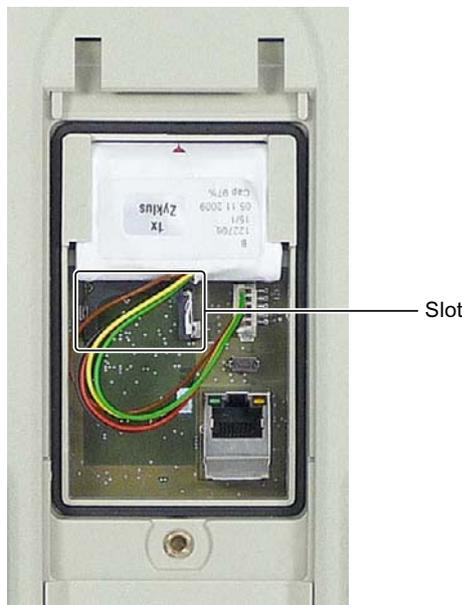
Procedure – inserting a memory card

Note

Read sections "Safety instructions (Page 66)" and "Opening and closing the terminal compartment (Page 67)".

Proceed as follows:

1. Open the connection compartment.
2. Insert the memory card into the slot.



An arrow on the memory card indicates the front side and the direction of insertion. When the memory card is correctly inserted into the slot, it stands approx. 3 mm proud of the slot.

3. Close the connection compartment or proceed with the following tasks.

Procedure – using a memory card for the first time

Note

The first time you use a memory card, the HMI device will prompt you to format it. All data is lost on the memory card during formatting.

Back up existing data, if necessary, before you use the memory card in the HMI device.

Proceed as follows:

1. Cancel the formatting procedure by pressing "ESC".
2. Remove the memory card from the slot.
3. Back up data that are still needed.
4. Insert the memory card into the slot.
5. Format the memory card.

Procedure – removing a memory card

Proceed as follows:

1. Pull the memory card out of the slot.
2. Store the memory card in a safe place.
3. Close the connection compartment.

4.5.5 Connecting the rechargeable buffer battery

Before you begin operation of the HMI device, you need to connect the rechargeable buffer battery.

You can only replace the main rechargeable battery without switching off the HMI device when the rechargeable buffer battery is connected.

Procedure

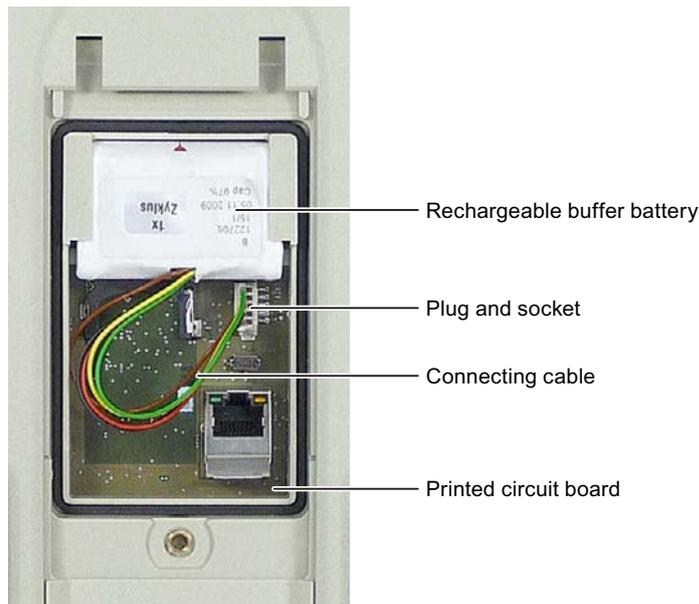
Note

Read the following sections:

- "Opening and closing the terminal compartment (Page 67)"
 - "Safety instructions (Page 72)".
-

Proceed as follows:

1. Open the connection compartment.
2. Plug the connector if the cable into the socket on the printed circuit board.



3. Position the cable so that it is not pinched when you close the connection compartment.
4. Close the connection compartment.

4.5.6 Replacing and charging the main rechargeable battery

4.5.6.1 Safety instructions

<p> CAUTION</p> <p>Charging and discharging the rechargeable battery</p> <p>There is a risk of fire and, in extreme cases, explosion in the following situations!</p> <ul style="list-style-type: none"> • Incorrect charging and discharging of the rechargeable battery • Reverse polarity • Short-circuit <p>Only charge the rechargeable battery in the HMI device or in a charger approved for the HMI device.</p> <p>Contact with battery fluid</p> <p>If used incorrectly, fluid can leak from the battery.</p> <p>Avoid contact with the battery fluid. If battery fluid comes in contact with skin, rinse it off with water. If battery fluid comes into contact with the eyes, seek medical advice.</p>
--

<p>NOTICE</p> <p>Use only approved batteries</p> <p>If you use non-approved batteries, malfunctions may occur as a result.</p> <p>Only use batteries that are approved for the HMI device.</p> <p>Fully charge the main rechargeable battery before first use</p> <p>If you attempt to use a main rechargeable battery in the HMI device in its factory state, the HMI device will not start.</p> <p>Fully charge the main rechargeable battery before inserting it in the HMI device.</p>

Note

The following applies to lithium-ion rechargeable batteries:

- Do not crush
- Do not heat or burn
- Do not short-circuit
- Do not disassemble
- Do not immerse in liquids – the rechargeable battery may rupture or burst
- Store unused rechargeable batteries away from the following items which can cause the contacts to be bridged.

These include:

- Paper clips
- Coins
- Keys
- Nails
- Screws or other small metal objects

4.5.6.2 Replacing the main rechargeable battery

You can replace the main rechargeable battery during operation. The rechargeable buffer battery supplies the power while the main rechargeable battery is being replaced. The maximum bridging time is 20 seconds. If you exceed the buffer time, the HMI device will switch off.

During the bridging time, the following features are disabled:

- Display backlighting
- All LEDs except for "SAFE" and "RNG"
- The illuminated pushbuttons
- The USB ports

Note

Read the section "Safety instructions (Page 72)".

If the capacity of a rechargeable battery drops to 50 percent of the original capacity, use a new rechargeable battery. A new rechargeable battery is needed after 500 full charge cycles.

Example of a full charge cycle:

The charge level of a rechargeable battery decreases from 100 percent to 80 percent. The rechargeable battery is charged again in this state and then reaches 100 percent. Discharging to 80 percent and recharging to 100% adds up to a full charge cycle.

Keep main rechargeable batteries in stock.

Procedure

Proceed as follows:

1. Lay the HMI device on its front side.

CAUTION

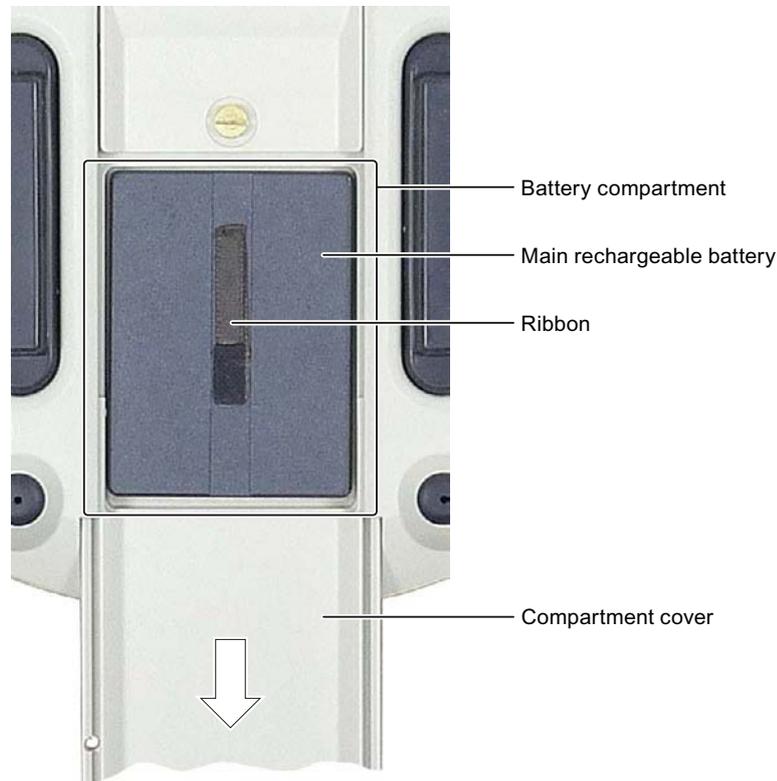
Potential malfunction when HMI device switched on

If the HMI device is switched on and lying on its front, any one of the operator controls can trigger a malfunction.

Make sure that no operator control can be triggered when the HMI device is laid down.

2. Slide the compartment cover in the direction of the arrow until it catches.

If you are using the HMI device for the first time, there is no main rechargeable battery in the battery compartment.



3. Remove the main rechargeable battery by pulling on the ribbon.
4. Insert a charged main rechargeable battery.
5. Close the compartment cover fully.

4.5.6.3 Charging the main rechargeable battery

The main rechargeable battery is not fully charged when delivered. The main rechargeable battery is charged:

- In the HMI device while it is sitting in the docking station.
- In the charger

Note

Read the section "Safety instructions (Page 72)".

Before charging the main rechargeable battery, read the documentation that accompanies the charger.

Requirement

The following devices are available:

- Charger° (Page 18)
- Power supply unit (Page 19)

Procedure – Connecting a charger and charging the main rechargeable battery

Note

When charging a rechargeable battery, the ambient temperature or battery temperature should not exceed 40° C. The higher the temperature, the longer it will take for the rechargeable battery to fully charge.

Select a location for the charger with a cool ambient temperature. Let the rechargeable battery cool before charging it. Keep to the permitted ambient conditions.

The main rechargeable battery can be placed in the charger before or after connecting the power supply unit.

Proceed as follows:

1. Store the power supply unit in a safe place.
2. Insert the plug of the power cable into the socket of the charger.
3. Connect the charger to the mains.

The "POWER" LED lights up.

4. Place the rechargeable battery into the charger.

The rechargeable battery is fully charged once all five LEDs are lit. See section "Showing the battery charge (Page 76)".

Mounting and connection

4.5 Connecting the HMI device

Procedure – Disconnecting the charger

Proceed as follows:

1. Pull the plug of the power cable out of the charger's socket.
The "POWER" LED goes out.
2. Disconnect the power supply from the mains.

4.5.6.4 Showing the battery charge

The main rechargeable battery features an LED array. The respective LEDs indicate the battery charge.



Requirement

- The main rechargeable battery is removed from the HMI device.

Procedure

Proceed as follows:

1. Press the button.
The LED lights when the button is released after approx. 5 seconds.
The number of illuminated LEDs indicates the charge status.

Number of LEDs	Flashes for	Lights for
1	0 to 19 % of the charge capacity	20 to 39 % of the charge capacity
2	-	40 to 59 % of the charge capacity
3	-	60 to 79 % of the charge capacity
4	-	80 to 96 % of the charge capacity
5	-	97 to 100 % of the charge capacity

If all the LEDs light up, the main rechargeable battery is fully charged.

Note

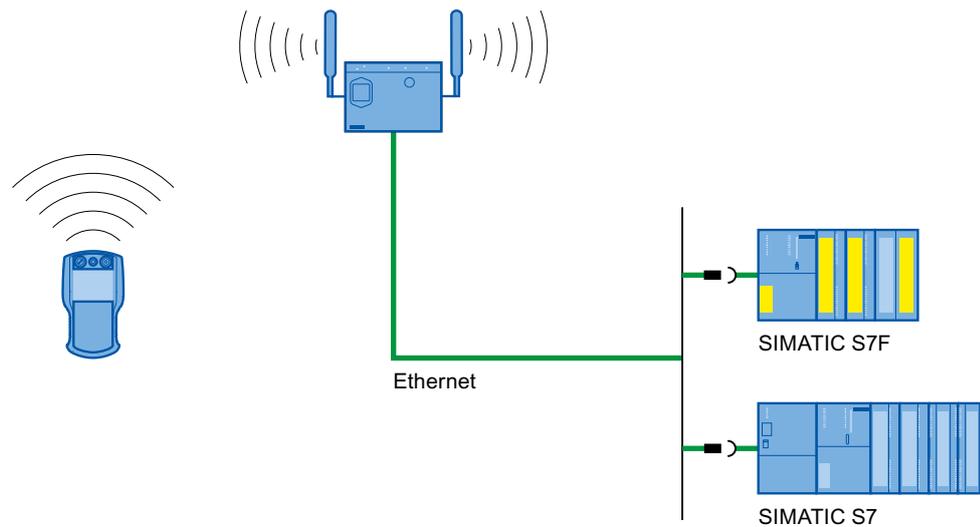
This applies to rechargeable batteries that are stored – read the section "Maintenance and care (Page 237)".

4.5.7 Connecting the PLC

Only use approved components to connect a SIMATIC S7 PLC. You can find more information on this on the Internet in Industry Mall (<http://mall.automation.siemens.com>).

Configuration graphic

The following figure shows the connection between the PLC and the HMI device.



See also

System manual "Basics on Setting up an Industrial Wireless LAN"
(<http://support.automation.siemens.com/WW/view/en/9975764>)

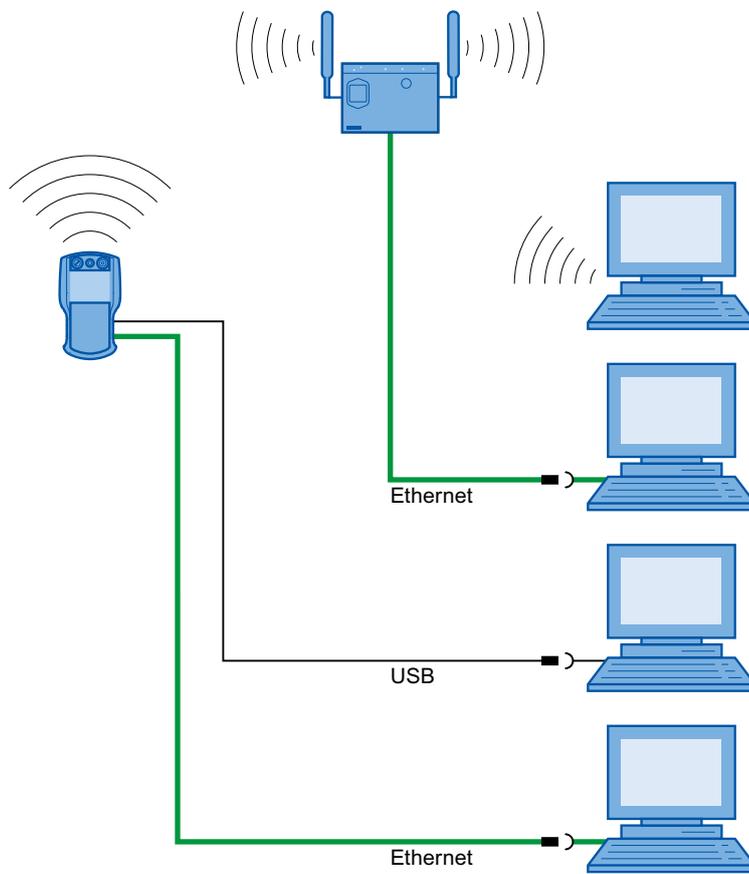
4.5.8 Connecting the configuration PC

You have the following options for connecting a configuration PC to the HMI device:

- Connection via WLAN
- Connection via LAN and RJ45 interface
- Connection via USB

Configuration graphic

The following figure illustrates the options for connection between the HMI device and the configuration PC.



NOTICE

Adhere to the USB connection sequence

You will not be able to transfer a project to the HMI device if you do not adhere to the connection sequence.

Observe the following sequence when connecting by USB:

1. HMI device
2. PC

USB host-to-host cable

You will not be able to transfer a project to the HMI device if you use the driver for the USB host-to-host cable.

Use only the driver for the USB host-to-host cable that is included in the WinCC flexible package.

Note

Point-to-point connection

Use a cross cable for a point-to-point connection. The HMI device and the PC can also be subscribers in a local area network.

Connection via WLAN

In its factory state, the WLAN interface of the HMI device is disabled. Before you access the HMI device from the configuration PC via WiFi, you need to appropriately configure the access point and HMI device in infrastructure mode. An ad hoc wireless network is not possible.

Restoring the factory settings

To update the operating system and reset the factory settings, you need to connect the HMI device to the configuration PC via the RJ45 port. Connect a configuration PC directly to the HMI device only as long as it is necessary. You can find additional information in the "Restoring factory settings (Page 194)" section.

4.5.9 Connecting a USB device

You can connect the following devices to the USB port of the HMI device:

- External mouse
- External keyboard
- USB memory stick

Only connect industrial devices.

Note when connecting

NOTICE

USB interface only suitable for commissioning

Use the USB interface for commissioning and maintenance only.

The cable length of the connected USB devices may not exceed 3 meters.

IP65 protection with a USB device not guaranteed

If a USB device is connected to one of the USB ports, the HMI device does not comply with the IP65 degree of protection.

Do not connect a USB device if dust or moisture can enter the device.

Devices with a separate power supply

Self-powered devices cause a malfunctions in the HMI device. A PC or configuration PC is an exception.

Only connect a configuration PC or PC to the USB port.

Malfunction

A USB device that places too much power consumption load on the USB port can damage the HMI device.

Be aware of the maximum power load placed on the USB port.

Access to USB port

The USB port is disabled while the main rechargeable battery is being replaced. You cannot save data to a USB memory stick, for example, while the main rechargeable battery is being replaced.

Ensure no one tries to access the USB port while the main rechargeable battery is being replaced.

Note

Devices without a separate power supply connected to the USB port increase the power load. This will reduce the service life of the HMI device.

See also

Specifications (Page 244)

4.6 Switching on and testing the HMI device

When the HMI device is initially put into operation, there is no project. Ethernet is set as the data transfer channel.

Requirement

- A charged main rechargeable battery is inserted in the HMI device.

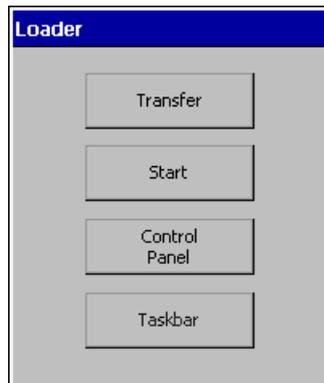
Procedure

Proceed as follows:

1. Briefly press the "ON/OFF" button.

The "PWR" LED lights up – see section "LED display (Page 85)". The display then lights. A progress bar is displayed during startup.

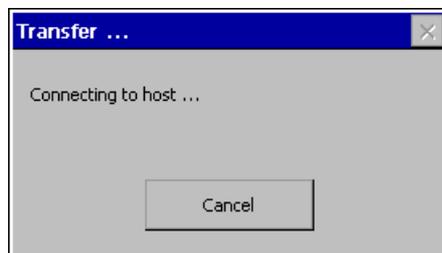
The loader is displayed once the operating system has started.



If a charged main rechargeable battery is inserted, the "BAT" LED lights up. The HMI device automatically switches to "Transfer" mode if the following two requirements are met:

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

The following dialog appears:



2. Press the "Cancel" button.

The transfer is canceled. The Loader appears.

Result

The HMI device is ready for operation when the loader displays one of the following dialogs:

- "Transfer" dialog
- "Testing enabling button" dialog

4.7 Switching off the HMI device

The following procedure applies to an HMI device on which there is no project. The way the device is switched off therefore differs from that of an integrated HMI device.

Procedure

Proceed as follows:

1. Press the "ON/OFF" button on the HMI device at least 4 seconds.
The HMI device switches off.

See also

Switch-off behavior (Page 208)

5

Operator controls and displays

5.1 Overview

The standard input unit on the HMI device is the touch screen. All operator controls required for operation appear in one or more HMI screens on the display after the project starts.

<p>NOTICE</p> <p>Damage to the touch screen</p> <p>Never touch the touch screen with a pointed or sharp object. Avoid applying sudden pressure to the touch screen with a hard object. Both these will substantially reduce the service life of the touch screen and can even lead to total failure.</p> <p>Always operate the touch screen of the HMI device with your fingers or with a touch pen.</p>
--

Membrane keyboard

The following figure shows the membrane keyboard of the Wireless Teach Pendant F IWLAN.



- ① Membrane keyboard – six buttons simultaneously enabled
- ② Membrane keyboard for robot control
- ③ Key "ON/OFF"

NOTICE

Damage to the membrane keyboard

Do not touch the keys with a pointed or sharp object. Avoid applying sudden pressure to the keys with a hard object. Both of these will substantially reduce the service life of the membrane keyboard and can even lead to total failure.

Only use your fingers to operate the HMI device buttons.

The functions assigned to the keys of the membrane keyboard are defined during configuration. Outside of the project, the keys of the membrane keyboard have no function.

Displays and other operator controls

- LED display
- EMERGENCY STOP button
- Enabling button
- Rotary switch
- Illuminated pushbutton

5.2 LED display

An LED display consisting of five LEDs is located on the front of the HMI device. The LED display shows the operating states for the HMI device and the communication.



Meaning of LEDs

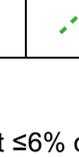
The LED display is activated when the HMI device is switched on.

LED	Color	Function	LED signals
SAFE	Yellow	PROFIsafe communication	The "SAFE" LED lights up when the HMI device is integrated in the safety program of the F CPU. Requirement – PROFIsafe communication has been established. If the "SAFE" LED lights up, the EMERGENCY STOP button is enabled.
PWR	Green	Power	The "PWR" LED only lights up or flashes when the HMI device is switched on. The "PWR" LED lights up under the following circumstances: <ul style="list-style-type: none"> The main rechargeable battery is inserted and charged. The HMI device is in the docking station. The "PWR" LED flashes when the HMI device is in the "POWER SAVE 2" operating mode.
COM	Green	Communication	The "COM" LED is off if no WLAN is available. The "COM" LED flashes when the HMI device attempts to establish a connection to the WLAN. The "COM" LED lights when there is a connection between the HMI device and WLAN.
RNG	Green	Effective range	The "RNG" LED lights when the HMI device is logged on to a machine. If a communication error occurs after the HMI device has logged on to a machine, the "RNG" lights up until PROFIsafe communication is reestablished and the communication error has been acknowledged. The "RNG" LED is off when the HMI device is logged off a machine.

Refer to the plant documentation for additional information on the meaning of the LEDs.

Meaning of the "BAT" LED

The "BAT" LED signals the following states depending on the type of power supply:

Power supply	BAT LED					
	①	②	③	④	⑤	⑥
Rechargeable battery operation, HMI device on					-	
Rechargeable battery operation, HMI device off						
Docking station, HMI device on or off						

- ① Charge at $\leq 6\%$ capacity
- ② Charge at $> 6\%$ capacity
- ③ Maximum charge
- ④ Rechargeable battery not in the HMI device
- ⑤ Rechargeable battery temperature too high
- ⑥ Possible error:
 - Short circuit, discharge current > 8.0 A
 - Overload, discharge current > 4.0 A
 - Overload, charge current > 2.8 A
 - Charging error, cell voltage > 4.3 V
 - Charging error, cell voltage < 3.0 V

Note the following:

- An error event always has priority.
If an error occurs, the "BAT" LED signals according to column ⑥.
- If the battery is **not** fully charged, the "BAT" LED signals according to column ⑤.
- If the main rechargeable battery is fully charged, the "BAT" LED signals according to column ③.

5.3 Power management

The HMI device is equipped with a power management function. If you do not operate the HMI device within a configured time period, power management will switch the HMI device to power saving mode. This extends the operating period of the HMI device until the next time the main rechargeable battery is replaced or the next time it is charged.

Operating modes in power management

Power management has two operating modes:

- "Power Save 1"
 - Reduces the brightness of the touch screen.
 - The EMERGENCY STOP button remains available.
 - As long as the HMI device is logged on, the enabling button remains enabled.

Note

When you place the HMI device in the docking station, it will automatically assume the operating state "Power Save 1" after 2 minutes.

If a time period of less than 2 minutes has been specified for activation of "Power Save 1" mode in the WinCC flexible project, then this time period will be applied.

- "Power Save 2"
 - The touch screen is switched off.
 - Other power save measures are activated.
 - The online help for WinCC flexible describes how to configure power management.
 - The EMERGENCY STOP button remains available.
 - The rotary switch remains available.
- "Power Save 1" corresponds to the "Reduce brightness" setting.
- "Power Save 2" corresponds to the "Switch off screen" setting.

Note

When the HMI device is logged on to a machine, "Power Save 2" operating mode is not available.

Power management for the HMI device provides the following operating modes:

Operating mode	LED	Action	Follow-up operating mode
OFF	"PWR" is off. "BAT" is off.	Briefly press Taste "ON/OFF"	ON
ON	"PWR" lights up.	Automatically, if no actions are performed within a configured time period.	"Power Save 1"
		Briefly press Taste "ON/OFF"	"Power Save 2"
		Press Taste "ON/OFF" for at least 4 seconds.	OFF
"Power Save 1"	"PWR" lights up. The brightness of the touch screen is reduced.	Operation on the touch screen	ON
		Briefly press Taste "ON/OFF"	"Power Save 2"
		Automatically, after a configured time interval if no operations are carried out	"Power Save 2"
		Press Taste "ON/OFF" for at least 4 seconds.	OFF
"Power Save 2"	"PWR" flashes. The touch screen is switched off.	Briefly press Taste "ON/OFF"	ON
		Briefly press Taste "ON/OFF" and then press it for at least 4 seconds.	OFF

See also

Setting the screen saver (Page 127)

5.4 Safety-related operator controls

5.4.1 EMERGENCY STOP button

The EMERGENCY STOP button is designed with 2-channels and enables an EMERGENCY STOP of the plant unit with which safety-related communication is taking place. The EMERGENCY STOP button satisfies the requirements specified in DIN IEC 60947-5-5,1997 Annex K. You can find additional information in the section "Safety functions of the EMERGENCY STOP button (Page 41)".



Due to its position, the EMERGENCY STOP button is equally accessible for both left-handed and right-handed persons.

Storing a non-integrated HMI device

<p> WARNING</p> <p>EMERGENCY STOP button out of service when HMI device is removed</p> <p>If the HMI device is not integrated in the safety program of the F-CPU, the EMERGENCY STOP button will be out of service.</p> <p>To avoid confusion between HMI devices with enabled and disabled EMERGENCY STOP buttons during an emergency, only one integrated HMI device should be freely accessible.</p> <p>If an HMI device is not integrated and not in use, store the HMI device in a location with protected access.</p>
--

Requirement

- The EMERGENCY STOP button is evaluated under the condition that the HMI device is integrated in the safety program of the F-CPU. See section "Safety-related configuration (Page 161)".

Procedure – Operating the EMERGENCY STOP button

<p> WARNING</p> <p>Function the EMERGENCY STOP button</p> <p>The EMERGENCY STOP button has no effect if the HMI device is without power or removed from the safety program.</p> <p>Operate the HMI device in mobile mode using the main rechargeable battery or in stationary mode in the docking station and integrate it in safe-related communication.</p>
--

<p>NOTICE</p> <p>Unintentional triggering of the EMERGENCY STOP button</p> <p>The EMERGENCY STOP button can be triggered unintentionally, thereby bring the plant to a standstill in the following cases:</p> <ul style="list-style-type: none"> • When the HMI device is dropped. • When the HMI device is laid on its front. <p>Handle the HMI device with care!</p>
--

Proceed as follows:

1. Press the EMERGENCY STOP button fully if a dangerous situation develops.
The EMERGENCY STOP button engages in the EMERGENCY STOP position. The associated plant unit is stopped.

Procedure – Releasing the EMERGENCY STOP button

<p>⚠ WARNING</p> <p>EMERGENCY STOP button released</p> <p>If you have pressed the EMERGENCY STOP button and thereby brought the plant unit to a standstill, you should only release the EMERGENCY STOP button under the following conditions:</p> <ul style="list-style-type: none"> • The reasons for the EMERGENCY STOP have been eliminated. • A safe restart is possible. • The restart should not be performed by releasing the EMERGENCY STOP button. <p>The project should force the operator to perform an action for restarting independent of the EMERGENCY STOP button. The safety program must specify that no automatic restart of the plant is possible simply by releasing the EMERGENCY STOP button.</p>

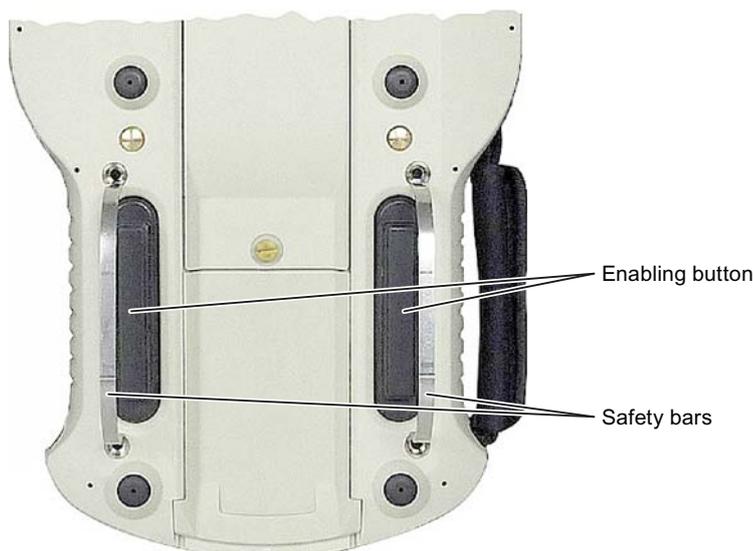
Proceed as follows:

1. Turn the EMERGENCY STOP button clockwise to its original position.
The EMERGENCY STOP button is released.

5.4.2 Enabling button

The enabling mechanism consists of two enabling buttons which are installed on both sides of the HMI device. You can find additional information in the "Safety functions of the enabling mechanism (Page 42)" section.

The enabling button is required to confirm axis movements, for example.



The enabling button has three switch settings:

- Neutral position
The enabling button is not pressed.
- Enable
The enabling button is pressed to a middle switch position. The switch position has a noticeable pressure point. This switch position is used to confirm an entry, for example.
- Panic
The "Panic" switch position is reached as soon as one of the two enabling buttons is fully pressed. To do this, the pressure point of the "Enable" switching position must be overcome. An audible switching noise is then heard.

The switch position of the other enabling button is unimportant in this case. The "Panic" switch position has the same effect as releasing the enabling button. In both switch positions, the enable is revoked.

Requirement

- The enabling button is evaluated under the condition that the HMI device is integrated in the safety program of the F-CPU. See section "Safety-related configuration (Page 161)".

Procedure

 WARNING
<p>Press the enabling button only as long as necessary</p> <p>Enabling is a conscious operator action. It is not permitted to continuously press the enabling button or to fasten it in place.</p> <p>Press the enabling button only until the operation you wish to enable is completed.</p>

Note

The enabling button only has an effect when the HMI device is logged on to a machine and the "RNG" LED on the HMI device is lit.

Proceed as follows:

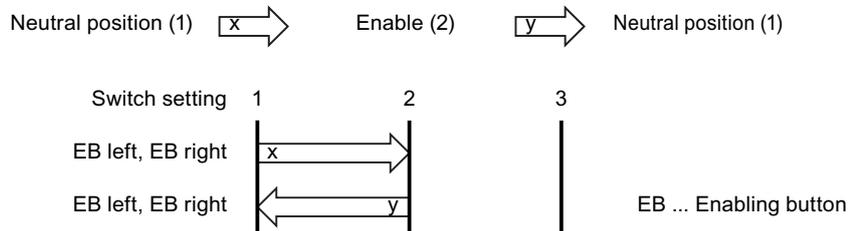
1. Press at least one of the enabling button to reach the "Enable" position.

The controller receives the same signal, regardless of whether one or both enabling buttons have been pressed.

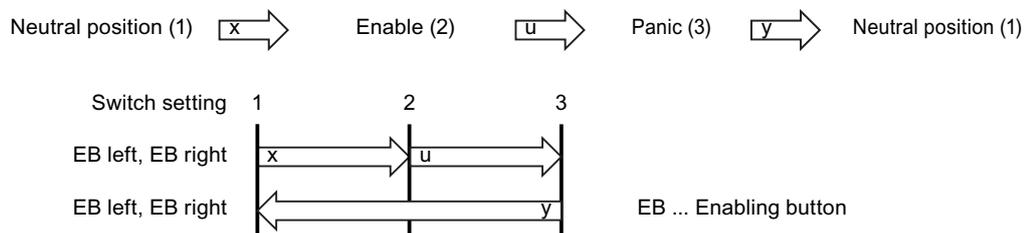
NOTICE
<p>Enabling button can tilt</p> <p>If you do not press the center of the enabling button, the enabling button may tilt. The switching process is delayed by this. A discrepancy error may occur – see section "Discrepancy error during enabling (Page 258)".</p> <p>Press the enabling button in the middle.</p>

Switch settings

The following figure shows the switching sequence for enable.



The following figure shows the switching sequence during panic usage.



If the operator presses the enabling button in the "Panic" switch position, the "Enable" switch position will not be evaluated when leaving the panic setting. A new enable can only be triggered by releasing the enabling button.

Note

The HMI device analyzes the switch settings of the two enabling buttons in the form of an OR gate.

The enabling button and membrane keyboard can be operated simultaneously.

5.4.3 Testing the function

Perform an annual function test for the enabling button and EMERGENCY STOP button during commissioning.

Procedure

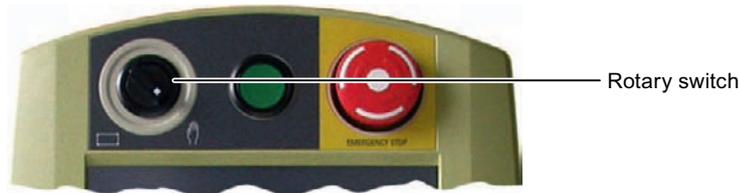
Proceed as follows:

1. Switch on the HMI device.
2. Press both enabling buttons when the "Test Enabling Button" dialog is shown.
3. Press the EMERGENCY STOP button.

5.5 Operator controls

5.5.1 Operating the rotary switch

The rotary switch has two positions. The function of the rotary switch is defined in the current project. Refer to the plant documentation for additional information on the function.



5.5.2 Operating the illuminated push-button

The function of the illuminated pushbutton is defined in the current project. Refer to the plant documentation for additional information on the function.



5.5.3 Evaluating operator controls

5.5.3.1 Overview

The following information can be obtained between the Wireless Teach Pendant F IWLAN and PLC:

- Control state of the rotary switch
- Control state of the illuminated pushbutton
- Signal status of the LEDs

There are two ways of transferring information:

- Direct keys
- System functions of WinCC flexible

Note

The following sections are intended for the configuration engineer.

- Bit coding of illuminated pushbutton

State	T1
Not pressed	0
Pressed	1

- Bit coding of illuminated pushbutton LEDs

State	T1
Off	0
On permanently	1

5.6 Holding, operating and setting down the HMI device

Holding and operating the HMI device

The HMI device is equally easy to hold and operate for right-handers and left-handers because it is designed symmetrically. The free hand can be used to operate the operator controls on the front side.

Note

Read the section "Safety-related operator controls (Page 88)".

The neck strap provides support for holding of the Wireless Teach Pendant F IWLAN. Use the velcro closure on the neck strap to attach the strap to HMI device and adjust the length as necessary.

The method of holding the HMI device shown in the following figure enables you to control movements in the plant to be monitored during servicing, for example.



The hand holding the HMI device can also be used to activate the enabling button. The enabling button is optimally accessible. In a dangerous situation, a safety shutdown is triggered in a panic reaction by releasing or fully pressing the enabling button.

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

NOTICE

Holding the HMI device

If you do not carry the HMI device with the neck strap and hold it as shown, you cannot operate the EMERGENCY STOP button or enabling button quickly enough in a dangerous situation.

Carry and hold the HMI device as shown. This especially applies to all hazardous movements that you control manually. You can then engage the EMERGENCY STOP button or enabling button as fast as possible in a dangerous situation.

Setting down the HMI device

A docking station is available for safe and stationary storage of the HMI device.

NOTICE

Pressing the EMERGENCY STOP button

If the HMI device is placed in an unsuitable holder, the operability of the EMERGENCY STOP button will be impaired.

Therefore, only use the docking station especially designed for storing the Wireless Teach Pendant F IWLAN.

The HMI device can be used as a stationary device when it is placed in the docking station. The following figure shows how the HMI device is placed in the docking station.

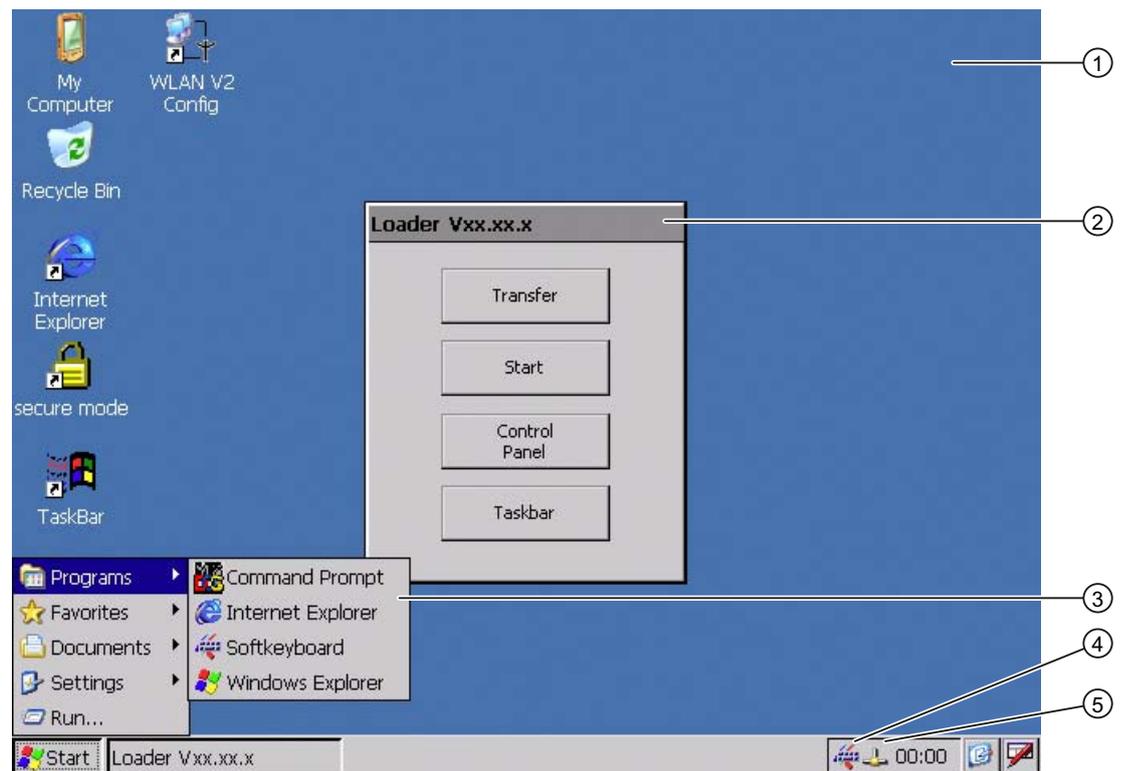


6

Configuring the HMI device

6.1 Desktop and Loader

Once the HMI device is switched on and booted, the display shows the desktop with the Loader.



- ① Desktop
- ② Loader
- ③ Start menu
- ④ Icon for screen keyboard
- ⑤ Icon for displaying IP information about the WLAN/LAN connection

Loader

The following figure shows the Loader.



The buttons on the Loader have the following function:

- "Transfer" button – This switches the HMI device to "Transfer" mode.
The transfer mode can only be activated when at least one data channel has been enabled for the transfer.
- "Start" button – This starts the project on the HMI device.
When you do not perform any operation, the project starts automatically based on the settings in the Control Panel after a delay time.
- "Control Panel" button – This opens the Control Panel.
You can make a variety of settings in the Control Panel, for example, the settings for the transfer.
- "Taskbar" button – This opens the taskbar and the Windows CE Start menu.

The Loader will reappear when the project is closed on the HMI device.

Password protection

You can protect the Control Panel and taskbar from unauthorized access.

If password protection is configured, the "secure mode" message is displayed on the desktop. If the password is not entered, only the "Transfer" and "Start" buttons are operable. You can find additional information on Secure Mode in the section "Enabling and disabling SecureMode (Page 101)."

NOTICE

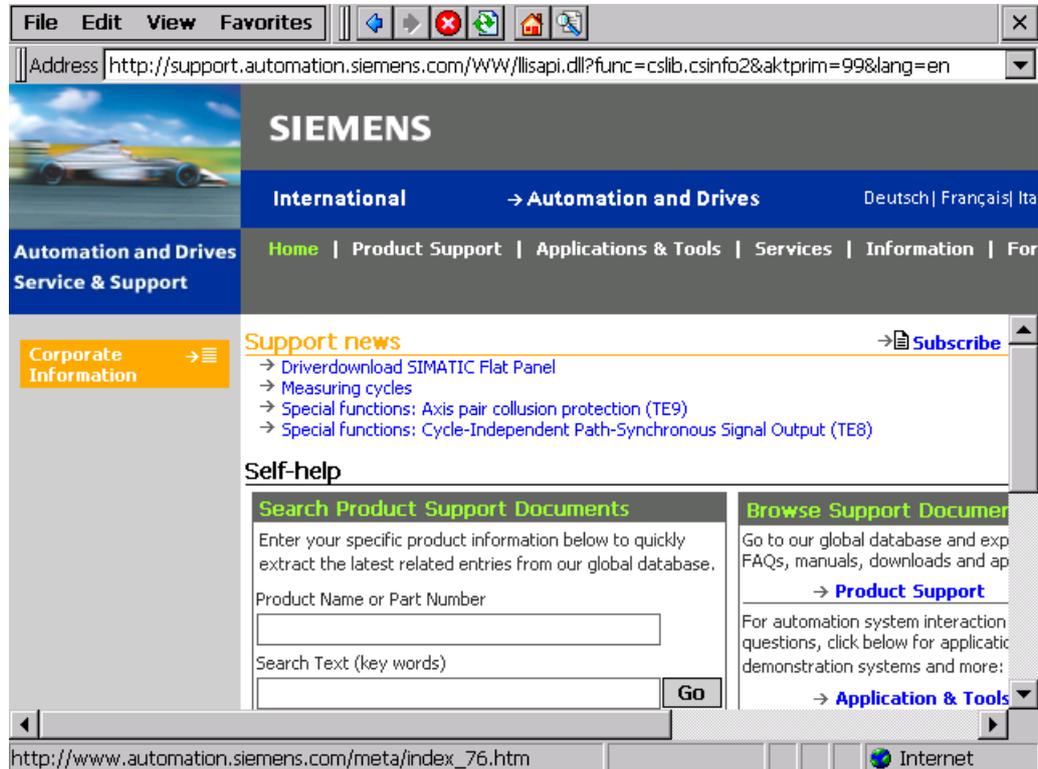
Keeping the password

If the password is no longer available, you are forced to update the operating system to regain access to the Control Panel and the Windows CE taskbar.

Backup password to protect it against loss. You can find additional information on updating the operating system in the section "Updating the operating system (Page 191)."

Internet Explorer

Internet Explore for Windows CE is installed on the HMI device.



Note

Internet Explorer for Windows CE and the Internet Explorer on a PC differ in terms of functionality.

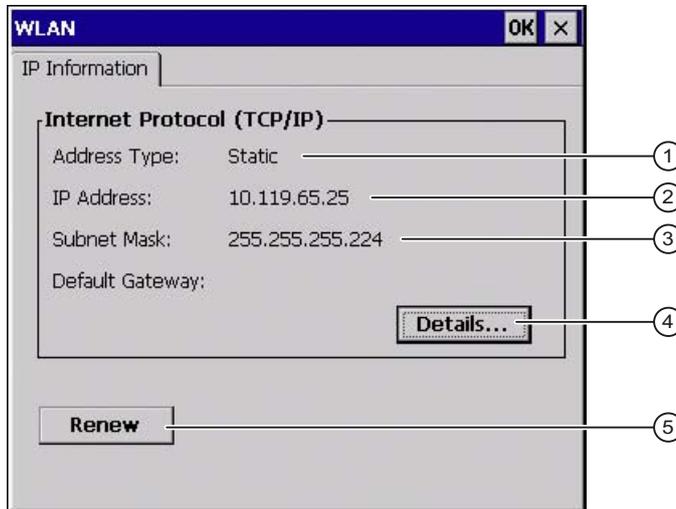
Internet Explorer for Windows CE has separate proxy settings that are independent of the settings in the Control Panel of the HMI device.

For more detailed information, refer to the Microsoft website.

Status bar



When you click the icon in the status bar, the following dialog appears:



- ① Address type
- ② IP address
- ③ Subnet mask
- ④ Button for details
- ⑤ Button to refresh the display

The dialog contains information on the current WLAN or LAN connection

6.2 Operator input options

The following operator control options are made available for the Windows CE interface and Control Panel:

- Touch screen

The operator controls shown in the dialogs are touch-sensitive. Touch objects are operated in the same way as mechanical keys. You activate an operator control by pressing on it with your finger. To double-click them, touch an operator control twice in succession.

- Membrane keyboard

You can use the numeric area of the membrane keyboard to enter numeric values.

- USB keyboard

You can operate the Windows CE interface and Control Panel with an external keyboard in the exact same way as you do with the screen keyboard of the HMI device.

- USB mouse

You can operate the Windows CE interface and Control Panel with an external mouse in the exact same way as you do with the touch screen of the HMI device.