

## SIMATIC HMI

### HMI device KP8 PN, KP8F PN, KP32F PN

#### 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.

 <b>DANGER</b>
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indicates that death or severe personal injury <b>will</b> result if proper precautions are not taken.
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 <b>WARNING</b>
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indicates that death or severe personal injury <b>may</b> result if proper precautions are not taken.
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 <b>CAUTION</b>
--

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

<b>NOTICE</b>
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indicates that property damage can result if proper precautions are not taken.
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If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

### Qualified Personnel

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

### Proper use of Siemens products

Note the following:

 <b>WARNING</b>
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Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.
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### 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 based on the requirements defined by mechanical engineering documentation for manuals. This information relates to the place of use, transport, storage, mounting, use and maintenance.

These operating instructions are intended for:

- Project planning engineers
- Users
- Commissioning engineers
- Maintenance personnel

Pay particular attention to the section "General safety instructions (Page 21)".

## 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.

For the configuration of the HMI devices, in-depth knowledge in the handling of the configuration software used is required.

A sound knowledge of safety engineering is required for the configuration and commissioning of the KP8F and KP32F HMI devices in fail-safe operation.

## Scope

The operating instructions apply to the following HMI devices in conjunction with the STEP 7 software (TIA Portal):

- KP8 PN, article number 6AV3688-3AY36-0AX0, F-State > 5
- KP8F PN, article number 6AV3688-3AF37-0AX0, F-State > 6
- KP32F PN, article number 6AV3688-3EH47-0AX0, F-State > 3

\* You can find the F-State (function state) on the nameplate of the HMI device.

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### Note

The manual is part of the HMI device and will be required for repeat commissioning. Retain all enclosed and additional documents for the entire service life of the HMI device.

You must pass on all these documents to future owners of the HMI device.

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- HMI®
- SIMATIC®
- WinCC®

## Style conventions

This manual uses the following style conventions:

Text markup	Example	Meaning
Text in quotation marks: "Text"	"Add screen"	<ul style="list-style-type: none"> <li>• Terminology that appears in the user interface, for example dialog names, tabs, buttons, menu commands</li> <li>• Required input, for example, limits, tag values.</li> <li>• Path information</li> </ul>
Texts in quotation marks, separated by a greater-than sign: "Text > Text"	"File > Edit"	Operating sequences, for example, menu commands, shortcut menu commands.
Texts in square brackets: <Text>	<F1>, <Alt+P>	Keyboard operation

Please observe notes labeled as follows:

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### 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.

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## Naming conventions

This manual uses the following naming conventions:

Naming convention	Applies to
Plant	<ul style="list-style-type: none"> <li>• System</li> <li>• Machining center</li> <li>• One or more machines</li> </ul>
HMI device, key panel	<ul style="list-style-type: none"> <li>• KP8 PN</li> <li>• KP8F PN</li> <li>• KP32F PN</li> </ul>
PROFIsafe devices	<ul style="list-style-type: none"> <li>• KP8F PN</li> <li>• KP32F PN</li> </ul>
STEP 7	Configuration software STEP 7 (TIA Portal)
F-system, fail-safe system	Automation system with increased safety requirements in which, for example, EMERGENCY STOP pushbuttons and fail-safe sensors are used.
F-parameters	Parameters relevant for the fail-safe operation of the HMI device.
Switching cabinet	<ul style="list-style-type: none"> <li>• Mounting cabinet</li> <li>• Switching cabinet</li> <li>• Switchboard</li> <li>• Console</li> </ul>

The short forms KP8, KP8F and KP32F are also being used instead of the full product labels KP8 PN, KP8F PN and KP32F PN.

## Figures

This manual contains illustrations of the described devices. The illustrations can deviate from the details of the delivered device.

Picture parts are marked with black position numbers on a white background: ①, ②, ③, ...



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# Overview

## 1.1 Product description

### Application scenarios of the HMI device

The HMI device shows you operating states of a plant. You can actively control a running production process based on this information.

The HMI device is designed for mounting in control panels, and replaces keys and LEDs that are individually mounted. The HMI device is connected via PROFINET to a SIMATIC controller.

The HMI device is parameterized for immediate use. In comparison to conventional wiring, substantially less time is needed for commissioning and the device provides increased security against failure during runtime.

### Fail-safe operation of the KP8F and KP32F

The HMI devices KP8F and KP32F support PROFIsafe communication and can be used for simple sensor applications in fail-safe mode. In regards to the safety-relevant signals, safety categories SIL3, Performance Level e and category 4 are reached.

### Performance features of the KP8

The HMI device offers a wide range of features:

- 8 short-stroke keys with integrated LEDs  
The LEDs allow for the display of different colors. The colors red, yellow, blue, green and white are displayable.
- 8 clamps, rear  
The clamps are used as digital inputs or outputs to the connection of external sensors.
- Integrated light and button tests - after turning on the HMI device
- Communication via PROFINET
- SIMATIC design  
Through this, the HMI devices can be arranged closely next to each other.

### Expansion with external input/output devices

The functionality of the HMI device can be extended using input and output devices, for example lamps or key switches.

### Performance features of the KP8F

The KP8F has the following additional performance features compared to the KP8:

- Fail-safe digital inputs for:
  - An EMERGENCY STOP button or alternatively
  - Two single-channel evaluations

### Performance features of the KP32F

The HMI device offers a wide range of features:

- 32 short-stroke keys with integrated LEDs  
The LEDs allow for the display of different colors. The colors red, yellow, blue, green and white are displayable.
- 32 clamps, rear  
16 terminals to be used as digital inputs and 16 terminals as digital inputs or outputs for connection of external encoders and sensors.
- Integrated light and button tests - after turning on the HMI device
- Communication via PROFINET
- SIMATIC design  
Through this, the HMI devices can be arranged closely next to each other.
- 4 fail-safe digital inputs for:
  - Two EMERGENCY STOP buttons or alternatively
  - four single-channel evaluations

## 1.2 Scope of delivery

The following are included in the scope of supply:

- 1 HMI device
- 1 accessory kit
- 1 data carrier with ATEX documentation

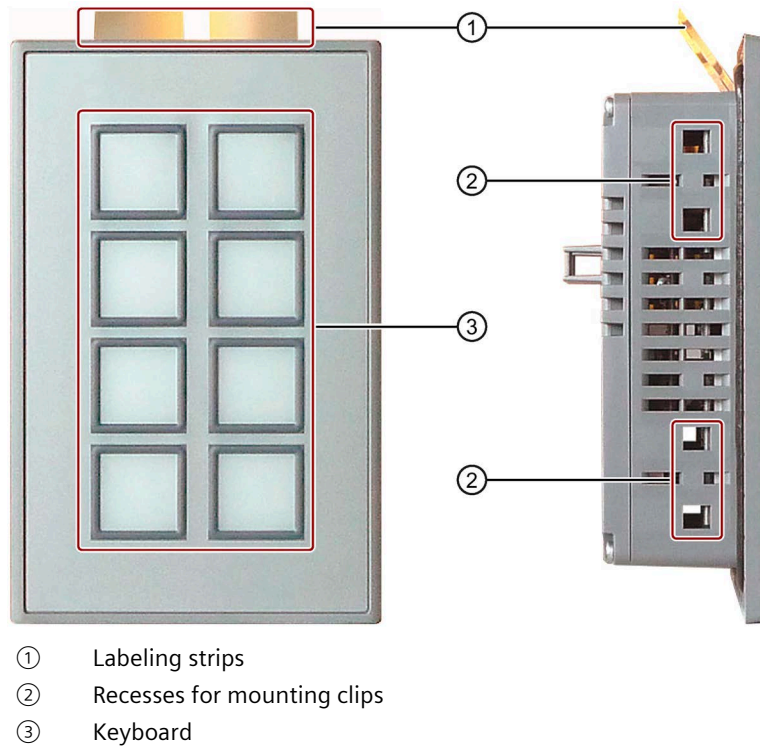
### Accessory kit

Device	Content of the accessory kit
KP8	<ul style="list-style-type: none"> <li>• A 12-pin plug connector</li> <li>• Four mounting clips for mounting the HMI device</li> </ul>
KP8F	<ul style="list-style-type: none"> <li>• A 16-pin plug connector</li> <li>• Four mounting clips for mounting the HMI device</li> </ul>
KP32F	<ul style="list-style-type: none"> <li>• A 24 V DC power supply connector</li> <li>• A 16-pin plug connector</li> <li>• A 24-pin plug connector</li> <li>• 10 mounting clips for mounting the HMI device</li> </ul>

The accessory kit can include documents.

## 1.3 Design and interfaces of the KP8 and KP8F

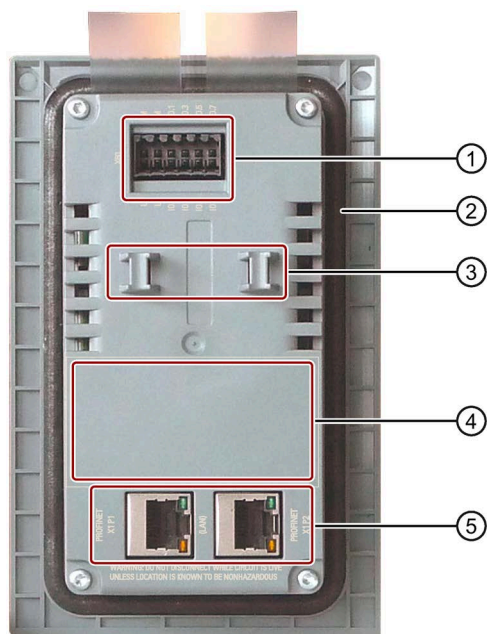
### Front view and side view



### Plan view

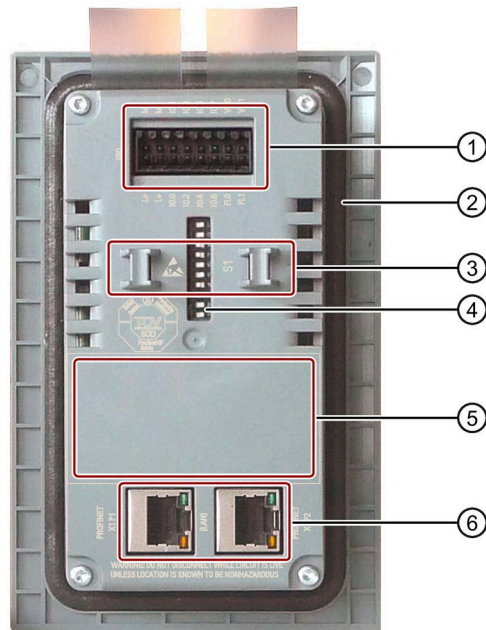


### Rear view KP8



- ① X60 power supply connection and digital inputs and outputs
- ② Seal
- ③ Bars for strain relief
- ④ Position of the nameplate
- ⑤ X1P1 and X1P2 PROFINET (LAN) interfaces

## Rear view KP8F

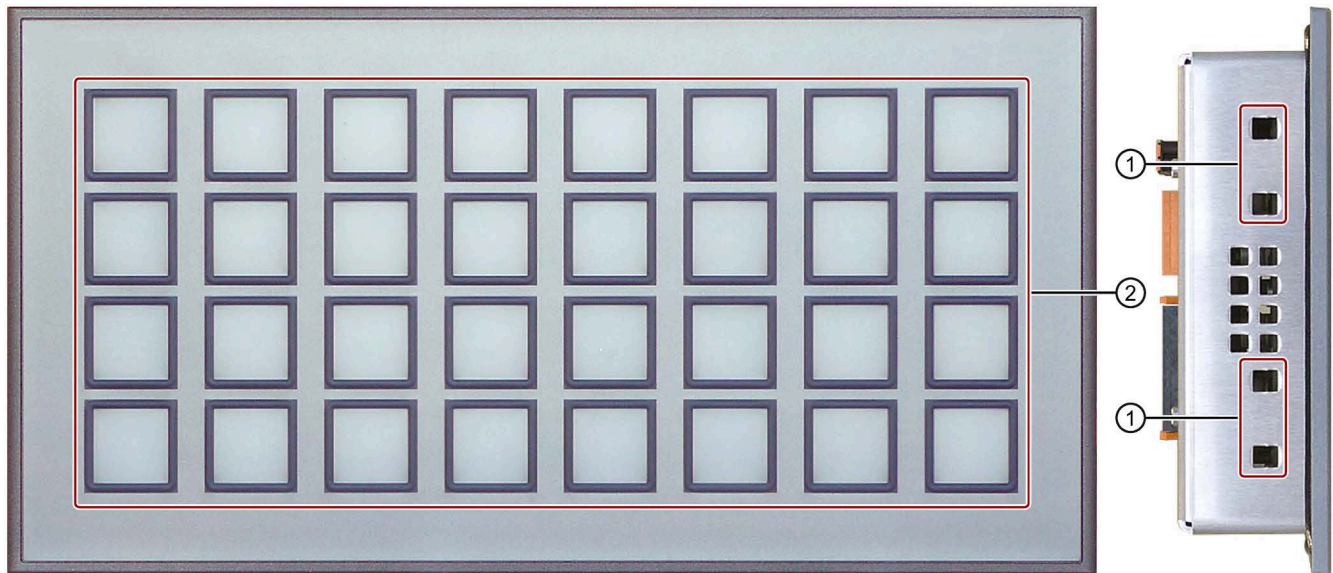


- ① X60 power supply connection and digital inputs and outputs
- ② Seal
- ③ Bars for strain relief
- ④ S1 DIP switch for the PROFIsafe address of the HMI device
- ⑤ Position of the nameplate
- ⑥ X1P1 and X1P2 PROFINET (LAN) interfaces

You can find the detailed description of the interfaces in the section "Interface description (Page 107)".

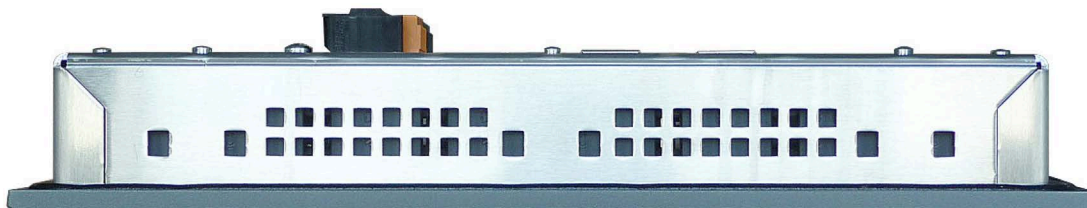
## 1.4 Design and interfaces of the KP32F

### Front view and side view



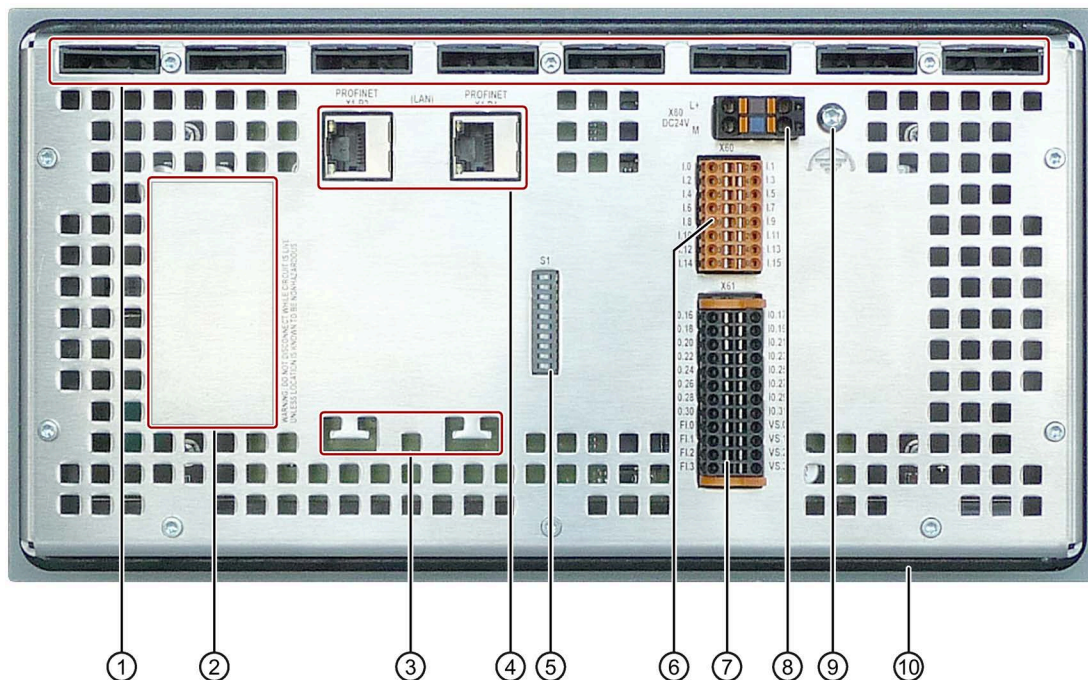
- ① Recesses for mounting clips
- ② Keyboard

### Plan view





## Rear view



- ① Openings for labeling strips
- ② Position of the nameplate
- ③ Bars for strain relief
- ④ X1P1 and X1P2 PROFINET (LAN) interfaces
- ⑤ S1 DIP switch for the PROFIsafe address of the HMI device
- ⑥ X60 connector for the digital inputs
- ⑦ X61 connector for the digital inputs/outputs
- ⑧ X80 connector for the power supply connection
- ⑨ Connection for functional grounding
- ⑩ Seal

You can find the detailed description of the interfaces in the section "Interface description (Page 107)".

## 1.5 Accessories

An accessory kit with the necessary accessories is included with the HMI device.

### Note

This section includes a selection of accessories suited to your HMI device. You can find additional versions of this selection and the full range of accessories for HMI devices in the Industry Mall on the Internet (<https://mall.industry.siemens.com/mall/en/WW/Catalog/Products/10144445>). Details such as the delivery quantity and technical specifications of accessories can be found in the Industry Mall under the respective article numbers.

### HMI I/O components

Name	Article number
Connector, 12-pin, for KP8	6AV6671-3XY38-....
Connector, 16-pin, for KP8F and KP32F	6AV6671-3XY48-....
Connector, 24-pin, for KP32F	6AV6671-3XY58-....
Connector for power supply of the KP32F, 2-pin, screw-type terminals	6AV6671-8XA00-....
Connector for power supply of the KP32F, 2x2 pin, spring-type terminals	6ES7193-4JB00-....

"...." stands for the variant key of the article number.

### Fasteners

Name	Article number
Plastic mounting clips	6AV6671-8XK00-0AX2

"...." stands for the variant key of the article number.

## 1.6 Required software

To configure the HMI devices, you require the following:

- STEP 7 TIA Portal V11 Basic Edition or higher
- For KP8F and KP32F, additionally the option STEP 7 Safety (TIA Portal) V11 or higher

### Note

For TIA Portal Engineering software as of V15, the following applies:

- WinCC Basic also includes a STEP 7 Basic Edition.
- WinCC Advanced and WinCC Professional also include the STEP 7 Safety option.

For a description of how to configure the HMI devices in STEP 7 as of V5.5, refer to the operating instructions, edition 11/2011, on the Internet

(<https://support.industry.siemens.com/cs/ww/en/view/47416561>).

## 1.7 Fail-safe operation of the KP8F and KP32F

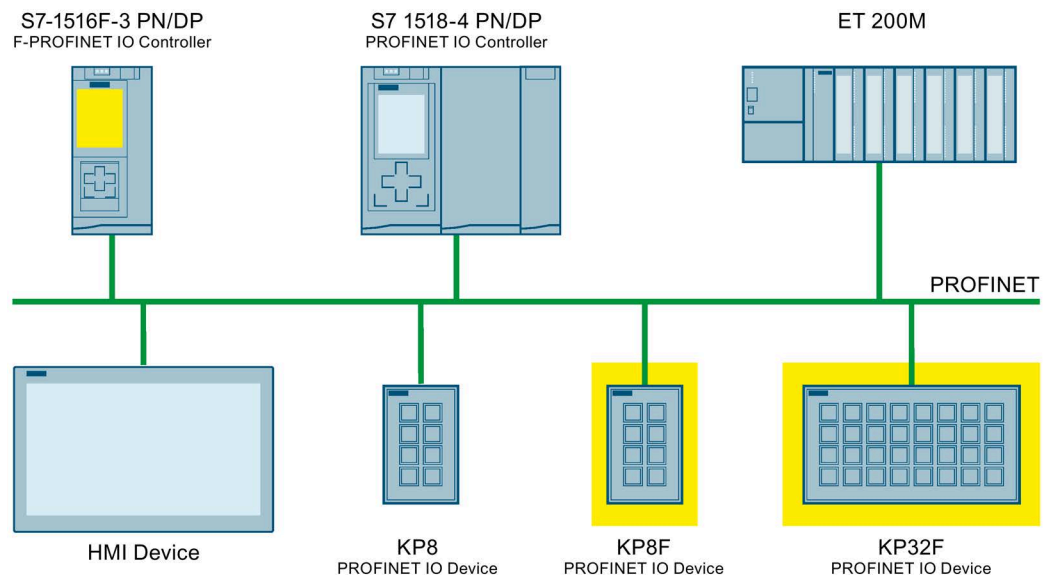
### Fail-safe automation system

A fail-safe automation system (F-system) is used in plants with increased safety requirements.

An F-system controls production processes so that residual error probability is taken into consideration to achieve a safe operating state when a shutdown occurs. An immediate shutdown therefore does not pose a danger to people or the environment.

### Configuration example of an F-system with KP8F and KP32F

The following example shows fail-safe and non-fail-safe devices in a PROFINET subnet.



In the example, each PROFINET IO device communicates with just one PROFINET IO controller. The PROFIsafe device communicates here exclusively with the F-PROFINET IO controller.

### Fail-safe operation of KP8F and KP32F

KP8F and KP32F are PROFINET IO devices in an Industrial Ethernet.

In fail-safe mode the HMI device registers the signal states of compatible emergency stop buttons and transmits corresponding safety frames to the controller. The controller and the HMI device communicate with each other using the fail-safe protocol, PROFIsafe.

The HMI device can operate in fail-safe mode corresponding to SIL3, Performance Level e and category 4 if the safety functions are appropriately configured. To configure the safety functions, you need the "STEP 7 Safety (TIA Portal)" add-on package in addition to the configuration software, see section "Required software (Page 18)".

## 1.7 Fail-safe operation of the KP8F and KP32F

Fail-safe mode of the HMI devices differs from standard mode essentially in that during communication, the signals are checked for being fault-free. In the event of a fault, the HMI device is placed in a safe state.

The fail-safe connection fulfills the following requirements:

- Single-channel mode with 1oo1 parameterization
  - Safety category SIL2 according to IEC 61508
  - Performance Level d and Category 3 according to EN ISO 13849-1
- Two-channel mode with 1oo2 parameter assignment
  - Safety category SIL3 according to IEC 61508
  - Performance Level e and Category 4 according to EN ISO 13849-1

### Diagnostic function of the KP8F and KP32F

KP8F and KP32F offer non-programmable diagnostic functions. The diagnostic functions are always active. The diagnostics result is automatically made available by the HMI device in STEP 7 and passed on to the fail-safe controller in the event of a fault.

### Important notes on fail-safe operation

The following sections of these operating instructions contain important information about the fail-safe operation of the KP8F and the KP32F:

- Safety instructions (Page 21)
- Requirements for fail-safe operation (Page 25)
- Connecting the HMI device (Page 38)
- Configuring the HMI device in STEP 7 (TIA Portal) (Page 57)
- Fail-safe operation of KP8F and KP32F (Page 81)
- KP8F – Encoder evaluation of the fail-safe channels (Page 112)
- KP32F – Sensor evaluation of the fail-safe channels (Page 116)


# Safety instructions

## 2.1 General safety instructions

The device is designed for use in the industrial sector for operating and monitoring plant processes.

Observe the safety and accident prevention instructions applicable to your application in addition to the safety information given in the device documentation.

### Open equipment

 <b>WARNING</b>
<p><b>The device constitutes open equipment on the back side.</b></p> <p>The device constitutes open equipment on the back side. This means that the device may only be integrated in an enclosure or cabinet which provides front access for operating the device. The enclosure or the cabinet must provide protection against electric shock and the spread of fire. The enclosure or the cabinet must meet the requirements for mechanical strength and the degree of protection for the relevant application.</p> <p>Access to the enclosure or cabinet in which the device is installed should only be possible by means of a key or tool and for trained and qualified personnel.</p> <p><b>Electrocution risk when control cabinet is open</b></p> <p>When you open the control cabinet, there may be a dangerous voltage at certain areas or components.</p> <p>Touching these areas or components can cause electrocution.</p> <p>Disconnect the cabinet from the mains before opening it. Do <b>not</b> plug in or pull out the system component during operation.</p>

### Safety of the plant or system

<b>NOTICE</b>
<p><b>The planner is responsible for the safety.</b></p> <p>The safety of the plant or system into which the device is integrated is the responsibility of the plant or system planner.</p>

## 2.1 General safety instructions

### ESD



An electrostatically sensitive device is equipped with electronic components. Due to their design, electronic components are sensitive to overvoltage and thus to the discharge of static electricity. Note the corresponding regulations when handling ESD.

### Industrial Security

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

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

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

For additional information on industrial security measures that may be implemented, please visit (<https://www.siemens.com/industrialsecurity>).

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

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under (<https://www.siemens.com/cert>).

## 2.2 Notes about usage

<b>NOTICE</b>
<b>The HMI device is approved for indoor use only.</b> The HMI device may be damaged if it is operated outdoors. Operate the HMI device indoors only.

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### Note

The device is intended for operation in an SELV/PELV circuit according to IEC/EN 61131 or IEC/EN 61010-2-201 in a dry environment, which means a dry environment on the rear of the device.

You can find additional information in the section "Operating conditions (Page 100)".

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### Industrial applications

The HMI device is designed for industrial applications. It conforms to the following standards:

- Requirements on interference emission EN IEC 61000-6-4:2019
- Requirements on immunity EN IEC 61000-6-2:2019

#### Use in mixed-use zone

Under certain circumstances you can use the HMI device in a mixed-use zone. A mixed-use zone is used for housing and commercial operations that do not have a significant impact on residents.

When you use the HMI device in a mixed-use zone, you must ensure that the limits of the generic standard EN 61000-6-3 regarding emission of radio frequency interference are observed. Suitable measures for achieving these limits for use in a mixed-use zone include:

- Installation of the HMI device in grounded control cabinets
- Use of filters in electrical supply lines

Individual acceptance is required.

#### Use in residential areas

---

### Note

#### HMI device not intended for use in residential area

The HMI device is not intended for use in residential areas. Operation of an HMI device in residential areas can have a negative influence on radio or TV reception.

---


### Use with additional measures

The HMI device should not be used at the following locations unless additional measures are taken:


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

## 2.3 Use in hazardous areas

The following warnings apply to operating a device with Ex approval in hazardous areas.

 <b>WARNING</b>
<b>Do not plug or pull connectors in potentially explosive atmospheres</b> When you plug or pull the plug-in connector during operation, there is a risk of an arc-over. An explosion can be triggered in the hazardous area due to spark-over, and death or serious bodily injury can occur. Plugging or pulling connectors, such as a 24 V DC power supply plug or a multi-pin connector, is <b>prohibited</b> in the potentially explosive atmosphere. Plug or pull a plug-in connector only when one of the following two requirements is met: The area is no longer hazardous or the device and its plug-in connections are de-energized. To switch off an HMI device, disconnect it from the power supply.

Note for using the HMI device within the scope of UL approval:

 <b>WARNING</b>
<b>Explosion Hazard</b> Do not disconnect while circuit is live unless area is known to be non-hazardous. Substitution of components may impair suitability for Class I, Division 2 or Zone 2.  <b>Risque d'Explosion</b> Ne pas déconnecter pendant que le circuit est sous tension, sauf si la zone est non-dangereuse. Le remplacement de composants peut compromettre leur capacité à satisfaire à la Classe I, Division 2 ou Zone 2.

Also read the enclosed documentation for use in potentially explosive atmospheres and the information in the section "Labels, certificates and approvals (Page 91)".



## 2.4 Requirements for fail-safe operation

### 2.4.1 Sensor for 1oo1 mode

The following safety categories can be achieved with the HMI device:

- SIL2 corresponding to IEC 61508
- PL d and Category 3 according to EN ISO 13849-1

---

**Note**

Have the fail-safe part of the system checked and accepted by a registered company in regards to the prescribed technical safety controls before commissioning the HMI device.

---

### Sensor Requirements for Fail-Safe Sensors

---

**Note****Qualified sensor**

If you do not use any qualified, normed sensors, the safety categories SIL2, PL d and category 3 will not be reached.

Only use qualified sensors corresponding with IEC 60947.

---

**Note**

Our electronics are equipped with such safety engineering features so that 98% of the maximum permissible probability of hazardous faults is due to all other components of the safety function. This corresponds to the recommended load division in safety engineering between sensing devices, actuating devices, and electronic switching for input, processing, and output.

The probability of hazardous faults and the rate of occurrence of hazardous faults of a safety function must comply with an upper limit determined by an SIL or PL. The values of the HMI device are available in the section "Technical specifications (Page 104)".

---

### Proof-test interval

Note the following:

- They have a considerable safety responsibility for the instrumentation with sensors.
- Sensors normally do not survive a proof-test interval of 10 years corresponding with IEC 61508.

The sensors clearly lose their safety.

---

#### Note

In order to reach the safety categories SIL2, PL d and category 3, high-quality sensors are required. The encoders used must comply with the standards EN 60947-5-1:2017 and EN 60947-5-5:20217.

The contacts of the sensors must be weld-resistant in accordance with the standard IEC EN 60947-5. Ensure that the sensor connection is free of short-circuits.

Define an ideal proof-test interval for the used sensor.

---

### Fault detection

Errors are detected in the following configurations:

- Short-circuit between two sensors
- Short-circuit to DC 24 V

## 2.4.2 Sensor for 1oo2 mode

The following safety categories can be achieved with the HMI device:

- SIL3 corresponding to IEC 61508
- PL e and Category 4 according to EN ISO 13849-1

---

### Note

Have the fail-safe part of the system checked and accepted by a registered company in regards to the prescribed technical safety controls before commissioning the HMI device.

---

## Sensor Requirements for Fail-Safe Sensors

---

### Note

#### Qualified sensor

If you do not use any qualified, normed sensors, the safety categories SIL3, PL e and category 4 will not be reached.

Only use qualified sensors corresponding with IEC 60947.

---

### Note

Our electronics are equipped with such safety engineering features so that 98% of the maximum permissible probability of hazardous faults is due to all other components of the safety function. This corresponds to the recommended load division in safety engineering between sensing devices, actuating devices, and electronic switching for input, processing, and output.

The probability of hazardous faults and the rate of occurrence of hazardous faults of a safety function must comply with an upper limit determined by an SIL or PL. The values of the HMI device are available in the section "Technical specifications (Page 104)".

When you operate the HMI device with an EMERGENCY STOP button, you must use a 2-channel equivalent sensor switching - see section "General (Page 46)".

---

### Proof-test interval

Note the following:

- They have a considerable safety responsibility for the instrumentation with sensors.
- Sensors normally do not survive a proof-test interval of 10 years corresponding with IEC 61508.

The sensors clearly lose their safety.

---

#### Note

In order to reach the safety categories SIL3, PL e and category 4, high-quality sensors are required. The encoders used must comply with the standards EN 60947-5-1:2017 and EN 60947-5-5:20217.

The contacts of the sensors must be weld-resistant in accordance with the standard IEC EN 60947-5. Ensure the short-circuit-free connection of the EMERGENCY STOP button.

Define an ideal proof-test interval for the used sensor.

---

### Fault detection

Errors are detected in the following configurations:

- When non-equivalent sensor signals are connected.
- When a single-channel sensor has a redundant connection.



#### WARNING

##### No redundant connection of two single-channel break contacts

If sensor signals are connected redundantly (break contacts), a fault will only be recognized if one of the sensors is triggered.

Ascertain that under no circumstances are two single-channel break contacts redundantly connected as sensor signals.

# Mounting and connecting the HMI device

## 3.1 Preparing for installation

### 3.1.1 Selecting installation location

Points to observe when selecting the mounting location:

- Position the HMI device so that it is not subjected to direct sunlight.
- Position the HMI device such that it is ergonomically accessible for the user.  
Choose a suitable mounting height.
- Ensure that the air vents are not covered as a result of the mounting.
- Observe the permissible mounting positions for the HMI device.

### 3.1.2 Checking delivery

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

---

**Note****Damaged parts**

A damaged part will cause the HMI device to malfunction.

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

---

### 3.1.3 Permitted mounting positions

The HMI device is designed for mounting in:

- Racks
- Cabinets
- Control boards
- Consoles

In the following, all of these mounting options are referred to by the general term "cabinet".

3.1 Preparing for installation

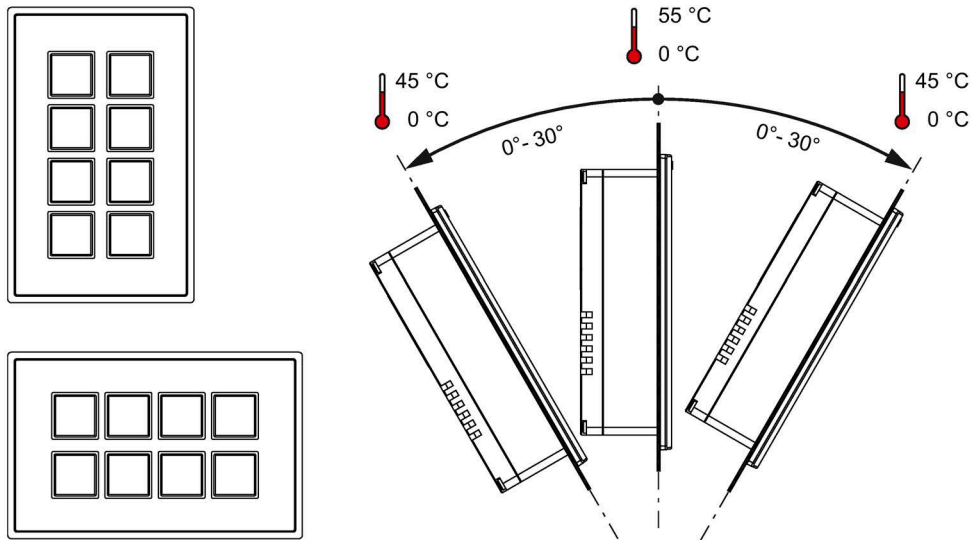
The device is self-ventilated and may be installed up to an angle of 30° to the front or back in portrait format or landscape format.

<p><b>NOTICE</b></p> <p><b>Damage due to overheating</b></p> <p>An inclined installation reduces the convection by the HMI device and therefore the maximum permitted ambient temperature for operation.</p> <p>If there is sufficient convection from forced ventilation, the HMI device can also be operated in the inclined mounting position up to the maximum permitted ambient temperature for vertical installation. The HMI device may otherwise be damaged and its certifications and warranty will become void.</p> <p>The operating temperature ranges specified in this section apply to the rear and front of the HMI device.</p>
--

For detailed information regarding the permitted ambient temperatures, refer to section "Climatic ambient conditions (Page 99)".

**Mounting position**

Select one of the approved mounting positions for your HMI device. The following figure shows the front and side view of the permitted mounting positions using the KP8(F) as an example; it applies to the KP32F in the same way.



**See also**

Operating conditions (Page 100)

### 3.1.4 Preparing the mounting cutout

---

#### Note

#### Stability of the mounting cutout

The material in the area of the mounting cutout must provide sufficient strength to guarantee the enduring and safe mounting of the HMI device.

The force of the mounting clips or operation of the device may not lead to deformation of the material in order to achieve the degrees of protection described below.

---

#### Degrees of protection and installation area

The degrees of protection of the HMI device can only be guaranteed if the following requirements are met:

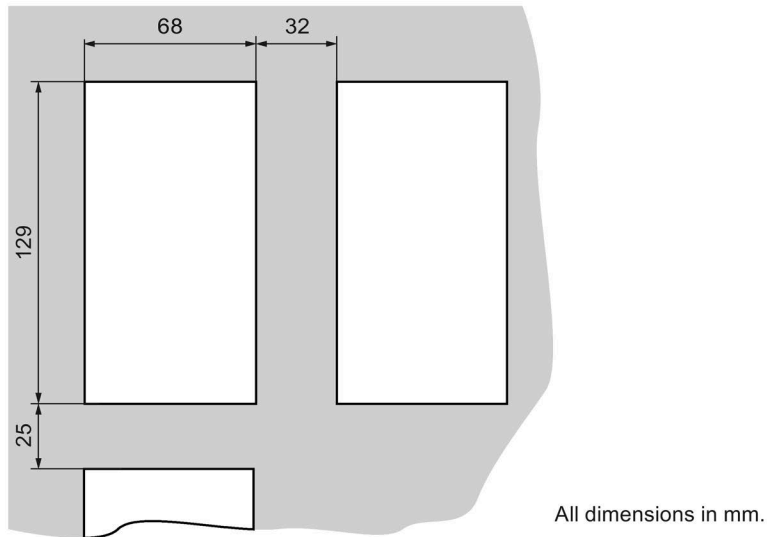
- Material thickness at the mounting cutout for IP65 degree of protection or Front face only Type 4X/Type 12 (indoor use only): 2 mm up to 6 mm
- Permitted deviation from plane at the mounting cutout:  $\leq 0.5$  mm  
This condition must be fulfilled for the mounted HMI device.
- Permitted surface roughness in the area of the mounting gasket:  $\leq 120$   $\mu\text{m}$  ( $R_z$  120)
- The installation area is dry and free from contamination such as dust or lubricant.

### Dimensions of the mounting cut-out

You can mount several HMI devices flush side-by-side or stacked.

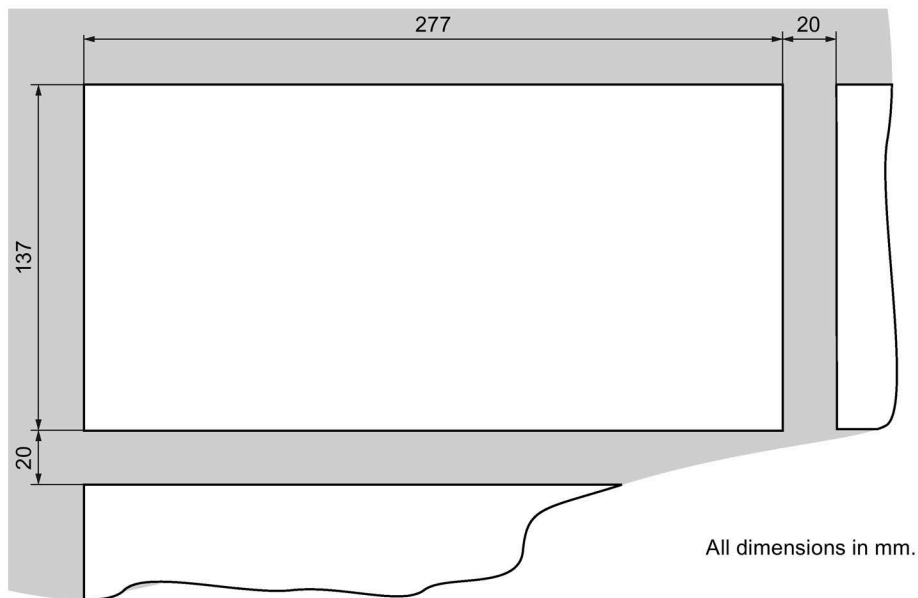
- Mounting cut-out KP8, KP8F

The following figure shows the dimensions of the mounting cut-out and the required distances.



- Mounting cut-out KP32F

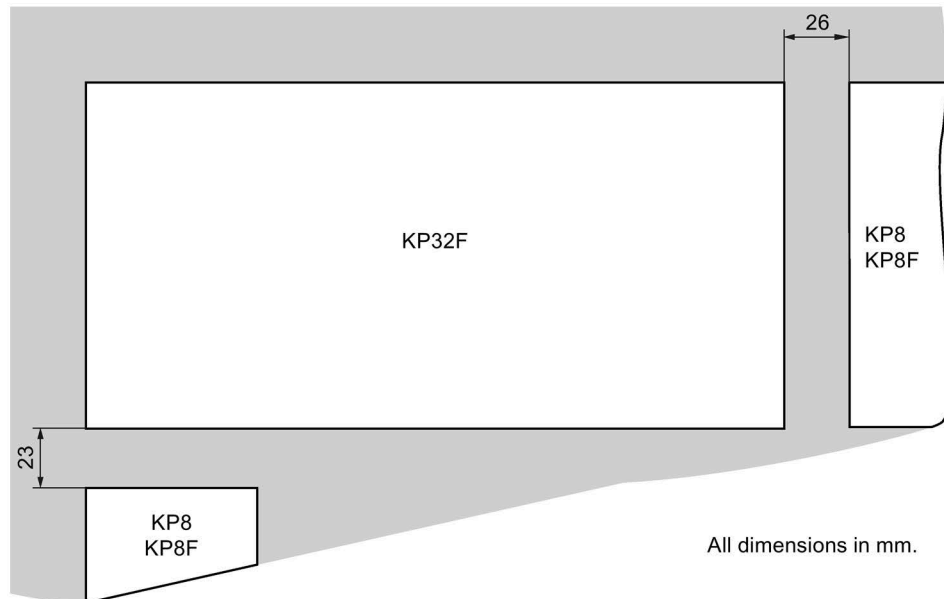
The following figure shows the dimensions of the mounting cut-out and the required distances.





### Distances between KP32F and KP8 or KP8F

The following figure shows the required distances for flush-mounting of KP32F and KP8 or KP8F.



### Mounting Depth

The mounting depth for the HMI device depends on the type of construction of the PROFINET connector. With angled PROFINET connector, order number 6GK1901-1BB20-2AB0, the mounting depth is 65 mm.

Plan for an adequate bending radius for the cables connected to the HMI device.

### Clearance

Observe the maximum permitted ambient temperature particularly when flush-mounting multiple HMI devices. Make sure that there is sufficient heat dissipation during operation.

### See also

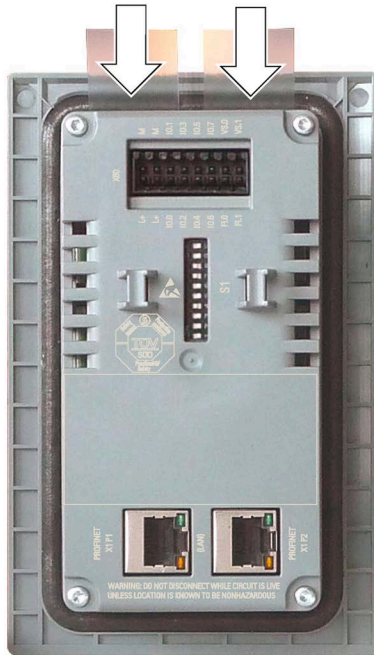
Information on insulation tests, protection class and degree of protection (Page 101)

### 3.1.5 Labeling keys

You can label the keys as required for your project. Use the labeling strip for this purpose.

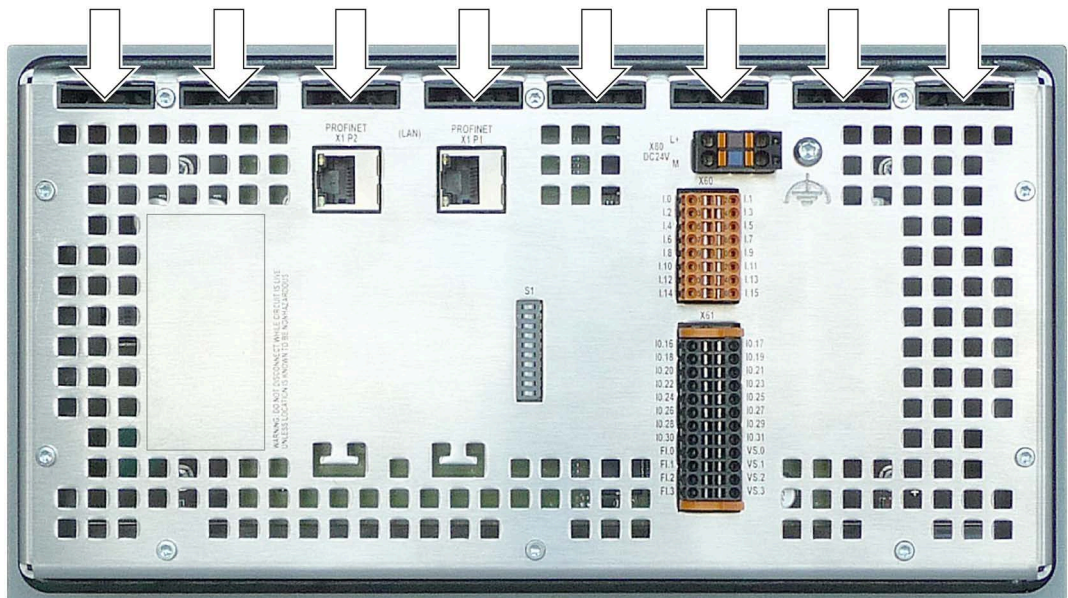
- KP8 and KP8F

The following figure shows the KP8F as an example.



When installed, the labeling strips can be inserted if the mounting has a material thickness of < 3.5 mm. With larger material thicknesses, the disassembly of the HMI device is required if a labeling strip should be changed.

- KP32F



With KP32F you can replace the labeling strips in the installed state without restrictions.

**Note**

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

**Printing labeling strips**

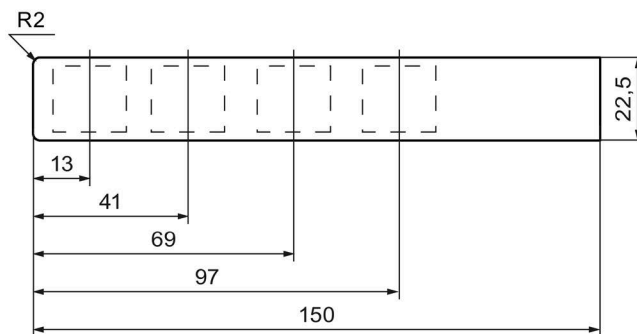
A template for the labeling strips is available as a Word file online under:

"Labeling strips for HMI panels

(<https://support.industry.siemens.com/cs/ww/en/view/11274631>)"

Observe the information in this file.

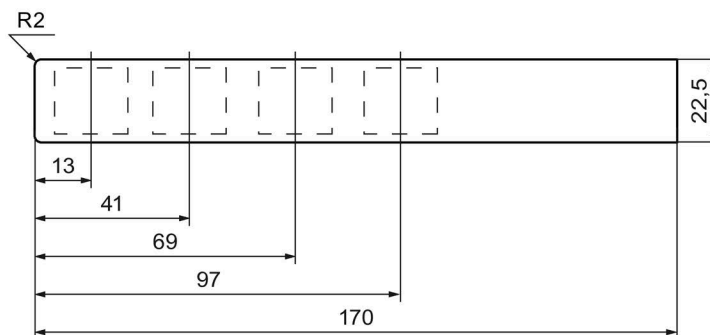
The labeling strip of the KP8 and the KP8F have the following dimensions:



Visible window area, 20 x 20

All dimensions in mm.

The labeling strip of the KP32F has the following dimensions:



Visible window area, 20 x 20

All dimensions in mm.

### 3.1 Preparing for installation

#### Procedure

1. Edit the template.

2. Print the template.

You can use printable foils. Always ensure an adequate material stiffness during the selection. This is needed to insert the labeling strips. The maximum permitted thickness of the labeling strip is 0.15 mm.

Alternatively, you can also label the strips by hand.

---

#### Note

Wait for the printed labeling strips to dry before you insert them.

---

3. Cut out the labeling strip.

Ensure that the corners are cut according to the corresponding diagram, as this makes it easier to slide them into the slot.

4. Remove any previously existing labeling strips.

5. Slide the new labeling strips into the guide up to the stop.

The labeling strip will protrude approximately 1 cm out of the guide. The template dimensions for the labeling strips are designed so that the labeling is correctly placed for the keys. An interlock is not required for the labeling strips.

## 3.2 Mounting the HMI device

### Requirement

- For KP8, KP8F: Four mounting clips  
For KP32F: Ten mounting clips  
The mounting clips are included in the accessory kit.
- The HMI device comes equipped with a mounting seal.  
If the mounting seal is damaged, do not mount the HMI device.

### Procedure

---

#### Note

Always mount the HMI device according to the operating instructions in this manual.

When mounting the HMI device, ensure that the labeling strips do not become jammed between the mounting cut-out and the HMI device.

---

1. Insert the HMI device into the mounting cut-out.
2. Insert a mounting clamp into a recess on the HMI device.
3. Fasten each mounting clamp by tightening the screw.  
The permitted torque is 0.2 Nm.
4. Repeat step 2 and 3 until all required mounting clamps are fastened.

## 3.3 Connecting the HMI device

### 3.3.1 Connection information

#### Requirement

- The HMI device must be mounted according to the specifications of these operating instructions.

#### Connecting cables

Use only shielded standard cables as data connection cables. You can find order information on the Internet (<https://mall.industry.siemens.com>).

---

#### Note

##### **Disconnect SELV/PELV circuits from other circuits or insulate the cables**

The wiring of the SELV/PELV circuits must be disconnected from other circuits that are not SELV/PELV or the insulation of all conductors must be rated for the higher voltage. Alternatively, a grounded shielding or additional insulation must be ordered around the wiring for SELV/PELV circuits or the other circuits based on IEC 60364-4-41.

---

The cables used must meet the following requirements:

- The unique assignment of terminals to sensors must be ensured.
- Cables laid outside of the switching cabinet must be laid separately in accordance with the relevant standards.

Use stable pipes or cable channels to avoid short circuits and cross-circuits.

---

#### Note

When connecting an EMERGENCY STOP button to the fail-safe channels of the HMI device, you must observe the cable lengths according to the section "Technical specifications (Page 104)".

---

Note for using the HMI device in the geographical scope of the UL approval:

---

#### Note

##### **Use copper cables at connectors with terminal connections**

Use copper (Cu) cables for all supply lines that are connected to the device with terminals, e.g. 24 V DC power supply cables to the 24 V DC power supply connectors.

##### **Utiliser des câbles en cuivre sur les connexions à bornes**

Utilisez des câbles en cuivre (Cu) pour tous les câbles d'alimentation qui sont raccordés à l'appareil par des bornes, par exemple les câbles d'alimentation 24 V CC sur le connecteur d'alimentation 24 V CC.

---

## Connection sequence

---

**Note**

Failure to do so may result in damage to the HMI device.

---

Connect the HMI device in the following sequence:

1. For KP32F: Functional earth
2. Power supply
3. Controller

Proceed in a reverse direction when disconnecting the connections.

## Connecting the cables

**NOTICE****Adhere to local installation regulations**

When connecting the cables, observe the local regulations and the local installation conditions, such as protective circuits for power supply lines.

**Short-circuit and overload protection**

Various measures as protection against short-circuits and overloads are required for setting up a full installation. The types of components and the degree to which the protective measures are mandatory depend on the regulation that applies to your system setup.

- When connecting the cables, ensure that the contact pins are not bent.
- Provide adequate strain relief for all cables.
- The pin assignment of the interfaces is described in the technical specifications.

## See also

Technical specifications (Page 91)

### 3.3.2 Equipotential bonding for KP32F

#### Differences in electrical potential

Differences in potential may occur between spatially separated system parts. Such differences in electrical potential can lead to high equalizing currents over the data cables and therefore to the destruction of their interfaces. Equalizing currents can develop if the cable shielding is terminated at both ends and grounded to different parts of the system.

Differences in potential can develop when a system is connected to different mains.

#### General requirements of equipotential bonding

Differences in electrical potential must be reduced using equipotential bonding to ensure trouble-free operation of the relevant components of the electronic system. The following must therefore be observed when installing the equipotential bonding circuit:

- The effectiveness of equipotential bonding increases as the impedance of the equipotential bonding conductor decreases or as its cross-section increases.
- If two plant parts are interconnected by means of shielded data cables and their shielding is bonded at both ends to the grounding/protective conductor, the impedance of the additionally installed equipotential bonding cable must not exceed 10% of the shielding impedance.
- The cross-section of a selected equipotential bonding conductor must be capable of handling the maximum equalizing current. Equipotential bonding cables with a minimum cross-section of 16 mm<sup>2</sup> are required between control cabinets.
- Use equipotential bonding conductors made of copper or galvanized steel. Establish a large surface contact between the equipotential bonding conductors and the grounding/protective conductor and protect them from corrosion.
- Use a suitable cable clip to clamp the shield of the data cable flush to the equipotential bonding rail. Keep the length of cable between the HMI device and the equipotential bonding rail as short as possible.
- Route the equipotential bonding conductor and data cables in parallel and with minimum clearance between them.

---

#### Note

##### Equipotential bonding cable

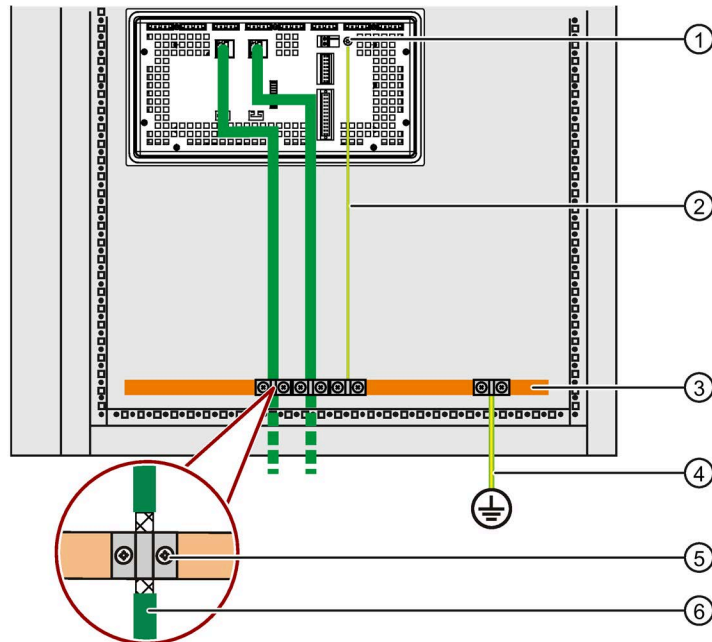
Cable shields are not suitable for equipotential bonding. Always use the prescribed equipotential bonding conductors for this. An equipotential bonding conductor between control cabinets must have a minimum cross-section of 16 mm<sup>2</sup>. The cable between the ground bar and HMI device must have a minimum cross-section of 4 mm<sup>2</sup>.

---



### Connection diagram

The following figure shows the connection of the functional grounding for equipotential bonding.



- ① Connection for functional grounding
- ② Equipotential bonding cable, 4 mm<sup>2</sup>
- ③ Equipotential busbar for equipotential bonding cables, ground connection and shield support of data cables
- ④ Ground bar, 16 mm<sup>2</sup>
- ⑤ Cable clamp
- ⑥ PROFINET cable

### 3.3.3 Connecting the power supply

**NOTICE**

**Safe electrical isolation**

Use only 24 V DC power supply units with safe electrical isolation (SELV/PELV) in accordance with IEC 61010-2-201.

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

For non-isolated plant design: Connect the connection for GND 24 V from the 24 V power supply output to equipotential bonding for uniform reference potential. Select a central termination point as far as possible.

**NOTICE**

**External protective circuit required for Key Panels V1**

For Key Panels V1 (see "Conventions (Page 3)"): An external protective circuit is required for operation with 24 V DC, refer to the Function Manual "Designing interference-free controllers (<https://support.industry.siemens.com/cs/ww/en/view/59193566>)", section 7 "Lightning and overvoltage protection".

**Note**

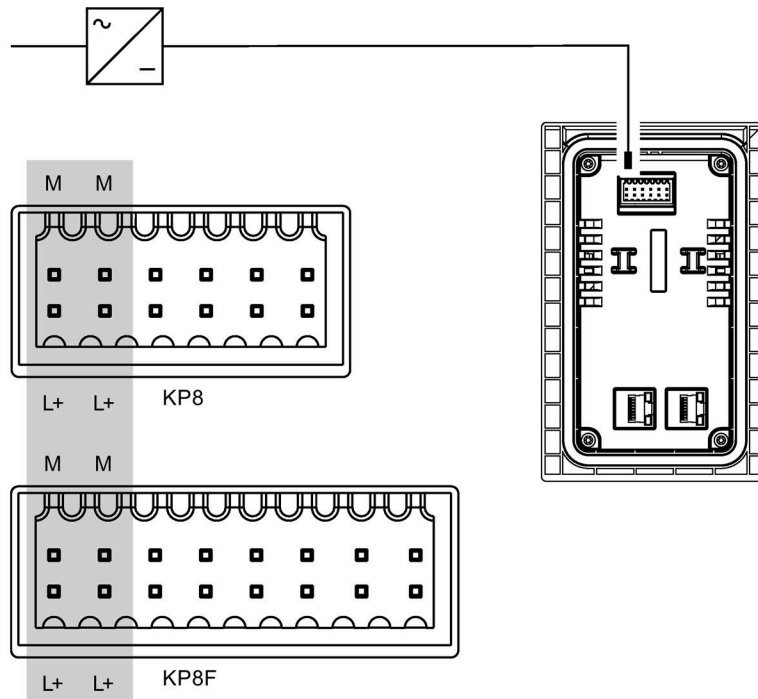
The HMI device offers reverse polarity protection that prevents damaging the device when the power supply cables are connected incorrectly.

The following configuration diagrams show how to connect the HMI devices to the power supply.

You can find the detailed description of the interfaces in the section "Interface description (Page 107)".

### Configuration diagram KP8, KP8F

The following figure shows how to network the power supply to the KP8 or KP8F.



#### Connecting the connector

The plug-in connector for connecting the power supply is contained in the accessory kit and is designed for cables with a maximum cross-section of 1 mm<sup>2</sup>. Note the following diagram when stripping the wire.



#### Note

##### Avoid damaging the socket

Do not connect the cables when the connector is plugged into the HMI device. You may otherwise damage the mounting of the socket in the HMI device.

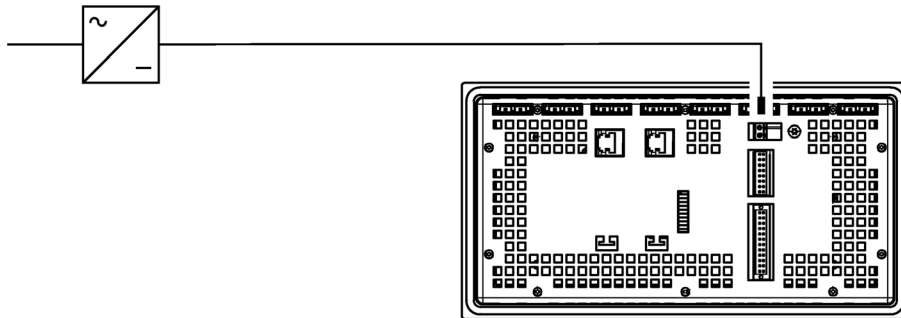
Only connect the cables to the removed plug connector.

To open the connectors, press in the opening provided with a screwdriver for slotted screws. Slide the cable into the connector enclosure and remove the screwdriver.

Do not confuse the cables. Refer to the label for the contact pins on the rear of the HMI device.

### Configuration graphic K32F

The following figure shows how to network the power supply to the KP8 or KP8F.



#### Connecting the power supply plug

##### NOTICE

##### Do not damage the socket

Do not tighten the screws of the power supply plug when it is plugged into the HMI device. The pressure from the screwdriver may otherwise damage the HMI device socket.

Connect the power cables when the power supply plug is disconnected from the HMI device.

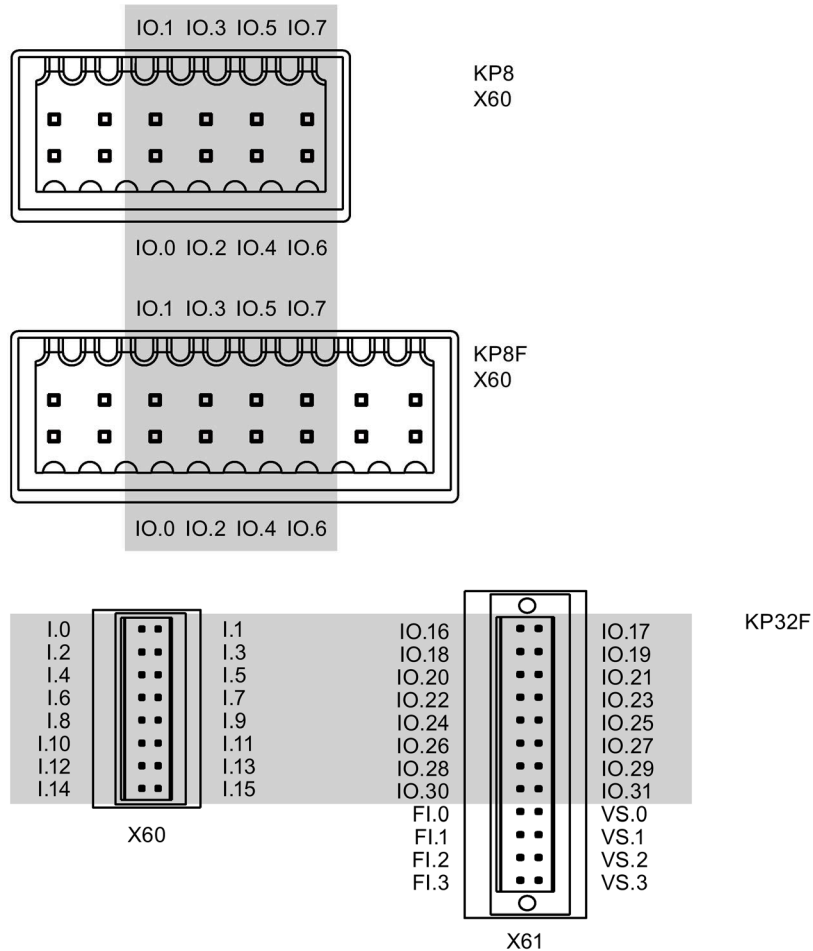
1. Switch off the power supply.
2. Connect the power supply cables with the power supply plug, torque 0.5 to 0.6 Nm.
3. Connect the power supply plug to the corresponding socket on the HMI device as shown in the figure above. Check for correct polarity of the cables by referring to the interface labeling on the back of the HMI device.

Additional information on the power supply plug supplied and other permissible power supply plugs can be found in the section "Accessories (Page 18)".

### 3.3.4 Connect standard inputs/outputs

On the back of the HMI device are the digital inputs/outputs for **non** fail-safe input and output devices. Non fail-safe inputs/outputs are shown in gray in the following illustrations.

Unconnected inputs/outputs are automatically set to "0".



The signal assignment is described in the section "Interface description (Page 107)".

#### Procedure

##### Note

Follow the notes about connectors in section "Connecting the power supply (Page 42)".

1. Connect the cables according to the assignment of the socket to the connector.
2. Fasten the connector to the respective socket on the rear of the HMI device.

### 3.3.5 Connecting KP8F - fail-safe inputs

#### 3.3.5.1 General

The KP8F is intended for operation of an EMERGENCY STOP button and fail-safe sensor. Please observe the information in the sections "Sensor for 1oo1 mode (Page 25)" and "Sensor for 1oo2 mode (Page 27)".

---

#### Note

For supplying the fail-safe inputs, only inputs labeled with VS may be used on the HMI device. Only connect fail-safe inputs if these are also used. This also applies for disabled fail-safe inputs.

---

Follow the notes about connectors in section "Connecting the power supply (Page 42)".

### 3.3.5.2 Connecting the EMERGENCY STOP button

#### Requirement

- 1 connector, see accessory kit
- 1 EMERGENCY STOP button

#### Note

If you selected the option "No evaluation" for the KP8F in the "Evaluation of the encoders" parameter in STEP 7 and no encoder is connected, the value 0 will be reported to the controller for the encoder values in the process image.

See section "KP8 and KP8F - Bit assignment in the process image (Page 111)".

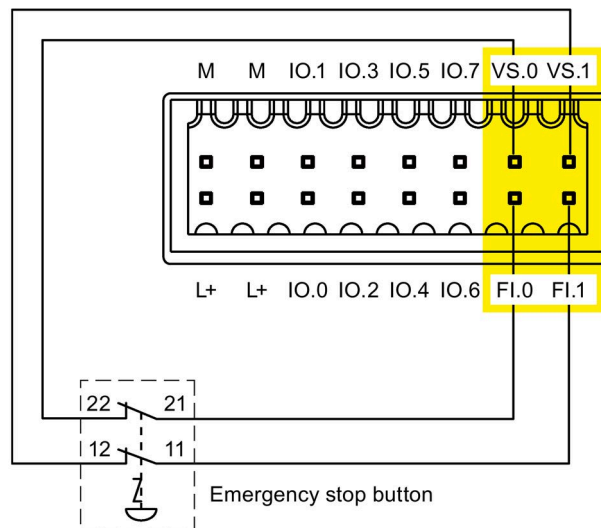
#### Procedure

1. Connect the EMERGENCY STOP button as follows to the connector for the fail-safe digital inputs:
  - Sensor supply VS.0 for the FI.0 input
  - Sensor supply VS.1 for the FI.1 input

#### Note

The assignment of the fail-safe inputs has been changed as of product version 03.

External power supply is not permissible for VS.0 and VS.1.



The EMERGENCY STOP button must be connected as an equivalent NC contact. Observe the respective setting for "Evaluation of the sensor" in the configuration.

### 3.3.5.3 Fail-safe connection of sensor

#### Requirement

- 1 connector, see accessory kit
- 2 buttons as NC contact or NO contact

#### Procedure

The following procedure is an example.

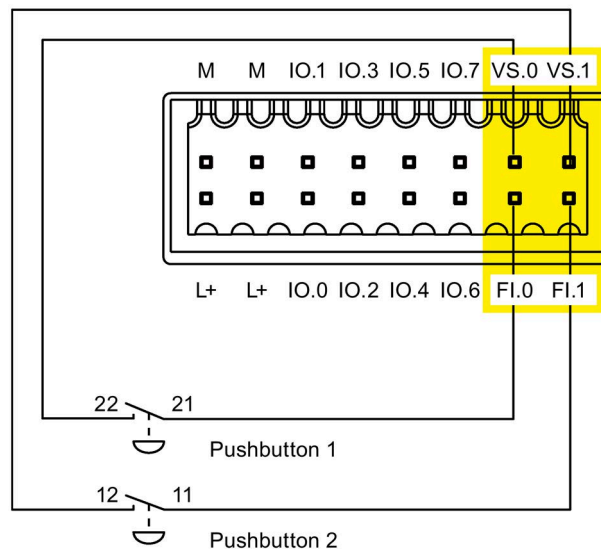
1. Connect the button as follows to the connector for the fail-safe digital inputs:
  - Sensor supply VS.0 for the FI.0 input
  - Sensor supply VS.1 for the FI.1 input

---

#### Note

The assignment of the fail-safe inputs has been changed as of product version 03.  
External power supply is not permissible for VS.0 and VS.1.

---



Observe the respective setting for "Evaluation of the sensor" in the configuration.



### 3.3.6 Connecting KP32F - fail-safe inputs

#### 3.3.6.1 General

The KP32F is intended for the connection of EMERGENCY STOP buttons and fail-safe sensors. Please observe the information in the sections "Sensor for 1oo1 mode (Page 25)" and "Sensor for 1oo2 mode (Page 27)".

---

**Note**

For supplying the fail-safe inputs, only inputs labeled with VS may be used on the HMI device. Only connect fail-safe inputs if these are also used. This also applies for disabled fail-safe inputs.

---

Follow the notes about connectors in section "Connecting the power supply (Page 42)".

#### 3.3.6.2 Connecting the EMERGENCY STOP button

##### Requirement

- 1 connector, see accessory kit
- 1 or 2 EMERGENCY STOP buttons

---

**Note**

If you selected the option "No evaluation" for the KP32F in the "Evaluation of the sensor" parameter in STEP 7 HW Config and no sensor is connected, the value 0 will be reported to the controller for the sensor values in the process image.

See section "KP32F - Bit assignment in the process image (Page 114)".

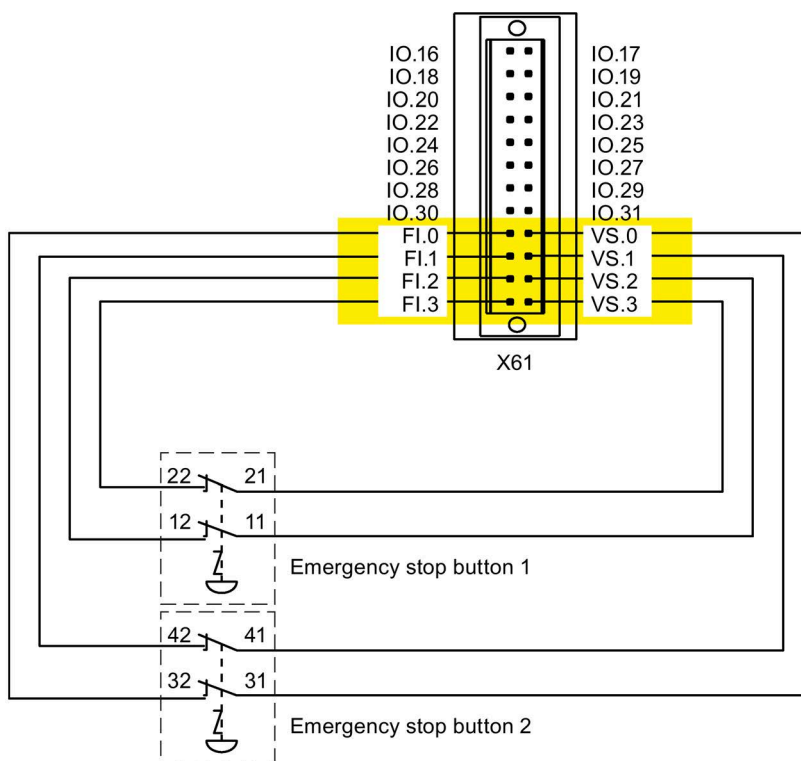
---

**Procedure**

1. Connect the EMERGENCY STOP button as follows to the connector for the fail-safe digital inputs:
  - Sensor supply VS.0 for the FI.0 input
  - Sensor supply VS.1 for the FI.1 input
  - Sensor supply VS.2 for the FI.2 input
  - Sensor supply VS.3 for the FI.3 input

**Note**

External supply is not permitted for VS.0, VS.1, VS.2 and VS.3.



The following connection options are available:

FI.0	FI.1	FI.2	FI.3
1oo1	1oo1	Not connected	
1oo2		Not connected	
1oo2		1oo2	
1oo2		1oo1	1oo1
1oo1	1oo1	1oo1	1oo1

The EMERGENCY STOP button must be connected as an equivalent NC contact. Observe the respective setting for "Evaluation of the sensor" in the configuration.

### 3.3.6.3 Fail-safe connection of sensor

#### Requirement

- 1 connector, see accessory kit
- 2 to 4 buttons as NC contact or NO contact

#### Procedure

The following procedure is an example.

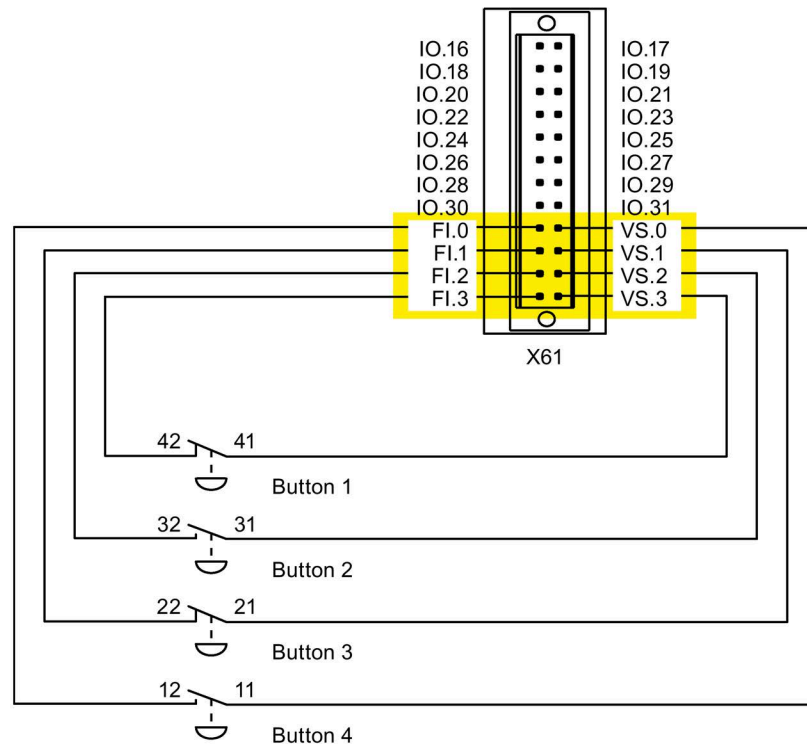
1. Connect the button as follows to the connector for the fail-safe digital inputs:
  - Sensor supply VS.0 for the FI.0 input
  - Sensor supply VS.1 for the FI.1 input
  - Sensor supply VS.2 for the FI.2 input
  - Sensor supply VS.3 for the FI.3 input

---

#### Note

External supply is not permitted for VS.0, VS.1, VS.2 and VS.3.

---



The following connection options are available:

FI.0	FI.1	FI.2	FI.3
1oo1	1oo1	Not connected	
1oo2		Not connected	
1oo2		1oo2	
1oo2		1oo1	1oo1
1oo1	1oo1	1oo1	1oo1

Observe the respective setting for "Evaluation of the sensor" in the configuration.

### 3.3.7 Connecting the PLC

The connection between the HMI device and controller depends on the topology of the PROFINET network.

- Line  
All the communication nodes are connected in series as a bus. The series structure is implemented with switches that are integrated in the PROFINET devices.
- Star  
The communication nodes are connected with a switch, from the Scalance X208 or X204 series for example.

You can find additional information on the topology of PROFINET networks in the system manual, "PROFINET System Description".

---

#### Note

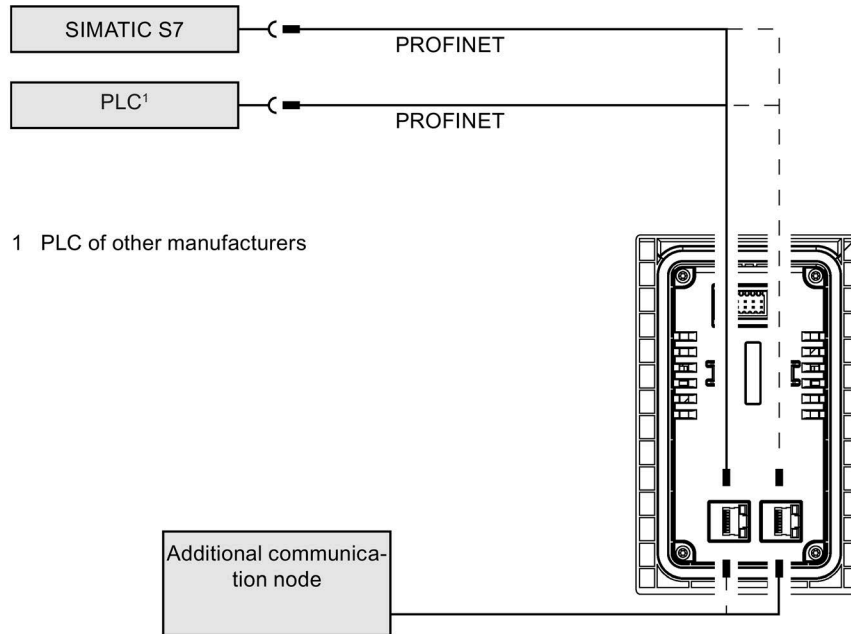
Always use only the approved cables to connect a SIMATIC S7 controller.

---

Standard cables are available for the connection. For more information, see: Industry Mall (<https://mall.industry.siemens.com>)

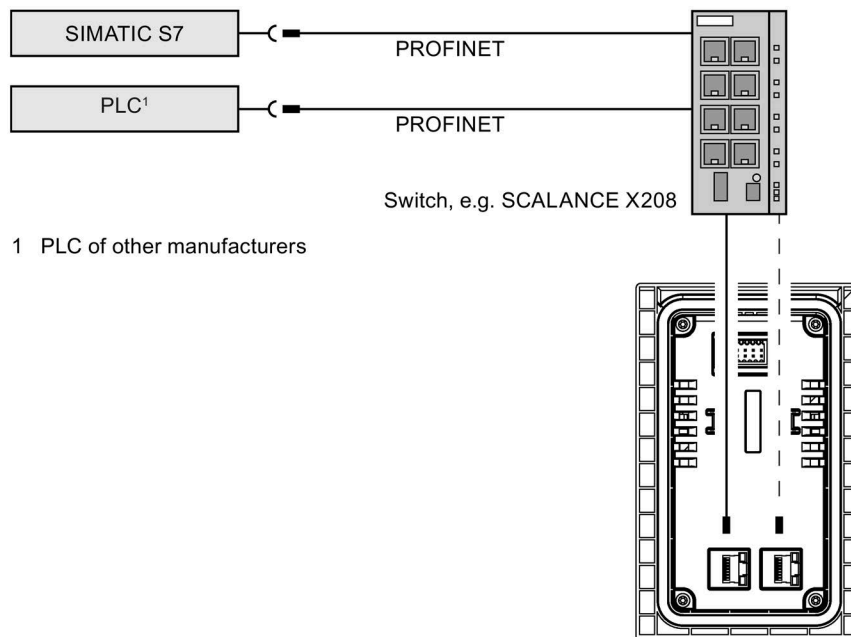
### Configuration diagram for serial configuration

The figure below illustrates the connection between the HMI device and the controller with a serial configuration using a KP8 as an example.



### Configuration diagram for star configuration

The following figure shows the connection between the HMI device and the controller with a star configuration using a KP8 as an example.



## 3.4 Switching the HMI device on, testing it and switching it off

---

### Note

If the KP8F or KP32F is operated with fail-safe components, check before each commissioning, whether the sensor evaluation in the configuration is set correctly according to the wiring of the fail-safe components.

---

### Procedure

1. Switch on the power supply.

After starting the HMI device, all LEDs will illuminate corresponding to the setting. The standard lighting duration is 5 seconds.

---

### Note

As long as the light test is executed, no keyboard entry will be transferred to the connected controller.

---

If the HMI device fails to start, you may have crossed the wires on the connector. Check the connected cables and change their connection, if necessary.

2. Press each light button after one another.

The LED of the illuminated pushbutton goes off while it is pressed.

If required, increase the duration of the lamp test in the configuration under the module parameters of slot 1, see section "Configuring the HMI device in STEP 7 (TIA Portal) (Page 57)".

3. For KP8F and KP32F, the following applies: If fail-safe components are connected, you must conduct a function test of the fail-safe components each time you turn them on.

## Switching off the HMI device

---

### Note

#### Switching off PROFIsafe devices

The plant can enter the fail-safe state when you switch off a PROFIsafe device, depending on the configuration.

Before you switch off the PROFIsafe device, check its integration into the control program.

---

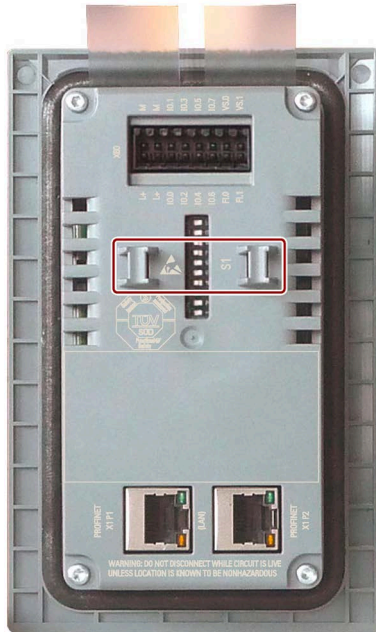
To switch off an HMI device, switch off the associated power supply unit.

### 3.5 Securing the cables

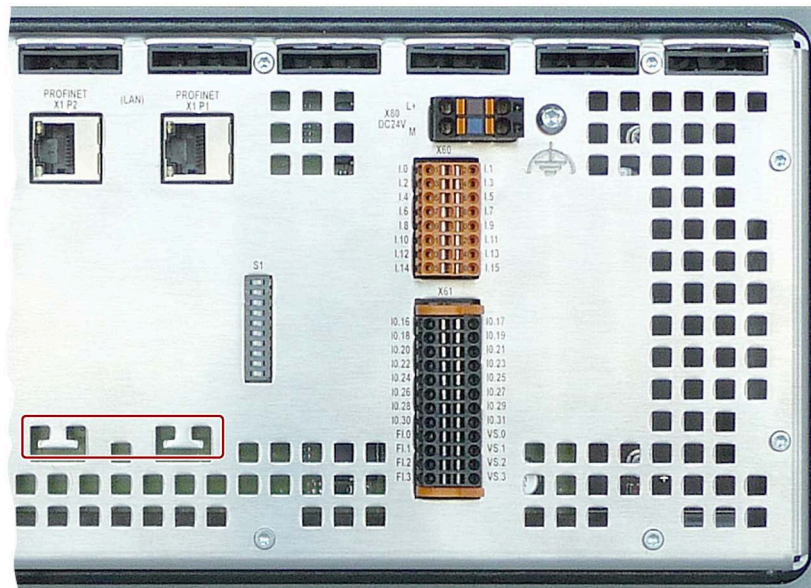
After the power-on test, use cable ties to secure the connected cables to the marked fixing elements to ensure strain relief.

- Strain relief on the KP8 and KP8F

The following figure shows the KP8F as an example.



- Strain relief on the KP32F



## 3.6 Removing the HMI device

This section describes how you remove the HMI device properly if this becomes necessary.

The HMI device is removed by following the steps taken to install it but in the reverse order.

### Procedure

Proceed as follows:

1. Switch off the power supply to the HMI device.
2. If you use the HMI device in a hazardous area, ensure that one of the two following requirements is met: The area is no longer hazardous, or the HMI device and its plug-in connections are de-energized.
3. Remove all cable ties which are located at the strain relief elements of the HMI device.
4. Remove all cable connectors and the equipotential bonding (only for KP32F) from the HMI device.
5. Loosen the mounting clips screws and remove all mounting clips.
6. Remove the HMI device from the mounting cutout.

### See also

Mounting the HMI device (Page 37)

Connecting the HMI device (Page 38)



## Configuring the HMI device in STEP 7 (TIA Portal)

### 4.1 Checklist "Assign parameters for the HMI device"

For the operation of the HMI device, parameter assignment steps are required in STEP 7 and for the HMI device. Information on how to assign parameters of the fail-safe I/O in STEP 7 is available in the "SIMATIC Safety - Configuring and Programming" programming and operating manual (<https://support.industry.siemens.com/cs/ww/en/view/54110126>).

- For the KP8F and KP32F, refer to the section "Notes on the PROFI-safe devices (Page 61)".
- Display checklist KP8, KP8F, KP32F in the catalog and network with a controller

Step	Check
Displaying key panels in the hardware catalog (Page 58)	
Networking a key panel with a controller (Page 59)	

- Parameter assignment checklist for KP8 and KP8F

Test step	Information	Check
Assign parameters for slot 0	Overview (Page 63)	
Assign parameters for slot 1	Setting the properties of the digital inputs/outputs (Page 65)	
Assign parameters for slot 2 of the KP8F for fail-safe operation	KP8F – Set F-parameters (Page 67)	

- Parameter assignment checklist for KP32F

Test step	Information	Check
Assign parameters for slot 0	Setting the properties for PROFINET (Page 70)	
Assign parameters for slots 1 and 2	Setting the properties and addresses of the lights and buttons (Page 71)	
Assign parameters for slot 3	Setting the properties of the digital inputs (Page 73)	
Assign parameters for slot 4	Setting the properties of the digital inputs/outputs (Page 74)	
Assign parameters for slot 5 for fail-safe operation	KP32F – Set F-parameters (Page 75)	

## 4.2 Displaying key panels in the hardware catalog

### Requirement

- A TIA Portal project is open.
- You are in the project view under "Devices and networks".

### Integrating the GSD file in the hardware catalog

In the following cases you have to integrate the GSD file of the key panels into the hardware catalog:

- The key panel is not displayed in the hardware catalog.
- You want to configure "Shared device" for a KP8F or KP32F, but the settings for "Shared device" are not available for the HMI device.

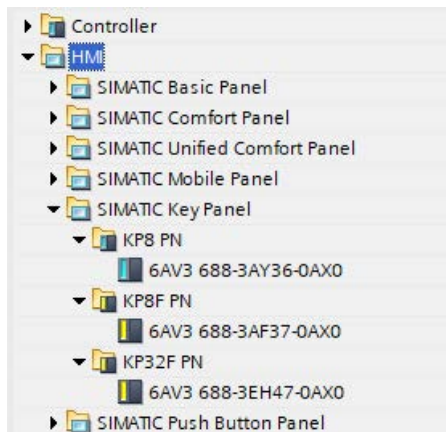
Proceed as follows to integrate the GSD file for key panels in the hardware catalog.

1. Download the GSD file for key panels. You can find the GSD for download in SIOS under: GSD file KP8, KP8F, KP32F (<https://support.industry.siemens.com/cs/de/en/view/50710644>)
2. Install the GSD file using the following description: Integrating a GSD file in TIA (<https://support.industry.siemens.com/cs/ww/en/view/109738401>)

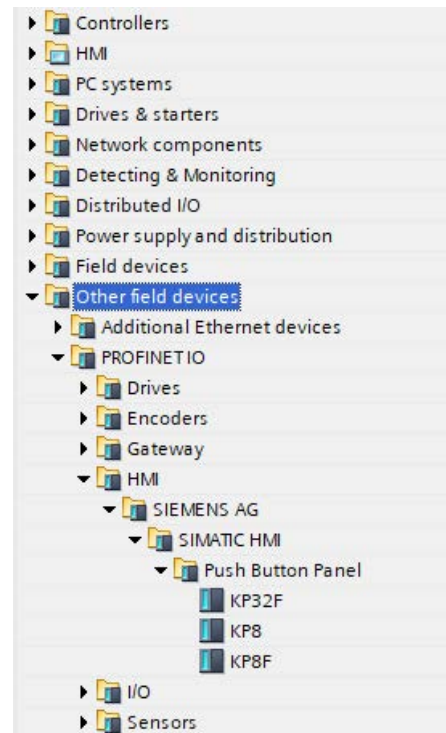
### Displaying HMI devices in the hardware catalog

Depending on whether you have used the GSD file or not, you will find the key panels in the following folder of the hardware catalog.

Catalog structure without GSD file:



Catalog structure with GSD file:



## 4.3 Networking a key panel with a controller

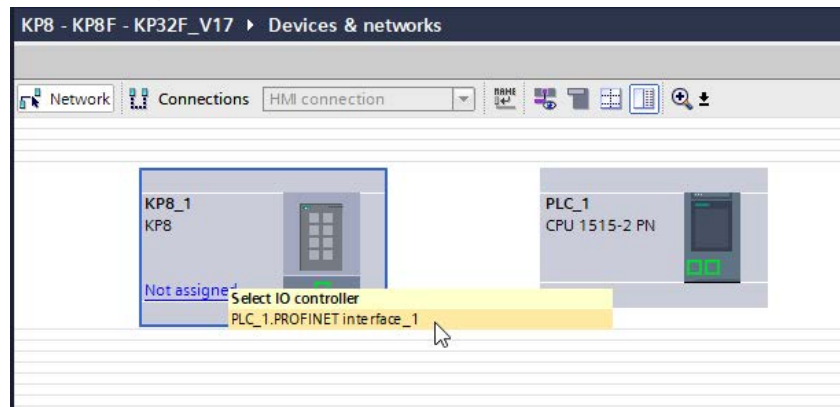
This section describes at the example of the KP8 and a CPU 1515-2 PN how to network the HMI device to a controller and how to set the corresponding IP addresses.

### Requirement

- A project is open in STEP 7 (TIA Portal).

### Networking a HMI device and controller

1. Open the "Devices & Networks" editor.
2. Place a key panel and a controller in the editor.
3. Ensure that "Network" mode is selected.
4. Select the key panel.

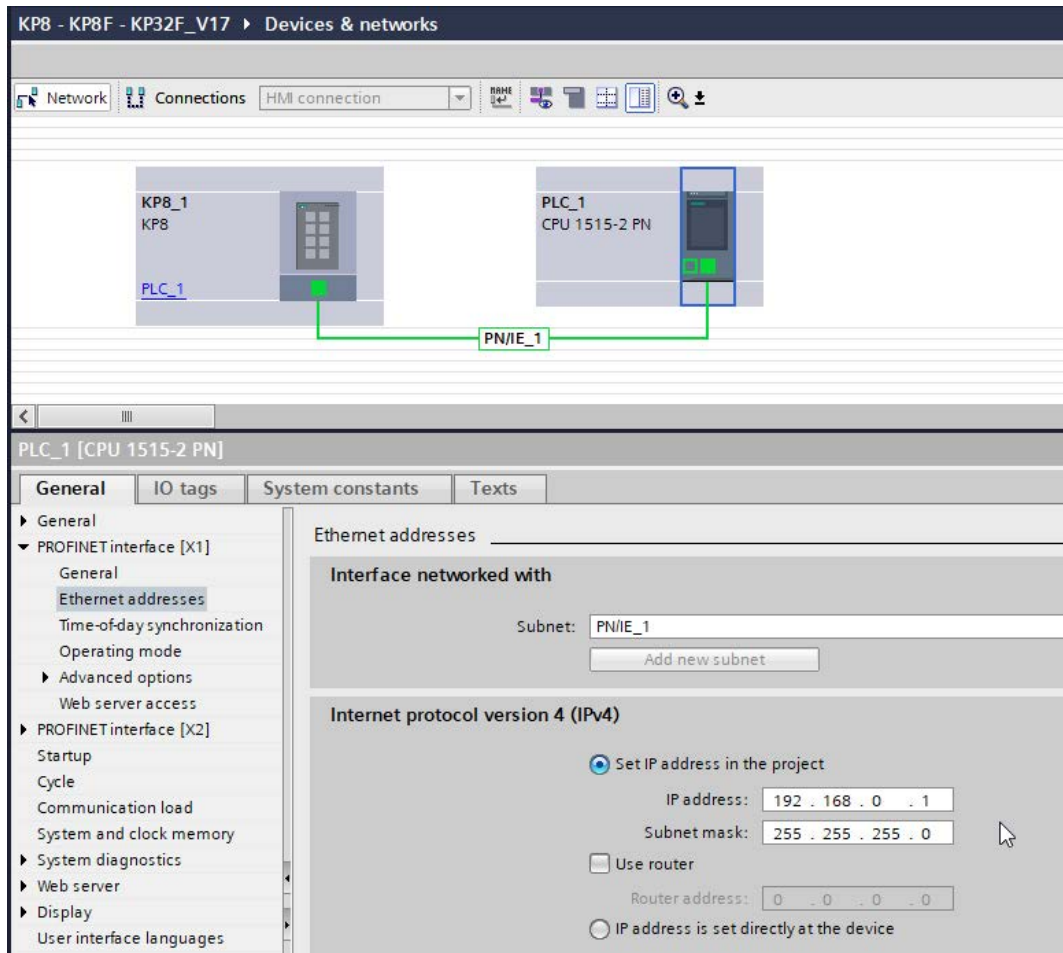


5. Click "Not assigned" to the left of the PROFINET interface.
6. Select a PROFINET interface of the controller.

### Check IP addresses

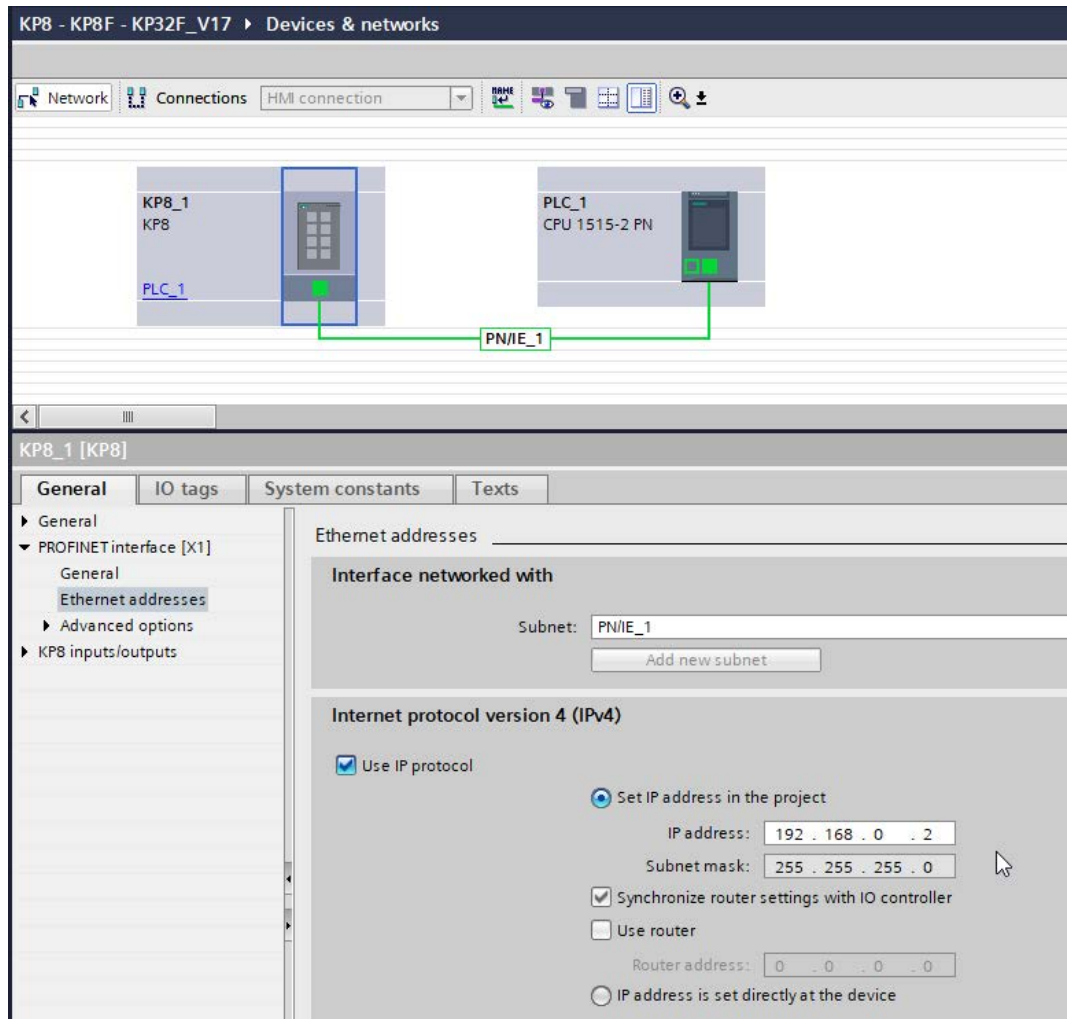
To ensure that the HMI device and controller can communicate with each other, check the IP addresses after the networking. Proceed as follows:

1. In the "Devices & networks" editor, click the controller icon.



2. Select the entry "Ethernet addresses" in the properties of the PROFINET interface that is connected to the key panel.
3. If required, change the entries for IP address and subnet mask.
4. Make a note of the settings.

- In the "Devices & networks" editor, click the Key Panel icon.



- In the properties of the PROFINET interface, select the entry "Ethernet addresses".
- Make sure that the IP address and subnet mask are set so that the HMI device is assigned to the IP subnet of the controller.
- Correct the settings if required.

## 4.4 Notes on the PROFIsafe devices

### Configuring the KP8F with a non-fail-safe controller

#### Note

KP8F can only be configured with a non-fail-safe controller if this controller supports shared device.

## System blocks for fail-safe operation

As soon as you insert a KP8F or a KP32F in the project and network it via a PROFINET IO connection to a fail-safe controller, an F-I/O DB for the KP8F/KP32F is generated for the fail-safe controller.

---

### Note

#### Address F-I/O DB (KP8F/KP32F) at least once

If the F-I/O DB (KP8F/KP32F) is not addressed in the safety program, the parameter "QBAD" remains at the value "true" and the fail-safe functions of the KP8F/32F cannot be used.

The "Main\_Safety\_RTGx [FB1]" block must contain at least one read or write access to one of the parameters of the F-I/O DB (KP8F/KP32F) (x = number of the F-runtime group).

---

#### Path and name of the F-I/O DB (KP8F/KP32F)

You will find the automatically generated F-I/O DB in the project tree via the following path under the fail-safe controller networked with the KP8F/KP32F:

"Program blocks > System blocks > STEP 7 Safety > F-I/O data blocks"

The name of the F-I/O DB is generated automatically using the start address of the KP8F/KP32F F-DI.

Syntax: **F0...0<Start address of the F-DI>\_1 [DB3000x]** (x = consecutive number)

Example: "F00004\_F-DI\_1 [DB30002]"

#### Parameters of the F-I/O DB (KP8F/KP32F)

- Inputs

Designation	Start value	Meaning
PASS_ON	false	1 = Activate passivation
ACK_NEC	true	1 = Acknowledgement for reintegration is required
ACK_REI	false	1 = Acknowledgement for reintegration
IPAR_EN	false	Tag for re-parameterization of fail-safe DP standard slaves/IO standard devices or for enabling HART communication.

- Outputs

Designation	Start value	Meaning
PASS_OUT	true	Passivation output
QBAD	true	1 = Substitute values are output
ACK_REQ	false	1 = Acknowledgement request for reintegration
IPAR_OK	false	Tag for re-parameterization of fail-safe DP standard slaves/IO standard devices or for enabling HART communication.
DIAG	16#0	Non-fail-safe service information

## 4.5 Assigning parameters for the KP8 and KP8F

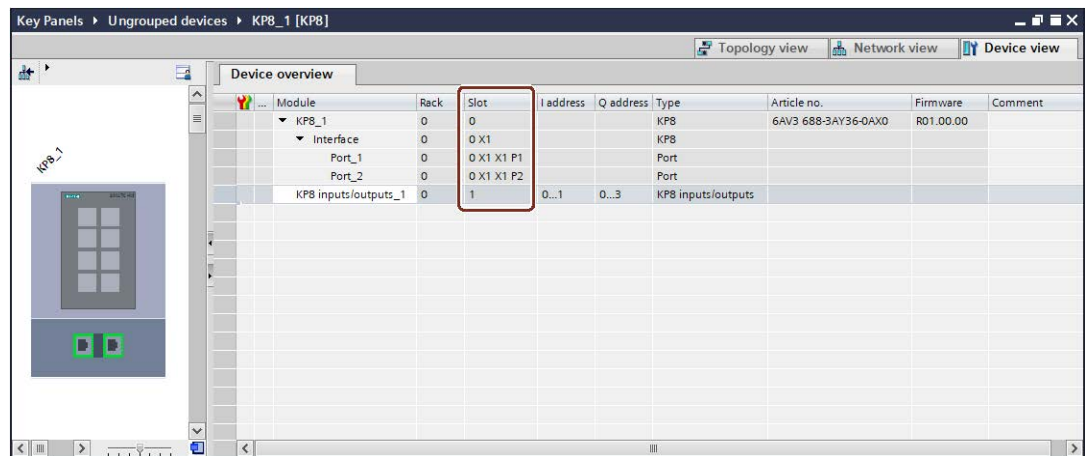
### 4.5.1 Overview

This section describes the parameter assignment of the KP8 and KP8F in STEP 7 (TIA Portal).

The following requirements apply to all sub-sections described in this section:

- A project in STEP 7 (TIA Portal) is open.
- A KP8/KP8F HMI device and a controller compatible with this HMI device are configured.
- HMI device and controller are connected in the "Devices & networks" editor via their PROFINET interfaces.

The following figure shows an example of a KP8; the slots to be parameterized are framed in red.



Parameters for following slots are entered in HW Config:

- Slot 0 – Device identification, interface X1
- Slot 1 - duration and brightness of the lamp test, type of terminals 0 to 7 (input/output) and I/O addresses
- Slot 2 (KP8F only) – fail-safe digital inputs

## 4.5.2 Setting the properties for PROFINET

The parameter assignment in this section is described using the example of the KP8 and applies equally to the KP8F.

### Procedure

1. To edit the properties in the Inspector window, double-click the HMI device icon in the device view or in the project tree.  
Alternatively: Select the HMI device in the project tree and select "Properties" in the shortcut menu of the HMI device. The properties window opens.
2. Select "PROFINET Interface [X1]" in the Properties.
3. If required, assign a different name for the PROFINET interface under "General".
4. Verify the connection parameters under "Ethernet addresses".  
If required, change the settings for the subnet and the IP address.  
The input/output device is addressed by the IO controller with the PROFINET device name. The device name must be unique within the subnet. The device name is connected with the IP address which is set for the HMI device.  
You can identify an IO device in the user program with its device number. STEP 7 assigns the device number.
5. Under "Advanced options" you have, for example, the following additional configuration options:
  - You can configure a ring topology under "Media redundancy".
  - You define the settings for the IO cycle under "Real time settings".
  - Under "Port [X1 P1] / Port [X1 P2] > Port interconnection", you specify which interface ports of the HMI device and controller are connected to each other.
6. If you have worked in the Inspector window, click again in another input field after the last entry to apply all changes.  
If you have worked in the properties window, then save the settings with "OK". The properties window is closed.

You can find detailed information in the "PROFINET with STEP 7 (<https://support.industry.siemens.com/cs/ww/en/view/49948856>)" function manual.



### 4.5.3 Key mapping KP8F

The following figure shows the assignment of the keys to the bits of the start address. The corresponding bit is set for as long as the key is pressed.



LEDs are integrated into each key; they can be used to represent bit states of the connected controller. The LEDs can be displayed in red, green, yellow, blue and white.

The brightness of the LEDs is adjustable, see section "Setting the properties of the digital inputs/outputs (Page 65)". The default setting is "normal".

You can use the process image to evaluate the signal states of the keys and control the colors of the LEDs, see section "KP8 and KP8F - Bit assignment in the process image (Page 111)".

### 4.5.4 Setting the properties of the digital inputs/outputs

#### Procedure

1. Double-click the HMI device icon in the device view or in the project tree.
2. Select slot 1 ("KP8 inputs/outputs\_1") in the device overview to edit the properties in the Inspector window.  
Alternatively: In the project tree below the KP8F, select the "Properties" entry in the shortcut menu of slot 1 ("KP8 inputs/outputs\_1"). The properties window opens.
3. If required, assign a different name for the inputs/outputs in the properties under "General".

- Under "Module parameters", you define the properties for the lamp test and the functions of the terminals.

Parameter	Meaning
Duration of the light test	The value range 0 to 60 seconds can be set. No lamp test is performed at the value "0". The default setting is 5 seconds.
Brightness	The following settings can be configured: very bright, bright, normal, dark or very dark. Default setting is "normal".
Function of the clamp 0	The following settings can be configured: Input or output, default setting is input
Function of the clamp 1	The following settings can be configured: Input or output, default setting is input
...	...
Function of the clamp 6	The following settings can be configured: Input or output, default setting is output
Function of the clamp 7	The following settings can be configured: Input or output, default setting is output

- Select "I/O addresses".

In the "Input addresses" and "Output addresses" groups, the start values of the address ranges are set depending on the controller used.

Parameter	Meaning
Input addresses > Start address	Start of the address range in which the user data of the HMI device are mapped.
Input addresses > Process image	Process image to which the address range belongs. This parameter cannot be set with controllers of the SIMATIC CPU 300 type.
Output addresses > Start address	Start of the address range in which the user data of the HMI device are mapped.
Output addresses > Process image	Process image to which the address range belongs. This parameter cannot be set with controllers of the SIMATIC CPU 300 type.

- Change the entries, if required.
- If you have worked in the Inspector window, click again in another input field after the last entry to apply all changes.  
If you have worked in the properties window, then save the settings with "OK". The properties window is closed.

## Result

The HMI device will now respond in operation according to the new setting. The switch states of the digital inputs/outputs of the HMI device are stored in the specified address area of the controller.

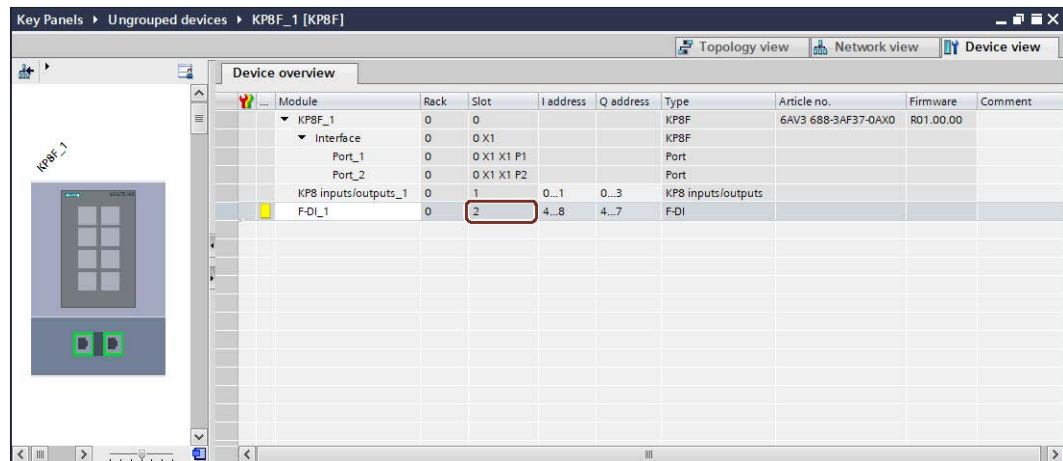
## See also

Key panel library for TIA Portal  
<https://support.industry.siemens.com/cs/ww/en/view/63482149>

### 4.5.5 KP8F – Set F-parameters

This section applies to the fail-safe slot 2 of the KP8F.

In the following image, the slot that requires parameter assignment is labeled in red.



#### Procedure

1. Double-click the symbol of the KP8F in the device view or in the project tree.
2. Select slot 2 ("F-DI\_1") in the device overview to edit the properties in the Inspector window.  
Alternatively: In the project tree below the KP8F, select the "Properties" entry in the shortcut menu of slot 2 ("F\_DI\_1"). The properties window opens.
3. If required, assign a different name for the slot in the properties under "General".
4. Select the desired evaluation of the encoders under "Module parameters":
  - No evaluation (default setting)
  - 1oo2 evaluation, EMERGENCY STOP
  - 1oo1 evaluation, 1-channel

The selection depends on the connected encoders, see section "Connecting KP8F - fail-safe inputs (Page 46)".

#### Note

Make sure that the sensor is monitored corresponding with its connection.

#### 4.5 Assigning parameters for the KP8 and KP8F

5. Enter the following parameters under "PROFIsafe":
  - "F\_Dest\_Add": A unique PROFIsafe destination address must match the setting of the DIP switch on the rear of the HMI device, see section "Setting the PROFIsafe address (Page 77)".
  - "F\_WD\_Time": Enter the monitoring time for the PROFIsafe driver. The default value is 500 ms. The value can be optimized depending on the number of devices to be monitored.
6. If you have worked in the Inspector window, click again in another input field after the last entry to apply all changes.  
If you have worked in the properties window, then save the settings with "OK". The properties window is closed.

### Result

The parameters for fail-safe operation are specified.

## 4.6 KP32F

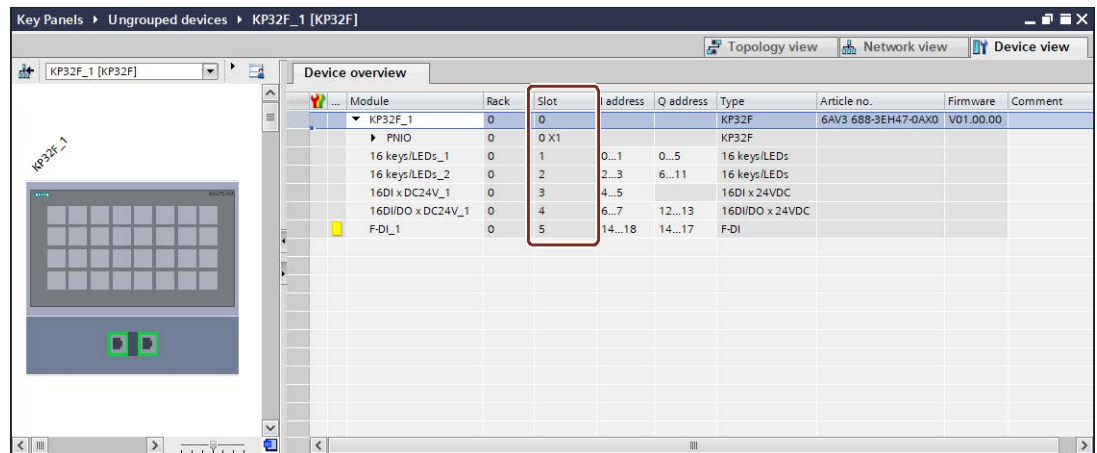
### 4.6.1 Overview

This section describes the parameterization of the KP32F in STEP 7 (TIA Portal).

The following requirements apply to all sub-sections described in this section:

- A project in STEP 7 (TIA Portal) is open.
- A KP32F HMI device and a controller compatible with KP32F are configured.
- HMI device and controller are connected in the "Devices & networks" editor via their PROFINET interfaces.

The following figure shows a KP32F; the slots to be parameterized are framed in red.



Parameters for following slots are entered in the HW Config for the KP32F:

- Slot 0 – Device identification, interface X1
- Slot 1 – Duration and brightness of the lamp test and address range of the keys and LEDs 0 to 15
- Slot 2 - address area of the keys and LEDs 16 to 31
- Slot 3 - digital inputs
- Slot 4 - digital inputs/outputs
- Slot 5 - fail-safe digital inputs

## 4.6.2 Setting the properties for PROFINET

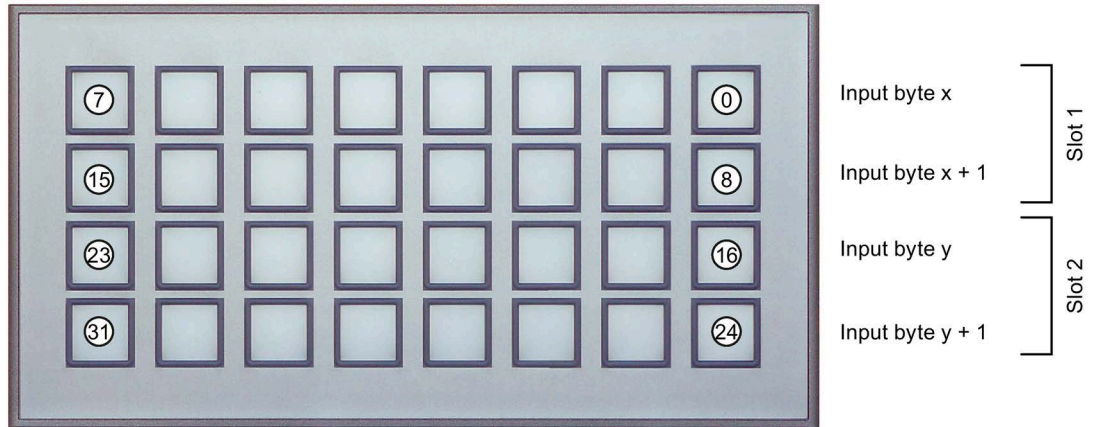
### Procedure

1. To edit the properties in the Inspector window, double-click the HMI device icon in the device view or in the project tree.  
Alternatively: Select the HMI device in the project tree and select "Properties" in the shortcut menu of the HMI device. The properties window opens.
2. Select "PROFINET Interface [X1]" in the Properties.
3. If required, assign a different name for the PROFINET interface under "General".
4. Verify the connection parameters under "Ethernet addresses".  
If required, change the settings for the subnet and the IP address.  
The input/output device is addressed by the IO controller with the PROFINET device name. The device name must be unique within the subnet. The device name is connected with the IP address which is set for the HMI device.  
You can identify an IO device in the user program with its device number. The device number is assigned automatically.
5. Under "Advanced options" you have, for example, the following additional configuration options:
  - You can configure a ring topology under "Media redundancy".
  - You define the settings for the IO cycle under "Real time settings".
  - Under "Port [X1 P1] / Port [X1 P2] > Port interconnection", you specify which interface ports of the HMI device and controller are connected to each other.
6. If you have worked in the Inspector window, click again in another input field after the last entry to apply all changes.  
If you have worked in the properties window, then save the settings with "OK". The properties window is closed.

You can find detailed information in the "PROFINET with STEP 7 (<https://support.industry.siemens.com/cs/ww/en/view/49948856>)" function manual.

### 4.6.3 Key mapping KP32F

The following figure shows the assignment of the keys to the bits of the start addresses. The corresponding bit is set for as long as the key is pressed.



x Input byte start address of slot 1

y Input byte start address of slot 2

LEDs are integrated into each key; they can be used to represent bit states of the connected controller. The LEDs can be displayed in red, green, yellow, blue and white.

The brightness of the LEDs is adjustable – see section "Setting the properties and addresses of the lights and buttons (Page 71)". The default setting is "normal".

You can use the process image to evaluate the signal states of the keys and control the colors of the LEDs, see section "KP32F - Bit assignment in the process image (Page 114)".

### 4.6.4 Setting the properties and addresses of the lights and buttons

This operation applies to slot 1 ("16 keys/LEDs\_1") and slot 2 ("16 keys/LEDs\_2"). The properties of the lamp test of all lamps can only be set in slot 1.

#### Procedure

1. Double-click the symbol of the KP32F in the device view or in the project tree.
2. Select slot 1 ("16 keys/LEDs\_1") or slot 2 ("16 keys/LEDs\_2") in the device overview to edit the properties in the Inspector window.

Alternatively: In the project tree below the KP32F, select the "Properties" entry in the shortcut menu of the respective slot. The properties window opens.

3. If required, assign a different name for the slot in the properties under "General".

4. Define the properties for the lamp test under "Module parameters".

Parameter	Meaning
Duration of the light test	The value range from 0 to 60 s can be set. With the value "0", no light test is executed. Default setting is 5 s.
Brightness	The following settings can be configured: very bright, bright, normal, dark or very dark. Default setting is "normal".

5. Select "I/O addresses".

In the "Input addresses" and "Output addresses" groups, the start values of the address ranges are set depending on the controller used.

Parameter	Meaning
Input addresses > Start address	Start of the address range in which the user data of the HMI device are mapped.
Input addresses > Process image	Process image to which the address range belongs. This parameter cannot be set with controllers of the SIMATIC CPU 300 type.
Output addresses > Start address	Start of the address range in which the user data of the HMI device are mapped.
Output addresses > Process image	Process image to which the address range belongs. This parameter cannot be set with controllers of the SIMATIC CPU 300 type.

6. Change the entries, if required.
7. If you have worked in the Inspector window, click again in another input field after the last entry to apply all changes.  
If you have worked in the properties window, then save the settings with "OK". The properties window is closed.

## Result

The switch states of the digital inputs/outputs of the HMI device are stored in the specified address area of the controller.

## See also

Key panel library for TIA Portal  
(<https://support.industry.siemens.com/cs/ww/en/view/63482149>)



## 4.6.5 Setting the properties of the digital inputs

### Procedure

1. Double-click the symbol of the KP32F in the device view or in the project tree.
2. Select slot 3 ("16 DI DC24V\_1") in the device overview to edit the properties in the Inspector window.

Alternatively: In the project tree below the KP32F, select the "Properties" entry in the shortcut menu of slot 3 ("16 DI DC24V\_1"). The properties window opens.

3. If required, assign a different name for the slot in the properties under "General".
4. Select "I/O addresses".

In the "Input addresses" group, the start value of the address range is set depending on the controller used.

Parameter	Meaning
Input addresses > Start address	Start of the address range in which the user data of the HMI device are mapped.
Input addresses > Process image	Process image to which the address range belongs. This parameter cannot be set with controllers of the SIMATIC CPU 300 type.

5. Change the entries, if required.
6. If you have worked in the Inspector window, click again in another input field after the last entry to apply all changes.  
If you have worked in the properties window, then save the settings with "OK". The properties window is closed.

### Result

The switch states of the digital inputs of the HMI device are stored in the specified address ranges of the controller.

## 4.6.6 Setting the properties of the digital inputs/outputs

### Procedure

1. Double-click the symbol of the KP32F in the device view or in the project tree.
2. Select slot 4 ("16 DI/DO DC24V\_1") in the device overview to edit the properties in the Inspector window.  
 Alternatively: In the project tree below the KP32F, select the "Properties" entry in the shortcut menu of slot 4 ("16 DI DC24V\_1"). The properties window opens.
3. If required, assign a different name to the slot under "General".
4. Under "Module parameters", you define the functions of the terminals.

Parameter	Meaning
Terminal 16 function (IO.16)	The following settings can be configured: Input or output, default setting is input
...	The following settings can be configured: Input or output, default setting is input
Terminal 31 function (IO.31)	The following settings can be configured: Input or output, default setting is input

5. Select "I/O addresses".  
 In the "Input addresses" and "Output addresses" groups, the start values of the address ranges are set depending on the controller used.

Parameter	Meaning
Input addresses > Start address	Start of the address range in which the user data of the HMI device are mapped.
Input addresses > Process image	Process image to which the address range belongs. This parameter cannot be set with controllers of the SIMATIC CPU 300 type.
Output addresses > Start address	Start of the address range in which the user data of the HMI device are mapped.
Output addresses > Process image	Process image to which the address range belongs. This parameter cannot be set with controllers of the SIMATIC CPU 300 type.

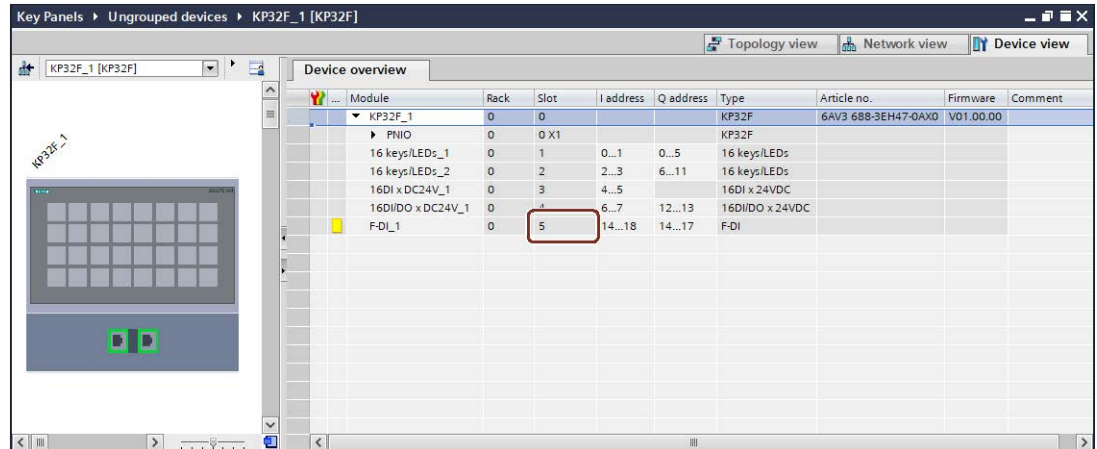
6. Change the entries, if required.
7. If you have worked in the Inspector window, click again in another input field after the last entry to apply all changes.  
 If you have worked in the properties window, then save the settings with "OK". The properties window is closed.

### Result

The switch states of the digital inputs/outputs of the HMI device are stored in the specified address area of the controller.

### 4.6.7 KP32F – Set F-parameters

This section applies to the fail-safe slot 5 "F-DI\_1".



To use a KP32F in non-fail-safe mode, you can delete slot 5 in the device overview or in the project tree.

### Procedure

1. Double-click the symbol of the KP32F in the device view or in the project tree.
2. Select slot 5 ("F-DI\_1") in the device overview to edit the properties in the Inspector window.  
Alternatively: In the project tree below the KP32F, select the "Properties" entry in the shortcut menu of slot 5 ("F-DI\_1"). The properties window opens.
3. If required, assign a different name to the slot under "General".
4. Select the desired evaluation of the encoders under "Module parameters":

- [101 h] FI.0,FI.1 deactivated | FI.2,FI.3 deactivated
- [8484 h] FI.0,FI.1 1oo1 | FI.2,FI.3 deactivated
- [D3D3h] FI.0,FI.1 1oo2 | FI.2,FI.3 deactivated
- [5454h] FI.0,FI.1 1oo2 | FI.2,FI.3 1oo2
- [4A4Ah] FI.0,FI.1 1oo2 | FI.2,FI.3 1oo1
- [9898h] FI.0,FI.1 1oo1 | FI.2,FI.3 1oo1

The selection depends on the connected encoders, see section "Connecting KP32F - fail-safe inputs (Page 49)".

### Note

Make sure that the sensor is monitored corresponding with its connection.

5. Enter the following parameters under "PROFIsafe":
  - "F\_Dest\_Add": A unique PROFIsafe destination address must match the setting of the DIP switch on the rear of the HMI device, see section "Setting the PROFIsafe address (Page 77)".

4.6 KP32F

- "F\_WD\_Time": Enter the monitoring time for the PROFIsafe driver. The default value is 500 ms. The value can be optimized depending on the number of devices to be monitored.
- "F\_iPar\_CRC": Enter the hexadecimal or decimal value that corresponds to the evaluation of the encoder specified under "Module parameters".

**Note**

**KP32F with and without GSD file**

If you use the KP32F from the "HMI" catalog structure (without GSD file), the value must be specified in decimal format.

If you use the KP32F from the catalog structure "Other field devices" (with GSD file), the value must be specified in hexadecimal format.

Evaluation of the encoders	Associated value, hexadecimal	Associated value, decimal
[101 h] FI.0,FI.1 deactivated   FI.2,FI.3 deactivated	101	257
[8484 h] FI.0,FI.1 1oo1   FI.2,FI.3 deactivated	8484	33924
[D3D3h] FI.0,FI.1 1oo2   FI.2,FI.3 deactivated	D3D3	54227
[5454h] FI.0,FI.1 1oo2   FI.2,FI.3 1oo2	5454	21588
[4A4Ah] FI.0,FI.1 1oo2   FI.2,FI.3 1oo1	4A4A	19018
[9898h] FI.0,FI.1 1oo1   FI.2,FI.3 1oo1	9898	39064

**Note**

**Changing the encoder evaluation requires changing "F\_iPar\_CRC"**

If you change the entry for the encoder evaluation, you must also adapt the value of the "F\_iPar\_CRC" parameter.

6. Only applies to a KP32F that was inserted via a GSD file: Select "I/O addresses".  
In the "Input addresses" group, the start value of the address range is set depending on the controller used.

Parameter	Meaning
Input addresses > Start address	Start of the address range in which the user data of the HMI device are mapped.
Input addresses > Process image	Process image to which the address range belongs. This parameter cannot be set with controllers of the SIMATIC CPU 300 type.

7. If you have worked in the Inspector window, click again in another input field after the last entry to apply all changes.  
If you have worked in the properties window, then save the settings with "OK". The properties window is closed.

**Result**

The parameters for fail-safe operation are specified.

## 4.7 KP8F/KP32F - Configure Shared Device

You can configure the "Shared Device" function for a KP8F or a KP32F in connection with two controllers. Via "Shared Device" you assign the standard inputs/outputs of one controller and the fail-safe inputs of the other controller to the HMI device.

Two independent TIA projects are required to configure "Shared Device".

You can find the description of how to assign "Shared Device" parameters at:

- In the TIA information system via a search for "Configure shared devices"
- In the PROFINET function manual (<https://support.industry.siemens.com/cs/ww/en/view/49948856>)  
Search for "shared device" in the function manual.

## 4.8 Setting the PROFIsafe address

A PROFIsafe destination address is assigned when you add a fail-safe HMI device to the STEP 7 project. The PROFIsafe destination address is the value of the "F\_Dest\_Add" parameter – KP8F see section "KP8F – Set F-parameters (Page 67)" and KP32F see section "KP32F – Set F-parameters (Page 75)".

Then you must set the same PROFIsafe destination address using the DIP switch on the rear of the HMI device.

---

### Note

Ensure that the HMI device is disconnected from the power before setting the PROFIsafe destination address with the DIP switches.

---

### Requirement

- The DIP switch of the HMI device is accessible.
- A suitable tool is available for setting the DIP switch.
- The value of the "F\_Dest\_Add" parameter is known.

---

### Note

The PROFIsafe destination address of the HMI device must be unique throughout the communication network and station. You can assign a maximum of 1022 PROFIsafe destination addresses in a single system.

If you change the STEP 7 program in a way that changes the PROFIsafe destination address, you need to change the switch settings on the HMI device's DIP switch accordingly.

---

**Procedure**

**NOTICE**

**Only operate DIP switches with suitable tools**

The DIP switch is sensitive to electrostatic discharge according to IEC 61000-4-2 and is marked with a corresponding warning symbol.

Do **not** touch the DIP switch with your hands and **not** with conductive materials such as a metallic screwdriver.

Use a suitable plastic tool, e.g. the DIPSTICK from Grayhill.

Set the PROFIsafe address in binary format via the DIP switch, orientation from bottom to top.

**Example**

Set the binary address for "383" as the PROFIsafe destination address in the STEP 7 project:

Corresponding setting on the DIP switch: 0101111111

- 1 = switch setting "ON"
- 0 = switch setting "OFF".

Set the DIP switch on the back of the KP8F or the KP32F as follows:

OFF	ON	Switch	Bit number	Weighting	Address
<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	0	1	1
<input type="checkbox"/>	<input checked="" type="checkbox"/>	2	1	2	2
<input type="checkbox"/>	<input checked="" type="checkbox"/>	3	2	4	4
<input type="checkbox"/>	<input checked="" type="checkbox"/>	4	3	8	8
<input type="checkbox"/>	<input checked="" type="checkbox"/>	5	4	16	16
<input type="checkbox"/>	<input checked="" type="checkbox"/>	6	5	32	32
<input type="checkbox"/>	<input checked="" type="checkbox"/>	7	6	64	64
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8	7	128	0
<input type="checkbox"/>	<input checked="" type="checkbox"/>	9	8	256	256
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10	9	512	0

383

The illustrated switch settings correspond with the binary address 383.

**Result**

The HMI device can be uniquely identified by the configured PROFIsafe destination address.

## 4.9 Assigning parameters for Media Redundancy Protocol and Isochronous Real-Time

KP8, KP8F and KP32F are designed for MRP and IRT.

See the STEP 7 Help for a description of how to configure MRT and IRT in STEP 7 (TIA Portal). You will find detailed information in the following manual:

"PROFINET with STEP 7" function manual

(<https://support.industry.siemens.com/cs/ww/en/view/49948856>)

## 4.10 Update firmware

This section describes how to update the firmware of the HMI device or the fail-safe firmware of a PROFIsafe device.

Firmware files can be found on the Internet at the following address:

Downloads for key panels (<https://support.industry.siemens.com/cs/ww/en/ps/14732/dl>)

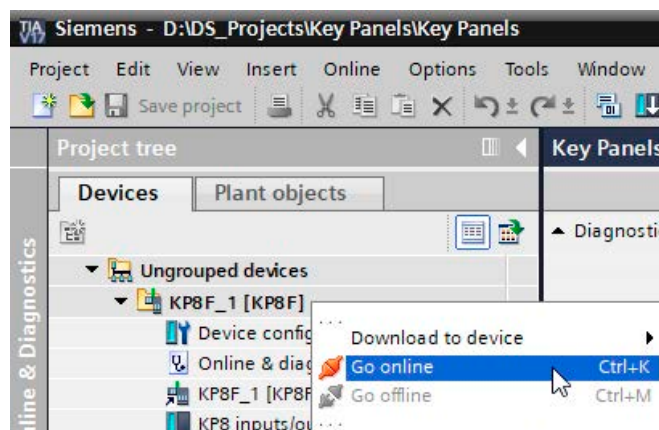
### Requirement

- A project with a HMI device is open in STEP 7 (TIA Portal).
- A new firmware file has been downloaded.

### Procedure

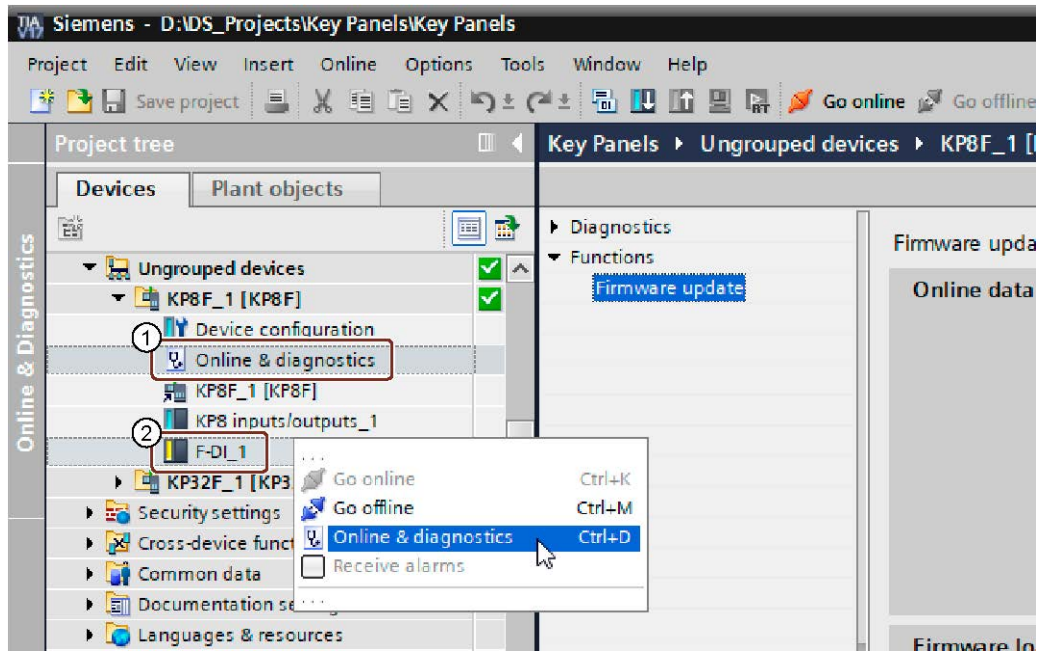
The following description shows the procedure using the example of the KP8F and applies in the same way to the KP8 and KP32F HMI devices.

1. Select the HMI device in the project tree and select the "Go online" entry in the shortcut menu of the HMI device.



4.10 Update firmware

2. Select one of the following entries in the project tree below the HMI device:



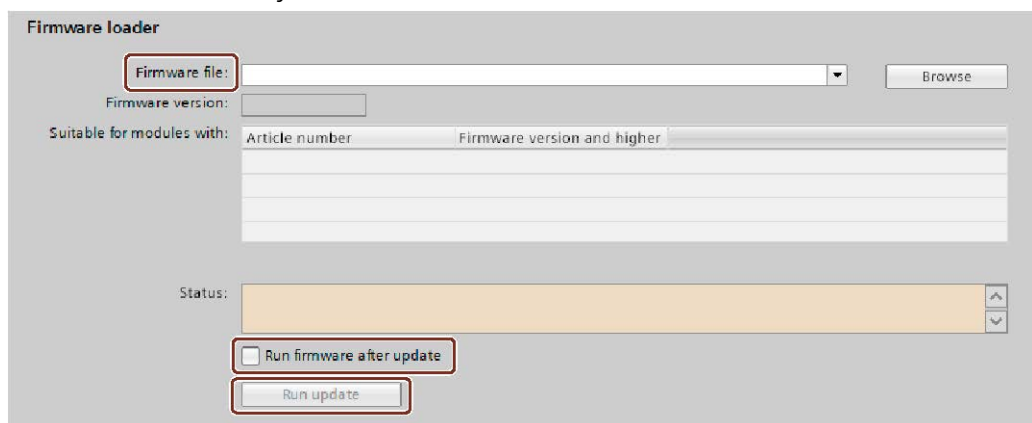
- ① "Online & diagnosis" below the HMI device to update the firmware of the HMI device.
- ② "Online & diagnosis" in the shortcut menu of the F-DI to update the fail-safe firmware of a PROFIsafe device.

3. Click "Functions > Firmware update" in the Inspector window.

4. In the Inspector window, enter the path and name of a firmware file for the HMI device under "Firmware file".

The version of the firmware currently on the HMI device is displayed under "Firmware version".

The list "Suitable for modules with" shows whether the firmware is compatible with the device and the currently installed firmware.



5. Select the "Run firmware after update" option and then the "Run update" button.



# Fail-safe operation of KP8F and KP32F

## 5.1 Overview

### Fail-safe mode

In fail-safe mode, the HMI device recognizes signal states from suitable fail-safe sensors and sends corresponding safety frames to the fail-safe controller in which the safety program runs. The fail-safe controller and the HMI device communicate with each other using the fail-safe protocol "PROFIsafe".

### Safety functions

During fail-safe mode, safety functions are activated in both HMI and the fail-safe controller which recognize faults and react to them.

In the following cases, the fitting system unit must be run in a secure operating state:

- The EMERGENCY STOP button was pressed.
- An sensor was actuated.
- A diagnosable error has occurred.

### Reaction to pressed EMERGENCY STOP button or activated sensor

When the EMERGENCY-STOP button was pressed or a sensor was activated, the related bit is sent to the controller in a safety-related manner. The controller program analyzes whether the EMERGENCY STOP button was pressed, or the sensor was activated.

---

#### Note

Which reactions this bit activates in the controller and thus, in the system, is the task of the user. Tasks include:

- Configuring required responses appropriate for the EMERGENCY STOP in the controller
- Initiating measures to repair the cause of an EMERGENCY STOP
- Configuring the startup behavior after an EMERGENCY STOP

The response to an EMERGENCY STOP or activation of the sensor, measures and startup behavior must be described in the system documentation.

---

## Responses to faults in the system

In the case of a failure, the F channels of the HMI device are passivated. This means "0" will be recognized at all fail-safe digital inputs.

The system must be configured so that the required safe operating mode can occur. Which measures must be implemented for failure analysis and repairs must be provided by the user.

---

### Note

The HMI device may first be integrated into the control process after the causes for the failure have been repaired.

---

After integration, the process values for the digital fail-safe inputs are available again.

## 5.2 Passivate HMI device

As soon as the HMI device recognizes a fault in fail-safe mode, all fail-safe channels are switched to the safe operating state. Through this, the fail-safe channels of this HMI device are passivated.

---

### Note

If the HMI device is passivated, instead of the queued process values, the fail-safe value "0" is always assigned to all the fail-safe digital inputs. You cannot assign parameters for the fail-safe value.

---

Detected faults are entered in the diagnostic buffer of the fail-safe controller and reported to the safety program in the fail-safe controller.

The HMI device cannot permanently save the fault. When you switch off the HMI device and switch it on again, only one of the existing faults will continue to be detected after startup. If you want to save the faults, program your safety program accordingly.

The HMI device is passivated in the following situations:

- After turning on the HMI device
- With a setting error  
Errors in the PROFIsafe parameters, for example "F\_WD\_TIME" (F\_monitoring time) too short.
- When an error occurs in the PROFIsafe communication between the fail-safe controller and HMI device
- With a hardware error  
Error, for example, through wire break, short-circuit, discrepancy errors, internal errors of the HMI device.

## Determining passivation

If you want to determine if the HMI device is passive or not, address the "PASS\_OUT" variable of the F-I/O. The variable can be assigned the following values:

- 0 = HMI device not passive
- 1 = HMI device passive

## Reintegration of KP8F and KP32F

After passivation of the HMI device, the fault must be diagnosed and rectified. Afterwards, the HMI device can be reintegrated.

# 5.3 Repair error and reintegrate

## Remedy

The error correction of the HMI device should be undertaken depending on the type of error recognized:

Error	Possible causes of error	Remedy
Short-circuit	Short-circuit in the sensor	Eliminate the short-circuit.
	Cross-circuit in the sensor	Eliminate the cross-circuit.
	Internal error	Replace the HMI device.
Serious error	Internal error in the HMI device	Replace the HMI device.
Discrepancy error (1oo2 evaluation)	The process signal is faulty. The sensor is defective.	Check the process signal. Replace the sensor if needed.
	Short-circuit between the sensor line and the sensor voltage supply line.	Eliminate the short-circuit.
	The sensor is tilted so that different signals (equivalent 2-channel sensor) or identical signals (nonequivalent sensor) are read in on the channel pair.	Actuate or release the sensor so that it is no longer tilted.
Configuration error	The HMI device does not match the configuration.	Correct the configuration. Check the communication paths.
	Configuration incorrect	Correct the configuration.
PROFIsafe address deviation	The PROFIsafe address on the HMI device is set incorrectly.	Set the same PROFIsafe address in the configuration and on the device. This address must be unique.

Error	Possible causes of error	Remedy
Communication error	The communication between the fail-safe controller and HMI device is interrupted. For example, due to a defective PROFINET connection or electromagnetic interference.	Check the PROFINET cable.
	The PROFIsafe monitoring time set too low.	Increase the value of the "F_WD_Time" parameter in the configuration.
	The configuration of the HMI device does not match the safety program.	Compile the safety program again. Then download the configuration and the safety program to the fail-safe controller.
Non-permissible sensor evaluation	An invalid value was transferred for the setting "Evaluation of the sensor".	Check the setting. Check the version of your GSDML-file. Load a new GSDML file.
Version conflict	The HMI device recognized an invalid combination of firmware.	Update the device firmware completely and bring it to the current state.

## End passivation

When you have eliminated an error that lead to a passivation of the HMI device, you have to reintegrate the HMI device. A user acknowledgement in the safety program may be required for the reintegration of the HMI device. After reintegration, the pending process values at the HMI device's fail-safe channels are provided again for the safety program.

More information about the reintegration of F-I/O and for creating a user acknowledgement in the safety program can be found in the following manual:

"SIMATIC Safety - Configuring and Programming" programming and operating manual (<https://support.industry.siemens.com/cs/ww/en/view/54110126>)

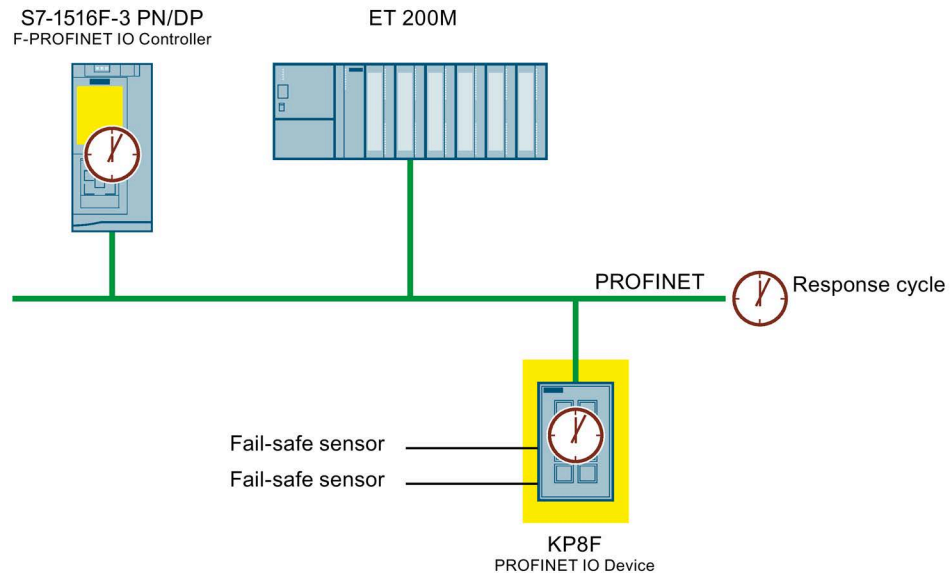
## 5.4 Response times of the PROFIsafe devices

### Influencing the response time

The response time of the HMI device enters into the calculation of the response time of the F-system.

- Response time of the fail-safe channel  
The response time is the time that is required between a signal change on the digital input and the safe loading of the safety frame to PROFINET.
- Response time of the HMI device  
The actual response time is somewhere between the shortest and longest response time. When planning a system, the longest response time must always be anticipated. Information about the response time can be found in the section "Technical specifications (Page 104)".

The following image shows where response times can be expected.



## Calculating response time

Information about the response times of the IO controller can be found in the manual of the IO controller used.

The "STEP 7 Safety (TIA Portal)" add-on package provides you with an Excel file for calculating the maximum response time in each case. You can find the current version of this table on the Internet at the following address:

- For controllers of the type S7-300F and S7-400F: "s7cotia.xls" (<https://support.industry.siemens.com/cs/ww/en/view/19138505>) table
- For controllers of the type S7-1200F and S7-1500F: "s7safety\_rttplus.xlsx" (<https://support.industry.siemens.com/cs/de/en/view/93839056>) table

Detailed information on the calculation of the response time of the F-system can be found in the following manual:

"SIMATIC Safety - Configuring and Programming" programming and operating manual (<https://support.industry.siemens.com/cs/ww/en/view/54110126>)

## Discrepancy time

The discrepancy time between the contacts of the fail-safe digital inputs of the KP8F and KP32F is 2000 ms until the error bit is triggered. The discrepancy time is permanently set and cannot be changed.

## See also

"Safety Technology in SIMATIC S7" system manual (<https://support.industry.siemens.com/cs/ww/en/view/12490443>)

## 5.5 Diagnostics

### 5.5.1 Overview

#### Diagnostic functions

Diagnostic functions, in other words displays and messages, are not critical to safety and therefore are not designed to be safety-related functions. They are therefore not tested internally.

#### Diagnostic function the HMI device

The fail-safe HMI device includes a non-configurable diagnostic function. The diagnostics are always activated and are automatically made available by the HMI device in STEP 7 and passed on to the controller in the event of a fault.

The diagnostics function passes the following diagnostics information to the controller:

- Communication error  
The communication between the HMI device as the IO-device and the controller as the IO-controller is disrupted.
- Configuration error  
Error in the PROFIsafe configuration

#### Behavior of the HMI device in the event of a serious error

If a serious error in the HMI device leads to its failure, the HMI device reacts as follows:

- The connection to PROFINET will be interrupted and the fail-safe channels will be rendered passive.
- No diagnosis will be transmitted from the HMI device.  
In STEP 7 in module diagnostics, the standard diagnosis "Module interrupted" or "Module missing" will be reported.

## 5.5.2 Opening module diagnostics

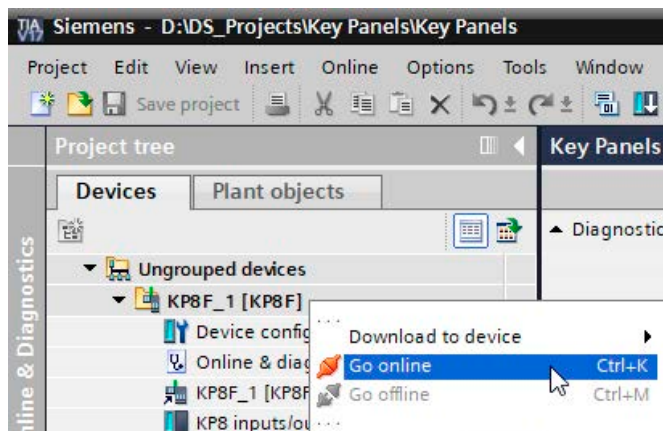
### Requirement

- A project with a fail-safe HMI device is open in STEP 7 (TIA Portal).

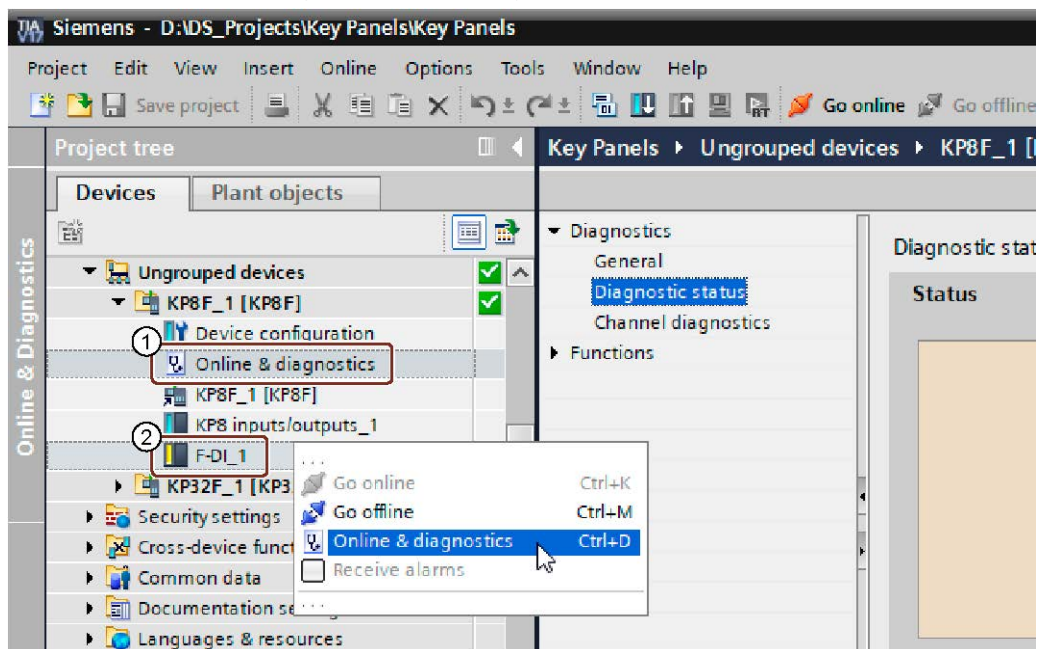
### Procedure

To display the diagnostic status of a fail-safe digital input, follow these steps.

1. Select the fail-safe HMI device in the project tree and select the "Go online" entry in the shortcut menu of the HMI device.



2. Select one of the following entries in the project tree below the HMI device:



- ① "Online & diagnosis" below the HMI device to display general diagnostic information for the HMI device.
- ② "Online & diagnosis" in the shortcut menu of the F-DI to display diagnostic information for fail-safe operation.

3. Select "Diagnostics > Diagnostic status" in the Inspector window.

### Diagnostics of PROFIsafe errors

When diagnosing PROFIsafe errors, read the diagnostic information of the F-DI or access the "DIAG" tag of the F-I/O DB. Additional information is available in the "SIMATIC Safety - Configuring and Programming" programming and operating manual (<https://support.industry.siemens.com/cs/ww/en/view/54110126>).



# HMI device maintenance and repair

## 6.1 General information on maintenance and servicing

Observe the following when servicing and repairing protective equipment e.g. such as ground circuits or overvoltage protection components:

- Observe the maintenance and replacement intervals.
- Replace system components, including external cables, fuses and batteries only with equivalent components approved by the respective manufacturer.

## 6.2 Cleaning the device front

The HMI device is designed for maintenance-free operation. But you should still clean the front regularly.

### Requirement

- Damp cleaning cloth
- Dishwashing liquid or foaming screen cleaning agent

### Procedure

---

#### Note

##### Unintentional response

When you clean the HMI device while it is switched on, you could trigger an inadvertent operation.

Switch off the HMI device before you clean it.

##### Damage caused by prohibited cleaning agents

Using compressed air or steam cleaners, or aggressive solutions or scouring agents will damage the HMI device.

Do not clean the HMI device with compressed air or steam cleaners. Do not use aggressive solvents or scouring agents.

---

Proceed as follows:

1. Switch off the HMI device.
2. Spray cleaning agents on the cleaning cloth.  
Do not spray them directly on the HMI device.
3. Clean the HMI device front.

## 6.3 Spare parts and repairs

### Repairs

Contact your Siemens representative (<https://www.siemens.com/aspa>). You can filter according to competence, product and region.

Your contact person can tell you whether a product can be repaired and which modalities apply for returning it.

Also contact your representative before returning your product if you need prioritized handling for repair of the product, a cost estimate, a repair report or fact-finding report.

Your contact person can also give you information about possible spare part procurement.

### Spare parts

Spare parts and accessories for the HMI device can be found in section "Accessories (Page 18)".

## 6.4 Recycling and disposal

Due to the low levels of pollutants in the HMI devices described in these operating instructions, they can be recycled.

For environmentally friendly recycling and disposal of your old equipment, contact a certified electronic waste disposal company and dispose of the equipment according to the applicable regulations in your country.

# Technical specifications

## 7.1 Labels, certificates and approvals

### Approvals

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#### Note

The following overview shows possible approvals.

The HMI device itself is approved as shown on the rear panel labels.

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### CE approval



The devices meet the general and safety-related requirements of the following EU Directives and conform with the harmonized European standards (EN) published in the official gazettes of the European Union and confirmed in the EU declarations of conformity:

- 2014/30/EU "Electromagnetic Compatibility" (EMC Directive)
- 2014/34/EU "Equipment and protective systems for use in hazardous areas" (Explosion protection directive)
- 2011/65/EU "Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment" (RoHS Directive)

#### EU Declaration of Conformity

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

Siemens AG  
 Digital Industries  
 Factory Automation  
 DI FA TI COS  
 Postfach 1963  
 D-92209 Amberg

The Declaration of Conformity and other certificates are also available at the following Internet address: Key Panels certificates

(<https://support.industry.siemens.com/cs/ww/en/ps/14732/cert>)

### UKCA marking



The devices fulfill the requirements and protection goals of the following regulations and associated supplements and comply with the designated British standards (BS) published in the official consolidated list of the British Government.

- Electromagnetic Compatibility Regulations 2016 (EMC)
- Regulations on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2012 (RoHS)

If the device has Ex approval, the following also applies:

- Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016 (Explosion Protection)

### UK Declarations of Conformity

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

Siemens AG  
Digital Industries  
Factory Automation  
DI FA TI COS  
Postfach 1963  
D-92209 Amberg

You can also find these for download on the Internet at the following address, keyword "Declaration of Conformity": Key Panels certificates  
(<https://support.industry.siemens.com/cs/ww/en/ps/14732/cert>)

### UL approval

Observe the following information:

- The device shall be supplied from an isolating source, rated 24 VDC.
- Only for use in LAN, not for connection to telecommunication circuits.



Underwriters Laboratories Inc. (E116536) according to

- UL61010-1 and UL61010-2-201
- CAN/CSA C22.2 No. 61010-1 and 61010-2-201

or



Underwriters Laboratories Inc. (E222109) according to

- UL61010-1 and UL61010-2-201
- CAN/CSA C22.2 No. 61010-1 and 61010-2-201
- ANSI/ISA 12.12.01
- CAN/CSA C22.2 No. 213 (Hazardous Location)

Approved for use in

- Class I, Division 2, Group A, B, C, D T4 or
- Class I, Zone 2, Group IIC T4 or
- non-hazardous locations

## FM Approval



Factory Mutual Research (FM) conforming to

- Approval Standard Class Number 3611, 3600, 3810
- ANSI/ISA 61010-1
- ANSI/UL 121201
- ANSI/NEMA 250
- CAN/CSA C22.2 No. 0-10
- CAN/CSA-C22.2 No. 94
- CAN/CSA C22.2 No. 213
- CAN/CSA C22.2 No. 61010-1

Approved for use in

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

### Installation Instructions for cFMus:

WARNING – Do not remove or replace while circuit is live when a flammable or combustible atmosphere is present.

WARNING – Substitution of components may impair suitability of the equipment.

CAUTION – To prevent injury, read the manual before use.

WARNING – The equipment is intended to be installed within an enclosure/control cabinet. The inner service temperature of the enclosure/control cabinet corresponds to the ambient temperature of the module. Use cables with a maximum permitted operating temperature of at least 20 °C higher than the maximum ambient temperature.

## ATEX/UKEX/IECEX approval

### Notes on use in hazardous areas

Observe the following FAQ regarding the use of an HMI device in hazardous areas: ATEX-FAQ (<https://support.industry.siemens.com/cs/ww/en/view/291285>)


You can find more information about explosion protection, EC/EU declarations of conformity and other certificates on the Internet at the following address: Key Panels certificates (<https://support.industry.siemens.com/cs/ww/en/ps/14732/cert>)

**ATEX/UKEX approval**

For an HMI device with "Ex" marking, the following approvals apply according to the following standards.

- Standards:
  - EN IEC 60079-0
  - EN IEC 60079-7
  - EN 60079-31

- Approvals:


	II 3 G	Ex ec IIC T4 Gc
	II 3 D	Ex tc IIIC T 70 °C Dc

**IECEx approval**

For an HMI device with "IECEx" marking, the following approvals apply according to the following standards.

- Standards:
  - IEC 60079-0
  - IEC 60079-7
  - IEC 60079-31

- Approvals:

	Ex ec IIC T4 Gc
	Ex tc IIIC T 70°C Dc

**CCCEX approval**



The following approvals according to the following standards are valid for a device with the "CCC" marking.

- Standards:
  - GB/T 3836.1 (Explosive atmospheres - Part 1: Equipment - General requirements)
  - GB/T 3836.3 (Explosive atmospheres - Part 3: Device protection through type of protection "e")
  - GB/T 3836.31 (Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t")
- Approvals:
  - Ex ec IIC T4 Gc
  - Ex tc IIIC T70°C Dc

**Special conditions of use**

- The front of the HMI device provides a degree of protection of at least IP65.  
The front of the HMI device must be installed with a certified enclosure that ensures a degree of protection of at least IP54 in accordance with GB/T 3836.1 for Group II, IP54 according to GB/T 3836.1 for Group IIIA and IIIB and IP6X according to GB/T 3836.1 for Group IIIC.  
During use, make allowances for the ambient conditions.
- The equipment shall be installed in such a way that the risk of mechanical danger is low.
- To avoid an electrostatic charge, wipe the enclosure surface with a damp cloth only.
- When used in an area requiring the use of equipment with EPL Gc, the following additional conditions apply:
  - The equipment shall only be used in an area of not more than pollution degree 2, as defined in GB/T 16935.1.
  - Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 119 V.

**IEC 61010-2-201/IEC 61131-2**

The devices meet the requirements and criteria of the IEC 61010-2-201 or IEC 61131-2 standard.

- IEC 61010-2-201, Safety regulations for electrical equipment for measurement, control, and laboratory use: Particular requirements for control equipment
- IEC 61131-2, Programmable controllers: Equipment requirements and testing

**RCM AUSTRALIA/NEW ZEALAND**

This product meets the requirements of the standard EN 61000-6-4 Generic standards – Emission standard for industrial environments.

**KOREA**

This product satisfies the requirement of the Korean Certification (KC Mark).

이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며 가정 외의 지역에서 사용하는 것을 목적으로 합니다.

Note that this device conforms to Limit Class A for emission of radio interference. This device can be used in all areas except the residential area.

### Eurasian Customs Union marking



EAC (Eurasian Conformity)

- Customs union of Russia, Belarus and Kazakhstan
- Declaration of conformity according to Technical Regulations of the Customs Union (TR CU)

### WEEE label (European Union)



Disposal instructions, observe the local regulations and the section "Recycling and disposal (Page 90)".

### Marine approvals

The following marine approvals are planned for the devices:

- ABS (American Bureau of Shipping)
- BV (Bureau Veritas)
- CCS (China Classification Society)
- DNV (Det Norske Veritas)
- KR (Korean Register of Shipping)
- LR (Lloyds Register)
- NK (Nippon Kaiji Kyokai)
- RINA (Registro Italiano Navale)

After successful approval, the certificates will be available at the following Internet address:

Key Panels certificates (<https://support.industry.siemens.com/cs/ww/en/ps/14732/cert>)

Filter the entries via a search for the term "Marine".



## TÜV certificates

The HMI device is certified according to the following standards. The edition of the standards is listed in the respective TÜV certificate.

Safety subject	Standard
Functional safety	IEC 61508
	EN ISO 13849-1
	DIN EN 954-1 (merged into EN ISO 13849-1)
Basic safety	DIN EN 61131-2
Machine Safety	DIN EN 60204-1
	IEC 62061
	EN ISO 13850
	NFPA79

Copies of the TÜV certificates and associated reports can be requested from the following address:

Siemens AG  
Digital Industries  
Factory Automation  
DI FA TI COS  
Postfach 1963  
D-92209 Amberg

The TÜV certificates and reports are also available on the Internet at the following address:  
Key Panels certificates (<https://support.industry.siemens.com/cs/ww/en/ps/14732/cert>)  
Filter the entries via a search for the term "TUEV".

## 7.2 Electromagnetic compatibility

The HMI device satisfies, among other things, the requirements of the EMC guidelines of the European domestic market.

### EMC-compatible installation of the HMI device

The EMC-compliant installation of the HMI device and the application of interference-proof cable is the basis for interference-free operation.

Observed the following manuals in addition to these operating instructions:

- Designing interference-free controllers  
(<https://support.industry.siemens.com/cs/ww/en/view/59193566>)
- Industrial Ethernet / PROFINET - Passive network components  
(<https://support.industry.siemens.com/cs/ww/en/view/84922825>)

### Pulse-shaped disturbance

The following table shows the electromagnetic compatibility of modules with regard to pulse-shaped interference. The precondition for electromagnetic compatibility is that the HMI device meets the specifications and guidelines for electrical installation.

Pulse-shaped interference	Tested with	Performance level equivalence
Electrostatic discharge in accordance with IEC 61000-4-2	Air discharge: 8 kV	3
	Contact discharge: 6 kV (front)	
	Contact discharge: 4 kV (rear)	2
Bursts (high-speed transient interferences) in accordance with IEC 61000-4-4	2 kV supply cable 1 kV signal line, < 30 m	3
	2 kV signal line, > 30 m	4
Powerful single pulse (surge) according to IEC 61000-4-5	Asymmetric coupling (line to ground):	
	• 1 kV supply cable, DC voltage	2
	• 1 kV signal line/data cable, > 30 m	
	Symmetrical coupling (line against line):	
	• 0.5 kV power cable, DC voltage	2
• 1 kV signal line, > 30 m	3	

### Sinusoidal interference

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

Sinusoidal interference	Test values
HF radiation (electromagnetic fields) according to IEC 61000-4-3	80% amplitude modulation at 1 kHz <ul style="list-style-type: none"> <li>To 10 V/m in the range 80 MHz to 1 GHz</li> <li>To 3 V/m in the range 1.4 GHz to 6 GHz</li> </ul>
HF current feed on cables and cable shields according to IEC 61000-4-6	Test voltage 10 V with 80% amplitude modulation at 1 kHz in the 10 kHz to 80 MHz range
Magnetic field intensity	50/60 Hz; 100 A/m RMS

### Emission of radio interference

The following table shows the interference emission from electromagnetic fields according to EN 61000-6-4, measured at the following distance.

#### Radiated emission (emitted interference)

Frequency range	Measuring distance	Interference emission
30 ... 230 MHz	10 m	< 40 dB (µV/m) quasi-peak
230 ... 1000 MHz	10 m	< 47 dB (µV/m) quasi-peak
1 ... 3 GHz	3 m	< 76 dB peak and < 56 dB average
3 ... 6 GHz	3 m	< 80 dB peak and < 60 dB average

**Emission of radio interference voltages**

Frequency range	Interference emission
0.150 ... 0.5 MHz	< 79 dB quasi-peak and < 66 dB average
0.5 ... 30 MHz	< 73 dB quasi-peak and < 60 dB average

**See also**

EMC information in section "Notes about usage (Page 23)".

## 7.3 Mechanical environmental conditions

### 7.3.1 Storage conditions

The following information is for a device that is transported and stored in its original packaging.

The device was tested according to IEC 60721-3-2:2018 Class 2M4 with the following amendments and limitations:

Type of condition	Permitted range
Free fall	≤ 0.3 m
Vibration according to IEC 60068-2-6	5 .. 8.4 Hz, deflection 3.5 mm 8.4 ... 500 Hz, acceleration 1 g
Shock according to IEC 60068-2-27	250 m/s <sup>2</sup> , 6 ms, 1000 shocks

### 7.3.2 Operating conditions

The following information applies to a device installed according to the specifications in these operating instructions.

The device was tested based on IEC 60721-3-3:2002 Class 3M3 with the following amendments and limitations:

Type of condition	Permitted range
Vibration according to IEC 60068-2-6	5 ... 8.4 Hz, deflection 3.5 mm 8.4 ... 150 Hz, acceleration 1 g
Shock according to IEC 60068-2-27	150 m/s <sup>2</sup> , 11 ms, 3 shocks

## 7.4 Climatic ambient conditions

### 7.4.1 Long-term storage

The following information applies to a device that is stored in its original packaging for longer than two weeks.

The device meets the requirements of IEC 60721-3-1:2018 Class 1K21.

### 7.4.2 Transport and short-term storage

The following information applies to a device that is transported in the original packaging and weather-proof packaging, and stored from some time.

The device was tested according to IEC 60721-3-2:2018 Class 2K11 with the following amendments and limitations:

Type of condition	Permitted range
Temperature	-20 ... 60 °C
Atmospheric pressure	1140 ... 660 hPa, corresponds to an elevation of -1000 to 3500 m
Relative humidity	10 ... 90 %
Pollutant concentration	In accordance with ANSI/ISA-71.04-2013 severity level G3

#### Note

If dewing has developed, wait until the HMI device has dried completely before switching it on.

Do not expose the HMI device to direct radiation from a heater.

### 7.4.3 Operating conditions

The following information applies to a device installed according to the specifications in these operating instructions.

The HMI device is designed for weatherproof and stationary operation according to IEC 60721-3-3.

The device was tested according to IEC 60721-3-3:2019 Class 3K22 with the following amendments and limitations:

Type of condition	Mounting position	Permitted range
Temperature, mounting in portrait format or landscape format	Vertical	0 to 55 °C
	inclined, incline max. 30°	0 to 45 °C
Air pressure, operating elevation	1140 ... 795 hPa, corresponds to an elevation of -1000 to 2000 m	
Relative humidity	From 10 ... 90%, no condensation at the rear of the device	
Pollutant concentration	In accordance with ANSI/ISA-71.04-2013 severity level G3	

Read the Notes on use (Page 23).

#### Note

The system components connected to the HMI device, the power supply for example, must also be suited to the respective operating conditions.

#### See also

Permitted mounting positions (Page 29)

## 7.5 Information on insulation tests, protection class and degree of protection

### Insulation test

The insulation strength is demonstrated in the type test with the following test voltages in accordance with IEC 61010-2-201/IEC 61131-2:

Circuit	Insulation tested with (type test)
Rated voltage $U_e$ 24 V	707 V DC to other circuits / to ground
Ethernet connector	1500 V AC

### Degree of pollution and overvoltage category

The device meets the following requirements according to IEC 61010-2-201/IEC 61131-2:

Degree of pollution	2
Overvoltage category	II

### Protection class

Protection class III according to IEC 61010-2-201/IEC 61131-2.

### Protection against foreign objects and water

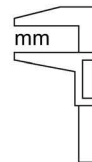
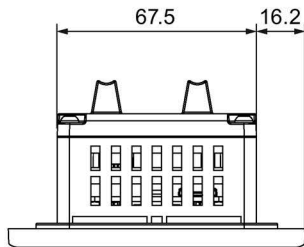
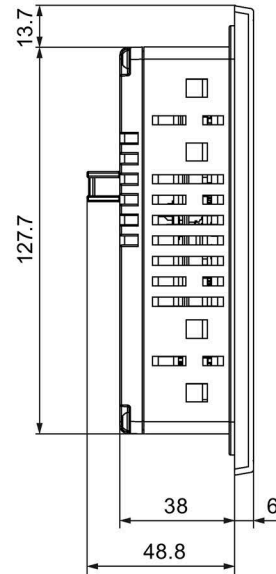
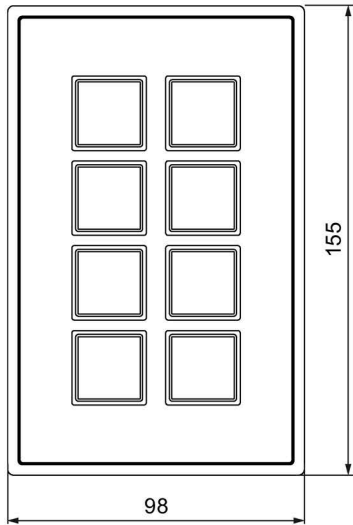
The device meets the requirements according to IEC 60529 and UL50.

Device side	Degree of protection
Front	When mounted: <ul style="list-style-type: none"> <li>IP65 according to IEC 60529</li> <li>Type 4X/Type 12 (indoor use only) according to UL50</li> </ul>
Rear panel	IP20 Protection against contact with standard test probes. There is no protection against the ingress of water, dust and noxious gas.

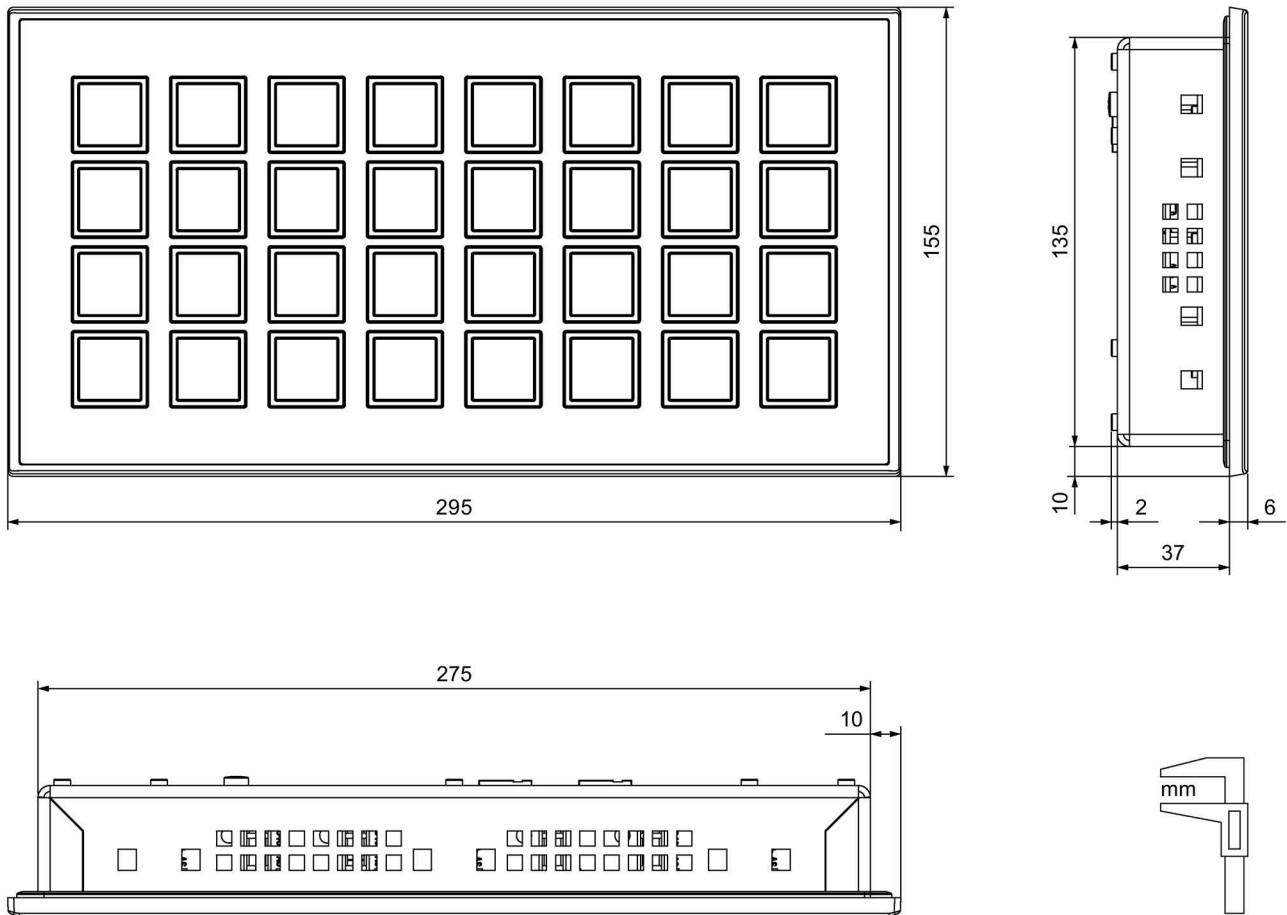
The front protection rating can only be guaranteed if the mounting seal lies flush against the mounting cutout. Read the corresponding information in section "Preparing the mounting cutout (Page 31)".

## 7.6 Dimension drawings

### 7.6.1 Dimension drawings KP8, KP8F



### 7.6.2 Dimension drawings KP32F



## 7.7 Technical specifications

### Weight

KP8, including connector and mounting clips, without packaging	270 g
KP8F, including connector and mounting clips, without packaging	280 g
KP32F, including connector and mounting clips, without packaging	1,220 g

### Power supply

Physical variable	KP8, KP8F	KP32F
Rated voltage	+24 VDC	
Permitted voltage range	+19.2 V ... +28.8 V	
Mains and voltage failure buffering time	20 ms, corresponds to PS2 according to IEC 61131-2	
Current consumption without load, all LEDs are off	≤ 0.3 A	≤ 1.0 A
Current consumption with load, all LEDs are on	≤ 0.3 A + 0.8 A external	≤ 1.0 A + 1.6 A external
Power consumption internal without load, all LEDs are off <sup>1</sup>	~ 3 W	~ 4 W
Power consumption internal with load, all LEDs are on <sup>1</sup>	≤ 6 W	≤ 20 W
Inrush current I <sup>2</sup> t	0.75 A <sup>2</sup> s	
Electrical isolation	No	
Short-circuit protection	Yes	
Transients, maximum permissible	35 V, 500 ms	
Time between two transients	≥ 50 s	
Fuse, internal	4 A	

<sup>1</sup> The power loss generally corresponds to the specified value for power consumption.



### KP8, KP8F and KP32F in non fail-safe operation - digital inputs/outputs

Physical variable	KP8, KP8F	KP32F
Connectable	Keys, switches	
Number of digital inputs, standard mode	0	16
Number of digital inputs/outputs, standard mode	8	16
Electrically isolated from internal logic	No	
Cable length		
• Unshielded cable	≤ 3 m	
• Shielded cable	≤ 10 m	
Input current with "1" signal and 24 V, per input	5 mA, typical	
Input type according to IEC 61131-2	1 and 3	3
Delay in the digital inputs/outputs	0.3 ms	
Bounce time	≤ 10 ms	
Permissible load		
• Ohmic load, per output	100 mA	
• Lamp load, per output	2 W	
Inductive energy per output	≤ 200 mWs	
Output voltage		
• With "0" signal	≤ 2 V, in no-load operation	
• With "1" signal	≥ (supply voltage - 1.5 V)	
Output current		
• With "0" signal	≤ 1 mA	
• At signal "1", per output	100 mA *	
Switching frequency, max. at		
• Resistive load	100 Hz	
• Lamp load	8 Hz	

\* Cumulative current for all outputs KP8/KP8F: Maximum 800 mA, KP32F: Maximum 1.6 A

### KP8 and KP32F – fail-safe digital inputs/outputs

In addition, the following applies to fail-safe digital inputs with KP8F and KP32F:

Physical variable	KP8, KP8F	KP32F
Number of fail-safe digital inputs	2	4
Number of fail-safe outputs	Corresponding to PROFIsafe process values	
Cable length		
• Unshielded cable	≤ 1 m	≤ 3 m
• Shielded cable	≤ 3 m	≤ 10 m
Response time in error-free case at 1oo1 and 1oo2	9 ... 27 ms	
Response time in case of error at 1oo1 and 1oo2	10 ... 30 ms	
Acknowledgment time in safety mode	17 ... 36 ms	
Signal duration, minimum	27 ms	

## 7.8 Safety characteristics for fail-safe operation

### Fail-safe mode for 1oo1 evaluation

- According to IEC 61508

Systematic Capability	SIL2
Mode of operation	High and low demand mode
Meantime to Restoration (MTTR)	<100 h
Probability of a dangerous failure per hour (PFH)	$5.95 \times 10^{-10}$ 1/h
Probability of a dangerous failure on demand (PFD)	$<3.00 \times 10^{-5}$
Proof Test Interval	1 year
Lifetime	20 years

- In accordance with EN ISO 13849-1

Meantime to Failure (MTTF <sub>d</sub> )	High
Diagnostic Coverage (DC <sub>avg</sub> )	Medium
Performance Level	d
Category	3

### Fail-safe mode for 1oo2 evaluation

- According to IEC 61508

Systematic Capability	SIL3
Mode of operation	High and low demand mode
Meantime to Restoration (MTTR)	<100 h
Probability of a dangerous failure per hour (PFH)	$2.55 \times 10^{-10}$ 1/h
Probability of a dangerous failure on demand (PFD)	$<3.00 \times 10^{-6}$
Diagnostic test interval	15 ms
Proof Test Interval	1 month
Lifetime	20 years

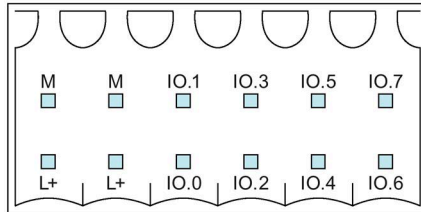
- In accordance with EN ISO 13849-1

Meantime to Failure (MTTF <sub>d</sub> )	High
Diagnostic Coverage (DC <sub>avg</sub> )	High
Performance Level	e
Category	4

## 7.9 Interface description

### 7.9.1 D IO KP8

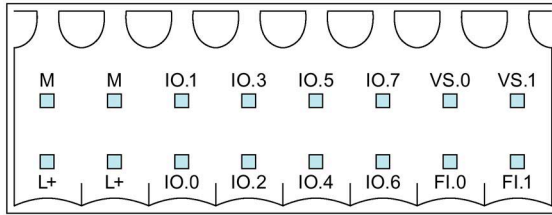
X60, 12-pin connector



Pin	Name	Meaning
1	L+	+24 VDC
2	M	Ground
3	L+	+24 VDC
4	M	Ground
5	IO.0	digital input/output 0
6	IO.1	digital input/output 1
7	IO.2	digital input/output 2
8	IO.3	digital input/output 3
9	IO.4	digital input/output 4
10	IO.5	digital input/output 5
11	IO.6	digital input/output 6
12	IO.7	digital input/output 7

### 7.9.2 D IO KP8F

X60, 16-pin connector

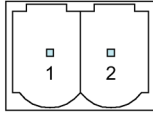


Pin	Name	Meaning
1	L+	+24 VDC
2	M	Ground
3	L+	+24 VDC
4	M	Ground
5	IO.0	digital input/output 0
6	IO.1	digital input/output 1
7	IO.2	digital input/output 2
8	IO.3	digital input/output 3
9	IO.4	digital input/output 4
10	IO.5	digital input/output 5
11	IO.6	digital input/output 6
12	IO.7	digital input/output 7
13	FI.0	Fail-safe digital input 0
14	VS.0	Sensor supply 1 for FI.0
15	FI.1	Fail-safe digital input 1
16	VS.1	Sensor supply 2 for FI.1

### 7.9.3 KP32F

#### 7.9.3.1 24 V DC 2-pin

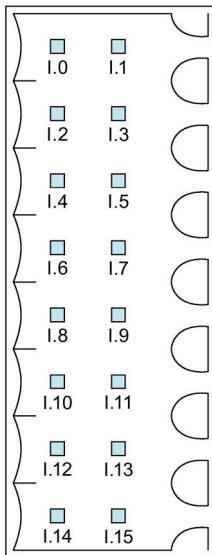
Power supply 24 V DC 2-pin



Pin	Meaning
1	+24 V DC
2	Ground

#### 7.9.3.2 D I 16-Pin KP32F X60

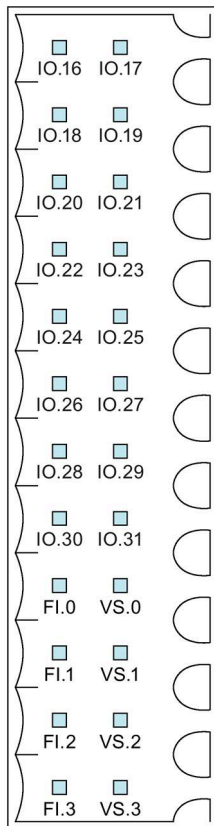
X60, 16-pin connector



Pin	Designation	Meaning
1	I.0	Digital input 0
2	I.1	Digital input 1
...	...	...
15	I.14	Digital input 14
16	I.15	Digital input 15

**7.9.3.3 D IO 24-Pin KP32F X61**

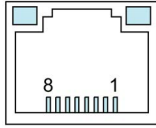
X60, 24-pin connector



Pin	Name	Meaning
1	IO.16	Digital input/output 16
2	IO.17	Digital input/output 17
...	...	...
15	IO.30	Digital input/output 30
16	IO.31	Digital input/output 31
17	FI.0	Fail-safe digital input 0
18	VS.0	Sensor supply 0 for FI.0
19	FI.1	Fail-safe digital input 1
20	VS.1	Sensor supply 1 for FI.1
21	FI.2	Fail-safe digital input 2
22	VS.2	Sensor supply 2 for FI.2
23	FI.3	Fail-safe digital input 3
24	VS.3	Sensor supply 3 for FI.3

### 7.9.4 PROFINET (LAN)

PROFINET (LAN) 10/100 Mbps, RJ45 socket



Pin	Name	Meaning
1	Tx+	Data output +
2	Tx-	Data output -
3	Rx+	Data input +
4	NC	Not assigned
5	NC	Not assigned
6	Rx-	Data input -
7	NC	Not assigned
8	NC	Not assigned

### 7.10 KP8 and KP8F - Bit assignment in the process image

The signal states of HMI device digital inputs/outputs that are used in standard mode are saved in their own process images independently from the signal states of the fail-safe channels.

#### Input area of the controller

The keys and digital inputs of the HMI device are mapped to the bits in the input area of the controller as follows:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description	Input
K 7	K 6	K 5	K 4	K 3	K 2	K 1	K 0	Keys 0 to 7	Byte 0
DI 7	DI 6	DI 5	DI 4	DI 3	DI 2	DI 1	DI 0	Digital inputs 0 to 7	Byte 1

K = Key

DI = Digital input

The numbering refers to the information in the section "Key mapping KP8F (Page 65)".

### Output area of the controller

Each of the three questions has its own output byte. The LEDs are assigned to the bits in the output area of the controller as follows:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description	Output
R 7	R 6	R 5	R 4	R 3	R 2	R 1	R 0	LEDs 0 to 7, red	Byte 0
G 7	G 6	G 5	G 4	G 3	G 2	G 1	G 0	LEDs 0 to 7, green	Byte 1
B 7	B 6	B 5	B 4	B 3	B 2	B 1	B 0	LEDs 0 to 7, blue	Byte 2
DO 7	DO 6	DO 5	DO 4	DO 3	DO 2	DO 1	DO 0	Digital outputs 0 to 7	Byte 3

R = Red

G = Green

B = Blue

DO = Digital output

For the output bytes 0 to 2, the bit combinations of the bit x are illustrated in the following table.

Bit R x (red, byte 0)	Bit G x (green, byte 1)	Bit B x (blue, byte 2)	LED
1	0	0	Red
0	1	0	Green
0	0	1	Blue
1	1	0	Yellow
1	1	1	White
0	0	0	OFF
1	0	1	OFF
0	1	1	OFF

## 7.11 KP8F – Encoder evaluation of the fail-safe channels

### Note

For digital inputs that are reserved with a fail-safe channel, the process image described in the chapter "KP8 and KP8F - Bit assignment in the process image (Page 111)" is **not** used.

The fail-safe channels occupy the following address areas in the process image of the fail-safe controller:

Input area	Output area
x + 0 to x + 4	x + 0 to x + 3

"x" is the start address for the input and output range. The address was specified in the object properties of the "KP8F, slot 2" module under "I/O addresses".

The first byte in the process image describes the switch state of the connected sensors or a connected EMERGENCY stop button.



The remaining 4 bytes in the process image of the inputs as well as the 4 bytes of the outputs contain PROFIsafe protocol elements and cannot be used by the user.

**Note**

The unused bits in the byte 0 are always "0".

The following evaluations are possible:

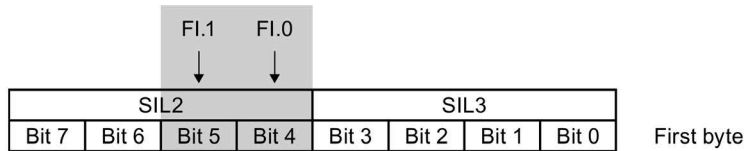
- No evaluation

Slot 2 was not set. No evaluation occurs.

SIL2				SIL3				First byte
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	

- 1oo1 evaluation

Slot 2 was set with "1oo1 evaluation, one-channel". The connected sensors are evaluated.

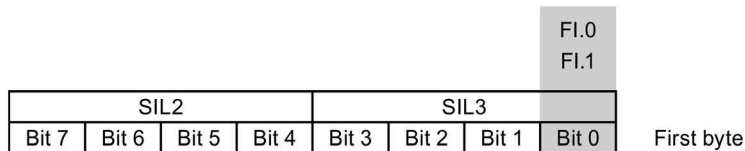


Bits 4 and 5 determine if the respective sensor contact is open or closed. The bits may take on the following values:

- 0 = Open sensor contact
- 1 = sensor contact closed

- 1oo2 evaluation

Slot 2 was set to "1oo2 evaluation, EMERGENCY STOP". The EMERGENCY stop pushbutton is being evaluated.



Bit 0 determines whether or not the EMERGENCY STOP button was pressed. The bit can take on the following values:

- 0 = EMERGENCY STOP button pressed or error
- 1 = EMERGENCY STOP button **not** pressed

## 7.12 KP32F - Bit assignment in the process image

The signal states of HMI device digital inputs/outputs that are used in standard mode are saved in their own process images independently from the signal states of the fail-safe channels.

### Input area of the controller

The keys and digital inputs of the HMI device are mapped to the bits in the input area of the controller as follows:

#### Input area, slot 1

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description	Input
K07	K06	K05	K04	K03	K02	K01	K00	Keys 0 to 7	Byte 0
K15	K14	K13	K12	K11	K10	K09	K08	Keys 8 to 15	Byte 1

#### Input area, slot 2

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description	Input
K23	K22	K21	K20	K19	K18	K17	K16	Keys 16 to 23	Byte 0
K31	K30	K29	K28	K27	K26	K25	K24	Keys 24 to 31	Byte 1

K = Key

The numbering of the keys refers to the specifications in the section "Key mapping KP32F (Page 71)".

#### Digital inputs, slot 3

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description	Input
DI07	DI06	DI05	DI04	DI03	DI02	DI01	DI00	Input 0 to 7	Byte 0
DI15	DI14	DI13	DI12	DI11	DI10	DI09	DI08	Input 8 to 15	Byte 1

#### Digital inputs, slot 4

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description	Input
DI23	DI22	DI21	DI20	DI19	DI18	DI17	DI16	Input 16 to 23	Byte 0
DI31	DI30	DI29	DI28	DI27	DI26	DI25	DI24	Input 24 to 31	Byte 1

DI = Digital input

### Output area of the controller

Each of the three questions has its own output byte. The LEDs are assigned to the bits in the output area of the controller as follows:

For the DOe output bytes 0 to 2, the DOe bit combinations of the bit x are illustrated in the following table.

Bit R x (red, byte 0)	Bit G x (green, byte 1)	Bit B x (blue, byte 2)	LED
1	0	0	Red
0	1	0	Green
0	0	1	Blue
1	1	0	Yellow
1	1	1	White
0	0	0	OFF
1	0	1	OFF
0	1	1	OFF

### Output area, slot 1

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description	Output
D07	D06	D05	D04	D03	D02	D01	D00	LEDs 0 to 7, red	Byte 0
D07	D06	D05	D04	D03	D02	D01	D00	LEDs 0 to 7, green	Byte 1
D07	D06	D05	D04	D03	D02	D01	D00	LEDs 0 to 7, blue	Byte 2

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description	Output
D15	D14	D13	D12	D11	D10	D09	D08	LEDs 8 to 15, red	Byte 3
D15	D14	D13	D12	D11	D10	D09	D08	LEDs 8 to 15, green	Byte 4
D15	D14	D13	D12	D11	D10	D09	D08	LEDs 8 to 15, blue	Byte 5

D = LED

### Output area, slot 2

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description	Output
D23	D22	D21	D20	D19	D18	D17	D16	LEDs 16 to 23, red	Byte 0
D23	D22	D21	D20	D19	D18	D17	D16	LEDs 16 to 23, green	Byte 1
D23	D22	D21	D20	D19	D18	D17	D16	LEDs 16 to 23, blue	Byte 2

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description	Output
D31	D30	D29	D28	D27	D26	D25	D24	LEDs 24 to 31, red	Byte 3
D31	D30	D29	D28	D27	D26	D25	D24	LEDs 24 to 31, green	Byte 4
D31	D30	D29	D28	D27	D26	D25	D24	LEDs 24 to 31, blue	Byte 5

D = LED

### Digital outputs, slot 4

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Description	Output
DO23	DO22	DO21	DO20	DO19	DO18	DO17	DO16	Output 16 to 23	Byte 0
DO31	DO30	DO29	DO28	DO27	DO26	DO25	DO24	Output 24 to 31	Byte 1

DO = Digital output

## 7.13 KP32F – Sensor evaluation of the fail-safe channels

**Note**

For digital inputs that are reserved with a fail-safe channel, the process image described in the chapter "KP32F - Bit assignment in the process image (Page 114)" is **not** used.

The fail-safe channels occupy the following address areas in the process image of the fail-safe controller:

Input area	Output area
x + 0 to x + 4	x + 0 to x + 3

"x" is the start address for the input and output range. The address was specified in the object properties of the "KP32F, slot 5" module under "I/O addresses".

The first byte in the process image describes the switch state of the connected sensors or a connected EMERGENCY stop button.

The remaining 4 bytes in the process image of the inputs as well as the 4 bytes of the outputs contain PROFIsafe protocol elements and cannot be used by the user.

**Note**

The unused bits in the byte 0 are always "0".

The following evaluations are possible:

- FI.0,FI.1 deactivated | FI.2,FI.3 deactivated

Slot 5 was not set. No evaluation occurs.

SIL2				SIL3			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

First byte

- FI.0,FI.1 1oo1 | FI.2,FI.3 deactivated

Slot 5 parameters were set to "FI.0.FI.1 1oo1 | FI.2.FI.3 deactivated". The connected sensors are evaluated.

SIL2				SIL3			
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

First byte

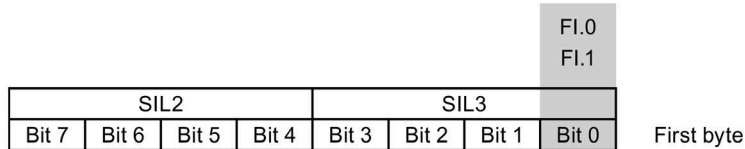
FI.1	FI.0
↓	↓

Bits 4 and 5 determine if the respective sensor contact is open or closed. The bits may take on the following values:

- 0 = Open sensor contact
- 1 = sensor contact closed

- FI.0,FI.1 1oo2 | FI.2,FI.3 deactivated

Slot 5 parameters were set to "FI.0.FI.1 1oo2 | FI.2.FI.3 deactivated". The EMERGENCY stop pushbutton is being evaluated.

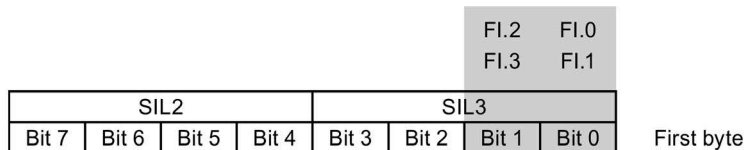


Bit 0 determines whether or not the EMERGENCY STOP button was pressed. The bit can take on the following values:

- 0 = EMERGENCY STOP button pressed or error
- 1 = EMERGENCY STOP button **not** pressed

- FI.0,FI.1 1oo2 | FI.2,FI.3 1oo2

Slot 5 was set to "FI.0.FI.1 1oo2 | FI.2.FI.3 1oo2". The EMERGENCY stop pushbuttons are evaluated.

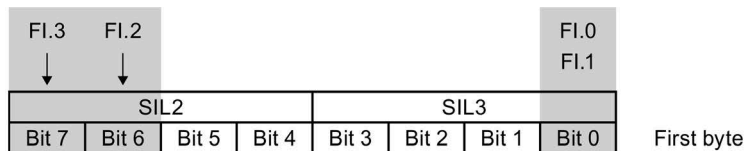


Bits 0 and 1 determine whether or not the EMERGENCY STOP button was pressed. The bit can take on the following values:

- 0 = EMERGENCY STOP button pressed or error
- 1 = EMERGENCY STOP button **not** pressed

- FI.0,FI.1 1oo2 | FI.2,FI.3 1oo1

Slot 5 was set to "FI.0.FI.1 1oo2 | FI.2.FI.3 1oo1". The EMERGENCY stop pushbuttons and the connected sensors are evaluated.



Bit 0 determines whether or not the EMERGENCY STOP button was pressed. The bit can take on the following values:

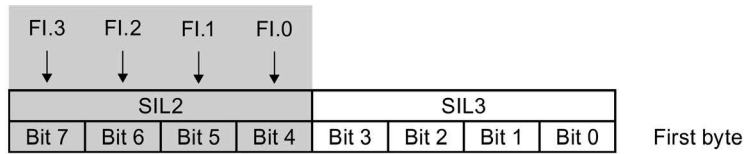
- 0 = EMERGENCY STOP button pressed or error
- 1 = EMERGENCY STOP button **not** pressed

Bits 6 and 7 determine if the respective sensor contact is open or closed. The bits may take on the following values:

- 0 = Open sensor contact
- 1 = sensor contact closed

- FI.0,FI.1 1oo1 | FI.2,FI.3 1oo1

Slot 5 was set to "FI.0.FI.1 1oo1 | FI.2.FI.3 1oo1". The connected sensors are evaluated.



Bits 4 to 7 determine if the associated sensor contact is open or closed. The bits may take on the following values:

- 0 = Open sensor contact
- 1 = sensor contact closed

## 7.14 Communication and enabled PLCs

### Enabled PLCs

The HMI device has been enabled for operation with the following type of controllers:

- SIMATIC S7-1200, S7-1200F
- SIMATIC S7-1500, SIMATIC S7-1500F
- SIMATIC S7-400, SIMATIC S7-400F
- SIMATIC S7-300, SIMATIC S7-300F
- WinAC and Embedded Controllers

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#### Note

##### Safety-related communication

A non fail-safe controller does not provide any safety-directed communication.

A SIMATIC S7F controller is required for fail-safe communication.

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### Released protocols

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

- PROFINET IO for standard communication
- PROFIsafe Mode V2.0 for fail-safe communication of the KP8F and KP32F

# Technical Support

## A.1 Service and support

You can find additional information and support for the products described on the Internet at the following addresses:

- Technical support (<https://support.industry.siemens.com>)
- Support request form (<https://www.siemens.com/supportrequest>)
- After Sales Information System SIMATIC IPC/PG (<https://www.siemens.com/asis>)
- SIMATIC Documentation Collection (<https://www.siemens.com/simatic-tech-doku-portal>)
- Your local representative ([https://www.automation.siemens.com/aspa\\_app](https://www.automation.siemens.com/aspa_app))
- Training center (<https://siemens.com/sitrain>)
- Industry Mall (<https://mall.industry.siemens.com>)
- TIA Selection Tool (<https://www.siemens.com/tia-selection-tool>)

When contacting your local representative or Technical Support, please have the following information at hand:

- MLFB of the device
- F-State of the device

You can find this information on the nameplate of the HMI device.

### Current documentation

Always use the current documentation available for your product. You can find the latest edition of this manual and other important documents by entering the article number of your device on the Internet (<https://support.industry.siemens.com>). If necessary, filter the entries by entry type "Manual".

## A.2 Application examples and FAQs

### Application examples

You can find application examples on the Internet at the following address:  
Application examples of Key Panels  
(<https://support.industry.siemens.com/cs/ww/en/ps/14731/ae>).

### FAQs

You can find frequently asked questions on the Internet at the following address: Key Panels  
FAQs (<https://support.industry.siemens.com/cs/ww/en/ps/14731/faq>)

## A.3 Information about the manufacturer

Siemens AG is the manufacturer of the HMI devices described in this document.

The manufacturer address is:












Siemens AG  
Digital Industries  
Postfach 48 48  
90026 NÜRNBERG  
GERMANY







## Markings and symbols

### B.1 Safety-relevant symbols

The following table describes symbols that can be added to your SIMATIC device, to its packaging or to an enclosed document in addition to the symbols described in the manuals.

Symbol	Meaning	Reference
	General danger sign Caution / Attention You must following the operating instructions. The operating instructions contain information on the type of the potential hazard and enable you to identify risks and implement countermeasures.	ISO 7000 No. 0434B, DIN ISO 7000 No. 0434B
  ONLY EX MODULES	Attention, only relevant for modules with Ex approval	
	Follow the instructions	ISO 7010 M002
	May be installed by qualified electricians only	IEC 60417 No. 6182
 F<2N DISPLAY F<4N HOUSING	Mechanical load for HMI devices	
 CABLE SPEC.	Connection cables must be designed for the ambient temperature	
 EMC	EMC-compliant installation	
 U = 0V	No mounting or pulling & plugging under voltage	
 230V MODULES	Dangerous electrical voltage for 230V modules	ANSI Z535.2
 24V MODULES	Protection class III, supply only with protective low voltage (SELV/PELV)	IEC 60417-1-5180 "Class III equipment"

B.1 Safety-relevant symbols

Symbol	Meaning	Reference
 <p data-bbox="145 357 330 400">INDOOR USE ONLY INDUSTRIAL USE ONLY</p>	<p data-bbox="360 278 1053 306">Only for industrial applications and indoor areas (control cabinet)</p>	
	<p data-bbox="360 412 965 440">Device is to be integrated or installed in a control cabinet</p>	
 <p data-bbox="161 576 314 619">ZONE 2 USE CABINET IP54</p>	<p data-bbox="360 497 1102 553">Integrate or install devices approved for Ex Zone 2 in a control cabinet with at least IP54</p>	
 <p data-bbox="161 710 314 753">ZONE 22 USE CABINET IP6x</p>	<p data-bbox="360 632 1117 687">Integrate or install devices approved for Ex Zone 22 in a control cabinet with at least IP6x</p>	

# Abbreviations

# C

CPU	Central Processing Unit
DC	Direct Current
DIL	Dual-in-Line
DP	Distributed I/O
ESD	Electrostatic Discharge, the components and modules endangered by such
EMC	Electromagnetic Compatibility
EN	European standard
ESD	Electrostatic Sensitive Device
F-CPU	Fail-safe Central Processing Unit
GND	Ground
GSD	Device master file
HF	High Frequency
HMI	Human Machine Interface
IEC	International Electronically Commission
IRT	Isochronous Real-Time
LED	Light Emitting Diode
MTTR	Meantime to Restoration
MRP	Media Redundancy Protocol
MS	Microsoft
PELV	Protective Extra Low Voltage
PFD	Probability of a dangerous Failure on Demand
PFH	Probability of a dangerous Failure per Hour
PL	Performance Level
RSTP	Rapid Spanning Tree Protocol
SELV	Safety Extra Low Voltage
SIL	Safety Integrity Level
TIA	Totally Integrated Automation
UL	Underwriter's Laboratory



# Glossary

## Automation system

An automation system is the totality of devices in an industrial plant and their interconnection.

## Controller

General term for devices and systems with which the HMI device communicates, e.g. SIMATIC S7.

## Diagnostics

Diagnostics enable you to determine if the signals are being correctly registered in the fail-safe HMI device.

## EMC

Electromagnetic compatibility (EMC) refers to a state in which technical equipment does not disturb other equipment with unwanted electrical or electromagnetic effects. Electromagnetic compatibility deals with technical and regulatory questions of undesired, mutual influence in electrical engineering.

## Fail-safe

Capability of a technical system to remain in a safe state or switch to another safe state immediately in the event of a failure or fault.

## Fail-safe system, F-system

A fail-safe system is used to control production processes in which immediate shutdown results in a safe system status. This means that fail-safe systems control processes that do not present a danger to people or the environment if a direct shutdown of the plant occurs.

Fail-safe systems are used in plants with high safety requirements.

## GSD

The GSD file contains all the properties of a DP slave or IO device. STEP 7 requires a GSD file for each DP slave and for each IO device to allow the DP slave or IO device to be selected in the module catalog of HW Config.

## Passivation

If the F-I/O detects a fault/error, it switches the affected channel or all its channels to the safe state. In other words, channels of this F-I/O are passivated. The F-I/O reports the detected error to CPU via the slave diagnostics. With an F-I/O with inputs, passivation is performed by the F-system by making available substitute values (0) to the safety program instead of the process values queued at the fail-safe inputs. With an F-I/O with outputs, passivation is performed by the F-system by sending substitute values (0) to the fail-safe outputs instead of the output values provided by from the safety program.

## PROFINET

Within the framework of Totally Integrated Automation (TIA), PROFINET represents an enhancement of the following bus systems:

- PROFIBUS DP as well-established field bus
- Industrial Ethernet as the communication bus for the cell level

The experience gained from both systems has been and continues to be integrated in PROFINET. PROFINET as an Ethernet-based automation standard from PROFIBUS International (PROFIBUS Nutzerorganisation e.V.) defines a vendor-independent communication and engineering model.

## PROFINET IO controller

Device used to address the connected IO devices. That is: The IO controller exchanges input and output signals with assigned field devices. The IO controller is often the controller on which the automation program runs.

## PROFINET IO device

A PROFINET IO device is a decentralized field device that is assigned to one of the IO controllers (e.g., remote IO, valve terminals, frequency converters, switches)

## PROFINET IO

As part of PROFINET, PROFINET IO is a communication concept that is used to implement modular, distributed applications.

PROFINET IO allows you to create automation solutions of the type with which you are familiar from PROFIBUS.

PROFINET IO is implemented by the PROFINET standard for automation devices on the one hand, and on the other hand by the STEP 7 engineering tool.

This means that you have the same application view in STEP 7 regardless of whether you configure PROFINET devices or PROFIBUS devices. Programming your user program is essentially the same for PROFINET IO and PROFIBUS DP if you use the extended blocks and system status lists for PROFINET IO.

**PROFIsafe**

Fail-safe bus profile of PROFINET for communication between the safety program and the F-I/O in an F system.

**PROFIsafe address**

Every F-I/O has a PROFIsafe address. This address is used to receive safety frames from the fail-safe CPU or send safety frames to the fail-safe CPU.

**Proof-test interval**

The proof-test interval is the time period after which a component must be put into fail-safe state. That is, it is replaced by an unused component or it is proven to be completely fault-free.

**Reintegration**

Reintegration of the fail-safe I/O is required after troubleshooting. Reintegration (switching from substitute values to process data) takes place either automatically or following user acknowledgment.

For an F-I/O module with inputs, the process data queued at the failsafe inputs are made available again to the safety program after reintegration. For an F-I/O module with outputs, the output values for fail-safe outputs are sent again by the system to the fail-safe outputs.

**Safe state**

State of a unit in which safety is assured. In other words, the risk is acceptably low because it has been established that safety-related malfunctions do not occur or because of the safety measures taken to prevent possible safety-related malfunctions.

The basic principle of the safety concept in a fail-safe system is the existence of a safe state for all process variables.

**Safety function**

Safety function is a mechanism integrated in fail-safe CPUs and I/Os, enabling them to be used in fail-safe systems. According to IEC 61508: A safety function is implemented by a safety system to ensure that the system is kept in a safe state or brought into a safe state in the event of a particular fault (user safety function).

**Safety Integrity Level**

The Safety Integrity Level SIL indicates the safety category of a fail-safe automation system. The higher the Safety Integrity Level, the stricter the measures for prevention of systematic faults and for management of systematic faults and random hardware failures.

### **Safety mode**

Operating mode of the HMI device in which safety-related communication can be performed via safety frames.

### **Safety-related communication**

Communication used to exchange fail-safe data.

### **Sensor evaluation**

Two types of sensor evaluation:

- 1oo1 evaluation  
Sensor signal is read once.
- 1oo2 evaluation  
The sensor signal is read twice by the same F-I/O and compared internally.

### **Standard mode**

Operating mode of an HMI device in which only standard communication is possible and safety-related communication cannot be performed via safety frames.

### **STEP 7, STEP 7 (TIA Portal)**

STEP 7 and STEP 7 (TIA Portal) are engineering systems for configuring an automation system.