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Application Description • 02/2016

# Using the Mobile Panels 2nd generation in Fail-Safe Applications

WinCC V13 SP1, KTP700F / KTP900F Mobile, STEP 7 Safety Advanced



<https://support.industry.siemens.com/cs/ww/de/view/103497649>

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# Table of Contents

|  |           |
|--|-----------|
| <b>Warranty and Liability .....</b>                  | <b>2</b>  |
| <b>1 Task.....</b>                                   | <b>4</b>  |
| 1.1 Introduction.....                                | 4         |
| 1.2 Overview of the automation task.....             | 4         |
| <b>2 Solution.....</b>                               | <b>6</b>  |
| 2.1 Overview.....                                    | 6         |
| 2.2 Hardware setup .....                             | 7         |
| 2.3 Description of the core functionality .....      | 8         |
| 2.4 Hardware and software components .....           | 10        |
| 2.4.1 Validity.....                                  | 10        |
| 2.4.2 Hardware components .....                      | 10        |
| 2.4.3 Software components.....                       | 11        |
| 2.4.4 Sample files and projects .....                | 11        |
| <b>3 Basics .....</b>                                | <b>12</b> |
| 3.1 Log-off from the safety program.....             | 12        |
| 3.2 Safety notices.....                              | 12        |
| 3.3 Operating modes.....                             | 12        |
| 3.4 Mobile Panel.....                                | 13        |
| <b>4 Mode of Operation .....</b>                     | <b>14</b> |
| 4.1 Wiring diagram/hardware plan .....               | 14        |
| 4.1.1 Preliminary considerations .....               | 14        |
| 4.1.2 "Load circuit" solution .....                  | 16        |
| 4.2 Design of operating elements and contactors..... | 17        |
| 4.3 Hardware .....                                   | 18        |
| 4.3.1 Mobile Panel, connection box advanced.....     | 18        |
| 4.3.2 ET 200SP, electronic module 8 F-DI.....        | 19        |
| <b>5 Configuration Instruction.....</b>              | <b>20</b> |
| 5.1 Circuit diagram .....                            | 20        |
| 5.2 Configuration .....                              | 27        |
| 5.2.1 General information.....                       | 27        |
| 5.2.2 Hardware configuration .....                   | 28        |
| 5.2.3 STEP 7 standard program.....                   | 32        |
| 5.2.4 STEP 7 program.....                            | 35        |
| 5.3 HMI configuration .....                          | 42        |
| 5.3.1 General information.....                       | 42        |
| 5.3.2 Acknowledging using the panel.....             | 43        |
| 5.4 Device settings .....                            | 44        |
| 5.4.1 Connection box .....                           | 44        |
| 5.4.2 Mobile Panel.....                              | 45        |
| <b>6 Operating the Application.....</b>              | <b>48</b> |
| 6.1 General information.....                         | 48        |
| 6.2 Operating the HMI .....                          | 49        |
| 6.3 Operating modes.....                             | 50        |
| <b>7 Error detection .....</b>                       | <b>52</b> |
| <b>8 Links &amp; Literature .....</b>                | <b>54</b> |
| <b>9 History.....</b>                                | <b>54</b> |

# 1 Task

## 1.1 Introduction

The KTP700F/KTP900F Mobile offers versatile application options in an industrial environment. Thanks to its mobility and ruggedness, it can be used even where other HMI panels cannot be used or only with considerable effort.

Using an example, the application describes how to implement the

- Emergency stop/stop button
- and the enabling button

of the KTP700F Mobile in a fail-safe application.

### Note

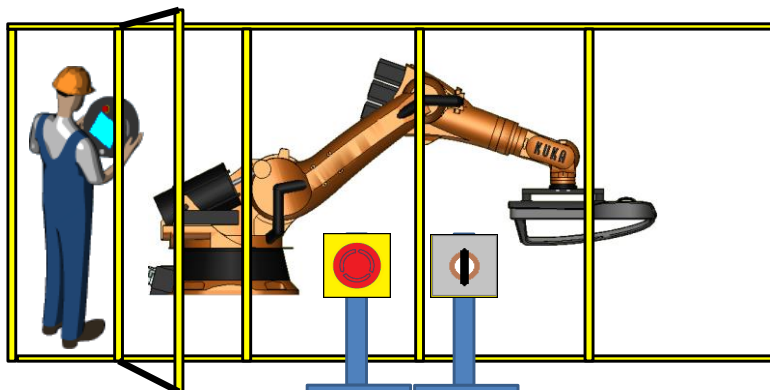
Whenever this document talks about the mobile panel, it always relates to the KTP700F/KTP900F Mobile.

## 1.2 Overview of the automation task

The robot to be operated in an automotive plant is behind a safety fence. The safety fence can be entered through a safety door for adjustment and maintenance work.

- The robot is to be operated with a mobile HMI panel.
- In operating mode “Service mode” the safety door can be opened. When the safety door is open, you must actuate an additional enabling button to operate the robot.
- An emergency stop button must be within reach when operating in the safety area.
- The “Service mode” is selected with a key switch.
- There is an external emergency stop button outside the safety fence.
- The system requires a PL d for ISO 13849-1 or SIL 2 for IEX 62061 compatibility.

Figure 1-1



## 1 Task

---

### 1.2 Overview of the automation task

#### **The following operating modes are to be implemented:**

- Automatic mode
  - The drive is switched on with one button and switched off with another button.
- Manual mode (setup mode)
  - The drive is switched on/off with one button (jog mode).
- Service mode (process monitoring in production)
  - Like manual mode. In addition, an enabling button is required to operate the system. The system can only be activated in connection with the enabling button.

#### **Requirements for the mobile operating device**

The HMI panel must allow the following functions:

- Selection of operating modes
  - Manual
  - Automatic
- Drive on/off
- Emergency stop/stop button
- Operation with enabling button

## 2 Solution

### 2.1 Overview

The KTP700F Mobile (alternatively KTP900F Mobile) is used as an HMI device for this task.

The mobile panel is connected to a Connection box Advanced.

The connection box and the F-CPU communicate via PROFI-safe.

The emergency stop/stop button and enabling button are evaluated by the mobile panel directly with the F program of the connected **F-CPU**.

**Fail-safe digital input and output modules** (“F-DI” or “F-DO”) are used to evaluate the following equipment like

- external emergency stop button
- safety door
- key switch for “service mode”.

The system complies with PL d for ISO 13849-1 or SIL 2 for IEX 62061.

#### What does the application include?

The application describes the following items:

- Hardware used
- Circuit diagram
- Program description
  - STEP 7 standard program incl. F program
- Operating the application

#### Topics not covered in this application

This application does not include a description...

- of ISO 13849-1 or IEC 62061
- on the subject “Machine safety”
- on how to operate the WinCC TIA Portal software

Basic knowledge of these topics is assumed.

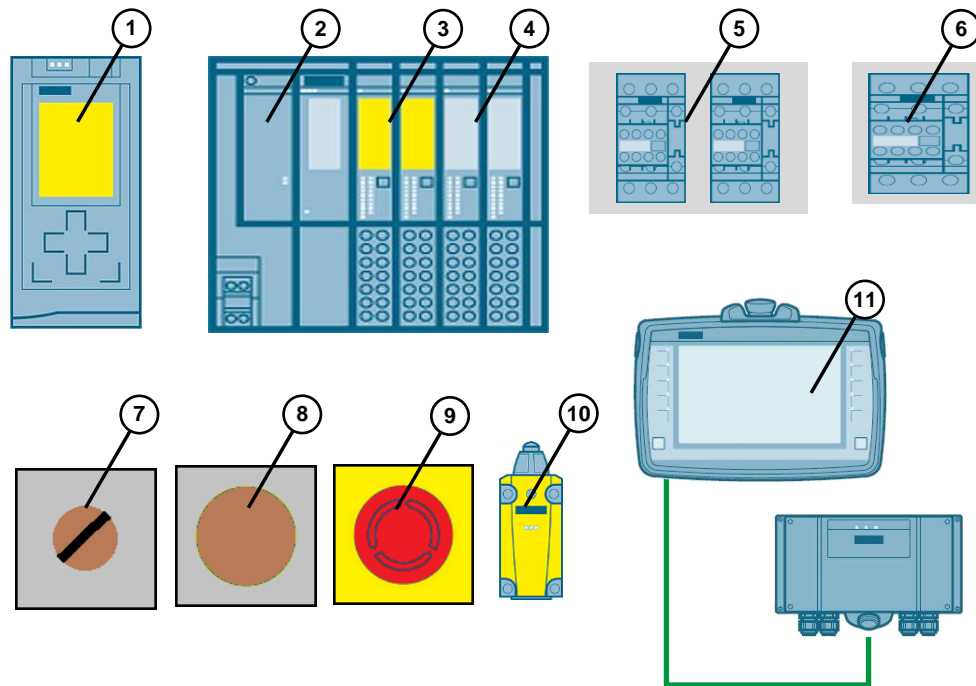
#### Assumed knowledge

Basic knowledge of the software and hardware used is assumed.

## 2.2 Hardware setup

The figure below shows a schematic illustration of the main components.

Figure 2-1



1. Fail-safe CPU
2. ET 200SP interface module
3. ET 200SP, fail-safe digital input / output modules
4. ET 200SP, standard digital input / output modules
5. Contactors for fail-safe shutdown of the load circuit
6. Contactor for operational control of the robot (on/off)
7. External key switch for selecting "Service mode"
8. External push button for acknowledging fault messages
9. External emergency stop button
10. Safety door switches
11. Mobile Panel KTP700F with connection box advanced

## 2.3 Description of the core functionality

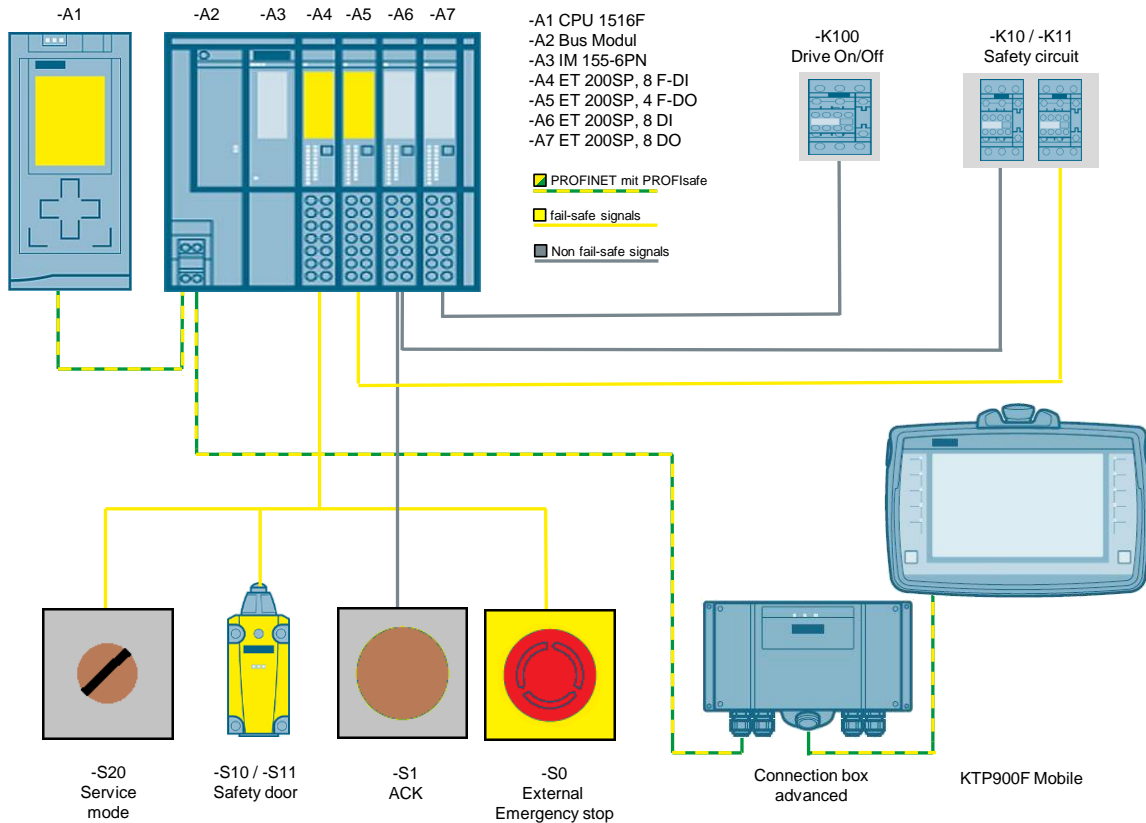
The core functionality is the...

- hardware implementation with a circuit diagram with all hardware components.
- software implementation for the STEP 7 control program.

### Overview and description of the circuit diagram

The figure below shows the functional setup overview. Details on the circuit diagram are described in chapter 5.

Figure 2

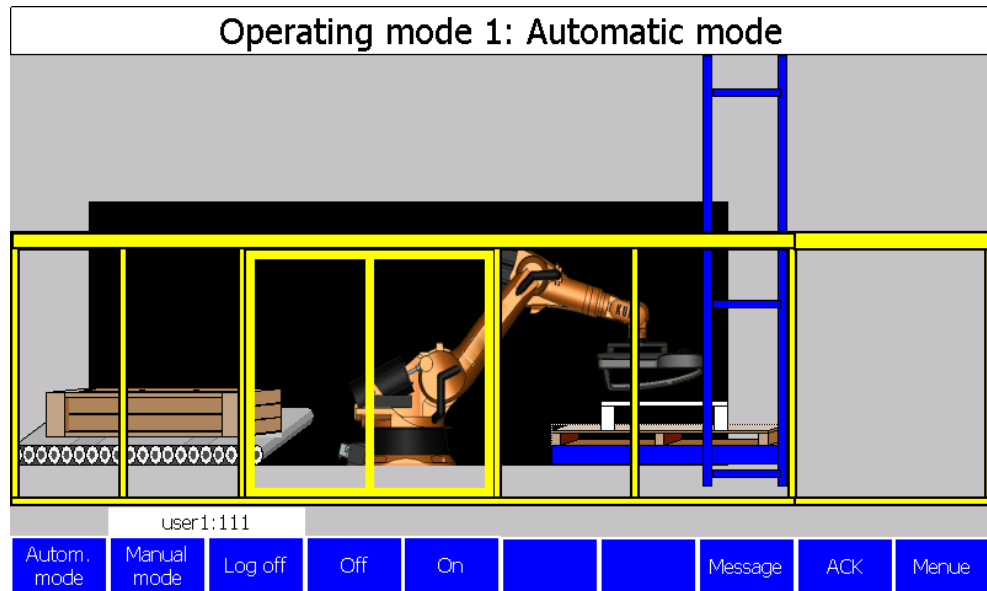




**Overview and description of the HMI user interface**

The figure below shows the configured plant screen for robot control.

Figure 2-2



**Sequence in operating mode: Automatic**

Table 2-1

| No. | Action  |
|-----|---|
| 1.  | Function button "Automatic mode"  |
| 2.  | Function button "ON/OFF"  |
| 3.  | Preconditions <ul style="list-style-type: none"> <li>Emergency stop/stop button on mobile panel and external emergency stop button not actuated.</li> <li>Safety door closed</li> </ul> |

**Sequence in operating mode: Manual mode**

Table 2-2

| No. | Action  |
|-----|---|
| 1.  | Function button "Manual mode" (requires login)  |
| 2.  | Press function button "ON" and keep pressed (only jog mode)   |
| 3.  | Preconditions <ul style="list-style-type: none"> <li>Emergency stop/stop button on mobile panel and external emergency stop button not actuated.</li> <li>Safety door closed</li> </ul> |

**Sequence in operating mode: Service mode**

Table 2-3

| No. | Action  |
|-----|---|
| 1.  | Selection of "Service mode" via separate key switch |

## 2 Solution

### 2.4 Hardware and software components

| No. | Action  |
|-----|---|
| 2.  | Press enabling button on KTP and keep pressed   |
| 3.  | Press function button "ON" and keep pressed (only jog mode)   |
| 4.  | Preconditions <ul style="list-style-type: none"><li>Emergency stop/stop button on mobile panel and external emergency stop button not actuated.</li></ul> |

## 2.4 Hardware and software components

### 2.4.1 Validity

The application was created with the following software.

- STEP 7 Professional V13 SP1 Update 2
- STEP 7 Safety V13 SP1
- WinCC (TIA Portal) from V13 SP1 Update 3

### 2.4.2 Hardware components

The application was created with the following components:

Table 2-4

| Component   | Qty | Article number     | Note |
|---|-----|--------------------|------|
| KTP700F Mobile  | 1   | 6AV2125-2GB23-0AX0 |      |
| Connection box advanced   | 1   | 6AV2125-2AE23-0AX0 |      |
| Connecting cable PN 5m  | 5m  | 6AV2181-5AF05-0AX0 |      |
| DIN rail 480 mm   | 1   | 6ES7390-1AE80-0AA0 |      |
| Load current supply. PS 307; AC 120/230V, DC 24V, 10A                   | 1   | 6ES7307-1KA02-0AA0 |      |
| CPU 1516F-3 PN/DP   | 1   | 6ES7516-3FN00-0AB0 |      |
| SIMATIC S7, memory card for S7-1X00 CPU/SINAMICS, 3.3 V FLASH, 24 MBYTE | 1   | 6ES7954-8LF02-0AA0 |      |
|   |     |                    |      |
| IM 155-6 PN HF,   | 1   | 6ES7155-6AU00-0CN0 |      |
| F-DI 8x24VDC HF   | 1   | 6ES7136-6BA00-0CA0 |      |
| F-DQ 4x24VDC/2A PM HF   | 1   | 6ES7136-6DB00-0CA0 |      |
| DI 8x24VDC ST   | 1   | 6ES7131-6BF00-0BA0 |      |
| DQ 8x24VDC/0.5A ST  | 1   | 6ES7132-6BF00-0BA0 |      |
|   |     |                    |      |
| Contactors AC-3 3KW/400V, 1OE, DC24V                                    | 4   | 3RT2015-1BB2       |      |
| Auxiliary switch blocks 2S + 2OE  | 3   | 3RH2911-1FA22      |      |

## 2 Solution

### 2.4 Hardware and software components

| Component         | Qty | Article number               | Note   |
|-------------------|-----|------------------------------|--|
| External controls | 4   | 3SB3801-0EG3<br>3SB3801-0DD3 | <ul style="list-style-type: none"><li>• Emergency stop button</li><li>• Safety door switches</li><li>• Acknowledgement button</li><li>• Key switch</li></ul> |

#### 2.4.3 Software components

Table 2-5

| Component                            | Qty | Article number     | Note              |
|--------------------------------------|-----|--------------------|-------------------|
| STEP 7 Professional V13 SP1 Update 3 | 1   | 6ES7810-4CC10-0YA5 | From this version |
| WinCC Advanced V13 SP1 Update 3      | 1   | 6AV6613-0AA51-3CA5 | From this version |
| STEP 7 Safety Advanced V13 SP1       | 1   | 6ES7833-1FA13-0YA5 | From this version |

#### 2.4.4 Sample files and projects

The following list includes all files and projects that are used in this example.

Table 2-6

| Component  | Note   |
|--|--|
| 103497649_KTP700F_KTP900F_Application_DOC_en.pdf     | This document.   |
| 103497649_KTP700F_KTP900F_Getting_Started_DOC_en.pdf | Brief description  |
| 103497649_KTP700F_KTP900F_Application_Code.zip       | The file contains the program for the application example and the wiring diagram |
| 103497649_KTP700F_KTP900F_GettingStarted_Code.zip    | The file contains the program for the standard configuration                     |

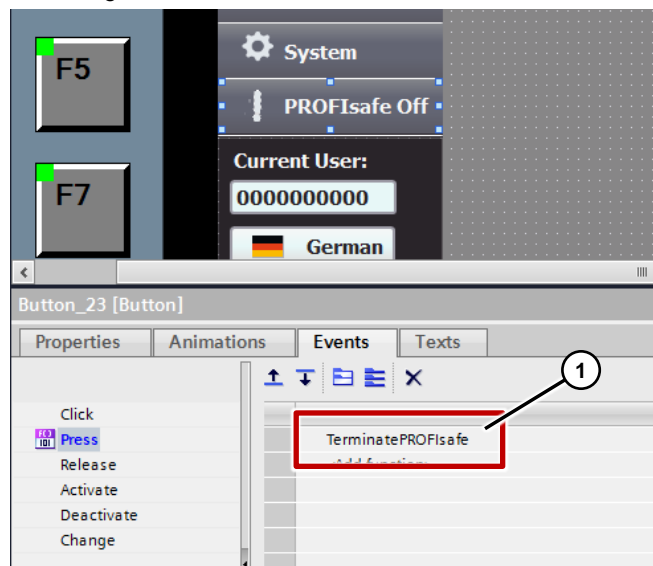
## 3 Basics

### 3.1 Log-off from the safety program

Before disconnecting the fail-safe HMI device from a connection box, you must log off the HMI device from the safety program using the system function "TerminatePROFIsafe" (1) or close the current project.

After logging off, the emergency stop button and enabling button are **no** longer active.

Abbildung 3-1



### 3.2 Safety notices

Make yourself familiar with the safety notes and the general information in the mobile panel operating instructions. You can find the operating instructions under the following link:

<https://support.industry.siemens.com/cs/de/en/ps/14746/man>

### 3.3 Operating modes

There are predefined operating modes for tool machines. In this application, the following operating modes are used.

- Automatic mode (operating mode 1)
  - In this operating mode, it is not possible to enter the processing area. Automatic mode must be deactivated before the door can be opened and the processing area can be entered. If the safety door is opened during automatic mode, the robot drive is shut down.
- Manual mode (operating mode 2 → setup mode)
  - This mode can only be selected with a password. Operators must have received specific training before they can use this operating mode. Movements are carried out in jog mode. If the operating element is let loose, the robot drive is shut down. Safety devices must be closed.

If the safety door is opened during manual mode, the drives are immediately shut down.

- Service mode (operating mode 3 → process monitoring in production)
  - In contrast to the previous operating modes, the user can monitor and control the processing with open safety device (door).  
To operate the robot, an additional enabling button is required. When the enabling button is let loose, the robot drive is stopped immediately.

In all three operating modes, the stationary emergency stop button and the emergency stop/stop button of the mobile panel are active.

## 3.4 Mobile Panel

### PROFIsafe

PROFIsafe ensures F communication between both partners.

The mobile panel supports the communication via PROFIsafe. This functionality enables evaluating the emergency stop/stop button and the enabling button of the mobile panel directly in the F-CPU. Wiring additional modules is therefore not required anymore.

### Connection box advanced

There are three different connection boxes for the mobile panel.

The connection box **advanced** used in the application can be integrated in an existing emergency stop circuit.

The assigned emergency stop circuit is not opened when unplugging the mobile panel from the connection box.

When used together with PROFIsafe, the mobile panel must be logged off the network beforehand.

### Emergency stop/stop button

The emergency stop/stop button signal from the mobile panel can be further processed via **PROFIsafe** or via suitable external evaluation devices, e.g. safety relays.

When the mobile panel is connected to the connection box, the emergency stop/stop button **must** always be active.

Depending on the operating mode, the emergency stop/stop button is lights up. In this application, the emergency stop/stop button lights up when the mobile panel is logged in to the safety program.

More information on the various operating modes can be found in the manual.

### Enabling button

The enabling button signal from the mobile panel can be further processed via **PROFIsafe** or via suitable external evaluation devices, e.g. safety relays.

#### Note

The enabling button is only required if prescribed by the operating mode. This would be the case, for example, in operating mode 3 "Service mode".

# 4 Mode of Operation

## 4.1 Wiring diagram/hardware plan

### 4.1.1 Preliminary considerations

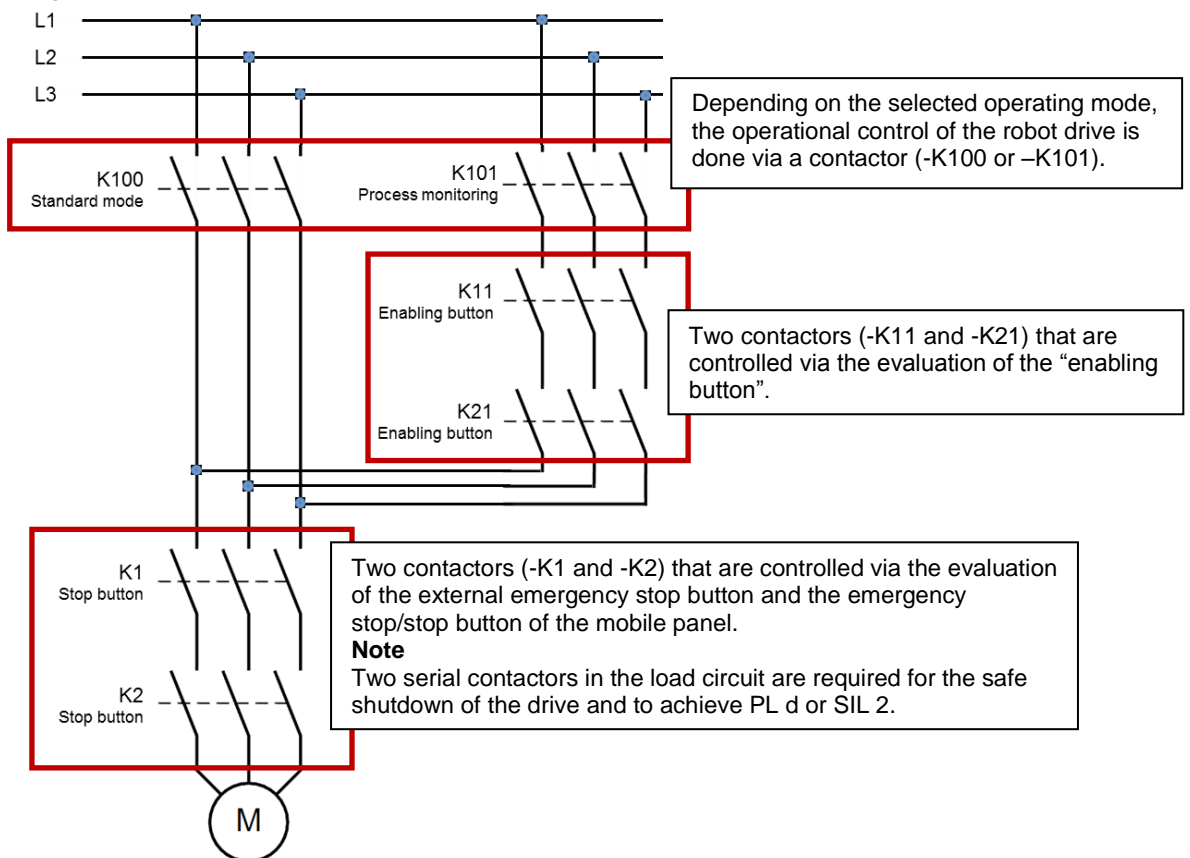
Considering the task described in chapter 1.2 [“Overview of the automation task”](#), the hardware plan must cover three functions.

- Function 1: Automatic/manual mode.
- Function 2: Service mode. The enabling button evaluation from the mobile panel must be active in this operating mode.
- Function 3: The external emergency stop button and the emergency stop/stop button of the mobile panel must be active in every operating mode.

The task is now to integrate these three individual functions together in one application and to achieve PL d or SIL 2.

The figure below shows the respective load circuit.

Figure 4-1



The detailed function description follows on the next page.

## 4 Mode of Operation

---

### 4.1 Wiring diagram/hardware plan

#### Function description of [Figure 4-1](#)

- The contactors -K100 and -K101 are used to turn the drive on and off.
  - -K100, controls the drive in operating modes 1 and 2.
  - -K101, controls the drive in operating mode 3.
- When the external emergency stop button or the emergency stop/stop button of the mobile panel is pressed, the safe shutdown is carried out via contactors -K1 and -K2.
- When the enabling button of the mobile panel is pressed in operating mode 3, the safe shutdown is carried out via contactors -K11 and -K21.

In this example, a total of 6 contactors are required.

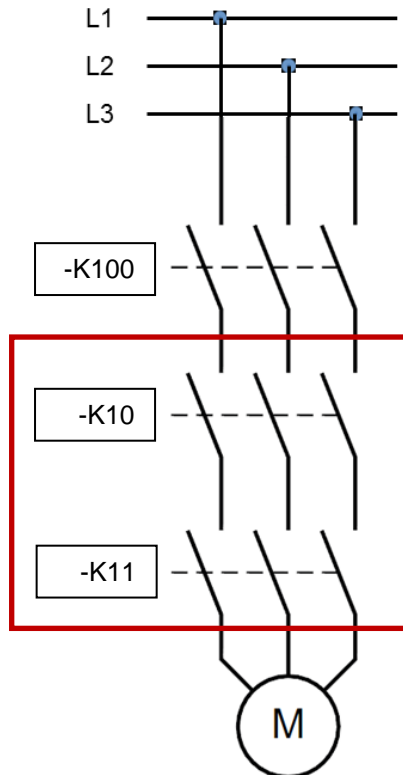
The following solution was created based on these “preliminary considerations”.

4.1.2 “Load circuit” solution

The figure below shows the load circuit.

Based on the “preliminary considerations” from chapter 4.1, the number of required main contactors in the load circuit could be reduced from **six** to **three**.

Figure 4-2



**Description**

With the F-CPU together with the fail-safe digital input and output modules, only three contactors are required in the load circuit.

The fail-safe modules provide safe evaluation and shutdown of contactors -K10 and -K11.

Contactors -K100 is used to turn the drive on and off.



## 4.2 Design of operating elements and contactors

To achieve the required PL d or SIL 2, the various hardware components must meet certain requirements. These are described in this chapter.

### Contactors

- Safety circuit
  - For fail-safe shutdown, two contactors are required in the drive train.
  - The main contacts of the first contactor are connected in series with the second contactor.
  - For further evaluation, one make contact and one break contact each is required.
- Drive control.
  - Requires a contactor to switch the drive on and off.

Table 4-1

| No. | Device                                    | Together with an F program  |
|-----|---|---|
| 1.  | Stationary emergency stop button          | <ul style="list-style-type: none"> <li>• A 2-channel button must be used (two break contacts).</li> <li>• The signals are read with a fail-safe digital input module.</li> <li>• All emergency stop buttons of the corresponding emergency stop circuit are connected in series.</li> </ul>   |
| 2.  | Emergency stop/stop button (Mobile Panel) | <ul style="list-style-type: none"> <li>• The signals are read with a fail-safe digital input module.</li> <li>• Requires no additional hardware when used together with PROFIsafe.</li> </ul>   |
| 3.  | Enabling button (Mobile Panel)            | <ul style="list-style-type: none"> <li>• The signals are read with a fail-safe digital input module.</li> <li>• Requires no additional hardware when used together with PROFIsafe.</li> </ul>   |
| 4.  | Fault acknowledgment                      | <ul style="list-style-type: none"> <li>• Requires a button with a 1-channel switching element (make contact).</li> <li>• The signal is read with a standard digital input module.</li> </ul> <p><b>Note</b><br/>To acknowledge a message with the mobile panel is only possible together with an F-CPU and STEP 7 Safety Advanced together with the "FB187" (F_ACK_OP).</p> |
| 5.  | Mode selector switch                      | <ul style="list-style-type: none"> <li>• Requires a key switch with two switching elements (e.g. two break contacts).</li> <li>• The signals are read with a fail-safe digital input module.</li> </ul> <p><b>Note</b><br/>The mobile panel features one key switch. This <b>cannot</b> be used for mode switching. The key switch is not fail-safe.</p>                    |

## 4 Mode of Operation

### 4.3 Hardware

| No. | Device                              | Together with an F program   |
|-----|-------------------------------------|--|
| 6.  | Safety door switches                | <ul style="list-style-type: none"> <li>Requires two switches with a 1-channel switching element (break contact).</li> <li>The signals are read with a fail-safe digital input module.</li> </ul>   |
| 7.  | Contactors control (safety circuit) | <ul style="list-style-type: none"> <li>The contactors are controlled via a fail-safe digital output module.</li> </ul>   |
| 8.  | Contactors control (drive ON/OFF)   | <ul style="list-style-type: none"> <li>The contactors are controlled with a standard digital output module.</li> </ul>   |
| 9.  | Readback signals (contactors)       | <ul style="list-style-type: none"> <li>Both contactors must provide one break contact each for safe shutdown of the drive.</li> <li>The break contacts are connected in series.</li> <li>The signal is read with a standard digital input module.</li> </ul> |

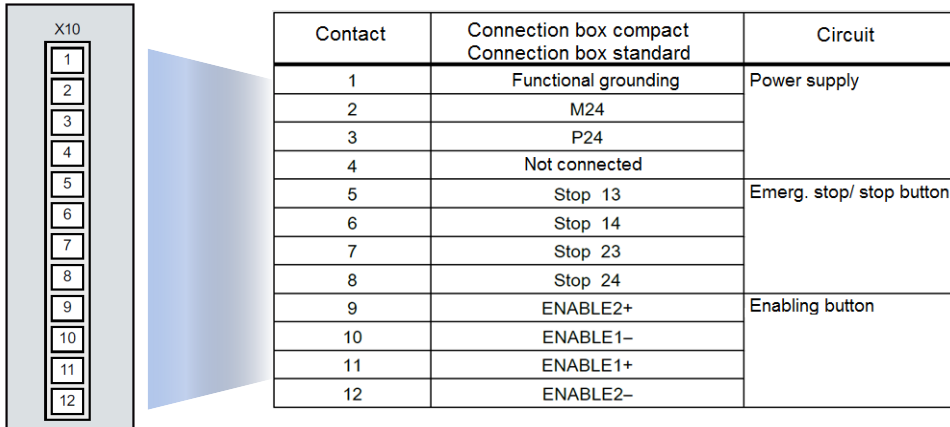
## 4.3 Hardware

### 4.3.1 Mobile Panel, connection box advanced

#### X10 interface assignment

Terminal strip X10, 12-pole: 24V DC voltage supply

Figure 4-3



| Contact | Connection box compact<br>Connection box standard | Circuit                  |
|---------|---|--------------------------|
| 1       | Functional grounding                              | Power supply             |
| 2       | M24   |                          |
| 3       | P24   |                          |
| 4       | Not connected                                     |                          |
| 5       | Stop 13   | Emerg. stop/ stop button |
| 6       | Stop 14   |                          |
| 7       | Stop 23   |                          |
| 8       | Stop 24   |                          |
| 9       | ENABLE2+  | Enabling button          |
| 10      | ENABLE1-  |                          |
| 11      | ENABLE1+  |                          |
| 12      | ENABLE2-  |                          |

#### Note

The application evaluates the emergency stop/stop button and the enabling button via PROFIsafe.

**4.3.2 ET 200SP, electronic module 8 F-DI**

The digital electronic module 8 F-DI DC24V is, among others, used for acquisition of the safety-related signals.

The evaluation of the signals from the

- external emergency stop button
- key switch for “service mode”

are connected with 2 channels to the corresponding opposing digital module inputs (2oo2 evaluation).

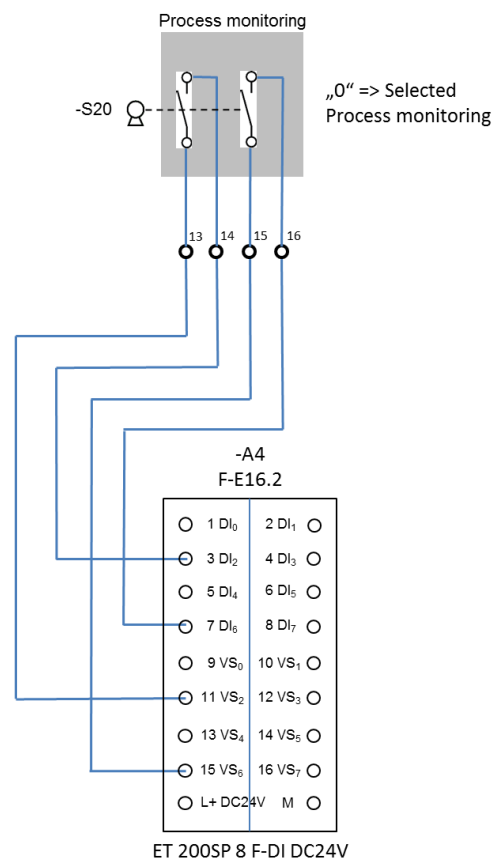
The two safety door contact elements are evaluated with one channel; they are assigned one digital input each (1oo1 evaluation).

**Pin assignment**

|               |           |  |
|---------------|-----------|--|
| Channel 0, 4: | DI0 – DI4 | (1 <sup>1</sup> ) DI0 + (9) VS0 – (5) DI4 + (13) VS4 |
| Channel 1, 5: | DI1 – DI5 | (2) DI1 + (10) VS1 – (6) DI5 + (14) VS5              |
| Channel 2, 6: | DI2 – DI6 | (3) DI2 + (11) VS2 – (7) DI6 + (15) VS6              |
| Channel 3, 7: | DI3 – DI7 | (4) DI3 + (12) VS3 – (8) DI7 + (16) VS7              |

The diagram below shows the pin assignment of the “key switch” for implementing the 2oo2 evaluation (channel 2, 6).

Figure 4-4



<sup>1</sup> The value in brackets is the terminal at the module

# 5 Configuration Instruction

## 5.1 Circuit diagram

### General information

The circuit diagram contains the data for implementing the automation task presented in chapter 1.2.

The circuit diagram corresponds to the test setup that was used to test the functionality of the automation task.

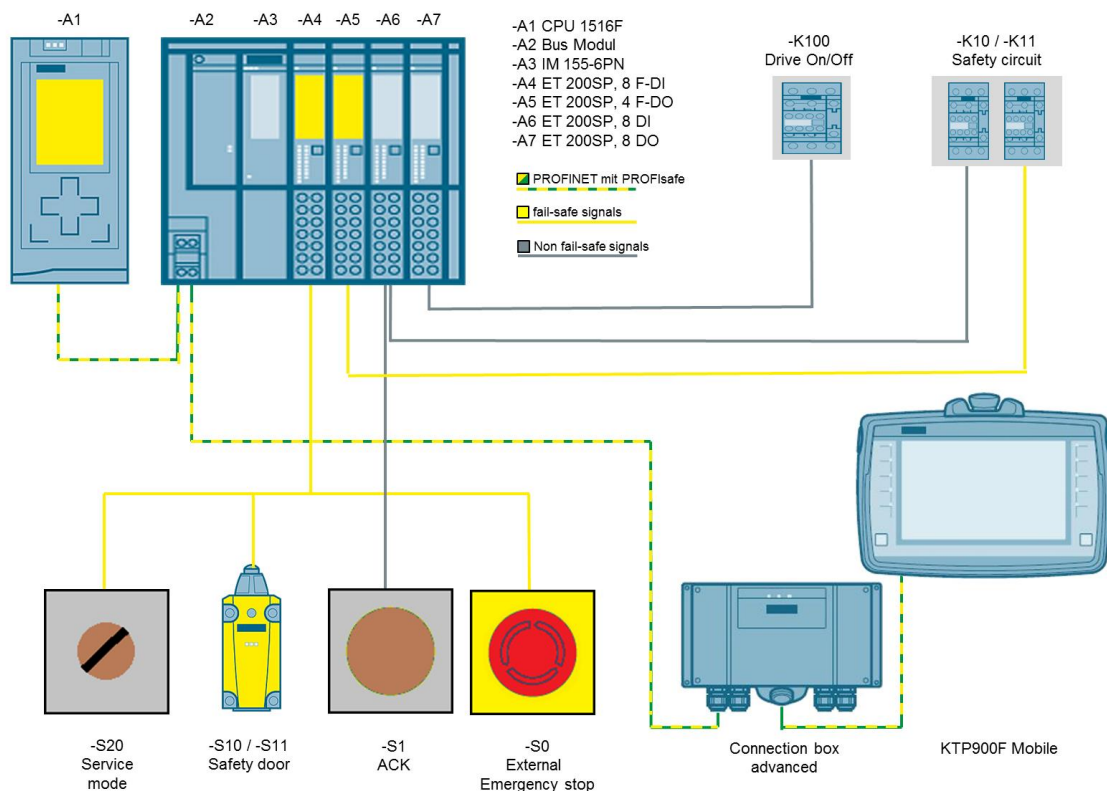
### Notes

- The circuit diagram is also included in this application as a separate document.
- Depending on the required automation task, further evaluation devices and protective measures are necessary.

### Circuit diagram, page 1

Overview of the hardware and the signal exchange between each other.

Figure 5-1

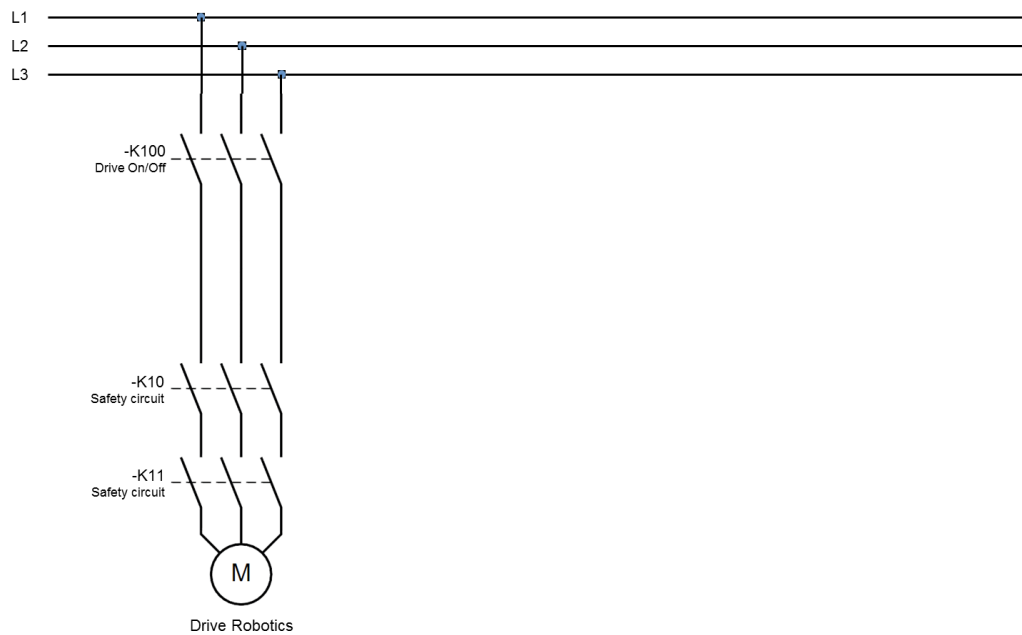


#### Circuit diagram, page 2

Overview of the load circuit.

- Contactor -K100 is used to turn the robot drive on and off.
- Contactors -K10 and -K11 (safety chain) are used to safely switch off the robot drive.

Figure 5-2



## 5 Configuration Instruction

### 5.1 Circuit diagram

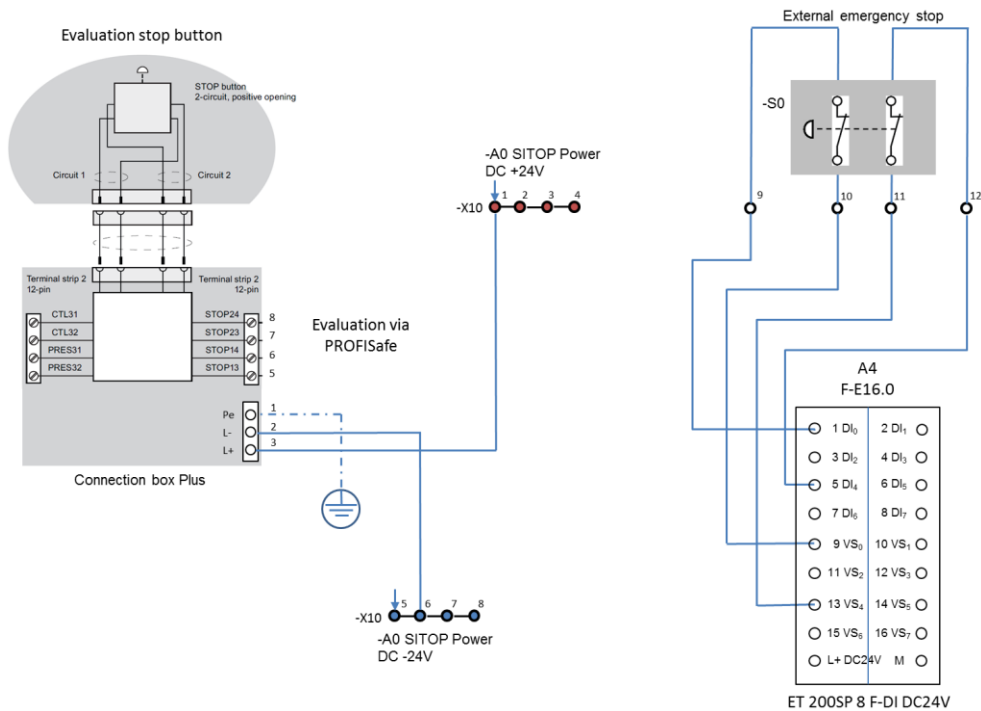
#### Circuit diagram, page 3

This page shows how to connect the external emergency stop button to the F-DI 8 module.

The pin assignment shows the implementation of the 2oo2 evaluation (channel 0, 4).

The emergency stop/stop button of the Mobile Panel are evaluated directly in the F-CPU.

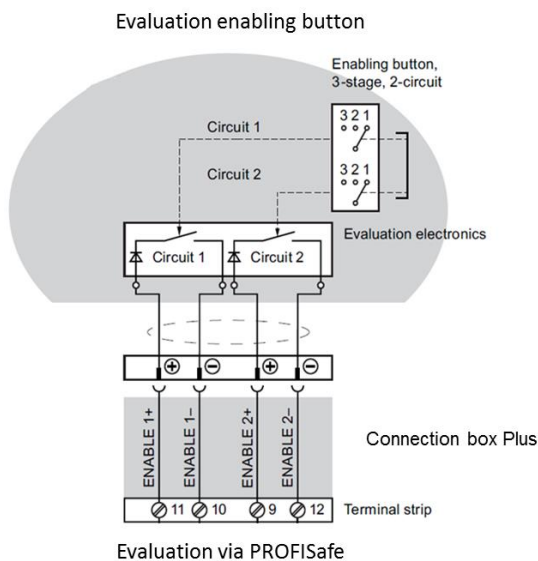
Figure 5-3



#### Circuit diagram, page 4

The enabling button is evaluated via PROFISafe.

Figure 5-4



**Circuit diagram, page 5**

This page shows how to

- connect the “service mode” key switch for to the F-DI module.

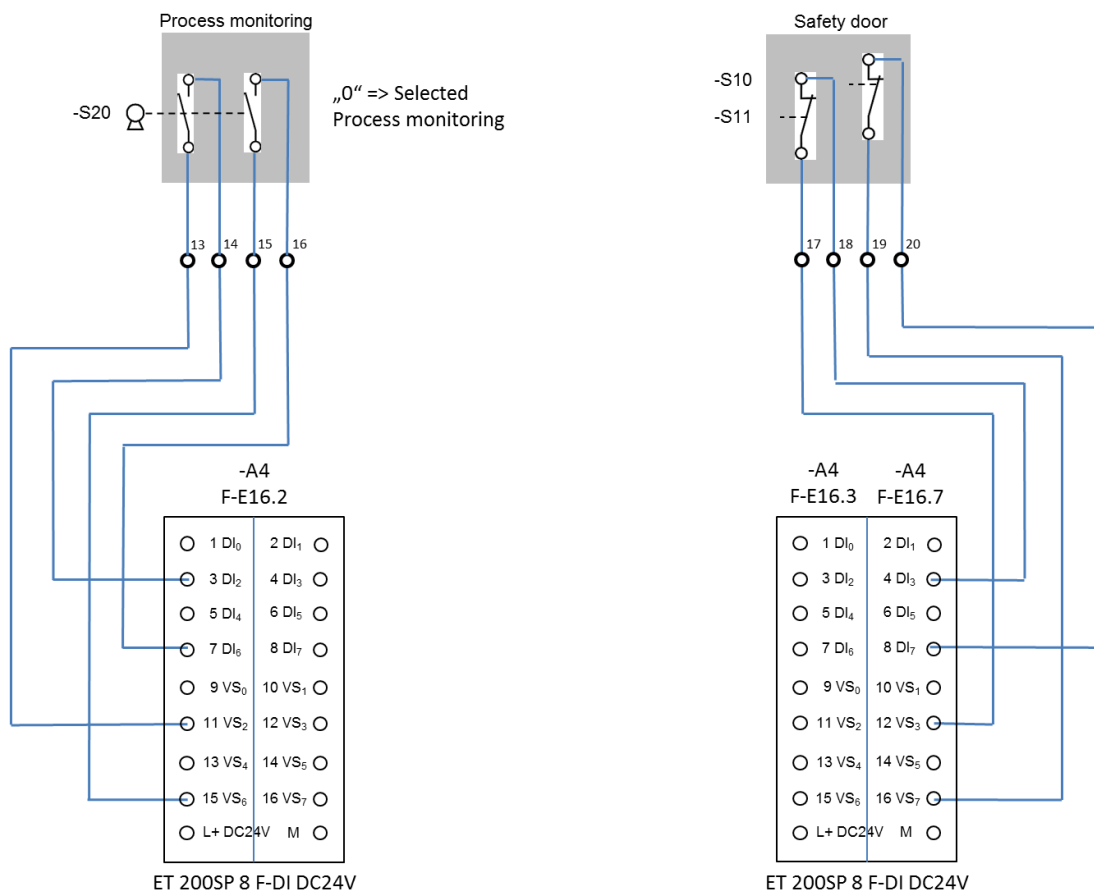
The pin assignment shows the implementation of the **2oo2 evaluation** (channel 2, 6).

- connect the safety door switch (switch -S10 and -S11) to the F-DI module.

The pin assignment shows the implementation of the **1oo1 evaluation** (channel 3 and channel 7). The discrepancy analysis is done in the control program via the standard function block FB217 “F\_SFDOOR”.

**Note** Each channel of the F-DI module can be parameterized separately.

Figure 5-5



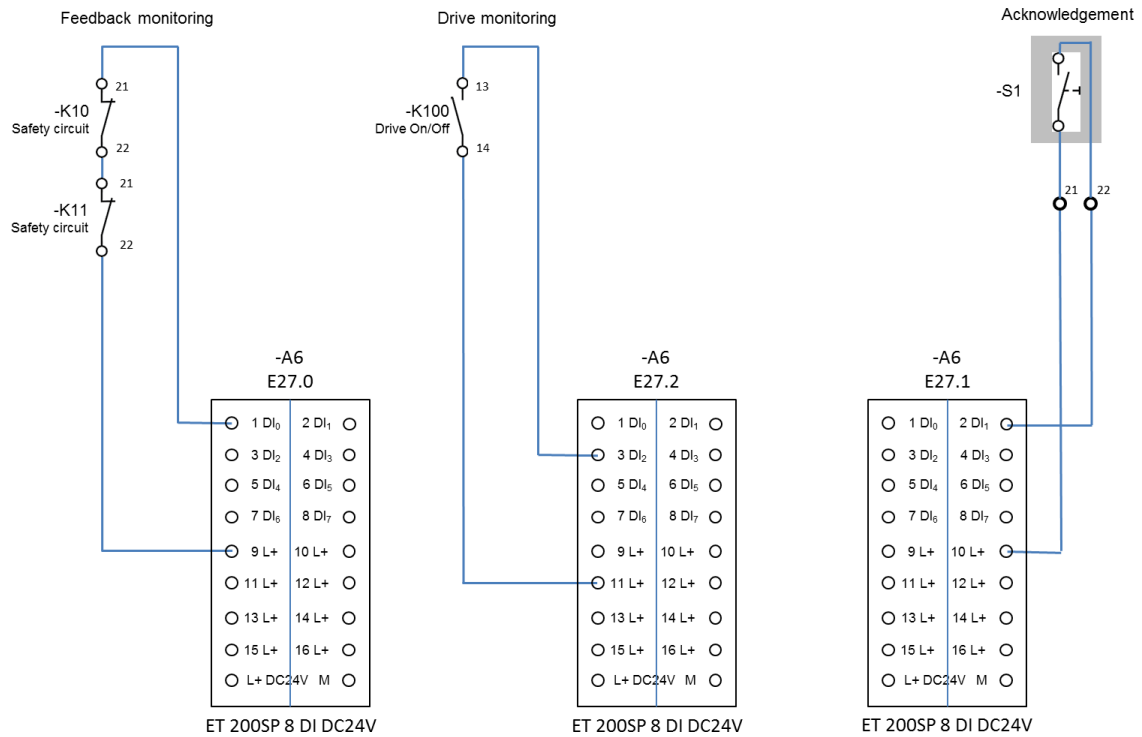
**Circuit diagram, page 6**

This page shows how to

- connect the feedback circuit monitoring of contactors -K10 and -K11 to the DI standard module.
- connect the switch-on monitoring of contactor -K100 to the DI standard module.
- connect the external button for acknowledge fault messages to the DI standard module.

The HMI panel can also be used to acknowledge fault messages. The acknowledgement is done in the control program via the standard function block FB187 "F\_ACK\_OP".

Figure 5-6





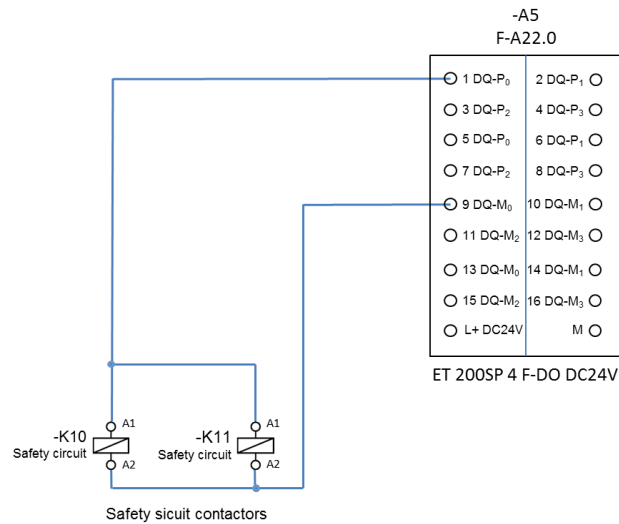
## 5 Configuration Instruction

### 5.1 Circuit diagram

#### Circuit diagram, page 7

This page shows how to connect contactors –K10 and –K11 via the F-DO module.  
The contactors are used to safely switch off the load circuit with the robot drive.

Figure 5-7



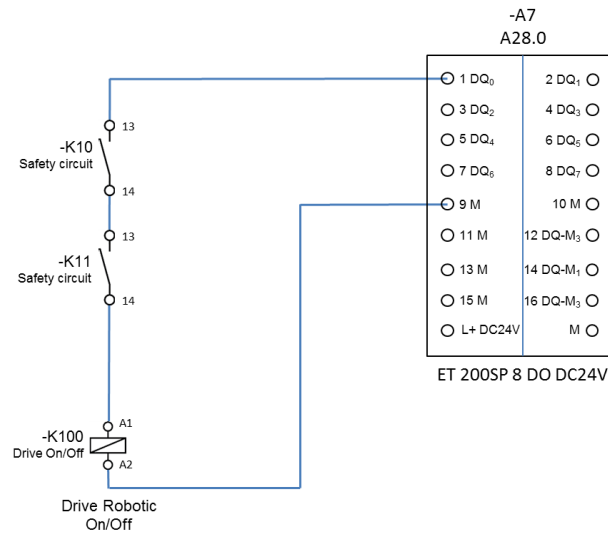
5.1 Circuit diagram

**Circuit diagram, page 8**

This page shows how to control contactor –K100 for normal startup/shutdown of the robot drive.

The contactor is controlled with a standard digital output module.

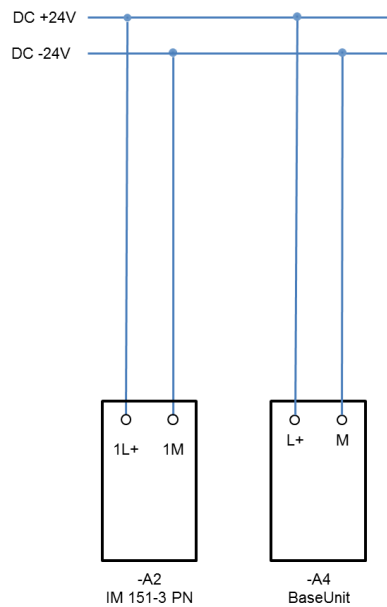
Figure 5-8



**Circuit diagram, page 9**

This page shows the voltage supply for ET200 SP

Figure 5-9



## 5.2 Configuration

### 5.2.1 General information

#### STEP 7 program

The STEP 7 program contains a standard STEP 7 program and an F program.

- The standard program is used to control the robot drive.
- The F program is used to evaluate the safety-related functions.
- An F\_FB\_KTP\_Mobile must be parameterized for each Mobile Panel.
- An F\_FB\_KTP\_RNG must be parameterized for each connection box.

#### HMI configuration

The HMI configuration contains all required functions for robot control. The robots movements are animated with a graphics list.

#### Program information

The following measures have been implemented in the STEP 7 program to avoid the risk of misuse by forbidden fixation of the enabling button.

- The enabling button must be released within a specified time frame and then be returned to the “enabling” position.  
The time frame must be specified based on the activity of the monitoring system.
- It is forbidden to use the enabling button to start the drive.
  - The enabling button must always be pressed **before** starting the drive.
  - When the “Drive on” button is pressed and the enabling button is pressed next, the drive will not be activated.

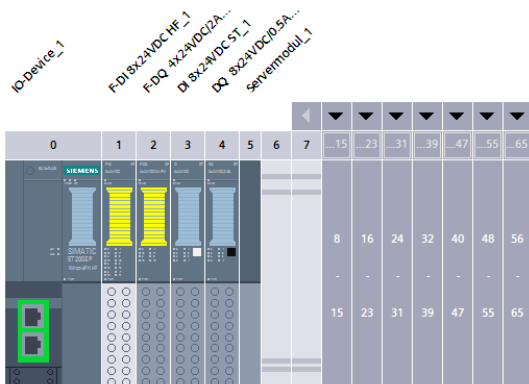
#### Note

Please note the safety information and general information in the Mobile Panel manual. (You can find the operating instructions under the following link <https://support.industry.siemens.com/cs/de/en/ps/14746/man>)

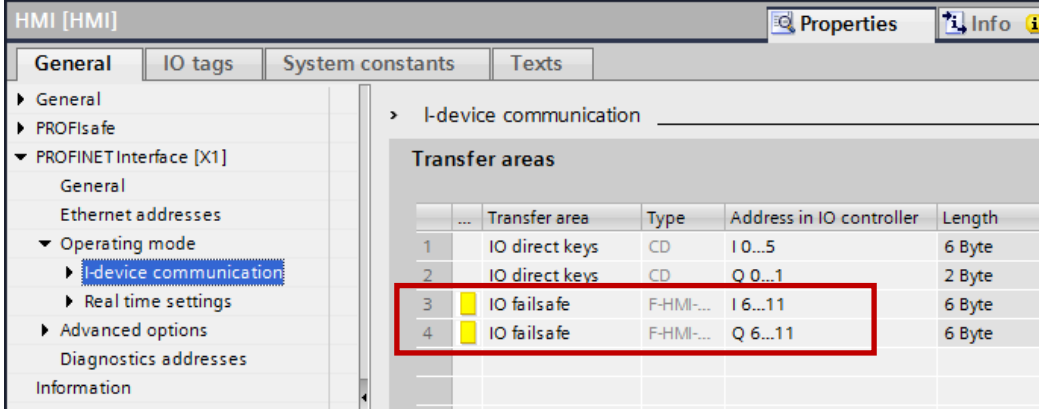
Excerpts from STEP 7 and from HMI configuration are described below in more detail.

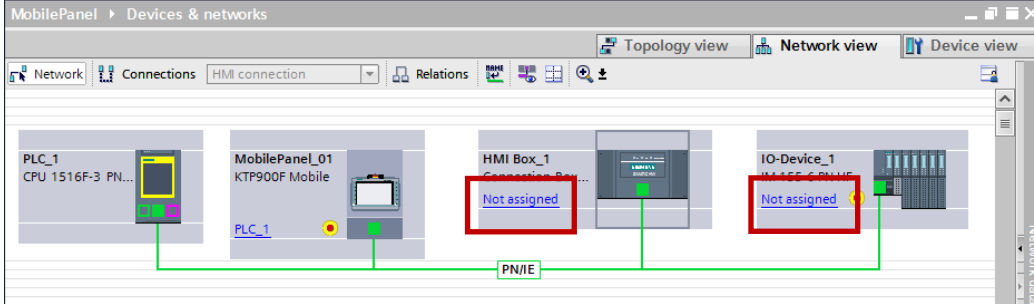
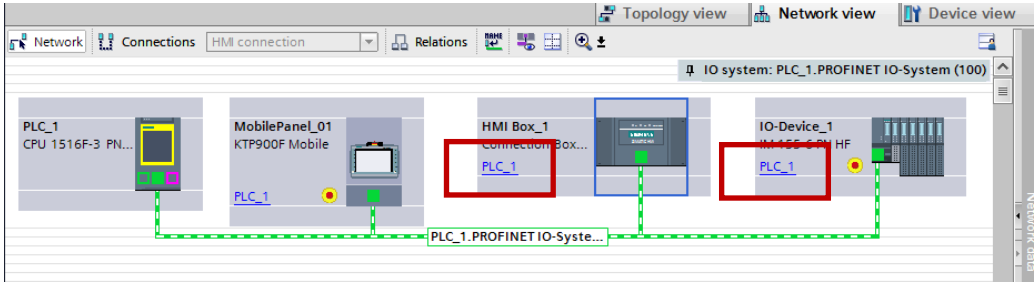
5.2.2 Hardware configuration

Table 5-1

| No. | Description   |
|-----|---|
| 1.  | <p><b>F CPU</b></p> <ul style="list-style-type: none"> <li>To add an F-CPU, click the “Add new device” button in the project tree. In this case, select a “CPU 1516F-3 PN/DP”.</li> <li>Open the F-CPU device configuration and click on the F-CPU once. The CPU properties are shown.</li> <li>Open the “<b>PROFINET interface [X1]</b>” property in the area navigation.                             <ul style="list-style-type: none"> <li><b>Ethernet addresses</b> <ul style="list-style-type: none"> <li>Interface: Use the drop-down list to select a subnet or to add a new one.</li> <li>IP protocol: Enter the IP address here.</li> <li>PROFINET: Here, you can specify your custom PROFINET device name. The name will not be evaluated.</li> </ul> </li> </ul> </li> </ul> <p>The default settings were applied to the F parameters F-CPU. Check each parameter and adjust if necessary.<br/>The list entries containing F parameters are marked with yellow rectangles.</p>   |
| 2.  | <p><b>ET 200SP</b></p> <ul style="list-style-type: none"> <li>In the hardware catalogue, select the interface module in folder “Distributed I/O &gt; ET 200SP &gt; Interface module &gt; PROFINET &gt; IM 155-6 PN HF” and drag and drop the module to the graphics area of the network view.</li> <li>Select the module and go to the device view.</li> <li>Open the “<b>PROFINET interface [X1]</b>” property in the area navigation.                             <ul style="list-style-type: none"> <li><b>Ethernet addresses</b> <ul style="list-style-type: none"> <li>Interface: Use the drop-down list to select a subnet.</li> <li>IP protocol: Enter the IP address here.</li> <li>PROFINET: Here, you can specify your custom PROFINET device name. The name will not be evaluated.</li> </ul> </li> </ul> </li> <li>In the hardware catalogue, activate the option “Filter”. All available ET 200SP components will be listed.                             <ul style="list-style-type: none"> <li>Select the folders of the components used and drag and drop the components to the module slots.</li> </ul> </li> </ul> <p>In this example: see Hardware used, chapter <a href="#">2.4.2</a></p> <p>View of the completed station configuration</p>  |



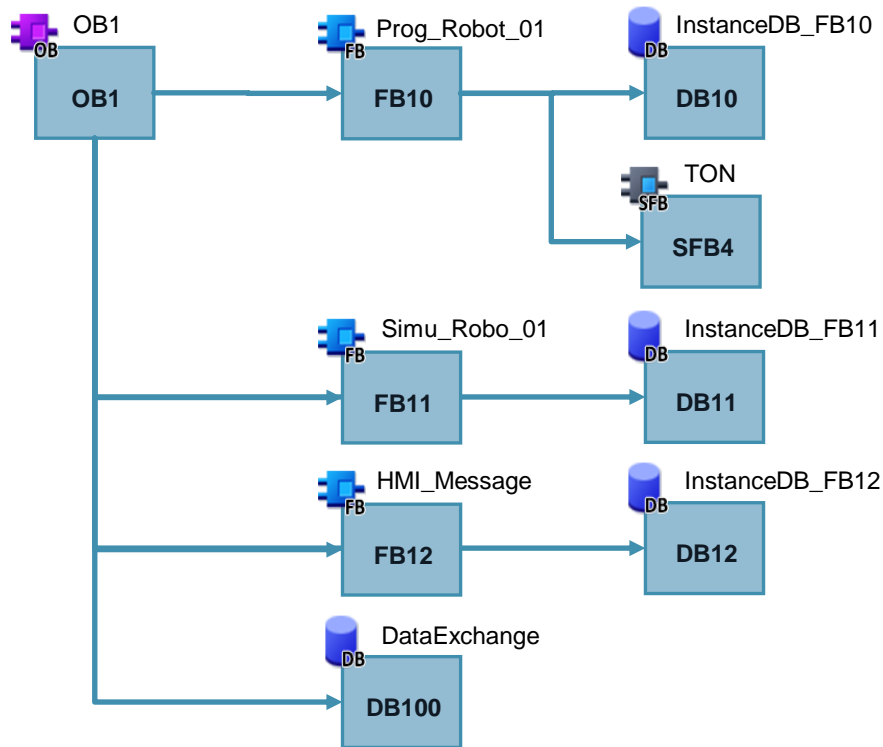
| No. | Description  |
|-----|--|
| 7.  | <p><b>Mobile Panel</b></p> <ul style="list-style-type: none"> <li>Go to the network view.</li> <li>In the hardware catalogue, select the Mobile Panel in folder “HMI &gt; SIMATIC Mobile Panel &gt; 7“ display &gt; KTP700F Mobile” and drag and drop the Mobile Panel to the graphics area of the network view.</li> <li>Select the Mobile Panel and go to the device view.</li> <li>Open the “<b>PROFINET interface [X1]</b>” property in the area navigation.               <ul style="list-style-type: none"> <li><b>Ethernet addresses</b> <ul style="list-style-type: none"> <li>IP protocol: Enter the IP address here.</li> <li>PROFINET: Here, you can specify your custom PROFINET device name. The name must be identical to the PROFINET name at the Mobile Panel under “Settings &gt; PROFINET” (<a href="#">Link</a>).</li> </ul> </li> <li><b>Mode</b> <ul style="list-style-type: none"> <li>Operating mode: Enable the “<b>IO device</b>” checkbox. You can now select the IO controller in the drop-down list.</li> </ul> </li> </ul> </li> <li>Open the “<b>PROFIsafe</b>” property in the area navigation.               <ul style="list-style-type: none"> <li><b>Activating PROFIsafe</b> <ul style="list-style-type: none"> <li>Activating PROFIsafe: Click the “Activate PROFIsafe” button. The button can only be activated, if the “IO device” option has been activated before.</li> </ul> </li> <li><b>PROFIsafe parameters</b> <ul style="list-style-type: none"> <li>F parameters: Adjust the F monitoring time manually here, if required.</li> </ul> </li> </ul> <p style="text-align: center;"><b>F-destination address:</b><br/>The F-destination address set here must be identical to the PROFIsafe address at the Mobile Panel under “Settings &gt; PROFIsafe” (<a href="#">Link</a>).</p> </li> <li>Open the “<b>PROFINET interface [X1]</b>” property in the area navigation.               <ul style="list-style-type: none"> <li><b>Mode</b> <ul style="list-style-type: none"> <li>I-Device communication: You can now edit the transfer areas for the input and output areas for “IO failsafe”. The addresses are evaluated in the “<b>F_FB_KTP_Mobile</b>” block in the F program (<a href="#">Link</a>).</li> </ul> </li> </ul> </li> </ul> |
|     |  <p><b>HMI connection</b></p> <ul style="list-style-type: none"> <li>Go to the network view.</li> <li>Create an HMI connection between the F-CPU and the Mobile Panel.</li> </ul>  |

| No. | Description   |
|-----|---|
| 8.  | <p><b>Connection box</b></p> <ul style="list-style-type: none"> <li>Go to the network view.</li> <li>In the hardware catalogue, select the connection box in folder “HMI &gt; SIMATIC Mobile Panel &gt; System Components &gt; Connection Box advanced” and drag and drop the connection box to the graphics area of the network view.</li> <li>Select the connection box and go to the device view.</li> <li>Open the “<b>PROFINET interface [X1]</b>” property in the area navigation.               <ul style="list-style-type: none"> <li><b>Ethernet addresses</b> <ul style="list-style-type: none"> <li>Interface: Use the drop-down list to select a subnet.</li> <li>IP protocol: Enter the IP address here.</li> <li>PROFINET: Here, you can specify your custom PROFINET device name. The name will not be evaluated.</li> </ul> </li> </ul> </li> </ul> |
| 9.  | <p><b>Assigning an IO controller</b></p>  <ul style="list-style-type: none"> <li>Go to the network view.</li> <li>Assign an IO controller to the ET 200SP and the connection box (in this case the parameterized F-CPU).           <ul style="list-style-type: none"> <li>Left click on the text “Not assigned” with blue background. A window opens.</li> <li>In the window, select the IO controller.</li> <li>The name of the assigned IO controller is displayed at the module.</li> </ul> </li> </ul> <p>View of the completed hardware configuration</p>   |
| 10. | <p><b>Adjusting I/O addresses (ET 200SP)</b></p> <p>To change the default addresses of the ET 200SP, the station must be assigned to an IO controller (in this case the F-CPU). Otherwise, the entry field is grayed out.</p>   |

5.2.3 STEP 7 standard program

Program structure

Figure 5-10



Content of the blocks

Table 5-2

| No. | Description  |
|-----|--|
| 1.  | <b>OB1</b><br>The blocks listed in the program structure are called with OB1.  |
| 2.  | <b>FB10</b><br>FB10 contains the control program for the robot drive.  |
| 3.  | <b>FB11</b><br>FB11 contains the program to simulate the robot movement on the HMI panel.  |
| 4.  | <b>FB12</b><br>FB12 generates fault messages and warning messages that are output via the HMI panel.   |
| 5.  | <b>SFB4</b><br>This block generates a switch-on delay.<br>The standard block can be found under "Instructions > Basic instructions > Timer operations".  |
| 6.  | <b>DB100</b><br>DB100 contains the data for the data exchange <ul style="list-style-type: none"> <li>• between HMI panel and control program</li> <li>• between each program block.</li> </ul> |
| 7.  | <b>DB10, DB11, DB12</b><br>Instance data block for the assigned function blocks.   |



**Description of the blocks****FB10, Prog\_Robot-01**

FB10 contains the essential program steps to control the robot drive.

Table 5-3

| No. | Description   |
|-----|---|
| 1.  | <p><b>Network 4, automatic mode</b></p> <p>To ensure that the function button for switching on the drive cannot be “fixated”, the signal is polled via a positive edge.</p>   |
| 2.  | <p><b>Network 5, manual mode</b></p> <ul style="list-style-type: none"> <li>• To ensure that the function button for switching on the drive cannot be “fixated”, the signal is polled via a positive edge.</li> <li>• In “Manual mode”, the system is switched on/off with a function button -&gt; jog mode.</li> </ul>   |
| 3.  | <p><b>Network 6, service mode</b></p> <ul style="list-style-type: none"> <li>• To ensure that the function button for switching on the drive cannot be “fixated”, the signal is polled via a positive edge.</li> <li>• In “Service mode”, the system is switched on/off with a function button -&gt; jog mode.</li> </ul>   |
| 4.  | <p><b>Network 8, feedback circuit monitoring</b></p> <p>The network monitors possible functional errors of contactor –K100 “Robot drive on/off”. To do this, one make contact was wired from the contactor to one input. When the drive is off and the input signals a “1 signal”, for example, then there is a malfunction.</p> <p><b>Note</b><br/>The monitoring is <b>not</b> a safety-relevant function. It is not used to safely shut down the drive. Safe shutdown is evaluated by the F program.</p> |
| 5.  | <p><b>Network 9, output of the selected operating mode</b></p> <p>The current operating mode is output in a text list at the HMI panel. The evaluation is performed in this network.</p>  |
| 6.  | <p><b>Network 10, output of Safety door open/closed</b></p> <p>The HMI panel shows an animation of the open or closed safety door. The evaluation is performed in this network.</p>   |

#### **FB11, Simu\_Robot-01**

FB11 simulates the robot movements and the elevator.

The robot movements are simulated on the HMI panel via a graphics list. Depending on the selected operating mode, the execution is displayed with different speeds.

The speed of the execution is preset with a clock memory.

Table 5-4

| No. | Description   |
|-----|---|
| 1.  | <b>Network 1, movement in "Automatic" mode.</b><br><br>The speed of the execution is "simulated" using a clock memory.<br>In this example: M10.0 (5 Hz, 0.1 sec). |
| 2.  | <b>Network 2, movement in "Manual" mode.</b><br><br>The speed of the execution is "simulated" using a clock memory.<br>In this example: M10.2 (2.5 Hz, 0.4 sec).  |
| 3.  | <b>Network 3, movement in "Service" mode.</b><br><br>The speed of the execution is "simulated" using a clock memory.<br>In this example: M10.3 (2 Hz, 0.5 sec).   |

#### **FB12, HMI\_Message**

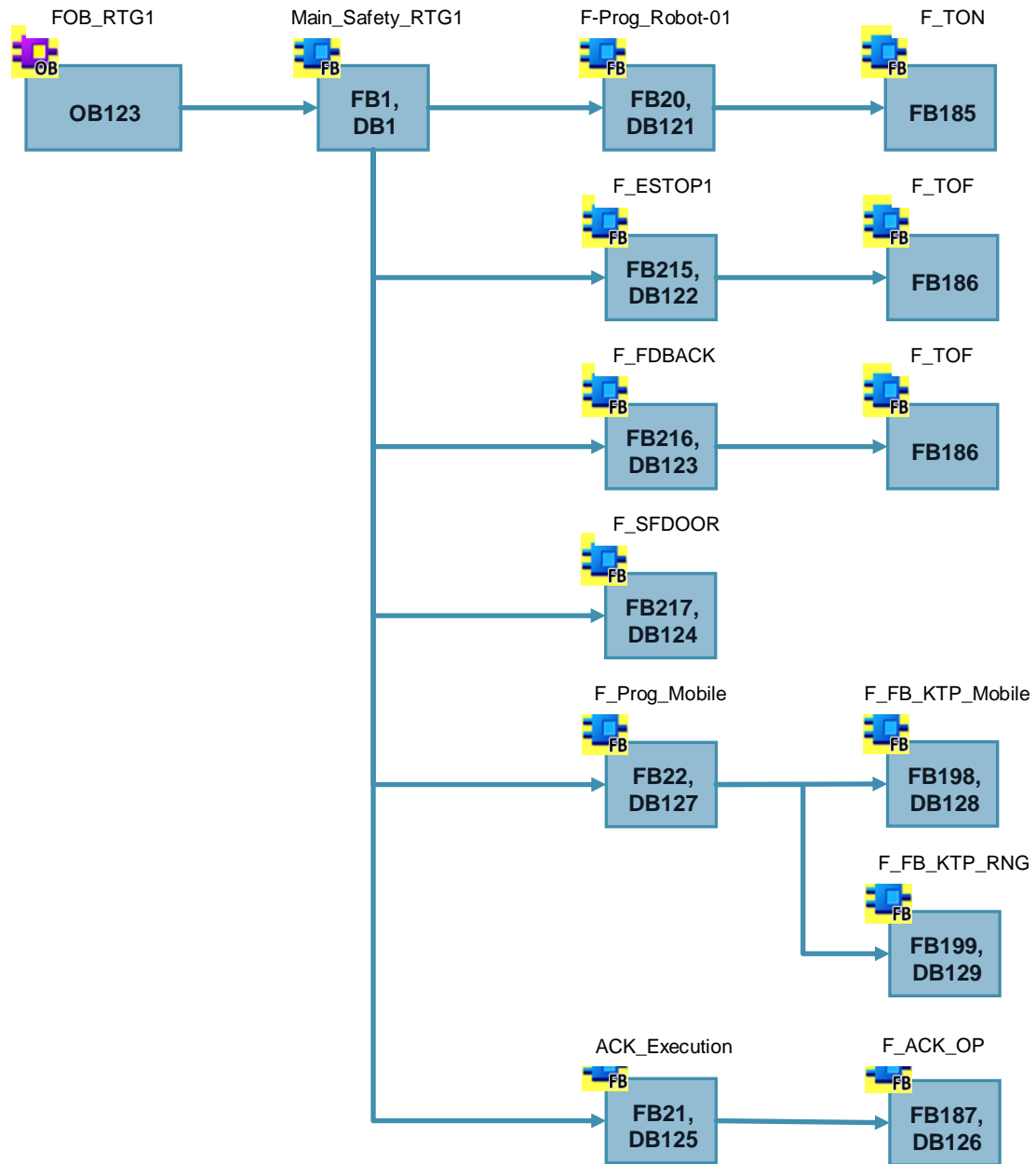
FB12 evaluates fault messages and warning messages that are output via the HMI panel.

It does not use special functions.

5.2.4 STEP 7 program

F program structure

Figure 5-11



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Content of the blocks

Table 5-5

| No. | Description  |
|-----|--|
| 1.  | <b>FOB_RTG1</b><br>F-runtime group. FB1 "Main_Safety_RTG1" is called with this OB. |

## 5 Configuration Instruction

### 5.2 Configuration

| No. | Description   |
|-----|---|
| 2.  | <p><b>FB1, DB1</b></p> <p>FB1 serves to coordinate the subsequent F block calls. All subsequent FBs are called with this FB.</p>  |
| 3.  | <p><b>FB20, DB120</b></p> <p>FB20 evaluates</p> <ul style="list-style-type: none"> <li>• if the safety circuit is closed           <ul style="list-style-type: none"> <li>- Emergency stop OK</li> <li>- Safety door closed</li> <li>- F-DI and F-DO modules OK</li> <li>- etc.</li> </ul> </li> <li>• if the enabling button is being pressed</li> <li>• "Service mode" is activated.</li> </ul> <p>FB185 is called to generate a switch-on delay.</p>   |
| 4.  | <p><b>FB215, DB122, Emergency stop switch-off with acknowledgement</b></p> <p>FB215 is a protected standard function block from the F library.<br/>The block realizes an emergency stop switch-off with acknowledgement. The block internally requires FB186 "F_TOF" (switch-off delay).</p>  |
| 5.  | <p><b>FB216, DB123, Feedback circuit monitoring</b></p> <p>FB216 is a protected standard function block.<br/>The block realizes feedback circuit monitoring.<br/>The block internally requires FB186 "F_TOF" (switch-off delay).</p>  |
| 6.  | <p><b>FB217, DB124, Safety door monitoring</b></p> <p>FB217 is a protected standard function block from the F library.<br/>The block realizes safety door monitoring.</p>   |
| 7.  | <p><b>FB22, DB127, Mobile Panel evaluation</b></p> <p>FB22 evaluates the emergency stop/stop button and the enabling button of the Mobile Panel.<br/>The following failsafe HMI blocks are called for evaluation.</p> <ul style="list-style-type: none"> <li>• F_FB_KTP_Mobile (monitors the assigned operator panel)           <ul style="list-style-type: none"> <li>- An F_FB_KTP_Mobile is required for each Mobile Panel.</li> </ul> </li> <li>• F_FB_KTP_RNG (prepares the output user data)           <ul style="list-style-type: none"> <li>- An F_FB_KTP_RNG is required for each connection box.</li> </ul> </li> </ul> |
| 8.  | <p><b>FB21, DB125, Acknowledgement</b></p> <p>FB21 evaluates the acknowledgement with</p> <ul style="list-style-type: none"> <li>• the external acknowledgement button</li> <li>• the panel.</li> </ul> <p>To acknowledge using the Panel, FB187, DB126 is required.<br/>FB187 is a protected standard function block.<br/>The block realizes fail-safe acknowledgement using a panel.</p>  |

| No. | Description   |
|-----|---|
| 9.  | <b>DB120</b><br>DB120 contains the data for the data exchange <ul style="list-style-type: none"> <li>• between the standard program and the F program</li> <li>• within the F program.</li> </ul> |
| 10. | <b>DB1, DB121, DB122, DB123, DB124, DB125, DB126, DB127, DB128, DB129</b><br>Instance data block for the assigned function blocks.  |
| 11. | <b>OB82, OB83, OB86</b><br>These blocks are required in connection with the F program.<br>The blocks do not contain program elements.   |

**Note** Please refer to the online help for more information on the standard function blocks used.

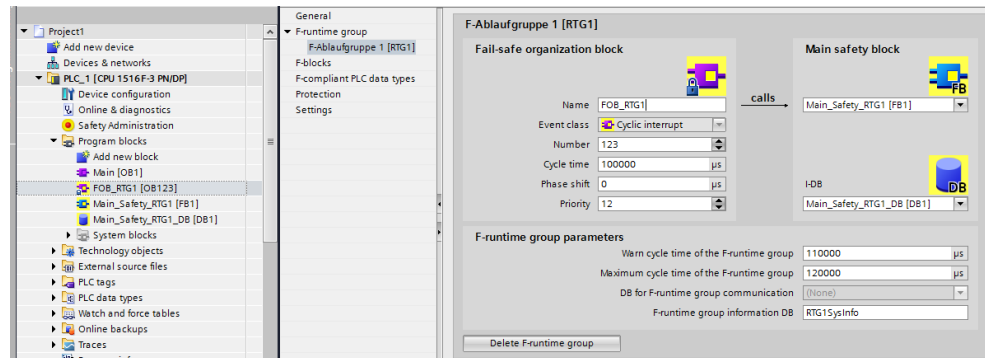
**F-runtime group (FOB\_RTG1, OB123)**

When adding the F-CPU, STEP 7 Safety automatically adds an F-runtime group. Open the “Program blocks” folder to see the F blocks for the F-runtime group.

F blocks of the F-runtime group

- Main\_Safety [FB1]
- Main\_Safety\_DB [DB1]

Figure 5-12



**FB1, Main\_Safety\_RTG1**

FB1 calls all F function blocks and parameterizes them according to the input/output parameters.

There are not “logic connections” in this FB.

**Note** Please make sure that the acknowledgement, in this case FB21, is always called up at the end.

**FB20, F-Prog\_Robot-01**

FB20 connects the safety circuit signals and the enabling button signals.

Table 5-6

| No. | Description  |
|-----|--|
| 1.  | <p><b>Network 1</b></p> <p><b>Evaluation of the safety circuit</b></p> <p>The network evaluates whether the safety chain is OK (emergency stop, etc.). At what point the safety door may be open during operation and when not is considered in the evaluation.</p>  |
| 2.  | <p><b>Network 3</b></p> <p><b>Evaluation of the enabling button</b></p> <p>The time period in which the enabling button is being pressed is monitored to avoid the risk of misuse by forbidden fixation of the enabling button.<br/>                     The preset time period is transferred to the block as "IN parameter".<br/>                     In this case, the enabling button must be released after 10 seconds (see FB20 call in FB1, network 1).<br/>                     This is monitored by SFB4 "TON" switch-on delay.</p> <p><b>Information on SFB 4 "TON" switch-on delay</b></p> <p>SFB4 can be parameterized with a FB,DB call (instance DB) or, like in this example, with a multi instance call (multi instance DB).</p> |

**FB21, ACK\_Execution**

FB21 evaluates the acknowledgement.

Table 5-7

| No. | Description   |
|-----|---|
| 1.  | <p><b>Network 1</b></p> <p><b>Acknowledging using the panel</b></p> <p>The standard function block “FB187” (F_ACK_OP) makes safe acknowledgement via the panel. For this, two buttons are required at the HMI panel (see <a href="#">Link</a>).</p> <p>A tag from a standard DB is used as “IN parameter”.</p> <p>Detailed information on fail-safe acknowledgement can be found in the STEP 7 online help.</p> |
| 2.  | <p><b>Network 2</b></p> <p><b>Evaluation and output of the acknowledgement</b></p> <p>The acknowledgement signal from the “external acknowledgement button” and the “Acknowledgement” from the panel are combined via the network.</p> <p>It is output to three outputs.</p>  |

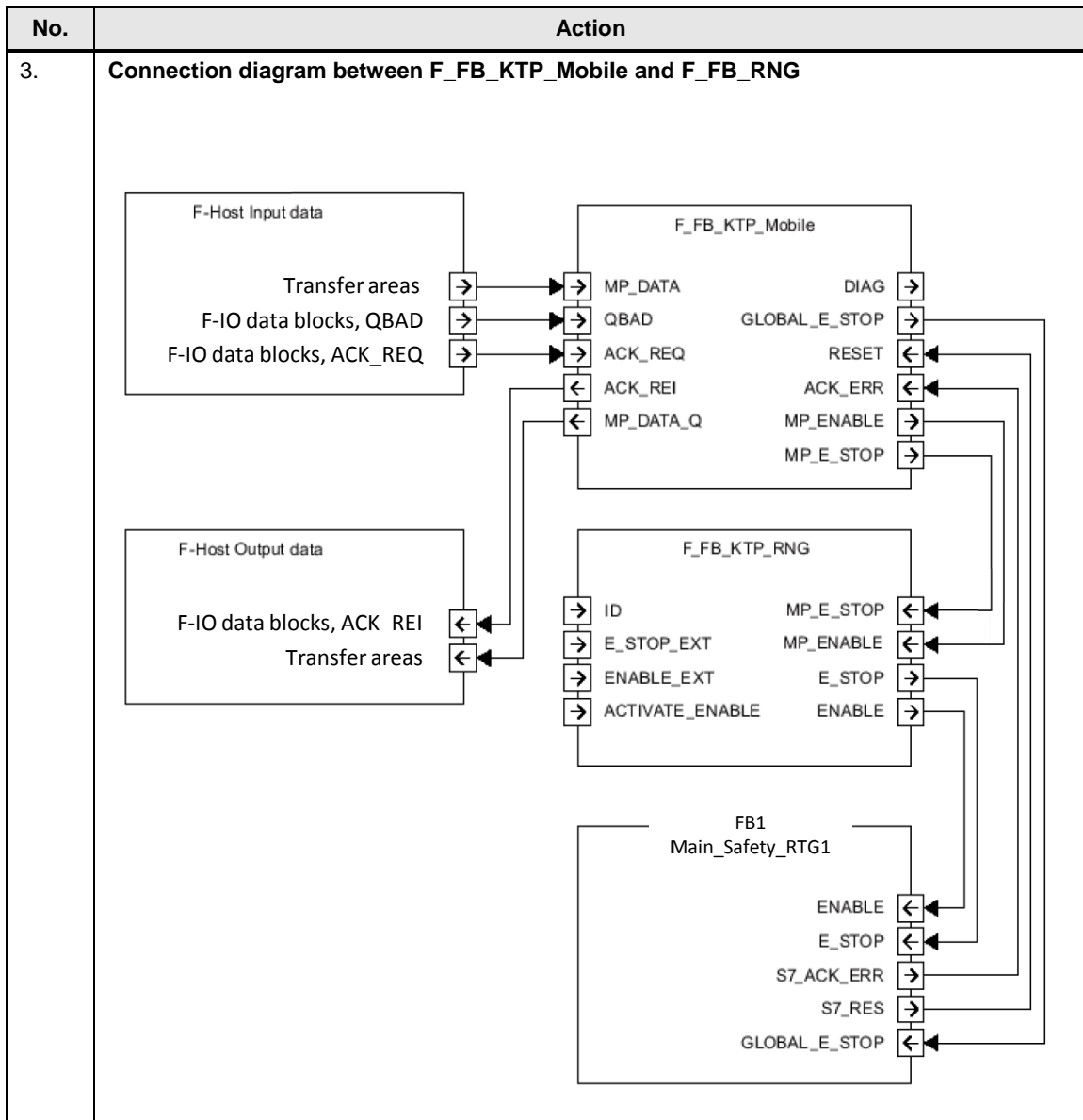
**FB22, F-Prog\_MobilePanel**

FB22 evaluates the emergency stop/stop button and the enabling button.

Table 5-8

| No.                          | Action   |                              |     |                          |    |
|------------------------------|--|------------------------------|-----|--------------------------|----|
| 1.                           | <p><b>Network 1</b></p> <p><b>Calling F_FB_KTP_Mobile</b></p> <p>The FB can be found in the “Instructions” task card. Select the “Communication” tab.<br/>For detailed description on how to parameterize the FB, refer to the online Help.</p> <p><b>Information on the parameters</b></p> <ul style="list-style-type: none"> <li>• Instance DB <ul style="list-style-type: none"> <li>- A multi instance DB can be used for the instance DB to be created.</li> </ul> </li> <li>• QBAD / ACK_REQ /ACK_REI <ul style="list-style-type: none"> <li>- When the Mobile Panel was parameterized, an initial address for IO failsafe was stored under the properties<br/>“General &gt; PROFINET interface [X1] &gt; Operating mode &gt; I-Device communication” in the field “Transfer areas” (<a href="#">Link</a>).<br/>The system will create an F-I/O DB of this transfer area. The DB is stored in the project tree under “Program blocks &gt; System blocks &gt; STEP 7 Safety &gt; F-I/O DBs”.<br/>The name is composed as follows:<br/>“F000”“failsafe address”_ “Name of the Mobile Panel”“[F-I/O DB number]”</li> </ul> </li> </ul> <p>In the example project “<b>F00006_MobilePanel_01 [DB30017]</b>”.</p> <p>Navigate to this DB and select the “QBAD” or “ACK_REI” tag.</p> <ul style="list-style-type: none"> <li>• MP_Data / MP_Data_Q <ul style="list-style-type: none"> <li>- Create an “Integer” type “PLC tag” for each parameter. Use the initial address from the transfer area of the Mobile Panel (IO failsafe address).</li> </ul> </li> </ul> <p><b>Note</b><br/>Parameter “MP_Data / MP_Data_Q”<br/>- For a SIMATIC S7-1500, use an “INTEGER” type tag.<br/>- For a SIMATIC S7-300, use a “WORD” type tag.</p> |                              |     |                          |    |
| 2.                           | <p><b>Network 2</b></p> <p><b>Calling F_FB_KTP_RNG</b></p> <p>The FB can be found in the “Instructions” task card. Select the “Communication” tab.<br/>For detailed description on how to parameterize the FB, refer to the online Help.</p> <p><b>Information on the parameters</b></p> <ul style="list-style-type: none"> <li>• Instance DB <ul style="list-style-type: none"> <li>- A multi instance DB can be used for the instance DB to be created.</li> </ul> </li> <li>• ID <ul style="list-style-type: none"> <li>- The connection box is uniquely identified by the ID of the connection box. The value is specified in “decimal” format. (In the connection box, the ID is entered in “Hex” format - <a href="#">Link</a>).</li> </ul> </li> </ul> <p>In the example project</p> <table style="width: 100%; border: none;"> <tr> <td style="padding-left: 20px;">- Connection box ID entered:</td> <td style="text-align: right;">22h</td> </tr> <tr> <td style="padding-left: 20px;">- “ID” parameter preset:</td> <td style="text-align: right;">33</td> </tr> </table>   | - Connection box ID entered: | 22h | - “ID” parameter preset: | 33 |
| - Connection box ID entered: | 22h  |                              |     |                          |    |
| - “ID” parameter preset:     | 33   |                              |     |                          |    |





## 5.3 HMI configuration

### 5.3.1 General information

The HMI configuration does not include specifically parameterized functions. The safety-related functions of the Mobile Panel like

- emergency stop/stop button
- and the enabling button

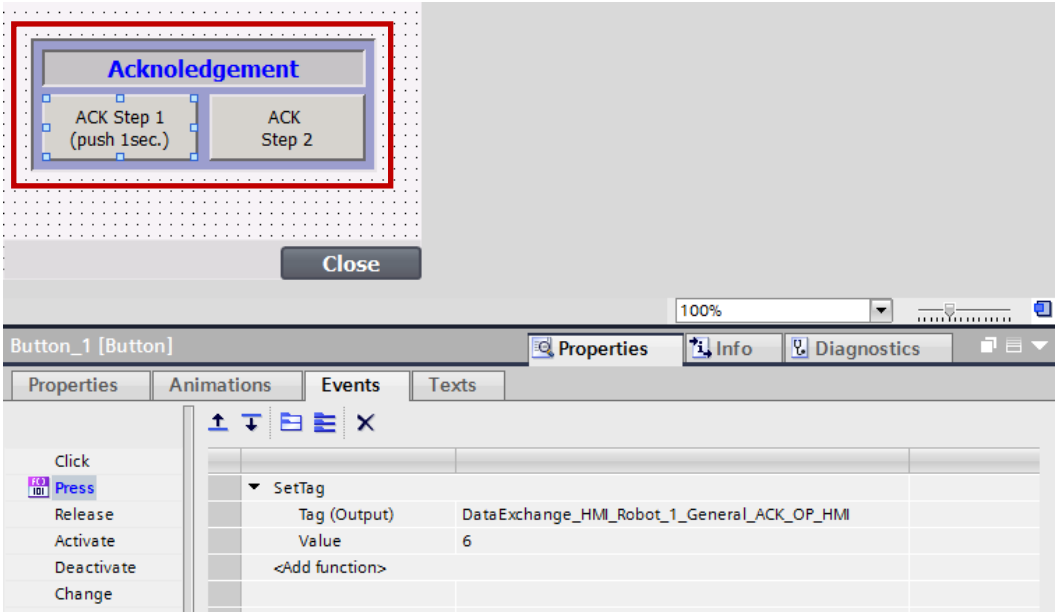
are evaluated via the F program.

The following functions have been included in the Mobile Panel configuration.

- “Manual mode”
  - The operating mode can only be selected via the Mobile Panel with a password protected button.
  - The drive can only be activated in “jog mode”.
- “Service mode”
  - This operating mode is selected with an external key switch. The key switch integrated in the Mobile Panel **must not** be used for this.
  - The drive can only be activated in “jog mode”.

**5.3.2 Acknowledging using the panel**

Table 5-9

| No. | Description  |
|-----|--|
| 1.  | <p><b>Acknowledging using the panel</b></p> <p>In connection with FB187 (F_ACK_OP), the panel can be used for fail-safe acknowledgement. For this, two buttons are required.</p> <ul style="list-style-type: none"> <li>• Button 1                     <ul style="list-style-type: none"> <li>- Assign the "SetValue" function to this button under "Events &gt; Press".</li> <li>- This tag is from a "Standard DB".<br/>In the example, the "DB100.DBW6" tag is assigned the value "6" via the button.</li> </ul> </li> <li>• Button 2                     <ul style="list-style-type: none"> <li>- Assign the "SetValue" function to this button under "Events &gt; Press".</li> <li>- This tag is from a "Standard DB".<br/>In the example, the "DB100.DBW6" tag is assigned the value "9" via the button.</li> </ul> </li> </ul> <p>Again, please refer to FB21 <a href="#">Link</a>.</p> <p>The acknowledgement buttons were configured in a "pop-up window".</p>  |

## 5.4 Device settings

### General information

The following settings refer to the use of PROFIsafe for the communication between the Mobile Panel and the F-CPU.

#### 5.4.1 Connection box

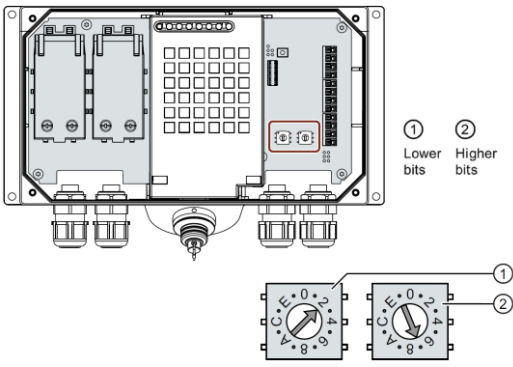
##### Connection box ID

The connection box is uniquely identified by the ID preset at the connection box. The ID must be unique throughout the system.

The ID must be identical with the address stored in the Mobile Panel ([Link](#)) and the address assigned to the F block "F\_FB\_KTP\_RNG" ([Link](#)).

### Setting the box ID

Table 5-10

| No. | Figure   | Action   |
|-----|--|--|
| 1.  |  | <ul style="list-style-type: none"> <li>Turn the arrows of the rotary coding switch to the required hexadecimal value with a suitable tool.</li> </ul> <p>In the example on the left, the box ID "27H" (39 in decimal format) is set.</p> <p><b>Notes</b></p> <ul style="list-style-type: none"> <li>The rotary coding switches can set values from "00" to "ff" (0 to 255 in decimal format).</li> <li>The value "00" must only be used for the "Stop button evaluated by safety relay" operating mode.</li> <li>The value "FF" (255) is reserved and must not be used.</li> </ul> |

### 5.4.2 Mobile Panel

#### General information

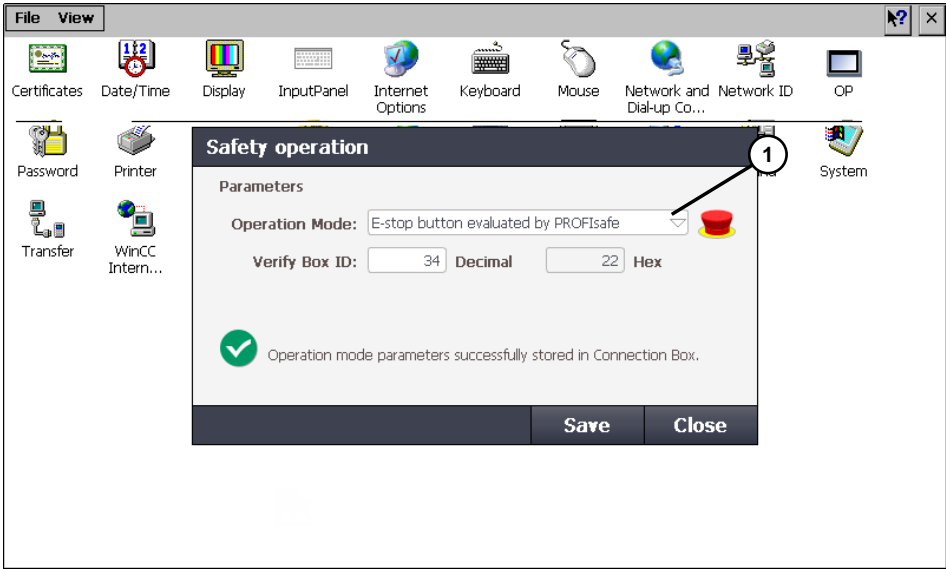
It is assumed that the Mobile Panel is connected to the connection box and the box ID has been set.

Table 5-11

| No. | Action   |
|-----|--|
| 1.  | <p><b>Opening the control panel</b></p> <p>Open the control panel through the “Start Center” and the “Settings” button.</p>  |
| 2.  | <p><b>Setting the Ethernet address</b></p> <ul style="list-style-type: none"> <li>• Open the “Network and dial-up connections” dialog.</li> <li>• Enter the IP address.</li> </ul> <p>In this example:      172.16.34.210<br/>                                 255.255.0.0</p>   |
| 3.  | <p><b>Transfer settings</b></p> <ul style="list-style-type: none"> <li>• Open the “Transfer” dialog</li> <li>• In “Transfer channel”, select <b>PN/IE</b>.</li> </ul>  |
| 4.  | <p><b>Assign password</b></p> <ul style="list-style-type: none"> <li>• Open the “Password” dialog</li> <li>• Assign a password.</li> </ul> <p>The password is required/used for the “Safety Operation” function (<a href="#">Link</a>). In addition, the access to the control panel is protected (<a href="#">Link</a>).</p> <p>In this example:      100</p> |
| 5.  | <p><b>Enter PROFINET name</b></p> <ul style="list-style-type: none"> <li>• Open the “PROFINET” dialog.</li> <li>• Activate the “PROFINET IO enabled” checkbox.</li> <li>• Enter the PROFINET name. This must be identical to the name stored in the configuration (<a href="#">Link</a>).</li> </ul> <p>In this example:      mobile</p>                       |
| 6.  | <p><b>Enter PROFIsafe address</b></p> <ul style="list-style-type: none"> <li>• Open the “PROFIsafe” dialog.</li> <li>• Enter the PROFIsafe address. This must be identical to the address stored in the configuration (<a href="#">Link</a>).</li> </ul> <p>In this example:      1</p>  |

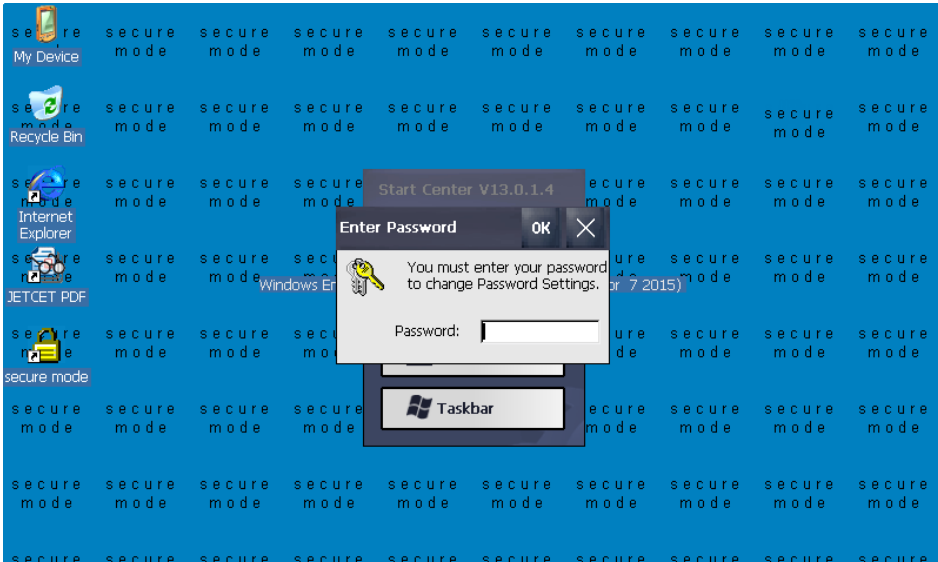
## 5 Configuration Instruction

### 5.4 Device settings

| No. | Action   |
|-----|--|
| 7.  | <p><b>Safety Operation</b></p> <ul style="list-style-type: none"><li>• Open the “Safety Operation” dialog.</li><li>• Select “E-Stop button evaluated by PROFIsafe” from the drop-down list (1).</li><li>• Enter the connection box ID in the “Decimal field” (in decimal format). The “Hex value” is output automatically. The box ID must be identical to the address stored in the connection box (<a href="#">Link</a>).</li></ul> <p>In this example:          22h (34 decimal)</p> <ul style="list-style-type: none"><li>• Confirm the entry with the “<b>Save</b>” button. A password prompt window opens.</li><li>• Enter the stored password (<a href="#">Link</a>).</li></ul> <p>In this example:          100</p> <ul style="list-style-type: none"><li>• When the entered box ID and the password match, this is indicated with a green “check mark”.</li><li>• Close the window with the “Close” button.</li></ul>  |

## 5 Configuration Instruction

### 5.4 Device settings

| No. | Action  |
|-----|---|
| 8.  | <p>The hardware settings are now complete.<br/>Close the control panel.</p> <p><b>Note</b><br/>After a password has been assigned, the start screen will display “<b>secure mode</b>”.<br/>The “Settings” and “Taskbar” buttons can only be accessed after the password has been entered.</p>  |

## 6 Operating the Application

### 6.1 General information

#### Screens

The HMI configuration comprises the following screens:

- Screen\_00\_Home (start screen)
- Screen\_01\_Robo1 (robot control)
- Screen\_02\_Settings (panel settings)
- Screen\_03\_AlarmView (Alarm message view)
- Screen\_04\_Diagnostic (Diagnostics view)

#### Slide-in bars

- Slide-in bar on the right (navigation panel)
- Slide-in bar at the top (fault message window)

#### Pop-up screens

- Pop-up ACK\_HMI
- Pop-up alarm



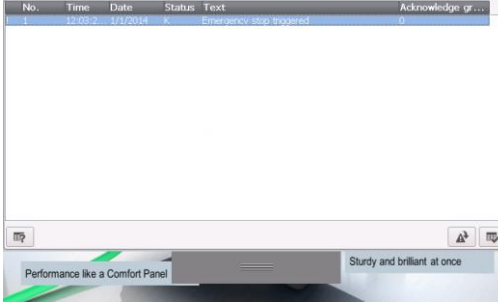
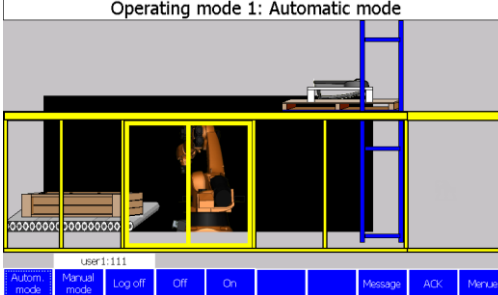
#### Fault acknowledgment

- When there is a fault during operation, e.g. because the emergency stop/stop button was activated at the Mobile Panel, the cause of the fault must be rectified (unlock emergency stop/stop button) and the message must be acknowledged.
- Use the “ACK” button or the “Pop-up-ACK\_HMI” pop-up screen to acknowledge the fault.
- After the CPU voltage supply is switched off and switched back on again, the safety door must be opened completely and closed again (integrated safety function of the door). The, the system must be acknowledged.
- A PROFIsafe communication error requires double acknowledgement.
  - Fault acknowledgment of PROFIsafe communication.
  - Fault acknowledgment of further messages.



## 6.2 Operating the HMI

Table 6-1

| No. | Action   | Figure   |
|-----|--|--|
| 1.  | <p><b>Start screen</b></p> <p>View of the start screen</p>   |    |
| 2.  | <p><b>Slide-in bar on the right</b></p> <p>Use this slide-in bar to navigate to the individual panel screens. The bar can be opened from every screen.</p> |   |
| 3.  | <p><b>Slide-in bar at the top</b></p> <p>Use this slide-in bar to call the message window. The bar can be opened from every screen.</p>                    |  |
| 4.  | <p><b>Plant screen</b></p> <p>The plant screen is called with the "Application" button. In this screen the robot is operated.</p>                          |  |

## 6.3 Operating modes

### Basic information

- After switching on the control voltage for the system, the safety door must be opened completely and closed again.
- When the operating mode is switched during operation, the drive control is interrupted.
- When "Service mode" is deactivated, a new operating mode must be selected at the panel.

### Automatic mode

Table 6-2

| No. | Description  |
|-----|--|
| 1.  | <p><b>Selecting automatic mode</b></p> <p>Select automatic mode with the "Autom. mode" function button.<br/>This operating mode can only be selected, when "Service mode" is <b>not</b> selected.</p>  |
| 2.  | <p><b>Drive on/off</b></p> <p>The drive is switched on using the "On" function button.<br/>The drive is switched off using the "Off" function button.</p> <p>When the safety door is opened or an emergency stop is triggered during operation, the drive (-K100) and the safety circuit (-K10 /-K11) are shut down immediately.</p> |

### Manual mode

Table 6-6

| No. | Description   |
|-----|---|
| 1.  | <p><b>Selecting manual mode</b></p> <p>Select manual mode with the "Manual mode" function button.<br/>This operating mode can only be selected, when "Service mode" is <b>not</b> selected.</p> <p>This selection is protected with a password. After pressing the function button, the log in dialog box is shown.</p> <ul style="list-style-type: none"> <li>• User: user</li> <li>• Password: 111</li> </ul> <p>The operating mode can only be selected after entering the correct password.</p> |

## 6 Operating the Application

### 6.3 Operating modes

| No. | Description  |
|-----|--|
| 2.  | <p><b>Drive on/off</b></p> <p>In this operating mode, only jog mode is possible.</p> <ul style="list-style-type: none"><li>• The drive is switched on using the “On” function button.</li><li>• The drive is switched off when the “On” function button is released.</li></ul> <p>The “Off” function button is not evaluated.</p> <p>When the safety door is opened or an emergency stop is triggered during operation, the drive (-K100) and the safety circuit (-K10 /-K11) are shut down immediately.</p> |

### Service mode

Table 6-6

| No. | Description   |
|-----|---|
| 1.  | <p><b>Selecting service mode</b></p> <p>This operating mode <b>cannot</b> be selected via the Mobile Panel; it must be selected with a separate key switch.</p> <p>The safety door may be opened in this operating mode. Depending on the status, the door is displayed as open or closed.</p>  |
| 2.  | <p><b>Drive on/off</b></p> <p>In this operating mode, only jog mode is possible.</p> <p>Before the drive is switched on with the “On” button, the enabling button at the Mobile Panel must <b>always</b> be pressed first and kept pressed.</p> <ul style="list-style-type: none"><li>• The drive is switched on using the “On” function button.</li><li>• The drive is switched off when the “On” function button is released.</li></ul> <p>The enabling button must only be pressed for a maximum of 10 seconds (F program preset). When it is pressed longer, the drive (-K100) and the safety circuit (-K10 /-K11) are shut down immediately.</p> <p>The same is the case when the enabling button is released during operation or when an emergency stop is triggered.</p> |

## 7 Error detection

The following notes are intended to support you when troubleshooting.

- Why is the “PROFIsafe” function grayed out in the Mobile Panel configuration and cannot be activated?
  - To activate the PROFIsafe option, activate “IO device” under “Operating mode” first (see [Link](#)).
  
- Why is there no secure connection after a device exchange?
  - Check the PROFIsafe settings, they must be re-parameterized after a device exchange.
  
- In which PII word can the emergency stop/stop button and enabling button be evaluated?

|          |                                      |
|----------|--------------------------------------|
| - Word 0 | 0010-0010 emergency stop/stop button |
| Word 1   | 0010-0010 enabling button            |
| Word 2-5 | Reserved                             |
  
- Why is the box ID entered not applied to the Mobile Panel?
  - Check the rotary switch settings in the connection box. The box ID is preset in “Hexadecimal” there.  
The box ID at the F-FB and at the Mobile Panel is entered in “decimal”.
  
- Problems with PROFIsafe communication
  - Check the PROFIsafe address in the configuration and on the Mobile Panel.
  - Check the PROFIsafe name in the configuration and on the Mobile Panel.
  - Is the “IO device” option activated under “PROFINET”?
  
- Problems with the evaluation of safety-relevant Mobile Panel functions
  - Check F\_FB\_KTP\_Mobile parameter
  - Check the F-data block address
  - Check IW / OW at the F\_FB
  - View status information online

- Description of the blocks cannot be found in the online help
  - Enter the complete F-FB name as a search term.  
e.g. F\_FB\_KTP\_Mobile
- Why are the I/O addresses of the ET200 SP modules (DI /DO modules) grayed out and cannot be adjusted?
  - To change the default addresses of the ET 200SP, the station must be assigned to an IO controller (in this case the F-CPU). Otherwise, the entry field is grayed out.
- Why are the robot movements not simulated?
  - Check the F-CPU properties under “System and clock memory” and make sure the clock memory option is enabled and the correct byte is used.
- How can I set the box IDs of several connection boxes at the Mobile Panel?
  - Always use the same menu. Go to each connection box and plug in the Mobile Panel. Open the “Safety Operation” menu and enter the corresponding box ID.
- Is it possible to activate the PROFIsafe connection via a system function at the Mobile Panel after the PROFIsafe connection was deactivated with the system function “PROFIsafeDisconnect”?
  - No. To activate the PROFIsafe connection, you must restart the panel runtime.
- Why does the drive shut down when I remove the Mobile Panel from the connection box?
  - Make sure to disconnect the PROFIsafe connection before unplugging the panel. Use the system function “PROFIsafeDisconnect” to do this; you can configure it in a button, for example.  
Alternatively, terminate the Mobile Panel runtime and confirm the PROFIsafe disconnection in the logoff dialog.

## 8 Links & Literature

Table 8-1

|     | Topic                           | Title  |
|-----|---------------------------------|--|
| \1\ | Siemens Industry Online Support | <a href="https://support.industry.siemens.com">https://support.industry.siemens.com</a>  |
| \2\ | Download page of the entry      | <a href="https://support.industry.siemens.com/cs/ww/de/view/103497649">https://support.industry.siemens.com/cs/ww/de/view/103497649</a><br><a href="https://support.industry.siemens.com/cs/ww/en/view/103497649">https://support.industry.siemens.com/cs/ww/en/view/103497649</a> |
| \3\ | Manual                          | Overview of various manuals on the Mobile Panel<br><a href="https://support.industry.siemens.com/cs/ww/en/ps/14746/man">https://support.industry.siemens.com/cs/ww/en/ps/14746/man</a>   |
| \4\ | Manual                          | SIMATIC Distributed I/O System Fail-Safe Engineering ET 200SP Distributed I/O System<br><a href="http://support.automation.siemens.com/WW/view/en/12490437">http://support.automation.siemens.com/WW/view/en/12490437</a>  |
| \5\ | Manual                          | SIMATIC Industrial Software SIMATIC Safety - Configuring and Programming<br><a href="https://support.industry.siemens.com/cs/ww/en/view/54110126">https://support.industry.siemens.com/cs/ww/en/view/54110126</a>  |
| \6\ | Manual                          | SIMATIC Industrial Software SIMATIC Safety V13 - Getting Started<br><a href="https://support.industry.siemens.com/cs/ww/en/view/101177693">https://support.industry.siemens.com/cs/ww/en/view/101177693</a>  |

## 9 History

Table 9-1

| Version | Date    | Modifications                                   |
|---------|---------|---|
| V1.0    | 06/2014 | First version                                   |
| V1.1    | 02/2016 | S7 Distributed Safety -> STEP 7 Safety Advanced |