



Industry Information Live

Fra hardware opsætning til programmering af
enkel nødstopfunktion

Dagens værter



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Fra hardware opsætning til programmering af enkel nødstopfunktion

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Ingenuity for life

- Hvad er SIMATIC Safety Integrated?
- Hvordan kan man enkelt integrere safety-funktioner med TIA-portalen
- Application example Entry ID: 21331098
- Industry Support
- SITRAIN
- Spørgsmål



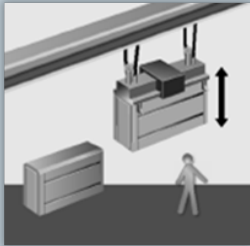
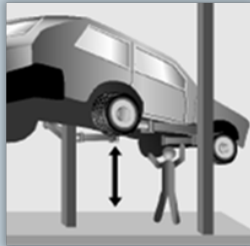
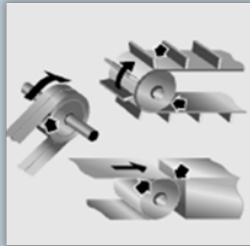
What do we protect against with SIMATIC Safety Integrated!

Electric shock	Heat and fire	Dangerous radiation	Hazard due to functional faults
			

Safety Integrated for personnel, machines and the environment

The potential hazards can be identified according to EN ISO 12100.

Risk assessment

Cutting	Dropping	Motion	Gravity	Approach	Rotation
					

Application example Entry ID: 21331098

> Home > Product Support

Entry type: Application example Entry ID: 21331098, Entry date: 08/15/2019

★★★★☆ (11)
> Rate

Monitoring the feedback circuit in the safety program

Entry Associated product(s)

A machine executing dangerous movements is controlled by a fail-safe controller and switched by means of contactors. The correct functioning of the contactors shall be monitored in order to ensure a high diagnostic coverage and, thus, a high SIL or PL.

Solution

Monitoring the actuators represents a diagnostic function and significantly contributes to the SILCL (SIL claim limit) or PL of the corresponding subsystem. For electromechanical components (e. g. relays or contactors), a positively driven auxiliary contact often is fed back to the controller and then evaluated. This process is referred to as monitoring of the feedback circuit or readback of the contactors.

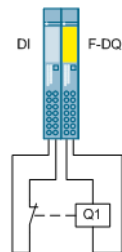


Figure 1 Typical wiring of an actuator and its feedback circuit

This is particularly required for a redundant setup. If one of the two contactors welds (without this being noticed), the two-channel system would become a single-channel system. Instead, the welding will be detected and it will be prevented that the system is switched on again until the error is eliminated.

In this application example, two machine parts are switched separately in order to illustrate the monitoring of the feedback circuit. Only the affected machine part shall be switched off via the local emergency-stop control devices. By means of the global emergency-stop control device, both machine parts are switched off safely.

CPU 1516F



ET 200SP



Local
E-Stop A



Local
E-Stop B



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Product information

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Related links

- > Compatibility Tool
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Topic pages for this entry

- > Safety Integrated - Safety in Factory Automation
- > TIA Portal - An Overview of the Most Important Documents and Links - Safety
- > TIA Portal - An Overview of the Most Important Documents and Links - Communication

Documentation and example project

PDF Documentation (1,0 MB)

ZIP Example project for TIA Portal V15.1 (7,1 MB)

ZIP Evaluation of the safety function as SET project (34,3 KB)

Safety Evaluation Tool

<https://new.siemens.com/global/en/products/automation/topic-areas/safety-integrated/factory-automation/support/safety-evaluation-tool.html>

SIEMENS

File Project Copy selection Paste selection Delete selection Create report Options Technical Parameters

Library Projects

User projects

- Feedback monitoring; PL e; CPU 1516F
 - Machine part A
 - Global E-Stop
 - DETECTION
 - Global E-Stop
 - EVALUATION
 - CPU 1516F
 - ET 200SP F-DI
 - ET 200SP F-DQ
 - REACTION
 - Contactor machine part A
 - Contactor machine part B
 - Local E-Stop A
 - Machine part B
 - Local E-Stop B
 - DETECTION
 - Local E-Stop
 - EVALUATION
 - CPU 1516F
 - ET 200SP F-DI
 - ET 200SP F-DQ
 - REACTION
 - Contactor

Feedback monitoring; SIL 3; CPU 1516F

Sensor group - ISO 13849-1 - General description

Name: Global E-Stop Comment: S7 Connection: ET200SP

Type: ☒ Customerdata required ☐ SIL/PL exists Category of circuit: 4 Nr. of components: 1

Channel 1 Channel 2

Manufacturer: Siemens Reset Reference designations: This could be interesting: SIRIUS Commanding and Signaling Devices

Productgroup: SIRIUS Commanding and Signaling Devices DC (%): 99 (high) Estimate DC

Productname: EMERGENCY STOP pushbutton, Turn-to-Release (rotate to unlock) B10 (operation cycles): 1.00 E+05

Integrated communication connection: without Ratio of dangerous failures (%): 20

Order number: 3SB3.0-1.A2. Max. service life (in years): 20

More order numbers: B10D (operation cycles): 5.00 E+05

Number of operations / test interval (switching cycles): 1 Per week MTTFD (in years): 9.58 E+04 (high)

Supplementary notes

Consideration of safety integrity acc. to ISO 13849-1

CCF (points): ≥65 Estimate CCF PL PL e

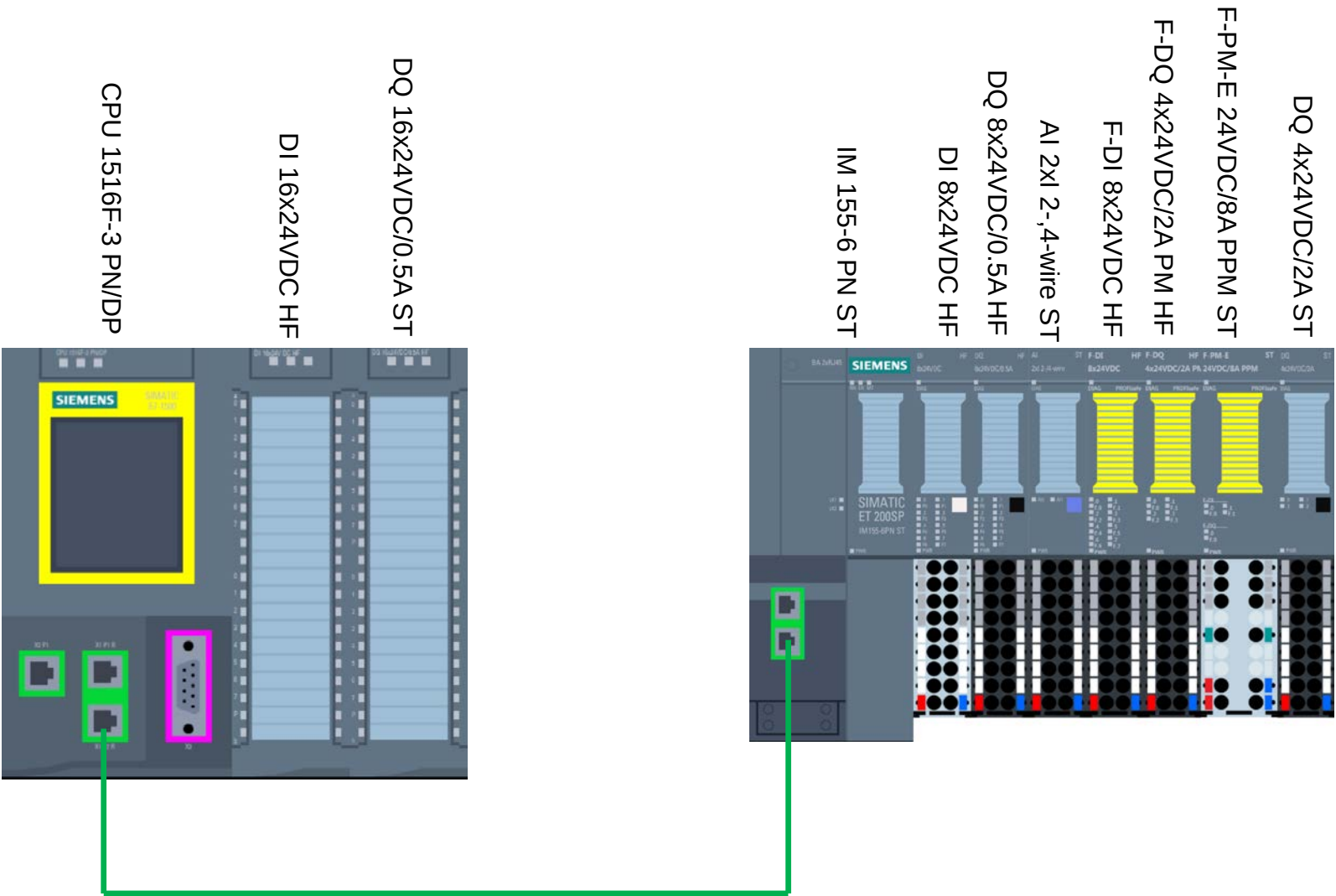
PFHD 9.06 E-10

Consideration of safety integrity

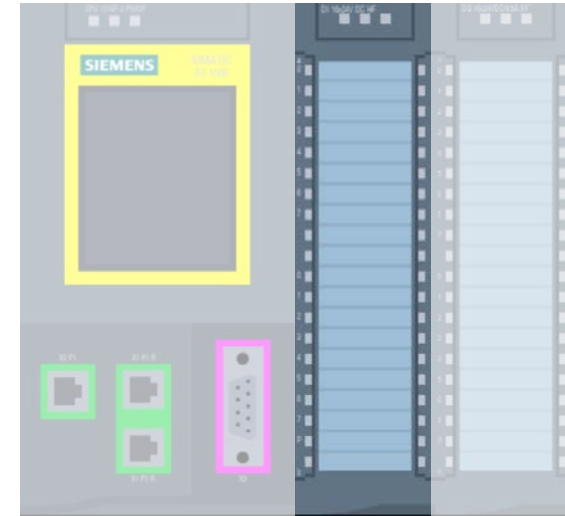
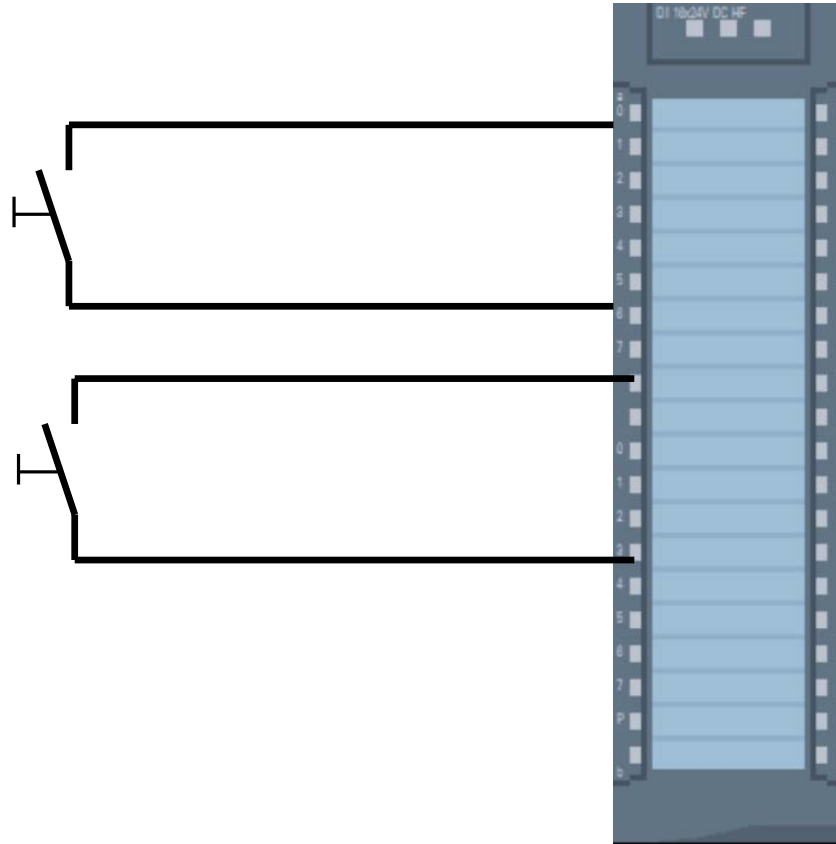
Safety function: PL a PL b PL c PL d PL e



Hardware configuration



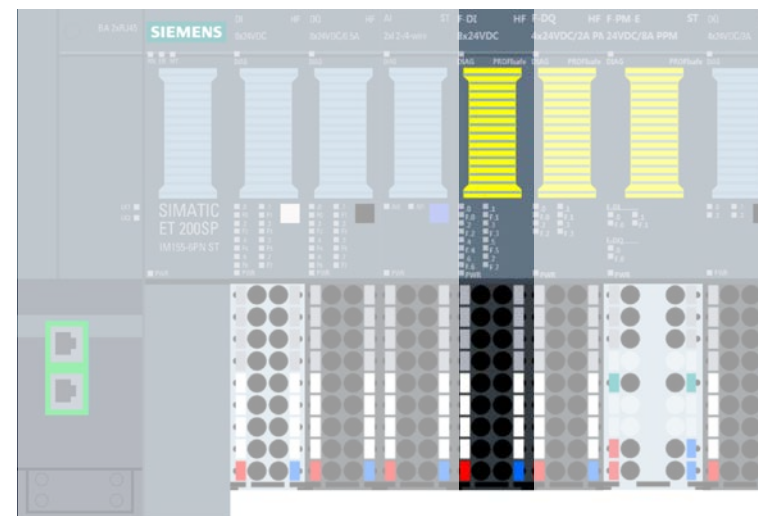
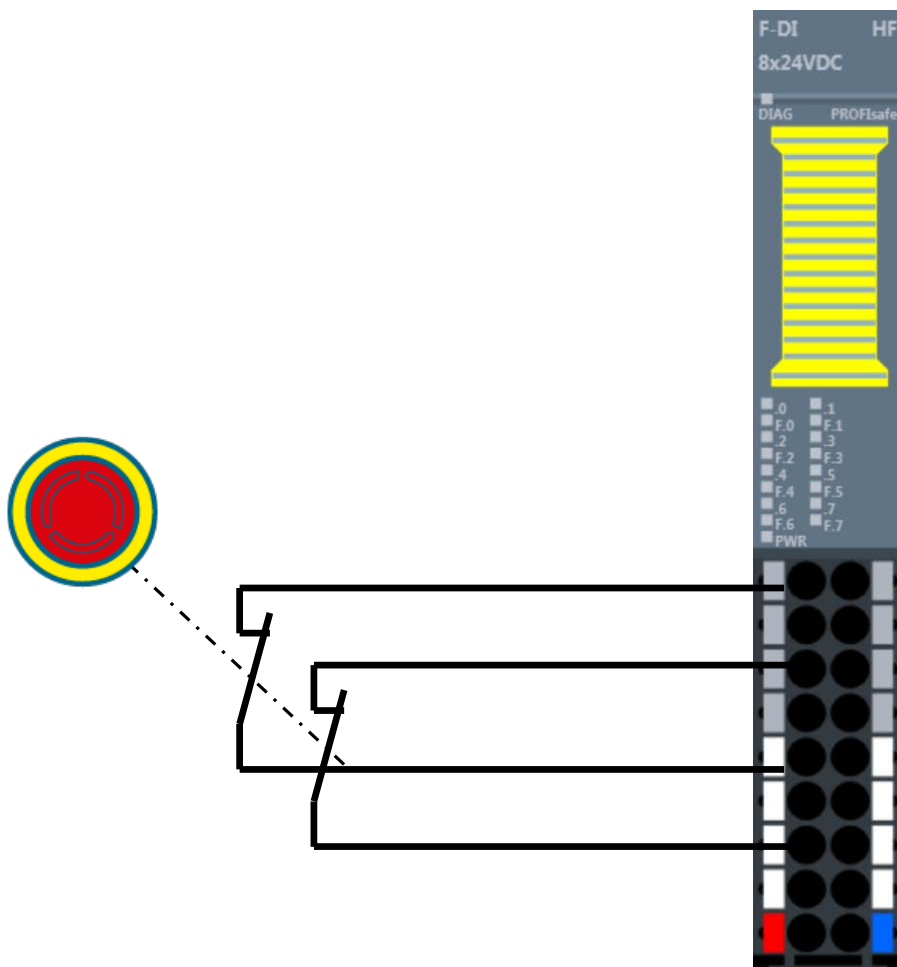
Start Stop



%I0.0  start

%I0.1  stop

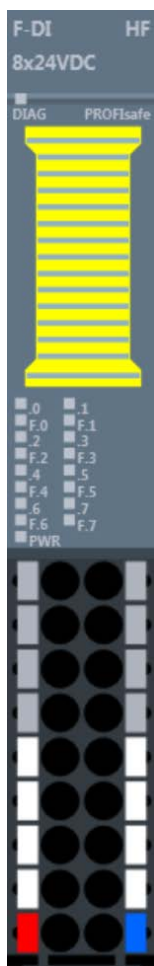
E-stop



%I7.0  localEstop

%I7.4

Channel parameters F-DI



F-DI 8x24VDC HF_1 [F-DI 8x24VDC HF]

Properties Info Diagnostics

General IO tags System constants Texts

General

Potential group

Module parameters

General

F-parameters

DI parameters

Sensor supply

Channel parameters

Channel 0, 4

Channel 1, 5

Channel 2, 6

Channel 3, 7

I/O addresses

Channel parameters

Channel 0, 4

Sensor evaluation: 1oo2 evaluation, equivalent

Discrepancy behavior: 1oo1 evaluation

Discrepancy time: 1oo2 evaluation, equivalent

Reintegration after discrepancy error: Test 0-Signal not necessary

Channel 0

Activated

Sensor supply: Sensor supply 0

Input delay: 3,2 ms

Chatter monitoring

Number of signal changes: 5

Monitoring window: 2 sec

Channel 4

Activated

Sensor supply: Sensor supply 4

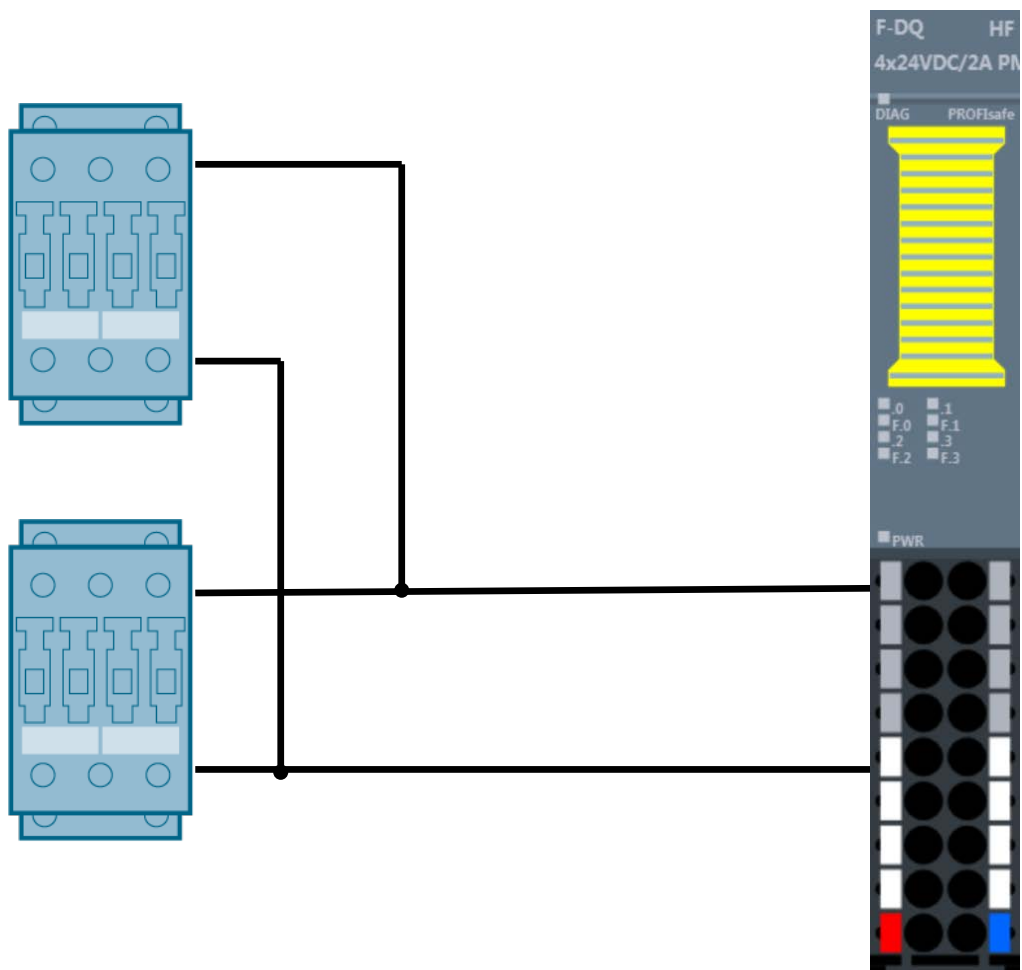
Input delay: 3,2 ms

Chatter monitoring

Number of signal changes: 5

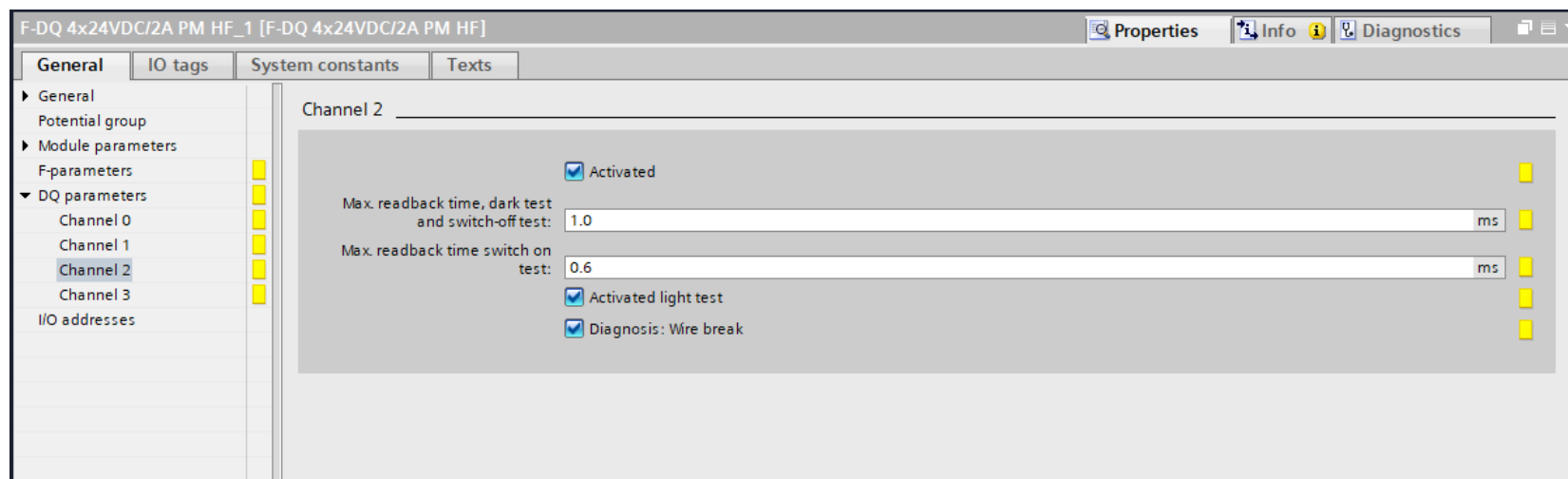
Monitoring window: 2 sec

Contactor

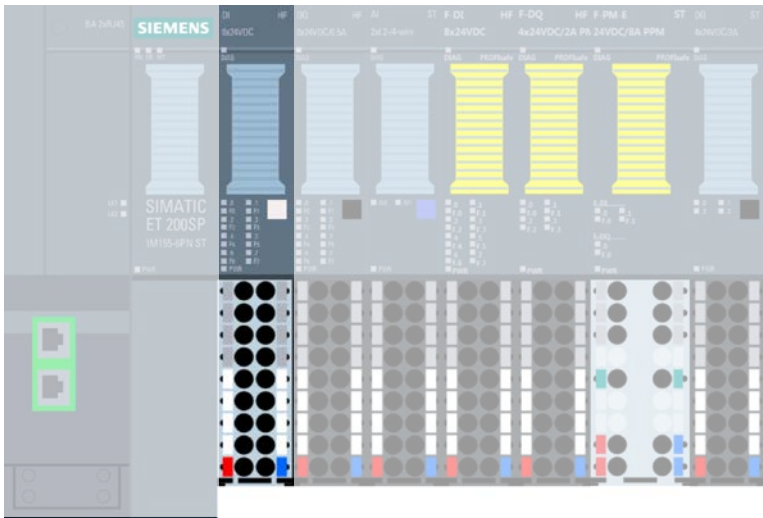
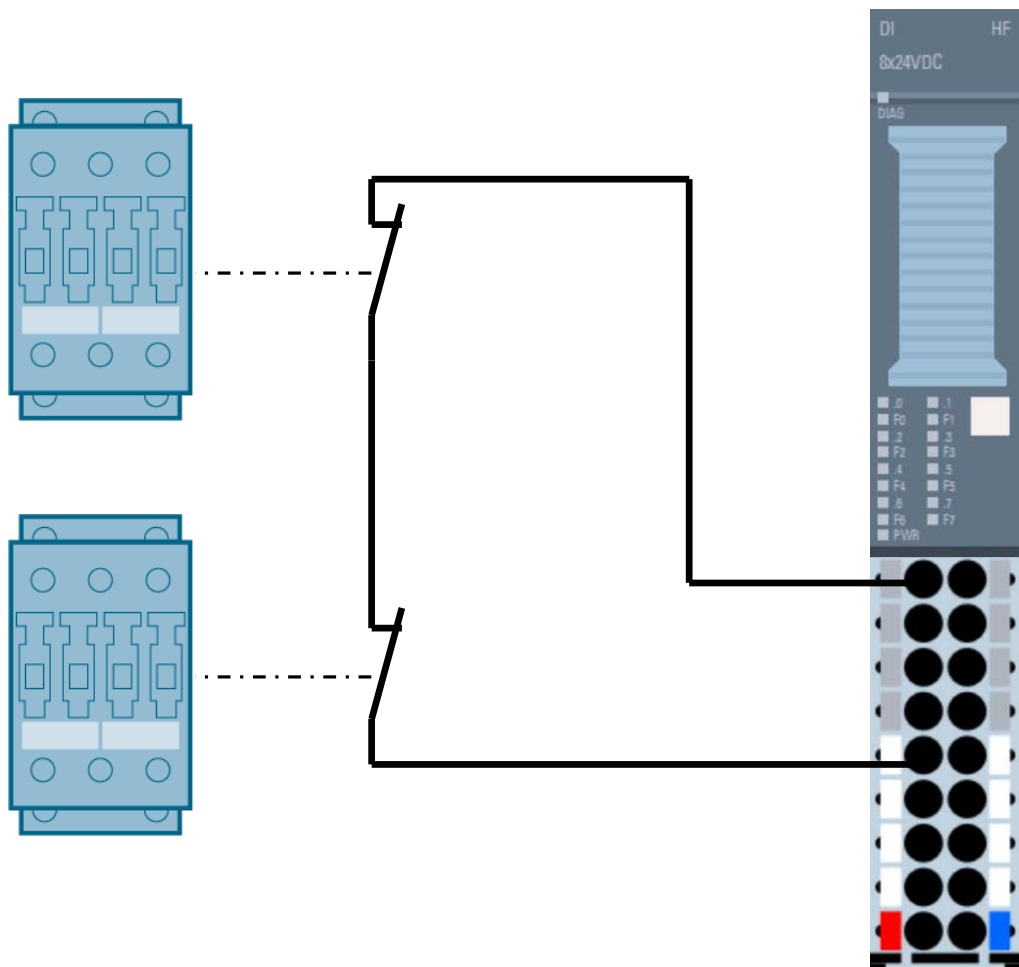


%Q13.2  contactor

Channel parameters F-DQ

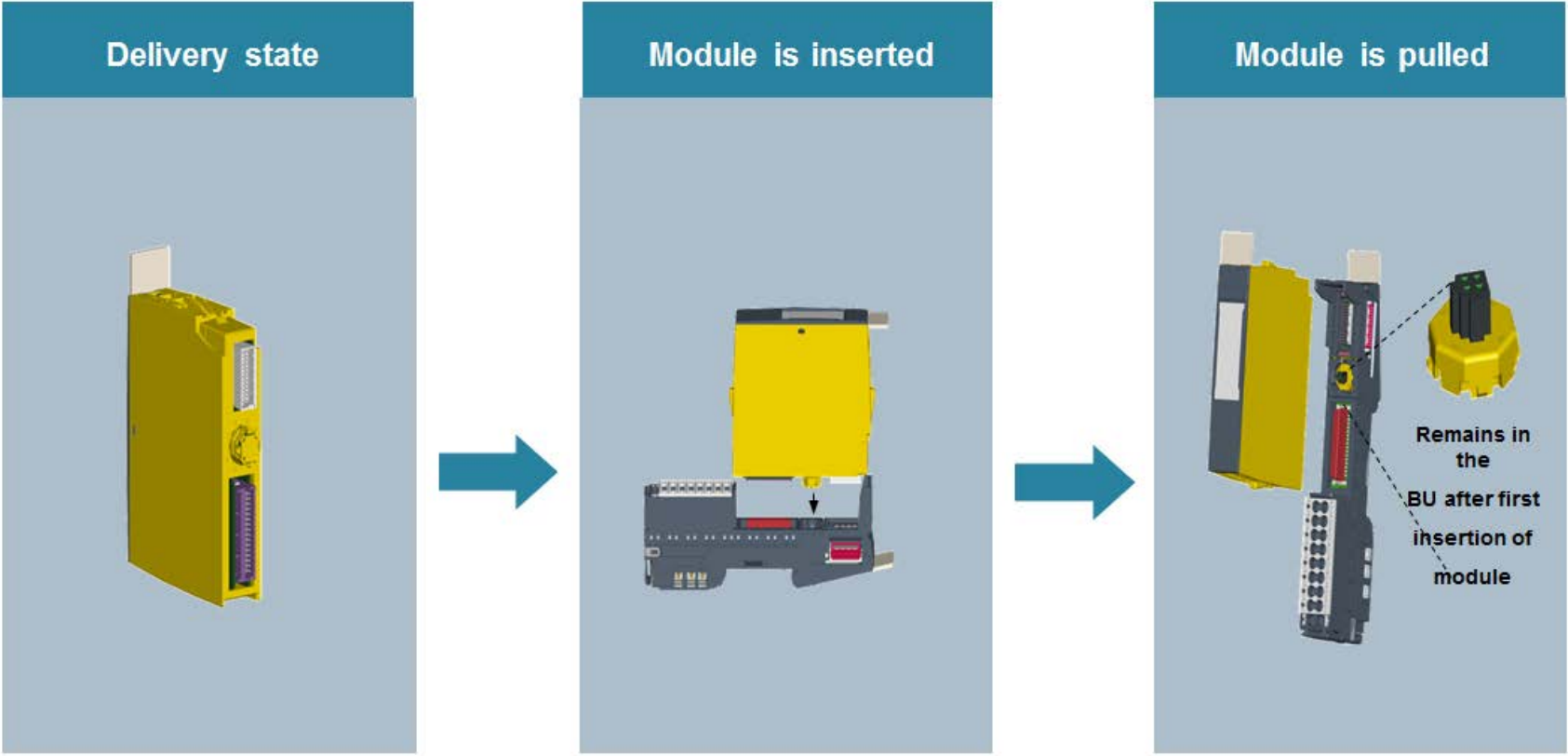


Feedback



%I2.0  fdbackContactor

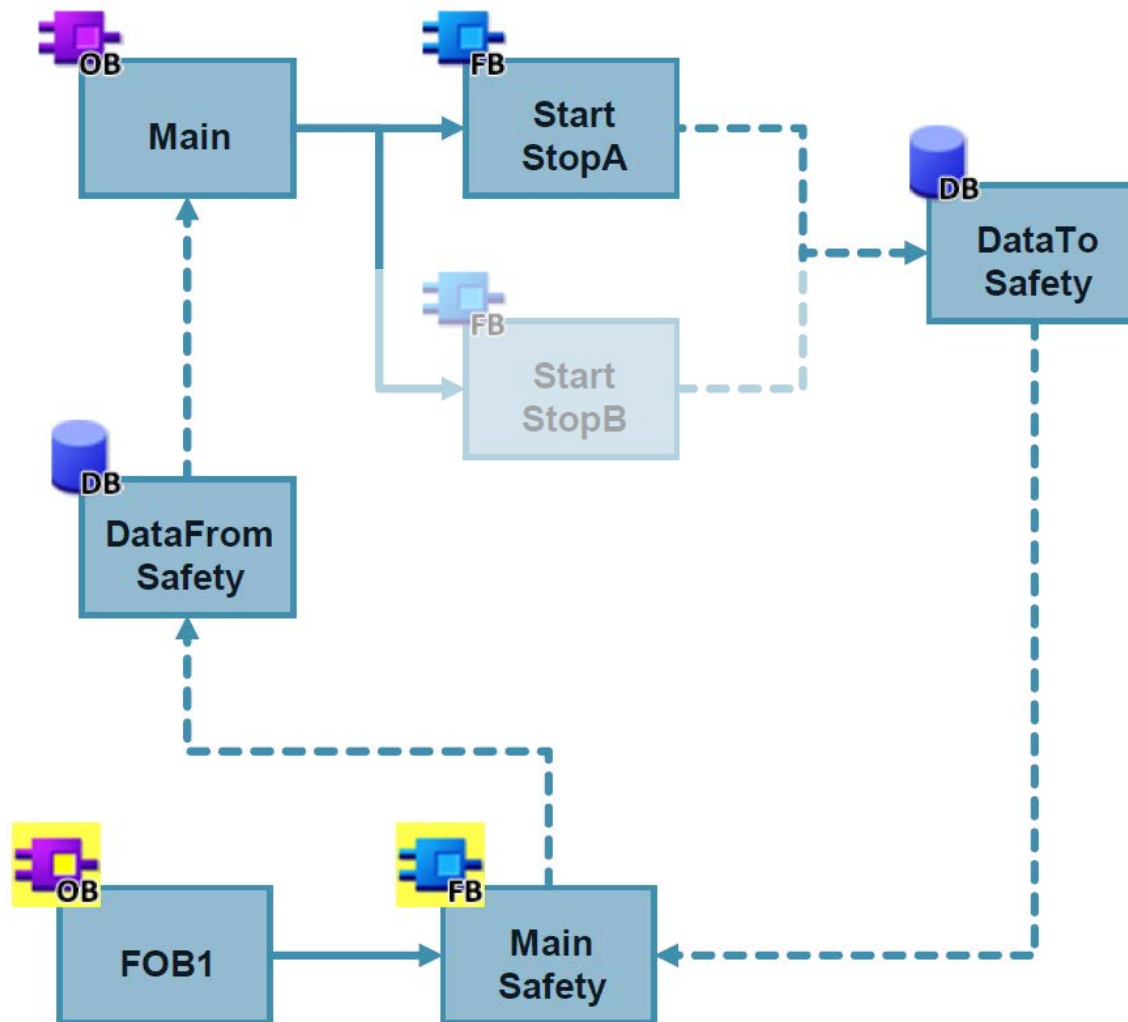
PROFIsafe address



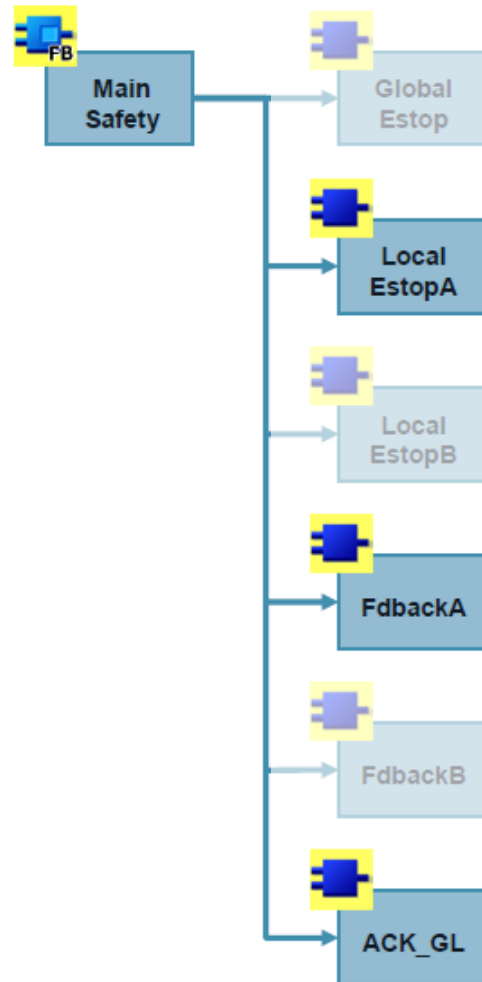
F-parameter

☐ Manual assignment of F-monitoring time	
F-monitoring time:	150 ms
F-source address:	1
F-destination address:	65534
F-parameter signature (without addresses):	13722
Behavior after channel fault:	Passivate channel
☐ F-I/O DB manual number assignment	
F-I/O DB-number:	30002
F-I/O DB-name:	F00000_F-DI8x24VDCHF_1

Data exchange



Safety program



Position of the Value State bits F-DQ

Byte in the F-CPU	Assigned bits in F-CPU per F-module:							
	7	6	5	4	3	2	1	0
x + 0	—	—	—	—	Value status DQ ₃	Value status DQ ₂	Value status DQ ₁	Value status DQ ₀

Byte in the F-CPU	Assigned bits in F-CPU per F-module:							
	7	6	5	4	3	2	1	0
x + 0	—	—	—	—	DQ ₃	DQ ₂	DQ ₁	DQ ₀

4x24VDC/2A PM HF]

constants Texts

I/O addresses

Input addresses

Start address: 13 .0

End address: 17 .7

Organization block: ---

Process image: ---

Output addresses

Start address: 13 .0

End address: 17 .7

Organization block: ---

Process image: ---

The screenshot shows the 'I/O addresses' configuration window in TIA Portal. The 'Input addresses' section has 'Start address' set to 13 and 'End address' set to 17. The 'Output addresses' section also has 'Start address' set to 13 and 'End address' set to 17. Red arrows point from the 'Value status DQ₀' and 'DQ₀' fields in the tables above to the 'Start address' input fields in the 'Input addresses' and 'Output addresses' sections respectively. The 'Start address' input field in the 'Input addresses' section is highlighted with a red box.

Position of the Value State bits F-DI

Byte in the F-CPU	Assigned bits in F-CPU per F-module:							
	7	6	5	4	3	2	1	0
x + 0	DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0
x + 1	Value status for DI7	Value status for DI6	Value status for DI5	Value status for DI4	Value status for DI3	Value status for DI2	Value status for DI1	Value status for DI0

Byte 8

F-DI 8x24VDC HF_1 [F-DI 8x24VDC HF]

General IO tags System constants Texts

General

Potential group

Module parameters

General

F-parameters

DI parameters

Sensor supply

Channel parameters

I/O addresses

I/O addresses

Input addresses

Start address: 7 .0

End address: 12 .7

Organization block: ---

Process image: ---

Output addresses

Start address: 7 .0

End address: 10 .7

Organization block: ---

Process image: ---

How to get help and information

Safety Integrated programming guideline

Safety with the S7-1200 FC CPU

SLS specification via HMI

Configuration control with safety

PROFIsafe address assignment

Mode selection

Filter criteria for entries

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Product tree

All

Product

> Search product

Entry type

Example type

Date From To

728 Entries Filtered by 'simatic safety' and 'Application example'

Entries per page: 20 | 50 | 100 |

☐

☐ > Application example **SIMATIC - Failsafe library LDrvSafe to control the Safety Integrated functions of the SINAMICS drive family** 02/18/2020 ID: 109485794 ★★★★★ (91)

The plausibility of ... corresponding to the **SIMATIC Safety** Configuring and Programming Manual ... 3.2 Examples for checking the **Safety** functionality of the ... the individual blocks ... Function test of ... one of the **Safety** Functions being used ... the block input ... The selected **Safety** Function becomes active ... = 0) ... Then deselect this **Safety** Function being used ... block input ... The selected **Safety** Function becomes inactive ... = 1) ... Repeat these two ... all of the **Safety** ... being used ... 3 Functional test ... for checking the **Safety** functionality of the ... functioning of all **Safety** Functions of the ... the machine.

For products: 6SL3244-0BB13-1FA0, 6SL3244-0BB13-1PA0, ... > All products

☐ Additional hits in the chapters of following attachments

☐ > Application example **SIMATIC S7-F/P Press Safety Blocks** 02/26/2020 ID: 48299432 ★★★★★ (10)

Programming Proceed ... the manual "SIMATIC Safety ... 48299432, V15.0.1, ... and commissioning the **safety**-oriented function CPU ... the manual "SIMATIC Safety ... Manual to press **safety** library **SIMATIC Safety** - configuring and programming **Safety** technology in **SIMATIC** S7, system description ... This information ... directory of the **SIMATIC** folder after installation ... and STEP 7 **Safety** ... The ... been created The **safety** program is activated ... NOTE The required **safety**-oriented function components of the library **SIMATIC S7-F/P** are to ... 1 ... of reference Press **Safety** ... 48299432, ... of the press **safety** components on the ... Decentralized ... and commissioning Press **Safety**

For products: 6ES7317-2FK14-0AB0, 6AU1837-0EA10-0DX2, ... > All products

☐ Additional hits in the chapters of following attachments

☐ > Application example **SIMATIC Industrial Software SIMATIC Safety V13 - Getting Started** 09/02/2014 ID: 101177693 ★★★★★ (11)

F-CPU An F-CPU ... for use in **SIMATIC Safety** and in which a → **safety** program can run ... standard user program ... F-I/O Collective name ... outputs available in **SIMATIC S7** for integration in **SIMATIC Safety**, among others ... Category Category in ... ISO 13849-1:2008 With **SIMATIC Safety**, use in → **safety** mode up to ... 4 is possible ... 2008 With **SIMATIC Safety**, use up ... possible in → **safety** mode ... With **SIMATIC Safety**, up to **Safety** Integrity Level SIL3 is possible in **safety** mode ... F-runtime group The → **safety** program consists of ... two F-runtime groups ... → Main **safety** block, F-OB (S7-1200, ... generated F-blocks ... F-runtime group information ... on the → **safety** program ... a whole.

For products: 6ES7833-1FA13-0YA5, 6ES7833-1FA13-0YE5

☐ Additional hits in the chapters of following attachments

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Topic pages for these entries

Training by SITRAIN – www.siemens.dk/sitrain

SITRAIN – Digital Industry Academy



Følg med tiden og hold dig opdateret

Nye teknologier kommer hele tiden til, og det betyder, at vi løbende skal holde os opdateret. Hos SITRAIN kan du finde relevante uddannelser og kurser tilpasset dine og din virksomheds behov.

Du kan se alle vores kurser her og har du spørgsmål er du velkommen til at skrive til os.

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Specifikke kursus tilbud fra Siemens



SITRAIN access

Webbaseret træning



Starter kits

It's never been easier
to get started!

SIMATIC S7-1200 Starter Kits



Package 5: SIMATIC S7-1200 Fail-safe Starter Kit

CPU 1212FC DC/DC/RLY

- Input simulator
- SM 1226 F-DI
- SM 1226 F-DQ
- SIMATIC STEP 7 Basic and STEP 7 Safety Basic in the TIA Portal
- IE TP Cord 2 m and more ...

Article No.: 6ES7 212-1HF41-4YB1



NEW: Paket 6: SIMATIC S7-1200 Fail-safe Starter Kit

CPU 1214FC DC/DC/RLY

- Input simulator
- SM 1226 F-DI
- SM 1226 F-DQ
- SIMATIC STEP 7 Safety Basic in the TIA Portal
- IE TP Cord 2 m and more ...

Artikel-Nr.: 6ES7212-1HF42-4YB1

Yderligere information

Gense webinar og download materiale på

www.siemens.dk/di-webinarer

Find tips og trick på YouTube

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Tak for opmærksomheden



www.siemens.dk/di-webinarer