EUCHNER

Application

Connection CTP-L1-AP-.. to Siemens ET200SP

EN

from V1.0.0

Contents

1. About this document

1.1. Version

Version	Date	Change/addition	Chapter
01-09/19	9/18/2019	Prepared	All

1.2. Scope

This document describes the connection of the CTP-L1-AP-.. to the decentral peripheral system SIMATIC ET200 SP.

1.3. Target group

Design engineers and installation planners for safety systems on machines, as well as setup and servicing staff possessing special expertise in handling safety components as well as expertise in the installation, setup, programming and diagnostics of programmable logic controllers (PLC) and bus systems.

1.4. Supplementary documents

The overall documentation for this application consists of the following documents:

Document title (document number)	Contents	
Operating Instructions (2124217)	Operating instructions transponder-coded safety switch with guard locking CTP-AP unicode/multicode	
Safety Information (2138087)	Information sheet with important safety information	
Possibly enclosed data sheets	Item-specific information about deviations or additions	

1.5. Notice

This application is based on the operating instructions for the CTP-L1-AP-.. . Please refer to the operating instructions for technical details and other information.

EN

2. Components/modules used

2.1. EUCHNER

Description	Order number / item number
Safety switches with guard locking and guard lock monitoring with transponder technology	123364 / CTP-L1-AP-U-HA-AZ-SH-123364
	123375 / CTP-L1-AP-U-HA-AE-SH-123375
	137342 / CTP-L1-AP-U-HA-AEE-SH-137342
	156056 / CTP-L1-AP-U-HA-AZE-SH-156056
	123365 / CTP-L1-AP-M-HA-AZ-SH-123365
	123376 / CTP-L1-AP-M-HA-AE-SH-123376
	124225 / CTP-L1-AP-U-HA-AZ-SA-124225
	126912 / CTP-L1-AP-U-HA-AE-SA-126912
	127727 / CTP-L1-AP-U-HA-AZ-SA-127727
	128484 / CTP-L1-AP-U-HA-AE-SA-128484
	157111 / CTP-L1-AP-U-HA-AZS-SA-157111
	157112 / CTP-L1-AP-U-HA-AES-SA-157112
	124727 / CTP-L1-AP-M-HA-AZ-SA-124727
	163003 / CTP-L1-AP-M-HA-AE-SA-163003
	124468 / CTP-L1-AP-U-HA-AZ-SII-124468
	127640 / CTP-L1-AP-U-HA-AE-SII-127640
	129477 / CTP-L1-AP-U-HA-AZ-SII-129477
	129478 / CTP-L1-AP-U-HA-AE-SII-129478

Tip: More information and downloads about the aforementioned EUCHNER products can be found at www.EUCHNER.com. Simply enter the order number in the search box.

2.2. Others

Description	Order number / item number
SIMATIC S7-1215 FC DC/DC/DC	6ES7 215-1AF40-0XB0
SIMATIC ET200 SP, interface module	6ES7 155-6AU00-0BN0
SIMATIC ET200 SP, F-DI electronics module	6ES7 136-6BA00-0CA0
SIMATIC ET200 SP, F-DQ electronics module	6ES7 136-6DB00-0CA0

2.3. Software

Description	Version
Totally Integrated Automation Portal	Version V14 SP1 update 9
STEP 7 Professional	Version V14 SP1 update 9
STEP 7 Safety	Version V14 SP1 update 9

3. Functional description

3.1. CTP-L1-AP-..

The CTP-L1-AP-.. is a guard locking device according to EN ISO 14119 according to the closed-circuit current principle. The safety outputs are switched off when guard locking is released (monitoring of the locking element).

Guard locking according to EN ISO 14119 actuated by spring force – released by power-ON (closed-circuit current principle)	
Safety function	Guard locking for personnel protection acc. to EN ISO 14119
Reliability values according to EN ISO 13849	Category 4, PL e

In this example the two safe outputs (FO1A and FO1B) on the CTP-L1-AP-.. are connected to a safe input on the SIEMENS ET200 SP.

4. Safety assessment

The CTP-L1-AP-.. features complete monitoring for faults in the safety-relevant parts and in the cables connected (short circuit monitoring by means of pulsed signals on the outputs FO1A and FO1B). Due to the device's own pulsing, switching off or not connecting the clock signals from the control system's safe inputs does not lead to a reduction in the PL. The example achieves PL e in accordance with EN ISO 13849-1 for position monitoring of the locking element for the guard locking.

	**Important!** A safety assessment for control of guard locking is not part of this example and must be supplemented for the respective machine by the design engineer in accordance with the risk assessment.

EN

5. Overview of the connections

5.1. Plug connector SH

Pin	Designation	Function	Use in this example
1	IMP	Operating voltage of guard locking solenoid 24 V DC	Connection to the fail-safe output assembly: F-DQ..P Important: According to EN ISO 14119, it must be ensured that the hazard posed by a machine is no longer present before the guard locking can be opened.
2	-	n.c.	-
3	-	n.c.	-
4	FO1A	Safety output, channel 1	Connection to fail-safe input assembly: F-DI_0 and F-DI_4. Switching off at least one of the outputs must lead to the shutdown of the machine or installation via the connected control system. Important: The actual shutdown of the energy causing a hazard in a machine is not shown in the example and must be supplemented.
5	FO1B	Safety output, channel 2	
6	UB	Operating voltage of AP electronics 24 V DC	Connection to power supply 24 V DC
7	RST	Operating voltage of AP electronics 0 V	-
8	OD	Door monitoring output	Connected to a standard input on the ET200 SP
9	OI	Diagnostic output	Connected to a standard input on the ET200 SP
10	OL	Guard locking monitoring output	Connected to a standard input on the ET200 SP
11	-	n.c.	Function is not used
12	FE	Function earth (must be connected to meet the EMC requirements)	
13	-	n.c.	-
14	-	n.c.	-
15	-	n.c.	-
16	-	n.c.	-
17	-	n.c.	-
18	IMM	Operating voltage of guard locking solenoid 0 V	Connection to fail-safe output assembly: F-DQ..M
19	0 V UB	Operating voltage of AP electronics 0 V	Connection to power supply 0 V DC

Table 1: Terminal assignment and contact description, plug connector SH

5.2. Plug connector SA

Pin	Designation	Function	Use in this example
1	IMP	Operating voltage of guard locking solenoid 24 V DC	Connection to the fail-safe output assembly: F-DQ..P Important: According to EN ISO 14119, it must be ensured that the hazard posed by a machine is no longer present before the guard locking can be opened.
2	UB	Operating voltage of AP electronics 24 V DC	Connection to power supply 24 V DC
3	FO1A	Safety output, channel 1	Connection to fail-safe input assembly: F-DI_0 and F-DI_4 Switching off at least one of the outputs must lead to the shutdown of the machine or installation via the connected control system. Important: The actual shutdown of the energy causing a hazard in a machine is not shown in the example and must be supplemented.
4	FO1B	Safety output, channel 2	
5	OI	Diagnostic output	Connected to a standard input on the ET200 SP
6	OD	Door monitoring output	Connected to a standard input on the ET200 SP
7	0 V UB	Reset input	Connection to power supply 0 V DC
8	IMM	Operating voltage of guard locking solenoid 0 V	Connection to fail-safe output assembly: F-DQ..M

Table 2: Terminal assignment and contact description, plug connector SA

5.3. Plug connector SII

Pin	Designation	Function	Use in this example
X1.1	UB	Operating voltage of AP electronics 24 V DC	Connection to power supply 24 V DC
X1. 2	FO1A	Safety output, channel 1	Connection to fail-safe input assembly: F-DI_0 Switching off at least one of the outputs must lead to the shutdown of the machine or installation via the connected control system. Important: The actual shutdown of the energy causing a hazard in a machine is not shown in the example and must be supplemented.
X1. 3	0 V UB	Operating voltage of AP electronics 0 V	Connection to power supply 0 V DC
X1. 4	FO1B	Safety output, channel 2	Connection to fail-safe input assembly: F-DI_4 Switching off at least one of the outputs must lead to the shutdown of the machine or installation via the connected control system. Important: The actual shutdown of the energy causing a hazard in a machine is not shown in the example and must be supplemented.
X1. 5	-	n.c	-
X2. 1	-	n.c.	-
X2. 2	-	n.c.	-
X2. 3	IMM	Operating voltage of guard locking solenoid 0 V	Connection to fail-safe output assembly: F-DQ..M
X2.4	IMP	Operating voltage of guard locking solenoid 24 V DC	Connection to the fail-safe output assembly: F-DQ..P Important: According to EN ISO 14119, it must be ensured that the hazard posed by a machine is no longer present before the guard locking can be opened.
X2.5	-	n.c.	

Table 3: Terminal assignment and contact description, plug connector SII

EN

6. Basic circuit diagram

6.1. Plug connector - SH

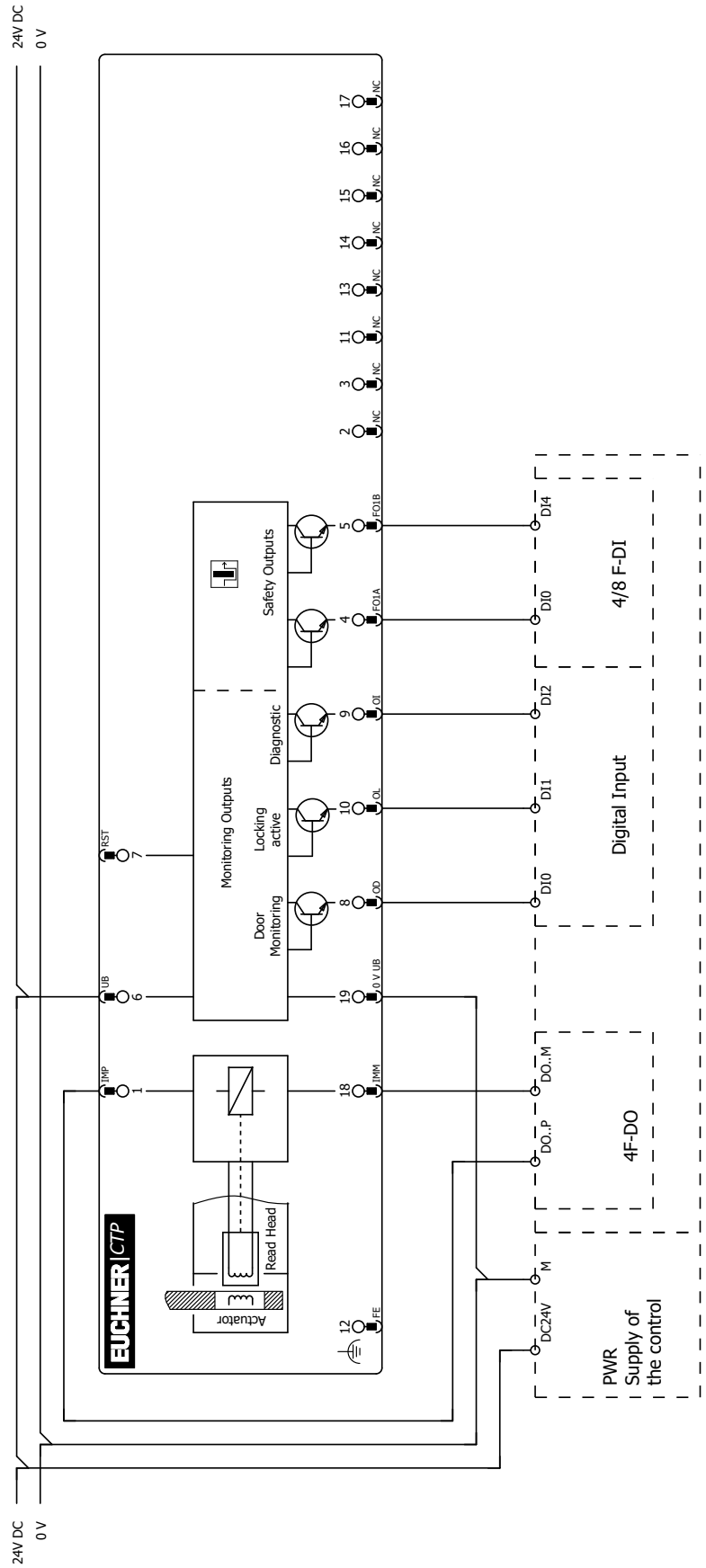

Figure 1: CTP with plug connector SH

6.2. Plug connector - SA

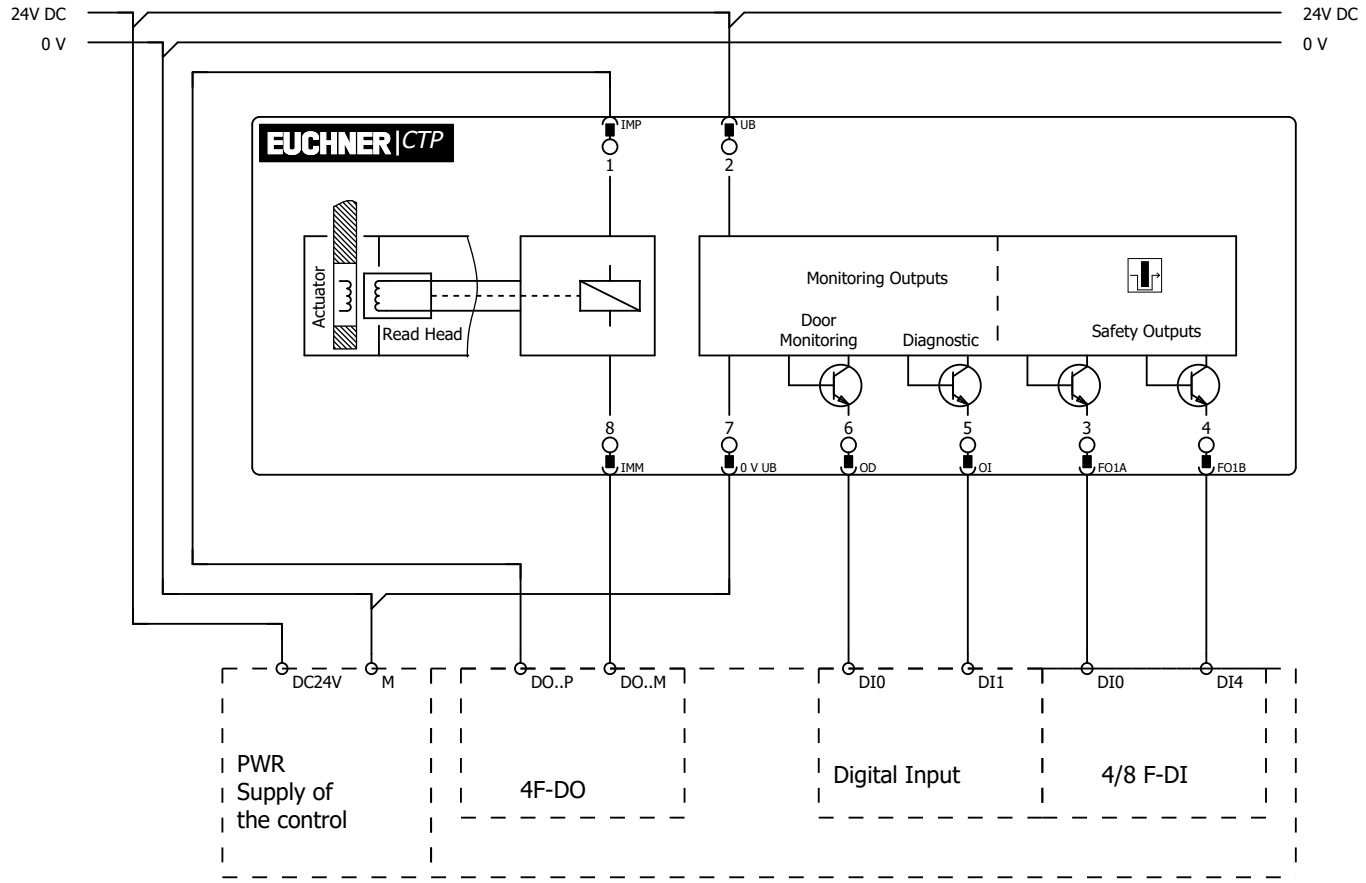

Figure 2: CTP with plug connector SA

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6.3. Plug connector - SII

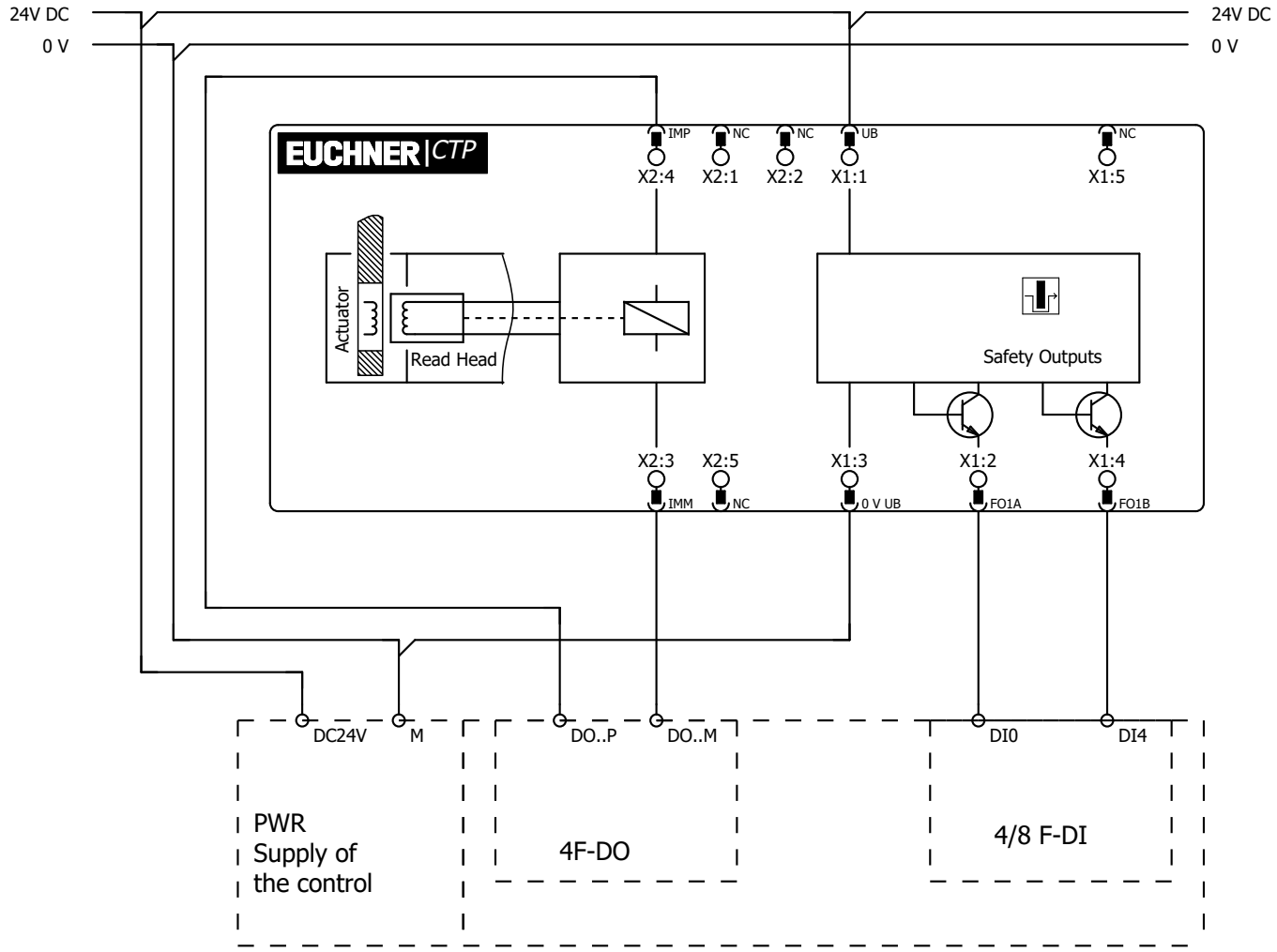

Figure 3: CTP with plug connector SII

7. Parameter assignment in the control system

Notice

The F parameters for the input module and the output module must be configured to suit the application in PROFINET

7.1. Input F-DI 8x24VDC HF

Parameter name (English)	Parameter name (German)	Value
Channel 0,4		
Sensor evaluation	Auswertung der Geber	1oo2 evaluation, equivalent
Discrepancy behavior	Diskrepanzverhalten	Supply value 0 or as required
Discrepancy Time	Diskrepanzzeit	10 ms
Reintegration after discrepancy error	Wiedereingliederung nach Diskrepanzfehler	Test 0-Signal not necessary or as required
Channel 0		
Activated	Aktiviert	☑
Sensor supply	Geberversorgung	External sensor supply
Input delay	Eingangsverzögerung	1.6 ms or longer
Channel 4		
Activated	Aktiviert	☑
Sensor supply	Geberversorgung	External sensor supply
Input delay	Eingangsverzögerung	1.6 ms or longer

Table 4: Parameter settings for the inputs

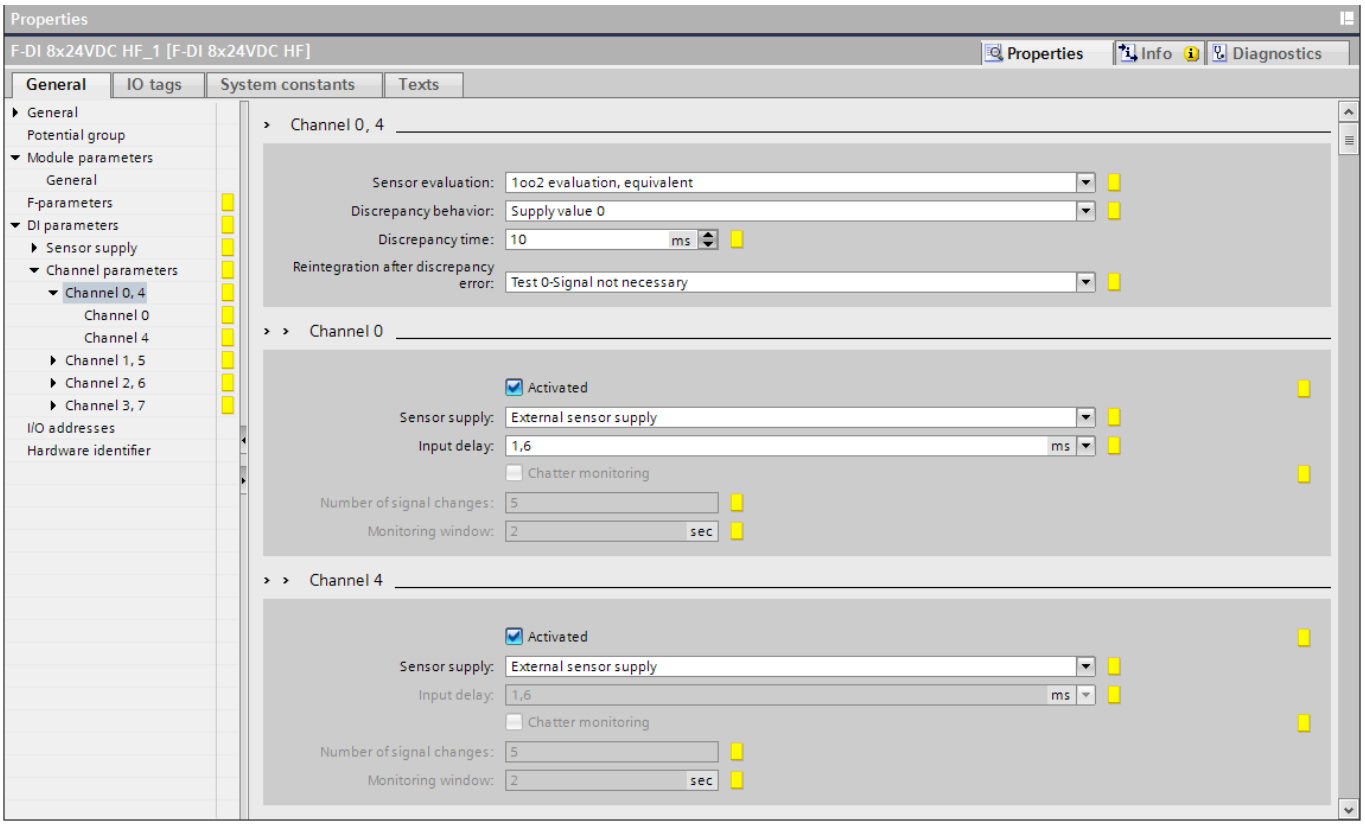

Figure 4: Parameter settings for the inputs

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7.2. Output F-DQ 4x24VDC/2A PM HF

Parameter name (English)	Parameter (German)	Value
Channel 0		
Activated	Aktiviert	☑
Max. readback time dark test	Max. Rücklesezeit Dunkeltest	1.0
Max. readback time switch on test	Max. Rücklesezeit Einschalttest	0.6
Activated light test	Helltest aktiviert	☑
Diagnosis: Wire break	Diagnose: Drahtbruch	☑

Table 5: Parameter settings for the outputs

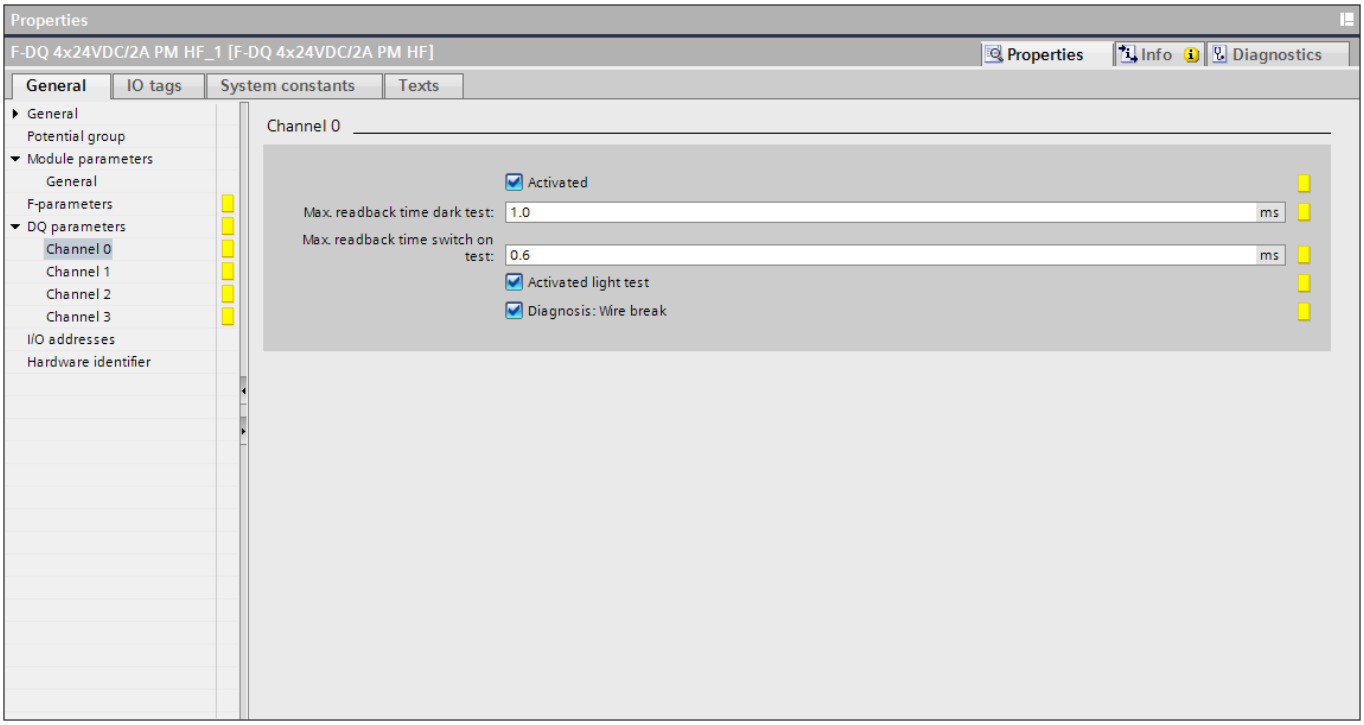

Figure 5: Parameter settings for the outputs

8. Important note – please observe carefully!

This document is intended for a design engineer who possesses the requisite knowledge in safety engineering and knows the applicable standards, e.g. through training for qualification as a safety engineer. Only with the appropriate qualification is it possible to integrate the example provided into a complete safety chain.

The example represents only part of a complete safety chain and does not fulfill any safety function on its own. In order to fulfill a safety function, the energy switch-off function for the danger zone and the software within the safety evaluation must also be considered, for example.

The applications provided are only examples for solving certain safety tasks for protecting safety doors. The examples cannot be comprehensive due to the application-dependent and individual protection goals within a machine/installation.

If questions concerning this example remain open, please contact us directly.

According to the Machinery Directive 2006/42/EC, the design engineer of a machine or installation has the obligation to perform a risk assessment and take measures to reduce the risk. While doing this, the engineer must comply with the applicable national and international safety standards. Standards generally represent the current state-of-the-art. Therefore, the design engineer should continuously inform himself about changes in the standards and adapt his considerations to them. Relevant standards for functional safety include EN ISO 13849 and EN 62061. This application must be regarded only as assistance for the considerations about safety measures.

The design engineer of a machine/installation has the obligation to assess the safety technology him/herself. The examples must not be used for an assessment, because only a small excerpt of a complete safety function was considered in terms of safety engineering here.

In order to be able to use the safety switch applications correctly on safety doors, it is indispensable to observe the standards EN ISO 13849-1, EN ISO 14119 and all relevant C-standards for the respective machine type. Under no circumstances does this document replace the engineer's own risk assessment, and it cannot serve as the basis for a fault assessment.

In particular in relation to a fault exclusion, it must be noted that a fault can only be excluded by the machine's or installation's design engineer and this action requires justification. A general fault exclusion is not possible. More information about fault exclusion can be found in EN ISO 13849-2.

Changes to products or within assemblies from third-party suppliers used in this example can lead to the function no longer being ensured or the safety assessment having to be adapted. In any event, the information in the operating instructions on the part of EUCHNER, as well as on the part of third-party suppliers, must be used as the basis before this application is integrated into an overall safety function. If contradictions should arise between the operating instructions and this document, please contact us directly.

Use of brand names and company names

All brand names and company names stated are the property of the related manufacturer. They are used only for the clear identification of compatible peripheral devices and operating environments in relation to our products.

EN

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