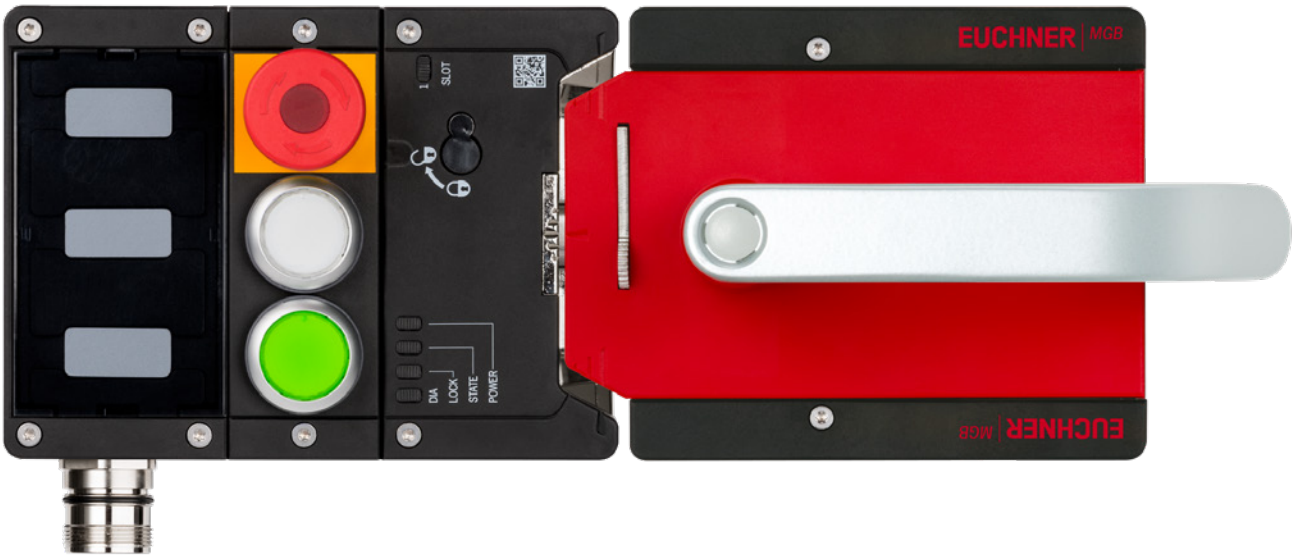
EUCHNER

Application



Connection of MGB2-L.-B.-... *Classic* to Siemens ET 200SP

from V1.0.0

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Contents

1. About this document

1.1. Version

Version	Date	Change/addition	Chapter
01-01/20	Jan. 9, 2020	Prepared	All

1.2. Scope

This document describes the connection of the MGB2-L1-B.-... *Classic* to the decentralized peripheral system SIMATIC ET 200SP.

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 (PLCs) 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 (2500233)	Operating instructions safety systems MGB2-L1-...-BR.-... / MGB2-L2-...-BR.-... and MGB2-L1-...-BP.-... / MGB2-L2-...-BP.-...	www
Safety Information and Maintenance for Safety System MGB2-BR/MGB2-BP from V1.0.0 (2500232)	Information sheet with important safety information	
Operating instructions for the modules connected and their submodules	Device-specific information for the related module and the submodules installed	www
Possibly enclosed data sheets	Item-specific information about deviations or additions	

1.5. Notice

This application is based on the MGB2 *Classic* operating instructions. Please refer to the operating instructions for technical details and other information.

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2. Components/modules used

2.1. EUCHNER

Description	Order number / item number
Safety system MGB2 *Classic*, guard locking with guard lock monitoring, without submodule	136774 / MGB2-L1-BR-U-X0000-BX-136774
	158166 / MGB2-L1-BR-U-X0000-BJ-158166
	161762 / MGB2-L1-BR-U-XA4S0-OB-R-161762
	161764 / MGB2-L1-BR-U-XA4S0-OB-L-161764
	138012 / MGB2-L2-BR-U-X0000-BX-138012
	158168 / MGB2-L2-BR-U-X0000-BJ-158168
	161766 / MGB2-L2-BR-U-XA4S0-OB-R-161766
	161768 / MGB2-L2-BR-U-XA4S0-OB-L-161768
	161021 / MGB2-L1-BR-M-X0000-BX-161021
	161027 / MGB2-L1-BR-M-X0000-BJ-161027
	161023 / MGB2-L2-BR-M-X0000-BX-161023
	161029 / MGB2-L2-BR-M-X0000-BJ-161029
Safety system MGB2 *Classic*, guard locking with guard lock monitoring, with submodule MSM-1-K-CA-CPP-B2-137732	158394 / MGB2-L1-BR-U-XB2S0-DB-R-158394
	160748 / MGB2-L1-BR-U-XB2S1-DY-R-160748
	161770 / MGB2-L1-BR-U-XB2S0-DB-L-161770
	161774 / MGB2-L1H-BR-U-S0-DB-R-161774
	161775 / MGB2-L1H-BR-U-S0-DB-L-161775
	161778 / MGB2-L1-BR-U-XB2S1-DY-L-161778
	161786 / MGB2-L1H-BR-U-S1-DY-R-161786
	161787 / MGB2-L1H-BR-U-S1-DY-L-161787
	158396 / MGB2-L2-BR-U-XB2S0-DB-R-158396
	161772 / MGB2-L2-BR-U-XB2S0-DB-L-161772
	161776 / MGB2-L2H-BR-U-S0-DB-R-161776
	161777 / MGB2-L2H-BR-U-S0-DB-L-161777
	161781 / MGB2-L2-BR-U-XB2S1-DY-R-161781
	161783 / MGB2-L2-BR-U-XB2S1-DY-L-161783
	161788 / MGB2-L2H-BR-U-S1-DY-R-161788
	161789 / MGB2-L2H-BR-U-S1-DY-L-161789
Safety system MGB2 *Classic*, guard locking with guard lock monitoring, with submodule MSM-1-P-CA-0R0-G1-164730	164744 / MGB2-L1HE-BP-M-S2-RY-R-164744
	164745 / MGB2-L1HE-BP-M-S2-RY-L-164745
	164734 / MGB2-L1-BP-M-XG1S2-RY-R-164734
	164736 / MGB2-L1-BP-M-XG1S2-RY-L-164736

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 V16
STEP 7 Professional	Version V16
STEP 7 Safety	Version V16

3. Functional description

3.1. MGB2-L1-B.-...

The MGB2-L1-B.-... is a guard locking device in accordance with EN ISO 14119 according to the closed-circuit current principle. Provided the guard lock monitoring on the MGB2 *Classic* is activated using the DIP switches (factory setting), the safety outputs are switched off if the guard locking is released (monitoring of the locking element).

Activation and deactivation of guard lock monitoring are described in chapter 7.

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

With inactive guard lock monitoring, the MGB2-L1-…-BR.-… is to be treated as a guard locking device for process protection. On this aspect, see chapter 3.2.

3.2. MGB2-L2-B.-...

The MGB2-L2-B.-... is a guard locking device in accordance with EN ISO 14119 according to the open-circuit current principle. Provided the guard lock monitoring on the MGB2 *Classic* is activated using the DIP switches (factory setting), the safety outputs are switched off if the guard locking is released (monitoring of the locking element). With inactive guard lock monitoring, the guard locking position does not influence the safety outputs. The safety outputs are switched off as soon as the device is unlocked using the handle module.

Activation and deactivation of guard lock monitoring are described in chapter 7.

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

4. Safety assessment

The MGB2-L.-B.-... 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 of the guard locking device.

	**Important!** The safety assessment on safety functions in an optional submodule, e.g. emergency stop or acknowledgment button, connection of an enabling switch to plug connector X5/X6 as well as the control of guard locking are not part of this example and must be added for the respective machine by the design engineer in accordance with the risk assessment.

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5. Overview of the connections

5.1. Connection of MGB2-L.-B.-...

Terminal	Designation	Function	Use in this example
X1.1	UB	Operating voltage of BR/BP electronics, 24 V DC	Connection to power supply 24 V DC
X1.2	FI1A	Enable input for channel A If operated separately (BP), set DIP switch as per the operating instructions or chapter 7 of the application.	Connection to power supply 24 V DC, first device in the series connection
X1.3	FI1B	Enable input for channel B If operated separately (BP), set DIP switch as per the operating instructions or chapter 7 of the application.	Connection to power supply 24 V DC, first device in the series connection
X1.4	OT/C	Bolt tongue monitoring output ON when the door is closed and the bolt tongue is inserted into the locking module. Optional: BR diagnostic output	Function is not used
X1.5	OD	Door monitoring output ON when the door is closed.	
X1.6	OL	Guard locking monitoring output ON when the door is closed and locked.	
X1.7	OI	Monitoring output DIA ON when the device is in the fault state.	
X1.8	FO1A	Safety output channel A ON when the door is closed and locked/interlocked. Attention: Pay attention to the DIP switch position. See chapter 7.	Connection to fail-safe input assembly: F-DI0 and F-DI4. 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 added.
X2.1	0V UB	Operating voltage of BR/BP electronics, 0V	Connection to power supply 0 V DC
X2.2 - X2.6	-	Function dependent on the submodule used	Function is not used
X2.7	RST	Reset input; device is reset if DC 24 V is applied to RST for min. 3 s.	Function is not used
X2.8	FO1B	Safety output channel B ON when the door is closed and locked/interlocked. Attention: Pay attention to the DIP switch position. See chapter 7	Connection to fail-safe input assembly: F-DI0 and F-DI4. 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 added.
X3.1	IMP	Operating voltage of guard locking solenoid, 24 V DC	Connection to 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.
X3.2	IMM	Operating voltage of guard locking solenoid, 0 V	Connection to fail-safe output assembly: F-DQ..M
X3.3 - X3.8	-	Function dependent on the submodule used	Function is not used
X4.1 - X4.8	-	Function dependent on the submodule used or plug connector X5/X6	

Table 1: Terminal assignment and contact description, MGB2 *Classic*

6. Basic circuit diagram

6.1. MGB2-L.-BR-...

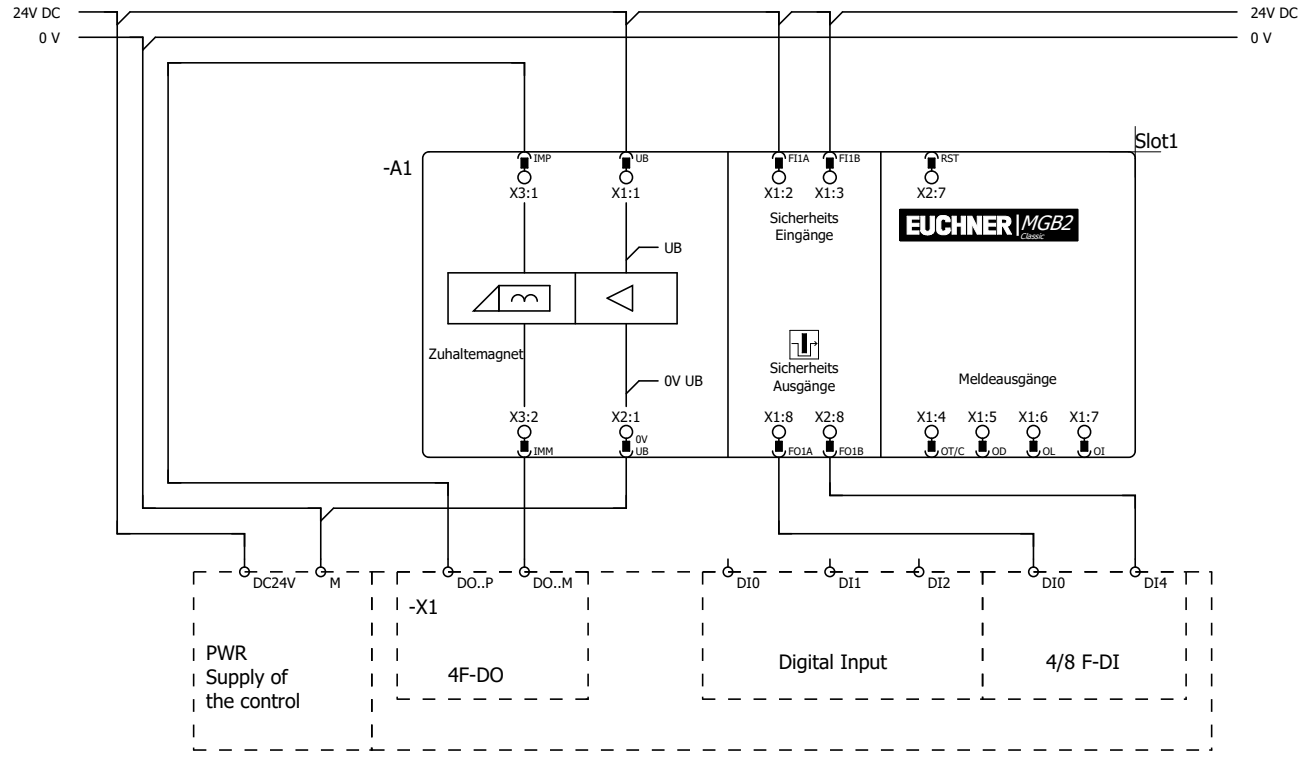

Figure 1: Basic circuit diagram, MGB2-L.-BR-...

6.2. MGB2-L.-BP-...

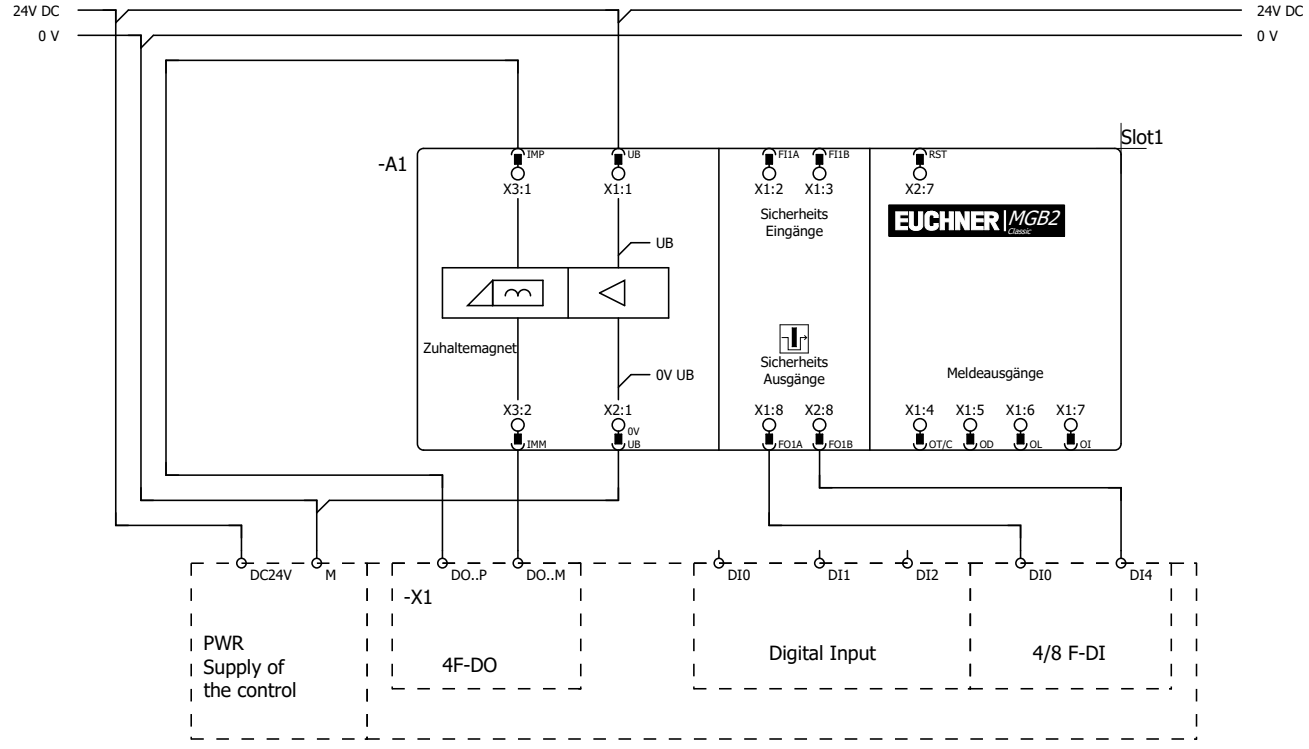

Figure 2: Basic circuit diagram, MGB2-L.-BP-...

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7. Device configuration MGB2 *Classic*

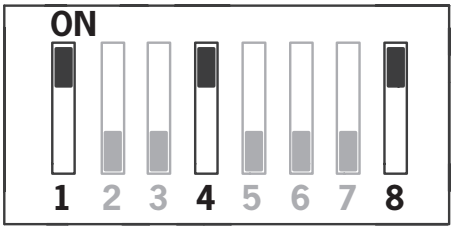
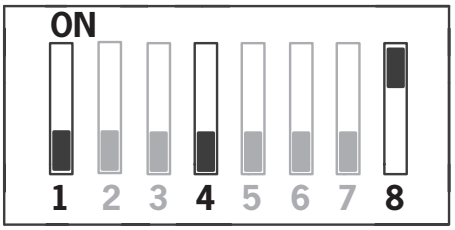
7.1. BR/BP system selection

CAUTION

Malfunction due to incorrect configuration or incorrect connection.

- Note that the terminal assignment also changes when the configuration is changed (see operating instructions)

1. Switch off power supply.
2. Set DIP switches 1, 4 and 8 as shown.

For change from BR => BP	For change from BP => BR
	

3. Switch on power supply for 5 s.

➡ The change is confirmed by the illumination of the Power LED. All other LEDs are off.

4. Switch off power supply and set DIP switch 8 to OFF.

➡ The next time the device is started, it operates in the operating mode set.

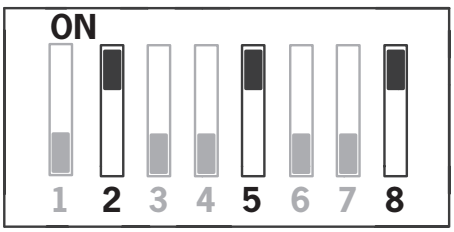
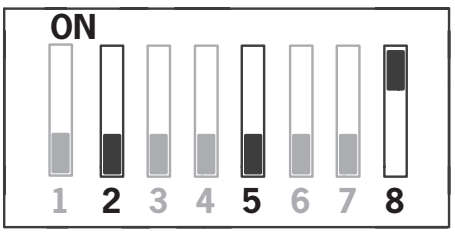
7.2. Activating/deactivating guard lock monitoring

WARNING

Risk of injury due to inactive guard lock monitoring.

- With inactive guard lock monitoring, the guard locking position does not influence the safety outputs. The guard can be opened immediately. This setting is not allowed to be used in applications in which, e.g., there is a hazard due to overrunning machinery movement. With inactive guard lock monitoring, guard locking must be used only for process protection.

1. Switch off power supply.
2. Set DIP switches 2, 5 and 8 as shown

Deactivating guard lock monitoring	Activating guard lock monitoring
	

3. Switch on power supply for 5 s.

➡ The change is confirmed by the illumination of the Power LED. All other LEDs are off.

4. Switch off power supply and set DIP switch 8 to OFF.

➡ The next time the device is started, it operates in the operating mode set.

8. 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

8.1. Input F-DI 8x24VDC HF

Parameter name (English)	Parameter name (German)	Value
Channel 0,4		
Sensor evaluation	Sensor evaluation	1oo2 evaluation, equivalent
Discrepancy behavior	Discrepancy behavior	Supply value 0 or as required
Discrepancy Time	Discrepancy time	10 ms
Reintegration after discrepancy error	Reintegration after discrepancy error	Test 0 signal not necessary or as required
Channel 0		
Activated	Activated	☑
Sensor supply	Sensor supply	External sensor supply
Input delay	Input delay	1.6 ms or longer
Channel 4		
Activated	Activated	☑
Sensor supply	Sensor supply	External sensor supply
Input delay	Input delay	1.6 ms or longer

Table 2: Parameter settings for the inputs

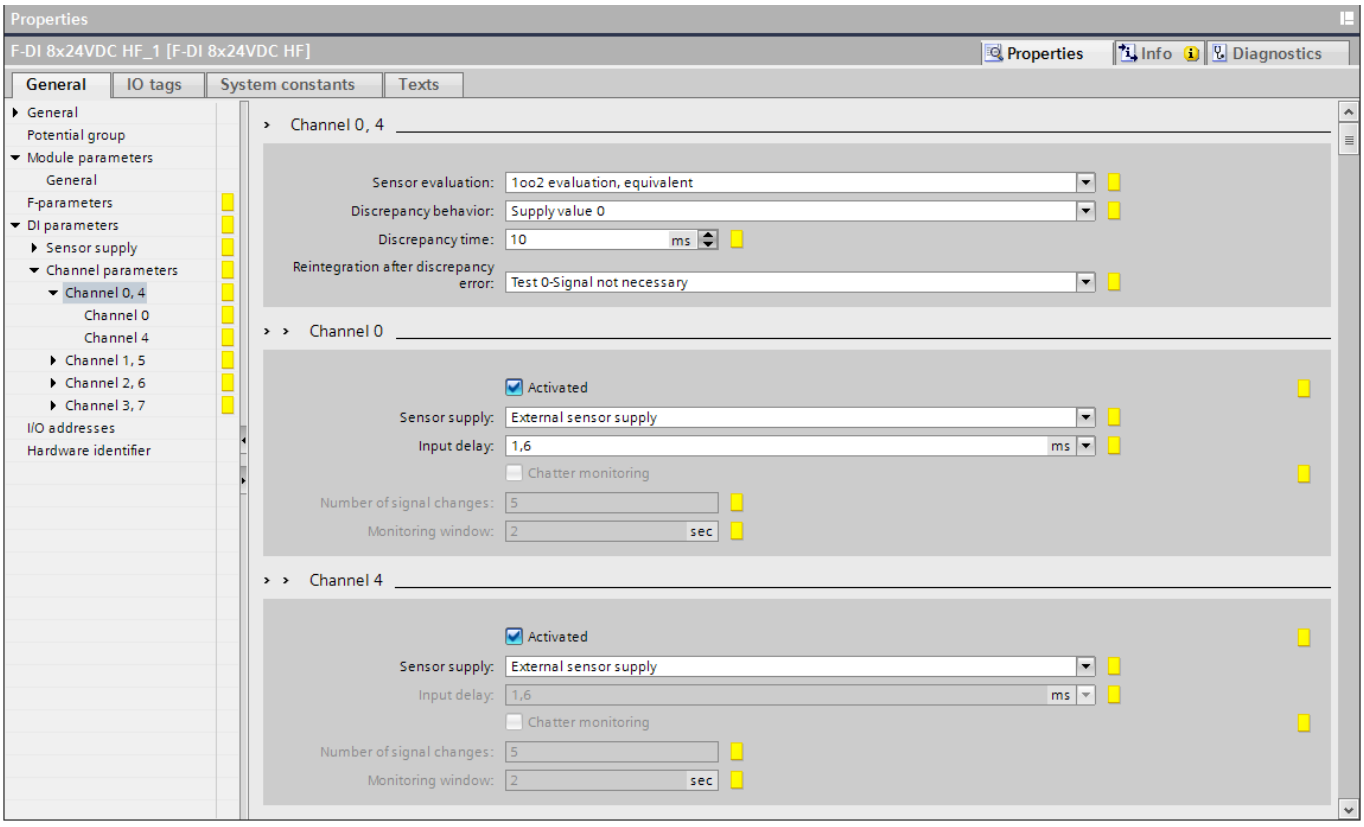


Figure 3: Parameter settings for the inputs

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

Parameter name (English)	Parameter (German)	Value
Channel 0		
Activated	Activated	☑
Max. readback time dark test	Max. read-back time, dark test	1.0
Max. readback time switch on test	Max. read-back time, switch-on test	0.6
Activated light test	Light test activated	☑
Diagnosis: Wire break	Diagnosis: wire break	☑

Table 3: Parameter settings for the outputs

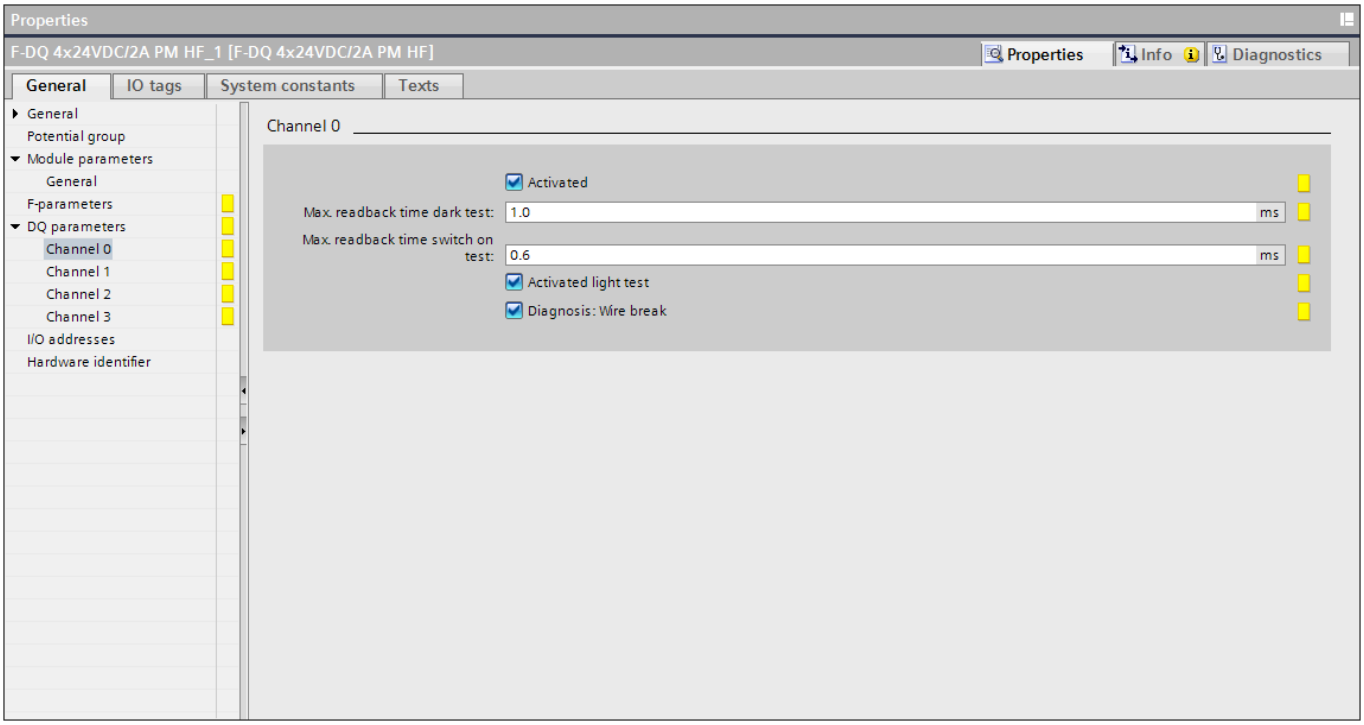

Figure 4: Parameter settings for the outputs

9. 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 must also be considered in the safety evaluation, 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 himself. 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 be excluded only 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.

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