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SIEMENS

Safety Integrated examples of calculating a (vertical) axis subject to gravity

Calculation examples for security functions on a vertical axis

<https://support.industry.siemens.com/cs/ww/en/view/109896030>

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1 Task

1.1 Note

The following application examples are intended to serve as basis as to how a performance level could be calculated according to EN ISO 13849 for an axis subject to the force of gravity.

A risk assessment is always the basis for configuring safety functions. The manufacturer of a machine or an authorized representative must perform this risk assessment to determine the applicable safety and health protection requirements for the machine. The machine must be designed and constructed taking into account the results of the risk assessment.

1.2 Introduction

Since December 29, 2009 in the European Community, the requirements of the new Machinery Directive 2006/42/EC apply for functional safety – and therefore the protection of people, machines, and production materials. This means that all machines that are marketed in the European Community must meet the requirements of this Machinery Directive.

You can achieve conformity with the new Machinery Directive, which enables you to export your products and protects you from liability claims, in a number of ways including applying the EN ISO 13849-1 or EN 62061 standard. The safety case required by both standards must demonstrate that the SIL (Safety Integrity Level) or PL (Performance Level) value determined in the risk assessment was achieved with the safety solutions used.

A clearly structured risk assessment is the basis for verifying safety!

This risk assessment is the first step toward a safe machine, and it is already performed in the planning phase.

Protective measures are derived from the risk assessment to reduce risk. These are described as safety functions.

The safety function solution is then checked and evaluated, as to whether the Safety Integrity or Performance Level, required as a result of the risk assessment, is achieved.

1.3 Brief description of the examples

This application example explains how to calculate the performance level for an axis subject to the force of gravity, based on the EN ISO 13849 standard.

The following cases are taken into consideration:

- When the protective doors are open, an axis subject to the force of gravity is in the Safe Operating Stop (SOS) condition.
- When the safety doors are open, an axis subject to the force of gravity with an enabling button is monitored for Safely-Limited Speed (SLS)
- Holding an axis subject to the force of gravity when the power fails
- Stopping an axis subject to the force of gravity, e.g. for an Emergency Stop



Fig. 1-1

Note

Calculating the $MTTF_D$:

- $MTTF_D$ is calculated using the parts count technique according to DIN EN ISO 13849-1
- The following assumption applies to the application examples described in this document: $MTTF_D = 2 \times MTBF$

The components used in the following examples depend on the particular application.

Depending on the particular machine type and application, other components can be used or some components omitted.

The user is responsible for selecting the components and for calculating the safety function.

1.4 Overview diagram for an application example

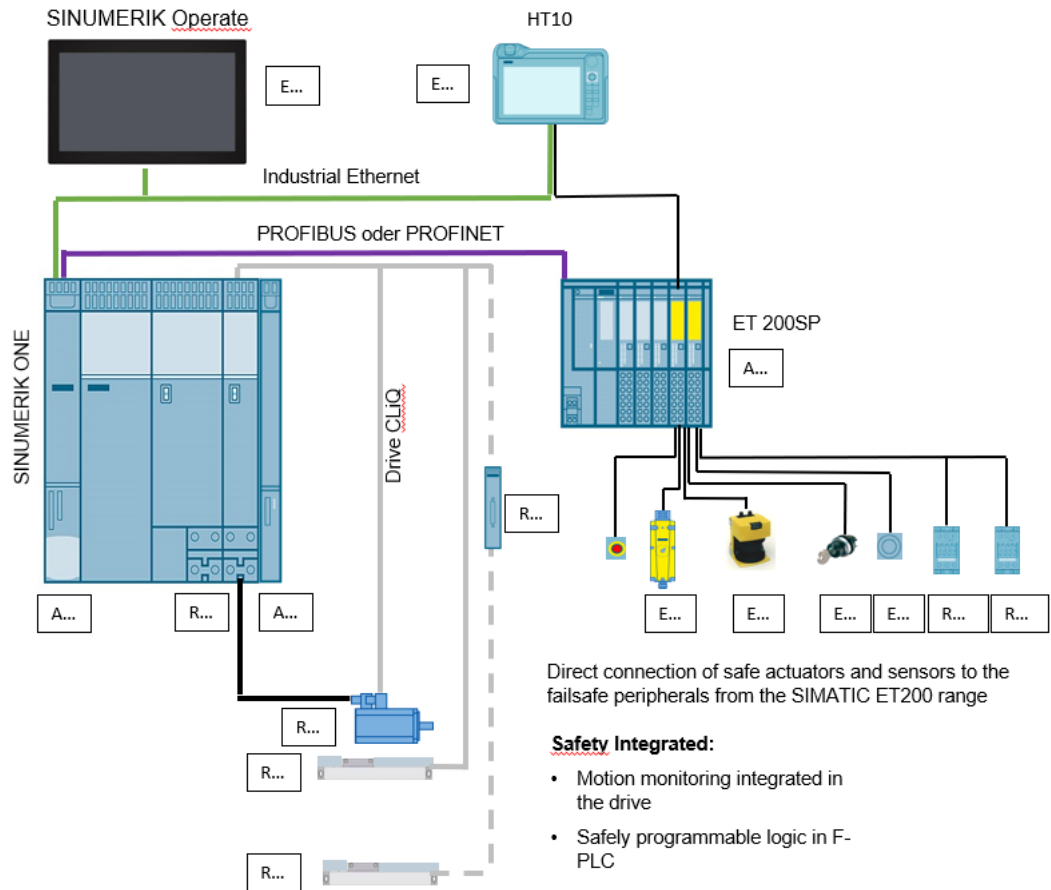


Fig. 1-2: Example, application overview

Assignment	Component in the overview or in the block diagrams
E... (Sense)	Sensors and button
A... (Evaluate)	Logic
R... (React)	Motor including encoder, Motor Module, contactor relay

Table 1-1: Legend

2 Solution

2.1 Overview of the components used

Designation E... Sense A... Evaluate R... React	Component	Order number	PFH value	MTBF value (years)	B10 value
E...	Protective door switch	3SE5...-...U..	-	-	1.000.000
E...	Emergency Stop button of the HT10 handheld terminal	-	1.01×10^{-07}	-	-
E...	Enabling button of the HT10 handheld terminal	-	5.07×10^{-09}	-	-
A...	Safety input module ET 200SP, el mod., F-DI 8x24VDC HF	6ES7136-6BA00-0CA0	1.00×10^{-09}	-	-
A... *) R...	NCU 1760	6FC5317-6AA00-0AA0	1.4×10^{-08}	90 *)	-
A...	Safety output module ET 200SP, el mod., F-DQ 4xDC 24V/2A	6ES7136-6DB00-0CA0	1.00×10^{-09}	-	-
R...	Drive-CLiQ interface (integrated DQI interface)	-	3.00×10^{-08} 2)	-	-
R..	Use of a two-encoder system (DQ interface)	-	7.00×10^{-09} 2)	-	-
R...	Third-party encoder	-	1)	Manufacturer's data	-
R...	SME20	6SL3055-0AA00-5EA3	-	286	-
R...	Motor Module	6SL312-2.E.-.A..	1.00×10^{-08}	80	-
R...	Holding brake of a servomotor 1FK704 motor	-	-	-	10.000.000
R...	External holding brake	-	-	-	Manufacturer's data
R...	1FT7 servomotor	-	-	400	-

Table 2-1: Component overview

¹⁾ The following basic encoder types can be used with a drive module to implement safety-related operation:

- Incremental encoder via a Sensor Module and DRIVE-CLiQ with sinusoidal voltage signals A and B (signal A is shifted with respect to B through 90°) and a reference signal R
- Absolute encoder via Sensor Module and DRIVE-CLiQ with EnDat interface and incremental sinusoidal voltage signals A and B (signal A shifted with respect to B through 90°)
- Motor encoder (IMS) with integrated DRIVE-CLiQ interface
- Direct encoder (DMS, e.g. linear scale) with integrated DRIVE-CLiQ interface

²⁾ From the VDMA library

2.1.1 Consideration of the measuring systems used

When calculating the monitoring functions (e.g. SLS, SOS) the following applies:

A fault analysis was performed for the encoders (measuring systems). This indicated that the proportion of undetected faults of the sin/cos and Drive-CLiQ encoders is negligible compared to the failure rate being considered. As a consequence, when calculating the safety function, only the "encoder connection", SMC/SME or the Drive-CLiQ interface must be considered

However, for the safety-related holding system for vertical axes, the encoder **must** be taken into consideration.

2.2 Safe Operating Stop (SOS)

Definition according to EN 61800-5-2:

"Function Safe Operating Stop (SOS) is used to safely monitor the standstill position of a drive."

For Safe Operating Stop (SOS), the axes are in closed-loop position control and their position is monitored.

2.2.1 Safe Operating Stop (SOS) when the safety door is open

A SINUMERIK ONE with function "Safety Integrated" is used.

Safe brake management is implemented for the axis subject to the force of gravity. Safe brake management comprises diagnostic function "Safe Brake Test" (SBT) and function "Safe Brake Control" (SBC).

When the safety door is open, function Safe Operating Stop (SOS) is selected via the F-PLC's safety program and the axis position is safely monitored.

If the axis exits the safe standstill tolerance, then a safe stop response is triggered. As a result, the axis is braked as quickly as possible and transitioned to STO after a transition period. The machine holding brake is closed by function SBC (Safe Brake Control).

The safety door switch is connected to a safe input module of the SIMATIC ET 200SP via two channels. The protective door switch is evaluated in the F-PLC safety program.

The holding brake of the 1FK7 servomotor is connected via the two-channel brake output on the SINAMICS Motor Module. The Safe Brake Control (SBC) function is initiated together with STO and the brake is safely closed.

Monitoring the axis position is split up into the standard functionality of SINUMERIK and the holding brake:

The standard functionality of SINUMERIK (channel 1) keeps the axis in position, so that here the MTBF value must be used for the calculation.

For the holding brake (channel 2), a diagnostic coverage (DC) of 90% is used as basis for the calculation, because it is cyclically tested and the axis position is reliably monitored.

For the SOS safety function described in this example, only safety-relevant components are used. This means that the PFH value of the safety function is obtained by adding the individual PFH values.

In the following calculations, the application is shown with a 1-encoder as well as a 2-encoder system.

2.2.1.1 Calculating SOS with a one encoder system

The position is safely monitored (SOS).

The axis is brought to a standstill and then held in position using the standard closed-loop position control function (channel 1).

The holding brake (channel 2) is cyclically tested.

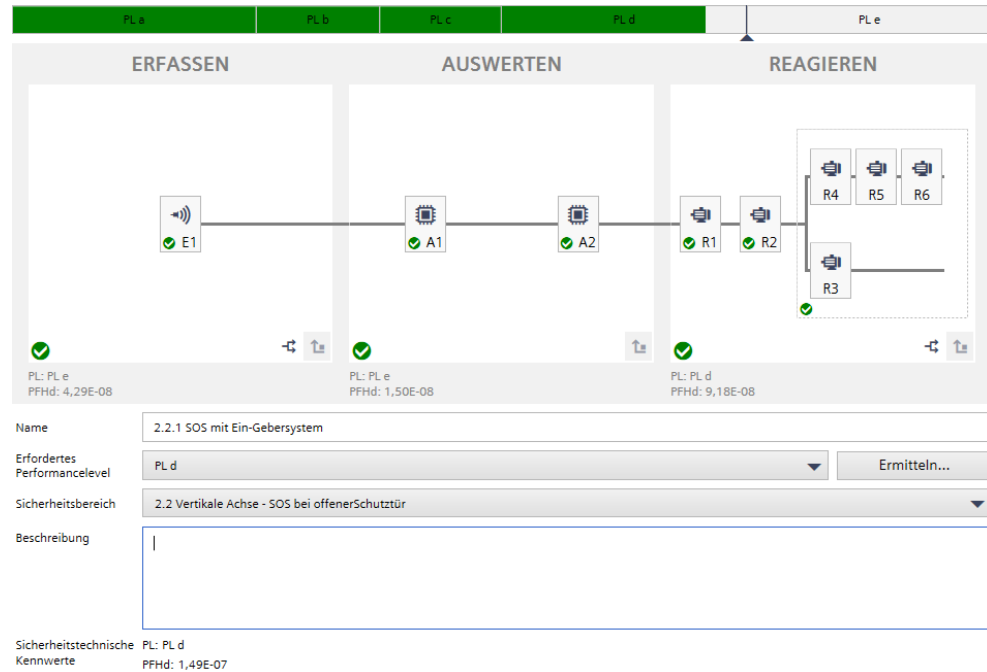


Fig. 2-1

Designation	Component	Order number	PFH value
E1	Protective door switch	3SE5...-..U..	4.29×10^{-08}
A1	Safety input module ET 200SP, el mod., F-DI 8x24VDC HF	6ES7136-6BA00-0CA0	1.00×10^{-09}
A2	NCU 1760	6FC5317-6AA00-0AA0	1.4×10^{-08}
R2	Drive CLiQ interface (DQI)		3.00×10^{-08}
R1	Motor Module	6SL312.-2.E...-A..	1.00×10^{-08}
<u>Channel 1</u> R4 R5 R6	NCU 1760 Motor Module 1FK7 servomotor	6FC5317-6AA00-0AA0 6SL312.-2.E...-A..	5.18×10^{-08} (standard components were used in channels 1 and 2. The PFH value is calculated using the MTBF or B10 values.)
<u>Channel 2</u> R3	Motor holding brake		
Result			1.49×10^{-07}
Performance level achieved: PL d			

Table 2-2: Calculating the safety function

2.2.1.2 Calculating SOS with two encoder systems

The position is safely monitored (SOS).

The axis is brought to a standstill and then held in position using the standard closed-loop position control function (channel 1).

The holding brake (channel 2) is cyclically tested.

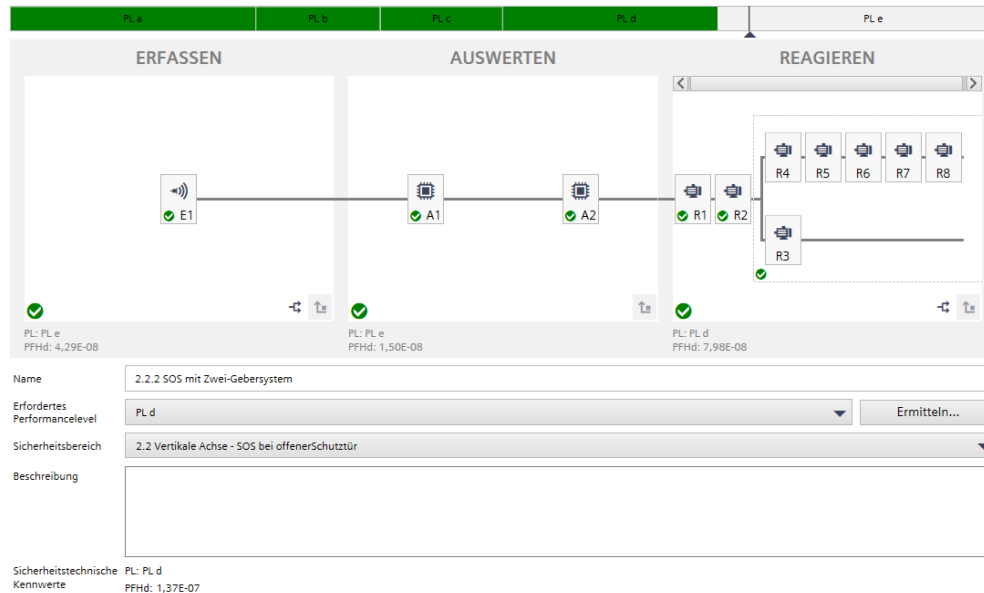


Fig. 2-2

Designation	Component	Order number	PFH value
E1	Protective door switch	3SE5...-..U..	4.29×10^{-08}
A1	Safety input module ET 200SP, el mod., F-DI 8x24VDC HF	6ES7136-6BA00-0CA0	1.00×10^{-09}
A2	NCU 1760	6FC5317-6AA00-0AA0	1.4×10^{-08}
R2	2-encoder system		7.00×10^{-09}
R1	Motor Module	6SL312-2.E...A..	1.00×10^{-08}
<u>Channel 1</u>			
R4	NCU 1760	6FC5317-6AA00-0AA0	6.28×10^{-08} (standard components were used in channels 1 and 2. The PFH value is calculated using the MTBF or B10 values.)
R5	SME	6SL3055-0AA00-5EAX	
R6	Third-party encoder		
R7	Motor Module	6SL312-2.E...A....	
R8	1FT7 servomotor		
<u>Channel 2</u>			
R3	Motor holding brake		
		Result	1.37×10^{-07}
Performance level achieved: PL d			

Table 2-3: Calculating the safety function

2.3 Safely-Limited Speed (SLS)

Definition according to EN 61800-5-2:

"Function Safely-Limited Speed (SLS) prevents the motor from exceeding a defined speed limit."

2.3.1 Traversing the axis with enabling device (SLS)

A SINUMERIK ONE with function "Safety Integrated" is used.

Safe brake management is implemented for the axis subject to the force of gravity. Safe brake management comprises diagnostic function "Safe Brake Test" (SBT) and function "Safe Brake Control" (SBC).

When the safety door is open, the axis subject to the force of gravity is traversed by actuating the enabling device and the direction buttons.

The axis is traversed using the standard functions of SINUMERIK and SINAMICS.

In the safety program, the enabling device activates monitoring for a Safely-Limited Speed (SLS).

The enabling device is connected to a safety SIMATIC ET200SP input module via two channels. The enable signal is evaluated in the F-PLC safety program.

The holding brake of the servomotor is controlled using function SBC.

Axis monitoring is split up into the standard functionality of the SINUMERIK and the holding brake:

The standard functionality of SINUMERIK (channel 1) keeps the axis in position, so that here the MTBF value must be used for the calculation.

For the holding brake (channel 2), a diagnostic coverage (DC) of 90% is used as basis for the calculation, because it is cyclically tested and the axis position is reliably monitored.

For the SLS safety function described in this example, only safety-relevant components are used. This means that the PFH value of the safety function is obtained by adding the individual PFH values.

In the following calculations, the application is shown with a 1-encoder and a 2-encoder system

2.3.1.1 Example of SLS with one encoder system

After activating the enabling device, the user switches from safely monitored position (SOS) to safely monitored speed (SLS).

The axis is held in position by the standard function of the closed-loop position control and traversed after switching over to SLS (channel 1).

The holding brake (channel 2) is cyclically tested.

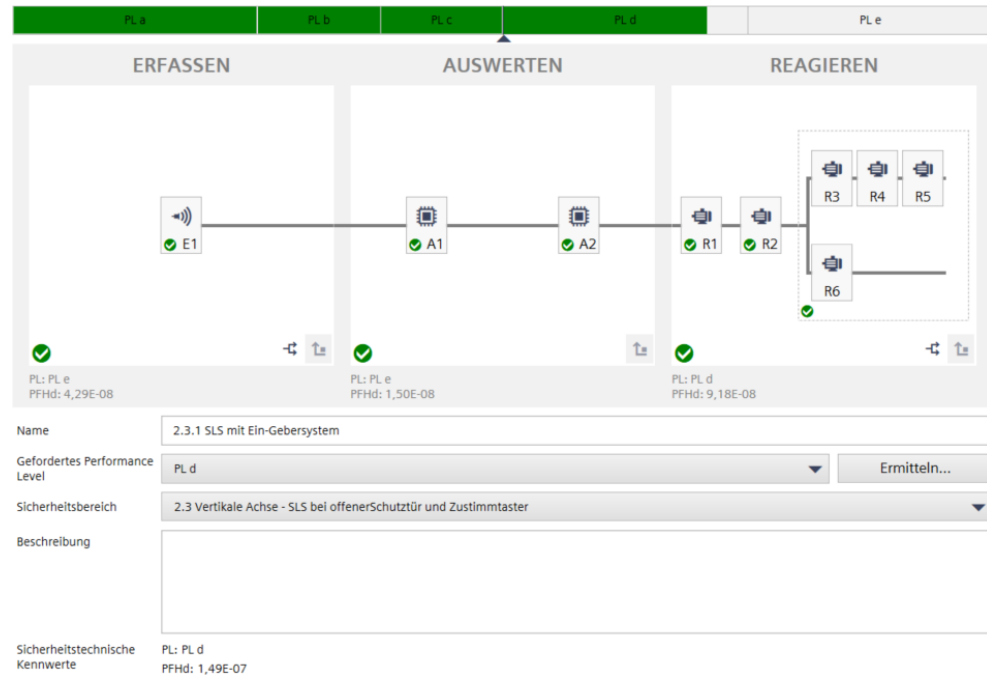


Fig. 2-3

Designation	Component	Order number	PFH value
E1	Enabling button		4.29×10^{-08}
E1	Safety input module ET 200SP, el mod., F-DI 8x24VDC HF	6ES7136-6BA00-0CA0	1.00×10^{-09}
E2	NCU 1760	6FC5317-6AA00-0AA0	1.4×10^{-08}
R2	Drive CLiQ interface (DQI)		3.00×10^{-08}
R1	Motor Module	6SL312-2.E...A..	1.00×10^{-08}
Channel 1 R4 R5 R3	NCU 1760 Motor Module 1FT7 servomotor	6FC5317-6AA00-0AA0 6SL312-2.E...A....	5.18×10^{-08} (standard components were used in channels 1 and 2. The PFH value is calculated using the MTBF or B10 values.)
Channel 2 R6	Motor holding brake		
		Result	1.49×10^{-07}
Performance level achieved: PL d			

Table 2-4: Calculating the safety function

2.3.1.2 Example of SLS with two encoder systems

After activating the enabling device, the user switches from safely monitored position (SOS) to safely monitored speed (SLS).

The axis is held in position by the standard function of the closed-loop position control and traversed after switching over to SLS (channel 1).

The holding brake (channel 2) is cyclically tested.

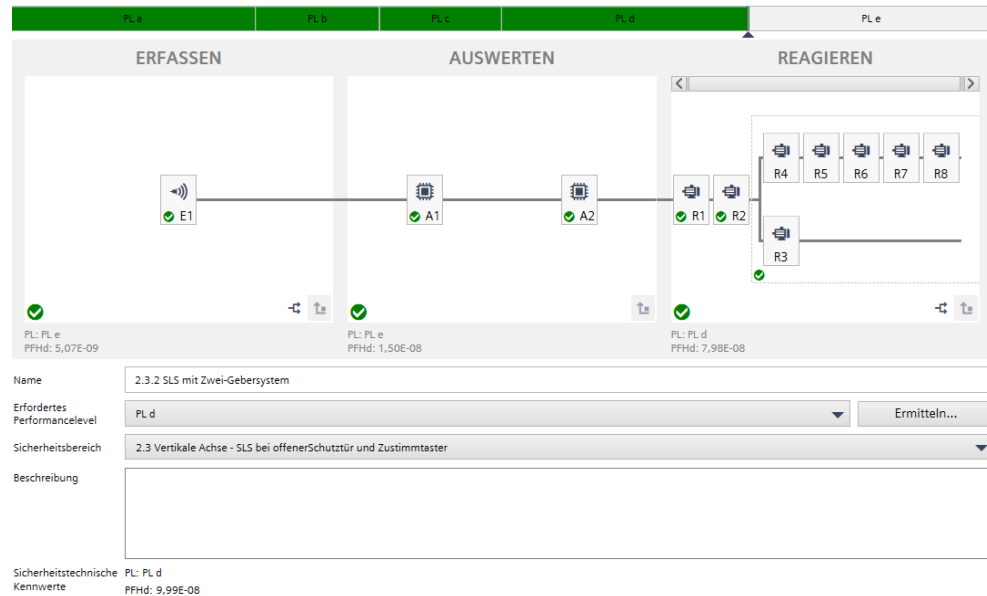


Fig. 2-4

Calculating the safety function

Designation	Component	Order number	PFH value
E1	Enabling button		4.29×10^{-08}
A1	Safety input module ET 200SP, el mod., F-DI 8x24VDC HF	6ES7136-6BA00-0CA0	1.00×10^{-09}
A2	NCU 1760	6FC5317-6AA00-0AA0	1.4×10^{-08}
R2	2-encoder system		7.00×10^{-09}
R1	SINAMICS Motor Module	6SL312-2.E...A..	1.00×10^{-08}
<u>Channel 1</u> R4 R5 R6 R7 R8	NCU 1760 SME Third-party encoder Motor Module 1FT7 servomotor	6FC5317-6AA00-0AA0 6SL3055-0AA00-5EAx 6SL312-2.E...A....	6.28×10^{-08} (standard components were used in channels 1 and 2. The PFH value is calculated using the MTBF or B10 values.)
<u>Channel 2</u> R3	Motor holding brake		
		Result	1.37×10^{-07}
Performance level achieved: PL d			

Table 2-5: Calculating the safety function

2.4 Holding an axis subject to the force of gravity when the power fails

A SINUMERIK ONE with function "Safety Integrated" is used.

When it is identified that the power has failed (e.g. as a result of an undervoltage condition), the axis is brought to a standstill by a clamping or braking device that is effective in the non-energized state (brakes or clamps that are then closed).

Controlled braking using the control system is no longer possible as a result of the sudden power failure if there is no buffering, e.g. using a CSM module.

For the case that there is only one holding brake, this is controlled by the SINAMICS output. For STO, the brake is safely closed using function Safe Brake Control (SBC).

If the axis is also equipped with an external holding brake, then the second holding brake is controlled from a safe output of the F-I/O.

As a brake test is regularly performed, a diagnostic coverage of 90% can be assumed when making the calculation.

According to ISO 13849-1, the following prerequisite is used to calculate the test channel of the brake: "for category 2, $MTTF_D$ of the test channel is greater than half of the $MTTF_D$ of the function channel". The test channel is realized using the cyclic brake test. This is mapped with the NCU and motor module components.

Note:

The test channel is not shown in the diagrams and is not included in the calculation.

The brake is controlled via safety-relevant components. This means that when calculating this safety function, the PFH values of the components involved can be used as basis.

2.4.1 Example of power failure with a holding brake

When it is identified that the power has failed, the axis is brought to a standstill by the clamping or braking devices that are effective in the non-energized state (brakes close).

The axis is held in position at standstill, for example, using a clamping or braking device that acts in the de-energized state.

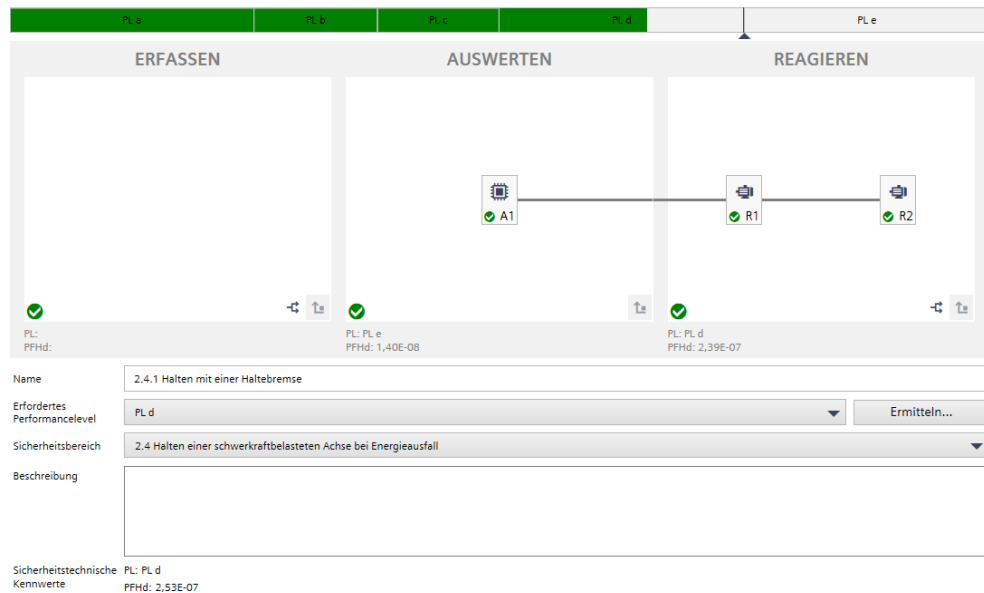


Fig. 2-5:

Designation	Component	Order number	PFH value
A1	NCU 1760	6FC5317-6AA00-0AA0	1.4×10^{-08}
R1	Motor Module	6SL312-2.E..-A..	1.0×10^{-08}
R2	Holding brake (B10 = 10,000,000) Assumption: The brake is actuated with 250 cycles / year (the machine is switched off on a daily basis (with 220 work days per year), the emergency stop or power failure is activated/occurs a total of 30 times) The MTTF _D value of the brake is capped at 100 years		2.29×10^{-07} (The brake is a standard component (category 2), the PFH value was calculated based on the B10 value and a DC of 90%.)
		Result	2.53×10^{-07}
Performance level achieved: PL d			

Table 2-6: Calculation example for a safety function with one holding brake

2.4.2 Example for power failure with two holding brakes

When it is identified that the power has failed, the axis is brought to a standstill by the clamping or braking devices that are effective in the non-energized state (brakes close).

The axis is held in position at standstill, for example, using a clamping or braking device that acts in the de-energized state.

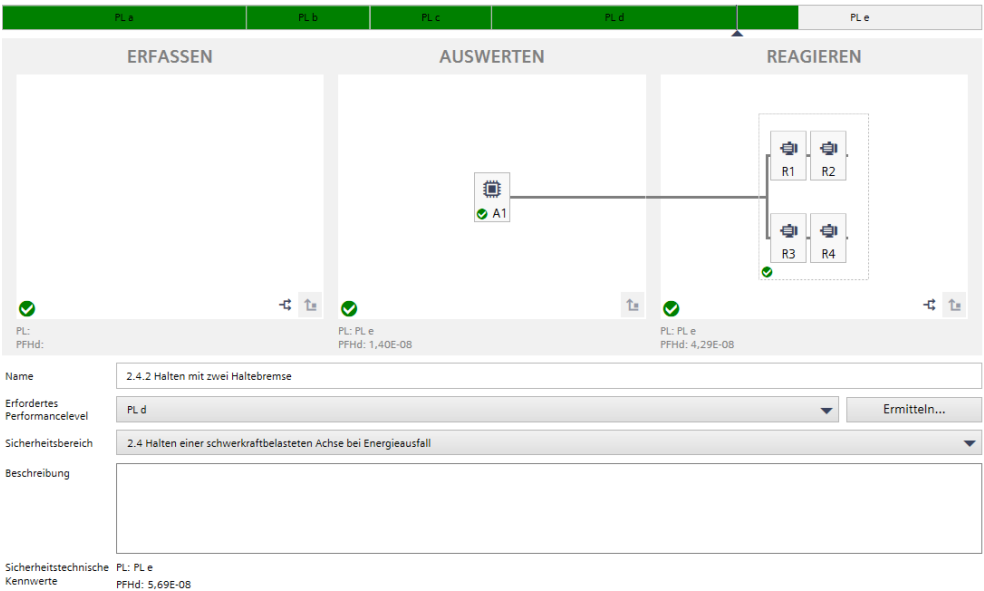


Fig. 2-6

Designation	Component	Order number	PFH value
A1	NCU 1760	6FC5317-6AA00-0AA0	1.4 x 10-08
Channel 1: R1 R2	Motor Module Holding brake 1	6SL312-2.E...A..	4.29 x 10-08
Channel 2: R3 R4	Safety output module Holding brake 2	6ES7136-6DB00-0CA0	(The brake is a standard component (category 2), the PFH value was calculated based on the B10 value and a DC of 90%.)
Result			5.69 x 10-08
Performance level achieved: PL e			

Table 2-7: Calculation example for a safety function with two holding brakes

2.5 Stopping an axis subject to the force of gravity for an Emergency Stop (STO)

A SINUMERIK ONE with function "Safety Integrated" is used.

Safe brake management is implemented for the axis subject to the force of gravity. Safe brake management comprises diagnostic function "Safe Brake Test" (SBT) and function "Safe Brake Control" (SBC).

The Emergency Stop button is connected to a safety input module of the SIMATIC ET 200SP through two channels. The Emergency Stop button is evaluated in the F-PLC safety program.

When the Emergency Stop button is activated, depending on the risk assessment, the axis is braked either as quickly as possible along the OFF3 ramp with Safe Stop 2 (SS2) or interpolating with Safe Stop 2 external (SS2E); after a defined time, the safe state Safe Torque Off (STO) is activated in the F-PLC safety program, the pulses are canceled and the brake closes (Category 1 stop; EN 60204-1).

If the axis is also equipped with an external holding brake, the second holding brake is controlled by a safe output of the F-I/O via the F-PLC safety program.

As a brake test is regularly performed, a diagnostic coverage of 90% can be assumed when making the calculation.

Note:

The test channel is not shown in the diagrams and is not included in the calculation.

2.5.1 Calculation with one holding brake and one encoder system

The axis is brought to a standstill and the pulses are safely canceled.

The clamping or braking device (closing brake), which acts in the de-energized state, keeps the axis in position.

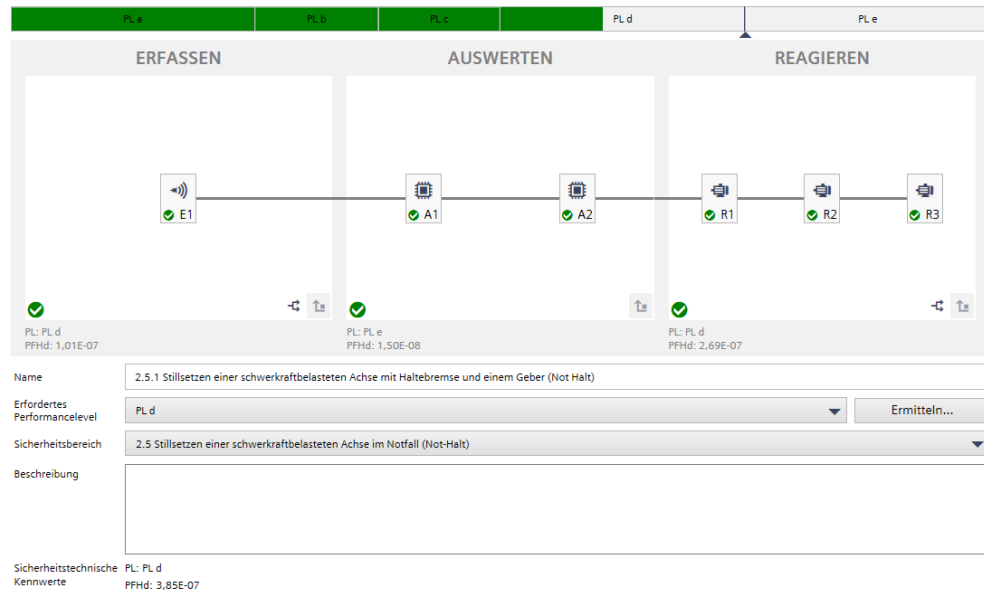


Fig. 2-7

Designation	Component	Order number	PFH value
E1	Emergency Stop button of the HT10 handheld terminal	-	1.01×10^{-07}
A1	Safety input module ET 200SP, el mod., F-DI 8x24VDC HF	6ES7136-6BA00-0CA0	1.00×10^{-09}
A2	NCU 1760	6FC5317-6AA00-0AA0	1.4×10^{-08}
R2	Drive CLiQ interface (DQI)		3.00×10^{-08}
R1	Motor Module	6SL312.-2.E...-A..	1.00×10^{-08}
R3	Motor holding brake		2.29×10^{-07} (The brake is a standard component (category 2), the PFH value was calculated based on the B10 value and a DC of 90%.)
Result			3.85×10^{-07}
Performance level achieved: PL d			

Table 2-8: Calculating the safety function

2.5.2 Calculation with one holding brake and two encoder systems

The axis is brought to a standstill and the pulses are safely canceled. The axis is held in position by the clamping or braking device (closing brakes) that act in the de-energized state.

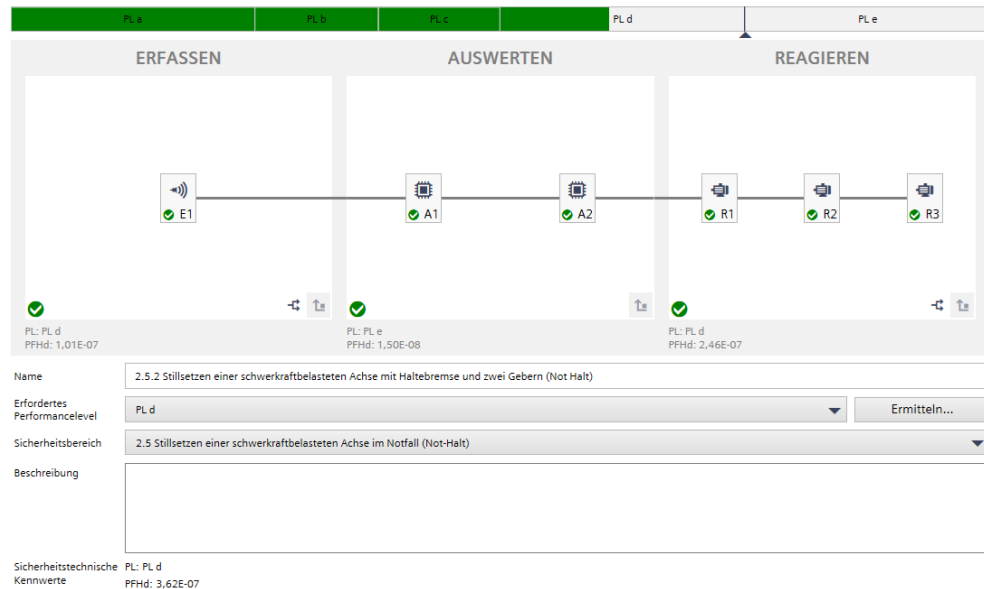


Fig. 2-8

Designation	Component	Order number	PFH value
E1	Emergency Stop button of the HT10 handheld terminal	-	1.01×10^{-07}
A1	Safety input module ET 200SP, ei mod., F-DI 8x24VDC HF	6ES7136-6BA00-0CA0	1.00×10^{-09}
A2	NCU 1760	6FC5317-6AA00-0AA0	1.4×10^{-08}
R2	Use of a two-encoder system (highly integrated DQ interface)		7.00×10^{-09}
R1	Motor Module	6SL312.-2.E...A..	1.00×10^{-08}
R3	Motor holding brake		2.29×10^{-07} (The brake is a standard component (category 2), the PFH value was calculated based on the B10 value and a DC of 90%.)
		Result	3.62×10^{-07}
Performance level achieved: PL d			

Table 2-9: Calculating the safety function

2.5.3 Calculating with two holding brakes and one encoder system

The axis is brought to a standstill and the pulses are safely canceled. The axis is held in position by the clamping or braking devices (closing brakes) that act in the de-energized state.

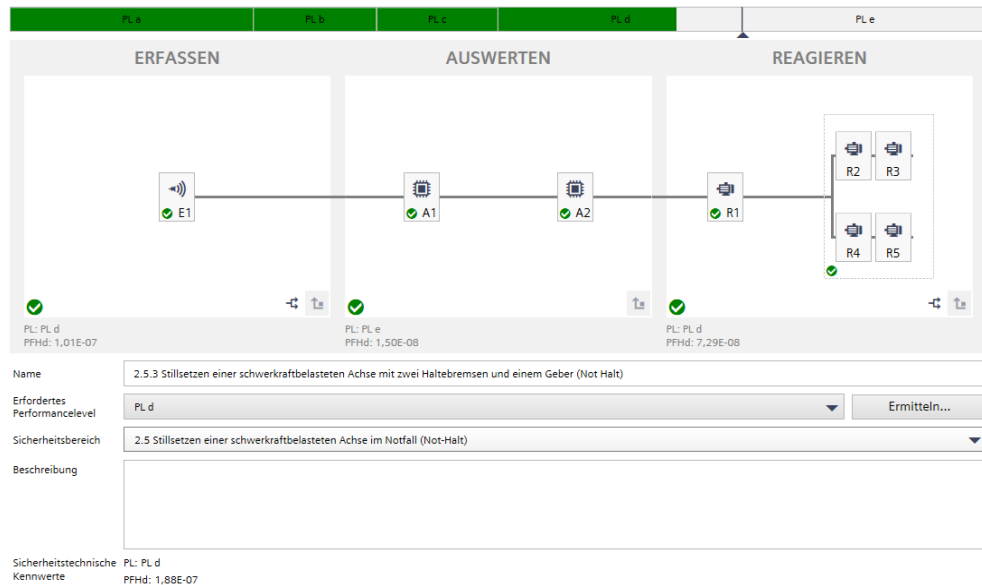


Fig. 2-9

Designation	Component	Order number	PFH value
E1	Emergency Stop button of the HT10 handheld terminal	-	1.01×10^{-07}
A1	Safety input module ET 200SP, el mod., F-DI 8x24VDC HF	6ES7136-6BA00-0CA0	1.00×10^{-09}
A2	NCU 1760	6FC5317-6AA00-0AA0	1.4×10^{-08}
R1	Drive CLIQ interface (DQI)		3.00×10^{-08}
<u>Channel 1</u> R2 R2	Motor Module I Holding brake 1 (motor)	6SL312.-2.E...-A..	4.29×10^{-08}
<u>Channel 2</u> R4 R5	Safety output module Holding brake 2	6ES7136-6DB00-0CA0	(The brakes are a standard component, the PFH value was calculated based on the B10 value and a DC of 90%.)
		Result	1.88×10^{-07}
Performance level achieved: PL d			

Table 2-10: Calculating the safety function

2.5.4 Calculation with two holding brakes and two encoder systems

The axis is brought to a standstill and the pulses are safely canceled. The axis is held in position by the clamping or braking devices (closing brakes) that act in the de-energized state.

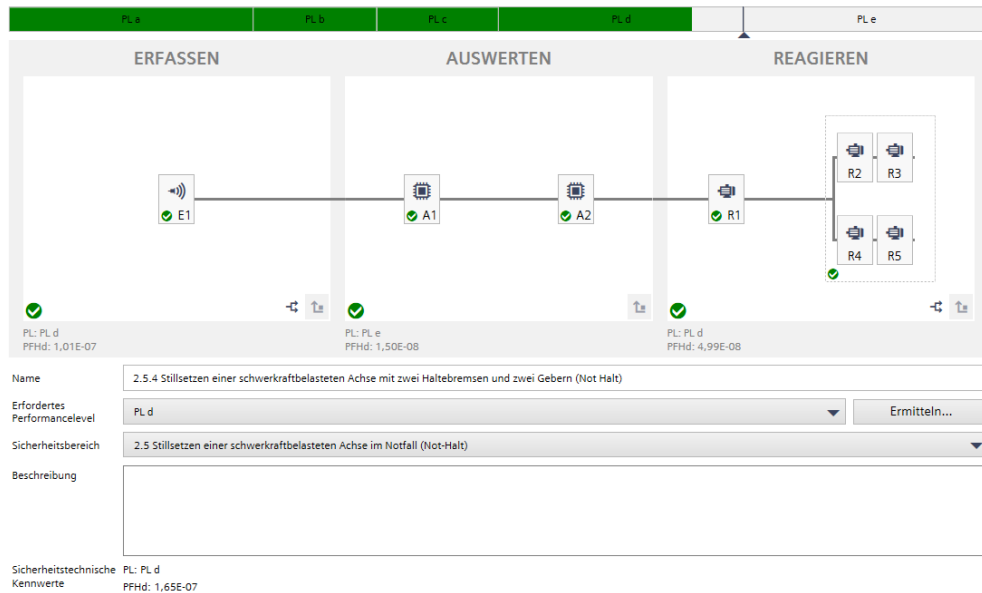


Fig. 2-10

Designation	Component	Order number	PFH value
E1	Emergency Stop button of the HT10 handheld terminal	-	1.01×10^{-07}
A1	Safety input module ET 200SP, ei mod., F-DI 8x24VDC HF	6ES7136-6BA00-0CA0	1.00×10^{-09}
A2	NCU 1760	6FC5317-6AA00-0AA0	1.4×10^{-08}
R1	Use of a two-encoder system (highly integrated DQ interface)		7.00×10^{-09}
<u>Channel 1</u> R2 R3	Motor Module holding brake 1 (motor)	6SL312.-2TE21-8A..	4.29×10^{-08}
<u>Channel 2</u> R4 R5	Safety output module Holding brake 2	6ES7136-6DB00-0CA0	(The brakes are a standard component, the PFH value was calculated based on the B10 value and a DC of 90%.)
		Result	1.65×10^{-07}
Performance level achieved: PL d			

Table 2-11: Calculating the safety function

2.6 Calculating the safety evaluation using the TIA selection tool (TST)

This application example includes a calculation example of the safety evaluation using the TIA selection tool (TST).

For detailed calculations, refer to the TIA file.

Open the attached file:

- Save the attached file to the local hard disk of your computer
- Start the "TIA selection tool" application
- From the pulldown menu "Project" and program point "Open", load the file into application "TIA selection tool"
- Start calculations in the "Safety Evaluation" project tree.

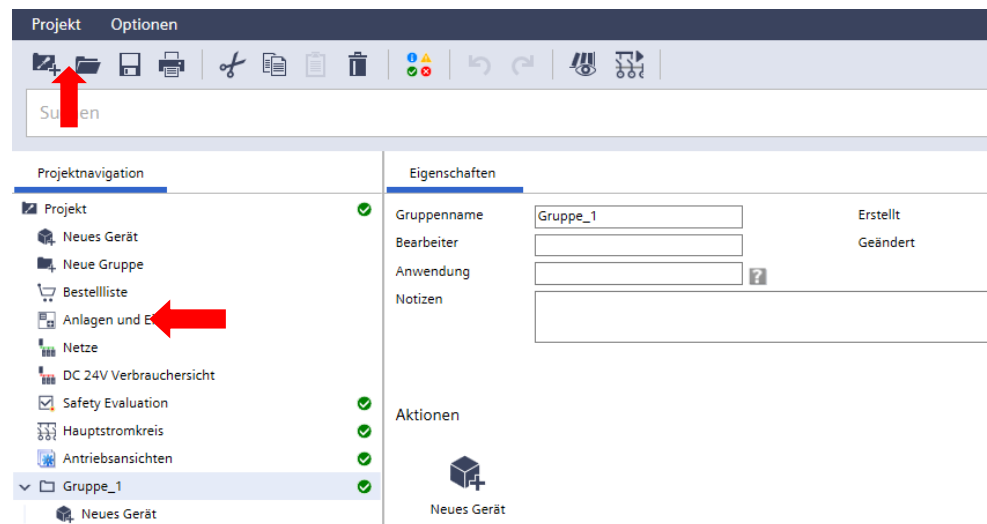


Fig. 2-11

The TST tool can be found at [13](#).

3 Terms/abbreviations

EN	European Standard
ISO	International Standards Organization
SIL	Safety Integrity Level
PL	Performance Level
PFH	Probability of Failure per Hour
MTBF	Mean Time between Failure
MTTFD	Mean Time to dangerous Failure
B ₁₀	Number cycles until 10% of the components have failed
B10d	Number cycles until 10% of the components have dangerously failed
DC	Diagnostic coverage
STO	Safe Torque Off
SOS	Safe Operating Stop
SLS	Safely Limited Speed
SS1	Safe Stop 1
SS2	Safe Stop 2
SS2E	Safe Stop 2 mit ext. Stopp
SCA	Safe Cam
SRP/CS	Safety-related parts of a control system
NC	Numerical control
NCU	Numerical control unit
PLC	Programmable logic control
PN	Profinet
DI	Digital input
DO	Digital output
F-DI	Failsafe digital input
F-DO	Failsafe digital output

4 Appendix

4.1 Service and support

Industry Online Support

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks:

support.industry.siemens.com

Technical Support

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts.

Please send queries to Technical Support via Web form:

siemens.com/SupportRequest

SITRAIN – Digital Industry Academy

We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.

For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page:

siemens.com/sitrain

Service offer

Our range of services includes the following:

- Plant data services
- Spare parts services
- Repair services
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog web page:

support.industry.siemens.com/cs/sc

Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" APP. The app is available for iOS and Android:

support.industry.siemens.com/cs/ww/en/sc/2067

4.2 Industry Mall



The Siemens Industry Mall is the platform on which the entire Siemens Industry product portfolio is accessible. From the selection of products to the order and the delivery tracking, the Industry Mall enables the complete purchasing processing – directly and independently of time and location:

mall.industry.siemens.com

4.3 Links and literature

Table 4-1

No.	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to this entry page of this application example https://support.industry.siemens.com/cs/ww/en/view/109896030
\3\	TST-Tool: https://support.industry.siemens.com/cs/ww/de/view/109767888

4.4 Change documentation

Table 4-2

Version	Date	Modifications
V1.0	07/2024	First version