

SISTEMA - Safety Integrity Software Tool for the Evaluation of Machine



Project name: 100386

File date: 21.06.2026 17:44:02 Report date: 21.06.2026 Checksum: 1970b2498e944b8e74bdb33edfc8f038

PR Project name: 100386

Project file name: C:\Users\jklh\OneDrive - Festo\Dokumente\Know-how\SPN\20211208-001 STO Cat1 PLc 2x3-2 way\100386 Sistema Project - V3.0.4 - EN.ssm

Creation date: 15.12.2021 09:26:29

Project status:

Project number:

Project version:

Authors:

Project managers:

Inspectors:

Dangerous point/machine:

Documentation:

Document:

Version of software: 3.0.4 build 3

Version of standard: ISO 13849-1:2023, ISO 13849-2:2012

Checksum: 1970b2498e944b8e74bdb33edfc8f038

Options: ☒ Use DC intermediate levels for calculation of PFH (more precise)
☐ MTTFD capping for category 4 lower from 2500 to 100 years.

Status: ☒ green

Note: There are no warnings listed for this project (or it's subordinate basic elements).

Print options

- | | |
|--|---|
| ☒ Show device details | ☒ Show requirements on PL and Category |
| ☒ Show documentations on SF, SB, BL and EL | ☒ Show parameter documentations on PLr, PL, Category, CCF, MTTFD and DC |
| ☐ Show CCF and DC measures in detail | ☒ Show messages |

Contained safety functions

SF Name: STO (single valve)

Required: PLr c	Reached: PL c	PFH [1/h]: 1,15E-6	Status: green
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List of documented messages:

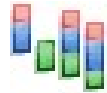
- No messages known -

List of devices with a permissible operation time (T10D) of less than 20 years:

- No devices known -

SF Name: PUS (single valve)

Required: PLr c	Reached: PL c	PFH [1/h]: 1,15E-6	Status: green
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PR Project name: 100386

List of documented messages:

- No messages known -

List of devices with a permissible operation time (T10D) of less than 20 years:

- No devices known -

SF Name: STO (2 x 3/2 directional control valve)

Required: PLr c

Reached: PL c

PFH [1/h]: 1,15E-6

Status: green

List of documented messages:

- No messages known -

List of devices with a permissible operation time (T10D) of less than 20 years:

- No devices known -

SF Name: PUS (2 x 3/2directional control valve)

Required: PLr c

Reached: PL c

PFH [1/h]: 1,15E-6

Status: green

List of documented messages:

- No messages known -

List of devices with a permissible operation time (T10D) of less than 20 years:

- No devices known -



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SF Safety function: STO (single valve)

Identifier of the Safety function:

Safety function type:

Triggering event:

Reaction and
Behaviour on power failure:

Safe state:

Operation mode:

Interfaces:

Demand rate:

Running-on time:

Priority:

Documentation:

Document:

Required Performance Level Safety function

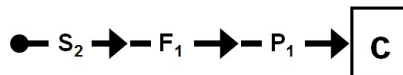
PLr (by risk graph): c

Severity of injury (S): Serious (normally irreversible) injury or death

Frequency / exposure times to hazard
(F): Seldom to less often / exposure time is short

Possibility of avoiding (P): Possible under specific conditions

Risk graph:



Documentation:

Document:

Performance Level Safety function

Reached PL: c

PFH [1/h]: 1,15E-6

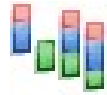
*Electromagnetic immunity, EMI (Annex L) Safety function*Route for fulfilment
of EMI measures: n/a

Documentation:

Document:

List of devices with a permissible operation time (T10D) of less than 20 years:

Device list:

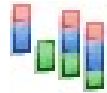


Project name: 100386

File date: 21.06.2026 17:44:02 Report date: 21.06.2026 Checksum: 1970b2498e944b8e74bdb33edfc8f038

SF Safety function: STO (single valve)*Status / Messages Safety function***Status:** green**Subsystems (1 / 1)****SB Name:** Output**Reference designator:****Inventory number:***Device details Subsystem***Device Manufacturer:****Device Identifier:****Device group:****Part number:****Revision:****Function:**☐ Input☒ Output☐ Logic☐ unknown**Use case:****Description of the use case:***Documentation Subsystem***Documentation:****Document:***Performance Level Subsystem***PL determination:** Determine PL/PFH from Category, MTTFD and DCavg*Qualitative aspects (e.g. software, see sections 7, 10.3) Subsystem***Qualitative aspects suitable up to PL:** n/a**Documentation:****Document:***Electromagnetic immunity, EMI (Annex L) Subsystem***Route for fulfilment of EMI measures:** The fulfilment of the measures for electromagnetic immunity (EMI) was documented in the associated safety function.**PL requirements:** fulfilled**The PL shall be determined by the estimation of the following aspects (section 6.1.1):**

- Behaviour of the safety function under fault conditions [fulfilled]
- Safety-related software according to clause 7 and Annex J or no software included [fulfilled]
- Systematic failure (see clause 6.1.7 and Annex G) [fulfilled]
- Ability to perform a safety function under expected environmental conditions [fulfilled]



Project name: 100386

File date: 21.06.2026 17:44:02 Report date: 21.06.2026 Checksum: 1970b2498e944b8e74bdb33edfc8f038

SF Safety function: STO (single valve)

Reached PL:	c	PFH [1/h]:	1,15E-6
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Documentation:*Category Subsystem*

Cat.:	1
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Category requirements:	fulfilled
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Requirements for the category:

- Accordance with relevant standards to withstand the expected influences. [fulfilled]
- Basic safety principles are being used. [fulfilled]
- Well-tried components (clause 6.1.11) are being used. [fulfilled]
- Well-tried safety principles are being used. [fulfilled]
- MTTFD is at least High. [fulfilled]

Documentation:**Source (e.g. standard) Category:****File:***MTTFD and Mission time Subsystem*

MTTFD [a]:	100 (High)
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Mission time [a]:	20	Shortest mission time [a]:	20
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Status / Messages Subsystem

Status:	green
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Channels / Test channels (1 / 1)**CH** Name: Channel 1

MTTFD [a]: 100

Blocks (1 / 2)**BL** Name: 3/2 Directional control valve

Reference designator:	Q1
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Inventory number:

Device details Block

Device Manufacturer:

Device Identifier:

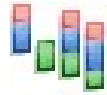
Device group:

Part number:

Revision:

Function:

☐ Input
☒ Output☐ Logic
☐ unknown



Project name: 100386

File date: 21.06.2026 17:44:02 Report date: 21.06.2026 Checksum: 1970b2498e944b8e74bdb33edfc8f038

Safety function: STO (single valve)

Technology: unknown

Category: -

Use case:

Description of the use case:

Documentation Block

Documentation:

Document:

MTTFD and Mission time Block

MTTFD [a]: 380,5 (High)

Mission time [a]: 20

Shortest mission time [a]: 20

B10 [cycles]: 10000000

RDF [%]: 50

B10D [cycles]: 20000000

nop [cycles/a]: 525600

Documentation:

Document:

Status / Messages Block

Status: green

Blocks (2 / 2)

 Name: 3/2 Directional control valve

Reference designator: Q2

Inventory number:

Device details Block

Device Manufacturer:

Device Identifier:

Device group:

Part number:

Revision:

Function:

☐ Input
☒ Output

☐ Logic
☐ unknown

Technology: unknown

Category: -

Use case:



Project name: 100386

File date: 21.06.2026 17:44:02 Report date: 21.06.2026 Checksum: 1970b2498e944b8e74bdb33edfc8f038

SF Safety function: STO (single valve)

Description of the use case:

Documentation Block

Documentation:

Document:

MTTFD and Mission time Block

MTTFD [a]:	380,5 (High)		
Mission time [a]:	20	Shortest mission time [a]:	20
B10 [cycles]:	10000000	RDF [%]:	50
B10D [cycles]:	20000000	nop [cycles/a]:	525600

Documentation:

Document:

Status / Messages Block

Status: green

SF Safety function: PUS (single valve)

Identifier of the Safety function:

Safety function type:

Triggering event:

Reaction and
Behaviour on power failure:

Safe state:

Operation mode:

Interfaces:

Demand rate:

Running-on time:

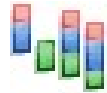
Priority:

Documentation:

Document:

Required Performance Level Safety function

PLr (by risk graph): c



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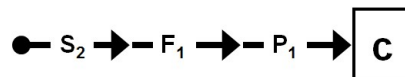
SF Safety function: PUS (single valve)

Severity of injury (S): Serious (normally irreversible) injury or death

Frequency / exposure times to hazard (F): Seldom to less often / exposure time is short

Possibility of avoiding (P): Possible under specific conditions

Risk graph:



Documentation:

Document:

Performance Level Safety function

Reached PL: c PFH [1/h]: 1,15E-6

Electromagnetic immunity, EMI (Annex L) Safety function

Route for fulfilment of EMI measures: n/a

Documentation:

Document:

List of devices with a permissible operation time (T10D) of less than 20 years:

Device list:

Status / Messages Safety function

Status: green

Subsystems (1 / 1)**SB** Name: Output

Reference designator:

Inventory number:

Device details Subsystem

Device Manufacturer:

Device Identifier:

Device group:

Part number:

Revision:

 Function: ☐ Input ☐ Logic ☒ Output ☐ unknown

Use case:



Project name: 100386

File date: 21.06.2026 17:44:02 Report date: 21.06.2026 Checksum: 1970b2498e944b8e74bdb33edfc8f038

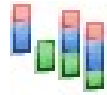
SF Safety function: PUS (single valve)**Description of the use case:***Documentation Subsystem***Documentation:****Document:***Performance Level Subsystem***PL determination:** Determine PL/PFH from Category, MTTFD and DCavg*Qualitative aspects (e.g. software, see sections 7, 10.3) Subsystem***Qualitative aspects suitable up to PL:** n/a**Documentation:****Document:***Electromagnetic immunity, EMI (Annex L) Subsystem***Route for fulfilment of EMI measures:** The fulfilment of the measures for electromagnetic immunity (EMI) was documented in the associated safety function.**PL requirements:** fulfilled**The PL shall be determined by the estimation of the following aspects (section 6.1.1):**

- Behaviour of the safety function under fault conditions [fulfilled]
- Safety-related software according to clause 7 and Annex J or no software included [fulfilled]
- Systematic failure (see clause 6.1.7 and Annex G) [fulfilled]
- Ability to perform a safety function under expected environmental conditions [fulfilled]

Reached PL: c **PFH [1/h]:** 1,15E-6**Documentation:***Category Subsystem***Cat.:** 1**Category requirements:** fulfilled**Requirements for the category:**

- Accordance with relevant standards to withstand the expected influences. [fulfilled]
- Basic safety principles are being used. [fulfilled]
- Well-trying components (clause 6.1.11) are being used. [fulfilled]
- Well-trying safety principles are being used. [fulfilled]
- MTTFD is at least High. [fulfilled]

Documentation:**Source (e.g. standard) Category:****File:**



Project name: 100386

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SF Safety function: PUS (single valve)*MTTFD and Mission time Subsystem*

MTTFD [a]:	100 (High)		
Mission time [a]:	20	Shortest mission time [a]:	20

Status / Messages Subsystem

Status:	green
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Channels / Test channels (1 / 1)**CH** Name: Channel 1

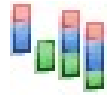
MTTFD [a]: 100

Blocks (1 / 2)**BL** Name: 3/2 Directional control valve**Reference designator:** Q1**Inventory number:***Device details Block***Device Manufacturer:****Device Identifier:****Device group:****Part number:****Revision:**

Function: ☐ Input ☒ Output ☐ Logic ☐ unknown

Technology: unknown**Category:** -**Use case:****Description of the use case:***Documentation Block***Documentation:****Document:***MTTFD and Mission time Block*

MTTFD [a]:	380,5 (High)		
Mission time [a]:	20	Shortest mission time [a]:	20
B10 [cycles]:	10000000	RDF [%]:	50
B10D [cycles]:	20000000	nop [cycles/a]:	525600



Project name: 100386

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SF Safety function: PUS (single valve)

Documentation:

Document:

*Status / Messages Block***Status:** green**Blocks (2 / 2)****BL** Name: 3/2 Directional control valve**Reference designator:** Q2**Inventory number:***Device details Block***Device Manufacturer:****Device Identifier:****Device group:****Part number:****Revision:****Function:** ☐ Input ☒ Output ☐ Logic ☐ unknown**Technology:** unknown**Category:** -**Use case:****Description of the use case:***Documentation Block***Documentation:****Document:***MTTFD and Mission time Block***MTTFD [a]:** 380,5 (High)**Mission time [a]:** 20 **Shortest mission time [a]:** 20**B10 [cycles]:** 10000000 **RDF [%]:** 50**B10D [cycles]:** 20000000 **nop [cycles/a]:** 525600**Documentation:****Document:***Status / Messages Block*



Project name: 100386

File date: 21.06.2026 17:44:02 Report date: 21.06.2026 Checksum: 1970b2498e944b8e74bdb33edfc8f038

SF Safety function: PUS (single valve)

Status: green

SF Safety function: STO (2 x 3/2 directional control valve)

Identifier of the Safety function:

Safety function type:

Triggering event:

Reaction and
Behaviour on power failure:

Safe state:

Operation mode:

Interfaces:

Demand rate:

Running-on time:

Priority:

Documentation:

Document:

Required Performance Level Safety function

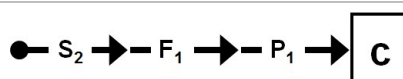
PLr (by risk graph): c

Severity of injury (S): Serious (normally irreversible) injury or death

Frequency / exposure times to hazard
(F): Seldom to less often / exposure time is short

Possibility of avoiding (P): Possible under specific conditions

Risk graph:



Documentation:

Document:

Performance Level Safety function

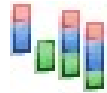
Reached PL: c

PFH [1/h]: 1,15E-6

*Electromagnetic immunity, EMI (Annex L) Safety function*Route for fulfilment
of EMI measures: n/a

Documentation:

Document:



Project name: 100386

File date: 21.06.2026 17:44:02 Report date: 21.06.2026 Checksum: 1970b2498e944b8e74bdb33edfc8f038

SF Safety function: STO (2 x 3/2 directional control valve)

List of devices with a permissible operation time (T10D) of less than 20 years:

Device list:

Status / Messages Safety function

Status: green

Subsystems (1 / 1)

SB Name: Output

Reference designator:

Inventory number:

Device details Subsystem

Device Manufacturer:

Device Identifier:

Device group:

Part number:

Revision:

Function: ☐ Input ☒ Output ☐ Logic ☐ unknown

Use case:

Description of the use case:

Documentation Subsystem

Documentation:

Document:

Performance Level Subsystem

PL determination: Determine PL/PFH from Category, MTTFD and DCavg

Qualitative aspects (e.g. software, see sections 7, 10.3) Subsystem

Qualitative aspects suitable up to PL: n/a

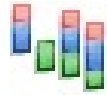
Documentation:

Document:

Electromagnetic immunity, EMI (Annex L) Subsystem

Route for fulfilment of EMI measures: The fulfilment of the measures for electromagnetic immunity (EMI) was documented in the associated safety function.

PL requirements: fulfilled



Project name: 100386

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SF Safety function: STO (2 x 3/2 directional control valve)**The PL shall be determined by the estimation of the following aspects (section 6.1.1):**

- Behaviour of the safety function under fault conditions [fulfilled]
- Safety-related software according to clause 7 and Annex J or no software included [fulfilled]
- Systematic failure (see clause 6.1.7 and Annex G) [fulfilled]
- Ability to perform a safety function under expected environmental conditions [fulfilled]

Reached PL:	c	PFH [1/h]:	1,15E-6
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Documentation:*Category Subsystem*

Cat.:	1
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Category requirements:	fulfilled
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Requirements for the category:

- Accordance with relevant standards to withstand the expected influences. [fulfilled]
- Basic safety principles are being used. [fulfilled]
- Well-trying components (clause 6.1.11) are being used. [fulfilled]
- Well-trying safety principles are being used. [fulfilled]
- MTTFD is at least High. [fulfilled]

Documentation:**Source (e.g. standard) Category:****File:***MTTFD and Mission time Subsystem*

MTTFD [a]:	100 (High)
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Mission time [a]:	20	Shortest mission time [a]:	20
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Status / Messages Subsystem

Status:	green
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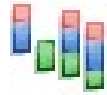
Channels / Test channels (1 / 1)**CH** Name: Channel 1

MTTFD [a]: 100

Blocks (1 / 1)**BL** Name: 2 x 3/2 Directional control valve

Reference designator:	Q1, Q2
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Inventory number:*Device details Block***Device Manufacturer:****Device Identifier:****Device group:**



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SF Safety function: STO (2 x 3/2 directional control valve)

Part number:

Revision:

Function:

☐ Input
☒ Output

☐ Logic
☐ unknown

Technology:

unknown

Category:

-

Use case:

Description of the use case:

Documentation Block

Documentation:

Document:

MTTFD and Mission time Block

MTTFD [a]: 380,5 (High)

Mission time [a]:	20	Shortest mission time [a]:	20
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B10 [cycles]:	10000000	RDF [%]:	50
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B10D [cycles]:	20000000	nop [cycles/a]:	525600
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Documentation:

Document:

Status / Messages Block

Status: green

SF Safety function: PUS (2 x 3/2directional control valve)

Identifier of the Safety function:

Safety function type:

Triggering event:

Reaction and
Behaviour on power failure:

Safe state:

Operation mode:

Interfaces:

Demand rate:

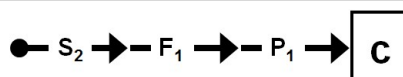
Running-on time:

Priority:



Project name: 100386

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SF Safety function: PUS (2 x 3/2directional control valve)**Documentation:****Document:***Required Performance Level Safety function***PLr (by risk graph):** c**Severity of injury (S):** Serious (normally irreversible) injury or death**Frequency / exposure times to hazard (F):** Seldom to less often / exposure time is short**Possibility of avoiding (P):** Possible under specific conditions**Risk graph:****Documentation:****Document:***Performance Level Safety function***Reached PL:** c**PFH [1/h]:** 1,15E-6*Electromagnetic immunity, EMI (Annex L) Safety function***Route for fulfilment of EMI measures:** n/a**Documentation:****Document:***List of devices with a permissible operation time (T10D) of less than 20 years:***Device list:***Status / Messages Safety function***Status:** green**Subsystems (1 / 1)****SB Name:** Output**Reference designator:****Inventory number:***Device details Subsystem***Device Manufacturer:****Device Identifier:****Device group:**



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SF Safety function: PUS (2 x 3/2directional control valve)

Part number:

Revision:

Function:

☐ Input

☒ Output

☐ Logic

☐ unknown

Use case:

Description of the use case:

Documentation Subsystem

Documentation:

Document:

Performance Level Subsystem

PL determination: Determine PL/PFH from Category, MTTFD and DCavg

Qualitative aspects (e.g. software, see sections 7, 10.3) Subsystem

Qualitative aspects suitable up to PL: n/a

Documentation:

Document:

Electromagnetic immunity, EMI (Annex L) Subsystem

Route for fulfilment of EMI measures: The fulfilment of the measures for electromagnetic immunity (EMI) was documented in the associated safety function.

PL requirements: fulfilled

The PL shall be determined by the estimation of the following aspects (section 6.1.1):

- Behaviour of the safety function under fault conditions [fulfilled]
- Safety-related software according to clause 7 and Annex J or no software included [fulfilled]
- Systematic failure (see clause 6.1.7 and Annex G) [fulfilled]
- Ability to perform a safety function under expected environmental conditions [fulfilled]

Reached PL: c **PFH [1/h]:** 1,15E-6

Documentation:

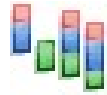
Category Subsystem

Cat.: 1

Category requirements: fulfilled

Requirements for the category:

- Accordance with relevant standards to withstand the expected influences. [fulfilled]
- Basic safety principles are being used. [fulfilled]
- Well-tried components (clause 6.1.11) are being used. [fulfilled]
- Well-tried safety principles are being used. [fulfilled]
- MTTFD is at least High. [fulfilled]



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SF Safety function: PUS (2 x 3/2directional control valve)**Documentation:****Source (e.g. standard) Category:****File:***MTTFD and Mission time Subsystem***MTTFD [a]:** 100 (High)**Mission time [a]:** 20 **Shortest mission time [a]:** 20*Status / Messages Subsystem***Status:** green**Channels / Test channels (1 / 1)****CH** Name: Channel 1

MTTFD [a]: 100

Blocks (1 / 1)**BL** Name: 2 x 3/2 Directional control valve**Reference designator:** Q1, Q2**Inventory number:***Device details Block***Device Manufacturer:****Device Identifier:****Device group:****Part number:****Revision:****Function:** ☐ Input ☒ Output ☐ Logic ☐ unknown**Technology:** unknown**Category:** -**Use case:****Description of the use case:***Documentation Block***Documentation:****Document:***MTTFD and Mission time Block*

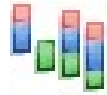


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SF Safety function: PUS (2 x 3/2directional control valve

MTTFD [a]:	380,5 (High)		
Mission time [a]:	20	Shortest mission time [a]:	20
B10 [cycles]:	10000000	RDF [%]:	50
B10D [cycles]:	20000000	nop [cycles/a]:	525600
Documentation:			
Document:			
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EXCLUSION OF LIABILITY

Care has been taken in production of the software SISTEMA, which corresponds to the state of the art. It is made available to users free of charge.

Die Haftung des Institut für Arbeitsschutz der DGUV (IFA) ist damit auf Vorsatz und grobe Fahrlässigkeit (§ 521 BGB) bzw. bei Sach- und Rechtsmängel auf arglistig verschwiegene Fehler beschränkt (523, 524 BGB).

The Institute for Occupational Safety and Health of the German Social Accident Insurance undertakes to keep its website free of viruses; nevertheless, no guarantee can be given that the software and information provided are virus-free. The user is therefore advised to take appropriate security precautions and to use a virus scanner prior to downloading software, documentation or information.

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NOTE

This document is not a complete technical documentation according to EN ISO 13849-1:2023, clause 12.

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