SEW EURODRIVE

Manual

MOVI-C® Decentralized Electronics
MOVISAFE® CSB51A Safety Option

Edition 06/2020

26726416/EN

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1 General information

1.1 About this documentation

The documentation at hand is the original.

This documentation is an integral part of the product. The documentation is intended for all employees who perform work on the product.

Make sure this documentation is accessible and legible. Ensure that persons responsible for the systems and their operation as well as persons who work on the product independently have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation or if you require further information, contact SEW-EURODRIVE.

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

The following table shows the grading and meaning of the signal words for safety notes.

Signal word	Meaning	Consequences if disregarded
⚠ **DANGER**	Imminent hazard	Severe or fatal injuries
⚠ **WARNING**	Possible dangerous situation	Severe or fatal injuries
⚠ **CAUTION**	Possible dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the product or its environment
INFORMATION	Useful information or tip: Simplifies handling of the product.	

1.2.2 Structure of section-related safety notes

Section-related safety notes do not apply to a specific action but to several actions pertaining to one subject. The hazard symbols used either indicate a general hazard or a specific hazard.

This is the formal structure of a safety note for a specific section:

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

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Meaning of the hazard symbols

The hazard symbols in the safety notes have the following meaning:

Hazard symbol	Meaning
	General hazard
	Warning of automatic restart

1.2.3 Structure of embedded safety notes

Embedded safety notes are directly integrated into the instructions just before the description of the dangerous action.

This is the formal structure of an embedded safety note:

⚠ **SIGNAL WORD!** Type and source of hazard. Possible consequence(s) if disregarded. Measure(s) to prevent the hazard.

1.3 Rights to claim under limited warranty

Read the information in this documentation. This is essential for fault-free operation and fulfillment of any rights to claim under limited warranty. Read the documentation before you start working with the product.

1.4 Content of the documentation

This documentation contains additional safety-related information and conditions for operation in safety-related applications.

1.5 Other applicable documentation

This documentation supplements the operating instructions of the associated product. Use this document only in connection with the operating instructions.

Always use the latest edition of the documentation and the software.

The SEW-EURODRIVE website (www.sew-eurodrive.com) provides a wide selection of documents for download in various languages. If required, you can also order printed and bound copies of the documentation from SEW-EURODRIVE.

1.6 Decimal separator in numerical values

In this document, a period is used to indicate the decimal separator.

Example: 30.5 kg

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1.7 Copyright notice

1.8 Product names and trademarks

The brands and product names in this documentation are trademarks or registered trademarks of their respective titleholders.

1.8.1 Trademarks of Beckhoff Automation GmbH

EtherCAT® and Safety over EtherCAT® are registered trademarks and patented technologies, licensed by Beckhoff Automation GmbH, Germany.

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2 Safety notes

2.1 Preliminary information

The following general safety notes serve the purpose of preventing injury to persons and damage to property. They primarily apply to the use of products described in this documentation. If you use additional components, also observe the relevant warning and safety notes.

2.2 Duties of the user

As the user, you must ensure that the basic safety notes are observed and complied with. Make sure that persons responsible for the machinery and its operation as well as persons who work on the device independently have read through the documentation carefully and understood it.

As the user, you must ensure that all of the work listed in the following may be carried out only by qualified specialists:

- Setup and installation
- Installation and connection
- Startup
- Maintenance and repairs
- Shutdown
- Disassembly

Ensure that the persons who work on the product pay attention to the following regulations, conditions, documentation, and information:

- National and regional safety and accident prevention regulations
- Warning and safety signs on the product
- All other relevant project planning documents, installation and startup instructions, and wiring diagrams
- Do not assemble, install or operate damaged products
- All system-specific specifications and conditions

Ensure that systems in which the product is installed are equipped with additional monitoring and protection devices. Observe the applicable safety regulations and legislation governing technical work equipment and accident prevention regulations.

2.3 Target group

Specialist for mechanical work

Any mechanical work may be performed only by adequately qualified specialists. Specialists in the context of this documentation are persons who are familiar with the design, mechanical installation, troubleshooting, and maintenance of the product who possess the following qualifications:

- Qualifications in the field of mechanics in accordance with the national regulations
- Familiarity with this documentation

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Specialist for electrotechnical work

Any electrotechnical work may be performed only by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons who are familiar with electrical installation, startup, troubleshooting, and maintenance of the product who possess the following qualifications:

- Qualifications in the field of electrical engineering in accordance with the national regulations
- Familiarity with this documentation

Additional qualifications

In addition to that, these persons must be familiar with the valid safety regulations and laws, as well as with the requirements of the standards, directives, and laws specified in this documentation.

The persons must have the express authorization of the company to operate, program, parameterize, label, and ground devices, systems, and circuits in accordance with the standards of safety technology.

Instructed persons

All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately. The purpose of the training is to give persons the ability to perform the required tasks and work steps in a safe and correct manner.

2.4 Designated use

The product is integrated as an option in decentralized MOVI-C® electronics components.

The product is a configurable safety control for realizing safety cutoffs and functions. The product is intended for use:

- In emergency stop devices
- As a safety-related component pursuant to Machinery Directive 2006/42/EC
- As a PES for risk reduction pursuant to EN 61508
- In safety circuits according to EN 60204-1
- As a PES for functional safety pursuant to EN 62061
- As a SRP/CS pursuant to EN ISO 13849
- As a device for implementing the safety functions pursuant to EN 61800-5-2

In the case of installation in electrical systems or machines, it is prohibited to start the proper operation of the product until it is determined that the machine meets the requirements stipulated in the local laws and directives.

The standards given in the declaration of conformity apply to the product.

Unintended or improper use of the product may result in severe injury to persons and damage to property.

Technical data and information on the connection conditions are provided on the nameplate and in chapter "Technical data" in the documentation. Always comply with the data and conditions.

2.4.1 Restrictions under the European WEEE Directive 2012/19/EU

You may use options and accessories from SEW-EURODRIVE exclusively in connection with products from SEW-EURODRIVE.

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2.5 Startup/operation

Observe the safety notes in the chapters "Startup" (→ 🗎 21) and "Operation" (→ 🗎 31) in the documentation.

Depending on the degree of protection, products may have live, uninsulated, and sometimes moving or rotating parts as well as hot surfaces during operation.

Mechanical blocking or internal protective functions of the product can cause a motor standstill. Eliminating the cause of the problem or performing a reset may result in the drive restarting automatically. If, for safety reasons, this is not permitted for the drive-controlled machine, first disconnect the product from the supply system and then start troubleshooting.

The fact that the operation LED and other display elements are no longer illuminated does not indicate that the product has been disconnected from the supply system and no longer carries any voltage.

In the event of deviations from normal operation, switch the product off. Possible deviations are increased temperatures, noise, or vibration, for example. Determine the cause. Contact SEW-EURODRIVE if necessary.

Do not deactivate monitoring and protection devices of the machine or system, even for a test run.

Additional preventive measures may be required for applications with increased hazard potential. Be sure to check the effectiveness of the protection devices after every modification.

2.6 Definitions

- The designation “CS..A” is used as a generic term for all derivatives of the MOVISAFE® CS product series. If a particular derivative is referred to in the manual, then the complete designation is used.
- The term "safe" used in this manual refers to the classification as a safe function according to EN ISO 13849-1.
- PROFIsafe is a technology standard for a safe fieldbus system.
- The “Assist CS..” parameter tool is the parameterization interface in MOVISUITE® for the MOVISAFE® CSB51A safety option.
- The SS1 drive safety function is described according to the currently applicable EN 61800-5-2 as follows:
  - SS1-t corresponds to the former presentation of SS1(c)

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3 Safety concept

3.1 General information

The MOVISAFE® CSB51A safety option is a safe electronic assembly with a safe, internal output that can be activated via safe communication.

MOVISAFE® CSB51A is completely integrated in the basic device. MOVISAFE® CSB51A uses the safe fieldbus to activate the STO drive safety function inside the device. Instead of galvanic isolation of the drive from the supply system by means of contactors or switches, the disconnection via STO within the device safely prevents the control of the power semiconductors in the output stage. The rotary-field generation for the respective motor is deactivated even though the line voltage is still present.

The safety concept is based on a safe state existing for all safe process values. A safe state of the MOVISAFE® CSB51A safety option is defined as follows:

- The internal output F-DO_STO is disabled. This activates the STO drive safety function.
- Either substitute values are sent for the data via the F-protocol (i.e. all data is "0") or the communication is interrupted.

3.2 Notes on stop categories

- The STO drive safety function corresponds to stop category 0.
- The SS1-t drive safety function corresponds to stop category 1.

3.3 Memory module

When switching on the basic device with the MOVISAFE® CSB51A safety option, the memory module must be plugged in.

The parameterization data of the MOVISAFE® CSB51A safety option is divided into application-related data and the key data set. The key data set ensures the data integrity.

The application-related data is stored in the basic device. The application-related data is released by means of the key data set on the memory module. The safety option becomes operational only if the key data set on the memory module matches the parameterization.

The memory module is also used to establish a location reference in the system. Since the application-related data set is released only with the matching key data set on the memory module, the location reference can be established in this way. It is the user's responsibility to secure the location reference of the memory module in the system. The data for safe communication is also stored on the memory module because this data has the same location reference. This ensures that, in the event of a device replacement, the application-related data and the communication data are available again immediately.

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3.4 Identification and authentication

In the "Assist CS.." parameterization tool, unique identification of the decentralized basic device and an authentication of the user are necessary for the steps "Parameterize", "Create report" and "Confirm validation". To identify the decentralized basic device, enter the ID of the memory module in the login dialog of the "Assist CS.." parameterization tool. The ID is printed on the memory module. As an alternative, the ID can be read directly from the "Assist CS.." parameterization tool. To do so, the user must perform an identification check using the LED displays of the decentralized basic device.

These two identification procedures ensure that the "Assist CS.." parameterization tool is connected to the correct decentralized basic device. The user is authenticated via the entry of a password.

INFORMATION

Make sure to check the unique identification of the device to be parameterized.

3.5 Report and safety check

The acceptance report can be created once the parameters are downloaded. The report supports the safety-relevant acceptance required for the system (see chapter "Startup requirements"). If the parameterization of the safety functions is changed, the acceptance of the safety option must be confirmed. The confirmation is not a replacement for the test that must be carried out. The "Checksum of the report" of the safety option is announced as confirmation of the acceptance in the "Assist CS.." parameterization tool.

3.6 MOVISAFE® CSB51A safety concept

- The MOVISAFE® CSB51A safety option is a safe electronic assembly integrated in the basic device, which is operated with safe communication connection.
- The MOVISAFE® CSB51A safety option can release or safely deactivate the output stage of the basic device. The internal diagnostics functions at the F-DO_STO output require a stable state (stable "1" or "stable "0") for at least 2 seconds (2.5 seconds with activated extended diagnostics) within 60 seconds.
- The safety concept of the MOVISAFE® CSB51A safety option is based on a safe state existing for all safe process values. With the MOVISAFE® CSB51A, this is the value "0" for F-DO_STO.
- The MOVISAFE® CSB51A safety option was designed pursuant to IEC 61508 for SIL 3 and according to EN ISO 13849-1 for Performance Level e.

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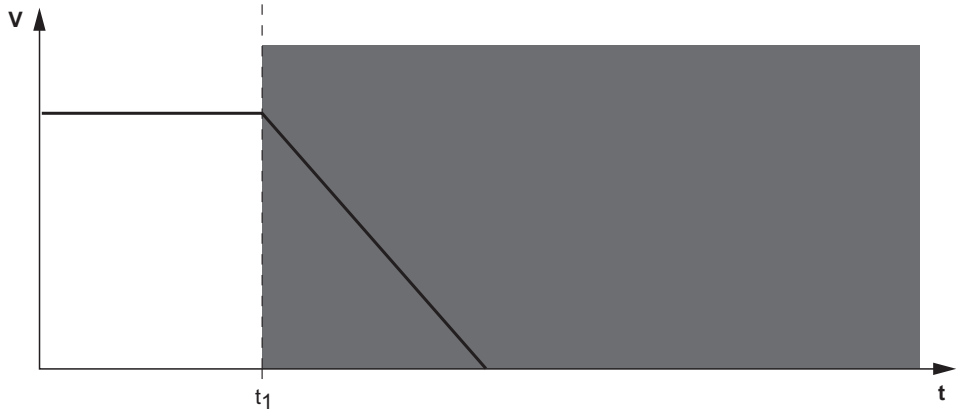
3.7 Drive safety functions

Drive safety functions according to EN 61800-5-2 that are supported by the MOVISAFE® CSB51A safety option are described in this chapter.

3.7.1 STO – Safe Torque Off

If the STO function is activated, the drive inverter no longer supplies power to the motor. As a result, the drive cannot generate torque. This drive safety function corresponds to a non-controlled stop according to EN 60204-1, stop category 0.



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= Drive safety function active
v = Speed
t = Time
t_1 = Point of time when STO is triggered.

INFORMATION

The motor coasts to a halt or is stopped mechanically.

Controlled standstill is preferred, if possible.

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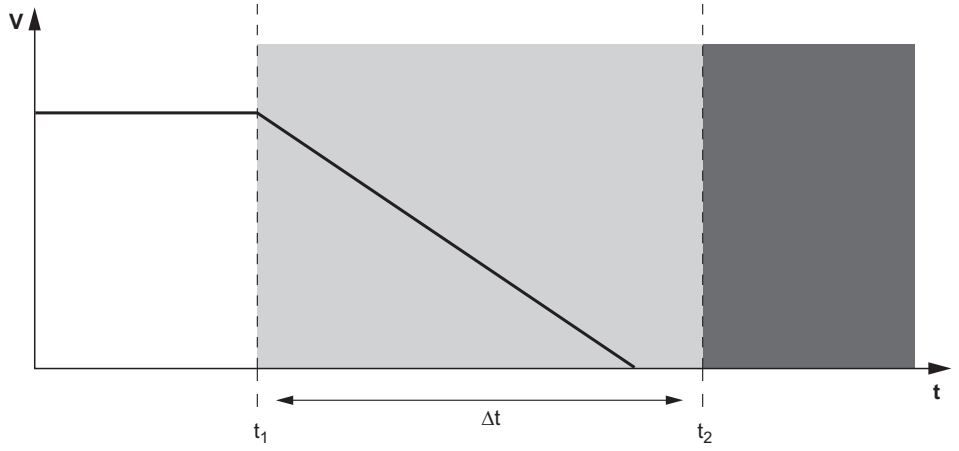
3.7.2 SS1-t – Safe Stop 1 with time control

When the SS1-t function is active, the drive inverter brings the motor to a standstill electrically. The drive safety function STO is triggered after a specified, safety-related time.

This drive safety function corresponds to a controlled stop of the drive according to EN 60204-1, stop category 1.



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= Drive safety function monitoring
= STO drive safety function active
v = Speed
t = Time
t_1 = Point of time when SS1-t is activated and motor deceleration is triggered.
t_2 = Point of time when STO is triggered.
Δt = Safety-related period of time

INFORMATION

- The SS1-t function does not monitor the stopping of the drive.
- The safety-related period of time Δt allows the drive to come to a stop. In the event of a fault, the drive does not come to a stop and becomes de-energized at the time t_2 (STO).

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3.8 Safety concept of Assist CS..

3.8.1 Safety parameters

For parameterization of the drive safety functions, MOVISAFE® CSB51A offers adjustable safety parameters.

The safety parameters determine the behavior of the corresponding drive safety functions and are safety-related. All safety parameters are combined in the parameter set.

3.8.2 Test concept and test procedure

The parameters of the MOVISAFE® CSB51A safety option are set using an engineering PC with the "Assist CS.." parameterization tool. As the PC and the "Assist CS.." parameterization tool are not safety-related and therefore possibly not error-free, the safety concept prescribes the following measures:

- Identification of MOVISAFE® CSB51A.
- When establishing a connection to the MOVISAFE® CSB51A safety option, the correct safety option is selected via the ID of the memory module.
- Guided parameter setting procedure with the parameterization tool "Assist CS.." with integrated safety features such as plausibility check of entries.
- Completion of parameterization with an acceptance report to accept the drive safety functions.

INFORMATION

If the default parameterization of the MOVISAFE® CSB51A safety option is used, the acceptance of the STO drive safety function can be performed as part of the complete approval of the system.

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4 Safety requirements

4.1 Installation requirements

Observe the regulations applicable to the application and the information in the operating instructions of the used basic device.

4.2 Startup requirements

Following parameterization and startup of the CSB51A safety option, the system startup engineer must check and document whether the drive safety functions are being executed correctly.

For applications of the basic device with safe torque off

- in stop category 0 or 1 in accordance with EN 60204-1,
- and to prevent unexpected startup in accordance with EN ISO 14118,

you must, as a general rule, perform and document startup checks of the disconnecting device.

This is supported by the "Assist CS.." parameterization tool with an acceptance protocol.

INFORMATION

- In order to avoid a hazard in the intended application when a fault occurs, the user must check whether the fault response time of each drive safety function is then shorter than the maximum permitted fault response time of the application. The maximum permitted fault response time may not be exceeded!
- The user must ensure implementation of the requirements of the required safety integrity level (SIL) in accordance with IEC 61508 or performance level (PL) pursuant to EN ISO 13849-1.

4.3 Requirements for stopping in an emergency pursuant to EN 60204-1 (emergency stop)

The MOVISAFE® CSB51A safety option, in combination with a higher-level controller, is suitable for implementing an emergency stop according to EN 60204-1.

⚠ WARNING

In the case of a pending travel command, the drive restarts after acknowledgment of the safety option.

Severe or fatal injuries.

- Cancel the travel command before acknowledging the safety option.

4.4 Operational requirements

Operation is permitted only within the limits specified in the corresponding documentation. This applies to the MOVISAFE® CSB51A safety option as well as all connected devices.

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4.5 Acceptance

The system manufacturer has to perform an overall evaluation for determining the safety of a machine or a system. The effectiveness of each risk minimization must be checked. It must also be checked if the required safety integrity (SIL and/or PL) is reached for each implemented safety function.

To validate the safety integrity level you can use the "SISTEMA" calculation tool from the Institut für Arbeitsschutz (Institute for Occupational Safety and Health of the German Social Accident Insurance).

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5 Device structure

5.1 Type designation

The type designation MOVISAFE® CSxxA contains the following data:

CSxx1A	MOVISAFE® CS..A safety card/option	
CS	Series:	
	C	MOVI-C® option/option card
	S	Safety
x	Function:	
	A	Advanced: Motion/positioning functions with safe encoder system
	B	Basic: Stop functions without encoder
	S	Standard: Motion functions with a safety encoder
x	Hardware design:	
	1	MOVITRAC®
	2	MOVIDRIVE® modular/system/technology without second encoder
	3	MOVIDRIVE® modular/system/technology with second encoder
	5	Electronics cover of the basic device (MOVI-C® decentralized electronics)
1	Design characteristic	
A	Technology version	

5.2 Compatibility

The following compatibility dependencies are relevant:

- Decentralized basic devices:

  Firmware version 4.50 or later. You can find the firmware version in MOVISUITE® under the menu item [Device properties] > [Device data] > [Main components].
- MOVISAFE® CSB51A safety option:

  Firmware version 2.05 or later. You can find the firmware version in MOVISUITE® under the menu item [Device properties] > [Device data] > [Main components].
- MOVISUITE® engineering software:
  - with PROFIsafe: Version 2.1 or later.
  - with FSoE: Version 2.10 or later.

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6 Electrical installation

6.1 Installation instructions

⚠ WARNING

The STO connection of the basic device might be assigned.

Severe or fatal injuries.

- If a MOVISAFE® CSB51A safety option is installed in the basic device, the connections X9:1, X9:2, X9:3, X9:4, X9:11, X9:12, X9:21 and X9:22 must not be assigned.

To guarantee electrical safety and fault-free operation, you must observe the general installation instructions and the notes in the operating instructions of the respective basic device that is used.

6.2 Safe digital output F-DO_STO

The switching state of the internal output F-DO_STO and thus the STO safety function must be stable at least once within 60 seconds for a minimum of 2 seconds.

If the extended diagnostics is active via the "Assist CS.." parameterization tool, the signal must be stable "1" or stable "0" for 2.5 seconds. The error response "Output error", which blocks the safe digital output F-DO_STO, is triggered if this stable state cannot be effected, resulting in a failure to execute the diagnostics in their entirety.

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7 Startup

7.1 General startup instructions

INFORMATION

- The startup procedure of the standard functions of the basic device is described in the respective operating instructions.
- Observe the information in chapter "Compatibility".
- The following chapters describe the additional startup procedure for the MOVISAFE® CSB51A safety option and the drive safety functions.
- Note the prerequisites for installation and operation of MOVISUITE®.
- When starting up several similar devices with identical parameterization, the devices can be parameterized via the "Import/Export" function. Note that you must accept every single device to accomplish this.

7.2 Startup options

No drive safety function is approved in the delivery state of the basic device with MOVISAFE® CSB51A safety option. The safety option permanently activates the STO function.

7.2.1 Variant 1: Startup with default parameterization

After the PROFIsafe protocol has been activated, the MOVISAFE® CSB51A safety option can be taken into operation with the default parameterization of the drive safety functions.

Take into account the following constraints for this operating mode:

- The PROFIsafe protocol of the MOVISAFE® CSB51A safety option is activated using the "Assist CS.." parameterization tool.

For startup, perform the following steps:

1. The PROFIsafe protocol of the MOVISAFE® CSB51A safety option is activated using the "Assist CS.." parameterization tool.
2. Startup of the safe fieldbus and the higher-level F-PLC.

   Ensure that the default parameterization of the MOVISAFE® CSB51A safety option is active. To do so, check the following parameters (see following figure).

   - The status of the parameterization of the safety option is "Accepted".

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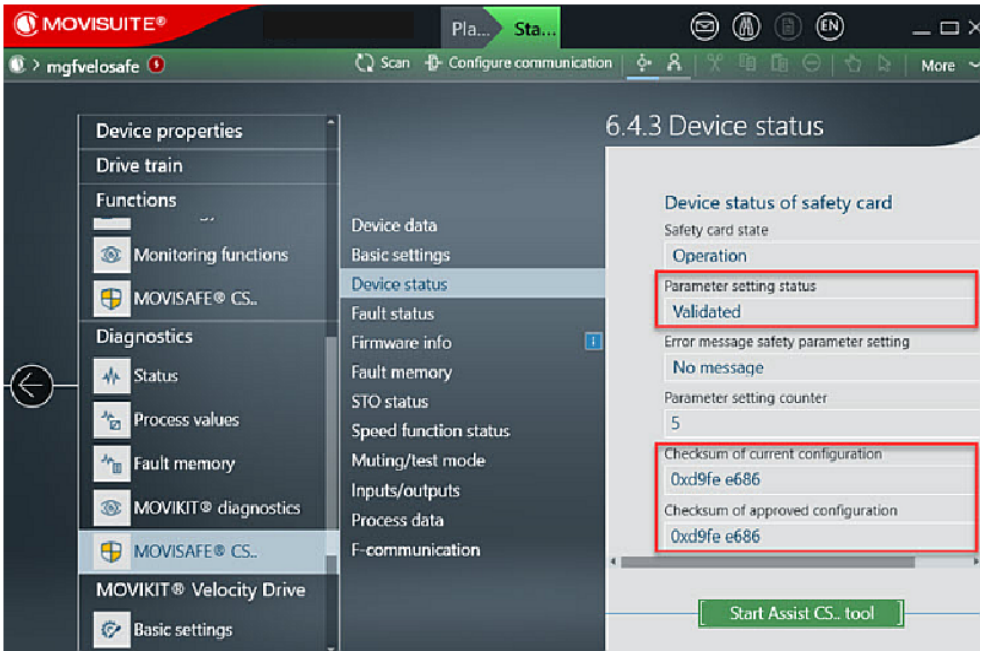
- The preset iPar_CRC for the default parameterization in the GSDML file corresponds to the checksums of the current and accepted configuration.



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3. The acceptance of the STO function can be performed as part of the acceptance of the complete system or the acceptance of the F-PLC.

7.2.2 Variant 2: Startup with adjustment of the parameters of the drive safety functions

The MOVISAFE® CSB51A safety option can be parameterized and operated with the PROFIsafe protocol connection (fieldbus connection).

Take into account the following constraints for this operating mode:

- The parameters of the MOVISAFE® CSB51A safety option are set using the "Assist CS.." parameterization tool.
- The safety-relevant acceptance of the system is supported by an acceptance protocol generated in the "Assist CS.." parameterization tool.

For startup, perform the following steps:

1. Parameterization of drive safety functions in the "Assist CS.." parameterization tool.
2. Startup of the fieldbus and the higher-level F-PLC.
3. The acceptance is supported by the "Assist CS.." parameterization tool.

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7.3 Parameterization of the drive safety functions

7.3.1 Prerequisites

For a successful startup, you need the "Assist CS.." parameterization tool. You can call up the "Assist CS.." parameterization tool directly in MOVISUITE®.

INFORMATION

Only one "Assist CS.." parameterization tool at a time must be used in the system.

7.3.2 Parameterization procedure

This chapter describes the parameterization of the drive safety functions step-by-step.

1. Start **MOVISUITE®.**
2. **Scan the network.**

   Scan the network that contains the engineering interface to the basic device.
3. **Start the "Assist CS.." parameterization tool.**

   Start the "Assist CS.." parameterization tool from the MOVISUITE® interface.

   A window opens with a prompt to enter the ID of the safety key and the password.
4. **Enter the memory module ID and establish a connection.**

   Enter the memory module ID of the safety option to be parameterized and the corresponding password and confirm the entry with [OK].

   The memory module ID is printed on the memory module. During the initial startup you can set a password by entering it twice.

   The querying of the memory module ID ensures that the "Assist CS.." parameterization tool connects to the correct device.

   As an alternative, you can read the memory module ID via the "Assist CS.." parameterization tool. Proceed as follows:

   - Click the [Read memory module ID] button.
   - Check if the addressed device signals a read memory module ID via the "F-RUN" LED (see chapter "F-RUN LED"). This process must only take a minute. After one minute, the device LED does not flash anymore and confirmation of the flash code is no longer accepted. In this case, restart the flash code query.
   - The read memory module ID is applied in the "Memory module ID" field.
5. **Upload the current parameterization of the device.**

   After successful login in the "Assist CS.." parameterization tool, the current parameter setting of the CSB51A safety option is compared with the current parameter setting in the "Assist CS..". If the data sets are identical, the "Assist CS.." parameterization tool starts. In case of deviation, a dialog opens in which the user can choose whether the data set of the safety option or the data set of the "Assist CS.." is used.

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6. **Parameterization**

   Set the parameterization according to your safety-related requirements of your application.

   For parameterization of the MOVISAFE® CSB51A safety option, call the individual sections in the parameter tree and enter the required values. The higher-level parameters such as start inhibit after power on, muting, maximum muting time and enable emergency mode can be set in the "Basic settings" area. The corresponding F-protocol is set in the section "Communication". After this, the parameters of the drive safety functions STO and SS1(c) are set.

   The "Assist CS.." parameterization tool creates a new parameter set from all of the parameters.

7. **Transferring the parameter set to the device**

   Click the [Download] button to transfer the parameter set to the MOVISAFE® CSB51A safety option.

   After the download, the transferred parameter set is checked for consistency and plausibility. Possibly existing inconsistencies or plausibility errors are displayed and can then be corrected.

For a detailed description of steps 4 – 7, refer to chapter "Assist CS..".

Once the parameter set has been transferred to the MOVISAFE® CSB51A safety option without any errors, you can start up the standard functions and make the connection to the higher-level safety controller (F-PLC).

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7.4 Startup of the fieldbus and the higher-level F-PLC

Note that this startup option supports only the safe fieldbus profile "PROFIsafe".

7.4.1 Requirements for F-communication

Requirements regarding IT security regarding F-protocols must be checked in accordance with EN 61508-1, chapter "Hazard and risk analysis".

INFORMATION

Before making changes to the set F-protocol at the CSB51A safety option you have to disconnect the F-master physically.

7.4.2 PROFIsafe protocol

INFORMATION

To control failsafe functions and for evaluation of the responses from the CSB51A safety option via PROFIsafe, the assignment of the individual bits within the F-protocol must be taken into account.

Requirements

- The CSB51A safety option supports the PROFIsafe versions 2.4 and 2.6.
- The higher-level F-PLC must support the iPar_CRC mechanism.
- For a successful startup, you need the "Assist CS.." parameterization tool.
- Additional requirements for using the MOVISAFE® CSB51A with PROFIsafe fieldbus connection via PROFINET:
  - TIA portal with STEP7 Safety option (for Siemens controllers).
  - Device description file `GSDML-V2.33-SEW-MOVI-C-Decentralized-Electronics`. Download from www.sew-eurodrive.de. Always use the latest device description file (iPar_CRC for default parameterization: D9FEE686).

Safety option settings

Besides parameterization of the drive safety functions, the corresponding safety protocol and the PROFIsafe addresses must be set during startup.

Setting the safety protocol

The CSB51A safety option supports the PROFIsafe safety protocol. Select "PROFIsafe" under [F-communication] > [Configuration] in the "Assist CS.." parameterization tool.

Setting the PROFIsafe address

The PROFIsafe address must be identical to the address set for the slave in the PROFIsafe master. Enter the correct PROFIsafe address under [F-communication] > [Configuration] > [PROFIsafe]. The used PROFIsafe F addresses must be unique within the fieldbus network.

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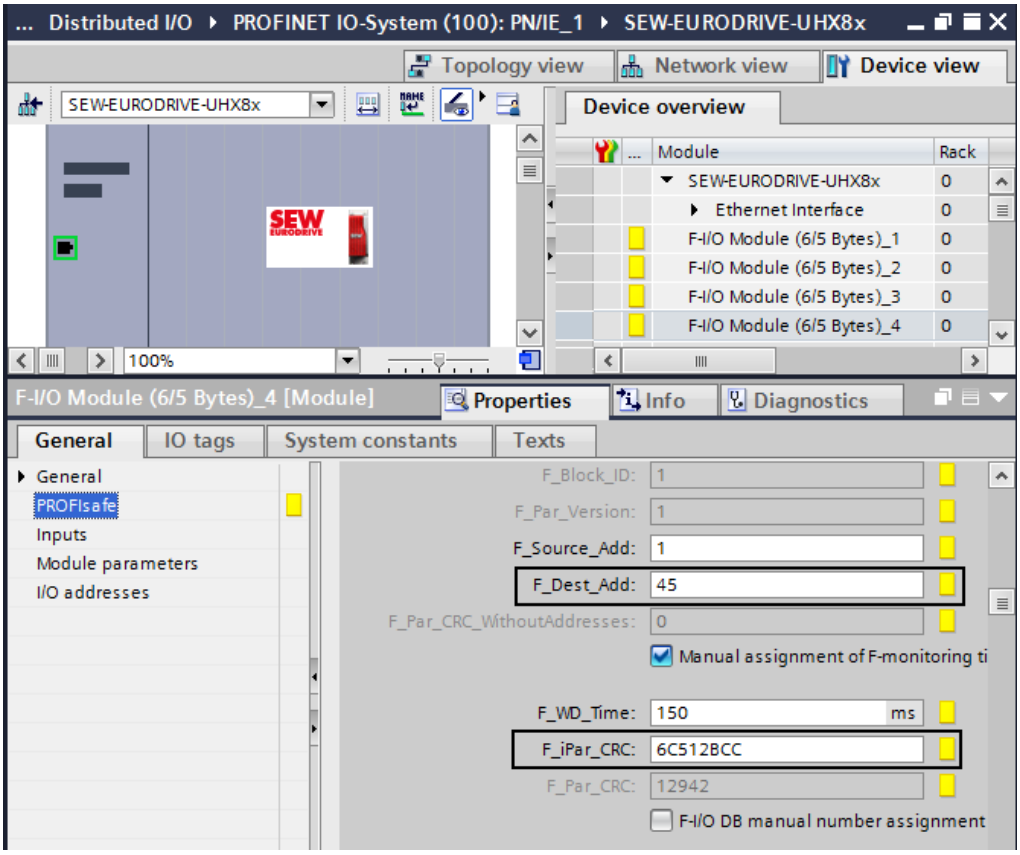
PROFIsafe master settings

The settings that must be made at the PROFIsafe master are shown in an example for an S71500F in the TIA portal. Transfer the F_iPar_CRC of the report to the PROFIsafe master after successful startup of the CSB51A safety option.



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7.4.3 FSoE protocol

Requirements

- For communication over FSoE (Fail Safe over EtherCAT®), the safety option must be connected to a safety controller with FSoE master functionality.
- Firmware version 2.05 or higher is required for the safety option.
- MOVISUITE® engineering software version 2.10 or higher (download from www.sew-eurodrive.de).
- Additional requirements for using the safety option with FSoE fieldbus connection:
  - ESI device description file (EtherCAT® XML file for MOVI-C® decentralized drive electronics with DSI, decentralized drive electronics with CiA402). Download from www.sew-eurodrive.de. Always use the latest device description file.

Safety option settings

Besides parameterization of the drive safety functions, the corresponding safety protocol and the F addresses must be set during startup.

Setting the safety protocol

The safety option supports several safety protocols. For this, select "FSoE" under [F-communication] > [Configuration].

Setting the F-address

The F-address must be identical to the address set for the slave in the FSoE master. Enter the correct F-address under [F-communication] > [Configuration] > [FSoE]. The used F-address must be unique within the FSoE network.

Setting the ParCRC bus

Transfer the ParCRC bus from the acceptance protocol of the safety option into the safety controller.

3. F-communication

Line	Property	Value
186	Version	2
187	F-protocol type	FSoE
188	FSoE slave - F-address	45
189	ParCrcBus	0x6c5128cc

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7.5 Operating states

The MOVISAFE® CSB51A safety option distinguishes between the following operating states:

- Operation
- Parameterization
- Safe state after critical error

7.5.1 Operating state “Operation”

In the "Operation" operating state, the selected drive safety functions are executed in accordance with the parameterization (see chapter "Parameterization of the drive safety functions").

7.5.2 Operating state “Parameterization”

In the "Parameterization" operating state, the MOVISAFE® CSB51A safety option is in safe state. MOVISAFE® CSB51A can be parameterized in this state. If an error occurs during the parameterization, e.g., a violation of a plausibility rule, MOVISAFE® CSB51A remains in the "Parameterization" state.

7.5.3 Operating state “Safe state” after critical fault

No F-process data communication occurs in the "Safe state" operating state. The output F-DO_STO is disabled internally. The "Safe state" operating state can be resolved only by deactivation and reactivation.

7.6 Safety-relevant acceptance

⚠ WARNING

The proper functioning of the drive safety functions is not guaranteed without a safety-relevant acceptance.

Severe or fatal injuries.

- Verify every single drive safety function.

To ensure the correctly parameterized drive safety functions, you must perform verification and documentation of the parameters once startup and parameterization have been completed. This is supported by the "Assist CS.." parameterization tool, integrated in MOVISUITE®, in the form of an acceptance protocol.

7.6.1 Sequence

After a successful startup, you must confirm that the data of the acceptance report matches the parameters on the safety option. You must identify and protocol the values parameterized for the drive safety functions individually by performing a function test. You may must take this into account in the machine and system controls.

7.6.2 Creating an acceptance report

With the "Assist CS.." parameterization tool integrated in MOVISUITE®, you can generate an individual acceptance report and save it as a PDF. Before creating the report, enter the system-specific data in the "Assist CS.." parametrization tool form. The system-specific data is transferred to the PDF file.

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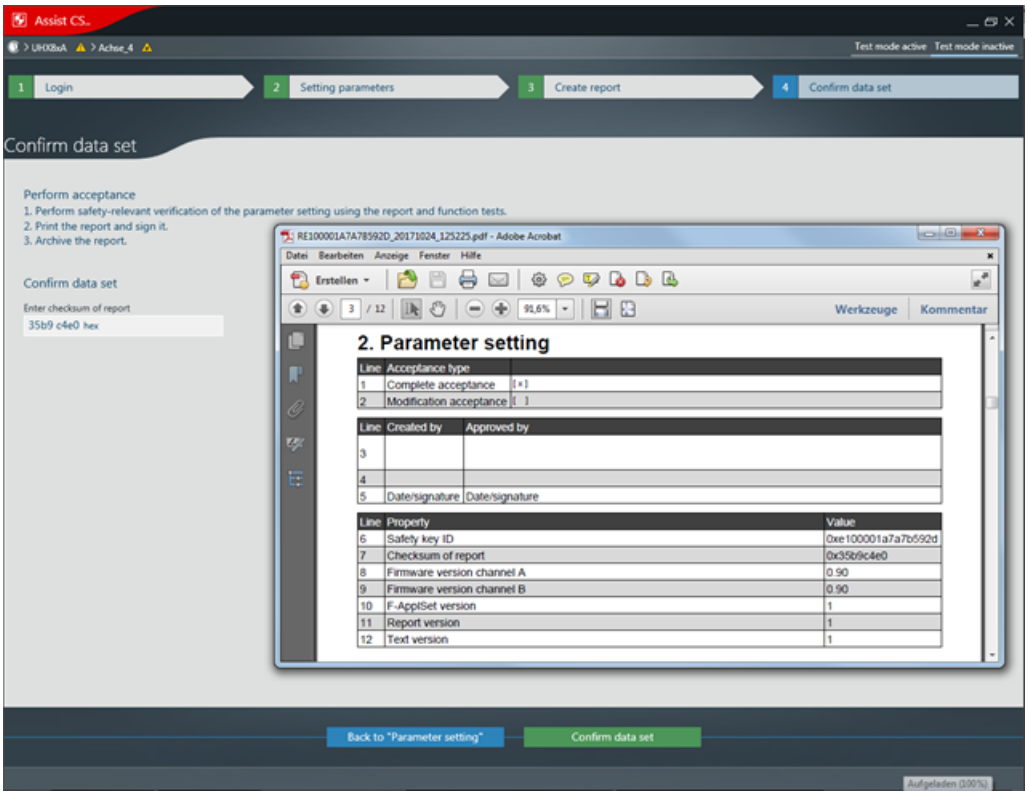
7.6.3 Structure of the acceptance report

The acceptance report that is generated as a PDF file contains the following information:

- System information
- Parameters of the safety option
- Overview of checksums
- Communication data

7.6.4 Confirming acceptance

The status of the safety option must be confirmed after completion of the safety technology verification. To confirm the data set, enter the checksum of the report in the "Assist CS.." parametrization tool (line 7 in the following figure).



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7.7 Reset the password

7.7.1 Procedure

INFORMATION

Observe the data in the operating instructions of the respective decentralized basic device when installing or removing the electronics cover.

Proceed as follows:

1. Switch off the system.
2. Dismount the electronics cover. To reset the password, you require the master password of the safety option.
3. The master password of the option can be found on the inside of the electronics cover.
4. Mount the electronics cover back onto the decentralized basic device.
5. Switch on the system.
6. Open the "Assist CS.." parameterization tool. To open the main menu, click the red "Assist CS.." tile in the left upper corner.
7. Select the menu item "Change password". In the "Old password" edit box, enter the master password.
8. In the edit boxes "New password" and "Reenter new password", enter the new password. Confirm your entries.

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8 Operation

8.1 Hazard caused by coasting of the drive

⚠ WARNING

Hazard caused by coasting of the drive. Without mechanical brake or if the brake is faulty, a danger exists of the drive coasting to a halt.

Severe or fatal injuries.

- If the coasting of the drive causes any application-specific dangers, you must provide for additional preventive measures (e.g. guard with guard locking device). The additional preventive measures must cover the danger zone until no further danger to personnel exists.
- The additional preventive measures must be designed and integrated so that they meet the requirements determined in the risk assessment for the machine.
- After activating the stop command, access to the machine must remain blocked until the drive has reached standstill depending on the hazard involved. As an alternative, you must determine the access or intervention time and then calculate and observe the resulting safety clearance.

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9 Data exchange with higher-level controller

9.1 Introduction

Basic devices with integrated safety option support parallel operation of standard and safe communication via a bus system or network. Safe communication is possible via both PROFIsafe and FSoE.

The safe PROFIsafe communication can be carried out via PROFINET. For this, the basic device in the variant DFC with integrated safety option via PROFINET must be connected to a fail-safe controller (F-PLC).

The safe FSoE communication can be carried out via EtherCAT®. For this, the basic device in the variant DSI with integrated safety option via EtherCAT®/SBus^{PLUS} must be connected to a fail-safe controller (F-PLC).

To control drive safety functions and for evaluation of the responses from the safety option via PROFIsafe, the assignment of the individual bits within the F-process input/ output data must be taken into account.

9.2 F-periphery access of the safety option in the TIA Portal

For safe communication, the CSB51A safety option requires a total of 8 bytes for input data and 7 bytes for output data for the PROFIsafe telegram part and occupies them in the process image. The F user data is divided into 4 bytes input data and 3 bytes output data.

The remaining 4 bytes input data and output data are required for the telegram backup according to the PROFIsafe specification.

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9.2.1 F-periphery data component of the safety option

While compiling the configuration tool (HW Config), the system automatically generates an F-periphery data component (DB) for each safety option. The F-periphery data block provides an interface through which you can evaluate or control variables in the safety program.

The symbolic name consists of the invariable prefix "F", the start address of the F-periphery, and the name entered in the object properties during configuration for the F-periphery (e.g.: F00008_198).

The following table shows the F-periphery data component of the safety option:

	Address	Symbolic name (Variable)	Data type	Function	Preset-ting
User-controllable variables.	DBX0.0	"F00008_198" (PASS_ON)	BOOL	1: Activate passivation	0
	DBX0.1	"F00008_198" (ACK_NEC)	BOOL	1: Acknowledgment required for reintegration with safety option	1
	DBX0.2	"F00008_198" (ACK_REI)	BOOL	1: Acknowledgment for reintegration	0
	DBX0.3	"F00008_198" (IPAR_EN)	BOOL	Variable for reparameterization (not supported by the safety option).	0
Variables that can be read in by the user.	DBX2.0	"F00008_198" (PASS-OUT)	BOOL	Run passivation.	1
	DBX2.1	"F00008_198" (QBAD)	BOOL	1: Substitute values are output.	1
	DBX2.2	"F00008_198" (ACK_REQ)	BOOL	1: Acknowledgment required for reintegration	0
	DBX2.3	"F00008_198" (IPAR_OK)	BOOL	Variable for reparameterization (not supported by the safety option).	0
	DBB3	"F00008_198" (DIAG)	BYTE	Service information	-

PASS_ON

With the PASS_ON variable, you can activate a passivation of the safety option. Passivation of the F-periphery takes place, provided that PASS_ON = "1".

ACK_NEC

After resolving an error, the safety option is reintegrated depending on the setting of the variable ACK_NEC.

- ACK_NEC = 0: Automatic reintegration occurs.
- ACK_NEC = 1: Automatic reintegration occurs following acknowledgment by the user.

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⚠ WARNING

Disallowed parameterization of the variable *ACK_NEC = 0*.

Severe or fatal injuries

- The parameterization of the variable *ACK_NEC = 0* is permitted only if automatic reintegration is safe for the process in question.
- Check if automatic reintegration is permitted for the process in question.

ACK_REI	In order to reintegrate the safety option after the fault has been corrected, user acknowledgment with positive edge at the variable *ACK_REI* is required. Acknowledgment is only possible if variable *ACK_REQ = 1*.
ACK_REQ	The F control system sets *ACK_REQ = 1* after all faults in the data exchange with the safety option have been corrected. After successful acknowledgment, the F control system sets *ACK_REQ* to "0".
PASS_OUT	The variable *PASS_OUT* indicates whether there is a passivation of the safety option. Substitute values are output.
QBAD	Fault in the data exchange with the safety option. Indicates passivation. Substitute values are output.
DIAG	For service information purposes, the variable *DIAG* supplies non-failsafe information about faults that have occurred in the F control system. For further information, refer to the relevant F control system manual.

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9.3 Safe communication over FSoE

For safe communication over FSoE with the CSB51A safety option, a safety module with an useful data length of 48 bits is required. In addition, another 48 bits for the cyclic redundancy check (CRC) and 24 control bits are required.

9.3.1 Integrating the safe communication

Each safety option must be created by the user in the safety program. For operation of the safety function, there are defined variables available that can be named differently depending on the FSoE master.

Example

The following example illustrates these variables on the basis of group ports from Beckhoff.

	Variable	Function
Group ports for controlling	RUN/STOP	Starts/stops the execution of the FSoE program.
	Err Ack	Error reset/acknowledgment of safe communication.
	Module fault	TBD
Group ports for monitoring	FB Err	Error during execution of function block.
	Com Err	Communication error.
	Out Err	Output error.
	Other Err	Other error.
	Com Startup	Safe communication is established.
	FB Deactive	TBD
	FB Run	Execution of function blocks is running.
	In Run	Safety program is running.

The procedure for starting the safety function and for reintegrating a safety device depends on the FSoE master and is not shown here.

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9.4 F-process output data

Byte	Bit	Name	Value	Description
0	0	STO1	0	Activate STO.
			1	Deactivate STO.
	1	Reserve		
	2	Reserve		
	3	Reserve		
	4	Reserve		
	5	Reserve		
	6	Reserve		
	7	Fault acknowledgment	0	No acknowledgment.
			1	Fault acknowledgment (0 → 1 edge).
1	0	Reserve		
	1	Reserve		
	2	Reserve		
	3	Reserve		
	4	Reserve		
	5	Reserve		
	6	Reserve		
	7	Reserve		
2	0	Reserve		
	1	Reserve		
	2	SSX1	0	Activate SSx1.
			1	Deactivate SSx1.
	3	SSX2	0	Activate SSx2.
			1	Deactivate SSx2.
	4	Reserve		
	5	Reserve		
	6	Reserve		
	7	Reserve		

9.4.1 Substitute values

In the F-controller, all bits described as "Reserve" must be set to "0".

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9.5 F-process input data

Byte	Bit	Name	Value	Description
0	0	STO1	0	STO is not active. Safe disconnection of the drive is not active.
			1	STO signals the status "STO active". Status internal output F-DO_STO is disabled.
	1	Reserve		
	2	Reserve		
	3	Reserve		
	4	Reserve		
	5	Reserve		
	6	Warning	0	CSB51A does not signal warning
			1	CSB51A signals warning
	7	Fault status	0	CSB51A is in fault-free operation.
			1	At least one fault at the CSB51A.
1	0	Reserve		
	1	Reserve		
	2	Reserve		
	3	Reserve		
	4	Reserve		
	5	Reserve		
	6	Reserve		
	7	Reserve		
2	0	Reserve		
	1	Reserve		
	2	SSx1	0	SSx1 is not active.
			1	SSx1 is active.
	3	SSx2	0	SSx2 is not active.
			1	SSx2 is active.
	4	Reserve		
	5	Reserve		
	6	Reserve		
	7	Reserve		

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Byte	Bit	Name	Value	Description
3	0	Reserve		
	1	Reserve		
	2	Reserve		
	3	Reserve		
	4	Reserve		
	5	Reserve		
	6	Reserve		
	7	Reserve		

9.5.1 Substitute values

For all outgoing process data (F-PE), the value "0" is written as the substitute value. One exception is *Fault state*. For *Fault state*, the value "1" is written as the substitute value in the case of a fault-free protocol. In the case of a faulty F-protocol, the value "0" is written for *Fault state*.

9.6 Possible acknowledgment procedures of the safety option

9.6.1 Acknowledging fault-free data exchange using PROFIsafe

The PROFIsafe communication must be fault-free for safe data exchange of the safety option via PROFIsafe. As soon as there is an acknowledgment request of the safety option via the *ACK_NEC* bit in the F-periphery data component, the user must trigger an acknowledgment by a rising edge via the *ACK_REI* bit.

9.6.2 Acknowledging the fault

As soon as the safe data exchange of the safety option using PROFIsafe or FSoE is fault-free, faults in the safety option can be acknowledged by a rising edge with the *Fault acknowledgment* bit in the F-process output data.

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10 Response times

The response time plays a decisive role in the design and execution of drive safety functions in systems and machines. In order to match the response time to the requirements of a drive safety function, always take the entire system into account, from the sensor (or command device) to the actuator. The following times are of particular importance in connection with the MOVISAFE® CSB51A safety option:

- Response time of the connected sensors
- PROFIsafe cycle time
- Processing time (cycle time) in the safety controller
- PROFIsafe monitoring time *F_WD_Time*
- Internal response times of the MOVISAFE® CSB51A safety option
- Response time of the actuators (e.g. frequency inverters)

Establish the response sequence for each drive safety function in your application and determine the maximum response time for each case, taking into account the relevant manufacturer data. Observe in particular the information contained in the safety documentation of the safety controller used.

For detailed information regarding response time consideration for safe PROFIsafe communication, refer to the respective standard: IEC 61784-3-3.

10.1 Calculation of response times

The following response times are fixed:

- $T_{\_Sys}$ = 4 ms (cycle time of the system)
- $T_{\_Task}$ = 0.5 ms (cycle time of a process)
- Maximum fault response time $T_{\_FRZ}$ = 9 ms applies to the deactivation of the internal output F-DO_STO and to setting the fault status of the safe process input data (F-PE).

10.1.1 Safe communication

All response times must be multiplied by the factor 1.002.

Calculation factor (formula symbol)	Calculation specification response time
Input processing time via safe process output data ($T_{\_InputProcessing\_F\text{-}PA}$)	$2 \times T_{\_Task} + T_{\_Sys}$
Response time (F-PA after F-DO_STO)	$T_{\_InputProcessing\_F\text{-}PA} + T_{Sys}$

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10.1.2 Selection of a drive safety function via safe communication

The response times for the safe communication always relate to the safe protocol and not to the external interface of the safety option. All response times must be multiplied by the factor 1.002.

Calculation factor	Calculation specification response time
STO: • Via F-PA	$T_{\_InputProcessing\_F\text{-}PA} + 2 \times T_{\_Sys}$
SS1(c): • Via F-PA	$T_{\_InputProcessing\_F\text{-}PA} + 2 \times T_{\_Sys}$ + SSx(c) delay t_1 (8706.8)

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11 Service

11.1 Modification/changes to the device

- Firmware modifications

  Only SEW-EURODRIVE is authorized to make changes to the firmware.
- Repair

  Only SEW-EURODRIVE is authorized to repair the CSB51A safety option.
- Warranty

INFORMATION

The safety certification and any right to claim under limited warranty of SEW-EURODRIVE become void if the user modifies the device internally (e.g. exchange of components, welding parts).

11.2 Status LEDs

⚠ WARNING

Danger due to incorrect interpretation of the LEDs "F-RUN" and "F-ERR"

Severe or fatal injuries

- The LEDs are not safety-related and may not be used as a safety device.

INFORMATION

- "Slow" flashing frequency means that the LED is flashing at 0.5 Hz.
- "Fast" flashing frequency means that the LED is flashing at 2 Hz.
- The "flashing sequence" state means that both LEDs of the assembly alternately flash in yellow or green. The LED color is alternately assigned to the LEDs, e.g. F-RUN LED flashes green, F-ERR LED flashes yellow and vice versa.

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11.2.1 "F-RUN" LED

The following table shows the states of the "F-RUN" LED.

LED status	Meaning
Flashing sequence	Device identification for safety key ID query.
Red, slowly flashing	Device identification for parameterization.
Red, rapidly flashing	Firmware update, do not switch the device off.
Red	Critical fault (cannot be acknowledged).
Yellow	STO drive safety function is active.
Yellow, flashing slowly	Device in the operating state with one or more of the following constraints: • The safety card controls inverters • Test mode
Green, slowly flashing	Acceptance of the assembly has not yet taken place.
Green, rapidly flashing	• Device booting up or initializing • Device in parameterization state
Green	Device in operating state and parameter set approved.
Off	Device off.

11.2.2 "F-ERR" LED

The following table shows the states of the "F-ERR" LED.

LED status	Meaning
Flashing sequence	Device identification for safety key ID query.
Red	Critical error, cannot be acknowledged.
Red, slowly flashing	• Error can be acknowledged • Error outside of the device, cabling system error • Reaction to limit value overshoot active
Yellow, rapidly flashing	• Error suppression (muting) active • Emergency mode active
Yellow	Warning: Error connection basic device
Green, slowly flashing	Error in the operating state "Parameterization": • Error in parameterization • No parameterization exists • Current parameter set not consistent with the safety key • Inconsistent parameterization
Green	Error-free operation.
Off	Device off.

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11.3 Fault states of the MOVISAFE® CSB51A safety option

⚠ WARNING

A fault occurred at the MOVISAFE® CSB51A safety option and automatically restarts in the following cases:

- The DC-24-V supply voltage was switched off and back on.
- The safety option was in standby state.
- Several device faults were acknowledged.

Severe or fatal injuries.

- To prevent automatic restart in the aforementioned cases, the parameter *Error status after startup* (8703.240) must be parameterized to "Start inhibit". "Start inhibit" must be acknowledged.

11.3.1 Error classes

The occurring faults of the safety option are divided into 5 different fault classes. Depending on the fault class, the response described in the following table is carried out.

Fault class	Response
Message.	Entry in fault memory, no further response.
Warning.	Entry in fault memory, no further response.
Output fault.	Entry in fault memory and safe state of the F-DO_STO if necessary.
System error.	Entry in fault memory and safe state of the F-DO_STO.
Critical fault.	Entry in fault memory and safe state of the F-DO_STO. No safe communication.

Message

No error response is carried out in the case of a message. An entry is made in the fault memory. In addition, the corresponding error code is transferred.

Warning

No error response is carried out in the case of a warning. An entry is made in the fault memory. In addition, the corresponding error code is transferred.

A warning is information, e.g. about an error in the encoder system, which has no effect with regard to safety technology at the time of occurrence, but which can represent an error at a later time.

Output fault

System error

In the case of a system error, the F-DO_STO is switched to the safe state. In addition, the drive safety function STO is executed without delay. The safety option is set to the safe state.

The bits for the drive safety function STO and the fault are set to "1" in the F-protocol.

In addition, the corresponding error code is transferred for the system error that occurred.

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INFORMATION

If the safe digital output is assigned to a drive safety function via the function assignment, this drive safety function is selected in the case of a system error.

Critical fault

In the case of a critical error, the safety option is set to the safe state. The F-DO_STO is switched to the safe state. In addition, the drive safety function STO is executed without delay. Active safe communication is suspended.

In addition, the corresponding error code is transferred for the critical error that occurred.

Fault messages

If there is a fault in the safety option, the basic device indicates that the safety option is reporting a fault.

Measures for fault resolution and more information on causes can be found using the fault status of the safety option.

11.4 Error diagnostics

The "Latest initial fault" fault status shows the fault that occurred first in the safety option with the corresponding fault code, subfault code and fault description. For internal purposes, additional fault codes are displayed.

The current first fault is the fault that occurs after a restart or since the last acknowledgment as the first fault with the highest priority.

11.4.1 Error messages

If there is a fault in the safety option, this fault is indicated as follows.

Subfault: 46.50 **Description: Warning**		
	Response: Warning with self-reset	
	Cause	Measure
	– The safety option signals a subcomponent fault of the type "warning".	See fault status "Subcomponent safety option"

Subfault: 46.51 **Description: Fault**		
	Response: Emergency stop and output stage inhibit with self-reset	
	Cause	Measure
	– The safety option signals a subcomponent fault of the type "standard fault".	See fault status "Subcomponent safety option"

Subfault: 46.52 **Description: Critical fault**		
	Response: Output stage inhibit with self-reset	
	Cause	Measure
	– The safety option signals a subcomponent fault of the type "critical fault".	See fault status "Subcomponent safety option"

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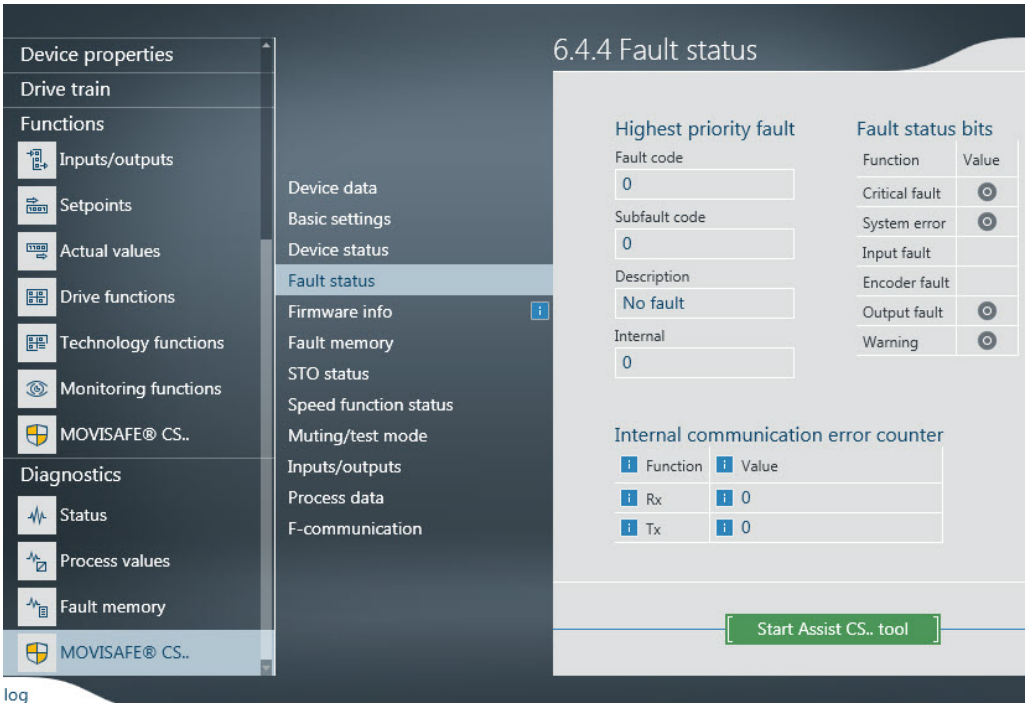
11.4.2 Diagnostics with MOVISUITE® Assist CS..

The current fault of the safety option is displayed with the corresponding fault description in the "Diagnostics" segment in the menu command [MOVISAFE® CS..] > [Fault status].



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11.4.3 Diagnostics with PROFIsafe connection

The CSB51A safety option with PROFIsafe connection triggers a diagnostic alarm on the F-PLC in the data exchange between the F-PLC (fieldbus master) and the safety option (fieldbus slave) in case of a fault. Simultaneously, the associated error code is transferred via the communication connection.

The F-PLC responds to the dispatched diagnostic alarm if the *Diagnostic alarm* assembly parameter is enabled for the safety option in the F-PLC per configuration. Depending on the fieldbus used, the fault code of the safety option can be evaluated in the F- PLC. A diagnostic alarm does not trigger a fault response in the F-PLC (default setting of the safety option in the F-PLC).

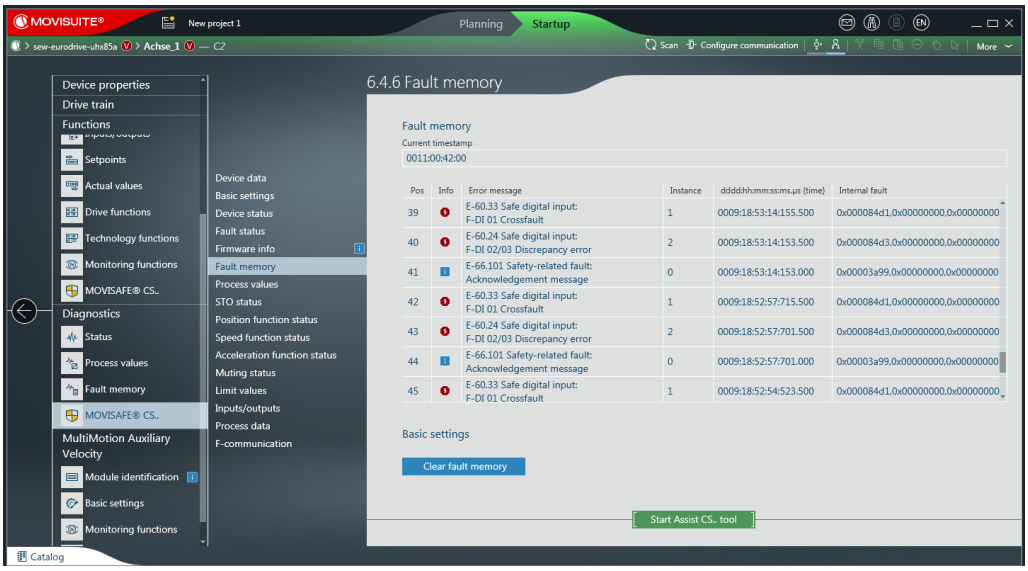
The safety option has PROFIsafe and assembly-specific fault codes. All fault codes of the CSB51A safety option are listed in a fault table.

INFORMATION

You can find the structure and the evaluation of a diagnostic data set in the F-PLC in the respective manual of the fieldbus master. In addition, ensure that the current device description file of the SEW-EURODRIVE drive system is always installed in the engineering tool of the F-PLC during configuration.

11.4.4 Fault memory

The current first error and all other subsequent errors are residually saved in the fault memory with associated timestamp.



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Additional messages for the errors are entered in the fault memory in the columns "Primary error" and "Sub-error". These are messages that do not directly trigger a fault response of the CSB51A safety option. Essentially, these are the message "Power On" (primary error 66 and sub-error 100) and the message "Acknowledgment message" (primary error 66 and sub-error 101).

In the "Pos" column, the position of the fault is displayed. In the "Info" column, an icon indicates the category of the fault. In the "Fault message" column, the fault number, the main fault text and the subfault text is displayed. The actual value of the operating hours counter of the safety option is displayed in the "Time" column. The "Internal fault" column is used for internal purposes. The fault memory is organized as a ring memory. The most recently occurring error is shown in line 0 of the list. If there are more than 50 entries, the oldest fault is overwritten.

11.5 "Emergency mode" function

The "emergency mode" function can only be triggered using the CBG21 keypad. The "emergency mode" function automatically triggers the "Muting safe process output data (F-PO)" function (see chapter "Muting safe process output data").

11.5.1 Safety notes

⚠ WARNING

Due to the "Emergency mode" function, immediate restart of the system is possible.

Severe or fatal injuries.

- Before activation of the "Emergency mode" function, the user must undertake organizational measures for the protection of personnel and machinery.

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⚠ WARNING

The keypad is connected to the wrong device. This can cause immediate restart of the system.

Severe or fatal injuries.

- Before activation of the "Emergency mode" function, the user must undertake organizational measures for the protection of personnel and machinery.
- The keypad must mechanically be connected to the correct device.
- Make sure that you can see the display of the keypad and the system at any time during emergency mode. The keypad must be connected to the device in such a way that the keypad and the device can be disconnected without tools.

11.5.2 Approved devices

The "emergency mode" function is permitted for all decentralized MOVI-C® basic devices with MOVISAFE® CSB51A safety option.

11.5.3 Prerequisites

- A safe communication protocol (e.g. PROFIsafe) must be activated.
- The "Emergency mode" function (index 8707.2) must be enabled.
- To start the "emergency mode" function, a communication error must be pending in the F-protocol.

11.5.4 Starting the emergency mode

Proceed as follows:

- Select "emergency mode" using the keypad.
- With the "F-ERR" LED (see chapter "F-ERR LED"), check if the correct device signals emergency mode. If the wrong device is flashing, activation of the emergency mode must be canceled immediately.
- If the correct device is selected, the emergency mode ID is displayed. Confirm signaling of the correct device. For this, enter the displayed emergency mode ID in reverse order and click OK.

11.5.5 Ending emergency mode

- You can end emergency mode in a safety-related manner by interrupting the connection between keypad and device.
- You cannot end emergency mode in a safety-related manner by selecting "End emergency mode" on the keypad.

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11.6 Device replacement

11.6.1 Device replacement requirements

⚠ WARNING

An incorrect parameterization of the safety option is enabled if the memory module is inserted incorrectly.

Severe or fatal injuries.

- Ensure that the memory module matching the application is inserted at the correct system position.

- In safety-related applications, only electronics covers with the MOVISAFE® CSB51A safety option that are marked with the FS81 logo for functional safety may be used. Observe the information on the FS81 logo in the operating instructions of the respective basic device.
- In safety-related applications, replace an electronics cover only with an electronics cover with the same FS logo.

11.6.2 Replacing the electronics cover

To replace the electronics cover, you must perform the following steps:

1. Switch off the basic device to be replaced.
2. Open the screw fitting of the electronics cover. Remove the plugged-in memory module from the electronics cover.
3. Replace the electronics cover (including the MOVISAFE® CSB51A safety option).
4. Insert the memory module that was removed in step 2 into the new electronics cover. Mount the electronics cover.
5. Switch on the basic device again. Carry out a functional test. The checking of all parameters is omitted.

The replacement of the electronics cover is detected automatically and the application-related data set is loaded from the memory module into the MOVISAFE® CSB51A. The MOVISAFE® CSB51A safety option is subsequently in the same state that it was in before the replacement of the electronics cover. This means that the MOVISAFE® CSB51A safety option will be in the "Accepted" state again afterwards if it was in the "Accepted" state before the replacement of the electronics cover. A function test of the safety option is required after the replacement of the electronics cover.

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12 Technical data

12.1 General technical data

Observe the technical data of the respective basic device.

12.2 General electrical data

The safety option is supplied with voltage by the basic device.

12.2.1 Power consumption of the safety option

Safety option	Maximum current consumption	Maximum power consumption
CSB51A	0.09 A	2.1 W

12.3 Characteristic safety values

	Characteristic values pursuant to	
	EN 62061/IEC 61800-5-2	**EN ISO 13849-1**
Tested safety class/underlying standards	SIL 3	PL e
Probability of dangerous failure per hour (PFH_D value)	3×10^{-9} 1/h	
Mission time / service life	20 years, after which the component must be replaced with a new one.	
Proof test interval	20 years	-
Safe state	Value "0" for safe F-DO_STO process value (output disabled).	
Drive safety function	• STO, SS1(c) • Safe communication	

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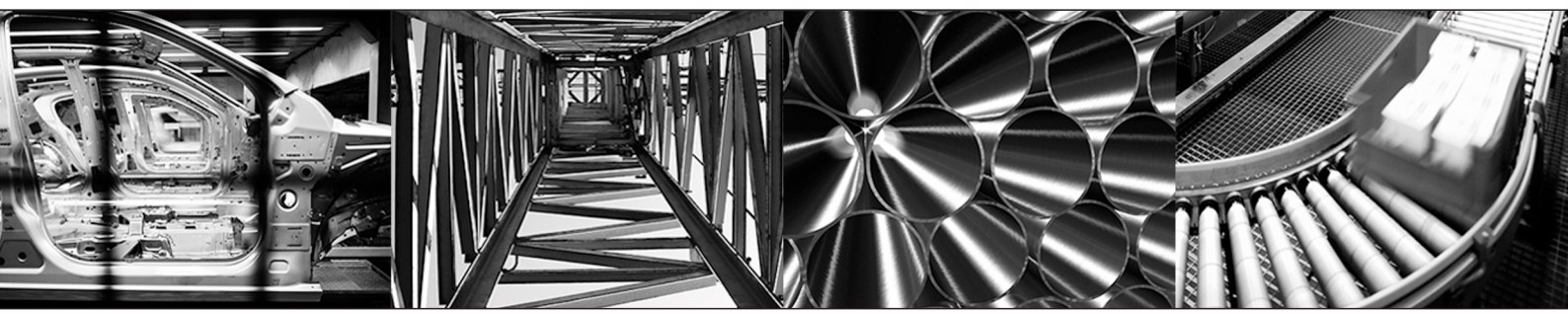

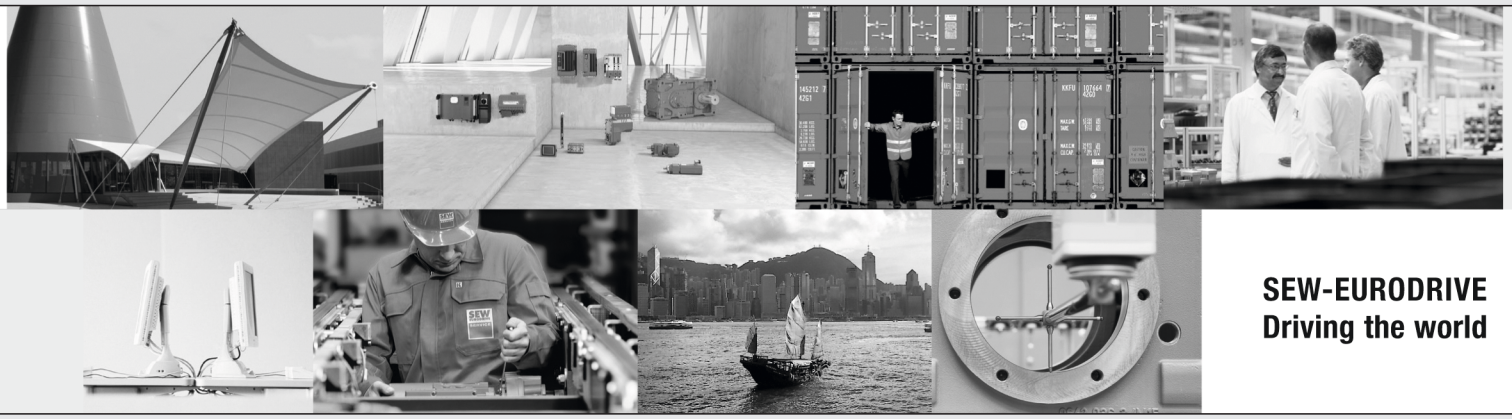

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