SIGMATEK

SR 011

S-DIAS DC Motor Module

Technical Manual

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Translation from German

S-DIAS DC-Motor Module SR 011

with1 DC motor output stage +50 V/5 A

1 brake chopper

1 incremental encoder input switchable RS422/TTL

2 Enable inputs +24 V/3 mA/0.5 ms with STO function (not EG type tested)

1 digital output +24 V/0.5 A/short-circuit protected

The S-DIAS motor output module SR 011 allows the connection of DC brush motors with a phase current up to 5 A. The operating modes PWM control, current and speed regulation via IxR compensation, as well as speed and position regulation via incremental encoder are supported.

The integrated brake chopper provides the connection for an external regen resistor, with which excess energy generated by the braking process of the motor and fed back to the motor supply, can be dissipated.

The incremental encoder input, which supports RS422 as well as TTL encoders, is provided for position feedback.

With the two Enable inputs, the Safety function STO is implemented (not EG type tested).
The module also has a short-circuit proof digital output (+24 V/0.5 A). The +24 V supply voltage for the digital in- and outputs, as well as the incremental encoder supply are monitored for under voltage.

Contents

1 Introduction

1.1 Target Group/Purpose of this Manual

This manual contains all information required for operating the SR 011.

This manual is intended for:

- Project planners
- Technicians
- Configurators/commissioning engineers
- Machine operators
- Maintenance/test technicians

General knowledge of automation technology is required.

Further help and training information, as well as the appropriate accessories can be found on our website www.sigmatek-automation.com

Our support team is happily available to answer your questions.
For our support hotline and business hours, please visit our website.

1.2 Contents of Delivery

1x SR 011
4x opposing connector

This document can be downloaded from our website.
Additional documents may be included with delivery.

2 Basic Safety Guidelines

2.1 Symbols Used

The following symbols are used in the operator documentation for warning and danger messages, as well as informational notes:

DANGER 	Identifies an immediate danger with high risk, which **will** lead to immediate death or serious injury if not avoided. Identifie un danger immédiat avec un risque élevé, entraînant le décès immédiat ou des blessures graves s'il n'est pas évité
WARNING 	Identifies a possible danger with a mid-level risk, which **can** lead to death or (serious) injury if not avoided. Indique un danger possible d'un risque moyen de décès ou de (graves) blessures si les consignes de sécurité ne sont pas respectées
CAUTION 	Identifies a possible danger with a mid-level risk, which **can** lead to death or (serious) injury if not avoided. Indique un danger possible d'un risque moyen de décès ou de (graves) blessures si les consignes de sécurité ne sont pas respectées
	Warning, dangerous electrical voltage. Attention, tension électrique dangereuse.
	Hot surface warning Avertissement de surface chaude
	Danger for ESD-sensitive components. Les signes de danger pour les composants sensibles aux décharges électrostatiques

Provides user tips, informs of special features and identifies especially important information in the text.

Fournit des conseils d'utilisation, informe sur les fonctions particulaires et souligne les informations particulièrement importantes dans le texte.

2.2 Disclaimer

The contents of this document were prepared with the greatest care. However, deviations cannot be ruled out. This document is regularly checked and required corrections are included in the subsequent versions. The machine manufacturer is responsible for the proper assembly, as well as device configuration. The machine operator is responsible for safe handling, as well as proper operation.

The current document can be found on our website. If necessary, contact our support.

Subject to technical changes, which improve the performance of the devices. The following documentation is purely a product description. It does not guarantee properties under the warranty.

Please thoroughly read the corresponding data sheets, operating instructions and this system handbook before handling a product.

SIGMATEK GmbH & Co KG is not liable for damages caused through non-compliance with these instructions or applicable regulations.

The general and special safety instructions described in the following sections, as well as technical regulations, must therefore be observed.

2.3 General Safety Guidelines

According to EU Guidelines, the operating instructions are a component of a product.

This manual must therefore be accessible in the vicinity of the machine since it contains important instructions.

This technical documentation should be included in the sale, rental or transfer of the product, or its online availability indicated.

Maintain this manual in readable condition and keep it accessible for reference.

Regarding the requirements for Safety and health connected to the use of machines, the manufacturer must perform a risk assessment in accordance with machine guidelines 2006/42/EG before introducing a machine to the market.

Before commissioning this product, check that conformance with the provisions of the 2006/42/EG guidelines is correct. As long as the machine with which the with the device should be used does not comply with the guideline, operating this product is prohibited.

Operate the unit with devices and accessories approved by SIGMATEK only.

CAUTION

Handle the device with care and do not drop or let fall.

Prevent foreign bodies and fluids from entering the device.

The device must not be opened, otherwise it could be damaged!

Manipulez l'appareil avec précaution et ne le laissez pas tomber.

Empêchez les corps étrangers et les liquides de pénétrer dans l'appareil.

L'appareil ne doit pas être ouvert, sinon il risque d'être endommagé!

2.4 Guidelines

The device was constructed in compliance with European Union guidelines.

2.4.1 EU Conformity Declaration

CE Declaration of Conformity

The SR 011 conforms to the following European guidelines:

- 2014/35/EU Low-voltage guideline
- 2014/30/EU “Electromagnetic Compatibility” (EMC guideline)
- 2011/65/EU “Restricted use of certain hazardous substances in electrical and electronic equipment” (RoHS Guideline)

The EU Conformity Declarations are provided on the SIGMATEK website. See: Products/downloads, or using the search function and keyword “EU Declaration of Conformity”

In addition to these directives, the SR 011 was also designed in accordance with 2006/42/EC and the standards EN 13849-1 and EN 62061 but was not EC type-examination tested!

2.5 Safety-Relevant Parameters

The use of the specified parameters requires a risk analysis of the end application.

Safety parameters for two channel operation of the SR 011		
	Safety Parameters	**Safety Level**
EN 62061	PFH_D = 1.64E-09 (1/h) DC = 99.77 %	SIL 3 or SIL CL3
EN ISO 13849-1	MTTFd = 631 years DC = 99.11 %	PL e, Cat. 4

3 Technical Data

3.1 DC Motor Output Specifications

Number	1
Supported motor type	DC brush motor
Operating modes	PWM control Current regulation Speed regulation via IxR compensation Speed regulation via incremental encoder Position regulation via incremental encoder
Supply voltage	+18-55 V
PWM frequency	32 kHz
Current controller frequency	16 kHz
Maximum PWM Switching ratio	95 % (limited by hardware)
Maximum continuous current	5 A
Output current over the environmental temperature	maximum 5 A continuous current at 45 °C maximum 3.5 A continuous current at 50 °C maximum 2 A continuous current at 55 °C
Maximum peak current (1 s)	15 A
DC-link capacitance	2.8 µF
Motor current measurement	0-15 A
Voltage measurement	0-65 V
Temperature measurement	0-125 °C with temperature warning at 103 °C with temperature warning at 108 °C
Safety functions	Short circuit cutoff Temperature cut-off I^2t monitor Over and under voltage monitor

3.2 Brake Chopper Specifications

Number	1
Output	GND switching
Maximum current	6 A (1)
Short-circuit protection	yes
Regen resistor	External power resistor
Article number	20-014-061-Z1
Regen resistor switching threshold on/off	60 V/55 V

(1) Regen braking must be dimensioned according to the application For most applications, a 15 Ω /100 W resistor is sufficient. If multiple motor modules are driven with one intermediate circuit supply, it is possible to equip only one module with regen braking. The recommended regen resistor is available at SIGMATEK under the article number 20-014-061-Z1.

(2) The resistance must be dimensioned based on its maximum power dissipation corresponding to the braking power generated in the application. However, the permissible short-term power generated must be at least P=U2/R, meaning 602/R.

Hot surface warning

A burn hazard exists with physical contact!

During operation, the surface of the brake resistor can become very hot and remain hot sometime after operation.

Avertissement de surface chaude

Il existe un risque de brûlure par contact physique !

Pendant le fonctionnement, la surface de la résistance de freinage peut devenir très chaude et rester chaude quelque temps après le fonctionnement.

Avoid physical contact with the surface of the brake resistor, and for a significant time after operation.

Éviter tout contact physique avec la surface de la résistance de freinage et pendant une longue période après le fonctionnement.

3.3 Incremental Encoder Input

Number	1
Input signals	Incremental encoder signals RS422 (A, /A, B, /B, R, /R) RS422 signal (120 Ω termination)
	Incremental encoder signal TTL (A, B, R) TTL level (1200 Ω Pull-Up)
Input frequency	maximum 125 kHz
Counter frequency	maximum 500 kHz
Signal analysis	4x
Counter resolution	16 bits
Encoder power supply	+5 V/0.2 A short-circuit proof

3.4 STO Enable Input Specifications

Number	2	
Input voltage	+24 V DC	
Input voltage range	minimum +18 V	maximum +30 V
Signal level	low: ≤ +5 V	high: ≥ +15 V
Switch hysteresis	typically +11 V	
Input current	3 mA at +24 V	
Input delay	typically 0.5 ms	
Safety Level	Complies with the requirements of Category 4, Performance Level "e" according to EN ISO 13849-1 and SIL CL 3 according to 62061 **Not EG type tested!**	
Safety function	STO according to EN 61800-5-2, section 4.2.2.2 The motor is not supplied with energy, which can cause a turn. The DC motor output stage does not supply energy to the motor, which can generate torque. **Not EG type tested!**	

3.5 Digital Output Specifications

Number	1
Short-circuit proof	yes
Maximum continuous current load allowed	0.5 A
Maximum braking energy of the output (inductive load)	maximum 0.5 Joules
Residual current output (off)	≤ 10 µA
Turn-on delay	< 200 µs
Turn-off delay	< 200 µs

3.6 Electrical Requirements

Supply voltage +24 V (X4)	18-30 V	
Current consumption of the +24 V supply (X4)	load-dependent (digital output + digital output supply) maximum 0.6 A	
Motor supply voltage (X2)	+18-55 V	
Current consumption of motor supply (X2)	maximum 5 A (load-dependent)	
Voltage supply from S-DIAS bus	+24 V	
Current consumption on the S-DIAS bus (+24 V supply)	typically 60 mA	maximum 85 mA
Voltage supply from S-DIAS bus	+5 V	
Current consumption on the S-DIAS bus (+5 V supply)	-	-

The motor supply must be connected with an appropriate DC-link capacitance (at least 2000 µF / 100 V).

Braking a DC motor

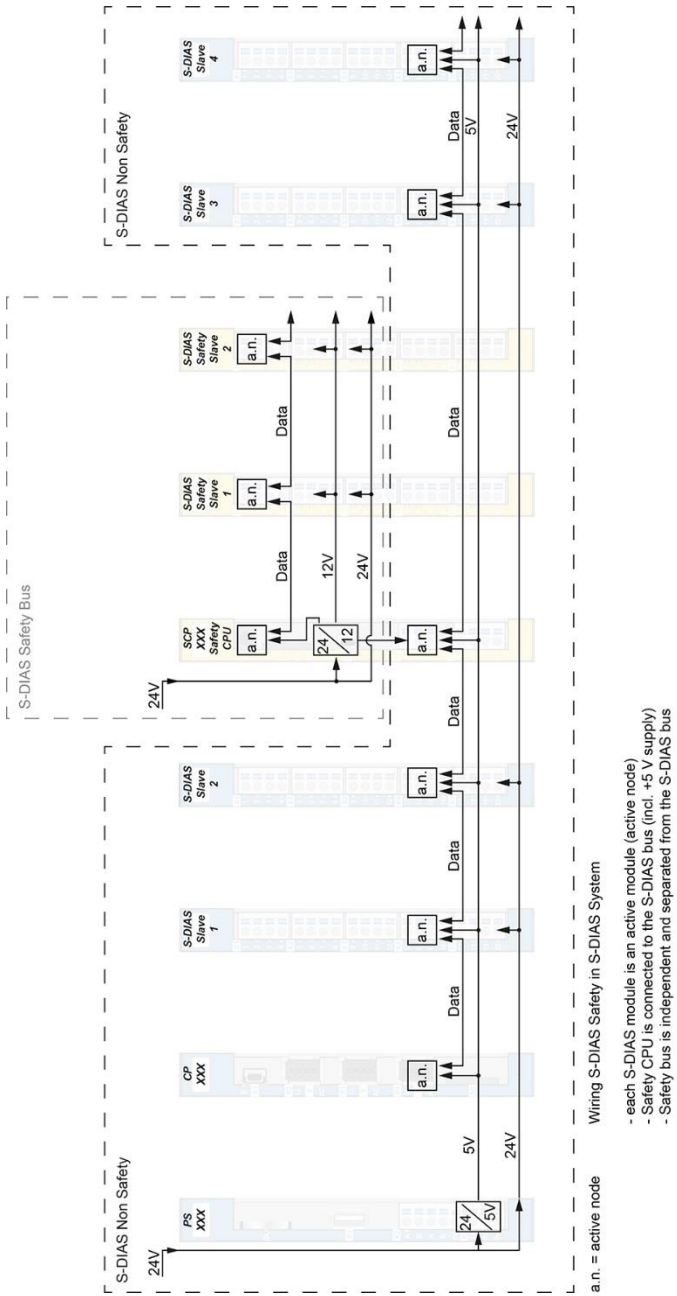
When braking a DC motor, a generative process can occur whereby the kinetic energy of the motor is converted into electrical energy. The energy of the motor is thereby fed back into the supply of the DC motor output stage; this then increases the supply voltage. It should be noted that the feedback voltage supply voltage of 65 V cannot be exceeded!

The external capacity of the motor supply is may be needed. If the capacitors in the power supply are insufficient, a regen resistor, which converts the excess energy into heat must be connected to the DC motor output stage. When selecting the power supply, it is important to ensure that it is appropriately feedback-resistant up to the maximum feedback voltage.

Use only conductors that are rated for at least 75 °C!

There is no motor thermostat analysis in the motor output.

Incorrectly set parameter or incorrect wiring can lead to destruction of the motor. It is important that the motor currents and the I^2T settings (A-I2TT, A-I2TERR), which can be defined via the LASAL Class 2 Tool in the DIAS-Drive Editor, must be taken into account.


S-DIAS Non Safety
S-DIAS Safety Bus
S-DIAS Non Safety
24V
PS XXX
CP XXX
S-DIAS Slave 1
S-DIAS Slave 2
SCP XXX Safety CPU
S-DIAS Safety Slave 1
S-DIAS Safety Slave 2
S-DIAS Slave 3
S-DIAS Slave 4
a.n.
Data
5V
12V
24V
24/5
24/12
a.n. = active node
Wiring S-DIAS Safety in S-DIAS System
- each S-DIAS module is an active module (active node)
- Safety CPU is connected to the S-DIAS bus (incl. +5 V supply)
- Safety bus is independent and separated from the S-DIAS bus

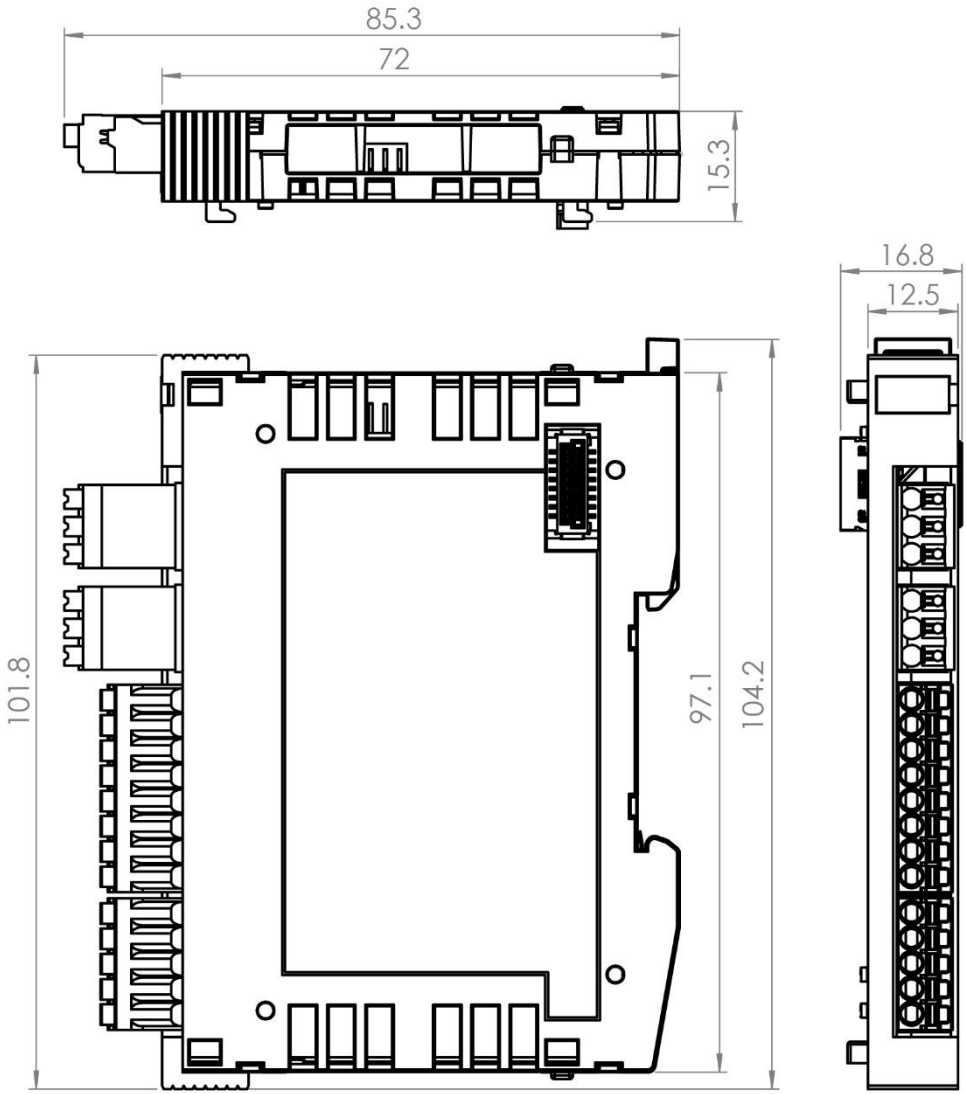
3.7 Miscellaneous

Article number	20-029-011
Hardware version	1.x
Standard	CE

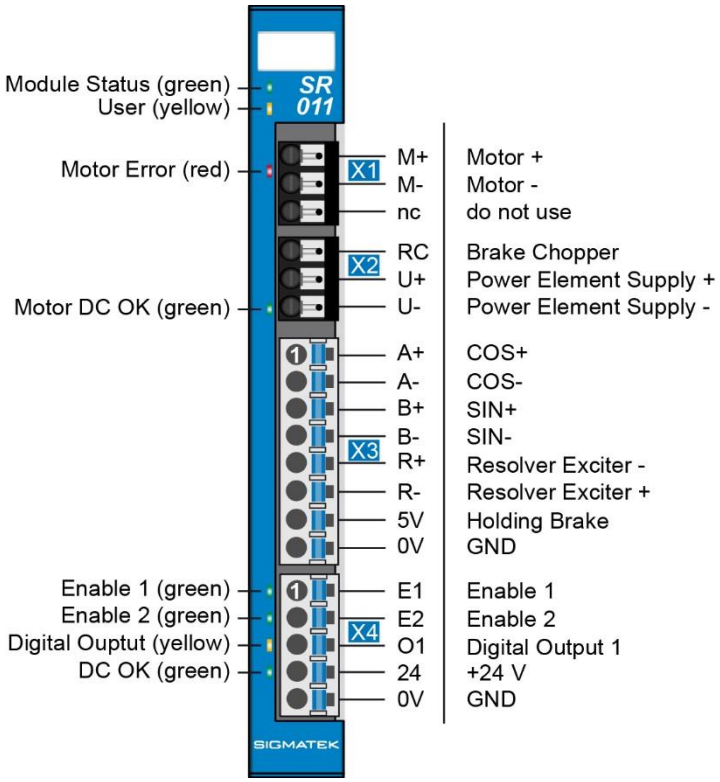
3.8 Environmental Conditions

Storage temperature	-20 ... +85 °C	
Environmental temperature	0 ... +55 °C	
Humidity	0-95 %, non-condensing	
Installation altitude above sea level	0-2000 m without derating, > 2000 m with derating of the maximum environment temperature by 0.5 °C per 100 m	
Operating conditions	pollution degree 2 indoor use	
EMC resistance	in accordance with 61000-6-7:2015 (Generic standards – immunity requirements for equipment designed to perform functions in safety-based systems (functional safety) at industrial facilities) according to EN 61000-6-2:2007 (industrial area) (increased requirements in accordance with IEC 62061)	
EMC noise generation	in accordance with EN 61000-6-4:2007 (industrial area)	
Vibration resistance	EN 60068-2-6	3.5 mm from 5-8.4 Hz 1 g from 8.4-150 Hz
Shock resistance	EN 60068-2-27	15 g
Protection type	EN 60529	IP20

4 Mechanical Dimensions



5 Connector Layout



5.1 Status LEDs

Module Status	green	ON	module active
		OFF	no supply available
		BLINKING (5 Hz)	no communication
User	yellow	ON	can be set from the application (e.g. the module LED can be set to blinking through the visualization, so that it is easily found in the control cabinet)
		OFF	
		BLINKING (2 Hz)	
		BLINKING (4 Hz)	
Motor Error	red	BLINKS	motor output stage error
		OFF	normal operation
Motor DC OK	green	ON	power applied and motor active
		BLINKS	power applied, but motor inactive
		OFF	no motor supply voltage
Enable 1	green	ON	enable 1 high
		OFF	enable 1 low
Enable 2	green	ON	enable 1 high
		OFF	enable 1 low
Digital output	yellow	ON	output active
		OFF	output inactive
DC OK	green	ON	+24 V DC supply OK
		BLINKS	+24 V DC voltage supply too high
		OFF	+24 V DC supply missing or voltage too low

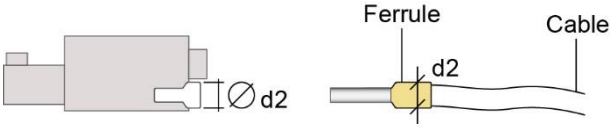
5.2 Applicable Connectors

Connectors:
X1, X2: Weidmüller socket connectors with spring terminals (included in delivery)
X3, X4: Phoenix connector plugs with spring terminals (included in delivery)

The spring terminals are suited for the connection of ultrasonically compacted (ultrasonically welded) stranded wire.

Weidmüller connector capacity:

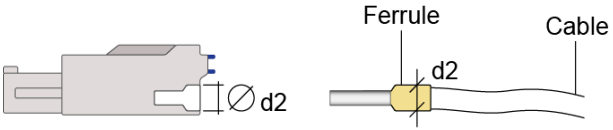
Stripping length/sleeve length:	9 mm
Mating direction:	parallel to the conductor axis or circuit board
Conductor cross section rigid: H05(07) V-U	0.14-1.5 mm^2
Conductor cross section flexible: H05(07) V-K	0.14-1.5 mm^2
conductor cross section strands ultrasonically compacted:	0.14-1.5 mm^2
Conductor cross section AWG/kcmil:	26-16
Conductor cross section flexible with ferrule without plastic sleeve (DIN 46228-1):	0.25-1.5 mm^2
Conductor cross section flexible with ferrule with plastic sleeve (DIN 46228-4):	0.25-1 mm^2 (reason for reduction d2 of the ferrule)



d2 = max. 3.5 mm

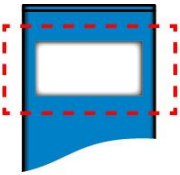
Phoenix connector capacity:

Stripping length/sleeve length:	10 mm
Mating direction:	parallel to the conductor axis or circuit board
Conductor cross section rigid:	0.2-1.5 mm^2
Conductor cross section flexible:	0.2-1.5 mm^2
Conductor cross section strands ultrasonically compacted:	0.2-1.5 mm^2
Conductor cross section AWG/kcmil:	24-16
Conductor cross section flexible with ferrule without plastic sleeve:	0.25-1.5 mm^2
Conductor cross section flexible with ferrule with plastic sleeve:	0.25-0.75 mm^2 (reason for reduction d2 of the ferrule)



d2 = max. 2.8 mm

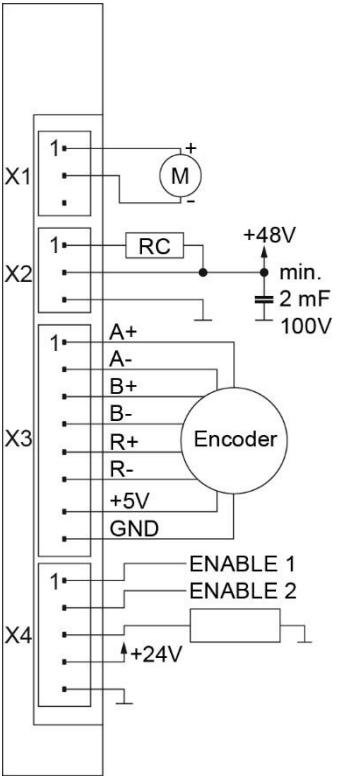
5.3 Label Field



Manufacturer	Weidmüller
Type	MF 10/5 CABUR MC NE WS
Article number Weidmüller	1854510000
Compatible printer	Weidmüller
Type	Printjet Advanced 230V
Article number Weidmüller	1324380000

6 Wiring

6.1 Wiring Example



6.2 Note

- The DIN rail must have an adequate connection to mass.
- To wire the incremental encoder, a shielded cable is required. With an RS422 encoder, the use of shielded, twisted pair cables is recommended. The shield must be placed in front of the module as close as possible.
- For the motor wiring, a shielded cable is required. The shield must be placed as close as possible to the module.
- The shielding must be connected to a shielding bus.

The ground bus should be connected to the control cabinet when possible!

The maximum length of the encoder and motor cables is 30 m.

CAUTION

The S-DIAS module CANNOT be connected/disconnected while voltage is applied!

Le module S-DIAS NE PEUT PAS être connecté/déconnecté lorsque la tension est appliquée !

7 Additional Safety Information

The Safety function “STO” is an integrated component of the DC motor output stage. It meets all necessary requirements for safe operation in SIL 3 according to EN 62061 and in compliance with PL e. Cat. 4 in accordance with EN ISO 13849-1 (not EG type tested).

CAUTION

The instructions contained in this document must be followed.

The SR 011 can only be powered by supplies that meet the requirements for SELV or PELV in compliance with EN 60204.

For error-free operation, proper transport and storage are essential. See chapter 9.

Installation, mounting, programming, initial start-up, operation, maintenance and decommissioning can only be performed by qualified personnel.

Qualified personnel in this context are people, who have completed training or have trained under supervision of qualified personnel and have been authorized to operate and maintain safety-related equipment, systems and facilities in compliance with the strict guidelines and standards of safety technology. The applicable environmental conditions must be maintained.

Les instructions de cette documentation doivent être respectées.
Les composants de sécurité ne doivent être alimentés que par des alimentations conformes aux exigences PELV selon la norme EN60204. Un transport et un stockage approprié sont essentiels au bon fonctionnement.

L'installation, le montage, la programmation, la mise en service, l'exploitation, la maintenance et la mise hors service des modules de sécurité **ne doivent être effectués que par du personnel qualifié**.

En ce sens, les **personnes qualifiées** sont des personnes ayant acquis la formation respective ou étant formées par un spécialiste pour superviser des dispositifs, systèmes et systèmes de sécurité conformément aux directives et normes de sécurité applicables. Les conditions environnementales applicables doivent être respectées.

For your own safety and that of others, the safety modules should be used for their designated purpose only.

Correct EMC installation is also included under designated use.

Utilisez les modules de sécurité pour votre sécurité et celle des autres uniquement d'une façon appropriée.

Une utilisation appropriée inclut également une installation conforme à la compatibilité électromagnétique.

Non-designated use consists of:

- any changes made to the module or the use of damaged modules.
- use of the module inconsistent with the technical margins described in this manual or the speciation's defined in the technical data (see chapter 3).

L'utilisation abusive comprend entre autres:

- les modifications quelconques apportées aux modules de sécurité.
- utilisation du module incompatible avec les marges techniques décrites dans ce manuel ou les espèces définies dans les données techniques (voir chapitre 3).

DANGER

Failure to follow the above safety measures can lead to severe injuries.

Le non-respect des mesures de sécurité ci-dessus peut entraîner des blessures graves.

- Only trained personnel are authorized to install the "safe restart lock" STO (Safe Torque off) and set the parameters.
- All control devices (switches, relays, PLC, etc.) and the control closet must meet the requirements for EN 13849 This consists of:
  - Door switches, etc. with at least IP54 protection.
  - Control classes with at least IP54 protection.
- The proper cables and end-sleeves must be used
- All cables that affect safety (e.g. control cables for the ENABLE 1 and ENABLE 2 inputs) must be laid in a cable duct outside of the control cabinet. Short or crossed circuits in the signal lines must be avoided! See EN ISO 13849
- If external forces influence axes that are used with the STO safety function (e.g. hanging load), additional measures must be taken (such as an electromagnetic double-surface spring brake, instead of a permanent magnet brake).

- Seul un personnel qualifié est autorisé à installer le "blocage de redémarrage sûr" STO (Safe Torque off) et à régler les parameters.
- Tous les appareils de commande (interrupteurs, relais, API, etc.) et l'armoire de commande doivent satisfaire aux exigences de la norme EN 13849:

  - Interrupteurs de porte, etc. avec au moins un in dice de protection IP54.
  - Classes de contrôle avec au moins un indice de protection IP54.

- Les câbles et les embouts appropriés doivent être utilisés.
- Tous les câbles affectant la sécurité (par ex. les câbles de commande pour les entrées ENABLE 1 et ENABLE 2) doivent être posés dans un conduit de câbles de raccordement à l'extérieur de l'armoire électrique. Eviter les courts-circuits ou les courts-circuits croisés dans les lignes de signalisation ! Voir EN ISO 13849

- Si des forces externes influencent les axes utilisés avec la fonction de sécurité STO (par ex. charge suspendue), des mesures supplémentaires doivent être prises (par ex. un frein à ressort électromagnétique à double surface au lieu d'un frein à aimant permanent).

CAUTION

The main power supply for the servo amplifier must be disconnected using the main switch for the following instances:

- Cleaning, maintenance or repairs
- Extended still-stand periods

L'alimentation principale du variateur doit être débranchée à l'aide de l'interrupteur principal dans les cas suivants :

- Nettoyage, entretien ou réparation
- Périodes d'immobilisation prolongées

7.1 STO

The stepper motor output stage supports the safety functions STO (Safe Torque Off) and meets the requirements for Category 4 Performance Level "e" according to EN ISO 13849-1 and SIL3 according to EN 62061 (not EG type tested).

For his purpose, the output stage has two safe inputs ENABLE 1 and ENABLE 2.

7.2 Function

The safety functions in the stepper motor output stage are controlled over two digital inputs.

The following table shows the status that the safe inputs ENABLE 1 and ENABLE 2 must assume to enable normal operation or trigger the safety function.

Input Status		**Description**
ENABLE 1	**ENABLE 2**	
Open	Open	**Safe status of the drive system**
Open	Low	
Low	Open	
Low	Low	
High	High	**Drive system ready**

If the ENABLE 1 and ENABLE 2 are changed from any status to the "Drive Ready" status, the stepper motor output stage is not enabled immediately. In order to set the system to “Drive system ready” status, a change from “Low - Low” to “High - High” must occur.

7.3 Function Test

WARNING

The safety function test is required to ensure correct operation. The entire safety circuit must be tested for full functionality.

Tests must be performed at the following times:

- After installation
- In regular intervals, or at least once a year.

If the function test results in an invalid machine status, the error must be found and corrected before the safety function is retested. If the error reoccurs during the function test, the machine can no longer be operated.

Le test de fonctionnement de sécurité est nécessaire pour garantir un fonctionnement correct. L'ensemble du circuit de sécurité doit être testé pour s'assurer de son bon fonctionnement.

Les essais doivent être effectués aux moments suivants :

- Après l'installation
- A intervalles réguliers, ou au moins une fois par an.

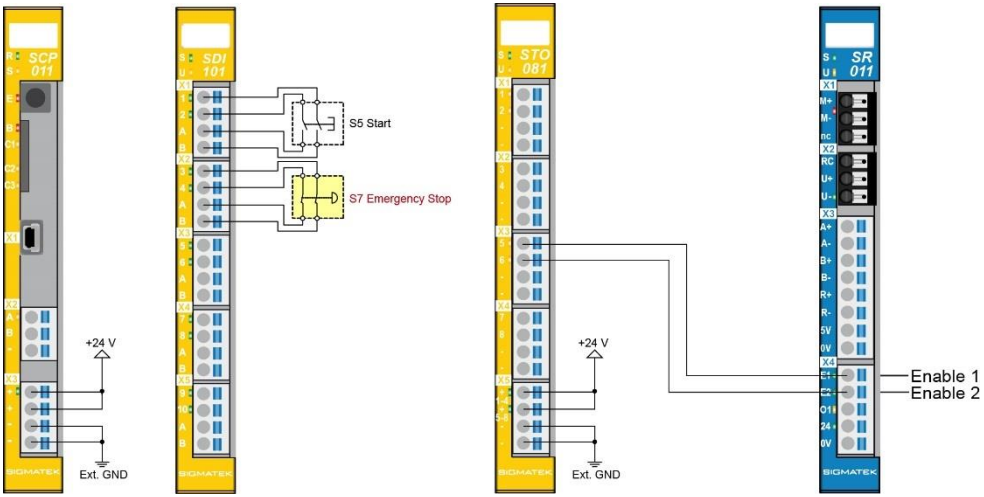
Si le test de fonctionnement aboutit à un état machine non valide, l'erreur doit être détectée et corrigée avant que la fonction de sécurité ne soit de nouveau testée. Si l'erreur se reproduit pendant le test de fonctionnement, la machine ne peut plus être utilisée.

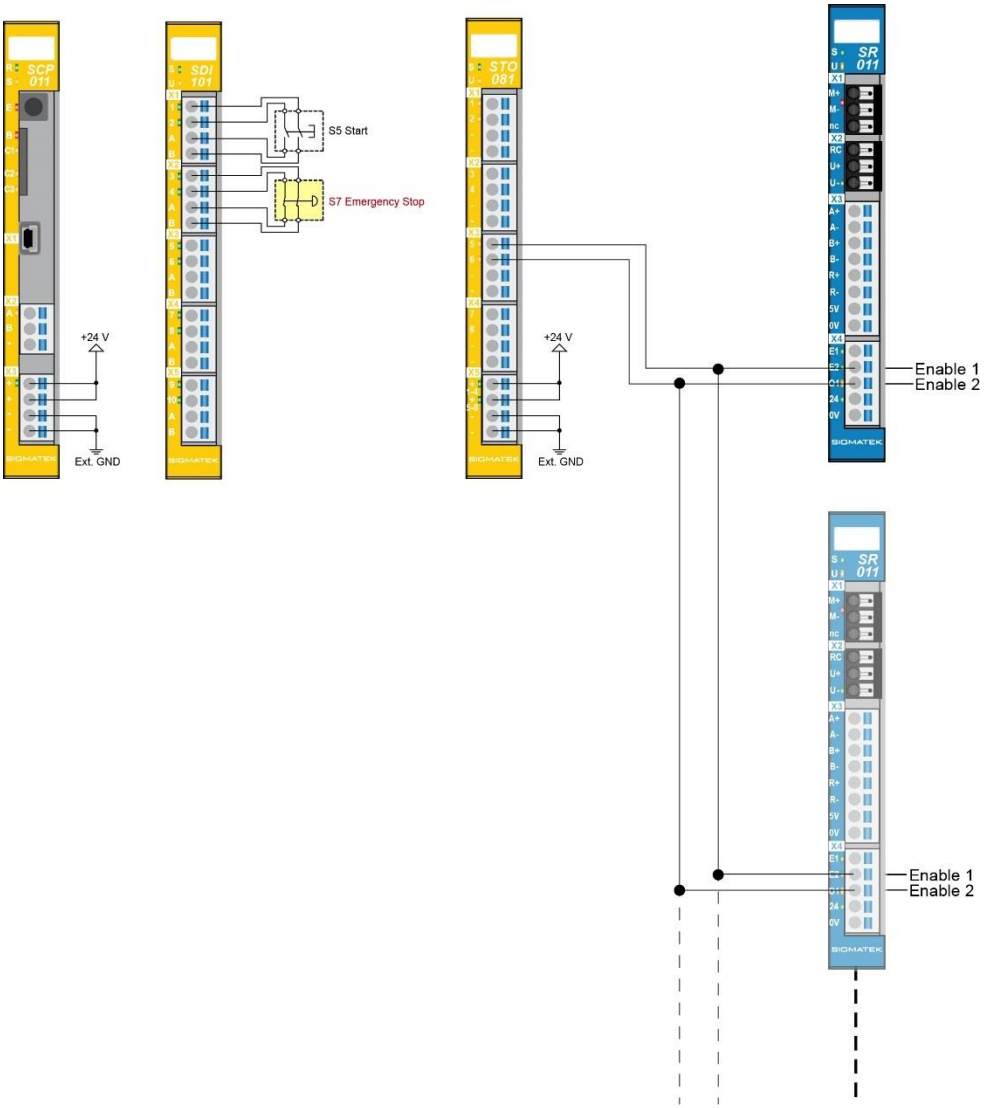
8 Wiring Examples

In the following sub chapters, wiring examples are provided. It must be ensured that all constructive measures etc. are complied with and applied in order to fulfil the requirements of the category used.

8.1 Performance Level e, Category 4 or SIL 3 – Safety-SPS

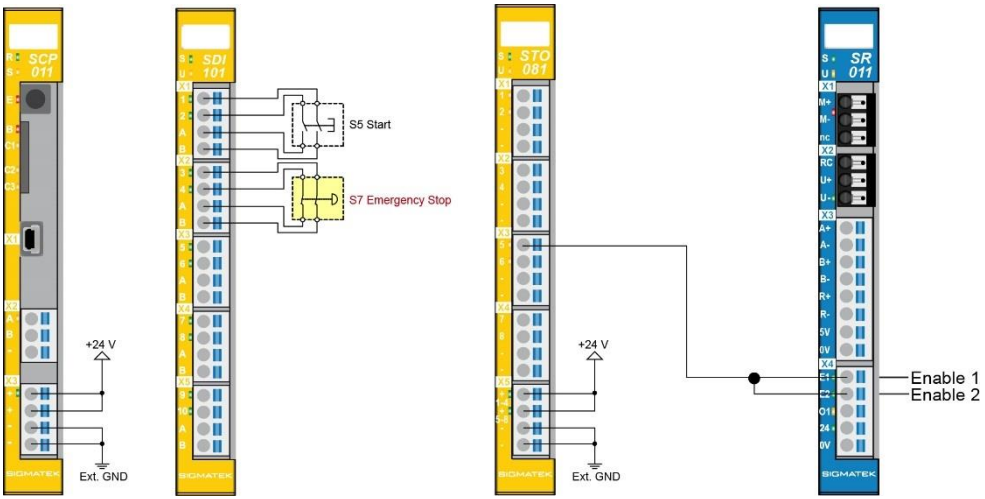
To meet the requirements of category 4, performance Level "e" for EN ISO 13849-1 and SIL 3 according to EN 62061, two error-proof output of a Safety PLC must be used. Cross-circuit detection between the two lines via the output tests of the STO 081 is hereby possible.

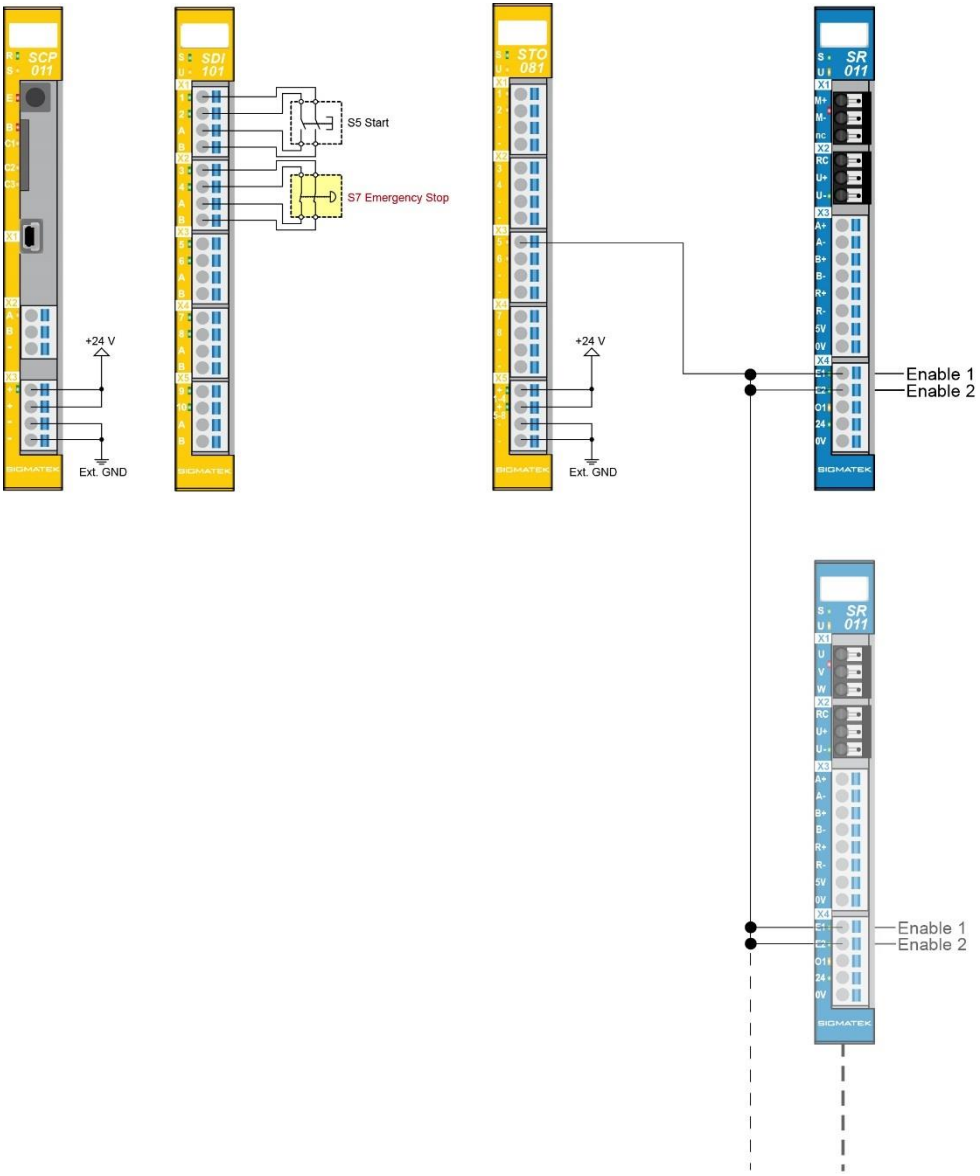



SCP 011
SDI 101
S5 Start
S7 Emergency Stop
+24 V
Ext. GND
STO 081
+24 V
Ext. GND
SR 011
Enable 1
Enable 2
SR 011
Enable 1
Enable 2

8.2 Performance Level e, Category 3 or SIL 3 – Safety-SPS

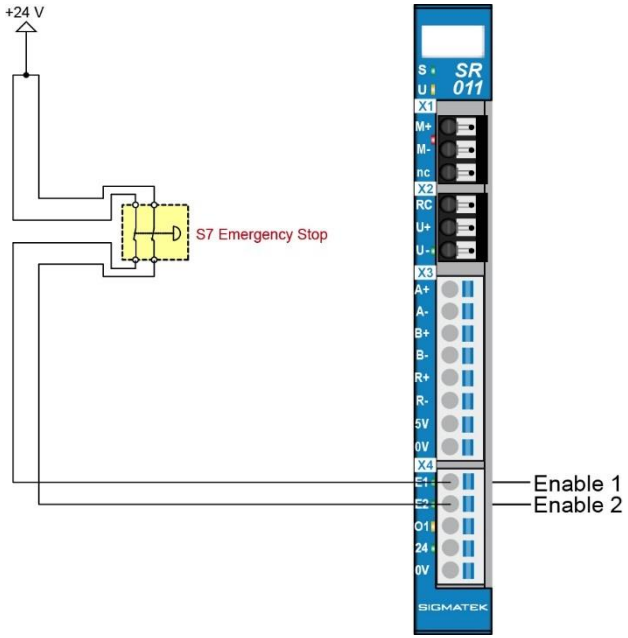
To meet the requirements of safety category 3, performance level "e" for EN ISO 13849-1 and SIL 3 according to EN 62061, an error-proof output of a safety PLC must be used. The reason for category 3 here, is because cross-circuit detection between the two lines is not possible.

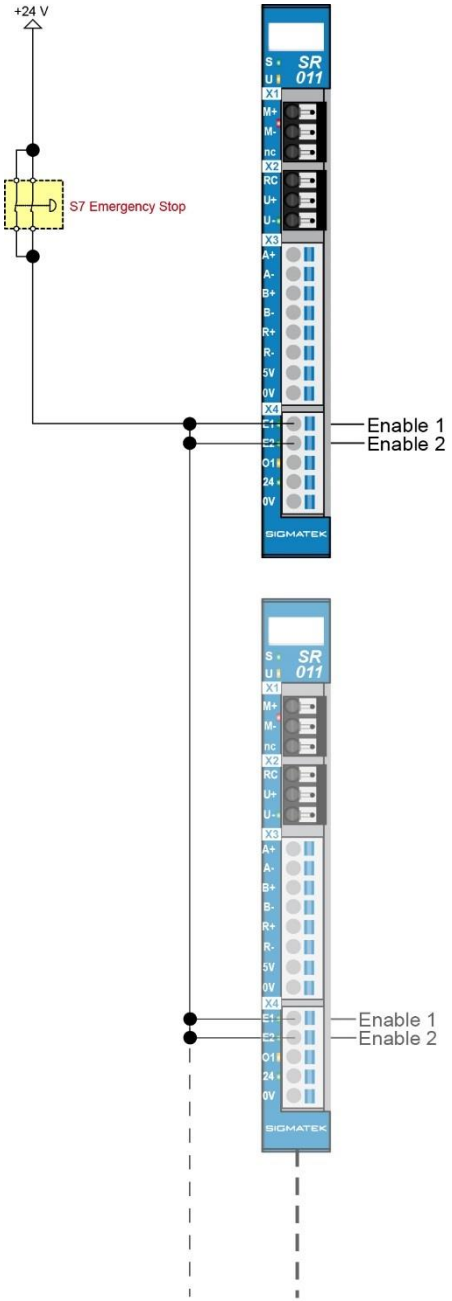



SCP 011
SDI 101
STC 081
SR 011
S5 Start
S7 Emergency Stop
+24 V
Ext. GND
+24 V
Ext. GND
Enable 1
Enable 2
SR 011
Enable 1
Enable 2

8.3 Performance Level e, Category 4 or SIL 3 – Conventional

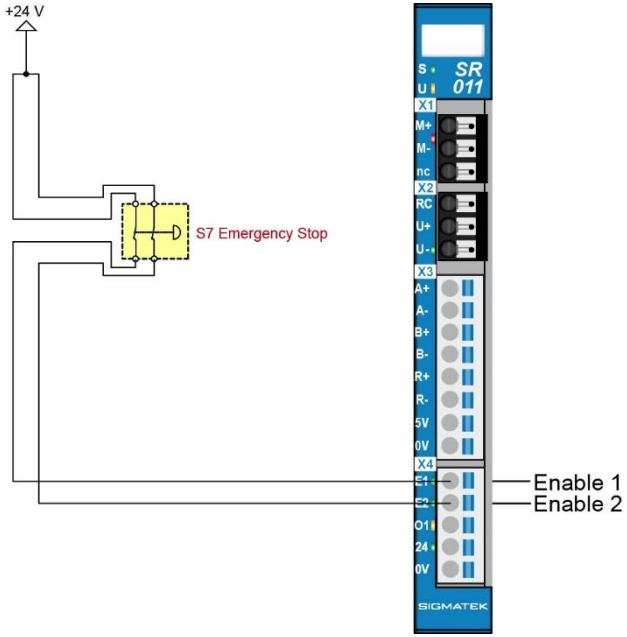
To meet the requirements of safety category 4, performance level "e" for EN ISO 13849-1 and SIL 3 according to EN 62061, the placement of the lines must comply with EN ISO 13849-2, table D.4 (separate placement, prohibiting of error via short circuits between wires) as cross-circuit detection is not possible.




+24 V
S7 Emergency Stop
SR 011
X1
M+
M-
nc
X2
RC
U+
U-
X3
A+
A-
B+
B-
R+
R-
5V
0V
X4
E1
E2
O1
24
0V
SIGMATEK
Enable 1
Enable 2
SR 011
X1
M+
M-
nc
X2
RC
U+
U-
X3
A+
A-
B+
B-
R+
R-
5V
0V
X4
E1
E2
O1
24
0V
SIGMATEK
Enable 1
Enable 2

8.4 Performance Level e, Category 2 or SIL 2 – Safety-SPS

This involves 1-channel wiring, whereby the Enable inputs are tested separately. No cross-circuit detection is possible.



9 Transport/Storage

This device contains sensitive electronics. During transport and storage, high mechanical stress must therefore be avoided.

For storage and transport, the same values for humidity and vibration as for operation must be maintained!

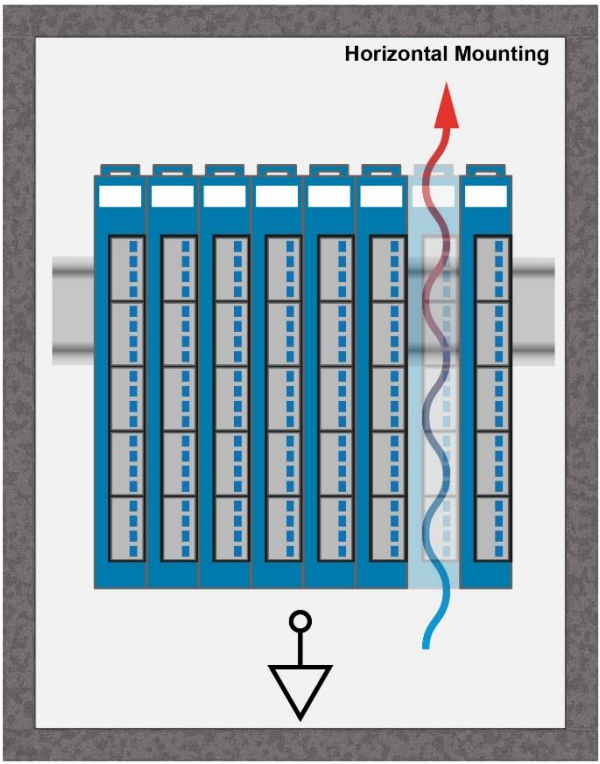
CAUTION

During transport, temperature and humidity fluctuations may occur. Ensure that no moisture condenses in or on the device.

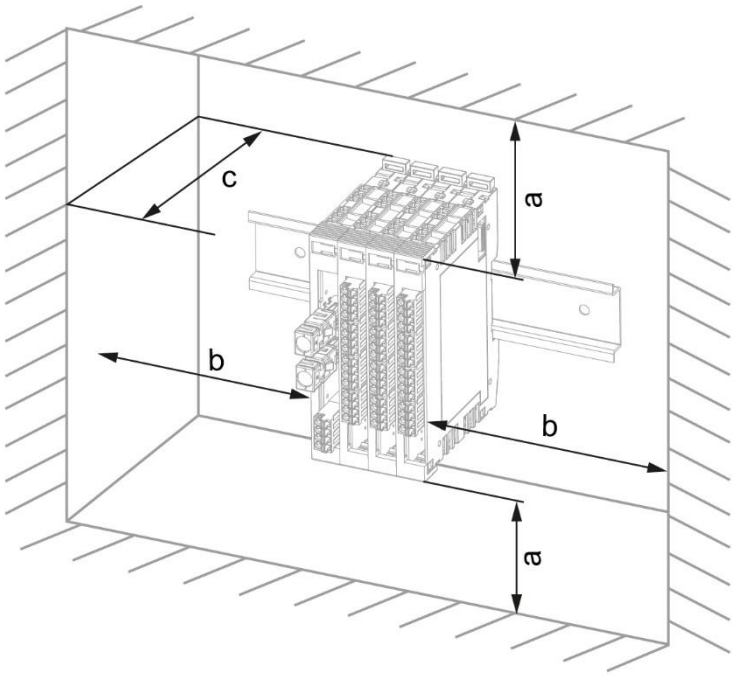
Pendant le transport, des fluctuations de température et d'humidité peuvent survenir. Veillez à ce qu'il n'y ait pas de condensation d'humidité dans ou sur l'appareil.

10 Mounting

The S-DIAS modules are designed for installation into the control cabinet. To mount the modules, a DIN-rail is required. The DIN rail must establish a conductive connection with the back wall of the control cabinet. The individual S-DIAS modules are mounted on the DIN rail as a block and secured with latches. The modules must be mounted horizontally (module label up) with sufficient clearance between the ventilation slots of the S-DIAS module blocks and nearby components and/or the control cabinet wall. This is necessary for optimal cooling and air circulation, so that proper function up to the maximum operating temperature is ensured.



Recommended minimum distances of the S-DIAS modules to the surrounding components or control cabinet wall:



a	b	c
30 mm (1.18″)	**30 mm** (1.18″)	**100 mm** (3.94″)

a, b, c … distances in mm (inches)

11 Maintenance

WARNING

During maintenance as well as servicing, observe the safety instructions from chapter 2.

Lors de l'entretien et de la maintenance, respectez les consignes de sécurité du chapitre 2.

11.1 Maintenance

This product was constructed for low-maintenance operation.

11.2 Repair

When sent for repair, the panel should be transported in the original packaging if possible. Otherwise, packaging should be selected that sufficiently protects the product from external mechanical influences. Such as cardboard filled with air cushioning.

In the event of a defect/repair, send the panel with a detailed error description to the address listed at the beginning of this document.

12 Disposal

When disposing of the panel, the national electronic scrap regulation must be observed.

The panel cannot be discarded with domestic waste.

Documentation Changes

Change date	Affected page(s)	Chapter	Note