

SIB 061

Safety Input Box

Instruction Manual

Publisher: SIGMATEK GmbH & Co KG
A-5112 Lamprechtshausen
Tel.: +43/6274/4321
Fax: +43/6274/4321-18
Email: office@sigmatek.at
WWW.SIGMATEK-AUTOMATION.COM

Copyright © 2015
SIGMATEK GmbH & Co KG

Translation of the Original Instruction

All rights reserved. No part of this work may be reproduced, edited using an electronic system, duplicated or distributed in any form (print, photocopy, microfilm or in any other process) without the express permission.

We reserve the right to make changes in the content without notice. The SIGMATEK GmbH & Co KG is not responsible for technical or printing errors in the handbook and assumes no responsibility for damages that occur through use of this handbook.

Safety Input Box

SIB 061

The Safety Input Box SIB 061 has the Safety integrity level SIL3 (EN IEC 62061) or Performance level e (PL e) (EN ISO 13849).

The SIB 061 has:

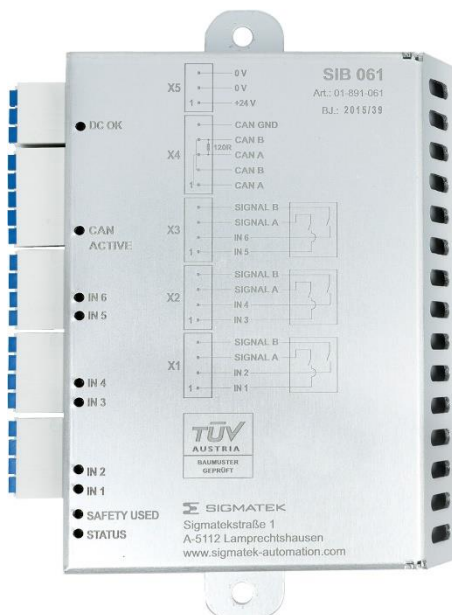
- 6 Safe inputs (EN 61131-2; EN IEC 62061 und EN ISO 13849)
- Double clock output signal (short circuit proof)

The Safety inputs are used for reading 6 actuator signals (Emergency Stop, confirmation button etc.).

To test inputs and detect crossed circuits (e.g. Emergency Stop), the SIB 061 has 2 signal outputs, TA and TB.

To use the Safety digital input module in an application, the SIB 061 also requires a Safety CPU module that regulates the synchronized communication with the Safety modules using safe bus telegrams. This also includes

- Processing the safe application and
- the distribution of configuration data to remote Safety modules.



Contents

- 1 Introduction 5**
 - 1.1 Target Group/Purpose of this Operating Manual 5**
 - 1.2 Important Reference Documentation 5**
 - 1.3 Contents of Delivery 5**
- 2 Basic Safety Guidelines 6**
 - 2.1 Symbols Used 6**
 - 2.2 Disclaimer 8**
 - 2.3 General Safety Directives 9**
 - 2.4 Designated Use 11**
 - 2.5 Software/Training 12**
- 3 IT Security13**
- 4 Standards and Directives.....14**
 - 4.1 Residual Risks 14**
 - 4.2 Safety of the Machine or Equipment 14**
 - 4.3 Directives..... 14**
 - 4.3.1 Functional Safety Standards..... 15**
 - 4.3.2 EU Conformity Declaration 15**
 - 4.4 Safety-Relevant Parameters 16**
 - 4.5 Compatibility 18**
- 5 Type Plate.....19**

6	Technical Data	20
6.1	Input Specifications	20
6.2	Cross-Circuit Detection Signal Outputs Specifications	21
6.3	Electrical Requirements	22
6.4	Input Circuit	24
6.5	CAN Bus	24
6.6	Miscellaneous	24
6.7	Environmental Conditions	25
7	Mechanical Dimensions	26
8	Connector Layout	27
8.1	Status LEDs	28
8.2	Applicable Connectors	28
9	Wiring	29
9.1	Wiring Example	29
9.2	Connection Diagram Wiring	30
9.3	Note	31
10	Assembly/Installation	32
10.1	Check Contents of Delivery	32
10.2	Mounting	32
11	Transport/Storage	33
12	Storage	33

13 Maintenance34

13.1 Service 34

13.2 Repair..... 34

14 Disposal.....34

1 Introduction

1.1 Target Group/Purpose of this Operating Manual

This operating manual contains all information required for the operation of the product.

This operating manual is intended for:

- Project planners
- Technicians
- 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.sigmathek-automation.com.

Our support team is happily available to answer your questions.
Please see our website for our hotline number and business hours.

1.2 Important Reference Documentation

- Safety System Handbook

This and additional documents can be downloaded from our website or obtained through support.

1.3 Contents of Delivery

1x SIB 061

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



Danger indicates that death or serious injury **will occur**, if the specified measures are not taken.

⇒ To avoid death or serious injuries, observe all guidelines.

Danger indique une situation dangereuse qui, faute de prendre les mesures adéquates, **entraînera** des blessures graves, voire mortelles.

⇒ Respectez toutes les consignes pour éviter des blessures graves, voire mortelles.

WARNING



Warning indicates that death or serious injury **can** occur, if the specified measures are not taken.

⇒ To avoid death or serious injuries, observe all guidelines.

Avertissement d'une situation dangereuse qui, faute de prendre les mesures adéquates, **entraînera** des blessures graves, voire mortelles.

⇒ Respectez toutes les consignes pour éviter des blessures graves, voire mortelles.

CAUTION



Caution indicates that moderate to slight injury **can** occur, if the specified measures are not taken.

⇒ To avoid moderate to slight injuries, observe all guidelines.

Attention indique une situation dangereuse qui, faute de prendre les mesures adéquates, **peut** entraîner des blessures assez graves ou légères.

⇒ Respectez toutes les consignes pour éviter des blessures graves, voire mortelles.

CAUTION

Danger for ESD-sensitive components.

Les signes de danger pour les composants sensibles aux décharges électrostatiques.

INFORMATION**Information**

- ⇒ Provides important information on the product, handling or relevant sections of the documentation, which require attention.

2.2 Disclaimer

INFORMATION



The contents of this operating manual were prepared with the greatest care. However, deviations cannot be ruled out. This operating manual 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 operating manual can be found on our website. If necessary, contact our support.

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

Please thoroughly read the corresponding documents and this operating manual before handling a product.

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

2.3 General Safety Directives

The Safety Directives in the other sections of this operating manual must be observed. These instructions are visually emphasized by symbols.



INFORMATION

According to EU Directives, the operating manual is a component of a product.

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

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

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

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!

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!

If the device does not function as intended or has damage that could pose a danger, it must be replaced!

En cas de fonctionnement non conforme ou de dommages pouvant entraîner des risques, l'appareil doit être remplacé!

The module complies with EN 61131-2.

In combination with a facility, the system integrator must comply with EN 60204-1 standards.

For your own safety and that of others, compliance with the environmental conditions is essential.

Le module est conforme à la norme EN 61131-2.

En combinaison avec une équipement, l'intégrateur de système doit respecter la norme EN 60204-1.

Pour votre propre sécurité et celle des autres, le respect des conditions environnementales est essentiel.

2.4 Designated Use

The Safety functions implemented in the product are designed for use with safety applications in a SIGMATEK control and meet the required conditions for safe operation according to SIL 3, HFT 1 n compliance with EN IEC 62061 and according to PL e, Kat. 4 in compliance with EN ISO 13849-1.

CAUTION



The instructions contained in this operating manual must be followed.

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

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 directives and standards of safety technology (Functional Safety).

Les instructions contenues dans ce manuel technique doivent être suivies.

Pour un fonctionnement sans erreur, le transport et le stockage appropriés sont essentiels.

L'installation, le montage, la programmation, la mise en service initiale, l'exploitation, la maintenance et la mise hors service ne peuvent être effectués que par une personne qualifiée.

Dans ce contexte, on entend par personnel qualifié les personnes qui ont suivi une formation ou qui ont été formées sous la supervision d'un personnel qualifié et qui ont été autorisées à utiliser et à entretenir l'équipement, les systèmes et les installations de sécurité conformément aux directives et aux normes strictes de la technique de sécurité (Sécurité fonctionnelle).

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

Correct EMC installation is also included under designated use.

Pour votre propre sécurité et celle des autres, le produit ne doit être utilisé qu'à des fins prévues.

Une installation CEM correcte est également incluse dans l'utilisation prévue.

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 operating manual or the specifications defined in the technical data.

L'utilisation non désignée consiste en:

- toute modification apportée au module ou l'utilisation des modules endommagés.
 - utilisation du module non conforme aux marges techniques décrites dans ce manuel ou aux spécifications définies dans les données techniques.
-

2.5 Software/Training

The application is created with the software LASAL CLASS 2 and LASAL SCREEN Editor, the Safety application is created using the SAFETYDesigner. Basic information on Safety (Functional Safety) can be found in the Safety System Handbook.

Training for the LASAL development environment, with which the product can be configured, is provided. Information on our training schedule can be found on our website.

3 IT Security

S-DIAS safety modules were developed for integration into a network protected against unauthorized access. For example, the following dangers can affect the network:

- Unauthorized access
- Data manipulation
- and many other IT security violations

It is the responsibility of the operator to protect the safe connection between S-DIAS modules against unauthorized access. The following measures, for example, are suitable for this:

- Firewalls
- Password-protected user accounts
- Data encryption
- and much more

4 Standards and Directives

4.1 Residual Risks

CAUTION



The following residual risks for the product must be included in the system integrator's risk assessment:

- Release of non-environmentally safe substances, emissions and unusual temperatures
- Possible effects of information technology devices

Les risques résiduels suivants pour le produit doivent être inclus dans l'évaluation des risques de l'intégrateur de système:

- Libération de substances non respectueuses de l'environnement, émissions et températures inhabituelles
- Effets possibles des dispositifs de technologie de l'information

4.2 Safety of the Machine or Equipment

INFORMATION



Observe all on-site rules and regulations for accident prevention and occupational safety.

4.3 Directives

The product was constructed in compliance with the following European Union directives and tested for conformity.

4.3.1 Functional Safety Standards

EN IEC 62061 - Safety of machinery - Functional safety of safety-related control systems
EN ISO 13849-1 - Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design
EN ISO 13849-2 - Safety of machinery - Safety-related parts of control systems - Part 2: Validation

4.3.2 EU Conformity Declaration



EU Declaration of Conformity

The product SIB 061 conforms to the following European directives:

- **2006/42/EG** Machine Directive
- **2014/30/EU** Electromagnetic Compatibility (EMC Directive)
- **2011/65/EU** “Restricted use of certain hazardous substances in electrical and electronic equipment” (RoHS Directive)

The EU Conformity Declarations are provided on the SIGMATEK website.
They can be found in the download area of the respective product.

4.4 Safety-Relevant Parameters

Input Module	Safety Parameters	Safety Level
SIB 061 up to 60 °C T_{amb} including SCP 011/SCP 111 CPU Module up to 55 °C ambient temperature	1-channel application: $PFH = 1.50E-9$ (1/h) $MTTF_D = 713$ years $DC = 98 \%$ $SFF = 99 \%$	$PL\ d/Cat.\ 2$ $SIL\ 3$
	2-channel application: $PFH = 1.80E-9$ (1/h) $MTTF_D = 724$ years $DC = 99 \%$ $SFF = 99 \%$	$PL\ e/Cat.\ 4$ $SIL\ 3$

Input Module	Safety Parameters	Safety Level
SIB 061 up to 60 °C T_{amb} including SCP 011/SCP 111 CPU Module up to 60 °C ambient temperature	1-channel application: $PFH = 1.50E-9$ (1/h) $MTTF_D = 670$ years $DC = 98 \%$ $SFF = 99 \%$	$PL\ d/Cat.\ 2$ $SIL\ 3$
	2-channel application: $PFH = 1.80E-9$ (1/h) $MTTF_D = 679$ years $DC = 99 \%$ $SFF = 99 \%$	$PL\ e/Cat.\ 4$ $SIL\ 3$

Input Module	Safety Parameters	Safety Level
SIB 061 up to 60 °C T_{amb} including SCP 211/SCP 111-S CPU Module up to 60 °C ambient temperature	1-channel application: PFH = 3.20E-9 (1/h) MTTF _D = 536 years DC = 98 % SFF = 99 %	PL d/Cat. 2 SIL 3
	2-channel application: PFH = 3.50E-9 (1/h) MTTF _D = 542 years DC = 99 % SFF = 99 %	PL e/Cat. 4 SIL 3

Reason for SIL 3 with single-channel use:

Because the high SFF value is greater than 99 %, SIL 3 can be accepted with a hardware tolerance (HFT) of 0 according to EN IEC 62061.

4.5 Compatibility

INFORMATION



Compatibility

In regard to compatibility with the S-DIAS Safety component, section "Compatibility with S-DIAS Safety Components" in the system handbook is referenced.

Test Signals for Cross Circuit Detection

The module sends pulses in cyclic time intervals to detect a crossed circuit in the outputs. When selecting the actuators, keep in mind that these pulses do not switch the actuators or trigger any diagnostic messages. The pulse signals cannot be deactivated or configured.

Contact Short Detection

It is important to keep in mind that the cross-circuit detection only functions correctly when it is configured and wired correctly. This applies equally to both in- and outputs.

It must also be considered that the cross-circuit detection only works between adjacent inputs. Cross circuits between adjacent inputs must be prevented via constructive measures (e.g. separate wiring, insulated cables).

Application

The SIB 061 can only be operated with the Safety modules of the SCP series.

5 Type Plate



HW: X.XX
SW: XX.XX.XXX
Safety Version: SXX.XX.XX

SIGMA TEK GMBH & CO KG
Sigmatekstrasse 1 A-5112 LAMPRECHTSHAUSEN

Serial No.

Article Number

Product Name Short Name

Exemplary nameplate (symbol image)



HW: 1.00
SW: 01.00.000
Safety Version: S01.00.00

SIGMA TEK GMBH & CO KG
Sigmatekstrasse 1 A-5112 LAMPRECHTSHAUSEN

12345678

12-246-133-3

Handbediengerät Wireless HGW 1033-3

HW: Hardware version
SW: Software version

6 Technical Data

6.1 Input Specifications

The inputs are Type 1 according to EN 61131-2

Number	6	
Input voltage	+24 V DC	
Input voltage range	minimum +18 V	maximum +30 V
Signal level	low: $\leq +5\text{ V}$	high: $\geq +15\text{ V}$
Switching threshold	typically +13 V	
Input current	3 mA at +24 V	
Input delay	0.5 ms	

INFORMATION



¹⁾ With increased ambient temperature $>55\text{ }^{\circ}\text{C}$ the maximum permissible supply voltage is reduced from 30 V to 28.8 V.

6.2 Cross-Circuit Detection Signal Outputs Specifications

Number	3x signal A	3x signal B
Rated output voltage	+24 V DC	
Output voltage range	minimum +18 V	maximum +30 V
Output current	100 mA at +24 V	
Miscellaneous	short-circuit proof	

INFORMATION



²⁾ With increased ambient temperature >55 °C the maximum permissible supply voltage is reduced from 30 V to 28.8 V.

The clock outputs A and B are generated once internally and are wired in parallel to the connectors. A direct cross-circuit of Clock A and/or B of a connector therefore results in cross-circuit detection in all channels.

When using the digital inputs with the clock outputs for cross-fault detection for long cable lengths, make sure that the cable capacitance from the clock output to the digital input does not exceed a value of 100 nF and that the cable resistance does not exceed a value of 250 Ω, so that the cross-fault detection does not detect a wiring error with proper wiring.

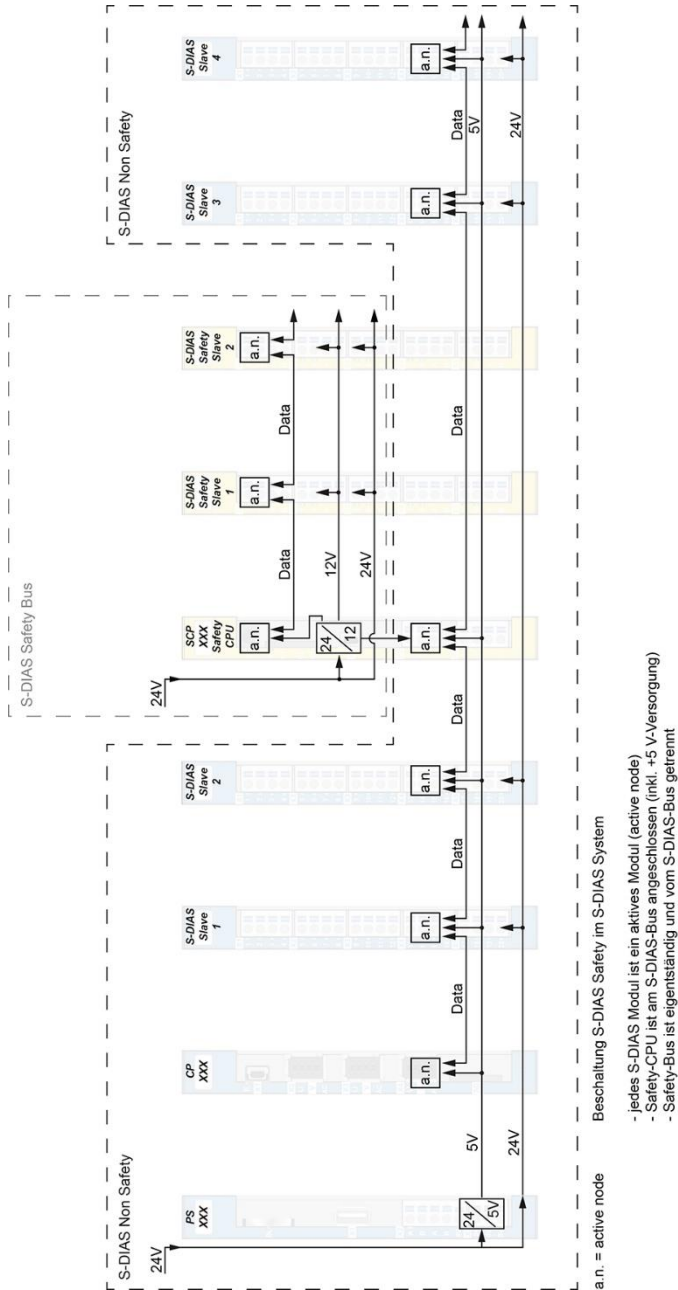
6.3 Electrical Requirements

Supply voltage	+24 V DC
Supply voltage (UL)	+24-30 V DC (Class 2)
Supply voltage range	+18-30 V DC
Current consumption (+24 V power supply, internal consumption)	typically 35 mA

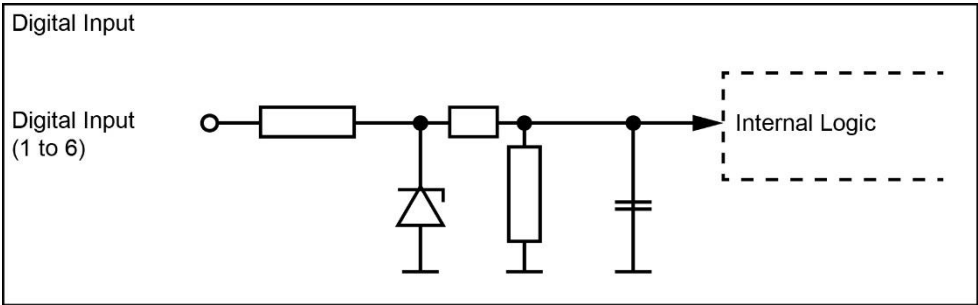
INFORMATION



A supply voltage fuse with sufficient voltage and current limiting must be provided!



6.4 Input Circuit



6.5 CAN Bus

Baud rate	500 kBit/s
Max. cable length	80 m
Terminating resistor	120 Ω internal

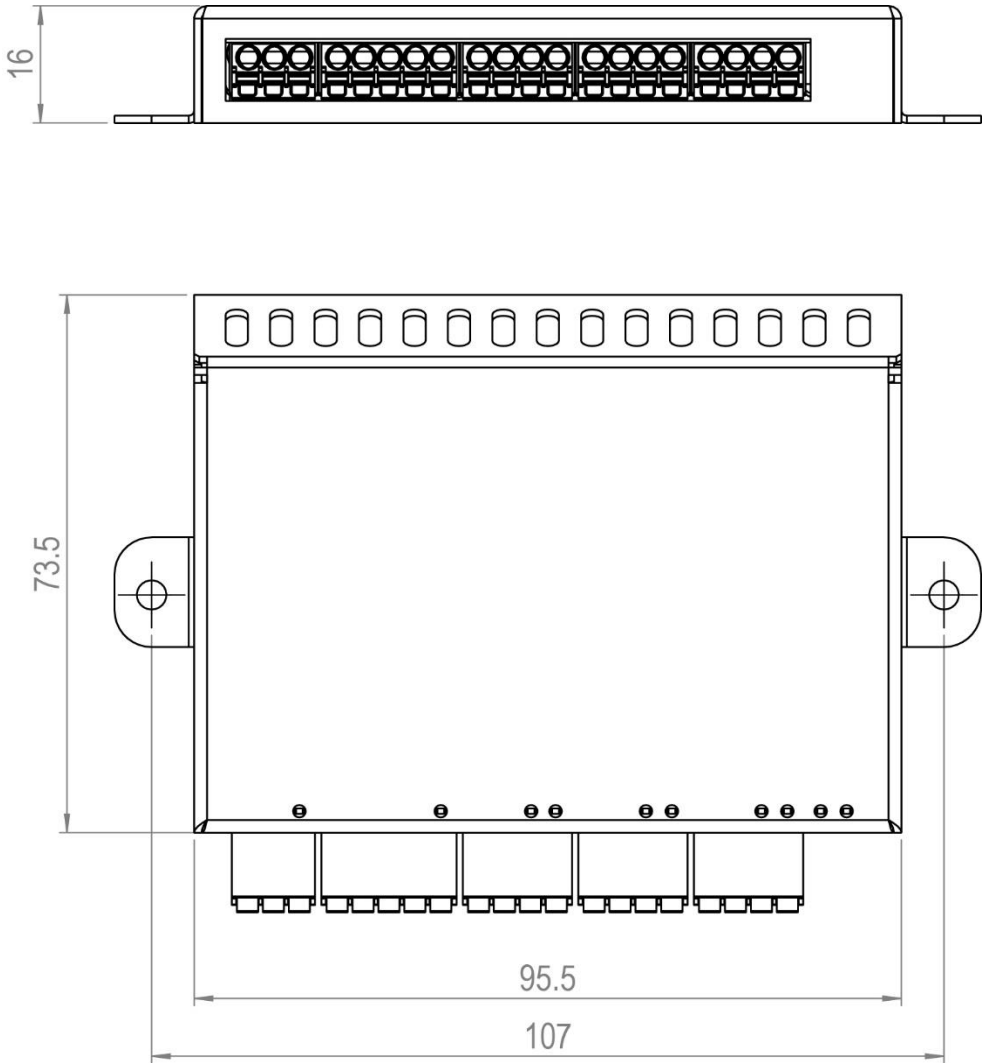
6.6 Miscellaneous

Article number	01-891-061
Standard	designed according to UL
Approvals	CE, TÜV Austria EG type-tested
Mission time	20 years

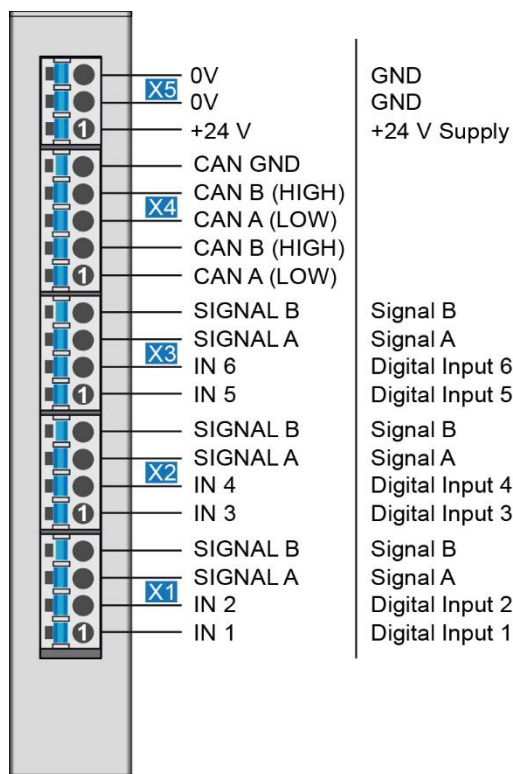
6.7 Environmental Conditions

Storage temperature	-20 ... +85 °C	
Environmental temperature	-10 ... +60 °C	
Humidity	0-95 %, non-condensing	
Installation altitude above sea level	0-2000 m without derating > 2000 m with derating of the maximum environmental temperature by 0.5 °C per 100 m	
Operating conditions	Pollution degree 2	
Noise emissions	≤ 70 dB	
EMC resistance	in accordance with EN 61000-6-7 (Generic standards - Immunity requirements for equipment intended to perform functions in safety-related systems (functional safety) at industrial locations) in accordance with EN 61000-6-2 (industrial area) (increased requirements in accordance with EN IEC 62061)	
EMC noise generation	in accordance with EN 61000-6-4 (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

7 Mechanical Dimensions



8 Connector Layout



INFORMATION



The CAN interface must be used exclusively with the SIGMATEK SCP XXX! The status of the Safety-related inputs is sent to the SCP XXX.

The GND supply (X5: Pin 3 and Pin 4) is internally bridged. Only one GND pin (pin 3 or pin 4) is required to power the module. The bridged connections may be used for further looping of the GND supply. However, it must be taken into account that a total current of 6 A per connection is not exceeded by the forward looping!

8.1 Status LEDs

DC OK	green	ON	supply voltage available
		OFF	no supply available
CAN ACTIVE	orange	ON	CAN connection made
		OFF	no CAN communication
IN 1-6 Input Status	green	ON	input ON
		OFF	input OFF
SAFETY USED	yellow	ON	module is used and no errors exist
		OFF	module is not used or not in operational mode
STATUS	green	ON	bus communication OK
		OFF	no supply available
		BLINKING (5 Hz)	no communication

8.2 Applicable Connectors

Connectors:

X1-X5: Connectors with spring terminals (included in delivery)

The spring terminals are suitable connecting ultrasonically compacted (ultrasonically welded) strands.

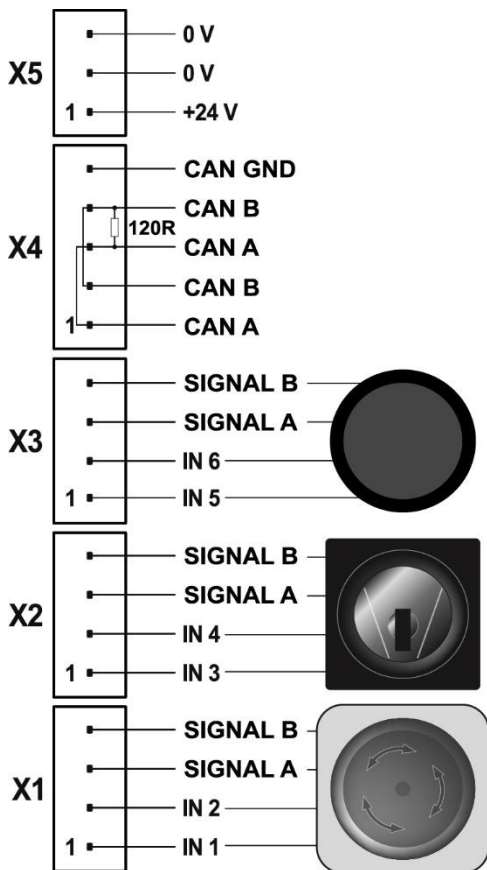
Connections:

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 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)



9 Wiring

9.1 Wiring Example



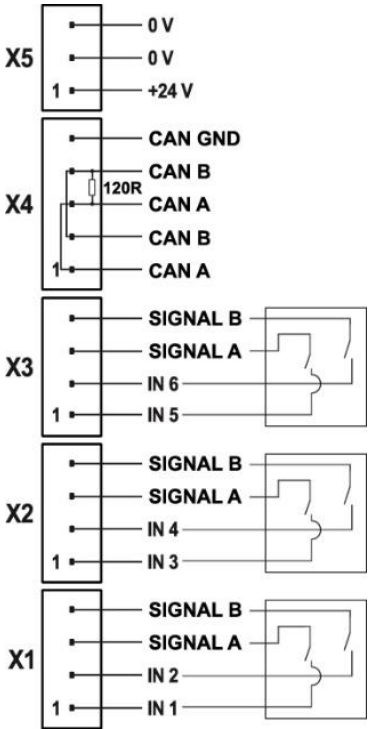
INFORMATION



The connections Signal A and Signal B can, as shown in the diagram, only be fed back to the inputs at the same connectors.

Signal A has to be connected to the odd inputs of the connector and signal B with the even ones (e.g. IN1 with signal A, IN2 with signal B).

9.2 Connection Diagram Wiring



9.3 Note

The input filters, which suppress noise signals, allow operation in harsh environmental conditions. A careful wiring method is also recommended to ensure error-free function.

The following installation guidelines should be observed:

- Avoid parallel connections between input lines and load-bearing circuits.
- Protective circuits for all relays (RC networks or free-wheeling diodes)
- Correct wiring to ground

INFORMATION



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

Wiring and mounting must be performed with no voltage applied!

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

10 Assembly/Installation

10.1 Check Contents of Delivery

Ensure that the contents of the delivery are complete and intact. See chapter Contents of Delivery.

INFORMATION

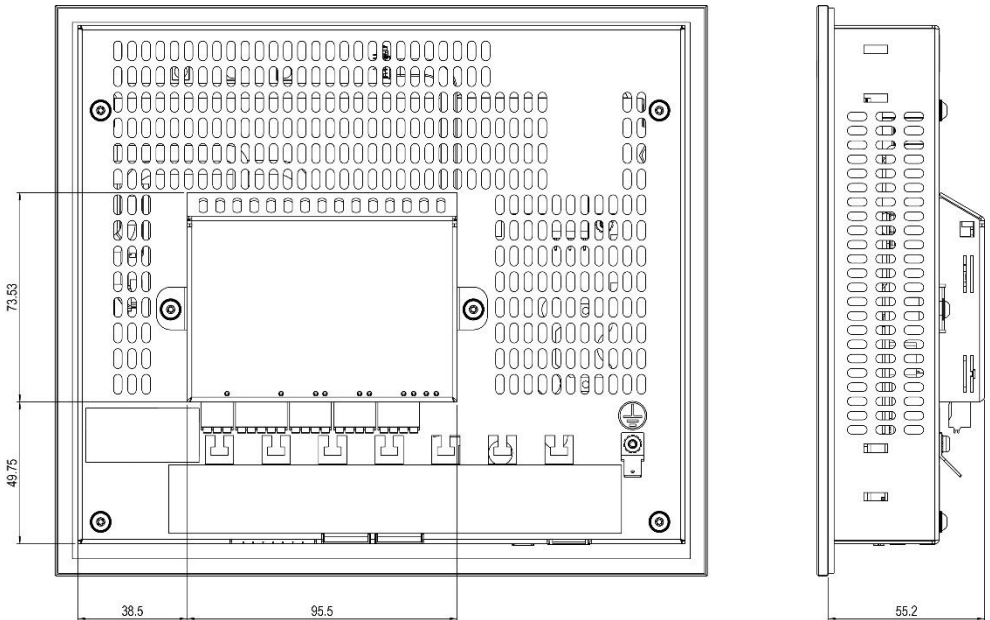


On receipt and before initial use, check the device for damage. If the device is damaged, contact our customer service and do not install the device in your system.

Damaged components can disrupt or damage the system.

10.2 Mounting

Mount using M3x6 screws on the housing of an ETT. Mount with ventilation slots upwards (see diagram)



11 Transport/Storage

INFORMATION



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!

Temperature and humidity fluctuations may occur during transport. Ensure that no moisture condenses in or on the device, by allowing the device to acclimate to the room temperature while turned off.

When sent, the device 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.

12 Storage

INFORMATION



When not in use, store the device according to the storage conditions. See chapter 11 Transport/Storage.

During storage, ensure that all protective covers (if available) are placed correctly, so that no contamination, foreign bodies or fluids enter the device.

13 Maintenance

INFORMATION



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

13.1 Service

This product was constructed for low-maintenance operation.

13.2 Repair

INFORMATION



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

For transport conditions, see chapter 11 Transport/Storage.

14 Disposal

INFORMATION



Should you need to dispose of the device, the national regulations for disposal must be followed.

The device appliance must not be disposed of as household waste.



Documentation Changes

Change date	Affected page(s)	Chapter	Note
17.12.2015	10	2.2 Safety-Relevant Parameters	Safety level added
15.02.2016	10	2.2 Safety-Relevant Parameters	Table sequence changed SILCL instead of SIL CL
09.03.2016	14	3.3 Electrical Requirements	Graphics added
08.09.2016	19 20	Description 6.1 Wiring Example 6.2 Connection Diagram Wiring	"non-safe" removed Note extended Added
21.02.2017	15	3.5 CAN-Bus	Chapter added
13.03.2017	12	3.2 Signal Output Specifications for Cross-Circuit Detection	Note added
17.08.2017	16 19	3.7 Environmental Conditions 5.2 Applicable Connectors	Pollution Degree Sleeve length added Added info regarding ultrasonically welded strands
19.06.2018	13	3.3 Electrical Requirements	Note UL conditions
20.09.2018		5 Connector Layout	Note added
02.04.2019	11 17 all	2.3 Safety-Relevant Parameters 3.7 Environmental Conditions	Correction of the safety-relevant parameters Corrections environmental conditions Corrections due to CE
02.12.2019		2.3 Safety-Related Parameters	Values updated
20.07.2020	all		Safety-relevant parameters extended with SCPx11 with 60 °C ambient temperature
02.09.2020	1 8 11	1.3 General Requirements 2.3 Safety-Relevant Parameters	Text correction Text correction of Designated Use Safety Parameters changed

02.09.2020	12	2.4 Compatibility	Text correction of Contact short detection
08.09.2020	24	9 Hardware Class SIB061	Chapter added
07.02.2022	12	2.3 Safety-Relevant Parameters	Parameters SCP 211/SCP 111-S added
20.04.2023	20	5 Connector Layout	Info box corrected
05.12.2023	23	5.6 Miscellaneous	Mission time added
	24	5.7 Environmental Conditions	Noise emissions added
		9 Hardware Class SIB061	Chapter removed
01.02.2024	14	3.3.2 EU Conformity Declaration	Note on download adjusted
	15	3.4 Safety-Relevant Parameters	The safety indicators (PFH, MTTF _D) were adjusted slightly with the recertification.
21.02.2024	13	3 IT Security	Chapter added
			Wording of standards corrected