

SIB 061

Safety Input Box

Operating Manual

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Safety Input Box

SIB 061

The Safety Input Box SIB 061 has the Safety integrity level SIL3 (EN / IEC 62061) or Performancelevel e (PL e) (EN ISO 13849-1/-2).

The SIB 061 has:

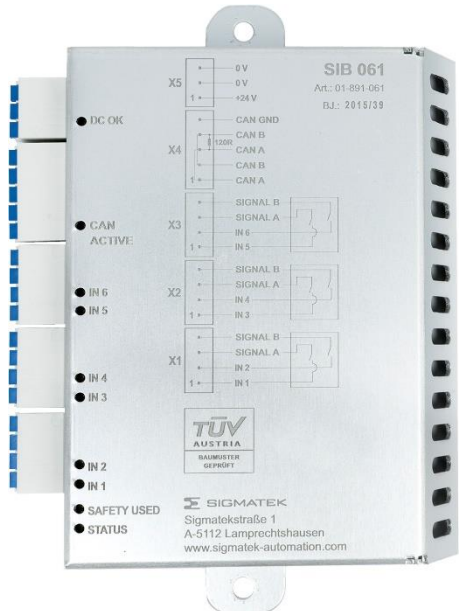
- 6 Safe inputs (EN 61131-2; EN/IEC 62061 und EN ISO 13849-1/-2)
- Double clock output signal (short circuit proof)

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.



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1 Basic Safety Guidelines

1.1 General Safety Information

If the Safety guidelines are not followed, danger to personnel can result, which could then lead to serious injury or in worst cases, death. In less serious cases, systems and equipment can be damaged.

The following symbols identify the individual risks as well as the degree of seriousness; their respective meanings are briefly explained below. You should therefore familiarize yourself with the Safety symbols and their meanings to prevent dangers and risks.

DANGER



DANGER

Identifies an immediate danger with high risk, which can lead to immediate death or serious injury if not avoided.

DANGER

Indique un danger direct à haut risque d'un décès immédiat ou des blessures graves si les consignes de sécurité ne sont pas respectées

WARNING



WARNING

Identifies a possible danger with a mid-level risk, which can lead to death or (serious) injury if not avoided.

ATTENTION

Indique un danger possible d'un risque moyen de décès ou de (graves) blessures si les consignes de sécurité ne sont pas respectées.

CAUTION**CAUTION**

Identifies a low risk danger, which can lead to injury or property damage if not avoided.

Attention!

Indique un danger avec un niveau de risque faible des blessures légères ou des dommages matériels si les consignes de sécurité ne sont pas respectées

1.2 Further Safety Guidelines



Warning, dangerous electrical voltage

Avertissement d'une tension électrique dangereuse



Hot surface warning

Avertissement de surface chaude



Danger for ESD-sensitive components

Danger pour les composants sensibles aux décharges électrostatiques (DES)



This symbol identifies important or additional information regarding the operation of the Safety modules.

Ce symbole indique des informations importantes ou supplémentaires concernant le fonctionnement des modules de sécurité particuliers

1.3 General Requirements

Technical Documentation



This technical documentation is a component of this product.

- This document must be accessible in the vicinity of the machine, since it contains important instructions.
- The technical documentation should be included in the sale, rental or transfer of the product.

Documentation technique

Cette documentation technique fait partie intégrale du produit.

- Gardez la toujours à portée de main et à la proximité de la machine, car elle contient des informations importantes.
 - Distribuez la documentation technique aux secteurs de la vente et/ou de la location du produit.
-

Acceptance of Safety Guidelines



Before handling the product to which this documentation belongs, the operating instructions and Safety guidelines must be read. SIGMATEK GmbH & Co KG accepts no liability for damages resulting from non-compliance with the Safety guidelines or the applicable regulations.

Acceptance of the Safety guidelines and the explanations in this document, as well as the Safety System Handbook (see homepage¹) are a basic requirement for proper use. Therefore, read this operating manual thoroughly and familiarize yourself with each of them in detail.

More information on standards and regulations etc. can be found in the system handbook.

Prendre connaissance de consignes de sécurité

Avant toute manipulation on doit impérativement prendre connaissance de consignes de sécurité et du mode d'emploi. SIGMATEK GmbH & Co KG n'assume aucune responsabilité pour les dommages causés par le non-respect des consignes de sécurité ou du mode d'emploi respectif.

La connaissance de consignes de sécurité et le contenu de cette documentation ainsi que le mode d'emploi du système de sécurité constitue une condition préalable à l'utilisation prévue. Lisez ce mode d'emploi et assurez-vous de le comprendre jusqu'aux détails.

Pour plus d'informations sur les normes et les lignes directrices, etc., reportez-vous au mode d'emploi.

¹ Using the search function with the keyword “Safety System Handbook”

Qualified Personnel

Installation, assembly, programming and initial start-up, operation, maintenance and decommissioning of control and automation technology products in general, as well as Safety-related products especially, 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.

Personnel qualifié

Installation, montage, programmation, mise en service, l'exploitation, l'entretien et mise hors service de produits de commande et d'automatisation en général, et de produits liés à la sécurité, en particulier, ne peut être effectuée que par le personnel qualifié.

On entend sous terme personnel qualifié les personnes ayant acquis une formation professionnelle dispensé par un spécialiste sur l'utilisation et surveillance des composants et des systèmes de sécurité, ceci conformément aux lignes directrices et les normes en vigueur.

Designated Use



The Safety modules are designed for use in Safety-oriented applications and meet the required conditions for Safety operation in compliance with Performancelevel e (PL e), in accordance with EN ISO 13849-1/-2 and SIL3 in accordance with EN 62061.

For your own safety and the safety of others, use Safety modules for their designated purpose only. Correct EMC installation as well as proper transport and storage are also included under designated use.

Non-designated use consists of:

- any change made to the Safety modules of any kind.
- the use of damaged Safety modules.
- the use of the Safety module outside of the instructions described in this handbook.
- the use of the Safety module outside of the technical data described in this handbook.

Utilisation prévue

Les modules de sécurité sont conçus pour une utilisation dans les applications sollicitant un niveau de sécurité et répondent à toutes les conditions nécessaires pour un fonctionnement sûr conformément au niveau de performance e (PL e) selon la norme EN ISO 13849-1/-2 et SIL3 de la norme EN 62061.

Utilisez le module de sécurité conformément à son mode d'emploi pour votre propre sécurité et celle d'autres personnes. L'utilisation conforme comprend également une installation conforme CEM ainsi que le transport et le stockage conforme. L'utilisation abusive comprend entre autres:

- Les modifications quelconques apportées aux modules de sécurité.
- Utilisation de modules de sécurité endommagés.
- Utilisation de modules de sécurité en dehors du cadre décrit dans ce mode d'emploi.
- Utilisation de modules de sécurité en dehors des spécifications décrites dans ce mode d'emploi.

Operator Due Diligence

The operator must ensure that

- the Safety modules are to be used for their designated purpose only.
- the Safety modules are to be operated in error-free, fully functional condition only.
- only sufficiently qualified and authorized personnel operate the Safety modules.

This documentation is complete and in readable condition and available at the site of operation.

Obligation de diligence

L'utilisateur doit s'assurer que

- les modules de sécurité ne sont utilisés que selon les spécifications.
- uniquement les modules de sécurité en parfait état de fonctionnement peuvent être utilisés.
- seulement le personnel qualifié et autorisé puisse manipuler les modules de sécurité.

la documentation dans son intégralité et dans un état lisible est mise à disposition à l'endroit où les modules de sécurité sont utilisés.

2 Safety Conformity

2.1 Functional Safety Standards

- EN / IEC 62061:2005/A2:2015
- EN ISO 13849-1:2015
- EN ISO 13849-2:2012

2.2 EU Conformity Declaration



CE Declaration of Conformity

The SIB 061 complies with the following European directives:

- 2006/42/EG “Directive of the European Parliament and of the Council of 17 May 2006 on Machinery and Change to the Directive 95/16/EC” (machine 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. Using the search function with the keyword “EU Declaration of Conformity”.

2.3 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: $PFH_D = 1.2E-9$ (1/h) $MTTF_D = 839$ years DC = 98 % SFF = 99 %	PL d/Cat. 2 SIL 3
	2-channel application: $PFH_D = 1.4E-9$ (1/h) $MTTF_D = 854$ 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: $PFH_D = 1.2E-9$ (1/h) $MTTF_D = 790$ years DC = 98 % SFF = 99 %	PL d/Cat. 2 SIL 3
	2-channel application: $PFH_D = 1.4E-9$ (1/h) $MTTF_D = 804$ 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: $PFH_D = 2.7E-9$ (1/h) $MTTF_D = 626$ years DC = 98 % SFF = 99 %	PL d/Cat. 2 SIL 3
	2-channel application: $PFH_D = 2.9E-9$ (1/h) $MTTF_D = 635$ 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 62061.

2.4 Compatibility

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.

3 Technical Data

3.1 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: $\leq +5$ V	high: $\geq +15$ V
Switching threshold	typically +13 V	
Input current	3 mA at +24 V	
Input delay	0.5 ms	

3.2 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	

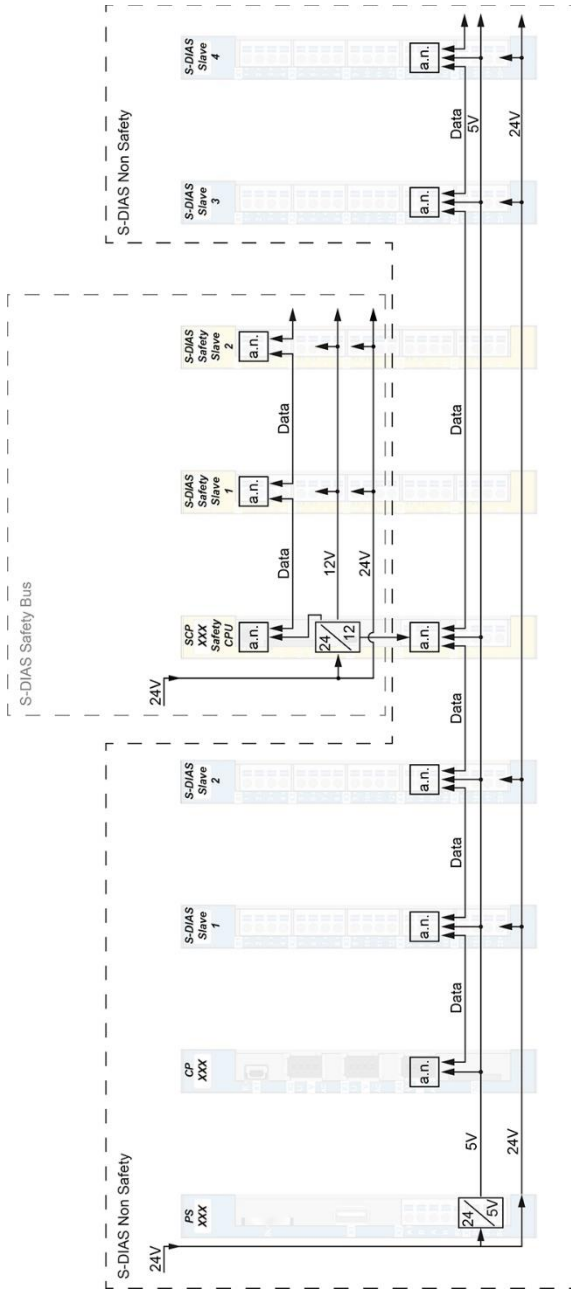
The clock outputs A and B are generated once internally and are wired in parallel to the connectors. A direct cross-circuit of Clock A and/or B of a connector therefore results in cross-circuit detection in all channels.

3.3 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

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

Un fusible conforme aux limites de la tension et du courant d'alimentation doit être présent en amont de l'alimentation.

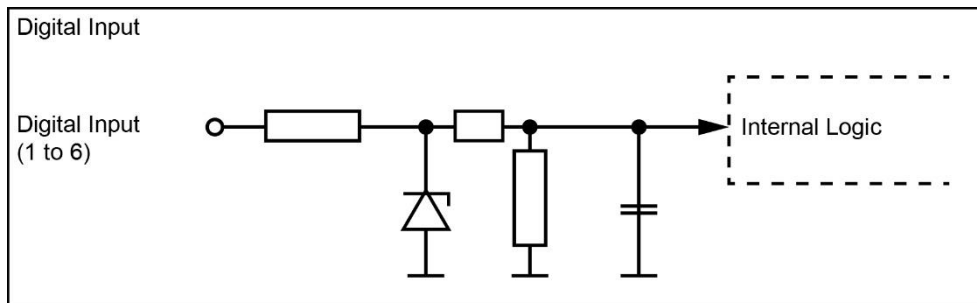


Beschaltung S-DIAS Safety im S-DIAS System

- jedes S-DIAS Modul ist ein aktives Modul (active node)
- Safety-CPU ist am S-DIAS-Bus angeschlossen (inkl. +5 V-Versorgung)
- Safety-Bus ist eigenständig und vom S-DIAS-Bus getrennt

a.n. = active node

3.4 Input Circuit



3.5 CAN Bus

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

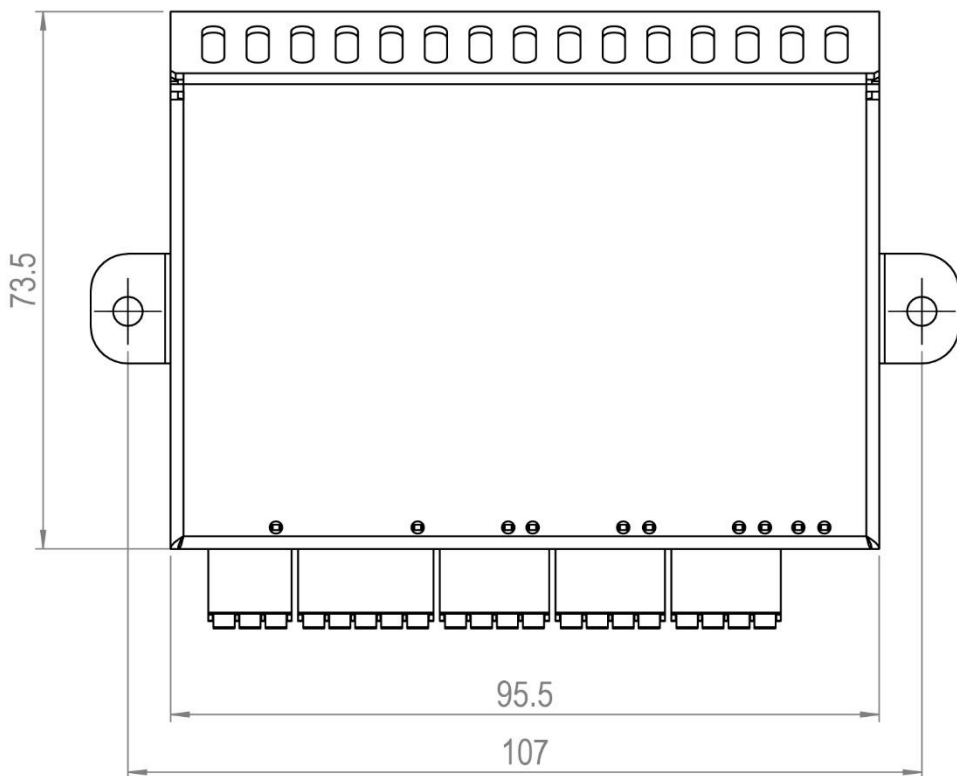
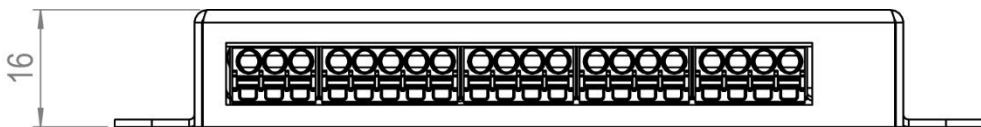
3.6 Miscellaneous

Article number	01-891-061
Hardware version	1.x
Standard	UL in preparation
Approvals	CE, TÜV Austria EG type-tested

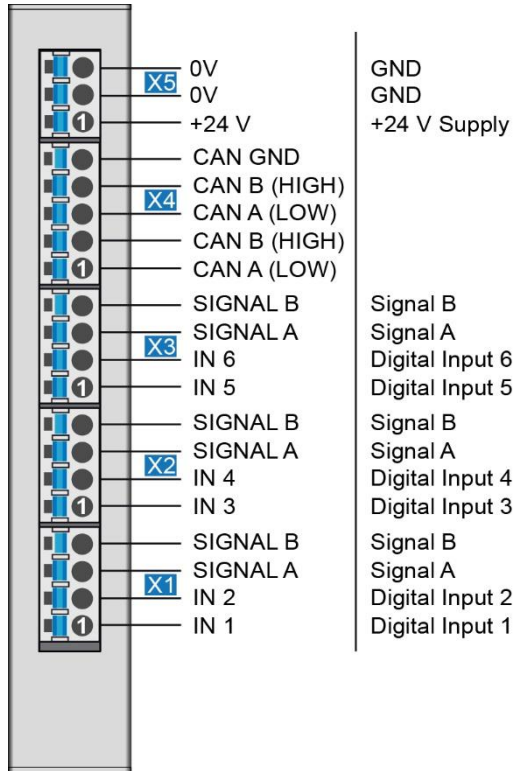
3.7 Environmental Conditions

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	
EMC resistance	in accordance with 61000-6-7:2015 (Generic standards - Immunity requirements for equipment intended to perform functions in safety-related systems (functional safety) at industrial locations) in accordance with EN 61000-6-2:2007 (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



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 +24 V supply and 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!

5.1 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

5.2 Applicable Connectors

Connectors:

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

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

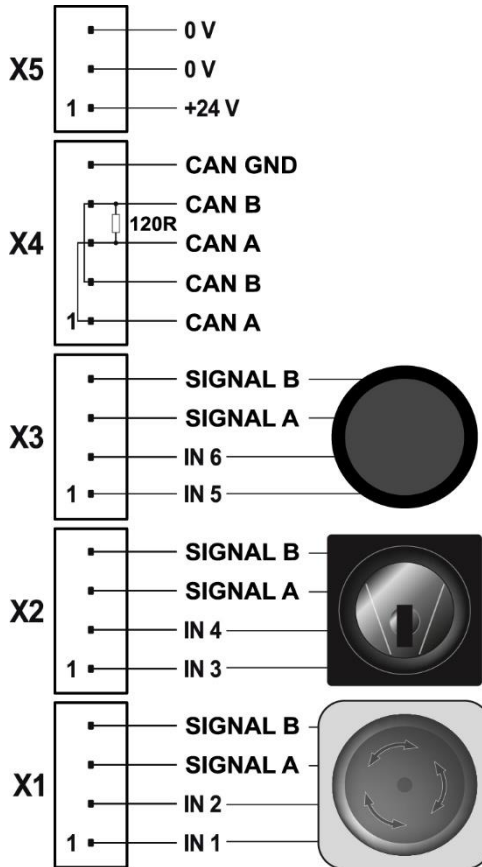
Connections:

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)



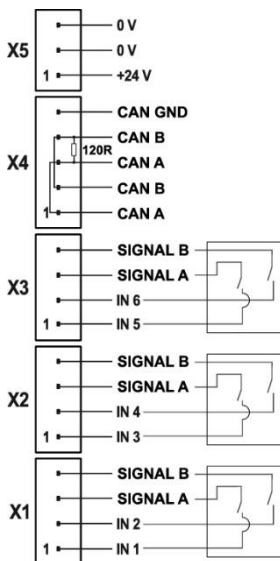
6 Wiring

6.1 Wiring Example



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).

6.2 Connection Diagram Wiring



6.3 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

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

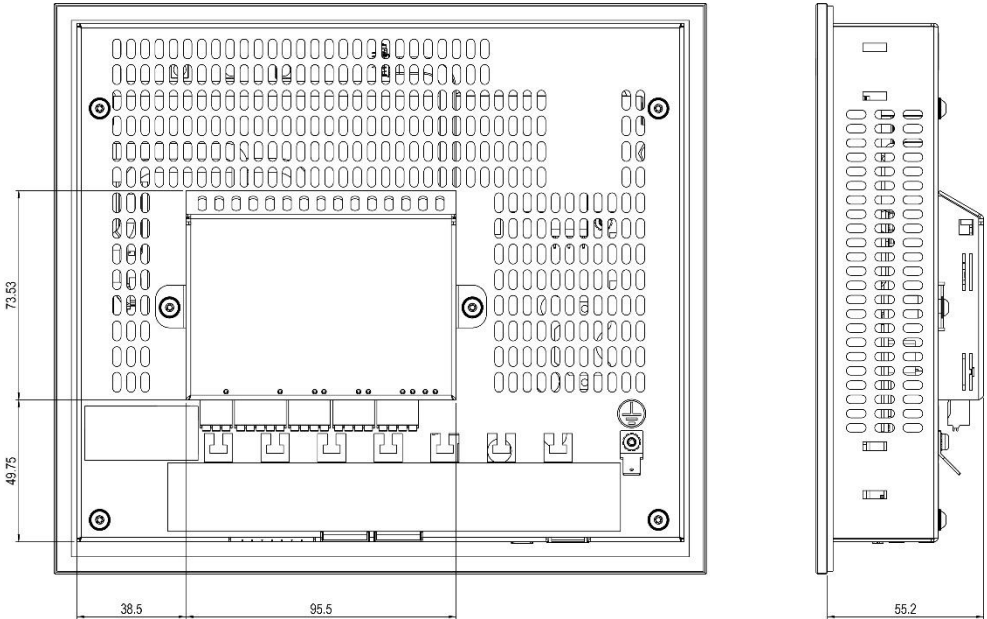
Si possible la terre doit être connectée à l'armoire de commande!



Wiring and mounting must be performed with no voltage applied!

7 Mounting

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



8 Disposal

For the disposal of the product, the respective guidelines, possibly country-specific, must be observed and followed.

9 Hardware Class SIB061

Hardware Classe SIB061 for the Safety Box SIB061

This hardware class is used to control the SIB 061 hardware module. More information on the hardware can be found in the module documentation.

```
CAN:00, SIB061 (SIB0612)
S Class State (ClassState) <-[]->
I Device ID (DeviceID) <-[]->
I Safe Input 1 (Safe_Input1) <-[]->
I Safe Input 2 (Safe_Input2) <-[]->
I Safe Input 3 (Safe_Input3) <-[]->
I Safe Input 4 (Safe_Input4) <-[]->
I Safe Input 5 (Safe_Input5) <-[]->
I Safe Input 6 (Safe_Input6) <-[]->
S Safe IO Error (SafeIOError) <-[]->
ALARM:00, Empty
```

9.1 Interfaces

9.1.1 General

Class State	State	This server shows the actual status of the hardware class.
Device ID	State	The device ID of the hardware module is shown in this server.
Required	Property	This client is active by default, which means that the S-DIAS hardware module at this position is mandatory for the system and can under no circumstances be disconnected or return an error. Otherwise, the entire hardware deactivated. If the hardware module is missing or removed, an S-DIAS error is triggered. If his client is initialized with 0, the hardware module located in this position is not mandatory. This means that it doesn't have to be available or error-free. However, which components identified as "not required" should be selected with regard to the safety of the system.

9.1.2 Safety Inputs [1-6]

Safe Input	Input	Status of safe digital inputs 1 to 8.
Safe IO Error	State	Shows which safe inputs are in error mode with a bit code E.g.: Bit0 = input 1, Bit1 = input 2,...

9.1.3 Communication Interfaces

ALARM	Downlink	With this downlink the corresponding alarm class can be placed via the hardware editor.
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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		Description	"non-safe" removed
	19	6.1 Wiring Example	Note extended
	20	6.2 Connection Diagram Wiring	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	3.7 Environmental Conditions	Pollution Degree
	19	5.2 Applicable Connectors	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	2.3 Safety-Relevant Parameters	Correction of the safety-relevant parameters
	17	3.7 Environmental Conditions	Corrections environmental conditions
	all		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		Text correction
	8	1.3 General Requirements	Text correction of Designated Use
	11	2.3 Safety-Relevant Parameters	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

