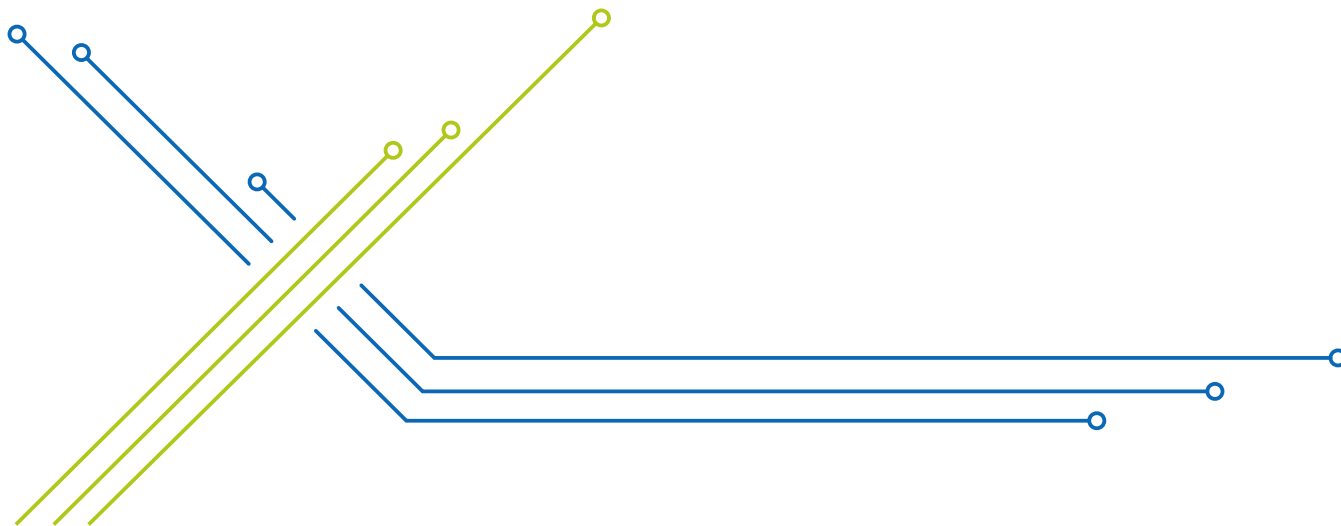


DI 202

S-DIAS Digital Input Module with Counter Function

INSTRUCTION MANUAL

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S-DIAS Digital Input Module with Counter Function**DI 202****16 digital inputs****4 digital inputs with counter function**

The S-DIAS Digital Input Module with Counter Function DI 202 is equipped with 20 inputs and a +24 V signal for reading the signal states "0" and "1".

To suppress noise in the signal lines, according input filters are provided.

In addition, digital inputs 1-4 have a counter function.

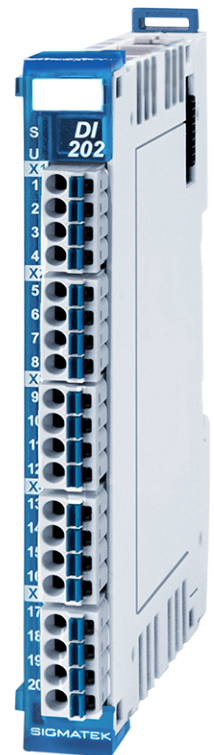


Table of Contents

1 Introduction	6
1.1 Target Group/Purpose of this Operating Manual	6
1.2 Important Reference Documentation	6
1.3 Contents of Delivery	6
2 Basic Safety Directives	7
2.1 Symbols Used	7
2.2 Disclaimer	8
2.3 General Safety Directives	8
2.4 Software/Training	9
3 Standards and Directives	10
3.1 Directives	10
3.1.1 EU Declaration of Conformity	10
3.2 Safety-Relevant Parameters	10
4 Type Plate	11
5 Technical Data	12
5.1 Digital Input Specifications	12
5.2 Electrical Requirements	12
5.3 Miscellaneous	14
5.4 Environmental Conditions	14
6 Mechanical Dimensions	15
7 Connector Layout	16
7.1 Status LEDs	16
7.2 Applicable Connectors	17
7.3 Label Field	17
8 Wiring	18
8.1 Wiring Example	18
8.2 Note	18
9 Assembly/Installation	19
9.1 Check Contents of Delivery	19
9.2 Mounting	19
10 Transport/Storage	21

11 Storage 22

12 Maintenance 23

 12.1 Service 23

 12.2 Repair 23

13 Disposal 24

14 Addressing 25

15 Supported Cycle Times 26

 15.1 Cycle Times below 1 ms (in μ s) 26

 15.2 Cycle Times equal to or higher than 1 ms (in ms) 26

16 Hardware Class 28

DI202 29

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.sigmatek-automation.com.

Our support team is happily available to answer your questions or assist you in case of any issues. Please see our website for our hotline number and business hours.

1.2 Important Reference Documentation

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

1.3 Contents of Delivery

1x DI 202

2 Basic Safety Directives

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.

INFORMATION



INFORMATION

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

2.2 Disclaimer

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.

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.

INFORMATION



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 !

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

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

2.4 Software/Training

The application is created with the software LASAL CLASS 2 and LASAL SCREEN Editor.

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 Standards and Directives

3.1 Directives

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

3.1.1 EU Declaration of Conformity



EU Declaration of Conformity

The product DI 202 conforms to the following European directives:

- 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.

3.2 Safety-Relevant Parameters

Conditions	+40 °C
MTBF	1036 years
The MTBF is a calculated value, which represents the failure probability and must not be confused with the product lifespan.	

4 Type Plate

The type plate provides information about the product's features. The type plate shown here is only an example.

Approbations		Standards
QR-Code  BJ: XXXX/XX S/N XXXXXXXX	Short Name Specifications FS: XXX.XX.XX FW: XXX LD: XX.X HW: X.XX	Electrical Ratings  SIGMATEK Sigmathekstraße 1 A-5112 Lamprechtshausen www.sigmatek-automation.com
Article Number		Product Name

HW: Hardware version
FS: Safety version number
FW: Firmware version
LD: Logic device version
QR-Code: Serial number

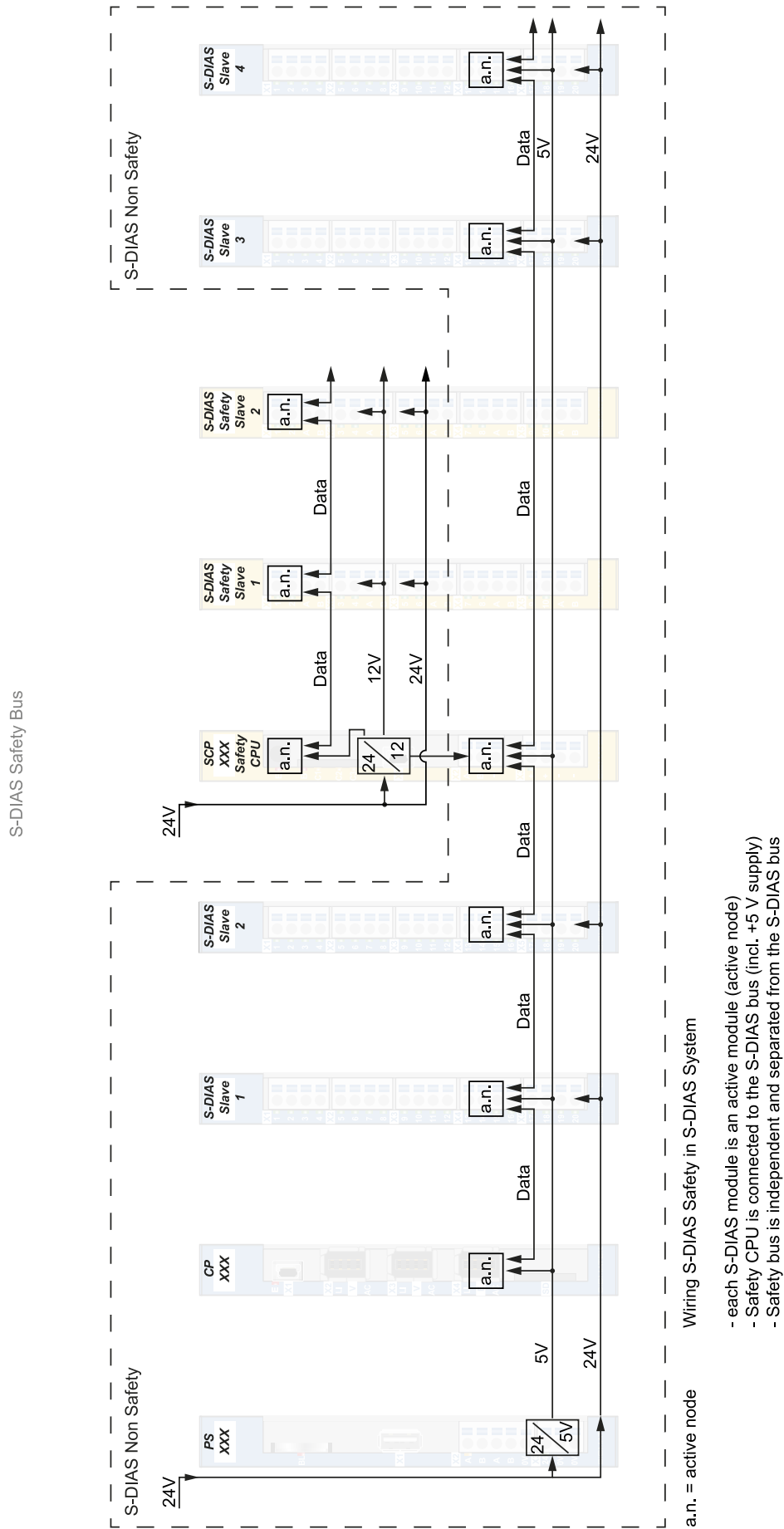
5 Technical Data

5.1 Digital Input Specifications

Number	20	
Input voltage	typically +24 V	maximum +30 V
Signal level (up to HW version 2.10)	low: < +8 V	high: > +14 V
Signal level (starting with HW version 2.20)	low: < +5 V	high: > +15 V
Input current	3.7 mA at +24 V	
Input delay	Inputs 1-4: 10 μ s, inputs 5-20: 0.5 ms	
Input frequency, inputs 1-4	25 kHz in normal counter mode resp. in incremental counter mode with 4-edge evaluation	
Counter frequency input 1-4	25 kHz in normal counter mode 100 kHz in incremental counter mode with 4-edge evaluation	

5.2 Electrical Requirements

Supply from S-DIAS bus	+5 V	
Current consumption on the S-DIAS bus +5 V supply	typically 40 mA	maximum 45 mA



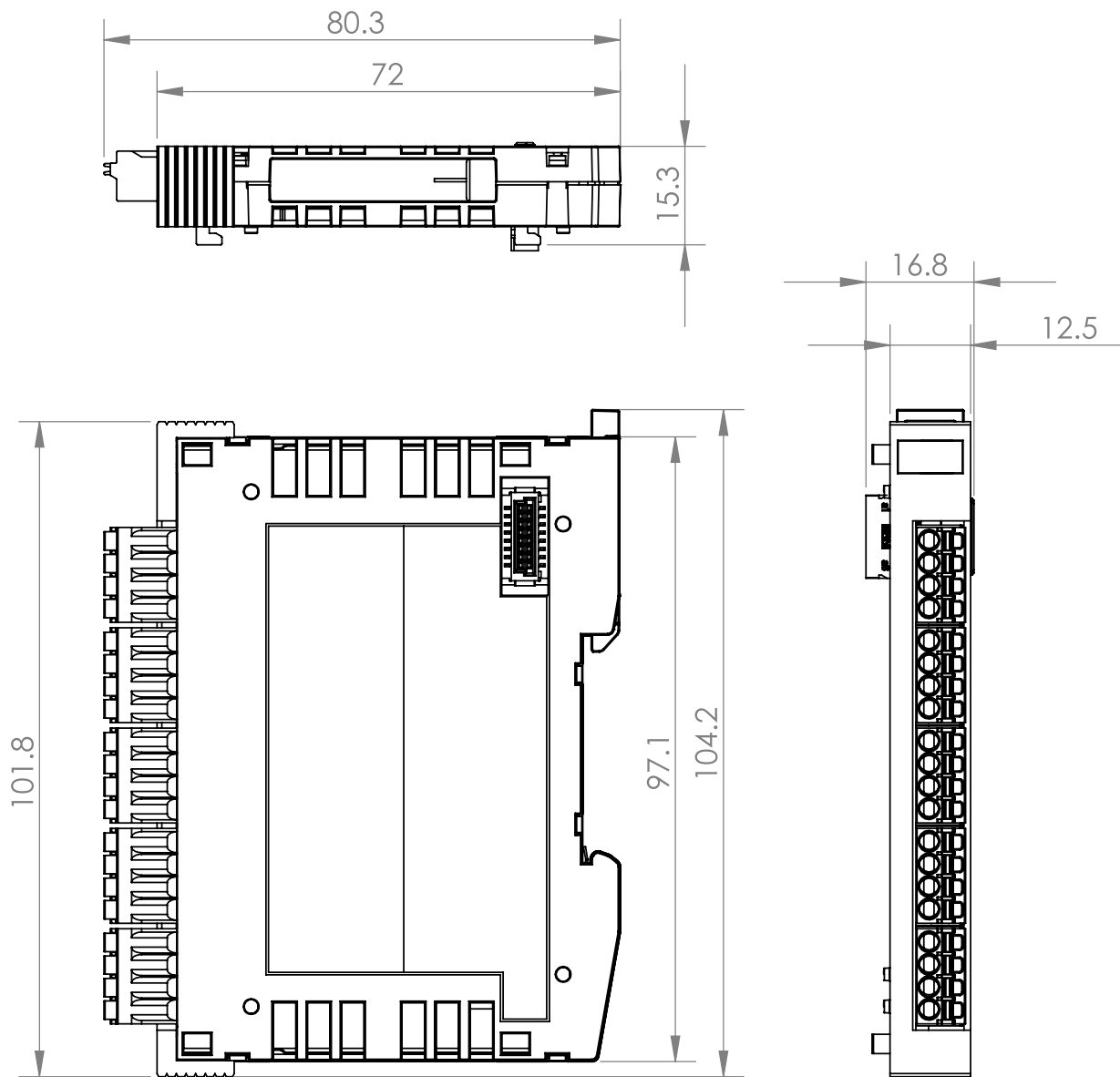
5.3 Miscellaneous

Article number	20-006-202	
Printed circuit board coating	no	
Approvals	CE	yes
	UL	cULus (E247993)
	Functional Safety	no
	UKCA	yes

5.4 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 up to a maximum of 5000 m with derating of the maximum environmental temperature by 0.5 °C per 100 m	
Operating conditions	pollution degree 2	
Noise emission	≤ 70 dB	
EMC resistance	EN 61000-6-2 (industrial area)	
EMC noise generation	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 (147.15 m/s²)
Protection type	EN 60529	IP20 (not evaluated by UL)

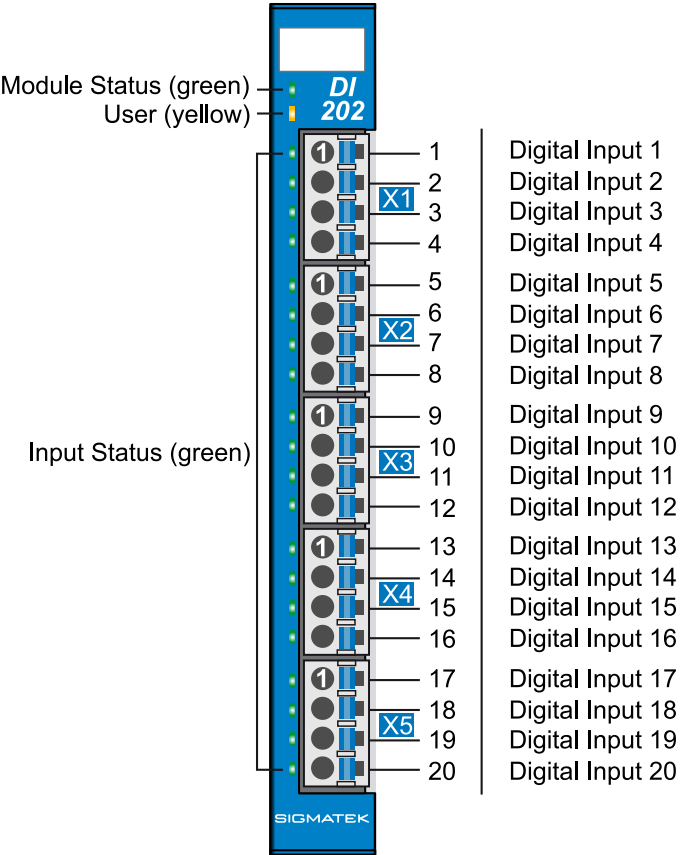
6 Mechanical Dimensions



Measurements

12.5 x 104 x 72 mm (W x H x D)

7 Connector Layout



7.1 Status LEDs

Module status	green	ON	module active
		OFF	no supply available
		BLINKING (5 Hz)	no communication
User	yellow	ON	adjustable by application (e.g. the module LED can be set to blinking through the visualization so that the module is easily found in the control cabinet)
		OFF	
		BLINKING (2 Hz)	
		BLINKING (4 Hz)	
Input status	green	ON	input ON
		OFF	input OFF

7.2 Applicable Connectors

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

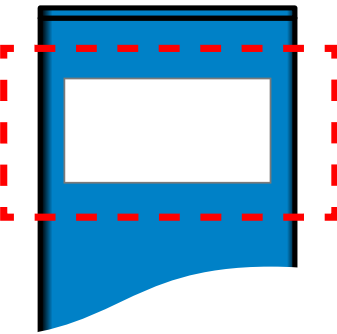
The spring terminals are suited for the connection of ultrasonically compacted (ultrasonically welded) stranded wire.

Connection capacity:

Stripping length/sleeve length	10 mm
Mating direction	parallel to conductor axis or to 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 reducing d2 of the ferrule)



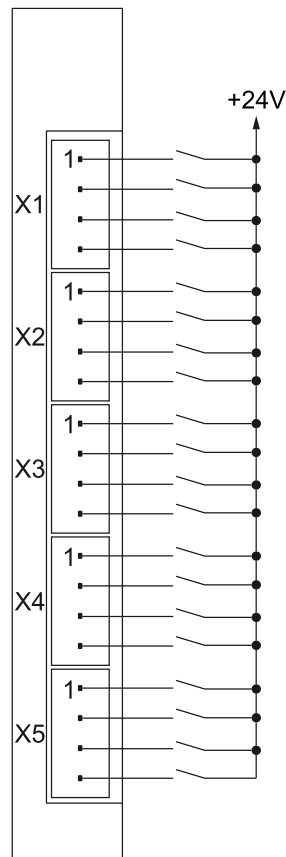
7.3 Label Field



The labeling field is printed directly on the module.

8 Wiring

8.1 Wiring Example



8.2 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!

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

9 Assembly/Installation

9.1 Check Contents of Delivery

Ensure that the contents of the delivery are complete and intact. See chapter 1.3 Contents of Delivery.

INFORMATION

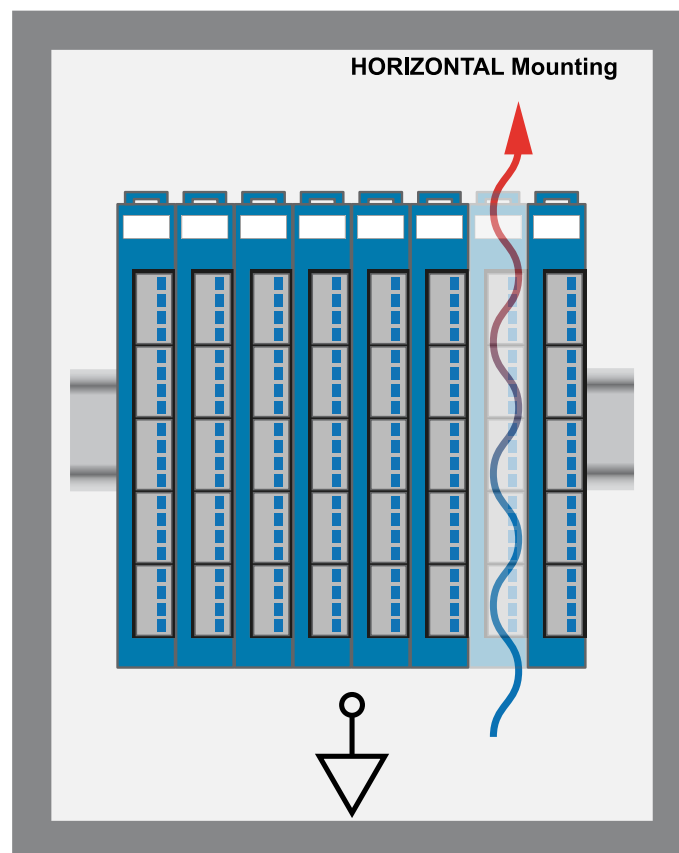


On receipt and before initial use, check the device for damage. If the device is damaged, contact our customer service and do not install the device in your system.

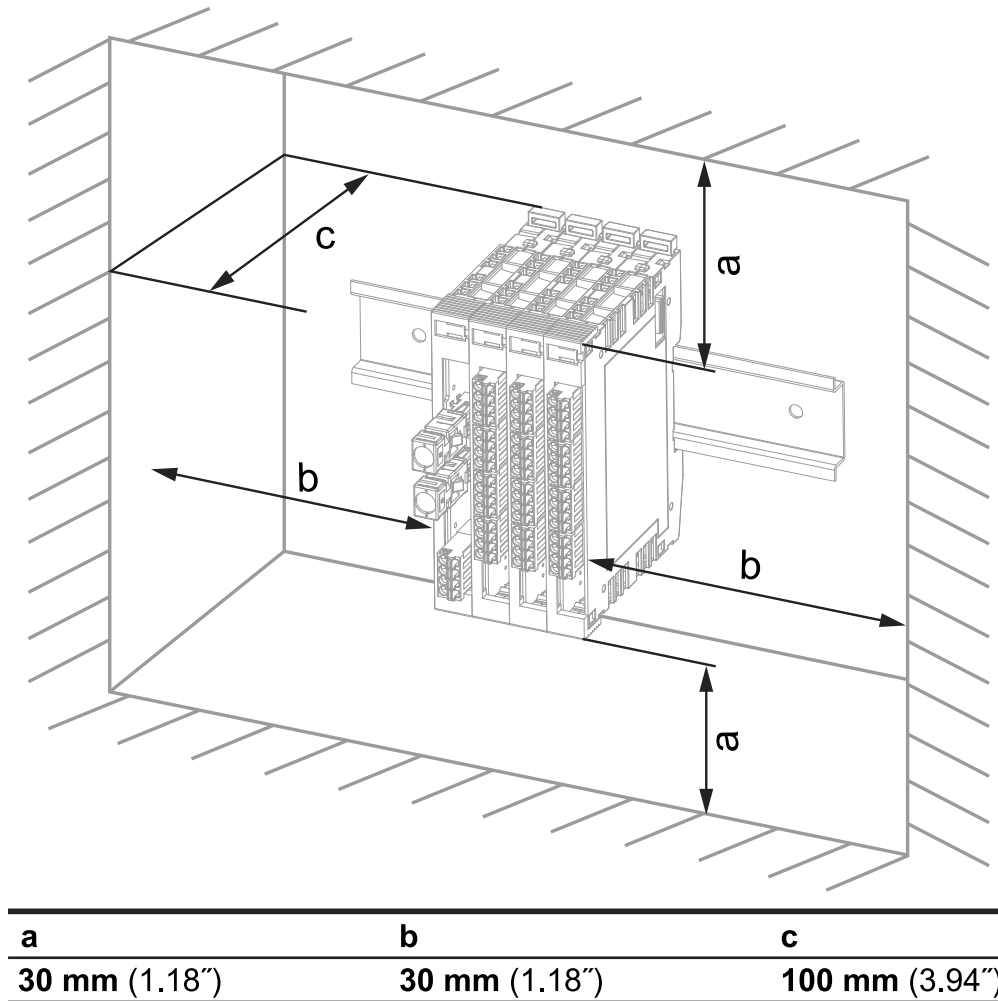
Damaged components can disrupt or damage the system.

9.2 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 functional ground connection from the module to the DIN rail is made via the grounding lug on the back of the S-DIAS modules. 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 to ensure proper function up to the maximum operating temperature.



Recommended minimum distances between the S-DIAS modules and the surrounding components or control cabinet wall:



a, b, c ... distances in mm (inches)

10 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!

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.

11 Storage

When not in use, store the device according to the storage conditions. See chapter 10 Transport/Storage.

INFORMATION



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

12 Maintenance

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

12.1 Service

This product was constructed for low-maintenance operation.

12.2 Repair

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 10 Transport/Storage.

13 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.



14 Addressing

Address (hex)	Size (bytes)	Access type	Description	Reset value
Memory				
0000	3	r	Input register	000000
			Bit 0	
			Bit 1	
			...	
			Bit 19	
			Bit 20-23	
0003	1	r/w	Counter mode register ¹⁾	00
			Bit 0	
			Bit 1	
			Bit 2-7	
			(0 = normal counter mode, 1 = incremental counter mode)	
0004	1	r	Counter 1 ²⁾	00
			8-bit counter for input 1	
0004	2	r16	Incremental encoder 1 ³⁾	0000
			16-bit encoder counter	
0005	1	r	Counter 2 ²⁾	00
			8-bit counter for input 2	
0006	1	r	Counter 3 ²⁾	00
			8-bit counter for input 3	
0006	1	r	Incremental encoder 2 ³⁾	0000
			16-bit encoder counter	
0007	1	r	Counter 4 ²⁾	00
			8-bit counter for input 4	

¹⁾ Writing to this register clears all counter values (if performed while counting, the first edge could be missed).

²⁾ If mode register is set to counter mode.

³⁾ If mode register is set to incremental encoder mode

15 Supported Cycle Times

15.1 Cycle Times below 1 ms (in μs)

50	100	125	200	250	500
x	x	x	x	x	x

x = supported

15.2 Cycle Times equal to or higher than 1 ms (in ms)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

x = supported

17	18	18	20	21	22	23	24	25	26	27	28	29	30	31	32
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

x = supported

Changes Chart

Change date	Affected page(s)	Chapter	Note
24.10.2013	12	5.1 Digital Input Specifications	Input frequency 1-4 and counter frequency input 1-4 added
23.12.2013	16	7 Connector Layout	Changed image
11.02.2014	16	7 Connector Layout	Changed image
	17	7.2 Applicable Connectors	Connection capacity added
	18	8.1 Wiring Example	Added wiring schematic
01.04.2014	14	5.3 Miscellaneous	UL added
	19	9 Assembly/Installation	Text updated
30.01.2015	18	8.2 Note	Note regarding connecting/disconnecting the S-DIAS module under voltage added.
26.03.2015	17	7.2 Applicable Connectors	Added connections
15.06.2015	12	5.2 Electrical Requirements	Changed values in table Current consumption on the S-DIAS bus (+5 V supply)
28.04.2016	19	9 Assembly/Installation	Graphics distances
17.08.2017	14	5.4 Environmental Conditions	Pollution degree
	17	7.2 Applicable Connectors	Added info regarding ultrasonically welded strands
18.10.2017	17	7.3 Label Field	Added chapter
	19	9 Assembly/Installation	Graphic replaced
13.02.2018	10	3.2 Safety-Relevant Parameters	Chapter added
14.11.2019	26	15 Supported Cycle Times	Chapter added
28.02.2020	26	15 Supported Cycle Times	Text adapted
08.09.2020		Hardware Class DI 202	Chapter added
04.11.2020	19	9 Assembly/Installation	Expansion functional ground connection
24.08.2021	12	5.1 Digital Input Specifications	Signal level and Switching threshold
03.06.2022	14	5.3 Miscellaneous	HW version
06.12.2022	14	5.3 Miscellaneous	UKCA conformity
26.07.2023		Document	General chapters added, design
22.07.2026	10	3.2 Safety-Relevant Parameters	Values deleted

16 Hardware Class

The HW classes are used to configure the module under LASAL CLASS and this document is available in the LASAL CLASS help.

DI202

Hardware Class DI202 for the S-DIAS DI202 digital input module

```

SDIAS:38, DI202 (DI2021)
S Class State (ClassState) <-[]->
S Device ID (DeviceID) <-[]->
S FPGA Version (FPGAVersion) <-[]->
S Hardware Version (HwVersion) <-[]->
S Serial Number (SerialNo) <-[]->
S Retry Counter (RetryCounter) <-[]->
O LED Control (LEDControl) <-[]->
----- Digital Inputs -----
I Digital Input 1 (Input1) <-[]->
I Digital Input 2 (Input2) <-[]->
I Digital Input 3 (Input3) <-[]->
I Digital Input 4 (Input4) <-[]->
I Digital Input 5 (Input5) <-[]->
I Digital Input 6 (Input6) <-[]->
I Digital Input 7 (Input7) <-[]->
I Digital Input 8 (Input8) <-[]->
I Digital Input 9 (Input9) <-[]->
I Digital Input 10 (Input10) <-[]->
I Digital Input 11 (Input11) <-[]->
I Digital Input 12 (Input12) <-[]->
I Digital Input 13 (Input13) <-[]->
I Digital Input 14 (Input14) <-[]->
I Digital Input 15 (Input15) <-[]->
I Digital Input 16 (Input16) <-[]->
I Digital Input 17 (Input17) <-[]->
I Digital Input 18 (Input18) <-[]->
I Digital Input 19 (Input19) <-[]->
I Digital Input 20 (Input20) <-[]->
I Inputs Double (InputDouble) <-[]->
I Counter 1 (Counter1) <-[]->
I Counter 2 (Counter2) <-[]->
I Counter 3 (Counter3) <-[]->
I Counter 4 (Counter4) <-[]->
ALARM:00, Empty

```

This hardware class is used to control the DI 202 hardware module with 20 digital inputs and 4 counters. More information on the hardware can be found in the module documentation.

Interfaces

Clients

SdiasIn	The client must be connected to an S-DIAS port, an "SdiasOut" _[x]" server.
Place	The physical location of the hardware module is entered in this client. Up to 64 modules, 0 to 63, can be assigned.
Required	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.
CounterMode[1,2]	Setting the counter 1 or 2. 0 no counter 1 counter counts with rising edge from Input1 and 2 or Input3 and 4 2 incremental encoder (Input1 and 2 or Input3 and 5) as initialization value

Servers

ClassState	This server shows the actual status of the hardware class.
DeviceID	The device ID of the hardware module is shown in this server.
FPGAVersion	FPGA version of the module in 16#XY (e.g. 16#10 = version 1.0).
SerialNo	The serial number of the hardware module is shown in this server.
RetryCounter	This server increments when a transfer fails.
LEDControl	With this server, the application LED of the S-DIAS module can be activated to find the module in the network more quickly. The following statuses are possible: 0 LED off 1 LED on 2 Blinks slowly 3 Blinks rapidly
Input[1-20]	Status of input 1-20
InputDouble	In this server, the digital outputs are shown in a 32-bit field. Bits 0 to 19 are assigned to inputs 1 to 20 in this double word.
Counter1	CounterMode1 = 0 ... disabled CounterMode1 = 1 ... normal counter input 1 CounterMode1 = 2 ... incremental encoder input 1 and 2 Counter can be reset with the write method of the server.
Counter2	CounterMode1 = 0 ... disabled, CounterMode1 = 1 ... normal counter input 2 CounterMode1 = 2 ... disabled Counter can be reset with the write method of the server.
Counter3	CounterMode2 = 0 ... disabled CounterMode2 = 1 ... normal counter input 3 CounterMode2 = 2 ... normal counter input 3 and 4 Counter can be reset with the write method of the server.
Counter4	CounterMode2 = 0 ... disabled CounterMode2 = 1 ... normal counter input 4 CounterMode2 = 2 ... disabled Counter can be reset with the write method of the server.

Communication Interfaces

ALARM	Downlink	With this downlink the corresponding alarm class can be placed via the hardware editor.
--------------	----------	---

Example

