

AI 084

S-DIAS Analog Input Module

Instruction Manual

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Translation of the Original Instructions

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S-DIAS Analog Input Module

AI 084

with 8 current inputs

The S-DIAS AI 084 analog input module has eight current inputs with a 16-bit resolution.

The module supports the measurement ranges 0-20 mA and 4-20 mA.



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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.
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 AI 084

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 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 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 Conformity Declaration



EU Declaration of Conformity

The product AI 084 conforms to the following European directives:

- **2014/35/EU** Low-voltage 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. See Products/Downloads or use the search function and the keyword “EU Declaration of Conformity”.

4 Type Plate

	HW: X.XX	
	SW: XX.XX.XXX	
	Safety Version: SXX.XX.XX	
Serial No.	SIGMATEK GMBH & CO KG Sigmatekstrasse 1 A-5112 LAMPRECHTSHAUSEN	
Article Number	Product Name	Short Name

Exemplary nameplate (symbol image)

	HW: 1.00	
	SW: 01.00.000	
	Safety Version: S01.00.00	
12345678	SIGMATEK GMBH & CO KG Sigmatekstrasse 1 A-5112 LAMPRECHTSHAUSEN	
12-246-133-3	Handbediengerät Wireless HGW 1033-3	

HW: Hardware version

SW: Software version

5 Technical Data

5.1 Analog Current Input Specifications

Number of channels	8	
Measurement range	0-20 mA	4-20 mA
Measurement value	0-20000	4000-20000 An open or shorted input returns -2147483632 in the hardware class.
Input type	differential Input	
Current resolution	16-bit (circa 0.3 μ A/LSB)	
Conversion time for all channels	1 ms	
Common mode range	± 10 V	
Input resistance	typically 50 Ω	
Hardware input filter	typically 1 kHz low pass 3 rd order system	
Software input filter	configurable	
Maximum input current allowed	continuous 30 mA single pulse 1s 0.12 A single pulse 40 ms 0.25 A single pulse 200 μ s 0.75 A	
Cable break monitor	no	yes, adjustable via software between 0-4 mA (Default: 3 mA)
Short circuit monitor	20.25 mA	20.25 mA
Basic precision incl. calibration error, linearity and noise at 25 °C	± 0.30 % of maximum measurement value	
Temperature drift 0-60 °C	± 0.20 % of maximum measurement value	
Total measurement precision (0-60 °C)	$\pm 0,50$ % of maximum measurement value	

5.2 Electrical Requirements

Voltage supply from S-DIAS bus	+5 V	
Current consumption on the S-DIAS bus (+5 V power supply)	typically 50 mA	maximum 55 mA
Voltage supply from S-DIAS bus	+24 V	
Current consumption on the S-DIAS bus (+24 V power supply)	typically 30 mA	maximum 35 mA
HW1.x to HW1.30		
Current consumption on the S-DIAS bus (+24 V power supply)	typically 32 mA	maximum 37 mA
Starting with HW1.40		

INFORMATION

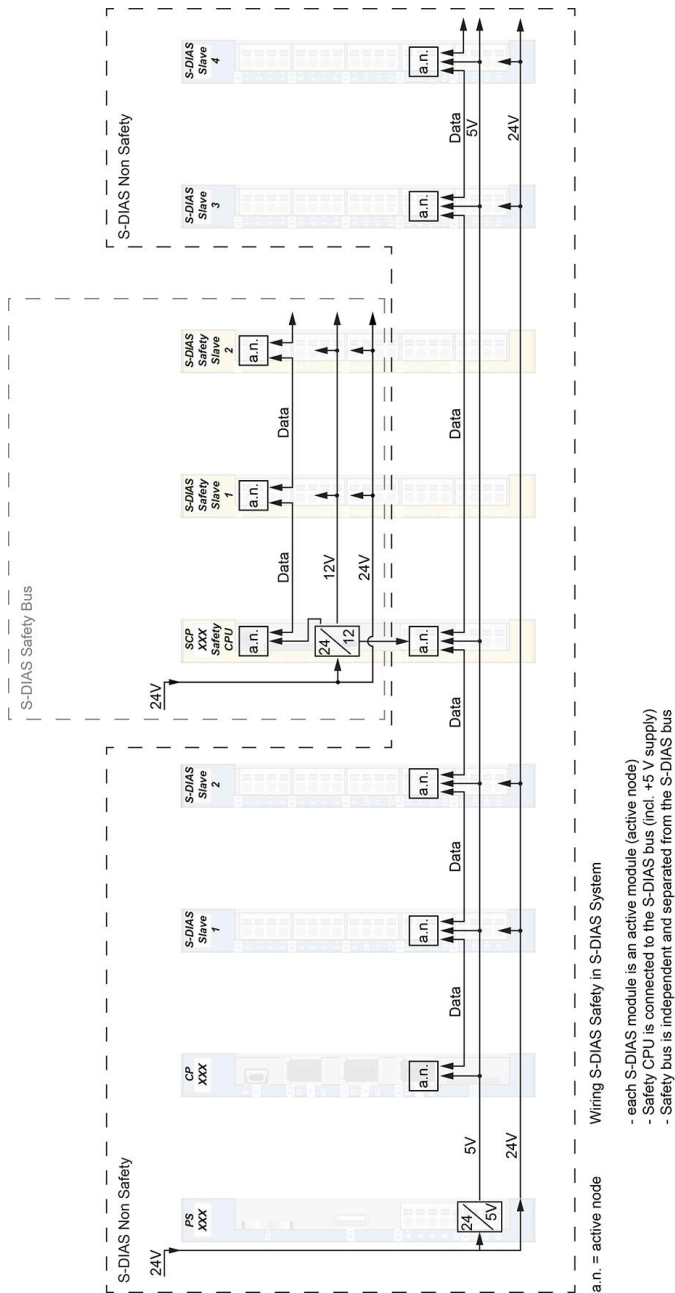


If this S-DIAS module is connected to an S-DIAS supply module with several S-DIAS modules, the total current of the modules used must be determined and checked.

The total current of the +24 V supply cannot exceed 1.6 A!

The total current of the +5 V supply cannot exceed 1.6 A!

The specification for the current can be found in the module-specific documentation under "Electrical Requirements".



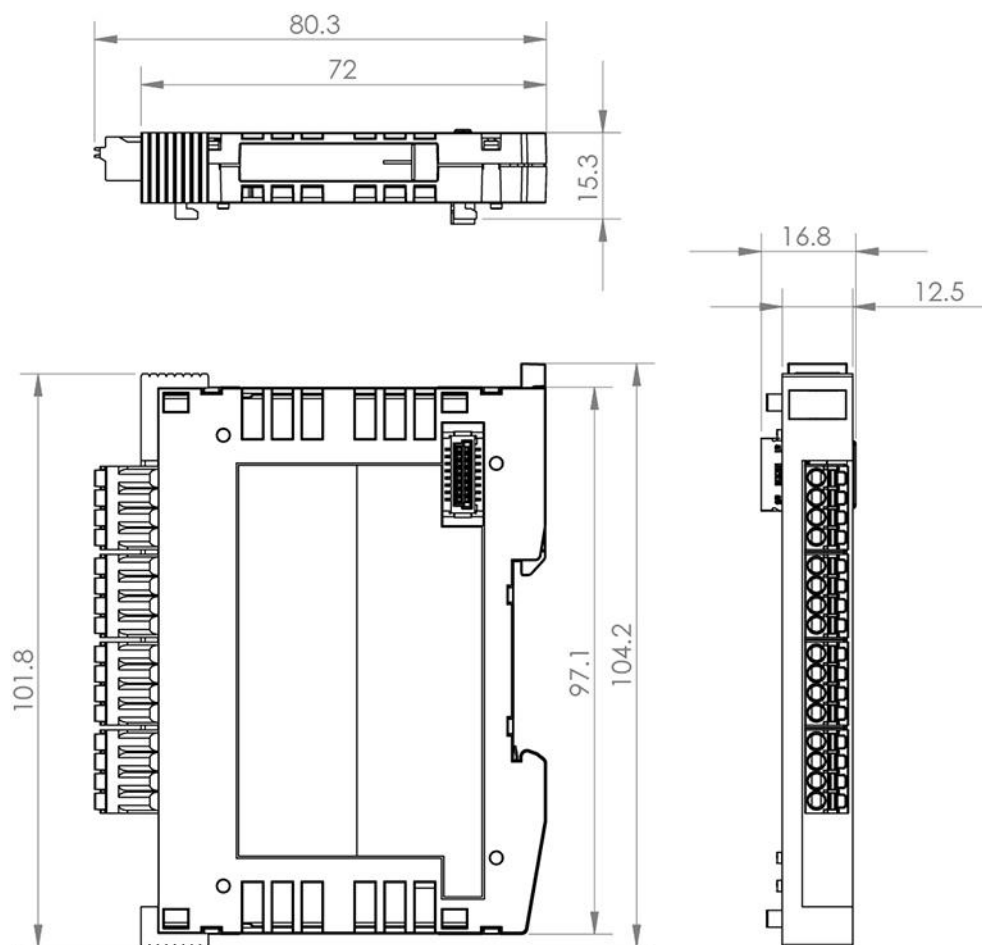
5.3 Miscellaneous

Article number	20-009-084
Standard	UL 508 (E247993)
Approbations	UL, cUL, CE, UKCA

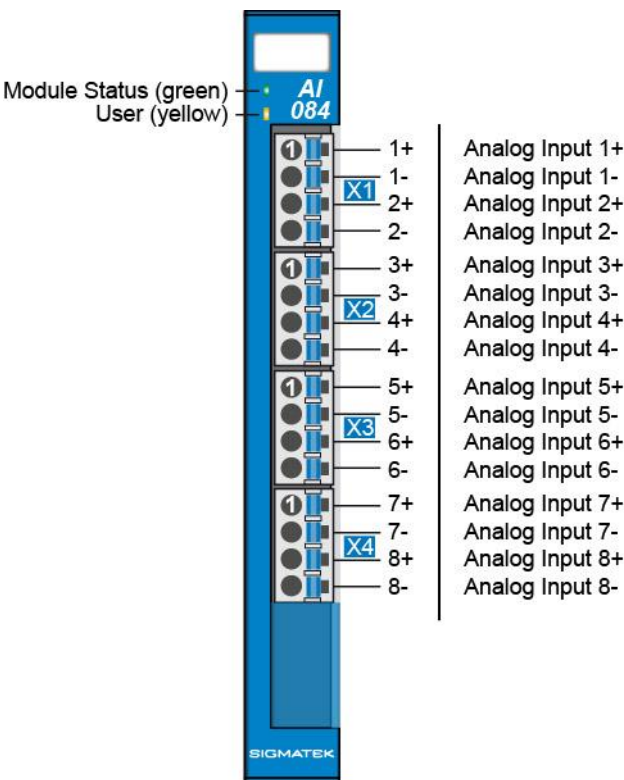
5.4 Environmental Conditions

Storage temperature	-20 ... +85 °C	
Environmental temperature	0 ... +60 °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	
EMC resistance	in accordance with EN 61000-6-2 (industrial area)	
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

6 Mechanical Dimensions



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	can be set from the application
		OFF	(e.g. the module LED can be set to blinking through the visualization so that the module is easily found in the control cabinet)
		BLINKING (2 Hz)	
		BLINKING (4 Hz)	

7.2 Applicable Connectors

Connectors:

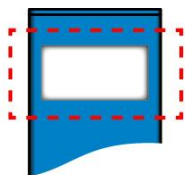
X1-X4: Connectors with spring terminals (included in delivery)
The spring terminals are suitable connecting ultrasonically compacted (ultrasonically welded) strands.

Connections:

Stripping length/Sleeve length:	10 mm
Plug-in direction:	parallel to conductor axis or to PCB
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 (ground for reducing d2 of the ferrule)



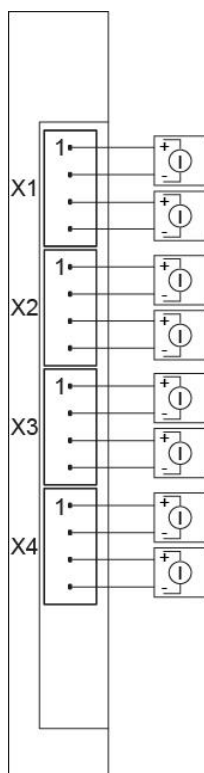
7.3 Label Field



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

8 Wiring

8.1 Wiring Example



8.2 Note

The signals recorded by the analog modules are very small, as compared to the digital signals. To ensure error-free operation, a careful wiring method must be followed:

- The DIN rail must have an adequate mass connection.
- The lines connected to the source of the analog signals must be as short as possible and parallel wiring to digital signal lines must be avoided.
- The signal lines must be shielded.
- The shielding must be connected to a shielding bus.
- Avoid parallel connections between input lines and load-bearing circuits.
- Protective circuits for all relays (RC networks or free-wheeling diodes).

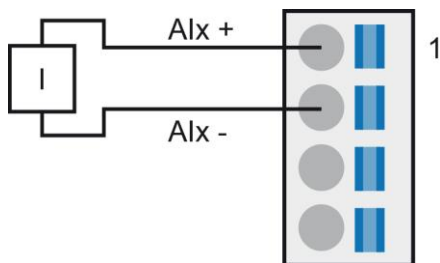
INFORMATION



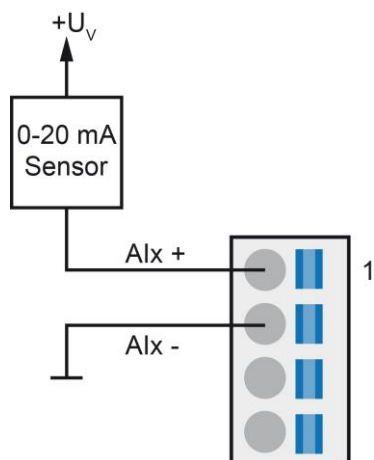
Connect the ground bus to the control cabinet.

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

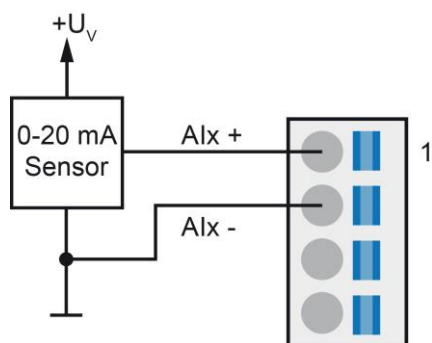
8.3 Connecting the Signal Source



8.4 Connection of a 2-wire Sensor



8.5 Connection of a 3-wire Sensor



9 Assembly/Installation

9.1 Check Contents of Delivery

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

INFORMATION

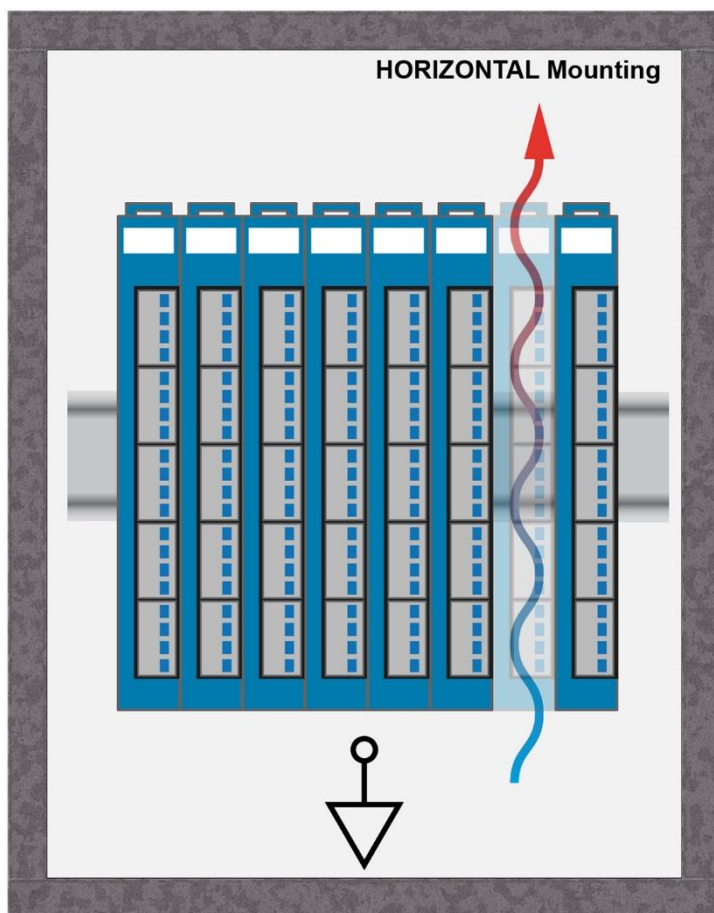


On receipt and before initial use, check the device for damage. If the device is damaged, contact our customer service and do not install the device in your system.

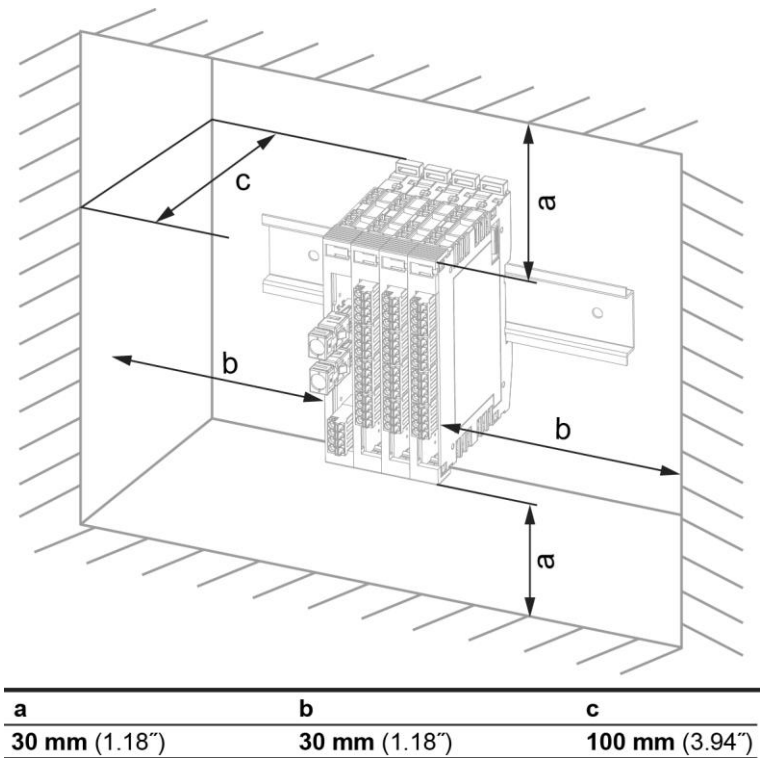
Damaged components can disrupt or damage the system.

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 clamp 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, 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 ... distances in mm (inches)

10 Addressing

10.1 Address Mapping Overview (FW version 1.20)

Address (hex)	Size (bytes)	Access Type	Description
0000	128	w	Cyclic Data for Firmware
0000	0	-	-
0080	128	r	Cyclic Data for the HW Class
0080	2	r	Status
0082	2	r	Analog input 1 in μA
0084	2	r	Analog input 2 in μA
0086	2	r	Analog input 3 in μA
0088	2	r	Analog input 4 in μA
008A	2	r	Analog input 5 in μA
008C	2	r	Analog input 6 in μA
008E	2	r	Analog input 7 in μA
0090	2	r	Analog input 8 in μA
0092	2	r	Lower limit value exceeded Bit 0 input AI1 Bit 1 input AI2 Bit 6 input AI7 Bit 7 input AI8 Upper limit value exceeded (only active if New-Threshold-Enable is active (0x104:2 or 0x105:0)) Bit 8 input AI1 Bit 9 input AI2 Bit 14 input AI7 Bit 15 input AI8
0100	128	w	CFG for the Firmware
0100	2	w	CRC 16
0102	2	w	Data length

0104	1	w	Info (special purpose or status bits) Bit 0 PMB mode Bit 1 Boot loader/update request Bit 2 New-Threshold-Enable - EATON (If active, disables evaluation of 0x105:0, but enables its functionality. The detection of new configuration corresponds to the behavior with 0x105:0 deactivated, i.e. new Cfg is detected at the message counter)
0105	1	w	Config-Bits: Bit 0: New-Threshold-Enable (If true: activates the new measurement limits and allows configurable cable-break detection. Additionally, the message counter is thereby activated. Not evaluated if 0x104:2 is active) Rest: reserved
Standard Mode (info-register bit 0 = 0)			
0106	2	w	Analog input mode selection Bit 0 = 0 input 1: analog input 0-20 mA Bit 0 = 1 input 1: analog input U-20 mA Bit 1 = 0 input 2: analog input 0-20 mA Bit 1 = 1 input 2: analog input U-20 mA Bit 2 = 0 input 3: analog input 0-20 mA Bit 2 = 1 input 3: analog input U-20 mA Bit 3 = 0 input 4: analog input 0-20 mA Bit 3 = 1 input 4: analog input U-20 mA Bit 4 = 0 input 5: analog input 0-20 mA Bit 4 = 1 input 5: analog input U-20 mA Bit 5 = 0 input 6: analog input 0-20 mA Bit 5 = 1 input 6: analog input U-20 mA Bit 6 = 0 input 7: analog input 0-20 mA Bit 6 = 1 input 7: analog input U-20 mA Bit 7 = 0 input 8: analog input 0-20 mA Bit 7 = 1 input 8: analog input U-20 mA If New-Threshold-Enable is active (0x104:2 or 0x105:0), U corresponds to the threshold value for cable break detection (0x118), otherwise U corresponds to 4 mA.
0108	2	w	Cutoff frequency low pass filter input 1 Supported values: 1000 Hz, 500 Hz, 250 Hz, 100 Hz, 50 Hz, 25 Hz, 10 Hz, 0 (filter bypass)
010A	2	w	Cutoff frequency low pass filter input 2
010C	2	w	Cutoff frequency low pass filter input 3
010E	2	w	Cutoff frequency low pass filter input 4

0110	2	w	Cutoff frequency low pass filter input 5
0112	2	w	Cutoff frequency low pass filter input 6
0114	2	w	Cutoff frequency low pass filter input 7
0116	2	w	Cutoff frequency low pass filter input 8
0118	2	w	Threshold value for cable-break detection. 1 increment = 1 μ A, valid value range 0-4000 μ A. Default value 4000 μ A. Only available if New-Threshold-Enable is active (0x104:2 or 0x105:0).
011A	2	w	Message Counter (for Firmware) Only available if New-Threshold-Enable is active (0x104:2 or 0x105:0).
PMB mode (Info register bit 0 = 1)			
0180	128	r	CFG/version for the HW class
0180	2		CRC16
0182	2		Data length
0184	2		Firmware version
0186	2		Message Counter (return to the HW class)
0200	x		Firmware update
0200	x		Firmware update

10.2 Address Mapping Overview (FW version 1.10)

Address (hex)	Size (bytes)	Access Type	Description
0000	128	w	Cyclic Data for Firmware
0000	0	-	-
0080	128	r	Cyclic Data for the HW Class
0080	2	r	Status
0082	2	r	Analog input 1 in μA
0084	2	r	Analog input 2 in μA
0086	2	r	Analog input 3 in μA
0088	2	r	Analog input 4 in μA
008A	2	r	Analog input 5 in μA
008C	2	r	Analog input 6 in μA
008E	2	r	Analog input 7 in μA
0090	2	r	Analog input 8 in μA
0092	2	r	Lower limit value exceeded Bit 0 input AI1 Bit 1 input AI2 Bit 6 input AI7 Bit 7 input AI8 Upper limit value exceeded (only active if New-Threshold-Enable is active (0x104:2)) Bit 8 input AI1 Bit 9 input AI2 Bit 14 input AI7 Bit 15 input AI8
0100	128	w	CFG for the Firmware
0100	2	w	CRC 16
0102	2	w	Data length
0104	1	w	Info (special purpose or status bits) Bit 0 PMB mode Bit 1 Boot loader/update request

0105	1	w	Config-Bits: Bit 0: New-Threshold-Enable (If true: activates the new measurement limits and allows configurable cable-break detection. Additionally, the message counter is thereby activated). Rest: reserved
Standard Mode (info-register bit 0 = 0)			
0106	2	w	Analog input mode selection Bit 0 = 0 input 1: analog input 0-20 mA Bit 0 = 1 input 1: analog input U-20 mA Bit 1 = 0 input 2: analog input 0-20 mA Bit 1 = 1 input 2: analog input U-20 mA Bit 2 = 0 input 3: analog input 0-20 mA Bit 2 = 1 input 3: analog input U-20 mA Bit 3 = 0 input 4: analog input 0-20 mA Bit 3 = 1 input 4: analog input U-20 mA Bit 4 = 0 input 5: analog input 0-20 mA Bit 4 = 1 input 5: analog input U-20 mA Bit 5 = 0 input 6: analog input 0-20 mA Bit 5 = 1 input 6: analog input U-20 mA Bit 6 = 0 input 7: analog input 0-20 mA Bit 6 = 1 input 7: analog input U-20 mA Bit 7 = 0 input 8: analog input 0-20 mA Bit 7 = 1 input 8: analog input U-20 mA If New-Threshold-Enable is active (0x104:2), U corresponds to the threshold value for cable break detection (0x118), otherwise U corresponds to 4 mA.
0108	2	w	Cutoff frequency low pass filter input 1 Supported values: 1000 Hz, 500 Hz, 250 Hz, 100 Hz, 50 Hz, 25 Hz, 10 Hz, 0 (filter bypass)
010A	2	w	Cutoff frequency low pass filter input 2
010C	2	w	Cutoff frequency low pass filter input 3
010E	2	w	Cutoff frequency low pass filter input 4
0110	2	w	Cutoff frequency low pass filter input 5
0112	2	w	Cutoff frequency low pass filter input 6
0114	2	w	Cutoff frequency low pass filter input 7
0116	2	w	Cutoff frequency low pass filter input 8
0118	2	w	Threshold value for cable-break detection. 1 increment = 1 μA, valid value range 0-4000 μA. Default value 4000 μA. Only available if New-Threshold-Enable is active (0x104:2).

011A	2	w	Message Counter (for Firmware) Only available if New-Threshold-Enable is active (0x104:2).
PMB mode (Info register bit 0 = 1)			
0180	128	r	CFG/version for the HW class
0180	2		CRC16
0182	2		Data length
0184	2		Firmware version
0186	2		Message Counter (return to the HW class)
0200	x		Firmware update
0200	x		Firmware update

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 operating panel according to the storage conditions. See chapter 11.

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



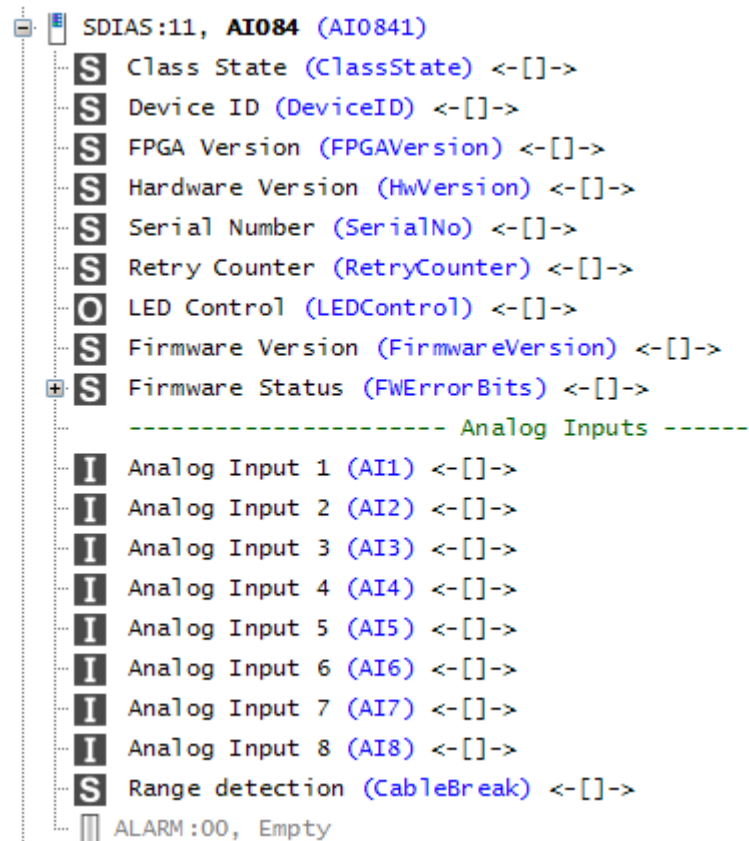
Should you need to dispose of the device, the national regulations for disposal must be followed.

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



15 Hardware Class AI084

Hardware Class AI084 for the S-DIAS AI084 analog module



This hardware class is used to control the AI 084 hardware module. The module has 8 analog 0 to 20 mA inputs. Whereby, cable break detection can be activated for the inputs with currents smaller than 4 mA. More information on the hardware can be found in the module documentation.

15.1 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.										
FPGA Version	State	FPGA version of the module in 16#XY (e.g. 16#10 = version 1.0).										
Hardware Version	State	Hardware version of the module in format 16#XXYY (e.g. 16#0120 = Version 1.20)										
Serial Number	State	The serial number of the hardware module is shown in this server.										
Retry Counter	State	This server increments when a transfer fails.										
LED Control	Output	With this server, the application LED of the S-DIAS module can be activated to find the module in the network more quickly. <table><tr><td>0</td><td>LED off</td></tr><tr><td>1</td><td>LED on</td></tr><tr><td>2</td><td>blinks slowly</td></tr><tr><td>3</td><td>blinks rapidly</td></tr></table>	0	LED off	1	LED on	2	blinks slowly	3	blinks rapidly		
0	LED off											
1	LED on											
2	blinks slowly											
3	blinks rapidly											
Firmware Version	State	The Firmware version of the hardware module is shown in this server.										
Firmware Status	State	In this server, the status bits of the FW are shown. <table><tr><td>Bit 0</td><td>DC not OK</td></tr><tr><td>Bit 1</td><td>no Sync available</td></tr><tr><td>Bit 2</td><td>Flash Data CRC Error</td></tr><tr><td>Bit 3</td><td>Ram Data CRC Error</td></tr><tr><td>Bit 4</td><td>invalid EEPROM version</td></tr></table>	Bit 0	DC not OK	Bit 1	no Sync available	Bit 2	Flash Data CRC Error	Bit 3	Ram Data CRC Error	Bit 4	invalid EEPROM version
Bit 0	DC not OK											
Bit 1	no Sync available											
Bit 2	Flash Data CRC Error											
Bit 3	Ram Data CRC Error											
Bit 4	invalid EEPROM version											
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 can be inserted or removed at any time. However, which components identified as "not required" should be selected with regard to the safety of the system.										

15.2 Analog Inputs [1-8]

Analog Input [1-8]	Input	Analog input 1-8, status request via read().
AI[1-8] Config	Property	0 AI[1-8] used as analog input (range: 0 to 20 mA) 1 AI[1-8] used as analog input (range: 4 to 20 mA). With currents smaller than 4 mA, a cable brake is detected (see section: Cable break detection and measurement value limits).
AI[1-8] cut off frequency	Property	In this client, the cutoff frequency for the software low pass filter is set. Value setting options are: 0 1000 Hz 1 500 Hz 2 250 Hz 3 100 Hz 4 50 Hz 5 25 Hz 6 10 Hz
AI[1-8] minimal value	Property	This value indicates the minimum value for the channel. If 0 mA is measured at the channel (0 mA AI[1-8] Config = 0, 4mA AI[1-8] Config = 1), this value is output in the software. The range of the measurement values are defined by the setting in the clients AI[1-8]_Min und AI[1-8]_Max.
AI[1-8] maximal value	Property	This value indicates the maximum value for the channel. If +20 mA is measured at the channel, this value is output in the software. The range of the measurement values are defined by the setting in the clients AI[1-8]_Min und AI[1-8]_Max.

15.3 Cable Break Detection and Measurement Values

Range Detection	State	Detection lower measurement limit (cable break detection) <table><tr><td>Bit 0</td><td>cable break at input AI1</td></tr><tr><td>Bit 1</td><td>cable break at input AI2</td></tr><tr><td>Bit 2</td><td>cable break at input AI3</td></tr><tr><td>Bit 3</td><td>cable break at input AI4</td></tr><tr><td>Bit 4</td><td>cable break at input AI5</td></tr><tr><td>Bit 5</td><td>cable break at input AI6</td></tr><tr><td>Bit 6</td><td>cable break at input AI7</td></tr><tr><td>Bit 7</td><td>cable break at input AI8</td></tr></table> 0-20 mA mode: The limit for the lower measurement range is < -0,25 mA. 4-20 mA mode: Firmware ≥ 1.10: The limit for the cable break detection can be set in the property "Limit for low rangedetection". Default value = 3 mA Firmware < 1.10: The limit is fixly set to < 4 mA. Detection upper measurement limit: <table><tr><td>Bit 0</td><td>upper measurement range exceeded at input AI1</td></tr><tr><td>Bit 1</td><td>upper measurement range exceeded at input AI2</td></tr><tr><td>Bit 2</td><td>upper measurement range exceeded at input AI3</td></tr><tr><td>Bit 3</td><td>upper measurement range exceeded at input AI4</td></tr><tr><td>Bit 4</td><td>upper measurement range exceeded at input AI5</td></tr><tr><td>Bit 5</td><td>upper measurement range exceeded at input AI6</td></tr><tr><td>Bit 6</td><td>upper measurement range exceeded at input AI7</td></tr><tr><td>Bit 7</td><td>upper measurement range exceeded at input AI8</td></tr></table> Firmware ≥ 1.10: The upper measurement value limit is > 20.25 mA. Firmware < 1.10: No detection of upper measurement limit.	Bit 0	cable break at input AI1	Bit 1	cable break at input AI2	Bit 2	cable break at input AI3	Bit 3	cable break at input AI4	Bit 4	cable break at input AI5	Bit 5	cable break at input AI6	Bit 6	cable break at input AI7	Bit 7	cable break at input AI8	Bit 0	upper measurement range exceeded at input AI1	Bit 1	upper measurement range exceeded at input AI2	Bit 2	upper measurement range exceeded at input AI3	Bit 3	upper measurement range exceeded at input AI4	Bit 4	upper measurement range exceeded at input AI5	Bit 5	upper measurement range exceeded at input AI6	Bit 6	upper measurement range exceeded at input AI7	Bit 7	upper measurement range exceeded at input AI8
	Bit 0	cable break at input AI1																																
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Bit 4	upper measurement range exceeded at input AI5																																	
Bit 5	upper measurement range exceeded at input AI6																																	
Bit 6	upper measurement range exceeded at input AI7																																	
Bit 7	upper measurement range exceeded at input AI8																																	
Limit for low range detection	Property	Configurable limit for the detection of the lower measurement limit (cable break detection). Value range 0-4000 [µA]. (3000 default value = 3 mA) => effective with using firmware version ≥ 1.10. => with firmware versions < 1.10 the value is < 4 mA.																																

15.4 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
01.04.2014	10	5 Mounting	Text updated
08.04.2014	3	1.1 Analog Voltage / Current Input Specifications	Measurement value changed to 0-20000
08.09.2014	4	1.3 Miscellaneous	Added Standard
30.01.2015	9	4.2 Notes	Added note concerning connecting the S-DIAS module while voltage is applied
26.03.2015	7	3.2 Applicable Connectors	Added connections
09.07.2015	3	1.1 Analog Current Input Specifications	Changed Input resistance
22.01.2016	5	1.2 Electrical Requirements	Graphic added
09.03.2016	3	1.1 Analog Current Input Specifications	Input type added
28.04.2016	13	5 Mounting	Graphics distances
27.03.2017	3	1.1 Analog Current Input Specifications	Added value for cable break and short circuit monitoring
26.05.2017	3	1.1 Analog Current Input Specifications	Cable-break monitor and short-circuit monitor
	14	6.1 Address Mapping Overview	Address 092 and 105 changed Address 0118, 011A and 0186 added
17.08.2017	6	1.4 Environmental Conditions	Added operating conditions
	9	3.2 Applicable Connectors	Added sleeve length Added info regarding ultrasonically welded strands
18.10.2017	10	3.3 Label Field	Added chapter
	14	5 Mounting	Graphic replaced
03.11.2017	13	4.4 Connection of a 2-wire Sensor	Chapter added
		4.5 Connection of a 3-wire Sensor	
20.03.2018	3	1.1 Analog Current Input Specifications	Measurement precision specified in detail
08.09.2020		7 Hardware Class AI084	Chapter added

15.09.2020	4 17	1 Technical Data Addressing 6.2 Address Mapping Overview (FW version 1.10)	Short circuit monitor changed to 20,25 mA Changes in the table Address-Mapping Overview (FW version 1.20) Chapter added
04.11.2020	15	5 Mounting	Expansion functional ground connection
01.12.2021	5	1.2 Electrical Requirements	Current consumption changed
06.12.2022	7	1.3 Miscellaneous	UKCA conformity
26.07.2023		Document	General chapters added, design
22.11.2023	13	5.1 Analog Current Input Specifications	Maximum input current allowed added