SIGMATEK

DM 822

S-DIAS Differential Pressure Input Module

Instruction Manual

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Translation of the Original Instructions

S-DIAS Differential Pressure Input Module DM 822

with 2 differential pressure inputs

8 digital inputs

The S-DIAS DM 822 differential pressure input module has two differential pressure inputs with a measurement range of -2068 … +2068 mBar and eight digital inputs (+24 V/3.7 mA/0.5 ms).

Contents

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 DM 822

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 essential.

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 Dm 822 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

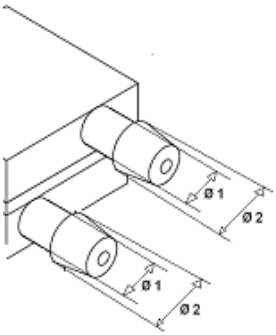
Exemplary nameplate (symbol image)

HW: Hardware version
SW: Software version

5 Technical Data

5.1 Differential Pressure Input Specifications

<table>
<tr><td>Number</td><td colspan="5">2</td></tr>
<tr><td>Pressure sensor type</td><td colspan="5">difference pressure sensor</td></tr>
<tr><td>Measurement range</td><td colspan="5">-2068 ... +2068 mbar</td></tr>
<tr><td>Measurement value</td><td colspan="5">-2068 … +2068</td></tr>
<tr><td>Resolution</td><td colspan="5">12-bit (ca. 1.0 mbar/LSB)</td></tr>
<tr><td>Conversion time for all channels</td><td colspan="5">1 ms</td></tr>
<tr><td>Input filter hardware</td><td colspan="5">typically 1 kHz, low pass 3rd order system</td></tr>
<tr><td>Input filter software</td><td colspan="5">configurable</td></tr>
<tr><td>Measurement precision</td><td colspan="5">based on the total measurement range: ±2 %
(at 10-50 °C ambient temperature)

based on the total measurement range: ±3 %
(at 0-60 °C ambient temperature)</td></tr>
<tr><td>Maximum differential pressure</td><td colspan="5">8 bar</td></tr>
<tr><td>Maximum ambient pressure</td><td colspan="5">10 bar</td></tr>
<tr><td>Connection</td><td colspan="5"> 

Ø 1: typically 1.6 mm
Ø 2: typically 1.9 mm</td></tr>
<tr><td>Recommended inner diameter of the connection tube</td><td colspan="5">1.68 mm</td></tr>
<tr><td rowspan="4">Applicable tube types</td><td>Manufacturer</td><td>Article number</td><td>Inner tube diameter</td><td>Shore hardness</td><td>Max. pressure at 25 °C</td></tr>
<tr><td>Frelin-Wade</td><td>95a-157</td><td>1.68 mm</td><td>95</td><td>6.89 bar</td></tr>
<tr><td>NewAge Industries</td><td>2110535</td><td>1.68 mm</td><td>85</td><td>9.31 bar</td></tr>
<tr><td>SMC</td><td>TU0212BU-20</td><td>1.2 mm (*)</td><td>-</td><td>7.50 bar</td></tr>
</table>

(*) difficult tube mounting at the pressure sensor because of the small inner tube diameter

5.2 Digital Input Specifications

Number	8	
Input voltage	typically +24 V	maximum +30 V
Signal level	low: < +8 V	high: > +14 V
Signal level (starting with HW version 1.10)	low: < +5 V	high: > +15 V
Input current	3.7 mA at +24 V	
Input delay	typically 0.5 ms	

5.3 Electrical Requirements

Voltage supply from the S-DIAS bus	+5 V	
Current consumption on the S-DIAS bus (+5 V power supply)	typically 55 mA	maximum 60 mA
Voltage supply from the S-DIAS bus	+24 V	
Current consumption on the S-DIAS bus (+24 V power supply)	typically 10 mA	maximum 15 mA

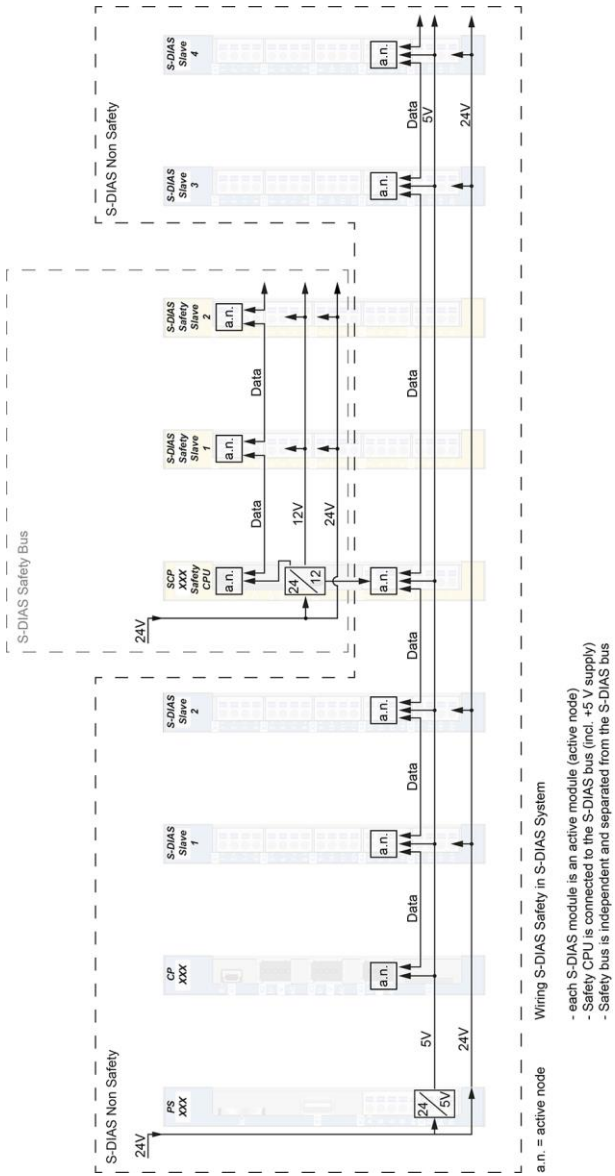
INFORMATION

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".


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

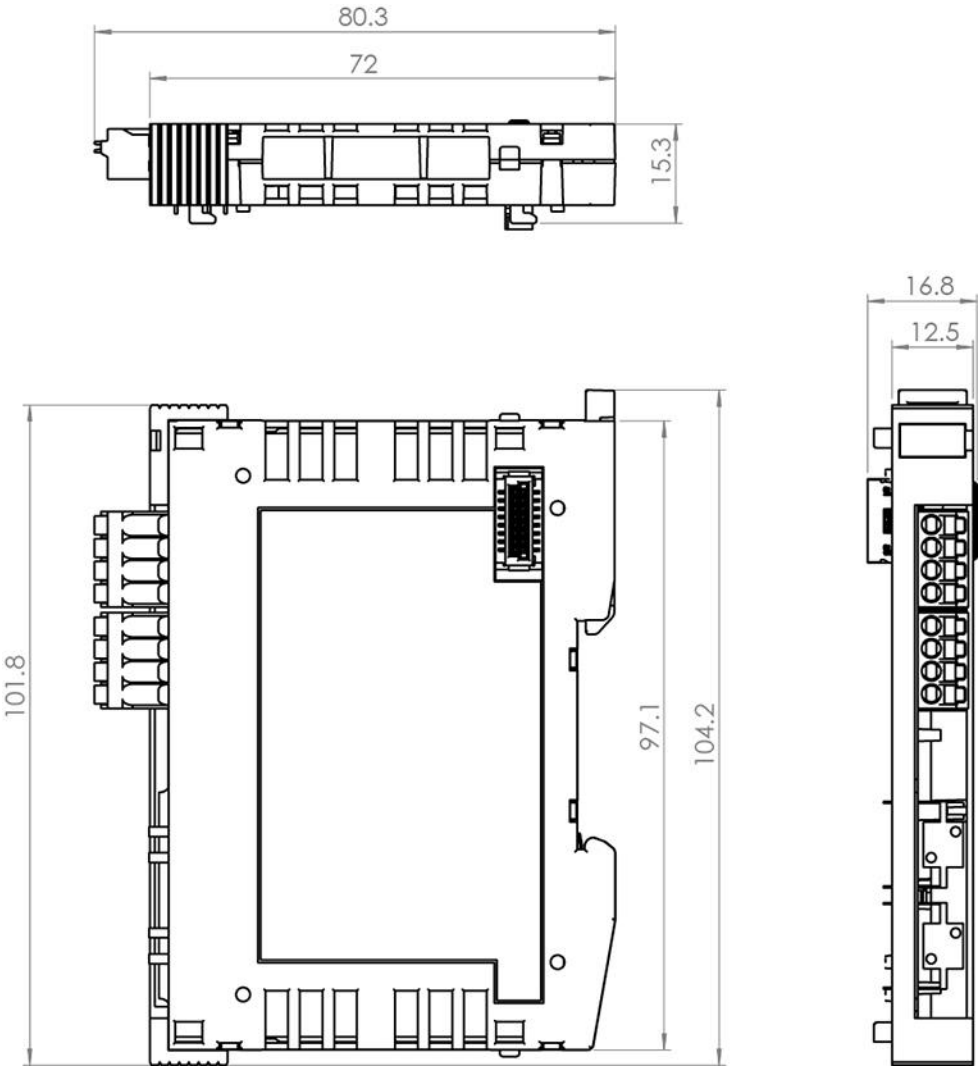
5.4 Miscellaneous

Article number	20-008-822
Standard	UL 508 (E247993)
Approbations	UL, cUL, CE, UKCA

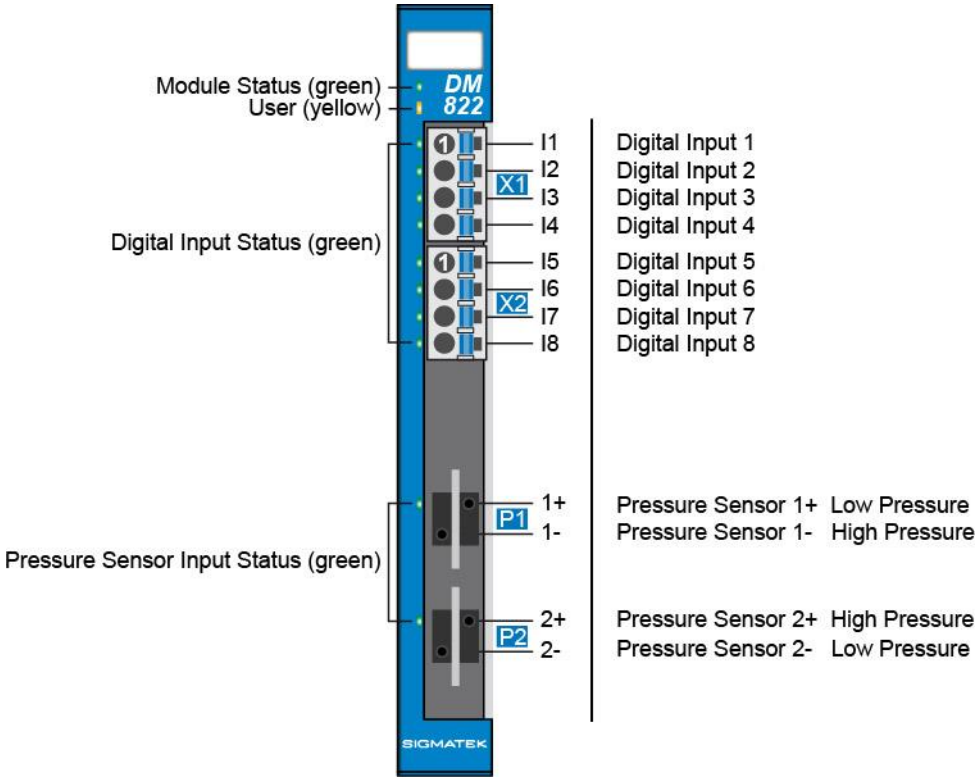
5.5 Environmental Conditions

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 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 61000-6-2:2007 (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

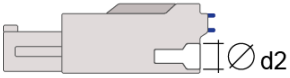
Module Status	green	ON	module active
		OFF	no supply available
		BLINKING (5 Hz)	no communication
User	yellow	ON	can be set from the application (e.g. the module LED can be set to blinking through the visualization so that the module is easily found in the control cabinet)
		OFF	
		BLINKING (2 Hz)	
		BLINKING (4 Hz)	
Digital input status	green	ON	input ON
		OFF	input OFF
Pressure sensor status	green	ON	input activated
		OFF	input deactivated
		BLINKING (0.5 Hz)	input below measurement range
		BLINKING (4 Hz)	input above measurement range / sensor break

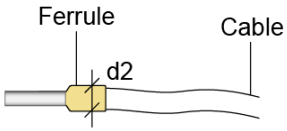
7.2 Applicable Connectors

Connectors:
X1-X2: 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)



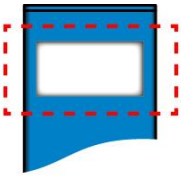


d2 = max. 2.8 mm

INFORMATION

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

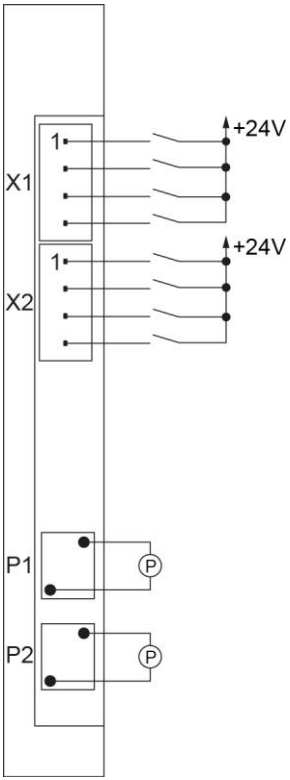
7.3 Label Field



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



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.

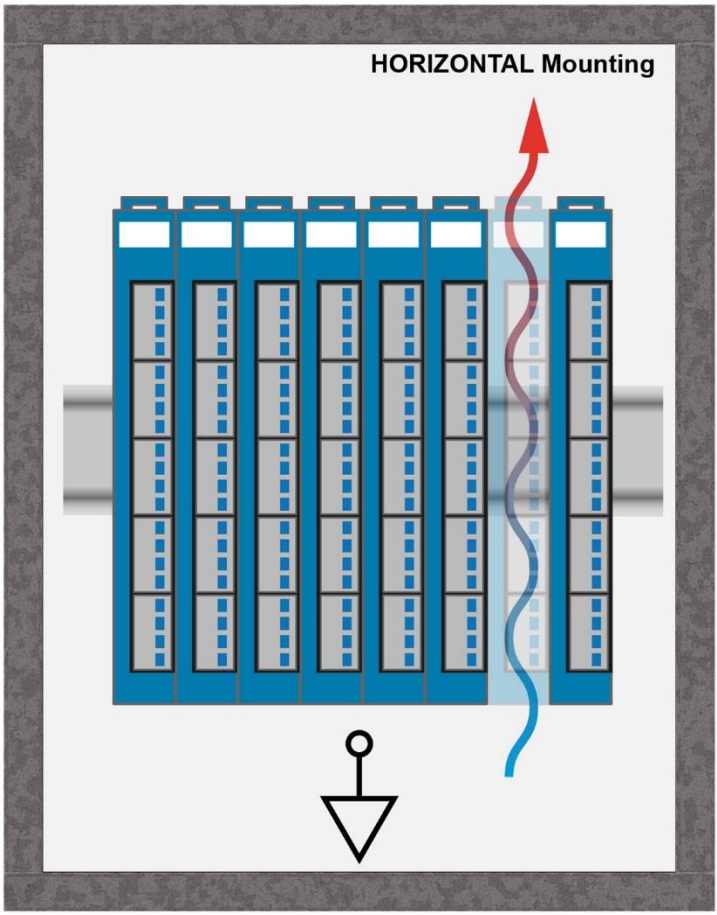
INFORMATION

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.

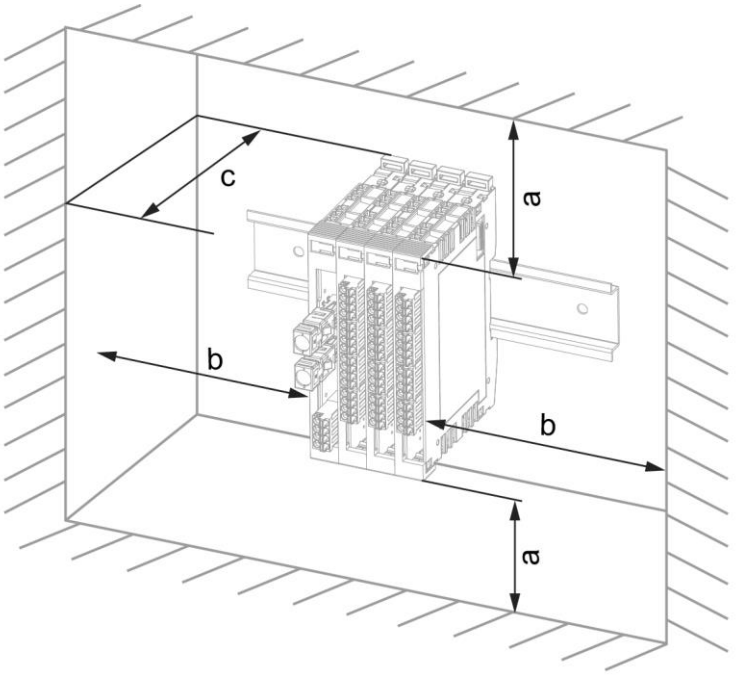
Damaged components can disrupt or damage the system.

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 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
30 mm (1.18″)	**30 mm** (1.18″)	**100 mm** (3.94″)

a, b, c … distances in mm (inches)

10 Addressing

10.1 Address Mapping Overview

Address (hex)	Size (bytes)	Description
0000	128	Cyclic Data for Firmware
0080	128	Cyclic Data for the HW Class
0100	128	CFG for the Firmware
0180	128	CFG/version for the HW class
0300	128	SDO Request
0380	128	SDO Response

10.2 Detailed Address Mapping

Cyclic Data for the HW Class (memory address range)		
0004	2	Status Bit 0 tbd
0006	2	Analog input 1
0008	2	Analog input 2
000A	1	Over range Bit 0 input AI1 Bit 1 input AI2 Under range Bit 2 input AI1 Bit 3 input AI2
000B	2	Raw value analog input 1
000D	2	Raw value analog input 2
Cyclic Data for Firmware (memory address range)		
0080	0	-
CFG for the Firmware (memory address range)		
0100	2	CRC16
0102	2	Data length

0104	1	Info (special-purpose or status bits) Bit 0 free Bit 1 boot loader/update request
0105	2	reserved
	Standard mode (info register bit 0 = 0)	
0106	2	Cutoff frequency low pass filter input 1
0108	2	Cutoff frequency low pass filter input 1
010A	1	Bit 0 = 0 AI1 → inactive Bit 0 = 1 AI1 → active Bit 1 = 0 AI2 → inactive Bit 1 = 1 AI2 → active
010B	1	Message counter
CFG/version for the HW class (memory address range)		
0180	2	CRC16
0182	2	Data length
0184	2	Firmware version
SDO access (memory address range)		
0300	128	SDO Request
0380	128	SDO Response

11 Supported Cycle Times

11.1 Cycle Times below 1 ms (in µs)

FW	50	100	125	200	250	500
V1.00		x	x	x	x	x

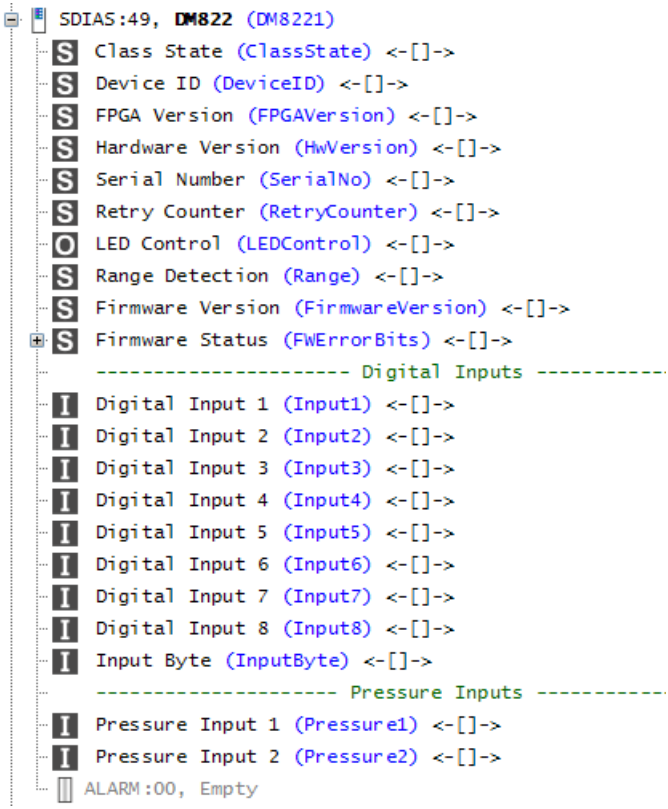
11.2 Cycle Times equal to or above 1 ms (in ms)

FW	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
V1.00	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

FW	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
V1.00	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

12 Hardware Class DM822

Hardware Class DM822 for the S-DIAS DM822 analog module



This hardware class is used to control the DM 822 hardware module. The module has 8 digital inputs and 2 pressure inputs with a measurement range of -2068 mbar to +2068 mbar.

More information on the hardware can be found in the module documentation.

12.1 Interfaces

12.1.1 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 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.
AI[1-2]_FilterFreq	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[1-2]_Active	This client is used to set whether the respective channel is active. Possible values: 0 – channel is inactive LED is off. 1 – channel is active LED is on. LED blinks with Hz when the input value exceeds the upper limit of the measurement range and with 0,5 Hz when it exceeds the lower limit.

12.1.2 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
FirmwareVersion	The Firmware version of the hardware module is shown in this server.
FWErrorBits	In this server, the status bits of the FW are shown. The respective bits mean the following: 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
Input[1-8]	Value of input 1-8.
InputByte	In this server, the digital outputs are shown in a 16-bit field. Within this bit field, 0 to 7 are allocated to inputs input1 to input8
Pressure[1-2]	Value of the pressure [1-2] in mbar, status query via read().
Range	This server indicates whether the value of an input has exceeded the upper or lower limit. Bit 0 maximum value of the range was exceeded at input AI1 Bit 1 maximum value of the range was exceeded at input AI2 Bit 2 minimum value of the range was exceeded at input AI1 Bit 3 minimum value of the range was exceeded at input AI2

12.1.3 Communication Interfaces

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

13 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.

14 Storage

INFORMATION

When not in use, store the operating panel according to the storage conditions. See chapter 13.

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

15 Maintenance

INFORMATION

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

15.1 Service

This product was constructed for low-maintenance operation.

15.2 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 13 Transport/Storage.

16 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
23.03.2015	3	1.1 Differential Pressure Input Specifications	Changed resolution from 12-bit (ca. **0.3** mbar / LSB) to 12-bit (ca. **1.0** mbar / LSB)
26.03.2015	9	3.2 Applicable Connectors	Added connections
21.01.2016	6	1.4 Miscellaneous	Approbations added
25.01.2016	4	1.3 Electrical Requirements	Graphics added
28.04.2016	13	5 Mounting	Graphics distances
10.06.2016	6	1.4 Miscellaneous	Applicable tube type
17.06.2016	3 6	1.1 Differential Pressure Input Specifications 1.4 Miscellaneous	Table extended Tube type removed
17.08.2017	6 10	1.5 Environmental Conditions 3.2 Applicable Connectors	Pollution Degree Sleeve length added Added info regarding ultrasonically welded strands
18.10.2017	11 14	3.3 Label Field 5 Mounting	Added chapter Graphic replaced
18.07.2019	17	7 Unterstützte Zykluszeiten	Chapter added
08.09.2020	19	8 Hardware Class DM822	Chapter added
04.11.2020	14	5 Mounting	Expansion functional ground connection
03.09.2021	5	1.3 Digital Input Specifications	Signal level and Switching threshold
06.12.2022	7	1.4 Miscellaneous	UKCA conformity
26.07.2023		Document	General chapters added, design