

DI 204

S-DIAS Digital Input Module with 2 Incremental Encoder Inputs

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S-DIAS Digital Input Module with 2 Incremental Encoder Inputs

DI 204

with 14 digital inputs

2 Incremental encoder inputs

The S-DIAS digital input module DI 204 is equipped with two incremental inputs with a TTL signal and 14 inputs with a +24 V signal for reading the signal states "0" and "1". To suppress noise in the signal lines, input filters are provided. The incremental encoder values can be latched.



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1 Technical Data

1.1 Incremental Encoder Input Specifications

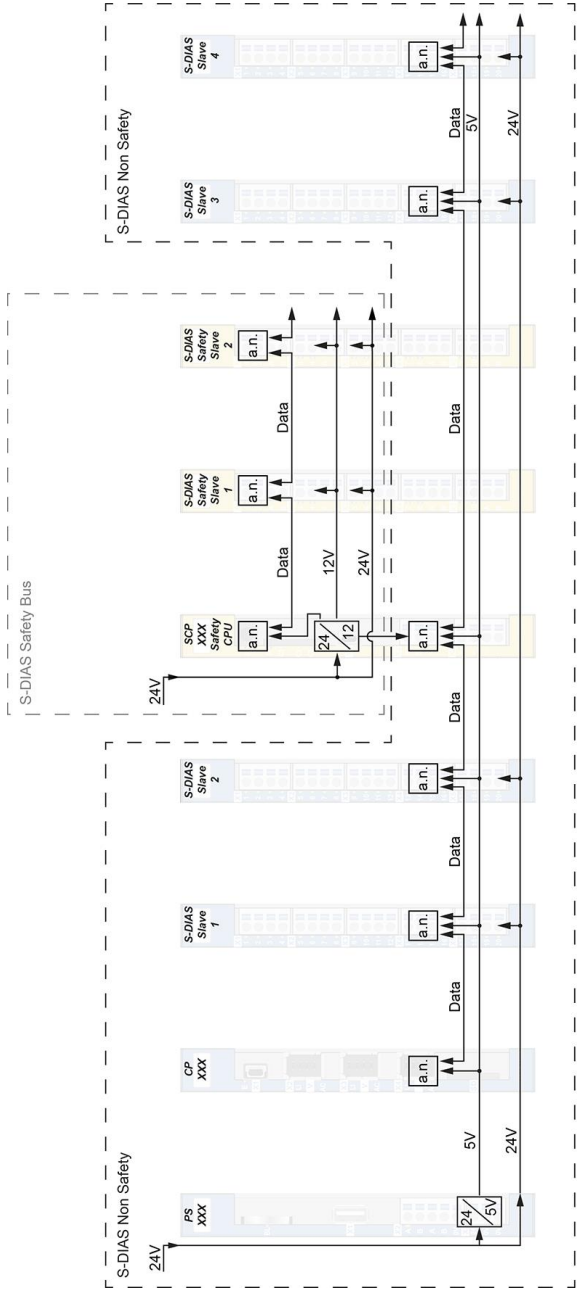
Number	2	
Input voltage	typically 5.0 V	maximum 5.5 V
Signal level	low 0.8 V	high 2.0
Switching threshold	typically 1.4 V	
Input current	1.5 mA at +5 V	
Input delay	typically 10 μ s	
Input frequency	maximum 25 kHz	
Counter frequency	maximum 100 kHz in incremental counter mode with 4-edge analysis	

1.2 Input Specifications

Number	14	
Input voltage	typically +24 V	maximum +30 V
Signal level	low: < +8 V	high: > +14 V
Switching threshold	typically +11 V	
Input current	3.7 mA at +24 V	
Input delay	typically 0.5 ms	

1.3 Electrical Requirements

Voltage supply from S-DIAS bus	+5 V	
Current consumption on the S-DIAS bus (+5 V supply)	typically 38 mA	maximum 43 mA



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

a.n. = active node

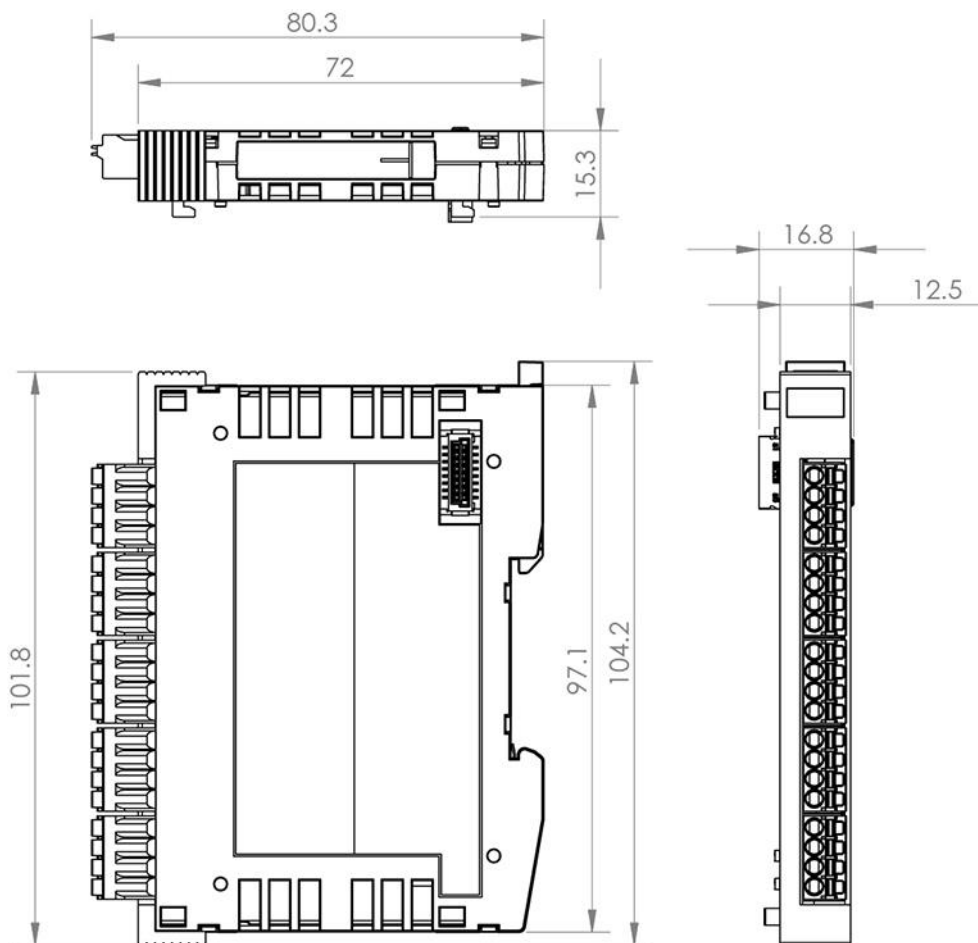
1.4 Miscellaneous

Article number	20-006-204
Hardware version	1.x
Standard	UL 508 (E247993)
Approbations	UL, cUL, CE

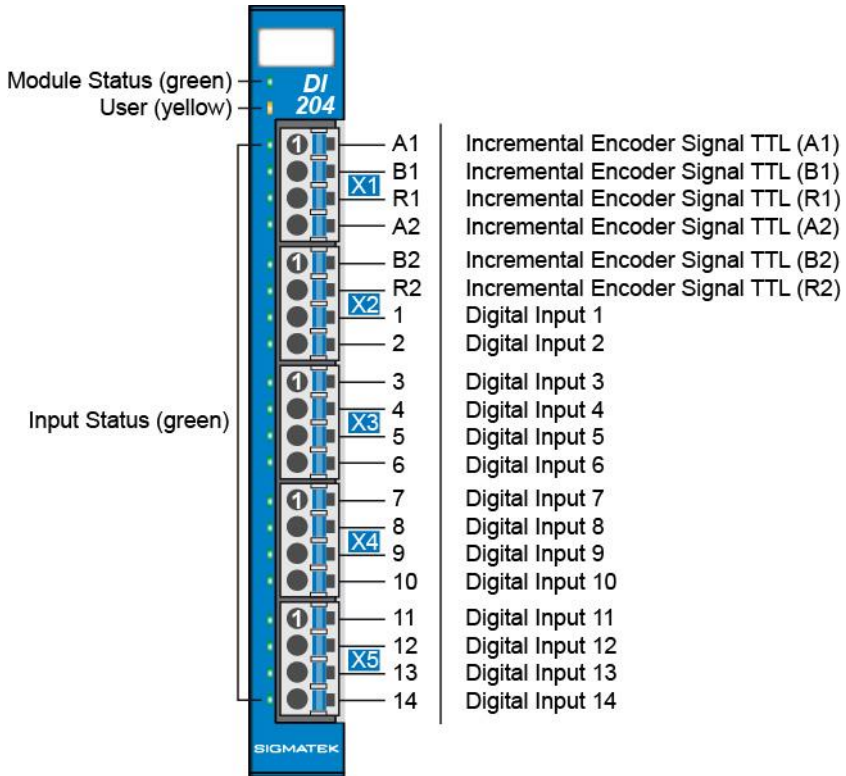
1.5 Environmental Conditions

Storage temperature	-20 ... +85 °C	
Environmental temperature	0 ... +55 °C	
Humidity	0-95 %, non-condensing	
Operating conditions	Pollution degree 2 altitude up to 2000 m	
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

2 Mechanical Dimensions



3 Connector Layout



3.1 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)	
Input Status	green	ON	input ON
		OFF	input OFF

3.2 Applicable Connectors

Connectors:

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

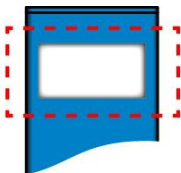
The spring terminals are suitable connecting ultrasonically compacted (ultrasonically welded) strands.

Connections:

Stripping length/Sleeve length:	10 mm
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)



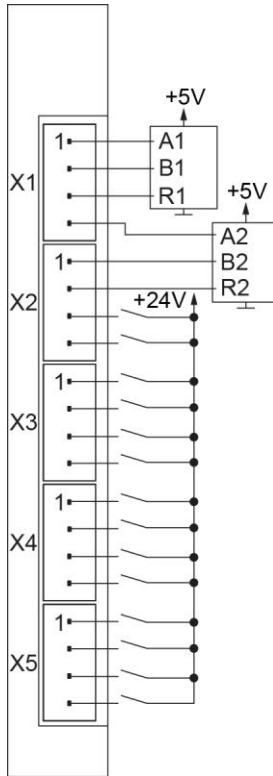
3.3 Label Field



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

4 Wiring

4.1 Wiring Example



4.2 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 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!

IMPORTANT:

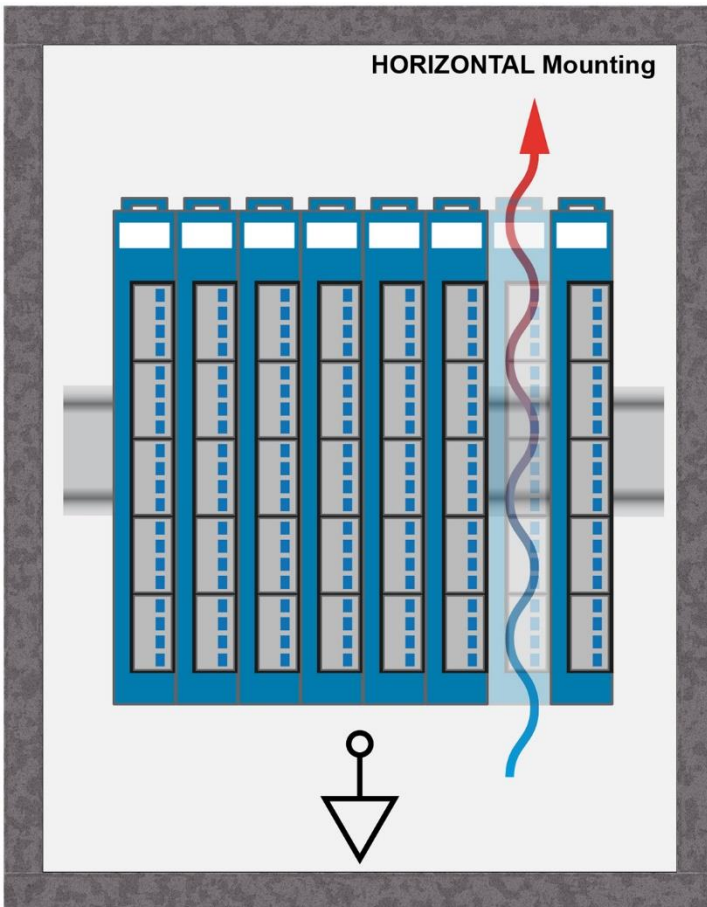
The S-DIAS module CANNOT be connected or disconnected while voltage is applied!

IMPORTANT:

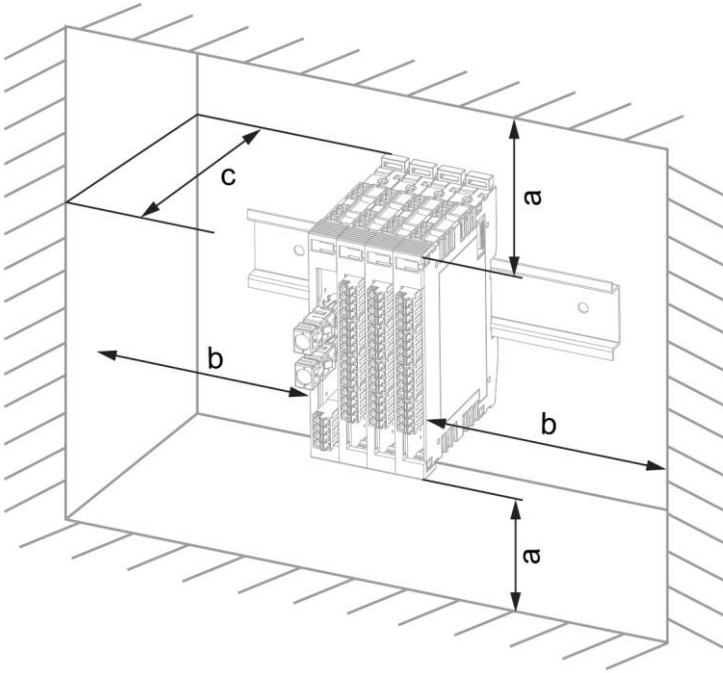
Le module S-Dias NE PEUT PAS être inséré ou retiré sous tension.

5 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)

6 Addressing

6.1 Address mapping overview

Address (hex)	Size (bytes)	Access Type	Description
Read Cyclic Data (PDO)			
0000	2	r	Input register Bit 0 input 1 Bit 1 input 2 ... Bit 13 input 14 Bit 14-15 reserved
0002	2	r16	Incremental encoder counter 1 Actual counter value
0004	2	r16	Incremental encoder counter 1 latched Latched counter value
4000	2	r16	Incremental encoder counter 2 Actual counter value
0008	2	r16	Incremental encoder counter 2 latched Latched counter value
1x	1	r	Incremental encoder status register 1 Bit 0-1 reserved Bit 2 Input A1 Bit 3 Input B1 Bit 4 Null position R1 Bit 5 Null position latched (reset when read) Bit 6-7 reserved
1x	1	r	Incremental encoder status register 2 Bit 0-1 reserved Bit 2 Input A2 Bit 3 Input B2 Bit 4 Null position R2 Bit 5 Null position latched (reset when read) Bit 6-7 reserved

Read/Write Configuration (SDO)			
000C	1	w	Incremental encoder command register 1 ⁽¹⁾ Bit 0-1 reserved Bit 2 Null position inversion (1 = inverted) Bit 3 Phase B inversion (1 = inverted) Bit 4-5 Edge sampling time 00 = incremental encoder off 01 = 1 edge 10 = 2 edges 11 = 4 edges Bit 6 A/B counter mode 1 edge input curve 0 = signal (A) and direction (B) 1 = true A/B Bit 7 reserved
1x	1	r/w	Incremental encoder command register 2 ⁽¹⁾ Bit 0-1 reserved Bit 2 Null position inversion (1 = inverted) Bit 3 Phase B inversion (1 = inverted) Bit 4-5 Edge sampling time 00 = incremental encoder off 01 = 1 edge 10 = 2 edges 11 = 4 edges Bit 6 A/B counter mode 1 edge input curve 0 = signal (A) and direction (B) 1 = true A/B Bit 7 reserved

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

7 Supported Cycle Times

7.1 Cycle Times below 1 ms (in μ s)

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

x= supported

7.2 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	19	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

8 Hardware Class DI204

Hardware Class DI204 for the DIAS DI204 digital input module

```

SDIAS:40, DI204 (DI2041)
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 Inputs Double (InputDouble) <-[]->
----- Encoder 1 -----
I Encoder 1 (Encoder1) <-[]->
I Encoder 1 Latched (Encoder1Latched) <-[]->
I Zero Position 1 (ZPuls1) <-[]->
I Zero Position Latched 1 (ZPulsLatch1) <-[]->
----- Encoder 2 -----
I Encoder 2 (Encoder2) <-[]->
I Encoder 2 Latched (Encoder2Latched) <-[]->
I Zero Position 2 (ZPuls2) <-[]->
I Zero Position Latched 2 (ZPulsLatch2) <-[]->
ALARM:00, Empty

```

This hardware class is used to control the DI 204 hardware module with 14 digital inputs and 2 rotary incremental encoders. More information on the hardware can be found in the module documentation.

8.1 Interfaces

8.1.1 General

ClassState	Input	This server shows the actual status of the hardware class.								
DeviceID	Input	The device ID of the hardware module is shown in this server.								
FPGAVersion	Input	FPGA version of the module in 16#XY (e.g. 16#10 = version 1.0).								
SerialNumber	Input	The serial number of the hardware module is shown in this server.								
RetryCounter	Input	This server increments when a transfer fails.								
LEDControl	Output	<p>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:</p> <table border="1" data-bbox="380 491 991 622"> <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									
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.								

8.1.2 Digital Inputs

Input[1-14]	Input	Status of input 1-14
InputDouble	Input	In this server, the digital outputs are shown in a 32-bit field. Bits 0 to 13 are assigned to inputs1 to input14 in this double word.

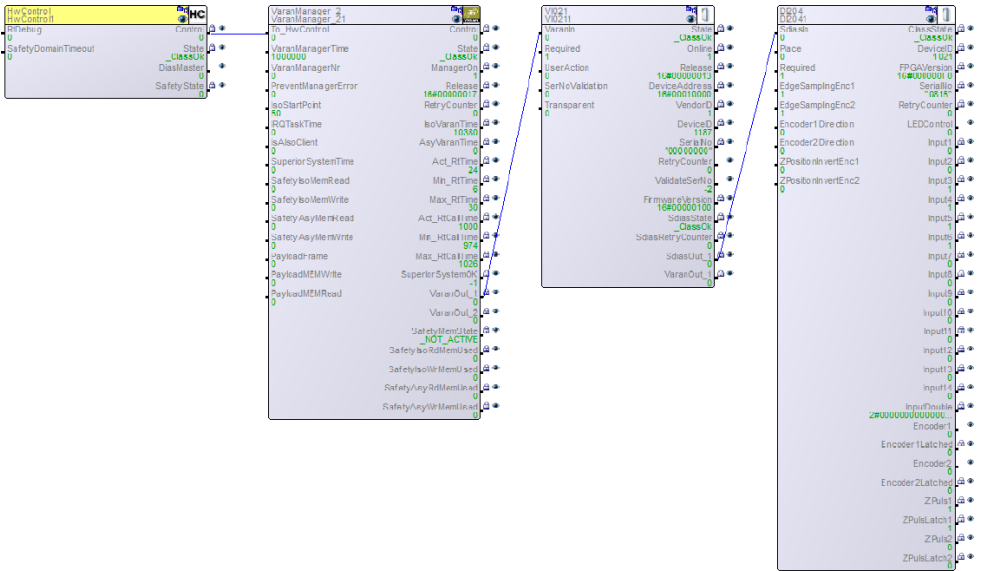
8.1.3 Encoder

Encoder[1,2]	Input	Position of incremental encoder 1 or 2 (32-bit signed up/down counter) The encoder can be reset with the write method of the server. The status is queried over read().
EncoderLatched[1,2]	Input	Latch position of incremental encoder 1 or 2 (32-bit signed up/down counter) The status is queried over read().
ZPuls[1,2]	Input	Reference position of encoder 1 or 2. 0 actual position does not match the reference position 1 actual position matches the reference position The status is queried over read().
ZPulsLatched[1,2]	Input	Latched position of encoder 1 or 2. 0 reference position has not been reached since last status query 1 reference position has been reached since last status query The status is queried over read(). During the status query, the server is reset to 0.
EdgeSamplingEnc[1,2]	Property	Edge sampling rate setting in encoder 1 or 2: 0 Encoder off 1 1 edge is counted 2 2 edges are counted 3 4 edges are counted as initialization value
EncoderDirection[1,2]	Property	Count direction setting in encoder 1 or 2: 0 Normal 1 Inverse as initialization value
ZpositionInvertEnc[1,2]	Property	When this client is activated, the ZeroPosition and ZeroPositionLatched servers of encoder 1 or 2 are inverted. This setting is used by the encoder and must therefore be configured so that in the ZeroPosition and ZeroPositionLatched servers, the idle status is shown as "0" and the reference signal as "1". 0 normal (default) 1 inverted as initialization value
ABCntMode[1,2]	Property	Setting of the counter mode of the encoder 1 resp. 2 with 2-edge scanning =1. 0 A pulses und B direction 1 true A/B as initialization value

8.1.4 Communication Interfaces

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



Documentation Changes

Change date	Affected page(s)	Chapter	Note
10.02.2014	7	3.2 Applicable Connectors	Connection capacity added French notes added
01.04.2014	9	5 Mounting	Text updated
08.09.2014	4	1.4 Miscellaneous	Added Standard
30.01.2015	8	4.2 Note	Added note concerning connecting the S-DIAS module while voltage is applied
26.03.2015	7	3.2 Applicable Connectors	Added connections
28.04.2016	12	5 Mounting	Graphics distances
17.08.2017	5 8	1.5 Environmental Conditions 3.2 Applicable Connectors	Pollution Degree Sleeve length added Added info regarding ultrasonically welded strands
18.10.2017	9 13	3.3 Label Field 5 Mounting	Added chapter Graphic replaced
14.11.2019	16	7 Supported Cycle Times	Chapter added
28.02.2020	16	7 Supported Cycle Times	Text adapted
08.09.2020	18	8 Hardware Class DI204	Chapter added
04.11.2020	13	5 Mounting	Expansion functional ground connection

