SIGMATEK

DM 161

S-DIAS Digital Mixed Module

Operating Manual

Date of creation: 27.02.2014 | Version date: 20.05.2022 | Article number: 20-008-161-E

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Translation from German

S-DIAS Digital Mixed Module DM 161

with 8 digital inputs

8 short-circuit proof digital outputs

The S-DIAS DM 161 digital mixed module has eight digital inputs (+24 V/3.7 mA/5 ms) and eight short-circuit proof digital outputs (+24 V/0.5 A). The supply voltage is monitored for under voltage.

Contents

1 Technical Data

1.1 Digital Input Specifications

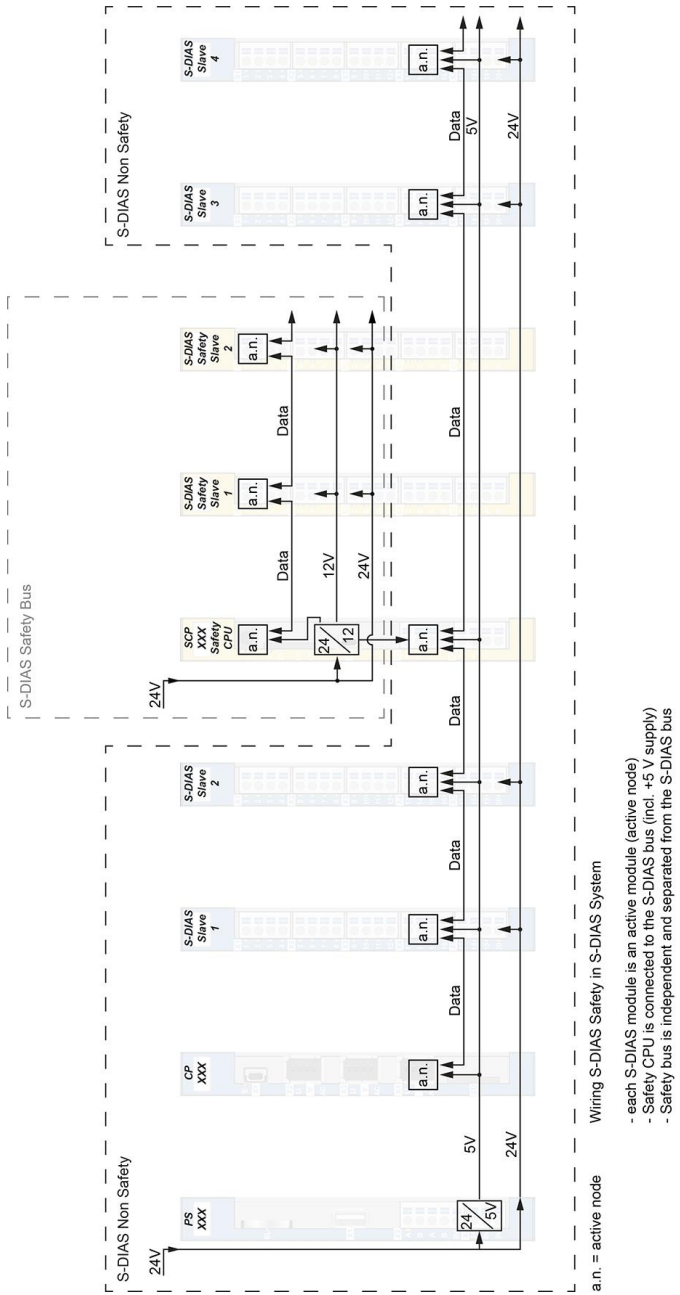
Number	8	
Input voltage	typically +24 V	maximum +30 V
Signal level (up to HW version 5.10, DM 161) (up to HW version 3.10, DM 161-E)	low: < +8 V	high: > +14 V
Signal level (starting with HW version 5.20, DM 161) (starting with HW version 3.20, DM 161-E)	low: < +5 V	high: > +15 V
Input current	3.7 mA at +24 V	
Input delay	typically 5 ms	

1.2 Digital Output Specification

Number	8
Short-circuit proof	yes
Maximum continuous current load allowed per channel	0.5 A
Maximum total current (all 8 outputs)	4 A (100% of on-time)
Maximum braking energy of outputs (inductive load)	maximum 1 Joule/channel
Residual current (off)	≤ 10 µA
Turn-on delay	< 100 µs (up to HW version 6.XX, DM 161) < 100 µs (up to HW version 3.30, DM 161-E) < 200 µs (starting with HW version 7.00, DM 161) < 200 µs (starting with HW version 5.00, DM 161-E)
Turn-off delay	< 150 µs (up to HW version 6.XX, DM 161) < 150 µs (up to HW version 3.30, DM 161-E) < 200 µs (starting with HW version 7.00, DM 161) < 200 µs (starting with HW version 5.00, DM 161-E)

1.3 Electrical Requirements

Power supply +24 V	18-30 V DC	
Current consumption of the +24 V supply	corresponds to the load on the digital outputs	
Voltage supply from S-DIAS bus	+5 V	
Current consumption on the S-DIAS bus (+5 V supply) for DM 161 HW1.x to HW5.x	typically 45 mA	maximum 50 mA
Current consumption on the S-DIAS bus (+5 V supply) for DM 161 HW6.x, HW7.x	typically 62 mA	maximum 67 mA
Current consumption on the S-DIAS bus (+5 V supply) for DM 161-E HW1.x to HW3.x	typically 45 mA	maximum 50 mA


S-DIAS Non Safety
S-DIAS Safety Bus
S-DIAS Non Safety
24V
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.
Data
5V
12V
24V
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

1. Voltage Monitor

Power supply +24 V	supply voltage > 18 V (DC OK-LED lights green)

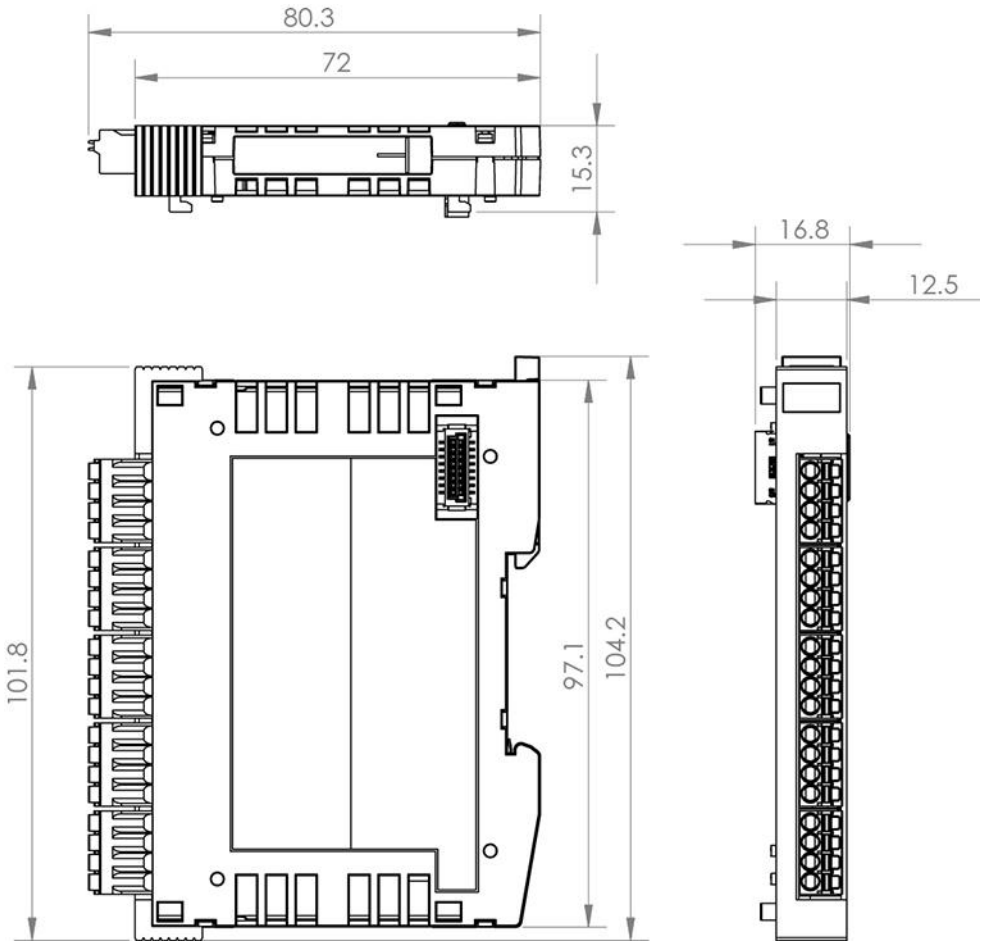
1.4 Miscellaneous

Article number	20-008-161
Hardware version	1.x-7.x
Standard	UL 508 (E247993)
Approbations	UL, cUL, CE

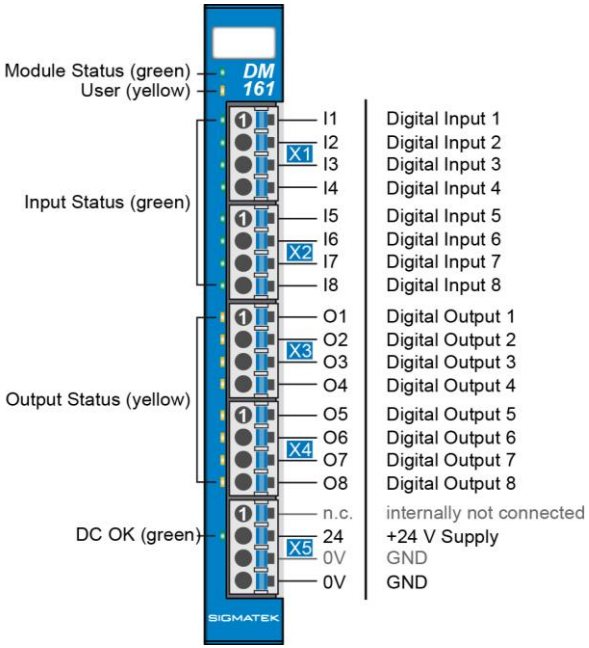
1.5 Environmental Conditions

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 (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



The pins 3 & 4 of the connector X5 are bridged within the module. For the GND supply of the module only the connection of pin 4 is necessary. The internally bridged connections may be used for further looping of the GND supply. However, it must be taken into account that a total current of 6 A per connection is not exceeded as a result of further looping!

3.1 Status LEDs

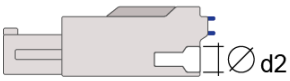
Module Status	green	ON	module active
		OFF	no supply available
		BLINKING (5 Hz)	no communication
User	yellow	ON	can be set from the application (e.g. the module LED can be set to blinking through the visualization so that the module is easily found in the control cabinet)
		OFF	
		BLINKING (2 Hz)	
		BLINKING (4 Hz)	
Input Status	green	ON	input ON
		OFF	input OFF
Output status	yellow	ON	output on
		OFF	output off
DC OK	green	ON	voltage is supplied to the output group

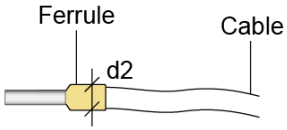
3.2 Applicable Connectors

Connectors:
X1-X5: Connectors with spring terminals (included in delivery)
The spring terminals are suitable connecting ultrasonically compacted (ultrasonically welded) strands.

Connections:

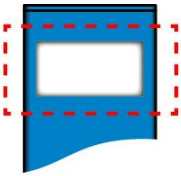
Stripping length/Sleeve length:	10 mm
Plug-in direction:	parallel to conductor axis or to PCB
Conductor cross section, rigid:	0.2-1.5 mm^2
Conductor cross section, flexible:	0.2-1.5 mm^2
Conductor cross section, ultrasonically compacted:	0.2-1.5 mm^2
Conductor cross section AWG/kcmil:	24-16
Conductor 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)





d2 = max. 2.8 mm

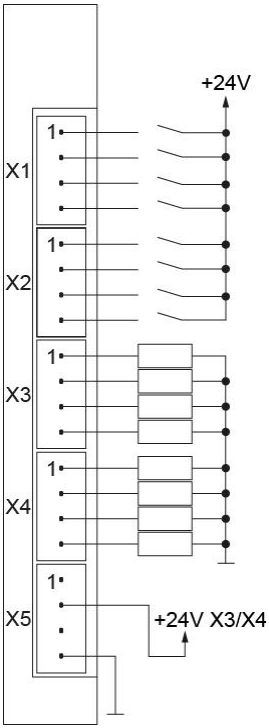
3.3 Label Field



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

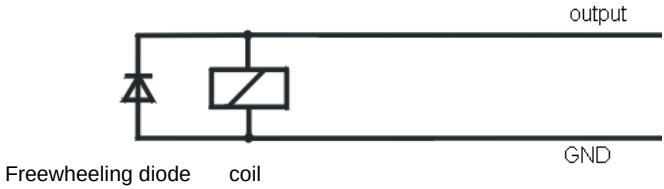
- Up to 8 outputs are powered by a common +24 V supply.
- The cross section of the conductor for the +24 supply must be sufficient for the maximum total current.
- The outputs and can be turned off by turning off the +24 V supply voltage.
- Applying power to an output whose supply voltage exceeds 0.7 V is not allowed.

Inductive loads must always be connected to a freewheeling diode or an RC network. This should be placed as close to the load as possible.

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

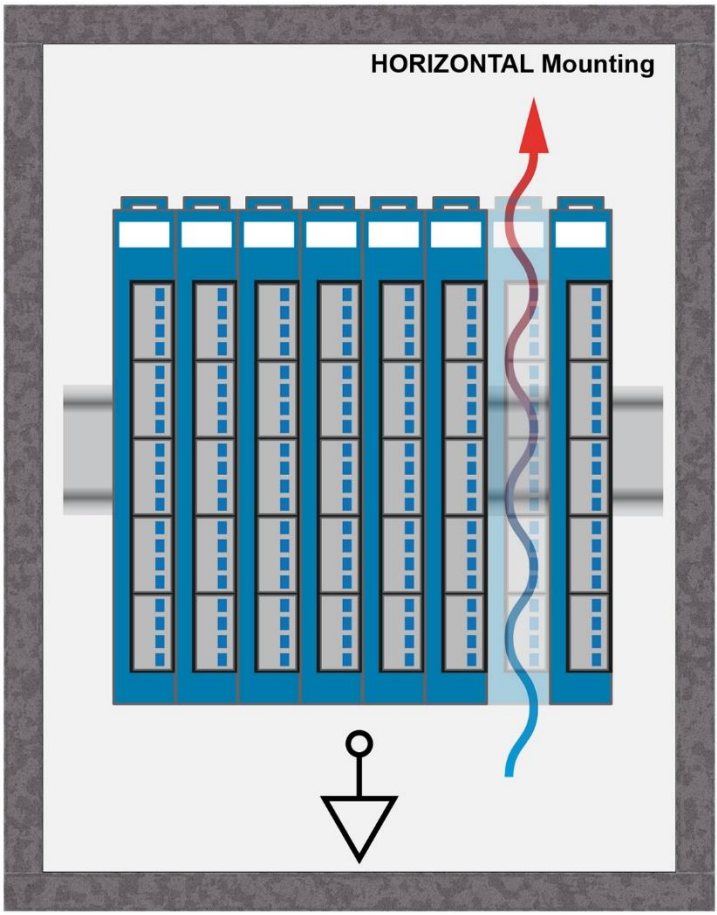
IMPORTANT:
Le module S-Dias NE PEUT PAS être inséré ou retiré sous tension.

4.2.1 Connecting Inductive Loads

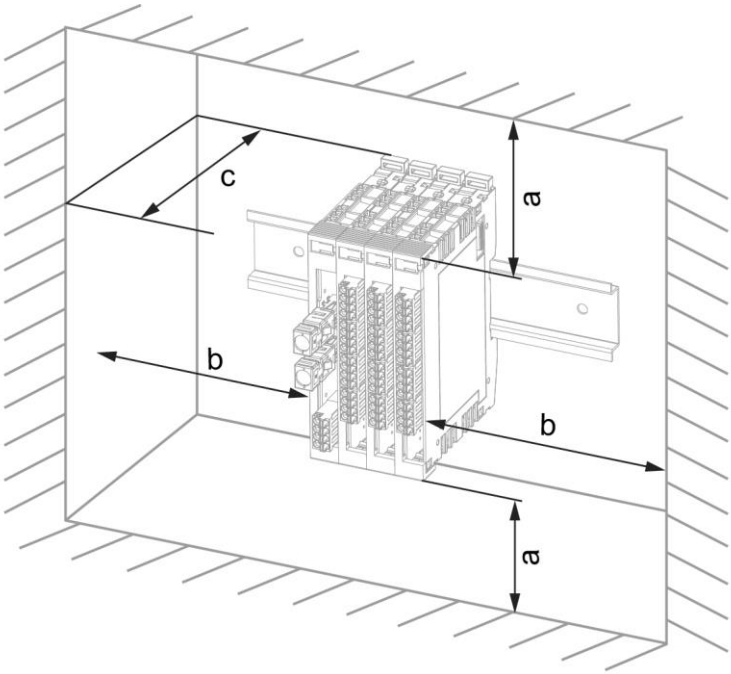


5 Mounting

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

Address (hex)	Size (bytes)	Access Type	Description	Reset value
Memory				
0000	2	r	Input register Bit 0 input 1 Bit 1 input 2 … Bit 7 input 8 Bit 8 reserved	0000
0000	1	w	Output register Bit 0 output 1 Bit 1 output 2 … Bit 7 output 8	00

7 Supported Cycle Times

7.1 Cycle Times below 1 ms (in µs)

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

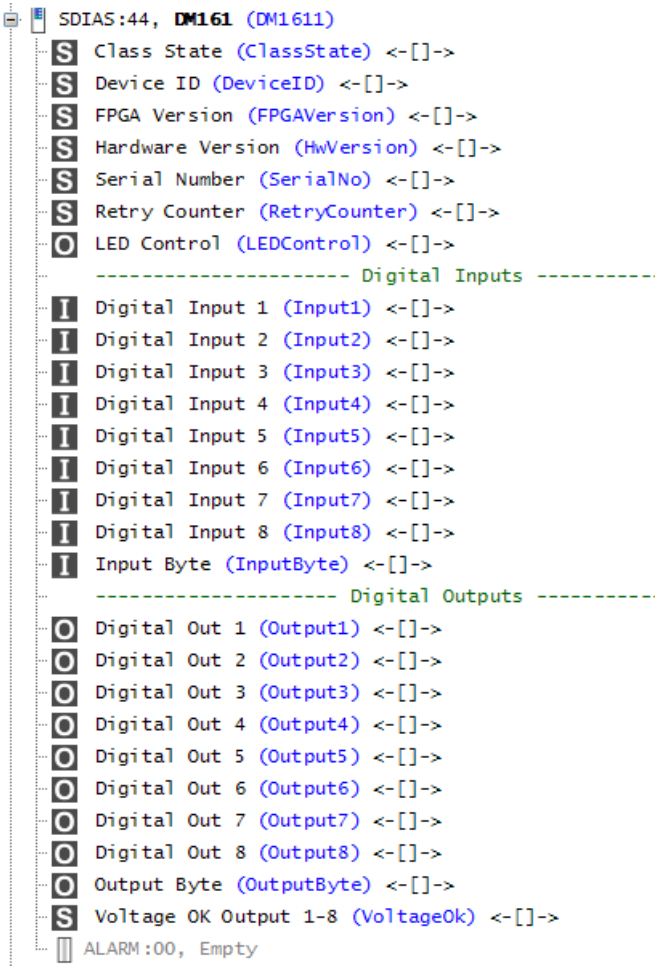
x= supported

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 DM161

Hardware Class DM161 for the S-DIAS DM161 digital module



This hardware class is used to control the DM 161 hardware module with 8 digital outputs and digital inputs. More information on the hardware can be found in the module documentation.

8.1 Interfaces

8.1.1 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 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.

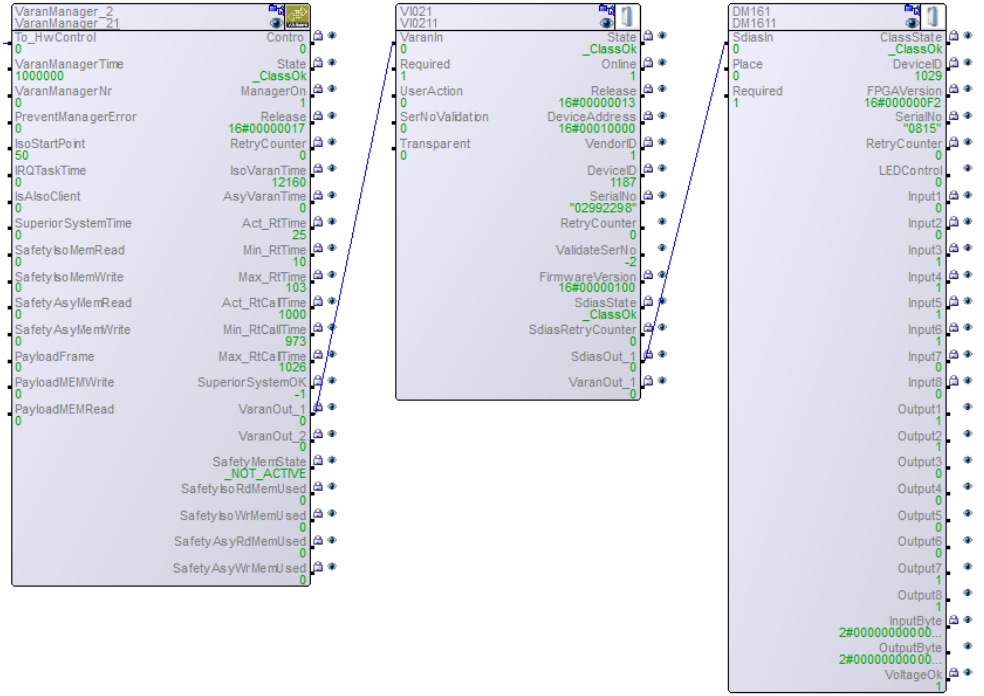
8.1.2 Servers

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[1-8]	Status of input 1-8.
Output[1-8]	Output 1-8, Output set via the write() method.
InputByte	In this server, the digital outputs are shown in an 8-bit field. Within this bit field, 0 to 7 are allocated to inputs input1 to input8
OutputByte	In this server, the digital outputs are shown in a 8-bit field. In this word, bits 0 to 7 are allocated to output1 to output8. A write() instruction to this server writes the bit pattern to these outputs.
VoltageOk	0 power supply error 1 power supply ok Bank1: for outputs 1-8

8.1.3 Communication Interfaces

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

8.2 Example


VaranManager_2
VaranManager_21
To_HwControl
0
VaranManagerTime
1000000
VaranManagerNr
0
PreventManagerError
0
IsoStartPoint
50
IRQTaskTime
0
IsAlsoClient
0
SuperiorSystemTime
0
SafetyIsoMemRead
0
SafetyIsoMemWrite
0
SafetyAsyMemRead
0
SafetyAsyMemWrite
0
PayloadFrame
0
PayloadMEMWrite
0
PayloadMEMRead
0
Contro
0
State
_ClassOk
ManagerOn
1
Release
16#00000017
RetryCounter
0
IsoVaranTime
12160
AsyVaranTime
0
Act_RtTime
25
Min_RtTime
10
Max_RtTime
103
Act_RtCallTime
1000
Min_RtCallTime
973
Max_RtCallTime
1026
SuperiorSystemOK
-1
VaranOut_1
0
VaranOut_2
0
SafetyMemState
_NOT_ACTIVE
SafetyIsoRdMemUsed
0
SafetyIsoWrMemUsed
0
SafetyAsyRdMemUsed
0
SafetyAsyWrMemUsed
0
VI021
VI0211
VaranIn
0
Required
1
UserAction
0
SerNoValidation
0
Transparent
0
State
_ClassOk
Online
1
Release
16#00000013
DeviceAddress
16#00010000
VendorID
1
DeviceID
1187
SerialNo
"02992298"
RetryCounter
0
ValidateSerNo
-2
FirmwareVersion
16#00000100
SdiasState
_ClassOk
SdiasRetryCounter
0
SdiasOut_1
0
VaranOut_1
0
DM161
DM1611
SdiasIn
0
Place
0
Required
1
ClassState
_ClassOk
DeviceID
1029
FPGAVersion
16#000000F2
SerialNo
"0815"
RetryCounter
0
LEDControl
0
Input1
0
Input2
0
Input3
1
Input4
1
Input5
1
Input6
1
Input7
0
Input8
0
Output1
1
Output2
1
Output3
0
Output4
0
Output5
0
Output6
0
Output7
1
Output8
1
InputByte
2#00000000000...
OutputByte
2#00000000000...
VoltageOk
1

Documentation Changes

Date	Affected page(s)	Chapter	Note
01.04.2014	10	5 Mounting	Text updated
30.01.2015	9	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
21.01.2016	4	1.5 Miscellaneous	Standard changed
25.01.2016	3	1.3 Electrical Requirements	Graphics added
28.04.2016	12	5 Mounting	Graphics distances
17,.08.2017	5 8	1.5 Environmental Conditions 3.2 Applicable Conditions	Pollution Degree Sleeve length added Added info regarding ultrasonically welded strands
18.10.2017	9 13	3.3 Label Field 5 Mounting	Added chapter Graphics replaced
26.09.2019	7	3 Connector Layout	Graphics extended, note added
14.11.2019	16	7 Supported Cycle Times	Chapter added
28.02.2020	16	7 Supported Cycle Times	Text adapted
08.09.2020	17	8 Hardware Class DM161	Chapter added
04.11.2020	13	5 Mounting	Expansion functional ground connection
30.08.2021	4	1.1 Digital Input Specifications	Signal level and Switching threshold
13.09.2021	5	1.3 Electrical Requirements	Current consumption changed
05.10.2021	5	1.3 Electrical Requirements	HW version -E added
23.12.2021	4	1.2 Digital Output Specifications	Delay values changed
20.05.2022	5	1.3 Electrical Requirements	HW version added