

A0 081

S-DIAS Analog Output Module

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S-DIAS Analog Output Module

AO 081

with 8 analog outputs

The S-DIAS AO 081 analog output module has eight, ± 10 V analog outputs with a resolution of 12 bits.



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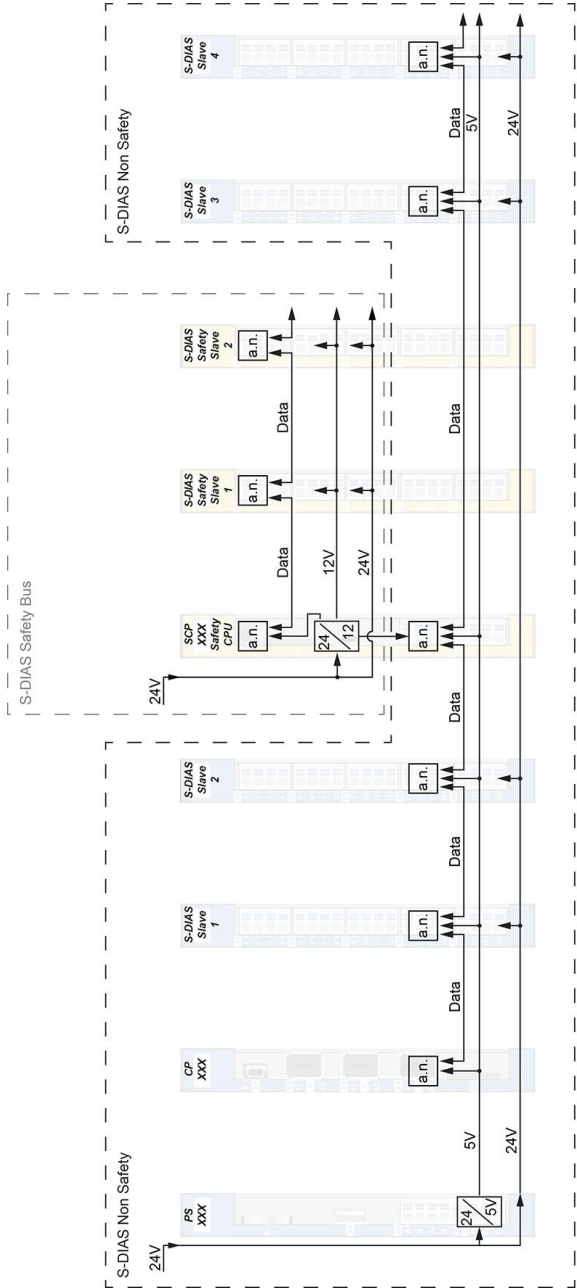
1 Technical Data

1.1 Analog Output Specifications

Number of channels	8
Output range	-10 ... +10 V
Output value	-10.000 ... +10.000
Resolution	12-bit (ca. 5 mV/LSB)
Refresh time for all channels	1 ms
Output voltage capacity	> 5 kOhm
Allowable capacitive load	maximum 100 nF
Short circuit protection	yes (1 min.)
Settling time	50 μ s (63 % of the end value) 100 μ s (86 % of the end value) 250 μ s (99 % the end value)
Analog precision	$\pm 0,5$ % of maximum output value

1.2 Electrical Requirements

External +24 V supply	+18-30 V DC	
Current consumption of the +24 V supply without load on the analog outputs	typically 36 mA at +18 V typically 31 mA at +24 V typically 28 mA at +30 V	maximum 40 mA at +18 V maximum 35 mA at +24 V maximum 32 mA at +30 V
Current consumption of the +24 V supply with maximum load on the analog outputs	typically 54 mA at +18 V typically 44 mA at +24 V typically 39 mA at +30 V	maximum 60 mA at +18 V maximum 49 mA at +24 V maximum 44 mA at +30 V
Current consumption of +24 V during short-circuit	typically an additional 25 mA per analog output	
Voltage supply from S-DIAS bus	+5 V	
Current consumption on the S-DIAS bus (+5 V supply)	typically 55 mA	maximum 60 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

1.3 Voltage Monitor External +24 V Supply

+24 V supply voltage	Supply voltage > 18 V (DC OK-LED lights green)
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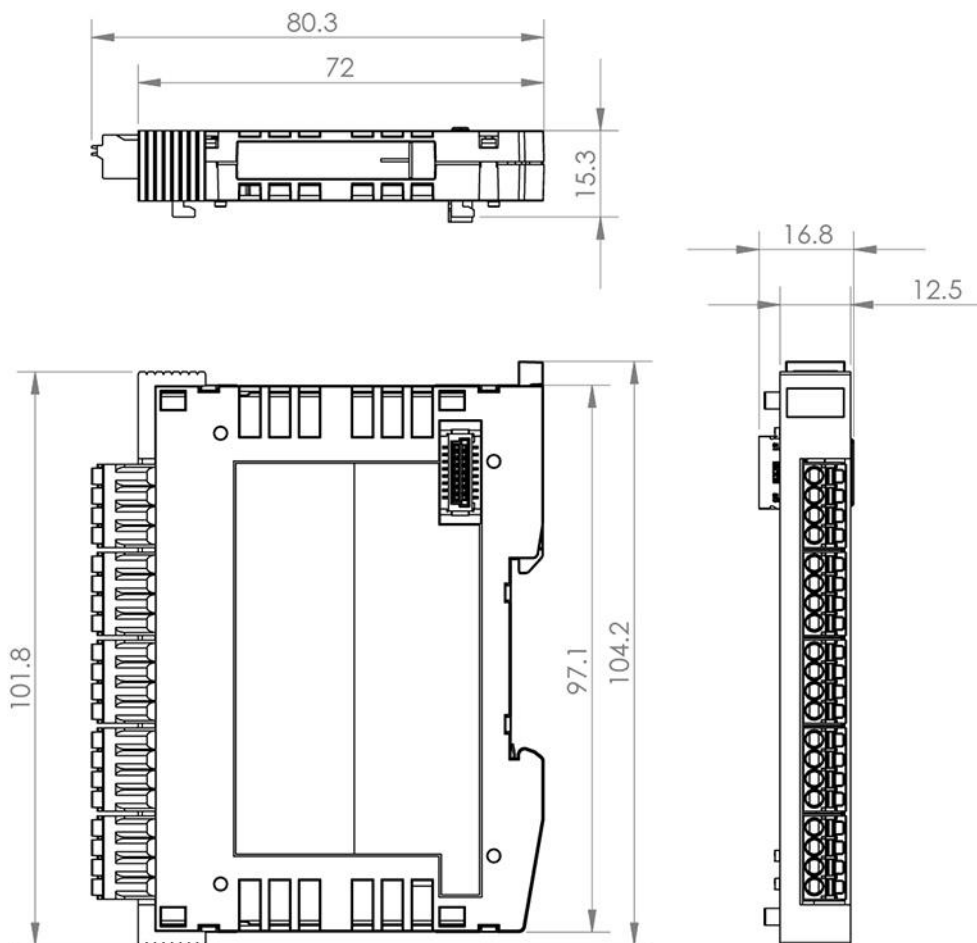
1.4 Miscellaneous

Article number	20-010-081
Hardware version	1.x
Standard	UL 508 (E247993)
Approbations	UL, cUL, CE

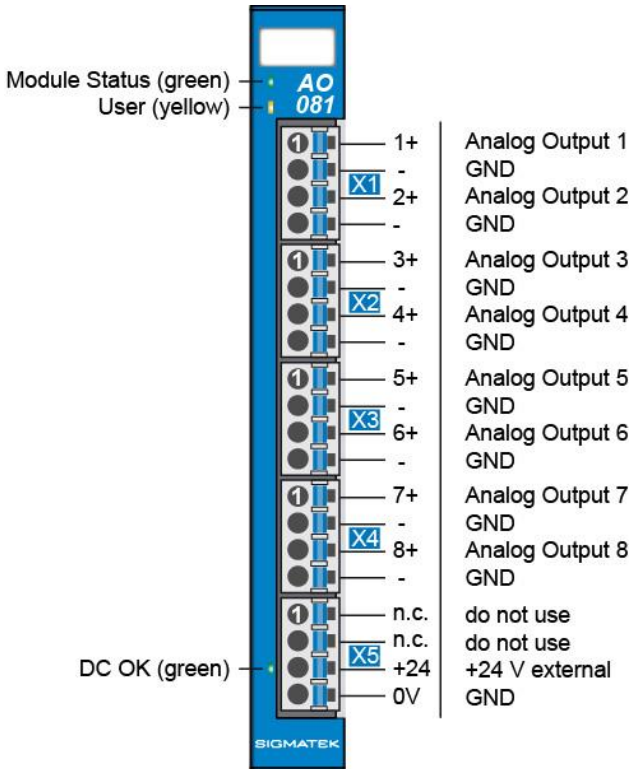
1.5 Environmental Conditions

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 altitude up to 2000 m	
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

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)	
DC OK	green	ON	+24 V supply provided for analog output

3.2 Applicable Connectors

Connectors:

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

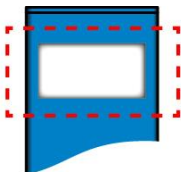
The spring terminals are suitable connecting ultrasonically compacted (ultrasonically welded) strands.

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)



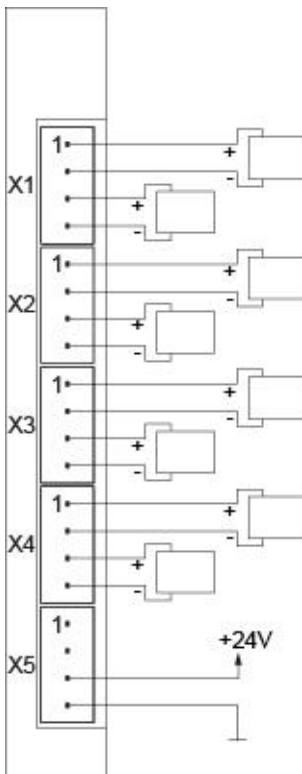
3.3 Label Field



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 Notes

To ensure error-free operation, a careful wiring method must be followed:

- The 0 V connection of the supply voltage must be connected with the 0 V collection point over the shortest route possible.
- The DIN rail must have an adequate mass connection.
- The lines connected to the source of the analog components 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.
- Protective circuits for all relays (RC networks or free-wheeling diodes).
- Correct wiring to mass.

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!

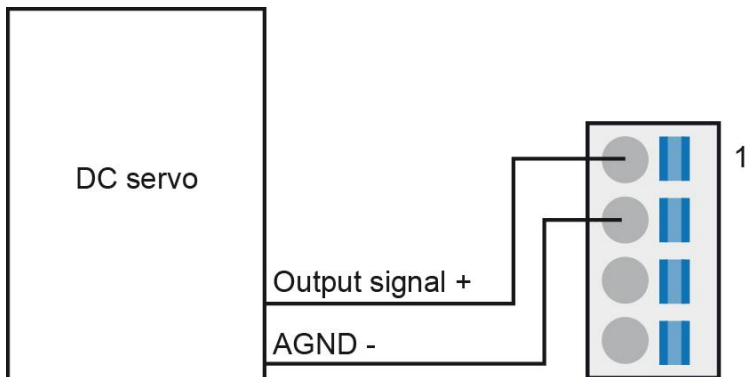
IMPORTANT:

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

4.3 Connection Variants

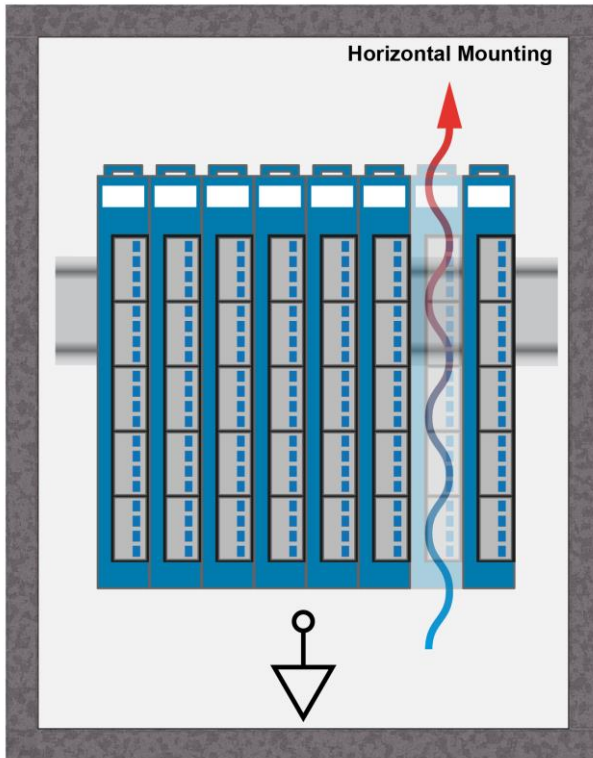
4.3.1 Connecting the Analog Outputs

Example application: Axis control for a DC servo, frequency converter.

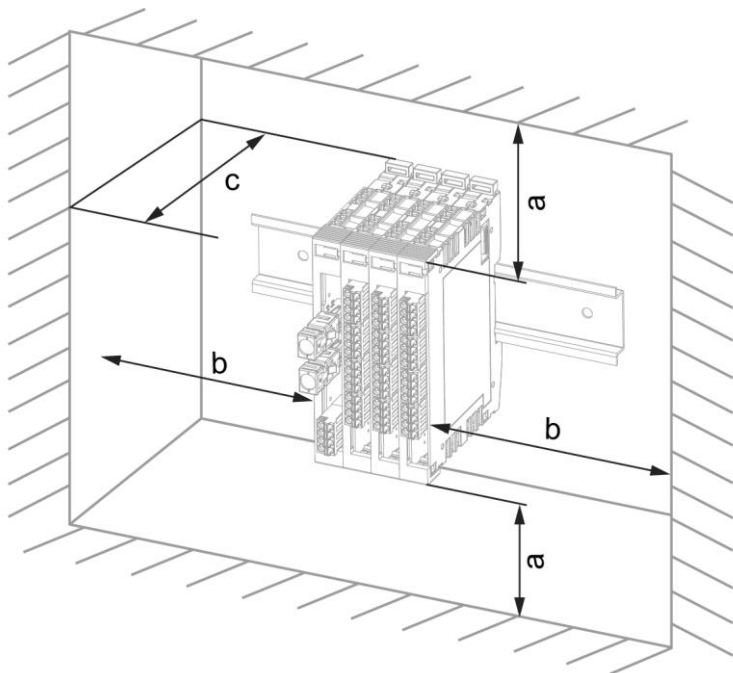


5 Mounting

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
0000	128	w	Cyclic Data for Firmware
0000	2	w	Analog output 1
0000	2	w	Analog output 2
0004	2	w	Analog output 3
0006	2	w	Analog output 4
0008	2	w	Analog output 5
000A	2	w	Analog output 6
000C	2	w	Analog output 7
000E	2	w	Analog output 8
0080	128	r	Cyclic Data for HW class
0080	2	r	Status Bit 0 24V DC not OK Bit 1 no sync Bit 2 FLASH data CRC error Bit 3 RAM data CRC error Bit 4 unsafe FLASH data
0100	128	w	CFG for Firmware
0100	2	w	CRC
0102	2	w	Data length
0104	1	w	Info (special purpose or status bits) Bit 0 PMB mode 0 ... normal mode 1 ... PMB Mode, value specification with RAW data Bit 1 boot loader/update request
0105	1	w	reserved
0180	128	r	CFG/Version for HW class
0180	2	r	CRC
0182	2	r	Data length
0184	2	r	Firmware version

7 Supported Cycle Times

7.1 Cycle Times below 1 ms (in μs)

FW	50	100	125	200	250	500
V1.20			x	x	x	x

7.2 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
V1.20	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
V1.20	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

8 Hardware Class AO081

Hardware Class AO081 for the S-DIAS AO081 analog output module

```
SDIAS:21, AO081 (A00811)
  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) <-[]->
  S Firmware Version (FirmwareVersion) <-[]->
  S Firmware Status (FWErrorBits) <-[]->
  S Extern Voltage Ok (ExternVoltageOk) <-[]->
  ----- Analog Outputs -----
  O Analog Output 1 (A01) <-[]->
  O Analog Output 2 (A02) <-[]->
  O Analog Output 3 (A03) <-[]->
  O Analog Output 4 (A04) <-[]->
  O Analog Output 5 (A05) <-[]->
  O Analog Output 6 (A06) <-[]->
  O Analog Output 7 (A07) <-[]->
  O Analog Output 8 (A08) <-[]->
  ALARM:00, Empty
  SDIAS:22, Empty
```

This hardware class is used to control the AO 081 hardware module. The module has 6 x ± 10 V analog outputs. More information on the hardware can be found in the module documentation.

8.1 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	<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"> <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	<p>In this server, the status bits of the FW are shown. The respective bits mean the following:</p> <table border="1"> <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											
Extern Voltage OK	State	This server indicates whether the external module supply is ok.										
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.										

8.2 Analog Outputs

AO[1-8] minimal value	Property	Minimum output value AO[1-8]. If this value is written to the respective channel server, the module outputs -10 V
AO[1-8] maximal value	Property	Maximum output value AO [1-8]. If this value is written to the respective channel server, the module outputs +10 V.
Analog Output [1-8]	Output	Analog output [1-8]

8.3 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
23.10.2013	4	1.4	Vibration resistance added
23.12.2013	6 7	3 Connector Layout 4.1 Wiring example	Changed image Wiring example added
11.02.2014	6 7	3 Connector Layout 3.2 Applicable Connectors	Changed image Connection capacity added French notes added
01.04.2014	3 10	1.3 Miscellaneous 5 Mounting	UL added Text updated
30.01.2015	8	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	1.2 Electrical Requirements	Changed electrical requirements
09.07.2015	4	1.3 Voltage Monitor external +24 V supply	Added voltage monitor external +24 V supply
18.02.2016	3	1.2 Electrical Requirements	Graphics added
28.04.2016	13	5 Mounting	Graphics distances
11.01.2017	3	1.1 Analog Output Specifications	Wording of analog precision
17.08.2017	5 8	1.5 Environmental Conditions 3.2 Applicable Connectors	Added operating conditions Added sleeve length Added info regarding ultrasonically welded strands
18.10.2017	9 14	3.3 Label Field 5 Mounting	Added chapter Graphic replaced
18.07.2019	16	7 Supported Cycle Times	Chapter added
08.09.2020		8 Hardware Class AO081	Chapter added
04.11.2020	14	5 Mounting	Expansion functional ground connection

