SIGMATEK

TS 041/051

S-DIAS Transsonar Distance Measuring Module

Instruction Manual

Date of creation: 22.07.2013 | Version date: 26.07.2023 | Article number: 20-053-051-E

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Translation of the Original Instructions

S-DIAS Transsonar Module TS 041/051

with 4 or 5 Transsonar Encoders

The S-DIAS TS 041 or TS 051 transsonar module can be used to analyze ultrasound distance recordings. The advantage lies in the contact and wear-free collection of measurement values with ultrasound.

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 TS 041/051

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

CE

EU Declaration of Conformity

The product TS 041/051 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 Transsonar Specifications

Number of channels	5 (TS 051) 4 (TS 041)	
Number of position encoders / channel	maximum 4	
Transonic encoder	ultrasonic encoder with start/stop function and RS422 interface (MTS EPS, Balluff BTL5, Balluff BTL6, Balluff BTL7)	
Position encoder speed	manufacturer-dependent (vus*: ca. 2845 m/s for Balluff encoder). This value must be set for each position encoder!!	
Automatic sensor parameter recognition	for sensors with integrated protocols (= "expanded P-interface" with Balluff BTL 6 AT types with DPI/IP (BTL6-P111-.....) MTS EP start/stop sensor EPSxxxMDxxxR3)	
Measurement value (corresponds to the runtime)	0-1048575 (0-3.50 ms)	
Resolution	20 bits (corresponds to 9.48 µm at vus* = 2845 m/s)	
Gate time	3.33 ns	
Counter frequency	500 MHz	
Distance measuring (Example)	minimum: depends on the type of position sensor	maximum: runtime x vus (3.50 ms x 2845 m/s = 9.96 m)
Status LEDs	5	

*v_{us} = Position encoder speed, ultra sound (each scale has a defined speed)

5.2 Electrical Requirements

	TS 041	
Voltage supply from S-DIAS bus	+24 V	
Current consumption on the S-Dias bus (+24 V power supply)	typically 85 mA at 18 V 65 mA at 24 V 55 mA at 30 V	maximum 90 mA at 18 V 70 mA at 24 V 60 mA at 30 V
	TS 051	
Voltage supply from the S-DIAS bus	+24 V	
Current consumption on the S-Dias bus (+24 V voltage supply)	typically 90 mA at 18 V 70 mA at 24 V 60 mA at 30 V	maximum 95 mA at 18 V 75 mA at 24 V 65 mA at 30 V

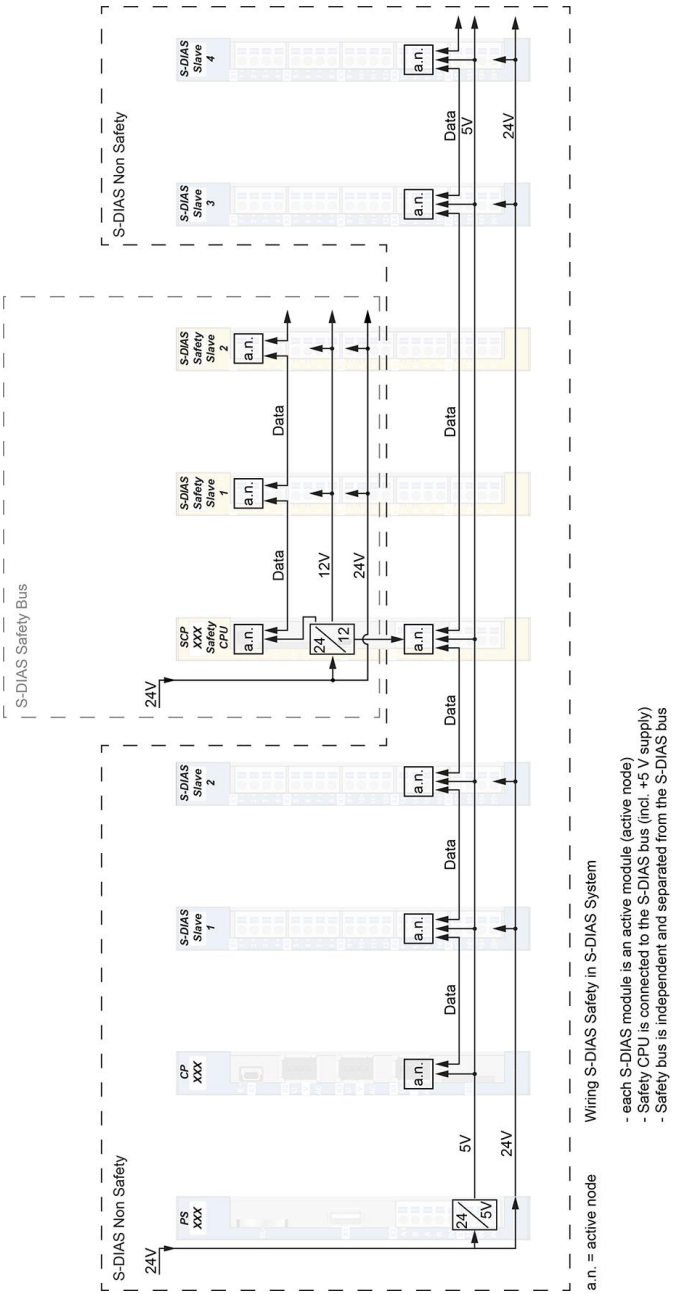
INFORMATION

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
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

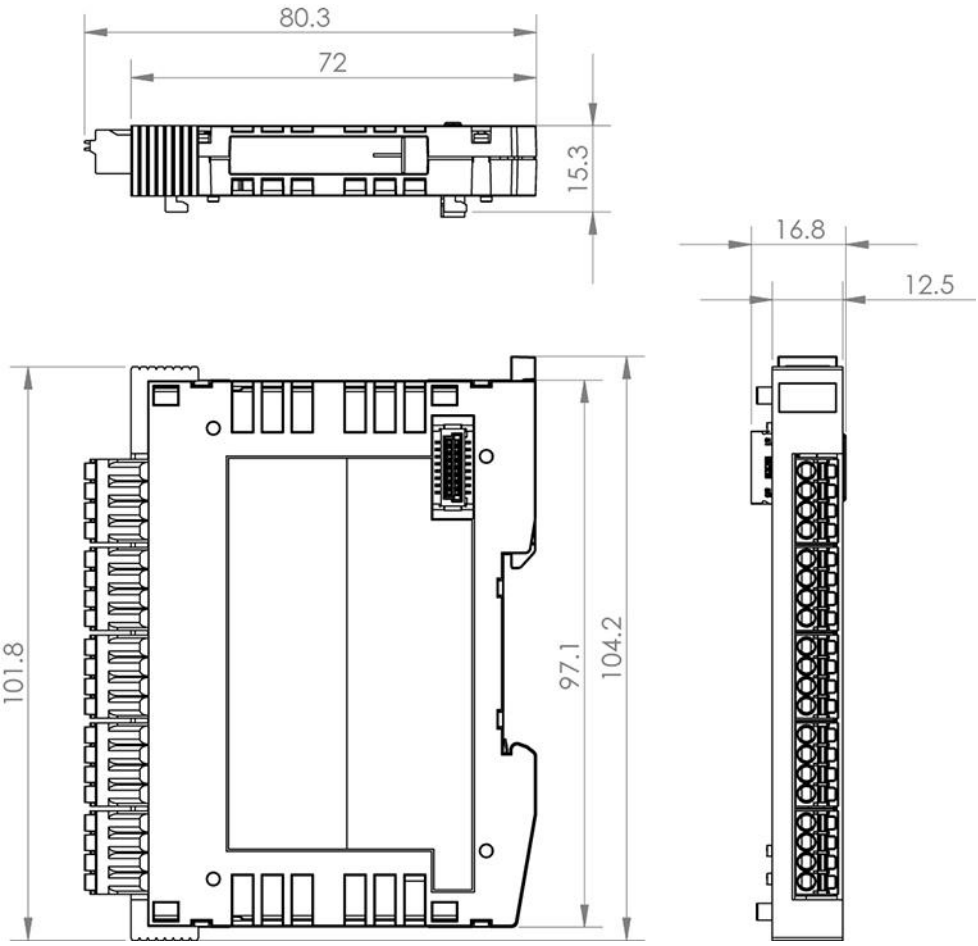
5.3 Miscellaneous

Article number	20-053-041 20-053-051
Standard	UL 508 (E247993)
Approbations	UL, cUL, CE

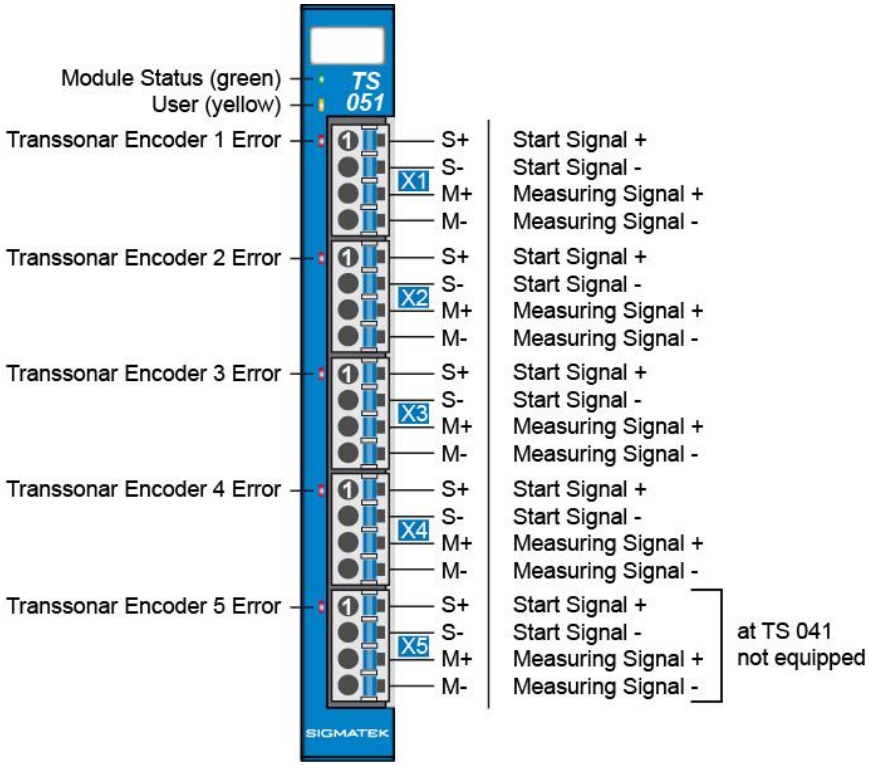
5.4 Environmental Conditions

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

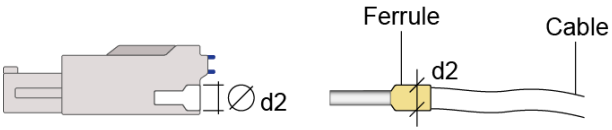
Module Status	green	ON	module active
		OFF	no supply available
		BLINKING (5 Hz)	no communication
User	yellow	ON	can be set from the application (e.g. the module LED can be set to blinking through the visualization so that the module is easily found in the control cabinet)
		OFF	
		BLINKING (2 Hz)	
		BLINKING (4 Hz)	
Transsonar Encoder 1-5 Error	red	ON	number of position encoders wrong Transsonar rod error
		OFF	no errors

7.2 Applicable Connectors

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

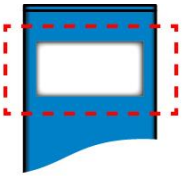
Connections:

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

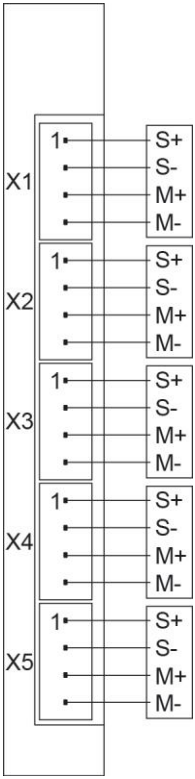
7.3 Label Field



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

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

- The 0 V connection (GND) of the supply voltage must be connected with the 0 V collection point over the shortest route possible.
- The lines connected to the transsonar encoders must be as short as possible and parallel wiring to digital signal lines must be avoided.
- The signal lines must be 2, 3 or 4-pin shielded wires.

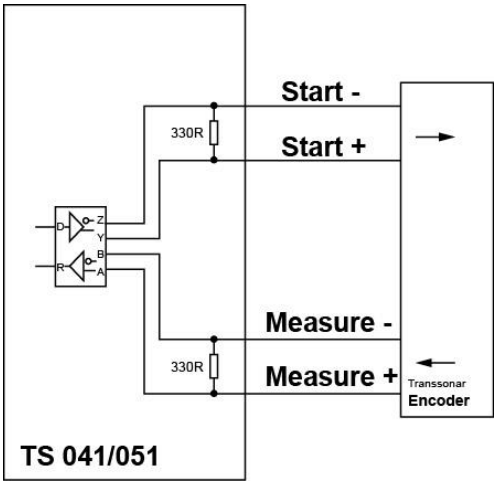
INFORMATION

The ground bus should be connected to the control cabinet when possible!

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

8.3 RS422 Interface

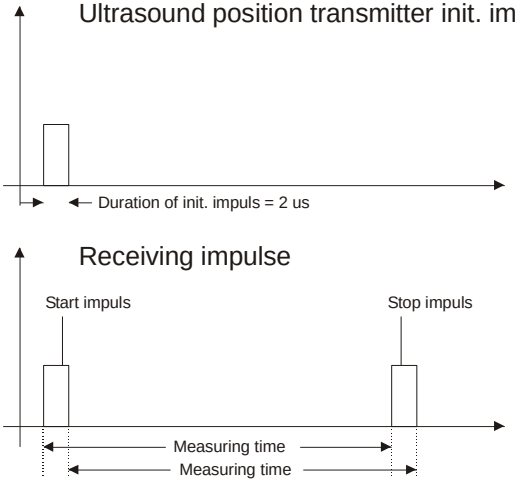
The RS422 interface is internally connected in the transsonar module.



9 Function

9.1 The Measuring Process

The measurement of all channels is triggered with a start signal. The recorder returns a signal consisting of two pulses. The first pulse is the returned start signal to compensate for the cable length; the second pulse is the stop signal. The time between the falling or rising flanks of these signals (start and stop) is proportional to the measured length.



9.2 Calculating the Route

After a measurement has been made successfully, the length of the route can be calculated using the following formula.

The length of the route [m] = position encoder speed [m/s] x gate time [s] x counter

Example:

Counter = 46000 (read from channel 1-channel 5)
Gate time = 3.33 ns (defined-300 MHz)
Position encoder speed = 2845 m/s
(assumed value, since each position encoder has a different speed)

Length of the path = 2845 [m/s] x 3.33x10-9 [s] x 46000 = **0.431871 [m]**

10 Assembly/Installation

10.1 Check Contents of Delivery

Ensure that the contents of the delivery are complete and intact. See chapter 1.3 Contents of Delivery.

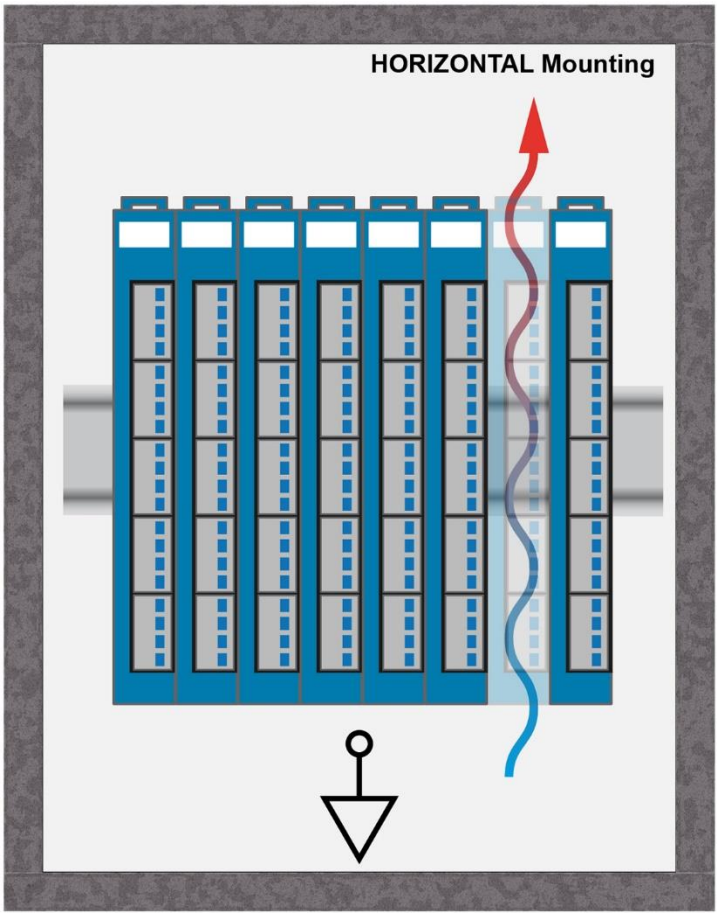
INFORMATION

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.

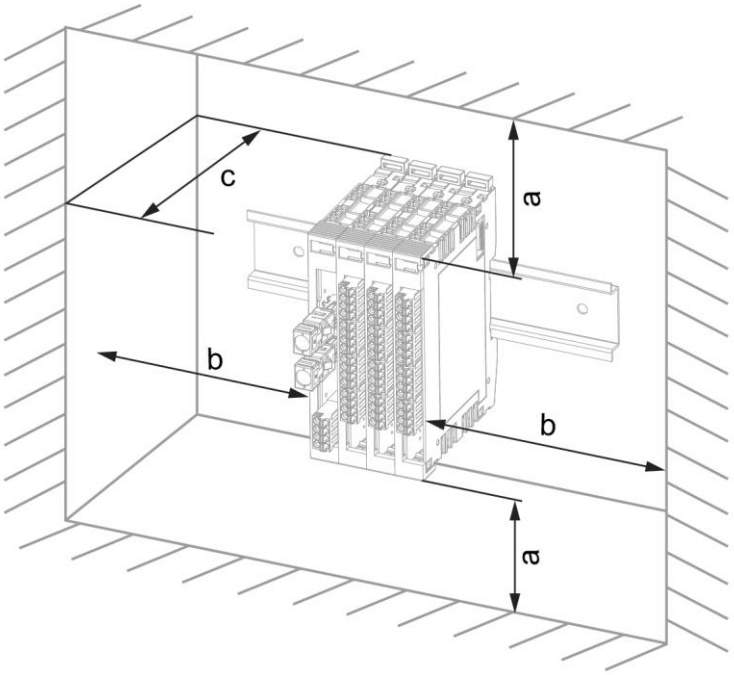
Damaged components can disrupt or damage the system.

10.2 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)

11 Addressing

Address (hex)	Size (bytes)	Access Type	Description	Reset value
Memory				
PDO cyclic read				
0000	4	r32	Channel 1, Magnet 1 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
0004	4	r32	Channel 2, Magnet 1 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
0008	4	r32	Channel 3, Magnet Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
000C	4	r32	Channel 4, Magnet 1 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
0010	4	r32	Channel 5, Magnet 1 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
0014	4	r32	Channel 1, Magnet 2 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
0018	4	r32	Channel 2, Magnet 2 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
001C	4	r32	Channel 3, Magnet 2 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
0020	4	r32	Channel 4, Magnet 2 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00

0024	4	r32	Channel 5, Magnet 2 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
0028	4	r32	Channel 1, Magnet 3 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
002C	4	r32	Channel 2, Magnet 3 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
0030	4	r32	Channel 3, Magnet 3 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
0034	4	r32	Channel 4, Magnet 3 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
0038	4	r32	Channel 5, Magnet 3 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
003C	4	r32	Channel 1, Magnet 4 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
0040	4	r32	Channel 2, Magnet 4 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
0044	4	r32	Channel 3, Magnet 4 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
0048	4	r32	Channel 4, Magnet 4 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00
004C	4	r32	Channel 5, Magnet 4 Bit 0-19 Position (19:0) Bit 20-30 Reserved Bit 31 Measure Ready Bit	00

0050	1	r	Supply STATUS-Register Bit 0 +5V-OK (‘1’ = DC OK) Bit 1-7 Reserved	00

SDO space				
0051	1	r/w	Error Enable Bit 0: Error Enable	01
0052	1	r/w	Configuration Register Channel 1 Bit 2 Number of Magnets Bit 3: Start-Stop Edge Bit 6..4: Measure Periods Bit 7: Reserved	00
0053	1	r/w	Configuration Register Channel 2 (see Channel 1)	00
0054	1	r/w	Configuration Register Channel 3 (see Channel 1)	00
0055	1	r/w	Configuration Register Channel 4 (see Channel 1)	00
0056	1	r/w	Configuration Register Channel 5 (see Channel 1)	00
0057	1	r/w	Reserved	00
0058	1	w	IP Command-Number	00
0059	1	w	IP Number of Data bytes	00
005A	1	w	IP CRC high	00
005B	1	w	IP CRC low	00
005C	16	r/w	IP Data	00
006C	1	r	IP Read Status Bit 2..0: Reserved Bit 3: Frame-Error Bit 4: Parity-Error Bit 5: Reserved Bit 6: Timeout-Error Bit 7: 1 = busy = data transmission running, IP Parameter not valid	00
006C	1	w	IP Configuration- and Start Register Bit 0: 0 = MTS 1 = Balluff Bit 3..1: Reserved Bit 7..4: Channel number for Uart Communication (UART Communication starts when written to this address)	00

12 Supported Cycle Times

12.1 Cycle Times below 1 ms (in µs)

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

x= supported

12.2 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

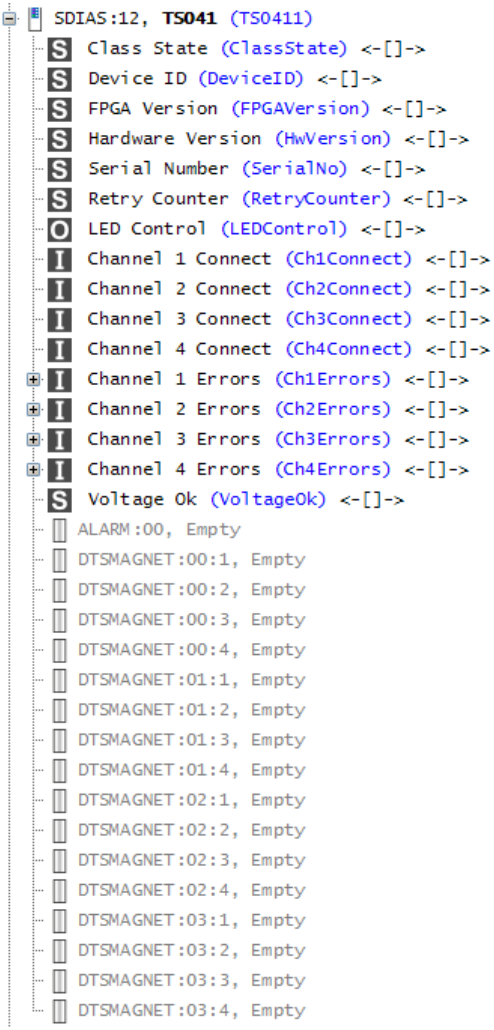
x= supported

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

13 Hardware Class TS041

Hardware Class TS041 for the S-DIAS TS041 module



This hardware class is used to control the TS 041 Transsonar distance measuring module. More information on the hardware can be found in the module documentation.

13.1 Interfaces

13.1.1 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.
Ch[1-4]Type	0 MTS 1 BALLUF -2 MTS Series R0, as initialization value
Ch[1-4]Speed	In this client, the speed in mm/s for the ultrasonic pulse of the measuring rod is entered. The speed is visible on the measuring rod, as initialization value
Ch[1-4]Length	The maximum length of the measuring rod in1/10µm, as initialization value
f_Quarz	Quartz oscillator frequency: 300 MHz as initialization value

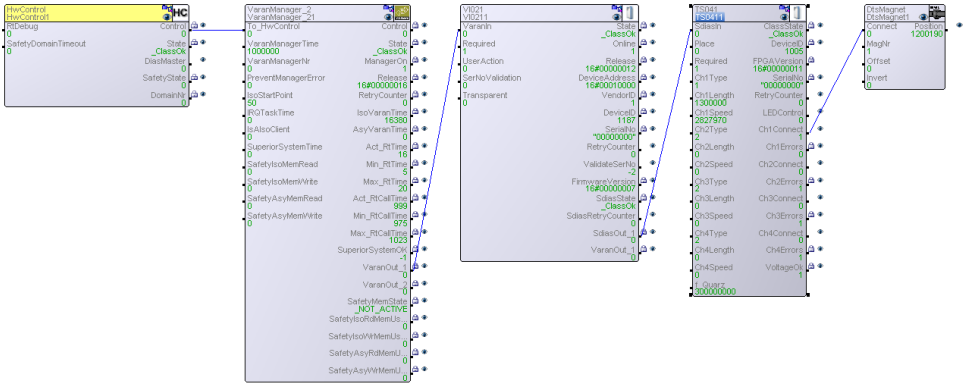
13.1.2 Servers

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
Ch[1-4]Connect	This server is connected to the "Connect" server of the DtsMagnet class.
Ch[1-4]Errors	This server indicates the current error status of the respective channel. Bit 0 IP protocol error Bit 1 CRC error
VoltageOk	1 internal switching regulator voltage supply is OK.

Communication Interfaces

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

13.2 Example

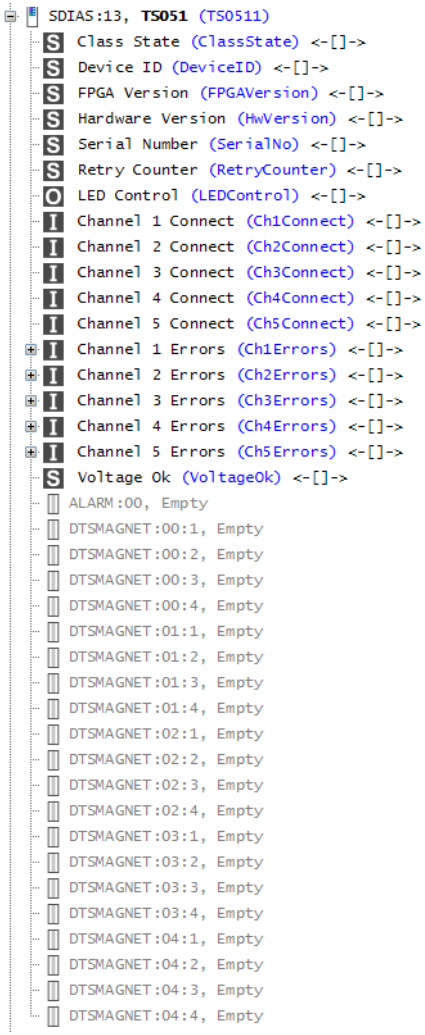


13.3 Internal Properties

Caution!
If a measuring rod (Balluff with IP function (integrated protocol) or an MTS with a new protocol) is used, the client does not have to be initialized since the corresponding data is read from the measuring rod and entered into the client.

14 Hardware Class TS051

Hardware Class TS051 for the S-DIAS TS051 module



This hardware class is used to control the TS 051 Transsonar distance measuring module. More information on the hardware can be found in the module documentation.

14.1 Interfaces

14.1.1 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.
Ch[1-5]Type	0 MTS 1 BALLUF 2 MTS Series R0 as initialization value
Ch[1-5]Speed	In this client, the speed in mm/s for the ultrasonic pulse of the measuring rod is entered. The speed is visible on the measuring rod, as initialization value
Ch[1-5]Length	The maximum length of the measuring rod in 1/10µm, as initialization value
f_Quarz	Quartz oscillator frequency: 300 MHz as initialization value

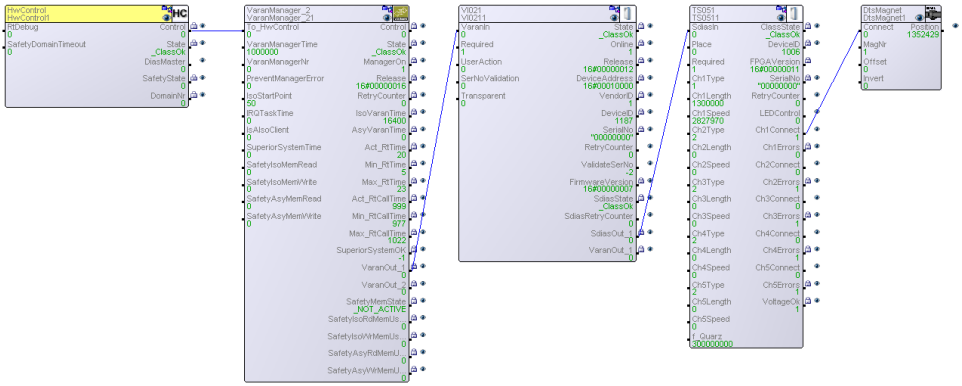
Server

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
Ch[1-5]Connect	This server is connected to the "Connect" server of the DtsMagnet class.
Ch[1-5]Errors	This server indicates the current error status of the respective channel. Bit 0 IP protocol error Bit 1 CRC error
VoltageOk	1 internal switching regulator voltage supply is OK.

14.1.2 Communication Interfaces

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

14.2 Example



14.3 Internal Properties

Caution!
If a measuring rod (Balluff with IP function (integrated protocol) or an MTS with a new protocol) is used, the client does not have to be initialized since the corresponding data is read from the measuring rod and entered into the client.

15 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.

16 Storage

INFORMATION

When not in use, store the operating panel according to the storage conditions. See chapter 15.

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

17 Maintenance

INFORMATION

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

17.1 Service

This product was constructed for low-maintenance operation.

17.2 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 15 Transport/Storage.

18 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
21.11.2012	12	7	Chapter "Mounting" added
04.10.2013	4	1.2	Note
24.10.2013	5	1.4	Added Vibration resistance
23.12.2013	7 9	3 Connector Layout 4.1 Wiring Example	Changed image Added wiring example
16.01.2014	3	1.1 Transsonar Specifications	Changed values at the following lines: Measurement value (corresponds to the runtime), Resolution and Distance measuring (Example)
11.02.2014	7 8	3 Connector Layout 3.2 Applicable Connectors	Changed image Connection capacity added French notes added
01.04.2014	5 13	1.3 Miscellaneous 6 Mounting	UL added Text updated
30.01.2015	10	4.2 Note	Added note concerning connecting the S-DIAS module while voltage is applied
26.03.2015	8	3.2 Applicable Connectors	Added connections
28.04.2016	15	6 Mounting	Graphics distances
17.08.2017	6 9	1.4 Environmental Conditions 3.2 Applicable Connectors	Pollution Degree Sleeve length added Added info regarding ultrasonically welded strands
18.10.2017	10 16	3.3 Label Field 6 Mounting	Added chapter Graphic replaced
14.11.2019	22	8 Supported Cycle Times	Chapter added
28.02.2020	22	8 Supported Cycle Times	Text adapted
08.09.2020	23	9 Hardware Class TS041 10 Hardware Class TS051	Chapter added
04.11.2020	16	6 Mounting	Expansion functional ground connection
29.06.2021	4	1.1 Transsonar Specifications	BTL7 added

26.07.2023		Document	General chapters added, design