SIGMATEK

ST 011

S-DIAS Stepper Module

Instruction Manual

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Translation of the Original Instructions

S-DIAS Stepper Module ST 011

with 1 incremental encoder input

1 output channel for the motor control

2 digital optic coupler outputs (with 1 input function)

2 digital inputs

The S-DIAS ST 011 stepper module can be used to control stepper motors and servo motor power components. Switching between the individual modes is done through the module register. One channel (motor) can be controlled. The outputs for the control are configured as RS422 outputs with the appropriate signal levels.

The digital inputs are provided for the reference motion and monitoring the end positions. The ST 011 also has two digital optic coupler outputs. Depending on the connector configuration, an output can be back-read (if the output high side is configured for switching). The option is available to only use the read-back function of the output as a digital input (see connector layout).

An incremental encoder connection with A/B/R analysis is available as well as the corresponding +5 V incremental encoder supply.

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 ST 011

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 ST 011 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 Incremental Encoder Specifications

Number	1
Input signals	Incremental encoder signals RS422 (A, /A, B, /B, R, /R) RS422 signal (150 Ω connection, 330 Ω spread, integrated in module)
Input frequency	maximum 125 kHz
Counter frequency	maximum 500 kHz
Signal analysis	4X
Counter resolution	32-bit
Encoder power supply	+5 V / 0.2 A short circuit protected

5.2 Power Component Control Output Specifications

Number	1
Output signals	Activation signals RS422 (C, /C, D, /D, E, /E) RS422 signal
Output frequency	maximum 500 kHz
Maximum continuous current allowed	40 mA

5.3 Digital Input Specifications

Number	2	
Input voltage	typically +24 V	maximum +30 V
Signal level (up to HW version 1.40)	low: < +8 V	high: > +14 V
Signal level (starting with HW version 1.50)	low: < +5 V	high: > +15 V
Input current	3 mA at +24 V	
Input delay	typically 0.1 ms	

5.4 Digital Optic Coupler Specifications

Number	2
Configuration	potential-free (output 1 is either back readable or can be used as an input)
Switching voltage	maximum +30 V DC
Current load	maximum 100 mA
Residual voltage	< 2 V at 100 mA

5.5 Electrical Requirements

Power supply +24 V from S-DIAS bus	+18-30 V DC	
Current consumption of the +24 V supply on the S-DIAS bus	typically 80 mA (incl. incremental encoder supply)	maximum 90 mA (incl. incremental encoder supply)
Voltage supply from S-DIAS bus	+5 V	
Current consumption on the S-DIAS bus (+5 V supply)	typically 180 mA	maximum 200 mA

INFORMATION

This module exceeds the standard current consumption for S-DIAS modules!

(80 mA at +24 V)
(180 mA at +5 V)

Depending on the voltage supply used (VI 021, PS 101, CP 101), the total current of the S-DIAS modules used must be determined and checked.

The specification for the current can be found in the module-specific documentation under "Electrical Requirements".

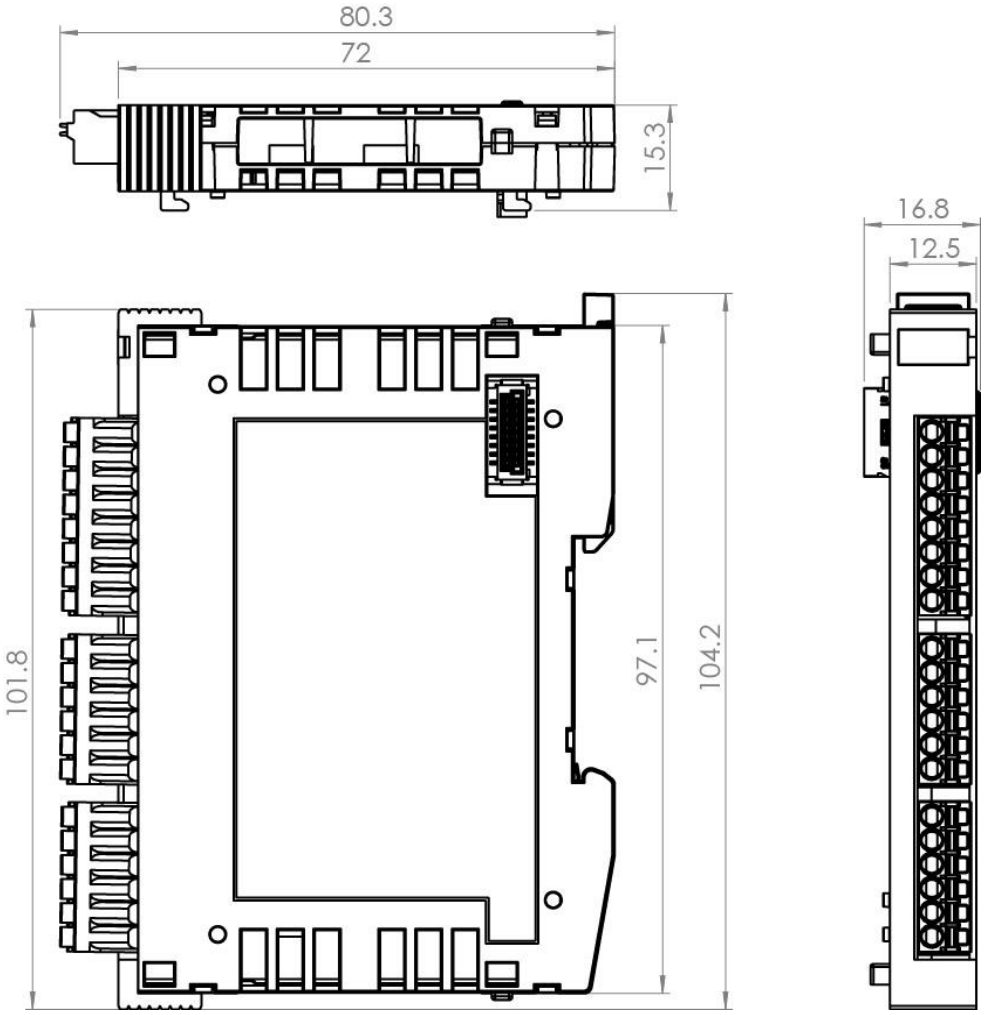
5.6 Miscellaneous

Article number	20-014-011 20-014-011-X (Printed circuit board with protective lacquer)
Standard	UL 508 (E247993)
Approbations	UL, cUL, CE, UKCA

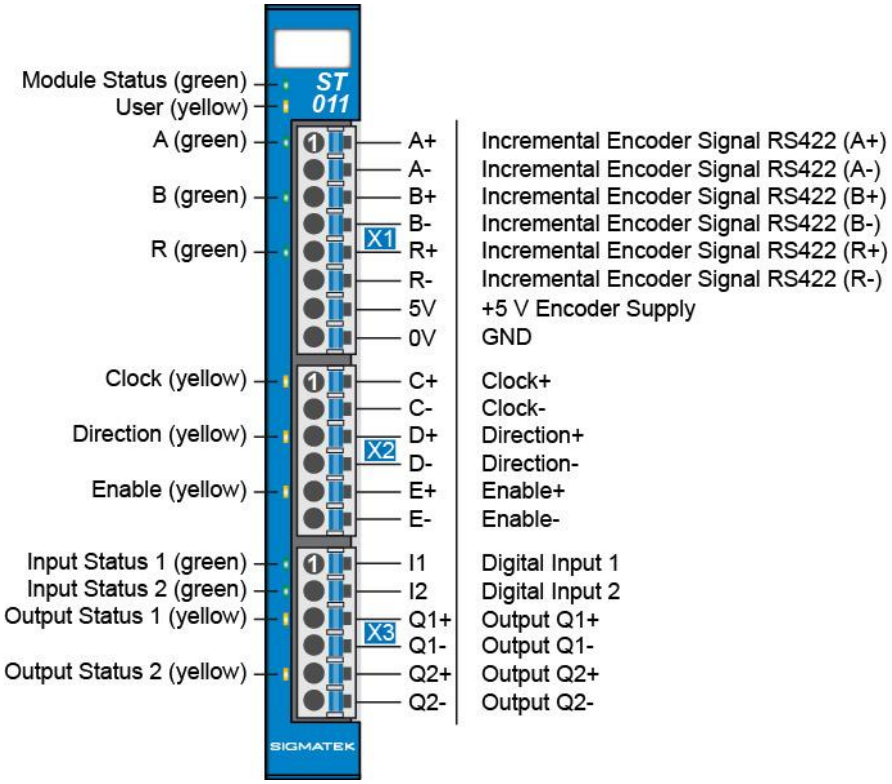
5.7 Environmental Conditions

Storage temperature	-20 ... +85 °C	
Environmental temperature	0 ... +55 °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 1g 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

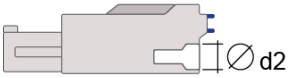
Module Status	green	ON	module active
		OFF	no supply available
		BLINKING (5 Hz)	no communication
User	yellow	ON	can be set from the application (e.g. the module LED can be set to blinking through the visualization so that the module is easily found in the control cabinet)
		OFF	
		BLINKING (2 Hz)	
		BLINKING (4 Hz)	
A	green	BLINKS	line active
		OFF	line inactive
B	green	BLINKS	line active
		OFF	line inactive
R	green	BLINKS	line active
		OFF	line inactive
Clock	yellow	BLINKS	line active
		OFF	line inactive
Direction	yellow	BLINKS	line active
		OFF	line inactive
ENABLE	yellow	BLINKS	line active
		OFF	line inactive
Input Status 1	green	ON	input 1 ON
		OFF	input 1 OFF
Input Status 2	green	ON	input 2 ON
		OFF	input 2 OFF
Output Status 1	yellow	ON	output 1 ON
		OFF	output 1 OFF
Output Status 2	yellow	ON	output 2 ON
		OFF	output 2 OFF

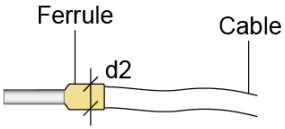
7.2 Applicable Connectors

Connectors:
X1-X3: 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)



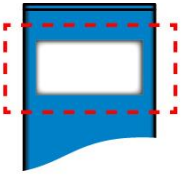


d2 = max. 2.8 mm

INFORMATION

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

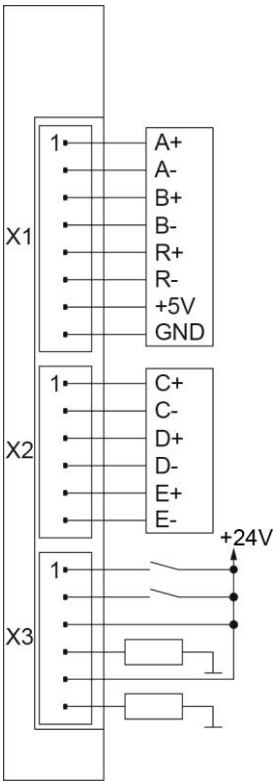
7.3 Label Field



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



8.2 Note

8.2.1 General

The 0 V connection of the supply voltage must be connected with the 0 V collection point over the shortest route possible. The signal lines should be shielded or at least twisted pair wires.

8.2.2 X2: Power Component Control

The ST 011 is suited for control of stepper module power components. This results in the following connection and control options.

8.2.2.1 Stepper Motor Control

C+, C- (RS422) => Clock
D+, D- (RS422) => Direction
E+, E- (RS422) => Enable (With the ST 011, Boost is provided by default)

Additional signal options can be found in the control variants and register documentation.

8.2.3 X3: Optic Coupler Outputs

The outputs are digital optic coupler outputs, whereby one contact is equipped with a digital input switch. Three connection options are therefore available.

8.2.3.1 Plus-switching (high side)

In this variation, output 1 can be digitally back-read:

X3, pin 3 or 5 wired to the supply voltage,
X3, pin 4 or 6 to wired to the load,

8.2.3.2 GND Switching (low side):

X3, pin 3 or 5 wired to the load
X3, pin 4 or 6 wired to mass

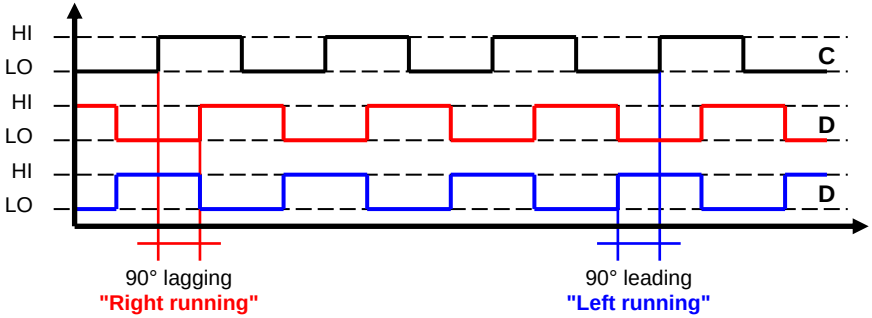
8.2.3.3 Application as Digital Input

X3, pin 3 not connected (open terminal)
X3, pin 4 is connected to a normal input;
Output 2 can continue to be used as an optic coupler.

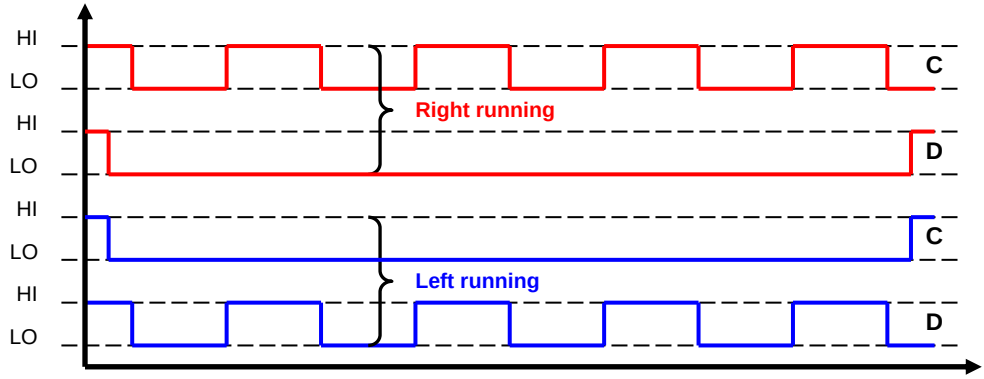
Note: There is no status display (LED) for this digital input.

8.2.4 Control Variations (RS422 signals for the power component control)

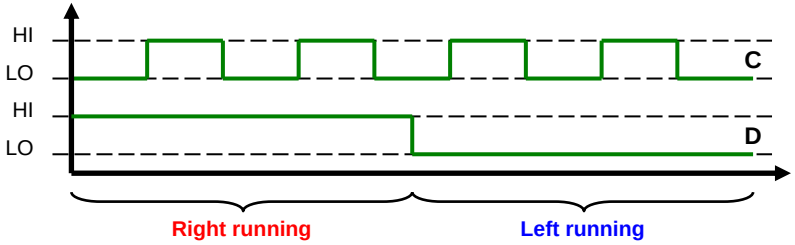
8.2.4.1 Mode 0: (equal to mode 2) Pulse with 90° Phase Offset.



8.2.4.2 Mode 1: CW (CCW pulse command)

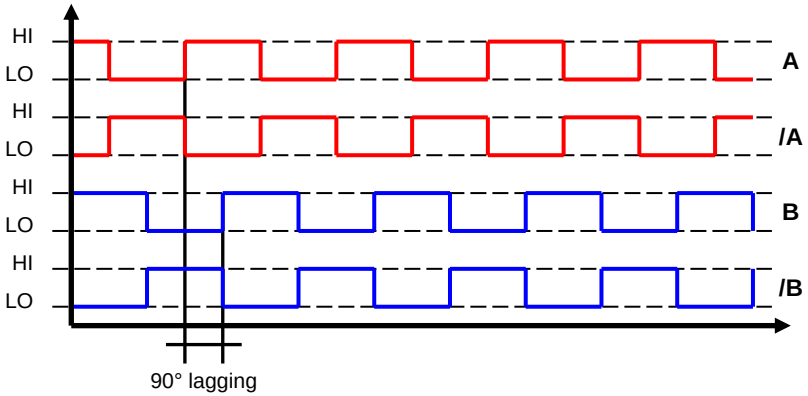


8.2.4.3 Mode 3: Pulse/Sign Command

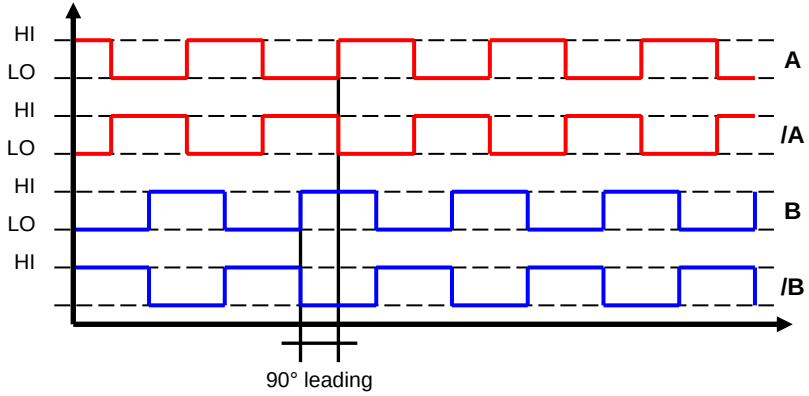


8.2.5 Incremental Encoder RS422 Signals

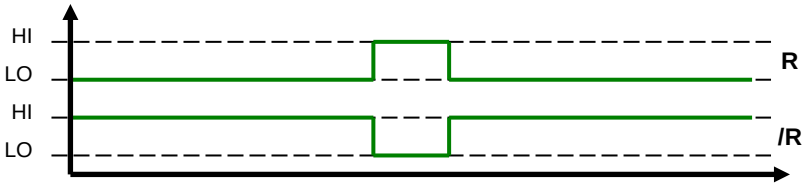
8.2.5.1 Count UP



8.2.5.2 Count DOWN



8.2.5.3 Reference pulse (zero position)



8.2.6 Latch Function

This function is primarily used for the reference motion.

The incremental encoder data and frequency counter values can be stored (latched) in a selected input at the time of an event. The event source (input) and event type (edge) can be set via latch registers (see address mapping for optional configurations).

The latched data are assumed with the next realtime task.

9 Assembly/Installation

9.1 Check Contents of Delivery

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

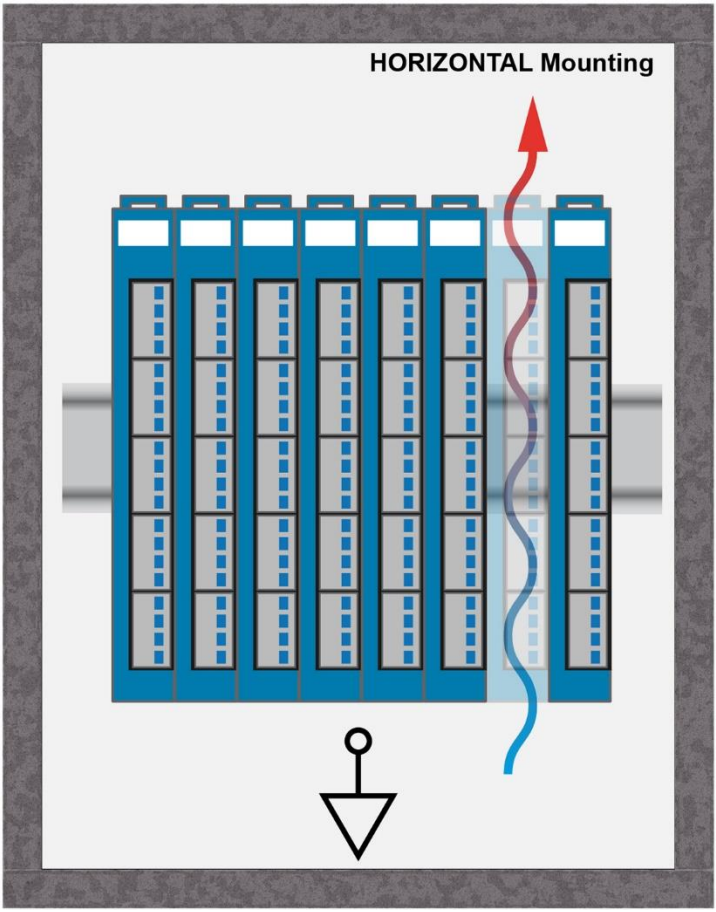
INFORMATION

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.

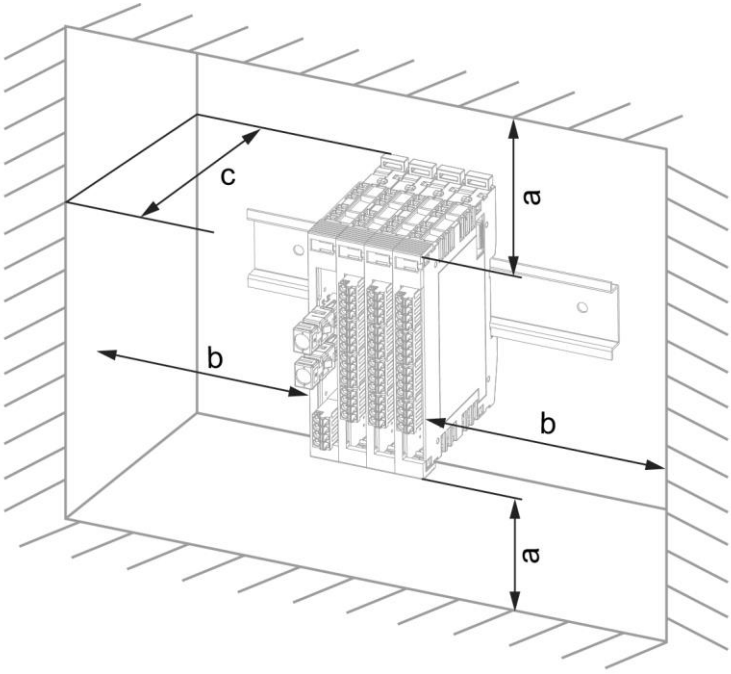
Damaged components can disrupt or damage the system.

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)	Access Type	Description
PDO Write			
001F	1	r/w	Output register Bit 0: Output 1 Bit 1: Output 1 (back-readable as an input in the input register)
0020	4	r/w32	Servo/stepper output pulse time [1 LSB = 8 ns] (-17.179 … +17.179 s) ½ period for output module 1 or 3 ½ period for output module 0 (= 2) 0 = output pulse disabled
0024	1	w	Servo/stepper control register: Bit 1: ENABLE
SDO Write			
0025	1	r/w	Servo/stepper control register 0 (output module, incremental encoder) Bit 1...0: servo output mode 0 or 2 = 2-phase pules with 90° phase offset (between A and B) 1 = CW/CCW output mode 3 = Pulse/Sign output mode Bit 3: Incremental encoder B phase inversion 0 = phase 1 not inverted 1 = phase B inverted Bit 5..4: incremental encoder edge detection 0 = incremental encoder 1 = 1 edge 2 = 2 edges 3 = 4 edges
0026	2	r/w	Minimum pulse width [8.0 ns](1) Defines the minimum output pulse width "Low" or "High" time. Must be set during initialization.
PDO Read			
0037	1	r	Servo/stepper status register Bit 1: ENABLE Bit 4: incremental encoder null position Bit 5: incremental encoder null position saved
0038	2	r	Incremental encoder counter The counter value represents the number of rising and falling edges of the encoder signal (A, B = sign). Depending on byte 6#06/ bit 5…4, a single, double or quadruple analysis is performed.
003A	2	r	16-bit frequency counter Counts the number of steps output

003C	2	r	Incremental encoder saved Saves the incremental encoder counter with the result setting (memory register).
003E	2	r	16- bit frequency counter latched Saves the frequency counter value with the special event
0040	1	r	Digital Input Status Register Bit 0: input 1 Bit 1: input 2 Bit 2: Back-readable output 1 Bit 3: zero plus Bit 6: 24 V OK Bit 7: 5 V encoder OK
0041	1	r	Latch Source Register (Bits are only set when the corresponding enable register is set, this register is cancelled when read) Bit 0: change at input 1 Bit 1: change at input 2 Bit 2: Change in back-readable output 1 Bit 3: zero pulse Bit 6: 24 V OK Bit 7: 5 V encoder OK
SDO Write			
0042	1	r/w	Latch Enable, Rising Edge Bit 0: rising edge at input 1 Bit 1: rising edge at input 2 Bit 2: Rising edge at back-readable output 1 Bit 3: zero plus Bit 7: 5 V encoder OK
0043	1	r/w	Latch Enable, Falling Edge Bit 0: falling edge at input 1 Bit 1: falling edge at input 2 Bit 2: falling edge at back-readable output 1 Bit 3: zero plus Bit 7: 5 V encoder OK

(1) Caution:
The remaining value x “003C” is the smallest value allowed. It should also be taken into consideration that the minimum pulse width of the minimum period is -3 * clk_cnt (clk_cnt period = 8 ns).

11 Supported Cycle Times

11.1 Cycle Times below 1 ms (in µs)

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

x= supported

11.2 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

12 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.

13 Storage

INFORMATION

When not in use, store the operating panel according to the storage conditions. See chapter 12.

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

14 Maintenance

INFORMATION

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

14.1 Service

This product was constructed for low-maintenance operation.

14.2 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 12 Transport/Storage.

15 Disposal

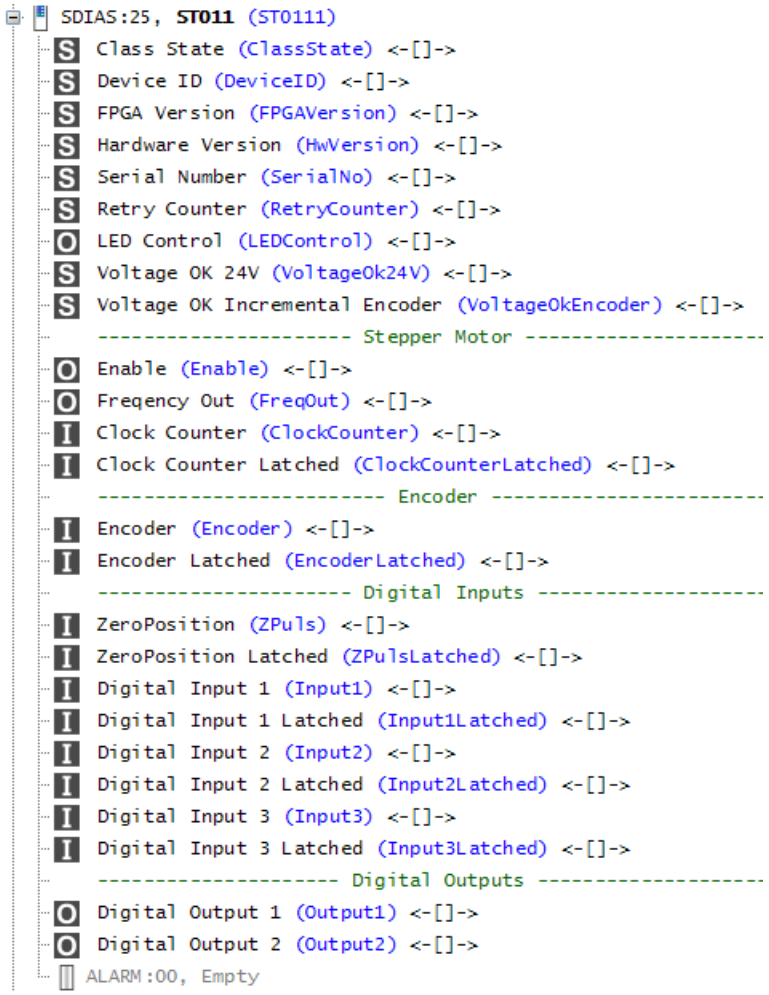
INFORMATION

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.

16 Hardware Class ST011

Hardware Class ST011 for the S-DIAS ST011 stepper motor module



This hardware class is used to control the ST 011 stepper motor module. More information on the hardware can be found in the module documentation.

16.1 Properties

Object of class ST011	ST0111
Place	0
Comment	
Required	Module is not required
Use Pulse count Correction	Old Pulse count Mode
Pulse Mode	2 Phase pulse with a 90° offset1=CW/CCW pulse command mode3=Pulse/sign command mode
Mode Clock Counter	Edges
Invert Encoder	Normal
Invert Enable	Normal
Encoder Sampling	Off
Minimal Pulse Width	

16.2 Interfaces

16.2.1 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.
UsePulseCntCorrection	On this client the pulse counter of the ClockCounter can be switched to a corrected mode. Should be used in corrected mode since FPGA version 1.2. The old mode should only be used for compatibility reasons. 0 old mode 1 corrected mode (leads to error status with FPGA versions < 1.2) as initialization value
PulseMode	In this client, the operating mode is set. 0, 2 2-phase pulse with 90° phase offset 1 CW/CCW Pulse Command mode 3 Pulse/Sign Command mode as initialization value
ModeClockCounter	0 ClockCounter counts every edge 1 ClockCounter counts steps (only for PulseMode 1 and 3) 2 ClockCounter counts steps (only for PulseMode 0 and 2) as initialization value

InvertEncoder	Inverts the encoder values 0 normal 1 inverted as initialization value
InvertEnable	Inverts the Enable server value 0 normal 1 inverted as initialization value
EncoderSampling	0 encoder off 1 1x analysis (rising edge) 2 2x analysis 3 4x analysis 4 1x analysis (falling edge) as initialization value
Input[1-3]LatchZPulsLatch	Inputs DigIn[1-4] and/or Z-signal can be used to latch the incremental encoder value. This client must be set as an initialization value.
LatchEncoder	Writes the encoder value to the connected sever when the Latch function is enabled.
LatchClockCounter	Writes the frequency counter value to the connected server when the Latch function is enabled.
MinPulseWidth	Indicates the minimum duration of a high/low phase in ns. Adjustable value range: > 468 If this client is <> 0 the client DeathTime is no longer used. as initialization value
DeathTime	Indicates the minimum duration of a high/low phase in 128 Mhz cycles. Adjustable value range: > 60 If the client MinPulseWidth <> 0 the DeathTime is no longer used. as initialization value

16.2.2 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
FreqOut	In this server, the desired frequency is entered in Hz.
Encoder	The current encoder value of the motor is stored here.

EncoderLatched	This is the latched encoder value the motor.
ClockCounter	Frequency counter value
ClockCounterLatched	This server contains the latched frequency counter value.
ZPuls	This server is 1 when the motor is exactly on the null position.
ZPulsLatched	Latched reference position of the encoder 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.
Enable	Here, the motor is turned on or off.
Input[1-3]	Digital input 1-3
Input[1-3]Latched	Latched digital input 0 input was not set since last reading 1 input has been set since the last reading The status is queried over read(). During the status query, the server is reset to 0.
Output[1-2]	Digital output 1-2, whereby the 2nd output is back-readable as input 3 when it is connected accordingly See module documentation
VoltageOKEncoder	Incremental encoder supply voltage 0 power supply error 1 supply OK
VoltageOK24V	Supply voltage for the outputs 0 power supply error 1 supply OK

16.2.3 Communication Interfaces

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

Documentation Changes

Change date	Affected page(s)	Chapter	Note
11.03.2015	1		Changed text
	4	1.1 Incremental Encoder Specifications	Changed Input signals
	4	1.2 Power Component Control Output Specif.	Changed Output signals
	4	1.3 Digital Input Specif.	Changed table
	12	4.2.2.1 Stepper Motor Control	Changed text
	15	4.2.5.3 Reference pulse	Changed graphic
	15	4.2.6 Interrupt Function	Changed text
	17	6.1 Address Mapping Overview	Corrected text
26.03.2015	10	3.2 Applicable Connectors	Added connections
30.07.2015	15	4.2.6 Interrupt Function	Interrupt Function deleted
28.04.2016	17	5 Mounting	Graphics distance
17.08.2017	6	1.7 Environmental Conditions	Added operating conditions
	10	3.2 Applicable Connectors	Added sleeve length Added info regarding ultrasonically welded strands
18.10.2017	11	3.3 Label Field	Added chapter
	18	5 Mounting	Graphic replaced
14.11.2019	21	7 Supported Cycle Times	Chapter added
28.02.2020	21	7 Supported Cycle Times	Text adapted
08.09.2020	22	8 Hardware Class ST011	Chapter added
04.11.2020	17	5 Mounting	Expansion functional ground connection
01.07.2021		1.1 Incremental Encoder Specifications	Integrated in module
03.09.2021	4	1.3 Digital Input Specifications	Signal level and Switching threshold
13.09.2021	6	1.6 Miscellaneous	20-014-011-X added
06.12.2022	6	1.6 Miscellaneous	UKCA conformity

26.07.2023		Document	General chapters added, design