PW 022

S-DIAS Pulse Width Module

Instruction Manual

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Translation of the Original Instructions

S-DIAS Pulse Width Module PW 022

with 2 PWM outputs

The S-DIAS PW 022 pulse width module has two +24 V switching PWM outputs with an adjustable frequency for controlling inductive loads (magnetic valve, proportional valve, ...). The 2 PWM outputs are powered through a supply connection.

The supply voltage is monitored for under voltage.

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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 PW 022

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 PW 022 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 PWM Output Specifications

Number	2
Configuration	+24 V-switching
Short-circuit proof	yes
Maximum output current/channel	1.5 A to 45 °C 1 A to 55 °C
PWM frequency	adjustable as period in 0.5 µs increments between 30.5 Hz and 20 kHz
PWM pulse width	adjustable via software in 0.5 µs increments

5.2 Electrical Requirements

PWM output supply voltage	+18-30 V DC	
Current consumption of PWM output supply	corresponds to the load on PWM outputs	
Voltage supply from S-DIAS bus	+5 V	
Current consumption on the S-DIAS bus (+5 V power supply)	typically 50 mA	maximum 65 mA

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".

5.3 Voltage Monitor

PWM supply voltage	supply voltage > 18 V (corresponding DC OK LED lights)

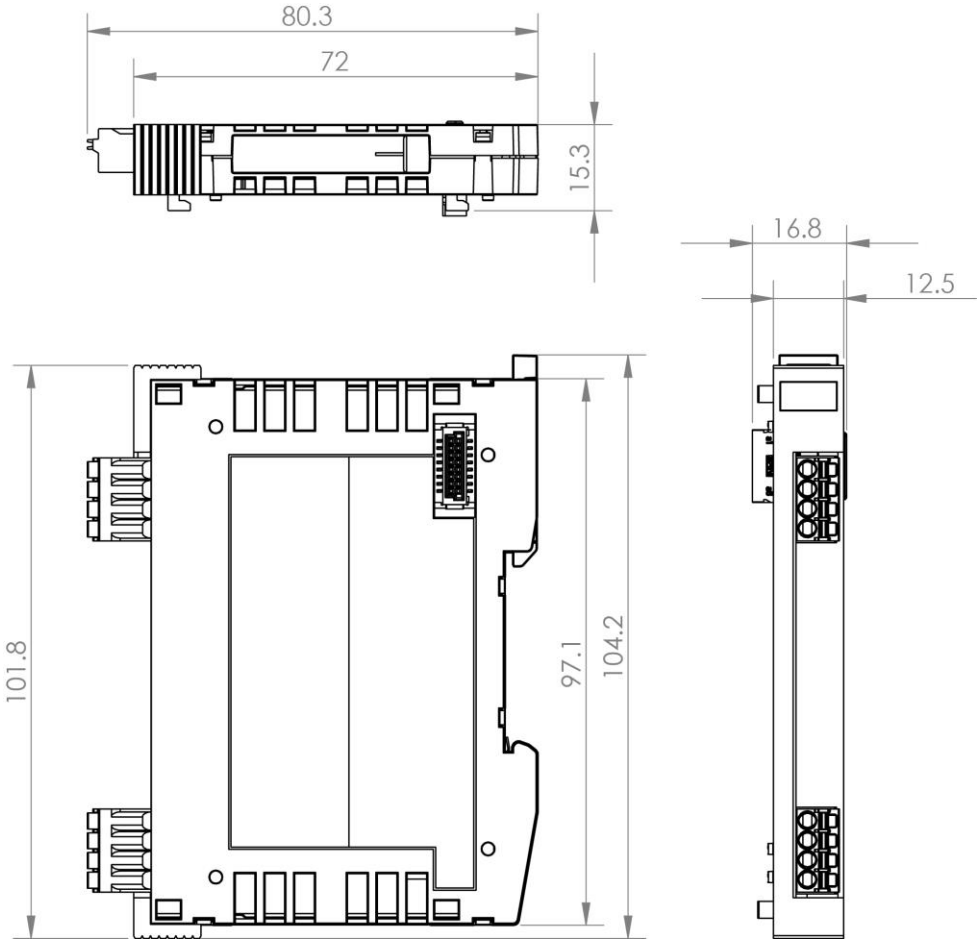
5.4 Miscellaneous

Article number	20-030-022
Standard	UL 508 (E247993)
Approvals	CE, cULus, UKCA

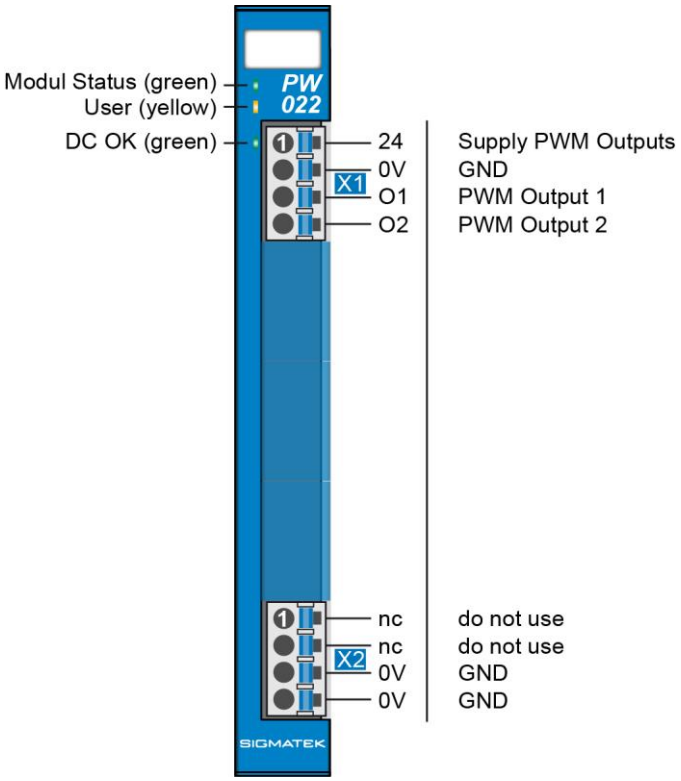
5.5 Environmental Conditions

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 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



INFORMATION

The GND supply (X2: Pin 3 and Pin 4) is internally bridged. Only one GND pin (pin 3 or pin 4) is required to power the module. The 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 by the forward looping!

7.1 Status LEDs

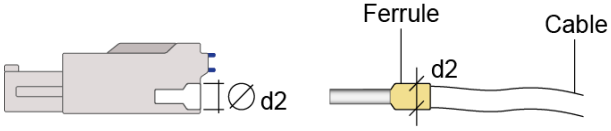
Module Status	green	ON	module active
		OFF	no supply available
		BLINKING (5 Hz)	no communication
User	yellow	ON	can be set from the application (e.g. the module LED can be set to blinking through the visualization so that the module is easily found in the control cabinet)
		OFF	
		BLINKING (2 Hz)	
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

7.2 Applicable Connectors

Connectors:
X1, X2: Connectors with spring terminals (included in delivery)
The spring terminals are suited for the connection of ultrasonically compacted (ultrasonically welded) wires.

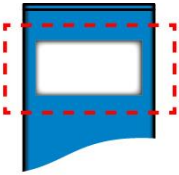
Connections:

Stripping length/sleeve length.	10 mm
Mating direction:	parallel to the conductor axis or circuit board
Conductor cross section rigid:	0.2-1.5 mm^2
Conductor cross section flexible:	0.2-1.5 mm^2
conductor cross section strands 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 (reason for reduction d2 of the ferrule)



d2 = max. 2.8 mm

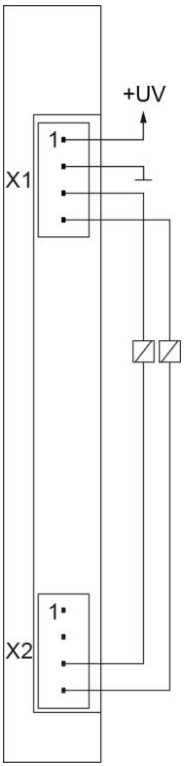
7.3 Label Field



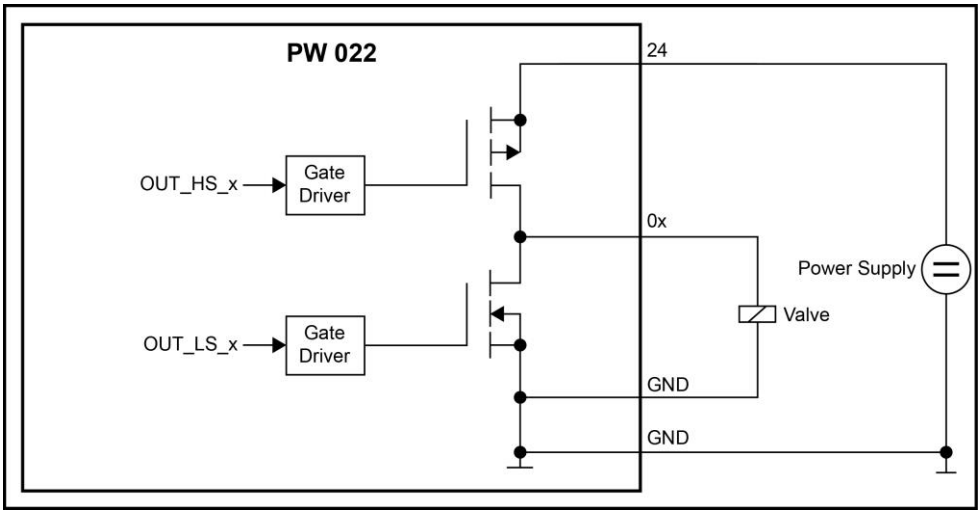
Manufacturer	Weidmüller
Type	MF 10/5 CABUR MC NE WS
Article number Weidmüller	1854510000
Compatible printer	Weidmüller
Type	Printjet Advanced 230V
Article number Weidmüller	1324380000

8 Wiring

8.1 Wiring Example



8.2 Output Scheme



8.3 Notes

INFORMATION

Connect the ground bus to the control cabinet.

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

9 Assembly/Installation

9.1 Check Contents of Delivery

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

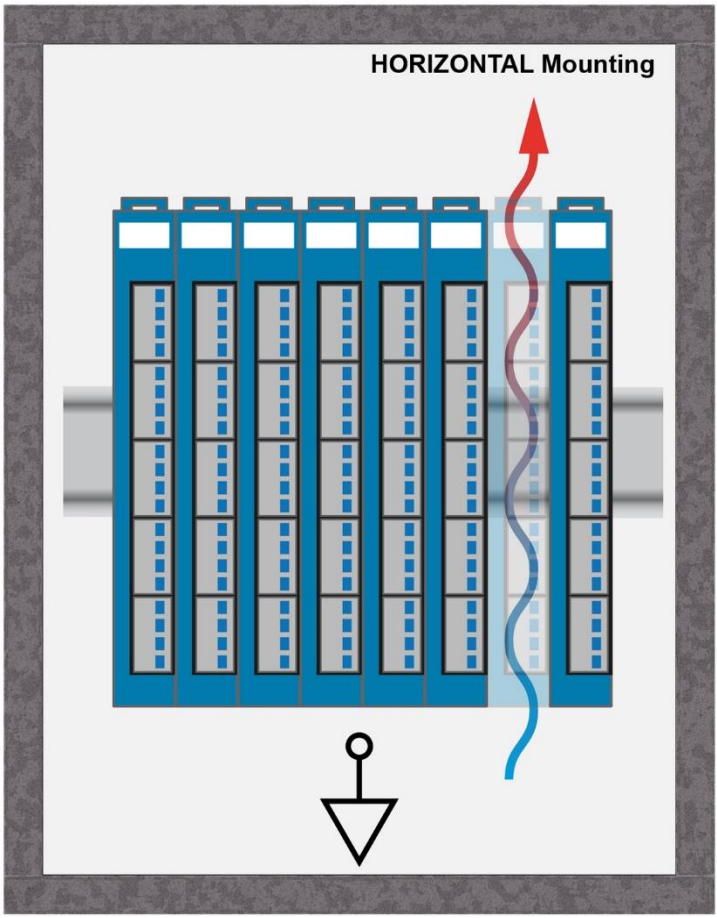
INFORMATION

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.

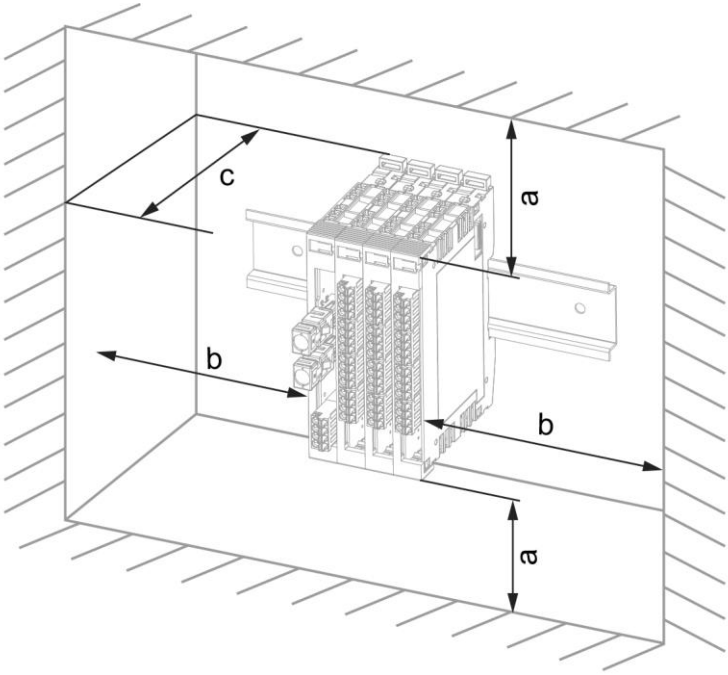
Damaged components can disrupt or damage the system.

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

Address (hex)	Size (bytes)	Access Type	Description	Reset value
Cyclic Writing				
0000	2	w16	PWM 1 turn-on time (high time) With the value 0, the PWM is deactivated (PWM high and low side), with a periphery reset, value is reset (PWM off) Bit 15..0: High time [500 ns]	0000
0002	2	w16	PWM 2 turn-on time With the value 0, the PWM is deactivated (PWM high and low side), with a periphery reset, value is reset (PWM off) Bit 15..0: High time [500 ns]	0000
SDO				
0004	2	w16	PWM 1 period Bit 15..0: Period [500 ns]	0000
0006	2	w16	PWM 2 period Bit 15..0: Period [500 ns]	0000
Cyclic Reading				
0010	1	r	Status register latch Bit 0: Current high (7 A) (high-side FETs are also turned off during that time) Bit 1: Over current (14 A) (triggers a periphery reset) Bit 2: DC OK for output stage Bit 3: Periphery reset Bit 4: Voltage for output stage too high (triggers periphery reset) Bit 7..5: Reserve	0000

SDO				
0011	1	r	Status register Bit 0: Current high (7 A) (high-side FETs are also turned off during that time) Bit 1: Over current (14 A) (triggers a periphery reset) Bit 2: DC OK for output stage Bit 3: Periphery reset Bit 4: Voltage for output stage too high (triggers periphery reset) Bit 7..5: Reserve	00

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

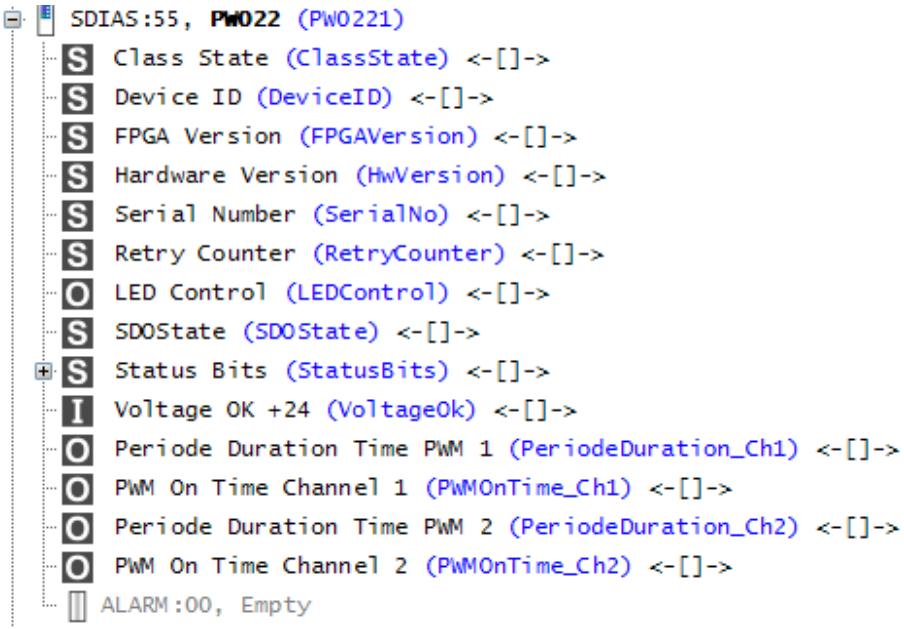
Should you need to dispose of the device, the national regulations for disposal must be followed.

The device appliance must not be disposed of as household waste.

16 Hardware Class PW022

Hardware class PW022 for the S-DIAS PW022 valve output module

This hardware class is used to control the PW 022 hardware module with 2 PWM outputs. More information on the hardware can be found in the module documentation.



16.1 General

ClassState	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	The retry counter is incremented, when a transfer fails.
LED control	Output	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 status are possible: 0 LED off 1 LED on 2 blinks slowly 3 blinks rapidly
Required	Property	This setting 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.

16.2 PWM Outputs 1-2

Status Bits	State	In this server, the status bits of the micro controllers are shown. The respective bits mean the following: Bit 1 Over current 7 A Bit 2 Over current 14 A Bit 3 Supply voltage OK (X1B) Bit 4 Peripherals reset Bit 5 Voltage too high
Voltage OK	State	The voltage supply for output 1 and 2 is displayed in this server. 0 power supply error 1 power supply OK

Periode Duration PWM [1-2]	Output	Defines the PWM period duration for channel 1-2 depending on the setting of the PWM Unit Mode. PWM Unit Mode = 0: The period duration is defined in 1 µs steps. The period duration must be at least 50*1 µs (=20 kHz). Default value is 100 = 100 µs. PWM Unit Mode = 1: The period duration is defined in 500 ns steps. The period duration must be at least 100*500 ns (=20 kHz). Default value is 100 = 50 µs. When changing the value, it is transmitted to the module via SDO asynchronously.
PWM On Time Channel [1-2]	Output	Defines the PWM switch on duration for channel 1-2 depending on the setting of the PWM Unit Mode. PWM Unit Mode = 0: Switch on time in percent of 0 .. 10000 (0 - 100.00 %) PWM Unit Mode = 1: Switch on time on 500 ns steps. The time must not be longer than the PWM period duration.
PWM Unit Mode	Property	Defines the unit for setting the period duration and the PWM switch on duration. 0: the PWM switch on duration is defined in percent of 0 to 10000 (100.00 %) and the period duration in 1 µs steps. (default) 1: the PWM switch on duration and the period duration are defined in 500 ns steps. as initialization value

16.3 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
20.09.2018		3 Connector Layout	Note added
15.11.2018	5	1.4 Miscellaneous	UL instead of UL in preparation
14.11.2019	17	7 Supported Cycle Times	Chapter added
28.02.2020	17	7 Supported Cycle Times	Text adapted
08.09.2020	18	8 Hardware Class PW022	Chapter added
04.11.2020	13	5 Mounting	Expansion functional ground connection
06.12.2022	6	1.4 Miscellaneous	UKCA conformity
20.04.2023	8	3 Connector Layout	Info box corrected
26.07.2023		Document	General chapters added, design