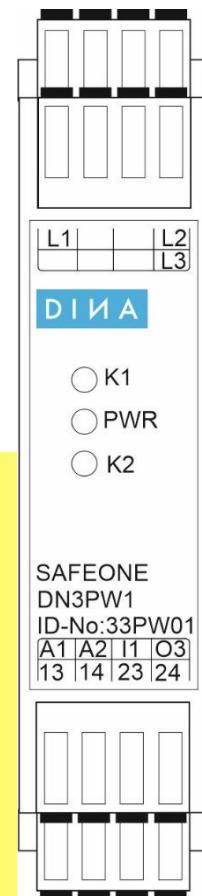


DINA

SAFEONE DN3PW1

Manual



Three phases voltage monitoring

DINA Elektronik GmbH

Esslinger Straße 84
72649 Wolfschlugen
Germany

Phone +49 7022 9517 0
Mail info@dina.de
Web www.dina.de

© Copyright by DINA Elektronik GmbH 2024

All parts of this documentation are protected by copyright.

Any use beyond that permitted under copyright law is not permitted without express written consent from the publisher. This applies in particular to the reproduction, distribution and translation of this documentation or parts thereof, as well as the storage and processing of this content using electronic data processing systems.

The information contained in this documentation corresponds to the technical state of the product at the time these operating instructions were published.

This manual is valid for:

Description	ID-No.
--------------------	---------------

SAFEONE DN3PW1	33PW01
----------------	--------

Legal information

Handbook:	Manual
Target group:	Electricians, electrical designers
Editor:	DINA Elektronik GmbH
File name:	BA_DN3PW1-en-33PW01.docx
Language:	ENG
Publication as at:	9. July 2024

Table of Contents

1	Structure of the document	1
1.1	Conventions.....	1
1.1.1	Emphasizing information	1
1.1.2	Emphasizing paragraphs using typography	1
1.1.3	Emphasizing words using typography	1
1.2	Your opinion is important to us!.....	2
2	Safety.....	3
2.1	Warnings	3
2.1.1	Function of warnings	3
2.1.2	Design of warnings.....	3
2.1.3	Hazard symbols.....	4
2.2	Qualification of personnel	4
2.2.1	Electrician.....	4
2.2.2	Electrical designers	4
2.3	Intended use and improper use	5
3	EC declaration of conformity	8
4	Product description.....	9
4.1	Function description.....	9
4.1.1	Reaction time	9
4.1.2	Measurement voltage tolerance	10
4.2	Connections.....	10
4.3	Block diagram.....	11
5	Diagnostics and switching status displays	12
5.1	LED indicators	12
6	Example of application.....	13
7	Order information	14
8	Technical data.....	14
8.1	Supply	14
8.2	Digital inputs	14
8.3	Measuring inputs	14
8.4	Transistor outputs	14

8.5	Contact outputs	15
8.6	General data.....	15
8.7	Connection data	15
8.8	Environmental conditions.....	16
8.9	Dimensions.....	16
8.10	Contact life	16
9	Installation and removal.....	17
9.1	Installing a module.....	17
9.1.1	Overview	17
9.2	Removing a module.....	17

1 Structure of the document

1.1 Conventions

Information of particular importance is emphasized in this documentation through the use of symbols, typography or formulations.

1.1.1 Emphasizing information

The following symbols indicate important information:

	Degree of hazard (e.g. WARNING): Triangular symbols indicate the degree of hazard in warnings.
	Type of hazard (e.g. electrical shock – dangerous voltage): Triangular symbols indicate the type of hazard in warnings.
	Information: Additional clarification.
	Tip: Additional information to help optimize the workflow.

1.1.2 Emphasizing paragraphs using typography

The following typography is used to emphasize paragraphs with special functions:

►	Indicates an instruction.
◀	Indicates an expected reaction.
▼	Indicates an unexpected reaction.
■	Indicates an item in a list.

1.1.3 Emphasizing words using typography

The following typography is used to emphasize words with special functions:

(1)	Represents a numbered item in a figure.
→	Indicates a cross-reference to another page, figure or document.

1.2 Your opinion is important to us!

We do all we can to provide complete, accurate documentation for the product. If you have any suggestions for improvement or advice for us, please share your thoughts with us. Send us your comments by e-mail to the following address.

E-mail: info@dina.de

2 Safety

2.1 Warnings

2.1.1 Function of warnings

Warnings warn users about hazards when handling the product. The hazards are classified, specified, described and supplemented with information about how to avoid them.

- If there is a warning before a list of instructions, the hazard is present throughout the entire activity.
- If there is a warning immediately before an instruction, the hazard is present during the next step.

2.1.2 Design of warnings

All warnings are indicated by a signal word and a warning symbol. The different combinations of the signal word and warning symbol indicate the degree of danger.



DANGER

For an immediate hazard that will result in severe injuries or death.



WARNING

For an immediate hazard that could result in severe injuries or death.



CAUTION

For a potentially hazardous situation that could result in injuries.



CAUTION

For a potentially harmful situation in which the product or an item near it could be damaged.



CAUTION

For a hazard that could cause environmental damage.

2.1.3 Hazard symbols



Note

The warning symbol may be present alongside another hazard symbol that represents the type of hazard, in order to attract the reader's attention.

Hazard symbols are indicated by a triangular symbol in the context of warnings. The following hazard symbols are used in this documentation:



Electric shock – dangerous voltage!

2.2 Qualification of personnel

DINA Elektronik GmbH distinguishes between specialist staff with different qualifications when it comes to carrying out work on the product. The minimum required qualifications are specified for each task and are defined as follows:

2.2.1 Electrician

Specialist, who installs, maintains and repairs the electrical system in the product. A specialist is a person whose specialist training means that they have the knowledge and experience, including knowledge of relevant regulations, necessary to assess the work assigned to them and the potential hazards.



Note

When evaluating a person's specialist training, multiple years of work in the relevant field may also be taken into account.

→ **DIN VDE 1000-10** Requirements for persons working in a field of electrical engineering.

2.2.2 Electrical designers

Specialists, who design the electrical system and the product. A specialist is a person whose specialist training means that they have the knowledge and experience, including knowledge of relevant regulations, necessary to assess the work assigned to them and the potential hazards.



Note

When evaluating a person's specialist training, multiple years of work in the relevant field may also be taken into account.

→ **DIN VDE 1000-10** Requirements for persons working in a field of electrical engineering.

2.3 Intended use and improper use

The product has exclusively been developed for use for the purpose described here. The specifications set out in these operating instructions must be strictly complied with.

- The SAFEONE DN3PW1 module monitors the three phases of the supply voltage of an electrical system.

Any other form of use is regarded as improper use.

If the product is

- not used as intended,
- improperly maintained or
- incorrectly operated,

the manufacturer will not assume any liability for any damage that results. In this case, the risk shall be borne exclusively by the user.

2.4 Documentation

Operating instructions contain instructions on how to use a product safely, correctly and cost-effectively. Follow the instructions in these operating instructions in order to prevent hazards, avoid repair costs and standstill, and improve the reliability and service life of the product. You must read the operating instructions and ensure that you understand them.



- ▶ Before working with the product, read the documentation
 - ▶ Always ensure that the operating instructions are available where the product is in use.
-

2.5 Safety regulations

The safety regulations listed below must always be complied with. In the event that these safety regulations are not complied with or the device is used improperly, **DINA Elektronik GmbH** accepts no liability for any resulting injury or damage.

- The product must only be installed and commissioned by a skilled electrician or a trained, instructed person, who is familiar with these operating instructions and the applicable specifications regarding occupational health and safety and accident prevention.
-



WARNING

Danger to persons and materials! In the event that specifications are not complied with, this can result in death, severe injuries or significant material damage.

- ▶ Observe VDE, EN and local regulations, in particular with regard to protective measures.
-

- If the emergency stop is used, either the integrated restart prevention function must be used or the machine must be prevented from restarting automatically using a superordinate control system.
-

- When installing the device, the required distances as per DIN EN 50274, VDE 0660514 must be taken into account.
 - ▶ During transport, storage and operation, comply with the conditions set out in EN 60068-2-1, 2-2.
 - ▶ Assemble the device in a control cabinet with at least IP54 degree of protection. Otherwise, dust and moisture can impair the functions. The device must be installed in a control cabinet.
 - ▶ Ensure that the output contacts have sufficient protective circuitry for capacitive and inductive loads.
 - ▶ Follow the specifications in the general technical data.
-

**Note**

More detailed information can be found in the → **Technical data** section.

**WARNING**

Electric shock – dangerous voltage! During operation, switching devices conduct dangerous voltages.

- ▶ Never remove protective covers from electrical switching devices during operation.
 - ▶ Replace the device the first time a fault occurs.
 - ▶ Dispose of the device in accordance with nationally applicable environmental regulations.
-

2.5.1 Retrofitting and conversion

- Unauthorized conversion voids any warranty. This can cause hazards that can lead to severe or even fatal injury.

2.5.2 Basic safety regulations

The safety regulations listed below must always be complied with. In the event that these safety regulations are not complied with or the device is used improperly, **DINA Elektronik GmbH** accepts no liability for any resulting injury or damage.

- The product described here was developed to take on controlling and monitoring functions as part of an overall system.
- The entire system is made up of sensors, analysis units and reporting units.
- It is the manufacturer's responsibility to ensure that a system or machine is functioning correctly as a whole.

- It is the responsibility of the manufacturer of a system or machine to ensure the correct overall function
- **DINA Elektronik GmbH** is not able to make any guarantees regarding the properties of an overall system not designed by the company.
- **DINA Elektronik GmbH** accepts no liability for any recommendations given or implied in the following description.
- No new guarantee, warranty or liability claims that go beyond DINA Elektronik GmbH's general delivery conditions can be derived from the following description.
- To prevent EMC disturbances, the physical environmental and operating conditions where the product is installed must correspond to the EMC section of DIN EN 60204-1.

2.6 Working on live parts



WARNING

Electric shock – dangerous voltage! Touching live components can cause severe or even fatal injury, depending on circumstances, as a result of an electric shock.

- ▶ Never assume that a circuit is dead.
 - ▶ Always check circuits as a safety precaution! Components being worked on may only be live if this is absolutely necessary and stipulated.
 - ▶ Accident prevention regulations (e.g. VBG4 and VDE 105) must be observed during all work.
 - ▶ Only use suitable, intact tools and measuring equipment.
-

3 EC declaration of conformity

DINA

Original EU-Konformitätserklärung

(gemäß der Richtlinie 2014/35/EU)

Original EC-Declaration of Conformity

(according to Directive 2014/35/EU)

DINA Elektronik GmbH
Esslinger Str. 84
72649 Wolfschlugen
Deutschland

Wir erklären, dass folgendes Produkt allen einschlägigen Bestimmungen der Richtlinie 2014/35/EU entspricht.
We declare, that the following product fulfils all the relevant provisions of Directive 2014/35 / EC.

Produkt/Product	Funktion/Function
SAFEONE DN3PW1	Dreiphasen Spannungswächter Three phases voltage monitoring

Weitere EU-Richtlinien/ Further EC- directives

2014/30/EU	EMV-Richtlinie/EMC-Directive
2011/65/EU	RoHS Richtlinie/RoHS-Directive

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen/Authorized representative for the compilation of the technical documents.

DINA Elektronik GmbH
Esslinger Str. 84
72649 Wolfschlugen
Deutschland

Wolfschlugen, 07.07.2022


Markus Henzler
Entwicklung

4 Product description

The SAFEONE DN3PW1 measures the phase voltage at the measurement inputs L1, L2, L3.

- If one or 3 phases are missing during the operation, the outputs switch off.
- The reaction time and the measurement voltage tolerance are adjustable in the device.
- The readiness for operation and the switching status of the contact outputs are displayed via LEDs.
- The device is intended for mounting on a 35mm standard rail.
- Phase monitoring can be deselected by wiring input I1.

4.1 Function description

The **SAFEONE DN3PW1** measures the phase voltage at the measurement inputs L1, L2, L3 and impresses them. This process is repeated every 60 s.

If the measuring voltage of all three phases is within the tolerance range, the contact outputs 13/14, 23/24 and output O3 switch on after 3s. Otherwise the outputs remain switched off.

As soon as a voltage outside the tolerance limit is measured on one or more phases, the outputs switch off after the reaction time.

The outputs remain switched off for at least 1.5s, even if the measuring voltage returns to the tolerance range within this time. The interruption is indicated by the LED K2. This remains off and can be switched on again by switching off the operating voltage for 1s or by a falling signal level at input I1.

4.1.1 Reaction time

The reaction time is adjustable in the device from 10 to 100ms.

shift position	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
reaction time in ms	10	16 1)	22	28	34	40	46	52	58	64	70	76	82	88	94	100

1) factory setting

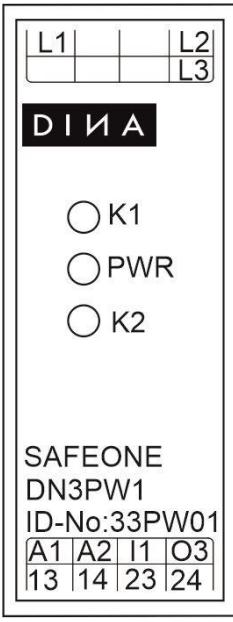
4.1.2 Measurement voltage tolerance

The measurement voltage tolerance is adjustable in the device. Voltage fluctuations of one or more phases within the set tolerance do not lead to a shutdown.

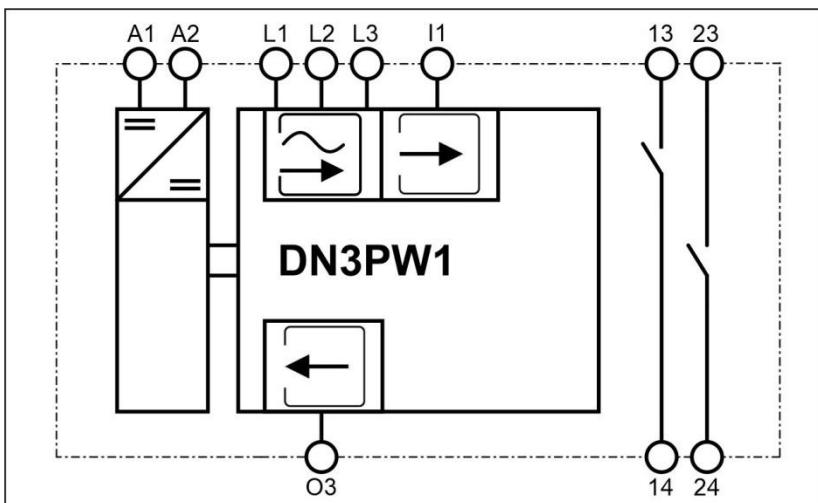
shift position	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
tolerance in V $\pm 5\%$	--	10	19	29	38	48	57	67	76	85	95	105	115	124	133	143

1) factory setting

4.2 Connections

 DIN A <ul style="list-style-type: none"> <input type="radio"/> K1 <input type="radio"/> PWR <input type="radio"/> K2 SAFEONE DN3PW1 ID-No:33PW01 <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>A1</td> <td>A2</td> <td>I1</td> <td>O3</td> </tr> <tr> <td>13</td> <td>14</td> <td>23</td> <td>24</td> </tr> </table>	A1	A2	I1	O3	13	14	23	24	L1, L2, L3	Measuring inputs
A1	A2	I1	O3							
13	14	23	24							
A1	Power supply +24 V DC									
A2	Power supply 0V									
I1	Digital input									
O3	Signal output									
13/14	Contact output K1									
23/24	Contact output K2									
LED K1	Status display K1									
LED K2	Status display K2									
LED PWR	PWR on/off									

4.3 Block diagram



Measuring inputs



Inputs



Outputs

5 Diagnostics and switching status displays

The module has an LED indicator for

- Ready to use
- Status of the contact outputs

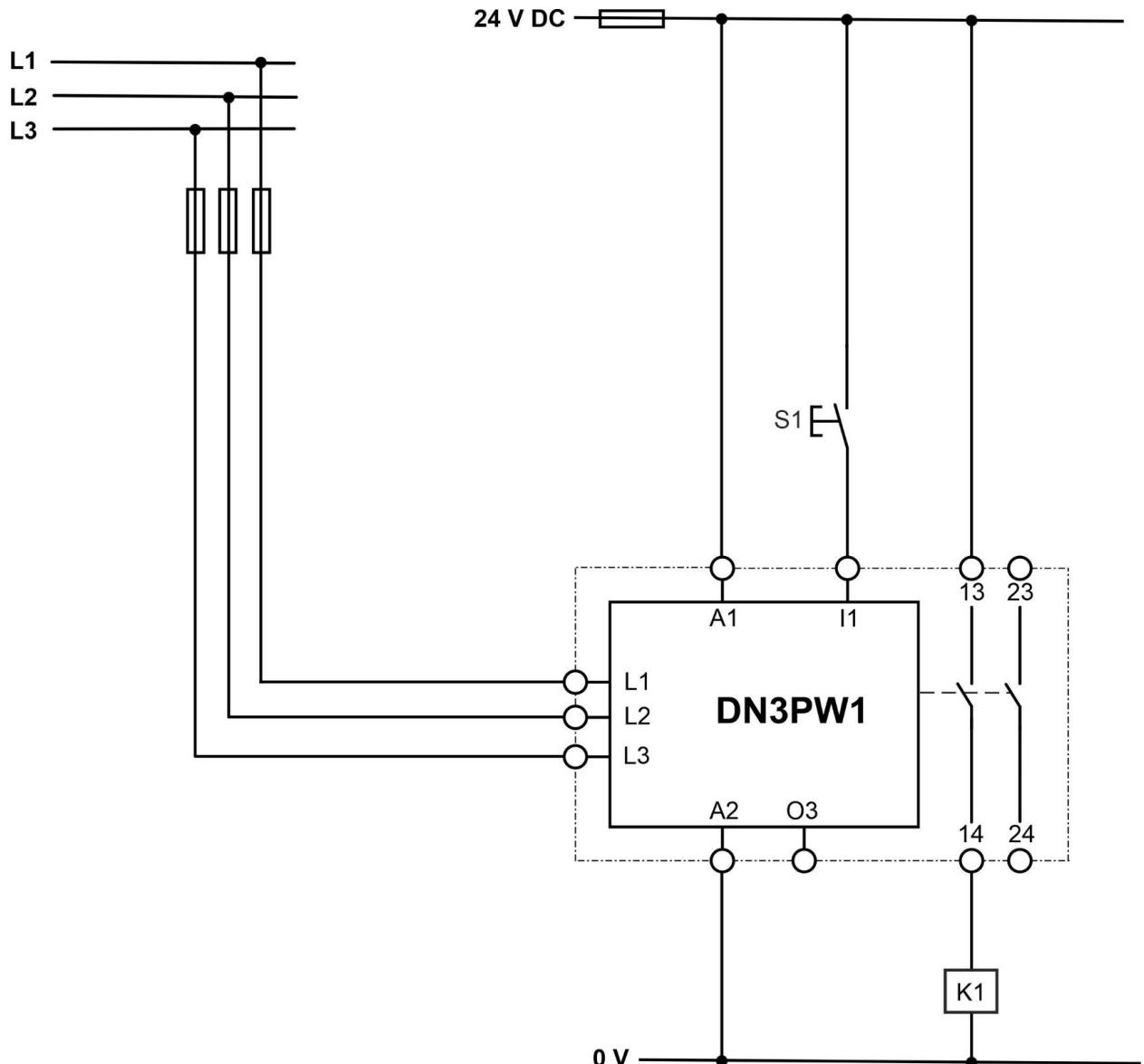
5.1 LED indicators

Legend

	LED on
	LED off
	LED flashing

LED K1	LED PWR	LED K2	13/14, 23/24	O3	Status
When turning on					
			OFF	OFF	The measuring voltage is impressed.
			OFF	OFF	Voltage at L1, L2, L3 is outside the measurement tolerance.
in operation					
			ON	ON	Voltage at L1, L2, L3 is within measurement tolerance.
			OFF	OFF	Voltage at L1, L2, L3 is outside the measurement tolerance.
			ON	ON	Voltage at L1, L2, L3 was briefly outside the measurement tolerance.
			ON	ON	Phase monitoring is deactivated.

6 Example of application



Legend:

S1 Switch for deactivating the monitoring

7 Order information

Description	Product	ID-No.
Three phases voltage monitoring	SAFEONE DN3PW1	33PW01

8 Technical data

8.1 Supply

Operating voltage U_B	24 V DC (-15/+10%)
Current consumption at 24V	50 mA
Power consumption at A1/A2	1,2 W

8.2 Digital inputs

Inputs	I1 (galvanically isolated)
Input voltage range	24 V DC (-15/+10%)
Current consumption	typ. 4 mA (at U_B)

8.3 Measuring inputs

Measuring inputs	L1, L2, L3
Maximum voltage	540V AC
Nominal voltage	400V AC
Measurement voltage tolerance	-15%/+10%
Current consumption	0,55mA per input

8.4 Transistor outputs

Outputs	O3
Output type	
Voltage	24 V DC

Max. switching current	1 A
Min. switching current	1 mA

8.5 Contact outputs

Outputs	13/14, 23/24
Contact material	Ag alloy
Output guidance, performance level	
Minimum switching current	10 mA
Switching capacity in accordance with IEC 60947-5-1	DC13: 1A/30V DC
Mechanical service life	5 x 10 ⁷ switching cycles
Contact fuse	3 A gL/gG
Typical response time	10 ms / 10 ms

8.6 General data

Type of protection (housing and terminals)	IP 20
Type of protection (place of installation)	min. IP 54
Clearance and creepage distances between circuits	In accordance with DIN EN 50178
Rated insulation voltage	50V AC
Rated surge voltage/insulation	0,8 kV
Degree of contamination	2
Overshoot category	III
Housing material	Polyamide (PA), not reinforced

8.7 Connection data

Terminals	Push-in, pluggable
-----------	--------------------

Conductor cross section	0,25 - 2,5mm ²
AWG conductor cross section	24...12
Conductor type	Flexible with end sleeves
Stripping length	10 mm

8.8 Environmental conditions

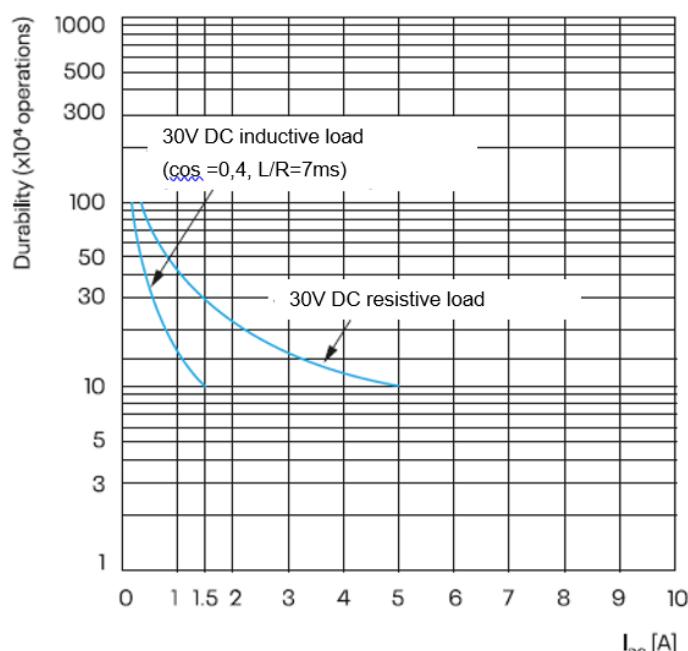
Operating temperature	-10 °C to +55 °C
Storage temperature	-40 °C to +85 °C
Altitude of place of use	< 2000 m above sea level

8.9 Dimensions

B x H x T	22,5 x 114 x 111 mm (0.886 x 4.488 x 4.370 in)
Size of DIN rail	35,0 mm (1.378 in)

8.10 Contact life

Electrical service life of the output contacts in accordance with DIN EN 60947-5-1/ Annex C.3

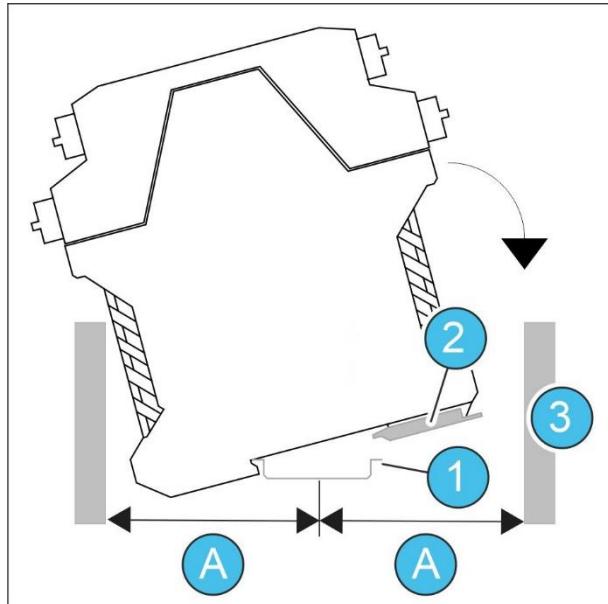


9 Installation and removal

9.1 Installing a module

9.1.1 Overview

- (A) 70-75 mm (2,756-2,953 in)
- (1) Top hat rail
- (2) Locking slider
- (3) Cable duct



Procedure

- ▶ Hook the module onto the top hat rail (1) and press it downward.
- ▶ The locking slider (2) engages under the top hat rail.

9.2 Removing a module

Procedure

- ▶ Use a screwdriver (1) to move the locking slider away from the module.
- ▶ Move the module upward and remove it from the rail.

