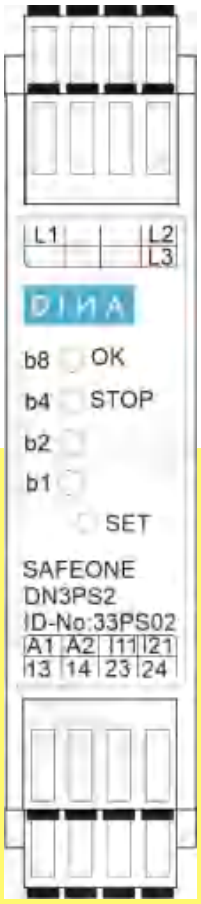
# SAFEONE
# DN3PS2

## Hardware




Safety switchgear to monitor the standstill of
three-phase and single-phase motors without sensor

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This manual is valid for:

| **Description** | **ID-No.** |
|---|---|
| DN3PS2 | 33PS02 |
| DN3PS2 | 33PS03 |
| DN3PS2 | 33PS05 |
| DN3PS2 | 33PS08 |

## Legal information

| | |
|---|---|
| Handbook: | Hardware |
| Target group: | Electricians, electrical designers |
| Editor: | DINA Elektronik GmbH |
| File name: | DN3PS2-Handbuch-en-202308.docx |
| Language: | ENG |
| Publication as at: | 22. September 2023 |

# 1 Structure of the document

## 1.1 Conventions

Information of particular important 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**<br>For an immediate hazard that will result in severe injuries or death. |
|  | **WARNING**<br>For an immediate hazard that could result in severe injuries or death. |
|  | **CAUTION**<br>For a potentially hazardous situation that could result in injuries. |
|  | **CAUTION**<br>For a potentially harmful situation in which the product or an item near it could be damaged. |
|  | **CAUTION**<br>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.

**DN3PS2** is a safety switchgear to monitor the speed of three-phase and single-phase motors without sensor.

- The safety module is intended for use on machines and plants to prevent hazards from arising.

Any other form of use is regarded as improper use.

If the product is

not used as intended,

improperly

You can download the certificates from our website:

**https://www.dina.de/downloads**

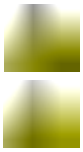
## 2.4 Documentation

Operating instructions contain instructions on

To prevent EMC disturbances, the physical environmental and operating conditions where the product is installed must correspond to the EMC section of DIN EN 602041.

If contact outputs are used, the safety function must be requested at least once per month for Performance Level (e) and once per year for Performance Level (d).

## 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

# 4 Product description

The **SAFEONE DN3PS2** is a safety switchgear for sensorless standstill monitoring of electric drives.

In the event of drive movement or errors, the potential-free NO output contacts switch to the rest position.

The restart can be parameterized with a time delay.

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.

## 4.1 Function description

Standstill is detected by evaluating the induced voltage (EMF) when the motor is coasting.

After applying the operating voltage (24 V DC) to terminals A1 and A2, the safety relay will operate a self-test. The safety relay is in safe condition for the duration of the self-test. The LED OK lights up red.

The device is ready for operation, when the LED OK lights up green.

If the voltage measured at the measuring inputs is lower than the switching threshold S1 set on the device, the enabling current path switches on with a time delay. The STOP LED lights up green.

The enabling current path opens immediately when the measured voltage exceeds the set switching threshold S2. The STOP LED goes out.

**CAUTION**

Note that the method of frequency measurement does not recognize a mechanically blocked motor.

**WARNING**

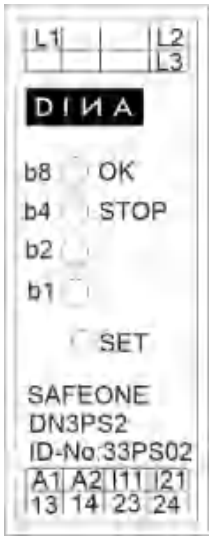
The wire break error is automatically acknowledged as soon as the error is no longer present.

Ensure suitable protective measures to prevent an automatic restart.

The DN3PS2 is available in different variants

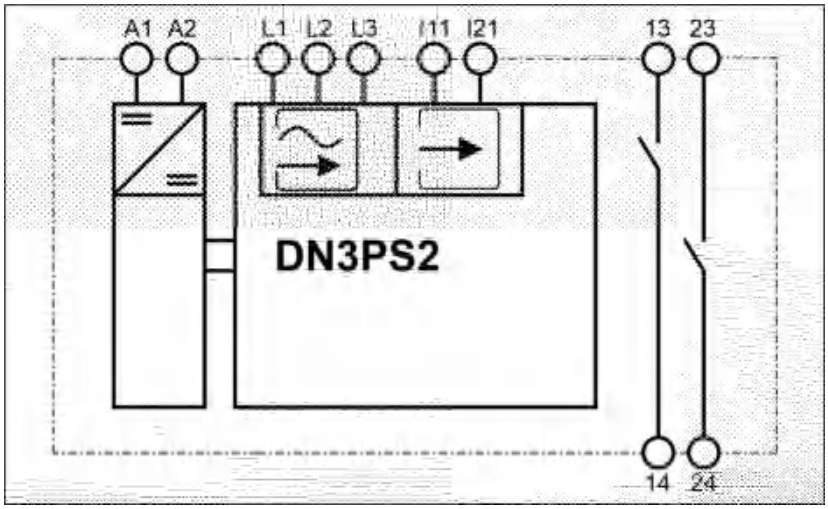
| ID-No. | Variant |
|---|---|
| 33PS02 | Standard |
| 33PS03 | Higher sensitivity,<br>longer switch-on delay times |
| 33PS05 | Single-channel muting of relay contact 13/14 |
| 33PS08 | 2 signal outputs, no muting inputs |

### 4.1.1 Connection 33PS02, 33PS03, 33PS05




| | |
|---|---|
| A1 | Power supply +24V DC |
| A2 | Power supply 0 V |
| L1, L2, L3 | Measuring inputs are to be connected directly to the motor |
| I11 | Digital input for muting-function |
| I21 | Digital input for muting-function |
| 13/14,<br>23/24 | Enabling contacts |
| LED OK | operational readiness |
| LED<br>STOP | state of the enabling current path |
| LED b1,<br>b2, b4, b8 | Binary-coded display of the set parameters |

### 4.1.2 Block diagram




Measuring inputs

Inputs

### 4.1.3 Inputs I11 and I21

With the variants 33PS02, 33PS03, 33PS05, two different types of function are possible. The function type is selected via inputs I11 and I21.

| **Function type 1** | **Function type 2 (Muting)** |
|---|---|
| I11 und I21 not connected<br>Standstill monitoring is constantly active.<br>Enable contacts close when the drive is at standstill. | I11 und I21 connected<br>Standstill monitoring is not active.<br>Enable contacts are closed [1)]<br>The "wire break" and "single-channel" error detection is inactive. [2)] |

[1)] with 33PS05 only the release contact 13/14 remains closed. The release contact 23/24 switches off when there is movement.
[2)] not with 33PS05

### 4.1.4 Example of application

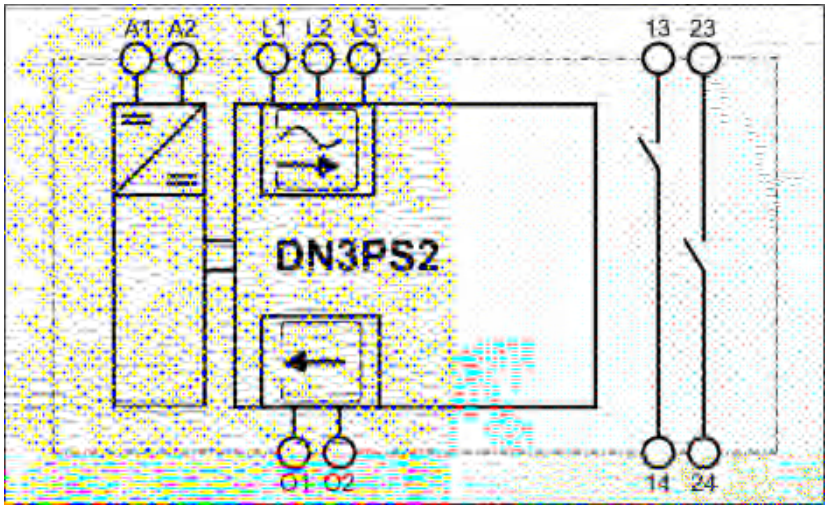
When the protective device is open, inputs I11 and I21 are not connected. Standstill monitoring is active and the enabling current path only closes when the drive is at standstill.

When the protective device is closed, standstill monitoring is **not** active and the enabling current path is closed

### 4.1.5 Connection 33PS08


| | |
|---|---|
| A1 | Power supply +24V DC |
| A2 | Power supply 0 V |
| L1, L2, L3 | Measuring inputs are to be connected directly to the motor |
| O1 | Signal output |
| O2 | Signal output |
| 13/14, 23/24 | Enabling contacts |
| LED OK | operational readiness |
| LED STOP | state of the enabling current path |
| LED b1, b2, b4, b8 | Binary-coded display of the set parameters |

### 4.1.6 Block diagram





Measuring inputs


Outputs

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| b8 | | | | | | | | | | | | | | | |
| b4 | | | | | | | | | | | | | | | |
| b2 | | | | | | | | | | | | | | | |
| b1 | | | | | | | | | | | | | | | |
| S1 (mV) | 50 | 55 | 60 | 65 | 70 | | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| b8 | | | | | | | | | | | | | | | |
| b4 | | | | | | | | | | | | | | | |
| b2 | | | | | | | | | | | | | | | |
| b1 | | | | | | | | | | | | | | | |
| t (s) | 0,5 | 1 [2)] | 2 | 3 | 4 | 5 | 6 | 7 | | | | | | | |

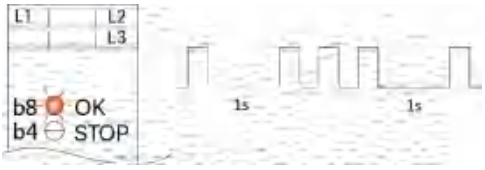
# 6 Diagnostics and switching status displays

## 6.2 Flash-codes

The safety switching device uses a flashing code of the "OK" LED to indicate errors, which lead to the safe state of the device.

The blink code repeats continuously with a pause of 1 s.

The meaning of the individual blink codes can be found in the table.




| Flash-Code | Definition | Remedy |
|---|---|---|
| 1 x flash | Internal error | Send the device to DINA Elektronik for testing. |
| 2 x flash | incorrect power supply | Check power supply<br>UB = 20.5V-26,5V DC |
| 3 x flash | Open-circuit on L1, L2, L3 | Check the wiring at the measuring inputs for<br>wire break<br>presence of direct voltage |
| 4 x flash | single-channel error<br>The signals at the measuring inputs are different. | Check the wiring at the measuring inputs for<br>short circuit<br>cross-connection<br>wire break |
| 5 x flash | Relay error | Send the device to DINA Elektronik for testing. |
| 8 x flash | Unequal wiring of inputs I11 / I21 | Check the wiring of the inputs I11/21. |

**Note**

In the function type 2 (Muting) are the error "wire break" and "single-channel" inactive.

# 7 Order information

| Description | Product | ID-No. |
|---|---|---|
| Standstill monitoring without sensor | SAFEONE<br>DN3PS2 | 33PS02<br>33PS03<br>33PS05<br>33PS08 |

# 8 Technical data

## 8.1 Supply

| | |
|---|---|
| Operating voltage UB | 24 V DC (-15/+10%) |
| Current consumption at 24V | < 80 mA |
| Power consumption at A1/A2 | 2,8 W |

## 8.2 Digital inputs

| | |
|---|---|
| Inputs | I11, I21 |
| Input voltage range | 24 V DC (-15/+10%) |
| Current consumption | typ. 4 mA (at UB) |

## 8.3 Measuring inputs

| | |
|---|---|
| Inputs | |

-circuit and overload-

## 8.7 Connection data

| | |
|---|---|
| Terminals | Push-in, pluggable |
| Conductor cross section | 0,25 2,5mm$^2$ |
| AWG conductor cross section | |
| Conductor type | Flexible with end sleeves |
| Stripping length | 8 mm |

## 8.8 Environment conditions

| | |
|---|---|
| Operating temperature | -20 °C to +55 °C |
| Storage temperature | -40 °C to +85 °C |
| Attitude of place of use | < 2000m above sea level |
| Shock | 10g |

4E-08

## 8.12 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-