

Operating Manual PS2DK

updated: 2024-09-04 / sm



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Operating manual, Quick guide, Datasheet, Connection diagram, CAD Data
Firmwareupdates, FAQ, Videos about installation and settings, Certificates

- Phase relays for monitoring phase asymmetry and phase sequence



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1 General Notes

Compliance with the following instructions is mandatory to ensure the functionality and safety of the product. If the following instructions given especially but not limited for general safety, transport, storage, mounting, operating conditions, commissioning and disposal / recycling are not observed, the product may not operate safely and may cause a hazard to the life and limb of users and third parties.

Deviations from the following requirements may therefore lead both to the loss of the statutory material defect liability rights and to the liability of the buyer for the product that has become unsafe due to the deviation from the specifications.

2 Display and controls

Asymm

Potentiometer for phase asymmetry

t

Potentiometer for response delay

LED "Relay on" yellow

lights on = relay switched on

LED "Alarm" red

lights on = phase asymmetry

flashing = phase sequence



3 Factory setting

The phase relay PS2DK is factory set to the following values:

Asymmetry Asymm = 15%
Delay time t = 0.5 s

4 Application and short description

PS2DK type phase relays monitor three-phase networks without neutral conductors and protect electric motors from asymmetry as well as incorrect phase sequences.

The switching threshold for asymmetry is adjustable from 5% to 25% and can be adapted to the grid conditions. As factory setting the asymmetry is set to 15%.

If a 2-phase motor continues to generate a reverse voltage, the asymmetry has to be set to smaller values, so that a phase failure is also detected in this operating state. For grids with high harmonic content, it may be necessary to reduce asymmetry.

When the asymmetry is set to 25%, the device works as a phase sequence monitor. It triggers in case of phase failure or incorrect phase sequencing.

If there is an incorrect phase sequence at the switch-on torque, the relay won't actuate.

The PS2DK phase relay is housed in a space-saving 22.5 mm wide housing.

5 Overview of functions

- Phase asymmetry monitoring
- Phase sequence monitoring
- adjustable asymmetry 5...25%
- Adjustable reset times, 0.1...5 s
- Output relay 2 changers
- LED indicating the operating state

6 Connecting diagram



7 Function Chart

Working principle for asymmetry

In case of symmetry, the relay is switched on (terminals 11,14 and 21,24 closed); it is being switched off (terminals 11,12 and 21,22 closed) when the voltage of one phase changes by the set value compared to the other phases and the response delay has expired or a phase fails completely. In the case of a symmetrical voltage reduction within the three-phase network $0.7 < U_s < 0.95$, the device does not respond, since a switch-off should only take place in the case of asymmetry.

Working principle for phase sequence

The relay is switched on (terminals 11,14 and 21,24 closed) when the phase sequence is correct. It will be turned off when the phase sequence is incorrect. If two mains connections of the device are interchanged, then the situation will be identical to an incorrect phase sequence and therefore the relay won't actuate. The PS2DK works according to the quiescent current principle, whereby it monitors itself for wire breakage and poor contacting at the connection terminals.

8 Important Information



DANGER!

Hazardous voltage!

Will cause death or serious injury. Turn off and lock out all power supplying this device before Working on this device.



Attention!

Observe the maximum temperature permissible when installing in switching cabinet. Make sure sufficient space to other equipment or heat sources. If the cooling becomes more difficult e.g. through close proximity of apparatus with elevated surface temperature or hindrance of the cooling air, the tolerable environmental temperature is diminishing.



Attention!

Before connecting the power supply U_s , check if the connected supply voltage matches the defined supply voltage on the type plate.

To use the equipment flawless and safe, transport and store properly, install and start professionally and operate as directed.

Only let persons work with the equipment who are familiar with installation, start and use and who have appropriate qualification corresponding to their function. They must observe the contents of the instructions manual, the information which are written on the equipment and the relevant security instructions for the setting up and the use of electrical units.

The equipment is built according to DIN VDE/EN/IEC and checked and leave the plant according to security in perfect condition. If, in any case the information in the instructions manual is not sufficient, please contact our company or the responsible representative.

In order to maintain this status, you must observe the safety regulations entitled "caution" in this operating manual. Failures to follow the safety regulations can result in death, personal injury or property damage to the device itself and to other devices and facilities.

To maintain this condition, you must observe the safety instructions in this instruction manual titled "Important Information". Failure to follow the safety instructions may result in death, personal injury, or property damage to the equipment itself and other equipment and facilities.

Instead of the industrial norms and regulations written in this instruction manual valid for Europe, you must observe out of their geographical scope the valid and relevant regulations of the corresponding country.

9 Installation

- mount on 35 mm mounting rail according to EN 60715 or wall-mount with 3 x screws M4
- connecting wires refer to the connection plan to prevent miss-operation and malfunction.

10 Commissioning

- Apply control voltage
- Set phase asymmetry
- Set response delay

11 Operation

The relay is operated with the help of the 2 potentiometers. Switching thresholds can be set for the asymmetry detection (5 ... 25%) and the delay time (0.1 ... 5 s).

12 Error search

Relay does not switch on (LED "Relay on" does not light up). Check whether:

the LED alarm lights up = phase asymmetry

- one or two phases deviate from the rated voltage. The normal tripping takes place at approx. 15% asymmetry comparative to the rated voltage (factory setting).
If all 3 phases change symmetrically, the relay does not fall off.
- Interference caused by harmonics (e.g. by frequency converters) on the grid.

the LED alarm flashes = phase sequence

- The phase sequence is correct – if not, then change.

no LED lights up = phase failure or failure of control voltage

- supply voltage is correctly applied and coincides with the device voltage of the side type plate.

In case of other errors, replace the device and send it in with the error description.

13 Technical data

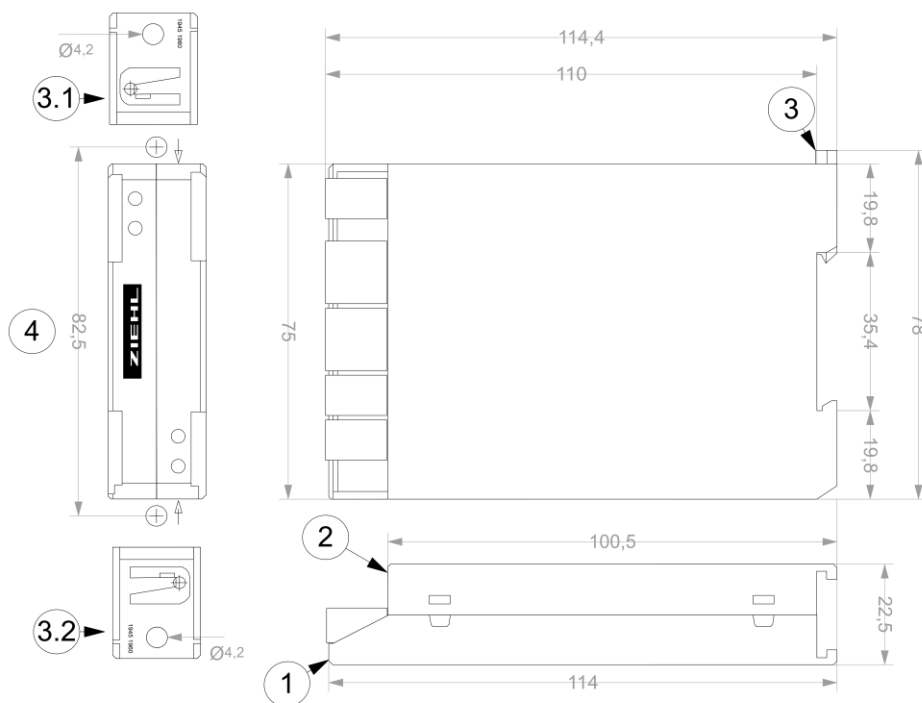
Rated supply voltage Us		3 AC 400V 50/60Hz		
Tolerance		0,85 Us ... 1,1 Us		
Power consumption		< 3 VA		
Switching points				
Adjustable asymmetry		from approx. 5 ... 25%, set ex works approx. 15%		
Response delay		0.1 ... 5s		
Actuation time		Approx. 0.2 s after phase return		
Hysteresis		Approx. 5%		
Output relay K1, K2		2 x 1 changeover contact		
Switching voltage		max. AC 400V		
Switching current		max. 6A		
Switching capacity max. AC cos φ = 1		2000 VA (ohmic load)		
Switching capacity max. DC (ohmic)		120W at DC 24V		
Nominal operating current i e for changers		3A AC-15, 250V; 2A DC-13, 24V		
Mechanical contact lifespan		3x10 ⁷ switching cycles		
Electrical contact lifespan		1x10 ⁵ switching cycles at 240V / 6A 1x10 ⁶ switching cycles at 240V / 2A		
Reduction factor at cos φ = 0.3		0.5		
EMC-tests				
Emission		EN 61000-6-3 Class B		
Immunity		EN 61000-6-2 industrial environment		
Electrical fast transient/Burst		EN 61000-4-4 ±4 kV Pulse 5/50 ns, f = 5 kHz, t = 15 ms, T = 300 ms		
SURGE immunity		IEC 61000-4-5 ±2 kV		
Electrostatic discharge		IEC 61000-4-2 ± 6 kV contact discharge, ± 8 kV over air		
Reliability – failure rate		EN 61709/ SN29500		
Ambient conditions		Local operation in dry rooms		
Operation time 24/7/365		8760 h/y		
Failure rate (FIT)		Tu = 40 °C	Tu = 60°C	Tu = 80°C
Tu = Tref (component not in operation)		781 FIT	1499 FIT	3060 FIT
		100 (146) years	76 years	37 years
Installation conditions				
Permissible ambient temperature		-20 °C ... +60 °C		
Permissible storage temperature		-20 °C ...+70 °C		
Installation height		< 2000 m over N.N.		
Climatic conditions		5-85% rel. F., no condensation		
Permissible wiring temperature		-5 °C ...+70 °C		
Vibration resistance EN 60068-2-6		2...25 Hz ±1,6 mm 25 ... 150 Hz 5 g		

Contact termination	Push-In spring-type terminal
Protection class terminals	IP20
Actuation type	Push-Button
Number of levels	1
Solid conductor	1 x 0,14 mm ² ... 1,5 mm ² / AWG 28 ... 16
Fine-stranded conductor	1 x 0,14 mm ² ... 1,5 mm ² / AWG 26 ... 14
Fine-stranded with insulated ferrule	1 x 0,25 mm ² ... 0,75 mm ²
Fine-stranded with uninsulated ferrule	1 x 0,25 mm ² ... 1,5 mm ²
Strip length	8 ... 9 mm / 0.31 ... 0.35 inches
Housing	Type K
Dimensions (W x H x D)	22,5 x 75 x 115 mm
Width	1 M
Protection class housing	IP40
IK-Code	IK06 (1 J impact energy)
Mounting	Snap mounting on 35 mm standard rail EN60715 or M4 screws (additional bar not included)
Mounting position	any
Weight	app. 150 g

Subject to technical changes

14 Housing Type K

Dimensions in mm



- 1 Bottom
- 2 Top
- 3 Bolt
- 4 Holes for screw mounting

15 Disposal



Disposal should be carried out properly and in an environmentally friendly manner in accordance with legal provisions.

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