Voltage
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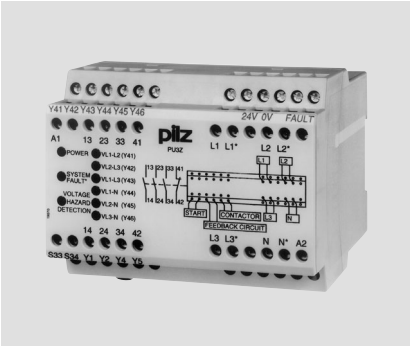


Voltage monitoring relay for the safe monitoring of 3-phase supplies

Approvals

	PU3Z
c UL us LISTED	◆
TÜV Nord Baumuster geprüft	◆
CCC	◆

Unit features

- Positive-guided relay outputs:
  - 3 safety contacts (N/O), instantaneous
  - 1 auxiliary contact (N/C), instantaneous
- 6 semiconductor outputs
- LED indicator for:
  - Supply voltage
  - Semiconductor output
  - Status of measuring circuit
- Semiconductor outputs signal:
  - Status of measuring circuit
- See order reference for unit types

Unit description

The voltage monitoring relay operates as a device for the safe monitoring of 3-phase supplies. The unit meets the requirements of EN 945-1 up to Category 4. It may be used with

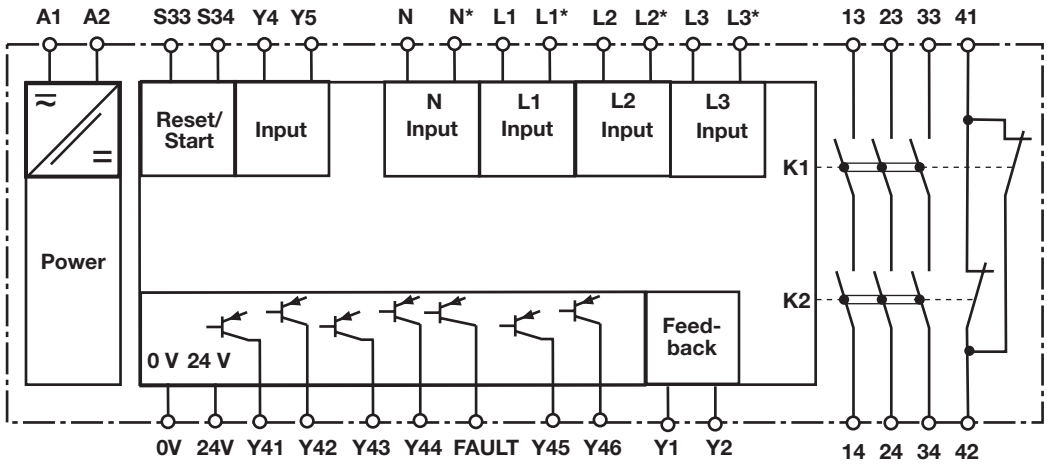
- safety circuits in accordance with VDE 0113 and EN 60204-1 (e.g. on movable guards)

Safety features

The relay meets the following safety requirements:

- The circuit is redundant with built-in self-monitoring.
- The safety function remains effective in the case of a component failure.
- The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.
- The unit has an electronic fuse.

Block diagram



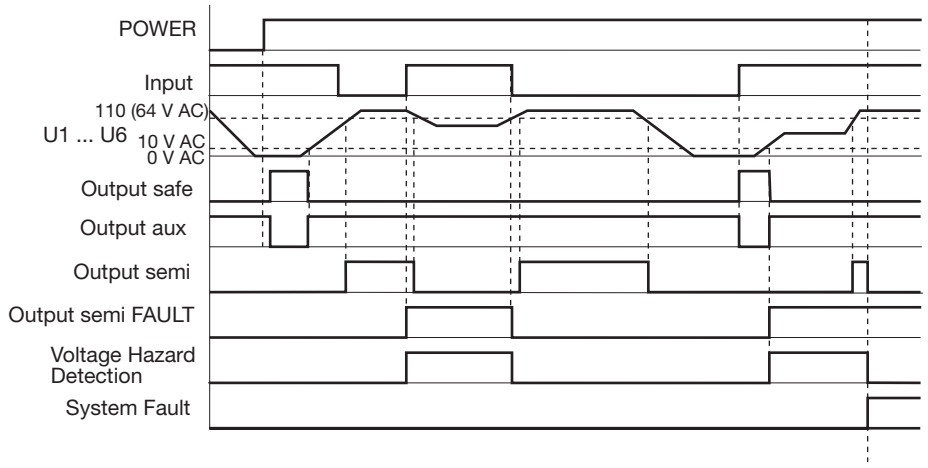
Voltage
PU3Z

Function description

- Automatic reset: Unit is active once the input circuit has been closed.
- Manual reset: Unit is active once the input circuit is closed and then the reset circuit is closed.
- Self test: An internal self test is carried out during initial commissioning and each time the supply voltage is switched off and on. The process simulates switching all measuring voltages on and then off again. Provided no error occurs during the self test, the unit will then be ready for operation.
- Increase in the number of safety contacts available by connecting external contactors.
- The unit operates as a threshold switch. The switching thresholds of the three phase voltages L1, L2, L3 are 10 V and 110 VAC / 64 VAC when measured against the neutral conductor N.The status of the measuring circuit is displayed via the semiconductor outputs and the relevant LEDs:

Measuring voltage	Semiconductor	LED
L1 – L2	Y41	VL1-L2 (Y41)
L2 – L3	Y42	VL2-L3 (Y42)
L1 – L3	Y43	VL1-L3 (Y43)
L1 – N	Y44	VL1-N (Y44)
L2 – N	Y45	VL2-N (Y45)
L3 – N	Y46	VL3-N (Y46)

Timing diagram



Key

- Power: Supply voltage
- Input: Input circuitY4-Y5
- U1 ... U6: Phase voltages on the measuring circuit L1-L1*, L2-L2*, L3-L3*, N-N*
- Output safe: Safety contacts 13-14, 23-24, 33-34
- Output aux: Auxiliary contacts 41-42
- Output semi: Semiconductor outputs Y41, Y42, Y43, Y44, Y45, Y46 indicate the status of the measuring circuit
- Voltage Hazard Detection: LED lights when there is a measuring voltage of >10 VAC, although the input circuit is closed
- System Fault: LED on: Open circuit on at least one measuring circuit or internal error
- Output semi FAULT: "FAULT" semiconductor conducts when a "Voltage Hazard Detection" error or "System Fault" occurs

Wiring

Please note:

- Information given in the “Technical details” must be followed.
- Outputs 13-14, 23-24, 33-34 are instantaneous safety contacts, outputs are delay-on de-energisation safety contacts, output 41-42 is an instantaneous auxiliary contact (e.g. for display).

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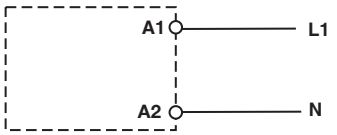
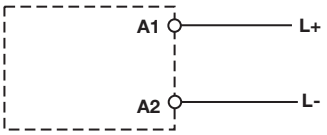
Voltage
PU3Z

- To prevent contact welding, a fuse should be connected before the output contacts (see technical details).
- Use copper wire that can withstand 60/75 °C.
- Sufficient fuse protection must be provided on all output contacts with capacitive and inductive loads.
- To meet the requirements of the safety circuits, separate wires in separate multicore cables must be used for the measuring voltages L1, L2, L3, N and the measuring voltages L1*, L2*, L3*, N*.
- Connect the measuring voltages L1 and L1*, L2 and L2* and L3 and L3*, N and N* to separate terminals on the plant, so that at least one measuring voltage will be present if a terminal screw should come away unintentionally (single fault tolerance).
- Always connect the neutral conductors N and N* to the same potential, e.g. neutral conductor on the three-phase supply, earth connection.

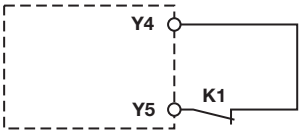
Voltage
PU3Z

Preparing for operation

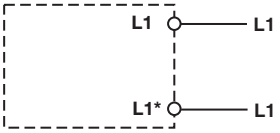
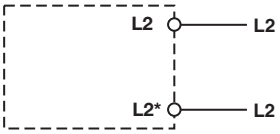
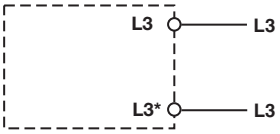
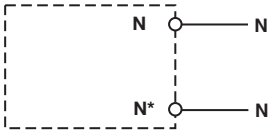
- Supply voltage

Supply voltage	AC	DC
		

- Input circuit

Input circuit	
Contactor to be monitored	

- Measuring circuit

Measuring circuit	
Measuring voltage L1	
Measuring voltage L2	
Measuring voltage L3	
Measuring voltage N	

Voltage
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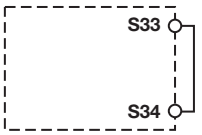
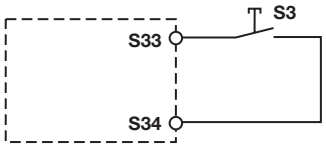
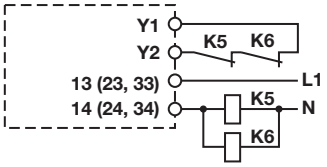
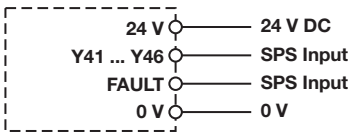
Reset circuit

Reset circuit	
Automatic reset	
Manual reset	

Feedback loop

Feedback loop	
Contacts from external contactors	

Semiconductor output



Key

S3	Reset button

Voltage
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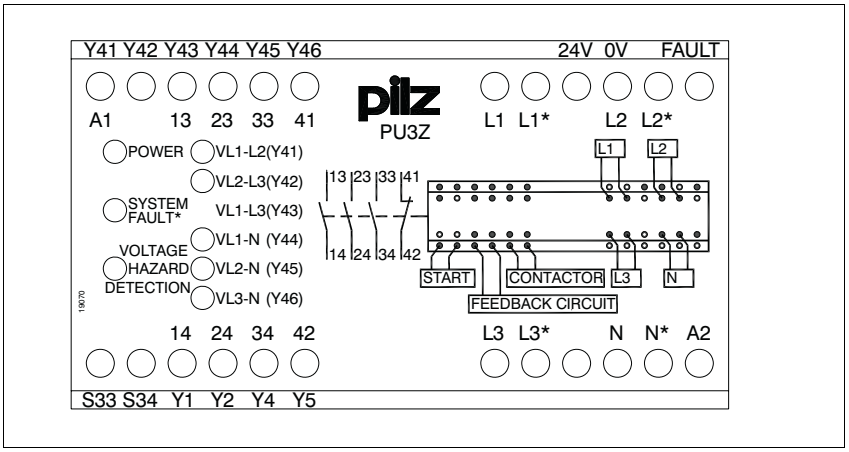
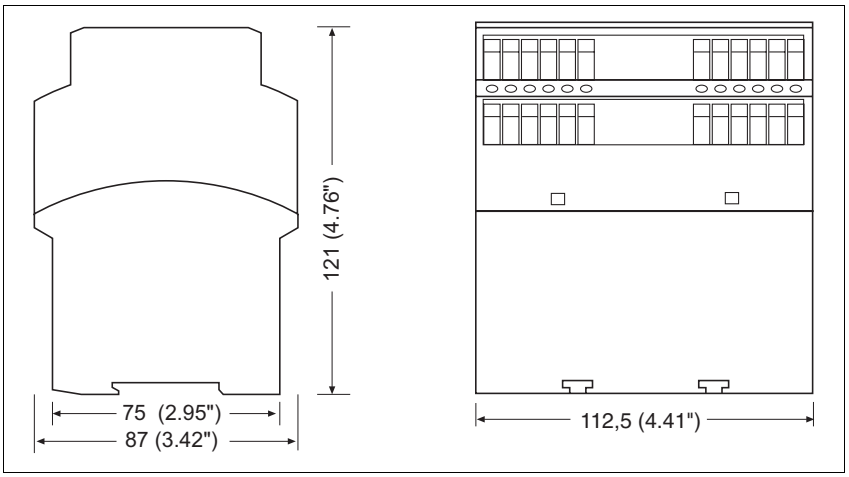
Terminal configuration



Installation

- The safety relay should be installed in a control cabinet with a protection type of at least IP54.
- Use the notch on the rear of the unit to attach it to a DIN rail.
- Ensure the unit is mounted securely on a vertical DIN rail (35 mm) by using a fixing element (e.g. retaining bracket or an end angle).

Dimensions



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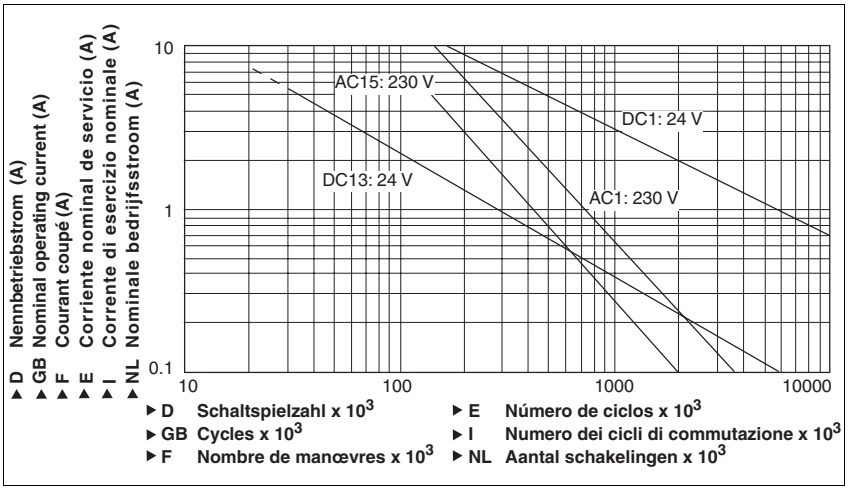
Voltage
PU3Z

Notice

This data sheet is only intended for use during configuration. For installation and operation, please refer to the operating instructions supplied with the unit.

Service life graph



Technical Details

Electrical data	
Supply voltage	
Supply voltage U_B AC	**120 - 240 V**
Supply voltage U_B AC/DC	**24 V**
Voltage tolerance	**-15 %/+10 %**
Power consumption at U_B AC	**10.0 VA** Order no.: 775510 **12.0 VA** Order no.: 775505
Power consumption at U_B DC	**7.0 W** Order no.: 775510
Frequency range AC	**50 - 60 Hz**
Residual ripple DC	**20 %**
Voltage and current at	
Input circuit DC: **24.0 V**	**80.0 mA**
Reset circuit DC: **24.0 V**	**40.0 mA**
Feedback loop DC: **24.0 V**	**0.5 mA**
Number of output contacts	
Safety contacts (S) instantaneous:	**3**
Auxiliary contacts (N/C):	**1**
Category of output contacts in accordance with **EN 954-1**	
Safety contacts (S) instantaneous:	**4**
Utilisation category in accordance with **EN 60947-4-1**	
Safety contacts: AC1 at **240 V**	I_{min}: **0.01 A** , I_{max}: **5.0 A** P_{max}: **1200 VA**
Safety contacts: DC1 at **24 V**	I_{min}: **0.01 A** , I_{max}: **5.0 A** P_{max}: **120 W**
Auxiliary contacts: AC1 at **240 V**	I_{min}: **0.01 A** , I_{max}: **5.0 A** P_{max}: **1200 VA**
Auxiliary contacts: DC1 at **24 V**	I_{min}: **0.01 A** , I_{max}: **5.0 A** P_{max}: **120 W**
Utilisation category in accordance with **EN 60947-5-1**	
Safety contacts: AC15 at **230 V**	I_{max}: **5.0 A**
Safety contacts: DC13 at **24 V** (6 cycles/min)	I_{max}: **5.0 A**
Auxiliary contacts: AC15 at **230 V**	I_{max}: **5.0 A**
Auxiliary contacts: DC13 at **24 V** (6 cycles/min)	I_{max}: **5.0 A**
Conventional thermal current	**5,0 A**
Contact material	**AgSnO2 + 0.2 µm Au**

Voltage
PU3Z

Electrical data	
External contact fuse protection (I_K = 1 kA) to **EN 60947-5-1**	
Blow-out fuse, quick	
Safety contacts:	**6 A**
Auxiliary contacts:	**6 A**
Blow-out fuse, slow	
Safety contacts:	**4 A**
Auxiliary contacts:	**4 A**
Circuit breaker 24 VAC/DC, characteristic B/C	
Safety contacts:	**4 A**
Auxiliary contacts:	**4 A**
Measuring voltage U_B AC Lx-Lx min.	**110.0 V**
Measuring voltage U_B AC Lx-Lx max.	**600.0 V**
Measuring voltage U_B AC Lx-N min.	**64.0 V**
Measuring voltage U_B AC Lx-N max.	**346.0 V**
Tolerance, measuring voltage	**-15% / +10%**
Frequency range, measuring voltage AC	**50 -60 Hz**
Semiconductor outputs (short circuit proof)	**24.0 V** DC,**50 mA**
External supply voltage	**24.0 V** DC
Voltage tolerance	**-20 %/+20 %**
Times	
Switch-on delay	
with automatic reset typ.	**2 s**
with automatic reset max.	**3 s**
with automatic reset after power on typ.	**2,700 ms**
with automatic reset after power on max.	**3,500 ms** Order no.: 775510 **4,000 ms** Order no.: 775505
with manual reset typ.	**20 ms**
with manual reset max.	**3,000 ms**
Delay-on de-energisation after safety function	**100 ms**
with power failure typ. U_B AC : **240 V**	**100 ms** Order no.: 775510 **250 ms** Order no.: 775505
with power failure max. U_B AC : **240 V**	**200 ms** Order no.: 775510 **350 ms** Order no.: 775505
Recovery time at max. switching frequency 1/s	
after power failure	**1500 ms**
Simultaneity, channel 1 and 2	**3 s**
Supply interruption before de-energisation	**20 ms**
Environmental data	
EMC	**EN 60947-5-1**, **EN 61000-6-2**, **EN 61000-6-4**
Vibration to **EN 60068-2-6**	
Frequency	**10 - 55 Hz**
Amplitude	**0.35 mm**
Climatic suitability	**EN 60068-2-78**
Airgap creepage	**EN 60947-1**
Rated insulation voltage	**600 V**
Rated impulse withstand voltage	**6 kV**
Ambient temperature	**-10 - 55 °C**
Storage temperature	**-40 - 85 °C**
Protection type	
Mounting (e.g. cabinet)	**IP54**
Housing	**IP40**
Terminals	**IP20**
Mechanical data	
Housing material	
Housing	**PPO UL 94 V0**
Front	**ABS UL 94 V0**

Voltage
PU3Z

Mechanical data	
Max. cross section of external conductors with screw terminals	
1 core flexible	**0.20 - 4.00 mm² , 24 - 10 AWG**
2 core, same cross section, flexible:	
with crimp connectors, without insulating sleeve	**0.20 - 2.50 mm² , 24 - 14 AWG**
without crimp connectors or with TWIN crimp connectors	**0.20 - 2.50 mm² , 24 - 14 AWG**
Torque setting with screw terminals	**0.60 Nm**
Dimensions	
Height	**87.0 mm**
Width	**112.5 mm**
Depth	**121.0 mm**
Weight	**740 g**

The standards current on **2005-10** apply.

Order reference

Type	Features	Terminals	Order no.
PU3Z	120 - 240 VAC	Screw terminals	775 505
PU3Z	24 V AC/DC	Screw terminals	775 510