

Monitoring Relays

Monitoring Relays for Electrical Variables

General data

Overview

The solid-state monitoring relays are offered in the field-proven design with different functions. These relays are used to detect wear effects and potential faults at an early stage and to respond to them before more serious secondary damage can occur. With their minimal space requirements, high measuring accuracy and optimized functions for high reliability, they are easy to use.

For example, the monitoring modes "Overcurrent/overvoltage" and "Undercurrent/undervoltage" can be set for the relay for current and voltage monitoring using a DIP switch. Similarly, the latching/unlatching function as well as various delay times can be set.

Area of application

Depending on the relay type, these relays can be used for monitoring electrical and non-electrical variables. They respond, for example, as soon as the set value is reached and drop as soon as the value is below the set value.

According to the relay version, they can be used for device and system protection in AC and DC systems. Combined with circuit-breakers, they can, for example, be used for overload protection of motors in chain conveyors, packaging machines etc.

Technical specifications

Type	3UG30/3UG35	
Load capacity of the output relay	Rated operating current I_e	A max. 8
	AC-15/230 V	A 3
	DC-13/24 V	A 1
	DC-13/48 V	A 0.45
	DC-13/60 V	A 0.35
	DC-13/110 V	A 0.2
	DC-13/230 V	A 0.1
Minimum contact load	mA	5/17 V for a fault of 1 ppm
Output relay DIAZED fuse protection¹⁾	Operational class gl/Gg	A 4
Electrical endurance	Operating cycles	1×10^5
Mechanical endurance	Operating cycles	2×10^6
Ambient temperature	during operation	°C – 20 ... + 50
	during storage	°C – 30 ... + 70
Conductor connection	solid	mm ² 2 × (0.5 ... 2.5)
	finely stranded, with end sleeves	mm ² 2 × (0.5 ... 1.5)
Degree of protection	Terminals:	IP20
	Housing	IP40
Can be used in networks	3UG30 13/3UG35 11	AC V 660
	other 3UG3	AC V 480
Vibration resistance	to IEC 60068-2-6	Hz/mm 10 ... 150/0.035

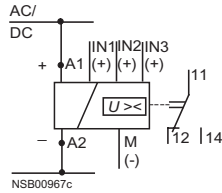
Note:

Fuse protection of the measurement circuit is not required for device protection. Conductor protection depends on the conductor cross-section used.

1) Short-circuits without any contact welding to EN 60947-5-1.

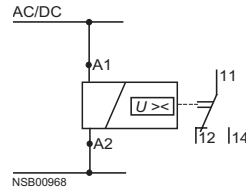
Circuit diagrams

Voltage monitoring relay, single-phase
3UG35 31, 3UG35 32



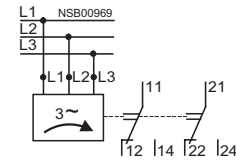
IN1/IN2/IN3: AC/DC

Voltage monitoring relay, single-phase
3UG35 34, 3UG35 35

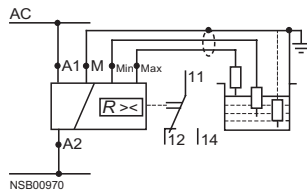


A1/A2: AC/DC

Phase monitoring relay, three-phase
3UG35 11

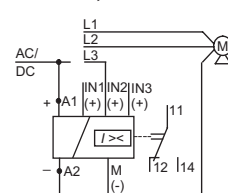


Level monitoring relay
3UG35 01



NSB00970

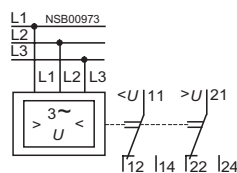
Current monitoring relay, single-phase
3UG35 21, 3UG35 22



NSB0_0971d

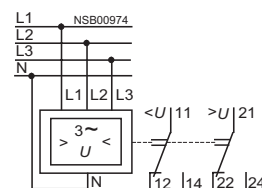
IN1/IN2/IN3: AC/DC

Voltage monitoring relay, three-phase
3UG30 41



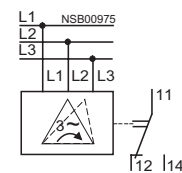
NSB00973

Voltage monitoring relay with N, three-phase,
3UG30 42



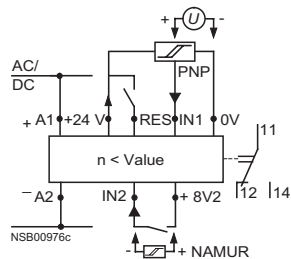
NSB00974

Asymmetry monitoring relay, three-phase
3UG30 12



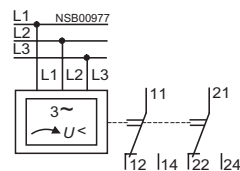
NSB00975

Underspeed monitoring relay
3UG30 51



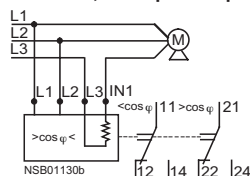
NSB00976c

Line monitoring relay, three-phase
3UG30 13



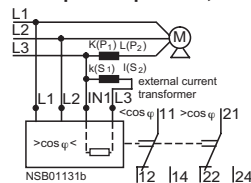
NSB00977

Power factor monitoring relay, single- and three-phase,
3UG30 14, three-phase operation, $I < 10 \text{ A}$



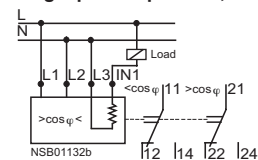
NSB01130b

Power factor monitoring relay, single- and three-phase,
3UG30 14, three-phase operation, $I > 10 \text{ A}$



NSB01131b

Power factor monitoring relay, single- and three-phase,
3UG30 14 single-phase operation, 230 V~



NSB01132b

Monitoring Relays

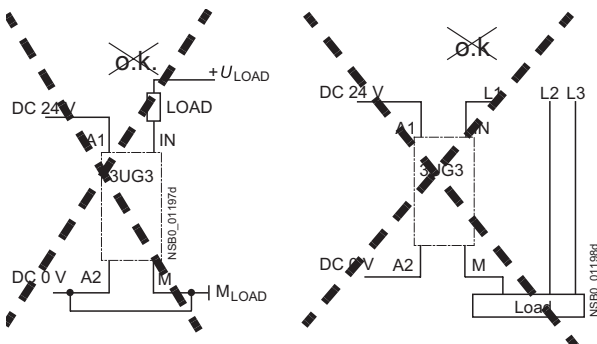
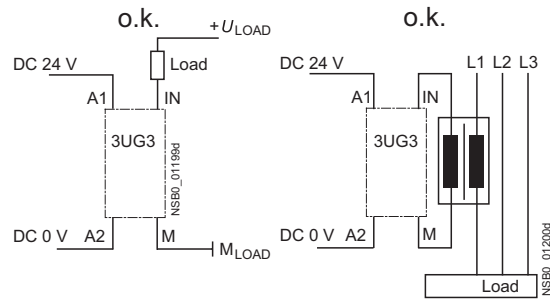
Monitoring Relays for Electrical Variables

General data

Connection diagram for DC 24 V

Current monitoring relay, single-phase
3UG35 21, 3UG35 22

For current relays with a DC 24 V supply voltage, A2 and M must not be jumpered in the device otherwise the relays will not function. The circuit diagrams below show that loads in DC measuring circuits must be upstream from the monitoring relay and that AC loads must only be connected via converters. Otherwise the monitoring relay will be damaged and the short-circuit current can cause damage to the plant.



Configuring note:

For measuring currents of 10 A and side-by-side mounting, the maximum ambient temperature is 40 °C

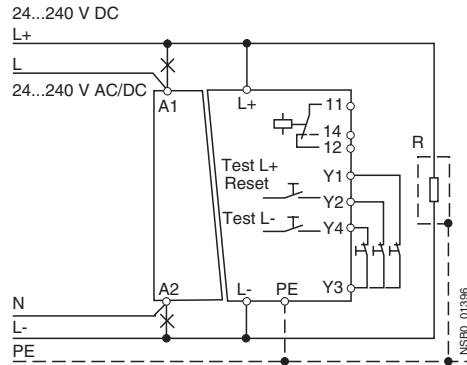
The internal configuration of the 3UG35 21/22 current monitoring relay for DC 24 V control supply voltage has been changed. In the new internal circuit the control supply voltage and the measuring-circuit voltage should not have the same reference potential.

In cases in which the load to be monitored and the monitoring relay are fed by the same power supply, the function of the current monitoring relay is no longer provided. The devices are, however, not destroyed as a result. Relief is provided in the form of a second power supply that is not directly connected to the control supply voltage.

Please therefore pay attention to the connection information shown in the circuit diagram for the new current monitoring relays!

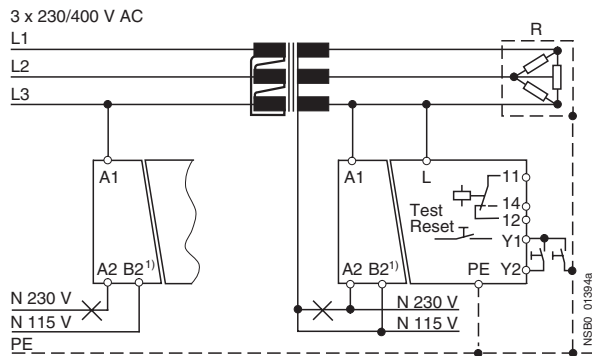
Connection diagram for 24...240 V DC

Insulation resistance
for ungrounded DC voltage networks



Connection diagram for networks up to 400 V AC

Insulation resistance
for ungrounded voltage networks



A1-B2/A1-A2 für AC 115 V/230 V ¹⁾ 3UG3081-1AK20 only
A1-A2 für AC/DC 24...240 V

Monitoring Relays

Monitoring Relays for Electrical Variables

Phases and voltage: Phase failure and phase sequence monitoring

Functions

Depending on version, the 3UG35 11 and 3UG35 13 relays monitor the phase sequence and failure of one of the three phases. During operation, no adjustment is required. If the phase sequence is correct and none of the three phases have failed, the output relay picks up after the delay time T1 has elapsed and the LED is lit. On phase failure, the output relay trips after the delay time T2 has elapsed and the LED is no longer lit.

If a phase sequence fault is detected when the voltage is switched on, the relay will not pick up.

The 3UG35 11 relay does not detect any voltage feedback into the supply

The 3UG35 11 relay is not protected against feedback of voltage into the supply. If there is a risk of feedback from a motor in the case of phase failure or voltage loops through parallel loads, the 3UG35 13 with fixed operating point or 3UG30 13 relays with adjustable operating point can be used.

3UG35 13 for detection of phase failure

The fixed undervoltage detection ensures that the relay also trips in the case of voltage feedback from the motor. Feedback from the motor or caused by voltage loops will be detected at up to 90 % of the rated voltage.



- ① Output relay
- T1: Delay-time at rise
max. 200 ms
- T2: Delay-time at drop
max. 300 ms

Technical specifications

Type	3UG35 11	3UG35 13
Rated control supply voltage U_s	V 3 × 230 ... 400 (phase-to-phase)	see Selection data
Voltage tolerance	V 3 × 200 ... 460 (corresponds to 0.85 ... 1.15 × U_s)	0.8 ... 1.15 × U_s
Power consumption		
• at 200 V	VA 5	
• at 400 V	VA 20	
• at 460 V	VA 25	
Undervoltage detection fixed	% none	90
Frequency of the monitored line	Hz 50/60	
Delay time		
• T1 for correct phase sequence	ms max. 200	
• T2 for phase failure	ms approx. 300	

Selection and ordering data

Screw connection

Standard rail mounting
Width 22.5 mm

Phase monitoring relay, three-phase

- Monitoring of phase failure and phase sequence
- 1 yellow LED for indicating the relay state
- 2 changeover contacts



Version	Measuring range U_e	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx.
	AC 50/60 Hz	AC 50/60 Hz				kg
	V	V				
	No tripping following voltage feedback by the consumer load					
	Measuring-circuit voltage = control supply voltage	3 × 230 ... 400 phase conductor voltage		▶ 3UG35 11-1BQ50	1 unit	0.120
	Detection following voltage feedback by the consumer load of up to 90 %					
	Measuring-circuit voltage = control supply voltage	3 × 230 3 × 400 phase conductor voltage		3UG35 13-1BL50 3UG35 13-1BP50	1 unit 1 unit	0.112 0.112

* This quantity or a multiple thereof can be ordered.

Monitoring Relays

Monitoring Relays for Electrical Variables

Phases and voltage: Phase asymmetry monitoring

Functions

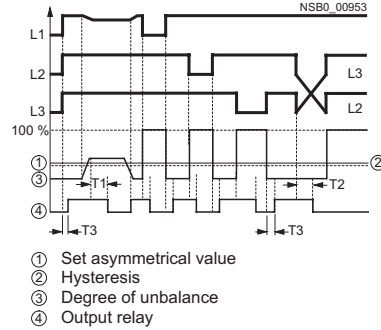
The relay monitors voltage imbalances in the three-phase system. If the phase sequence is correct and the imbalance is less than the set threshold value, the output relay picks up and the yellow LED is lit. The relay trips when one of the following faults occurs:

- Incorrect phase sequence on terminals L1-L2-L3
- Failure of a phase
- System imbalance greater than the set threshold.

A system imbalance means that the voltage of one of the phases rises or falls in relation to the voltage of the other two phases. This is used to detect voltage feedback from a running drive (e.g. on failure of a fuse) of up to 95 % of the rated voltage as a fault.

The time delay T1 is only effective in the case of imbalance faults and when phase L3 fails. Hysteresis prevents the output relay from continuously switching on and off when the system imbalance is close to the set value.

The relay does not respond to a symmetrical overvoltage or undervoltage.



Technical specifications

Rated control supply voltage U_s	V	see Selection data (L1/L2 also used to supply units)
Voltage tolerance		0.8 ... 1.2 × U_s
Maximum power consumption	W/VA	4/8
Frequency of the measuring-circuit voltage	Hz	50/60 switchable
Max. setting range for asymmetry value	%	adjustable to 5 to 20 % of the nominal supply voltage
Max. hysteresis	%	fixed at 10 % of set asymmetry value
Setting accuracy	%	± 20 referred to maximum asymmetry value
Repeat accuracy at constant parameters	%	± 1
Deviations with temperature fluctuations	%/°C	± 0.1
Delay time		
• T1 when relay drops	s	adjustable to 0.5 ... 10 ± 60 % or T2 in case of phase failure of L1 or L2
• T3 when relay picks up	s	max. 1
• T2 in case of phase failure L1 or L2	ms	max. 300
Mains buffering time	ms	10

Selection and ordering data

Screw connection

For mounting standard rail or screw fixing
Width 45 mm

Phase asymmetry monitoring relay, three-phase

- phase asymmetry monitoring
- phase sequence and phase failure monitoring
- 1 yellow LED for indicating the relay state flashes during operating time T
- 1 green LED for indicating applied control supply voltage
- 1 changeover contact



Version	Measuring-circuit voltage U_e AC 50/60 Hz	DT	Order No.	PS*	Weight per PU approx. kg
Measuring-circuit voltage = control supply voltage, asymmetry value and delay time, adjustable	3 × 230 phase-to-phase voltage	▶	3UG30 12-1AL50	1 unit	0.299
	3 × 400 phase-to-phase voltage	▶	3UG30 12-1AP50	1 unit	0.305

Monitoring Relays

Monitoring Relays for Electrical Variables

Phases and voltage:
Line monitoring

Functions

The 3UG30 13 relay monitors the phase sequence, failure of a phase and undershoot of the set measuring voltage by 20%. If the phase sequence is correct and the monitored voltage corresponds to the value of the set measuring voltage, the output relay picks up and the LEDs for the operating voltage display and the relay status are lit.

If a phase fails, the output relay trips (in the case of failure of L3, only after the time T that can be set at the front) and the LED for relay status goes off.

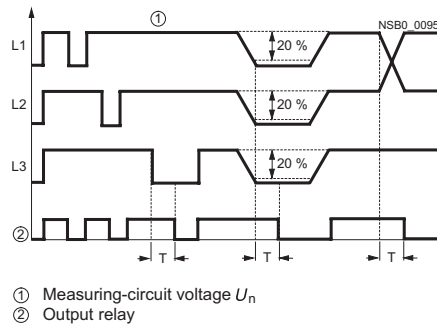
If the monitored voltage falls symmetrically (L1, L2 and L3 simultaneously) or asymmetrically (only one phase) by more than 20% of the set measuring voltage, the output relays will also trip after the set time T has elapsed and the associated LED goes off.

If the monitored voltage rises again above a hysteresis of between 2% and 10% of the set measuring voltage, the output relays pick up again and the LED is lit.

Note:

After failure of a phase on a rotating motor, a feedback voltage of up to 70% of the set rated motor voltage is recognized as a fault.

The setting for the measuring voltage can be increased to increase the percentage for the maximum detectable feedback into the supply.



Technical specifications

Rated control supply voltage U_s	V	see Selection data (L1/L2 also used to supply units)
Voltage tolerance	V	see Selection data
Maximum power consumption	W/VA	5/8
Frequency of the monitored line	Hz	50/60
Measuring-circuit voltage of the monitored line		adjustable within the associated measuring range, absolute scale for U_s
Undervoltage detection	%	-20 ± 10 of the set measuring-circuit voltage
Hysteresis		
• with symmetrical undervoltage	%	fixed, 2...5 of the set measuring-circuit voltage
• with asymmetrical undervoltage	%	fixed, 5...10 of the set measuring-circuit voltage
Delay time T	on detection of a line fault	s adjustable 0.2 ... 10; ± 50%
Response time	on detection of a disturbance	ms 400
Availability time	after application of U_s	ms 500
Operating frequency	at max. make-break capacity	1/h 360
Mains buffering time		ms 10


Selection and ordering data

Screw connection

For mounting onto standard rail or screw fixing
Width 45 mm

Line monitoring relay, three-phase

- phase failure and phase sequence monitoring
- monitoring of the variable measuring-circuit voltage
- 1 yellow LED for indicating the relay state
- 1 green LED for indicating applied control supply voltage
- 2 changeover contacts

Version	Measuring range U_s AC 50/60 Hz V	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx. kg
 Measuring-circuit voltage = control supply voltage, measuring-circuit voltage and delay time adjustable	Phase conductor voltage					
	3 × 180 ... 260			▶ 3UG30 13-1BL60	1 unit	0.317
	3 × 320 ... 460			▶ 3UG30 13-1BP60	1 unit	0.313
	3 × 380 ... 550			▶ 3UG30 13-1BR60	1 unit	0.356
	3 × 460 ... 660			▶ 3UG30 13-1BS60	1 unit	0.355

* This quantity or a multiple thereof can be ordered.

Monitoring Relays

Monitoring Relays for Electrical Variables

Phases and voltage: Single-phase voltage monitoring

Functions

The relays monitor single-phase voltages against the set threshold. The products differ not only with respect to their measuring ranges and voltage types but also with regard to their functions:

- Supplied from an external auxiliary supply (3UG35 31/3UG35 32)
- Internal power supply and no auxiliary supply (3UG35 34/3UG35 35)
- Overshoot/undershoot, latching/unlatching, selectable (3UG35 31/3UG35 32/3UG35 34)
- Window principle with upper and lower threshold (3UG35 35)

The latching/unlatching function can be set for the 3UG35 31, 3UG35 32 and 3UG35 34 relays using a DIP switch on the bottom of the device. The 3UG35 34 relay has an internal power supply, i.e. in the following diagram, A1/A2 is replaced by the measuring-circuit voltage.

Advantages of the products that are supplied from an external supply

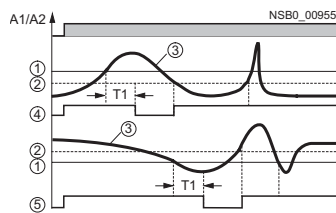
- Extremely low loading on the measuring signals
- Large measuring range is necessary

Advantages of the products that are supplied from an internal supply

- No separate supply voltage is necessary
- Low wiring overheads

Voltage monitoring without memory (NO MEMORY)

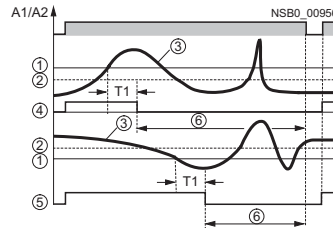
As soon as the measuring-circuit voltage reaches the set threshold, the output relay changes its output state as soon as the set time T1 has elapsed. The relay returns to its original state as soon as the measuring-circuit voltage reaches the set hysteresis value.



- ① Threshold value U_e
- ② Hysteresis
- ③ Measuring-circuit voltage
- ④ Output relay Function OVER
- ⑤ Output relay Function UNDER

with memory (MEMORY)

If the set threshold is reached, the output relay changes its state as soon as the set time T1 has elapsed and it remains latched in this position even when the measuring-circuit voltage reaches the set hysteresis value. The relay is reset (RESET) by switching the supply voltage off and on again.



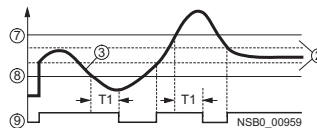
- ① Threshold value U_e
- ② Hysteresis
- ③ Measuring-circuit voltage
- ④ Output relay Function OVER
- ⑤ Output relay Function UNDER
- ⑥ Storage MEMORY

3UG35 35 relay, internal power supply with windows-type technology

The 3UG35 35 relay monitors the applied voltage using the windows principle. The upper and lower thresholds are set and monitored. As soon as the monitored voltage leaves the set range, the output relay trips after the set time T1 has elapsed.

Configuring note:

When the upper and lower threshold are too close, the tolerances of the setting accuracy and of the two hysteresis settings can result in undefined output states.



- ⑦ Hysteresis
- ⑧ Measuring-circuit voltage
- ⑨ Upper peak value
- ⑩ Lower peak value
- ⑪ Output relay

Monitoring Relays

Monitoring Relays for Electrical Variables

Phases and voltage:
Single-phase voltage monitoring

Technical specifications

Monitoring relays with external power supply

Type	3UG35 31	3UG35 32	
Rated control supply voltage U_s	V	see Selection data (for AC voltages with electrical isolation by means of transformer, 24 V DC without electrical isolation)	
Voltage tolerance	0.8 ... 1.15 × U_s		
Maximum power consumption	W/VA	4/5	
Rated insulation voltage U_i Pollution degree 2 Overvoltage category III to DIN VDE 0110	AC V	300	
Frequency of the measuring-circuit voltage	Hz	40 ... 500 and DC	
Threshold value U_e	%	adjustable to 10 ... 100 of the selected measuring range	
Hysteresis	%	adjustable from 5 to 50 % of the set threshold value	
Setting accuracy	%	± 10 referred to upper limit of measuring range	
Repeat accuracy at constant parameters	%	± 0.1	
Delay time T1 after reaching the threshold	s	adjustable to 0.1 ... 3 ± 10 %	
Availability time after application of U_s	ms	max. 500	
Mains buffering time	ms	10	
Measuring range inputs			
• IN1-M	- sensitivity - input resistance - overvoltage strength	V 0.2 ... 2 kΩ 2 V 4	15 ... 150 150 200
• IN2-M	- sensitivity - input resistance - overvoltage strength	V 1 ... 10 kΩ 10 V 20	30 ... 300 300 350
• IN3-M	- sensitivity - input resistance - overvoltage strength	V 6 ... 60 kΩ 60 V 120	60 ... 600 ¹⁾ 600 650
Function mode setting			
• Overvoltage or undervoltage		slide switch in lower part of unit	
• With or without memory		slide switch in lower part of unit	

1) Observe rated insulation voltage.

Monitoring relays with internal power supply

Type	3UG35 34	3UG35 35
Rated control supply voltage U_s	V	see Selection data
Voltage tolerance	see Selection data, min./max. values	
Maximum power consumption	W/VA	2/7
Frequency of the measuring-circuit voltage	Hz	50/60 and DC
Threshold value U_e		absolute scale for U_e
Hysteresis	%	adjustable from 5 to 20 of the set threshold value
Setting accuracy	%	± 10 referred to upper limit of measuring range
Repeat accuracy at constant parameters	%	0.3
Delay time T1 after reaching the threshold	s	adjustable to 0.1 ... 3 ± 10 %
Measuring range inputs		
• IN1-M	Min. sensitivity Overvoltage strength	A1/A2: A see Selection data, measuring range of the corresponding version V see Selection data, upper limit of rated control supply voltage
Function mode setting		
• Overvoltage or undervoltage		slide switch
• With or without memory		slide switch

Monitoring Relays

Monitoring Relays for Electrical Variables

Phases and voltage: Single-phase voltage monitoring

Selection and ordering data

Monitoring relays with external power supply

Screw connection

Mounting onto standard rail
Width 22.5 mm

Voltage monitoring relay, single-phase

- Overvoltage and/or undervoltage monitoring for DC and AC voltages
- 1 yellow LED for indicating the relay state
- 1 green LED for indicating applied control supply voltage
- 1 changeover contact



Version	Measuring range U_e AC/DC	Rated control supply voltage U_s		DT	Order No.	PS*	Weight per PU approx.
		AC 50/60 Hz	DC				
	V	V	V				kg
electrical isolation: AC: yes DC: no adjustable threshold and hysteresis	0.2 ... 60 (3 ranges)	24		A	3UG35 31-1AC20	1 unit	0.155
		120		D	3UG35 31-1AG20	1 unit	0.155
		230		▶	3UG35 31-1AL20	1 unit	0.157
				24 ¹⁾	▶	3UG35 31-1AC40	1 unit
	15 ... 600 (3 ranges)	24		▶	3UG35 32-1AC20	1 unit	0.161
		120		▶	3UG35 32-1AG20	1 unit	0.161
		230		▶	3UG35 32-1AL20	1 unit	0.159
				24 ¹⁾	▶	3UG35 32-1AC40	1 unit

1) The rated control supply voltage and the measuring circuit are not electrically isolated.

Monitoring relays with internal power supply

Screw connection

For mounting onto standard rail
Width 22.5 mm

Voltage monitoring relay, single-phase

Absolute scale

- Overvoltage and/or undervoltage mode, depending upon version
- 3UG35 34:
1 yellow LED for indicating the relay state and 1 green LED for indicating applied control supply voltage
- 3UG35 35:
1 yellow LED for indicating the relay state and 1 yellow LED each for U_{min} and U_{max} :
 U_{min} = flashing, U_{max} = off
- 1 changeover contact



3UG35 34



3UG35 35

Version	Measuring range U_e AC/DC	Rated control supply voltage U_s		DT	Order No.	PS*	Weight per PU approx.
		AC 50/60 Hz	DC				
	V	V	V				kg
Measuring-circuit voltage = control supply voltage no adjustable threshold and hysteresis	20 ... 80 65 ... 260	15 ... 150	15 ... 150	▶	3UG35 34-1AC50	1 unit	0.107
		50 ... 275	50 ... 275	▶	3UG35 34-1AM50	1 unit	0.107
Measuring-circuit voltage = control supply voltage upper and lower threshold value can be adjusted separately	20 ... 80 65 ... 260	15 ... 150	15 ... 150	▶	3UG35 35-1AC50	1 unit	0.108
		50 ... 275	50 ... 275	▶	3UG35 35-1AM50	1 unit	0.107

Monitoring Relays

Monitoring Relays for Electrical Variables

Phases and voltage: Three-phase voltage monitoring

Functions

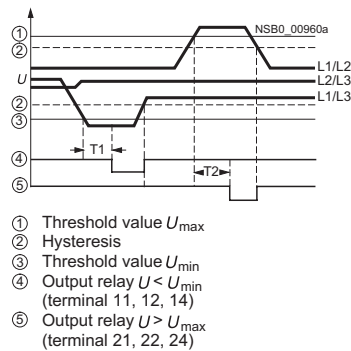
The output relay has tripped, provided that the values of the three phase conductor voltages in the case of 3UG30 41 or the three star voltages of the phases with reference to the neutral conductor in the case of 3UG30 42 lie between the lower and upper threshold. These are set separately on the front using two potentiometers.

When the value of one voltage lies outside this range, the corresponding output relay will trip after elapse of a delay time T1 or T2 that can be set separately on the front.

A fixed hysteresis of 3% prevents the output relay from continuously switching on and off when the measuring-circuit voltage is close to the threshold.

The monitoring relay detects voltage feedback from running drives up to the level of the set minimum threshold U_{min} .

The phase sequence is not monitored. The 3UG30 42 relay also responds to failure of the neutral conductor.



- ① Threshold value U_{max}
- ② Hysteresis
- ③ Threshold value U_{min}
- ④ Output relay $U < U_{min}$ (terminal 11, 12, 14)
- ⑤ Output relay $U > U_{max}$ (terminal 21, 22, 24)

Technical specifications


Type	3UG30 41	3UG30 42
Rated control supply voltage U_s	V 400 phase conductor voltage (L1/L2 also used to supply units)	400 phase conductor voltage/ 230 star voltage (L1/L2 also used to supply units)
Voltage tolerance	0.8 ... 1.2 $\times U_s$	
Maximum power consumption	W/VA 4/8	
Frequency of the measuring-circuit voltage	Hz 50/60	
Threshold value U_n	min. 0.85 ... 0.98 $\times U_n$ (340 ... 392 V phase/phase) max. 1.02 ... 1.15 $\times U_n$ (408 ... 460 V phase/phase)	
Monitoring	undervoltage and overvoltage failure L1/L2/L3	undervoltage and overvoltage failure L1/L2/L3/N
Hysteresis	fixed	% up to 3 of the set threshold
Setting accuracy	% ± 10	
Delay time T1/T2 after reaching the threshold	s adjustable to 0.1 ... 10; $\pm 50\%$	
Response time	on occurrence of a fault	ms 500
Availability time after application of U_s	s 3	
Mains buffering time	ms 10	

Selection and ordering data

Screw connection

For mounting onto standard rail and screw fixing
Width 45 mm

- Three-phase voltage monitoring relay with/without N conductor
- Upper and lower threshold value can be adjusted separately
 - 1 changeover contact for undervoltage and 1 changeover contact for overvoltage
 - 1 yellow LED each for indicating undervoltage or overvoltage
 - 1 green LED for indicating applied control supply voltage

Version	Measuring-circuit voltage U_e AC 50/60 Hz	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx. kg
 3UG30 41	3UG30 41 Measuring-circuit voltage = control supply voltage; upper and lower threshold can be adjusted individually, hysteresis fixed	400 (phase to phase)	400	▶	3UG30 41-1BP50	1 unit 0.313
	3UG30 42 Measuring-circuit voltage = control supply voltage with monitoring N conductor, upper and lower threshold adjustment can be adjusted individually, hysteresis fixed	400 (phase to phase) 230 (phase to N conductor)	400 230	▶	3UG30 42-1BP50	1 unit 0.313

* This quantity or a multiple thereof can be ordered.

Monitoring Relays

Monitoring Relay for Electrical Variables

Current: Single-phase current monitoring

Functions

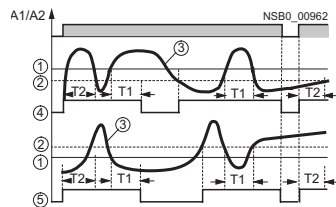
The relays monitor single-phase currents against the set threshold. The products differ with regard to their measuring ranges and voltage types.

If the load on a motor changes, the motor current also changes. This effect can be used to monitor loading on a motor by means of the current. Thus wear effects on tools, blocked loads, etc. are detected. It is also possible to check the functionality of load in this way. If current is flowing, the load is functioning. The relay can also be used as a trigger for analog signals.

The latching/non-latching function can be set for the relay using a DIP switch underneath the relay. It is also possible to set two delay times.

Current monitoring without memory (NO MEMORY)

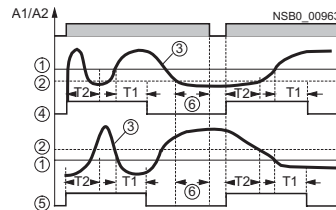
As soon as the value of the monitored AC or DC current reaches the threshold set on the front, the output relay trips after the set time T1 has elapsed. The relay picks up immediately again when the current reaches the hysteresis value again.



- ① Threshold value I_e
- ② Hysteresis
- ③ Monitored measured current
- ④ Output relay Function OVER
- ⑤ Output relay Function UNDER

Current monitoring with memory (MEMORY)

If the set threshold is reached, the output relay trips as soon as the set time T1 has elapsed and it remains stored in this position even when the measured current reaches the set hysteresis value. The relay is reset by switching the supply voltage off and on again.



- ① Threshold value I_e
- ② Hysteresis
- ③ Monitored measured current
- ④ Output relay Function OVER
- ⑤ Output relay Function UNDER
- ⑥ Storage

ON delay T1 and T2:

Due to the ON delay T2, current peaks (OVER function) or current falls (UNDER function), that can occur when switching on, do not cause a change in relay status, e.g. for suppression of the inrush current on motor starting. The delay time T1 prevents the relay from continuously switching on and off when the measured current is close to the set threshold.

Note:

Please see the connection diagrams and notes under General data, circuit diagrams.

Monitoring Relays

Monitoring Relay for Electrical Variables

Current:
Single-phase current monitoring

Technical specifications

Type		3UG35 21	3UG35 22	
Rated control supply voltage U_s	V	see Selection data (for AC voltages with electrical isolation by means of transformer, 24 V DC without electrical isolation)		
Voltage tolerance		0.8 ... 1.15 × U_s		
Maximum power consumption	W/VA	4/5		
Frequency of the measured current	Hz	40 ... 500 and DC		
Threshold I_e	%	adjustable to 10 ... 100 of the selected effective range		
Hysteresis	%	adjustable from 5 to 50 of the set threshold value		
Setting accuracy ¹⁾	%	± 10 referred to upper limit of effective range		
Repeat accuracy	at constant parameters	% ± 0.1		
Deviations	at voltage fluctuations	% ≤ 0.5		
	with temperature fluctuations	% / °C ± 0.05		
Delay time	T2, ON-delay	s 1 ... 20 ± 10%		
	T1 after reaching the threshold	s 0.1 ... 3 ± 10%		
Effective range inputs	• IN1-M	- sensitivity	A 0.002 ... 0.02	0.1 ... 1
		- input resistance	Ω 5	0.1
		- overvoltage strength, continuous	A 0.04	2
	• IN2-M	- overvoltage strength < 1 s	A 1	17
		- sensitivity	A 0.01 ... 0.1	0.5 ... 5
		- input resistance	Ω 1	0.02
	• IN3-M	- overvoltage strength, continuous	A 0.2	10
		- overvoltage strength < 1 s	A 5	20
		- sensitivity	A 0.05 ... 0.5	1 ... 10 ²
		- input resistance	Ω 0.2	0.01
		- overvoltage strength, continuous	A 1	13
		- overvoltage strength < 1 s	A 8	50
Max. voltage in monitoring circuit and permissible potential difference	AC V	480		
	DC V	300		
Function mode setting		slide switch in lower part of unit		
• overcurrent and undercurrent		slide switch in lower part of unit		
• with or without memory				

1) With sinusoidal currents. Measuring principle: arithmetic mean-value generation.

2) For continuous currents of 10 A and devices mounted side by side, the ambient temperature must not exceed +40 °C.

Selection and ordering data

Screw-type connection

For mounting onto standard rail or screw fixing
Width 22.5 mm

Current monitoring relay, single-phase

- Overvoltage and undervoltage monitoring of DC and AC voltages
- 1 yellow LED for indicating the relay state
- 1 green LED for indicating applied control supply voltage
- 1 changeover contact



Version	Effective range U_e AC/DC	Rated control supply voltage U_s AC 50/60 Hz DC	DT	Order No.	PS*	Weight per PU approx. kg		
electrical isolation AC: yes DC: no adjustable threshold and hysteresis	0.002 ... 0.5 (3 ranges)	24	▶	3UG35 21-1AC20	1 unit	0.273		
			A	3UG35 21-1AG20	1 unit	0.157		
			▶	3UG35 21-1AL20	1 unit	0.157		
		24 ¹⁾	▶	3UG35 21-1AC40	1 unit	0.118		
			0.1 ... 10 (3 ranges)	24	▶	3UG35 22-1AC20	1 unit	0.158
					▶	3UG35 22-1AG20	1 unit	0.156
	▶	3UG35 22-1AL20			1 unit	0.158		
	24 ¹⁾	230	▶	3UG35 22-1AC40	1 unit	0.117		

1) The rated control supply voltage and the measuring circuit are not electrically isolated, see also Page 8/46.

Monitoring Relays

Monitoring Relay for Electrical Variables

Power factor monitoring (motor load monitoring)

Functions

The 3UG30 14 monitoring relay is used for monitoring the load of motors by measuring the phase angle between voltage and current, i.e. the power factor. The output relays respond as long as the power factor lies between the upper and lower thresholds. These are set separately on the front using two potentiometers.

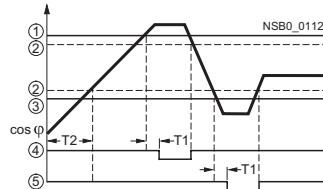
When the value of the power factor lies outside this range, the corresponding output relay will drop after a delay time T1 that can be set on the front has elapsed. A fixed hysteresis prevents the output relay from continuously switching on and off when the measured value is close to the threshold. The ON delay T2 can be used to suppress the effects of motor start-up.

Important!

It is important to ensure that the phases are connected in the correct sequence L1-L2-L3, otherwise the power factor will be evaluated incorrectly.

Note:

Power factor monitoring relays are connected in series after the motor contactor to ensure that the delay time for bridging start-up elapses after switch-on. For this reason, the output relay must not be connected in series with the supply voltage of the motor contactor, otherwise it would not be possible to switch on the load feeder.



- ① Threshold value U_{max}
- ② Hysteresis
- ③ Threshold value U_{min}
- ④ Output relay $\cos \varphi > \cos \varphi_{max}$
(terminals 21, 22, 24)
- ⑤ Output relay $\cos \varphi < \cos \varphi_{min}$
(terminals 11, 12, 14)

Technical specifications

Rated control supply voltage U_s	V	see Selection data (L1/L2 also used to supply units)
Voltage tolerance	V	0.85 ... 1.15 × U_s
Maximum power consumption	VA	3
Frequency of the monitored line	Hz	50 ... 60
Effective range of power factor		0.1 ... 0.99 for lower and upper threshold
Hysteresis fixed	%	10 for p.f. ≤ 0.4 10 ... 30 for p.f. < 0.4
Setting accuracy	%	± 10 referred to upper limit of effective range
Repeat accuracy at constant parameters	%	± 0.8
Deviations for temperature deviations	%	± 0.05/ K
Delay time	s	0.5 ... 20 ; ± 20%
• T2, ON-delay	s	0.3 ... 3 ; ± 20%
• T1 after reaching the threshold		
Input circuit		
• Current range	A	0.5 ... 10
• Peak current (< 1 s)	A	50
• Input resistance L1/L2/L3	kΩ	2
• Input resistance current, IN1	Ω	0.02


Note: currents > 10 A only with current converter.

Selection and ordering data

Screw connection

For mounting onto standard rail and screw fixing
Assembly width 45 mm

- Relay for power factor monitoring, single and three-phase
- monitoring of the power factor for undershoot/overshoot for motor underload and overload
 - upper and lower threshold value can be adjusted separately
 - 1 changeover contact each for undershoot/overshoot
 - 1 yellow LED each for indicating of undershoot/overshoot
 - 1 green LED for indicating the applied control supply voltage flashes with 1 Hz, during the operating time T1
 - flashes with 2 Hz, if $p.f._{min} \geq p.f._{max}$

Version	Measuring range U_e	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx. kg
	p.f.	Phase conductor voltage AC 50/60 Hz V				
 3UG30 14	Measured voltage = control supply voltage	0.1 ... 0.99	3 × 230	B	3UG30 14-1BL60	1 unit 0.311
			3 × 400	▶	3UG30 14-1BP60	1 unit 0.308
			3 × 480	B	3UG30 14-1BR60	1 unit 0.355
			3 × 575	B	3UG30 14-1BS60	1 unit 0.350

3UG30 14

Monitoring Relays

Monitoring Relay for Electrical Variables

Insulation resistance
for ungrounded AC voltage networks

Overview

- Relay for monitoring the isolation resistance between the ungrounded single or three-phase AC supply and a protective ground conductor
- Measuring principle with superimposed DC voltage
- Two selectable measuring ranges of 1 ... 110 k Ω
- Stepless setting within the measuring range
- Selectable:
 - Auto reset function with fixed hysteresis or
 - Storage of the tripping operation
- Test function with test button and terminal connections on the front
- Switching output: 1 changeover contact
- Isolation fault indication with a red LED
- Supply voltage indication with a green LED
- Electro-magnetically compatible according to EN 61000-6-4 and EN 61000-6-2

Area of application

The 3UG30 81 monitoring relay is suitable for isolation monitoring of AC systems with one or three phases in ungrounded networks (IT networks).

Supply voltage

The 3UG30 81-1AK20 has alternative voltage terminals. Only one supply voltage is permitted to be connected to it! Terminals A1 and A2 are used to connect AC 230 V and terminals A1 and B2 are used to connect AC 115 V.

The 3UG30 81-1AW30 has a wide-range input of AC/DC 24 V to 240 V on terminals A1 and A2.

Functions

The monitoring relay measures the isolation resistance between the ungrounded AC supply and an associated protective ground conductor.

A superposed DC measuring voltage is used to perform the measurement.

The monitoring relay is divided into two ranges for an isolation resistance range from 1 to 100 k Ω . A range switch on the front can be used to switch over between a 1 to 11 k Ω range and a 10 to 110 k Ω range. Within the selected range, the monitoring relay can be steplessly adapted to the respective isolation conditions.

If the isolation resistance undershoots the set threshold, the output relay is excited and the red LED (fault display) is lit.

If the isolation resistance exceeds 1.6 times (corresponding to 60 % hysteresis) the set threshold, the output relay will return to the rest position.

Test functions

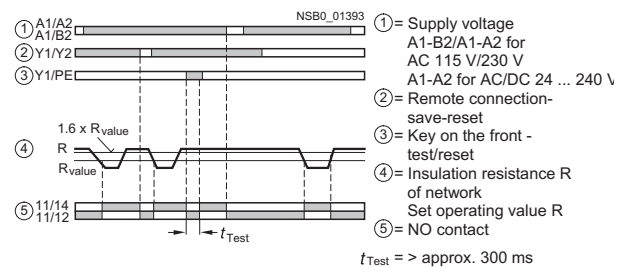
The "Test" button on the front can be used to simulate a ground fault. If the "Test" button is pressed for at least 300 ms, the output relay is energized and the fault LED lights up. An external test button can be connected to terminals Y1 and Y2. The function is activated through a normally-open contact.

Storage of the fault

If terminals Y1 and Y2 are jumpered, the monitoring relay is set to fault storage mode. If the set isolation resistance is undershot, the output relay is excited and remains tripped even after the isolation resistance rises above 1.6 times the set value again. Fault storage can be reset by briefly pressing the RESET button, briefly jumpering the Y1 and PE/ground terminals or by switching off the supply voltage.

Note:

The monitoring relay is designed for AC supply systems. Series-connected rectifiers must be galvanically isolated from the measuring relay that is to be monitored.



Monitoring Relays


Monitoring Relay for Electrical Variables

Insulation resistance for ungrounded AC voltage networks

Technical specifications

			3UG30 81
Control circuit			
Operating range of the control supply voltage			- 15 % ... + 10 %
Rated power	AC/DC 24 ... 240 V	VA/W	8/2
	AC 110/130 V	VA	3
	AC 220 ... 240 V	VA	3
Frequency of the rated control supply voltage			Hz 50 ... 60
Measurement circuit L/PE/ground			
• Response value		kΩ	1 ... 110
• Minimum internal resistance for AC		kΩ	100
• Minimum internal resistance for DC		kΩ	100
• DC measurement voltage		V	DC30
• Insulation voltage		V	AC 415
• Reset/test function terminals			Y1-Y2
• Maximum cable length		m	10
• ON-delay		s	1
Output relay			1 changeover contact, open-circuit principle
General data			
Rated insulation voltage U_i	between supply, measurement, and output circuit	V	400 acc. to IEC 60947-1
Overvoltage category	acc. to IEC 60664		III
Pollution degree	acc. to IEC 60664		3
Rated impulse withstand voltage U_{imp}	acc. to VDE 0435, Part 303	kV	4
Degree of protection	acc. to EN 60529		IP50 enclosure, IP20 terminals
Shock resistance	acc. to IEC 60068-2-27	g/ms	10
Vibration resistance	acc. to IEC 60068-2-6	Hz/mm	10-55/0.35
Permissible ambient temperature		°C	- 25 ... 65
• during operation		°C	- 40 ... 85
• during storage			
Permissible mounting position			any
Conductor cross-section	solid	mm ²	2 × 0.75 ... 2.5
	finely stranded with end sleeve	mm ²	2 × 0.75 ... 2.5

Selection and ordering data

	Effective range U_e	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx.
	kΩ	V				
Isolation monitors for ungrounded AC networks						
	10 ... 110	AC 115/ 230	A	3UG30 81-1AK20	1 unit	0.327
	10 ... 110	AC/DC 24 ... 240	A			
Accessories						
	sealable, transparent cover		A	3UG32 08-1A	1 unit	0.010

Monitoring Relays

Monitoring Relay for Electrical Variables

Insulation resistance
for ungrounded DC voltage networks

Overview

- Relay for monitoring the isolation resistance between ungrounded purely DC networks and a protective-ground conductor
- Measuring principle for differential current measurement
- Response threshold can be set continuously from 10 to 110 k Ω
- Selectable
 - Auto reset function with hysteresis or
 - Storage of the tripping operation
- Front selector switch for open-circuit and closed-circuit principle for the output relay
- Test function with test buttons on the front for L+ and L- and over terminal connections
- Switching output: 1 changeover contact
- Isolation fault indicator for L+ and L- through two red LEDs
- Supply voltage indication with a green LED
- Electro-magnetically compatible according to EN 61000-6-4 and EN 61000-6-2

Area of application

The 3UG30 82 monitoring relay has been designed for isolation monitoring in ungrounded, purely DC networks with or without filtering. It is mainly used to monitor ungrounded DC voltage networks as well as to monitor battery-powered systems.

Supply voltage

Due to the electrical isolation of the supply voltage and the measurement circuit, the relay can be used for DC networks in which the auxiliary voltage is either supplied externally or where the network to be monitored also serves as the power supply.

Note:

If the monitoring relay is supplied with an AC 230 V voltage, for example, the terminals A1 and L+ as well as A2 and L- must not be connected with each other!

Functions

The monitoring relay measures the insulation voltage between the positive and negative supply voltage in an ungrounded DC voltage network and a corresponding protective conductor.

The measurement is based on the DC residual current measurement principle. The response value can be adjusted steplessly in the range from 10...110 k Ω and thus can be adapted to the corresponding conditions. If the insulation resistance falls below the set response value, the output relay triggers (depending on the setting of the open/closed-circuit principle selector switch) and a fault LED lights up.

A ground fault is evaluated separately for L+ and L- and indicated by means of a corresponding LED.

Note:

Due to the measurement principle, a symmetrical ground fault on terminals L+ and L- cannot be evaluated.

Test function

A ground fault can be simulated using the Test L+ and Test L- buttons on the front. If the test button is pressed for at least 1 s, the status of the output relay changes and the corresponding fault LED lights up.

An external test button can be connected to terminals Y1-Y3 for L+ and terminals Y4-Y3 for L-. The function is triggered by means of a NO contact.

Storage of the fault

If terminals Y1 and Y2 are linked, the monitoring relay is set to fault storage mode.

If the insulation resistance falls below the set value, the output relay triggers (depending on the setting of the open/closed circuit selector switch), and stays in this state even if the insulation resistance rises again above the hysteresis value (typical: 2 times the set value). This fault storage can be deleted by pressing and releasing the L+ RESET button, opening the Y2-Y3 connection or by switching off the supply voltage.

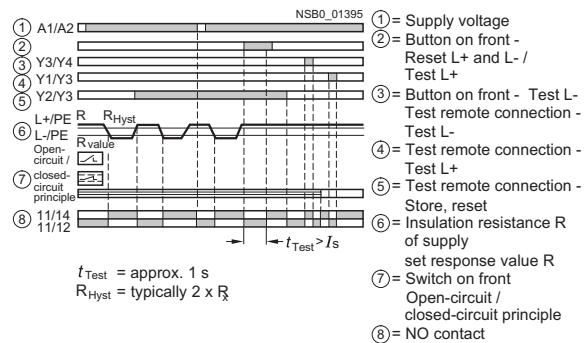
Open/closed-circuit principle selector switch

The function principle of the output relay can be adjusted by means of a selector switch on the front panel.

If the relay is to respond in the event of a fault (contact symbol open), the open-circuit principle must be selected. If the relay however is to trigger in the event of a fault (contact symbol closed), the closed-circuit principle must be selected.

Note:

The position of the selector switch has no effect upon the fault LEDs. The LEDs always light up if the insulation resistance on L+ or L- falls below the set value.



Monitoring Relays

Monitoring Relay for Electrical Variables

Insulation resistance for ungrounded DC voltage networks

Technical specifications

		3UG30 82
Control circuit		
Operating range of the control supply voltage		
Rated power	AC/DC 24 ... 240 V V	VA/W 8/2
Frequency of the rated control supply voltage		
		Hz 50 ... 60
Measurement circuit		
• response value		kΩ 10 ... 110
• minimum internal resistance for DC		kΩ 57
• measurement DC voltage		V 24 ... 240
• max. DC insulation voltage (L+/PE/ground, L-/PE/ground)	DC V	300
• reset/test function terminals		Y1/Y3, Y4/Y3
• maximum cable length	m	10
• ON-delay	s	1
Output relay		
1 changeover contact, open-circuit or closed-circuit principle		
General data		
Rated insulation voltage U_i	between supply, measurement, and output circuit	V 400
Overvoltage category	acc. to IEC 60664	III
Pollution degree	acc. to IEC 60664	3
Rated impulse withstand voltage U_{imp}	acc. to VDE 0435, Part 303	V 4000
Degree of protection	acc. to EN 60529	IP50 enclosure, IP20 terminals
Shock resistance	acc. to IEC 60068-2-27	g/ms 10
Vibration resistance	acc. to IEC 60068-2-6	Hz/mm 10-55/0.35
Permissible ambient temperature		
• during operation	°C	-25 ... +65
• during storage	°C	-40 ... +85
Permissible mounting position		
any		
Conductor cross-section		
	solid	mm ² 2 × 0.75 ... 2.5
	finely stranded with end sleeve	mm ² 2 × 0.75 ... 2.5

Selection and ordering data

Effective range U_e	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx.
kΩ	V				kg
Isolation monitors for ungrounded DC networks					
10 ... 110	AC/DC 24 ... 240 V	A	3UG30 82-1AW30	1 unit	0.241
Accessories					
	sealable, transparent cover	A	3UG32 08-1A	1 unit	0.010



Overview

Electronic monitoring relays are offered in the well-proven design with different functions. These relays are used to detect wear effects and potential faults at an early stage and to respond to them before more serious secondary damage can occur. With their minimal space requirements, high measuring accuracy and optimized functions for high reliability, they are easy to use.

Area of application

Relays for level control are used for single-point and two-point level control. With a resistance measurement in the fluid, the limits determined by the probe are monitored and the output relay is switched. A range of probes that have been optimized for tank level monitoring are available as accessories.

The relay for speed falls below monitoring is particularly suited to checking belt slip or tears. In addition, any continuous pulse signal can be monitored, e.g. for checking smooth running of a belt, monitoring cycle times or as a watchdog for a control.

Technical data

Type	3UG30/3UG35		
Load capacity of the output relay	rated operating current I_e	A	max. 8
	AC-15/230 V	A	3
	DC-13/24 V	A	1
	DC-13/48 V	A	0.45
	DC-13/60 V	A	0.35
	DC-13/110 V	A	0.2
	DC-13/230 V	A	0.1
Minimum contact load		mA	5/17 V for a fault of 1 ppm
Output relay, DIAZED fuse¹⁾	Operational class gI/Gg	A	4
Electrical endurance	Operating cycles		1×10^5
Mechanical endurance	Operating cycles		2×10^6
Ambient temperature	during operation	°C	-20 ... +50
	during storage	°C	-30 ... +70
Conductor connection	solid	mm ²	$2 \times (0.5 \dots 2.5)$
	finely stranded, with end sleeve	mm ²	$2 \times (0.5 \dots 1.5)$
Degree of protection	Terminals		IP20
	Enclosure		IP40
Can be used in networks	3UG30 13/3UG35 11	AC V	660
	other 3UG3	AC V	480
Vibration resistance	acc. to IEC 60068-2-6	Hz/mm	10 ... 55/0.35

Note:

Fuse protection of the measurement circuit is not required to protect the device. Conductor protection depends on the conductor cross-section used.

1) Short-circuits without contact welding to EN 60947-5-1.

Monitoring Relays

Other Monitoring Relays

Fill level

Functions

The principle of operation is based on measuring the electrical resistance of the liquid between two immersion sensors and a reference terminal. If the measured value is lower than the sensitivity set at the front, the output relay changes its switching state. In order to exclude electrolytic phenomena in the liquid, the sensors are supplied with alternating current.

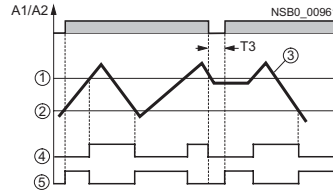
Two-level control: the output relay changes its switching state as soon as the liquid level reaches the maximum sensor, while the minimum sensor is submerged. The relay returns to its original switching state as soon as the minimum sensor no longer has contact with the liquid.

For safe resetting, the supply voltage must be interrupted for at least 0.5 s (T3).

The delay times T1 and T2 of the output relay have not been included in the diagram in order to enhance clarity.

Note:

It is also possible to connect other resistance sensors to the Min and Max terminals in the range 5 ... 100 kΩ e.g. photoresistors, temperature sensors, encoders based on resistance etc. The monitoring relay can therefore also be used for other applications apart from monitoring the levels of conductive liquids.



- ① Maximum level 1)
- ② Minimum level 1)
- ③ Monitored level
- ④ Output relay Function OVER
- ⑤ Output relay Function UNDER

1) Determined by the arrangement of the probes in the monitored liquid.

Technical specifications

Rated control supply voltage U_s	V	see Selection data (electrical isolation by means of a transformer)
Voltage tolerance		0.85 ... 1.1 × U_s
Maximum power consumption	W/VA	3/6
Function	Inlet or outlet monitoring	UNDER/OVER slide switch at the front
Sensitivity	adjustable	kΩ 5 ... 100
Setting accuracy	at maximum sensitivity	% ± 30
Repeat accuracy	at constant parameters	% ± 1
Sensor length	max.	m 100
Electrode voltage	max.	V 24 (50/60 Hz)
Electrode current	max.	mA 1 (50/60 Hz)
Conductor capacity	of the sensor cable ¹⁾	nF 10
Delay time		
• T1 at Max/M terminal	ms	typically 500 (ON-delay with OVER, OFF-delay with UNDER)
• T2 at MIN/M terminal	ms	typically 300 (OFF-delay with OVER, ON-delay with UNDER)
Mains buffering time	ms	300

1) The sensor cable need not necessarily be shielded, but it is not recommended to lay this cable parallel to the power supply lines. It is also possible to use a shielded cable, whereby the shield has to be connected to the M terminal.


Selection and ordering data

Screw connection

Standard rail mounting
Width 22.5 mm






Level monitoring relay for conductive liquids

- inlet or outlet monitoring adjustable
- sensitivity adjustment by potentiometer
- 1 yellow LED for indicating the relay state
- 1 green LED for indicating applied control supply voltage
- 1 changeover contact

Design	Sensitivity	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx.
	kΩ	AC 50/60 Hz V				kg
 Inlet or outlet monitoring (UNDER/OVER function) adjustable	5 ... 100	24	▶	3UG35 01-1AC20	1 unit	0.143
		120	▶	3UG35 01-1AG20	1 unit	0.142
		230	▶	3UG35 01-1AL20	1 unit	0.144

Accessories

Sensors for level monitoring

Version	Assignment Cable	Electrode	Application	DT	Order No.	PS*	Weight per PU approx. kg
		brown white green	center electrode not assign-able	The electrodes can be cut or bent to the required length before or after installation. The Teflon insulation must be removed over a length of approx. 5 mm. Application: for 2-point liquid level control in an insulating tank. One electrode each for the min. and max. value and a common reference electrode.	▶	3UG32 07-3A	1 unit 0.254
		brown white	not assign-able	For installation, see 3UG32 07-3A Application: for alarm indication in the event of overflow or low level and for 2-step liquid-level control, when the conductive tank is used as the reference electrode.	▶	3UG32 07-2A	1 unit 0.230
		brown white green	gland not assign-able	Thanks to the small space requirements due to lateral fitting, ideal for use in small containers and pipes, as a leak monitor and level monitor or for warning of water entering an enclosure.	▶	3UG32 07-2B	1 unit 0.128
		brown white	gland electrode	As a max. value electrode for lateral fitting or for alarm indication in conductive tanks or pipes.	▶	3UG32 07-1B	1 unit 0.122
		brown white	gland electrode	For high flow velocities or for alarm indication in conductive tanks or pipes.	A	3UG32 07-1C	1 unit 0.144

* This quantity or a multiple thereof can be ordered.

Monitoring Relays

Other Monitoring Relays

Speed

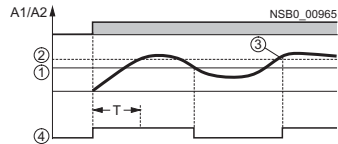
Functions

The underspeed monitoring relay operates according to the principle of retriggerable OFF-delay. During the time (value) set on the front panel, another pulse must arrive at input IN1 or IN2 to ensure that the output relay remains picked up. The monitoring relay evaluates the rising edge of the signal, i.e. a continuous signal is also recognized as a missing pulse. If the retrigger pulse does not arrive, indicating a reduction in speed, the output relay drops. In order to be able to start a drive, the output relay remains picked up during the ON-delay time T , even if the speed is still below the set value (motor starting override time).

The monitoring relay can be used for all functions where a continuous pulse signal needs to be monitored (belt travel monitoring, completeness monitoring, passing monitoring, clock-time monitoring).

Speed monitoring without memory (NO MEMORY)

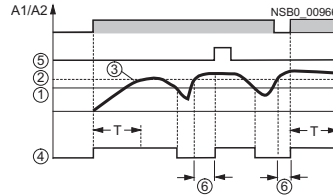
When the speed of the drive drops below the set value, the output relay drops. It picks up again when the speed is greater than the set value plus the fixed hysteresis.



- ① Set value
- ② Hysteresis
- ③ Actual value
- ④ Output relay

Speed monitoring with memory (MEMORY)

When the output relay drops, this state remains stored even when the speed reaches a permissible value again. The stored state can be ended by a control signal at the reset terminal or by interrupting the supply voltage for at least 200 ms.



- ① Set value
- ② Hysteresis
- ③ Actual value
- ④ Output relay
- ⑤ Reset
- ⑥ Storage (MEMORY)

Technical specifications

Type	3UG30 51		
Rated control supply voltage U_s	V	see Selection data (for AC voltages with electrical isolation by means of transformer, 24 V DC without electrical isolation)	
Voltage tolerance	0.85 ... 1.15 × U_s		
Maximum power consumption	W/VA	4/5	
Set value	%	adjustable to 10 ... 100 of the selected time setting range	
Hysteresis	%	typically 5 of the set value	
Setting accuracy	%	10 referred to upper limit of time setting range	
Repeat accuracy	at constant parameters	%	± 0.5
Deviations	with temperature fluctuations	%/°C	0.1
ON-delay T	s adjustable to 0.3 ... 30 ± 10%		
Signal input IN1¹⁾	(input resistance 16 kΩ)	V	max. voltage 30, 3-wire sensor, pnp operation
Signal input IN2¹⁾	(input resistance 1 kΩ)	floating contact, 2-wire NAMUR sensor	
Voltage level for reliable operation	level 1	V	4.5 ... 30
	level 0	V	0 ... 1
Sensor supply	+24 V/0 V	mA	max. 50 at DC 24 V (20 ... 35 V)
	+8 V2	mA	1 DC 8.2 V
Measuring range, selectable (rotary switch on front)	time setting range		
• 0.1 ... 1 s	- frequency	Hz	10 ... 1
	- revolutions	min ⁻¹	600 ... 60
• 1 ... 10 s	- frequency	Hz	1 ... 0.1
	- revolutions	min ⁻¹	60 ... 6
• 0.1 ... 1 min	- frequency	Hz	0.17 ... 0.017
	- revolutions	min ⁻¹	10 ... 1
• 1 ... 10 min	- frequency	Hz	0.017 ... 0.0017
	- revolutions	min ⁻¹	1 ... 0.1
- minimum pulse duration of signal		ms	5
- minimum interval between 2 pulses		ms	5
Function mode setting	With or without memory	rotary switch on front panel	
Availability time after application of U_s	ms		200
Mains buffering time	ms		10

1) The sensors are not included in the scope of supply.


Selection and ordering data

Screw-type connection

For snap-on mounting onto 35 mm standard mounting rail and screw fixing
 Assembly width 45 mm

Underspeed monitoring relay

- 4 measuring ranges adjustable on front panel
- 1 green LED for indicating applied control supply voltage
- 1 yellow LED for indicating the relay state, flashes during operating time T
- 1 changeover contact

Version	Measuring range	Rated control supply voltage U_s	DT	Order No.	PS*	Weight per PU approx.
	revolutions/min ⁻¹	AC 50/60 Hz V	DC			kg
 Measuring range with or without memory, start-up override 0.3 ... 30 s, electrical isolation AC: yes DC: no	0.1 ... 600 (4 ranges)	24		▶ 3UG30 51-1AC20	1 unit	0.273
		120		▶ 3UG30 51-1AG20	1 unit	0.274
		230	24 ¹⁾	▶ 3UG30 51-1AL20	1 unit	0.272
				▶ 3UG30 51-1AC40	1 unit	0.161

1) The rated control supply voltage and the measuring circuit are not electrically isolated.