Voltage Monitoring Types SW

Modern electrical switching plants for power generation and distribution, for tooling and finishing machinery and a number of other drives, are generally equipped with control devices. The use of such instruments, however, also requires that the mains voltage differs only slightly from its nominal value, as otherwise the required accuracy of the measuring results or control commands will not be achieved, or downstream devices may be destroyed by overvoltage.

ZIEHL SW-type voltage monitors are used to monitor the mains voltage in DC, AC and 3-phase networks for under- and/or overvoltage. In the case of deviation of the rated voltage the plant must be switched off or the operator should be warned by an optical or acoustic signal.

Special applications where the SW device can be used are in building machinery, hoisting plant, escalators and travelling staircases, cranes , tooling machinery of all kinds, switching frequency motors and motors with high starting and braking times, as well as emergency plant and electronic devices.

The following table provides a summary of the different models of the ZIEHL-voltage monitors.

Summary

Voltage Monitor	DC	AC/DC	AC/3 x AC		3 x AC	
Type	**STW1000V2**	**SW12V**	**SW31V**	**SW32V**	**UFR1000**	**SW31K**
Function	↑	↑↓	↑↓	↑↓	↑↓	↓
Monitoring of - Undervoltage	-	X	X	X	X	X
- Overvoltage	X	X	-	X	X	-
Switching point adjusable	Scale	digital	Scale	digital	digital	-
Relay output	1 U	2 U	2 U	2 U	2 U	1 U
Housing	V2	V4	V2	V4	V4	K

Other devices for monitoring of voltage AC/DC you can find at chapter MINIPAN Digital Panelmeters. The Limit-Value-Switch TR210 monitors voltages of DC 0 - 10 V.

Function and Features

When the mains voltage turns on, the integrated relay closes if the voltage values in the mains to be monitored do not fall short or are exceeded. The relay releases if the set limit value falls short. The instruments with overvoltage monitoring switch off if their upper limit is exceeded. According to the switching hysteresis, the switchback points are closer to the rated voltage than to switch off points (see electr. Data).

Single-phase instruments measure phase against N (the single-phase measuring principle). 3-phase current instruments monitor the voltage phase against phase.

Upon request the instruments can also be equipped with measurement phase against N.

These instruments operate with high reliability - even in mains with high interference voltage superimposition - by using integrated overvoltage protection against voltage peaks.

DC Limit Relay for Standard Signals

DC 0/4 - 20 mA, 0/2 - 10 V

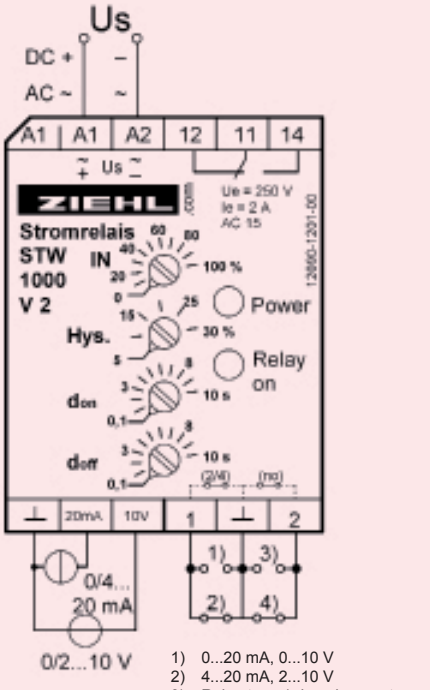
STW1000V2

ZIEHL STW1000V2 current relays monitor standard signals from instrument transformers for compliance with a limit value. Units can be wired in series (current) or in parallel (voltage) to monitor multiple limits.
Measurement inputs for 0/4-20 mA and 0-10 V, adjustable hysteresis and switching delays plus the selection facility to choose between the idle current and load current principle for the relay make it a universal limit switch.

- Measurement inputs 0-20 mA / 0-10 V, switchable to 4-20 mA / 2-10 V
- Limit adjustable 0-100 %
- Hysteresis adjustable 5-30 %
- On-delay adjustable 0.1... 10 s
- Response-delay adjustable 0.1... 10 s
- Output relay 1 change-over contact
- Operating or idle current with bridge selectable
- LEDs for service condition display
- Universal voltage power supply AC/DC 24-240 V
- Panel mounted distributor housing 35 mm wide (2 TE), Installation depth 55 mm

Application:
Monitoring nearly any measured quantity in connection with instrument transformers, e.g., in plants and controls.

Bestell-Nummer
AC/DC 24-240 V **S225677**



Technical Data

Control voltage Us	AC/DC 24 - 240 V, 0/50/60 Hz, < 2W, < 3VA (DC 20,4 - 297 V, AC 20 - 264 V)
Output relay	1 change-over contact
Type of contact	**Typ 3** see "general technical information"
Test conditions	see "general technical informations"
Function	Maximumüberwachung
Measurement inputs	DC 0/4 ... 20 mA, 20 Ω DC 0...10 V, 63 kΩ
Switch point/limit	adjustable 0...100%
Hysteresis	adjustable 5...30% vom eingestellten Grenzwert
Adjustment error	< 10% of span
Repeatability	< 0,2%
Temperature influence	≤0,05 %/K
On-delay don	adjustable 0,1...10 sec.
Response-delay doff	adjustable 0,1...10 sec.
Permissible ambient temperature	-20°C…+55°C
Dimensions H x W x D	Design V2: 90 x 35 x 58 [mm], mounting height 55 mm
Fixture	auf 35 mm DIN rail EN 60 715 or screws M4
Protection class housing / terminals	IP 30 / IP 20
Weight	approx. 130 g

AC- and DC-Voltage Monitor SW12V

DC- and AC-Voltage, Over- and Undervoltage up to 300 V

SW12V

The voltage-relay SW12V is a high-grade device for monitoring DC- and AC-networks for over-voltage and/or undervoltage. 2 measuring-ranges 0...40,0 V and 0...300 V guarantee a high resolution.

The digital display shows the measured values and is used for the programming of limits and switching functions.

Application:
As voltage-monitor in emergency-current-supplies or everywhere, where an accurate monitoring of voltage is required.
A short switching-delay ensures a good protection of sensitive devices.

2

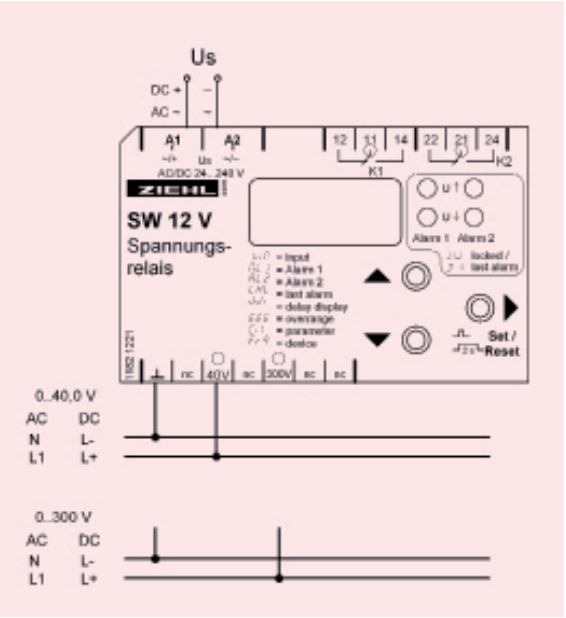
Description

General:
- Monitoring of voltage in DC-networks
- Measuring of voltage in AC-networks
- Averaging measuring, insensible to harmonics (DC and AC 50/60 Hz only)
- Peak measuring in frequency-range AC 45-100 Hz
- Monitoring of under- and/or overvoltage
- Measuring-Range 0...40,0 V with resolution 0,1 V
- Measuring-Range 0...300 V with resolution 1 V
- 2 output-relays (co-contacts) can be programmed independently
- Universal power-supply AC/DC 24-240 V
- Housing for mounting in fuse-boxes or switchgear cabinets, 70 mm wide, mounting height 55 mm

Display:
- 3-digit display for measured voltage and programming
- 4 LEDs for cause of tripping
- 2 LEDs for active inputs
- 2 LEDs for state of relays

Switching functions:
- 2 output-relays with change-over contacts
- Hysteresis programmable
- Switching-delay adjustable 0,05 ... 99,9 s
- Switching-back- = switching-on-delay adjustable 0,05 ... 99,9 s
- Operating- or closed-current-mode programmable

Order-number: **S222266**



Technical Data SW12V

Power Supply	Rated supply voltage Us	AC/DC 24-240 V, 0/45...100 Hz, <5VA DC: 20,4...297 V, AC: 20,4...264 V
Relay-Output		2 change-over contacts **type 2** see "general technical informations"
Measuring Input	Measuring voltage range 1	AC/DC 0...40,0 V
	Measuring voltage range 2	AC/DC 0...300 V
	Frequency	45...100 Hz
	Measuring time	< 50 ms
	Measuring error DC	± 0,8% of measured value ± 1 digit
	Measuring error AC	
	Averaging measuring	Nominal frequencies 50/60 Hz ± 2 Hz
	Error	± 0,8% of value ± 1 Digit
	Dependence on frequency	± 2% /Hz additional error
	Peak measuring	Frequency-range 45-100 Hz
	Error	± 0,8% of value ± 1 Digit
	at frequency > 61 Hz	< 0,5 % additional error
	Repeat error	± 1% at constant parameters
	Hysteresis range 1	adjustable 0,1...20 V
	Hysteresis range 2	adjustable 1...99 V
	Switching-delay	adjustable 0,05...99,9 s
	Switching-back delay	adjustable 0,05...99,9 s
	Time until ready after applying Us	≤ 300 ms (+ switch-back delay)
Testing conditions		EN 50178 / EN 60 664-1
	Rated impulse voltage	6000 V
	Overvoltage catagory	III
	Rated Insulation voltage	AC 415 V
	Contamination level	2
	On-period	100 %
	Rated ambient temp. range	-20 °C...+55 °C EN 60 068-2-1 dry heat
	Interference resistance	EN 61 000-6-2
	Interference transmission	EN 61 000-6-4
Housing	Design	V 4
	Dimensions (h x w x d)	90 x 70 x 58 mm, mounting height 55 mm
	Protection housing	IP 30
	Protection terminals	IP20
	Attachment	DIN-rail 35 mm or screws M4
	Weight	app. 200 g

Voltage Relay for three-phase current
also for alternating current networks

SW31V

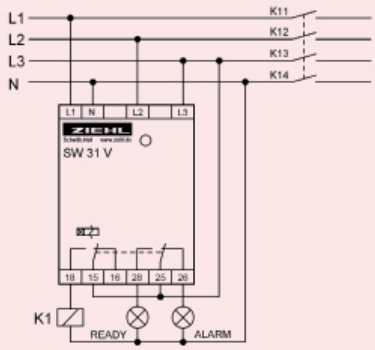
Modern electrical switchgear for energy generation and distribution, for treatment and processing machines and for a variety of other drives are usually equipped with measuring and control-engineering devices.
However, the use of such devices demands that the supplied mains voltage deviates only slightly from the nominal value as otherwise the required accuracy of the measurements or the actuating signal is not attained, or downstream units are destroyed by overvoltage.

SW series voltage monitors from ZIEHL are used to monitor the mains voltage in direct, alternating and three-phase current networks for undervoltage and/or overvoltage. If the nominal voltage deviates by various values which, depending on the consumer, are not allowed to be undercut, the involved system needs to be disconnected, or at least the operator needs to be optically or acoustically warned.

2

Functions and Characteristics

When the mains voltage is applied, the integrated relay pulls up if the voltage value preset for the network to be monitored is not undercut. If the set limit is undercut, the relay drops.
Type SW voltage monitors comply with Class III acc. VDE 0435 Part 303, Para. 4.8.2, for static measuring relays (SMR).



Undervoltage monitors (↓) for three-phase current networks with N and alternating voltage networks. The switching point lies at approx. 80% UNom. Hysteresis is approx. 5%. The voltages of the 3 phases are measured against the neutral conductor.
A green LED indicates the unit is ready for service. During undervoltage (<80%), the relay (2 change-over contacts) falls and the green LED goes out.
The housing can be snapped onto 35 mm mounting rails and is perfectly suited for installation in distribution cabinets.

Features:
- Monitoring three-phase current networks 3 AC 400 V with neutral conductor
- Monitoring alternating current networks AC 230 V (connect inputs L1/2/3)
- Monitoring own power supply
- Switching point fixed 80 %
- Output relay 2 change-over contacts
- Panel mounted distributor housing, 35 mm wide

Options:
- Adjustable response threshold 70...95 %
- Adjustable response delay 0.1...5 s
- Adjustable on-delay 0.1...5 s
  (delayed reset after short network interruptions to prevent damage during restarting)

Technical Data

Supply Voltage Us	AC 230 V, +10...-30%, < 5 VA
Other voltages	upon request
Frequency	50/60 Hz
Output Relay	2change-over contacts
Type of contact	**Typ 2** see "general technical informations"
Test conditions	see "general technical informations"
Permissible ambient temperature	-20°C...+55°C
Hysteresis	approx. 5% U_{Nenn}
Delay relay, undervoltage at voltage breakdown	L1/N: ca. 400 ms, L2/L3: ca. 1 s
Dimensions H x W x D	Design V2: 90x35x58 [mm], mounting height 55 mm
Protection class housing/terminals	IP 30 / IP 20
Order-number	**S 222281**

Universal Voltage Monitor SW 32 V

3-Phase- and AC-Voltage, Over- and Undervoltage up to 690 V

SW 32 V

The voltage-relay SW 32 V is a high-grade device for monitoring 3-phase and AC-networks for overvoltage and/or undervoltage. In 3-phase-networks additionally phase-symmetry and phase-sequence can be monitored.

The digital display shows the measured values and is used for the programming of limits and switching functions.

Application:
As voltage-monitor in equipment for generation or distribution of electric energy.
Monitoring of voltage in machines and plants to protect them from damage caused by failure or deviation of voltage.

Description

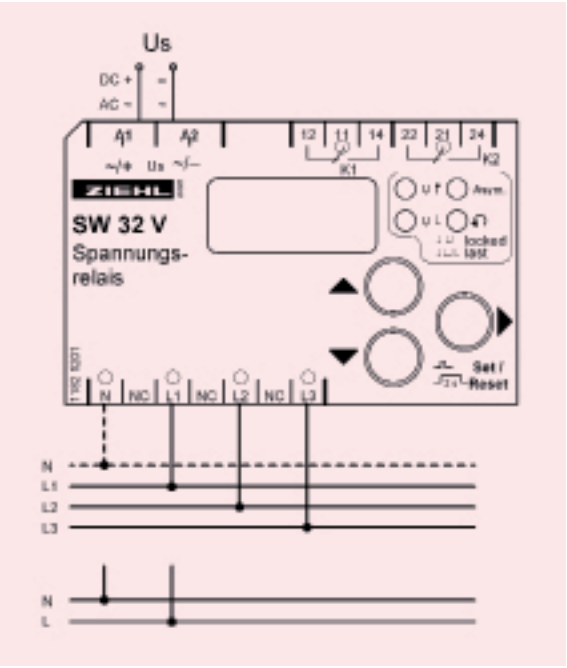
General:
- Monitoring of voltage in 3-phase networks
- Measuring of phase/phase or phase/neutral
- Averaging measuring, insensible to harmonics (50/60 Hz only)
- Peak measuring in frequency-range 45-100 Hz
- Monitoring of under- and/or overvoltage
- Monitoring of voltagges up to AC 830 V (phase/phase)
- Monitoring of AC-networks
- Monitoring of phase-sequence and phase-asymmetry in 3-phase networks
- 2 output-relays (co-contacts)
- Supply-voltage AC 400 V or universal power-supply
- AC/DC 24-240 V
- Housing for mounting in fuse-boxes or switchgear cabinets, 70 mm wide, mounting height 55 mm

Display:
- 3-digit display for measured voltage and programming
- 3 LEDs for cause of tripping
- 4 LEDs for active inputs
- 2 LEDs for state of relays

Switching functions:
- 2 output-relays with change-over contacts
- Hysteresis programmable AC 1 ... 99 V
- Switching-delay adjustable 0,05 ... 9,95 s
- Switching-back- = switching-on-delay adjustable 0,05 ... 9,95 s
- Operating- or closed-current-mode programmable

Order-numbers:

Supply-voltage	
AC/DC 24-240 V	**S222279**
AC 400 V	**S222280**



Technical Data SW32V

Power Supply	Rated supply voltage Us	AC/DC 24-240 V, 0/45...100 Hz, <5VA DC: 20,4...297 V, AC: 20,4...264 V
	Rated supply voltage Us	AC 400 V, 50/60 Hz, <5VA, -30%...+15%
Relay-Output		2 change-over contacts **type 2** see "general technical informations"
Measuring Input	Measuring voltage phase/phase	AC 0...830 V
	Measuring voltage phase/neutral	AC 0...480 V
	Frequency	45...100 Hz
	Measuring time	< 50 ms
	Measuring accuracy	at measuring voltage > 50 V
	Averaging measuring	Nominal frequencies 50/60 Hz ± 2 Hz
	Measuring with N	± 2% of value ± 1 Digit
	Measuring without N	± 2,5% of value ± 1 Digit
	Dependence on frequency	± 2% / Hz additional error
	Peak measuring	Frequency-range 45-100 Hz
	Measuring with N	± 0,8% of value ± 1 Digit
	Measuring without N	± 1% of value ± 1 Digit
	at frequency > 61 Hz	0,5% additional error
	Error asymmetry	± % asymmetry * 0,15 (asymmetry 0-50%)
	Hysteresis	adjustable AC 1...99 V
	Threshold phase-sequence	> AC 70 V (ph/ph) / > 50 V (p/neutral)
	Threshold phase-symmetry	adjustable 5...50 %
	Switching-delay	adjustable 0,05...9,95 s
	Switching-back delay	adjustable 0,05...9,95 s
	Time until ready after applying Us	≤ 300 ms (+ switch-back delay)
Test Conditions	Rated impulse voltage	
	Overvoltage catagory	EN 50178 / EN 60 664-1
	Rated Insulation voltage	6000 V
	Contamination level	III
	On-period	AC 690 V
	Rated ambient temp. range	2
	Interference resistance	100 %
	Interference transmission	-20 °C...+55 °C EN 60 068-2-1 dry heat EN 61 000-6-2 EN 61 000-6-4
Housing	Design	V4
	Dimensions (h x w x d)	90 x 70 x 58 mm, mounting height 55 mm
	Protection housing	IP 30
	Protection terminals	IP20
	Attachment	DIN-rail 35 mm or screws M4
	Weight	app. 200 g (AC/DC 240 V) app. 300 g (AC 400 V)

Voltage- and Frequency-Relay UFR1000

with integrated Vector-Step-Relay

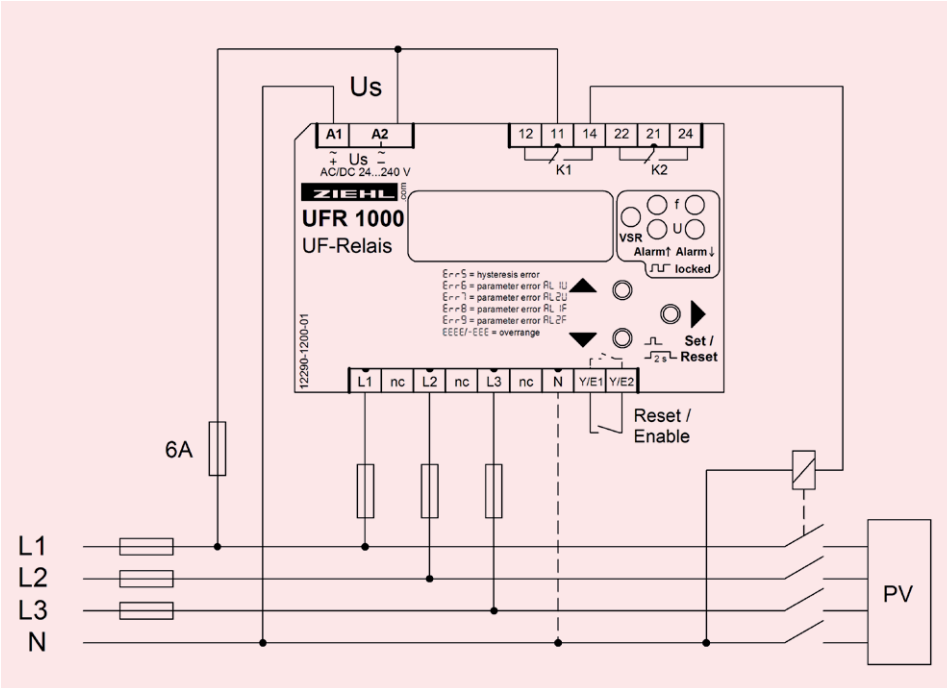
UFR1000

The voltage- and frequency-relay UFR1000 monitors voltage and frequency in two- or three-phase networks with or without neutral and switches off rapidly when required.
The device can be easily adapted to the requirements of the carrier of the power network.
With the integrated vector-step relay it can also monitor networks at synchronous generators.
After selecting a basic program, for each relay limits can be programmed for over-/undervoltage and over-/underfrequency.
In programs with vector-step-monitoring, K2 is used for vector-step only.
Applications are monitoring power-networks at great solar-plants, in block power heating stations, also with synchronous generators (vector step) or generally monitoring the quality in power networks at machines or power-supplies.

The device fulfils the requirements of power network carriers for the conventional protection at LV-systems >30 kVA according to VDE FNN.

- monitoring of over- and undervoltage 40…465 V
- monitoring of over- and underfrequency 45…65 Hz
- monitoring of quality of voltage (10-minutes-average)
- monitoring of vector-step 2…20 °, 1 or 3-phase
- Switching-delay adjustable <0,05…60,0 s
- Switching-back-delay adjustable 0…1000 s
- display 4 digits
- LEDs for alarms, allocation of values and states of relays
- 2 output-relays, each for monitoring frequency and/or voltage
- function of relays (nc- or no -operating mode) programmable
- interlocked switching or autoreset
- input for Enable / Reset
- easy programming by help of basic programs
- code-lock against manipulation of settings
- universal power-supply AC/DC 24-240 V
- housing for DIN-rail-mount, 70 mm wide, mounting height 55 mm

Order-number: **S222294**



Technische Daten UFR1000

Power supply	Rated supply voltage Us	AC/DC 24-240 V, 0/45...65 Hz, <5VA DC: 20,4...297 V, AC: 20,4...264 V
Relay output		2 change-over contacts **type 2**, see "general technical informations"
Voltage	Measuring voltage phase-phase	AC 40...465 V
	Measuring voltage phase - N	AC 40...270 V
	Hysteresis	adjustable 1...99 V
	Frequency	45...65 Hz
	Error (with N)	± 0,8% of measured value ± 1 Digit
	Error (without N)	± 1% of measured value ± 1 Digit
	Measuring functions	3-phasig mit/ ohne N, 1-phasig gegen N
	Switching-delay	adjustable 0,05...60,00 s
	Switching-back delay (zero-voltage-proof)	adjustable 0 (> 200 ms)...1000 s
Frequency	Measuring range	45,00...65,00 Hz
	Hysteresis	0,05...5.00 Hz
	Error	± 0,05 Hz ± 1 Digit
	Switching-delay	einstellbar 0,1...99,9 s
	Switching-back delay	einstellbar 0...240 s
Vector-Step	Mathod	
	Measuring range	1- or 3-phase
	Hysteresis	2.0...20.0 °
	Switching-delay	0,1 °
	Switching-back delay	< 50 ms
	Delay at Us on	adjustable 3...240 s adjustable 2...20 s
Test Conditions	Rated impulse voltage	EN 60 255
	Overvoltage catagory	4000 V
	Rated Insulation voltage	III
	Contamination level	AC 300 V
	Isolation material group	2
	On-period	II
	Rated ambient temp. range	100 %
	Interference resistance	-20 °C...+55 °C EN 60 068-2-1 dry heat
	Interference transmission	EN 61 000-6-2 EN 61 000-6-4
Housing	Design	V 4
	Dimensions (h x w x d)	90 x 70 x 58 mm, mounting height 55 mm
	Protection housing	IP 30
	Protection terminals	IP20
	Attachment	DIN-rail 35 mm or screws M4
	Weight	app. 200 g

Voltage Monitor for 3-Phase Networks
Undervoltage

SW31K

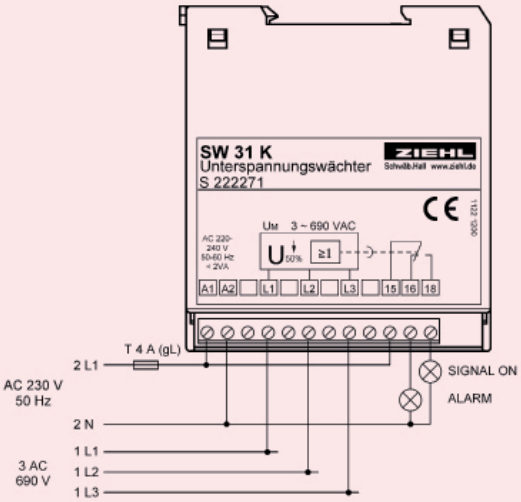
Undervoltage monitor for three-phase networks without N for monitoring on voltage failure. The voltage is being measured between phases and an artificial neutral point. At symmetrical decrease of the voltage to approx. 50% of the nominal value or in case of failure of a phase the integrated relay (1 change-over contact) releases with a delay of approx. 1s. With engines running-on on 2 phases, so much back voltage can be produced that the failure of a phase may be not detected. The SW31K is available for measuring voltages AC 400 V and AC 690 V. As supply voltage in the standard version AC 230 V is needed.

Application:
- Monitoring of three-phase networks on loss of a phase
- monitoring of fuses

Order-numbers:

AC 400 V	**S222272**
AC 690 V	**S222271**

Special Versions upon request



Technical Data

Rated supply voltage U_s	AC 230 V, +10...-15%, < 3 V
other Voltages	upon request
Frequency	50/60 Hz
Relay-Output	1 change-over contact (co)
Type of Contact	**Type 2** (see "general technical informations")
Testing Conditions	see "general technical informations"
Rated ambient Temp. Range	-20°C...+55°C
Hysteresis	app. 10% U_{Nenn}
Switching delay	app. 1 s
	Design K: 75 x 22 x 115 mm
Dimensions (H x W x D) mm	IP 30 / IP 20
Protection Housing/Terminals	app.135 g
Weight	