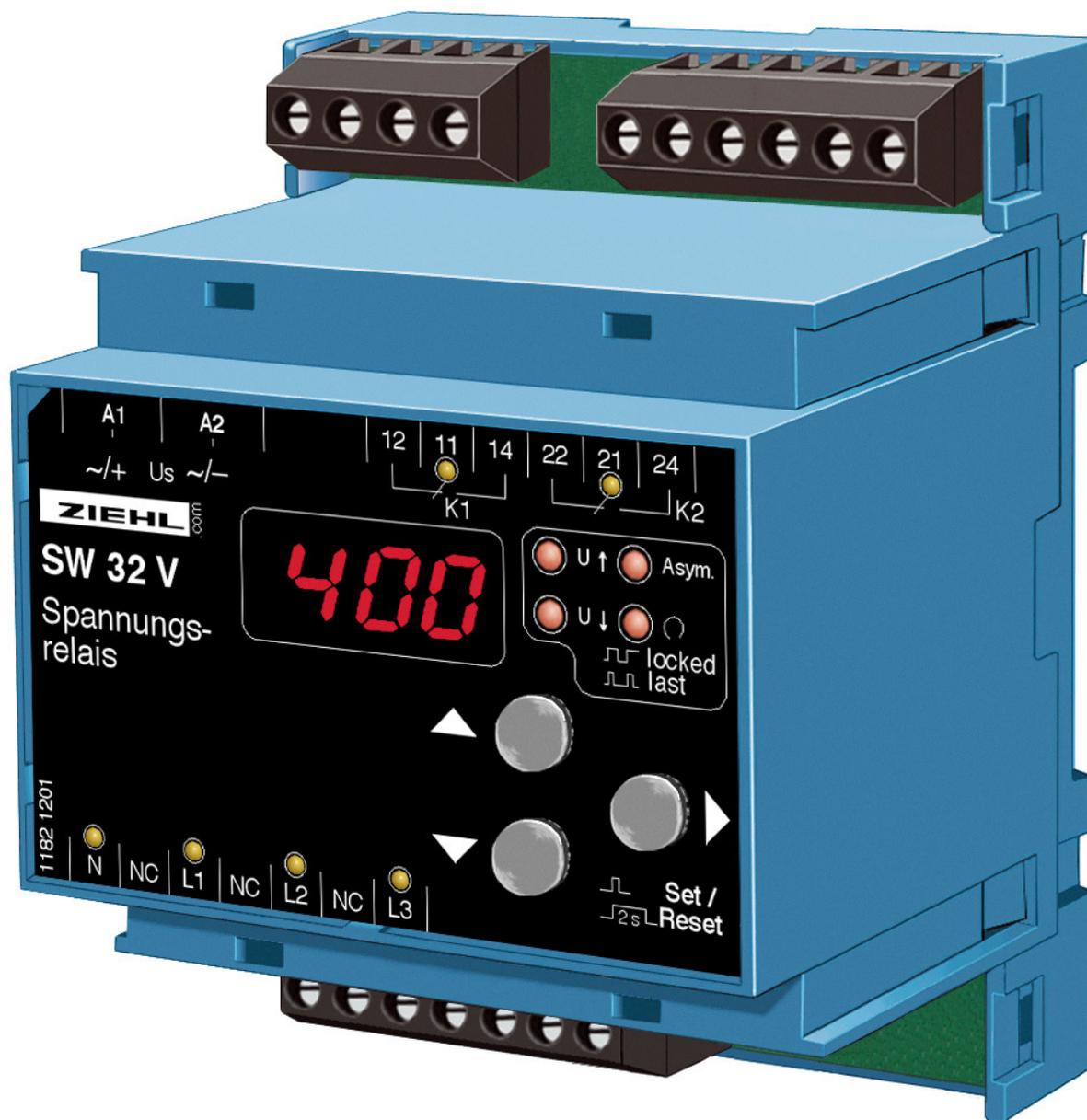


Operating Manual - Archive document

Universal Voltage Monitor SW 32 V



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Application and Short description

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.

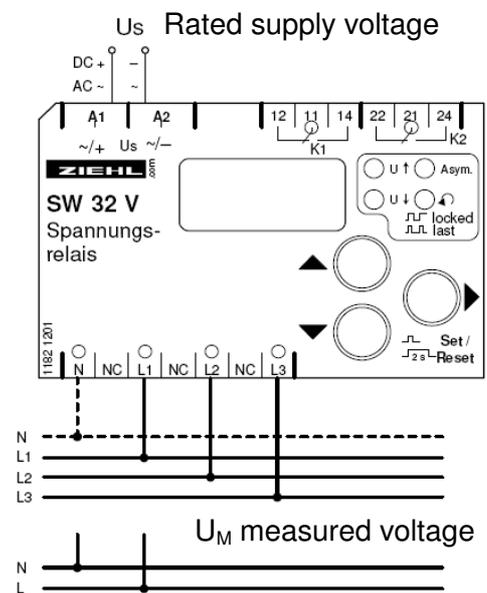
Application as voltage-monitor in equipment for generation or distribution of electric energy. Monitoring of voltage in machines and plants to protect them from damage caused by failure or deviation of voltage.

Overview of functions

General:

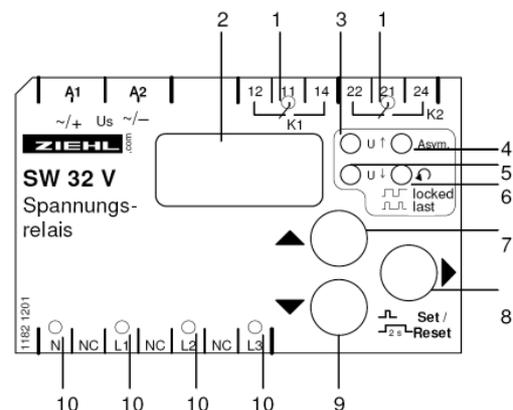
- 3 digit-display
- 2 limits / 2 output-relays
- individually programmable for each relay:
 - operating or closed-current-mode
 - hysteresis 1...99 V
- switching-delay 0,05...9,95 s
- switching-back = switching-on-delay 0,05...9,95 s
- LEDs for
 - state of relays and alarms
 - active inputs
 - cause of tripping
- Easy programming with 3 buttons
- Code-lock to prevent from unintended / unauthorized change of setting

Connection Plan



Display and operation parts

- 1 LEDs yellow state of relay
- 2 Digital display, 3 digits
- 3 LED red Alarm over-voltage
- 4 LED red Alarm asymmetry
- 5 LED red Alarm under-voltage
- 6 LED red Alarm phase-sequence
- 7 Button Up
- 8 Button Set/Reset
- 9 Button Down
- 10 LEDs yellow display select



Programs

12 programs (P_r), that are preset ex works, can be selected. Due to these programs, the device can be adapted very easily to the application.

Choose the program, which fits to your application and after that change the parameters! In case of changing the program, each parameter is being resetted to "factory setting". (see chart " factory setting")

When monitoring of asymmetry and/or phase-sequence is activated, both relays K1 and K2 will switch in case of an alarm.

Choosing the programs:

Switch off power-supply. Push button Set and hold it when switching on again. Hold Set for min. 10 s. Then the program ($P_r 1 \dots P_r 12$) can be selected with the pushbuttons up/down and confirmed with Set.

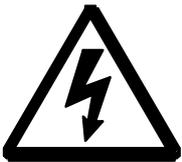
The selected program is displayed when switching on power-supply.

Program	Measuring mode	Measured limits	Relay K1		Relay K2	
$P_r 1^*$	3-phase without N	MIN + MAX	MIN	ASYM + PHF	MAX	ASYM + PHF
$P_r 2$		MIN + MAX	MIN + MAX	ASYM + PHF	MIN + MAX	ASYM + PHF
$P_r 3$		MAX	MAX	ASYM + PHF	MAX	ASYM + PHF
$P_r 4$		MIN	MIN	ASYM + PHF	MIN	ASYM + PHF
$P_r 5$	3-phase with N	MIN + MAX	MIN	ASYM + PHF	MAX	ASYM + PHF
$P_r 6^{**}$		MIN + MAX	MIN + MAX	ASYM + PHF	MIN + MAX	ASYM + PHF
$P_r 7$		MAX	MAX	ASYM + PHF	MAX	ASYM + PHF
$P_r 8$		MIN	MIN	ASYM + PHF	MIN	ASYM + PHF
$P_r 9$	1-phase N – L1	MIN + MAX	MIN		MAX	
$P_r R$		MIN + MAX	MIN + MAX		MIN + MAX	
$P_r b$		MAX	MAX		MAX	
$P_r c$		MIN	MIN		MIN	

* factory setting

** factory setting order-no S 222278

Important Informations



ATTENTION

Dangerous electrical voltage!

May lead to electrical shock and burn.

Before beginning of work switch unit and equipment free of voltage.



Attention!

When all relays are programmed in operation current mode (= pick up at alarm), a loss of the supply voltage or an instrument failure can remain unidentified. When the relay is applied as control instrument, the operator must ensure, that this error is recognized by regular examinations. We recommend to program and accordingly evaluate at least one relay in the closed-circuit current mode.

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

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

The equipments are built according to DIN / EN and checked and leave the plant according to security in perfect condition. To keep this condition, observe the security instructions with the headline „Attention“ written in the instructions manual. Ignoring of the security instructions may lead to death, physical injury or damage of the equipment itself and of other apparatus and equipment.

If, in any case the information in the instructions manual is not sufficient, please contact our company or the responsible representative.

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



ATTENTION!

Devices with electronic reclosing lock do not fulfill the conditions for safety-circuits according to EN 60204. In these applications suitable wiring of the device in combination with other devices must ensure to avoid an unintended start.



Attention!

Before switching on make sure that the rated supply voltage U_s of the type plate corresponds with the mains voltage.

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



Attention!

The device has been designed for applications in industrial surroundings (class A). The use in residential surroundings may cause interference transmissions.



Attention!

If the frequency of the monitored voltage differs more than ± 2 Hz from the nominal frequencies 50 or 60 Hz, measuring principle f_{od} has to be set to measuring of peak. When measuring peak, harmonics on the signal can result in an additional measuring error.

Installation

The unit can be installed as follows:

- Installation in switchgear cabinet on 35 mm mounting rail according to EN 60715
 - With screws M4 for installation on walls or panel. (additional latch included in delivery)
- Connection according to connection plan or type plate.

Putting into operation

Decimal point behind the last digit:

- Off = display mode, displays values of measuring inputs
- On = menu mode, select the menu items
- blinking = parameter setting mode

Display mode

Indication of the current measured value

LEDs Relay (K1, K2)

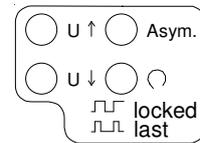
ON = relay picked up

LEDs N / L1 / L2 / L3

ON = Voltage between these inputs is displayed
change to next input by pushing button Set shortly

LED display of alarms

- On = Alarm; Limit exceeded
- Flash 1:1 = Reclosing lock (Loc locked) active
Reset: push Reset for 2 s
or interrupt power-supply
- Flash 1:4 = Alarm memory; shows last alarm which has been active
Reset: push Reset for 2 s
or interrupt power-supply



Function of buttons UP/DOWN

Push short change into menu mode

Function button SET/RESET

- Push for 2 s Reset restart interlock
- Push for 4 s Display of chosen program
- Push for 10 s Display of software version

Menu mode (Decimal point behind the last digit ON)

Selection of the menu items for changing the parameters.

Function button UP/DOWN

Push short Selection of menu item; Change into display mode

Function button SET/RESET

Push short Change into parameter setting mode

Parameter setting mode (Decimal point behind the last digit FLASHES)

Function button UP/DOWN

Press short/long Adjustment of parameter value (slow/fast)

Function button SET/RESET

Press short Storage of setting and choice of next parameter.
Change into menu mode after the last parameter

Limit for under-voltage U_{-} 0-830 V:

Chose menu item with up/down until U_{-} and value of limit alternate in display.

Here it can be read clearly, which limit value is parametrized.

Begin to parametrize limit value with Set.

Adjust limit with up/down. In measuring-programs with N set limit to voltage phase-N. In programs without N set limit to voltage phase-phase.

Hysteresis for under-voltage H_{-} 1-99 V:

The alarm / Relay for under-voltage switches back when $U_{-}+H_{-}$ is exceeded.

Limit for over-voltage U_{+} 0-830 V:

Chose menu item with up/down until U_{+} and value of limit alternate in display.

Here it can be read clearly, which limit value is parametrized.

Begin to parametrize limit value with Set.

Adjust limit with up/down. In measuring-programs with N set limit to voltage phase-N. In programs without N set limit to voltage phase-phase.

Hysteresis for over-voltage H_{+} 1-99 V:

The alarm / Relay for over-voltage switches back when $U_{+}-H_{+}$ is exceeded.

Alarm-delay d_{RL} 0,05-9,95 s:

An alarm is suppressed for the adjusted time, short-time exceeding of the limits does not cause an alarm. The delay is active for the monitoring-functions: under- and over-voltage and asymmetry.

Switch-back delay d_{oF} 0,05-9,95 s: (= delay when switching on power-supply)

Alarms are switched off this time after the signal has returned into good-state.

The delay is active for the monitoring-functions: under- and over-voltage and asymmetry.

Function of relays $rE1$ $rE2$:

r -Closed-current circuit mode. Relay is picked up in GOOD and releases when the limit is exceeded = alarm. Advantage: errors and faults normally cause an alarm. Disadvantage: alarm also when supply-voltage is switched off and after switching on until the relay has picked up.

R - Operating-current mode: relay is released in GOOD state and picks up when the limit is exceeded. No alarm at errors and when supply-voltage is switched off.

Asymmetry-monitoring R_{SY} OFF; 5-50%:

When the limit is exceeded, after switching-delay-time an alarm is reported.

Phase-sequence-monitoring PHF ON/OFF:

The net is monitored for wrong phase sequence. An alarm is reported at wrong phase-sequence.

Electronic reclosing-lock (Locked) Loc ON/OFF:

With Loc activated, an alarm is being stored until a Reset (Reset-button or interruption of supply-voltage) The reclosing-lock is active for the monitoring-functions: under- and over-voltage and asymmetry.

Measuring principle Π_{od} 0/1:

Here you can chose, which measuring principle is applied.

0: averaging measuring, to be used for frequencies 50 or 60 Hz only.

1: peak-measuring

Delay of display dd ; 0,1-1,0 s:

Defines the display-rate. Set to higher values at nervous display.

Simulation (S_i) 0-999 V:

Simulate an input-signal with the buttons up/down. All functions of the relay will work as if the signal was measured in real.

Asymmetry- und -sequence cannot be simulated.

If there is no button pressed for 15 minutes, the device automatically returns into display-mode.

Code-lock (Γ_{od}):

After setting all parameters they can be protected by activating the code lock. After pushing Set, the display indicates $P_i n$.

Adjust with buttons up/down $P_i n$ 504 (factory setting). After pushing Set, code lock can be activated or switched off. After pushing Set again, an individual $P_i n$ can be selected (write down).

When code lock is activated all parameters can be seen but not be changed anymore. In case of problems with the code lock (forgotten $P_i n$) the lock can be switched off and the **Pin** can be set back to 504, by pushing button set while connecting the device to supply-voltage until $\Gamma_{od}E$ / OFF is indicated in the display.

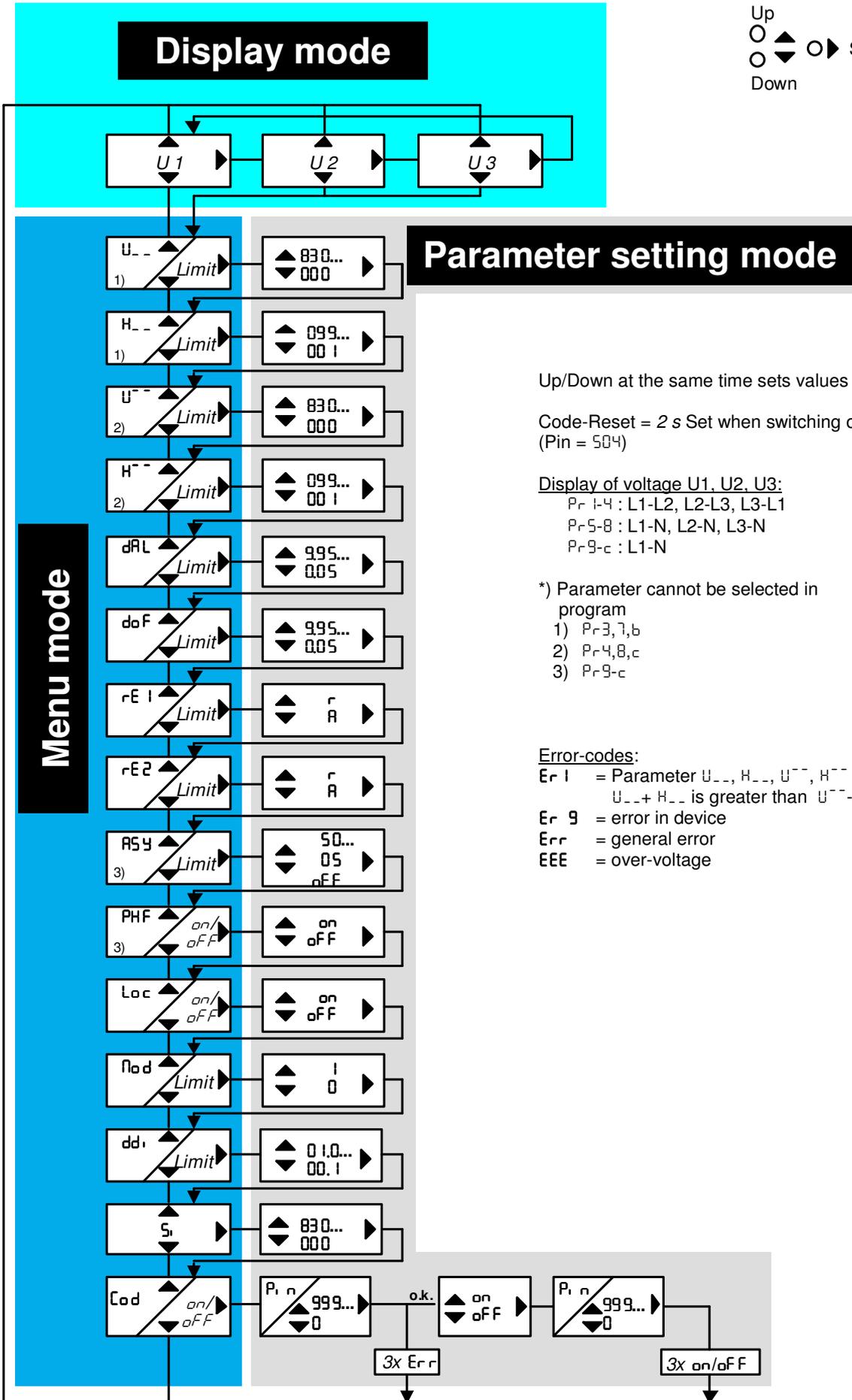
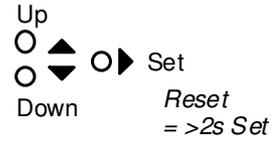
Tips:

- With the pre-set programs P_{r1} - P_{rC} the most important parameters are being set in advance, so that only little modifications are necessary, e.g. setting of the limits (limit values) for each alarm.
- When the right decimal point in the 7 segment display is on, the display mode has been left, and the menu items can be chosen with up/down (menu mode).
- When the right decimal point blinks, you are in the parameter setting mode and can change the setting with up/down.
- Long pushing on up/down speeds up the changes in the display.
- Pushing button up and down at the same time sets values to zero.
- With reset (press Set/Reset for 2s) the display mode can be reached from every position (exception: simulation) of the parameter setting mode (the last selected value in is being stored).

Indications in the 7-segment display:

Pr 1..Pr c	= number of program (a,b,c = 10,11,12)
U ₋₋	= Alarm limit for under-voltage
H ₋₋	= Hysteresis for under-voltage
U _{^-^-}	= Alarm limit for over-voltage
H _{^-^-}	= Hysteresis for over-voltage
dAL	= alarm delay (time delay until alarm)
doF	= switch back delay (time delay until alarm switches back to good)
rE 1	= function of relay K1
r	= closed-circuit current mode, contact 11-14 opens at alarm
R	= operating current mode, contact 11-14 closes at alarm
rE 2	= function of relay K2
r	= closed-circuit current mode, contact 21-24 opens at alarm
R	= operating current mode, contact 21-24 closes at alarm
ASY	= Monitoring of asymmetry on/off
PHF	= Monitoring of phase-sequence on/off
Loc	= Electronic reclosing lock (Locked) on/off
Mod	= Measuring principle 1: peak measuring 0: averaging measuring
ddi	= Delay of display
Si	= Simulation
Code	= Code (Pin)
Pin	= factory-setting 504
on / off	= on/off

Operate with buttons:



Up/Down at the same time sets values to zero.

Code-Reset = 2 s Set when switching on.
(Pin = 504)

Display of voltage U1, U2, U3:

- Pr 1-4 : L1-L2, L2-L3, L3-L1
- Pr 5-8 : L1-N, L2-N, L3-N
- Pr 9-c : L1-N

*) Parameter cannot be selected in program

- 1) Pr 3, 7, b
- 2) Pr 4, 8, c
- 3) Pr 9-c

Error-codes:

- Er 1 = Parameter U₋₋, H₋₋, U^{''}, H^{''} check
U₋₋ + H₋₋ is greater than U^{''} - H^{''}
- Er 9 = error in device
- Err = general error
- EEE = over-voltage

Factory settings:

In case of programme change all parameters are set back upon factory setting:

Menue -item	Parameter	Value			Users parameters
		Pr 1-4	Pr 5-8	Pr 9-c	
U ₋₋	Limit under-voltage V	340	196 (135)	207	
H ₋₋	Hysteresis under-voltage V	10	6 (45)	6	
U ₋₋	Limit over-voltage V	440	253 (265)	253	
H ₋₋	Hysteresis over-voltage V	8	5 (10)	5	
dAL	Alarm-delay s	0.10	0.10 (0.05)	0.10	
dof	Delay-Alarm off s	0.50	0.50 (9.95)	0.50	
rE1	Function relay K1	r	r	r	
rE2	Function relay K2	r	r	r	
ASY	Limit Asymmetry %	oFF	oFF	-	
PHF	Monitoring of phase-sequence	oFF	oFF	-	
Loc	Electronic reclosing-lock (Locked)	oFF	oFF	oFF	
n _{od}	Measuring principle (0: averaging)	0	0	0	
dd _i	Delay of display s	0.5	0.5	0.5	
C _{od}	on / oFF	oFF	oFF	oFF	
	P _{i n}	504	504	504	

factory-preset:

PR 1

factory-preset order-no. S222278:

PR 6 and values in brackets

Indication of the **software version**: select display mode an push button „Set“ for 10 s.

Error search and measures

- Unit cannot be programmed – Code lock

The code lock gives protection against unauthorized manipulation of the unit. When code lock is activated the parameters can not be changed. The pin can be set by the user.

Pin unknown? Make code-reset: Switch off power-supply. Push button Set and hold it when switching on again.

Display indicates: "888"; "Cod"; "oFF"; "888" release button „Set“.

Code = oFF, Pin = 504.

- Indicated value does not correspond with the input-signal

Check which program is selected (phase-N / phase-phase?). The selected program is displayed when switching on power-supply.

For measuring 3-phase without N, N must not be connected.

At great asymmetry or missing phase the measuring error is greater.

The measuring principle averaging is insensible to harmonics. It can only be applied at frequencies 50 or 60 Hz. If the frequency differs more than ± 2 Hz from these nominal frequencies, measuring principle Mod has to be changed to peak measuring. Please consider, that at peak measuring harmonics on the measured signal can cause other measuring errors.

- Error in evaluation of phase-sequence

Monitoring of phase-sequence only at voltages >50/70 V

At frequencies >61 Hz a reliable evaluation of the phase-sequence is not ensured

Check phase-sequence.

- Indication „Er I“

check parameters $U_{-}, H_{-}, U^{+}, H^{+}$

$U_{-} + H_{-}$ is greater than $U^{+} - H^{+}$

- Indication „Er 9“

Er 9 is an internal fault of the device. Switch off- and on the power-supply, eventually reset parameters upon factory preset.

If after that there still is an error indicated, the unit must be sent to the factory for repair.

Technical Data

<u>Rated supply voltage Us:</u>	AC/DC 24 – 240 V, 0 / 45-100 Hz < 3 W < 5 VA
Tolerance	DC 20,4 - 297 V, AC 20,4 - 264 V
<u>Rated supply voltage Us:</u>	AC 400 V, 50 / 60 Hz < 5 VA
Tolerance	-30% ... +15%

<u>Data of relay</u>	EN 60947-5
Type of contact	2 x 1 change-over contact (CO)
Switching voltage	max. AC 415 V
Switching current	max. 6 A
Switching power	max. 2000 VA (ohmic load) max. 120 W at DC 24 V
Rated nominal current Ie	3 A AC15 250 V; 2 A DC13 24 V
Recommended fuse	3,15 A slow (gL)
Contact life mechanic	3 x 10 ⁷ operations
Contact life electrical	1 x 10 ⁵ operations at 240 V / 6 A
Reduction factor at cosφ = 0,3	0,5

<u>Test conditions</u>	EN 50178 / EN 60 664-1
Rated impulse voltage	6000 V
Overvoltage category	III
Rated insulation voltage	AC 690 V
Contamination level	2
Isolation material group	II
On-period	100 %
Rated ambient temperature range	-20 °C ... +55 °C EN 60068-2-1 dry heat
Interference resistance	EN 61000-6-2
Interference transmission	EN 61000-6-4
Vibration resistance EN 60068-2-6	2...25 Hz ±1,6 mm 25 ... 150 Hz 5 g

<u>Measuring inputs / Ranges</u>	
Measuring voltage U _M Phase - Phase	AC 0 - 830 V
Measuring voltage U _M Phase – N	AC 0 - 480 V
Frequency	45 - 100 Hz
Measuring time	< 50 ms

Averaging measuring

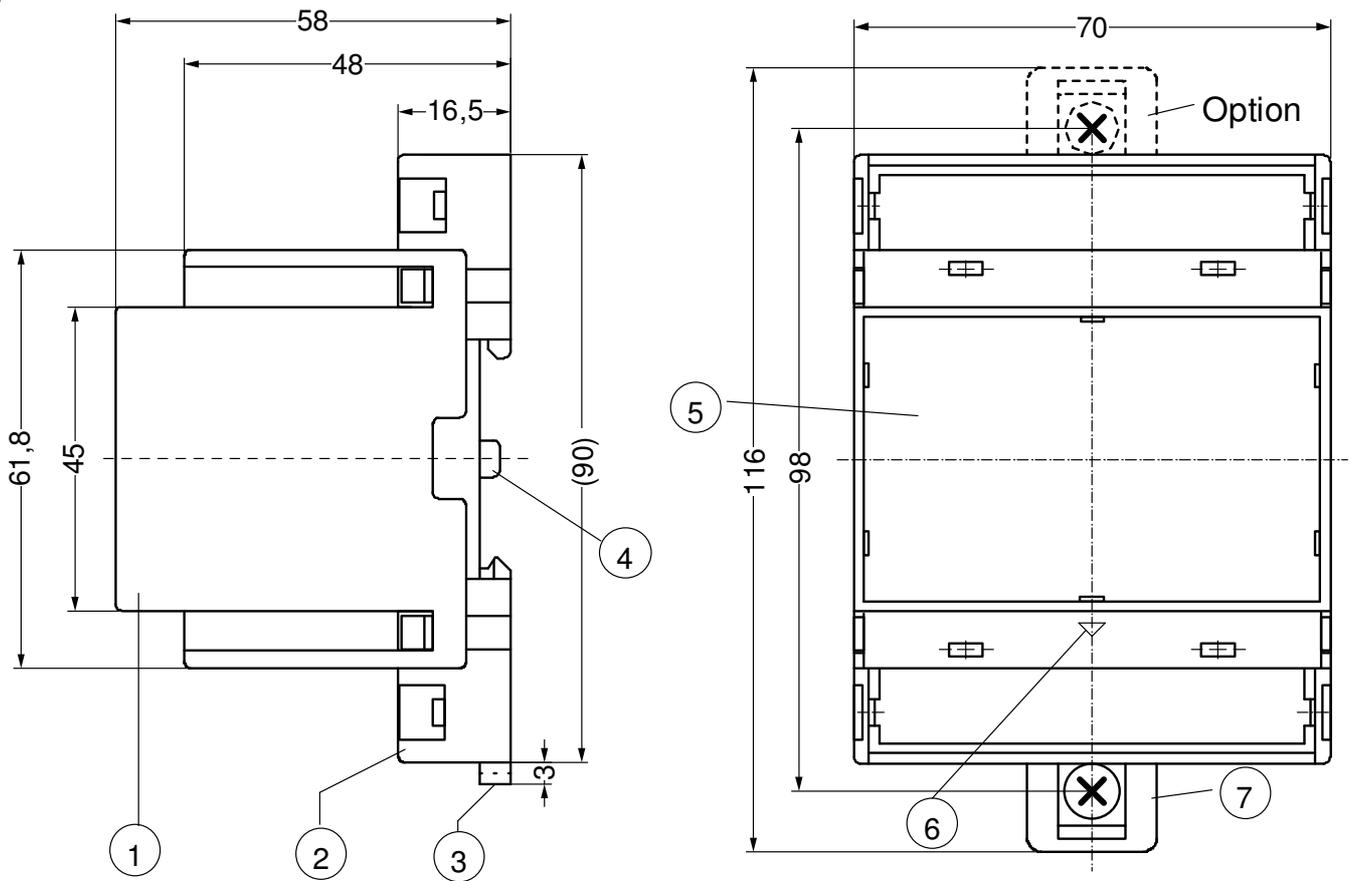
(Hint: This measuring principle is largely insensible to harmonics)

Frequency range	50 / 60 Hz ± 2 Hz
Measuring error	Measuring voltage > 50 V
Measuring with N	± 2 % of value ± 1 Digit
Measuring without N	± 2,5 % of value ± 1 Digit ± % asymmetry * 0,15 (asymmetry 0-50 %)
Dependence on frequency	± 2 % / Hz additional error
Repeat accuracy	± 1 % at constant parameters

Peak measuring (Hint: Harmonics on the measured signal can cause measuring errors)	
Frequency range	45 - 100 Hz
Measuring error	Measuring voltage > 50 V, frequency 45 – 61 Hz
Measuring with N	± 0,8 % of value ± 1 Digit
Measuring without N	± 1 % of value ± 1 Digit
	± % asymmetry * 0,15 (asymmetry 0-50 %)
at frequency > 61 Hz	± 0,5 % additional error
Temperature factor	< 0,05 % / K of value
Measuring function	selectable: 3-phase without N 3-phase with N 1 phase to N
Hysteresis	AC 1 – 99 V
Trigger point phase-sequence	> AC 50/70 V Frequency 45 - 61 Hz
Symmetry of phases	5 – 50 % Hysteresis ca. 1%
Switching delay	0,05 – 9,95 s
Switch-back delay	0,05 – 9,95 s
Ready after Us	<= (300 ms + switch-back delay)
<u>Housing:</u>	Design V4
Mounting height	55 mm
Dimensions (W x H x D)	70 x 90 x 58 mm
Line connection 1 wire	4 mm ²
Protection Housing	IP 30
Protection Terminals	IP 20
Attachment	DIN-rail 35 mm or screws M 4 (additional bar for snap-mounting enclosed)
Weight	AC/DC 24 – 240 V app. 170 g AC 400 V app. 270 g

Subject to technical changes

Housing Design V4: Dimensions in mm



- 1 Oberteil / cover
- 2 Unterteil / base
- 3 Riegel / bar for snap mounting
- 4 Plombenlasche / latch for sealing
- 5 Frontplatteneinsatz / front panel
- 6 Kennzeichen für unten / position downward
- 7 Riegel bei Wandbefestigung mit Schrauben. Riegelbohrung \varnothing 4,2 mm / for fixing to wall with screws, \varnothing 4,2 mm.

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