Operating Manual - Archive document

AC and DC Voltage Monitor SW 12 V

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Index Page

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Application and Short description

The voltage-relay SW 12 V is a high-grade device for monitoring DC and AC-networks for overvoltage and/or undervoltage. Two 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.

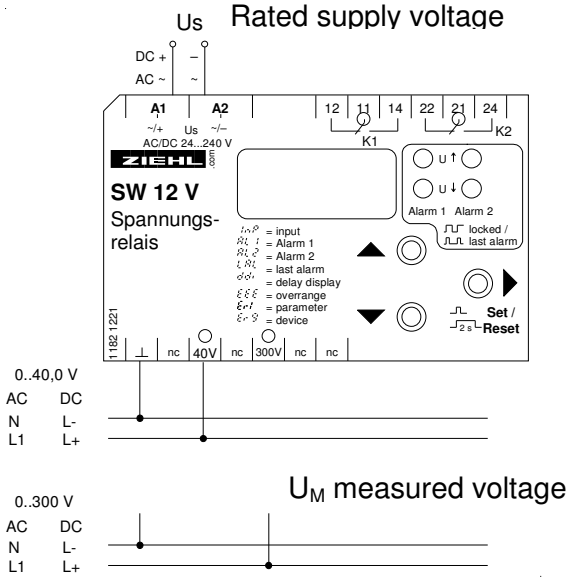
Application as voltage-monitor in emergency current-supplies or everywhere, where an accurate monitoring of voltage is required.
A short switching-delay ensures a good protection of sensitive devices.

Overview of functions

General:

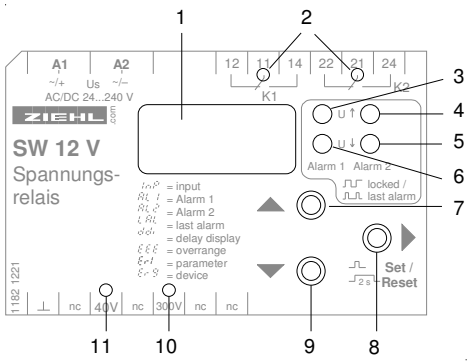
- 3 digit-display
- 2 limits / 2 output-relays
- individually programmable for each relay:
  - operating or closed-current-mode
  - monitoring of under- and/or overvoltage
  - hysteresis 0,1...20,0 V / 1...99 V
  - switching-delay 0,05...9,95 s
  - switching-back = switching-on-delay 0,05...99,9 s
- LEDs for
  - state of relays and alarms
  - aktive 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	Digital display, 3 digits
2	LEDs state of relay
3	LED Alarm 1 over-voltage
4	LED Alarm 2 over-voltage
5	LED Alarm 2 under-voltage
6	LED Alarm 1 under-voltage
7	Button Up
8	Button Set/Reset
9	Button Down
10	LED input 0...300 V active
11	LED input 0...40,0 V active



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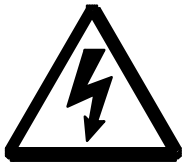
Important Informations



ATTENTION

Dangerous electrical voltage!
May lead to electrical shock and burn.
Before beginning of work switch unit and equipment free of voltage.

ATTENTION!

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.

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!

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.

Attention!

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

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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 Mod 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

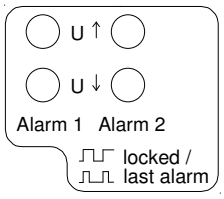
Decimal point behind the last digit:
Off = display mode, displays values of measuring inputs
On = menu mode, select the menue items
Blinking = parameter setting mode

Display mode

Indication of the current measured value

LEDs Relay (K1, K2)
ON = relay picked up
LEDs 40 V / 300 V
ON = display of the active input

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



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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 menue mode

Function button SET/RESET
Push for 2 s Reset restart interlock
Push for 10 s Display of software version

Display of Min/Max- Values
Push button Up for >=2 s --- /indication of highest measured voltage
Push button Down for >=2 s --- / indication of lowest measured voltage
To Reset the displayed value push additionally button Set/Reset for >= 2 s, until --- is displayed.

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 BLINKS)

Function button UP/DOWN
Press briefly/long Changement of parameter value (slow/fast)
Function button SET/RESET
Press briefly Acception of setting and choice of next parameters, after the last parameter change into menu mode

Selecting the inputs (InP):
Choose menu item with up/down until InP and range alternate in display.
Here it can be read clearly, which input is parameterized.
Enter in parameterizing with Set.
Select input with up/down and store with Set
Display 300: measuring input 0...300 V is active
Display 40: measuring input 0...40,0 V is active

Setting the alarms (AL1 / AL2):
Choose menu item with up/down until AL1 (AL2) and limit (limit value) alternate.
Here it can be read clearly which limit value is parameterized.
When undervoltage is monitored with this alarm, the limit for undervoltage, otherwise the limit for overvoltage is displayed
Begin to parameterize with set.
Set limit with up/down and store with set.

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Choose function:

- oFF Alarm OFF, relay is released all the time
- ⌐¯L Overvoltage without reclosing lock
- ⌐¯¯ Overvoltage with reclosing lock. Reset only possible after signal is below the limit (with hysterisis) and after the switchback-delay. The switchback-delay is indicated with blinking diode U↑.
- ⌐_r Undervoltage without reclosing lock
- ⌐__ Undervoltage with reclosing lock. Reset only possible after signal is above the limit (with hysterisis) and after the switchback-delay. The switchback-delay is indicated with blinking diode U↓.
- ⊣¯⊢ Window (under- and overvoltage) monitoring without lock.
- ⊣¯¯ Window (under- and overvoltage) monitoring with reclosing lock. Reset only possible after signal is within the window (with hysterisis) and after the switchback-delay. The switchback-delay is indicated with blinking diode U.

Limit for Undervoltage U__ 0,1..39,8 V (1..298 V):

This additional Parameter can only be selected when function window-monitoring has been selected. Adjust limit with up/down and store with Set.

Hysteresis for under- and overvoltage H 0,1...20,0 V (1...99V):

The Alarm switches back when the value returns over limit + hysteresis (undervoltage) respectively under limit - hysteresis (overvoltage) .

Alarm-delay dAL 0,05-99,9 s:

An alarm is suppressed for the adjusted time, short-time exceeding of the limits does not cause an alarm.

Switch-back delay doF 0,05...99,9 s (=delay when switching on power-supply):

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

Function of relays rEL:

- 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.
- A 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.

Measuring principle Mod 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

Display of last alarm LAL:

When monitoring without electronic reclosing-lock active

- oFF no display of last alarm.
- on display with blinking Alarm-LED 1:4. Reset with button Reset >=2s.

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

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

Simulation (S) 0-300 V:

Simulate a measured input-signal with buttons up/down. All functions of the unit work as if this temperature was really measured. If there is no button pushed for 15 minutes, the device automatically switches back into the display mode.

Code-lock (Cod):

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

Adjust with buttons up/down P n 504 (factory setting). After pushing Set, code lock can be activated or switched off. After pushing Set again, an individual P 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 n) the lock can be switched off and the P n can be set back to 504, by pushing button set while connecting the device to supply-voltage until Cod / oFF is indicated in the display.

Tips:

- 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.
- After finishing one menu item it is switched automatically on the next one.
- 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 of the parameter setting mode (the last selected value in is being stored).

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Indications in the digital display:

InP	= input
300	= measuring input 300 V
40	= measuring input 40,0 V
AL1 / AL2	= alarm limit (upper limit at window monitoring)
Fun	= alarm function
oFF	= alarm off
o-L	= overvoltage without reclosing lock
o--	= overvoltage with reclosing lock.
u-r	= undervoltage without reclosing lock
u--	= undervoltage with reclosing lock
H-F	= window monitoring without reclosing lock
H--	= window monitoring with reclosing lock
U--	= limit for undervoltage when monitoring a window
H	= hysterisis
dAL	= alarm delay (time delay until alarm)
doF	= switch-back delay (time delay until alarm switches back to good)
rEL	= function of relay
r	= closed-circuit current mode, contact 11-14 opens at alarm 1 (contact 21-24 opens at alarm 2)
A	= operating current mode, contact 11-14 closes at alarm 1 (contact 21-24 closes at alarm 2)
Mod	= Measuring principle 1: peak measuring 0: averaging measuring
LAL	= display of last alarm
on / oFF	= on / off
ddi	= delay of display
Cod	= Code (Pin)
Pin	= factory-setting 504
on / oFF	= on / off

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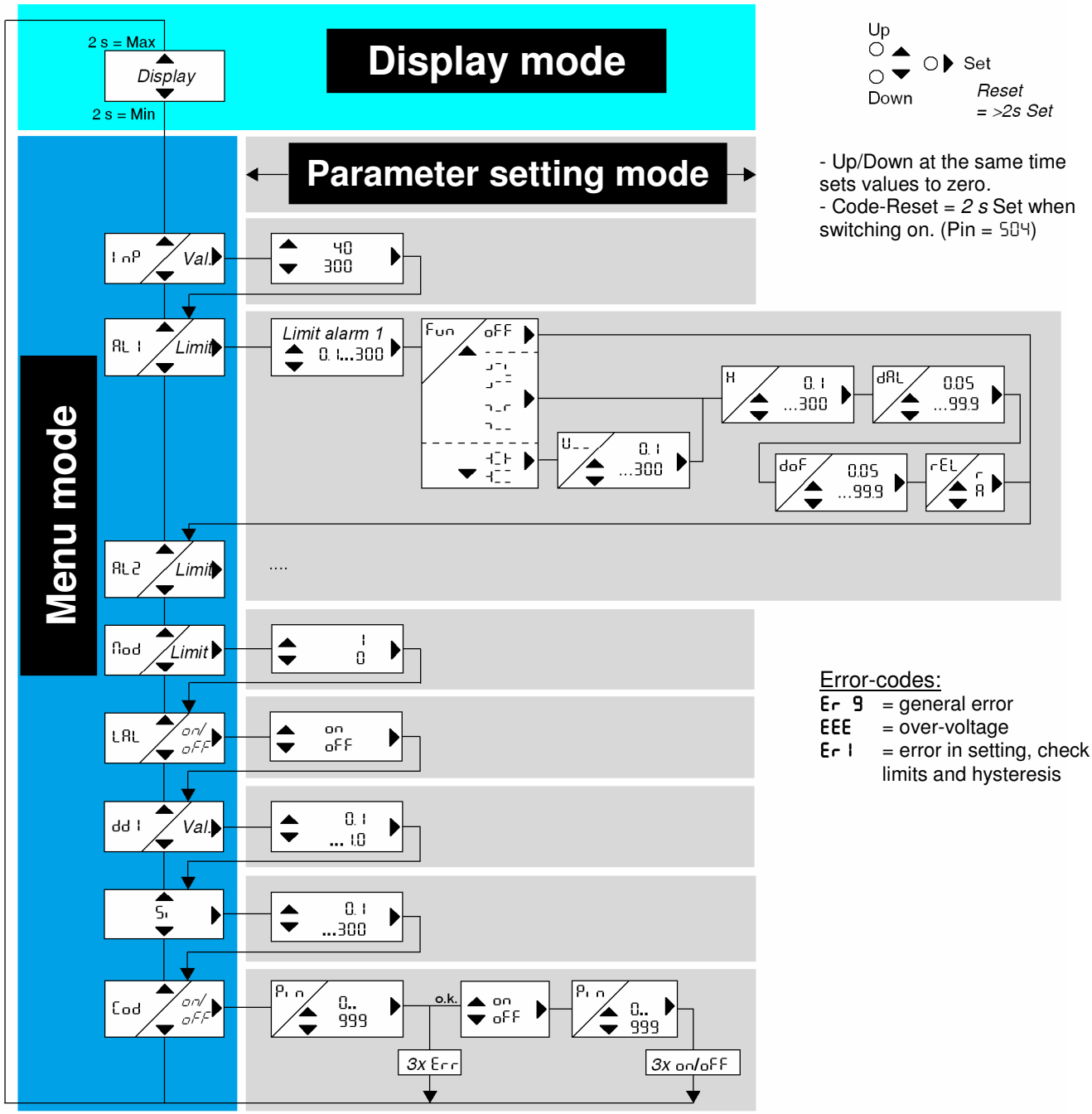
Operation:

Operate with buttons:



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

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Factory Settings:

Menu-Item		Parameter	Unit	Value		My Data
I nP		Input		40	300	
AL 1		Limit 1	V	26.4	242	
	Fun	Function		↓-L	↓-L	
	U--	Limit undervoltage (window)	V	-	-	
	H	Hysteresis	V	0.5	5	
	dAL	Alarm-delay	s	0.5	0.5	
	doF	Switch-back Delay	s	0.5	0.5	
	rEL	Function of relay K1		r	r	
AL 2		Limit 2	V	21.6	198	
	Fun	Function		↑-r	↑-r	
	U--	Limit undervoltage (window)	V	-	-	
	H	Hysteresis	V	0.5	5	
	dAL	Alarm-delay	s	0.5	0.5	
	doF	Switch-back Delay	s	0.5	0.5	
	rEL	Function of relay K2		r	r	
nod		Measuring principle (0: averaging)		0	0	
LAL		LED-display of last alarm		oFF		
ddi		Delay of display	s	0.5		
Cod		Code-Lock		oFF		
	Pin	PIN		504		

Reset to factory-settings:

Push button Set for 10s when switching on supply-voltage until --- is displayed

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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: When switching in supply-voltage keep pushed button „Set“ for **2 s**.
  Display shows: "888"; "Cod"; "oFF"; release button „Set“.
  Code = oFF, Pin = 504.

- Indicated value does not correspond with the input-signal
  Check if the voltage is connected to the correct input.
  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.

- Indication „EEE“
  Overvoltage - measured voltage is too high

- Indication „Er 1“
  check parameters AL 1, U__, H and AL2, U__, H

- Indication „Er9“
  Er9 is an internal fault of the device. Switch off- and on the power-supply.
  If after that there still is an error indicated, the unit must be sent to the factory for repair.

Technical Data

Rated supply voltage Us:	AC/DC 24 – 240 V, 0 / 45-100 Hz < 3 W < 5 VA
Tolerance	DC 20,4 - 297 V, AC 20,4 - 264 V
Data of relay	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

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Test conditions	EN 50178 / EN 60 664-1
Rated impulse voltage	4000 V
Overvoltage category	III
Rated insulation voltage	AC 415 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

Measuring inputs / Ranges

Measuring voltage range 1	AC/DC 0...40,0 V
Measuring voltage range 2	AC/DC 0...300 V
Overload Capacity range 1	AC/DC 200V continuously, AC/DC 300V max. 1s
Overload Capacity range 2	AC/DC 450V continuously, AC/DC 600V max. 1s

DC Measuring

Measuring time	< 50 ms
Measuring error	± 0,8 % of value ± 1 Digit

AC Measuring - averaging

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

Frequenzbereich	50 / 60 Hz ± 2 Hz
Measuring error	± 0,8 % of value ± 1 Digit
Dependence on frequency	± 2 % / Hz additional error
Repeat accuracy	± 1 % at constant parameters

AC Measuring, Peak

(Hint: Harmonics on the measured signal can cause measuring errors)

Frequency range	45 - 100 Hz
Measuring error	± 0,8 % of value ± 1 Digit
at frequency > 61 Hz	± 0,5 % additional error
Repeat accuracy	± 1 % at constant parameters
Temperature factor	< 0,05 % / K of value
resistance of input range 1	88 kΩ
resistance of input range 2	400 kΩ
Hysteresis range 1	0,1...20,0 V
Hysteresis range 2	1...99 V
Switching delay	0,05 – 99,9 s
Switch-back delay	0,05 – 99,9 s
Ready after Us	<= (300 ms + switch-back delay)

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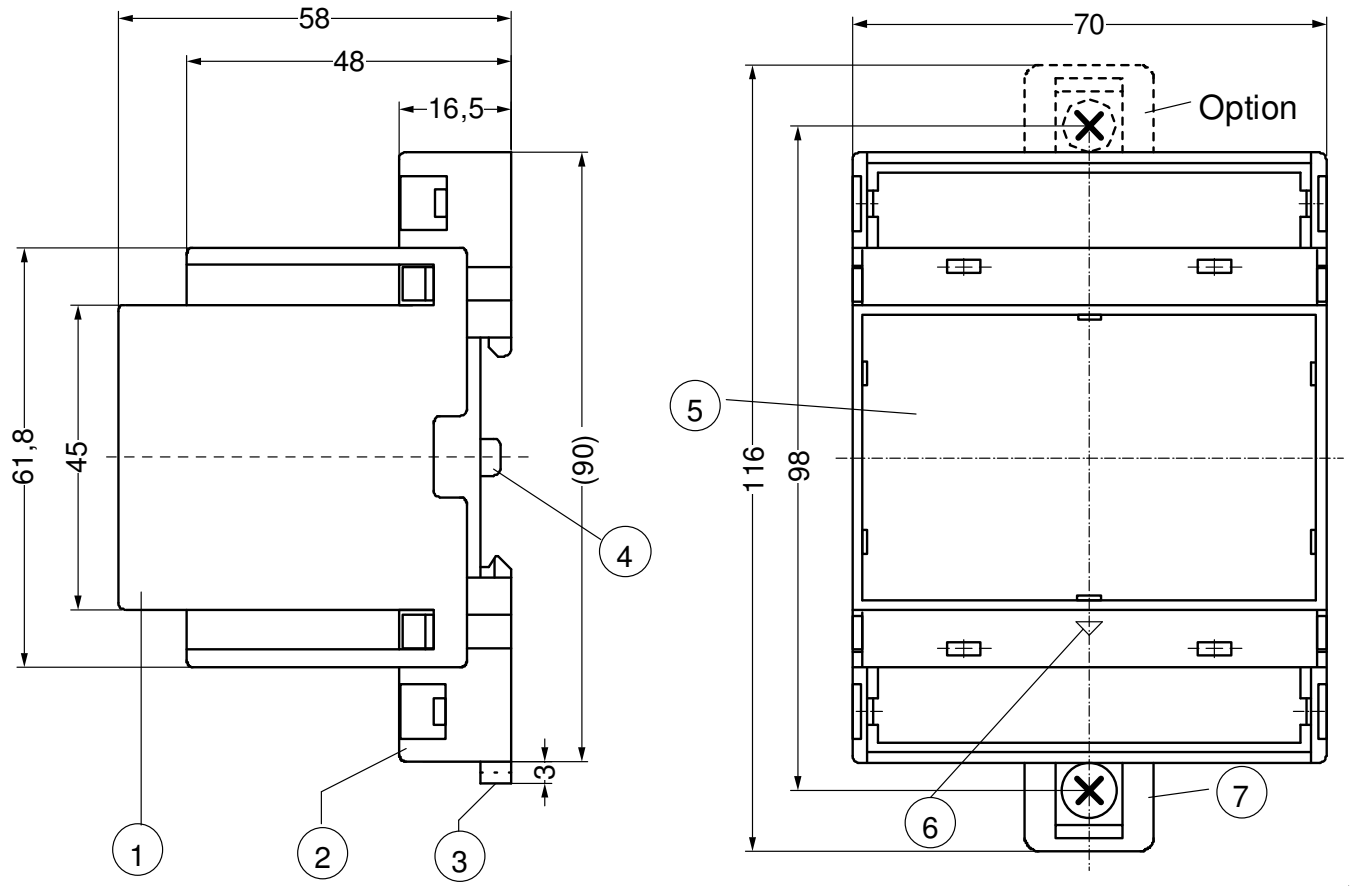
Housing:	Design V4
Mounting height	55 mm
Dimensions (W x H x D)	70 x 90 x 58 mm
Line connection 1 wire	4 mm^2
Protection Housing	IP 30
Protection Terminals	IP 20
Attachment	DIN-rail 35 mm or screws M 4 (additional bar for snap-mounting enclosed)
Weight	app. 170 g

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 Ø 4,2 mm / for fixing to wall with screws, Ø 4,2 mm.

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