

Mains Monitoring

| | |
|---------------------------------------------------|-----|
| Phase-Monitor Relays Type PS | 66 |
| Phase-Asymmetry | |
| Phase-Sequence | |
| Under- and Overvoltage | |
| Phase-Sequence-Change | |
| Motorload $\cos \varphi$ | |
| Voltage-Monitor Relays Type SW | 73 |
| DC-Voltage-Monitor Relays | |
| AC-Voltage-Monitor Relays | |
| 3 AC-Voltage-Monitor Relays | |
| Current Relays for Current Recognition Type STW | 89 |
| Current-Relays with OR-circuits | |
| Current-Relays with AND-circuits | |
| Electronic Current Transformers / Current-Sensors | 97 |
| Current-Detection | |
| Measuring-Transducers | |
| Current Relays adjustable Type STW | 109 |
| Current-Relays | |
| Current-Transformers | |
| Measuring Relays for Generation of own Energy | 121 |
| Current Relay Type SolarYes | 128 |

Phase monitoring Type PS - Phase asymmetry - Phase sequence

General

The PS-type phase protector safeguards electromotors against 2-phase operation even in the case of feedback via the motor. Depending on the model, the device has the following functions or connections.

Nowadays, more and more modern electrical switching plants for power generation and distribution, tooling and finishing machinery and a number of other drives are equipped with metering and control devices. However the use of such instruments also requires that the mains voltage feed varies only slightly from the

rated value, as otherwise the necessary accuracy of the measuring results or control commands will not be achieved. In case of deviations in the rated voltage either exceeding or falling below a pre-defined value, the plant must be switched off, or at least warn the operator via an optical or acoustic signal.

Special applications where these PS devices can be put into operation are building machinery, hoisting plants, escalators and travelling staircases, cranes, tooling machinery of all kinds, and all switching frequency motors with high starting and braking times.

| | PS2DK | PSSW1 | DRR10 | DRR20 | COSFI100V |
|------------------------------------------|-------|-------|-------|-------|-----------|
| Phase asymmetry / failure | X | X | | X | |
| Phase sequence | X | X | X | X | |
| Undervoltage | | X | | X | |
| Overvoltage | | X | | | |
| Connection for PTC-sensor | | | X | | |
| automatic change of wrong phase-sequence | | | X | X | |
| Monitoring of COSFI/ true current | | | | | X |
| Monitoring of current-direction | | | | | X |
| Housing | K | K | V4 | K | V4 |

Phase asymmetry Relay Type PS2DK

Monitoring of Phase-Asymmetry and Phase Sequence

Phasenasymmetrierelais PS2DK



Part number: **P222505**

Phase asymmetry relays PS2DK are used for the protection of electric motors against asymmetries in the 3-phase mains without neutral and for monitoring the phase-sequence.

The switching-point is adjustable and can be adapted to the situation in the mains.

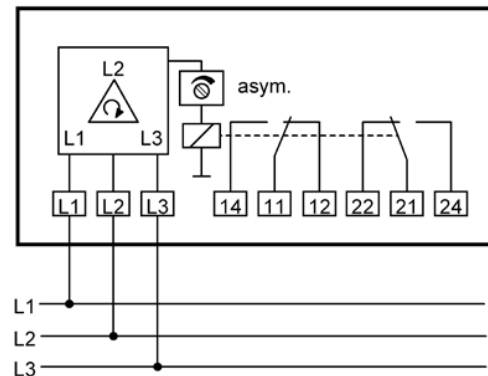
If a motor, running with 2 phases, creates the 3rd phase, the sensitivity can be increased.

With mains with high harmonics it can be necessary to reduce the sensitivity..

When the sensitivity is reduced to minimum (25% = potentiometer turned fully right), the device works as a phase-sequence relay. It trips only at wrong phase-sequence or missing phase.

If there is a wrong phase-sequence when switching on the device, the relay does not pick up.

- Monitoring of phase-asymmetry
- Monitoring of phase-sequence
- Adjustable sensitivity 5...25 %
- Output-relay with 2 change-over contacts
- Switching delay adjustable 0,1 ... 5 s
- LED for display state of operation



Technical Data

| | |
|--------------------------------------------------|----------------------------------------------------|
| Rated supply Voltage Us | 3-phase 380-415 V, without neutral |
| Admissible tolerance | +10%...-15% |
| Power consumption | app. 3 VA |
| Frequency | 50/60 Hz |
| Relay output | 2 change-over contacts |
| Type of contact | type 2 see "General technical informations" |
| Test conditions | see "General technical informations" |
| rated ambient temperature range | -20°C...+55°C |
| Switching point asymmetry | adjustable 5...25% |
| Hysteresis | app. 2% |
| Delay at phase-loss (< 240 V) | app. 0,2 s |
| Switch-back delay at voltage recovery | app. 0,5 s |
| Switching-delay at asymmetry | adjustable 0,1...5 s |
| Switching point at symmetric decrease of voltage | not defined |
| Dimensions (H x W x D) | Housing K: 75 x 22,5 x 115 mm |
| Attachment | on 35 mm DIN-rail or with screws M4 (option) |
| Protection housing / terminals | IP 30/20 |
| Weight | 150 g |

Monitor for 3-phase Type PSSW1

Phase asymmetry, Phase sequence, over- and undervoltage

PSSW1



Part numbers:

P222525 AC 230 V
P222526 AC/DC 400 V

Relays for 3-phase networks type PSSW1 monitor 3-phase networks for phase-sequence, asymmetry and over- and undervoltage.

Applications: Monitoring of 3-phase-networks at heat pumps, compressors or at machines at building sites.

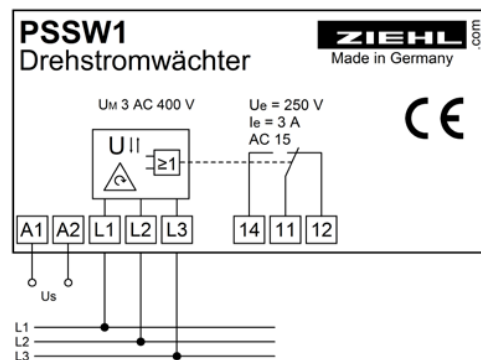
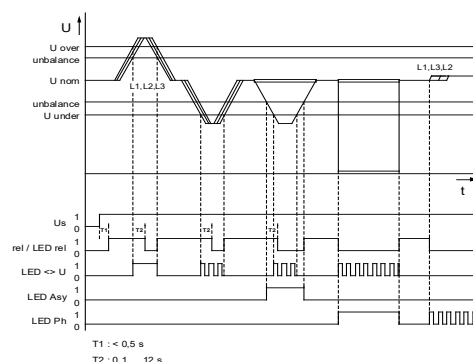
Functions:

- Over- and undervoltage, adjustable $\pm 2-20\%$ (common)
- Asymmetry adjustable 5-15%
- Phase loss
- Phase sequence
- Switching delay adjustable 0,1-12 s (for voltage and asymmetry)
- Bifurcational measuring input 50/60 Hz

Displays:

4 LEDs for:

- Over-/undervoltage
- Asymmetry
- Phase-sequence/loss
- State of relay



Technical Data

Rated supply voltage U_s
 Admissible tolerance U_s

AC 230 V, alt. AC 400 V, 50/60 Hz, <math>< 3 VA</math>
 $\pm 20\%$

Output relay
 Type of contact

1 change-over contact (co)
type 2 see "general technical informations"

Test conditions
 Rated ambient temperature range

see "general technical informations"

$-20^\circ C \dots +55^\circ C$

Monitoring asymmetry
 Hysteresis
 Switching delay

switching point adjustable 5...15 %
 app. 2 %
 adjustable 0,1...12 s

Loss of voltage
 Hysteresis
 Switching delay

switching point app. 50 %
 app. 5 %
 0,1 s

Under-/overvoltage
 Switching point
 Hysteresis
 Switching delay

measuring voltage 3 AC 400 V
 adjustable $\pm 2 \dots 20\%$ (common, symmetric)
 app. 1 %
 adjustable 0,1-12 s

Dimensions (h x w x d)
 Attachment
 Protection housing / terminals
 Weight

housing K: 75 x 22,5 x 110 mm
 on 35 mm DIN-rail or with 2 screws M4 (option)
 IP 40 / IP 20
 160 g

Phase sequence Relay Type DRR10

automatic change of wrong Phase sequence

DRR10



Part numbers:
P222546 3x AC 400 V

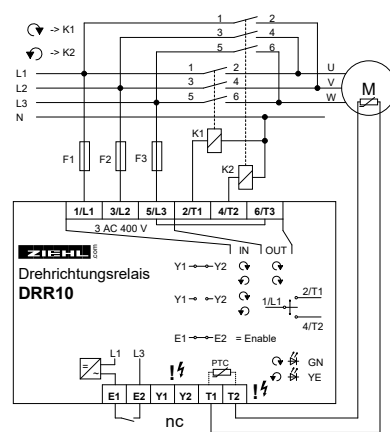
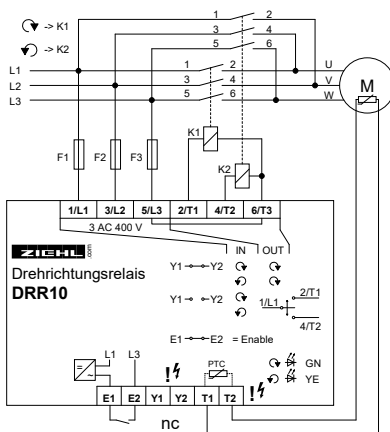
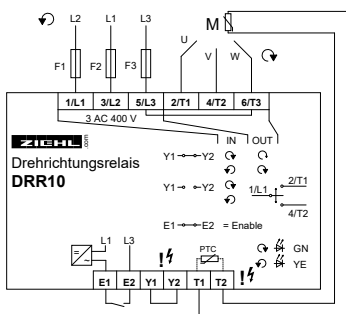
Phase sequence relays DRR10 measure the sequence of the phases when being switched on and switch - if necessary - the rotation of the field by changing 2 phases.

The integrated PTC-monitor protects the motor from overheating.

Applications are especially machines and equipment, that is operated at variable locations e.g. at building sites. Pumps, compressors and vacuum cleaners always run correctly. No more search for faults or change of wiring necessary.

- automatic change of wrong phase-sequence when connected falsely
- running backward of motors is avoided
- integrated PTC-protection for motor
- enable-input for direct switching on/off of the motor with DRR10
- max. 3 x 12 A
- switch-on currents 30 A / max. 4 s / 60 A / max. 1 s
- higher currents with external contactors
- integrated protection for relay contacts
- integrated protection from over-temperature
- housing for mounting in fuse-boxes or switchgear-cabinets, mounting height 55 mm

2



Technical Data

rated supply voltage U_s
 admissible tolerance U_s

3 AC 400 V, 50/60 Hz, < 3 VA
 +10% ... -20%

relay output
 switching voltage
 conventional thermal current I_{th}
 switch-on current (10% on)
 recommended fuse
 expected contact life mech.
 expected contact life electr.

2 x 2 normally opened contacts (no)
 max. AC 440 V
 12 A
 30 A / max. 4 s, 60 A / max. 1 s
 gG/gL 16 A
 30 x 10⁶ operations
 1 x 10⁶ operations at AC 400 V / 3 A
 2 x 10⁵ operations at AC 400 V / 6 A cosφ 0,5

inputs
 T1 - T2
 E1 - E2

without separation of potential from supply-voltage
 PTC-thermistors according to DIN 44081/44082
 potential-free contact for AC 400 V

rated ambient temp. range

-20°C...+55°C

housing (H x W x D) mm
 fitting position
 attachment

design V4: 90 x 70 x 58 mm
 any
 on 35 mm DIN rail according to EN 60715 or
 2 screws M 4

protection housing/terminals
 weight

IP 30 / IP 20
 app. 230 g

Phase sequence change Relay DRR20

with integrated monitoring of undervoltage and asymmetry

Drehrichtungsrelais DRR20



Part number: **P222551**

Phase sequence change relays DRR20 measure the sequence of the phases and switch – if necessary the rotation of the field. At the output (connect relays K1 and K2 in series in this application) two contactors are connected. The contactor at the normally-open contact of K2 switches the phases 1:1 without changing them, the second (at normally-closed contact) changes 2 phases.

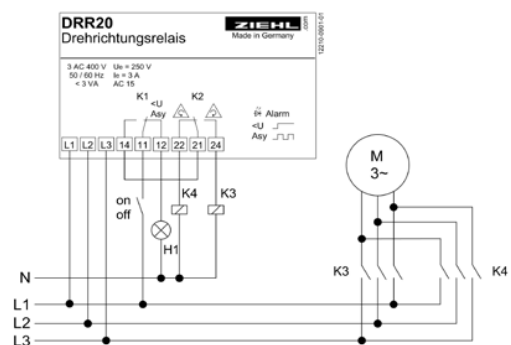
When switching on with phase-sequence ok, relay K2 picks up. With wrong phase-sequence it remains released. After K2 has switched, K1 picks up. K1 also releases first. This makes sure, that no wrong contactor can be picked up under any condition. Additionally the DRR20 monitors the three phases for asymmetry and undervoltage. If the limits are exceeded, the K1 switches off (respectively doesn't pick up) and protects the connected motor from damage.

The device can also be used as a monitor for undervoltage, asymmetry or phase-sequence.

Applications are machines and equipment that is operated at variable locations, e.g. at building sites. Pumps, compressors and

vacuum-cleaners always run correctly and they are protected from damage by undervoltage or asymmetry.

- automatic change of wrong phase-sequence when connected falsely (2 contactors afforded) running backward of motors is avoided
- no switching on at asymmetry or undervoltage
- relay K2 picks up when phase-sequence is correct
- relay K1 picks up (after K2) when symmetry and voltage is correct
- 3 LEDs for state of relays and errors
- measuring-voltage 3 AC 400 V
- limit asymmetry adjustable 5...25 %
- limit undervoltage adjustable 70...95 %
- alarm-delay adjustable 0,1...10 s (undervoltage and asymmetry)
- no supply-voltage required



Technical Data

Rated supply voltage U_s
Admissible tolerance U_s
Output relay
Type of contact

Output relay
Type of contact
Test conditions
Rated ambient temperature range

Limit asymmetry
Limit undervoltage
Hysteresis
Delay undervoltage/asymmetry
Delay phase-loss (<60% U_s)
Pick-up delay after recovery of U_s
Delay K2 - K1

Dimensions (h x w x d) mm
Fitting position
Attachment

Protection housing / terminals
Weight

3-phase, 400 V without N
+20%...-30%
ca. 3 VA
50/60 Hz

2 change-over contacts (co)
type 2 see "general technical informations"
see "general technical informations"
-20°C...+55°C

adjustable 5...25 %
adjustable 70...95 %
app. 2%
adjustable 0,1...10 s
< 0,2 s
< 0,5 s

app. 100 ms

housing K: 75 x 22,5 x 115 mm
any
on 35 mm DIN rail according to EN 60715 or
2 screws M 4
IP 30/20
150 g

Load and Current-Monitor COSFI100V

Active current with direction, over- and underload and $\cos\varphi$

COSFI 100V



Part numbers: **P222534**

ER4  **T224384**

Load monitors protect motors in 1- or 3-phase mains from over- or underload. They are simply switched into the supply-line of the motor and monitor the phase angle between voltage and current and/or the true current.

The power factor $\cos \varphi$ has its greatest alteration at small loads at the motor. Therefore monitoring this parameter is suitable to recognize underload.

The current of the motor increases most at high loads. Provided that the motor is not oversized, the current is more suitable for monitoring overload.

The COSFI100V can monitor both values. It is even possible to monitor the power factor with alarm 1 for underload and protect the drive from overload by monitoring the current with alarm 2.

This allows detection of a breaking V-belt or clogging of a filter or a valve. A local sensor near the motor is not necessary.

As **monitor for current direction**, value and direction of active current in one phase is measured. Thus it can be used for the direction dependent monitoring of AC-current.

With its digital display and many setting options, it can be individually adapted to the application.

The resolution of the measuring input is 0.1 A. When using a current transformer, multiply this by the transformer factor.

Application $\cos \varphi$ / active current:

- Monitoring of V-belt (slip and destruction)
- Fan-monitoring
- Pump-monitoring
- Conveyor systems
- Agitators
- excessive wear
- wear-out of tools
- Protection of motors, drives and plants from overload

Application current direction:

- Optimizing of own consumption of energy in photovoltaik plants. Consumers can be switched on or off depending on power available. By measuring current at the feed point it can be detected, whether there is enough power available to start heat pumps, cooling units or other consumers.
- Warning or shut-down when a generator is consuming energy instead of producing.

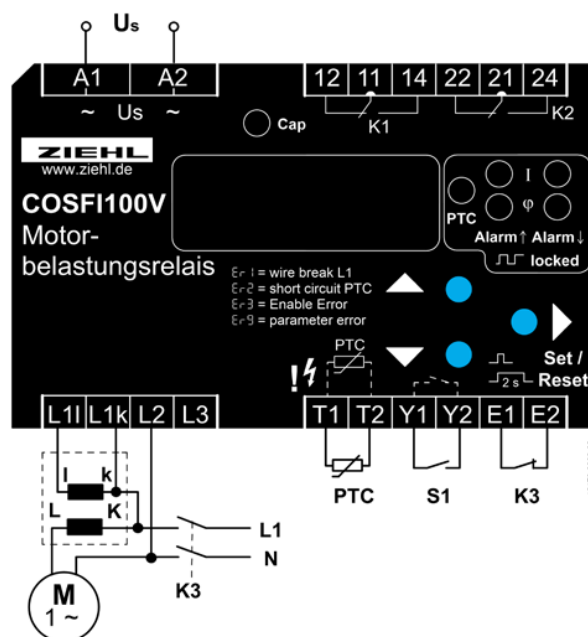
Function and features:

At an AC-motor (inductive load) the phase of the current is retarded to the voltage by the phase angle φ . With decreasing load, this angle increases and the $\cos \varphi$ decreases. Thus the load at the shaft of the motor can be measured.

The load monitor COSFI100V can measure sinusoidal signals.

- for networks AC and 3 AC
- Digital display for $\cos \varphi$ and true current
- 2 limits / alarms
- min, max or min/max for each alarm
- Monitoring of 2 x $\cos \varphi$, 2 x true current or 1 x $\cos \varphi$ and 1 x true current

- Scaling of display (factor of current-transformer)
- Hysteresis and switching-delay programmable
- Auto-reset or interlocked switching
- Programmable attempts (1...10) for restart
- Auto-enable (current) or external signal
- Start-up delay programmable 0...99 s
- Current input max. 10A, more with transformers
- Detection of breaks
- Input for PTC-thermistors
- Housing for mounting in fuse-boxes or switchboards
- Accessory: [Installation frame ER4 for panel mount](#)



Technical Data COSFI100V

| | |
|--------------------------------|--------------------------------------------------------------------|
| Rated supply voltage U_s | AC 230 V, +10%/-15%, 3VA, 50 Hz |
| Power factor ($\cos\varphi$) | -0,99...+0,99 |
| Hysteresis ($\cos\varphi$) | 0,05...0,20 |
| Nominal current of motor | 0,2...10 A (higher currents with current-transformers) |
| Overload capacity | 10 A continuously, 15 A max. 3 s |
| Resolution active current | Current factor x 0.1 A |
| Input Voltage L1-L2-L3 | AC 100...400 V, 48...62 Hz |
| Relay | 2 change-over contacts (co) |
| Type of contact | Type 2 (see "general technical informations") |
| Test conditions | see "general technical informations" |
| Rated ambient Temp. Range | -20°C...+55°C |
| Housing / Installation Frame | Design V4/ Front mounting kit Type ER4 |
| Dimensions (H x W x D) mm | 90 x 70 x 58 mm, mounting height 55 mm |
| Attachment | on rail 35 mm according to EN 60 715 or with screws M4 (option) |
| Protection Housing/Terminals | IP 30/IP 20 |
| Weight | |

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.

2

Summary

| Voltage | DC | AC/DC / 3AC | AC / 3AC | 3AC | | | |
|---------------------------------|-----------|-------------|----------|---------|----------|---------|-------|
| | STW1000V2 | SW32V | SW31V | UFR1001 | UFR1001E | SPI1021 | SW31K |
| Function | ↑ | ↑↓ | ↓ | ↑↓ | ↑↓ | ↑↓ | ↓ |
| Monitoring of - Undervoltage | - | X | X | X | X | X | X |
| - Overvoltage | X | X | - | X | X | X | - |
| Switching point adjustable | Scale | digital | - | digital | digital | digital | - |
| Relay output | 1 U | 2 U | 2 U | 2 U | 2 U | 2 U | 1 U |
| Housing | V 2 | V 4 | V 2 | V 4 | V 6 | V 6 | 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.

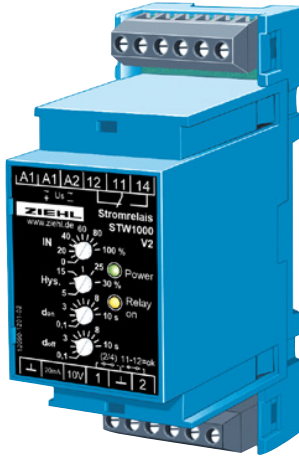
Upon request the instruments can also be equipped with measurement phase against N.

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



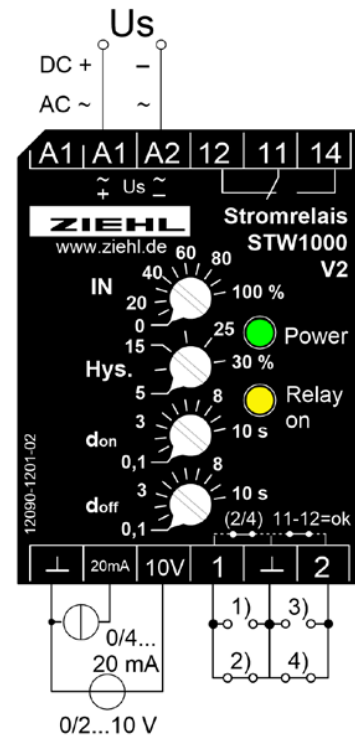
Part number:
S225677 AC/DC 24- 240 V

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 normally closed current and normally opened 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 close-circuit current with bridge selectable
- LEDs for service condition display
- Universal power supply AC/DC 24-240 V
- Panel mounted distributor housing 35 mm wide (2 TE),
- Installation height 55 mm

Application:

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



- 1) 0...20 mA, 0...10 V
- 2) 4...20 mA, 2...10 V
- 3) Ruhestrom / closed current
- 4) Arbeitsstrom / operating current

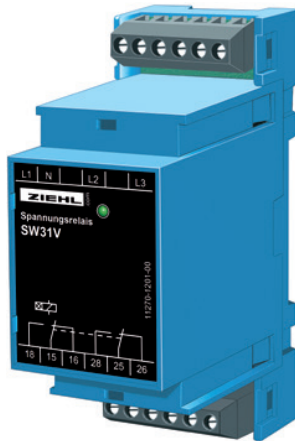
Technical Data

| | |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Rated supply voltage U_s | 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 | Maximum |
| Measurement inputs | DC 0/4 ... 20 mA, 20 Ω DC 0...10 V, 63 k Ω adjustable 0...100% adjustable 5...30% of set value |
| Switch point/limit | < 10% of span |
| Hysteresis | < 0,2% |
| Adjustment error | $\leq 0,05$ %/K |
| Repeatability | adjustable 0,1...10 sec. |
| Temperature influence | adjustable 0,1...10 sec. |
| On-delay don | -20°C...+55°C |
| Response-delay doff | |
| Rated ambient temperature range | |
| Dimensions H x W x D | Design V2: 90 x 35 x 58 [mm], mounting height 55 mm |
| Attachment | on 35 mm DIN rail EN 60 715 or screws M4 |
| Protection housing / terminals | OP 30 / IP 20 |
| Weight | app. 130 g |

Voltage Relay for three-phase current

also for alternating current networks

SW31V



Part number:
S222281 AC 230 V

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

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

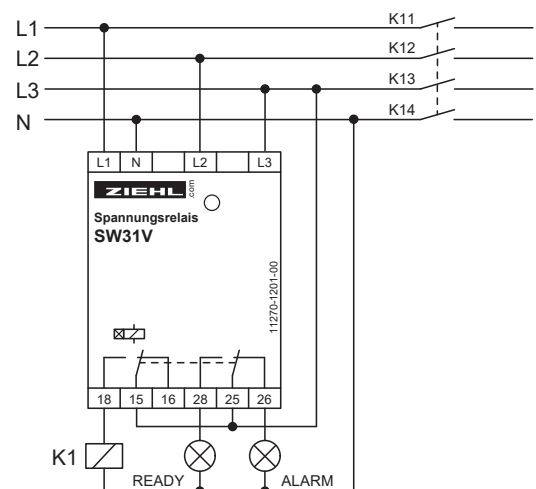
Undervoltage monitors (↓) for three-phase current networks with N and alternating voltage networks. The switching point lies at approx. 80% UNom. Hysteresis is approx. 5%. The voltages of the 3 phases are measured against the neutral conductor. A green LED indicates the unit is ready for service. During undervoltage (<80%), the relay (2 change-over contacts) releases 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.

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.

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 housing, 35 mm wide



Technical Data

Rated Supply Voltage U_s
Frequency

AC 230 V, +10...-30%, < 5 VA
50/60 Hz

Output Relay
Type of contact
Test conditions
Rated ambient temperature range
Hysteresis
Delay relay, undervoltage at voltage breakdown

2 change-over contacts
Type 2 see "general technical informations"
see "general technical informations"

-20°C...+55°C
approx. 5% U_{Nom}

L1/N: ca. 400 ms, L2/L3: ca. 1 s

Dimensions H x W x D
Protection housing/terminals

Design V2: 90x35x58 [mm], mounting height 55 mm
IP 30 / IP 20

Universal voltage monitor SW32V

Over- and undervoltage for DC-, AC- and 3AC voltages

SW32V



Part number: **S222276**

Description

The voltage relay SW32V is a high-grade voltage monitor with a wide measuring-range for monitoring DC-, AC- and 3-phase voltages for over- and/or undervoltage.

In 3-phase power networks phase-symmetry and phase-sequence can also be monitored.

The limits are set in Volts. Thus the device can be used at different nominal voltages.

The digital display shows the measured value as well as it helps setting the limits, switching-delays and switching functions.

Application:

As voltage monitor in equipment for generation or distribution of electric energy, especially in photovoltaic plants and block heating stations,

Monitoring of voltage in machines and plants to protect them from damage caused by failure or deviation of voltage.

General:

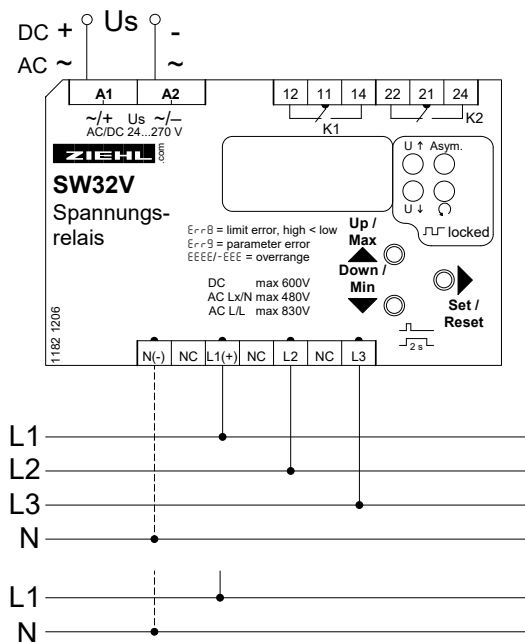
- monitoring of voltage in DC networks DC 10...600 V
- monitoring of voltage in AC networks AC 15...480 V
- monitoring of voltage in 3-phase networks with/without neutral 3AC 26...830 V
- preset values for grid- and plant protection acc. to VDE-AR-N 4110:2018-11
- Asymmetry (5...50%) and phase-sequence-monitoring selectable
- measuring of True RMS
- 2 alarms / relays, each with 1 changeover-contact
- setting of limits and hysteresis in VOLT
- simulation-function to test settings
- codelock against manipulation of settings
- universal power supply AC/DC 24-270 V
- housing for DIN-rail-mount, 70 mm wide, height 55 mm

Display:

- 3 digit display for measured values and settings
- MIN/MAX-values of measured voltages
- 4 LEDs for alarm
- 4 LEDs for displayed inputs
- 2 LEDs for states or relays
- resolution <100V: 0,1V

Switching functions:

- overvoltage with hysteresis, switching- and switch-back time
- undervoltage with hysteresis, switching- and switch-back time
- asymmetry / phase-sequence
- relay-function normally opened mode/normally closed mode, reclosing lock



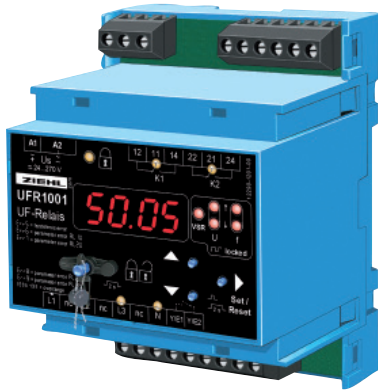
Technical Data SW32V

| | | |
|---------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------|
| Power Supply | Rated supply voltage U_s | AC/DC 24-270 V, 0/45...100 Hz, <5VA DC: 20,4...297 V, AC: 20,4...297 V |
| Relay-Output | | 2 change-over contacts type 2 see "general technical informations" |
| Measuring Input | Measuring voltage DC | DC 10...600 V |
| | Measuring voltage phase/phase | AC 26...830 V |
| | Measuring voltage phase/neutral | AC 15...480 V |
| | Frequency | 40...100 Hz |
| | Measuring time DC | DC average over 50 ms |
| | Measuring time AC | < 50 ms |
| | Measuring accuracy DC | >100V: 0,5% of value \pm 1 Digit <100V: 0,5% of value \pm 5 Digit (res. 0,1V) |
| | Measuring accuracy AC with N | >100V: 0,8% of value \pm 1Digit |
| | | <100V: 0,8% of value \pm 5Digit (res. 0,1V) |
| | without N | >100V: 1,0% of value \pm 1Digit <100V: 1,0% of value \pm 5Digit (res. 0,1V) |
| | Hysteresis | adjustable 0,1...130 V |
| | Range asymmetry | 5...50% |
| | Hysteresis asymmetry | fest 1% |
| Error asymmetry | \pm 15% of set value | |
| Switching delay | 0,05...99,9 s | |
| Switch-back delay | 0...999 s | |
| Time until ready after applying U_s | \leq 300 ms (+ switch-back delay) | |
| Test Conditions | | EN 60255 |
| | Rated impulse voltage | 6000 V |
| | Overvoltage category | III |
| | Pollution degree | 2 |
| | Rated Insulation voltage | AC 690 V |
| | Operation time | 100 % |
| | Permissible ambient temperature | -20 °C...+55 °C |
| | EMC - immunity | EN 60 068-2-2 dry heat |
| | EMC - emission | 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 |

Voltage- and Frequency Relay UFR1001

with integrated vector shift relay, sealable

UFR1001



Part number: **S222295**

The voltage- and frequency relay UFR1001 monitors voltage and frequency in two- or three-phase networks with or without neutral and switches off rapidly when required.

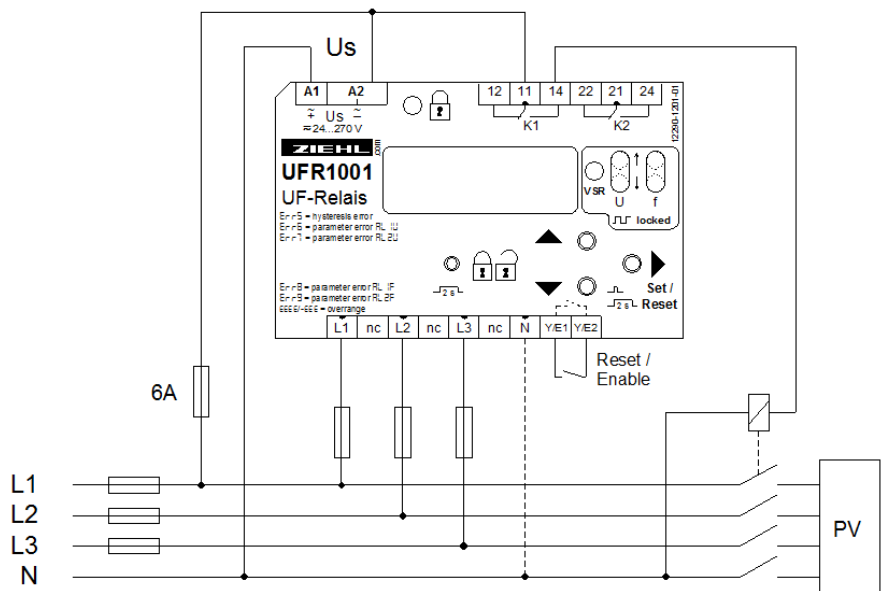
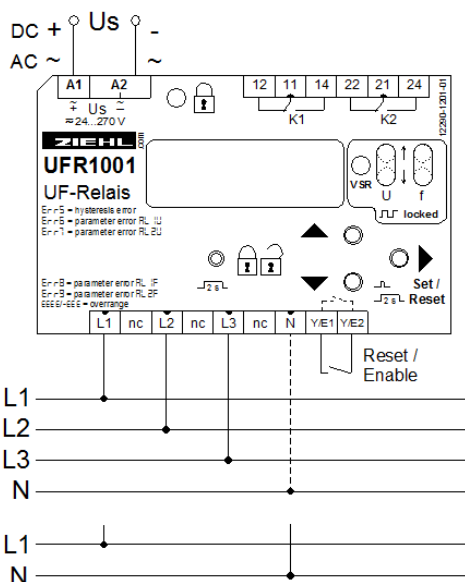
The device can be easily adapted to the requirements of the carrier of the power network.

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 shift) or generally monitoring the quality in power networks at machines or power-supplies.

- Monitoring of over- and undervoltage 40...520 V
- monitoring of over- and underfrequency 45...65 Hz
- monitoring of quality of voltage (10-minutes-average)
- monitoring of vector-shift 2...20 °, 1 or 3-phase
- Switching-delay adjustable <0,05...60,0 s
- Switching-back-delay adjustable 0...1000 s
- Alarm-counter for up to 100 alarms (with measured value and reason)
- Added time of alarm up to 999 hours. Displays the time, alarms have been active (while supply voltage applied only)
- 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
- Sealing of settings is possible
- code-lock against manipulation of settings
- universal power-supply AC/DC 24-270 V
- housing for DIN-rail-mount, 70 mm wide, mounting height 66 mm



Technical Data UFR1001

| | | |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply | Rated supply voltage U_s | AC/DC 24-270 V, 0/45...65 Hz, <5VA DC: 20,4...297 V, AC: 20,4...297 V |
| Relay output | | 2 change-over contacts type 2 , see "general technical informations" |
| Voltage | Measuring voltage phase-phase Measuring voltage phase - N Hysteresis Frequency Error (with N) Error (without N) Measuring functions Switching-delay Switching-back delay (zero-voltage-proof) | AC 40...520 V AC 40...300 V adjustable 1...99 V 45...65 Hz $\pm 0,8\%$ of measured value ± 1 Digit $\pm 1\%$ of measured value ± 1 Digit 3-phase with / without neutral, single phase to neutral adjustable 0,05...60,00 s adjustable 0 (> 200 ms)...1000 s |
| Frequency | Measuring range Hysteresis Error Switching-delay Switching-back delay | 45,00...65,00 Hz 0,05...5,00 Hz $\pm 0,05$ Hz ± 1 Digit adjustable 0,1...99,9 s adjustable 0...240 s |
| Vector-Shift | Method Measuring range Hysteresis Switching-delay Switching-back delay Delay at U_s on | 1- or 3-phase 2,0...20,0 ° 0,1 ° < 50 ms adjustable 3...240 s adjustable 2...20 s |
| Test Conditions | Rated impulse voltage Overvoltage category Rated Insulation voltage Contamination level Isolation material group On-period Rated ambient temp. range Interference resistance Interference transmission | EN 60 255 4000 V III AC 300 V 2 II 100 % -20 °C...+55 °C EN 60 068-2-1 dry heat EN 61 000-6-2 EN 61 000-6-4 |
| Housing | Design Dimensions (h x w x d) Protection housing Protection terminals Attachment Weight | V 4 90 x 70 x 58 mm, mounting height 66 mm IP 30 IP20 DIN-rail 35 mm or screws M4 app. 200 g |

Voltage and Frequency Relay UFR1001E

Grid- and Plant Protection VDE-AR-N 4105, G98 + G99, DIN V VDE 0126-1-1, VFR2013/2014, NRS 0972-1:2017 Ed 2, Synergrid C10/C11, EN50438:2013, RD1699:2011/RD413:2014 and more

NEW: VDE-AR-N 4120:2018-11, VDE-AR-N 4105:2018-11, VDE-AR-N 4110:2018-11

UFR1001E



Part numbers:

UFR1001E **S222296**

ER6 **T224386**



The grid- and plant protection device UFR1001E monitors voltage and frequency in plants for own generation of electricity. It complies with the requirements of VDE-AR-N 4105:2018-11, VDE-AR-N 4110:2018-11, G98, G99, ÖVE/ÖNORM E 8001-4-712:2009 and other standards for generators connected to the public grid.

The UFR1001E is a dual-channel device and thus one-fault-proof. The function of the output-relays and of the connected switches can be monitored with feed-back contacts. When a connected switch does not switch

off, the UFR does not switch on again. When a switch does not switch on it makes 2 restarts and thus improves availability of monitored plant.

The limits are pre-set according to VDE-AR-N 4105:2018-11, VDE-AR-N 4105:2018-11 and other standards. They can be changed if required and be protected with a code and/or a seal.

With a 2-step test both channels can be tested individually and the triggering time of connected switches is measured. The standby input allows a remote shutoff e.g. with a RCR.

Monitoring of:

- Under- and overvoltage 15...520 V (with voltage transformers up to 1000V)
- Under- and overfrequency 45...65 Hz
- Quality of voltage (10-minutes-average)
- Vector shift 2...65°, *zuschaltbar*
- Measuring phase-neutral or phase-phase
- ROCOF rate of change of frequency df/dt 0,100...5,000 Hz/s
- Zero voltage U_0 (ANSI 59v0)

- One-fault-proof with monitoring of connected switches (defeatable when using the integrated switch of pv and battery inverter acc. to DIN EN 62109 (VDE 0126-4))
- 2 automatic restarts at switch-on error
- Passive anti-islanding protection acc. to ch. 6.5.3 and app. D2
- Switching delay adjustable 0.05 ... 300 s
- Switching back delay adjustable 0 ... 6.000 s
- Alarm counter for 100 alarms (trip value, cause and rel. time stamp)
- Record of added times of alarms
- Input for standby with counter and recording of time
- Test button and simulation with measuring of switching-times
- Sealing. All values can be read-out when sealed
- Easy installation and programming with pre-set programs
- Housing for DIN-rail-mount, 105 mm wide, mounting height 66 mm

Accessory: [Installation frame ER6 for panel mount](#)

Preset values:

- VDE-AR-N 4105:2018-11 (Pr2), VDE-AR-N 4105-2011-08 (Pr1)
- VDE-AR-N 4110:2018-11 (PR11-14) and BDEW (Pr 3-6)
- G98 (G83/2) and G99 (G59/3) for Great Britain
- TOR producers type A, B, C, D for Austria
- Synergrid C10/C11 for Belgium
- NA/EEA-NE7 CH 2020 for Switzerland

Certificates:



Certificate of conformity Grid and Plant protection acc. to VDE-AR-N 4105 2011-08 and 2018-11 "Plants for generation of own energy in low voltage grid"

Certificate for component VDE-AR-N 4110 and 4120

Certificate of conformity Grid and Plant protection acc. to BDEW requirement "Plants for generation of own energy in medium voltage grid"



Certificate of compliance DIN V VDE 0126-1-1



gelistet bei Energex RED STD00233



TOR Erzeuger A,B,C,D



Certificate ÖVE/ÖNORME 8001-4-712:2009-12, Enclosure A



approved Synergrid C10/C11



Certificate de conformité
DIN V VDE 0126-1-1, VFR2013/VFR 2014



Certificate of compliance G59/3:2013, G83/2:2012, G99/1-1+2+3:2018 und G98/1-1+2:2018



Certificate of compliance EN 50549-1:2019, EN 50438:2013



accepted by Tepco



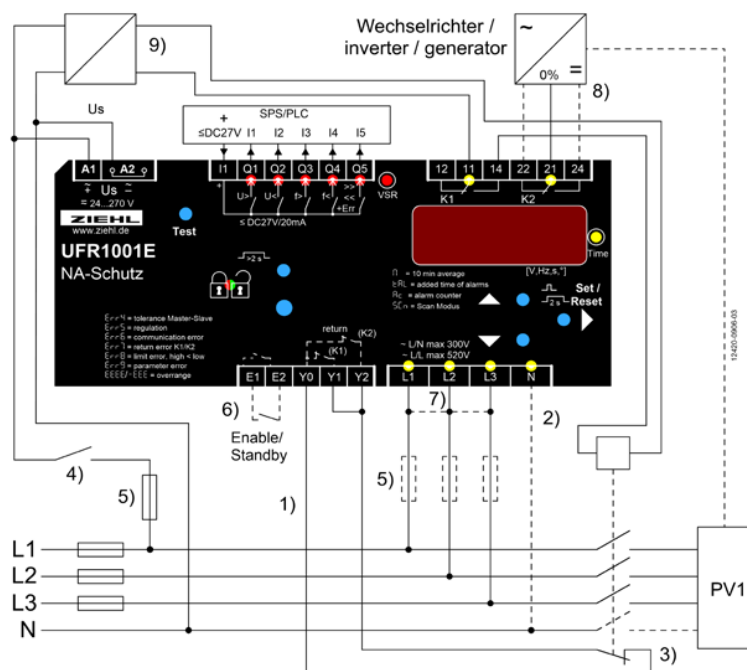
Netherlands EN50549-1



RD1699:2011 / RD413:2014



Certificate of compliance NRS 097-2-1:2017 2.0 South Africa



Technical Data UFR1001E

| | | |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply | Rated supply voltage U_s | AC/DC 24-270 V, 0/45...65 Hz, <5VA DC: 20,4...297 V, AC: 20,4...297 V |
| Relay output | | 2 change-over contacts see operating manual |
| Voltage | Measurement phase-phase Setting range phase-phase Measuring voltage phase-neutral Setting range phase-neutral Measurement method Hysteresis Measurement accuracy Accuracy of display Measurement functions Switching-delay (dAL) Switching-back-delay (doF) | AC 15...530 V (< 5 V display: 0) AC 15...520 V AC 10...310 V (< 5 V display: 0) AC 15...300 V true RMS adjustable 1,0...180 V with neutral: $\pm 0,6\%$ of measured value without neutral: $\pm 0,8\%$ of measured value >100V: -1 digit (resolution 1 V) <100V: -1 digit (resolution 0,1 V) 3-phase with / without neutral adjustable 0,05 (± 15 ms)...300,0 s adjustable 0 (approx. 200 ms)...6.000 s |
| Frequency | Measurement range Setting range Hysteresis Measurement accuracy Switching delay (dAL) Switching-back-delay (doF) | 40...70 Hz 45,00...65,00 Hz 0,05...10,00 Hz $\pm 0,04$ Hz ± 1 digit adjustable 0,05 (± 15 ms)...300,0 s adjustable 0 (>200 ms)...6.000 s |
| Vector-Shift | Measurement range Setting range Switching-delay (dAL) Switching-back-delay (doF) Delay at U_s on | 0...90,0° 2,0...65,0° < 50 ms adjustable 3...240 s adjustable 2...20 s |
| ROCOF (df/dt) | Setting range | 0,100...5,000 Hz/s, 4...50 cycles |
| Digital outputs insulated | Voltage I1 Current Q1...Q5 | DC 4,5...27 V max. 20 mA / output |
| Input Feed-back-contacts | Voltage Y0...Y1/2 Switching time connected switches | DC 15...35 V adjustable 0,5...99,0 s |
| Test Conditions | | EN 60255 Rated impulse voltage 4000 V Overvoltage category III Pollution degree 2 Rated Insulation voltage U_i 300 V Operating time 100 % Operating temperature -20 °C...+55 °C Storage temperature -25 °C...+70 °C Climatic conditions (IEC/EN 60721-3-3) 3K5 (except condensation and formation of ice) |
| | EMC - immunity EMC - emission | EN 61 000-6-2 EN 61 000-6-3 |
| Housing | Design / Installation Frame Dimensions (h x w x d) Protection housing Protection terminals Attachment Weight | V6 / Front mounting kit type ER6, 6 TE 90 x 105 x 69 mm, mounting height 66 mm IP30 IP20 DIN-rail 35 mm according to EN 60 715 or screws M4 ca. 250 g |

Voltage- and Frequency-Relay SPI1021

Grid- and Plant Protection according to CEI 0-21 (Italy) and DEWA-standard (Dubai), with integrated Vector-Shift-Relay

SPI1021



Part numbers:

SPI1021 **S222300**

ER6 **T224386**



Declaration of conformity with requirements of CEI 0-21 Italy.

Dichiarazione di conformità alle prescrizioni alla Norma CEI 0-21 Italia..

Declaration of conformity with requirements of DEWA 2016 Dubai (DRRG).

The SPI1021 monitors voltage and frequency in plants for own generation of electricity. It fulfills the requirements of CEI 0-21 (Italy) and DEWA-standard (Dubai) Interface Protection (IP) according to DEWA Distributed Renewable Resources Generation programme (DRRG19, September 01, 2016).

6 selectable programs allow measuring 3 phases to neutral (4-wire mode), 3 phases phase-phase (3-wire mode) and single phase to neutral (2-wire).

The SPI1021 can monitor all decentralized power, photovoltaic, wind or thermal plants, that feed in the low voltage and medium voltage grid. In applications with possible asymmetry >6 kVA, power balance has to be monitored extra.

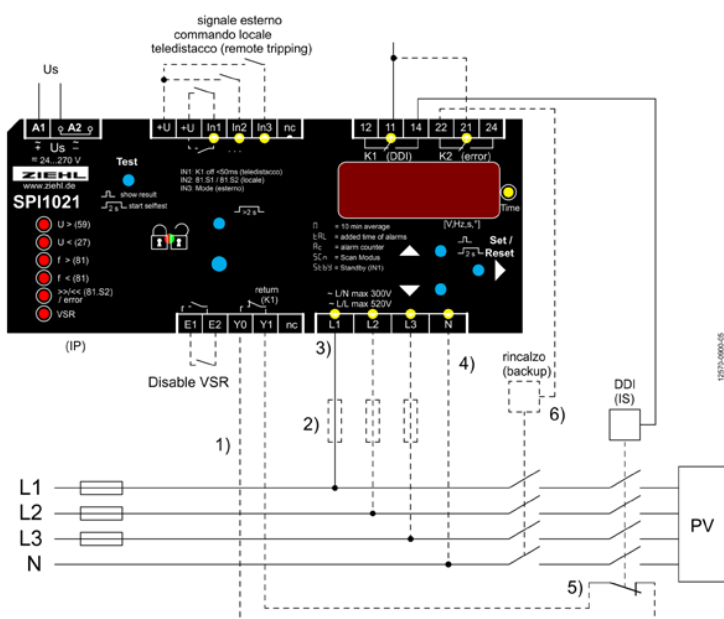
With the integrated certified self test, the device can be used in plants < 6kVA.

In programs 1-3 (3= default), the limits are preset according to CEI 0-21. In programs 4-6 they are preset according to DEWA-standard. They can be changed if required and be protected with a code and/or a seal.

A counter for alarms and standbys stores the last 100 events with reason and elapsed time. In addition the time the SPI1021 has interrupted the plant is recorded. All values can be displayed at the device and give the operator valuable information about the availability of the plant.

When the device has been installed, a self-test starts automatically. The self-test can be repeated when required. All values of the test are stored and can be read out at the display.

- Monitoring of under- and overvoltage 15-520 V
- Measuring of 3 phase with or without neutral or single phase
- Monitoring of over- and underfrequency 45-65 Hz
- Monitoring of quality of voltage (10-minutes-average)
- RocoF "Rate of Change of Frequency" connectable
- Monitoring of vector-shift (connectable)
- Input IN2 for selection of frequency window
- Input IN3 for selection of mode transitory or definitive
- Input Y0/Y1 for monitoring function of connected switch (automatic detection of nc/no)
- Relay K2 picks up (on time <500 ms) only at failure at switch connected to K1
- 2 restarts at switch-on error of connected switch
- Selftest with storing of values
- Switching delays adjustable 0,05...130 s
- Switching-back-delays adjustable 0...999 s
- Different switching time according to type of alarm and selected mode
- Switch-on delay 300 s (adjustable)
- All parameters preset according to CEI 0-21
- Alarm counter for 100 alarms with value. Reason and elapsed time
- Recording of added time of alarms
- Input for standby (off time <50ms) with counter and recording of time
- Simulation for testing
- Sealing, all parameters can be read out while sealed
- Easy installation and programming with 6 preset programs
- Supply-voltage AC/DC 24-270 V
- Housing for DIN-rail-mount, 105 mm wide, mounting height 70 mm



Accessory: [Installation frame ER6 for panel mount](#)

Technical Data SPI1021

| | | |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply | Rated supply voltage U_s | AC/DC 24-270 V, 0/40...70 Hz, <5VA DC: 20,4...297 V, AC: 20,4...297 V |
| Relay output | | 2 change-over contacts |
| Measuring voltage | Voltage phase-phase Setting range phase-phase Voltage phase-neutral Setting range phase-neutral Measurement method | AC 15...530 V (< 5 V display 0) AC 15...520 V AC 10...310 V (< 5 V display 0) AC 15...300 V true RMS |
| | Hysteresis | adjustable 1,0...99,9 V |
| | Measurement accuracy (with neutral) | $\pm 0,6\%$ of measured value |
| | Measurement accuracy (without neutral) | $\pm 0,8\%$ of measured value |
| | Accuracy of display | >100V: ± 1 digit (resolution 1 V) <100V: ± 1 digit (resolution 0,1 V) |
| | Measurement functions | 3-phase with / without neutral, single phase |
| | Switching-delay (dAL) | adjustable 0,05 (± 15 ms)...130,0 s |
| | Switching-back-delay (doF) | adjustable 0 (= 40ms)...999 s |
| Measuring frequency | Measurement range Setting range Hysteresis Measurement accuracy Switching delay (dAL) Switching-back-delay (doF) | 40...70 Hz 45,00...65,00 Hz 0,05...10,00 Hz $\pm 0,01$ Hz ± 1 digit adjustable 0,05 (± 15 ms)...130,0 s adjustable 0 (= 40ms)...999 s |
| Vector-Shift | Measurement range Measurement range Switching-delay (dAL) Switching-back-delay (doF) Delay at U_s on | 0...45,0° 2,0...20,0° < 50 ms adjustable 3...240 s adjustable 2...20 s |
| Digital inputs (INx) | Switching voltage + U Current INx | DC 15...37 V > 3 mA |
| Input Feedback contact | Switching voltage Y0...Y1 Current Y1 Switching time connected switches | DC 15...35 V > 3 mA adjustable 0,5...99,0 s |
| Housing | Design / Installation Frame Dimensions (h x w x d) Wiring connection single strand Finely stranded with wire end ferule Protection housing Protection terminals Attachment Weight | V6 / Front mounting kit type ER6, 6 TE 90 x 105 x 69 mm, mounting height 70 mm 1 x 4 mm ² 1 x 2,5 mm ² IP30 IP20 DIN-rail 35 mm according to EN 60 715 or screws M4 ca. 250 g |

Voltage and Frequency Relay UFR1002IP

Grid- and Plant Protection VDE-AR-N 4105, 4110, 4120, NA-Box
IP interface and LCD-Display

Available 4th quarter 2022

UFR1002IP



Part numbers:

UFR1002IP **S222301**

ER6 **T224386**

VG1200 **S222312**

The grid decoupling relay UFR1002IP is the "big brother" of the UFR1001E and monitors voltage and frequency in three-phase and AC grids.

With a color LCD display (German/English) and joystick, it is even easier to operate than the UFR1001E. Measured values and settings are clearly displayed. The device can be programmed, updates installed and the alarm memory read out via the integrated IP interface. The real-time clock (with power reserve) simplifies the traceability of the alarms. Up to 1,200 V can be monitored in conjunction with the VG1200 coupling device.

The device has a two-channel, single-fault-safe design and thus meets the requirements of VDE-AR-N 4105:2018-11. The function of the connected switch is monitored. If monitoring is activated, the device does not switch on again if a switch-off error is detected.

Limit values for different applications are preset. Where permitted, they can easily be changed. If the nominal voltage is changed, the device automatically adjusts the limit values that have already been set.

With the standby input, a remote shutdown can be implemented, e.g. with a ripple control receiver.

Monitoring of:

- Under/over voltage 15-520V (with ZIEHL VG1200 coupling device up to 1,200 V)
- Under/over frequency 45-65 Hz
- Voltage quality (10-minute average)
- Vector shift 2-65°
- ROCOF, rate of change of frequency df/dt 0.100...5.000 Hz/s
- Zero voltage U_0 (ANSI 59v0)
- passive anti islanding protection

Approvals/certificates (applied for): Germany:

- Certificate of conformity Grid- and Plant protection acc. to VDE-AR-N 4105:2018-11 "Plants for generation of own energy in low voltage grid"
- Certificate for component VDE-AR-N4110 and 4120

More will follow

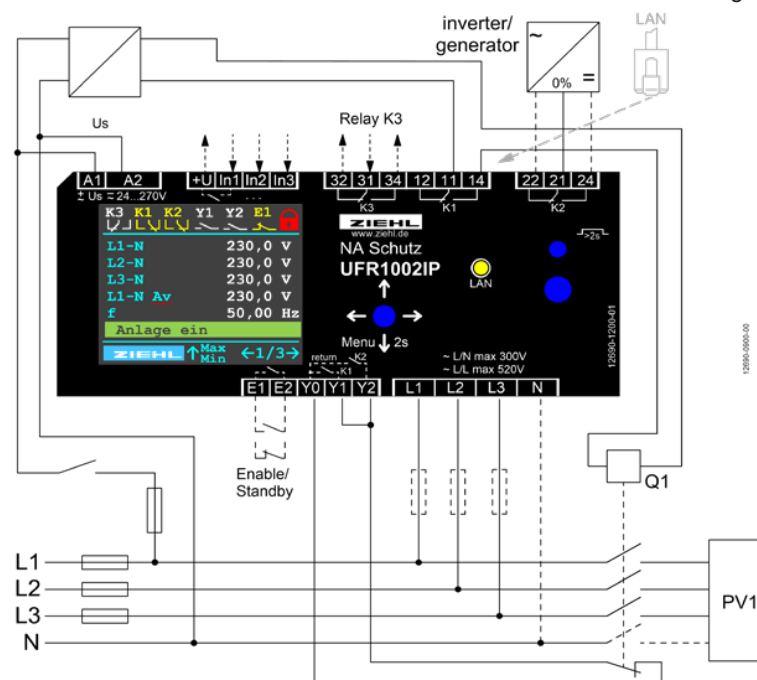
Features:

- single-fault-proof, with monitoring of connected switch (can be switched off when using the integrated switch of PV and battery converters)
- Programmable restart attempts in the event of a switch-on error in the connected switch
- Relay K3 with programmable functions, including life contact, delayed switch-on signal for switches or error messages

- Response time adjustable 0.05 ... 300,0 s
- Switch-back time adjustable 0 ... 6,000 s
- Preset according to VDE-AR-N 4105-2018-11 (Pr 1.02) and VDE-AR-N 4105-2011-08 (Pr 1.01)
- Preset according to VDE-AR-N 4110-2018-11 (Pr 1.11-1.14) and bdev guideline (Pr 1.3-1.6)
- automatic adjustment of the switching points when the nominal voltage is changed
- Alarm counter for 100 alarms (with trigger value, cause and date/time, time of restart)
- 3 programmable digital inputs
- Standby counter and timer with standby on/off date/time
- Test and simulation function with measurement of switch-off times
- Sealing option and code protection for settings
- Simple commissioning and programming thanks to preset basic programs and transmission via IP interface
- Supply voltage AC/DC 24-270 V
- Housing for DIN-rail mount, 105 mm wide, installation depth 66 mm

Accessory:

Installation frame ER6 for panel mount
ZIEHL Coupling device VG1200



Technische Daten UFR1002IP

| | | |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply | Rated supply voltage U_s bridging at dropping U_s | AC/DC 24-270 V, 0/40...70 Hz, <5VA DC: 20,4...297 V, AC: 20,4...297 V 230 V -> 0 V: 400 ms |
| Relay output | | 3 change over contacts, see operating manual |
| Voltage | Measurement phase-phase Setting range phase-phase Measuring voltage phase-neutral Setting range phase-neutral Measurement method Measurement accuracy Measurement functions Switching-delay (dAL) Switching-back-delay (doF) | AC 15...530 V (< 5 V display 0) AC 15...520 V AC 10...310 V (< 5 V display 0) AC 15...300 V true RMS <1 % of measured value $\pm 0,2$ digit 3-phase with / without neutral adjustable 0,05 (± 15 ms)...300,0 s adjustable 0 (ca. 200 ms)...6.000 s |
| Frequency | Measurement range Setting range Hysteresis Measurement accuracy Switching delay (dAL) Switching-back-delay (doF) | 40...70 Hz 45,00...65,00 Hz 0,05...10,00 Hz $\pm 0,04$ Hz ± 1 Digit einstellbar 0,05 (± 15 ms)...300,0 s einstellbar 0 (> 200 ms)...6.000 s |
| Vector-Shift | Measurement range Setting range Switching-delay (dAL) Switching-back-delay (doF) Delay at U_s on | 0...90,0° 2,0...65,0° < 50 ms adjustable 3...240 s adjustable 2...20 s |
| ROCOF (df/dt) | Setting range | 0,100...5,000 Hz/s, 4...50 cycles |
| Digital outputs insulated | E1/E2, Y0...Y2, In1...In3 | DC 15...35 V |
| Test Conditions | Rated impulse voltage Overvoltage category Pollution degree Rated Insulation voltage U_i Operating time Operating temperature Storage temperature Climatic conditions (IEC/EN 60721-3-3) EMC - immunity EMC - emission | EN 60255 4000 V III 2 300 V 100 % -20 °C...+55 °C -25 °C...+70 °C 3K5 (except condensation and formation of ice) EN 61 000-6-2 EN 61 000-6-3 |
| Housing | Design / Installation Frame Dimensions (h x w x d) Protection housing/terminals Attachment Weight | V6 / Front mounting kit type ER6, 6 TE 90 x 105 x 69 mm, mounting height 66 mm IP30/20 DIN rail 35 mm according to EN 60 715 or screws M4 approx. 250 g |

Coupling Device for Voltage Type VG1200

Measuring of voltages up to 1.200V with NA-Box UFR1200IP

Available 4th quarter 2022

VG1200



Part numbers:

VG1200 **S222312**ER4 **T224384**UFR1002IP **S222301**

In order to achieve higher efficiencies and to reduce line losses, inverters with a higher output voltage than the usual 3AC 400 V are often used in large on-site generation systems.

So that the grid and system protection can monitor this high voltage, it must be reduced. This is usually done with voltage converters.

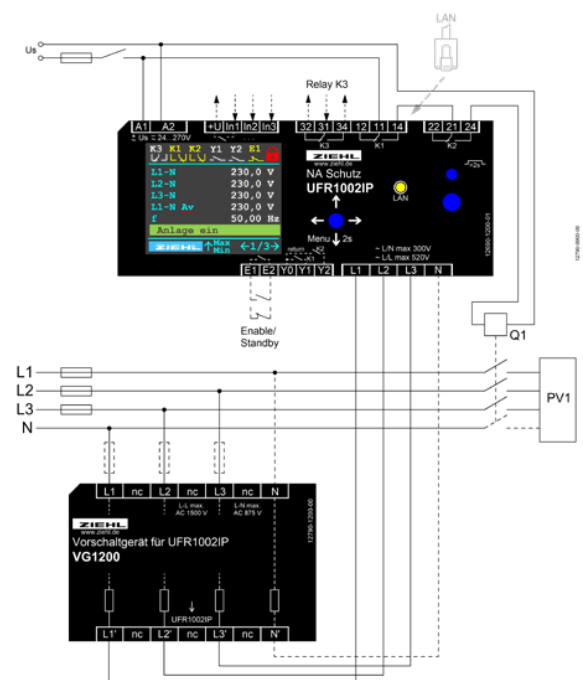
With the VG1200IP coupling device, an ohmic voltage divider is available that takes on this task. In conjunction with the UFR1002IP can measure voltages of up to 1200 V. The display in the UFR1002IP is scalable. This means that the voltages at the input of the VG1200 are displayed and the limits for protection against over- and undervoltage are set accordingly.

Both devices together meet the requirements of VDE-AR-N 4110 (feeding into the medium-voltage grid).

- Measuring of voltage up to 1200 V
- Max. error 2 %
- No voltage converters required
- Display of the correct voltage on the UFR1002IP (scalable)
- No supply voltage required
- Housing V4, 70 mm wide

Accessory:

[Installation frame ER4 for panel mount](#)
[ZIEHL NA-Box UFR1002IP](#)



Technical Data

| | |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Measurement | 3AC + N |
| Nominal voltage Un L-N | 250...690 V |
| Nominal voltage Un L-L | 440...1200 V |
| Measuring range | 0...1,25 Un (continuously) |
| Measurement accuracy | < ±2% |
| UFR + VG | |
| Frequency range | AC 45...65 Hz |
| Overvoltage category | III |
| Pollution degree | 2 |
| Protection category | II (with UFR1002IP) |
| Rated impulse voltage | 16 kV |
| Isolation coordination | Electronics - Housing 20,0 mm reinforced isolation Phase-Phase 11,5 mm basic isolation Phase-Neutral 8,0 mm basic isolation |
| Internal resistance Ri | 1,8 mOhm / measuring channel |
| Residual current (single error) | <0,9 mA @1500 V _{L-L} |
| Protection class | IP20 |
| Perm. ambient temperature | -20...55 °C |
| Housing | Design V4 / Front mounting kit ER4, 4 TE |
| Dimensions (H x B x T) | V4: 90x 70 x 58 [mm], Fitting height 55 mm |
| Attachment | 35 mm standard rail according EN 60 715 or screws M4 |

Voltage Monitor for 3-Phase Networks

Undervoltage

SW31K



Part numbers:

- S222272** AC 400 V
- S222271** AC 690 V
- Special Versions upon request

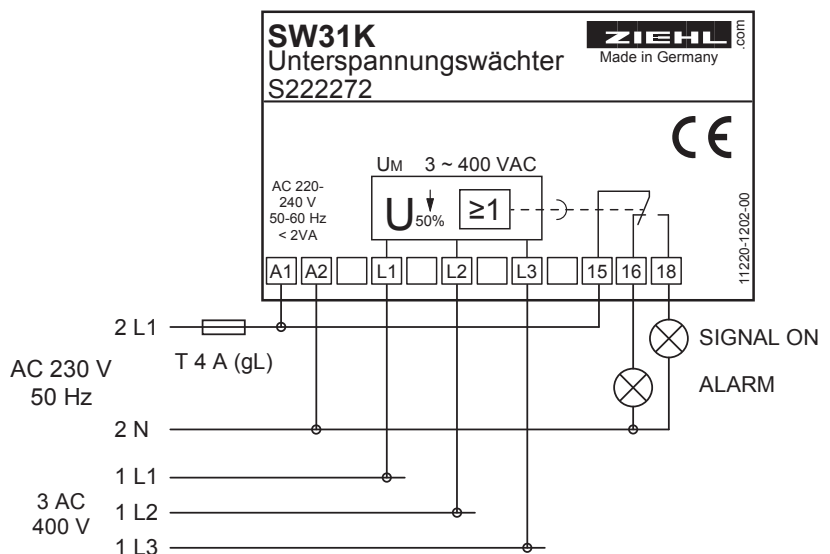
Undervoltage monitor for three-phase networks without N for monitoring on voltage failure. The voltage is being measured between phases and an artificial neutral point. At symmetrical decrease of the voltage to approx. 50% of the nominal value or in case of failure of a phase the integrated relay (1 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

2



Technical Data

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

Current recognition Relays for alternating current

General

ZIEHL current monitors for current recognition are electronic measuring relays for current monitoring in up to 8 measuring circuits. The current is captured by STWA1 type current transducers. Current monitors

in OR-evaluation (STW1K, STW12V and STW12), in AND-circuits (STW20K, STW20V) or for individual monitoring STW12 are available for different monitoring tasks. OR-circuit current monitors signal if at least one of several monitored lines is connected. AND-circuit current monitors signal if not all lines are connected.

2

Summary

| Type | STW1K | STW12V | STW12 | STW20K | STW20V |
|--------------------------------------------------------|-------------------|-------------------|-------------------|---------------------|---------------------|
| Number of circuits | 8 | 12 | 12 | 3 | 3 |
| Connection via change-over STWA 1 or Current-Sensor S1 | X | X +contact | X | X | X |
| Response value | 1 A | 0,5 - 5 A | 10 x 1 A | 1 A 2 x 1 - 5 A | 1A |
| Relay output | 1 U | 1 U | 1 U | 2 U | 2 U |
| Transistor output | - | - | 12 | - | - |
| Operating mode | operating-current | operating-current | operating-current | cl.-circuit current | cl.-circuit current |
| Evaluation principle | OR | OR | single/ | AND OR | AND |
| Current/voltage comparison | - | - | - | - | - |

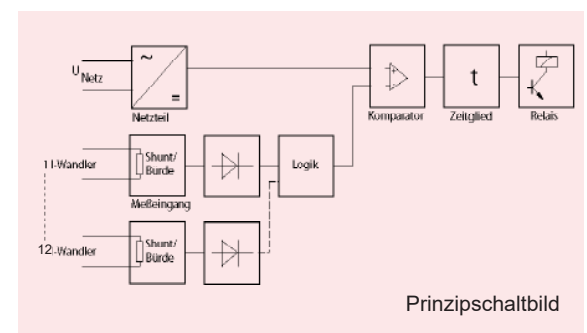
Function and Features

In case of current flow through a connected STWA1 type transformer, a voltage is induced at the current monitor input. This voltage is captured, evaluated, and releases corresponding switching functions.

Due to the simple yes/no evaluation of current recognition and the permission of relatively high tolerances ($\pm 20\%$) in the transformer and evaluation device, a wide variety of functions can be created with a good performance at moderate prices. The operating state of consumers outside the switch cabinet can be captured without a direct feedback of the consumer (costly and work-intensive wiring being unnecessary).

If the switching threshold is not reached due to low currents of less than 1 A, the monitored wire should be led multiple times through the transformer.

Current relays of type STW conform to VDE 0435 part 303, 4.8.2



Current-Relay STW1K

AC-Detection, OR-Evaluation of 1-8 Transformers

STW1K



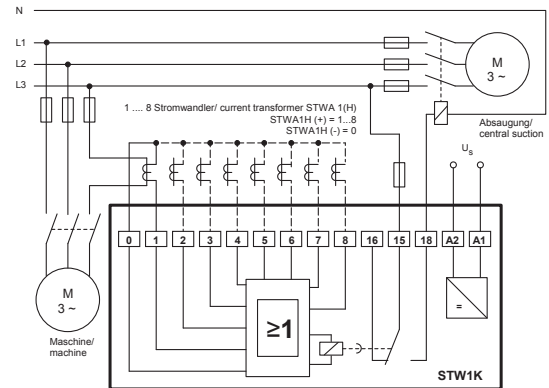
Part numbers:

| | |
|----------------|--------------|
| S225636 | AC 220-240 V |
| S225658 | AC/DC 24 V |

Current relay in OR evaluation with 8 inputs, designed e.g. for controlling of suction plants in the timber and plastics processing industry.

When there is an AC-current >1 A through one of up to 8 connected transformers STWA 1, the integrated relay (1co) picks up. When all currents are 0, the relay releases with a delay of approx. 10s. This enables a run-after of the central suction.

- 8 inputs
- OR-evaluation
- relay picks up if at least 1 input is activated
- Connection of current transformers STWA1 or STWA1H
- operating value approx. 1 A
- turn-off delay approx. 10 s
- not necessary inputs remain open
- options:
 - switch-on delay 3 s
 - without switch-off delay



Technical Data

| | |
|---------------------------------|-----------------------------------------------------------------------------------------------|
| Rated supply voltage U_s | AC 220 - 240 V $+10-15\%$, < 3 VA, 50/ 60 Hz AC/DC 24 V, DC 21 - 30 V, AC 20,4 - 26,4 V |
| Transformer input | 1...8, type STWA1 or STWA1H |
| Overload cap.continuous/max 10s | 100 A / 300 A |
| Function | OR-evaluation |
| Switching point on | \leq AC 1 A |
| Switching point off | $>$ AC 0,3 A |
| Switch-off delay | approx. 10 sec. |
| Switch-on delay | approx. 0,5 sec. |
| Output relay | 1 change-over contact (co) |
| Type of contact | type 2 , see "general technical informations" |
| Test conditions | see "general technical informations" |
| Rated ambient temperature range | $-20^\circ\text{C} \dots +55^\circ\text{C}$ |
| Dimensions (h x w x d) | Design K: 75 x 22.5 x 115 [mm] |
| Attachment | on 35 mm DIN rail according to DIN EN 60715 or with screws M4 (option) |
| Protection housing / terminals | IP 40 / IP 20 |
| Weight | approx. 140 g |

Current-Relay STW12V

Current-Detection, OR-Evaluation, 12 Inputs, adjustable

STW12V



Part number:
S225519 AC/DC 24 -240 V

Current relays in OR evaluation with 12 inputs, designed e.g. for controlling of suction plants in the timber and plastics processing industry.

Recording of current is made with current transformers type STWA 1, current-sensors S 1 (DC also) or potential-free contacts.

When there is an AC-current higher than the set response value (setting range 0.5 - 5A) through at least one of the connected transformers, the integrated relay (1 NO) picks up. If all monitored circuits are switched off or the current falls below the set response value by approx. 0.3A, the output relay releases after the set time delay (1 - 60).

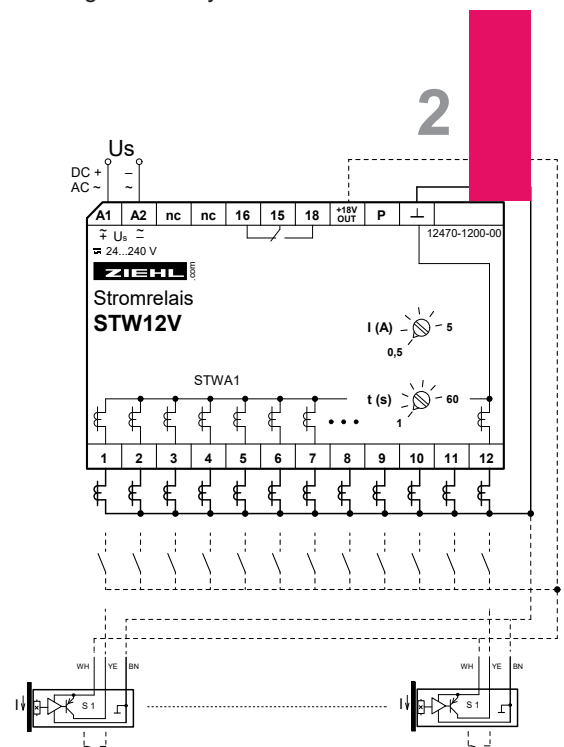
Due to the adjustable response value, the user can permit lower currents without releasing switchings. Thus, for example, a machine can be switched on in order to adjust its electronic settings (low current via transformers). The STW will only switch on when the main motor has been put into operation (high current). Due to the adjustable switch off delay an easy adjustment of the follow-on is possible.

- Current monitoring of up to 12 currents
- Inputs for current transformers STWA 1, current-sensors S 1 or potential-free contacts

- Adjustable switching point 0.5 - 5 A
- Adjustable switch off delay (1 - 60 s)
- Plug-in terminals
- Universal supply-voltage AC/DC 24-240 V
- Housing for mounting in switchgear cabinets or fuse-boxes, 70 mm wide, mounting height 55 mm

Application:

ZIEHL current monitors in OR-circuits can be used particularly where dust, fumes and gases are generated by various electrical devices, and where these must be extracted by a central suction system. Due to the integrated delaytime the follow-on of the suction



Technical Data

Supply voltage Us

AC/DC 24 - 240 V, < 3 W, < 5 VA, 50/ 60 Hz

AC 20 - 264 V, DC 20,4 - 297 V

Relay output

1 change-over contact (co)

Type of contact

type 2 see "general technical informations"

Test conditions

see "general technical informations"

Rated amb. temperature range

-20°C...+55°C

Function

OR-evaluation

Measuring inputs

12 x for current transmitters STWA 1, current-sensors S 1 or potential-free contacts

Overload cap./continuous max 10s

100 A / 300 A

Switching point

with STWA 1 adjustable, AC 0,5 - 5 A

Tolerance

± 20%

Switch-off delay

adjustable 1- 60 s

Switch-on delay

app. 0,5 s

Dimensions (H x W x D)

design V4: 90x70x58 [mm], mounting height 55 mm

Attachment

on 35 mm DIN-rail according to EN 60 715 or

with screws M4

Protection housing/terminals

IP 30 / IP 20

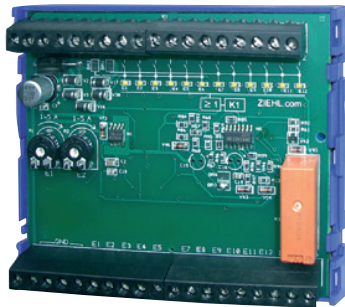
Weight

app. 200 g

Current-Relay STW12

AC-Detection, 12-channel, Single evaluation, OR-Circuit

STW12



Part number:
S225127 DC 20-30 V

The current relay STW12 monitors the current flow yes/no of up to 12 alternating-current circuits. If there is an AC-current of ≥ 1 A through a connected transformer STWA 1, the according output transistor switches and the yellow LED lights up.

All the OR inputs are linked at the same time. If a current is identified in at least one of the monitored current circuits, a relay (1 change-over contact) picks up.

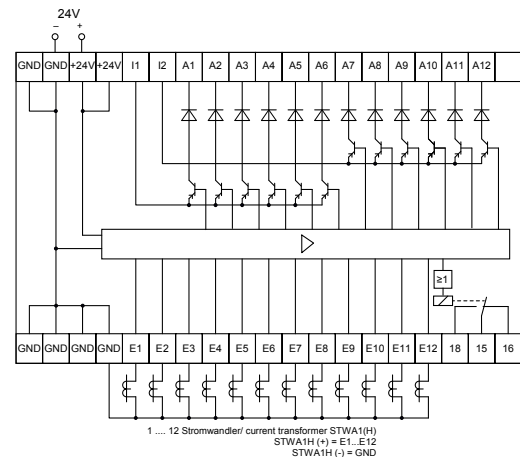
The STW12 is installed at an open printed circuit board. The lower part can be used for snap-fastening on a 35 mm DIN-rail or for screw fastening (option). The supply voltage is DC 24.

This voltage can be used at the same time for inquiry of the output transistors. When requesting the outputs in 2 groups in multiplex operation, only 8 I/Os of the PLC are needed.

- 12 inputs (for transformer STWA1)
- 2 of these inputs with adjustable switching threshold AC 0,5...5 AA
- 12 outputs (Open Collector) max. DC 40 V/40 mA
- relay OR-linked (of all 12 inputs)
- LED displays (1/channel)
- Multiplex operation possible

Applications:

The current relay STW12 is used where AC-current yes/no has to be evaluated, however, the exact value of the current is not relevant. Examples are the control of machines in suction plants or monitoring of the mode of operation of loads (on, off or damaged). The STW12 is suitable in particular for being used in connection with a PLC.



Technical Data

Power supply Us

DC 20 - 30 V, < 2 VA

Function

Transformer input
Overload cap.continuous/max 10s
Switching points E1, E2
Tolerance
Switching points E3...E12

12-channel single/OR
1...12, type STWA 1
100 A / 300 A
adjustable, AC 0,5...5 A
 $\pm 20\%$
on \leq AC 1 A
off \geq AC 0,3 A
10 s.
approx. 0,5 s.

Switch-off delay
Switch-on delay

Output relay
Type of contact
Open Collector
Testing conditions
rated ambient temperature range

1 CO, 12 x Open-Collector
type 2 see "general technical informations"
max. DC 40 V/40 mA
see "general technical informations"
-20°C...+55°C

Dimensions H x B x T
Attachment

design V 6: 90 x 105 x 32 [mm], 37-pole
on 35 mm DIN rail according to DIN EN 50 022 or
with screws M4 (option)

Protection housing / terminals
Weight

IP 30 / IP 20
approx. 135 g

Current-Relay STW20K

AC-Detection, AND-Evaluation, 3 Transformers

STW20K



Part number:
S225121 AC/DC 24-240 V

The current relay STW20K monitors the current in up to 3 lines with current transformers STWA1 (AND circuit). If there is a current in all 3 monitored lines, the relay (2 change-over contacts) picks up. If there is no current in at least one of the lines, the relay releases. The relay works in closed circuit current. When voltage is applied to the STW, the relay signals an alarm until the it has picked up.

Applications:

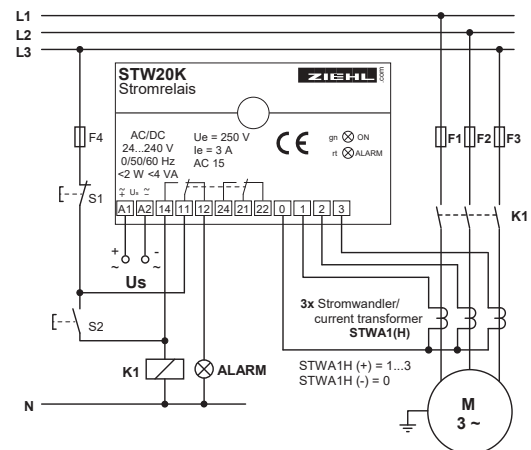
Identifies power failure with 1- or 3-phase electrical consumers, e.g. with monitoring of heating elements or heating installations where a constant heating has to be guaranteed.

A further application is the identification of phase failure, monitoring of fuses, or triggering of operating hours counters.

If the switching threshold is not reached due to low currents of less than 1 A, the monitored wire should be led multiple times through the transformer. Not required inputs have to be connected to a occupied input.

Features

- 3 current transformers STWA1
- AND-evaluation
- relay output 2 CO
- Switching point approx. AC 1 A
- LED-display for power on and alarm
- housing design K



Technical Data

Power supply Us

AC/DC 24 - 240 V, 0/50/60 Hz, < 1 W, < 4 VA
(DC 20 - 297 V, AC 20 - 264 V)

Output relay Type of contact

2 CO
type 2 see "general technical informations"

Function Transformer input Overload cap.continuous/max 10s Switching point on Switching point off Tolerance Switch-off delay Switch-on delay

3 channel/AND
1 to 3, type STWA 1
100 A / 300 A
≤ AC 1 A
≥ AC 0,3 A
± 20%
approx. 0,3 s
approx. 0,3 ms

Testing conditions rated ambient temperature range

see "general technical informations"
-20°C...+55°C

Dimensions H x B x T Protection housing / terminals Weight

design K: 75 x 22,5 x 110 [mm], 12-pol
IP 30 / IP 20
approx. 120 g

Current-Relay STW20V

AC-Detection, AND-Evaluation, 3 Transformers

STW20V



Part number:
S225124 AC/DC 24-240 V

The current relay STW20V monitors the current in up to 3 lines with current transformers STWA 1 (AND circuit). If there is a current in all 3 monitored lines, the relay (2 change-over contacts) picks up. If there is no current in at least one of the lines, the relay releases.

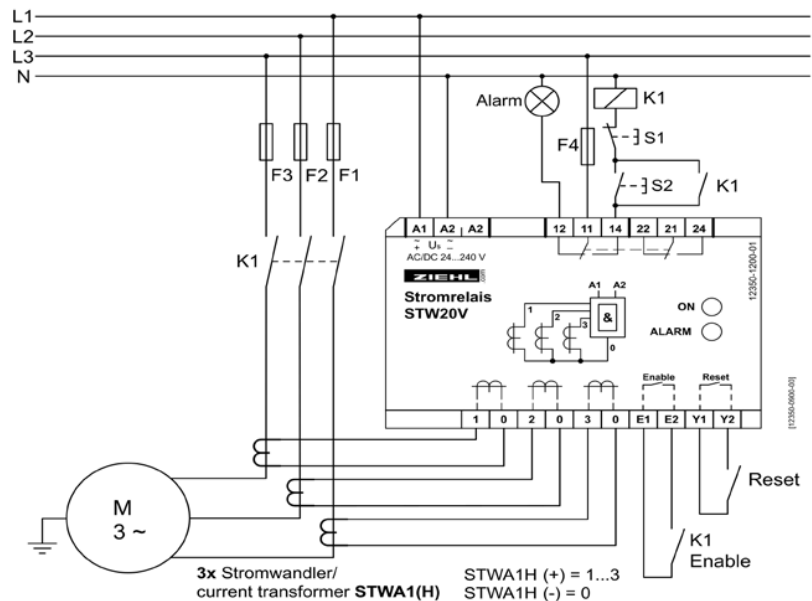
The relay works in closed circuit current. When voltage is applied to the STW, the relay signals an alarm until the it has picked up. This can be avoided if the device is constantly alive and monitoring is started by closing a contact at the Enable input. With a bridge at the Enable input, monitoring is automatically started when voltage is applied.

- 3 inputs (transformer STWA1)
- 3 x current-sensor S1 (power-supply required)
- AND-evaluation
- output relay 2 CO
- switching point app. AC 1 A
- Enable-input
- storage of alarms or Auto-Reset
- LEDs power on and alarm
- housing V4 for mounting on DIN-rail or wall-mount

Applications:

Identifies power failure with 1- or 3-phase electrical consumers, e.g. with monitoring of heating elements or heating installations where a constant heating has to be guaranteed.

A further application is the identification of phase failure, monitoring of fuses, or triggering of operating hours counters.



Technical Data

Power supply U_s

AC/DC 24 - 240 V, < 3 W, < 5 VA,
(AC 20 - 264 V, DC 20,4 - 297 V) AND-evaluation

Function

AND-evaluation

Transformer input

1 or 3, type STWA 1

Overload cap. continuous/max.10s

100 A / 300 A

Switching point on

≤ AC 1 A

Switching point off

≥ AC 0,3 A

Switch-off delay

approx. 0,3 s.

Switch-on delay

approx. 0,3 s.

Overload capacity cont./max.10s

100 A / 300 A

Output relay

2 CO

Type of contact

type 2 see "general technical informations"

Testing conditions

see "general technical informations"

rated ambient temperature range

-20°C...+55°C

Dimensions H x B x T

design V 4: 90 x 70 x 58 [mm]

Protection housing / terminals

IP 30 / IP 20

Weight

approx. 240 g

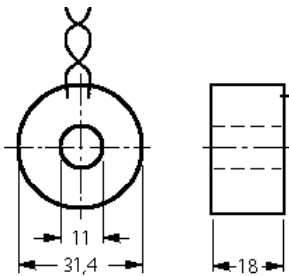
Current Transformer STWA1

for recognition of AC-currents

Current Transformer STWA1
for monitoring current yes/no



Part number: S225201

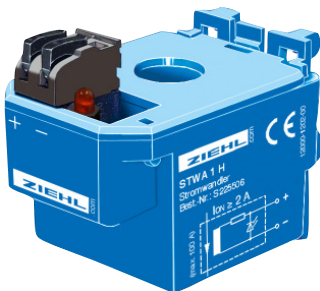


The STWA1 current transformer is made to match the STW current monitor. One current transformer is required for each line being monitored. The STWA1 consists of a climate-proven sealed-in coil with toroidal tape core. The connection cables are permanently fixed to the transformer and are 1 m in length. The level of the current to be monitored is limited to 100 A continuously, 300 A for max. 10s.

In case of current of more than approx. 5 A, an LED can be triggered directly via the STWA 1 current transformer. Thus it's easy for users to visually monitor the current conduction in a line. The LED is protected by an anti-parallel diode or by its connection in series. A protective resistor is necessary depending on the LED used or the level of current being monitored.

2

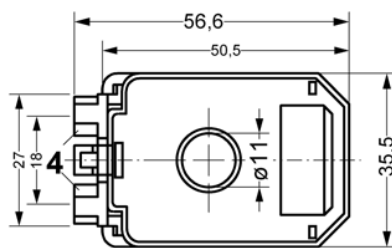
Current Transformer STWA1H
for DIN-rail-mount or screw-mount



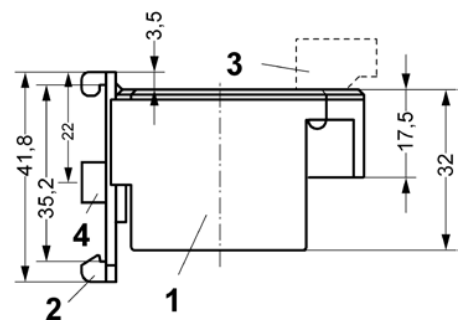
Part number: S225506

Current-transformers STWA1H can be fixed on a 35 mm DIN-rail or with 2 screws. The electrical connection is made via pluggable terminals. The cables are led vertical through the transformer (right angle to 35 mm-rail). The available diameter is 11 mm.

A built-in LED lights up at currents > app. 2 A. Even short current pulses are visible. ZIEHL current monitor type STW or an external LED can be connected to the terminals. The built-in resistor protects the LED from overload. The STWA 1 H can also be used to visualize current-flow in stand-alone mode, without connecting it to a current monitor.



- 1 Housing
- 2 Clip for DIN-rail (removeable)
- 3 Terminal (pluggable)
- 4 Wall-mounting (M4)



Electronic Current Transformers

Current-Detection and Measuring-Transducers

General

Electronic current-transformers are compact and good-valued devices for the detection of a current in a wire.

Electronic current-transformers and current-sensors give a signal, when there is a current in a wire. At STWA1SEH and at current-sensor S1 the response-value

is adjustable. The evaluation of the signals usually is made with digital inputs of PLCs. STWA1LH can directly switch AC-signals up to 230 V / 0,5 A.

Electronic current-transformers as measuring-transducers supply a signal 0-20 mA or 4-20 mA at the output that is proportional to the measured current. The output-signal of the STWA1FH is a frequency, which can be evaluated with digital inputs of PLCs.

2

Overview

| Function | Current-detection yes/no | | | | Measuring-Transducer for AC-current | | | Current-detection |
|-----------------|--------------------------|------------|------------|------------|-------------------------------------|---------------------|----------------------|-------------------|
| | Current-sensor S1 | STWA1S | STWA1SH | STWA1SEH | STWA1AH | STWA2AH | STWA1FH | |
| Type | AC/DC | AC | AC | AC | AC | AC 0-20/ 0-100 A | AC 0-20 A | AC |
| Measuring-input | AC/DC | AC | AC | AC | AC | AC 0-20/ 0-100 A | AC 0-20 A | AC |
| Response-value | 5-30 A | 2 A | 2 A | 2-10 A | - | - | - | 2-20 A |
| Output | Transistor +/- | Transistor | Transistor | Transistor | DC 0-20 mA | DC 4-20 mA | Transistor 0,5-20 Hz | Triac 0,5 A |
| Housing | S 1 | Ø 34,5 mm | H | H | H | H | H | H |

Functions and Properties

The current-sensor S1 is attached at the outside of the monitored wire, e.g. with a cable-fastener. With help of a hall-sensor it detects AC- and DC-currents in the wire. The response-value depends on the orientation of the sensor to the current (distance, angle). Neighbouring wires can have an impact.

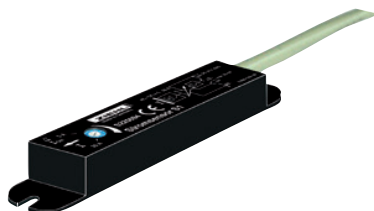
At Electronic current-transformers the monitored wire is pushed through the hole (11 mm) in the transformer. A built-in coil transforms the current into a measuring-signal. This signal is evaluated by the built-in electronics and transduced into the required output-signal. A supply-voltage is not necessary (except STWA1FH and current-sensor S1). The STWA2AH is loop-powered (4-20 mA).

Electronic current-transformers in housing type H can be fixed on an 35 mm DIN-rail or with 2 screws M4. The terminals are pluggable.

Current Sensor for AC and DC currents

Put-on sensor with transistor-output

Current sensor S1 for AC and DC currents



Part number: **S225694**

The current sensor S1 records the current in a cable with a hall-sensor. At currents of adjustable 5-30 A the transistor-outputs switch and report a current in the monitored cable.

The current sensor can be fixed with a cable fastener (apply to only 1 cable). Thus it can be mounted subsequently without disconnecting the cable.

As supply-voltage DC 24 V are required.

The current sensor can be connected to ZIEHL current-relays for current detection yes/ no ant to ZIEHL controls for dedusting plants. The connection to a digital input of a PLC also is possible.

Application:

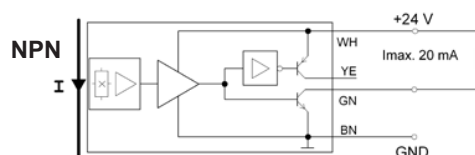
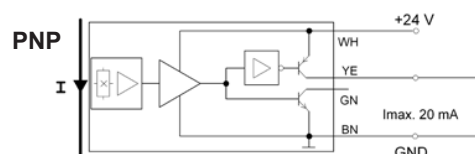
Recording of welding currents (mounting at ground wire) for controlling dedusting plants in combination with ZIEHL-controls type STW.

Recording of the state of a consumer of electricity (on or off or defective).

In general the current sensor S1 is used where the current flow is to be detected, with the exact value of the current either known from the power consumption of the connected consumer or does not matter for the evaluation.

For evaluation of measuring data in more than 1 cable, the outputs of several current sensors can be connected in parallel (or-evaluation).

- switching point adjustable 5-30 A
- LED for current flow
- monitoring of AC and DC currents
- mounting without disconnection of cable possible
- 2 transistor-outputs, switching + and -
- direct connection to a PLC possible
- connection to current-relays ZIEHL type STW
- sturdy, sealed execution
- overload capacity: unlimited
- test-voltage 2,5 kV



Technical Data

| | |
|---------------------------------------------|---------------------------------------------------------------|
| Supply voltage U_s | DC 24 V $\pm 20\%$, 12 mA |
| Switching point at $T_u = 25^\circ\text{C}$ | adjustable AC/DC 5-30 A |
| Tolerance | $\pm 20\%$ |
| Repeat accuracy | $\pm 2\%$ |
| Temperature coefficient | typical $< \pm 0,2 \text{ A/K}$, max. $\pm 0,45 \text{ A/K}$ |
| Frequency of measured current | 0 / 10 ... 400 Hz |
| Overload cap. continuous/ $< 1\text{min}$ | 500 A / 1000 A |
| Output 1 | DC 24 V, + switching, max. 10 mA |
| Output 2 | DC 24 V, - switching, max. 10 mA |
| On- / off-delay | app. 300 ms |
| Rated ambient temperature range | 0...55°C |
| Dimensions (l x w x h) | 75 x 16,5 x 10 mm |
| Cable for connection | app. 2 m, 4 x 0,34 mm ² |
| Attachmant | e.g. with cable fastener (not included) |
| Weight | app. 150 g (cable included) |

AC-Electronic Current Transformer STWA1S with transistor-output

STWA1S

Electronic current transformer
with fixed switching-point



Part number: **S225195**

The STWA1S has an integrated electronic with transistor-output. The switching point is 2A. Above app. 2 A the output transistor is switched on (LOW), below app. 1.5 A it is off (HIGH).

The conductor is simply pushed through the transformer. Multiple loops reduce the switching point correspondingly, for instance to 0.5 A with four loops. A supply voltage is not required.

Application: The STWA1S is used where current flow is to be detected, with the exact value of the current either known from the power consumption of the connected consumer or does not

matter for the evaluation.

For simultaneous evaluation of the current flow in several conductors the STWA1S device can be connected in series (AND circuit, pay attention to the voltage drop) or in parallel (OR circuit, pay attention to the leak current).

- isolated transistor-output max. DC 40 V/40 mA
- output can be directly connected to the digital input of a PLC
- integrated diode for reverse voltage protection
- 2-wire-connection, 1 m
- no supply voltage required
- transformer and electronic unit enapsulated in a climate-proof housing
- plug-in current transformer (Ø 11 mm)
- max. overload 100 A continuously, 300 A / 10 s

Switching point at $T_u = 25^\circ\text{C}$
Hysteresis
Repeat accuracy
Temperature dependence
Overload cap. continuous / 10s

AC 2 A +20/-40%
approx. 6%
 $\pm 5\%$
0...55°C: <0,5%/K (-20...0°C: <2,5%/K)
100 A / 300 A

Output voltage/current max.
Voltage drop (ON)
Leak current (OFF)
Switch-on /switch-off delay

DC 40 V / 40 mA
max. 3 V
max. 0,6 mA
app. 50 / 200 ms

nominal frequency/ operating range
error

50 Hz/ 30...70 Hz
 $\leq 1\%/Hz$

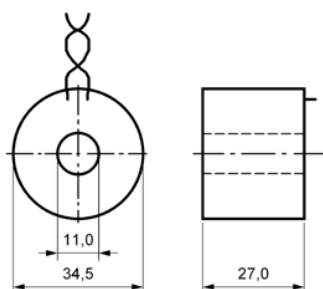
rated ambient temperature range

-20...+55 °C

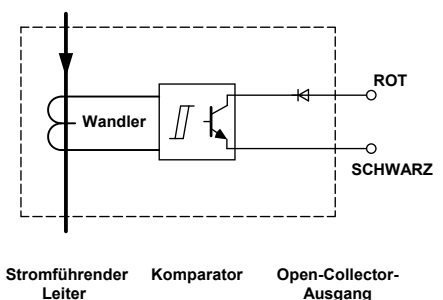
Housing
Dimensions (Ø x H)
Diameter for conductor
Weight

Design S
34,5 x 27 mm
11 mm
app. 60 g

Dimension illustrations



Electronic current transformer STWA1S



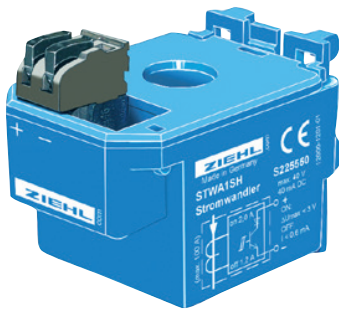
Stromführender Leiter Komparator Open-Collector-Ausgang

AC-Electronic Current Transformer STWA1SH

2 A, with transistor-output

STWA1SH

Electronic Current Transformer with fixed switching point



Part number: **S225550**

The STWA1SH has an integrated electronic with transistor-output. The switching point is 2 A. Above app. 2 A the output transistor is switched on below app. 1.5 A it is off.

The conductor is simply pushed through the transformer. Multiple loops reduce the switching point correspondingly, for instance to 0.5 A with four loops. A supply voltage is not required.

Application: The STWA1SH is used where current flow is to be detected, with the exact value of the current either known from the power consumption of the connected consumer or does not

matter for the evaluation.

For simultaneous evaluation of the current flow in several conductors the STWA 1 S device can be connected in series (AND circuit, pay attention to the voltage drop) or in parallel (OR circuit, pay attention to the leak current).

- isolated transistor-output max. DC 40 V/40 mA
- output can be directly connected to the digital input of a PLC
- integrated diode for reverse voltage protection
- electrical connection via screwless pluggable terminals
- no supply voltage required
- DIN-rail-mount or with screws
- plug-in current transformer (Ø 11 mm)
- max. overload 100 A continuously, 300 A / 10 s

Switching point at $T_u = 25^\circ\text{C}$
Hysteresis
Repeat accuracy
Temperature dependence
Overload cap. continuous / 10s

Output voltage/current max.
Voltage drop (ON)
Leak current (OFF)
Switch-on /switch-off delay

Nominal frequency
operating range
error

Rated ambient temperature
range

Housing
Dimensions (h x w x d)
Diameter for conductor
Weight

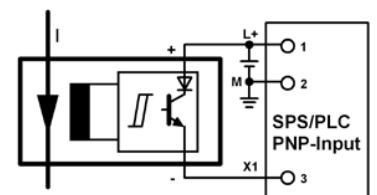
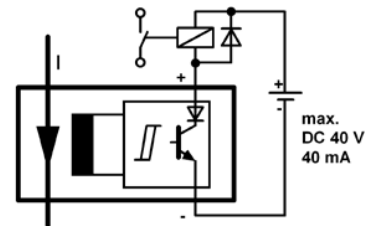
AC 2 A +20/-40%
approx. 6%
 $\pm 5\%$
0...55°C: <0,5%/K (-20...0°C: <2,5%/K)
100 A / 300 A

DC 40 V / 40 mA
max. 3 V
max. 0,6 mA
app. 50 / 200 ms

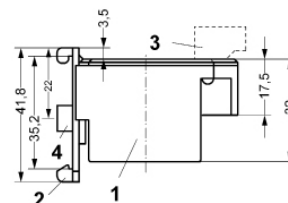
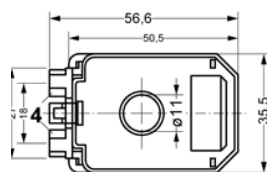
50 Hz
30...70 Hz
 $\leq 1\%/Hz$

-20...+55 °C

Design H
50 x 36 x 56 mm
11 mm
app. 90 g



Dimension illustrations



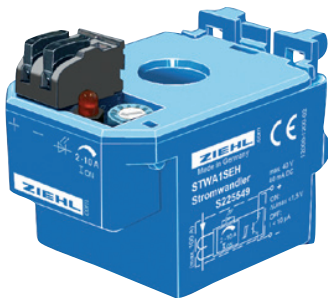
- 1 Housing
- 2 Clip for DIN-rail (removeable)
- 3 Terminal (pluggable)
- 4 Wall-mounting (M4)

AC-Electronic Current Transformer STWA1SEH

adjustable 2...10 A, with transistor-output

STWA1SEH

Electronic current transformer with fixed switching-point 2...10 A



Part number: **S225549**

The STWA1SEH has an integrated electronic with transistor-output.

The switching point is adjustable 2-10A. Above switching-point the output transistor is switched on, below it is off.

The conductor is simply pushed through the transformer. Multiple loops reduce the switching point correspondingly, for instance to 0.5-2,5A with four loops. A supply voltage is not required.

For monitoring of higher currents, the STWA1SEH is simply looped into the secondary current of big current transformers.

Application: The STWA1SE is used where AC current flow is to be detected in a conductor, e.g. to give a warning if a defined current value is exceeded or not reached, or to switch off a machine or to simply report the current flow.

- adjustable switching limit 2...10 A
- isolated transistor-output max. DC 40 V/40 mA
- output can be directly connected to the digital input of a PLC
- LED for display state of output
- integrated diode for reverse voltage protection
- electrical connection via screwless pluggable terminals
- no supply voltage required
- plug-in current transformer (Ø 11 mm)
- max. overload 100 A continuously, 300 A / 10 s

Switching point at $T_u = 25^\circ\text{C}$

Hysteresis

Repeat accuracy

Temperature dependence

Overload cap. continuous / 10s

Output voltage/current max.

Voltage drop (ON)

Leak current (OFF)

Switch-on /switch-off delay

nominal frequency

operating range

error

rated ambient temperature range

ge

Housing

Dimensions (h x w x d)

Diameter for conductor

Weight

AC 2...10 A $\pm 25\%$

5...30 %

$\pm 2\%$

$< 0,06\%/K$

100 A / 300 A

DC 40 V / 40 mA

max. 1,5 V

max. 0,6 mA

0,2...2s / $\leq 0,3$ s

50 Hz

30...70 Hz

$\leq 3\%/Hz$

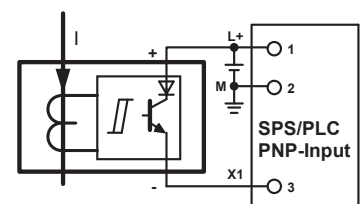
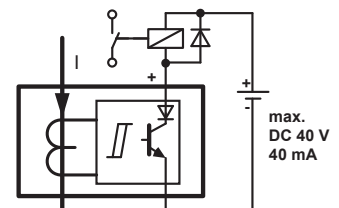
-20...+50°C

Design H

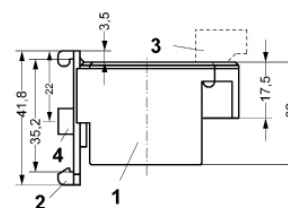
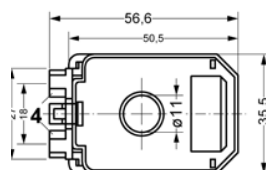
50 x 36 x 56 mm

11 mm

app. 90 g



Dimension illustrations



- 1 Housing
- 2 Clip for DIN-rail (removeable)
- 3 Terminal (pluggable)
- 4 Wall-mounting (M4)

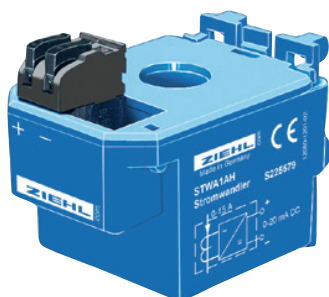
AC-Electronic Current Transducer STWA1AH

with analog output

STWA1AH

Electronic current transformer

AC 0...15 A - DC 0...20 mA



Part number: **S225579**

The STWA1AH is a measuring transducer for AC currents 0...15 A. Multiple loops of the conductor through the transformer reduces the measuring range correspondingly (for instance to 0...5 A with three loops).

For the monitoring of currents of any level, the STWA1AH is simply looped into the secondary circuit of a large transformer with secondary 5 A (cable three times through the STWA1AH). Consequently, the output is proportional to the primary current of the transformer, e.g. 0...100 A for a transformer with 100/5 A.

The analog output is isolated. The load should be 50...300 Ω.

Application: The STWA1AH makes it possible to monitor the value of an AC current. The output signal can be evaluated or displayed with components with analog inputs, e.g. ZIEHL TR210, STW1000/V2 or MINIPAN®.

- current-proportional analog output DC 0...20 mA = AC 0...15 A (isolated)
- electrical connection via screwless pluggable terminals
- no supply voltage required
- DIN-rail-mount or with screws
- plug-in current transformer (Ø 11 mm)
- max. overload 100 A continuously, 300 A / 10 s
- plug-in current transformer, easy assembly

Monitoring range

Analog output

Adjustment time

Error (from 10% / I_{nom})

Error with other load

Temperature coefficient

Ripple at 50 Hz

Nominal frequency

Operating range

Error

Overload cap. continuous / 10s

Rated ambient temperature range

Housing

Dimensions (h x w x d)

Diameter for conductor

Weight

AC 0 - 15 A

DC 0 - 20 mA

< 0,5 s.

<5% from FS (at 100 Ω), <7% 50...200Ω

<9% ..300Ω

+5%/100 Ω, max. 500 Ω

< 0,06%/K

<2,5 % at 300Ω, <4,5 % at 100Ω, <7,5 % at 50Ω

50 Hz

30...400 Hz

≤ 0,2%/Hz

100 A / 300 A

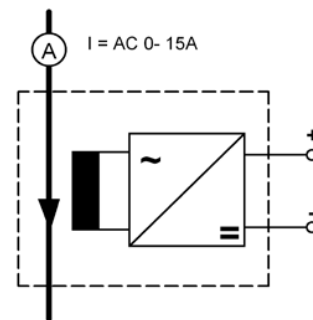
0...55°C

Design H

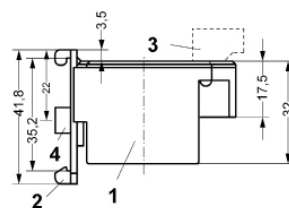
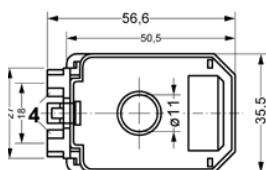
42 x 36 x 56 mm

11 mm

app. 90 g



Dimension illustrations



- 1 Housing
- 2 Clip for DIN-rail (removeable)
- 3 Terminal (pluggable)
- 4 Wall-mounting (M4)

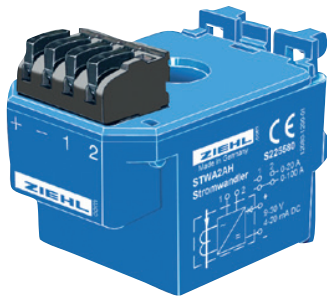
AC-Electronic Current Transducer STWA2AH

with analog output

STWA2AH

Electronic current transducer

AC 0...20 A / 0...100 A -
DC 4...20 mA



Part number: **S225580**

The STWA2AH is a measuring transducer for AC currents 0...100 A, divided in 2 ranges 0...20 A and 0...100 A. Multiple loops of the conductor through the transformer reduces the measuring range correspondingly (for instance to 0...5 A with four loops).

For the monitoring of currents of any level, the STWA2AH is simply looped into the secondary circuit of a large transformer with secondary 5 A (cable four times through the STWA2AH). Consequently, the output is proportional to the primary current of the transformer, e.g. 0...100

A for a transformer with 100/5 A.

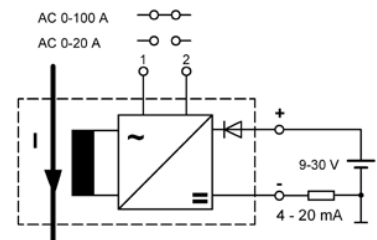
The analog output is isolated. The STWA 2 AH is in 2-wire execution and needs a supply-voltage DC 9...30 V.

Application: The STWA" AH makes it possible to monitor the value of an AC current. The output signal can be evaluated or displayed with components with analog inputs, e.g. ZIEHL TR210, STW1000V2 or MINIPAN®.

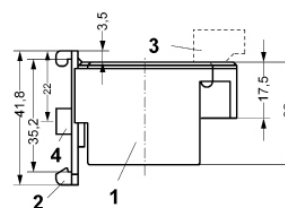
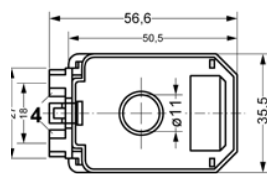
- current-proportional analog output DC 4...20 mA = AC 0...20 / 0...100 A (isolated)
- electrical connection via screwless pluggable terminals
- supply voltage DC 9...30 V (2-wire)
- DIN-rail-mount or with screws
- plug-in current transformer (Ø 11 mm)

2

| | |
|---------------------------------------------------|----------------------------------------------------|
| Supply voltage | DC 9...30 V (2-wire), depending on load |
| Monitoring ranges | AC 0 - 20 / 0...100 A |
| Analog output | DC 4 - 20 mA (max. 32 mA) |
| Adjustment time | < 0,5 s. |
| Error (of scale, above 10% / I _{rated}) | <5% |
| Temperature coefficient | 0...55°C: <0,06%/K (-20...0°C: <0,5%/K) |
| Nominal frequency | 50/60 Hz |
| Operating range | 30...400 Hz |
| Error | ≤ 0,1%/Hz (30 - 50 Hz) ≤ 0,05%/Hz (60 - 400 Hz) |
| Overload cap. 20/100 A | 63 A / 360 A continuously |
| Rated ambient temperature range | -20...+55°C |
| Housing | Design H |
| Dimensions (h x w x d) | 42 x 36 x 56 mm |
| Diameter for conductor | 11 mm |
| Weight | app. 90 g |



Dimension illustrations



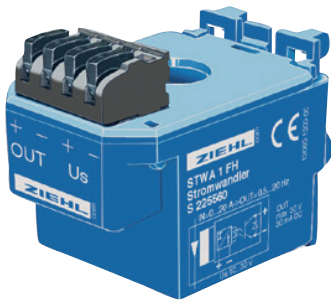
- 1 Housing
- 2 Clip for DIN-rail (removeable)
- 3 Terminal (pluggable)
- 4 Wall-mounting (M4)

AC-Electronic Current Transducer STWA1FH

with frequency output

STWA1FH

Electronic Current Transformer with current proportional frequency output
0...20 A - 0,5...20 Hz



Part number: **S225560**

The STWA1FH provides a frequency output with 0.5...20 Hz which corresponds to a current flow of AC 0 - 20 A through the transformer. Multiple loops of the conductor through the transformer reduce the current range correspondingly (e.g. with fourfold looping-through 0 - 5 A correspond to 0.5...20 Hz). For the monitoring of high currents, the STWA1FH is simply looped in the secondary circuit of a large current transformer. Consequently, the frequency output is proportional to the primary current of the transformer, e.g. 0 - 100 A for a transformer with 100/5A (cable four times through the STWA1F).

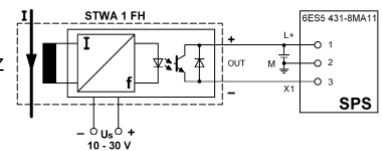
The offset of 0.5 Hz at the beginning of the transducing range is for technical reasons. During evaluation, it can be taken into account.

Application: The STWA1FH enables moderately priced detection of the value of an AC-current with a DIGITAL INPUT of a PLC. Costly analogue inputs are no longer necessary.

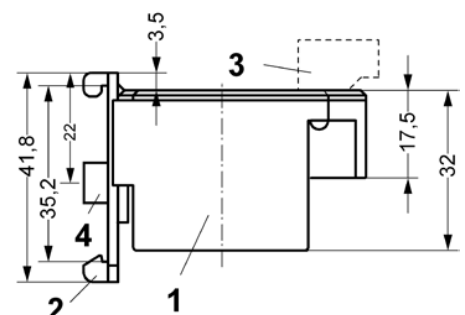
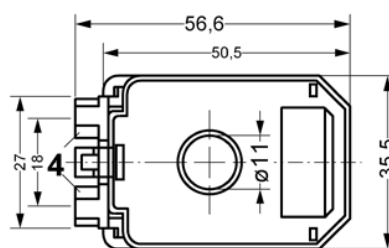
The STWA1FH is particularly suitable to evaluate the current in electric motors in machines of i.e. saws. The feed can be regulated dependent from the load of the motor of the saw.

- current-proportional frequency output 0.5 - 20 Hz = AC 0 - 20 A
- output isolated, max DC 30 V/30 mA
- output frequency limited to 30 Hz
- output can be connected to the digital input of a PLC
- incorporated reverse voltage protection diode
- electrical connection via screwless pluggable terminals
- supply voltage DC 10...30 V
- DIN-rail-mount or with screws
- plug-in current transformer (Ø 11 mm)
- Options:
 - currents up to 60 A
 - other frequencies

| | |
|-------------------------------------|-------------------|
| Power supply U_s | DC 10 - 30 V |
| Monitoring range | AC 0...20 A |
| Output | 0,5...20 Hz |
| Switching voltage | max. DC 30 V |
| Switching current min/max | DC 1 / 30 mA |
| Adjustment time | < 0,5 s. |
| Error (of scale, above 10%/I rated) | ≤ 3% |
| Temperature coefficient | < 0,06%/K |
| Nominal frequency/operating range | 50 Hz/50...400 Hz |
| Error | ≤ 0,2%/Hz |
| Overload capacity cont./10 s | In + 5% / 200 A |
| Testing voltage to supply voltage | 500 V |
| max. ambient temperature | 0...55°C |
| Housing | Design H |
| Dimensions (h x w x d) | 42 x 36 x 56 mm |
| Diameter for conductor | 11 mm |
| Weight | app. 90 g |



Dimension illustrations



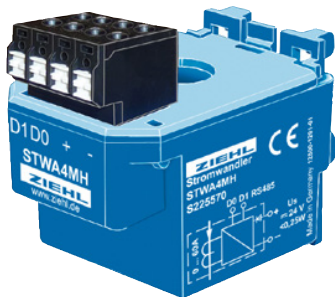
- 1 Housing
- 2 Clip for DIN-rail (removeable)
- 3 Terminal (pluggable)
- 4 Wall-mounting (M4)

AC-Electronic Current Transducer STWA4MH

AC 0 - 60 A, with interface RS485

STWA4MH

Electronic Current Transformer 0 - 60 A, with interface RS485



Part numbers:

STWA4MH **S225570**

Starterkit **S225571**



With this starter set it is possible to test the STWA4MH on a PC without a connected PLC or Modbus master.

STWA4MH is a measuring transducer. It measures AC up to 60A and has an RS485 interface (Modbus RTU). The measured analog current value is made available as a digital signal and can be read by a PLC, an IPC or a master computer.

The conductor to be measured is passed through an opening (\varnothing 11 mm). In case of small currents, the sensitivity of the current transducer can be increased by looping through the current-carrying conductor several times, e.g. double looping doubles the sensitivity. The measuring range of the STWA4MH is reduced by multiple looping. To measure currents of any size, the STWA4MH is simply looped into the secondary circuit of a large current transformer with a secondary output of 5A (lead the cable through STWA4MH several times).

Rated supply voltage U_s DC 24 V, 10,0 ... 30,0 V, < 0,25 W
 Measuring input current AC 0 ... 60 A, sinus shaped (RMS)
 Error (from 1%/I_{nom}) 0,1 % \pm 200 mA
 Temperature coefficient \pm 0,1 %/K
 Resolution 1 mA
 Measurement time 1 period (40 ... 70 Hz)
 Overload constantly/10s I_{nom} + 20% / AC 200 A
 Measuring range frequency 40...70 Hz
 Error (from 1% I_{nom}) \leq 0,1 Hz
 Resolution 0,01 Hz
 Rated insulation voltage 300 V
 Rated ambient temperature range -20 ... +55 °C

Housing/Dimensions (h x w x d) Design H: 42 x 36 x 56 mm
 Max. \varnothing conductor 11 mm
 Weight app. 90 g

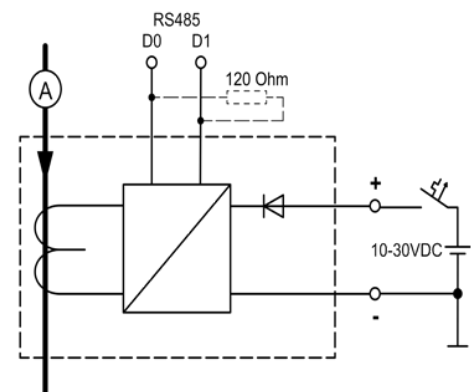
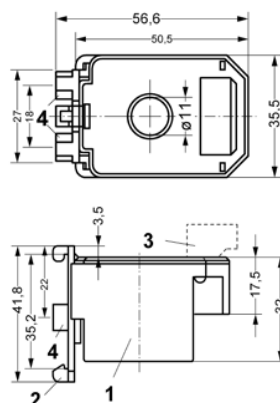
Application:

The STWA4MH enables the space-saving and cost-effective measurement of the actual value of an alternating current. Compared to transducers with analog output, the bus technology significantly reduces the effort for the hardware (inputs) and the wiring. Applications are e.g. the recording of the current consumption of electrical motors in processing machines. Here the feed can be regulated depending on the load on the motor. Another example is the monitoring of consumers, e.g. heating elements, for failure.

- Current measurement AC 0...60 A (RMS - Root Mean Square), resolution 1mA
 - Actual value
 - Average over 200 ms
 - Average over 1 s
 - Measured values from the last 50 periods
- Frequency measurement 40...70 Hz (sinus-shaped signals)
- RS485 interface (Modbus RTU)
- Addressable up to 246 participants
- Baud rates 4800, 9600, 19200, 57600, 115200
- Wiring effort minimized through bus technology
- Supply voltage DC 24 V (10...30V)
- Connection via plug in spring type terminals
- Lockable housing on mounting rail or screw fastening
- Plug in current transformer (\varnothing 11 mm)

Dimension illustrations/ wiring sheme

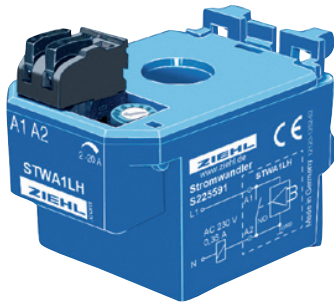
- 1 Housing
- 2 Clip for DIN-rail (removeable)
- 3 Terminal (pluggable)
- 4 Wall-mounting (M4)



AC-Electronic Current Transformer STWA1LH

with output AC 230 V / 0,35 A

STWA1LH



Part number: S225591

The electronic current transformer STWA1LH monitors alternating currents 2 ... 20 A. For lower currents, the monitored wire can be led multiple times through the transformer. Used in the secondary circuit of transformers (e.g. 100/5 A), it is possible to monitor higher currents.

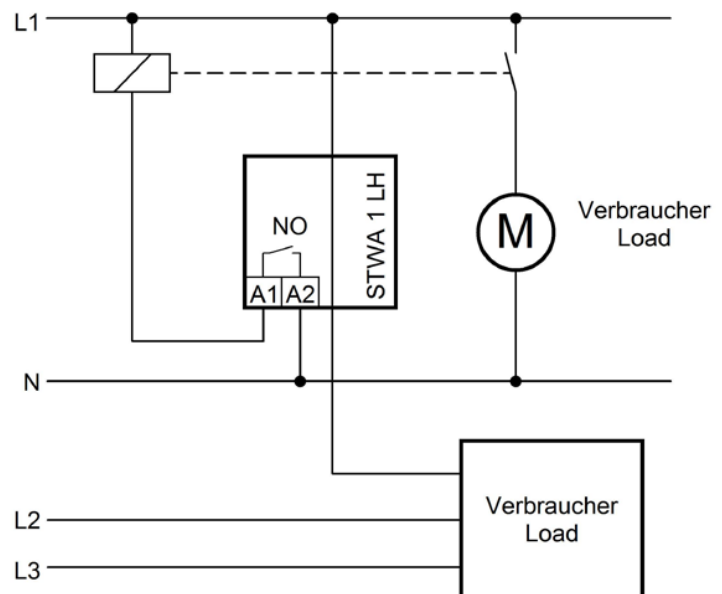
The STWA1LH directly switches alternating voltage up to AC 230 V / 0,35 A.

- Control of ventilations or suction plants
- Control of valves at suction plants in the wood-working industry

Features

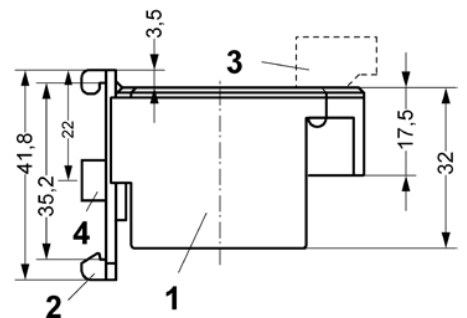
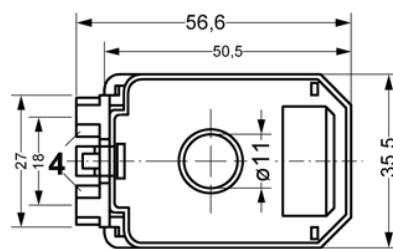
- Monitoring of alternating current up to 20 A
- Response value adjustable 2 ... 20 A
- Two-wire contact (voltage supply through output)
- Operating voltage AC 24 ... 230 V
- Transformer, \varnothing 11 mm
- Space-saving, easy mounting
- Potential separation between monitored current circuit and switch output

Automatic switching-on of additional consumers



Technical Data STWA1LH

| | | |
|-------------------------|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| Operating voltage | Operating voltage | AC 24...240 V |
| | Operating voltage tolerance | ± 10 % |
| | Frequency | 50/60 Hz |
| | Overvoltage category | III (EC 60 664) |
| Current measuring range | | AC 2...20 A For lower currents, the monitored wire can be led multiple times through the transformer |
| | Maximum permanent current | AC 40 A |
| | Maximum excess current | AC 100 A for 60 s |
| Output | Maximum output current | AC 350 mA |
| | Minimum output current | ca. 10 mA |
| | Voltage drop | ≤ AC 8 V |
| | Leakage current | ≤ AC 2 mA at 230 V |
| | Switch | solid state |
| | Electromagnetic compatibility | EN 61000-6-2 and EN 61 000-6-4 |
| | Adjustment accuracy | ± 15 % |
| | Repeat accuracy | ± 5 % |
| | Hysteresis | ca. 10 % of value |
| | Release time | On = <100 ms...800 ms Off = app. 1,5 s |
| | Design dimensions (H x W x D) | housing H 50 x 36 x 56 mm |
| | Fitting position | any |
| | max. ambient temperature range | 0...55 °C |
| | storage temperature | - 20...+70 °C |
| Attachment | 35 mm standard rails conform to EN 50 022 or M 4 screws | |
| Protection | IP 20 | |
| Weight | approx. 90 g | |



- 1 Housing
- 2 Clip for DIN-rail (removeable)
- 3 Terminal (pluggable)
- 4 Wall-mounting (M4)

Current Monitors Type STW

adjustable

General

The STW is an electronic current monitoring relay. Depending on the model, one or more consumers can be monitored using only one instrument.

Specific applications, where current monitors can be used are:

- obstacle lights
- stone- and woodworking machines
- chemical plants
- machine tools of all kinds

and wherever it is necessary to monitor currents for over- or undercurrent.

2

Funktion und Eigenschaften

According to the application, the current-relays are connected into the current-line to the load directly or via a current-transformer. The built-in relay picks up after supply-

voltage is switched on. It releases, when the limit is exceeded and the switching delay has run down.

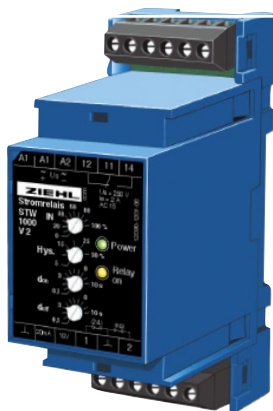
Summary

| Current Monitor | DC | DC | AC/DC | AC | AC | AC |
|----------------------------|-------------------------------|------------------------------------|------------------------------------------------|--------------------------|-----------------|------------------|
| Type | STW1000V2 | TR210 | STW1000 | STW200 | RCM1000V | COSFI100V |
| Connection current direct | X | X | X | X | - | x |
| External shunt | - | - | X | - | - | - |
| External transformer | - | - | X | - | STWA3D | x |
| Number of circuits | 1 | 1 | 1 | 1 | 1 | 1 |
| Response values adjustable | 0 / 4 - 20 mA 0 / 2 - 10 V | 0 - 20 mA 4 - 20 mA 0 - 10 V | 0,1 - 1 A 0,5 - 5A 1 - 10 A 6 - 60 mV | 12 - 120 mA 0,1 - 1 A | 0,01 - 9,99 A | -10,0 - +10,0 A |
| Analog output | - | X | - | - | - | - |
| Housing | V2 | V4 | V4 | V4 | V4 | V4 |

DC-Limit Value Switch Type STW1000V2

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

STW1000V2



Part number:

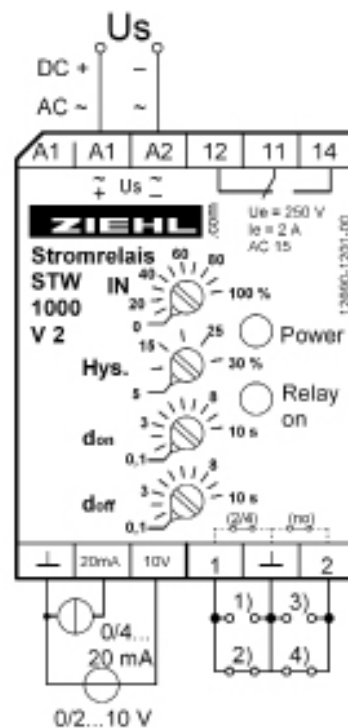
S225677 AC/DC 24-240 V

ZIEHL current-relays STW1000V2 monitor standard-signals from measuring transducers if a limit is exceeded. For monitoring of more than 1 signal, multiple relays can be connected in series (current) or in parallel (voltage). Measuring inputs for 0/4-20 mA and 0-10 V, adjustable hysteresis and switching delay and the choice between operating- and closed-current mode of the relay make it a very universal limit switch.

- Measuring inputs 0-20 mA / 0-10 V, switchable to 4-20 mA / 2-10 V
- Limit adjustable 0-100 %
- Hysteresis adjustable 5-30 %
- Start-up delay adjustable 0,1 ... 10 s
- Switching delay adjustable 0,1 ... 10 s
- Output-relay 1 changeover-contact (co)
- Operating- or closed-circuit-mode for relay selectable with bridge
- LEDs for display state of operation
- Universal supply-voltage AC/DC 24-240 V
- Housing for mounting in switchgear cabinets or fuse-boxes, 35 mm wide

Applications:

Monitoring of different values in combination with measuring transducers, e.g. in machines and controls.



- 1) 0...20 mA, 0...10 V
- 2) 4...20 mA, 2...10 V
- 3) Ruhestrom / closed current
- 4) Arbeitsstrom / operating current

Technical Data

Supply voltage U_s

AC/DC 24 - 240 V, 0/50/60 Hz, < 2W, < 3VA
(DC 20,4 - 297 V, AC 20 - 264 V)

Relay output

Type of contact
Test conditions

1 change-over contact (co)

type 3 see "general technical informations"
see "general technical informations"

Function

Measuring signals

Maximum limit switch

DC 0/4 ... 20 mA, 20 Ω
DC 0...10 V, 63 k Ω

Switching point

Hysteresis

Error of setting

Repeat error

Temperature-dependence

Start-up-delay d_{Enable}

Switching delay d_{AL}

adjustable 0...100%

adjustable 5...30% of set limit

< 10% of fullscale

< 0,2%

$\leq 0,05$ %/K

adjustable 0,1...10 sec.

adjustable 0,1...10 sec.

Rated ambient temp.range

Dimensions (H x W x D)

Attachment

-20°C...+55°C

design V2: 90x35x58 [mm], mounting height 55 mm
on 35 mm DIN-rail according to EN 60 715 or
with screws M4

Protection housing/terminals

Weight

IP 30 / IP 20

approx. 130 g

DC-Universal-Limit Value Switch TR210

for 2 Temperature-sensors or 0/4-20 mA, 0-10 V, 2 Limits, Analog output

TR210



Part number: T224071

The limit value switch TR210 monitors up to 2 measuring inputs for Pt100 (RTD), Pt1000, thermocouples, or standard-signals 0/4-20 mA, 0-10 V.

The signals are monitored for up to 4 limits. The value of one or of both inputs can be read out at an analog output.

Application:

The TR210 is very versatile and can thus be used in many applications. Nevertheless multiple preset programs allow an easy setting.

It can be used as a limit switch or as a controller for 2 limits (with day/night shift up to 4 limits).

As a measuring transducer it can convert signals from the temperature-sensors to standard-signals or change the scaling of standard-signals. The user can also select, if minimum or maximum of 2 signals or the difference of 2 signals is connected to the analog output.

For more applications see basic programs.

2

Function

- Measuring and monitoring range $-170...+1820\text{ }^{\circ}\text{C}$
- resolution $0,1^{\circ}\text{C}$ (to $999,9\text{ }^{\circ}\text{C}$)
- Analog output (scaleable) for 1 input, min./max. of 2 inputs or difference of 2 sensors (no isolation between inputs and output)
- 2 relay outputs
- Shifting of day/night (selectable with contact at terminals Y1/Y2)
- Universal power supply AC/DC 24-240 V
- Easy setting with 3 buttons and preset programs
- Storing of min- and max-values of inputs
- Code-lock against manipulation of settings
- Terminals pluggable

2 Measuring-Inputs:

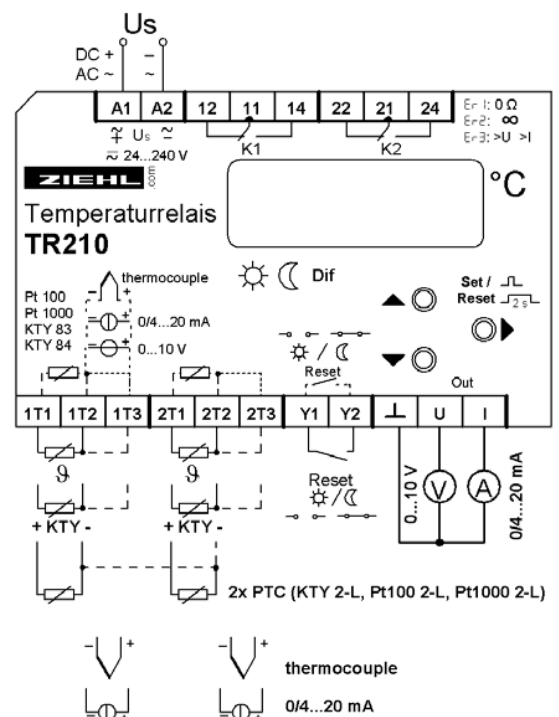
- Resistance-sensors Pt100 (RTD), Pt1000, KTY83/84 in 2- or 3-wire-connection
- Thermocouples types B, E, J, K, L, N, R, S or T
- different sensors at both inputs possible
- Standard-signals 0/4-20 mA, 0-10 V (scaleable)

Displays:

- 4-digit for measuring value
- 2 LEDs for state of relays
- 3 LEDs sensor/difference
- 2 LEDs day/night

Switching-Functions:

- 2 relays (co-contacts)
- 2-4 limits
- Warmest/coldest sensor switches relay
- Programmable for every relay:
 - hysteresis (+ or - = MIN- or MAX-function) $-199,9...999,9\text{ s}$
 - autoreset or electronic reclosing lock
 - delay-time for switching and switching back $0...9999\text{ s}$
 - operating- or closed current-mode
 - cyclic check of function
- Monitoring of difference in temperature
- Preset basic programs



Basic Programs

Program 1:

**1 Temperature-sensor,
2 Limits**

Application: Monitoring of a temperature for 2 limits, e.g. over-temperature with warning and switching off or monitoring of a temperature-range (min/max).

Program 2:

**2 Temperature-Sensors,
1 Limit for each Sensor**

Application: Monitoring of 2 temperatures for 1 limit each, e.g. over-temperature or as double electronic controller.

Program 3:

**1 Temperature-Sensor,
2 Limits each day/night**

Application: Controlling of a temperature with first limit, different for day and night.

Monitoring of the same temperature with second limit, different for day and night.

Program 4:

**2 Temperature-Sensors,
each 1 Limit for day/night**

Application: Monitoring or controlling of 2 temperatures for 2 limits, depending on operation mode, e.g. controlling of 2 circulation pumps (day/night) or of processes (active/stand-by).

Program 5:

**2 Temperature-Sensors for
monitoring of differences in
temperature, 2 Limits**

Application: Regulation or monitoring of the difference of 2 measuring-points for 2 limits, e.g. circulation pumps in solar systems.

Program 6:

1 Standard-Signal 0/4-20 mA or 0-10 V, 2 Limits

Display can be scaled, e.g. measuring input 4-20 mA = display 0...1200 l/h.

Application: Monitoring of signals from a measuring transducer for 2 limits, e.g. over- or under- exceeding of limits with pre-alarm and alarm or monitoring of a signal-range (min/max) and/or as measuring-transducer.

In combination with any measuring-transducers, signals like pressure, volume-flow, pH-value, ... can be monitored.

Program 7:

**2 Standard-Signals 0/4-20 mA or 0-10 V,
1 Limit each**

Display can be scaled, e.g. measuring input 4-20 mA = display 0...1200 l/h.

Application: Monitoring of signals from 2 measuring transducers, each for 1 limit, e.g. over- or under- exceeding of a limit as double electronic controller.

Program 8:

**2 Standard-Signals 0/4-20 mA or 0-10 V for moni-
toring of differences of signals**

Application: Regulation or monitoring of the difference of 2 analog signals for 2 limits, e.g. levels of liquids.

Program 9:

22 Temperature-Sensors, 2 shared Limits

Application: Coldest (MIN) or warmest (MAX) sensor switches relay. Monitoring of 2 bearings for pre-alarm and alarm.

Application as Measuring-Transducer:

At programs **with 1 measuring-input** the output can be scaled for this input, e.g. 0...200.0 = 4-20 mA.

At programs **with 2 measuring-inputs** the output can be scaled for 1 input or min- or max- value of both inputs.

At programs **for measuring of differences** output can be scaled for 1 signal or for the difference input 2 minus input or for min- or max- value of both inputs.

Thus the TR 210 can be used as limit value switch and/or measuring-transducer simultaneously. The measured values can be forwarded to e.g. a remote display or a superior control.

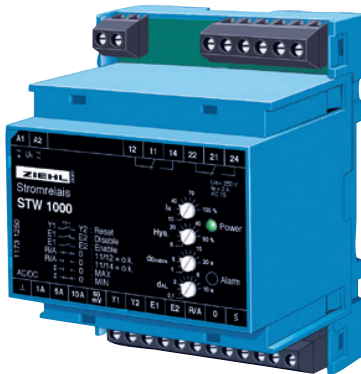
Technical Data

| | |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rated supply voltageUs | AC/DC 24-240V, <3W, <5VA (AC 20-264 V, DC 20,4-297 V) |
| 2 Measuring inputs | Pt100, Pt1000 according to EN 60 751 Thermocouples types B, E, J, K, L, N, R, S, according to EN 60 584, DIN 43 710 0/4-20 mA (22Ω), 0-10 V (13 kΩ) |
| Measuring-time | <2,5s to 5s, depending on speed of change of signal |
| Analog output | 0/4-20 mA, max. 500 Ω. 0-10 V, max. 10 mA (without isolation to inputs) |
| Relay output | type 3, see "general technical informations" 2 x 1 co- (change-over) contact |
| Test conditions | see "general technical informations" |
| Rated ambient temperature range | -20...+60°C |
| Dimensions h x w x d | design V4: 90x70x58 [mm], mounting height 55 mm |
| Protection housing / terminals | IP 30 / IP 20 (terminals pluggable) |
| Weight | app. 200 g |
| Attachment | on 35 mm DIN-rail or with screws M 4 |

Current Relay for DC- and AC-currents

AC/DC 0,1 - 10 A, 60 mV with external shunt

STW1000



Part number:
S225684 AC/DC 24-240 V

ZIEHL current-relays STW1000 have 4 measuring-ranges. They monitor most of the common AC- and DC-currents for over- or undercurrent. Currents up to 10 A can be connected directly to the STW. For higher currents external transformers (to inputs 1/5 A) or Shunts (input 60 mV) can be connected.

- Measuring inputs 1 A, 5 A, 10 A, direct or via transformer
- Measuring input 60 mV for ext. Shunt
- Automatic detection of AC/DC
- Monitoring of over- or undercurrent
- Adjustable range 10...100% I_n
- Hysteresis adjustable 5...50%
- Start-up delay 1...20s (input enable)
- Switching delay 0,1...10s for fading of short peaks
- Output-relay 2 changeover-contacts (co)
- Operating- or closed-circuit-mode for relays selectable with bridge

- Universal supply-voltage AC/DC 24-240 V
- Interlocked switching selectable with bridge
- LEDs for display state of relay
- Housing for mounting in switchgear cabinets or fuse boxes, 70 mm wide, mounting height 55 mm
- option: other supply voltages

Technical Data

supply voltage U_s

AC/DC 24-240 V, <3W, <5VA
(AC 20-264 V, DC 20,4...297 V)

relay output
type of contact
test conditions

2 change-over contacts
type 2 see "general technical informations"
siehe "general technical informations"

function
frequency of measured current
internal resistance
overload capacity/continuously
max. 10s

Over- or undercurrent, DC or AC (1-phase)
0 / 40 ... 400 Hz
60 mV: 40 k Ω , 1A: 0,1 Ω , 5A: 20 m Ω , 10 A: 10 m Ω
60 mV: 10 V, 1A: 2 A, 5A: 7,5 A, 10 A: 11 A
60 mV: 10 V, 1A: 5 A, 5A: 15 A, 10 A: 20 A

switching point
hysteresis
error of setting
repeat error
temperature-dependence
start-up-delay d_{enable}
switching delay d_{al}

adjustable 10...100% I_n
adjustable 5...50% of switching point
< 10%
 $\pm 0,2\%$
 $\leq 0,05 \% / K$
adjustable 1...20 sec.
adjustable 0,1...10 sec.

rated ambient temp. range

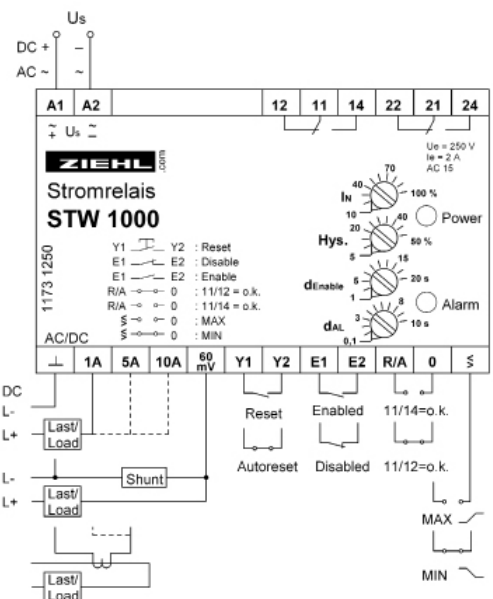
-20°C...+55°C

dimensions (h x w x d)
attachment

design V4: 90 x 70 x 58 [mm]
on 35 mm DIN-rail according to EN 60 715 or
with screws M4

protection housing/terminals
weight

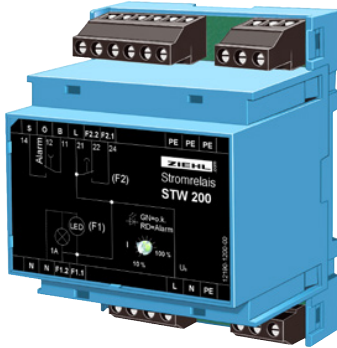
IP 30 / IP 20
approx. 180 g



Current-Relay for Obstacle Lights

AC 12 - 120 mA for LED-Lamps, 0,1...1 A for light bulbs

STW200



Current-relays STW200 monitor AC-currents for falling below an adjusted limit. The ranges 12 ... 120 mA and 0,1 ... 1 A allow the monitoring of LED-Lamps as well as incandescent lamps in obstruction lights.

In case of main lamp failure a relay switches on the reserve lamp. An alarm contact is available for signaling a lamp failure.

If an alarm is required in case of failure of reserve lamp, a second STW200 is used.

Application:

Monitoring of LED-Lamps or light-bulbs in twin obstacle lights with alarm (lamp failure) and switching on a reserve lamp.

Monitoring of the function of single obstacle lights. At conventional solutions with a change-over contact, there is a short on-pulse at the reserve lamp everytime when the system is switched on. The STW200 switches it on only in case of a failure of the main lamp. LED-lamps can also be monitored with long cables between relay and lamp.

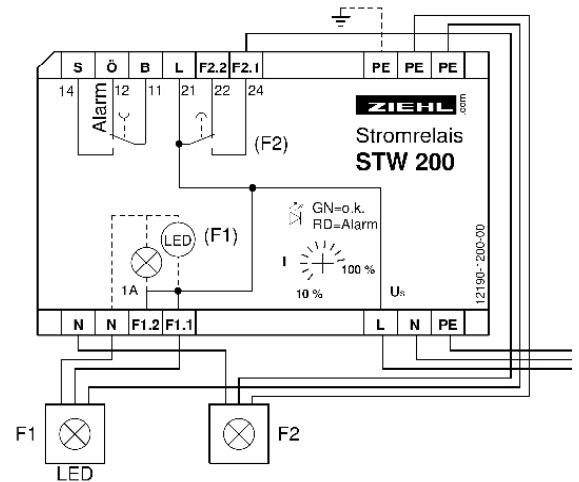
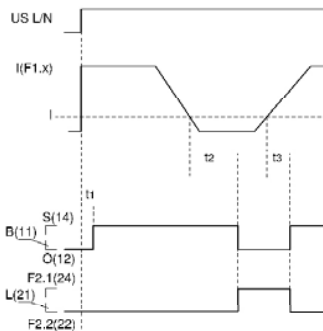
When monitoring LED-lamps a total failure is detected. Failures of single LEDs are not detected.

Part number:

S225530 AC 230 V

- Measuring input 12...120 mA for LED-lamps
- Measuring input 0,1...1 A for incandescent lamps (bulbs)
- withstands current-peaks when switching on lamp
- Adjustment range 10...100 %

- Relay for switching on reserve light in operating-current mode
- Relay for alarm in closed-current mode
- Cable-length from relay to lamp up to 500 m
- Display green = o.k., red = low current alarm
- Housing 70 mm wide, mounting height 55 mm



Technical Data

Supply voltage U_s
Tolerance

AC 230 V 50/60 Hz, < 3 VA
0,85 ... 1,1 U_s

Relay output
Type of contact

2 x 1 change-over contact
type 2 see "General Technical Informations"

Measuring ranges
Tolerance / repeating error
Hysteresis
Delay alarm

AC 12...120 mA / AC 0,1...1 A
 $\pm 15\%$ / < 1 %
app. 5%
app. 2 s

rated ambient temp. range

-40°C...+55°C

Dimensions H x B x T
Line connection
Attachment
Protection housing/terminals
Weight

V 4: 90 x 70 x 58 mm, mounting height 55 mm
one wire: 4 mm², stranded with sleeves: 2,5 mm²
35 mm DIN-rail or 2 screws M4 (option)
IP 30/ IP 20
app. 210 g

Residual Current Monitor RCM1000V

Monitoring of AC-currents in grounded power supply systems

RCM1000V



Part numbers:

S225710 AC/DC 24-240 V

T224384

ER4



RCM100V monitors residual currents in grounded power supply systems. Used as a current relay it monitors AC- or pulsing DC-currents for exceeding upper or lower limits.

Insulation faults can be caused by damages (mechanical, thermic or chemical) of insulations or also by humidity or pollution. At currents > app. 250 mA (at 230 V) at a location, the fault can lead to danger of fire.

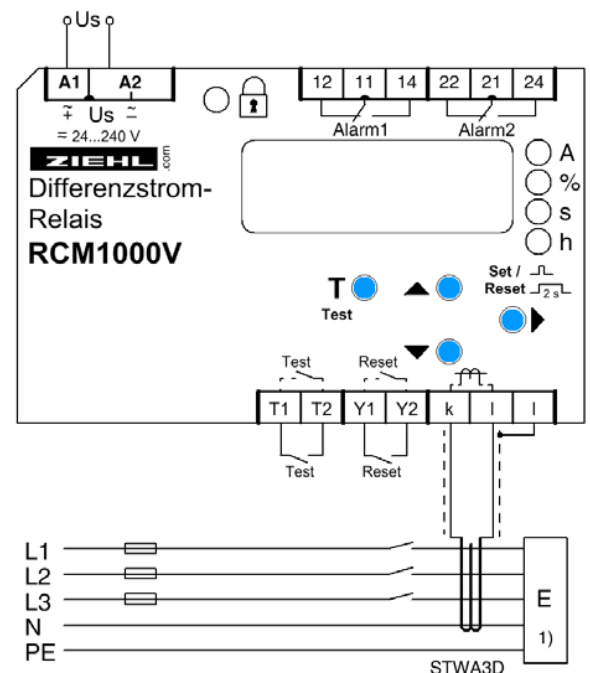
Applied as current relays RCM1000V can among others monitor current in the neutral conductor. Nonlinear loads, e.g. switching power supplies in PC, printers or lights with EGC, cause harmonics in the neutral conductor: Even when the load is symmetric, the harmonics can lead to an overload in the neutral conductor. RCM1000V detect and report this overload.

Residual current monitors detect these faults in widely branched power supply systems and make a signal before additional damage develops.


By displaying the residual current also stealthy changes can easily be detected and localized by switching on and off parts of the power supply system.

Particularly useful in monitoring in systems in which no fault current circuit breaker can or shall be used, because an immediate switching would have wide-ranging consequences, such as breakdown of computer systems or interruption of processes of sensitive goods. RCM1000V do NOT replace fault current circuit breakers for protection from electric shock but they can complement it by detection of a fault in the insulation before the systems has to be shut off.

- Monitoring of residual currents
- 2 limits for alarm and trip
- Monitoring of current, 2 x under- or overcurrent or windows
- Measuring range 0,003 ... 9,999 A
- Setting range 0,010...9,999 A
- Display can be scaled
- Test-button and automatic test every 24 hours
- Input for current transformer STWA3D with monitoring of transformer
- Start-up delay to suppress alarms when switching on
- 4 digits bright LED-display for measured values and programming
- LEDs for alarms, state of relays and units
- Limit, hysteresis, switching delay and switch off delay individually programmable
- Function of relays (nc-, or no-mode) and interlocked switching or autoreset programmable
- Universal supply voltage AC/DC 24-240 V
- Housing for DIN-rail mount, 70 mm wide, mounting height 55 mm
- Accessory: [Installation frame ER4 for panel mount](#)



Technical Data

| | |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rated supply voltage | AC/ DC 24V - 240V, < 1,5W, < 5 VA DC 20,4 - 297 V, AC 20-264 V 50 ...500 Hz |
| Relays K1, K2 (alarm 1, 2) | 2 x 1 co-contacts, type 2, see "general technical informations" |
| Monitoring of current (program 1 and 2) | Type STWA3D... (20, 35, 70, 125) ≤ 10 m, single wire, ≥ 0,75 mm ² 0,003 A ... 9,999 A 10 % ... 25 % 50 ...500 Hz adjustable 0 ... 10 s adjustable 0,03 ... 10,0 s (Prog. 2 = 0,03 ... 500,0 s) adjustable 0 ... 999 s |
| Residual current relay (program 1 only) | EN 62020 Alarm 2 -> adjustable 0,010 A ... 9,999 A Alarm 1 -> adjustable 50% ... 100% of alarm 2 0 ... -20% depending of configuration of relays: closed current -> relays release = alarm operating current -> relays remain released (= no alarm) type A  |
| Current relay (program 2 only) | EN 50178 / EN 60947-5-1 0,010 A ... 9,999 A 10%...25% ± 2%, ± 3 digit ± 10%, ± 3 digit |
| Insulation | EN 60664-1 4000 V AC 300 V III 2 |
| EMC tests | EN 62020 EN 61000-6-3 EN 61000-4-4 ± 4 kV pulse 5/50 ns, f = 5 kHz, t = 15 ms, T = 300 ms IEC 61000-4-5 ± 2 kV IEC 61000-4-2 ± 3,8 kV discharge contact, ± 6 kV discharge air -20...+65 °C -20...+70 °C |
| Housing | Design V4 / Front mounting kit type ER4 70 x 90 x 58 mm mounting height 55 mm IP30/20 Snap mount on standard rail 35 mm acc. to EN 60715 or screws M4 app. 170 g |

Current Transformer STWA3D

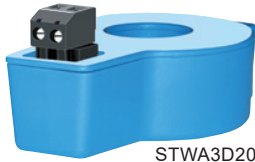
for use with RCM1000V

STWA3D

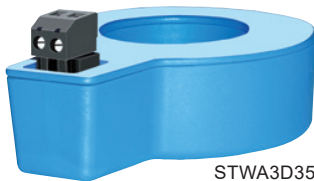
The current transformers STWA3D for use with residual current monitor RCM1000V are available with 4 different inside diameters.

STWA3D20-70 can be snapped on a DIN-rail, vertically or horizontally or be fixed with screws. The Bracket for mounting is included.

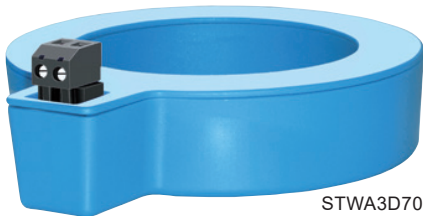
STWA3D125 can only be mounted with screws.



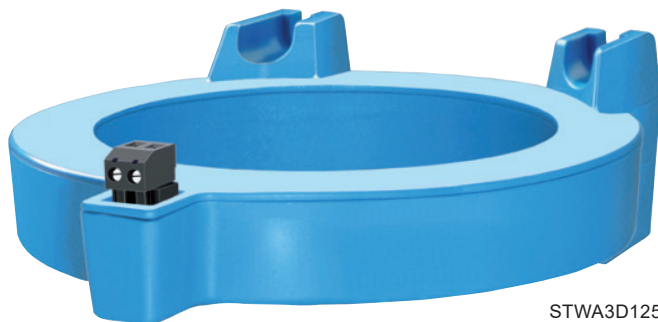
STWA3D20



STWA3D35

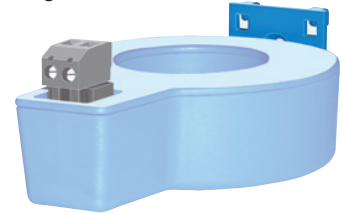


STWA3D70



STWA3D125

Bracket for mounting 20 - 70 mm



2

Part numbers:

| | | | |
|----------------|-----------|--------|----------|
| S225725 | STWA3D20 | 20 mm | ∅ Inside |
| S225726 | STWA3D35 | 35 mm | ∅ inside |
| S225727 | STWA3D70 | 70 mm | ∅ inside |
| S225728 | STWA3D125 | 125 mm | ∅ inside |

Option:

Split core current transformer upon request.

Technical Data

| | |
|-------------------------------------------|-------------------|
| Rated current K_n primary/secondary | 10 A / 0,0167 A |
| Rated power | 50 mVA (180 Ohm) |
| Frequency range | 42 Hz ... 3 kHz |
| Rated ambient temperature range | -5 °C ... +70 °C |
| Temperature storage | -25 °C ... +70 °C |
| Rated short-time thermal current I_{th} | 2,4 kA / 1 s |
| Rated continuous residual current | 40 A |
| Nominal current I_{DYN} | 6 kA / 40 ms |
| Nominal voltage | 0,8 kV |
| Rated impulse voltage | 8 kV |
| Contamination level | III |

| Dimensions | STWA3D20 | STWA3D35 | STWA3D70 | STWA3D125 |
|-----------------|--------------|---------------|----------------|----------------|
| Inside diameter | 20 mm | 35 mm | 70 mm | 125 mm |
| X * Y * Z (mm) | 53 * 49 * 87 | 68 * 49 * 103 | 103 * 49 * 137 | 173 * 63 * 200 |
| Weight | 120 g | 160 g | 290 g | 910 g |

Current Transformers for AC-Current

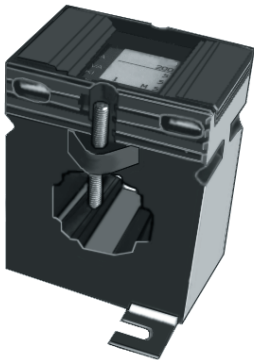
WS and AS



Current-Transformer Type WS

For currents >5A current monitors require a current transformer with secondary 1 or 5 A and a rated capacity of min. 2.5 VA. The primary rated current must be appropriate to the max. expected current (fuse). Plug-in or winding current transformers can be used. We recommend the use of WS winding current transformers for primary rated currents of 5 to 30 A. For primary rated currents of 60 to 500 A we recommend using AS plug-in current transformers, suitable for the Cu-rail of 30 x 10 mm or 2 x 20 x 10 mm or round conductor of 28 mm. Both transformers have a Class 1 accuracy and a voltage resistance of up to 800 V. When ordering, please indicate desired type (WS or AS) primary and secondary rated current.

Terminal designation
primary: K/L
secondary: k/l



Current-Transformer Type AS

Part numbers:

WS winding current transformers are available:

S225178
S225179
S225180
S225688

S225182
S225183
S225184
S225689

Class 1, 2,5 A

WS5/1 A
WS10/1 A
WS20/1 A
WS30/1 A

WS5/5 A
WS10/5 A
WS20/5 A
WS30/5 A

AS plug-in current transformers are available:

S225170
S225171
S225172
S225173

S225174
S225175
S225176
S225177

Class 1, 2,5 VA

AS60/1 A (1,5 VA)
AS100/1 A
AS200/1 A
AS500/1 A

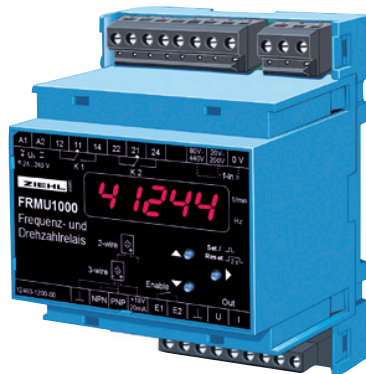
AS60/5 A (1,5 VA)
AS100/5 A
AS200/5 A
AS500/5 A

Weight approx. 300 g

Frequency- and Speed-Relay FRMU1000

with integrated Measuring-Transducer

FRMU1000



Part numbers:

FR1000 no analog output
U226135

FRMU1000 with analog output
U226134

Input 20-200 / 80-440 V
U226138
Input 110-300 / 210-830 V

Function

The FRMU1000 is a speed-monitor, a frequency-monitor and a measuring-transducer in one device.

2 limits with 1 relay each can be programmed for under- or over-speed, under- or overfrequency or each monitoring of a range (min/max).

The input for monitoring of speed can evaluate signals from proximity-sensors 2- or 3-wire, npn or pnp. The display can be scaled. Thus the real speed of a shaft can be displayed, even though there are several pulses per revolution, e.g. from a cogwheel.

Application as Frequency-Relay:

Monitoring of frequencies in mains 16 2/3 to 400 Hz on maintaining a range (min/max).

Application as Speed-Relay:

Monitoring of overspeed or underspeed, each with pre-alarm and alarm, monitoring of maintaining a range (min/max) or monitoring of stop at machines and equipment, e.g. at conveyors, escalators or lifts or for monitoring of drive-belts.

Application as Measuring-Transducer:

In addition, the FRMU can be used as measuring-transducer to convert the input-signal into a standard-signal 0/4-20 mA or 0-10 V.

Frequency:

- Measuring-inputs voltage AC 20-200 V/ 80-440 V oder AC 110-300 V/ 210-830 V (option)
- Monitoring of frequency of own supply-voltage
- Monitoring range 10-500 Hz
- Resolution of display 0,01 Hz

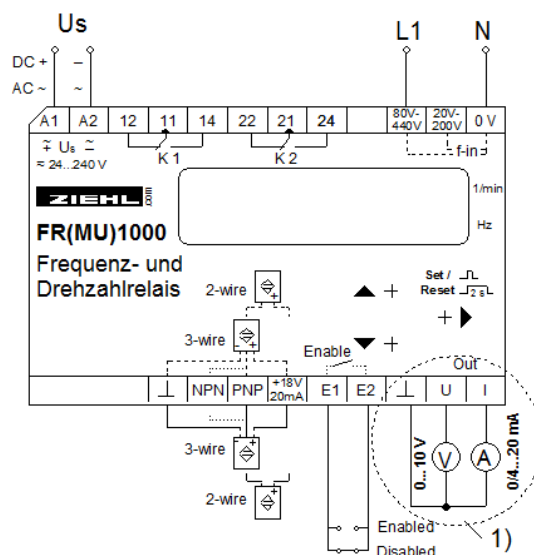
Speed:

- Monitoring range 5...99999 min⁻¹
- Display can be scaled
- Measuring-input for capacitance-switches 2- or 3-wire, npn or pnp
- Start-up-delay programmable
- Start-input (activates device with switching on the monitored drive)

General:

- Setting in Hz or min⁻¹
- 5-digit display
- Analog output DC 0/4-20 mA, or DC 0-10 V, freely scaleable (with isolation to frequency-input U1/U2)
- 2 limits/ 2 relays

- Programmable for each relay:
 - Monitoring of min, max or range
 - Hysteresis
 - Autoreset reclosing lock
 - Delay-time for switching and switching back down to 50 ms
 - Operating- or closed-current mode
- LEDs for state of relays and unit (Hz oder min⁻¹)
- Storage of min- and max- values of the inputs
- Easy setting with 3 buttons
- Code lock against manipulation of settings
- Universal power supply AC/DC 24-240 V
- Terminals pluggable



Technical Data FRMU1000

| | |
|---------------------------------|--------------------------------------------------------------------------------------|
| Rated supply voltage U_s | AC/DC 24-240 V, <3W, <10VA (AC 20-264 V, DC 20,4-297 V) |
| Frequency | 0, 40...500 Hz, > AC 80 V: 10...500 Hz |
| Measuring input Frequency | 10.00-500.00 Hz |
| Admissible voltage | AC 20-200 V/ 80-440 V AC 110-300 V/ 210-830 V (option) |
| Measuring input Speed | 5-99999 min ⁻¹ |
| Analog output | PNP or NPN, 3-wire or 2-wire 0/4-20 mA, max. 500 Ω , 0-10 V, max. 10 mA |
| max. error | < 0,15 % from FullScale + 0,015 %/K |
| Relay output | Type 3, see "general technical information" 2 x 1 (change-over) contact |
| Test conditions | see "general technical information" |
| Rated ambient temperature range | -20 °C ... +60 °C |
| Dimensions(h x w x d) | Design V4: 90 x 70 x 58 mm, mounting height 55 mm |
| Protection housing / terminals | IP 30/IP 20 (terminals pluggable) |
| Weight | app. 180 g |
| Attachment | on 35 mm DIN rail or with screws M 4 |

Inductive Proximity Sensor IG2



Part numbers:

| | |
|----------------|-------|
| U226003 | IG2 |
| U226004 | cable |

Proximity-Sensor for Speed Relay FRMU 1000.

- 3-wire-connection PNP
brown =+, blue = -, black = A
- nickel-plated brass
- flush-mounting possible
- max. 48.000 IPM (800 Hz)
- max. switching distance 4 mm
(recommended \leq 3 mm)

- Connection cable pluggable
- integrated protection against reverse polarity
- LED for state of output

Connection Cable

- Plug M 12, angled
- Length 5 m, 3 x 0,34 sqmm
- PUR cable sheath

Technical Data

| | |
|----------------------------|----------------------------|
| Rated supply voltage U_s | DC 10-30 V |
| Max. switching frequency | 800 Hz = 48000 Imp/min |
| Max. switching distance | 4 mm (recomm. \leq 3 mm) |
| Factor of reduction | Ms: 0,45, Al: 0,4, Cu: 0,3 |
| Rated amb. temp. range | -25 ... +70 degC |
| Housing | Threaded pipe M12x1 |
| Material | nickel-plated brass |
| Weight | app. 26 g |
| Dimensions | M 12x1 / length 50 mm |
| Torque | max. 10 Nm |
| Connection | threaded plug M 12 |
| Shock resistance | \leq 30 g, \leq 11 ms |
| Vibration resistance | \leq 55 Hz, \leq 1 mm |
| protection | IP 67 |

Relay for Energy Flow EFR3000

Optimization of consumption of own energy

Zero Export Device, measuring transducer for power

EFR3000



Part number: **S225760**

The EFR measures the energy flow in all 3 phases and calculates the mean value.

If sufficient own power left, the EFR3000 switches on up to three consumers and ensures that the power is consumed in the house. Potential consumers are e.g. air conditioners, boilers or battery chargers but also washing machines, dryers, etc ...

This is relatively simple if a PV system feeds uniformly under a clear sky and consumers with constant power consumption, such as heat pumps or heating elements, are connected. Particularly suitable are consumers that consume a lot of energy and can be switched frequently, for example boilers.

It becomes more complicated when the generation varies because of clouds before the sun and consumers do not continuously draw current as washers, dryers, irons or stoves.

The analog output can regulate a consumer stepless and thus achieve a yet higher rate of own consumption. When using phase angle controls the specifications of the grid providers have to be obeyed.

Energy flow is always evaluated and displayed, as seen from a power meter for purchasing energy: purchase from public grid is positive, fed in energy reduces the bill and is therefore negative (- sign).

The EFR3000 can optimize the consumption of own energy even under difficult conditions.

Relays for energy flow EFR3000 monitor the current flow between public power grid and generating plant / consumer.

When the own power plant generates more power than actually is consumed it often is more economical to consume the excess energy self. This is especially reasonable when the difference is high between the price you pay

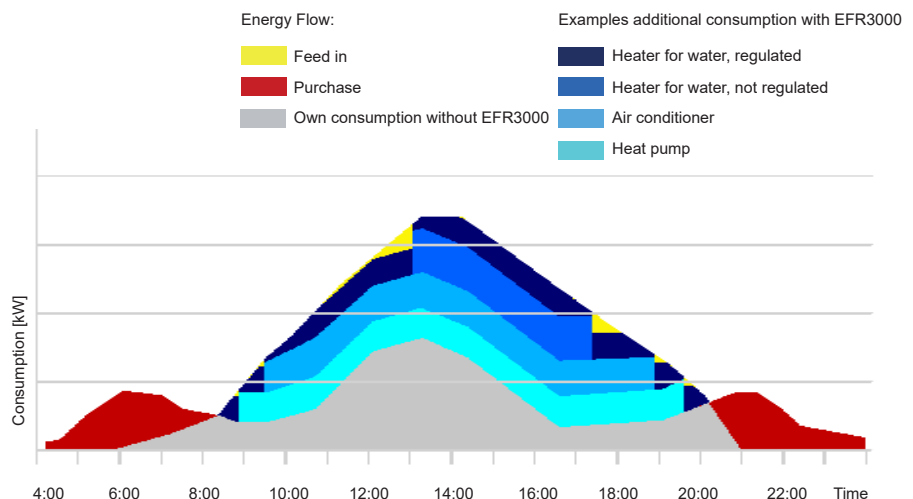
to the grid provider and the price the provider pays for fed in energy.

Functions:

- Shift own consumption into times with high generation of energy
- Switch on consumers when you have overflow of energy
- Increase the share of consumed own energy
- intelligent control of consumers

To achieve this the following parameters can be set

- Switching of up to 3 consumers: the largest consumer, ranked 1-2-3 or combination of 3 consumers (7 levels)
- Power consumption of the connected consumers
- Switch on points. At which energy flow consumers are switched on
- Switch on delay of consumers. Short lowering in consumption (by clocking consumers) or peaks in the feed does not immediately cause turn on of additional consumer
- Minimum on time. Heat pumps may not be switched on and off permanently, washing machines should be able to complete a cycle.
- Switch off delay. Short consumption peaks or reduction of the generated energy does not immediately switch off a load.
- Switch off point. At which energy flow consumers are switched off again. In practice, this value is usually slightly on the purchase side.
- Inputs for blinding out consumers when these are not available, for example when boiler has reached maximum temperature.



Cheap equipment costs ensure a short payback period: Save € 312 * a year with the EFR3000 by switching on

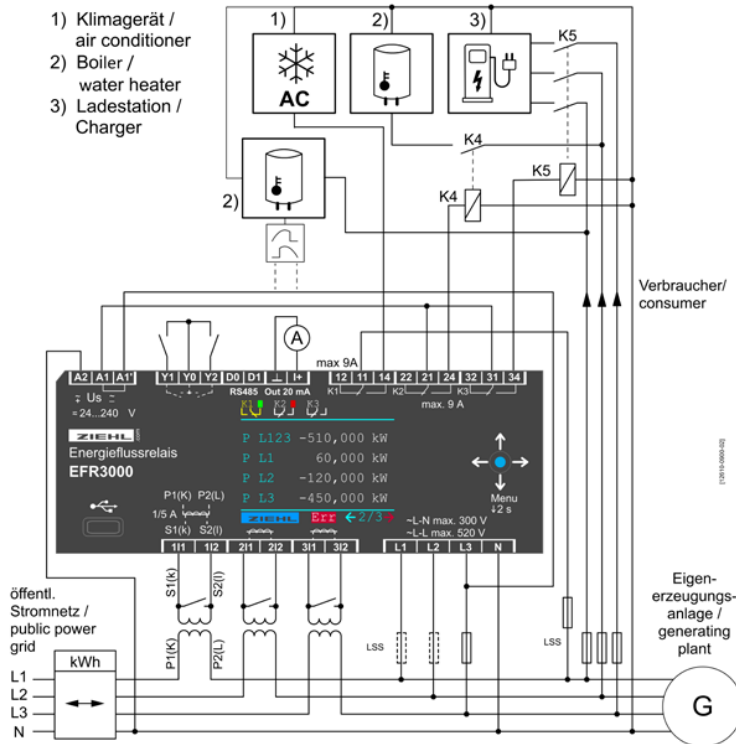
- at 200 days a year
- for an average 3 hours
- consumers with 4 kW

in times you have a surplus of own energy.

Equipment costs (EFR 3000, 3x current transformer, if necessary contactors) are returned within less than 2 years*.

Longer / shorter switch on times and larger / smaller consumption shorten / extend the period. In addition, in the long term rising purchase prices for energy can be expected.

* Feed 12 Ct / kWh, electricity purchase price 25 Ct / kWh



Features:

- Measuring of active power
- Measuring inputs isolated from electronics
- Colored LCD display
- Intuitive handling with joystick
- 3 inputs for customary current transformers with secondary 1 or 5 A. Ratio programmable
- 3 relay outputs, 2 kW directly, higher loads with contactors
- 2 digital inputs Y1/Y2 for control signals
- Analog output for stepless regulation of a consumer
- Measuring transducer with analog output 0/4-20 mA for power L1, L2, L3 or L1+L2+L3. Measuring range can be scaled
- Micro-USB port for configuration and update
- Interface RS 485 (Modbus RTU)
- Housing 140 mm wide
- Zero Export Device. Switch off within <500 ms at inadmissible feed in that is contrary to contract

Part numbers:

S225760 **EFR3000**

Suitable current transformer (split core):

S225770 **KBR 18S**, 60/1A, Klasse 3 0,4 VA

Suitable mini current transformer:

S225780 **CTM7**, 64/1A, Klasse 1 0,5 VA

Technical Data

Rated supply voltage

DC/AC 24 – 240 V 0/50/60 Hz, <3 W, <9 VA
DC 20,4 - 297 V AC 20 - 264 V

Relay outputs K1, K2, K3
Switching voltage
Conventional thermal current I_{th}
Switching power max cos φ=1
Contact service life, electr. cos φ=1
Rated operational current

3 x 1 change-over contact
max. AC 300 V, DC 300 V
max. 9 A
2000 VA
10⁵ operations at 300 V / 9 A
AC-15 I_e = 6 A U_e = 250 V

Measurement of voltage (RMS)
Voltage phase-N
Max. error of measurement

L1 / L2 / L3 towards N
AC 35,0 ... 330,0 V, 50/60 Hz
± 0,5% of fullscale, ±1 digit

Measurement of current
Nominal currents / resolution
Max. error of measurement
Overload capacity
Resistance of input

Primary current max. 1.000 A
AC 1/5 A / 1 mA
± 0,5% of fullscale ±1 digit
8 A continuously, 25 A max. 1 s
25 mΩ

Measurement of active power
Max. error of measurement

± 1.000 kW, resolution 1 W
± 1 % of fullscale ±1 digit

Analog output (GND (–), I+)
Max. error

DC 0/4 – 20 mA for active power ± 1.000 kW, scaleable
± 0,3 % of fullscale + error of measurement active power

Temperature factor
Load

< 0,015 % / K
≤ 500 Ω

Test conditions
Operating temperature

see "general technical information"
-20 °C ... +55 °C

Dimensions (B x H x T)
Protection housing/terminals
Attachment
Weight

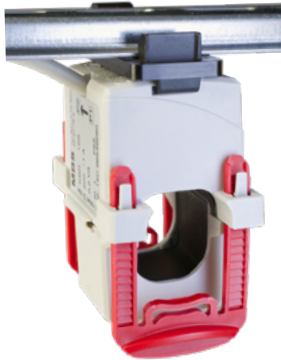
140 x 90 x 58 mm, mounting height 55 mm
IP 30 / IP20
on 35 mm DIN rail or with screws M4
app. 300 g

Current transformers for Relay for Energy Flow EFR3000 and EFR4000IP

Split core current transformer KBR18S, 60/1 A, class 3, 0,4 VA

Compact current transformer CTM7, 64/1 A, class 1, 0,5 VA

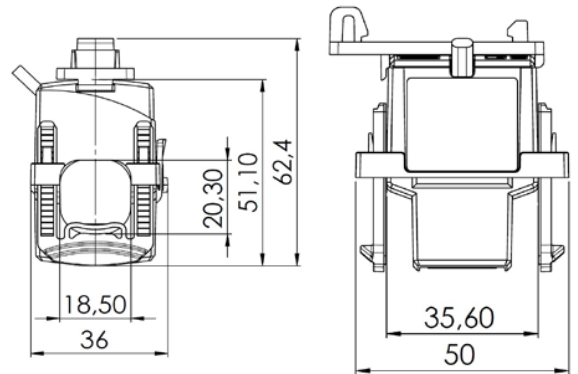
KBR18S



The split core current transformer KBR18S is especially suitable for being subsequently mounted in existing facilities. With its primary 60 A it matches perfectly the 63 A with which domestic connections are usually fused.

The secondary 1 A are connected to EFR. The inputs of the EFR are preset for this value. A clip for mounting on DIN-rail is included.

For EFR three current transformers are required.



Part number: S225770

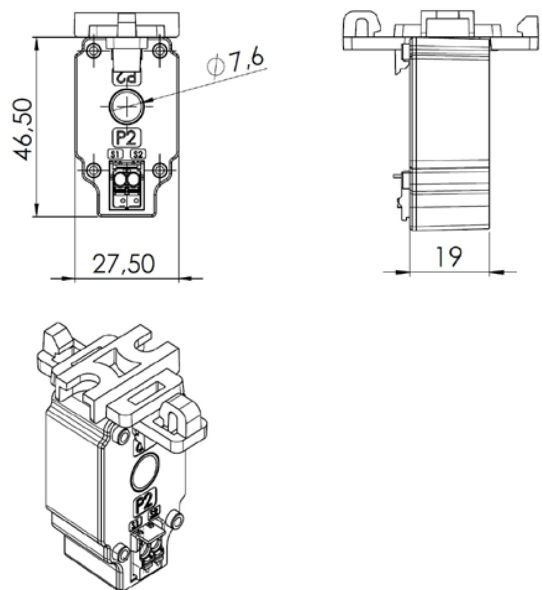
CTM7



The compact current transformer is especially suitable for use in tight space conditions. With its primary 64 A it matches perfectly the 63 A with which domestic connections are usually fused.

The secondary 1 A are connected to EFR. The inputs of the EFR are preset for primary currents 60 A, changing is simple.

A clip for mounting on DIN-rail is included. The transformers can be clicked together for saving space. For EFR three current transformers are required.



Part number: S225780

Technical Data

| | KBR18S | CTM7 |
|---------------------------|----------------------------------------|----------------------------------------|
| Applied standards | EN 61869-1, EN 61869-2 und IEC 61010-1 | EN 61869-1, EN 61869-2 und IEC 61010-1 |
| Primary nominal current | 60 A | 64 A |
| Secondary nominal current | 1 A | 1 A |
| Accuracy class | 3 | 1 |
| Rated power | 0,4 VA | 0,5 VA |
| Operating temperature | -5...+40 °C | -5...+50 °C |
| Dimensions (w x h x d) | 36,0 x 50 x 51,1 mm | 27,5 x 19 x 46,5 mm |
| Diameter of cable | max. 18,5 mm (isolated wire only) | max. 7,5 mm (isolated wire only) |
| Connection | cable 2,5 m 0,5 mm ² | Terminals 0,2...1,5 mm |
| Attachment | on 35 mm DIN rail or with screws | on 35 mm DIN rail or with screws |
| Weight | ca. 180 g | ca. 47 g |

Relay for Energy Flow EFR4000IP

Optimization of consumption of own energy

Integrated Webserver, IP-Connection, Zero Export Device, measuring transducer for power

EFR4000IP



Part numbers:

EFR4000IP **S225761**

ER8 **T224388**

Suitable current transformers
(split core):

60/1A, class 3 0,4 VA
KBR 18S **S225770**
64/1A, class 1 0,5 VA
CTM7 **S225780**

The EFR measures the energy flow in all 3 phases and calculates the mean value.

If sufficient own power left, the EFR4000IP switches on up to three consumers and ensures that the power is consumed in the house.

This is relatively simple if a PV system feeds uniformly under a clear sky and consumers with constant power consumption, such as heat pumps or heating elements, are connected. Particularly suitable are consumers that consume a lot of energy and can be switched frequently, for example boilers.

It becomes more complicated when the generation varies because of clouds before the sun and consumers do not continuously draw current as washers, dryers, irons or stoves.

The analog output can regulate a consumer stepless and thus achieve a yet higher rate of own consumption. When using phase angle controls the specifications of the grid providers have to be obeyed.

Energy flow is always evaluated and displayed, as seen from a power meter for purchasing energy: purchase from public grid is positive, fed in energy reduces the bill and is therefore negative (- sign).

Relays for energy flow EFR4000IP monitor the current flow between public power grid and generating plant / consumer.

Operation is made comfortably via integrated webserver or directly at the device. Measured values are displayed neatly arranged at device on monitor.

When the own power plant generates more power than actually is consumed it often is more

economical to consume the excess energy self. This is especially reasonable when the difference is high between the price you pay to the grid provider and the price the provider pays for fed in energy.

Functions:

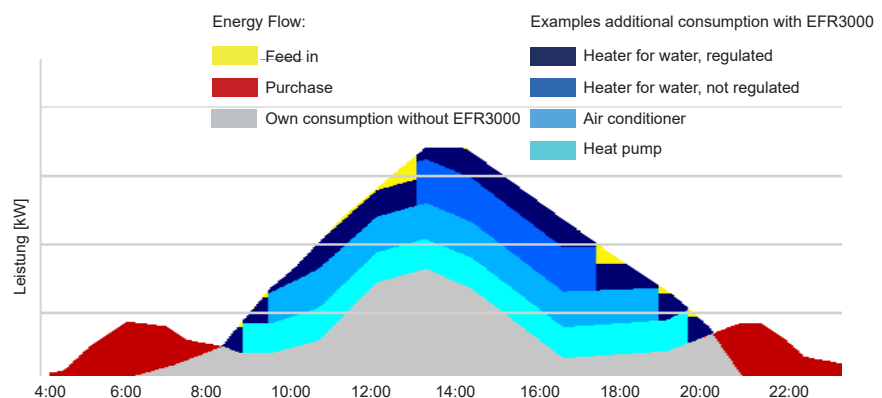
- Shift own consumption into times with high generation of energy
- Switch on consumers when you have overflow of energy
- Increase the share of consumed own energy
- Control of BHKW units or inverters via integrated analog outputs
- intelligent control of consumers

Accessory: [Installation frame ER8 for panel mount](#)

The EFR4000IP can optimize the consumption of own energy even under difficult conditions.

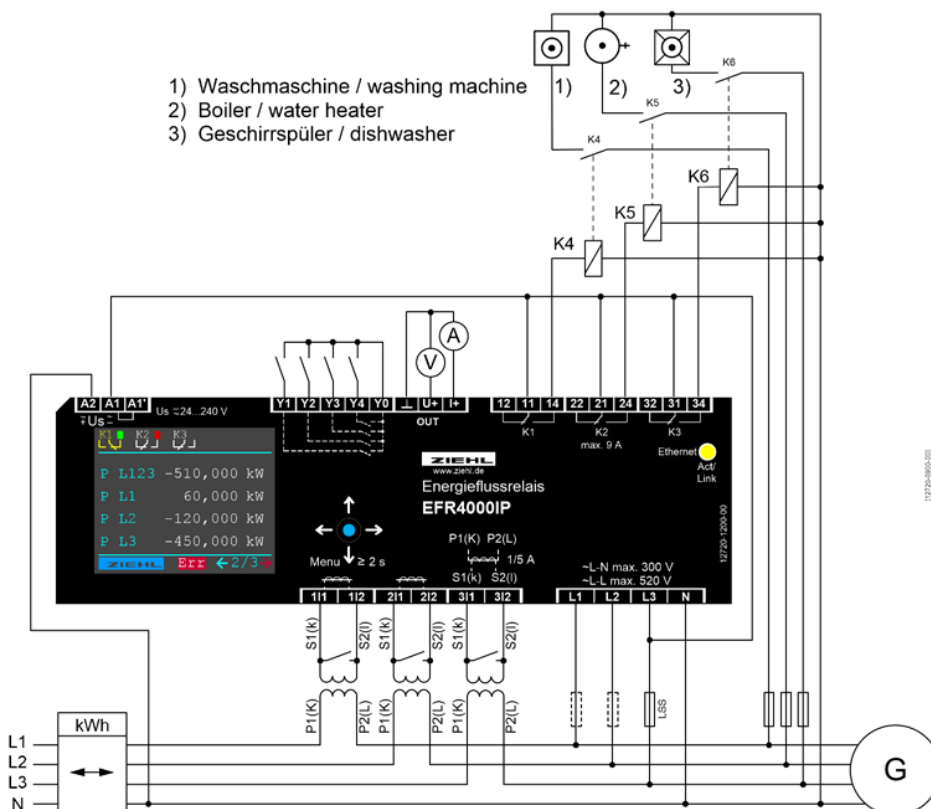
Features and functions:

- Switching of up to 3 consumers: the largest consumer, ranked 1-2-3 or combination of 3 consumers (7 levels)
- Power consumption of the connected consumers
- Switch on points. At which energy flow consumers are switched on
- Switch on delay of consumers. Short lowering in consumption (by clocking consumers) or peaks in the feed does not immediately cause turn on of additional consumer
- Minimum on time. Heat pumps may not be switched on and off permanently, washing machines should be able to complete a cycle.
- Switch off delay. Short consumption peaks or reduction of the generated energy does not immediately switch off a load.
- Switch off point. At which energy flow consumers are switched off again. In practice, this value is usually slightly on the purchase side.
- Inputs for blinding out consumers when these are not available, for example when boiler has reached maximum temperature.



Features:

- Measuring of active power
- Counters for power (feed in and consumption) and switched on consumers (calculated)
- IP-conntection, integrated web-server
- Operation at device with color display (LCD) and joystick
- 3 inputs for customary current transformers with secondary 1 or 5 A. Ratio programmable
- 3 relay outputs
- 4 digital inputs Y1-Y4 for control signals
- Analog outputs for stepless regulation of a consumer. Zero adjustable 0-10 mA / 0-5 V for charging only when enough power is available
- Measuring transducer for power DC 0/2-10 V, 0/4-20 mA for active power up to ± 1000 kW, scaleable
- Housing 140 mm wide
- Zero Export Device and limiter. Switch off within <500 ms at inadmissible feed in that is contrary to contract



2

Technical Data

| | |
|----------------------------------------------|---------------------------------------------------------------------------|
| Rated supply voltage | DC/AC 24 – 240 V 0/50/60 Hz, <3 W, <9 VA DC 20,4 - 297 V AC 20 - 264 V |
| Relay outputs K1, K2, K3 | 3 x 1 change-over contact |
| Switching voltage | max. AC 300 V, DC 300 V |
| Conventional thermal current I _{th} | max. 9 A |
| Switching power max cos φ=1 | 2000 VA |
| Contact service life, electr. cos φ=1 | 10 ⁵ operations at 300 V / 9 A |
| Rated operational current | AC-15 I _e = 6 A U _e = 250 V |
| Measurement of voltage (RMS) | L1 / L2 / L3 towards N |
| Voltage phase-N | AC 40,0 ... 330,0 V, 50/60 Hz |
| Max. error of measurement | ± 0,5% of fullscale, ±1 digit |
| Measurement of current | Primary current max. 1.000 A |
| Nominal currents / resolution | AC 1/5 A / 1 mA |
| Max. error of measurement | ± 0,5% of fullscale ±1 digit |
| Overload capacity | 8 A continuously, 25 A max. 1 s |
| Resistance of input | 25 mΩ |
| Measurement of active power | ± 1.000 kW, resolution 1 W |
| Max. error of measurement | ± 1 % of fullscale ±1 digit |
| Analog outputs (GND (⊥), I+, U+) | DC 0/4/1-10...20 mA, DC 0/2/0-5...10 V |
| Max. error | ± 0,3 % of fullscale + error of measurement active power |
| Temperature factor | < 0,015 % / K |
| Load | ≤ 500 Ω |
| Test conditions | see "general technical information" |
| Operating temperature | -20 °C ... +55 °C |
| Housing / Installation Frame | Design V8 / Front mounting kit ER8, 8 TE |
| Dimensions (B x H x T) | 140 x 90 x 58 mm, mounting height 55 mm |
| Protection housing/terminals | IP 30 / IP20 |
| Attachment | on 35 mm DIN rail or with screws M4 |
| Weight | app. 300 g |

Relay for Energy Flow EFR4001IP

Optimization of self-consumption of self-generated energy

Zero Export Device

Available 3rd quarter 2022

EFR4001IP



Part numbers:

EFR4001IP **S225762**

ER8 **T224388**

Suitable current transformers:
(split core)

60/1A, Klasse 3 0,4 VA :
KBR 18S **S225770**
(not possible for Pav,e)

64/1A, Klasse 1 0,5 VA
CTM7 **S225780**

Relays for energy flow EFR4001IP monitor the current flow between public power grid and generating plant / consumer. Operation is made comfortably via integrated webserver or directly at the device. Measured values are displayed neatly arranged at device on monitor.

When the own power plant generates more power than actually is consumed it often is more economical to consume the excess energy self. This is especially reasonable when the difference is high between the price you pay to the grid provider and the price the provider pays for fed in energy.

Many areas suitable for photovoltaics could not be used so far, since only a limited amount of power can be fed in at the grid connection point.

In Germany new standards allow exceeding this value by up to 2/3 (66.6%) installed capacity. The prerequisite for this is that the overbuilt power is consumed and

Features:

- Measuring of active power 1- or 3-phase up to 1.000 kW (more with factor)
- Counters for power (feed in and consumption)
- Operation at device with color display (LCD) and joystick
- 3 inputs for customary current transformers with secondary 1 or 5 A.

not fed into the grid. In order to still ensure the stability of the system, this must be monitored.

The same applies to zero export, when no energy at all may be fed into the grid. In this case, the device can be used as an energy flow direction sensor (EnFluRi). The EFR4001IP has been optimized for these functions.

Zero-Export-Device or limiter:

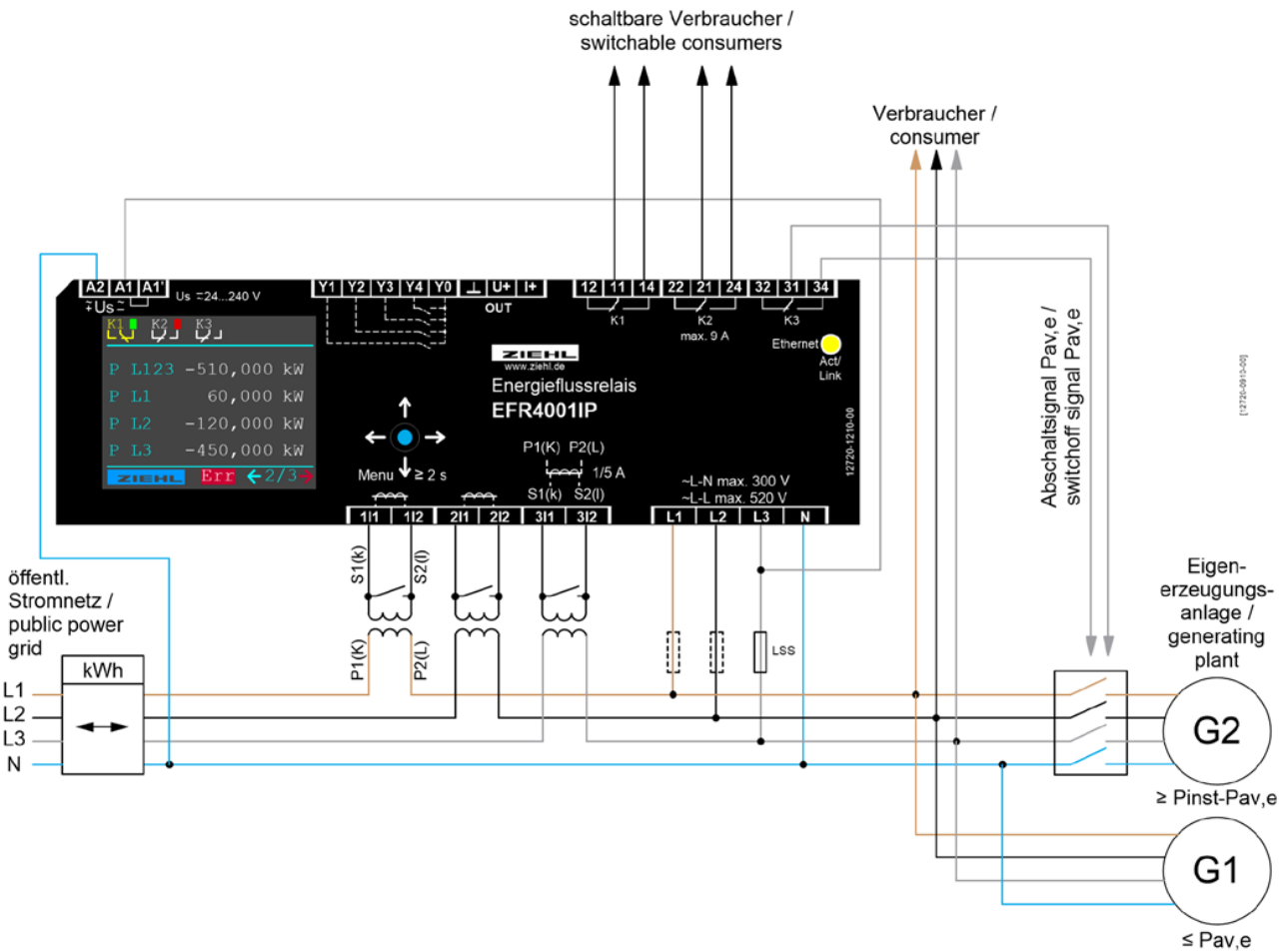
- Switching off the power generation system or parts of it if the permissible feed-in power is exceeded with relay K3
- Switching on consumers or reducing generators before it comes to that by means of regulating with an analogue output or switching loads with relays K1 and K2
- Energy flow direction sensor (EnFluRi sensor) and feed-in limitation < 0.1s

Functions

- Switching of up to 3 consumers: the largest consumer, ranked 1-2-3 or combination of 3 consumers (7 levels))
- Switch on and off points. At which energy flow consumers are switched on and off again
- Switch on and off delay of consumers, minimum on time.
- Control of heat pumps (SG-ready), battery chargers, inverters

- 3 relay outputs
- 4 digital inputs Y1-Y4 for control signals, e.g. relay on or off
- IP-connection, integrated webserver
- Analog outputs as measuring transducer and for stepless regulation of a consumer
- Switch gear housing 140 mm wide

Accessory: [Installation frame ER8 for panel mount](#)



2

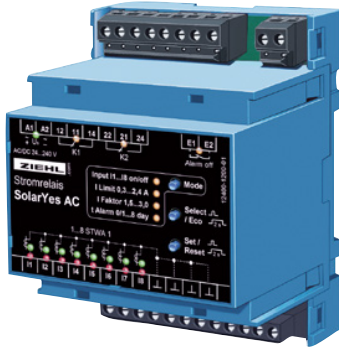
Technische Daten

| | |
|----------------------------------------------|---------------------------------------------------------------------------|
| Rated supply voltage | DC/AC 24 – 240 V 0/50/60 Hz, <3 W, <9 VA DC 20,4 - 297 V AC 20 - 264 V |
| Relay outputs K1, K2, K3 | 3 x 1 change-over contact |
| Switching voltage | max. AC 300 V, DC 300 V |
| Conventional thermal current I _{th} | max. 9 A |
| Switching power max cos φ=1 | 2000 VA |
| Contact service life, electr. cos φ=1 | 10 ⁵ operations at 300 V / 9 A |
| Rated operational current | AC-15 I _e = 6 A U _e = 250 V |
| Measurement of voltage (RMS) | L1 / L2 / L3 towards N |
| Voltage phase-N | AC 15,0 ... 330,0 V |
| Max. error of measurement | ± 0,5% of fullscale, ±1 digit |
| Measurement of current | with transformers (scaleable up to 1.000 A) |
| Nominal currents / resolution | AC 1/5 A / 1 mA |
| Max. error of measurement | ± 0,5% of fullscale ±1 digit |
| Overload capacity | 8 A continuously, 25 A max. 1 s |
| Resistance of input | 60 mΩ |
| Measurement of active power | ± 1.000 kW, resolution 1 W |
| Max. error of measurement | ± 1 % of fullscale ±1 digit |
| Analog outputs (GND (⊥), I+, U+) | DC 0/4/1-10...20 mA, DC 0/2/0-5...10 V |
| Max. error | ± 0,3 % of fullscale + error of measurement active power |
| Temperature factor | < 0,015 % / K |
| Load | ≤ 500 Ω |
| Test conditions | see "general technical information" |
| Operating temperature | -20 °C ... +55 °C |
| Housing / Installation Frame | Design V8 / Front mounting kit ER8, 8 TE |
| Dimensions (B x H x T) | 140 x 90 x 58 mm, mounting height 55 mm |
| Protection housing/terminals | IP 30 / IP20 |
| Attachment | on 35 mm DIN rail or with screws M4 |

Current-Relay SolarYes

Monitoring of Function at Photovoltaic Systems,
Detection of Failure at Inverters, 8 inputs

SolarYes AC



Part number: **S225535**

ER4  **T224384**

The SolarYes monitors outputs of inverters in PV-systems. Its output-relays (2 potential-free contacts) switch, when there has been no current during the last 24 hours in one of up to 8 monitored lines. Thus the failure of an inverter or a fuse is detected and reported. The operator can initiate repair immediately and saves downtime.

The SolarYes is a simple, easily understandable and economical solution, that protects PV-systems from downtimes.

The device is mounted in a switch cabinet or a distribution box. The current is measured contactless with simple and solid current transformers, that are mounted over the line at any position, e.g. near the fuses. A subsequent installation in an existent system is possible.

Over the course of 24 hours occurring minimal currents (at night there can be wattles currents, caused by interference suppression capacitors in the inverter) are automatically measured and faded out in the evaluation.

The minimum response limit of 0,3 A allows measuring of low current-levels. The limit can be reduced by leading the monitored line multiple times through the transformer (\varnothing 11 mm).

In case of false alarms, e.g. with snow on the solar modules, the monitoring interval can be extended to up to 8 days or the alarm can be suppressed with a switch.

The 2 output-relays can switch alarm-lamps or electroacoustic transducers. The connection of an alarm system or another monitoring unit also is possible.

Function

Inputs:

- 8 inputs for current transformers STWA1 or STWA1H (max. 100 A)
- Not connected inputs disconnectible
- Sensitivity adjustable AC 0,3...2,4 A (lower values by leading the monitored line multiple times through the transformer)
- Autocalibration of inputs
- Enable-input

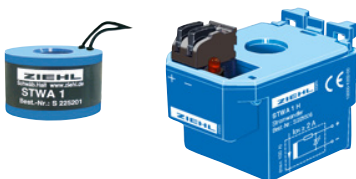
Displays and Controls:

- 8 LEDs for inputs
- 8 LEDs for alarms
- 4 LEDs for display of state and programming
- 2 LEDs for relays
- 1 LED enable-input
- 3 pushbuttons

Other features:

- 2 change-over contacts, nc and no individually programmable
- Autocalibration for easy startup
- Power-saving (Eco-Mode), disconnectible
- Power consumption <0,5 W, <1,2 VA
- Universal supply-voltage AC/DC 24-240 V
- Housing for DIN-rail mount, 70 mm, mounting height 55 mm
- Accessory: [Installation frame ER4 for panel mount](#)

Current transformers STWA1 and STWA1H



For measuring the current, current transformers STWA1 and STWA1H are used, one for every monitored line.

The STWA1 consist of a climate-proven sealed-in coil with 2 x 1 m cable.

The STWA1H can be fixed on a DIN-rail or mounted with 2 screws. The electrical connection is made via pluggable terminals. A built-in LED lights up at currents > app. 2 A.

The inner diameter of both current transformers is 11 mm, the maximum current is 100 A.

Part numbers:

S225201 STWA1

S225506 STWA1H

Technical Data SolarYes

| | |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Rated Supply Voltage | AC/DC 24-240 V, 0/45...65 Hz DC: 20,4...297 V, AC: 20,4...264 V |
| Power Consumption | < 0,5 W, < 1,2 VA |
| Relay-Output | 2 Change-over contact (CO) type 2, see general technical hints |
| Measuring Inputs | 1-8 Current transformers STWA 1 or STWA 1 H Sensitivity adjustable AC 0,3 - 2,4 A ± 30% max. 100 A continuously, 300 A / 10 s |
| Function | Monitoring interval adjustable 1-8 days |
| Test Conditions | see general technical hints |
| Rated ambient temperature range | -20°C...+65°C |
| Housing / Installation Frame | Design V4 / Front mounting kit type ER4 |
| Dimensions (w x h x d) | 70 x 90 x 58 mm, mounting height 55 mm |
| Protection housing/terminals | IP 30 / IP 20 |
| Attachment | DIN-rail 35 mm or screw-mount M4 |
| Weight | approx. 180 g |

2

