





### **Editorial**

Besser, schneller, innovativer, das ist unsere Maxime bei der Entwicklung und Produktion zukunftsorientierter Mess-, Steuer- und Regelgeräte.

Im malerischen Schwäbisch Hall in Baden-Württemberg, dort wo alles vor mehr als 40 Jahren begann, entstehen unsere Hightech-Geräte. Damals wie heute forschen, entwickeln und konstruieren wir hier unsere Produkte für Sicherheit und modernste Überwachung Ihrer Prozesse, Anlagen, Objekte und vieles mehr. Immer mit offenem Blick in die Zukunft und immer der Konkurrenz einen Schritt voraus. Unser Produktprogramm reicht weit über das Übliche hinaus. Unsere Schwerpunkte heißen Temperaturüberwachung, Digitale Einbaumessgeräte Minipan, Strom- und Spannungsrelais, Schalt-, Steuer- und Regelgeräte sowie Messumformer. Jedoch sind auch individuelle Speziallösungen, nahezu für jede Anforderung, unsere Stärke. Namhafte Kunden schätzen seit langen Jahren die Qualität unserer verlässlichen Systeme - dafür sind wir bekannt. Das neuste Refreshment unserer Corporate Identity mit "Yes", soll Ihnen unsere Begeisterung und Offenheit für alles Neue, in unserem täglichen Tun für die Sache, lebendig vermitteln.

Lassen Sie sich davon inspirieren und wenn Sie es noch nicht sind, dann werden auch Sie jetzt ZIEHL-Fan.

ZIEHL - Messen, steuern, regeln auf höchstem Niveau



## Inhalt

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\*Latest Informations and Operating manuals see www.ziehl.de

Customer number gen

### 1

## Temperature-Relays

PTC Resistor-Relays Type MS	8
Temperature-Range 60180°C Fixed switching point Particularly suitable for monitoring of Electromotors, Transformers and Bearings	
PTC-Resistor Temperature Sensors (Thermistors) MINIKA®	27
Temperature-Relays for Pt 100-Sensors (RTD) Type TR	33
Temperature-Range -200850°C Adjustable switching point For use in the manufacture of chemical apparatus, plastic machinery, for motor protection in high-power generators and high-voltage motors	
Safety Temperature Limiter	55
Pt 100-Sensors (RTD)	57
Temperature-Relays for Thermocouples Type TR  Temperature-Range -170+1820°C  Adjustable switching point for high-temperature monitoring functions	61

Measuring-Transducers and Measuring-Point change-over see products groups 4 and 5

### PTC-Resistor-Relays

#### General

ZIEHL PTC resistor relays and ZIEHL PTC resistors according to DIN 44 081 and DIN 44 082 are a reliable protection from thermal overloading. Together they result in a fast and effective protective system for i.e. engines and transformers.

ZIEHL PTC relays offer the following advantages:

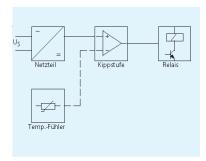
Sensors and relays can be used in many combination

- fixed response temperatures of the sensors of 60... 180 °C
- reliable monitoring of sensor line sensors
- 1 6 PTC resistor connectable
- monitoring of normally closed contacts possible housings for the fast assembly standard rail or with screws M4
- protection against accidental contact according to VBG 4, VDE 106 part of 100

ZIEHL PTC resistor relays are routine tested and meet the following standards for PTC resistor relays: VDE 0660, VDE 0160, IEC 337-1, CENELEC hp 420 i

Туре	housing	connectable PTC-resistors	potential-free relay contacts	reclosing- lock	approvals/remarks
MS220K	K	16	1 CO, 2 CO	-	Low-Cost-Version
MSR220K	K	16	1 CO, 2 CO	Х	Low-Cost-Version
MS220KA	K	16	1 CO, 2 CO	-	Short-circuit monitoring, ATEX-Approval
MSR220KA	K	16	1 CO, 2 CO	Х	Short-circuit monitoring, ATEX-Approval
MS220VA	V2	16	1 CO	-	Short-circuit monitoring, ATEX-Approval
MSR220VA	V2	16	1 CO	Х	Short-circuit monitoring, ATEX-Approval
MS220Vi	V4	16	2 CO	-	intrinsic safe sensor-circuit, Ex II (1) GD (Ex ia) II C (Ex ia D)
MSR220Vi	V4	16	2 CO	х	intrinsic safe sensor-circuit, Ex II (1) GD (Ex ia) II C (Ex ia D)
MS220C	С	16	1 CO	-	compact device, GL-Zulassung
MS220K2	K	2 x 16	2 x 1 CO	-	2 seperate channels
MSR220K2	K	2 x 16	2 x 1CO	x	2 seperate channels, reclosing-lock
MSR220K6	K	6 x 16	1 CO	x	6 channels, common output
MSR820V	V4	8 x 16	2 CO	x	8 channels, common output, LED-display for responsing sensor-circuit
MSM220K	K	16	1 CO	x	reclosing lock power fail proof, test button
MS40ZT	S12	16	1 CO	-	pulse input for monitoring movement of elevators
MSF220K	K	2 x 16	1 CO, 1 NO	-	2 seperate channels, test-button, monitoring of dry transformers
MSF220SE	S12	2 x 16	2x1 CO	-	2 seperate channels, timing-relay, monitoring of dry transformers
MSF220V	V4	3 x 16	2x1 CO, 1 NO	-	3 seperate channels, fan-control, monitoring of dry transformers
MSF220VL	V4	4 x 16	4 x 1CO	-	4 seperate channels, fan-control, core monitoring of dry transformers
MSR220SEL	S24	4 x 16	3x1 CO, 1 NO	х	4 seperate channels, timing-relay, fan-control, monitoring of dry transformers
TS1000	V8	3 x 16	3x1 CO, 6x1 NO	-	protection of dry transformers with integrated monitoring of fan-motors
MS-Tester	K	-	-	-	device for testing PTC-relays

#### Function



The electronics monitors the sensor-circuit with a continous current. In the cold state the resistance is <250 Ω per sensor and the relay signals o.k. The resistance of the sensors rise rapidly when reaching nominal response temperature (NRT). The relay switches at values

values ≤1650 Ω.

PTC-relays type MS switch back automatically. PTC-relays type MSR store the switching until a RESET (integrated reset-button, external reset with contact at terminal or switch-off of power-supply). PTC-relays type MSM have a power-fail proof reclosing lock.

between 1650  $\Omega$ ... 4000  $\Omega$ . The relay switches backat

**Application** 

PTC-relays in combination with PTC-resistors also effectively monitor the temperatures of

- bearings in equipment and machinery
- coolants, i.e. in transformers
- airflows and gases
- oil and other liquid media

PTC-resistor sensors are suitable for the installation into windings of electrical machines. They protect against to high temperatures in case of: blocking rotors, hard start, countercurrent operation, undervoltage and phase failure, with increased ambient temperature and hindered cooling.

## PTC-Resistor-Relay Type MS(R)220K

Single PTC-Circuit

#### MS220K



The MS220K is a particularly economical standard design in a 22,5 mm wide housing with vertically arranged terminals. Each terminal remains accessible even if all others are already occupied.

- 1 PTC resistor set 1... 6 PTC resistors
- output relay with 1 or 2 change-over (co) contacts
- 2 LEDs for ON and ALARM
- K-type housing, vertically arranged terminals, 22,5 mm wide

- assembly on 35 mm DIN rail or with 2 screws M4 (option)
- **UL Recognized Component**
- Option:
  - other suppy-voltages

Order-numbers: 2 COs T221765 AC 220-240 V T221745 AC/DC 24 V T221761 T221741 1 CO / 1 NO

1 CO

T221755

2 COs

T221775

T221771

AC/DC 24-240 V T221739

(without cURus)



### MSR220K



Same execution as MS220K, additionally with electronic reclosing lock. A switching is stored until a RESET.

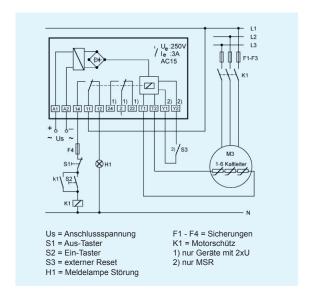
- electronic reclosing lock (disconnectable)
- integrated RESET-button
- link for external RESET
- automatic RESET at voltage recovery
- LEDs for power ON (green) and alarm (red) in resetbutton
- **UL Recognized Component**
- Option: othersupply-voltages



Order-numbers:

AC 220-240 V

AC/DC 24 V



#### Technical Data

Rated supply voltage Us

connectable PTC resistors switching point output relay type of contact test conditions rated ambient temperature range dimensions (h x w x d) attachment

protection housing / terminals weight

AC 220 - 240 V, ± 10 %, 50/60 Hz, ≤2 VA  $AC/DC 24 V, AC \pm 10 \% DC 21-30 V < 2 VA,$ without potential separation AC/DC 24-240 V, AC 14-264 V, DC 20-297 V < 2 VA 1... 6 PTC according to DIN 44 081 or 44 082 <4000 Ω 1 or 2 change-over contacts (co) type 2 (see "general technical informations") see "general technical informations"

design K: 75 x 22.5 x 110 [ mm ] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4 (option) IP 30 / IP 20 approx. 150 g

-20...+55 °C

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## PTC-Resistor-Relay Type MS(R)220KA

### Single PTC-Circuit, ATEX-Approval according to Directive 94/9/EC

#### MS220KA



PTC-relay for the application as a protection device against inadmissible heating up at electrical equipment in areas with explosive gases (zones 1 and 2) and areas with combustible dust (21 an 22), e.g. for direct temperature-monitoring of explosion-proof motors EEx e and EEx d.

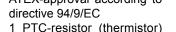
Vertically arranged terminals. Each terminal remains accessible even if all others are already occupied.

- ATEX-approval according to
- 1 PTC-resistor (thermistor)

short-circuit monitoring of sensor-circuit

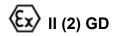
- output-relay with 1 or 2 change-over contacts (co)
- 2 LEDs for ON and ALARM
- K-kousing, vertically arranged terminals housing 22.5 mm wide
- assembly on DIN-rail or with 2 screws M4 (option)
- **UL Recognized Component**
- Option:
  - other suppy-voltages

Order-numbers: 1 change-over 2 change-over AC 220-240 V T222145 T222155 AC/DC 24 V T222151



set, each 1...6 PTC-sensors





MSR220KA Same execution as MS220KA, additionally with electronic reclosing lock. An alarm is stored until

a reset is made.

ATEX-approval according to directive 94/9/EC

- electronic reclosing lock (disconnectable)
- integrated RESET-button
- link for external reset
- automatic reset at voltage recovery
- LEDs for power-on (green) and alarm (red) in resetbutton
- **UL Recognized Component**
- Option:
  - other suppy-voltages

Order-numbers: 1 change-over 2 change-over AC 220-240 V T222165 T222175 AC/DC 24 V T222171 AC 110-120 V T222173 AC 380-415 V (ohne cURus) T222176

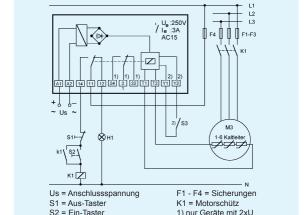


S2 = Ein-Taster

H1 = Meldelampe Störung



II (2) GD



Technical Data

Rated supply-voltageUs

connectable PTC-resistors switching point output relay type of contaxt test conditions rated ambient temperature dimensions (h x w x d) attachment protection housing/terminals weight

AC 220 - 240 V  $\pm$  10 % 50/60 Hz  $\leq$  2 VA AC/DC 24 V, AC ± 10 % DC 21- 30 V < 2 VA, without potential separation

1...6 in series according toDIN 44081 or 44082

1 or 2 change-over contacts (co) type 2 (see "general technical informations") see "general technical informations" -20...+55 °C design K: 75 x 22,5 x 110 [mm]

on 35 mm DIN-rail or with 2 screws M4 (option) IP 30 / IP 20 app. 150 g

### 1

## PTC-Resistor-Relay Type MS(R)220VA

### Single PTC-Circuit, Atex-Approval according to Directive 94/9/EC

#### MS220VA



PTC-relay for the application as a protection device against inadmissible heating up at electrical equipment in areas with explosive gases (zones 1 and 2) and areas with combustible dust (21 an 22), e.g. for direct temperature-monitoring of explosion-proof motors EEx e and EEx d.

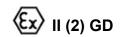
This compact version is especially suitable for mounting in fuse-boxes or power-distribution panels.

- ATEX-approval according to directice 94/9/EC
- 1 PTC-resistor (thermistor) set, each 1...6 PTC-sensors

- short-circuit monitoring of sensor-circuit
- output-relay with 1 change-over contact (co)
- · 2 LEDs for ON and ALARM
- housing for mounting in fuse-boxes mounting height 55 mm, 35 mm wide
- · assembly on DIN-rail or with 2 screws M4
- Option:
  - other suppy-voltages

Order-number:

AC 220-240 V **T222115** 



MSR220VA



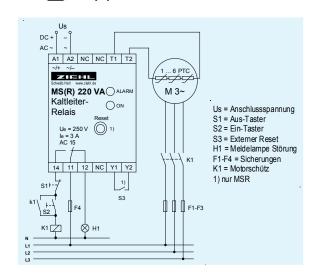
Same execution as MS220VA, additionally with electronic reclosing lock. An alarm is stored until a reset is made.

- ATEX-approval according to directive 94/9/EC
- electronic reclosing lock (disconnectable)
- integrated RESET-button
- link for external reset
- automatic reset at voltage recovery
- Option:
  - other supply-voltages

AC 220-240 V T222135 AC/DC 24 V T222131

Order-numbers:

(€x) II (2) GD



#### Technical Data

Rated supply-voltageUs

connectable PTC-resistors switching point output relay type of contaxt test conditions rated ambient temperature dimensions (h x w x d) attachment protection housing/terminals weight

AC 220 - 240 V  $\pm$  10 % 50/60 Hz  $\leq$  2 VA AC/DC 24 V, AC  $\pm$  10 % DC 21- 30 V < 2 VA, without potential separation 1...6 in series according toDIN 44081 or 44082 < 4000  $\Omega$  1 change-over contact (co) type 2 (see "general technical informations") see "general technical informations" -20...+55 °C design V2: 90 x 35 x 58 [mm] on 35 mm DIN-rail or with 2 screws M4

IP 30 / IP 20 app.. 120 g

## PTC-Resistor-Relay Type MS(R)220Vi

### Atex-Approval according to Directive 94/9/EC

#### MS220Vi



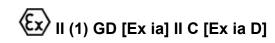
PTC-relay for the application as a protection device against inadmissible heating up at electrical equipment in areas with explosive gases (zones 0, 1 and 2) and in areas with combustible dust (zones 20, 21 and 22), e.g. for direct monitoring in explosion-protected areas where intrinsic safety class "i" is afforded.

PTC-Sensors (Thermistors) of intrinsic safety class "i" can be connected directly. The sensors may be placed in the potentially explosive athmosphere, e.g. for mechanical explosion-protection at bearings. The relay itself may not be installed in the potentially explosive atmospheres.

- ATEX-approval according to directive 94/9/EG
- Safety Integrity Level SIL 1
- 1 PTC-resistor set (thermistors), each 1...6 PTC
- · Short-circuit monitoring of sensor-circuit
- Output-relay with 2 change-over contacts
- · LEDs for ON and ALARM
- Housing for mounting in switchgear-cabinet, 70 mm wide, mounting height 55 mm
- Assembly on DIN-rail 35 mm or screws M4
- Option: other supply-voltages

Order-number:

AC 220-240 V **T222185** 



#### MSR220Vi

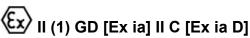


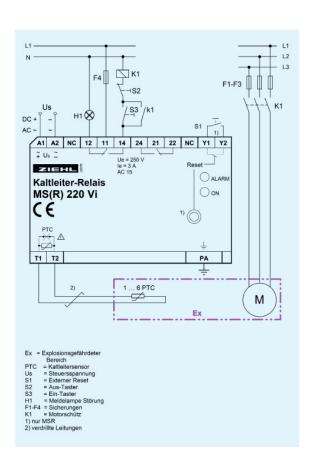
Same execution as MS220Vi, additionally with electronic reclosing lock. An alarm is stored until a reset is made.

- ATEX-approval according to directive 94/9/EG
- Electronic reclosing lock (disconnectable)
- Integrated RESET-button
- Link for external reset
- Automatic reset at voltage recovery
- Option: other supply-voltages

Order-numbers:

AC 220-240 V **T222195** AC/DC 24 V **T222191** 





#### Technical Data

Rated supply-voltage  $U_s$  AC 220 - 240 V  $\pm$  10 % 50/60 Hz  $\leq$  2 VA

AC/DC 24 V, AC  $\pm$  10 % DC 21- 30 V < 2 VA, without

potential separation

Connectable PTC-resistors

Switching point

1...6 in series according to DIN 44081 or 44082

< 4000 Ω

Output relay

Type of contact

2 change-over contacts (co)

type 2, see "general technical informations"

Test conditions

Rated ambient temp. range

see "general technical informations"

-20...+60 °C

Dimensions (H x W x D)

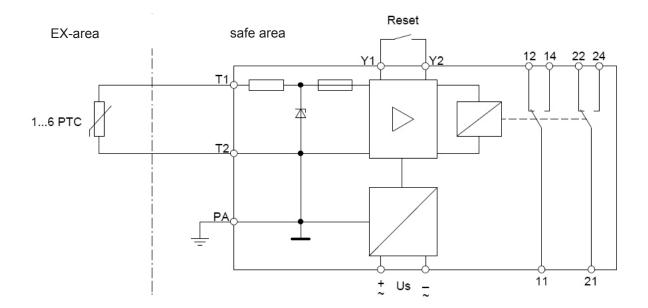
Attachment

Protection housing/terminals

Weight

Design V4:  $90 \times 70 \times 58$  mm, mounting height 55 mm on 35 mm rail according to EN 60 715 or screws M4

IP 30 / IP 20 app. 180 g



## PTC-Resistor-Relay Type MS220C

### Single PTC-Circuit

#### MS220C



This compact device is the smallest version of all our PTCresistor relays:

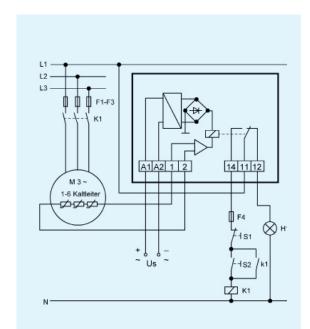
- terminals outside
- protection terminals IP 20
- Relays 1 change-over contact (co)
- GL-approval for version AC 220 - 240 V

#### Order-numbers:

without GL-approval: AC/DC 24 V T221830 AC/DC 24 - 240 V T221821

with GL-approval: AC 220 - 240 V T221804





#### Technical Data

#### Rated supply voltage Us

AC 220-240 V ± 10 %, 50/60 Hz, 2 VA AC/DC 24 V, AC +10/-15 %, DC +25/-20 %, < 1 W, < 2 VA, without potential separation AC/DC 24-240 V, AC 20-264 V, DC 20-297 V,

connectable PTC resistors switching point

output relay type of contact

test conditions rated ambient temperature range

dimensions (h x w x d) attach-

protection housing / terminals weight

< 1 W, < 4 VA

1... 6 PTC according to DIN 44 081 or 44 082 <4000 Ω

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

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

design C: 72 x 33 x 60 [ mm ] on 35 mm of DIN rail according to EN 60 715 or with screws M4 IP 30 / IP 20 approx. 120 g

### 1

## PTC-Resistor-Relay Type MS(R)220K2

#### 2 PTC-Circuits

#### MS220K2



The MS220K2 monitors 2 PTC-resistor sets at the same time. If a temperature rise occurs in one set, the appropriate output relay releases.

With this relay, 2 PTC-sets can be independently monitored on only 22.5 mm space

- 2 PTC-resistor sets, each 1...
   6 PTC resistors
- output relays 2 x 1 changeover contact (co)
- LEDs for operation and alarm

#### Order numbers:

AC/DC 24 V T221923 AC 115 V T221922 AC 230 V T221925



#### MSR220K2



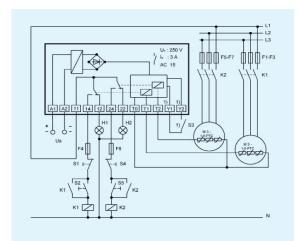
Same execution as MS220K 2, additionally with electronic reclosing lock:

- electronoic reclosing lock (disconnectible)
- integrated RESET-button
- link for external RESET
- automatic RESET at voltage recovery

#### Order numbers:

AC/DC 24 V T221943 AC 115 V T221942 AC 230 V T221945





Us = Anschlussspannung S2, S5 = Ein-Taster S1, S4 = Aus-Taster S3 = externer Reset H1, H2 = Störmeldung F1 - F8 = Sicherungen K1, K2 = Motorschütz 1) nur MSR

#### Technical Data

Rated supply voltage Us

connectable PTC resistors switching point output relays type of contact test conditions rated ambient temperature range

dimensions (h x w x d) attach-

protection housing / terminals weight

AC 230 V,  $\pm$  10 %, 50/60 Hz,  $\leq$ 2 VA AC/DC 24 V, AC  $\pm$  10 %, DC 21-30 V,  $\leq$  2 VA, without potential separation 2 x 1... 6 PTC according to DIN 44 081 or 44 082  $\leq$ 4000  $\Omega$  2 x 1 change-over contact (co) type 2 (see "general technical informations") see "general technical informations" -20...+55 °C

design K: 75 x 22.5 x 110 [ mm ] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4 (option) IP 30 / IP 20 approx. 145 g

## PTC-Resistor-Relay Type MSR220K6

6 PTC-Circuits

#### MSR220K6



The MSR220K6 monitors up to 6 PTC-reseitor sets with up to 6 PTCs each at the same time. If a temperature rise occurs in one set, the output relay releases and LEDs show the overheated sensor.

Switching-off is stored until a Reset. Thus enables to find the overheated sensor even when it has cooled down.

With the MSR220K6 only 4 mm space is needed per monitored PTC-circuit.

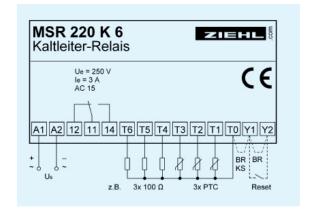
It is especially suitable for monitoring drives with multiple motors, like cranes or robots.

Instead of the PTC-sensors also contacts (normally closed) can be connected.

- 6 PTC-resistor sets, each 1...6 PTC
- Monitoring of short-circuit of sensor
- Output relay 1 x change-over contact
- Electronic reclosing lock (disconnectible with bridge)
- · Input for external RESET
- Automatic RESET at voltage recovery
- LED for power on (green)
- 6 LEDs for display of overheated sensor
- Universal supply voltage AC/DC 24-240 V

Order-number:

AC/DC 24-240 V T221958



#### Technical Data

Rated supply voltage Us

connectable PTC resistors

switching point

output relay ype of contact

test conditions

rated ambient temperaturer-

ange

dimensions (h x w x d) attach-

ment

protection housing / terminals

. weight AC/DC 24-240 V, AC 19-264 V, DC 20-297 V, <2 VA

6 x 1... 6 PTC according to DIN 44081 or 44082

<4000Ω

change-over contact (co)

type 2 (see "general technical informations")

see "general technical informations")

-20... +55 °C

design K: 75 x 22,5 x 110 [ mm ]

on 35 mm DIN rail according to DIN EN 50 022

or with screws M4 IP 30 / IP 20

approx. 145 g

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## PTC-Resistor-Relay Type MSR820V

8 PTC-Circuits

#### MSR820V



The MSR820V monitors up to 8 PTC-resistor-circuits at the same time. A common relay signals an alarm or an error in a sensor-circuit.

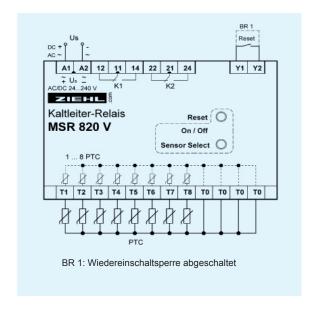
The inputs can be enabled or disabled during operation.

The MSR820V can also be used as a fault annuciator for collective reports

- 1-8 PTC-circuits, each 1...6 PTC in series (max. coldresistance 1500Ω/circuit)
- Easy activating/deactivating of PTC-circuits (display with LEDs)
- 2 potential-free relay-outputs, display of switching state with LEDs
- Display of state of PTC-circuits with 2 LEDs per circuit
- Electronic reclosing-lock (disconnectible with bridge Y1-Y2)
- monitoring of contacts for collective fault-reports

- Programmable functions:
  - Monitoring of short-circuit of PTCs (off / on)
  - External Reset as normally closed (nc) or open (no) contact (Y1, Y2)
  - Power-fail-safe reclosing lock (off / on)
  - Function of relay
    - K1 and K2 closed-current mode
    - K1 and K2 operating-current mode
  - K1 closed- and K2 operating-current-mode
- Universal supply-voltage AC/DC 24 240 V
- Mounting on DIN-rail 35mm EN 60715 or wall-mount (Option)
- Mounting height 55 mm

Order-number: T221709



#### Technical Data

Rated supply-voltage Us

AC/DC 24-240 V 0/50/60 Hz + 25/-20 %, <1W,<3VA DC 20,4 - 297 V AC 20 - 264 V

Connectable PTC-resistors Switching Point 8 x 1...6 pieces according to DIN 44081/82 3,3 k $\Omega$ ...4 k $\Omega$  typical 3,65 k $\Omega$ 

Output Relay Type of contact

2 x 1 change-over contact (CO) AgSnO<sub>2</sub>

Testing Conditions
Rated ambient Temperature
range

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

Dimensions H x W x D Attachment

Design V4:  $90 \times 70 \times 58$  mm, mounting height 55 mm on rail NS 35 mm according to EN 60 715 or with screws M4 (option)

Protection Housing / Terminals Weight

IP 30 / IP 20 app. 180 g

## PTC-Resistor-Relay Type MSM220K

#### Lock Power-Fail Proof

#### MSM220K



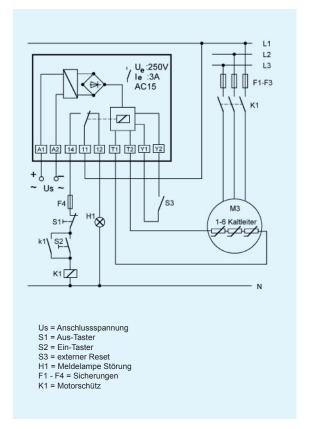
The reclosing-lock of the PTC-resistor relay MSM220K is power-fail proof. Thus a tripping is being stored also over a loss of voltage.

The integrated TEST-button enables a simple test of the device and the connected system.

- 1 PTC resistor set 1... 6 PTC resistors
- output relay with 1 changeover contact (co)
- power-fail proof reclosing lock (disconnectible)
- integrated RESET-button
- link for externat RESET
- integrated TEST-button
- · LEDs for operation and
- alarm
   K-type housing, vertically
   arranged terminals, 22,5 mm
- wide assembly on 35 mm DIN rail or with 2 screws M4 (option)

Order number:

AC 230/ 240 V T221947



#### Technical Data

#### Control voltage Us

connectable PTC resistors switching point output relay type of contact test conditions rated ambient temperature range dimensions (h x w x d) attachment

protection housing / terminals weight

AC 230 - 240 V ± 10 % 50/60 Hz, 2 VA

1... 6 PTC according to DIN 44 081 or 44 082 < 4000  $\Omega$ 

1 change-over contact (co)

type 2 (see "general technical informations") see "general technical informations"

-20... +55 °C

design K: 75 x 22.5 x 110 [ mm ] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4 (option) IP 30 / IP 20 approx. 145 g

## PTC-Resistor-Relay Type MS40ZT

for Elevators

MS40ZT



The PTC-resistor relay MS40ZT monitors particularly engines at elevator cars and lifts.

A pulse input monitors the movement of the elevator car as long as the motor is switched on.

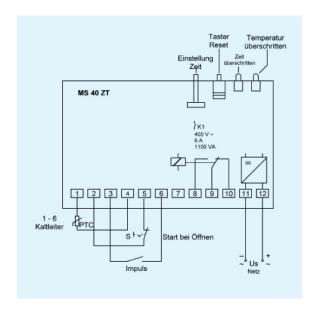
- watchdog timing adjustable 5 50 s.
- temperature monitoring with PTC-resistor
- integrated RESET-button
- LED for temperatur alarm LED for watchdog alarm

At elevator systems the temperature of the motor and the travelling motion have to be monitored. With the car at rest and contact between terminals 2 and 5 closed, the integrated relay picks up (terminals 8, 9 connected). The time monitoring starts with the opening of the contact between terminals 2 and 5. Then the pulse input between terminals 3 and 6 must continously open and close during travelling motion. When the pulse stops or the nominal

response temperature of the PTC-resistor is exceeded, the relay releases. Each disconnection is locked. A restart by pressing the RESET-button is only possible with closed contact between terminals 2 and 5 and low-resistive sensor.

Order number:

AC 220 - 240 V **T221120** 



#### Technical Data

Rated supply voltage Us connectable PTC resistors switching point output relay type of contact test conditions rated ambient temperature range dimensions (h x w x d) attachment

protection housing / terminals weight

AC 220 - 240 V  $\pm$ 10 %, 50/60 Hz, 3VA 1... 6 PTC according to DIN 44 081 or 44 082 < 4000  $\Omega$  1 change-over contact (co) type 2 (see "general technical informations")

see "general technical informations", see "general technical informations" -20... +55 ∞C

design S 12: 82 x 42 x 121 [ mm ] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4 IP 30 / IP 20 approx. 280 g

### PTC-resistor relay type MSF220K

### for Dry-Transformers, 2 PTC-Circuits

#### MSF220K



Low Cost execution for the monitoring of dry transformers.

Alarm 1 with relay in closedcircuit current mode for preliminary warning, releases at over-temperature at PTC-set 1 and serves at the same time as functional monitoring.

Alarm 2 in operating current mode. Thus no wiping signal occurs when switching on the supply voltage on.

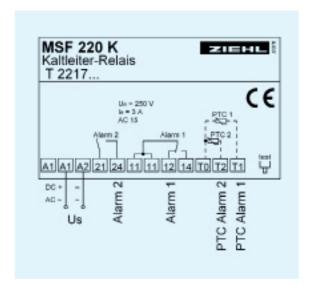
Additional terminals enable comfortable wiring from supply voltage to relays K1 and/or K2.

- · 2-PTC resistor sets
- 2 output relays 1 change-over contact (co) / 1 normally open contact (no)
- TEST-button, for alarm 1 and 2 power on green LED
- red LEDs for alarm 1 and 2
- K-type housing, vertically arranged terminals, 22,5 mm wide

for attachment on DIN rail 35 mm or with 2 screws M4

Order numbers:

AC 230 - 240 V **T221716** AC/DC 24 - 240 V **T221715** 



#### Technical Data

Rated supply voltage Us

connectable PTC resistors switching point output relays

type of contact test conditions rated ambient temperature range dimensions (h x w x d) attachment

protection housing / terminals weight

AC 220 - 240 V  $\pm$  10 %, 50/60 Hz,  $\leq$ 2 VA AC/DC 24-240 V, AC 19 - 264 V, DC 20 - 297 V <2VA 2 x 1... 6 PTC according to DIN 44081 or 44082 < 4000  $\Omega$ 

1 change-over contact (co), 1 normally-open contact (no)

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

design K:  $75 \times 22.5 \times 110$  [ mm ] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4

IP 30 / IP 20 approx. 110 g

### 1

## PTC-Resistor-Relay Type MSF220SE

for Dry-Transformers, 2 PTC-Circuits

#### MSF220SE



The MSF220SE is a 2-channel PTC resistorrelay. It is used favourably wherever an alarm has to be supressed for a short period when applying the supply voltage.

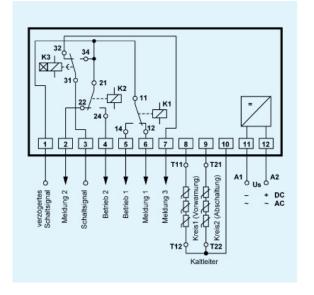
- 2 PTC resistor sets
- 2 output-relays with changeover contacts (co)
- integrated timing-relay K3 to suppress an alarm-impulse when switching on supply voltage
- ALARM 1, i.e. for preliminary alarm
- ALARM 2, i.e. for switching off
- · power on green LED
- ALARM 1 yellow LED
- ALARM 2 red LED
- Test-button for testing of relays K1/K2
- time-delayed signal (2-4s) of K3 available at terminal 1 for extarnal use

Thanks to the delayed switchingon of relay K3, the MSF 220 SE is especially suitable in applications, where an auxiliary voltage is not available and the secondary voltage of the monitored transformer is being used as supply voltage.

As a consequence of this feature, there will be no alarm case of failure of supply voltage. We recommend therefore the monitoring of the function of K3 at terminals 1 or 7.

#### Order numbers:

AC/DC 90 - 240 V **T221697** AC/DC 24 - 240 V **T221696** 



#### Technical Data

Rated supply voltage Us

connectable PTC resistors switching point output relays type of contact test conditions rated ambient temperature range dimensions (h x w x d) attachment

protection housing / terminals weight

AC/DC 90-240 V, AC 80-264 V, DC 80-297 V, < 2 VA AC/DC 24-240 V, AC 20-264 V, DC 21-297 V, < 2 VA 2 x 1... 6 PTC according to DIN 44 081 or 44 082 < 4000  $\Omega$ 

2 x 1 change-over contacts (co) type 2 (see "general technical informations") see "general technical informations" -20... +55 °C

design S 12: 82 x 42 x 121 [ mm ] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4 IP 40 / IP 20 approx. 290 g

### PTC-Resistor-Relay Type MSF220V/VU

for Dry-Transformers, 3 PTC-Circuits

MSF220V/ MSF220VU



The MSF220V is particularly suitable for the temperature monitoring at dry transformers.

3 PTC-circuits with different nominal response temperatures (NRT) can be connected to this unit, one for controlling an fan (forced cooling) and two for alarms

Each PTC-circuit is monitored for break and short circuit. This reduces the probability of false alarms.

- · 3 PTC-circuits
- MSF220VU for universal supply voltage AC/DC 24-240 V
- intelligent control of fan (relay K0, 1 normally-open con-
- tact)
  - ALARM 1 in closed-circuit current mode (relay K1, 1 change-over contact) for pre-
- alarm. Signals also error in any sensor and interruption of supply voltage.
  - ALARM 2 in operation current
- mode (relay K2, 1 changeover contact). No signal when switching on ond off the supply voltage.
- all output relays potentially
- separated from each other. monitoring of sensor lines
- TEST-button (stop possible
- before ALARM 2) simple testing with disconnectable monitoring of break and

short-circuit (for 10 minutes)

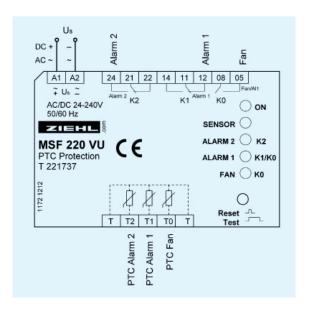
- LEDs for ON, sensor error, Fan, ALARM 1 and ALARM 2
- plug-in terminals

housing for mounting on DIN-rail or wall-mount

- mounting height 55 mm

Order numbers:

MSF220V AC 230/240 V **T221738** MSF220VU AC/DC 24-240 V **T221737** 



#### Technical Data

#### Rated supply voltage Us

connectable PTC resistors switching point output relays type of contact test conditions rated ambient temperature range dimensions (h x w x d) attachment

protection housing / terminals weight

AC 220 - 240 V ± 10 %, 50/60 Hz, ≤3 VA AC/DC 24 - 240 V ± 15 %, < 3 VA 3 x 1 6 PTC according to DIN 44 081 or 44

3 x 1... 6 PTC according to DIN 44 081 or 44 082 < 4000  $\Omega$ 

2 x 1 change-over contacts, 1 normally-open contact type 2 (see "general technical informations") see "general technical informations"

-20... +55 °C

design V 4: 90 x 70 x 58 [ mm ] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4 IP 30 / IP 20 approx. 320 g

## PTC-Resistor-Relay Type MSF220VL

für Dry-Transformers, Fan, Warning, Trip Winding and Trip Core

#### MSF220VL

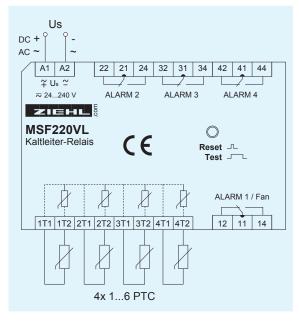


The MSF220VL is particularly suitable for monitoring of temperatures at dry transformers, when also the temperature of the core shall be measured. Monitoring of core temperature is especially required in rectifier transformers because of harmonics causing heat in the core. An intelligent control prolongs automatically the runtime of a cooling-fan, depending on the load of the transformer. Each PTC-circuit is monitored for break and short circuit. This reduces probability of false alarms. Relays in operating-current mode prevent from a trip-signal when switching on supply voltage.

The device can be adapted to different applications with 4 programs:

- 1.) Fan-control alarm trip (winding) trip (core)
- 2.) Alarm trip (winding) trip (core) alarm (fault)
- 3.) Fan-control alarm trip (winding) alarm (fault)
- 4.) Fan-control with hysteresis T1/T2 alarm trip (winding) time relay
- 4 inputs for PTC
- Intelligent control of fan
- Automatic fan-test 1x / week
- Monitoring of sensors
- Test-button
- Simple testing with disconnectable monitoring of break and short circuit (for 10 minutes)
- LEDs for alarms, states of relays and sensors
- Housing for mounting on DIN-Rail or wall-mount
- (option)
  - Mounting height 55 mm
- Universal supply voltage AC/DC 24-240 V

Order-number T221674



#### Technical Data

Rated supply voltage Us

connectable PTC resistors switching point output relays type of contact test conditions rated ambient temperature range dimensions (h x w x d) attachment

protection housing / terminals weight

AC/DC 24 - 240 V  $\pm$  15 %, < 3 VA

4 x 1... 6 PTC according to DIN 44 081 or 44 082 < 4000  $\Omega$ 

4 x 1 change-over contacts type 2 (see "general technical informations") see "general technical informations" -20... +55 °C

design V 4: 90 x 70 x 58 [ mm ] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4 IP 30 / IP 20 approx. 250 g

## PTC-resistor relay type MSR220SEL

for Dry-Transformers, 4 PTC-Circuits

#### MSR220SEL



The MSR220SEL is a PTC-resistor relay for the monitoring of up to 4 PTC resistor sets. It is used favourably, where the simultaneous monitoring of 2 ALARMS and the controlling offorced cooling are required.

It is suitable also for the application in systems, in which an error message must be suppressed in the moment of switching on supply voltage, e.g. because supply voltage is supplied by the monitored transformer.

The MSR220SEL is especially suitable for the monitoring of cast resin dry-type transformers.

The switching points of the integrated ventilator control are determined by the nominal response temperatures (NRT) of the connected PTC resistor sets. This and the insertable automatic delay for the fan enable a better utilization of the transformer.

The monitoring of the sensors on short-circuit and break as well as the simultaneous digital and analog evaluation of the sensor for ALARM 3 minimize false alarms.

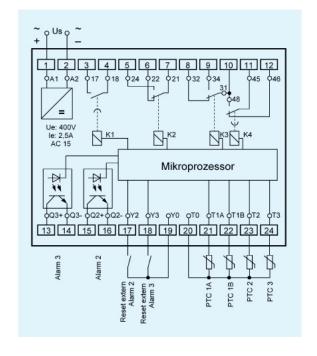
Test-buttons simplify the check of the device and the connected equipment.

- 2 PTC-resistor sets for ventilation control (ALARM 1), e.g. ON at 90 °C, OFF at 80 °C,
- optional operation with only one PTC resistor set
- delay ventilation 20 min. insertable

- automatic test of fan 1x/week
  - TEST-buttons for ALARM 1 and ALARM 2 (3 seconds at the same time pressed for ALARM 3)
- ALARM 2, e.g. for preliminary warning
- ALARM 3 analog and digital evaluation, minimizing
- risk for false alarms
- electronis reclosing-lock for ALARM 2 and 3 (dis-
- connectible), RESET-button integrated integrated time delay relay for suppressing of error
- · signals when switching on and off
- open collector outputs (max. DC 60 V/40 mA) for ALARM 2 and 3 for message to a PLC
- sensor monitoring for short-circuit and line break, release of ALARM 2 in case of error
- LED displays for ON, ALARM 1, 2 and 3 and sensor error
- Universal Power Supply AC/DC 24-240 V

Order numbers:

AC/DC 24-240 V **T221672** 



#### Technical Data

Rated supply voltage Us connectable PTC resistors switching point output relays type of contact test conditions rated ambient temperature range dimensions (h x w x d) attachment

protection housing / terminals weight

AC/DC 24 - 240 V  $\pm$  15 %,  $\leq$  3 VA 4 x 1...6 PTC according to DIN 44 081 or 44 082 < 4000  $\Omega$ 

3 x 1 cahnge-over contact, 1 normally-open contact type 2 (see "general technical informations") see "general technical informations" -20...+55 °C

design S24: 82 x 120 x 121 [mm] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4 IP 30 / IP 20 approx. 500 g

### Transformer-Protection Trafosafe TS1000

### with integrated monitoring of Fans

#### Trafosafe TS1000



The Trafosafe TS1000 is applied at transformers with forced cooling.

It monitors the temperature of the transformer with 3 sensor-circuits (PTC-thermistors), controls the forced cooling depending on the load of the transformer, reports exceeding of alarm-temperature and switches off the transformer (trip) when increasing of the temperature continues.

Up to 6 fans can be controlled and monitored directly with the TS1000. Contactors and motor protection switches are not necessary any more.

At Pt 100-monitored transformers the TS1000 can be used to control only the fans.

#### Temperature-Monitoring:

- 1 PTC-circuit for controlling the cooling (1T1/1T2) = input for starting fan when using as fan-control only.
- 2 x 1 PTC-circuit for alarm 1 (2T1/2T2) and alarm 2/ trip (3T1/3T2), monitored for
- short-circuit and interruption Alarm 1 (K2) in closed-circuit current mode = monitoring of function
- Alarm 2/trip (K3) in opencircuit current mode = no signal/tripping when switching on the device
- Test-/Reset-button for testing the function

Fan-Control and Monitoring of Fan:

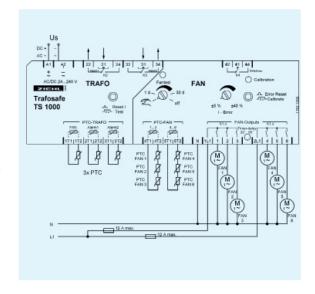
- direct connection of up to 6 fans
- automatic exceeding of the on-time of the fans at high load of the transformer
- Monitoring of failure fan (over-/undercurrent)
- Self-calibration of the monitored values of the currents to the fans
- Switching-point for current-failure adjustable ± 5-40 %
- · automatic test of fans 1-30 days, disconnectable
- · Relay for reporting fan-failure
- · Clear displays with LEDs

#### General:

- Universal-power-supply AC/DC 24-240 V
- compact hausing for cabinet-mount, 140 mm wide, mounting height 55 mm
- · Attachment on 35 mm rail or with 3 screws M4

Order-number

T221660



#### Technical Data

Supply voltage U<sub>s</sub> Steuerspannung 1L1, 2L1-N

Connectable PTC-circuits Switching point

Output relays K2, K3, K4 Type of contact

Output relays 1-6 Rated current of fans

Test conditions
Rated ambient temp. range
Dimensions (h x w x d)
Attachment
Protection housing / terminals
Weight

AC/DC 24 - 240 V  $\pm$  15 % 0/50/60 Hz <3W <5 VA AC 90 - 240 V  $\pm$  10 % 50/60 Hz (<1 VA no load)

5 x 1...6 pcs according to DIN 44081 or 44082 < 4000  $\Omega$ 

3 x 1 change-over contact (co) type 3 (see "general technical informations")

6 x 1 normally-open contact (no) max. 4 A

see "general technical informations" -20...+55 °C housing V8: 90x140x8 [mm], mounting height 55 mm on DIN-rail 35 mm or 3 screws M4 IP 30 / IP 20 app. 420 g

### **MS-Tester**

### for PTC-Relays Type MS

MS-Tester



Simple PTC-relays can be easily tested by interrupting the sensor-line.

At PTC-relays with monitoring the sensor for short-circuit and break this is not possible.

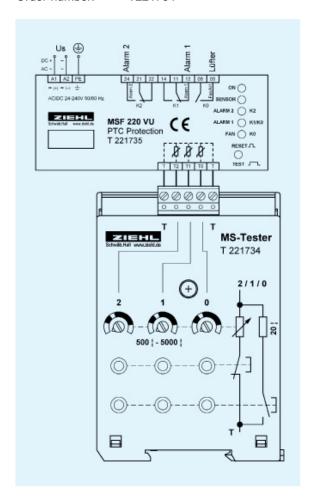
With the ZIEHL MS-Tester these relays can also be tested easily for correct function.

The connection-cable (included) is cabled for the connection to a ZIEHL MSF220V(U), but other PTC-relays can be tested with the MS-Tester also.

#### Test:

- Turn off supply-voltage of the tested relay
- disconnect output-side if necessary
- connect MS-Tester (T/0, T/1 and/orT/2) to the sensorinputs
- · switch on PTC-relay
- increase resistance slowly by turning the potentiometer until the according alarm switches
- reduce resistance until the relay in the MS switches back or the LED signals ready for switching back
- If necessary , the accurate switching-points can be evaluated by measuring the resistances between the terminals T/0, T/1 and T/2 after disconnecting the MS. The values are typically 3000  $\Omega$  to 4000  $\Omega$  for tripping and >1500  $\Omega$  for switching back.
- Test break of sensor with button (only relays with monitoring of sensor-break)
- Test short-circuit of sensor with button (only relays with monitoring of sensor-short-circuit))
- ATTENTION: At MSF 220 V(U) short-circuit or break of any sensor or fast rising of resistance will lead to a report of an error = alarm 1.
- TIP: Cold PTC have a resistance of 20 ... 250  $\Omega$ , typically 50 ... 120  $\Omega$  per sensor.

Order-number: T221734



# PTC-Resistor Temperature-Sensors MINIKA® to DIN 44 081 and DIN 44 082

#### General

PTC-resistor temperature sensors (also called PTC-resistors or thermistors) are temperatur dependent semiconductor resistors whose main function is to alter their electrical resistance drastically when their body temperature changes within the res-ponse range.

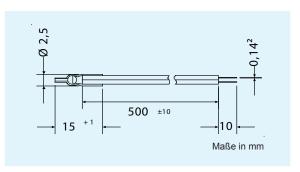
PTC-resistors are used principally to protect windings in electromotors or transformers against excess temperature. They also find application in machines, tooling machines especially machine bearings and controlling the temperature of power semiconductors.

PTC-resistor temperature sensors are particularly suited to this purpose due to their precise response range combined with small dimensions and minimal thermal inertia at low cost.

### Single PTC-resistor type MINIKA® K

PTFE-insulated strand Cu, silver-plated Lead length: 500 ±10 mm Stripping of lead-ends 10 mm standard cross-section: 0,14 mm² (AWG 26) weight: approx. 2,6 g



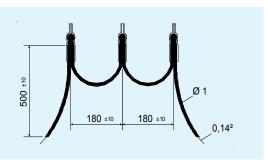


Туре	NAT°C	Standard ID colour (DIN 44 081)	Order-no. MINIKA®
K60	60 ± 5	white - grey	K401000
K70	70 ± 5	white - brown	K401010
K 80	80 ± 5	white - white	K401005
K 90	90 ± 5	green - green	K401015
K100	100 ± 5	red - red	K401025
K110	110 ± 5	brown - brown	K401035
K120	120 ± 5	grey - grey	K401045
K130	130 ± 5	blue - blue	K401055
K140	140 ± 5	white - blue	K401065
K150	150 ± 5	black - black	K401075
K160	160 ± 5	blue - red	K401085
K170	170 ± 5	white - green	K401095
K 180	180 ± 5	white - red	K401090

### Triple PTC-resistor type MINIKA® KD

PTFE-insulated strand
Cu, silver-plated
Lead length:
500-180-180-500 ± 10 mm
Stripping of lead ends 10 mm
standard cross-section:
0.14 mm² (AWG 26)
weight: approx. 3,6 g





Туре	NAT°C	Standard ID colour (DIN 44 082)	Order-no. MINIKA®
KD60 KD70 KD80 KD90 KD100 KD110 KD120 KD130 KD140 KD150 KD150 KD160 KD170	60 ± 5 70 ± 5 80 ± 5 90 ± 5 100 ± 5 110 ± 5 120 ± 5 130 ± 5 140 ± 5 150 ± 5 160 ± 5 170 ± 5 180 ± 5	white - yellow - yellow - grey white - yellow - yellow - brown white - yellow - yellow - white green - yellow - yellow - green red - yellow - yellow - red brown - yellow - yellow - brown grey - yellow - yellow - grey blue - yellow - yellow - blue white - yellow - yellow - blue black - yellow - yellow - black blue - yellow - yellow - red white - yellow - yellow - green white - yellow - yellow - red	K401300 K401310 K401305 K401315 K401325 K401335 K401345 K401365 K401365 K401375 K401385 K401395
1100	.00 ± 0	Willia yollow yollow roa	11.0.000

#### Screw-in sensors in Gehäuse G2 (M4) und G3 (M6) MINIKA KS

PTFE-insulated strand
Cu, silver-platedd
Lead length:
500 ± 10 mm
Stripping of lead ends 10 mm
standard cross-section:
0.14 mm² (AWG 26)
weight: G2: approx. 5 g

G3: approx. 14 g





Туре	NAT°C	Standard ID colour DIN (44 081)	Order-numbers G2 (M4)	G3 (M6)
KS80	80 ± 5	white - white	K302005	K302109
KS90	90 ± 5	green - green	K302015	K302119
KS100	100 ± 5	red - red	K302025	K302129
KS110	110 ± 5	brown - brown	K302035	K302139
KS120	120 ± 5	grey - grey	K302045	K302149
KS130	130 ± 5	blue - blue	K302055	K302159
KS140	140 ± 5	white - blue	K302065	K302169
KS150	150 ± 5	black - black	K302075	K302179
KS160	160 ± 5	blue - red	K302085	K302189
KS170	170 ± 5	white - green	K302095	K302199
KS180	180 ± 5	white - red	K302090	K302190

#### Technichal Data

Design	K	KD	KS
Max. operational voltage	25 V DC	25 V DC	25 V DC
Measuring voltage at NAT+15K -20NAT+5K	≤ 7,5 V DC ≤ 7,5 V DC ≤ 2,5 V DC		≤ 7,5 V DC ≤ 2,5 V DC
Nominal response temperature NRT (TNF)	60180°C	60180°C 60180°C	
Tolerance NRT	± 5 K	± 5 K ± 5 K	
Nominal resistance R at -20NAT-20K VPTC ≤ 2,5 V	≤ 250 Ω	≤ 250 Ω	
Rated ambient temperature range		-20°CNAT+20°C	
Thermal response-time ta	≤ 5 s	≤ 5 s	-
Storage temperature		-25°C+65°C	
Rated insulation voltage Ueff	690 V	690 V	690 V
Test voltage Ueff	2500 V AC	2500 V AC	2500 V AC

#### Resistors

The resistance of each individual sensor (according to standard) must, for temperatures related to the Nominal Response Temperature, have the following values:

- ≤ 250 Ohms at temperatures of -20°C to NRT -20 degrees. Measurement voltage up to max. 2.5 V
- ≤ 550 Ohms at a temperature of NRT-5 degrees. Measurement voltage max. 2.5 V
- ≥ 1330 Ohms at a temperature of NRT +5 degrees. Measurement voltage max. 2.5 V
- ≥ 4000 Ohms at a temperature of NRT+15 degrees. Measurement voltage max. 7.5 V

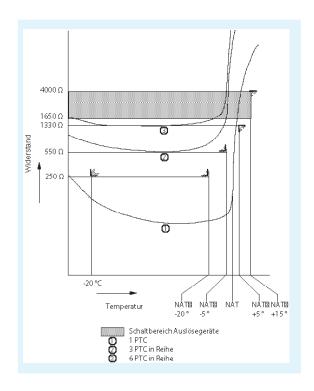
The exact values of the resistance values in the temperature ranges are not relevant. Flawless sensors should have a cold resistance of between 20 and at most 250 Ohms. Typical values (ambient temperature) lie between 50 - 150 Ohms.

When the cold resistance is within these limits, short-circuit and interruption can be excluded. For checking the nominal response temperature, the sensors have to be heated up to this temperature.

In accordance with standards, trip devices switch between 1650 Ohms and 4000 Ohms.

If a varying number of temperature sensors connected in series to a trip device are subjected to uniform heat, this results in the following cut-off point:

- 1 PTC switches at latest at NRT +15 degrees, at earliest at NRT +5 degrees.
- 3 PTC (typical instance) switch at latest at NRT +5 degrees, at earliest at NRT -5 degrees.
  - 6 PTC switch at latest at NRT, at earliest at NRT -20 degrees.
- (Absolutely uniform heating of all sensors virtually
- never occurs in this instance).



#### Insulation classes

For built-in PTC-resistors, we recommend the following nominal cut-off temperature values for machines which are used to full capacity within permissible heating limits in keeping with their insulation class (VDE 0530).

These values can then be correspondingly reduced for machines at less than full capacity. In some instances it might prove necessary to work out nominal response temperature values which deviate somewhat from

the values recommended in the table, on the basis of trial and error. When it is intended as a preliminary warning, the value recommended as nominal response temperature is 20°C below the break temperature.

Insulation material class							
120 (E)	130 (B)	155 (F)	180 (H)				
120°C	130°C	150°C					

## Fitting PTC-resistor temperature sensors

PTC-resistors can only be fitted before a winding has been impregnated by the motor manufacturer. It is not possible to insert them at a later stage.

Each winding has a sensor of its own. This means fitting 3 in single-speed motors and 6 in pole changing motors, with these sensors arranged in series and taken to separate terminals in the terminal box.

Measuring circuit must be provided with a separate power supply. The use of motor supply lines or other main current lines is unacceptable. Shielded supply lines must be used in case inductive or capacitive interference is produced by nearby high-voltage lines.

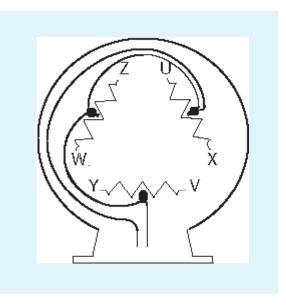
The maximum line lenght for a cable diameter of 0.5 mm<sup>2</sup> is approx. 500 m. For greater diameter cable, correspondingly more.

Fitting should, where possible, be carried out at the warmest winding head in the exhaustedair-side of the electrical machine. Care should be taken to ensure good heat contact between the sensors and the winding when being fitted. The more intimate the connection between a PTCresistor and its winding, the better the winding temperature is registered, especially when temperatures rise sharply. For this reason, Temperature sensors should be implanted in the middle of the end winding-heads so as to be surrounded on all sides by the winding copper.

To fit the temperature sensors, the ready-shaped winding heads are spread apart in the centre using a piece of winding wood. The temperature sensors should be inserted parallel to the winding wires, care being taken that the winding wires are actually touching the temperature sensors. Cavities and air-occlusions impair heat contact and can be minimized by exerting pressure by hand to close the gap between winding wires and sensors. At the spot where the sensors are to be fitted, the winding wires on the end winding should be tightly bandaged. If the wire is more than 1 mm² thick, intervening spaces should be filled in with resin thickened with quartz powder.

If the motor manufacturer uses special saturants or impregnating resins whose chemical behaviour is anything but neutral, or if he uses some special working method, he will have to test the temperature sensors' resistivity himself in the operating conditions he will use.

To prevent peaks in interference voltage due to the formation of loops, we recommed that the connecting strand be fed back on the same side as the lead.



Assembly Tip: Do not shorten leads which are too long, roll them up and fasten them in position.

## Testing fitted PTC-resistors

A maximum DC-voltage of 2.5 V can be passed through PTC-resistor temperature sensors when testing. Buzzers (voltage peaks) and similar testers should, therefore, not be used, but only meters or bridges.

For all measurement voltage values up to DC 2.5 V, resistance

values ranging from -20°C to NRT -20 degrees should not exceeded 250 Ohms. Exact resistance values within this temperature range are unimportant. For flawless sensors, the lowest resistance value is generally above 20 Ohms.

When measurement values are being determined, care must be taken that the measurement results are not influenced by the selfwarming of the sensors. In the course of the manufacturing process, we test all sensors for NRT and disruptive strength.

#### Technical Data

Limit Values

Max. perm. operational voltage Max. perm. PTC-resistor temp. Max. perm. top temperature

Test voltage (Strand against insulation) also for screwable

sensors

Umax. 30 V Tmax. 200°C

Tmax.\*210°C for 12 h

2.5 kV

Characteristic Values

Measuring voltage below NRT

+5°C Leads

Stripping of lead ends Dielectric strength of leads

Shrink-tube Donut diameter

Thermal sensor time constant

max. DC 2.5 V

silvered copper strand with PTFE teflon insulation

approx. 10 mm, twisted AC 660 V<sub>eff</sub>, permanent Kynar, approx. 15 mm 3.5 mm (2.5 mm for MINIKA)

approx. 2.5 - 3.5 sec (MINIKA < 2 sec)

Mechanical Data

Lead length

Single PTC-resistor 500 mm ± 10 mm (standard)
Douple PTC-resistor 500-180-500 mm ± 10 mm

capter 1 to resister 500 100 00

(standard)

Triple PTC-resistor 500-180-180-500 mm ± 10 mm

(standard)

Oil immersed single PTC-resistor 1200 mm  $\pm$  10 mm Other connection lengths are available on request.

Lead cross-section

0.14 mm² for single, douple and triple PTC-resistors 0.75 mm² for oil immersed single PTC-resistors

Standard identification colour Nominal response temperature see table 60°C...180°C

Special designs are available on request.

### 1

## Pt 100-Temperature-Relays Type TR

General

Temperature relays type TR monitor temperatures in connection with temperature sensors Pt 100 according to

DIN 43 760 / IEC 751. They signal or switch, if a preset limit is exceeded.

They operate according to standard with relays in closed-circuit current mode. Break of sensor is recognized. In some models also short-circuit of sensor line is monitored.

The temperature relays type TR have the following features:

type	connectable sensors Pt 100	connection	3-wire	adjustable limits	output relays	analog output	housing	remarks
TR111V	1	-	х	1	1 co	-	V2	hysteresis and switching delay adjustable
TR122D	1	х	х	2	2 co	-	S12	digital display programmable, plug-in housing
TR122DA	1	x	х	2	2 co	0 / 4-20 mA	S12	digital display programmable, plug-in housing
TR210	2	х	х	2/4	2 co	0 / 4-20 mA 0 - 10 V	V4	digital display programmable, Pt 1000, Thermocouples
TR250	3	x	Х	3	3 co	-	V4	digital display programmable, connection of PTC
TR400	4	х	х	4	4 + 1 co	2 x 0/4 - 20 mA 2 x 0 - 10 V	V8	digital display programmable, plug-in terminals
TR440	4	x	Х	4	3 + 1 co	-	96x96 mm	interface RS485 MODBUS
TR600	6	x	х	6	6 + 1 co	2 x 0/4 - 20 mA 2 x 0 - 10 V	V8	digital display programmable, plug-in terminals, option: interface RS 485
TR800 WebControl	8	x	х	4 x 8	4 co	-	V8	interface for Ethernet, TCP/IP udp, MODBUS TCP/IP inputs Thermocouples 0/4 - 20 mA, 0 - 10 V
TR1200	12	х	х	-	1 U	-	V8	RS485 MODBUS
TR1200IP	12	х	х	-	1 U	-	V8	Ethernet-Interface TCP/IP udp modbus TCP/IP
WR250	6	wirele	ess	3	3 U + 1 U	-	V4	for wireless-temperature-sensors WSPt100

Application

Temperature relays type TR and temperature sensors Pt 100 are a reliable monitoring system. Possible damage by excess temperature in machines and plants are positively avoided.

Typical for all devices is exact recording of temperatures and constant switching points.

For the monitoring of engines or transformers devices with 3 to 6 inputs are especially suitable. They can monitor a sensor in the coil of each phase.

If the measuring temperature is to be displayed additionally or be evaluated by a superior computer system, devices with analogue output or interface RS 485 are recommended.

We supply temperature sensors Pt 100 in many various executions, according to customer's request and with isolation for high voltages.

## Pt 100-Temperature-Relay Type TR111V

1 Sensor

TR111V 3-wire



Temperature-Relays TR111V can be used as limit-switches or 2-point controllers with high repeat accuracy.

3 measuring-ranges, adjustable hysteresis and switching delay and the choice between operating- and closed-current principle of the relay make it a very universal device.

- Measuring input 1x Pt 100 (RTD) / 3-wire
- 3 measuring-ranges:
  - -10...+40 °C
  - 0...100 °C
  - 0...200 °C
- 1 limit adjustable 0...100 % switching delay adjustable 0,1...10 s
- Output-relay 1 changeovercontact (co)
- Operating- or closed-surrentmode selectable with bridge
- Switching off at sensor-shortcircuit or break
- LEDs for display state of operation
- Universal supply-voltage AC/ DC 24-240 V
- Housing for mounting in switchgear cabinets or fuseboxes, 35 mm wide Mounting heigt 55 mm

#### Application:

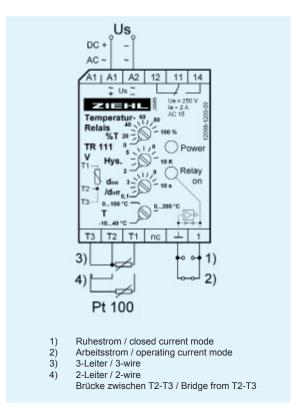
Protection from over-temperature in processes, plants and machines. Monitoring of temperatures in bearings.

Controlling of temperatures in processes and plants.

Order-number:

AC/DC 24-240 V **T224107** 

other measuring-ranges on request



#### Technical Data

Supply voltageUs

-----

Pt 100 -Sensor (RTD)

Measuring ranges Error of setting Repeat error

Temperature-dependence

Hysteresis

Switching delay don/doff

Relay output Type of contact Test conditions

Rated ambient temperature range

Dimensions (H x W x D) Attachment

Protection housing/terminals Weight

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

EN 60751 / IEC 60751

3 ranges selectable

± 5 K app. 0,5 K ≤0,05 %/K adjustable 2...10 K adjustable 0,1...10 s

1 change-over contact (co)

**type 3 see** "general technical informations" siehe "general technical informations"

-20°C...+55°C

design V4: 90x70x58 [mm], mounting height 55 mm on 35 mm DIN-rail according to EN 60 715 or

with screws M4 IP 30 / IP 20 app. 100 g

## Pt 100-Temperature-Relay Type TR122DA

1 Sensor, 2 Limits, Digital display, Analog-output

#### TR122DA



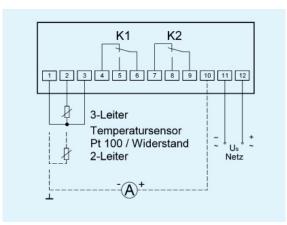
The TR122DA is a temperature relay with 2 independant switching points and with analog output.

Order-numbers:

TR122DA with analog output TR122D without analog output T224126 T224127

#### Applications:

- Monitoring of temperature with pre-alarm and alarm
- Monitoring of under- and overtemperature
- 2-point-controller, e.g. for heating (the second switching point can be used for monitoring the function and release an alarm at over- or under-temperature) 3-point-controller for heating/ keeping temperature
- Monitoring of resistance 0...850 Ohm
- Transducer for Resistance



#### **Function**

- 1 sensor Pt 100 (RTD) 2- or 3-wire-connection
- Range -199...+850 °C
- Resistance 0...850 Ω
- 2 alarms/relays (co- con-
- Digital display, 3 digits
- Monitoring of sensor (break/ short-circuit)
- Display of MIN- and MAXvalues
- scalable analog output 0/4...20 mA (TR 122 DA only)

- Universal supply voltage AC/DC 24-240 V
- Plug-in housing for easy mounting and service

The following parameters can be programmed:

- Switching points (alarms)
- Hysteresis (+ or = MIN or MAX-function)
- Relay in closed- or operating current mode
- automatic reset or electronic reclosing lock
- switching- and switch-back-delay
- Analog output
- EasyLimit for simplyfied setting of alarms
- Code-lock against manipulation of settings

#### Technical Data

rated supply voltage Us

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

sensor Pt 100 (RTD) connection

Pt 100 according to EN 60 751/IEC 60 751, Resistance 0...850 Ohm

measuring accuracy measuring current

line-resistance max. 3 x 22  $\Omega$  / 2 x 10  $\Omega$ 

connection of sensor

< 0.3 % of value  $\pm 0.5$  K ( $\Omega$ ) ≤ 0,8 mA

2-/3-wire, line-resistance max. 2 x 50  $\Omega$ / 3 x 50  $\Omega$ 

analog output measuring range resolution hysteresis switching delays relay-contact

0/4-20 mA, max. 500  $\Omega$ , error <0,3% of fullscale -199 ... +850 °C / 0 ... 850 Ω 1 K  $(\Omega)$ , -19,9 ... 99,9: 0,1 K  $(\Omega)$ 

±200 K

type 2 (see "general technical informations")

test conditions rated ambient temp. range dimensions (h x w x d)

see "general technical informations" -20°C...+55°C design S12: 82 x 42 x 121 [mm]

attachment

on 35 mm DIN rail according to DIN EN 50 022 or with

protection housing / terminals weight

screws M4 P 30 / IP 20 app. 300 g

Edition March 2011

### Temperature Relay Type TR210

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

#### TR210



The control unit 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.

**Function** 

- Measuring and monitoring range -270...+1820 °C
- resolution 0,1°C (to 999.9 °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 maxvalues 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)

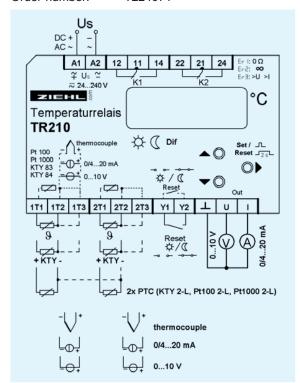
#### Displays:

- 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 s
  - autoreset or electronic reclosing lock
  - elay-time for switching and switching back 0...9999 s
  - operating- or closed current-mode
  - cyclic check of function
- Monitoring of difference in temperature
- · Preset basic programs

Order-number: T224071



### **Basic Programs**

### Program 1:

### 1 Temperature-sensor, 2 Limits

Application: Monitoring of a temperature for 2 limits, e.g. over-temperature with warning and switchjing 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-Sensores 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.

### Technical Data

Rated supply voltageUs

2 Measuring inputs

Measuring-time Analog output

Relay output

Test conditions
Rated ambient temperature renge

Dimensions h x w x d

Protection housing / terminals Weight Attachment

### 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 monitoring 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 1measuring-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 ca be forwarded to e.g. a remote display or a superior control.

AC/DC 24-240V, <3W, <7VA

(AC 20-264 V, DC 20,4-297 V)
Pt 100, Pt 1000 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 ( $22\Omega$ ), 0-10 V (13 k $\Omega$ )

<2,5 s to 5 s, depending on speed of change of signal

0/4-20 mA, max. 500  $\Omega$ . 0-10 V, max. 10 mA (without isolation to inputs)

type 3, see "general technical informations" 2 x 1 co- (change-over) contact

see "general technical informations" -20...+65°C

design V4: 90x70x58 [mm], mounting height 55 mm IP 30 / IP 20 (terminals pluggable)

app. 200 g

on 35 mm DIN-rail or with screws M 4

## Pt100-Temperature-Relay Type TR250

Digital, 3 Sensors, 3 Limits

### TR250





Function

anction

Technical Data

The Pt100 thermostat TR250 monitors up to 3 sensors Pt100 (RTD), Pt1000, KTY83 KTY84 or thermistors (PTC) at the same time. Different types of sensors, e.g. Pt 100 and PTC can be monitored simultaneously.

The unit is especially suitable for monitoring motors, generators and transformers.

An other application is the use as a 2- or 3-step-controller with additional monitoring of over- or under-temperature. monitoring of differences in temperatures of 2 sensors or temperature controller for heat pumps.

- Measuring and monitoring range - 199...+850°C
- resolution 0.1 °C selectable within range -19.9...99.9 °C
- 3 relay outputs K1 to K3 with change-over contacts
- Universal power supply AC/ DC 24-240 V
- Easy setting
- Storing of values of MIN- and MAX- temperature
- Code-lock against manipulation of settings

### 3 Sensor-Inputs:

- Pt100/1000, 2- or 3-wire connection, KTY83, KTY84
- Thermistors (PTC) each 1...6 in series
- Monitoring of short-circuit and break

### Rated supply voltage Us

Sensor connection

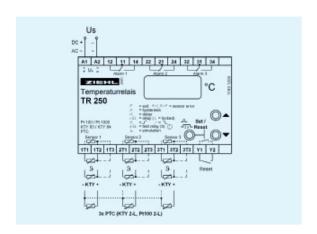
Measuring accuracy Sensor-current Connection

Measuring range Hysteresis Switching delay on/off Type of contact

Test conditions
Rated ambient temperature range

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

Order-number: T224190



#### Displays:

- 3 digit 7-segment-display for temperature and programming
- 3 LEDs for sensors, for alarms/relays
- °C / °F / resolution 0.1 °C can be selected

### Switching-Functions

- · 3 relays
- warmest/coldest sensor switches relay
- · prgrammable for every relay:
  - hysteresis (+ or = MIN- or MAX-function)
  - autoreset or electronic reclosing lock
  - delay-time for switching and switching back
  - operating- or closed current-mode
  - cyclic check of function
- monitoring of difference in temperature
- 4 preset programms:
  - motor / generator
  - transformer with Pt 100, with PTC/Pt 100
  - 3 x 1 alarm per sensor

AC/DC 24-240 V (AC 20-264 V, DC 20-297 V)

3 x Pt100 (DIN 43 760/IEC 751) (RTD) 3 x Pt1000, KTY83, KTY84

3 x 1...6 PTC (DIN 44080/44081)

< 0.5 % of value ±1 K

< 1 mA

3-wire, 2-wire, line-resistance max. 2 x 50  $\Omega$ 

-199...+850 °C -99...+99 °C 0...99 s / 0...999 s

type 2 (see "general technical informations")

3 x change-over / alarm

see "general technical informations"

-20°C...+65°C

V4: 90 x 70 x 58 [mm], mounting height 55 mm P 30 / IP 20 app. 200 g on 35 mm DIN rail or with screws M4

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### 1

## Pt100-Temperature Relays type TR400

Digital, 4 Sensors, 4 Limits

### TR400



c **FU**<sup>®</sup>US

The Pt100 thermostat TR400 is a temperature controller and monitors up to four Pt100 (RTD) sensors at the same time. Four switching points and four relays permit almost any combination of switching action. It also can select the highest temperatur of a group of three or four sensors. The temperatures of two sensors or groups of sensors can be issued

to 2 analog outputs i.e. for remote displays or further evaluation. Programming is very variable and simple.

Due to the fact that 4 type Pt100 sensors can be connected, the unit is especially suitable for temperature monitoring wherever up to 4 different measuring points must be monitored simultaneausly:

- · machines, bearings, plants
- motors and generators with simultaneous monitoring of bearing or coolant
- transformers with additional monitoring of the core temperature also

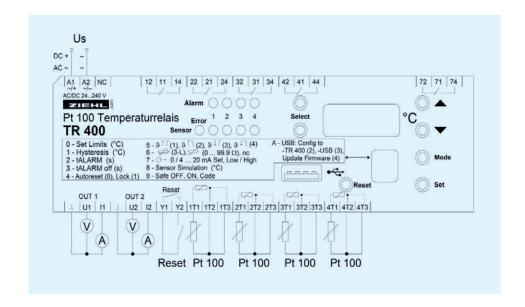
### **Function**

### Function overview

- Measuring and monitoring range -199 ... +800 °C
- 4 sensor inputs with 2- or 3-wire connection
- 4 relay outputs K1 to K4 with change-over contact
- Sensor Error Relay K7 monitors sensor break or sensor short circuit as well as an interruption of the powersupply.
- 2 analog outputs, 0/4...20 mA and 0/2...10 V, with individual scaling.
- Universal power supply. 2 ranges AC/DC 24-240 V USB-Stick-Terminal for up-
- and download of sets of parameters and for firmwareupdates

### Displays

- built-in 3 digit temperature display and 1 digit programm-mode display
- LED Alarm showing state of the alarm relays
- LED Sensor Error blinking at sensor short circuit or sensor interruption.
- Stored Values of MIN- and MAX- temperature can be displayed
- "Sensor select" showing temperatures of the different sensors "Alarm select" showing switching points.



### Technical Data TR400

Rated supply voltage Us

AC/DC 24 - 240 V tolerance DC-supply DC 20,4...297 V tolerance AC-supply AC 20...264 V

power consumption < 4 W, < 13 VA 0 / 50 / 60 Hz frequency

Relay outputs 5 change-over contacts (co)

max. AC 415 V switching voltage max. 5 A switching current

switching power max. 1250 VA (ohmic load) max. 120 W at DC 30 V

Nominal operational current I AC15 I<sub>e</sub> = 3 A  $U_{e} = 250 \text{ V}$ 

DC13  $I_{a} = 0.1 \text{ A}$   $U_{a} = 250 \text{ V}$ U = 24 V  $l_0 = 2 A$ 

recommended fuse for contacts T 3,15 A (gL) expected life mechanical 3 x 107 operations

expected life electrical 1 x 10 $^{5}$  operations with AC 250 V / 5 A, cos  $\phi$  = 1

EN 60 010-1 Testing conditions - 20 ... + 65 °C ambient temperature range

> Us-Relay, Sensors, USB, Analog output galvanic separation

Restet input -> DC 3820 V

Relay - Sensors, USB, Analog output

Reset input -> DC 3820 V

-199 ... +800 °C

No galvanic separation Sensors, USB, Analog output, Reset input

Sensor connection 4 x Pt 100 acc. to EN 60751 / IEC 60751, 2-/3-wire measuring accuracy ±0,5 % of value ±1 Digit

sensor current ≤ 0,7 mA

measuring delay time t<sub>M</sub> <1,5 s

switch points Temperature alarm hysteresis 1 ... 99 K

delay time tALARM 0,1 ... 99,9 s delay time tALARM off 0 ... 999 s

DC 0/2 V - 10 V, max. DC 10 mAAnalog output OUT 1/2 voltage outputs

current outputs DC 0/4 mA - 20 mA output resistance current max. 500 Ω no-load voltage max. DC 16 V

1% of span ±1 K accuracy

Housing design V8

dimensions (h x w x d) 90 x 140 x 58 [mm]

1 x 1,5 mm<sup>2</sup>(1,0 mm<sup>2</sup> with end sleeves for strands) line connection solid wire

protection housing / terminals IP 30 / IP 20

attachment on 35 mm DIN rail according to DIN EN 60 715 or M4 screw weight

app. 360 g

T224380 Order-number

Order-numbers

### 4

## Pt100-Temperature-Relay Type TR440

4 Sensors Pt100 (RTD), Monitoring of Core, Panel-Mount

### TR440



# Temperature-Relay for the protection of transformers from over-temperature and for controlling a fan.

Monitoring of the temperatures in the windings is made with 3 sensors. The input for the 4th sensor can be used for monitoring the temperature in the core or for a sensor for ambient temperature.

The 4 alarms/relay-outputs control the fan and release signals for alarm and trip if limits are exceeded. Different programs allow to adapt the required alarms to the application. Depending on the program e.g. extra alarms for sensor-error or for tripping because of overtemperature in the core are available.

### Other applications:

The forth sensor can be used to monitor the room, in which the transformer is set up and the alarm can control a forced cooling of the room.

The TR440 can also be used for the monitoring of temperatures e.g. at motors.

### Function:

#### Features:

- 4 sensor-inputs Pt 100 (RTD) and Pt 1000
- Sensor-connection in 2- or 3-wire
- Monitoring range
   -199...+850°C /-199...+999°F
- 4 alarms / relays
- Supply-voltage AC/DC 24-240 V
- Clearly arranged displays and easy programming
- Storing of values of MIN- and MAX-temperature
- Code-lock against unintended / unauthorized manipulations of settings

### Displays:

- 3 digit 7-segment-display
- 4 LEDs for sensor-inputs, LED for sensor-error
- 4 LEDs for alarms
- · 4 LEDs for state of relays
- Display in °C or °F

### Switching functions:

- 4 relay-outputs,
- 3 x 1 change-over (co) contacts, 1 x normally opend (no)
- Relay for Fan max. 10 A
- Adjustable (depending of function)
  - Hysteresis 1...99 K
  - Switch- and switch-backdelay 0...999 s
  - Operating- or closed-current mode
  - Autoreset or electronic reclosing lock
  - Cyclic start of fan (K1 only)

### Option:

Interface RS485 (Modbus RTU)

### Monitoring Programs: 3 sensors in windings:

Alarms/outputs for:

- Fan (with cyclic test)
- Alarm
- Trip
- · Sensor-Error

### 3 sensors in windings and 1 sensor in core:

Alarms/outputs for:

- Fan (with cyclic test)
- Alarm (winding and core)
- Trip (winding and core)
- · Sensor-Error

For core and winding different limits can be programmed.

### 3 sensors in windings and 1 sensor in core:

Alarms/outputs for:

- Fan (with cyclic test)
- Alarm (winding) / sensor-error (combined)
- Trip (winding)
- Trip (core)

Alarm 2 reports sensor-error and alarm

### 3 sensors in windings and 1 sensor in core:

Alarms/outputs for:

- Trip (core)
- Alarm (winding)
- Trip (winding)
- · Sensor-Error

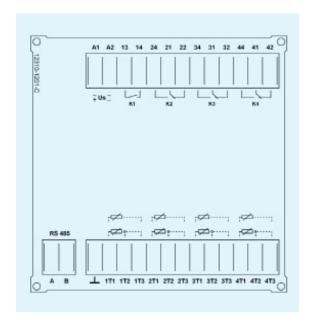
The relay for error (short-circuit or break of sensor-lines) is preset in closed-current mode (alarm also at loss of supply-voltage or failure in the device = monitoring of function of the device). All other relays are in operating-current mode (pick up at an alarm = no alarm when switching on and off supply-voltage). The mode of the relays can be changed by the user.

Order-numbers:

RS485 T224185

T224184

### Connection plan:



### Technical Data

Rated supply voltage Us  $$\sf AC/DC\ 24\text{-}240V},\ AC\ 20\text{-}264\ V,\ DC\ 20\text{-}297\ V,$  Power consumption  $$< 3\ W, < 5\ VA$ 

Sonsor-connection 4 x Pt100 (RTD) acc. to EN 60 751/ IEC 60 751

Measuring accuracy < 1% of value ± 1 digit

Sensor-current ≤ 1 mA

Connection 2- wire or 3-wire, with line-resistance max. 2 x 50  $\Omega$ 

Measuring range -199...850 °C (-199...+999 °F)

 $\begin{array}{ll} \mbox{Hysteresis} & \mbox{1...99 °C (°F)} \\ \mbox{Switching-delay on/off} & \mbox{0...999 s} \end{array}$ 

Relay-output Alarm 1 (Fan): 10 A

Alarms 2-4: type 3, see "general technical informati-

ons"

Test conditions see "general technical informations"

Rated ambient temperature -40...+65 °C

range

Housing panel-mount 96 x 96 mm

 $\begin{array}{lll} \text{Dimensions (H x B x T)} & 96 \text{ x } 96 \text{ x } 85 \text{ mm} \\ \text{Terminals} & 2 \text{ x } 13\text{-pole} \\ \text{Line connection solid wire} & 1 \text{ x } 0,5 \text{ mm}^2 \\ \text{Stranded with insulated ferrules} & 1 \text{ x } 0,14...1,5 \text{ mm}^2 \end{array}$ 

Attachment Panel-mount, cutout 92<sup>+0,8</sup>x92<sup>+0,8</sup> mm

Protection housing IP 20
Protection front IP 54
Protection terminals IP 20
Weight app. 350 g

## Pt100-Temperature-Relay Type TR600

Digital, 6 Sensors, 6 Limits

### TR600



### Temperature Relay for 6 Sensors Pt100

The Pt100-temperature relay TR600 monitors up to six sensors Pt100 (RTD) at the same time. Six switching points and six relays permit almost any combination of switching action. It also can select the highest temperature of groups of sensors. The temperatures of two sensors or groups of sensors can be issued to 2 analog

outputs i.e. for remote displays or further evaluation. Programming is very variable and simple.

Due to the fact that 6 type Pt100 sensors can be connected, the unit is especially suitable for temperature monitoring wherever up to 6 different measuring points must be monitored simultaneausly:

- machines, bearings, plants
- motors and generators with simultaneous monitoring of bearings and coolant.
- transformers with additional monitoring of the core temperature also

### **Function**

- measuring and monitoring range -199 ... +800 °C
- 6 sensor inputs with 2- or 3wire connection
- 6 relay outputs K1 to K6 with change-over contacts
- switching points for single sensor or group of 2, 3 or 6 sensors
- sensor error relay K7 monitors sensor break or
- sensor short circuit as well as an interruption of the powersupply.
- 2 analog outputs, 0/4...20 mA and 0/2...10 V, with individual scaling.
- universal power supply in 2 ranges AC/DC 24 - 240 V
- USB-Stick-Terminal for upand download of sets of parameters and for firmwareupdates

### Displays

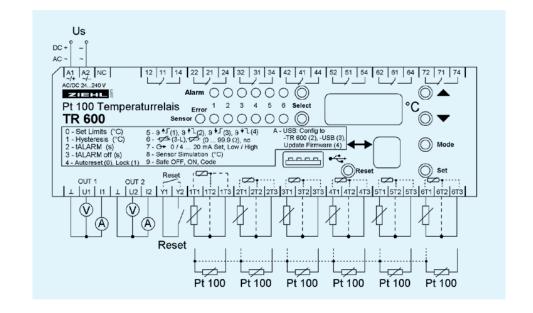
- built-in 3 digit temperature display and 1 digit program-mode display
- LED Alarm showing state of the alarm relays
- LED Sensor Error blinking at sensor short circuit or sensor interruption.
- Stored Values of MIN- and MAX- temperature can be displayed
- "Sensor select" showing temperatures of the different sensors
- · "Alarm select" showing switching points .

### Programmable for each relay extra:

- · hysteresis
- electronic reclosing lock or autoreset
- switch-on delay and switch-off delay
- MIN or MAX- function of relay
- relay releases or picks up when exceeding the setpoint

#### Options:

 interface RS485 protocols ZIEHL and Modbus RTU



### Technical Data TR600

Rated supply voltage Us

AC/DC 24 – 240 V

tolerance DC-supply DC 20,4...297 V tolerance AC-supply AC 20...264 V

power consumption < 4 W, < 13 VA frequency 0 / 50 / 60 Hz

Relay outputs 7 change-over contacts (co)

switching voltage max. AC 415 V switching current max. 5 A

switching power max. 1250 VA (ohmic load)

max. 120 W at DC 30 V

Nominal operational current I

AC 15  $I_{e} = 3 \text{ A} \qquad U_{e} = 250 \text{ V}$   $I_{e} = 2 \text{ A} \qquad U_{e} = 24 \text{ V}$   $I_{e} = 0.1 \text{ A} \qquad U_{e} = 250 \text{ V}$ 

 $\begin{array}{ll} \text{recommended fuse for contacts} & \text{T 3,15 A (gL)} \\ \text{expected life mechanical} & \text{3 x } 10^7 \text{ operations} \end{array}$ 

expected life electrical 1 x 10 $^{\circ}$  operations with AC 250 V / 5 A,  $\cos \varphi$  = 1

Testing conditions EN 60 010-1 ambient temperature range = 20 ... + 65 °C

galvanic separation Us-Relay, Sensors, USB, Analog output

Reset input -> DC 3820 V

Relay - Sensors, USB, Analog output

Reset input -> DC 3820 V

No galvanic separation Sensors, USB, Analog output, Reset input

Sensor connection 6 x Pt 100 acc. to EN 60751 / IEC 60751, 2- / 3-wire

measuring accuracy ±0,5 % of value ±1 Digit

sensor current  $\leq 0.7 \text{ mA}$ measuring delay time  $t_{\text{M}}$  < 1.5 s

Temperature alarm switch points -199 ... +800 °C

hysteresis 1 ... 99 K
delay time tALARM 0,1 ... 99,9 s
delay time tALARM off 0 ... 999 s

Analog output OUT 1/2 voltage outputs DC 0/2 V - 10 V , max. DC 10 mA

accuracy 1% of span ±1 K

Interface RS485 Modbus RTU/ZIEHL RS485 protocol

address/busnumber 1-247 (Modbus)/0-99 (ZIEHL RS485 protocol)

baudrate 4800/9600/19200/57600

parity bit no, odd, even

stoppbit 1 (at modbus and pority no, stoppit = 2)
Response time ZIEHL RS485 protocol 7-9 ms after reception of last sign

Housing design V8

dimensions (h x w x d) 90 x 140 x 58 [mm]

line connection solid wire 1 x 1,5 mm<sup>2</sup>(1,0 mm<sup>2</sup> with end sleeves for strands)

protection housing / terminals IP 30 / IP 20

attachment on 35 mm DIN rail according to EN 60715 or M4 screw

weight app. 360 g

Order-numbers analog output interface RS 485:

(= standard) without analog output

**T224360** T224361

# Universal-Relay Type TR800Web

8 Inputs, Operation with Browser via TCP/IP

#### TR800Web





Web-IO Universal Relay with 8 Inputs for Temperature-Sensors and other analog Signals.

The TR800Web can be connected to the internet or an intranet and operated via TCP/IP from a normal PC with a suitable browser (tested with MS IE 7). No special software and no special instruction is necessary.

The Universal-Relay TR800Web monitors and logs signals from up to 8 inputs. Up to 8 limits (one per input) can be programmed for each of the 4 output-relays. Thus e.g. alarm 1 can be activated when the temperature at a sensor (e.g. Pt100) at input 1 exceeds

a limit or when the signal of a transmitter for pressure (e.g. 4-20 mA) at input 5 falls below a limit.

It can also send an email when a limit is exceeded and/or when the signals falls short of the limit again. A day/night switchover allows to vary limits depending on daytime.

In addition the device has an interface RS485 with the protocols Modbus and ZIEHL-standard.

### Applications:

The TR800Web is used where one or more of the following features a required:

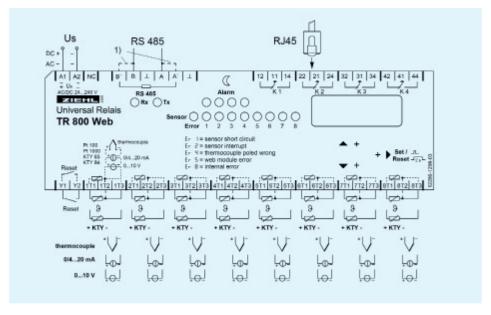
- measuring of up to 8 analog signals and transmit the data via TCP/IP
- reading of measured values and teleservice via internet/intranet
- signalling of alarms via email when limits are exceeded
- logging of measured values and remote inquiry e.g. for monitoring temperatures at engines and in plants

### Features

- 8 Measuring Inputs (each programmable):
- Pt100 (RTD), Pt1000 in 2- or 3-wire
- KTY83 or KTY84
- thermocouples types B, E, J, K, L, N, R, S, T
- DC 0-10 V, DC 0/4-20 mA, display can be scaled
- resistance 0-500 Ohm, 0-30 kOhm

### 4 Alarms

- 4 relays, potential-free change-over contacts
- for every alarm separately programmable
- one limit per input (limit and switching-backvalue)
- second set of values switchable day/night with week-program
- switching-delay and switching-back delay
- function of relay (on or off)
- interlocked switching
- · alarm at functional error
- email to any adresses with freely selectable subject and text



### Connected via internet in webbrowser

- display of measured values, min- and max-values with date/ time-stamp
- simulation of measured values
- · state of alarms
- configuration of inputs (name, compensation, scaling and measuring-unit)
- configuration of alarms (limits, function of relays, ...)
- time-depending day/night changing of limits
- logging of up to 150.000 values per input, alarms with date/ time-stamp
- logging-interval adjustable 2 seconds to 24 hours
- configuration of network
- settings of system
- administration of users and code-protection
- real-time clock with synchronizing with time-server, reserve 7 days

#### Interfaces:

- · Ethernet interface (http, https, UDP and Modbus)
  - http (port can be selected and switched off) and https
  - ftp-upload for automatic (interval adjustable) storage of logged data on ftp-server
  - UDP- and Modbus protocol to read data (port can be selected)
  - AJAX for data-readout in html
  - SNMP
- RS485 interface to readout data with modbus and ZIEHL-protocol

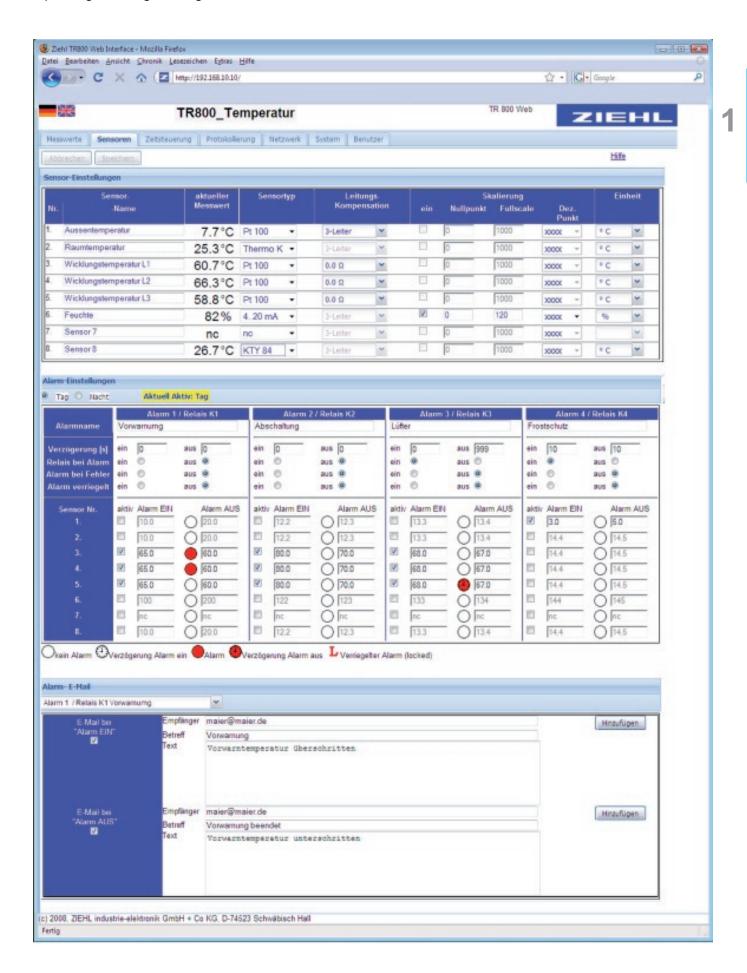
### Displays and Operating Elements

- · 8 LEDs for inputs
- · 4 LEDs for alarms, 4 LEDs for state of relays
- 4 digit display for measuring values
- 3 buttons for reading measured values at the device and for setting of IP-adress
- switch IP 10.10.10.10 / user
- reset-button
- · LEDs for activity of interfaces

Order-number: T224164



### Operating and Programming with Web-Browser:



### Technical Data TR800Web

Rated supply voltage Us AC/DC 24-240 V, 0/50/60 Hz < 4 W < 13 VA Tolerance

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

Relay output

4 x 1 change-over contact (CO)Typ 2 Type of contact

type 2 (see "general technical informations")

Testing conditions see "general technical informations"

Network-connection 10/100 MBit Auto-MDIX

Measuring cycle/measuring time < 3 s Inputs

### Pt100, Pt1000 according to EN 60 751

	Measu	0	Short-circuit	Interruption	Resistance sensor
	range °C		Ohm	Ohm	+ resistance line Ohm
Sensor	min	max	<	>	max
Pt100	-199	860	15	400	500
Pt1000	-199	860	150	4000	4100
KTY83	-55	175	150	4000	4100
KTY84	-40 150		150	4000	4100

< ± 0,5 % of measured value ± 0,5 K (KTY ±5K) Accuracy

Sensor-current  $\leq$  ± 0,6 mA Thermal drift < 0,04 °C/K

### Thermocouples according to EN 60 584, DIN 43710

	Measuring range	ge °C	Accuracy
Тур	Min	Max	
В	0	1820	≤ ± 2 °C T > 300 °C
E	-270	1000	≤±1°C
J	-210	1200	≤±1°C
K	-200	1372	≤±2°C
L	-200	900	≤±1°C
N	-270	1300	≤ ± 2 °C
R	-50	1770	≤±2°C
S	-50	1770	≤±2°C
Т	-270	400	≤±1°C

< 0.01 % /K Thermal drift Measuring-error of sensor-line + 0,25  $\mu$ V /  $\Omega$ Accuracy of summing point < ± 5 °C

### Inputs for voltage and current

	Resistance of	max.	Accuracy
	input	Inputsignal	from Full Scale
0 - 10 V	12 k Ω	27 V	< 0,1 %
0/420 mA	18 Ω	100 mA	< 0,5 %

Thermal drift < 0,02 %/ K

### Measuring of resistance:

Accuracy 0,0...500,0 Ω < 0,2 % of measured value  $\pm$  0,5  $\Omega$ Accuracy 0...30,00 kΩ < 0,5 % measured value ± 2  $\Omega$ 

Measuring current ≤ 0,6 mA

dimensions (w x h x d) design V8, switchgear-mount Housing

protection housing/terminals 140 x 90 x 58 mm, mounting height 55 mm

attachment IP 30/ IP 20

DIN-rail 35 mm according to EN 60715 oder screws M4

weight (with 2 extra bars)

app. 370 g

# Pt100-Temperature-Relay TR1200

12 Sensors, Interface RS485

#### TR1200





### 12-channel Temperature-Relay for Sensors Pt100 (RTD)

Temperature-relays TR1200 measure the temperature of up to 12 sensors within 199...+850 °C and provide the data at an interface RS485 for external evaluation. With its universal power-supply AC/DC 24-240 V it can be connected to all common supply-voltages.

The TR1200 provides the data as Modbus-RTU-protocol or according to the ZIEHL-standard.

With protocol ZIEHL-standard it can replace two ZIEHL TR600.

The TR1200 is used where temperatures of many sensors Pt100 shall be evaluated by a device with input RS485.

### Applications are e.g. monitoring of

- motors and generators (windings, bearings, coolant, ambient temperature)
- transformers (windings, core, ambient temperature)
- machines, plants and equipment

### **Features**

#### Sensors and Displays:

- 12 inputs for sensors Pt100 (RTD)
- Connection 2- or 3-wire unneeded inputs can be switched off
- Monitoring of sensors for short-circuit and interrupt
- 3-digit-display for temperature
- LEDs for assigning the measured value, error, state of relay and interface

### Interface and Relay:

- Interface RS485 (protocols ZIEHL-standard and Modbus-RTU)
- Baud rate (4800/9600/19200) and Parity-Bit selectable
- fully compatible to TR600

- · Protocols see operating-manual on www.ziehl.de
- Relay for Error (1 co-contact) for sensor-error and operational failure

#### More Features:

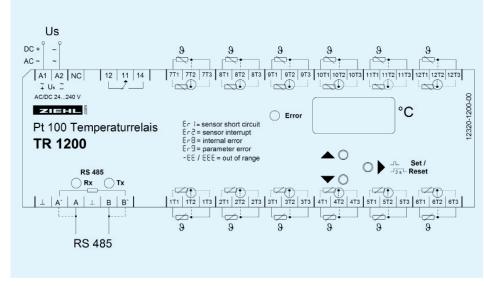
- easy operation and selection of temperatures at the device
- · Sensor-simulation
- · Code-protection against manipulation of settings
- Universal supply-voltage AC/DC 24...240 V
- Housing for switchgear-mount, 140 mm wide, mounting-height 55 mm
- Mounting on DIN-rail 35mm or with screws M4 (option)

### Software for operation (download from www.ziehl.de)

- · Software (Modbus) for programming the inputs
- Logging-function (with connected PC only)

Order-number

T224095



### Technical Data TR1200

Rated Supply Voltage Us AC/DC 24-240 V, 0/45...65 Hz, < 5 VA

DC: 20,4...297 V, AC: 20,4...264 V

Relay output 1 change-over contact (CO)

type 2, see "general technical informations"

Measuring inputs 12 x Pt100 (RTD) acc. to EN 60 751 / IEC 60 751 Measuring time sensor 0,25...3s (depending on number of sensors)

Measuring range -199°...850°C

Resolution 1°C

Tolerance  $\pm 0.5\%$  of value  $\pm 1 \text{ K}$ 

Sensor-current ≤ 0,8 mA

RS485 interface

Adress of device 0...96

Baud rate 4800, 9600, 19200 baud
Parity N, O, E (non, odd, even)
cable-length max. 1000 m at 19200 baud

Testing conditions

Rated ambient temperature

range

see "general technical informations"

-20°C...+65°C

Housing Design V8

Dimensions (W x H x D) 140 x 90 x 58 mm, mounting height 55 mm

Protection housing/terminals IP 30 / IP 20

Attachment DIN-rail 35 mm acc. to EN 60715 or screws M4

(option)

Weight app. 350 g

## Pt100-Temperature-Relay TR1200IP

12 Sensors, Interface TCP/IP

### TR1200IP



### 12-channel Temperature-Relay for Sensors Pt 100 (RTD)

Temperature-relays TR1200IP measure the temperature of up to 12 sensors within 199...+850 °C and provide the data at an ethernet interface for external evaluation. With its universal power-supply AC/DC 24-240 V it can be connected to all common supply-voltages.

Actual measured values and stored min- and max-values can

be displayed in a normal browser. At the Ethernet-interface the values are available in protocol Modbus TCP or in ZIEHL-Standard RTD.

The TR1200IP is used where temperatures of many sensors Pt100 shall be measured and transmitted via Ethernet.

### Applications are e.g. monitoring of

- motors and generators (windings, bearings, coolant, ambient temperature)
- transformers (windings, core, ambient temperature)
- machines, plants and equipment

### Features

### Sensors and Displays:

- 12 inputs for sensors Pt100 (RTD)
- Connection 2- or 3-wire unneeded inputs can be switched off
- Monitoring of sensors for short-circuit and interrupt
- 3-digit-display for temperature
- LEDs for assigning the measured value, error, state of relay and interface

### Interface and Relay:

- Interface TCP/IP
- 10 MBit/s Ethernet
- Protocol ZIEHL-Standard RTD or Modbus TCP (see www.ziehl.de)

- function like 2 x TR600Web
- Relay for Error (1 co-contact) for sensor-error and operational failure

#### More Features:

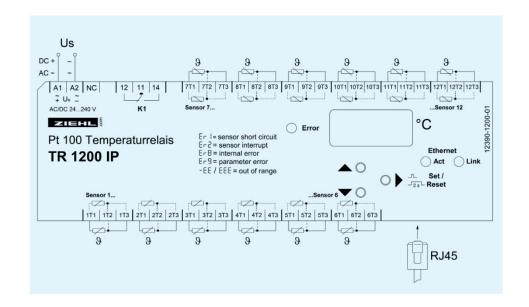
- easy operation and selection of temperatures at the device
- Sensor-simulation
- Code-protection against manipulation of settings
- Universal supply-voltage AC/DC 24...240 V
- Housing for switchgear-mount, 140 mm wide, mounting-height 55 mm
- Mounting on DIN-rail 35mm or with screws M4 (option)

### Software

 The TR1200IP can be operated with a normal webbrowser. There is no special software required.

Order-number

T224081



### Technical Data TR1200IP

Rated Supply Voltage Us AC/DC 24-240 V, 0/45...65 Hz, < 5 VA

DC: 20,4...297 V, AC: 20,4...264 V

Relay output 1 change-over contact (CO)

type 2, see "general technical informations"

Measuring inputs 12 x Pt 100 (RTD) acc. to EN 60 751 / IEC 60 751 Measuring time sensor 0,25...3s (depending on number of sensors)

Measuring range -199°...850°C

Resolution 1°C

Tolerance  $\pm 0.5\%$  of value  $\pm 1 \text{ K}$ 

Sensor-current ≤ 0,8 mA

Ethernet interface

IP-adress selectable Subnet mask selectable

UDP Port selectable 0...65535

Max. cable-length max. 20 m with CAT 5 patch-cable

Max. response time 200 ms

Testing conditions

Rated ambient temperature

range

see "general technical informations"

-20°C...+65°C

Housing Design V8

Dimensions (W x H x D) 140 x 90 x 58 mm, mounting height 55 mm

Protection housing/terminals IP 30 / IP 20

Attachment DIN-rail 35 mm acc. to EN 60715 or screws M4

(option)

Weight app. 350 g

### 1

# Wireless-Temperature-Relay Type WR250

Potential-free monitoring of temperatures at high-voltage transformers

#### WR250



The Wireless-Relay WR250 is a receiver for up to 6 Wireless Temperature-Sensors WSPt100. Up to 6 sensors transmit temperatures by radio. The WR250 displays and evaluates the temperatures.

#### Application:

- Protection of high-voltage transformers (in primary windings also) from over-temperatures
- where temperatures are to be measured on high potential
- · where wireless data-transfer via radio is preferred

### Function

- Evaluation of 1-6 WS Pt 100-sensors
- Measuring- and monitoringrange 0...180 °C
- Limits and functions of relay pre-set for monitoring transformers (Fan, Alarm, Trip)
- Sensor-Simulation for testing the settings
- Code-lock against manipulation of settings
- Universal power-supply AC/ DC 24-240 V
- Interface RS485 (Modbus) for reading temperature and states of alarms and programming
- · Input for external antenna
- · Terminals pluggable

### Displays

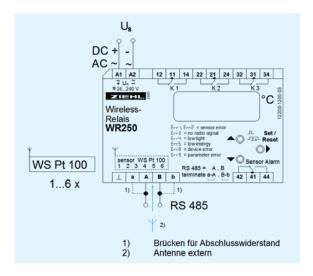
- 3 digit 7-segment-display for temperatures, alarms and parameters
- Resolution 1 °C
- Display/Storing of min- and max-temperatures
- 4 LEDs for state of relays
- 6 LEDs for states of wirelesssensors

### Switching functions

- 3 relays alarm (each 1 change-over contact)
- · warmest sensor switches relay
- individually adjustable for relays K1-K3
  - Hysteresis
  - Delay-times for switching and switching back
  - operating- or closed surrent mode
  - cyclic check of function (e.g. K1 for fan)
- Relay K4 for sensor error alarm

#### Order-number:

WR250 T224350 Antenna with magnet foot (Option) 101100



### Technical Data

Rated Supply Voltage Us

Sensor-Input

Measuring range Tolerance

Relay-output

Test conditions
Rated ambient temperature
range
Dimensions (h x w x d)
Protection housing / terminals
Weight
Attachment

AC/DC 24-240V, AC 20-264 V, DC 20,4-297 V, <5VA

Receiver for 1-6 wirelesssensors WS Pt 100

0...180 °C

± 4 K (Wirelesssensor Pt 100)

Typ 2 see "general technical informations" 4 x 1 changeover-contact (CO)

see "general technical informations" -20...+65°C

Design V4: 90x 70x 58 [mm], mounting height 55 mm IP 30 / IP 20 approx. 190 g DIN-rail 35 mm or screws M4

### Wireless-Temperature-Sensor WSPt100

### potential-free monitoring of temperatures at high-voltage transformers

#### WSPt100



The Wireless Temperature-Sensor WSPt100 measures the temperature of a connected Pt100 (RTD) sensor.

The measured values are transmitted by radio to a Wireless-Relay WR250. The WR250 displays and evaluates the temperatures.

The WSPt100 has a built-in battery or generates the required energy by means of an integrated photocell and stores it in a capacitor. Thus the WSPt100 can also measure and transmit temperatures during a temporary darkness.

The maximum duration at darkness depends on the selected intervals for measuring- and sending and on the state of charge of the capacitor.

Power-supply and transmission of data are completely potential-free. Thus high differences in potentials are possible.

The electronics must be mounted potential-free or on the same potential as the connected sensor. Max. ambient temperature 65 °C.

### Application:

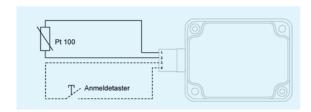
- Protection of high-voltage transformers (in primary windings also) from over-temperatures
- where temperatures are to be measured on high potential
- where wireless data-transfer via radio is preferred

### Description

- Input for temperature-sensor Pt100 (RTD)
- Measuring range 0 .. 180°C (other ranges on request)
- Lifetime of battery at 10s/10 cycles and ambient temperature < 30°C up to 10 years
- Duration at darkness max. app. 10 hours (solar)
- Measuring-cycle adjustable (1s / 10s / 100s)
- Sending-cycle adjustable (every 1 / 10 / 100 measurements)
- Automatic sending on temperature-change >4 K

- Input for sensor Pt100 (not included) via connector M12 (included)
- Lighting on photocell min. 500 LUX (continously)
- Range of radio signal: free field app. 100 m, in buildings app. 20 m

Order-numbers: solar T224351 with battery T224352



### Technical Data

### Rated supply-voltage Us

868,3 MHz

Radio frequency Transmitting power

max. 10 mW

Measuring cycle

app. 1s / 10s / 100s (BR1 and BR2)

not required (supply via photocell)

Sending cycle

every 1 / 10 / 100 measurements (BR3 and BR4)

**Battery Life** 

Weight

depending on configuration and ambient temperature

up to 10 years

Measuring range Tolerance

0 °C...180 °C ± 4 K

Environment

weather-protected places

+5°C ... +65°C

65 x 50 x 35 mm

5% ... 85% relative humidity no condensation or icing permitted

Protection **IP 66** 

EN 61000-6-2 Interference resistance

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

IP 66 / IP 67 Screws M 4 (mounting plate included)

app. 80 g

54

# Safety Temperature-Limiting-Device STR100

STR100



The electrical safety temperature limiting device type STR100, in connection with Pt100 sensors, monitors temperatures in applications for which monitoring with increased safety is required. Functioning corresponds to type 2BDK as per VDE 0631.

The limit temperature T can be set at the front by means of a scaled potentiometer. An unauthorized or unintended manipulation of the limit is prevented by a transparent plastic-plate which can be sealed. A potential free relay contact is switched off when exceeding the limit value.

Safety temperature limiting devices are used in plants when temperature monitoring has to meet high requirements:

- · Industrial furnace plants
- · Dyeing machines
- · Thermal oil plants

The device cabe used in combination with sensors Pt100 (RTD). The suitability must be proved in combination with the used sensors. Regular checks are stipulated for enhanced safety requirements.

The safety temperature limiting device STR100 meets the requirements of safety category 3 (Safety of machines according to DIN EN 954-1, for models with supply-voltage DC 24 V and AC 230 V tested and approved by TÜV Rheinland with reports T24/00, 19.6.2000, T103/2007, 25.1.2007 and Z103/2007 E2, 12.9.07. Reports see homepage www.ziehl.de).

Description

The safety temperature limiting device STR100 detects the resistance of a Pt100-sensor connected to the input. This is linearized and evaluated in 2 separated channels. If the measured temperature is smaller than the limit value adjusted, both output relays are picked up. To do this, a reset has to be made after switching on the supply voltage (close contact between terminals 3+4). The relays are wired in such a way to have the function of a change-over switch to the outside. The load circuit is only closed when both relays are picked up. If a malfunction occurs or if the limit value is exceeded, both relays are released and the load circuit is separated. The released relays K1 and K2 are indicated by the lighting up of the red LEDs. When the limit value is exceeded, a third relay picks up which is used for error indication.

Interruption of the sensor or shortcircuit are signaled by a red LED each and also lead to disconnection of both channels.

Only when the temperature has fallen below the response value by the switching hysteresis of about 10°C and no malfunction occurs, it is possible for the STR 100 to close the load circuit after actuating the reset key.

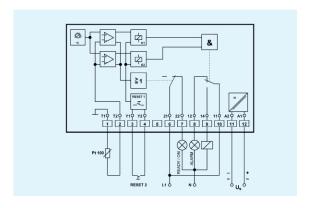
Readiness for switching on is displayed by the third relay and a LED. An incorporated safety fuse avoids welding of the relay contacts.

- Safety temperature limiting device meets safety category 3 (SK 3) as per DIN EN 954-1
- Connection for Pt 100 sensors as per EN 60751/ IEC 60751
- can be delivered with measuring-range between -200 and +700 °C
- · 2-channel evaluation
- Sensor monitoring for interruption and short-circuit LED-displays for relay position, error messages and
- readiness for switching on Relay for message readiness for switching on
- Setting of limit value to be sealed
- · Incorporated reset key
- Connection for external reset key
- Assembly-friendly plug-in base housing S 12
- TÜV-examined

#### Order-numbers:

0...200°C AC 230 V **T224148** 100...300°C AC 230 V **T224142** 200...500°C AC 230 V **T224144** 

supply-voltage DC 24 V and other measuring ranges on request



### Technische Daten STR100

Power supply Rated supply-voltage  $U_s$  AC 230 V DC 24 V Adm. tolerance  $U_s$  -10...+10% -15...+25% Power consumption <2 VA <3W

Frequency 50/60 Hz

Sensor-Input 2-wire Pt 100 acc. to EN 60751/IEC 751, α = 0,00385

Max. current < 3,15 mA (< 10 mA bei -200...+0°C)
Max. voltage < 2 V, open terminals < 15 V

Line resistance Standard =  $0.5 \Omega$ , Option: max.  $30 \Omega$ 

Switching points Switching off Over-temperature, sensor break, sensor short circuit

and malfunction

Limit value T adjustable Switching hysteresis 10°C (±25%)

Reset with reset key at the front or an external key

Relay outputs 1 change-over contact (CO)

Switching voltage max. AC 400 V max. DC 300 V

Switching current max. 6 A

Switching power max. 2000 VA (ohmic load) max. 48 W at DC 24 V

nominal continous current Ith 6 A

nominal operating current le 2 A AC 15 400V 2 A DC 13 24 V

4 A AC 11/AC 15 230V

recommended fuse for contacts 3,15 A slow blow, 4 A flink expected life mechanical  $3 \times 10^7$  operations

expected life electrical 1 x 10<sup>5</sup> operations with 240 V/6 A

derating factor  $\cos \varphi 0.3$  0.5

Testing conditions EN 50178, EN 61010-1, EN 60947-5

Rated insulation voltage AC 250 V
Contamination level 2 (normal)
Rated impulse withstand volta-

ge

Overvolatage category I

Transformer EN 61558-2-6 (VDE 0551) Interference resistance industry EN 61000-6-2, EN 61326-1

Interference transmission Class B EN 50081-1

"on"-period 100 %
Rated ambient temperature 0...50°C EN 60068-2-1 dry heat

range

Housing Dimensions H x B x T Design S 12 (plugable): 82 x 42 x 121 [mm]

wire-connection 12-pole, each 2 x 1,5 mm<sup>2</sup>

Protection housing IP 40
Protection terminals IP 20
Fitting position any

Fastening Snap mounting on 35 mm standard rail conforms to

DIN EN 50 022 or M4 screws

Vibration resistance 1 mm deflection 25 Hz/ 10 g 25-100 Hz

Shock resistance 10 g 20 ms 20 g 4 ms

Weight approx. 300 g

# Pt100-Temperature-Sensors Type TF101

### General

TF101 temperature sensors use EN60751/IEC platinum resistance temperature detectors (RTD). For precise temperature measure-ment the Platinum Resistance Thermometer offers the best overall advantages in repeatability and stability over a long period. High accuracy allows replacement of a sensor without

any need for re-adjust of the connected measuring devices or thermostats. TF101 temperature sensors are available in different designs.

### Types / Description

TF101N -50°C...+550°C



Platinum resistance temperature sensor on ceramic substrate intended for installation into any housing depending to user's requirements. Very small and quick sensor, only suitable for further treatment. Notice: do not cut the sensor leads. Thermal response time refer to manufacturer data:  $T_{0,9}$  in the air 10 s, in water <1 s.

With 2-wire connection and cable-length of 2 m there is a temperature-failure of approx. 0.51  $\Omega$  = 1.32 K

TF101K -50°C...+200°C



Platinum resistance temperature sensor on ceramic substrate protected by a heat-shrinkable sleeve and with PTFE isolated stranded wire. The TF101K version can be installed in motor or transformer windings. When build-in into windings do not pressure the sensor element. Precautions should be taken to protect sensor and extension leads against push and pull forces. Thermal response time  $T_{0,9}$  in the air 100 s, in water 19 s.

Weight: 10 g

Order number: 2-wire **T223154** 

caused by the line resistance.

Order number: 019061

3-wire **T223134** 

TF 101U2 -30°C...+105°C



-50°C...+200°C



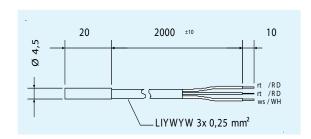
Sensors TF101U2 are encapsulated in a stainless-steel-shell V4A. They are suitable for measuring temperatures in fluids, under isolations, at surfaces or for inside or outside applications. The protection class is IP 66.

The version with PVC-isolated cable (3 x 0,25 mm² in one cable) can be easily wired. The maximum ambient temperature is 105 °C.

The version with PTFE-isolation (3 x 0,14 mm $^2$  single wires) withstands peak-temperatures up to 200  $^{\circ}$ C Weight: app. 50 g (PVC)

app. 20 g (PTFE)

Order number: 3-wire, -30...+105°C **T223051** 3-wire, -50...+200°C **T223052** 



TF101G3 -50°C...+200°C mit Gewinde



Platinum resistance temperature sensor on ceramic substrate built into a M6 brass threaded bush, especially suitable for being screwed into metal, e.g. for monitoring temperature of heat sinks or heating plates.

Please note that there will be a measuring error due to the design, as the sensor can loose heat via the connection strand.

Cable length: 2000 mm

Weight: 21 g.

(Dimensions see Dimension illustrations)

Order number: 3-wire T223143

TF101ZG2 -50°C...+200°C



Platinum resistance temperature sensor built into steel tube V4A, 1/2 inch, suitable for installation in pipes. Thermal response time  $T_{\rm 0,9}$  in the air 255 s, in water 45 s.

Suitable for transmission in 2- or 3-wire technique. Weight 120  ${\rm g}$ 

(Dimensions see Dimension illustrations)

Order numbers:

110 mm insertion depth T223137

TF101R -20...+70°C



Sensor for measuring ambient temperatures inside or outside.

Protection class IP 54. Cabling can be connected in 2- or 3- wire technique.

Housing W x H x D =  $65 \times 50 \times 38 \text{ mm}$ 

Weight: app. 70 g

Order number: T223060

Technical Data

Nominal resistance Temperature coefficient Class B, DIN 43 760 Test voltage Extension leads Shrink sleeve Measuring range 100 Ω at 0 °C 3,85 x 10  $^{-3}$ /K (see table)  $\Delta \vartheta = \pm (0,3 + 0,005 \ \vartheta)$  [°C] 2,5 kV AC (not TF101N)

PTFE; silver-plated stranded copper wire 0,14 mm<sup>2</sup>

Kynar

-50°C...+170 °C permanent

200 °C max. 170 h

### Cabling

ZIEHL thermostats of TR series are generally insensitive to interference in the sensor line. Occasionally, however, undesirable switching is unavoidable, especially when temperature is near the switching point. For this reason it is highly recommended that cables are not laid parallel to power current lines over long distances. When appropriate, cables should be screened or twisted together.

### Line-resistance

With RTD sensors the resistance of the connecting cable should be considered, otherwise there is an measuring error. The resistance must be compensated. The resistance of a connecting cable can be calculated as follows:

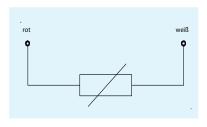
 $R [\Omega] = 2 \times I/(k \times A),$  I = cable length [m],

 $k = \text{conductivity } [S \times m/mm^2] \text{ e.g. } Cu = 56,$ 

A = cross sectional area [mm<sup>2</sup>]

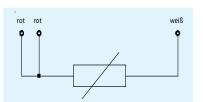
For example copper-wire: I = 50 m, cross sectional area 1 mm<sup>2</sup>: R = 2 x 50/(56 x 1) = 1,79  $\Omega$ , Resulting error = 1,79  $\Omega$ /0,385  $\Omega$  x K = 4,6 K.

### Linecompensation



### 2-wire technique

With 2-wire connection the line resistance is compensated for by a potentiometer in the thermostat, by programming (e.g. TR122D, TR600) or via wiring an external resistor. The advantage of the possibly simpler and more economical running of just two wires is counteracted by the disadvantage of the manual compensation required in the case of longer wiring. Differences in resistance caused by temperature changes cannot be compensated.



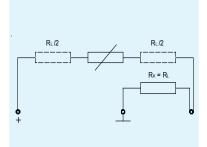
### 3-wire technique

With 3-wire connection, a third wire (sense) connected to the sensor registers the drop in voltage in one line. For compensation of line resistance it is assumed that the voltage drop in the second line is identical (i.e. the same wire and same wire temperature). Compensation is then performed automatically. Possible changes of resistance in the line due to temperature changes are also compensated for.



### 4-wire technique

With 4-wire connection, impressed current flows via two wires to the sensor. Via a two sensor line the drop in voltage is measured directly at the sensor. Possible differences in the sensor connection wiring can be disregarded. A disadvantage is the higher costs involved in running 4 wires.



### Kombination of 2- and 3-wire technique

When connecting 2-wire-sensors to units with 3-wire input, the line resistance can be compensated by connecting a compensation resistor (Rk) between ground and sense-input. Rk must have the same value as the resistance of the line. The sensor then has to be connected to the + and the sense- input. Rk must be lower than the permitted resistance for 1 line of the 3-wire-input.

Units requiring 3-wire configurations can also be operated by 2-wire sensors. The sensor input is simply shortened. The line resistance need not be compensated.

3-wire sensors can be used as 2-wire sensors, simply by omitting one wire.

2-wire sensors can be branched at any desired position in a 3 or 4-wire connection system. In this case though, the line resistance of the two wires from the branching point to the sensor is not compensated.

ZIEHL thermostats, series TR are designed for use with 2 or 3-wire connection.

### Pt100 resistance table

### Basic values in $\Omega$ for measuring resistors Pt 100 according to DIN/ IEC 751

°C	Ω	°C	Ω	°C	Ω	°C	Ω	°C	Ω	°C	Ω
-200 -190 -180 -170 -180 -170 -150 -140 -130 -120 -110 -100 - 90 - 80 - 70 - 60 - 50 - 40 - 30 - 20 - 10	18,49 22,80 27,08 31,32 35,53 39,71 43,87 48,00 52,11 56,19 60,25 64,30 68,33 72,33 76,33 80,31 84,27 88,22 92,16 96,09	0 10 20 30 40 50 60 70 80 90 110 120 130 140 150 160 170 180	100,00 103,90 107,79 111,67 115,54 119,40 123,24 127,07 130,89 134,70 142,29 146,06 149,82 153,58 157,31 161,04 164,76 168,46 172,16	200 210 220 230 240 250 260 270 280 290 310 320 330 340 350 360 370 380 390	175,84 179,51 183,17 186,82 190,45 194,07 197,69 201,29 204,88 208,45 212,02 215,57 219,12 222,65 222,65 222,617 233,17 236,65 240,13 243,59	400 410 420 430 440 450 460 470 480 490 500 510 520 530 540 550 560 570 580 590	247,04 250,48 253,90 257,32 260,72 264,11 267,49 270,86 274,22 277,56 280,90 284,22 287,53 290,83 294,11 297,39 300,91 307,15 310,38	600 610 620 630 640 650 660 670 680 690 710 720 730 740 750 760 770 780 790	313,59 316,80 319,99 323,18 326,35 329,51 332,66 335,79 338,92 342,03 345,13 348,22 351,30 354,37 357,42 360,47 363,50 366,52 369,53 372,52	800 810 820 830 840 850	375,51 378,48 381,45 384,40 387,34 390,26

### Pt1000-Temperature-Sensor

The Pt1000 sensor is the "big brother" of the Pt100 sensor. Its nominal resistance at  $0^{\circ}\text{C}$  is 1000  $\Omega.$  Resistance values of the whole series are higher by a factor of 10. The sensor is used in the same way as the Pt100 sensor. Its dimensions are slightly larger (4 x 5 uninsulated). Thermostats and sensors for Pt1000 on request.

Pt1000 resistance table

values see Pt100, multiplicated by the factor of 10.

# Limit Value Switch Type TR210

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

### TR210



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.

### Function

- Measuring and monitoring range -170...+1820 °C
- resolution 0,1°C (to 999.9 °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 maxvalues of inputs
- Code-lock against manipulation of settings
- Terminals pluggable

### 2 Measuring-Inputs:

- Resistance-sensors Pt 100 (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)

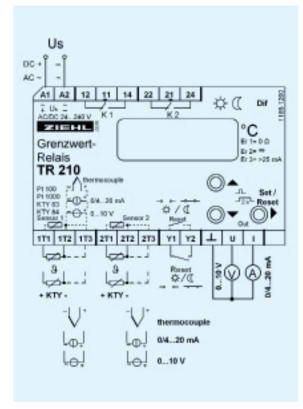
### Displays:

- 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 s
  - autoreset or electronic reclosing lock
  - elay-time for switching and switching back 0...9999 s
  - operating- or closed current-mode
  - cyclic check of function
- · Monitoring of difference in temperature
- Preset basic programs

Order-number: T224071



### Basic Programs

### Program 1:

### 1 Temperature-sensor, 2 Limits

Application: Monitoring of a temperature for 2 limits, e.g. over-temperature with warning and switchjing 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-Sensores 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, si-

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 monitoring 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 1measuring-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 ca be forwarded to e.g. a remote display or a superior control.

#### Technical Data

Rated supply voltageUs

2 Measuring inputs

Measuring-time Analog output

Relay output

Test conditions Rated ambient temperature renge

Dimensions h x w x d Protection housing / terminals Weight Attachment AC/DC 24-240V, <3W, <5VA (AC 20-264 V, DC 20,4-297 V)

Pt 100, Pt 1000 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  $(22\Omega)$ , 0-10 V  $(13 \text{ k}\Omega)$ 

<2,5s to 5s, depending on speed of change of signal 0/4-20 mA, max. 500  $\Omega$ . 0-10 V, max. 10 mA

(without isolation to inputs)

type 3, see "general technical informations" 2 x 1 co- (change-over) contact

see "general technical informations" -20...+60°C

design V4: 90x70x58 [mm], mounting height 55 mm IP 30 / IP 20 (terminals pluggable)

app. 200 g on 35 mm DIN-rail or with screws M 4

### Temperature-Measuring with Thermocouples

A thermocouple consists of two spot welded wires of different metals or metal alloys. When the joint (measuring point) is heated, a voltage is produced at the free ends (connection or reference junction). This effect, which is essential for the action of the thermocouple, results from the fact that a contact voltage is produced at the contact of two different metals, the value of which depends on the temperature (thermo-voltage).

The value of the contact voltage at metal junctions can be taken from the thermoelectric voltage series.

The contact value of the measuring point cannot be measured easily. When the metallic line ends form a circuit, by connecting to a measuring instrument, there are additional contact voltages at each metal junction. The total voltage in the closed circuit will equal zero as long as all junctions are on the same temperature level.

This calls for three essential requirements:

- The open ends of the thermocouples must be led to the measuring instrument on special compensating leads in order to avoid additional contact voltages.
- To avoid distorting contact voltages at themeasuring instrument, both connecting terminals must have the same temperature (isothermal block).
- 3. As with the thermocouples, only the temperature difference between the measuring point and the reference junction can be measured. The temperature at the reference junction must be kept constant (by measuring with 2 thermocouples) or the measuring instrument must automatically compensate for the error incurred by the change of the ambient temperature at the reference junction (in this case at the terminal) in some electronic way.

Thermocouples cover a vast temperature range, from

-270°C to +2800°C. Their accuracy is guaranteed to DIN 43 710 and IEC 584-1 standards which facilitates their interchangeability. Their performance curves show mainly non-linear characteristics so that a linearisation becomes necessary. Thermocouples are very small, have short response times and a stability of just a few ° Kelvin variation year by year. Their range of applications depends on the materials used for the thermocouple and the medium to be measured. Thermocouple suppliers give exact information with regard to the service life and the admissible maximum short-time temperatures.

in mV temperatures in steps of 10 °C

reference junction 0 °C

### Which Thermocouple for which application?

Pt 30	Rh-Pt	6 Rh	Typ	В
DIN EN	160 584			

in mV temperatures in steps of 10 °C reference junction 0 °C

D	IN EI	N 60 !	584							,	
	°C	0	10	20	30	40	50	60	70	80	90
	0	0	-0,002	-0,003	-0,002	-0	0,002	0,006	0,011	0,017	0,025
	100	0,033	0,043	0,053	0,065	0,078	0,092	0,107	0,123	0,140	0,159
	200	0,178	0,199	0,220	0,243	0,266	0,291	0,317	0,344	0,372	0,401
	300	0,431	0,462	0,494	0,527	0,561	0,596	0,632	0,669	0,707	0,746
	400	0,786	0,827	0,870	0,913	0,957	1,002	1,048	1,095	1,143	1,192
	500	1,241	1,292	1,344	1,397	1,450	1,505	1,560	1,617	1,674	1,732
	600	1,791	1,851	1,912	1,974	2,036	2,100	2,164	2,230	2,296	2,363
	700	2,430	2,499	2,569	2,639	2,710	2,782	2,855	2,928	3,003	3,078
	800	3,154	3,231	3,308	3,387	3,466	3,546	3,626	3,708	3,790	3,873
	900	3,957	4,041	4,126	4,212	4,298	4,386	4,474	4,562	4,652	4,742
	1000	4,833	4,924	5,016	5,109	5,202	5,297	5,391	5,487	5,583	5,680
	1100	5,777	5,875	5,973	6,073	6,172	6,273	6,374	6,475	6,577	6,680
	1200	6,783	6,887	6,991	7,096	7,202	7,308	7,414	7,521	7,628	7,736
	1300	7,845	7,953	8,063	8,172	8,283	8,393	8,504	8,616	8,727	8,839
	1400	8,953	9,065	9,178	9,291	9,405	9,519	9,634	9,748	9,863	9,979
	1500	10,094	10,210	10,325	10,441	10,558	10,674	10,790	10,907	11,024	11,141
	1600	11,257	11,374	11,491	11,608	11,725	11,842	11,959	12,076	12,193	12,310
	1700	12,426	12,543	12,659	12,776	12,892	13,008	13,124	13,239	13,354	13,470

### Pt 15 Rh-Pt Typ R DIN EN 60 584

°C 0 10 20 30 40 50 60 70 80 90 0 0 0,054 0,111 0,171 0,232 0,296 0,363 0,431 0,501 0.573 100 0,647 0,723 0,800 0,879 0,959 1,041 1,124 1,208 1,294 1.380 1.647 1.738 1.830 1.923 2.017 2.111 2.207 200 1.468 1.557 2.303 300 2.400 2.498 2.596 2.695 2.795 2.896 2.997 3.099 3.201 3.304 400 3,407 3,511 3,616 3,721 3,826 3,933 4,039 4,146 4,254 4,362 500 4,471 4,580 4,689 4,799 4,910 5,021 5,132 5,244 5,356 5.469 600 5,582 5,696 5,810 5,925 6,040 6,155 6,272 6,388 6,505 6,623 700 6,741 6,860 6,979 7,098 7,218 7,339 7,460 7,582 7,703 7,826 800 7.949 8.072 8.196 8.320 8.445 8.570 8.696 8.822 8.949 9.076 900 9.203 9.331 9.460 9.589 9.718 9.848 9.978 10.109 10.240 10.371 1000 10,503 10,636 10,768 10,902 11,035 11,170 11,304 11,439 11,574 11,710 1100 11,846 11,983 12,119 12,257 12,394 12,532 2,669 12,808 12,946 13,085 1200 13,224 13,363 13,502 13,642 13,782 13,922 14,062 14,202 14,343 14,483 1300 14,624 14,765 14,906 15,047 15,188 15,329 15,470 15,611 15,752 15,893 1400 16.035 16.176 16.317 16.458 16.599 16.741 16.882 17.022 17.163 17.304 1500 17 445 17 585 17 726 17 866 18 006 18 146 18 286 18 425 18 564 18 703 1600 18.842 18.981 19.119 19.257 19.395 19.533 19.670 19.807 19.944 20.080

### Pt 10 Rh-Pt Typ S DIN EN 60 584

in mV temperatures in steps of 10  $^{\circ}\text{C}$  reference junction 0  $^{\circ}\text{C}$ 

DIN LI	1 00 .	JU-4									
°C	0	10	20	30	40	50	60	70	80	90	
0	0	0,055	0,113	0,173	1,234	0,299	0,365	0,432	0,502	0,573	
100	0,645	0,719	0,795	0,872	0,950	1,029	1,109	1,190	1,273	1,356	
200	1,440	1,525	1,611	1,698	1,785	1,873	1,962	2,051	2,141	2,232	
300	2,323	2,414	2,506	2,599	2,692	2,786	2,880	2,974	3,069	3,164	
400	3,260	3,356	3,452	3,549	3,645	3,743	3,840	3,938	4,036	4,135	
500	4,234	4,333	4,432	4,532	4,632	4,732	4,832	4,933	5,034	5,136	
600	5,237	5,339	5,442	5,544	5,648	5,751	5,855	5,960	6,064	6,169	
700	6,274	3,380	6,486	6,592	6,699	6,805	6,913	7,020	7,128	7,236	
800	7,345	7,454	7,563	7,672	7,782	7,892	8,003	8,114	8,225	8,336	
900	8,448	8,560	8,673	8,786	8,899	9,012	9,126	9,240	9,355	9,470	
1000	9,585	9,700	9,816	9,932	10,048	10,165	10,282	10,400	10,517	10,635	
1100	10,754	10,872	10,991	11,110	11,229	11,348	11,467	11,587	11,707	11,827	
1200	11,947	12,067	12,188	12,308	12,429	12,550	12,671	12,792	12,913	13,034	
1300	13,155	13,276	13,397	13,519	13,640	13,761	13,883	14,004	14,125	14,247	
1400	14,368	14,489	14,610	14,731	14,852	14,973	15,094	15,215	15,336	15,456	
1500	15,576	15,697	15,817	15,937	16,057	16,176	16,296	16,415	16,534	16,653	
1600	16,771	16,890	17,008	17,125	17,243	17,360	17,477	17,594	17,711	17,826	

### Cu-CuNi, Typ T DIN EN 60 584

in mV temperatures in steps of 10 °C reference junction 0 °C

°C -200 -5,6 -100 -3,3		-20 - -3,923 -0,757	-30 - -4,177	-40 - -4,419	-50 -	-60 -	-70 -	-80	-90 -
-100 -3,3	378 -3,656	-3,923	-4,177			-	-	-	-
			-4,177	-4,419					
0	0 -0,383	-0.757			-4,648	-4,865	-5,069	-5,261	-5,439
0		-0,707	-1,121	-1,1475	-1,819	-2,152	-2,475	-2,788	-3,089
°C	0 10	20	30	40	50	60	70	80	90
0	0 0,391	0,789	1,196	1,611	2,035	2,467	2,908	3,357	3,813
100 4,2	277 4,749	5,227	5,712	6,204	6,702	7,207	7,718	8,235	8,757
200 9,2	286 9,5820	10,360	10,905	11,456	12,011	12,572	13,137	13,707	14,281
300 14,8	360 15,443	16,030	16,621	17,217	17,816	18,420	19,027	19,638	20,252

### Fe-CuNi, Typ J DIN EN 60 584

in mV temperatures in steps of 10  $^{\circ}\text{C}$  reference junction 0  $^{\circ}\text{C}$ 

°C	0	-10	-20	-30	-40	-50	-60	-70	-80	-90
-200	-7,890	-	-	-	-	-	-	-	-	-
-100	-4,632	-5,036	-5,426	-5,801	-6,159	-6,499	-6,821	-7,122	-7,402	-7,659
0	0	-0,501	-0,995	-1,481	-1,960	-2,431	-2,892	-3,344	-3,785	-4,215
°C	0	10	20	30	40	50	60	70	80	90
0	0	0,507	1,019	1,536	2,058	2,585	3,115	3,649	4,186	4,725
100	5,268	5,812	6,359	6,907	7,457	8,008	8,560	9,113	9,667	10,222
200	10,777	11,332	11,887	12,442	12,998	13,553	14,108	14,663	15,217	15,771
300	16,325	16,879	17,432	17,984	18,537	19,089	19,640	20,192	20,743	21,295
400	21,846	22,397	22,949	23,501	24,054	24,607	25,161	25,716	26,272	26,829
500	27,388	27,949	28,511	29,075	29,642	30,210	30,782	31,356	31,933	32,513
600	33,096	33,683	34,273	34,867	35,464	36,066	36,671	37,280	37,893	38,510
700	39,130	39,754	40,382	41,013	41,647	42,283	42,922	43,563	44,207	44,852

### Fe-CuNi, Typ L DIN 43 710

in mV temperatures in steps of 10 °C reference junction 0 °C

°C	0	-10	-20	-30	-40	-50	-60	-70	-80	-90
-200	-8,15	-	-	-	-	-	-	-	-	-
-100	-4,75	-5,15	-5,53	-5,90	-6,26	-6,60	-6,93	-7,25	-7,56	-7,86
0	0	-0,51	-1,02	-1,53	-2,03	-2,51	-2,98	-3,44	-3,89	-4,33
°C	0	10	20	30	40	50	60	70	80	90
0	0	0,52	1,05	1,58	2,11	2,65	3,19	3,73	4,27	4,82
100	5,37	5,92	6,47	7,03	7,59	8,15	8,71	9,27	9,83	10,39
200	10,95	11,51	12,07	12,63	13,19	13,75	14,31	14,88	15,44	16,00
300	16,56	17,12	17,68	18,24	18,80	19,36	19,92	20,48	21,04	21,60
400	22,16	22,72	23,29	23,86	24,43	25,00	25,57	26,14	26,71	27,28
500	27,85	28,43	29,01	29,59	30,17	30,75	31,33	31,91	32,49	33,08
600	33,67	34,26	34,85	35,44	36,04	36,64	37,25	37,85	38,47	39,09
700	39,72	40,35	40,98	41,62	42,27	42,92	43,57	44,23	44,89	45,55
800	46,22	46,89	47,57	48,25	48,94	49,63	50,32	51,02	51,72	52,43

### NiCr-CuNi, Typ E DIN EN 60 584

in mV temperatures in steps of 10 °C reference junction 0 °C

°C	0	-10	-20	-30	-40	-50	-60	-70	-80	-90
-200	-8,824	-9,063	-9,274	-9,455	-9,604	-9,719	-9,797	-9,835		
-100	-5,237	-5,680	-6,107	-6,516	-6,907	-7,279	-7,631	-7,963	-8,273	-8,561
0	0	-0,581	-1,151	-1,709	-2,254	-2,787	-3,306	-3,811	-4,301	-4,771
°C	0	10	20	30	40	50	60	70	80	90
0	0	0,591	1,192	1,801	2,419	3,047	3,683	4,329	4,983	5,646
100	6,317	6,996	7,683	8,377	9,078	9,787	10,501	11,222	11,949	12,681
200	13,419	14,161	14,909	15,661	16,417	17,178	17,942	18,710	19,481	20,256
300	21,033	21,814	22,597	23,383	24,171	24,961	25,754	26,549	27,345	28,143
400	28,943	29,744	30,546	31,350	32,155	32,960	33,767	34,574	35,382	36,190
500	36,999	37,808	38,617	,9,426	40,236	41,045	41,853	42,662	43,470	44,278
600	45,085	45,891	46,697	47,502	48,306	49,109	49,911	50,713	51,513	52,312
700	53,110	53,907	54,703	55,498	56,291	57,083	57,873	58,663	59,451	60,237
800	61,022	61,806	62,588	63,368	64,147	64,924	65,700	66,473	67,245	68,015
900	68,783	69,549	70,313	71,075	71,835	72,593	73,350	74,104	74,857	75,608

### NiCr-Ni, Typ K DIN EN 60 584

in mV temperatures in steps of 10 °C reference junction 0 °C

Ī														
	°C	0	-10	-20	-30	-40	-50	-60	-70	-80	-90			
	-200	-5,891	-	-	-	-	-	-	-	-	-			
	-100	-3,554	-3,852	-4,138	-4,411	-4,669	-4,913	-5,141	-5,354	-5,550	-5,730			
	0	0	-0,392	-0,778	-1,156	-1,527	-1,889	-2,243	-2,587	-2,920	-3,243			
	°C	0	10	20	30	40	50	60	70	80	90			
	0	0	0,397	0,798	1,203	1,612	2,023	2,436	2,851	3,267	3,682			
	100	4,096	4,509	4,920	5,328	5,735	6,138	6,540	6,941	7,340	7,739			
	200	8,138	8,539	8,940	9,343	9,747	10,153	10,561	10,971	11,382	11,795			
	300	12,209	12,624	13,040	13,457	13,874	14,293	14,713	15,133	15,554	15,975			
	400	16,397	16,820	17,243	17,667	18,091	18,516	18,941	19,366	19,792	20,218			
	500	20,644	21,071	21,497	21,924	22,350	22,776	23,203	23,629	24,055	24,480			
	600	24,905	25,330	25,755	26,179	26,602	27,025	27,447	27,869	28,289	28,710			
	700	29,129	29,548	29,965	30,382	30,798	31,213	31,628	32,041	32,453	32,865			
	800	33,075	33,685	34,093	34,501	34,908	35,313	35,718	36,121	36,524	36,925			
	900	37,326	37,725	38,124	38,522	38,918	39,314	39,708	40,101	40,494	40,885			
	1000	41,276	41,665	42,053	42,440	42,826	43,211	43,595	43,978	44,359	44,740			
	1100	45,119	45,497	45,873	46,249	46,623	46,995	47,367	47,737	48,105	48,473			
	1200	48,838	49,202	49,565	49,926	50,286	50,644	51,000	51,355	51,708	52,060			
	1300	52,410	52,759	53,106	53,451	53,795	54,138	54,479	54,819	-	-			

# Mains Monitoring

Phase-Monitor Relays Type PS	66		
Phase-Asymmetry Phase-Sequence Under- and Overvoltage Phase-Sequence-Change Motorload cos φ			
Voltage-Monitor Relays Type SW	71		
DC-Voltage-Monitor Relays AC-Voltage-Monitor Relays 3 AC-Voltage-Moitor Relays			
Current-Relays for Current Recognition Type STW	85		
Current-Relays with OR-circuits Current-Relays with AND-circuits			
Electronic Current-Transformers / Current-Sensors	93		
Current-Detection Measuring-Transducers			
Current-Relays adjustable Type STW	103		
Current-Relays Current-Transformers			
Frequency-Relay Type FR	111		
Voltage-, Frequency, Vector-Step Type UFR	113		
Current-Relay for Photovoltaic-Systems Type SolarYes	115		

# 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.

Integrated in a 12-pole plastic quick-mount housing and meeting the regulations of the automobile and machine tool industry, the PS device offers optimal protection against load fluctuations and phase failures in the 3-phase network, and against thermal overload.

	PS2DK	PSSW1	DRR10	DRR20	COSFI100V
Asymmetrie/ Ausfall	Χ	X		X	
Phasenfolge	Χ	Χ	X	Χ	
Unterspannung		X		Χ	
Überspannung		Χ			
Kaltleiter-Anschluss			Χ		
automat. Drehrichtungskorrektur			Χ	Χ	
Überwachung COSFI/ Wirkstrom					Χ
Stromrichtungserkennung					Χ
Bauform	K	K	V4	K	V4

### 2

# Phase-Asymmetry Relay Type PS2DK

### Monitoring of Phase-Asymmetry and Phase Sequence

# Phase-Asymmetry Relay PS2DK



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..

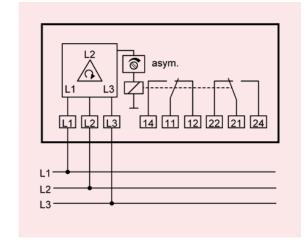
When the sensitivity is reduced to minimum (25% = potentiometer turned fully right), the device works as a phase-sequence relay. It trips only at wrong phase-sequence or missing phase.

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

Order-number

P222505



### Technical Data

Rated supply Voltage Us

Admissible tolerance Power consumption Frequency

Relay output Type of contact

Test conditions rated ambient temperature range

Switching point asymmetry Hysteresis Delay at phase-loss (< 240 V) Switch-back delay at voltage recovery Switching-delay at asymmetry Switching point at symmetric decrease of voltage

Dimensions (H x W x D) Attachment

Protection housing / terminals Weight

3-phase 380-415 V, without neutral

+10%...-15% app. 3 VA 50/60 Hz

2 change-over contacts

type 2 see "General technical informations"

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

adjustable 5...25% app. 2% app. 0,2 s app. 0,5 s

adjustable 0,1...5 s not defined

Housing K: 75 x 22,5 x 115 mm on 35 mm DIN-rail or with screws M4 (option)

IP 30/20 150 g

## Monitor for 3-phase Type PSSW1

### Phase Asymmetry, Phase Sequence, Over- and Undervoltage

PSSW1



Relays for 3-phase networks type PSSW1 monitor 3-phase networks for 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:

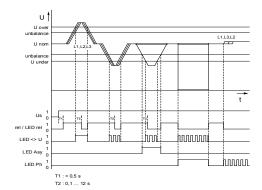
- Over- and undervoltage, adjustable ± 2-20 % (common) Asymmetry adjustable
- 5-15% Phase loss
- Phase sequence
- Switching delay adjustable
- 0,1-12 s (for voltage and asymmetry)
- Bifrequential measuring input 50/60 Hz

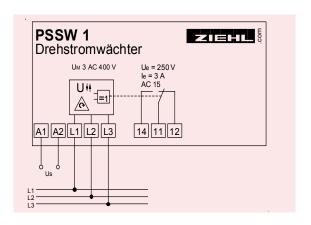
### Displays:

#### 4 LEDs for:

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

Order-numbers: supply-voltage AC 230 V P222525 supply-voltage AC 400 V P222526





### **Technical Data**

Rated supply voltage Us Admissible tolerance Us

Output relay Type of contact

Test conditions Rated ambient temperature

range

Monitoring asymmetry

Hysteresis Switching delay

Loss of voltage Hysteresis Switching delay

Under-/overvoltage Switching point Hysteresis Switching delay

Dimensions (h x w x d) Attachment

Protection housing / terminals Weight

AC230 V, alt. AC 400 V, 50/60 Hz, < 3 VA ±20%

1 change-over contact (co)

type 2 see "general technical informations"

see"general technical informations"

-20°C...+55°C

switching point adjustable 5...15 %

app. 2 %

adjustable 0,1...12 s

switching point app. 50 %

app. 5 % 0,1 s

measuring voltage 3 AC 400 V

adjustable ±2...20 % (common, symmetric)

app.1 %

adjustable 0,1-12 s

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**



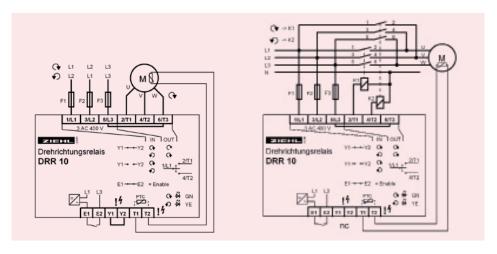
Phase-sequence relays DRR10 measure the sequence of the phases when being switched on and switch - if necessary - the rotation of the field by changing 2 phases.

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 switchgearcabinets, mounting height 55 mm

order-number: P222546



### Technical Data

rated supply voltage Us admissible tolerance Us

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

inputs T1 - T2 E1 - E2

rated ambient temp. range

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

protection housing/terminals weight

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

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  $10^6$  operations 1 x  $10^6$  operations at AC 400 V / 3 A 2 x  $10^5$  operations at AC 400 V / 6 A cosfi 0,5

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

-20°C...+55°C

design V4: 90 x 70 x 58 mm

any

on 35 mm DIN rail according to EN 60715 or

2 screws M 4 IP 30 / IP 20 app. 230 g

## Phase Sequence-Change Relay DRR20

with integrated Monitoring of Undervoltage and Asymmetry

Phase Sequence-Change Relay DRR20



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 1:1without changing them, the second (at normally-closed contact) changes 2 phases.

When switching on with phasesequence 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

Rated supply voltage Us Admissible tolerance Us 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% Us) Pick-up delay after recovery of Delay K2 - K1

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

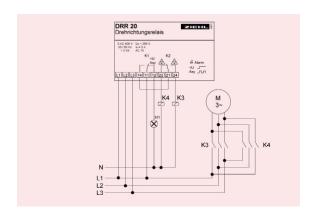
Protection housing / terminals Weight

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 cor-
- 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

Order-number

P222551



3-phase, 400 V without N +10%...-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

on 35 mm DIN rail according to EN 60715 or

2 screws M 4 IP 30/20 150 g

Technical Data

### Load and Current-Monitor COSFI100V

### Over- and Underload, cosφ and True Current

### COSFI100V



Load monitors protect motors in 1- or 3-phase mains from overor 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 fi 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 it monitors if a generator produces or consumes energy.

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

Application  $\cos \varphi$  / true 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:

 Warning or shut-down when a generator consumes instead of produce energy

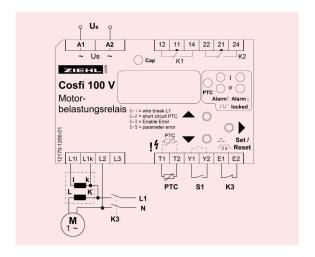
#### Function and features:

At an AC-motor (inductive load) the phase of the current is retarded to the voltage by the phase angle  $\phi$ . With decreasing load, this angle increases and the cos  $\phi$  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 φ and true current
- 2 limits / alarms
- min, max or min/max for each alarm
- Monitoring of 2 x cos  $\phi$ , 2 x true current or 1 x cos  $\phi$  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. 10 A, more with transformers
- Detection of breaks
- · Input for PTC-thermistors
- Housing for mounting in fuse-boxes or switchboards

Order-numbers: AC 230 V P222534 AC 400 V P222535



### Technical Data COSFI100V

Rated supply voltage Us AC 400 V, +10%/-15%, 3VA, 50 Hz AC 230 V, +10%/-15%, 3VA, 50 Hz

Nominal current of motor 0,2...10 A (higher currents with current-transfomers)
Overload capacity 10 A continuously, 15 A max. 3 s
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

Dimensions (H x W x D) mm
Attachment

Design V4: 90 x 70 x 58 mm, mounting height 55 mm on rail 35 mm according to EN 60 715 or with screws

Protection Housing/Terminals
Weight

M4 (option)
IP 30/IP 20
app. 300 g



# Voltage Monitoring Types SW

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

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

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

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

### Summary

Voltage Monitor	DC	AC/DC	AC/3 x AC		3 x AC	
Туре	STW1000V2	SW12V	SW31V	SW32V	UFR1000	SW31K
Function	$\uparrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	$\downarrow$
Monitoring of - Undervoltage	-	X	X	X	X	Х
- Overvoltage	Х	X	-	X	Χ	-
Switching point adjusable	Scale	digital	Scale	digital	digital	-
Relay output	1 U	2 U	2 U	2 U	2 U	1 U
Housing	V2	V4	V2	V4	V4	K

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

### **Function and Features**

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

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

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

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

# DC Limit Relay for Standard Signals

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

### STW1000V2



ZIEHL STW1000V2 current relays monitor standard signals from instrument transformers for compliance with a limit value. Units can be wired in series (current) or in parallel (voltage) to monitor multiple limits.

Measurement inputs for 0/4-20 mA and 0-10 V, adjustable hysteresis and switching delays plus the selection facility to choose between the 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...
- 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

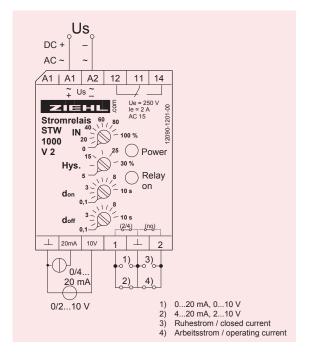
- Panel mounted distributor housing 35 mm wide
- Installation height 55 mm

### Application:

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

Order-number AC/DC 24-240 V

S225677



### Technical Data

### Rated supply voltage Us

Output relay Type of contact Test conditions

Function

Measurement inputs

Switch point/limit Hysteresis Adjustment error Repeatability Temperature influence

On-delay don Response-delay doff

Rated ambient temperature

range

Dimensions H x W x D

Attachment

Protection class housing /

terminals

Weight

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

1 change-over contact

Typ 3 see "general technical information" see "general technical informations"

Maximum

DC 0/4 ... 20 mA, 20  $\Omega$ DC 0...10 V, 63 kΩ adjustable 0...100%

adjustable 5...30% of set value

< 10% of span < 0.2% ≤ 0,05 %/K

adjustable 0,1...10 sec. adjustable 0,1...10 sec.

-20°C...+55°C

Design V2: 90 x 35 x 58 [mm], mounting height 55

on 35 mm DIN rail EN 60 715 or screws M4

IP 30 / IP 20

app. 130 g

# AC- and DC-Voltage Monitor SW12V

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

### SW12V



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

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

### Application:

As voltage-monitor in emergency-current-supplies or everywhere, where an accurate monitoring of voltage is required.

A short switching-delay ensures a good protection of sensitive devices.

### Description

### General:

- Monitoring of voltage in DCnetworks
- Measuring of voltage in ACnetworks
- Averaging measuring, insensible to harmonics (DC and AC 50/60 Hz only)
- Peak measuring in frequencyrange AC 45-100 Hz
- Monitoring of under- and/or overvoltage
- Measuring-Range 0...40,0 V with resolution 0.1 V
- Measuring-Range 0...300 V with resolution 1 V
- 2 output-relays (co-contacts) can be programmed independently
- Universal power-supply AC/DC 24-240 V
- Housing for mounting in fuseboxes or switchgear cabinets, 70 mm wide, mounting height 55 mm

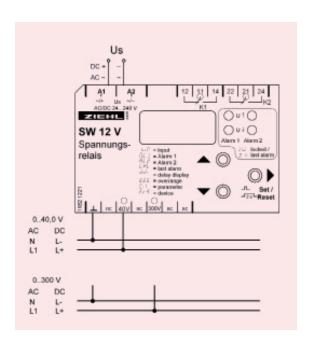
### Display:

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

### Switching functions:

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

Order-number: S222266



### Technical Data SW12V

Testing conditions

Power Supply Rated supply voltage Us AC/DC 24-240 V, 0/45...100 Hz, <5VA

DC: 20,4...297 V, AC: 20,4...264 V

Relay-Output 2 change-over contacts

type 2 see "general technical informations"

Measuring Input Measuring voltage range 1 AC/DC 0...40,0 V Measuring voltage range 2 AC/DC 0...300 V

Frequency 45...100 Hz
Measuring time < 50 ms

Measuring error DC  $\pm$  0,8% of measured value  $\pm$  1 digit

Measuring error AC

Averaging measuring Nominal frequencies 50/60 Hz  $\pm$  2 Hz

Error ± 0,8% of value ± 1 Digit
Dependence on frequency ± 2% /Hz additional error
Peak measuring Frequency-range 45-100 Hz

Error ± 0,8% of value ± 1 Digit
at frequency > 61 Hz

Repeat error ± 1% at constant parameters

Hysteresis range 1 adjustable 0,1...20 V Hysteresis range 2 adjustable 1...99 V

Switching-delay adjustable 0,05...99,9 s
Switching-back delay adjustable 0,05...99,9 s
Time until ready after applying ≤ 300 ms (+ switch-back delay)

, 11,7,8

Us

EN 50178 / EN 60 664-1

Rated impulse voltage 6000 V
Overvoltage catagory III
Rated Insulation voltage AC 415 V
Contamination level 2
On-period 100 %

Rated ambient temp. range -20 °C...+55 °C EN 60 068-2-1 dry heat

Interference resistance EN 61 000-6-2 Interference transmission EN 61 000-6-4

Housing Design V 4

Dimensions (h x w x d) 90 x 70 x 58 mm, mounting height 55 mm

Protection housing IP 30 Protection terminals IP20

Attachment DIN-rail 35 mm or screws M4

Weight app. 200 g

# Voltage Relay for three-phase current

also for alternating current networks



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 controlengineering devices.

However, the use of such devices demands that the supplied mains voltage deviates only slightly from the nominal value as otherwise the required accuracy of the measurements or the actuating signal is not attained, or downstream units are destroyed by overvoltage.

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

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.

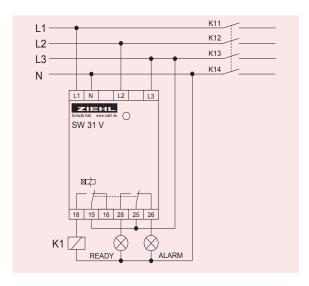
A green LED indicates the unit is ready for service. During undervoltage (<80%), the relay (2 change-over contacts) releases and the green LED goes out.

The housing can be snapped onto 35 mm mounting rails and is perfectly suited for installation in distribution cabinets.

#### 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

Order-number: \$222281



### Technical Data

Rated Supply Voltage Us Frequency

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

Dimensions H x W x D Protection housing/terminals

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

2change-over contacts **Typ 2** see "general technical informations" see "general technical informations"

-20°C...+55°C approx. 5% U<sub>Nenn</sub>

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

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

SW 32 V



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 phasesymmetry 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 ditribution 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.

### Description

### 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,
- 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

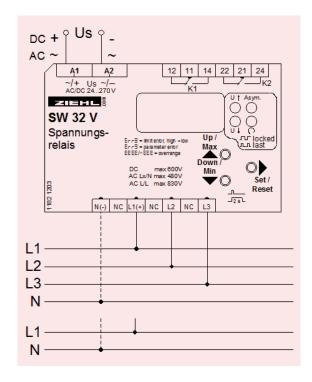
### Display:

- 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

### Switching functions:

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

Order-number: S222276





### Technical Data SW32V

Power Supply Rated supply voltage Us 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 Voltage DC DC 10...600 V Measuring voltage phase/phase AC 26...830 V

Measuring voltage phase/neu- AC 15...480 V

trai

Frequency 40...100 Hz

Measuring time DC DC average over 50 ms

Measuring time AC < 50 ms

Measuring accuracy DC 0,5% of value ± 1 Digit

Measuring accuracy AC >100V: 0,8% of value ± 1Digit

with N <100V: 0.8% of value  $\pm 5$ Digit (res. 0.1V)

without N >100V: 1,0% of value ± 1Digit

<100V: 1,0% of value ± 5Digit (res. 0,1V)

Hysteresis adjustable AC 1...99 V

Range asymmetry 5...50% Hysteresis asymmetry fest 1%

Error asymmetry ± 15% vom Einstellwert

Switching delay 0,05...9,99 s Switch-back delay 0...999 s

Time until ready after applying ≤ 300 ms (+ switch-back delay)

Us

Test Conditions Rated impulse voltage EN 50178 / EN 60 664-1

Overvoltage catagory 6000 V
Rated Insulation voltage III
Contamination level AC 690 V
On-period 2
Rated ambient temp. range 100 %

Interference resistance -20 °C...+55 °C EN 60 068-2-1 dry heat

Interference transmission EN 61 000-6-2 EN 61 000-6-4

Housing Design 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-Step-Relay, Sealable

UFR1001



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.

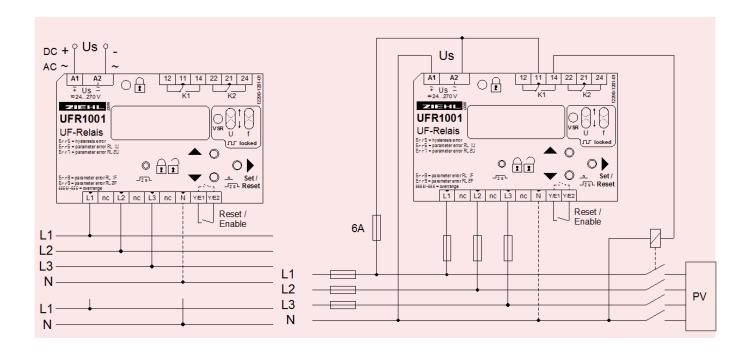
With the integrated vector-step relay it can also monitor networks at synchronous generators.

After selecting a basic program, for each relay limits can be programmed for over-/undervoltage and over-/underfrequency. In programs with vector-stepmonitoring, K2 is used for vector-step only.

Applications are monitoring power-networks at great solar-plants, in block power heating stations, also with synchronous generators (vector step) or generally monitoring the quality in power networks at machines or power-supplies.

- 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-step 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 24-240 V
- housing for DIN-rail-mount, 70 mm wide, mounting height 66 mm

Order-number: \$222295



### Technische Daten UFR1001

Power supply Rated supply voltage Us 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 AC 40...520 V
Measuring voltage phase - N AC 40...300 V
Hysteresis adjustable 1...99 V

Frequency 45...65 Hz

 $\begin{array}{ll} \text{Error (with N)} & \pm 0.8\% \text{ of measured value} \pm 1 \text{ Digit} \\ \text{Error (without N)} & \pm 1\% \text{ of measured value} \pm 1 \text{ Digit} \\ \text{Measuring functions} & 3\text{-phasig mit/ ohne N, 1-phasig gegen N} \end{array}$ 

Switching-delay adjustable 0,05...60,00 s Switching-back delay (zero-adjustable 0 (> 200 ms)...1000 s

voltage-proof)

Frequency Measuring range 45,00...65,00 Hz
Hysteresis 0,05...5.00 Hz

Error  $\pm$  0,05 Hz  $\pm$  1 Digit Switching-delay einstellbar 0,1...99,9 s Switching-back delay einstellbar 0...240 s

Vector-Step Mathod

Mathod 1- or 3-phase
Measuring range 2.0...20.0 °
Hysteresis 0,1 °
Switching-delay < 50 ms

Switching-back delay adjustable 3...240 s
Delay at Us on adjustable 2...20 s

Test Conditions EN 60 255
Rated impulse voltage 4000 V

Overvoltage catagory III
Rated Insulation voltage AC 300 V
Contamination level 2
Isolation material group II
On-period 100 %

Rated ambient temp. range -20 °C...+55 °C EN 60 068-2-1 dry heat

Interference resistance EN 61 000-6-2 Interference transmission EN 61 000-6-4

Housing Design V 4

Dimensions (h x w x d) 90 x 70 x 58 mm, mounting height 66 mm

Protection housing IP 30 Protection terminals IP20

Attachment DIN-rail 35 mm or screws M4

Weight app. 200 g

# Voltage- and Frequency-Relay UFR1001E

Grid- and Plant Protection according to VDE-AR-N 4105, with integrated Vector-Step-Relay

**UFR1001E** 





The UFR1001E monitors voltage and frequency in plants for own generation of electricity. It fulfills the requirements of VDE-AR-N 4105.

The UFR1001E is a dual-channel device and thus one-fault-proof. Input-circuit, A/D-converter, processor and output-relay are doubly present. The processors control each other. The function of the output-relays and of the connected switches can be monitored with feed-back contacts. At an alarm the device switches off and the reason is displayed with LEDs and signaled with transistor-outputs.

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

An alarm-counter stores the last 100 alarms with reason and elapsed time. In addition the time the UFR1001E has interrupted the plant is recorded. All values can be read-out with the integrated display and give the operator valuable information about the availability of the plant.

With a test-button the function of the connected switches can be tested and their switching-time can be measured. The simulation displays the complete switching-time of device plus connected switches.

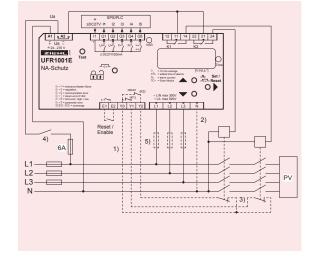
When feeding into medium voltage, limit, hysteresis, alarm-delay and switch-back-delay can be individually set for U>>, U>, U<, U<<, F>>, F>, F<, F<<.

- Monitoring of under- and overvoltage 15-520 V
- · Measuring phase-neutral or phase-phase
- Monitoring of under- and overfrequency 45-65 Hz
- Monitoring of quality of voltage (10-minutesaverage)
- Monitoring of vector-step 2...20 °
- One-fault-proof with monitoring of connected switches (defeatable)
- Passive detection of insular grid acc. to ch. 6.5.3 and app. D2
- Selftest
- Switching delay adjustable 0,05 ... 60 s
- Switching-back-delay adjustable 0 ... 999 s
- Switching-back-delay at alarms <3 s: 5 s
- Preset values acc. to VDE-AR-N 4105 and bdewdirective
- Alarm-counter for 100 alarms with value, reason and elapsed time
- Recording of elapsed time of alarms
- Test-button and simulation with measuring of switching-times
- LEDs for alarms. Allocation of values and states of relays
- Sealing of settings. All values can be read-out when sealed
- Code-lock against manipulation of settings
- Easy installation and programming with 6 pre-set programs
- Outputs for reporting of alarms to superior control (transistors, max. DC 24 V, 20 mA)
- Supply-voltage AC/DC 24-270 V
- Housing for DIN-rail-mount, 70 mm wide, mounting height 66 mm

### Medium voltage:

- 2 x 2 alarms for voltage and frequency
- Individual adjustment of switching-delay for every alarm

Order-Number: \$222296



### Technical Data UFR1001E

Power supply	Rated supply voltage Us	AC/DC 24-270 V, 0/4565 Hz, <5VA DC: 20,4297 V, AC: 20,4297 V
Relay output		2 change-over contacts type 2, see "general technical informations"
Voltage	Measurement voltage phase- phase	AC 15530 V (< 5 V display: 0)
	Setting range phase-phase Measuring voltage phase-neutral Setting range phase-neutral Measurement method Hysteresis Measurement accuracy (with neutral)	AC 15520 V AC 10310 V (< 5 V display: 0) AC 15300 V true RMS adjustable1,099,9 V ±0,6% of measured value
	Measurement accuracy (without neutral)	±0,8% of measured value
	Accuracy of display  Measurement functions Switching-delay (dAL) Switching-back-delay (doF)	>100V: -1 digit (resolution 1 V) <100V: -1 digit (resolution 0,1 V) 3-phase with / without neutral adjustable 0,05 (± 15ms)60,00 s adjustable 0 (approx. 200 ms)1000 s
Frequency	Measurement range Setting range Hysteresis Measurement accuracy Switching delay (dAL) Switching-back-delay (doF)	4070 Hz 45,0065,00 Hz 0,0510,00 Hz ± 0,04 Hz ± 1 digit adjustable 0,05 (± 15ms)60,00 s adjustable 0 (>200 ms)999 s
Vector-Step	Measurement range Setting range Switching-delay (dAL) Switching-back-delay (doF) Delay at Us on	045,0° 2,020,0° < 50 ms adjustable 3240 s adjustable 220 s
Digital outputs insulated	Voltage I1 Current Q1Q5	DC 4,527 V max. 20 mA / output
Input Feed-back-contacts	Voltage Y0Y1/2 Switching time connected switches	DC 1535 V adjustable 0,599,0 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 60255 4000 V III 2 300 V II 100 % -20 °C+55 °C EN 60 068-2-2 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	V6 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 Monitor for 3-Phase Networks Undervoltage

SW31K



Undervoltage monitor for threephase 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 runningon on 2 phases, so much back voltage can be produced that the failure of a phase may be not detected. The SW31K is available for measuring voltages AC 400 V and AC 690 V. As supply voltage in the standard version AC 230 V is needed.

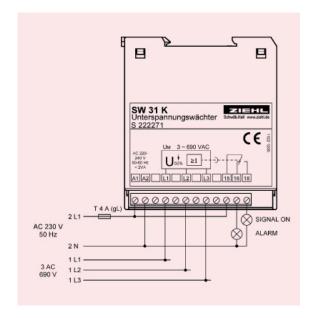
### Application:

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

Order-numbers:

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

Special Versions upon request



### Technical Data

Rated supply voltage Us other Voltages Frequency

Relay-Output Type of Contact

Testing Conditions Rated ambient Temp. Range Hysteresis Switching delay

Dimensions (H x W x D) mm Protection Housing/Terminals Weight AC 230 V, +10...-15%, < 3 V upon request 50/60 Hz

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

see "general technical informations" -20°C...+55°C app. 10% U<sub>Nenn</sub> app. 1 s
Design K: 75 x 22 x 115 mm
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 ORevaluation (STW1K, STW6S and STW12), in AND-circuits (STW20K, STW20V), in NAND-circuits (STWL3S) or for individual monitoring (STW12 and

STW2SK) 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.

The 2-channel STW2SK device can be cascaded via its voltage output, and thus has a wide variety of applications.

The STWL3S NAND-circuit current-/voltage monitor compares whether current flows after the sink has been switched on.

### Summary

Туре	STW2V	STW1K	STW12V	STW12	STW20K	STW20V
Number of circuits	1	8	12	12	3	3
Connection via change-over STWA 1 or Current-Sensor S1	only S1	X	X +contact	X	X	X
Response value	5 / 5-30 A	1 A	0,5 - 5 A	10 x 1 A 2 x 1 - 5 A	1 A	1A
Relay output	1 U	1 U	1 U	1 U	2 U	2 U
Transistor outoput	-	-	-	12	-	-
Operating mode	operating- current	operating- current	operating- current	operating- current	clcircuit current	clcircuit current
Evaluation principle	single	OR	OR	single/ OR	AND	AND
Current/voltage comparison	-	-	-	-	-	-

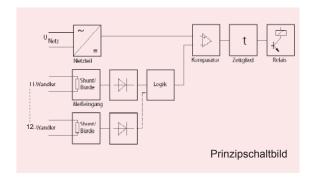
# Function and Features

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 (±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



2

# Current-Relay STW2V

### Current-Detection AC/DC with Current-Sensor S1

### STW2V



The current relay STW2V in combination with a current-sensor S 1 monitors AC- and DC-current-flow yes/no. It supplies the power for the current-sensor.

The STW 2 V can also be used as a switching-amplifier for potential-free contacts.

### Application:

- Monitoring of current-flow yes/ no for AC- and DC-currents
- Detecting state (on/off or defective) of a load by measuring the current in the feed line
- Monitoring of fuses
- Control of dedusting fans at welding work-stations with automatic run-after for the motor of the fan

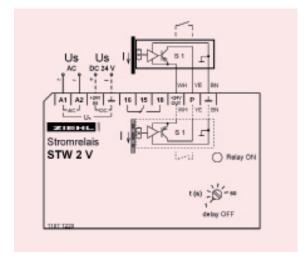
### Features

- · Input for current-sensor S 1
- · Detection of AC- and DC- currents
- · Switching-point see current-sensor S 1
- Switch-off delay adjustable 1-60 s
- · Relay-output 1 change-over contact
- Housing for mounting in switchgear-cabinets

### Order-number

AC 220 - 240 V

S225541



# Current-Sensor S1 for AC- und DC-currents



The current-sensor S 1 records the current in a cable with a hall-sensor. At currents of app. 5 A (adjustable version 5-30 A) the transistor-outputs report a current in the monitored cable.

The current-sensor can be easily fixed to the cable without disconnecting it. This allows a simple change of cables. For mounting at welding devices a version for mounting in a tong is available.

### Features:

- switching point app. 5 A (option: adjustable 5-30 A)
- · mounting without disconnection of cable possible
- LED for current-flow
- · robust, sealed execution
- · overload capacity unlimited

### Order-numbers::

Current-sensor S 1, 5 A fixed S225693 Current-sensor S 1, 5-30 A adjustable S225694

### Technical Data

Supply voltageUs

Relay output Type of contact Test conditions Rated ambient temp. range

Inputs
Switching point

Switch-off delay Switch-on delay Overload capacity

Dimensions (H x W x D) Attachment Protection housing/terminals Weight AC 220 - 240 V, +10...-15%, < 3 VA, 50/ 60 Hz DC 24 V,  $\pm$ 20 %

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

see "general technical informations"

-20°C...+55°C

1 current-sensor S 1 or potential-free contact see current-sensor S 1

adjustable 1...60 s app. 0,5 s

with current-sensor S 1 unlimited

Design V4: 90x70x58 [mm], mounting height 55 mm on 25 mm DIN-rail or with screws M4 IP 30 / IP 20 app. 190 g

# Current-Relay STW1K

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

### STW1K



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

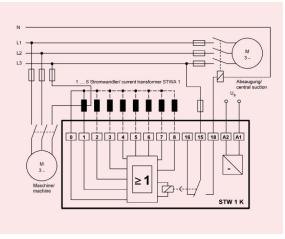
When there is an AC-current >1 A through one of up to 8 connected transformers STWA 1, the integrated relay (1co) picks up. When all currents are 0, the relay releases with a delay of approx. 10s. This enables a run-after of the central suction.

- 8 inputs
- OR-evaluation
- relay picks up if at least 1 input is activated
- 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

Order-number:

AC 220 - 240 V

S225636



### Technical Data

Rated supply voltage Us

Transformer input

Overload cap.continous/max 10s

Function

Switching point on Switching point off Switch-off delay Switch-on delay

Output relay

Type of contact Test conditions

Rated ambient temperature

range

Dimensions (h x w x d)

Attachment

Protection housing / terminals

Weight

AC 220 - 240 V +10-15%, < 3 VA, 50/ 60 Hz

1...8, type STWA, order-number S 225201

100 A / 300 A **OR-evaluation** ≤AC1A

> AC 0,3 A approx. 10 sec. approx. 0,5 sec.

1 change-over contact (co)

type 2, see "general technical informations" see "general technical informations"

-20°C...+55°C

Design K: 75 x 22.5 x 115 [ mm ]

on 35 mm DIN rail according to DIN EN 60715

or with screws M4 (option)

IP 30 / IP 20 approx. 140 g

# Current-Relay STW12V

### Current-Detection, OR-Evaluation, 1-12 Inputs, adjustable

### STW12V



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. 0.3 A, 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
- Supply-voltage AC 220-240 V and DC 24 V
- Housing for mounting in switchgear cabinets or fuseboxes, 70 mm wide, mounting height 55 mm

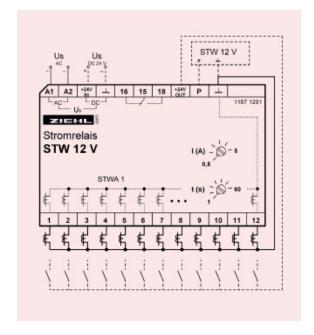
### Application:

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 is controlled.

Order-number

AC 220 - 240 V / DC 24 V

S225509



### Technical Data

### Supply voltageUs

Relay output
Type of contact
Test conditions
Rated amb. temperature range
Function
Measuring inputs

Overload cap./continous max 10s Switching point Tolerance Switch-off delay Switch-on delay

Dimensions (H x W x D) Attachment

Protection housing/terminals Weight

AC 220 - 240 V, +10...-15%, < 3 VA, 50/ 60 Hz DC 24 V,  $\pm$ 20 %

1 change-over contact (co)

type 2 see "general technical informations" siehe "general technical informations"

-20°C...+55°C OR-evaluation

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

100 A / 300 A

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

± 20%

adjustable 1- 60 s

app. 0,5 s

design V4: 90x70x58 [mm], mounting height 55 mm on 35 mm DIN-rail according to EN 60 715 or with screws M4

with screws M4 IP 30 / IP 20 app. 200 g

# Current-Relay STW12

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

STW12



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 changeover contact) picks up.

The STW12 is installed at an open printed circuit board. The lower part can be used for snapfastening 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

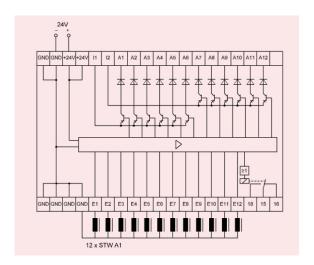
- 12 inputs (for transformer STWA1)
- 2 of these inputs with adjustable switching threshold AC 0,5...5 AA
- 12 outputs (Open Collector) max. DC 40 V/40 mA
- relay OR-linked (of all 12 inputs)
- LED displays (1/channel)
- Multiplex operation possible

### 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.

Order-number DC 20 - 30 V

S225127



### Technical Data

Power supply Us

Function

Transformer input

Overload cap.continous/max 10s Switching points E1, E2

Tolerance

Switching points E3...E12

Switch-off delay Switch-on delay

Output relay Type of contact Open Collector Testing conditions

rated ambient temperature range

Dimensions H x B x T Attachment

Protection housing / terminals Weight

DC 20 - 30 V, < 2 VA

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.

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

approx. 0,5 s.

design V 6: 90 x 105 x 32 [mm], 37-pole lon 35 mm DIN rail according to DIN EN 50 022 or  $\frac{1}{2}$ 

with screws M4 (option)

P 30 / IP 20 approx. 135 g

# Current-Relay STW20K

### AC-Detection, AND-Evaluation, 3 Transformers

### STW20K



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-overcontacts) 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.

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

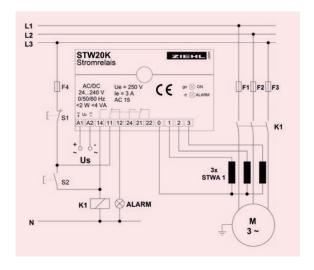
If the switching threshold is not reached due to low currents of less than 1 A, the monitored wire should be led multiple times through the transformer. Not required inputs have to be connected to a occupied input.

#### 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

Order-number

AC/DC 24 - 240 V S225121



### 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

type 2 see "general technical informations"

Function Transformer input

Overload cap.continous/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



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

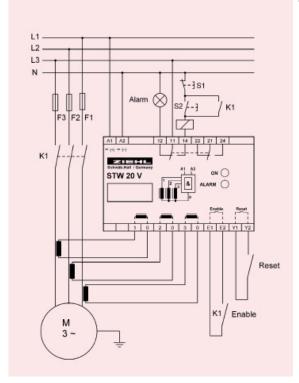
### Applications:

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.

Order-number AC/DC 24 - 240 V

S225124



### Technical Data

Power supply Us

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

Output relay
Type of contact
Testing conditions
rated ambient temperature
range

Dimensions H x B x T Protection housing / terminals Weight AC/DC 24 - 240 V, < 3 W, < 5 VA, (AC 20 - 264 V, DC 20,4 - 297 V) AND-evaluation AND-evaluation 1 or 3, type STWA 1 100A / 300 A

≤ AC 1 A ≥ AC 0,3 A approx. 0,3 s. approx. 0,3 s. with STWA 1 unlimited

2 CC

**type 2** see "general technical informations" see "general technical informations"

-20°C...+55°C

design V 4: 90 x 70 x 58 [mm] IP 30 / IP 20 approx. 240 g

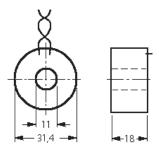
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# **Current Transformer STWA1**

for recognition of AC-currents

Current Transformer STWA1 for monitoring current yes/no





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 continously, 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.

Order-number \$225201

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



Current-transformers STWA1H can be fixed on a 35 mm DIN-rail or with 2 screws.

The electrical connection is made via pluggable terminals.

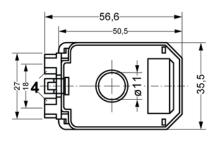
The cables are led vertical through the transformer (right angle to 35 mm-rail). The available diameter is 11 mm.

A built-in LED lights up at currents > app. 2 A. Even short current pulses are visible.

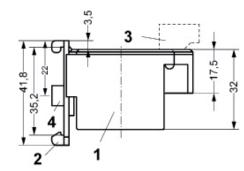
ZIEHL current monitor type STW or an external LED can be connected to the terminals. The built-in resistor protects the LED from overload.

The STWA 1 H can also be used to visualize currentflow in stand-alone mode, without connecting it to a current monitor.

Order-number \$225506



- 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 currentsensor 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.

### Overview

Function	Current-detection yes/no			Measuring-Transducer for AC-current			Current- detection	
Туре	Current- sensor S1	STWA1S	STWA1SH	STWA1SEH	STWA1AH	STWA2AH	STWA1FH	STWA1LH
Measuring- input	AC/DC	AC	AC	AC	AC	AC 0-20/ 0-100 A	AC 0-20 A	AC
Response- value	5 A/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	Н	Н	Н	Н	Н	Н

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). Neighboured 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- und DC-Ströme





The current sensor S1 records the current in a cable with a hall-sensor. At currents of app. 5 A (adjustable version 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 (e.g. ZIEHL-power-supply NG 4 V).

The current sensor can be connected to ZIEHL current-relaysfor current detection yes/ no ant to ZIEHL controls for dedusting plants. The connection to a digital input of a PLC also is possible. For easy change from cable to cable, for example at welding devices, a version with a 90° twisted sensor is available for mounting in a tong.

### 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.

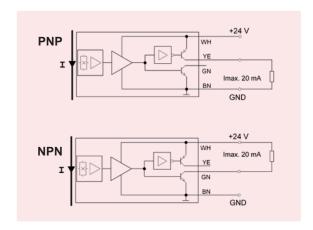
the outputs of several current sensors can be connected

in parallel (or-evaluation).

- switching point app. 5 A (option: 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
- · robust, sealed execution
- · overload capacity: unlimited
- test-voltage 2,5 kV

### Order-number:

Current Sensor S1, 5 A fixed S225693
Current Sensor S1, 5-30 A adjustable S225694



### **Technical Data**

Supply voltage Us
Switching point at Tu = 25°C
Hysteresis
Tolerance
Repeat accuracy
Temperature-dependance
Max. measuring current

Frequency of measured current

Output 1 Output 2 On- / off-delay

Rated ambient temperature range
Dimensions (I x w x h)
Cable for connection
Attachmant
Weight

DC 24 V ±20%, 15 mA <AC/DC 5 A (option: adjustable 5-30 A)

app. 15% ± 10%

± 2% < 0,06%/K unlimited 0 / 10 ... 400 Hz

DC 24 V, + switching, max. 10 mA DC 24 V, - switching, max. 10 mA app. 300 ms

0...55°C

75 x 16,5 x 10 mm app. 2 m, 4 x 0,34 mm2 e.g. with cable fastener (not included) app. 150 g (cable included)

# **AC-Electronic Current Transformer STWA1S**

with transistor-output

STWA1S
Electronic current transformer
with fixed switching-point



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 continously, 300 A / 10 s

Order-number

S225195

Switching point at Tu = 25°C Switching-back Point Repeat accuracy Temperature dependence Overload cap. continous / 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 (Ø x H) Diameter for conductor Weight AC 2 A ±25% AC 1,5 A ±25% ± 5% < 0,06%/K 100 A / 300 A

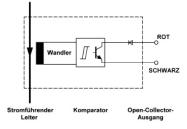
DC 40 V / 40 mA max. 3 V max. 0,6 mA app. 50 / 200 ms

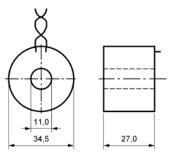
50 Hz/ 30...70 Hz

≤ 1%/Hz

0...55°C

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





Electronic current transformer STWA1S

# **AC-Electronic Current Transformer STWA1SH**

2 A, with transistor-output

STWA1SH Electronic Current Transformer with fixed switching point



The STWA1SH has an integrated electronic with transistor-output. The switching point is 2A. 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 continously, 300 A / 10 s

Order-number

S225550

Switching point at Tu = 25°C Switching-back Point Repeat accuracy Temperature dependence Overload cap. continous / 10s

Output voltage/current max. Voltage drop (ON) 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

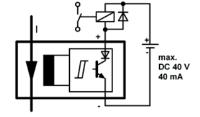
AC 2 A ±25% AC 1,5 A ±25% ± 5% < 0,5%/K 100 A / 300 A

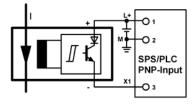
DC 40 V / 40 mA max. 1 V app. 50 / 200 ms

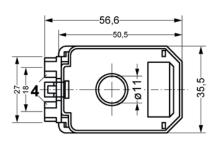
50 Hz 30...70 Hz ≤ 1%/Hz

0...50 °C

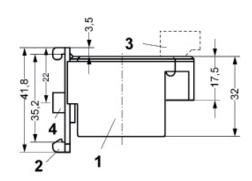
Design H 50 x 36 x 56 mm 11 mm app. 90 g







- 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



The STWA1SEH has an integrated electronic with transistoroutput.

The switching point is adjustable 2-10 A. 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 0.5-2,5 A 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 continously, 300 A / 10 s

Order-number

S225550

Switching point at Tu = 25°C Hyseteresis Repeat accuracy Temperature dependence Overload cap. continous / 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...10 A ±25 % 5...30 % ± 2 % < 0.06%/K

DC 40 V / 40 mA max. 3 V

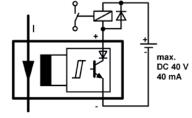
100 A / 300 A

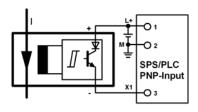
max. 0,6 mA 0,2...2s / ≤0,3 s

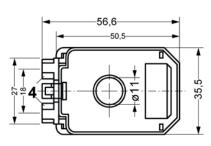
50 Hz 30...70 Hz ≤ 3%/Hz

-20...+50°C

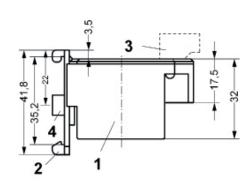
Design H 50 x 36 x 56 mm 11 mm app. 90 g







- 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



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  $50...300 \Omega$ .

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 continously, 300 A / 10 s
- plug-in current transformer, easy assembly

Order-number

S225579

Monitoring range Analog output Adjustment time Error (from 10% / Inom)

Error with other load Temperature coefficient Ripple at 50 Hz

Nominal frequency Operating range

Error

Overload cap. continous / 10s

Rated ambient temperature range

Dimensions (h x w x d) Diameter for conductor

Weight

AC 0 - 15 A DC 0 - 20 mA < 0.5 s.

<3% from FS ( at 100  $\Omega$  ), <5% 50...200 $\Omega$ 

<7% ..300Ω

+5%/100  $\Omega$ , max. 500  $\Omega$ 

< 0,06%/K

<2,5 % at  $300\Omega$ , <4,5 % at  $100\Omega$ , <7,5 % at  $50\Omega$ 

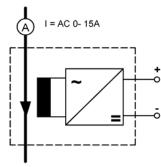
50 Hz 30...400 Hz ≤ 0,2%/Hz

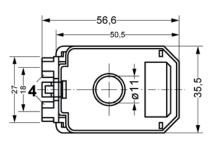
100 A / 300 A

0...55°C

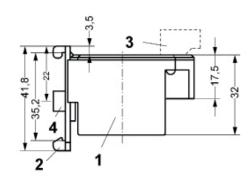
Design H 42 x 36 x 56 mm 11 mm

app. 90 g





- Housing
- Clip for DIN-rail (removeable)
- Terminal (pluggable)
- Wall-mounting (M4)



# AC-Electroic Current Transducer STWA2AH

with analog output

STWA2AH Electronic current transformer

AC 0...20 A / 0...100 A -



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 STWA2AH 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)
- max. overload 100 A continously, 300 A / 10 s

Order-number

S225580

### Supply voltage

Monitoring ranges Analog output Adjustment time

Error (of scale, above 10%/ Irated)

Error with otther load Temperature coefficient

Nominal frequency Operating range Error

Overload cap. continous / 10s

Rated ambient temperature range

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

DC 9...30 V (2-wire), depending on load

AC 0 - 20 / 0...100 A

DC 4 - 20 mA (max. 32 mA)

< 0.5 s.

<5% (50 - 300 Ω)

< 0.06%/K 50 Hz 30...400 Hz

≤ 0,2%/Hz 100 A / 300 A

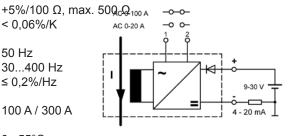
0...55°C

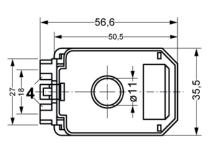
Design H

app. 90 g

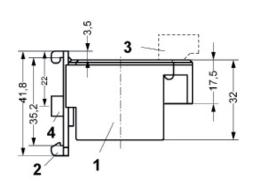
11 mm

42 x 36 x 56 mm





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



# AC-Electronic Current Tranducer STWA1FH

with frequency output

### STWA1FH

**Electronic Current Trans**former with current proportional frequency output 0...20 A - 0,5...20 Hz



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 100/5 A (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 Us

Monitoring range

Output

Switching voltage

Switching current min/max

Adjustment time

Error (of scale, above 10%/

Irated)

Temperature coefficient

Nominal frequency/operating

range Error

Overload capacity cont./10 s

Testing voltage to supply volta-

max. ambient temperature

Housing

DC 10 - 30 V

AC 0...20 A

0,5...20 Hz

max. DC 30 V DC 1 / 30 mA

< 0,5 s.

≤ 3%

< 0.06%/K 50 Hz/50...400 H

≤ 0,2%/Hz

In + 5% / 200 A

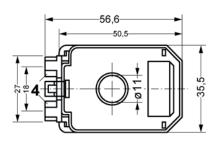
500 V 0...55°C

Design H

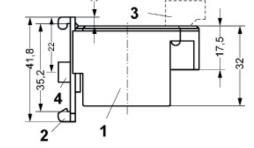
42 x 36 x 56 mm

11 mm

app. 90 g



- Housing
- Clip for DIN-rail (removeable)
- 3 Terminal (pluggable)



# AC-Electronic Current Transformer STWA1LH

with output AC 230 V / 0,5 A

STWA1LH



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 / 0.5 A.

It is available with output (contactless) normally opened (standard) and normally closed (option). Version with normally closed contact:

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

Version with break contact:

- Load decrease (Disconnection or locking of consumers)
- · Monitoring of motor current

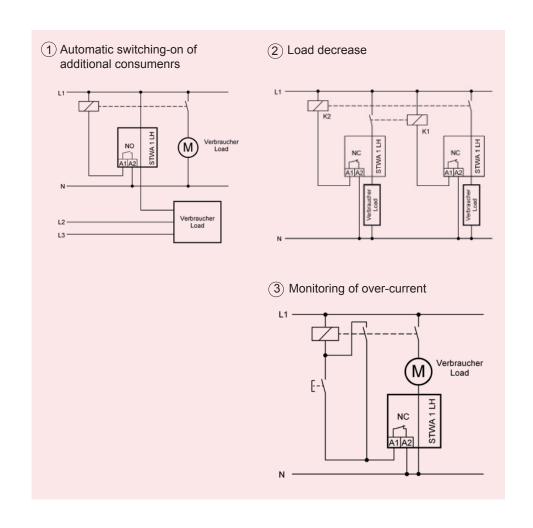
### **Features**

- 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, ø 11 mm
- · Space-saving, easy mounting
- Potential separation between monitored current circuit and switch output

### Order-numbers:

normally-open contact (no) normally-closed contact (nc)

**S225591** S225590 (Option)



### Technical Data STWA1LH

Operating voltage

Operating voltage tolerance ± 10 %
Frequency 60/60 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 500 mA
Minimum output current ca. 10 mA
Voltage drop ≤ AC 8 V

Leakage current ≤ AC 2 mA at 230 V

Switch solid state

Electomagnetic compatibility EN 61000-6-2 and EN 61 000-6-4

Adjustment accuracy ± 15 % Repeat accuray ± 5 %

Hysteresis ca. 10 % of value
Release time On = <100 ms...800 ms

Off = app. 1,5 s

 $\begin{array}{ll} \text{Design} & \text{housing H} \\ \text{dimensions (H x W x D)} & \text{50 x 36 x 56 mm} \end{array}$ 

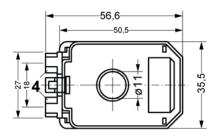
Fitting position any

max. ambient temperature range 0...55 °C storage temperature - 20...+70 °C

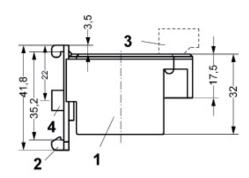
Attachment 35 mm standard rails conform to EN 50 022 or

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.

# 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
Туре	STW1000V2	TR210	STW1000	STW200
Conntection current direct	Χ	X	X	X
External shunt	-	-	X	-
External transformer	-	-	X	-
Number of circuits	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	15 - 150 mA 0,1 - 1 A
Analog output	-	X	-	-
Housing	V2	V4	V4	V4

# DC-Limit Value Switch Type STW1000V2

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

### STW1000V2



ZIEHL current-relays STW1000V2 monitor standardsignals 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 changeovercontact (co)
- Operating- or closed-circuitmode 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 fuseboxes, 35 mm wide

Supply voltageUs

Relay output Type of contact Test conditions

Function Measuring signals

Switching point
Hysteresis
Error of setting
Repeat error
Temperature-dependence
Start-up-delay dEnable
Switching delay dAL

Rated ambient temperature range

Dimensions (H x W x D) Attachment

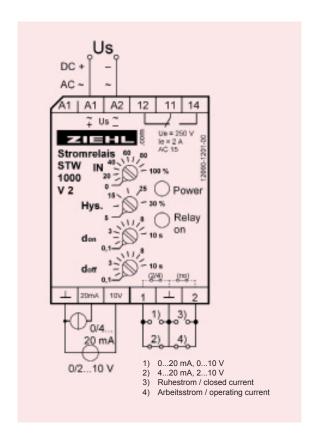
Protection housing/terminals Weight

### Applications:

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

Order-number

AC/DC 24-240 V: S225677



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

1 change-over contact (co)

**type 3 see** "general technical informations" siehe "general technical informations"

Maximum limit switch DC 0/4 ... 20 mA, 20  $\Omega$  DC 0...10 V, 63 k $\Omega$ 

adjustable 0...100% adjustable 5...30% of set limit

< 10% of fullscale

< 0,2% ≤0,05 %/K

adjustable 0,1...10 sec. adjustable 0,1...10 sec.

-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 IP 30 / IP 20

approx. 130 g

**Technical Data** 

# DC-Universal-Limit Value Switch TR210

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

### TR210



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.

### Function

- Measuring and monitoring range -170...+1820 °C
- resolution 0,1°C (to 999.9 °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 maxvalues 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)

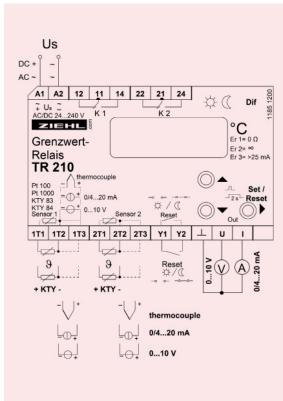
### Displays:

- 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 s
  - autoreset or electronic reclosing lock
  - elay-time for switching and switching back 0...9999 s
  - operating- or closed current-mode
  - cyclic check of function
- Monitoring of difference in temperature
- Preset basic programs

Order-number: T224071



### **Basic Programs**

### Program 1:

# 1 Temperature-sensor, 2 Limits

Application: Monitoring of a temperature for 2 limits, e.g. over-temperature with warning and switchjing 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-Sensores 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 monitoring 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 1measuring-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 ca be forwarded to e.g. a remote display or a superior control.

### Technical Data

Rated supply voltageUs

2 Measuring inputs

Measuring-time Analog output

Relay output

Test conditions
Rated ambient temperature renge

Dimensions h x w x d Protection housing / terminals Weight Attachment AC/DC 24-240V, <3W, <5VA (AC 20-264 V, DC 20,4-297 V)

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 ( $22\Omega$ ), 0-10 V (13 k $\Omega$ )

<2,5s to 5s, depending on speed of change of signal 0/4-20 mA, max. 500  $\Omega$ . 0-10 V, max. 10 mA

(without isolation to inputs)

type 3, see "general technical informations" 2 x 1 co- (change-over) contact

see "general technical informations" -20...+60°C

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

IP 30 / IP 20 (terminals pluggable)

app. 200 g

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



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.

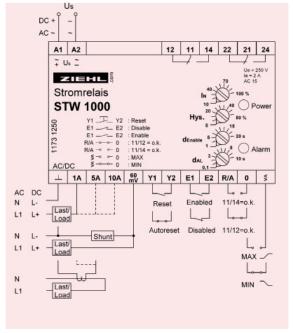
- Measuring inputs 1 A, 5 A, 10 A, direct or via transformer
- Measuring input 60 mV for ext. Shunt
- Automatic detection of AC/ DC
- Monitoring of over- or undercurrent
- Adjustable range 10...100%
- Hysteresis adjustable 5...50%
- Start-up delay 1...20s (input enable)
- Switching delay 0,1...10s for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

Order-number

AC/DC 24-240 V

S225684



### Technical Data

supply voltageUs

relay output type of contact test conditions

function frequency of measured current internal resistance

overload capacity/continously max. 10s

switching point hysteresis error of setting repeat error temperature-dependence start-up-delay denable switching delay dal

rated ambient temp. range

dimensions (h x w x d) attachment

protection housing/terminals weight

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

2 change-over contacts

**type 2 see** "general technical informations" siehe "general technical informations"

Over- or undercurrent, DC orAC (1-phase)  $0/40 \dots 400 \text{ Hz}$ 

60 mV: 40 k $\Omega$ , 1A: 0,1  $\Omega$ , 5A: 20 m $\Omega$ , 10 A: 10 m $\Omega$ 

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

adjustable 10...100% In

adjustable 5...50% of switching point < 10%

± 0,2% ≤0,05 %/K

adjustable 1...20 sec. adjustable 0,1...10 sec.

-20°C...+55°C

design V4: 90 x 70 x 58 [mm]

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

with screws M4 IP 30 / IP 20

ca. 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.

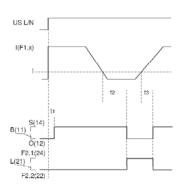
At conventional solutions with a change-over contact, there is a short on-pulse at the reserve lamp everytime when the system is switched on. The STW200 switches it on only in case of a failure of the main lamp.

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.

Order-number: \$225530

- 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 operatingcurrent 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 Us Tolerance

Relay output Type of contact

Measuring ranges Tolerance / repeating error Hysteresis Delay alarm

rated ambient temp. range

Dimensions H x B x T Line connection Attachment Protection housing/terminals Weight AC 230 V 50/60 Hz, < 3 VA 0,85 ... 1,1 Us

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

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

-40°C...+55°C

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

# Measuring-Transducer for AC-Current

WS and AS



Current-Transformer Typt WS



Current-Transformer Type AS

These current monitors require a current transformer with a 1 or 5 A secondary and a rated capacity of 2.5 VA as signal transmitter. The primary rated current must be appropriate to the current to be monitored. 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 Awe 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) and primary or secondary rated current.

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

The following winding current transformers type WS are available:

Class 1, 2.5 A	
WS5/1 A	S225178
WS10/1 A	S225179
WS20/1 A	S225180
WS30/1 A	S225688
WS5/5 A	S225182
WS10/5 A	S225183
WS20/5 A	S225184
WS30/5 A	S225689

The following **AS plug-in current transformers** are available:

Class 1, 2.5 A	
AS60/1 A	S225170
AS100/1 A	S225171
AS200/1 A	S225172
AS500/1 A	S225173
AS60/5 A	S225174
AS100/5 A	S225175
AS200/5 A	S225176
AS500/5 A	S225177

Weight approx. 300 g Other values upon request!

Current-Voltage-Transformer ASS500/5 0 - 500 A, 5 mV/A



The ASS500/5 plug-in-current-voltage transformer is a measuring transformer with high linearity for currents up to AC 500 A and an output signal of 5 mV per ampere. Its maximum error is 1% of the measured value. The instrument is simply plugged onto the current-carrying conductor.

ZIEHL MINIPAN instrument panels are suitable for direct connection to the ASS500/5. Different primary current ranges can be monitored by ZIEHL current monitors, e.g. the STW201S and STWMU201S current measuring monitors with corresponding voltage inputs for the ASS500/5.

The ASS500/5V is not overloadable.

Order number: \$225168

#### Application:

The ASS500/5 is of use where currents within a wide range need to be monitored, and high short-circuit currents can also occur. Currents up to 6 kA can be measured provided that an appropriate monitor range has been selected.

In practice, when capturing low currents in the monitored line, a distortion of the measuring value can occur due to high-level currents in adjoining conductors. This can be avoided by a suitable mechanical arrangement of current conductors and transformers.

The output voltage is dephased in quadrature (90°) compared to the current to be measured.

- 1 transformer type for rated currents of 0 10 A up to 0 - 500 A
- linear output signal even in case of multiple (up to 12-fold = 6 kA) overload
- output signal of 5 mV/A
- · not overloadable
- error < 1 % of measuring value</li>
- suitable for current rails of 10 x 20 mm or round conductors of Ø up to 22.5 mm
- Internal resistance < 450  $\Omega$
- Input resistance of the evaluation instrument min. 10 k $\Omega$  (adjusted to 10 k $\Omega$ )
- Weight approx. 180 g

# Frequency- and Speed-Relay FRMU1000

with integrated Measuring-Transducer

#### FRMU1000



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

2 limits with 1 relay each can be programmed for under- or overspeed, 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, npnor 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.

#### Function

#### Frequency:

- Measuring-input voltage AC 20-200V/80-440 V
- Monitoring of frequency of own supply-voltage
- · Monitoring range 10-500 Hz
- Resolution of display 0,01 Hz

#### Speed:

- Monitoring range 5...99999 min<sup>-1</sup>
- · 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)

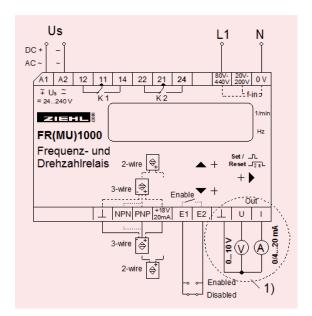
#### General:

- 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 frequencyinput 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

#### Order-numbers:

FRMU1000 with analog output **U226134** FR1000 without analog output **U226135** 



#### Technical Data FRMU1000

Rated supply voltage Us

AC/DC 24-240 V, <3W, <10VA (AC 20-264 V, DC 20,4-297 V) 0, 40...500 Hz, > AC 80 V: 10...500 Hz

Frequency

Measuring-input Frequency Measuring-input Speed

10.00-500.00 Hz, AC 20-200 V/80-440 V

5-99999 min -1

PNP or NPN, 3-wire or 2-wire 0/4-20 mA, max. 500  $\Omega$ ,

0-10 V, max. 10 mA

< 0,15 % from FullScale + 0,015 %/K

Relay output

Analog output

max. error

Type 3, see "general technical informations"

2 x 1 (change-over) contact

see "general technical informations"

-20 °C ... +60 °C

Test conditions

Rated ambient temperature

range

design V4: 90 x 70 x 58 mm, mounting height 55 mm

IP 30/IP 20 (terminals pluggable)

app. 180 g

on 35 mm DIN rail or with screws M 4

Protection housing / terminals Weight Attachment

Dimensions(h x w x d)

#### Inductive Proximity Sensor IG2



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 ≤ 3 mm)
- Connection cable pluggable
- integrated protection against reverse polartity
- · 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 Us Max. switching frequency Max. switching distance Factor of reduction Rated amb. temp. range

Housing Material Weiaht Dimensions

Torque Connection Shock resistance Vibration resistance

protection

Order-number IG 2 Order-number cable DC 10-30 V

800 Hz = 48000 Imp/min4 mm (recomm. ≤3 mm) Ms: 0,45, Al: 0,4, Cu: 0,3 -25 ... +70 degC

Threaded pipe M12x1 nickel-plated brass app. 26 g

M 12x1 / length 50 mm

max. 10 Nm threaded plug M 12 ≤30 g, ≤11 ms ≤55 Hz, ≤1 mm

**IP 67** 

U226003 U226004

# Voltage- and Frequency-Relay UFR1000

with integrated Vector-Step-Relay

UFR1000



The voltage- and frequency-relay UFR 1000 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.

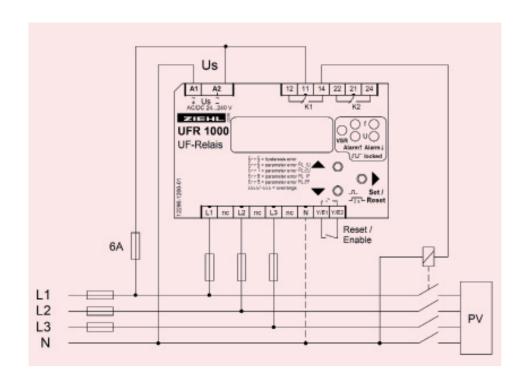
After selecting a basic program, for each relay limits can be programmed for over-/undervoltage and over-/underfrequency. In programs with vector-stepmonitoring, K2 is used for vector-step only.

Applications are monitoring power-networks at great solar-plants, in block power heating stations, also with synchronous generators (vector step) or generally monitoring the quality in power networks at machines or power-supplies.

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

- monitoring of over- and undervoltage 75...465 V
- monitoring of over- and underfrequency 45...65
- monitoring of quality of voltage (10-minutes-average)
- monitoring of vector-step 2...20 °, 1 or 3-phase
- Switching-delay adjustable <0,05...60,0 s</li>
- Switching-back-delay adjustable 0...1000 s
- · display 4 digits
- LEDs for alarms, allocation of values and states of
- 2 output-relays, each for monitoring frequency and/ or voltage
- function of relays (nc- or no -operating mode) programmable
- · interlocked switching or autoreset
- input for Enable / Reset
- · easy programming by help of basic programs
- · code-lock against manipulation of settings
- universal power-supply AC/DC 24-240 V
- · housing for DIN-rail-mount, 70 mm wide, mounting

Order-number: \$222294



#### Technische Daten UFR1000

Rated supply voltage Us AC/DC 24-240 V, 0/45...65 Hz, <5VA Power supply DC: 20,4...297 V, AC: 20,4...264 V

Relay output 2 change-over contacts type 2, see "general technical informations"

Voltage Measuring voltage

phase-phase AC 40...465 V Measuring voltage phase - N AC 40...270 V Hysteresis adjustable 1...99 V

Frequency 45...65 Hz

Error (with N) ± 0,8% of measured value ± 1 Digit Error (without N) ± 1% of measured value ± 1 Digit

Measuring functions 3-phasig mit/ ohne N, 1-phasig gegen N Switching-delay adjustable 0,05...60,00 s

Switching-back delay (zeroadjustable 0 (> 200 ms)...1000 s

voltage-proof)

45,00...65,00 Hz Frequency Measuring range Hysteresis 0,05...5.00 Hz

Error ± 0,05 Hz ± 1 Digit Switching-delay einstellbar 0.1...99.9 s Switching-back delay einstellbar 0...240 s

Vector-Step Mathod

> 1- or 3-phase Measuring range Hysteresis 2.0...20.0° Switching-delay 0,1° Switching-back delay < 50 ms

Delay at Us on adjustable 3...240 s adjustable 2...20 s

EN 60 255 **Test Conditions** Rated impulse voltage 4000 V Overvoltage catagory

Rated Insulation voltage Ш Contamination level AC 300 V Isolation material group On-period Ш

Rated ambient temp. range

100 % Interference resistance -20 °C...+55 °C EN 60 068-2-1 dry heat

Interference transmission EN 61 000-6-2 EN 61 000-6-4

Housing Design

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

# Current-Relay SolarYes

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

#### SolarYes AC



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 de reduced by leading the monitored line multiple times through the transformer (Ø 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</li>
- Universal supply-voltage AC/DC 24-240 V
- Housing for DIN-rail mount, 70 mm, mounting height 55 mm

Order-number

S225535

#### 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.

Order-numbers: STWA1 S225201

STWA1H S225506

#### 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

Relaiy-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  $\pm$  30%

max. 100 A continously, 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

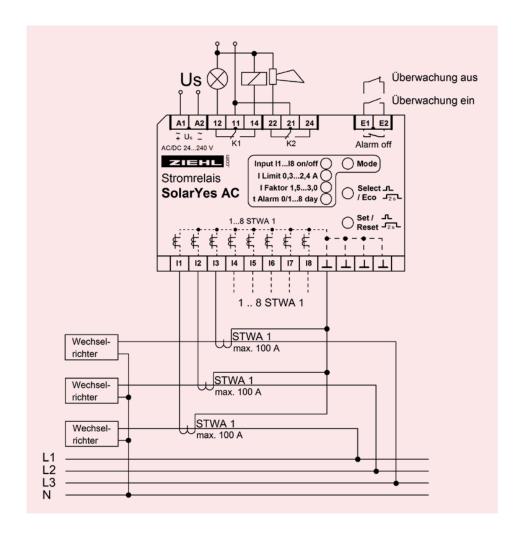
Housing Design V4

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



# Digital Measuring-Instruments MINIPAN®

MINP	AN® 300	118
	Panel-mount 36 x 72 mm, 4 digits	
MINIF	PAN® 350V and 352V	120
	Switch gear-cabinet-mount, 4 digits with alarms / relays	
MINIF	PAN® 352P	124
	Panel-mount 72 x 72 mm, 4 digits with alarms / relays	
MINIF	PAN® SE352	127
	Panel-mount 48 x 96 mm, 4 digits with alarms / relays	

Measuring Point Change-over-switches see products group 5

## Universal-Digital Panelmeter MINIPAN 300

### in Housing for Panel-Mount 36 x 72 mm

#### MINIPAN 300



With its 4 digit, 14 mm high display, Digital Panelmeters of MINIPAN 300-series allow the accurate display of different values in the range -1999 ... +9999.

Only 3 designs cover the measuring of DC voltage and current, AC voltage and current and temperature with Pt 100-sensors (RTD).

The display can be easily programmed by the customer (e.g. input 0-10 V --> display 0-350.0 ms or AC 0-1 A ---> 0-400.0 A With the built-in universal powersupply AC/DC 24-240 V it is especiall versatile.

#### Inputs DC-Meter:

- Measuring of current with external shunt max. 300 mV
- 1 A for direct measuring of current
- · 0/4-20 mA for standard-
- signals
- 0-10 V for standard-signals
- 100/500 V switchable

#### Inputs AC-Meter:

- 500 V
- 50 V
- 10 V
- Measuring of current with external shunt max.150 mV
- 1 A for direct measuring of current or with external transformers

#### Measuring of Temperature Pt100 (RTD):

- Pt100 in 2- or 3-wire connection
- Measuring Range -199,9 ... +850,0 °C
- Resolution 0,1 °C
- Display in °C or °F

#### Easy programming with 3 buttons

- · Display (skaling, decimal-point)
- Display of MIN- and MAX-values
- Delay at unstable signals
- Code-lock against manipulation of settings

#### Additional Features:

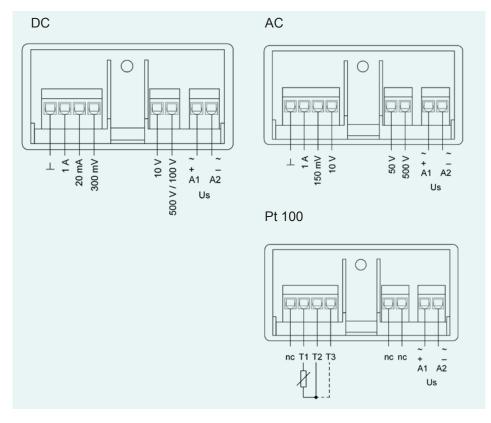
- Sticker with different measuring units included
- · Terminals pluggable
- Face-Plate 36 x 72 mm

#### Option:

Programming of parameters ex works

#### Order-numbers:

MINIPAN 300 DC D440300 MINIPAN 300 AC D440320 MINIPAN 300 Pt 100 D440340



#### Technical Data MINIPAN 300

Power supply rated supply-voltage Us AC/DC 24-240 V

tolerance DC DC 20 - 297 V (0,85 x 24 V...1,35 x 220 V) tolerance AC AC 20 - 264 V (0,85 x 24 V...1,1 x 240 V)

power consumption < 3 VA frequency 48...62 Hz

Measuring inputs (always connect 1 input only) potentially separated from supply-voltage

DC-Meter  $\pm$  300 mV / 120 k $\Omega$  / max.  $\pm$ 2,5 V measuring-range / resistance of  $\pm$  10.00 V / 1 M $\Omega$  / max.  $\pm$ 50 V

input / overload capacity + 500.0 V / -199.9 V / 3 M $\Omega$  / max.  $\pm$ 600 V

+ 100.0 V / -100.0 V / 3 MΩ / max. ±600 V

+ 20.00 mA / -19.99 mA/ Shunt 15 Ω/ max. ±100 mA

 $\pm$  1.00 A / Shunt 150 m $\Omega$  / max.  $\pm$ 2 A

AC-Meter 150 mV / 900  $\Omega$  / max. 2,5 V measuring-range / resistance of 10.00 V / 100 k $\Omega$  / max. 50 V

**1.00 A** / Shunt 150 mΩ / max. 2 A

Temperature Pt 100 (RTD) - 199,9 ... + 850,0 °C (= -328 ... +1563 °F)

sensor-input Pt 100, 2- or 3-wire connection

 $\begin{array}{cc} & \text{max. 3 x 50 } \Omega \\ \text{resistance 3-wire} & \text{<400 ms} \\ \text{measuring time AC/DC} & \text{<400 ms} \end{array}$ 

measuring time Pt 100

Accuracy resolution +9999 / -1999

error (of full measuring range)

 $\begin{array}{ll} \text{DC-voltage, DC-current} & \pm \ 0,1 \ \% \ \pm \ 1 \ \text{Digit} \\ \text{AC-voltage, AC current} & \pm \ 0,5 \ \% \ \pm \ 1 \ \text{Digit} \\ \text{temperature factor} & \pm \ 0,02 \ \% \ / \ \text{K} \\ \end{array}$ 

total error at temperature-measu- ± 0,3 % of value ± 0,5 K

ring

temperature factor  $\pm$  0,03 °C / K

Housing Design 300 panel-mount housing dimensions (h x w x d) mm 36 x 72 x 79 mm

Attachment panel-mount, panel cutout 33 +0.6 x 68 +0.6 mm

max. thickness of panel 8 mm

-20...+60 °C

Single wire 1 x 0,5...1,5 mm<sup>2</sup> Fine wired with end sleeves 1 x 0,14...1 mm<sup>2</sup>

Rated ambient temperature

ige

protection housing/terminals IP 30/IP 20 weight ca. 120 g

Order Notice Programming ex works:

If you want us to deliver the devices readily programmed ex works (extra charge), please specify in your order the following parameters (see also operating manual):

bold = compulsory Measuring Input e.g. 100 V

Mesuring Range e.g. 20...80 V, no specification = measuring input e.g. 0...500,0 (do not forget the decimal point)

Number of fixed zeros at the 0, 1 oder 2

end

Delay of Display e.g. 1 s Code-lock yes/no

## Universal-Display MINIPAN 350V

### in Housing for DIN-Rail-Mount

#### MINIPAN 350V



With its 4 digit, 7 mm high display, Digital measuring-instruments of MINIPAN 350V- series allow the accurate display of different values in the range -1999 ... +9999.

Only 3 designs cover the measuring of DC voltage and current, AC voltage and current and temperature with Pt 100-sensors (RTD).

The display can be easily programmed by the customer (e.g. input 0-10 V --> display 0-350.0 ms or AC 0-1 A ---> 0-400.0 A). With the built-in universal powersupply AC/DC 24-240 V it is especiall versatile.

#### Inputs DC-Meter:

- Measuring of current with external shunt max. 300 mV
- 1 A for direct measuring of current
- 0/4-20 mA for standardsignals
- 0-10 V for standard-signals
- 100/500 V switchable

#### Inputs AC-Meter:

- 500 V
- 50 V
- 10 V
- Measuring of current with external shunt max.150 mV
- 1 A for direct measuring of current or with external transformers

#### Measuring of Temperature Pt 100 (RTD):

- Pt100 in 2- or 3-wire connection
- Measuring Range -199,9 ... +850,0 °C
- Resolution 0,1 °C
- · Display in °C or °F

#### Easy programming with 3 buttons

- Display (skaling, decimal-point)
- · Display of MIN- and MAX-values
- · Delay at unstable signals
- Code-lock against manipulation of settings

#### Additional Features:

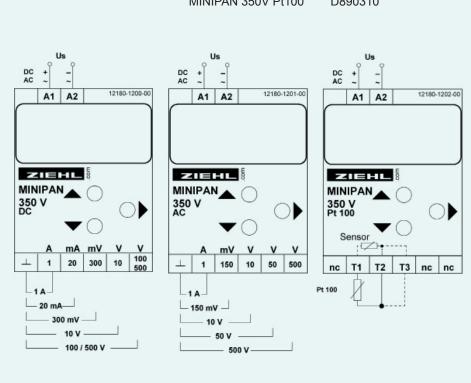
- · Sticker with different measuring units included
- · Terminals pluggable
- · Mounting-height 55 mm, 70 mm wide

#### Option:

Programming of parameters ex works

#### Order-numbers:

MINIPAN 350V DC D890100 MINIPAN 350V AC D890210 MINIPAN 350V Pt100 D890310



#### Technical Data MINPAN 350V

Power supply rated supply-voltage Us AC/DC 24-240 V

tolerance DC DC 20 - 297 V (0,85 x 24 V...1,35 x 220 V) tolerance AC AC 20 - 264 V (0,85 x 24 V...1,1 x 240 V)

power consumption < 3 VA frequency 48...62 Hz

Measuring inputs (always connect 1 input only) potentially separated from supply-voltage

> DC-Meter ± 300 mV / 120 kΩ / max. ±2.5 V measuring-range / resistance of ± 10.00 V / 1 MΩ / max. ±50 V

input / overload capacity + 500.0 V / -199.9 V / 3 MΩ / max. ±600 V

+ 100.0 V / -100.0 V / 3 MΩ / max. ±600 V

+ 20.00 mA / -19.99 mA/ Shunt 15  $\Omega$ / max. ±100 mA

± 1.00 A / Shunt 150 mΩ / max. ±2 A

AC-Meter 150 mV / 900 O / max. 2.5 V

measuring-range / resistance of **10.00 V** / 100 kΩ / max. 50 V input / overload capacity **50.0 V** / 1 MΩ / max. 60 V

**500.0 V** / 3 MΩ / max. 600 V 1.00 A / Shunt 150 mΩ / max. 2 A

- 199,9 ... + 850,0 °C (= -328 ... +1563 °F) Temperature Pt 100 (RTD)

Pt 100. 2- or 3-wire connection sensor-input resistance 3-wire max. 3 x 50 Ω

measuring time AC/DC <400 ms measuring time Pt 100 <400 ms

+9999 / -1999 Accuracy resolution

error (of full measuring range)

DC-voltage, DC-current ± 0,1 % ± 1 Digit AC-voltage, AC current ± 0,5 % ± 1 Digit temperature factor ± 0,02 % / Kelvin  $\pm$  0,3 % of value  $\pm$  0,5 K

total error at temperature-measu-

ring

temperature factor ± 0.03 °C / K

Housing housing design V2

dimensions (h x w x d) mm 90 x 35 x 58 mm, mounting height 55 mm

terminals 8-pole

Attachment on 35 mm DIN-rail or with screws M4

ambient temperature range -20...+60 °C IP 30 protection housing/ protection terminals IP 20 weight app. 100 g

### Universal-Instrument MINIPAN 352V

### for DIN-rail-mounting

#### MINIPAN 352V



With its 4 digit, 14 mm high display, Digital Panelmeters of MINIPAN 352V- series allow the accurate display of different values in the range -1999 ... +9999.

Measuring inputs AC (True RMS), DC current and voltage and measuring of restistance and of temperatures with various sensors are combined in one instrument.

Two programmable switching points allow applications as limit-switch or 2- or 3-point controller.

With *EasyLimit* the switching points can be set easily. Other parameters are blocked and thus protected from unindended manipulation.

With its analog output (option) it is in addition a measuring-transducer.

The display can be easily programmed by the user (e.g. input DC 4-20 mA/ display 0-350.0 m/s or 0...200  $\Omega$  / 0...3000 mm or AC 0-5 A / 0-400.0 A).

In addition the built-in universal power-supply AC/DC 24-240 V makes it even more versatile.

#### Temperature:

- Pt 100 (RTD), Pt 1000, KTY 83 and KTY 84 in 2- or 3-wire connection
- Thermocouples type B, E, J, K, L, N, R, S, T
- Measuring range -170 ... +1820 °C
- Resolution 0.1 °C (up to 999.9 C)
- Display in °C or °F

#### AC/DC-measuring inputs:

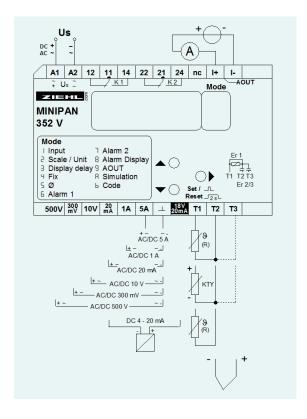
- 300 mV for measuring current with external shunt
- 1 and 5 A for direct measuring of current (or AC with external transformer)
- 500 V
- 10 V for standard signals
- 20 mA for standard signals
- AC-measuring TrueRMS

#### Measuring of resistance:

- Range 0...500 Ω
- Range 0...30 kΩ
- Easy programming with 3 buttons and supporting display:
  - Display (zero, fullscale, decimal point)
  - 2 switching points with hysteresis and delays
  - EasyLimit for easy setting of alarms
  - Switching with automatic reset or interlocked
  - MIN/MAX-contacts or operating-/closed current mode of relays
  - Storage of MIN- and MAX-values
  - Average of multiple measurings
  - Simulation of operation
  - Code-lock against manipulation of settings
- Outputs 2 potential-free change-over contacts (co)
- Supply-voltage for external measuring transducer 4-20 mA
- · Sticker with different measuring units included
- · Terminals pluggable
- · Mounting dimensions 72x72 mm
- Supply-voltage AC/DC 24-240 V
- Option: analog output 4...20 mA (insulated when externally supplied)

Order-numbers: D340101

D340110 (with analog output)



#### Technical Data MINIPAN 352V

Power supply Rated supply-voltage Us AC/DC 24-240 V

Tolerance DC DC 20 - 297 V (0,85 x 24 V...1,35 x 220 V)
Tolerance AC AC 20 - 264 V (0,85 x 24 V...1,1 x 240 V)

Power consumption < 5 VA Frequency 48...62 Hz

Measuring inputs

Housing

potentially separated from supply-voltage (always connect 1 input only at the same time)

DC-measuring  $\pm$  300 mV / 29 k $\Omega$  / max.  $\pm$ 2,5 V Measuring-range / input-  $\pm$  10.00 V / 1 M $\Omega$  / max.  $\pm$ 50 V

### Sesistance / overload capacity

### 500.0 V / 3 MΩ / max. ±600 V

### ± 20.00 mA / Shunt 8 Ω/ max. ±100 mA

### ± 1.00 A / Shunt 150 mΩ / max. ±2 A

### ± 5.00 A / Shunt 30 mΩ / max. ±7.5 A for 10 s

AC-measuring 300 mV / 20 k $\Omega$  / max. 2,5 V Measuring-range / input- 10.00 V / 1 M $\Omega$  / max. 50 V Resistance / overload capacity 500.0 V / 3 M $\Omega$  / max. 600 V

**20.00 mA** / Shunt 8  $\Omega$  / max. 100 mA **1.00 A** / Shunt 150 m $\Omega$  / max. 2 A **5.00 A** / Shunt 30 m $\Omega$  / max. 7.5 A for 10 s

Messuring of resistance 0...500  $\Omega$  0... 30  $k\Omega$ 

Temperature-measuring - 199,9 ... + 850,0 °C (= -328 ... +1563 °F)
Sensor-input Pt 100, Pt 1000, KTY 83, KTY 84, 2- or 3-wire con-

nection, line-resistance max.  $3x 50 \Omega$ 

Thermocouples B, E, J, K, L, N, R, S, T

Measuring time DC  $< 300 \text{ ms x } \emptyset$ 

Measuring time AC < 700 ms + 300 ms x Ø

Measuring time temperature + < 600 ms (3-wire + thermocouple)

Resistance < 300 ms (2-wire)

Output Typ 2, see "general technical informations"

2x1 change-over) contanct

Analog output 4-20 mA (insulated when externally supplied) Supply-voltage for loop-powered DC 15-20 V / max. 45 mA

measuring transducer and analog

Output -1999 / +9999

 $\begin{array}{lll} \text{Resolution} & \pm \ 0,1 \ \% \pm 1 \ \text{Digit} \pm 0,02 \ \% \ \text{K} \\ \text{Error DC (of FullScale)} & \pm \ 0,5 \ \% \pm 1 \ \text{Digit} \pm 0,05 \ \% \ \text{K} \\ \text{Error AC (of FullScale)} & 500 \ \Omega: \ 0,2 \ \% \pm 0,5 \ \Omega \\ \text{Error resistance} & 30 \ \text{k}\Omega: \ 0,5 \ \% \pm 2 \ \Omega \end{array}$ 

(of value)  $\pm 0.2 \% \pm 0.5 \text{ K} \pm 0.04 \text{ °C/K}$ 

V4

Error Pt 100 (of value)

Housing 90 x 70 x 58 mm

Dimensions (h x w x d) mm  $\,$  on 35 mm DIN rail according to EN 60 715 or with 2

Attachment screws M4 (option)

-20...+60 °C
Ambient temperature range
Protection housing
Protection terminals

-20...+60 °C
IP 30
IP 20
approx. 190 g

Weight

### Universal-Instrument MINIPAN 352P

### in Housing for Panel-Mount 72 x 72 mm

#### MINIPAN 352P



With its 4 digit, 14 mm high display, Digital Panelmeters of MINIPAN 352P- series allow the accurate display of different values in the range -1999 ... +9999.

Measuring inputs AC (True RMS), DC current and voltage and measuring of restistance and of temperatures with various sensors are combined in one instrument.

Two programmable switching points allow applications as limit-switch or 2- or 3-point controller.

With *EasyLimit* the switching points can be set easily. Other parameters are blocked and thus protected from unindended manipulation.

With its analog output (option) it is in addition a measuring-transducer.

The display can be easily programmed by the user (e.g. input DC 4-20 mA/ display 0-350.0 m/s or 0...200  $\Omega$  / 0...3000 mm or AC 0-5 A / 0-400.0 A).

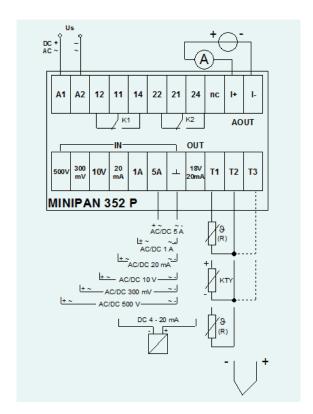
In addition the built-in universal power-supply AC/DC 24-240 V makes it even more versatile.

- <u>Temperature:</u>
  - Pt 100 (RTD), Pt 1000, KTY 83 and KTY 84 in 2- or 3-wire connection
  - Thermocouples type B, E, J, K, L, N, R, S, T
  - Measuring range -170 ... +1820 °C
  - Resolution 0.1 °C (up to 999.9 C)
  - Display in °C or °F
- AC/DC-measuring inputs:
  - 300 mV for measuring current with external shunt
  - 1 and 5 A for direct measuring of current (or AC with external transformer)
  - 500 V
  - 10 V for standard signals
  - 20 mA for standard signals
  - AC-measuring TrueRMS

- Measuring of resistance:
  - Range 0...500 Ω
  - Range 0...30 kΩ
- Easy programming with 3 buttons and supporting display:
  - Display (zero, fullscale, decimal point)
  - 2 switching points with hysteresis and delays
  - EasyLimit for easy setting of alarms
  - Switching with automatic reset or interlocked
  - MIN/MAX-contacts or operating-/closed current mode of relays
  - Storage of MIN- and MAX-values
  - Average of multiple measurings
  - Simulation of operation
  - Code-lock against manipulation of settings
- Outputs 2 potential-free change-over contacts (co)
- Supply-voltage for external measuring transducer 4-20 mA
- · Sticker with different measuring units included
- Terminals pluggable
- Mounting dimensions 72x72 mm
- Supply-voltage AC/DC 24-240 V
- Option: analog output 4...20 mA (insulated when externally supplied)

Order-numbers: D440200

D440210 (with analog output)



#### Technical Data MINIPAN 352P

Power supply Rated supply-voltage Us AC/DC 24-240 V

Tolerance DC DC 20 - 297 V (0,85 x 24 V...1,35 x 220 V)
Tolerance AC AC 20 - 264 V (0,85 x 24 V...1,1 x 240 V)

Power consumption < 3 W, < 10 VA Frequency 48...62 Hz

Measuring inputs

potentially separated from supply-voltage (always connect 1 input only at the same time)

DC-measuring  $\pm$  300 mV / 29 k $\Omega$  / max.  $\pm$ 2,5 V Measuring-range / input-  $\pm$  10.00 V / 1 M $\Omega$  / max.  $\pm$ 50 V

Resistance / overload capacity  $\begin{array}{c} \pm \ 500.0 \ \text{V} \ / \ 3 \ \text{M}\Omega \ / \ \text{max.} \ \pm 600 \ \text{V} \\ \pm \ 20.00 \ \text{mA} \ / \ \text{Shunt} \ 8 \ \Omega / \ \text{max.} \ \pm 100 \ \text{mA} \\ \pm \ 1.00 \ \text{A} \ / \ \text{Shunt} \ 150 \ \text{m}\Omega \ / \ \text{max.} \ \pm 2 \ \text{A} \\ \pm \ 5.00 \ \text{A} \ / \ \text{Shunt} \ 30 \ \text{m}\Omega \ / \ \text{max.} \ \pm 7,5 \ \text{A} \ \text{for} \ 10 \ \text{s} \end{array}$ 

AC-measuring 300 mV / 20 k $\Omega$  / max. 2,5 V Measuring-range / input- 10.00 V / 1 M $\Omega$  / max. 50 V Resistance / overload capacity 500.0 V / 3 M $\Omega$  / max. 600 V

20.00 mA / Shunt 8 Ω / max. 100 mA 1.00 A / Shunt 150 mΩ / max. 2 A 5.00 A / Shunt 30 mΩ / max. 7.5 A for 10 s

Messuring of resistance 0...500  $\Omega$  0... 30  $k\Omega$ 

Temperature-measuring - 199,9 ... + 850,0 °C (= -328 ... +1563 °F)
Sensor-input Pt 100, Pt 1000, KTY 83, KTY 84, 2- or 3-wire con-

nection, line-resistance max.  $3x 50 \Omega$ 

Thermocouples B, E, J, K, L, N, R, S, T

Measuring time DC  $< 300 \text{ ms } \times \emptyset$ Measuring time AC  $< 700 \text{ ms } + 300 \text{ ms } \times \emptyset$ 

Measuring time temperature + < 600 ms (3-wire + thermocouple)

Resistance < 300 ms (2-wire)

Output Typ 2, see "general technical informations"

2x1 change-over) contanct

Analog output 4-20 mA (insulated when externally supplied)

Supply-voltage for loop-powered DC 15-20 V / max. 45 mA

measuring transducer and analog output

Accuracy Resolution -1999 / +9999

Error DC (of FullScale) $\pm$  0,1 %  $\pm$  1 Digit  $\pm$  0,02 % KError AC (of FullScale) $\pm$  0,5 %  $\pm$  1 Digit  $\pm$  0,05 % KError resistance $500 \Omega$ : 0,2 %  $\pm$  0,5  $\Omega$ (of value) $30 k\Omega$ : 0,5 %  $\pm$ 2  $\Omega$ 

Error Pt 100 (of value)  $\pm 0.2 \% \pm 0.5 \text{ K} \pm 0.04 \text{ °C/K}$ 

Housing panel-mount housing 72 x 72 mm

Dimensions (h x w x d) mm 72 x 72 x 93,5 mm

Attachment panel-mount, panel cutout 68 +0.7 x 68 +0.7 mm

max. thickness of panel: 8 mm

Rated ambient temperature-

range -20...+60 °C

Protection housing front-side IP 50, back-side IP 20

Protection terminals IP 20 Weight approx. 240 g

### Universal-Instrument MINIPAN SE352

in Housing for Panel-Mount 48 x 96 mm

#### MINIPAN SE352



With its 4 digit, 14 mm high display, Digital Panelmeters of MINIPAN SE 352-series allow the accurate display of different values in the range -1999 ... +9999.

Measuring inputs AC (True RMS), DC current and voltage and measuring of restistance and of temperatures with various sensors are combined in one instrument.

Two programmable switching points allow applications as limit-switch or 2- or 3-point controller.

With *EasyLimit* the switching points can be set easily. Other parameters are blocked and thus protected from unindended manipulation.

With its analog output (option) it is in addition a measuring-transducer.

The display can be easily programmed by the user (e.g. input DC 4-20 mA/ display 0-350.0 m/s or 0...200  $\Omega$  / 0...3000 mm or AC 0-5 A / 0-400.0 A).

In addition the built-in universal power-supply AC/DC 24-240 V makes it even more versatile.

#### Temperature:

- Pt 100 (RTD), Pt 1000, KTY 83 and KTY 84 in 2- or 3-wire connection
- Thermocouples type B, E, J, K, L, N, R, S, T
- Measuring range -170 ... +1820 °C

- Resolution 0.1 °C (up to 999.9 C)
- Display in °C or °F

#### · AC/DC-measuring inputs:

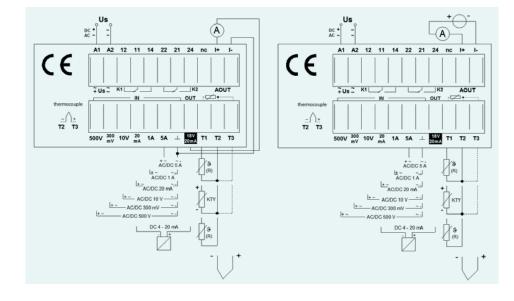
- 300 mV for measuring current with external shunt
- 1 and 5 A for direct measuring of current (or AC with external transformer)
- 500 V
- 10 V for standard signals
- 20 mA for standard signals
- AC-measuring TrueRMS

#### Measuring of resistance:

- Ranges 0...500 Ω, 0...30 kΩ
- Easy programming with 3 buttons and supporting display:
  - Display (zero, fullscale, decimal point)
  - 2 switching points with hysteresis and delays
  - EasyLimit for easy setting of alarms
  - Switching with automatic reset or interlocked
  - MIN/MAX-contacts or operating-/closed cur-
  - rent mode of relays
  - Storage of MIN- and MAX-values
  - Average of multiple measurings
  - Simulation of operation
  - Code-lock against manipulation of settings
- Outputs 2 potential-free change-over contacts (co)
- Supply-voltage for external measuring transducer 4-20 mA
- · Sticker with different measuring units included
- · Terminals pluggable
- Mounting dimensions 48 x 96 mm
- Splash-proof frontside IP54
- Supply-voltage AC/DC 24-240 V
- Option: analog output 4...20 mA (insulated when externally supplied)

Order-numbers: D440101

D440110 (with analog output)



#### Technische Daten MINIPAN SE352

AC/DC 24-240 V Power supply Rated supply-voltage Us

Tolerance DC DC 20 - 297 V (0,85 x 24 V...1,35 x 220 V) Tolerance AC AC 20 - 264 V (0,85 x 24 V...1,1 x 240 V)

Power consumption < 3 W. < 10 VA Frequency 48...62 Hz

Measuring inputs potentially separated from supply-voltage (always connect 1 input only at the same time)

DC-measuring ± 300 mV / 29 kΩ / max. ±2,5 V **± 10.00 V** / 1 MΩ / max. ±50 V Measuring-range / input-

± 500.0 V / 3 MΩ / max. ±600 V Resistance / overload capacity ± 20.00 mA / Shunt 8 Ω/ max. ±100 mA ± 1.00 A / Shunt 150 mΩ / max. ±2 A

± 5.00 A / Shunt 30 mΩ / max. ±7.5 A for 10 s

300 mV / 20 kΩ / max. 2.5 V AC-measuring **10.00 V** / 1 MΩ / max. 50 V

Measuring-range / input-**500.0 V** / 3 MΩ / max. 600 V Resistance / overload capacity

**20.00 mA** / Shunt 8 Ω / max. 100 mA 1.00 A / Shunt 150 mΩ / max. 2 A **5.00 A** / Shunt 30 mΩ / max. 7.5 A for 10 s

Messuring of resistance  $0...500 \Omega$ ,  $0...30 k\Omega$ 

- 199,9 ... + 850,0 °C (= -328 ... +1563 °F) Temperature-measuring

Pt 100, Pt 1000, KTY 83, KTY 84, 2- or 3-wire con-Sensor-input

nection, line-resistance max.  $3x 50 \Omega$ 

Thermocouples B, E, J, K, L, N, R, S, T

< 300 ms x Ø Measuring time DC

< 700 ms + 300 ms x Ø Measuring time AC

< 600 ms (3-wire + thermocouple) Measuring time temperature +

Resistance < 300 ms (2-wire)

Relay output Typ 2, see "general technical informations" Output

2x1 change-over) contanct

4-20 mA (insulated when externally supplied) Analog output

Supply-voltage for loop-powered DC 15-20 V / 25 mA

measuring transducer and analog output

Resolution -1999 / +9999 Accuracy

± 0,1 % ± 1 Digit ± 0,02 % K Error DC (of FullScale) Error AC (of FullScale) ± 0,5 % ± 1 Digit ± 0,05 % K  $500 \Omega$ : 0,2 % ± 0,5 Ω Error resistance 30 kΩ: 0,5 % ±2 Ω (of value)

Error Pt 100 (of value)  $\pm$  0,2 %  $\pm$  0,5 K  $\pm$  0,04 °C/K

panel-mount housing Housing 48 x 96 x 100 mm Dimensions (h x w x d) mm

panel-mount, panel cutout 45 +0,6 x 92 +0,8 mm Attachment

max. thickness of panel: 8 mm

Rated ambient temperature-

-20...+60 °C range

Protection housing front-side IP 54, back-side IP 20

Protection terminals **IP 20** Weight approx. 240 g

# Switching Relays and Controls

Controls for Suction Plants Type STW	130
Speed-Relays Type FR	146
Level-Relays Type NS for conductive liquids	148
Twilight Switches Type DS	155
Power Supplies Type NG	157
Watchdog-Time-Relays Type WD	158

### Controls for Suction-plants

for Dust, Sawdust, Shaving and Smoke

#### General

ZIEHL controls STW are designed to control suction plants especially in carpentry and wood-processing industry.

They are mounted centrally in the switchgear-cabinet. They monitor the current to the machines with help of transformers STWA1 or STWA1H and thus detect, when a machine is switched on. When used in systems with welding-fume, the DC-currents are detected with current-sensors S1.

Simple switch-on automats (STW1K, STW12V) start dedu-

sting when at least one of the monitored machines is switched on and stop dedusting with a delay after the last machine has been switched off.

Devices with integrated control of slide-valves (STW81V, STW84V) make sure that full advantage is taken from the available dedusting-capacity.

Multiple STW84V can be combined for controlling greater plants.

In addition STW84V can control a frequency-converter at the motor of the fan and thus optimize dedusting and save energy.

When PLCs are used for controlling the dedusting plant, electronic current-transmitters STWA1S can detect, if a machine is switched on. They can be directly connected to digital inputs of PLCs.

#### Overview

Тур	STW2V	STW1K	STW12V	STW81V	STW84V	STWA1S/SEH	Sensor S1
Number of monitored machines	1	8	12	8	8	1	1
Imputs for Transformers STWA 1 Current Sensor S1 Potential-free contact	- S1 Contact	STWA1 S1	STWA1 S1 Contact	STWA1 S1 Contact	STWA1 S1 Contact	- - -	- - -
Operating value	5 / 5-30 A	≤ 1 A	0,5 - 5 A	≤ 1 A	0,5-5 A	2 A / 2-10 A	5 / 5-30 A
Control of valves	-	-	-	X	X	-	-
Relay outputs	1 U	1 U	1 U	8 + 1 U	8 + 3 U	Transistor	Transistor
Control of minimum volume-flow	-	-	-	-	X	-	-
Control of filter-cleaning	-	-	-	-	X	-	-
Control of discharge		-	-	X	-	-	
Monitoring of max. volume flow	-	-	-	-	X	-	-

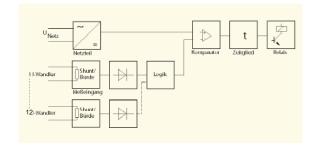
# Function and Characteristics

When there is a current through a current-transformer STWA 1, the input of the control can measure a voltage at the output of the STWA 1. This voltage is evaluated and according actions are performed by the device.

This simple principle to detect current yes/no allows to realize various functions at a reasonable price.

The state (on/off) of a consumer outside the switchgear-cabinet can be detected without needing a signal from the consumer. This saves cabling.

At currents <1 A, the necessary current for reaching the operating-value of the input of the control can be reduced by leading the monitored wire multiple times through the transformer STWA 1.



## Current-Relay STW2V

Current-Detection AC/DC with Current-Sensor S1

#### STW2V



The current relay STW 2 V in combination with a current-sensor S 1 monitors AC- and DC-currentflow yes/no. It supplies the power for the current-sensor.

The STW2V can also be used as a switching-amplifier for potential-free contacts.

#### Application:

- Monitoring of current-flow ves/ no for AC- and DC-currents
- Detecting state (on/off or defective) of a load by measuring the current in the feed line
- Monitoring of fuses
- Control of dedusting fans at welding work-stations with automatic run-after for the motor of the fan

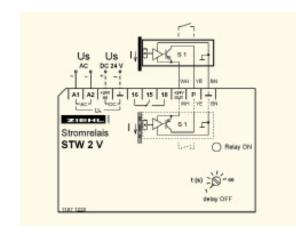
#### **Features**

- Input for current-sensor S1
- Detection of AC- and DC- currents
- Switching-point see current-sensor S1
- Switch-off delay adjustable 1-60 s
- Relay-output 1 change-over contact
- Housing for mounting in switchgear-cabinets

Bestell-Nummer

AC 220 - 240 V/ DC 24 V

S225541



#### Current-Sensor S1 for AC- and DC-Currents



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

The current-sensor can be easily fixed to the cable without disconnecting it. This allows a simple change of cables. For easy change from cable to cable, for example at welding devices, a version with a 90° twisted sensor is available for mounting in a tong.

Supply voltageUs

#### Features:

- switching point app. 5 A (option: adjustable 5-30 A)
  - mounting without disconnection of cable possible
- LED for current-flow
- robust, sealed execution
- overload capacity unlimited

Order-numbers:

Current-sensor S1. 5 A fixed S225693 Current-sensor S1, 5-30 A adjustable S225694

Technical Data

Relay output Type of contact Test conditions Rated ambient temp. range

Inputs Switching point

Switch-off delay Switch-on delay Overload capacity

Dimensions (H x W x D) Attachment Protection housing/terminals Weight

AC 220 - 240 V, +10...-15%, < 3 VA, 50/ 60 Hz DC 24 V, ±20 %

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

1 current-sensor S 1 or potential-free contact see current-sensor S1

adjustable 1...60 s app. 0,5 s with current-sensor S1 unlimited

Design V4: 90x70x58 [mm], mounting height 55 mm on 25 mm DIN-rail or with screws M4 IP 30 / IP 20 app. 190 g

## Current-Relay STW1K

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

#### STW1K



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

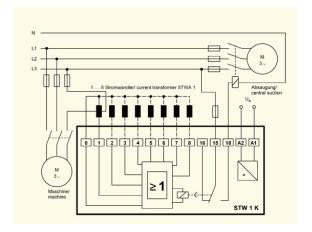
When there is an AC-current >1 A through one of up to 8 connected transformers STWA1, the integrated relay (1co) picks up. When all currents are 0, the relay releases with a delay of approx. 10s. This enables a run-after of the central suction.

- 8 inputs
- OR-evaluation
- relay picks up if at least 1 input is activated
- 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

Order-number:

AC 220 - 240 V

S225636



#### Technical Data

#### Rated supply voltage Us

Transformer input Overload cap.continous/max 10s

**Function** 

Switching point on Switching point off Switch-off delay Switch-on delay

Output relay

Type of contact Test conditions

Rated ambient temperature

range

Dimensions (h x w x d)

Attachment

Protection housing / terminals

Weight

AC 220 - 240 V +10-15%, < 3 VA, 50/ 60 Hz

1...8, type STWA, order-number S225201

100 A / 300 A **OR-evaluation** 

≤AC1A

> AC 0,3 A approx. 10 sec.

approx. 0,5 sec.

1 change-over contact (co)

type 2, see "general technical informations"

see "general technical informations"

-20°C...+55°C

Design K: 75 x 22.5 x 115 [ mm ]

on 35 mm DIN rail according to DIN EN 60715

or with screws M4 (option)

IP 30 / IP 20

approx. 140 g

## Current-Relay STW12V

### Current-Detection, OR-Evaluation, 1-12 Inputs, adjustable

#### STW12V



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 STWA1, current-sensors S1 (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. 0.3 A, 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

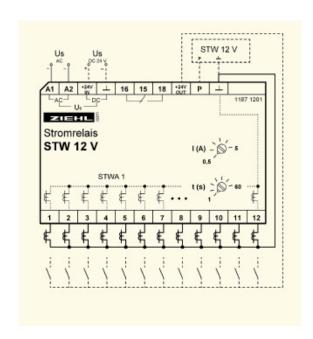
- Adjustable switch off delay (1 60 s)
- Plug-in terminals
- Supply-voltage AC 220-240 V and DC 24 V
- Housing for mounting in switchgear cabinets or fuseboxes, 70 mm wide, mounting height 55 mm

#### 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 is controlled.

Order-number

AC 220 - 240 V / DC 24 V **\$225509** 



#### Technical Data

#### Supply voltageUs

Relay output
Type of contact
Test conditions
Rated amb. temperature range
Function
Measuring inputs

Overload cap./continous max 10s Switching point Tolerance Switch-off delay Switch-on delay

Dimensions (H x W x D) Attachment

Protection housing/terminals Weight

AC 220 - 240 V, +10...-15%, < 3 VA, 50/ 60 Hz DC 24 V,  $\pm$ 20 %

1 change-over contact (co)

type 2 see "general technical informations" siehe "general technical informations"

-20°C...+55°C OR-evaluation

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

100 A / 300 A

with STWA 1 adjustable, AC 0,5 - 5 A + 20%

adjustable 1- 60 s app. 0,5 s

design V4: 90x70x58 [mm], mounting height 55 mm on 35 mm DIN-rail according to EN 60 715 or with screws M4

with screws M4 IP 30 / IP 20 app. 200 g

## Current relay STW81V

8-channel, single evaluation + OR-circuit

#### STW81V



The current relay STW81V is an 8-channel AC current relay, designed for controlling of suction plants e.g. in the timber and plastics processing industry.

When there is an AC-current >1A through one of up to 8 connected transformers type STWA1, the appropriate relay K1...K8 (1 x co) picks up and opens the slide valve of the machine. At the same time the relay K9 starts the central suction.

Relays K1...K8 switch off 10s after the current flow through the appropriate transformer is 0. K9 switches off 0...60s (adjustable) after the current in all transformers is 0.

#### Application:

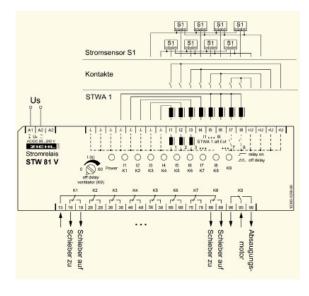
The current relay STW81V is particularly suitable for the central control of slide valves in suction plants, which are to be operated dependent on operating condition of individual machines. It can control a central suction at the same time.

- single evaluation of 8 inputs with STWA1
- single evaluation of 8 inputs with current-sensor S1
- · inputs for 8 potential-free contacts
- OR-evaluation of all circuits (K9)
- · 9 output relays
- LED display for relays / inputs
- switch-off delay of K9 adjustable 0 60 seconds
- · switch-off delay single relays 10 s
- last relay: K9 + 20 s
- Power consumption < 1W (in standard-operation with STWA1)</li>

#### Order-numbers:

AC/DC 90 - 240 V

S225516



#### **Technical Data**

#### Rated supply voltage Us

Output relay
Type of contact
Test conditions
Rated ambient temperature
range

Transformer input
Function
Overload cap. continuous max.
10 s
Switching point on
Switching point off

Switching point on Switching point off Switch-on delay Switch-off delay

Dimensions (h x w x d) Attachment

Protection housing / terminals Weight

AC/DC 90 - 240 V, 0/50/60 Hz, < 4 W, < 8 VA DC: 76,5 ... 297 V, AC: 76,5 ... 264 V

8 + 1 change-over contacts (co) type 2 see "general technical informations" see "general technical informations" -20°C...+55°C

1...8 type STWA1, or STWA1H single/OR-circuit 100 A / 300 A

≤ AC 1 A > AC 0,3 A approx. 0,5s 10 s / 0 - 60 s

design V 8 / 90 x 140 x 58 [mm] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4 (option) IP 30 / IP 20 approx. 330 g

### Control for Suction Plants STW84V

with integrated control for dedusting of filters and volume flow

#### General



The current relay STW84V monitors up to 8 alternating current sets on current flow yes/no. The inputs can analyse signals of current transformers type STWA1 or of potential-free contacts.

For controlling of great dedusting plants several relays can be combined.

Applications: Controlling of dedusting plants in the timber and plastic processing industry according to the technical rules for dangerous materials TRGS 553.

The central suction is switched on, as soon as any machine is put into operation. According slide valves in the suction ducts of the individual machines are opened. In addition, cleaning of a filter (vibration) and a cellular wheel/discharge can be controlled, an external cleaning (with compressed air) can be startet or exceeding of max. volume flow can be reported.

The analog output 0...10 V can control a frequency-converter at the motor of the ventilator and thus optimize performance and save energy.

## Function and Characteristics

#### **Description:**

- Monitoring of 8 machines (STWA1 or contact)
- input for "open all slide valves"
- 8 relays (with change-over contacts) for slide valves
- 1 relay for control ventilator
- 1 relay for filter-cleaning
- 1 relay for control of cellular wheel/discharge or report exceeding max.. volume flow
- analog output for control of frequency-converter and combination of more STW
- terminals plugable

#### Functions/adjustments:

- run-after last slide valve 0...
   99 s
- turn-off delay ventilator 0...99 s
- minimum volume flow 1... 100%, (if necessary automatic opening of additional slide valves, beginning with K8)
- maximum volume flow 5...
   100%

### Individually adjustable per channel:

- turn-on delay I1... I8: 0... 20 s
- turn-off delay relay K1...K8:
   0... 99 s
- operating value I1...I8: app. 0.5... 5A
- volume flow of slide valves 1...100%

#### Combination of more STW: Master-relay considers volumeflow of other relays for:

- control of ventilator (relay K9 and analog output 0-10 V)
- opening of additional slide valves
- · adding time for filter-cleaning
- report of exceeding max. volume flow

#### Control of cleaning of filters:

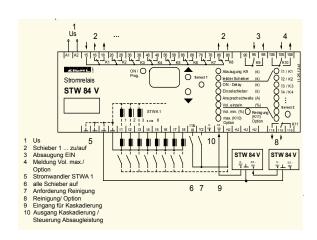
The run time of the ventilator is added with consideration of the volume flow. The dedusting of the filters is started after achieving the programmed run time (only with switched off ventilation).

- time for addition: 0... 99 min.
- added time stored permanently even at loss of power (power failure or upon completion of work)
- delay before start of cleaning: 0... 990 s
- number of dedusting impulses: 0... 20
- impulse on-time: 1... 30 s
  - impulse off-time: 1... 990 s
- time of continous dedusting: 0... 990 s
- alternatively impulse shaking 0.1... 9.9 s (square)
- alternatively dedusting request (with running suction)
- · input for external dedusting command
- controlling a cellular wheel / discharge during dedusting

#### Displays and operation:

- 7-segment-display for settings during programming, in operation display of the volume flow
- 8 LEDs for input/output selection and display of the active inputs/outputs
- 9 LEDS for function selection
- · easy programming

Order-number: \$225103



#### Technical Data STW84V

Power Supply rated supply voltage Us other voltages on request voltage tolerance +10...-15% power consumption < 12 VA

frequency 50/60 Hz

Relay output contact elements 11 change-over contacts (co)

type of contact type 3

(see with " general information " max. 5 A/ 1250 VA

under relays)

Test conditions EN 50178/60947 rated insulation voltage Ui AC 415 V

contamination level 2
rated impulse voltageelement 4000 V
interference transmission EN 61000-6-4
interference resistance EN 61000-6-2

rated ambient temperature range -20°C...+45°C

Voltage output DC 17...21 V, max. 120 mA (max. 8 x Current Sensor S1)

Inputs 1...8 STWA 1, floating contact or AC/DC 24 V, STWA 1 H or

 $\begin{array}{c} \text{current-sensor S1} \\ \text{Overload cap. continuous/max.10s} \\ \text{current overload capacity} \\ \end{array} \begin{array}{c} \text{current-sensor S1} \\ \text{100 A/300 A} \\ \text{ca.15 k}\Omega \\ \end{array}$ 

operating value adjustable 0.5... 5 A tolerance  $\pm 20\%$ 

Command inputs Y2, external dedusting command + DC 24 V

I1&l8, command all valves open + DC 24 V internal resistance of inputs approx.15 kΩ

Housing design V 8 (installation)

dimensions (h x w x d) mm 90 x 140 x 58 mm, mounting height 55 mm

wire connections 1 x 2.5 mm<sup>2</sup> for each pole

installation position any

attachment on 35 mm DIN rail or M4 screws

housing protection IP 30 terminal protection IP 20

vibration resistance 1 mm 25 cycles per second /

10 g 25 - 100 cycles per second of

shock resistance 10 g 20 ms 20 g 4 ms

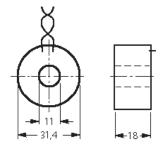
weight approx. 460g

# Stromwandler Typ STWA1

für AC Stromerkennungsrelais

Current Transformer STWA1 for monitoring current yes/no





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 continously, 300 A for max. 10s.

In case of current of more than approx. 5 A, an LED can be triggered directly via the STWA1 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.

Order-number \$225201

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



Current-transformers STWA1H can be fixed on a 35 mm DIN-rail or with 2 screws.

The electrical connection is made via pluggable terminals.

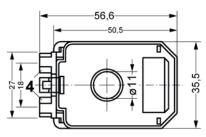
The cables are led vertical through the transformer (right angle to 35 mm-rail). The available diameter is 11 mm.

A built-in LED lights up at currents > app. 2 A. Even short current pulses are visible.

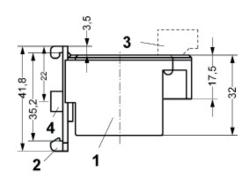
ZIEHL current monitor type STW or an external LED can be connected to the terminals. The built-in resistor protects the LED from overload.

The STWA 1 H can also be used to visualize currentflow in stand-alone mode, without connecting it to a current monitor.

Order-number \$225506



- 1 Unterteil
- 2 Tragschienenhalter (abnehmbar)
- 3 Anschlussklemme (steckbar)
- 4 Wandbefestigung (M4)



### **AC-Electronic Current Transformer STWA1S**

with transistor-output

STWA1S
Electronic current transformer
with fixed switching-point



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 continously, 300 A / 10 s

Order-number

S225195

Switching point at Tu = 25°C Switching-back Point Repeat accuracy Temperature dependence Overload cap. continous / 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 (Ø x H) Diameter for conductor Weight AC 2 A ±25% AC 1,5 A ±25% ± 5% < 0,06%/K 100 A / 300 A

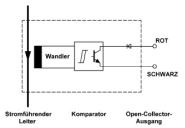
DC 40 V / 40 mA max. 3 V max. 0,6 mA app. 50 / 200 ms

50 Hz/ 30...70 Hz

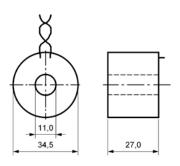
≤ 1%/Hz

0...55°C

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



**Dimension illustrations** 



## **AC-Electronic Current Transformer STWA1SH**

2 A, with transistor-output

STWA1SH Electronic Current Transformer with fixed switching point



The STWA1SH has an integrated electronic with transistor-output. The switching point is 2A. 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 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
- 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 continously, 300 A / 10 s

Order-number

S225550

Switching point at Tu = 25°C Switching-back Point Repeat accuracy Temperature dependence Overload cap. continous / 10s

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

Nominal frequency operating range error

Rated ambient temperature range

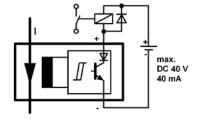
Housing Dimensions (h x w x d) Diameter for conductor Weight AC 2 A ±25% AC 1,5 A ±25% ± 5% < 0,5%/K 100 A / 300 A

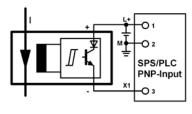
DC 40 V / 40 mA max. 1 V app. 50 / 200 ms

50 Hz 30...70 Hz ≤ 1%/Hz

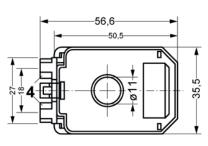
0...50 °C

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

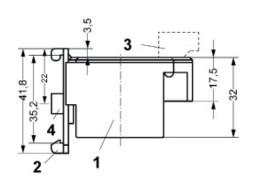




#### **Dimension illustrations**



- I 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



The STWA1SEH has an integrated electronic with transistoroutput.

The switching point is adjustable 2-10 A. 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 0.5-2,5 A 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 continously, 300 A / 10 s

Order-number

S225550

Switching point at Tu = 25°C Hyseteresis Repeat accuracy Temperature dependence Overload cap. continous / 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

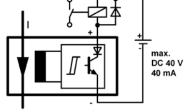
AC 2...10 A ±25 % 5...30 % ± 2 % < 0,06%/K 100 A / 300 A

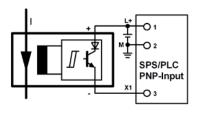
DC 40 V / 40 mA max. 3 V max. 0,6 mA 0,2...2s / ≤0,3 s

50 Hz 30...70 Hz ≤ 3%/Hz

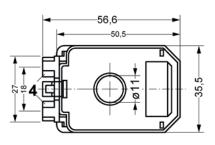
-20...+50°C

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

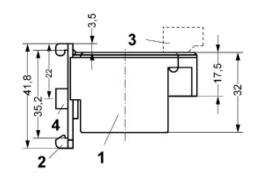




#### Dimension illustrations



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



### Current Sensor for AC- and DC-Currents

### Put-on sensor with transistor-output

Current Sensor S1 for AC- und DC-Ströme





The current sensor S1 records the current in a cable with a hall-sensor. At currents of app. 5 A (adjustable version 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 (e.g. ZIEHL-power-supply NG4V).

The current sensor can be connected to ZIEHL current-relaysfor 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).

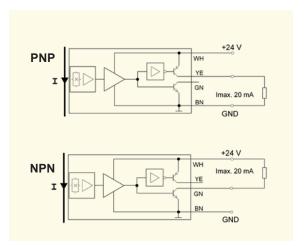
In general the current sensor S1 is used where the current flow is to be detected, with the exact value of the current either known from the power consumption of the connected consumer or does not matter for the evaluation.

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 app. 5A (option: adjustable 5-30A)
- 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
- · robust, sealed execution
- · overload capacity: unlimited
- test-voltage 2,5 kV

#### Order-number:

Current Sensor S1, 5 A fixed S225693
Current Sensor S1, 5-30 A adjustable S225694



#### Technical Data

Supply voltage Us
Switching point at Tu = 25°C
Hysteresis
Tolerance
Repeat accuracy
Temperature-dependence
Max. measuring current
Frequency of measured current

Output 1 Output 2 On- / off-delay

Rated ambient temperature range
Dimensions (I x w x h)
Cable for connection
Attachmant
Weight

DC 24 V ±20%, 15 mA <AC/DC 5 A (option: adjustable 5-30 A) app. 15% ± 10% ± 2% < 0,06%/K unlimited 0 / 10 ... 400 Hz

DC 24 V, + switching, max. 10 mA DC 24 V, - switching, max. 10 mA app. 300 ms

0...55°C

75 x 16,5 x 10 mm app. 2 m, 4 x 0,34 mm2 e.g. with cable fastener (not included) app. 150 g (cable included)

# Vibrator Control Type RS1K

#### RS1K



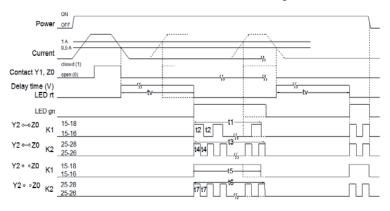
The vibrator control RS1K is a compact multiple time relay for triggering of vibrators in suction plants. In order to be able to operate suction plants at an optimum, the filters which get clogged by sawdust, chips or dust, have to be dedusted by vibration from

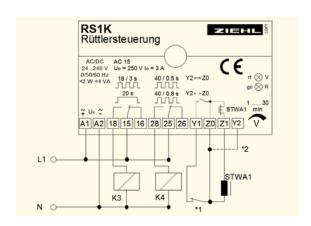
time to time. The vibration action is by no means to be carried out the suction running or while slowing down the ventilator. If suctioning is started during vibration, the process is immediately to be interrupted. Prior to starting the vibration action, an adjustable deceleration time is running to delay the ventilator before start of vibration. This means that short stoppages can be bypassed without being obliged to carry out a vibration every time.

- Start of deceleration time by break contact at Y1/Z0 (e.g. from contactor suction motor)
- Starting of deceleration time through current transformer STWA1atZ0/Z1 (e.g. L1 from suction motor)
- adjustable deceleration time 1...30 min.
- Relay K1: continous vibration 20 s or impulsevibration 18 s with 3 s clock
- Relay K2: impulse-vibration 40 s with clock 0,5 s or 0,8 s (for magnet valves)
- · LED (red) signals deceleration time
- · LED (green) signals vibration action
- automatic interruption of the vibration action when starting the suction process.

Order-number: Z224302

#### Function diagram:





#### Technical Data

Rated Voltage Supply Us

Input Y1/Z0, Y2/Z0 Input Z1/Z0 Switching current Overload Capacity of transformer

Relay-Output Type of Contact

Test Conditions adm. ambient temperature

Dimensions H x B x T Fitting position

Protection Housing/Terminals

AC/DC 24...240 V, AC 19-264 V, DC 20-297 V < 2VA

Contact, Breaker (nc), 18 V, 3 mA Current Transformer STWA1 ON ≥ AC 1 A, OFF ≤ AC 0,4 A max. 100 A continous, 300 A / 10 s

2 x 1 co

Type 2 (see general technical informations)

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

Design K: 75 x 22,5 x 115 [mm]

on 35 mm standard rail according to DIN EN 60 715 or screws M4 (not included in delivery scope)

IP 30/IP 20

### **Vibrator Control RSP1**

### with Time addition

#### RSP1



The vibration control RSP1 is a compact multiple timing relay for capturing operation times of suction plants and for triggering vibrators.

It provides optimal control of the vibration device by collecting of operating times of up to 3 suctions

with variable programs for vibration procedures (spintime, interval- and permanent vibration) and programmable vibration periods. LED displays provide information about the operational state at any time.

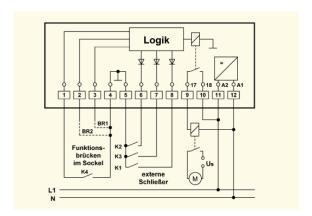
All times are permanently saved in an EEPROM. Thus the accumulated operation period of the suction operation saved when switching off the supply voltage, e.g. during the night or weekend.

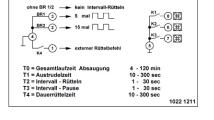
- addition of the running time of 1, 2 or 3 suctions.
- introduction of vibration procedure after having reached the set total time (adjustable 4 to 120 min.) and after completion of the last suction operation.
- external vibration command by closing a contact, e.g. by filter monitoring work
- spintime adjustable 10 to 300 sec.
- interval vibrations 5, 15 or 20 times (disconnectable)
- interval vibration time (adjustable 1 30 sec.)
- interval break time (adjustable 1 30 sec.)
- continuous vibration (adjustable 10 300 sec.)
- no vibration during suction operation.
- if vibration procedure is interrupted (e.g. by switching on suction), the same will be recommenced at the next possible opportunity.

#### Features:

- inputs for up to 3 suctions.
- · permanent saving of all times in the EEPROM.
- · LED-display
- · 2 pushbuttons for programming.
- · coding switch for adjustment of all times
- RESET-button, resets operation period to zero or interrupts a running vibration procedure.
- VIBRATION-button, starts vibration procedure (only if suction is not active).

Order-number: Z224305





#### Technical Data

Supply voltage Us

Relay output Contact type Test Conditions max. ambient temperature

Inputs
Contact 6, 7, 8 against 5
Contact 1 against 4

Casing dimensions (W x H x D) Protection housing/terminals Mounting

Weight

AC 220 - 240 V, ± 10%, 50/ 60 Hz, < 3 VA

1 NO

**type 2** see "general technical informations" see "general technical informations" -20°C...+55°C

approx. DC 24 V/3 mA approx. DC 5 V/5 mA

Design S 12:  $41.5 \times 82 \times 121$  IP 30/ IP 20 on 35 mm standard rail according to EN 60 715 or with M4 screws. approx. 300 g

# Frequency- and Speed-Relay FRMU1000

with integrated Measuring-Transducer

#### FRMU1000



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

2 limits with 1 relay each can be programmed for under- or overspeed, 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, npnor 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). Voltage 80-440 V.

#### 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.

#### Function

#### Frequency:

- Measuring-input voltage AC 80-440 V
- Monitoring of frequency of own supply-voltage
- Monitoring range 10-500 Hz
- Resolution of display 0,01
   Hz

#### Speed:

- Monitoring range 5...99999 min<sup>-1</sup>
- · 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)

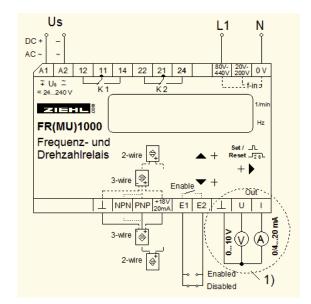
#### General:

- Setting in Hz or min<sup>-1</sup>
- 5-digit display
- Analog output DC 0/4-20 mA, or DC 0-10 V, freely scaleable (with isolation to frequencyinput 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

#### Order-numbers:

FRMU1000 with analog output FR1000 without analog output U226134 U226135



### Technical Data FRMU1000

Rated supply voltage Us

Frequency

AC/DC 24-240 V, <3W, <5VA (AC 20-264 V, DC 20,4-297 V) 0, 40...500 Hz, > AC 80 V: 10...500 Hz

10.00-500.00 Hz, AC 80-440 V

Measuring-input Frequency

Measuring-input Speed

PNP or NPN, 3-wire or 2-wire Analog output

0/4-20 mA, max. 500 Ω, 0-10 V, max. 10 mA

max. error < 0,15 % from FullScale + 0,015 %/K

Relay output

Test conditions

Rated ambient temperature

range

-20 °C ... +60 °C

5-99999 min -1

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

Weight Attachment 2 x 1 (change-over) contact see "general technical informations"

Type 3, see "general technical informations"

design V4: 90 x 70 x 58 mm, mounting height 55 mm

IP 30/IP 20 (terminals pluggable) app. 200 g

on 35 mm DIN rail or with screws M 4

#### Inductive Proximity Sensor IG2



Proximity-Sensor for Speed Relay FRMU1000.

- 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 polartity
- 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 Us Max. switching frequency Max. switching distance Factor of reduction Rated amb. temp. range

Housing Material Weight **Dimensions** Torque Connection Shock resistance Vibration resistance protection

Order-number IG2 Order-number cable DC 10-30 V

800 Hz = 48000 Imp/min4 mm (recomm. ≤3 mm) Ms: 0,45, Al: 0,4, Cu: 0,3 -25 ... +70 degC

Threaded pipe M12x1 nickel-plated brass

app. 26 g

M 12x1 / length 50 mm

max. 10 Nm threaded plug M 12 ≤30 g, ≤11 ms ≤55 Hz, ≤1 mm

**IP 67** 

U226003 U226004

# Level Monitors Type NS

#### General

The NS level monitor is an electronical device for monitoring liquid levels. Two different types allow the application as limit monitor or minimal-maximal control.

The monitoring of liquid levels is effected via electrodes.

#### Application:

The NS units protect aggregates and plants against dry running, overflow, leakage damages and unnecessary lost of liquids. Characteristical applications are swimming pools, groundwater endangered buildings, oilfilled under-water-pumps as well as whereever a certain level should be maintained resp. dosed.

#### Function

The level capture is effected through resistance measurement via an AC voltage measuring path, operating completely DC voltage-free. Hereby, the resistance between two (resp. three) electrodes is measured.

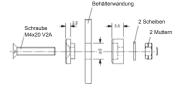
When the level increases, the electrodes are bridged and an integrated relay switches.

The level monitor operates as conductivity measuring device and guarantees a perfect level capture at a resistance of up to 250 k $\Omega$ , measured between the electrodes. The ZIEHL level monitor can also be delivered with time delay in order to avoid a too high relay switching frequency in case of a moving water surface.

As electrodes any conductors, that jut into the tank down to the required level, can be used. At metal tanks the wall of the tank can be used as basic electrode.

#### Niveauelectrodes

#### Electrode NE1



Insulated screw-in electrodes for mounting in walls of tanks. The electrodes are made of stainless steel (V2A), the material of the insulation is Teflon.

Order-number

V223430

#### Electrode NE2

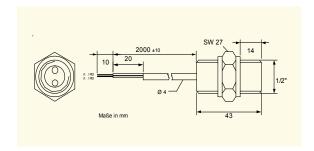


The electrode NE2 with its ½" thread can directly be screwed into the wall of a tank. The two electrodes (stainless steel V4A) are flush cast in a plastic housing (Polypropylen, PP) with cast resin. The electrode can be used in a temperature-range -5...105 °C and is pressure-resistant up to 6 bar. The ingrained cable with 2 strands, each 0,25 mm2, is 2000 mm long, Ø 4 mm.

For use with a level-monitor for one level only, one NE2 is sufficient. For use with a level-monitor for more levels, normally one NE2 per level is required..

Order-number

V223429



# Level Monitors Type NS1

### 1 Niveau, Wall-mount

NS<sub>1</sub>

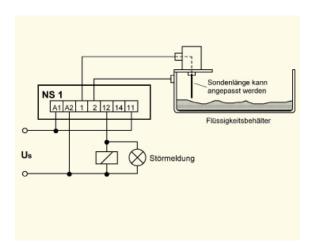


This level monitor for two electrodes preferrably serves to the limit control, e.g. as overflow or idle running protection of a conducting liquid. The device is integrated in a shock-resistant plastic housing of the type 94 and can also be used for outside-resp. waterproof mounting according to its protec-

tion system IP 54.

The function of the relay is reversible (standard: releases, when E2 is reached) by changing of jumpers in the device. The switching point can be changed between 25...250 kOhm and the switching delay between 0,5...10 s.

Order-number: V223202



Technical Data

Supply Voltage Us AC 230 V +10%...-15% Adm. Tolerance Us **Power Consumption** ≤ 3 VA Frequency 50...60 Hz

Relavs

Contact type Type 2 (see "General technical Informations")

Pick up delay approx.  $0.5 \, s$ 

Release delay approx. 0,5...10s adjustable Other times upon request

Text conditions see "General technical Informations"

max. ambient temperature -20°C...+55°C

**Quantity Electrodes** 2 Voltage at the Electrodes < AC 6 Veff

Line capacity bei 25 k $\Omega$ max. 100 nF = approx. 500 m

> bei 150 k $\Omega$ max. 20 nF = approx. 100 m bei 250 k $\Omega$ max. 10 nF = approx. 50 m

Dimensions (H x B x T) Design I 94: 94 x 94 x 57 mm

Fitting position with screws

Protection housing/ terminals IP 54/ IP 20 Weight

approx. 310 g

## Level Monitor Type NS20

### 1 Level and MIN / MAX-Control

**NS20** 



Lever-Relays NS20 for conductive liquids can be used as monitors for 1 Level and for controlling a level between 2 electrodes.

- 3 elektrodes for MIN/MAXcontrol
- 2 elektrodes (E2 open) as level-monitor
- Sensitivity adjustable  $5 \text{ k}\Omega...250 \text{ k}\Omega$
- · LED for state of relay
- Function of relay reversible (picks up or releases at top electrode)
- Switching-delay adjustable 0,1 ... 10 s
- Universal supply-voltage AC/ DC 24-240 V

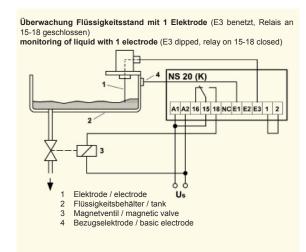
Applications as level-monitor: Protection from running dry or overflow, seal-monitoring of submersible pumps for leaks, detection of leaks.

Applications Min/Max:

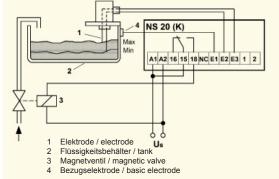
Controlling a level between minimum (elektrode E2) and maximum (E3). As long as E3 is dry, a magnetic valve is opened (or a pump is running) and liquid is influenting. As soon as maximum (E3) is reached, the NS 20 closes the valve. When the level falls below E2, the cycle starts new.

In reverse also discharging of a container can be controlled.

Order-number V223440



Zulaufsteuerung mit 2 Elektroden (E3 benetzt, Relais aus 15-16 geschlossen) filling tank with 2 electrodes (E3 dipped, relay off 15-16 closed)



Technical Data

Supply voltage Us

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

Relay Contact Switching delay 1 change-over-contact (co) **type 2** (see "general technical informations") adjustable 0,1...10 s

Test conditions
Rated ambient temperature range

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

Number of electrodes Voltage at electrodes 2 or 3 (with 2 electrodes: E2 not connected) < AC 6 V<sub>eff</sub>

Line capacity at 5 k $\Omega$  at 150 k $\Omega$ 

max. 500 nF = app. 2500 m max. 20 nF = app. 100 m max. 10 nF = app. 50 m

Dimensions (h x w x d) mm Attachment

design V2:  $90 \times 35 \times 58$  mm, mounting height 55 mm on 35 mm DIN-rail or with screws M4

Protection housing/terminals
Weight

IP 30/ IP 20 app. 100 g

at 250  $k\Omega$ 

# Level Monitor Type NS20K

### 1 Level and MIN / MAX-Control

NS<sub>20</sub>K



Level-Relays NS20 can be used for monitoring 1 level and as MIN/ MAX-Control.

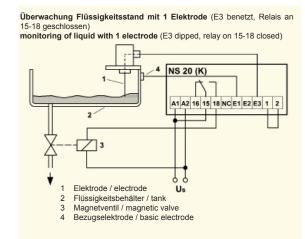
- · 3 elektrodes for MIN/MAX-
- 2 elektrodes (E2 open) as level-monitor
- · Sensitivity adjustable 5 kΩ...250 kΩ
- · LED for state of relay Function of relay reversible
- (picks up or releases at top electrode) Switching-delay adjustable
- 0,1 ... 10 s

Application as level-monitor: Protection from running dry or overflow, seal-monitoring of submersible pumps for leaks, detection of leaks.

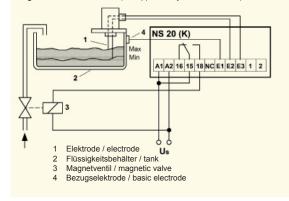
Application Min/Max: Controlling a level between minimum (elektrode E2) and maximum (E3). As long as E3 is dry, a magnetic valve is opened (or a pump is running) and liquid is influenting. As soon as maximum (E3) is reached, the NS 20 closes the valve. When the level falls below E2, the cycle starts new.

In reverse also discharging of a container can be controlled.

Order-number: V223445



Zulaufsteuerung mit 2 Elektroden (E3 benetzt, Relais aus 15-16 geschlossen) filling tank with 2 electrodes (E3 dipped, relay off 15-16 closed)



Technical Data

Supply voltage Us

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

Relay Contact Switching delay 1 change-over-contact (co) type 2 (see "general technical informations") adjustable 0,1...10 s

Test conditions Rated ambient temperature range

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

Number of electrodes

2 or 3 (with 2 electrodes: E2 not connected) < AC 6 Veff

Voltage at electrodes

max. 500 nF = app. 2500 m max. 20 nF = app. 100 m

Line capacity at 5 kΩ at 150 kΩ at 250  $k\Omega$ 

max. 10 nF = app. 50 m

Dimensions (h x w x d) mm Attachment

Design K: 75 x 22,5 x 115 mm on 35 mm DIN-rail or screws M4

Protection housing/terminals Weight

IP 30/ IP 20 approx. 100 g

## Level Monitors Type NS43

### MIN/MAX-Regulation, protection from overflow and unlubricated operation

**NS43** 



The level monitor NS43 regulates the level of liquid in a container between 2 electrodes. In the normal operation the level of the liquid is situated between the electrodes E2 and E3. The relay K2 tightens, if the level E3 is achieved and drops, if E2 is fallen below. Over the output contacts (1 change-over switch) a pump or a valve can be controlled depending upon case of application and so the level be

regulated. If the level continues to rise in an incident and if the electrode achieves E4, then a message takes place via relay K3 (drops). In the reverse case (level under E1) the relay K1 drops and protects e.g. a pump against running dry.

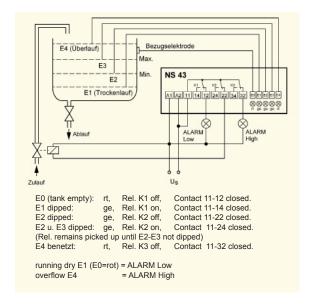
LEDS signal, which electrodes are moistened.

- Level monitoring of leading liquids
- MIN/MAX level regulation
- protection from overflow
- protection from running dry
- · sensitivity adjustable 5... 250 k?
- LED for level display / alarm

#### Application:

In the galvanotechnics and everywhere, where the level of a leading liquid must be held on a certain level and at the same time a monitoring on overflow and/or no-load operation is necessary.

Order-number: V223267



Technical Data

Supply voltage U<sub>s</sub> Admissible tolerance U<sub>s</sub> Power consumption Frequency

nsumption  $\leq$  5 VA, < 3 W  $_{\rm 0,45}$  - 62 Hz

Relay 3 CO
Contact Type 2 see "general technical information"

Pick up delay approx. 1 s Release delay approx. 1 s

Test conditions

Rated ambient temperature

range

see "general technical information"

-20°C...+60°C

AC/DC 24-240 V

AC 20-264 V, DC 20-297 V

Number of electrodes
Voltage at electrodes

oltage at electrodes < AC 3 Veff (≤ 0,1 mA)

Line capacity at  $5 \text{ k}\Omega$  max. 500 nF = approx. 2500 m at  $25 \text{ k}\Omega$  max. 100 nF = approx. 500 m

at 250 k $\Omega$  max. 10 nF = approx. 50 m

Dimensions (h x w x d) mm

Attachment

Protection housing/terminals Weight Design K: 75 x 22,5 x 115 mm Snap mounting on 35 mm standard rail IP 30/ IP 20 approx. 130 g

150

## Level Monitor Type NS43V

### Switchgear-mount Housing

#### NS43V



The NS level monitor is an electronic device for monitoring levels of conductive liquids.

The monitoring of the levels is effected vis electrodes, which are dipped or set free according to liquid level.

All conductive liquids can be monitored, preferrably, however, water, also of different degree of hardness.

To adapt the relay to the conductivity of the liquid and to the capacitance of (long) cables, the switching limit can be adjusted app.  $5\,\mathrm{k}\Omega\dots250\,\mathrm{k}\Omega$ . Thus it also is possible to tell between the liquid and foam over the liquid.

#### **Function**

The NS unit protects aggregates and plants against dry running, overflow, leakage damages and unnecessary loss of liquids.

It controls and monitors levels of liquids in waste-water, pools, fish farms and whereever a certain level should be maintained or dosed.

Depending on the application and the set program, it controls the level between 2 or 3 electrodes by means of opening or closing dose or drain of a container.

The top and the lowest electrode protect from overflow or running dry.

An electrolytic corrosion of the electrodes as well as detonating gas production is excluded due to a AC current measuring path.

The universal supply voltage AC/DC 24-240 V allows to connect the relay to any common mains. The isolation between electronics (= electrodes) and supply voltage avoids malfunctions caused by potential spreading, also at DC-supplys.

- · Monitoring of up to 4 levels
- 4 relays with change-over contacts (co)
- Sensitivity adjustable 5...250 kΩ
- Switching delay of relays adjustable 0...10 s Switching-delay of alarms (on/off) adjustable
- 0...10 s

Basic programs (selectable with DIP-switches) for

- various applications
  - Universal supply voltage AC/DC 24-240 V
- Terminals pluggable
- . Housing for DIN-rail or wall-mount,
- · mounting height 55 mm, 70 m m wide

Order-number:

V223313

#### Technical Data

#### Supply voltage Us

max. voltage/current

Electrode connection Nivea

Sensitivity

max. cable-length/capacity

Hysteresis Switching delay

Relay output

Test conditions

Rated ambient temperature

Dimensions h x b x d

Protection housing / terminals

Weight Attachment AC/DC 24-240V, <3W, <6VA AC 20-264 V, DC 20,4-297 V,

Niveauelektroden E1, E2, E3, E4, Bezug E0

<3Veff / <100 μA adjustable 5 k $\Omega$ ...250 k $\Omega$  ± 25%

 $5 \text{ k}\Omega/\text{ca.}$  500m/100 nF, 250 kΩ/ca. 50m/10nF

approx.  $15\% + 5 k\Omega$  adjustable 0,1...10 s

Type 2 see "general technical informations" 4 x 1 changeover-contact

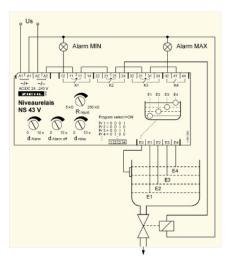
see "general technical informations" -20...+55°C

Design V6: 90 x 105 x 58 [mm], mounting height 55

IP 30 / IP 20 (terminals pluggable)

approx. 250 g

On 35 mm DIN-rail or screws M4

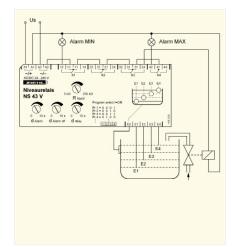


#### Program 1

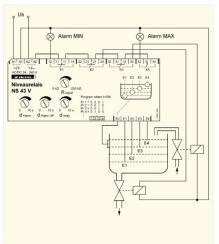
Control of dose or drain with 2 elektrodes with 2 more electrodes to protect from overflow and running dry.

The level swings between the 2 middle electrodes.

Standard-program for levelling a liquid in a container.



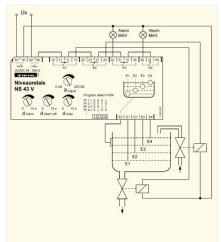
Example for dosecontrol



#### Program 2

Control of dose and drain between 2 electrodes with 2 more electrodes to protect from overflow and running dry.

Depending on if speed of dose or drain is higher, the level swings around the upper or the lower of the 2 middle electrodes.

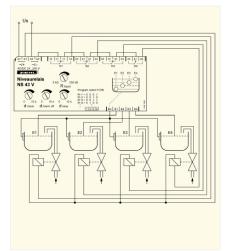


#### Program 3

Control of dose and drain between 3 electrodes with 2 more electrodes to protect from overflow.

The level swings between electrodes E1 and E3. Dose and drain are switched on at E2 and off at E3 respectively E1.

Application e.g. in fishfarming.

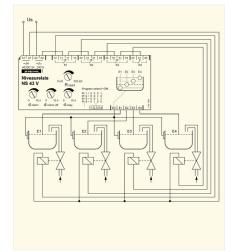


#### Program 4

Monitoring of 4 single levels with 4 electrodes.

Relay OFF when relevant electrode is dipped.

Program for controlling or monitoring of levels in 4 containers or for monitoring of up to 4 levels in 1 container.



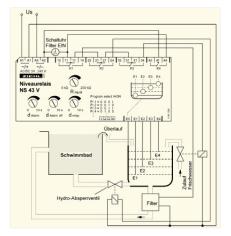
#### Program 5

Monitoring of 4 single levels with 4 electrodes.

Relay ON when relevant electrode is dipped.

Program for controlling or monitoring of levels in 4 containers or for monitoring of up to 4 levels in 1 container.

E.G. monitoring of break of a pipe at 4 different points.



### Program 6

Pool control for overflow bassin with switching of hydro-lock valve, dosing of fresh water, emergency filter-on and protection from running dry.

Order-number: AC/DC 24-240 V

V223313

# Twilight Switch

### Types DS6V and DS6

General

The universally applicable twilight switches DS6 in combination with light-sensor LF5 are reliable switching devices for street-, courtyard-, house-, stable- and showroom-window illumination. It monitors daylight or artificial light. The switching-limit is adjustable

between 10 and 100 LUX.

Switching illumination by means of a twilight switch is more economic than switching with a timer, because it is only switched on when it is really needed.

An adjustable switching-delay allows to suppress short changes in brightness, e.g. caused by the light of a car, shining on the sensor.

#### Designs

#### DS6V



The DS6V is especially universal. It can be mounted on DIN-rail in cabinets or wall-mounted.

Variable possible settings allow a good adaptation to a variety of applications.

An adjustable switch-on-hold time can switch on an illumination, e.g. in a courtyard, in a showroom -window or at a christmas-tree, at twilight for a fiwed time, e.g. 6 hours. The light is automatically switched off after this time, an aditional timer is not necessary.

The 2 output-relay switch inverted. This means, taht at relay K1 the light is connected to the normally closed-contact (nc, terminal 12) and is automatically switched on at a failure.

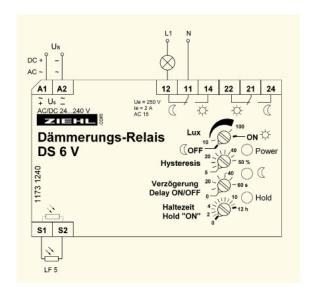
The universal supply voltage AC/DC 24-240 V allows to connect the relay to any common mains.

- Switching limit adjustable app. 10...100 LUX
- Hysteresis adjustable 5...50 %
- Switching-delay on/off adjustable 0...60 s
- Switching-on-hold adjustable 0-12 hours
- 2 Relays, 1 co-contact each, with inverted functions
- Position ON/OFF for continous ON/OFF
- Position automatic 10...100 LUX
- LEDs for Power ON, light on and hold
- Universal-power-supply AC/DC 24-240 V
- · Housing for rail- or wall-mount,
- · mounting height 55 mm, 70 m m wide
- Input for light-sensor LF 5

Order-number:

AC/DC 24-240 V O223036

Please order light-sensor LF 5 extra.



#### DS<sub>6</sub>



The twilight-switch DS6 is mounted in a plastic-housing, protection-class IP54. It is suited for mounting in moist atmosphere or outside.

The relay is connected in closedcurrent-mode. When the light at the sensor LF 5 falls below the limit, the relay releases and switches on the light. The illumniation is connected to the normally closed-contact (nc, terminal 16).

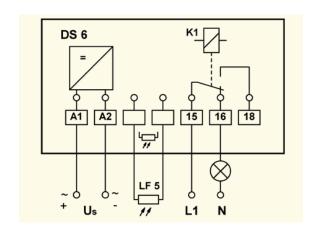
At failures, e.g. disconnection of the sensor or loss of supply-voltage, the light is switched on.

- Switching-limit adjustable app. 10...100 LUX
- Switching-delay adjustable 0,2...10 s
- Relay 1 CO contact
- Housing protected IP 54
- Input for light-sensor LF 5

### Options:

- Operating-current mode, Relay picks up at darkness
- other supply-voltages
- especially current-saving execution DC 12-24 V

for applications in solar plants



### Light-Sensor LF5



 The light-sensor LF5 can be connected to the twilight-switches DS6 and DS 6V. It is mounted in a hermetically sealed, weather-proof and uv-resistant plastic threadid pipe. The connection-cable is 1 m long.

If possible, the sensor should be mounted on the northside of a building to avoid direct exposure to the sun on summer days. Take care that street lamps, headlamps of cars or the light switched by the DS 6 itself has no disturbing influence on the function. Vertically positioning of the sensor directly upwards is therefore recommended.

To reduce the sensitivity and to shift switching-limits of the connected relays to higher values, filters can be mounted in front of the sensor (not included).

Order-number: O223105

#### Technical Data

Power Supply

Supply voltage Us Admissible tolerance Us Power consumption Frequency

Switching Limits

Switching-on limit Hysteresis Switching-delay Switch-on-hold

Contact elements

Relay-Output

Type of contact
Test conditions
Rated ambient temperature
Dimensions (h x w x d) mm
Protection housing / terminals
Weight

Light-Sensor LF 5

Resistance 10...100 Lux Sensor-housing Connection-cable Rated ambient temperature DS6 DS6V

app. 10...100 Lux app. 10-100 Lux adjustable adjustable 5-50% 0,2...10 s (ex works. 5 s) 0...60 s

adjustable 0-12 h

1 change-over (co) 2 co, 1 x inverted Type 2 see "general technical informations" see "general technical informations" -20°C...+55°C -20°C...+55°C

IP 54/IP 20 IP 30/IP20 app. 320 g app. 250 g

app. 9...1  $k\Omega$ , tolerance see characteristic

Design M 14 x 35 mm

1 m (extension up to min. 50 m possible)

-30...+80°C

Special executions and cable-lengths on request.

# Power-Supply-Unit NG4V

### forMeasuring-Transducers

#### NG4V

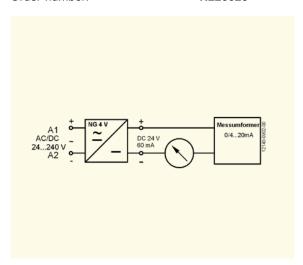


With its universal power-supply the NG4V can be connected to supply-voltages AC/DC 24-240 V. The output supplies DC 24 V at 60 mA.

Applications of the NG4V are the supply of loop-powered (4-20 mA) measuring-transducers and the supply of small consumers which need DC 24 V, especially when an unusual voltage is available or a wide range of input-voltage is required.

Order-number:

N223328



#### Technical Data

Rated supply-voltage Us

Tolerance Us Power consumption

DC 24 V bei 60 mA

≤ 5 VA

stabilized

Current capacity

Output-voltage

short-circuit-proof, max. current < 400 mA

Prüfbedingungen

Rated ambient temperature

range

see "General technical informations"

-20°C...+55°C

AC/DC 24-240 V

AC 19-264 V, DC 20-297 V

Dimensions (h x w x d)

Design V2: 90 x 35 x 58 mm, mounting height 55 mm

Gewicht

Attachment

app. 65 g on 35 mm DIN-rail or with screws M4.

Protection housing/terminals

IP 30 / IP 20

# Watchdog Time-Relay Type WD100V

**WD100V** 



In the control technology of today, the number of industrial PCs (IPC) partly with decentralized intelligence constantly increases. Individual processes are controlled independent of each other. In case of failure or malfunction of one component, it can therefore be necessary to switch off the hardware of a complete machine or plant.

Time-Relay WD100V is used to make sure that because of malfunctions in the program flow, caused by shortterm voltage interruptions for instance, no undefined status are created.

Application:

Monitoring of controls/IPC in packing machines. Monitoring of application software

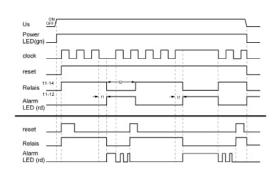
Order-number

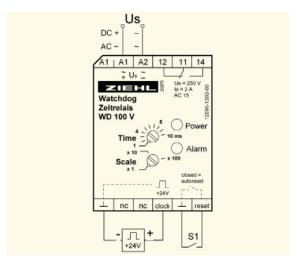
Z224317

The software of the IPC creates a square wave voltage (DC 24 V) with a cycle time of 1 to 1000

The output relay (1 potential free change-over contact) of the watchdog time relay WD100 is picked up if the supply voltage and the square wave voltage are fed. The relay releases the preset time (Time x Scale) after the last recognized slope when the next slope is missing. Positive slopes as well as negative slopes are monitored. When the square signals recovers and the resetinput is closed or supply-voltage is switched on, the relay picks up again (not earlier than 500 ms after switching off).

The output signal can be evaluated by a superordinate control or directly switched into the emergency-stop circuit of the machine.





Technical Data

Rated supply voltageUs

Contact elements Contact type

Measuring input clock

Pulse lenth Input Reset

Rated ambient temp. range

Dimensions h x w x d Weight Attachment

Protection housing / terminals

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

1 change-over contact (co)

Type 2 see "General technical Informations"

app. DC 24 V square wave (LOW ≤4 V, HIGH ≥12 V) Relay picked up when square wave voltage is fed Relay is released 1-1000 ms after last slope

0,5 ... 1000 ms

Button for Reset / bridge = autoreset

-20°C...+55°C

Design V2: 90 x 35 x 58 [mm]

approx. 100 g

on 35 mm DIN-rail or with screws M4.

IP 30/ IP 20

# Measuring Transducers

Overview	154
for Temperature	156
Pt 100, Thermocouples Type TMU Type TR Limit-Relay at the same time	
with galvanic isolation Type MU1000K	
for Current / Voltage (Isolating amplifier)	161
with galvanic isolation Type MU100/101	
with 2 inputs Type TR210	
for Potentiometers / Resistance Type MU100W	165
Limit-Relay for analog signals Type STW1000	166
Measuring-Point Change-over-Switches Type MUM	167

# Measuring Transducers

#### General

Measuring transducers supply a linear output signal which is proportional to the measured value. ZIEHL delivers measuringtransducers for input signals DC voltage and AC/DC current, Pt100, Pt1000, KTY83/84, thermocouples and resistance (potentiometer). Output signals are: DC 0/4-20 mA, 0-10 V or frequencies. Frequency signals can be easily evaluated by digital inputs of PLC's.

Various measuring- and switching-devices are also available with analog output. Thus also measuringtransducers for AC voltage, frequency and speed are available.

To display the measured values digital panelmeters type MINIPAN are recommended.

For the evaluation of limits we recommend our limitrelays STW1000V2 and TR210.

In combination with our measuring point change-over switch MUM8 and MUM16 up to 16 signals can be connected to one input (i.e. display or PLC).

#### Measuring Transducers for Temperature

Туре	Input	Output	Potential separation	Housing- Design	Remarks
TMU300	3 x Pt100	4-20 mA	no	420	Transducer for motor-protection Loop-supplied
TR210	2 x Pt100/ 1000 2/3-wire KTY83/84	0/4-20 mA 0-10 V	no	V4	Digital display, programmable 1 or 2 sensors, difference 2 alarms/relays
TMU100V	Pt100 3-wire	0/4-20 mA 0-10 V	no	V2	zero and full scale adjustable
MU1000K	Pt100 3-wire	0/4-20 mA und 0-10 V	yes	K	various zero and spans programmable

More devices with integrated measuring transducer (see according product-group in catalog):

TR122DA	Pt100 2-/3-wire	0/4-20 mA	no	S12	2 alarms/relays
TR400	4 x Pt100 2-/3-wire	2 x 0/4 mA or 0/2-10 V	no	V8	Max. values out of 3/4 sensors, programmable
TR600	6 x Pt100 2/ 3-wire	2 x 0/4-20 mA or 0/2-10 V	no	V8	Max. values out of 2/3/4/6 sensors, programmable
MINIPAN352P MINIPAN SE352 MINIPAN 352V	Pt100 2-/3-wire	4-20 mA	yes	350	potential-free output 4-20 mA, Loop-supplied

#### Measuring Transducers for Thermocouples

Туре	Input	Output	Potential- separation	Housing- Design	Remarks
TR210	B, E, J, K, L, N, R, S, T	0/4-20 mA 0-10 V	no	V4	Digital display, programmable, 1 or 2 Sensors, difference, 2 alarms/relays

More devices with integrated measuring transducer (see according product-group in catalog):

### Measuring-Transducers for AC Current (see Electronic Current-Transformers)

Туре	Input	Output	Potential- separation	Housing- Design	Remarks
STWA1FH	AC 0-20 A	0,5-20 Hz	yes	Н	Electronic current-transmitter, Transistor-output
STWA1AH	AC 0-15 A	0-20 mA	yes	Н	Electronic current-transmitter, No suply required
STWA2AH	AC 0-20 / 100 A	4-20 mA	yes	Н	Electronic current-transmitter, Loop-powered 4-20 mA

More devices with integrated measuring transducer (see according product-group in catalog):

MINIPAN 352P MINIPAN 352V MINIPAN SE352	AC/DC current and voltage	4-20 mA	yes	350	Passiv analog output mit Loop-powered

### Measuring-Transducers for DC current/voltage

Туре	Input	Output	Potential- separation	Housing- Design	Remarks
MU1000K	DC 0/4-20 mA und 0-10 V	0/4-20 mA 0-10 V	yes	К	Universal-supply-voltage all inputs and outputs in one device
MU1001K	DC 0/420 mA DC 0300 mV DC 0300 V	0/4-20 mA 0-10 V	yes	K	Universal-supply-voltage all inputs and outputs in one device Scaleable inputs
MU100U	DC 0/4-20 mA	0/4-20 mA und 0-10 V	yes 0-10 V	K	Universal-supply-voltage all inputs and outputs in one device
TR210	DC 0/4-20 mA 0-10 V	0/4-20 mA 0-10 V	no	V4	Digital display, programmable, 1 or 2 Sensors, difference, 2 alarms/relays

### Measuring Transducers for Potentiometers

Туре	Input	Output	Potential- separation	Housing- Design	Remarks	4
MU100W	Potentiometer 0-500 $\Omega$ / 10 $k\Omega$	0/4-20 mA and 0-10 V	no	V2	For remote potentiometers	

More devices with integrated measuring transducer (see according product-group in catalog):

TD 400D 4	0.050.0	0/4 00 4		0.40	
TR122DA	0 - 850 Ω	0/4 - 20 mA	no	S12	2 alarms/relays

### Measuring Transducers for Speed/Frequency

FRMU1000	AC-voltage 10-500 Hz	0/4-20 mA 0-10 V	yes	V4	Measuring voltage 80-440 V
FRMU1000	5-99999 IMP/min	0/4-20 mA 0-10 V	yes	V4	Input for proximity-sensor 2- or 3-wire, PNP oder NPN

# Measuring Transducers for Motor Protection

TMU300 for 3 x Pt100

#### TMU300



Transducers for motor protection TMU300 are transducers for 1-3 sensors Pt100 (RTD).

Anew, current-saving measuringsystem makes it possible to evaluate 3 sensors with a transducer that is supplied by a loop 4-20 mA. This design is protected.

The sensors Pt100 are connected in 2-wire-technique. The output signal is a current 4-20 mA. The value of the output current corresponds with the temperature of the hottest sensor.

#### Application:

Recording of temperatures at e.g. motors, generators, transformers or compressors and forward them to relais or controls for evaluation.

In difference to PTC with sensors Pt100 a adjustable switching temperature can be realized. The temperature protection can be adapted to the requirements at any time.

Optimal operation and longer life by intelligent management possible. E.g. no start at high motor temperatures.

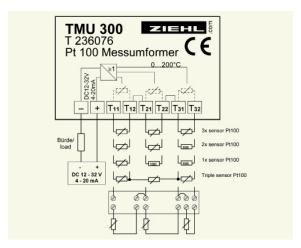
The cast-resign sealed electronics can be used at temperatures up to 85 °C and thus be placed near the sensors, e.g. in the terminal box of a motor. This reduces influence of EMC and line resistance. The signal 4-20 mA can be transmitted over long distances

#### Characteristics:

- connection of 1-3 sensors Pt 100 in 2-wire-technique
- measuring range 0...200 °C
- · automatic selection of warmest sensor
- I < 3,5 mA at short circuit in any sensor
- I > 25 mA at interruption in any sensor
- analog output 4-20 mA
- rated ambient temperature up to 85 °C
- no supply voltage required (supplied by 4-20 mAloop)
- · with sealed-in electronics

#### Order-number:

TMU300 Box 420 **T236076** 



#### Technical Data

Input

Output Current output Voltage loop Error

Temperature coefficient

Reference conditions adm. operating temperature

Dimensions (W x H x D)

Attachment Protection housing / terminals Weight 1 - 3 x Pt 100 DIN 43 760/IEC 751 without compensation of line resistance

DC 4...20 mA DC 12...32 V class 2,5 0,025 %/°K

IEC 770, Tu = 23 °C  $\pm$  5 °C, Us = DC 24 V  $\pm$  1 V -20...+85 °C

#### **TMU300**

Design 420 with terminals 60 x 55 x 32 mm Screw mounting 2 x M4 IP 40 / IP 20 approx. 70 g

# Limit Value Switch Type TR210

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

#### TR210



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.

#### Function

- Measuring and monitoring range -170...+1820 °C
- resolution 0,1°C (to 999.9 °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 maxvalues of inputs
- Code-lock against manipulation of settings
- · Terminals pluggable

#### 2 Measuring-Inputs:

- Resistance-sensors Pt 100 (RTD), Pt 1000, KTY 83/84 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)

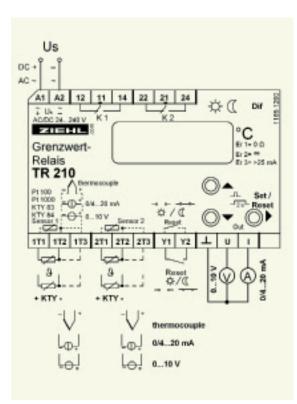
#### Displays:

 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 s
  - autoreset or electronic reclosing lock
  - elay-time for switching and switching back 0...9999 s
  - operating- or closed current-mode
  - cyclic check of function
- · Monitoring of difference in temperature
- · Preset basic programs

Order-number: T224071



#### **Basic Programs**

#### Program 1:

### 1 Temperature-sensor, 2 Limits

Application: Monitoring of a temperature for 2 limits, e.g. over-temperature with warning and switchjing 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-Sensores 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 monitoring 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:

#### 2 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 1measuring-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 ca be forwarded to e.g. a remote display or a superior control.

#### Technical Data

Rated supply voltageUs

2 Measuring inputs

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

Pt 100, Pt 1000 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 (22 $\Omega$ ), 0-10 V (13 k $\Omega$ )

<2,5s to 5s, depending on speed of change of signal 0/4-20 mA, max. 500  $\Omega$ . 0-10 V, max. 10 mA

(without isolation to inputs)

Relay output

Measuring-time

Analog output

type 3, see "general technical informations" 2 x 1 co- (change-over) contact

2 x 1 co- (change-over) contact

see "general technical informations"

Test conditions

Rated ambient temperature

range

Dimensions h x w x d Protection housing / terminals

Weight Attachment design V4: 90x70x

-20...+60°C

design V4: 90x70x58 [mm], mounting height 55 mm IP 30 / IP 20 (terminals pluggable)

app. 200 g

on 35 mm DIN-rail or with screws M 4

# Measuring-Transducer for Temperature

TMU100V for Pt 100 (RTD)

#### TMU100V



Model TMU100 Pt100 measuring transducers are suitable for measuring temperatures with sensors Pt100 (RTD).

Zero and FullScale can be freely set within the whole range -199 ... +850 °C. To do this only resistors with the according value or a Pt 100-decade is connected. The adjustment is done by pressing a button.

The built-in universal powersupply AC/DC 24-240 V allows the connection to all common supply-voltages.

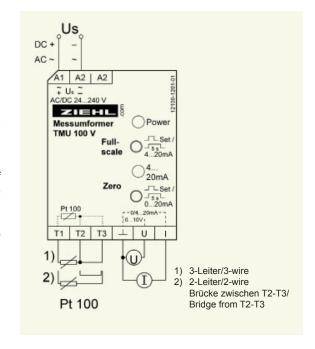
The Pt100- sensor can be connected in 2- or 3-wire connection.

The output delivers 0/4 ... 20 mA and 0 ... 10 V simultaneously.

- Pt100-input 2- or 3-wire automatic compensation of
- line up to 500 Ω total resiistance (sensor + line)
   Detection of sensor-break
- Easy adjustment of Zero and FullScale by pressing a button
- Wide measuring-range -200... +850 °C

- Analog output 0 ... 20 mA / 4 ... 20 mA
- Analog output 0 ... 10 V
- LEDs for display of operative state
- Universal supply AC/DC 24-240 V
- Housing for DIN-rail or wall-mount, 70 mm wide, mounting height 55 mm
- Option: Scaled ex works

Order-number T236090



#### Technical Data

Rated supply volatge Us Adm. tolerance DC Adm. tolerance AC

Measuring input Temperature-range Resolution

Tolerance

Temperature factor

Analog output

Error

Test conditions
Rated impulse withstand

voltage

Contamination level Rated insulation voltage Rated ambient temp. range

Dimensions (h x w x d)

Weight Attachment

Protection housing / terminals

AC/DC 24V...240 V, 0/50/60 Hz, < 3 W, <5 VA DC 20...297 V

AC 19...264 V

Pt 100 EN 60751, 2-/3--wire, ≤0,8 mA

-200 ... +850 °C

0,1 K

± 0,5 % of measured value ±0,5 K

<0.03 %/K

DC 0...10 V, min. 1 k $\Omega$  DC 0/4...20 mA, max. 500  $\Omega$ 

< 0,3% of FullScale

EN 50178 / EN 60947

4000 V

250 V

-20 ... +60 °C

design V2: 90x35x58 mm, mounting height 55 mm

арр. 130 д

on 35 mm DIN-rail EN 60 715 or with screws M4

IP 20 / IP 30

# Universal-Measuring-Transducer MU1000K

Temperature Pt 100 (RTD), DC Current and Voltage, Isolating Amplifier

#### MU1000K



Universal-measuring-transducers MU1000K can measure signals Pt100 (RTD) and DC current (0/4-20 mA) and voltage (DC 0/2-10 V). Several measuring-ranges are pre-programmed. More can be easily scaled. Temperatures at sensors Pt 100 can be evaluated from -200 °C to +800°.

The output-signals 0/2-10 V and 0/4-20 mA are potentially separated from inputs and supply-voltage.

With its universal power-supply AC/DC 24-240 V the measuring-transducer can be connected to all common supply-voltages.

#### Inputs:

Input DC 0/2-10 V

- Input DC 0/4-20 mA
- Input Pt 100, 3-wire, -200 ...
- +800 °C
  - automatic compensation of line-resistance
  - pre-programmed zeros and spans
  - individually programmable zeros and spans

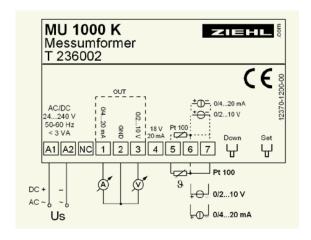
#### Outputs:

- DC 0/4-20 mA
- DC 0/2-10 V
- Insulation between inputs, outputs and supplyvoltage

Displays and control elements:

- 2 buttons for scaling
- · 4 LEDs for display of state and scaling
- Universal supply-voltage AC/DC 24-240 V
- · Housing type K, 22,5 mm wide

Order-number: T236002



#### **Technical Data**

Rated Supply Voltage Us

Input DC-Voltage Accuracy Input DC-Current Accuracy Input Pt 100

> Temperature-range Line-resistance Accuracy Sensor-current

Output voltage
Accuracy
Output current
Accuracy
Error load

Galvanic insulation Response-time T09 Pt100

Voltage-/Current input

Test conditions rated ambient temperature-range

Housing dimensions (h x w x d) Protection housing/terminals Attachment Weight AC/DC 24V-240 V, 0/50/60 Hz < 3 W < 5 VA

DC: 20,4 - 297 V, AC: 20 - 264 V DC 0/2-10 V, max. 27 V, 12  $k\Omega$ 

 $\leq$  0,1% from fullscale 0/4-20 mA, max. 100 mA, 18  $\Omega$ 

≤ 0.5% from fullscale

Pt 100 acc. to EN 60 751 / IEC 60 751, 3-wire

-200 °...+800 °C

max. 500  $\Omega$  (sensor + line) ± 0,5% from value ±0,5 K, drift: ≤0,04 °C/K

≤ 0,6 mA

DC 0/2-10 V, load min. 1 k $\Omega$  0,3 % from fullscale, drift <0,01 %/K DC 0/4-20 mA, load max. 500  $\Omega$  0,3 % from fullscale, drift <0,015 %/K 0,3 % of current x (250 $\Omega$  - load) / 250 $\Omega$ 

supply-voltage - input - output

< 350 ms < 20 ms

see "general technical informations" -20 °C ... +65 °C, EN 60068-2-5 dry heat

type K, 75 x 22,5 x 115 mm

IP 40 / IP 20

35mm standard-rail or screws M4 (option)

app. 100 g

# Universal-Measuring-Transducer MU1001K

DC Voltage, Isolating Amplifier

#### MU1001K



Universal Measuring-Transducers MU1001K can measure DC-signals up to 300 V. Pre-set measuring-ranges can be selected by the user. More measuringranges (zero and full scale) can be easily scaled.

The output-signals DC 0/2-10 V and 0/4-20 mA are insulated from measuring-input and supply-

With its universal power-supply AC/DC 24-240 V the measuringtransducer can be connected to all common supply-voltages.

#### Inputs:

- DC 0 300 mV (pre-set: 60/150/300 mV)
- DC 0 10 V
- DC 0 300 V (pre-set: 20/50/100/200/300 V)

Zeros and Full Scales for more measuring-ranges can be freely selected by the user.

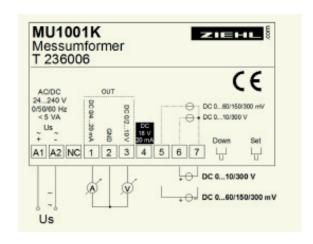
#### Outputs:

- DC 0/4-20 mA
- DC 0/2-10 V
- Insulation between inputs, outputs and supplyvoltage

Displays and control elements:

- 2 buttons for scaling
- · 4 LEDs for display of state and scaling
- Universal supply-voltage AC/DC 24-240 V
- · Housing type K, 22,5 mm wide

Order-number: T236006



#### Technical Data

Rated Supply Voltage Us

AC/DC 24V-240 V, 0/50/60 Hz < 3 W < 5 VA DC: 20,4 - 297 V, AC: 20 - 264 V

Measuring Input

DC 10 V/DC 300 V, max. 300 V, 500 kΩ DC 300 mV, max. 2 V, 10 M $\Omega$ 

Accuracy

≤ 0.1% vom Endwert

Resolution

14 Bit

Output Voltage

DC 0/2-10 V, load min. 1 k $\Omega$ 

0.3 % from Fullscale. Drift < 0.01 %/K Accuracy Resolution

11.6 Bit, <3,1 mV

**Output Current** Accuracy

DC 0/4-20 mA, load max. 500  $\Omega$ 0,3 % from Fullscale, Drift <0,015 %/K

11.6 Bit. <6.1 μA

0,3 % of current x ( $250\Omega$  - load) /  $250\Omega$ 

Resolution Error load

> Supply voltage - Input - Output < 20 ms

Galvanic Insulation Measuring Time Reaction Time

< 40 ms

Test conditions

rated ambient temperature-range

see "general technical informations" -20 °C ... +65 °C, EN 60068-2-2 dry heat

Housing dimensions (h x w x d) Protection housing/terminals

IP 40 / IP 20

Attachment

35 mm standard-rail or screws M4 app. 100 g

type K, 75 x 22,5 x 115 mm

Weight

### 5

# Universal-Measuring Transducer/ Isolating Amplifier Type MU100U

#### General

The universal measuring transducer MU100U can be connected to any supply voltage AC or DC between 24 and 240 V. Input signals and output signals

are electrically isolated from each other. Signals DC 0/4-20 mA or 0-10 V can be connected to the inputs. The input signals are transduced to standard-signal 0-10 V, 0/4-20 mA at the outputs.

#### Function

The measuring signal applied to one of the inputs is converted into a normalized voltage signal and changed into a frequency. The frequency signal is transferred by means of an optocoupler for electrical isolation. It is then converted again into a voltage and amplified. Signals 0/4-20 mA and 0-10 V are now available at the outputs.

The electronics before and after the optocoupler are supplied from the power supply unit with potential separated voltages each.

### Application



It is often necessary to separate the potentials of signals by means of isolation amplifiers as otherwise this would lead to adulteration of measuring values because of compensating currents.

Furthermore, the low-voltage side is effectively protected against damage caused by malfunctions at the primary side.

(0-20 mA, 4-20 mA, 0-10 V), it often happens that the output of a measuring transducer is not compatible with the input of the evaluation unit. MU 100 U eliminates these problems. Stockkeeping is

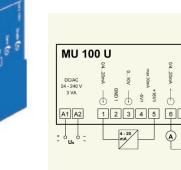
Because of the variety of the current standard signals

MU 100 U eliminates these problems. Stockkeeping is largely facilitated by the universal supply voltage and different input and output signals in one device.

These measuring transducers almost always fit.

#### MU100U:

- Input signals DC 0 20 mA, 0 10 V
- Output signals DC 0 20 mA, 0 10 V
- Offset with signals 4 20 mA can be compensated by the user
- Universal supply voltage AC/DC 24 240 V
- · electrical isolation between inputs and outputs
- supply voltage for external measuring transducers -5/+18 V/ max. 30 mA
- · Isolation voltage 2.5 kV



#### Technical Data

Power Supply Rated supply voltage Us AC/ DC 24V - 240V

adm. tolerance DCV DC 20 - 297 V

adm. tolerance ACV AC 19 - 264 V, Frequency 20 - 120 Hz

Power consumption < 3 W recommended fuse 2 A slow (gL)

 $\begin{array}{ccc} \text{Input voltage} & \text{DC 0 - 10 V} \\ \text{Nominal input resistance} & > 500 \text{ k}\Omega \end{array}$ 

 $\begin{array}{ll} \mbox{Input current} & \mbox{DC 0/ 4 - 20 mA} \\ \mbox{max. current} & \mbox{DC 50 mA} \\ \mbox{Nominal input resistance} & \mbox{50 } \Omega \\ \end{array}$ 

Voltage supply for ext. Measuring Transducer voltage DC -5 V/ ground GND1

-16 - 20 V

current max. 30 mA

Outputs

2 outputs with common ground

Output voltage

DC 0 - 10 V

Output voltageDC 0 - 10 Vmax. no load voltageDC 12 Vmax. currentDC 20 mAOutput currentDC 0/4 - 20 mA

max. short-circuit current DC 30 mA (short-circuit-proof)

max. load 500  $\Omega$ 

Accuracy class 0,2 at Tu = 23°C

 $\begin{array}{ll} \mbox{Temperature effect} & 0.025\% \mbox{*}\mbox{K}^{-1} \\ \mbox{Nominal rise time T}_{0.9} & 50 \mbox{ ms} \end{array}$ 

Operation Conditions rated ambient temperature range 0...50°C

ambient storage temperature -20...+70°C

Test Conditions Isolation Input/Output/Supply voltage 2500 VAC

EMV EN 61000-6-4 / EN 61000-6-2

Operating time 100%

Housing Dimensions H x B x T Design K: 75 x 22,5 x 110 [mm]

Line connection one-wire  $1 \times 0.5 - 2.5 \text{ mm}^2$  fine-wire with multicore cable  $1 \times 0.14 - 1.5 \text{ mm}^2$ 

ends

Fitting position any

Fastening Snap mounting on 35 mm standard rail conforms to

DIN EN 60 715 or M4 screws

Protection housing / terminals IP 40 / IP 20

Burning behaviour UL 94 V-2
Stripping length 8 mm
Connection torque of screw max. 0,5 Nm
Weight approx. 200 g

Order-numbers T236010

### 5

# Limit Value Switch Type TR210

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

#### TR210



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.

#### **Function**

- Measuring and monitoring range -170...+1820 °C
- resolution 0,1°C (to 999.9 °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 maxvalues 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)

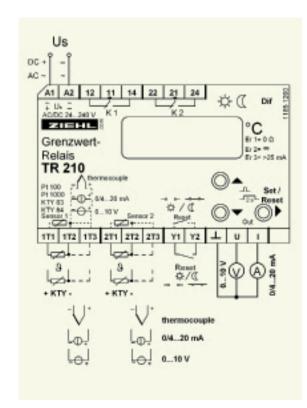
#### Displays:

- 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 s
  - autoreset or electronic reclosing lock
  - elay-time for switching and switching back
     0...9999 s
  - operating- or closed current-mode
  - cyclic check of function
- Monitoring of difference in temperature
- Preset basic programs

Order-number: T224071



#### **Basic Programs**

#### Program 1:

### 1 Temperature-sensor, 2 Limits

Application: Monitoring of a temperature for 2 limits, e.g. over-temperature with warning and switchjing 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-Sensores 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 monitoring 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 1measuring-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 ca be forwarded to e.g. a remote display or a superior control.

#### Technical Data

Rated supply voltageUs

2 Measuring inputs

Measuring-time Analog output

Relay output

Test conditions

Rated ambient temperature renge

Dimensions h x w x d Protection housing / terminals Weight Attachment AC/DC 24-240V, <3W, <5VA (AC 20-264 V, DC 20,4-297 V)

Pt 100, Pt 1000 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 ( $22\Omega$ ), 0-10 V (13 k $\Omega$ )

<2,5 s to 5 s, depending on speed of change of signal

0/4-20 mA, max. 500  $\Omega$ . 0-10 V, max. 10 mA (without isolation to inputs)

type 3, see "general technical informations" 2 x 1 co- (change-over) contact

see "general technical informations" -20...+60°C

design V4: 90x70x58 [mm], mounting height 55 mm IP 30 / IP 20 (terminals pluggable)

app. 200 g

on 35 mm DIN-rail or with screws M 4

# Measuring-Transducer for Potentiometers

MU100W for 0-500  $\Omega$  ... 0-10 k $\Omega$ 

#### MU100W



The MU100W measuring transducer converts the position of a potentiometer into a linear signal 0/4-20 mA respectively 0-10 V. Zero can be easily scaled 0...40 %, FullScale 60 ... 100 % of the range of thepotentiometers by pressing a button.

The built-in universal powersupply AC/DC 24-240 V allows the connection to all common supply-voltages.

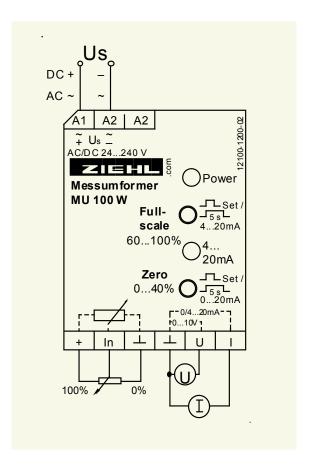
The output delivers 0/4 ... 20 mA and 0 ... 10 V simultaneously.

<u>Applications</u> are the creation of adjusting commands or the detection of mechanical elements, e.g. flaps.

- Connection of a potentiometer  $0...500 \Omega$  to  $0...10 k\Omega$
- Zero adjustable 0 ... 40 % of Scale
- FullScale adjustable 60 ... 100 % of Scale
- Easy adjusting of zero and FullScale by pressing a button
- Analog output 0 ... 20 mA / 4 ... 20 mA
- Analog output 0 ... 10 V
- LEDs for display of operative state

- Universal supply AC/DC 24-240 V
- · Housing for DIN-rail or wall-mount, 70 mm wide,
- mounting height 55 mm

Order-number T236041



#### Technical Data

Rated supply volatge Us Tolerance DC Tolerance AC

Measuring input
Measuring current/ -voltage

Analog output

Error

Temperature factor

Test conditions

Rated impulse withstand voltage

Contamination level Rated insulation voltage Rated ambient temp. range

Dimensions (h x w x d)

Weight Attachment

Protection housing / terminals

AC/DC 24V...240 V, 0/50/60 Hz, < 3 W, <5 VA

DC 20...297 V AC 19...264 V

Resistance-potentiometer 0...500  $\Omega$  to 0...10 k $\Omega$  6,6 mA ... 330  $\mu/3,3$  VA

DC 0...10 V, min. 1  $\,k\Omega$  DC 0/4...20 mA, max. 500  $\Omega$ 

< ±1%

0-10 V: < 0,01 %/K, 0/4-20 mA: < 0,015 %/K

EN 50178 / EN 60947

4000 V

3 250 V -20 ... +60 °C

design V2: 90x35x58 mm, mounting height 55 mm

app. 130 g

on DIN-rail 35 mm or with screws M4

IP 20 / IP 30

# Accessories for Measuring Transducers:

Limit Value Switch for standard signals, DC 0/4 - 20 mA, 0/2 - 10 V

#### STW1000V2



ZIEHL current-relays STW1000V2 monitor standardsignals 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.

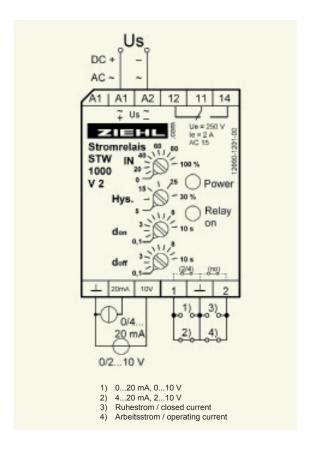
- Measuring inputs 0-20 mA / 0-10 V, switchable to 4-20 mA / 2-10 V
- Limit adjustable 0-100 %
- Hysteresis adjustable 5-30 %
- Start-up delay adjustable 0,1 ... 10 s
- Switching delay adjustable 0.1 ... 10 s
- Output-relay 1 changeovercontact (co)
- Operating- or closed-circuitmode for relay selectable with bridge
- LEDs for display state of operation
- Universal supply-voltage AC/ DC 24-240 V
- Housing for mounting in switchgear cabinets or fuseboxes, 35 mm wide

#### Applications:

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

Order-number

AC/DC 24-240 V S225677



### Technical Data

Supply voltageUs

Relay output Type of contact Test conditions

**Function** Measuring signals

Switching point Hysteresis Error of setting Repeat error

Temperature-dependence Start-up-delay dEnable Switching delay dal

Rated ambient temperature range

Dimensions (H x W x D)

Attachment

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

1 change-over contact (co)

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

maximum limit switch DC 0/4  $\dots$  20 mA, 20  $\Omega$ DC 0...10 V, 63 kΩ

adjustable 0...100%

adjustable 5...30% of set limit

< 10% of fullscale

< 0,2% ≤0,05 %/K

adjustable 0,1...10 s

adjustable 0,1...10 s

-20°C...+55°C

design V4: 90x70x58 [mm], mounting height 55 mm on 35 mm DIN-rail according to EN 60 715 or with screws M4

IP 30 / IP 20

Protection housing/terminals

# Measuring Point Change-over Switch Type MUM for 8 or 16 Measuring points

Allgemeines

Measuring point change-over switches allow the connection of up to 16 measuring points to 1 measuring device, e.g. an analog input of a PLC.

The inputs can be selected with a BCD-Code.

Manual selection can be made with a code-switch.

In automatic mode, the inputs are polled (tact-time adjustabe) and thus be displayed in succession.

When using a measuring point change-over switch, only 1 measuring input is needed to collect multiple values. Especially with slowly changing signals like temperatures, measuring every other second is enough.

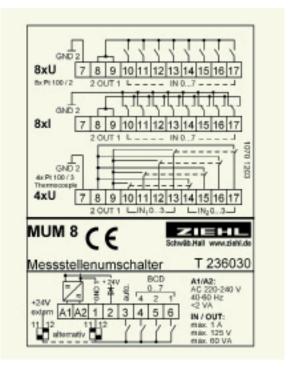
Expensive inputs for Pt100 or 0-10 V/0-20 mA at PLCs can be saved.

MUM8 8-fach



With the MUM8, alternatively 8 measuring points with common ground or 4 measuring points with separated ground can be switched.

- PLC-compatibel. Channelselection over 3 bit parallel (24 V), e.g. PLC or by a code switch
- Optional switching + or -8 channels (0/4 ... 20 mA, 0 ... 10V, Pt 100) with common ground
- 4 double-channels (= Pt 100/3wire and thermocouples)
- Supply-voltage AC 230 V or DC 24 V
- LED-display for selected channel
- Tact-time in automatic mode adjustable 0,5 ... 10 s
- plug-in terminals



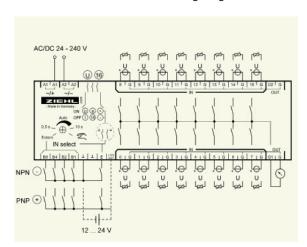
MUM16 16-fach



With the MUM16, alternatively 16 measuring points with common ground or 8 measuring points with separated ground can be switched.

- PLC-compatibel. Channelselection over 4 bit parallel (24 V), e.g. PLC or by a code-switch
- · Optional switching + or -
- Enable-input for using multiple MUM in parallel
- Monitoring of up to 16 signals for one limit with only 1 limit switch
- 16 channels (0/4 ... 20 mA, 0 ... 10V, Pt 100) with common ground
- 8 double-channels (= Pt 100/ 3-wire and thermocouples)
- Simple configuration with 3 DIP-switches

- Supply AC/DC 24-240 V
- LED-display for selected channel
- Tact-time in automatic mode adjustable 0,5 ... 10 s
- plug-in terminals
- Housing for mounting in switchgear cabinets or fuse boxes, 140 mm wide, mounting height 55 mm



**Technical Data** MUM8 MUM16

AC 220 - 240 V/ DC 24 V AC/DC 24 - 240 V Supply voltage Rated supply-Voltage Us

> 50/60 Hz 0/50/60 Hz Frequency < 2 VA Power consumption < 6,5 VA, 4 W

AC -10...+10% -10...+10% Admissible tolerance

Inputs 8 channels 16 channels Number of input channels

with common ground with common ground or 4 x 2 channels or 8 x 2 channels potentially separated potentially separated

1 LED / channel display max. AC/ DC 24 V switching voltage

max. 100 mA switching current

max. 2,4 W or 2,4 VA (ohmic Load) switching capacity 8 x 1 co relays

expected contact life mech. approx. 108 operations

5 x 107 operations at 12 V/ 10 mA expected contact life elec. 3 x 106 operations at 24 V/ 0,1 A

manual / automatic enable control inputs

channel select 3 bit BCD channel select 4 bit BCD

potentially separated from analog part

for all control inputs 0/24 V (PLC-compatible) control signal aktive high or low selectable with DIP-switches

adjustable (potentiometer) 0,5...10 s clock-time break between 2 channels app. 1-2 ms switching time

max. 2 Outputs outputs

In 0 - 7 to Out 1 + Out 2 In 0 - 15 to Out 1 at single channel: In 0 - 3 to Out 1 In 0 - 7 to Out 1 at double channel: In 4 - 7 to Out 2 In 8 - 15 to Out 2

**Test Conditions** EN 50 178

AC 250 V/ DC 300 V rated insulation voltage Ui

EN 60664 insulation pollution grade 4 kV 2 **EMC** 

EN 61 000-6-2, EN 61 000-6-3 transformer

EN 61 558

Normal conditions of use rated ambient temperature 0...+50°C -20...+55°C

-40°...+75°C storage temperature EN 60 068-1 environmental conditions 100% on-period

Dimensions (h x w x d) mm Design K: 75 x 22,5 x 118 V8: 90 x 140 x 58 Housing

> Protection housing IP 20, EN 60 529 Protection terminals IP 20, EN 60 529

Fitting position any

Weight app. 150 g app. 350 g

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

option: screw-mount M 4 with additional bar (not in-

cluded)

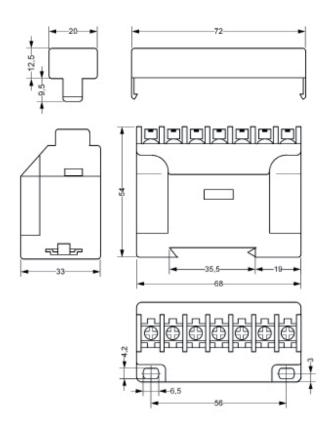
Order-numbers: T236030 T236035

# **Dimension Illustrations**

Housings for Switchgear-Cabinet Mount	170
Design C Design K Design S12 Design S24 Design V2, 4, 6, 8	
Splash-Proof Housing	173
Design 194	
Panel-Mount Housing	174
Design 300 Design 350 / 352 Design SE Design SE2	
Electronic Current-Transformers/ Current-Sensor	176
Design H Design S1	
Temperature-Sensors	177

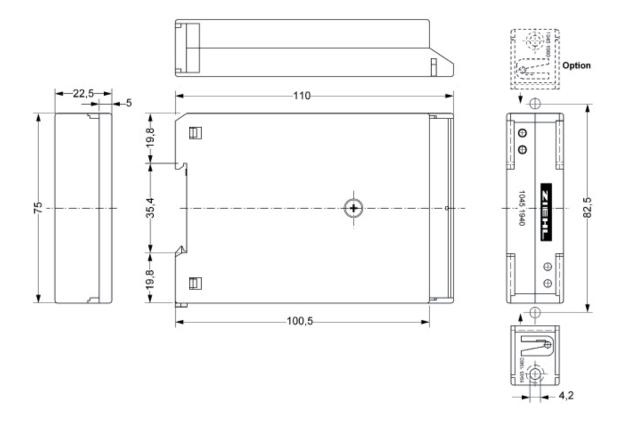
Housing Design C

Material: Polyamid PA 6



Housing Design K

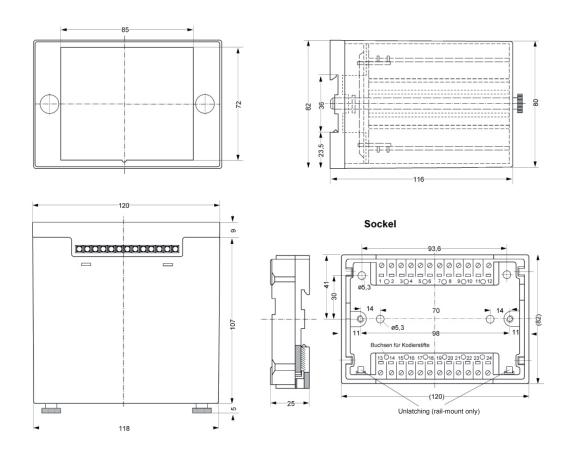
Material: Polyamid PA 66





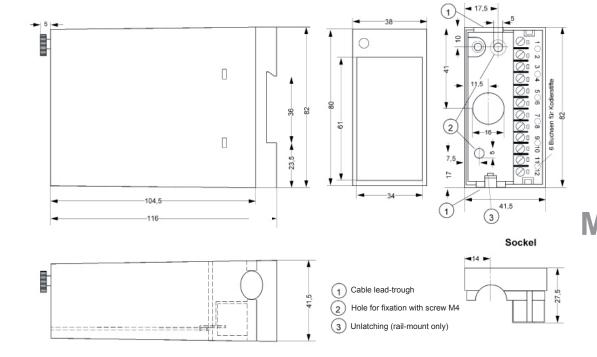
Housing Design S24

Material: Polyamid PA 6



Housing Design S12

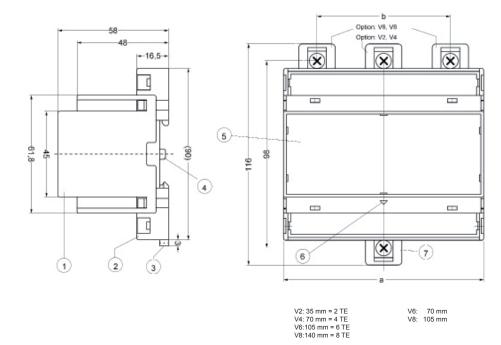
Material: Polyamid PA 6



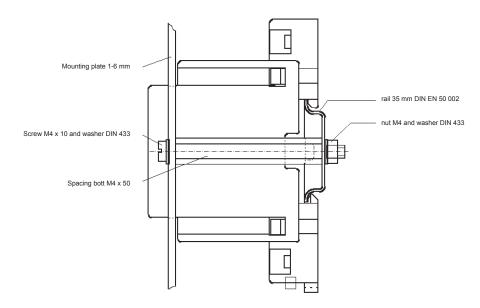
### Housing Design V

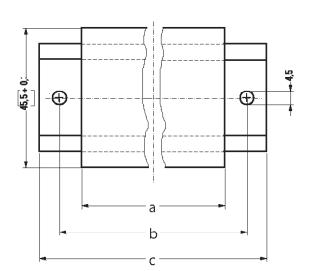
Material: Polyamid PA 66 Front plate Polycarbonat

Switchboard mount V2, V4, V6, V8: Mounting height 55 mm



Panel mount V2, V4, V6, V8:

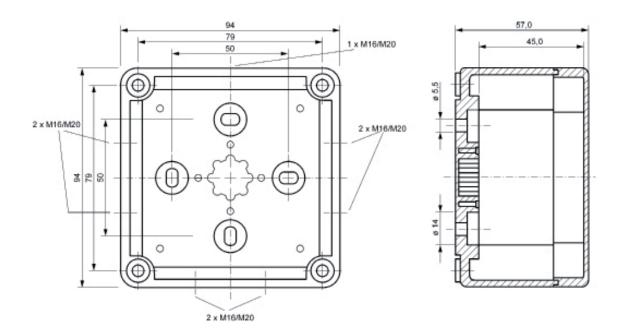


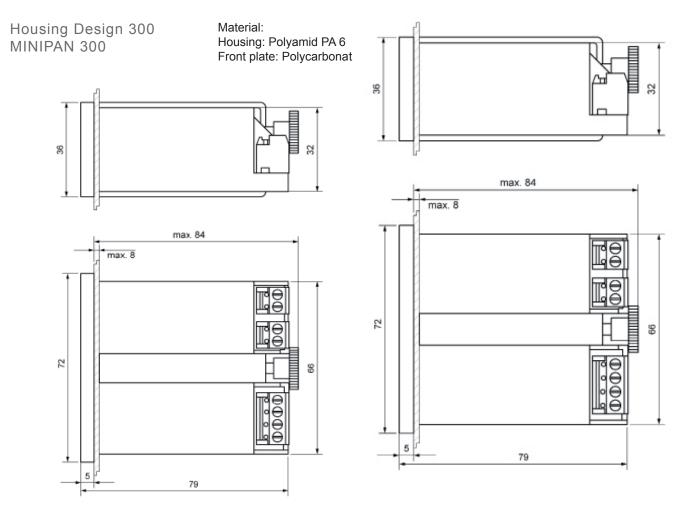


mm	а	b	С
V2	35	50	65
V4	70	85	100
V6	105,5	120	135
V8	140,5	155	170
Tol.	+ 0,3	± 0,3	± 2

Housing Design 194

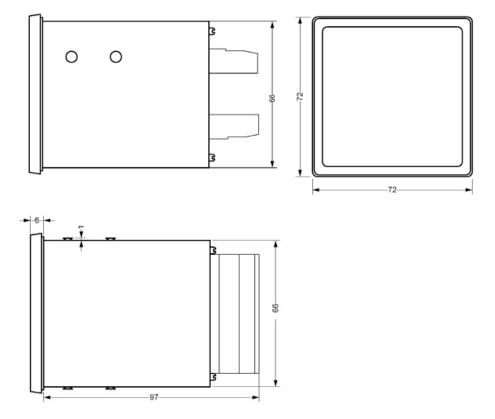
Material: Polystyrol = Standard Polycarbonat = Option





Housing Design 350 MINIPAN 352P Material:

Housing: Ultramid U-B3WG5 Front plate: Polycarbonat



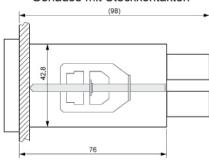
Housing Design SE MINIPAN SE352

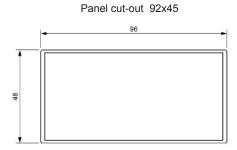
Material:

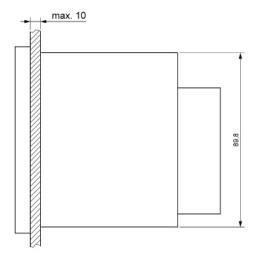
Housing: Noryl GFN2 SE1 Backplane: FR4

Front frame: Noryl GFN2 SE1

Gehäuse mit Steckkontakten





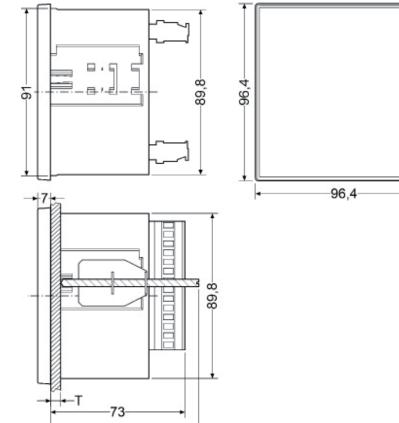


Housing Design SE2 TR440

Material:

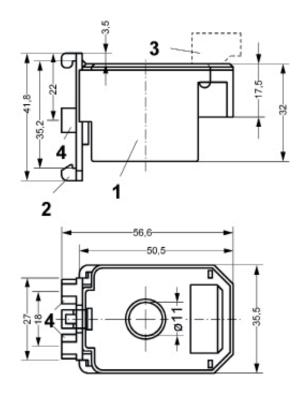
Housing: Noryl SE1 GFN1 Backplane: FR4

Front frame: Noryl SE1 GFN1 Front plate: Polyesterfolie



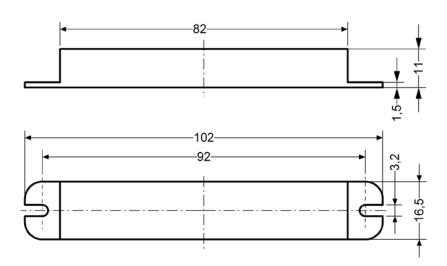
-T + 70-

Housing Design H for Current-Transfomers



- 1 Base
- 2 Clip for DIN-rail
- 3 Terminal (pluggable)
- 4 Surface-mount (M4)

Housing Design S1 for Current-Sensor S1

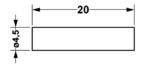




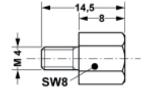
# Designs of Temperature-Sensors

Type of Housing Material

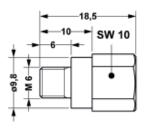
U2 High-grade steel WSt-Nr. 1.4571



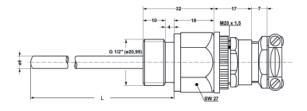
G2 Aluminum



G3 Brass



ZG2 High-grade steel WSt.-Nr. 1.4571



V

### **General Technical Informations**

Important note: The terms and definitions laid out here do not lay claim to accuracy, completeness or legal validity. These terms and definitions should help the user to understand our catalogue, and provide some useful hints and advice. In case of any doubt, the user should refer to the relevant VDE regulations, IEC publications and DIN standards.

**Regulations:** The devices described in this catalogue are manufactured to DIN VDE 0106, DIN VDE 0110, DIN VDE 0160 DIN VDE 0660, EN 60 947 and many other standards and regulations.

**Quality assurance:** We have adapted our quality assurance system to ISO 9001 specifications during 1992/93. The quality assurance system is documented in a quality assurance manual, and this is mantained in all relevant areas.

**AC/DC 24 V:** Such a device can be operated from either an AC or DC 24 V supply. It is not equipped with a mains transformer (the supply voltage input goes directly to the rectifier) and there is no isolation of the supply from the electronics.

AC voltage, AC current: Technically, AC voltage has a sinusoidal form. Preferred frequencies are 50 and 60 Hz. AC voltages, and AC currents are measured at RMS value. The peak value is √2 times the RMS value.

**Air gap:** is the shortest distance in the air between two conducting parts.

Analogue output: see Voltage output, see also Current output.

Capacity consumption: Indicated in VA (AC) or W (DC). We are constantly trying to minimize the capacity consumption in our devices by the application of current-saving components.

Climate-proof, humidity, condensing water: Electrical equipment must be suitable for the application. The ambient environment for the operating material determines the protection to be afforded against environmental influences (e.g. cooling, water splash, oil saturated air) or else equipment has its own protection system (application class according to DIN 40 040, see also Protection system, e.g. IP 65). Ziehl devices are usually sealed devices complying with DIN VDE 0160. They are equipped with protection against indirect contact (finger guard, contact safety to VBG 4). All devices are usually suitable for humidity class F.

Closed-circuit current: The relay is closed in the OK state (when the actual value is within the permissible range) and releases on a signal being received. Disadvantage: malfunction may produce a switching signal, e.g. in case of voltage breakdown in the supply voltage. Advantage: A monitoring breakdown will normally be recognized. See Operating current.

Control voltage: See Us

Current output: Measuring transformers usually have current outputs with DC 0 - 20 mA or 4 - 20 mA (option). Other values available upon request. Loading capacity of current outputs is limited. The permissible maximum load (burden) will usually be determined by the maximum voltage dissipated in the device, e.g.  $500~\Omega$  at 20 mA and 10 V. Current inputs of loads.

**DC voltage:** A DC voltage is indicated as an average value. Accumulators supply a smooth DC voltage. RMS value and average value are taken to be equal. Rectifiers supply a pulsating DC voltage. If nothing else is stated, a sufficiently smooth DC voltage, produced with the help of capacitors, is expected when using devices with a DC supply voltage; the

upper and lower peak values of the expected constant DC voltage should not exceed the permissible supply voltage tolerance.

### **Explanation of conformity:**

- 1. Devices conform to the DIN VDE 0160 "Equipment of power plants with electronic operating material" regulations.
- 2. Devices conform to the DIN VDE 0411 "VDE regulations for electronic measuring devices and control units" regulations.
- 3. Devices conform to the DIN VDE 0435 "Electrical relays" regulations.
- 4. Devices conform to the DIN VDE 0660 T302 "Thermal motor protection for rotating electrical engines" regulations.
- 5. Devices conform to the EN 60 947-5-1 "Control devices and switching elements, electromechanical control devices" regulations.

These statements are valid as explanations of conformity to article 10 of the E.C. low voltage regulations 73/23/E.C.

**Explosion proofing:** Devices carry an explicit warning with regard to applications in explosive environments. They are not equipped with intrinsically safe terminals. Connection to sensors in an explosive environment must be effected via suitable zener-barriers. In doing so, it must be observed that line resistance should not be adversely affected.

**Fuse:** See Relay prefuse several devices may be connected in series to one current output up to the maximum permissible load. See Input resistance.

**Galvanic isolation (of mains):** In many applications a galvanic separation between the supply voltage and the electronics, and thus the measuring input/sensor, is necessary. See Reliable separation, see also Test voltage.

### Attention!

Faultless and reliable functioning of devices requires appropriate transport and storage, expert installation and setup, as well as operation in accordance with the regulations.

These devices may be operated only by persons who are well acquainted with their installation, setup and operation and who are qualified in accordance with their occupation. They should strictly observe all operating instructions, the directions fixed to the device and the relevant safety regulations for installation and operation of electronic plant.

These devices are constructed and tested to DIN VDE specifications, and leave our factory in perfect condition and conforming with safety regulations. To maintain this condition, the safety regulations which are explicitly highlighted under the headline "Attention" in the operating instructions must be strictly observed. Death, bodily harm, or damage to the device itself and to other devices or installations may result from non-observance of the safety regulations.

Should the information in the operating instructions be in any way inadequate, please do not hesitate to contact us directly or one of our agents or representatives.

Relevant regulations in the user's country must be observed with regard to the application area of the device, over and above the valid industry standards and regulations mentioned in these operating instructions which are valid in Europe.



### Galvanic isolation (between input and output):

see Measuring transformer with galvanic isolation

**Hysteresis:** Hysteresis is the separation between two switching points. For example, the hysteresis is 5°C if a temperature monitor relay switches off at 80°C as the temperature rises and switches back again at 75°C as the temperature falls. A certain minimum hysteresis is necessary to avoid any "flutter effect" in the relay when switching.

Input resistance: Current inputs usually have a low input resistance. In the case of standard DC signal inputs of 0/4 - 20 mA (e.g. STW 1020 S) it is important in order to load the preceding measuring transformer as little as possible. In the case of inputs for high-level currents (e.g. STW 210 S) in order to keep the stray power low, see Shunt. For the same reasons the voltage outputs have a input resistance as high as possible. See Voltage output, see also Current output.

**Installation direction:** All devices should be installed by appropriately trained skilled labour taking into account all the relevant regulations.

**MIN-contact:** The switching condition for a relay will be achieved at signal drop on the set switching point. Switchback after signal exceeds a particular point: see Hysteresis.

MINIKA®: ZIEHL registered trade name.

MINIPAN®: ZIEHL registered trade name.

**Modifications:** We reserve the right to make technical modifications within the scope of further development of our products.

Operating current: The relay releases in the operating state for the relevant equipment (when the actual value is within the permissible range) and closes again when the appropriate signal is received. A disadvantage of this configuration may be that there may be no signal in the case of voltage breakdown. An advantage is that there will be no signal in the switched-off state or while switching on. See Closed-circuit current.

**Operating cycle:** ZIEHL devices are usually designed for a 100% operating cycle.

Climatic Conditions (normal conditions, minimum ambient conditions)

Typical places	Temperature	Relative Humidity	Barometric Pressure
weather-protected places, e.g. not air-conditioned control rooms and operating areas	+5°C+40°C outside of cabinet	5%86% no condensation	860 hPa1060 hPa
during storage during transport	-20°C+70°C -20°C+70°C	5%95% 5%95%	860 hPa1060 hPa 860 hPa1060 hPa

**Insulation:** In order to protect against dangerous body currents (electric shock), protective arrangements must be taken conforming with DIN VDE 0100, DIN VDE 0106. See Protection system.

A frequently used protection measure consists of insulation. See Insulation coordination, Air gaps, Leakage distances.

Insulation coordination: During use, anticipated impulse (over) voltages in case of error (e.g. lightning strike), subsequent contamination and the insulation features of the materials are used as a basis for the definition of minimum values for Air gaps (qv) and Leakage distances (qv). The same applies for the Test voltage (qv), which is used for testing the insulation features of the products.

**Insulation voltage:** The rated insulation voltage U<sub>i</sub> is indicated according to DIN VDE 0110. It gives the information on the maximum voltages that can be connected to the operating material.

**Insulation voltage, temperature sensor:** In the case of temperature sensors a higher insulation voltage will usually lead to a higher heat transmission resistance to the sensor and thus to a deterioration of the response period.

**Leakage distance:** is the shortest distance anlong the surface of an insulation material between two conducting parts.

Line adjustment: See PT 100 temperature sensor.

Load: see current output, see also voltage output.
3-wire technique: for sensor connection see PT 100 temperature sensor in the catalogue.

**Maintenance:** Usually not necessary for our devices. Depending upon the application, though, we recommend period inspection, especially where otherwise a breakdown would not be noticed.

**MAX-contact:** The switching condition for a relay will be achieved at signal increase on the set switching point. Switchback after signal falls below particular setting: see Hysteresis.

**Permissible ambient temperature:** usually -20 or 0 up to 55°C measured at 10mm distance from the middle of the upper housing surface. Different values may be appropriate, dependent on self-heating and the material used. For some devices the stated accuracy is valid only within a reduced temperature range.

**Power supply:** If a voltage range for the rated voltage is indicated, e.g. AC 220 - 240 V +10/-15%, the operating range will be from 187 up to 264 V.

In the case of DC voltages only screened voltages with an upper ripple of max. 5% are admissible.

**Protection system:** IP 00 - IP 68. Defined according to DIN 40050. The first figure thereof states the protection against contact and the penetration of foreign bodies, the second one represents water-proofing, as follows:

### 1st figure:

- 0: no protection
- 1: Protection against large foreign bodies Ø 50 mm
- 2: Protection against medium-sized foreign bodies  $\varnothing$  12 mm
- 3: Protection against small foreign bodies Ø 2.5 mm
- 4: Protection against granular-structured bodies Ø 1 mm
- 5: Protection against dust deposit. Complete protection against contact of voltage-carrying parts
- 6: protection against dust penetration 2nd figure:
- 0: No protection
- 1: Protection against vertically falling dripping water
- 2: Protection against angular (≤15°) falling dripping water
- 3: Protection against spray water (<60° to vertical)
- 4: Protection against splash water from all directions
- 5: Protection against jet water
- Protection against water penetration while dipping under fixed conditions
- 7: Protection against water penetration while dipping under fixed conditions
- 8: Protection against submersion



### PTB-approval see Explosion-proof:

Motor protection devices with PTB approval are intended for direct monitoring of explosion-proven motors conforming with the "Higher security" EEx e protection system complying with DIN VDE 0165.

Rated frequency: ZIEHL devices with AC voltage supplies usually operate within a range of 48 - 62 Hz. Deviations are explicitly indicated.

Rated voltage: A component or device is designed for such a voltage, and operating and capacity features refer to it. See Us, rated operating voltage.

### Relay, connection designation according to DIN EN 50 042:

Change-over = 11 (15), normally closed contact = 12 (16), normally opened contact = 14 (18) (figures in brackets for time-delayed contacts). NO: 13/14(17/18), NC: 11/12(15/16). The first number is the number of the relay, e.g. 32 = normally closed contact of relay K3.

Relay, contact life: This will be determined by the number of switches under load. Modern relays have a mechanical service life of more than 1 million operations. The electrical service life will be determined by the switching capacity (qv) of the contacts. See also contact material.

Relay contact	Type 3	Type 2
Contact material	AgNi 90/10	AgNi 0,15
Rated voltage	250 VAC 50 Hz	250 VAC 50 Hz
Switching voltage	max. 415 VAC	max. 440 VAC
	max. 300 VDC	max. 300 VDC
Thermal current	3 A	5 A
Switching current	5 A	8 A
	20A 4s 10% on-period	30 A 4s 10% on-period
Minimum current/voltage	12 V	12 V
	10 mA	10 mA
Switching power max. AC $\cos \varphi = 1$	1250 VA	2000 VA
Switching power max. DC $\cos \varphi = 1$	0,3 A DC 240 V	0,3 A DC 300 V
	0,4 A DC 120 V	0,5 A DC 120 V
	0,8 A DC 60 V	1 A DC 60 V
	5 A DC 30 V	8 A DC 30 V
Reducation factor	$0.5 \text{ at } \cos \varphi = 0.7$	$0.5 \text{ at } \cos \varphi = 0.3$
Switching capacity normally opened	Application category	Application category
Rated nominal current	AC 15 le = 1 A Ue = 400 V	AC 15 le = 2 A Ue = 400 V
	AC 15 le = 2 A Ue = 250 V	AC 15 le = 3 A Ue = 250 V
	DC 13 le = 2 A Ue = 24 V	DC 13 le = 2 A Ue = 24 V
Switching capacity normally opened	Application category	Application category
Rated nominal current	AC 15 le = 1 A Ue = 400 V	AC 15 le = 1 A Ue = 400 V
	AC 15 le = 2 A Ue = 250 V	AC 15 le = 3 A Ue = 250 V
	DC 13 le = 2 A Ue = 24 V	DC 13 le = 2 A Ue = 24 V
Switching capacity normally opened	Application category	Application category
Rated nominal current	AC 15 le = 1 A Ue = 400 V	AC 15 le = 1 A Ue = 400 V
	AC 15 le = 2 A Ue = 250 V	AC 15 le = 3 A Ue = 250 V
	DC 13 le = 2 A Ue = 24 V	DC 13 le = 2 A Ue = 24 V
UL 508 electrical ratings	E214025	E214025
	240V AC 3A resistive load	250V AC 10A general use
	D300 1A 240 VAC	B300
		240V AC 1/2 hp
		120V AC 1/4 hp
Contact life mechanical	15*10 <sup>6</sup> operations	30*10 <sup>6</sup> operations
Contact life electrical		· ·
10⁵ operations - $\cos \varphi$ = 1	5 A - 250 VAC	8 A - 250 VAC
$2 \times 10^5$ operations - $\cos \varphi = 1$	3 A - 250 VAC	5 A - 250 VAC
$5x10^5$ operations - $\cos \varphi = 1$	2 A - 250 VAC	3 A - 250 VAC
10 <sup>6</sup> operations - cos $φ$ = 1	1 A - 250 VAC	1,5 A - 250 VAC
$2 \times 10^6$ operations - $\cos \varphi = 1$	0,5 A - 250 VAC	1 A - 250 VAC
Fuse for contacts	gG/gL 2 A	T 4 A

Application-	Typical applications	7
category		
AC - 12	Switching of ohmic load and load of semiconductors in inputcircuits of optocoupler	7
AC - 13	Switching of load of semiconductors with de-coupling by a transformer	
AC - 14	Switching of low electromagnetic load (max. 72 VA)	
AC - 15	Switching of electromagnetic load (> 72 VA)	
DC - 12	Switching of ohmic load and load of semiconductors in inputcircuits of optocoupler	7
DC - 13	Switching of electromagnetic loads	1
DC - 14	Switching of electromagnetic loads with economy resistance in circuit	

Application-	Standard conditions					
category	Switch-on		Switc	h-off		
	I/Ie	_U/Ue_	cos φ	I/Ie	_U/Ue	cos φ
AC - 12	1	1	0,9	1	1	0,9
AC - 15	10	1	0,3	1	1	0,3
DC - 13	1	1	< 0,3 s	1	1	< 0,3 s

Relay, contact material: The material used for the relay contacts is crucial for the switching capacity. No contact material is optimally suited for all applications. Thus contact materials which are suitable for switching higher voltages and currents will show poor features with regard to the transmission of low signals.

ZIEHL relays usually use silver-cadmium-oxide (AgCdO).

### Silver-cadmium-oxide (AgCdO)

Advantages: low welding tendency, high oxidation consistency, high burn-up consistency, good electric arc extinguishing, also suitable for switching inductive and capacitive devices with medium to high switching capacity.

Disadvantage: The minimum switching voltage should be over 12 - 24 V, the switching current over 60 - 100 mA.

#### Hard silver (AgCu)

Advantage: suitable for medium and high switching capacities, min. switching voltage of 6 V.

Disadvantage: oxide production, especially in sulphurous atmosphere.

### Silver-palladium (AgPd):

Advantage: low oxidation tendency.

Disadvantage: low conductivity, low burn-up consistency, only suitable for switching lower capacity and voltage of up to 60  $\vee$ 

#### Gold-nickel (AuNi):

Advantage: very good starting consistency, very good suitability for low-level voltages and currents. Max. 60 V max. 0.1 A Disadvantage: Not suitable for voltages of more than 60 V and currents of more than 0.1 A.

### Silver-nickel (AgNi):

Advantage: high burn-up consistency, low welding tendency, especially suitable for inductive loads, 6 - 400 V and 10 mA up to 100 A.

Disadvantage: higher contact resistance than other Agcontacts.

**Relay, fuse protection of contacts:** In order to avoid bonding of the relay contacts, we generally recommend the use of a 6.3 A instantaneous fuse.

**Relay, rated operating current le:** This is the current which can reliably be switched by the relay contact at an indicated rated operating voltage. See Switching capacity.

**Relay, standard design:** We use miniature power relays with low capacity consumption and reliable separation between relay contacts and coil side. See Test voltage e.g. 4 kV.

Relay, switching capacity according to EN 60 947-5-1: to AC 15 / DC 13, auxiliary current circuits, electromagnetic

Relay, switching capacity is the load (ohmic), which can switch a relay contact. Maximum indicated values, therefore, shouldn't usually be exceeded.

In case of AC current loads the maximum switching capacity must be reduced by a displacement of current and voltage (cos  $\varphi$  = 0.7) See Reduction factor.

Service life: is mainly limited by the relay (number of operations, contact load) and electrolytic capacitors (which may dry out within a certain period in the case of high ambient temperature). We generally equip our devices with relays and capacitors with a high life expectancy.

Shunt: See Input resistance

Storage temperature, permissible: usually -20 up to +70°C.

Supply voltage: See power supply, Rated frequency

**Switch-on response:** When applying the supply voltage it takes some time until all outputs and displays pass through the transient-effect state. In the case of closed-circuit current design output relays, these relays are designed to signal an error message during this switch-on period.

Switch-on response of mains: see Switch-on response.

**Switching functions:** See Operating current, see also Closed-circuit current (above).

**Test voltage:** voltage for testing the Insulation (qv) of an operating material. The insulation between operating voltage, output contacts, housing and the electronics is tested. As a rule of thumb: test voltage = rated insulation voltage + 1000 V. See Protection class, see also Safe separation.

**Tropicalized designs:** Special designs are possible for several devices and available upon request, but with a concomitant price increase.

**Two-wire configuration:** for sensor connection. See PT 100 temperature sensor in the catalogue.

Uc, Mains voltage: previous designation for  $U_s$  (qv), see also Control voltage

**Us, Control voltage, rated operating voltage:** is the rated value of the voltage to be connected for operating the device. Voltage variations are allowed within the stated tolerances. See Frequency, Rated supply.

**VDE 0551:** Specification for the technical design of a transformer isolated between the mains side and the low voltage output. Design includes unconditional short-circuit proven or conditional short-circuit proven with integrated fuse (qv).

Voltage output: Measuring transformers are available with voltage outputs with DC 0 - 10 V. Other values are available upon request. Loading capacity of voltage outputs is limited. Voltage inputs of several devices may be connected in parallel to one voltage output until minimum permissible load is reached. See Input resistance.

A

### Terms of Payment and Delivery

#### 1) General

All business is transacted according to German law. Orders are only binding after written confirmation. Events such as acts of God or nature, strikes, shut-outs, material shortage, accidents, transport, manufacture or firm disruptions, regardless of whether in own firm or that of a supplier as well as circumstances for which we are not responsible, give us the right to withdraw from the order or to delay its completion. Damage claims of any kind in such a case are out of the question. Times and terms of delivery being made are not binding. Differing sales conditions for individual customers are only valid with our express confirmation. Acceptance of our confirmation of order is taken to mean that the order is valid according to our terms of delivery.

Goods from orders which have been properly filled and delivered cannot be taken back, due to the large scope of our programme. With an order on call, the customer undertakes that he will buy the complete order quantity within 12 months from the date of ordering. The respective minimum order quantity is 1/10 of the complete order. If after 12 months the goods have not yet all been called, this point in time is considered to be the binding delivery date for the remaining goods.

We reserve the right to make technical changes to equipment even in the case of a serial delivery, if this serves further development.

### 2) Prices

Our prices are industrial net prices, are in EURO and are subject to Value Added Tax as required by law. Prices billed are our prices valid on the day of delivery. Minimum order value is EUR 100.00, beneath which we must make a low quantity surcharge of EUR 15.00

### 3) Payment

Payment must be paid in full, within 10 days from date of invoice without deduction of any kind. If the customer delays payment, default interest will be charged. Withholding payment or setting off of payment due to any counterclaim is not permissible. Any bank charges incurred by payment from a foreign country are to be paid by the customer.

#### 4) Delivery

Delivery is from our factory in Schwäbisch Hall. Delivery is paid by the recipient and at the recipient's own risk. Without instructions to the contrary we dispatch goods by the most cost-effective means. We accept no responsibility for damage in transport unless it is proven that the damage is due to inappropriate packaging on our part. Packaging 1,2% at values smmaler than EUR 500.00, 0.7% at values higher than EUR 500.00 minimum EUR 2.00. In the case that after accepting an order from a customer, we become aware of facts which make the customer's ability to pay doubtful, we have the right to change the conditions of payment or refuse delivery.

### 5) Warranty

Complaints and notice of defects can only be acknowledged within 5 days of delivery. If the complaint is justified, warranty service follows the return of the faulty part(s). Over and above this we will correct possible defects at our discretion up to 2 years after delivery - without consideration of working time of part - by repair or replacement of equipment. This warranty performance includes materials and work time but not transport costs. Further claims including damages claims are not permissible. No responsibility will be accepted for damages resulting from careless treatment. The careful use of our products is the responsibility of the customer. The warranty period for order on call goods also begins with the delivery of the goods but ends at the latest, 3 years after the order is made.

Goods which have been exchanged in the course of repair or which have been modified at the customers wish are warranted by us for 6 months.

#### 6) Retention of title

Good delivered by us remain our property until they have been paid for in full by the customer. The buyer is not entitled to pawn or pledge or use as security, goods which are our property. The buyer is obliged to inform us of the requisition or impounding or any other action by a third party which affects our property.

### 7) Other arrangements

Oral arrangements or agreements are not legally binding. Buying conditions on the part of the customer which do not conform to these conditions are not binding for us even if they were made a basis for the order and their content was not expressly contested by us.

### 8) Place of performance

The place of performance of delivery and payment as well as legal domicile for both contract partners is Schwäbisch Hall.

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ΕU

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