Complete Catalogue
2018

Efficient use of self-generated energy
Relay for energy flow type **EFR4000IP**

Measuring, Controlling, Monitoring on highest level

ZIEHL

Contents

Your customer number

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

Temperature-Relays

Measuring-Transducers and Measuring-Point change-over
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1

PTC-Resistor-Relays

General

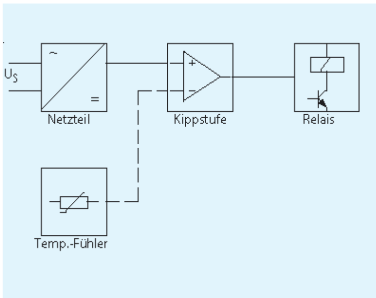
ZIEHL PTC resistor relays and ZIEHL PTC resistors according to DIN 44 081 and DIN 44 082 are a reliable protection from thermal overloading. Together they result in a fast and effective protective system for i.e. engines and transformers.
ZIEHL PTC relays offer the following advantages:

- 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

Type	housing	connectable PTC-resistors	potential-free relay contacts	reclosing-lock	approvals/remarks
MS220K	K	1...6	1 CO, 2 CO	-	Low-Cost-Version
MSR220K	K	1...6	1 CO, 2 CO	x	Low-Cost-Version
MS220KA	K	1...6	1 CO, 2 CO	-	Short-circuit monitoring, ATEX-Approval
MSR220KA	K	1...6	1 CO, 2 CO	x	Short-circuit monitoring, ATEX-Approval
MS220VA	V2	1...6	1 CO	-	Short-circuit monitoring, ATEX-Approval
MSR220VA	V2	1...6	1 CO	x	Short-circuit monitoring, ATEX-Approval
MS220Vi	V4	1...6	2 CO	-	intrinsic safe sensor-circuit, Ex II (1) GD (Ex ia) II C (Ex ia D)
MSR220Vi	V4	1...6	2 CO	x	intrinsic safe sensor-circuit, Ex II (1) GD (Ex ia) II C (Ex ia D)
MS220C	C	1...6	1 CO	-	compact device, GL-Zulassung
MS220K2	K	2 x 1...6	2 x 1 CO	-	2 seperate channels
MSR220K2	K	2 x 1...6	2 x 1CO	x	2 seperate channels, reclosing-lock
MSR220K6	K	6 x 1...6	1 CO	x	6 channels, common output
MSR820V	V4	8 x 1...6	2 CO	x	8 channels, common output, LED-display for responsing sensor-circuit
MSM220K	K	1...6	1 CO	x	reclosing lock power fail proof, test button
MS40ZT	S12	1...6	1 CO	-	pulse input for monitoring movement of elevators
MSF220K	K	2 x 1...6	1 CO, 1 NO	-	2 seperate channels, test-button, monitoring of dry transformers
MSF220SE	S12	2 x 1...6	2x1 CO	-	2 seperate channels, timing-relay, monitoring of dry transformers
MSF220V	V4	3 x 1...6	2x1 CO, 1 NO	-	3 seperate channels, fan-control, monitoring of dry transformers
MSF220VL	V4	4 x 1...6	4 x 1CO	-	4 seperate channels, fan-control, core monitoring of dry transformers
TS1000	V8	3 x 1...6	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 between 1650 Ω... 4000 Ω. The relay switches backat 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.

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

1

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

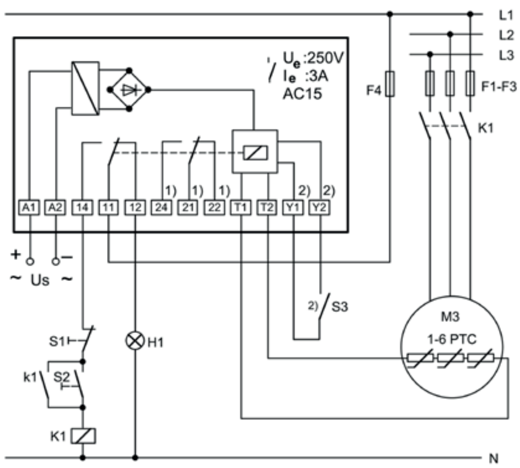
Art.-no.:	1 CO	2 CO
AC 220 - 240V	T221745	T221765
AC/DC 24V	T221741	T221761
	1 CO/ 1 NO	
AC/DC 24-240V	T221749	

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 reset-button
- UL Recognized Component
- Option:
  othersupply-voltages

Art.-no.:	2 COs
AC 220 - 240V	T221775
AC/DC 24V	T221771



Us = supply voltage
S1 = pushbutton OFF
S2 = pushbutton ON
S3 = external reset
H1 = trip alarm

F1 - F4 = fuses
K1 = contactor
1) only versions with 2xCO
2) only MSR

Technical Data

Rated supply voltage Us	AC 220 - 240 V, ± 10 %, 50/60 Hz, ≤2 VA AC/DC 24 V, AC ± 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
connectable PTC resistors	1... 6 PTC according to DIN 44 081 or 44 082
switching point	<4000 Ω
output relay	1 or 2 change-over contacts (co)
type of contact	type 2 see "general technical information"
test conditions	see "general technical information"
rated ambient temperature range	-20...+55 °C
dimensions (h x w x d) attachment	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)
protection housing / terminals	IP 30 / IP 20
weight	approx. 150 g

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

Single PTC-Circuit, ATEX-Approval according to Directive 2014/34/EU

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 and 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 directive 2014/34/EU
- SIL 1 according to IEC 61508
- PL c according to ISO 13849

- 1 PTC-resistor (thermistor) set, each 1...6 PTC-sensors
- short-circuit monitoring of sensor-circuit
- output-relay with 1 or 2 change-over contacts (co)
- 2 LEDs for ON and ALARM
- K-housing,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	**T222445**	**T222455**
AC/DC 24 V		**T222451**

II (2) G [Ex e] [Ex d] [Ex px]
II (2) D [Ex t] [Ex p]

c US SIL IEC 61508

MSR220KA

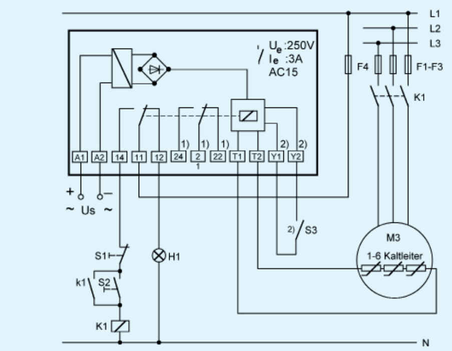
Same execution as MS220KA, additionally with electronic reclosing lock. An alarm is stored until a reset is made.

- ATEX-approval according to directive 2014/34/EU
- SIL 1 according to IEC 61508
- PL c according to ISO 13849
- 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 reset-button
- UL Recognized Component
- Option:
  - other suppy-voltages

Order-numbers:	2 change-over
AC 220-240 V	**T222475**
AC/DC 24 V	**T222471**
AC 110-120 V	**T222473**
AC 380-415 V (without cURus)	**T222476**

II (2) G [Ex e] [Ex d] [Ex px]
II (2) D [Ex t] [Ex p]

c US SIL IEC 61508



Us = supply voltage
S1 = pushbutton OFF
S2 = pushbutton ON
S3 = external reset
H1 = trip alarm

F1 - F4 = fuses
K1 = contactor
1) only version with 2xCO
2) only MSR

Technical Data

Rated supply-voltageU_s	AC 220 - 240 V ± 10 % 50/60 Hz ≤ 2 VA AC/DC 24 V, AC ± 10 % DC 21- 30 V < 2 VA, without potential separation
connectable PTC-resistors	1...6 in series according toDIN 44081 or 44082
switching point	< 4000 Ω
output relay	1 or 2 change-over contacts (co)
type of contaxt	type 2 see "general technical information"
test conditions	see "general technical information"
rated ambient temperature	-20...+55 °C
dimensions (h x w x d)	design K: 75 x 22,5 x 110 [mm]
attachment	on 35 mm DIN-rail or with 2 screws M4 (option)
protection housing/terminals	IP 30 / IP 20
weight	app. 150 g

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

Single PTC-Circuit, Atex-Approval according to Directive 2014/34/EU

MS220VA

Art.-no:
AC 220 - 240V T222415

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 directive 2014/34/EU
- SIL 1 nach IEC 61508
- PL c nach ISO 13849

- 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
- UL Recognized Component

<u>Option:</u>
- - other suppy-voltages

II (2) G [Ex e] [Ex d] [Ex px]
II (2) D [Ex t] [Ex p]

SIL IEC 61508

MSR220VA

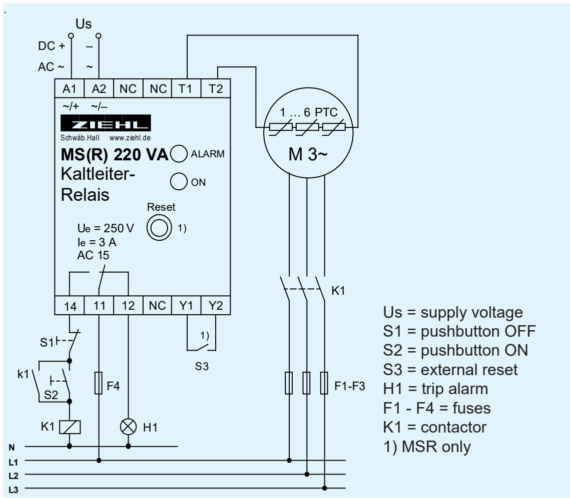
Art.-no:
AC 220 - 240 V T222435
AC/DC 24 V T222431

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

- ATEX-approval according to directive 2014/34/EU
- SIL 1 nach IEC 61508
- PL c nach ISO 13849
- electronic reclosing lock (disconnectable)
- integrated RESET-button
- link for external reset
- automatic reset at voltage recovery
- UL Recognized Component
- <u>Option:</u>
  - other supply-voltages

II (2) G [Ex e] [Ex d] [Ex px]
II (2) D [Ex t] [Ex p]

SIL IEC 61508



Technical Data

Rated supply-voltage U_s	AC 220 - 240 V ± 10 % 50/60 Hz ≤ 2 VA AC/DC 24 V, AC ± 10 % DC 21- 30 V < 2 VA, without potential separation
connectable PTC-resistors	1...6 in series according toDIN 44081 or 44082
switching point	< 4000 Ω
output relay	1 change-over contact (co)
type of contaxt	type 2 see "general technical information"
test conditions	see "general technical information"
rated ambient temperature	-20...+55 °C
dimensions (h x w x d)	design V2: 90 x 35 x 58 [mm]
attachment	on 35 mm DIN-rail or with 2 screws M4
protection housing/terminals	IP 30 / IP 20
weight	app. 120 g

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

Atex-Approval according to Directive 2014/34/EU, intrinsic safe input

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.

- Connection for temperature sensor with intrinsic safety ignition protection type Ex ia IIC and Ex iaD
- ATEX-approval according to directive 2014/34/EU
- 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**

II (1) GD [Ex ia] IIC [Ex iaD]

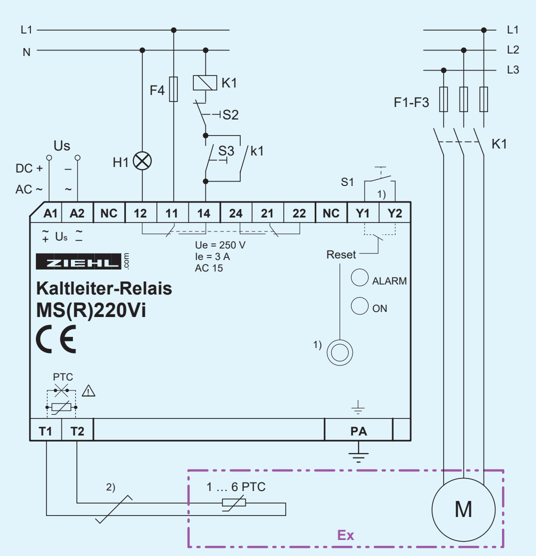
MSR220Vi

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

- ATEX-approval according to directive 2014/34/EU
- 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**

II (1) GD [Ex ia] IIC [Ex iaD]



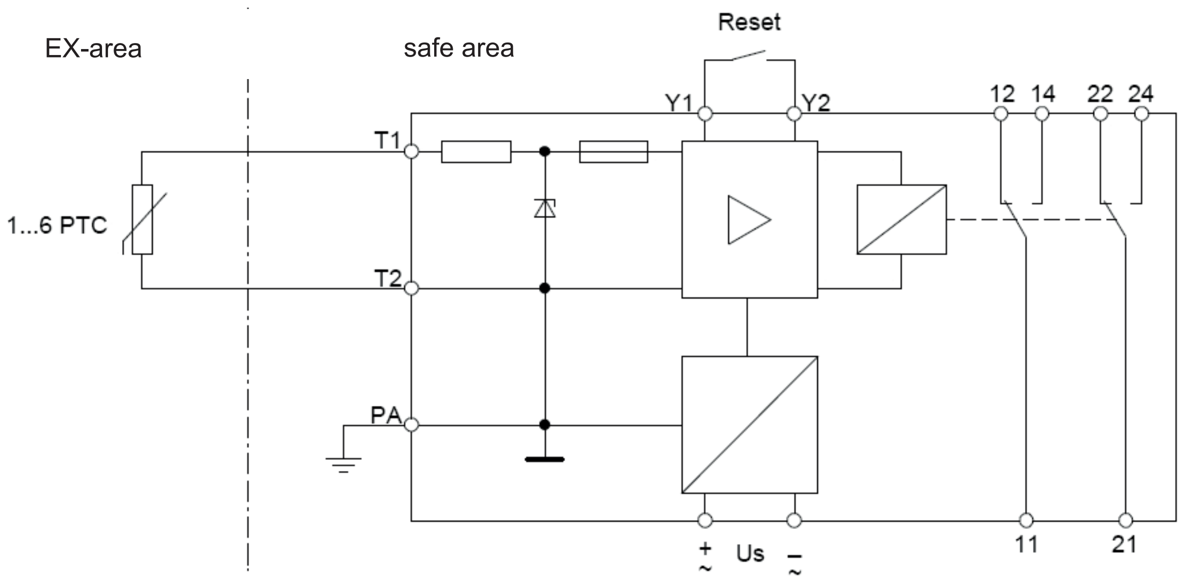
Ex = area of potentially explosive atmosphere
PTC = Thermistor sensor
Us = supply voltage
S1 = external reset
S2 = pushbutton OFF
S3 = pushbutton ON
H1 = Trip alarm

F1-F4 = fuses
K1 = contactor

1) only MSR
2) twisted lines

Technical Data

Rated supply-voltage U_s	AC 220 - 240 V ± 10 % 50/60 Hz ≤ 2 VA AC/DC 24 V, AC ± 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 information"
Test conditions Rated ambient temp. range	see "general technical information" -20...+60 °C
Dimensions (H x W x D) Attachment Protection housing/terminals Weight	Design V4: 90 x 70 x 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

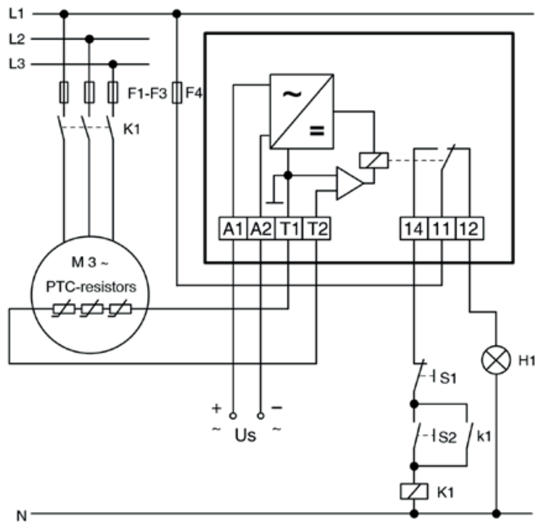
MS220C

Art.-number:

AC/DC24 V	T221830
AC 220 - 240 V	T221804

This compact device is the smallest version of all our PTC-resistor relays:

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



Us = Anschlussspannung	Us = supply voltage
S1 = Aus-Taster	S1 = pushbutton OFF
S2 = Ein-Taster	S2 = pushbutton ON
H1 = Meldelampe Störung	H1 = trip alarm
F1-F4 = Sicherungen	F1-F4 = fuse
K1 = Motorschütz	K1 = contactor

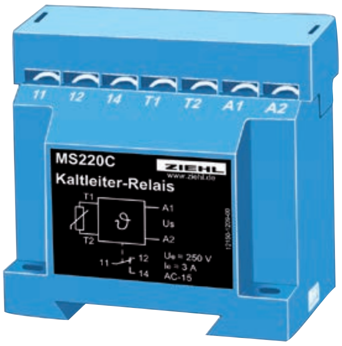
Technical Data

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
connectable PTC resistors	1... 6 PTC according to DIN 44 081 or 44 082
switching point	<4000 Ω
output relay	1 change-over contact (co)
type of contact	type 2 see "general technical information"
test conditions	see "general technical information"
rated ambient temperature range	-20...+55 °C
dimensions (h x w x d) attachment	design C: 72 x 33 x 60 [mm] on 35 mm of DIN rail according to EN 60 715 or with screws M4
protection housing / terminals	IP 30 / IP 20
weight	approx. 120 g

PTC-Resistor-Relay Type MS220C

Single PTC-Circuit, Supply Voltage AC/DC 24 - 240 V

MS220C

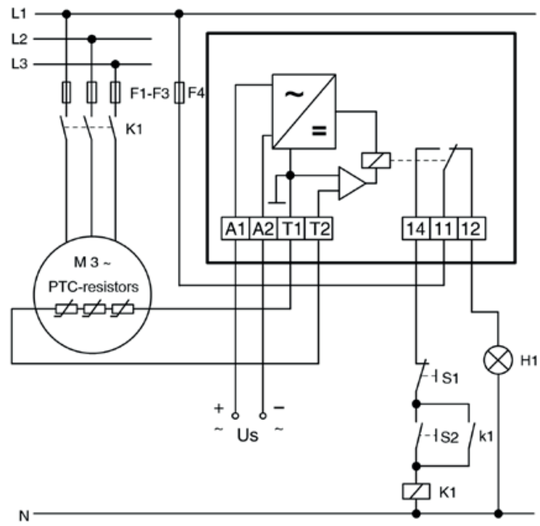


Art.-number:
AC/DC24 - 240V T221821

This compact device is the smallest version of all our PTC-resistor relays:

- terminals outside
- protection terminals IP 20
- Relays 1 change-over contact (co)

c UL us



Us = Anschlussspannung	Us = supply voltage
S1 = Aus-Taster	S1 = pushbutton OFF
S2 = Ein-Taster	S2 = pushbutton ON
H1 = Meldelampe Störung	H1 = trip alarm
F1-F4 = Sicherungen	F1-F4 = fuse
K1 = Motorschütz	K1 = contactor

Technical Data

Rated supply voltage Us	AC/DC 24-240 V, AC 20-264 V, DC 20-297 V, < 1 W, < 4 VA
connectable PTC resistors	1... 6 PTC according to DIN 44 081 or 44 082
switching point	<4000 Ω
output relay	1 change-over contact (co)
type of contact	type 2 see "general technical information"
test conditions	see "general technical information"
rated ambient temperature range	-20...+70 °C
dimensions (h x w x d) attachment	design C: 72 x 33 x 60 [mm] on 35 mm of DIN rail according to EN 60 715 or with screws M4
protection housing / terminals	IP 30 / IP 20
weight	approx. 120 g

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 change-over contact (co)
- LEDs for operation and alarm

Order numbers:

AC/DC 24 V	**T221923**
AC 230 V	**T221925**

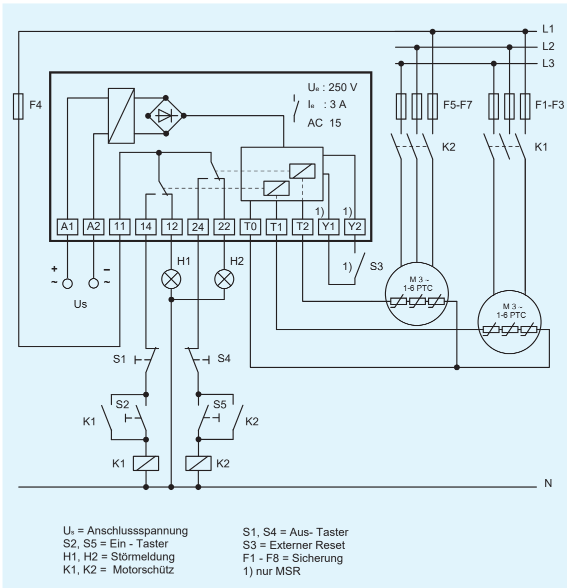
MSR220K2

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 230 V	**T221945**



Technical Data

Rated supply voltage Us	AC 230 V, ± 10 %, 50/60 Hz, ≤2 VA AC/DC 24 V, AC ± 10 %, DC 21-30 V, < 2 VA, without potential separation
connectable PTC resistors	2 x 1... 6 PTC according to DIN 44 081 or 44 082
switching point	<4000 Ω
output relays	2 x 1 change-over contact (co)
type of contact	type 2 (see "general technical informations")
test conditions	see "general technical informations"
rated ambient temperature range	-20...+55 °C
dimensions (h x w x d) attachment	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)
protection housing / terminals	IP 30 / IP 20
weight	approx. 145 g

PTC-Resistor-Relay Type MSR220K6

6 PTC-Circuits

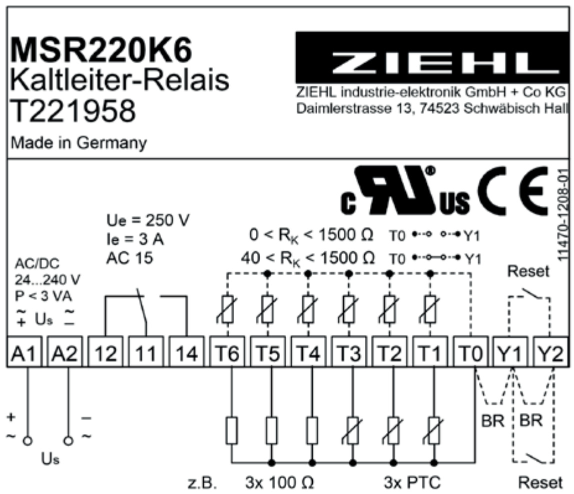
MSR220K6

Art.-No.:
AC/DC24 - 240V T221958

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
- UL Recognized Component



Technical Data

Rated supply voltage Us	AC/DC 24-240 V, AC 19-264 V, DC 20-297 V, <2 VA
connectable PTC resistors switching point	6 x 1... 6 PTC according to DIN 44081 or 44082 <4000Ω
output relay Type of contact	change-over contact (co) type 2 see "general technical informations"
test conditions rated ambient temperaturerange	see "general technical informations" -20... +55 °C
dimensions (h x w x d) attachment	design K: 75 x 22,5 x 110 [mm] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4
protection housing / terminals weight	IP 30 / IP 20 approx. 145 g

PTC-Resistor-Relay Type MSR820V

8 PTC-Circuits

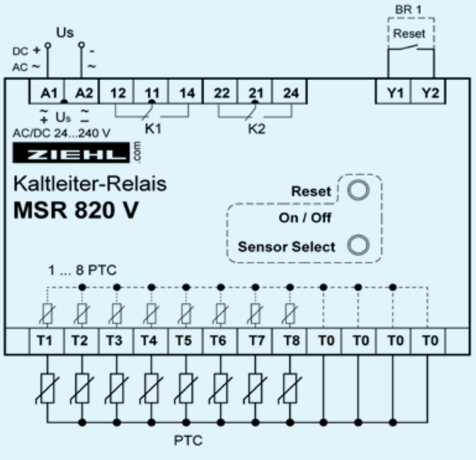
MSR820V

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. cold-resistance 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**



BR 1: Wiedereinschaltsperre abgeschaltet

Technical Data

Rated supply-voltage U_s	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 kΩ...4 kΩ typical 3,65 kΩ
Output Relay Type of contact	2 x 1 change-over contact (CO) $AgSnO_2$
Testing Conditions Rated ambient Temperature range	see "general technical informations" -20...+55 °C
Dimensions H x W x D Attachment	Design V4: 90 x 70 x 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

1

MSM220K

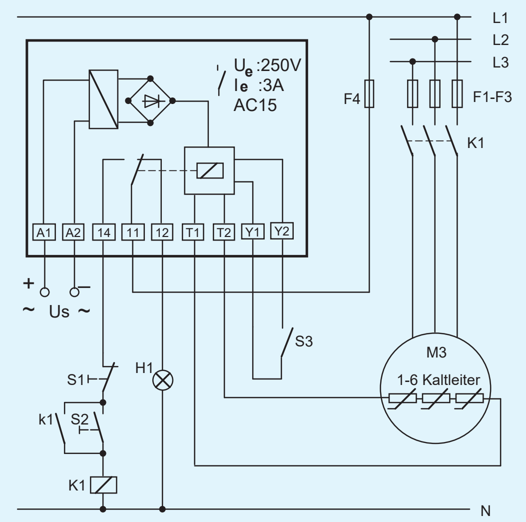
The reclosing-lock of the PTC-resistor relay MSM220K is power-fail proof. Thus a tripping is being stored also over a loss of voltage.

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 change-over 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**



Us = Anschlussspannung
S1 = Aus-Taster
S2 = Ein-Taster
S3 = Externer Reset
H1 = Meldelampe Störung
F1-F4 = Sicherungen
K1 = Motorschütz

Technical Data

Control voltage Us	AC 230 - 240 V ± 10 % 50/60 Hz, 2 VA
connectable PTC resistors	1... 6 PTC according to DIN 44 081 or 44 082
switching point	< 4000 Ω
output relay	1 change-over contact (co)
type of contact	type 2 (see "general technical informations")
test conditions	see "general technical informations"
rated ambient temperature range	-20... +55 °C
dimensions (h x w x d)	design K: 75 x 22.5 x 110 [mm]
attachment	on 35 mm DIN rail according to DIN EN 50 022 or with screws M4 (option)
protection housing / terminals	IP 30 / IP 20
weight	approx. 145 g

PTC-Resistor-Relay Type MS40ZT
for Elevators

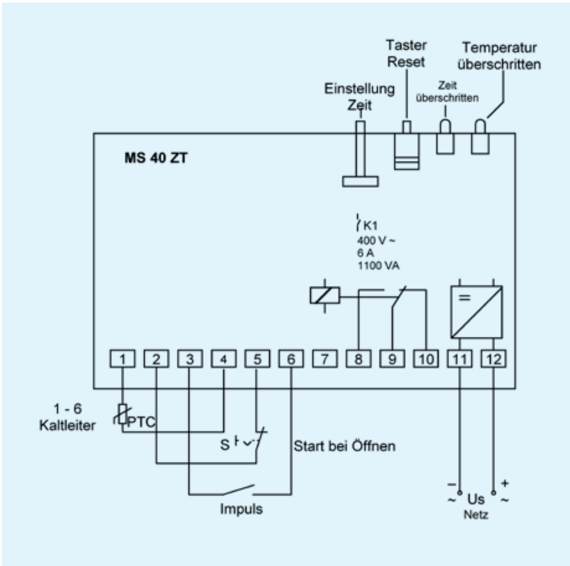
MS40ZT

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	AC 220 - 240 V ±10 %, 50/60 Hz, 3VA
connectable PTC resistors	1... 6 PTC according to DIN 44 081 or 44 082
switching point	< 4000 Ω
output relay	1 change-over contact (co)
type of contact	type 2 (see "general technical informations")
test conditions	see "general technical informations"
rated ambient temperature range	-20... +55 ∞C
dimensions (h x w x d) attachment	design S 12: 82 x 42 x 121 [mm] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4
protection housing / terminals	IP 30 / IP 20
weight	approx. 280 g

PTC-resistor relay type MSF220K

for Dry-Transformers, 2 PTC-Circuits

1

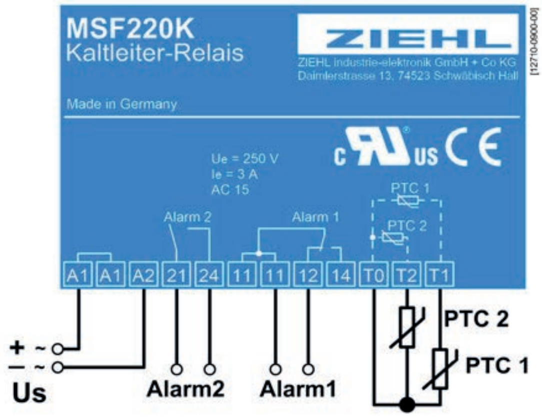
MSF220K

Art.-numbers:

AC 220 - 240 V	T221718
AC/DC 24 - 240 V	T221717

PTC-relay for the monitoring of dry transformers.
Alarm 1 with relay in closed-circuit 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)
- monitoring of sensors for short-circuit and break activatable
- Test-button (delayed)
- LEDs for ON, 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



Technical Data

Rated supply voltage Us	AC 220 - 240 V ± 10 %, 50/60 Hz, ≤2 VA AC/DC 24-240 V, AC 19 - 264 V, DC 20 - 297 V <2VA
connectable PTC resistors	2 x 1... 6 PTC according to DIN 44081 or 44082
switching point	< 4000 Ω
output relays	1 change-over contact (co), 1 normally-open contact (no)
type of contact	type 2 see "general technical information"
test conditions	see "general technical information"
rated ambient temperature range	-20... +55 °C
dimensions (h x w x d)	design K: 75 x 22.5 x 110 [mm]
attachment	on 35 mm DIN rail according to DIN EN 50 022 or with screws M4
protection housing / terminals	IP 30 / IP 20
weight	approx. 110 g

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.

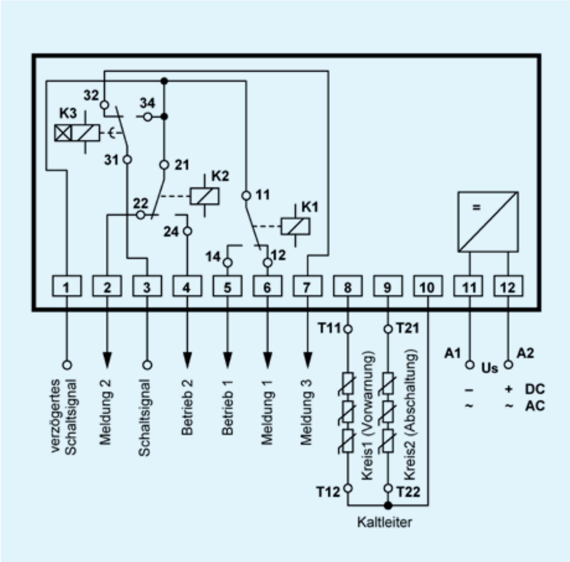
- 2 PTC resistor sets
- 2 output-relays with change-over contacts (co)
- integrated timing-relay K3 to suppress an alarm-impulse when switching on supply voltage
- ALARM 1, i.e. for preliminary alarm
- ALARM 2, i.e. for switching off power on green LED
- ALARM 1 yellow LED
- ALARM 2 red LED
- Test-button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

Thanks to the delayed switching-on 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	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
connectable PTC resistors	2 x 1... 6 PTC according to DIN 44 081 or 44 082
switching point	< 4000 Ω
output relays	2 x 1 change-over contacts (co)
type of contact	type 2 see "general technical information"
test conditions	see "general technical information"
rated ambient temperature range	-20... +55 °C
dimensions (h x w x d) attachment	design S 12: 82 x 42 x 121 [mm] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4
protection housing / terminals	IP 40 / IP 20
weight	approx. 290 g

PTC-Resistor-Relay Type MSF220V/VU

for Dry-Transformers, 3 PTC-Circuits

1

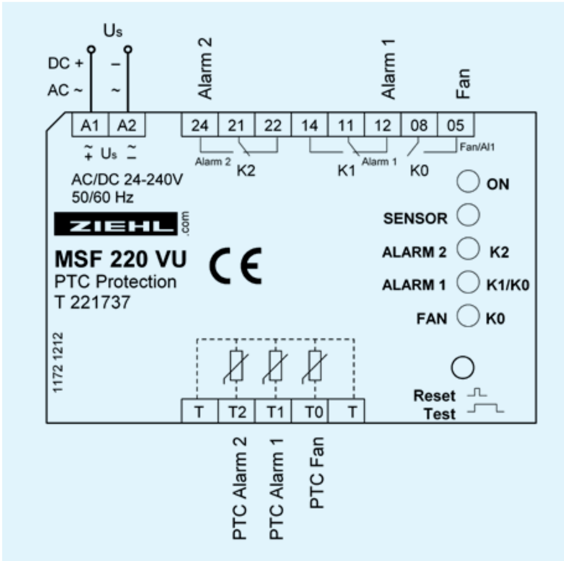
MSF220V/ MSF220VU

Art.-numbers:

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

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 contact)
- 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 change-over 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
- UL Recognized Component
- plug-in terminals
- housing for mounting on DIN-rail or wall-mount mounting height 55 mm



Technical Data

Rated supply voltage Us	AC 220 - 240 V ± 10 %, 50/60 Hz, ≤3 VA AC/DC 24 - 240 V ± 15 %, < 3 VA
connectable PTC resistors	3 x 1... 6 PTC according to DIN 44 081 or 44 082
switching point	< 4000 Ω
output relays	2 x 1 change-over contacts, 1 normally-open contact
type of contact	type 2 see "general technical information"
test conditions	see "general technical information"
rated ambient temperature range	-20... +55 °C
dimensions (h x w x d) attachment	design V 4: 90 x 70 x 58 [mm] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4
protection housing / terminals	IP 30 / IP 20
weight	approx. 320 g

PTC-Resistor-Relay Type MSF220VL

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

MSF220VL

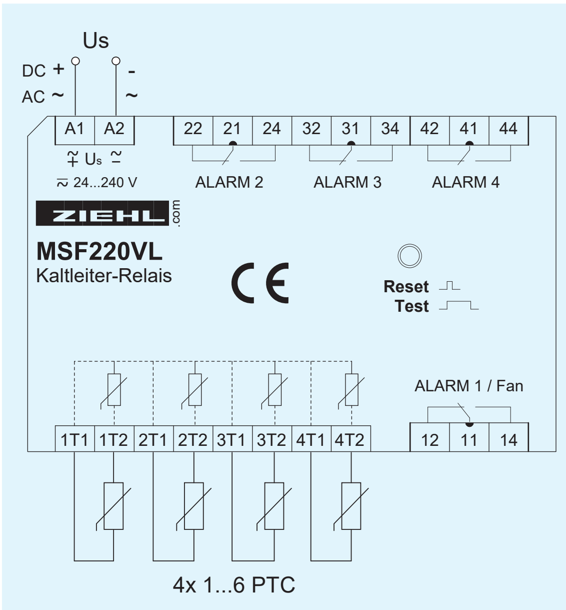
Art.-no: T221674

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
- electronic reclosing lock for alarms (trip) connectable
- 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



Technical Data

Rated supply voltage Us	AC/DC 24 - 240 V ± 15 %, < 3 VA
connectable PTC resistors	4 x 1... 6 PTC according to DIN 44 081 or 44 082
switching point	< 4000 Ω
output relays	4 x 1 change-over contacts
type of contact	type 2 see "general technical information"
test conditions	see "general technical information"
rated ambient temperature range	-20... +60 °C
dimensions (h x w x d) attachment	design V 4: 90 x 70 x 58 [mm] on 35 mm DIN rail according to DIN EN 50 022 or with screws M4
protection housing / terminals	IP 30 / IP 20
weight	approx. 185 g

Transformer-Protection Trafosafe TS1000

with integrated monitoring of Fans

1

Trafosafe TS1000

Art.-No.: T221660

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:

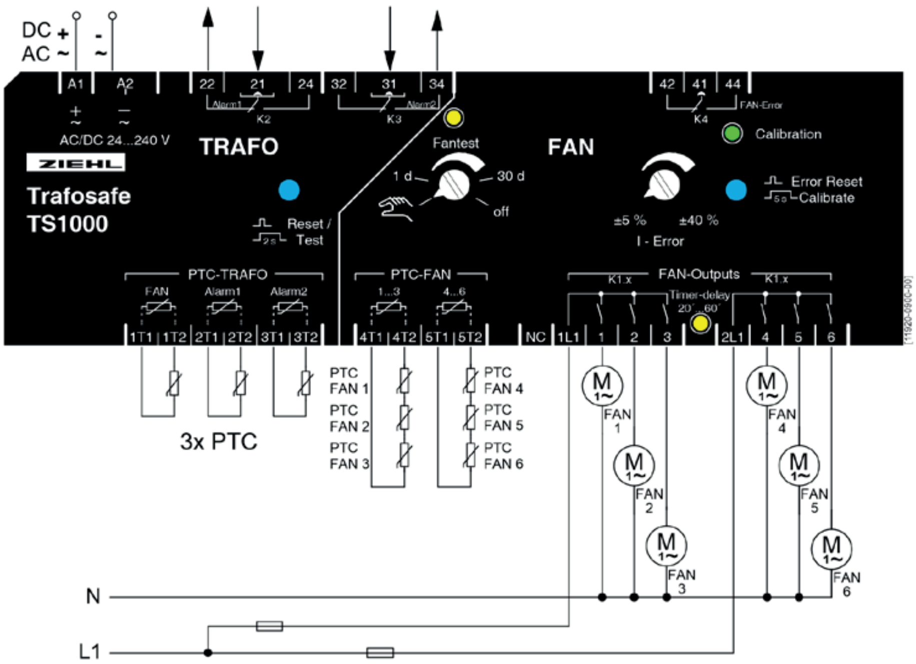
- 1 PTC-circuit for controlling the cooling (1T1/1T2) = input for starting fan when using as fan-control only.
- 2 x 1 PTC-circuit for alarm 1 (2T1/2T2) and alarm 2/trip (3T1/3T2), monitored for
- short-circuit and interruption Alarm 1 (K2) in closed-circuit current mode = monitoring of function
- Alarm 2/trip (K3) in open-circuit 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 0,07...4,0 A
- 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



Technical Data

Supply voltage U_s	AC/DC 24 - 240 V, 0/45-120 Hz, < 2 W, < 4 VA
Tolerance	DC 20,4 - 297 V, AC 20 - 264 V
Connectable PTC-circuits	5 x 1...6 pcs according to DIN 44081 or 44082
Switching point	< 4000 Ω
Output relays K2, K3, K4	3 x 1 change-over contact (co)
Type of contact	type 3 (see "general technical informations")
Output relays 1-6	6 x 1 normally-open contact (no)
Rated current of fans	0,07...4,0 A
Test conditions	see "general technical informations"
Rated ambient temp. range	-20...+55 °C
Dimensions (h x w x d)	housing V8: 90x140x8 [mm], mounting height 55 mm
Attachment	on DIN-rail 35 mm or 3 screws M4
Protection housing / terminals	IP 30 / IP 20
Weight	app. 400 g

MS-Tester
for PTC-Relays Type MS

MS-Tester

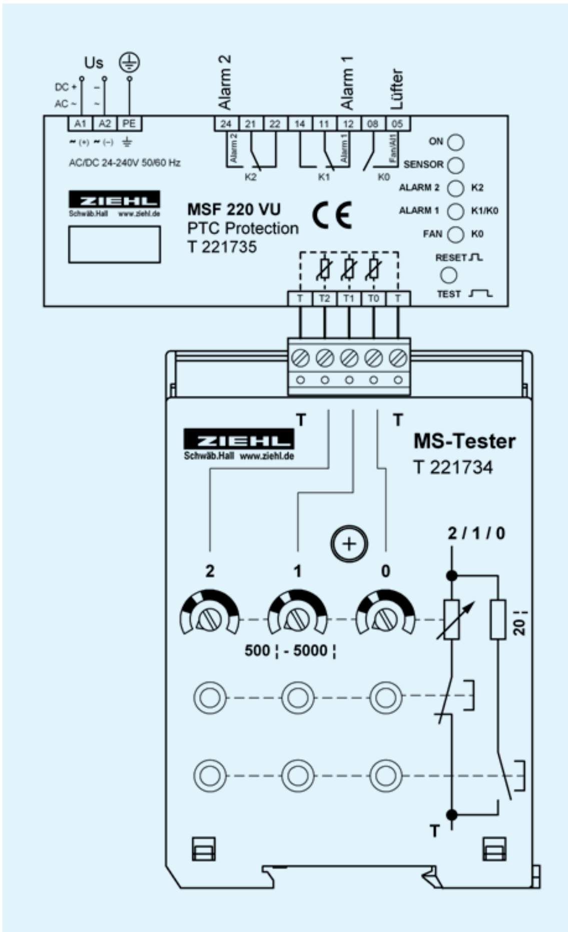
Simple PTC-relays can be easily tested by interrupting the sensor-line.
At PTC-relays with monitoring the sensor for short-circuit and break this is not possible.
With the ZIEHL MS-Tester these relays can also be tested easily for correct function.

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) tothe sensor-inputs
- 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 Ω to 4000 Ω for tripping and >1500 Ω 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 Ω, typically 50 ... 120 Ω per sensor.

Order-number: T221734



PTC-Resistor Temperature-Sensors MINIKA®

to DIN 44 081 and DIN 44 082

1

General

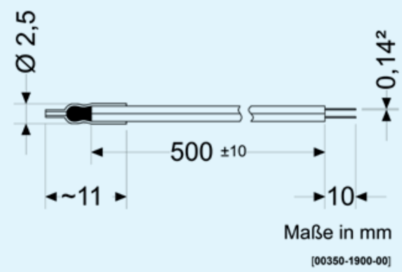
PTC-resistor temperature sensors (also called PTC-resistors or thermistors) are temperatur dependent semiconductor resistors whose main function is to alter their electrical resistance drastically when their body temperature reaches the nominal trip temperature NAT (TNF)

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

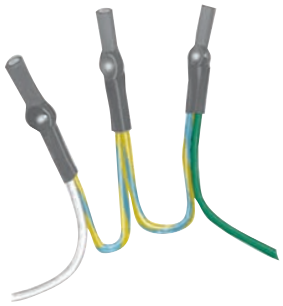
PTFE-insulated strand
Cu, silver-plated
Lead length: 500 ±10 mm
Stripping of lead-ends 10 mm
standard cross-section:
0,14 mm² (AWG 26)
weight: approx. 2,6 g

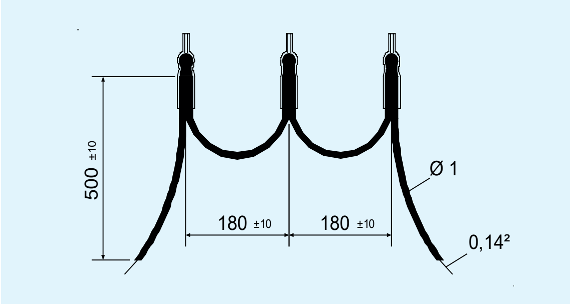


Type	NAT°C	Standard ID colour (DIN 44 081)	Order-no. MINIKA®
K60	60 ± 5	white - grey	**K401000**
K70	70 ± 5	white - brown	**K401010**
K 80	80 ± 5	white - white	**K401005**
K 90	90 ± 5	green - green	**K401015**
K100	100 ± 5	red - red	**K401025**
K110	110 ± 5	brown - brown	**K401035**
K120	120 ± 5	grey - 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

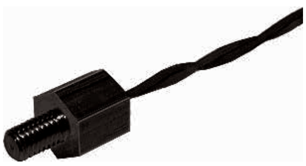


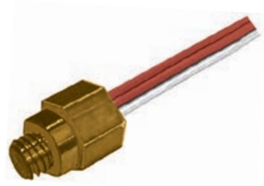


Type	NAT°C	Standard ID colour (DIN 44 082)	Order-no. MINIKA®
KD60	60 ± 5	white - yellow - yellow - grey	**K401300**
KD70	70 ± 5	white - yellow - yellow - brown	**K401310**
KD80	80 ± 5	white - yellow - yellow - white	**K401305**
KD90	90 ± 5	green - yellow - yellow - green	**K401315**
KD100	100 ± 5	red - yellow - yellow - red	**K401325**
KD110	110 ± 5	brown - yellow - yellow - brown	**K401335**
KD120	120 ± 5	grey - yellow - yellow - grey	**K401345**
KD130	130 ± 5	blue - yellow - yellow - blue	**K401355**
KD140	140 ± 5	white - yellow - yellow - blue	**K401365**
KD150	150 ± 5	black - yellow - yellow - black	**K401375**
KD160	160 ± 5	blue - yellow - yellow - red	**K401385**
KD170	170 ± 5	white - yellow - yellow - green	**K401395**
KD180	180 ± 5	white - yellow - yellow - red	**K401390**

Screw-in sensors in housing G2 (M4) and 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





Type	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 -20...NAT+5K	 ≤ 7,5 V DC ≤ 2,5 V DC	 ≤ 7,5 V DC ≤ 2,5 V DC	 ≤ 7,5 V DC ≤ 2,5 V DC
Nominal response temperature NAT (TNF)	60...180°C	60...180°C	80...180°C
Tolerance NAT	± 5 K	± 5 K	± 5 K
Nominal resistance R at -20...NAT-20K VPTC ≤ 2,5 V	≤ 250 Ω	≤ 750 Ω	≤ 250 Ω
Rated ambient temperature range	-20°C...NAT+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 (NAT), have the following values:

≤ 250 Ohms at temperatures of -20°C to NAT -20 degrees. Measurement voltage up to max. 2.5 V

≤ 550 Ohms at a temperature of NAT -5 degrees. Measurement voltage max. 2.5 V

≥ 1330 Ohms at a temperature of NAT +5 degrees. Measurement voltage max. 2.5 V

≥ 4000 Ohms at a temperature of NAT +15 degrees. Measurement voltage max. 7.5 V

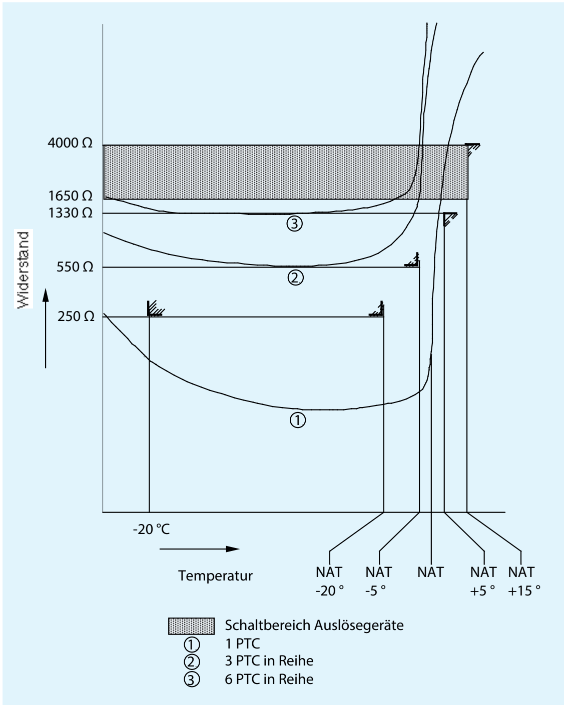
The exact values of the resistance values in the temperature ranges are not relevant. Flawless sensors should have a cold resistance of between 20 and at most 250 Ohms. Typical values (ambient temperature) lie between 50 - 150 Ohms.

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 NAT +15 degrees, at earliest at NAT +5 degrees.
- 3 PTC (typical instance) switch at latest at NAT +5 degrees, at earliest at NAT -5 degrees.
- 6 PTC switch at latest at NAT, at earliest at NAT -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.

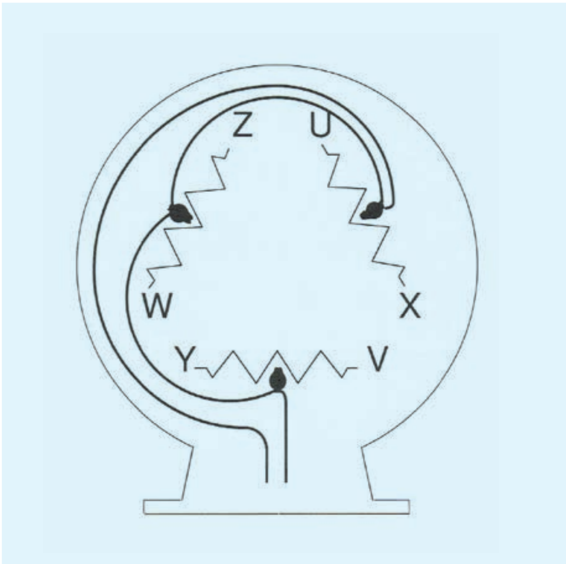
The maximum line lenght for a cable diameter of 0.5 mm^2 is approx. 500 m. For greater diameter cable, correspondingly more.

Fitting should, where possible, be carried out at the warmest winding head in the exhausted-air-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 PTC-resistor 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 mm^2 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 NAT -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 NAT and disruptive strength.

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:

1

type	connectable sensors Pt 100	connection 2-wire	3-wire technique	adjustable limits	output relays	analog output	housing	remarks
TR111V	1	-	x	1	1 co	-	V2	hysteresis and switching delay adjustable
TR122D	1	x	x	2	2 co	-	S12	digital display programmable, plug-in housing
TR122DA	1	x	x	2	2 co	0 / 4-20 mA	S12	digital display programmable, plug-in housing
TR210	2	x	x	2/4	2 co	0 / 4-20 mA 0 - 10 V	V4	digital display programmable, Pt 1000, Thermocouples
TR250	3	x	x	3	3 co	-	V4	digital display programmable, connection of PTC
TR400	4	x	x	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	x	4	3 + 1 co	-	96x96 mm	interface RS485 MODBUS
TR600	6	x	x	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	x	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	x	x	-	1 U	-	V8	RS485 MODBUS
TR1200IP	12	x	x	-	1 U	-	V8	Ethernet-Interface TCP/IP udp modbus TCP/IP
WR250	6	wireless		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

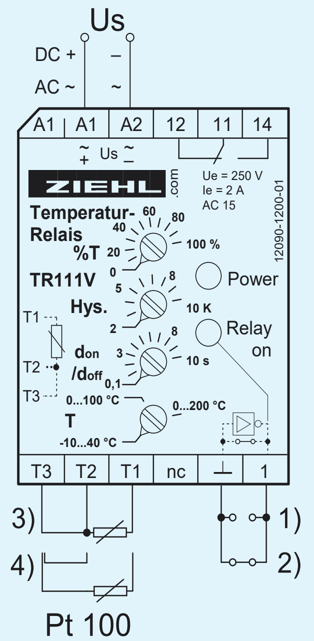
Temperature-Relays TR111V can be used as limit-switches or 2-point controllers with high repeat accuracy.
3 measuring-ranges, adjustable hysteresis and switching delay and the choice between operating- and closed-current principle of the relay make it a very universal device.

- Measuring input 1x Pt 100 (RTD) / 3-wire
- measuring-ranges selectable:
  - -10...+40/0...100/0...200 °C
  - 0...100/100...200/200...300/ 300...400 °C
- 1 limit adjustable 0...100 %
  switching delay adjustable 0,1...10 s
- Output-relay 1 changeover-contact (co)
- Operating- or closed-surrent-mode selectable with bridge
- Switching off at sensor-short-circuit or break
- LEDs for display state of operation
- Universal supply-voltage AC/ DC 24-240 V
- Housing for mounting in switchgear cabinets or fuse-boxes, 35 mm wide
  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:

-10...+200 °C	**T224107**
0...400 °C	**T224108**



1) Ruhestrom / closed current mode
2) Arbeitsstrom / operating current mode
3) 3-Leiter / 3-wire
4) 2-Leiter / 2-wire
Brücke zwischen T2-T3 / Bridge from T2-T3

Technical Data

Supply voltageUs	AC/DC 24-240 V, 0/50/60 Hz, < 2W, < 3VA (DC 20,4 - 297, AC 20-264 V)
Pt 100 -Sensor (RTD)	EN 60751 / IEC 60751
Measuring ranges	ranges selectable
Error of setting	± 5 K
Repeat error	app. 0,5 K
Temperature-dependence	≤0,05 %/K
Hysteresis	adjustable 2...10 K
Switching delay don/doff	adjustable 0,1...10 s
Relay output	1 change-over contact (co)
Type of contact	**type 3 see** "general technical informations**"**
Test conditions	siehe "general technical informations**"**
Rated ambient temperature range	-20°C…+55°C
Dimensions (H x W x D)	design V4: 90x70x58 [mm], mounting height 55 mm
Attachment	on 35 mm DIN-rail according to EN 60 715 or with screws M4
Protection housing/terminals	IP 30 / IP 20
Weight	app. 100 g

Pt 100-Temperature-Relay Type TR122DA

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

1

TR122DA

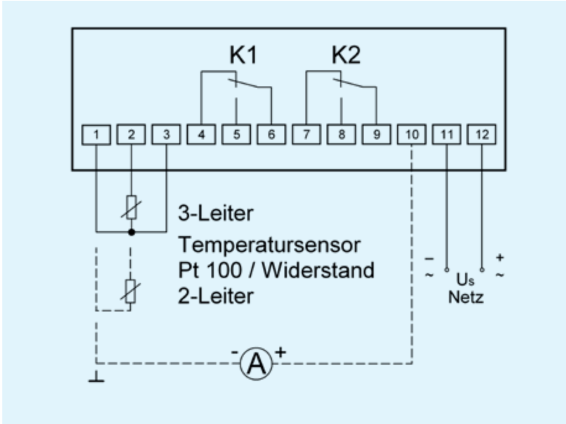
The TR122DA is a temperature relay with 2 independant switching points and with analog output.

Applications:

- Monitoring of temperature with pre-alarm and alarm
- Monitoring of under- and over-temperature
- 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

Order-numbers:

TR122DA with analog output	**T224126**
TR122D without analog output	**T224127**



Function

- 1 sensor Pt 100 (RTD) 2- or 3-wire-connection
- Range -199...+850 °C
- Resistance 0...850 Ω
- 2 alarms/relays (co- contacts)
- Digital display, 3 digits
- Monitoring of sensor (break/ short-circuit)
- Display of MIN- and MAX-values
- 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 line-resistance max. 3 x 22 Ω / 2 x 10 Ω
measuring accuracy	< 0,3 % of value ± 0,5 K (Ω)
measuring current	≤ 0,8 mA
connection of sensor	2-/3-wire, line-resistance max. 2 x 50 Ω/ 3 x 50 Ω
analog output	0/4-20 mA, max. 500 Ω, error <0,3% of fullscale
measuring range	-199 ... +850 °C / 0 ... 850 Ω
resolution	1 K (Ω), -19,9 ... 99,9: 0,1 K (Ω)
hysteresis	±200 K
switching delays	0...999 s
relay-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)	design S12: 82 x 42 x 121 [mm]
attachment	on 35 mm DIN rail according to DIN EN 50 022 or with screws M4
protection housing / terminals	P 30 / IP 20
weight	app. 300 g

Temperature Relay Type TR210

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

TR210

Art.-no: T224071

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.

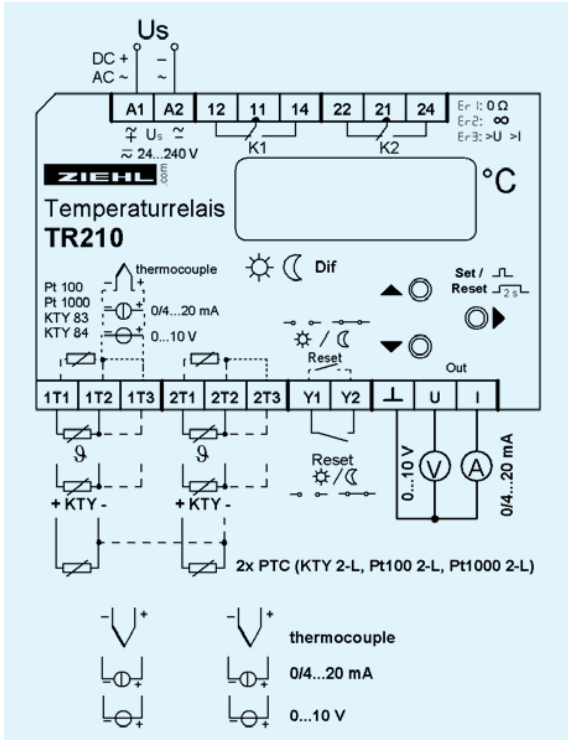
Function

- 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 max-values of inputs
- Code-lock against manipulation of settings
- Terminals pluggable

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

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

Switching-Functions:
- 2 relays (co-contacts)
- 2-4 limits
- Warmest/coldest sensor switches relay
- Programmable for every relay:
  - hysteresis (+ or - = MIN- or MAX-function) -199.9...999.9 s
  - autoreset or electronic reclosing lock
  - delay-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



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	AC/DC 24-240V, <3W, <7VA (AC 20-264 V, DC 20,4-297 V)
2 Measuring inputs	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 (22Ω), 0-10 V (13 kΩ)
Measuring-time	<2,5 s to 5 s, depending on speed of change of signal
Analog output	0/4-20 mA, max. 500 Ω. 0-10 V, max. 10 mA (without isolation to inputs)
Relay output	type 3, see "general technical informations" 2 x 1 co- (change-over) contact
Test conditions	see "general technical informations"
Rated ambient temperature renge	-20…+65°C
Dimensions h x w x d	design V4: 90x70x58 [mm], mounting height 55 mm
Protection housing / terminals	IP 30 / IP 20 (terminals pluggable)
Weight	app. 200 g
Attachment	on 35 mm DIN-rail or with screws M 4

Pt100-Temperature-Relay Type TR250

3 Sensors Pt 100 (RTD), Pt 1000, PTC or KTY, 3 Limits

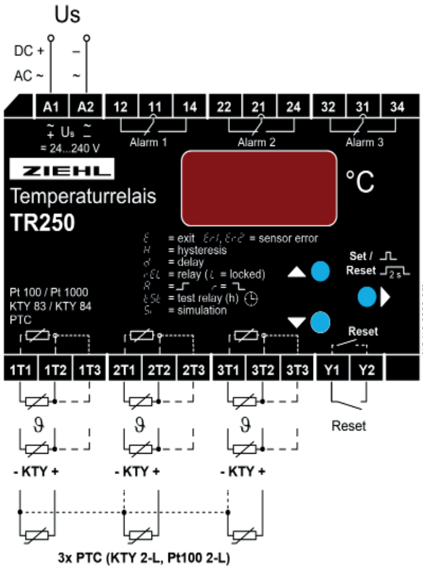
NEW: Alarm counter and preset programs for use with PTC thermistors only

TR250

Art.-no: T224190

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.



Function

- 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
- Alarm counter for 3x99 alarms with display of sensor and elapsed time.
- 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

Displays:
- 3 digit 7-segment-display for temperature and programming
- 3 LEDs for sensors, for alarms/ relays
- display °C or °F selectable, resolution 0.1 °C

Switching-Functions
- 3 relays
- warmest/coldest sensor switches relay
- prgrammable for every relay:
  - hysteresis
  - 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

6 preset programs:
- motor / generator with 3x Pt 100
- transformer with 3x Pt 100
- transformer with 2x PTC / 3x PTC
- transformer with 2x PTC and 1x Pt 100
- 3 x 1 alarm per sensor

Technical Data

Rated supply voltage Us	AC/DC 24-240 V (AC 20-264 V, DC 20-297 V)
Sensor connection	3 x Pt100 (DIN 43 760/IEC 751) (RTD) 3 x Pt1000, KTY83, KTY84 3 x 1...6 PTC (DIN 44080/44081)
Measuring accuracy	< 0,5 % of value ±1 K
Sensor-current	< 1 mA
Connection	3-wire, 2-wire, line-resistance max. 2 x 50 Ω
Measuring range	-199...+850 °C
Hysteresis	-99...+99 °C
Switching delay on/off	0...99 s / 0...999 s
Type of contact	**type 2** (see "general technical information") 3 x change-over / alarm
Test conditions	see "general technical information"
Rated ambient temperature range	-20°C...+65°C
Dimensions (h x w x d)	V4: 90 x 70 x 58 [mm], mounting height 55 mm
Protection housing / terminals	P 30 / IP 20
Weight	app. 200 g
Attachment	on 35 mm DIN rail or with screws M4

Pt100-Temperature Relays type TR400

Digital, 4 Sensors, 4 Limits

1

TR400

Art.-no: T224380

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 orcoolant
- transformers with additional monitoring of the core temperature also

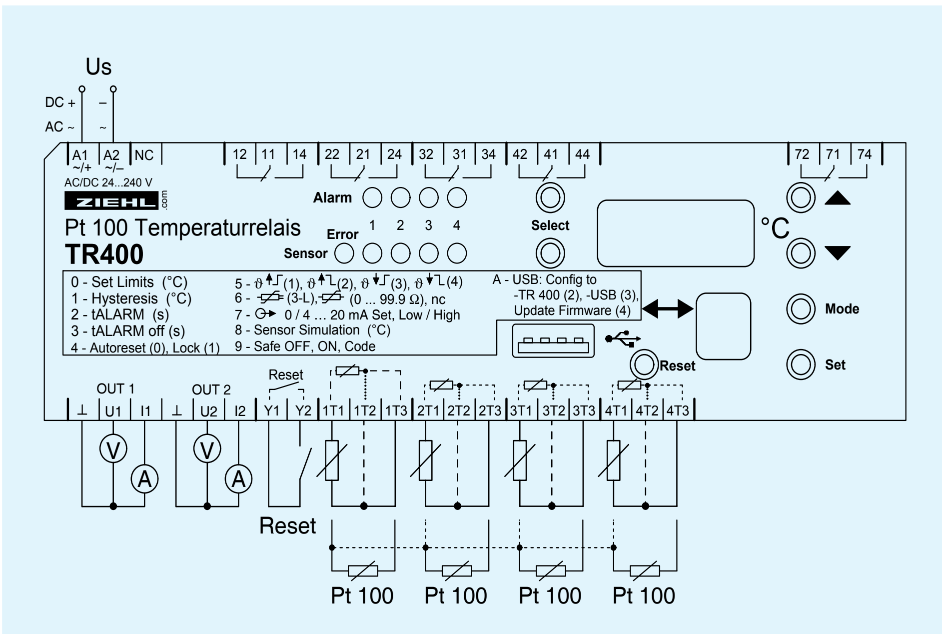
Function

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 firmware-updates

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
frequency	0 / 50 / 60 Hz

Relay outputs

	5 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_e AC15	I_e = 3 A U_e = 250 V
DC13	I_e = 0,1 A U_e = 250 V
	I_e = 2 A U_e = 24 V
recommended fuse NO	4 A time-lag or miniature circuit-breaker MCB B4
recommended fuse NC	3.15 A time-lag
expected life mechanical	3 x 10^7 operations
expected life electrical	1 x 10^5 operations with AC 250 V / 5 A, cos φ = 1

Testing conditions

	EN 60 010-1
ambient temperature range	- 20 ... + 65 °C
galvanic separation	Us-Relay, Sensors, USB, Analog output
	Restet 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

	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_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
current outputs	DC 0/4 mA – 20 mA
output resistance current	max. 500 Ω
no-load voltage	max. DC 16 V
accuracy	1% of span ±1 K

Housing

design	V8
dimensions (h x w x d)	90 x 140 x 58 [mm]
line connection solid wire	1 x 1,5 mm²(1,0 mm² with end sleeves for strands)
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

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 over-temperature 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, change-over (co) contacts
- Relay for Fan max. 10 A
- Adjustable (depending of function)
  - Hysteresis 1…99 K
  - Switch- and switch-back-delay 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)

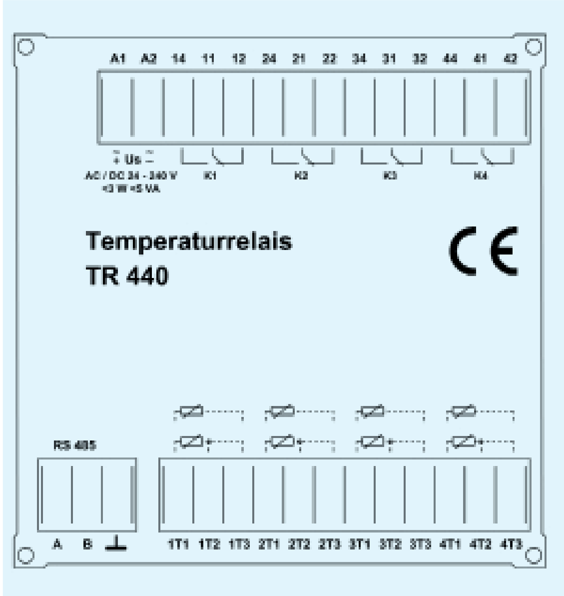
Alarm 2 reports sensor-error and alarm

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: T224184
RS485 T224185

Connection plan:



Technical Data

Rated supply voltage Us	AC/DC 24-240V, AC 20-264 V, DC 20-297 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 Ω
Measuring range	-199...850 °C (-199...+999 °F)
Hysteresis	1...99 °C (°F)
Switching-delay on/off	0...999 s
Relay-output	Alarm 1 (Fan): 10 A Alarms 2-4: type 3, see "general technical informations"
Test conditions	see "general technical informations"
Rated ambient temperature range	-40...+65 °C
Housing	panel-mount 96 x 96 mm
Dimensions (H x B x T)	96 x 96 x 85 mm
Terminals	2 x 13-pole
Line connection solid wire	1 x 0,5 mm^2
Stranded with insulated ferrules	1 x 0,14...1,5 mm^2
Attachment	Panel-mount, cutout 92$^{+0,8}$x92$^{+0,8}$ mm
Protection housing	IP 20
Protection front	IP 54
Protection terminals	IP 20
Weight	app. 290 g

Pt100-Temperature-Relay Type TR600

Digital, 6 Sensors, 6 Limits, 2 analog outputs

TR600

Art.-number: T224360

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

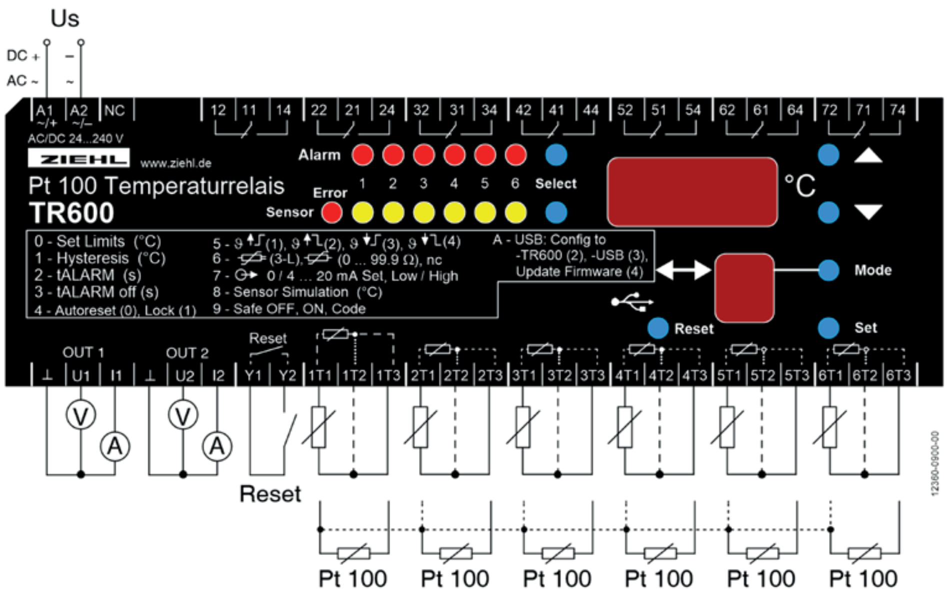
- measuring and monitoring range -199 ... +800 °C
- 6 sensor inputs with 2- or 3-wire connection
- 6 relay outputs K1 to K6 with change-over contacts
- switching points for single sensor or group of 2, 3 or 6 sensors
- sensor error relay K7 monitors sensor break or
- sensor short circuit as well as an interruption of the power-supply.
- 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 up- and download of sets of parameters and for firmware-updates

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



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_e	
	AC 15	I_e = 3 A U_e = 250 V
	DC 13	I_e = 2 A U_e = 24 V
		I_e = 0,1 A U_e = 250 V
	recommended fuse NO	4 A time-lag or miniature circuit-breaker MCB B4
	recommended fuse NC	3.15 A time-lag
	expected life mechanical	3 x 10^7 operations
	expected life electrical	1 x 10^5 operations with AC 250 V / 5 A, cos φ = 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	≤ 0,7 mA
	measuring delay time t_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
	current outputs	DC 0/4 mA – 20 mA
	output resistance current	max. 500 Ω
	no-load voltage	max. DC 16 V
	accuracy	1% of span ±1 K
Housing	design	V8
	dimensions (h x w x d)	90 x 140 x 58 [mm]
	line connection solid wire	1 x 1,5 mm^2(1,0 mm^2 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

Pt100-Temperature-Relay Type TR600

Digital, 6 Sensors, 6 Limits, RS485

TR600 RS485

Art.-number: T224361

Temperature Relay for 6 Sensors Pt100
The Pt100-temperature relay TR600 monitors up to six sensors Pt100 (RTD) at the same time. 6 switching points and 6 relays permit almost any combination of switching action. It also can select the highest temperature of groups of sensors.
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

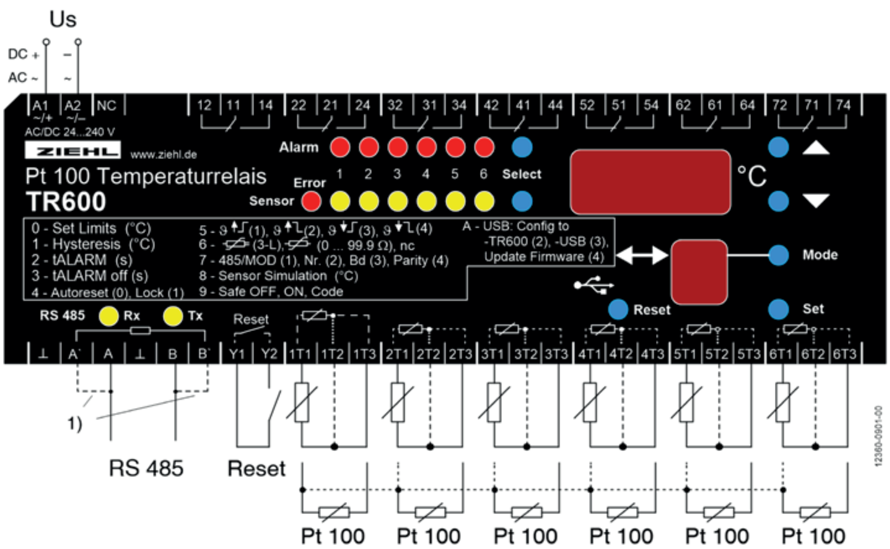
- measuring and monitoring range -199 ... +800 °C
- 6 sensor inputs with 2- or 3-wire connection
- 6 relay outputs K1 to K6 with change-over contacts
- switching points for single sensor or group of 2, 3 or 6 sensors
- sensor error relay K7 monitors sensor break or sensor short circuit as well as an interruption of the power-supply.
- interface RS485 protocols ZIEHL and modbus RTU
- universal power supply in 2 ranges AC/DC 24 - 240 V
- USB-Stick-Terminal for up- and download of sets of parameters and for firmware-updates

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



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_e	
	AC 15	I_e = 3 A U_e = 250 V
	DC 13	I_e = 2 A U_e = 24 V
		I_e = 0,1 A U_e = 250 V
	recommended fuse NO	4 A time-lag or miniature circuit-breaker MCB B4
	recommended fuse NC	3.15 A time-lag
	expected life mechanical	3 x 10^7 operations
	expected life electrical	1 x 10^5 operations with AC 250 V / 5 A, cos φ = 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	≤ 0,7 mA
	measuring delay time t_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
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^2(1,0 mm^2 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

Universal-Relay Type TR800Web

8 Inputs, Operation with Browser via TCP/IP

TR800Web

Art.-Nr. T224164

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
- monitoring of filling levels (water, oil) with ZIEHL [filling level probe NS6123-6]
- logging of measured values and remote inquiry e.g. for monitoring temperatures at engines and in plants

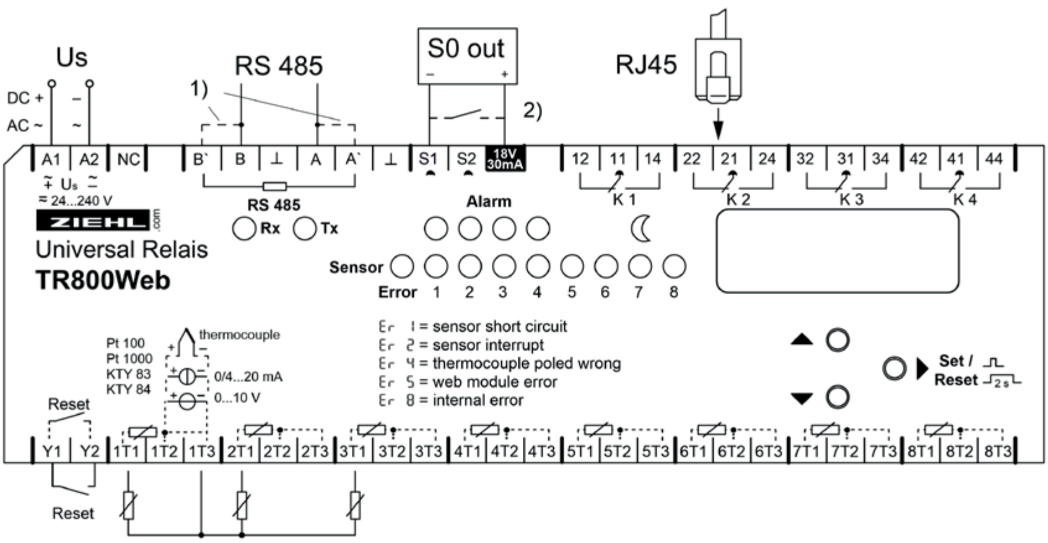
Features

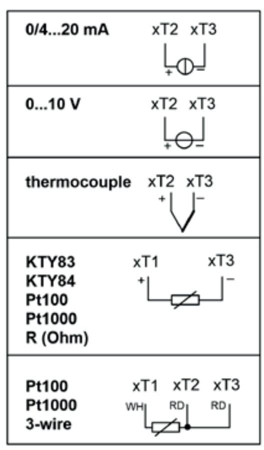
8 Measuring Inputs (each programmable):

- 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
- Difference of 2 signals

4 Alarms

- 4 relays, potential-free change-over contacts
- Remote switching of relays via Ethernet
- for every alarm separately programmable
  - one limit per input (limit and switching-back-value)
  - second set of values switchable day/night
  - switching-delay and switching-back delay
  - remote operation of relays (on/off) with browser
  - interlocked switching
  - email at alarm





Programmable via internet in web-browser

- 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

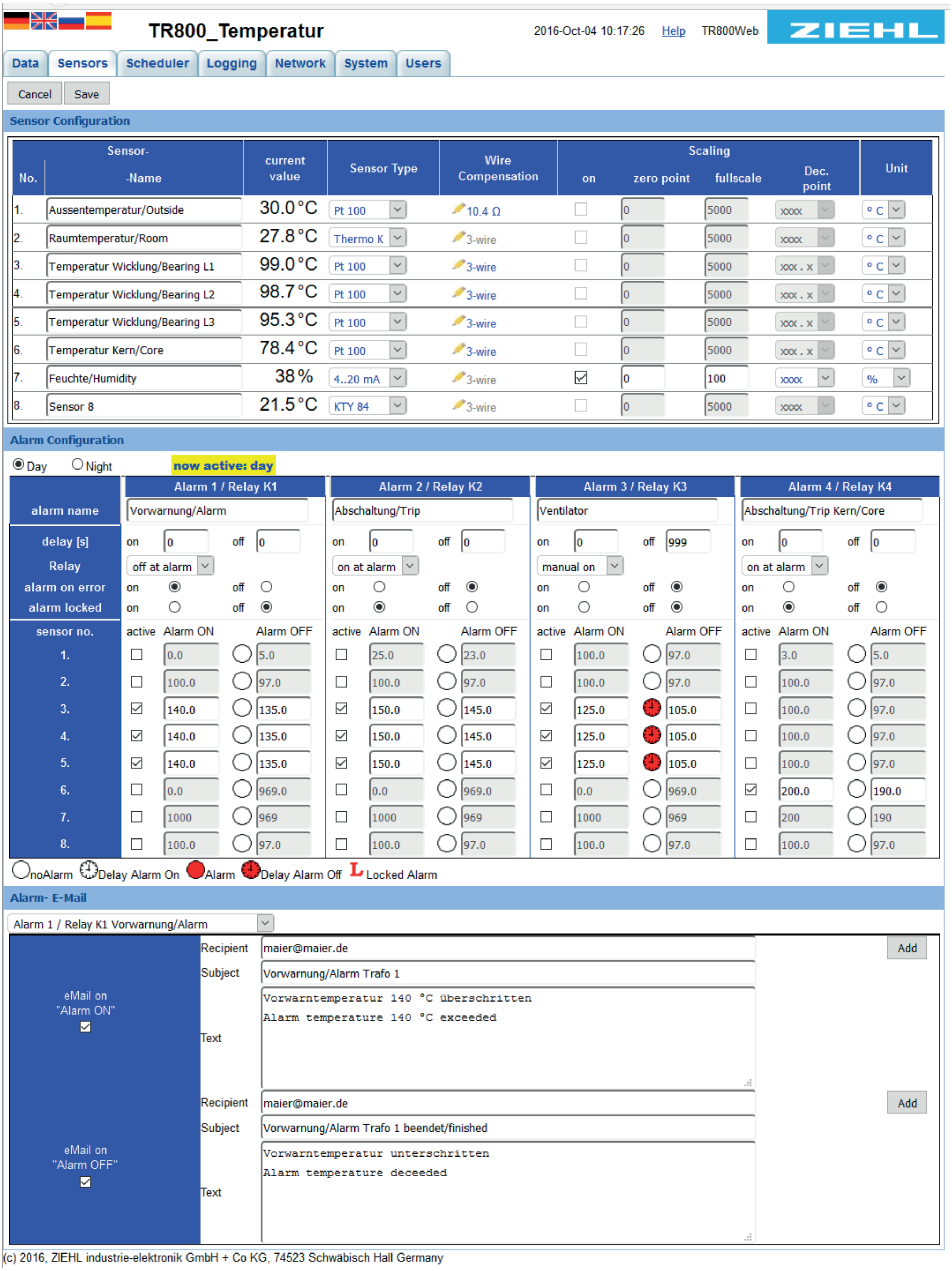
RS485 interface to readout data with modbus (RTU) and ZIEHL-protocol

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

1

Operating and Programming with Web-Browser:



TR800_Temperatur   2016-Oct-04 10:17:26   Help   TR800Web   ZIEHL

Data | Sensors | Scheduler | Logging | Network | System | Users

Cancel   Save

Sensor Configuration

No.	Sensor-Name	current value	Sensor Type	Wire Compensation	Scaling on	zero point	fullscale	Dec. point	Unit
1.	Aussentemperatur/Outside	30.0 °C	Pt 100	10.4 Ω	☐	0	5000	xxxx	° C
2.	Raumtemperatur/Room	27.8 °C	Thermo K	3-wire	☐	0	5000	xxxx	° C
3.	Temperatur Wicklung/Bearing L1	99.0 °C	Pt 100	3-wire	☐	0	5000	xxx . x	° C
4.	Temperatur Wicklung/Bearing L2	98.7 °C	Pt 100	3-wire	☐	0	5000	xxx . x	° C
5.	Temperatur Wicklung/Bearing L3	95.3 °C	Pt 100	3-wire	☐	0	5000	xxx . x	° C
6.	Temperatur Kern/Core	78.4 °C	Pt 100	3-wire	☐	0	5000	xxx . x	° C
7.	Feuchte/Humidity	38 %	4..20 mA	3-wire	☑	0	100	xxxx	%
8.	Sensor 8	21.5 °C	KTY 84	3-wire	☐	0	5000	xxxx	° C

Alarm Configuration

◉ Day ○ Night   now active: day

	Alarm 1 / Relay K1			Alarm 2 / Relay K2			Alarm 3 / Relay K3			Alarm 4 / Relay K4		
alarm name	Vorwarnung/Alarm			Abschaltung/Trip			Ventilator			Abschaltung/Trip Kern/Core		
delay [s]	on 0		off 0	on 0		off 0	on 0		off 999	on 0		off 0
Relay	off at alarm			on at alarm			manual on			on at alarm		
alarm on error	on ◉		off ○	on ○		off ◉	on ○		off ◉	on ○		off ◉
alarm locked	on ○		off ◉	on ◉		off ○	on ○		off ◉	on ◉		off ○
sensor no.	active	Alarm ON	Alarm OFF	active	Alarm ON	Alarm OFF	active	Alarm ON	Alarm OFF	active	Alarm ON	Alarm OFF
1.	☐	0.0	5.0	☐	25.0	23.0	☐	100.0	97.0	☐	3.0	5.0
2.	☐	100.0	97.0	☐	100.0	97.0	☐	100.0	97.0	☐	100.0	97.0
3.	☑	140.0	135.0	☑	150.0	145.0	☑	125.0	105.0	☐	100.0	97.0
4.	☑	140.0	135.0	☑	150.0	145.0	☑	125.0	105.0	☐	100.0	97.0
5.	☑	140.0	135.0	☑	150.0	145.0	☑	125.0	105.0	☐	100.0	97.0
6.	☐	0.0	969.0	☐	0.0	969.0	☐	0.0	969.0	☑	200.0	190.0
7.	☐	1000	969	☐	1000	969	☐	1000	969	☐	200	190
8.	☐	100.0	97.0	☐	100.0	97.0	☐	100.0	97.0	☐	100.0	97.0

noAlarm   Delay Alarm On   Alarm   Delay Alarm Off   L Locked Alarm

Alarm- E-Mail

Alarm 1 / Relay K1 Vorwarnung/Alarm

eMail on "Alarm ON" ☑	Recipient	maier@maier.de	Add
	Subject	Vorwarnung/Alarm Trafo 1	
	Text	Vorwarntemperatur 140 °C überschritten Alarm temperature 140 °C exceeded	
eMail on "Alarm OFF" ☑	Recipient	maier@maier.de	Add
	Subject	Vorwarnung/Alarm Trafo 1 beendet/finished	
	Text	Vorwarntemperatur unterschritten Alarm temperature deceeded	

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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

Inputs

Measuring cycle/measuring time: < 3 s

Pt100, Pt1000 according to EN 60 751

	Measuring range °C		Short-circuit Ohm	Interruption Ohm	Resistance sensor + 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

Accuracy: < ± 0,5 % of measured value ± 0,5 K (KTY ±5K)
Sensor-current: ≤ ± 0,6 mA
Thermal drift: < 0,04 °C/K

Thermocouples according to EN 60 584, DIN 43710

Typ	Measuring range °C Min	Max	Accuracy
B	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
T	-270	400	≤ ± 1 °C

Thermal drift: < 0,01 % /K
Measuring-error of sensor-line: + 0,25 µV / Ω
Accuracy of summing point: < ± 5 °C

Inputs for voltage and current

	Resistance of input	max. Inputsignal	Accuracy from Full Scale
0 - 10 V	12 k Ω	27 V	< 0,1 %
0/4...20 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 ± 0,5 Ω
Accuracy 0...30,00 kΩ: < 0,5 % measured value ± 2 Ω
Measuring current: ≤ 0,6 mA

Housing

dimensions (w x h x d): design V8, switchgear-mount
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 (with 2 extra bars)
weight: app. 370 g

Pt100-Temperature-Relay TR1200

12 Sensors, Interface RS485

1

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

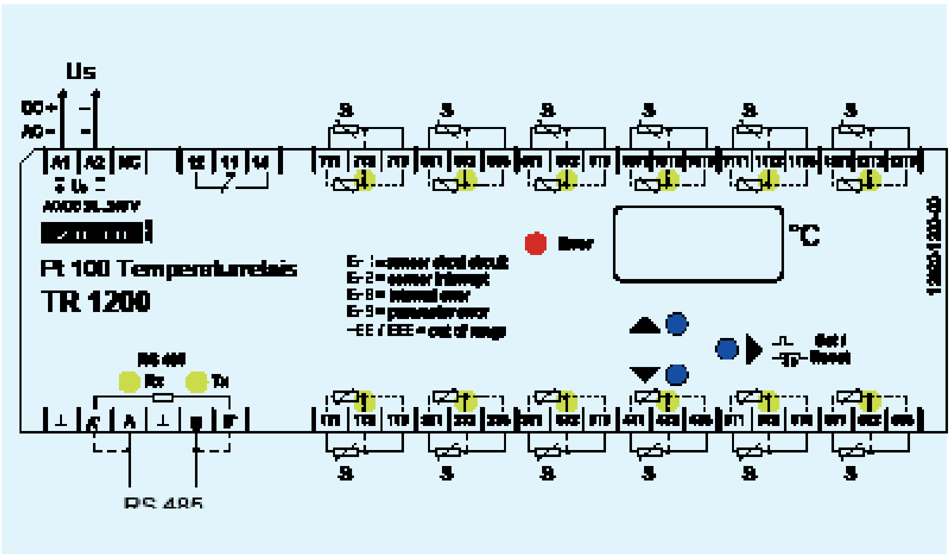
Sensors and Displays:
- 12 inputs for sensors Pt100 (RTD)
- Connection 2- or 3-wire unneeded inputs can be switched off
- Monitoring of sensors for short-circuit and interrupt
- 3-digit-display for temperature
- LEDs for assigning the measured value, error, state of relay and interface

Interface:
- Interface RS485 (protocols ZIEHL-standard and Modbus-RTU)
- Baud rate (4800/9600/19200) and Parity-Bit selectableProtocols 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	± 0,5% of value ± 1 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	see "general technical informations"
Rated ambient temperature range	-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, IEC 61850 (GOOSE)

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 following protocols are available:

- Modbus TCP
- ZIEHL RTD
- IEC 61850 (GOOSE)

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:

- Interface TCP/IP
- 10 MBit/s Ethernet
- supports IEC 61850 GOOSE

- Protocol details see www.ziehl.de - operating manuals

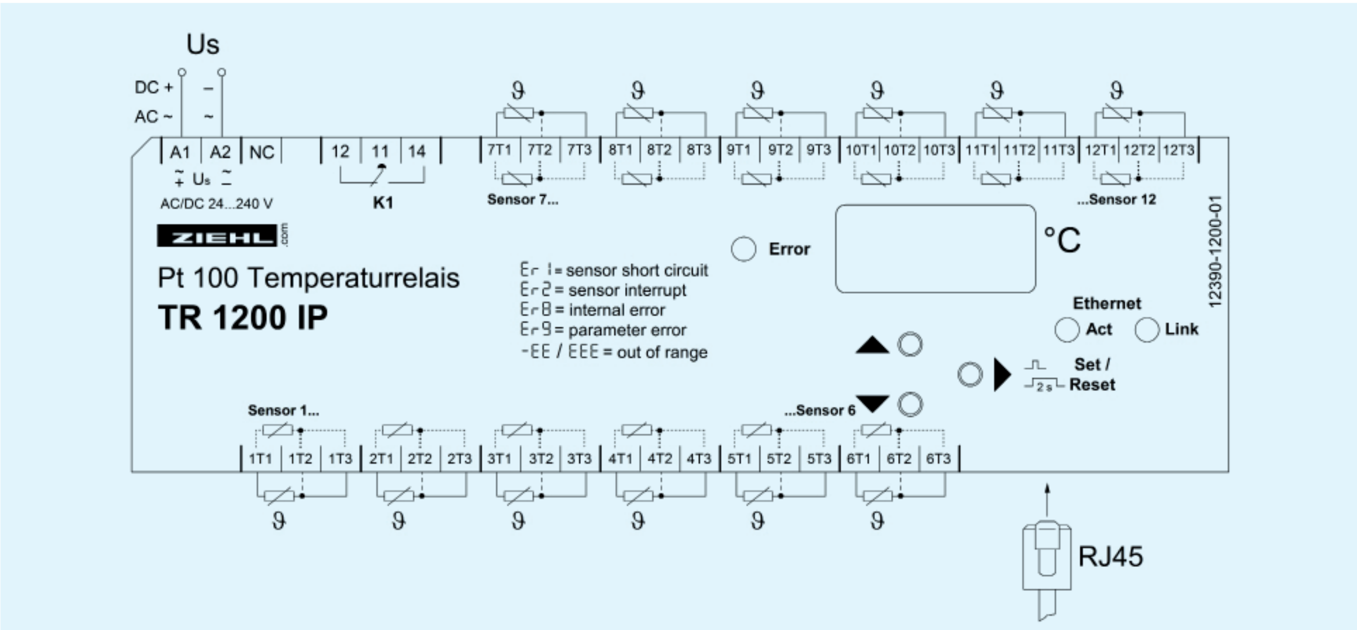
More Features:

- easy operation and selection of temperatures at the device
- Sensor-simulation
- Code-protection against manipulation of settings
- Relay for Error (1 co-contact) for sensor-error and operational failure
- 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)

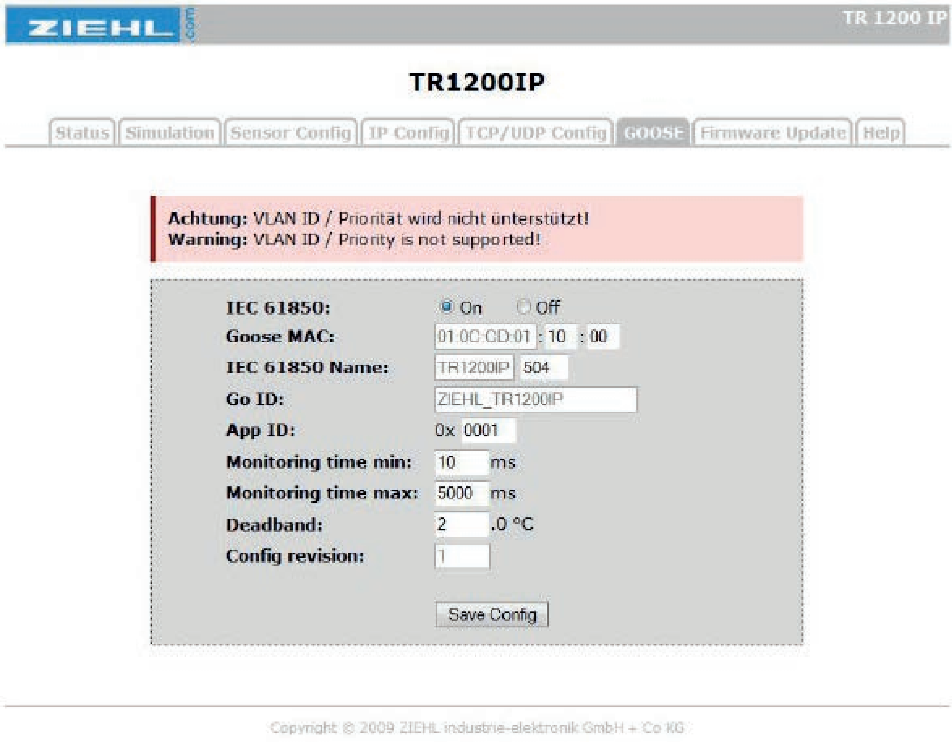
Software

- The TR1200IP can be operated with a normal web-browser. There is no special software required.

Order-number **T224078**



GOOSE settings and configuration:



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	± 0,5% of value ± 1 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	see "general technical informations"
Rated ambient temperature range	-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

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

1

Function

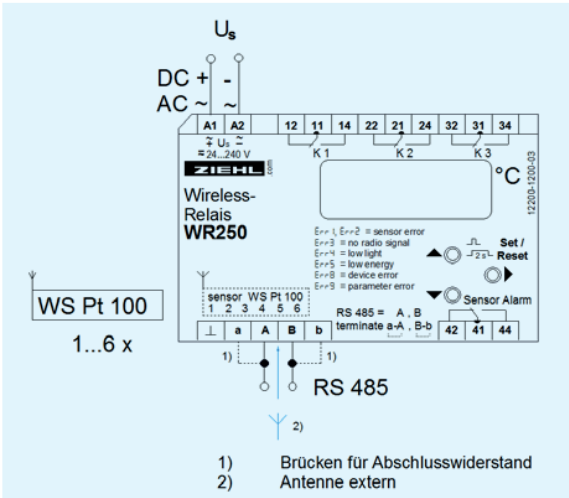
- Evaluation of 1-6 WS Pt 100-sensors
- Measuring- and monitoring-range 0…180 °C
- Limits and functions of relay pre-set for monitoring transformers (Fan, Alarm, Trip)
- Sensor-Simulation for testing the settings
- Code-lock against manipulation of settings
- Universal power-supply AC/ DC 24-240 V
- 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



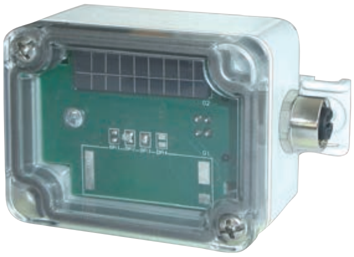
Technical Data

Rated Supply Voltage Us	AC/DC 24-240V, AC 20-264 V, DC 20,4-297 V, <5VA
Sensor-Input	Receiver for 1-6 wirelesssensors WS Pt 100
Measuring range	0...180 °C
Tolerance	± 4 K (Wirelesssensor Pt 100)
Relay-output	Typ 2 see "general technical informations" 4 x 1 changeover-contact (CO)
Test conditions	see "general technical informations"
Rated ambient temperature range	-20…+65°C
Dimensions (h x w x d)	Design V4: 90x 70x 58 [mm], mounting height 55 mm
Protection housing / terminals	IP 30 / IP 20
Weight	approx. 190 g
Attachment	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.

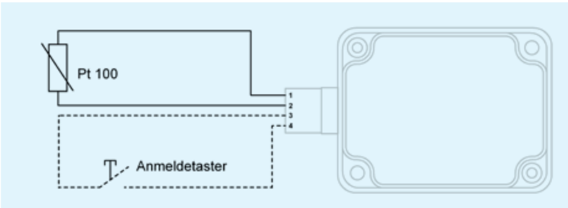
The maximum duration at darkness depends on the selected intervals for measuring- and sending and on the state of charge of the capacitor.
Power-supply and transmission of data are completely potential-free. Thus high differences in potentials are possible.
The electronics must be mounted potential-free 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	not required (supply via photocell)
Radio frequency	868,3 MHz
Transmitting power	max. 10 mW
Measuring cycle	app. 1s / 10s / 100s (BR1 and BR2)
Sending cycle	every 1 / 10 / 100 measurements (BR3 and BR4)
Battery Life	depending on configuration and ambient temperature up to 10 years
Measuring range	0 °C...180 °C
Tolerance	± 4 K
Environment	weather-protected places +5°C … +65°C 5% … 85% relative humidity no condensation or icing permitted
Protection	IP 66
Interference resistance	EN 61000-6-2
Dimensions (h x w x d)	65 x 50 x 35 mm
Protection housing / terminals	IP 66 / IP 67
Attachment	Screws M 4 (mounting plate included)
Weight	app. 80 g

Safety Temperature-Limiting-Device STR100

for Pt100

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 ca be 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 safe STR100 can be used in applications, in which an increased safety level up to SIL 2, PL c is required. It 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

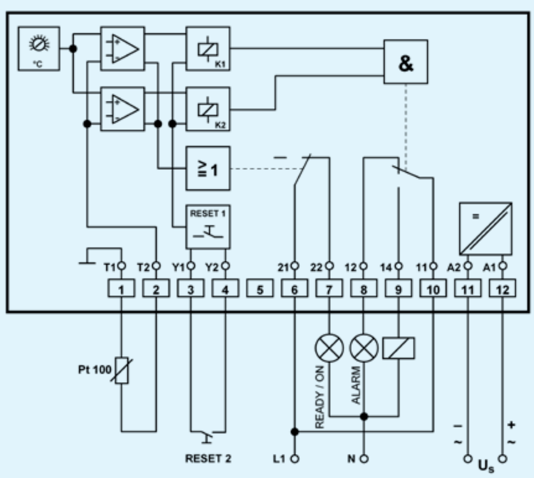
The safety temperature limiting device STR100 detects the resistance of a Pt100-sensor connected to the input. This is linearized and evaluated in 2 separated channels. If the measured temperature is smaller than the limit value adjusted, both output relays are picked up. To do this, a reset has to be 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 short-circuit 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
- SIL2 according to IEC61508
- 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

Art.-numbers:

0...200°C	AC 230 V	**T224148**
100...300°C	AC 230 V	**T224142**
200...500°C	AC 230 V	**T224144**
0...200°C	DC 24 V	**T224058**
100...300°C	DC 24 V	**T224059**
200...500°C	DC 24 V	**T224062**

Other measuring ranges -200...700 °C upon 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 Ω, Option: max. 30 Ω	
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 I_{th}	6 A	
	nominal operating current I_e	2 A AC 15 400V 4 A AC 11/AC 15 230V	2 A DC 13 24 V
	recommended fuse for contacts	3,15 A slow blow, 4 A flink	
	expected life mechanical	3 x 10^7 operations	
	expected life electrical	1 x 10^5 operations with 240 V/6 A	
	derating factor cos φ 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 voltage	4000 V	
	Overvolatage category	III	
	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 range	0...50°C EN 60068-2-1 dry heat	
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^2	
	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

1

General

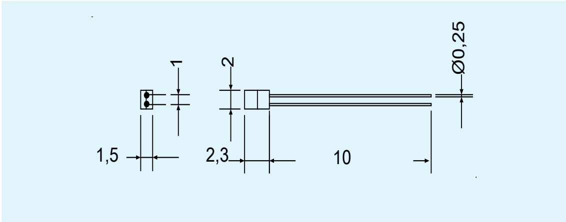
TF101 temperature sensors use EN 60751/IEC 60751 platinum resistance temperature detectors (RTD). For precise temperature measurement the Platinum Resistance Thermometer offers the best overall advantages in repeatability and stability over a long period. High accuracy allows replacement of a sensor without any need for re-adjust of the connected measuring devices or thermostats.

Types / Description

TF101N
-70°C...+500°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.

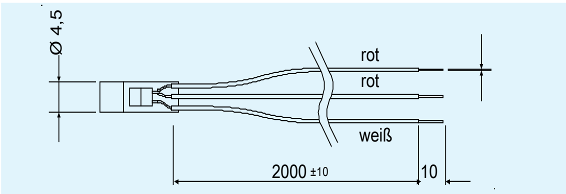
Order number: **019061**



TF101K
-50°C...+170°C

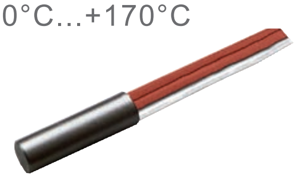
Platinum resistance temperature sensor on ceramic substrate protected by a heat-shrinkable sleeve and with PTFE isolated stranded wire. The TF101K version can be installed in motor or transformer windings. When build-in into windings do not pressure the sensor element. Precautions should be taken to 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.

With 2-wire connection and cable-length of 2 m there is a temperature-failure of approx. 0.51 Ω = 1.32 K caused by the line resistance.
Cable length: 2000 mm
Weight: 10 g
Order number: 2-wire **T223154**
3-wire **T223134**

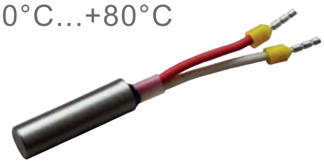


TF 101U2
-30°C...+105°C

-50°C...+170°C



-30°C...+80°C

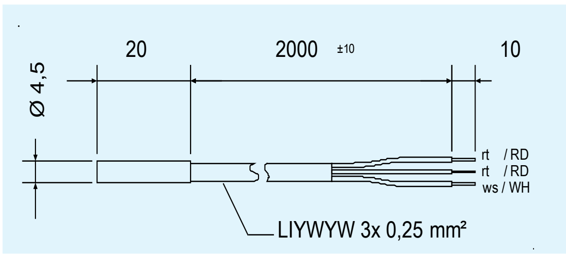


Sensors TF101U2 are encapsulated in a stainless-steel-shell V4A. They are suitable for measuring temperatures in fluids, at surfaces or for inside or outside applications. The protection class is IP 66. The version with PVC-insulated cable (3 x 0,25 mm² in one cable) can be easily wired. The maximum ambient temperature is 105 °C.
The sensor with cable 30mm (PVC) can be mounted in terminals in switchgear cabinets to measure temperature in enclosure.
The version with PTFE-insulation (3 x 0,14 mm² single wires) withstands peak-temperatures up to 200 °C

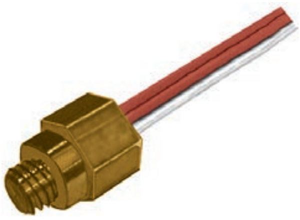
Weights: PVC: 2 m = 50 g, 10 m = 250 g, 30 mm = 15 g
PTFE: 2 m = 20 g

Order numbers:

3-wire	2m PVC	-30...+105°C	**T223051**
3-wire	10m PVC	-30...+105°C	**T223058**
3-wire	2m PTFE	-50...+170°C	**T223052**
2-wire	30mm PVC	-30...+ 80°C	**T223047**



TF101G3
-50°C...+170°C
Screw-in housing



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...+170°C

Platinum resistance temperature sensor built into steel tube V4A, 1/2 inch, suitable for installation in pipes. Thermal response time $T_{0,9}$ in the air 255 s, in water 45 s.
Suitable for transmission in 2- or 3-wire technique.
Weight 120 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 x 50 x 38 mm
Weight: app. 70 g

Order number: **T223060**

Technical Data

Nominal resistance	100 Ω at 0 °C
Temperature coefficient	3,85 x 10 $^{-3}$/K (see table)
Class B, DIN 43 760	$\Delta\vartheta = \pm (0{,}3 + 0{,}005\ \vartheta)$ [°C]
Test voltage	2,5 kV AC (not 019061 and T223047)
Extension leads	PTFE; silver-plated stranded copper wire 0,14 mm² or PVC isolated copper wire
Shrink sleeve	Kynar
max. temperature at sensors with max. 170°C	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.

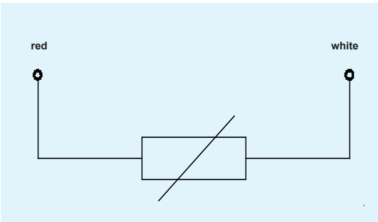
Line-resistance

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:

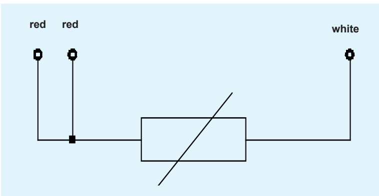
R [Ω] = 2 x l/(k x A), l = cable length [m],
k = conductivity [S x m/mm^2] e.g. Cu = 56,
A = cross sectional area [mm^2]

For example copper-wire: l = 50 m, cross sectional area 1 mm^2: R = 2 x 50/(56 x 1) = 1,79 Ω, Resulting error = 1,79 Ω/0,385 Ω x K = 4,6 K.

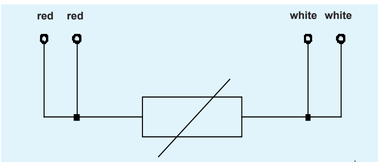
Linecompensation



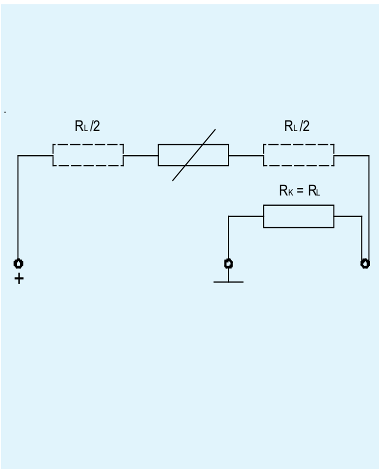
2-wire technique
With 2-wire connection the line resistance is compensated for by a potentiometer in the thermostat, by programming (e.g. TR122D, TR600) or via wiring an external resistor. The advantage of the possibly simpler and more economical running of just two wires is counter-acted by the disadvantage 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 Ω for measuring resistors Pt 100 according to DIN/ IEC 751

°C	Ω	°C	Ω	°C	Ω	°C	Ω	°C	Ω	°C	Ω
-200	18,49	0	100,00	200	175,84	400	247,04	600	313,59	800	375,51
-190	22,80	10	103,90	210	179,51	410	250,48	610	316,80	810	378,48
-180	27,08	20	107,79	220	183,17	420	253,90	620	319,99	820	381,45
-170	31,32	30	111,67	230	186,82	430	257,32	630	323,18	830	384,40
-160	35,53	40	115,54	240	190,45	440	260,72	640	326,35	840	387,34
-150	39,71	50	119,40	250	194,07	450	264,11	650	329,51	850	390,26
-140	43,87	60	123,24	260	197,69	460	267,49	660	332,66		
-130	48,00	70	127,07	270	201,29	470	270,86	670	335,79		
-120	52,11	80	130,89	280	204,88	480	274,22	680	338,92		
-110	56,19	90	134,70	290	208,45	490	277,56	690	342,03		
-100	60,25	100	138,50	300	212,02	500	280,90	700	345,13		
- 90	64,30	110	142,29	310	215,57	510	284,22	710	348,22		
- 80	68,33	120	146,06	320	219,12	520	287,53	720	351,30		
- 70	72,33	130	149,82	330	222,65	530	290,83	730	354,37		
- 60	76,33	140	153,58	340	226,17	540	294,11	740	357,42		
- 50	80,31	150	157,31	350	229,67	550	297,39	750	360,47		
- 40	84,27	160	161,04	360	233,17	560	300,65	760	363,50		
- 30	88,22	170	164,76	370	236,65	570	303,91	770	366,52		
- 20	92,16	180	168,46	380	240,13	580	307,15	780	369,53		
- 10	96,09	190	172,16	390	243,59	590	310,38	790	372,52		

Pt1000-Temperature-Sensor

The Pt1000 sensor is the "big brother" of the Pt100 sensor. Its nominal resistance at 0°C is 1000 Ω. 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 un-insulated). 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

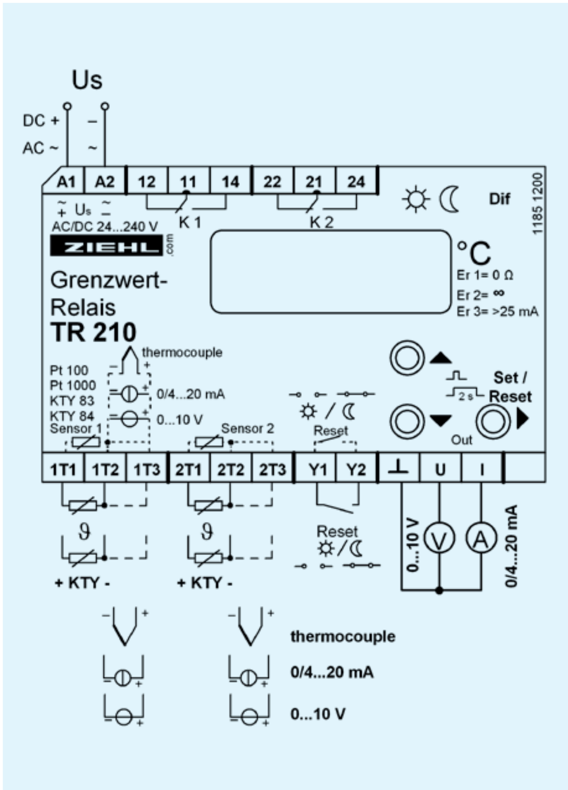
- Measuring and monitoring range -170...+1820 °C
- resolution 0,1°C (to 999.9 °C)
- Analog output (scaleable) for 1 input, min./max. of 2 inputs or difference of 2 sensors (no isolation between inputs and output)
- 2 relay outputs
- Shifting of day/night (selectable with contact at terminals Y1/Y2)
- Universal power supply AC/ DC 24-240 V
- Easy setting with 3 buttons and preset programs
- Storing of min- and max-values 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, 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	AC/DC 24-240V, <3W, <5VA (AC 20-264 V, DC 20,4-297 V)
2 Measuring inputs	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 (22Ω), 0-10 V (13 kΩ)
Measuring-time	<2,5s to 5s, depending on speed of change of signal
Analog output	0/4-20 mA, max. 500 Ω. 0-10 V, max. 10 mA (without isolation to inputs)
Relay output	type 3, see "general technical informations" 2 x 1 co- (change-over) contact
Test conditions	see "general technical informations"
Rated ambient temperature renge	-20…+60°C
Dimensions h x w x d	design V4: 90x70x58 [mm], mounting height 55 mm
Protection housing / terminals	IP 30 / IP 20 (terminals pluggable)
Weight	app. 200 g
Attachment	on 35 mm DIN-rail or with screws M 4

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:

1. The open ends of the thermocouples must be led to the measuring instrument on special compensating leads in order to avoid additional contact voltages.
2. To avoid distorting contact voltages at the measuring 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.

Which Thermocouple for which application?

Pt 30 Rh-Pt 6 Rh Typ B
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
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

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

°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
200	1,468	1,557	1,647	1,738	1,830	1,923	2,017	2,111	2,207	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 °C
reference junction 0 °C

°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	0	-10	-20	-30	-40	-50	-60	-70	-80	-90
-200	-5,603	-	-	-	-	-	-	-	-	-
-100	-3,378	-3,656	-3,923	-4,177	-4,419	-4,648	-4,865	-5,069	-5,261	-5,439
0	0	-0,383	-0,757	-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	4,277	4,749	5,227	5,712	6,204	6,702	7,207	7,718	8,235	8,757
200	9,286	9,5820	10,360	10,905	11,456	12,011	12,572	13,137	13,707	14,281
300	14,860	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 °C
reference junction 0 °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

°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 monitoring Type PS - Phase asymmetry - Phase sequence

General

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

Nowadays, more and more modern electrical switching plants for power generation and distribution, tooling and finishing machinery and a number of other drives are equipped with metering and control devices. However the use of such instruments also requires that the mains voltage feed varies only slightly from the rated value, as otherwise the necessary accuracy of the measuring results or control commands will not be achieved. In case of deviations in the rated voltage either exceeding or falling below a pre-defined value, the plant must be switched off, or at least warn the operator via an optical or acoustic signal.

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

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

Phase-Asymmetry Relay Type PS2DK

Monitoring of Phase-Asymmetry and Phase Sequence

2

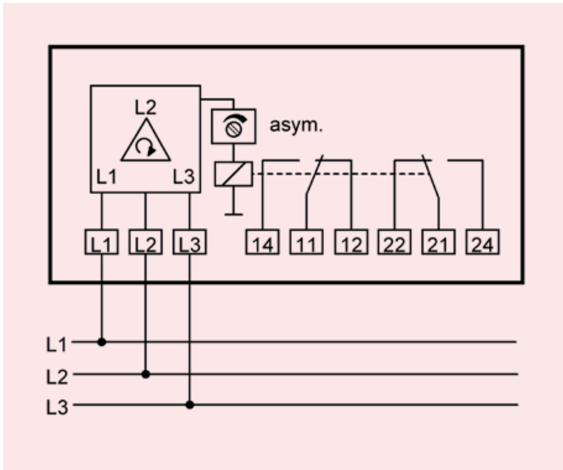
Phase-Asymmetry Relay PS2DK

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

Monitor for 3-phase Type PSSW1

Phase Asymmetry, Phase Sequence, Over- and Undervoltage

PSSW1

Relays for 3-phase networks type PSSW1 monitor 3-phase networks for phase-sequence, asymmetry and over- and undervoltage.
Applications: Monitoring of 3-phase-networks at heat pumps, compressors or at machines at building sites.

Functions:

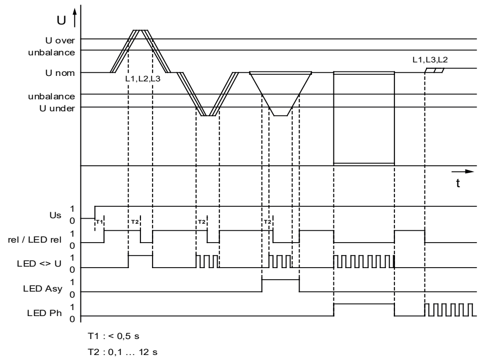
- Over- and undervoltage, adjustable ± 2-20 % (common)
- Asymmetry adjustable 5-15%
- Phase loss
- Phase sequence
- Switching delay adjustable 0,1-12 s (for voltage and asymmetry)
- Bifrequential measuring input 50/60 Hz

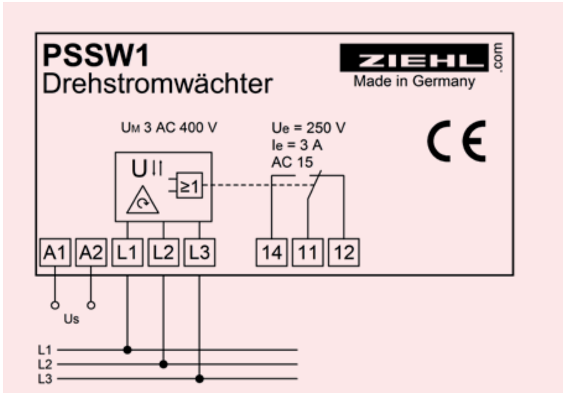
Displays:
4 LEDs for:

- 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	AC 230 V, alt. AC 400 V, 50/60 Hz, < 3 VA
Admissible tolerance Us	±20%
Output relay	1 change-over contact (co)
Type of contact	**type 2** see "general technical informations"
Test conditions	see"general technical informations"
Rated ambient temperature range	-20°C...+55°C
Monitoring asymmetry	switching point adjustable 5...15 %
Hysteresis	app. 2 %
Switching delay	adjustable 0,1...12 s
Loss of voltage	switching point app. 50 %
Hysteresis	app. 5 %
Switching delay	0,1 s
Under-/overvoltage	measuring voltage 3 AC 400 V
Switching point	adjustable ±2...20 % (common, symmetric)
Hysteresis	app.1 %
Switching delay	adjustable 0,1-12 s
Dimensions (h x w x d)	housing K: 75 x 22,5 x 110 mm
Attachment	on 35 mm DIN-rail or with 2 screws M4 (option)
Protection housing / terminals	IP 40 / IP 20
Weight	160 g

Phase-Sequence Relay Type DRR10

automatic change of wrong Phase-Sequence

DRR10

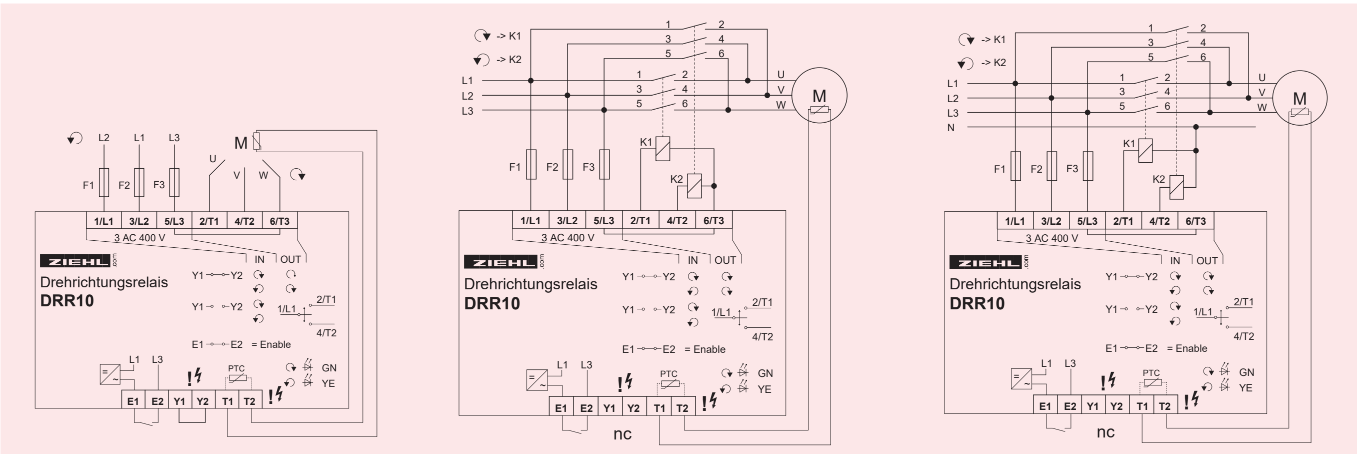
Phase-sequence relays DRR10 measure the sequence of the phases when being switched on and switch - if necessary - the rotation of the field by changing 2 phases.
The integrated PTC-monitor protects the motor from over-heating.

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

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

2

order-number: P222546



Technical Data

rated supply voltage Us	3 AC 400 V, 50/60 Hz, < 3 VA
admissible tolerance Us	+10% ... -20%
relay output	2 x 2 normally opened contacts (no)
switching voltage	max. AC 440 V
conventional thermal current Ith	12 A
switch-on current (10% on)	30 A / max. 4 s, 60 A / max. 1 s
recommended fuse	gG/gL 16 A
expected contact life mech.	30 x 10^6 operations
expected contact life electr.	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
inputs	without separation of potential from supply-voltage
T1 - T2	PTC-thermistors according to DIN 44081/44082
E1 - E2	potential-free contact for AC 400 V
rated ambient temp. range	-20°C...+55°C
housing (H x W x D) mm	design V4: 90 x 70 x 58 mm
fitting position	any
attachment	on 35 mm DIN rail according to EN 60715 or 2 screws M 4
protection housing/terminals	IP 30 / IP 20
weight	app. 230 g

Phase Sequence-Change Relay DRR20

with integrated Monitoring of Undervoltage and Asymmetry

Phase Sequence-Change Relay DRR20

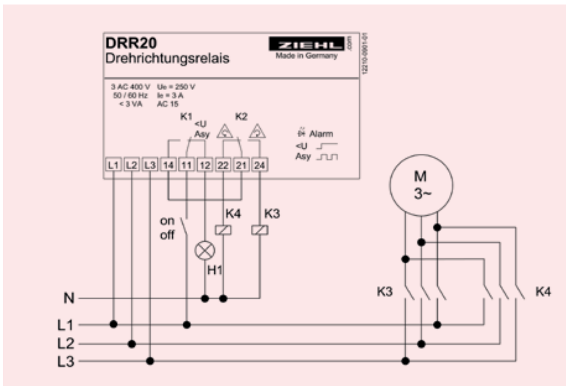
Phase-Sequence-Change Relays DRR20 measure the sequence of the phases and switch – if necessary the rotation of the field. At the output (connect relays K1 and K2 in series in this application) two contactors are connected. The contactor at the normally-open contact of K2 switches the phases 1:1without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

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

Applications are machines and equipment that is operated at variable locations, e.g. at building sites. Pumps, compressors and vacuum-cleaners always run correctly and they are protected from damage by undervoltage or asymmetry.

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

Order-number **P222551**



Technical Data

Rated supply voltage Us	3-phase, 400 V without N
Admissible tolerance Us	+20%...-30%
Output relay	ca. 3 VA
Type of contact	50/60 Hz
Output relay	2 change-over contacts (co)
Type of contact	**type 2** see "general technical informations"
Test conditions	see"general technical informations"
Rated ambient temperature range	-20°C...+55°C
Limit asymmetry	adjustable 5...25 %
Limit undervoltage	adjustable 70...95 %
Hysteresis	app. 2%
Delay undervoltage/asymmetry	adjustable 0,1...10 s
Delay phase-loss (<60% Us)	< 0,2 s
Pick-up delay after recovery of Us	< 0,5 s
Delay K2 - K1	app. 100 ms
Dimensions (h x w x d) mm	housing K: 75 x 22,5 x 115 mm
Fitting position	any
Attachment	on 35 mm DIN rail according to EN 60715 or 2 screws M 4
Protection housing / terminals	IP 30/20
Weight	150 g

Load and Current-Monitor COSFI100V

Active Current with direction,Over- and Underload and cosφ

COSFI100V

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

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

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

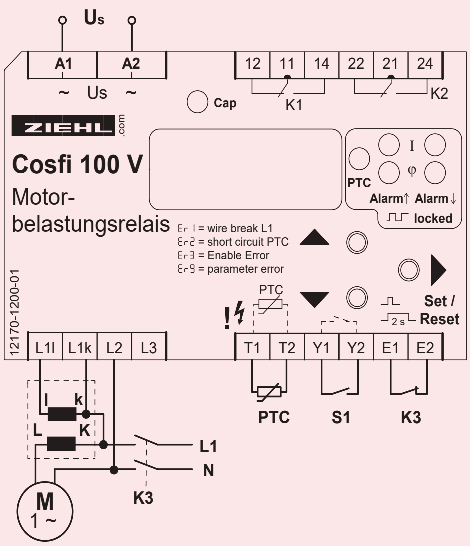
Application cos φ / active current:
- Monitoring of V-belt (slip and destruction)
- Fan-monitoring
- Pump-monitoring
- Conveyor systems
- Agitators
- excessive wear
- wear-out of tools
- Protection of motors, drives and plants from overload

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

Function and features:
At an AC-motor (inductive load) the phase of the current is retarded to the voltage by the phase angle φ. With decreasing load, this angle increases and the cos φ 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 φ, 2 x true current or 1 x cos φ 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-number **P222534**



Technical Data COSFI100V

Rated supply voltage U_s	AC 230 V, +10%/-15%, 3VA, 50 Hz
Power factor (cosφ)	-0,99...+0,99
Hysteresis (cosφ)	0,05...0,20
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	Design V4: 90 x 70 x 58 mm, mounting height 55 mm
Attachment	on rail 35 mm according to EN 60 715 or with screws M4 (option)
Protection Housing/Terminals	IP 30/IP 20
Weight	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	DC	AC/DC / 3AC	AC / 3AC	3AC			
Type	**STW1000V2**	**SW32V**	**SW31V**	**UFR1001**	**UFR1001E**	**SPI1021**	**SW31K**
Function	↑	↑↓	↓	↑↓	↑↓	↑↓	↓
Monitoring of - Undervoltage	-	X	X	X	X	X	X
- Overvoltage	X	X	-	X	X	X	-
Switching point adjustable	Scale	digital	-	digital	digital	digital	-
Relay output	1 U	2 U	2 U	2 U	2 U	2 U	1 U
Housing	V 2	V 4	V 2	V 4	V 6	V 6	K

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

Function and Features

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

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

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

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

DC Limit Relay for Standard Signals

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

STW1000V2

Art.-no: AC/DC 24-240 V S225677

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

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

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

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

Technical Data

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

Voltage Relay for three-phase current

also for alternating current networks

SW31V

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

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

2

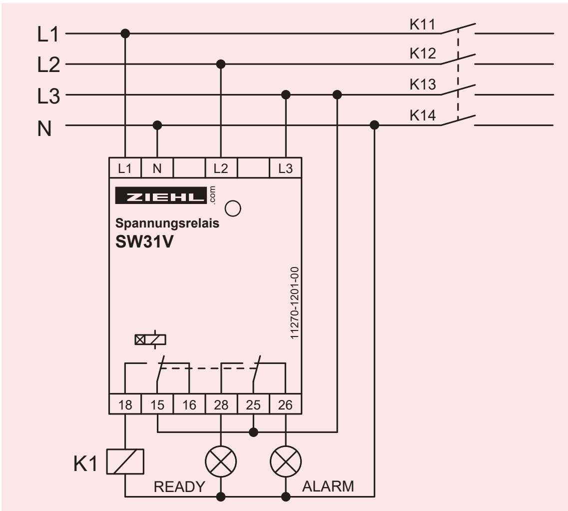
When the mains voltage is applied, the integrated relay picks up if the voltage value preset for the network to be monitored is not undercut. If the set limit is undercut, the relay releases.
Type SW voltage monitors comply with Class III acc. VDE 0435 Part 303, Para. 4.8.2, for static measuring relays (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: **S222281**



Technical Data

Rated Supply Voltage Us	AC 230 V, +10...-30%, < 5 VA
Frequency	50/60 Hz
Output Relay	2change-over contacts
Type of contact	**Type 2** see "general technical informations"
Test conditions	see "general technical informations"
Rated ambient temperature range	-20°C...+55°C
Hysteresis	approx. 5% U_{Nom}
Delay relay, undervoltage at voltage breakdown	L1/N: ca. 400 ms, L2/L3: ca. 1 s
Dimensions H x W x D	Design V2: 90x35x58 [mm], mounting height 55 mm
Protection housing/terminals	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 phase-symmetry and phase-sequence can also be monitored.
The limits are set in Volts. Thus the device can be used at different nominal voltages.

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

Application:
As voltage monitor in equipment for generation or 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
- preset values for grid- and plant protection acc. to BDEW standard
- Asymmetry (5…50%) and phase-sequence-monitoring selectable
- measuring of True RMS
- 2 alarms / relays, each with 1 changeover-contact
- setting of limits and hysteresis in VOLT
- simulation-function to test settings
- codelock against manipulation of settings
- universal power supply AC/DC 24-270 V
- housing for DIN-rail-mount, 70 mm wide, height 55 mm

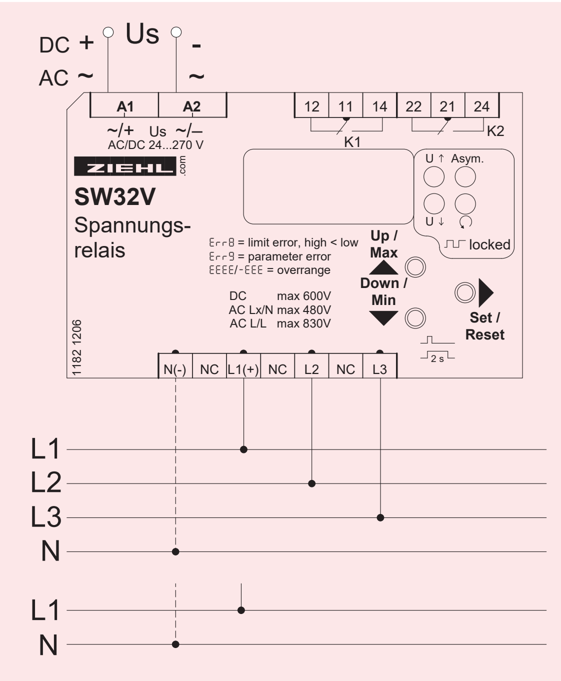
Display:

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

Switching functions:

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

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 Input	Measuring voltage DC	DC 10...600 V
	Measuring voltage phase/phase	AC 26...830 V
	Measuring voltage phase/neutral	AC 15...480 V
	Frequency	40...100 Hz
	Measuring time DC	DC average over 50 ms
	Measuring time AC	< 50 ms
	Measuring accuracy DC	>100V: 0,5% of value ± 1 Digit <100V: 0,5% of value ± 5 Digit (res. 0,1V)
	Measuring accuracy AC with N	>100V: 0,8% of value ± 1Digit <100V: 0,8% of value ± 5Digit (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% of set value
	Switching delay	0,05...9,99 s
	Switch-back delay	0...999 s
	Time until ready after applying Us	≤ 300 ms (+ switch-back delay)
Test Conditions		EN 60255
	Rated impulse voltage	6000 V
	Overvoltage catagory	III
	Pollution degree	2
	Rated Insulation voltage	AC 690 V
	Operationg time	100 %
	Permissible ambient temperature	-20 °C...+55 °C EN 60 068-2-2 dry heat
	EMC - immunity	EN 61 000-6-2
	EMC - emission	EN 61 000-6-4
Housing		
	Design	V4
	Dimensions (h x w x d)	90 x 70 x 58 mm, mounting height 55 mm
	Protection housing	IP 30
	Protection terminals	IP20
	Attachment	DIN-rail 35 mm or screws M4
	Weight	app. 200 g

Voltage- and Frequency-Relay UFR1001

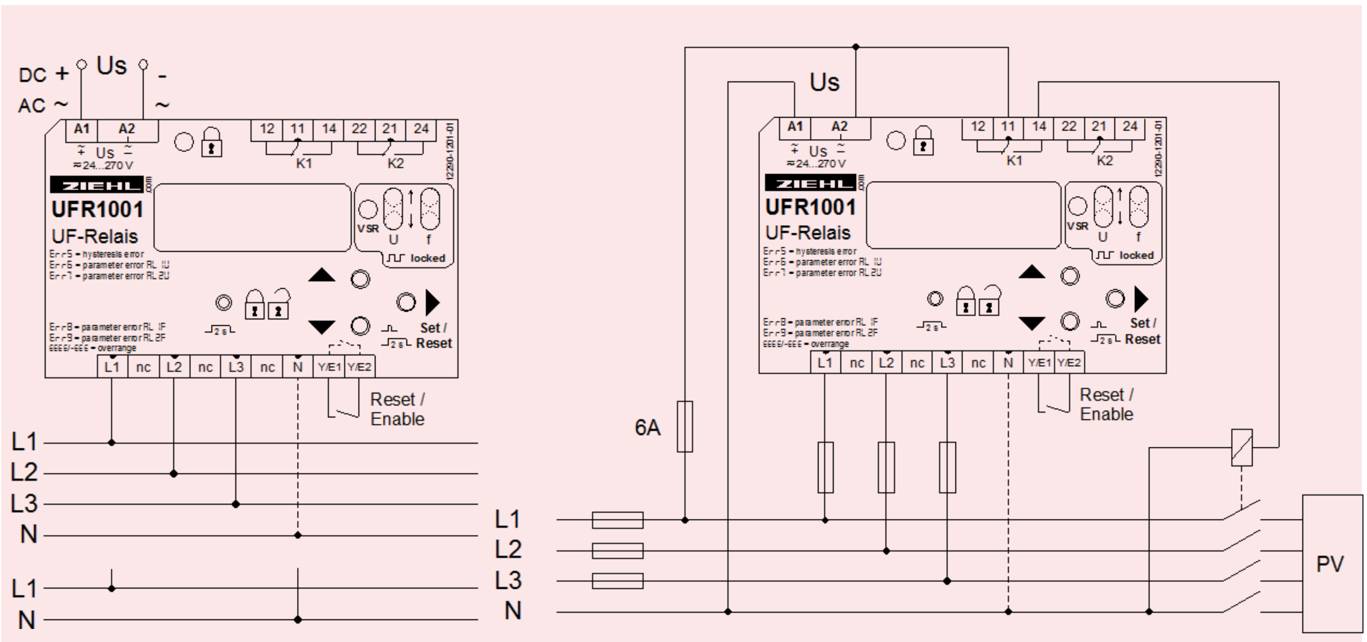
with integrated Vector-Shift-Relay, Sealable

UFR1001

The voltage- and frequency-relay UFR1001 monitors voltage and frequency in two- or three-phase networks with or without neutral and switches off rapidly when required.
The device can be easily adapted to the requirements of the carrier of the power network.
With the integrated vector-step relay it can also monitor networks at synchronous generators.
After selecting a basic program, for each relay limits can be programmed for over-/undervoltage and over-/underfrequency. In programs with vector-step-monitoring, K2 is used for vector-step only.
Applications are monitoring power-networks at great solar-plants, in block power heating stations, also with synchronous generators (vector shift) or generally monitoring the quality in power networks at machines or power-supplies.

- Monitoring of over- and undervoltage 40…520 V
- monitoring of over- and underfrequency 45…65 Hz
- monitoring of quality of voltage (10-minutes-average)
- monitoring of vector-shift 2…20 °, 1 or 3-phase
- Switching-delay adjustable <0,05…60,0 s
- Switching-back-delay adjustable 0…1000 s
- Alarm-counter for up to 100 alarms (with measured value and reason)
- Added time of alarm up to 999 hours. Displays the time, alarms have been active (while supply voltage applied only)
- LEDs for alarms, allocation of values and states of relays
- 2 output-relays, each for monitoring frequency and/or voltage
- function of relays (nc- or no -operating mode) programmable
- interlocked switching or autoreset
- input for Enable / Reset
- easy programming by help of basic programs
- Sealing of settings is possible
- code-lock against manipulation of settings
- universal power-supply AC/DC 24-270 V
- housing for DIN-rail-mount, 70 mm wide, mounting height 66 mm

Order-number: **S222295**



Technical Data 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
	Error (with N)	± 0,8% of measured value ± 1 Digit
	Error (without N)	± 1% of measured value ± 1 Digit
	Measuring functions	3-phase with / without neutral, single phase to neutral
	Switching-delay	adjustable 0,05...60,00 s
	Switching-back delay (zero-voltage-proof)	adjustable 0 (> 200 ms)...1000 s
Frequency	Measuring range	45,00...65,00 Hz
	Hysteresis	0,05...5.00 Hz
	Error	± 0,05 Hz ± 1 Digit
	Switching-delay	adjustable 0,1...99,9 s
	Switching-back delay	adjustable 0...240 s
Vector-Shift	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, bdew, ÖVE-standard, G59/3 and G83/2, DIN V VDE 0126-1-1

UFR1001E

Art.-No.: S222296

The grid protection device UFR1001E monitors voltage and frequency in plants for own generation of electricity. It fulfills the requirements of VDE-AR-N 4105 bdew-directive, G59/3, G83/2 and ÖVE/ÖNORM E 8001-4-712:2009 for generatores connected to the public grid. 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.
The standby input allows a remote shutoff e.g. with a RCR. It can also be used to switch to an energy saving mode by a timer or a twilight switch.

- 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-minutes-average)
- Monitoring of vector shift 2…65 °
- Monitoring of rate of change of frequency (ROCOF, df/dt) 0,100...5,000 Hz/s
- One-fault-proof with monitoring of connected switches (defeatable), 2 automatic restarts at error
- Passive detection of insular grid acc. to ch. 6.5.3 and app. D2
- Support of synchronisation of generators
- Selftest
- Switching delay adjustable 0,05 … 130 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 bdew-directive
- Preset values acc. to G59/3 and G83/2 for Great Britain
- Preset values acc. to ÖVE standard for Austria
- Preset values acc. to VSE/EEA-CH 2014 for Switzerland
- Alarm-counter for 100 alarms with value, reason and elapsed time
- Recording of added time of alarms
- Input for standby with counter and recording of time
- Test-button and simulation with measuring of switching-times
- LEDs for alarms. Allocation of values and states of relays
- Sealing. All values can be read-out when sealed
- Easy installation and programming with 13 pre-set programs
- Outputs for reporting of alarms to superior control
- Supply-voltage AC/DC 24-270 V
- Housing for DIN-rail-mount, 105 mm wide, mounting height 66 mm
- Medium voltage:
  2 x 2 alarms for voltage and frequency
  (U>>, U>, U<, U<<, F>>, F>, F<, F<<)

Certificates:

Konformitätsnachweis NA-Schutz VDE-AR-N 4105 "Eigenerzeugungsanlagen am Niederspannungsnetz
Konformitätsnachweis NA-Schutz bdew-Richtlinie "Eigenerzeugungsanlagen am Mittelspannungsnetz"

Certificate of compliance
DIN V VDE 0126-1-1

Certificate
ÖVE/ÖNORM E 8001-4-712:2009-12, Anhang A

Certificate of compliance G59/3:2013
Certificate of compliance G83/2:2012

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

Certificate of compliance
NRS 097-2-1:2010 ed1.0 South Africa

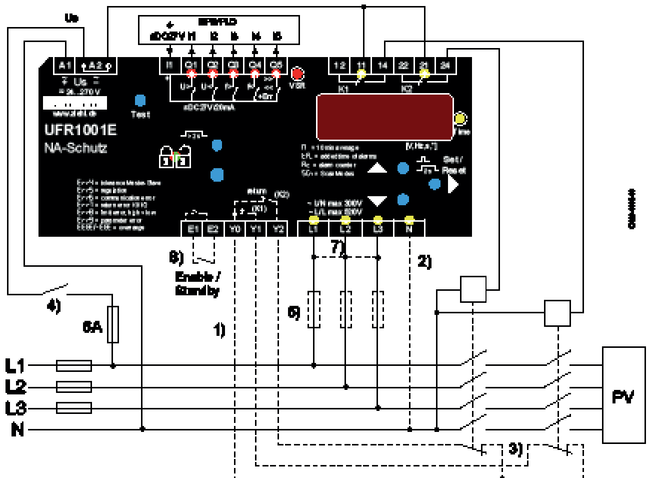
approved Synergrid C10/C11

approved Energex RED STD00233

accepted by Tepco

for Italy:

CEI 0-21 relay SPI1021



Technical Data UFR1001E

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
		see operating manual
Voltage	Measurement phase-phase	AC 15...530 V (< 5 V display: 0)
	Setting range phase-phase	AC 15...520 V
	Measuring voltage phase-neutral	AC 10...310 V (< 5 V display: 0)
	Setting range phase-neutral	AC 15...300 V
	Measurement method	true RMS
	Hysteresis	adjustable1,0...99,9 V
	Measurement accuracy	with neutral: ±0,6% of measured value
		without neutral: ±0,8% of measured value
	Accuracy of display	>100V: -1 digit (resolution 1 V)
		<100V: -1 digit (resolution 0,1 V)
	Measurement functions	3-phase with / without neutral
	Switching-delay (dAL)	adjustable 0,05 (± 15ms)...130,0 s
	Switching-back-delay (doF)	adjustable 0 (approx. 200 ms)...1000 s
Frequency	Measurement range	40...70 Hz
	Setting range	45,00...65,00 Hz
	Hysteresis	0,05...10,00 Hz
	Measurement accuracy	± 0,04 Hz ± 1 digit
	Switching delay (dAL)	adjustable 0,05 (± 15ms)...130,0 s
	Switching-back-delay (doF)	adjustable 0 (>200 ms)...999 s
Vector-Shift	Measurement range	0...90,0°
	Setting range	2,0...65,0°
	Switching-delay (dAL)	< 50 ms
	Switching-back-delay (doF)	adjustable 3...240 s
	Delay at Us on	adjustable 2...20 s
ROCOF (df/dt)	Setting range	0,100...5,000 Hz/s, 4...50 cycles
Digital outputs insulated	Voltage I1	DC 4,5...27 V
	Current Q1...Q5	max. 20 mA / output
Input Feed-back-contacts	Voltage Y0...Y1/2	DC 15...35 V
	Switching time connected switches	adjustable 0,5...99,0 s
Test Conditions		EN 60255
	Rated impulse voltage	4000 V
	Overvoltage category	III
	Pollution degree	2
	Rated Insulation voltage Ui	300 V
	Operating time	100 %
	Operating temperature	-20 °C...+55 °C
	Storage temperature	-25 °C...+70 °C
	Climatic conditions (IEC/EN 60721-3-3)	3K5 (except condesation and formation of ice)
	EMC - immunity	EN 61 000-6-2
	EMC - emission	EN 61 000-6-3
Housing	Design	V6
	Dimensions (h x w x d)	90 x 105 x 69 mm, mounting height 66 mm
	Protection housing	IP30
	Protection terminals	IP20
	Attachment	DIN-rail 35 mm according to EN 60 715 or screws M4
	Weight	ca. 250 g

Voltage- and Frequency-Relay SPI1021

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

SPI1021

Art.-no: **S222300**

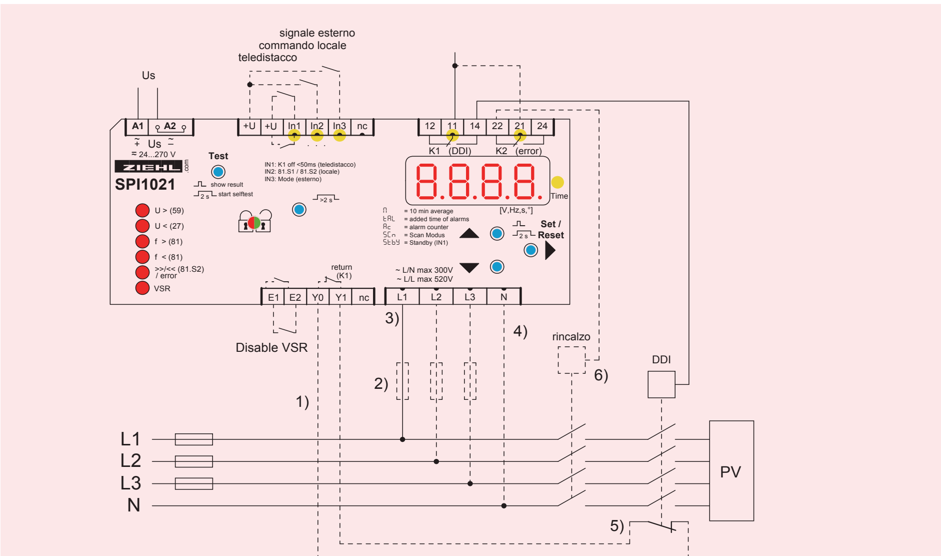
Declaration of confrmity with requirements of **CEI 0-21 Italy**. *Dichiarazione die confomità alle prescrizioni alla Norma CEI 0-21 Italia..*

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

The SPI1021 monitors voltage and frequency in plants for own generation of electricity. It fulfills the requirements of CEI 0-21 (Italy) and DEWA-standard (Dubai) Interface Protection (IP) according to DEWA Distributed Renewable Resources Generation programme (DRRG19, September 01, 2016).
6 selectable programs allow measuring 3 phases to neutral (4-wire mode), 3 phases phase-phase (3-wire mode) and single phase to neutral (2-wire).
The SPI1021 can monitor all decentralized power, photovoltaic, wind or thermal plants, that feed in the low voltage and medium voltage grid. In applications with possible asymmetry >6 kVA, power balance has to be monitored extra.

With the integrated certified self test, the device can be used in plants < 6kVA.
In programs 1-3 (3= default), the limits are preset according to CEI 0-21. In programs 4-6 they are preset according to DEWA-standard. They can be changed if required and be protected with a code and/or a seal.
A counter for alarms and standbys stores the last 100 events with reason and elapsed time. In addition the time the SPI1021 has interrupted the plant is recorded. All values can be displayed at the device and give the operator valuable information about the availability of the plant. When the device has been installed, a self-test starts automatically. The self-test can be repeated when required. All values of the test are stored and can be read out at the display.

- Monitoring of under- and overvoltage 15-520 V
- Measuring of 3 phase with or without neutral or single phase
- Monitoring of over- and underfrequency 45-65 Hz
- Monitoring of quality of voltage (10-minutes-average)
- RocoF "Rate of Change of Frequency" connectable
- Monitoring of vector-shift (connectible)
- Input IN2 for selection of frequency window
- Input In3 for selection of mode transitory or definitive
- Input Y0/Y1 for monitoring function of connected switch (automatic detection of nc/no)
- Relay K2 picks up (on time <500 ms) only at failure at switch connected to K1
- 2 restarts at switch-on error of connected switch
- Selftest with storing of values
- Switching delays adjustable 0,05…130 s
- Switching-back-delays adjustable 0…999 s
- Different switching time according to type of alarm and selected mode
- Switch-on delay 300 s (adjustable)
- All parameters preset according to CEI 0-21
- Alarm counter for 100 alarms with value. Reason and elapsed time
- Recording of added time of alarms
- Input for standby (off time <50ms) with counter and recording of time
- Simulation for testing
- Sealing, all parameters can be read out while sealed
- Easy installation and programming with 6 preset programs
- Supply-voltage AC/DC 24-270 V
- Housing for DIN-rail-mount, 105 mm wide, mounting height 70 mm



Technical Data SPI1021

Power supply	Rated supply voltage Us	AC/DC 24-270 V, 0/40...70 Hz, <5VA DC: 20,4...297 V, AC: 20,4...297 V
Relay output		2 change-over contacts
Measuring voltage	Voltage phase-phase	AC 15...530 V (< 5 V display 0)
	Setting range phase-phase	AC 15...520 V
	Voltage phase-neutral	AC 10...310 V (< 5 V display 0)
	Setting range phase-neutral	AC 15...300 V
	Measurement method	true RMS
	Hysteresis	adjustable1,0...99,9 V
	Measurement accuracy (with neutral)	±0,6% of measured value
	Measurement accuracy (without neutral)	±0,8% of measured value
	Accuracy of display	>100V: ±1 digit (resolution 1 V) <100V: ±1 digit (resolution 0,1 V)
	Measurement functions	3-phase with / without neutral, single phase
	Switching-delay (dAL)	adjustable 0,05 (± 15ms)...130,0 s
	Switching-back-delay (doF)	adjustable 0 (= 40ms)...999 s
Measuring frequency	Measurement range	40...70 Hz
	Setting range	45,00...65,00 Hz
	Hysteresis	0,05...10,00 Hz
	Measurement accuracy	± 0,01 Hz ± 1 digit
	Switching delay (dAL)	adjustable 0,05 (± 15ms)...130,0 s
	Switching-back-delay (doF)	adjustable 0 (= 40ms)...999 s
Vector-Shift	Measurement range	0...45,0°
	Measurement range	2,0...20,0°
	Switching-delay (dAL)	< 50 ms
	Switching-back-delay (doF)	adjustable 3...240 s
	Delay at Us on	adjustable 2...20 s
Digital inputs (INx)	Switching voltage + U	DC 15...37 V
	Current INx	> 3 mA
Input Feedback contact	Switching voltage Y0...Y1	DC 15...35 V
	Current Y1	> 3 mA
	Switching time connected swit-ches	adjustable 0,5...99,0 s
Housing	Design	V6
	Dimensions (h x w x d)	90 x 105 x 69 mm, mounting height 70 mm
	Wiring connection single strand	1 x 4 mm2
	Finely stranded with wire end ferule	1 x 2,5 mm2
	Protection housing	IP30
	Protection terminals	IP20
	Attachment	DIN-rail 35 mm according to EN 60 715 or screws M4
	Weight	ca. 250 g

Voltage Monitor for 3-Phase Networks
Undervoltage

SW31K

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

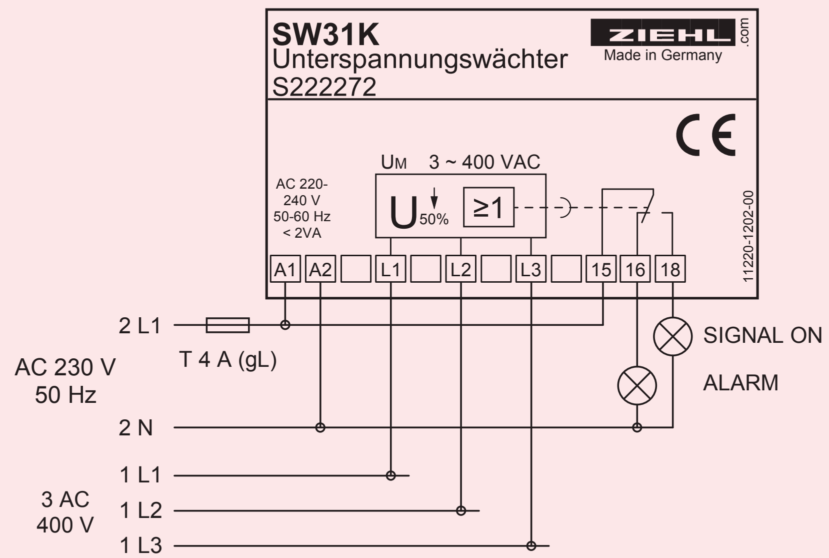
Application:

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

Order-numbers:

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

Special Versions upon request



Technical Data

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

Current recognition Relays for alternating current

General

ZIEHL current monitors for current recognition are electronic measuring relays for current monitoring in up to 8 measuring circuits. The current is captured by STWA1 type current transducers. Current monitors in OR-evaluation (STW1K, STW12V and STW12), in AND-circuits (STW20K, STW20V) or for individual monitoring STW12 are available for different monitoring tasks. OR-circuit current monitors signal if at least one of several monitored lines is connected.
AND-circuit current monitors signal if not all lines are connected.

Summary

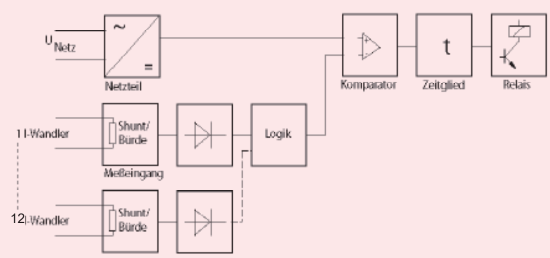
Type	STW1K	STW12V	STW12	STW20K	STW20V
Number of circuits	8	12	12	3	3
Connection via change-over STWA 1 or Current-Sensor S1	X	X +contact	X	X	X
Response value	1 A	0,5 - 5 A	10 x 1 A	1 A 2 x 1 - 5 A	1A
Relay output	1 U	1 U	1 U	2 U	2 U
Transistor outoput	-	-	12	-	-
Operating mode	operating- current	operating-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

Function and Features

In case of current flow through a connected STWA1 type transformer, a voltage is induced at the current monitor input. This voltage is captured, evaluated, and releases corresponding switching functions.
Due to the simple yes/no evaluation of current recognition and the permission of relatively high tolerances (±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



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Current-Relay STW1K

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

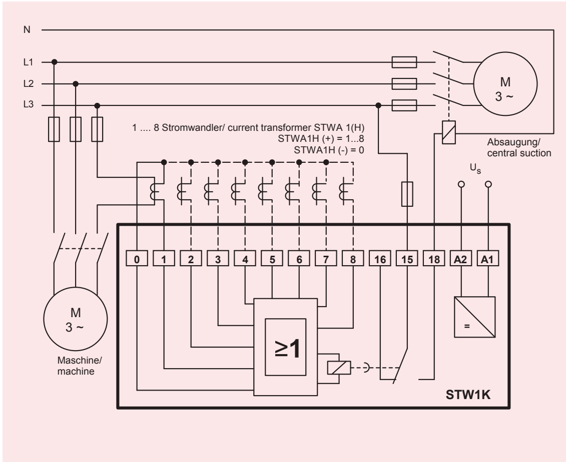
STW1K

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**
AC/DC 24 V	S225658



Technical Data

Rated supply voltage Us	AC 220 - 240 V +10-15%, < 3 VA, 50/ 60 Hz AC/DC 24 V, DC 21-30 V, AC 20,4-26,4 Hz
Transformer input	1…8, type STWA , order-number S 225201
Overload cap.continous/max 10s	100 A / 300 A
Function	OR-evaluation
Switching point on	≤ AC 1 A
Switching point off	> AC 0,3 A
Switch-off delay	approx. 10 sec.
Switch-on delay	approx. 0,5 sec.
Output relay	1 change-over contact (co)
Type of contact	**type 2**, see "general technical informations"
Test conditions	see "general technical informations"
Rated ambient temperature range	-20°C…+55°C
Dimensions (h x w x d)	Design K: 75 x 22.5 x 115 [mm]
Attachment	on 35 mm DIN rail according to DIN EN 60715 or with screws M4 (option)
Protection housing / terminals	IP 40 / IP 20
Weight	approx. 140 g

Current-Relay STW12V

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

STW12V

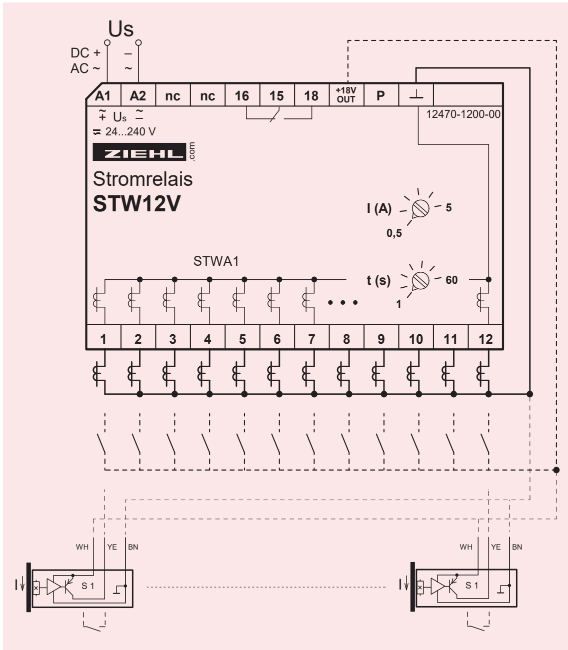
Current relays in OR evaluation with 12 inputs, designed e.g. for controlling of suction plants in the timber and plastics processing industry.
Recording of current is made with current transformers type STWA 1, current-sensors S 1 (DC also) or potential-free contacts.
When there is an AC-current higher 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
- Universal supply-voltage AC/DC 24-240 V
- Housing for mounting in switchgear cabinets or fuse-boxes, 70 mm wide, mounting height 55 mm

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

2

Order-number
AC/DC 24-240 V **S225519**



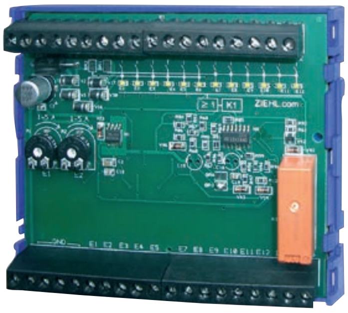
Technical Data

Supply voltage Us	AC/DC 24 - 240 V, < 3 W, < 5 VA,50/ 60 Hz AC 20 - 264 V, DC 20,4 - 297 V
Relay output	1 change-over contact (co)
Type of contact	**type 2 see** "general technical informations**"**
Test conditions	see "general technical informations**"**
Rated amb. temperature range	-20°C…+55°C
Function	OR-evaluation
Measuring inputs	12 x for current transmitters STWA 1, current-sensors S 1 or potential-free contacts
Overload cap./continous max 10s	100 A / 300 A
Switching point	with STWA 1 adjustable, AC 0,5 - 5 A
Tolerance	± 20%
Switch-off delay	adjustable 1- 60 s
Switch-on delay	app. 0,5 s
Dimensions (H x W x D)	design V4: 90x70x58 [mm], mounting height 55 mm
Attachment	on 35 mm DIN-rail according to EN 60 715 or with screws M4
Protection housing/terminals	IP 30 / IP 20
Weight	app. 200 g

Current-Relay STW12

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

STW12

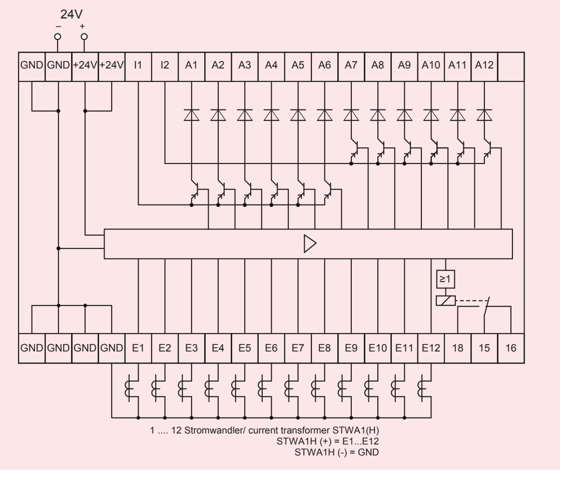


The current relay STW12 monitors the current flow yes/no of up to 12 alternating-current circuits. If there is an AC-current of ≥1 A through a connected transformer STWA 1, the according output transistor switches and the yellow LED lights up.
All the OR inputs are linked at the same time. If a current is identified in at least one of the monitored current circuits, a relay (1 change-over contact) picks up.
The STW12 is installed at an open printed circuit board. The lower part can be used for snap-fastening on a 35 mm DIN-rail or for screw fastening (option). The supply voltage is DC 24.
This voltage can be used at the same time for inquiry of the output transistors. When requesting the outputs in 2 groups in multiplex operation, only 8 I/Os of the PLC are needed.

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

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

Order-number
DC 20 - 30 V **S225127**



Technical Data

Power supply Us	DC 20 - 30 V, < 2 VA
Function	12-channel single/OR
Transformer input	1…12, type STWA 1
Overload cap.continous/max 10s	100 A / 300 A
Switching points E1, E2	adjustable, AC 0,5...5 A
Tolerance	± 20%
Switching points E3...E12	on ≤ AC 1 A off ≥ AC 0,3 A
Switch-off delay	10 s.
Switch-on delay	approx. 0,5 s.
Output relay	1 CO, 12 x Open-Collector
Type of contact	**type 2** see "general technical informations"
Open Collector	max. DC 40 V/40 mA
Testing conditions	see "general technical informations"
rated ambient temperature range	-20°C…+55°C
Dimensions H x B x T	design V 6: 90 x 105 x 32 [mm], 37-pole
Attachment	on 35 mm DIN rail according to DIN EN 50 022 or with screws M4 (option)
Protection housing / terminals	IP 30 / IP 20
Weight	approx. 135 g

Current-Relay STW20K

AC-Detection, AND-Evaluation, 3 Transformers

STW20K

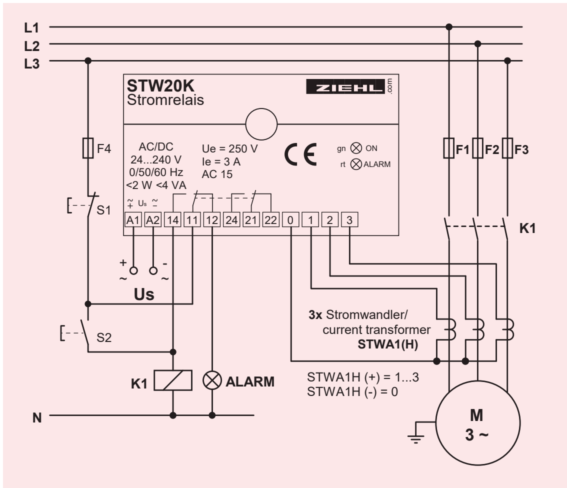
The current relay STW20K monitors the current in up to 3 lines with current transformers STWA1 (AND circuit). If there is a current in all 3 monitored lines, the relay (2 change-over contacts) picks up. If there is no current in at least one of the lines, the relay releases. The relay works in closed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

Applications:
Identifies power failure with 1- or 3-phase electrical consumers, e.g. with monitoring of heating elements or heating installations where a constant heating has to be guaranteed.
A further application is the identification of phase failure, monitoring of fuses, or triggering of operating hours counters.
If the switching threshold is not reached due to low currents of less than 1 A, the monitored wire should be led multiple times through the transformer. Not required inputs have to be connected to a occupied input.

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

Order-number
AC/DC 24 - 240 V **S225121**

2



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	2 CO
Type of contact	**type 2** see "general technical informations"
Function	3 channel/AND
Transformer input	1 to 3, type STWA 1
Overload cap.continous/max 10s	100 A / 300 A
Switching point on	≤ AC 1 A
Switching point off	≥ AC 0,3 A
Tolerance	± 20%
Switch-off delay	approx. 0,3 s
Switch-on delay	approx. 0,3 ms
Testing conditions	see "general technical informations"
rated ambient temperature range	-20°C…+55°C
Dimensions H x B x T	design K: 75 x 22,5 x 110 [mm], 12-pol
Protection housing / terminals	IP 30 / IP 20
Weight	approx. 120 g

Current-Relay STW20V

AC-Detection, AND-Evaluation, 3 Transformers

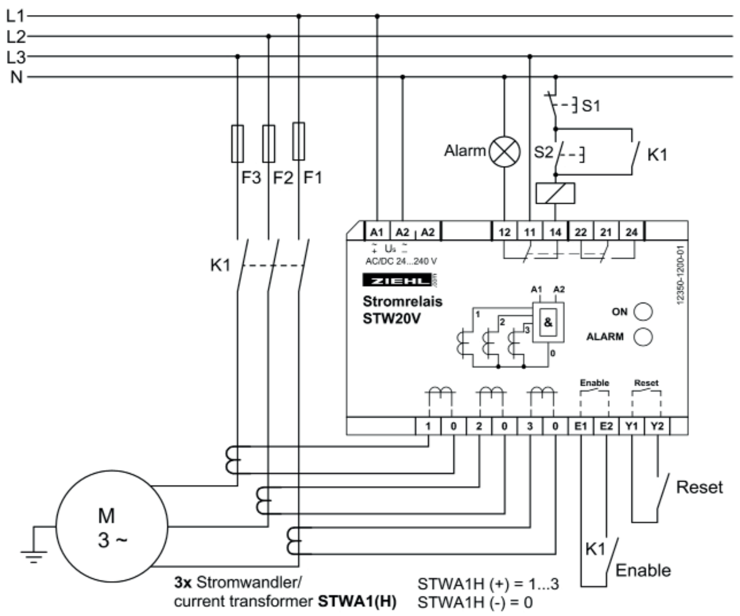
STW20V

Art.-number:
AC/DC 24 - 240 V S225124

The current relay STW20V monitors the current in up to 3 lines with current transformers STWA 1 (AND circuit). If there is a current in all 3 monitored lines, the relay (2 change-over contacts) picks up. If there is no current in at least one of the lines, the relay releases.
The relay works in closed circuit current. When voltage is applied to the STW, the relay signals an alarm until the it has picked up. This can be avoided if the device is constantly alive and monitoring is started by closing a contact at the Enable input. With a bridge at the Enable input, monitoring is automatically started when voltage is applied.

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

Applications:
Identifies power failure with 1- or 3-phase electrical consumers, e.g. with monitoring of heating elements or heating installations where a constant heating has to be guaranteed.
A further application is the identification of phase failure, monitoring of fuses, or triggering of operating hours counters.



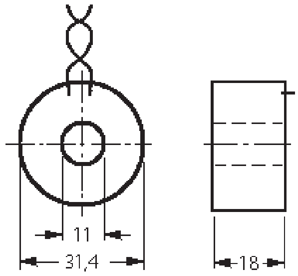
Technical Data

Power supply Us	AC/DC 24 - 240 V, < 3 W, < 5 VA, (AC 20 - 264 V, DC 20,4 - 297 V) AND-evaluation
Function	AND-evaluation
Transformer input	1 or 3, type STWA 1
Overload cap. continious/max.10s	100A / 300 A
Switching point on	≤ AC 1 A
Switching point off	≥ AC 0,3 A
Switch-off delay	approx. 0,3 s.
Switch-on delay	approx. 0,3 s.
Overload capacity	with STWA 1 unlimited
Output relay	2 CO
Type of contact	**type 2** see "general technical informations**"**
Testing conditions	see "general technical informations**"**
rated ambient temperature range	-20°C…+55°C
Dimensions H x B x T	design V 4: 90 x 70 x 58 [mm]
Protection housing / terminals	IP 30 / IP 20
Weight	approx. 240 g

Current Transformer STWA1

for recognition of AC-currents

Current Transformer STWA1 for monitoring current yes/no

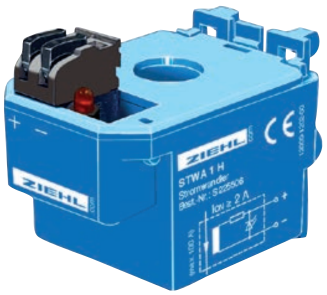


The STWA1 current transformer is made to match the STW current monitor. One current transformer is required for each line being monitored. The STWA1 consists of a climate-proven sealed-in coil with toroidal tape core. The connection cables are permanently fixed to the transformer and are 1 m in length. 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 **S225201**

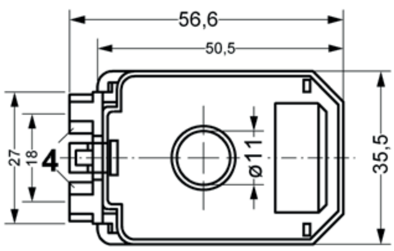
Current Transformer STWA1H for DIN-rail-mount or screw-mount

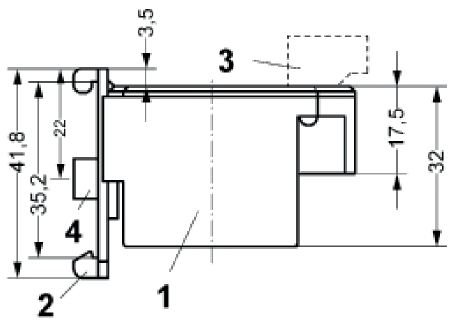


Current-transformers STWA1H can be fixed on a 35 mm DIN-rail or with 2 screws.
The electrical connection is made via pluggable terminals.
The cables are led vertical through the transformer (right angle to 35 mm-rail). The available diameter is 11 mm.

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 conntected 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 **S225506**





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

Electronic Current-Transformers

Current-Detection and Measuring-Transducers

General

Electronic current-transformers are compact and good-valued devices for the detection of a current in a wire.
Electronic current-transformers and current-sensors give a signal, when there is a current in a wire. At STWA1SEH and at current-sensor S1 the response-value is adjustable. The evaluation of the signals usually is made with digital inputs of PLCs. STWA1LH can directly switch AC-signals up to 230 V / 0,5 A.
Electronic current-transformers as measuring-transducers supply a signal 0-20 mA or 4-20 mA at the output that is proportional to the measured current. The output-signal of the STWA1FH is a frequency, which can be evaluated with digital inputs of PLCs.

Overview

Function	Current-detection yes/no				Measuring-Transducer for AC-current			Current-detection
Type	**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	5-30 A	2 A	2 A	2-10 A	-	-	-	2-20 A
Output	Transistor +/-	Transistor	Transistor	Transistor	DC 0-20 mA	DC 4-20 mA	Transistor 0,5-20 Hz	Triac 0,5 A
Housing	S 1	Ø 34,5 mm	H	H	H	H	H	H

Functions and Properties

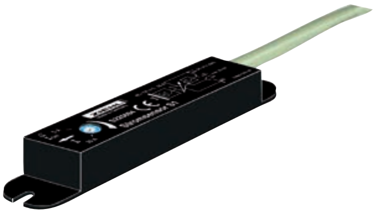
The current-sensor S1 is attached at the outside of the monitored wire, e.g. with a cable-fastener. With help of a hall-sensor it detects AC- and DC-currents in the wire. The response-value depends on the orientation of the sensor to the current (distance, angle). Neighboured wires can have an impact.

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 adjustable 5-30 A the transistor-outputs switch and report a current in the monitored cable.
The current sensor can be fixed with a cable fastener (apply to only 1 cable). Thus it can be mounted subsequently without disconnecting the cable.
As supply-voltage DC 24 V are required (e.g. ZIEHL-power-supply NG 4 V).

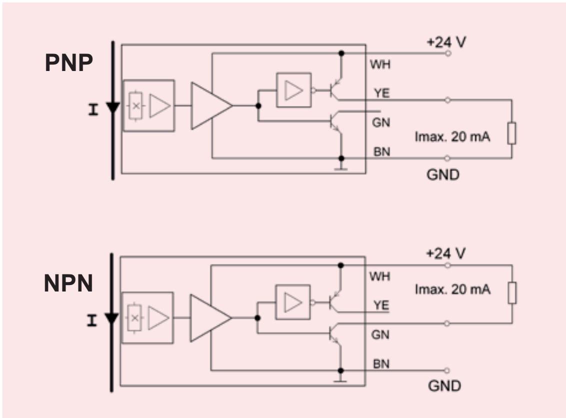
The current sensor can be connected to ZIEHL current-relaysfor current detection yes/ no ant to ZIEHL controls for dedusting plants. The connection to a digital input of a PLC also is possible.

Application:
Recording of welding currents (mounting at ground wire) for controlling dedusting plants in combination with ZIEHL-controls type STW.
Recording of the state of a consumer of electricity (on or off or defective).
In general the current sensor S1 is used where the current flow is to be detected, with the exact value of the current either known from the power consumption of the connected consumer or does not matter for the evaluation.
For evaluation of measuring data in more than 1 cable,
the outputs of several current sensors can be connected
in parallel (or-evaluation).

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

2

Order-number:
Current Sensor S1, 5-30 A adjustable **S225694**



Technical Data

Supply voltage Us	DC 24 V ±20%, 12 mA
Switching point at Tu = 25°C	adjustable AC/DC 5-30 A
Tolerance	± 20%
Repeat accuracy	± 2%
Temperature coefficient	typical < ± 0,2 A/K, max. ± 0,45 A/K
Frequency of measured current	0 / 10 ... 400 Hz
Overload cap. continious/< 1min	500 A / 1000 A
Output 1	DC 24 V, + switching, max. 10 mA
Output 2	DC 24 V, - switching, max. 10 mA
On- / off-delay	app. 300 ms
Rated ambient temperature range	0...55°C
Dimensions (l x w x h)	75 x 16,5 x 10 mm
Cable for connection	app. 2 m, 4 x 0,34 mm2
Attachmant	e.g. with cable fastener (not included)
Weight	app. 150 g (cable included)

AC-Electronic Current Transformer STWA1S

with transistor-output

STWA1S
Electronic current transformer
with fixed switching-point

The STWA1S has an integrated electronic with transistor-output. The switching point is 2 A. 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.

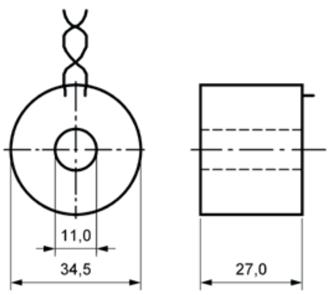
Application: The STWA1S is used where current flow is to be detected, with the exact value of the current either known from the power consumption of the connected consumer or does not matter for the evaluation.
For simultaneous evaluation of the current flow in several conductors the STWA1S device can 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

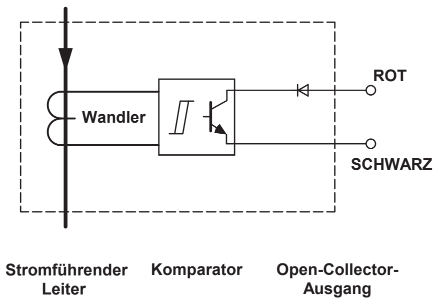
Order-number **S225195**

Switching point at Tu = 25°C	AC 2 A +20/-40%
Hysteresis	approx. 6%
Repeat accuracy	±5 %
Temperature dependence	0...55°C: <0,5%/K (-20...0°C: <2,5%/K)
Overload cap. continous / 10s	100 A / 300 A
Output voltage/current max.	DC 40 V / 40 mA
Voltage drop (ON)	max. 3 V
Leak current (OFF)	max. 0,6 mA
Switch-on /switch-off delay	app. 50 / 200 ms
nominal frequency/ operating range	50 Hz/ 30...70 Hz
error	≤ 1%/Hz
rated ambient temperature range	-20...+55 °C
Housing	Design S
Dimensions (Ø x H)	34,5 x 27 mm
Diameter for conductor	11 mm
Weight	app. 60 g

Dimension illustrations



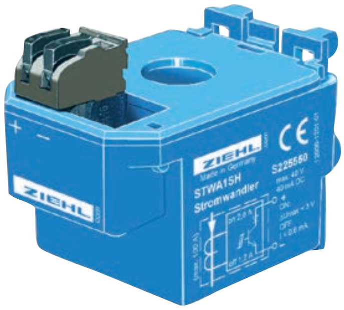
Electronic current transformer STWA1S



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 2 A. Above app. 2 A the output transistor is switched on below app. 1.5 A it is off.
The conductor is simply pushed through the transformer.Multiple loops reduce the switching point correspondingly, for instance to 0.5 A with four loops. A supply voltage is not required.

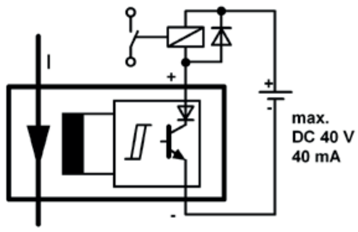
Application: The STWA1SH is used where current flow is to be detected, with the exact value of the current either known from the power consumption of the connected consumer or does not matter for the evaluation.
For simultaneous evaluation of the current flow in several conductors the STWA 1 S device can be connected in series (AND circuit, pay attention to the voltage drop) or in parallel (OR circuit, pay attention to the leak current).

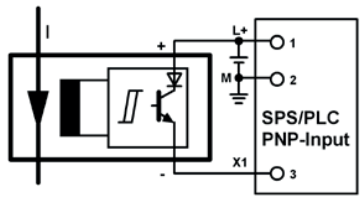
- isolated transistor-output max. DC 40 V/40 mA
- output can be directly connected to the digital input of a PLC
- integrated diode for reverse voltage protection
- electrical connection via screwless pluggable terminals
- no supply voltage required
- DIN-rail-mount or with screws
- plug-in current transformer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

2

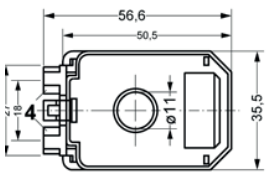
Order-number **S225550**

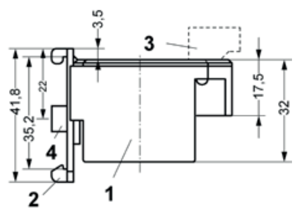
Switching point at Tu = 25°C	AC 2 A +20/-40%
Hysteresis	approx. 6%
Repeat accuracy	± 5%
Temperature dependence	0...55°C: <0,5%/K (-20...0°C: <2,5%/K)
Overload cap. continous / 10s	100 A / 300 A
Output voltage/current max.	DC 40 V / 40 mA
Voltage drop (ON)	max. 3 V
Leak current (OFF)	max. 0,6 mA
Switch-on /switch-off delay	app. 50 / 200 ms
Nominal frequency	50 Hz
operating range	30...70 Hz
error	≤ 1%/Hz
Rated ambient temperature range	-20...+55 °C
Housing	Design H
Dimensions (h x w x d)	50 x 36 x 56 mm
Diameter for conductor	11 mm
Weight	app. 90 g





Dimension illustrations



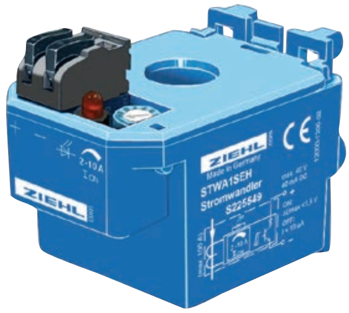


1 Housing
2 Clip for DIN-rail (removeable)
3 Terminal (pluggable)
4 Wall-mounting (M4)

AC-Electronic Current Transformer STWA1SEH

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

STWA1SEH Electronic current transformer with fixed switching-point 2...10 A



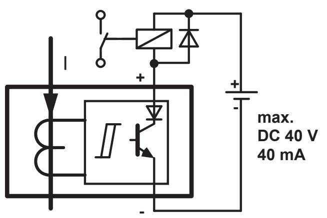
The STWA1SEH has an integrated electronic with transistor-output.
The switching point is adjustable 2-10A. Above switching-point the output transistor is switched on, below it is off.
The conductor is simply pushed through the transformer. Multiple loops reduce the switching point correspondingly, for instance to 0.5-2,5A with four loops. A supply voltage is not required.
For monitoring of higher currents, the STWA1SEH is simply looped into the secondary current of big current transformers.

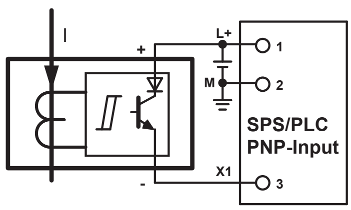
Application: The STWA1SE is used where AC current flow is to be detected in a conductor, e.g. to give a warning if a defined current value is exceeded or not reached, or to switch off a machine or to simply report the current flow.

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

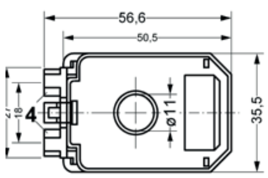
Order-number **S225550**

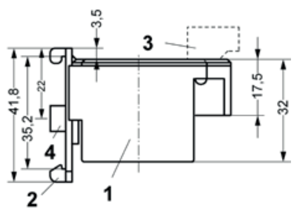
Switching point at Tu = 25°C	AC 2...10 A ±25 %
Hyseteresis	5...30 %
Repeat accuracy	± 2 %
Temperature dependence	< 0,06%/K
Overload cap. continous / 10s	100 A / 300 A
Output voltage/current max.	DC 40 V / 40 mA
Voltage drop (ON)	max. 1,5 V
Leak current (OFF)	max. 0,6 mA
Switch-on /switch-off delay	0,2...2s / ≤0,3 s
nominal frequency	50 Hz
operating range	30...70 Hz
error	≤ 3%/Hz
rated ambient temperature range	-20...+50°C
Housing	Design H
Dimensions (h x w x d)	50 x 36 x 56 mm
Diameter for conductor	11 mm
Weight	app. 90 g





Dimension illustrations



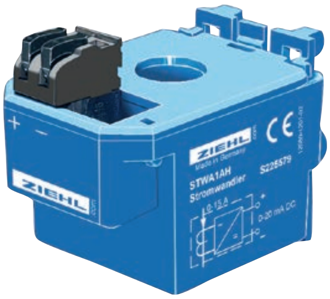


1 Housing
2 Clip for DIN-rail (removeable)
3 Terminal (pluggable)
4 Wall-mounting (M4)

AC-Electronic Current Transducer STWA1AH

with analog output

STWA1AH
Electronic current transformer
AC 0...15 A - DC 0...20 mA



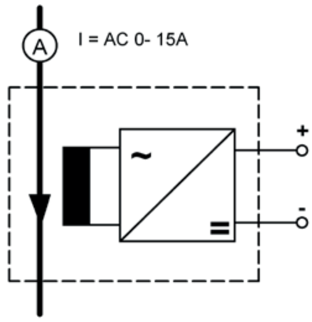
The STWA1AH is a measuring transducer for AC currents 0...15 A. Multiple loops of the conductor through the transformer reduces the measuring range correspondingly (for instance to 0...5 A with three loops).
For the monitoring of currents of any level, the STWA1AH is simply looped into the secondary 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 Ω.

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

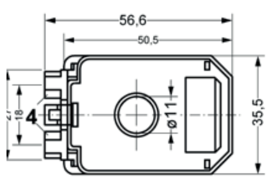
- current-proportional analog output DC 0...20 mA = AC 0...15 A (isolated)
- electrical connection via screwless pluggable terminals
- no supply voltage required
- DIN-rail-mount or with screws
- plug-in current transformer (Ø 11 mm)
- max. overload 100 A continously, 300 A / 10 s
- plug-in current transformer,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

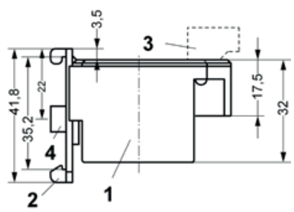
Order-number **S225579**

Monitoring range	AC 0 - 15 A
Analog output	DC 0 - 20 mA
Adjustment time	< 0,5 s.
Error (from 10% / I_{nom})	<3% from FS (at 100 Ω), <5% 50...200Ω <7% ..300Ω
Error with other load	+5%/100 Ω, max. 500 Ω
Temperature coefficient	< 0,06%/K
Ripple at 50 Hz	<2,5 % at 300Ω, <4,5 % at 100Ω, <7,5 % at 50Ω
Nominal frequency	50 Hz
Operating range	30...400 Hz
Error	≤ 0,2%/Hz
Overload cap. continous / 10s	100 A / 300 A
Rated ambient temperature range	0...55°C
Housing	Design H
Dimensions (h x w x d)	42 x 36 x 56 mm
Diameter for conductor	11 mm
Weight	app. 90 g



Dimension illustrations



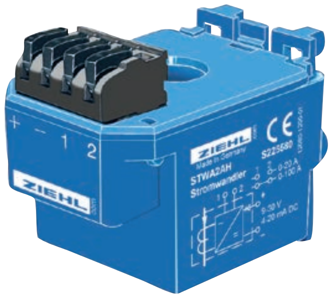


1 Housing
2 Clip for DIN-rail (removeable)
3 Terminal (pluggable)
4 Wall-mounting (M4)

AC-Electronic Current Transducer STWA2AH

with analog output

STWA2AH
Electronic current transformer
AC 0...20 A / 0...100 A - DC 4...20 mA



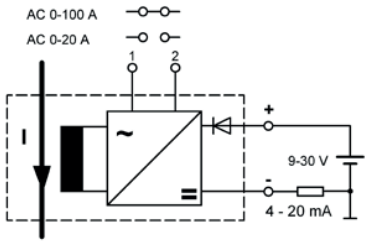
Art.-no: S225580

The STWA2AH is a measuring transducer for AC currents 0...100 A, divided in 2 ranges 0...20 A and 0...100 A. Multiple loops of the conductor through the transformer reduces the measuring range correspondingly (for instance to 0...5 A with four loops).
For the monitoring of currents of any level, the STWA2AH is simply looped into the secondary circuit of a large transformer with secondary 5 A (cable four times through the STWA2AH). Consequently, the output is proportional to the primary current of the transformer, e.g. 0...100 A for a transformer with 100/5 A.
The analog output is isolated. The STWA 2 AH is in 2-wire execution and needs a supply-voltage DC 9...30 V.

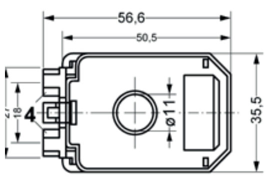
Application: The STWA"AH makes it possible to monitor the value of an AC current. The output signal can be evaluated or displayed with components with analog inputs, e.g. ZIEHL TR210, STW1000V2 or MINIPAN®.

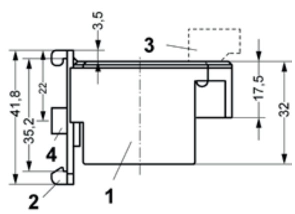
- current-proportional analog output DC 4...20 mA = AC 0...20 / 0...100 A (isolated)
- electrical connection via screwless pluggable terminals
- supply voltage DC 9...30 V (2-wire)
- DIN-rail-mount or with screws
- plug-in current transformer (Ø 11 mm)
- max. overload 100 A continously, 300 A / 10 s

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



Dimension illustrations



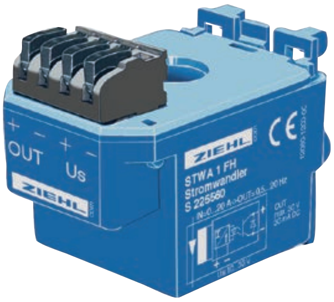


1 Housing
2 Clip for DIN-rail (removeable)
3 Terminal (pluggable)
4 Wall-mounting (M4)

AC-Electronic Current Tranducer STWA1FH

with frequency output

STWA1FH
Electronic Current Transformer 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.

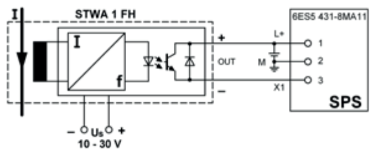
- current-proportional frequency output 0.5 - 20 Hz = AC 0 - 20 A
- output isolated, max DC 30 V/30 mA
- output frequency limited to 30 Hz
- output can be connected to the digital input of a PLC incorporated reverse voltage protection diode
- electrical connection via screwless pluggable terminals
-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

- <u>Options</u>: - currents up to 60 A
  - other frequencies

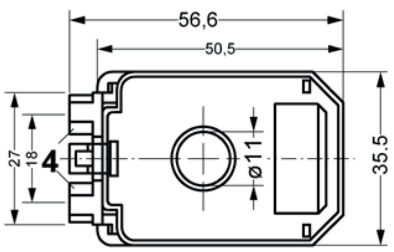
Order-number **S 225560**

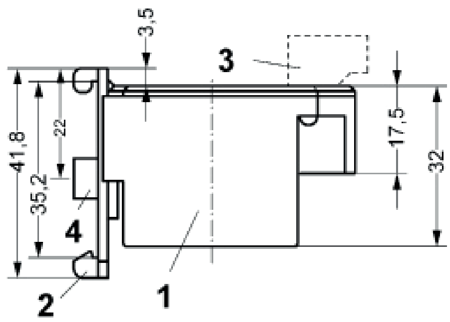
2

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



Dimension illustrations

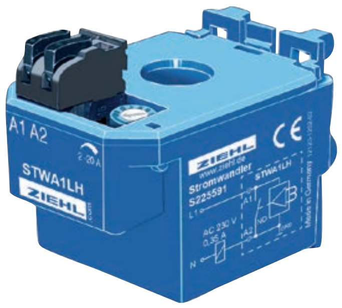




1 Housing
2 Clip for DIN-rail (removeable)
3 Terminal (pluggable)
4 Wall-mounting (M4)

AC-Electronic Current Transformer STWA1LH
with output AC 230 V / 0,35 A

STWA1LH



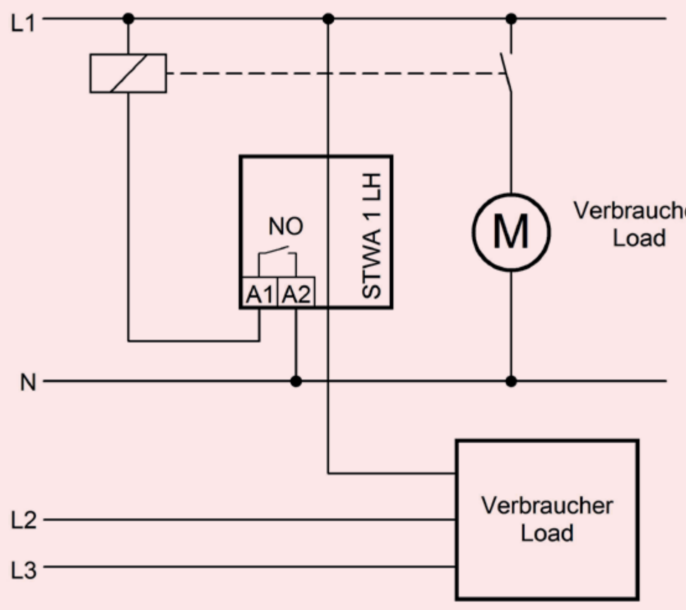
The electronic current transformer STWA1LH monitors alternating currents 2 ... 20 A. For lower currents, the monitored wire can be led multiple times through the transformer. Used in the secondary circuit of transformers (e.g. 100/5 A), it is possible to monitor higher currents.
The STWA1LH directly switches alternating voltage up to AC 230 V / 0,35 A.

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

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

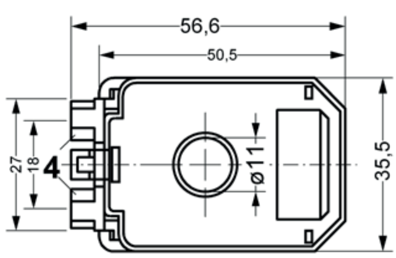
Order-numbers: **S225591**

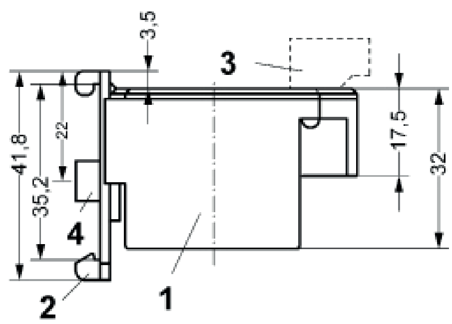
Automatic switching-on of additional consumenrs



Technical Data STWA1LH

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





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

2

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

DC-Limit Value Switch Type STW1000V2

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

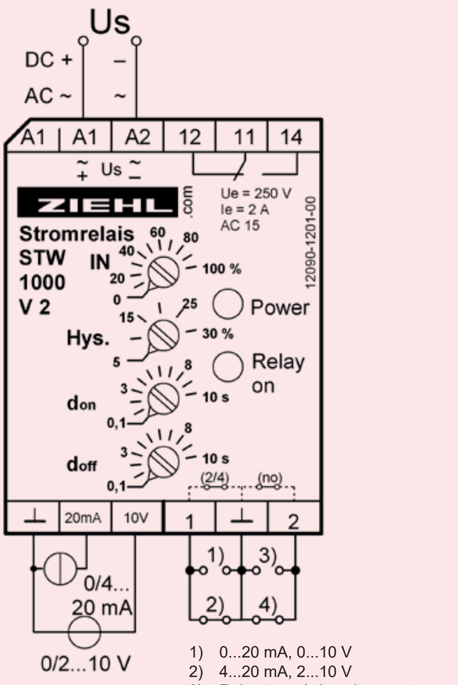
STW1000V2

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

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

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

Order-number
AC/DC 24-240 V: S225677



2

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 output	1 change-over contact (co)
Type of contact	**type 3 see** "general technical informations**"**
Test conditions	see "general technical informations**"**
Function	Maximum limit switch
Measuring signals	DC 0/4 ... 20 mA, 20 Ω DC 0...10 V, 63 kΩ
Switching point	adjustable 0...100%
Hysteresis	adjustable 5...30% of set limit
Error of setting	< 10% of fullscale
Repeat error	< 0,2%
Temperature-dependence	≤0,05 %/K
Start-up-delay d_{Enable}	adjustable 0,1...10 sec.
Switching delay d_{AL}	adjustable 0,1...10 sec.
Rated ambient temp.range	-20°C…+55°C
Dimensions (H x W x D)	design V2: 90x35x58 [mm], mounting height 55 mm
Attachment	on 35 mm DIN-rail according to EN 60 715 or with screws M4
Protection housing/terminals	IP 30 / IP 20
Weight	approx. 130 g

DC-Universal-Limit Value Switch TR210

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

TR210

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

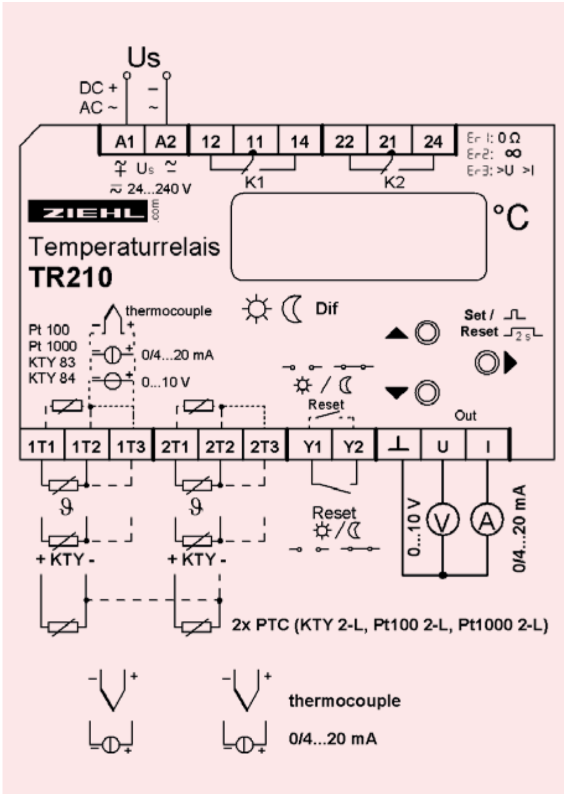
- Measuring and monitoring range -170...+1820 °C
- resolution 0,1°C (to 999.9 °C)
- Analog output (scaleable) for 1 input, min./max. of 2 inputs or difference of 2 sensors (no isolation between inputs and output)
- 2 relay outputs
- Shifting of day/night (selectable with contact at terminals Y1/Y2)
- Universal power supply AC/DC 24-240 V
- Easy setting with 3 buttons and preset programs
- Storing of min- and max-values of inputs
- Code-lock against manipulation of settings
- Terminals pluggable

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

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

Switching-Functions:
- 2 relays (co-contacts)
- 2-4 limits
- Warmest/coldest sensor switches relay
- Programmable for every relay:
  - hysteresis (+ or - = MIN- or MAX-function) -199.9...999.9 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.

2

Technical Data

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

Current Relay for DC- and AC-currents

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

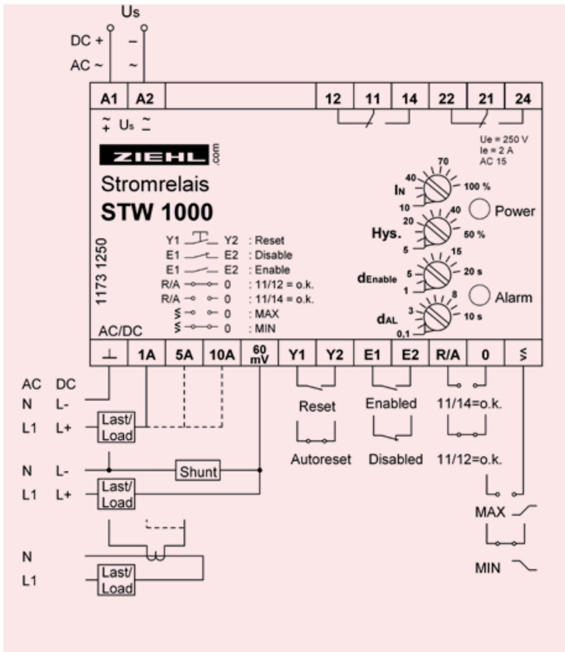
STW1000

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% IN
- Hysteresis adjustable 5...50%
- Start-up delay 1...20s (input enable)
- Switching delay 0,1...10s for fading of short peaks
- Output-relay 2 changeover-contacts (co)
- Operating- or closed-circuit-mode for relays selectable with bridge

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

Order-number
AC/DC 24-240 V **S225684**



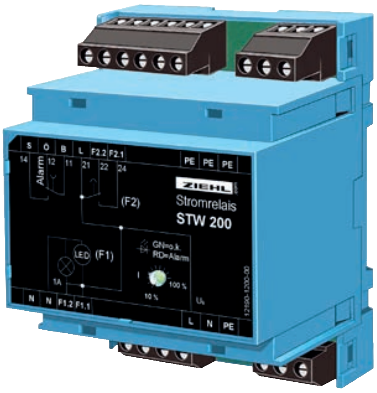
Technical Data

supply voltageUs	AC/DC 24-240 V, <3W, <5VA (AC 20-264 V, DC 20,4...297 V)
relay output	2 change-over contacts
type of contact	**type 2 see** "general technical informations"
test conditions	siehe "general technical informations"
function	Over- or undercurrent, DC orAC (1-phase)
frequency of measured current	0 / 40 ... 400 Hz
internal resistance	60 mV: 40 kΩ, 1A: 0,1 Ω, 5A: 20 mΩ, 10 A: 10 mΩ
overload capacity/continously	60 mV: 10 V, 1A: 2 A, 5A: 7,5 A, 10 A: 11 A
max. 10s	60 mV: 10 V, 1A: 5 A, 5A: 15 A, 10 A: 20 A
switching point	adjustable 10...100% IN
hysteresis	adjustable 5...50% of switching point
error of setting	< 10%
repeat error	± 0,2%
temperature-dependence	≤0,05 %/K
start-up-delay denable	adjustable1...20 sec.
switching delay dal	adjustable 0,1...10 sec.
rated ambient temp. range	-20°C…+55°C
dimensions (h x w x d)	design V4: 90 x 70 x 58 [mm]
attachment	on 35 mm DIN-rail according to EN 60 715 or with screws M4
protection housing/terminals	IP 30 / IP 20
weight	approx. 180 g

Current-Relay for Obstacle Lights

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

STW200



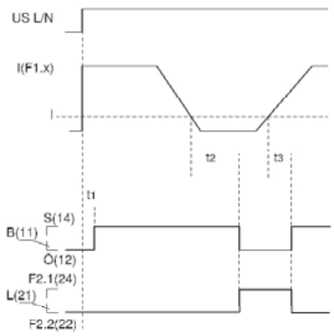
Current-relays STW200 monitor AC-currents for falling below an adjusted limit. The ranges 12 ... 120 mA and 0,1 ... 1 A allow the monitoring of LED-Lamps as well as incandescent lamps in obstruction lights.
In case of main lamp failure a relay switches on the reserve lamp. An alarm contact is available for signaling a lamp failure.
If an alarm is required in case of failure of reserve lamp, a second STW200 is used.

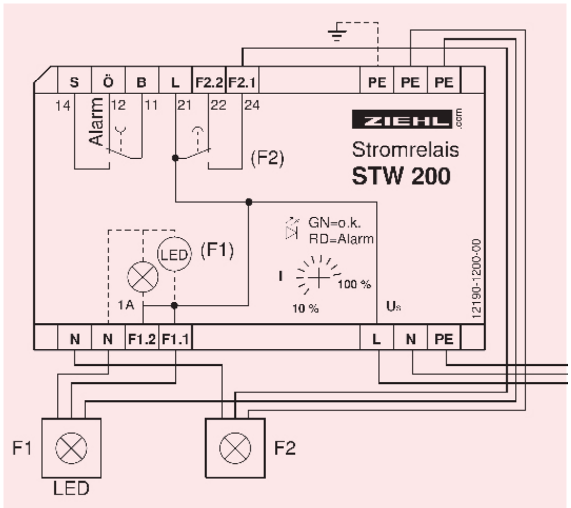
Application:
Monitoring of LED-Lamps or light-bulbs in twin obstacle lights with alarm (lamp failure) and switching on a reserve lamp.
Monitoring of the function of single obstacle lights.
At conventional solutions with a change-over contact, there is a short on-pulse at the reserve lamp everytime when the system is switched on. The STW200 switches it on only in case of a failure of the main lamp.
LED-lamps can also be monitored with long cables between relay and lamp.
When monitoring LED-lamps a total failure is detected. Failures of single LEDs are not detected.

2

Order-number: **S225530**

- Measuring input 12...120 mA for LED-lamps
- Measuring input 0,1...1 A for incandescent lamps (bulbs)
- withstands current-peaks when switching on lamp
- Adjustment range 10...100 %
- Relay for switching on reserve light in operating-current mode
- Relay for alarm in closed-current mode
- Cable-length from relay to lamp up to 500 m
- Display green = o.k., red = low current alarm
- Housing 70 mm wide, mounting height 55 mm





Technical Data

Supply voltage Us	AC 230 V 50/60 Hz, < 3 VA
Tolerance	0,85 ... 1,1 Us
Relay output	2 x 1 change-over contact
Type of contact	**type 2** see "General Technical Informations"
Measuring ranges	AC 12...120 mA / AC 0,1...1 A
Tolerance / repeating error	±15 % / <1 %
Hysteresis	app. 5%
Delay alarm	app. 2 s
rated ambient temp. range	-40°C...+55°C
Dimensions H x B x T	V 4: 90 x 70 x 58 mm, mounting height 55 mm
Line connection	one wire: 4 mm², stranded with sleeves: 2,5 mm²
Attachment	35 mm DIN-rail or 2 screws M4 (option)
Protection housing/terminals	IP 30/ IP 20
Weight	app. 210 g

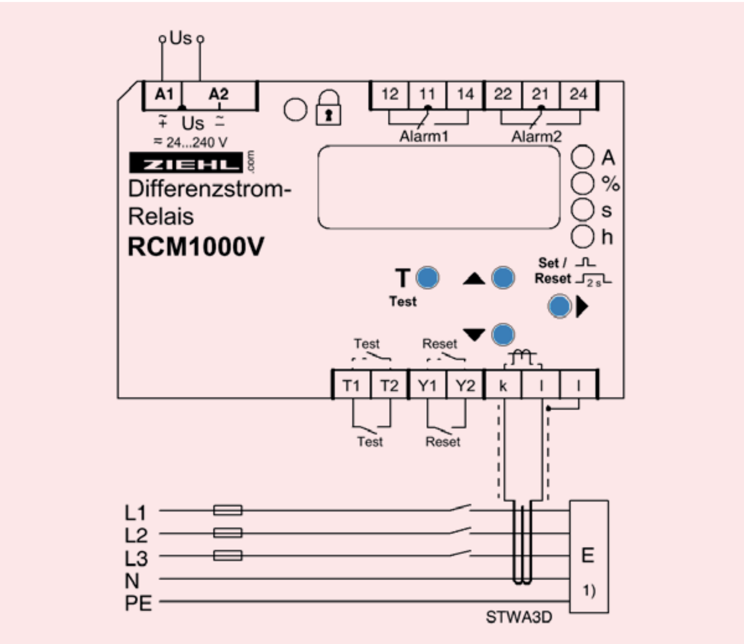
Residual Current Monitor RCM1000V

Monitoring of AC-currents in grounded power supply systems

RCM1000V

RCM100V monitors residual currents in grounded power supply systems. Used as a current relay it monitors AC- or pulsing DC-currents for exceeding upper or lower limits.
Insulation faults can be caused by damages (mechanical, thermic or chemical) of insulations or also by humidity or pollution. At currents > app. 250 mA (at 230 V) at a location, the fault can lead to danger of fire.

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



Residual current monitors detect these faults in widely branched power supply systems and make a signal before additional damage develops.
By displaying the residual current also stealthy changes can easily be detected and localized by switching on and off parts of the power supply system.

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

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

Order-number: **S225710**

Technical Data

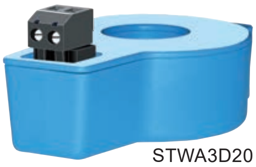
Rated supply voltage	AC/ DC 24V - 240V, < 1,5W, < 5 VA DC 20,4 - 297 V, AC 20-264 V 50 ...500 Hz
Relays K1, K2 (alarm 1, 2)	2 x 1 co-contacts, type 2, see "general technical informations"
Monitoring of current (program 1 and 2)	Type STWA3D... (20, 35, 70, 125) ≤ 10 m, single wire, ≥ 0,75 mm^2 0,003 A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

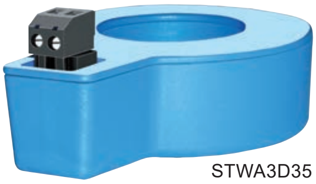
Current Transformer STWA3D
for use with RCM1000V

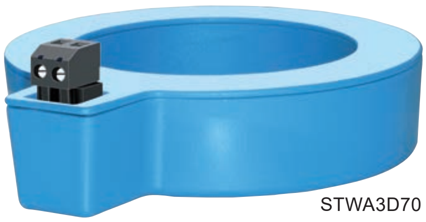
STWA3D

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

STWA3D20-70 can be snapped on a DIN-rail, vertically or horizontally or be fixed with screws. The Bracket for mounting is included.
STWA3D125 can only be mounted with screws.

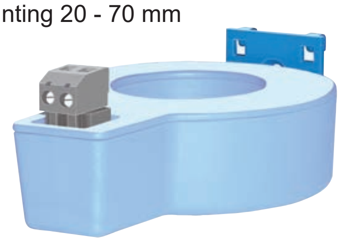

STWA3D20


STWA3D35


STWA3D70


STWA3D125

Bracket for mounting 20 - 70 mm



Type	Inside diameter	Order-number
STWA3D20	20 mm	S225725
STWA3D35	35 mm	S225726
STWA3D70	70 mm	S225727
STWA3D125	125 mm	S225728

Option:
Split core current transformer upon request.

Technical Data

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

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

Load and Current-Monitor COSFI100V

Active Current with direction,Over- and Underload and cosφ

COSFI100V

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

The power factor cos 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**, value and direction of active current in one phase is measured. Thus it can be used for the direction dependent monitoring of AC-current. With its digital display and many setting options, it can be individually adapted to the application.

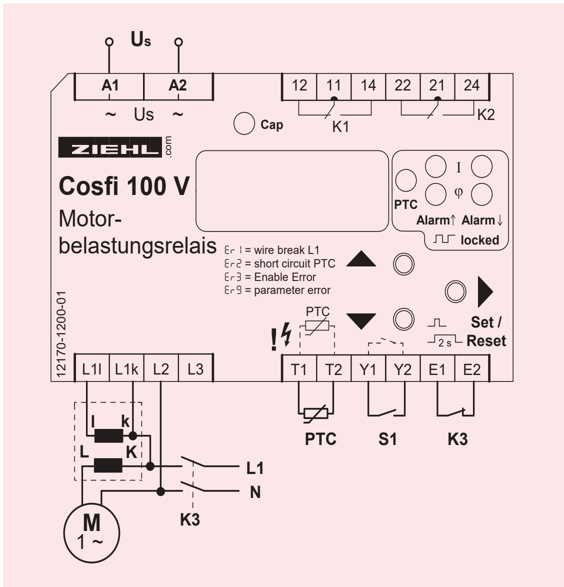
Application cos φ / true current:
- Monitoring of V-belt (slip and destruction)
- Fan-monitoring
- Pump-monitoring
- Conveyor systems
- Agitators
- excessive wear
- wear-out of tools
- Protection of motors, drives and plants from overload

Application current direction:
- Optimizing of own consumption of energy in photovoltaik plants.
  Consumers can be switched on or off depending on power available. By measuring current at the feed point it can be detected, wheather there is enough power available to start heat pumps, cooling units or other consumers.
- 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 φ. With decreasing load, this angle increases and the cos φ 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 φ, 2 x true current or 1 x cos φ 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**



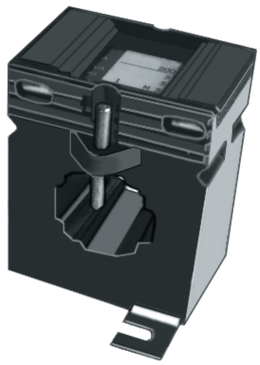
Technical Data COSFI100V

Rated supply voltage U_s	AC 400 V, +10%/-15%, 3VA, 50 Hz AC 230 V, +10%/-15%, 3VA, 50 Hz
Power factor (cosφ)	-0,99...+0,99
Hysteresis (cosφ)	0,05...0,20
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	Design V4: 90 x 70 x 58 mm, mounting height 55 mm
Attachment	on rail 35 mm according to EN 60 715 or with screws M4 (option)
Protection Housing/Terminals	IP 30/IP 20
Weight	app. 300 g

Measuring-Transducer for AC-Current

WS and AS

Current-Transformer Typt WS



Current-Transformer Type AS

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

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

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

2

Frequency- and Speed-Relay FRMU1000
with integrated Measuring-Transducer

FRMU1000

The FRMU1000 is a speed-monitor, a frequency-monitor and a measuring-transducer in one device.
2 limits with 1 relay each can be programmed for under- or over-speed, under- or overfrequency or each monitoring of a range (min/max).
The input for monitoring of speed can evaluate signals from proximity-sensors 2- or 3-wire, npn- or pnp. The display can be scaled. Thus the real speed of a shaft can be displayed, even though there are several pulses per revolution, e.g. from a cogwheel.

Application as Frequency-Relay:
Monitoring of frequencies in mains 16 2/3 to 400 Hz on maintaining a range (min/max).

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

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

Function

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

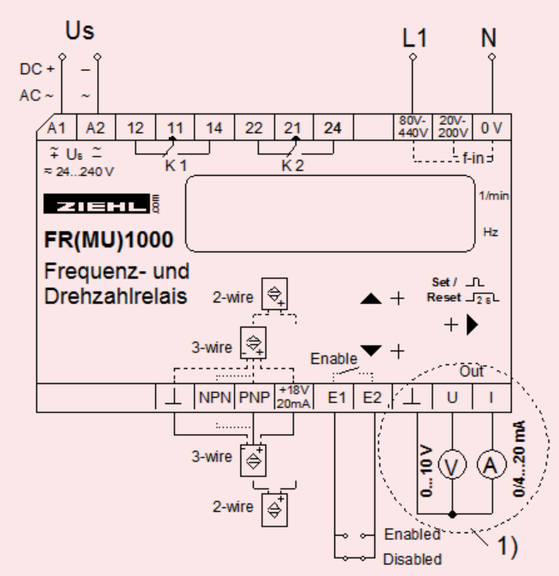
Speed:
- Monitoring range 5...99999 min^{-1}
- Display can be scaled
- Measuring-input for capacitance-switches 2- or 3-wire, npn or pnp
- Start-up-delay programmable
- Start-input (activates device with switching on the monitored drive)

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

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

Order-numbers:

without analog output FR1000	**U226135**
with analog output FRMU1000	
Input 20-200 / 80-440 V	**U226134**
Input 110-300 / 210-830 V	**U226138**



Technical Data FRMU1000

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

2

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	DC 10-30 V
Max. switching frequency	800 Hz = 48000 Imp/min
Max. switching distance	4 mm (recomm. ≤3 mm)
Factor of reduction	Ms: 0,45, Al: 0,4, Cu: 0,3
Rated amb. temp. range	-25 ... +70 degC
Housing	Threaded pipe M12x1
Material	nickel-plated brass
Weight	app. 26 g
Dimensions	M 12x1 / length 50 mm
Torque	max. 10 Nm
Connection	threaded plug M 12
Shock resistance	≤30 g, ≤11 ms
Vibration resistance	≤55 Hz, ≤1 mm
protection	IP 67
Order-number IG 2	U226003
Order-number cable	U226004

Relay for Energy Flow EFR3000

Optimization of consumption of own energy
Zero Export Device, measuring transducer for power

EFR3000

Relays for energy flow EFR3000 monitor the current flow between public power grid and generating plant / consumer.
When the own power plant generates more power than actually is consumed it often is more economical to consume the excess energy self. This is especially reasonable when the difference is high between the price you pay to the grid provider and the price the provider pays for fed in energy.

Functions:

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

2

The EFR measures the energy flow in all 3 phases and calculates the mean value.
Is sufficient own power left, the EFR3000 switches on up to three consumers and ensures that the power is consumed in the house. Potential consumers are e.g. air conditioners, boilers or battery chargers but also washing machines, dryers, etc ... .

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

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

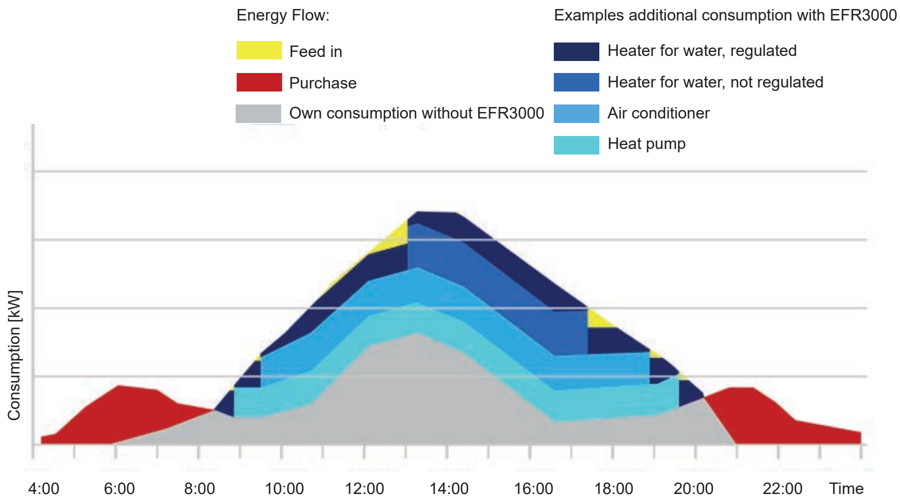
The analog output can regulate a consumer stepless and thus achieve a yet higher rate of own consumption. When using phase angle controls the specifications of the grid providers have to be obeyed.

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

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

To achieve this the following parameters can be set

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

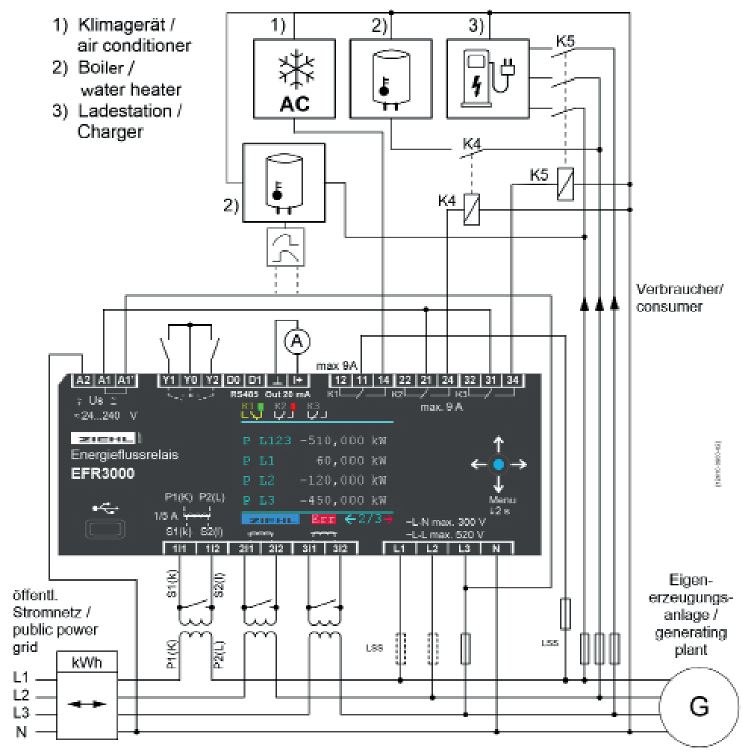


Cheap equipment costs ensure a short payback period:
Save € 312 * a year with the EFR3000 by switching on

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

in times you have a surplus of own energy.

Equipment costs (EFR 3000, 3x current transformer, if necessary contactors) are returned within less than 2 years*.
Longer / shorter switch on times and larger / smaller consumption shorten / extend the period. In addition, in the long term rising purchase prices for energy can be expected.
* Feed 12 Ct / kWh, electricity purchase price 25 Ct / kWh



Features:

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

Order numbers

EFR3000	**S225760**
Suitable current transformer (split core):	
KBR 18S, 60/1A, class 3 0,4VA	**S225770**
Suitable mini current transformer:	
CTM7, 64/1A, class 1 0,5VA	**S225780**

Technical Data

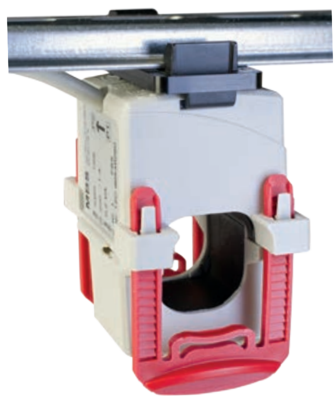
Rated supply voltage	DC/AC 24 – 240 V 0/50/60 Hz, <3 W, <9 VA DC 20,4 - 297 V AC 20 - 264 V
Relay outputs K1, K2, K3	3 x 1 change-over contact
Switching voltage	max. AC 300 V, DC 300 V
Conventionel thermal current Ith	max. 9 A
Switching power max cos φ=1	2000 VA
Contact service life, electr. cos φ=1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

Current transformers for Relay for Energy Flow EFR3000 and EFR4000IP

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

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

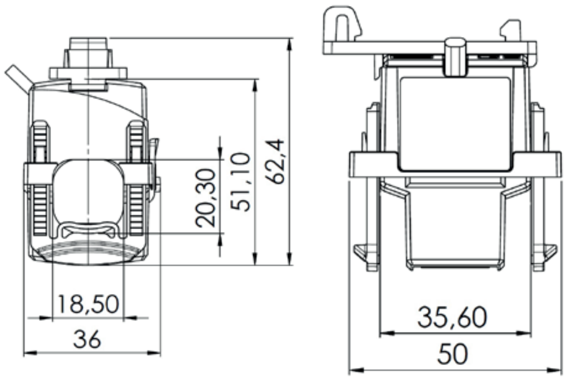
KBR18S



The split core current transformer KBR18S is especially suitable for being subsequently mounted in existing facilities. With its primary 60 A it matches perfectly the 63 A with which domestic connections are usually fused.
The secondary 1 A are connected to EFR. The inputs of the EFR are preset for this value.
A clip for mounting on DIN-rail is included.

For EFR three current transformers are required.

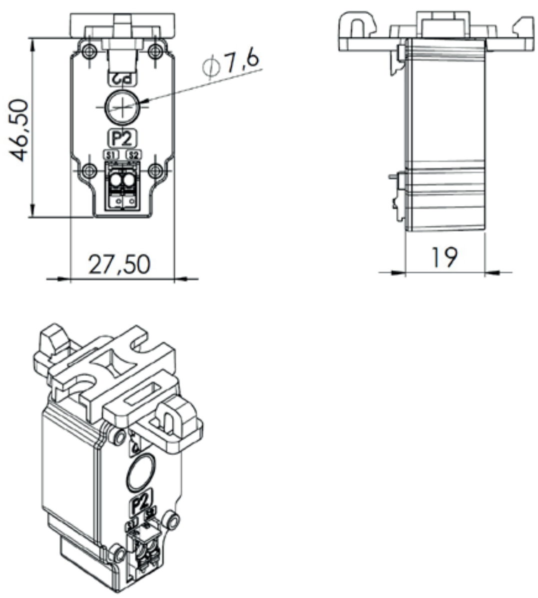
Order-number: **S225770**



CTM7

The compact current transformer is especially suitable for use in tight space conditions. With its primary 64 A it matches perfectly the 63 A with which domestic connections are usually fused.
The secondary 1 A are connected to EFR. The inputs of the EFR are preset for primary currents 60 A, changing is simple.
A clip for mounting on DIN-rail is included. The transformers can be clicked together for saving space.
For EFR three current transformers are required.

Order-number: **S225780**



Technical Data

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

Relay for Energy Flow EFR4000IP

Optimization of consumption of own energy
Integrated Webserver, IP-Connection, Zero Export Device, measuring transducer for power

EFR4000IP

Art.-numbers:
EFR4000IP S225761
Suitable current transformer (split core) 60/1A, class 3, 0,4VA
KBR 18S S225770
Suitable mini current transformer: 64/1A, class 1, 0,5VA
CTM7 S225780

Relays for energy flow EFR4000IP monitor the current flow between public power grid and generating plant / consumer.
Operation is made comfortably via integrated webserver or directly at the device. Measured values are displayed nearty arranged at device on monitor.

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

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

The EFR measures the energy flow in all 3 phases and calculates the mean value.
Is sufficient own power left, the EFR4000IP switches on up to three consumers and ensures that the power is consumed in the house.

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

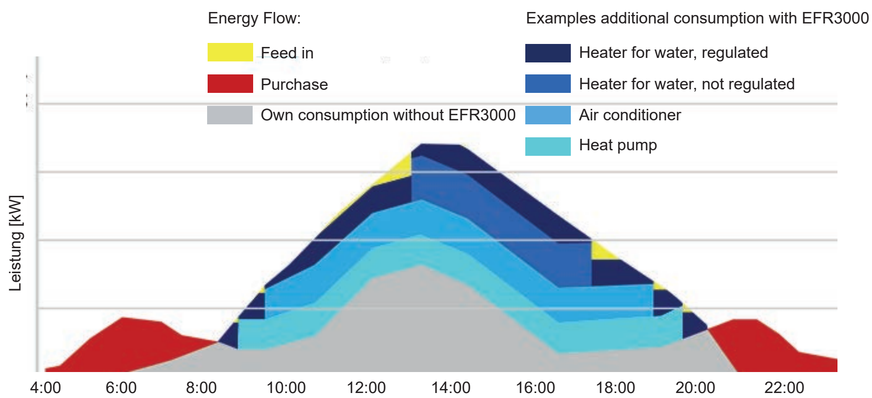
It becomes more complicated when the generation varies because of clouds before the sun and consumers do not continuously draw current as washers, dryers, irons or stoves.

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

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

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

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

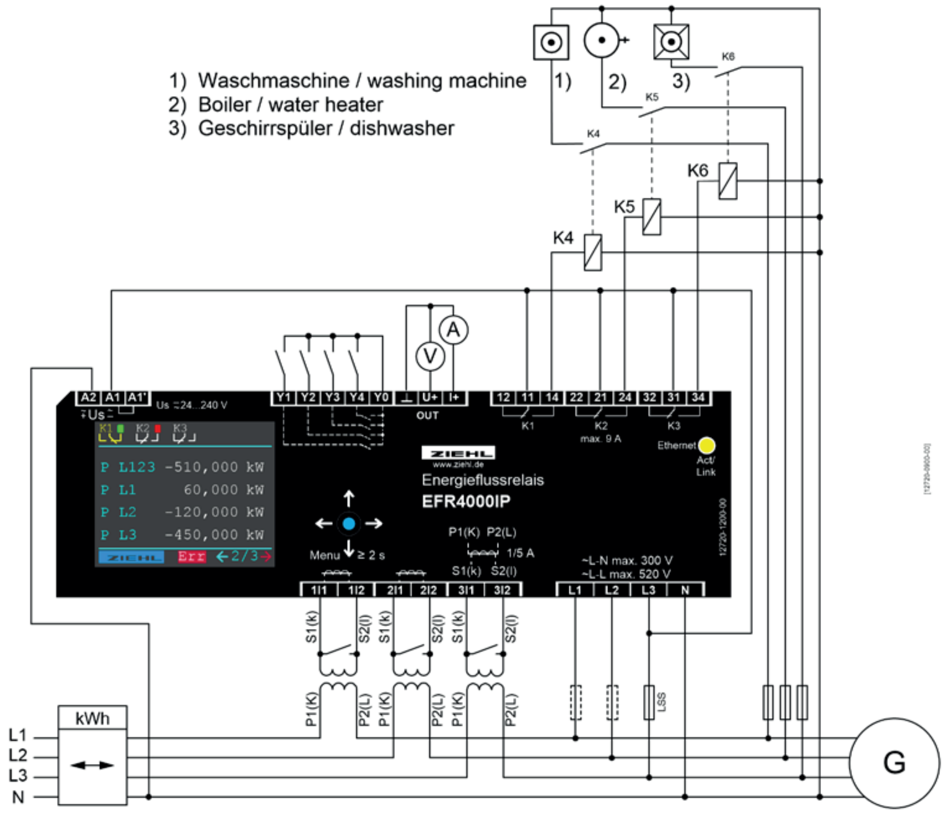


Cheap equipment costs ensure a short payback period:
Save € 312 * a year with the EFR4000IP by switching on at 200 days a year for an average 3 hours consumers with 4 kW in times you have a surplus of own energy.

Equipment costs (EFR4000IP, 3x current transformer, if necessary contactors) are returned within about 2 years*.
Longer / shorter switch on times and larger / smaller consumption shorten / extend the period. In addition, in the long term rising purchase prices for energy can be expected.
* Feed 12 Ct / kWh, electricity purchase price 25 Ct / kWh

Features:

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



2

Technical Data

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

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
- 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

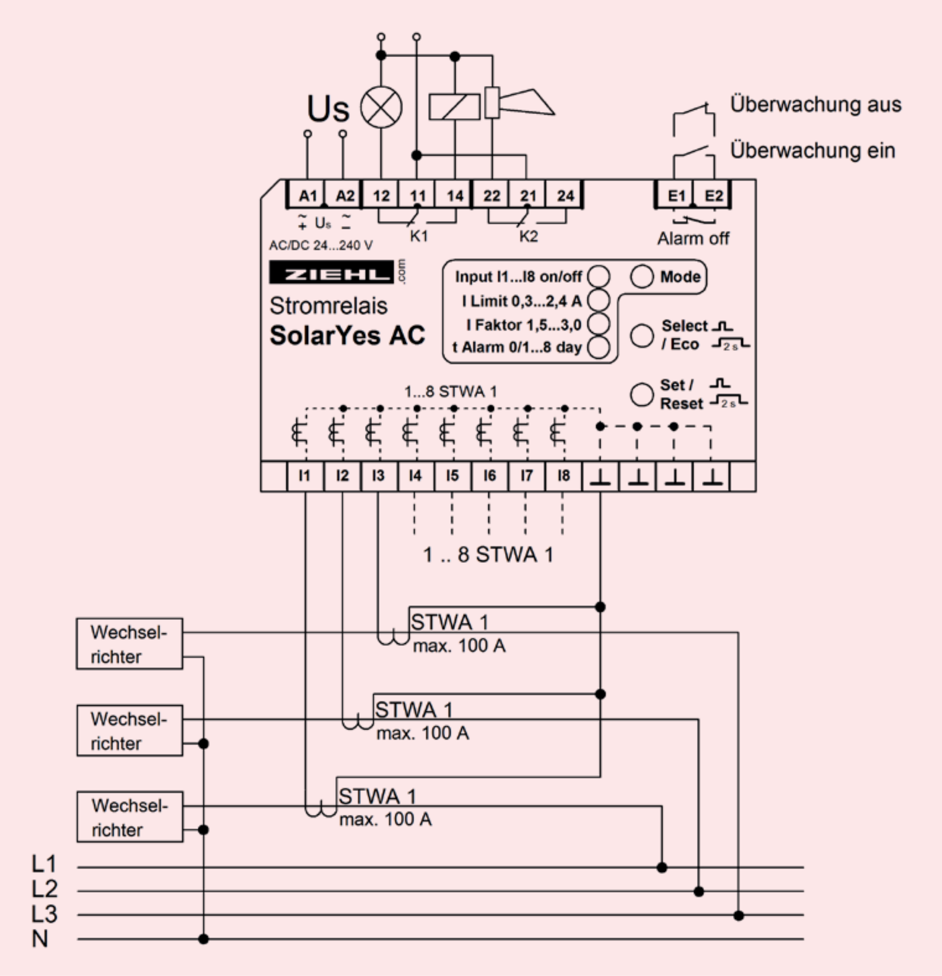
For measuring the current, current transformers STWA1 and STWA1H are used, one for every monitored line. The STWA1 consist of a climate-proven sealed-in coil with 2 x 1 m cable.
The STWA1H can be fixed on a DIN-rail or mounted with 2 screws. The electrical connection is made via pluggable terminals. 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
Relay-Output	2 Change-over contact (CO) type 2, see general technical hints
Measuring Inputs	1-8 Current transformers STWA 1 or STWA 1 H Sensitivity adjustable AC 0,3 - 2,4 A ± 30% max. 100 A 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

2



Digital Measuring-Instruments MINIPAN®

3

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 power-supply 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

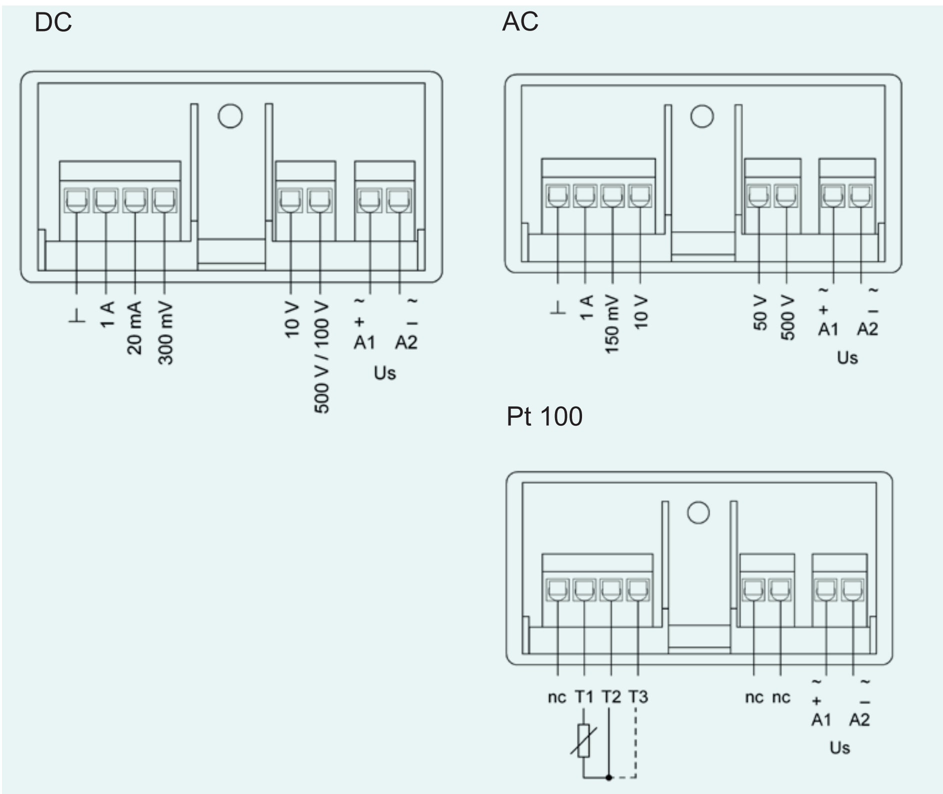
Measuring of Temperature Pt100 (RTD):
- Pt100 in 2- or 3-wire connection
- Measuring Range -199,9 ... +850,0 °C
- Resolution 0,1 °C
- Display in °C or °F

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

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	**± 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 Ω/ max. ±100 mA
		± 1.00 A / Shunt 150 mΩ / max. ±2 A
	AC-Meter	**150 mV** / 900 Ω / 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
	Temperature Pt 100 (RTD)	**- 199,9 ... + 850,0 °C** (= -328 ... +1563 °F)
	sensor-input	Pt 100, 2- or 3-wire connection
		max. 3 x 50 Ω
	resistance 3-wire	<400 ms
	measuring time AC/DC	<400 ms
	measuring time Pt 100	
Accuracy	resolution	+9999 / -1999
	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 % / K
	total error at temperature-measuring	± 0,3 % of value ± 0,5 K
	temperature factor	± 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
	Single wire	1 x 0,5…1,5 mm^2
	Fine wired with end sleeves	1 x 0,14…1 mm^2
	Rated ambient temperature range	-20...+60 °C
	protection housing/terminals	IP 30/IP 20
	weight	ca. 120 g

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 power-supply 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

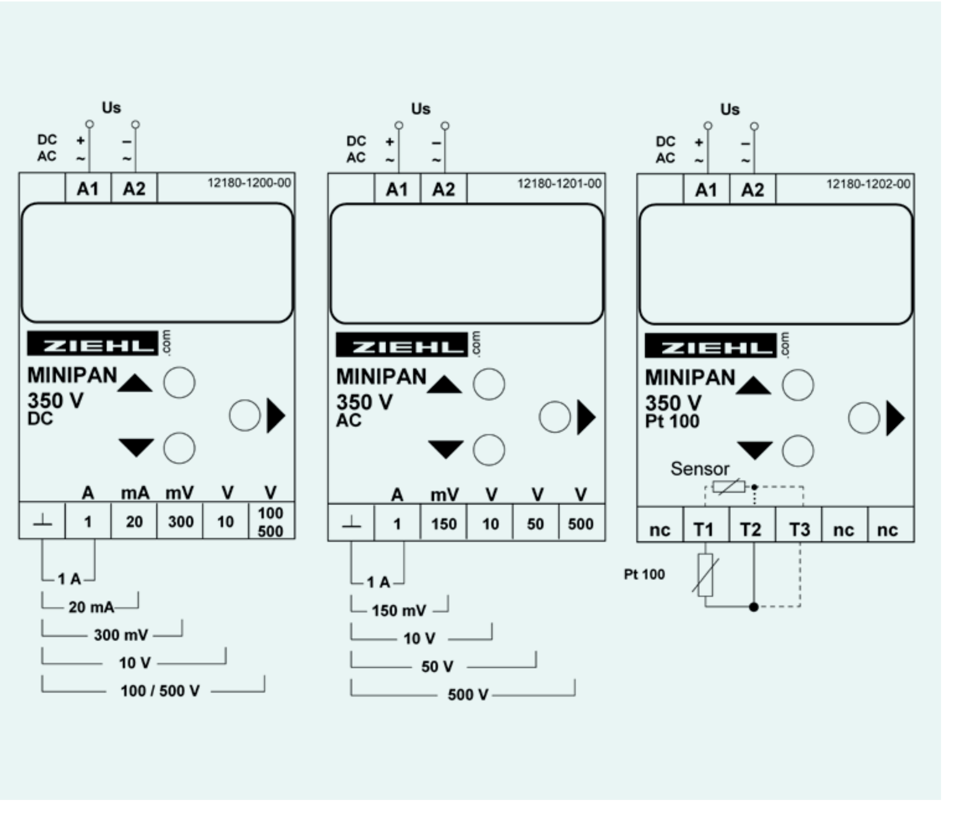
Measuring of Temperature Pt 100 (RTD):
- Pt100 in 2- or 3-wire connection
- Measuring Range -199,9 ... +850,0 °C
- Resolution 0,1 °C
- Display in °C or °F

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

Order-numbers:

MINIPAN 350V DC	D890110
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 measuring-range / resistance of input / overload capacity	**± 300 mV** / 120 kΩ / max. ±2,5 V **± 10.00 V** / 1 MΩ / max. ±50 V **+ 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 Ω/ max. ±100 mA **± 1.00 A** / Shunt 150 mΩ / max. ±2 A
	AC-Meter measuring-range / resistance of input / overload capacity	**150 mV** / 900 Ω / max. 2,5 V **10.00 V** / 100 kΩ / max. 50 V **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
	Temperature Pt 100 (RTD)	**- 199,9 ... + 850,0 °C** (= -328 ... +1563 °F)
	sensor-input	Pt 100, 2- or 3-wire connection
	resistance 3-wire	max. 3 x 50 Ω
	measuring time AC/DC	<400 ms
	measuring time Pt 100	<400 ms
Accuracy	resolution	+9999 / -1999
	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
	total error at temperature-measuring	± 0,3 % of value ± 0,5 K
	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
	protection housing/	IP 30
	protection terminals	IP 20
	weight	app. 100 g

3

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 Ω / 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.

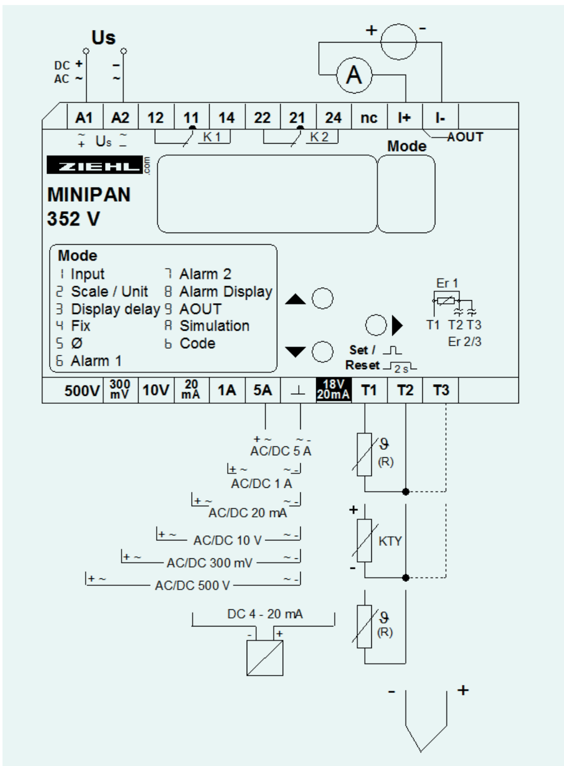
- Temperature:
  - Pt 100 (RTD) , Pt 1000, KTY 83 and KTY 84 in 2- or 3-wire connection
  - Thermocouples type B, E, J, K, L, N, R, S, T
  - Measuring range –170 ... +1820 °C
  - Resolution 0.1 °C (up to 999.9 C)
  - Display in °C or °F

- 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		potentially separated from supply-voltage (always connect 1 input only at the same time)
	DC-measuring Measuring-range / input-Resistance / overload capacity	**± 300 mV** / 29 kΩ / max. ±2,5 V **± 10.00 V** / 1 MΩ / max. ±50 V **± 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 Measuring-range / input-Resistance / overload capacity	**300 mV** / 20 kΩ / max. 2,5 V **10.00 V** / 1 MΩ / max. 50 V **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
	Messuring of resistance	0...500 Ω 0... 30 kΩ
	Temperature-measuring	**- 199,9 ... + 850,0 °C** (= -328 ... +1563 °F)
	Sensor-input	Pt 100, Pt 1000, KTY 83, KTY 84, 2- or 3-wire connection, line-resistance max. 3x 50 Ω
	Thermocouples	B, E, J, K, L, N, R, S, T
	Measuring time DC	< 300 ms x Ø
	Measuring time AC	< 700 ms + 300 ms x Ø
	Measuring time temperature + Resistance	< 600 ms (3-wire + thermocouple) < 300 ms (2-wire)
Output	Relay 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 measuring transducer and analog output	DC 15-20 V / max. 45 mA
Accuracy	Resolution	-1999 / +9999
	Error DC (of FullScale)	± 0,1 % ± 1 Digit ± 0,02 % K
	Error AC (of FullScale)	± 0,5 % ± 1 Digit ± 0,05 % K
	Error resistance (of value)	500 Ω: 0,2 % ± 0,5 Ω 30 kΩ: 0,5 % ±2 Ω
	Error Pt 100 (of value)	± 0,2 % ± 0,5 K ± 0,04 °C/K
Housing	Housing	V4
	Dimensions (h x w x d) mm	90 x 70 x 58 mm
	Attachment	on 35 mm DIN rail according to EN 60 715 or with 2 screws M4 (option)
	Ambient temperature range	-20...+60 °C
	Protection housing	IP 30
	Protection terminals	IP 20
	Weight	approx. 190 g

3

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 Ω / 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.

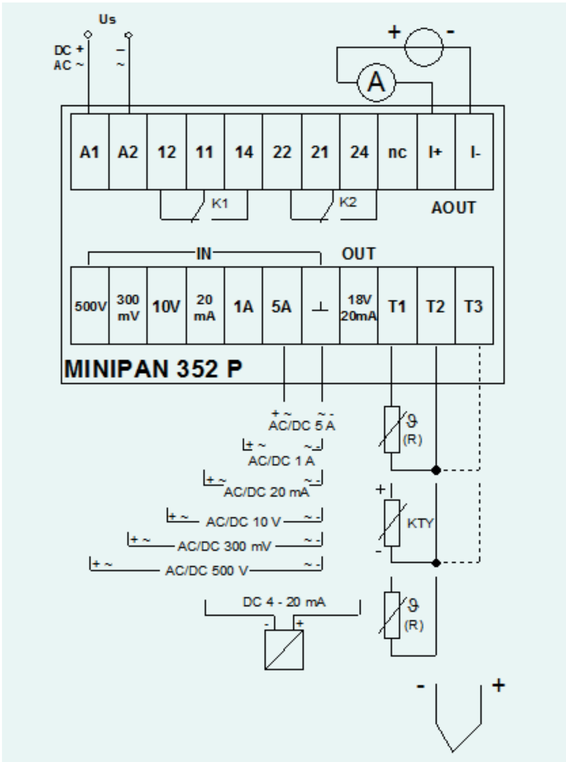
- Temperature:
  - Pt 100 (RTD) , Pt 1000, KTY 83 and KTY 84 in 2- or 3-wire connection
  - Thermocouples type B, E, J, K, L, N, R, S, T
  - Measuring range –170 ... +1820 °C
  - Resolution 0.1 °C (up to 999.9 C)
  - Display in °C or °F

- 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: D440200
D440210 (with analog output)



Technical Data MINIPAN 352P

Power supply	Rated supply-voltage Us Tolerance DC Tolerance AC Power consumption Frequency	AC/DC 24-240 V DC 20 - 297 V (0,85 x 24 V...1,35 x 220 V) AC 20 - 264 V (0,85 x 24 V...1,1 x 240 V) < 3 W, < 10 VA 48...62 Hz
Measuring inputs		potentially separated from supply-voltage (always connect 1 input only at the same time)
	DC-measuring Measuring-range / input- Resistance / overload capacity	**± 300 mV** / 29 kΩ / max. ±2,5 V **± 10.00 V** / 1 MΩ / max. ±50 V **± 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 Measuring-range / input- Resistance / overload capacity	**300 mV** / 20 kΩ / max. 2,5 V **10.00 V** / 1 MΩ / max. 50 V **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
	Messuring of resistance	0...500 Ω 0... 30 kΩ
	Temperature-measuring Sensor-input	**- 199,9 ... + 850,0 °C** (= -328 ... +1563 °F) Pt 100, Pt 1000, KTY 83, KTY 84, 2- or 3-wire connection, line-resistance max. 3x 50 Ω
	Thermocouples	B, E, J, K, L, N, R, S, T
	Measuring time DC Measuring time AC Measuring time temperature + Resistance	< 300 ms x Ø < 700 ms + 300 ms x Ø < 600 ms (3-wire + thermocouple) < 300 ms (2-wire)
Output	Relay output	Typ 2, see "general technical informations" 2x1 change-over) contanct
	Analog output Supply-voltage for loop-powered measuring transducer and analog output	4-20 mA (insulated when externally supplied) DC 15-20 V / max. 45 mA
Accuracy	Resolution Error DC (of FullScale) Error AC (of FullScale) Error resistance (of value) Error Pt 100 (of value)	-1999 / +9999 ± 0,1 % ± 1 Digit ± 0,02 % K ± 0,5 % ± 1 Digit ± 0,05 % K 500 Ω: 0,2 % ± 0,5 Ω 30 kΩ: 0,5 % ±2 Ω ± 0,2 % ± 0,5 K ± 0,04 °C/K
Housing		panel-mount housing 72 x 72 mm
	Dimensions (h x w x d) mm Attachment	72 x 72 x 103 mm 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 Protection terminals Weight	front-side IP 50, back-side IP 20 IP 20 approx. 240 g

3

Universal-Instrument MINIPAN SE352

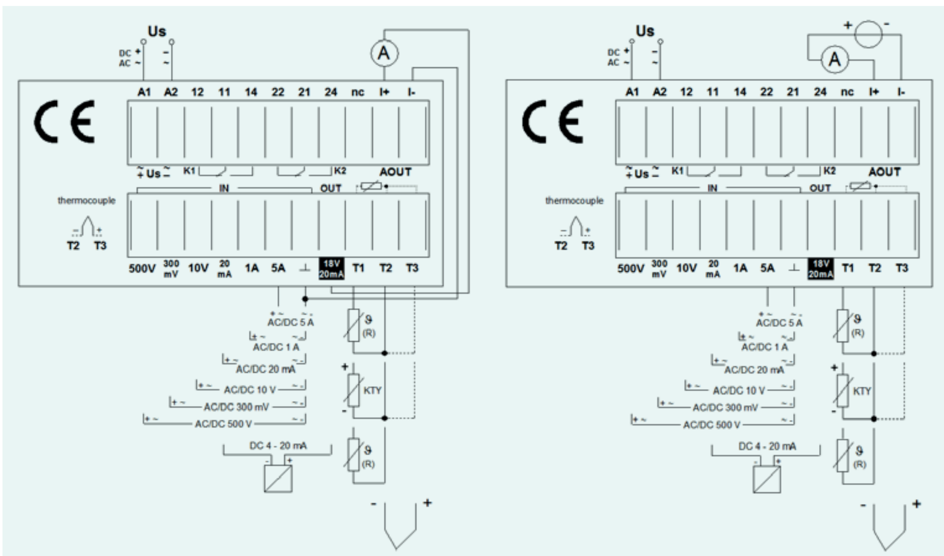
in Housing for Panel-Mount 48 x 96 mm

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 Ω / 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)



Technical Data MINIPAN SE352

Power supply	Rated supply-voltage Us Tolerance DC Tolerance AC Power consumption Frequency	AC/DC 24-240 V DC 20 - 297 V (0,85 x 24 V...1,35 x 220 V) AC 20 - 264 V (0,85 x 24 V...1,1 x 240 V) < 3 W, < 10 VA 48...62 Hz
Measuring inputs		potentially separated from supply-voltage (always connect 1 input only at the same time)
	DC-measuring Measuring-range / input- Resistance / overload capacity	**± 300 mV** / 29 kΩ / max. ±2,5 V **± 10.00 V** / 1 MΩ / max. ±50 V **± 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 Measuring-range / input- Resistance / overload capacity	**300 mV** / 20 kΩ / max. 2,5 V **10.00 V** / 1 MΩ / max. 50 V **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
	Messuring of resistance	0...500 Ω, 0... 30 kΩ
	Temperature-measuring Sensor-input	**- 199,9 ... + 850,0 °C** (= -328 ... +1563 °F) Pt 100, Pt 1000, KTY 83, KTY 84, 2- or 3-wire connection, line-resistance max. 3x 50 Ω
	Thermocouples	B, E, J, K, L, N, R, S, T
	Measuring time DC Measuring time AC Measuring time temperature + Resistance	< 300 ms x Ø < 700 ms + 300 ms x Ø < 600 ms (3-wire + thermocouple) < 300 ms (2-wire)
Output	Relay output	Typ 2, see "general technical informations" 2x1 change-over) contanct
	Analog output Supply-voltage for loop-powered measuring transducer and analog output	4-20 mA (insulated when externally supplied) DC 15-20 V / 25 mA
Accuracy	Resolution Error DC (of FullScale) Error AC (of FullScale) Error resistance (of value) Error Pt 100 (of value)	-1999 / +9999 ± 0,1 % ± 1 Digit ± 0,02 % K ± 0,5 % ± 1 Digit ± 0,05 % K 500 Ω: 0,2 % ± 0,5 Ω 30 kΩ: 0,5 % ±2 Ω ± 0,2 % ± 0,5 K ± 0,04 °C/K
Housing		panel-mount housing
	Dimensions (h x w x d) mm Attachment	48 x 96 x 100 mm panel-mount, panel cutout 45 $^{+0,6}$ x 92 $^{+0,8}$ mm max. thickness of panel: 8 mm
	Rated ambient temperature-range	-20...+60 °C
	Protection housing Protection terminals Weight	front-side IP 54, back-side IP 20 IP 20 approx. 240 g

Switching Relays and Controls

4

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 dedusting 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 STWA 1 S can detect, if a machine is switched on. They can be directly connected to digital inputs of PLCs.

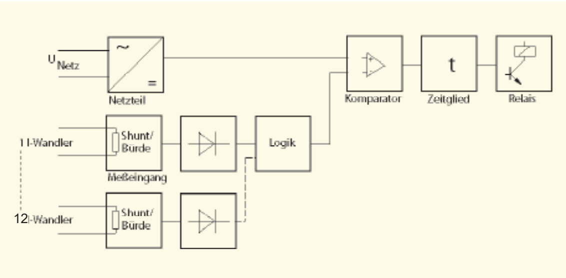
Overview

Typ	STW1K	STW12V	STW81V	STW84V	STWA1S/SEH	Sensor S1
Number of monitored machines	8	12	8	8	1	1
Imputs for Transformers STWA 1 Current Sensor S1 Potential-free contact	STWA1 S1 -	STWA1 S1 Contact	STWA1 S1 Contact	STWA1 S1 Contact	- - -	- - -
Operating value	≤ 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	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 STW1K

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

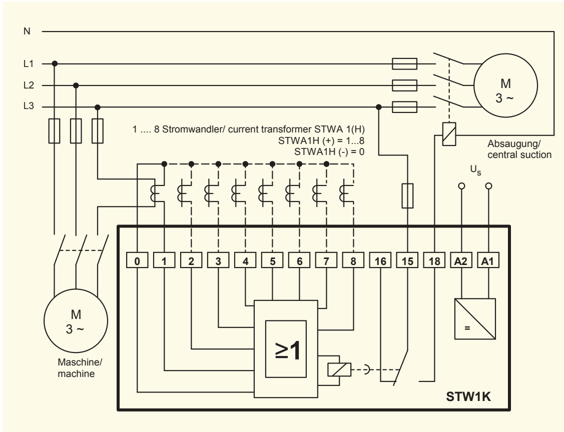
STW1K

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	AC 220 - 240 V +10-15%, < 3 VA, 50/ 60 Hz
Transformer input	1…8, type STWA , order-number S225201
Overload cap.continous/max 10s	100 A / 300 A
Function	OR-evaluation
Switching point on	≤ AC 1 A
Switching point off	> AC 0,3 A
Switch-off delay	approx. 10 sec.
Switch-on delay	approx. 0,5 sec.
Output relay	1 change-over contact (co)
Type of contact	**type 2**, see "general technical informations"
Test conditions	see "general technical informations"
Rated ambient temperature range	-20°C…+55°C
Dimensions (h x w x d)	Design K: 75 x 22.5 x 115 [mm]
Attachment	on 35 mm DIN rail according to DIN EN 60715 or with screws M4 (option)
Protection housing / terminals	IP 30 / IP 20
Weight	approx. 140 g

Current-Relay STW12V

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

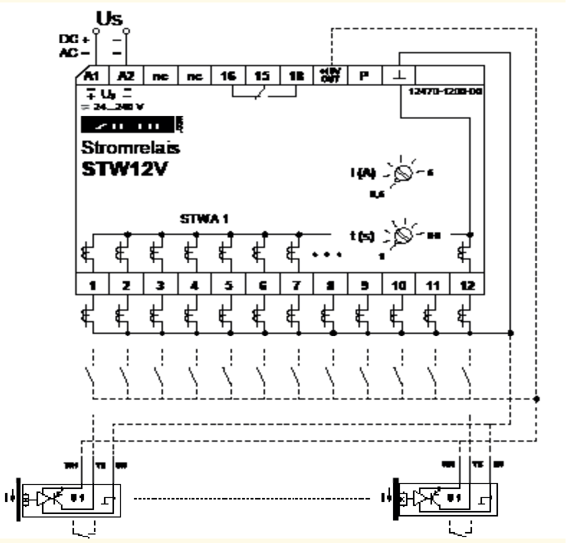
STW12V

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
- Universal supply-voltage AC/DC 24-240 V
- Housing for mounting in switchgear cabinets or fuse-boxes, 70 mm wide, mounting height 55 mm

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

Order-number
AC/DC 24-240 V **S225519**



Technical Data

Supply voltageUs	AC/DC 24 - 240 V, < 3 W, < 5 VA,50/ 60 Hz AC 20 - 264 V, DC 20,4 - 297 V
Relay output	1 change-over contact (co)
Type of contact	**type 2 see** "general technical informations"
Test conditions	siehe "general technical informations"
Rated amb. temperature range	-20°C…+55°C
Function	OR-evaluation
Measuring inputs	12 x for current transmitters STWA 1, current-sensors S 1 or potential-free contacts
Overload cap./continous max 10s	100 A / 300 A
Switching point	with STWA 1 adjustable, AC 0,5 - 5 A
Tolerance	± 20%
Switch-off delay	adjustable 1- 60 s
Switch-on delay	app. 0,5 s
Dimensions (H x W x D)	design V4: 90x70x58 [mm], mounting height 55 mm
Attachment	on 35 mm DIN-rail according to EN 60 715 or with screws M4
Protection housing/terminals	IP 30 / IP 20
Weight	app. 200 g

Current relay STW81V

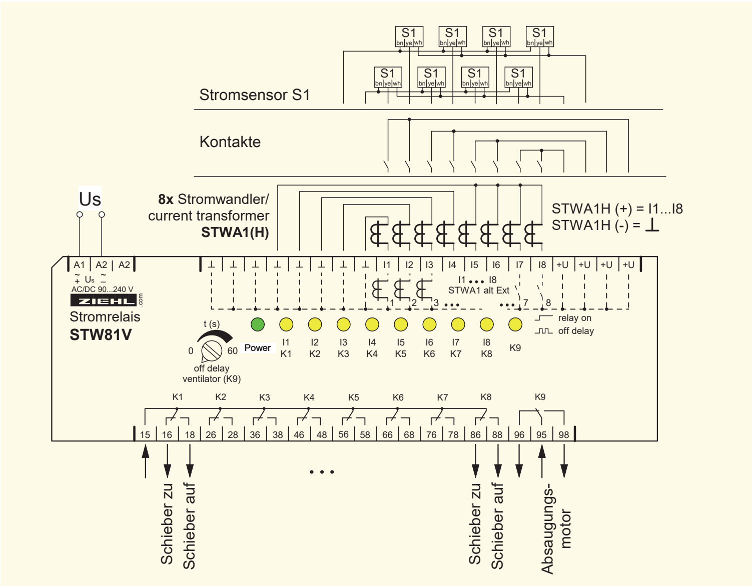
8-channel, single evaluation + OR-circuit

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)

Order-numbers:

AC/DC 90 - 240 V **S225516**

4

Technical Data

Rated supply voltage Us	AC/DC 90 - 240 V, 0/50/60 Hz, < 4 W, < 8 VA DC: 76,5 ... 297 V, AC: 76,5 ... 264 V
Output relay	8 + 1 change-over contacts (co)
Type of contact	**type 2** see "general technical informations**"**
Test conditions	see "general technical informations**"**
Rated ambient temperature range	-20°C…+55°C
Transformer input	1...8 type STWA1, or STWA1H
Function	single/OR-circuit
Overload cap. continuous max. 10 s	100 A / 300 A
Switching point on	≤ AC 1 A
Switching point off	> AC 0,3 A
Switch-on delay	approx. 0,5s
Switch-off delay	10 s / 0 - 60 s
Dimensions (h x w x d)	design V 8 / 90 x 140 x 58 [mm]
Attachment	on 35 mm DIN rail according to DIN EN 50 022 or with screws M4 (option)
Protection housing / terminals	IP 30 / IP 20
Weight	approx. 330 g

Control for Suction Plants STW84V

with integrated control for dedusting of filters and volume flow

General

Art.-No.: S225522

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.

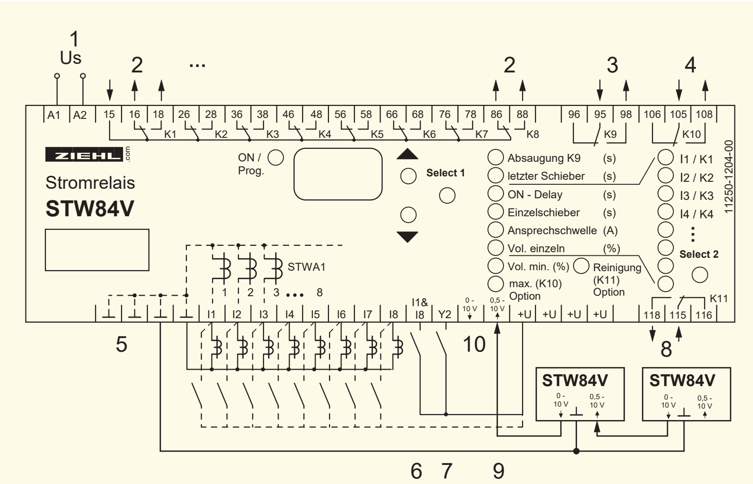
Applications: Controlling of dedusting plants in the timber and plastic processing industry according to the technical rules for dangerous materials TRGS 553.
The central suction is switched on, as soon as any machine is put into operation. According slide valves in the suction ducts of the individual 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
- Universal supply voltage AC/DC 24-240 V



1 power supply
2 8 outputs for slide-valves (16, 26...86=close, 18, 28...88=open
3 suction ON
4 max. volume-flow exceeded/option
5 inputs for current transformers STWA 1
6 open all slide valves
7 external dedusting command
8 dedusting/option
9 analog input
10 control of suction power

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 volume-flow 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

Technical Data STW84V

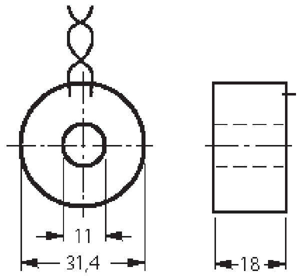
Power Supply	rated supply voltage Us	AC/DC 24-240 V
	Voltage tolerance	+10...-15%
	Power consumption	< 12 VA
	Frequency	50/ 60 Hz
Relay output		
	Contact elements	11 change-over contacts (co)
	Type of contact	**type 3**
	(see with " general information " under relays)	max. 5 A/ 1250 VA
Test conditions		EN 61010
	rated insulation voltage U_i	Ui 250 V
	Pollution degree	2
	rated impulse voltageelement	4000 V
	EMC - interference transmission	EN 61326-1 CISPR 11 class B
	EMC - interference resistance	EN 61326-1 (industrial surrounding)
	rated ambient temperature range	-20°C…+45°C
Voltage output +U		DC 17-21 V
		max. 120 m A at Us = 230 V (max. 8 Current sensors S1)
		max. 10 mA at Us = 24 V (0 sensors S1)
Inputs		1...8 STWA 1, floating contact or AC/DC 24 V, STWA 1 H or current-sensor S1
	Overload cap. continuous/max.10s	100 A/300 A
	Current overload capacity	ca.15 kΩ
	Operating value	adjustable 0.5... 5 A
	Tolerance	±20%
Command inputs	Y2, external dedusting command	+ DC 24 V
	I1&I8, 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 1.5 mm^2 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. 350g

Stromwandler Typ STWA1

für AC Stromerkennungsrelais

Current Transformer STWA1 for monitoring current yes/no

Art.-no: S225201

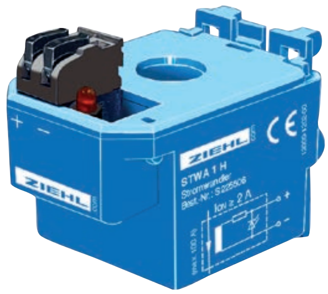


The STWA1 current transformer is made to match the STW current monitor. One current transformer is required for each line being monitored. The STWA1 consists of a climate-proven sealed-in coil with toroidal tape core. The connection cables are permanently fixed to the transformer and are 1 m in length.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

Weight: app. 43 g

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

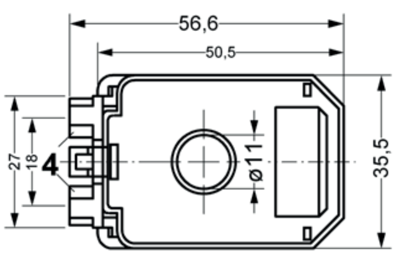


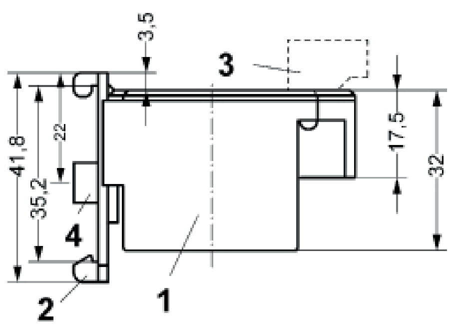
Art.-no: S225506

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

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

Weight: app. 90 g





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

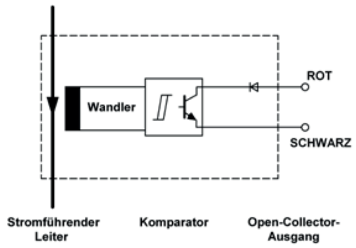
The STWA1S has an integrated electronic with transistor-output. The switching point is 2 A. Above app. 2 A the output transistor is switched on (LOW), below app. 1.5 A it is off (HIGH).
The conductor is simply pushed through the transformer.Multiple loops reduce the switching point correspondingly, for 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	AC 2 A ±25%
Switching-back Point	AC 1,5 A ±25%
Repeat accuracy	± 5%
Temperature dependence	< 0,06%/K
Overload cap. continous / 10s	100 A / 300 A
Output voltage/current max.	DC 40 V / 40 mA
Voltage drop (ON)	max. 3 V
Leak current (OFF)	max. 0,6 mA
Switch-on /switch-off delay	app. 50 / 200 ms
nominal frequency/ operating range	50 Hz/ 30...70 Hz
error	≤ 1%/Hz
rated ambient temperature range	0...55°C
Housing	Design S
Dimensions (Ø x H)	34,5 x 27 mm
Diameter for conductor	11 mm
Weight	app. 60 g



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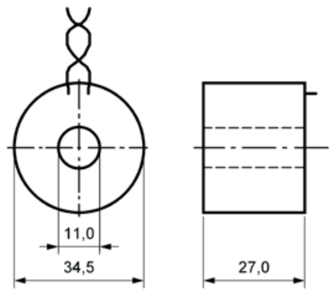
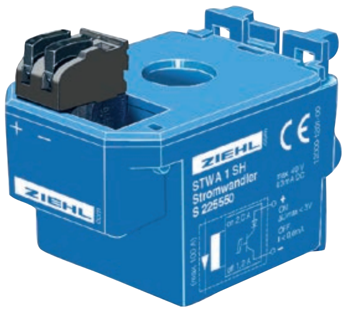
Dimension illustrations



AC-Electronic Current Transformer STWA1SH

2 A, with transistor-output

STWA1SH
Electronic Current Transformer with fixed switching point



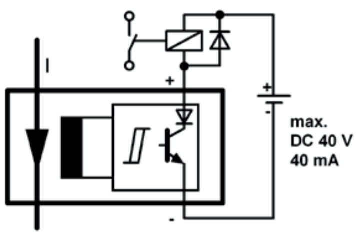
The STWA1SH has an integrated electronic with transistor-output. The switching point is 2 A. Above app. 2 A the output transistor is switched on below app. 1.5 A it is off.
The conductor is simply pushed through the transformer.Multiple loops reduce the switching point correspondingly, for instance to 0.5 A with four loops. A supply voltage is not required.

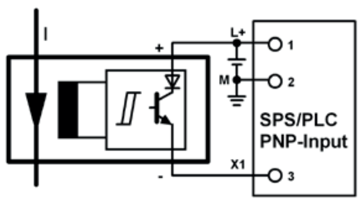
<u>Application:</u> The STWA1SH is used where current flow is to be detected, with the exact value of the current either known from the power consumption of the connected consumer or does not matter for the evaluation.
For simultaneous evaluation of the current flow in several conductors the STWA1S device 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

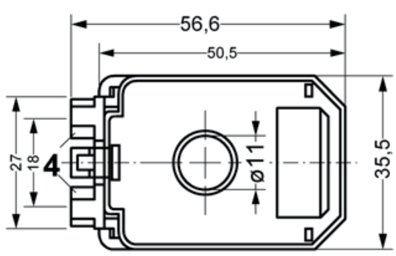
Order-number **S225550**

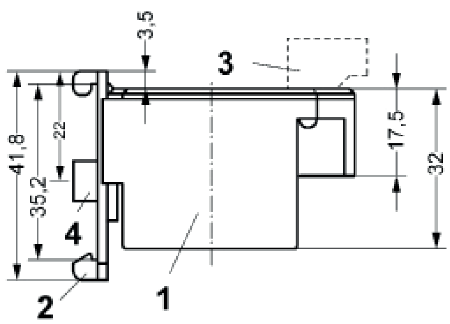
Switching point at Tu = 25°C	AC 2 A ±25%
Switching-back Point	AC 1,5 A ±25%
Repeat accuracy	± 5%
Temperature dependence	< 0,5%/K
Overload cap. continous / 10s	100 A / 300 A
Output voltage/current max.	DC 40 V / 40 mA
Voltage drop (ON)	max. 1 V
Switch-on /switch-off delay	app. 50 / 200 ms
Nominal frequency	50 Hz
operating range	30...70 Hz
error	≤ 1%/Hz
Rated ambient temperature range	0...50 °C
Housing	Design H
Dimensions (h x w x d)	50 x 36 x 56 mm
Diameter for conductor	11 mm
Weight	app. 90 g





Dimension illustrations



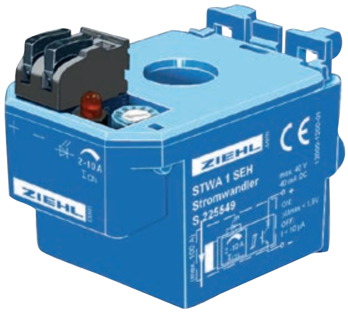


1 Housing
2 Clip for DIN-rail (removeable)
3 Terminal (pluggable)
4 Wall-mounting (M4)

AC-Electronic Current Transformer STWA1SEH

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

STWA1SEH
Electronic current transformer with fixed switching-point 2...10 A



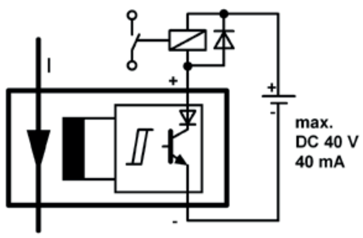
The STWA1SEH has an integrated electronic with transistor-output.
The switching point is adjustable 2-10 A. Above switching-point the output transistor is switched on, below it is off.
The conductor is simply pushed through the transformer. Multiple loops reduce the switching point correspondingly, for 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	AC 2...10 A ±25 %
Hyseteresis	5...30 %
Repeat accuracy	± 2 %
Temperature dependence	< 0,06%/K
Overload cap. continous / 10s	100 A / 300 A
Output voltage/current max.	DC 40 V / 40 mA
Voltage drop (ON)	max. 3 V
Leak current (OFF)	max. 0,6 mA
Switch-on /switch-off delay	0,2...2s / ≤0,3 s
nominal frequency	50 Hz
operating range	30...70 Hz
error	≤ 3%/Hz
rated ambient temperature range	-20...+50°C
Housing	Design H
Dimensions (h x w x d)	50 x 36 x 56 mm
Diameter for conductor	11 mm
Weight	app. 90 g



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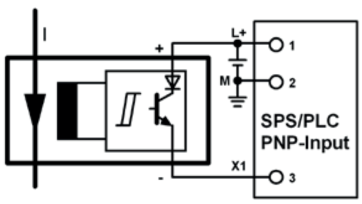
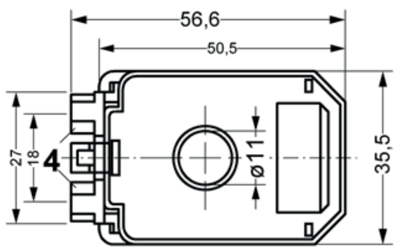
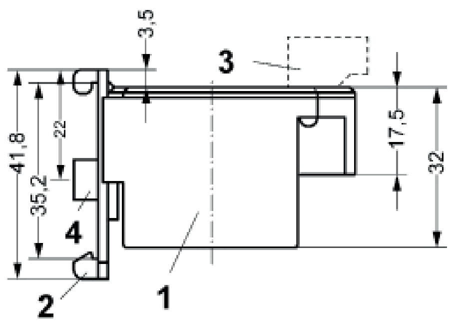


Dimension illustrations





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

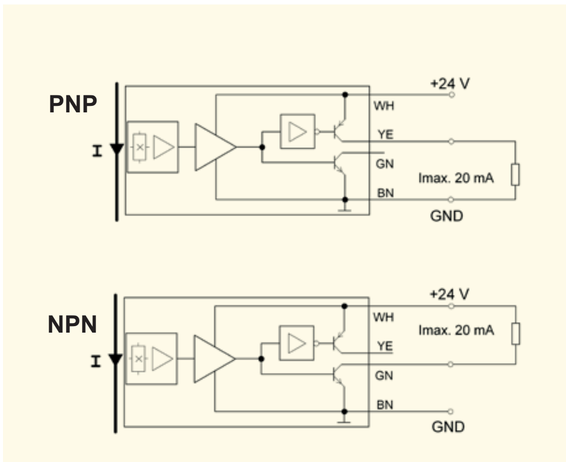
The current sensor S1 records the current in a cable with a hall-sensor. At currents of adjustable 5-30 A the transistor-outputs switch and report a current in the monitored cable.
The current sensor can be fixed with a cable fastener (apply to only 1 cable). Thus it can be mounted subsequently without disconnecting the cable.
As supply-voltage DC 24 V are required (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.

Application:
Recording of welding currents (mounting at ground wire) for controlling dedusting plants in combination with ZIEHL-controls type STW.
Recording of the state of a consumer of electricity (on or off or defective).
In general the current sensor S1 is used where the current flow is to be detected, with the exact value of the current either known from the power consumption of the connected consumer or does not matter for the evaluation.
For evaluation of measuring data in more than 1 cable,
the outputs of several current sensors can be connected in parallel (or-evaluation).

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

Order-number:
Current Sensor S1, 5-30 A adjustable **S225694**



Technical Data

Supply voltage Us	DC 24 V ±20%, 12 mA
Switching point at Tu = 25°C	adjustable AC/DC 5-30 A
Tolerance	± 20%
Repeat accuracy	± 2%
Temperature coefficient	typical < ± 0,2 A/K, max. ± 0,45 A/K
Frequency of measured current	0 / 10 ... 400 Hz
Overload cap. continious/< 1min	500 A / 1000 A
Output 1	DC 24 V, + switching, max. 10 mA
Output 2	DC 24 V, - switching, max. 10 mA
On- / off-delay	app. 300 ms
Rated ambient temperature range	0...55°C
Dimensions (l x w x h)	75 x 16,5 x 10 mm
Cable for connection	app. 2 m, 4 x 0,34 mm2
Attachmant	e.g. with cable fastener (not included)
Weight	app. 150 g (cable included)

Vibrator Control Type RS1K

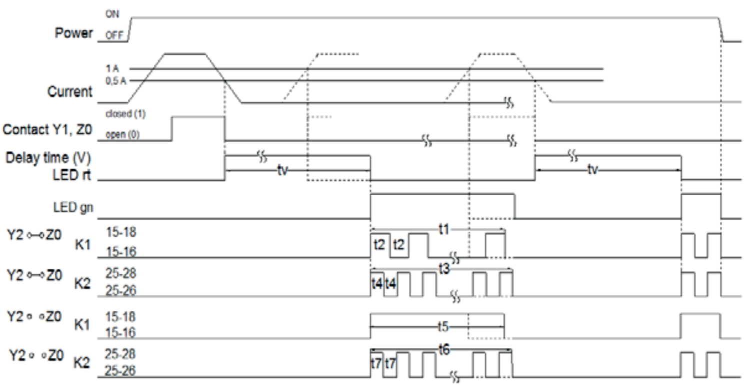
RS1K

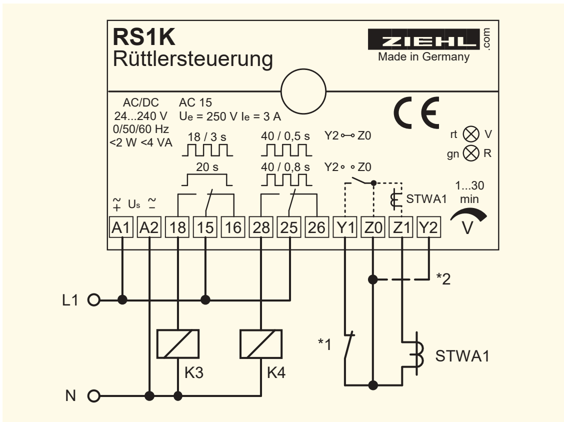
The vibrator control RS1K is a compact multiple time relay for triggering of vibrators in suction plants. In order to be able to operate suction plants at an optimum, the filters which get clogged by sawdust, chips or dust, have to be dedusted by vibration from time to time. The vibration action is by 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 STWA1 at Z0/Z1 (e.g. L1 from suction motor)
- adjustable deceleration time 1...30 min.
- Relay K1: continous vibration 20 s or impulse-vibration 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	AC/DC 24...240 V, AC 19-264 V, DC 20-297 V < 2VA
Input Y1/Z0, Y2/Z0	Contact, Breaker (nc), 18 V, 3 mA
Input Z1/Z0	Current Transformer STWA1
Switching current	ON ≥ AC 1 A, OFF ≤ AC 0,4 A
Overload Capacity of transformer	max. 100 A continous, 300 A / 10 s
Relay-Output	2 x 1 co
Type of Contact	Type 2 (see general technical informations)
Test Conditions	see "general technical informations"
adm. ambient temperature	-20...+55°C
Dimensions H x B x T	Design K: 75 x 22,5 x 115 [mm]
Fitting position	on 35 mm standard rail according to DIN EN 60 715 or screws M4 (not included in delivery scope)
Protection Housing/Terminals	IP 30/IP 20

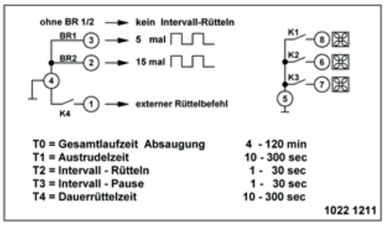
Vibrator Control RSP1
with Time addition

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.

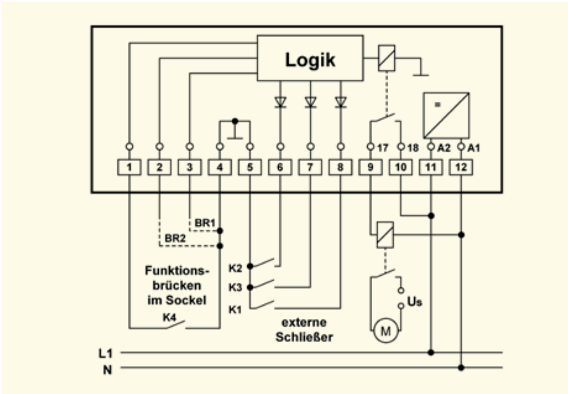
All times are permanently saved in an EEPROM. Thus the accumulated operation period of the suction operation saved when switching off the supply voltage, e.g. during the night or weekend.



- 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 U_s	AC 220 - 240 V, ± 10%, 50/ 60 Hz, < 3 VA
Relay output	1 NO
Contact type	**type 2** see "general technical informations"
Test Conditions	see "general technical informations"
max. ambient temperature	-20°C...+55°C
Inputs	
Contact 6, 7, 8 against 5	approx. DC 24 V/3 mA
Contact 1 against 4	approx. DC 5 V/5 mA
Casing dimensions (W x H x D)	Design S 12: 41.5 x 82 x 121
Protection housing/terminals	IP 30/ IP 20
Mounting	on 35 mm standard rail according to EN 60 715 or with M4 screws.
Weight	approx. 300 g

Frequency- and Speed-Relay FRMU1000

with integrated Measuring-Transducer

FRMU1000

The FRMU1000 is a speed-monitor, a frequency-monitor and a measuring-transducer in one device.
2 limits with 1 relay each can be programmed for under- or over-speed, under- or overfrequency or each monitoring of a range (min/max).
The input for monitoring of speed can evaluate signals from proximity-sensors 2- or 3-wire, npn- or pnp. The display can be scaled. Thus the real speed of a shaft can be displayed, even though there are several pulses per revolution, e.g. from a cogwheel.

Application as Frequency-Relay:
Monitoring of frequencies in mains 16 2/3 to 400 Hz on maintaining a range (min/max).

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

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

Function

Frequency:

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

Speed:

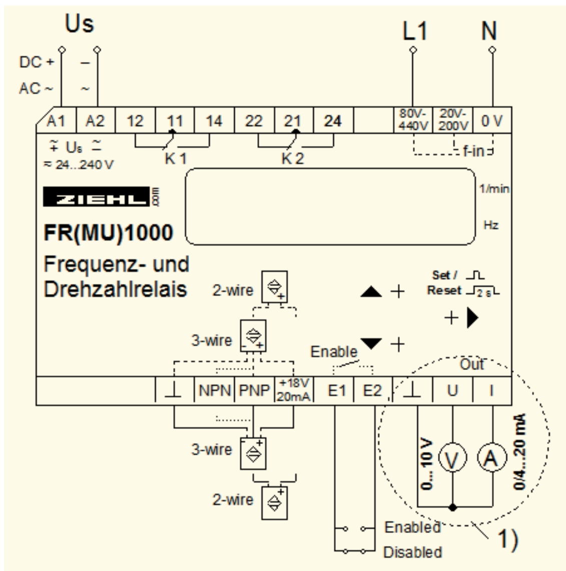
- Monitoring range 5...99999 min^{-1}
- Display can be scaled
- Measuring-input for capacitance-switches 2- or 3-wire, npn or pnp
- Start-up-delay programmable
- Start-input (activates device with switching on the monitored drive)

General:

- Setting in Hz or min^{-1}
- 5-digit display
- Analog output DC 0/4-20 mA, or DC 0-10 V, freely scaleable (with isolation to frequency-input U1/U2)
- 2 limits/ 2 relays
- Programmable for each relay:
  - Monitoring of min, max or range
  - Hysteresis
  - Autoreset reclosing lock
  - Delay-time for switching and switching back down to 50 ms
  - Operating- or closed-current mode
- LEDs for state of relays and unit (Hz oder min^{-1})
- Storage of min- and max- values of the inputs
- Easy setting with 3 buttons
- Code lock against manipulation of settings
- Universal power supply AC/DC 24-240 V
- Terminals pluggable

Order-numbers:

without analog output FR1000	**U226135**
with analog output FRMU1000	
Input 20-200 / 80-440 V	**U226134**
Input 110-300 / 210-830 V	**U226138**



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Technical Data FRMU1000

Rated supply voltage Us	AC/DC 24-240 V, <3W, <10VA (AC 20-264 V, DC 20,4-297 V)
Frequency	0, 40...500 Hz, > AC 80 V: 10...500 Hz
Measuring input Frequency	10.00-500.00 Hz
Admissible voltage	AC 20-200 V/ 80-440 V AC 110-300 V/ 210-830 V (option)
Measuring input Speed	5-99999 min^{-1} 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	Type 3, see "general technical informations" 2 x 1 (change-over) contact
Test conditions	see "general technical informations"
Rated ambient temperature range	-20 °C ... +60 °C
Dimensions(h x w x d)	Design V4: 90 x 70 x 58 mm, mounting height 55 mm
Protection housing / terminals	IP 30/IP 20 (terminals pluggable)
Weight	app. 180 g
Attachment	on 35 mm DIN rail or with screws M 4

Inductive Proximity Sensor IG2

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 ≤ 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	DC 10-30 V
Max. switching frequency	800 Hz = 48000 Imp/min
Max. switching distance	4 mm (recomm. ≤3 mm)
Factor of reduction	Ms: 0,45, Al: 0,4, Cu: 0,3
Rated amb. temp. range	-25 ... +70 degC
Housing	Threaded pipe M12x1
Material	nickel-plated brass
Weight	app. 26 g
Dimensions	M 12x1 / length 50 mm
Torque	max. 10 Nm
Connection	threaded plug M 12
Shock resistance	≤30 g, ≤11 ms
Vibration resistance	≤55 Hz, ≤1 mm
protection	IP 67
Order-number IG2	U226003
Order-number cable	U226004

Level Monitors Type NS

General

The NS level monitor is an electronical device for monitoring liquid levels. They can be used 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.

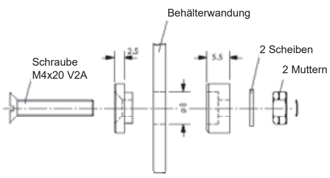
Function

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 kΩ, measured between the electrodes. ZIEHL level monitors are also available with adjustable 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.

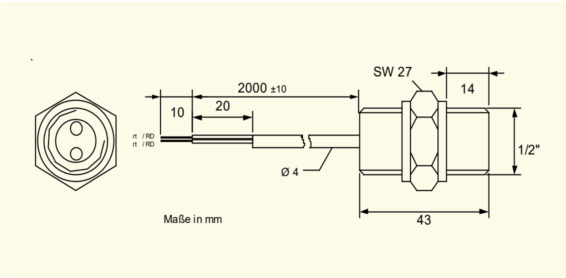
Order-number **V223430**

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 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**



Filling level probe Type NS6123-6

for measuring filling level of water and gasoil
0 - 250 mbar, integrated measuring transducer

NS6123-6

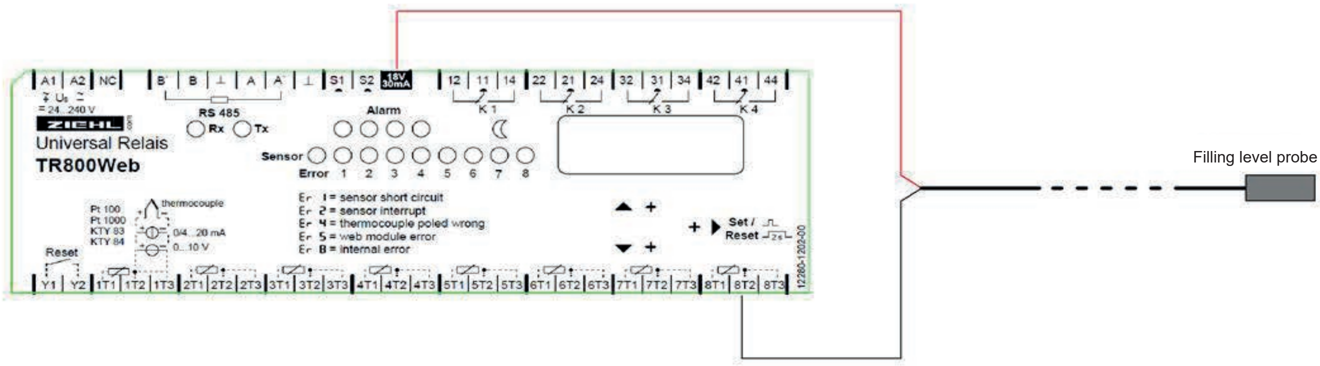
Art.-no.: V223470

Economy-priced probe with integrated measuring transducer for measuring filling level e.g. in tanks, cisterns or waters. Connection to ZIEHL-Web-Relay TR800Web for monitoring and logging of filling levels. Alarms by emails when levels are reached, e.g. before tank is empty. Monitoring and display of levels with Digital Panelmeters MINI-PAN 352 or other devices with input 4-20 mA. The probe for relative pressure is submersible. It is placed at the bottom of the tank and determines the level by measuring the hydrostatic pressure. The result is transmitted via signal 4-20 mA (2 wire). The cable (PUR) includes a pressure compensation capillary that compensates fluctuation of atmospheric pressure.

Applications:
- Gasoil, diesel, used oil
- Engine oil and lube oil (fresh)
- Rainwater in cisterns, basins and water levels in general

Standard probe NS6123-6
0-250 mbar, cable 6 m

Connection to Universal Web-Relay Type TR800Web



Scaling of TR800Web for water:

Sensor-Einstellungen

Nr.	Sensor- -Name	aktueller Messwert	Sensortyp	Leitungs-Kompensation	Skalierung ein	Nullpunkt	Fullscale	Dez. Punkt	Einheit
1.	Pegelsonde	25.3 cm	4..20 mA	3-Leiter	☑	0	2500	xxx . x	cm

Water (density 1,0): 1 mbar = 1 cm
0...250 mbar correspond to level 250.0 cm

Scaling of TR800Web for oil:

Sensor-Einstellungen

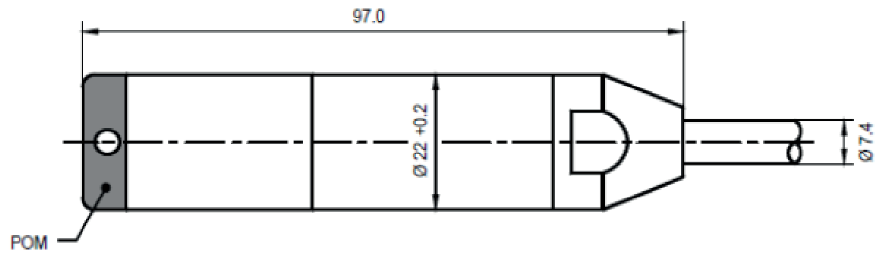
Nr.	Sensor- -Name	aktueller Messwert	Sensortyp	Leitungs-Kompensation	Skalierung ein	Nullpunkt	Fullscale	Dez. Punkt	Einheit
1.	Pegelsonde	25.3 cm	4..20 mA	3-Leiter	☑	0	2900	xxx . x	cm

Oil (density 0,82...0,95): 1 mbar = 1/density cm
Example density 0,862: 1 mbar = 1,160 cm
0...250 mbar correspond to level 0,0...290 cm
Density of liquid can be calculated by using signal of probe and measuring depth of immersion with a meter stick.

Technical Data

Input	0...250 mbar (0...250 cm water; 0...~290 cm oil)
Output	4...20 mA, 2-wire
Supply voltage	10...30 V DC direct connection to TR800Web
Measuring cell	ceramic Al_2O_3, DMS bridge
Response time	50 ms
Error	< 1% of FullScale
Thermal drift	< 0,05% /K of span
Ambient temperature	-10...+40 °C
Housing	stainless steel 1.4404 (316 L, V4A)
Weight of probe	ca. 0,2 kg, without cable
Cable	PUR black, oil proofen with pressure compensation capillary
Applications	Gasoil, diesel, water not for petrol, kerosine not for use in zone EEx

Drawing



Level Monitors Type NS1

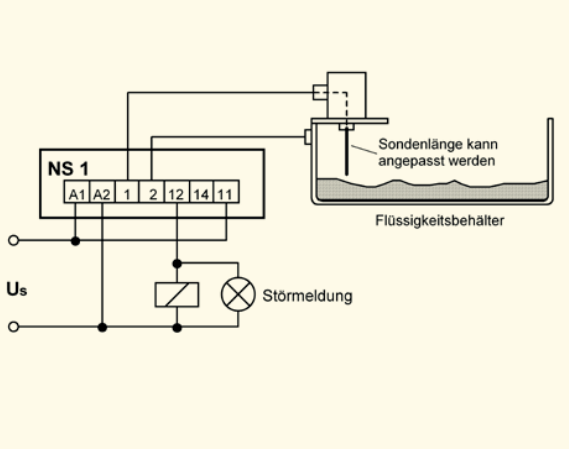
1 Niveau, Wall-mount

NS1

This level monitor for two electrodes preferrably serves to the limit control, e.g. as overflow or running dry 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 protection system IP 54.

The function of the relay is reversible (standard: releases, when E2 is reached) by changing of jumpers in the device. The sensitivity can be changed between 25…250 kOhm and the switching delay between 0,5…10 s.

Order-number: V223202



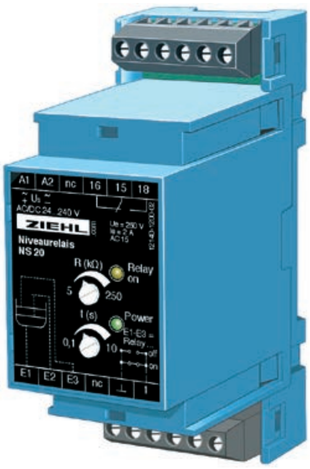
Technical Data

Supply Voltage U_s		AC 230 V
Adm. Tolerance U_s		+10%…-15%
Power Consumption		≤ 3 VA
Frequency		50…60 Hz
Relays		1 CO
Contact type		Type 2 (see "General technical Informations")
Pick up delay approx.		0,5 s
Release delay approx.		0,5...10s adjustable
Text conditions		see "General technical Informations"
max. ambient temperature		-20°C...+55°C
Quantity Electrodes		2
Voltage at the Electrodes		< AC 6 V_{eff}
Line capacity	at 25 kΩ	max. 100 nF = approx. 500 m
	at 150 kΩ	max. 20 nF = approx. 100 m
	at 250 kΩ	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.

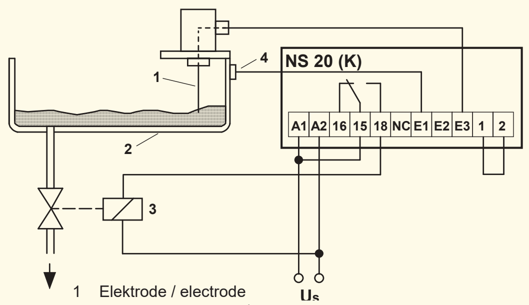
- 3 elektrodes for MIN/MAX-control
- 2 elektrodes (E2 open) as level-monitor
- Sensitivity adjustable 5 kΩ...250 kΩ
- LED for state of relay
- Function of relay reversible (picks up or releases at top electrode)
- Switching-delay adjustable 0,1 ... 10 s
- Universal supply-voltage AC/DC 24-240 V

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.

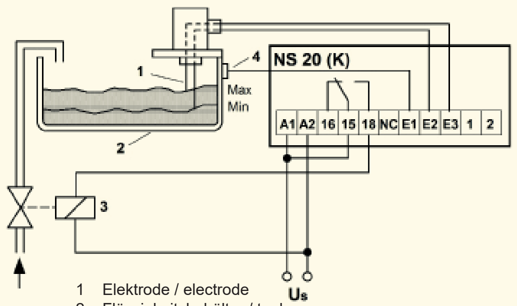
Order-number **V223440**

Überwachung Flüssigkeitsstand mit 1 Elektrode (E3 benetzt, Relais an 15-18 geschlossen)
monitoring of liquid with 1 electrode (E3 dipped, relay on 15-18 closed)



1 Elektrode / electrode
2 Flüssigkeitsbehälter / tank
3 Magnetventil / magnetic valve
4 Bezugselektrode / basic electrode

Zulaufsteuerung mit 2 Elektroden (E3 benetzt, Relais aus 15-16 geschlossen)
filling tank with 2 electrodes (E3 dipped, relay off 15-16 closed)



1 Elektrode / electrode
2 Flüssigkeitsbehälter / tank
3 Magnetventil / magnetic valve
4 Bezugselektrode / basic electrode

Technical Data

Supply voltage U_s	AC/DC 24-240 V, 0/50/60 Hz, <2W, <3VA (DC 20,4-297 V, AC 20-264 V)
Relay	1 change-over-contact (co)
Contact	**type 2** see "general technical information"
Switching delay	adjustable 0,1...10 s
Test conditions	see "general technical information"
Rated ambient temperature range	-20°C...+55°C
Number of electrodes	2 or 3 (with 2 electrodes: E2 not connected)
Voltage at electrodes	< AC 6 V_{eff}
Line capacity at 5 kΩ	max. 500 nF = app. 2500 m
at 150 kΩ	max. 20 nF = app. 100 m
at 250 kΩ	max. 10 nF = app. 50 m
Dimensions (h x w x d) mm	design V2: 90 x 35 x 58 mm, mounting height 55 mm
Attachment	on 35 mm DIN-rail or with screws M4
Protection housing/terminals	IP 30/ IP 20
Weight	app. 100 g

4

Level Monitor Type NS20K

1 Level and MIN / MAX-Control

NS20K

Level-Relays NS20 can be used for monitoring 1 level and as MIN/MAX-Control.

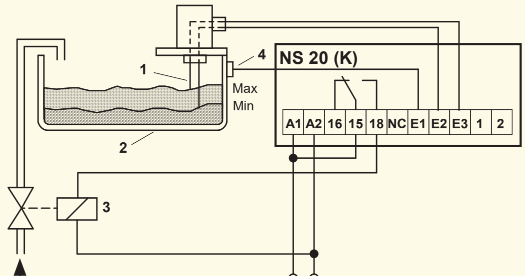
- 3 elektrodes for MIN/MAX-control
- 2 elektrodes (E2 open) as level-monitor
- Sensitivity adjustable 5 kΩ...250 kΩ
- LED for state of relay Function of relay reversible
- (picks up or releases at top electrode) Switching-delay adjustable
- 0,1 ... 10 s

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.

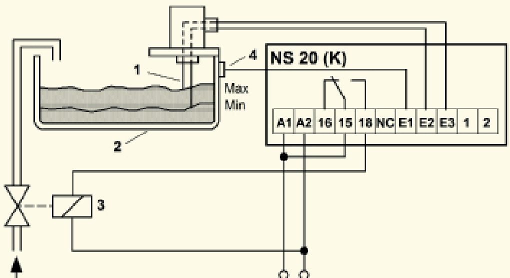
Order-number: **V223445**

Überwachung Flüssigkeitsstand mit 1 Elektrode (E3 benetzt, Relais an 15-18 geschlossen)
monitoring of liquid with 1 electrode (E3 dipped, relay on 15-18 closed)



1 Elektrode / electrode
2 Flüssigkeitsbehälter / tank
3 Magnetventil / magnetic valve
4 Bezugselektrode / basic electrode

Zulaufsteuerung mit 2 Elektroden (E3 benetzt, Relais aus 15-16 geschlossen)
filling tank with 2 electrodes (E3 dipped, relay off 15-16 closed)



1 Elektrode / electrode
2 Flüssigkeitsbehälter / tank
3 Magnetventil / magnetic valve
4 Bezugselektrode / basic electrode

Technical Data

Supply voltage U_s	AC/DC 24-240 V, 0/50/60 Hz, <2W, <3VA (DC 20,4-297 V, AC 20-264 V)
Relay Contact Switching delay	1 change-over-contact (co) **type 2** see "general technical information" adjustable 0,1...10 s
Test conditions Rated ambient temperature range	see "general technical information" -20°C...+55°C
Number of electrodes Voltage at electrodes	2 or 3 (with 2 electrodes: E2 not connected) < AC 6 V_{eff}
Line capacity at 5 kΩ at 150 kΩ at 250 kΩ	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 Protection housing/terminals Weight	Design K: 75 x 22,5 x 115 mm on 35 mm DIN-rail or screws M4 IP 30/ IP 20 approx. 100 g

Level Monitors Type NS43

MIN/MAX-Regulation, protection from overflow and unlubricated operation

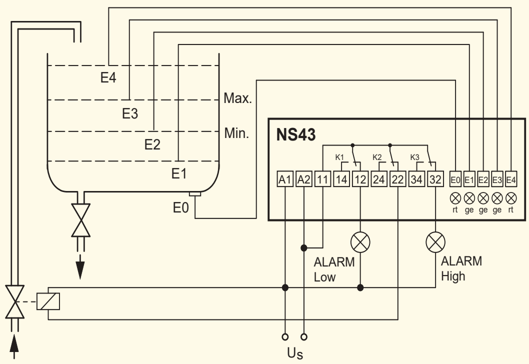
NS43

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



Elektrodes		LED	Relay	Contact	
E1	not dipped	E0-red	K1 off	11-12 closed	ALARM Low (running dry)
E1	dipped	E1-ye	K1 on	11-14 closed	
E2	dipped	E2-ye	K2 off	11-22 closed	
E3	dipped	E3-ye	K2 on (K2 on until E2 not dipped)	11-24 closed	
E4	dipped	E4-red	K3 off	11-32 closed	ALARM High (overflow)

4

Technical Data

Supply voltage U_s		AC/DC 24-240 V
Admissible tolerance U_s		AC 20-264 V, DC 20-297 V
Power consumption		≤ 5 VA, < 3 W
Frequency		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		see "general technical information"
Rated ambient temperature range		-20°C...+60°C
Number of electrodes		5
Voltage at electrodes		< AC 3 V_{eff} (≤ 0,1 mA)
Line capacity	at 5 kΩ	max. 500 nF = approx. 2500 m
	at 25 kΩ	max. 100 nF = approx. 500 m
	at 250 kΩ	max. 10 nF = approx. 50 m
Dimensions (h x w x d) mm		Design K: 75 x 22,5 x 115 mm
Attachment		Snap mounting on 35 mm standard rail
Protection housing/terminals		IP 30/ IP 20
Weight		approx. 130 g

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 kΩ ... 250 kΩ. 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.

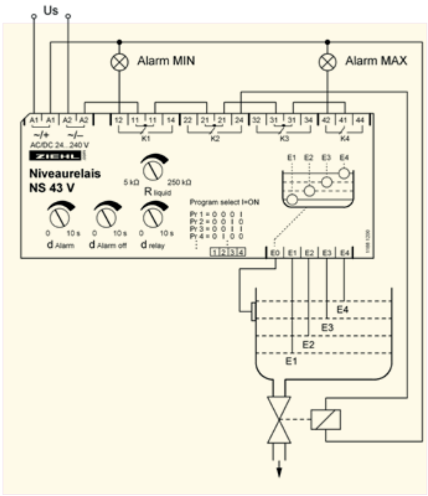
An electrolytic corrosion of the electrodes as well as detonating gas production is excluded due to a AC current measuring path.
The universal supply voltage AC/DC 24-240 V allows to connect the relay to any common mains.The isolation between electronics (= electrodes) and supply voltage avoids malfunctions 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

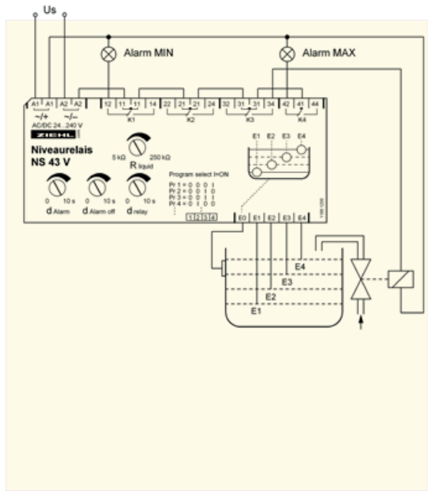
Order-number: **V223313**

Technical Data

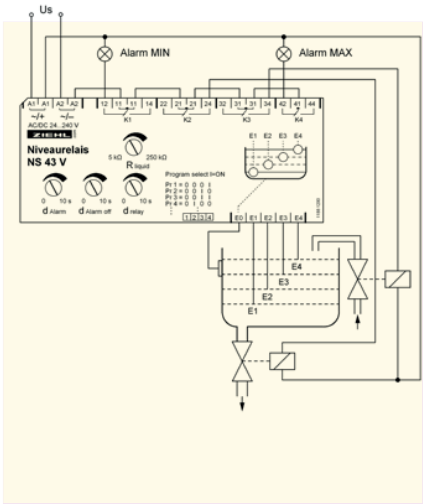
Supply voltage Us	AC/DC 24-240V, <3W, <6VA AC 20-264 V, DC 20,4-297 V,
Electrode connection	Level electrodes E1, E2, E3, E4, reference E0
max. voltage/current	<3Veff / <100 µA
Sensitivity	adjustable 5 kΩ...250 kΩ ± 25%
max. cable-length/capacity	5 kΩ/approx. 500m/100 nF, 250 kΩ/approx. 50m/10nF
Hysteresis	approx. 15% + 5 kΩ
Switching delay	adjustable 0,1...10 s
Relay output	Type 2 see "general technical informations" 4 x 1 changeover-contact
Test conditions	see "general technical informations"
Rated ambient temperature	-20…+55°C
Dimensions h x b x d	Design V6: 90 x 105 x 58 [mm], mounting height 55 mm
Attachment	On 35 mm DIN-rail or screws M4
Protection housing / terminals	IP 30 / IP 20 (terminals pluggable)
Weight	approx. 250 g



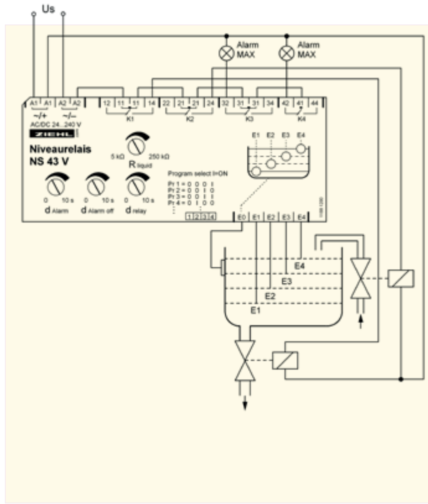
Program 1
Control of dose or drain with 2 elektrodes with 2 more electrodes to protect from overflow and running dry.
The level swings between the 2 middle electrodes.
Standard-program for levelling a liquid in a container.



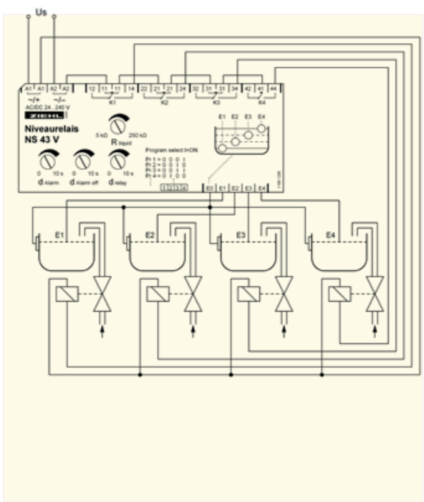
Example for dose-control



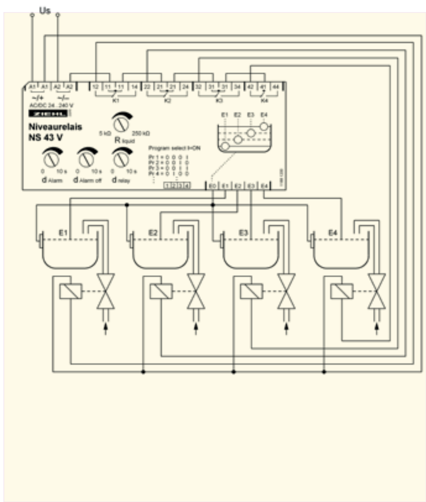
Program 2
Control of dose and drain between 2 electrodes with 2 more electrodes to protect from overflow and running dry.
Depending on if speed of dose or drain is higher, the level swings around the upper or the lower of the 2 middle electrodes.



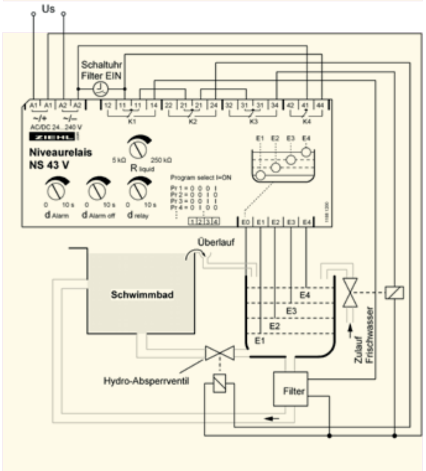
Program 3
Control of dose and drain between 3 electrodes with 2 more electrodes to protect from overflow.
The level swings between electrodes E1 and E3. Dose and drain are switched on at E2 and off at E3 respectively E1.
Application e.g. in fish-farming.



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

4

Twilight Switch

Types DS6V and DS6

General

The universally applicable twilight switches DS6 in combination with light-sensor LF 5 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.

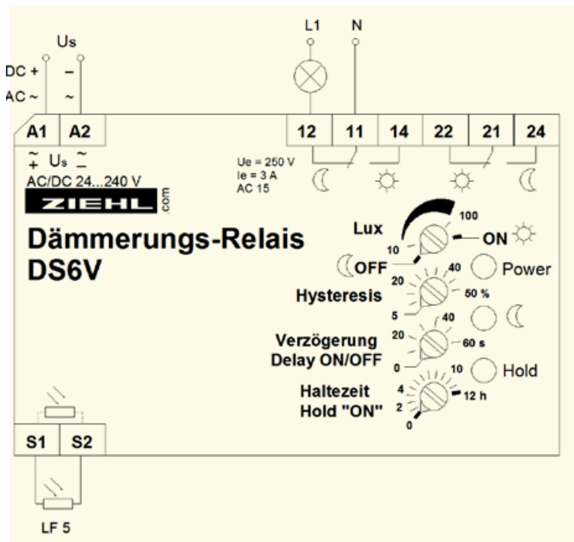
The 2 output-relay switch inverted. This means, taht at relay K1 the light is connected to the normally closed-contact (nc, terminal 12) and is automatically switched on at a failure.

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.



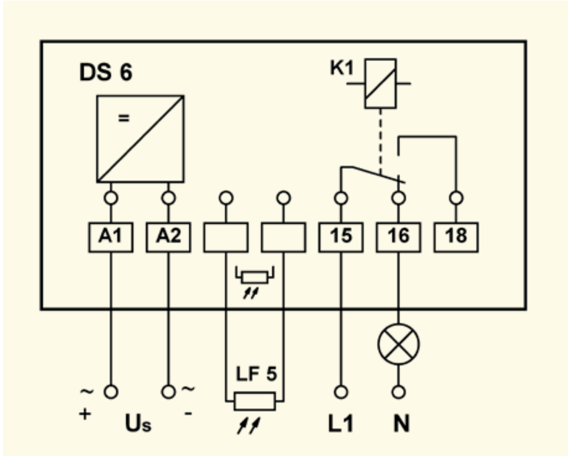
DS 6

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 closed-current-mode. When the light at the sensor LF 5 falls below the limit, the relay releases and switches on the light. The illumniation is connedted 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.

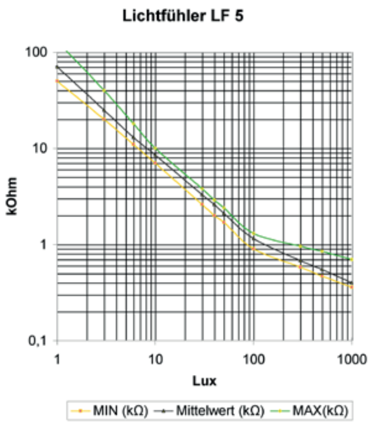
- Switching-limit adjustable app. 10...100 LUX
- Switching-delay adjustable 0,2...10 s
- Relay 1 CO contact
- Housing protected IP 54
- Input for light-sensor LF 5

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 north-side of a building to avoid direct exposure to the sun on summer days. Take care that street lamps, head-lamps 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

4

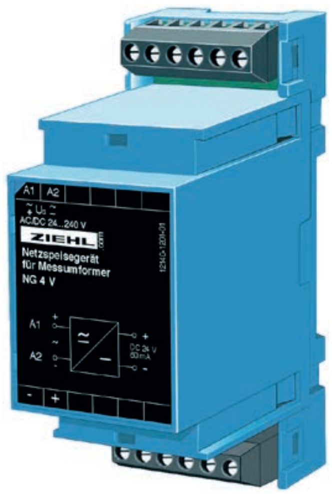
Technical Data

		DS6	DS6V
Power Supply	Supply voltage U_s	AC 230 V	AC/DC 24-240 V
	Admissible tolerance U_s	+10%…-15%	± 15%
	Power consumption	≤ 3 VA	< 3 VA
	Frequency	50...60 Hz	0/50/60 Hz
Switching Limits	Switching-on limit	app. 10...100 Lux	app. 10-100 Lux
	Hysteresis	adjustable	adjustable 5-50%
	Switching-delay	0,2...10 s (ex works. 5 s)	0...60 s
	Switch-on-hold	-	adjustable 0-12 h
Relay-Output	Contact elements	1 change-over (co)	2 co, 1 x inverted
	Type of contact	Type 2 see "general technical informations"	
	Test conditions	see "general technical informations"	
	Rated ambient temperature	-20°C...+55°C	-20°C...+55°C
	Dimensions (h x w x d) mm	Design I 94: 94x94x57	Design V4: 90x70x58
	Protection housing / terminals	IP 54/IP 20	IP 30/IP20
	Weight	app. 320 g	app. 250 g
Light-Sensor LF 5	Resistance 10...100 Lux	app. 9...1 kΩ, tolerance see characteristic	
	Sensor-housing	Design M 14 x 35 mm	
	Connection-cable	1 m (extension up to min. 50 m possible)	
	Rated ambient temperature	-30...+80°C	

Special executions and cable-lengths on request.

Power-Supply-Unit NG4V
forMeasuring-Transducers

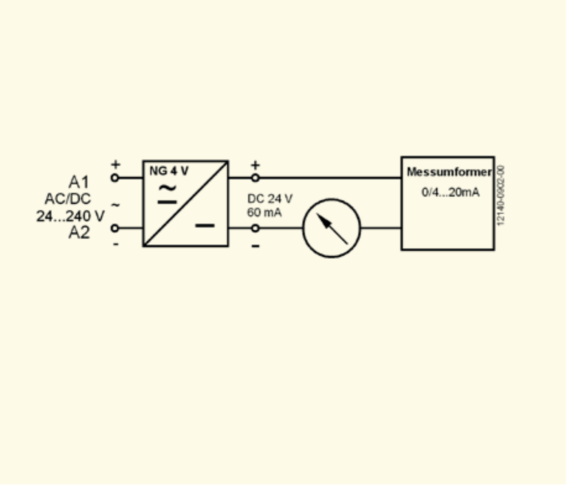
NG4V



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**

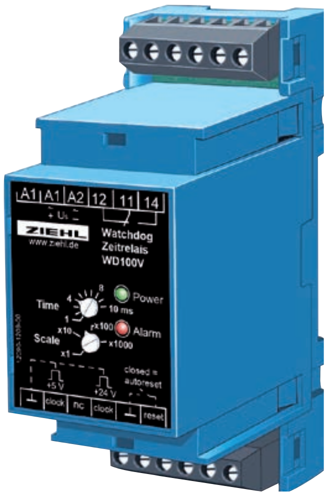


Technical Data

Rated supply-voltage U_s	AC/DC 24-240 V
Tolerance U_s	AC 19-264 V, DC 20-297 V
Power consumption	≤ 5 VA
Output-voltage	DC 24 V max. 60 mA stabilized
Current capacity	short-circuit-proof, max. current < 400 mA
Test conditions	see "General technical informations"
Rated ambient temperature range	-20°C…+55°C
Dimensions (h x w x d)	Design V2: 90 x 35 x 58 mm, mounting height 55 mm
Weightt	app. 65 g
Attachment	on 35 mm DIN-rail or with screws M4.
Protection housing/terminals	IP 30 / IP 20

Watchdog Time-Relay Type WD100V

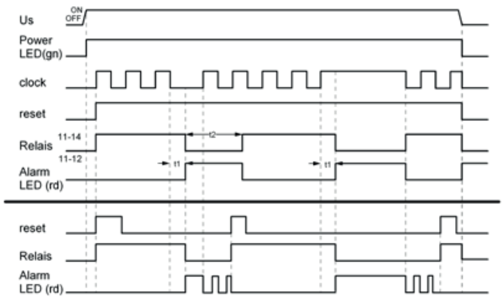
WD100V

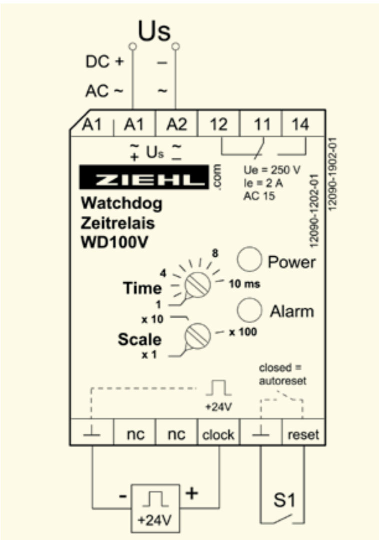


In the control technology of today, the number of industrial PCs (IPC) partly with decentralized intelligence constantly increases. Individual processes are controlled independent of each other. In case of failure or malfunction of one component, it can therefore be necessary to switch off the hardware of a complete machine or plant.
Time-Relay WD100V is used to make sure that because of malfunctions in the program flow, caused by short-term voltage interruptions for instance, no undefined status are created. The output signal can be evaluated by a superordinate control or directly switched into the emergency-stop circuit of the machine.

Application:
Monitoring of controls/IPC in packing machines.
Monitoring of application software

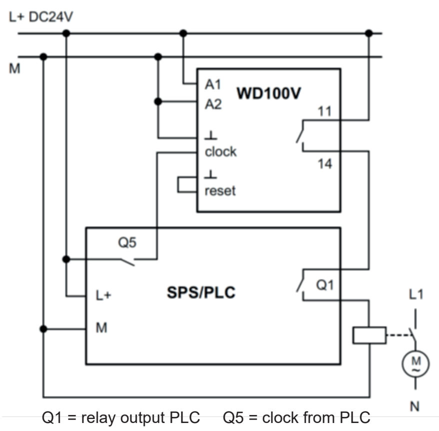
Order-number **Z224317**





Example for application: Release motor

The software of the mmonitored control (PLC, IPC) makes a clock signal at the output Q5 (DC24V, transistor). The relay of the WD100V picks up only when the input recognizes a clock signal. The time between two slopes has to be shorter than the time set at the WD100V (time x scale). When the clock is missing completely or at a missing slope, the output relay of the WD100V opens contacts 11-14 and the motor is switched off respectively switching on is inhibited. When the square signals recovers and the reset-input is closed or supply-voltage is switched on, the relay picks up again (not earlier than 500 ms after switching off).



Q1 = relay output PLC Q5 = clock from PLC

Technical Data

Rated supply voltage U_s	AC/DC 24-240 V, 0/50/60 Hz, <2W, < 3 VA
	DC 20,4-297 V, AC 20-264 V
Contact elements	1 change-over contact (co)
Contact type	**Type 2** see "General technical Informations"
Measuring input clock	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
Pulse lenth	0,5 ... 1000 ms
Input Reset	Button for Reset / bridge = autoreset
Rated ambient temp. range	-32°C...+70°C
Dimensions h x w x d	Design V2: 90 x 35 x 58 [mm]
Weight	approx. 100 g
Attachment	on 35 mm DIN-rail or with screws M4.
Protection housing / terminals	IP 30/ IP 20

Measuring Transducers

Measuring Transducers

General

Measuring transducers supply a linear output signal which is proportional to the measured value. ZIEHL delivers measuring-transducers 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 measuring-transducers 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 limit-relays 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

Type	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
TMU104V	Pt100, Pt1000, KTY83/84, Thermocouples, B, E, J, K, L, N, R, S, T	4 x Pt100	yes	V4	Measuring Point Multiplicator
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-grcup 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

Type	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):

MINIPAN 352P, 352V and SE352	B, E, J, K, L, N, R, S, T	4-20 mA	yes	350	potential free output 4-20 mA, Loop-supplied

Measuring-Transducers for AC Current (see Electronic Current-Transformers)

Type	Input	Output	Potential-separation	Housing-Design	Remarks
STWA1FH	AC 0-20 A	0,5-20 Hz	yes	H	Electronic current-transmitter, Transistor-output
STWA1AH	AC 0-15 A	0-20 mA	yes	H	Electronic current-transmitter, No suply required
STWA2AH	AC 0-20 / 100 A	4-20 mA	yes	H	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

Type	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	K	Universal-supply-voltage all inputs and outputs in one device
MU1001K	DC 0/4...20 mA DC 0...300 mV DC 0...300 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

Type	Input	Output	Potential-separation	Housing-Design	Remarks
MU100W	Potentiometer 0-500 Ω/ 10 kΩ	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):					
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

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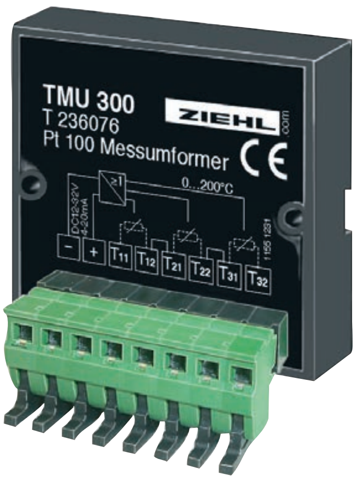
Measuring Transducer for Motor Protection

TMU300 for 3 x Pt100

TMU300



Art.-no: T236076

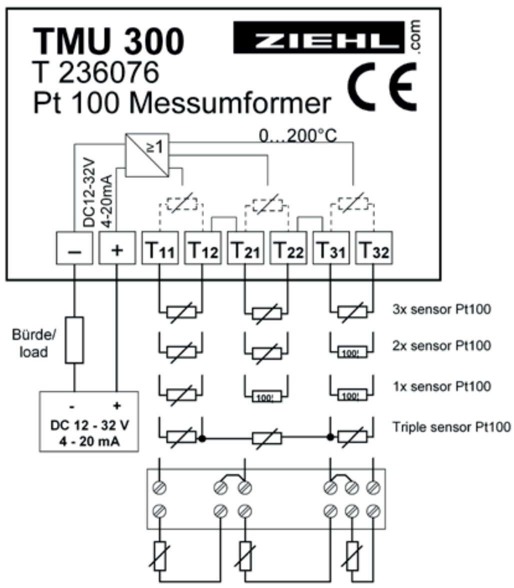
Transducers for motor protection TMU300 are transducers for 1-3 sensors Pt100 (RTD).
A new, current-saving measuring-system makes it possible to evaluate 3 sensors with a transducer that is supplied by a loop 4-20 mA.

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 mA-loop)
- with sealed-in electronics



Technical Data

Input	1 - 3 x Pt 100 DIN 43 760/IEC 751 without compensation of line resistance
Output	
Current output	DC 4...20 mA
Voltage loop	DC 12...32 V
Error	class 2,5
Temperature coefficient	0,025 %/°K
Reference conditions	IEC 770, Tu = 23 °C ± 5 °C, Us = DC 24 V ± 1 V
adm. operating temperature	-20...+85 °C
	TMU300
	Design 420 with terminals
Dimensions (W x H x D)	60 x 55 x 32 mm
Attachment	Screw mounting 2 x M4
Protection housing / terminals	IP 40 / IP 20
Weight	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

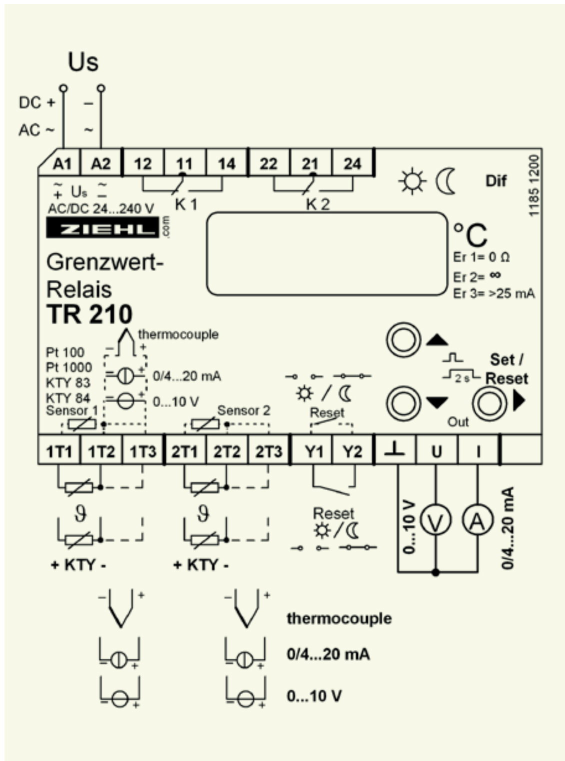
- Measuring and monitoring range -170...+1820 °C
- resolution 0,1°C (to 999.9 °C)
- Analog output (scaleable) for 1 input, min./max. of 2 inputs or difference of 2 sensors (no isolation between inputs and output)
- 2 relay outputs
- Shifting of day/night (selectable with contact at terminals Y1/Y2)
- Universal power supply AC/DC 24-240 V
- Easy setting with 3 buttons and preset programs
- Storing of min- and max-values 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



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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 1 measuring-input** the output can be scaled for this input, e.g. 0...200.0 = 4-20 mA.
At programs **with 2 measuring-inputs** the output can be scaled for 1 input or min- or max- value of both inputs.
At programs **for measuring of differences** output can be scaled for 1 signal or for the difference input 2 minus input or for min- or max- value of both inputs.
Thus the TR 210 can be used as limit value switch and/or measuring-transducer simultaneously. The measured values ca be forwarded to e.g. a remote display or a superior control.

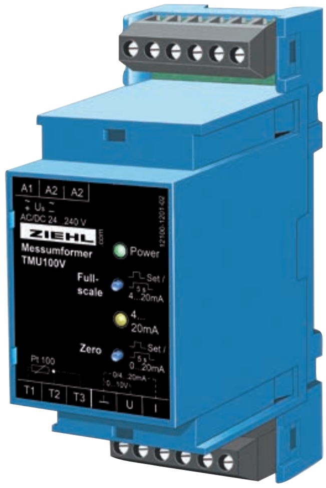
Technical Data

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

Measuring-Transducer for Temperature

TMU100V for Pt 100 (RTD)

TMU100V



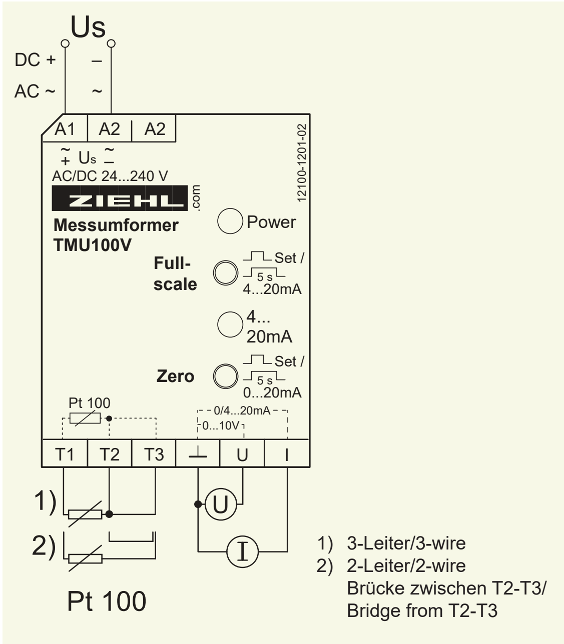
Model TMU100 Pt100 measuring transducers are suitable for measuring temperatures with sensors Pt100 (RTD).
Zero and FullScale can be freely set within the whole range -199 ... +850 °C. To do this only resistors with the according value or a Pt 100-decade is connected. The adjustment is done by pressing a button.

The built-in universal power-supply 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 resistance (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, 35 mm wide, mounting height 55 mm

Order-number T236090



Technical Data

Rated supply volatge Us	AC/DC 24V…240 V, 0/50/60 Hz, < 3 W, <5 VA
Adm. tolerance DC	DC 20…297 V
Adm. tolerance AC	AC 19…264 V
Measuring input	Pt 100 EN 60751, 2-/3--wire, ≤0,8 mA
Temperature-range	-200 ... +850 °C
Resolution	0,1 K
Tolerance	± 0,5 % of measured value ±0,5 K
Temperature factor	<0,03 %/K
Analog output	DC 0…10 V, min. 1 kΩ
	DC 0/4…20 mA, max. 500 Ω
Error	< 0,3% of FullScale
Test conditons	EN 61010
Rated impulse withstand voltage	4000 V
Contamination level	2
Rated insulation voltage	250 V
Rated ambient temp. range	-20 … +60 °C
Dimensions (h x w x d)	design V2: 90x35x58 mm, mounting height 55 mm
Weight	app. 130 g
Attachment	on 35 mm DIN-rail EN 60 715 or with screws M4
Protection housing / terminals	IP 20 / IP 30

Measuring Point Multiplicator TMU104V

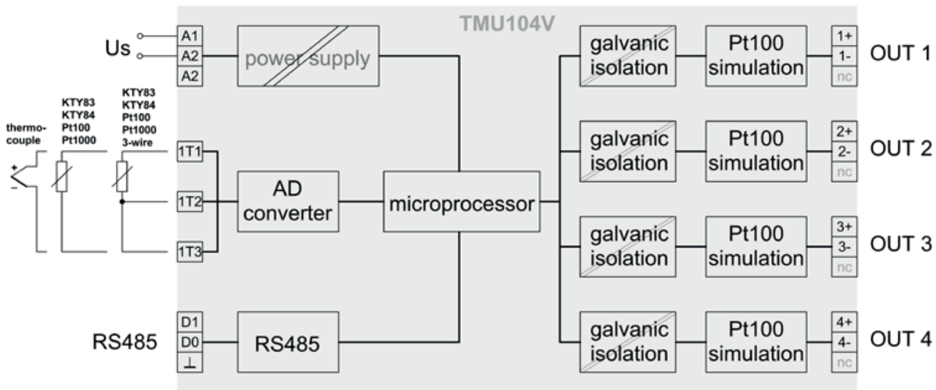
1 Input for Temperature Sensors, 4 Outputs Pt100 (RTD)

TMU104V

The measuring point multiplicator TMU101V measures the temperature at a connected sensor and transduces it into 4 insulated signals Pt 100 (RTD).
Via interface RS 485 it can be used as a simulator for up to 4 signals Pt 100.

- Measuring input Pt 100 (RTD), Pt 1000, KTY 83 / 84 in 2- or 3-wire
- connection
- Measuring input thermocouple (types B, E, J, K, L, N, R, S, T)
- Measuring range -199…+850 °C
  4 insulated outputs signal Pt 100 (resistance- signal), connection in 2-,
- 3- or 4-wire
- Digital display, 3 digits, resolution 1 °C (-19.9 … 99.9 °C: resolution 0,1 °C)
- Storing of MIN- and MAX- values
- Universal supply voltage AC/DC 24-240 V
- Interface RS 485 (protocols ZIEHL and Modbus RTU)
- Housing for DIN-rail or wall-mount, 105 mm wide, mounting height 55 mm

Block diagram



Measuring Point Multiplicator and Transducer:
The temperature of the sensor (resistance or thermocouple), connected to the input, is available as signal Pt 100 (RTD) at 4 insulated outputs. Thus allows the connection of other sensors than Pt 100 to inputs for Pt 100 at other devices.
Normally only one input can be connected to a temperature sensor. With help of TMU104 up to 4 devices (controls, displays, monitoring devices) with inputs Pt 100 can be connected to one sensor at the same time.

Simulator für Pt 100:
Controlled via interface RS 485 (protocol Modbus RTU) the TMU1004V can simulate up to 4 sensors Pt 100 (RTD). This allows the application in equipment, that makes automatic tests and calibrations at devices and installations with several inputs Pt 100.

Order-number: T236061

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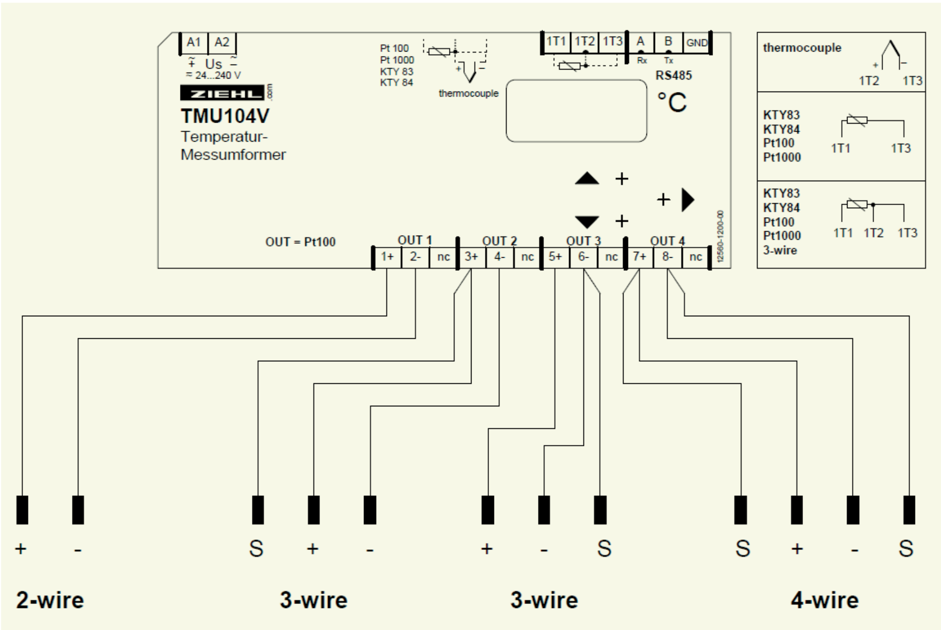

Technical Data

Rated supply voltage U_s	AC/ DC 24V - 240V < 2,5 V
Tolerance	DC 20,4 - 297 V, AC 20-264 V, 50/60 Hz

Sensor input 1T/2T/3T

Pt100 (RTD), Pt1000 nach EN 60751:

Sensor	Measuring range [°C] from	to	Short Circuit [Ω]	Break [Ω]	Resistance of sensor + line[Ω]
Pt100	-199	860	15	400	500
Pt1000	-199	860	150	4000	4100
KTY83	-55	175	150	4000	4100
KTY84	40	150	150	4000	4100

Tolerance	± 0,2 % of measured value ±0,5 K (KTY ±5 K)
Sensor current	≤ 0,6 mA
Temperature factor	< 0,04°C/K
Measuring time 2-wire/3-wire	≤ 330 ms/ ≤ 440 ms

Thermocouples according to EN 60584, DIN 43710:

Type	Measuring range [°C] from	to	Tolerance [°C]
B	0	1820	T > 300 ± 2
E	-270	1000	± 1
J	-210	1200	± 1
K	-200	1372	± 2
L	-200	900	± 1
N	-270	1300	± 2
R	-50	1770	± 2
S	-50	1770	± 2
T	-270	400	± 1

Temperature factor	± 0,01 % /K
Measuring error of sensor line	+ 0,25 µV / Ω
Reference junction	± 5 °C
Measuring time	≤ 440 ms

Sensor output OUT1...OUT4

	Pt100 according to EN60751
Reaction time	< 10 ms
Current range	200 µA … 5 mA
Type of connection	2-, 3-, 4-wire
Tolerance	±0,2 % of simulated value

Test conditions

	EN 61010-1
Rated impulse voltage	4000 V
Overvoltage category	III
Contamination level	2
Rated insulation voltage	Ui 300 V
ON period	100%
Insulation / Test voltage	Us - OUT1...4, Input, RS 485: DC 3820 V OUT1...4 -Input, RS 485: DC 1000 V OUT1 - OUT2 - OUT3 - OUT4: DC 1000 V
no insulation	Input - RS 485
EMC-Tests	EN 61326-1
Rated ambient temperature range	-20...+65 °C

Housing

Dimensions (w x h x d)	Design V6, 105 x 90 x 58 mm
Torque	0,5 Nm (3,6 lb.in)
Protection Housing/Terminals	IP30/IP20
Installation	Snap mount on rail 35 mm or screws M4
Weight	app. 200g

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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.

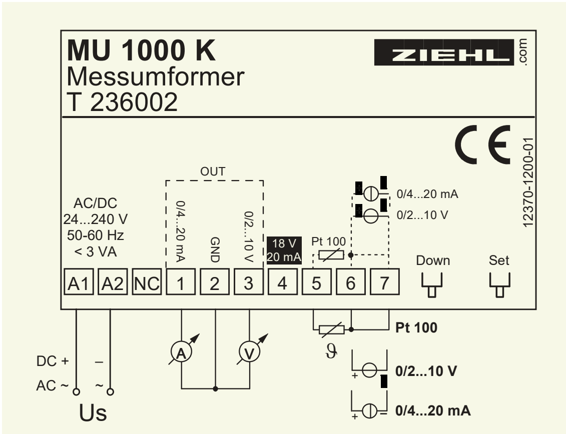
Inputs:
- Input DC 0/2-10 V
- Input DC 0/4-20 mA
- Supply-voltage for external measuring transducer DC 18V/25 mA
- Input Pt 100, 3-wire, -200 … +800 °C
  - automatic compensation of line-resistance
  - pre-programmed zeros and spans
  - individually programmable zeros and spans

Outputs:
- DC 0/4-20 mA
- DC 0/2-10 V
- Insulation between inputs, outputs and supply-voltage

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	AC/DC 24V-240 V, 0/50/60 Hz < 3 W < 5 VA
	DC: 20,4 - 297 V, AC: 20 - 264 V
Input DC-Voltage	DC 0/2-10 V, max. 27 V, 12 kΩ
Accuracy	≤ 0,1% from fullscale
Input DC-Current	0/4-20 mA, max. 100 mA, 18 Ω
Accuracy	≤ 0,5% from fullscale
Input Pt 100	Pt 100 acc. to EN 60 751 / IEC 60 751, 3-wire
Temperature-range	-200 °…+800 °C
Line-resistance	max. 500 Ω (sensor + line)
Accuracy	± 0,5% from value ±0,5 K, drift: ≤0,04 °C/K
Sensor-current	≤ 0,6 mA
Output voltage	DC 0/2-10 V, load min. 1 kΩ
Accuracy	0,3 % from fullscale, drift <0,01 %/K
Output current	DC 0/4-20 mA, load max. 500 Ω
Accuracy	0,3 % from fullscale, drift <0,015 %/K
Error load	0,3 % of current x (250Ω - load) / 250Ω
Galvanic insulation	supply-voltage - input - output
Response-time T09	
Pt100	< 350 ms
Voltage-/Current input	< 20 ms
Test conditions	see "general technical information"
rated ambient temperature-range	-20 °C ... +65 °C, EN 60068-2-5 dry heat
Housing dimensions (h x w x d)	type K, 75 x 22,5 x 115 mm
Protection housing/terminals	IP 40 / IP 20
Attachment	35mm standard-rail or screws M4 (option)
Weight	app. 100 g

Universal-Measuring-Transducer MU1001K

DC Voltage, Isolating Amplifier

MU1001K

Universal Measuring-Transducers MU1001K can measure DC-signals up to 300 V. Inputs 60/150/300 mV are measuring DC current.
Pre-set measuring-ranges can be selected by the user. More measuring-ranges (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-voltage.
With its universal power-supply AC/DC 24-240 V the measuring-transducer can be connected to all common supply-voltages.

Inputs:
- ± DC 0 - 300 mV (pre-set: 60/150/300 mV, ± 60/150/300 mV)
- DC 0 - 10 V, ± 10 V
- DC 0 - 300 V (pre-set: 20/50/100/200/300 V)

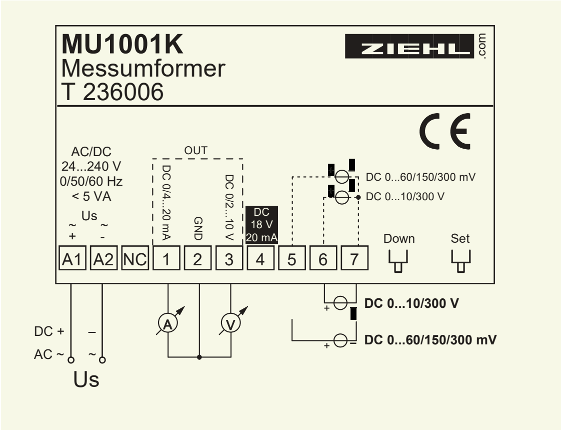
Zeros and Full Scales for more measuring-ranges can be freely selected by the user.

Outputs:
- DC 0/4-20 mA
- DC 0/2-10 V
- Insulation between inputs, outputs and supply-voltage

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 MΩ
Accuracy	≤ 0,1% from full scale
Resolution	14 Bit
Output Voltage	DC 0/2-10 V, load min. 1 kΩ
Accuracy	0,3 % from Fullscale, Drift <0,01 %/K
Resolution	11.6 Bit, <3,1 mV
Output Current	DC 0/4-20 mA, load max. 500 Ω
Accuracy	0,3 % from Fullscale, Drift <0,015 %/K
Resolution	11,6 Bit, <6,1 µA
Error load	0,3 % of current x (250Ω - load) / 250Ω
Galvanic Insulation	Supply voltage - Input - Output
Measuring Time	< 20 ms
Reaction Time	< 40 ms
Test conditions	see "general technical information"
rated ambient temperature-range	-20 °C ... +65 °C, EN 60068-2-2 dry heat
Housing dimensions (h x w x d)	type K, 75 x 22,5 x 115 mm
Protection housing/terminals	IP 40 / IP 20
Attachment	35 mm standard-rail or screws M4
Weight	app. 100 g

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Universal-Measuring Transducer/ Isolating Amplifier Type MU100U

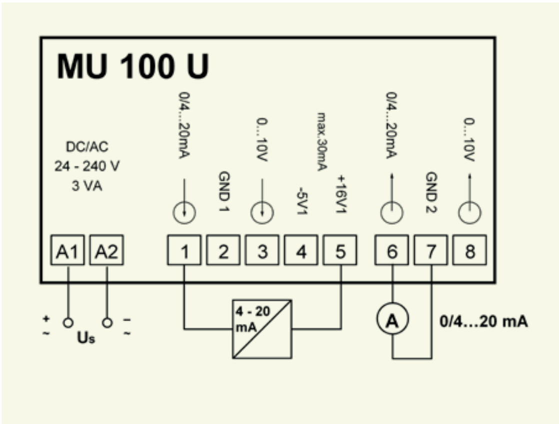
MU100U

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.

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.

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.
Because of the variety of the current standard signals (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 largely facilitated by the universal supply voltage and different input and output signals in one device.
These measuring transducers almost always fit.

- 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 U_s	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)
Inputs	**Input voltage**	DC 0 - 10 V
	Nominal input resistance	> 500 kΩ
	Input current	DC 0/ 4 - 20 mA
	max. current	DC 50 mA
	Nominal input resistance	50 Ω
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
	max. no load voltage	DC 12 V
	max. current	DC 20 mA
	Output current	DC 0/4 - 20 mA
	max. short-circuit current	DC 30 mA (short-circuit-proof)
	max. load	500 Ω
	Accuracy	class 0,2 at Tu = 23°C
	Temperature effect	0,025%*K^{-1}
	Nominal rise time $T_{0,9}$	50 ms
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 x 0,5 - 2,5 mm^2
	fine-wire with multicore cable ends	1 x 0,14 - 1,5 mm^2
	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**

Universal-Measuring-Transducer MU2000K

AC and DC, Voltage and Current

MU2000K

Art.-no: T236053

Measuring transducers MU200K can measure DC- and AC- voltages up to 600 V and AC- and DC- currents 0-1/5 A.

Preset measuring ranges can be selected. More measuring ranges (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 voltage.

With its universal supply voltage AC/DC 24-240 V the measuring transducer can be connected to all common supply voltages.

The MU2000K e.g. is suitable for measuring DC voltages and charging currents at batteries or for measuring AC voltages and currents in plants for own generation of energy.

Inputs:

- Voltage AC/DC 600 V (preset 0-30/150/300/600 V, 80-120V)
- Current AC/DC 5 A (preset 1/5 A)
- AC and DC measuring without switching over

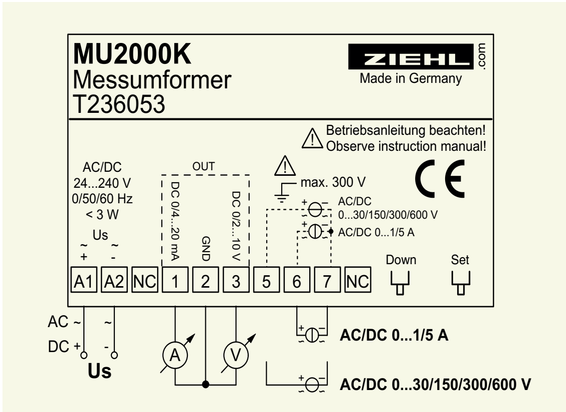
Zero and full scale for other ranges can be scaled by the user.

Outputs:

- DC 0/4-20 mA
- DC 0/2-10 V
- Insulation between input, output and supply voltage

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



Technical Data

Rated supply voltage Us	AC/DC 24V-240 V, 0/50/60 Hz < 3 W < 8 VA DC 20,4 - 297 V, AC 20 - 264 V
Input voltage	AC/DC 0-30/150/300/600 V, 80 - 120 V, Ri = 500 kΩ, max. 600 V, max. 300 V to GND
Accuracy	DC ≤ 0,2% AC ≤ 0,5% (50/60 Hz) from full scale, drift < 0,02 %K
Input current	AC/DC 1A, 5A, max. 7,5 A/4s, 25A/1s, 30 mΩ
Accuracy	DC ≤ 0,2%, AC ≤ 0,5% (50/60 Hz) from full scale, drift < 0,02 %K
Measuring method/ Resolution	RMS (AC), Averaging (DC)/ 14 Bit
Output voltage	DC 0/2-10 V, load min. 1 kΩ
Accuracy	≤ 0,3 % from full scale, drift <0,01 %/K
Resolution	11.6 Bit, <3,1 mV
Output current	DC 0/4-20 mA, load max. 500 Ω
Accuracy	≤ 0,3 % from full scale, drift <0,015 %/K
Resolution	11,6 Bit, <6,1 µA
Error load	0,3 % of current x (250Ω - load / 250Ω
Galvanic insulation	Supply voltage - input - output
Measuring time/ Averaging	45 ms + 20 ms x number of averages (1/2/8/16/32 values)
Test conditons	see "general technical information"
Rated ambient temperature range	-20 °C ... +50 °C
Housing dimensions (H x W x D)	Design K, 75 x 22,5 x 115 mm
Protection housing/terminals	IP 40 / IP 20
Attachment	35 mm standard rail or screws M4
Weight	app. 100 g

Measuring-Transducer for Potentiometers

MU100W for 0-500 Ω ... 0-10 kΩ

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.

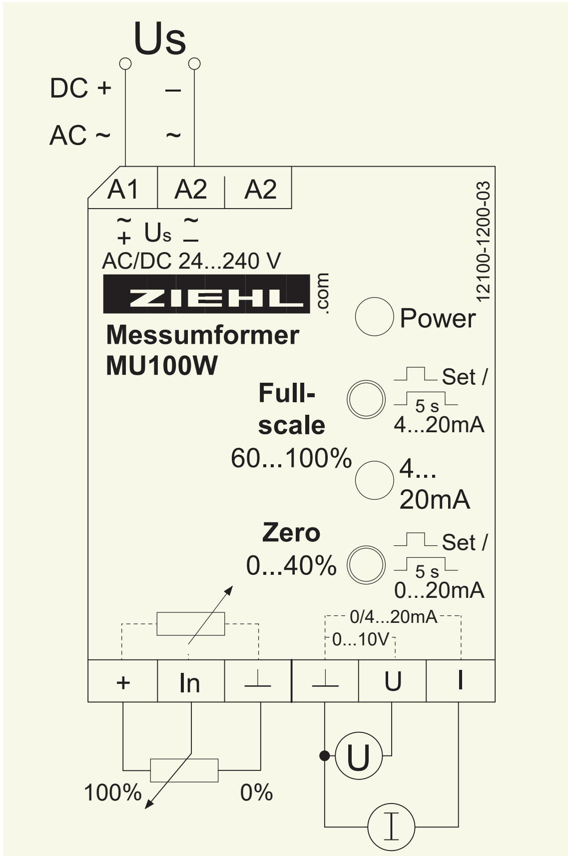
The built-in universal power-supply AC/DC 24-240 V allows the connection to all common supply-voltages.
The output delivers 0/4 ... 20 mA and 0 ... 10 V simultaneously.

Applications are the creation of adjusting commands or the detection of mechanical elements, e.g. flaps.

- Connection of a potentiometer 0...500 Ω to 0...10 kΩ
- 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	AC/DC 24V…240 V, 0/50/60 Hz, < 3 W, <5 VA
Tolerance DC	DC 20…297 V
Tolerance AC	AC 19…264 V
Measuring input	Resistance-potentiometer 0...500 Ω to 0...10 kΩ
Measuring current/ -voltage	6,6 mA ... 330 μ/3,3 VA
Analog output	DC 0…10 V, min. 1 kΩ DC 0/4…20 mA, max. 500 Ω
Error	< ±1%
Temperature factor	0-10 V: < 0,01 %/K, 0/4-20 mA: < 0,015 %/K
Test conditons	EN 61010
Rated impulse withstand voltage	4000 V
Contamination level	2
Rated insulation voltage	250 V
Rated ambient temp. range	-20 … +60 °C
Dimensions (h x w x d)	design V2: 90x35x58 mm, mounting height 55 mm
Weight	app. 130 g
Attachment	on DIN-rail 35 mm or with screws M4
Protection housing / terminals	IP 20 / IP 30

5

Accessories for Measuring Transducers:

Limit Value Switch for standard signals, DC 0/4 - 20 mA, 0/2 - 10 V

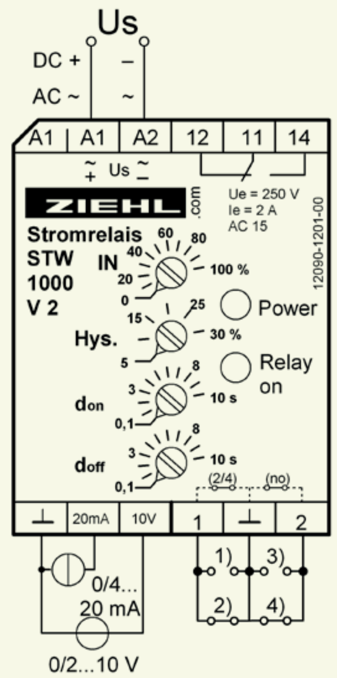
STW1000V2

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

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

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

Order-number
AC/DC 24-240 V S225677



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

Technical Data

Supply voltageUs	AC/DC 24-240 V, 0/50/60 Hz, <2 W, <3 VA (DC 20,4-297 V, AC 20-264 V)
Relay output	1 change-over contact (co)
Type of contact	**type 3 see** "general technical informations**"**
Test conditions	siehe "general technical informations**"**
Function	maximum limit switch
Measuring signals	DC 0/4 ... 20 mA, 20 Ω DC 0...10 V, 63 kΩ
Switching point	adjustable 0...100%
Hysteresis	adjustable 5...30% of set limit
Error of setting	< 10% of fullscale
Repeat error	< 0,2%
Temperature-dependence	≤0,05 %/K
Start-up-delay d_{Enable}	adjustable 0,1...10 s
Switching delay d_{AL}	adjustable 0,1...10 s
Rated ambient temperature range	-20°C…+55°C
Dimensions (H x W x D)	design V4: 90x70x58 [mm], mounting height 55 mm
Attachment	on 35 mm DIN-rail according to EN 60 715 or with screws M4
Protection housing/terminals	IP 30 / IP 20
Weight	app. 130 g

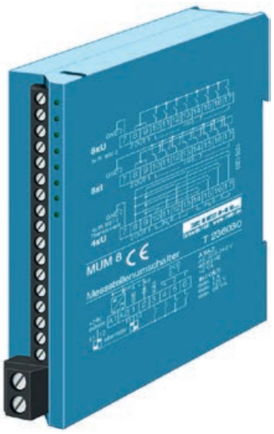
Measuring Point Change-over Switch
Type MUM for 8 or 16 Measuring points

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.

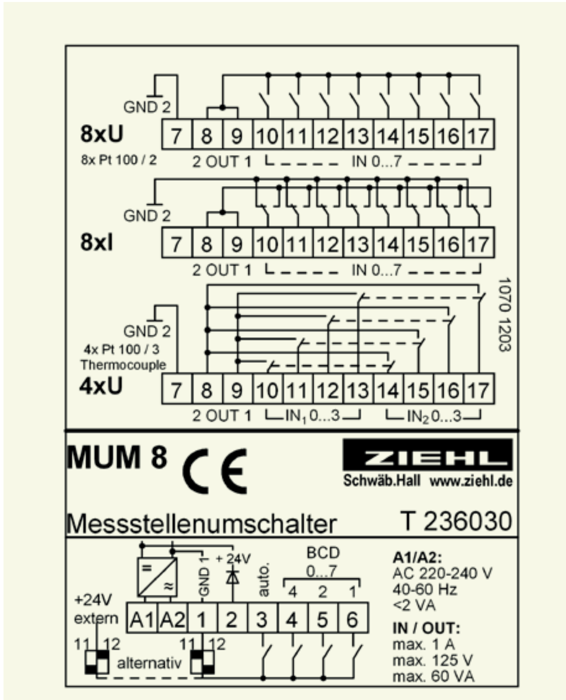
In automatic mode, the inputs are polled (tact-time adjustabe) and thus be displayed in succession.
When using a measuring point change-over switch, only 1 measuring input is needed to collect multiple values.
Especially with slowly changing signals like temperatures, measuring every other second is 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. Channel-selection 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 100/3-wire and thermocouples)
- Supply-voltage AC 230 V or DC 24 V
- LED-display for selected channel
- Clock 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. Channel-selection 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

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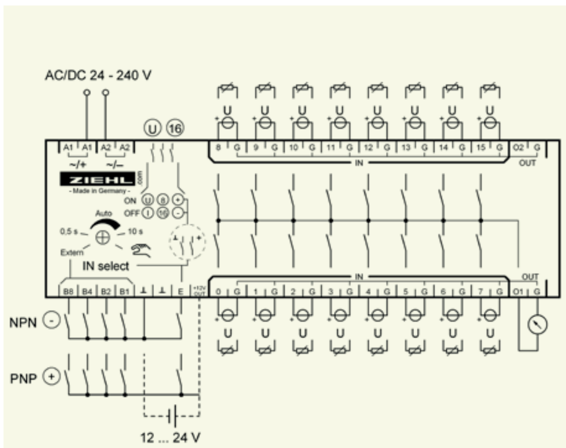


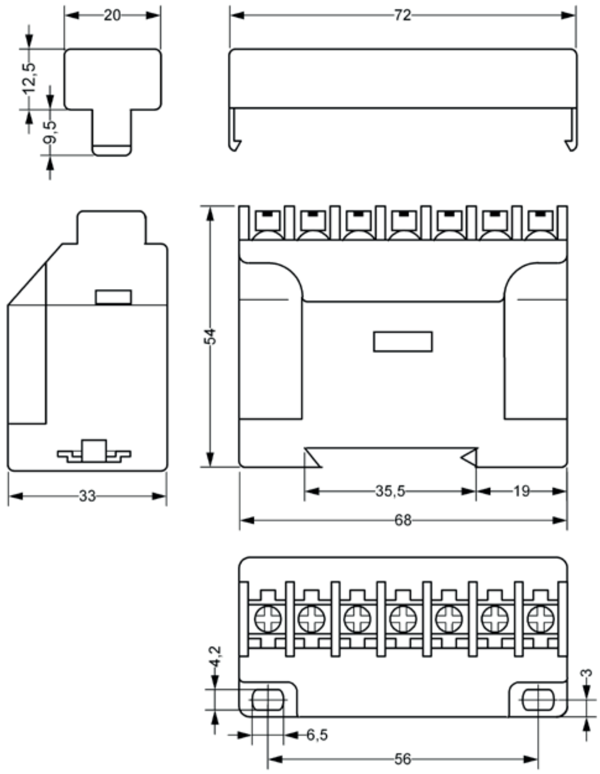
Technical Data

		MUM8	MUM16
Supply voltage	Rated supply-Voltage U_s	AC 220 - 240 V/ DC 24 V	AC/DC 24 - 240 V
	Frequency	50/ 60 Hz	0/ 50/ 60 Hz
	Power consumption	< 2 VA	< 6,5 VA, 4 W
	Admissible tolerance	AC -10…+10%	-10...+10%
Inputs	Number of input channels	8 channels with common ground or 4 x 2 channels potentially separated	16 channels with common ground or 8 x 2 channels potentially separated
	display	1 LED / channel	
	switching voltage	max. AC/ DC 24 V	
	switching current	max. 100 mA	
	switching capacity	max. 2,4 W or 2,4 VA (ohmic Load)	
	relays	8 x 1 co	16 x 1 co
	expected contact life mech.	approx. 10^8 operations	
	expected contact life elec.	5 x 10^7 operations at 12 V/ 10 mA 3 x 10^6 operations at 24 V/ 0,1 A	
	control inputs	manual / automatic channel select 3 bit BCD	enable channel select 4 bit BCD
		potentially separated from analog part	
	control signal	for all control inputs 0/24 V (PLC-compatible) aktive high or low selectable with DIP-switches	
	clock-time	adjustable (potentiometer) 0,5…10 s	
	switching time	break between 2 channels app. 1-2 ms	
Outputs	outputs	max. 2	
	at single channel:	In 0 - 7 to Out 1 + Out 2	In 0 - 15 to Out 1
	at double channel:	In 0 - 3 to Out 1 In 4 - 7 to Out 2	In 0 - 7 to Out 1 In 8 - 15 to Out 2
Test Conditions		EN 50 178	
	rated insulation voltage U_i	AC 250 V/ DC 300 V	
	insulation	EN 60664	
	pollution grade	4 kV	
	EMC	2	
	transformer	EN 61 000-6-2, EN 61 000-6-3	
		EN 61 558	
Normal conditions of use	rated ambient temperature	0...+50°C	-20...+55°C
	storage temperature	-40°...+75°C	
	environmental conditions	EN 60 068-1	
	on-period	100%	
Housing	Dimensions (h x w x d) mm	Design K: 75 x 22,5 x 118	V8: 90 x 140 x 58
	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 included)	
	Order-numbers:	**T236030**	**T236035**

Dimension Illustrations

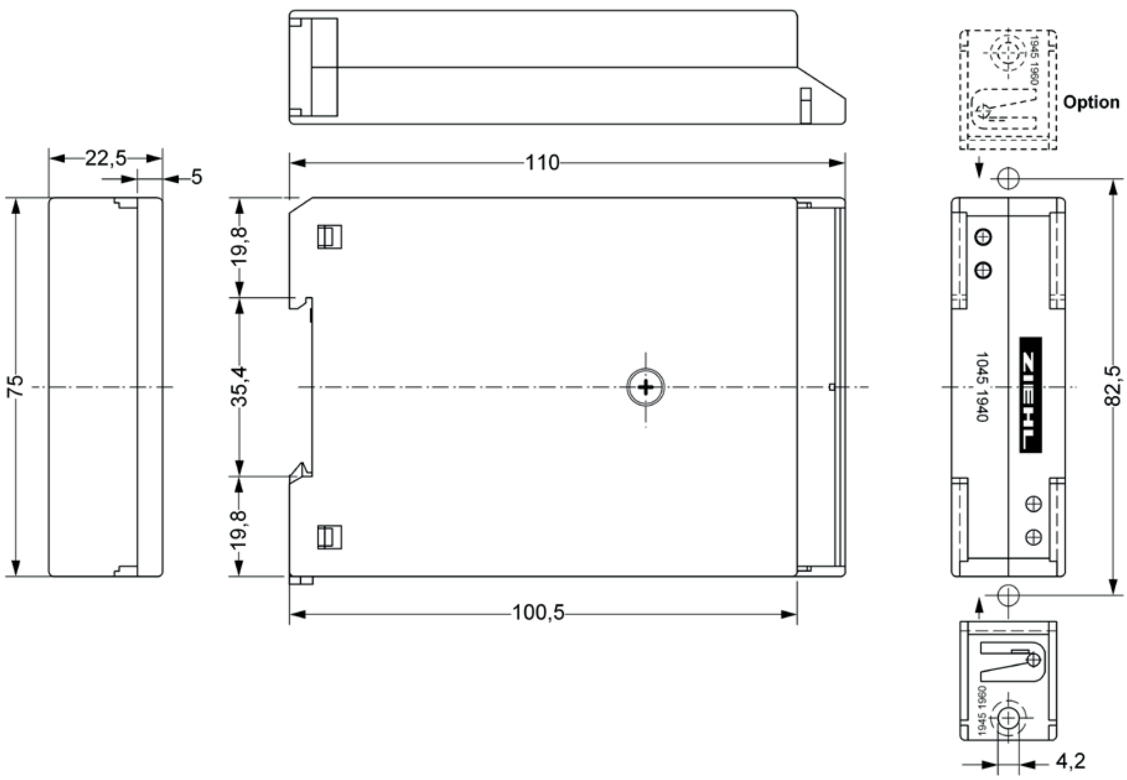
Housing Design C

Material:
Polyamid PA66



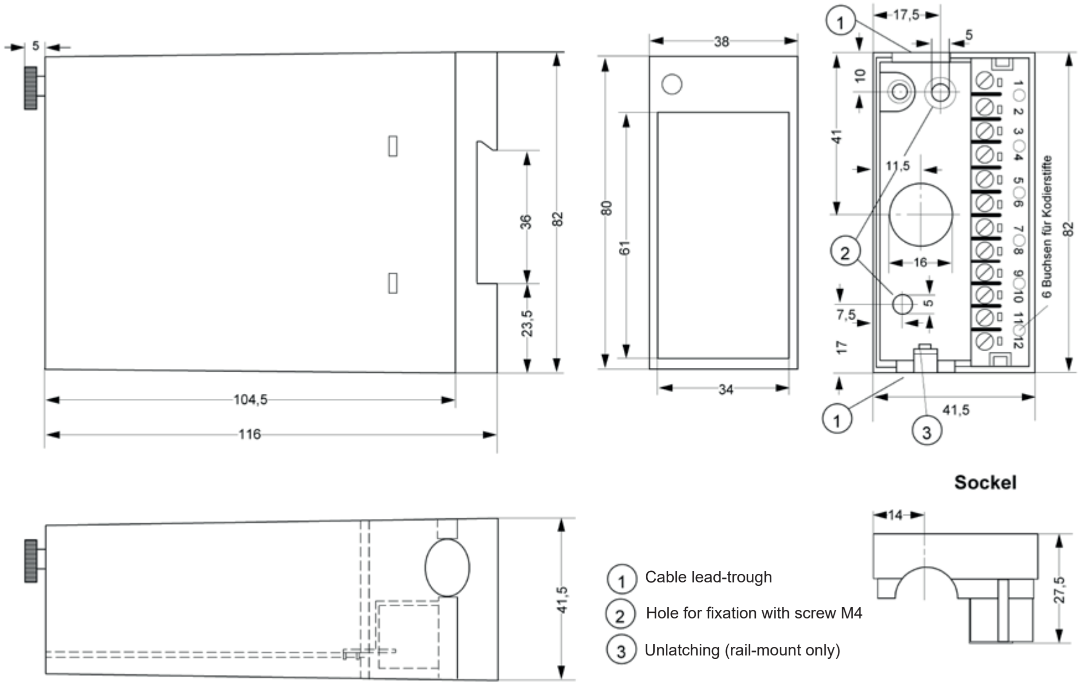
Housing Design

Material:



Housing Design S12

Material:
Polyamid PA 6



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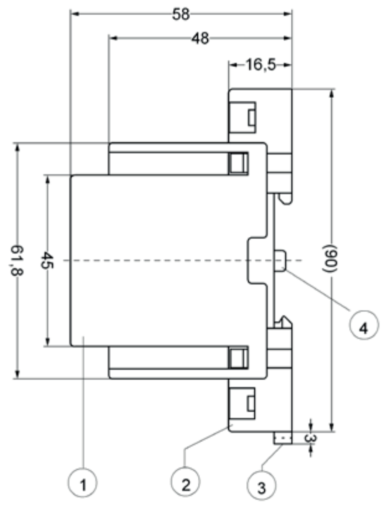
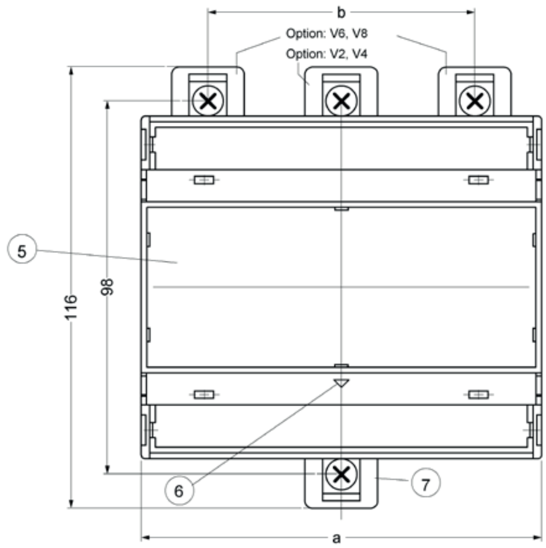
Housing Design V

Material:
Polyamid PA 66
Front plate Polycarbonat

Switchboard mount
V2, V4, V6, V8:
Mounting height 55 mm

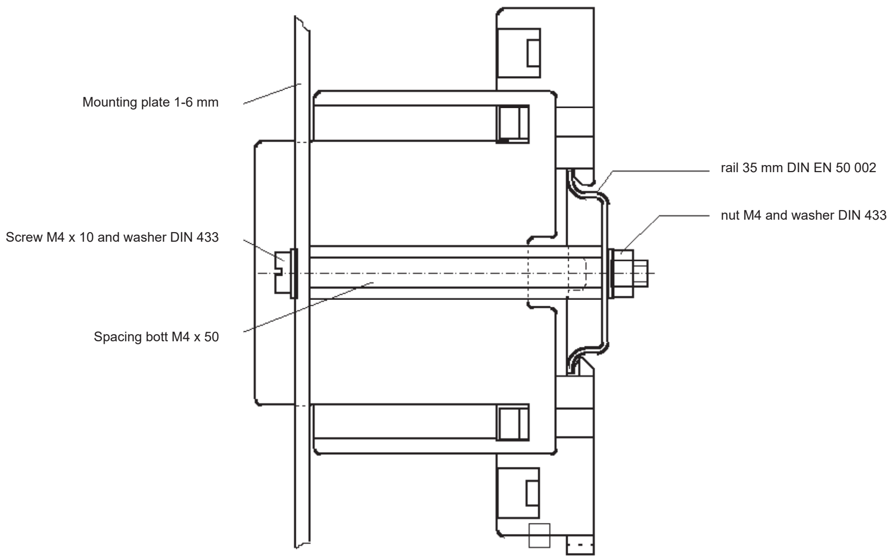


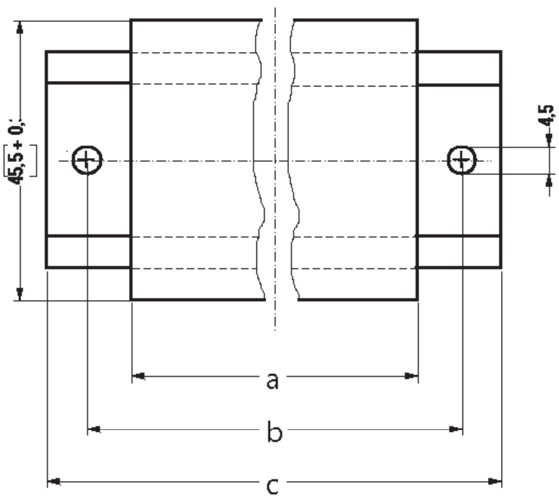


Maß a:
V2: 35 mm = 2 TE
V4: 70 mm = 4 TE
V6:105 mm = 6 TE
V8:140 mm = 8 TE

Maß b:
V6: 70 mm
V8: 105 mm

Panel mount V2, V4, V6, V8:

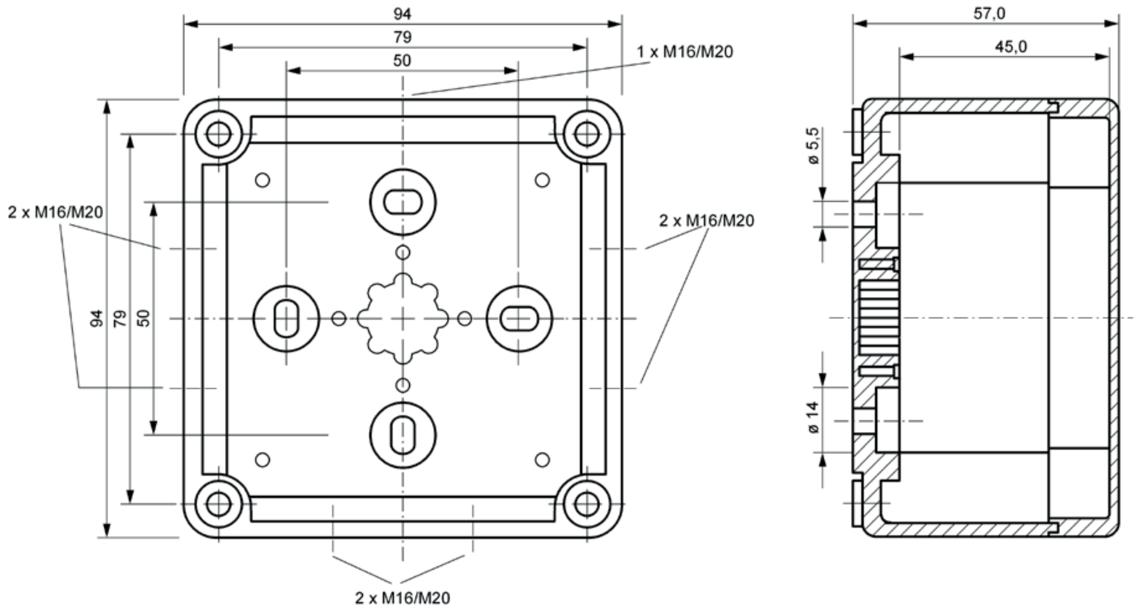




mm	a	b	c
V2	35	50	65
V4	70	85	100
V6	105,5	120	135
V8	140,5	155	170
Tol.	+ 0,3	± 0,3	± 2

Housing Design I94

Material:
Polystyrol = Standard
Polycarbonat = Option



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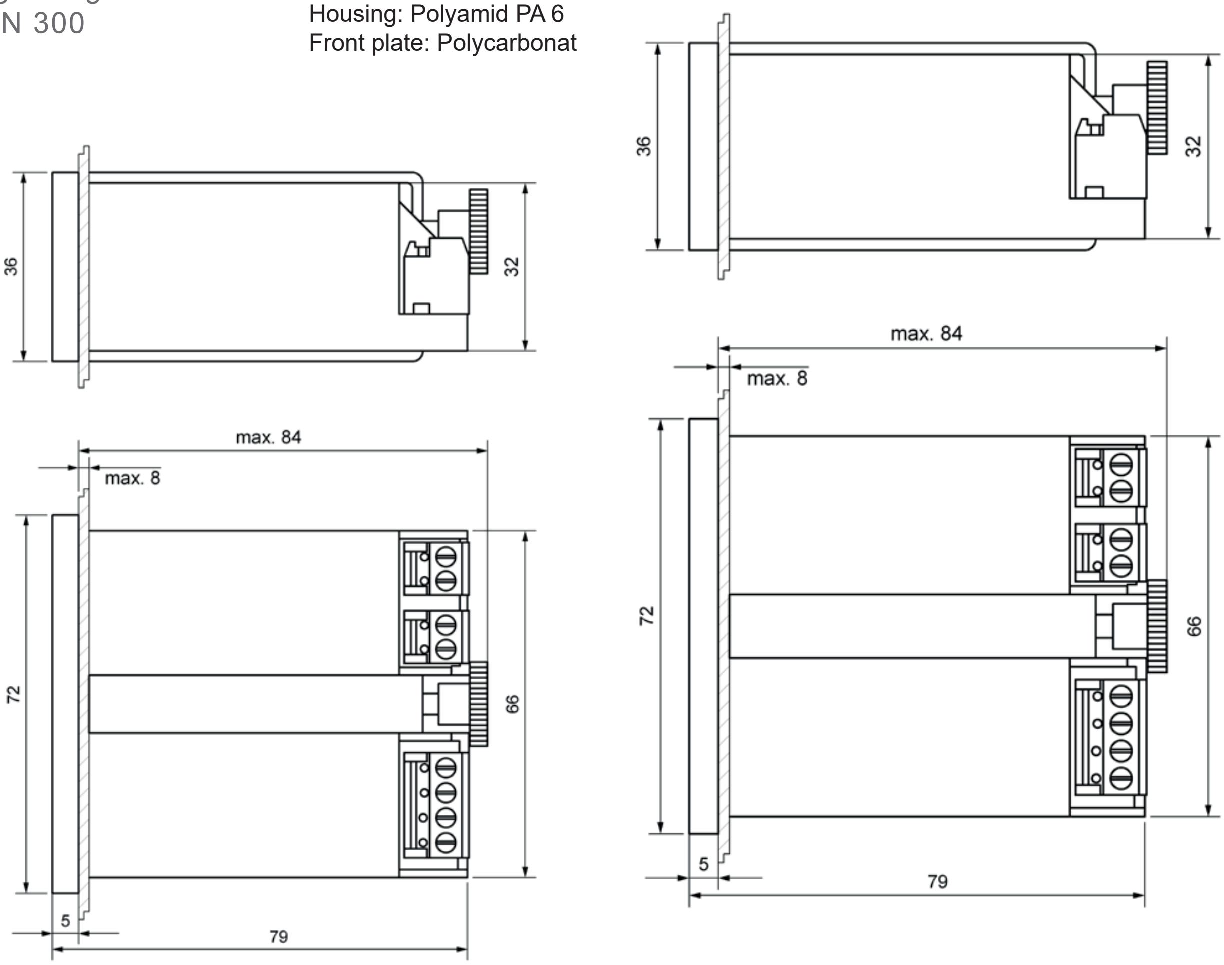
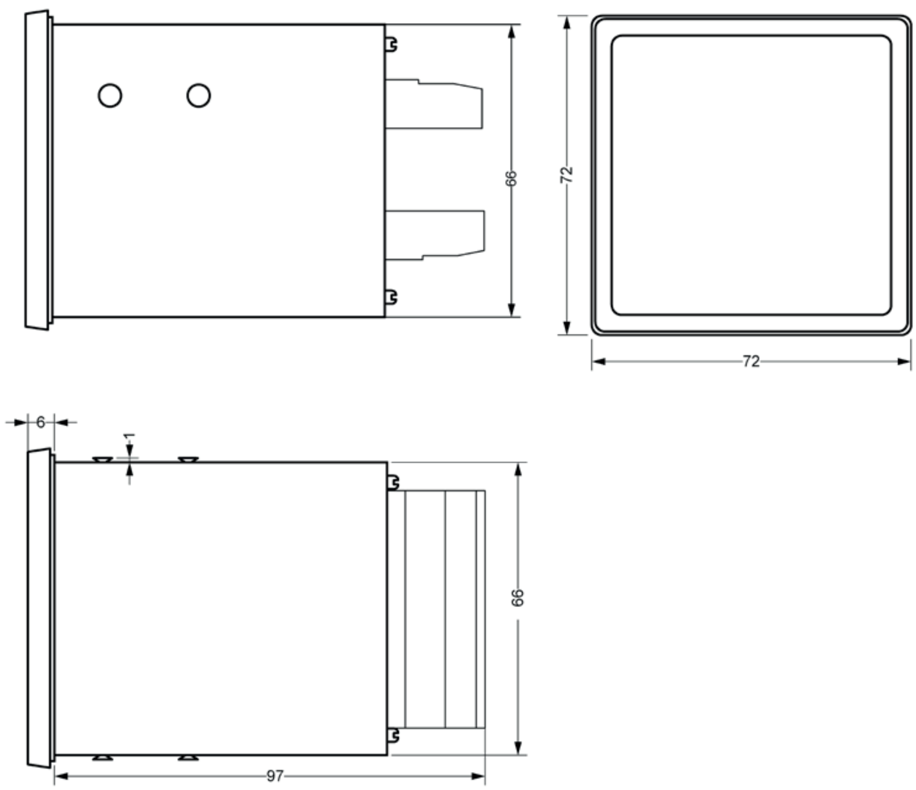
Housing Design 300
MINIPAN 300

Material:
Housing: Polyamid PA 6
Front plate: Polycarbonat



Housing Design 350
MINIPAN 352P

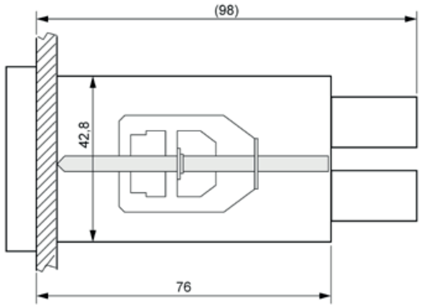
Material:
Housing: Ultramid U-B3WG5
Front plate: Polycarbonat



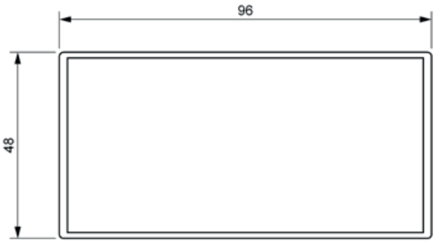
Housing Design SE
MINIPAN SE352

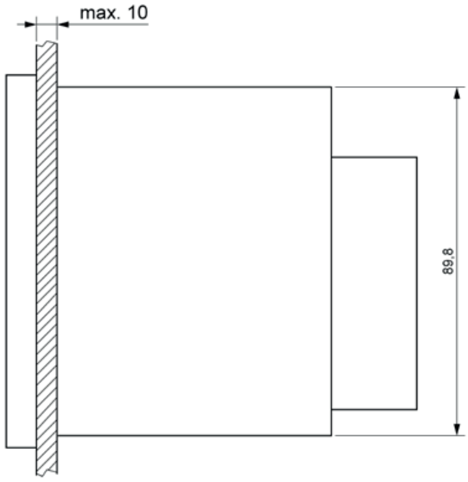
Material:
Housing: Noryl GFN2 SE1
Backplane: FR4
Front frame: Noryl GFN2 SE1

Gehäuse mit Steckkontakten



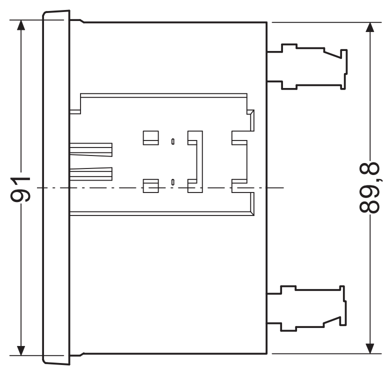
Panel cut-out 92x45

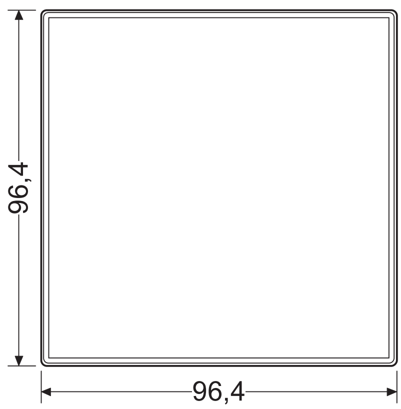


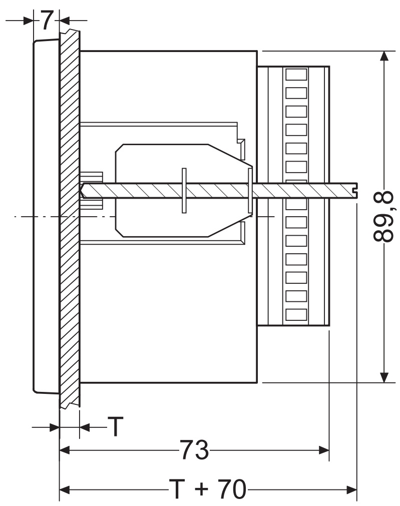


Housing Design SE2
TR440

Material:
Housing: Noryl SE1 GFN1
Backplane: FR4
Front frame: Noryl SE1 GFN1
Front plate: Polyesterfolie







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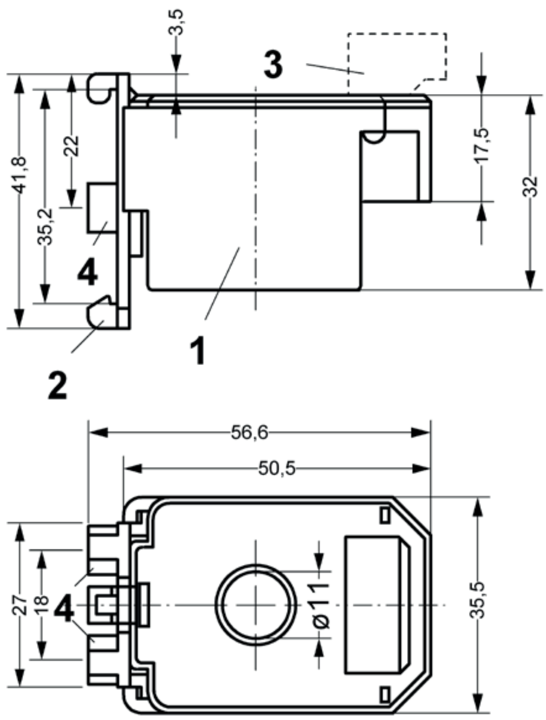
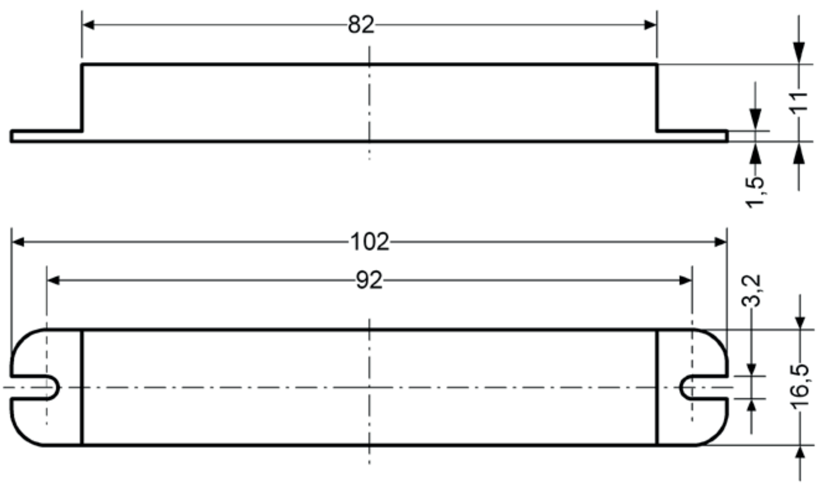
Housing Design H
for
Current-Transfomers

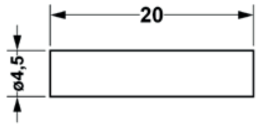
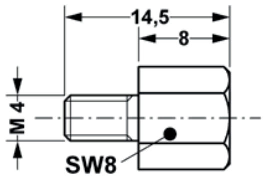
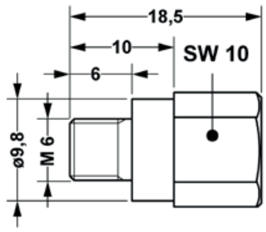
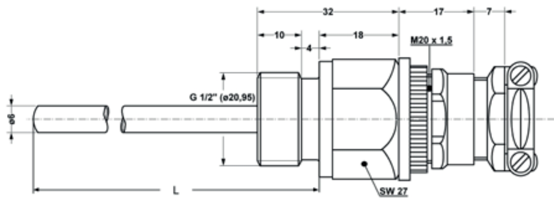


1 Base
2 Clip for DIN-rail
3 Terminal (pluggable)
4 Surface-mount (M4)

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	

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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.

Standards + specifications: The devices described in this catalogue are manufactured taking into account the provisions of EN60664 / VDE0110, EN50178 / VDE0160, EN60947 / VDE0660, EN 61010 /VDE 0411, EN60255 / VDE0435 and a number of other relevant standards and regulations.

Quality assurance: Our quality management system according DIN EN ISO 9001 is evaluated regularly by an independent body. In addition we have a quality assurance system for the production in accordance with Directive 2014/34/EU (ATEX) and parts of the production are monitored by UL.

AC/DC 24 V: Such a device can be operated from either an AC or DC 24 V supply voltage. It is not equipped with a mains transformer (the supply voltage input goes directly to the rectifier) and there is no insulation between supply voltage and electronic parts.

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 as RMS value. The peak value is √2 times the RMS value.

Altitude: The device is designed for use at a height of up to 2000 m above sea level (MSL).

Ambient temperature, permissible: typically -20 °C to +55 °C measured in a distance of 10 mm to the bottom surface of the housing. Depending on self-heating and the material used also other values can be realized. With some devices the specified accuracy applies only within a narrow temperature range.

ATEX approval: -> Explosion protection
Motor protection devices with ATEX approval protect non-explosion-protected motors and explosion-protected motors with ignition rating according EN 60079 in normal operation an in case of failure.

Accident prevention regulation DGUV Vorschrift 3: All devices featured in the catalogue comply with the accident prevention regulations issued by the Professional Association for precision mechanics and electrical engineering (BG ETEM). This provision clarifies that for "Occasional managing" components such as pushbuttons, tilting levers or knobs,a protection against direct contact has to be made. All dangerous voltage parts are "finger-proof" run and may therefore be not touchable with the test finger acc. EN 60529. The standard equipment of our house meet these conditions, unless the customer has removed no parts.

Climatic conditions, humidity, condensation: Electrical equipment must be suitable for the application. The ambient conditions of the electronic device determine the protection afforded against the environmental influences (e.g. cooling, water splash, oil saturated air) or the equipment has its own protection system (protection provided by enclosures, e.g. IP 65). Ziehl devices are for installation complying with EN50178/VDE 0160. All devices are usually suitable for environmental class 3K3.

CE mark: We declare as manufacturer, that our products comply with the requirements of the appropriate directives. These products carry the CE mark.

Closed current principle: The relay is energized in the OK state (when the actual value is within the permissible range) and releases with the alarm signal. 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. → Open circuit current.

Current output: Measuring transducers have current outputs with DC 0 - 20 mA or 4 - 20 mA. The loading capacity of current outputs is limited. The permissible maximum load (burden) is determined by the maximum voltage in the device, e.g. 500 Ω at 20 mA and 10 V. Current inputs of multiple devices may be connected to a current output up to the maximum permissible load. → Input resistance.

Creepage destance: shortest distance along the surface of an insulation material between two conducting parts.

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 is expected, produced with the help of capacitors, when using devices with DC supply voltage; the upper and lower peak values of the DC voltage should not exceed the permissible tolerance of the supply voltage.

Duty cycle: ZIEHL devices are usually designed for a 100% duty cycle.

Declaration of Conformity: The devices comply with the regulations and directives 2014/35/EU (electrical equipement designed for use within certain voltage limits) and 2014/30/EU (electromagnetic compatibility - EMC)

1. EN 50178: Electronic equipment for use in power installations
2. EN 61000-6-4: Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
3. EN 61000-6-2:
Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
4. EN 61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
5. EN 60255-27: Measuring relays and protection equipment - Part 27: Product safety requirements
6. EN 60947-8: Low-voltage switchgear and controlgear - Part

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%...85% no condensation	760 hPa...1060 hPa
during storage	-20°C...+70°C	5%...95%	760 hPa...1060 hPa
during transport	-20°C...+70°C	5%...95%	700 hPa...1060 hPa

5-8: Control circuit devices and switching elements - Three-position enabling switches.

Emitted interference: If not otherwise specified devices with AC supply voltage (built-in transformer) meet the requirements of the EN 61000-6-3: Emission for residential, commercial and light-industrial environments . If not otherwise specified devices with DC control voltage or AC/DC 24-240 V-all voltage power supplies meet the requirements of EN 61000-6-4: Emission standard for industrial environments.

EN 61558/ VDE 0551: Specification of the technical construction of a transformer with safe separation between mains and electrical low voltage. Performed absolutely short-circuit proof or conditional short-circuit proof with integrated →Fuse.

Explosion proof: Devices carry an explicit warning with regard to applications in potentially explosive atmospheres . They are not equipped with intrinsically safe terminals. Connection to sensors in potentially explosive atmospheres must be effected via suitable zener-barriers (exception MS(R)220Vi). In doing so, it must be observed that line resistance should not be adversely affected. Devices with ATEX approval are to be installed outside potentially explosive atmospheres.

Galvanic isolation (of mains): In many applications a galvanic separation is necessary between the voltage supply and the electronics, and thus e.g. measuring input/sensor. The separation is achieved typically by transformer or DC/DC converters →proof voltage.

Galvanic isolation (between input and output): → Measuring transducer with galvanic isolation

Hysteresis: Hysteresis is the difference 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.

Important Notes! Read carefully! 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 Europ

Input impedance: A current input has usually a low input impedance. Especially for the upstream transducer it is important that inputs DC 0/4-20 mA cause loads as little as possible. And high current inputs to keep low power loss on the shunt. Vice versa, a voltage output requires a high load resistance so as to reduce the power losses. → current output → voltage output

Installation hints: All devices are to be installed by appropriately trained skilled labour taking into account all the relevant regulations.

Insulation: In order to protect against dangerous body currents (electric shock), protective arrangements must be taken conforming with EN 61140. Shock-proof protection → Protection system. A frequently used protection measure consists of insulation. →Insulation coordination →creepage distances.

Insulation coordination: due to the application expectable impulse and over-voltages during lifecycle (e.g. lightning strike), subsequent contamination and the insulation features of the materials are used as a basis for the definition of minimum values fo→ creepage distances. The same applies for the → Proof voltage, which is used for testing the insulation features of the products.

Insulation voltage: The rated insulation voltage Ui is specified according EN60664. It provides information of the maximum voltages that can be connected to the equipment.

Insulation voltage, temperature sensor: In the case of temperature sensors a higher insulation voltage will usually lead to a higher heat transmission resistance of the sensor and thus to a higher response time.

Maintenance: Usually not necessary for our devices. Depending upon the application, though, we recommend periodical 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: → Hysteresis. Hysteresis is negativ.

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: → Hysteresis. Hysteresis is positive.

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.

Pollution degree: according to EN 60664-1 the levels of pollution are defined as follows:

Pollution degree 1: no pollution or only dry, non-conductive pollution occurs, which has no influence
Pollution degree 2: only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is expected
Pollution degree 3: conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation which is expected
Pollution degree 4: continuous conductivity occurs due to conductive dust, rain or other wet conditions.

Ambient temperature, permissible: 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 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.

Power supply: If the voltage range is specified for the supply voltage, e.g. AC 220 - 240 V +10/-15%, the operating range will be from AC 187 V up to AC 264 V. In case of DC supply only smoothed voltages with an upper ripple of max. 5% are admissible.

Proof voltage: voltage for testing the → Insulation of an equipment. The insulation strenght between supply voltage, output contacts, housing and the electrical low voltage circuits (ELV) is tested. As a rule of thumb: withstand voltage = 2 x rated insulation voltage + 1000 V. → Protection provided by enclosure, → Safe separation.

Protection system: ZIEHL devices comply with DGUV part 3 (formerly BGV A3). They are equipped with protection against indirect contact (finger guard, protection against electric shock).

Protection proviced by enclosure (IP-Code): Defined according to EN60529. 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 Ø 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
6: Protection against water penetration while dipping under fixed conditions
7: Protection against water penetration while dipping under fixed conditions
8: Protection against submersion

To achieve the type of required protection in the relevant application, the devices must be installed into housings or cabinets if necessary. In places with expected radiated EMI, the installation should be appropriately shielded.

Rated frequency: ZIEHL devices with AC voltage supply usually operate with 50 and 60 Hz. Deviations are indicated explicitly.

Rated voltage: The component or device is designed for this voltage and the operating and performance features refer to it. → Us, rated operating voltage

Relay, connection designation according to EN 60947-1: 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 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 devices usually use relays with silver-nickel alloy (AgNi).

Silver-nickel alloy AgNi10
Advantage: high resistance to arc-erosion, low welding tendency, especially suitable for inductive loads, 6 - 400 V and 10 mA up to 100 A. Disadvantage: higher contact resistance than other Ag contacts.

Silver nickel alloy AgNi0,15 (fine grain silver)
Advantages: relatively small contact resistance, low welding tendency, suitable for the switching of medium and high loads.

Relay, contact life cycle: This will be determined by the number of switches under load. Modern relays have mechanical life cycle of more than 1 million switching operations. The electrical life cycle will be determined by the switching capacity of the contacts. See also contact material.

Relay, contact protection: Switching inductive loads it is advised to connect the load with a protection element to eliminate errors. For alternating current with a RC-element or a VDR (voltage-depending resistance) at DC with a RC-element or a free-wheeling diode. The switch-off time then must be observed. Generally the interference effect will be significantly reduced and the life-time of the contacts improved.

Relay contacts: see Table next page

Relay, fuse protection of contacts: In order to avoid welding of the relay contacts, we generally recommend the use of a fuse. For typical application with relays type 2 and make-contact (NO) we recommend a fuse slow-blow 4 A or miniatur circuit breaker 4 A (MCB) characteristic B..

Relay, rated operating current Ie: This is the current which can reliably be switched by the relay contact at an indicated rated operating voltage -> Switching capacity.

Relay, switching capacity according to EN 60 947-5-1: to AC 15 / DC 13, auxiliary current circuits, electromagnetic load

Relay, switching capacity is the load (ohmic), which can switched by a relay contact. Maximum specified values, therefore, shouldn't be exceeded. In case of AC current loads the maximum switching capacity must be reduced because of the phase displacement between current and voltage (cos φ = 0.7).

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.

Shock resistance: Specifies the acceptable mechanical shock (in a multiple of the acceleration due to gravity "g" with half sine wave form and 11 ms duration) where no malfunctions occur. All instruments featured in the catalogue are resilient with 5 g

Storage temperature, permissible: usually -20 up to +70°C.

Switch-on behaviour: When applying the supply voltage it takes some time until all outputs and displays change into the steady state. Output relay with → closed current principle are designed to signal an error message during this switch-on period.

Test conditions: These are the test conditions of our devices, as far as not mentioned otherwise in the data sheet
Rated insulation voltage Ui acc. EN 60664-1:
AC 250 V pollution degree 3
AC 415 V pollution degree 2
Overvoltage category III
Rated impulse withstand voltage 4000 V

Proof voltage between control supply voltage Us, sensor circuits and relay outputs AC 2500 V
Proof voltage open contact (normal open, no) AC 1000 V
Emitted interference/immunity for industrial environments: EN 61000-6-4; EN 61000-6-2
Vibration resistance: ±0,075 mm 10...57Hz; 1g 57...150Hz
Shock resistance: 5g 11 ms

Relay contacts:		
	Type 3	**Type 2**
Contact material Rated voltage Switching voltage Thermal current AC/DC Minimum current/voltage	AgNi 9/10 AC 250 V 50 Hz max. AC 400 V max. DC 300 V 3 A 12 V 10 mA	AgNi 0,15 AC 250 V 50 Hz max. AC 400 V max. DC 300 V 5 A 12 V 10 mA
Switching power max. AC cos φ = 1 Switching power max. DC (ohmic load) Switching capacity normally opened (no) Rated nominal current	5 A 250 V 0,3 A DC 240 V 5 A DC 30 V Application category - AC-15 Ie = 2 A Ue = 250 V DC-13 Ie = 2 A Ue = 24 V DC-13 Ie = 0,8 A Ue = 60 V DC-13 Ie = 0,4 A Ue = 120 V DC-13 Ie = 0,2 A Ue = 240 V	8 A 250 V 0,3 A DC 300 V 8 A DC 30 V Application category AC-15 Ie = 2 A Ue = 400 V AC-15 Ie = 3 A Ue = 250 V DC-13 Ie = 2 A Ue = 24 V DC-13 Ie = 0,8 A Ue = 60 V DC-13 Ie = 0,4 A Ue = 120 V DC-13 Ie = 0,2 A Ue = 240 V
Contact life cycle Life cycle electrical 2 x 10^5 switching operations 5 x 10^5 switching operations	 cos φ = 1 3 A - 250 VAC 2 A - 250 VAC	 cos φ = 1 5 A - 250 VAC 3 A - 250 VAC

Application category	Typical conditions
AC-12	Switching of ohmic load and load of semiconductors in inputcircuits of optocoupler
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 lelctromagnetic load (> 72 VA)
DC-12	Switching of ohmic load and load of semiconductors in inputcircuits of optocoupler
DC-13	Switching of electromagnetic loads
DC-14	Switching of electromagnetic loads with economy resistance in circuit

Application category	Normal conditions					
	Switch-on			Switch-off		
	I/I_e	U/U_e		I/I_e	U/U_e	
AC-12	1	1	cos φ = 0,9	1	1	cos φ = 0,9
AC-15	10	1	cos φ = 0,3	1	1	cos φ = 0,3
DC-13	1	1	T < 300 ms	1	1	T < 300 ms

Climatic conditions 3K3 acc. EN 60721-3

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

Vibration resistance: Specifies at which amplitude and acceleration in a defined frequency range no malfunctions or damages occur. All our devices featured in the catalog are sufficient resilient and comply with EN 60068-2-6 for device, where no increased demands appear due to their installation location. Vibration Test Fc with 10-57 Hz ± 0.075 mm and 57-150 Hz 1 g

Voltage output: Measuring transducer are available with voltage outputs with DC 0 - 10 V. Other values are available upon request. The Loading capacity of voltage outputs is limited.

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 quality reasons. 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. Deliveries to commercial customers only.

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

Invoices are sent as pdf documents by email unless the buyer disagrees explicitly. Invoices 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 at source 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. Packing an postage are charged according to expenditure. 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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Measuring, Controlling, Monitoring on highest level

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