# Pt 100-Temperature-Relays Type TR



## General

Temperature relays type TR monitor temperatures in connection with temperature sensors Pt 100 according to DIN 43 760 / IEC 751. They signal or switch, if a preset limit is exceeded.

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

The temperature relays type TR have the following features:

| type | connectable sensors Pt 100 | connection 2-wire | 3-wire technique | adjustable limits | output relays | analog output | housing | remarks |
|---|---|---|---|---|---|---|---|---|
| TR 111 V | 1 | - | x | 1 | 1 co | - | V 2 | hysteresis and switching delay adjustable |
| TR 122 D | 1 | x | x | 2 | 2 co | - | S 12 | digital display programmable, plug-in housing |
| TR 122 DA | 1 | x | x | 2 | 2 co | 0 / 4-20 mA | S 12 | digital display programmable, plug-in housing |
| TR 210 | 2 | x | x | 2/4 | 2 co | 0 / 4-20 mA<br>0 - 10 V | V4 | digital display programmable, Pt 1000, Thermocouples |
| TR 250 | 3 | x | x | 3 | 3 co | - | V4 | digital display programmable, connection of PTC |
| TR 400 | 4 | x | x | 4 | 4 + 1 co | 2 x 0/4 - 20 mA<br>2 x 0 - 10 V | V 8 | digital display programmable, plug-in terminals |
| TR 440 | 4 | x | x | 4 | 3 + 1 co | - | 96x96 mm | interface RS 485 MODBUS |
| TR 600 | 6 | x | x | 6 | 6 + 1 co | 2 x 0/4 - 20 mA<br>2 x 0 - 10 V | V 8 | digital display programmable, plug-in terminals, option: interface RS 485 |
| TR 800 WebControl | 8 | x | x | 4 x 8 | 4 co | - | V 8 | interface for Ethernet, TCP/IP udp, MODBUS TCP/IP inputs Thermocouples 0/4 - 20 mA, 0 - 10 V |
| TR 1200 | 12 | x | x | - | 1 U | - | V 8 | RS 485 MODBUS |
| TR 1200 IP | 12 | x | x | - | 1 U | - | V 8 | Ethernet-Interface TCP/IP udp modbus TCP/IP |
| WR 250 | 6 | wireless | | 3 | 3 U + 1 U | - | V 4 | for wireless-temperature-sensors WS Pt 100 |

## 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 TR 111 V

## 1 Sensor

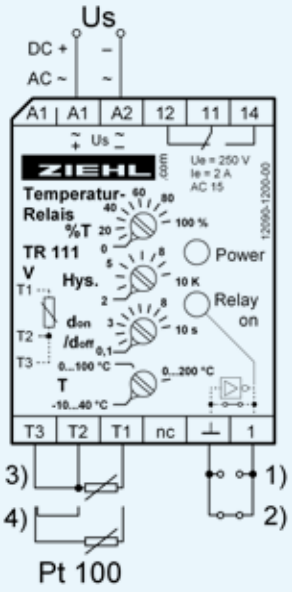
TR 111 V
3-wire

Temperature-Relays TR 111 V can be used as limit-switches or 2-point controllers with high repeat accuracy.
3 measuring-ranges, adjustable hysteresis and switching delay and the choice between operating- and closed-current principle of the relay make it a very universal device.

- Measuring input 1x Pt 100 (RTD) / 3-wire
- 3 measuring-ranges:
  - -10...+40 °C
  - 0...100 °C
  - 0...200 °C
- 1 limit adjustable 0...100 % switching delay adjustable 0,1...10 s
- Output-relay 1 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:
AC/DC 24-240 V **T 224107**
other measuring-ranges on request




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<br>(DC 20,4 - 297, AC 20-264 V) |
| Pt 100 -Sensor (RTD) | EN 60751 / IEC 60751 |
| Measuring ranges | 3 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 TR 122 DA

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



### TR 122 DA

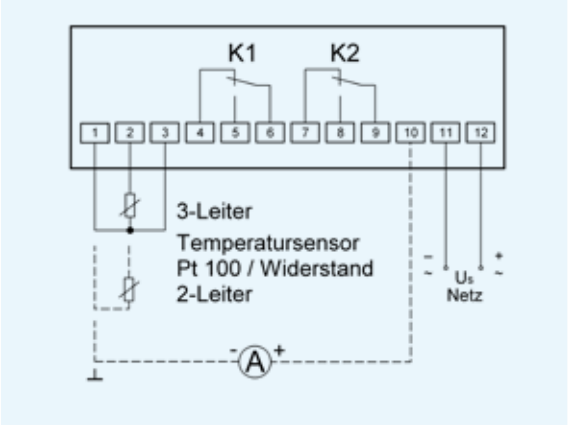
The TR 122 DA is a temperature relay with 2 independant switching points and with analog output.

Order-numbers:

| | |
|---|---|
| TR 122 DA with analog output | **T 224126** |
| TR 122 D without analog output | **T 224127** |

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




### 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<br>(AC 20-264 V, DC 20,4-297 V) |
| sensor Pt 100 (RTD) connection | Pt 100 according to EN 60 751/IEC 60 751,<br>Resistance 0...850 Ohm<br>line-resistance max. 3 x 22 Ω / 2 x 10 Ω |
| measuring accuracy | < 0,3 % of value ± 0,5 K (Ω) |
| measuring current | ≤ 1,5 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 temperature range | -20°C...+55°C |
| dimensions (h x w x d) | design S 12: 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 |

# Limit Value Switch Type TR 210

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

### TR 210


The limit value switch TR 210 monitors up to 2 measuring inputs for Pt 100 (RTD), Pt 1000, 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 TR 210 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

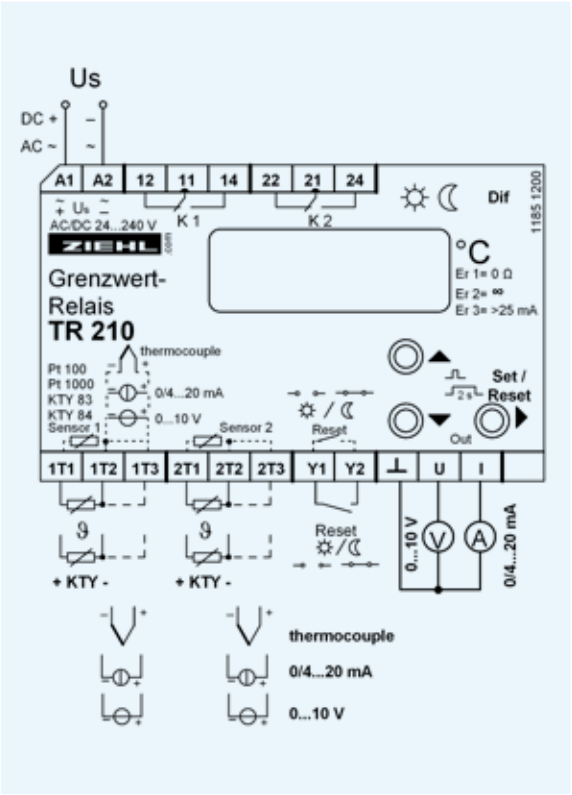
- Measuring and monitoring range -170...+1820 °C
- resolution 0,1°C (to 999.9 °C)
- Analog output (scaleable) for 1 input, min./max. of 2 inputs or difference of 2 sensors (no isolation between inputs and output)
- 2 relay outputs
- Shifting of day/night (selectable with contact at terminals Y1/Y2 )
- 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: T 224071



## 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

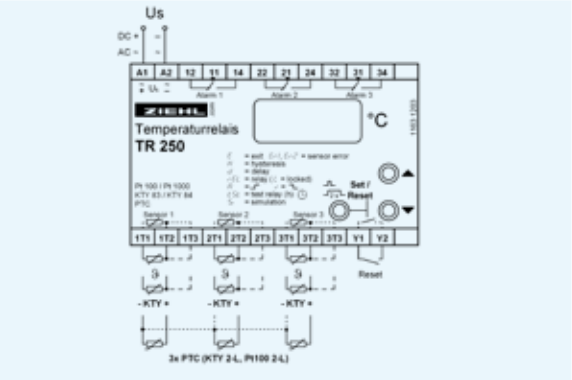
| | |
|---|---|
| Rated supply voltageUs | AC/DC 24-240V, <3W, <5VA<br>(AC 20-264 V, DC 20,4-297 V) |
| 2 Measuring inputs | Pt 100, Pt 1000 according to EN 60 751<br>Thermocouples types B, E, J, K, L, N, R, S, according to EN 60 584, DIN 43 710<br>0/4-20 mA (22Ω), 0-10 V (13 kΩ) |
| Measuring-time | <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<br>(without isolation to inputs) |
| Relay output | type 3, see "general technical informations"<br>2 x 1 co- (change-over) contact |
| Test conditions | |
| Rated ambient temperature renge | see "general technical informations"<br>-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 |

# Pt 100-Temperature-Relay Type TR 250

## Digital, 3 Sensors, 3 Limits

### TR 250


The Pt 100 thermostat TR 250 monitors up to 3 sensors Pt 100 (RTD), Pt 1000, KTY 83 KTY 84 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.
Order-number: T 224190




### 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
- Code-lock against manipulation of settings
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3 Sensor-Inputs:
- Pt 100/1000, 2- or 3-wire connection
- KTY 83, KTY 84
- 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
- °C / °F / resolution 0.1 °C can be selected

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

### Technical Data

| | |
|---|---|
| Rated supply voltage Us | AC/DC 24-240 V (AC 20-264 V, DC 20-297 V), 3 VA |
| Sensor connection | 3 x Pt 100 (DIN 43 760/IEC 751) (RTD)<br>3 x Pt 1000, KTY 83, KTY 84<br>3 x 1...6 PTC (DIN 44080/44081) |
| Measuring accuracy | <1 % of value ±1 digit |
| Sensor-current | <3 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 informations")<br>3 x change-over / alarm |
| Test conditions | see "general technical informations" |
| 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 |

# Pt 100-Temperature Relays type TR 400

## Digital, 4 Sensors, 4 Limits



### TR 400

The Pt 100 thermostat TR 400 is a temperature controller and monitors up to four Pt 100 (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 Pt 100 sensors can be connected, the unit is especially suitable for temperature monitoring wherever up to 4 different measuring points must be monitored simultaneously:

- 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 24-60V or AC/DC 90-240 V
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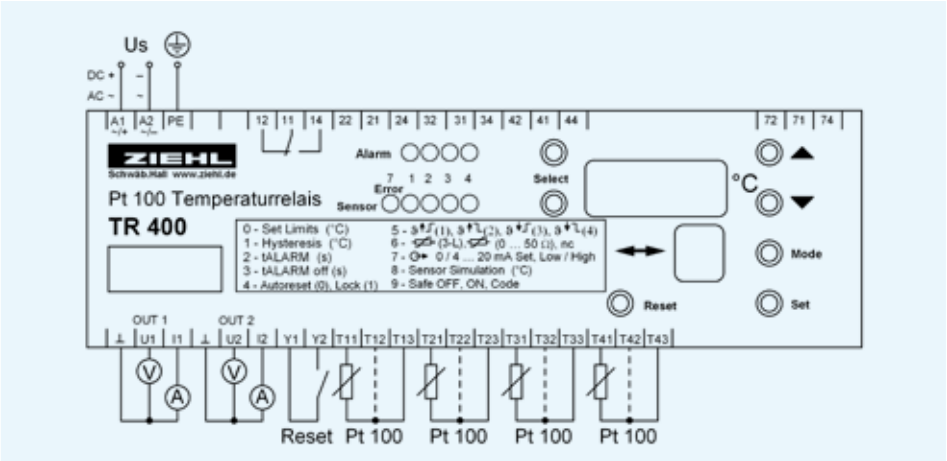
Displays

- 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 TR 400

| | | |
|---|---|---|
| **Rated supply voltage Us** | | AC/DC 24 – 60 V (see lateral type plate) |
| | Tolerance DC-supply | DC 20 - 81 V (0,85 x 24V…1,35 x 60V) |
| | Tolerance AC-supply | AC 20 - 66 V (0,85 x 24V…1,1 x 60V) |
| | Ratede supply voltage Us: | AC/DC 90 – 240 V (see lateral type plate) |
| | Tolerance DC-supply | DC 81 - 297 V (0,9 x 90V…1,35 x 220V) |
| | Tolerance AC-supply | AC 76 - 264 V (0,85 x 90V…1,1 x 240V) |
| | Power consumption | < 8 VA |
| | Frequency | 0 / 50 / 60 Hz |
| | ON-period | 100% |
| **Relay outputs** | | 1 change-over (CO) contact |
| | Switching voltage | max. AC 415 V |
| | Switching current | max. 5 A |
| | Switching power cosφ =1 | max. 1250 VA (ohmic load)<br>max. 48 W at DC 24 V |
| | Recommended fuse for contacts | T 3,15 A (gL) |
| | Expected life mechanical | 3 x $10^7$ operations |
| | Expected life elektrical | 1 x $10^6$operations with AC 250 V / 5 A<br>2 x $10^6$ operations with AC 250 V / 3 A<br>2 x $10^7$ operations with AC 250 V / 1 A |
| **Testing conditions** | Derating factor cosφ =0,7 | 0,5 |
| | | VDE 0660 / VDE 0160 |
| | Rated insulation voltage Ui | VDE 0110 / AC 415 V / I Gr.C |
| **Sonsor connection** | Max. ambient temperature | - 20 ... + 65 °C |
| | | 4 x Pt 100 acc. to DIN 43760 / IEC 751 (RTD) |
| | Measuring accuracy | ±0,5 % of value ±1 Digit |
| | Sensor current | ≤ 2 mA |
| | 3-wire sensor | Pt 100 + RL = max. 490 Ω |
| | 2-wire sensor | RL = 0 …50,6 Ω adjustible |
| | Measuring delay time $t_M$ | <1,5 s (normal operation, depends on number of connected sensors) |
| **Switching points** | | 4 , digitally adjustable |
| | Relay operating function | standard = closed circuit current principle (NC)<br>option = operating current (NO) |
| **Temperature alarm** | | |
| | Temperature range ϑ1…ϑ6 | -199 ... +800 °C |
| | Hysteresis | 1 ... 20 K |
| | (Release) delay time tALARM | 0,1 ... 99,9 s |
| | (Pick-up) delay time tALARM off | 0 ... 999 s |
| **Analog output** | | |
| | Voltage output | DC 0/2 V – 10 V , max. DC 10 mA |
| | Current output | DC 0/4 mA – 20 mA |
| **Housing** | Type V8 Dimensions (H x W x D) | 90 x 140 x 58 mm |
| | Line connection solid wire | je 1 x 1,5 mm2 |
| | Stranded wire with isulated ferrules | je 1 x 1,0 mm2 |
| | Protection class housing | IP 30 |
| | Protection class terminals | IP 20 |
| | Fitting position | any |
| | Mounting | Snap mounting on 35 mm standard rail<br>DIN EN 50022 or M4 screws |
| | Weight | app. 330 gr |

| Order-numbers: | |
|---|---|
| AC/DC 90-240 V | T 224180 |
| AC/DC 24-60 V | T 224181 |

# Pt 100-Temperature-Relay Type TR 440

## 4 Sensors Pt 100 (RTD), Monitoring of Core, Panel-Mount



TR 440


**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 TR 440 can also be used for the monitoring of temperatures e.g. at motors.

## Function:

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

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

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

Option:
- Interface RS 485 (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)

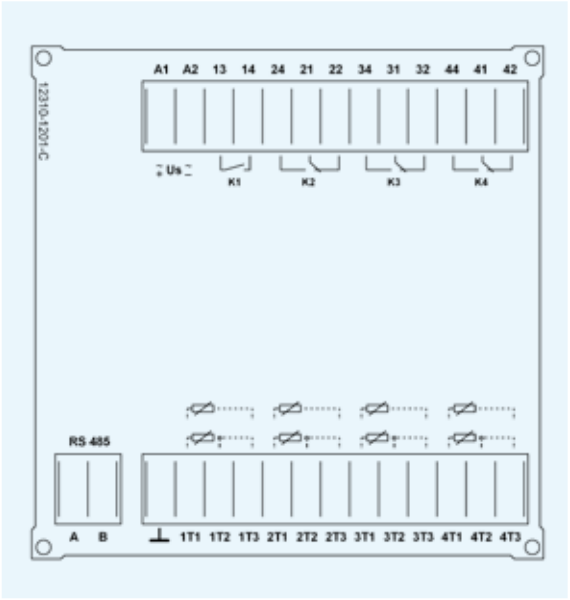
Alarm 2 reports sensor-error and alarm

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: T 224184
RS 485 T 224185

## 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 Pt 100 (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<br>Alarms 2-4: type 3, see "general technical informations" |
| Test conditions | see "general technical informations" |
| Rated ambient temperature range | -20...+55 °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 $92^{+0,8}$x$92^{+0,8}$ mm |
| Protection housing | IP 20 |
| Protection front | IP 54 |
| Protection terminals | IP 20 |
| Weight | app. 350 g |

# Pt 100-Temperature-Relay Type TR 600

## Digital, 6 Sensors, 6 Limits



### TR 600

**Temperature Relay for 6 Sensors Pt 100**

The Pt 100-temperature relay TR 600 monitors up to six sensors Pt 100 (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 Pt 100 sensors can be connected, the unit is especially suitable for temperature monitoring wherever up to 6 different measuring points must be monitored simultaneously:

- 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 1-3, 4+5, 4-6 or 1-6
- 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 24-60 V or AC/DC 90-240 V
- USB-Stick-Terminal for up- and download of sets of parameters and for firmware-updates

Displays

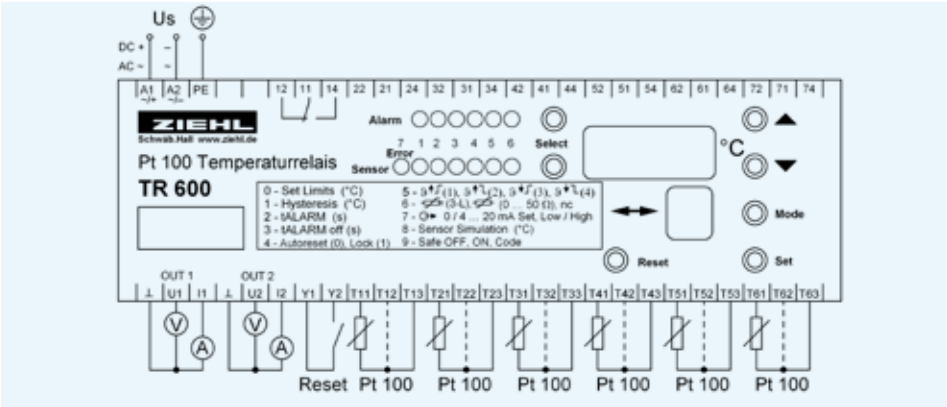
- built-in 3 digit temperature display and 1 digit program-mode display
- LED Alarm showing state of the alarm relays
- LED Sensor Error blinking at sensor short circuit or sensor interruption.
- Stored Values of MIN- and MAX- temperature can be displayed
- „Sensor select“ showing temperatures of the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

Options:

- interface RS 485
  protocols ZIEHL and Modbus RTU



# Technical Data TR 600

| | | |
|---|---|---|
| **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 | < 3 W, < 6 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)<br>max. 5 A DC 30 V |
| | recommended fuse for contacts | T 2 A (gL) |
| | expected life mechanical | 15 x $10^6$ operations |
| | expected life electrical | 1 x $10^5$ operations with AC 250 V / 5 A, cos φ = 1<br>2 x $10^5$ operations with AC 250 V / 3 A, cos φ = 1<br>1 x $10^6$ operations with AC 250 V / 1 A, cos φ = 1 |
| | derating factor cosφ =0,7 | 0,5 |
| **Testing conditions** | | EN 60 010-1 |
| | ambient temperature range | - 20 ... + 65 °C |
| **Sensor connection** | | 6 x Pt 100 acc. to EN 60751 / IEC 60751 |
| | measuring accuracy | ±0,5 % of value ±1 Digit |
| | sensor current | ≤ 0,7 mA |
| | sensor connection | 2- / 3-wire |
| | measuring delay time $t_M$ | <1,5 s |
| **Switching points** | | 6 , digitally adjustable |
| | relay operating function | standard = closed circuit current mode<br>operating current mode programmable |
| **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** | 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 |
| **Interface RS 485** | | Modbus RTU/ZIEHL RS 485 protocol |
| | address/busnumber | 1-247 (Modbus)/0-99 (ZIEHL RS 485 protocol) |
| | baudrate | 4800/9600/19200/57600 |
| | parity bit | no, odd, even |
| | stoppbit | 1 (at modbus and pority no, stoppit = 2) |
| | Response time ZIEHL RS 485 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 DIN EN 60 715 or M4 screw |
| | weight | app. 360 g |

## Order-numbers

| **analog output (= standard)** | RS 485: |
|---|---|
| **T 224360** | T 224361 |

# Universal-Relay Type TR 800 Web

## 8 Inputs, Operation with Browser via TCP/IP



### TR 800 Web

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

The TR 800 Web 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 TR 800 Web 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. Pt 100) 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 RS 485 with the protocols Modbus and ZIEHL-standard.

Applications:
The TR 800 Web is used where one or more of the following features a required:

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

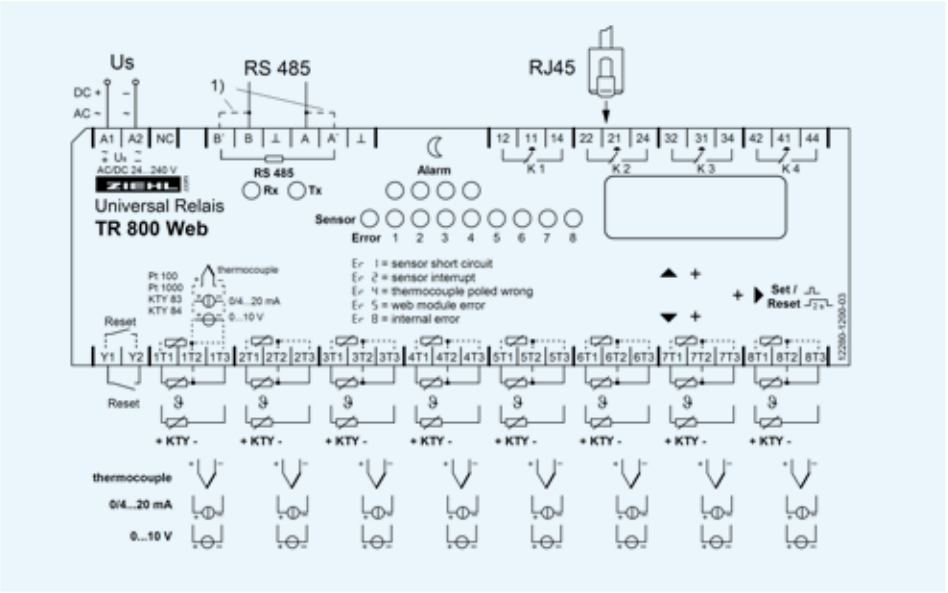
### Features

8 Measuring Inputs (each programmable):

- Pt 100 (RTD), Pt 1000 in 2- or 3-wire
- KTY 83 or KTY 84
- thermocouples types B, E, J, K, L, N, R, S, T
- DC 0-10 V, DC 0/4-20 mA, display can be scaled
- resistance 0-500 Ohm, 0-30 kOhm

4 Alarms

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



**Connected via internet in 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 data, alarms and parameters with date/time-stamp
- configuration of network
- settings of system
- administration of users and code-protection
- real-time clock with synchronizing with time-server, reserve 7 days

**Interfaces:**

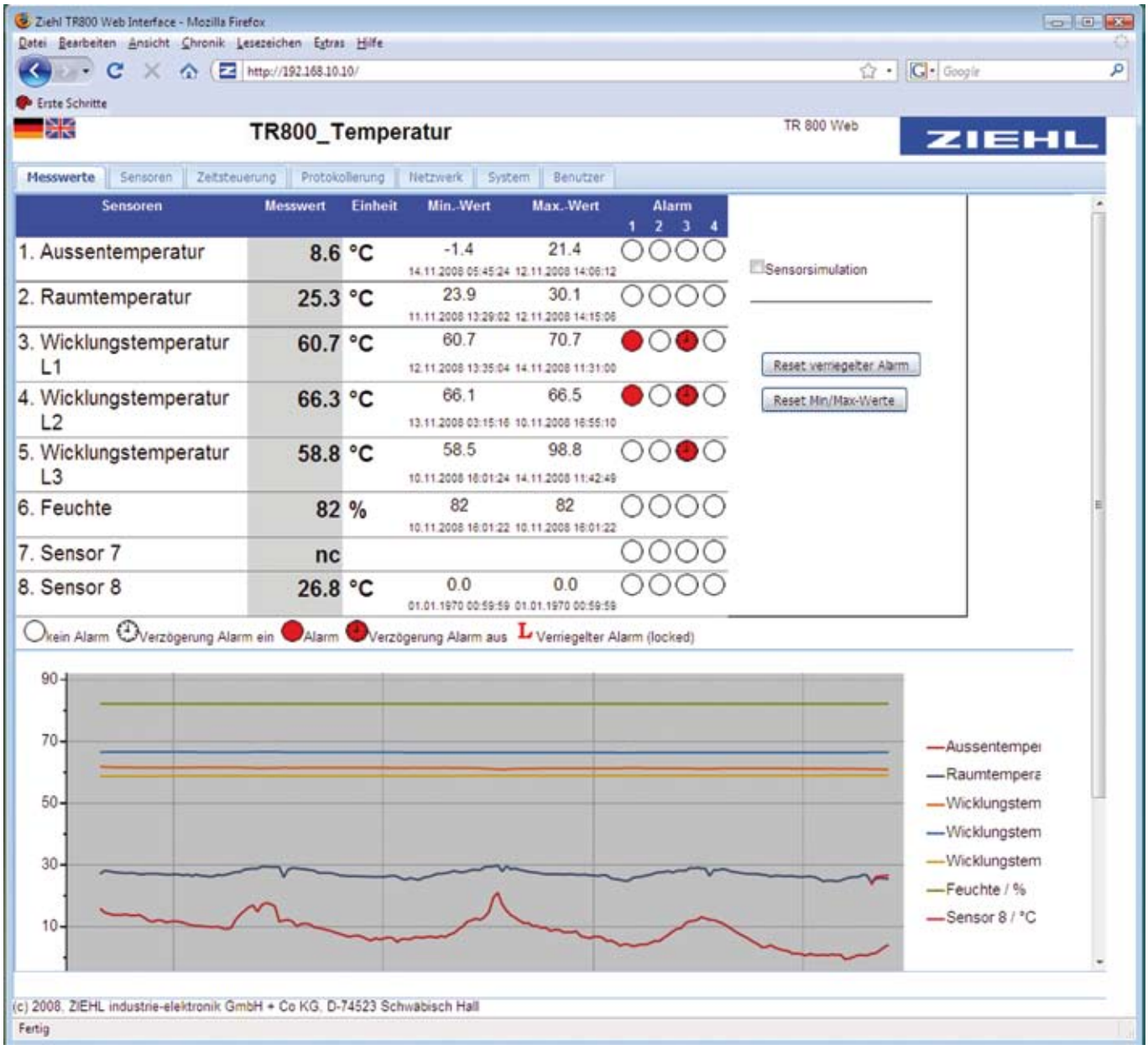
- Ethernet interface (http, https, UDP and Modbus)
  - http and https (at http port can be selected and switched off)
  - UDP- and Modbus- protokoll to read data (port can be selected)
  - SNMP (Option)
- RS485 interface to readout data with modbus and ZIEHL-protocol

Displays and Operating Elements

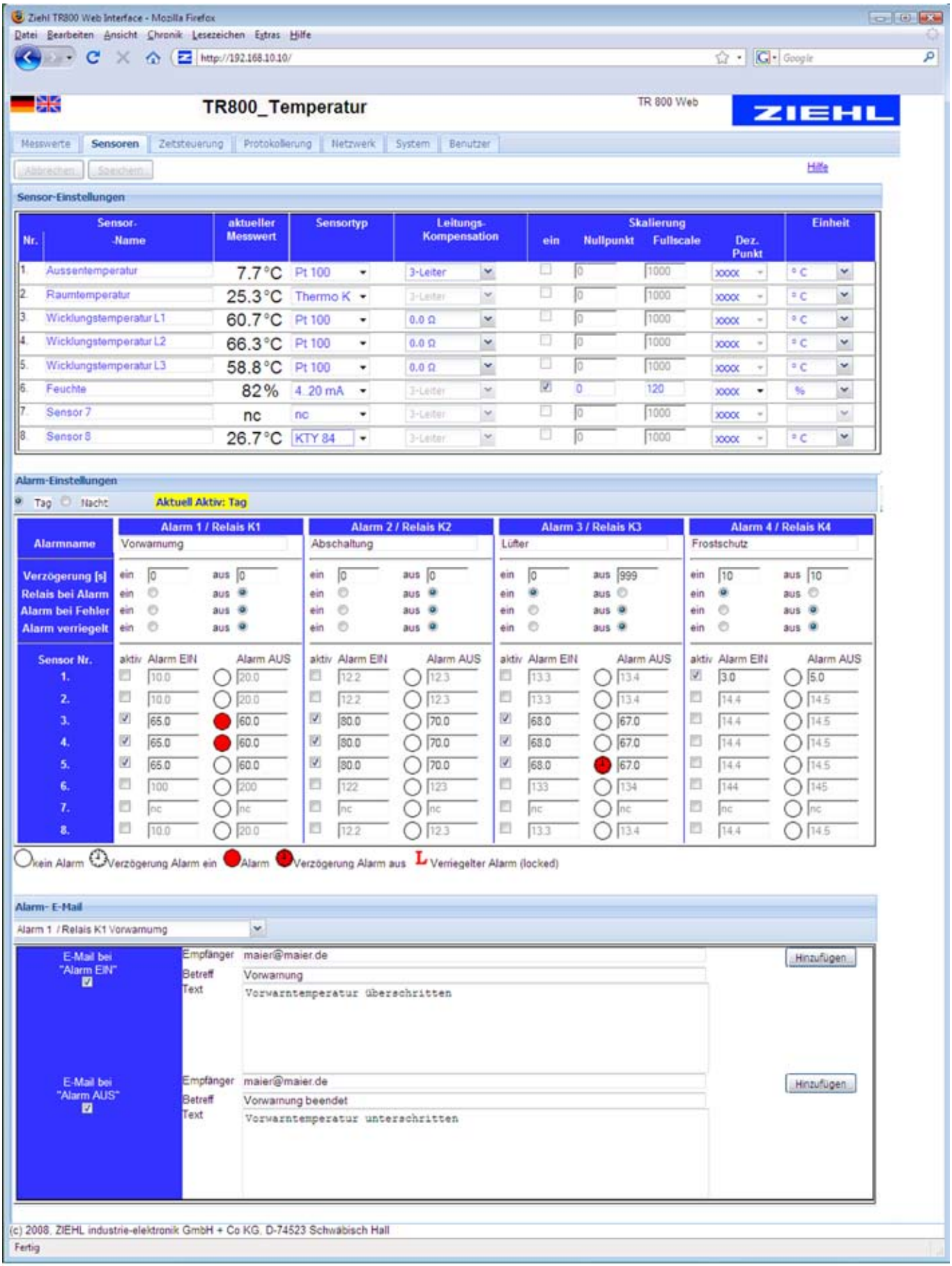
- 8 LEDs for inputs
- 4 LEDs for alarms, 4 LEDs for state of relays
- 4 digit display for measuring values
- 3 buttons for reading measured values at the device and for setting of IP-adress
- switch IP 10.10.10.10 / user
- reset-button
- LEDs for activity of interfaces

Universal power-supply AC/DC 24-240 V
Housing for switchgear-mount, 140 mm wide, mounting-height 55 mm

**Order-number: T 224162**



Operating and Programming with Web-Browser:



# Technical Data TR 800 Web

## Rated supply voltage Us

Tolerance: AC/DC 24-240 V, 0/45...120 Hz < 4 W < 8 VA
DC 20,4...297 V, AC 20...264 V

## Relay output

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

Pt 100, Pt 1000 according to EN 60 751

| | Measuring range °C | | Short-circuit Ohm | Interruption Ohm | Resistance sensor + resistance line Ohm |
|---|---|---|---|---|---|
| Sensor | min | max | < | > | max |
| Pt 100 | -199 | 860 | 15 | 400 | 500 |
| Pt 1000 | -199 | 860 | 150 | 4000 | 4100 |
| KTY 83 | -55 | 175 | 150 | 4000 | 4100 |
| KTY 84 | -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
weight: (with 2 extra bars)
app. 370 g

# Pt 100-Temperature-Relay TR 1200

## 12 Sensors, Interface RS 485



TR 1200

**12-channel Temperature-Relay for Sensors Pt 100 (RTD)**
Temperature-relays TR 1200 measure the temperature of up to 12 sensors within 199…+850 °C and provide the data at an interface RS 485 for external evaluation. With its universal power-supply AC/DC 24-240 V it can be connected to all common supply-voltages.
The TR 1200 provides the data as Modbus-RTU-protocol or according to the ZIEHL-standard. With protocol ZIEHL-standard it can replace two ZIEHL TR 600.

The TR 1200 is used where temperatures of many sensors Pt 100 shall be evaluated by a device with input RS 485.

Applications are e.g. monitoring of
- motors and generators (windings, bearings, coolant, ambient temperature)
- transformers (windings, core, ambient temperature)
- machines, plants and equipment

## Features

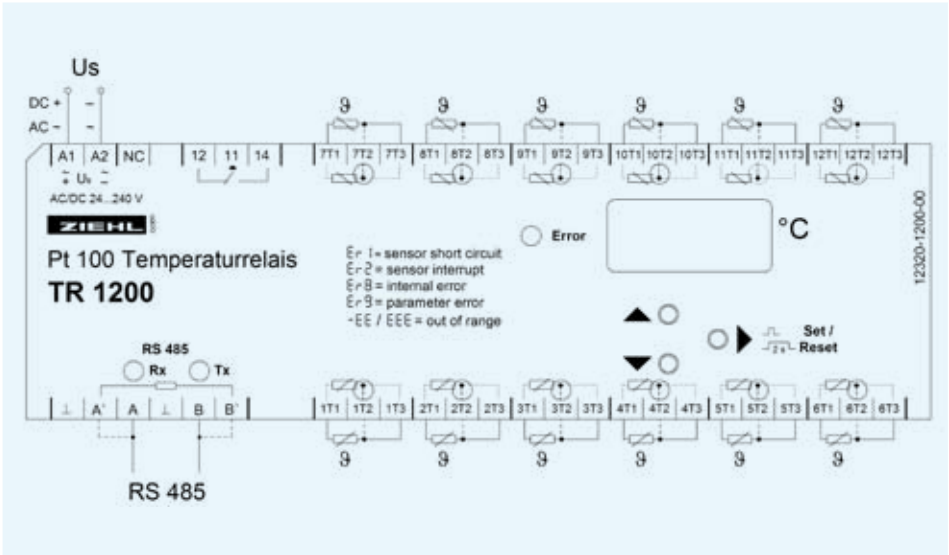
Sensors and Displays:
- 12 inputs for sensors Pt 100 (RTD)
- Connection 2- or 3-wire unneeded inputs can be switched off
- Monitoring of sensors for short-circuit and interrupt
- 3-digit-display for temperature
- LEDs for assigning the measured value, error, state of relay and interface

Interface and Relay:
- Interface RS 485 (protocols ZIEHL-standard and Modbus-RTU)
- Baud rate (4800/9600/19200) and Parity-Bit selectable
- fully compatible to TR 600
- Protocols see operating-manual on www.ziehl.de
- Relay for Error (1 co-contact) for sensor-error and operational failure

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

Software for operation (download from www.ziehl.de)
- Software (Modbus) for programming the inputs
- Logging-function (with connected PC only)

Bestell-Nummer **T 224095**



## Technical Data TR 1200

| | |
|---|---|
| Rated Supply Voltage Us | AC/DC 24-240 V, 0/45...65 Hz, < 5 VA<br>DC: 20,4...297 V, AC: 20,4...264 V |
| Relay output | 1 change-over contact (CO)<br>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 |
| RS 485 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 |

# Pt 100-Temperature-Relay TR 1200 IP

## 12 Sensors, Interface TCP/IP



### TR 1200 IP

**12-channel Temperature-Relay for Sensors Pt 100 (RTD)**
Temperature-relays TR 1200 IP measure the temperature of up to 12 sensors within 199…+850 °C and provide the data at an ethernet interface for external evaluation. With its universal power-supply AC/DC 24-240 V it can be connected to all common supply-voltages.
Actual measured values and stored min- and max-values can be displayed in a normal browser. At the Ethernet-interface the values are available in protocol Modbus TCP or in ZIEHL-Standard RTD.

The TR 1200 IP is used where temperatures of many sensors Pt 100 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

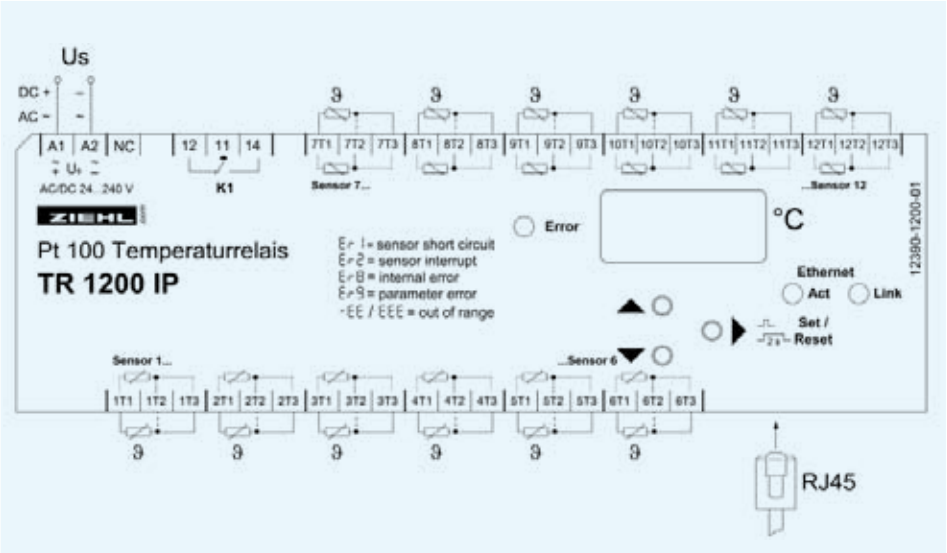
Sensors and Displays:
- 12 inputs for sensors Pt 100 (RTD)
- Connection 2- or 3-wire unneeded inputs can be switched off
- Monitoring of sensors for short-circuit and interrupt
- 3-digit-display for temperature
- LEDs for assigning the measured value, error, state of relay and interface

Interface and Relay:
- Interface TCP/IP
- 10 MBit/s Ethernet
- Protocol ZIEHL-Standard RTD or Modbus TCP (see www.ziehl.de)
- function like 2 x TR 600 Web
- Relay for Error (1 co-contact) for sensor-error and operational failure

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

Software
- The TR 1200 IP can be operated with a normal web-browser. There is no special software required.

Order-number **T 224081**



## Technical Data TR 1200 IP

| | |
|---|---|
| Rated Supply Voltage Us | AC/DC 24-240 V, 0/45...65 Hz, < 5 VA<br>DC: 20,4...297 V, AC: 20,4...264 V |
| Relay output | 1 change-over contact (CO)<br>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 WR 250

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



### WR 250

The Wireless-Relay WR 250 is a receiver for up to 6 Wireless Temperature-Sensors WS Pt 100. Up to 6 sensors transmit temperatures by radio. The WR 250 displays and evaluates the temperatures.

Application:

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

### Function

- Evaluation of 1-6 WS Pt 100-sensors
- Measuring- and monitoring-range 0…180 °C
- Limits and functions of relay pre-set for monitoring trans-formers (Fan, Alarm, Trip) Sensor-Simulation for tes-
- ting the settings Code-lock against manipula-tion of settings
- Universal power-supply AC/ DC 24-240 V Interface RS485 (Modbus)
- for reading temperature and states of alarms and
- programming Terminals pluggable

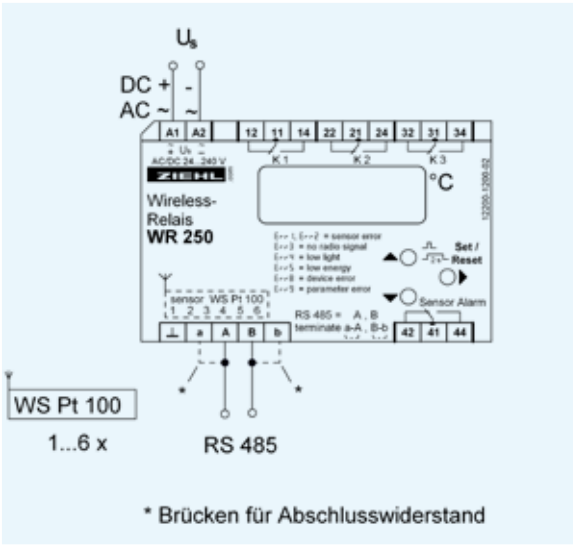
Displays

- 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: T 224350




### 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<br>Tolerance | 0...180 °C<br>± 4 K (Wirelesssensor Pt 100) |
| Relay-output | Typ 2 see "general technical informations"<br>4 x 1 changeover-contact (CO) |
| Test conditions<br>Rated ambient temperature range<br>Dimensions (h x w x d)<br>Protection housing / terminals<br>Weight<br>Attachment | see "general technical informations"<br>-20…+65°C<br><br>Design V4: 90x 70x 58 [mm], mounting height 55 mm<br>IP 30 / IP 20<br>approx. 190 g<br>DIN-rail 35 mm or screws M4 |

# Wireless-Temperature-Sensor WS Pt 100

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

### WS Pt 100

The Wireless Temperature-Sensor WS Pt 100 measures the temperature of a connected Pt 100 (RTD) sensor.
The measured values are transmitted by radio to a Wireless-Relay WR 250. The WR 250 displays and evaluates the temperatures.
The WS Pt 100 has a built-in battery or generates the required energy by means of an integrated photocell and stores it in a capacitor. Thus the WS Pt 100 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.

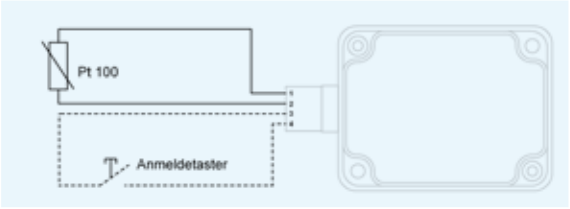
Application:
- Protection of high-voltage transformers (in primary windings also) from over-temperatures
- where temperatures are to be measured on high potential
- where wireless data-transfer via radio is preferred

### Description

- Input for temperature-sensor Pt 100 (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 Pt 100 (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 | **T 224351** |
| | with battery | **T 224352** |




### 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<br>+5°C … +65°C<br>5% … 85% relative humidity<br>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 |