Operating instructions

Temperature-Relay TR210

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1. Application and Short description

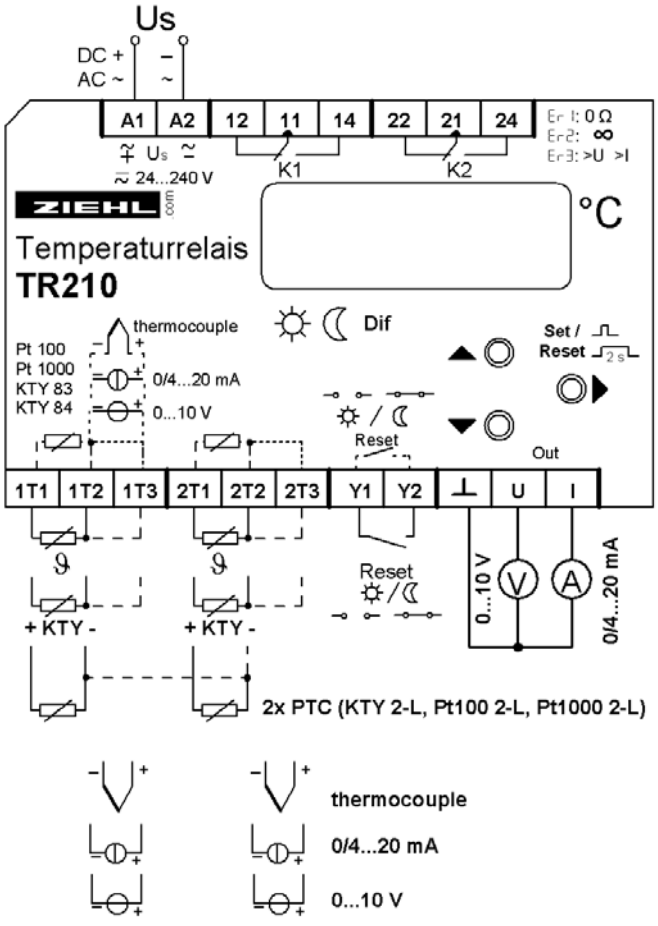
Control units type TR210 control up to 2 limit values.
The TR210 is used as:

- General temperature protection of machines and installations
- Temperature control unit, also for cooling applications
- Difference temperature controller unit for air-conditioning technology

2. Overview of functions

- 2 Sensor inputs:
  - Pt 100, Pt 1000, KTY 83 or KTY 84 in 2- or 3-wire configuration
  - Thermocouples Type B, E, J, K, L, N, R, S, T
  - Input signal DC 0-10 V; DC 0/4-20 mA
- 0.1 °C resolution between –199.9...999.9 °C
- 2 Relay outputs (each 1 change-over contact)
- 1 Analogue output DC 0-10 V or
  0/4-20 mA for parameterizing (not potentially separated from the inputs)
- Universal power supply AC/DC 24-240 V
- Several selectable programs
- Storage and indication of the measured MIN- und MAX-values
- pluggable terminals

3. Connection Plan



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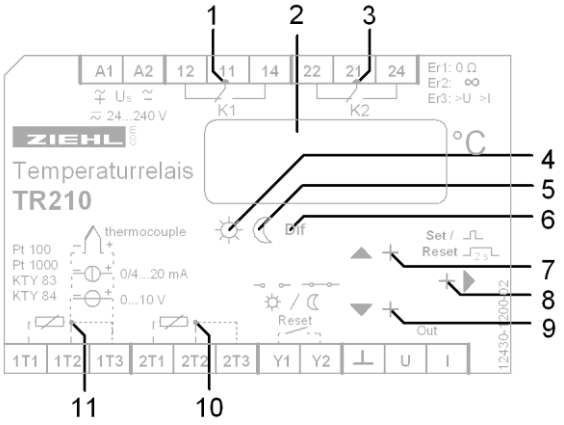
4. Display and operation parts

1, 3	LEDs state of relay
2	Digital display, 4 digits
4, 5	LEDs day/night switching
6	LED measuring of differences
7	Up pushbutton
8	Pushbutton set/reset
9	Down pushbutton
10, 11	LEDs sensor



5. Programs

9 programs (Pr) with factory default settings can be selected. Due to these programs, the device can be adapted very easily to the application.
Choose the program, which fits to your application and after that change the parameters! In case of changing the program, each parameter is being reset to "factory setting".
(see chart " factory setting")

Choosing the programs:
When applying the power supply hold the pushbutton “Set” for 10 s. Then the program (Pr 1 ... Pr 9) can be selected with the pushbuttons up/down and confirmed with Set.

Pr	Input	Limit value
1*	1 temperature sensor	2
2	2 temperature sensors	1 per sensor
3	1 temperature sensor	2 day and 2 night
4	2 temperature sensors	1 day and 1 night per sensor
5	2 temperature sensors	2 difference temperature
6	1x 0-10 V or 0/ 4-20 mA	2
7	2x 0-10 V or 0/ 4-20 mA	1 per input
8	2x 0-10 V or 0/4- 20 mA	2 difference
9	2 temperature sensors	2 MIN/MAX

* factory setting

Please note:
Pr 1, 2, 5-9: Y1 / Y2 = remote – reset (external)
Pr 3+4: Y1 / Y2 = switching day / night

6. Important Information

To use the equipment flawless and safe, transport and store properly, install and start professionally and operate as directed.
Only let persons work with the equipment who are familiar with installation, start and use and who have appropriate qualification corresponding to their function. They must observe the contents of the instructions manual, the information which are written on the equipment and the relevant security instructions for the setting up and the use of electrical units.
The equipment is built according to DIN / EN and checked and leave the plant according to

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security in perfect condition. To keep this condition, observe the security instructions with the headline „Attention" in the instructions manual. Ignoring of the security instructions may lead to death, physical injury or damage of the equipment itself and of other apparatus and equipment.
If, in any case the information in the instructions manual is not sufficient, please contact our company or the responsible representative.
Instead of the industrial norms and regulations written in this instructions manual valid for Europe, you must observe out of their geographical scope the valid and relevant regulations of the corresponding country.

DANGER!

Hazardous voltage!
Will cause death or serious injury. Turn off and lock out all power supplying this device before working on this device.

Observe the maximum temperature permissible when installing in switching cabinet. Make sure sufficient space to other equipment or heat sources. If the cooling becomes more difficult e.g. through close proximity of apparatus with elevated surface temperature or hindrance of the cooling air, the tolerable environmental temperature is diminishing.

Attention! Connecting the temperature sensors
The temperature sensors are connected to the clamps 1T1, 1T2 and 1T3 and so on. These pluggable terminals have a special contact material and may only be used for the connection of the sensors.
When connecting 2 thermocouples they must be isolated from each other.

Attention! Universal power supply
The unit is equipped with a universal power supply, that is suitable for DC- and AC-voltages. Before connecting the unit to the current, make sure that the allowed scope of voltage of the control voltage Us, written on the lateral type plate, corresponds to the supply voltage of the unit.

Attention! When all relays are programmed in operation current mode (=pick up at alarm), a loss of the supply voltage or an instrument failure can remain unidentified. When the relay is applied as control instrument, the operator must ensure, that this error is recognized by regular examinations. We recommend to program and accordingly evaluate at least one relay in the closed-circuit current mode.

7. Installation

The unit can be installed as follows:

- Installation in switchgear cabinet on 35 mm mounting rail according to EN 60715
- With screws M4 for installation on walls or panel. (additional latch included in delivery)

Connection according to connection plan or type plate.

A circuit-breaker or switch must be situated within easy reach of the unit and fused. Installation excess current protection should be ≤ 10 A.

8. Putting into operation

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

8.1 Display mode

Indication of the current sensor temperature. The temperature is shown in degrees centigrade. The indication for voltage (0-10 V) and current (0/4-20 mA) can be scaled.

LED relay (K1, K2)
- ON = relay picked up

LED sensor
- ON = appropriate value in the display
- flashes = sensor error

Function of buttons UP/DOWN

Push short	change into menu mode
Push for > 2 s	Display of the stored MIN- or MAX-values of the chosen sensor

Function button SET/RESET

Push short	
two sensors	Display sensor 1 / sensor 2 (/ difference)
one sensor	Display sensor / alarm limit 1 / alarm limit 2
Push for 2 s	Reset restart interlock
Push for 4 s	Display of chosen program
Push for 10 s	Display of software version

8.2 Menu mode (Decimal point behind the last digit ON)

Selection of the menu items for changing the parameters. In the menu items for sensor- and alarm parameterizing the LEDs indicate the special classification sensor-alarm-day/night - difference.

Function button UP/DOWN

Push short	Selection of menu item; Change into display mode

Function button SET/RESET

Push short	Change into parameter setting mode

8.3 Parameter setting mode (Decimal point behind the last digit FLASHES)

LEDs indicate sensors and relays concerned by the selected parameter setting point as well as day/night-switching and differentiation measurement.

Function button UP/DOWN

Press short/long	Adjustment of parameter value (slow/fast)

Function button SET/RESET

Press short	Storage of setting and choice of next parameter. Change into menu mode after the last parameter

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8.3.1 Parameterizing the sensors (S 1 / S 2):

Dependent on the chosen program: temperature (Pr 1-5, 9) or current/voltage (Pr 6-8)
Choose menu item with up/down until in indication S 1 and type of sensor alternate.
Here it can be read clearly, which type of sensor is selected and on which alarm the sensor works (corresponding LEDs alarm on).
Enter with Set in parameterizing sensor e.g. S 1 / 100 for Pt 100.
Choose sensor type with up/down
Set cable resistance or 3-wire configuration (3- L).
2-wire configuration, cable resistance compensation:

Short-circuit the wires nearby the sensor and measure the cable resistance. Set parameter „LA“ on this value.

With 2-wire connection and a common wire for all sensors, all sensor measuring currents will be added on the common wire. The compensation value LA to be set is calculated as follows:

LA = 3 x RL/2 (RL = resistance of two wires)

We recommend 3-wire connection for each sensor.

8.3.2 Parameterizing of the alarms (AL 1 / AL 2):

Choose menu item with up/down until AL 1 and limit (limit value) alternate in display, e.g. AL 1 und 130 for 130 °C.
Here it can be read clearly, which limit value is parameterized and to which sensor works on the alarm (yellow LEDs sensor on).
Begin to parameterize with Set.
Adjust limit with up/down. Adjust hysteresis. Negative hysteresis = MAX-switching point, the relay switches when the adjusted limit is reached and switches back when the signal is fallen by the hysteresis. E.g. limit 130 °C and hysteresis -5 °C: Relay switches at 130 °C and switches back at 125 °C. Positive hysteresis vice versa = MIN-switching point.
Alarm delay time dAL: An alarm is suppressed for the adjusted time, short-timed exceeding of the limit does not cause an alarm.
Switch-back delay doF: An alarm is only switched off after the signal is below the limit and after delay of this time, e.g. a cooling ventilator can cool further on for this time to avoid, that it has to switch be switched on again after a short time.
Function of relay:

- r - Closed-current circuit mode, relay is picked up in GOOD-state (=limit not reached) and releases when the limit is exceeded. Advantage: errors and faults normally cause an alarm. Disadvantage: alarm also when supply-voltage is switched off and after switching on until the relay has picked up. Unfavorable e.g. with transformers, particularly, when the supply-voltage of the TR210 comes from the monitored transformer.
- A - Operating-current mode: relay is released in GOOD state and picks up when the limit is exceeded. No alarm at errors and when supply-voltage switched off. Used normally switch ventilators or heatings or for tripping of transformers.
- r - L / A - L: alarm switches locked. Set back with reset only after fall short of the limit (with hysteresis) and end of the switch-back delay. Ready for Reset is indicated with „A12L“ in the display mode.

Error report: With Err it can be selected, if the relay switches in the alarm state in case of sensor-error Er 1- 9 (short circuit or break). (on / oFF)

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8.3.3 Test relay (t St):

Here it can be programmed, that a relay switches into the alarm state after a certain time don, e.g. 1 weeks (= 168 hours) for the time doF, e.g. 10 s, to make a ventilator or a pump run for a short time, to make them move and protect the bearings from damage through long standstill.
Choice of the alarm with up/down. Set switches to don and doF.
don = oFF = test not active.

8.3.4 Sensor simulation (Si):

A sensor can be selected, and a measured temperature can be simulated with the buttons up/down. All functions of the unit work as if this temperature was really measured. If there is no button pushed for 15 minutes, the device automatically switches back into the display mode.

8.3.5 Sensor (CodE):

After setting all parameters they can be protected by activating the code lock. After pushing Set, the display indicates Pi n. Adjust with buttons up/down Pi n 504 (factory setting). After pushing Set, code lock can be activated or switched off. After pushing Set again, an individual Pi n can be selected (write down).
When code lock is activated all parameters can be seen but not be changed anymore.
In case of problems with the code lock (forgotten Pi n) the lock can be switched off and the Pi n can be set back to 504, by pushing button set while connecting the device to supply-voltage until Code / of F is indicated in the display.

8.3.6 Tips:

- With the pre-set programs Pr 1 to Pr 9 the most important parameters can be set in advance, so that only little modifications are necessary, e.g. setting of the limits (limit values) for each alarm.
- After finishing one menu item it is switched automatically on the next one. E.g. after programming the line resistance of sensor 1 and pushing Set, the devices switches on to sensor 2.
- When the right decimal point in the 7 segment display is on, the display mode has been left, and the menu items can be chosen with up/down (menu mode).
- When the right decimal point blinks, you are in the parameter setting mode and can change the setting with up/down.
- Long pushing on up/down speeds up the changes in the display.
- Pushing button up and down at the same time sets values to zero.
- With reset (press set/reset for 2s) the display mode can be reached from every position (exception: simulation) of the parameter setting mode (the last selected value in is being stored).

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8.3.7 Indication of the digital display:

Pr 1 ... Pr 9 = program number
A1, A2 = alarm 1 or alarm 2 active
A12 = alarm 1 and alarm 2 active
additional L = alarm locked, for setting back „reset“ is necessary.

S = sensor
100, 1000 = Pt 100, Pt 1000
83, 84 = KTY-sensor 83, 84
LA = 2-wire cable resistance
3-L = 3-wire configuration
Thermocouples (th..)

Display	thb	thE	thJ	thk	thL	thn	thr	thS	tht
Type	B	E	J	K	L	N	R	S	T

CoMP = compensation of the reference temperature of thermocouples
int = internal reference temperature or fix reference temperature
0-10 = 0-10 V voltage input
0/4-20 = 0/4-20 mA current input
SCAL = scaling of display for voltage- and current input
Auto = to adopt zero point, full scale and decimal point from the chosen type
USEr = free scaling of zero point, full scale and decimal point
____ = zero point value for 0 V, 0/4 mA
,,,, = full scale value for 10 V, 20 mA
dP = decimal point
AL 1, AL 2 = alarm limit
ALd = alarm limit day
Aln = alarm night
H = hysteresis
dAL = alarm delay (time delay until alarm)
doF = switch back delay (time delay until alarm switches back to good)
rEL = function of relay
r, A = closed-circuit current mode, operating current mode
r-L, A-L = closed-circuit- / operating current with interlocked switching (Locked)
tst = relay test periodically in hours after the time *don* for the duration *doF*
don = periodical time in hours for testing alarm/relay (oFF = no test)
doF = duration of test
E = exit (leave loop)
out = analogue output: oFF, 0-10 V, 0-20 mA, 4-20mA
SEn = sensor select for analogue output
S12, = maximum value of sensor 1 or sensor 2 is put out
S12_ = minimum value of sensor 1 or sensor 2 is put out
____ = value, at which 0 V, 0/4 mA is put out
,,,, = value, at which 10 V, 20 mA is put out
diF = difference sensor 2 minus sensor 1
on, oFF = on/off
Si = simulation
CodE = code (pin)
Pin = factory setting of Pin: 504

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