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Operating manual TR 200

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1. Function

1.1 General

ZIEHL thermostats of the TR 200 series are electronic two-setpoint controllers for monitoring temperatures. The standard design of the temperature controllers model TR 200 is based on the closed-circuit current principle. With connected sensors and sensor-temperature within the set limits the built-in relay switches on.
The thermostat signals and switches when the set limit is exceeded. It will also signal and switch at sensor breakdown or sensor short circuit as well as at interruption of the sensor line. The relays will also release at breakdown of supply voltage.
Modern circuitry, reliable components such as function and routine test ensure high repeat accuracy and long service life.

TR 200 thermostats are built into a 24 plug-in housings:
. easy to operate and to install as directly wired to the plug base and the upper electronic part can easily be changed
. housing snapable on DIN-rail according to DIN EN 50 022 or mountable with M4 screws
. gold-coated contact springs and plugs ensure a perfect contact and a long service life.

1.2 Special Features of TR 200

Temperature controller for Pt 100 sensor DIN 43 760 / IEC 751
The TR 200 temperature controller monitors 2 Pt 100 sensors simultaneously. Each temperature sensor has two adjustable limits. Each limit operates on one relay. The TR 200 temperature controller has thus altogether 4 switching points, making it possible to represent virtually any combination of switching action.
In addition, the TR 200 provides a current output of 0 - 20 mA or 4 - 20 mA for transmission of measuring data or display via digital panel instrument model Minipan or SE (see "MINIPAN" catalogue).

. 2 sensors, 4 adjustable limits, 4 relays
. LED display for operation ON, interference in measuring circuit and switching state of the relays
. Three-conductor connection. Line resistance up to 3 x 20 Ω is compensated internally.
. At sensor break or sensor short-circuit as well as at disconnection of sensor line the relays switch off. Signalling by LED display "trouble".
. 2 current outputs 0-20 mA / 4-20 mA (1 per sensor)

1.3 Application

TR 200 thermostats and Pt 100 sensors are a reliable monitoring system for electromotors and generators. Possible damages by excessive temperature at machinery and equipment are effectively avoided:
. Exact temperature registration and exact switching with high repeatability
. on measuring line largely insensitive to interferences

2. Electrical Data

Rated operational voltage	see lateral type plate
Tolerance	+ 10 … - 15 %
Power consumption	< 8 VA
Frequency	40 - 60 Hz
ON period	100 %
Sensor connection	
Sensor	2 x Pt 100 according to DIN 43 760
Sensor current	≤ 2 mA
Connection type	3 connections = standard line resistance max. 3 x 22 Ohms
Monitoring	Sensor short - circuit (< 80 Ohms) Line short - circuit (< 80 Ohms) Sensor break (> 430 Ohms) Cable break (> 430 Ohms)
Switching points	4
Adjustment accuracy	approx. 3 degrees
Repetitive error	< 0,2 degrees
Switching state	standard: closed-circuit current principle option: operating current
Relay standard	true > set value = relay released
LED Display standard	true > set value = LED off
Hysteresis	≤ 2 % of span
Current output	standard 0 - 20 mA or 4 - 20 mA apparent ohmic resistance: max. 200 Ohms
Relay output	4 relays
Switching voltage	max. AC 415 V
Switching current	max. 6 A
Switching power consumption	max. 1100 VA
Rated operational current Ic	2,5 A 400 V AC 15 4 A 250 V AC 15 3 A 24 V DC 13
Test conditions	VDE 0660 / VDE 0160
Insulation	VDE 0110 / AC 380 V / I Group C
Transformer	VDE 0550
Permissible ambient temp.	-20 … + 55 °C
Housing	design S - 24
Line connection	24 pole, 2 x 0,75 mm^2 ... 1,5 mm^2 per terminal
Housing protective system	IP 30
Terminal protective system	IP 20
Panel inclination	any
Mounting	snapable mounting onto DIN-rail 35 mm according to DIN 50022 or screwable assembly M4

3. Installation - Putting into operation

3.1 The plug base can be mounted either with
- 35 mm mounting rail according to DIN 50 002 or
- M4 screws

3.2 Wiring directly to plug base
- Connect wires as per wiring scheme
- Plug in electronics and fix with knurled screw

ATTENTION

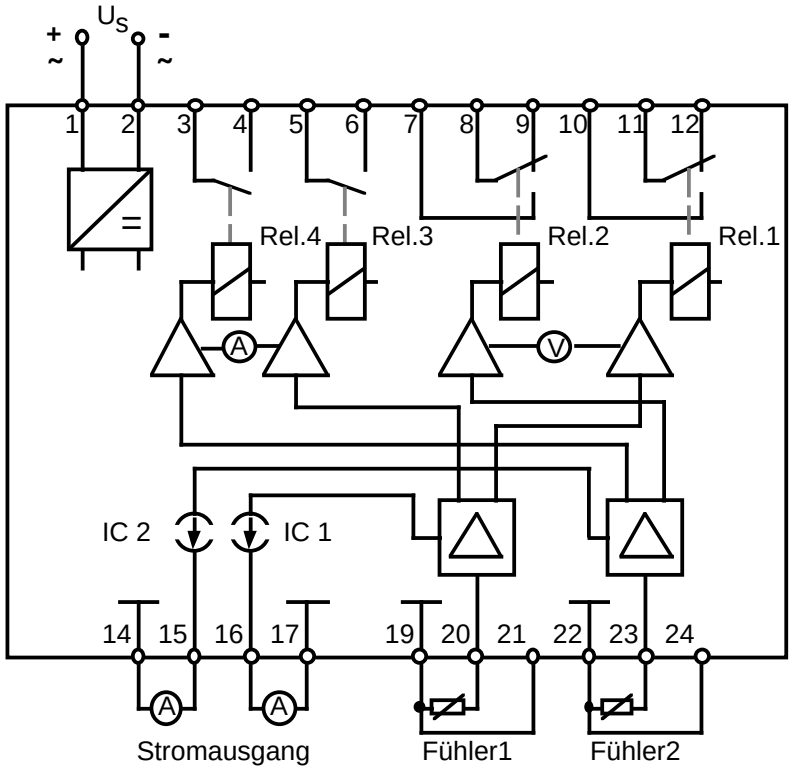
Before switching on thermostat make sure that the operational voltage Us of the lateral type plate and the mains voltage connected to the thermostat are the same.

3.3 Put into operation the thermostat as follows
- Connect Pt 100 sensors (3 conductors). Switch on mains voltage
- At correct state, green LED light up .All red LED´s out, contacts 3 - 4 , 5 - 6 , 7 - 8 and 10 - 11 closed. (Relays picked up).
- Set limits with screwdriver to desired value, e.g. limit 1 for warning, limit 2 for switching off.
- Relay releases when set temperature is exceeded, the relevant LED light´s up.

If the thermostat does not switch check wether

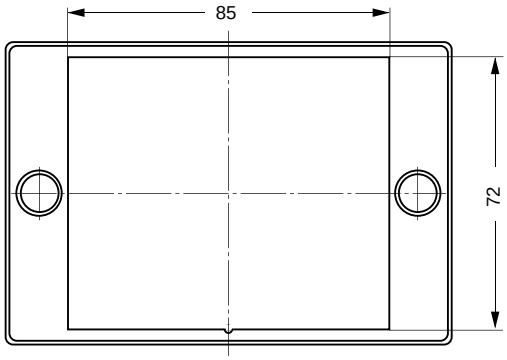
- sensor is correctly connected
- sensor temperature is higher than limit value
- sensor temperature is higher than measuring range (see resistance table Pt 100)

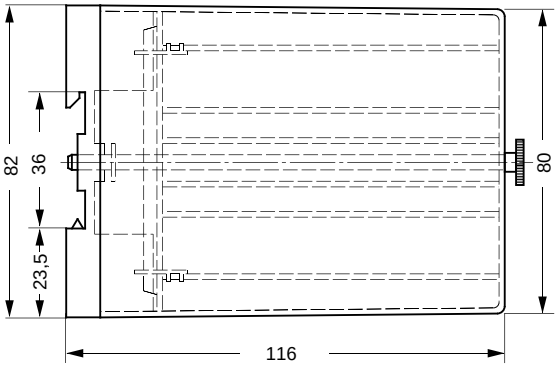
Wiring scheme :

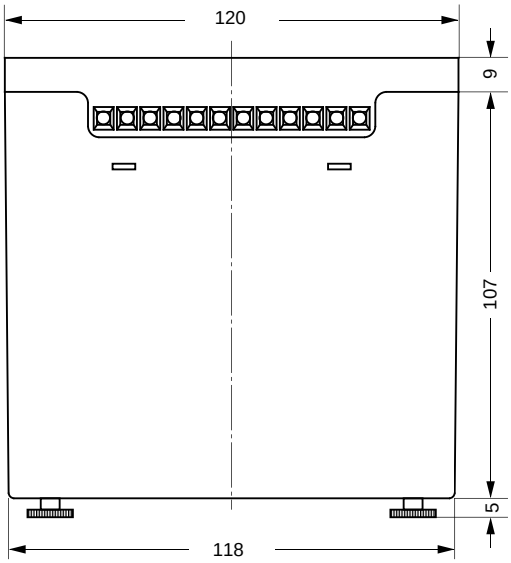


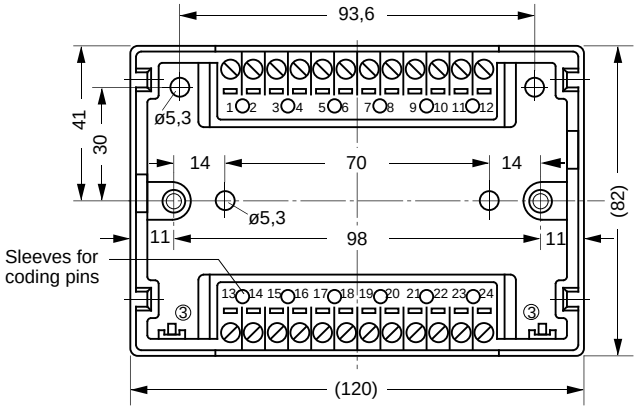
Subject to technical modifications.

Design S24 :



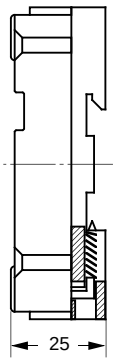






③ Unlatching
(only with DIN-rail mounting)

Base



Subject to technical modifications.

Z. Nr.: 569 0730.1
Type: TR 200
EA - Nr.: 128.2

Subject to technical modifications.

Characteristic Temperature - Resistance Diagram for measurement resistors with platinum coiling

°C	0	10	20	30	40	50	60	70	80	90	Ω / °C
0	100,00	103,90	107,79	111,67	115,54	119,40	123,24	127,07	130,89	134,70	0,385
100	138,50	142,29	146,06	149,82	153,58	157,31	161,04	164,76	168,64	172,16	0,373
200	175,84	179,51	183,17	186,82	190,45	194,07	197,69	201,29	204,88	208,45	0,362
300	212,02	215,57	219,12	222,65	226,17	229,67	233,17	236,65	240,13	243,59	0,35
400	247,04	250,48	253,90	257,32	260,72	264,11	267,49	270,86	274,22	277,56	0,339
500	280,90	284,22	287,53	290,83	294,11	297,39	300,65	303,91	307,15	210,38	0,327
600	313,59	316,80	319,99	323,18	326,35	329,51	332,66	335,79	338,92	342,03	0,315
700	345,13	348,22	351,30	354,37	357,42	360,47	363,50	366,52	369,53	372,52	0,304
800	375,51	378,48	381,45	384,40	387,34	390,26					0,295

By a number of fixed point measurements the following interpolation function could be determined for the basic value series of measurement resistors with Pt coiling (DIN 43 760)

$R_t = R_0 (1 + At + Bt^2)$

R_0= resistance at temperature 0 °C
R_t= resistance at temperature t (°C)
$A = 0{,}390802 * 10^{-2} (Grd)^{-1}$
$B = 0{,}580195 * 10^{-6} (Grd)^{-2}$

Thus any intermediate value can mathematically exactly be terminated, e.g.

t = 761,24 °C
$R = 100 (1 + 761{,}24 * A + 5{,}794863 * 10^{5} * B)$
$= 100 (1 + 2{,}974941 - 0{,}336215)$ $= 363{,}87\ \Omega$