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Operating manual TR 300 - Archive document -

1. Function

1.1 General

ZIEHL thermostats of the TR 300 series are electronic two-setpoint controllers for monitoring temperatures. The standard design of the temperature controllers model TR 310 is based on the closed-circuit current principle. The installed relays pick up with connected sensors and temperature within limits. The thermostat signals and switches when the set limit is exceeded.
Modern circuitry, reliable components such as function and routine test ensure high repeat accuracy and long service life.

TR 300 thermostats are built into a 24-pole plug-in housing:
- easy to operate and to install as directly wired to the plug base. 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 300

Temperature controller for Pt 100 sensors according to DIN 43 760 / IEC 751
The TR 300 temperature controller monitors 3 Pt 100 sensors simultaneously.
When the limit of early warning or switching off is exceeded in one of the sensors the appropriate relay releases.

- 3 sensors, 2 adjustable limits, 2 relays
- LED display for operation ON, trouble in measuring circuit and switching state of the relays
- Two-lines connection. Line resistance up to 20 Ω can be compensated.
- At sensor break or sensor short-circuit as well as at disconnection of sensor line the relays switch off. Signalled by an LED.

1.3 Application

TR 300 thermostats and Pt 100 sensors are a reliable monitoring system. For verifications at electromotors and generators the temperature characteristics and the temperature limits are an important measurable value. Possible damages by excessive temperature at machinery and equipment are effectively avoided:
- Exact switching-points with high repeatability
- largely insensitive to interference on measuring line

1.4 Compensation of line resistance

- connect pins 16-21 and 14-20
- connect sensor 1 to pins 18 an 22, short-circuit sensor line at sensor side (close to the sensor)
- set limit 1 to 85 °C
- turn trimmer for compensating line 1 until relay 1 switches, sensor line 1 is compensated
- make the same procedure for sensors 2 and 3
- disconnect short-circuits at sensor side
- connect sensors properly

2. Electrical Data

Rated operational voltage	see lateral type plate
Tolerance	- 15 … + 10 %
Power consumption	< 8 VA
Frequency	50 - 60 Hz
ON period	100 %
Relay output	2 relays, co- contacts
Switching voltage	max. AC 400 V
Switching current	max. 6 A
Switching power	max. 1100 VA
Rated operational current	Ie = 2,5 A, 380 V , AC11
Test conditions	VDE 0660 / VDE 0160
Isolation	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 protection class	IP 31
Terminal protection class	IP 20
Panel inclination	any
Mounting	snapable mounting onto DIN-rail 35 mm according to DIN 50022 or screwable assembly M4
Sensor connection	
Sensor	3 x Pt 100 according to DIN 43 760 / IEC 751
Sensor current	≤ 1 mA
Connection type	standard = 2 lines line resistance max. Ohms (adjustable)
Monitoring	line/sensor short - circuit line/sensor break
Switching points	2
Adjustment accuracy	approx. 3 °C
Repetitive error	< 0,2 K
Switching state	standard: closed-circuit current principle true < set limit = relay on option: operating current true < set limit = relay off
Hysteresis	≤ 2 % of span
Weight	approx. 750 gr

3. Installation - Commissioning

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

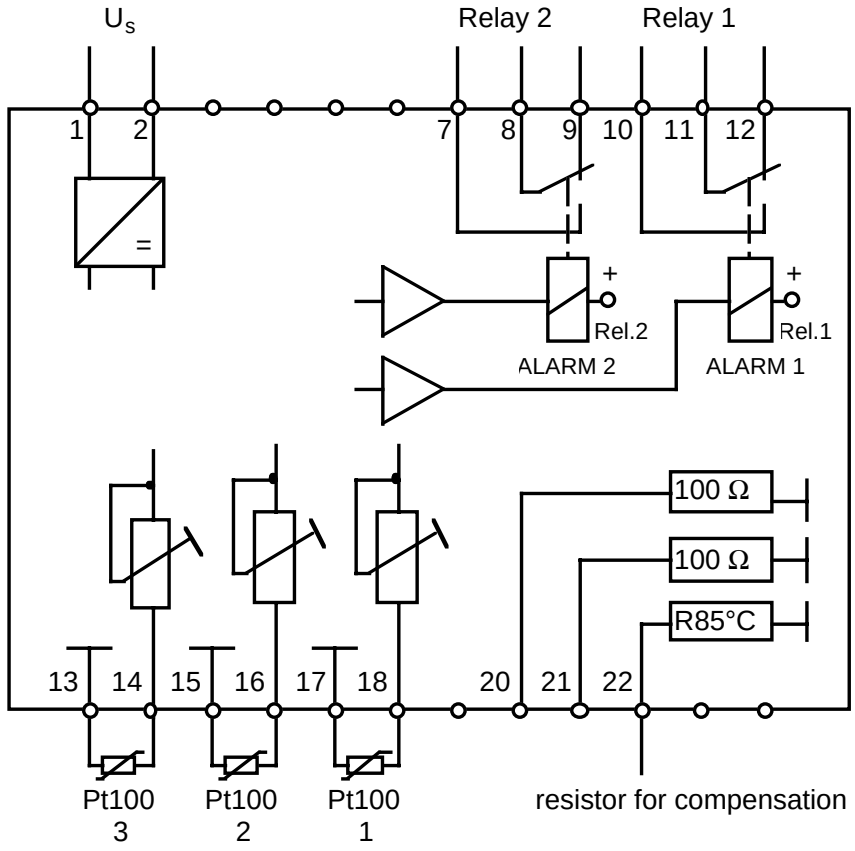
ATTENTION
Before switching on thermostat make sure that the operational voltage Uc of the lateral type plate and the mains voltage connected to the thermostat are the same.

3.3 Commission the thermostat as follows
- Connect Pt 100 sensors . Switch on mains voltage
- At correct state contacts 7 - 8 and 10 - 11 closed. (Relays picked up).
- Set limits with screwdriver to desired values, e.g. limit 1 for warning, limit 2 for switching off.
- Relays release when set temperature is exceeded, the relevant LED light´s up.

If the thermostat does not switch check whether

- sensors are connected correctly
- sensor temperature is higher than limit

Connection plan



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)

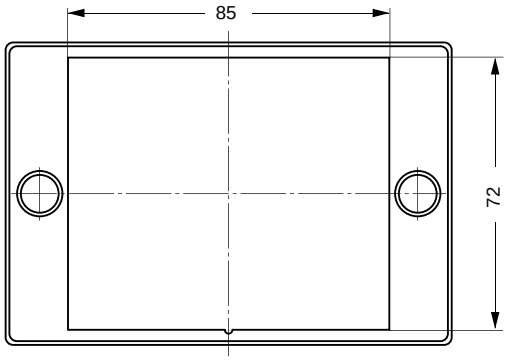
$R_t = R_0 (1 + At + Bt^2)$

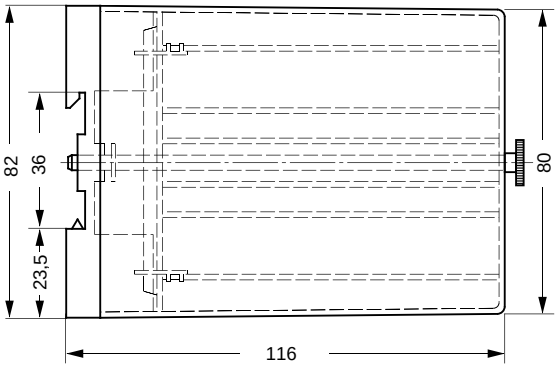
R_0= resistance at temperature 0 °C
R_t= resistance at temperature t (°C)
$A = 0{,}390802 * 10^{-2} (Grd)^{-1}$
$B = 0{,}580195 * 10^{-6} (Grd)^{-2}$

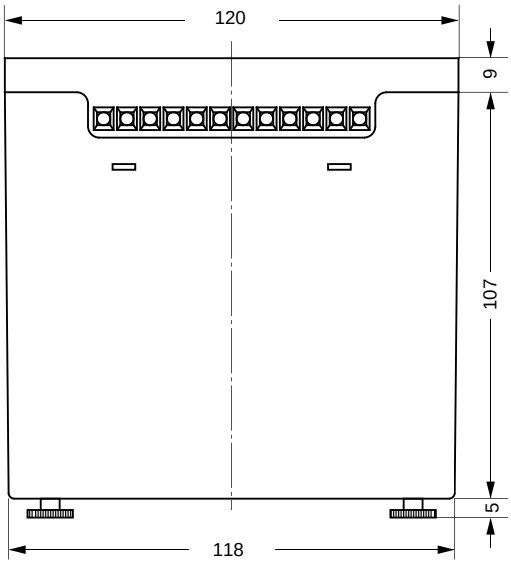
Thus any intermediate value can mathematically exactly be terminated, e.g.

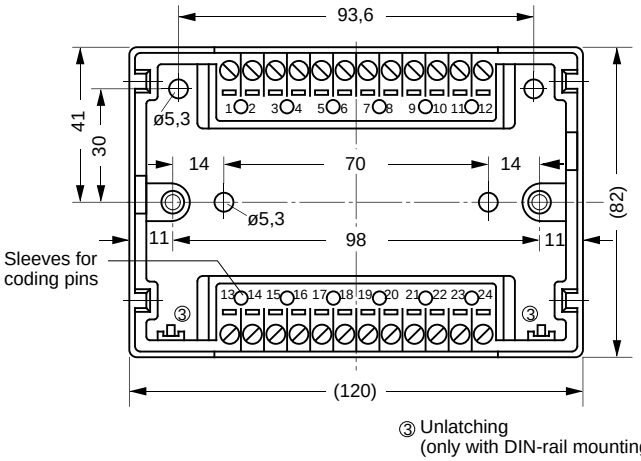
t = 761,24 °C
$R = 100 (1 + 761{,}24 * A + 5{,}794863 * 10^{5} * B)$
$= 100 (1 + 2{,}974941 - 0{,}336215)$ = 363,87 Ω

Design S24









③ Unlatching
(only with DIN-rail mounting)

Base