Digital panel meters, temperatur- and mains controllingspecial purpose instruments for customer requirements

ZIEHL

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Operating   manual   TR   361 - Archive document -

1. Function

1.1 General

ZIEHL thermostats of the TR 361 series are electronic two-setpoint controllers for monitoring temperatures. The standard design of the temperature controllers model TR 361 is based on the closed-circuit current principle. The installed relays release with connected sensors.
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 361 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 361

Temperature controller for Pt 100 sensor DIN 43 760 / IEC 751
The TR 361 temperature controller monitors 3 Pt 100 sensors simultaneously. Each sensor has two adjustable limit values. When the limit value of early warning or switching off is exceeded in one of the sensors the corresponding relay switches off. The TR 361 temperature controller has thus altogether 6 switching points, making it possible to represent many combinations of switch actions.

* 3 sensors, 6 adjustable limits, 2 relays
* LED display for operation ON, trouble in measuring circuit and switching state of the relays
* LED display for switching state of the relays " Alarm 1 " and " Alarm 2 "
* At sensor break or sensor short-circuit as well as at disconnection of sensor line the relays switch off. Signalling by LED display " Sensor ".
* Three-conductor connection. Line resistance up to 3x20 Ω is compensated internally.

1.3 Application

TR 361 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 temperature registration and exact switching with high repeatability
* on measuring line largely insensitive to interference

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Type: TR 361
EA - Nr.: 9916

2. Electrical Data

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Type	
Ordering Number	
Rated operational voltage / Frequency	
Power consumtion	see type plate
Other	
	on the device

....

Tolerance of operational voltage	- 15 ... + 10 %
Tolerance of frequency	48 ... 62 Hz
On period	100 %

Relay output
	2 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 , AC15

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 31
Terminal protective system	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 = 3 conductors
	line resistance max. 3 x 20 Ohms
Monitoring	Sensor short - circuit (< 70 Ohms)
	Line short - circuit (< 70 Ohms)
	Sensor break (> 430 Ohms)
	Cable break (> 430 Ohms)

Switching points
	6
Adjustment accuracy	approx. 3 degrees
Repetitive error	< 0,2 K
Switching state	standard: closed-circuit current principle
	true > set value = relay on
	option: operating current
	true > set value = relay off
LED Display	standard : true > set value = LED off
	option : true > set value = LED on
Hysteresis	≤ 2 % of span
Weight	approx. 830 gr

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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 Us of the lateral type plate and the mains voltage connected to the thermostat are the same.
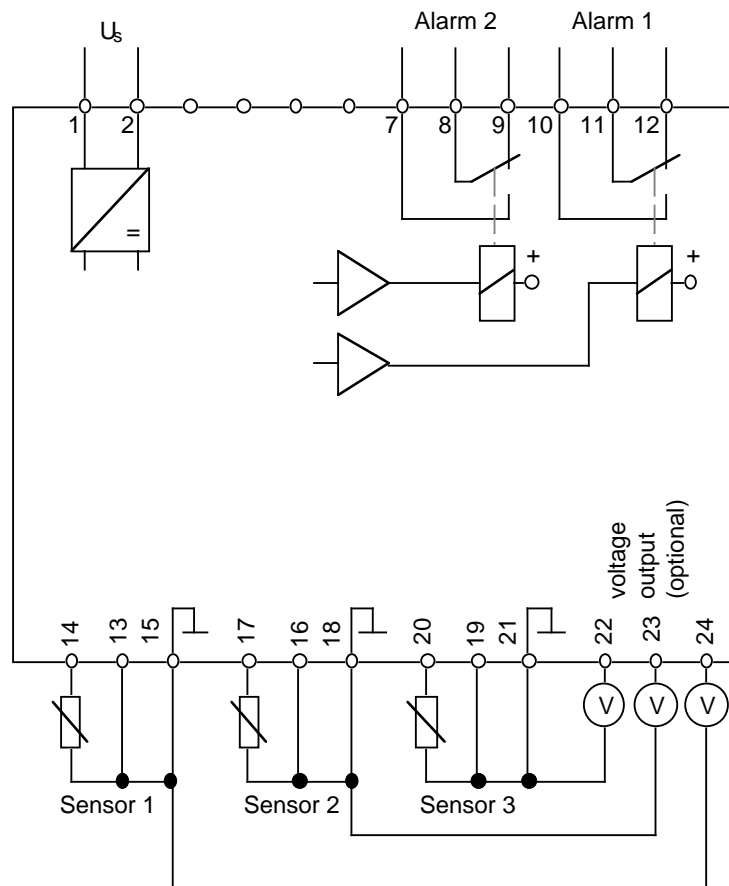

3.3   Commission the thermostat as follows
- Connect Pt 100 sensors . Switch on mains voltage
- At correct state, green LED " ON " light up . All red LED´s out, contacts 7 - 8 and 10 - 11 closed. (Relays picked up).
- Set limits with screwdriver to desired value, e.g. alarm 1 for warning, alarm 2 for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

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Design S24 :

85

72

120

9

107

5

118

82

36

23,5

80

116

93,6

41

30

ø5,3

14   70   14

(82)

ø5,3

11   98   11

Sleeves for
coding pins

1 2 3 4 5 6 7 8 9 10 11 12

13 14 15 16 17 18 19 20 21 22 23 24

③   ③

(120)

③ Unlatching
(only with DIN-rail mounting)

Base

25

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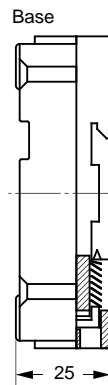
Characteristic Temperature - Resistance Diagram for measurement resistors with platinum coiling

°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

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