

## Multifunction differential thermostat

### 1. Device description

TR121 is multifunction differential thermostat with 6 operation functions and 4 service functions. Relay has two output contacts 16 A.

Terminal description:	Terminal placement:	Connection diagram:
<ol style="list-style-type: none"> <li>Supply voltage</li> <li>Terminals for sensor connection</li> <li>2<sup>nd</sup> channel output indication</li> <li>1<sup>st</sup> channel output indication</li> <li>Function selection</li> <li>Temperature adjustment</li> <li>Fine temperature adjustment</li> <li>Difference setting</li> <li>2<sup>nd</sup> channel output R2</li> <li>1<sup>st</sup> channel output R1</li> </ol>		

### 2. Function

#### F1 – differential thermostat

If T is set on - 40°C, it is compared only set difference between measured temperatures t1, t2:

$t1 - t2 > D + 1^{\circ}\text{C}$       R1 closed  
 $t1 - t2 < D$                       R1 opened

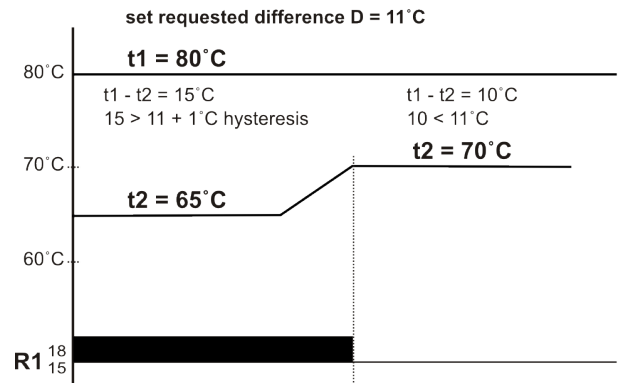
$t2 - t1 > D + 1^{\circ}\text{C}$       R2 closed  
 $t2 - t1 < D$                       R2 opened

Note: hysteresis is fix 1°C

If T is set on different temperature than - 40°C, it is compared measured t2 with temperature T:

$t2 > T + 1^{\circ}\text{C}$                   R1 closed  
 $t2 < T$                               R1 opened

Note: hysteresis is fix 1°C

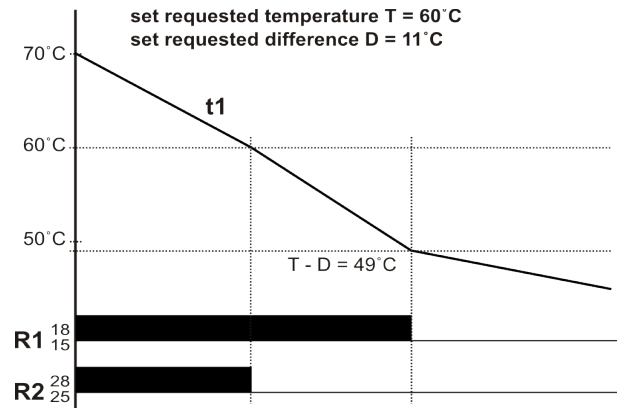


**F2 – double stage thermostat, mode 1**

It is compared only measured temperature  $t_1$  with set reference temperature  $T$ :

- $t_1 > T$  R1 and R2 closed
- $T - D < t_1 < T$  R1 closed, R2 opened
- $t_1 < T - D$  R1 and R2 opened

Note: sensor 2 is not connected

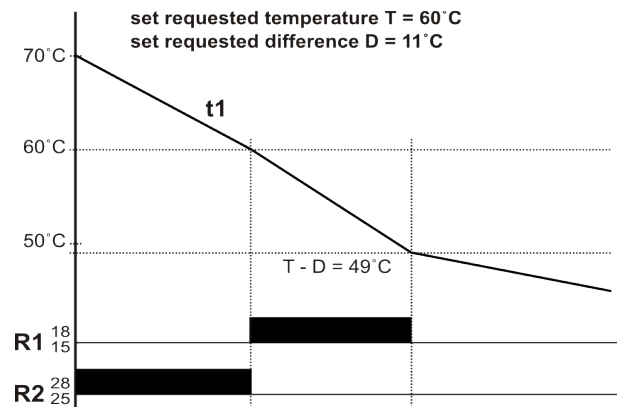


**F3 – double stage thermostat, mode 2**

It is compared only measured temperature  $t_1$  with set reference temperature  $T$ :

- $t_1 > T$  R2 closed
- $T - D < t_1 < T$  R1 closed
- $t_1 < T - D$  R1 and R2 opened

Note: sensor 2 is not connected

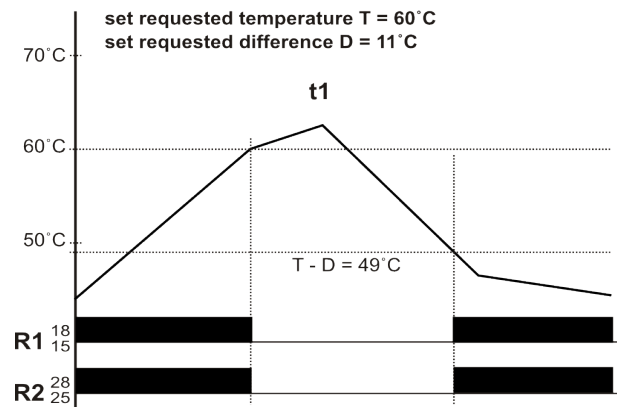


**F4 – single channel zone thermostat**

It is compared only measured temperature  $t_1$  with set reference temperature  $T$  and difference  $D$ :

- $t_1 < T - D$  R1 closed
- $t_1 > T$  R1 opened

Note: sensor 2 is not connected. If there is instead of sensor 2 terminal link, both relays R1 and R2 are operating.



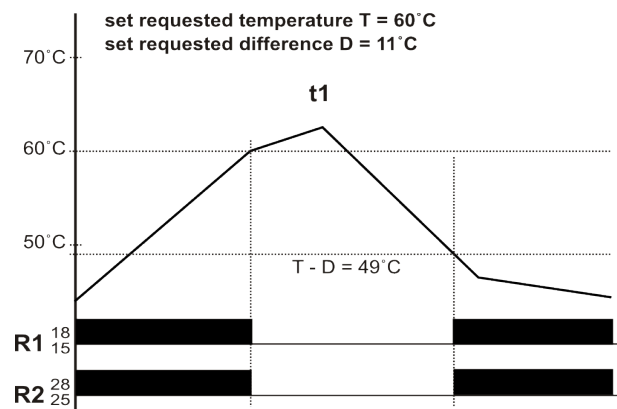
**F5 – double channel zone thermostat**

It is compared measured temperature  $t_1$  and  $t_2$  with set reference temperature  $T$  and difference  $D$ .

sensor 1 controls relay R1. Sensor 2 controls relay R2. Function is the same as for function F4:

- $t_1 < T - D$  R1 closed
- $t_1 > T$  R1 opened

- $t_2 < T - D$  R2 closed
- $t_2 > T$  R2 opened



**F6 – thermostat heating / cooling**

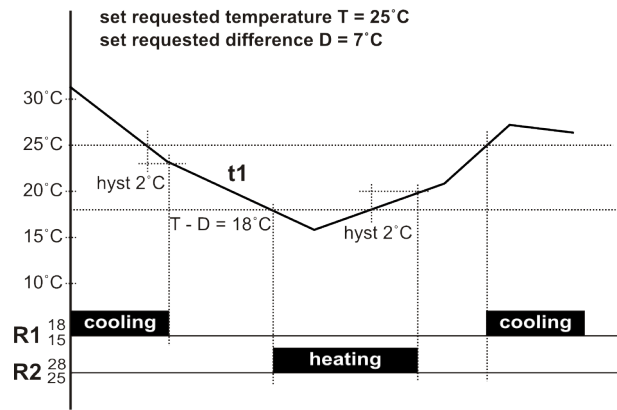
It is compared only measured temperature  $t_1$  with set reference temperature  $T$  and difference  $D$ :

$t_1 > T$  R1 closed (for example cooling)  
 $t_1 < T - 2^\circ\text{C}$  R1 opened

$t_1 < T - D$  R2 closed (for example heating)  
 $t_1 > T - D + 2^\circ\text{C}$  R2 opened

$T - D < t_1 < T$  R1 and R2 opened

Note: Sensor 2 is not connected



**3. Service functions**

**F7 – service R1**

Relay R1 closed

**F8 – service R2**

Relay R2 closed

**F9 – sensor 1 service**

Relay R1 closed

Yellow LED: Off – sensor 1 is OK  
 Blinking – sensor 1 disabled  
 On – short circuit on sensor 1

**F10 – sensor 2 service**

Relay R2 closed

Yellow LED: Off – sensor 2 is OK  
 Blinking – sensor 2 disabled  
 On – short circuit on sensor 2

#### 4. Technical features

Parameter	Value
Supply voltage:	230 VAC, 50 Hz
Supply terminals:	L, N
Power consumption:	max. 1,5 VA
Number of functions:	10
Measuring terminals:	T1 – C, T2 – C
Sensor type:	BMR RT_P, NTC 3k3
Supply voltage indication:	green LED blinking
1 <sup>st</sup> channel output relay R1 indication	yellow LED
2 <sup>nd</sup> channel output relay R2 indication	green LED
Measuring temperature range:	-40°C .. +109°C
Temperature difference range:	7°C .. +25°C
<b>Output parameters:</b>	
Number and type of contacts:	2 x switching contact (one per channel)
Nominal current:	16 A
Switching power:	max. AC 4000 VA
Trigger current:	30 A
Nominal voltage / max. switching voltage:	250 VAC / 440 VAC
Mechanical lifetime:	3 x 10 <sup>7</sup>
Electrical lifetime:	1 x 10 <sup>5</sup> 250 VAC, 8 A
<b>Others:</b>	
Working temperature:	-20 .. +55 °C
Storage temperature:	-40 .. +70 °C
Working position:	any
Mounting:	IEC 60715 (DIN 35)
Protection degree:	IP 40 on panel / IP 20 terminals
Electrical strength:	4 kV
Input wire diameter with/without cavern:	max. 2x1,5mm <sup>2</sup> ; 1x2,5mm <sup>2</sup> / max. 2x1,5mm <sup>2</sup> ; 1x2,5mm <sup>2</sup>
Weight:	75 g
Dimensions:	90 x 18 x 65 mm
Standards:	IEC 60255-6, IEC 61010

#### Note

*When the time interval is being adjusted, it is not necessary to disconnect supply voltage.*