Description TR – D

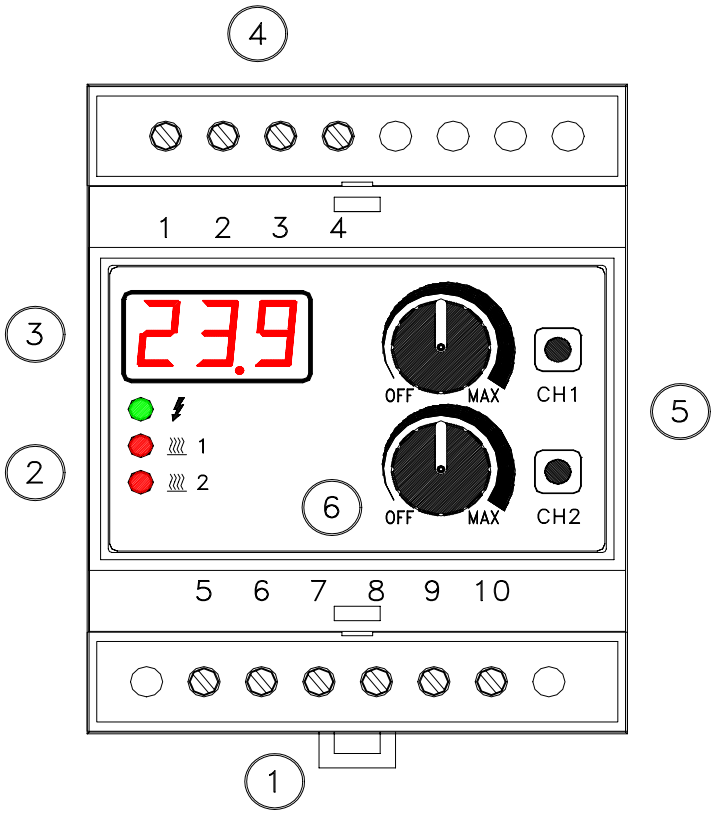
78385 270607

Electronic double thermostat with heat curve in a DIN standard bar enclosure

1. Short Description

The electronic double thermostat serves to control electric heating panels used for piglet nest heaters. Two independent control circuits have been integrated into the device; both record the actual temperature by means of a temperature sensor and enable a relay output in accordance to the settings. The electric heating panels are controlled directly via the output.

2. Operating Elements and Display



1 Connecting terminals for mains supply and load
2 Output signal indicator for the relays; mains voltage on (LED)
3 Temperature indicator
4 Connecting terminals for the sensors
5 Buttons for operating/programming
6 Dial potentiometer for operating/programming

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3. Function

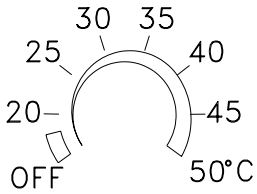
The device can be used in two different modes of operation per automatic control loop to accommodate the different tasks. ‘Normal operation’ is for continuous control at a constant nominal temperature; to adjust the nominal temperature to a growth cycle it is possible to switch to ‘heat curve mode’.

The set values are set directly on the potentiometer of the required automatic control loop according to the mode of operation or are determined by the specified heat curve.

A 3-digit display has been integrated into the respective automatic control loop to indicate the actual temperature. The actual temperatures are displayed in intervals of approximately 8 seconds. To allocate the displayed temperature to the respective automatic control loop the LED flashes for the corresponding output.

The output signal indicator for each relay is indicated by a red LED in the device (LED on = relay on). The mode of operation currently selected is also indicated via the display.

3.1. ‘Normal Operation’ Mode



In ‘normal operation’ mode, the device functions as a two position controller with an adjustable set value. The set value is set with the respective potentiometer and is not time restricted. The required value is set on a notional scale ranging from 20°C – 50°C. As the set value is being adjusted, it is shown on the display. After approx. 3 seconds, the actual value is displayed once again. The set value is also displayed by briefly pressing the CHx button.

The green LED flashes while a set value is being displayed! However, the LED for the respectively selected output is lit up constantly. In this way, it is easy to see that a set value is being indicated and also which one.

By turning the potentiometer to the ‘OFF’ position the control is switched off completely. Instead of the actual temperature being displayed ‘OFF’ will then appear after a short time.

The heating circuit can only be completely turned off when in ‘normal operation’ mode.

The switch over from ‘normal operation’ to ‘heat curve operation’ for the respective circuit is achieved by pressing the CHx button for approx. 5 seconds. Switching back to ‘normal operation’ is achieved in the same manner.

3.2. ‘Heat Curve Operation’ Mode

In heat curve mode the set value is given using a programmed time period. For this, the **‘tS..’** (start temperature), **‘tE..’** (end temperature) and **‘hr..’** (length of time in hours per reduction of the set value by 1K) parameters are stored in the device. Following the switch over from ‘normal operation’ to ‘heat curve operation’ the timer stops and the **‘tE..’** parameter specifies the nominal temperature. To signalise that the timer has stopped, the decimal point in the right-hand section lights up constantly. By briefly pressing the CHx button (approx. 1s) the set value – ‘**tS..**’ – is momentarily displayed and the timer starts. The starting temperature is set by the ‘**tS..**’ parameter; the decimal point in the right-hand section will flash. By pressing the CHx button again, the process is stopped again. The timer is thus reset, the set value – which *is momentarily displayed* – is at **‘tE..’** and the decimal point will light up continuously again.

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If the set value of a cycle needs to be adjusted during the current heat curve, this can be carried out using the relevant set value potentiometer. While the potentiometer is being turned, the display shows the actual applicable set value. At the same time, the notional setting is compared to this value. Depending on how much time has passed this can be at different points on the (conceived) scale. If the two values agree, the set value can be changed. After setting the desired value, this will automatically be accepted within a few seconds and therefore become valid. The actual temperature will be displayed again. The timer is not interrupted by this. Following execution of the heat curve, the manual adjustment of the set value will be deleted again and the stored values will apply without restriction.

To control the actual set value in a current heat curve this can be shown on the display by briefly pressing the CHx button (< 1s). After a few seconds, the display will switch over to an actual value again.

The green LED flashes while a set value is being displayed! However, the LED for the respectively selected output is constantly lit up. In this way, it is easy to see that a set value is being indicated and also which one.

After the heat curve starts the **'tS..'** setting serves as the set value. The **'hr..'** parameter now specifies after how many hours the nominal temperature is to be reduced by 1K (settings from 1 to 99). The cycle of the heat curve is determined by the difference in temperature between **'tS..'** and **'tE..'** and the **'hr..'** interval. Refer to the calculation example.

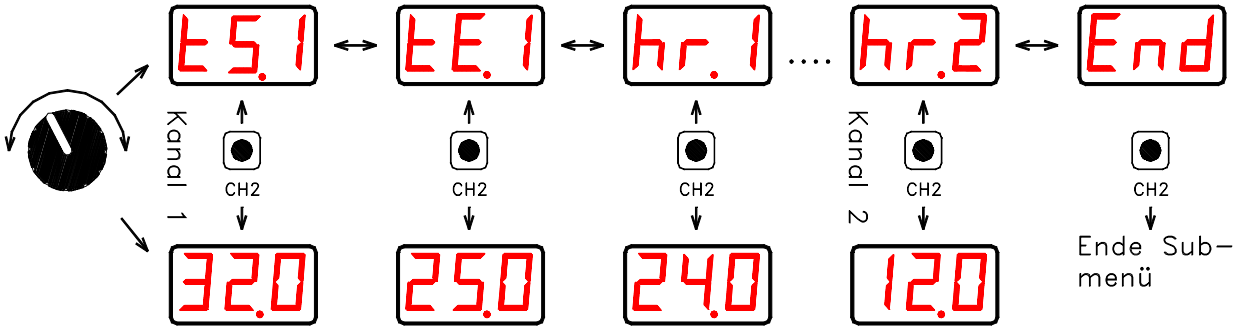
Example: **'tS..'** = 32°C, **'tE..'** = 25°C, **'hr..'** = 24 (h/K)
32°C - 25°C = 7K * 24 hr/K = 168 hr (7 days). The **'tE..'** nominal temperature is reached after 168 hours of operations and the heat curve is thus executed. This is controlled without time restrictions using the **'tE..'** value (25°C).

3.3. Programming the Heat Curve

The parameters for the heat curves are programmed in a submenu. To do this the CH1 and CH2 buttons have to be pressed at the same time for approx. 5 seconds. After making changes in the submenu, the different parameters can be browsed through using the set value potentiometer from the second automatic control loop. By pressing CH2 the parameter value will be displayed. To change this, the potentiometer has to be moved over the notional scale range slowly. If the stored value is the same as the set value, this is 'captured' and can now be changed. By pressing CH2 again the desired setting can be saved and changes made in the list of parameters. In this way, the desired values can be changed one after the other. The submenu is exited in the **'End'** setting and by pressing CH2, and will switch back to the previous mode of operation.

Changes cannot be made to a current heat curve; this can also not be interrupted by the submenu being entered.

The diagram shows the submenu and the values 'behind' the parameters. The CH2 button is always used to switch between the parameter and the value. The values are set using the potentiometer from the second automatic control loop.



It is to be noted that the programmed starting value always has to be greater than the end value. If the values are not programmed properly **(tS.. < = tE..)**, the timer cannot be started. Control continues as before according to the **tE..** value.

If a longer break occurs during input (approx. 3 minutes), programming is cancelled. Non-confirmed values are rejected.

3.4. Functions after Commissioning or Restoration of Power

The 'normal operation' and 'heat curve operation' are saved. Following restoration of voltage, the last mode will be recalled and applied as follows:

'Normal operation': Control is carried out according to the set value (potentiometer setting); this also includes the 'OFF' setting!

'Heat curve operation': The timer is stopped; Control is carried out according to the set value of the '**tE..**' parameter

3.5. Visual Indicators

There is an LED (red) per output to indicate the switching statuses on the relay. Another LED (green) indicates the device is ready for operation. There is an integrated 3-digit display to show the nominal and actual temperatures, a help window for programming and also status reports. To be able to match the displayed temperature with the corresponding heating circuit, the respective LED flashes briefly. The actual values displayed (sensors) are shown alternately for approx. 8 seconds.

3.6. Sensor Monitoring

Both of the sensor inputs are monitored for short circuits or breaks. If the device detects a defective sensor, the corresponding output will be switched off. Instead of the actual value being shown on the display **'Err'** will be displayed. The limits for monitoring errors are temperatures > 80°C and < -20°C.

3.7. Output

Each of the device's channels has a relay output (N/O contact). This is lead through non-floating (with L) at the respective terminal. See the 'Technical Data' for the maximum load. The device has no internal fuse. Make sure the customer has provided proper fuses.

3.8. Supply Voltage

The device is designed for connection to an alternating current of 23OV/5OHz. It has no on/off switch; it is only intended for connection to permanently installed lines.

4. Assembly

For electricians only!

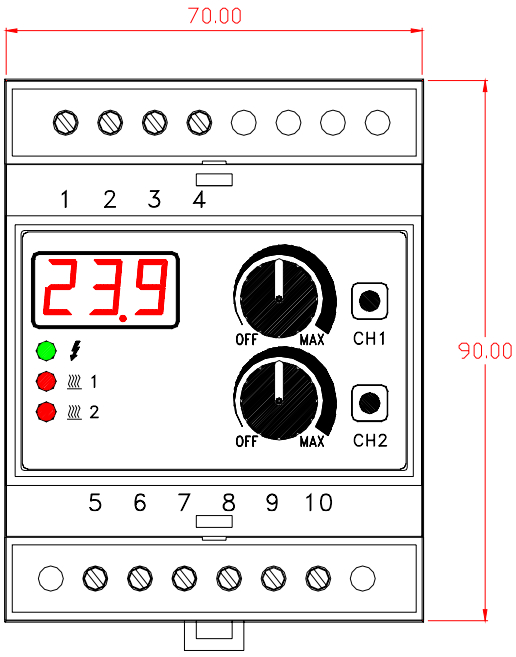
ATTENTION: Incorrect installation may result in damages to the control device! No liability is taken for damages incurred by incorrect connection and/or improper handling!

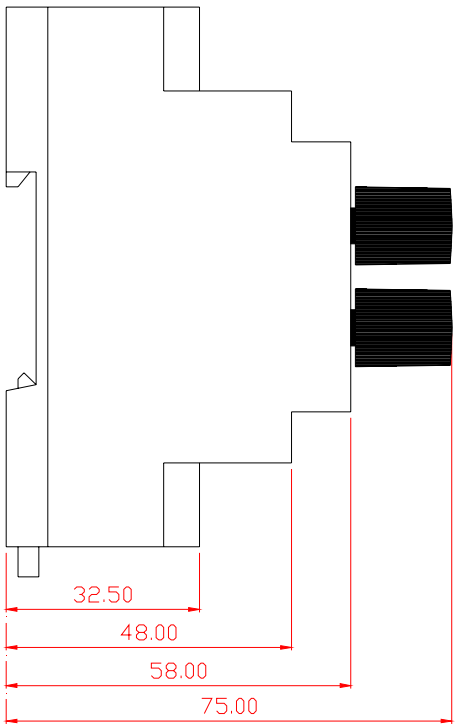
- The device is exclusively designed for installation in switch boxes!
- Disconnect lines prior to work on the equipment!
- Only authorised technicians are allowed to connect and service the equipment!
- Connections are to be made in accordance with the enclosed main circuit diagram.
- The device is only intended for connection to permanently installed lines.
- When installing the device, care is to be taken that cables carrying mains voltage, such as mains supply and relay connection cables, do not come into contact with low voltage cables, such as sensor cables (minimum distance of 4 mm in the case of basic insulated conductors).
- Furthermore, adequate protective measures need to be taken to ensure that none of the terminal leads become loose; these must fulfil the requirements as according to EN 60730, part 1. For example, this can be done by securing cables with cable ties.
- To be taken into account is the VDE 0100 (VDE – *Association of German Electrical Engineers*), particularly part 705, EN 60730, part 1, and the regulations of the local electricity board.
- The sensor cables are not to be laid with other conductor lines; in this way, interference can be prevented.
- The device is to be fused with a line circuit breaker with a maximum 16A.
- The connecting lines have to be laid, so that they are out of the reach of animals.
- The connecting lines are to be laid protected in the floor screed (empty pipe).
- Live cables (L and N) are not to be looped from device to device; rather, they must each be wired separately from a bus bar.
- If the device does not work, please check it has been connected properly first and check the power supply.

5. Technical Data

Type		**TR - D**
Temperature range:		+20...+50°C
Switching differential:		+/- 0.2K, fixed
Sensor inputs:		PTC 2k, poles do not have to be taken into account
Line voltage:		23OV AC ±10%
Received power:		approx. 3VA
Output/type of contact:		Relay, N/O contact, non-floating with L
Max. permissible switching current:		per circuit/relay 8(2)A, 230V AC cos-phi = 1, at an environmental temperature of a max. +40°C
Electric life span:		min. 0.5 x $1O^5$ switching cycles
Electric connections:		Screw connectors
Permissible environmental temperature:		0 to +40°C
Storage temperature:		-10 to +70°C
Set value adjustment:		with knob, sometimes with push-button
Programming:		with knob and push-button
Visual indicator:		LEDs for the switching status of the relay (red) and mains voltage (green), 3-digit display for temperature and programming
Casing:	Material:	Plastic
	Protection system:	IP 2O
	Protection class:	II according to DIN EN 60730-1 (in the case of switch box installation)
	Dimensions:	70 x 90 x 75 mm (4* machine width)
	Mounting:	on DIN bars
	Weight:	approx. 230g

6. Dimensioned Drawing





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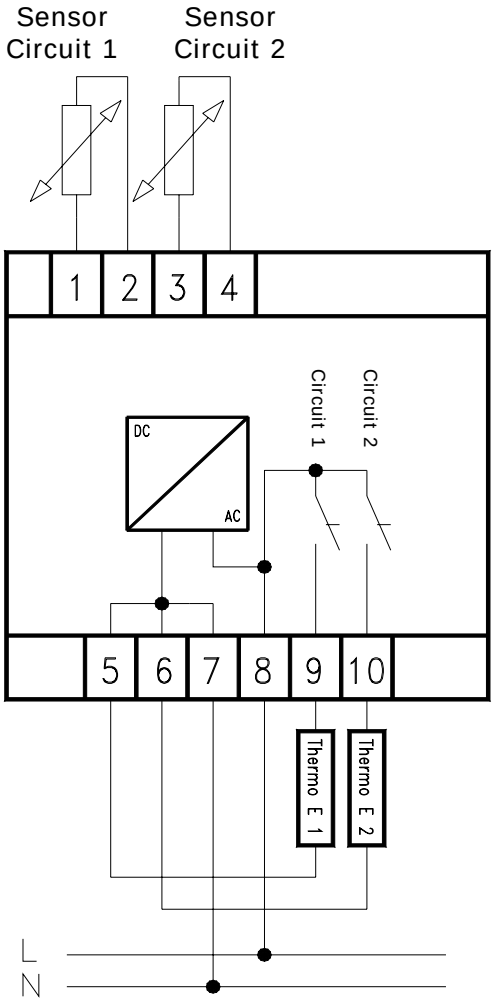
7. Circuit Diagram

Per circuit connections to maximum:
18 Thermo E 400x600
7 Thermo E 400x1200 *)
7 Thermo E 500x1200 *)
7 Thermo E 600x1200 *)

*) Per distributer housing max. 2 regulators TR-D



Subject to alteration

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