ALPHA

Temperature Controller
Universal Programmable

Introduction

ALPHA is a specialized device, that maintains the temperature of the controlled system, in accordance to the set temperature. It can be used both for heating and cooling in wide temperature range.

Besides altering the set temperature, the controller also provides access to other parameters. This flexibility makes it suitable and convenient for integrating in wide variety of heating systems.

ALPHA monitors the temperature of the controlled system and according to the set temperature, switches the connected load on or off, which in turn heats up or cools down the system.

Installation

ALPHA is designed for DIN rail mounting, use it only indoors in dry closed places and away from strong electromagnetic fields.

The device is powered from mains high voltage! Please follow the safety regulations for operating under high voltage!

Included in the set

Temperature sensor:

- Sensor measuring the temperature of the controlled system

NTC (-40 .. 125°C) or optionally ***Pt1000*** (-40 .. 200°C)

Electrical connection

The thermostat should be powered through external mains breaker (last step of the installation process), voltage 230 V / 50 Hz.

Connection	Terminals		
Mains Power	3 | 4	**L | N**	230V / 50Hz
Load	1 | 4	**NO | N**	Max 5A / 1 KW
Temperature sensor	10 | 1 1	**T1**	NTC 10K or Pt1000

Connect the load to the terminal NO (normal open) of the relay R1 and to mains neutral N. The terminal NC (normal closed) is active when the relay switches off and can be used in some special cases.

The temperature sensor has no polarity and when installing it, the cable can be extended up to 100 m using the following cable size: up to 50 m – 0.75 mm^2, up to 100 m – 1.5 mm^2. It's advised, that the cables of the temperature sensors and the high voltage ones be distanced from one another at 100 mm. When using in environment with strong electromagnetic fields, use shielded cable for low voltages, grounded in both ends.

Maximum size of the cable to be connected to the terminals – 2.5 mm^2.

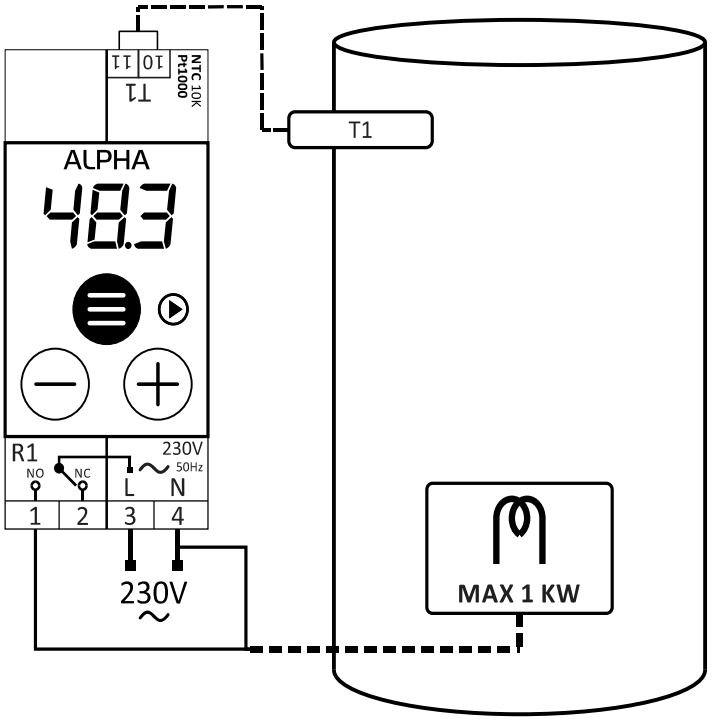

Figure 1 Electrical connection

Operation

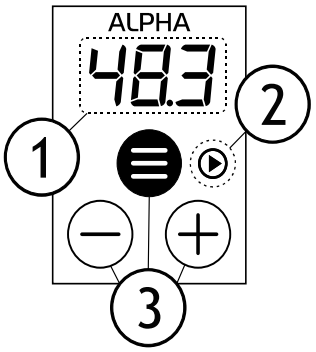

Figure 2 Control panel

1. Three digit seven-segment display 888
2. LED, indicating the state of the circulation pump
3. Buttons:
   - increase
   - decrease
   - parameters, exit confirmation

When powered, the device is in ***Main*** mode and works as thermostat for heating or cooling, depending on the configuration.

The display shows the current temperature measured.

Set Temperature

In order to check the set temperature, press any of the buttons ⊕ or ⊖. The device switches to ***Set Temperature*** mode and the display shows the blinking value of the set temperature. To change the value, use ⊕ to increase and ⊖ to decrease. At first the temperature is changed with the minimal step, but if you hold the button pressed, the step is increased progressively. This way it is very convenient to quickly alter the temperature in wide range.

Changing the set temperature immediately effects the control algorithm. This can be used to forcefully switch the load on or off if necessary.

Pressing the button ☰ or 7 sec after the last button interaction, the device goes back to ***Main*** mode and saves the set temperature while making long beep.

Errors

The device automatically enters error display mode if the measured temperature is out of the acceptable limits. In this mode the device beeps and on the display is shown the cause for the error. If there is an electrical issue with the temperature sensor, then instead of temperature, the following is displayed:

- Ero — broken connection
- ErC — shorted connection
- ErU — wrong sensor type

Press any button to stop the beeping sound, or remove the cause for the error.

Setting parameters

Hold the button ☰ pressed for 2 sec from ***Main*** mode in order to enter ***Parameters*** menu. While holding the button, a specific sound is made and an animation is shown on the display.

When you enter the menu, the display shows the name of the current parameter and using the buttons ⊕ and ⊖ you can choose a parameter to edit. The name, description, values and order of the user parameters are described in the table following. Press ☰ to change the value of the current parameter. The blinking value is shown, ⊕ and ⊖ change the parameter value and by pressing ☰ the current value is saved and you get back to choosing parameter.

If you want to exit the menu, then choose the element that is before the first / after the last parameter (reverse menu enter animation is displayed) and confirm by pressing ☰. Also if for 20 sec no button is pressed, then the device goes back to ***Main*** mode.

Working principle

Thermostat

The device powers the relay output, depending on the difference between the ***SetTemp*** and the measured temperature ***T1***. The triggering of the output can activate heating or cooling unit, depending on the configuration of the particular system.

Heating

T1 > SetTemp R1 = OFF

T1 < SetTemp R1 = ON

If the temperature measured is below the set one, then the heating unit is turned on, if it is above it, then is turned off.

Cooling

T1 > SetTemp R1 = ON

T1 < SetTemp R1 = OFF

If the temperature measured is above the set one, then the cooling unit is turned on, if it is below it, then is turned off.

Hysteresis

The hysteresis is included in the control algorithm, so the powered unit is protected from switching too often. It adds a certain insensitivity to the difference between the set and current temperature (Figure 3 Work algorithm). When the temperature difference is within the hysteresis limits, the algorithm does not change the output state.

Increasing the hysteresis leads to less load switching, but also increases the controlled temperature error.

The hysteresis is set as additional temperature difference for switching on and off. This way the total range of switching is twice the value of the hysteresis parameter.

T1 > SetTemp + HYS

T1 < SetTemp – HYS

For example, when the hysteresis is set to 2°C, ***SetTemp*** = 22°C and heating function, the output will be switched on when the temperature ***T1 <*** 22 – 2 = 20°C and will be switched off at ***T1 <*** 22 + 2 = 24°C.

Thermostat function

Use the parameter [Fun] in order to choose the thermostat function:

- [HEAt] Heating
- [COOL] Cooling

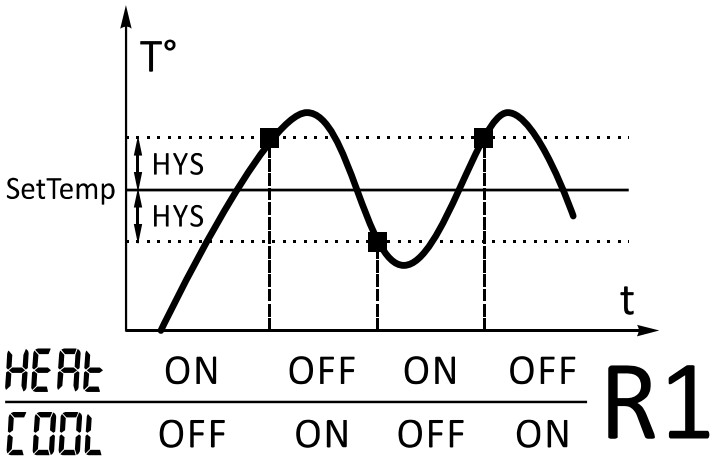

Figure 3 Work algorithm

Emergency cases

- ***The output is ALWAYS switched off in case of a damaged temperature sensor!***

Technical parameters

Power	230 V, 50 Hz
Maximum power consumption	1.5 VA
Relay output (R1)	5 A / 1 KW, 250 VAC
Temperature sensor NTC	-40 ... 125 °C
Temperature sensor Pt1000	-40 ... 200 °C
Operating ambient temperature	0 ... 40 °C
Protection	IP 40
Dimensions	36 x 90 x 58 mm
Mounting	DIN rail
Warranty	24 months

Parameters

Parameter	Description	Limits			
		min	**set**	max	
SetTemp	Set temperature	-50	**24**	250	°C
	Parameters				
[HYS] ***HYS***	Hysteresis	0.5	**1.0**	20.0	°C
[Fun] ***Function***	Thermostat function – heating or cooling	[HEAt]	[HEAt]	[COOL]	
[StEP] ***Step***	Set temperature minimum change step	0.1	**0.5**	2.0	°C
[t1] ***T1Type***	Temperature sensor type	NTC	**NTC**	Pt1000	

Limited warranty

The warranty is valid for 24 months from the sale date.

Warranty is void in case of:

- Incorrect installation
- Alteration of the product and/or attempts to repair or modify
- Visible damage of the housing and/or the inside of the device
- Damage caused by lightning storms
- Usage in inappropriate conditions (temperature and humidity)
- Broken warranty stickers

Warranty Card

Sold (client/date):_____

_____

Invoice No (Receipt No):_____

Signature:_____

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