

## CTH 46 - CTD 43 / 46 CTH 46 Part number 89422512



- CTH 46
- Heating / cooling function
  - Measurement and setpoint display
- CTD 43
- Heating or cooling function
  - Measurement display
  - Measurement deviation display-Setpoint via LED
  - 1 configurable alarm
- CTD 46
- Heating or cooling function
  - Measurement and setpoint display
  - 1 configurable alarm

### Part numbers

|          | Type   | Output | Supply voltage |
|----------|--------|--------|----------------|
| 89422512 | CTH 46 | Logic  | 24 V ACDC      |

### Specifications

#### General characteristics

|                     |   |
|---------------------|---|
| Supply              | 100 to 240 VAC, 24 VACDC                      |
| Frequency (Hz)      | 50 / 60                                       |
| Tolerance           | -15 % +10 % Un                                |
| Consumption         | 8 VA max.                                     |
| Display measurement | red LEDs-4 digits, 7 segment, height 10 mm    |
| Display setpoint    | green LEDs-4 digits, 7 segment, height 7,5 mm |

#### Control characteristics

|  |   |
|--|---|
| Control algorithm  | PID with auto-tune and adaptive tune : SMART  |
| Control type   | heat or cool<br>heat / cool                   |
| Sampling time linear input   | 250 ms  |
| Sampling time TC and RTD input   | 500 ms  |
| Proportional band Pb heat or cool  | 1,0 to 100 % of scale amplitude               |
| Proportional band Pb heat - cool   | 1,5 to 100 % of scale amplitude               |
| Proportional band Pb<br>Note : if Pb = 0 % discrete action               | ■   |
| Hysteresis (during discrete action)                                      | 0,1 to 10 % of scale amplitude                |
| Integral time ti<br>Note : if ti > 20 min<br>integral action is inactive | 20 s to 20 min                                |
| Derivative time td.<br>Note : if td=0<br>derivative action is inactive   | 1 s to 10 min                                 |
| Cycle time heating   | 1 s → 200 s                                   |
| Cycle time cooling   | 1 s → 200 s                                   |
| Heat-cool control<br>Cool proportional band                              | rC x heat proportional band                   |
| Heat-cool control<br>rC : relative gain                                  | 0,20 → 1,00                                   |
| Heat-cool control<br>dead.overlap band                                   | -20 % to + 50 % of the heat proportional band |

#### Inputs

|  |  |
|--|--|
| Thermocouples J, K, R, S, and N                              | IEC 584-1  |
| Thermocouples L  | DIN 43710  |
| Reference junction   | Automatic cold junction compensation : 0 to 50 °C<br>(Thermocouples)   |
| Reference junction drift                                     | 0,1 °C / °C  |
| Input impedance (kΩ)   | > 1 M Ω  |
| Calibration (IEC 584-1)                                      | ■  |
| Resist. temp. detector 3-wire Pt 100 conforming to DIN 43760 | ■  |
| Line resistance  | 20 Ω max. (Resistance temperature detector)  |
| Input type and standard range TC                             | L (0/400 °C) (0/1650°F) (0/900 °C)<br>J (0/400 °C) (0/1830°F) (0/1000 °C)<br>K (0/400 °C) (0/2190°F) (0/1200 °C)<br>N (0/1400 °C) (0/2550°F)<br>R (0/1760 °C) (0/3200°F)<br>S (0/1760 °C) (0/3200°F) |
| Input types and standard range RTD Pt100                     | (-199,9/400,0 °C) (-199,9/400,0°F)<br>(-200/800 °C) (-330/1470°F)  |

|                   |  |
|-------------------|--|
| Measurement range | - 1999 →+ 4000                                     |
| Decimal point     | adjustable : - - - - , - - - - , - - - - , - - - - |

### Current transformer input for monitoring the load break

|                                    |  |
|------------------------------------|--|
| Inputs                             | 50 mAAC  |
| Measurement range with transformer | 10 A →100 A  |
| Resolution                         | 10 to 20 A : 0.1 A<br>21 to 100 A : 1 A                |
| Measurement logic threshold        | Relay output : NO or NC<br>Logic output : level 1 or 0 |
| Measurement update period          | 50 ms  |
| Setpoints                          | - main setpoint : SP<br>- auxiliary setpoint : SP2     |
| Selection input<br>SP/SP2          | 50 mA AC<br>selection via external N/C type contact    |

### Output

|  |  |
|--|--|
| Type of output   | discontinuous                                |
| Action type  | can be programmed for heating and/or cooling |
| Limitation of output power : SOFT-START- heat action     | adjustable from 0 to 100 %                   |
| Limitation of output power : SOFT-START-heat/cool action | adjustable from -100 to +100 %               |

### Output specification

|   |   |
|---|---|
| OUT 1 Main output N/O contact                 | 3A 250 V AC resistive (N/C contact is possible via a jumper)                            |
| OUT 1 Main output logic                       | Level 0 : <0,5 V DC<br>Level 1 :<br>14 V DC±20 % @ 20 mA max<br>24 V DC±20 % @ 1 mA max |
| Main output cycle time                        | 1 s →99 s   |
| OUT 2 Cool output or alarm 1 output           | N/O-2A contact, 250 V AC resistive  |
| OUT 3 Load break output and/or alarm 2 output | N/O-2A contact, 250 V AC resistive  |

### Description of alarms 1 and 2

|                                   |   |
|-----------------------------------|---|
| Type of output                    | direct or reverse   |
| Functions                         | absolute alarm<br>band alarm<br>deviation alarm   |
| Reset to zero                     | Manual / automatic  |
| Inhibition                        | Configuration   |
| Alarm threshold - absolute alarm  | absolute value independent from SP  |
| Alarm threshold - band alarm      | value relative to SP, adjustable from 0 to 500 °C/°F  |
| Alarm threshold - deviation alarm | value relative to SP, adjustable from -500 °C/°F (negative deviation) to + 500 °C/°F (positive deviation) |
| Alarm                             | 0.1 to 10 % of scale amplitude  |

### Serial link

|                     |                   |
|---------------------|-------------------|
| Type                | RS485             |
| Protocol            | MODBUS, J.BUS     |
| Address             | 1 →255            |
| Number of data bits | 8                 |
| Transmission speed  | 600 →19 200 Bauds |
| Parity              | even, odd, no     |
| Stop bit            | 1                 |

### Physical details and protection

|  |  |
|--|--|
| Insulation resistance conforming to IEC 348      | > 100 MΩ   |
| Insulation voltage according to IEC 348          | 1500 V   |
| Immunity to interference conforming to IEC 801-4 | Level 3  |
| Immunity to interference conforming to IEC 801-2 | 8000 V   |
| Accuracy   | ± 0.2 % of the full measurement scale ± 1 digit at an ambient temperature of 25 °C at Un |
| Operating temperature range (°C)                 | 0 →+50   |
| Storage temperature range (°C)                   | -20 →+70 °C  |
| Relative humidity (no condensation)              | 20 →85 % Rh  |

### Housing

|  |                                  |
|--|----------------------------------|
| Housing material                                 | self-extinguishing UL94 grade VO |
| Front panel                                      | Polycarbonate membrane           |
| Protection class according to IEC 529 (IEC 70-1) | IP 54                            |
| Connection                                       | screw terminals                  |
| Weight (g)                                       | 250                              |

### Approvals

|          |             |
|----------|-------------|
| UL / CSA | in progress |
|----------|-------------|

### Protection

|            |   |
|------------|---|
| Safe-guard | detects a fault in the equipment caused by external interference and activates automatic reset without modification of the process. |
| Switch     | the configuration and calibration are accessed via an internal switch, can only be accessed when the device is unplugged.           |

|                |                |
|----------------|----------------|
| Supply         | 100 to 240 VAC |
| Frequency (Hz) | 50 / 60        |
| Tolerance      | -15 % +10 % Un |
| Consumption    | 5 VA           |

|  |  |
|--|--|
| Display CTD 43                                   | Measurement or setpoint : red LEDs, 3-digit, 7-segment, height 10 mm   |
| Display CTH 47 / CTD 46                          | Measurement : red LEDs, 3-digit, 7-segment, height 10 mm<br>Setpoint : green LEDs, 3-digit, 7-segment, height 7,5 mm                 |
| Switch   | the configuration and calibration are accessed via an internal switch, which can only be accessed when the equipment is disconnected |
| Insulation resistance conforming to IEC 348      | > 100 MΩ   |
| Insulation voltage according to IEC 348          | 1500 V   |
| Immunity to interference conforming to IEC 801-4 | Level 3  |
| Immunity to interference conforming to IEC 801-2 | 8000 V   |
| Accuracy   | ± 0.3 % of the full measurement scale at an ambient temperature of 25 °C at Un   |
| Operating temperature range (°C)                 | 0 →+50 °C  |
| Storage temperature range (°C)                   | -30 →+70 °C  |
| Relative humidity (Rh no condensation)           | 20 →85 %   |
| Housing material                                 | self-extinguishing UL94 VO grade   |
| Front panel                                      | polycarbonate membrane   |
| Protection class according to IEC 529 (IEC 70-1) | IP 54  |
| Connection                                       | screw terminals  |
| Weight (g)                                       | 160  |
| Approvals  | UL/CSA   |

### Inputs

|  |  |
|--|--|
| Thermocouples J, K, and N                          | IEC 584-1  |
| Thermocouples L                                    | DIN 43710  |
| Reference junction                                 | Automatic cold junction compensation : 0 to 50 °C (Thermocouples)                                    |
| Reference junction drift                           | 0,1 °C / °C  |
| Line resistance                                    | 100 Ω max  |
| Calibration (IEC 584-1)                            | IEC 584 - 1  |
| Resist. temp. detector Pt 100 according to IEC 751 | 3-wire   |
| Line resistance                                    | < 4 Ω  |
| Input type and standard range TC                   | L (0/800 °C) (0/999°F)<br>J (0/800 °C) (0/999°F)<br>K (0/999 °C) (0/999°F)<br>N (0/999 °C) (0/999°F) |
| Input types and standard rangeRTD Pt100            | (-199/500 °C) (-19,9/99,9°F) (-199/999 °C)   |

### Output

|  |   |
|--|---|
| Type of output   | discontinuous   |
| Action type CTH 46                                       | heating-cooling   |
| Action type CTD 43 - CTD 46                              | heating or cooling  |
| Limitation of output power : SOFT-START- heat action     | adjustable from 0 to 100 %  |
| Limitation of output power : SOFT-START-heat/cool action | adjustable from -100 to + 100 %   |
| Main output changeover relay                             | 3 A 250 V AC resistive  |
| Main output--logic                                       | Max. load : 700 Ω<br>Level 0 : < 0,5 V DC<br>Level 1 :<br>14 V DC± 20 % @ 20 mA max<br>24 V DC± 20 % @ 1 mA max |
| Main output cycle time                                   | 1 s →200 s  |
| Cool output CTH 46 only                                  | N/O-1 A contact, 250 V AC resistive   |
| Alarm output CTD 43-CTD 46 only                          | N/O-1 A contact, 250 V AC resistive   |

### Control characteristics

|  |   |
|--|---|
| Control algorithm  | PID with auto-tune and adaptive tune : SMART  |
| Control type CTD 43 CTD 46                                 | heating or cooling                            |
| Control type CTH 46  | heating-cooling                               |
| Sampling time  | 500 ms  |
| Proportional band Pb CTD 43 - CTD 46                       | 1,0 % to 99,9 % of scale amplitude            |
| Proportional band Pb CTH 46                                | 1,5 % to 99,9 % of scale amplitude            |
| Proportional band Pb<br>Note : if Pb = 0 % discrete action | ■   |
| Hysteresis (during discrete action)                        | 0,1 % to 10 % of scale amplitude              |
| Integral time ti<br>Note : if ti > 20 min                  | 1 min 20 s to 20 min 0 s (10 s resolution)    |
| Derivative time td.<br>Note : if td=0                      | 1 s to 9 min 59 s                             |
| Cycle time heating   | 1 s →200 s                                    |
| Cycle time cooling (CTH46 only)                            | 1 s →200 s                                    |
| Heat-cool control CTH 46<br>Cool proportional band         | rC x heat proportional band                   |
| Heat-cool control<br>rC : relative gain                    | 0,20 →1,00                                    |
| Heat-cool control CTH 46<br>dead.overlap band              | -20 % to + 50 % of the heat proportional band |

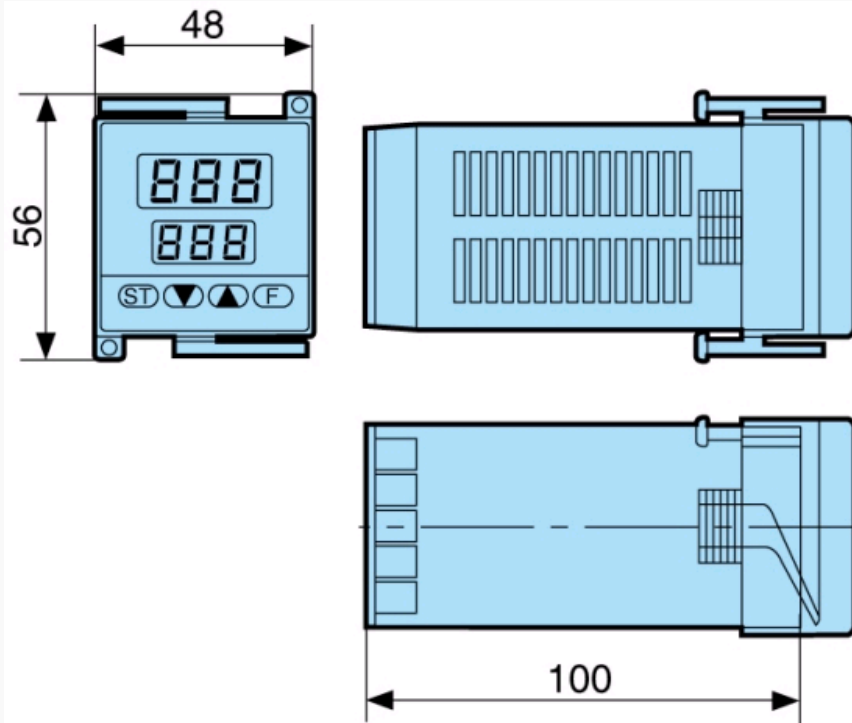
### Alarms (on CTD 43 and CTD 46 only)

|                |   |
|----------------|---|
| Type of output | direct or reverse                                   |
| Functions      | absolute alarm<br>. band alarm<br>. deviation alarm |
| Reset to zero  | manual  |

|                                   |  |
|-----------------------------------|--|
| Inhibition                        | can be configured  |
| Alarm threshold - absolute alarm  | absolute value independent from SP   |
| Alarm threshold - band alarm      | value relative to SP, adjustable from 0 to 500 °C/°F   |
| Alarm threshold - deviation alarm | value relative to SP, adjustable from -199 °C/°F (negative deviation) to +500 °C/°F (positive deviation) |
| Alarm                             | 0.1 to 10 % of scale amplitude   |

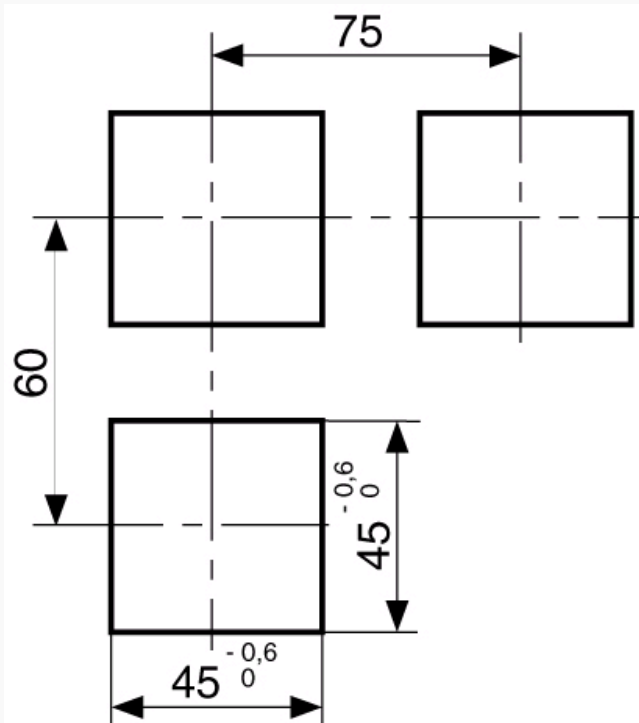
### Dimensions (mm)

#### Panel cut-out



### Dimensions (mm)

#### CTH / CTD

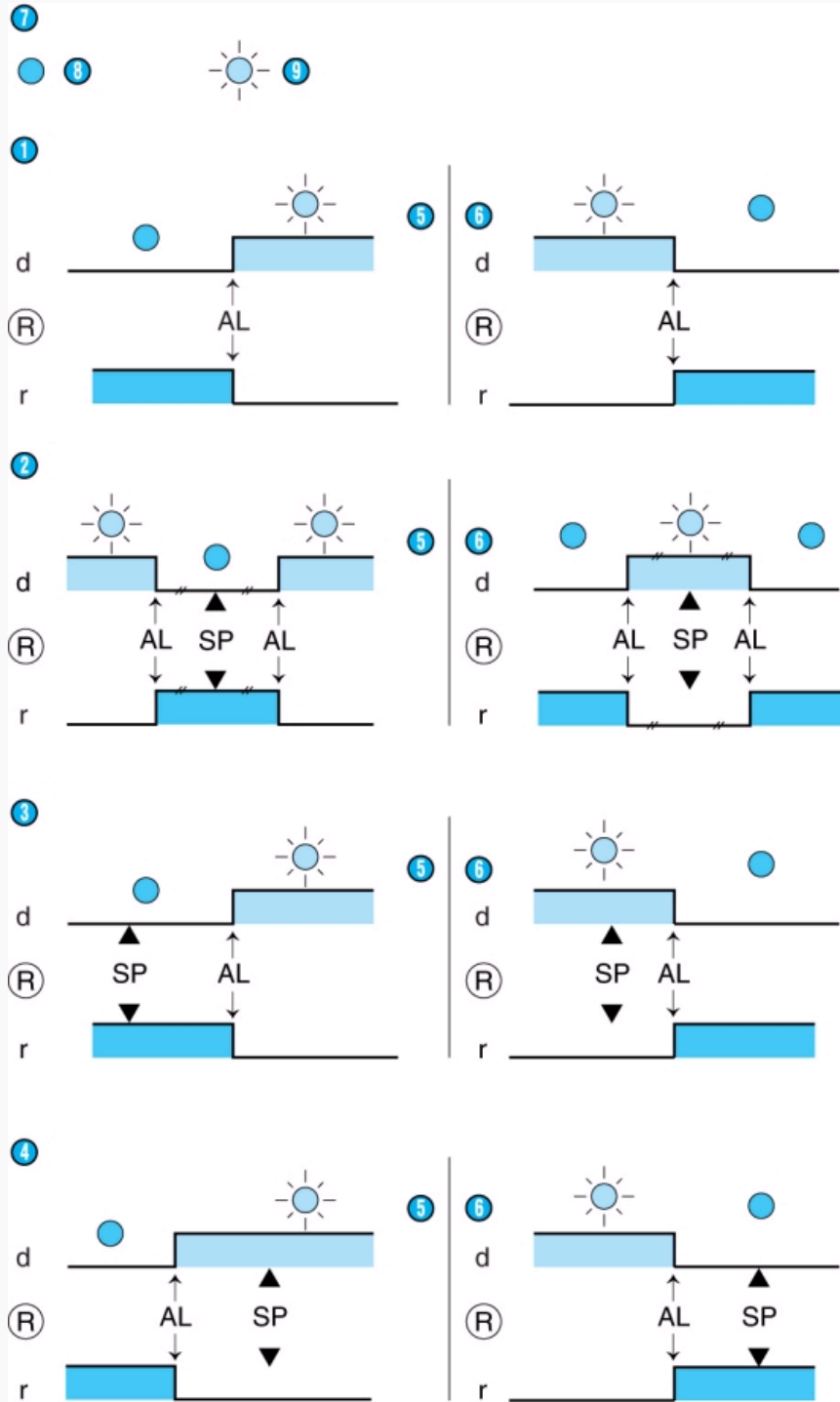


Panel cut-out

### Curves

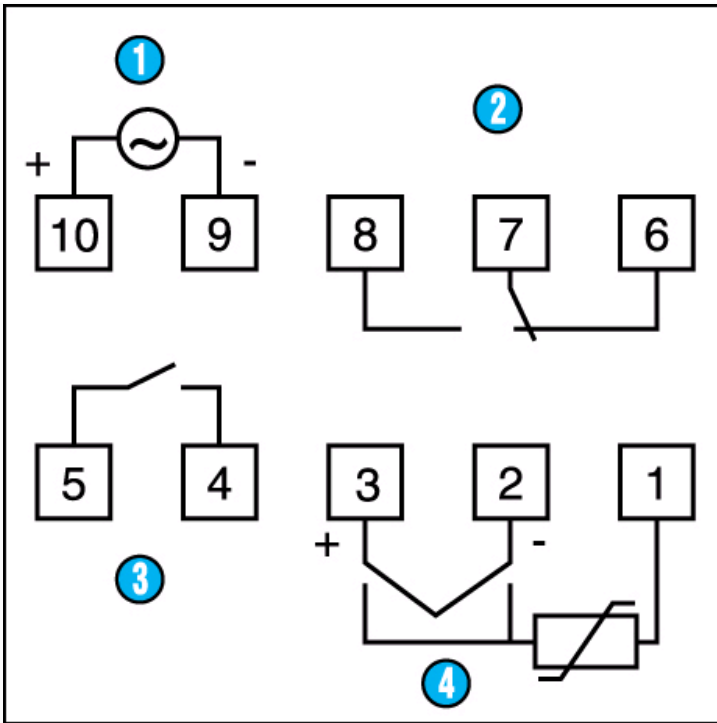
#### Operating modes

Summary of the various configurations



| N° | Legend                   |
|----|--------------------------|
| 1  | Absolute alarm           |
| 2  | Band alarm               |
| 3  | Positive deviation alarm |
| 4  | Negative deviation alarm |
| 5  | High                     |
| 6  | Low                      |

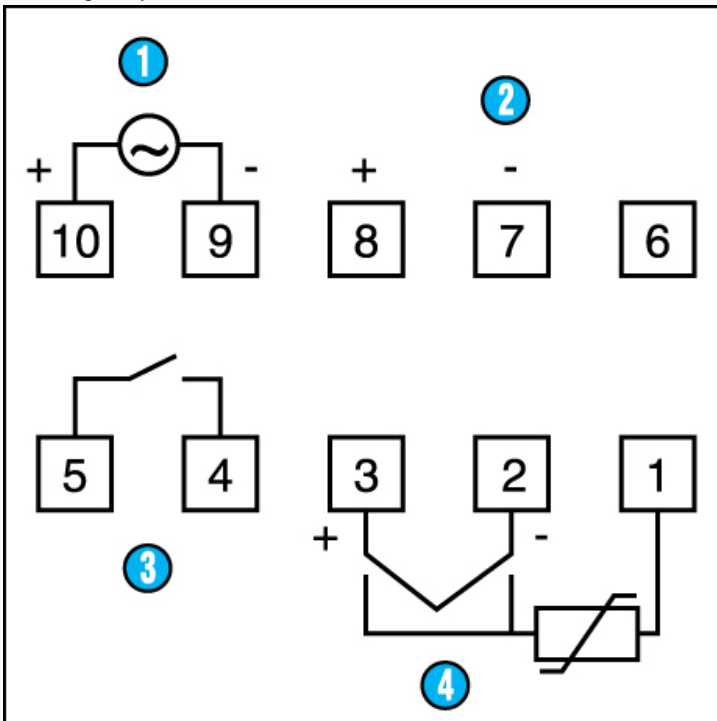
Connections  
CTH 46 relay output



| N° | Legend  |
|----|---|
| 1  | Supply  |
| 2  | Main output 250 V AC / 3A resistive   |
| 3  | Cool output 250 AC / 1 A resistive  |
| 4  | 14-15 : Input 50 mA AC (Current transformer connected for load break monitoring or selection of 2 <sup>nd</sup> setpoint) |

**Connections**

**CTH 46 logic output**



| N° | Legend                            |
|----|-----------------------------------|
| 1  | Supply                            |
| 2  | Main output 0-24 V DC / 20 mA max |

|   |   |
|---|---|
| ④ | Cool output 250 V AC / 1 A resistive  |
| ④ | 14-15 : Input 50 mA AC (Current transformer connected for load break monitoring or selection of 2 <sup>nd</sup> setpoint) |