

## Temperature controller for rail mounting PID controller, dimensions 75 x 22.5 mm Model CS4R

WIKA data sheet AC 85.05



### Applications

- Plant construction and industrial ovens
- Process engineering
- Plastics technology and processing
- Ventilation and air-conditioning
- General industrial applications

### Special features

- Control mode configurable (PID, PI, PD, <sup>ON</sup>/OFF)
- Integrated auto-tuning
- Selectable control output - relay, logic or 4 ... 20 mA
- Multi-function input for Pt100, thermocouples and standard industrial signals
- Optional with heater burnout alarm and serial interface



Temperature controller, model CS4R

### Description

The model CS4R is a compact digital temperature controller for the display, control and monitoring of temperature.

The controller features a multi-function input, meaning the configuration of the sensor input can be set. Thus the flexibility of the controller is considerably increased, and warehousing is made easier. An alarm output for monitoring the actual value is also available as standard.

The control parameters can be set across broad ranges. Auto-tuning, which facilitates finding the optimal control parameters, can be activated.

The controllers are intended for DIN-rail mounting. The control output can be set either as relay (for slow control), as logic level for the control of electronic solid-state relays (for fast control and high current loads) or as a continuous 4 ... 20 mA output.

The versions with 4 ... 20 mA control output can be reconfigured by the user and operated as a transmitter with 4 ... 20 mA output signal.

A heater burnout alarm for the heater current monitoring and a serial interface RS-485 are available optionally.

## Specifications

| Display          |                                                      |
|------------------|------------------------------------------------------|
| Actual value     | 7-segment LED, 4-digit, red, character size 7.5 mm   |
| Set point        | 7-segment LED, 4-digit, green, character size 7.5 mm |
| Indication range | -1999 ... 9999                                       |

| Input                  |                                                                                                                                                                                                                                                                                                                                |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Number and type        | 1 multi-function input for resistance thermometers, thermocouples and standard signals                                                                                                                                                                                                                                         |
| Input configuration    | Selectable via terminal connections and menu-driven programming                                                                                                                                                                                                                                                                |
| Resistance thermometer | Pt100, JPt100, 3-wire, max. permissible resistance per connecting cable: 10 $\Omega$                                                                                                                                                                                                                                           |
| Thermocouples          | Types K, J, R, S, E, T, N, PL-II, C (W/Re5-26): max. permissible external resistance: 100 $\Omega$<br>Type B: max. permissible external resistance: 40 $\Omega$                                                                                                                                                                |
| Standard signals       | 0 ... 20 mA, 4 ... 20 mA: Input impedance 50 $\Omega$ {external measurement shunt}<br>max. permissible input current: 100 mA<br>0 ... 1 V: Input impedance > 1 M $\Omega$<br>max. permissible input voltage: 5 V<br>0 ... 5 V, 1 ... 5 V, 0 ... 10 V: Input impedance > 100 k $\Omega$<br>max. permissible input voltage: 15 V |
| Measuring time         | 250 ms                                                                                                                                                                                                                                                                                                                         |

| Control output            |                                                                                                                                                                                                                                                                            |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Number and type           | 3 different versions are possible                                                                                                                                                                                                                                          |
| Relay contact             | Load: AC 250 V, 3 A (resistive load)<br>AC 250 V, 1 A (inductive load, $\cos \phi = 0.4$ )                                                                                                                                                                                 |
| Logic level               | DC 0 ... 12 V max. 40 mA (short-circuit proof)<br>For the control of an electronic switch relay (solid-state relay, SSR)                                                                                                                                                   |
| {Analogue current signal} | 4 ... 20 mA, max. load 550 $\Omega$<br>The control output 4 ... 20 mA can be reconfigured to a transmitter output 4 ... 20 mA                                                                                                                                              |
| Control mode              | PID, PI, PD, P, <sup>ON</sup> / <sub>OFF</sub> (configurable)<br>To determine the control parameters for PID control, auto-tuning can be activated.                                                                                                                        |
| Proportional band         | 0 ... 110 %                                                                                                                                                                                                                                                                |
| Integral time             | 0 ... 1,000 s                                                                                                                                                                                                                                                              |
| Derivative time           | 0 ... 300 s                                                                                                                                                                                                                                                                |
| Cycle time                | 1 ... 120 s (not available with analogue current signal control output)                                                                                                                                                                                                    |
| Hysteresis                | Only available with <sup>ON</sup> / <sub>OFF</sub> control mode<br>Thermocouples and resistance thermometers: 0.1 ... 100.0 $^{\circ}\text{C}$<br>Standard signals: 1 ... 1,000 (with a scaling of the input with one decimal point, this is taken over by the hysteresis) |

| Alarm output                         |                                                                                                                                                                                                            |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alarm output                         | Open-collector<br>Load: DC 24 V, max. 0.1 A                                                                                                                                                                |
| Alarm output 1                       | For the actual value and control loop monitoring<br>Alarm type, switch behaviour, hysteresis and time delay can be set                                                                                     |
| {Heater burnout alarm} <sup>1)</sup> | For single-phase heating systems (not possible with analogue current signal control output), optionally configured up to max. 5 A, 10 A, 20 A or 50 A, the current transformer is included in the delivery |

{ } Items in curved brackets are optional extras for an additional price.

1) If alarm output 1 and the heater burnout alarm are active simultaneously, both alarms affect the Open-collector output.

## Options and performance data

|                           |                                                                                                                      |
|---------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>{Serial interface}</b> | RS-485<br>The transmission rate can be set (2,400 bps, 4,800 bps, 9,600 bps or 19,200 bps).                          |
| <b>Power supply</b>       | AC 100 ... 240 V, 50/60 Hz (max. permissible 85 ... 264 V) or<br>AC/DC 24 V, 50/60 Hz (max. permissible 20 ... 28 V) |
| <b>Power consumption</b>  | approx. 6 VA                                                                                                         |

## Ambient conditions

|                            |                                    |
|----------------------------|------------------------------------|
| <b>Ambient temperature</b> | 0 ... 50 °C                        |
| <b>Storage temperature</b> | -20 ... +50 °C                     |
| <b>Humidity</b>            | 35 ... 85 % r. h. (non-condensing) |

## Case

|                 |                                             |
|-----------------|---------------------------------------------|
| <b>Material</b> | Polycarbonate                               |
| <b>Colour</b>   | Light grey                                  |
| <b>Weight</b>   | approx. 150 g                               |
| <b>Mounting</b> | Snap-in mechanism for mounting on DIN rails |

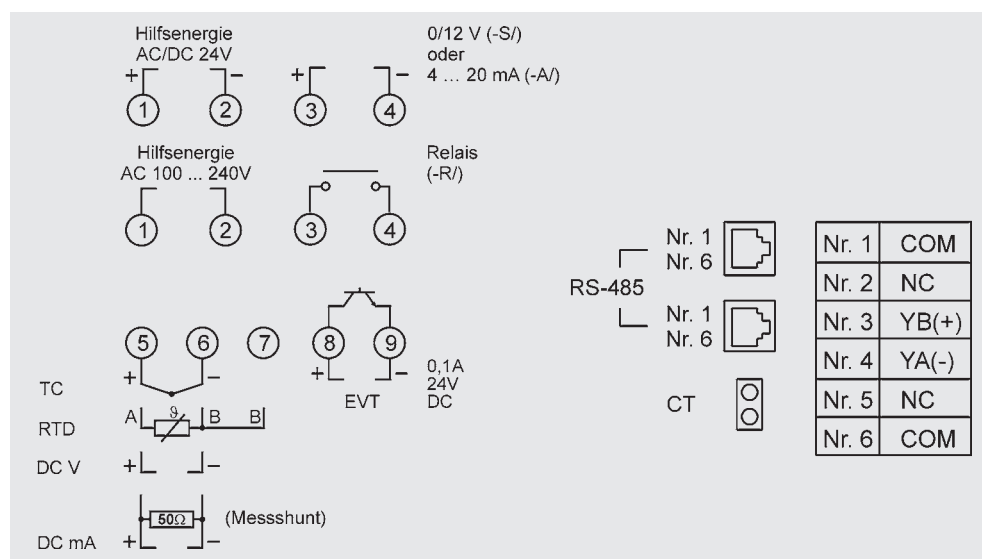
## Inputs of the temperature controller

| Input signals                    | Measuring span                             |                                            | Measuring error of the span in %                               |                                                    |
|----------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------------------------|----------------------------------------------------|
|                                  |                                            |                                            | Standard                                                       | Exceptions                                         |
| Current signals                  |                                            |                                            |                                                                |                                                    |
| 0 ... 20 mA, 4 ... 20 mA         | -1999 ... 9999 <sup>1)</sup>               |                                            | ±0.2 % ±1 digit                                                | -                                                  |
| Voltage signals                  |                                            |                                            |                                                                |                                                    |
| 0 ... 1 V, 0 ... 5 V, 0 ... 10 V | -1999 ... 9999 <sup>1)</sup>               |                                            | ±0.2 % ±1 digit                                                | -                                                  |
| 1 ... 5 V                        | -1999 ... 9999 <sup>1)</sup>               |                                            | ±0.2 % ±1 digit                                                | -                                                  |
| Thermocouples                    |                                            |                                            |                                                                |                                                    |
| Type K (NiCr-Ni)                 | -200 ... +1,370 °C<br>-199.9 ... +400.0 °C | -320 ... +2,500 °F<br>-199.9 ... +750.0 °F | ±0.2 % ±1 digit <sup>2)</sup><br>±2 K                          | ≤ 0 °C: ±0.4 % ±1 digit<br>≤ 0 °C: ±0.4 % ±1 digit |
| Type J (Fe-CuNi)                 | -200 ... +1,000 °C                         | -320 ... +1,800 °F                         | ±0.2 % ±1 digit <sup>2)</sup>                                  | ≤ 0 °C: ±0.4 % ±1 digit                            |
| Type R (PtRh-Pt)                 | 0 ... 1,760 °C                             | 0 ... 3,200 °F                             | ±0.2 % ±1 digit <sup>2)</sup>                                  | ≤ 200 °C: ±6 K                                     |
| Type S (PtRh-Pt)                 | 0 ... 1,760 °C                             | 0 ... 3,200 °F                             | ±0.2 % ±1 digit <sup>2)</sup>                                  | ≤ 200 °C: ±6 K                                     |
| Type B (PtRh-PtRh)               | 0 ... 1,820 °C                             | 0 ... 3,300 °F                             | ±0.2 % ±1 digit <sup>2)</sup>                                  | ≤ 300 °C: without details                          |
| Type E (NiCr-CuNi)               | -200 ... +800 °C                           | -320 ... +1,500 °F                         | ±0.2 % ±1 digit <sup>2)</sup>                                  | ≤ 0 °C: ±0.4 % ±1 digit                            |
| Type T (Cu-CuNi)                 | -199.9 ... +400.0 °C                       | -199.9 ... +750.0 °F                       | ±2 K                                                           | ≤ 0 °C: ±0.4 % ±1 digit                            |
| Type N (NiCrSi-NiSi)             | -200 ... +1,300 °C                         | -320 ... +2,300 °F                         | ±0.2 % ±1 digit <sup>2)</sup>                                  | ≤ 0 °C: ±0.4 % ±1 digit                            |
| Type PL-II                       | 0 ... 1,390 °C                             | 0 ... 2,500 °F                             | ±0.2 % ±1 digit <sup>2)</sup>                                  | -                                                  |
| Type C (W/Re5-26)                | 0 ... 2,315 °C                             | 0 ... 4,200 °F                             | ±0.2 % ±1 digit <sup>2)</sup>                                  | -                                                  |
| Resistance thermometer           |                                            |                                            |                                                                |                                                    |
| Pt100 (3-wire)                   | -200 ... +850 °C<br>-199.9 ... +850.0 °C   | -300 ... +1,500 °F<br>-199.9 ... +999.9 °F | ±0.1 % ±1 digit <sup>2)</sup><br>±0.1 % ±1 digit <sup>2)</sup> | -                                                  |
| JPt100 (3-wire)                  | -200 ... +500 °C<br>-199.9 ... +500.0 °C   | -300 ... +900 °F<br>-199.9 ... +900.0 °F   | ±0.1 % ±1 digit <sup>2)</sup><br>±1 K                          | -                                                  |

1) Adjustable decimal point

2) Referred to the measuring span in °C

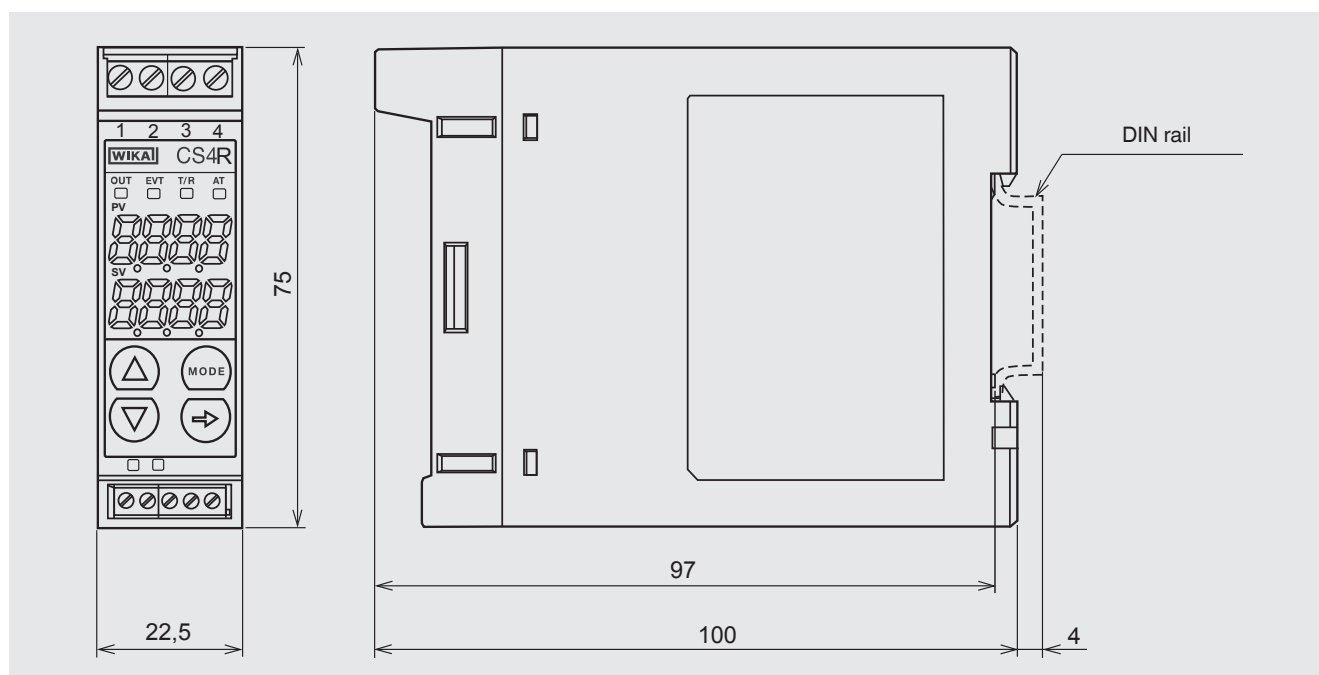
## Designation of connection terminals



### Legend:

- CT Input current transformer for heater burnout alarm
- EVT Output for alarm output 1 and heater burnout alarm
- (-R/) Control output, relay
- (-S/) Control output, logic level 0/12 V
- (-A/) Control output, 4 ... 20 mA analogue current signal
- TC Input thermocouple
- RTD Input resistance thermometer
- DC V Input voltage signal
- DC mA Input current signal
- RS-485 Serial interface RS-485

## Dimensions in mm



## Approvals

| Logo                                                                              | Description                                                                                                                                                                                                                                                                   | Country                     |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
|  | <b>EC declaration of conformity</b> <ul style="list-style-type: none"> <li>■ EMC directive 2004/108/EC<br/>EN 61326 emission (group 1, class B) and interference immunity (industrial application)</li> <li>■ Low voltage directive 2006/95/EC<br/>EN 61010-1:2010</li> </ul> | European Community          |
|  | <b>EAC</b> <ul style="list-style-type: none"> <li>■ Electromagnetic compatibility</li> <li>■ Low voltage directive</li> </ul>                                                                                                                                                 | Eurasian Economic Community |
|  | <b>GOST</b><br>Metrology, measurement technology                                                                                                                                                                                                                              | Russia                      |
|  | <b>BelGIM</b><br>Metrology, measurement technology                                                                                                                                                                                                                            | Belarus                     |

## Certificates (option)

- 2.2 test report
- 3.1 inspection certificate
- DKD/DAkkS calibration certificate

Approvals and certificates, see website

## Ordering information

Model / Control output / Power supply / Instrument configuration / Options

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