**JUMO GmbH & Co. KG**
Delivery address: Mackenrodtstraße 14,
36039 Fulda, Germany
Postal address: 36035 Fulda, Germany
Phone: +49 661 6003-0
Fax: +49 661 6003-607
e-mail: mail@jumo.net
Internet: www.jumo.net

**JUMO Instrument Co. Ltd.**
JUMO House
Temple Bank, Riverway
Harlow, Essex CM 20 2TT, UK
Phone: +44 1279 635533
Fax: +44 1279 635262
e-mail: sales@jumo.co.uk
Internet: www.jumo.co.uk

**JUMO Process Control, Inc.**
8 Technology Boulevard
Canastota, NY 13032, USA
Phone: 315-697-JUMO
1-800-554-JUMO
Fax: 315-697-5867
e-mail: info@jumo.us
Internet: www.jumo.us



# Electronic Thermostat TE-1


## Brief description

The TE-1 electronic thermostat is a temperature controller with ON/OFF action, in a housing for DIN rail or wall mounting. The relay at the controller output switches in accordance with the temperature at the probe (process value x) and the value that has been selected as the setpoint (w).

The setpoint is selected as an analog value on a scale, by means of a knob on the front of the controller. The knob is fitted with an adjustable stop for range restriction or limitation. An adjustable switching differential is a standard feature, as is zero-point adjustment.

Suitable probes that may be connected are platinum resistance sensors with a positive temperature coefficient to EN 60584 (Pt100) in 2-wire or 3-wire circuit, or thermocouples (NiCr-Ni) to EN 60584.

## Types

| **Typen** | for connection to | Switching action |
|---|---|---|
| **TE-1wO** | Pt100 resistance thermometer<br>as standard: 2-wire circuit | break action (SPST-NC) (standard)<br>relay de-energized at x ≥ w |
| **TE-1wS** | | make action (SPST-NO)<br>relay energized at x > w |
| **TE-1tO** | Thermocouple<br>NiCr-Ni K | break action (SPST-NC) (standard)<br>relay de-energized at x ≥ w |
| **TE-1tS** | | make action (SPST-NO)<br>relay energized at x > w |

| | | |
|---|---|---|
| **Extra codes** | **b3** | front-panel mounting by means of 2 screws |
| | **ka** | terminal cover, IP40 protection |
| | **sw** | dust-tight and water-jet proof housing, polycarbonate, IP65 protection |

## Technical data

**Electrical data**

| | | | |
|---|---|---|---|
| Supply voltage | as standard: | 230 V AC +10/-15%, 48 — 63 Hz<br>115 V AC +10/-15%, 48 — 63 Hz<br>24 V DC +10/-15%<br>other voltages on request | |
| Contact rating | 10 A, 250 V AC resistive load, 300000 operations at rated load<br>10 A, 24 V DC | | |
| Power drawn | max. 3 VA | | |
| Controller output | relay with floating changeover contact; for 3-wire circuit: only 1 break (SPST-NC) or 1 make (SPST-NO) | | |
| Electromagnetic compatibility | to EN 61326<br>interference emission: Class B, interference immunity: to industrial requirements | | |
| Electrical connection | via screw terminals, max. conductor cross-section: 4 $mm^2$ | | |
| Electrical safety | to EN 60730-1 | overvoltage category III<br>pollution degree 2 | for 24 V DC supply:<br>SELV and PELV operation |
| | | creepage distance equals air gaps:<br>mains supply to electronics and probe ≥<br>mains supply to relay ≥<br>relay to electronics and probe ≥ | <br>6 mm<br>3 mm<br>6 mm |

**JUMO GmbH & Co. KG**
Delivery address: Mackenrodtstraße 14,
36039 Fulda, Germany
Postal address: 36035 Fulda, Germany
Phone: +49 661 6003-0
Fax: +49 661 6003-607
e-mail: mail@jumo.net
Internet: www.jumo.net

**JUMO Instrument Co. Ltd.**
JUMO House
Temple Bank, Riverway
Harlow, Essex CM 20 2TT, UK
Phone: +44 1279 635533
Fax: +44 1279 635262
e-mail: sales@jumo.co.uk
Internet: www.jumo.co.uk

**JUMO Process Control, Inc.**
8 Technology Boulevard
Canastota, NY 13032, USA
Phone: 315-697-JUMO
1-800-554-JUMO
Fax: 315-697-5867
e-mail: info@jumo.us
Internet: www.jumo.us



**Measurement input: Pt100 resistance thermometer**

| **Control ranges** | Control range °C | Relay is de-energized at a probe temperature below: |
|---|---|---|
| | -50 to + 30 | - 85°C |
| | -20 to + 40 | - 45°C |
| | 0 to + 50 | - 25°C |
| | 0 to +100 | - 40°C |
| | 0 to +150 | - 65°C |
| | 0 to +200 | - 85°C |
| | 0 to +300 | -130°C |
| | 0 to +400 | -165°C |
| | 0 to +500 | -225°C |
| Probe cable error | When using a 2-wire temperature probe with a probe cable that is different from the standard types ( lead resistance RL = 165 mΩ ), there will be an error of about 1°C per 0.39 Ω change in lead resistance. This means that, if the probe cable is extended using a 2-core copper cable, the following error will occur: | |
| | Core cross-section | Temperature change per meter of cable |
| | 0.50 $mm^2$ | 0.18 °C/m |
| | 0.75 $mm^2$ | 0.12 °C/m |
| | 1.00 $mm^2$ | 0.09 °C/m |
| | 1.50 $mm^2$ | 0.06 °C/m |
| | In the case of a 3-wire circuit, the probe cable length is internally compensated. | |
| Measuring circuit monitoring | The resistance probe and the probe cable are monitored for break and short-circuit. In the event of a fault, the relay switches to the de-energized state. | |

**Measurement input: NiCr-Ni thermocouple**

| **Control ranges** | Control range °C | |
|---|---|---|
| | +200 to + 600 | |
| | +400 to + 800 | |
| | +600 to +1000 | |
| | +800 to +1200 | |
| Measuring circuit monitoring | The thermocouple and compensating cable are monitored for break. | |
| Temperature compensation | provided as standard | |

**Operating data**

| | |
|---|---|
| Switching point accuracy | ± 2% of control range span |
| Switching differential | adjustable from 0.25 to 5%, factory-set to minimum value |
| Zero-point correction | enables the optimum matching of the switching point and probe accuracy to the respective working point or range |
| Permissible ambient temperature | in operation -10 to +50°C |
| Permissible storage temperature | -40 to +75°C |
| Ambient temperature error | < 0.5% per 10 °C |
| Climatic conditions | relative humidity ≤ 75% annual mean, no condensation |

**Housing**

| | |
|---|---|
| Enclosure protection to EN 60529 | standard: IP20 |
| | with extra code ka: IP40 |
| | with extra code sw: IP65 |
| Housing | plastic housing, polycarbonate; color: light gray, RAL 7035 |
| Relay status indication | The yellow LED on the front indicates that the relay is energized. |
| Mounting | standard: on rail to EN 60715, 35 x 7.5 mm |
| Operating position | unrestricted |
| Weight | approx. 200 gm |

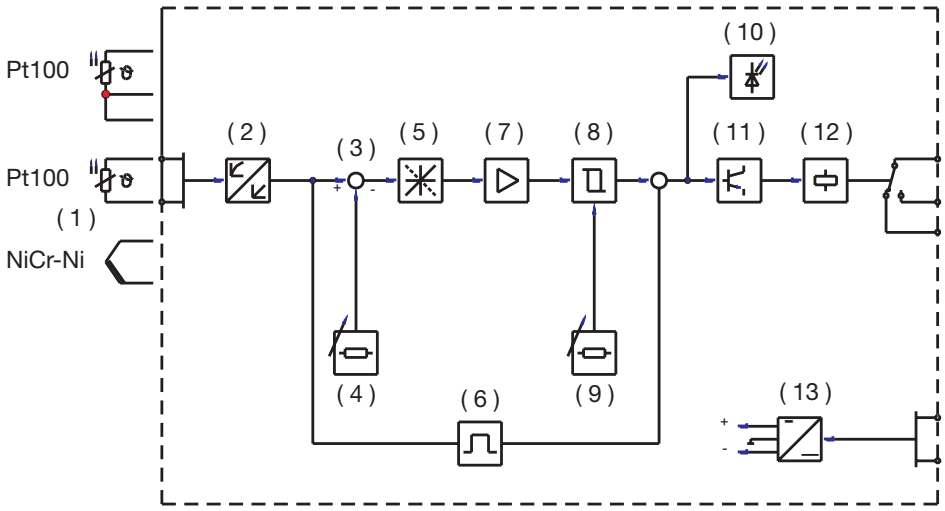
**JUMO GmbH & Co. KG**
Delivery address: Mackenrodtstraße 14,
36039 Fulda, Germany
Postal address: 36035 Fulda, Germany
Phone: +49 661 6003-0
Fax: +49 661 6003-607
e-mail: mail@jumo.net
Internet: www.jumo.net

**JUMO Instrument Co. Ltd.**
JUMO House
Temple Bank, Riverway
Harlow, Essex CM 20 2TT, UK
Phone: +44 1279 635533
Fax: +44 1279 635262
e-mail: sales@jumo.co.uk
Internet: www.jumo.co.uk

**JUMO Process Control, Inc.**
8 Technology Boulevard
Canastota, NY 13032, USA
Phone: 315-697-JUMO
1-800-554-JUMO
Fax: 315-697-5867
e-mail: info@jumo.us
Internet: www.jumo.us



# Block diagram




**Operation**

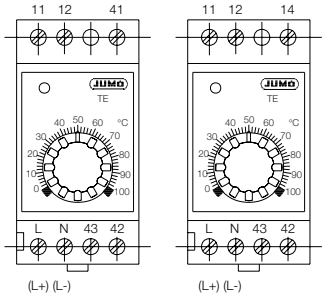
The sensor signal of the temperature probe ( 1 ) is linearized and amplified at the input stage ( 2 ) and reaches the comparator ( 3 ) as process value x. The comparator forms the difference between the process value x and the setpoint w that was set on the setpoint knob ( 4 ), resulting in the control deviation $x_w = x - w$.

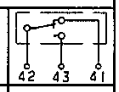
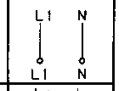
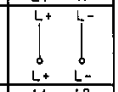
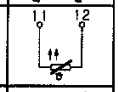
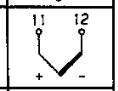
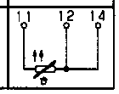
The contact action O or S is determined internally, through links ( 5 ). The difference signal produced during a control deviation acts through the integrated amplifier ( 7 ) on the subsequent trigger stage ( 8 ). The switching differential $x_{sd}$ of the trigger stage is adjusted by means of the potentiometer ( 9 ). The trigger output signal uses the transistor ( 11 ) to operate the relay, which has a floating changeover contact ( 12 ). In the case of type TE-1w in 3-wire circuit, only one make or one break contact is available. The “relay energized” status is indicated by the LED ( 10 ).

The measurement circuit monitor ( 6 ), which comes as standard, checks the probe and the probe cable for break or short-circuit. The voltage required to operate the modules is generated and stabilized in the power supply ( 13 ).

# Electrical connection

| Type TE-1 | Type TE-1w |
|---|---|
| as standard | 3-wire circuit |




| Connection for | Typ | Control status | Terminals | |
|---|---|---|---|---|
| Relay output (41 not applicable with 3-wire circuit) | O | x ≥ w* | 41 break (SPST-NC)<br>42 common<br>43 make (SPST-NO) |  |
| | S | x ≤ w | | |
| Supply | Code | | L1 line<br>N neutral |  |
| | AC | | | |
| | DC | | L+<br>L- |  |
| Resistance thermometer in 2-wire circuit | w | | 11<br>12 |  |
| Thermocouple (NiCr-Ni) | t | | 11<br>12 |  |
| Resistance thermometer in 3-wire circuit (Pt100) | w...-dl | | 11<br>12<br>14 |  |

* x = process value, w = setpoint

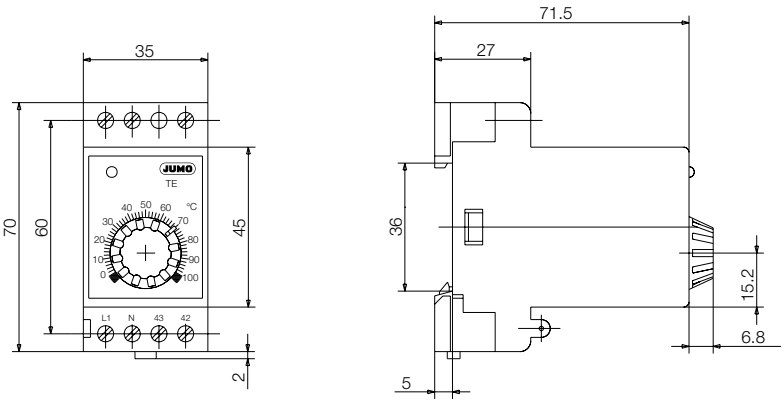
**JUMO GmbH & Co. KG**
Delivery address: Mackenrodtstraße 14,
36039 Fulda, Germany
Postal address: 36035 Fulda, Germany
Phone: +49 661 6003-0
Fax: +49 661 6003-607
e-mail: mail@jumo.net
Internet: www.jumo.net

**JUMO Instrument Co. Ltd.**
JUMO House
Temple Bank, Riverway
Harlow, Essex CM 20 2TT, UK
Phone: +44 1279 635533
Fax: +44 1279 635262
e-mail: sales@jumo.co.uk
Internet: www.jumo.co.uk

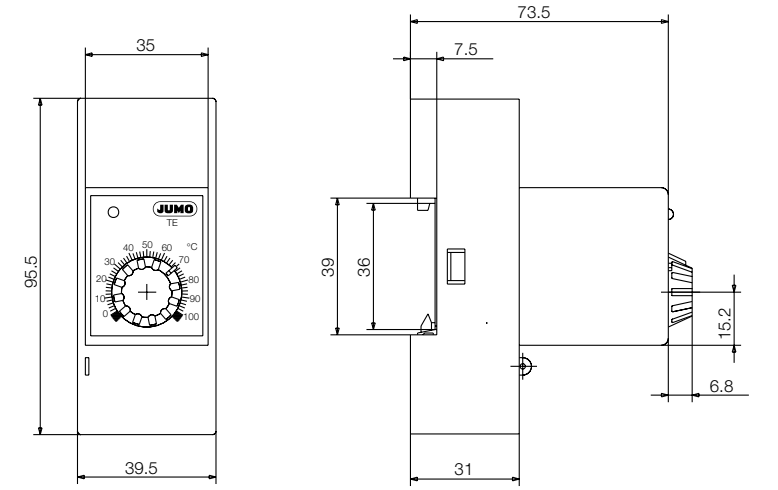
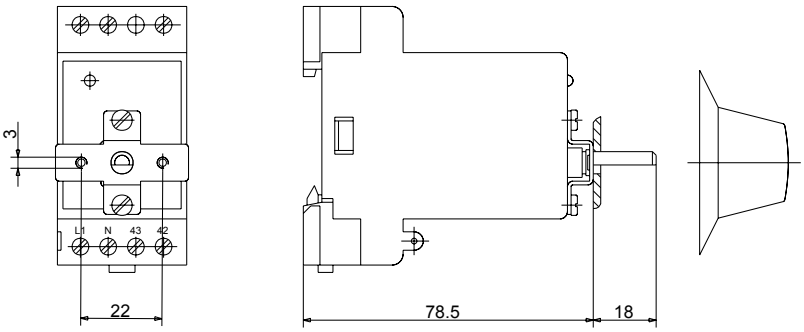
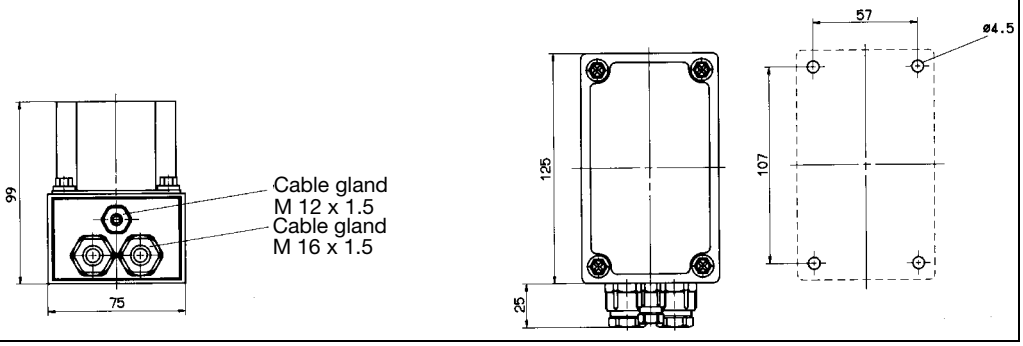
**JUMO Process Control, Inc.**
8 Technology Boulevard
Canastota, NY 13032, USA
Phone: 315-697-JUMO
1-800-554-JUMO
Fax: 315-697-5867
e-mail: info@jumo.us
Internet: www.jumo.us



# Dimensions

| | |
|---|---|
| Type TE-1<br>is standard |  |

**Extra code**

| | |
|---|---|
| ka<br>with terminal cover |  |
| b3<br>for front-panel mounting |  |
| sw<br>housing, polycarbonate<br>IP65 protection |  |

| | |
|---|---|
| Temperature probe | see Data Sheet 60.5521;<br>see sectional catalog 90 “Transducers” for additional temperature probes and styles |

**JUMO GmbH & Co. KG**
Delivery address: Mackenrodtstraße 14,
36039 Fulda, Germany
Postal address: 36035 Fulda, Germany
Phone: +49 661 6003-0
Fax: +49 661 6003-607
e-mail: mail@jumo.net
Internet: www.jumo.net

**JUMO Instrument Co. Ltd.**
JUMO House
Temple Bank, Riverway
Harlow, Essex CM 20 2TT, UK
Phone: +44 1279 635533
Fax: +44 1279 635262
e-mail: sales@jumo.co.uk
Internet: www.jumo.co.uk

**JUMO Process Control, Inc.**
8 Technology Boulevard
Canastota, NY 13032, USA
Phone: 315-697-JUMO
1-800-554-JUMO
Fax: 315-697-5867
e-mail: info@jumo.us
Internet: www.jumo.us



# Order details for the Electronic Thermostat TE-1

## Stock items:

(delivery 3 working days after receipt of order)

**Supply voltage 230 V AC +10/-15%, 48 — 63 Hz**

| Sales No. | Type | Control range °C | Probe input |
|---|---|---|---|
| 60/60001962 | TE-1w O | –50+30 | Pt100 in 2-wire circuit |
| 60/60001923 | TE-1w O | –20+40 | |
| 60/60001924 | TE-1w O | 0+50 | |
| 60/60001925 | TE-1w O | 0+100 | |
| 60/60001953 | TE-1w O | 0+150 | |
| 60/60001954 | TE-1w O | 0+200 | |
| 60/60001955 | TE-1w O | 0+300 | |
| 60/60001956 | TE-1w O | 0+400 | |
| 60/60001961 | TE-1w O | 0+500 | |
| 60/60002137 | TE-1t O | +200+600 | Thermocouple NiCr-Ni (Type K) |
| 60/60002138 | TE-1t O | +400+800 | |
| 60/60002139 | TE-1t O | +600+1000 | |
| 60/60002140 | TE-1t O | +800+1200 | |

## Non-stock items:

| Order code | | | | |
|---|---|---|---|---|
| 605501 | **(1)** | **Basic type** | | |
| | | TE-1 | | |
| | **(2)** | **Basic type extension** | | |
| 11 | | TE-1 wO with break action | for Pt100 in 2-wire circuit | standard |
| 12 | | TE-1 wS with make action | for Pt100 in 2-wire circuit | standard |
| 21 | | TE-1 wO with break action | for Pt100 in 3-wire circuit | |
| 22 | | TE-1 wS with make action | for Pt100 in 3-wire circuit | |
| 31 | | TE-1 tO with break action | for thermocouples NiCr-Ni | |
| 32 | | TE-1 tS with make action | for thermocouples NiCr-Ni | |
| | **(3)** | **Control ranges** | | |
| 011 | | -50 to 30°C | only with Pt100 resistance thermometer | |
| 013 | | -20 to 40°C | | |
| 021 | | 0 to 50°C | | |
| 025 | | 0 to 100°C | | |
| 027 | | 0 to 150°C | | |
| 028 | | 0 to 200°C | | |
| 030 | | 0 to 300°C | | |
| 031 | | 0 to 400°C | | |
| 032 | | 0 to 500°C | | |
| 086 | | 200 to 600°C | only with NiCr-Ni thermocouple | |
| 087 | | 400 to 800°C | | |
| 088 | | 600 to 1000°C | | |
| 089 | | 800 to 1200°C | | |
| | **(4)** | **Supply** | | |
| 02 | | 230 V AC +10/-15%, 48 — 63 Hz | | |
| 05 | | 115 V AC +10/-15%, 48 — 63 Hz | | |
| 29 | | 24 V DC +10/-15% | | |
| | **(5)** | **Extra codes** | | |
| 706 | | **b3** front-panel mounting by 2 screws M3 | | |
| 717 | | **ka** terminal cover, IP40 protection | | |
| 718 | | **sw** dust-tight and waterjet-proof housing, IP65 protection | | |

**Order code**

| (1) | | (2) | | (3) | | (4) | | (5) |
|---|---|---|---|---|---|---|---|---|
| 605501 | / | . . | - | . . . | - | . . | / | . . . |

**Order example**

| | | | | | | |
|---|---|---|---|---|---|---|
| 605501 | / | 11 | - | 025 | - | 02 | / | 706 |

TE-1 wO with break action, for Pt100 in 2-wire circuit
control range 0 to +100°C
230 V AC +10/-15%, 48 — 63 Hz
front-panel mounting by 2 screws M3