- **For control of heating or cooling in zone control systems**
- **0...10 VDC, 1 mA or 3-point 24VAC, 1A**
- **Setpoint 0...40 °C**
- **P or PI mode selection**
- **Occupancy mode control**
- **Change-over function**
- **External sensor TG-K340B  (Optional)**
- **Auto change-over sensor TG-A130B  (Optional)**

## Technical data

| | | |
|---|---|---|
| **Electrical data** | Nominal voltage | AC 24V  50/60 Hz |
| | Power supply range | AC 19.2 ... 28.8V |
| | Power consumption | 2VA |
| **Functional data** | **Input** | |
| | External sensor | Type NTC, 10kOhm@40°C, TG-K340B [Optional] |
| | Change-over | Potential-free relay contact or |
| | | NTC-sensor, TG-A130B (0...30°C) [Optional] |
| | Occupancy | Potential-free contact |
| | **Output** | |
| | Control signal | 0...10 V DC, 1 mA or 3-point AC 24V, 1A |
| | **Settings** | |
| | Setpoint | 0...40°C (Base setpoint value is 22°C) |
| | P-band | 0.5...50 K |
| | Reset-time(I-time) | 2 or 20 min, see jumper setting below |
| | TrimPot(Occupancy) | +/-6°C |
| **Working conditions** | Degree of protection | IP20 |
| | CE | CENELEC    EN 61000-1 and EN 61000-3 |
| | Ambient conditions | 0 ... +50°C |
| | Non-operating temperature | -10 ... +60°C |
| | Ambient humidity range | max. 90% r.h. , non-condensing |
| **Dimensions** | Dimensions (L x H x D) | 86 x 86 x 30 (mm) |

## Function selection (jumpers)

Fig.1
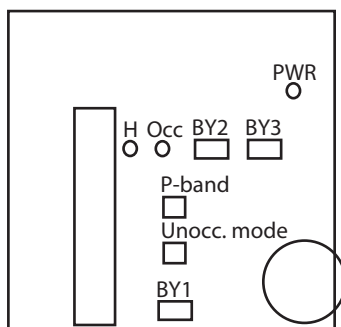


| Jumper BY1 | Right | = Internal sensor (**factory setting**) |
|---|---|---|
| | Left | = External sensor |
| Jumper BY2 | Closed | = Reset time (I-time) is 2 min |
| | Open | = Reset time (I-time) is 20 min(**factory setting**) |

BY2 setting vaild only when jumper BY3 is set to PI-function

| Jumper BY3 | Closed | = P-function |
|---|---|---|
| | Open | = PI-function (**factory setting**) |

To obtain open position place the jumper on one pin only.

# Room controller T24A1T

## Product function

**Sensor**
The controller has a built-in temperature sensor element. External sensor TG-K340B can be connected. See function selection for jumper setting.
For auto change-over function, sensor TG-A130B should be used.

**Occupied/Unoccupied mode**
The setpoint can be adjusted in accordance to an input for occupancy. On open contact, the thermostat setpoint is determined by the setpoint adjuster (occupied mode). On closed contact, the setpoint is determined by an internal trimpot (unoccupied mode). The base setpoint value is 22 °C.. It can be reset depending on the setting of the potentiometer "Unoccupied", and is adjustable with a span of +/-6°C. **[Factory setting = 3 (25°C, 19°C]**

| Position | 0 | 1 | 2 | **3** | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Cooling setpoint | 22 | 23 | 24 | **25** | 26 | 27 | 28 °C |
| Heating setpoint | 22 | 21 | 20 | **19** | 18 | 17 | 16 °C |

**Change-over**
An input can be connected to a NTC-sensor (TG-A130B) or a closing relay contact.
On closed contact the controller works with heating output and on open contact cooling.
When using sensor for auto change-over, sensor should be mounted on the surface of pipe in order to give accurate temperature values. When the temperature at the sensor exceeds 22 °C, the output function is switched to heating and when the temperature falls below 18 °C the output is set to cooling.
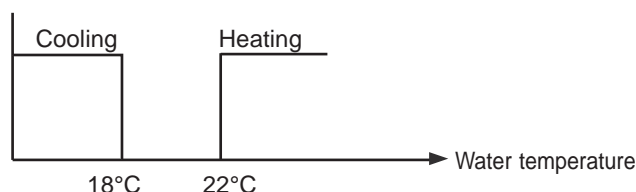


**Indications**
Green LED (PWR) : for activated output (see Fig. 1)
Red LED (H) : lit for heating, not lit for cooling
Green LED (Occ) : lit for occupied mode, not lit for unoccupied mode.

**Setpoint**
Adjust with knob that extends from the lower right of the casing. The knob setting can be mechanically fixed with a latchscrew located under the front cover.

**Setpoint calibration**
The knob rim with the scale can be detached from the hub and remounted in new position. Grip across the rim and pull out at the same time as maintaining an inward pressure on the hub. When re-mounting, make sure the parts snap together properly.
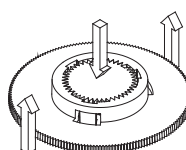


## Dimensions[mm] & Terminals
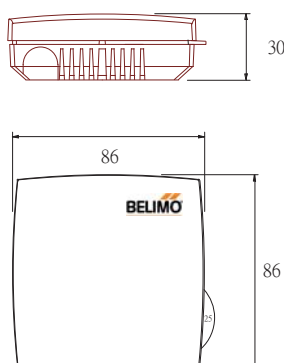


| 1 | AC 24V supply |
|---|---|
| 2 | System neutral |
| 3 | 3-point output  - neutral |
| 4 | 3-point output  - open |
| 5 | 3-point output  - close |
| 6 | 0…10V DC control output |
| 7 | Signal neutral |
| 8 | Change-over input |
| 9 | Occupancy input |
| 10 | External sensor |

| Terminals | 7 & 8 | 7 & 9 | 7 & 10 |
|---|---|---|---|
| Function | Change-over | Occupancy | External sensor |

| Terminals 7& 8 | Short | Open | Sensor |
|---|---|---|---|
| Function | Heat | Cool | Automatic control |

## Overview of product

LCD temperature controller EXT-T24-D201 provides the foundation for modern single room concepts.
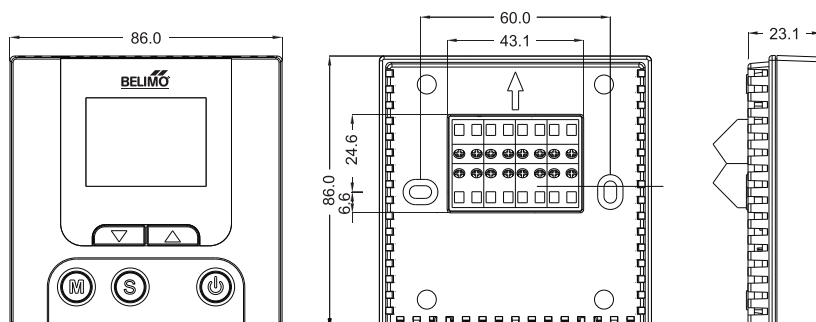
## Features

- LCD with green backlight
- Suits 2-pipe system
- Proportional output, DC 2...10V or 0-20mA (600Ω)
- Adjustable P-band, I-time and setpoint range
- Sleeping mode available
- Last status memory function
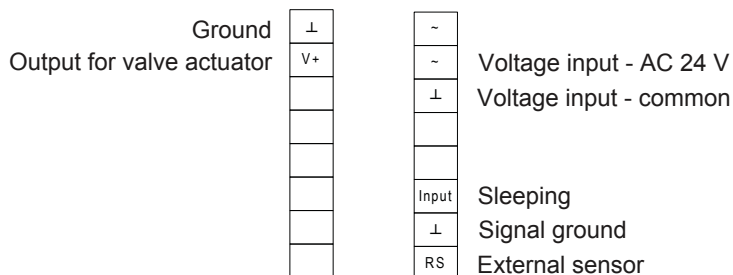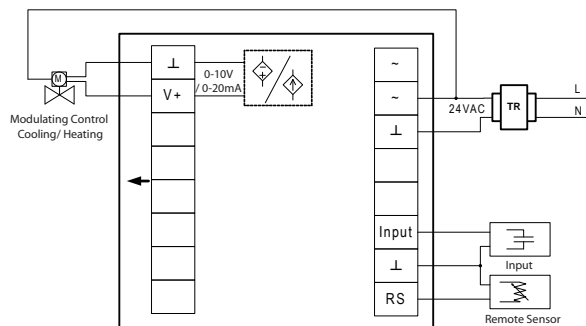- Low temperature protection
- External sensor included

## Technical data

| | |
|---|---|
| Norminal voltage | AC 24V 50/60Hz (±10%, AC 21.6V...29.7V) |
| Power consumption | <1W@AC 24V |
| Output(s) | DC 2...10V or 0...20mA (600Ω) |
| Built-in sensor | NTC thermistor, 10kΩ@25°C |
| External sensor | NTC thermistor, probe type 10k@25°C |
| Temperature range | Display : 0...99.5°C<br>Setpoint : 0...99.5°C, 0.5K per step |
| Mode | On / Off / Sleeping<br>Cooling / Heating |
| Proportional band | 1K...20K adjustable, 0.5K per step (factory default 2K) |
| Integral time | 10...300 seconds adjustable, 10s per step (factory default 90 seconds) |
| Display offset | ±20K adjustable, 0.1 per step (factory default 0) |
| Heating setpoint<br>Cooling setpoint | 0...99.5°C adjustable, 0.5°C per step (factory default 35°C)<br>0...99.5°C adjustable, 0.5°C per step (factory default 5°C) |
| Sleeping mode setpoint range | Cooling : 0...99.5°C (factory default 28°C)<br>Heating : 0...99.5°C (factory default 7°C) |
| Low temperature protection | When thermostat is switched off and ambient temperature < 5°C, thermostat automatically starts in heating mode until ambient temperature rise to 7°C. |
| Connection | Screw terminals, maximum 1.0mm² or 18 AWG |
| Ambient humidity | Max. 90% RH, non-condensing |
| Body material | PC + ABS retardant material |
| Weight | 225g |
| Dimensions (LxWxH) | 86 x 86 x 23mm |
| Mounting | Wall mounted, holes separate 60mm vertically, 2x screws provided |
| Degree of protection | IP20 |
| Agency approval | CE mark compliant to EMC Directive |

## Dimensions

## Wiring diagram



Ground
Output for valve actuator

Voltage input - AC 24 V
Voltage input - common

Sleeping
Signal ground
External sensor
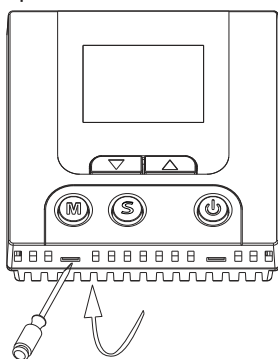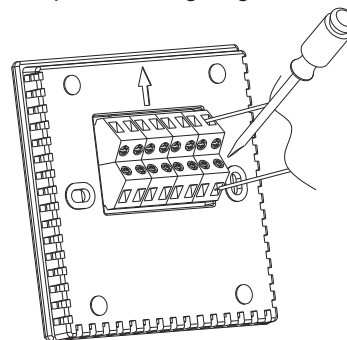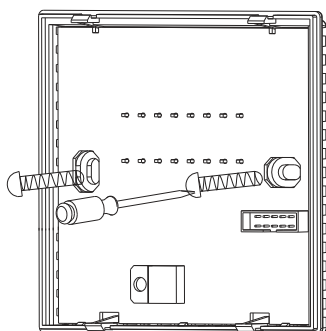
## Installation

1. Open the back panel with screwdriver.
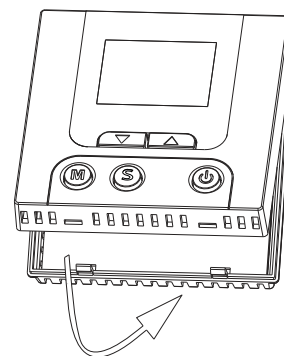


2. Connect the wires per the wiring diagram.



3. Secure the base with the screws provided.



4. Reattach the front panel.



## Setup menu

| | |
|---|---|
| 1. On/ Off | Press " ⏻ " buttons to turn on; press " ⏻ " again to turn off. |
| 2. Setpoint | Press " Ⓢ " button to display the set point, press " ▼ " to reduce the setpoint, press " ▲ " to increase the setpoint, the setpoint step is 0.5°C, the setpoint will be confirmed automatically after 5 seconds. |
| 3. Mode | With thermostat on, press " Ⓜ " to change the working mode – Cooling " ❄ ", Heating " ✳ ". |
| 4. Sleep mode | Press " Ⓜ " button for 3 seconds till " ☾ " display, there is a number of count down in the center of LCD. Use " ▲ " or " ▼ " to adjust the desired sleep time: the max. = 48 hours; thermostat will return to the working status after 5 seconds, " ☾ " is flashing to start counting down. The setpoint should be replaced by the sleep setpoint. |
| 5. Exit setup menu | When thermostat get into Sleep function, " ☾ " will flash, press " ▲ " or " ▼ " to quit. |
| 6. Keypad lock | Press " ▲ " and " ▼ " for 10 seconds till to " 🔒 " display to activate, under this function, any keypad is locked. Press " ▲ " and " ▼ " for 10 seconds till " 🔒 " disappear to quit the function. |

## Parameter setting

With thermostat off, press "Ⓜ" for 10 seconds to enter menu to set the parameters. It will confirm itself 20 seconds later after setting and return to Off state.

### Parameter table

| | Description | Default | Range | Step |
|---|---|---|---|---|
| 1 | Power on status (0: Off; 1: On; 2: Last status) | 2 | 0 - 2 | |
| 2 | N/A | | | |
| 3 | N/A | | | |
| 4 | Sensor selection (0: Internal; 1: External) | 1 | 0 - 1 | |
| 5 | Temperature format (0: Celsius; 1: Fahrenheit) | 0 | 0 - 1 | 0.1 |
| 6 | Temperature calibration | 0 | -20.0 - +20.0 | 0.1 |
| 7 | Minimum setpoint | 5℃/41℉ | 0 - 99.5 | 0.5 |
| 8 | Maximum setpoint | 35℃/96℉ | 0 - 99.5 | 0.5 |
| 9 | N/A | | | |
| 10 | Heating & Auto sleep setpoint | 7℃/45℉ | 0 - 99.5 | 0.5 |
| 11 | Cooling sleep setpoint | 28℃/82℉ | 0 - 99.5 | 0.5 |
| 12 | N/A | | | |
| 13 | Input Signal Mode<br>0: Invalid<br>1: N/A<br>2: thermostat will be sleep without input signal<br>3: thermostat will be Off without input signal | 0 | 0 - 3 | |
| 14 | Heating integral time | 90 sec. | 10 - 300 sec. | 10 sec. |
| 15 | Cooling integral time | 90 sec. | 10 - 300 sec. | 10 sec. |
| 16 | Valve mode (0: Modulation ; 1: On/Off) | 0 | 0 - 1 | |
| 17 | Valve status as turn off (0: Close; 1:Hold; 2: Open ) | 0 | 0 - 2 | |
| 18 | Valve Modulation direction(0:10V Open; 1:10V Close) | 0 | 0 - 1 | |
| 19 | Valve Modulation minimum signal | 4 Bit | 0-128Bit(5V/10mA) | 0.04V/Bit(0.08mA/Bit) |
| 20 | Valve Modulation proportional | 2 | 1 - 20 | 0.5 |
| 21-27 | N/A | | | |

## Switch

There is a 5-pole DIP switch on PCB. The meaning is below:
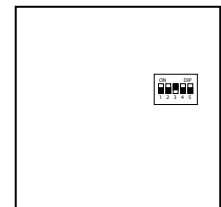
| Location | Pole | Default value |
|---|---|---|
| 1 | N/A | N/A |
| 2 | Valve Modulation  0 - 20mA | Off |
| 3 | Valve Modulation  2 - 10VDC | On |
| 4 | N/A | N/A |
| 5 | N/A | N/A |

## External sensor

The probe type sensor is included in the
EXT-T24-D201 temperature controller.



## Sensor specifications

| | |
|---|---|
| Sensing Element | NTC Thermistor, 10 kΩ@25ºC, See Table 1 for Characteristics |
| Range | -40°C...105°C |
| Maximum Length of Connecting Wires | 1.5 m |
| Ambient / Storage Temperature Limits | -10°C...40°C (avoid air corrosion or sunlight) |
| Ambient / Storage Humidity | ≤75% RH |
| Dimensions | See Fig. 1: Dimensions in mm |



2651 26 # 105ºC white double row wire
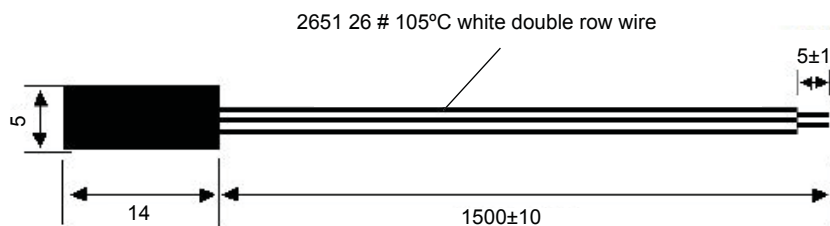
5±1

5

14

1500±10

Fig. 1

## Table 1 - Resistance versus Temperature

| Temperature °C | Resistance Ω | Temperature °C | Resistance Ω | Temperature °C | Resistance Ω | Temperature °C | Resistance Ω |
|---|---|---|---|---|---|---|---|
| 0 | 32116 | 11 | 18892 | 21 | 11939 | 31 | 7716 |
| 1 | 30570 | 12 | 18026 | 22 | 11418 | 32 | 7396 |
| 2 | 29105 | 13 | 17204 | 23 | 10921 | 33 | 7090 |
| 3 | 26399 | 14 | 16423 | 24 | 10418 | 34 | 6798 |
| 4 | 26399 | 15 | 15681 | 25 | 10000 | 35 | 6520 |
| 5 | 25150 | 16 | 14976 | 26 | 9571 | 36 | 6255 |
| 6 | 23965 | 17 | 14306 | 27 | 9164 | 37 | 6002 |
| 7 | 22842 | 18 | 13669 | 28 | 8775 | 38 | 5760 |
| 8 | 21776 | 19 | 13063 | 29 | 8405 | 39 | 5529 |
| 9 | 20764 | 20 | 12487 | 30 | 8052 | 40 | 5309 |
| 10 | 19783 | | | | | | |