

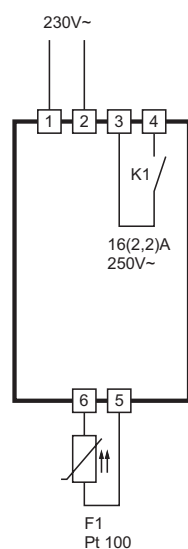
Temperature controller

Order number: 900197.008

As of: 21.09.2021 V2.01



Wiring diagram



Product description

The ST64-31.10 controller was developed for simple thermostatic applications. Due to its round housing, it can also be used where mechanical controllers were previously in use. The controller is supplied with a voltage of 230 V AC. The built-in relay has a resistive load capacity of 16 A. Inductive loads can be switched up to 2.2 A.

Sensor: Pt100-2L

Measuring range: -80...400 °C

Front size: 64mm round

Installation size: 60mm round

Protection class: Front IP65

Connection: flat plug 6.3mm

Control keys



Key 1: UP

Pressing this key increases the parameter or parameter value.



Key 2: DOWN

Press this key to reduce the parameter or parameter value.

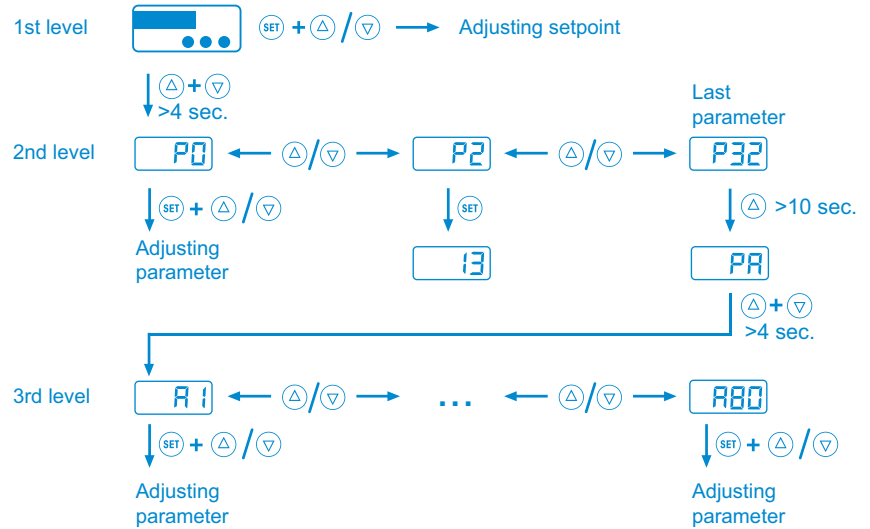
In case of alarm, the buzzer function is switched off by pressing the key.



Key 3: SET

While this key is pressed, the setpoint is displayed. This key is also used for parameter setting.

Operating levels:



1st control level:

Adjusting the setpoints

The setpoint can be selected directly by pressing the SET key. It can be adjusted by additionally pressing the UP or DOWN key.

2nd control level (P parameters):

Adjusting control parameters

By pressing the UP and DOWN keys simultaneously for at least 4 seconds, you can access a parameter list for control parameters (starting at **P0**).

Use the UP key to scroll up the list and the DOWN key to scroll down again.

Pressing the SET key displays the value of the respective parameter. By additionally pressing the UP or DOWN key the value can be adjusted.

After releasing all keys, the new value is stored permanently. If no key is pressed for more than 60 seconds, the system automatically returns to the basic status.

3rd control level (A parameters):

Adjusting control parameters

The third operating level can be reached by first going to the second level and scrolling through the parameter list to the highest parameter. Afterwards only the UP key is pressed for at least 10 seconds. The message **PR** appears in the display.

Then press the UP and DOWN keys simultaneously for at least 4 seconds to access the parameter list of the third operating level (starting at **R1**).

Use the UP key to scroll up the list and the DOWN key to scroll down again. If the SET key is pressed, the value of the respective parameter is displayed and the value can be adjusted by additionally pressing the UP or DOWN key.

After releasing all keys, the new value is stored permanently. If no key is pressed for more than 60 seconds, the system automatically returns to the basic status.

1st operating level (Setpoint)

| Parameter | Functional description | Adjustment range | Standard value | Custom value |
|-----------|----------------------------|------------------|----------------|--------------|
| S1 | Setpoint control contact 1 | P4...P5 | 0.0 °C | |

2nd control level (P parameters):

| Parameter | Functional description | Adjustment range | Standard value | Custom value |
|-----------|------------------------------|---------------------------------------|----------------|--------------|
| P0 | Display actual value | - | - | |
| P2 | Hysteresis control contact 1 | 0.1...99.0 K | 1.0 K | |
| P4 | Lower setpoint limit | -99 °C...P5 | -99 °C | |
| P5 | Upper setpoint limit | P4...999 °C | 999 °C | |
| P6 | Actual value correction | -10.0...+10.0 K | 0.0 K | |
| P19 | Key lock | 0: not locked 1: locked | 0 | |
| P30 | Lower alarm limit value | -99...999 °C/K | -99 °C | |
| P31 | Upper alarm limit value | -99...999 °C/K | 999 °C | |
| P32 | Hysteresis alarm, one-sided | 0.1...99.9 K | 1.0 K | |
| d0 | Defrosting interval | 0...99 h 0 = no defrosting | 0 | |
| d2 | Defrost temperature limit | -99.0...999.9 °C | 10.0 °C | |
| d3 | Defrost time limit | 0...99 min. 0 = without time limit | 30 min | |

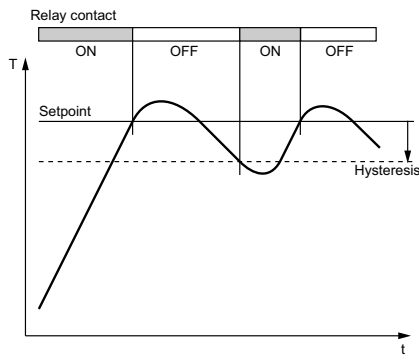
3rd control level (A parameters):

| Parameter | Functional description | Adjustment range | Standard value | Custom value |
|-----------|--|--|------------------------|--------------|
| R1 | Switching mode control contact | 0: heating contact 1: cooling contact 2: alarm function 3: alarm function inverted | 0 if Pt100 1 if PTC | |
| R3 | Function at sensor error (if heating or cooling contact) | 0: relay off 1: relay on | 0 | |
| R8 | Actual value - display mode (all parameter values are displayed with 0.1 °C) | 0: integer 1: Resolution 0.5 °C 2: Resolution 0.1 °C | 1 | |
| R19 | Parameter lock | 0: no locking 1: A parameters locked 2: A and P parameters locked | 0 | |
| R30 | Function Alarm contact | 0: Boundary value alarm, relative 1: Boundary value alarm, absolute 2: Range alarm, relative 3: Range alarm, absolute | 0 | |
| R31 | Special function on alarm | 0: not active 1: Display flashes 2: Buzzer active 3: Error display (F3..), display flashes and buzzer active 4: as 3, remember | 0 | |
| R32 | Display mode | 0: actual value display 1: setpoint display | 0 | |
| R40 | Hysteresis mode for heating / cooling function | 0: symmetrical 1: one-sided | 1 | |
| R50 | Minimum action time control contact "On" | 0...400 s | 0 s | |
| R51 | Minimum action time control contact "Off" | 0...400 s | 0 s | |
| R54 | Delay after "Power ON" | 0...400 s | 0 s | |
| R56 | Alarm suppression after "Power ON" or setpoint switching | 0...60 min | 20 min | |
| R60 | Sensor type | 11: Pt100 2-wire 21: PTC 22: PT1000 2-wire | 11 | |
| R70 | Software filter | 1: not active 1...128: mean value over 1...128 measured values | 8 | |
| R80 | Temperature scale | 0: Fahrenheit 1: Celsius | 1 | |
| Pro | Program version | - | - | |

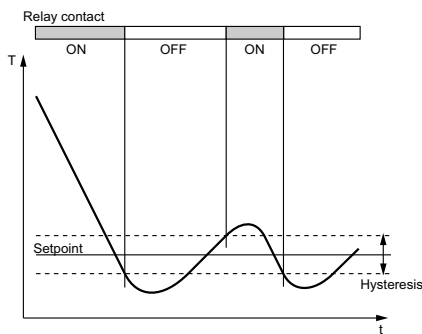
**2nd operating level,
(P parameters):**

P2: Hysteresis control contact 1

The hysteresis can be set symmetrically or on one side at the setpoint (see **R40**, **R41**). In the case of one-sided setting, the hysteresis is effective downwards for the heating contact and upwards for the cooling contact. In the case of symmetrical hysteresis, half the value of the hysteresis is effective above and below the switching point.



Heating controller, one-sided hysteresis



Cooling controller, symmetrical hysteresis

P4: Lower setpoint limitation

P5: Upper setpoint limit

The adjustment range of the setpoint can be limited upwards and downwards. This prevents the end user of a system from setting impermissible or dangerous setpoints.

P6: Actual value correction

The value set here is added to the measured sensor value. The modified measured value is displayed and serves as the basis for the control.

P19: Key lock

The key lock allows the operating keys to be locked. When locked, the setpoint cannot be changed using the keys. If an attempt is made to adjust the setpoint despite the keys being locked, the message "----" is displayed.

P30: Lower alarm limit value

P31: Upper alarm limit value

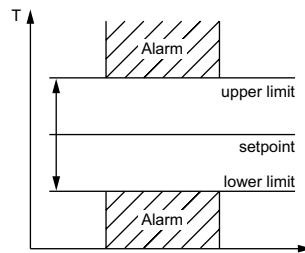
The Alarm output is a boundary or range alarm with one-sided hysteresis (see parameter **P32**).

The limit values can be relative for both boundary and range alarm, i.e. they can run with

setpoint S1, or absolute, i.e. independent of Setpoint S1.

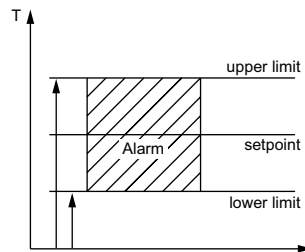
The hysteresis acts unilaterally inwards for boundary alarms and outwards for range alarms.

Function as boundary value alarm:



If the actual value is outside the set temperature limits, i.e. above the upper limit value or below the lower limit value, the alarm contact is active.

Function as band alarm:



Reversed switching behaviour as with the boundary value alarm. The alarm contact is activated when the actual value is within the set limit values.

P32: Hysteresis alarm, one-sided

The hysteresis is set to the set limit value on one side. It is effective depending on the alarm definition (see pictures).

d0: Defrost interval

The "Defrost interval" determines the time after which a defrosting operation is initiated. After each defrost start this time is reloaded and processed.

If no defrost is desired, defrost can be disabled by setting **d0**=0. Then only manual defrost initiated by the UP key is possible.

d2: Defrost temperature

A defrosting operation is ended when the temperature set in **d2** is exceeded at the cold room sensor.

As the appliance does not have an active defrosting device, defrosting is also ended by exceeding a time limit (see parameter **d3**).

d3: Defrost time limit

A defrosting operation cannot take longer than the time set here. If the time is exceeded, the defrost will be stopped. With setting **d3**=0 the time supervision is inactive.

**3rd operating level,
(A parameters):**

The following values can change the device properties and must therefore be carried out with the greatest care:

R1: Switching direction control contact

The switching direction for the controller is adjustable as heating, cooling or alarm function. With the heating controller the respective contact is closed if the actual temperature is lower than the setpoint temperature. With the cooling controller it is the other way round. With **R1** = 2, the relay K1 is assigned the function alarm and then has two switching points.

R3: Function of control contact in case of sensor error

In case of sensor error, the control contact takes on the state set here. If an error is detected in the parameter memory (display **EP**) and therefore the stored settings cannot be used, all relays are set to the de-energized state.

R8: Display mode

The actual value can be output as an integer or with one decimal place in the resolution 0.5°C or 0.1°C. When displayed with a resolution of 0.5°C, the actual value is rounded up or down. In principle, all parameter settings and setpoints are displayed with a resolution of 0.1°C.

R19: Parameter lock

This parameter allows the individual parameter levels to be locked step by step. When the A level is locked, only parameter **R19** itself can be changed.

In the locked state, the parameters are displayed, but they cannot be changed using the keys. If an attempt is made to change the parameters despite the keys being locked, the message "----" appears in the display.

R30: Function alarm contact

The Alarm output evaluates an upper and a lower limit value (see parameters **P30** and **P31**). Here you can select whether the alarm is active when the temperature is within these two limits or whether an alarm is given when the temperature is outside. In case of sensor error, the alarm is activated regardless of this setting. The exit can also be inverted with parameter **R1**, so that it functions like a release

R31: Special function on alarm

Here you can select whether the buzzer should sound in case of an alarm and whether the display should flash. The alarm can be acknowledged with the DOWN key, so the buzzer can be switched off despite the alarm function being active.

R32: Type of display

With **R32**=0 the actual value is displayed, while with **R32**=1 the setpoint S1 is permanently displayed.

R40: Hysteresis mode control contact

With this parameter it can be selected whether the hysteresis at the respective switching point is symmetrical or one-sided. A one-sided programmed hysteresis is set below the setpoint for the heating function and above the setpoint for the cooling function; there is no difference for symmetrical hysteresis.

R50: Minimum action time contact 'On'

R51: Minimum action time contact 'Off'

These parameters allow to delay the switching on or off of the respective output contact to reduce the switching frequency. The set time defines the total minimum duration of a switch-on or switch-off phase. This time is also effective when configured as alarm contact.

R54: Contact delay after "Power ON"

This parameter enables a delayed switch-on of the control contact after the supply voltage is switched on. Thus, an overload of the power supply system by simultaneously switching on many consumers can be avoided.

R56: Alarm suppression time after "ON" or setpoint switching

After switching on the control system, a certain amount of time elapses until the working temperature is reached, especially in cooling systems. This would result in an unwanted alarm message.

For this reason, parameter **R56** can be used to set an expiration time during which no alarm is reported.

R60: Sensor selection

Depending on the hardware used, not all sensor types can be selected.

R70: Software filter

This parameter refers to the change dynamics of the measured value acquisition. Smaller values lead to a faster adaptation to actual value changes, larger values result in a stronger damping of the change dynamics. The filter acts within the measured value formation and thus influences the actual value valid for the display and for the control..

R80: Temperature scale

The display can be switched between Fahrenheit and Celsius. By changing over, the parameters and setpoints retain their numerical value and setting range. (Example: A controller with a setpoint of 0°C is changed to Fahrenheit. The new setpoint is then interpreted as 0°F, which corresponds to a temperature of -18°C).

| Message | Cause | Measures |
|------------------|--|--|
| F IL | Sensor error, short circuit | Check sensor or sensor terminal |
| F IH | Sensor error, sensor break | Check sensor or sensor terminal |
| F3L | Boundary limit alarm (actual value < P30) | see parameters P30, P31, P32, R30, R31 |
| F3H | Boundary limit alarm (actual value > P30) | see parameters P30, P31, P32, R30, R31 |
| F3 | Range alarm (P30 < actual value < P31) | see parameters P30, P31, P32, R30, R31 |
| --- | Key lock active | see parameter P19 or R19 |
| Flashing display | Temperature alarm (see R31) | |
| EP | Data loss in the parameter memory (control contact 1 and 2 are current-free) | If the error cannot be eliminated by switching the power off and on, the controller must be repaired |

Sensor error messages are stored and displayed even after the cause of the error has been eliminated. The error message can be deleted by acknowledging it with the DOWN key.

Technical data

| | |
|---------------------------|--|
| Measuring input | F1: Resistance thermometer Pt100 or PTC Measuring range PTC: -50...130 °C Pt100: -80...400 °C Measuring accuracy: +/- 1K or +/- 0,5% of scale range, which ever is greater The actual value display can be in whole numbers or with 0,1K or 0,5K resolution |
| Outputs | K1: Relay, normally-open contact, 16(2.2)A 250V, permanent current max. 5(2.2)A, limited by connectors and/or conductive strips |
| Display | One 3-digit LED-Display, height 13 mm, colour red |
| Power supply | 230V~ 50/60 Hz, power consumption max. 20 mA |
| Connectors | Pins 1 to 4: flat plug connectors 6.3 x 0.8 mm Pins 5 and 6: flat plug connector 2.8 x 0.5 mm |
| Ambient conditions | Storage temperature: -20 °C ... +70 °C Working temperature: 0 ... 55 °C Relative humidity: max. 75 %, no condensation |
| Weight | ca 200 g, without sensor |
| Enclosure | Front IP65 |
| Installation data | Front panel: circular, 64 mm diameter Panel cut-out: circular, 60 mm diameter Depth: approx. 62 mm incl. terminals Mounting: metal fixing strap |

