

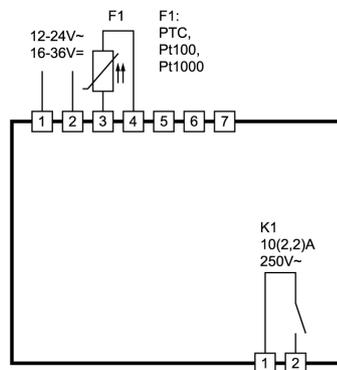
ST501-QA1TV.07

Temperature controller with timer

Order number 900219.005



Wiring diagram



Product description

The unit is developed with a front control surface as plug-finished installation unit and fulfils the function of a temperature controller, which can be switched on and/or off with the integrated week-timer. Daily, the programming cycle can be pre-set with three switch on and off times. The programming cycle runs through all set positions in a continuous loop. The display indicates the current selection.

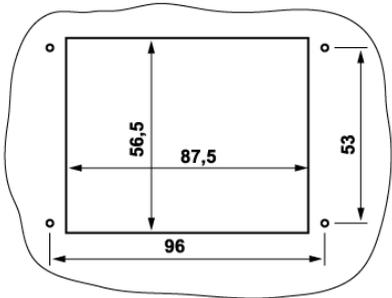
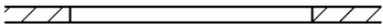
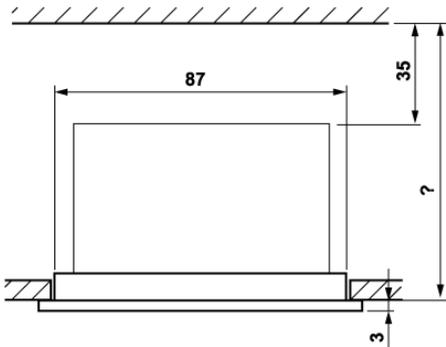
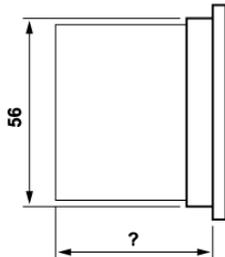
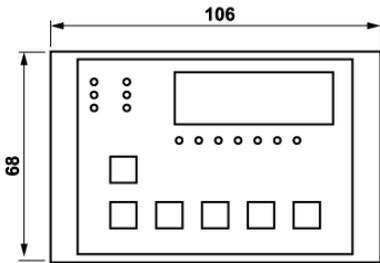
Measurement range: dependent on type of sensor

Front size: 106mm x 68mm

Panel cut-out: 87,5mm x 56,5mm

Connector: screw terminal

ST 501 ...



SOFTWARE .07

Adjustment options



Key UP

Pressing this key you can increase the parameter or parameter value or scroll the parameter list.



Key DOWN

Pressing this key you can decrease the parameter or parameter value or scroll the parameter list.



Key SET TIME

By pressing this key a specific value is indicated and can be adjusted in conjunction with the UP and DOWN key. Like this the actual time of day can be adjusted. When in programming cycle the switching times are adjusted this way.

Within the programming cycle the time settings of the previous day can be copied to the selected day by additionally pressing the PROG key. While doing so the SET TIME key is to be pressed first, and then the PROG key in addition.



Key PROG

If this key is pressed for 3 seconds the programming cycle of the switching times is accessed, always starting with parameter "H0". Within the programming cycle the time settings of the previous day can be copied to the selected day by additionally pressing the SET TIME key. While doing so the SET TIME key is to be pressed first, and then the PROG key in addition. The display shows "CPY".



Key "All On"

With this key the switching circle can be activated independently of the programmed switching times. The display indicates this condition with LED3. By pressing this key again, the switching times are reactivated.

After mains off the controller returns to the same condition as before.



Key Standby

Pressing this key switches off or on the controller. In standby mode, all exits are switched off, the LEDs are off and the display shows "AUS".

The key can be deactivated.

First control level:

Adjustment cycle for time of day and weekday

Selection and adjustment:

By pressing the SET TIME key the time of day can be adjusted by pressing the UP or DOWN key in addition. After releasing all key the new value is saved. To adjust the weekday you have to adjust the time further than midnight.

Parameter setting of the control setpoint

Pressing the UP or DOWN key for 3 seconds, the setpoint shows on the display and can be adjusted with the keys UP and DOWN. The setpoint is stored if none of the keys is pressed for 3 seconds.

Parameter	Function description	Adjustment range	Standard setting	Custom setting
S1	Setpoint	P4...P5	0.0°C	

Second control level:

Programming cycle for switching times

Selection and adjustment:

After access to the programming cycle by pressing the PROG key for 3 seconds the parameter list can be scrolled with the UP and DOWN key in the following order:

Display	LED
H0	0: switching times not activated 1: switching times activated
H11	Monday ON1
H12	Monday OFF1
H13	Monday ON2
H14	Monday OFF2
H15	Monday ON3
H16	Monday OFF3
H21	Tuesday ON1
H22	Tuesday OFF1
H23	Tuesday ON2
H24	Tuesday OFF2
H25	Tuesday ON3
H26	Tuesday OFF3
H31	Wednesday ON1
H32	Wednesday OFF1
H33	Wednesday ON2
H34	Wednesday OFF2
H35	Wednesday ON3
H36	Wednesday OFF3
H41	Thursday ON1
H42	Thursday OFF1
H43	Thursday ON2
H44	Thursday OFF2
H45	Thursday ON3
H46	Thursday OFF3
H51	Friday ON1
H52	Friday OFF1
H53	Friday ON2
H54	Friday OFF2
H55	Friday ON3
H56	Friday OFF3
H61	Saturday ON1
H62	Saturday OFF1
H63	Saturday ON2
H64	Saturday OFF2
H65	Saturday ON3
H66	Saturday OFF3

H71	Sunday ON1
H72	Sunday OFF1
H73	Sunday ON2
H74	Sunday OFF2
H75	Sunday ON3
H76	Sunday OFF3
H0	0: switching times not activated 1: switching times activated

By pressing the SET TIME key the respective time is indicated and can be adjusted by pressing the UP or DOWN key in addition. After releasing all key the new value is saved.

With parameter H0 the timer can be switched off without changing the switching times.

Adjustment notes:

The programming takes place by analogy with a mechanical timer where a mark can (but not has to) be set for switch on and switch off timers. The infinite loop of the programming cycle permits a quick access to the parameters for Saturday and Sunday by pressing the DOWN key.

Note that no switching takes place if the adjusted switch-on and switch-off time of an output is the same on the same day. A overlapping of the time values is possible but the respective switching time couple becomes ineffective.

Between "23:59" and "00:00" the switching times have the special position "----". With this setting the respective switching time is deactivated and has no more effect on the switching condition of the respective output. This is used to have outputs switched on until next day for example.

If in the programming cycle the SET TIME key and the PROG key are pressed at the same time, all times of the day before are copied to the selected day and the display indicates "CPY". Note that the key SET TIME has to be pressed first and after that the PROG key.

Leaving programming cycle:

The programming cycle is leaved if the PROG key is pressed again for 3 seconds or if no key is pressed for min. 60 seconds.

Third control level

Setting of control parameters

Simultaneously pressing the UP and DOWN key for at least 4 seconds opens a parameter list containing control parameters.

With the UP and DOWN keys the list can be scrolled in both directions.

Pressing the SET TIME key will give you the value of the respective parameter. Pressing also the UP or DOWN key at the same time the value can be adjusted.

Return to the initial position takes place automatically, if no key is pressed for 60 seconds.

Parameter	Function description	Adjustment range	Standard setting	Custom setting
P0	Actual value	-		
P2	Hysteresis contact K1	0.1... 99.9 K	1.0 K	
P4	Control range limitation – minimum setpoint	-99°C...P5	-99°C	
P5	Control range limitation – maximum setpoint	P4...999°C	999°C	
P6	Actual value correction	-20.0...+20.0 K	0.0 K	
P19	Key-lock	0: no key-lock 1: key-lock	0	
P30	Lower alarm value	-99 ... 999°C/K	-99.0°C	
P31	Upper alarm value	-99 ... 999°C/K	100.0°C	
P32	Hysteresis alarm circuit	0.1... 99.9 K	1.0 K	

Parameter description:

P0: Actual value

The here indicated temperature presents the actual measured value. If the control setpoint is indicated by the help of parameter A32, the actual value can only be seen with this parameter.

P2: Hysteresis contact K1

The hysteresis can be set symmetrically or one-sided at the setpoint (see A40).

At one-sided setting, the hysteresis works downward with heating contact and upward with cooling contact. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point (see fig. 1 and 2).

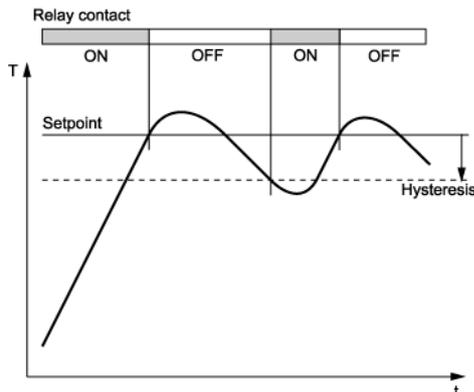


Fig. 1: Heating controller, one-sided hysteresis

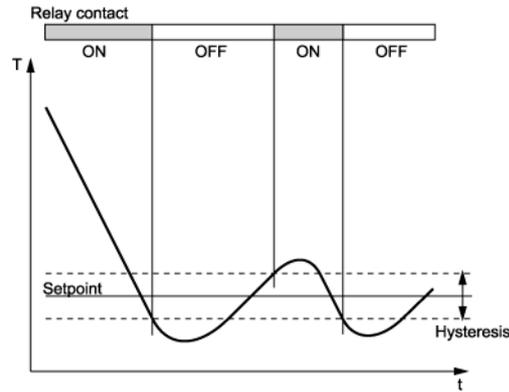


Fig. 2: Cooling controller, symmetrical hysteresis

P4: Control range limitation – minimum setpoint

P5: Control range limitation – maximum setpoint

The adjustment range of the setpoint can be limited in both directions. This is to prevent the end user of a unit from setting inadmissible or dangerous setpoints.

P6: Actual value correction

This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The regulation measure value is increased or decreased by the here adjusted value.

P19: Key-lock

The key-lock allows blocking of the control keys. In locked condition parameter adjustments with keys is not possible. At the attempt to adjust the parameters despite key-lock the message "===" appears in the display.

P30: Lower alarm value

P31: Upper alarm value

The exit alarm is a boundary alarm or a range alarm with one-sided hysteresis (see parameter P32). Both at the boundary alarm and the range alarm, limit values can be relative, i.e. going along with the setpoint S1/S1', or absolute, i.e. independent of the setpoint S1/S1'. At boundary alarm the hysteresis works one-sided inwardly, and at range alarm outwardly.

P32: Hysteresis alarm circuit

Hysteresis is set one-sided at the adjusted limit value. It becomes effective depending on alarm definition.

Third control level, (A-parameter):

Selection and adjustment

Access to the third control level is granted when selecting the last P-parameter on the second control level. Continue to press the UP key for approximately 10 seconds until "PA" appears. Continue to press the UP key and additionally press the DOWN key for about 4 seconds and the first A-parameter of the third control level is indicated.

With the keys UP and DOWN you can scroll the list in both directions. Pressing the SET TIME key will give you the value of the respective parameter. By pressing the UP or DOWN key at the same time the value can be adjusted.

Return to the initial position takes place automatically, if no key is pressed for 60 seconds, or by simultaneously pressing the UP and DOWN key for approx. 4 seconds.

Parameter	Function description	Adjustment range	Standard setting	Custom setting
A1	Switch mode contact K1	0: heating contact 1: cooling contact	0	
A3	Function of contact K1 at sensor error	0: relay off 1: relay on	0	
A8	Display mode (all parameter indications are presented in 0,1°K)	0: integrals 1: decimals in 0.5°C 2: decimals in 0.1°C	1	
A19	Parameter lock	0: no lock 1: A-parameter locked 2: A- and P-parameter locked	0	
A30	Function alarm exit	0: Boundary alarm, relative 1: Boundary alarm, absolute 2: Range alarm, relative 3: Range alarm, absolute 4: Boundary alarm, relative, alarm contact inverted	0	
A31	Special function at boundary or range alarm	0: no special function 1: flashing display 2: buzzer 3: flashing display and buzzer 4: like 3, buzzer can be cancelled 5: like 4, buzzer restarts after 10 min. 6: like 4, buzzer restarts after 30 min	0	
A32	Setpoint display	0: display shows actual value 1: display shows setpoint S1	0	
A33	Type of setpoint S1'	0: not activated 1: relative to setpoint S1 2: absolute (freely adjustable)	0	
A40	Hysteresis mode contact K1	0: symmetrically 1: one-sided	1	
A50	Minimum action time contact K1 "On"	0...999 sec.	0 sec.	
A51	Minimum action time contact K1 "Off"	0...999 sec.	0 sec.	
A54	Delay after "Power-on"	0...999 sec.	0 sec.	

Parameter	Function description	Adjustment range	Standard setting	Custom setting
A56	Alarm suppression after "Power-On"	0...999 min.	0 min.	
A60	Sensor type	11: PT100 two-wire 21: PTC 22: PT1000 two-wire	21	
A70	Software filter	1: inactive Average value with 2: 2 measuring values 4: 4 measuring values 8: 8 measuring values 16: 16 measuring values 32: 32 measuring values 64: 64 measuring values	4	
A80	Temperature scale	0: Fahrenheit 1: Celsius	1	
A87	Function key Standby	0: no function 1: controller On/Off (Standby)	1	
Pro	Program version	-	-	

Parameter description:

The following values can change the equipment characteristics and are therefore to be set with utmost care.

A1: Switch mode contact K1

The switch mode for the relays, i.e. cooling or heating function, can be programmed independently at works. Heating function means that the contact opens as soon as the setpoint is reached, thus power interruption. At cooling function the contact closes, if the actual value is above the required setpoint. (see fig. 1 + 2)

A3: Function of contact K1 at sensor error

At sensor error the selected relay falls back into the condition pre-set here. If there is a data-loss in parameter memory (display indicates "EP") contact K1 is switched off.

A8: Display mode

The value can be indicated in integrals or with decimals in 0.5°K or 0.1°K. At indication in 0.5°K the value is rounded up or down. In general, all parameter indications are presented in 0.1°K.

A19: Parameter lock

This parameter enables locking of each parameter level. If third level is locked, only parameter A19 may be changed.

A30: Function alarm exit

The alarm exit evaluates an upper and a lower limit value (see parameters P30 and P31), whereas a selection is possible as to whether the alarm is active if the temperature lies within these two limits, or whether the alarm is released if the temperature lies beyond them. In the case of sensor error, the alarm is activated independently of this adjustment. The exit can also be inverted, so that it functions like a release.

A31: Special function at boundary or range alarm

Here can be selected whether, in the case of an alarm, the indication to flash and/or the buzzer is to start. Sensor alarm (display F1L or F1H) is indicated independently thereof by flashing display and the buzzer.

A32: Setpoint display

A32=0 indicates the actual value, A32=1 statically indicates the setpoint S1 or S1' in the display. Therefore, the current actual value can only be indicated with parameter P0.

A33: Adjustment of setpoint S1' (not available on all types of controllers)

By closing switching input E1, setpoint S1 can be switched to a setpoint S1'. Setpoint S1' can be either relative to setpoint S1 or an independent, freely adjustable, control setting.

The setpoint S1' can only be accessed if input E1 is closed.

A40: Hysteresis mode contact K1

These parameters allow selection as to whether the hysteresis values which are adjustable with P32, are set symmetrically or one-sided at the respective switching point. At symmetrical hysteresis, half of the hysteresis' value is effective below and half of the value above the switching point. The one-sided hysteresis works downward with heating contact and upward with cooling contact (see fig. 1 + 2).

A50: Minimum action time contact K1 "On"**A51: Minimum action time contact K1 "Off"**

These parameters permit a delay in switching on/off the relay in order to reduce the switching frequency. The adjusted time sets the entire minimum time period for a switching-on or switching-off phase.

A54: Delay after "Power-on"

This parameter allows a switching-on delay of relays after switching-on the mains voltage. This delay corresponds with the time set here.

A56: Alarm suppression after "Power-On"

This parameter allows a switching-on delay of the alarm contact after switching on the mains voltage or setpoint change-over. This delay corresponds with the time set here.

A60: Sensor type

These parameter permits selection of the sensor type, if the needed hardware prerequisites are available.

A70: Software filter

With several measuring values, it is possible to obtain an average value. This parameter can determine by how many measured values an average value is to be formed. If a sensor with a very fast reaction to external influences is used, an average value ensures a calm signal process.

A80: Temperature scale

Indication can be switched between Fahrenheit and Celsius. At conversion, the parameters and setpoints maintain their numerical value and adjustment range. (Example: A controller with the desired value of 0°C is switched to Fahrenheit. The new desired value is then interpreted as 0°F, which corresponds to a temperature of -18°C).

NOTE: Indication limits with °F can be smaller than the actual measuring range!

A87: Function Standby Key

The following functions are available:

- 0: the respective key has no function
- 1: the controller is switched to standby mode

Error messages and status display

Message	Cause	Error elimination
F1L	Sensor error, short-circuit at sensor F1	Check sensor
F1H	Sensor error, open-circuit at sensor F1	Check sensor
---	Key-lock active	Change parameter P19 or A19
display flashes	Temperature alarm at too high or too low temperature (if activated) see A31	
rC	Data loss in real time clock chip	Setting the clock
rF	Real time clock chip fault	Controller must be repaired
EP	Data loss at parameter memory	Controller must be repaired

Technical data of ST501-QA1TV.07

Measuring input:

F1: Temperature sensor:

PTC (KTY81-121)	Measuring range	-50°C...+150°C
Pt1000 2-wire		-99°C...+300°C
Pt100		-80°C...+400°C

Measuring accuracy: $\pm 0,5K \pm 0.5\%$ at 25°C, without sensor

$\pm 1,0K \pm 0.5\%$ over entire temperature range (0...55°C), without sensor

Output

K1: Relay, normally-open contact, 10(2.2)A 250V

Display

One 4-digit LED-display, height 13 mm, for time indication, red

12 LEDs for status display, red

LED1: control circuit 1 is "on"

LED2: week timer and control circuit 1 are "on"

LED3: Key "All On" is activated (see key description)

Power supply

12...24 V AC (50/60 Hz) or 16...36V DC

Ambient conditions

Storage temperature: -20...+70 °C

Operating temperature: 0...+55 °C

Relative Humidity: max. 75% without dew

Weight

ca. 160g

Connectors

Screw terminal 7-pole, spacing 5mm, for cable up to 1,5mm²

Screw terminal 2-pole, spacing 5mm, for cable up to 1,5mm²

Internal battery

Lithium battery, 3 V, for buffering the time. With an ambient temperature of 25 °C the time is saved for several years after disconnection from power supply.

Enclosure

Front IP65, IP00 from the back

Installation data

Unit is to be installed in an instrument panel.

Front size: 106 x 68 mm

Panel cut-out: 87.5 x 56.5 mm

Installation depth: ca. 45 mm