

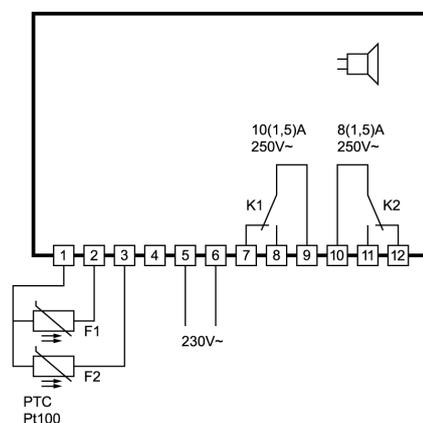
ST503-QE1TA.25

Two-channel temperature controller

Order number 900219.055



Wiring diagram



Product description

Its simple handling and robust structure prepare the two-channel temperature controller with 4-digit LED display, 6 keys and two relays for various employment. Channel selection and setpoint default are directly accessible with respectively assigned keys. A selective activation of the channels is possible with the standby key. The freely programmable general functions qualify the ST503 for a broad application area.

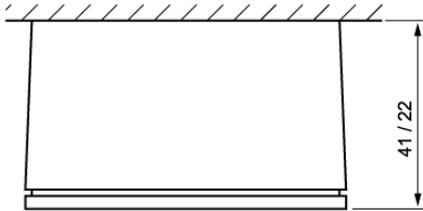
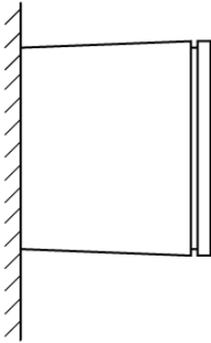
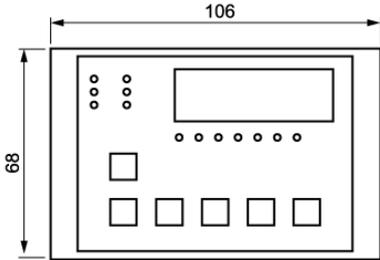
Measuring range: dependent on the type of sensor

Front size: 106mm x 68mm

Depth: 41mm

Connector: screw terminal

ST 503 ...



SOFTWARE .25

Adjustment options



Key 1: UP

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



Key 2: DOWN

Pressing this key you can decrease the parameter or parameter value or scroll the parameter list. At alarm the buzzer function can be switched off with this key.



Key 3: SET 2

Shortly pressing this key switches the display over to control circuit 2. Longer pressing indicates the setpoint and/or the parameters for control circuit 2.



Key 4: Standby 2

Shortly pressing this key switches the display over to control circuit 2. Longer pressing switches control circuit 2 to standby mode.



Key 5: SET 1

Shortly pressing this key switches the display over to control circuit 1. Longer pressing indicates the setpoint and/or the parameters for control circuit 1.



Key 6: Standby 1

Shortly pressing this key switches the display over to control circuit 1. Longer pressing switches control circuit 1 to standby mode.

The LEDs "SET1" and "SET2" below the digital display indicate which control circuit is visible in the display. Either the actual value of the temperature is indicated or the actual setpoint (see parameter A32)

Control circuit	1	2
LED	„SET 1“	„SET 2“
Key SET	Key 5	Key 3
Key Standby	Key 6	Key 4
Setpoint	S1/S1'	S2/S2'
Relay	K1	K2

Both control circuits operate independently of each other and are effective even if the respective control circuit is not visible in the display.

By shortly pressing key 3 (SET2) or key 4 (Standby 2) the display indicates control circuit 2, whereas shortly pressing key 5 (SET1) or key 6 (Standby 1) indicates control circuit 1.

If one control circuit is switched off by the respective standby key the still active control circuit is indicated automatically. If this control circuit is switched off too, both LEDs "SET1" and "SET2" light up. The LEDs "1" and "2" indicate the actual condition of the output relays K1 and K2. The LED "3" light up if there is an alarm in one of the control circuits. LED "3" can not be switched off manually, it is switched off as soon as the cause of the alarm is eliminated.

First control level:

Adjusting the main setpoint

Pressing the SET1 or SET2 key, the setpoint of the respective control circuit shows on the display. If the setpoint is to be changed, the SET key is to be kept pressed while adjusting the setpoint with the keys UP and DOWN. Both setpoints are independently adjustable and effect only the corresponding relay (see table on previous page).

With appropriate settings of parameters A33 and A81 a setpoint switch-over (function “night time reduction”) can be realised by means of the switching input. This function is only available if the controller is equipped with required hardware.

The setpoint S1' (if available) can be adjusted in the same way. If setpoint S1' is activated it is indicated and relevant for the control in case of closed switching input.

Parameter	Function description	Adjustment range	Standard setting	Custom setting
Control circuit 1 (effects relay K1):				
S1	Sollwert	P4...P5	0.0 °C	
S1'	If A33≠0 and A81=2:setpoint at closed switching input E1	-99...+99.9K if [A33=1] P4...P5, if [A33=2]	0.0 °C/K	
Control circuit 2 (effects relay K2):				
S2	Sollwert	P4...P5	0.0 °C	
S2'	If A33≠0 and A81=2:setpoint at closed switching input E2	-99...+99.9K if [A33=1] P4...P5, if [A33=2]	0.0 °C/K	

Second control level (P parameters):

Setting of control parameters

Simultaneously pressing the UP and DOWN key for at least 4 seconds opens a parameter list containing the control parameters of the respective control circuit shown in the display (indicated with LEDs “SET1” and “SET2”). With the UP and DOWN keys the list can be scrolled in both directions. Pressing a SET 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	0.1 ... 99.0 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 °C	
P31	Upper alarm value	-99...999°C/K	999 °C	
P32	Hysteresis alarm circuit	0.1 ... 99.9 K	1.0 K	
d0	Defrosting interval	0: no defrosting 1...99h	0	
d2	Defrosting temperature	-99...999°C	10.0°C	
d3	Defrosting time limit	0: no time limit 1...99 min	30 min	

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: Hysterese contact K1

The hysteresis can be set symmetrically or one-sided at the setpoint (see A40, A41).

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).

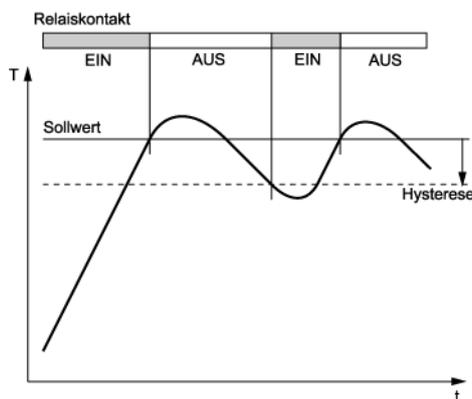


Fig. 1: Heating controller, one-sided hysteresis

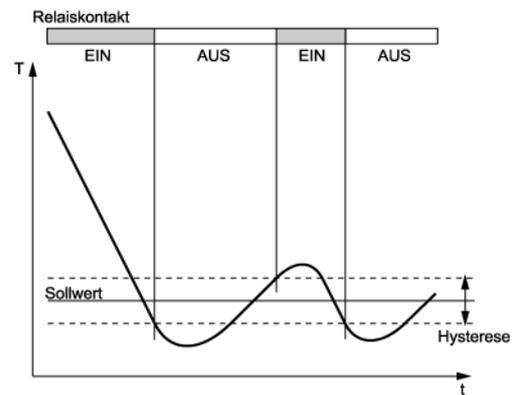


Fig. 2: Cooling controller, symmetrical hysteresis

P4: Control range limitation (S1 and S2) – minimum setpoint

P5: Control range limitation (S1 and S2) – maximum setpoint

The adjustment range of the setpoints S1 and S2 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 (see fig. 3-6).

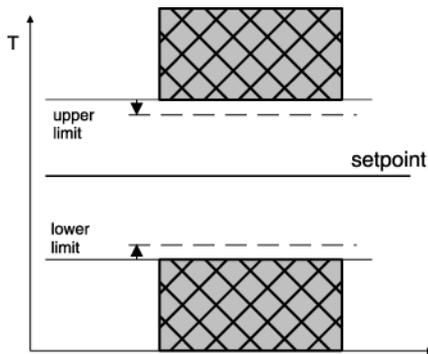


Fig. 3: Boundary alarm, alarm contact normal
 A30=0 limits relative
 A30=1 limits absolute

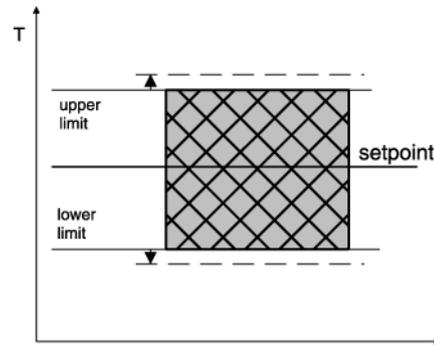


Fig. 4: Range alarm, alarm contact normal
 A30=2 limits relative
 A30=3 limits absolute

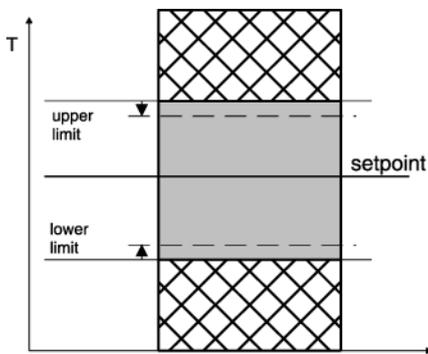


Fig. 5: Boundary alarm, alarm contact inverts
 A30=4 limits relative
 A30=5 limits absolute

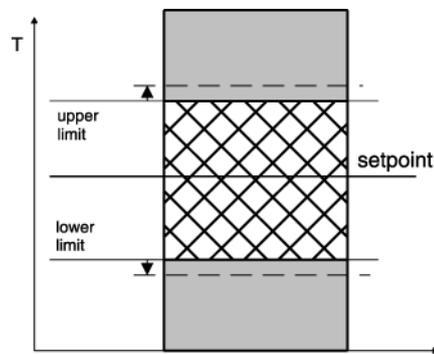
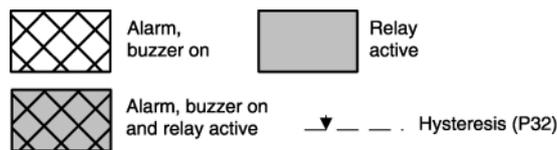


Fig. 6: Range alarm, alarm contact inverts
 A30=6 limits relative
 A30=7 limits absolute



P32: Hysteresis alarm circuit

Hysteresis is set one-sided at the adjusted limit value. It becomes effective depending on alarm definition (see fig. 3-6).

d0: Defrosting interval

The "defrosting interval" defines the time, after which a defrosting process is started. After each defrosting start, this time is reset and runs the next interval.

d2: Defrosting temperature limit

This permits to terminate defrosting when the adjusted desired temperature value is reached. The defrosting time set with "d3" nevertheless runs at the same time, i.e. it terminates the defrosting process in case the defrosting temperature is not reached.

d3: Defrosting time limit

After the here set time the defrosting process is terminated.

Third control level, (A parameters):

Setting of control parameters

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 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 2: alarm contact	0	
A3	Function at sensor error	0: relay off 1: relay on	0	
A5	Selection setpoint 2 or DeltaW contact K2	0: operation with setpoint 1: operation with DeltaW	1	
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 5: Boundary alarm, absolute, alarm contact inverted 6: Range alarm, relative, alarm contact inverted 7: Range alarm, absolute, 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, cancelled buzzer restarts after 10 min. 6: like 4, cancelled buzzer restarts after 30 min	0	
A32	Setpoint display	0: display shows actual value 1: display shows setpoint S1 (S1') or setpoint S2 (S2')	0	

Parameter	Function description	Adjustment range	Standard setting	Custom setting
A33	Type of setpoint S1' resp. S2' (setpoint reduction)	0: not activated 1: relative to setpoint S1 resp. S2 2: absolute (freely adjustable)	1	
A40	Hysteresis mode	0: symmetrically 1: one-sided	1	
A50	Minimum action time contact K1 "On"	0...600 sec.	0 sec.	
A51	Minimum action time contact K1 "Off"	0...600 sec.	0 sec.	
A54	Delay after "Power-on"	0...600 sec.	0 sec.	
A56	Alarm suppression after "Power-On" or setpoint switch over	0...60 min.	0 min.	
A60	Sensor type	11: PT100 2-wire 21: PTC 22: PT1000 2-wire	11	
A70	Software filter	1: not active Average value with : 2: 2 measuring values (ca. 0,8s) 4: 4 measuring values (ca. 1,6s) 8: 8 measuring values (ca. 3,2s) 16: 16 measuring values (ca. 6,4s) 32: 32 measuring values (ca. 12,8s) 64: 64 measuring values (ca. 25,6s)	8	
A80	Temperature scale and display when in Standby-Mode	0: Fahrenheit ("AUS") 1: Celsius ("AUS") 2: Fahrenheit ("OFF") 3: Celsius ("OFF")	1	
A81	Function input E1	0: no function 1: controller On/Off (Standby) 2: setpoint S1' or S2' activated	0	
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 relay, 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 relay falls back into the condition pre-set here. If there is a data-loss in parameter memory (display indicates "EP") both contacts K1 and K2 are switched off.

A5: Selection setpoint 2 or DeltaW

This parameter determines whether the setpoints for control circuit 1 and 2 independently adjustable (A5=0) or whether they are tied with one another via a switching offset DeltaW (A5=1). This parameter applies only to contact K2 (see parameter P1). This parameter is only active within control circuit 2, therefore a locked display is indicated when pressing "SET1".

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 (see fig. 3 – 6 at parameters P30/31).

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. In case of alarm LED 3 lights up independently of this setting.

A32: Setpoint display

A32=0 indicates the actual value, A32=1 statically indicates the setpoint S1/S1' or S2/S2' in the display. Therefore, the current actual value can only be indicated with parameter P0.

A33: Adjustment of setpoint S1'/S2'

By closing switching input E1, setpoint S1(S2) can be switched to a setpoint S1' (S2'). Setpoint S1'(S2') can be either relative to setpoint S1(S2) or an independent, freely adjustable, control setting.

The setpoint S1'(S2') can only be accessed if input E1 is closed. The setpoint S1'(S2') can only be activated, if the external input is configured for setpoint change-over (parameter A81=2).

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 the 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

This parameter permits selection of the sensor type, if the needed hardware prerequisites are available. The selection applies to both control circuits.

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!

A81: Function E1

With this parameter function of the ext. input E1 can be set. With A81=0 the E1 is not evaluated. With A81=1 the controller is switched to the standby mode. With A81=2 setpoint S1/S2 is switched to setpoint S1'/S2' when input E1 is closed. With A81=3 the status of E1 is indicated by LED3 in the display. Thus a night time reduction can be realised.

Status messages

Message	Cause	Error elimination
F1L	Sensor error control circuit 1, short circuit	Check sensor and/or sensor terminal
F1H	Sensor error control circuit 1, open circuit	Check sensor and/or sensor terminal
F2L	Sensor error control circuit 2, short circuit	Check sensor
F2H	Sensor error control circuit 2, open circuit	Check sensor
---	Key-lock active	see parameter P19 and/or A19
display flashes	Temperature alarm at too high or too low temperature (if activated) see A31	
Buzzer	Temperature alarm at too high or too low temperature (if activated) see A31	The buzzer function can be switched off with the DOWN-key.
EP	Data loss at parameter memory (Contacts K1 and K2 are switched off)	If error cannot be eliminated by switching on/off, the controller must be repaired

Sensor error messages are stored and still indicated even if the error is eliminated. The error message can be deleted with the DOWN key.

Technical data of ST503-QE1TA.25

Measuring input

F1: Resistance thermometer PTC/Pt100

F2: Resistance thermometer PTC/Pt100

Measuring range: PTC (KTY81-121) -50°C...+130°C
Pt100 -80°C...+400°C

Measuring accuracy: $\pm 0.5K \pm 0.5 \%$ at 25°C, without sensor
 $\pm 1K \pm 0.5 \%$ of scale range (0...+55°C), without sensor

Outputs

K1: Relay 10(1.5)A 250V~, change-over contact

K2: Relay 8(1.5)A 250V~, change-over contact

Summer ca. 85dB

Display

One 3-digit LED-Display, height 13 mm, colour red
5 LEDs for status display

Power supply

230 V 50/60 Hz, power consumption max. 6 VA

Connectors

12-pole screw terminal, spacing 5.0 mm, for cable up to 2.5 mm²

Ambient conditions:

Storage temperature: -20...+70°C

Operating temperature: 0...+55°C

Relative humidity: max. 75% without dew

Weight

ca. 350 g, without sensor

Enclosure

Front IP65, IP00 from behind

Installation data

Wall mounting

Front size: 106 x 68 mm

Installation depth: ca. 41 mm