

ST501-JX1TA

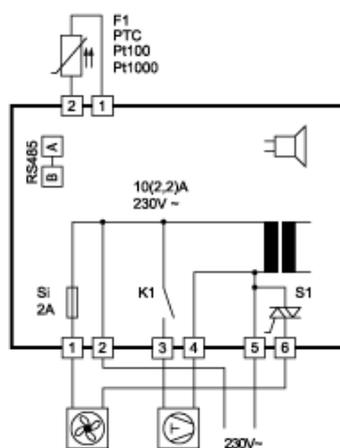
Temperature controller for fan drawers

Order number 900219.024

Old Id.Nr.: 149674



Wiring diagram



Product description

The ST501-JX1TA controller comprises a control unit and a power supply unit board. Both components are interconnected via a ribbon cable and form a plug-in unit. All input and output connections are established in the rear on the power supply unit board. The unit provides the functionality of a temperature controller for fan drawers.

A triac for fan control and a relay are provided as outputs. The relay is a normally open contact and can be defined either as control circuit 2 or as an alarm contact using the parameter setting function.

Sensor: PTC, Pt100

Range: dependent on type of sensor

Front dimensions: 106mm x 68mm

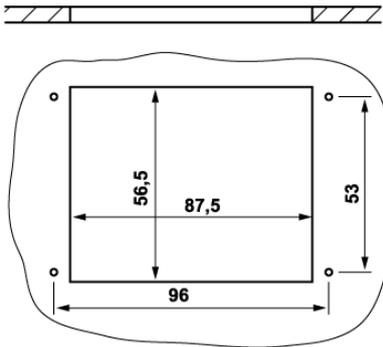
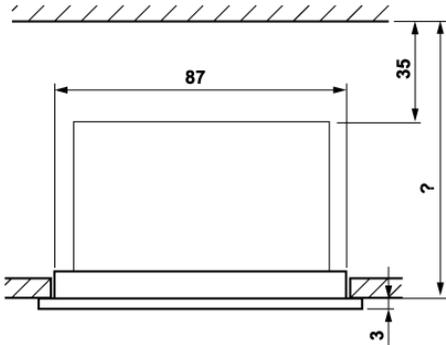
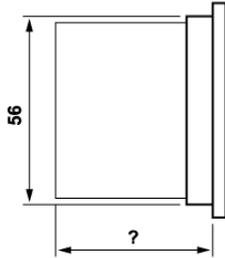
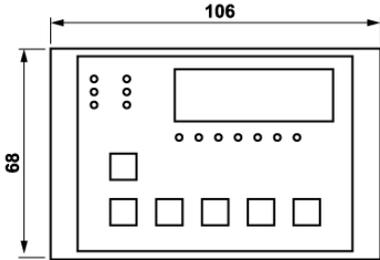
Panel cutout: 87.5mm x 56.5mm

Tightness: Front IP65

Connection: screw terminals

Versorgung: 230V AC

ST 501 ...



SOFTWARE for fan control

Adjustment options

**UP key**

Press this key to increment the parameter number or parameter value.

**DOWN key**

Press this key to decrement the parameter number or parameter value. In the event of an alarm, the buzzer is silenced by pressing this key.

**SET key**

The setpoint is displayed while this key is pressed.
This key is also used to set parameter values.

**Standby key**

This key switches the controller to the standby mode. Press the key again to switch the controller back on.

First control level:

Parametrization of primary setpoint

The actual value is always shown on the setpoint display.

Press the SET key to display the setpoint setting. Additionally press the UP key or DOWN key to adjust the value.

Parameter	Function description	Adjustment range	Default setting	Custom setting
S1	Primary setpoint	P4 ... P5	20.0 °C	

Second control level (P parameters):

Setting of control parameters

Press and hold the UP and DOWN keys simultaneously for at least 4 seconds to access a parameter list containing control parameters. Press the UP key to scroll up in the list and the DOWN key to scroll down in the list.

Press the SET key to display the value of the parameter in question. Additionally press the UP key or DOWN key to adjust the value.

Once you release all keys, the new value is permanently stored. If no key is pressed for more than 60 seconds, the unit automatically returns to its initial state.

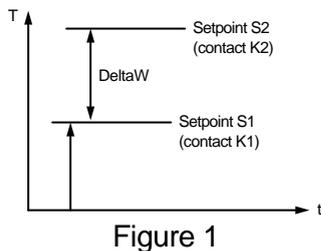
Parameter	Function description	Adjustment range	Default setting	Custom setting
P0	Displays the actual value from sensor F1	-----		-----
P1	Setpoint 2 / delta W Control circuit 2	P4 ... P5 -99 ... 99 K	Delta W: -10 K	
P2	Hysteresis, control circuit 1	0.1 ... 99.9 K	1.0 K	
P3	Hysteresis, control circuit 2	0.1 ... 99.9 K	1.0 K	
P4	Lower control range limit	-99 °C ... P5	-99 °C	
P5	Upper control range limit	P4 ... 999 °C	999 °C	
P6	Actual value correction	-20 ... +20 K	0.0 K	
P7	Proportional band	0.1 ... 100 K	10.0 K	
P8	Reset time T _n	0 ... 999 seconds (0 = inactive)	0 sec.	
P9	Derivative time T _v	0 ... 999 seconds (0 = inactive)	0 sec.	
P10	Cycle time	1 ... 100 sec.	1 sec.	
P19	Keypad locking	0: not locked 1: locked	0	
P30	Lower alarm limit	-99 °C/K ... P31	-99 K	
P31	Upper alarm limit	P30 ... 999 °C/K	999 K	
P32	Hysteresis, alarm contact	0.1 ... 99 K	1.0 K	
P33	Lower limit for fan	5 ... 100 % PWM	50 %	
P34	Upper limit for fan	5 ... 100 % PWM	95 %	
P35	Start-up boost time	0...60 seconds (0 = inactive)	1 sec.	

Parameter description:

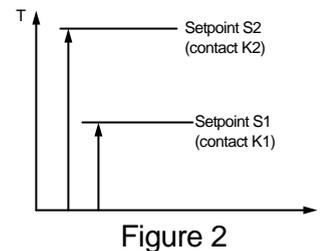
P1: Setpoint 2 / delta W

The second setpoint affects control circuit 2 and can be adjusted in 2 variants (see parameter A5 for selection):

First controller variant (cf. figure 1):
 Contacts K1 and K2 are linked via switching difference delta W (operation with delta W). This difference may take on positive or negative values. This allows you to implement a leading or following secondary contact.



Second controller variant (cf. figure 2):
 Contacts K1 and K2 can be adjusted independently. (Operation with setpoint 2.) Contact K1 is based on setpoint 1, and K2 is based on setpoint 2, which can be assigned a limit function.



Note: When a PID control is implemented for contacts K1 + K2, setpoint 1 affects both contacts.

P2/P3: Hysteresis, K1/K2

The hysteresis may be symmetrical or one-sided relative to the setpoint (see A40, A41). When the one-sided setting is chosen, the hysteresis works downward with the heating contact and upward with the cooling contact. When the symmetrical hysteresis function is chosen, half of the hysteresis value is effective above and half of the value below the switching point (cf. figures 3 and 4).

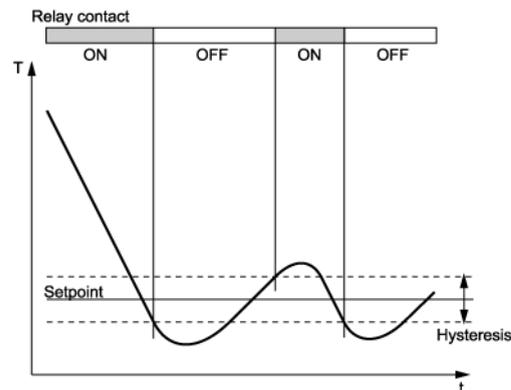
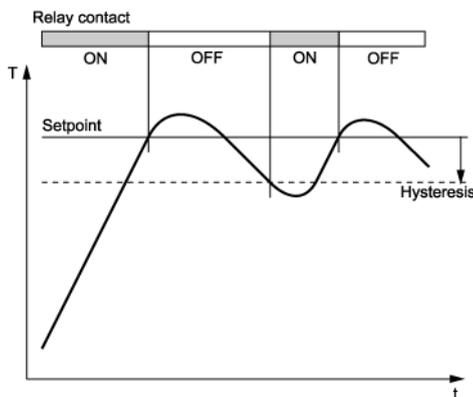


Figure 3: Heating controller, one-sided hysteresis Figure 4: Cooling controller, symm. hysteresis

P4/P5: Upper/lower control range limit

The adjustment range of the setpoint can be limited in both directions. The purpose of this is to prevent the operator of a unit from setting impermissible or dangerous setpoints.

P6: Actual value correction

A correction can be applied to the actual value. This correction value is added to the actual value across the entire measuring range.

P7: Proportional band

In the proportional band, the output is controlled in proportion to the deviation from the setpoint. The greater the system deviation, the greater the control output.

P8: Reset time T_n , I-portion

The proportional controller as such has a remaining deviation of the actual value from the setpoint. The integral portion provides for a complete compensation of this offset. The reset time is a measure for the period of time needed to adjust a remaining temperature deviation of the size of the proportional range. If a small reset time is set, a fast post-adjustment will take place. At a too small reset time, however, the system may tend to vibrate

P9: Derivative time T_v , D-portion

The differential portion dampens temperature changes. If a long derivative time T_v is set, damping is strong. At too long derivative time, however, the system may tend to vibrate. At setting 0 the values are ineffective. It is therefore possible to realize a pure PI or PD regulation.

P10: Cycle time T_p

The cycle time is the time during which the control output cycles through a switching period, that is from On through Off. The lower the cycle time setting, the faster the control. However, this also results in increased output switching frequency, which may quickly wear out relay contacts. In the case of very fast processes with high switching frequencies, a voltage output is therefore preferable.

P19: Keypad locking

The keypad locking function can be used to block the control keys. When keypad locking is enabled, the setpoint cannot be changed. Any attempt to change parameters with keypad locking enabled will display the message "===".

P30: Lower alarm limit

P31: Upper alarm limit

A limit or range alarm with a fixed hysteresis of 1.0 K is signaled using lamp 3 or contact K3.

Function as a limit alarm (cf. figure 5):

If the actual value is outside the defined temperature limits (that is, above the upper limit or below the lower limit), the alarm contact is active.

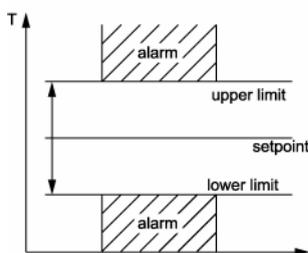


Figure 5

Function as a range alarm (cf. figure 6):

Inverted switching behavior compared to limit alarm. Lamp 3 is lit or contact K3 is picked up when the actual value lies within the defined limits.

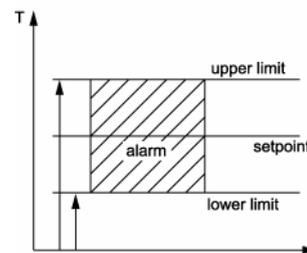


Figure 6

The limit values for the limit or the range alarm can be set to be relative, i.e. to float with the setpoint, or to be absolute, i.e. to be independently adjustable. If only one switching point is desired for the limit alarm, the second switching point (the one not needed) is set to a value above or below the controller working range. It is then preferable to choose the operating mode with absolute limits. Also see A30 within this context.

P32: Hysteresis, alarm contact

The hysteresis is to one side of the limit. In the case of the limit alarm, the hysteresis works upward from the lower limit and downward from the upper limit. In the case of the range alarm, the hystereses work in the opposite directions, i.e. downward from the lower limit and upward from the upper limit.

P33: Lower limit for fan

P34: Upper limit for fan

P35: Start-up boost time

Third control level (A parameters):

Setting of control parameters

The third control level is reached by first accessing the second control level and then scrolling through the parameter list all the way to the highest parameter (P45). Then press the UP key for a minimum of 10 seconds. The message "PA" appears on the display.

Press the UP and DOWN keys at the same time for a minimum of 4 seconds to access the parameter list of the third control level (which starts with A1).

Press the UP key to scroll up in the list and the DOWN key to scroll down in the list.

Press the SET key to display the value of the parameter in question. To adjust the value, additionally press the UP key or DOWN key.

Once you release all keys, the new value is permanently stored. If no key is pressed for more than 60 seconds, the unit automatically returns to its initial state.

Parameter	Function description	Adjustment range	Default setting	Custom setting
A1	Fan controller mode	0: heating contact 1: cooling contact	1	
A2	Control circuit 2 mode	0: heating contact 1: cooling contact	1	
A3	Fan controller function in the event of a sensor error	0: relay off 1: relay on	0	
A4	Control circuit 2 function in the event of a sensor error	0: relay off 1: relay on	0	
A5	Selection: setpoint 2 / delta W control circuit 2	0: operation with setpoint 2 1: operation with delta W	1	
A8	Display mode	0: integers 1: 0.5 K resolution 2: 0.1K resolution	2	
A19	Parameter lock	0: no lock 1: A parameters locked 2: A and P parameters locked	0	

Parameter	Function description	Adjustment range	Default setting	Custom setting
A30	Alarm contact function	0: limit alarm, relative 1: limit alarm, absolute 2: range alarm, relative 3: range alarm, absolute 4: limit alarm, relative inverted alarm contact 5: limit alarm, absolute inverted alarm contact 6: range alarm, relative inverted alarm contact 7: range alarm, absolute inverted alarm contact	1	
A31	Special functions for alarm	0: no special function 1: flashing display	1	
A32	Default display setting	0: actual value display 1: setpoint display	0	
A40	Hysteresis mode of fan controller	0: symm. around setpoint 1: on one side of setpoint	0	
A41	Hysteresis mode of control circuit 2	0: symm. around setpoint 1: on one side of setpoint	0	
A52	Minimum action time control circuit 2 "on"	0 ... 600 sec.	0 sec.	
A53	Minimum action time control circuit 2 "off"	0 ... 600 sec.	0 sec.	
A54	Delay after "power on"	0 ... 600 sec.	20 sec.	
A56	Alarm suppression of limit alarm after "power on"	0 ... 60 min.	0 min.	
A57	Continuous fan operation (outside proportional band with value from P33)	0: no continuous operation 1: continuous operation	1	
A60	Sensor selection	11: Pt100 two-wire 21: PTC 22: Pt1000 two-wire	21	
A70	Software filter	1: not active, otherwise 2 ... 32: mean value of 2...32 meas. values (approx. 0.6...9.6 s)	4	
A 80	Temperature scale and display	0: Fahrenheit (AUS) 1: Celsius (AUS) 2: Fahrenheit (OFF) 3: Celsius (OFF)	1	
A90	K1 output linking	0: no linking 1: linked with control circuit 2 2: linked with alarm contact	1	
Pro	Program version display	-----	-----	-----

Parameter description:

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

A1: Fan controller mode

A2: Control circuit 2 mode

The controller mode (cooling or heating function) can be individually programmed for the two control circuits at the factory. Heating function means that the contact drops out when the defined setpoint is reached, i.e. the power supply is interrupted. In the case of the cooling function, the contact only picks up when the actual value is above the defined setpoint.

A3: Fan controller function in the event of a sensor error

A4: Control circuit 2 function in the event of a sensor error

When the sensor is broken, the flashing display indicates F1H. When the sensor is short-circuited, the display indicates F1L (also flashing). Parameter A3 is used to determine the output behavior when this happens

A5: Selection of setpoint 2 / delta W for control circuit 2

This parameter determines whether the controller works with two linked contacts (operation with delta W) or with two independently adjustable contacts (operation with setpoint 2). See P1.

A8: Display mode

This parameter selects the resolution used to display the actual value.

A19: Parameter lock

This parameter can be used to lock (block access to) the parameter levels. When the A level is locked, only parameter A19 can still be changed.

When the parameter lock is active, the parameters are displayed but cannot be changed via the keys. Any attempt to change parameters with keypad locking enabled will display the message “---“.

A30: Alarm contact function

This parameter is used to determine alarm contact behavior when the values set with parameters P30 and P31 are reached.

Limit alarm means that an alarm is signaled when the defined limits are exceeded.

Range alarm means that an alarm is signaled within the defined limits.

Relative means that the values entered for parameters P30 and P31 represent a difference from the setpoint. Absolute means that the values entered for parameters P30 and P31 are independent of the setpoint.

A31: Special limit alarm function

This parameter can be used to activate additional actions for the limit alarm function.

A32: Default display setting

When parameter A32 is set to 1, the display always indicates the setpoint. It is then not possible to display the actual value.

A40 Hysteresis mode of fan controller

A41 Hysteresis mode of control circuit 2

These parameters determine whether the hysteresis values adjusted with P2 or P3 for the fan controller or control circuit 2 are symmetrical or one-sided relative to the switching point in question. When the symmetrical hysteresis function is chosen, half of the hysteresis value is effective above and half of the value below the switching point. When the one-sided setting is chosen, the hysteresis works downward with the heating contact and upward with the cooling contact.

A52: Minimum action time for control circuit 2 “On”

A53: Minimum action time for control circuit 2 “Off”

These parameters can be used to delay activation/deactivation of the output contact in order to reduce the frequency of switching operations. The minimum action time defines the entire minimum duration of a switch-on or switch-off phase. This time is also effective for the configuration as an alarm contact.

A54: Control circuit delay after “power on”

This parameter can be used to delay the activation of the control circuit after power on. The purpose of this is to prevent mains supply overload due to many consumers being switched on simultaneously.

A56: Suppression of limit alarm after “power on”

When the controller is switched on, it takes a certain period of time – particularly with cooling systems – until the operating temperature is reached. This would normally result in undesirable alarm signaling.

Therefore parameter A56 can be used to define a period of time during which an alarm condition is not signaled.

A57: Continuous fan operation

A60: Sensor selection

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

A70: Software filter

Calculates the mean value over the number of measurements set here.

A 80: Temperature scale

This parameter is used to switch the display between the Fahrenheit and Celsius temperature scales. It is not available on units with a voltage or current input.

A90: K1 output linking

Status messages

Message	Cause	Remedy
F1	Sensor error, resistance too high - sensor break	Check sensor
F8	Limit alarm (if activated; triggered by temperature monitoring of sensor F1)	Check sensor
---	Keypad locking active	see parameter P19 or A19
Flashing display	Temperature alarm (see A31)	
EP	Data loss in parameter memory (control circuits 1 and 2 are de-energized)	If the problem cannot be eliminated by switching the controller off and back on, the unit must be repaired

Technical data of ST501-JX1TA

Input

F1: resistance thermometer
Range: PTC (KTY81-121) -50 °C ... +130 °C
PT1000 -99 °C ... +300 °C
Pt100 -80 °C ... +400 °C
Accuracy: $\pm 0.5K \pm 0.5 \%$ at 25 °C, without sensor
 $\pm 1K \pm 0.5 \%$ across entire temperature range (0 – +55 °C), without sensor

Outputs

K1: relay, 16(2.2)A 250V NO contact
(limited to 10(2.2)A through terminals or printed circuit board)
S1 triac output for fan
Additional buzzer, 85 dB

Display and indicators

One 3-digit LED display for temperature indication
Three LEDs for status indication

Power supply

230 V, 50/60 Hz

Connectors

12-pin screw terminal, 5.0 mm pitch, for cable cross sections of up to 2.5 mm²

Weight

Approx. 250 g, without sensor.

Type of protection

Front IP65

Ambient conditions

Storage temperature: -20 °C ... +70 °C
Operating temperature: 0 ... 55 °C
Relative humidity: max. 75%, non-condensing

Installation data

Front dimensions: 106 x 68 mm
Panel cutout: 87.5 x 56.5 mm
Installation depth: approx. 50 mm