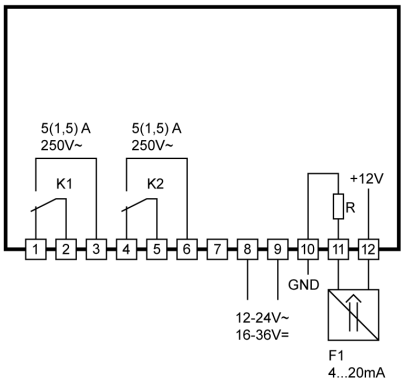
ST70-31.03

Humidity controller

Order number 900380.040

Wiring diagram



Product description

The switching exits of the thermostatic controller can be programmed as

-two-point controller with alarm
-three-point controller
-two-stage controller
-controller with ramp profile.

The setpoint and all parameters of the controller are set on a three-field plastic foil keyboard.

Sensor: current input 0-20mA
Range: with parameters A10+A11
Front size: 72mm x 36mm
Panel cut-out: 68.5mm x 28.5mm
Connector: screw terminal

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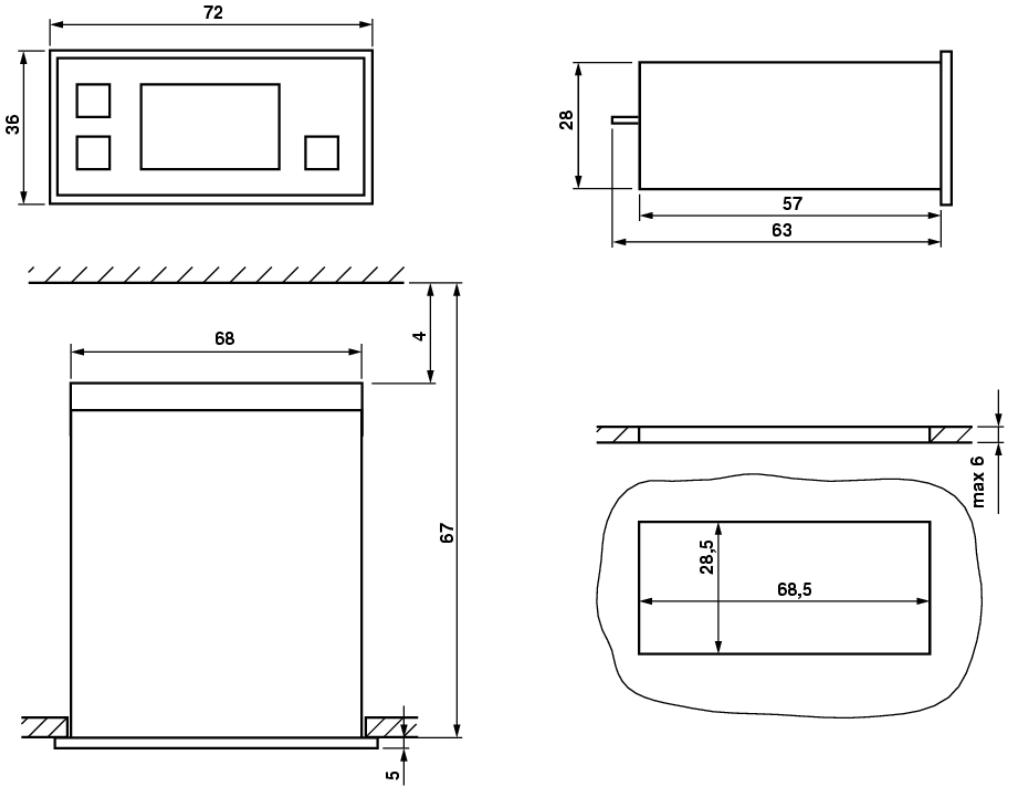


Software .03

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. At alarm the buzzer function can be switched off with this key.

Key 4: SET
While SET key is pressed, the setpoint is indicated.
In addition, the SET key is used for setting parameters

First control level:

Parameter setting of the control setpoint
If none of the keys is pressed, the display indicates the actual value of the temperature. Pressing the SET key, the setpoint 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.
Please note that the setpoint can only be changed within the set setpoint limits.

Para-meter	Function description	Adjustment range	Standard setting	Custom setting
S1	Setpoint	P4...P5	0.0°C	

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

Para-meter	Function description	Adjustment range	Standard setting	Custom setting
P1	Setpoint 2 or DeltaW	P4...P5 -99...+999 K	0,0°C +10K	
P2	Hysteresis contact K1	0.1... 99.9 K	1.0 K	
P3	Hysteresis contact K2	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	-10.0...+10.0 K	0.0 K	
P11**	Relative or absolute employment point of the ramp phase	-99...99K -99...999°C	10.0K 10.0°C	
P12**	Ramp gradient	0.1...100K/min.	10.0K/min.	
P19	Key-lock	0: no key-lock 1: key-lock	0	
P30	Lower alarm value	-99...999°C/K	-10.0 K	
P31	Upper alarm value	-99...999°C/K	+10.0 K	
P32	Hysteresis alarm circuit, symmetrical	0.1...99.9 K	1.0 K	

***** standard setting depends on sensor type
** parameter only available with activated ramp function

Parameter description:

P1: Setpoint / DeltaW for control circuit 2
Adjusting the setpoint of control circuit 2.
If A5=1, the setpoints for control circuit 1 and 2 are linked with one another via switching difference DeltaW, which can be adjusted with P1. (operation with DeltaW)
The following applies: setpoint thermostat 2 = setpoint control circuit 1 + delta W2.
This difference can take positive or negative values. Thus, a leading or following contact can be realised.

P2: Hysteresis contact K1
P3: Hysteresis contact K2
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).

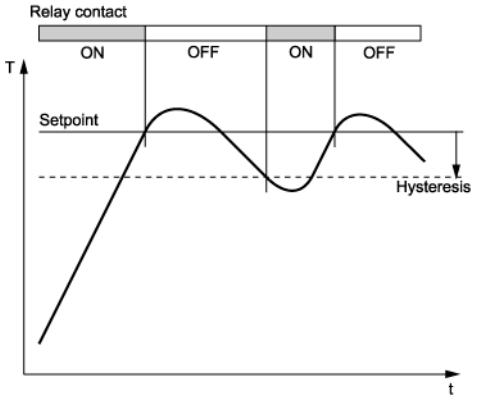


Fig. 1: Heating controller, one-sided hysteresis

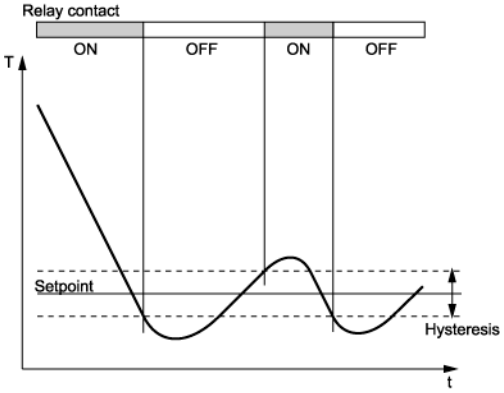


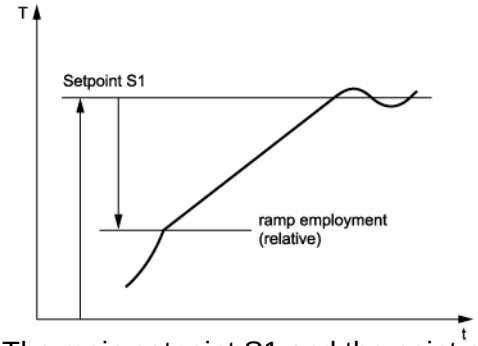
Fig. 2: Cooling controller, symmetrical hysteresis

P4: Control range limitation – 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.

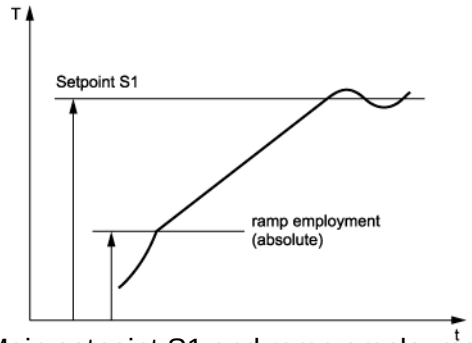
P11: Employment point of the ramp phase
Before reaching the point of ramp employment the controller works at full heating/cooling power. After reaching the point of ramp employment regulation to reach the setpoint is effected by help of a ramp profile. The ramp is ascending at heating function with employment points below the setpoint. At cooling function it is falling with employment points above the setpoint.
After the setpoint is reached, the ramp function becomes inactive, unless the temperature exceeds the point of ramp employment again in either direction, due to external influences (see fig. 3+4).
Please note that the ramp function is deactivated, if the actual value is inside the ramp range during switching-on.
Changes of ramp parameters are not considered once the ramp has started, but become effective only thereafter. In the case of activated ramp function, there are two employment points for the ramp possible (see parameter A6):

Fig. 3: relative values



The main setpoint S1 and the point of ramp employment are linked as difference with one another. This difference can take positive or negative values, i.e. starting point for the ramp can be above the setpoint at cooling function or below the setpoint at heating function, and automatically runs along with adjustments of the desired value.

Fig. 4: absolute values



Main setpoint S1 and ramp employment point are independent from each other

P12: Ramp gradient
The ramp gradient sets the degree applied to change the (internal) setpoint in a ramp phase.

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 symmetrical hysteresis (see P32). Both at the boundary alarm and the range alarm, limit values can be relative, i.e. going along with the setpoint, or absolute, i.e. independent of the setpoint. The operation mode is set with parameter A30. If, in case of boundary alarm and only one switching point is required the not used second switching point should be adjusted to a value above or below the operating range of the controller.

Boundary alarm function (see fig. 5):
The alarm contact is closed if the process temperature is above the upper or below the lower boundary value.

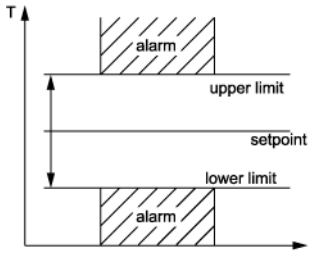


Fig. 5: Boundary alarm, rel. boundaries

Range alarm function (see fig. 6):
Opposite switching behaviour to the boundary value alarm. The alarm contact is closed if the actual value remains between the boundary values.

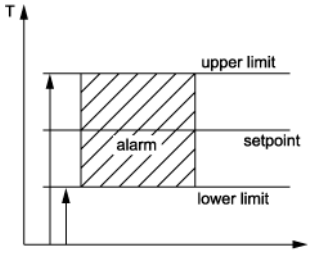


Fig 6: Range alarm, abs. boundaries

P32: Hysteresis alarm circuit
Hysteresis is set symmetrical at the adjusted limit value, i.e. half of the hysteresis' value is effective below and half of the value above the switching point

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.

Para-meter	Function description	Adjustment range	Standard setting	Custom setting
A1	Switch mode contact K1	0: heating contact 1: cooling contact	0	
A2	Switch mode contact K2	0: heating contact 1: cooling contact	1	
A3	Function of contact K1 at sensor error	0: relay off 1: relay on	0	
A4	Function of contact K2 at sensor error	0: relay off 1: relay on	0	
A5	Selection setpoint 2 or DeltaW	0: operation with setpoint 2 1: operation with DeltaW	1	
A6	Control characteristics	0: no ramp function 2: relative ramp function 3: absolute ramp function	0	
A8	Display mode (all parameter indications are presented in 0.1°K)	0: integrals, without leading zero 1: with decimals without leading zero	1	
A9	Weighing factor	0.50 ... 1.50	1.00	
A10*	Indication value for lower value linear analogue input	-99...999	0.0	
A11*	Indication value for upper value linear analogue input	-99...999	100	
A19	Parameter lock	0: no lock 1: A-parameter locked 2: A- and P-parameter locked	0	
A20	Key acknowledgement	0: no 1: yes	1	
A30	Function alarm exit	0: Boundary alarm, relative 1: Boundary alarm, absolute 2: Range alarm, relative 3: Range alarm, absolute	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	

Para-meter	Function description	Adjustment range	Standard setting	Custom setting
A32	Alarm delay after “Power-on”	0...60 min.	0 min.	
A40	Hysteresis mode contact K1	0: symmetrically 1: one-sided	0	
A41	Hysteresis mode contact K2	0: symmetrically 1: one-sided	0	
A50	Minimum action time contact K1 ”On”	0...400 sec.	0.0 sec.	
A51	Minimum action time contact K1 ”Off”	0...400 sec.	0.0 sec.	
A52	Minimum action time contact K2 ”On”	0...400 sec.	0.0 sec.	
A53	Minimum action time contact K2 ”Off”	0...400 sec.	0.0 sec.	
A54	Delay after “Power-on”	0...400 sec.	0.0 sec.	
A55	Mutual delay of contacts K1 and K2	0...400 sec.	0.0 sec.	
A60	Sensor type	01: Thermo element type J 02: Thermo element type K 11: PT100 (2-Leiter) 12: PT100 (3-Leiter) 21: KTY81-121 (2-Leiter) 22: PT1000 (2-Leiter) 31: 2-10 V or 4-20 mA 32: 0-10 V or 0-20 mA	dependent on hardware	
A70	Zeitkonstante Softwarefilter	0: 0.0 sec. 1: 0.8 sec. 2: 2.4 sec. 3: 6.0 sec. 4: 16.0 sec. 5: 38.6 sec. 6: 96.0 sec.	3	
A80**	Temperature scale	0: Fahrenheit 1: Celsius	1	

* parameter only available if there is a voltage/current input
** not available with voltage or current input

Parameter description:

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

A1: Switch mode contact K1
A2: Switch mode contact K2
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
A4: Function of contact K2 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”) both contacts K1 and K2 are switched off.

A5: Selection setpoint 2 or DeltaW
This parameter determines whether the setpoints for thermostat 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).

A6: Control characteristic
With this parameter the ramp function can be activated with either relative or absolute employment point.

A8: Display mode
The value can be indicated in integrals or with decimals and if there is a leading zero. In general, all parameter indications are presented with decimals.

A9: Weighing factor
With this parameter the actual value can be submitted to weighing. The measured value is multiplied by it and both indicated in the display and applied for regulation.

A10: Indication value for lower value linear analogue input
A11: Indication value for upper value linear analogue input
Only relevant, if the controller is programmed for a voltage input (0…10V linear) or a current input (4…20mA linear). These parameters allow scaling of the linear analogue input. The value to be indicated for the lower and upper entrance value then defines the range the controller will indicate. For input range 4…20mA the display will show sensor error if the input signal drops below 4mA.

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

A20: Activation of key acknowledgement
This parameter permits to switch on/off the key confirmation by internal buzzer.

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 (range alarm), or whether the alarm is released if the temperature lies beyond them (boundary alarm). In the case of sensor error, the alarm is activated independently of this adjustment.

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: Special function at boundary or range alarm
This parameter allows an alarm delay after switching-on the mains voltage

A40: Hysteresis mode contact K1
A41: Hysteresis mode contact K2
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"
A52: Minimum action time contact K2 "On"
A53: Minimum action time contact K2 "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.

A55: Mutual delay of contacts K1 and K2
This parameter makes a mutual switching-on delay of relays possible, depending on whichever contact is switched first.

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!

Status messages

Message	Cause	Error elimination
_ _ _	Key-lock active	Change parameter P19 or A19
F1L	Sensor error, short-circuit at sensor F1	Check sensor
F1H	Sensor error, open-circuit at sensor F1	Check sensor
F2	Wrong connection of Pt100 sensor	Check connection
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, display flashes	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

Error messages are saved and indicated even if the cause is eliminated. Pressing the DOWN key deletes the error message.

Technical data of ST70-31.03

Measuring input
F1: Linear current input 4...20mA, 2-wire connection
Measuring range: see parameters A10 and A11

Outputs
K1: Relay, change-over contact, 5A 250V (cosφ=1)
K2: Relay, change-over contact, 5A 250V (cosφ=1)

Display
3-digit LED Display, colour red
1 LED, diameter 3mm, for status display

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

Connectors
12-pole screw terminal, spacing 5.0mm, 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. 150g

Enclosure
Front IP50

Installation data

Front size:	72 x 36 mm
Panel cut-out:	68.5 x 28.5 mm
Installation depth:	ca. 67 mm with connector
Mounting:	with fixing strap