Type 702060

JUMO iTRON DR 100

Compact Microprocessor Controller

B 70.2060.0

Operating Manual

08.04/00438833

Contents

Please read this Operating Manual before commissioning the instrument. Keep the manual in a place which is accessible to all users at all times.

Please assist us to improve this manual, where necessary.

Your comments will be appreciated.

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email mail@jumo.net

All necessary settings are described in this Operating Manual. If any difficulties should still arise during start-up, you are asked not to manipulate the unit in any way.
You could endanger your rights under the instrument warranty !

Please contact the nearest subsidiary or the head office in such a case.

1 Identifying the instrument version

	(1)		(2)		(3)		(4)		(5)
702060/	. . .	-	. . .	–	. . .	–	. .	/	. . .

(1)	Basic type	Output 1	Output 2	Comment
	188 =	1 relay (changeover contact)	-	programmable, with factory setting[1]
	199 =	1 relay (changeover contact)	-	programmable, configuration to customer sprecification[2]
	288 =	1 relay (make contact)	1 relay (make contact)	programmable, with factory-setting[1]
	299 =	1 relay (make contact)	1 relay (make contact)	programmable, configuration to customer specification[2]

(2)	Measurement input
	888 = programmable, with factory setting[1]
	999 = programmable, configuration to customer specification[2]

(3)	Output 3
	000 = logic output: 0/5V, 0/20mA
	113 = logic output: 0/12V, 0/20mA

(4)	Supply voltage
	23 = 110 — 240V AC +10% /-15, 48 — 63Hz
	22 = 20 — 53V AC/DC, 48 — 63Hz

(5)	Extra code	**061 =** UL approval (Underwriters Laboratories)

Delivery pack	1 Operating Manual 70.2060

1. see factory settings under configuration and parameter level
2. see customer order text or settings under configuration and parameter level

2 Mounting

The controller is clipped onto a 35 mm DIN rail to EN 50 022 from the front.

2.1 The mounting site

- should be free from vibration, to prevent the screw terminals from becoming loose.
- should also be free from corrosive media, such as strong acids and caustic solutions, dust, powder and other suspended substances, so that the ventilations slots cannot become clogged.

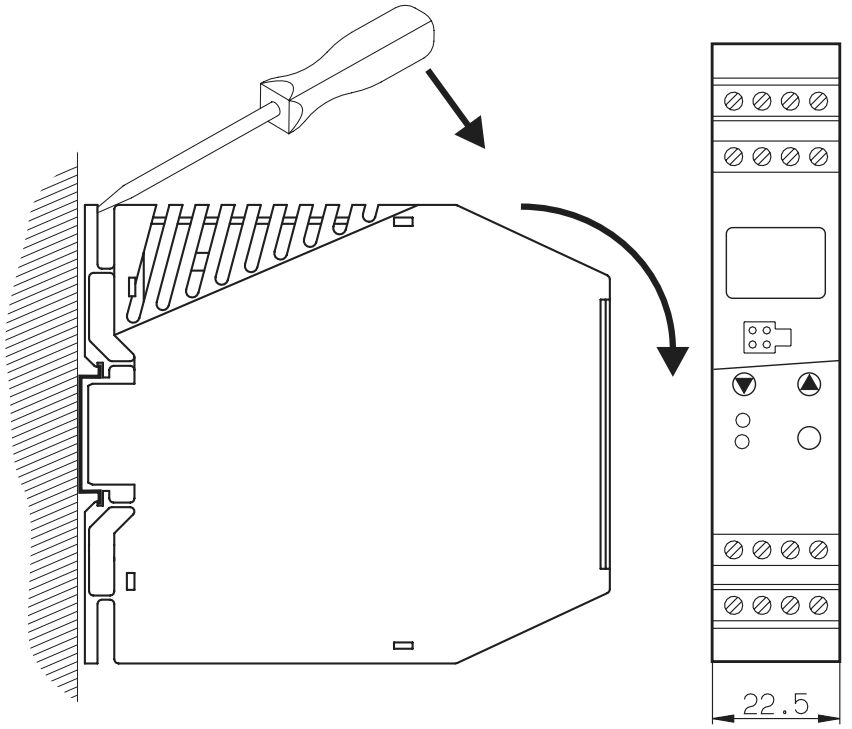
2.2 Side-by-side mounting

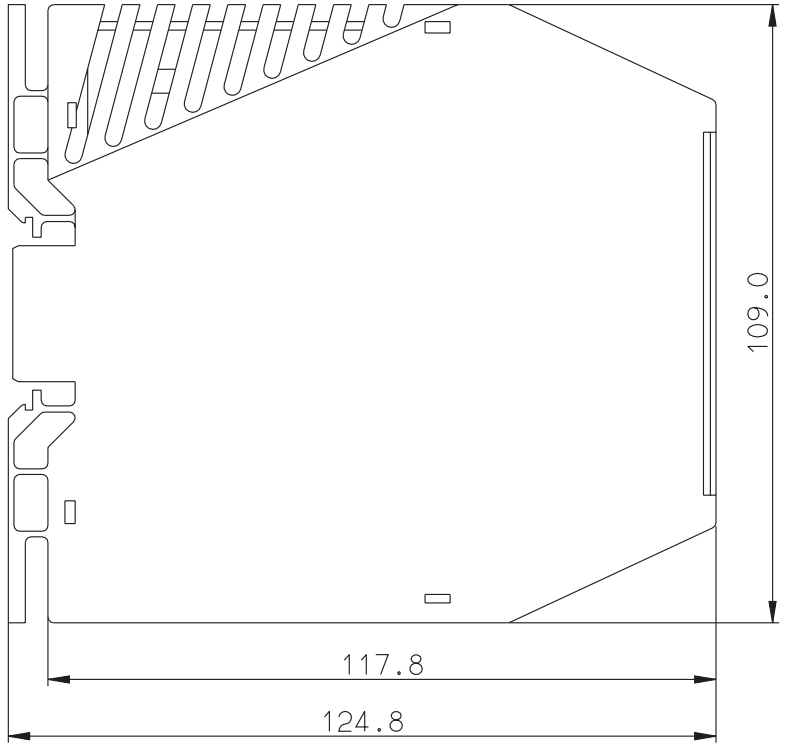
Make sure that there is at least 10 cm clearance at the top, to ensure that the release slot can be accessed from above with a screwdriver.

Several instruments may be mounted directly side by side, without any spacing.

2.3 Removal, dimensions

* Insert a screwdriver into the relase slot, press it towards the unit and swing it downwards from the rail.





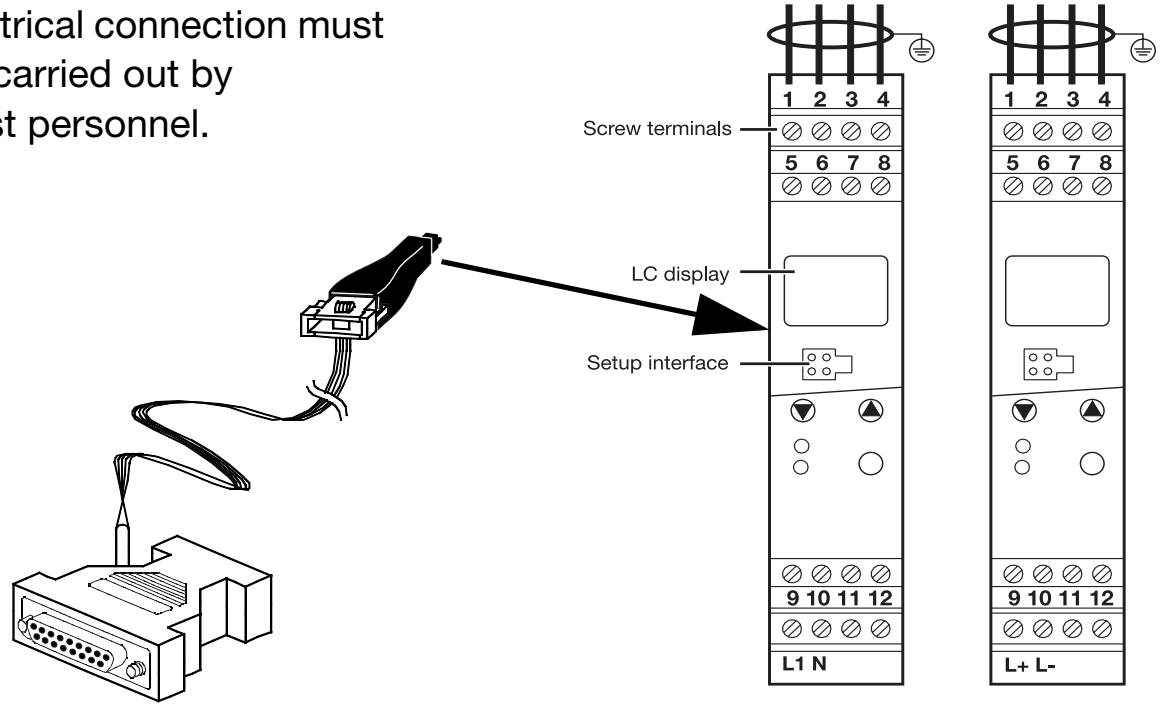
3 Electrical connection

Installation notes

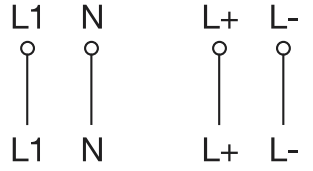
- The choice of cable, the installation, the fusing and the electrical connection must conform to the requirements of VDE 0100 “Regulations on the Installation of Power Circuits with nominal voltages below 1000 V” , or the appropriate local or national regulations.
- The electrical connection must only be carried out by qualified personnel.
- If contact with live parts is possible while working on the unit, it must be isolated on both poles from the supply.
- A current limiting resistor interrupts the supply circuit in the event of a short-circuit. The load circuit must be fused for the maximum relay current in order to prevent welding of the output relay contacts in the event of a short-circuit.
- Electromagnetic compatibility conforms to the standards and regulations listed under Technical Data.
- Run input, output and supply lines separately and not parallel to each other.
- Do not connect any additional loads to the supply terminals of the instrument.
- The instrument is not suitable for installation in areas with an explosion hazard.

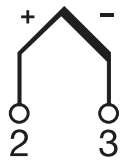
- Apart from faulty installation, there is also a possibility of interference with, or damage to, controlled processes due to incorrect settings on the controller (setpoint, data of parameter and configuration levels, internal adjustments). Safety devices independent of the controller, such as overpressure valves or temperature limiter/monitors should always be provided and should be capable of adjustment by specialist personnel only. Please refer to the appropriate safety regulations in this matter.
  Since autotuning (self-optimization) cannot be expected to handle all possible control loops, there is a theoretical possibility of unstable parameter settings. The resulting process value should therefore be monitored for its stability.
- All input and output cables without connection to the supply network must be arranged as twisted and screened cables. Do not run them close to current-carrying components or cables.
  Ground the screen on the instrument side.

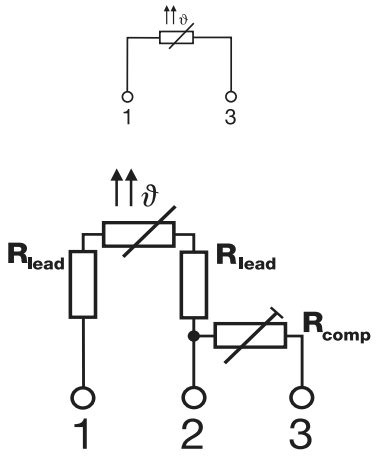
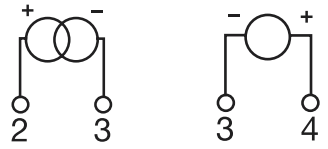
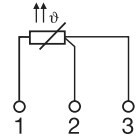
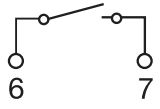
The electrical connection must only be carried out by specialist personnel.

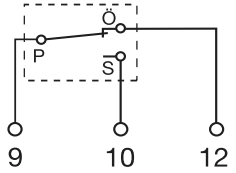
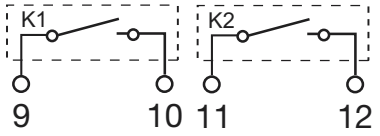


Supply as per nameplate	**AC** L1 line N neutral	**AC/DC** L+ L-
Analog inputs	Thermocouple	

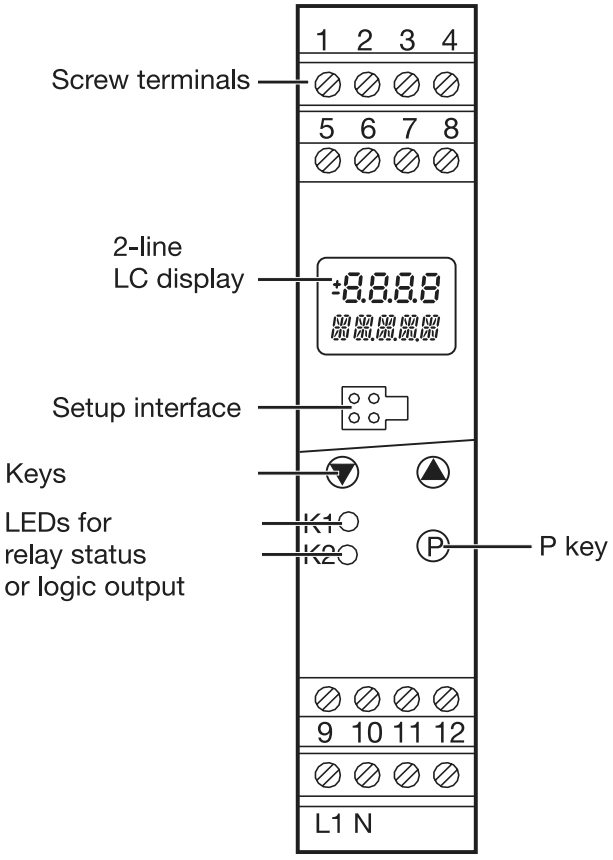




	Analog inputs	KTY11-6 PTC in 2-wire circuit With longer leads, resistance thermometers in 2-wire circuit must be changed over to `C111=001` (3-wire circuit) and compensated with a resistor. Compensation condition: $R_{lead} = R_{comp}$	
		Standard signals: 0(4) — 20 mA, 0(2) — 10 V	
		Resistance thermometer in 3-wire circuit	
	Logic input	for connection to floating contact	

<table>
<tr><td rowspan="3"></td><td>Logic output</td><td colspan="2">0/5 V, 0/20 mA or
0/12V, 0/20 mA (short-circuit proof)</td><td> 
</td></tr>
<tr><td>Relay outputs
without contact
protection circuit</td><td colspan="2">changeover contact K1
on Type 702060/1XX...</td><td> 
</td></tr>
<tr><td>It is not allowed to combine supply circuits with SELV circuits !</td><td>make contact K1
Type 702060/2XX...</td><td>make contact K2
Type 702060/2XX...</td><td> 
</td></tr>
</table>

4 Indications and keys



LC display

2 lines	1st line: 4 places, with 7 segments each 2nd line: 5 places, alphanumeric
Digit height	7 mm
Display span	-1999 to +9999 digit
Decimal places	none, one, two
Unit	°C/ °F (process value display)

Keys

For operating and programming the instrument.
`C-Codes` and parameter values are altered **dynamically**, which means that the longer the key is pressed, the faster the value in the display will change.

- Increase value with ▲
- Decrease value with ▼
- Programming and configuration of controller with (P)

The value is accepted automatically after 2 seconds.

Status indicators	Type 702060/1XX...	Type 702060/2XX...
LED K1 lights up yellow	changeover contact 1 active	make contact 1 active
LED K2 lights up yellow	logic output 3 active	make contact 2 active

5 Operation

The JUMO iTRON DR100 is an electronic controller for mounting on a 35 mm DIN rail. The controller features a 2-line LC display for indicating the process value or setpoint, or for running dialogs. Just 3 keys are necessary for configuration. Parameter setting is arranged dynamically, and the value is accepted automatically after two seconds. Self-optimization, which is provided as standard, establishes the optimum control parameters at the touch of a button. A ramp function with an adjustable gradient and a timer function are also included. The controller can be used as a 2-state controller with limit comparator or as a 3-state controller.

The setup program can be used for conveniently programming the parameters on the PC and transferring the data to the instrument.

5.1 Basic status

In “Controller” mode

The display shows the process value on top and the setpoint below.

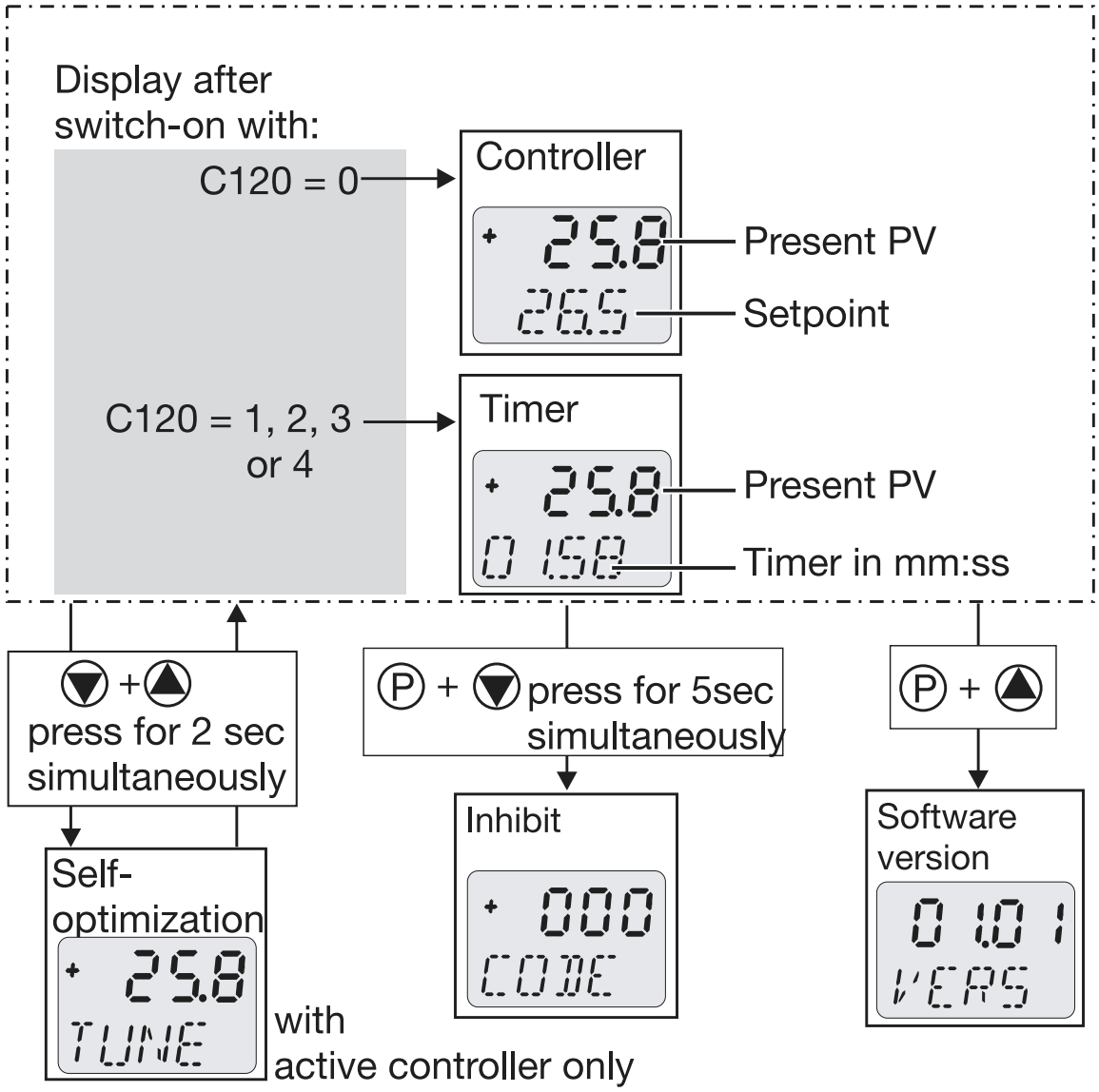
In “Timer” mode

With active timer function, the process value is shown on top and the timer value below.

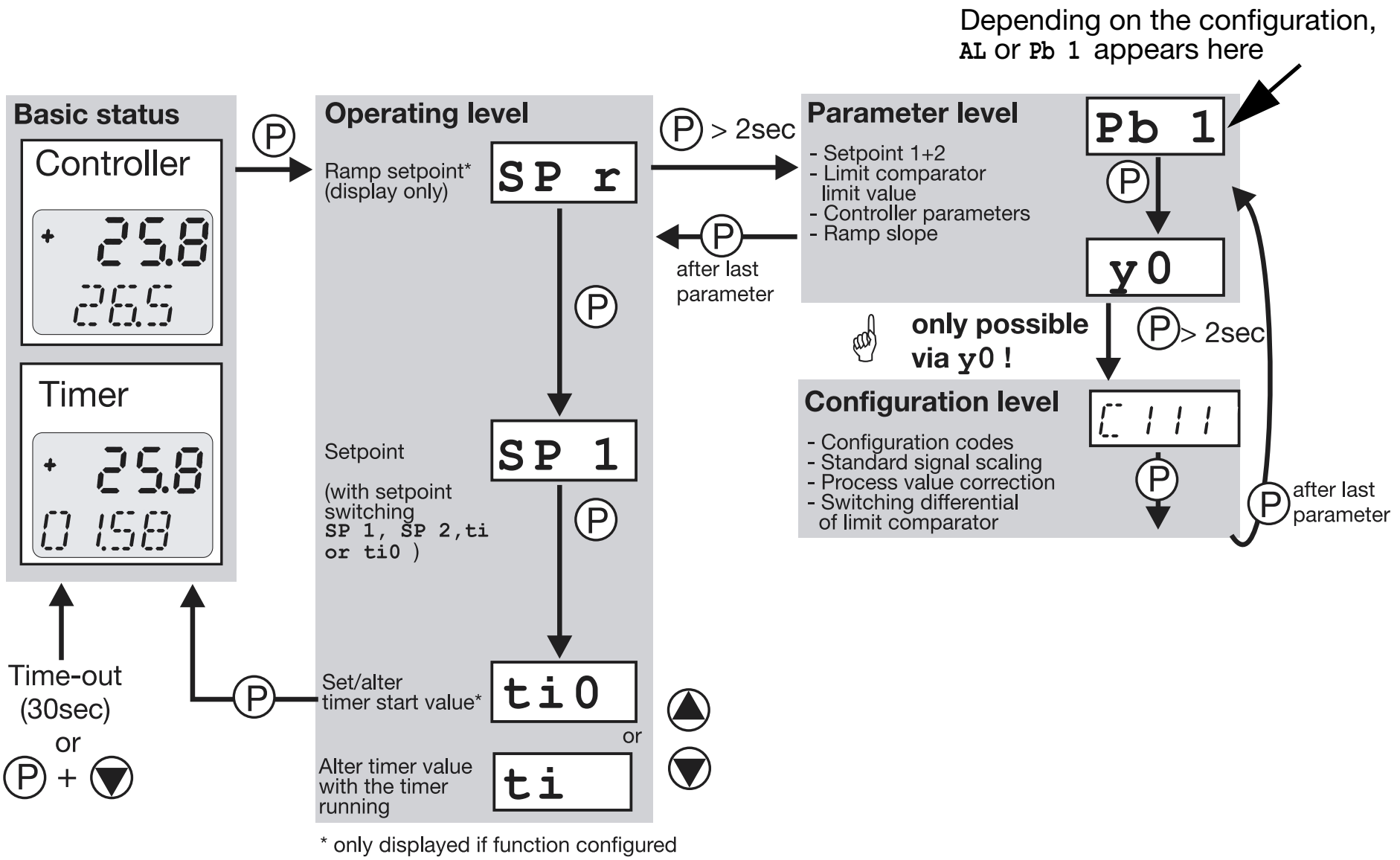
In “Self-optimization” mode

The upper display shows the present process value, the lower one shows “TUNE”.

BASIC STATUS



5.2 Operating/parameter/configuration and timer levels



* only displayed if function configured

Operating level

The setpoint SP 1 is defined here. With active setpoint switching via the logic input, SP 2 appears in addition. With active ramp function, the ramp setpoint SPr is displayed.
The setpoint is altered dynamically using the ▲ and ▼ keys.
The setting is accepted after approx. 2 sec.

Parameter	Explanation	Value range	factory-set	Your setting
SP 1	Setpoint 1	SPL — SPH	0	
SP 2	Setpoint 2	SPL — SPH	0	
t.t t.t0	Timer value, timer start value	00:00 — 99:59 (min:ss)	0	
SPr	Ramp setpoint	SPL — SPH	0	

Parameter level

The limit value of the limit comparator, the controller parameters and the ramp slope are programmed here.

Configuration level

The basic functions of the instrument are set here.

In order to make the settings, the parameter y 0 (parameter level) has to be selected and Ⓟ pressed for 2sec. This is the only way to change to the configuration level !

Time-out

If no operation occurs, the controller returns to the basic status after approx. 30 sec.

5.3 Operation of the timer function

The timer can be started using the ▲ key, via the logic input or through power ON (stop, cancel, acknowledgement from the keys), if the timer is indicated at the operating level.
Depending on the configuration of the logic input, an external button can take over the function of the ▲ key. In this case, the timer can also be operated even if the timer value does not appear in the display.

Possible displays for the timer function at the operating level

Display	State/Action	Display	State/Action
 Decimal point flashes Time value is not counted down	Timer is started, but the tolerance limit (C111) has not yet been reached * To cancel, press ▼ for 2sec	 Time value is not counted down	Timer has stopped * Continue with ▲ * To cancel, press ▼ for 2sec
	Timer not running * Start with ▲		Timer has run down * Acknowledge with any key (timer start value ti0 is shown) For time-delayed control (C120=3), press ▼ for 2sec
 Decimal point flashes Time value is counted down	- Timer running * Stop with ▲ * To cancel, press ▼ for 2sec		

When the timer has been started, the middle decimal point of the timer value will blink at second intervals! When the timer has run down, ENd will appear.

6 Functions

We recommend the following procedure:

- ✱ Familiarize yourself with the controller functions
- ✱ Enter the configuration codes and parameter values in the tables provided for this purpose in Chapter 8. Write down the appropriate values (✎), or mark selection with a cross (**X**✎). The parameters and configuration codes are listed in the order of their appearance. Parameters which are not relevant are masked (see table below).
- ✱ Enter the configuration codes and parameters on the instrument

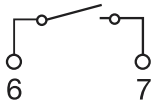
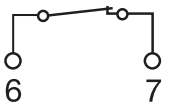
Configuration	**Masking out the parameters for**	**Parameter**
2-state controller	3-state controller	`Pb 2, Cy 2, db, HyS 2`
Limit comparator without function	Limit comparator	`HySt, AL`
Resistance thermometer, thermocouple	Standard signal scaling	`SCL, SCH`
Ramp function OFF	Ramp function	`RASd, SPr`
Setpoint switching not active	Setpoints at the operating level	`SP 2`
Timer function without function	Timer function	`ti, C121, C122, C123`

6.1 Process value input

Symbol	Notes
C 1 1 1	**Transducer/probe (process value input)** ⇨ Chapter 7 “Configuration tables (C codes)”
C 1 12	**Unit of the process value (°C/°F)/decimal places of display** ⇨ Chapter 7 “Configuration tables (C codes)”
SCL	**Start/end value of value range** for standard signals Example: 0 — 20 mA→20 — 200 °C: SCL = 20 / SCH = 200 ⇨ Chapter 8 “Parameter tables”
SCH	
OFFS	**Process value correction** Using the process value correction, a measured value can be corrected by a programmable amount upwards or downwards (offset). ⇨ Chapter 8 “Parameter tables” Examples: **Measured value** — **Offset** — **Displayed value** 294.7 — + 0.3 — 295.0 295.3 — - 0.3 — 295.0

Symbol	Notes
dF	**Filter time constant** (damping) for adapting the digital input filter (0 sec = filter off) ⇨ Chapter 8 “Parameter tables” if dF high: - high damping of interference signals - slow reaction of the PV display to changes in the process value - low cut-off frequency (2nd order low-pass filter)

6.2 Logic input

Floating contact	 open	 closed
Key inhibit	Operation is **possible** from keys.	Operation from keys is **not possible**.
Level inhibit	Access to the parameter and configuration levels is possible. Starting self-optimization is possible.	Access to the parameter and configuration levels is **not** possible. Starting self-optimization is **not** possible.
Ramp stop	Ramp running	Ramp stopped
Setpoint switching	Setpoint SP 1 is active	Setpoint SP 2 is not active
	The corresponding symbols SP 1 and SP 2 are displayed at the operating level.	
Timer control	Acknowledge start/stop/continue/timer run-down (edge-triggered)	

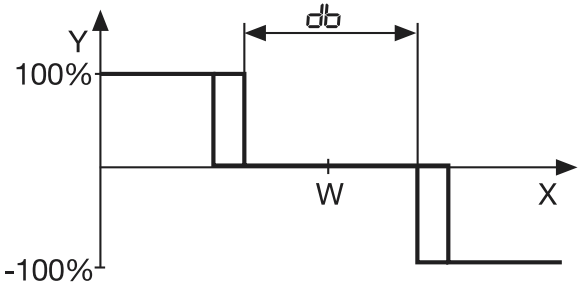
Symbol	Notes
C 117	**Function of the logic input** ⇨ Chapter 7 “Configuration tables (C codes)”

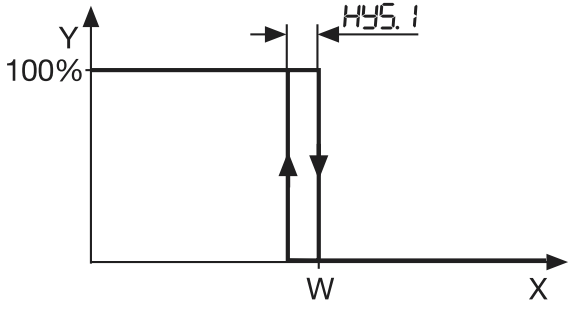
6.3 Controller

Controller structure

The controller structure is defined via the parameters `Pb`, `dt` and `rt`.
Example: Setting for PI controller ➔ `Pb .1=120, dt=0s, rt=350s`

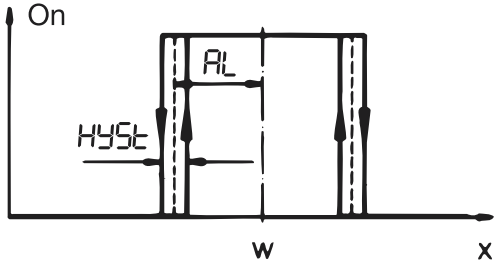
Symbol	Notes
C 113	**Controller type** ⇨ Chapter 7 “Configuration tables (C codes)”
C 116	**Response of the outputs in fault condition** The switching states of the outputs are defined here in the event of over/underrange, probe break/short-circuit or display overflow. ⇨ Chapter 7 “Configuration tables (C codes)”
C 118	**Assignment of the outputs** ⇨ Chapter 7 “Configuration tables (C codes)”

Symbol	Notes
Pb 1 Pb 2	**Proportional band 1** (controller output 1) **Proportional band 2** (controller output 2) Influences the P action of the controller. If Pb=0, the controller structure is not effective ⇨ Chapter 8 “Parameter tables”
dt	**Derivative time** Influences the D action of the controller. If dt=0, the controller has no D action.
rt	**Reset time** Influences the I action of the controller. If rt=0, the controller has not I action.
Cy 1 Cy 2	**Cycle time 1** (controller output 1) **Cycle time 2** (controller output 2) The cycle time has to be selected so that the energy supply to the process is virtually continuous, whilst not subjecting the switching elements to excessive wear.
db	**Contact spacing** for 3-state controllers ⇨ Chapter 8 “Parameter tables” 

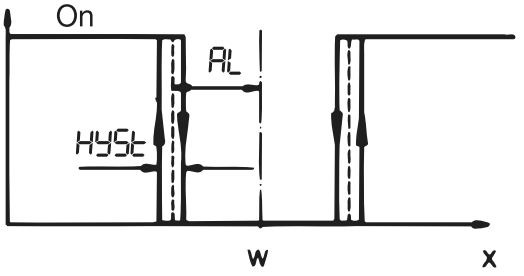
Symbol	Notes
HYS 1 HYS2	**Switching differential 1** (controller output 1) **Switching differential 2** (controller output 2) for controllers with Pb 1=0 or Pb 2=0 ⇨ Chapter 8 “Parameter tables” 
y 0	**Working point (basic load)** output if PV=setpoint ⇨ Chapter 8 “Parameter tables”
y 1 y 2	**Output limiting** y1 - maximum output y2 - minimum output ⇨ Chapter 8 “Parameter tables” ☞ On controllers without controller structure (Pb 1=0 or Pb 2=0), it is necessary that y1 = 100% and y2 = -100%.

6.4 Limit comparator (alarm contact)

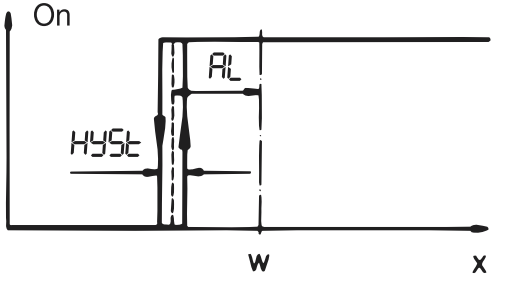
lk1



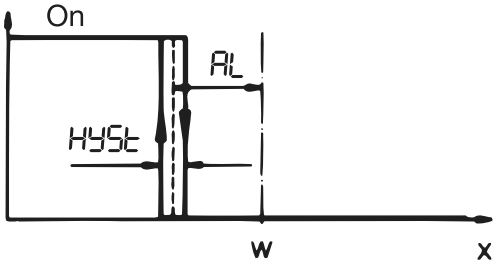
lk2



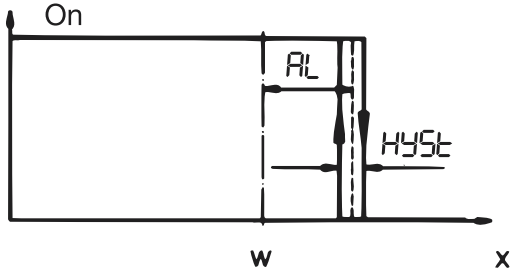
lk3



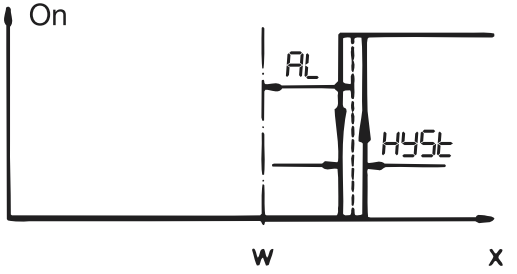
lk4



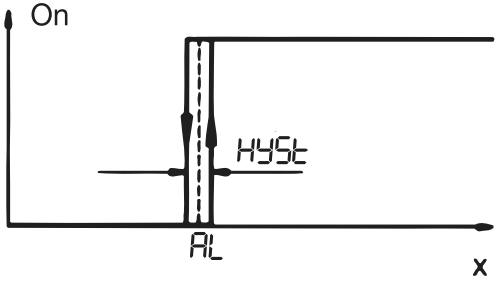
lk5



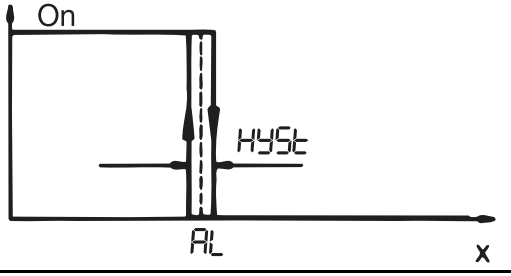
lk6



lk7



lk8



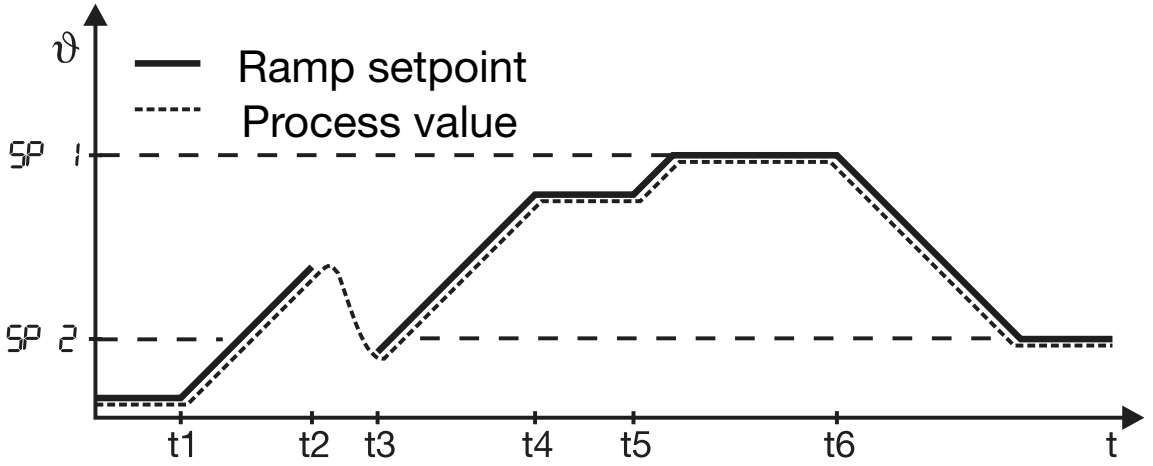
lk1 —lk6: Monitoring referred to the setpoint.
lk7 / lk8: Monitoring referred to a fixed value **AL**.

w = setpoint, x = process value

Symbol	Notes
C 1 14	**Limit comparator function** (lk1— lk8) ⇨ Chapter 7 “Configuration tables (C codes)”

Symbol	Notes
HYSt	**Switching differential of the limit comparator** ⇨ Chapter 8 “Parameter tables”
AL	**Limit value of limit comparator** ⇨ Chapter 5 “Operation”

6.5 Ramp function



t1 power ON (SP 1 active)
t2—t3 power failure or over/underrange
t4—t5 ramp stop
t6 setpoint switching to SP 2

Symbol	Notes
C 115	**Ramp function** (on/off, time unit) ⇨ Chapter 7 “Configuration tables (C codes)”
C 117	**Ramp stop** via logic input (floating contact) ⇨ Chapter 7 “Configuration tables (C codes)”
RASd	**Ramp slope** in °C/h or °C/min ⇨ Chapter 8 “Parameter tables”

6.6 Self-optimization

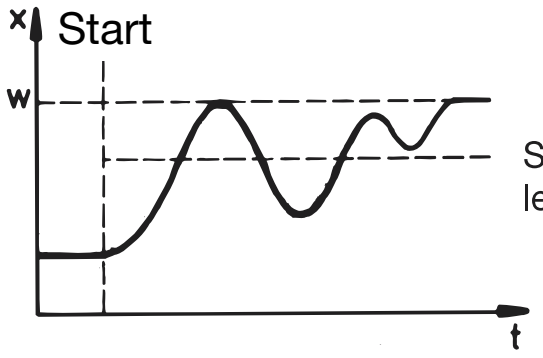
Self-optimization determines the optimum controller parameters for PID or PI controllers.

The following controller parameters are defined: `rt, dt, Pb 1, Pb 2, Cy 1, Cy 2, dF`

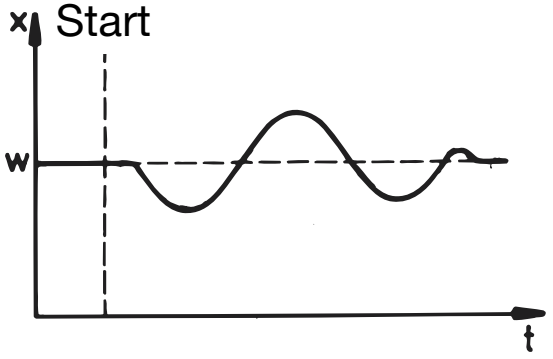
The controller selects procedure **a** or **b,** depending on the size of the control deviation:

a) Self-optimization in the approach phase

x = process value
w = setpoint



b) Self-optimization at setpoint



Starting self-optimization

☞ Starting self-optimization is not possible with active level inhibit and ramp function.

Self-optimization is automatically terminated, or can be canceled.

⇨ Chapter 5.1 “Basic status”

6.7 Level inhibit via code

As an alternative to the logic input, level inhibit can also be set via a code (logic input has priority).

* Press Ⓟ + ▼ simultaneously for 5 sec and enter code for inhibiting
* Acknowledge with Ⓟ

Level inhibit via the logic input will lock the parameter and configuration levels (corresponds to code 011).

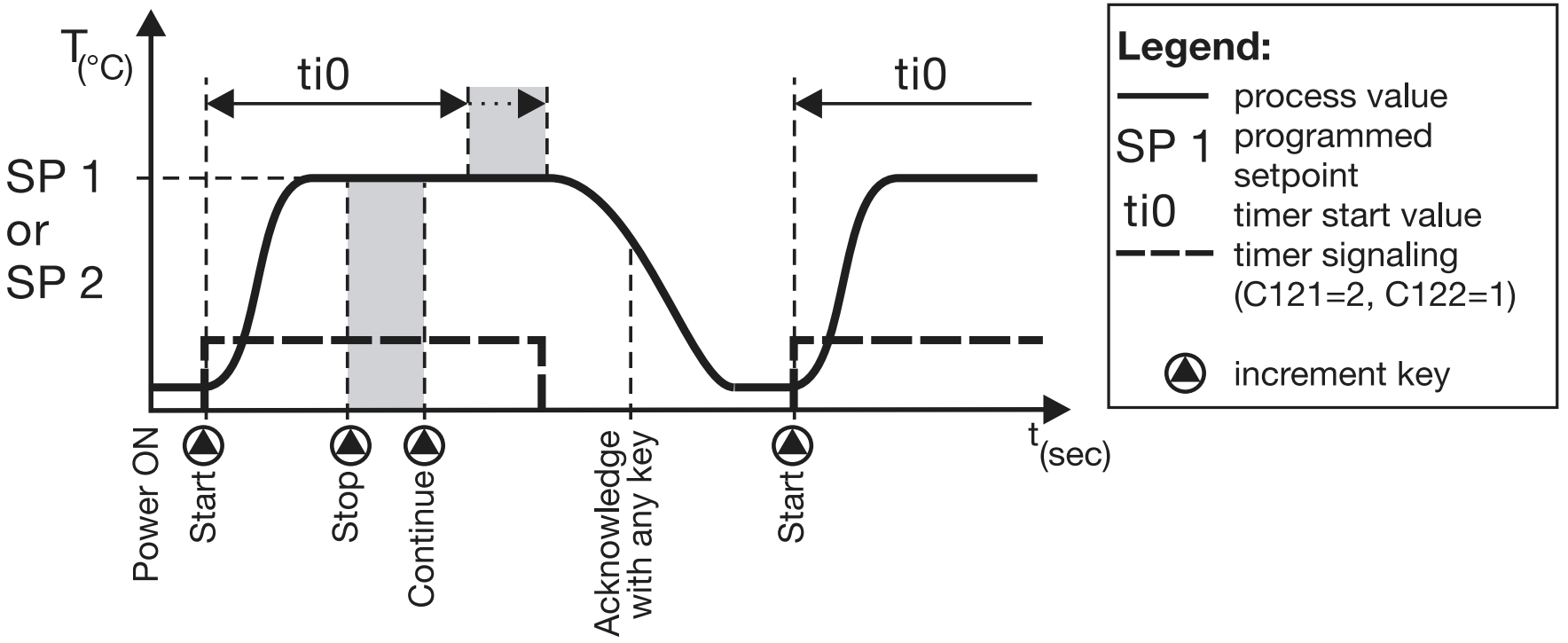
Code	Operating level	Parameter level	Configuration level
000	enabled	enabled	enabled
001	enabled	enabled	inhibited
011	enabled	inhibited	inhibited
111	inhibited[1]	inhibited	inhibited

1. The values at the operating level can only be indicated but not modified.

6.8 Timer function

Using the timer function, the control action can be influenced by means of the adjustable time ti0. After the timer has been started (by power ON, pressing the key, or via the logic input), the timer start value ti0 is counted down to 0, either immediately or after the process value has gone above or below a programmable tolerance limit. When the timer has run down, different events are triggered, such as control switch-off (output 0%) and setpoint switching. In addition, it is possible to implement timer signaling via an output.

Example:



Notes on the timer function in conjunction with the ramp function

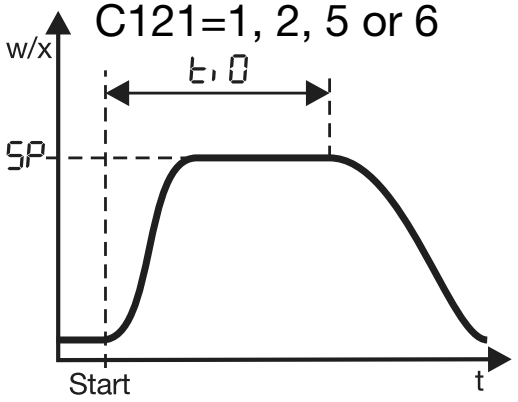
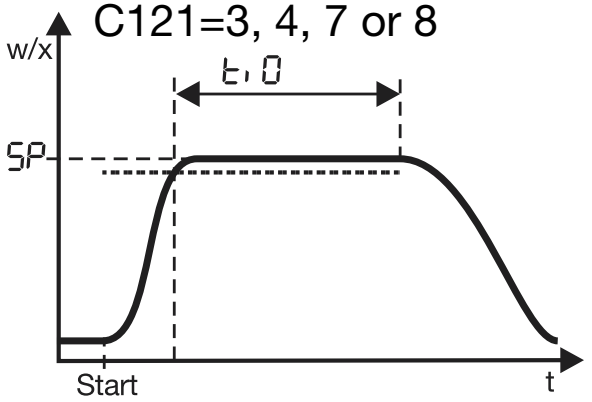
- Generally, the setpoints can also be approached using the ramp function.
- Stopping the timer does not affect the ramp function
- If control is active after the timer has run down, the current setpoint is approached with the ramp. Cancelation of the timer is followed by a setpoint step without ramp.
- In the case of timer functions with a tolerance limit, only the setpoint (=ramp end value) is monitored.

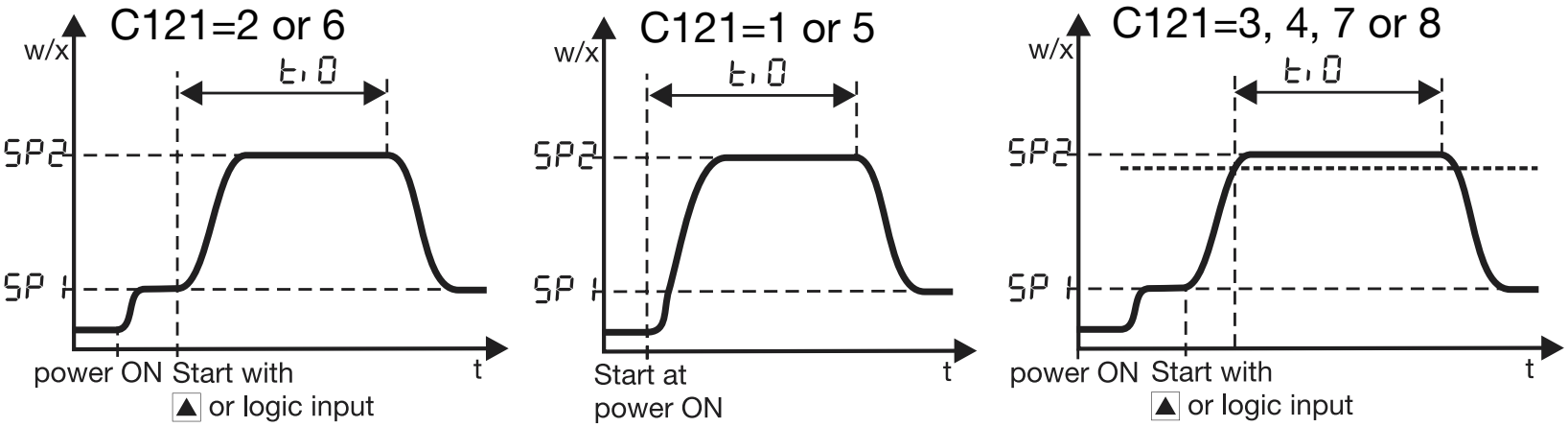
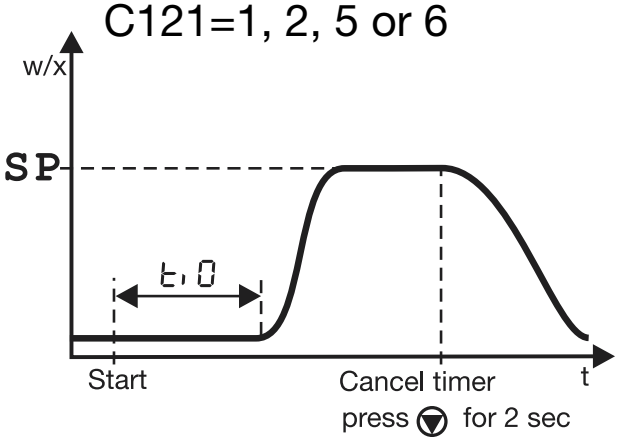
Notes on setpoint switching via the logic input

- Setpoint switching via the logic input is generally possible. An exception here is the timer function “Time-dependent setpoint switching”. In this case, configured setpoint switching via the logic input is not active.

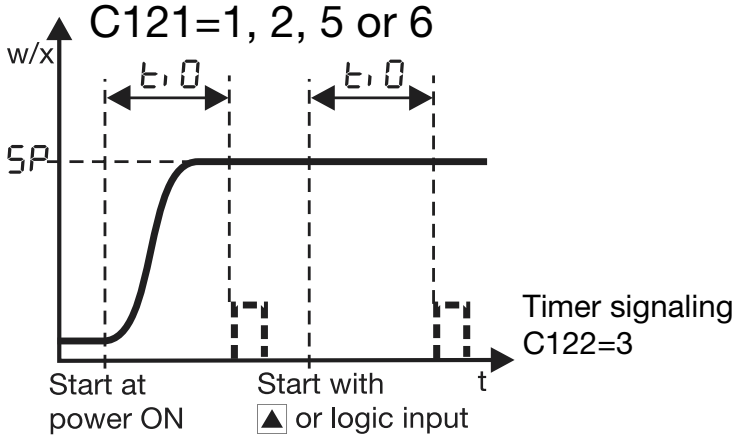
Notes on the display status in the event of a power failure

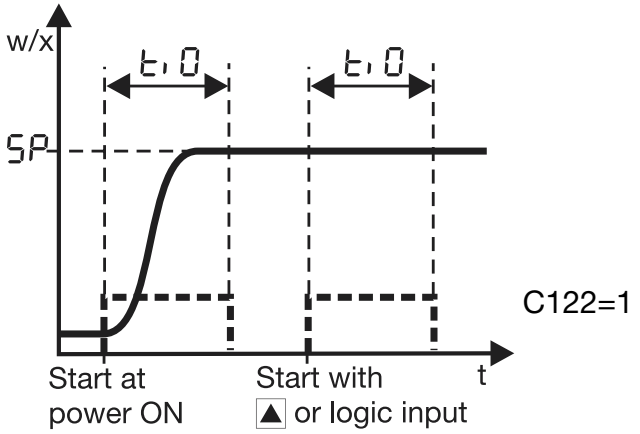
- The state of the display before the power failure will be restored, except for events that are related to the timer (start, cancel, continue, stop). The timer value will then be shown in the display.

Symbol	Notes
C 120 C120=1	**Timer function** ⇨ Chapter 7 “Configuration tables (C codes)” **Time-limited control:** Control is switched off after the timer has run down (output 0%) C121=1, 2, 5 or 6  C121=3, 4, 7 or 8  Diagrams with and without start above tolerance limit. ---- tolerance limit

Symbol	Notes
C120=2	**Time-dependent setpoint switching:** After starting the timer function, the process is controlled to setpoint **SP2**. When the timer has run down, the controller automatically switches to **SP1**. 
C120=3	**Time-delayed control:** The control action starts after the timer has run down.  ☞ ✱ After the timer has run down (ENd C), use any key to acknowledge

Symbol	Notes
C120=4	**Timer:** After starting the timer function, ti0 is counted down to 0. The control action is independent of the timer. Here, too, the timer run-down can be signaled via an output.





Symbol	Notes
C 121	**Start condition for timer** The timer start value ti0 is counted down as selected in the following events: 1. power ON or logic input/keys 2. start via keys/logic input 3. process value has reached tolerance limit (1 °C or 5 °C) (start via keys/logic input) The position of the tolerance limit depends on the controller type: - 2-state controller (direct): tolerance limit above setpoint - 2-state controller (inverse): tolerance limit below setpoint - 3-state controller: tolerance limit below setpoint  If, during the control process, the process value goes above/below the setpoint, the timer will be stopped for the duration of the infringement. **Response to a power failure** After a power failure, the condition before the power failure can be restored, or the timer function can be canceled. If the timer had already run down before the power failure, the timer start value will be loaded. The timer will start automatically when C121=1 or 5. The timer value is saved at one minute intervals, to cover the case of a power failure. ⇨ Chapter 7 “Configuration tables (C codes)”
C 122	**Timer signaling** From the start of the timer function until timer run-down, or after the timer has run down, a signal can be produced via an output.
C 123	**Time unit for the timer**

Example

After the start via the logic input or from the keys, the process must be controlled to a setpoint of 80 °C for 30 minutes. The control action has to be canceled in the event of a power failure.

Configuration:

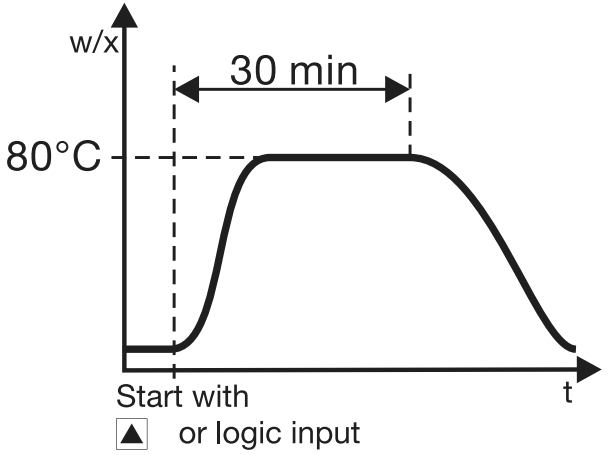
- `C111...C116`: controller programming
- `C117=5`: logic input = timer control
- `C120=1`: timer function = time-limited control
- `C121=6`: start condition for timer = via logic input/keys - cancelation on power failure
- `C122=0`: timer signaling = no function
- `C123=1`: time unit (timer) = mm.ss

Entry:

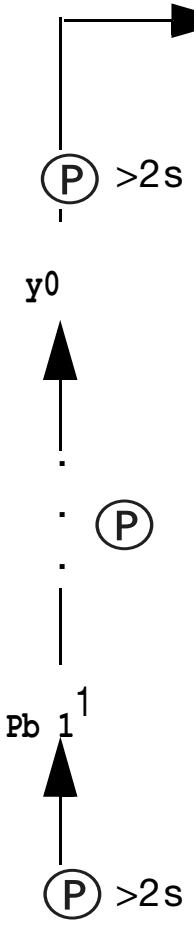
* Enter the setpoint SP (80 °C)
* Press the Ⓟ key until `ti0` is indicated

Enter the timer start value `ti0` (30.00)

* Return to basic status with Ⓟ
* Start the control action via the logic input or with ▲



7 Configuration tables (C codes)



C 1 1 1	Transducer		X
001	Pt 100	(3-wire)	
006	Pt 1000	(3-wire)	
601	KTY11-6	(2-wire)	
003	Pt 100	(2-wire)	
005	Pt 1000	(2-wire)	
039	Cu-Con	T	
040	Fe-Con	J	
041	Cu-Con	U	
042	Fe-Con	L	
043	NiCr-Ni	K	
044	Pt10Rh-Pt	S	
045	Pt13Rh-Pt	R	
046	Pt30Rh-Pt	B	
048	NiCrSi-NiSi	N	
052	standard signal 0 - 20 mA		
053	standard signal 4 - 20 mA		
063	standard signal 0 - 10 V		
071	standard signal 2 - 10 V		

P

C 1 12	Decimal places/unit	X
0	9999/°C	
1	999.9/°C	
2	99.99/°C	
3	9999/°F	
4	999.9/°F	
5	99.99/°F	

P

X Mark your selection with a cross.

C 113	Controller type	X
10	2-state controller (inverse)	
11	2-state controller (direct)	
30	3-state controller	

P

C 114	Limit comparator (LK)	X
0	no function	
1	lk 1	
2	lk 2	
3	lk 3	
4	lk 4	
5	lk 5	
6	lk 6	
7	lk 7	
8	lk 8	

P

C 115	Ramp function	X
0	ramp function OFF	
1	ramp function (°C/min)	
2	ramp function (°C/h)	

P

inverse = output is active when process value is below setpoint (controller output 1)
direct = output is active when process value is above setpoint (controller output 2)

C 116	Outputs in fault condition		X
0	0 %[1]	LK/timer signaling OFF	
1	100 %[2]		
2	-100 %[1]		
3	0 %[1]	LK/timer signaling ON	
4	100 %[2]		

1. Minimum output limiting **y2** is effective
2. Maximum output limiting **y1** is effective

Ⓟ

C 117	Logic input	X
0	no function	
1	key inhibit	
2	level inhibit	
3	ramp stop	
4	setpoint switching	
5	timer control	

Ⓟ

C 118		Output 1	Output 2 (only on Type 702060/2XX...)	Output 3
0		no function		
1	on 2-state controller	controller output	limit comparator	timer signaling
2		controller output	timer signaling	limit comparator
3		limit comparator	controller output	timer signaling
4		limit comparator	timer signaling	controller output
5		timer signaling	controller output	limit comparator
6		timer signaling	limit comparator	controller output
7	on 3-state controller	controller output 1	controller output 2	limit comparator/timer[1]
8		controller output 1	limit comparator/timer[1]	controller output 2
9		controller output 2	controller output 1	limit comparator/timer[1]
10		controller output 2	limit comparator/timer[1]	controller output 1
11		limit comparator/timer	controller output 1	controller output 2
12		limit comparator/timer	controller output 2	controller output 1

P

1. A programmed limit comparator (LK) has priority over timer signaling

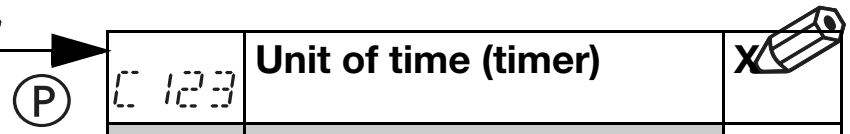
C 120	Timer function	X
0	no function	
1	time-limited control	
2	time-dependent setpoint switching	
3	time-delayed control	
4	timer (control is independent of timer)	

P

C 121	Start condition for timer	Action on power failure	X
1	after power ON, logic input/keys	Condition as before the power failure	
2	via logic input/keys		
3	via logic input/keys; timer counts 1 °C from tolerance limit		
4	via logic input/keys; timer counts 5°C from tolerance limit		
5	after power ON, logic input/keys	Cancelation of timer function (STOP appears in the display)	
6	via logic input/keys		
7	via logic input/keys; timer counts 1°C from tolerance limit		
8	via logic input/keys; timer counts 5 °C from tolerance limit		

The start conditions with tolerance limit (C121=3, 4, 7, 8) do not apply to C120=3 or 4.
If C120 is altered, the validity of C121 must be checked.

C 122	Timer signaling	X
0	no function	
1	timer start until run-down	
2	after run-down for 10 sec	
3	after run-down for 1 min.	
4	after run-down until acknowledgement	



C 123	Unit of time (timer)	X
1	mm.ss (max. 99.59)	
2	hh.mm (max. 99.59)	
3	hhh.h (max. 999.9)	

s = seconds; m = minutes;
h = hours

One output has to be configured accordingly (C118).

on to Chapter 8 “Parameter tables”

8 Parameter tables

Parameters of configuration level	Explanation	Value range	factory-set	Your setting
SCL	start value of standard signal	-1999 to +9999 digit	0	
SCH	end value of standard signal	-1999 to +9999 digit	100	
SPL	lower setpoint limiting	-1999 to +9999 digit	-200	
SPH	upper setpoint limiting	-1999 to +9999 digit	850	
OFFS	process value correction	-1999 to 9999 digit[1]	0	
HYSt	switching differential of limit comparator	0 to 9999 digit[1]	1	

1. With displays with one or two decimal places, the value range and the factory setting change accordingly.
   Example: 1 decimal place → value range: -199.9 to +999.9

Parameters of parameter level	Explanation	Value range	factory-set	Your setting
AL.	limit value of limit comparator	-1999 to +9999 digit	0	
Pb 1	proportional band 1	0 to 9999 digit[1]	0	
Pb 2	proportional band 2	0 to 9999 digit[1]	0	
dt	derivative time	0 to 9999 sec	80 sec	
rt	reset time	0 to 9999 sec	350 sec	
Cy 1	cycle time 1	1.0 to 999.9 sec	20.0 sec	
Cy 2	cycle time 2	1.0 to 999.9 sec	20.0 sec	
db	contact spacing	0 to 1000 digit[1]	0	
HyS 1	switching differential 1	0 to 9999 digit[1]	1	
HyS2	switching differential 2	0 to 9999 digit[1]	1	
y 0	working point	-100 to 100 %	0 %	
y 1	maximum output	0 to 100 %	100 %	
y 2	minimum output	-100 to +100 %	-100 %	
df	filter time constant	0.0 to 100.0 sec	0.6 sec	
rASd	ramp slope	0 to 999 °C/h (°C/min)[1]	0	

back to the operating level

Ⓟ

1. For displays with one or two decimal places, the value range and the factory setting change accordingly.

9 Alarm messages

Display	Description	Cause/Response
	The process value display flashes “1999”.	Over/underrange of process value. Controllers and limit comparators that refer to the process value input behave in accordance with the configuration of the outputs. The timer is stopped.
	The lower display shows STOP, which signifies that the timer was started and then a supply failure occurred. ✱ Acknowledge with any key (the timer start value `ti0` is loaded)	The timer function was canceled due to a supply failure. The timer value that was present at the time of the supply failure is indicated. ⇨ Chapter 7 “Configuration tables (C codes)”, C121.

The following events come under the heading over/underrange:

☞
- probe break/short-circuit
- measurement is outside the control range of the probe that is connected
- display overflow

10 Technical data

10.1 Measuring circuit monitoring

Transducer		Overrange/ underrange	Probe/ lead short-circuit	Probe/lead break
Thermocouple		is recognized	-	is recognized
Resistance thermometer		is recognized	is recognized	is recognized
Voltage	2 — 10V	is recognized	is recognized	is recognized
	0 — 10V	is recognized	-	-
Current	4 — 20mA	is recognized	is recognized	is recognized
	0 — 20mA	is recognized	-	-

10.2 Analog inputs

Resistance thermometer

Designation	Measuring range	Accuracy[1]
Pt 100 EN 60 751	-200 to +850°C	0.1%
KTY11-6 (PTC)	-50 to +150 °C	1%
Pt1000 DIN 60 751	-200 to +850°C	0.1%
Connection circuit	2-wire, 3-wire	

Designation	Measuring range	Accuracy[1]
Sampling rate	210 msec (250msec with active timer)	
Input filter	2nd order digital filter; filter constant adjustable from 0 to 100 sec	
Special features	also programmable in °F	

Thermocouple

Designation			Measuring range	Accuracy[1]
Fe-Con	L	DIN 43 710	-200 to + 900 °C	0.4 %
Fe-Con	J	EN 60 584	-200 to +1200 °C	0.4 %
Cu-Con	U	DIN 43 710	-200 to + 600 °C	0.4 %
Cu-Con	T	EN 60 584	-200 to + 400 °C	0.4 %
NiCr-Ni	K	EN 60 584	-200 to +1372 °C	0.4 %
NiCrSi-NiSi	N	EN 60 584	-100 to +1300 °C	0.4 %
Pt10Rh-Pt	S	EN 60 584	0 to +1768 °C	0.4 %
Pt13Rh-Pt	R	EN 60 584	0 to +1768 °C	0.4 %
Pt30Rh-Pt6Rh	B	EN 60 584	300 to 1820 °C	0.4 %
Cold junction			Pt100 internal	
Cold junction accuracy			± 1 °C	

Input filter	2nd order digital filter; filter constant adjustable from 0 to 100sec
Special features	also programmable in °F

1. The accuracy refers to the maximum measuring range span.
   The linearization accuracy is reduced with small ranges and short spans.

DC voltage, DC current

Measuring range	**Accuracy**	**Input resistance**
0 — 20mA 4 — 20mA	0.1%	$R_{IN} < 4\ \Omega$
0 — 10V 2 — 10V	0.1%	$R_{IN} > 100\ k\Omega$
Scaling	freely programmable within the limits	
Input filter	2nd order digital filter; filter constant adjustable from 0 — 100sec	

10.3 Logic input

Connection	**Function**
Floating contact	configurable for key inhibit, level inhibit, ramp stop, setpoint switching and for timer control

10.4 Logic outputs

Output	Function
Relay K1	make or changeover contact, 3A at 250V AC resistive load, 100,000 operations at nominal load
Relay K2	make contact, 3A at 250V AC resistive load; 100,000 operations at nominal load
Output 3, logic level	logic output 0/5V, 0/20mA, 0/12V, 0/20mA (short-circuit proof)

10.5 Controller

Controller type	2-state controller, inverse, direct
Controller structures	P/PD/PI/PID
A/D converter	resolution >15 bit

10.6 Supply voltage

110 — 240V AC +10% /-15, 48 — 63Hz or 20 — 53V AC/DC, 48 — 63Hz

Power consumption: max. 5VA

10.7 General data

Test voltages to EN 61 010, Part 1: overvoltage category II, pollution degree 2

Electrical connection:
via screw terminals, conductor cross-section 0.2 — 2.5 mm^2

Electromagnetic compatibility: EN 61 326

Interference emission: Class B

Immunity to interference: industrial requirements

Data backup: EEPROM

Accuracy of timer: 0.7 % / 10 ppm/°C

Ambient and storage temperature: 0 to 55 °C / -30 to +70 °C

Climatic conditions: ≤ 75% rel. humidity, no condensation

Operating position: vertical

Weight: approx. 160 g

Protection: IP20

Safety regulation: to EN 61 010

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