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Digital
Dual Function Controller EDR_MIC
e.g. for humidity and **temperature**
optional with integrated sensor power supply

Inputs:

standard signal 0/4 ... 20mA			
standard signal 0/0.2 ...1 V			
Pt100 (3-wire)		Pt1000 (3-wire)	
Pt100 (2-wire)		Pt1000 (2-wire)	
KTY11-6			
Cu-Con	„T“	Fe-Con	„J“
Cu-Con	„U“	Fe-Con	„L“
NiCr-Ni	„K“	Pt10Rh-Pt	„S“
Pt13Rh-Pt	„R“	Pt30Rh-Pt	„B“
NiCrSi-NiSi	„N“		

Description

The dual function controller EDR_MIC e.g. for humidity and temperature consists of two integrated, digital microprocessor controllers and also, optional, an integrated 15-VDC power supply for the sensors.

Humidity temperature sensors with the standard signals 0/4...20mA, 0/0.2 ...1V or others are used as readings recorders. In the Galltec+Mela programme you will find a large selection of different sensors.

The humidity and temperature values are displayed digitally as actual values on the EDR_MIC controller.

The measurement ranges can be set to any scale within the maximum ranges.

The filters on the controller inputs filter out changes in the input signal which are too fast. The filter time constant can be set to between 0.0 ... 100.0 sec by pressing a button. Thus the control is no longer affected by distortions and transients.

The individual microprocessor controllers can be programmed independently of each other for the various control tasks. Whether as a two point controller, three point controller, with timer or ramp function - you decide through programming. The structure of the controller, e.g. as a PI controller or PID controller with the corresponding parameters, is also entered via the programming level. Thus a universal combination controller is at your disposal.

Technical Data

power supply ..... 230VAC, 11VA (incl. sensors), 45...55Hz
controller type ..... two or three point controller
controller structures ..... P/PD/PI/PID
A/D-transducer ..... resolution > 15 bit
accuracy (timer) ..... 0.7 % / 10ppm/K
data storage ..... EEPROM
sampling time ..... 210 ms
measurement accuracy (analogue input) ..... ≤ 0.1% / 100ppm/K
outputs ..... 4 relays (2 per controller)
make contact (NO contact)
..... 3 A at 250 VAC resistive load
output sensor supply (optional)
..... 15 VDC max. 60 mA
target value display ..... 4-digit can be retrieved using keys
actual value display 4digit
housing ..... panel housing to DIN43700 black
housing dimensions ..... 144 x 72 x 135
contacts
..... on the back using screw terminals
conductor cross section ..... ≤ 1.5 mm^2
electromagnetic compatibility ..... EN 61 326
ambient temperature ..... +10...+50°C
protective system, front IP50
rear IP20
resistance to climatic conditions
..... ≤ 75%rh without condensation

Technical Data

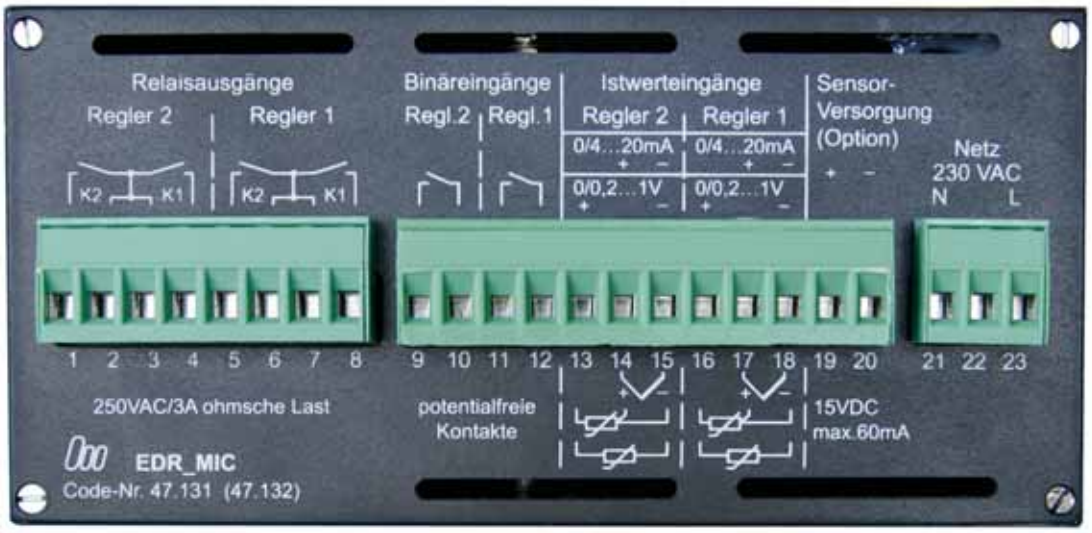
inputs ..... 0/4 ...20mA
..... 0/0.2 ... 1 V
..... 100 ... 138.5 Ohm, 1000 ... 1385 Ohm
or thermocouples see above

voltage drop current input: ..... ≤ 1 V
R_E voltage input ..... 10 MOhm

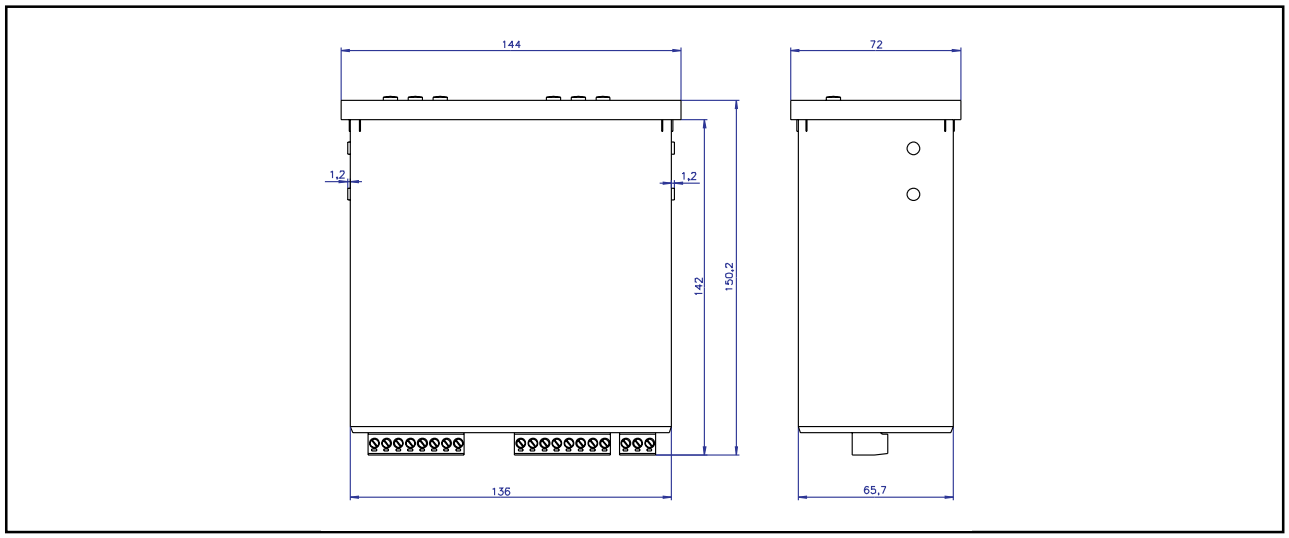
control range ..... depending on sensor used
display range ..... depending on sensor used

"subject to technical modifications"

Connecting Diagram

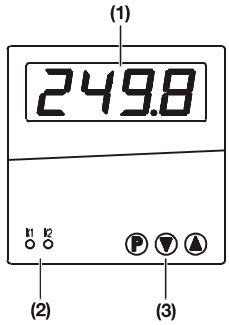


Dimensions

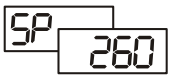


Operation of the Controller

Display and keys



(1) Display

7-segment display	4 places, green Display alternates when setpoints, parameters and codes are entered and indicated 
Character height	10 mm
Display range	-1999...+9999 digit
Decimal places	none, one, two
Unit	°C/ °F (process value display)

(2) Status indicators

LED	two LEDs for the outputs 1 and 2, yellow

(3) Keys

P , ▲ , ▼	for operating and programming the instrument. Dynamic modification of settings and parameters * Increase value with ▲ * Decrease value with ▼ Automatic value acceptance after 2 seconds.

Principle of operation

Normal display
The display shows the process value.

Operating level
The setpoint **SP** is input here. On active setpoint switching via the logic input, **SP 1** or **SP 2** appears in the display. When the ramp function is active, the ramp setpoint **SPr** is displayed. With activated timer function, the timer value **t.** or the timer start value **t. 0** is shown.
The setpoint is altered dynamically using the ▲ and ▼ keys. The setting will be accepted automatically after approx. 2 sec.

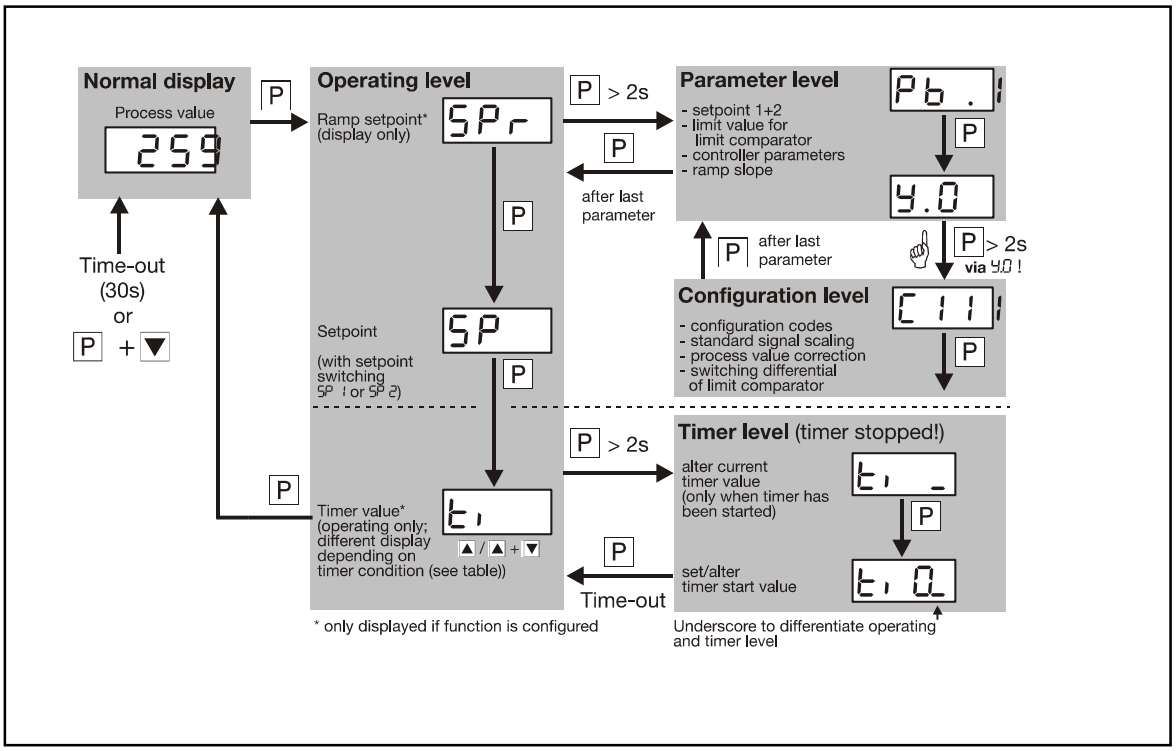
Parameter level
The setpoints, the limit value of the limit comparator, the controller parameters and the ramp slope are programmed here.

Configuration level
The basic functions of the controller are set here.

In order to make the settings, it is necessary to change to the configuration level via the parameter y .0 (parameter level).

Timer level
The current timer value (only when the timer has been started) and the timer start value are altered here. The parameters at this level are marked with an underscore in the display.

Time-out
If no operation occurs, the controller returns automatically to normal display after approx. 30 sec (exception: with timer functions starting via power ON, the timer value is displayed). If the timer value is displayed at the operating level, time-out is not active.



Operation of the timer function

Operation from the keys

The timer can be operated if the timer (operating level) is indicated. Time-out is not active here.

Operation via the logic input

If the logic input is configured accordingly, then a key, such as the ▲ key can be used. In this case, the timer can also be operated even if the timer value does not appear in the display.

Display	State/Action	Display	State/Action
t1 0 12.00	Timer not running * Start with ▲	t1 11.58	Timer has stopped * Continue with ▲ * Cancel with ▲ + ▼
t1 0 12.00	Timer has been started, but the tolerance limit has not yet been reached * Cancel with ▲ + ▼	t1 End	Timer has run down * Acknowledge with any key (timer start value t. 0 is indicated). With time-delayed control (C120=3), acknowledge with ▲ + ▼
t1 (1x) 11.59	Timer running; t . is displayed * Stop with ▲ * Cancel with ▲ + ▼		
When the timer has been started, the decimal point in the display for the timer value will blink! ☼			

Functions

We recommend the following procedure:

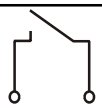
*	Familiarize yourself with the controller functions
*	Enter the configuration codes and the parameter values in the tables provided for this purpose in chapter " Configuration and parameter tables". Write down the appropriate values (✎) or mark selection with a cross (**x** ✎). The parameters and the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

Configuration	**Masking out the parameters for**	**Parameter**
Single-setpoint controller	Double-setpoint controller	Pb .2, CY 2, db, HYS.2
Double-setpoint controller	Limit comparator	C114, HYSt, AL
Limit comparator no function	Limit comparator	HYSt, AL
Resistance thermometer, thermocouple	Standard signal scaling	SCL, SCH
Ramp function off	Ramp function	rASd, SPr
Setpoint switching not activated	Setpoints at the parameter level	SP 1, SP 2
Timer function: no function	Timer function	t. , C 121, C 122, C 123

Process value input

Symbol	**Notes**
C 111	**Transducer/probe (process value input)** ⇨ **page 12**
C 112	**Unit of process value (°C/°F)/decimal places of display** ⇨ **page 12**
SCL SCH	**Start/end value of value range** for standard signals ⇨ **page 14** Example: 0...20 mA → 20...200°C: SCL = 20 / SCH =200
OFFS	**Process value correction** ⇨ **page 14** Using the process value correction, a measured value can be corrected by a programmable amount upwards or downwards (offset). Lead compensation can be implemented in software for 2-wire circuit through process value correction. Examples: **Measured value** **Offset** **Displayed value** 294,7 + 0,3 295,0 295,3 - 0,3 295,0
dF	**Filter time constant** (damping) to adapt the digital input filter (0sec = filter off) ⇨ **page 15** if dF high: - high damping of interference signals - slow reaction of the process value display to changes in the process value - low cut-off frequency (2nd order low-pass filter)

Logic input

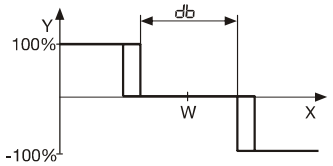
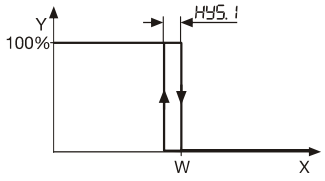
		
Key inhibit	Operation is possible from keys.	**No** operation from keys.
Level inhibit	Access to the parameter and configuration levels is possible. Starting self-optimization is possible.	**No** access to the parameter and configuration levels. Starting self-optimization is **not** possible
Ramp stop	Ramp running	Ramp stopped
Setpoint switching	Setpoint SP 1 is active	Setpoint SP 2 is active
	The appropriate symbols SP 1 and SP 2 are displayed at the operating level.	
Timer control	Ackowledge start/stop/continue/timer run-down (edge-triggered)	

Symbol	Notes
C117	**Function of the logic input** ⇨ **page 13**

Controller

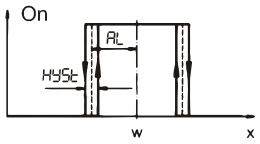
Controller structure
The controller structure is defined via the parameters Pb, dt and rt .
Example: Setting for PI controllerr → **Pb .1** =120, **dt** =0s, **rt** =350sec

Symbol	Notes
C113	**Controller type and assignment of the controller outputs to the physical outputs 1+2** ⇨ **page 13**
C116	**Outputs in fault condition** ⇨ **page 13** The switching states of the outputs are defined here in the event of over/underrange, probe break/ short circuit or display overflow. ⇨ Alarm messages
Pb .1 Pb .2	**Proportional band 1** (controller output 1) ⇨ **page 15** **Proportional band 2** (controller output 2) Influences the P action of the controller. If Pb=0 the controller structure is not effective.
dt	**Derivative time** ⇨ **page 15** Influences the D action of the controller. If dt=0 the controller has no D action.
rt	**Reset time** ⇨ **page 15** Influences the I action of the controller. If rt=0 the controller has no I action.
Cy 1 Cy 2	**Cycle time 1** (controller output 1) **page 15** ⇨ **Cycle time 2** (controller output 2) The cycle time has to be selected so that the energy supply to the process is virtually continuous, while not subjecting the switching elements to excessive wear.

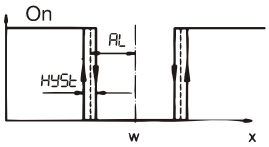
Symbol	Notes
db	**Contact spacing** ⇨ **page 15** for double-setpoint controller 
HYS. 1 HYS.2	**Differential 1** (controller output 1) ⇨ **page 15** **Differential 2** (controller output 2) for controllers with Pb. 1 =0 or Pb.2 =0 
y .0	**Working point (basic load)** ⇨ **page 15** Output if process value = setpoint
Y . 1 Y .2	**Output limiting** ⇨ **page 15** y . 1 - maximum output y .2 - minimum output ☞ For controllers without controller structure (Pb. 1 =0 or Pb.2 =0) it is necessary that y . 1 =100% and y .2 = -100%.

Limit comparator (alarm contact)

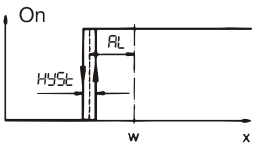
lk1



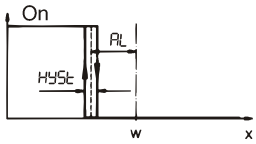
lk2



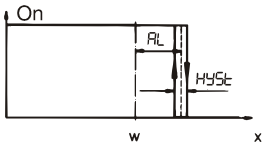
lk3



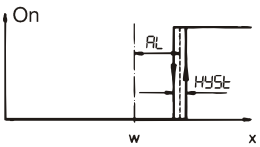
lk4



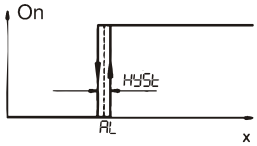
lk5



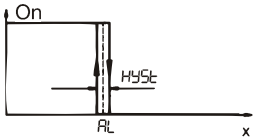
lk6



lk7



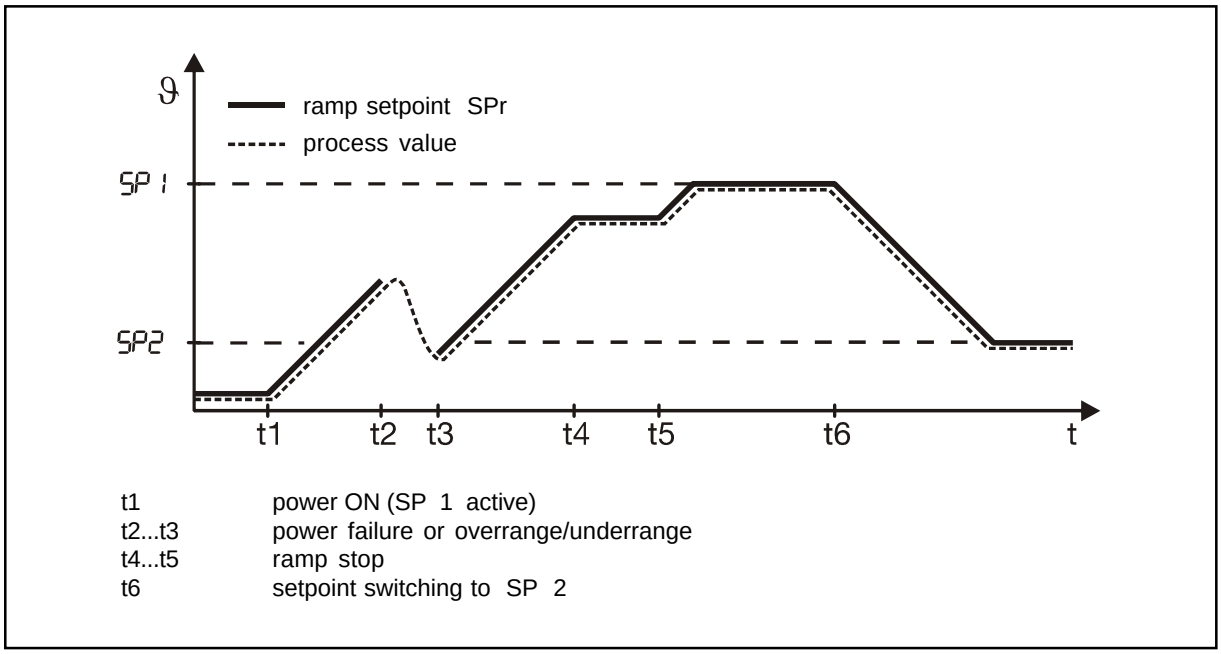
lk8



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

w - setpoint, x - process value

Symbol	Notes
C114	**Limit comparator function** (lk1...lk8) ⇨ **page 13**
HYSt	**Differential of limit comparator** ⇨ **page 14**
AL	**Limit value of limit comparator** ⇨ **page 15**



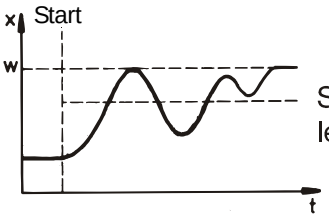
t1	power ON (SP 1 active)
t2...t3	power failure or overrange/underrange
t4...t5	ramp stop
t6	setpoint switching to SP 2

Symbol	Notes
C115	**Ramp function** (on/off, time unit) ⇨ **page 13**
C117	**Ramp stop** via logic input (floating contact) ⇨ **page 13**
rASd	**Ramp slope** in °C/h or °C/min ⇨ **page 15**

Self-optimization

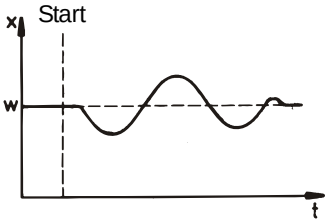
Self-optimization determines the optimum controller parameters for PID or PI controllers.
The following controller parameters are defined: **rt, dt, Pb . 1, Pb .2, CY 1, CY 2, dF**
IThe controller selects procedure **a** or **b**, depending on the size of the control deviation:

a) Self-optimization in the approach phase



x - process value
w - setpoint

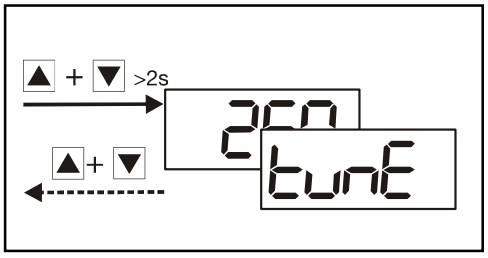
b) Self-optimization at setpoint



Starting self-optimization

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

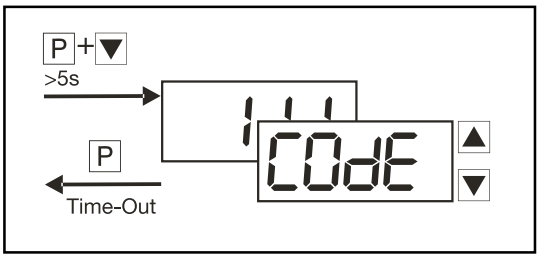
Self-optimization is automatically terminated, or can be cancelled.



Level inhibit via code

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

* Set the code using P + ▼ (at least 5sec) in normal display



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

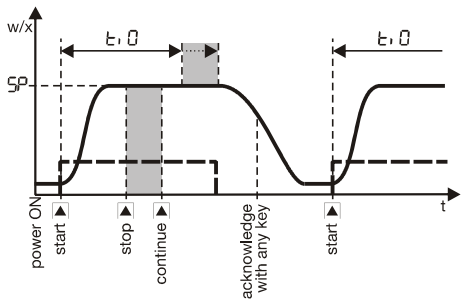
Code	Operating level	Parameter level	Configuration level	Timer level
000	enabled	enabled	enabled	enabled
001	enabled	enabled	inhibited	enabled
011	enabled	inhibited	inhibited	enabled
111	inhibited[1]	inhibited	inhibited	inhibited[2]

1. The values at the operating level can only be indicated but not modified.
2. Timer operation (start/stop/continue/cancel) will continue to be possible.

Timer function (extra code)

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

Example:



w - setpoint
x - process value
SP - programmed setpoint
t. 0 - timer start value
----- - timer signalling (here C122=1)
▲ - increment key

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 influence the ramp function
- If control is active after the timer has run down, the current setpoint is approached with the ramp. Cancellation of the timer is followed by a setpoint step without ramp.
- For timer functions with a tolerance limit, only the setpoint (=ramp end value) is monitored.

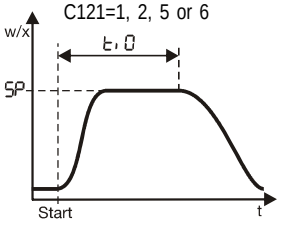
Note on setpoint switching via the logic input

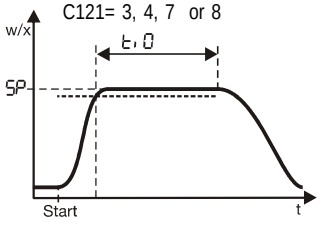
- Setpoint switching via the logic input is generally possible. An exception here is the timer function "Time-dependent setpoint switching". In this case, configured setpoint switching via the logic input will not be active.

Note 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). Then the timer value will be shown in the display.

Symbol	Notes
C 120	**Timer function** ⇨ **page 14**
C120=1	**Time-limited control**: The control is switched off after the timer has run down (output 0%)

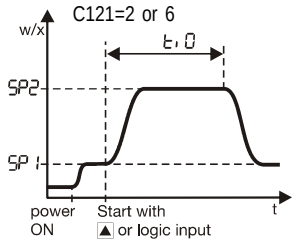


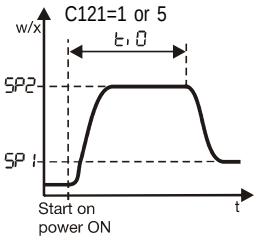


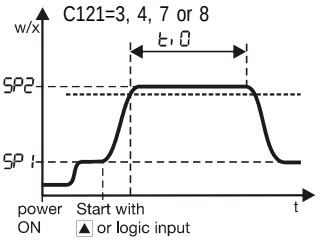
Diagrams with and without start above tolerance limit.

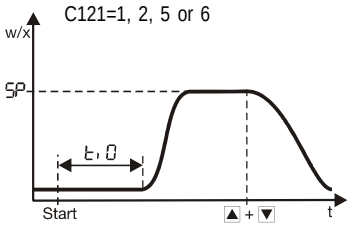
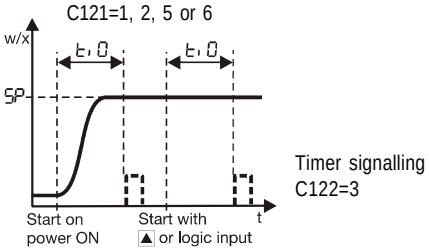
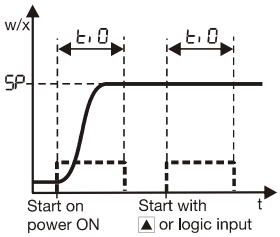
---- Tolerance limit

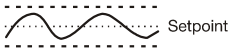
C120=2	**Time-dependent setpoint switching:** After the start of the timer function, the process is controlled to setpoint SP2. After the timer has run down, the controller automatically switches over to SP 1.







Symbol	Notes
C 120 C120=3	**Time-delayed control:** The control action starts after the timer has run down  After the timers has run down (End), the ▲ + ▼ keys are used for acknowledgement.
C120=4	**Timer:** After the start of the timer function, t. 0 is counted down to 0. The control action is independent of the timer. Here, too, the timer run-down can be signalled via an output.  Timer signalling C122=3  C122=1

Symbol	Notes
C 121	**Start condition of the timer** ⇨ **page 14** The timer start value t. 0 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: - 1-setpoint controller (direct): tolerance limit above setpoint - 1-setpoint controller (reversed): tolerance limit below setpoint - 2-setpoint controller: tolerance limit below setpoint  If, during the control process, the process value goes above/below the tolerance limit, the timer will be stopped for the duration of the infringement. **Response to a power failure** ⇨ **page 14** After a power failure, the condition before the power failure can be restored, or the timer function can be cancelled. If the timer had 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.
C 122	**Timer signalling** ⇨ **page 14** From the start of the timer function until timer run-down, a signal can be produced via an output.
C 123	**Time unit for the timer** ⇨ **page 14**

Programming example

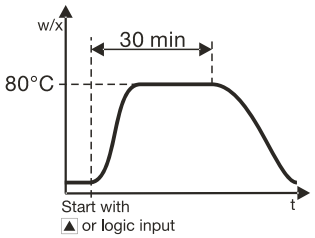
After the start via the logic input or from the keys, the process has to be controlled for 30 minutes to a setpoint of 80°C. The control action is to be cancelled in the event of a power failure.

Configuration:

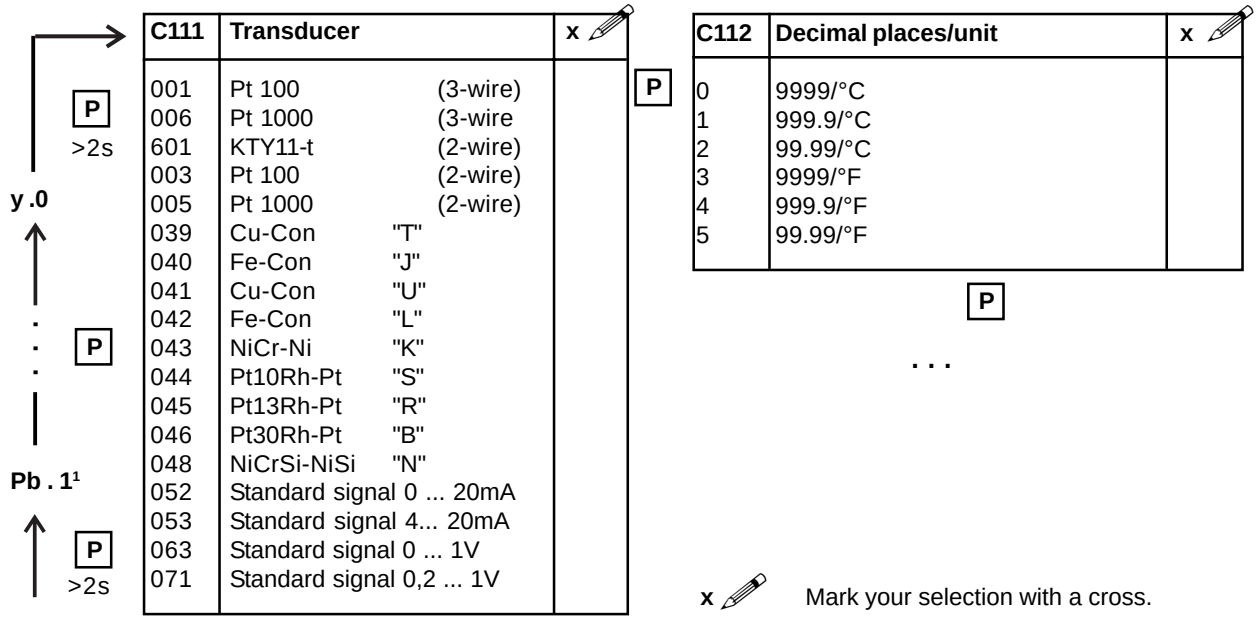
- C111...C116: Controller programming
- C117=5: Logic input = timer control
- C120=1: Timer function = time-limited control
- C121=6: Start condition for timer = via logic input/keys -cancellation on power failure
- C122=0: Timer signalling = no function
- C123=1: Time unit (timer) = mm.ss

Operation:

* Enter the setpoint **SP** (80°C)
* Press the P key until **t. 0** is indicated
* Change over to the timer level using P (at least 2sec)
* Enter the timer start value **t. 0**_ (30.00)
* Return to the operating level (timer value) with P
* Start the control action via the logic input or with ▲



Configuration and parameter tables



Normal display/
Operating level

1. **SP 1, AL** or **Pb . 1** is shown here, depending on the configuration.

C113	Controller type	Output 1 (relay)	Output 2+3 (logic+relay)	x
10	single setpoint (reversed)	controller	LK/timer signalling[1]	
11	single setpoint (direct)	controller	LK/timer signalling[1]	
30	double setpoint	controller reversed	controller direct	
20	single setpoint (reversed)	LK/timer signalling[1]	controller	
21	single setpoint (direct)	LK/timer signalling[1]	controller	
33	double setpoint	controller direct	controller reversed	

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

P

C114	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

C115	Ramp function	x
0	ramp function off	
1	ramp function (°C/min)	
2	ramp function (°C/h)	

P

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reversed = heating (output is active when process value is below setpoint)
direct = cooling (output is active when process value is above setpoint)

C116	Outputs on fault I		x
0	0%[1]	LK/timer signalling OFF	
1	100%[2]		
2	-100%[1]		
3	0%[1]	LK/timer signalling ON	
4	100%[2]		

P

C117	Logic input	x
0	no function	
1	key inhibit	
2	level inhibit	
3	ramp stop	
4	setpoint switching	
5	timer control	

P

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1. Minimum output limiting y.2 is effective
2. Maximum output limiting y. 1 is effective

C120	Timer function	x
0	no function	
1	time-limited control	
2	time-dependent setpoint switching	
3	time-delayed control	
4	timer (control independent of timer)	

P

C121	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 counts5°C from tolerance limit		
5	after power ON, logic input/keys	Cancellation 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) are not valid for C120=3 or 4.
If C120 is altered, the validity of C121 must be checked.

C122	Timer signalling	x
0	no function	
1	timer start until run-down	
2	after run-down for 10sec	
3	after run-down for 1 min.	
4	after run-down until acknowledgement	

P

C123	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 correspondingly (C113).

P

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

P

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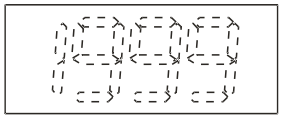
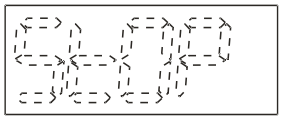
1. For displays with one or two decimal places, the value range and the factory setting change accordingly.
Example: 1 decimal place → value range: -199,9...+999,9

Parameter	Explanation	Value range	factory-set	Your setting
SP 1	setpoint 1	SPL ... SPH	0	
SP 2	setpoint 2	SPL ... SPH	0	
AL	limit value of limit comparator	-1999 ... +9999 digit	0	
Pb . 1	proportional band 1	0 ... 9999 digit [1]	0	
Pb .2	proportional band 2	0 ... 9999 digit [1]	0	
dt	derivative time	0 ... 9999 sec	80sec	
rt	reset time	0 ... 9999sec	350sec	
Cy 1	cycle time 1	1.0 ... 999.9sec	20,0sec	
Cy 2	cycle time 2	1.0 ... 999.9sec	20.0 sec	
db	contact spacing	0 ... 1000 digit [1]	0	
HYS. 1	differential 1	0 ... 9999 digit [1]	1	
HYS.2	differential 2	0 ... 9999 digit [1]	1	
Y .0	working point	-100 ... 100%	0%	
Y . 1	maximum output	0 ... 100%	100%	
Y .2	minimum output	-100 ... +100%	-100%	
dF	filter time constant	0.0 ... 100.0sec	0,6sec	
rASd	ramp slope	0 ... 999 °C/h (°C/min)[1]	0	

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

Alarm messages

Display	Description	Cause/response
	The displays for the process value or timer value flashes "1999". Display current timer value by repeatedly pressing the [P] key.	Over/underrange of process value. Controller and limit comparators referred to the process value input behave in accordance with the configuration of the outputs. The timer is stopped.
	The display for the timer value alternates between showing "StOP" and the time. * Acknowledge by using any key, (the timer start value t. 0 is loaded)	The timer function has been cancelled due to a supply failure. The timer value that was present at the time of the supply failure will be indicated.

☞ 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

Measurement circuit monitoring (• = recognized)

Transducer		Overrange/ underrange	Probe/ lead short-circuit	Probe/lead break
Thermocouple		•	-	•
Resistance thermometer		•	•	•
Voltage	0.2 ...1V	•	•	•
	0 ...1V	•	-	-
Current	4 ... 20mA	•	•	•
	0 ... 20mA	•	-	-

Technical data

Input for thermocouple

Designation			Range
Fe-Con	"L"		-200 ... +900°C
Fe-Con	"J"	DIN EN 60584	-200 ... +1200°C
Cu-Con	"U"		-200 ... +600°C
Cu-Con	"T"	DIN EN 60584	-200 ... +400°C
NiCr-Ni	"K"	DIN EN 60584	-200 ... + 1372°C
NiCrSi-NiSi	"N"	DIN EN 60584	-200 ... +1300°C
Pt10Rh-Pt	"S"	DIN EN 60584	0 ... 1768°C
Pt13Rh-Pt	"R"	DIN EN 60584	0 ... 1768°C
Pt30Rh-Pt6Rh	"B"	DIN EN 60854	0 ... 1820C[1]
Measurement accuracy: ≤ 0.4% / 100ppm/°C Cold junction: Pt 100 internal			

1. Accuracy is assured within the range 300 ... 1820°C

Input for standard signals

Designation	Range
Voltage	0 ... 1V, R_E > 10MΩ 0,2 ... 1V, R_E > 10MΩ R_E - input resistance
Current	4 ... 20mA, voltage drop ≤ 1.5V 0 ... 20mA, voltage drop ≤ 1.5V
Measurement accuracy: ≤ 0.1% / 100ppm/K	

Outputs
Relay:
Make contact (NO contact); 3A at 250V AC resistive load; 150.000 operations at rated load

Supply:
230V AC ±10%, 45 ... 55Hz