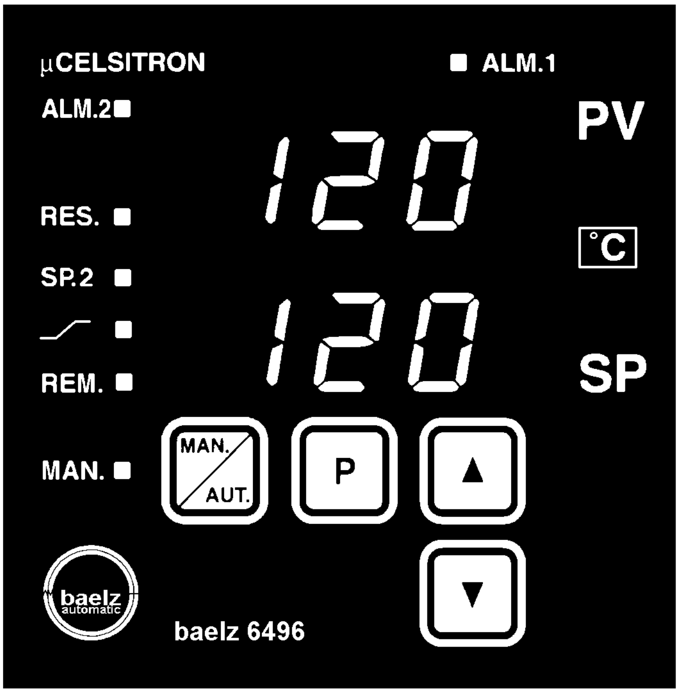
Operating Instructions OI 6496 / 6596

Microprocessor - based controller µCelsitron baelz 6496 / baelz 6596
Continuous controller

Industrial controller with continuous output



- Easy operation
- User - defined operating level
- Digital displays for process variable and setpoint
- Indication of the manipulated variable
- Control structure P, PD, PI and PID
- Output signal 0/4 to 20 mA or 0/2 to 10 V
- Two alarms
- Measurement inputs for Pt 100, current and voltage signals
- Manual -/ automatic changeover
- Compact design 96mm x 96mm x 135mm
- Two adjustable setpoints
- Remote setpoint
- Setpoint ramp
- Manipulated variable ramp
- Control via digital inputs
- Serial interface
- Robust self - optimization
- Semi - conductor memory for data protection
- Plug - type terminals
- Degree of protection Front IP 65
- Compact design 48mm x 96mm x 140mm

Contens

⚠ **Warning:**

During electrical equipment operation, the risk that several parts of this unit will be connected to high voltage is inevitable. Improper use can result in serious injuries or material damage.
The warning notes included in the following sections of these operating instructions must therefore be observed accordingly.
Personnel working with this unit must be properly qualified and familiar with the contens of these operating instructions.
Perfect, reliable operation of this unit presupposes suitable transport including proper storage, installation and operation.

1. Function overview

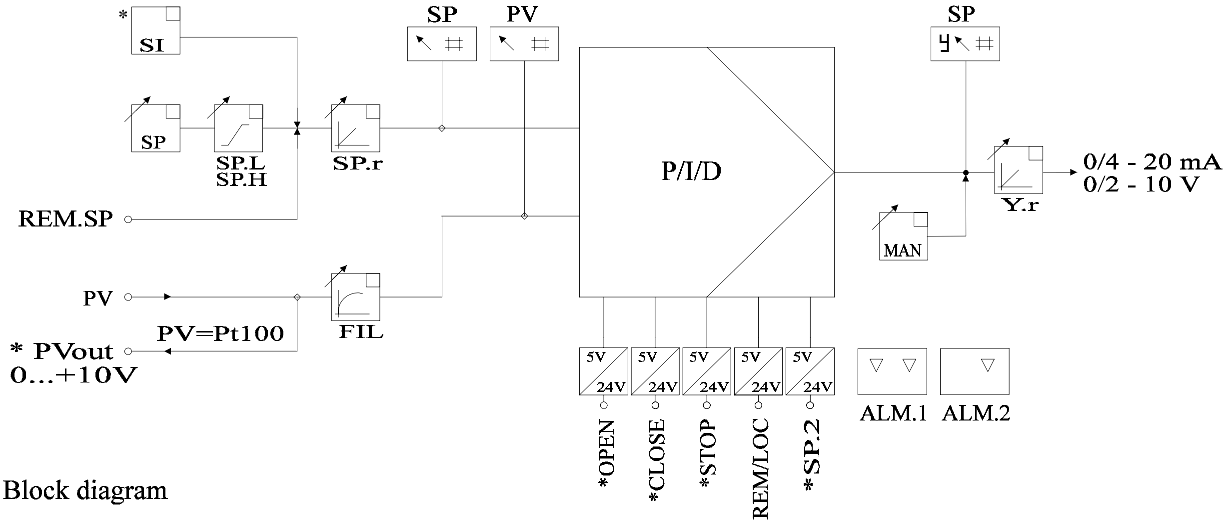
Basic device

Operating level:

Analog input Pt100	The analog inputs can be used optionally as a process variable input PV
Analog input 0/2 to 10V	or as an input for an analog remote setpoint SP
Analog input 0/4 to 20mA	
Digital input REM/LOC	For remote -/ local selection
Supply voltage 24 V DC	For two-wire transmitter and digital inputs
Analog output 0/4 to 20 mA, 0/2 to 10 V	Continuous controller output
Relay ALARM 1	Selectable alarms. The alarm relays operate on the basis of the normally
Relay ALARM 2	closed contact principle

Additional functions (option*)

Serial interface RS 485	Data transfer in accordance with MODBUS protocol
Process variable output 0 to 10 V	Only with Pt 100 as process variable sensor PV
Digital input OPEN	The actuator opens } not in manual mode
Digital input CLOSE	The actuator closes } not in manual mode
Digital input STOP	The actuator stops in its current position
Digital input REM/LOC	For remote -/ local selection
Digital input SP.2	To change over to second setpoint SP.2
	- connecting 24V DC to the corresponding digital input
	- priority: 1. Stop 2. Close 3. Open 4. SP.2 5. Rem/Loc 1. = highest priority



Block diagram

Setpoint limitation minimum value SP.L - setpoint low, maximum value SP.H - setpoint high. Only setpoints within the setpoint limits can be set by way of the keyboard.

Setpoint ramp SP.r. The setpoint change per minute (gradient) can be specified for local and remote setpoints with the aid of the setpoint ramp.

Manipulated variable ramp Y.r. The actuating time for a displacement (stroke) of 100 % can be specified with the aid of the manipulated variable ramp.

Process variable display

Filtering FIL of the process variable input PV. Interference signals and small process variable fluctuations can be smoothed by an adjustable software filter.

5V 24V * Digital inputs, voltage range 0 / 12 - 24 V DC
Internal or external voltage source possible.

SI * Serial interface

Alarms P 1 limit value PP 2 limit values possible

2. Operating and setting

Alarm 1

Alarm 2

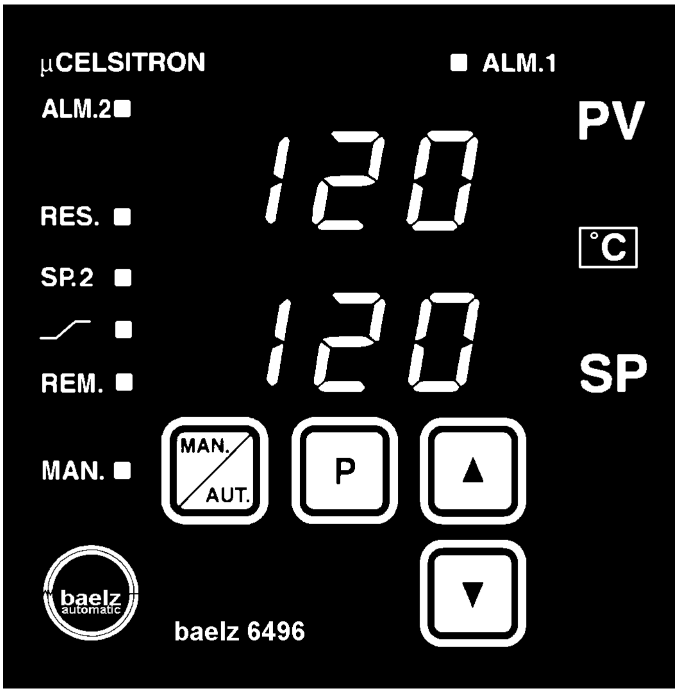
Reserve No function presently

Second setpoint effective, setpoint 2

Setpoint ramp active

Remote setpoint effective or serial communication

Manual mode

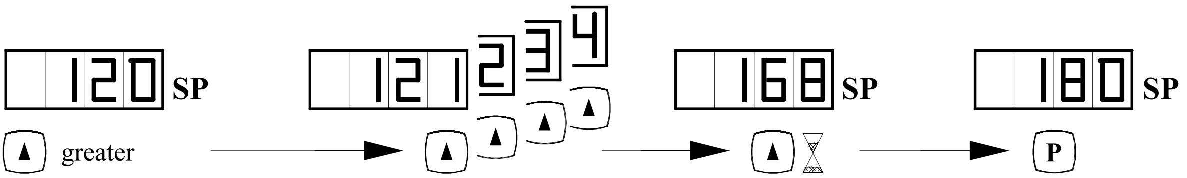


Other phys. units available as stickers

Setpoint display commutable to manipulated variable Y

At the device 6596 are the same designations on the adequate functions are valid, only the positioning differs.

2.1 **Setting setpoint** in automatic mode



▲ greater

▼ smaller

In individual steps

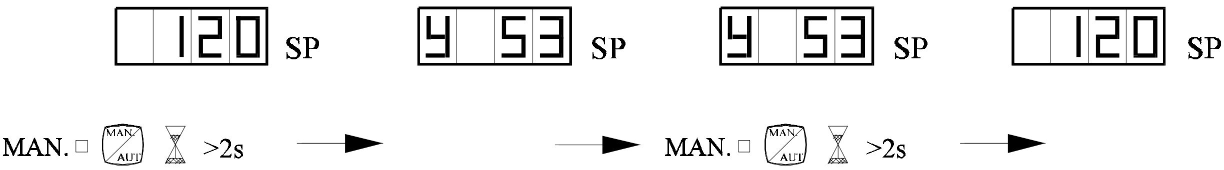
Continuous, adjustment at increasing speed

⌛ = Press continously

Within 5 s accept new setpoint, otherwise back to the old, still effective setpoint

Setting range: SP.L to SP.H
Locked setpoint input at SP.2 ,REM. and S.C = 1

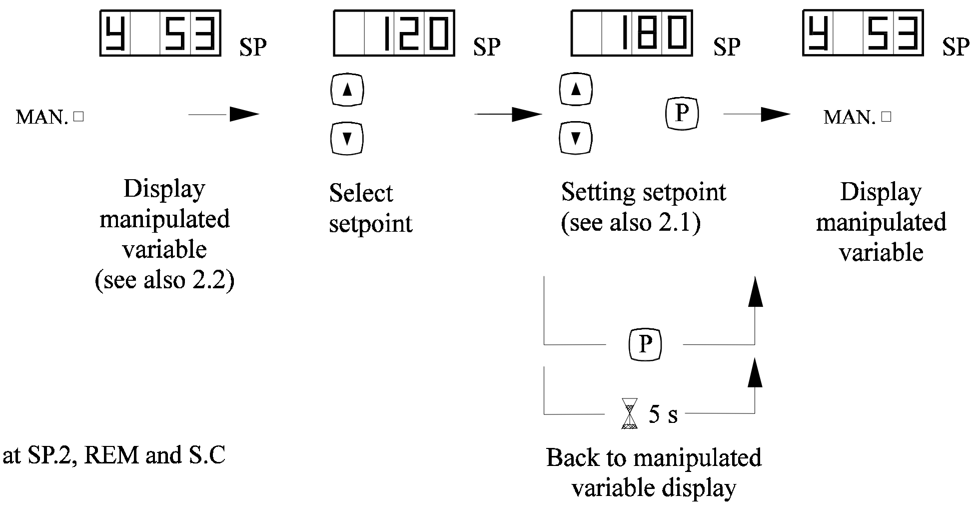
2.2 **Displaying the manipulated variable** Y in automatic mode



Select manipulated variable	Display manipulated variable	Select setpoint	Display setpoint

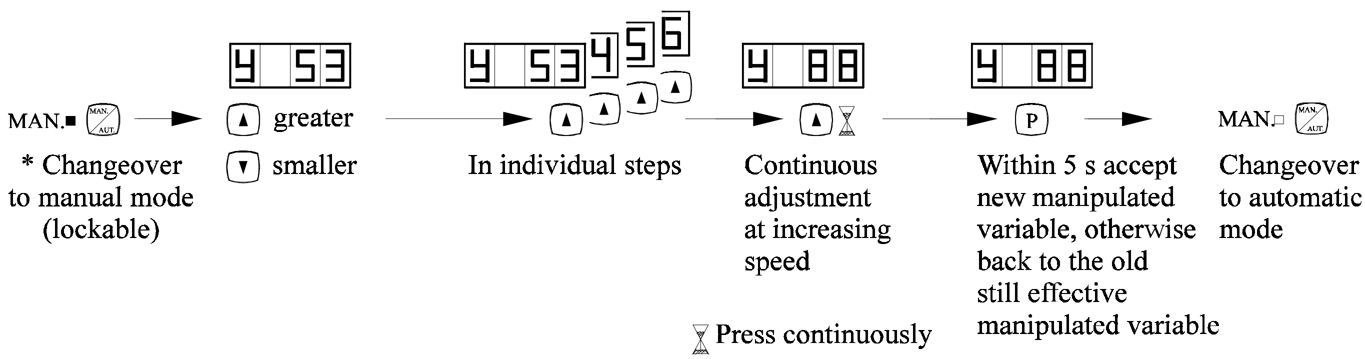
⌛ >2s Press longer than 2 s

2.3 Temporary changeover from manipulated variable Y to setpoint SP in automatic mode *



* not at SP.2, REM and S.C

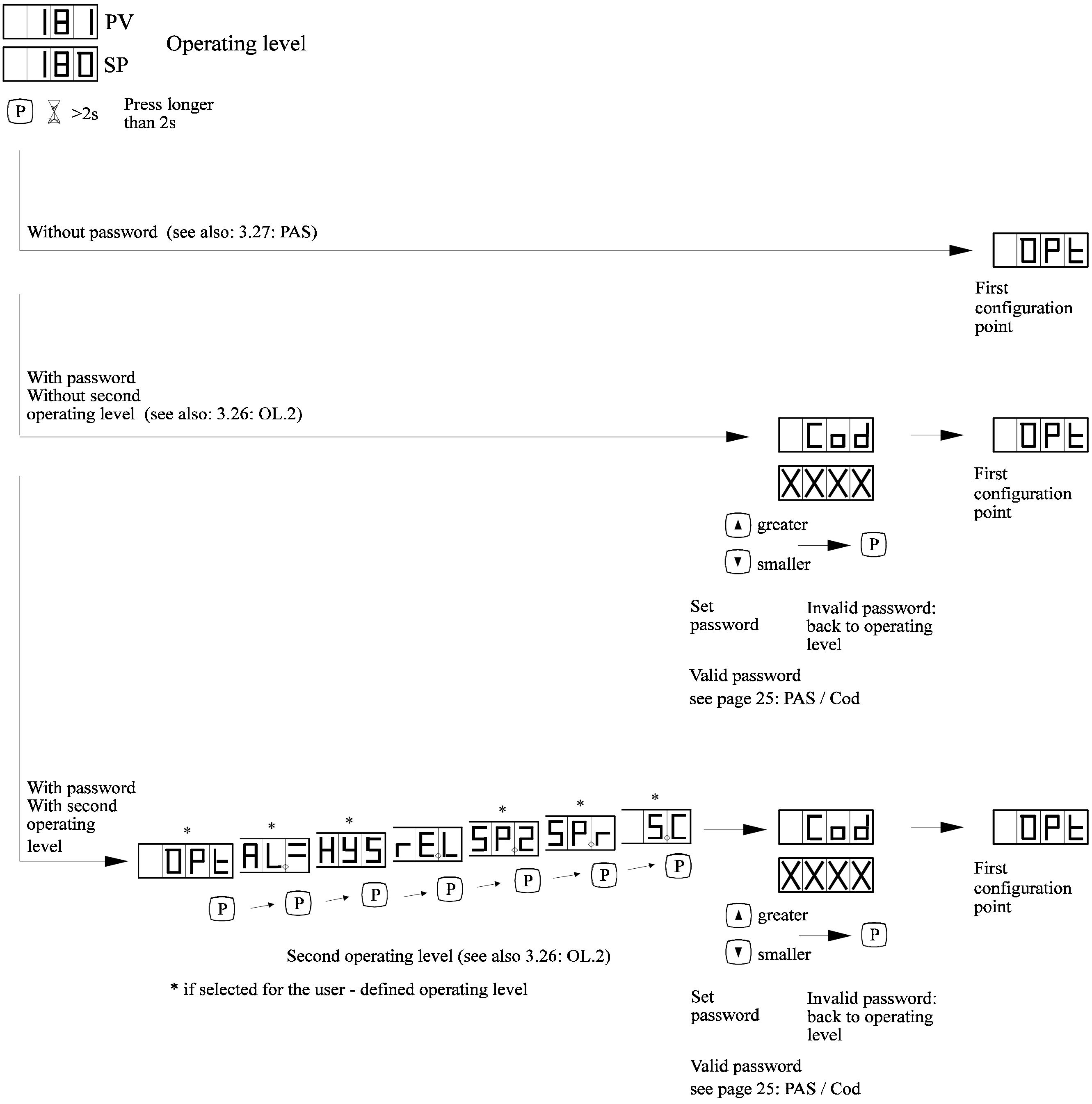
2.4 Opening / closing final control element in manual mode



* At changeover to manual mode the current value of the manipulated variable Y is retained.

Setting range: 0 to 100 %

2.5 Branch to parameterization -/ configuration level

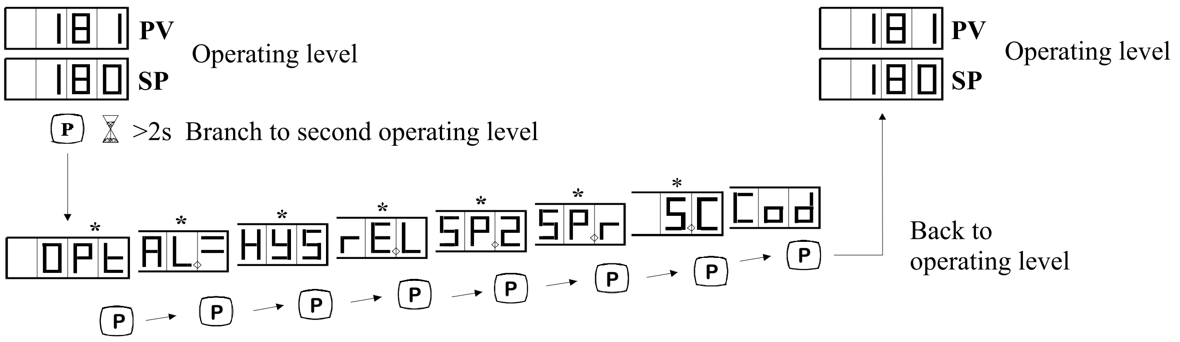


P >2s Back to operating level possible at any time

MAN/AUT Manual -/ automatic changeover possible at any time

2.6 Branch to second operating level (user - defined operating level)

Parameters and configuration points that have been selected for the second operating level (see also 3.26: OL.2) can be called up and set without entering the password, in case access to the parameterization -/ configuration level is protected by a password (see also 3.27: PAS).

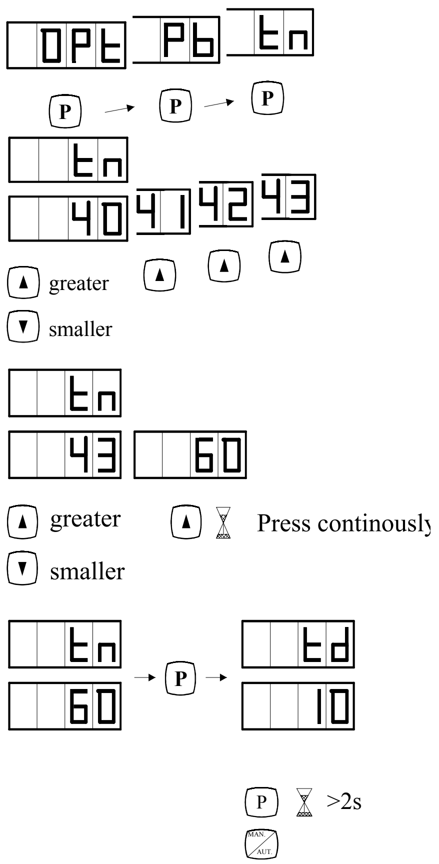


*if this function has been selected for the user - defined operating level and the access to the parameterization -/ configuration level has been interlocked by means of the password.

The following can be set as an option on the second operating level:

- self-optimization OPt
- alarms AL.,HYS
- remote -/ local changeover r.EL
- second setpoint SP.2
- setpoint ramp SP.r
- serial communication S.C

2.7 Set parameters / configuration points



Select parameter / configuration point

Set new value in individual steps

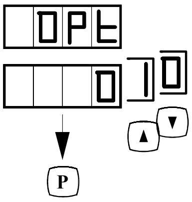
Set new value continuously, at increasing speed

Within 5s accept new value and call up next variable

Back to operating level possible at any time

Manual -/ automatic changeover possible at any time

3. Parameterization -/ configuration level

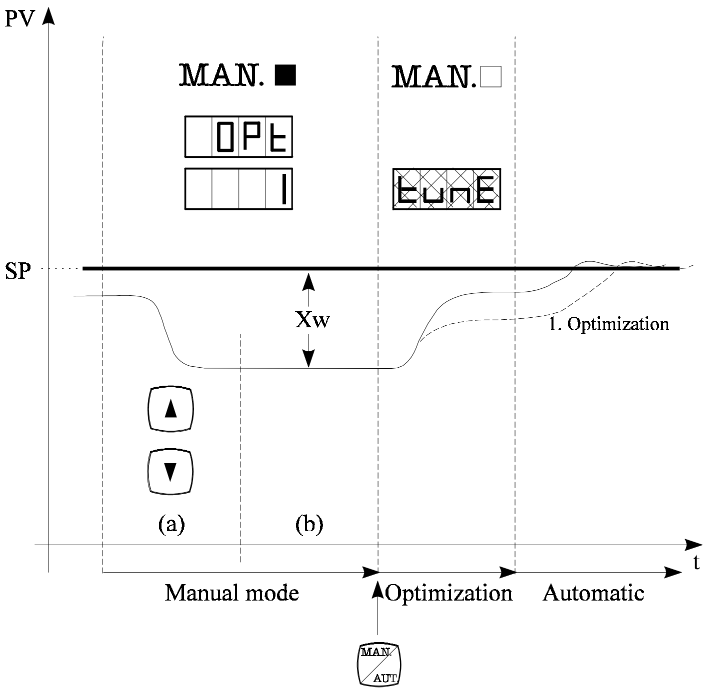


3.1 Optimization for automatic determination of favourable control parameters.

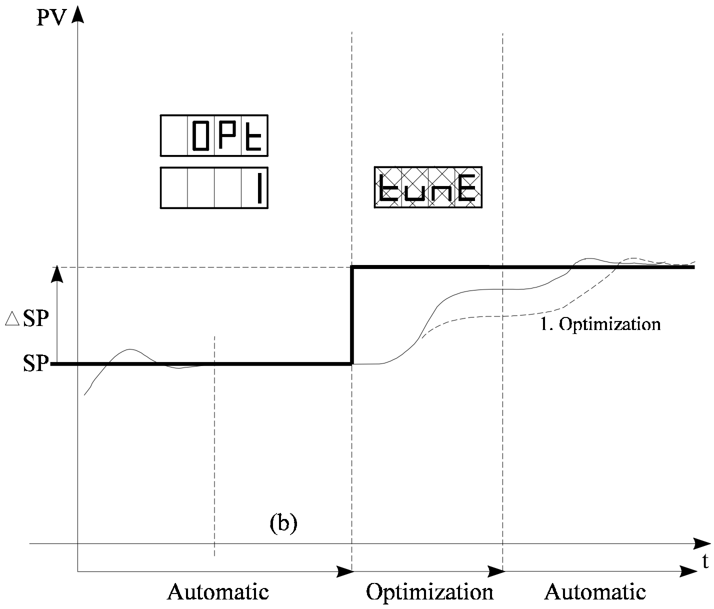
Selections: 0 No self - optimization
1 Self - optimization activated

Self - optimization is triggered by:

– a change in the setpoint SP (not for remote analog setpoint rE.L)
– a change in the setpoint SP.2 on the parameterization -/ configuration level, if SP.2 is the effective setpoint (see also 3.11: SP.2)
– a changeover from manual to automatic mode



Optimization from manual mode



Optimization in automatic mode

Procedure during optimization:

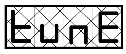
From the manual mode:

- Set the setpoint SP
- Switch over to manual mode
- Set the process variable PV greater / smaller than the setpoint SP by opening / closing the controlling element (a)
- Wait until PV is stable (b)
- Branch to parameterization -/ configuration level
- Set OPt = "1"
- If known, enter process gain P.G. (standard setting: P.G = 100%)
- Back to operating level
- Switch over to automatic mode

In the automatic mode:

- Wait until PV is stable (b)
- Branch to parameterization -/ configuration level
- Set OPt = "1"
- If known, enter process gain P.G. (standard setting: P.G = 100%)
- Back to operating level
- Set the setpoint

Self - optimization starts upon manual -/ automatic changeover (for optimization from the manual mode) or upon setpoint change DSP (for optimization in the automatic mode). During the optimization procedure, the **tunE** display is shown cyclically in the setpoint display SP. The determined parameters (Pb, tn, Td, P.G) are accepted automatically at the end of the self - optimization procedure.



Only PI and PID - controllers can be optimized.
P - controllers are optimized as PI - controllers, PD - controllers as PID - controllers.

The optimization routine will not be started, if the control deviation Xw (manual mode) or the setpoint change DSP (automatic mode) is less than 3.125% of the measuring range PV at the beginning of the optimization procedure. The change in the process variable PV or the setpoint must, during optimization, run in the same range and in the same direction in which the process is controlled following optimization, which means that the optimization procedure must correspond to the later control procedure as far as possible. If, during a control process, sequences of the process show extreme differences in time behaviour (e.g. rapid heating, slow cooling), the more important part of the process should be optimized.
If the process sequences are equivalent, the slower procedure has to be optimized.

For systems with linear transfer behaviour (constant process gain P.G = $\frac{D\,PV}{DY}$ over the entire control range), one optimization procedure will always provide the optimum control parameters.
If the transfer behaviour of the system is non-linear (e.g. process gain P.G = $\frac{D\,PV}{DY}$ changes with the setpoint SP to be controlled), the variable process gain P.G will have a significant effect on the control parameters. In this case, the process variable PV should come close to achieving the target setpoint during the optimization procedure.
Otherwise, an additional optimization procedure must be carried out. The process gain P.G in the working point was determined automatically in the preceding optimization procedure.
If the process gain P.G in the working point is known, it can be entered manually prior to optimization. (see also 3.14: P.G).
The configuration point OPt is reset to 0 automatically following each optimization procedure.
An optimization procedure can be interrupted anytime by

- pressing the hand - key
- pressing the P - key briefly, if setpoint SP is displayed
- pressing twice the P-key briefly, if manipulated variable Y is displayed

NO ENTRIES OR CHANGEOVER OPERATIONS MUST BE MADE DURING THE OPTIMIZATION PROCEDURE !

3.2 Proportional band Pb

Setting range: 1.0 % to 999.9%
Proportional action of the P(ID) - controller

3.3 Integral action time tn

Setting range: 1s to 2600s
Integral action of the PI(D) - controller
tn = 0: P - controller at td = 0
PD - controller at td > 0

3.4 Derivative action time td

Setting range: 1 to 255s
Derivative action of the P(I)D - controller
td = 0: P - controller at tn = 0
PI - controller at tn > 0

3.5 Working point for setpoint = 0 % (at P(D) - controller)

Manipulated variable Y at PV = SP

Setting range: 0 to 255% of correcting range Y

Y.0 = Y.E: fixed working point.
Y.0 ≠ Y.E: sliding working point, dependent on the setpoint

Calculation of Y.0 at sliding working point:

$$Y.0 = \frac{Y2 - Y1}{SP2 - SP1} \cdot (SP0 - SP1) + Y1$$

Working point for setpoint = 100 % (at P(D) controller)

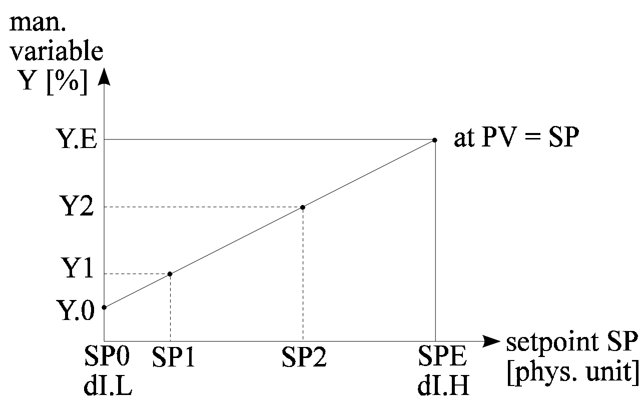
Manipulated variable Y at PV = SP

Setting range: 0 to 255% of correcting range Y

Y.0 = Y.E: fixed working point.
Y.0 ≠ Y.E: sliding working point, dependent on the setpoint

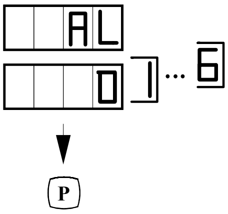
Calculation of Y.E at sliding working point:

$$Y.E = \frac{Y2 - Y1}{SP2 - SP1} \cdot (SPE - SP1) + Y1$$



Sliding working point

Choice of control mode		
	• **P - controller:**	**tn = 0, td = 0**
	• **PD - controller:**	**tn = 0, td >0**
	• **PI - controller:**	**tn >0, td = 0**
	• **PID - controller:**	**tn > 0, td > 0**



3.6 Alarm relays

The alarm relays operate on the basis of the normally closed contact principle.

3.6.1 Alarm Type A

Alarm at a limit value based on the setpoint SP

3.6.1.1 Alarm 1 at **SP ± AL.=**

3.6.1.2 Alarm 2 at **SP ± AL.=**

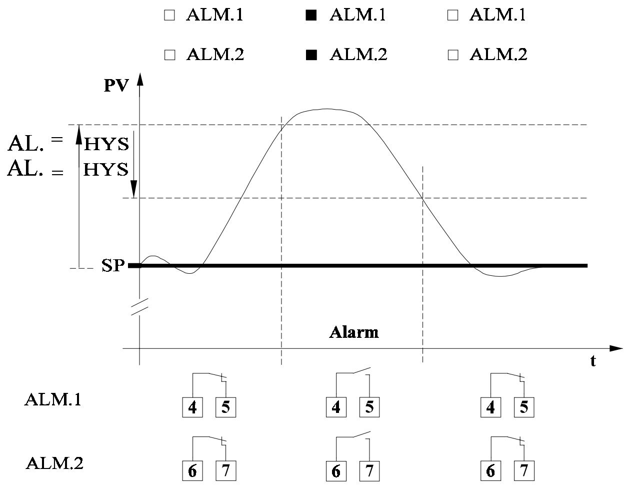
Setting range: 0 to ± extend of measuring range [phys. unit]

Reset hysteresis of alarm relays:

3.6.1.3 End of alarm 1 at SP ± AL.= **€ HYS**
(HYS displayed after AL.=)

3.6.1.4 End of alarm 2 at SP ± AL.= **€ HYS**
(HYS displayed after AL.=)

Setting range: 0 to extend of measuring range [phys. unit] (x 0,1 at dp = 0)



Alarm Typ A für Alarmrelais 1 und Alarmrelais 2

3.6.2 Alarm Type B

Alarm 1 at a fixed limit value

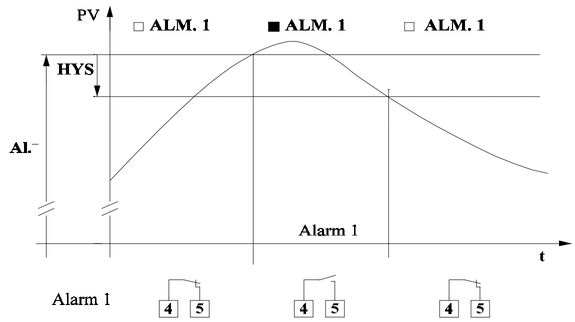
3.6.2.1 Alarm 1 at **AL.⁻**

Setting range: measuring range [phys. unit]

Reset hysteresis of alarm relay 1:

3.6.2.2 End of alarm at AL.⁻ **- HYS**
(HYS displayed after AL.⁻)

Setting range: 0 to extend of measuring range [phys. unit] (x 0,1 at dp = 0)



Alarm Type B for alarm relay 1

3.6.3 Alarm Type C

Alarm 1 at leaving a band by the setpoint SP.

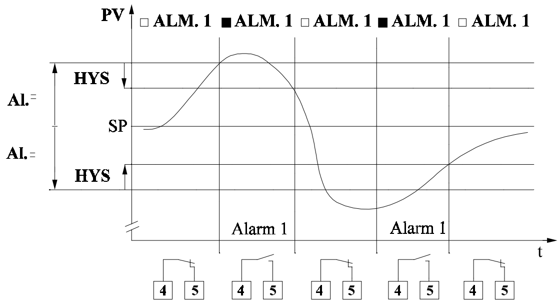
3.6.3.1 Alarm 1 at **SP ± AL.=** and at **SP ± AL.=**
(see also 3.6.1.1, 3.6.1.2)

Setting range: 0 to ± extend of measuring range [phys. unit]

Reset hysteresis of alarm relay 1:

3.6.3.2 End of alarm 1 at SP ± AL.=€ **HYS** and SP ± AL.=**€ HYS**
(see also 3.6.1.3, 3.6.1.4)

Setting range: 0 to ± extend of measuring range [phys. unit] (x 0,1 at dp = 0)



Alarm Type C for alarm relay 1

Selection AL = 0:
No alarms, also not in case of sensor failure (see also 3.18: SE.b)

Selection AL = 1: (Alarm relay 1 active)

Alarm relay 1 = Type A (see 3.6.1.1)
Alarm relay 1 in case of sensor failure independent of the adjusted limit value.

Reset hysteresis of alarm relay 1 (see 3.6.1.3)

Selection AL = 2: (alarm relay 1 active)

Alarm relay 1 = Type B (see 3.6.2.1)
Alarm relay 1 in case of sensor failure independent of the adjusted limit value.

Reset hysteresis of alarm relay 1 (see 3.6.2.2)

Selection: AL = 3: (alarm relay 1 and alarm relay 2 active)

Alarm relay 1 = Type A (see 3.6.1.1)
Alarm relay 1 in case of sensor failure independent of the adjusted limit value.

Reset hysteresis of alarm relay 1 (see 3.6.1.3)

Alarm relay 2 = Type A (see 3.6.1.2)

Reset hysteresis of alarm relay 2 (see 3.6.1.4)

Selection: AL = 4: (alarm relay 1 and alarm relay 2 active)

Alarm relay 1 = Type B (see 3.6.2.1)
Alarm relay 1 in case of sensor failure independent of the adjusted limit value.

Reset hysteresis of alarm relay 1 (see 3.6.2.2)

Alarm relay 2 = Type A (see 3.6.1.2)

Reset hysteresis of alarm relay 2 (see 3.6.1.4)

Selection: AL = 5: (alarm relay 1 and alarm relay 2 active)

Alarm relay 1 = Type C (see 3.6.3.1)
Alarm relay 1 in case of sensor failure independent of the adjusted limit value.

Reset hysteresis of alarm relay 1 for AL.$^{=}$ (see 3.6.3.2)

Alarm relay 1 = Type C (see 3.6.3.1)
Alarm relay 1 in case of sensor failure independent of the adjusted limit value.
Alarm relay 2 = Type A (see 3.6.1.2)

Reset hysteresis of alarm relay 1 for AL.$_{=}$ (see 3.6.3.2)
Reset hysteresis of alarm relay 2 (see 3.6.1.4)

Selection: AL = 6: (alarm relay 1 and alarm relay 2 active)

Alarm relay 1 at **AL.$^{-}$** and at SP ± AL.$_{=}$
Alarm relay 1 in case of sensor failure independent of the adjusted limit value.

Reset hysteresis of alarm relay 1 for AL.$^{-}$ (see 3.6.2.2)

Alarm relay 1 at AL.$^{-}$ and at **SP ± AL.$_{=}$**
Alarm relay 1 in case of sensor failure independent of the adjusted limit value.
Alarm relay 2 = Type A (see 3.6.1.2)

Reset hysteresis of alarm relay 1 for AL.$_{=}$ (see 3.6.1.4)
Reset hysteresis of alarm relay 2 (see 3.6.1.4)

Summary of Alarm selections

selection	alarm 1	alarm 2
0	-	-
1	A	-
2	B	-
3	A	A
4	B	A
5	A1 ∨ A2 (C)	A
6	B ∨ A2	A
sensor failure	alarm	no alarm

∨ = logical OR

Alarm types for alarm relay 1 and alarm relay 2 dP

0 1

P

3.7 Decimal point for LED - displays

Selections: 0 Indication without decimal point
1 Indication with decimal point

At any time the decimal point has been altered, the process variable display PV has to be rescaled.
(see also 3.8 dI.L, dI.H)

3.8 Scaling the process variable display PV

dI.L

P

Display.Low Enter: Zero point of the transmitter
Indication at start of measuring range
Setting range: -999 (-99.9 at dP = 1) ≤ dI.L ≤ dI.H-1 [phys. units] (dI.L must be less than dI.H)
standard value: **0**° C or **32**° F

dI.H

P

Display.High Enter: End point of the transmitter
Indication at end of measuring range
Setting range: dI.L+1 ≤ dI.H ≤ 9999 (999.9 at dP = 1) [phys. units] (dI.H must be greater than dI.L)
standard value: **300**° C or **572**° F

⚠ At In.P = 0, dI.L and dI.H have to correspond to the Pt 100 - measuring range of the supplied device (see type plate)
baelz 6496 / 6596 - 2.4 - ... : dI.L = 000(.0), dI.H = 300(.0)
baelz 6496 / 6596 - 2.2 - ... : dI.L = 000(.0), dI.H = 400(.0)
At In.P ≠ 0, dI.L and dI.H have to correspond to the measuring range of the connected transmitter.
(see also 3.15: In.P)

3.9 Setpoint limitation

Setpoint limitation applies to the setpoint SP which can be set via the keyboard

It is ineffective for - the second setpoint SP.2
- all remote setpoints
At SP.L = SP.H the setpoint has a fixed value.

SP.L

P

Setpoint.Low lowest setpoint that can be set
Setting range: dI.L to SP.H [phys. units] (see also: 3.8: dI.L)

SP.H

P

Setpoint.High highest setpoint that can be set
Setting range: SP.L to dI.H [phys. units] (see also: 3.8: dI.H)

3.10 Remote -/ local changeover

rE.L

0 1 2

P

Changeover from remote analog setpoint to local setpoint and vice versa

Selections: 0 only local setpoint and SP.2 effective
1 Changeover via digital input REM/LOC,
setpoint via analog input (see also 3.16: In.S)
2 jolt - free (smooth) remote -/ local changeover by tracking the local setpoint to the remote analog setpoint before remote -/ local changeover. SP loc. = SP rem.
otherwise as 1

A remote analog setpoint has higher priority than a remote setpoint transfered via serial interface.
In case of a signal error the internal setpoint is effective.

3.11 Second setpoint SP.2 (option)

SP.2

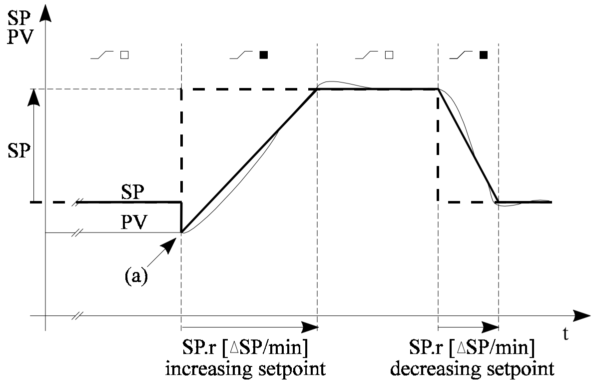
P

Setting range: dI.L to dI.H [phys. units] (see also 3.8: dI.L, dI.H)

Changeover to SP.2 via digital input SP.2

3.12 Setpoint ramp SP.r

Change rate of setpoint SP
(gradient)
Setting range: 1 (0.1 at dP = 1) to extent of measuring range in SP / min; SP [phys. unit]
e.g.: DSP = 5K / min
Setting SP.r = 0: no setpoint ramp, change of setpoint abruptly.
Effective for local and remote setpoints.
An analog, remote setpoint has to alter at least 0.2 % of measuring range PV to trigger the setpoint ramp.



3.12 Setpoint ramp SP.r

The setpoint ramp is triggered (at SP.r > 0):
- after switching on the device or after a power failure
- after sensor failure
- after every setpoint change (remote, local or SP.2)
- after switching over to the second setpoint SP.2
- after remote -/ local changeover and vice versa
- after a control function STOP, CLOSE, OPEN (via digital input)
- after switching over from manual mode to automatic mode

The start point of the setpoint ramp is always the current value of the process variable PV (a)
The current setpoint is displayed.

3.13 Ramp direction

Effective direction of setpoint ramp SP.r (at SP.r > 0)

Selections:
0 Setpoint ramp effective for increasing and decreasing setpoints
1 Setpoint ramp effective only for increasing setpoints
2 Setpoint ramp effective only for decreasing setpoints
(see also 3.12: SP.r)

3.14 Process Gain P.G

Setting range: 1 to 255%

Gain of controlled process (system) $P.G = \dfrac{\text{Change in process variable PV}}{\text{Change in actuating variable Y}} = \dfrac{D\,PV}{D\,Y}$ in %

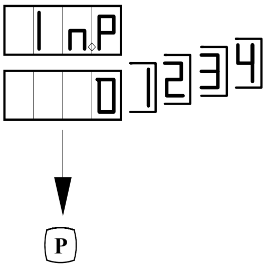
D PV [% of measuring range of PV]
D Y [% of actuating range (stroke) 0 - 100 %]

e.g.: $P.G = 50\%: \dfrac{D\,PV}{D\,Y} = 0.5$ A change of 10% in the valve position DY will result in a change of 5% in the process variable PV.

$P.G = 100\%: \dfrac{D\,PV}{D\,Y} = 1.0$ A change of 10% in the valve position DY will result in a change of 10% in the process variable PV.

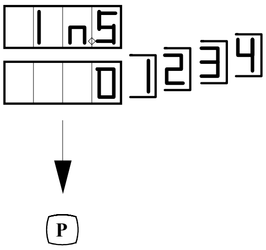
$P.G = 125\%: \dfrac{D\,PV}{D\,Y} = 1.25$ A change of 10% in the valve position DY will result in a change of 12.5% in the process variable PV.

The process gain P.G is required for self - optimization of the control parameters. If unknown, P.G is determined automatically during self - optimization (see also: 3.1: OPt)
In case of non - linear transfer behaviour of the system, the process gain changes with the working point (e.g. when controlling different setpoints).



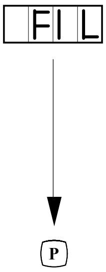
3.15 Input for process variable PV (input PV)

Selections:
0 PV is detected with a Pt100 sensor and connected to the terminals 14, 15, 16
1 PV is supplied as current signal 0-20 mA and connected to the terminals 12, 16*.
2 PV is supplied as current signal 4-20mA and connected to the terminals 12, 16*.
3 PV is supplied as voltage signal 0-10V and connected to the terminals 13, 16 .
4 PV is supplied as voltage signal 2-10V and connected to the terminals 13, 16
* Not if a transmitter is connected in two-wire technology
(see also 5.: Electrical connection)



3.16 Input for remote setpoint SP (input SP)

Selections:
0 SP is detected with a Pt100 sensor and connected to the terminals 14, 15, 16
1 SP is supplied as current signal 0-20 mA and connected to the terminals 12, 16.
2 SP is supplied as current signal 4-20mA and connected to the terminals 12, 16.
3 SP is supplied as voltage signal 0-10V and connected to the terminals 13, 16 .
4 SP is supplied as voltage signal 2-10V and connected to the terminals 13, 16
By detected signal failure: changeover to internal setpoint.
(see also 5.: Electrical connection)



3.17 Measured value filter for process variable PV (filter)

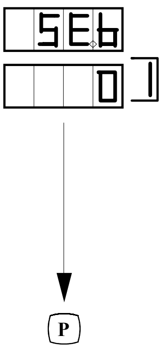
Software low-pass filter 1st order with adjustable time constant Tf to suppress interference signals and to smooth small process variable fluctuations.
Setting range: 100 bis 255

Formula:
$Tf = -0{,}04/\ln(input/256)$

Following assigments apply:

Input:	255	254	252	250	240	230*	220	200
Tf [s]:	10,22	5,10	2,54	1,69	0,62	0,37	0,26	0,16

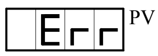
*standart setting



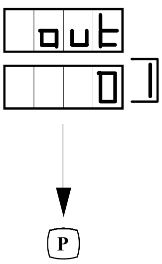
3.18 Response to sensor failure PV (sensor break)

Response of actuator in automatic mode in case of: sensor short-circuit, sensor break, too low or too high signal value at 4-20 mA and 2-10 V signals.

Selections: 0 Final control element closes
1 Final control element opens

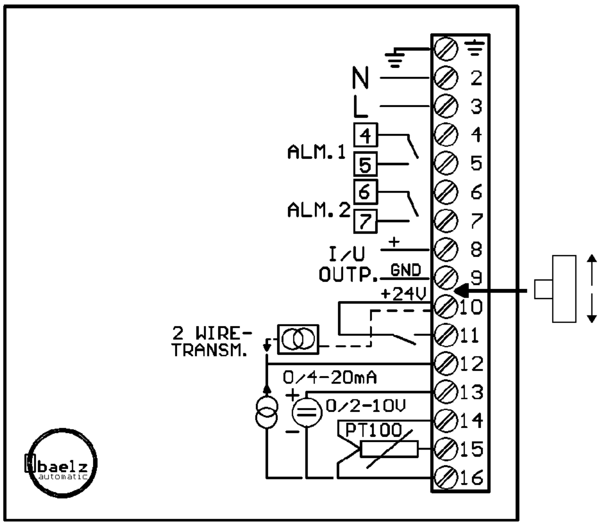


The error message **Err** is indicated in the LED - display PV in the case of a transmitter / sensor fault. Alarm message, if an alarm (AL ¹ 0) is configurated, independent of adjusted limit value.
Once the fault has been rectified, the controller reverts automatically to automatic mode.
Monitoring is not possible in the case of electrical input signal without live zero point, 0-20 mA or 0-10 V.



3.19 Controller output signal

Selections: 0 Output signal 0 to 20 mA or 0 to 10 V
1 Output signal 4 to 20 mA or 2 to 10 V

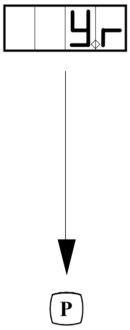


position of output signal selector switch

Choice of output signal :
sliding switch behind the
plug - type terminals.
Pull off terminals to set selector switch.

0 / 2 to 10 V
0 / 4 to 20 mA

At the device 6596 the output signal selector switch is placed on the same position like on the illustrated device 6496



3.20 Manipulated variable ramp Y.r

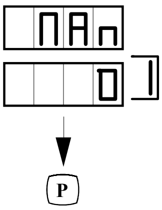
Maximum change rate of manipulated variable Y
Setting range: 1 to 255
Setting Y.r = 0: no manipulated variable ramp, change of manipulated variable without delay
Y.r = actuating time for a displacement of DY = 100 %

Following assignments apply:

Formula : $\text{Y.r} = \dfrac{163{,}84}{\text{input 1 to 255}}$ [s]

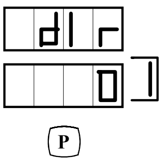
Input :	164	33	16	6	3	2	1
Y.r [s]	1	5	10	30	60	80	160

The end value of the manipulated variable ramp is displayed.



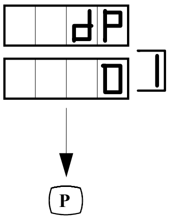
3.21 Interlocking manual -/ automatic changeover (manual)

Selections: 0 Changeover via keyboard possible at any time
1 Interlocking in current status
Changeover MAn. to -1- in automatic mode : always automatic mode
Changeover MAn. to -1- in manual mode : always manual mode



3.22 Direction of action

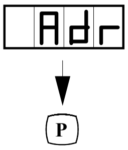
Selections: 0 Heating controller: final control element closes at increasing process variable PV
1 Cooling controller: final control element opens at increasing process variable PV



3.23 Transfer rate for serial interface (Baud) (effective at 6496 / 3 and 6596 / 3)

Serial interface RS 485, data transfer in accordance with MODBUS - Protocol
in RTU - mode

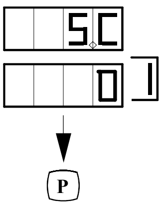
Selections: 0	19200 Baud	3	2400 Baud
1	9600 Baud	4	1200 Baud
2	4800 Baud		



3.24 Address for serial interface (effective at 6496 / 3 and 6596 / 3)

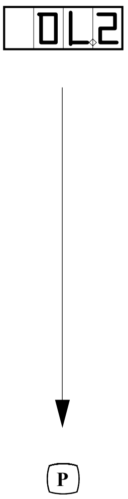
Setting range: 1 to 247

Address of the controller



3.25 Serial communication (effective at 6496 / 3 and 6596 / 3)

Selections: 0 The controller can be operated and set via the master computer and via the controller keyboard (parallel operating).
1 The controller is operated and set via the master computer.
The controller keyboard, with the exception of the setting of S.C, is locked.

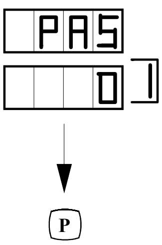


3.26 Second operating level

Select functions for the user - defined operating level.

Setting range: 0 to 63:
- 0 No second operating level
- 1 Self - optimization can be activated on the operating level 2 (see also: 3.1: OPt)
- 2 Limit value and hysteresis of the selected alarm can be set on operating level 2 (see also 3.6: Alarm relays)
- 4 Remote -/ local changeover possible on operating level 2 (see also: 3.10: rE.L)
- 8 The second setpoint SP.2 can be set on operating level 2 (see also: 3.11: SP.2)
- 16 The setpoint ramp SP.r can be set, switchend on and off on the operating level 2 (see also 3.12: SP.r)
- 32 The serial communication S.C can be set by defined on operating level 2 (see also 3.25: S.C)

The identifier numbers of the required functions are to be added and the result is set.
The password has to be activated. (see also: 3.27: PAS)
The access to the user - defined operating level is not interlocked via the password.



3.27 Access to the parameterization -/ configuration level (password)

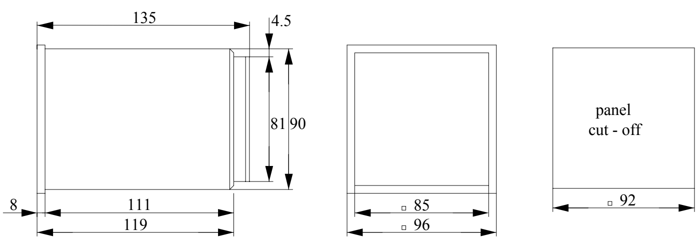
Interlocking the paramerization -/ configuration level by means of the password **Cod** prevents unauthorized access.

Selections: 0 No interlocking of parameterization -/ configuration level. OL.2 is deactive.
1 Access to parameterization -/ configuration level only after entry of the password via keyboard. OL.2 is active.
(see also: 3.26 OL.2 ; valid password: see also: page 25: PAS / Cod)

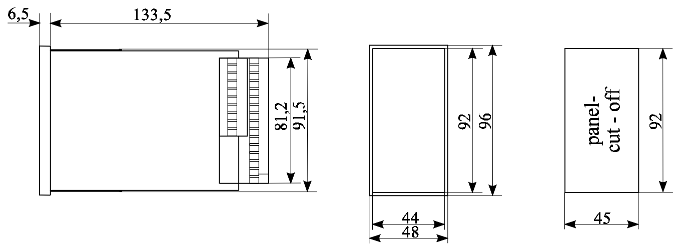
4. Installation

The controller is suitable for installation in a front panel and control desk at arbitary installation position.
Insert device from front in the prepared control panel cut-out and secure with the aid of the clamping tool provided.
The centerings on the housing ease the installation of the device.

⚠ The ambient temperatur at the installation location must not exceed the permissible temperature specified for nominal use. Sufficient ventilation must always be provided, including instances of high component density.
The unit must not be mounted in explosion - hazardous areas.



Device measurements 6496

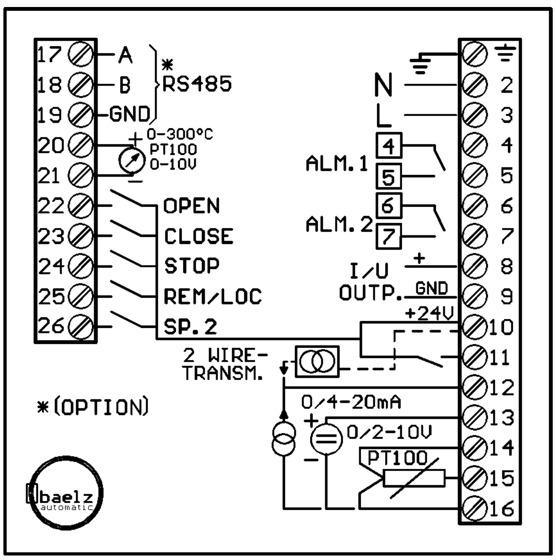


Device measurements 6596

5. Electrical connection

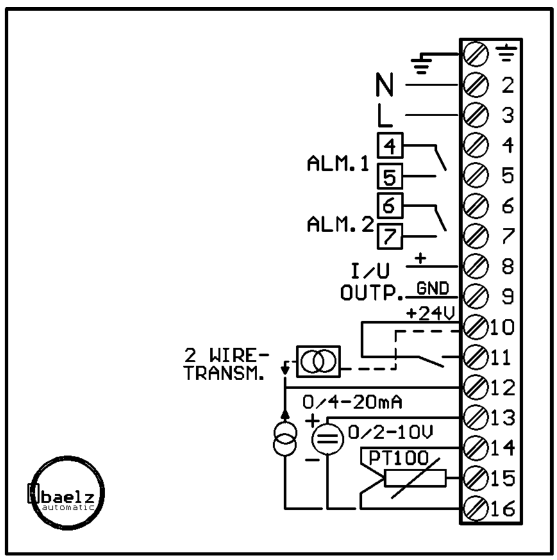
The plug - type terminals and the wiring diagram are located at the rear of the unit.

⚠ During installation, the regulations that are applicable to each country (DIN VDE 0100 in Germany) must be observed.
Electrical connection must be carried out in accordance with the connecting diagrams / wiring diagrams of the unit.
Shielded cables must be used for the measuring lines and control lines (digital inputs). These lines must be seperated from the high - power lines, also in the control cabinet.
Prior to switching on the unit, make sure that the operating voltage indicated on the type plate corresponds to the mains voltage.
The connection terminals with the connected lines may be disconnected from the unit in power - off state only.



Maximum component parts
(6496 / 2 - / 3 and 6596 / 2 - / 3)

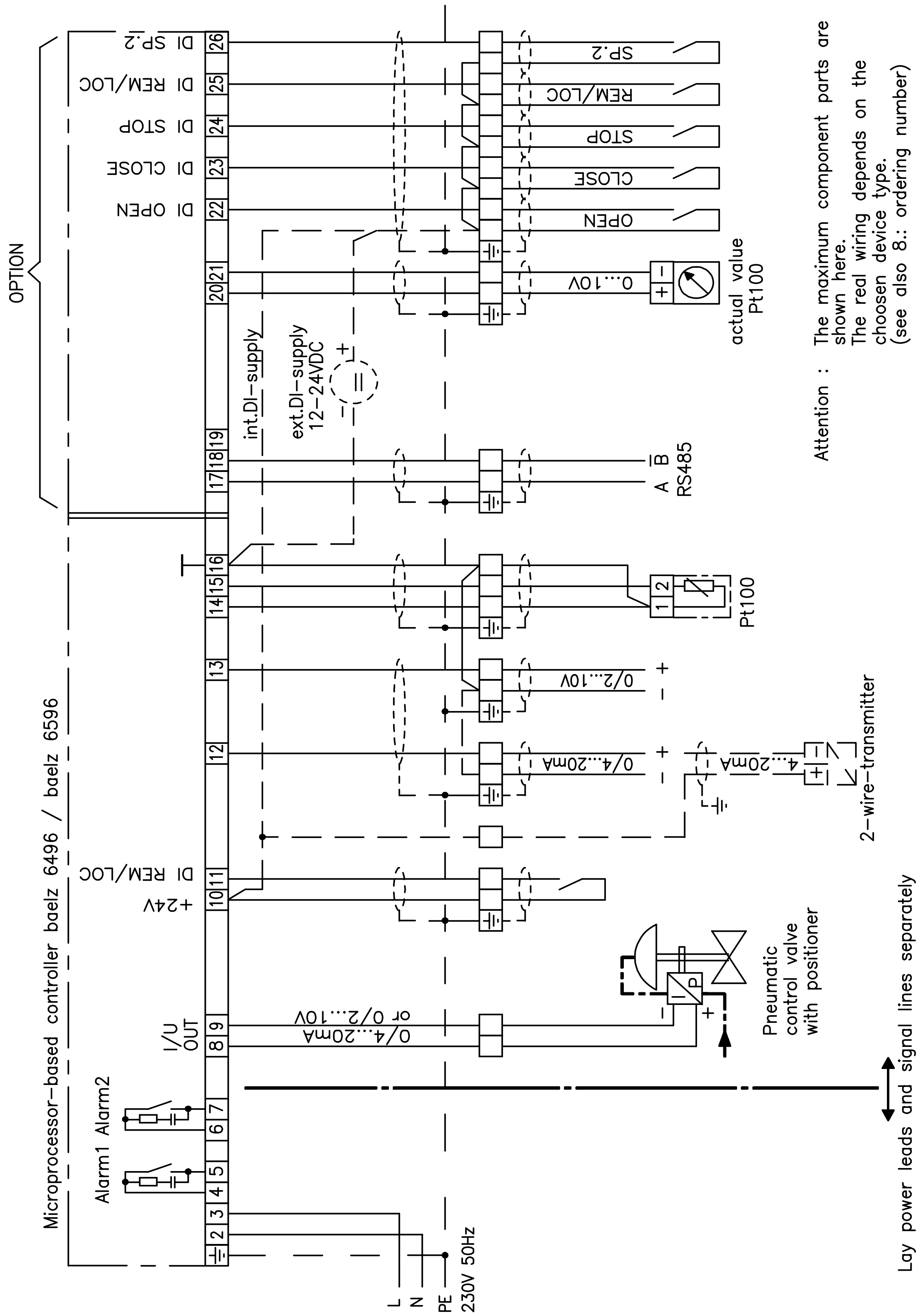
(see also 8.: ordering number)



minimum component parts (6496 / 1 and 6596 / 1)
terminal 11: digital input REM / LOC
(standard)
(see also 8.: ordering number)

The same terminal functions are intended for the device 6596 like shown by the 6496 above

5.1 Wiring diagram



6. Commissioning

Procedure:	Corrective measures in case of malfunctions
o Unit properly installed ?	see also 4.: Installation
o Electrical connection according to valid regulations and connection diagrams ?	see also 5.: Electrical connection
o Switch on mains voltage. When the unit is switched on, all display elements in the front plate will light up for approx. 2 sec. (lamp test). The unit is then ready for operation.	Compare operating voltage, indicated on the type plate, to mains voltage.
o Switch over to manual mode.	see also 2.4: Manual mode
Ÿ Does the actual value display PV correspond to process variable at measuring point ?	Check sensor, measuring line and electrical connection. see also 5.: Electrical connection
Ÿ Actual value display PV fluctuating / jumping ?	Adjust measuring filter FIL. see also: 3.17: FIL Unit in the immediate vicinity of powerful electrical or magnetic interference fields ?
Ÿ Connect digital inputs*	see also 5.: Electrical connection
- Are the corresponding LEDs on the front plate illuminated ?	Check voltage supply for digital inputs, remote switching contacts, signal lines and electrical connection. see also 5.1: Wiring diagram
Ÿ Supply remote setpoint and switch over to remote operation*	see also 3.16: In.S ; 3.10: re.L ; 3.25: S.C
- Is remote setpoint SP dispalyed correctly ?	Check setpoint transmitter, measuring line and electrical connection. see also 5.1: Wiring diagram
Ÿ Open final control element - Heating controller: Actual value PV increasing ? - Cooling controller: Actual value PV decreasing ? Ÿ Close final control element - Heating controller: Actual value PV decreasing ? - Cooling controller: Actual value PV increasing ?	see also 2.4: Manual mode No response: Check final control element, positioner and electrical connection controller - final control element reverse action: switch over Heating / Cooling (see also 3.22: dIr)
- final control element does not close completely	Adapt zero points of controller output signal and positioner (see also 3.19: out)
Ÿ Set control parameters using self - optimization.	see also 3.1: OPt
o Automatic mode	
Manual -/ automatic changeover	see also 2.4: Manual mode
Set setpoint SP	see also 2.1: Setting the setpoint SP in the automatic mode

* Option

7. Technical data

Power supply	230 V AC 115 V AC 24 V AC } -15 % / +10 %, 50 / 60 Hz
Power consumption	appr. 7 VA
Weight	appr. 1 kg
Permissible ambient temperatur	
- Operation	0 to 50ºC
- Transport an storage	-25º to + 65ºC
Degree of protection	Front IP 65 according to DIN 40050
Design	For control panel installation 96 x 96 x 135 mm (W x H x D)
Installation position	arbitary
DI - feed voltage and measuring transducer feed voltage	24 V DC, Imax. = 60 mA
Analog inputs	Pt100, 2.4 = 0°C to 300°C or 2.2 = 0°C to 400°C Connection in three - wire system 0/4 to 20 mA, input resistance = 50 Ohm 0/2 bis 10 V, input resistance = 100 KOhm
Accuracy	0.1% of measuring range
Digital inputs	high active, Ri = 1 k W; n.c. / 0V DC = low 12 V to 24 V DC = high
Controller output	0 / 4 to 20 mA, max. load = 500 Ohm 0 / 2 to 10 V min. load = 5 kOhm
Analog output	0 to +10 V comply with 0° to 300°C (2.4) or 0° to 400°C (2.2), Imax. = 2 mA
Displays	Two 4 - digit 7- segment displays, LED ,red, digit height = 13 mm
Alarms	Alarm type A, B, C; normally closed contact principle
Relays	Contact equipment: 1 normally open potential - free (Option: 1 change - over contact potentional - free) Switching capacity: 250 V AC / 3 A Spark quenching element
Serial interface	RS 485, MODBUS protocol acc. RTU - mode 1200 to 19200 baud 1 startbit, 8 data bit, 1 stopbit, no parity
Data storage	Semi - conductor memory

8. Ordering number baelz 6496 / 6596

baelz 06496 / 1 - 2.4 - I - 230 V - 00.0
baelz 06596 / 2 2.2 U 115 V S7.1
/ 3 24 V S8.1

Device type

Pt100 0° to 300°C (2.4)
Pt100 0° to 400°C (2.2)

Output signal 0/4 to 20 mA (I)
Output signal 0/2 to 10 V (U)

Power supply 230 V AC
115 V AC
24 V AC

00.0 Standard type
S7.1 for 2 inputs 0/4 - 20 mA (no input 0/2 to 10 V)
S8.1 for 2 inputs 0/2 - 10 V (no input 0/4 to 20 mA)

additional right hand controller card

	Device type	6496 / 1 6596 / 1	6496 / 2 6596 / 2	6496 / 3 6596 / 3
basic version	1 x input Pt 100	X	X	X
	1 x input 0 / 4 to 20 mA	X	X	X
	1 x input 0 / 2 to 10 V	X	X	X
	Supply voltage 24 V DC	X	X	X
	1 x digital input REM / LOC	X	X	X
options *	5 x digital inputs		X	X
	1 x process variable output Pt 100, 0 to 10 V		X	
	1 x serial interface RS 485			X

9. Overview of parameterization -/ configuration level, data list

Parameter / configuration point	Display	Settings		Remarks	
Optimization	OPt	0		No self - optimization	
		1		Activate if required	
Proportional band	Pb			1,0 to 999,9 %	
Integral action time	tn			1 to 2600 s	
	tn = 0		o	P controller at td = 0, PD controller at td > 0	
Derivative action time	td			1 to 255s	
	td = 0		o	P controller at tn = 0, PI controller at tn > 0	
Working point	Y.0			0 to 250 % for Setpoint = 0 %	
	Y.E			0 to 250 % for Setpoint = 100 %	
Alarm relays	AL	0	o	No alarm, also not in case of sensor failure	
		1	o	Alarm relay 1 = A, no alarm relay 2	Alarm relay 1 in case of sensor failure independent of adjusted limit value
		2	o	Alarm relay 1 = B, no alarm relay 2	
		3	o	Alarm relay 1 = A, alarm relay 2 = A	
		4	o	Alarm relay 1 = B, alarm relay 2 = A	
		5	o	Alarm relay 1 = C (A1 ∨ A2), alarm relay 2 = A	
		6	o	Alarm relay 1 = B ∨ A2, alarm relay 2 = A	
Alarm 1 = A	AL.$^{=}$			0 to ± extent of measuring range [phys. unit]	at AL = 1, 3, 5
Reset hysteresis	HYS			0 to extent of measuring range [phys. unit] (x0,1 at dP = 0)	
Alarm 1 = B	AL.$^{-}$			Measuring range: dI.L to dI.H [phys. unit]	at AL = 2, 4, 6
Reset hysteresis	HYS			0 to extent of measuring range [phys. unit] (x0,1 at dP = 0)	
Alarm 2 = A	AL.$_{=}$			0 to ± extent of measuring range	at AL = 3, 4, 5, 6
Reset hysteresis	HYS			0 to extent of measuring range [phys. unit] (x0,1 at dP = 0)	
Decimal point	dP	0	o	Display without decimal point	new input di.L, di.H after modification
		1	o	Display with decimal point	
Scaling, low	dI.L			Displayed value at start of measuring range, -999 to dI.H -1 [phys. unit] (x 0,1 at dP = 1)	
Scaling, high	dI.H			Displayed value at end of measuring range dI.L+1 to 9999 [phys. unit] (x 0,1 at dP = 1)	
Setpoint limit, lower	SP.L			dI.L to SP.H [phys. unit]	not valid for SP.2 and remote setpoints
Setpoint limit, upper	SP.H			SP.L to dI.H [phys. unit]	
Remote -/ local changeover	rE.L	0	o	Only local setpoint	
		1	o	Changeover via digital input REM / LOC, setpoint via analog input	
		2	o	Jolt - free (smooth) remote -/ local changeover, by tracking SP loc. = SP rem., otherwise as 1	
Second setpoint *	SP.2			dI.L to dI.H [phys. unit] Changeover via digital input SP.2	
Setpoint ramp	SP.r			0 to measuring range [phys. unit per min]	
Ramp direction	rA.d	0	o	Increasing and decreasing setpoint ramp	
		1	o	Only increasing setpoint ramp	
		2	o	Only decreasing setpoint ramp	
Process gain	P.G			1 to 255 %, for self - optimization	

* Option

Parameter / Configuration point	Display	Settings		Remarks	
Process variable input PV	In.P	0	o	Pt 100 2.4 = 0° to 300°C or 2.2 = 0° to 400°C	
		1	o	0 to 20 mA	
		2	o	4 to 20 mA	
		3	o	0 to 10 V	
		4	o	2 to 10 V	
Remote setpoint input	In.S	0	o	Pt 100 2.4 = 0° to 300°C or 2.2 = 0° to 400°C	by detected
		1	o	0 to 20 mA	signal failure:
		2	o	4 to 20 mA	changeover
		3	o	0 to 10 V	to internal
		4	o	2 to10 V	setpoint
Measured value filter	FIL			100 to 255 comply with 42 ms to 10 s	
Sensor break PV	SE.b	0	o	final control element closes	in automatic mode
		1	o	final control element opens	
Controller output Y	out	0	o	Output signal 0 to 20 mA or 0 to 10 V	
		1	o	Output signal 4 to 20 mA or 2 to 10 V	
Manipulated variable ramp	Y.r			0 to 255	
Manual -/ automatic changeover	MAn	0	o	Changeover via keyboard	
		1	o	Interlocking in current status automatic	
			o	Interlocking in current status manual	
Direction of action	dIr	0	o	Heating controller	
		1	o	Cooling controller	
Transfer rate *	bd	0	o	19200 Baud	
		1	o	9600 Baud	
		2	o	4800 Baud	
		3	o	2400 Baud	
		4	o	1200 Baud	
Address *	Adr	1 to 247		Slave address at bus - mode	
				Address	
Serial communication *	S.C	0	o	Operating and setting via controller keyboard and master computer	
		1	o	Operating and setting via master computer	
Second operating level	OL.2	0	o	No second operating level	
		1	o	Self - optimization	Add figures
		2	o	Limit value and hysteresis of alarm	of desired
		4	o	Remote -/ local changeover	functions and
		8	o	Second setpoint *	set PAS
		16	o	Setpoint ramp	to 1
		32	o	serial communication *	
				Result of added indentifier numbers	
Password	PAS	0	o	No interlocking, OL.2 deactive	
		1	o	Access only after entry of the password, OL.2 active, Functions on OL.2 not interlocked	
		1500		Code	

* Option

Device number	
Date	
Passed	
Plant	

10 2'-4