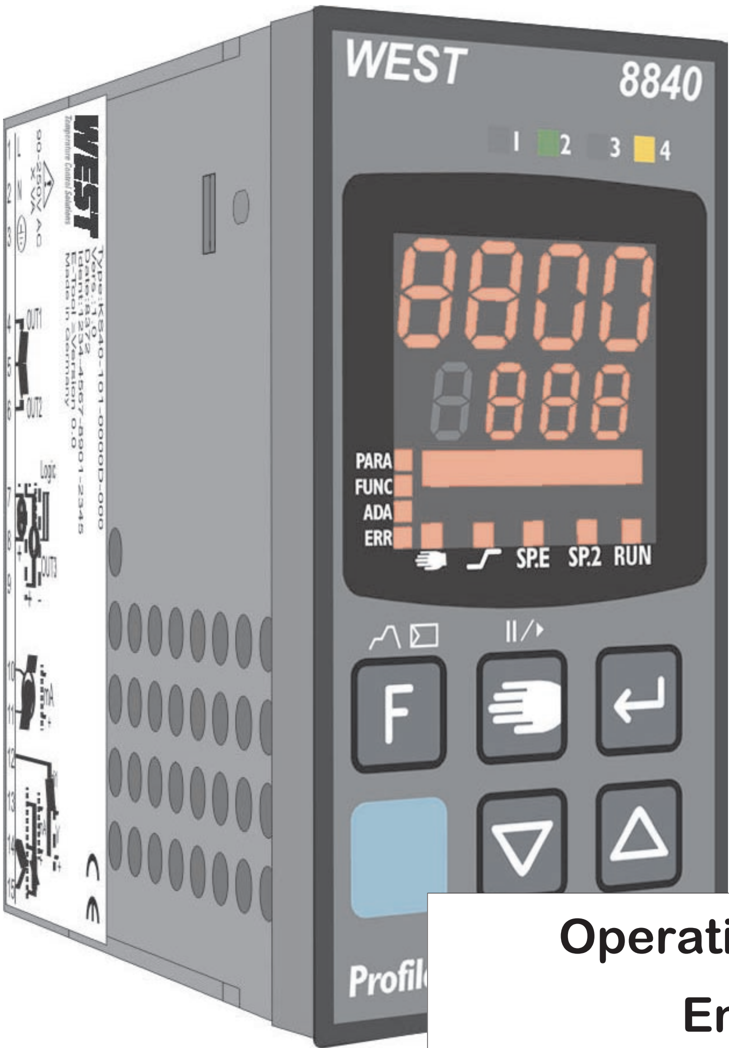
# profiler 8840




**Operating manual**

**English**

**9499-040-70711**

Valid from: 8405

# 8800/8840 Configurator

More efficiency in engineering, more overview in operating:
The projecting environment for the West controllers 8800/8840

**ATTENTION!**
Mini Version and Updates on
www.westinstruments.com

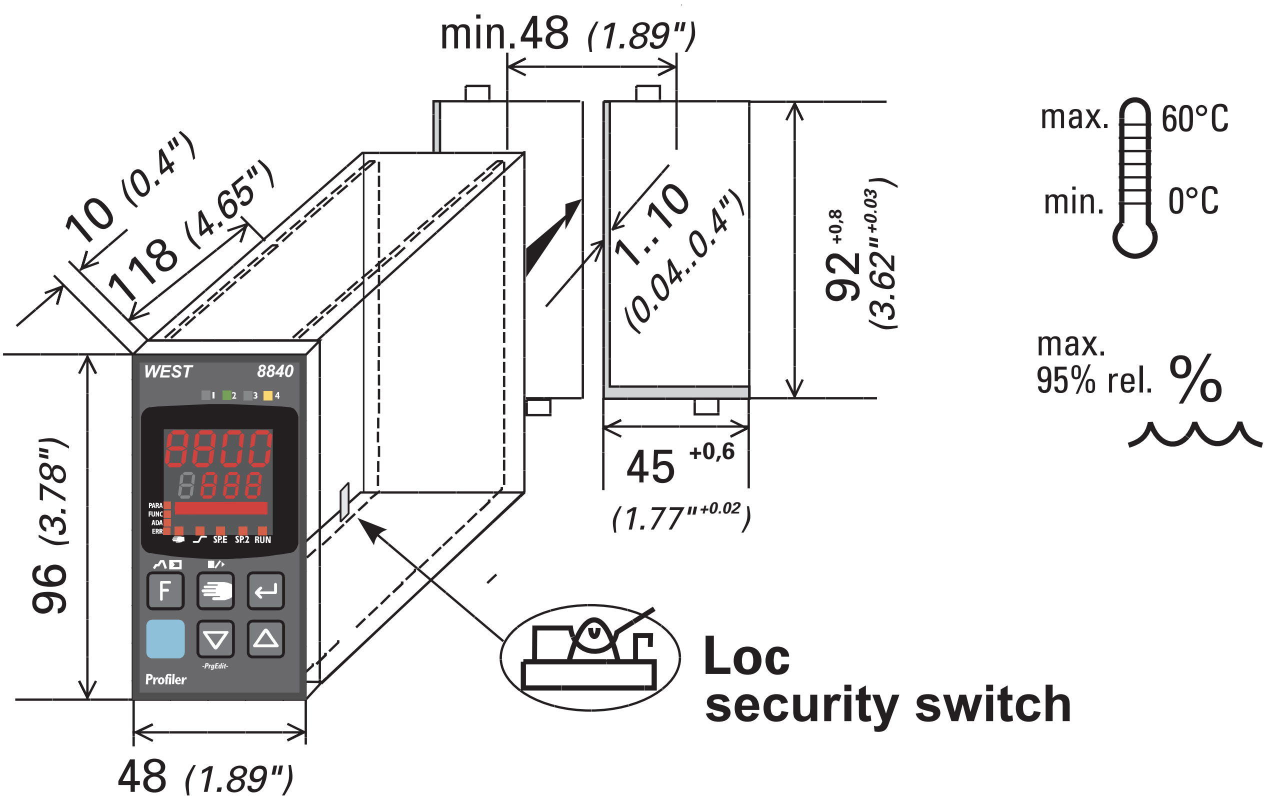
**Description of symbols:**

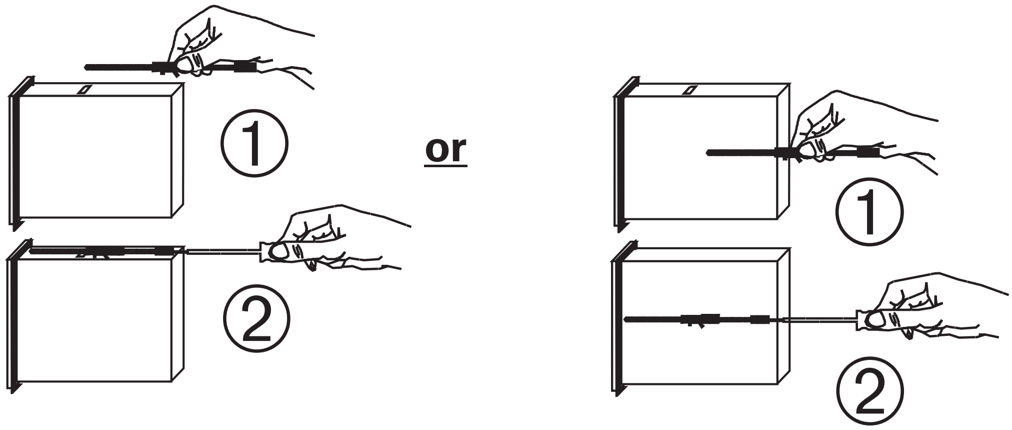
- General information
- General warning
- Attention: ESD sensitive devices


A publication of West Instruments, The Hyde Business Park,
Brighton BN2 4JU, England

**Content2**

# 1 Mounting




**Safety switch:**
For access to the safety switch, the controller must be withdrawn from the housing. Squeeze the top and bottom of the front bezel between thumb and forefinger and pull the controller firmly from the housing.

| | | |
|---|---|---|
| Loc | open | Access to the levels is as adjusted by means of 8800/8840 Configurator (engineering tool) ❷ |
| | closed ❶ | all levels accessible wihout restriction |

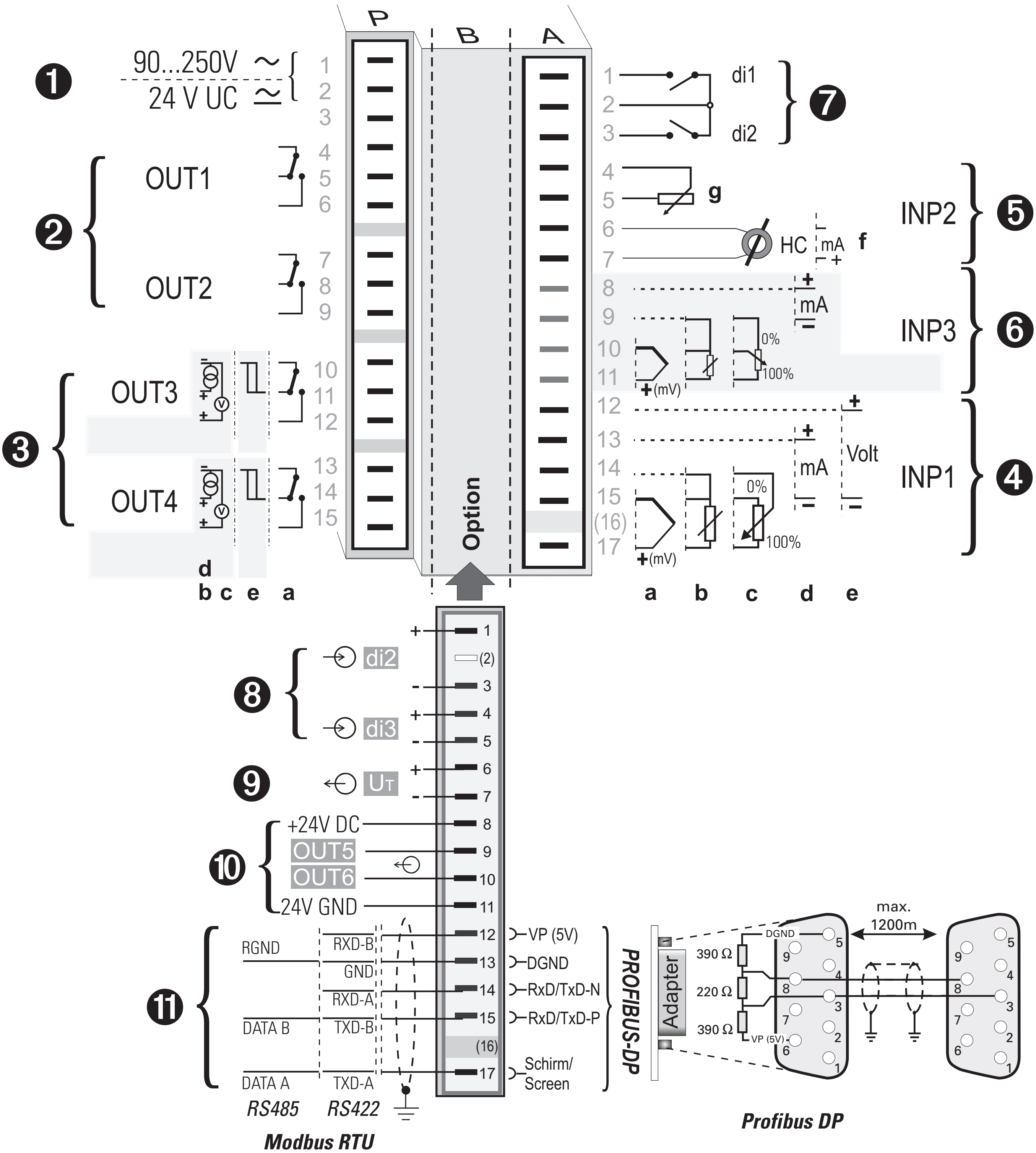
❶ Factory setting

❷ Default setting: display of all levels suppressed, password PASS = OFF

**Caution!** The unit contains ESD-sensitive components.

# 2 Electrical connections

## 2.1 *Connecting diagram*




Dependent of order, the controller is fitted with :

- flat-pin terminals 1 x 6,3mm or 2 x 2,8mm to DIN 46 244 or
- screw terminals for 0,5 to 2,5mm²

## 2.2 *Terminal connection*

***Power supply connection*** ❶

See chapter 11 "Technical data"

***Connection of outputs OUT1/2*** ❷

Relay outputs (250V/2A),
potential-free changeover contact

***Connection of outputs OUT3/4*** ❸

- **a** relay (250V/2A), potential-free changeover contact, universal output
- **b** current (0/4...20mA)
- **c** voltage (0/2...10V)
- **d** transmitter supply
- **e** logic (0..20mA / 0..12V)

***Connection of input INP1*** ❹

Input mostly used for variable x1 (process value)

- **a** thermocouple
- **b** resistance thermometer (Pt100/ Pt1000/ KTY/ ...)
- **c** current (0/4...20mA)
- **d** voltage (0/2...10V)

***Connection of input INP2*** ❺

- **f** heating current input (0..50mA AC) or input for ext. set-point (0/4...20mA)
- **g** potentiometer input for position feedback

***Connection of input INP3*** ❻

As input INP1, but without voltage

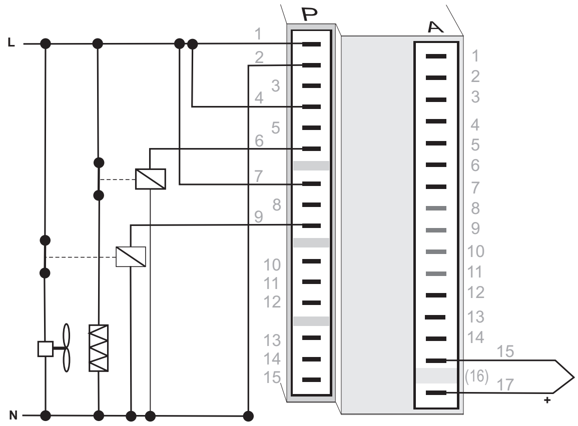
***Connection of inputs di1, di2*** ❼

Digital input, configurable as switch or push-button

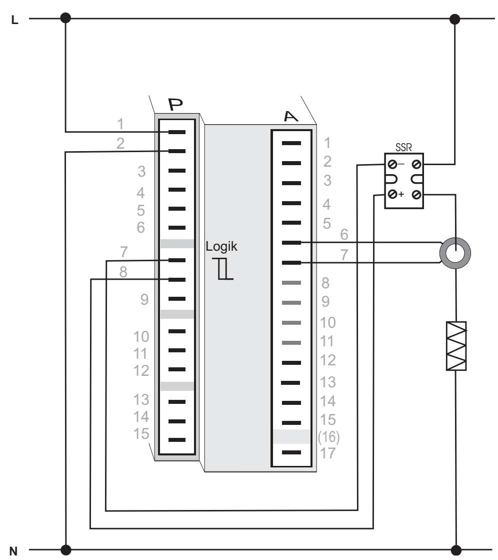
***Connection of inputs di2/3*** ❽ ***(option)***

Digital inputs (24VDC external),
galvanically isolated,
configurable as switch or push-button

❷ *OUT1/2 heating/cooling*




❺ *INP2 current tansformer*



### *Connection of output U ❾ (option)*

Supply voltage connection for external energization

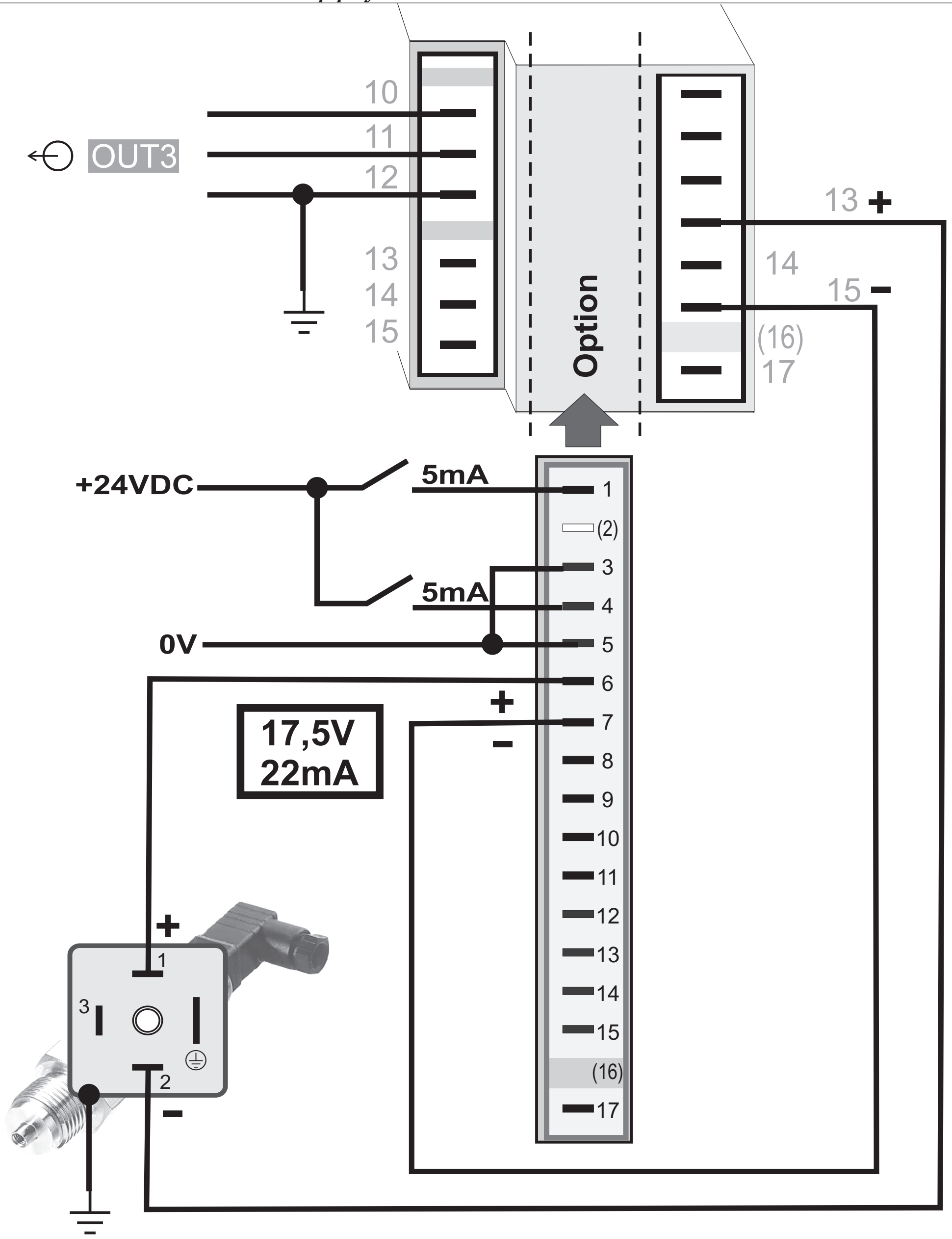
### *Connection of outputs OUT5/6 ❿ (option)*

Digital outputs (opto-coupler), galvanic isolated, common positive control voltage, output rating: 18...32VDC

### *Connection of bus interface ⓫ (option)*

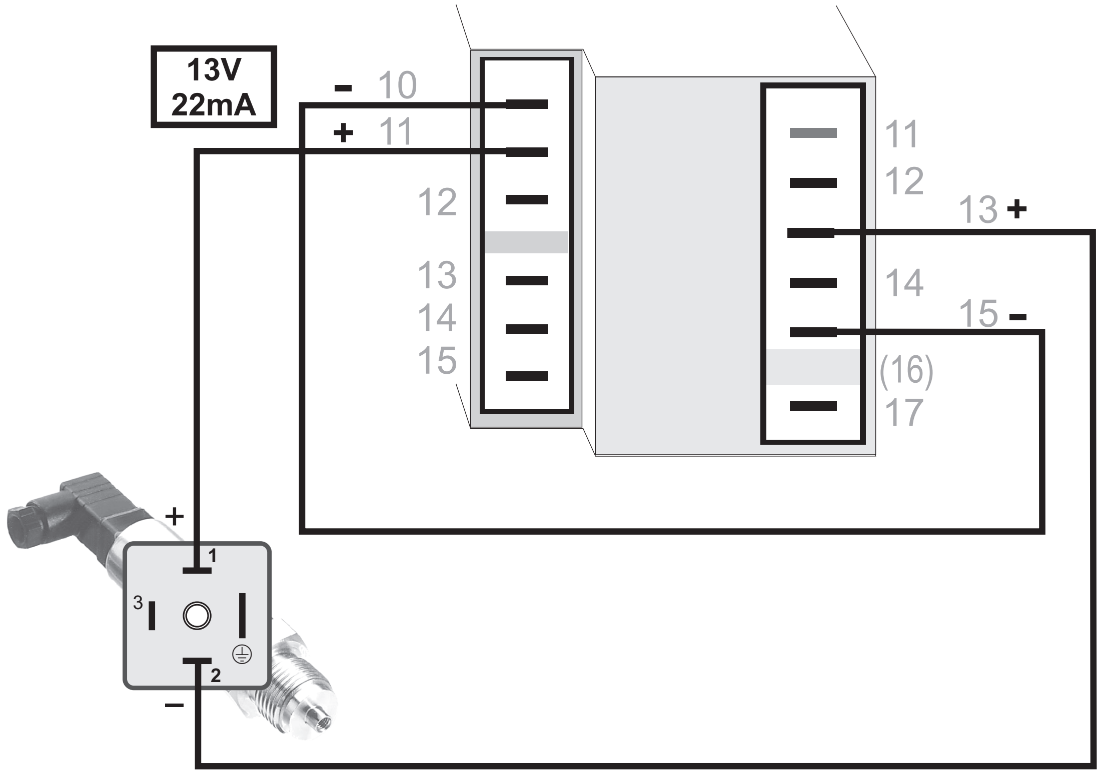
PROFIBUS DP or RS422/485 interface with Modbus RTU protocol

❽ ❾ *di2/3, 2-wire transmitter supply*

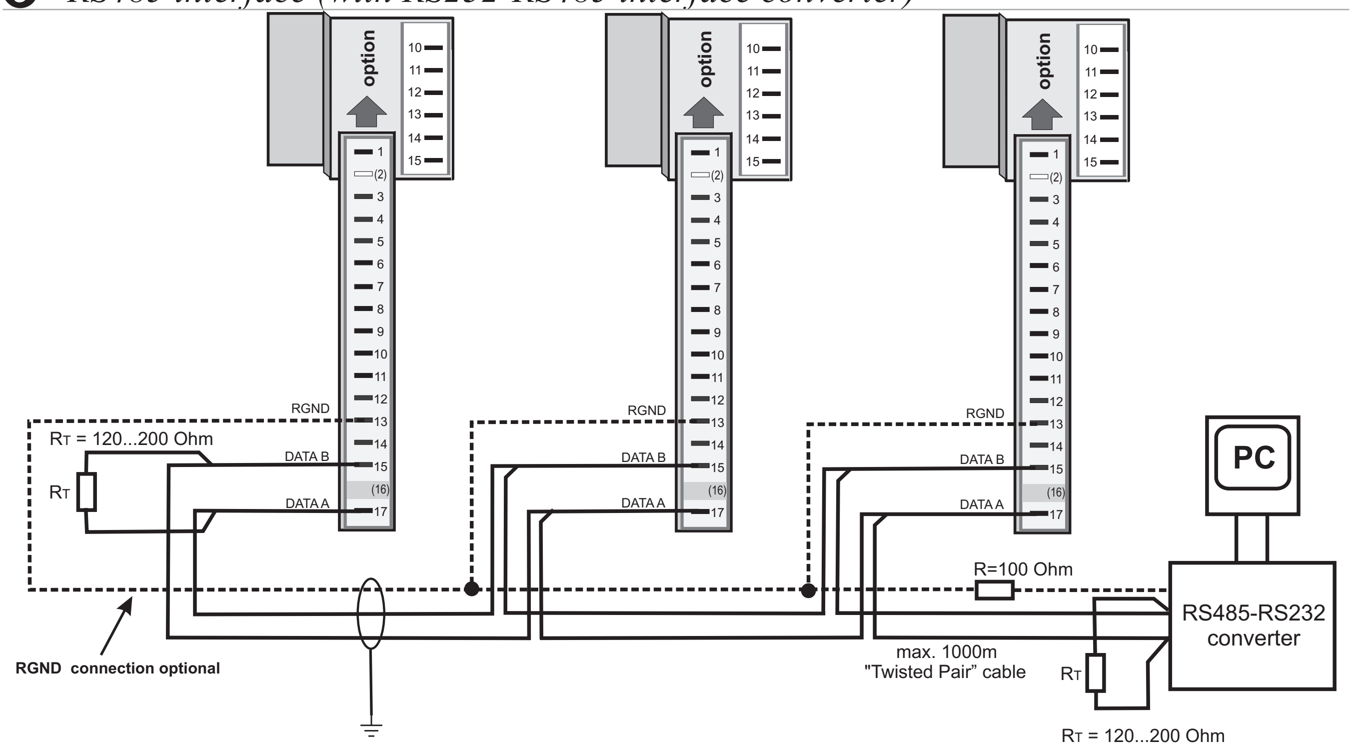



⚠ If the universal output OUT3 or OUT4 is used there may be no external galvanic connection between measuring and output circuits!

## ❸ *OUT3 transmitter supply*

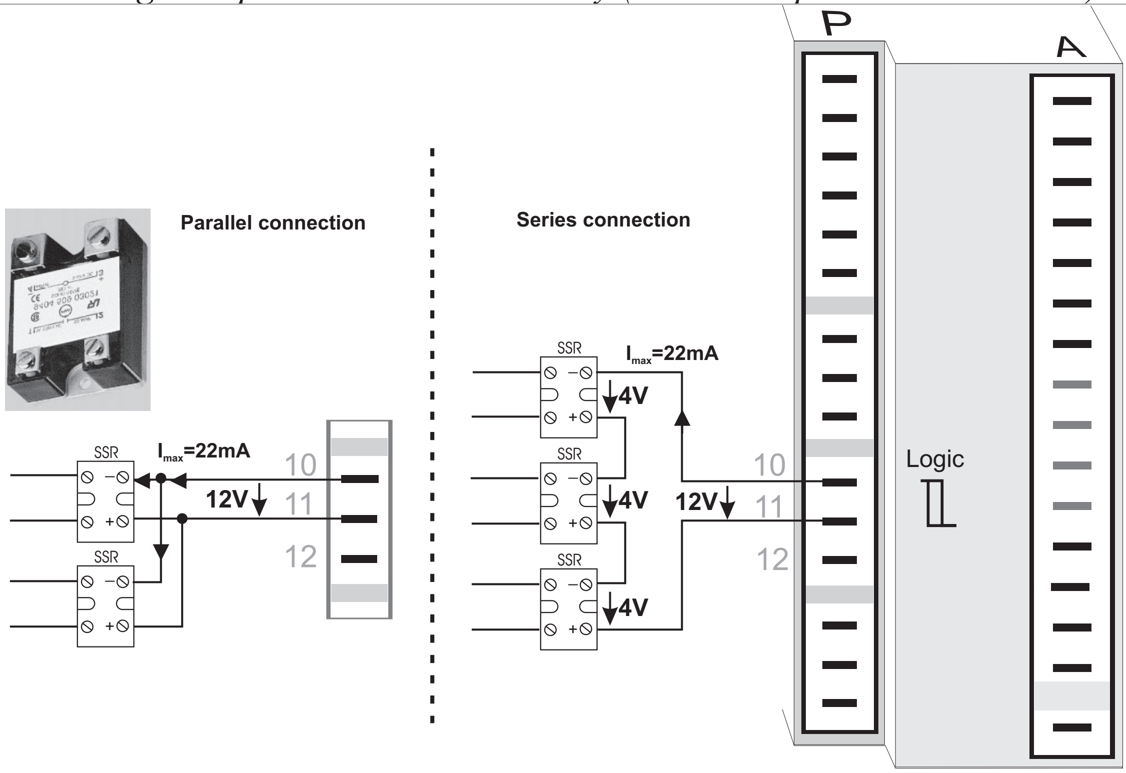



## ❾ *RS485 interface (with RS232-RS485 interface converter)* *

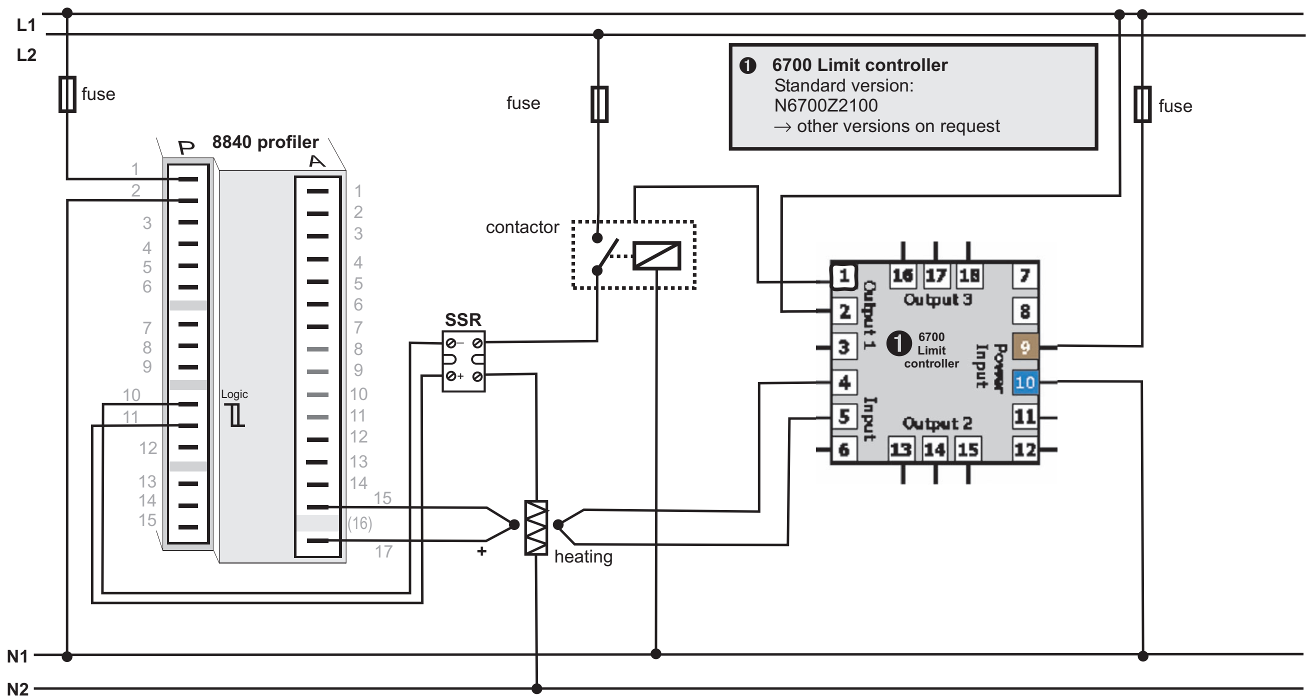



* **Interface description Modbus RTU in speperate manual: see page 78.**

## ❸ *OUT3 as logic output with solid-state relay (series and parallel connection)*



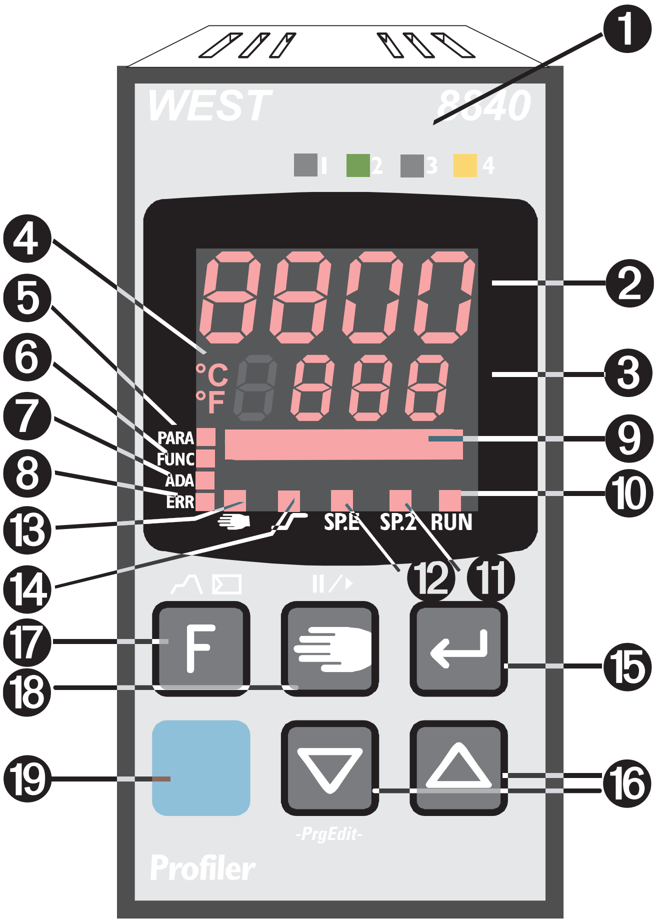

### *8840 profilerconnecting example:*




⚠ **CAUTION: Using a Limit controller is recommendable in systems where overtemperature implies a fire hazard or other risks.**

# 3 Operation

## 3.1 *Front view*




*LED colours:*

| | |
|---|---|
| LED 1, 2, 3, 4: | yellow |
| Bargraph: | red |
| other LEDs: | red |

ⓘ In the upper display line, the process value is always displayed. At parameter, configuration, calibration as well as extended operating level, the bottom display line changes cyclically between parameter name and parameter value.

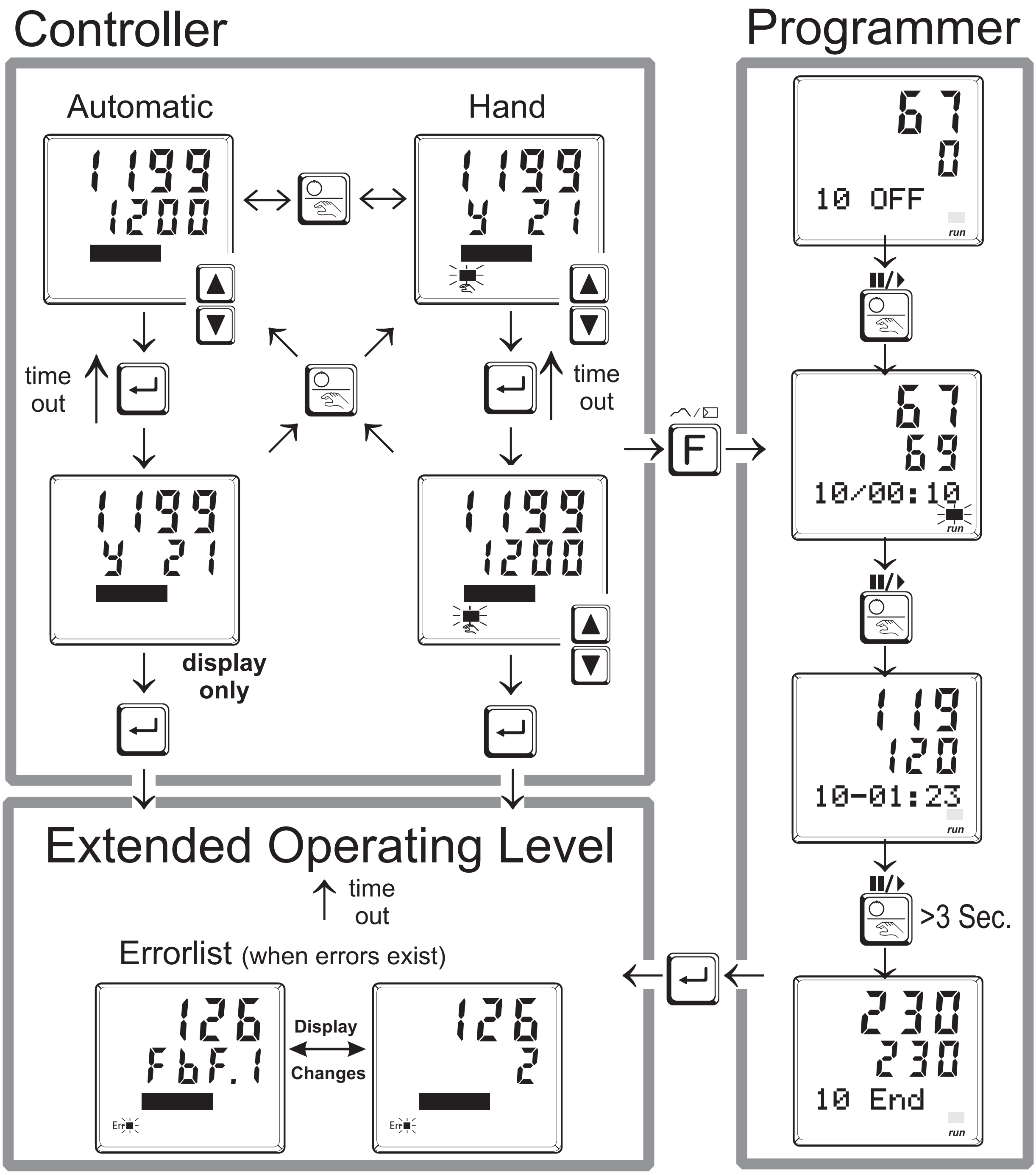
1. Status of switching outputs Out.1... 6
2. Process value display
3. Set-point, controller output
4. Signals display on °C or °F
5. Signals ConF and PArA level
6. Signals aktive function key
7. Self-tuning active
8. Entry in error list
9. Bargraph or clear text display
10. SP.2 is effective
11. SP.E is effective
12. Set-point gradient effective
13. Manual/automatic switch-over:
    *Off:* Automatic
    *On:* Manual(changing possible)
    *Blinks:* Manual (changing not possible (→ConF / Cntr / mAn)
14. Enter key:
    calls up error list / extended operating level /
15. Up/down keys:
    changing the set-point or the controller output value
16. Manual mode /spec. function (→ConF / LOGI )
17. switchover programmer / controller operation or, with pure controller operation, freely programmable function key
18. programmer: run/stop
    controller: automatic/manual
    other function (→ConF / LOGI )
19. PC connection for 8800/8840 Configurator (engineering tool)

## 3.2 *Behaviour after power-on*

After supply voltage switch-on, the unit starts with the **operating level**.
The unit is in the condition which was active before power-off.
If the 8840 profiler was in manual mode at supply voltage switch-off, the controller will re-start with the last output value in manual mode at power-on.

## 3.3 *Operating level*

The content of the extended operating level is determined by means of 8800/8840 Configurator (engineering tool). Parameters which are used frequently or the display of which is important can be copied to the extended operating level.



## 3.4 *Error list / Maintenance manager*

With one or several errors, the extended operating level always starts with the error list. Signalling an actual entry in the error list (alarm, error) is done by the Err LED in the display. To reach the error list press ↵ twice.


| Err LED status | Signification | Proceed as follows |
|---|---|---|
| blinks(status 2 ) | Alarm due to existing error | Determine the error type in the error list After error correction the unit changes to status 1 |
| lit(status 1 ) | Error removed, alarm not acknowledged | Acknowledge the alarm in the error list pressing key ▲ or ▼ The alarm entry was deleted (status 0 ). |
| off(status 0 ) | No error, all alarm entries deleted | -Not visible except when acknowledging |

**Error list:**

| Name | Description | Reason | Possible remedial action |
|---|---|---|---|
| E.1 | Internal error, cannot be removed | - E.g. defective EEPROM | - Contact West service<br>- Return unit to our factory |
| E.2 | Internal error, can be reset | - e.g. EMC trouble | - Keep measurement and power supply cables in separate runs<br>- Ensure that interference suppression of contactors is provided |
| E.3 | Configuration error, can be reset | - wrong configuration<br>- missing configuration | - Check interaction of configuration / parameters |
| E.4 | Hardware error | - Codenumber and hardware are not identical | - Contact West service<br>- Elektronic-/Optioncard must be exchanged |
| FbF.1 | Sensor break INP1 | - Sensor defective<br>- Faulty cabling | - Replace INP1 sensor<br>- Check INP1 connection |
| Sht.1 | Short circuit INP1 | - Sensor defective<br>- Faulty cabling | - Replace INP1 sensor<br>- Check INP1 connection |
| POL.1 | INP1polarity error | - Faulty cabling | - Reverse INP1 polarity |
| FbF.2 | Sensor break INP2 | - Sensor defective<br>- Faulty cabling | - Replace INP2 sensor<br>- Check INP2 connection |
| Sht.2 | Short circuit INP2 | - Sensor defective<br>- Faulty cabling | - Replace sensor INP2<br>- Check INP2 connection |
| POL.2 | INP2 polarity | - Faulty cabling | - Reverse INP2 polarity |
| FbF.3 | Sensor break INP3 | - Sensor defective<br>- Faulty cabling | - Replace INP3 sensor<br>- Check INP3 connection |
| Sht.3 | Short circuit INP3 | - Sensor defective<br>- Faulty cabling | - Replace sensor INP3<br>- Check INP3 connection |
| POL.3 | INP3 polarity | - Faulty cabling<br>- | - Reverse INP3 polarity |

| Name | Description | Reason | Possible remedial action |
|---|---|---|---|
| HCA | Heating current alarm (HCA) | - Heating current circuit interrupted, I< HC.A or I> HC.A (dependent of configuration)<br>- Heater band defective | - Check heating current circuit<br>- If necessary, replace heater band |
| SSr | Heating current short circuit (SSR) | - Current flow in heating circuit with controller off<br>- SSR defective | - Check heating current circuit<br>- If necessary, replace solid-state relay |
| LooP | Control loop alarm (LOOP) | - Input signal defective or not connected correctly<br>- Output not connected correctly | - Check heating or cooling circuit<br>- Check sensor and replace it, if necessary<br>- Check controller and switching device |
| AdA.H | Self-tuning heating alarm (ADAH) | - See Self-tuning heating error status | - see Self-tuning heating error status |
| AdA.C | Self-tuning heating alarm cooling (ADAC) | - See Self-tuning cooling error status | - see Self-tuning cooling error status |
| Lim.1 | stored limit alarm 1 | - adjusted limit value 1 exceeded | - check process |
| Lim.2 | stored limit alarm 2 | - adjusted limit value 2 exceeded | - check process |
| Lim.3 | stored limit alarm 3 | - adjusted limit value 3 exceeded | - check process |
| InF.1 | time limit value message | - adjusted number of operating hours reached | - application-specific |
| InF.2 | duty cycle message (digital ouputs) | - adjusted number of duty cycles reached | - application-specific |
| E.5 | Internal error in DP module | - self-test error<br>- internal communication interrupted | - Switch on the instrument again<br>- Contact West service |
| dP.1 | No access by bus master | - bus error<br>- connector problem<br>- no bus connection | - Check cable<br>- Check connector<br>- Check connections |
| dP.2 | Faulty configuration | - Faulty DP configuration telegram | - Check DP configuration telegram in master |
| dP.3 | Inadmissible parameter setting telegram sent | - Faulty DP parameter setting telegram | - Check DP parameter setting telegram in master |
| dP.4 | No data communication | - Bus error<br>- Address error<br>- Master stopped | - Check cable connection<br>- Check address<br>- Check master setting |

ⓘ Saved alarms (Err-LED is lit) can be acknowledged and deleted with the digital input di1/2/3, the [F]-key or the [ ]-key.
Configuration, see page 37: ConF / LOGI / Err.r

ⓘ If an alarm is still valid that means the cause of the alarm is not removed so far (Err-LED blinks), then other saved alarms can not be acknowledged and deleted.

**Self-tuning heating ( AdA.H ) and cooling ( AdA.C ) error status:**

| Error status | Description | Behaviour |
|---|---|---|
| 0 | No error | |
| 3 | Faulty control action | Re-configure controller (inverse ↔ direct) |
| 4 | No response of process variable | The control loop is perhaps not closed: check sensor, connections and process |
| 5 | Low reversal point | Increase ( AdA.H ) max. output limiting Y.Hi or decrease ( AdA.C ) min. output limiting Y.Lo |
| 6 | Danger of exceeded set-point (parameter determined) | If necessary, increase (inverse) or reduce (direct) set-point |
| 7 | Output step change too small (Δy > 5%) | Increase ( AdA.H ) max. output limiting Y.Hi or reduce ( AdA.C ) min. output limiting Y.Lo |
| 8 | Set-point reserve too small | Acknowledgment of this error message leads to switch-over to automatic mode.If self-tuning shall be continued, increase set-point (invers), reduce set-point (direct) or decrease set-point range (→ PArA / SEtP / SP.LO and SP.Hi ) |
| 9 | Impulse tuning failed | The control loop is perhaps not closed: check sensor, connections and process |

## 3.5 *Self-tuning*

For determination of optimum process parameters, self-tuning is possible. After starting by the operator, the controller makes an adaptation attempt, whereby the process characteristics are used to calculate the parameters for fast line-out to the set-point without overshoot.

**The following parameters are optimized when self-tuning:**
**Parameter set 1:**

Pb1 - Proportional band 1 (heating) in engineering units [e.g. °C]
ti1 - Integral time 1 (heating) in [s]
→ only, unless set to OFF
td1 - Derivative time 1 (heating) in [s]
→ only, unless set to OFF
t1 - Minimum cycle time 1 (heating) in [s]
→ only, unless Adt0 was set to "no self-tuning" during configuration by means of 8800/8840 Configurator.

Pb2 - Proportional band 2 (cooling) in engineering units [e.g. °C]

| | |
|---|---|
| ti2 | - Integral time 2 (cooling) in [s]<br>→ only, unless set to OFF |
| td2 | - Derivative time 2 (cooling) in [s]<br>→ only, unless set to OFF |
| t2 | - Minimum cycle time 2 (cooling) in [s]<br>→ only, unless AdtO was set to “no self-tuning” during configuration by means of 8800/8840 Configurator . |

**Parameter set 2:** analogous to parameter set 1 (see page 25)

### *3.5.1* Preparation for self-tuning

- Adjust the controller measuring range as control range limits. Set values rnG.L and rnG.H to the limits of subsequent control.
  (Configuration →Controller→ lower and upper control range limits)
  ConF → Cntr → rnG.L and rnG.H
- Determine which parameter set shall be optimized.
  - The instantaneously effective parameter set is optimized.
    → Activate the relevant parameter set (1 or 2).
- Determine which parameter set shall be optimized (see tables above).
- Select the self-tuning method
  see chapter 3.5.3
  -Step attempt after start-up
  - Pulse attempt after start-up
  - Optimization at the set-point

### *3.5.2* Optimization after start-up or at the set-point

The two methods are optimization after start-up and at the set-point.
As control parameters are always optimal only for a limited process range, various methods can be selected dependent of requirements. If the process behaviour is very different after start-up and directly at the set-point, parameter sets 1 and 2 can be optimized using different methods. Switch-over between parameter sets dependent of process status is possible (see page 25).

**Optimization after start-up**: (see page 17)
Optimization after start-up requires a certain separation between process value and set-point. This separation enables the controller to determine the control parameters by evaluation of the process when lining out to the set-point.
This method optimizes the control loop from the start conditions to the set-point, whereby a wide control range is covered.
We recommend selecting optimization method **“Step attempt after start-up”** with tunE = 0 first. Unless this attempt is completed successfully, we recommend a **“Pulse attempt after start-up”**.

**Optimization at the set-point**: (see page 18)
For optimizing at the set-point, the controller outputs a disturbance variable to the process. This is done by changing the output variable shortly. The process value changed by this pulse is evaluated. The detected process parameters are converted into control parameters and saved in the controller.
This procedure optimizes the control loop directly at the set-point. The advantage is in the small control deviation during optimization.

### *3.5.3* Selecting the method ( ConF / Cntr / tunE )

**Selection criteria for the optimization method:**

| | Step attempt after start-up | Pulse attempt after start-up | Optimization at the set-point |
|---|---|---|---|
| tunE = 0 | sufficient set-point reserve is provided | | sufficient set-point reserve is **not** provided |
| tunE = 1 | | sufficient set-point reserve is provided | sufficient set-point reserve is **not** provided |
| tunE = 2 | always step attempt after start-up | | |

**Sufficient set-point reserve:**

inverse controller: (with process value < set-point- (10% of rnGH -rnGL )
direct controller: (with process value > set-point + (10% of rnGH -rnGL )

**Step attempt after start-up**

Condition: - tunE = 0 and sufficient set-point reserve provided **or**
- tunE = 2

The controller outputs 0% correcting variable or Y.Lo and waits, until the process is at rest (see start-conditions on page 15).
Subsequently, a correcting variable step change to 100% is output.
The controller attempts to calculate the optimum control parameters from the process response. If this is done successfully, the optimized parameters are taken over and used for line-out to the set-point.

With a *3-point controller,* this is followed by *“cooling”*.
After completing the 1st step as described, a correcting variable of -100% (100% cooling energy) is output from the set-point. After successfull determination of the “cooling parameters”, line-out to the set-point is using the optimized parameters.

### Pulse attempt after start-up

Condition: -tunE = 1 and sufficient set-point reserve provided.

The controller outputs 0% correcting variable or Y.Lo and waits, until the process is at rest (see start conditions page 15)
Subsequently, a short pulse of 100% is output (Y=100%) and reset.
The controller attempts to determine the optimum control parameters from the process response. If this is completed successfully, these optimized parameters are taken over and used for line-out to the set-point.

With a *3-point controller,* this is followed by "cooling".
After completing the 1st step as described and line-out to the set-point, correcting variable "heating" remains unchanged and a cooling pulse (100% cooling energy) is output **additionally**. After successful determination of the "cooling parameters", the optimized parameters are used for line-out to the set-point.

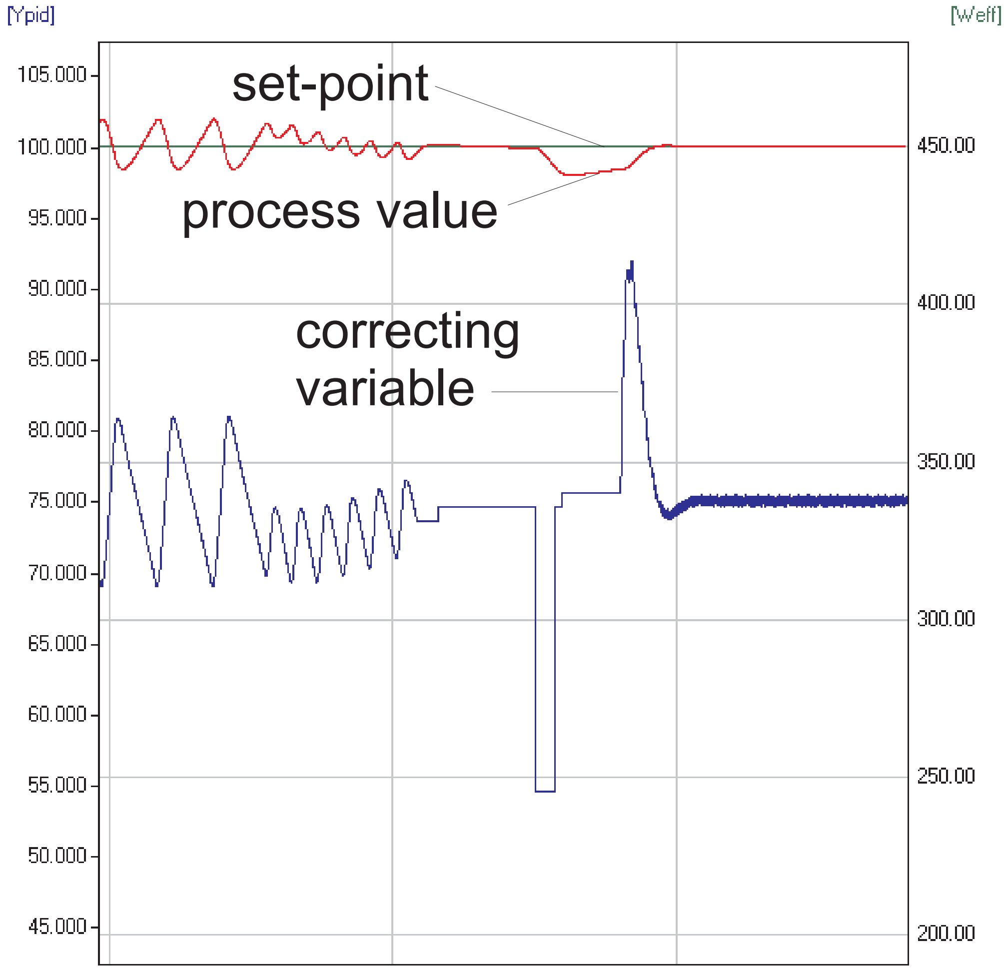
### Optimization at the set-point

Conditions:

- A sufficient set-point reserve is **not** provided at self-tuning start (see page 17).
- tunE is 0 or 1
- With Strt = 1 configured and detection of a process value oscillation by more than ± 0,5% of (rnG.H - rnG.L ) by the controller, the control parameters are preset for process stabilization and the controller realizes an *optimization at the set-point* (see figure "Optimization at the set-point").
- when the step attempt after power-on has failed
- with active gradient function ( PArA/SEtP/r.SP≠ OFF ), the set-point gradient is started from the process value and there isn't a sufficient set-point reserve.

**Optimization-at-the-set-point procedure:**
The controller uses its instantaneous parameters for control to the set-point. In lined out condition, the controller makes a pulse attempt. This pulse reduces the correcting variable by max. 20% ❶, to generate a slight process value undershoot. The changing process is analyzed and the parameters thus calculated are recorded in the controller. The optimized parameters are used for line-out to the set-point.

*Optimization at the set-point*

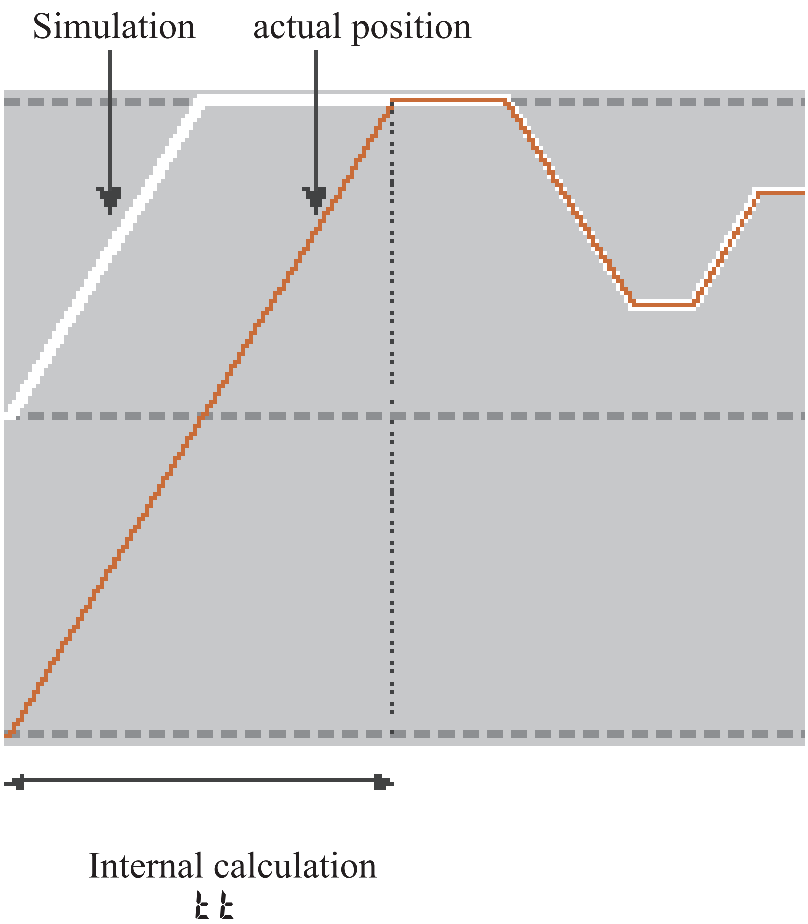



With a *3-point controller,* optimization for the “heating“ or “cooling” parameters occurs dependent of the instantaneous condition.
These two optimizations must be started separately.

❶ If the correcting variable is too low for reduction in lined out condition it is increased by max. 20%.

### Optimization at the set-point for 3-point stepping controller

With 3-point stepping controllers, the pulse attempt can be made with or without position feedback. Unless feedback is provided, the controller calculates the motor actuator position internally by varying an integrator with the adjusted actuator travel time. For this reason, precise entry of the actuator travel time (tt ), as time between stops is highly important. Due to position simulation, the controller knows whether an increased or reduced pulse must be output. After supply voltage switch-on, position simulation is at 50%. When the motor actuator was varied by the adjusted travel time in one go,  internal calculation occurs, i.e. the position corresponds to the simulation:




Internal calculation always occurs, when the actuator was varied by travel time tt ***in one go*** , independent of manual or automatic mode. When interrupting the variation, internal calculation is cancelled. Unless internal calculation occurred already after self-tuning start, it will occur automatically by closing the actuator once.

Unless the positioning limits were reached within 10 hours, a significant deviation between simulation and actual position may have occurred. In this case, the controller would realize minor internal calculation, i.e. the actuator would be closed by 20 %, and re-opened by 20 % subsequently. As a result, the controller knows that there is a 20% reserve for the attempt.

### *3.5.4* Self-tuning start

**Start condition:**

- For process evaluation, a stable condition is required. Therefore, the controller waits until the process has reached a stable condition after self-tuning start.
  The rest condition is considered being reached, when the process value oscillation is smaller than ± 0,5% of (rnG.H - rnG.L ).
- For self-tuning start after start-up, a 10% difference from (SP.L0 ... SP.Hi) is required.

ⓘ Self-tuning start can be blocked via 8800/8840 Configurator (engineering tool) ( P.Loc ).

Strt = 0 Only manual start by pressing keys ↵ and ▲ simultaneously or via interface is possible.

Strt = 1 Manual start by press keys ↵ and ▲ simultaneously via interface and automatic start after power-on and detection of process oscillations.


| Ada LED status | Signification |
|---|---|
| blinks | Waiting, until process calms down |
| lit | Self-tuning is running |
| off | Self-tuning not activ or ended |

### *3.5.5* Self-tuning cancellation

**By the operator:**
Self-tuning can always be cancelled by the operator. For this, press [↵] and [▲] key simultaneously.With controller switch-over to manual mode after self-tuning start, self-tuning is cancelled. When self-tuning is cancelled, the controller will continue operating using the old parameter values.

**By the controller:**
If the Err LED starts blinking whilst self-tuning is running, successful self-tuning is prevented due to the control conditions. In this case, self-tuning was cancelled by the controller. The controller continues operating with the old parameters in automatic mode. In manual mode it continues with the old controller output value.

### *3.5.6* Acknowledgement procedures in case of unsuccessful self-tuning

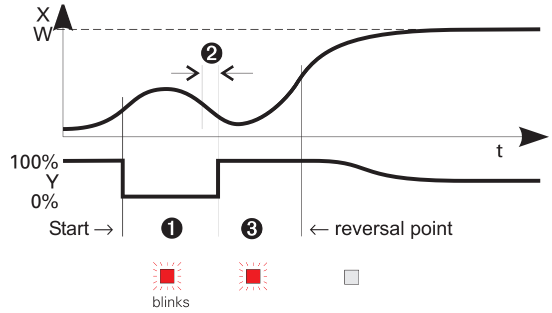
1. Press keys [↵] *and* [▲] simultaneously:
   The controller continues controlling using the old parameters in automatic mode. The Err LED continues blinking, until the self-tuning error was acknowledged in the error list.
2. *Press key* [manual key] *(if configured):*
   The controller goes to manual mode. The Err LED continues blinking, until the self-tuning error was acknowleged in the error list.

3. *Press key* [↵] *:*
   Display of error list at extended operating level. After acknowledgement of the error message, the controller continues control in automatic mode using the old parameters.

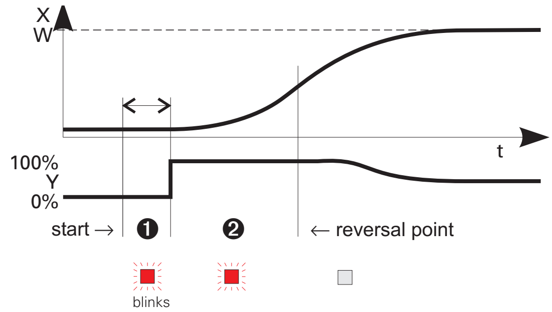
**Cancellation causes:**
→ page 15: "Error status self-tuning heating ( AdA.H ) and cooling ( AdA.C )"

### *3.5.7* Examples for self-tuning attempts (controller inverse, heating or heating/cooling)

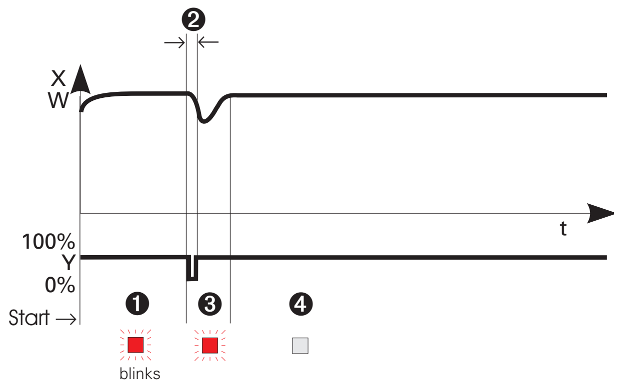
***Start: heating power switched on***
Heating power Y is switched off (❶). When the change of process value X was constant during one minute (❷), the power is switched on (❸). At the reversal point, the self-tuning attempt is finished and the new parameter are used for controlling to set-point W.



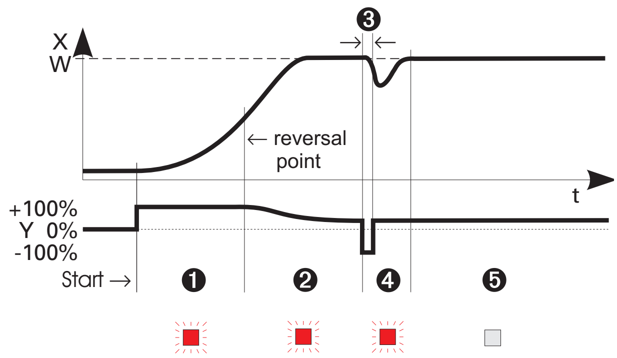

***Start: heating power switched off***
The controller waits 1,5 minutes (❶). Heating power Y is switched on (❷). At the reversal point, the self-tuning attempt is finished and control to the set-point is using the new parameters.




***Self-tuning at the set-point*** ⚠
The process is controlled to the set-point. With the control deviation constant during a defined time (❶) (i.e. constant separation of process value and set-point), the controller outputs a reduced correcting variable pulse (max. 20%) (❷). After determination of the control parameters using the process characteristic (❸), control is started using the new parameters (❹).



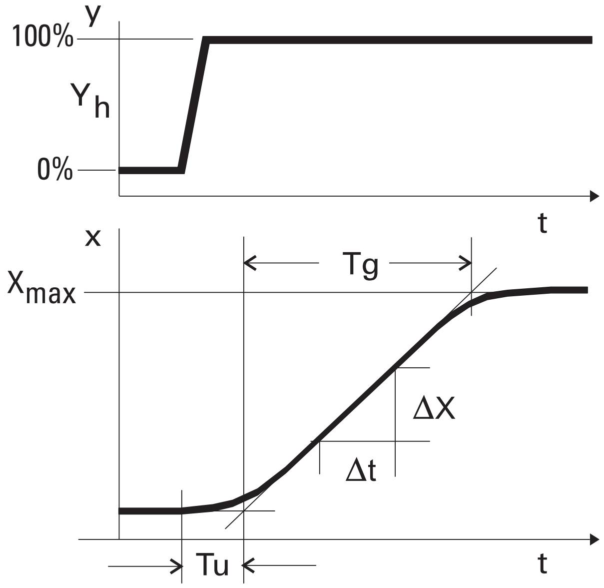

***Three-point controller*** ⚠
The parameter for heating and cooling are determined in two attempts. The heating power is switched on (❶). Heating parameters Pb1, ti1, td1 and t1 are determined at the reversal point. Control to the set-point occurs(❷). With constant control deviation, the controller provides a cooling correcting variable pulse (❸). After determining its cooling parameters Pb2, ti2, td2 and t2 (❹) from the process characteristics , control operation is started using the new parameters (❺).




⚠ During phase ❸, heating and cooling are done simultaneously!

## 3.6 *Manual self-tuning*

The optimization aid should be used with units on which the control parameters shall be set without self-tuning.
For this, the response of process variable x after a step change of correcting variable y can be used. Frequently, plotting the complete response curve (0 to 100%) is not possible, because the process must be kept within defined limits.
Values $T_g$ and $x_{max}$ (step change from 0 to 100 %) or Δt and Δx (partial step response) can be used to determine the maximum rate of increase $v_{max}$.




| | | |
|---|---|---|
| y | = | correcting variable |
| $Y_h$ | = | control range |
| Tu | = | delay time (s) |
| Tg | = | recovery time (s) |
| $X_{max}$ | = | maximum process value |

$$V_{max} = \frac{Xmax}{Tg} = \frac{\Delta x}{\Delta t} \triangleq \text{ max. rate of increase of process value}$$

The control parameters can be determined from the values calculated for delay time $T_u$ , maximum rate of increase $v_{max}$, control range $X_h$ and characteristic K according to the **formulas** given below. Increase Pb1, if line-out to the set-point oscillates.

*Parameter adjustment effects*

| Parameter | | Control | Line-out of disturbances | Start-up behaviour |
|---|---|---|---|---|
| Pb1 | higher | increased damping | slower line-out | slower reduction of duty cycle |
| | lower | reduced damping | faster line-out | faster reduction of duty cycle |
| td1 | higher | reduced damping | faster response to disturbances | faster reduction of duty cycle |
| | lower | increased damping | slower response to disturbances | slower reduction of duty cycle |
| ti1 | higher | increased damping | slower line-out | slower reduction of duty cycle |
| | lower | reduced damping | faster line-out | faster reduction of duty cycle |

K = Vmax * Tu

With 2-point and 3-point controllers, the cycle time must be adjusted to t1 /t2 ≤ 0,25 * Tu

*Formulas*

| controller behavior | Pb1 [phy. units] | td1 [s] | ti1 [s] |
|---|---|---|---|
| PID | 1,7 * K | 2 * Tu | 2 * Tu |
| PD | 0,5 * K | Tu | OFF |
| PI | 2,6 * K | OFF | 6 * Tu |
| P | K | OFF | OFF |
| 3-point-stepping | 1,7 * K | Tu | 2 * Tu |

## 3.7 *Second PID parameter set*

The process characteristic is frequently affected by various factors such as process value, correcting variable and material differences.
To comply with these requirements, the 8840 profiler can be switched over between two parameter sets.
Parameter sets PArA and PAr.2 are provided for heating and cooling.

Dependent of configuration (ConF/LOGI/Pid.2), switch-over to the second parameter set (ConF/LOGI/Pid.2) is via one of digital inputs di1, di2, di3, key F or interface (OPTION).

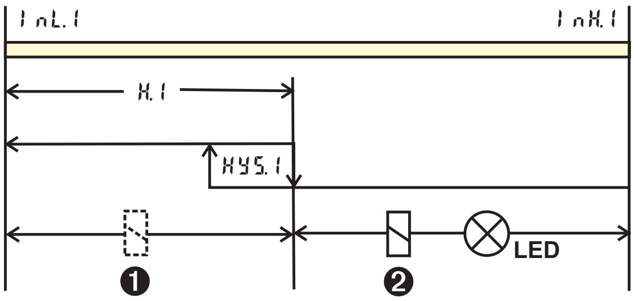
Self-tuning is always done using the active parameter set, i.e. the second parameter set must be active for optimizing.

## 3.8 *Alarm handling*

Max. three alarms can be configured and assigned to the individual outputs. Generally, outputs Out.1... Out.6 can be used each for alarm signalling. If more than one signal is linked to one output the signals are OR linked. Each of the 3 limit values Lim.1 ... Lim.3 has 2 trigger points H.x (Max) and L.x (Min), which can be switched off individually (parameter = "OFF"). Switching difference HYS.x and delay dEL.x of each limit value is adjustable.

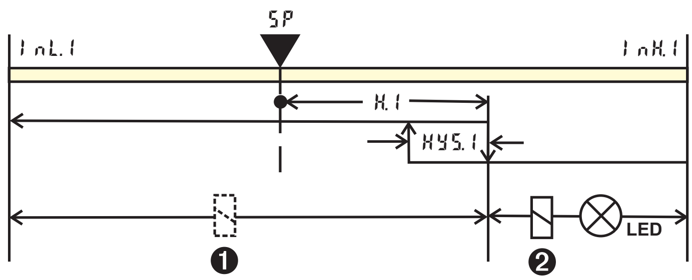
① *Operating principle* ***absolute*** *alarm*

L.1 = OFF

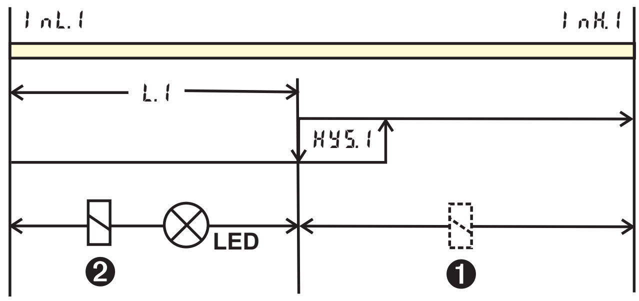



② *Operating principle* ***relative*** *alarm*

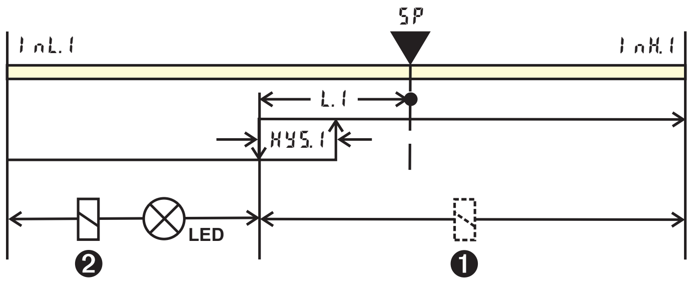
L.1 = OFF

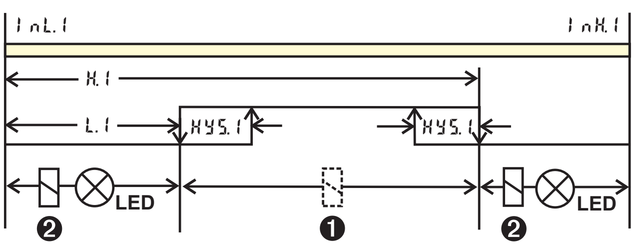


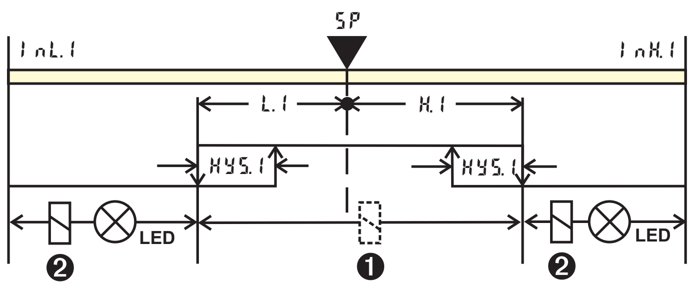

H.1 = OFF




H.1 = OFF




❶: normally closed ( ConF / Out.x / O.Act = 1 )

❷: normally open ( ConF / Out.x / O.Act = 0 )

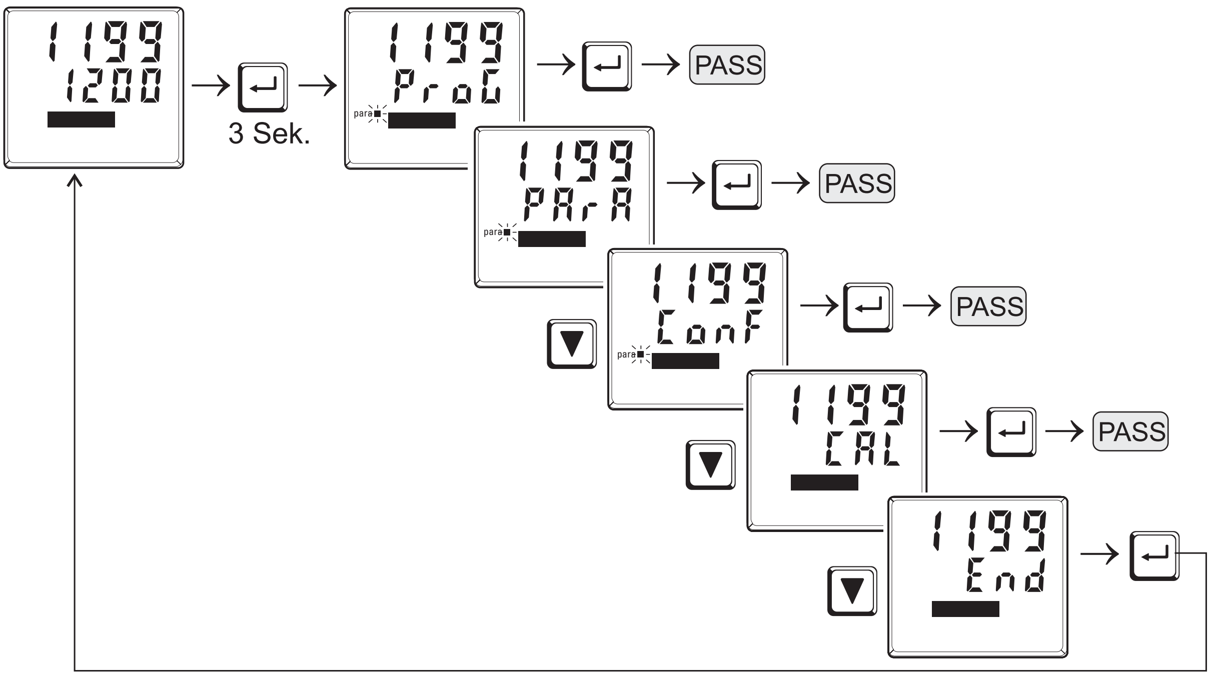
ⓘ The variable to be monitored can be selected seperately for each alarm via configuration
The following variables can be monitored:

- process value
- control deviation xw (process value - set-point)
- control deviation xw + suppression after start-up or set-point change
  After switching on or set-point changing, the alarm output is suppressed, until the process value is within the limits for the first time. At the latest after expiration of time 10 t.i1, the alarm is activated. (t.i1 = integral time 1; parameter → Cntr )
  If t.i1 is switched off (t.i1 = OFF ), this is interpreted as ∞, i.e. the alarm is not activated, before the process value was within the limits once.
- Measured value INP1
- Measured value INP2
- Measured value INP3
- effective set-point Weff
- correcting variable y (controller output)
- Deviation from SP internal
- Process value - x2

ⓘ If measured value monitoring + alarm status storage is chosen ( ConF / Lim / Fnc.x = 2/4 ), the alarm relay remains switched on until the alarm is resetted in the error list ( Lim 1..3 = 1 ).

## 3.9 *Operating structure*

After supply voltage switch-on, the controller starts with the **operating levels**. The controller status is as before power off.




PArA - level: At PArA - level, the right decimal point of the bottom display line is *lit continuously*.

ConF - level: At ConF - level, the right decimal point of bottom display line *blinks*.

PASS When safety switch **Loc** is open, only the levels enabled by means of 8800/8840 Configurator (engineering tool) are visible and accessible by entry of the password adjusted by means of 8800/8840 Configurator (engineering tool). Individual parameters accessible without password must be copied to the extended operating level.

Factory setting:Safety switch **Loc** closed: all levels accessible without restriction, password PASS = OFF .

All levels locked with a password are locked only if safety switch **Loc** is closed.

# 4 Configuration level

## 4.1 *Configuration survey*

**ConF Configuration level**

| CntR Control and self-tuning | ProG Programmer | InP.1 Input 1 | InP.2 Input 2 | InP.3 Input 3 | Lim Limit value functions | Out.1 Output 1 | Out.2 Output 2 | Out.3 Output 3 | Out.4 Output 4 | Out.5 Output 5 | Out.6 Output 6 | LOGI Digital inputs | Othr Display, operation, interface |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SP.Fn | t.bdS | I.Fnc | I.Fnc | I.Fnc | Fnc.1 | O.Act | See output 1 | O.tYP | O.tYP | See output 1 | See output 1 | L-r | bAud |
| C.tYP | | StYP | StYP | S.Lin | Src.1 | Y.1 | | O.Act | O.Act | | | SP.2 | Addr |
| C.Fnc | | S.Lin | Corr | S.tYP | Fnc.2 | Y.2 | | Y.1 | Y.1 | | | SP.E | PrtY |
| C.dif | | Corr | InF | Corr | Src.2 | Lim.1 | | Y.2 | Y.2 | | | Y.2 | dELY |
| mAn | | | | InF | Fnc.3 | Lim.2 | | Lim.1 | Lim.1 | | | Y.E | dP.Ad |
| C.Act | | | | | Src.3 | Lim.3 | | Lim.2 | Lim.2 | | | mAn | bc.uP |
| FAIL | | | | | HC.AL | LP.AL | | Lim.3 | Lim.3 | | | C.oFF | O2 |
| rnG.L | | | | | LP.AL | HC.AL | | LP.AL | LP.AL | | | m.Loc | Unit |
| rnG.H | | | | | | HC.SC | | HC.AL | HC.AL | | | Err.r | dP |
| CYCL | | | | | | P.End | | HC.SC | HC.SC | | | Pid.2 | LEd |
| tunE | | | | | | FAi.1 | | P.End | P.End | | | I.ChG | dISP |
| Strt | | | | | | FAi.2 | | FAi.1 | FAi.1 | | | di.Fn | C.dEL |
| | | | | | | FAi.3 | | FAi.2 | FAi.2 | | | | |
| | | | | | | | | FAi.3 | FAi.3 | | | | |
| | | | | | | | | Out.0 | Out.0 | | | | |
| | | | | | | | | Out.1 | Out.1 | | | | |
| | | | | | | | | O.Src | O.Src | | | | |
| | | | | | | | | | | | | | |

## 4.2 Adjustment:

- The configuration can be adjusted by means of keys ▲▼ .
- Transition to the next configuration is by pressing key ↵ .
- After the last configuration of a group, donE is displayed and followed by automatic change to the next group

**Return to the beginning of a group is by pressing the ↵ key for 3 sec.**

## 4.3 *Configuration parameters*

### Cntr

| Name | Value range | Description | Default |
|---|---|---|---|
| SP.Fn | | **Basic configuration of setpoint processing** | 1 |
| | 0 | set-point controller can be switched over to external set-point (-> LOGI / SP.E ) | |
| | 1 | programmer | |
| | 8 | standard controller with external offset (SP.E ) | |
| | 9 | Programmer with external offset (SP.E ) | |
| C.tYP | | **Calculation of the process value** | 0 |
| | 0 | standard controller (process value = x1) | |
| | 1 | ratio controller (x1/x2) | |
| | 2 | difference (x1 - x2) | |
| | 3 | Maximum value of x1and x2. It is controlled with the bigger value. At sensor failure it is controlled with the remaining actual value. | |
| | 4 | Minimum value of x1and x2. It is controlled with the smaller value. At sensor failure it is controlled with the remaining actual value. | |
| | 5 | Mean value (x1, x2). With sensor error, controlling is continued with the remaining process value. | |
| | 6 | Switching between x1 and x2 (-> LOGI / I.ChG ) | |
| | 7 | $O_2$ function with constant sensor temperature | |
| | 8 | $O_2$ function with measured sensor temperature | |
| C.Fnc | | **Control behaviour (algorithm)** | 1 |
| | 0 | on/off controller or signaller with one output | |
| | 1 | PID controller (2-point and continuous) | |
| | 2 | Δ / Y / Off, or 2-point controller with partial/full load switch-over | |
| | 3 | 2 x PID (3-point and continuous) | |
| | 4 | 3-point stepping controller | |
| | 5 | 3-point stepping controller with position feedback Yp | |
| | 6 | continuous controller with integrated positioner | |
| C.dif | | Output action of the PID controller derivative action | 0 |
| | 0 | Derivative action acts only on the measured value. | |
| | 1 | Derivative action only acts on the control deviation (set-point is also differentiated) | |
| mAn | | **Manual operation permitted** | 0 |
| | 0 | no | |
| | 1 | yes (→ LOGI / mAn ) | |
| C.Act | | **Method of controller operation** | 0 |
| | 0 | inverse, e.g. heating | |
| | 1 | direct, e.g. cooling | |
| FAIL | | **Behaviour at sensor break** | 1 |
| | 0 | controller outputs switched off | |
| | 1 | y = Y2 | |
| | 2 | y = mean output. The maximum permissible output can be adjusted with parameter Ym.H . To prevent determination of inadmissible values, mean value formation is only if the control deviation is lower than parameter L.Ym . | |

| Name | Value range | Description | Default |
|---|---|---|---|
| rnG.L | -1999...9999 | **X0 (low limit range of control)** ❶ | -100 |
| rnG.H | -1999...9999 | **X100 (high limit range of control)** ❶ | 1200 |
| CYCL | | **Characteristic for 2-point- and 3-point-controllers** | 0 |
| | 0 | standard | |
| | 3 | with constant cycle (see page 48) | |
| tunE | | **Auto-tuning at start-up** (see page 15 ) | 0 |
| | 0 | At start-up with step attempt, at set-point with impulse attempt | |
| | 1 | At start-up and at set-point with impulse attempt. Setting for fast controlled systems (e.g. hot runner control) | |
| | 2 | Always step attempt at start-up | |
| Strt | | **Start of auto-tuning** | 0 |
| | 0 | Manual start of auto-tuning | |
| | 1 | Manual or automatic start of auto-tuning at power on or when oscillating is detected | |
| Adt0 | | **Optimization of T1, T2** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | Automatic optimization | |
| | 1 | No optimization | |

❶ rnG.L and rnG.H are indicating the range of control on which e.g. the self-tuning is refering

## ProG

| Name | Value Range | Description | Default |
|---|---|---|---|
| t.bAS | | Timebase of Programmer | 0 |
| | 0 | hours [hh] : minutes [mm] | |
| | 1 | minutes [mm] : seconds [ss] | |

## InP.1

| Name | Value range | Description | Default |
|---|---|---|---|
| I.Fnc | | INP1 function selection | 7 |
| | 0 | No function (following INP data are skipped) | |
| | 1 | Heating current input | |
| | 2 | External set-point SP.E (switch-over -> LOGI / SP.E ) | |
| | 3 | Position feedback Yp | |
| | 4 | Second process value x2 (ratio, min, max, mean) | |
| | 5 | External positioning value Y.E (switch-over → LOGI / Y.E ) | |
| | 6 | No controller input (e.g. limit signalling instead) | |
| | 7 | Process value x1 | |

| Name | Value range | Description | Default |
|---|---|---|---|
| S.tYP | | **Sensor type selection** | 1 |
| | 0 | thermocouple type L (-100...900°C) , Fe-CuNi DIN | |
| | 1 | thermocouple type J (-100...1200°C) , Fe-CuNi | |
| | 2 | thermocouple type K (-100...1350°C), NiCr-Ni | |
| | 3 | thermocouple type N (-100...1300°C), Nicrosil-Nisil | |
| | 4 | thermocouple type S (0...1760°C), PtRh-Pt10% | |
| | 5 | thermocouple type R (0...1760°C), PtRh-Pt13% | |
| | 6 | thermocouple type T (-200...400°C), Cu-CuNi | |
| | 7 | thermocouple type C (0...2315°C), W5%Re-W26%Re | |
| | 8 | thermocouple type D (0...2315°C), W3%Re-W25%Re | |
| | 9 | thermocouple type E (-100...1000°C), NiCr-CuNi | |
| | 10 | thermocouple type B (0/100...1820°C), PtRh-Pt6% | |
| | 18 | special thermocouple | |
| | 20 | Pt100 (-200.0 ... 100,0 °C) | |
| | 21 | Pt100 (-200.0 ... 850,0 °C) | |
| | 22 | Pt1000 (-200.0 ... 850.0 °C) | |
| | 23 | special 0...4500 Ohm (preset to KTY11-6) | |
| | 24 | special 0...450 Ohm | |
| | 30 | 0...20mA / 4...20mA ❶ | |
| | 40 | 0...10V / 2...10V ❶ | |
| | 41 | special -2,5...115 mV ❶ | |
| | 42 | special -25...1150 mV ❶ | |
| | 50 | potentiometer 0...160 Ohm ❶ | |
| | 51 | potentiometer 0...450 Ohm ❶ | |
| | 52 | potentiometer 0...1600 Ohm ❶ | |
| | 53 | potentiometer 0...4500 Ohm ❶ | |
| S.Lin | | **Linearization (only at S.tYP = 23 (KTY 11-6), 24 (0...450 ), 30 (0..20mA), 40 (0..10V), 41 (0...100mV) and 42 (special -25...1150 mV))** | 0 |
| | 0 | none | |
| | 1 | Linearization to specification. Creation of linearization table with 8800/8840 Configurator (engineering tool) possible. The characteristic for KTY 11-6 temperature sensors is preset. | |
| Corr | | **Measured value correction / scaling** | 0 |
| | 0 | Without scaling | |
| | 1 | Offset correction (at CAL level) | |
| | 2 | 2-point correction (at CAL level) | |
| | 3 | Scaling (at PArA level) | |
| In.F | -1999...9999 | **Alternative value for error at INP1** | OFF |
| fAI1 | | **Forcing INP1** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | No forcing | |
| | 1 | Forcing via serial interface | |

❶ with current and voltage input signals, scaling is required (see chapter 5.3)

## InP.2

| Name | Value range | Description | Default |
|---|---|---|---|
| I.Fnc | | **Function selection of INP2** | 1 |
| | 0 | no function (subsequent input data are skipped) | |
| | 1 | heating current input | |
| | 2 | External set-point SP.E (switch-over -> LOGI / SP.E ) | |
| | 3 | Position feedback Yp | |
| | 4 | Second process value x2 (ratio, min, max, mean) | |
| | 5 | External positioning value Y.E (switch-over → LOGI / Y.E ) | |
| | 6 | no controller input (e.g. transmitter input instead) | |
| | 7 | Process value x1 | |
| S.tYP | | **Sensor type selection** | 30 |
| | 30 | 0...20mA / 4...20mA ❶ | |
| | 31 | 0...50mA AC ❶ | |
| | 50 | Potentiometer ( 0...160 Ohm) ❶ | |
| | 51 | Potentiometer ( 0...450 Ohm) ❶ | |
| | 52 | Potentiometer ( 0...1600 Ohm) ❶ | |
| | 53 | Potentiometer ( 0...4500 Ohm) ❶ | |
| Corr | | **Measured value correction / scaling** | 0 |
| | 0 | Without scaling | |
| | 1 | Offset correction (at CAL level) | |
| | 2 | 2-point correction (at CAL level) | |
| | 3 | Scaling (at PArA level) | |
| InF | -1999...9999 | **Alternative value for error at INP2** | OFF |
| fAI2 | | **Forcing INP2** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | No forcing | |
| | 1 | Forcing via serial interface | |

## InP.3

| Name | Value range | Description | Default |
|---|---|---|---|
| I.Fnc | | **Function selection of INP3** | 1 |
| | 0 | no function (subsequent input data are skipped) | |
| | 1 | heating current input | |
| | 2 | External set-point SP.E (switch-over -> LOGI / SP.E ) | |
| | 3 | Yp input | |
| | 4 | Second process value X2 | |
| | 5 | External positioning value Y.E (switch-over → LOGI / Y.E ) | |
| | 6 | no controller input (e.g. transmitter input instead) | |
| | 7 | Process value x1 | |

| Name | Value range | Description | Default |
|---|---|---|---|
| S.tYP | | **Sensor type selection** | 30 |
| | 0 | thermocouple type L (-100...900°C) , Fe-CuNi DIN | |
| | 1 | thermocouple type J (-100...1200°C) , Fe-CuNi | |
| | 2 | thermocouple type K (-100...1350°C), NiCr-Ni | |
| | 3 | thermocouple type N (-100...1300°C), Nicrosil-Nisil | |
| | 4 | thermocouple type S (0...1760°C), PtRh-Pt10% | |
| | 5 | thermocouple type R (0...1760°C), PtRh-Pt13% | |
| | 6 | thermocouple type T (-200...400°C), Cu-CuNi | |
| | 7 | thermocouple type C (0...2315°C), W5%Re-W26%Re | |
| | 8 | thermocouple type D (0...2315°C), W3%Re-W25%Re | |
| | 9 | thermocouple type E (-100...1000°C), NiCr-CuNi | |
| | 10 | thermocouple type B (0/100...1820°C), PtRh-Pt6% | |
| | 18 | special thermocouple | |
| | 20 | Pt100 (-200.0 ... 100,0 °C) | |
| | 21 | Pt100 (-200.0 ... 850,0 °C) | |
| | 22 | Pt1000 (-200.0 ... 850.0 °C) | |
| | 23 | special 0...4500 Ohm (preset to KTY11-6) | |
| | 24 | special 0...450 Ohm | |
| | 30 | 0...20mA / 4...20mA ❶ | |
| | 41 | special -2,5...115 mV ❶ | |
| | 42 | special -25...115 0mV ❶ | |
| | 50 | potentiometer 0...160 Ohm ❶ | |
| | 51 | potentiometer 0...450 Ohm ❶ | |
| | 52 | potentiometer 0...1600 Ohm ❶ | |
| | 53 | potentiometer 0...4500 Ohm ❶ | |
| S.Lin | | **Linearization**<br>**(only at S.tYP = 23,24,30,41 and 42 adjustable)** | 0 |
| | 0 | none | |
| | 1 | Linearization to specification. Creation of linearization table with 8800/8840 Configurator (engineering tool) possible. The characteristic for KTY 11-6 temperature sensors is preset. | |
| Corr | | **Measured value correction / scaling**<br>**(only at S.tYP = 23,24,30,41 and 42 adjustable)** | 0 |
| | 0 | Without scaling | |
| | 1 | Offset correction (at CAL level) | |
| | 2 | 2-point correction (at CAL level) | |
| | 3 | Scaling (at PArA level) | |
| I.nF | -1999...9999 | **Alternative value for error at INP3** | OFF |
| fAI3 | | **Forcing INP3** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | No forcing | |
| | 1 | Forcing via serial interface | |

❶ with current and voltage input signals, scaling is required (see chapter 5.3)

## Lim

| Name | Value range | Description | Default |
|---|---|---|---|
| Fnc.1 | | **Function of limit 1** | 1 |
| | 0 | switched off | |
| | 1 | measured value monitoring | |
| | 2 | Measured value monitoring + alarm status storage. A stored limit value can be reset via error list, F-key, -key or a digital input ( -> LOGI / Err.r ) | |
| | 3 | signal change (change/minute) | |
| | 4 | signal change and storage (change/minute) | |
| Src.1 | | **Source of imit 1** | 1 |
| | 0 | process value | |
| | 1 | control deviation xw (process value - set-point) | |
| | 2 | control deviation xw (with suppression after start-up and set-point change)<br><br>After switch-on or set-point changing, the alarm output is suppressed, until the process value is within the limits for the first time. At the latest after elapse of time 10 ti1 the alarm is activated (ti1 = integral time 1; parameter → Cntr )<br>If ti1 is switched off (ti1 = 0), this is interpreted as ∞ , i.e. the alarm is not activated, before the process value was within the limits once. | |
| | 3 | measured value INP1 | |
| | 4 | measured value INP2 | |
| | 5 | measured value INP3 | |
| | 6 | effective setpoint Weff | |
| | 7 | correcting variable y (controller output) | |
| | 8 | control variable deviation xw (actual value - internal setpoint) = deviation alarm to internal setpoint | |
| | 9 | difference x1 - x2 (utilizable e.g. in combination with process value function “mean value” for recognizing aged thermocouples | |
| Fnc.2 | | **Function of limit 2** | 0 |
| | 0 | switched off | |
| | 1 | measured value monitoring | |
| | 2 | Measured value monitoring + alarm status storage. A stored limit value can be reset via error list, F-key, -key or a digital input ( -> LOGI / Err.r ) | |
| | 3 | signal change (change/minute) | |
| | 4 | signal change and storage (change/minute) | |

| Name | Value range | Description | Default |
|---|---|---|---|
| Src.2 | | **Source of limit 2** | 0 |
| | 0 | process value | |
| | 1 | control deviation xw (process value - set-point) | |
| | 2 | control deviation xw (with suppression after start-up and set-point change)<br><br>After switch-on or set-point changing, the alarm output is suppressed, until the process value is within the limits for the first time. At the latest after elapse of time 10 t i1 the alarm is activated (Ct i1 = integral time 1; parameter → Cntr ) If t i1 is switched off (t i1 = 0), this is interpreted as ∞ , i.e. the alarm is not activated, before the process value was within the limits once. | |
| | 3 | measured value INP1 | |
| | 4 | measured value INP2 | |
| | 5 | measured value INP3 | |
| | 6 | effective setpoint Weff | |
| | 7 | correcting variable y (controller output) | |
| | 8 | control variable deviation xw (actual value - internal setpoint) = deviation alarm to internal setpoint | |
| | 9 | difference x1 - x2 (utilizable e.g. in combination with process value function "mean value" for recognizing aged thermocouples | |
| Fnc.3 | | **Function of limit 3** | 0 |
| | 0 | switched off | |
| | 1 | measured value monitoring | |
| | 2 | Measured value monitoring + alarm status storage. A stored limit value can be reset via error list, [F]-key, [key]-key or a digital input ( -> LOGI / Err.r ) | |
| | 3 | signal change (change/minute) | |
| | 4 | signal change and storage (change/minute) | |
| Src.3 | | **Source of limit 3** | 0 |
| | 0 | process value | |
| | 1 | control deviation xw (process value - set-point) | |
| | 2 | control deviation xw (with suppression after start-up and set-point change)<br><br>After switch-on or set-point changing, the alarm output is suppressed, until the process value is within the limits for the first time. At the latest after elapse of time 10 t i1 the alarm is activated (Ct i1 = integral time 1; parameter → Cntr ) If t i1 is switched off (t i1 = 0), this is interpreted as ∞ , i.e. the alarm is not activated, before the process value was within the limits once. | |
| | 3 | measured value INP1 | |
| | 4 | measured value INP2 | |
| | 5 | measured value INP3 | |
| | 6 | effective setpoint Weff | |
| | 7 | correcting variable y (controller output) | |
| | 8 | control variable deviation xw (actual value - internal setpoint) = deviation alarm to internal setpoint | |
| | 9 | difference x1 - x2 (utilizable e.g. in combination with process value function "mean value" for recognizing aged thermocouples | |

| Name | Value range | Description | Default |
|---|---|---|---|
| HC.AL | | **Alarm heat current function (INP2)** | 0 |
| | 0 | switched off | |
| | 1 | Overload short circuit monitoring | |
| | 2 | Break and short circuit monitoring | |
| LP.AL | | **Monitoring of control loop interruption for heating** | 0 |
| | 0 | switched off / inactive | |
| | 1 | active.<br>If ti1=0 LOOP alarm is inactive! | |
| Hour | OFF...999999 | **Operating hours** (only visible with 8800/8840 Configurator!) | OFF |
| Swit | OFF...999999 | **Output switching cycles** (only visible with 8800/8840 Configurator!) | OFF |

## Out.1

| Name | Value range | Description | Default |
|---|---|---|---|
| O.Act | | **Method of operation of output OUT1** | 0 |
| | 0 | direct / normally open | |
| | 1 | inverse / normally closed | |
| Y.1 | | **Controller output Y1** | 1 |
| | 0 | not active | |
| | 1 | active | |
| Y.2 | | **Controller output Y2** | 0 |
| | 0 | not active | |
| | 1 | active | |
| Lim.1 | | **Limit 1 signal** | 0 |
| | 0 | not active | |
| | 1 | active | |
| Lim.2 | | **Limit 2 signal** | 0 |
| | 0 | not active | |
| | 1 | active | |
| Lim.3 | | **Limit 3 signal** | 0 |
| | 0 | not active | |
| | 1 | active | |
| LP.AL | | **Interruption alarm signal (LOOP)** | 0 |
| | 0 | not active | |
| | 1 | active | |
| HC.AL | | **Heat current alarm signal** | 0 |
| | 0 | not active | |
| | 1 | active | |
| HC.SC | | **Solid state relay (SSR) short circuit signal** | 0 |
| | 0 | not active | |
| | 1 | active | |
| P.End | | **Message "Programm end"** | 0 |
| | 0 | not active | |
| | 1 | active | |
| FAi.1 | | **INP1 error signal** | 0 |
| | 0 | not active | |
| | 1 | active | |

| Name | Value range | Description | Default |
|---|---|---|---|
| FAi.2 | | **INP2 error signal** | 0 |
| | 0 | not active | |
| | 1 | active | |
| FAi.3 | | **INP3 error signal** | 0 |
| | 0 | not active | |
| | 1 | active | |
| PrG.1 | | **Programmer Control track 1** | |
| | 0 | not active | |
| | 1 | active | |
| PrG.2 | | **Programmer Control track 2** | |
| | 0 | not active | |
| | 1 | active | |
| PrG.3 | | **Programmer Control track 3** | |
| | 0 | not active | |
| | 1 | active | |
| PrG.4 | | **Programmer Control track 4** | |
| | 0 | not active | |
| | 1 | active | |
| CALL | | **Operator call** | |
| | 0 | not active | |
| | 1 | active | |
| fOut | | **Forcing OUT1** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | No forcing | |
| | 1 | Forcing via serial interface | |

## Out.2

Configuration parameters Out.2 as Out.1 except for: Default Y.1 = 0 Y.2 = 1

## Out.3

| Name | Value range | Description | Default |
|---|---|---|---|
| O.tYP | | **Signal type selection OUT3** | 0 |
| | 0 | relay / logic (only visible with current/logic voltage) | |
| | 1 | 0 ... 20 mA continuous (only visible with current/logic/voltage) | |
| | 2 | 4 ... 20 mA continuous (only visible with current/logic/voltage) | |
| | 3 | 0...10 V continuous (only visible with current/logic/voltage) | |
| | 4 | 2...10 V continuous (only visible with current/logic/voltage) | |
| | 5 | transmitter supply (only visible without OPTION) | |
| O.Act | | **Method of operation of output OUT3 (only visible when O.TYP=0)** | 1 |
| | 0 | direct / normally open | |
| | 1 | inverse / normally closed | |
| Y.1 | | **Controller output Y1 (only visible when O.TYP=0)** | 0 |
| | 0 | not active | |
| | 1 | active | |

| Name | Value range | Description | Default |
|---|---|---|---|
| Y.2 | | **Controller output Y2 (only visible when O.TYP=0)** | 0 |
| | 0 | not active | |
| | 1 | active | |
| L in.1 | | **Limit 1 signal (only visible when O.TYP=0)** | 1 |
| | 0 | not active | |
| | 1 | active | |
| L in.2 | | **Limit 2 signal (only visible when O.TYP=0)** | 0 |
| | 0 | not active | |
| | 1 | active | |
| L in.3 | | **Limit 3 signal (only visible when O.TYP=0)** | 0 |
| | 0 | not active | |
| | 1 | active | |
| LP.AL | | **Interruption alarm signal (LOOP) (only visible when O.TYP=0)** | 0 |
| | 0 | not active | |
| | 1 | active | |
| HC.AL | | **Heating current alarm signal (only visible when O.TYP=0)** | 0 |
| | 0 | not active | |
| | 1 | active | |
| HC.SC | | **Solid state relay (SSR) short circuit signal (only visible when O.TYP=0)** | 0 |
| | 0 | not active | |
| | 1 | active | |
| P.End | | **Message "Programm end"** | 0 |
| | 0 | not active | |
| | 1 | active | |
| FA i.1 | | **INP1 error (only visible when O.TYP=0)** | 0 |
| | 0 | not active | |
| | 1 | active | |
| FA i.2 | | **INP2 error (only visible when O.TYP=0)** | 0 |
| | 0 | not active | |
| | 1 | active | |
| FA i.3 | | **INP3 error (only visible when O.TYP=0)** | 0 |
| | 0 | not active | |
| | 1 | aktiv | |
| PrG.1 | | **Programmer Control track 1** | 0 |
| | 0 | not active | |
| | 1 | active | |
| PrG.2 | | **Programmer Control track 2** | 0 |
| | 0 | not active | |
| | 1 | active | |
| PrG.3 | | **Programmer Control track 3** | 0 |
| | 0 | not active | |
| | 1 | active | |
| PrG.4 | | **Programmer Control track 4** | 0 |
| | 0 | not active | |
| | 1 | active | |

| Name | Value range | Description | Default |
|---|---|---|---|
| CALL | | **Operator call** | 0 |
| | 0 | not active | |
| | 1 | active | |
| Out.0 | -1999...9999 | **Scaling of the analog output for 0% (0/4mA or 0/2V, only visible when O.TYP=1..5)** | 0 |
| Out.1 | -1999...9999 | **Scaling of the analog output for 100% (20mA or 10V, only visible when O.TYP=1..5)** | 100 |
| O.Src | | **Signal source of the analog output OUT3 (only visible when O.TYP=1..5)** | 1 |
| | 0 | not used | |
| | 1 | controller output y1 (continuous) | |
| | 2 | controller output y2 (continuous) | |
| | 3 | process value | |
| | 4 | effective set-point Weff | |
| | 5 | control deviation xw (process value - set-point) | |
| | 6 | measured value position feedback Yp | |
| | 7 | measured value INP1 | |
| | 8 | measured value INP2 | |
| | 9 | measured value INP3 | |
| fOut | | **Forcing OUT3** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | No forcing | |
| | 1 | Forcing via serial interface | |

## Out.4

Configuration parameters Out.4 as Out.3

## Out.5

Configuration parameters Out.2 as Out.1 except for: Default Y.1 = 0 Y.2 = 0

## Out.6

Configuration parameters Out.2 as Out.1 except for: Default Y.1 = 0 Y.2 = 0

**Method of operation and usage of output Out.1 to Out.6:**
Is more than one signal chosen active as source, those signals are OR-linked.

## LOGI

| Name | Value range | Description | Default |
|---|---|---|---|
| L-r | | **Local / Remote switching (Remote: adjusting of all values by front keys is blocked)** | 0 |
| | 0 | no function (switch-over via interface is possible) | |
| | 1 | always active | |
| | 2 | DI1 switches | |
| | 3 | DI2 switches (only visible with OPTION) | |
| | 4 | DI3 switches (only visible with OPTION) | |
| | 5 | F - key switches | |

| Name | Value range | Description | Default |
|---|---|---|---|
| SP.2 | | **Switching to second setpoint SP.2** | 0 |
| | 0 | no function (switch-over via interface is possible) | |
| | 2 | DI1 switches | |
| | 3 | DI2 switches (only visible with OPTION) | |
| | 4 | DI3 switches (only visible with OPTION) | |
| | 5 | [F] - key switches | |
| SP.E | | **Switching to external setpoint SP.E** | 0 |
| | 0 | no function (switch-over via interface is possible) | |
| | 1 | always active | |
| | 2 | DI1 switches | |
| | 3 | DI2 switches (only visible with OPTION) | |
| | 4 | DI3 switches (only visible with OPTION) | |
| | 5 | [F] - key switches | |
| Y2 | | **Y/Y2 switching** | 0 |
| | 0 | no function (switch-over via interface is possible) | |
| | 2 | DI1 switches | |
| | 3 | DI2 switches (only visible with OPTION) | |
| | 4 | DI3 switches (only visible with OPTION) | |
| | 5 | [F] - key switches | |
| | 6 | - key switches | |
| Y.E | | **Switching to fixed control output Y.E** | 0 |
| | 0 | no function (switch-over via interface is possible) | |
| | 1 | always activated (manual station) | |
| | 2 | DI1 switches | |
| | 3 | DI2 switches (only visible with OPTION) | |
| | 4 | DI3 switches (only visible with OPTION) | |
| | 5 | [F] - key switches | |
| | 6 | - key switches | |
| mAn | | **Automatic/manual switching** | 0 |
| | 0 | no function (switch-over via interface is possible) | |
| | 1 | always activated (manual station) | |
| | 2 | DI1 switches | |
| | 3 | DI2 switches (only visible with OPTION) | |
| | 4 | DI3 switches (only visible with OPTION) | |
| | 5 | [F] - key switches | |
| | 6 | - key switches | |
| C.oFF | | **Switching off the controller** | 0 |
| | 0 | no function (switch-over via interface is possible) | |
| | 2 | DI1 switches | |
| | 3 | DI2 switches (only visible with OPTION) | |
| | 4 | DI3 switches (only visible with OPTION) | |
| | 5 | [F] - key switches | |
| | 6 | - key switches | |

| Name | Value range | Description | Default |
|---|---|---|---|
| m.Loc | | **Blockage of hand function** | 0 |
| | 0 | no function (switch-over via interface is possible) | |
| | 2 | DI1 switches | |
| | 3 | DI2 switches (only visible with OPTION) | |
| | 4 | DI3 switches (only visible with OPTION) | |
| | 5 | [F] - key switches | |
| Err.r | | **Reset of all error list entries** | 0 |
| | 0 | no function (switch-over via interface is possible) | |
| | 2 | DI1 switches | |
| | 3 | DI2 switches (only visible with OPTION) | |
| | 4 | DI3 switches (only visible with OPTION) | |
| | 5 | [F] - key switches | |
| | 6 | - key switches | |
| Pid.2 | | **Switching of parameter set (Pb, ti, td)** | 0 |
| | 0 | no function (switch-over via interface is possible) | |
| | 2 | DI1 switches | |
| | 3 | DI2 switches (only visible with OPTION) | |
| | 4 | DI3 switches (only visible with OPTION) | |
| | 5 | [F] - key switches | |
| P.run | | **Programmer-Run/Stop (see Page 68)** | 0 |
| | 0 | no function | |
| | 2 | DI1 switches | |
| | 3 | DI2 switches (only visible with OPTION) | |
| | 4 | DI3 switches (only visible with OPTION) | |
| P.oFF | | **Programmer off. Internal set-point is effective (see Page 68)** | 0 |
| | 0 | no function | |
| | 2 | DI1 switches | |
| | 3 | DI2 switches (only visible with OPTION) | |
| | 4 | DI3 switches (only visible with OPTION) | |
| I.ChG | | **Switching of the actual process value between Inp1 and X2** | 0 |
| | 0 | no function (switch-over via interface is possible) | |
| | 2 | DI1 switches | |
| | 3 | DI2 switches (only visible with OPTION) | |
| | 4 | DI3 switches (only visible with OPTION) | |
| | 5 | [F] - key switches | |
| di.Fn | | **Function of digital inputs (valid for all inputs)** | 0 |
| | 0 | direct | |
| | 1 | inverse | |
| | 2 | toggle key function | |
| fDI1 | | **Forcing di1** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | No forcing | |
| | 1 | Forcing via serial interface | |
| fDI2 | | **Forcing di2** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | No forcing | |
| | 1 | Forcing via serial interface | |

| Name | Value range | Description | Default |
|---|---|---|---|
| fDI3 | | **Forcing di3** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | No forcing | |
| | 1 | Forcing via serial interface | |

## othr

| Name | Value range | Description | Default |
|---|---|---|---|
| bAud | | **Baudrate of the interface (only visible with OPTION)** | 2 |
| | 0 | 2400 Baud | |
| | 1 | 4800 Baud | |
| | 2 | 9600 Baud | |
| | 3 | 19200 Baud | |
| Addr | 1...247 | **Address on the interace (only visible with OPTION)** | 1 |
| PrtY | | **Data parity on the interface (only visible with OPTION)** | 1 |
| | 0 | no parity (2 stop bits) | |
| | 1 | even parity | |
| | 2 | odd parity | |
| | 3 | no parity (1 stopbit) | |
| dELY | 0...200 | **Delay of response signal [ms] (only visible with OPTION)** | 0 |
| Unit | | **Unit** | 1 |
| | 0 | without unit | |
| | 1 | °C | |
| | 2 | °F | |
| dP | | **Decimal point (max. number of digits behind the decimal point)** | 0 |
| | 0 | no digit behind the decimal point | |
| | 1 | 1 digit behind the decimal point | |
| | 2 | 2 digits behind the decimal point | |
| | 3 | 3 digits behind the decimal point | |
| LEd | | **Function allocation of status LEDs 1 / 2 / 3 / 4** | 0 |
| | 10 | OUT1, OUT2, OUT3, OUT4 | |
| | 11 | Heating, alarm 1, alarm 2, alarm 3 | |
| | 12 | Heating, cooling, alarm 1, alarm 2 | |
| | 13 | Cooling, heating, alarm 1, alarm 2 | |
| | 14 | Bus error | |
| | 20 | Y1, Y2, track1, track2 | |
| | 21 | Y2, Y1, track1, track2 | |
| | 22 | track1, track2, track3, track4 | |
| diSP | 0...10 | **Display luminosity** | 5 |
| C.dEL | 0..200 | **Modem delay [ms]** Additional delay time, before the received message is evaluated in the Modbus. This time is required, unless messages are transferred continuously during modem transmission. | 0 |
| dP.Ad | 0...126 | **Profibus address** | 126 |
| bc.uP | | **Behaviour as backup controller** | 0 |
| | 0 | No backup functionality | |
| | 1 | With backup functionality | |

| Name | Value range | Description | Default |
|---|---|---|---|
| FrEq | | **Switching 50 Hz / 60 Hz** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | 50 Hz | |
| | 1 | 60 Hz | |
| ICof | | **Block controller off** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | Released | |
| | 1 | Blocked | |
| IAda | | **Block auto tuning** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | Released | |
| | 1 | Blocked | |
| IExo | | **Block extended operating level** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | Released | |
| | 1 | Blocked | |
| ILat | | **Suppression error storage** | 0 |
| | 0 | Released | |
| | 1 | Blocked | |
| PTmp | | **Block temporary programm changes** | 0 |
| | 0 | Released | |
| | 1 | Blocked | |
| pPre | | **Block Preset to end and reset** | 0 |
| | 0 | Released | |
| | 1 | Blocked | |
| pRun | | **Block Run / Stop** | 0 |
| | 0 | Released | |
| | 1 | Blocked | |
| pSwi | | **Block switch-over to controller** | 0 |
| | 0 | Released | |
| | 1 | Blocked | |
| pCom | | Block general p rogram-parameter (b.Lo, b.Hi, d.00) | 0 |
| | 0 | Released | |
| | 1 | Blocked | |
| Pass | OFF...9999 | **Password** (only visible with 8800/8840 Configurator!) | OFF |
| IPar | | **Block parameter level** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | Released | |
| ICnf | | **Block configuration level** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | Released | |
| | 1 | Block | |
| ICal | | **Block calibration level** (only visible with 8800/8840 Configurator!) | 0 |
| | 0 | Released | |
| | 1 | Blocked | |

❶ with current and voltage input signals, scaling is required (see chapter 5.3)

| Name | Value range | Description | Default |
|---|---|---|---|
| CDis3 | | **Display 3 controller operating level** (only visible with 8800/8840 Configurator!) | 2 |
| | 0 | No value / only text | |
| | 1 | Display of value | |
| | 2 | Output value as bargraph | |
| | 3 | Control deviation as bargraph | |
| | 4 | Process value as bargraph | |
| TDis3 | 2...60 | **Display 3 display alternation time [s]** (only visible with 8800/8840 Configurator!) | 10 |
| PDis3 | | display 3 programmer-operating level | 0 |
| | 0 | Segm.-No., Segm.-Type, Progr.-remaining time | |
| | 1 | Segm.-No., Segm.-Type, Segm.-remaining time | |
| | 2 | Segm.-No., Segm.-Type, net-time | |
| | 3 | Segm.-No., Segm.-Type, Progr.-remaining time | |
| | 4 | Segm.-No., Segm.-Type, Segm.-remaining time | |
| | 5 | Segm.-No., Segm.-Type, net-time | |
| T.dis3 | 8 characters | **Text display 3** | |
| T.InF1 | 8 characters | **Text Inf.1** | |
| T.InF2 | 8 characters | **Text Inf.2** | |
| t.PrG01 | 8 characters | **Text Program 1** | |
| t.PrG02 | 8 characters | **Text Program 2** | |
| • • • | | | |
| t.PrG16 | 8 characters | **Text Program16** | |

**Lin** (only visible with 8800/8840 Configurator

| Name | Value range | Description | Default |
|---|---|---|---|
| Lin | | **Linearization for inputs INP1 or INP3**<br>Access to this table is always with selection special thermocouple for InP.1 or InP.3 or with setting S.Lin = 1: special linearization for linearization.<br>Default: KTY 11-6 (0...4,5 kOhm) | |
| In.1 | -999.0..99999 | **Input value 1**<br>The signal is in [µV] or in [Ω] dependent of input type | 1036 |
| Ou.1 | 0,001...9999 | **Output value 1**<br>Signal assigned to In.1 | -49,94 |
| In.2 | -999.0..99999 | **Input value 2**<br>The signal is in [µV] or in [Ω] dependent of input type | 1150 |
| Ou.2 | 0,001...9999 | **Output value 2**<br>Signal assigned to In.2 | -38,94 |
| ⋮ | ⋮ | ⋮ | ⋮ |
| In.16 | -999.0..99999 | **Input value 16**<br>The signal is in [µV] or in [Ω] dependent of input type | 4470 |
| Ou.16 | 0,001...9999 | **Output value 1** 6<br>Signal assigned to In.16 | 150,0 |

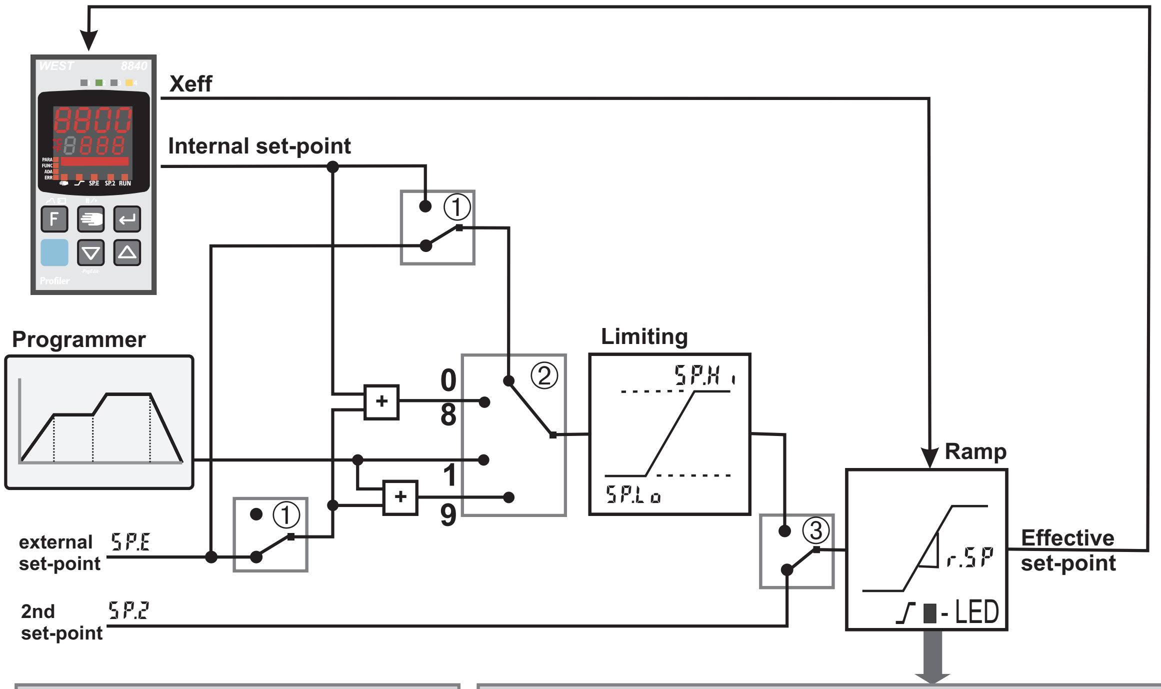
**Resetting the controller configuration to factory setting (Default)**
**→ chapter 12.1 (page 85)**

**8800/8840 Configurator - the engineering tool for the West controller series**
3 engineering tools with different functionality facilitating 8840 profiler configuration and parameter setting are available (see chapter 10: *Accessory equipment with ordering information*).
In addition to configuration and parameter setting, the engineering tools are used for data acquisition and offer long-term storage and print functions. The engineering tools are connected to the 8840 profiler via the front-panel interface by means of PC (Windows 95 / 98 / NT) and a PC adaptor.

Description 8800/8840 Configurator:
see chapter 9: *8800/8840 Configurator* (page 77).

## 4.4 *Set-point processing*

The set-point processing structure is shown in the following picture:




***Index:***
① : int/ext-setpoint switching
② : configuration SP.Fn
③ : SP / SP.2 switching

***The ramp starts at process value with the following switchings:***
- int / ext-setpoint switching
- SP / SP.2 switching
- Manual-/ Automatic switching
- at power on

### Set-point gradient / ramp

To prevent set-point step changes, parameter → set-point → r.SP can be adjusted to a maximum rate of change. This gradient is effective in positive and negative direction..

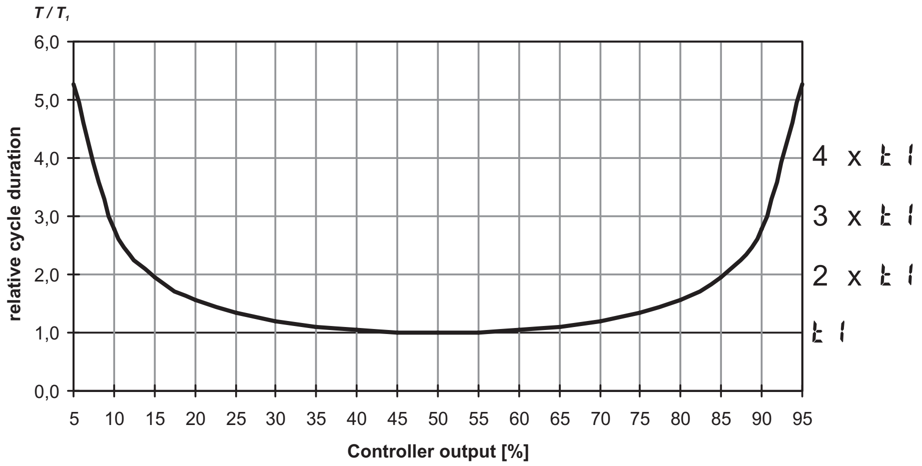
With parameter r.SP set to OFF (default), the gradient is switched off and set-point changes are realized directly.
(for parameter: see page 59 )

## 4.5 *8840 profiler cooling functions*

With the 8840 profiler , configuration parameter CYCL (ConF/Cntr/CYCL) can be used for matching the cycle time of 2-point and 3-point controllers. This can be done using the following 4 methods.

### *4.5.1* Standard (CYCL = 0 )

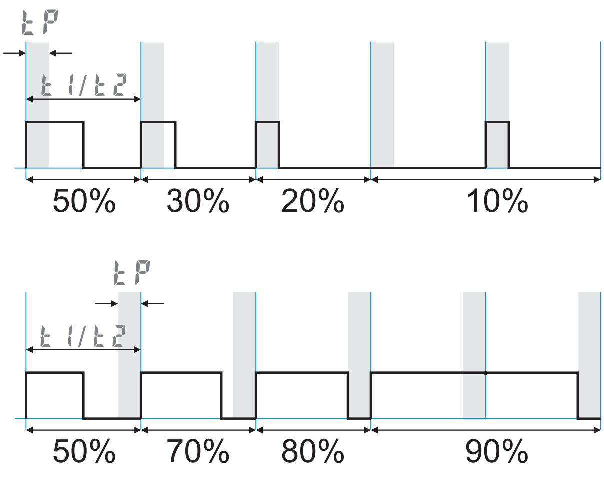
The adjusted cycle times t1 and t2 are valid for 50% or -50% correcting variable. With very small or very high values, the effective cycle time is extended to prevent unreasonably short on and off pulses. The shortest pulses result from ¼ x t1 or ¼ x t2. The characteristic curve is also called "bath tub curve"




***Parameters to be adjusted:*** t1 : min. cycle time 1 (heating) [s]
(PArA/Cntr) t2 : min. cycle time 2 (cooling) [s]

### *4.5.2* Heating and cooling with constant period (CYCL = 3 )

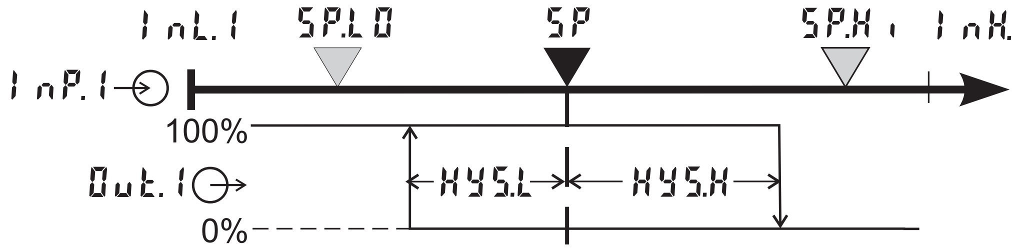
t1 and t2 are met in the overall output range . To prevent unreasonably short pulses, parameter tP is used for adjusting the shortest pulse duration. With small correcting values which require a pulse shorter than the value adjusted in tP, this pulse is suppressed. However, the controller stores the pulse and totalizes further pulses, until a pulse of duration tP can be output.




***Parameters to be adjusted:*** t1 : Min. cycle time 1 (heating) [s]
(PArA/Cntr) t2 : min. cycle time 2 (cooling) [s]
tP : min. pulse length [s]

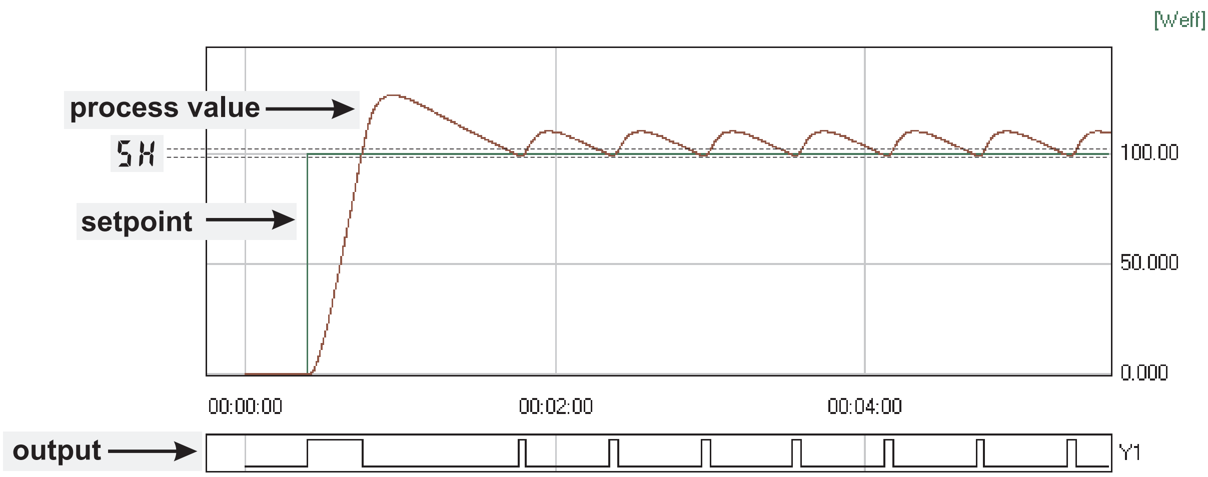
## 4.6 *Configuration examples*

### *4.6.1* On-Off controller / Signaller (inverse)

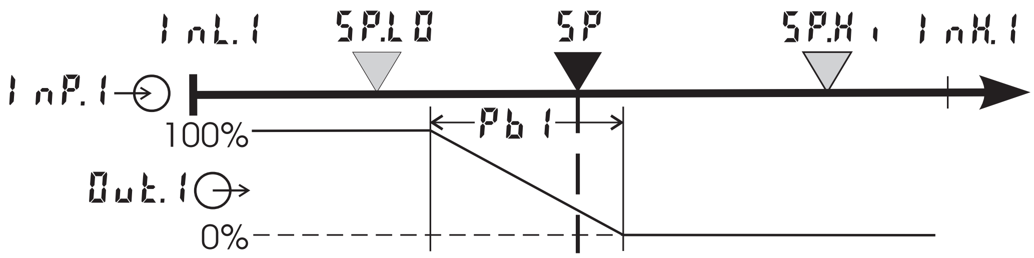



| | | | |
|---|---|---|---|
| ConF/Cntr: | SP.Fn | = 0 | set-point controller |
| | C.Fnc | = 0 | signaller with one output |
| | C.Act | = 0 | inverse action (e.g. Heating applications) |
| ConF/Out.1: | O.Act | = 0 | action Out.1 direct |
| | Y.1 | = 1 | control output Y1 active |
| PArA/Cntr: | HYSL | = 0...9999 | switching difference (below set-point) |
| PArA/Cntr: | HYSH | = 0...9999 | switching difference (above set-point) |
| PArA/SEtP: | SP.LO | = -1999...9999 | set-point limit low for Weff |
| | SP.Hi | = -1999...9999 | set-point limit high for Weff |

For direct signaller action, the controller action must be changed (ConF / Cntr / C.Act = 1 )

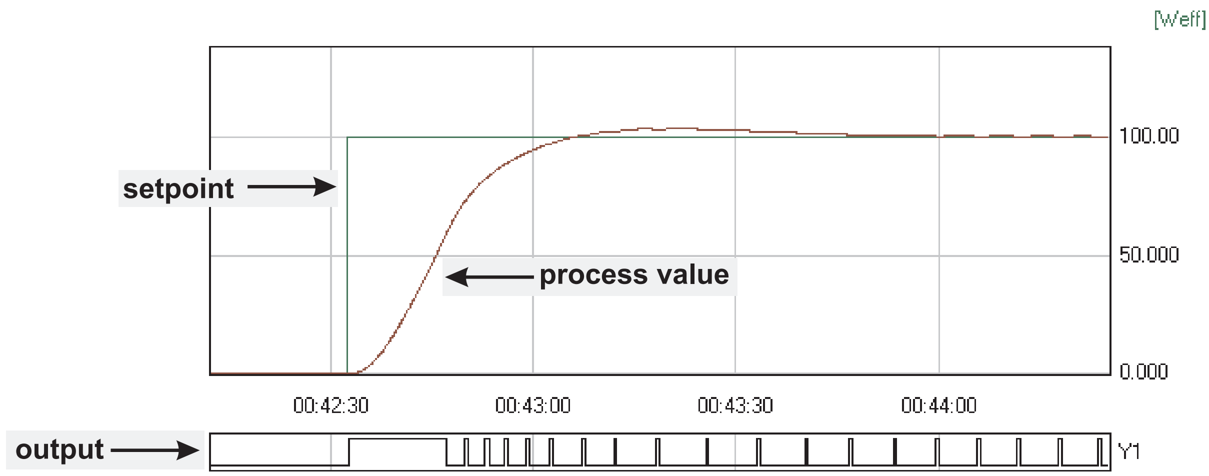


### *4.6.2* 2-point controller (inverse)

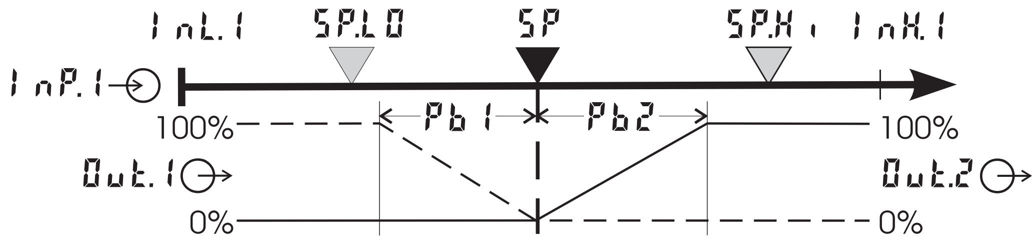



| | | | | |
|---|---|---|---|---|
| ConF / Cntr: | SP.Fn | = | 0 | set-point controller |
| | C.Fnc | = | 1 | 2-point controller (PID) |
| | C.Act | = | 0 | inverse action<br>(e.g. heating applications) |
| ConF / Out.1: | O.Act | = | 0 | action Out.1 direct |
| | Y.1 | = | 1 | control output Y1 active |
| PArA / Cntr: | Pb1 | = | 1...9999 | proportional band 1 (heating)<br>in units of phys. quantity (e.g. °C) |
| | ti1 | = | 0,1...9999 | integral time 1 (heating) in sec. |
| | td1 | = | 0,1...9999 | derivative time 1 (heating) in sec. |
| | t1 | = | 0,4...9999 | min. cycle time 1 (heating) |
| PArA / SEtP: | SP.LO | = | -1999...9999 | set-point limit low for Weff |
| | SP.Hi | = | -1999...9999 | set-point limit high for Weff |

ⓘ For direct action, the controller action must be changed (ConF / Cntr / C.Act = 1).

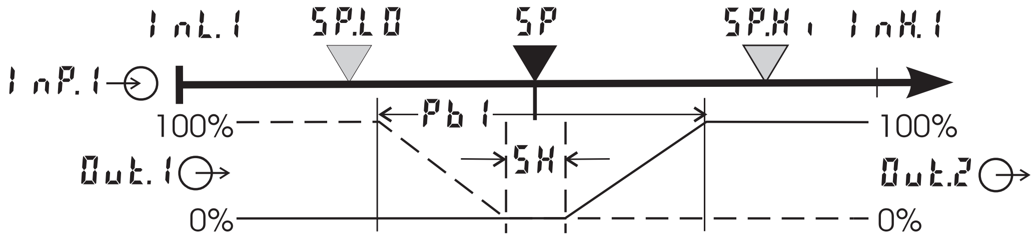


### *4.6.3* 3-point controller (relay & relay)



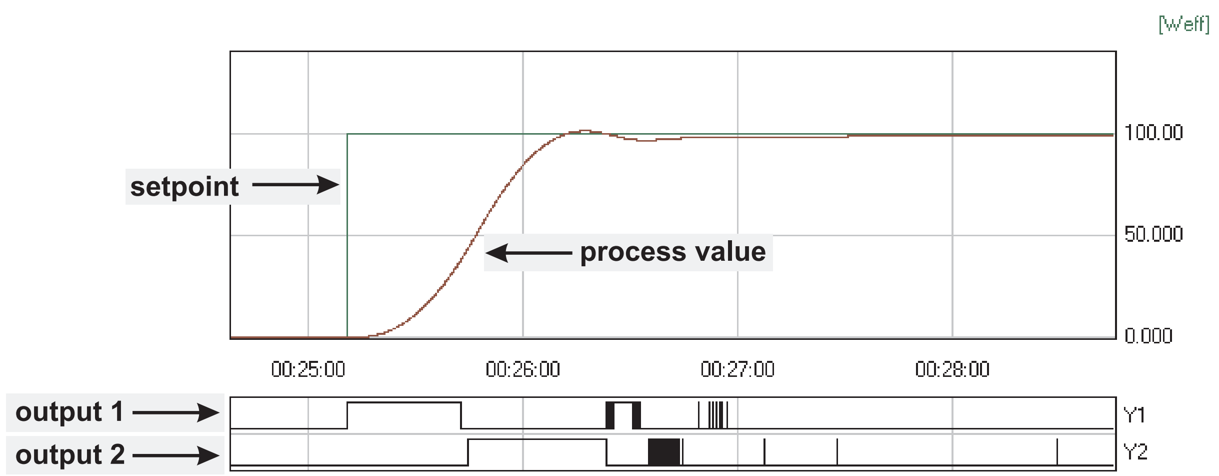

| | | | | |
|---|---|---|---|---|
| ConF / Cntr: | SP.Fn | = | 0 | set-point controller |
| | C.Fnc | = | 3 | 3-point controller (2xPID) |
| | C.Act | = | 0 | action inverse (e.g. heating applications) |
| ConF / Out.1: | O.Act | = | 0 | action Out.1 direct |
| | Y.1 | = | 1 | control output Y1 active |
| | Y.2 | = | 0 | control output Y2 not active |
| ConF / Out.2: | O.Act | = | 0 | action Out.2 direct |
| | Y.1 | = | 0 | control output Y1 not active |
| | Y.2 | = | 1 | control output Y2 active |
| PArA / Cntr: | Pb1 | = | 1...9999 | proportional band 1 (heating) in units of phys. quantity (e.g. °C) |
| | Pb2 | = | 1...9999 | proportional band 2 (cooling) in units of phys. quantity (e.g. °C) |
| | ti1 | = | 0,1...9999 | integral time 1 (heating) in sec. |
| | ti2 | = | 0,1...9999 | derivative time 2 (cooling) in sec. |
| | td1 | = | 0,1...9999 | integral time 1 (heating) in sec. |
| | td2 | = | 0,1...9999 | derivative time 2 (cooling) in sec. |
| | t1 | = | 0,4...9999 | min. cycle time 1 (heating) |
| | t2 | = | 0,4...9999 | min. cycle time 2 (cooling) |
| | SH | = | 0...9999 | neutr. zone in units of phys.quantity |
| PArA / SEtP: | SP.LO | = | -1999...9999 | set-point limit low for Weff |
| | SP.Hi | = | -1999...9999 | set-point limit high for Weff |

### *4.6.4* 3-point stepping controller (relay & relay)

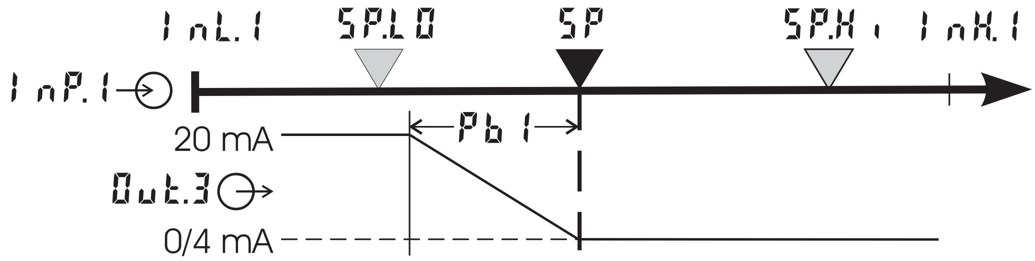



| | | | | |
|---|---|---|---|---|
| ConF / Cntr: | SP.Fn | = | 0 | set-point controller |
| | C.Fnc | = | 4 | 3-point stepping controller |
| | C.Act | = | 0 | inverse action (e.g. heating applications) |
| ConF / Out.1: | O.Act | = | 0 | action Out.1 direct |
| | Y.1 | = | 1 | control output Y1 active |
| | Y.2 | = | 0 | control output Y2 not active |
| ConF / Out.2: | O.Act | = | 0 | action Out.2 direct |
| | Y.1 | = | 0 | control output Y1 not active |
| | Y.2 | = | 1 | control output Y2 active |
| PArA / Cntr: | Pb1 | = | 1...9999 | proportional band 1 (heating) in units of phys. quantity (e.g. °C) |
| | ti1 | = | 0,1...9999 | integral time 1 (heating) in sec. |
| | td1 | = | 0,1...9999 | derivative time 1 (heating) in sec. |
| | t1 | = | 0,4...9999 | min. cycle time 1 (heating) |
| | SH | = | 0...9999 | neutral zone in units of phy. quantity |
| | tP | = | 0,1...9999 | min. pulse length in sec. |
| | tt | = | 3...9999 | actuator travel time in sec. |
| PArA / SEtP: | SP.LO | = | -1999...9999 | set-point limit low for Weff |
| | SP.Hi | = | -1999...9999 | set-point limit high for Weff |

ⓘ For direct action of the 3-point stepping controller, the controller output action must be changed ( ConF / Cntr / C.Act = 1 ).



## *4.6.5* Continuous controller (inverse)

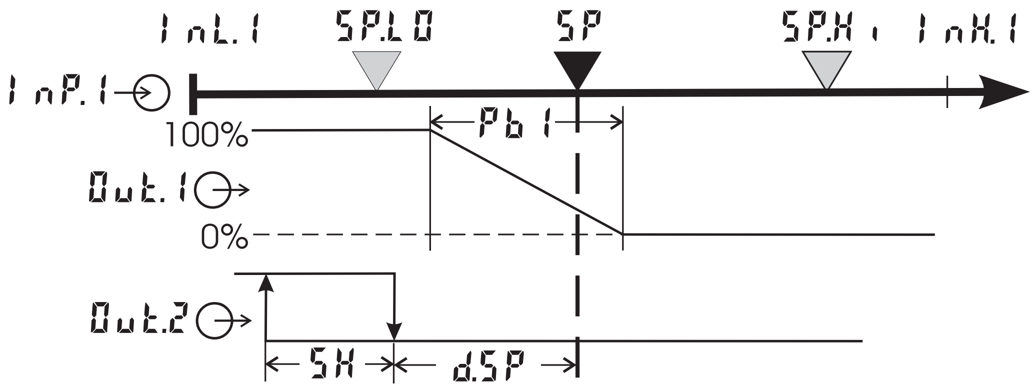



| | | | | |
|---|---|---|---|---|
| ConF / Cntr: | SP.Fn | = | 0 | set-point controller |
| | C.Fnc | = | 1 | continuous controller (PID) |
| | C.Act | = | 0 | inverse action (e.g. heating applications) |
| ConF / Out.3: | O.tYP | = | 1 / 2 | Out.3 type ( 0/4 … 20mA ) |
| | Out.0 | = | -1999...9999 | scaling analog output 0/4mA |
| | Out.1 | = | -1999...9999 | scaling analog output 20mA |
| PArA / Cntr: | Pb1 | = | 1...9999 | proportional band 1 (heating) in units of phys. quantity (e.g. °C) |
| | ti1 | = | 0,1...9999 | integral time 1 (heating) in sec. |
| | td1 | = | 0,1...9999 | derivative time 1 (heating) in sec. |
| | t1 | = | 0,4...9999 | min. cycle time 1 (heating) |
| PArA / SEtP: | SP.LO | = | -1999...9999 | set-point limit low for Weff |
| | SP.Hi | = | -1999...9999 | set-point limit high for Weff |

For direct action of the continuous controller, the controller action must be changed ( ConF / Cntr / C.Act = 1 ).

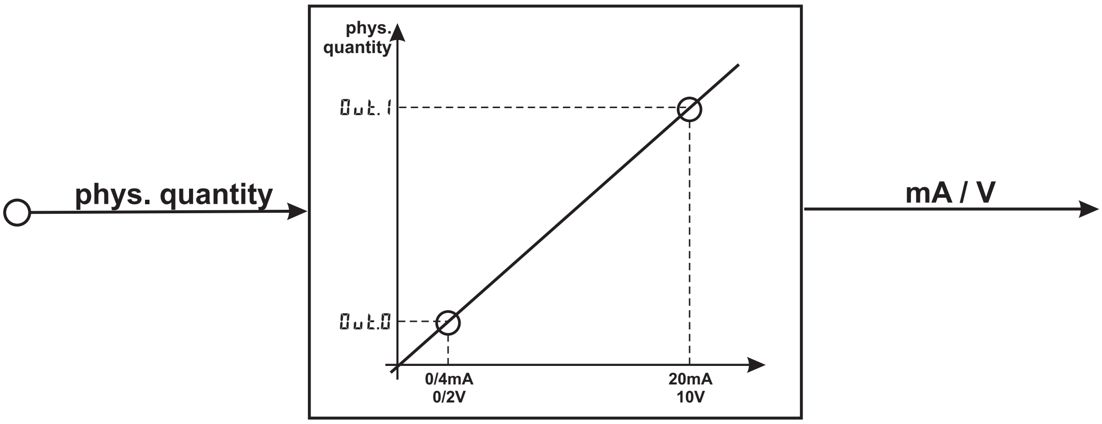
To prevent control outputs Out.1 and Out.2 of the continuous controller from switching simultaneously, the control function of outputs Out.1 and Out.2 must be switched off ( ConF / Out.1 and Out.2 / Y.1 and Y.2 = 0 ).

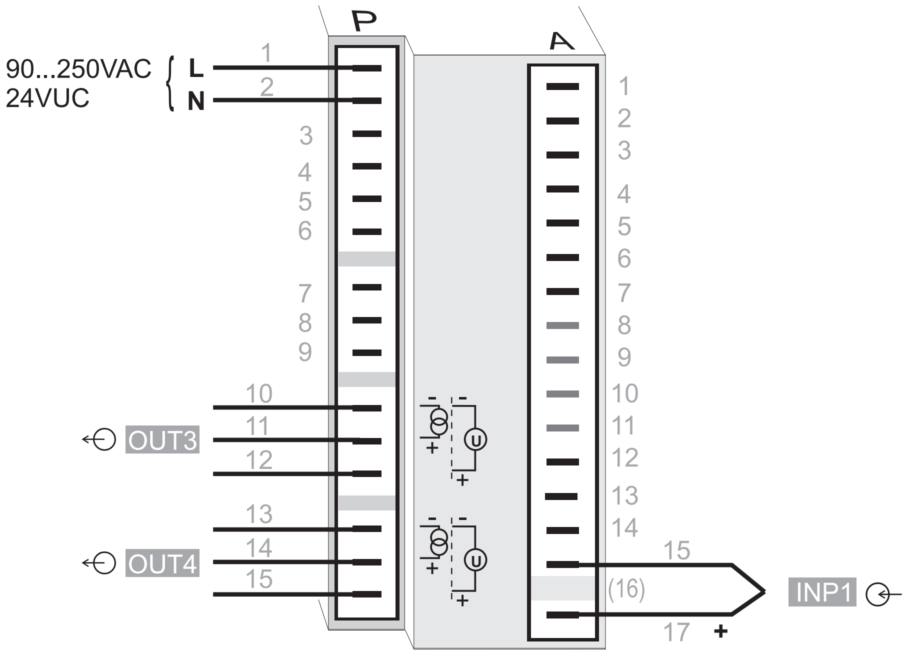
### *4.6.6* Δ - Y - Off controller / 2-point controller with pre-contact




| | | | | |
|---|---|---|---|---|
| ConF / Cntr: | SP.Fn | = | 0 | set-point controller |
| | C.Fnc | = | 2 | Δ -Y-Off controller |
| | C.Act | = | 0 | inverse action (e.g. heating applications) |
| ConF / Out.1: | O.Act | = | 0 | action Out.1 direct |
| | Y.1 | = | 1 | control output Y1 active |
| | Y.2 | = | 0 | control output Y2 not active |
| ConF / Out.2: | O.Act | = | 0 | action Out.2 direct |
| | Y.1 | = | 0 | control output Y1 not active |
| | Y.2 | = | 1 | control output Y2 active |
| PArA / Cntr: | Pb1 | = | 1...9999 | proportional band 1 (heating) in units of phys. quantity (e.g. °C) |
| | ti1 | = | 0,1...9999 | integral time 1 (heating) in sec. |
| | td1 | = | 0,1...9999 | derivative time 1 (heating) in sec. |
| | t1 | = | 0,4...9999 | min. cycle time 1 (heating) |
| | SH | = | 0...9999 | switching difference |
| | d.SP | = | -1999...9999 | trigg. point separation suppl. cont. Δ / Y / Off in units of phys. quantity |
| PArA / SEtP: | SP.LO | = | -1999...9999 | set-point limit low for Weff |
| | SP.Hi | = | -1999...9999 | set-point limit high for Weff |

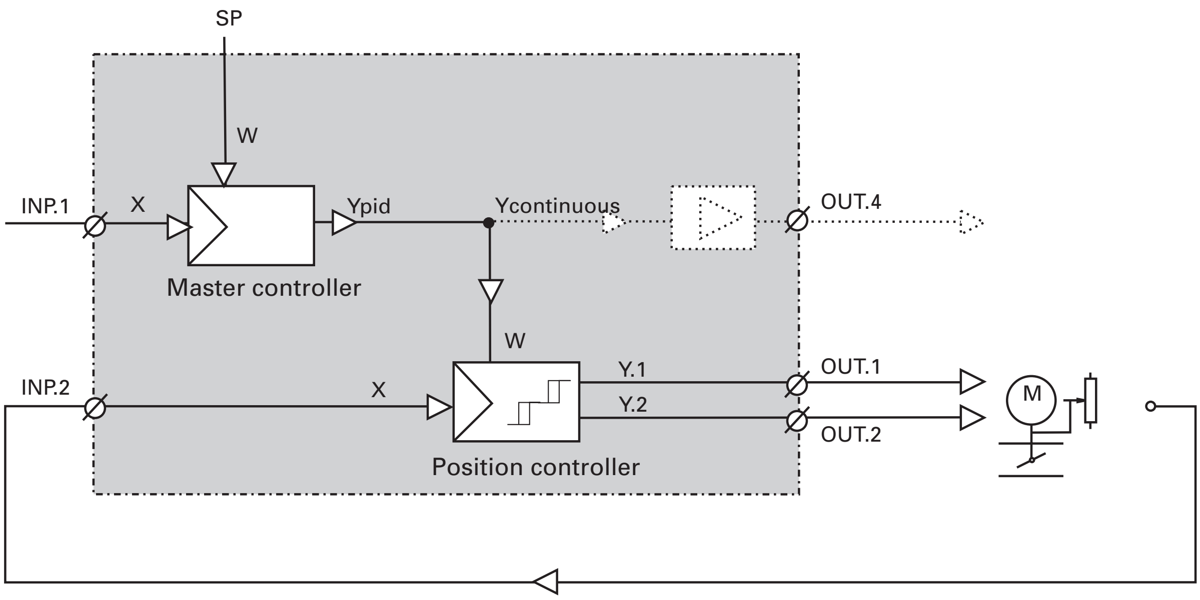
### *4.6.7* 8840 profiler with measured value output




| | | | |
|---|---|---|---|
| ConF / Out.3 / 4: O.tYP | = | 1 | Out.3 / 4 0...20mA continuous |
| | = | 2 | Out.3 / 4 4...20mA continuous |
| | = | 3 | Out.3 / 4 0...10V continuous |
| | = | 4 | Out.3 / 4 2...10V continuous |
| Out.0 | = | -1999...9999 | scaling Out.3 / 4 for 0/4mA or 0/2V |
| Out.1 | = | -1999...9999 | scaling Out.3 / 4 for 20mA or 10V |
| O.Src | = | 3 | signal source for Out.3 / 4 is the process value |

### *4.6.8* Continuous controller with integrated positioner ( Cntr / C.Fnc = 6 )




This is basically a cascade. A tracking controller with three-point stepping behaviour which operates with Yp as process value (INP.2 / INP.3) is used with the continuous controller.

| | | | |
|---|---|---|---|
| ConF / Cntr | SP.Fn | = 0 | Setpoint controller |
| | C.Fnc | = 6 | Continuous controller with integrated positioner |
| | C.Act | = 0 | Direction of operation invers (e.g. heating) |
| ConF / InP.2: | I.Fnc | = 3 | Position featback Yp |
| | S.tYP | = 50 | Sensor e.g. potentiometer 0..160 Ω |
| ConF / Out.1: | O.Act | = 0 | Direction of operation Out.1 direct |
| | Y.1 | = 1 | Controller output Y1 activ |
| | Y.2 | = 0 | Controller output Y2 not activ |
| ConF / Out.2: | O.Act | = 0 | Direction of operation Out.2 direct |
| | Y.1 | = 0 | Controller output Y1 not activ |
| | Y.2 | = 1 | Controller output Y2 activ |
| PArA / Cntr: | Pb1 | = 0,1...9999 | Proportional band 1 (heating) in phys. units (e.g. °C) |
| | ti1 | = 1...9999 | Integral action time 1 (heating) in sec. |
| | td1 | = 1...9999 | Derivative action time t 1 (heating) in sec. |
| | t1 | = 0,4...9999 | Minimal cycle time 1 (heating) |
| | SH | = 0...9999 | Neutral zone in phys. units (e.g.°C) |

# 5 Parameter setting level

## 5.1 *Parameter survey*

**PArA Parameter setting level**

| CntR Control and self-tuning | PAr.2 2. set of parameters | SEtP Set-point and process value | InP.1 Input 1 | InP.2 Input 2 | InP.3 Input 3 | Lim Limit value functions | End |
|---|---|---|---|---|---|---|---|
| Pb1 | Pb12 | SP.Lo | InL.1 | InL.2 | InL.3 | L.1 | |
| Pb2 | Pb22 | SP.Hi | OuL.1 | OuL.2 | OuL.3 | H.1 | |
| ti1 | ti12 | SP.2 | InH.1 | InH.2 | InH.3 | HYS.1 | |
| ti2 | ti22 | r.SP | OuH.1 | OuH.2 | OuH.3 | dEL.1 | |
| td1 | td12 | | tF.1 | tF.2 | tF.3 | L.2 | |
| td2 | td22 | | E.tc | | E.tc | H.2 | |
| t1 | | | | | | HYS.2 | |
| t2 | | | | | | dEL.2 | |
| SH | | | | | | L.3 | |
| HYS.L | | | | | | H.3 | |
| HYS.H | | | | | | HYS.3 | |
| d.SP | | | | | | dEL.3 | |
| tP | | | | | | HC.A | |
| tt | | | | | | | |
| Y.Lo | | | | | | | |
| Y.Hi | | | | | | | |
| Y2 | | | | | | | |
| Y0 | | | | | | | |
| Ym.H | | | | | | | |
| L.Ym | | | | | | | |
| oFFS | | | | | | | |
| tEmP | | | | | | | |

**Adjustment:**

- The parameters can be adjusted by means of keys ▲▼
- Transition to the next parameter is by pressing key ↵
- After the last parameter of a group, donE is displayed, followed by automatic change to the next group.

**Return to the beginning of a group is by pressing the ↵ key for 3 sec. If for 30 sec. no keypress is excecuted the controler returns to the process value and setpoint display ( Time Out = 30 sec. )**

## 5.2 *Parameters*

### CntR

| Name | Value range | Description | Default |
|---|---|---|---|
| Pb1 | 1...9999 ❶ | Proportional band 1 (heating) in phys. dimensions (e.g. °C) | 100 |
| Pb2 | 1...9999 ❶ | Proportional band 2 (cooling) in phys. dimensions (e.g. °C) | 100 |
| ti1 | 0,1...9999 | Integral action time 1 (heating) [s] | 180 |
| ti2 | 0,1...9999 | Integral action time 2 (cooling) [s] | 180 |
| td1 | 0,1...9999 | Derivative action time 1 (heating) [s] | 180 |
| td2 | 0,1...9999 | Derivative action time 2 (cooling) [s] | 180 |
| t1 | 0,4...9999 | Minimal cycle time 1 (heating) [s]. The minimum impulse is 1/4 x t1 | 10 |
| t2 | 0,4...9999 | Minimal cycle time 2 (heating) [s]. The minimum impulse is 1/4 x t2 | 10 |
| SH | 0...9999 | Neutral zone or switching differential for on-off control [phys. dimensions) | 2 |
| HYS.L | 0...9999 | Switching difference Low signaller [engineering unit] | 1 |
| HYS.H | 0...9999 | Switching difference High signaller [engineering unit] | 1 |
| d.SP | -1999...9999 | Trigger point seperation for additional contact Δ / Y / Off [phys. dimensions] | 100 |
| tP | 0,1...9999 | Minimum impulse [s] | OFF |
| tt | 3...9999 | Motor travel time [s] | 60 |
| Y2 | -100...100 | 2. correcting variable | 0 |
| Y.Lo | -120...120 | Lower output limit [%] | 0 |
| Y.Hi | -120...120 | Upper output limit [%] | 100 |
| Y.0 | -100...100 | Working point for the correcting variable [%] | 0 |
| Ym.H | -100...100 | Limitation of the mean value Ym [%] | 5 |
| L.Ym | 0...9999 | Max. deviation xw at the start of mean value calculation [phys. dimensions] | 8 |
| oFFS | -120...120 | Zero offset | 0 |

### PAr.2 (second parameterset → 5.4)

| Name | Value range | Description | Default |
|---|---|---|---|
| Pb12 | 1...9999 ❶ | Proportional band 1 (heating) in phys. dimensions (e.g. °C), 2. parameter set | 100 |
| Pb22 | 1...9999 ❶ | Proportional band 2 (cooling) in phys. dimensions (e.g. °C), 2. parameter set | 100 |
| ti22 | 0,1...9999 | Integral action time 2 (cooling) [s], 2. parameter set | 180 |

❶ Valid for ConF / othr / dP = 0. With dP = 1 / 2 / 3 also 0,1 / 0,01 / 0,001 is possible.

| Name | Value range | Description | Default |
|---|---|---|---|
| ti12 | 0,1...9999 | Integral action time 1 (heating) [s], 2. parameter set | 180 |
| td12 | 0,1...9999 | Derivative action time 1 (heating) [s], 2. parameter set | 180 |
| td22 | 0,1...9999 | Derivative action time 2 (cooling) [s], 2. parameter set | 180 |

## SEtP

| Name | Value range | Description | Default |
|---|---|---|---|
| SP.LO | -1999...9999 | Set-point limit low for Weff | -100 |
| SP.Hi | -1999...9999 | Set-point limit high for Weff | 1200 |
| SP.2 | -1999...9999 | Set-point 2. | 0 |
| r.SP | 0...9999 | Set-point gradient [/min] | OFF |
| SP | -1999...9999 | Set-point (only visible with 8800/8840 Configurator!) | 0 |

SP.LO and SP.Hi should be within the limits of rnGH and rnGL see configuration → Controller page 18

## InP.1

| Name | Value range | Description | Default |
|---|---|---|---|
| InL.1 | -1999...9999 | Input value for the lower scaling point | 0 |
| OuL.1 | -1999...9999 | Displayed value for the lower scaling point | 0 |
| InH.1 | -1999...9999 | Input value for the upper scaling point | 20 |
| OuH.1 | -1999...9999 | Displayed value for the lower scaling point | 20 |
| t.F1 | 0,0...9999 | Filter time constant [s] | 0,5 |
| Etc.1 | 0...100 (°C)<br>32...212 (°F) | External cold-junction reference temperature (external TC) | OFF |

## InP.2

| Name | Value range | Description | Default |
|---|---|---|---|
| InL.2 | -1999...9999 | Input value for the lower scaling point | 0 |
| OuL.2 | -1999...9999 | Displayed value for the lower scaling point | 0 |
| InH.2 | -1999...9999 | Input value for the upper scaling point | 50 |
| OuH.2 | -1999...9999 | Displayed value for the upper scaling point | 50 |
| t.F2 | 0,0...999,9 | Filter time constant [s] | 0,5 |

## InP.3

| Name | Value range | Description | Default |
|---|---|---|---|
| InL.3 | -1999...9999 | Input value for the lower scaling point | 0 |
| OuL.3 | -1999...9999 | Displayed value for the lower scaling point | 0 |
| InH.3 | -1999...9999 | Input value for the upper scaling point | 20 |

❶ Valid for ConF / othr / dP = 0. With dP = 1 / 2 / 3 also 0,1 / 0,01 / 0,001 is possible.

| Name | Value range | Description | Default |
|---|---|---|---|
| OuH.3 | -1999...9999 | Displayed value for the upper scaling point | 20 |
| t.F 3 | 0,0...999,9 | Filter time constant [s] | 0,5 |
| Etc.3 | 0...100 (°C)<br>32...212 (°F | External cold-junction reference temperature (external TC) | OFF |

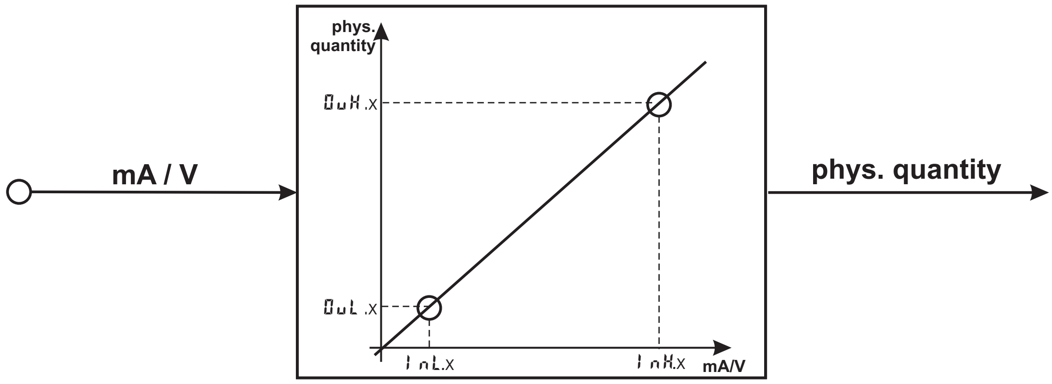
## Lim

| Name | Value range | Description | Default |
|---|---|---|---|
| L. 1 | -1999...9999 | Lower limit 1 | -10 |
| H. 1 | -1999...9999 | Upper limit 1 | 10 |
| HYS. 1 | 0...9999 | Hysteresis limit 1 | 1 |
| dEL. 1 | 0...9999 | Alarm delay from limit value 1 | 0 |
| L.2 | -1999...9999 | Lower limit 2 | OFF |
| H.2 | -1999...9999 | Upper limit 2 | OFF |
| HYS.2 | 0...9999 | Hysteresis limit 2 | 1 |
| dEL.2 | 0...9999 | Alarm delay from limit value 2 | 0 |
| L.3 | -1999...9999 | Lower limit 3 | OFF |
| H.3 | -1999...9999 | Upper limit 3 | OFF |
| HYS.3 | 0...9999 | Hysteresis limit 3 | 1 |
| dEL.3 | 0...9999 | Alarm delay from limit value 3 | 0 |
| HC.A | -1999...9999 | Heat current limit [A] | 50 |

**Resetting the controller configuration to factory setting (Default)**
**→ chapter 12.1 (page 85)**

## 5.3 *Input scaling*

When using current, voltage or resistance signals as input variables for InP.1, InP.2 or/and InP.3 scaling of input and display values at parameter setting level is required. Specification of the input value for lower and higher scaling point is in the relevant electrical unit (mA / V / Ω).




| S.tYP | Input signal | InL.x | OuL.x | InH.x | OuH.x |
|---|---|---|---|---|---|
| **30** (0...20mA) | **0 … 20 mA** | 0 | any | 20 | any |
| | **4 … 20 mA** | 4 | any | 20 | any |
| **40** (0...10V) | **0 … 10 V** | 0 | any | 10 | any |
| | **2 … 10 V** | 2 | any | 10 | any |

### *5.3.1* Input InP.1 and InP.3

Parameters InL.x , OuL.x, InH.x and OuH.x are only visible if ConF /InP.x / Corr = 3 is chosen.

In addition to these settings, InL.x and InH.x can be adjusted in the range (0...20mA / 0...10V / Ω) determined by selection of S.tYP .

For using the predetermined scaling with thermocouple and resistance thermometer (Pt100), the settings for InL.x and OuL.x and for InH.x and OuH.x must have the same value.

Input scaling changes at calibration level (→ page 62) are displayed by input scaling at parameter setting level. After calibration reset (OFF ), the scaling parameters are reset to default.

### *5.3.2* Input InP.2

| S.tYP | Input signal | InL.2 | OuL.2 | InH.2 | OuH.2 |
|---|---|---|---|---|---|
| **30** | **0 … 20 mA** | 0 | any | 20 | any |
| **31** | **0 … 50 mA** | 0 | any | 50 | any |

In addition to these settings, InL.2 and InH.2 can be adjusted in the range (0...20/ 50mA/Ω) determined by selection of S.tYP .

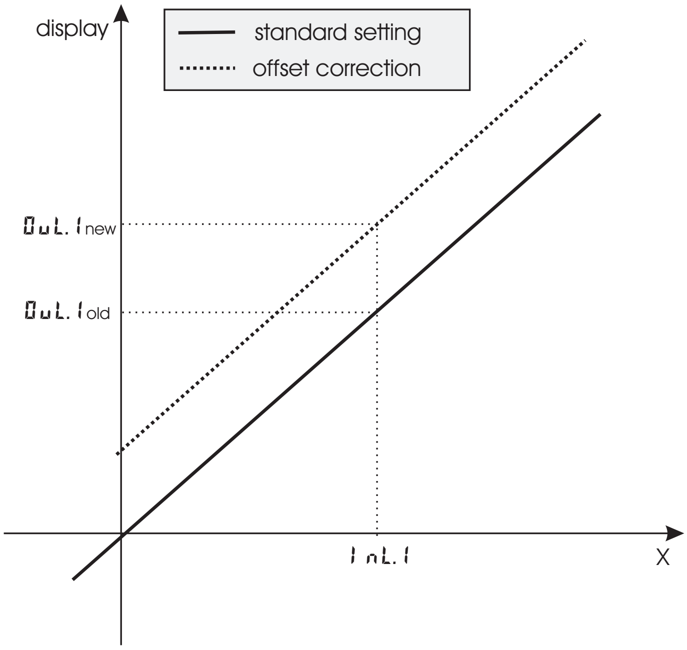
# 6 Calibration level

Measured value correction (CAL) is only visible if ConF / InP.1 / Corr = 1 or 2 is chosen.

The measured value can be matched in the calibration menu (CAL). Two methods are available:

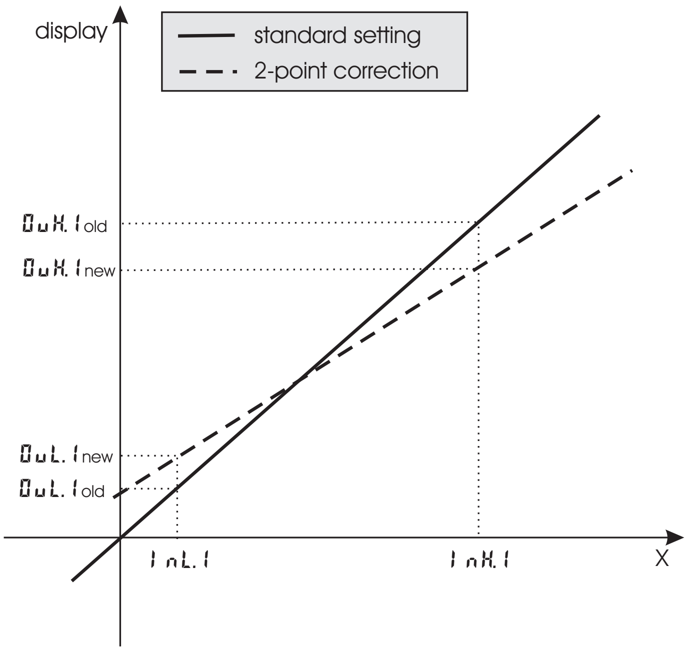
***Offset correction***
**(ConF / InP.1 / Corr = 1):**

- possible on-line at the process

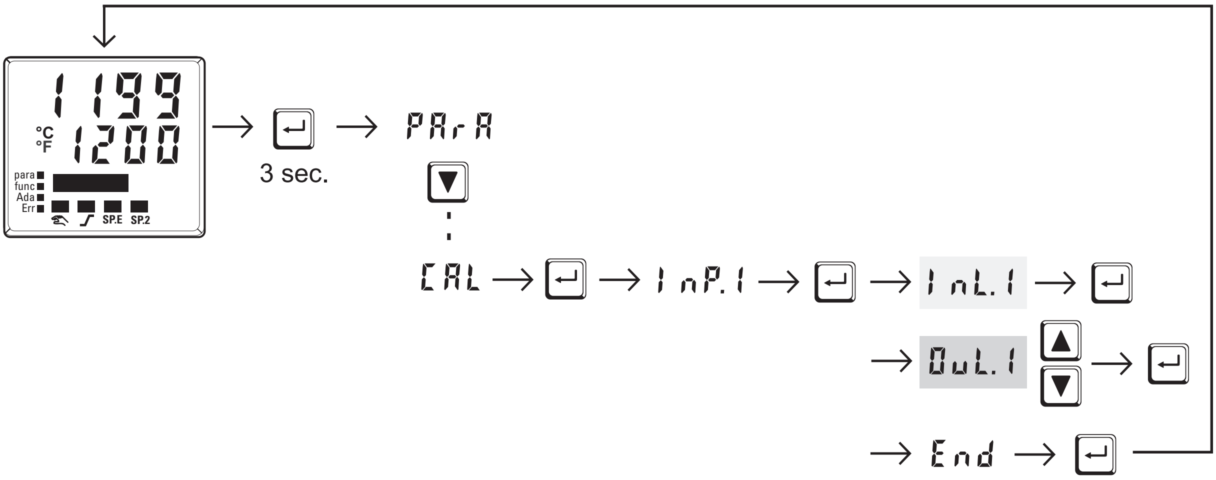



***2-point correction***
**(ConF / InP.1 / Corr = 2):**

- is possible off-line with process value simulator



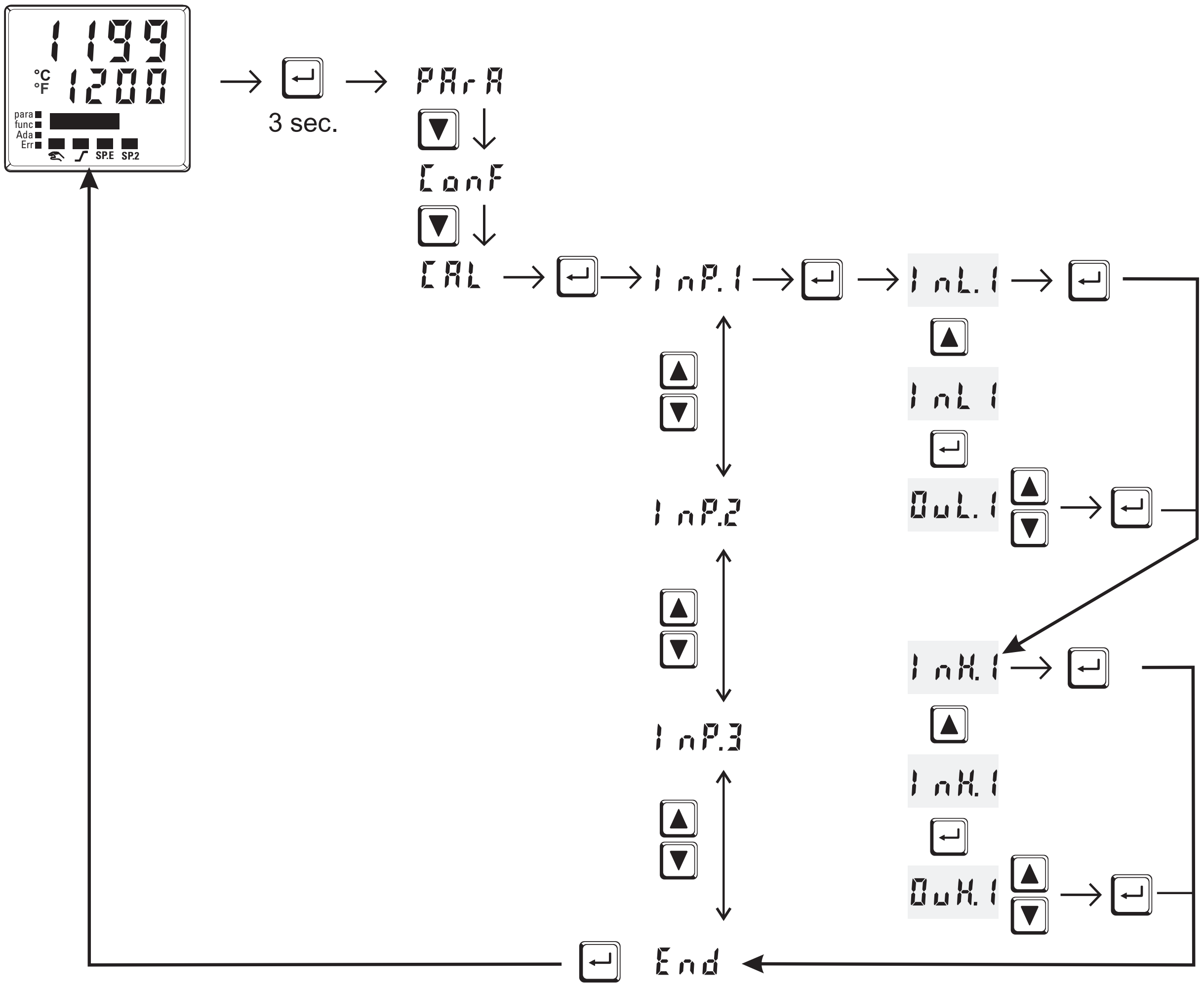
***Offset correction*** **(ConF / InP.1 / Corr = 1):**




InL.1: The input value of the scaling point is displayed.
The operator must wait, until the process is at rest.
Subsequently, the operator acknowledges the input value by pressing key ↵.

OuL.1: The display value of the scaling point is displayed.
Before calibration, OuL.1 is equal to InL.1.
The operator can correct the display value by pressing keys ▲▼.
Subsequently, he confirms the display value by pressing key ↵.

***2-point correction*** **(ConF / InP.1 / Corr = 2):**




InL.1: The input value of the lower scaling point is displayed.
The operator must adjust the lower input value by means of a process value simulator and confirm the input value by pressing key ↵.

OuL.1: The display value of the lower scaling point is displayed.
Before calibration, OuL.1 equals InL.1.
The operator can correct the lower display value by pressing the ▲▼ keys. Subsequently, he confirms the display value by pressing key ↵.

InH.1: The input value of the upper scaling point is displayed. .
The operator must adjust the upper input value by means of the process value simulator and confirm the input value by pressing key ↵.

OuH.1: The display value of the upper scaling point is displayed.
Before calibration OuH.1 equals InH.1.
The operator can correct the upper display value by pressing keys ▲▼
Subsequently, he confirms the display value by pressing key ↵.

ⓘ The parameters (OuL.1, OuH.1) changed at CAL level can be reset by adjusting the parameters below the lowest adjustment value (OFF ) by means of decrement key ▼.

# 7 Programmer level

## 7.1 *Parameter survey*

| ProG Programmer level | Edit Programmer editing | CoPY Program copying | End |
|---|---|---|---|
| ▲▼ | PrG | Src | |
| | b.Lo | dSt | |
| | b.hi | | |
| | d.00 | | |
| | tYPE | | |
| | SP | | |
| | Pt | | |
| | d.out | | |
| | ••• | | |
| | tYPE | | |
| | SP | | |
| | Pt | | |
| | tout | | |

**Setting:**

- The parameters can be set by means of keys ▲▼
- Transition to the next parameter is by pressing key ↵ .
- After the last parameter of a group, donE is displayed and an automatic transition the next group occurs

**Return to the start of a group is by pressing key ↵ during 3 sec.**

**Unless a key is pressed during 30 sec. , the controller returns to process value-set-point display ( Timeo Out = 30 sec. )**

## 7.2 *Parameters*

ProG

| Name | Value Range | Description | Default |
|---|---|---|---|
| b.Lo | 0...9999 | Bandwidth lower limit | Off |
| b.Hi | 0...9999 | Bandwidth upper limit | Off |
| d.00 | | Resetvalue of control track 1 ... 4 | 0 |
| | 0 | track 1= 0; track 2= 0; track 3= 0; track 4= 0 | |
| | 1 | track 1= 1; track 2= 0; track 3= 0; track 4= 0 | |
| | 2 | track 1= 0; track 2= 1; track 3= 0; track 4= 0 | |
| | 3 | track 1= 1; track 2=1; track 3= 0; track 4=0 | |
| | 4 | track 1= 0; track 2= 0; track 3= 1; track 4= 0 | |
| | 5 | track 1= 1; track 2= 0; track 3= 1; track 4= 0 | |
| | 6 | track 1= 0; track 2= 1; track 3= 1; track 4= 0 | |
| | 7 | track 1= 1; track 2= 1; track 3= 1; track 4= 0 | |
| | 8 | track 1= 0; track 2= 0; track 3= 0; track 4= 1 | |
| | 9 | track 1= 1; track 2= 0; track 3= 0; track 4=1 | |
| | 10 | track 1= 0; track 2= 1; track 3= 0; track 4= 1 | |
| | 11 | track 1= 1; track 2= 1; track 3= 0; track 4= 1 | |
| | 12 | track 1= 0; track 2= 0; track 3= 1; track 4= 1 | |
| | 13 | track 1= 1; track 2= 0; track 3= 1; track 4= 1 | |
| | 14 | track 1= 0; track 2= 1; track 3= 1; track 4= 1 | |
| | 15 | track 1= 1; track 2= 1; track 3= 1; track 4= 1 | |
| tYPE | | segment type 1 | 0 |
| | 0 | time | |
| | 1 | gradient | |
| | 2 | hold | |
| | 3 | step | |
| | 4 | time and wait | |
| | 5 | gradient and wait | |
| | 6 | hold and wait | |
| | 7 | step and wait | |
| | 8 | end segment | |
| SP | -1999...9999 | segment end set-point 1 | |
| Pt | 0...9999 | segment time/-gradient 1 | |
| d.0ut | | control track 1...4 - 1 (see parameter d.00) | |
| tYPE | | segment type 2 (see segment type 1) | 0 |
| SP | -1999...9999 | segment end set-point 2 | |
| Pt | 0...9999 | segment time/-gradient 2 | |
| d.0ut | | control track 1...4 - 2 (see parameter d.00) | |
| tYPE | | segment type3 (see segment type 1) | 0 |
| SP | -1999...9999 | segment end set-point3 | |
| Pt | 0...9999 | segment time/-gradient 3 | |
| d.0ut | | control track 1...4 - 3 (see parameter d.00) | |
| tYPE | | segment type 4 (see segment type 1) | 0 |
| SP | -1999...9999 | segment end set-point 4 | |
| Pt | 0...9999 | segment time/-gradient 4 | |
| d.0ut | | control track 1...4 - 4 (see parameter d.00) | |

| Name | Value Range | Description | Default |
|---|---|---|---|
| tYPE | | segment type 3 (see segment type 1) | 0 |
| SP | -1999...9999 | segment end set-point 5 | |
| Pt | 0...9999 | segment time/-gradient 5 | |
| d.Out | | control track 1...4 - 5 (see parameter d.00 ) | |
| tYPE | | segment type 6 (see segment type 1) | 0 |
| SP | -1999...9999 | segment end set-point 6 | |
| Pt | 0...9999 | segment time/-gradient 6 | |
| d.Out | | control track 1...4 - 6 (see parameter d.00 ) | |
| tYPE | | segment type 7 (see segment type 1) | 0 |
| SP | -1999...9999 | segment end set-point 7 | |
| Pt | 0...9999 | segment time/-gradient 7 | |
| d.Out | | control track 1...4 - 7 (see parameter d.00 ) | |
| tYPE | | segment type 8 (see segment type 1) | 0 |
| SP | -1999...9999 | segment end set-point 8 | |
| Pt | 0...9999 | segment time/-gradient 8 | |
| d.Out | | control track 1...4 - 8 (see parameter d.00 ) | |
| ⋮ | ⋮ | ⋮ | ⋮ |
| tYPE | | segment type15 (see segment type 1) | 0 |
| Pt | 0...9999 | segment time/-gradient 15 | |
| d.Out | | control track 1...4 - 15 (see parameter d.00 ) | |
| tYPE | | segment type 16 (see segment type 1) | 0 |
| SP | -1999...9999 | segment end set-point 16 | |
| Pt | 0...9999 | segment time/-gradient 16 | |
| d.Out | | control track1...4 - 16 (see parameter d.00 ) | |

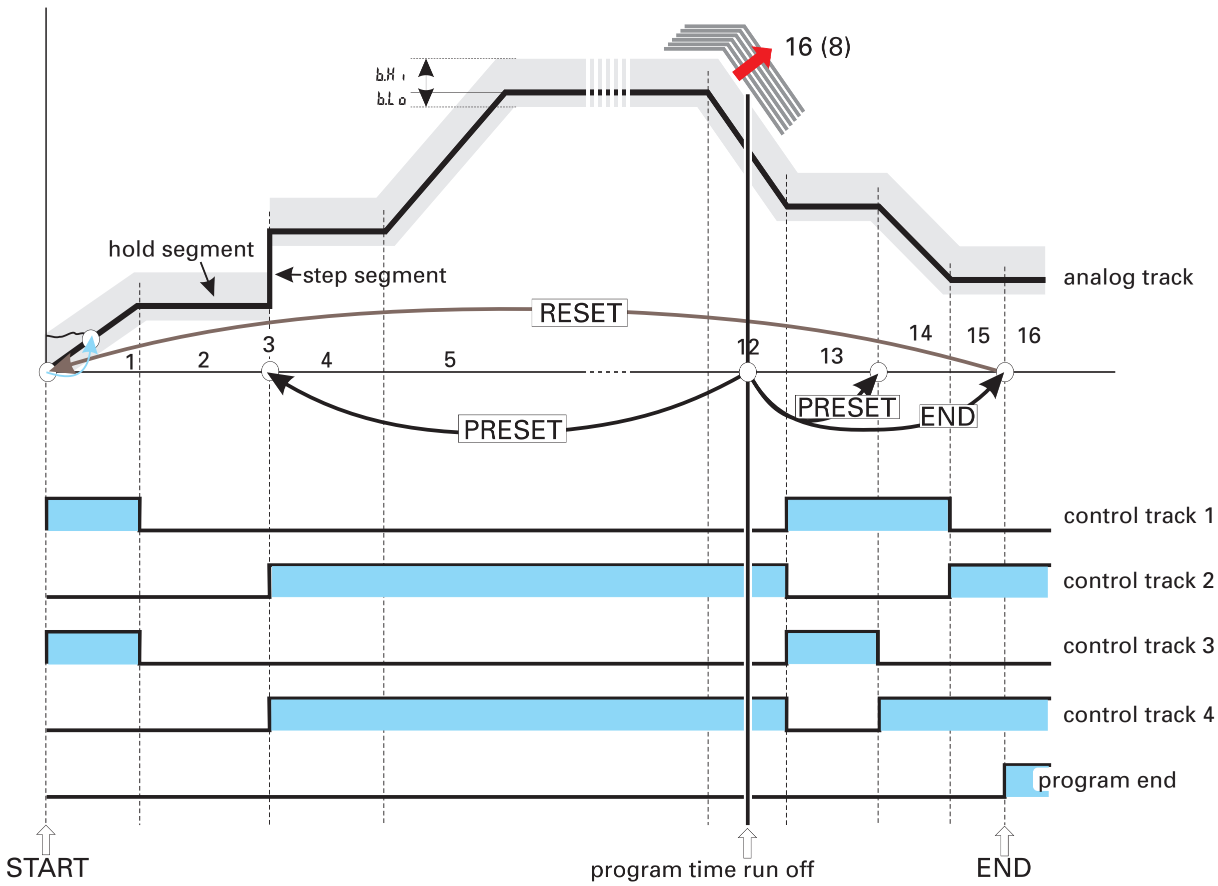
## 7.3 *Programmer description*

### *7.3.1* General

A survey of the most important features:

- Programs: 8 or 16 (dependent of order)
- Control outputs: 4
- Segments: 16 per program
- Segment types: ramp (set-point and time)
  ramp (set-point and gradient)
  hold segment (holding time)
  step segment (with alarm suppression)
  end segment

  All segment types can be combined with ”Wait at the end and call operator”
- Time unit: configurable in hours:minutes or minutes:seconds
- Maximum segment duration: 9999 hours = 1 year 51 days
- Maximum program duration: 16 x 9999 hours = > 18 years
- Gradient: 0,01°C/h ( /min) to 9999°C/h ( /min)
- Program name: 8 characters, adjustable via 8800/8840 Configurator software
- Bandwidth control: bandwidth high and low (b.Lo,b.Hi) limits defininable for each program



### *7.3.2* Programmer set-up:

The instrument is factory-configured as a program controller. The following settings must be checked:

- **Set-point function**
  For using the controller as a programmer, select parameter SP.Fn = 1 / 9 in the ConF menu (→ page 23).
- **Time base**
  The time base can be set to hours:minutes or minutes:seconds in the ConF menu; parameter t.bAS (→ page 24).
- **Digital signals**
  For assigning a control output, program end or the operator call as a digital signal to one of the outputs, set parameter P.End, PrG1 … PrG4 or CALL to 1 (→ page 30-33) for the relevant output OUt.1 ...OUt.6 in menu ConF (→ page 30-33).
- **Programmer operation**
  The programmer can be started, stopped and reset via one of the digital inputs di1..3. Which input should be used for each function is determined by selecting parameters P.run and P.oFF = 2 / 3 / 4 in the ConF menu accordingly (→ page 35, 36).

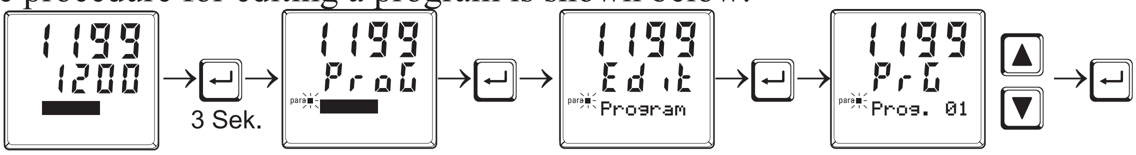
To permit programmer operation via the front panel, parameter di.Fn (ConF menu; LoGi → page 36) must be configured for key function.
Further settings, which affect the programmer display layout and operation are only possible using the 8800/8840 Configurator software (see picture below and page 37/38).

*Cutout from the 8800/8840 Configurator Konfiguration "**othr**"*

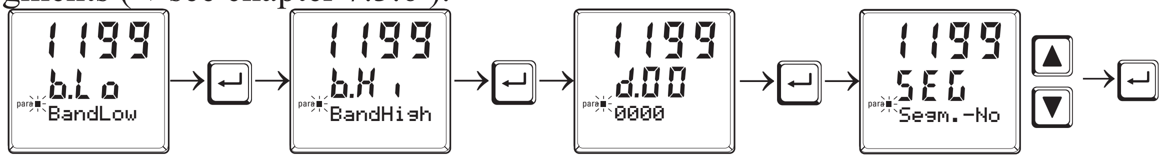
| Name | Description | Value | on | Range |
|---|---|---|---|---|
| **othr** | **Other** | | | |
| pTmp | access temporary program changes | 0: enabled | | |
| pPre | access preset to end and reset | 0: enabled | | |
| pRun | access run / stop | 0: enabled | | |
| pSwi | access switch controller | 0: enabled | | |
| pCom | access common program parameters | 0: enabled | | |
| IPrg | access programmer level | 1: blocked | | |
| CDis3 | display 3 controller operation | 2: bargraf of actuating variable | | |
| TDis3 | display 3 time cycle [s] | 10 | | 2...60 |
| PDis3 | display 3 programmer operation | 0: segm.-nr., segm.-type, prog.-rem-time | | |
| T.dis3 | text display 3 | | | |

### *Programmer parameter setting*

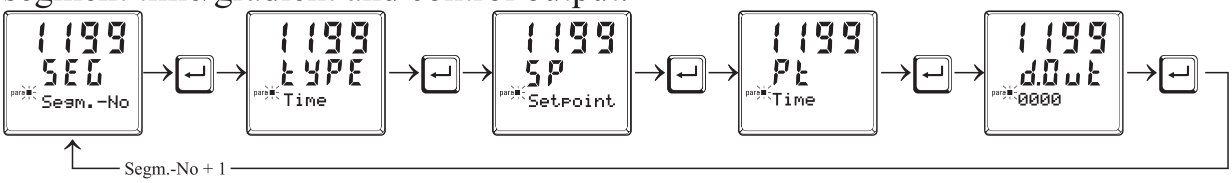
8(16) programmers with 16 segments each are available to the user. The relevant parameters must be determined in menu ProG . (→ page 57).
The procedure for editing a program is shown below.




Select the program you want to edit by means of keys ▲▼ and confirm it with ↵. Start by setting the bandwidth high and low (b.Lo; b.Hi) limits and the control output reset value (d.00) for the selected program. The bandwidth is valid for all segments (→ see chapter 7.3.6 ).



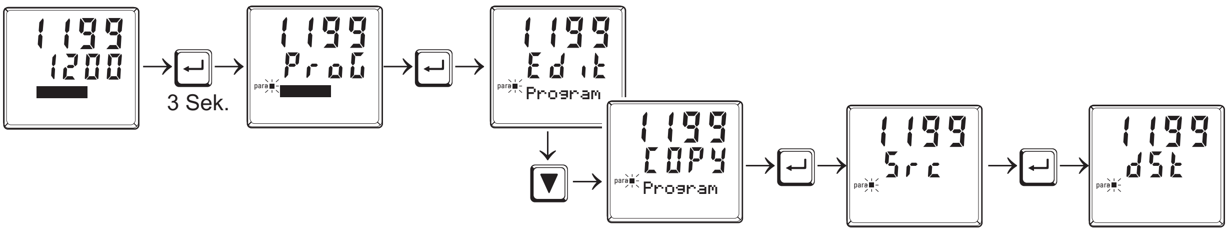

Configuration parameter pCom (→ page 38) can be used for display suppression of bandwidth parameters and control output reset value, which, however, remain valid.
Select the segment number (SEG; Segm.-No) for the segment which is to be edited. Now, enter segment type (→ page  chapter ), segment end set-point, segment time/gradient and control output.




After confirming parameter d.Out with key ↵ , select the following segment.

### *Copying a program*

The procedure for copying a program is shown below.




When confirming function COPY with key ↵,  the program which shall be copied must be selected (Src ). Subsequently, the target program (dSt ) must be adjusted. Press key ↵ to start copying.

### *7.3.3* Operation

Programmer operation (run/stop, preset und reset) is via front panel, digital inputs or interface (8800/8840 Configurator, superordinate visualization, ...).

***Front panel operation***

For programmer operation via the front panel keys, the digital input function (di.Fn → page 36) must be set to key operation.

Function key can be used for switch-over to programmer or controller . If programmer was selected, the func LED is lit.

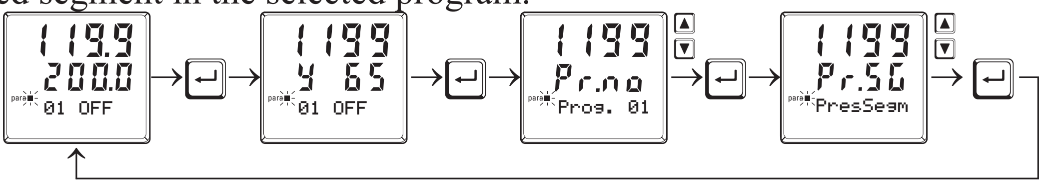
Now, the programmer can be started or stopped via auto/manual key (run LED = ON or OFF). By pressing auto/manual key during stop condition, the programmer jumps to the end segment. Press the key again to switch off the programmer (reset).

***Operation via digital inputs***

Functions start/stop and reset can be activated also via digital inputs. For this, parameters P.run and P.oFF must be set for digital inputs (→ page 35, 36) at CONF level LOGI (→ page 35, 36).

***Program/segment selection***

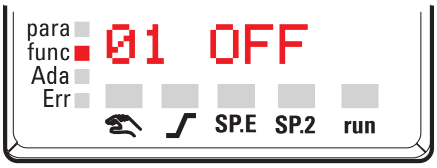
Prerequisite: Programmer is in the reset or stop condition. How to select a defined program (Pr.no) followed by a segment (Pr.SG) is shown below. When starting the programmer now, program operation starts at the beginning of the selected segment in the selected program.



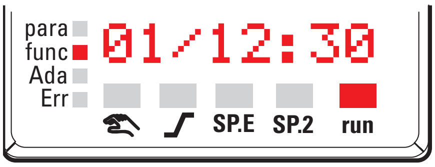

***Preset***

The preset function is activated via segment selection.
To permit preset in a running program, switch the programmer to stop, select the target segment as described in the above section and switch the programmer to run.

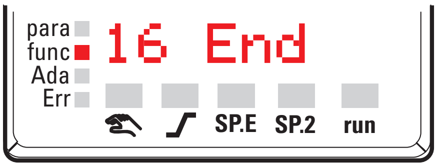
### *7.3.4* Programmer display



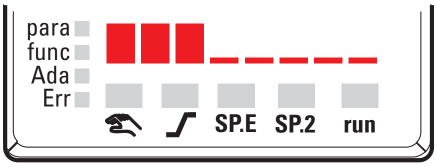

Programmer is in reset and the internal controller set-point is effective. Segment or program number and OFF are displayed (configurable with 8800/8840 Configurator: Configuration → Other → PDis3).




Programmer running (run LED is lit). Segment or program number, segment type (/ rising; \ falling; - hold) and program/segment rest time or runtime are displayed (configurable with 8800/8840 Configurator: Configuration → Other → PDis3).

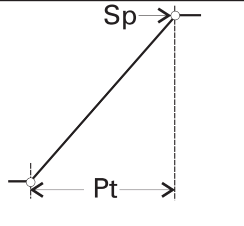
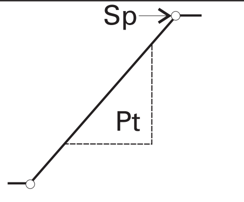
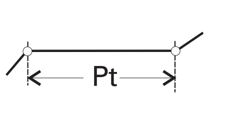
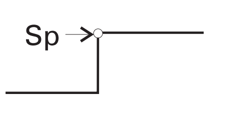
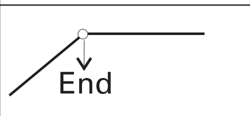



Program end was reached. The set-point defined in the last segment is effective. Segment or program number and End are displayed (configurable with 8800/8840 Configurator: Configuration → Other → PDis3).



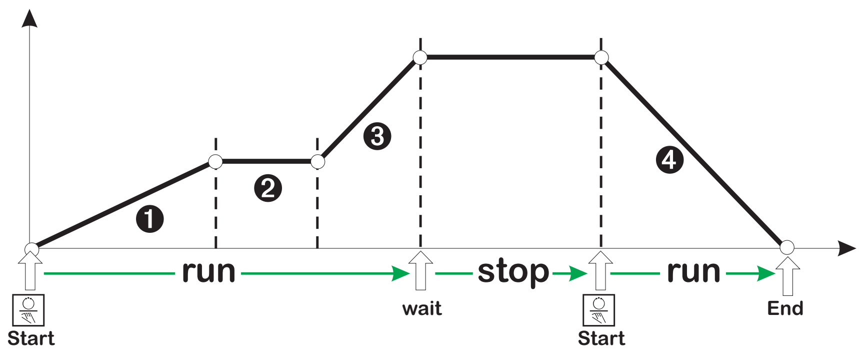

Function key [F] was used to switch over to the controller. The instantaneously effective correcting variable is displayed.

## *7.3.5* Segment type

| | | |
|---|---|---|
| Ramp-segment (time) |  | With a ramp segment (time), the set-point runs linearly from the start value (end of previous segment) towards the target set-point (Sp) of the relevant segment during time Pt (segment duration). |
| Ramp-segment (gradient) |  | With a ramp segment (gradient), the set-point runs linearly from the start value (end value of previous segment) towards the target value (Sp) of the relevant segment. The gradient is determined by parameter Pt. |
| Hold segment |  | With a hold segment, the end set-point of the previous segment is output constantly during a defined time which is determined by parameter Pt. |
| Step segment |  | With a step segment, the program set-point goes directly to the value specified in parameter Sp. With configured control deviation alarms, the alarm is suppressed within band monitoring. |
| End segment |  | The last segment in a program is the end segment. When reaching the end segment, output of the setpoint output last is continued. |

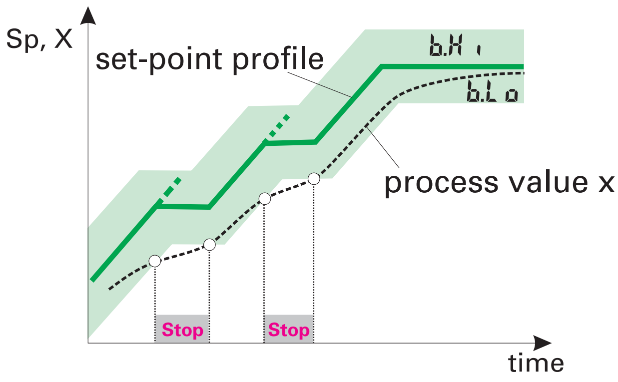
### *Waiting and operator call*

⚠ All segment types except end segment can be combined with ”Wait at the end and operator call”.
If a segment with combination ”wait” was configured, the programmer goes to stop mode at the segment end (run LED is off). Now, the programmer can be restarted by pressing the start/stop key (>3s), via interface or digital input.




❶ Segmenttype = time
❷ Segmenttype = hold
❸ Segmenttype = time and wait
❹ Segmenttype = time

### 7.3.6 Bandwidth monitoring



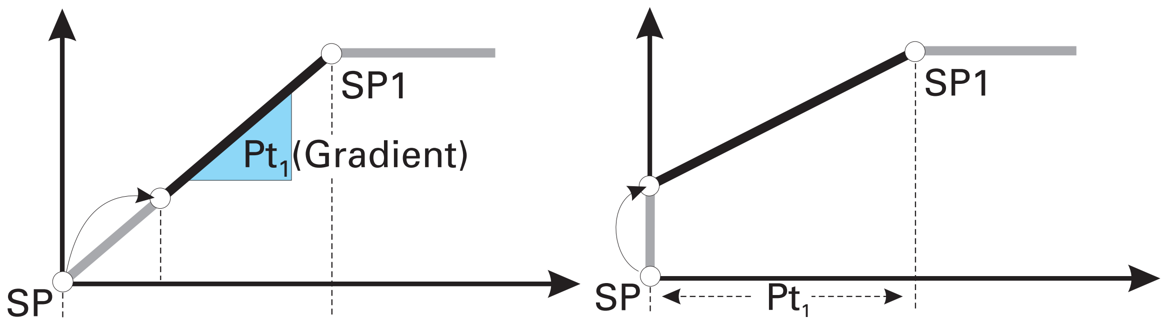

Bandwidth monitoring is valid for all program segments. An individual bandwidth can be determined for each program.
When leaving the bandwidth (b.Lo = low limit; b.Hi = high limit), the programmer is stopped (run LED flashes). The program continues running when the process value is within the predefined bandwidth again.

ⓘ With segment type Step and bandwidth monitoring activated, the control deviation alarm is suppressed, until the process value is in the band again.

ⓘ If band alarm signalling as a relay output is required, a control deviation alarm with the same limits as the band limits must be configured.

### 7.3.7 Search run at programmer start

The programmer starts the first segment at the actual process value (search run). This may change the effective runtime of the first segment.




### 7.3.8 Behaviour after mains recovery or sensor error

***Mains recovery***

After power recovery, the last program set-points and the time elapsed so far are not available any more. Therefore, the programmer is reset in this case. The controller uses the internal set-points and waits for further control commands (the run LED blinks).

***Sensor error***

With a sensor error, the programmer goes to stop condition (the run LED blinks). After removal of the sensor error, the programmer continues running.

# 8 Special functions

## 8.1 *8840 profiler as Modbus master*

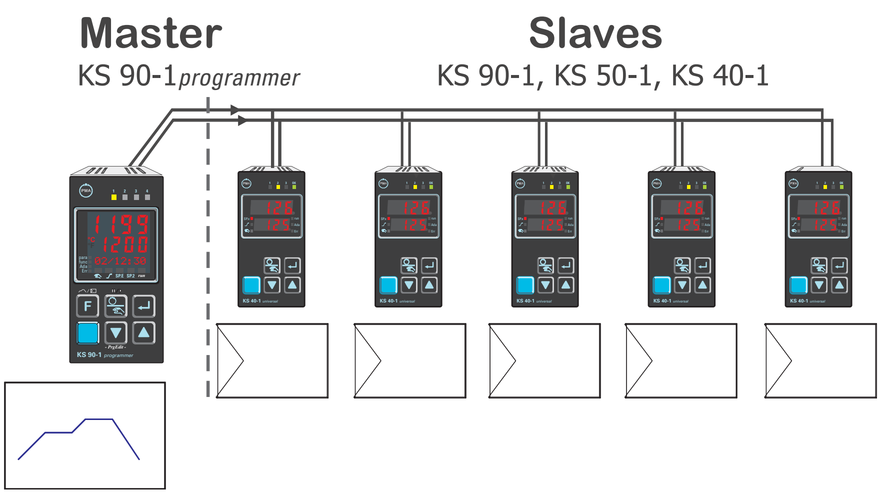
### Additions othr *(only visible with 8800/8840 Configurator!)*

| Name | Value range | Description | Default |
|---|---|---|---|
| MASt | | **Controller is used as Modbus master** | 0 |
| | 0 | Slave | |
| | 1 | Master | |
| Cycl | 0...200 | Cycle time [ms] for the Modbus master to transmit its data to the bus. | 60 |
| AdrO | 1...65535 | Target address to which the with **AdrU** specified data is given out on the bus. | 1 |
| AdrU | 1...65535 | Modbus address of the data that Modbus master gives to the bus. | 1 |
| Numb | 0...100 | Number of data that should be transmitted by the Modbus master. | 0 |

**This function is only selectable with 8800/8840 Configurator (engineering tool)!**

The 8840 profiler can be used as Modbus master ( ConF / othr / **MASt** = 1 ). The Modbus master sends its data to all slaves (Broadcast message, controller adress 0). It transmits its data (modbus adress **AdrU**) cyclic with the cycle time **Cycl** to the bus. The slave controller receives the data transmitted by the masters and allocates it to the modbus target adress **AdrO**. If more than one data should be transmitted by the master controller ( **Numb** > 1) , the modbus adress **AdrU** indicates the start adress of the data that should be transmitted and **AdrO** indicates the first target adress where the received data should be stored. The following data will be stored at the logically following modbus target adresses. With this it is possible e.g. to specify the process value of the master controller as set-point for the slave controllers.

*Example for transfering the programmer set-point*



## 8.2 *Linearization*

Linearization for inputs INP1 or INP3

Access to table "L in" is always with selection of sensor type S.TYP = 18: special thermocouple in INP1 or INP3, or with selection of linearization S.L in 1: special linearization.

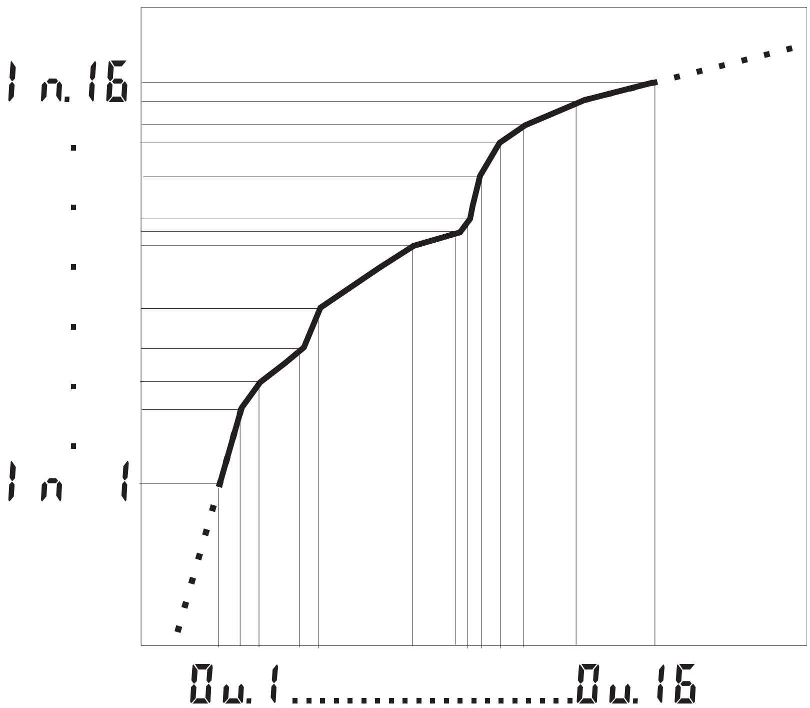
Dependent of input type, the input signals are specified in µV or in Ohm dependent of input type.

With up to 16 segment points, non-linear signals can be simulated or linearized. Every segment point comprises an input (In.1 … In.16) and an output (Ou.1 … Ou.16). These segment points are interconnected automatically by means of straight lines. The straight line between the first two segments is extended downwards and the straight line between the two largest segments is extended upwards. I.e. a defined output value is also provided for each input value.

When switching an In.x value to OFF, all other ones are switched off.

Condition for these configuration parameters is an ascending order.

In.1 < In.2 < ...< In.16 and Ou.1 < Ou.2 ...< Ou.16.

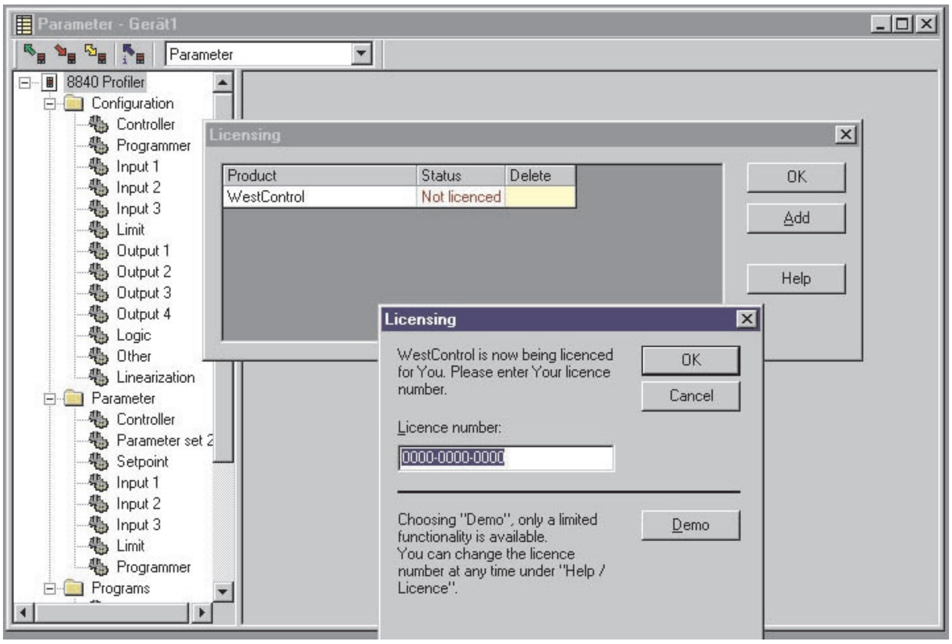


# 9 8800/8840 Configurator

8800/8840 Configurator is the projection environment for the corresponding West controllers. The following 3 versions with graded functionality are available:

| Functionality | Mini | Basic | Expert |
|---|---|---|---|
| parameter and configuration setting | yes | yes | yes |
| controller and control loop simulation | yes | yes | yes |
| download: writes an engineering to the controller | yes | yes | yes |
| online mode/ visualisation | SIM only | yes | yes |
| creation of user defined linearizations | yes | yes | yes |
| configuration of extended operating level | yes | yes | yes |
| upload: reads an engineering from the controller | SIM only | yes | yes |
| diagnosis function | no | no | yes |
| file, save engineering data | no | yes | yes |
| printer function | no | yes | yes |
| online documentation, help system | no | yes | yes |
| measurement correction (calibration procedure) | yes | yes | yes |
| program editor | no | no | yes |
| data acquisition and trend function | SIM only | yes | yes |
| network and multiuser licence | no | no | yes |
| personal assistant function | yes | yes | yes |
| extended simulation | no | no | yes |

The mini version is - free of charge - at your disposal as download at West homepage ***www.westinstruments.com*** or on the West-CD (please ask for).




At the end of the installation the licence number has to be stated or DEMO mode must be chosen. At DEMO mode the licence number can be stated subsequently under ***Help → Licence → Change***.

# 10 Versions

**8840-1 ☐ ☐ - ☐ ☐ ☐ ☐ ☐ - ☐ 00**

| Description | Code |
|---|---|
| Flat-pin connectors | 0 |
| Screw terminals | 1 |
| 90..250V AC, 4 relays | 0 |
| 24VAC / 18..30VDC, 4 relays | 1 |
| 90..250V AC, 3 relays + mA/logic | 2 |
| 24VAC / 18..30VDC, 3 relays +mA/logic | 3 |
| 90..250V AC, 2 relays + 2xmA/logic | 4 |
| 24VAC / 18..30VDC, 2 relays + 2xmA/logic | 5 |
| no option | 0 |
| RS422/485 + $U_T$ + di2, di3 + OUT5, OUT6 | 1 |
| PROFIBUS-DP + $U_T$ + di2/di3 + OUT5/OUT6 | 2 |
| INP1 and INP2 | 0 |
| INP1, INP2 and INP3 | 1 |
| Program controller with 8 programs | 1 |
| Program controller with 16 programs | 2 |
| Standard configuration | 0 |
| Configuration to specification | 9 |
| no manual | 0 |
| manual german | D |
| manual english | E |
| manual french | F |
| Standard | 0 |
| cUL certified (only possible with screw terminals) | U |
| Unit / front according to customer specification | XX |

**Accessories delivered with the unit**

Operating manual (if selected by the ordering code)

- 2 fixing clamps
- operating note in 12 languages

**Accessory equipment with ordering information**

| Description | | | Order no. |
|---|---|---|---|
| Heating current transformer 50A AC | | | 9404-407-50001 |
| PC-adaptor for the front-panel interface | | | 9404-998-00061 |
| Operating manual | German | | 9499-040-70718 |
| Operating manual | English | | 9499-040-70711 |
| Operating manual | French | | 9499-040-70732 |
| Interface description Modbus RTU | German | | 9499-040-70818 |
| Interface description Modbus RTU | English | | 9499-040-70811 |
| Interface description Profibus | German | | 9499-040-70918 |
| Interface description Profibus | English | | 9499-040-70911 |
| 8800/8840 Configurator (engineering tool) | Mini | Download | www.westinstruments.com |
| 8800/8840 Configurator (engineering tool) | Basic | | 9407-999-11931 |
| 8800/8840 Configurator (engineering tool) | Expert | | 9407-999-11941 |

# 11 Technical data

## INPUTS

### PROCESS VALUE INPUT INP1

| | |
|---|---|
| Resolution: | > 14 bits |
| Decimal point: | 0 to 3 digits behind the decimal point |
| Dig. input filter: | adjustable 0,000...9999 s |
| Scanning cycle: | 100 ms |
| Measured value correction: | 2-point or offset correction |

#### Thermocouples

→ Table 1 (page 83 )

| | |
|---|---|
| Input resistance: | ≥ 1 MΩ |
| Effect of source resistance: | 1 µV/Ω |

#### *Cold-junction compensation*

| | |
|---|---|
| Maximal additional error: | ± 0,5 K |

#### *Sensor break monitoring*

| | |
|---|---|
| Sensor current: | ≤ 1 µA |
| Configurable output action | |

#### Resistance thermometer

→ Table 2 (page 83 )

| | |
|---|---|
| Connection: | 3-wire |
| Lead resistance: | max. 30 Ohm |
| Input circuit monitor: | break and short circuit |

#### *Special measuring range*

8800/8840 Configurator (engineering tool) can be used to match the input to sensor KTY 11-6 (characteristic is stored in the controller).

| | |
|---|---|
| Physical measuring range: | 0...4500 Ohm |
| Linearization segments | 16 |

#### Current and voltage signals

→ Table 3 (page 83 )

| | |
|---|---|
| Span start, end of span: | anywhere within measuring range |
| Scaling: | selectable -1999...9999 |
| Linearization: | 16 segments, adaptable with 8800/8840 Configurator |
| Decimal point: | adjustable |
| Input circuit monitor: | 12,5% below span start (2mA, 1V) |

### SUPPLEMENTARY INPUT INP2

| | |
|---|---|
| Resolution: | > 14 bits |
| Scanning cycle: | 100 ms |

#### Heating current measurement

via current transformer (→ Accessory equipment)

| | |
|---|---|
| Measuring range: | 0...50mA AC |
| Scaling: | adjustable -1999...0,000...9999 A |

#### Current measuring range

Technical data as for INP1

#### Potentiometer

→ Table 2 (page 83 )

### SUPPLEMENTARY INPUT INP3 (OPTION)

| | |
|---|---|
| Resolution: | > 14 bits |
| Scanning cycle: | 100 ms |

Technical data as for INP1 except 10V range.

### CONTROL INPUTS DI1, DI2

Configurable as switch or push-button! Connection of a potential-free contact suitable for switching "dry" circuits.

| | |
|---|---|
| Switched voltage: | 5 V |
| Current: | 100 µA |

### CONTROL INPUTS DI2, DI3 (OPTION)

The digital input di2 located on the A-card and di2 located on the option card are or-linked. Configurable as switch or push-button! Optocoupler input for active triggering.

| | |
|---|---|
| Nominal voltage | 24 V DC external |
| Current sink (IEC 1131 type 1) | |
| Logic "0" | -3...5 V |
| Logic "1" | 15...30 V |
| Current requirement | approx.. 5 mA |

### TRANSMITTER SUPPLY $U_T$ (OPTION)

Power: 22 mA / ≥ 18 V

If the universal output OUT3 or OUT4 is used there may be no external galvanic connection between measuring and output circuits!

### GALVANIC ISOLATION

Safety isolation (single line)
Function isolation (double line)

<table border="1">
<tr><td rowspan="4">Mains supply</td><td>Process value input INP1</td></tr>
<tr><td>Supplementary input INP2</td></tr>
<tr><td>Optional input INP3</td></tr>
<tr><td>Digital input di1, di2</td></tr>
<tr><td>Relay OUT1</td><td>RS422/485 interface</td></tr>
<tr><td>Relay OUT2</td><td>Digital inputs di2, 3 option</td></tr>
<tr><td>Relay OUT3</td><td>Universal output OUT3</td></tr>
<tr><td>Relay OUT4</td><td>Universal output OUT4</td></tr>
<tr><td></td><td>Transmitter supply $U_T$</td></tr>
<tr><td></td><td>OUT5, OUT6</td></tr>
</table>

## OUTPUTS

### RELAY OUTPUTS OUT1...OUT4

| | |
|---|---|
| Contact type: | potential-free changeover contact |
| Max.contact rating: | 500 VA, 250 V, 2A at 48...62 Hz, resistive load |
| Min. contact rating: | 5V, 10 mA AC/DC |
| Operating life (electr.): | 600.000 duty cycles with max. contact rating |

**Note:**
If the relays operate external contactors, these must be fitted with RC snubber circuits to manufacturer specifications to prevent excessive switch-off voltage peaks.

### OUT3, 4 AS UNIVERSAL OUTPUT

Galvanically isolated from the inputs.

Freely scalable resolution: 11 bits

#### Current output

0/4...20 mA configurable.

| | |
|---|---|
| Signal range: | 0...approx.22mA |
| Max. load: | ≤ 500 Ω |
| Load effect: | no effect |
| Resolution: | ≤ 22 µA (0,1%) |
| Accuracy | ≤ 40 µA (0,2%) |

#### Voltage output

0/2...10V configurable

| | |
|---|---|
| Signal range: | 0...11 V |
| Min. load: | ≥ 2 kΩ |
| Load effect: | no effect |
| Resolution: | ≤ 11 mV (0,1%) |
| Accuracy | ≤ 20 mV (0,2%) |

#### OUT3, 4 used as transmitter supply

Output power: 22 mA / ≥ 13 V

#### OUT3, 4 used as logic output

| | |
|---|---|
| Load ≤ 500 Ω | 0/≤ 20 mA |
| Load > 500 Ω | 0/> 13 V |

### OUTPUTS OUT5/6 (OPTION)

Galvanically isolated opto-coupler outputs.
Grounded load: common positive voltage.
Output rating: 18...32 VDC; ≤ 70 mA
Internal voltage drop: ≤ 1 V with $I_{max}$
Protective circuit: built-in against short circuit, overload, reversed polarity (free-wheel diode for relay loads).

## POWER SUPPLY

Dependent of order:

### AC SUPPLY

| | |
|---|---|
| Voltage: | 90...260 V AC |
| Frequency: | 48...62 Hz |
| Power consumption | approx. 7,0 VA |

### UNIVERSAL SUPPLY 24 V UC

| | |
|---|---|
| AC voltage: | 20,4...26,4 V AC |
| Frequency: | 48...62 Hz |
| DC voltage: | 18...31 V DC |
| Power consumption: | approx.. 7,0 VA |

## BEHAVIOUR WITH POWER FAILURE

*Configuration, parameters and adjusted set-points, control mode:*
Non-volatile storage in EEPROM

## FRONT INTERFACE

Connection of PC via PC adapter (see "Accessory equipment"). The 8800/8840 Configurator software is used to configure, set parameters and operate the 8840 profiler.

## BUS INTERFACE (OPTION)

Galvanically isolated

| | |
|---|---|
| Physical: | RS 422/485 |
| Protocol: | Modbus RTU |
| Transmission speed: | 2400, 4800, 9600, 19.200 bits/sec |
| Address range: | 1...247 |
| Number of controllers per bus: | 32 |

Repeaters must be used to connect a higher number of controllers.

## ENVIRONMENTAL CONDITIONS

### Protection modes

| | |
|---|---|
| Front panel: | IP 65 (NEMA 4X) |
| Housing: | IP 20 |
| Terminals: | IP 00 |

### Permissible temperatures

| | |
|---|---|
| For specified accuracy: | 0...60°C |
| Warm-up time: | ≥ 15 minutes |
| For operation: | -20...65°C |
| For storage: | -40...70°C |

### Humidity

75% yearly average, no condensation

### Shock and vibration

*Vibration test Fc (DIN 68-2-6)*

| | |
|---|---|
| Frequency: | 10...150 Hz |
| Unit in operation: | 1g or 0,075 mm |
| Unit not in operation: | 2g or 0,15 mm |

*Shock test Ea (DIN IEC 68-2-27)*

| | |
|---|---|
| Shock: | 15g |
| Duration: | 11ms |

### Electromagnetic compatibility

Complies with EN 61 326-1
(for continuous, non-attended operation)

## GENERAL

### Housing

| | |
|---|---|
| Material: | Makrolon 9415 flame-retardant |
| Flammability class: | UL 94 VO, self-extinguishing |

Plug-in module, inserted from the front

### Safety test

Complies with EN 61010-1 (VDE 0411-1):
Overvoltage category II
Contamination class 2
Working voltage range 300 V
Protection class II

### *Certifications*

*UL-approval*

#### *Electrical connections*

- flat-pin terminals 1 x 6,3mm or 2 x 2,8mm to DIN 46 244 or
- screw terminals for 0,5 to 2,5mm²

### *Mounting*

Panel mounting with two fixing clamps at top/bottom or right/left,
High-density mounting possible

| | |
|---|---|
| Mounting position: | uncritical |
| Weight: | 0,27kg |

### *Accessories delivered with the unit*

Operating manual
Fixing clamps

*Table 1 Thermocouples measuring ranges*

| Thermoelementtype | | Measuring range | | Accuracy | Resolution (∅) |
|---|---|---|---|---|---|
| L | Fe-CuNi (DIN) | -100...900°C | -148...1652°F | ≤ 2K | 0,1 K |
| J | Fe-CuNi | -100...1200°C | -148...2192°F | ≤ 2K | 0,1 K |
| K | NiCr-Ni | -100...1350°C | -148...2462°F | ≤ 2K | 0,2 K |
| N | Nicrosil/Nisil | -100...1300°C | -148...2372°F | ≤ 2K | 0,2 K |
| S | PtRh-Pt 10% | 0...1760°C | 32...3200°F | ≤ 2K | 0,2 K |
| R | PtRh-Pt 13% | 0...1760°C | 32...3200°F | ≤ 2K | 0,2 K |
| T | Cu-CuNi | -200...400°C | -328...752°F | ≤ 2K | 0,05 K |
| C | W5%Re-W26%Re | 0...2315°C | 32...4199°F | ≤ 2K | 0,4 K |
| D | W3%Re-W25%Re | 0...2315°C | 32...4199°F | ≤ 2K | 0,4 K |
| E | NiCr-CuNi | -100...1000°C | -148...1832°F | ≤ 2K | 0,1 K |
| B * | PtRh-Pt6% | 0(100)...1820°C | 32(212)...3308°F | ≤ 2K | 0,3 K |

* Specifications valid for 400°C

*Table 2 Resistance transducer measuring ranges*

| Type | Signal current | Measuring range | | Accuracy | Resolution (∅) |
|---|---|---|---|---|---|
| Pt100 | 0,2mA | -200...100°C | -140...212°F | ≤ 1K | 0,1K |
| Pt100 | | -200...850°C | -140...1562°F | ≤ 1K | 0,1K |
| Pt1000 | | -200...850°C | -140...392°F | ≤ 2K | 0,1K |
| KTY 11-6 * | | -50...150°C | -58...302°F | ≤ 0,2K | 0,01K |
| Spezial | | 0...4500 | | ≤ 0,1% | 0,01 % |
| Spezial | | 0...450 | | | |
| Poti | | 0...160 | | | |
| Poti | | 0...450 | | | |
| Poti | | 0...1600 | | | |
| Poti | | 0...4500 | | | |

* Or special

*Table 3 Current and voltage measuring ranges*

| Measuring range | Input impedance | Accuracy | Resolution (∅) |
|---|---|---|---|
| 0-10 Volt | ≈ 110 kΩ | ≤ 0,1 % | 0,6 mV |
| -2,5-115 mV | ≥ 1MΩ | ≤ 0,1 % | 6 µV |
| -25-1150 mV | ≥ 1MΩ | ≤ 0,1 % | 60 µV |
| 0-20 mA | 20 Ω | ≤ 0,1 % | 1,5 µA |

# 12 Safety hints

This unit was built and tested in compliance with VDE 0411-1 / EN 61010-1 and was delivered in safe condition.
The unit complies with European guideline 89/336/EWG (EMC) and is provided with CE marking.
The unit was tested before delivery and has passed the tests required by the test schedule. To maintain this condition and to ensure safe operation, the user must follow the hints and warnings given in this operating manual.
The unit is intended exclusively for use as a measurement and control instrument in technical installations.

**Warning**
If the unit is damaged to an extent that safe operation seems impossible, the unit must not be taken into operation.

**ELECTRICAL CONNECTIONS**
The electrical wiring must conform to local standards (e.g. VDE 0100). The input measurement and control leads must be kept separate from signal and power supply leads.
In the installation of the controller a switch or a circuit-breaker must be used and signified. The switch or circuit-breaker must be installed near by the controller and the user must have easy access to the controller.

**COMMISSIONING**
Before instrument switch-on, check that the following information is taken into account:

- Ensure that the supply voltage corresponds to the specifications on the type label.
- All covers required for contact protection must be fitted.
- If the controller is connected with other units in the same signal loop, check that the equipment in the output circuit is not affected before switch-on. If necessary, suitable protective measures must be taken.
- The unit may be operated only in installed condition.
- Before and during operation, the temperature restrictions specified for controller operation must be met.

**SHUT-DOWN**
For taking the unit out of operation, disconnect it from all voltage sources and protect it against accidental operation.
If the controller is connected with other equipment in the same signal loop, check that other equipment in the output circuit is not affected before switch-off. If necessary, suitable protective measures must be taken.

**MAINTENANCE, REPAIR AND MODIFICATION**
The units do not need particular maintenance.

⚠ **Warning**
When opening the units, or when removing covers or components, live parts and terminals may be exposed.

**Before starting this work, the unit must be disconnected completely.**

After completing this work, re-shut the unit and re-fit all covers and components. Check if specifications on the type label must be changed and correct them, if necessary.

**Caution**
When opening the units, components which are sensitive to electrostatic discharge (ESD) can be exposed. The following work may be done only at workstations with suitable ESD protection.
Modification, maintenance and repair work may be done only by trained and authorized personnel. For this purpose, the West service should be contacted.

⚠ The cleaning of the front of the controller should be done with a dry or a wetted (spirit, water) handkerchief.

## 12.1 *Resetting to factory setting*

In case of faulty configuration, the 8840 profiler can be reset to the default condition.
For this, keep the following two keys pressed during power-on :

▲ ▼

Controller reset to default is signalled by displaying FACtorY shortly in the display. Subsequently, the controller returns to normal operation.

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# 13 Notes

Subject to alterations without notice

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**A6**

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