R 2000 - N4 . .

Temperature Controller
4 - Zones „heat-only"
4 - Zones „heating-off-cooling"

Installation depth: 122 mm
DIN-Format: 96 x 96 mm

Description and operating manual

ELOTECH Industrieelektronik GmbH
Verbindungsstraße 27
D - 40723 HILDEN
FON +49 2103 / 255 97 0 FAX +49 2103 / 255 97 29
www.elotech.de Email: info@elotech.de

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

1 Contents

1 Contents....2
2 General Information....3
3 Installation Instructions....3
4 Type Code....4
5 Connection Diagram....5
5.1 Power Supply and Outputs....5
5.2 Sensor Inputs....7
6 Display and Keyboard....8
6.1 Tendency Display....9
6.2 Operating Levels....10
7 Parameter descriptions:....12
7.1 Configuration Parameters, Valid for the Complete Device....12
7.2 Zone Configuration....16
7.3 Control Parameters, Zone Dependent....20
7.4 Operating Level....24
8 Error Messages....25
9 Technical Data....26
10 Notes....27

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

2 General Information

[o A 1	Messages shown by the controller display
<§>	Symbolizes the value of the factory adjustment of the respective parameters.
>3<	This parameter is available in 3-point controllers only.

3 Installation Instructions

Make certain that the device is used for the intended purpose only.

R2400 controllers are designed for installation in control panels.
Protect the device against impermissible humidity and contamination.

Ambient temperature may not exceed 50 °C (122 °F).
Electrical connections must be made according to valid regulations and by properly qualified personnel.

If using thermocouple sensors, compensation lines have to be connected directly to the controller terminals. Sensors may be connected only in compliance with the programmed range.

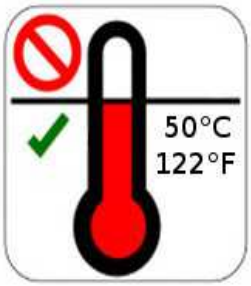
Sensor cables and signal lines (e.g. logic or linear voltage outputs) must be laid separately from control lines and mains voltage supply cables (power cables).
It is not permitted to connect the grounds of the sensor-inputs and Logic-outputs with each other.

Separate installation of controller and inductive loads is recommended.
Interference from contactor coils must be suppressed by connecting adapted RC-combinations parallel to the coils.
Control circuits (e.g. for contactors) should not be connected to the mains power supply terminals of the controller.

The configuration parameters are generally to be selected first.

Disclaimer of Liability
We have checked the contents of this document for conformity with the hardware and software described. Nevertheless, we are unable to preclude the possibility of deviations so that we are unable to assume warranty for full compliance. However, the information given in the publication is reviewed regularly. Necessary amendments are incorporated in the following editions.
We would be pleased to receive any improvement proposals which you may have.
The information contained herein is subject to change without notice.

Electronic scrap and components are subject to special treatment and must be disposed of by authorized companies.



Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

4 Type Code

R2000	-	N4xx	-	y	-	000	-	d	-	z

Power Supply	
1	230 VAC
2	115 VAC
3	24 VAC
5	24 VDC

Fieldbus-Interface	
0	No
2	RS 232
4	RS 485
5	0/20mA TTY

Heater Current Monitoring	
0	No
5	Yes (Logic outputs only)

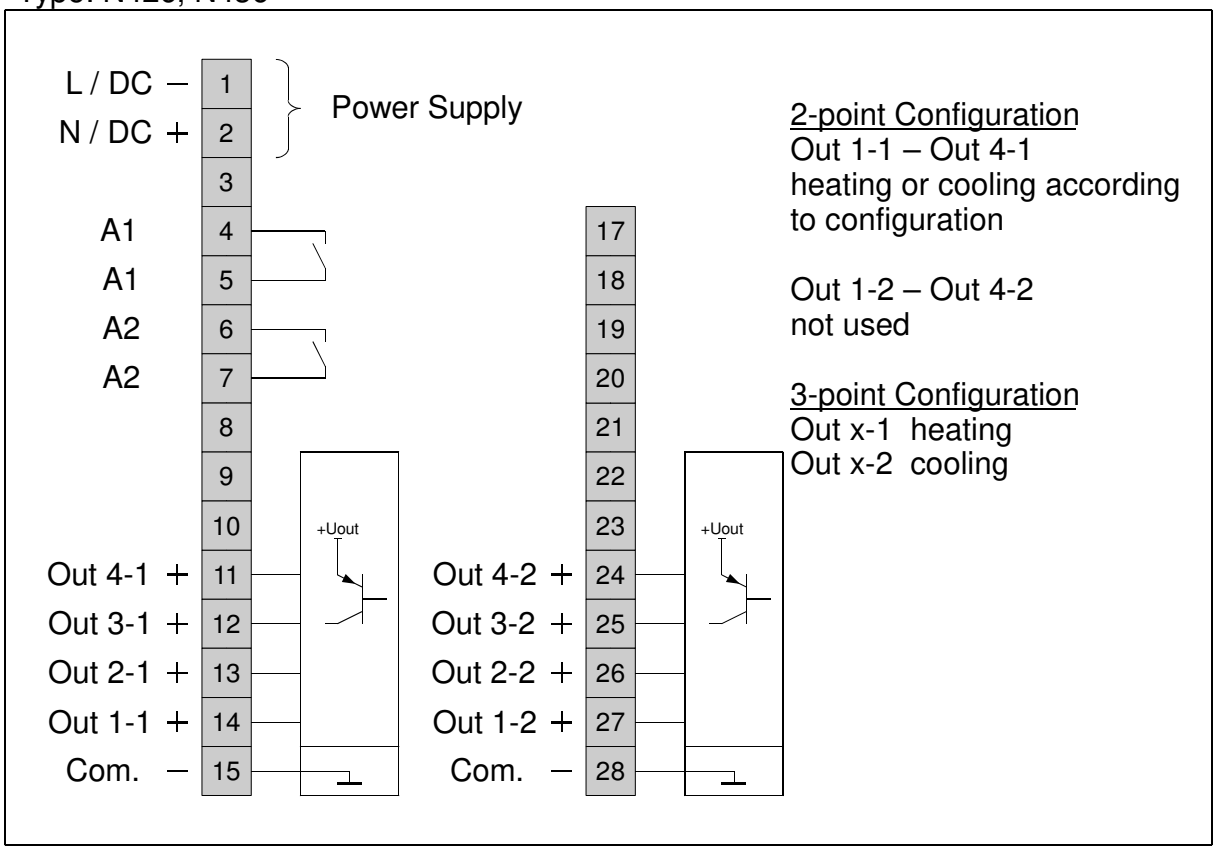
	Zones	Type	Control Outputs heating / cooling	
N421	4-zones	2-point	Relay	
N426	4-zones	2-point	Logic	
N431	4-zones	2/3-point	Relay	Relay
N436	4-zones	2/3-point	Logic	Logic
N437	4-zones	2/3-point	Logic	Relay

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

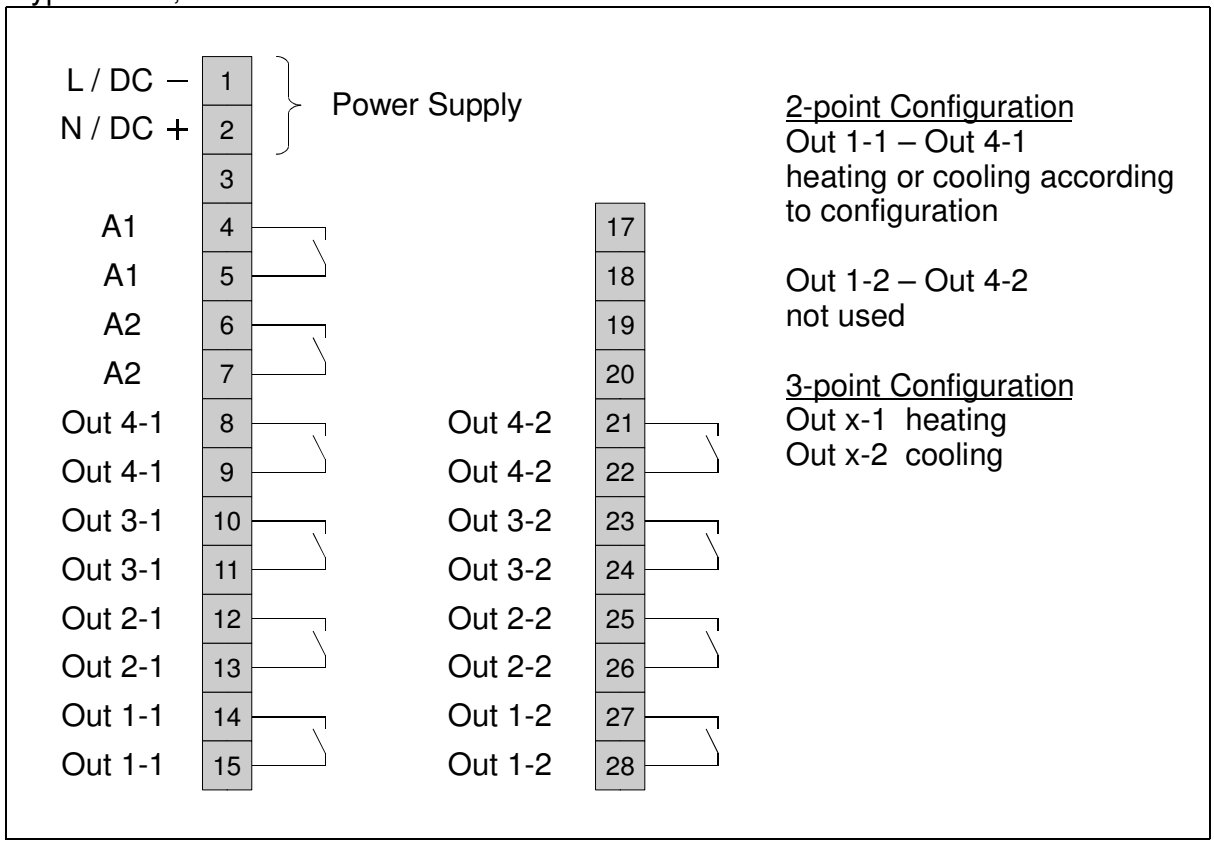
5 Connection Diagram

5.1 Power Supply and Outputs

Type: N426, N436

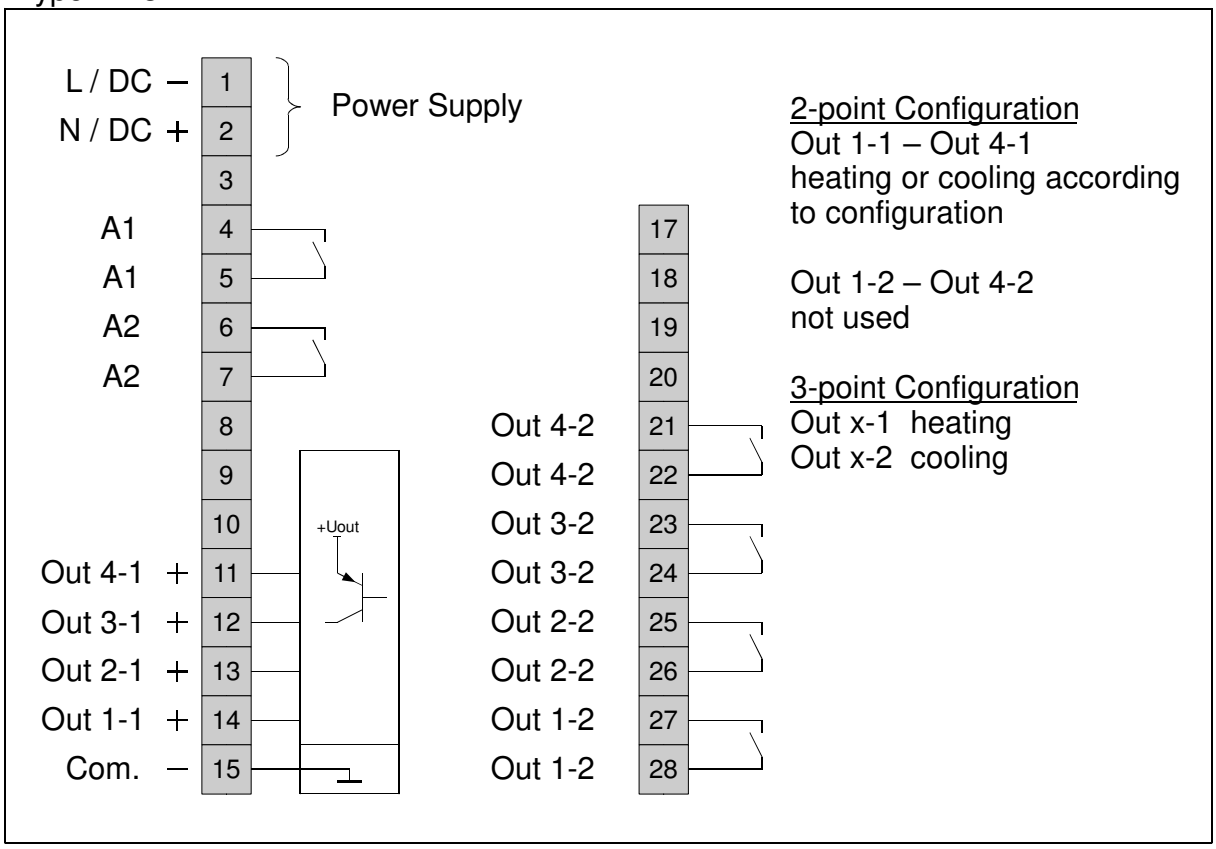


Type: N421, N431



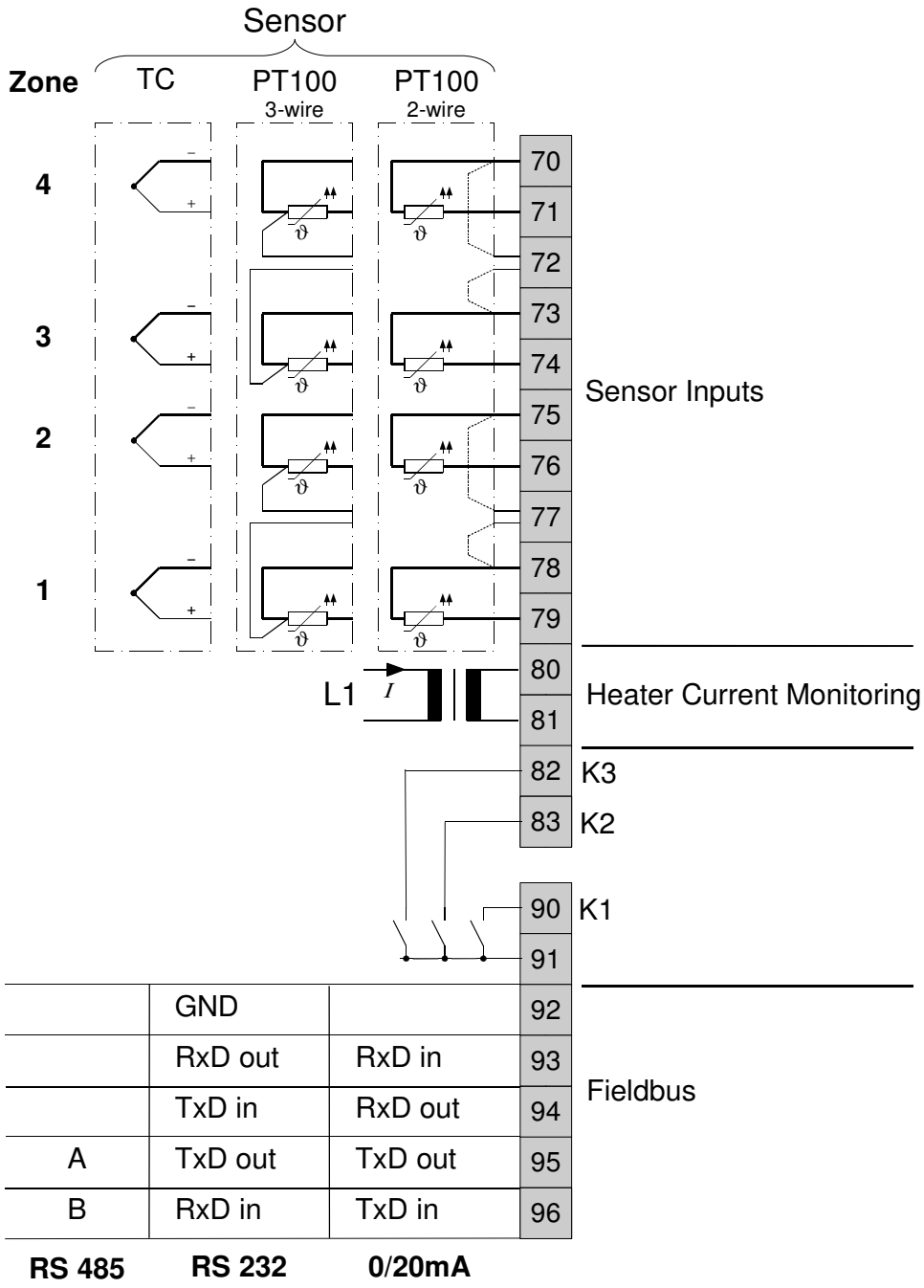
Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

Type: N437



Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

5.2 Sensor Inputs



It is not permitted to connect the grounds of the sensor-inputs and Logic-outputs with each other.

External Contacts:

Setpoint Switch:	K1	Open	Setpoint 1 (SP1) valid for all zones
		Closed	Setpoint 2 (SP2) valid for all zones
Adjustment Lock:	K2	Open	Adjustment lock off
		Closed	Adjustment lock on (see parameter „Adjustment lock")
Setpoint Changing:	K3	Open	Individual setpoint 1 adjustment for each zone
		Closed	Setpoint 1 will be overtaken for all other zones automatically

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

6 Display and Keyboard

LED 1:	Control output „heating" of the choosen zone active	**LED 2:**	Control output „cooling" of the choosen zone active
LED A1:	Alarm output A1, indication	**LED**	Setpoint ramp of the choosen zone active
LED A2:	Alarm output A2, indication	**LED SP2:**	Setpoint 2 valid (for all zones)

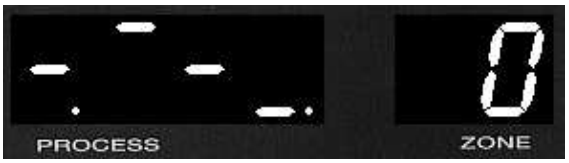
Key functions:

ZONE	Zone preselection
P	Parameter key (parameter preselection)
▲ ▼	Adjustment of chosen parameter (e.g. setpoint) to higher or lower values. Short operation: single-step adjustment Longer operation: quick-scanning When the parameter adjustments have been altered but not entered, the display will flash bright/dark.
E	Confirmation and storage of the preselected values. The display will show a light chain as a control of this function.
P	Sets the parameter back to the originally stored value. Any alterations made to the parameters, that are not confirmed (E-key) within 30 seconds, will not be accepted and the parameter will return to its originally stored value. The actual process value and the setpoint value will be indicated.
F1	Function key, E. g. all zones are displayed cyclic (zone scanning on/off). Zones, which are not in action (OFF), are not displayed. The function of this key can be programmed into the configuration level of zone 0. See parameter „Co.F1".

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

6.1 Tendency Display

After switching the instrument „on" a temperature tendency display will be shown, to give an overview about the temperatures deviations relating to the setpoints in the individual controller zones.

<table>
<tr>
<td>Zone:
1 2 3 4
 
</td>
<td>Display examples:

Zone 1: Controller output active
temperature OK
(Bar central)

Zone 2: Controller output not active
Process value is higher than setpoint
>0,5 % of measuring range (Bar top)

Zone 3: Controller output not active
temperature OK
(Bar central)

Zone 4: Controller output active
Process value is lower than setpoint
<0,5 % of measuring range (Bar bottom)</td>
</tr>
<tr>
<td>Zone:
1 2 3 4

</td>
<td>Zone 1: Top range end has been reached (sensor break)

Zone 2: Bottom range end has been reached (sensor error, open)

Zone 3: Selftuning algorithm is active

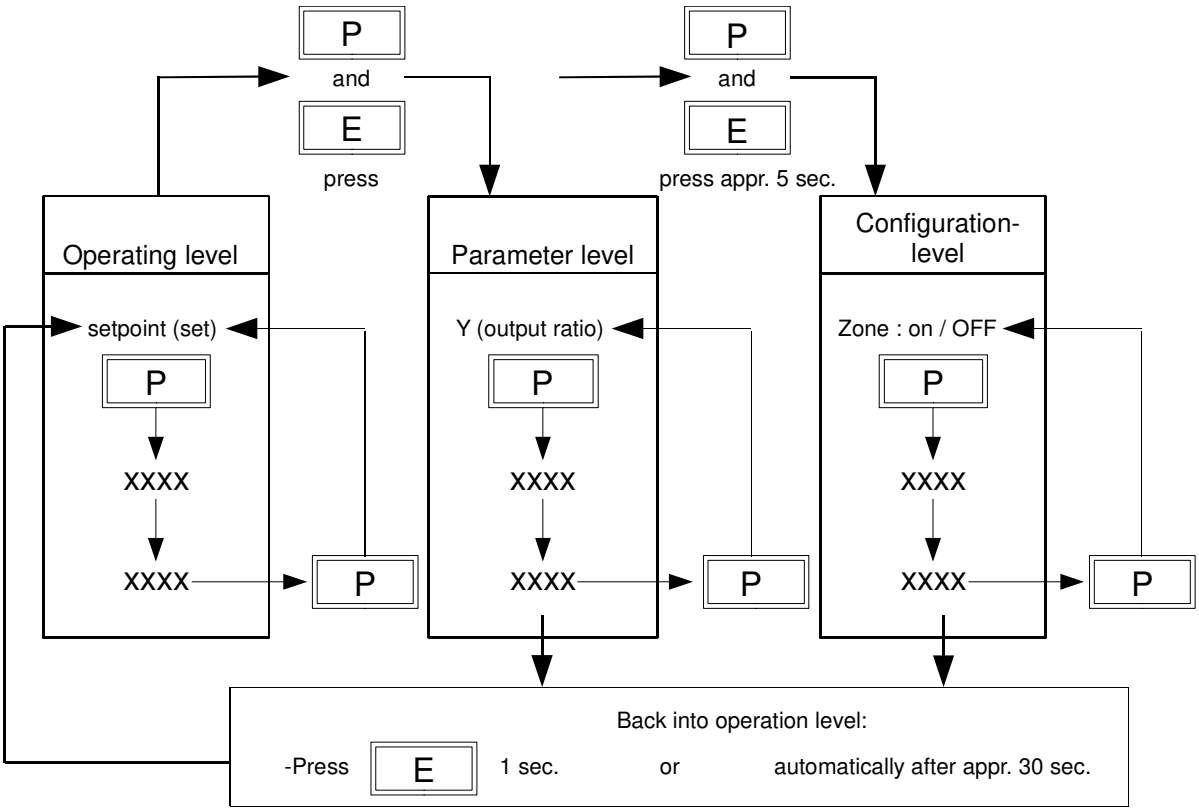
Zone 4: Manual mode</td>
</tr>
<tr>
<td colspan="2">The displayed decimal points show the actual situation of the controller output.
Flashing digit: Alarm indication in the matching zone</td>
</tr>
</table>

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

6.2 Operating Levels

The operation of the controller is divided into 3 levels.

After power up of the device, it will be automatically in the operating level.



Operating level (valid for each zone separately):
Process- and Setpoint value will be displayed simultaneously. Within the operating level the setpoint can be adjusted by pressing the**„UP" / „DOWN"** - keys.
Every adjustment has to be confirmed by pressing the **„ E "** - key.
All parameters within the operating level (including the alarm values) can , in succession, be displayed by pressing the **„ P "** - key and adjusted by pressing the **„UP" / „DOWN"** - keys.
Confirm by pressing the **„ E "** - key.

Parameter level: (valid for each zone separately)
Within the parameter level the values are adjusted to suit each individual process.
This level is reached by simultaneously pressing the **„ P"** - and **„ E "** -keys.
The display of each single parameter within the parameter level and their adjustment are made in the same fashion as within the operating level.
After either pressing the **„ E "** - key for approx. 1 second, or waiting for a period of approx. 30 seconds, the unit will automatically return to the operating level

Configuration level: (valid for the complete device)
Select zone "0". Then press simultaneously the **„ P "** - and "**„ E "** - keys for a period of approx. 5 seconds.
This general settings have to be made first.

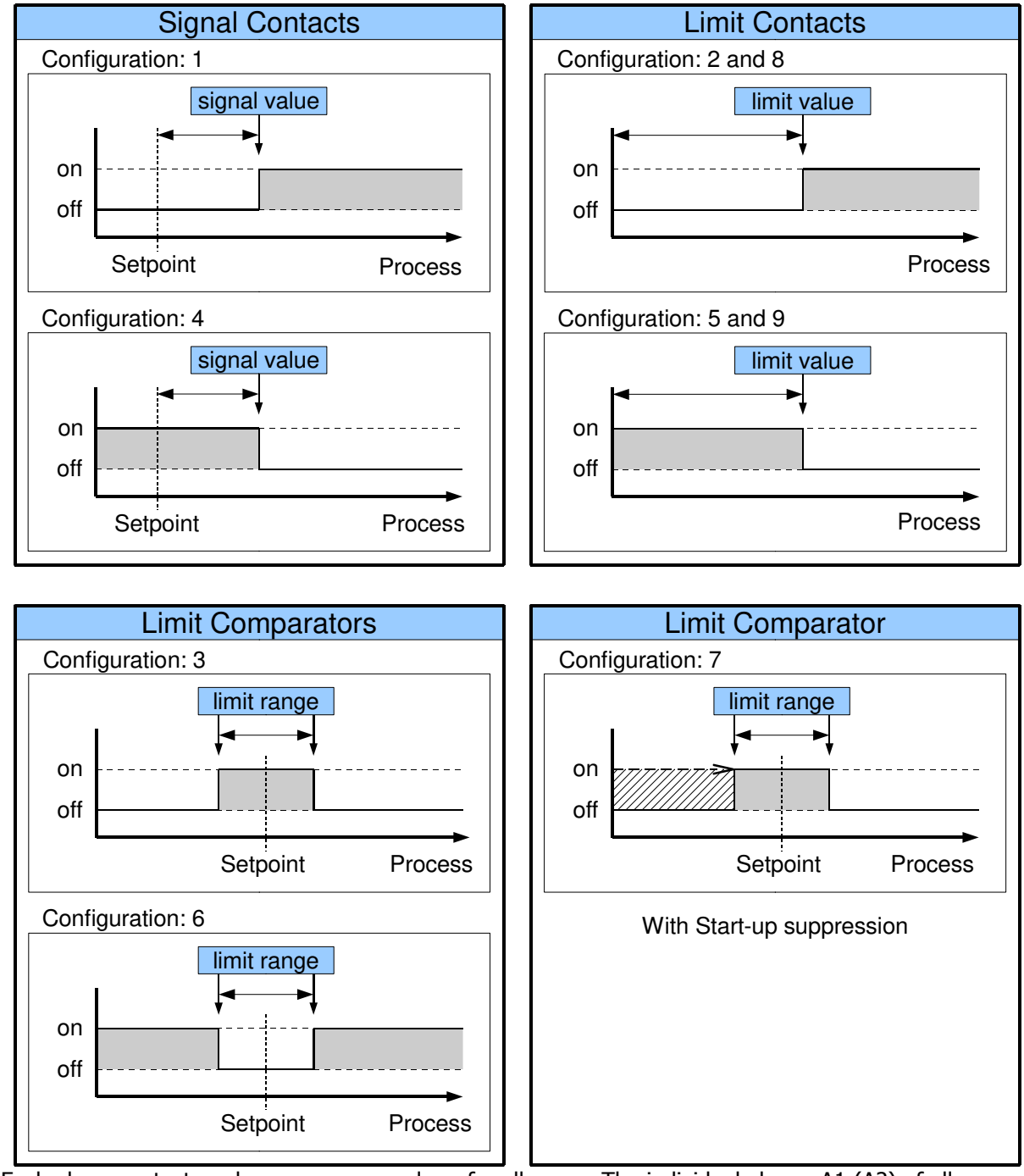
Configuration level: (valid for each zone separately)
Select zone 1...4. Then press simultaneously the **„ P "** - and "**„ E "** - keys for a period of approx. 5 seconds.
There is a copy function available. So it is possible to copy the programmed parameters of one zone to other zones.

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

7 Parameter descriptions:

7.1 Configuration Parameters, Valid for the Complete Device

Alarm configurations, general information:



Each alarm contact works as a common alarm for all zones. The individual alarms A1 (A2) of all zones are connected to the common contact A1 (A2). The selected configuration is valid for all active zones.

Please note:
Care should be taken to ensure that the setpoints of the alarm contacts are programmed within the selected measuring range. If a setpoint ramp has been programmed, the alarms that are relative to the setpoint (signal contact, limit comparator) follow the setpoint ramp.
In case of sensor error the alarms react in the same way as range override.
The alarm contacts therefore do not offer protection against all types of plant breakdown.
We recommend the use of a second, independent monitoring unit.

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

The different alarm configurations define the working mode of the alarm. If the controller features a heater current monitoring, two additional heater current alarms are available. The actual alarm values have to be set in the operating level.

CoA1 Alarm Configuration (switches relay A1)	OFF	Alarm OFF, no alarm signalisation **<§>**
	_ _ ¯1	Signal contact: off-on
	_J¯2	Limit contact: off-on
	_Π_3	Limit comparator: off-on-off
	¯_ _4	Signal contact: on-off
	¯L_5	Limit contact: on-off
	¯U¯6	Limit comparator: on-off-on
	¯Π_7	Limit comparator with start-up suppression: off-on-off
	_J¯8	Heater current monitoring, limit contact: off-on
	¯L_9	Heater current monitoring, limit contact: on-off
rEA1 Switching behaviour Relay A1	Here the relay function may be inverted:	
	dir direct	on: LED A1 „on", Relay A1 "activated" off: LED A1 „off", Relay A1 "not active" The relay is switched on if the controller displays an alarm message. **<§>**
	inv inverse	on: LED A1 „on", Relay A1 "not active" off: LED A1 „off", Relay A1 "activated" The relay is switched off if the controller displays an alarm message.
CoA2 Alarm Configuration (switches relay A1)	Identical adjustment as CoA1	
rEA2 Switching behaviour Relay A2	Identical adjustment as rEA1	

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

Heater current monitoring (option)

The heater current monitoring function is valid for all connected zones.
The following parameters are displayed when the alarm configuration is programmed to "heater current" (8 or 9).

The alarm value (heater current value) is programmed as an absolute value.

Please note: Ensure that the limit value is set correctly to avoid false alarms in case supply voltage changes. The alarm can be delayed by selecting a delay time "**dL.Ax**".

The monitoring function and all parameters are valid for all connected zones.

The heater current measuring is designed for a current transformer 1:1000. (ELOTECH type: M2000)
Heater current detection and indication range: 0...max. 60,0 A Single-phase operation.

dLA1 delay time, relay A1	Delay time for heater current alarm A1 5 steps adjustable, unit: seconds The values depend on the current detection cycle time and the number of active controller zones. OFF = no delay time active **<§>**	
dLA2 delay time, relay A2	Delay time for heater current alarm A2 5 steps adjustable, unit: seconds The values depend on the current detection cycle time and the number of active controller zones. OFF = no delay time active **<§>**	
CuCY Current detection interval	1 … 60s **<§ = 2s>** Time interval between the current measurement of two successive zones	
C 10 Min. leakage current value	OFF**<§>**, 0,0 … 99,9 A The sum of the actual leakage current will be displayed as "Act leak-curr." Monitoring concerning an impermissible permanent current SSRs (especially if they are combined with RC-combinations) normally have small leakage currents. A leakage current limit value is programmable. All values below this limit will not be considered in the alarm monitoring. If a permanent current is detected in one zone the alarm relay will be activated and the display „PROCESS" will show the error signalisation „Er.Cu". The zone with a measured permanent current can be located by pressing the zone key and watching all temperature indications. Display indication in this case: „Comparable with„temperature too high."	
CoF1 Select function of key „F1"	OFF	No function
	SCAn	Automatically zone-scanning „on"/ „off".
	OPt	Self-tuning algorithm can be activated by pressing key „F1" in the matching zone. „F1" approx 2sec.: stops self-tuning.
	y	Shows the actual percentage output ratio, while pressing „F1".
	LEdt	Lamp (LED) test, while pressing „F1".
LOC	OFF	no adjustment lock **<§>**

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

Adjustment lock	P C	parameter and configuration levels locked
	n.SP1	all parameters apart from SP1 locked (**n**ot **SP1**)
	ALL	All parameters that have been locked with LOC can be selected and read, but not adjusted. This adjustment cannot be changed if the external contact K2 is closed.
2o.OF Zones offset preselection	Continuous numbering of the controller zones OFF **<§>,** 1 ... 95 The adjusted offset value is added to the displayed zone numbers in the windows. Therefore a continuous numbering of the zones can be achieved if more than one device is used. Examples: offset = off: zones numbering: 1-4, 1-6, 1-8 offset = 4: zones numbering: 5-8, 5-10, 5-12	

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

Serial Interface (RS232, RS485 or TTY)

The controllers of the series **R2400** can be equipped with a serial interface **RS232**, **RS485** or **0/20mA** (half-duplex) as an option.

This enables a master (PLC) to set and to read the process- and configuration parameters.
The communication is always controlled by the master. The controller operates as a slave.
If there are transmission or range errors detected by the slave, the message is not accepted and the existing parameter values remain valid.

Protocol descriptions and further information: Please see www.elotech.de/downloads

Prot Protocol selection	ELO	ELOTECH- standard protocol **<§>**
	16S	Gateway-Protocol (for special applications only)
Adr Device address	1**<§> ...** 255 At this address a master communicates with the controller. Each controller needs a unique address.	
For Data format	Adjusting the data format for the transmission:	
	7E1	Data bit: 7 Parity: even Stop bit: 1
	7o1	Data bit: 7 Parity: odd Stop bit: 1
	7E2	Data bit: 7 Parity: even Stop bit: 2
	7o2	Data bit: 7 Parity: odd Stop bit: 2
	7n2	Data bit: 7 Parity: no Stop bit: 2
	8E1	Data bit: 8 Parity: even Stop bit: 1
	8o1	Data bit: 8 Parity: odd Stop bit: 1
	8n1	Data bit: 8 Parity: no Stop bit: 1
	8n2	Data bit: 8 Parity: no Stop bit: 2
bAud Baud rate	OFF Interface inactive 0,3 … 9,6**<§>** kBaud	
2009 EL.02 Control number	Device code End of configuration level	

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

7.2 Zone Configuration

ZonE	on	Measuring- or controller zone active **<§>**
	OFF	Measuring- or controller zone switched off
ConF Controller configuration	2P h	2-point controller "heating-off" **<§>**
	2P c	2-point controller "cooling-off"
	2Pnc	2-point controller "cooling non linear". Cooling action with non-linear cooling response curve (e.g. for vapour cooling).
	3P	3-point-controller "heating-off-cooling" **>3<**
	3Pnc	3-point-controller "heating-off-cooling". Cooling action with non-linear cooling response curve (e.g. for vapour cooling). **>3<**
	di SP	Indicator, no controller action

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

SEn Sensor selection	If the zone is configured to PT100, the following sensors are available:	
	P1°C	Pt100 -50,0...100,0°C
	P1°F	Pt100 -58...212°F
	P2°C	PT100 -90,0...205,0°C
	P2°F	Pt100 -130...401°F
	P4°C	Pt100 0...400°C **<§>**
	P4°F	Pt100 32...752°F
	P8°C	Pt100 0...800°C
	P8°F	Pt100 32...1472°F
	If the zone is configured to thermocouple, the following sensors are available:	
	L4°C	Thermocouple (TC) Fe-CuNi(L) 0...400°C
	L4°F	Thermocouple (TC) Fe-CuNi(L) 32..752°F
	L8°C	Thermocouple (TC) Fe-CuNi(L) 0...800°C
	L8°F	Thermocouple (TC) Fe-CuNi(L) 32..1472°F
	J8°C	Thermocouple(TC) Fe-CuNi(J) 0...800°C
	J8°F	Thermocouple (TC) Fe-CuNi(J) 32..1472°F
	n1°C	Thermocouple (TC) NiCr-Ni(K) 0..1200°C
	n1°F	Thermocouple (TC) NiCr-Ni(K) 32..2192°F
	S1°C	Thermocouple (TC) PtRh-Pt(S) 0..1600°C
	S1°F	Thermocouple (TC) PtRh-Pt(S) 32..2912°F
	Please note: If the sensor selection is changed, the following parameters will be reset:	
	Setpoint 1, Setpoint 2: Lower setpoint limitation: Higher setpoint limitation: Setpoint ramp rising/falling: Alarm values: Actual process value offset:	Setpoint limitation min. measuring range bottom measuring range top OFF OFF OFF
SP.Hi higher setpoint limitation	programming range: SP.Lo ... top range	Highest adjustable setpoint value **<§= 400°C>**
SP.Lo lower setpoint limitation	programming range: bottom range ... SP.Hi	Lowest adjustable setpoint value **<§ = 0°C>**
COPY Copy function	to 1... to 4 Copy all parameters of the actual zone to the selected zone x Select the target zone (1,2 .... or to A(to all) with the **„UP/DOWN"** keys and press **„E"** (enter). The parameters will be copied. **Note: This will only happen if the selected sensor types in the source and in the destination zone are identical.**	

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

Softstart Function in General:
If you select the softstart function, make sure that the instrument is equipped with bistable voltage (logic) outputs. This function is not allowed for instruments with relay outputs. Otherwise the relays will be damaged.

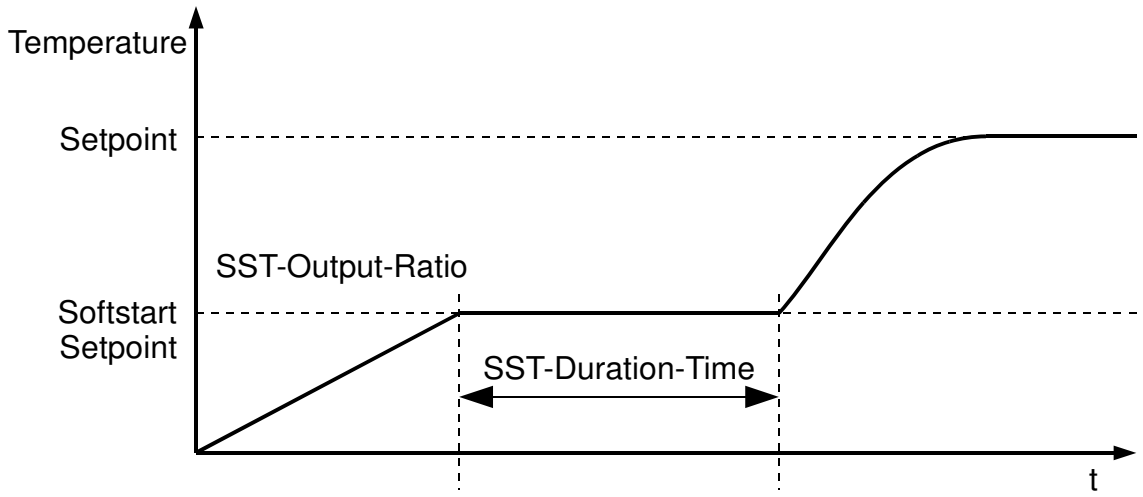
During the softstart the controller's heating output response is limited to a preselected ratio, in order to achieve a slow drying of high performance heat cartridges.
This results in a slower, more regular heating period.
Simultaneously the output clock frequency is quadrupled.

Once the process value reaches the softstart setpoint, it remains stable at this value for the preselected duration time.
At the end of this period the process value rises to the valid setpoint.

If the softstart is active, the controller's autotune function cannot operate (Er.0P).
If a setpoint ramp has been programmed, the softstart has priority, and the ramp will become active after the softstart has been completed.

The softstart only works
- if the parameter P (xp) is programmed ≥ 0,1%
- if the actual process value is lower than the softstart setpoint
– 5% of the selected measuring range

It is possible to select this function for each zone individually.



SoSt Softstart	OFF Softstart function is not active. **<§>** The other softstart parameters are not displayed. on Softstart function is active.
So.y Softstart output ratio	range: 10...100% **<§ = 30>**
SoSP Softstart setpoint	range: SPLo... SPHi **<§ = 100>**
Sot. Softstart duration time	range: OFF, 0.1 ... 9,9 min. **<§ = 2.0>**

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

HAnd Output mode	OFF	Controller mode **<§>**
	Auto Automatic Mode	In the event of sensor break the last valid output ratio is maintained. An „H" is then displayed as the first digit in the setpoint display, followed by the valid output ratio. Like the setpoint, the output ratio can be changed manually. Under the following circumstances, the output ratio will be 0%: - if the output ratio at the time of the sensor break was 100%. - if a setpoint ramp is active. - if the control deviation was more than 0,25% of the total range at the time of sensor break. - if the Proportional-band (P) = off. - if the softstart was active at the time of the sensor break. A few seconds after the sensor break has been rectified, the controller returns to automatic operation and calculates the required output ratio. An additional signal can be issued in the event of sensor break, if the alarm contacts are programmed accordingly.
	nAn Manual Mode	The controller now operates only as an actuator. The control function (PID) is inactive. PROCESS: Actual process value is shown. Display of setpoint: First an "H", then the actual adjustable output ratio. Negative value: cooling, positive value: heating Like the setpoint, the output ratio can be changed manually.

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

7.3 Control Parameters, Zone Dependent

Y valid output ratio	0 … 100% The output ratio shows the momentary calculated ratio. It cannot be altered. The display is in percent of the installed performance capability for heating or cooling. Output ratio for cooling is shown as a negative value.
1YH1 Output ratio limit „heating"	0 … 100%**<§ >** The limitation of the output ratio is only necessary if the heating energy supply is grossly overdimensioned compared to the power required. Under normal conditions a limitation is not necessary (setting = 100%). The limitation becomes effective when the controller's calculated output ratio is greater than the maximum permissible (limited) ratio. **Warning!** The output ratio limitation does not work during autotune.
2YH1 Output ratio limit „cooling"	0 … 100%**<§ >**

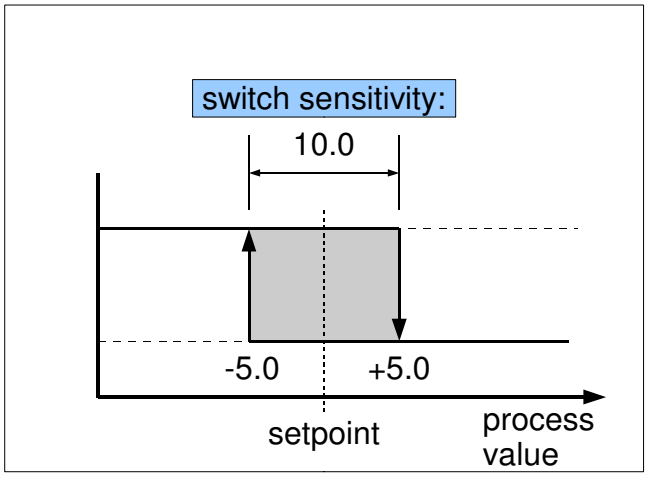
Adjustment of the control parameters:
As standard the controller operates in PD/I control mode, i. e. controlling without deviation and with practically no overshoot during start-up.

3-point controllers (marked with: **>3<**) have a second "cooling" parameter set.
The control action can be altered in its structure by adjusting the following values to the parameters:

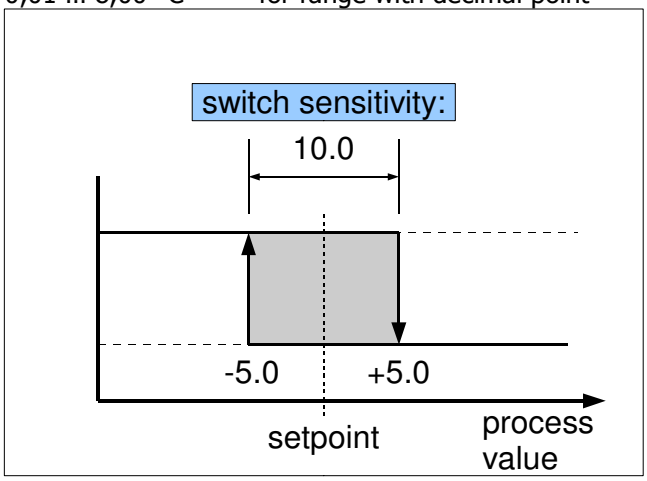
a. no control action, on-off	setting P = **OFF**
b. P-action	setting D and I = **OFF**
c. PD-action	setting I = **OFF**
d. PI-	setting D = **OFF**
e. PD/I	modified PID-mode (set: P, D, I)
	According to the configuration, certain parameters are not visible.

1 P prop. band (P) „heating"	**OFF**; 0,1...100,0 % **<§=3,0>** If **1 P**= **OFF**(control action: on-off, without feedback) next parameter: **1 Sd**.
1 d rate (D) „heating"	**OFF** 1 … 200 sec **<§ = 30>**
1 I reset(I) „heating"	**OFF** 1 … 1000 sec **<§ = 150>**
1 C cycle time „heating"	0,5 … 240,0 sec **<§=10,0>** The switching frequency of the actuator can be determined by adjusting the cycle time. In this time interval the controller switches on and off once. Voltage outputs for SSRs cycle time: 0,5...10 s Optimal value for fast control loops: 0,8s Relay outputs: cycle time: > 10 s The cycle time should be adjusted to a time as long as possible to minimize the wear of the relay contacts.

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

I Sd switch sensitivity „heating“	Only if „P- Band“ = off (on-off action, without feedback) **OFF**; 0,1**<§>** … 80,0 °C for range without decimal point **OFF**; 0,01 … 8,00 °C for range with decimal point 

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

Sh Switch point difference „heating" und „cooling" **>3<**	**OFF**; 0,1**<§ >** … 20,0 °C for range without decimal point **OFF**; 0,01 … 2,00 °C for range with decimal point If the controller is in heating mode, the actual process value has to rise by the adjusted value above the setpoint before the cooling mode will become active. By this the switching frequency between the heating and cooling outputs can be reduced. Simultaneous activation of heating and cooling outputs is not possible.
2 P prop. band (P) „cooling" **>3<**	**OFF**; 0.1 … 100.0% **<§ =3.0>** If **2 P** = **OFF** (control action: on-off, without feedback) next parameter: **2 Sd**
2 d rate (D) „cooling" **>3<**	**OFF**; 1 … 200 s **<§ = 30>**
2 I reset(I) „cooling" **>3<**	**OFF**; 1 … 1000 s **<§ = 150>**
2 C cycle time „cooling" **>3<**	**OFF** 0,5 … 240,0 s **<§ = 10,0>** The switching frequency of the actuator can be determined by adjusting the cycle time. In this time interval the controller switches on and off once. Voltage outputs for SSRs cycle time: 0,5...10 s Optimal value for fast control loops: 0,8s Relay outputs: cycle time: > 10 s The cycle time should be adjusted to a time as long as possible to minimize the wear of the relay contacts.
2 Sd switch sensitivity „cooling" **>3<**	Only if „P- Band" = off (on-off action, without feedback) **OFF**; 0,1**<§ >** … 80,0 °C for range without decimal point **OFF**; 0,01 … 8,00 °C for range with decimal point 

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

Autotune:

The tuning algorithm determines the characteristic values within the controlled process and calculates the valid feedback parameters (P,D,I) and the cycle time (= 0.3 x D) of a PD/I-controller for a wide section of the range.

The autotune mode is activated during start-up shortly before the setpoint is reached.
If activated after the setpoint has already been reached, the temperature will first drop by approx. 5% of the measuring range in order to detect the exact amplification of the process.

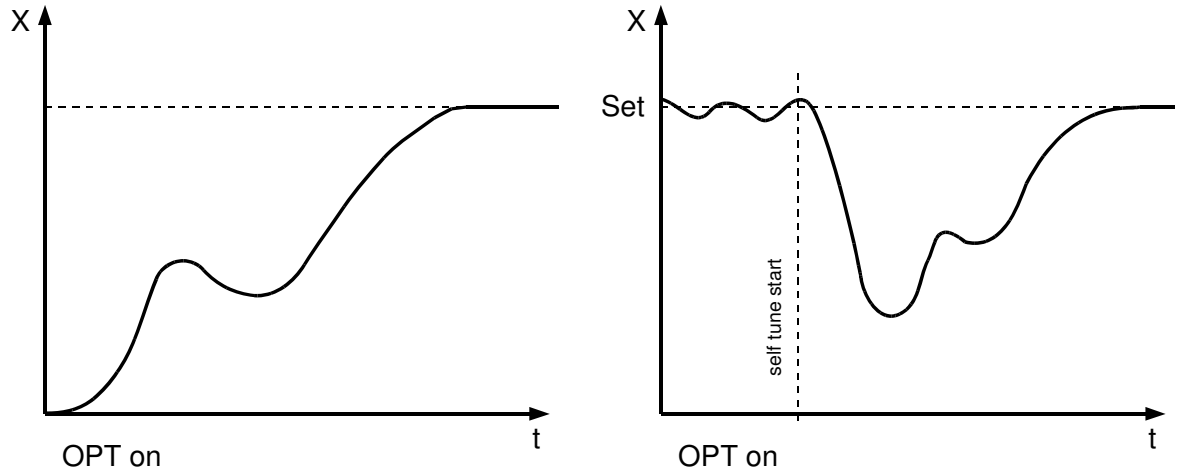
The setpoint must amount to at least 5% of the measuring range.

The tuning algorithm can be activated at any time by selecting the OPt= on and pressing the **„E"**-key.
After having calculated the correct feedback parameters, the controller will lead the process value to the setpoint.

Zone display: During self tuning is OPt shown in the display, alternating with the setpoint value.
Tendency display: „**O**" is shown.

Please note: If the softstart function is active, the autotune cannot be activated.

Selecting OPt= OFF will stop the autotune function.



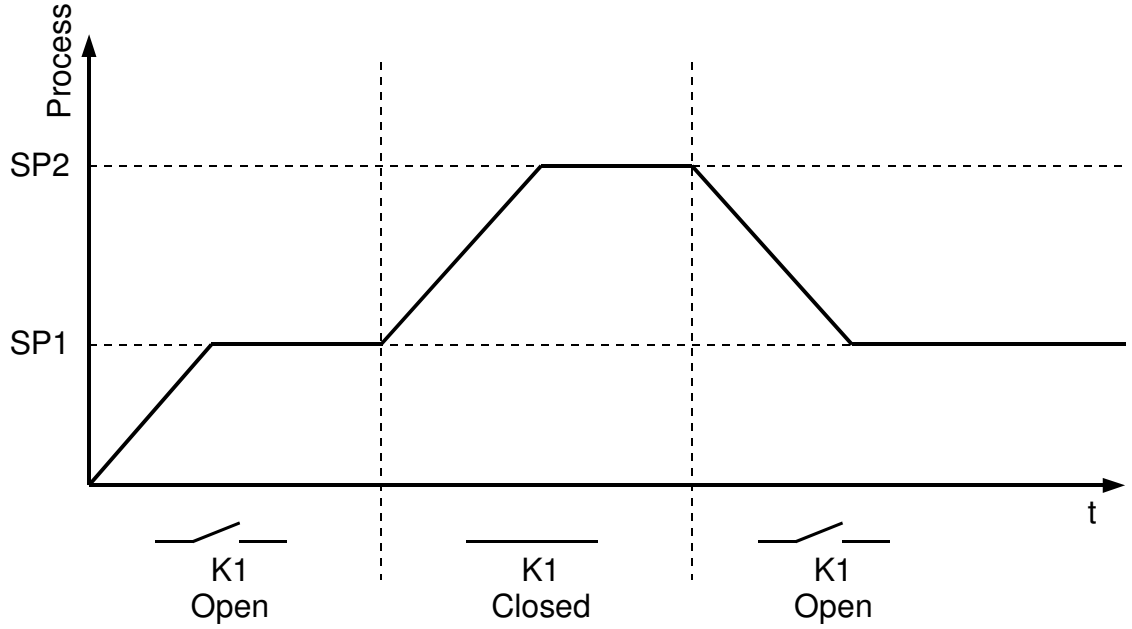
OPt Autotune	OFF autotune / self tuning out of action**<§>**
	on autotune / self tuning on request (one time)
OFSt Process value offset	- 999... OFF**<§>** … 1000 °C/°F for range without decimal point - 99,9... OFF**<§>** … 100,0 °C/°F for range with decimal point This parameter serves to correct the input signal, e.g. for: - the correction of a gradient between the measuring point and the sensor tip - the line resistance balancing of 2-line RTD (Pt100) sensors - correction of the control deviation when using P- or PD-action If for example the offset value is set to +5°C, the real temperature measured by the sensor (when process is balanced) is 5 °C less than the setpoint and the displayed actual process value. Make sure that the corrected temperature process value does not leave the selected measuring range.

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

7.4 Operating Level

SP2 Setpoint 2	OFF<§>; SP.Lo... SP.Hi If the external contact K1 is closed, the setpoint 2 becomes active in all zones in which Setpoint 2 is not set to OFF

Ramp function:
A programmed ramp is always activated when the setpoint is changed or when the mains supply is switched on. The ramp starts at the actual process value and ends at the preselected setpoint. The ramp can be activated for both setpoint 1 and setpoint 2. By programming the second setpoint accordingly a setpoint profile can be obtained.(Please see example below.)



SP1 Rising ramp	OFF<§>; 0,1 … 100,0 °C/min. or °F/min.	
SP4 Falling ramp	OFF<§>; 0,1 … 100,0 °C/min. or °F/min.	
A1 Alarm value 1 (switches relay A1)	Before adjusting an alarm value, the alarm configuration has to be set.	
	Temperature monitoring:	**Adjustment range**
	Signal contact, without decimal point	OFF<§>, -999 … 1000
	Signal contact, with decimal point	OFF<§>, -99,9 … 100,0
	Limit comparator, without decimal point	OFF<§>, 1 ... 1000
	Limit comparator, with decimal point	OFF<§>, 0,1 ... 100,0
	Limit contact, adjustment according to measuring range	OFF<§>, Measuring range, bottom end ... top end
	Heater current monitoring:	**Adjustment range**
	Limit contact	OFF<§>; 0,1 … 99,9 A
A2 Alarm value 2 (switches relay A2)	Identical setting as A1	
Cur Heater current	Indication of the actual heater current.	

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

8 Error Messages

Error Message	Cause	Possible remedy
SP.Lo	Lower setpoint limit has been reached	Reduce limit, if need be
SP.Hi	Upper setpoint limit has been reached	Increase limit, if need be
LOC	Parameter has been locked	Unlock, if need be Device parameter-> Adjustment lock
Er.Hi	Top range end has been exceeded, sensor defect	Check sensor and cable
Er.Lo	Bottom range end has been exceeded, sensor defect	Check sensor and cable Check process value offset
Er.OP	Self tuning error	Quit error message by pressing the key "E". Check the self tuning conditions and restart.
Er.SY	System error	Quit error message by pressing the key "E". Check all parameters. If the error message continues, please send the controller back to the manufacturer.
CoA1	Alarmconfiguration of alarm A1: OFF	No alarm signal available
CoA2	Alarmconfiguration of alarm A2: OFF	No alarm signal available
-no- -PA-	Parameter not available in this zone.	
Er.Cu	Permanent current indicated	

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

9 Technical Data

Input PT100 (RTD)	2- or 3- wire connection possible Built-in protection against sensor breakage and short circuit Sensor current: … ≤ 1 mA Calibration accuracy: … ≤ 0,2 % Linear error: … ≤ 0,2 % Influence of the ambient temperature: … ≤ 0,01 % / K
Input Thermocouple	Built-in internal compensation point and protection against sensor breakage and incorrect polarity. Re-calibration not required for a line resistance of up to 50 Ohm. Calibration accuracy: … ≤ 0,25 % Linear error: … ≤ 0,2 % Influence of the ambient temperature: … ≤ 0,01 % / K
External contacts	Designed for connecting external potential-free contacts. The contact voltage (approx. 24 V DC, max. 1mA) is provided at controller terminal 75.
Heater current monitoring	Measuring input range: 0 … 100mA corresponding 0,0 … 99,9A when using a current transformer 1:1000. If the value of 100mA is exceeded, the controller may be damaged.
Control outputs	Bist. voltage signal, 0/18 V DC, max. 10 mA, short-circuit proof or Relay, max. 250 VAC, max. 3 A (cos-phi = 1)
Alarm outputs	Relay, max. 250 VAC, max. 3 A (cos-phi = 1)
7-Segment-Display:	Process: 10 mm red, Set: 10 mm red
Data protection	EAROM When using a Fieldbus interface please note: Permissible writing operations per parameter must not exceed 1 000 000.
CE-mark	Tested according to 2004/108/EG; EN 61326-1 Electrical safety: EN 61010-1
Power supply	Depends on the version of the device: - 230 V AC, +/-10 %, 48 … 62 Hz; approx. 10VA - 115 V AC, +/-10 %, 48 … 62 Hz; approx. 10VA - 24 V DC, +/-25 %, approx. 10W
Connections	Screw terminals, Protection mode IP 20 (DIN 40050), Insulation class C
Permissible operating conditions	Operating temperature: 0 … 50°C / 32 … 122°F Storage temperature: -30 … 70°C / -22 … 158°F Climate class: KWF DIN 40040; equivalent to annual average max. 75 % rel. humidity, no condensation
Casing	Format, case: ¼-DIN; 96 x 96 mm (DIN 43700), installation depth 122 mm Panel cutout: 92 +0,5 mm x 92 +0,5 mm Material: Noryl, self-extinguishing, non-drip, UL 94-V1 Protection mode: IP 20 (DIN 40050), IP 50 front side
Weight	Approx. 800g, depends on the version of the device
Fieldbus Interface (optically isolated)	Depends on the version of the device: - Serial: RS232, RS485, TTY (20mA)

Subject to technical improvements.

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

10 Notes

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk

Clarian uk ltd
Clarian UK Ltd. Tel. 01942 620 062
www.clarian.co.uk