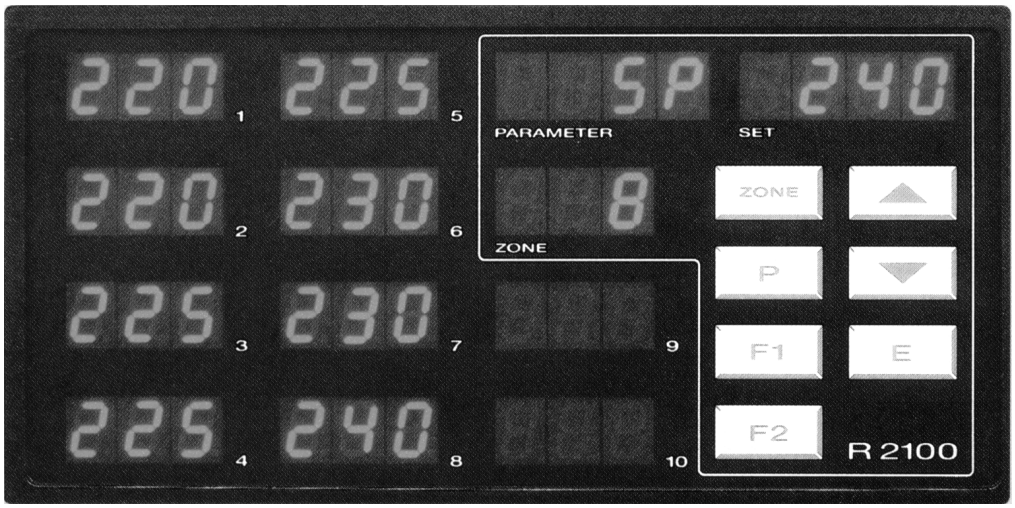
R 2100 - 63x - 0 - x:
6 - Zones „heat-only“ or „heating-off-cooling“ Temperature Controller

R 2100 - 83x - 0 - x :
8 - Zones „heat-only“ or „heating-off-cooling“ Temperature Controller

- 2 x Analogue Input (Option)



DIN-Format: 192 x 96 mm
Installation depth: 122 mm

DESCRIPTION AND OPERATING MANUAL

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Contents

Please read this operating manual carefully before starting up.
Observe the installation and connecting instructions.

Type code

R 2100 - aaa - x - y - 000 - d - z

1: power supply: 230 V AC
2: power supply: 115 V AC
3: power supply: 24 V AC
5: power supply: 24 V DC

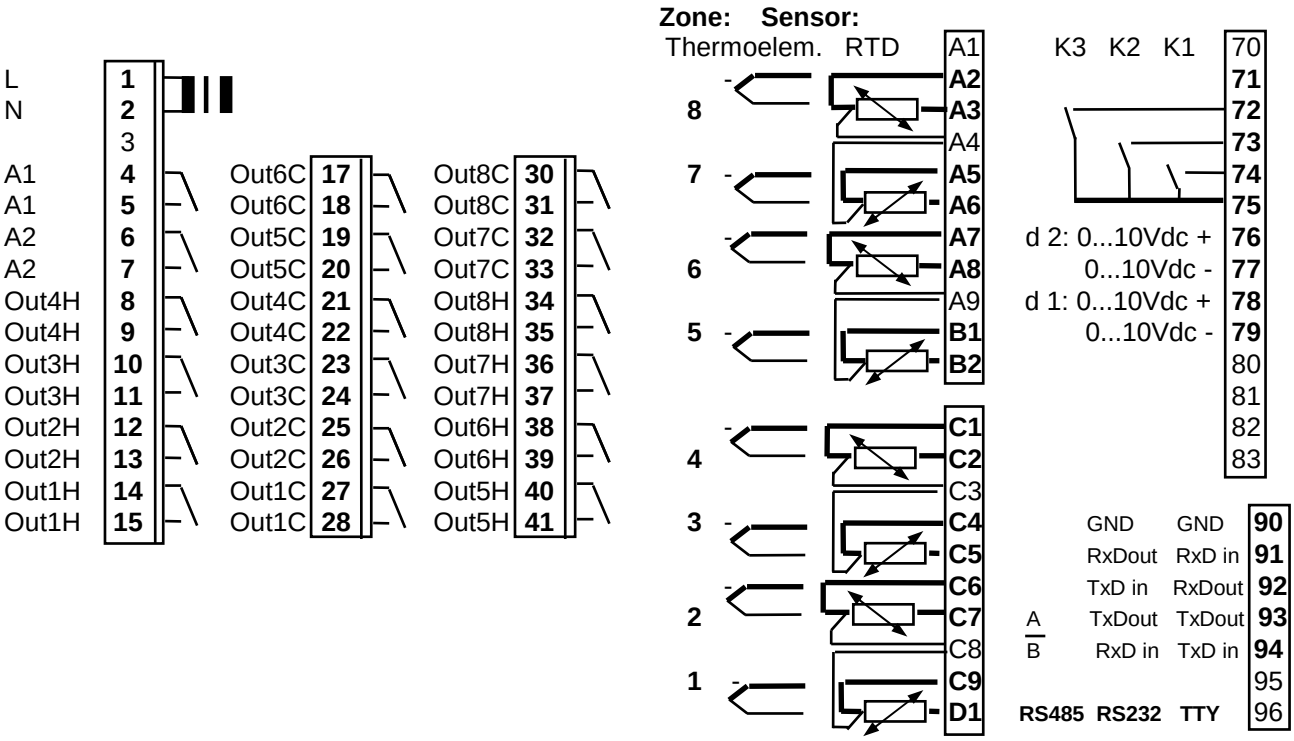
0: without serial interface
2: ser. interface RS232-C Protocol: ELOTECH - standard
4: ser. interface RS485 Protocol: ELOTECH – standard
InterBus-S via gateway M-IBS -5
5: Ser. interface 0/20mA Protocol: ELOTECH - standard
7: CAN, CANopen Device Profile DS-404
8: DeviceNet, V2.0
9: Profibus-DP

0: standard

0: sensor programmable: RTD (Pt100-DIN), 2- or 3-wire; Type L, Type J; Type K

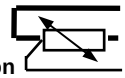
631	6 - zones heating-off-cooling controller;	control outputs:	all, relais
636	6 - zones heating-off-cooling controller;	control outputs:	all, bist. voltage signal. Com.: -
637	6 - zones heating-off-cooling controller;	control outputs: :	„heating“: bist. voltage signal. Com.: - „cooling“: relay
831	8 - zones heating-off-cooling controller;	control outputs:	all, relais
836	8 - zones heating-off-cooling controller;	control outputs:	all, bist. voltage signal. Com.: -
837	8 - zones heating-off-cooling controller;	control outputs: :	„heating“: bist. voltage signal. Com.: - „cooling“: relay

Connection Diagram: R 2100 - 631 R 2100 - 831



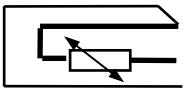
It is not permitted to connect the grounds of the sensor-inputs and bist. voltage-outputs with each other.

C6: **RTD**
C7: **3-wire**
C8: **connection**



2. wire
1. wire
3. wire

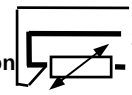
RTD
2-wire
connection



2. wire
1. wire
3. wire = jumper to 2. wire

jumper

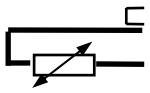
C8: **RTD**
C9: 3-wire
D1: connection



3. wire
2. wire
1. wire

jumper

RTD
2-wire-
connection



3. wire = jumper to 2. wire
2. wire
1. wire

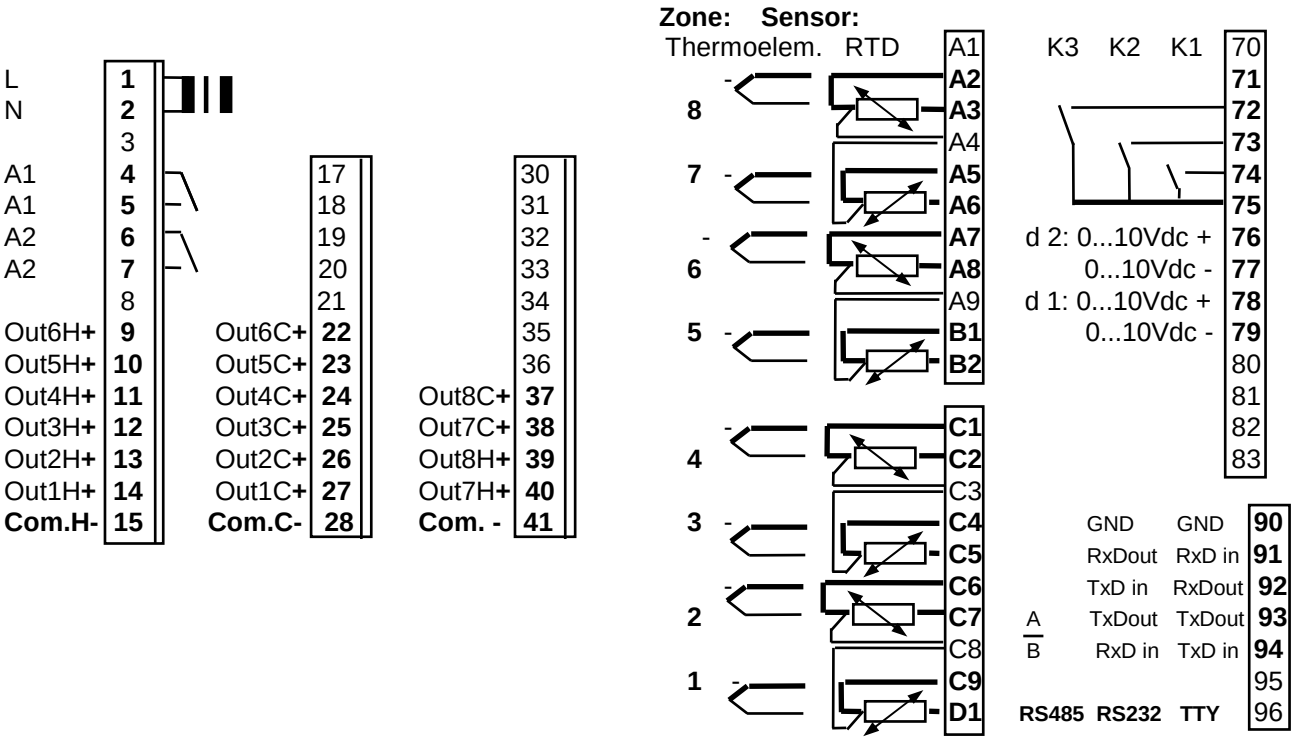
			„heat-only“ or „cool-only“ - controller:	**„heating-off-cooling“ - controller:**
Control output	**OUT 1H:**	Zone 1;	„heating“ or „cooling“	„heating“
	OUT 2H:	Zone 2;	„heating“ or „cooling“	„heating
	OUT 3H:	Zone 3;	„heating“ or „cooling“	„heating
	OUT 4H:	Zone 4;	„heating“ or „cooling“	„heating
	OUT 5H:	Zone 5;	„heating“ or „cooling“	„heating
	OUT 6H:	Zone 6;	„heating“ or „cooling“	„heating
	OUT 7H:	Zone 7;	„heating“ or „cooling“	„heating
	OUT 8H:	Zone 8;	„heating“ or „cooling“	„heating
Control output	**OUT 1C:**	Zone 1;		
	OUT 2C:	Zone 2;		„cooling“
	OUT 3C:	Zone 3;		„cooling“
	OUT 4C:	Zone 4;		„cooling“
	OUT 5C:	Zone 5;		„cooling“
	OUT 6C:	Zone 6;		„cooling“
	OUT 7C:	Zone 7;		„cooling“
	OUT 8C:	Zone 8;		„cooling“

Alarm Output A1: Alarm 1 (Temperature alarm A1 for all zones)
Alarm Output A2: Alarm 2 (Temperature alarm A2 for all zones)

Input d1: 0 ... 10 VDC, OPTION Zone: d1
Input d2: 0 ... 10 VDC, OPTION Zone: d2

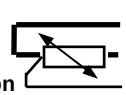
Setpoint Controlling: K1: open = Setpoint 1 (SP1) valid
K1: closed = Setpoint 2 (SP2) valid, for all zones
Adjustment lock (LOC)**:** K2: open = Adjustment lock only via „software code“ (see parameter: LOC)
K2: closed. = Adjustment locked according to the choosen „software code“.
Setpoint changing: K3: open = individual setpoint adjustment for each zone
K3: closed = if setpoint has been changed in one zone,
this new setpoint is valid (will be overtaken) for all other zones automatically.

Connection Diagram: R 2100 - 636 R 2100 - 836

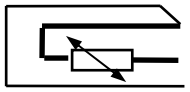


It is not permitted to connect the grounds of the sensor-inputs and bist. voltage-outputs with each other.

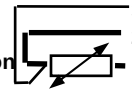
C6: **RTD** **2. wire**
C7: **3-wire** **1. wire**
C8: **connection** 3. wire



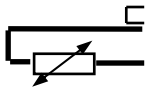
RTD **2. wire**
2-wire **1. wire**
connection 3. wire = jumper to 2. wire



C8: **RTD** 3. wire
C9: **3-wire** **2. wire**
D1: **connection** **1. wire**



RTD 3. wire = jumper to 2. wire
2-wire- **2. wire**
connection **1. wire**



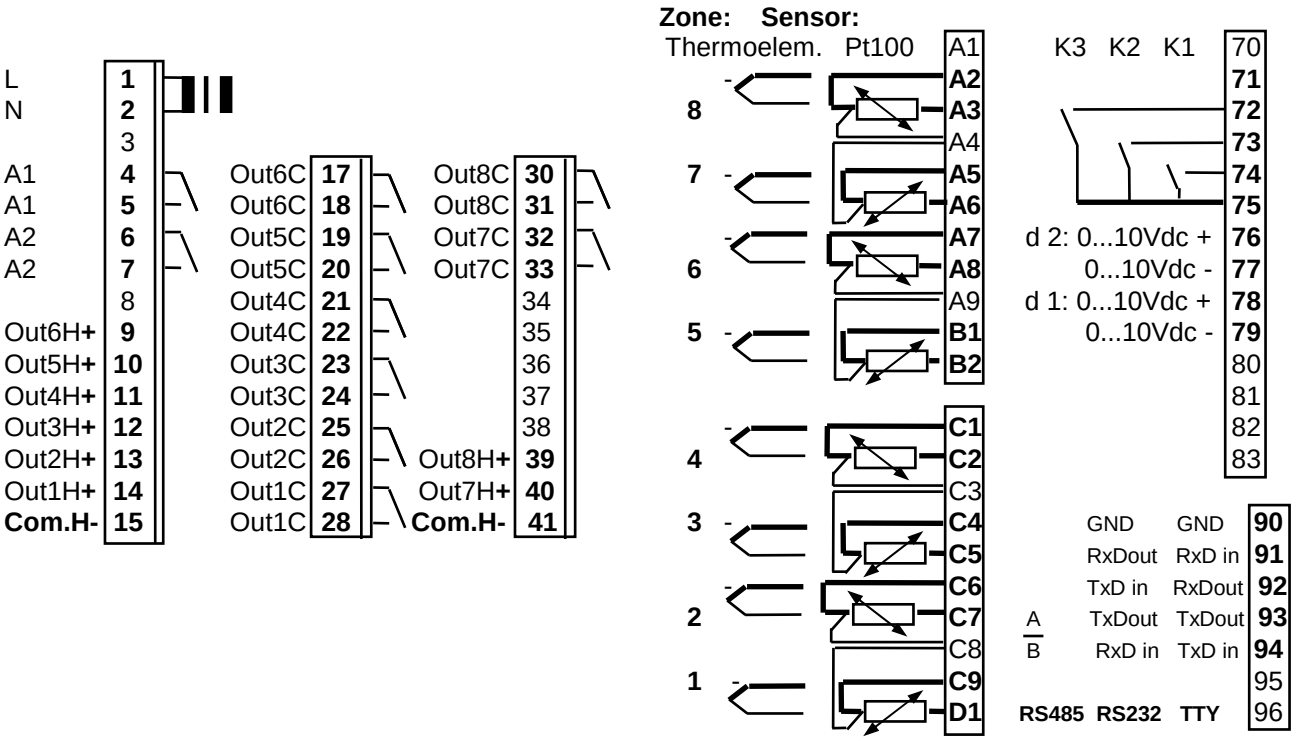
			„heat-only“ or „cool-only“ - controller:	**„heating-off-cooling“ - controller:**
Control output	**OUT 1H:**	Zone 1;	„heating“ or „cooling“	„heating“
	OUT 2H:	Zone 2;	„heating“ or „cooling“	„heating
	OUT 3H:	Zone 3;	„heating“ or „cooling“	„heating
	OUT 4H:	Zone 4;	„heating“ or „cooling“	„heating
	OUT 5H:	Zone 5;	„heating“ or „cooling“	„heating
	OUT 6H:	Zone 6;	„heating“ or „cooling“	„heating
	OUT 7H:	Zone 7;	„heating“ or „cooling“	„heating
	OUT 8H:	Zone 8;	„heating“ or „cooling“	„heating
Control output	**OUT 1C:**	Zone 1;		
	OUT 2C:	Zone 2;		„cooling“
	OUT 3C:	Zone 3;		„cooling“
	OUT 4C:	Zone 4;		„cooling“
	OUT 5C:	Zone 5;		„cooling“
	OUT 6C:	Zone 6;		„cooling“
	OUT 7C:	Zone 7;		„cooling“
	OUT 8C:	Zone 8;		„cooling“

Alarm Output A1: Alarm 1 (Temperature alarm A1 for all zones)
Alarm Output A2: Alarm 2 (Temperature alarm A2 for all zones)

Input d1: 0 ... 10 VDC, OPTION Zone: d1
Input d2: 0 ... 10 VDC, OPTION Zone: d2

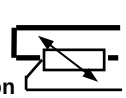
Setpoint Controlling: K1: open = Setpoint 1 (SP1) valid
K1: closed = Setpoint 2 (SP2) valid, for all zones
Adjustment lock (LOC)**:** K2: open = Adjustment lock only via „software code“ (see parameter: LOC)
K2: closed. = Adjustment locked according to the choosen „software code“.
Setpoint changing: K3: open = individual setpoint adjustment for each zone
K3: closed = if setpoint has been changed in one zone,
this new setpoint is valid (will be overtaken) for all other zones automatically.

Connection Diagram: R 2100 - 637 R 2100 - 837

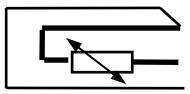


It is not permitted to connect the grounds of the sensor-inputs and bist. voltage-outputs with each other.

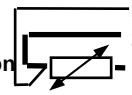
C6: **RTD** **2. wire**
C7: **3-wire** **1. wire**
C8: **connection** 3. wire



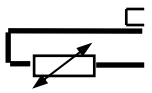
RTD **2. wire**
2-wire **1. wire**
connection 3. wire = jumper to 2. wire



C8: **RTD** 3. wire
C9: **3-wire** **2. wire**
D1: **connection** **1. wire**



RTD 3. wire = jumper to 2. wire
2-wire- **2. wire**
connection **1. wire**



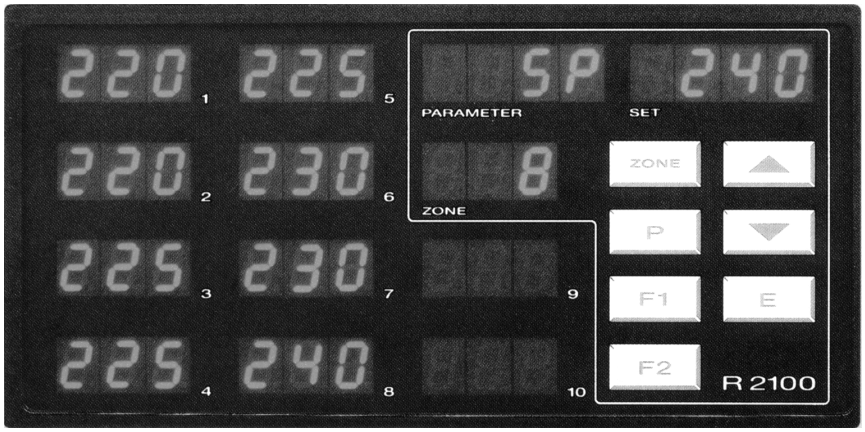
			„heat-only“ or „cool-only“ - controller:	**„heating-off-cooling“ - controller:**
Control output	**OUT 1H:**	Zone 1;	„heating“ or „cooling“	„heating“
	OUT 2H:	Zone 2;	„heating“ or „cooling“	„heating
	OUT 3H:	Zone 3;	„heating“ or „cooling“	„heating
	OUT 4H:	Zone 4;	„heating“ or „cooling“	„heating
	OUT 5H:	Zone 5;	„heating“ or „cooling“	„heating
	OUT 6H:	Zone 6;	„heating“ or „cooling“	„heating
	OUT 7H:	Zone 7;	„heating“ or „cooling“	„heating
	OUT 8H:	Zone 8;	„heating“ or „cooling“	„heating
Control output	**OUT 1C:**	Zone 1;		
	OUT 2C:	Zone 2;		„cooling“
	OUT 3C:	Zone 3;		„cooling“
	OUT 4C:	Zone 4;		„cooling“
	OUT 5C:	Zone 5;		„cooling“
	OUT 6C:	Zone 6;		„cooling“
	OUT 7C:	Zone 7;		„cooling“
	OUT 8C:	Zone 8;		„cooling“

Alarm Output A1: Alarm 1 (Temperature alarm A1 for all zones)
Alarm Output A2: Alarm 2 (Temperature alarm A2 for all zones)

Input d1: 0 ... 10 VDC, OPTION Zone: d1
Input d2: 0 ... 10 VDC, OPTION Zone: d2

Setpoint Controlling: K1: open = Setpoint 1 (SP1) valid
K1: closed = Setpoint 2 (SP2) valid, for all zones
Adjustment lock (LOC)**:** K2: open = Adjustment lock only via „software code“ (see parameter: LOC)
K2: closed. = Adjustment locked according to the choosen „software code“.
Setpoint changing: K3: open = individual setpoint adjustment for each zone
K3: closed = if setpoint has been changed in one zone,
this new setpoint is valid (will be overtaken) for all other zones automatically.

Display and Keyboard, general



Display 1: Zone 1, actual (process) value or setpoint or tendency display

Display 2: Zone 2, actual (process) value or setpoint or tendency display

Display 3: Zone 3, actual (process) value or setpoint or tendency display

Display 4: Zone 4, actual (process) value or setpoint or tendency display

Display 5: zone 5, actual (process) value or setpoint or tendency display

Display 6: zone 6, actual (process) value or setpoint or tendency display

Display 7: zone 7, actual (process) value or setpoint or tendency display

Display 8: zone 8, actual (process) value or setpoint or tendency display

Display „**ZONE**“: With key „ZONE“ preselected controlling zone.
Zone = 0: simultanouos indication of the above parameters.

Display „**PARAMETER**“: Shortform of the actual selected parameter.

Display „**SET**“: Parameter value

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 Enter. Confirmation and storage of the pre-selected values.
The display will show a light chain as a control of this function.

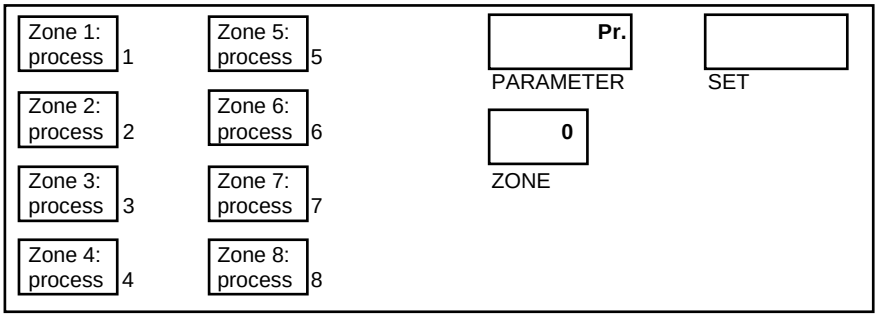
P Sets the parameter back to the originally stored value.
Any alterations made to the parameters, that are not confirmed (E-key) within 30 seconds, will not be accepted and the parameter will return to its originally stored value. The actual process value and the setpoint value will be indicated.

F1 Function key F1, The function of this key can be programmed into the configuration level of zone 0. See parameter „Co.F1“ (page 11).

F2 Function key F2, Preselection of the values displayed in the displays 1...8 simultaneous. All actual (process) values, actual setpoints or tendency displays.

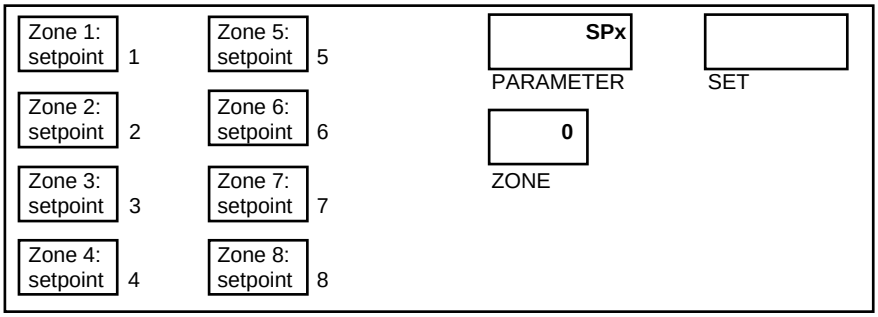
Display: Process values, setpoints; tendency, control output and alarm indication

After switching on the unit, the process values (actual values) of zones 1...6 or 1...8 will be displayed simultaneously::



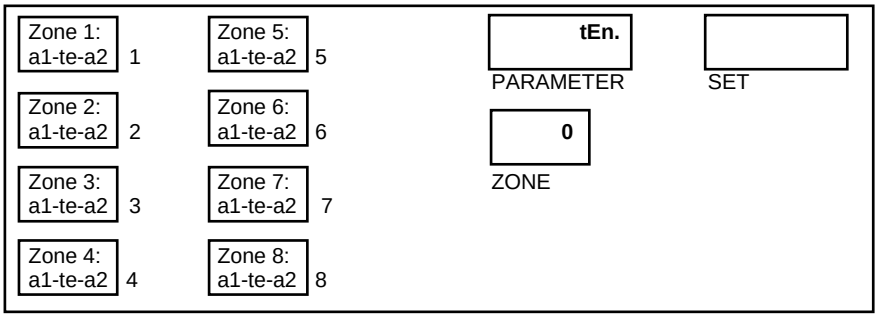
Pr.:
Pr: Process value

Press key F2: Display switches over to setpoint indication (= actual setpoint SP1 or SP2) zones 1...6 or 1...8:



SPx:
SP1: Setpoint 1
SP2: Setpoint 2

Press key F2: Display switches over to tendency-, control output and alarm indication. Zones: 1...6 or 1...8:



tEn.:
te: tendency and control output
a1: alarm indication A1
a2: alarm indication A2

Interpretation of the symbols: see next page

Press key F2: Display switches back to process value indication. Zones: 1...6 or 1...8:

Tendency, control output and alarm indication

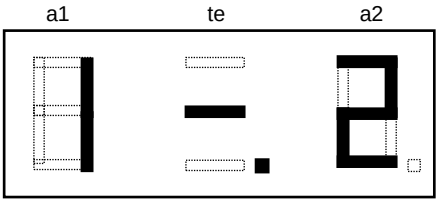
With the help of key „F2“ a temperature tendency display will be shown, to give an overview about the temperatures deviations relating to the setpoints, the activity of the control outputs and an alarm indication in the individual controller zones.

For each zone are 3 digits available (displays 1...8) :

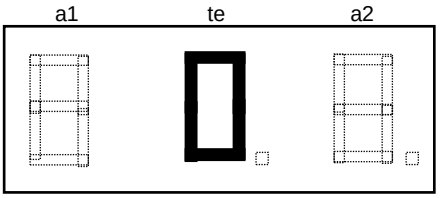
Digit a1: Indication = 1, if alarm message A1 is active in this zone.

Digit te: Temperature tendency digit.

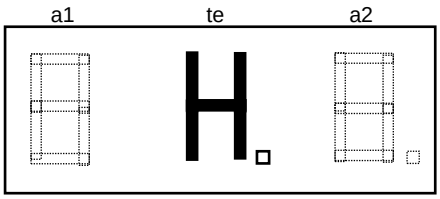
Digit a2: Indication = 2, if alarm message A2 is active in this zone.



Alarm 1: activ
Temperature: ok.
Output heating: on
Alarm2: activ

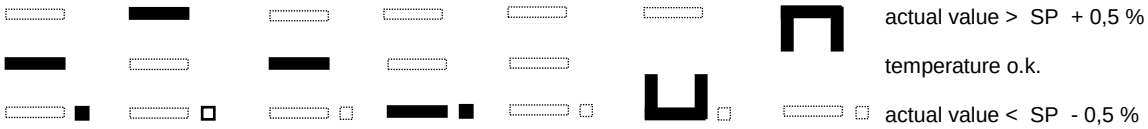


O = Selftuning mode (**O**pt.): on



H = Manuell output ratio operation: on
Dec.-point flashes acc. to output value

<u>The symbols in digit „te“ (Temperatur tendency) have to be interpreted as follows:</u>



actual value > SP + 0,5 %

temperature o.k.

actual value < SP - 0,5 %

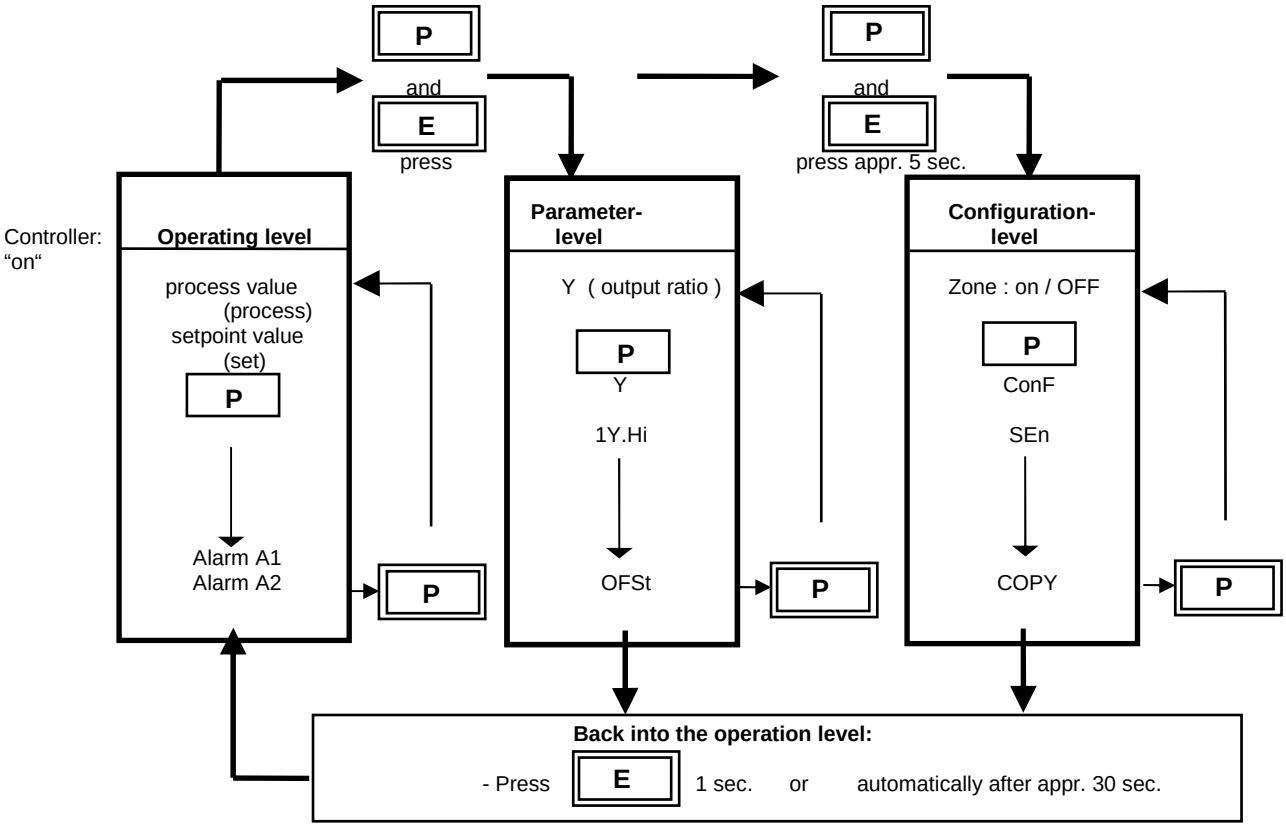
heating: on	heating: off	heating: off	heating: on	zone: off	Sensor error short circuit (bottom range end)	sensor breakage (top range end) or wrong connection.
or		**and**				
cooling on		cooling off				

The flashing dec.-point shows, that either „heating“- or „cooling“-output is active.

Operating Levels

The operation of the controller is divided into 3 levels.

In zone 0 general settings have to be made.



Operating level (for each zone separatly):
Process- and Setpoint value will be displayed simultaneously. Within the operating level the setpoint can be adjusted by pressing the "▲" / "▼" - keys.
Every adjustment has to be quit 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 "▲" / "▼" - keys. Quit by pressing the „ **E** " - key.

Parameter level (for each zone separatly):
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 (display of process value and setpoint).

Configuration level: This primary informations have to be entered before taking the instrument into operation.
The configuration level is reached by simultaneously pressing the "**P**" - and " **E** " - keys for a period of approx. 5 seconds.
First choose the configuration level in zone 0. Here general settings have to be made.
This has to be programmed at first:
- Only TC- or RTD-connection for all zones? Or: Mixed connection ?
- Alarm configuration (valid for all zones)
- Function of key „F1"
- Software key
- Serial interface informations

Than choose the configuration level of each individual controller zone.
This has to be programmed at second:
- Controller type (for each zone)
- Input type (sensor type), sensor range (for each zone)
- Min. and max. setpoint range (for each zone)

The display of each single parameter within the configuration level and their adjustment, made in the same fashion as within the operating level.
There is also a copy function available. So it is possible, to copy the programmed parameters of one zone to other zones.
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 (display of process value and setpoint).

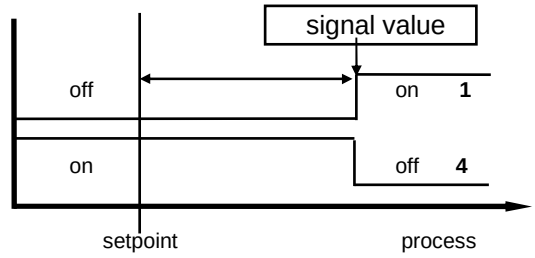
Configuration Level, general

(select zone 0 and press „P“ - and „E“ - key appr. 5sec., **general settings**)

Display "PROCESS"	Parameter	Display „SET“	
P - tc	**Sensor mix**	- 6	all 6 zones: prepared for thermocouple - connection
		- 8	all 8 zones: prepared for thermocouple - connection
		2 x	Zones 1 - 2 : RTD - connection; other zones: Thermocouple connection
		4 x	Zones 1 - 4 : RTD - connection; other zones: Thermocouple connection
		6 x	Zones 1 - 6 : RTD - connection; other zones: Thermocouple connection
		6 -	all 6 zones: prepared for RTD - connection
		8 -	all 8 zones: prepared for RTD - connection
Co.A1	**Alarm 1-Configuration** (switches relay A1)		The selected configuration is effective for all control zones. The individual temperature alarms A1 of all zones are connected to the main, common contact A1. If a control zone indicates a fault (sensor short circuit / break), the alarm output A1 is generally switched.
		OFF	alarm OFF, no alarm signalisation (ex works)
		1	signal contact, setpoint depentend: off-on
		2	limit contact, process value dependend: off-on
		3	limit comparator: off-on-off
		4	signal contact: on-off
		5	limit contact: on-off
		6	limit comparator: on-off-on
		7	limit comp. with start-up suppression: off-on-off

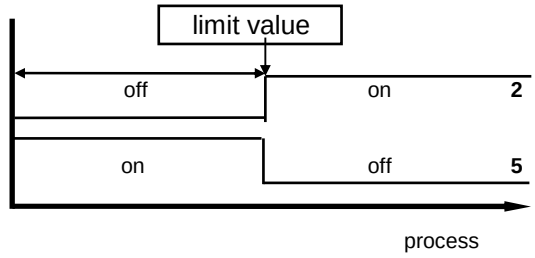
The signal contact is adjusted and displayed relative to the setpoint (deviation alarm).

Switching behaviour: **Configuration:**



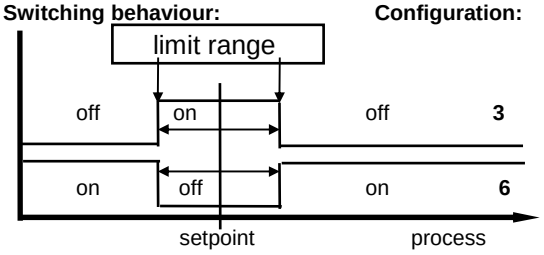
The limit contact is adjusted and displayed as an absolute value.

Switching behaviour: **Configuration:**



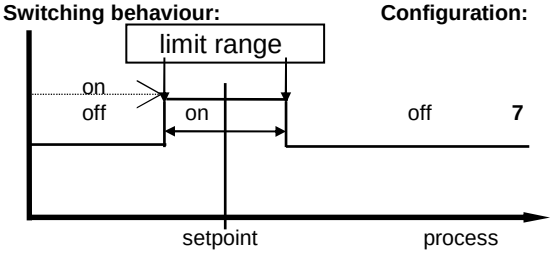
The limit comparator is adjusted and displayed relative to the setpoint. The selected value is effective below and above the setpoint.

Switching behaviour: **Configuration:**



The alarm relay of the limit comparator with start-up suppression is activated when the controller is first switched on. It is only then deactivated, when the process value has been within, and left, the o.k. -zone.

Switching behaviour: **Configuration:**



Please note:
In case of sensor error the alarms will react in the same way as range override. The alarm contacts therefore do not offer protection against all types of plant breakdown. With this in mind, we recommend the use of a second, independent monitor unit.
Care should be used 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 up the ramp.

Display "PARAMETER"	Parameter	Display „SET“			
rE.A1	**Relay A1 switching behaviour**	dir	on:	LED = „1“	Relay A1 "activated"
			off:	LED = „1“	Relay A1 "not active"
		inv	on:	LED = „1“	Relay A1 "not active"
			off:	LED = „1“	Relay A1 "activated"
Co.A2	**Alarm 2-Configuration** (switches relay A2)	see Co.A1 (alarm 1 - configuration)			
rE.A2	**Relay A2 switching behaviour**	dir	on:	LED = „2“	Relay A2 "activated",
			off:	LED = „2“	Relay A2 "not active",
		inv	on:	LED = „2“	Relay A2 "not active",
			off:	LED = „2“	Relay A2 "activated",

Co.F1	**Select funktion of key „F1“**	OFF	No function
		OPt	Selftuning algorithm can be activated by pressing key „F1“ in the matching zone. „F1“ and „E“: stop selftuning.
		Y	Shows the actual percentage output ratio, while pressing „F1“. Display „PARAMETER“: Y
		LEd.t	Lamp (LED) test, while pressing „F1“.
LOC	**Adjustment lock**	OFF	No adjustment lock (ex works)
		P C	Parameter and configuration levels locked
		n.SP1	All parameters apart from SP1 locked (**n**ot **SP1**)
		ALL	All parameters locked All parameters that have been locked with „LOC“ can be selected and read, but not altered. This adjustment cannot be changed if the external contact K2 is closed.
Zo.OF	**Zones offset preselection** (Continuous numbering of the controller zones)	OFF	No offset preselection. Zones indication: 1-6 or 1-8
		1 – 93, 6 zones 1 – 91, 8 zones	Zones will be numbered with preselected offset value. E.g.: Zo.OF = 1 -> Zone indication: 2-7 or 2-9 Zo.OF = 4 -> Zone indication: 5-10 or 5-12

Display „PARAMETER"	Parameter-description	Parameter value Display „SET“

The following parameters are only valid, if the unit is equipped with a serial interface.
RS232, RS485, 0/20mA.

Prot	**Protocol preselection**	ELO	ELOTECH- standard protocol	
		IbS	Gateway-protocol valid for InterBus-S Only with RS 485-interface (Code-No.: 4).	
Adr	**Unit adress**	1 255	(ex works: 1) The computer adresses the unit/controller at this adress. Each unit has ist own adress. With RS-485 it is possible to adress 32 units.	
For	**Data format**	7E1	7 data, even,	1 stopbit
		7o1	7 data, odd,	1 stopbit
		7E2	7 data, even,	2 stopbit
		7o2	7 data, odd,	2 stopbit
		7n2	7 data, none,	2 stopbit
		8E1	8 data, even,	1 stopbit
		8o1	8 data, odd,	1 stopbit
		8n1	8 data, none,	1 stopbit InterBus-S
		8n2	8 data, none,	2 stopbit
bAud	**Baud rate**	OFF; 0,3 ... 9,6 kBaud The baudrate denotes the transmission rate at which one bit is transmitted. InterBus-St = 9,6 kBaud		
	Details:	See:	- sep. interface description: ELOTECH – standard-protocol - sep. interface description: Gateway: M-IBS-5	

The following parameters are only valid, if the unit is equipped with a CAN interface.

Adr	**Unit adress**	1 127		(ex works: 1)
bAud	**Baud rate**	10, 20, 50, 100, 125, 250, 500 kBaud, 1MBaud		(ex works: 20)
	CANopen-specification:	CANopen Master:	no	
		CANopen Slave:	yes	
		Extended Boot-up:	no	
		Minimum Boot-up:	yes	
		COB ID Distribution:	yes; default via SDO	
		Node ID Distribution:	no; via device keyboard	
		No. of POD´s:	0RX, 1TX	
		PDO Modes:	async.	
		Variable PDO mapping:	no	
		Emergency message:	yes	
		Life guarding:	yes	
		No. of SDO`s:	1RX, 1TX	
		Device Profile:	CiA DS-404	
Details:		See: CANopen Device Profile CiA DS-404; ELOTECH Object Dictionary		

21xx **EL.xx**	**Control number**	No function. End of configuration level

Configuration Level

Individual selectable for zones 1 ... 8, d1, d2
(select zone and press „P“ - and „E“ - key appr. 3sec.)

Display "PARAMETER"	Parameter	Display „SET“	
Zone	**Zone on / off**	OFF	measuring- or controller zone „off“
		on	measuring- or controller zone „on“
ConF	**Controller configuration**	2P h	2-point-controller „heating-off“ (ex works)
		2P c	2point-controller „cooling-off“
		2Pnc	2point-controller „cooling-off“ with non-linear cooling *).
		3P	3point-controller „heating-off-cooling“ (Only type: R2100-x3x)
		3Pn c	3point-controller „heating-off-cooling“ with non-linear cooling *) (Only type: R2100-x3x)
			*) non-linear cooling: Cooling action can be pre-selected with either linear or non-linear cooling response curve (e.g. for vapour cooling).
		diSP	Zone works as an indicator, no controller action
SEn	**Sensor selection**	P1 ℃	Pt 100, 0,0 ...99,9 ℃
		P1 ℉	Pt 100, 32 ...212 ℉
		P2 ℃	Pt 100, -100 ...+100 ℃
		P2 ℉	Pt 100, -148 ... +392 ℉
		P4 ℃	Pt 100, 0 ... 400 ℃ (ex works)
		P4 ℉	Pt 100, 32 ... 752 ℉
		P8°C	Pt 100, 0 ... 800 ℃
			or, if selected as a thermocouple-input zone (depending on parameter „P - tc“ in Zone 0):
		L4 ℃	T/C Fe-CuNi (L), 0 ... 400 ℃
		L4 ℉	T/C Fe-CuNi (L), 32 ... 752 ℉
		L8 ℃	T/C Fe-CuNi (L), 0 ... 800 ℃
		J8 ℃	T/C Fe-CuNi (J), 0 ... 800 ℃
		n1 ℃	T/C NiCr-Ni (K), 0 ... 999 ℃

If the Sensor selection is changed, the following parameters will be set as follows and need to be re-adjusted:

Setpoint 1, setpoint 2:	SP.Lo	Process value offset:	OFF
Lower setpoint limitation:	Bottom range end;	Higher setpoint limitation:	Top range end;
Setpoint-ramp values:	OFF;	Alarm values:	OFF;

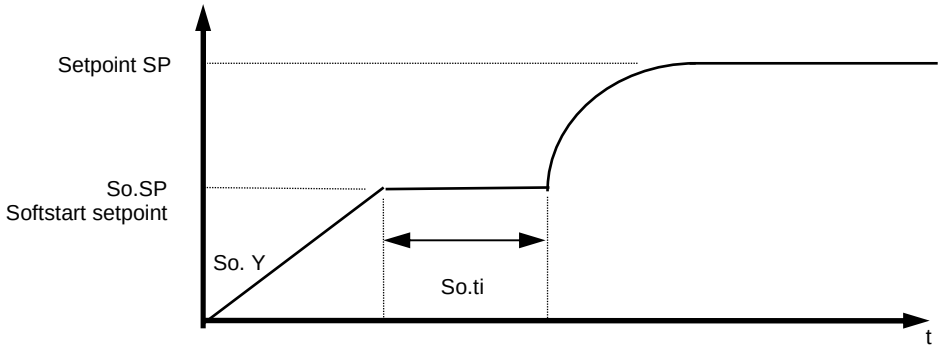
OPTION:		The following parameters are only valid for zones d1 and d2 (Input: 0...10 Vdc). It is to configurate the display range of the 0...10 Vdc inputs. The difference between the bottom end of the display range and the top end must amount to a minimum of 100 units and a maximum of 2000 units. By adjustment of one of the above parameters, the other in this case will automatically follow.	
unit	**selectable physical. unit**	Shown in the display „parameter“, when zone d1 or d2 selected (e.g. : ℃, ℉, bar, volt ...). Display „s et“ shows additional the actual value.	
rA.dP	**decimal points**	0; 1; 2	(ex works: 1)
rA.Hi	**display range top end**	rA.Lo ... 9999	(ex works: 100,0)
rA.Lo	**display range bottom end**	-1999 ... rA.Hi	(ex works: 0,0)

SP.Hi	**higher setpoint limitation**	programming range: SP.Lo ... top range	(ex works: 400)
SP.Lo	**lower setpoint limitation**	programming range: bottom range ... SP.Hi	(ex works: 0)
COPY	**Copy function**	to 1 ... to x	Copy all configuration datas of the actual zone 1 to zone x. Select the target zone 1, 2 .... or „to A“ (all) with the **„up/down“** - keys and press **„E“** (enter). After this, the datas would be copied. **Note:** It is only possible to copy the configuration, if the sensor configuration (Parameter: P - tc) in the target-zone is the same as in the actual zone. This means, that it is not possible, to copy configurations of e.g. RTD-input zones to thermocouple-input zones.

Softstart (general function):

TAKE CARE: **If you take 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 (in this case set So.St = OFF). Otherwise the relais will switch too fast.**

During the softstart the controllers' output response is limited to a pre-selected ratio, in order to achieve a slow baking out of high performance heat cartridges.
Simultaneously the output clock frequency is quadrupled. Once the process value reaches the softstart setpoint, it remains stable at this value for a pre-selcted hold-duration time.
At the end of this period the process value rises to the valid setpoint.
This results in a slower, more regular heating period.
For this purpose the bistable voltage output must be taken, that actuates SSR relays.
If the softstart is active, the controllers' autotune function can't operated (Er.OP).
If a setpoint-ramp has been programmed, the softstart has priority, and the ramp will only become active after the softstart has been completed.
The softstart only works, if the parameter „1 P“ (prop. band, xp) is programmed > 0,1%.



So.St	**Softstart-function**	OFF:	Softstart not active (ex works) Next parameter So.Y, So.SP, So.ti are not shown.
		On:	Softstart in action. The softstart function always runs, if the controller is switched on and / or if the actual temperature is below the softstart setpoint So.SP minus 5% of the range (e.g. range: 400^C -> 5%= 20℃).
So. Y	**Softstart output ratio**	10 ... 100%	
So.SP	**Softstart setpoint**	range: SP.Lo .... SP.Hi	
So.ti	**Softstart duration time**	OFF; 0,1 ... 10,0 min.	

Display "PARAMETER"	Parameter	Display „SET“	
Hand	**manual output ratio**	OFF, Auto, Man	(ex works: OFF)

Setting: OFF

Function not active

Setting: Auto

In event of sensor break the controller automatically maintains the last valid output ratio as the actuating signal.

Displays „process“:
Error warning „Er.H“ or „Er.L“ will be displayed.

Displays 1...8:
In the case of manual output ratio an „H“ (heating-function) or „C“ (cooling-function) will be displayed in the first digit, followed by the actual output ratio value.
H99 = 100% heating
C99 = 100% cooling

After selecting a certain zone (key „zone“) the output ratio can be altered in steps of min. 1%.

Display „PARAMETER“:	Y.HA
Display „SET“:	Actual output ratio, -100...+100 % Changable be pressing the up / down –keys. Enter with E-key. - 100 = 100% cooling 100 = 100% heating

Under the following circumstances, the output ratio willbe 0%:
- if the output ratio at time of the sensor break was 100%.
- if the controller is working along a setpoint-ramp.
- if the control deviation was more than 0,25% of the total range at the time of sensor break.
- if th prop. band (P; xp) = 0.
- if the soft start 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.

Setting: Man

The controller now operates only as an actuator.
Within the operation level, an output ratio can be entered instead of the setpoint.
In this case the control action (PID-function) is switched of.

Displays „process“:
The actual process temperature value will be displayed.

Displays 1...8:
In the case of manual output ratio an „H“ (heating-function) or „C“ (cooling-function) will be displayed in the first digit, followed by the actual manual output ratio value.
H99 = 100% heating
C99 = 100% cooling

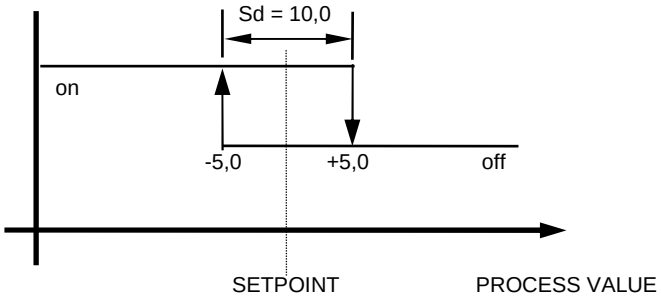
After selecting a certain zone (key „zone“) the output ratiocan be altered in steps of min. 1%.

Display „PARAMETER“:	Y.HA
Display „SET“:	Actual output ratio, -100...+100 % Changable be pressing the up / down –keys. Enter with E-key. - 100 = 100% cooling 100 = 100% heating

Parameter Level

Individual selectable for zones 1 ... 8, d1, d2
(select zone and press „P“ - and „E“ - key appr. 1sec.)

Display "PARAMETER"	Parameter	Display „SET“	
Y	**valid output ratio**	-100...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.
1Y.Hi	**output ratio limit „heating“**	0...100 %	(ex works: 100) Limitation of the output ratio is only necessary when: the heating or cooling energy supply is grossly over-dimensioned compared to the power required, or to turn off a control output (setting = 0%). Under normal circumstances no limitation is needed (setting = 0%). The limitation becomes effective, when the controllers' calculated output ratio is greater than the maximum permissible (limited) ratio. **Warning!** The output ratio limitation does not work during autotune.
2Y.Hi	**output ratio limit „cooling“**	0...100 %	(ex works: 100) Only types: R2100-63x and R2100-83x and Configuration: heating-off-cooling controller
1 P	**Xp, prop.-band (P) „heating“**	OFF; 0,1...100,0 %	(ex works: 3,0) If „ 1 P “ = OFF (control action: on-off, without feedback) next parameter: „ 1 sd “.
1 d	**Tv, rate (D) „heating“**	OFF; 1...200 secs	(ex works: 30)
1 J	**Tn, reset (I) „heating“**	OFF; 1...1000 secs	(ex works: 150) Normally the controller works using PD/I control action. This means, controlling without deviation and with practically no overshoot during start-up. The control action can be altered in its structure by making the following adjustments to the parameters: a. no control action, on-off (setting P = OFF) b. P-action (setting D and I = 0) c. PD-action (setting I = 0) d. PI-action (setting D = 0) e. PD/I modified PID-action
1 C	**cycle time „heating“**	0,5...240,0 secs	(ex works: 10,0) The switching frequency of the actuator can be determined by adjusting the cycle time. This is the total time needed for the controller to switch on and off once. a) Relay outputs: cycle time > 10 secs b) Bistable voltage outputs: cycle time 0,5...10 secs
1 Sd	**Control sensivity output „heating“**	Only if: 1 P = Xp = OFF (On-off action, without feedback) OFF; 0,1...80,0 ℃	(ex works: 0,1)



Display "PARAMETER"	Parameter	Display „SET“

The following parameters apply **only** to types **R 2100 - 63x** or **R2100 - 83x** and if configurated as heat-off-cool controllers (**configuration: „3 P“ or „3Pnc“**):

Sh **switch-point difference**

OFF; 0,1...80,0 °C/°F (ex works: OFF)
OFF; 0,01...8,00 °C/°F

This parameter raises the setpoint (switch-point) for cooling output by the displayed value. It can be help to reduce the switching frequency between the heating and cooling outputs, if this is to high. Simultaneously activation of heat and cool outputs is not possible.

2 P **Xp, prop. band (P) „cooling“**

OFF; 0,1...100,0 % (ex works: 3,0)
If „ 2 P “ = OFF (control action: on-off, without feedback)
next parameter: „ 2 sd “.

2 d **Tv, rate (D) „cooling“**

OFF; 1...200 secs (ex works: 30)

2 J **Tn, reset (I) „cooling“**

OFF; 1...1000 secs (ex works: 150)

Normally the controller works using PD/I control action.
This means, controlling without deviation and with practically no overshoot during start-up.
The control action can be altered in its structure by making the following adjustments to the parameters:

a. no control action, on-off (setting P = OFF)
b. P-action (setting D and I = 0)
c. PD-action (setting I = 0)
d. PI-action (setting D = 0)
e. PD/I modified PID-action

2 C **cycle time „cooling“**

0,5...240,0 secs (ex works: 10,0)

The switching frequency of the actuator can be determined by adjusting the cycle time. This is the total time needed for the controller to switch on and off once.

a) Relay outputs: cycle time > 10 secs
b) Bistable voltage outputs: cycle time 0,5...10 secs

2 Sd **Control sensivity „cooling“**

Only if: 2 P = Xp = OFF (On-off action, without feedback)
OFF; 0,1...80,0 °C (ex works: 0,1)

Display "PARAMETER"	Parameter	Display „SET“	
OPt	**self tuning** (autotune)	OFF on	self tuning out of action self tuning on request (one time)

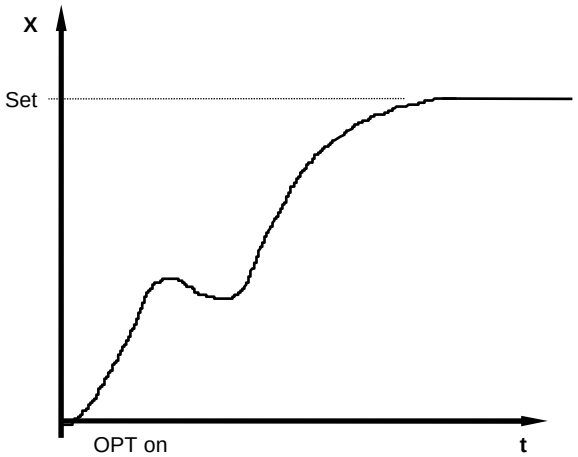
The tuning algorithm determines the characteristic values within the controlled process, and calculates the valid feedback parameters (P,D,I) and the cycle time (C = 0.3 x D) of a PD/I-controller for a wide section of the range.

The self tuning activates during start-up shortly before the setpoint is reached. The setpoint must amount to the least 5% of the total range.
If activated after the setpoint has already been reached, the temperature will first drop by approx. 5% of the total range, in order to detect the exact amplification of the process.

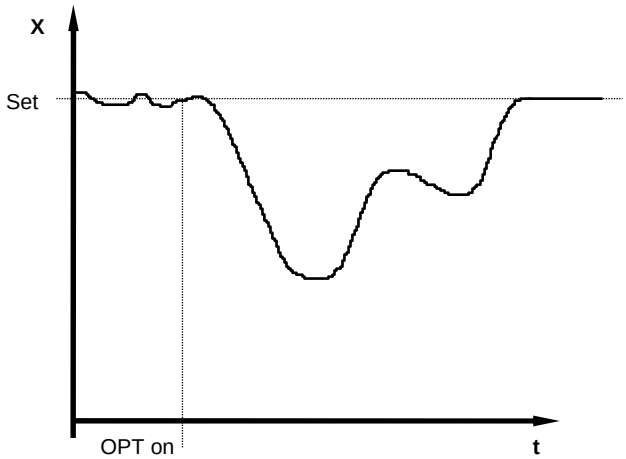
The tuning algorithm can be activated at any time by selecting the **OPT=on** and pressing the **„E“**-key.
During self tuning „Opt“ is shown in the display, alternating with the setpoint value.

Self tuning activ: „SPx“ flashes with „OPt“ - indication in display „PARAMETER“.

After having calculated the correct feedback parameters, the controller will lead the process value to the setpoint.



OPT on
Self tune during start-up



OPT on
Self tune, after the setpoint has already been reached

Self-tuning can be stopped by selecting the option **OPT = OFF** and pressing the **„E“** - key.

OFSt **process value offset**

-99 ... OFF ...100 Units (ex works: OFF)
-9,9 ... OFF ... 10,0

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 and
- correction of the control devition when using P- or PD-action.

If for example the offset value is set to +5℃ , then the real temperature measured by the sensor (when process is balanced) is 5°C less than the setpoint and the displayed process value.

Operating Level

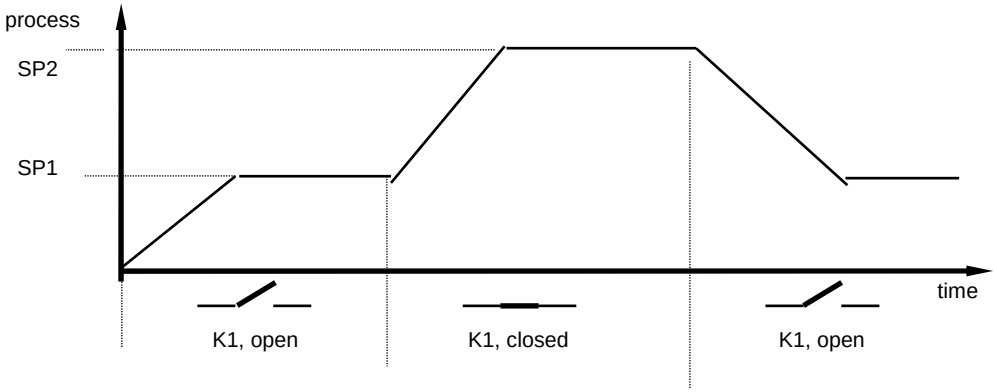
(individual selectable for zones 1 ... 8, d1, d2)

Display "PARAMETER"	Parameter	Display „SET“	
SP1	**Setpoint 1** (set)	SP.Lo...SP.Hi	(ex works: 0)
SP2	**Setpoint 2**	OFF; SP.Lo SP.Hi	(ex works: OFF)

The 2. setpoint is active when the external contact K1 is closed.
The corresponding LED „SP2“ lights up on the faceplate,and the second setpoint is shown in the setpoint-display.
In order to change the value the parameter SP2 has to be selected.
SP2=OFF: SP1 is still valid, if the contact K1 is closed.

SPl⌐	**rising ramp**	OFF; 0,1...100,0 °C/min. or °F/min.	(ex works: OF F)
SPl¬	**falling ramp**	OFF; 0,1...100,0 °C/min. or °F/min.	(ex works: OF F)

A programmed ramp is always activated when the setpoint is altered or when the mains supply is switched on.
The ramp constructs itself out of the momentary process value and the pre-selected setpoint. If the ramp is active, the corresponding LED lights up on the faceplate. The ramp can be activated for both setpoint1 and setpoint2.
By programming the second setpoint accordingly a setpoint profile can be oblained (please see example below).



A1	**Alarm value 1, switching point** (switches relay A1)	signal contact, limit comparator, limit contact OFF; -199... +199 °C/°F (ex works) OFF; -19,9... +19,9 °C/°F OFF; 0... 999 °C/°F
A2	**Alarm value 2, switching point** (switches relay A2)	signal contact, limit comparator, limit contact OFF; -199... +199 °C/°F (ex works) OFF; -19,9... +19,9 °C/°F OFF; 0... 999 °C/°F

The range of adjustment is dependant on the sensor and the alarm configuration.
Both have to be set in the configuration level.

D I S P L A Y

(only inputs zone d1 and d2 , individual display)

Analogue value	Display „Zone“	Indication	
input d1	**d1**	**Display 9:**	0...10 V DC, corresp. the progr. range (ex works: 0...100)
input d2	**d2**	**Display 10:**	0...10 V DC, corresp. the progr. range (ex works: 0...100)

Technical Data

Input RTD, Pt 100 (DIN):
2 - or 3 - wire connection possible.
Built-in protection against sensor breakage and short circuit.
Max. permissible line resistance by 3-wire connection: 80 Ohms
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 Ohms.
Calibration accuracy: ≤ 0,25%

Analogue input (Option):
0 ... 10 V DC (Display range programmable)

Setpoint selection:
Ext. potential-free contact, switching voltage appr. 24 V DC, max. 1 mA.
Selection between SP1 and SP2 valid for all zones.

Control outputs OUT 1 ... OUT 8:
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 A1 and A2:
Relay, max. 250 Vac, max. 3 A (cos-phi = 1)

7-Segment-Display:
Process: 10 mm red, Set: 10 mm red

Data protection:
EAROM

CE – mark:
Tested according to 89 / 336 / EWG
EN 50081-2, EN 50082-2

Power supply:
typ.: 230 V Ac, ± 10 %, 48...62 Hz, appr. 10VA.

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: 192 x 96 mm (DIN 43700), installation depth 122 mm
Panel cutout: 186 +1,1 mm x 92 +0,8 mm
Material: Noryl, self-extinguishing, non-drip, UL 94-V1
Protection mode: IP 20 (DIN 40050), IP 50 front side

Weight:
appr. 800 g

Subject to technical improvments!

Error displays

Display	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
Er.H	Top range end has been exceeded, sensor defect	Check sensor and cable
Er.L	Bottom range end has been exceeded, sensor defect	Check sensor and cable
Er.OP	Self tuning error	Extinguish error signal by pressing the „E“-key. Check the self tuning conditions and restart.
Er.SY	System error	Extinguish error signal by pressing the „E“-key. Check all parameters. If the error signal continues please send the controller for examination.
Co.A1	Alarmconfiguration of alarm A1: OFF	No alarm signal available
Co.A2	Alarmconfiguration of alarm A2: OFF	No alarm signal available
-no- **-PA-**	Parameter not available in this zone.	

Installation Instructions

Make certain that the devices described here are used only for the intended purpose.
They are intended for installation in control panels.
The controller must be installed so that it is protected against impermissible humidity and severe contamination.
In addition, make sure that the permitted ambient temperature is not exceeded.

The electrical connections must be made according to the relevant locally applicable regulations.

If using a thermocouple sensor, the compensation cables must be shielded and laid directly to the controller terminals.
Transducers must be connected only in compliance with the programmed range.

Transducer cables and signal lines (e.g. logic or linear voltage outputs) must be laid physically separated from control lines and mains voltage supply cables (power cables).
Spatial separation between controller and inductive loads is recommneded.
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.

IMPORTANT:
Before operation, the unit must be configurated for its intended purpose
(e.g. controller type, sensor type and range, alarm adjustment etc.)
Please see „Configuration Level“.