# R2200S

## Multi-Zone Temperature Controller with Service-Interface

## 4 | 6 |8 | 16 zone 2-point controller

## 4 | 8 zone 3-point controller

Designed for DIN rail mounting acc. EN 50 022

## Description and operating manual

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# 2 General Information

The controllers of the series R2200S are designed for mounting in a control cabinet. They do not have an operating panel.

By the integrated Fieldbus Interface all process- and configuration parameters can be accessed. For simplifying the initiation and configuration, the free configuration tool ELOVISION-2 is available at www.elotech.de. With this tool the controller can be configured without programming the Fieldbus Master for this purpose.

In case of parameters set by text identification, the numerical value which has to be transmitted by the Fieldbus, is declared in parentheses in this manual.

The description of the parameters in this manual refers to the readouts in ELOVISION-2. For further information see chapter "Service-Interface".

Used symbols:

| | |
|---|---|
| **Switch behav. A1** | Font for texts as displayed in ELOVISION-2 |
| **<§>** | Symbolizes the value of the factory adjustment of the respective parameters. |
| **>3<** | This parameter is available in 3-point controllers only. |
| **(2)** | This numerical value relates to the corresponding text and must be transmitted by the Fieldbus. The text Off relates to the smallest numerical value allowed reduced by 1. |



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# 3 Installation Instructions

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

The devices are designed for DIN rail mounting acc. EN 50 022.

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.

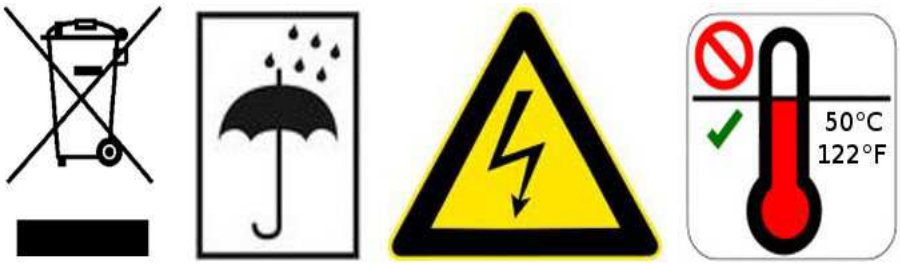
Separate installation of controller and inductive loads is recommended.
Interference from contactor coils must be suppressed by connecting adapted RC-combinations parallel to the coils.

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.



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# 4 Type Code

| R2200 | - | aaa | - | s | - | 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 |
| 7 | CAN |
| 9 | Profibus-DP |

| Heater Current Monitoring | |
|---|---|
| 0 | Standard |
| 5 | Yes (Logic outputs only) |

| Version | |
|---|---|
| 0 | Standard |
| S | With Service-Interface |

| | Zones | Type | Control Outputs heating / cooling | |
|---|---|---|---|---|
| 421 | 4-zones | two-point | Relay | |
| 426 | 4-zones | two-point | Logic | |
| 431 | 4-zones | three-point | Relay | Relay |
| 436 | 4-zones | three-point | Logic | Logic |
| 437 | 4-zones | three-point | Logic | Relay |
| 621 | 6-zones | two-point | Relay | |
| 626 | 6-zones | two-point | Logic | |
| 821 | 8-zones | two-point | Relay | |
| 826 | 8-zones | two-point | Logic | |
| 836 | 8-zones | three-point | Logic | Logic |
| E26 | 16-zones | two-point | Logic | |



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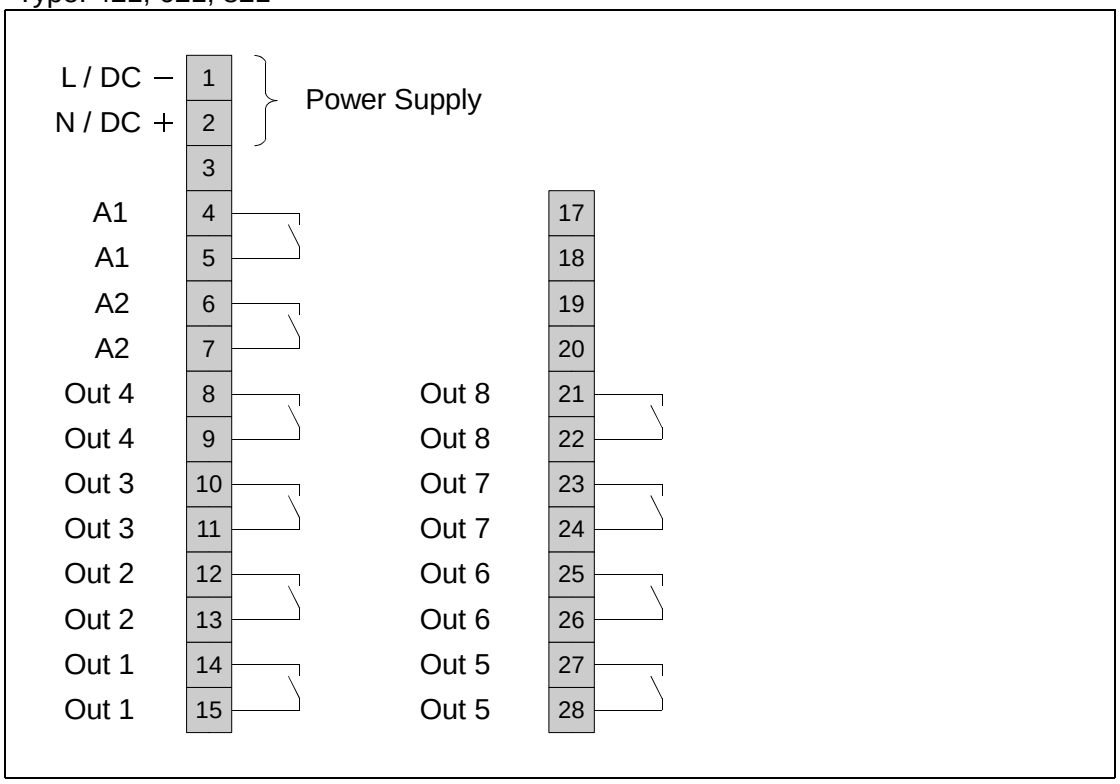
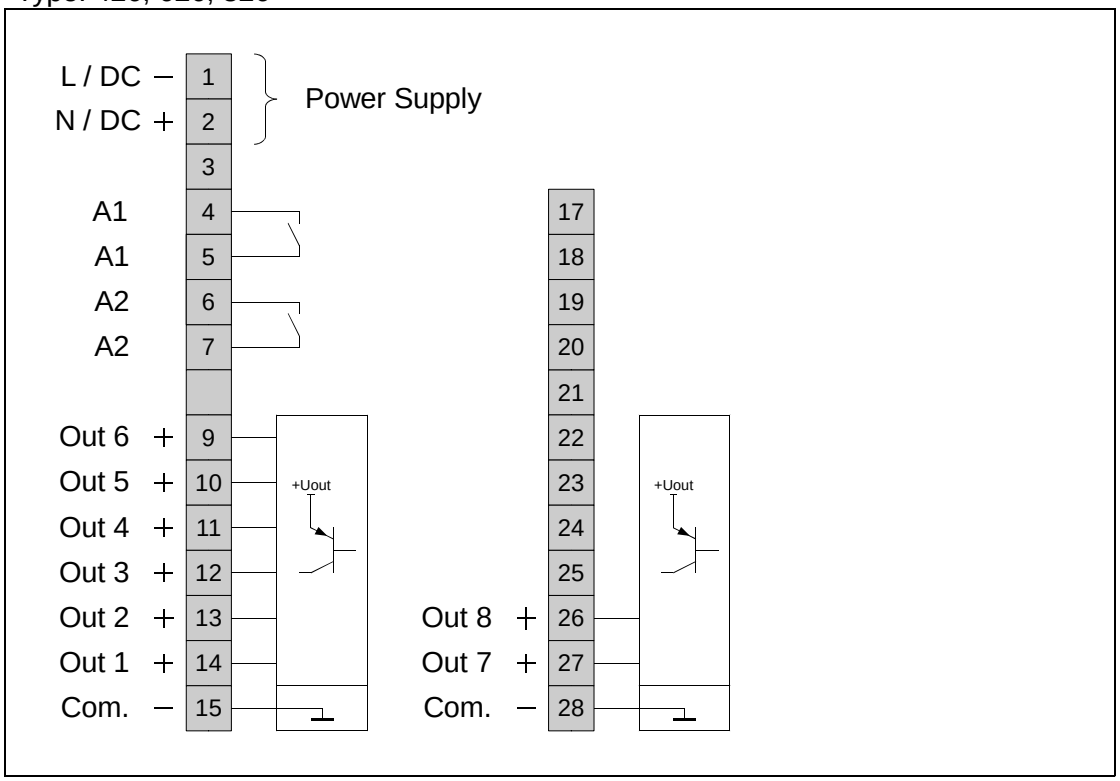
# 5 Connection Diagram

## *5.1 Power Supply and Outputs*

Type: 421, 621, 821




Type: 426, 626, 826



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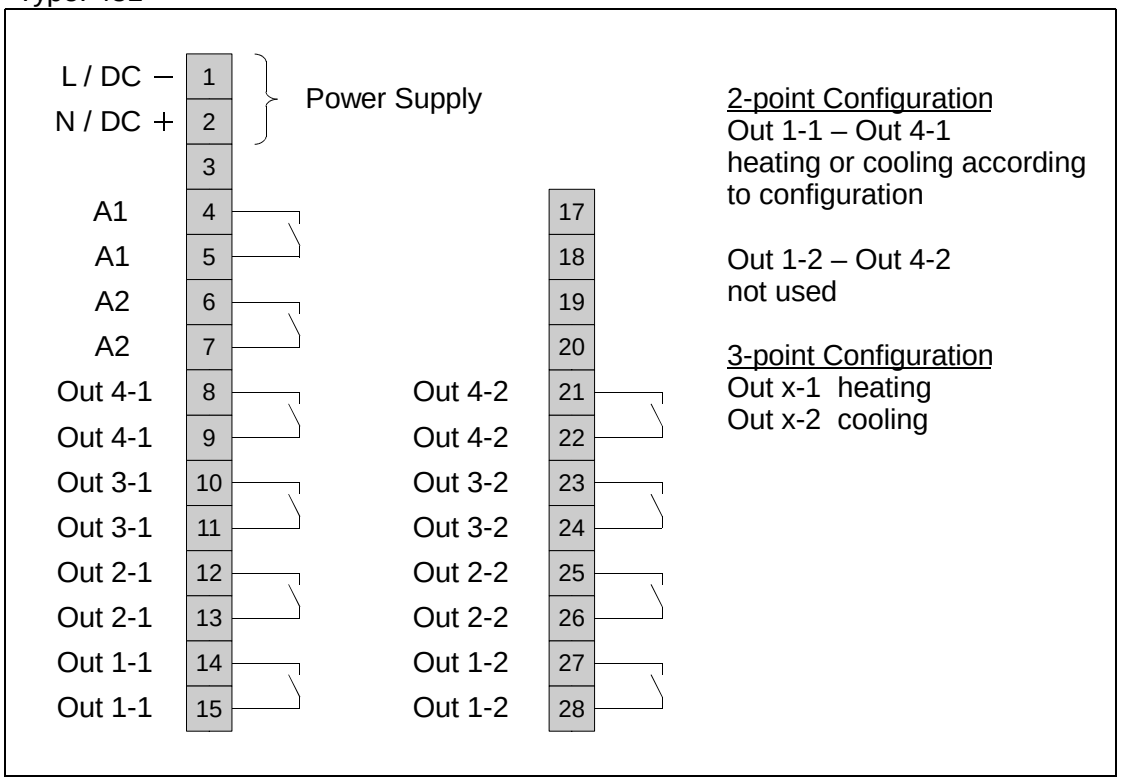
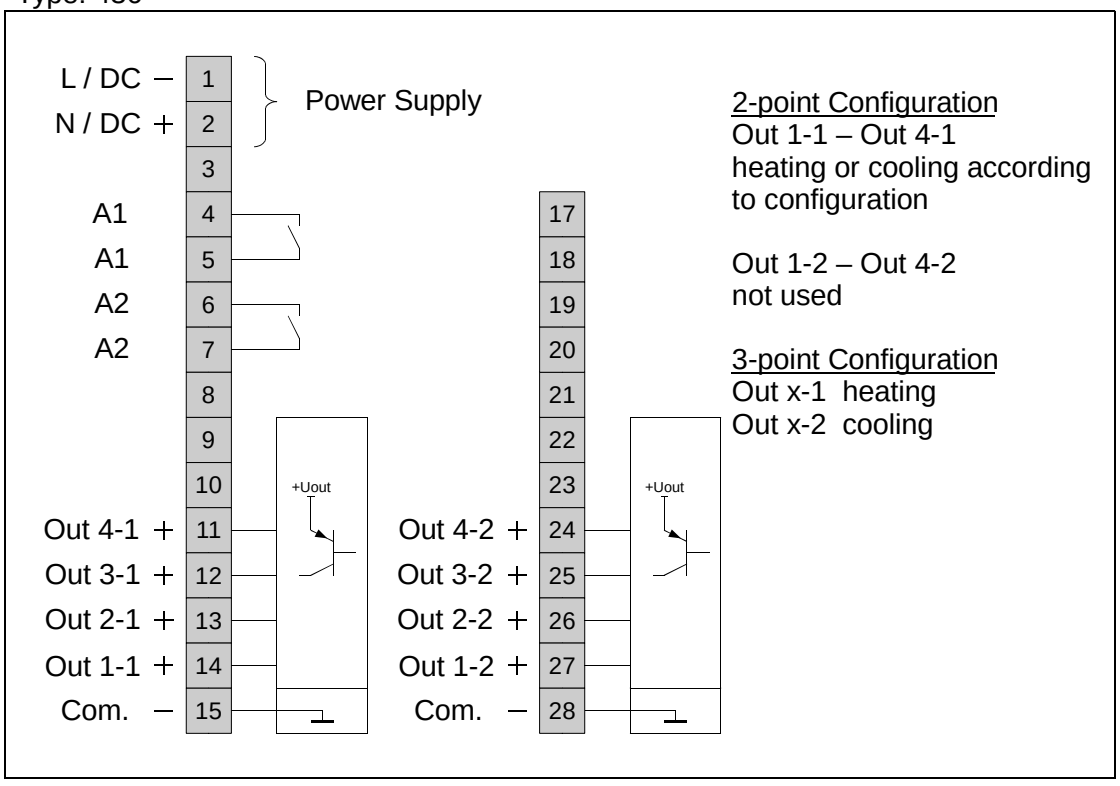
Type: 431




Type: 436



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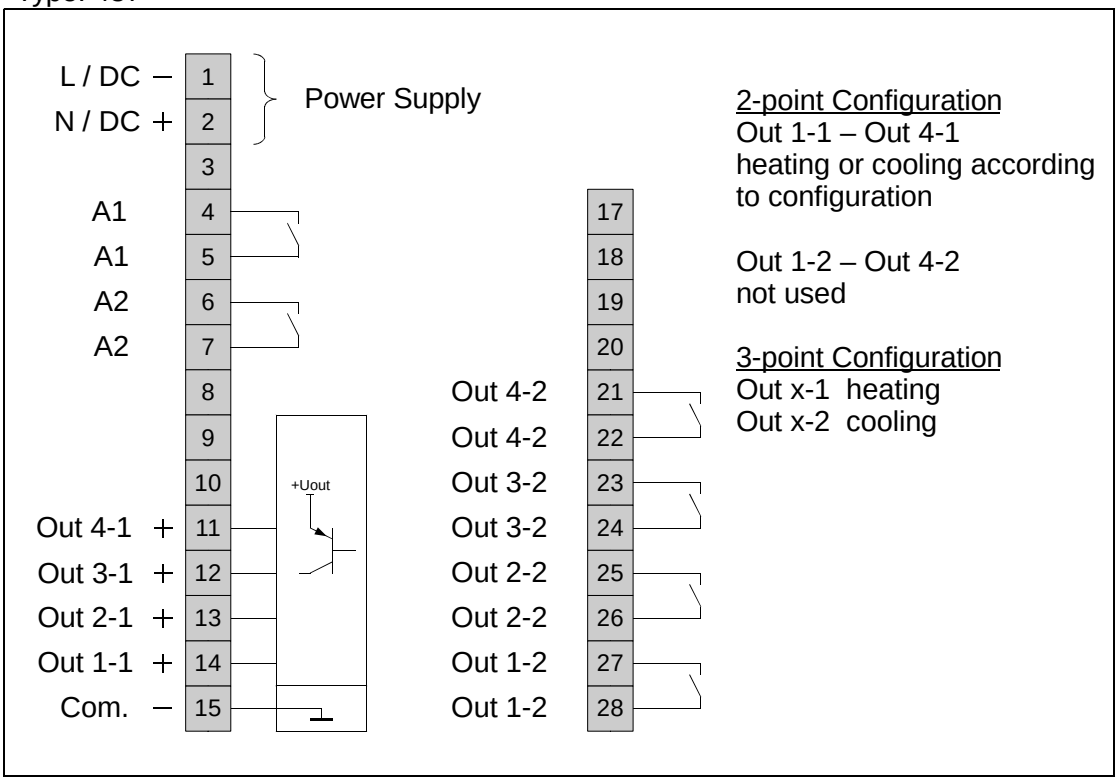
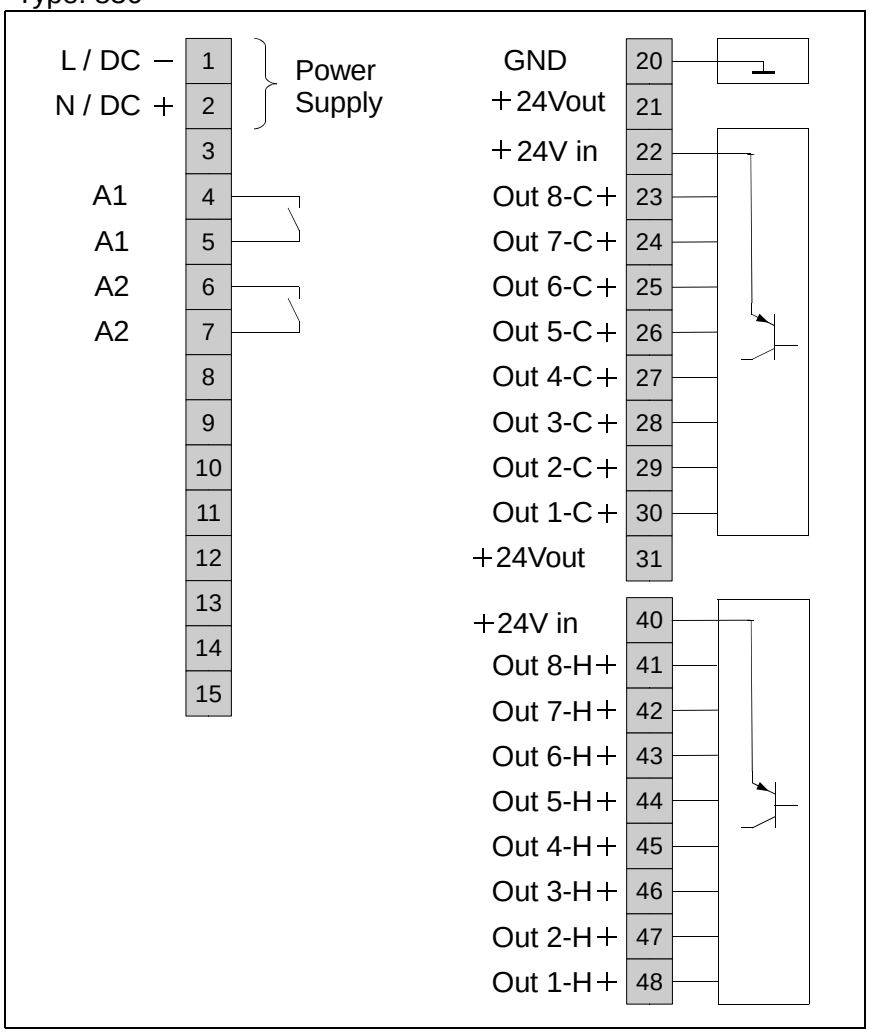
Type: 437




Type: 836



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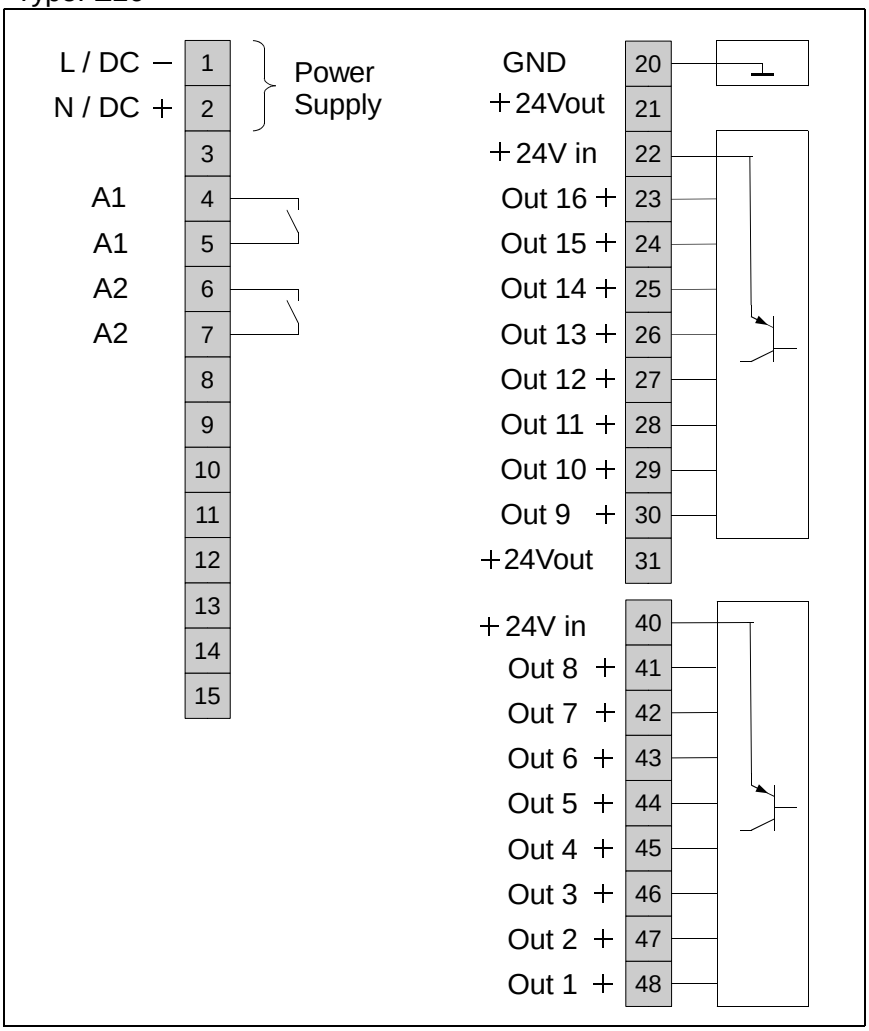
Type: E26



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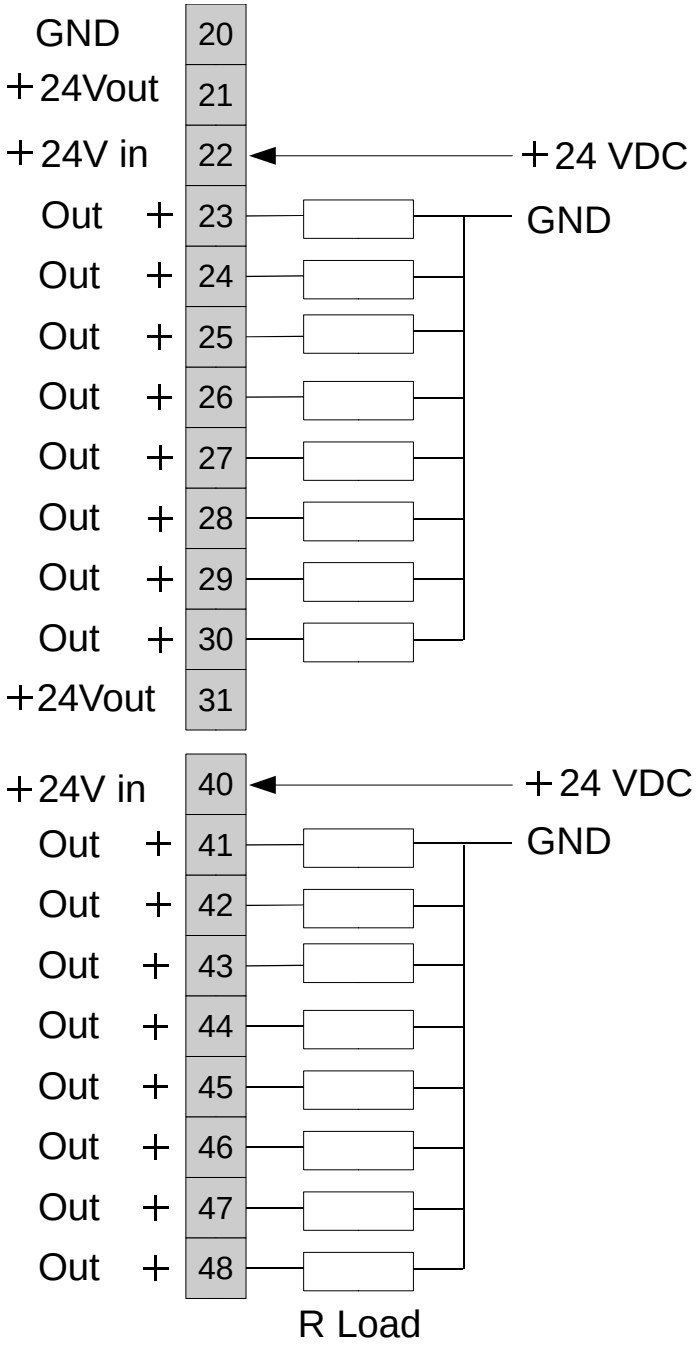
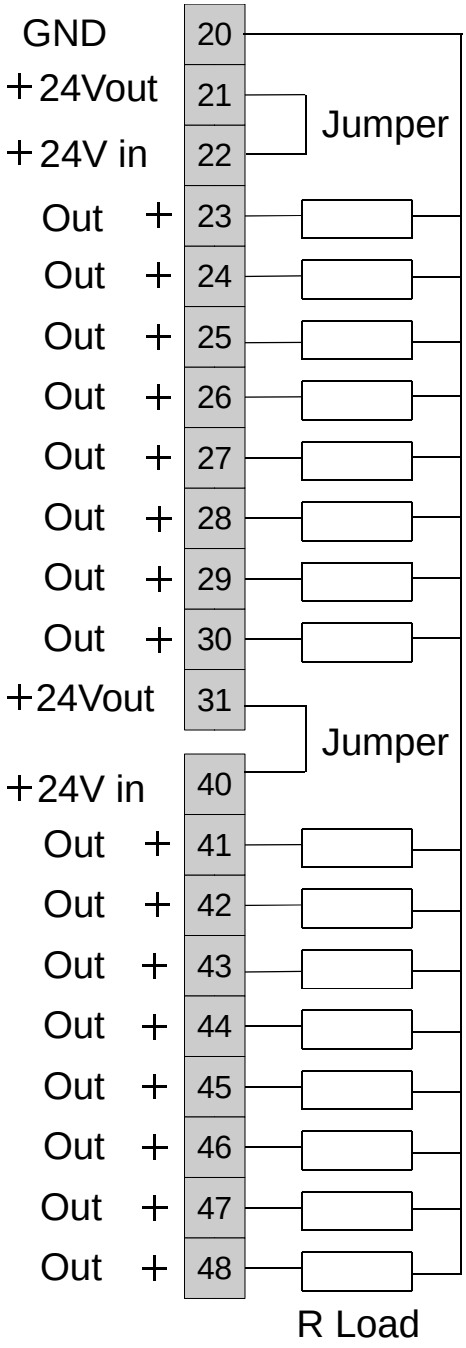
## 5.2 Connection Hints for Outputs Type 836 and E26

These types are equipped with galvanically isolated outputs.

Power supply with external voltage 24V DC
Galvanic isolation possible.




Power supply with internal voltage 24V
Galvanic isolation impossible.



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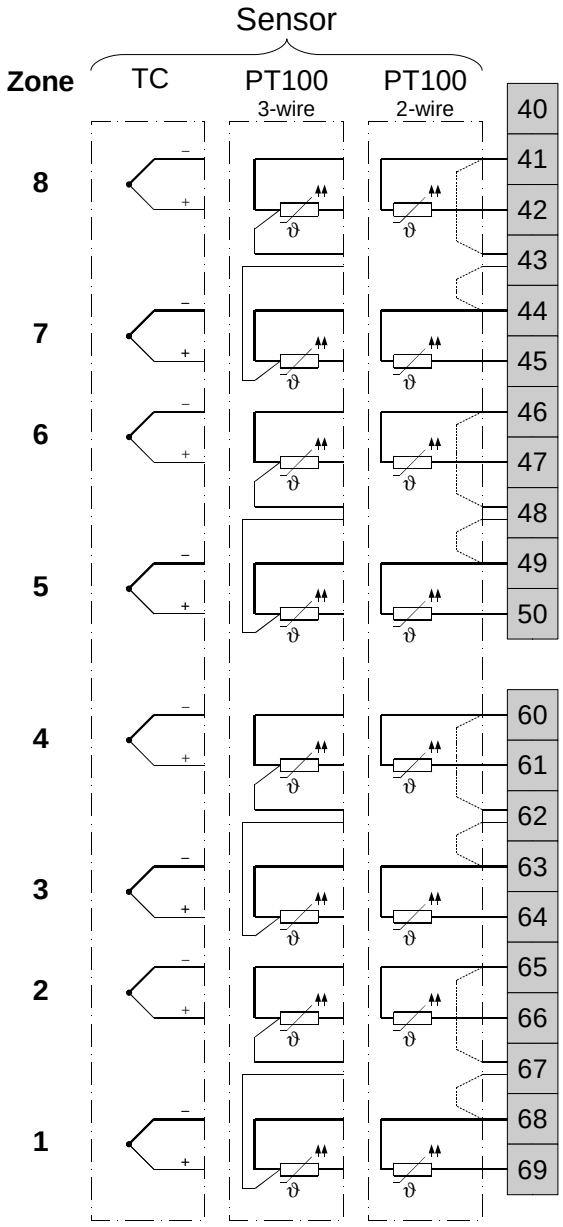
## *5.3 Sensor Inputs*

Type: 421, 426, 431, 436, 437, 621, 626, 821, 826,




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



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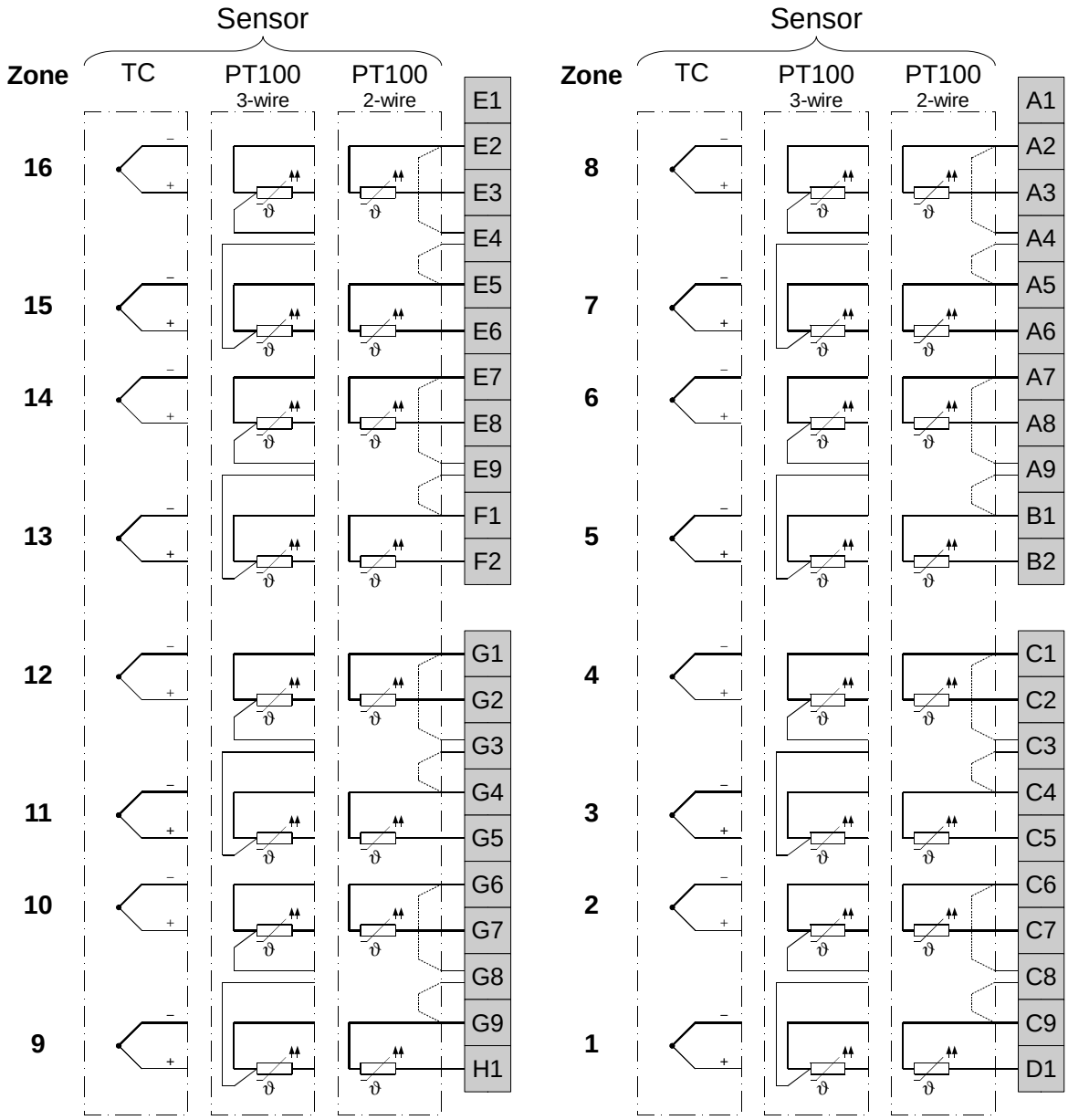
Type: 836, E26




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



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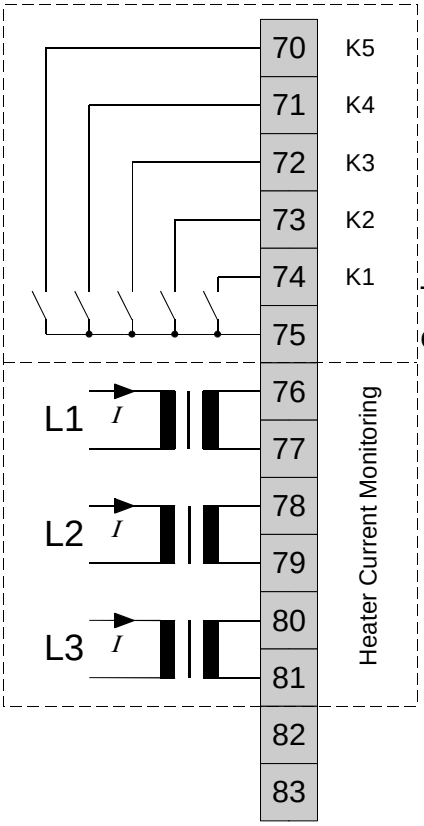
## 5.4 Additional Functions




Setpoint Controlling:

| | | |
|---|---|---|
| K1 | open | Setpoint 1 (SP1) valid for all zones |
| | closed | Setpoint 2 (SP2) valid for all zones |

CAN-Interface:

| | | |
|---|---|---|
| K4 | open | CAN: „operational“ only by CANopen protocol |
| | closed | CAN: „operational“ always active |

The contacts K2, K3, K5 are not used and must not be connected.

## 5.5 Fieldbus Interfaces

| Profibus | CAN | RS 485 | RS 232 | 0/20mA | |
|---|---|---|---|---|---|
| GND | | | GND | GND | 90 |
| VP +5V | | | RxD out | RxD in | 91 |
| CNTR | | | TxD in | RxD out | 92 |
| RxTx P | H | A | TxD out | TxD out | 93 |
| RxTx N | L | B | RxD in | TxD in | 94 |
| Service-Interface RS 485 | | | | A | 95 |
| | | | | B | 96 |



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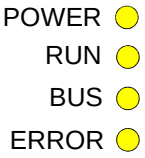
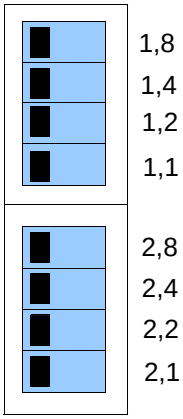
# 6 DIP-Switches and LED-Displays

## *6.1 Devices with Serial Interface*




Meaning of the LEDs

| | | |
|---|---|---|
| **POWER** | ON | Supply voltage is applied. |
| **RUN** | BLINKING | Device is in operation. |
| **BUS** | FLICKERING | Interface is active. |
| **ERROR** | BLINKING | System error, check parameters |
| | ON | System error |




Adjustment of the DIP-Switches:

| 1,8 | 1,4 | 1,2 | 1,1 | 2,8 | 2,4 | 2,2 | 2,1 | =OFF =ON |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Protocol: Elotech Standard |
| | | | | | | | | Protocol: Modbus |
| | | | | | | | | Baud rate: 9600 baud |
| | | | | | | | | Baud rate: 38400 baud |
| | | | | | | | | Format: 7E1 |
| | | | | | | | | Format: 8N1 |
| | | | | | | | | Address: 1 |
| | | | | | | | | Address: 2 |
| | | | | | | | | Address: 3 |
| | | | | | | | | ... |
| | | | | | | | | Address: 15 |
| | | | | | | | | Address: 16 |

DIP 1,8 must always be set to OFF.



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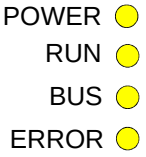
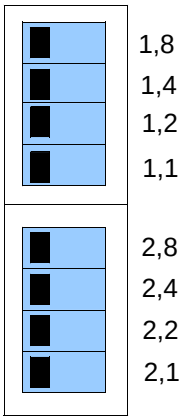
## 6.2 Devices with CANopen Interface




Meaning of the LEDs

| | | |
|---|---|---|
| **POWER** | ON | Supply voltage is applied. |
| **RUN** | BLINKING | Device is in operation. |
| **BUS** | FLICKERING | Interface is active. |
| **ERROR** | BLINKING | System error, check parameters |
| | ON | System error |




Adjustment of the DIP-Switches:

| 1,8 | 1,4 | 1,2 | 1,1 | 2,8 | 2,4 | 2,2 | 2,1 | =OFF =ON |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Baud rate: not allowed |
| | | | | | | | | Baud rate: 20 kbaud |
| | | | | | | | | Baud rate: 50 kbaud |
| | | | | | | | | Baud rate: 100 kbaud |
| | | | | | | | | Baud rate: 125 kbaud |
| | | | | | | | | Baud rate: 250 kbaud |
| | | | | | | | | Baud rate: 500 kbaud |
| | | | | | | | | Baud rate: 1000 kbaud |
| | | | | | | | | Address: 1 |
| | | | | | | | | Address: 2 |
| | | | | | | | | Address: 3 |
| | | | | | | | | ... |
| | | | | | | | | Address: 15 |
| | | | | | | | | Address: 16 |

DIP 1,8 must always be set to OFF.



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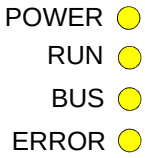
## 6.3 Devices with Profibus Interface




Meaning of the LEDs

| | | |
|---|---|---|
| **POWER** | ON | Supply voltage is applied. |
| **RUN** | BLINKING | Device is in operation. |

| LED BUS | LED ERROR | Meaning |
|---|---|---|
| X | ON | System error |
| X | BLINKING | System error, check parameters. |
| OFF | OFF | Profibus: No connection |
| BLINKING | OFF | Profibus: Wait for Parameterization |
| ON | OFF | Profibus: Data Exchange |
| alternating 10Hz | | Invalid adjustment of DIP-switches |
| alternating 1Hz | | System error Profibus-Hardware |

Adjustment of the DIP-Switches:

| 1,8 | 1,4 | 1,2 | 1,1 | 2,8 | 2,4 | 2,2 | 2,1 | =OFF =ON |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Not allowed |
| | | | | | | | | Address: 1 |
| | | | | | | | | Address: 2 |
| | | | | | | | | Address: 3 |
| | | | | | | | | ... |
| | | | | | | | | Address: 125 |
| | | | | | | | | Not allowed |
| | | | | | | | | Not allowed |

DIP 1,8 must always be set to OFF.



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# 7 Parameter Descriptions

## 7.1 Configuration Parameters, Valid for the Complete Device

| | | |
|---|---|---|
| **PT100 / Thermo.** | Selecting the kind of sensor for each zone. The zones can be configured in pairs of PT100 or thermocouple (TC):<br>Example:<br>`Z1-16:TC` All zones thermocouple<br>`Z1-2:TC Z3-16:PT100` Zone 1-2 thermocouple<br>`Z1-16:PT100` All zones PT100 **<§>**<br>For selecting the sensor type see chapter " Zone Configuration"**.** | |
| | 4-zone controller | (0) Z1-4:TC<br>(1) Z1-2:PT100 Z2-4:TC<br>(2) Z1-4:PT100 |
| | 6-zone controller | (0) Z1-6:TC<br>(1) Z1-2:PT100 Z3-6:TC<br>(2) Z1-4:PT100 Z5-6:TC<br>(3) Z1-6:PT100 |
| | 8-zone controller | (0) Z1-8:TC<br>(1) Z1-2:PT100 Z3-8:TC<br>(2) Z1-4:PT100 Z5-8:TC<br>(3) Z1-6:PT100 Z7-8:TC<br>(4) Z1-8:PT100 |
| | 12-zone controller | (0) Z1-12:TC<br>(1) Z1-2:PT100 Z3-12:TC<br>(2) Z1-4:PT100 Z5-12:TC<br>(3) Z1-6:PT100 Z7-12:TC<br>(4) Z1-8:PT100 Z9-12:TC<br>(5) Z1-10:PT100 Z11-12:TC<br>(6) Z1-12:PT100 |
| | 16-zone controller | (0) Z1-16:TC<br>(1) Z1-2:PT100 Z3-16:TC<br>(2) Z1-4:PT100 Z5-16:TC<br>(3) Z1-6:PT100 Z7-16:TC<br>(4) Z1-8:PT100 Z9-16:TC<br>(5) Z1-10:PT100 Z11-16:TC<br>(6) Z1-12:PT100 Z13-16:TC<br>(7) Z1-14:PT100 Z15-16:TC<br>(8) Z1-16:PT100 |



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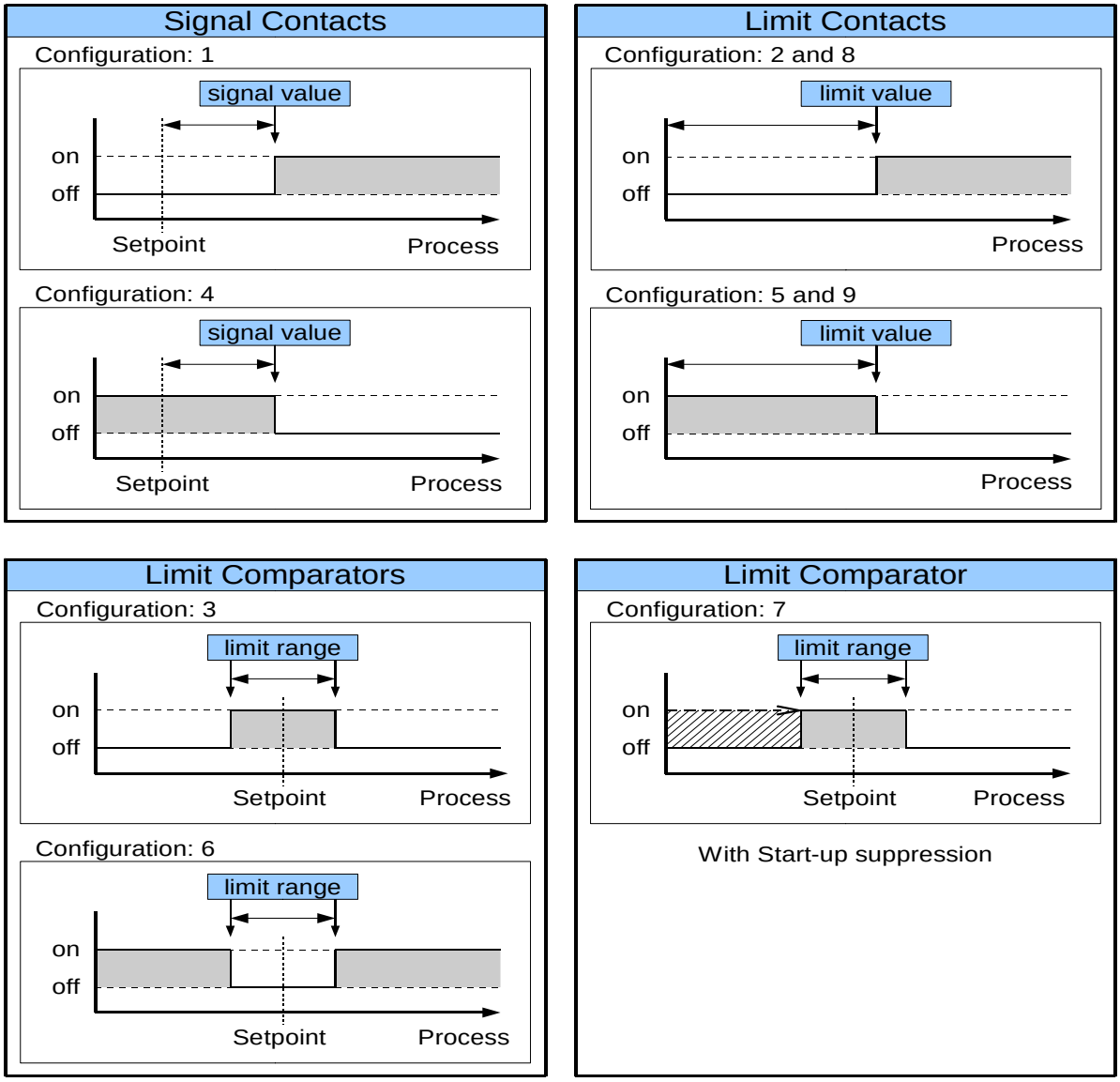
**Alarm configurations, general information:**

The controller features two independent alarms with one corresponding alarm relay each.




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.

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 menu "Control Parameters".



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| | |
|---|---|
| **Alarm config. A1**<br>Alarm configuration<br>Contact A1 | alarm off (0) **<§>**<br>signal contact (1)<br>limit contact (2)<br>limitcompar. (3) Limit comparator<br>signal contact (4)<br>limit contact (5)<br>limitcompar. (6) Limit comparator<br>lim comp ssup (7) Limit comparator with start-up suppression<br>heater current (8) Heater current limit contact<br>heater current (9) Heater current limit contact |
| **Switch behav. A1**<br>Relay switching behaviour | Here the relay function may be inverted:<br>direct (0) The relay is switched on if the controller displays an alarm message. **<§>**<br>inverse (1) The relay is switched on if the controller displays an alarm message. |
| **Alarm config. A2**<br>Alarm configuration<br>Contact A1 | Identical adjustment as **Alarm config. A1** |
| **Switch behav. A2**<br>Relay switching behaviour | Identical adjustment as **Switch behav. A1** |



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**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**".

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
0...max. 99,9 A Three-phase operation
The sum of all three phases currents is monitored.

| | |
|---|---|
| **Current det.cycle** | 1...60s **<§ = 2s>**<br>Time interval between the current measurement of two successive zones |
| **Delay time A1** | 5 steps adjustable, unit: seconds<br>The values depend on the current detection cycle time and the number of active controller zones.<br>off = no delay time active **<§>** |
| **Delay time A2** | 5 steps adjustable, unit: seconds<br>The values depend on the current detection cycle time and the number of active controller zones.<br>off = no delay time active **<§>** |
| **Min leak.Current**<br>Monitoring concerning an impermissible permanent current | Off**<§>**, 0,0...99,9 A<br><br>SSRs (especially if they are combined with RC-combinations) normally have small leakage currents.<br><br>A leakage current limit value is programmable. All values below this limit will not be considered in the alarm monitoring.<br><br>If a permanent current is detected the alarm will be activated.<br>The status is displayed in the window "Tendency Display":<br>„Permanent current detected".<br><br>The zone with a permanent current can be detected by observing the actual process values (high values). |
| **Current transformer: Turns ratio** | **1:100 … 1:9999 < § = 1:1000 for M2000 >** |



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## Serial Interface (RS232, RS485 or TTY)

The controllers of the series **R2200S** 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.

The LED "BUS" on the front panel indicates the activity of data communication.

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

The following parameters are adjusted by DIP-switches exclusively**. The values can be read, but not be modified by ELOVISION-2.**

| | |
|---|---|
| **Protocol select.** | Standard Elotech (0) Standard ELOTECH protocol<br>Modbus (1) Modbus- RTU protocol |
| **Device address** | 1... 16 (Standard ELOTECH protocol)<br>1... 16 (Modbus-RTU-Protocol)<br>At this address a master communicates with the controller. Each controller needs a unique address. |
| **Data format** | Adjusting the data format for the transmission:<br>7E1 (0) 7 databit, even parity, 1 stopbit<br>8n1 (7) 8 databit, no parity, 1 stopbit |
| **Baud rate** | 9.6 kbaud (6)<br>38.4 kbaud (8) |

## Profibus Interface

The following parameters are visible if the device is equipped with a Profibus-DP-interface (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.

The LED "BUS" on the front panel indicates the state of the Profibus Interface.

By Profibus all process values and configuration parameters can be read at any time.

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

The following parameters are adjusted by DIP-switches exclusively**. The values can be read, but not be modified by ELOVISION-2.**

| | |
|---|---|
| **Device address** | 1... 125<br>At this address a master communicates with the controller.<br>Each controller requires a unique address |



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## CANopen Interface

The following parameters are visible if the device is equipped with a CANopen interface. (option)

This enables a master (PLC) to set and to read the process- and configuration parameters.

The LED "BUS" on the front panel indicates the activity of data communication.

The control operation will start when the controller is set into "operational mode" by the CANopen-master. In this case the keyboard is locked.
For control operation without CAN-interface close contact K4.

**Note:** A CAN-network has to be terminated on both ends with terminating resistors (120 Ohm).

| | | |
|---|---|---|
| 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 PODs: | 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 |

Protocol descriptions and further information: www.elotech.de/Downloads

The following parameters are adjusted by DIP-switches exclusively**. The values can be read, but not be modified by ELOVISION-2.**

| | |
|---|---|
| **Device address** | 1... 16<br>At this address a master communicates with the controller. Each controller needs a unique address. |
| **Baud rate** | 20 kbaud (1)<br>50 kbaud (2)<br>100 kbaud (3)<br>125 kbaud (4)<br>250 kbaud (5)<br>500 kbaud (6)<br>1000 kbaud (7) |



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| | |
|---|---|
| **SERVICE Interface: Device address** | See chapter „Service interface“<br>**1...247 <§ = 1>** |
| **Language** | Adjusting the language for the operator guidance in ELOVISION-2.<br>German (0)**<§>**<br>English (1) |

End of the Configuration Parameters list



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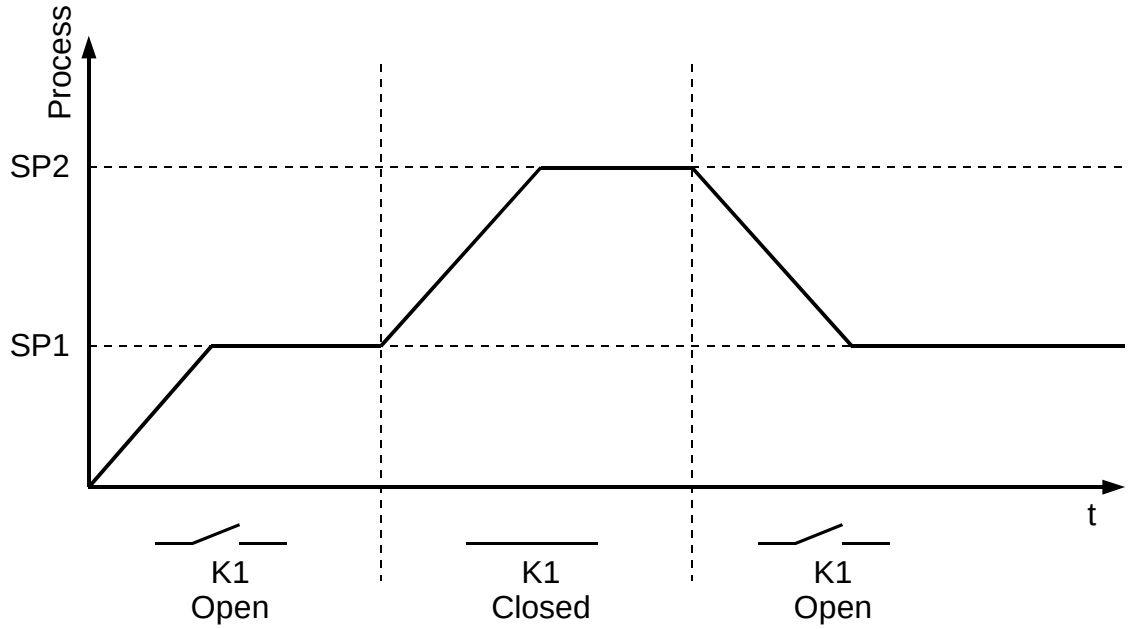
## 7.2 Control Parameters, Zone Dependent

| | |
|---|---|
| **Setpoint 1** | Programming range:<br>Setpointlimit min..Setpointlimit max **<§ = 0°C>** |
| **Setpoint 2** | off**<§>**,Setpointlimit min..Setpointlimit max<br>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.)




| | | |
|---|---|---|
| **Rising ramp** | off**<§>**, 0,1 … 99,9 | °C/min or °F/min for measuring range without decimal point |
| | off**<§>**, 0,01 … 9,99 | °C/min or °F/min for measuring range with decimal point |
| **Falling ramp** | off**<§>**, 0,1 … 99,9 | °C/min or °F/min for measuring range without decimal point |
| | off**<§>**, 0,01 … 9,99 | °C/min or °F/min for measuring range with decimal point |



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| | | |
|---|---|---|
| **Alarm value 1**<br>switches relay A1 | Before adjusting an alarm value, the alarm configuration has to be set. | |
| | **Temperature monitoring:** | |
| | off**<§>**, -199...199<br>off**<§>**, -19,9...19,9 | Signal contact, without decimal point<br>Signal contact, with decimal point |
| | off**<§>**, 1... 199<br>off**<§>**, 0,1... 19,9 | Limit comparator, without decimal point<br>Limit comparator, with decimal point |
| | off**<§>**,<br>Measuring range,<br>bottom end ... top end | Limit contact, adjustment according to measuring range |
| | **Heater current monitoring:** | |
| | off**<§>**, 0,1...99,9 A | Limit contact |
| **Alarmvalue 2**<br>switches relay A2 | Identical setting as **Alarm value 1** | |
| **Max output Ratio**<br>(heating) | 0%...100%**<§ >**<br>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.<br>**Warning!**<br>The output ratio limitation does not work during autotune. | |

**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.

| | |
|---|---|
| **P <P-band> (%)**<br>Proportional band | off, 0.1 … 100.0% **<§=3.0>** |
| **D <rate time>(s)**<br>Rate time | off, 1 … 200s **<§=30>** |
| **I <reset time>(s)**<br>Reset time | off, 1 … 1000s **<§=150>** |



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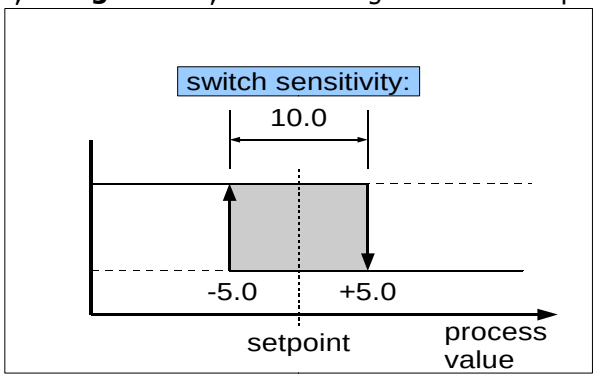
| | |
|---|---|
| **Cycle time** | 0,5...240,0 s **<§=10,0>**<br>The switching frequency of the actuator can be determined by adjusting the cycle time.<br>In this time interval the controller switches on and off once.<br><br>Voltage outputs for SSRs<br>cycle time: 0,5...10 s<br>Optimal value for fast control loops: 0,8s<br><br>Relay outputs:<br>cycle time > 10 s<br>The cycle time should be set as long as possible to minimize the wear of relay contacts. |
| **Switch sensitivit** | Only if „P- Band" = off (on-off action, without feedback)<br>off; 0,1**<§>**...80,0 for range without decimal point<br>off; 0,01**<§>**...8,00 for range with decimal point<br>  <br> |
| **Deadband h<->c**<br>**>3<** | off; 0,1**<§>**...80,0 for range without decimal point<br>off; 0,01**<§>**...8,00 for range with decimal point<br>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.<br>By this the switching frequency between the heating and cooling outputs can be reduced.<br>Simultaneous activation of heating and cooling outputs is not possible. |
| **max outp. ratio c**<br>**>3<** | 0%...100%**<§>**<br>The limitation of the output ratio is only necessary if the heating or cooling energy supply is grossly overdimensioned compared to the power required.<br>Under normal circumstances no limitation is needed (setting = 100%).<br>The limitation becomes effective when the controller's calculated output ratio is greater than the maximum permissible (limited) ratio.<br>**Warning!**<br>The output ratio limitation does not work during autotune. |
| **P <P-band> c (%)**<br>Proportional band cooling<br>**>3<** | off, 0.1 … 100.0% **<§=3.0>** |
| **D <rate time> c**<br>Rate time cooling **>3<** | off, 1 … 200s **<§=30>** |



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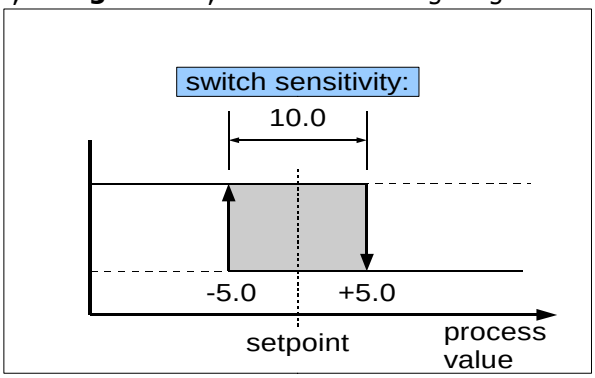
| | |
|---|---|
| **I <reset time> c**<br>Reset time cooling **>3<** | off, 1 … 1000s **<§=150>** |
| **Cycle time c**<br>Cycle time cooling<br><br>**>3<** | 0,5...240,0 s **<§=10,0>**<br>The switching frequency of the actuator can be determined by adjusting the cycle time. This is the total time needed for the controller to switch on and off once.<br><br>Bistable voltage outputs:<br>cycle time 0,5...10 s / optim. = 0,8secs.<br><br>Relay outputs:<br>cycle time > 10 s<br>The cycle time should be set as long as possible to minimize the wear of relay contacts. |
| **Switch sensitiv c**<br>Switch sensitivity cooling<br><br>**>3<** | Only if „P- Band" = off (on-off action, without feedback)<br>off; 0,1**<§>**...80,0 for measuring range without dec. point<br>off; 0,01**<§>**...8,00 for measuring range with decimal point<br>  |



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**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.

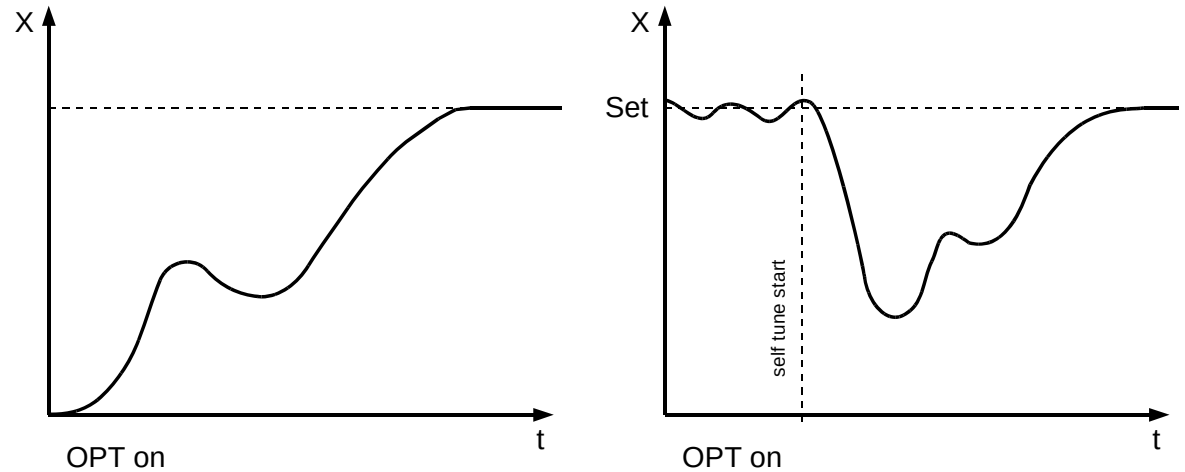
The autotune mode is activated during start-up shortly before the setpoint is reached.
If activated after the setpoint has already been reached, the temperature will first drop by approx. 5% of the measuring range in order to detect the exact amplification of the process.

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

**Autotune active:** Indication in display "Zone Information": OPT

The tuning algorithm can be activated at any time by selecting the parameter **`Autotune = on`**.
After having calculated the feedback parameters, the controller will lead the process value to the actual setpoint.
Please note: If the softstart function is active, the autotune cannot be activated.

Selecting **`Autotune = off`** will stop the autotune function.




OPT on
self tune during start-up

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

| | |
|---|---|
| **`Autotune`** | `off (0)` autotune / self tuning out of action **<§>**<br>`on (1)` autotune / self tuning active |
| **`Process offset`** | `- 999...off<§>...1000` for measuring range without decimal point<br>`- 9,9...off<§>...10,0` for measuring range with decimal point<br>This parameter serves to correct the input signal, e.g. for:<br>- the correction of a gradient between the measuring point and the sensor tip<br>- the line resistance balancing of 2-line RTD (Pt100) sensors<br>- correction of the control deviation when using P- or PD-action<br><br>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.<br><br>Make sure that the corrected temperature process value does not leave the selected measuring range. |
| **`Zone on/off`** | `on (0)` Measuring- or controller zone active **<§>**<br>`off (1)` Measuring- or controller zone switched off |



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| | | | |
|---|---|---|---|
| **Controller config**<br>Controller configuration | **2-point controller:**<br>2P h (0) 2-point controller "heating-off" **<§>**<br>2P c (1) 2-point controller "cooling-off"<br>2Pnc (2) 2-point controller "cooling non linear". Cooling action with non-linear cooling response curve ( e.g. for vapour cooling).<br>diSP (3) Indicator, no controller action | | |
| | **3-point controller:**<br>2P h (0) 2-point controller "heating-off" **<§>**<br>2P c (1) 2-point controller "cooling-off"<br>2Pnc (2) 2-point controller "cooling non linear". Cooling action with non-linear cooling response curve ( e.g. for vapour cooling).<br>3P (3) 3-point-controller "heating-off-cooling" **>3<**<br>3Pnc (4) 3-point-controller "heating-off-cooling". Cooling action with non-linear cooling response curve (e.g. for vapour cooling). **>3<**<br>diSP (5) Indicator, no controller action | | |
| **Sensor selection** | If the zone is configured to PT100, the following sensors are available: | | |
| | P1°C (0) | Pt 100, 0,0 ... 99,9 °C | |
| | P1°F (1) | Pt 100, 32 ... 212 °F | |
| | P2°C (2) | Pt 100, -100 ... 200 °C | |
| | P2°F (3) | Pt 100, -148 ... 392 °F | |
| | P4°C (4) | Pt 100, 0...400 °C | **<§>** |
| | P4°F (5) | Pt 100, 32...752 °F | |
| | P8°C (6) | Pt 100, 0...800 °C | |
| | Ni°C (7) | Ni120, 0...250 °C | |
| | Ni°F (8) | Ni120, 32...482 °F | |
| | If the zone is configured to thermocouple, the following sensors are available: | | |
| | L4°C (0) | T/C Fe-CuNi (L), 0...400 °C | |
| | L4°F (1) | T/C Fe-CuNi (L), 32...752 °F | |
| | L8°C (2) | T/C Fe-CuNi (L), 0...800 °C | |
| | J8°C (3) | T/C Fe-CuNi (J), 0...800 °C | |
| | K1°C (4) | T/C NiCr-Ni (K), 0...999 °C | |
| | N1°C (5) | T/C NiCrSi-NiSi (N), 0...999°C | |
| | **Please note:** If the sensor selection is changed, the following parameters will be reset: | | |
| | Setpoint 1, Setpoint 2: | Setpoint limitation min. | |
| | Lower setpoint limitation: | measuring range bottom | |
| | Higher setpoint limitation: | measuring range top | |
| | Setpoint ramp rising/falling: | off | |
| | Alarm values: | off | |
| | Actual process valueoffset: | off | |



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| | |
|---|---|
| **Setpointlimit max.** | Highest adjustable setpoint value **<§= 400°C>**<br>programming range:<br>`Setpointlimit min.` ... top range |
| **Setpointlimit min.** | Lowest adjustable setpoint value **<§ = 0°C>**<br>programming range:<br>bottom range ... `Setpointlimit max.` |

**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.

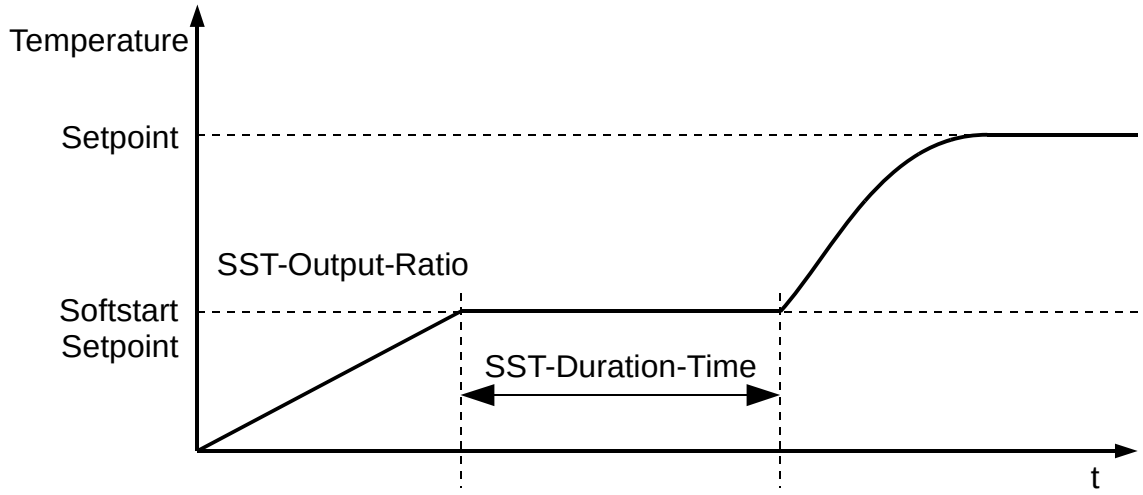
During the softstart the controller's heating output response is limited to a preselected ratio, in order to achieve a slow drying of high performance heat cartridges.
This results in a slower, more regular heating period.
Simultaneously the output clock frequency is quadrupled.

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 (E.OP).
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 $\geq$ 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.




| | |
|---|---|
| **Sst softstart** | `off (0)` Softstart function is not active.**<§>**<br>The other softstart parameters are not displayed.<br>`on (1)` Softstart function is active. |
| **Sst output ratio** | range: `10...100%` **<§ = 30>** |
| **Sst setpoint** | range: setpoint min. .... setpoint max.**<§ = 100>** |
| **Sst duration time** | range: `off, 0.1 ... 10.0 min` **<§ = 2.0>** |



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| | | |
|---|---|---|
| **Output mode** | cont (0) | Controller mode, |
| | auto (1) | In the event of sensor break the last valid output ratio is maintained.<br><br>The output ratio can be changed.<br><br>Under the following circumstances, the output ratio will be 0%:<br>- if the output ratio at the time of the sensor break was 100%.<br>- if a setpoint ramp is active.<br>- if the control deviation was more than 0,25% of the total range at the time of sensor break.<br>- if the Proportional-band (P) = off.<br>- if the softstart was active at the time of the sensor break.<br><br>A few seconds after the sensor break has been rectified, the controller returns to automatic operation and calculates the required output ratio.<br><br>An additional signal can be issued in the event of sensor break, if the alarm contacts are programmed accordingly. |
| | man. (2) | The controller now operates only as an actuator.<br>The control function (PID) is inactive.<br><br>The output ratio can be changed. |

End of the Control Parameters list



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# 8 Service-Interface

The multi-zones-controllers **R2200S** are equipped with a serial service interface.
It is designed to communicate with the software tool ELOVISION-2 which will allow the user to configure the controller by PC.

The following options are available:

- Read out all controller parameters.
- Modify all parameters.
- Save complete parameter sets on the PC (tool / setup management).
- Load back a setup from the PC to the controller. A once saved configuration can be copied to an unlimited number of controllers.
- Print a setup protocol.
- Visualization of all process values, setpoints and operating conditions

Interface parameters:

- Type: RS485, connection to terminal 95 (A) and 96 (B). A termination resistor (120 ohm) is required on both ends of the line!
- Baudrate: 115.2 kBaud (not adjustable)
- Format: 8 N 1 (not adjustable)
- Device address: Adjustable in the parameter ”SERVICE interface: Device address“:

When ordering the controller it has to be chosen whether the service interface is activated or not.
If not ordered ex works there will be the note ”not enabled“ visible at the bottom of the screen.
For later use of the service interface, it can be activated with the ELOVISION-2 software.
Please contact the manufacturer for obtaining a licence key.

# 9 Error Messages

| **Error message** | **Cause** | **Possible remedy** |
|---|---|---|
| LED **ERROR** BLINKING | Error writing parameters to memory | Check all parameters.<br>Switch device off and on.<br>If the error message continues, please send the controller back to the manufacturer. |
| LED **ERROR** ON | System error | Please send the controller back to the manufacturer. |

Further LED indications are described in chapter “DIP-Switches and LEDs”.



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# 10 Technical Data

| | |
|---|---|
| Input PT100 (RTD) | 2- or 3- wire connection possible<br>Built-in protection against sensor breakage and short circuit<br>Sensor current: … ≤ 1 mA<br>Calibration accuracy: … ≤ 0,2 %  Linear error: … ≤ 0,2 %<br>Influence of the ambient temperature: … ≤ 0,01 % / K |
| Input Thermocouple | Built-in internal compensation point and protection against sensor breakage and incorrect polarity.<br>Re-calibration not required for a line resistance of up to 50 Ohm.<br>Calibration accuracy: … ≤ 0,25 %  Linear error: … ≤ 0,2 %<br>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.<br>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<br>Relay,  max. 250 VAC, max. 3 A (cos-phi = 1) |
| Alarm outputs | Relay,  max. 250 VAC, max. 3 A (cos-phi = 1) |
| Data protection | EAROM<br>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<br>Electrical safety: EN 61010-1 |
| Power supply | Depends on the version of the device:<br>- 230 V AC, +/-10 %,  48 … 62 Hz; approx. 7 VA<br>- 115 V AC, +/-10 %,  48 … 62 Hz; approx. 7 VA<br>- 24 V DC, +/-25 %,  approx. 7 W |
| Connections | Screw terminals, Protection mode IP 20 (DIN 40050), Insulation class C |
| Permissible operating conditions | Operating temperature: 0 … 50°C / 32 … 122°F<br>Storage temperature: -30 … 70°C / -22 … 158°F<br>Climate class: KWF DIN 40040; equivalent to annual average max. 75 % rel. humidity, no condensation |
| Casing | Case for DIN-rail mounting (35mm symetric, EN 50 022)<br>Dimensions: 125mm  x  105mm  x  125mm<br>Material:  Polycarbonat (PC)<br>Protection mode: IP 20 (DIN 40050) |
| Weight | Approx. 800g,  depends on the version of the device |
| Fieldbus Interface (optically isolated) | Depends on the version of the device:<br>- Serial: RS232, RS485, TTY (20mA)<br>- CANopen, CiA Device Profile DS-404<br>- Profibus DP, according to EN 50170 |
| Service-Interface | RS485, 115,2 kbaud, 8N1 |

Subject to technical improvements.



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