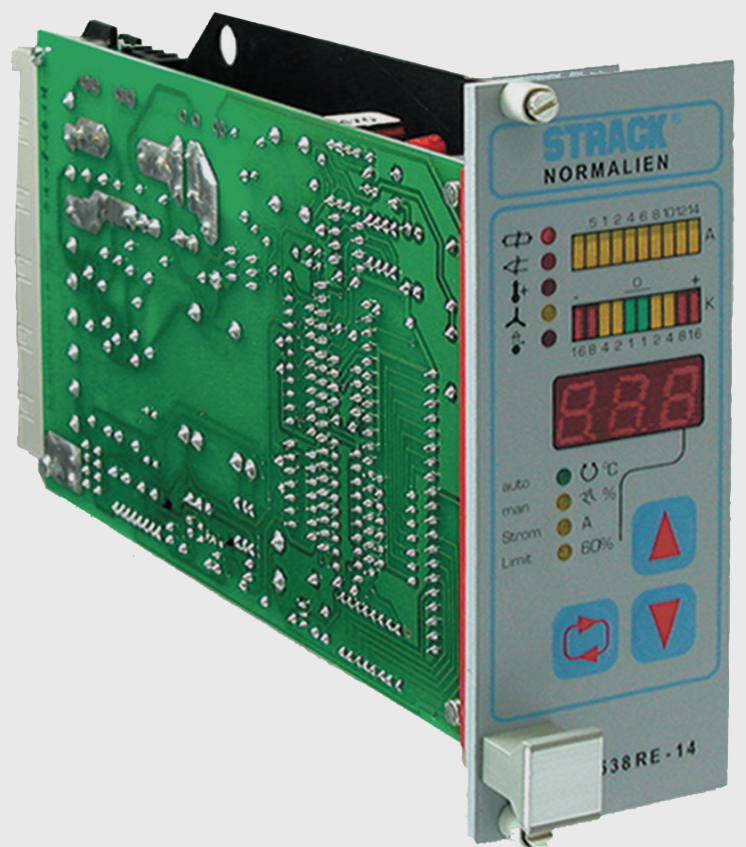# TEMPERATURE-CONTOLLER PLUG-IN UNIT
Z7538
OPERATING INSTRUCTION

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Dear customer,

thank you for having chosen a STRACK temperature controller.
This high quality device has been produced in our ISO 9001-certified factory and was shipped to you after a thourough quality test.

Unpack
Check the device for eventual shipping damage.
Don't connect damaged equipment !
Claim the damage with your shipping agent.

Read
Please read carefully this operating manual before bringing the device into service!

Connect
Wiring the device should be done by your qualified electrician following the instructions given in this instruction.

Warranty
period is 2 year and includes all malfunctions clearly caused by material, production or design failures. Repair or replacement in this case are free of charge, you only pay the shipping cost to our factory. No further claims or requirements can be accepted, especially for consequential losses or damages.

Service
We help you quickly and at resonable costs. Just send us the device with repair order and precise description of the malfunction.
Carefull packaging is essential for a safe shipment!
Small repairs up to 50,- EUR are done immediately without formal offer. In any other case, we contact you as soon as possible to determine the next steps.

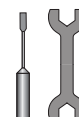To facilitate your orientation in this manual, you find the following symbols :

Safety advice

General information

Wiring- and installing advice

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Operating instruction Z7538 RE-14 Temperatur-controller plug-in unit

Content

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1. Features

19" - 3HE - 10TE - H11 temperature-controller plug-in unit,
for operating in basic-units of the series 7530 GC

- with integrated load-switching unit 230V~ / 12,5A

- with integrated load-current transformer

- Bargraphs additionally indicate control-deviation
  and load-current

- Microprocessor-controller with multiple
  monitoring features

- „Boost"-function establishes controlled
  elimination of „frozen" product-relics

- automatic adaption to the controlled system

- extremely easy 3-button-operation

Operating instruction Z7538 RE-14 Temperatur-controller plug-in unit

2.   Important safeguards

1. Read these notes completely

2. Keep these operating instructions for later use

3. This unit is operated electrically with mains voltage.
   Make sure to note the relevant regulations for safety and those laid down by your national electrician's association.
   Mains voltage as well as any voltage from 42V up are highly dangerous.

4. Before cleaning the unit, please do always disconnect it from the mains by pulling the power plug.

5. Do not place unit on hot machine parts or in the range of radiation of hot parts.

6. Keep power cord away from hot or sharp-edged parts.

7. Pull power plug immediately, if
   - power supply cable got damaged,
   - a liquid or an object got in,
   - the unit got damaged by falling or any other mechanic influence.

8. Operating staff must be thoroughly instructed by a qualified employee.

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9.   Maintainance on this unit must only be carried out by persons especially qualified for this job.

      For repairs the unit should be sent to the manufacturer, if possible.

      If replacement parts are needed, please do only use those which are designed for it by the manufacturer.

      The use of other parts can result in faulty functions or endangering of operating staff.

10.   Please follow further notes and warnings of these operating instructions.

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Operating instruction Z7538 RE-14 Temperatur-controller plug-in unit

3. Specification

Mains voltage:
230V ± 10%, 48...63Hz

Nominal power-output / current of heating load:
2,85kW / 12,5A

Fuses:
16A FF, 6,3 x 32mm (heating load)
1,6A MT, 5 x 20mm (optional cooling-exit))
0,1A MT, 5 x 20mm (controller)

Power control:
0...100% proportional
zero voltage switching

Power limitation:
60%

Automatic soft-start:
temperature sensitive, 20s - 9min. power & temperature
limited (ϑ_{max} = 80°C)

Boost-Function:
Single-time, controlled overheating after soft-start,
free selectable 0...9K

Standby-input:
9V, 15mA

LED-Display:
Displays actual value, desired value, load-current,
alarms, incorrect polarity of thermocouple, triac failure

LED-Bargraphs:
10-element for load-current
10-element control-deviation

Mode-LEDs:
Normal operation, manual power control, display in
load-current mode, 60%-limitation active

Operating instruction Z7538 RE-14 Temperatur-controller plug-in unit

Alarm-/info-LEDs:
load broken, sensor broken, process high, process low,
cooling-exit active (optional)

Safety load-cutoff:
contactor switches load off when process is high

Limit-comparators:
+3 ... 99K
- 3 ... 99K
1 relay each, „N" switched

Sensor-input:
thermocouples according to DIN IEC 584
Fe-CuNi type J: 0 ... 450°C
NiCr-Ni type K: 0 ... 999°C
Pt100:   0 ... 450°C
automatic zero-point-correction und
reverse-sensor protection (thermocouple),
sensor-breaking protection

Cooling-exit: (optional)
230V~/120VA

Type of control:
adaptive control, DPID-charakteristics

Accuracy:
0,5% f.s.

Insulation voltage:
2,5kV Netz/Elektronik

Dimensions:
50,5 x 128,5 x 195mm (w x h x d)

Size:
19" / 3HE / 10TE
transfer-plug H11 DIN 41612

Weight:
0,8kg

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4. Application and installation

Temperature-controller plug-in unit complying with the
19"-rack-standard to establish multiple-zone controls.
They are inserted in the same basic-units of series Z 7530 GC
which are deliverable fully wired for 2, 4, 6, 12, 18, 24
and 30 zones.

The functional equipment of the temperature-controller
unit and its special control mode are particularly suitable
for temperature-control of hot-runner injection-moulds,
plastics and rubber machinary, extruders, presses and
tools.

High temperature stability by using a precision
control-unit with adaptive DPID-characteristics.

Careful handling of the connected heating-elements by
use of automatic startup-routine with reduced poweroutput,
feasibility of permanent power-output limitation as
well as using nearly continuous proportional zero-voltage
switching.

Very easy and concise 3-button-operation.
All operational parameters at a glance:
3-digit 7-segment LED-display indicates actual value,
control-deviation is additionally indicated on the coloured
10-segment bargraph.

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5. Assembly
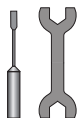
Small units of 2, 4 or 6 control zones are ready equipped with temperature-controller plug-in units when delivered. Bigger mainframes with 12 or more control-zones are delivered separately from the controller plug-in units. For assembly just insert the plug-in units into the spaces provided in the mainframe.

Warning:

The mainframe must not be connected to the mains during assembly. Please pull the power-cord!

Please turn both quick-seal coupling locks in horizontal position and insert PC boards of the plug-in units into lower and upper guide rail.
The front panel must engage fairly with gentle pressure. Please press quick-seal coupling locks gently through against spring with a screwdriver and lock with a 90° rotation.

Do not fit the spaces designed for alarm plug-in units with temperature controller plug-in units, there will be no function here.
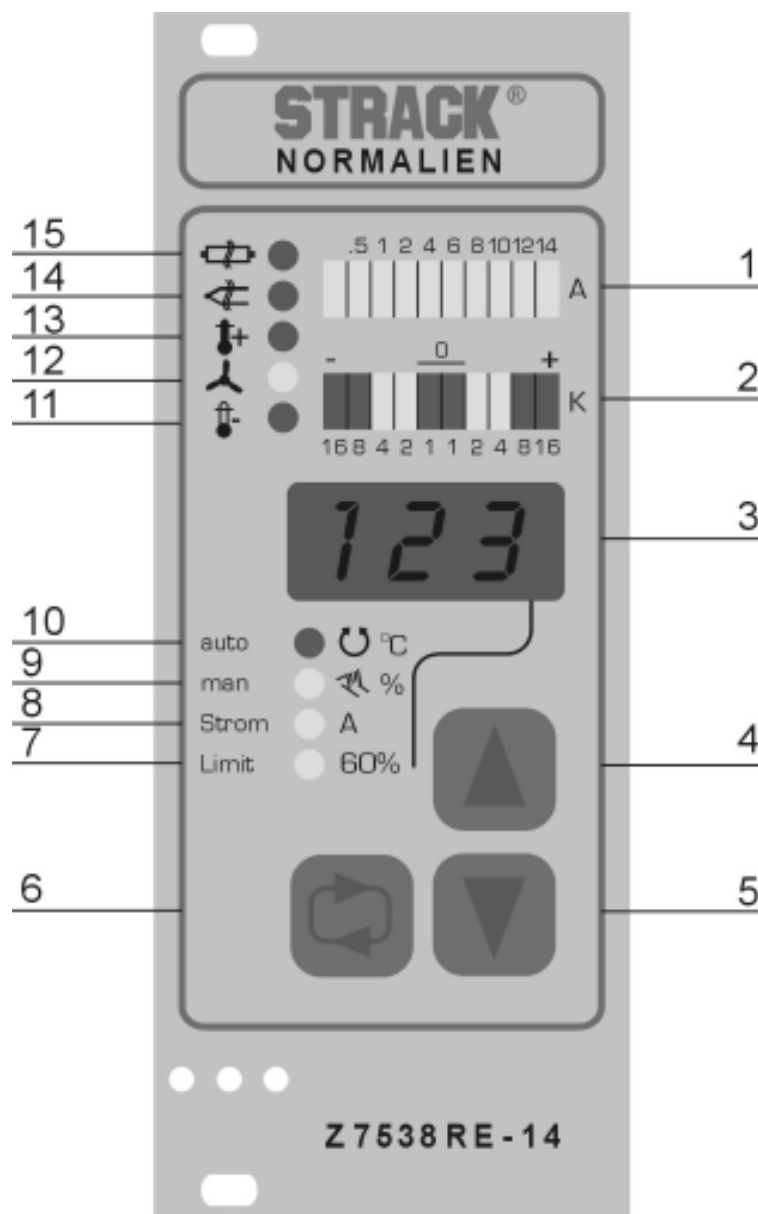An alarm plug-in unit can, however, be inserted into a vacant temperature controller space.

Please do always seal vacant spaces with blind plates!

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6. Operation

6.1 Operating elements

1	Bargraph	8	Multi-purpose display
	load current / heating-pulse		in load-current mode
2	Bargraph *Control deviation*	9	Manual power-control active
3	Multi-purpose display	10	Closed-loop control active
4	UP-buttom (increase value)	11	Process low
5	DOWN-buttom (decrease value)	12	Cooling-exit active
6	Mode-button	13	Process high
7	Power limitation	14	Sensor failure (broken)
	60% active	15	Load broken

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Keyboard:

Mode-button (6)

    starting from *closed-loop con-trol-mode*, actuating the mode-button enters the following operation-modes:

    DISPLAY IN „SET VALUE"-MODE / MANUAL POWER-CONTROL:
tapping once, the multi-purpose-display (3) indicates the actual set-value; indicator-LED 9 (manual power-control) and 10 (auto) flash alternately.
Actuating the UP/DOWN-buttons (4 / 5) switches to manual power-control; indicator 10 goes out, 9 lights constantly.
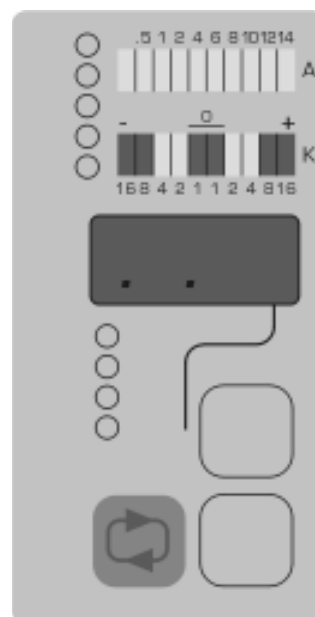

- **S**LEEP-**M**ODE:

    Pressing mode-button (6) longer than 4 secs will switch the controller into **S**LEEP-**M**ODE.
All outputs will be switched-off, the multipurpose-display indicates two decimal points.
To reconnect press mode-button (4) longer than 4 secs, the controller will restart.

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Operating instruction Z7538 RE-14 Temperatur-controller plug-in unit

LOAD-CURRENT:

Tapping the Mode-button twice switches over to LOAD-CURRENT-CONTROL-MODE. The multipurpose-display (3) now shows the actual load-current (resolution: 0,1A).

LOAD-CURRENT-CONTROL-MODE is also the first step towards entering SETUP-MODE (s. appendix).

The next acutation of mode-button returns to closed-loop control-mode.

UP/DOWN - buttons

- tapping in-/decreases the concerned value about one digit

- continuous actuation causes fast forward/reverse-count

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6.2 Getting started:

To put the control-unit into operation turn-on the mains-switch of the mainframe.
If the controller-unit was in **S**LEEP-**M**ODE, press mode-button (6) longer than 4 secs.
Factory-default control-values:

Temperature-desired value: 100°C
Limits
- process low: -15K
- process high: +15K
Softstart (time): 5 min.
Boost-funktion: 0K (off)

The desired temperature-value may be changed immediately (also while softstart is active).
All other parameters are locked during softstart.

When re-starting the control-unit all last operated parameters will be used.

The control-unit always starts-up in **C**LOSED-LOOP CONTROL-**M**ODE (normal operational mode).
The multi-purpose-display (3) indicates the actual temperature.

Operating instruction Z7538 RE-14 Temperatur-controller plug-in unit

According to the difference between actual and desired temperature and according to the programmed process-low limit the corresponding LED (11) lights up.
At starting tool-temperatures below 50°C the complete startup-sequence is run.
During soft-start the decimal points slowly flash from left to righ tof the multipurpose-display.

The initial power-output amounts to 5% and is increased continuously up to 60% within the time-period programmed in setup-mode.
Softstart-temperature is limited to 80°C.
Within this routine low-mass, fast acting heating-cardridges aregently preheated, and moisture,which may possibly be present, is expelled.

At starting-temperatures above 50°C the softstart-sequence is abbreviated to 1min.
Afterwards the control-unit analyses the controlled system and starts the complete control-sequenze.

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During the analysis of the controlled system the decimal points quickly flash from left to right of the multipur-pose-display.

If the BOOST-function is active, the programmed desired temperature will be overstepped once to the normal desired temperature plus the programmed BOOST-temperature. After that the tool is heated to the exact desired temperature.

Depending on limit-values there might be „process-high"-alarm during boost-process, wheras the cooling-exit (if established) is definitely deactivated during boost.

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7. Setting parameters

7.1 Temperature-desired value:

Changing temperature desired-value in **C**LOSED-LOOP CONTROL-MODE is done by pressing UP/DOWN buttons (4/5).
Multipurpose-display (3) changes over from actual- to desired value at the first keystroke at any of both buttons, the green closed-loop control-LED (10) flashes.

Each more tapping of ´UP´ increases the desired value about 1°C, tapping ´DOWN` decreases about 1°C.

Continuous actuation causes fast forward / reverse change.

New desired values can be confirmed by pressing the mode-button, after about 20secs the new value will be automaticcaly acceptet, the multipurpose-display now returns to actual temperature-value.

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7.2 Temperature-limit value:

Both process-high and -low temperature-limits have a following relation to the set temperature, adjustable between 3 ... 99K, hysteresis 2K:

Example:
desired temperature 100°C
process-high-
limit +10K
process-low-
limit -15K

result:
operating value process-high
100 + 10 = 110°C
release value process-high
100 + 10 - 2 = 108°C
operating value process-low
100 - 15 = 85°C
release value process-low
100 - 15 + 2 = 87°C

Setting temperature-limits:

(see SETUP-MODE)

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7.3 Cooling function: (optinal)

The cooling-exit of the temperature-controller-unit is designed to the direct-driving of fan-motors 230V~/max.120VA.

It works narrow-band proportional within an area of 5K, cycle-time is 10sec.

The proportional-band has a running relation of 2K to the process-high-limit.
Cooling exit only works if process-high limit is > 10K.

Settings (example):
process-high limit   +12K
results in proportional cooling-function within   +5K to +10K
at cooling-power   20% to 100%

|		
+5K	=>	20% cooling-power
+6K	=>	40% cooling-power
+7K	=>	60% cooling-power
+8K	=>	80% cooling-power
+9K	=>	100% cooling-power

7.4 Power-limitation:

(see SETUP-MODE)

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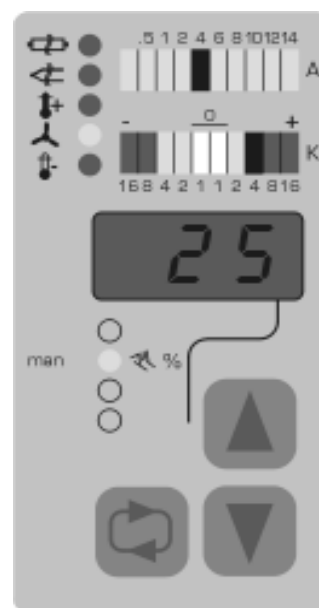
7.5 Manual power-control

Manual power-control - selected

In closed-loop control mode tapping mode-button once switches the multipurpose-display to actual power-output (%), UP/DOWN-buttons (4/5) can be used to change the manipulated variable. LEDs „Auto" (10) and„Man" (9) blink alternately. Actuating ´UP/DOWN´-buttons switches over to manual power-control, continuous light at LED (9) as well as going out of „Auto"-LED (10) indicates manual chosen manipulated variable.
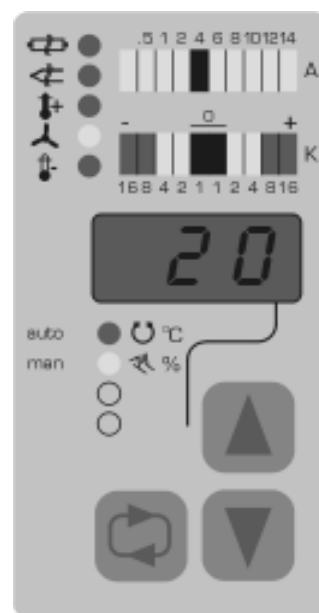
This way any heating zone can be tested in manual power-control mode. Control-deviation-bargraph (2) reacts according to set temperature-value. Any exceed of temperature-limits will be signalled its corresponding limit-exits.
If temperature rises more than +5K above the process-high limit, the additional load-relay will open the load-circuit.

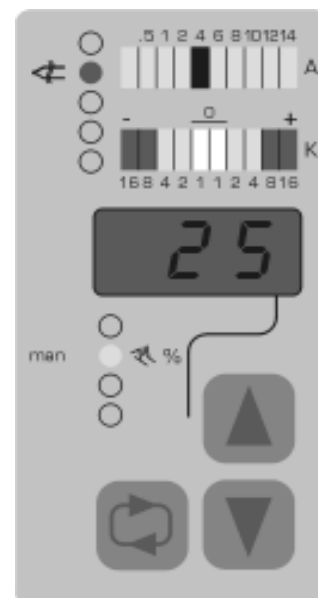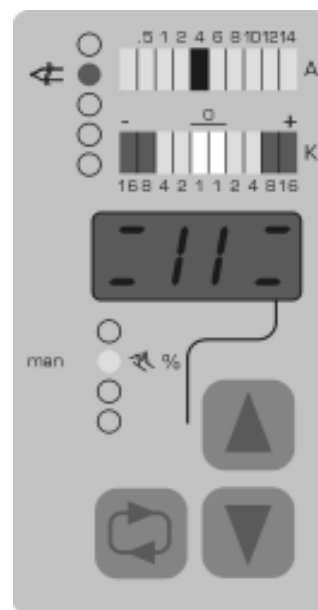# Operating instruction Z7538 RE-14 Temperatur-controller plug-in unit

Manual power-control-mode - emergency operation in case of sensor breakage

The sensor-breakage LED (14) flashes, the sensor-breakage-symbol appears on the multipurpose-display (3) alternating with the average manipulated variable in % (calculated by the control-unit). The calculated percentage for the manipulated variable depends on the manipulated system and therefore takes a certain time to be calculated; premature sensor-breakage may cause an incorrect manipulated variable. The calculated %-value can be changed any time by pressing UP/DOWN-buttons (4/5).

In contrast to the *selected* manual power-control-mode (with functional sensor) the deviation-bargraph now does not show any digits, process-high and -low is not available.

In case of mains-failure the actual manipulated variable is stored.

After replacement of the defective sensor the unit returns to normal closed-loop-control-mode.

7.6 Boost-function

(see SETUP-MODE)

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8. Monitoring of limit values

The signal exits in the basic unit (mainframe) are wired parallel and run on a 5-pole Amphenol socket at the rear of the unit. Process-high/ low-alarm devices can be driven directly, operating voltage is 230VAC, max. 150W, e.g. rotating mirror lamps.

8.1 Message „process high"

When the preset limit is reached, the corresponding LED (13) flashes. Simultanously a relay will switch the corresponding signal exit to N.

If temperature exceeds the preset process-high value above +5K, an additional load relay -serially wired with the triac- will reversibly open the load circuit mechanically.
This avoids e.g. an overheat by a melted triac.

8.2 Message „process low"

When the preset limit is reached, the corresponding LED (11) flashes. Simultanously a relay will switch the corresponding signal exit to N.

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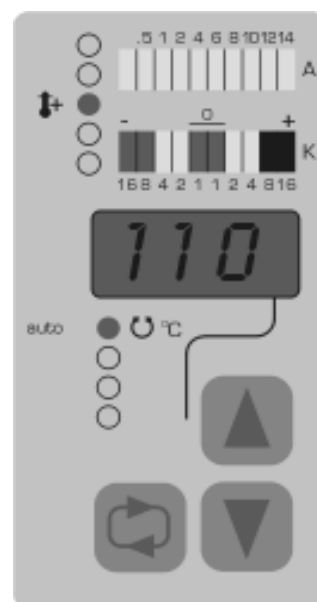
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8.3 Monitoring of load-current

The actial load-current can be
read-off any time at bargraph (1).
All segments below the actual
current-value blink synchronized
to the heating pulses.
For the exact current press mode-
button (6) twice (starting from normal
closed-loop control-mode).
The multipurpose-display now
indicates the exact load-current with
0,1A-resolution.

Press mode-button (6) once more to
return to closed-loop control-mode.

Missing load current with manipula-
ted variable above 10% will be inter-
preted as load-breakage.
The corresponding LED (15) lights up.

Operating low-power heating-
cardridges may lead to misinter
pretations, which have no influence
to control-routine.
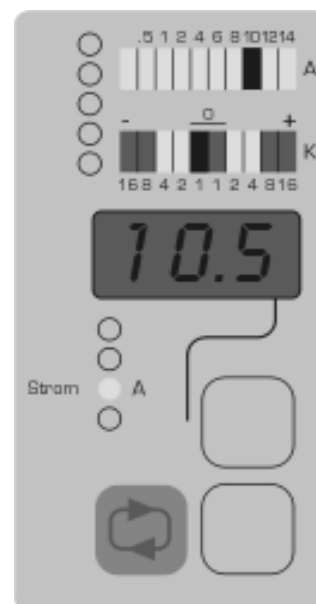
## Operating instruction Z7538 RE-14 Temperatur-controller plug-in unit

9. Sensor monitoring

9.1 Sensor breakage-guard

(s.a. „7.5 manual power-control")

If sensor is broken or sensor wire is damaged or no sensor is connected, the unit automatically switches over to manual power-control using the latest average power-output value.
The sensor-breakage-symbol appears on the multipurpose-display (3) alternating with the average manipulated variable in % UP/DOWN-buttons (4/5) can be used to change the manipulated value (%).
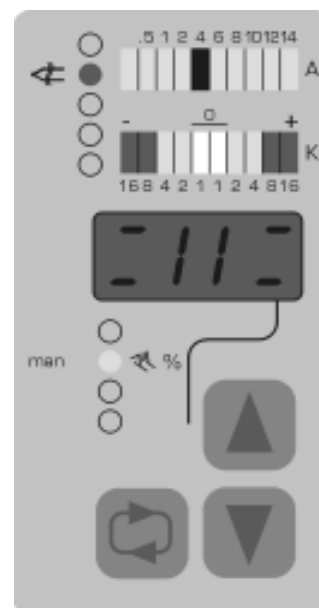
9.2 Incorrect sensor polarity

If the sensor is connected with incorrect polarity, the unit displays the symbol stated beside. The connected load is irreversibly switched-off, no manual power-control allowed.
Reset the unit by correcting the sensor-polarity and switch-off the controller-unit (turn-off mains-switch of mainframe or pull plug-in unit; **S**LEEP-**M**ODUS via mode-button (6) is not possible during failure).

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10. Triac monitoring

Running load-current without heating-pulses is recognized as triac failure.
The multipurpose-display (3) indicates the symbol stated beside.
The additional load relay -serially wired with the triac- will irreversibly open the load circuit mechanically.

11. Pin assignment (transfer plug)

(2) Cooling
(5) Heater
(8) High temperature
(11) L
(14) Low temperature
(17) N
(20) Standby +
(23) Standby -
(26) Sensor +
(29) Sensor -
(32) PE

N
N
L
N

Alarm plug-in unit

PE

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12. Location of fuses

Cooling 1,6A MT

Heating load 16A FF

Control system 0,1A MT

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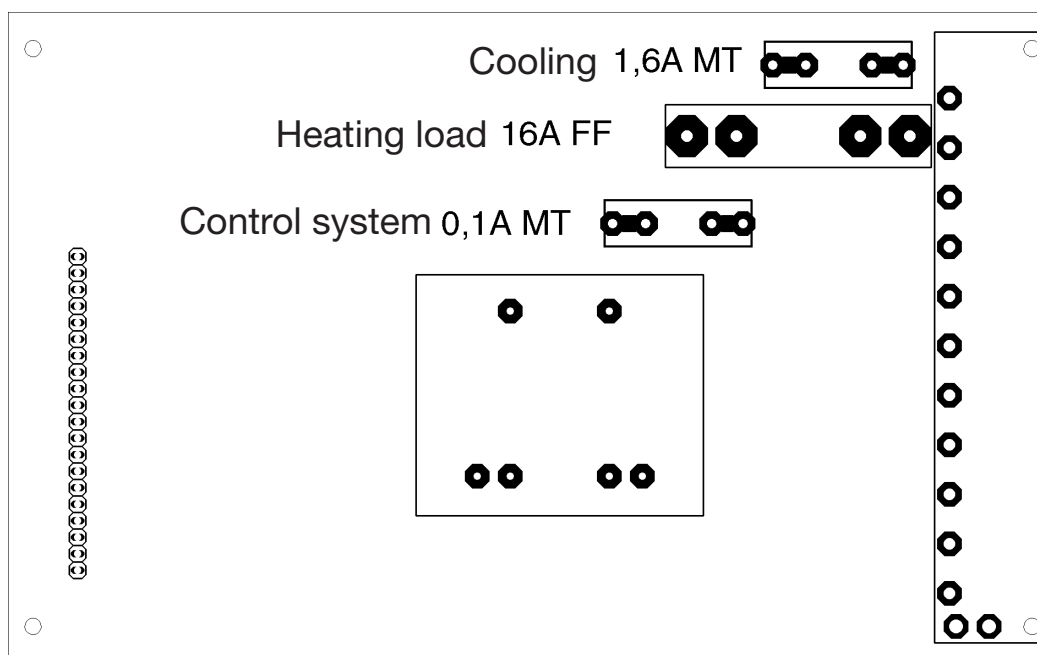
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13. Setup-mode

After the softstart-routine has finished several parameters may be adapted in **S**ETUP-**M**ODE. **S**ETUP-**M**ODE is started from **L**OAD-CURRENT-CONTROL-MODE. In this mode press and hold the UP- button (4) and additionally tap the Mode-button (6). This is the first menu-item:
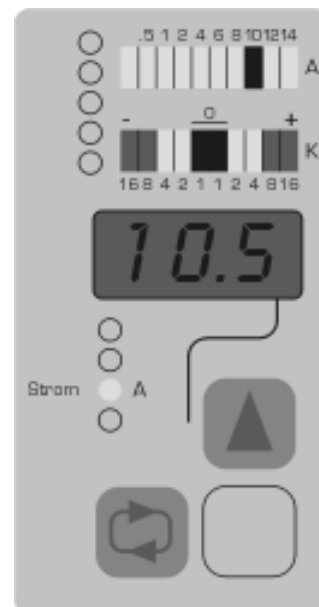
13.1 Process-high limit-value:

The multipurpose-display (3) shows the actual process-high limit. Process-high-LED (13) blinks slowly. The indicated value can be changed between +3 and +99K by tapping the UP/DOWN-buttons (4/5). Mode-button (6) confirms changes and continues to the next menu-item:

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13.2 Process-low limit-value:

The multipurpose-display (3) shows the actual process-high limit. Process-high-LED (11) blinks slowly. The indicated value can be changed between -3 and -99K by tapping the UP/DOWN-buttons (4/5).
Mode-button (6) confirms changes and continues to the next menu-item:

13.3 Limitation of power-output:

To save sensitive heating-elements during 24/7-operation, the maximum power-output can be limited to 60%.
Limit-LED (7) blinks, the multipurpose-display (3) shows the actual limit-status (ON - OFF).
Use UP/DOWN-buttons (4/5) to switch between limit-ON (UP) or limit-OFF (DOWN).
Limit-ON is indicated by LED (7), even after ruturning to **C**LOSED-**L**OOP-**O**PERATION-**M**ODE.
Mode-button (6) confirms changes and continues to the next menu-item:

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13.4 Softstart:

Softstart-time can be defined individually.

Select the desired duration via UP/DOWN-buttons (4/5) between 20secs („So.0") and 9min („So.9").

Mode-button (6) confirms changes and continues to the next menu-item:
Boost-funktion

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13.5 Boost-function:

The **Z 7538 RE-14** temperature-controller-unit features a facility to override the normal settempe-rature with 1 - 9K at the first heating-up. This intended overshooting abbreviates the required time to „melt" frozen injectors.
As soon as the increased boost-temperature has been reached, the unit immediately reduces the temperature to the normal set-temperature and hereby ends with the boost-routine. The amount of temperature-increase is selected via UP/DOWN-buttons (4/5) between 0K („bo.0") and 9K („bo.9"). „bo.0" means „boost OFF".

During boost process-high LED (13) as well as control-deviation-bargraph (2) react according to their presets (see chapter 7.1, so they will probably indicate process-high. Cooling-exit (see chapter 7.3) is disabled durcing boost-phase.

Mode-button (6) confirms changes and continues to the next menu-item: **S**OFTWARE-**V**ERSION

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13.6 Software-version:

The multipurpose-display indicates the actual software-revision.

Press mode-button (6) to return to CLOSED-LOOP CONTROL-MODE.

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