Operating Instructions

Single Loop Temperature Controller

hotcontrol® C248
hotcontrol® C296

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Quick start-up

The temperature controller is ready for use. One control zone for one heater and one thermocouple for measurement of the actual value is set up for operation. The start-up of the control zone can be done in a few steps.

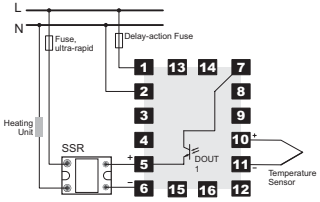
C248

Step 1: Electrical connection

- Connect the thermocouple between terminal 10 and 11.
- A Solid State Relay (SSR) is used as a power controller. Notice the heat output at switching to select the correct SSR.
  To activate the Solid State Relay connect it to terminal 5(+) and 6(-) of the controller.
- Connect the heater with power supply and Solid State Relay. Use ultra rapid micro-fuse or ultra rapid automatic circuit breaker for fuse protection of the heating circuit.
- Connect the power supply of the controller by terminal 1 and 2 (e.g. 230 VAC).

  Notice necessarily the specification of the power supply of the controller (85...250 VAC or 24 V)!

  Provide fuse protection.



Step 2: Adjust sensor type

- Press button P repeatedly until SEn is shown in the display.
- Choose sensor type with the buttons ▲ or ▼.
- Confirm sensor type with P and return to set point/actual value display with ⏻.

Step 3: Adjust set point

- Press button ⏻ repeatedly until SP is shown in the display.
- Press P and change set point with ▲ and ▼.
- Confirm set point entry with button P and return with ▲ or ▼ to set point/actual value display.

C296

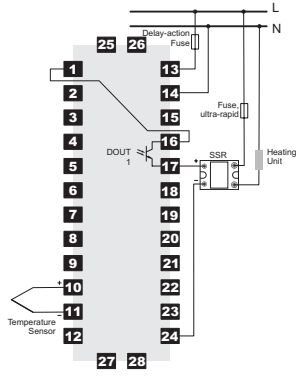
Step 1: Electrical connection

- Connect the thermocouple between terminal 10 and 11.
- A Solid State Relay (SSR) is used as a power controller. Notice the heat output at switching to select the correct SSR.
  To activate the Solid State Relay connect it to terminal 17(+) and 24(-) of the controller.

  For the power supply of the control output there must be an additional connection between terminal 1 and 16.
- Connect the heater with power supply and Solid State Relay. Use ultra rapid micro-fuse or ultra rapid automatic circuit breaker for fuse protection of the heating circuit.
- Connect the power supply of the controller by terminal 1 and 2 (e.g. 230 VAC)

  Notice necessarily the specification of the power supply of the controller (85...250 VAC or 24 V)!

  Provide fuse protection.



Step 2: Adjust sensor type

- Press button P repeatedly until SEn is shown in the display.
- Choose sensor type with the buttons ▲ or ▼.
- Confirm sensor type with P and return to set point/actual value display with ⏻.

Step 3: Adjust set point

- Press button ⏻ repeatedly until SP is shown in the display.
- Press P and change set point with ▲ and ▼.
- Confirm set point entry with button P and return with ▲ or ▼ to set point/actual value display.

1 Introduction

The compact controller models C248 and C296 are one zone temperature controllers (dimensions 48x48mm and 48x96mm) with adaptive parameter adjustment. They are applicable for all purpose applications in extremely fast to extremely slow zones.

The controllers are available in different specifications. This has to be considered at installation and start-up. For details please refer to chapter ↗Device Specification/Ordering Information as well as Page 27: *Configuration / Setting*.

These operating instructions assist in case of first installation and start-up of the controller as well as in case of changes and adjustment of an existing control system. Status and error messages are described and remedies are recommended for elimination of faults.

Protocol specifications of the serial interface and CAN-Bus are not integral part of the operating instructions. The specifications are available on request.

Symbols and explanation

Attention — A damage of a device or person can happen when you do not follow the instructions or follow them improperly.

Notice — Something is pointed out.

Example — Function is explained by an example.

2 Terms of Guarantee

This product is subject to the legal period of warranty for damages and deficiencies at production.

Contents

If there is a malfunction due to production, Hotset Heizpatronen und Zubehör GmbH rectifies the fault or replaces the defective product at their own discretion.

The guarantee does NOT cover the following causes of damage. Repair or replacement is brought to account in case of:

- malfunction after expiration of period of warranty.
- malfunction after faulty operation caused by a user (the device is not operated as described in the operating instructions).
- malfunction caused by other devices.
- changes or damages of the device not originated by the vendor.

For services due to these terms of guarantee please contact Hotset Heizpatronen und Zubehör GmbH.

3 Mounting and Security Advice

Please read through the operating instructions completely and carefully before mounting or operation of the controller.

This controller fulfils the European Directives of security and EMC. It is the responsibility of the operator to observe the directives at installation of the device.

Safety Standard

This controller is in conformity with the EC Low Voltage Directive 73/23/EWG, supplemented by 93/68/EWG, under appliance of the safety standard EN 61010.

Electro Magnetic Compatibility (EMC)

This controller is in conformity with the EMC Directive 89/336/EWG, supplemented by 93/68/EWG and the protection requirement. The device is designed for industrial applications according to EN 50081-2 and EN 50082-2.

Service and Repair

This controller is maintenance-free.

In case of error, please contact Hotset Heizpatronen und Zubehör GmbH. Repair by customer is prohibited.

Cleaning

DO NOT use water or water based cleaning supplies to clean labels on the device. The surface of the controller can be cleaned with a damp cloth.

Storage

If the controller is not immediately used after unpacking, it should be protected against humidity and dirt.

Staff

The controller should only be installed by authorized staff.

Wiring

The wiring has to be done correctly according to the operating instructions. All supplies and terminals have to be dimensioned according to the relevant current. All terminals should follow the effectual VDE instructions and the particular instructions of the country respectively.

Please pay attention to the AC power supply. DO NOT connect the AC power supply with logical outputs or low voltage inputs.

Overload Protection

For the power supply of the controller and the controller outputs use a fuse protection or a circuit breaker. That protects the printed circuit board against overload.

Maximum Voltage for Devices with Power Supply of 85...250VAC

For controllers with a power supply of 85...250VAC the maximum applied voltage on the terminals has to be less than 250 VAC.

DO NOT connect the controller to three phase systems or grounded midpoints. In case of an error the voltage of the power supply can exceed 250 VAC. Under these circumstances the device is not reliable.

Voltage transients on power supply terminals and between power supply and ground should not exceed 2,5 kV. For transients expect to exceed 2,5 kV, the power supply voltage should be limited to 2,5 kV by an over voltage protection.

Environment

Any excess dust/dirt near the terminals of the cabinet may be removed with a light brush.

Inspect the fan filters at regular intervals according to your own environment. Failure to do this reduces the flow of cooling air, and causing internal components to overheat. If the equipment is installed in a low temperature environment, it is recommended that a thermostat controlled heater is fitted in the cabinet to prevent condensation build up in the cabinet, and causing damage to the controller.

4 Installation and Start-up

4.1 Scope of Supply

The controller is packed in a robust cardboard box.
Check the packaging and the controller for any visible transport damages. Contact the transport company, if there are any signs of damage.

In case of damage DO NOT put the controller into operation.

Two securing brackets (see figure) and the operating instructions are included in the box.

4.2 Device Specification/Ordering Information

When ordering the controller it is important to specify what options are required (refer to ↗Type Designation). The exact specification can be read on the nameplate on the cardboard box, the controller housing and the printed circuit board.

Nameplate on cardboard box

Nameplate on controller housing

Nameplate on printed circuit board

4.2.1 Nameplate

The following information is available on the nameplate:

1 ↗Type Designation
2 Revision of printed circuit board
3 Revision of controller software
4 Order number
5 Serial number

4.2.2 Type Designation

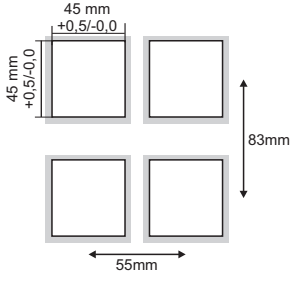
The type designation specifies the controller model and consists of the following options:

Controller type	C248		C296	
Measuring input A	TCPT	Thermocouple/Pt100	TCPT	Thermocouple/Pt100
Measuring input B	-	-	U	0/2...10VDC
Measuring input C	-	-	I	0/4...20mA
Digital output 1	TS	Optical coupler	TS	Optical coupler
Digital output 2	TS	Optical coupler	TS	Optical coupler
	R	Relay output	R	Relay output
Digital output 3	-	-	TS	Optical coupler
			R	Relay output
Digital output 4	-	-	TS	Optical coupler
			R	Relay output
Option A	-	Not applicable	-	Not applicable
	RS 485	Serial interface	RS 485	Serial interface
	U	Analogue output 0...10VDC	U	Analogue output 0...10VDC
	I	Analogue output 0...20mA	I	Analogue output 0...20mA
	DIO	Digital in-/output	DIO	Digital in-/output
Option B	-	Not applicable	-	Not applicable
	CAN	CAN-Bus	CAN	CAN-Bus
	U	Analogue output 0...10VDC	U	Analogue output 0...10VDC
	I	Analogue output 0...20mA	I	Analogue output 0...20mA
	DIO	Digital in-/output	DIO	Digital in-/output
Voltage	230 VAC	85...250 VAC	230 VAC	85...250 VAC
	24 V	24 VAC/DC	24 V	24 VAC/DC

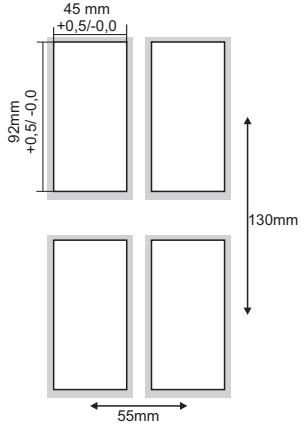
4.3 Mounting and Housing

The control panel cut out has to be prepared according to the following sketch:

C248

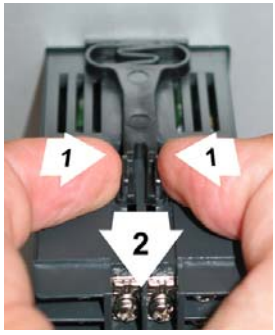


C296



When fitting more than one controller in a control panel the correct spacing of the controllers is necessary. A spacing of 10mm in horizontal, and 38mm in vertical direction is recommended.

The controllers C248 and C296 are equipped with a straightforward mounting system. The housing can be mounted / removed without any tools.



To mount the controller, remove the securing brackets.
Press the securing brackets at the end (1), move it backward (2) out of the guides.

Pass the controller into the front side of the control panel cut out or remove it from the front side.

Refit the securing brackets into the guides again and push it forward.

4.4 Exchange of Controller

For an exchange of a controller the housing need not to be removed.

Press the lock at the lower end of the front side and remove the controller from the housing (see figure).

Only controllers of the same type should be exchanged. Notice to take over the setting of the controller.

4.5 Electrical Connection and Base Configuration

Only authorized staff are allowed to install and start up the controller.

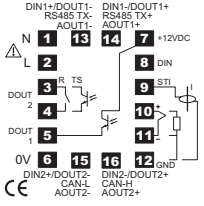
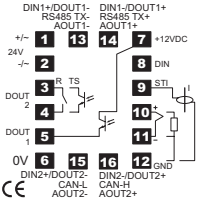
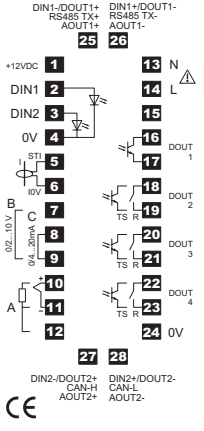
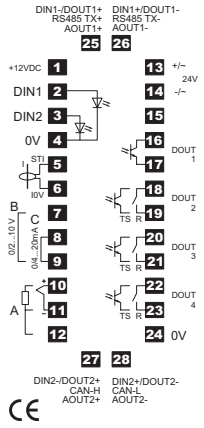
Before you put the zones into operation make sure, that the controller is correctly configured. A false configuration can lead to damage of controller parts and injury of persons.

Connections to the controller are made at the rear of the controller, by screw on terminals. The wires can have a cross section of 0,5 - 1,5mm^2.

The start-up of the controller includes the electrical installation as well as the correct configuration. Succeeding the terminal allocation and instructions on the configuration are given in detail.

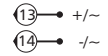
4.5.1 Terminal overview

The terminal overview is glued on one side of the controller next to the nameplate. All feasible connections are drawn in, but only controller configured variants can be used.

C248	C248	C296	C296
With power supply 85...250 VAC:	With power supply 24 V:	With power supply 85...250 VAC:	With power supply 24 V:
			

4.5.2 Standard Equipment

4.5.2.1 Power Supply

Controller type	C248	C248	C296	C296
Power supply	230 VAC	24 V	230 VAC	24 V
Range	85...250 VAC	18...24 VAC or 18...36 VDC	85...250 VAC	18...24 VAC or 18...36 VDC
				
Power consumption	6,5W	6,5W	6,5W	6,5W
Fuse protection	200mA slow	800mA slow	200mA slow	800mA slow

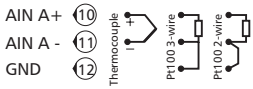
Fuse protection of the controller always externally.

4.5.2.2 Sensor and Measuring Inputs

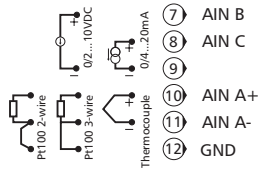
Compared to C248 with one measuring input, C296 has three measuring inputs. It can be selected which of these three measuring inputs or which combination of these is used as actual value.

Furthermore the presetting of the set point for C296 can be done by measuring input additional to entry by keypad or data interface.

C248



C296

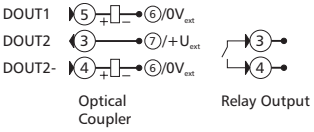


Configuration

Define measuring input A	■ Page 33: *SEn - Sensor Type of Measuring Input A* ■ Page 34: *oFF.A - Offset of Measuring Input A*
Define measuring input B and C (only C296)	■ Page 34: *iIb.L - Lower Display Limit of Measuring Input B* ■ Page 34: *Aib.H - Upper Display Limit of Measuring Input B* ■ Page 34: *AiC.L - Lower Display Limit of Measuring Input C* ■ Page 34: *AiC.H - Upper Display Limit of Measuring Input C*
Define function for measuring inputs (only C296)	■ Page 33: *SEn.C - Measuring Input for Control* ■ Page 33: *Sen.S - Measuring Input for Presetting of Set Point*
Define input range for set point	■ Page 31: *SP.Lo - Minimum Set Point* ■ Page 31: *SP.Hi - Maximum Set Point*

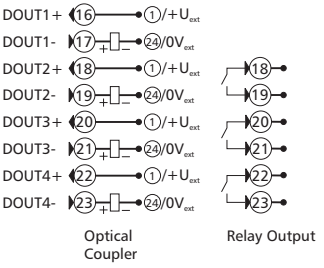
4.5.2.3 Digital Outputs

C248



The power supply of DOUT1 is controller internally already wired.

C296



As power supply for the outputs of the optical couplers either the controller internal voltage or an external d.c. voltage (24 VDC) can be used.

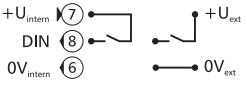
The controller outputs are according to the type designation.

Configuration

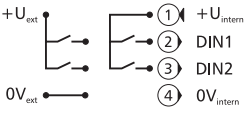
Which output on digital outputs?	■ Page 32: *dO.1 - Mode of Operation of Digital Output 1* - ■ Page 32: *dO.4 - Mode of Operation of Digital Output 4*
Is control output used for output of heating or cooling?	■ Page 31: *rEL.H - Relay Output Heating* ■ Page 31: *rEL.C - Relay Output Cooling*
Is control output used for output of alarm?	■ Page 34: *A1.d1 - Alarm Flag 1, Definition 1* - Page 35: *A4.d2 - Alarm Flag 4, Definition 2*
Additional setting if output is used as output of temperature limit alarms	Define alarm limits ■ Page 27: *Li.1 - Temperature Limit 1* - Page 27: *Li.4 - Temperature Limit 4* Define mode of operation of alarm limits Page 30: *Li.1d - Definition of Temperature Limit 1* - Page 31: *Li.d4 - Definition of Temperature Limit 4*

4.5.2.4 Digital Inputs

C248



C296



As power supply either the controller internal voltage or an external d.c. voltage (24 VDC) can be used.

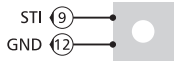
Configuration

Define mode of operation of digital inputs	■ Page 32: *dIn.1 - Mode of Operation of Digital Input 1* ■ Page 32: *dIn.2 - Mode of Operation of Digital Input 2*
Is digital input used to activate a set point?	Define set points ■ Page 27: *SP.2 - Set Point 2* - Page 27: *SP.4 - Set Point 4*

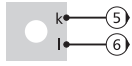
Setting if digital input is used to start a timer	Define duration of timer ■ Page 28: *t1 - Process Timer 1* - Page 28: *t4 - Process Timer 4* Define mode of operation of timer ■ Page 35: *t1.d1 - Mode of Operation of Timer 1, Definition 1* - Page 36: *t4.d2 - Mode of Operation of Timer 4, Definition 2* Define mode of operation of timer in case of disturbance ■ Page 36: *t.rES - Mode of Operation of Timer after Soft-Reset*

4.5.2.5 Heating Current Supervision

C248



C296



Do only use current transformers available in the accessories by Hotset Heizpatronen und Zubehör GmbH.

Configuration

Define measuring method	■ Page 31: *Cur.d - Current Supervision Function*
Define upper limit of measurement range	■ Page 31: *Cur.E - Final Value of Measurement Range of Current Supervision*
Define heating current and tolerance	■ Set point of current either directly entered: Page 27: *Cur.S - Set Point of Heater Current* or by automatic current transfer Page 19: *Information Level* ■ Page 27: *Cur.t - Tolerance Band of Heater Current*

4.5.3 Options

In addition to the standard equipment the controller can be equipped with two options (Option A and B).

4.5.3.1 Serial Interface RS485 (Option A)

C248

C296

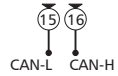
The RS485 connection admits to communicate with 32 controllers by PC over a great distance. A shielded wire has to be used.

Configuration

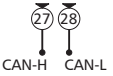
Define option	■ Page 33: *OPt.A - Definition of Option A* define as rS
Define communication protocol	■ Page 36: *S.Pro - Protocol of Serial Interface*
Define setting of interface	■ Page 36: *S.Adr - Address of Device* ■ Page 36: *S.bd - Baud Rate of Serial Interface* ■ Page 36: *S.Sto - Stop Bits of Serial Interface* ■ Page 36: *S.PAr - Parity of Serial Interface*
Additional setting if communication protocol is in mode MODBUS	■ Page 37: *m.Adr - Address of MODBUS*

4.5.3.2 CAN-Bus (Option B)

C248



C296



Up to 127 controllers can be connected by CAN-Bus. Beside the communication with a superior control/visualization system the remote control function is feasible. For more detailed information please refer to Page 36: *Configuration of Data Interface*.

Configuration

Define option	■ Page 33: *OPt.b - Definition of Option B* define as CAn
Define setting of interface	■ Page 37: *C.bAS - Address of CAN* ■ Page 37: *C.bd - Baud Rate of CAN* ■ Page 37: *C.OP - Auto Operational Mode of CAN*

4.5.3.3 Analogue Outputs (Option A and B)

C248

C296

Both options of the controller can be of the analogue output type.

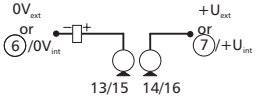
Configuration

Define option	■ Page 33: *OPt.A - Definition of Option A* and Page 33: *OPt.b - Definition of Option B* define as AO or AO.O
Define mode of operation of the analogue outputs	■ Page 33: *AO.A - Mode of Operation of Analogue Output Option A* and Page 33: *AO.b - Mode of Operation of Analogue Output Option B*

4.5.3.4 Digital in-/outputs (Option A and B)

C248

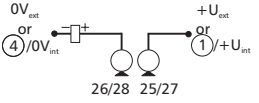
Digital outputs



Digital inputs

C296

Digital outputs



Digital inputs

Configuration

Define option	■ Page 33: *OPt.A - Definition of Option A* and Page 33: *OPt.b - Definition of Option B* define as dI or dO

Option digital output ***dO is defined:***

Define mode of operation of digital output	■ Page 33: *dO.A - Mode of Operation of Digital Output Option A* and Page 33: *dO.b - Mode of Operation of Digital Output Option B*
Is control output used for output of heating or cooling?	■ Page 31: *rEL.H - Relay Output Heating* ■ Page 31: *rEL.C - Relay Output Cooling*
Is control output used for output of alarm?	■ Page 34: *A1.d1 - Alarm Flag 1, Definition 1* - Page 35: *A4.d2 - Alarm Flag 4, Definition 2*
Additional setting if output is used for output of temperature limit alarms	Define alarm limits ■ Page 27: *Li.1 - Temperature Limit 1* - Page 27: *Li.4 - Temperature Limit 4* Define mode of operation of alarm limits ■ Page 30: *Li.1d - Definition of Temperature Limit 1* - Page 31: *Li.d4 - Definition of Temperature Limit 4*

Option digital input ***dI is defined:***

Define mode of operation of digital input	■ Page 33: *dIn.A - Mode of Operation of Digital Input Option A* and Page 33: *dIn.b - Mode of Operation of Digital Input Option B*
Is digital input used to activate a set point?	Define set point ■ Page 27: *SP.2 - Set Point 2* - Page 27: *SP.4 - Set Point 4*
Setting if digital input is used to start a timer	Define duration of timer ■ Page 28: *t1 - Process Timer 1* - Page 28: *t4 - Process Timer 4* Define mode of operation of timer ■ Page 35: *t1.d1 - Mode of Operation of Timer 1, Definition 1* - Page 36: *t4.d2 - Mode of Operation of Timer 4, Definition 2* Define mode of operation of timer in case of disturbance ■ Page 36: *t.rES - Mode of Operation of Timer after Soft-Reset*

5 Display and Operation

5.1 Front View

C248

C296

LED Display	1	Actual value / Parameter value	Actual value / Parameter value
	2	Set point / Parameter name	Set point / Parameter name
Buttons	3	Info button / Escape button	Info button / Escape button
	4	Decrease button	Decrease button
	5	Increase button	Increase button
	6	Parameter button / Edit Enter button	Parameter button / Edit Enter button
LEDs	A	Output heating	Digital input 1 activated
	B	Output cooling / alarm output	Digital output 2 activated
	C	Digital input activated	Temperature unit °F
	D	Temperature unit °F	Output heating
	E	Communication RS485/CAN-Bus	Output cooling / alarm output 3
	F	-	Alarm 1
	G	-	Alarm 2
	H	-	Communication RS485/CAN-Bus

5.2 Display of Examples of Operation

Display of Buttons

To illustrate the operation the symbols have the following meaning:


Press button


Keep the button pressed


Shortcut: Keep button pressed and press button additionally


Shortcut: First keep button pressed, then keep button additionally pressed


Press button *or* button .

Display of LED

The display of set point / actual value is in grey color for a better identification. All other LED displays have a black background.

Display, when set point or one parameter value is flashing.

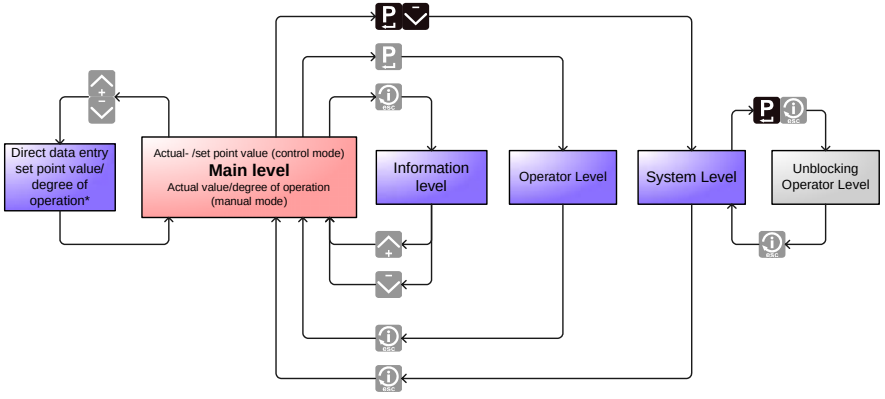
Steps of Operation in Flow-Chart

All steps of operation are explained by flow-charts. In the flow-charts the display as well as the buttons are shown in combination.

Please follow the arrows in the flow-chart to comprehend the steps of operation.

5.3 Operation Levels

Beside the direct data entry the operation and configuration of the controller takes place in three sublevels starting from the main level:



* Direct data entry of set point value and degree of operation	Direct data entry of set point value (the controller is in control mode) and degree of operation (the controller is in manual mode) only for ↗Edit - Entry Mode Directly = on.
Main level	In the main level actual value and set point value and actual value and degree of operation respectively are displayed.
Information level	Display and operation of the often used process parameters (set point, manual mode, heating current, alarm).
Operator level	Display and operation of parameters that are occasionally displayed and changed. The list of parameters can be arranged individually.
System level	Display and operation of *all* configuration parameters. Unblocking at operator level: Additionally to the parameter value each configuration parameter has an unblock information at operator level. This defines the status of the parameter at operator level: ▪ hidden ▪ visible/not changeable or ▪ visible/changeable. The display at operator level can individually be arranged for the application.

5.3.1 Direct data entry of set point value and degree of operation

In the direct data entry mode the set point value and the degree of operation are directly changed by pressing the buttons or **.**

- The data entry is accepted three seconds after the last entry.
- The data entry is accepted immediately after pressing the button .
- Pressing the button within the three seconds the data entry is cancelled.

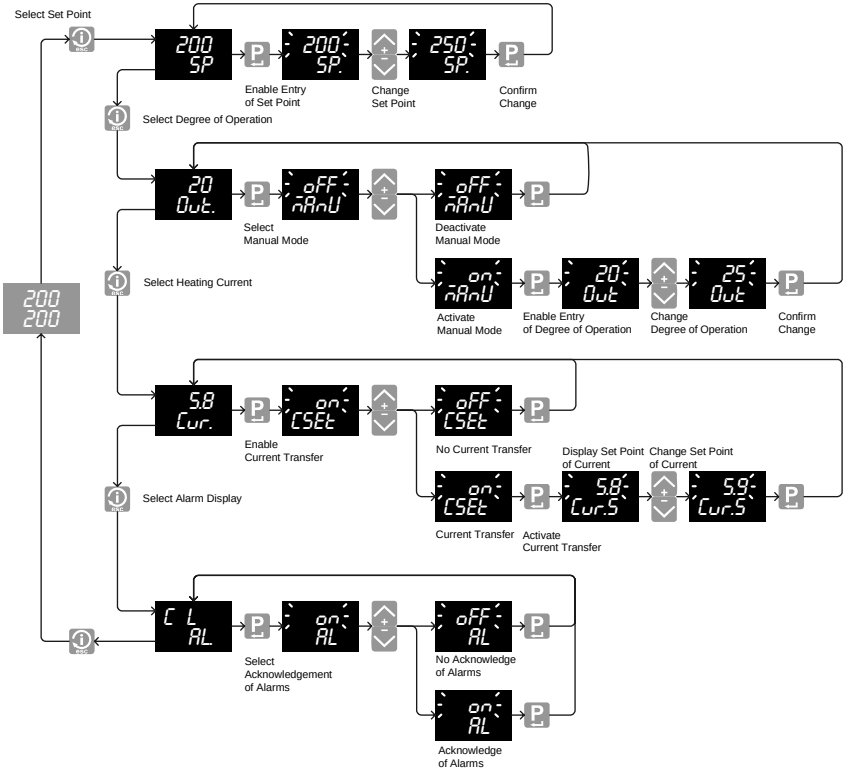
The program returns to main level and displays set point/actual value and set point value/degree of operation respectively.

5.3.2 Information Level

In the information level set point, manual mode, heating current and alarms are directly accessible by button .

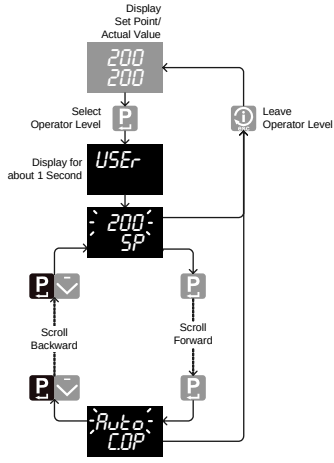
At information level

- set points for temperature can be changed,
- manual mode can be switch on/off and degree of operation can be adjusted,
- an automatic current transfer can be made as well as
- display of alarms and acknowledgement



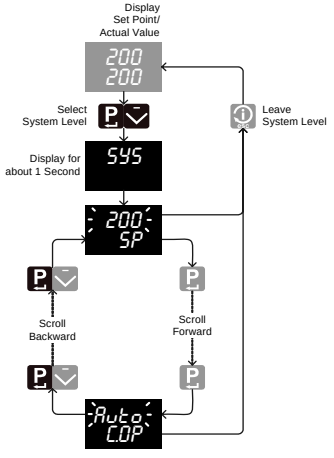
- If there is no operating function chosen awaiting a data entry (i.e. the upper LED display is flashing), the information level can directly be left by button ▼ or ▲.
- The operation at information level can be blocked by the configuration parameter ↗iLoc - Entry Lock on Info Level.

5.3.3 Operator Level



- By call of operator level USEr is shortly shown in the LED display.
- In the operator level it is feasible to scroll forward and backward between the parameters.
- It depends on the unblocking (↗Unblocking of Parameters at Operator Level), which parameters at the operator level are visible and changeable too.
- The operator level can always be left by button ⏻ to return to set point / actual value display.

5.3.4 System Level

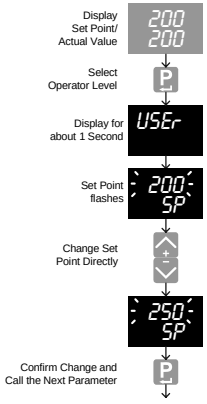


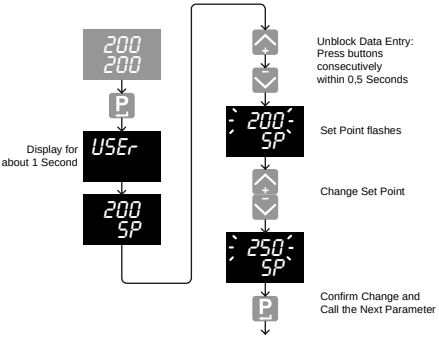
- By call of system level SYS is shortly shown in the LED display.
- In the system level it is feasible to scroll forward and backward between the parameters
- The system level can always be left by button ⏻ to return to set point / actual value display.

5.3.5 Two Methods of Data Entry at Operator and System Level

It can be chosen between two methods of data entry for parameters at operator and system level. The method of data entry is defined by the parameter ↗Edit - Entry Mode Directly.

The difference between the two methods is shown by the example of a change of a set point at operator level.





Direct Data Entry (Edit = on)

The set point can be entered directly after selection. Unblocking is not necessary.

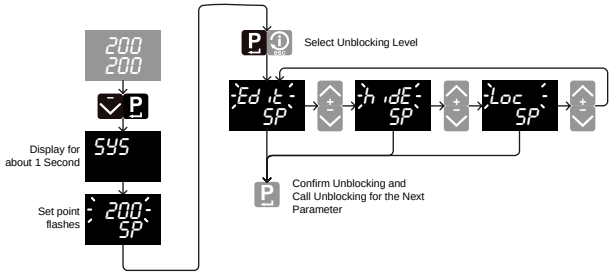
Unblock Data Entry (Edit = oFF)

Before data entry the blocking must be enabled at operator level.

The blocking is an additional step to prevent unintentional parameter changes which are feasible by the direct data entry.

For blocking of data entry also refer to ↗Enter Code Number.

5.3.6 Unblocking of Parameters at Operator Level



For each parameter the unblocking defines whether the parameter is visible and changeable at operator level. The display at operator level can individually be arranged for the application.

	Parameter visible	Parameter changeable
Ed it	yes	yes
h idE	no	no
Loc	yes	no

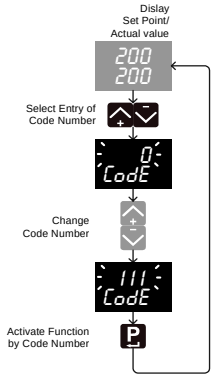
To return from unblocking to system level use button .

For factory-made settings concerning unblocking please refer to ↗Appendix.

5.4 Additional Operating Functions

5.4.1 Enter Code Number

Code numbers are used to call complex functions or system functions.

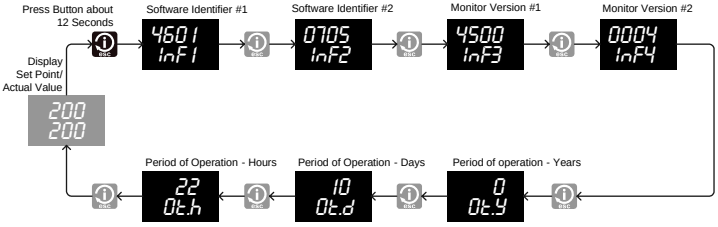


The following code numbers exist for this controller:

Code number	Function
111	Start automatic identification cooling Prerequisite to start the function is that the zone is in a adjusted status.
211	Deactivate data entry blocking (by code number 212)
212	Activate data entry blocking All data entry, except set point data entry, is locked. The data entry blocking is fail-safe. By entry of code number 211 the data entry blocking is deactivated.
445	Stop identification heating The function that calculates the control parameters during heating is directly stopped.
999	Perform controller reset After activation of the code number the controller makes a new start.

5.4.2 Software Version / Period of Operation

The display of software version and period of operation are only for reasons of maintenance. Please keep this data ready in case of queries for the controller at Hotset Heizpatronen und Zubehör GmbH.

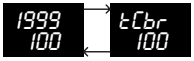


The firmware of the controller is of calendar week 07/2005 (software identification #2).
The period of operation is 10 days and 22 hours.
For software identifier #1 and the two monitor identifiers additional system information is available.

Exit dialog level by pressing button ▲ or button ▼.

5.5 Messages & Displays

5.5.1 Status Messages



Status messages in case of alarm status or certain operating status will be alternately displayed with the actual value as additional information.

Display	Description	Alarm	Status	Correction
tCbr	Sensor break	x		Control thermocouple or wiring.
tCrC	Reversed polarity	x		Thermocouple wiring wrong. Correct wiring.
IdE	Identification error	x		Cool zone down and then start identification again.
drI	Temperature drift	x		Determination of heating control parameters can not start because the zone was influenced by another zone at identification. Start identification again.
Id	Identification heating		x	
IdC	Identification cooling		x	
IdS	Start up phase automatic adaptation of cooling		x	
mAnU	Manual mode		x	
AL	Measuring range exceeded (temperature alarm)	x		Control heating unit and power controller (e.g. SSR). Control if the sensor related with the heating unit is connected with the controller.
SSr	Current alarm heating off	x		Control power controller (e.g. SSR). Control if the current transformer related to the heating unit is connected with the controller.
tCSC	Sensor alarm	x		Control thermocouple wiring.
rAmP	Ramp		x	
SP4	Set point 4		x	
SP3	Set point 3		x	
SP2	Set point 2		x	
Ar.	Automatic ramp slowest zone		x	
Ar	Automatic ramp		x	
ArE	Error automatic ramp		x	
ArE.	Error automatic ramp slowest zone		x	
Err1	Error in calibration data	x		Send controller to Hotset Heizpatronen und Zubehör GmbH.
Err2	Error in attributes	x		Send controller to Hotset Heizpatronen und Zubehör GmbH.
Err3	Error in channel data	x		Send controller to Hotset Heizpatronen und Zubehör GmbH.
HoFF	Controller off		x	

6 Configuration / Setting

The parameters for configuration and setting of the controller are functionally grouped.

It depends on the unblocking of a parameter whether it is visible and/or changeable. The unblocking is done on system level where all parameters are visible and changeable.

- The factory-made basic setting is marked with a bracket (e.g. [on]).
- For some parameters the value range exceeds the display range of the LED (9999 or 999.9). The complete value range is only adjustable via serial interface or CAN-Bus interface.
- Temperature parameters are specified in °C by default. They apply for °F as well.

6.1 Main functions

SP - Set Point

Range of values: [0.0]...1500.0

At 0°C/32°F

- no control signal is generated (degree of operation 0%)
- the control algorithm is initialized
- no other alarm except the heating circuit alarm is supervised

The setting of the unit for a set point (°C or °F) is done by parameter ↗CELS - Temperature Unit.

mAnU - Manual Mode

on	Manual mode active In manual mode the control is deactivated. The manual entered output signal ↗Out - Degree of Operation is sent to the control outputs. Manual mode for example is used in case of a defect at the sensor when there is no actual temperature value for control and the control function for the zone has to be maintained.
[oFF]	Controller is in control mode (manual mode deactivated).

Out - Degree of Operation

Range of values: -100...100% [0%]

Correcting variable. In control mode the correcting variable is calculated by the controller, in manual mode entered by the operator.

➥*AmAn - Automatic Manual Mode*

Cur.S - Set Point of Heater Current

Range of values: [0.0]...999.0 A

The measured heater current is compared with the set point. The set point is manually or by automatic current transfer (↗Information Level) entered.

Cur.t - Tolerance Band of Heater Current

Range of values: 0...100% [20]

Tolerance band around ↗Cur.S - Set Point of Heater Current for supervision of heating current.

ZonE - Zone

Activation/Deactivation of zone.

oFF	Zone deactivated ■ no control signal is generated (degree of operation 0%) ■ the control algorithm is initialized ■ no alarm supervision
[on]	Zone activated

Li.1 - Temperature Limit 1

Range of values: -999.0...1500.0 [5]

The zone can be supervised by four temperature limit values.

With the associated parameters ↗Li.1d - Definition of Temperature Limit 1 to ↗Li.d4 - Definition of Temperature Limit 4 the function of the limit value is determined.

Li.2 - Temperature Limit 2

Range of values: -999.0...1500.0 [-5]

➥*Li.1 - Temperature Limit 1*

Li.3 - Temperature Limit 3

Range of values: -999.0...1500.0 [0]

➥*Li.1 - Temperature Limit 1*

Li.4 - Temperature Limit 4

Range of values: -999.0...1500.0 [0]

➥*Li.1 - Temperature Limit 1*

SP.2 - Set Point 2

Range of values: -999.0...1500.0 [0]

The second set point is activated by a digital input or by a timer.

The same prerequisites apply accordingly to ↗SP - Set Point.

SP.3 - Set Point 3

Range of values: [0.0]...1500.0

➥*SP.2 - Set Point 2*

SP.4 - Set Point 4

Range of values: [0.0]...1500.0

➥*SP.2 - Set Point 2*

rAP.t - Temperature Ramp

Range of values: -999.0...999.0 °C/Minute [0]

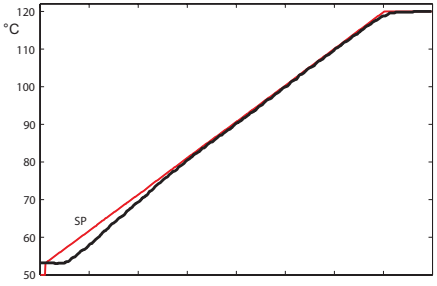
Changes of the set point are not directly made but by the adjusted ramp value.

= 0	Temperature ramp deactivated

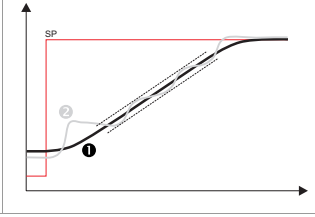
> 0	Temperature ramp at set point increase activated
< 0	Temperature ramp at set point increase and decrease activated

In the set point display the set point of the actual ramp is displayed.

In the following diagram a change of a set point from 50°C to 120°C with a temperature ramp of 10°C/Minute is shown.



rAP.A - Automatic Temperature Ramp

[oFF]	Automatic ramp deactivated
on	Consistent heating of several controllers. Prerequisites: ■ Controller with CAN-Bus interface ■ Controller is connected with other controllers which should be heated consistent. The allocation is done by the group function. Controllers with the same *GP.nr - Group Number* are heated consistent during active automatic temperature ramp. The automatic temperature ramp only works after the first change of the set point after switch-on of the controller. The zone with the slightest rate of rise of temperature is the leading zone and defines the set point of the ramp for all other zones. 15K before reaching the set point the automatic temperature ramp is completed. The calculation of the control parameters by the function identification heating is not affected by the automatic temperature ramp.
	

rAP.G - Temperature Band of Autom. Temperature Ramp

Range of values: 2.0 bis 25.5 K [5.0]

Maximal tolerable difference between actual value and set point of ramp during *rAP.A - Automatic Temperature Ramp*.

t1 - Process Timer 1

Range of values: [0]...9999 seconds

Four timers are available to carry out a sequence of functions. The definition, how the timers operate, is determined by the parameters *t1.d1 - Mode of Operation of Timer 1, Definition 1* to *t4.d2 - Mode of Operation of Timer 4, Definition 2*.

t2 - Process Timer 2

Range of values: [0]...9999 seconds

➥*t1 - Process Timer 1*

t3 - Process Timer 3

Range of values: [0]...9999 seconds

➥*t1 - Process Timer 1*

t4 - Process Timer 4

Range of values: [0]...9999 seconds

➥*t1 - Process Timer 1*

AmAn - Automatic Manual Mode

on	Is an invalid measured value (due to sensor break) detected during control mode, the controller switches automatically over to manual mode. The last averaged degree of operation determined by the controller is used as the new degree of operation.
[oFF]	Function deactivated

tC.AL - Autom. Short Circuit Supervision of Sensor

on	The function supervises the status and the wiring of the sensor of short circuit. The function is calculated by means of the actual value, the degree of operation and a ↗H.Ct - Sampling Time of Heating dependent time. This assures the detection of already existing as well as suddenly arising short circuits. A short circuit alarm of a sensor is displayed, if ■ after a sampling time dependent time no temperature rising is detected although the controller outputs the maximum degree of operation. ■ a sudden temperature decrease is detected. After detection of a short circuit of the sensor tCAL is shown in the actual value display and the zone is deactivated. The zone can be activated by the acknowledgement of the alarms (↗Information Level).
[oFF]	Function deactivated

tC.ti - Testing Period for *Manual Short Circuit Supervision of Sensor*

Range of values: [0]...999 seconds

Is the temperature increase after the expiration of the testing period not 5K, although the controller outputs the maximum degree of operation, a short circuit alarm was detected.

The zone is deactivated (degree of operation 0%). In the actual value display tCAL is shown. The zone can be activated by the acknowledgement of the alarm.

APPL - Application

N.a.

6.2 Control Parameters

This parameter group consists of the control parameters and the parameters that affect the automatic control parameter calculation.

H.Pb - Proportional Band of *Heating*

Range of values: 0.0...25.5% [6.5]

H.td - Derivative Time of *Heating*

Range of values: 0...2000 seconds [50]

H.ti - Integral Time of *Heating*

Range of values: 0...2000 seconds [50]

H.Ct - Sampling Time of *Heating*

Range of values: 0.2...90.0 seconds [0.2]

C.Pb - Proportional Band of *Cooling*

Range of values: 0.0...25.5% [6.5]

C.td - Derivative Time of *Cooling*

Range of values: 0...2000 seconds [50]

C.ti - Integral Time of *Cooling*

Range of values: 0...2000 seconds [50]

C.Ct - Sampling Time of *Cooling*

Range of values: 0.2...90.0 seconds [1.0]

IdE.H - Identification Heating

[on]	The control parameters *Heating* are calculated after the first change of the set point greater than 50K after... ■ a reset of a zone (↗ZonE - Zone = off) ■ switch-on of the controller ■ set point 0°C/32K during heating up. During the identification phase Id and actual value are shown alternately in the display.
oFF	Function deactivated. No parameter calculation for control parameters of heating is done during the heating up phase. The heating is done due to the adjusted set point.

IdE.C - Identification *Cooling* after Identification *Heating*

on	The function only operates on setting ↗CooL - Heating/Cooling=on. The control parameters *Cooling* are automatically determined after completion of ↗IdE.H - Identification Heating. The control parameters of cooling are calculated according to the actual value pattern while the output is set to the least degree of operation. During identification phase Id- is shown in the display. After completion of the calculation of the control parameters the controller operates with the active set point again.
[oFF]	After completion of the identification *Heating* no identification *Cooling* is executed.

idE.L - Loop Control

on	During identification phase *Heating* the control response at reaching the set point is additionally considered and if necessary a correction of the control parameters of heating is performed.
[oFF]	Function deactivated

C.Con - Control Parameter *Cooling* constant after Identification *Heating*

In accordance with the dimensioning of the efficiency of heating and of cooling at zones the control parameters *Cooling* can generally be derived from the control parameters *Heating*.

on	The control parameters *Cooling* are not determined after identification *Heating*.
[oFF]	Is the function deactivated, the control parameters *Cooling* are derived from the control parameters *Heating* after identification *Heating*.

SP.Cb - Set Point Cutback

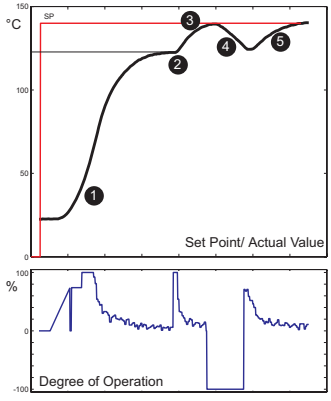
Range of values: [0.0]...25.5 K

The function only operates on setting ↗idE.L - Loop Control=on.

The set point cutback function is embedded to prevent an overshoot in the identification phase. The calculation of the control parameters of heating is performed by a set point cutback reduced temperature set point. Thereafter the controller operates with the temperature set point.

In the following diagram a complete trend (set point / actual value and degree of operation) of an automatic control parameter calculation is described. The trend was recorded with the following parameter setting:

- ↗IdE.H - Identification Heating = on
- ↗IdE.C - Identification Cooling after Identification Heating = on
- ↗idE.L - Loop Control = on
- ↗C.Con - Control Parameter Cooling constant after Identification Heating = off
- ↗SP.Cb - Set Point Cutback = 20



1 - After set point jump from 0°C to 140°C the control parameters of heating are calculated during heating up.

2 - 20°C (set point cutback) before reaching the set point of 140°C the calculation of the control parameters of heating is completed.

3 - The controller operates with the adjusted set point.

4 - After the actual value has reached the adjusted set point, the calculation of the control parameters of cooling is started.

5 - After the calculation of the control parameters of cooling is completed, the controller operates with the adjusted set point.

6.3 Group functions

To use the controller overall and operating functions the controller has to be allocated to a group.

Prerequisite for all group function is the networking of the controllers by CAN-Bus interface.

GP.rt - Remote Group

Range of values: [0]...32

With the remote operation function the operation of multiple controllers is facilitated. For all controllers allocated to one remote operation group the operations on information level are synchronously processed. It is negligible on which controller of the remote operation group the operation is processed.

GP.nr - Group Number

Range of values: [0]...32

For all controllers allocated to one remote operation group

- the automatic ramp
- the timers

are controller overall synchronized.

GP.Fu - Group Function

Range of values: [0]...255

6.4 Definition of Temperature Limit Values

This parameter group determines how the temperature limit values adjusted by the ↗Main functions are evaluated.

A combination of several alarms can be used for one temperature limit value. In this case the sum of all identifiers has to be entered for the parameter.

5 (is equivalent to the sum of identifiers 1 and 4) is entered when an alarm should be generated on exceeding an absolute alarm limit value.

The default value 0 defines a relative alarm limit value.

Li.1d - Definition of *Temperature Limit 1*

Range of values: [0]...255

Identifier	Alarm mode
1	Absolute alarm limit value. Otherwise: Alarm limit value relative to set point.
2	Alarm is generated after reaching the alarm value first time. Otherwise: Alarm is always generated.
4	Only valid for absolute alarm limit values. Alarm on actual value > limit value. Otherwise: Alarm on actual value < limit value.
8	N.a.
16	Only valid for C296: Supervise measuring input A.
32	Only valid for C296: Supervise measuring input B.
64	Only valid for C296: Supervise measuring input C.
128	N.a.

Li.2d - Definition of *Temperature Limit 2*
Range of values: [0]...255
➥*Li.1d - Definition of Temperature Limit 1*

Li.d3 - Definition of *Temperature Limit 3*
Range of values: [0]...255
➥*Li.1d - Definition of Temperature Limit 1*

Li.d4 - Definition of *Temperature Limit 4*
Range of values: [0]...255
➥*Li.1d - Definition of Temperature Limit 1*

6.5 Configuration of Base functions

Out.H - Maximum Degree of Operation *Heating*
Range of values: 0...[100]%
Upper limitation of degree of operation in control mode.

Out.C - Maximum Degree of Operation of *Cooling*
Range of values: [-100]...0 %
Lower limitation of degree of operation in control mode.

Out.m - Maximum Degree of Operation in Manual Mode
Range of values: -100...[100]%
Upper limitation of degree of operation in ↗mAnU - Manual Mode.
Function also active with ↗tC.AL - Autom. Short Circuit Supervision of Sensor.

CooL - Heating/Cooling

on	Controller operates as three-position controller (Heating/Cooling).
[oFF]	Controller operates as two-position controller (Heating).

rEL.H - Relay Output *Heating*

	If degree of operation > 0...
on	■ only one on/off switching operation at control output during one sampling cycle. ■ sampling time is set to minimum 10 seconds.
[oFF]	output of degree of operation with quickly clokked, short pulses (e.g. output for Solid State Relays).

rEL.C - Relay Output *Cooling*

	If degree of operation < 0...
[on]	■ only one on/off switching operation at control output during one sampling cycle. ■ sampling time is set to minimum 10 seconds.
oFF	output of degree of operation with quickly clokked, short pulses (e.g. output for Solid State Relays).

SP.Lo - Minimum Set Point
Range of values: [0.0]...1500.0 °C
Minimum adjustable set point.

SP.Hi - Maximum Set Point
Range of values: 0.0...1500.0 °C [500.0]
Maximum adjustable set point.

Cur.d - *Current Supervision* Function
Range of values: 0...99
Prerequisite: current transformer connected.

0	Current supervision deactivated
[1]	Measuring cycle 30 seconds. Analysis of currents > 0.3 A
2	Measuring cycle 30 seconds. Analysis of currents > 0.2 A
3	Measuring only for degree of operation > 0% Measuring cycle 30 seconds. Analysis of currents > 0.3 A
4	Measuring only for degree of operation > 0% Measuring cycle 30 seconds. Analysis of currents > 0.2 A
8	Master in Master-/Slave current measuring. Measuring cycle 30 seconds.
9	Slave in Master-/Slave current measuring. Measuring cycle 30 seconds.
11-19	Like 1 ... 9, only with measuring cycle 15 seconds.
21-29	Like 1 ... 9, only with measuring cycle 10 seconds.

Cur.E - Final Value of Measurement Range of *Current Supervision*
Range of values: 0...999.9% [100.0]
Scaling of the current measuring input when the output signal of the current transformer is different from 42mV/A or the feed line of the heating element is repeatedly led through the current transformer.

CELS - Temperature Unit

[C]	Celsius
F	Degrees Fahrenheit. LED °F on the front of the controller is illuminated.

6.6 Display

The displays are adjusted by means of this parameter group.

deCP - Display of Format of Temperature Values
Range of values: 0.1/[1.0]
Display / data entry of all temperature values by LED display with or without decimal place. Entry by serial

data interface RS485 and CAN-Bus interface always in format 0.1.

dmAn - Display in Manual Mode

[out]	Display of degree of operation
tEmP	Display of actual value

6.7 Configuration of Hardware

The mode of operation of in- and outputs at the controller is adjusted by means of this parameter group. The setting in general has to be done once at start-up.

dO.1 - Mode of Operation of *Digital Output 1*

oFF	Output without function
[HEAt]	Output of control signal *Heating*
Cool	Ouput of control signal *Cooling*
AL1	Output switched, if at least one alarm defined by ↗A1.d1 - Alarm Flag 1, Definition 1 or ↗A1.d2 - Alarm Flag 1, Definition 2 is active.
AL2	Output switched, if at least one alarm defined by ↗A2.d1 - Alarm Flag 2, Definition 1 or ↗A2.d2 - Alarm Flag 2, Definition 2 is active.
AL3	Output switched, if at least one alarm defined by ↗A3.d1 - Alarm Flag 3, Definition 1 or ↗A3.d2 - Alarm Flag 3, Definition 2 is active.
AL4	Output switched, if at least one alarm defined by ↗A4.d1 - Alarm Flag 4, Definition 1 or ↗A4.d2 - Alarm Flag 4, Definition 2 is active.
AL1-	Like ↗AL1. output inverse
AL2-	Like ↗AL2. output inverse
AL3-	Like ↗AL3. output inverse
AL4-	Like ↗AL4. output inverse
t1	Output switched, if timer 1 active
t2	Output switched, if timer 2 active
t3	Output switched, if timer 3 active
t4	Output switched, if timer 4 active
t1-	Output switched, if timer 1 is not active
t2-	Output switched, if timer 2 is not active
t3-	Output switched, if timer 3 is not active
t4-	Output switched, if timer 4 is not active

dO.2 - Mode of Operation of *Digital Output 2*

➥*dO.1 - Mode of Operation of Digital Output 1*

Default value [CooL]

dO.3 - Mode of Operation of *Digital Output 3*

➥*dO.1 - Mode of Operation of Digital Output 1*

Default value [AL1]

dO.4 - Mode of Operation of *Digital Output 4*

↗dO.1 - Mode of Operation of Digital Output 1

Default value [AL2]

dIn.1 - Mode of Operation of *Digital Input 1*

	Is digital input 1 active...
[oFF]	Digital input without function
P.on	it is indicated to the controller that the power controller for heating is connected. Is digital input 1 inactive the control is stopped, no control signal and no current tolerance alarms are generated.
P.oFF	it is indicated to the controller that the power controller for heating is disconnected.
SP2.A	the controller operates with the 2nd set point.
SP3.A	the controller operates with the 3rd set point.
SP4.A	the controller operates with the 4th set point.
SP2.r	the set point is increased or decreased by the 2nd set point.
SP3.r	the set point is increased or decreased by the 3rd set point.
SP4.r	the set point is increased or decreased by the 4th set point.
H.oFF	the heating output is permanently switched off.
H.on	the heating output is permanently switched on.
C.oFF	the cooling output is permanently switched off.
C.on	the cooling output is permanently switched on.
SP.bA	
SP.br	
AL.CL	the activated and stored alarm outputs are reset.
t1	timer 1 started by switch on edge.
t2	timer 2 started by switch on edge.
t3	timer 3 started by switch on edge.
t4	timer 4 started by switch on edge.
t1-	timer 1 started by switch off edge.
t2-	timer 2started by switch off edge.
t3-	timer 3 started by switch off edge.
t4-	timer 4 started by switch off edge.
iLoC	entry by membrane keypad is locked. No entry by membrane keypad is feasible.

dIn.2 - Mode of Operation of *Digital Input 2*

➥*dIn.1 - Mode of Operation of Digital Input 1*

OPt.A - Definition of *Option A*

Setting of function of option A.
The factory-made default setting depends on the de-

vice specification. For controllers without options the default setting is in each case oFF.

[oFF]	Option A n.a.
Sio	Interface RS485
dI	Digital input
dO	Digital output
AO	Analogue output 0...10VDC/0...20mA
AO.O	Analogue output 2...10VDC/4...20mA

OPt.b - Definition of *Option B*

Setting of function of option B.

The factory-made default setting depends on the device specification.

[oFF]	Option B n.a.
CAn	CAN-Bus
dI	Digital input
dO	Digital output
AO	Analogue output 0...10VDC/0...20mA
AO.O	Analogue output 2...10VDC/4...20mA

dO.A - Mode of Operation of *Digital Output Option A*

Prerequisite: Option A is configured as digital output.

➥*dO.1 - Mode of Operation of Digital Output 1*

dO.b - Mode of Operation of *Digital Output Option B*

Prerequisite: Option B is configured as digital output.

➥*dO.1 - Mode of Operation of Digital Output 1*

dIn.A - Mode of Operation of *Digital Input Option A*

Prerequisite: Option A is configured as digital input (↗dI).

➥*dIn.1 - Mode of Operation of Digital Input 1*

dIn.b - Mode of Operation of *Digital Input Option B*

Prerequisite: Option B is configured as digital input (↗dI).

➥*dIn.1 - Mode of Operation of Digital Input 1*

AO.A - Mode of Operation of *Analogue Output Option A*

Prerequisite: Option A is configured as analogue output (↗AO or ↗AO.O).

[oFF]	Output without function
out.H	Ouput of degree of operation of heating.
out.C	Output of degree of operation of cooling.
SEn.C	Output of value defined by ↗SEn.C - Measuring Input for Control.
S.C b	Output of value defined by ↗SEn.C - Measuring Input for Control, scaled by parameter Aib.L and Aib.H.
S.C C	Output of value defined by ↗SEn.C - Measuring Input for Control, scaled by parameter AiC.L and AiC.H.
IntF	Output of specified value by serial interface or CAN-Bus.

AO.b - Mode of Operation of *Analogue Output Option B*

Prerequisite: Option B is configured as analogue output (↗AO or ↗AO.O).

➥*AO.A - Mode of Operation of Analogue Output Option A*

SEn - Sensor Type of *Measuring Input A*

L	Fe-CuNi Type L
[J]	Fe-CuNi Type J
niCr	Ni-CrNi Type K
Pt	Resistance thermometer Pt100

SEn.C - Measuring Input for Control

Parameter is only valid for C296.

Presetting which of the three actual values or a combination of these are used for control.

[A]	Measuring input A
b	Measuring input B
C	Measuring input C
A-b	Difference (measuring input A - measuring input B)
b-A	Difference (measuring input B - measuring input A)
A-C	Difference (measuring input A - measuring input C)
C-A	Difference (measuring input C - measuring input C)
C-b	Difference (measuring input C - measuring input B)
b-C	Difference (measuring input B - measuring input C)

For measuring input B and C the limit ranges configured by AIb.L, Aib.H, AiC.L und AiC.H are valid.

Sen.S - Measuring Input for Presetting of Set Point

Parameter is only valid for C296.

[oFF]	Presetting of set point by keypad, serial interface or CAN-Bus.
A	Presetting of set point by measuring input A.
b	Presetting of set point by measuring input B.
C	Presetting of set point by measuring input C.

Exceeds the input value the measurement range, the current set point of control is set to ↗SP - Set Point, otherwise the input value is taken for current set point of control.

For measuring input B and C the input ranges configured by Aib.L, Aib.H, AiC.L und AiC.H are valid.

oFF.A - Offset of *Measuring Input A*

Range of values: -99.9...99.9 [0.0]

Correction of the actual value display of measuring input A. E.g. for compensation of the measurement error caused by the output resistance of a resistance thermometer Pt100.

Actual value display = measured value + 'Offset of Measuring Input A'

oFF.b - Offset of *Measuring Input B*

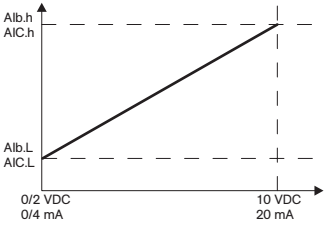
[0-10]	Measurement range 0...10 VDC
2-10	Measurement range 2...10 VDC

oFF.C - Offset of *Measuring Input C*

0-20	Measurement range 0...20 mA
[4-20]	Measurement range 4...20 mA

iIb.L - Lower Display Limit of *Measuring Input B*

Range of values: -100.0...1500.0 [0.0]



Defines the display value of measuring input B for a measured value of 0 respectively 2 VDC or 0 respectively 4mA.

The characteristic of the display values for measuring input B is defined by ↗Aib.H - Upper Display Limit of Measuring Input B.

The set point of control is linear output between Ai*.L and Ai*.H. For the set point of control beneath Ai*.L, 0 is output; above Ai*.H, maximal value is output.

Aib.H - Upper Display Limit of *Measuring Input B*

Range of values: -100.0...1500.0 [999.9]

➥*iIb.L - Lower Display Limit of Measuring Input B*

AiC.L - Lower Display Limit of *Measuring Input C*

Range of values: -100.0...1500.0 [0.0]

➥*iIb.L - Lower Display Limit of Measuring Input B*

AiC.H - Upper Display Limit of *Measuring Input C*

Range of values: -100.0...1500.0 [999.9]

➥*iIb.L - Lower Display Limit of Measuring Input B*

6.8 Configuration of Alarm Flags

The controller offers a total of four alarm flags.

The status of the alarm flags is defined by two parameters (definition groups). Is at least one defined process alarm active, the status of the alarm flag equals 1. The status of the alarm flags can be shown on the digital outputs.

The function of the alarm flag is defined by the alarm identifiers set.

A1.d1 - Alarm Flag 1, Definition 1

Range of values: 0...255 [4]

Identifier	Alarm
1	Current alarm on heating off - current is measured for degree of operation 0%
2	Current tolerance alarm
4	↗Li.1 - Temperature Limit 1
8	↗Li.2 - Temperature Limit 2
16	↗Li.3 - Temperature Limit 3
32	↗Li.4 - Temperature Limit 4
64	Short circuit of sensor
128	Sensor break / reversed polarity

A1.d2 - Alarm Flag 1, Definition 2

Range of values: 0...255 [0]

Identifier	Alarm
1	Error during identification phase / drift
2	Actual value greater than end of measurement range
4	N.a.
8	N.a.
16	N.a.
32	N.a.
64	Alarm flag can be acknowledged
128	Alarm flag storing

A2.d1 - Alarm Flag 2, Definition 1

Range of values: 0...255 [8]

➥*A1.d1 - Alarm Flag 1, Definition 1*

A2.d2 - Alarm Flag 2, Definition 2

Range of values: 0...255 [0]

➥*A1.d2 - Alarm Flag 1, Definition 2*

A3.d1 - Alarm Flag 3, Definition 1

Range of values: 0...255 [2]

➥*A1.d1 - Alarm Flag 1, Definition 1*

A3.d2 - Alarm Flag 3, Definition 2
Range of values: 0...255 [0]
➥*A1.d2 - Alarm Flag 1, Definition 2*

A4.d1 - Alarm Flag 4, Definition 1
Range of values: 0...255 [1]
➥*A1.d1 - Alarm Flag 1, Definition 1*

A4.d2 - Alarm Flag 4, Definition 2
➥*A1.d2 - Alarm Flag 1, Definition 2*
Range of values: 0...255 [0]

6.9 Definition of Timers

The controller offers a total of four timers where complex sequences of functions can be realized.

The function and how the timer acts are defined by two configuration parameters.

t1.d1 - Mode of Operation of Timer 1, Definition 1

With the first configuration parameter of a timer is defined which function is performed when the timer is active.

[oFF]	No function.
P.on	The power controller of heating is switched on.
P.oFF	The power controller of heating is switched off.
SP2.A	The controller operates with the 2nd set point.
SP3.A	The controller operates with the 3rd set point.
SP4.A	The controller operates with the 4th set point.
SP2.r	The set point is increased or decreased by the 2nd set point.
SP3.r	the set point is increased or decreased by the 3rd set point.
SP4.r	the set point is increased or decreased by the 4th set point.
H.oFF	Heating output is switched off.
H.on	Heating output is switched on.
C.oFF	Cooling output is switched off.
C.on	Cooling output is switched on.

t1.d2 - Mode of Operation of Timer 1, Definition 2

With the second configuration parameter of a timer is defined how the timer is started and which action is performed after termination of the timer.

*) For parameter t.rES = Auto, a Soft-Reset has the same effect like controller start.

[oFF]	Timer is not started.
Auto	Timer is automatically started after controller start *).
A.t1	Timer is automatically started after controller start *). After termination: Start of timer 1.
A.t2	Timer is automatically started after controller start *). After termination: Start of timer 2.
A.t3	Timer is automatically started after controller start *). After termination: Start of timer 3.
A.t4	Timer is automatically started after controller start *). After termination: Start of timer 4.
t1	After termination: Start of timer 1.
t2	After termination: Start of timer 2.
t3	After termination: Start of timer 3.
t4	After termination: Start of timer 4.
AL.t1	Timer is started when the actual value reaches the 5K band around the set point directly after start of the controller. After termination: Start of timer 1.
AL.t2	Timer is started when the actual value reaches the 5K band around the set point directly after start of the controller. After termination: Start of timer 2.
AL.t3	Timer is started when the actual value reaches the 5K band around the set point directly after start of the controller. After termination: Start of timer 3.
AL.t4	Timer is started when the actual value reaches the 5K band around the set point directly after start of the controller. After termination: Start of timer 4.
L.t1	Timer is started when the actual value reaches the 5K band around the set point. After termination: Start of timer 1.
L.t2	Timer is started when the actual value reaches the 5K band around the set point. After termination: Start of timer 2.
L.t3	Timer is started when the actual value reaches the 5K band around the set point. After termination: Start of timer 3.
L.t4	Timer is started when the actual value reaches the 5K band around the set point. After termination: Start of timer 4.
AL	Timer is started when the actual value reaches the 5K band around the set point directly after start of the controller.
L	Timer is started when the actual value reaches the 5K band around the set point.

AS	Timer is started when set point > 100 °C and actual value < 90 °C.
AS.t1	Timer is started when set point > 100 °C and actual value < 90 °C. After termination: Start of timer 1.
AS.t2	Timer is started when set point > 100 °C and actual value < 90 °C. After termination: Start of timer 2.
AS.t3	Timer is started when set point > 100 °C and actual value < 90 °C. After termination: Start of timer 3.
AS.t4	Timer is started when set point > 100 °C and actual value < 90 °C. After termination: Start of timer 4.

t2.d1 - Mode of Operation of Timer 2, Definition 1
➥*A1.d1 - Alarm Flag 1, Definition 1*

t2.d2 - Mode of Operation of Timer 2, Definition 2
➥*A1.d2 - Alarm Flag 1, Definition 2*

t3.d1 - Mode of Operation of Timer 3, Definition 1
➥*A1.d1 - Alarm Flag 1, Definition 1*

t3.d2 - Mode of Operation of Timer 3, Definition 2
➥*A1.d2 - Alarm Flag 1, Definition 2*

t4.d1 - Mode of Operation of Timer 4, Definition 1
➥*A1.d1 - Alarm Flag 1, Definition 1*

t4.d2 - Mode of Operation of Timer 4, Definition 2
➥*A1.d2 - Alarm Flag 1, Definition 2*

t.rES - Mode of Operation of Timer after Soft-Reset
A soft reset stands for a sensor break, a reset of a set point to zero or a passivation of a zone.

[run]	Timer keeps on running.
StoP	Timer is stopped and reset.
Auto	Timer is stopped, reset and after soft reset started again in case of t*.d2 = Auto and/or A.**.

6.10 Configuration of Operation

Edit - Entry Mode Directly

[on]	After selection the parameters in operator and system level can *directly* be changed by keypad. In this mode the direct data entry for set point value/degree of operation by decrease/increase button is feasible.
oFF	After selection the parameters in operator and system level can only be changed after unblocking by keypad by decrease/increase button.

iLoc - Entry Lock on Info Level

on	No data entry on information level feasible.
[oFF]	Data entry on information level feasible.

6.11 Configuration of Data Interface

The two optional available data interfaces are configured by means of this parameter group.

S.Adr - Address of Device
Address of device for communication via the serial data interface with ↗PSGII-Protocol.

S.Pro - Protocol of Serial Interface

[PSG]	PSGII-Protocol
rtU	Modbus RTU

Interface specifications are available on request.

S.bd - Baud Rate of Serial Interface
Range of values: 1200, 2400, 4800, 9600, [19.2], 38.4
Transfer rate of serial interface.

S.Sto - Stop Bits of Serial Interface
Range of values: [1]/2
Number of stop bits of serial data interface.

S.PAr - Parity of Serial Interface
Parity bit for detection of transmission errors.

[no]	No parity bit.
EvEn	The parity bit complements the 1 bits in the bit string to a even number of 1 bits.
odd	The parity bit complements the 1 bits in the bit string to a odd number of 1 bits.

C.bAS - Address of CAN
Range of values: 1...127 [32]
Node id of the controller.

C.bd - Baud Rate of CAN
Range of values: 78.8, 100, 125, [250], 500, 800, 1000
Transfer rate of CAN-Bus.

C.OP - Auto Operational Mode of CAN
In case of networking of several controllers by CAN-Bus without CAN-Bus-Master at least one controller has to send out the auto operational command.

oFF	Controller sends *no* auto operational command.
[Auto]	Controller sends auto operational command cyclical.

m.Adr - Address of MODBUS
Range of values: 0...255 [1]

6.12 Basic settings for Special Applications

The temperature controllers can easily be adapted to any application. For some applications the parameter modifications based on the factory-made delivery status are shown exemplarily. To change all parameters select ↗Information Level.

6.12.1 Application Hot Runner Control

Start-up Function

After start the controller operates for a definite time with the set point for start-up. ↗SP.4 - Set Point 4 is used for this function.

- Define mode of operation for the start-up timer after start of the controller:
  ↗t1.d1 - Mode of Operation of Timer 1, Definition 1 = SP4.A and ↗t1.d2 - Mode of Operation of Timer 1, Definition 2 = AL.t2
- Define period of start-up mode:
  ↗t1 - Process Timer 1 = 600 (seconds)
- Define temperature value on which the controller operates in start-up mode:
  ↗SP.4 - Set Point 4 = 100

Boost Function

In the boost mode the temperature set point is increased by an adjustable temperature value, e.g. to heat up the hot runner nozzles before start of the production. The boost mode is automatically started after start-up function or by a signal on the digital input 2 (only C296) of the controller. ↗SP.3 - Set Point 3 is used for this function.

- Define mode of operation for the second digital input:
  ↗dIn.2 - Mode of Operation of Digital Input 2 = SP3.r (only C296)
- Define a temperature value that increases („boosts“) the temperature:
  ↗SP.3 - Set Point 3
- Define mode of operation for the boost timer:
  ↗t2.d1 - Mode of Operation of Timer 2, Definition 1 = SP3.r and ↗t2.d1 - Mode of Operation of Timer 2, Definition 1 = L
- Define period of boost mode:
  ↗t2 - Process Timer 2 = 300 (seconds)

Stand-by Function

If the digital input 1 is active, the controller operates with the reduced set point.

- Define mode of operation of digital input 1:
  ↗dIn.1 - Mode of Operation of Digital Input 1 = SP2.r
- Define temperature value for lowering:
  ↗SP.2 - Set Point 2 = 100.0

Alarm Supervision

An alarm is generated when the temperature value exceeds the defined band around the temperature set point.

- Define upper temperature limit:
  ↗Li.1 - Temperature Limit 1 = 5°C
- Define lower temperature limit:
  ↗Li.2 - Temperature Limit 2 = -5°C
- Define identifiers of alarm flag:
  ↗A1.d1 - Alarm Flag 1, Definition 1 = 12
- Alarm flag should be generated on digital output:
  ↗dO.2 - Mode of Operation of Digital Output 2 = AL1

6.12.2 Application Extrusion

Three-point zone (Heating/Cooling)

- Activate cooling:
  ↗CooL - Heating/Cooling = on
- Activate auto tuning for cooling:
  ↗IdE.C - Identification Cooling after Identification Heating = on

Besides the controller is preset for the operation with an extruder.

6.12.3 Application Hot Air

To achieve optimal control results, the automatic calculation of the heating control parameters should be deactivated and the heating control parameters should be manually entered.

- Deactivate automatic calculation of heating control parameters:
  ↗IdE.H - Identification Heating = off
- Set heating control parameters:
  ↗H.Pb - Proportional Band of Heating = 15
  ↗H.td - Derivative Time of Heating = 1
  ↗H.ti - Integral Time of Heating = 3
  ↗H.Ct - Sampling Time of Heating = 0.3
  In case these control parameters are not leading to an optimal result for your hot air zones, please contact Hotset Heizpatronen und Zubehör GmbH.
  For a further adaptation of the heating control parameters please watch the actual value as well as the dedicated degree of operation.

7 Appendix

7.1 Configuration Parameter / Factory-made Delivery Status

Mnemonic	Parameter	Range of value (physical values)	Standard	My Setting	Enabling	My Enabling
SP	Set Point	0.0...1500.0	0		Edit	
mAnU	Manual Mode	oFF, on	oFF		Edit	
Out	Degree of Operation	-100...100	0		Edit	
Cur.S	Set Point of Heating Current	0.0...999.0	0.0		Edit	
Cur.t	Tolerance Band of Heating Current	0...100	20		Edit	
ZonE	Zone	oFF, on	on		Edit	
Li.1	Temperature Limit Value 1	-999.0...1500.0	5		Edit	
Li.2	Temperature Limit Value 2	-999.0...1500.0	-5		Edit	
Li.3	Temperature Limit Value 3	-999.0...1500.0	0		Edit	
Li.4	Temperature Limit Value 4	-999.0...1500.0	0		Edit	
SP.2	Set Point 2	-999.0...1500.0	0		Edit	
SP.3	Set Point 3	-999.0...1500.0	0		Edit	
SP.4	Set Point 4	-999.0...1500.0	0		Edit	
rAP.t	Temperature Ramp	-999.0...999.0	0		Edit	
rAP.A	Automatic Temperature Ramp	oFF, on	oFF		Edit	
rAP.G	Temperature Band of Automatic Temperature Ramp	2.0...25.5	5.0		Edit	
t1	Process timer 1	0...9999	0		Edit	
t2	Process timer 2	0...9999	0		Edit	
t3	Process timer 3	0...9999	0		Edit	
t4	Process timer 4	0...9999	0		Edit	
AmAn	Automatic Manual Mode	oFF, on	oFF		hidE	
tC.AL	Automatic Short Circuit Supervision of Sensor	oFF, on	oFF		hidE	
tC.ti	Testing Period for Manual Short Circuit Supervision of Sensor	0...999	0		hidE	
APPL	Application	0...255	0		hidE	
H.Pb	Proportional Band of Heating	0.0...25.5	6.5		Edit	
H.td	Derivative Time of Heating	0...2000	50		Edit	
H.ti	Reset Time of Heating	0...2000	50		Edit	
H.Ct	Sampling Time of Heating	0.2...90.0	0.2		Edit	
C.Pb	Proportional Band of Cooling	0.0...25.5	6.5		Edit	
C.td	Derivative Time of Cooling	0...2000	50		Edit	
C.ti	Reset Time of Cooling	0...2000	50		Edit	
C.Ct	Sampling Time of Cooling	0.2...90.0	1.0		Edit	
IdE.H	Identification Heating	oFF, on	on		Edit	
IdE.C	Identification Cooling after Identification Heating	oFF, on	oFF		Edit	
IdE.L	Loop Control	oFF, on	oFF		Edit	
SP.Cb	Set Point Cutback	0.0...25.5	0.0		Edit	
C.Con	Control Parameter Cooling constant after Identification Heating	oFF, on	oFF		Edit	
GP.rt	Remote Group	0...32	0		hidE	
GP.nr	Group Number	0...32	0		hidE	
GP.Fu	Group Function	0...255	0		hidE	
Li.1d	Definition of Temperature Limit Value 1	0...255	0		Edit	
Li.2d	Definition of Temperature Limit Value 2	0...255	0		Edit	
Li.d3	Definition of Temperature Limit Value 3	0...255	0		Edit	
Li.d4	Definition of Temperature Limit Value 4	0...255	0		Edit	
Out.H	Maximum Degree of Operation of Heating	0...100	100		hidE	
Out.C	Maximum Degree of Operation of Cooling	-100...0	-100		hidE	
Out.m	Maximum Degree of Operation in Manual Mode	-100...100	100		hidE	
CooL	Heating/Cooling	oFF, on	oFF		Edit	
rEL.H	Relay Output Heating	oFF, on	oFF		hidE	
rEL.C	Relay Output Cooling	oFF, on	on		hidE	
SP.Lo	Minimum Set Point	0.0...1500.0	0.0		hidE	
SP.Hi	Maximum Set Point	0.0...1500.0	500.0		hidE	

Mnemonic	Parameter	Range of value (physical values)	Standard	My Setting	Enabling	My Enabling
Cur.d	Current Supervision Function	0...99	1		hidE	
Cur.E	Final Value of Measurement Range of Current Supervision	0.0...999.0	100.0		hidE	
CELS	Temperature Unit	F, C	C		hidE	
deCP	Display of Format of Temperature Values	1.0, 0.1	0		hidE	
dmAn	Display in Manual Mode	tEmP, out	out		hidE	
dO.1	Mode of Operation of Digital Output 1	oFF, HEAt, CooL, AL1, AL2, AL3, AL4, AL1-, AL2-, AL3-, AL4-, t1, t2, t3, t4, t1-, t2-, t3-, t4-	HEAt		hidE	
dO.2	Mode of Operation of Digital Output 2	oFF, HEAt, CooL, AL1, AL2, AL3, AL4, AL1-, AL2-, AL3-, AL4-, t1, t2, t3, t4, t1-, t2-, t3-, t4-	CooL		hidE	
dO.3	Mode of Operation of Digital Output 3	oFF, HEAt, CooL, AL1, AL2, AL3, AL4, AL1-, AL2-, AL3-, AL4-, t1, t2, t3, t4, t1-, t2-, t3-, t4-	AL1		hidE	
dO.4	Mode of Operation of Digital Output 4	oFF, HEAt, CooL, AL1, AL2, AL3, AL4, AL1-, AL2-, AL3-, AL4-, t1, t2, t3, t4, t1-, t2-, t3-, t4-	AL2		hidE	
dIn.1	Mode of Operation of Digital Input 1	oFF, P.on, P.oFF, SP2.A, SP3.A, SP4.A, SP2.r, SP3.r, SP4.r, H.oFF, H.on,C.oFF, C.on, SP.bA, SP.br, AL.CL, t1, t2, t3, t4, t1-, t2-, t3-, t4-, iLoc	oFF		hidE	
dIn.2	Mode of Operation of Digital Input 2	oFF, P.on, P.oFF, SP2.A, SP3.A, SP4.A, SP2.r, SP3.r, SP4.r, H.oFF, H.on,C.oFF, C.on, SP.bA, SP.br, AL.CL, t1, t2, t3, t4, t1-, t2-, t3-, t4-, iLoc	oFF		hidE	
OPt.A	Definition Option A	oFF, Sio, dI, dO, AO, AO.O	oFF		hidE	
OPt.b	Definition Option B	oFF, CAn, dI, dO, AO, AO.O	oFF		hidE	
dO.A	Mode of Operation of Digital Output Option A	oFF, HEAt, CooL, AL1, AL2, AL3, AL4, AL1-, AL2-, AL3-, AL4-, t1, t2, t3, t4, t1-, t2-, t3-, t4-	oFF		hidE	
dO.b	Mode of Operation of Digital Output Option B	oFF, HEAt, CooL, AL1, AL2, AL3, AL4, AL1-, AL2-, AL3-, AL4-, t1, t2, t3, t4, t1-, t2-, t3-, t4-	oFF		hidE	
dIn.A	Mode of Operation of Digital Input Option A	oFF, P.on, P.oFF, SP2.A, SP3.A, SP4.A, SP2.r, SP3.r, SP4.r, H.oFF, H.on,C.oFF, C.on, SP.bA, SP.br, AL.CL, t1, t2, t3, t4, t1-, t2-, t3-, t4-, iLoc	oFF		hidE	
dIn.b	Mode of Operation of Digital Input Option B	oFF, P.on, P.oFF, SP2.A, SP3.A, SP4.A, SP2.r, SP3.r, SP4.r, H.oFF, H.on,C.oFF, C.on, SP.bA, SP.br, AL.CL, t1, t2, t3, t4, t1-, t2-, t3-, t4-, iLoc	oFF		hidE	
AO.A	Mode of Operation of Analogue Output Option A	oFF, out.H, out.C, SEn.C, IntF, S.C b, S.C C	oFF		hidE	
AO.b	Mode of Operation of Analogue Output Option B	oFF, out.H, out.C, SEn.C, IntF, S.C b, S.C C	oFF		hidE	
SEn	Sensor Type of Measuring Input A	L, J, niCr, Pt	J		Edit	
SEn.C	Measuring Input for Control	A, b, C, A-b, b-A, A-C, C-A, C-b, b-C	A		hidE	
SEn.S	Measuring Input for Presetting of Set Point	oFF, A, b, C	oFF		hidE	
oFF.A	Offset of Measuring Input A	-99.9...99.9	0.0		hidE	
oFF.b	Offset of Measuring Input B	0-10, 2-10	0		hidE	
oFF.C	Offset of Measuring Input C	0-20, 4-20	0		hidE	
Aib.L	Lower Display Limit of Measuring Input B	-100.0...1500.0	0.0		hidE	
Aib.H	Upper Display Limit of Measuring Input B	-100.0...1500.0	999.9		hidE	
AiC.L	Lower Display Limit of Measuring Input C	-100.0...1500.0	0.0		hidE	
AiC.H	Upper Display Limit of Measuring Input C	-100.0...1500.0	999.9		hidE	
A1.d1	Alarm Flag 1, Definition 1	0...255	4		hidE	
A1.d2	Alarm Flag 1, Definition 2	0...255	0		hidE	
A2.d1	Alarm Flag 2, Definition 1	0...255	8		hidE	
A2.d2	Alarm Flag 2, Definition 2	0...255	0		hidE	
A3.d1	Alarm Flag 3, Definition 1	0...255	2		hidE	
A3.d2	Alarm Flag 3, Definition 2	0...255	0		hidE	
A4.d1	Alarm Flag 4, Definition 1	0...255	1		hidE	
A4.d2	Alarm Flag 4, Definition 2	0...255	0		hidE	

Mnemonic	Parameter	Range of value (physical values)	Standard	My Setting	Enabling	My Enabling
t1.d1	Mode of Operation of Timer 1, Definition 1	oFF, P.on, P.oFF, SP2.A, SP3.A, SP4.A, SP2.r, SP3.r, SP4.r, H.oFF, H.on, C.oFF, C.on	oFF		hidE	
t1.d2	Mode of Operation of Timer 1, Definition 2	oFF, Auto, A.t1, A.t2, A.t3, A.t4, t1, t2, t3, t4, AL.t1, AL.t2, AL.t3, AL.t4, L.t1, L.t2, L.t3, L.t4, AL, L, AS., AS.t1, AS.t2, AS.t3, AS.t4	oFF		hidE	
t2.d1	Mode of Operation of Timer 2, Definition 1	oFF, P.on, P.oFF, SP2.A, SP3.A, SP4.A, SP2.r, SP3.r, SP4.r, H.oFF, H.on, C.oFF, C.on	oFF		hidE	
t2.d2	Mode of Operation of Timer 2, Definition 2	oFF, Auto, A.t1, A.t2, A.t3, A.t4, t1, t2, t3, t4, AL.t1, AL.t2, AL.t3, AL.t4, L.t1, L.t2, L.t3, L.t4, AL, L, AS., AS.t1, AS.t2, AS.t3, AS.t4	oFF		hidE	
t3.d1	Mode of Operation of Timer 3, Definition 1	oFF, P.on, P.oFF, SP2.A, SP3.A, SP4.A, SP2.r, SP3.r, SP4.r, H.oFF, H.on, C.oFF, C.on	oFF		hidE	
t3.d2	Mode of Operation of Timer 3, Definition 2	oFF, Auto, A.t1, A.t2, A.t3, A.t4, t1, t2, t3, t4, AL.t1, AL.t2, AL.t3, AL.t4, L.t1, L.t2, L.t3, L.t4, AL, L, AS., AS.t1, AS.t2, AS.t3, AS.t4	oFF		hidE	
t4.d1	Mode of Operation of Timer 4, Definition 1	oFF, P.on, P.oFF, SP2.A, SP3.A, SP4.A, SP2.r, SP3.r, SP4.r, H.oFF, H.on, C.oFF, C.on	oFF		hidE	
t4.d2	Mode of Operation of Timer 4, Definition 2	oFF, Auto, A.t1, A.t2, A.t3, A.t4, t1, t2, t3, t4, AL.t1, AL.t2, AL.t3, AL.t4, L.t1, L.t2, L.t3, L.t4, AL, L, AS., AS.t1, AS.t2, AS.t3, AS.t4	oFF		hidE	
t.rES	Mode of Operation of Timer after Soft-Reset	run, StoP, Auto	run		hidE	
Edit	Entry Mode Directly	oFF, on	on		hidE	
iLoc	Entry Lock on Info Level	oFF, on	oFF		hidE	
S.Adr	Address of Device	0...255	0		hidE	
S.Pro	Protocol of Serial Interface	PSG2, rtU, ---	PSG2		hidE	
S.bd	Baud Rate of Serial Interface	1200, 2400, 4800, 9600, 19.2, 38.4	19.2		hidE	
S.StP	Stop Bits of Serial Interface	1, 2	1		hidE	
S.PAr	Parity of Serial Interface	no, odd, EvEn	no		hidE	
C.bAS	Address of CAN	1...127	32		hidE	
C.bd	Baud Rate of CAN	78.8, 125, 250, 500, 800, 1000	250		hidE	
C.AOP	Auto Operational Mode CAN	oFF, Auto	Auto		hidE	
M.Adr	Address of MODBUS	0...255	1		hidE	

7.2 Firmware Update

The firmware of the controller is subject to continuing revolution. Due to the fact, that the controller is capable of being updated, the controller can easily be kept up to date by the latest software version after purchase.
The controller firmware is available as a hex file and is free of charge.
The firmware update is managed by the software engineering tool WinKonVis Professional (order nr. 039020, executable for at least Microsoft Windows 98) with the serial interface RS485 (option).
The program as well as the firmware can be delivered on request on CD or via e-mail or directly from the homepage of Hotset Heizpatronen und Zubehör GmbH.

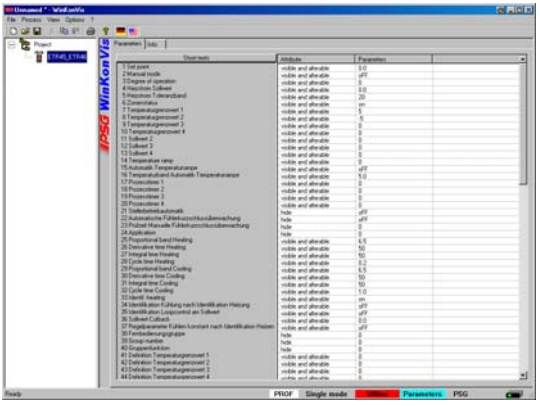
For execution of the update there exist two interface converters SK232485 (order nr. 039060, converter RS232-RS485) and SKUSB422 (order nr. 039065, converter USB-RS485) as well as the dedicated adaptation cable VK4852DR (order nr. 052220) as accessories.

Preparation of the Update

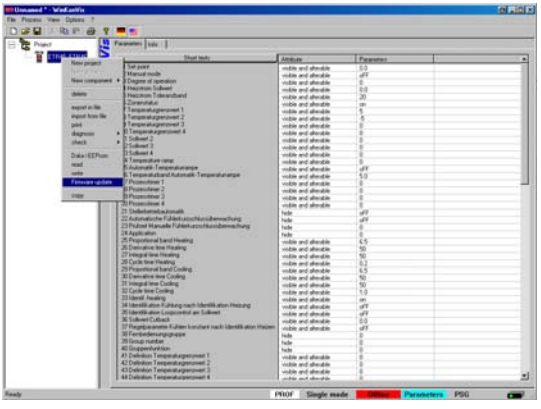
- WinKonVis must be installed and the professional version must be licensed.
- Optional: Installation of driver for USB-RS485 interface converter from provided diskette.
- Make sure, that the interface connection between PC and controller is working (e.g. interface test menu item Options/Interface/PSGII-Options in WinKonVis Professional).

Perform Update

Start WinKonVis Professional and create a project with one controller. The address of the created controller has to be identical with the address of the controller that should be updated with a new firmware.

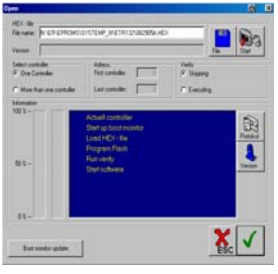


Select the controller in the left window with the right mouse button. Select the menu item „Firmware update“ in the context menu.



In the update dialog box the HEX file for the update of the firmware has to be selected first.

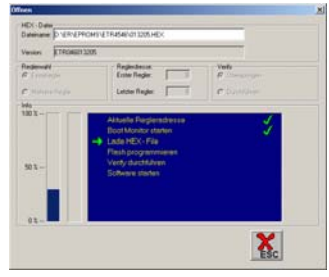
Select button „File“ to choose the corresponding hex file.



If the hex file is damaged, a warning is shown. Stop the update immediately and provide a correct hex file.

The firmware update is started by selection of button „Start“.

A bar shows the actual progress of the update process. The update process lasts about 4 minutes with deactivated verify function and with activated verify function about 7 minutes.



The controller is rebooted after successful completion of the firmware update. The dialog box can be closed.

7.3 Release

Revision	Date	Modification
1.01.02	08.05.2008	Functional extension S.C b and S.C C for parameter AO.A, AO.b. Specification for setpoint of control for measuring input for presetting of set point (SEn.C). Set point of control scaled by parameter Aib.L, Aib.H, AiC.L, AiC.H. From software version 011308. Code number 211, 212 from software version 015107.
1.01.01	08.08.2007	Combination of buttons for jump into system level revised (chapter 5.3, 5.3.4). Edit ON/OFF exchanged. Description of parameters t.rES, t*.d2 (chapter 6.9), Edit (chapter 6.10) stated more precisely. List of configuration parameters in appendix updated.
1.01.00	15.09.2006	Changes in operation of controller (direct data entry for set point value and degree of operation). Available for controller software release 013606.
1.00.00	Not published	New revision handling. Start conditions AS, AS.t1-AS.t4 for parameter tx.d2 added. Available for controller software release 010906. Default of configuration parameters H.Ct, C.Ct; configuration parameter sequence according appendix APPL, tc.ti, C.Con, SP,Cb
1.00	12.12.2005	First edition. Available for controller software release 2305A.