

**Small programmable controller  
MKA 120  
for cooking, baking and kettle units**

**User Manual**

**aditec**  
CONTROLS for  
FOODTECHNOLOGY



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Measurement and  
Control technology  
Hardware development  
Software development  
Specialised electronics  
Food technology  
Process visualisation

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








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## Symbols used in this user manual

The following symbols are used in this user manual to highlight important information:

Symbol	Description
	See page / press button
	Press several buttons simultaneously
	This symbol indicates a useful hint or gives a tip
	Factory setting
	Display is flashing
	<b>Be aware!</b> This symbol points out measures you should take in order to avoid potential problems.
	Code is supported by the service program
	Press a button for 3 seconds or wait 3 seconds.
	Indicates a sequence of actions that should be executed one after the other.

## 2 Introduction

### 2.1 Overview

Controller **MKA 120** has been developed **for use in cooking, baking and boiler systems**. It is infinitely variable and can be easily adapted for a range of applications.

The controller has 2 temperature measurement inputs and 3 potential-free output relays. The controller regulates the temperature through heating or cooling. Shut-down conditions can be either the operating time and/or the core temperature. Delta T cooking is also possible with the appropriate encoding.

The assignment of relays to the processes is infinitely variable. Relays can be assigned as leading, lagging, switch-on as well as switch-off delayed or pulsing relays.

An optional serial interface allows for data transfers between the controller MKA120 and a PC. The controller can be programmed via a PC with the installed **aditec service program**. The connection is made via a mini USB or optionally via LAN or a serial interface RS485, respectively.

The visualisation program **aditec „VisuNet“** allows you to connect one or several controllers to a superordinate program surveillance. This enables you to log temperature profiles, treatment types etc. and ensures comprehensive quality control of the treated products in compliance with HACCP and IFS (ISO 9000). Furthermore the tele-control and remote maintenance system **aditec Control** lets you monitor and operate the VisuNet program from anywhere, thereby allowing you to directly influence the system.



### 2.2 Controller characteristics

- Number of programs and steps can be pre-programmed, max.99 steps in total, 1 manual program.
- Straight forward, systematic setting of the configuration data.
- Programmabel processes
- 3 potential-free relay outputs can be programmed
- 2 x galvanically isolated analogue inputs which can be programmed as: Pt100 (for 3 wire connection with automatic power compensation), all standardised thermo-elements in compliance with DIN EN 60584 among others Type K: NiCr-Ni. Pt100 or as digital inputs

- Ethernet LAN for connection to a PC or connection via an expansion card (ZSL)
- RS485 for connection to a PC via an expansion card (ZS4)
- Mini USB connection (USB serial port for a firmware update)



- 4 x LED buttons (red) for status displays
- OLED-display with 128x64 pixel resolution and 16 grey scales
- Robust stainless steel housing (1.4016)
- Network for the visualisation and recording in accordance with HACCP is possible with **aditec-VisuNet**
- Programmable nominal limit values
- Program memory is retained during a power cut
- Programs interrupted by a power cut will be resumed at the point (can be defined) where they were interrupted once power is restored.
- Process runtime from 00h : 01min to 99h : 59min or continuous operation
- Pre-set time (start time) can be pre-set via real time/date
- Sensor breaks (interruption or short circuit) are shown
- 5 limit value alarms

### 3 Operating controls

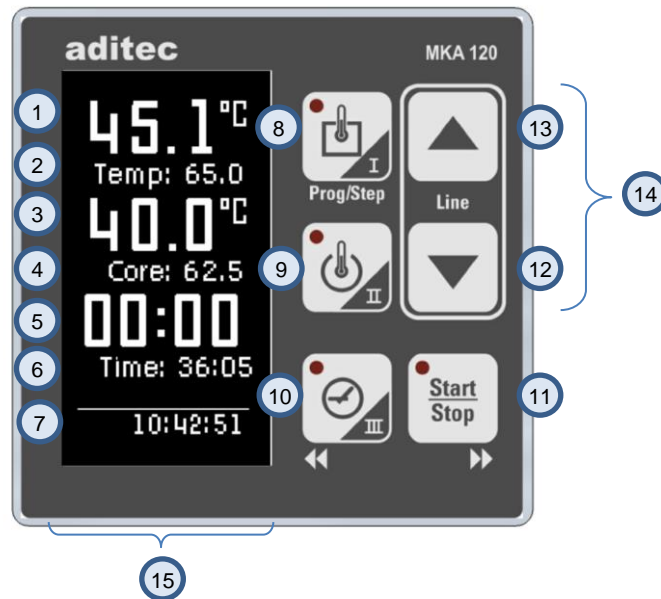









Figure 1: Operating controls

- ① Actual value temperature (*Temp*) / short cut button 1
- ② Nominal values / short cut button 1
- ③ Actual value core temperature / short cut button 2
- ④ Nominal values short cut button 2
- ⑤ Actual value step time/program runtime/remaining program time
- ⑥ Nominal step time value
- ⑦ Current time of day
- ⑧ Temp. button / short cut button 1
- ⑨ Core button / short cut button 2
- ⑩ Time button / Shortcut button III
- ⑪ Start/Stop button /right
- ⑫ Cursor button down
- ⑬ Cursor button up
- ⑭ Line button (press up and down buttons simultaneously)
- ⑮ Display

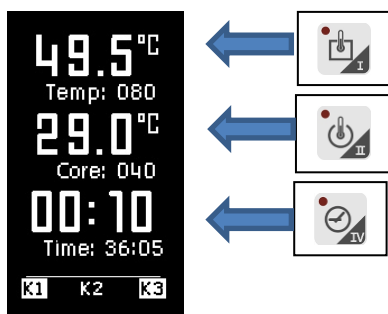
### 3.1 Button functions

Button	Description	Function
	Temperature „Temp“	Shortcut button for entering the following nominal values: temperature (min, max), Delta
	Core temperature „Core“	Shortcut button for entering the following nominal values: core temperatur (min, max)
	Time „Time“	Shortcut button for entering the following nominal value: step time  Moving the cursor in the input field to the left
	Start/Stop	Starting and stopping programs  Moving the cursor in the input field to the right
	Cursor buttons	Moving the cursor within the display, selecting specific settings.
	Line	Confirming an entry and focussing the next item by briefly pressing both cursor buttons simultaneously.  Leave the mask (code)  3 Sec. by pressing and holding both cursor buttons simultaneously.

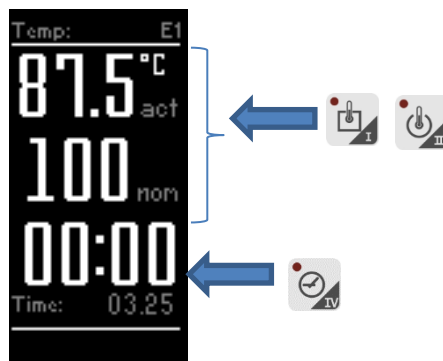
**Table 1: Button functions**

#### 3.1.1 Shortcut buttons

View of the shortcut buttons (View 1)



View of the shortcut buttons (View 2)



### 3.2 LED Display









	LED off	LED on	Relevance
Temperature (Temp)			LED „is flashing“ when a nominal value is changed ( see <i>how to configure a program</i> ).
Core temperature (Core)			LED „is flashing“ when a nominal value is changed ( <i>see how to configure a program</i> ). LED lights up when signal programming before programme start is active. (Signal activated)
Time (Time)			LED „is flashing“ when a nominal value for the step time is changed.
Start / Stop			LED „is flashing“ when the controller is in waiting mode or pause mode, if there has been an alarm or the end of a program has been reached. LED is on when the controller is in operation.

Table 2: LED Display



## 4 Control elements

### 4.1 Entering values (Edit box)




Figure 2: Entering values


How to enter values:




- Cursor is flashing in the position ‚far right‘: „00“.
- When you are making an entry, the cursor is at first in the position ‚far right‘: „00“. Use the button to increase the value and the  button to reduce the value. The numbers will  automatically shift to the left „10“. The value of the entry is limited by the limit value range.
- When you press the arrow button ‚left‘, you can change the individual digits.

#### Entering negative values:

-  Certain nominal values can be negative numbers (*e.g. temperature values*). In order to enter a negative value you have to press the arrow button „down“ until you go past value 0 then a minus („-“) sign will appear in front of the numbers.

#### Entering positive values:





-  When you want to change a negative number into a positive one you can either use the arrow buttons to position the cursor on the „-“ sign and overwrite it with a „+“ with the arrow button „up“ or you can enter a value higher than „0“.

Hint	
	<b>Scrolling characters:</b>   Use the arrow buttons „up“ / „down“ (keep pressed) to scroll a character.



## 4.2 General text entry (Edit box)

How to enter text:

- Cursor is flashing in the first position: „“.
- When you are making an entry the cursor is at first in the position „“. Use the  button to scroll the characters (number/letter/ special character) up, or the  button to scroll them down. Use the arrow buttons ‚left‘ or ‚right‘ to change the individual digits. In this way you can take the cursor to any position in the entry box.

Characters can only be entered in the position that is flashing. Press the relevant button „up“ or „down“ until the required character appears.  
The first character is a blank.

### 4.2.1 Sequence of the characters:




Numbers:												
' '	'0'	'1'	'2'	'3'	'4'	'5'	'6'	'7'	'8'	'9'		
Letters:												
'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'I'	'J'	'K'	'L'	'M'
'N'	'O'	'P'	'Q'	'R'	'S'	'T'	'U'	'V'	'W'	'X'	'Y'	'Z'
'a'	'b'	'c'	'd'	'e'	'f'	'g'	'h'	'i'	'j'	'k'	'l'	'm'
'n'	'o'	'p'	'q'	'r'	's'	't'	'u'	'v'	'w'	'x'	'y'	'z'
Special characters:												
'.'	','	':'	','	'!'	'"'	'\$'	'%'	'&'	'/'	'('	)'	'{'
'}'	'['	']'	'='	'?'	'+'	'-'	'*'	'_'	'#'	'@'	'~'	

Table 3: Table of characters

### 4.2.2 Deleting a character:

If you want to **overwrite a character** use the arrow buttons ‚left‘ and ‚right‘ to take the cursor to the required position and enter the new character in this position.

If you want to **delete a character**, take the cursor to the right of the position you want to delete. Press the „Temp“ button to backspace and the character is deleted.

Hint	
	<p><b>Scrolling characters:</b>    Use the arrow buttons „up“ / „down“ (keep pressed) to scroll a character.</p>

## 4.3 Buttons



The button allows the user to trigger an assigned function. When the button is focussed (*frame around the info text*) it can be activated by using the ‚Line‘ button. If several buttons exist, you can use the arrow buttons „up“ or „down“, respectively, to focus the following or previous button.

Figure 3: Button

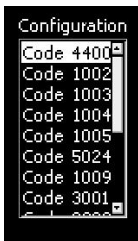
## 4.4 Check boxes



Check boxes allow you to set e.g. a state. When a check box is focussed (*frame around the info text*) you can change its state to **selected** (*Relay 1*) or **not selected** (*Relay 2,3*) by using the ‚Line‘ button. If several check boxes exist you can use the arrow buttons “up” or “down” respectively to focus the following or previous check box.

Figure 4: check boxes

## 4.5 List box



List boxes allow you to clearly display e.g. codes in a list. Use the arrow buttons “up” and “down” to focus an entry (*background = white, writing = black*) and the ‚Line‘ button to select it. The status bar gives you only an overview. The scroll bar is automatically moved when the last item of the visible segment is focussed with the arrow buttons

Figure 5: List box

## 4.6 Drop box

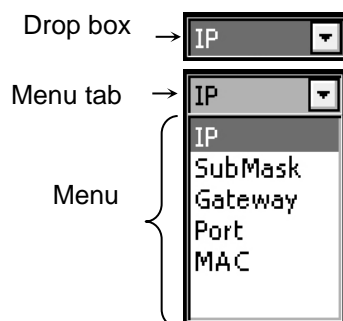


Figure 6:  
Drop box








A drop box is used to select one item from a shown list of items. Initially, the previously selected item is shown. Use the arrow buttons “up” or “down” respectively to focus the following or previous item. When you press the ‚Start‘ button, a list of all available items on the list will flick open and you can use the arrow buttons “up” or “down” respectively to focus the following or previous item. (*background = grey, writing = white*). The currently selected item is shown on the menu tab. Use the ‚Time‘ button to shut the drop box and the newly chosen item is automatically selected.

## 4.7 Leaving a code




There are two ways of leaving a code setting.

Option 1: Leaving the code to go back to the previous window.

*Example: leaving Code 2001*


	Buttons	Displays		Comment
<b>1</b>				Press the ,Line' button for 3 sec. to leave the code and the previous window will be shown. ( <i>List box -&gt;Code 2001 is selected</i> ).
<b>2</b>				Press the ,Line' button again for 3 sec. and you will leave the list box and the previous window will be shown ( <i>Menu</i> ).
<b>3</b>				Press the ,Line' button again for 3 sec. and you will leave the menu and the previous window will be shown ( <i>Standby</i> ).

Option 2:

	Buttons	Displays		Comment
<b>1</b>				Press the ,Start' button for 3 sec. to leave the code and the standby or operation window will be shown.


## 5 Relevance of the nominal values

The controller allows you to pre-program different nominal values within a program step. In the following chapter the relevance of the individual nominal values is explained.



Be aware	
	Depending on the system and the application, nominal values can be configured in different ways for individual processes. This means that you may find that not all the nominal values described here are available in your controller ( <i>it depends on your specific configuration</i> ). This manual describes all the available values.

## 5.1 Entering nominal values

The entry function for nominal values will automatically be terminated after 10 seconds if no further key pad buttons are pressed.  
The nominal value that was entered last is saved.

	<b>Hint</b>
	Nominal value entry is only possible via the shortcut buttons.


## 5.2 Switching off nominal values

	<b>Be aware</b>
	<b>Switching off nominal values:</b> Nominal values in the controller can also be negative. Therefore the value „0“ is also a valid nominal value. If you want to switch off a nominal value in a program step, e.g. the core temperature, the  button has to be pressed repeatedly until the value „OFF“ appears.

## 5.3 Nominal temperature

Nominal value for chamber temperature control. The chamber temperature is regulated via the heating relay (*when the actual value is smaller than the nominal value*) and/or cooling relay (*when the actual value is higher than the nominal value*). If two nominal values „Chamber min“ and „Chamber max“ have been enabled for temperature control, the heating process will use nominal value „**Chamber min**“ and the cooling process will use „**Chamber max**“.

## 5.4 Nominal core temperature

	<b>Be aware</b>
	<b>Shut-down condition:</b> If you have enabled the nominal core temperature value in a step and the actual temperature of the core sensor reaches this nominal value, the step will be terminated.

**The controller works with two types of core shut-down:**

### **Positive core shut-down (heating operation)**

If the pre-programmed nominal chamber temperature value is higher than the nominal core temperature value, the controller will switch to the next step as soon as the actual core temperature is higher or equal to the nominal core temperature.

### **Negative core shut-down (cooling operation)**


If the pre-programmed nominal chamber temperature value is lower than the nominal core temperature value, the controller will switch into the next step. When the actual core temperature is smaller or equal to the nominal core temperature the controller will also switch into the next step.

## 5.5 Step time

The step time is the duration of a step.

### **Entering a step time**

While a step is running the step time is counted backwards. When the pre-programmed step time has elapsed, the controller will switch into the next step.


<b>Be aware</b>	
	<b>No pre-set step time:</b>
	<p>If you have not entered a step time, time will be counted forward while the step is running. <i>(in this way you always know how long the step has been in operation).</i></p> <p>A maximum value of "99:59" (hours : minutes) can be displayed. If this value is exceeded, only the colon between hours : minutes flashes.</p>

## 5.6 Optional nominal values


A service technician can make further nominal values available by changing the configuration of the controller. The relevance of these nominal values can vary, this is why your service technician should explain them to you. The following description is just a list of possible applications.

### 5.6.1 Delta temperature (Delta-T process)

Cooking with the Delta-T process (Delta temperature control) allows you to heat the product gently and evenly. When using this process the chamber temperature is always kept higher, by the nominal Delta value, than the actual core of the product. This means the temperature difference between the surface and the core of the product always remains constant. The pre-set nominal chamber value is used as upper limit value for chamber temperature control. A lower nominal Delta value will prolong the duration of the cooking process and the heating process is gentler, a higher nominal Delta value will speed up the cooking process.

<b>Hint</b>	
	Apart from a nominal temperature value and a nominal Delta value, you can also enter a nominal core value, which will be used as core shut-down condition for the step.

### 5.6.2 FC – value

<b>Hint</b>	
	Bacteria have to be killed through pasteurisation (FC70)/sterilisation(FC121). How thoroughly the bacteria are killed depends on the temperature and the length of time this temperature is maintained. A mathematical formula can be applied to this process. The degree to which the bacteria are killed is called FC value.

#### The process:

It is the aim of **sterilisation** to kill all the bacteria and their spores. How thoroughly the bacteria are killed depends on the temperature and the length of time this temperature is maintained. A mathematical formula can be applied to this process.

$$F = \sum \left( \frac{10^{\left( \frac{(\text{core temperature}) - T_{ref}(\text{referencetemperature})}{z\text{-Value}} \right)}}{\left( \frac{60}{\text{Samplingrate}} \right)} \right)$$

The degree to which the bacteria are killed is called F-value.

For meat cans F-value 1 means the bacteria extermination which is achieved at a core temperature of 121,1°C, when maintained for one minute. How thoroughly the bacteria are killed also depends on the acidity of the conserved product. Acidic conserves, fruit juices, pickled gherkins etc have a higher killing rate and therefore a different FC value table than normal meat conserves with a PH value between 5 and 7.


In order to avoid confusion, two further specifications can be added to the F-value, e.g. FC 121-10 (z-value), this means that at a core temperature of 121,1°C and a time of one minute, the F-value = 1. If the temperature is increased by 10°C, the F-value increases 10-fold.


**Example FC-value 121:**

$$FC_{121} = 10^{\left(\frac{T(\text{coretemperature}) - 121.1^{\circ}\text{C}}{10}\right)}$$

**Example FC-value 70:**


$$FC_{70} = 10^{\left(\frac{T(\text{coretemperature}) - 70^{\circ}\text{C}}{10}\right)}$$

Hint	
	<p>Depending on the setting, the nominal FC-value is shown as displayed below.</p> <ul style="list-style-type: none"> <li>▪ <b>FC70</b> (pasteurisation), see example FC-value 70</li> <li>▪ <b>FC121</b>(sterilisation), see example FC-value 121.</li> <li>▪ <b>FC-UD</b>, user defined settings</li> </ul>

Be aware	
	<p><b>Shut-down condition:</b></p> <p>When the pre-programmed FC-value has been reached, the controller will automatically switch into the next step or terminate the program, respectively.</p>


### 5.6.3 Aggregate modules (*direct relay actuation*)

Up to 3 aggregate modules can be pre-programmed., thereby influencing the switching behaviour of specific relays and the connected hardware (aggregates). The configuration determines which nominal values may be entered and they can vary depending on the system. For example an aggregate can be simply switched on or off, or the interval time of a clocking relay can be changed.

 Item 7.1.4 Optional nominal values, p.19

The names of the aggregate modules in standby, operating and programming mode are generated from the relay names and shown in the display.

Actual interval times for the aggregate modules are shown during operation:

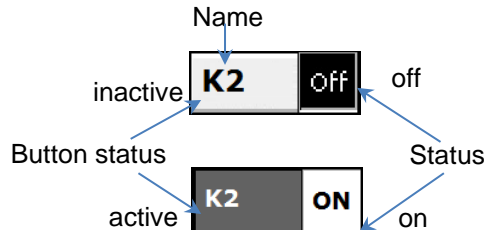


The display shows the following information from top to bottom:

- K2 off ← Actual status
- 05:40 ← Actual value 2
- AM2 off: 36:05 ← Nominal value 2
- 00:00 ← Step time
- Time: 36:05 ← Nominal value step time
- K1 K2 K3

Depending on the switching behaviour that was pre-programmed by the service technician, different nominal values are available to the operator.  
During operation the current actual value and the current nominal value are shown. If there is a pre-set switch-on and switch-off interval for an aggregate module, they will be shown alternately in the actual value display.

The status of the aggregate module button (*without deay / immed.*) is shown on the button.



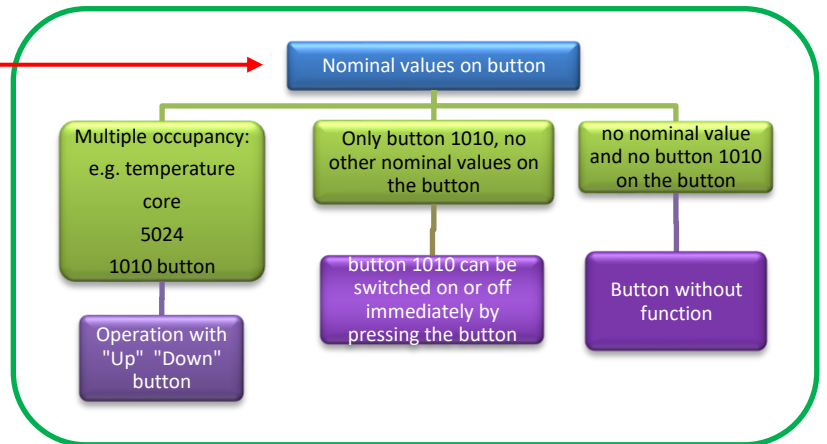
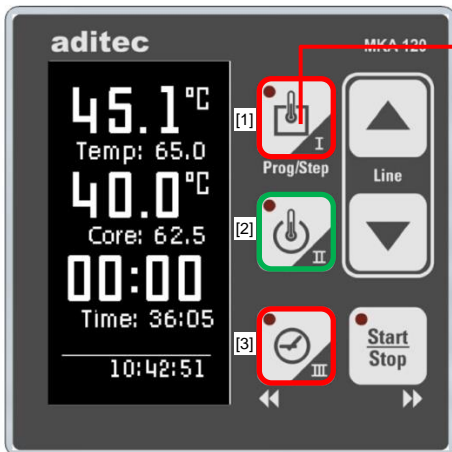
When a button is focused, the corresponding LED in the button flashes and a frame around the nominal state of the button is displayed (flashing).








Button focused with nominal state "OFF" and actual state (relay) "OFF"




Button focused with nominal state "ON" and actual state (relay) "ON"




**Keys with red borders have limited functions:**

	<p>Button can only be operated with the  (activated) or  (deactivated) buttons, as there is always a nominal value ("nominal time") on this key.</p>
	<p>If the button is configured as "TIP" mode and programmes are enabled, the state can only be changed with the  button.</p>


	<p><b>Be aware</b> If a nominal value is changed during operation via VisuNet, the display will be updated. (reset).</p>
---	--

### 5.6.4 Optionale control loops

Up to 3 optional regulator can be programmed. The configuration determines which nominal values may be entered and they can vary depending on the system. In this way the end user has the option of programming the nominal values of these regulators in the different program steps.

	<b>Be aware</b>
	The configuration of the individual regulators depends on the significance of the nominal values that are entered.

If additional control loops or additional sensors have been configured for the process that is currently in operation, their current temperature values (*actual values*) will be displayed.

 Item 7.1.4 Optional nominal values, p.19

## 5.7 Shut-down condition


As soon as at least one of the shut-down conditions has been fulfilled, the program step will end.. If a nominal value has not been pre-programmed (*OFF*) the related switch-off condition is also de-activated.

**Shut-down conditions are:**

- Nominal step time has elapsed and has reached 00.00
- Nominal core value has been reached
- Negative core shut-down (*cooling, e.g. shower*)
- Nominal FC-value has been reached

**Unplanned shut-down if:**

- „Stop“ button is pressed which leads to a program termination
- There is a temperature sensor fault which always leads to a program termination
- There is a core sensor fault, program termination only when a nominal value has been pre-programmed

	<b>Be aware</b>
	An empty ( <i>not valid</i> ) program step will be immediately terminated or not even started. A program step is considered valid when a process has been pre-programmed.

## 5.8 Negative core shut-down (*Shower/Cooling*)

In order to pre-program a **negative core shut-down** the nominal temperature value you enter has to be lower than the nominal core temperature value.

The program step will end when the actual core temperature falls below the nominal core temperature. If an operating time has also been entered, the program step will end when the operating time has run out **or** when the actual core temperature falls below the nominal core temperature. This means the program step will end when at least one of the shut-down conditions has been fulfilled.

## 5.9 Pre-heating function


The pre-heating function has an influence on how the step time is counted while a program is running. When this feature is activated, the controller only starts counting the step time when the nominal chamber temperature has been reached **for the first time**. („Act. temp“ is higher than nominal value „Temp min“).

There are two possible settings:

- 1) The program which is currently in operation is not interrupted and the step time counter starts automatically.



- 2) The program is paused and the display will show the message „Temperature reached!“, the „Start/Stop“ button will be flashing. The program will only be resumed when the „Start/Stop“ button is pressed and the step time counter will then start.

	<b>Hint</b>
<b>This function is pre-defined by your service technician!</b>	

## 5.10 Working with single step control

(V20.11)

The controller can be configured to pause at the end of every step. The message „Stop: one step control active“ will be shown and the signal relay will be energised for a pre-programmable time interval



„Yes“, controller will switch into the next step (if one exists).  
„No“, message will be hidden, operating screen is shown:

There are 4 options of how to proceed:

1. The program can be switched into the next step manually by the operator who can select and enter a new step number.
2. The nominal value which triggered the end of the step, e.g. the step time, can be changed and when you press the „Start/Stop button“ the controller will repeat the paused step.
3. Change nominal value „Single step control“ to „OFF“ then press the „Start/Stop button“ and the controller will continue the program with the next step. (if one is pre-programmed).
4. Press and hold the „Start/Stop button, which will terminate the program immediately.

## 5.11 Key lock

By locking the keypad, the device is protected against accidental entries.


To activate or deactivate the key lock, a combination of two keys must be pressed for about 3 seconds.



When the key lock is activated, the text "KEYLOCK!!!" appears on the display for about 3 seconds.


If you press a key while the key lock is active, the text "KEYLOCK!!!" is also displayed.

If the key lock is deactivated, the text "KEY UNLOCK!" appears on the display for approx. 3 seconds. The controller can be operated normally.

	<b>Hint</b>
After a power failure of the control unit, the key lock remains active.	

## 6 Standby

As soon as the controller is connected to a power source it will automatically boot up. This can take up to 1 minute.

<b>Be aware</b>	
	Please do not use pointy objects to operate the controller (e.g. pointed fingernails, ball points sharpened pencils or screw drivers). Only use blunt, soft objects, as e.g. your finger tips or a rubber or similar objects.

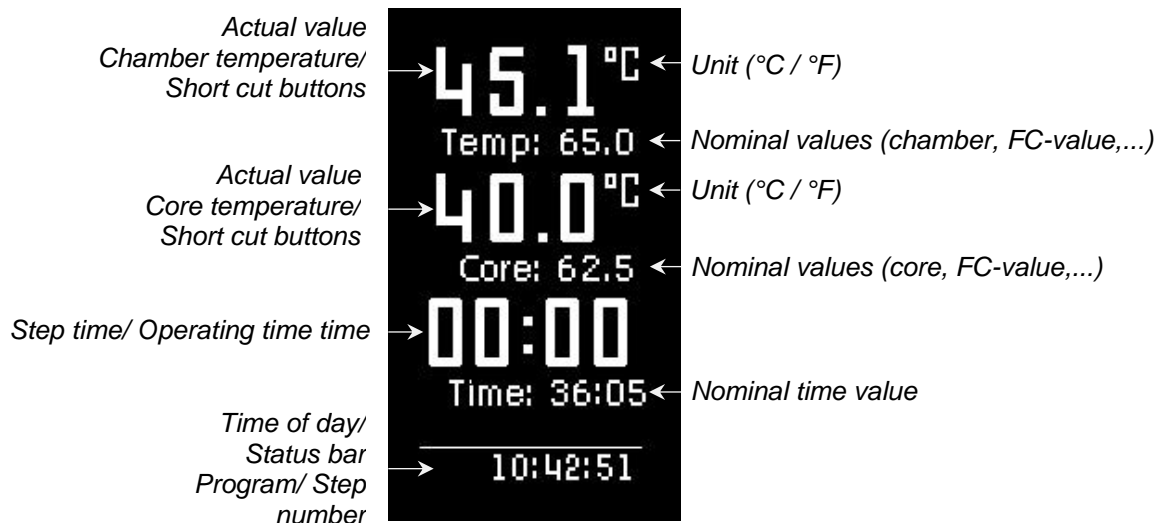


Figure 7: Standby

In the standby mask the current actual and nominal values are shown as well as the current program and step numbers.


Program and step are displayed in standby and operation.

e. g.:

**Operating mode - program number: program name - step number: process name**

Standby – P01:P1 – S01: Operation

Operation – P02:P2 – S03: Operation

<b>Hint</b>	
	Use the „Line“ button to skip between the program and step display.




<b>Hint</b>	
	During a data transfer between the PC and the controller the standby mask is hidden and an information page is shown.



Figure 8: Data Update

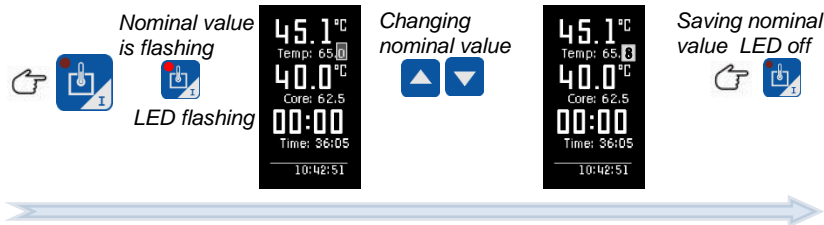
<b>Hint</b>	
	Press any button, to leave standby. By pressing and holding the „Start“ button you can always return to standby. <i>(When the system is not in operation).</i>

## 7 Program setup

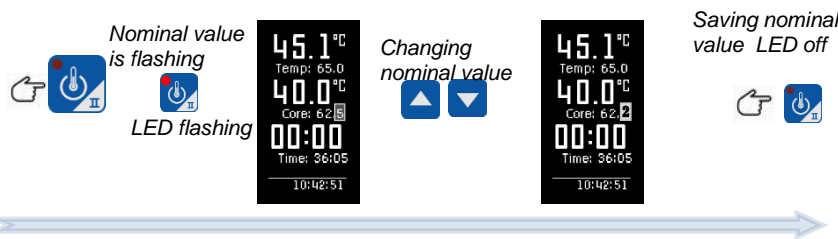
<b>Be aware</b>	
	The number of programs available may vary depending on the type of system you have got and the application. You can only access programming mode when the pre-set number of programs is greater than 0 <i>(please ask your service technician)</i> . If the number of program is set to 0 only one program (manual program) is available, you can set up this program from standby.

### 7.1 Program setup (Standby)

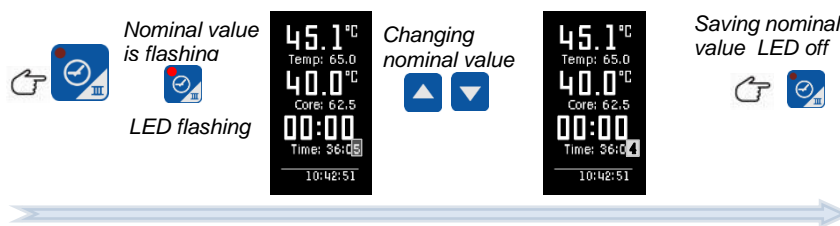
#### 7.1.1 Entering a temperature




#### 7.1.2 Entering a core temperature

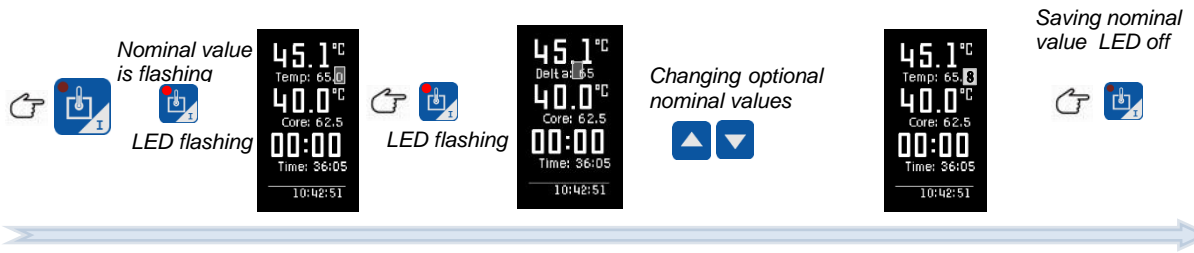


#### 7.1.3 Entering an operating time



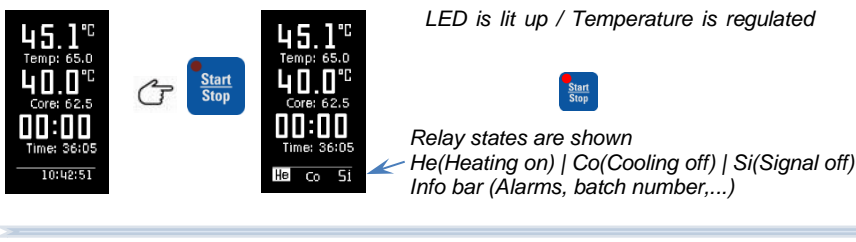
#### 7.1.4 Optional nominal values

<b>Be aware</b>	
	Depending on the system and the application, nominal values can be configured in different ways for individual processes. This means that you may find that not all the nominal values described here are available in your controller <i>(it depends on your specific configuration)</i> .

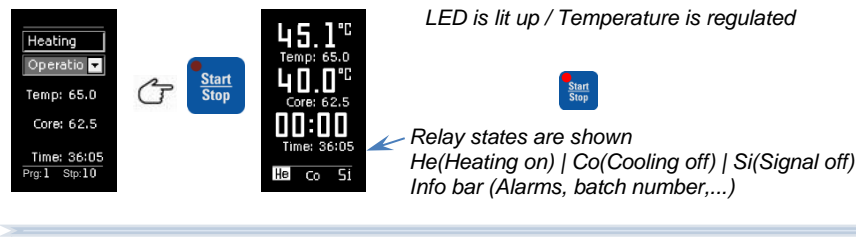


## 7.2 Program start

### 7.2.1 Starting from standby



### 7.2.2 Starting from programming mode



### 7.2.3 Starting a program with a batch number

Once you have selected a program and have entered the relevant nominal values, the program can be started with the „Start/Stop“ button.  
If the „Batch no.“ function is enabled, the controller is now going to ask for a batch description.

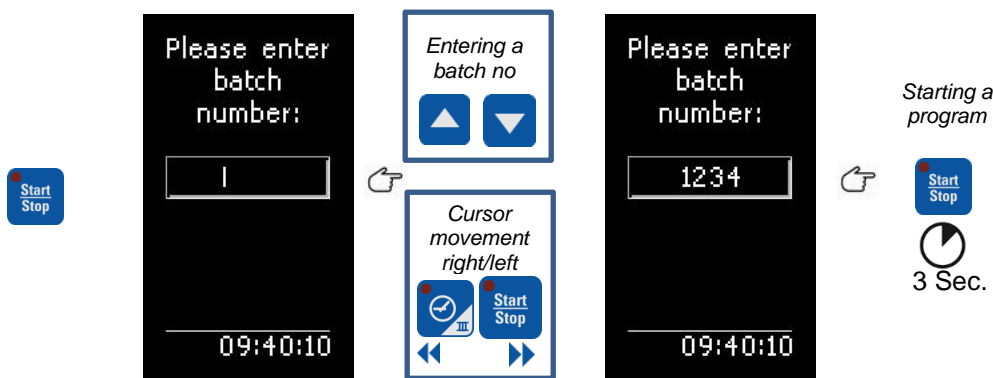
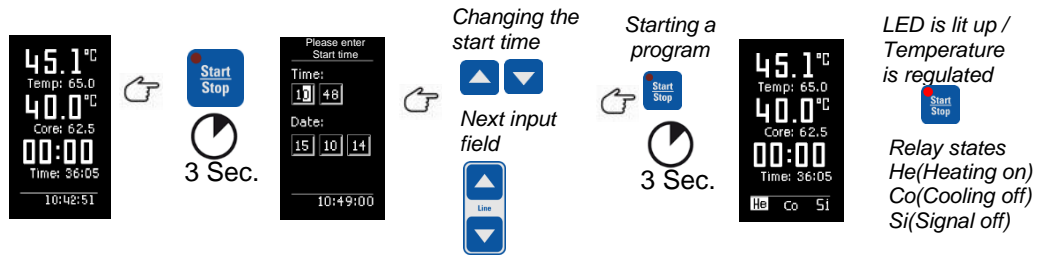


Figure 9: Entering a batch number

Hint	
	A batch number <b>has to be</b> entered when this feature has been enabled or the program <b>cannot</b> be started. The batch description can consist of up to 10 characters. By pressing the „Line“ button for about 3 seconds you can terminate the starting process.

### 7.2.4 Starting a program with starting time



**Hint**

While the waiting time interval is running the LED in the „Start/Stop“ button will be flashing. If you press this button, waiting mode will be terminated and the controller will return to standby mode.

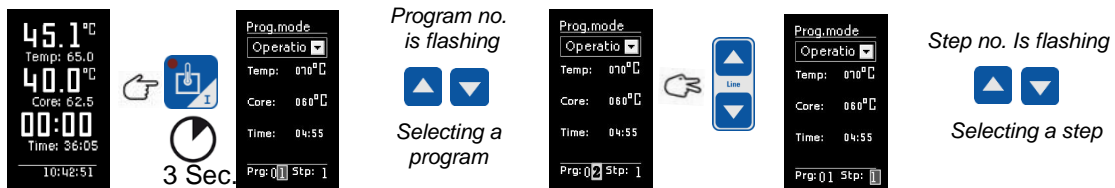
By pressing the „Line“ button for about 3 seconds, the starting process can be terminated..

### 7.3 Programming mode

**Be aware**


Access to programming mode is only possible when the pre-set number of programs is higher than 0 (please ask your service technician).

#### 7.3.1 Selecting a program step



From V20.12:

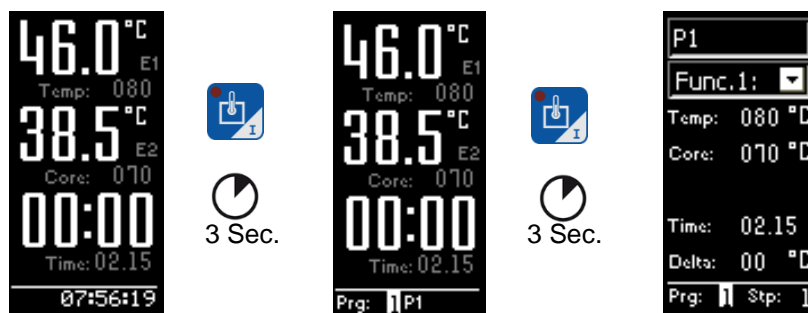
Press and hold the Temp. (Prog.) function key  to activate the program selection in the status line, after which the program can be changed.

If you are in the program selection and press the Temp. (Prog.) key  again, the programming mode is started.

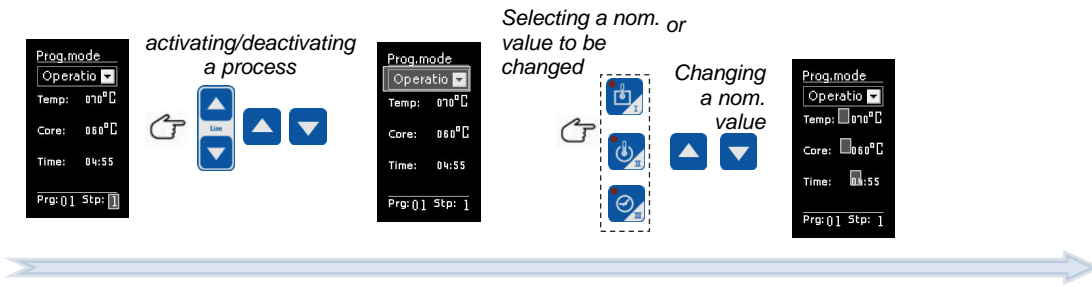



**Be aware**

In Code 2803 (Profile→Status bar) must be selected Prg.no. Otherwise, pressing the key for a long time will immediately call up the programming mode.




### 7.3.2 Changing nominal values within a step



	<b>Hint</b>
Only nominal values that have been enabled in the configuration can be entered/ changed here.	


### 7.3.3 Terminating programming mode

Press the  button for about 3 seconds and programming mode will be terminated.


## 7.4 Linking programs

If the "Linking programs" function has been programmed by the service technician, it is possible to link several programmes. If the last program step in a program has been configured and step 1 of the following program has also been configured both programs will automatically be linked.

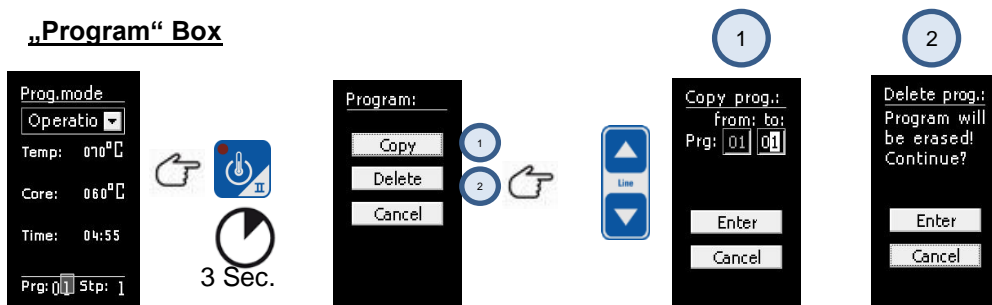
If the last step of a program is not configured, the controller will end the program after the last pre-programmed step has finished.

	<b>Hint</b>
The number programs, steps and program linking can be pre-programmed by the service technician to suit your requirements. ( <i>Service / Program, Number of steps</i> )	

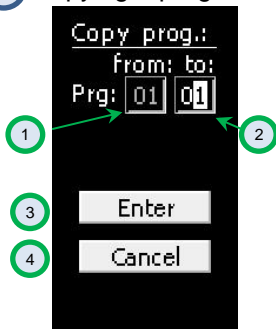
## 7.5 Copying, deleting and inserting programs

	<b>Be aware</b>
Access is only possible when the pre-set number of programs is higher than 0 ( <i>please ask your service technician</i> ).	

### „Program“ Box



1 Copying a program:

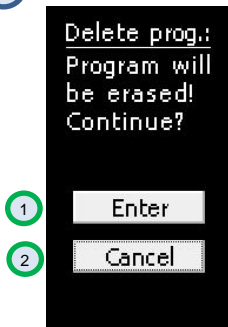


The program to be copied is shown in box 1

Select the program number you want to copy 2

Confirm your entry by pressing Enter (box 3) or cancel by pressing Cancel (box 4).

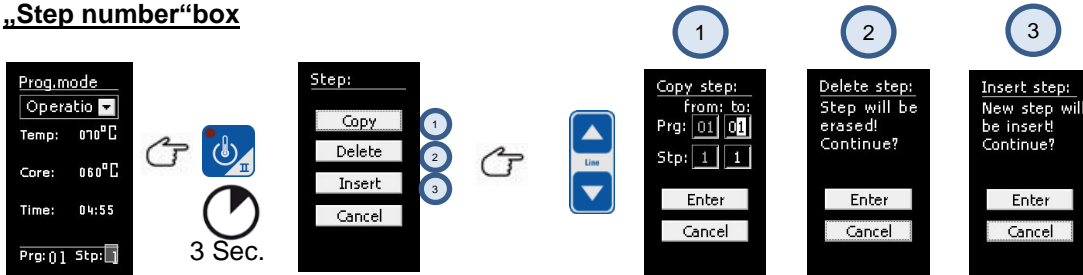
2 Deleting a program



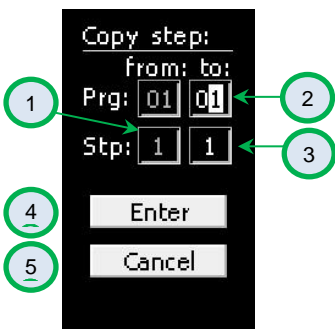
Deleting a previously selected program.

Confirm your entry by pressing Enter (box 1) or cancel by pressing Cancel (box 2).

„Step number“ box



Copying a step:



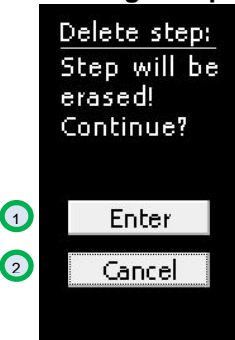
The step to be copied is shown in box 1.

Select the program number you want to copy (box 2).

Select the step number you want to copy (Feld 3).

Confirm your entry by pressing Enter (box 4) or cancel by pressing Cancel (box 5).

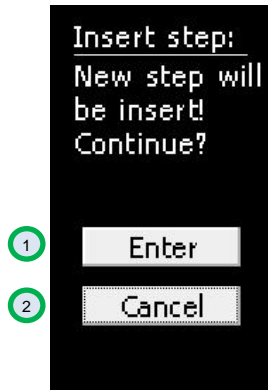
Deleting a step



Deleting a previously selected step.


Confirm your entry by pressing Enter (box 1) or cancel by pressing Cancel (box 2).

### Inserting a step



Inserting the previously selected step.

Confirm your entry by pressing Enter (box ①) or cancel by pressing Cancel (box ②).

Be aware	
	When you press the „Enter“ button the step will be automatically copied.
	A step which already exists in this position will be overwritten!
	Deleting or inserting steps can lead to an unintentional linking of programs or the breaking up of a previous program link!

## 7.6 Program end

At the end of a program the controller will change from operating mode into „Program end“ mode. The „Start/Stop“ LED will be flashing.

During this time you can skip between nominal values. This allows you to display e.g. the F-value after the end of the program.

Press the „Start/Stop“ button to change into standby mode.

## 8 Operating mode display and settings

The controller is in operation, this means a program is running.

The LED in the „Start/Stop“ button is lit. On the info bar the states of the relays are shown <sup>1</sup>.

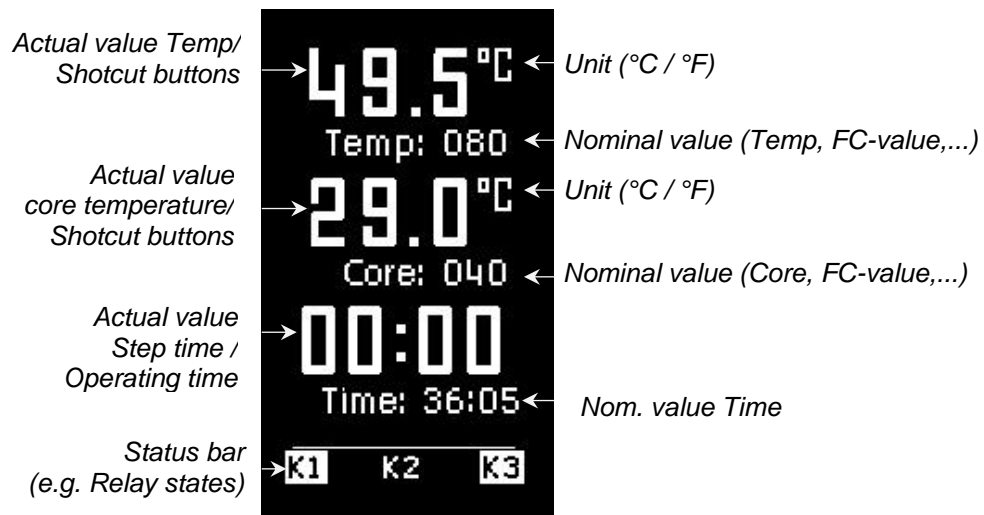


Figure 10: Operating mode


### 8.1 Nominal values

A service technician can make nominal values available by changing the configuration of the controller.. The relevance of these nominal values can vary, this is why your service technician should explain them to you.

<sup>1</sup> Depends on whether the setting has been enabled under Item 9.2 Status.

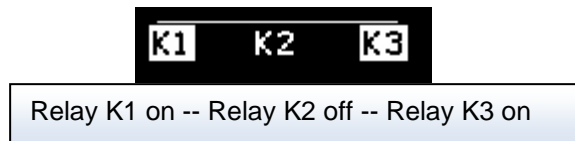


If additional nominal values or aggregate buttons (e.g. FC-value, Delta temperature, optional regulators) have been enabled, the relevant nominal and actual values are displayed in operating mode and can be changed transiently.

	<b>Be aware</b>
	If you change a nominal value while a step is running, then this value applies only for the duration of the current step. The value is not saved and is only valid until the step ends. If you want to save nominal values permanently you have to change them in „Programming mode“ p.21.


### 8.1.1 Aggregate and relay display

On the status bar all relays and their states are shown.

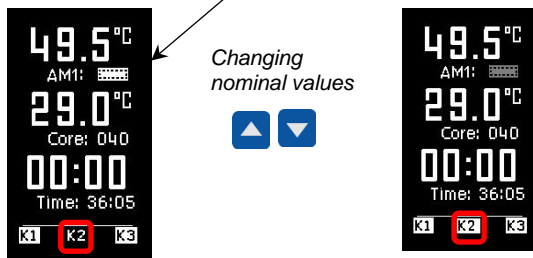


### 8.1.2 Aggregate modules

If aggregate modules have been enabled, you can influence them. Types of modules available, options for entering values and the unit scale in which these values are entered, all depend on the configuration and are determined by the manufacturer. Please ask your service technician for further information.

	<b>Be aware</b>
	These changes are only valid in the current step. They are not permanently saved and only apply until the end of the step!

Aggregate module (e.g. as a button for actuating relay K2)




### 8.1.3 Optional control loops

The nominal values of the optional control loops (if configured by a service technician) can be pre-set individually in the program steps.

If additional control loops or additional sensors have been configured for the process that is currently in operation, they will be displayed together with their current temperature values (actual values).

## 8.2 Switching into a different step


In order to switch into a different step, two conditions must be fulfilled in the configuration: There must be at least one step activated in a program under number of steps. (Please ask your service technician about this.)

Prog.no must be enabled on the status bar, this ensures that the information for the current program and step are shown during operation. 

(Setting up the status bar, please see next item 8.3)

If the program and step number are displayed during operation, you can use the “Line” button to select the step number. Once you have selected a step number (Stp: 1 is flashing), you can use the arrow buttons „up“ or „down“ to select the required step number.




When you have selected a step number, press the „Line“ button again to start this step. The step will be started immediately after you have pressed the „Line“ button.

	<b>Hint</b>
	If you do not want the controller to skip into the next step, press either shortcut buttons I, II or III.

### 8.3 Status bar

Different fixed messages, relay states, batch number, program/step number or the current time of day can all be shown on the status bar.


Use the arrow button to make changes to the status bar display.

	<b>Hint</b>
	The   buttons are used to skip between the different lines on the status bar. You can only skip between lines when nominal values are not focussed.




#### 8.3.1 Messages (system status messages)

Here all the messages that have been configured for this process or program are shown, together with their current status.

	<b>Hint</b>
	Messages are for information only and are <b>not</b> sent to the „VisuNet“ recording program.

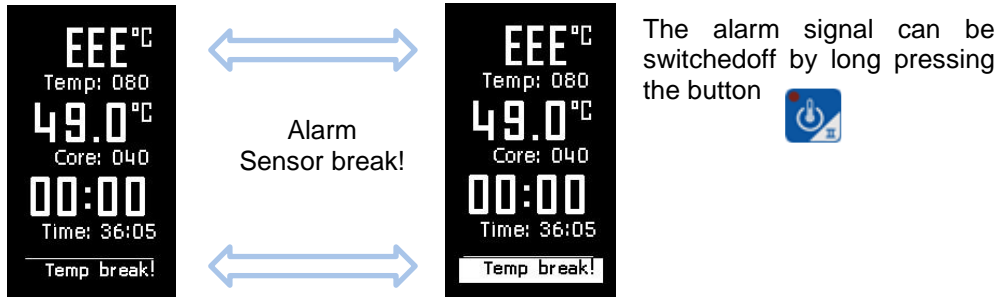
#### 8.3.2 Alarms


Here all the alarm signals that have been configured for this process or program are shown, together with their current status.

	<b>Hint</b>
	Alarms are critical operating states, which are sent to the „VisuNet“ recording program and logged.

## 8.4 Alarm signal

If an alarm has occurred, for example through a sensor break or a digital input (alarm), the box „Step“ will be flashing alternately (*light and dark*). On the status bar the alarm and its cause (e.g. *temperature sensor break*) will be shown.





	<b>Be aware</b>
	<p>Temperature sensor break, program is terminated.</p> <p>Core sensor break, program is terminated only when nominal values are pre-programmed.</p>



### 8.4.1 Enabling signal relays

This setting allows you to determine the time interval during which a signal relay may be switched on. If an interval time (greater than ZERO) has been entered, the controller can only switch on the signal relay during this time interval. In addition you can pre-program whether you want to be asked about enabling the signal at the start of every program.

#### Factory setting:

Signal enable: "Yes"  
Time from: 00:00 to 00:00 (*means: Signal can always be activated*)  
Signal can be programmed before the start of a program (Prg.sig.start): "No".

Code 5037	← Code number
Signal enable	
No 	← Activate signal
Signal time:	
from 08 10	← Signal time from:
until 15 10	← Signal time to:
Prg.sig.start:	
No 	← Signal programmable before the start of a program

	<b>Be aware</b>
	<ul style="list-style-type: none"> <li>▪ If you select "No" for "Signal enable" the controller <b>will not activate</b> the signal.</li> <li>▪ If you select "Yes" for „ Program signal before program start “ (Prg.sig.start), you can activate (LED in the button will light up) or de-activate (LED in the button be off) the signal before the start of a program (standby mode) by pressing the  button for 3 sec.</li> </ul>

**Settings during operation:**

If an alarm has occurred (signal relay has been energised), it can be acknowledged by pressing the button for 3 sec.



If no alarm has occurred, the signal relay can be activated or de-activated during operation by pressing the button for 3 sec.



Press the button




for 3 sec. or press „Line“





to leave the setting.

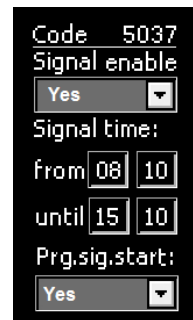



**How to activate/de-activate the signal:**

If the alarm signal has been enabled in the configuration and the signal is shown as pre-programmable, you can press the  button for 3 sec to deactivate the signal for the program you are about to start.

The LED in the button  will show the status of the button (LED is lit – signal is activated).

If an alarm signal occurs in the currently running program, it can be acknowledged by pressing .



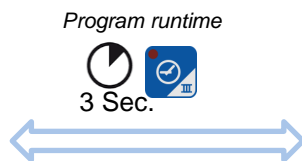
	<b>Be aware</b>
	If "Yes" has been set under "Signal before programme programmable" (Prg.sig.start), it is not possible to switch between programme running time - programme remaining time during operation.

**8.5 Program runtime, operating time display in operating mode**

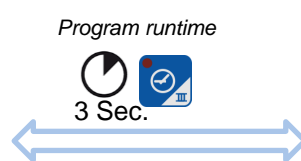
Press the "Time" button for about. 3 seconds to display the program runtime and /or the remaining program runtime while a program is in operation.



**Remaining step time:** runtime of a program



**Program runtime:** Duration of the current program (goes beyond individual steps)



**Remaining program runtime:** time interval that remains until the end of a program (goes beyond individual steps).

**Remaining program runtime: (from V20.11)**

The **remaining program runtime** is also calculated when steps have been programmed without a step time. When a step without step runtime is in operation the remaining step time cannot be counted down. In these steps the colon in the remaining program runtime does not flash.

## 9 Profile settings

Under profiles all settings are compiled for the operator.

You do not need a password to access profiles. The settings under this code have no effect on the controller settings.

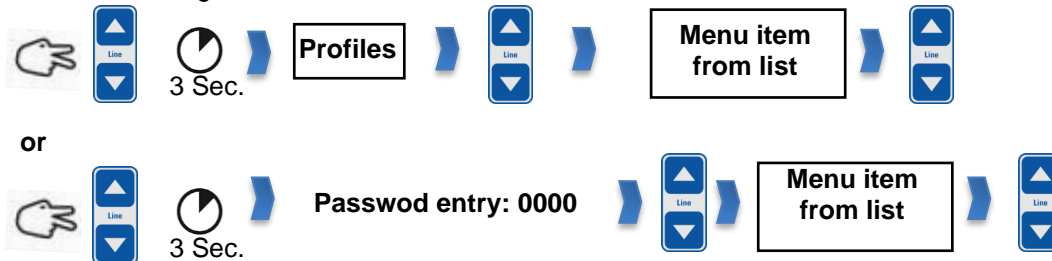


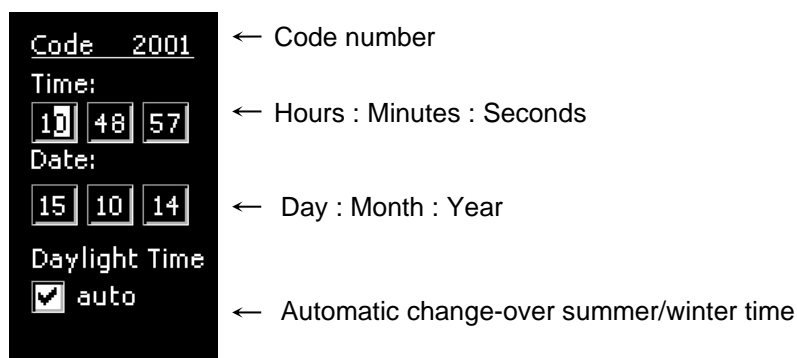
Figure 11: Profiles

### 9.1 Setting date and time of day



Setting the current date and time.

 **Factory setting:** Central European Time.




If you want to change the date and/or the time of day, select the relevant box (*press ,Line' button to skip between the edit boxes*) and use the ,up' or ,down' buttons to make changes to the date or time. When you leave the code (*see 4.7 Leaving code setting*) the entered changes will be saved.

Automatic change-over summer/winter time

The automatic change-over summer/winter time is active when the check box „Daylight Time“ has been activated.

This means the clock is moved forward one hour at 2:00a.m. on the last Sunday in March and moved back one hour at 3a.m. on the last Sunday in October:

<b>Hint</b>	
	<ul style="list-style-type: none"> <li>- The change-over of the clock can only occur when the controller is in standby mode</li> <li>- The day of the week (last Sunday) is automatically calculated from the date.</li> </ul>


**9.2 Status bar display (status bar)**



Changing the display settings of the status bar in the operation window.

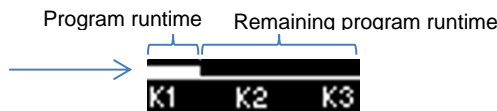
Code 2803 <input checked="" type="checkbox"/> Relay <input type="checkbox"/> DI <input type="checkbox"/> Prog.no. <input type="checkbox"/> Batch no. <input type="checkbox"/> Prog.bar <input checked="" type="checkbox"/> Clock	← Code number  } Show the value on the status bar
--	---

When a value has been activated you can, **during operation**, use the arrow buttons „up“ or „down“ to skip between values on the status bar.

	<b>Be aware</b>
Skipping between values on the status bar is not possible while you are entering values.	

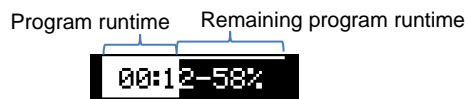
**Display of program progression: (from V20.11)**

The progression of the program will be shown on the status bar as a progression bar. The total program runtime or remaining program runtime ( total time of all program steps), respectively will be shown graphically.



**Display as a percentage (from V20.11)**

The remaining program runtime will be shown as time / percentage value of the total program runtime.



**Digital inputs (from V20.11)**

All sensors that have been configured as digital inputs together with their operating status will be shown on the status bar.

**D1: D1**   **D2**

Code 4400: Digital input D1, D2, configured  
-Digital input D1 closed  
-Digital input D2 open

**D1:**   **D2**

Code 4400: Digital input D2  
-Digital input D1 nonexistent  
-Digital input D2 open



**Factory setting:**

The following values are activated:

- Relay
- Clock (*current time*)

**9.3 Enabling a batch number**



Enabling batch number entry before every program start.

Code 5045 ← Code number


Batch No. enable:

No ↓ ← Enabling batch number

10:47:48 ← Current time of day



**Factory setting:** Batch number entry is disabled.

<b>Hint</b>
 <p>A batch number can have a maximum of 10 characters. You can enter a mixture of letters and numbers.</p>

**9.4 Enabling the VisuNet Program**


See *Enabling VisuNet-Program – Code 8305 (VisuNet)*

The visualisation program **aditec „VisuNet“** allows you to connect one or several controllers to a superordinate program surveillance system. This enables you to monitor and log temperature profiles and processes ensuring comprehensive quality control of the treated products in compliance with HACCP and IFS (ISO 9000). Please contact aditec or your service technician in order to enable this function.

## 9.5 Version number display



This code setting allows you to see the software version of the controller. You need the version number in case you have to contact the manufacturer.

<pre>Code 6789 V20.01 14.10.14 Ser.Nr.: D 130.116</pre> 	<p>← Code number</p> <p>Version and date of the controller</p> <p>Serial number of the controller</p> <p>← QR-Code*</p>	<p><b>Hint</b></p> <p>*QR-Code: Many mobile phones and PDAs have an integrated camera and Software that can recognise QR-codes. If you scan the code the aditec homepage can be opened. Here you will find the current user manual for „MKA120“.</p>
---	---	--



## 9.6 Sensor information



Information concerning sensor configuration is shown under code setting „ Sensor info“. This page is for information only and changes to the settings cannot be made on this page.

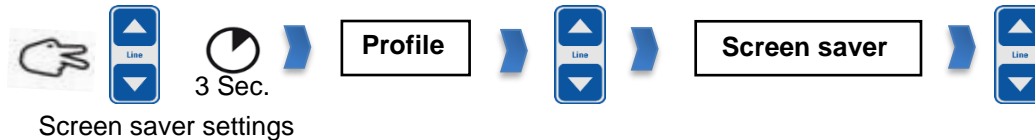
If several sensors are assigned to one measured variable, the lowest, highest and average values are used for the regulation process and are displayed. (*it depends on the configuration*) This means it is not always immediately obvious which measured value is used for regulation. You can look at the actual values of the sensors (*separately*) under code setting „Sensor info“.

<pre>Code 0035 E1: Temp Act: 21.6 °C Type: Pt100</pre> <hr/> <pre>E2: Core Act: 21.0 °C Type: Pt100</pre>	<p>← Code number</p> <p>Sensor information</p> <p>Sensor E1</p> <p>Sensor information</p> <p>Sensor E2</p>
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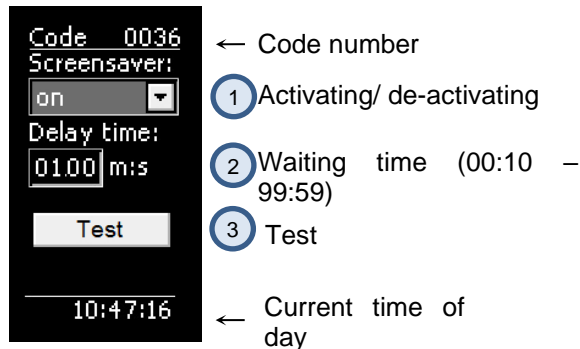
## 9.7 Screen saver

(from Version 20.05 onwards)



Screen saver settings

 **Factory setting:** Screen saver:ON  
Waiting time: 5 min



**Figure 12: Settings**

The screen saver will extend the life of your display:


- The brightness of the LEDs will diminish over time.
- The power consumption is reduced, because only certain pixels are activated.

The **screen saver** is activated after a pre-set waiting time interval, if none of the keys have been pressed during that time. It is terminated as soon as you press one of the keys/buttons.

- 1 Activating/de-activating the screen saver
- 2 Programmable waiting time interval for the activation of the screen saver. Entry range 00:10 bis 99:59 (*minutes : seconds*).
- 3 Testing the screen saver

## 10 Power failure

If a running program was interrupted by a power failure or because the appliance was switched off, the controller will automatically resume the interrupted program according to the configuration settings as soon as power is restored.

	<b>Be aware</b>
	<p>Your service technician can pre-program how the controller should react in case of a power failure, by making the relevant changes in the configuration.</p> <p><i>Resuming a program after a pre-programmed „Temperature difference“</i></p> <ul style="list-style-type: none"> <li>• „<b>always</b>“ resume after a power failure (factory setting)</li> <li>• „<b>never</b>“ resume after a power failure</li> </ul>

## 11 List of errors (possible problems)





Occurring problem	Possible cause	Possible action
Program does not start	Program is empty	Pre-program a process
	Pre-set start time has been entered („Start“ button is flashing)	Press the  „Start/Stop“button.
Program is terminated right after the start	Possible break in a temp., core or humidity sensor , display will show „EEE“ for sensor break or „--“ for sensor short circuit	Please check the three –core connection of the sensors (Jumper between terminals 2/3 and 5/6) Replace the faulty sensor or call your service technician. Afterwards the temperautre has to be checked. The <b>service technician</b> might have to readjust the controller.
Program is running fast through all the steps and ends	- the pre-set core temperature value is not reached- FC-value is not reached	Check the pre-programmed values of the program.
	Nominal core vlaue is higher than the pre-programmed nominal temperature value (negative core shut-down, core temperature is below the nominal temperature value)	 Page 19 „Nominal core temperature“
Running program switches automatically into the subsequent program	Program link is activated	Press the „Stop“ button  Page 22 „Linking programs“
Controller cannot be started	Disruption of the power supply	Take the controller off the power supply for at least a minute. Now switch the controller on again and try to operate it.
"Short circuit temp.sensor"	Temperature sensor defect <b>Running program is terminated</b>	Replace the sensor or assign a different sensor to the measured variable under Code 4400.
"Break temp. sensor"		
"Short circuit core sensor"	Core temperature sensor defect <b>Running program is terminated</b>	Replace sensor. If you want to continue using the appliance even without a core sensor, enter „00“ for the core and FC-value Replace the sensor or assign a different sensor to the measured variable under Code 4400.
"Break core sensor"		
"Sensor fault: opt. regulator x Short circuit/break"	Temperatur sensor of an optional regulator (1 bis 3) defect. <b>Additional regualtion is disabled.</b>	Replace sensor. In order to get rid of the error message, disable the sensor under Code 4400.
"Sensor fault: opt. regulator x Overheating!"	Temperature at the sensor of an optional regulator (1 bis 3) is higher than the maximum permissable temperature <b>Additional regualtion is disabled.</b>	If option "Enable = manually" is pre-programmed under Code 1024, you have to re-enable the regulator under Code 5678.

Table 4: List of errors

## 12 Connecting the controller to a PC


The controller is equipped with a Mini-USB interface for connection to a PC. This can only be used for programming, configuring and for updating firmware.

You will need an additional board for logging and to do remote maintenance (see item 12.1, p. 35)


	<b>Be aware</b>
	The mini-USB interface does not establish a network.

A connection to the PC has the following advantages:

- The controller can be **programmed and configured** comfortably via a PC

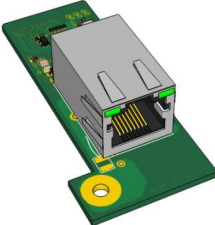
	<b>Hint</b>
	The required software will be supplied free of charge by aditec. Please ask for the aditec <b>service program!</b>


- Remote maintenance with the aditec service program
- Recording , documenting and archiving in compliance with HACCP with the aditec visualisation system **VisuNet**.
- The visualisation program **aditec VisuNet allows you to connect** the controllers to a superordinate surveillance system. This enables you to monitor and log temperature and humidity profiles of processes ensuring comprehensive quality control of the treated products in your plant (in compliance with ISO 9000)

	<b>Hint</b>
	Please ask aditec for the documents on the <b>VisuNet</b> program!

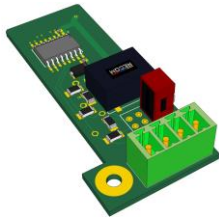
### 12.1 Connection cables, different types of connection

#### 12.1.1 Connection via an Ethernet interface

 <p><b>Figure 13:</b> <b>ZSL board</b></p>	<p>In order to connect the controller to a PC via an Ethernet interface you will need an Ethernet cable (<i>RJ45</i>).</p> <p>Furthermore the controller has to be fitted with a ZSL board (<i>expansion card Ethernet</i>) (see <i>Figure 13: ZSL</i>).</p>
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	<b>Hint</b>
	If required, please approach your service technician.

### 12.1.2 Connection via a RS485 interface



**Figure 14:**  
**ZS4 board**

In order to connect the controller to a PC via a RS485 interface you will need:

- a 3-core shielded cable
- a USB to RS485 converter (e.g.. *US-4561*)
- a ZS4 board (expansion card *RS485*, see *Figure 14*:
- ZS4)

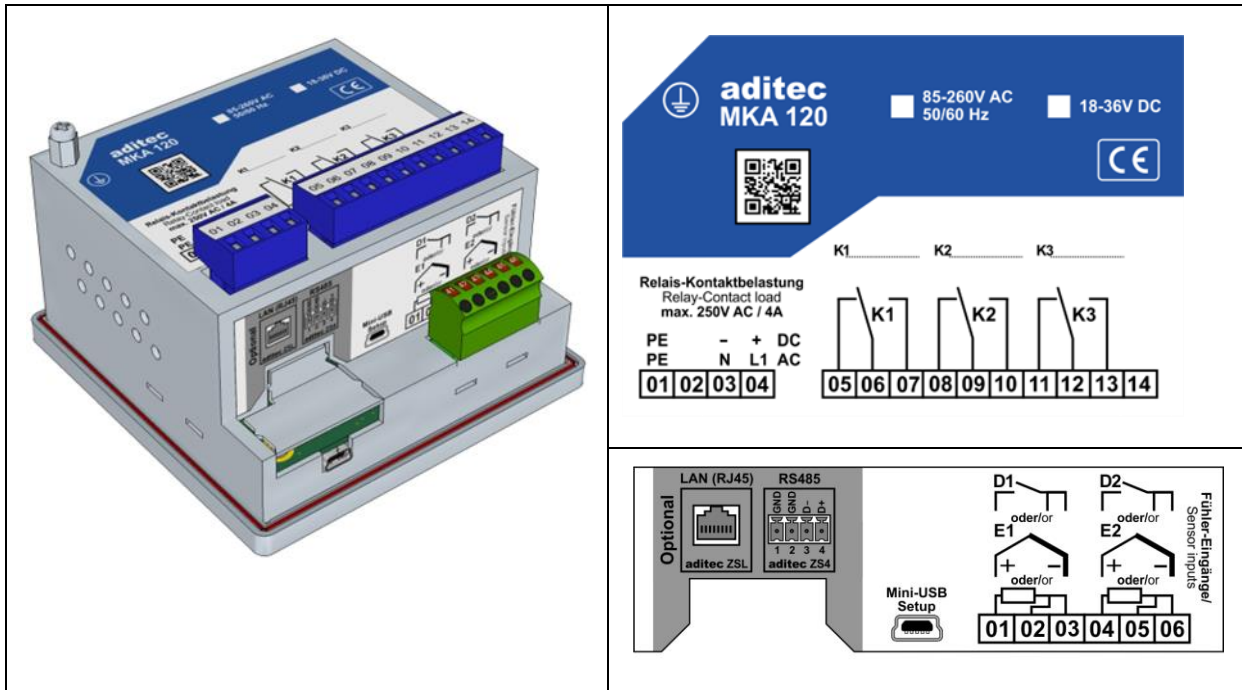
## 12.2 Enabling VisuNet-Program – Code 8305 (VisuNet)

In order to work with the visualisation program it has to be enabled. Further information is available from your service technician or from the company aditec.

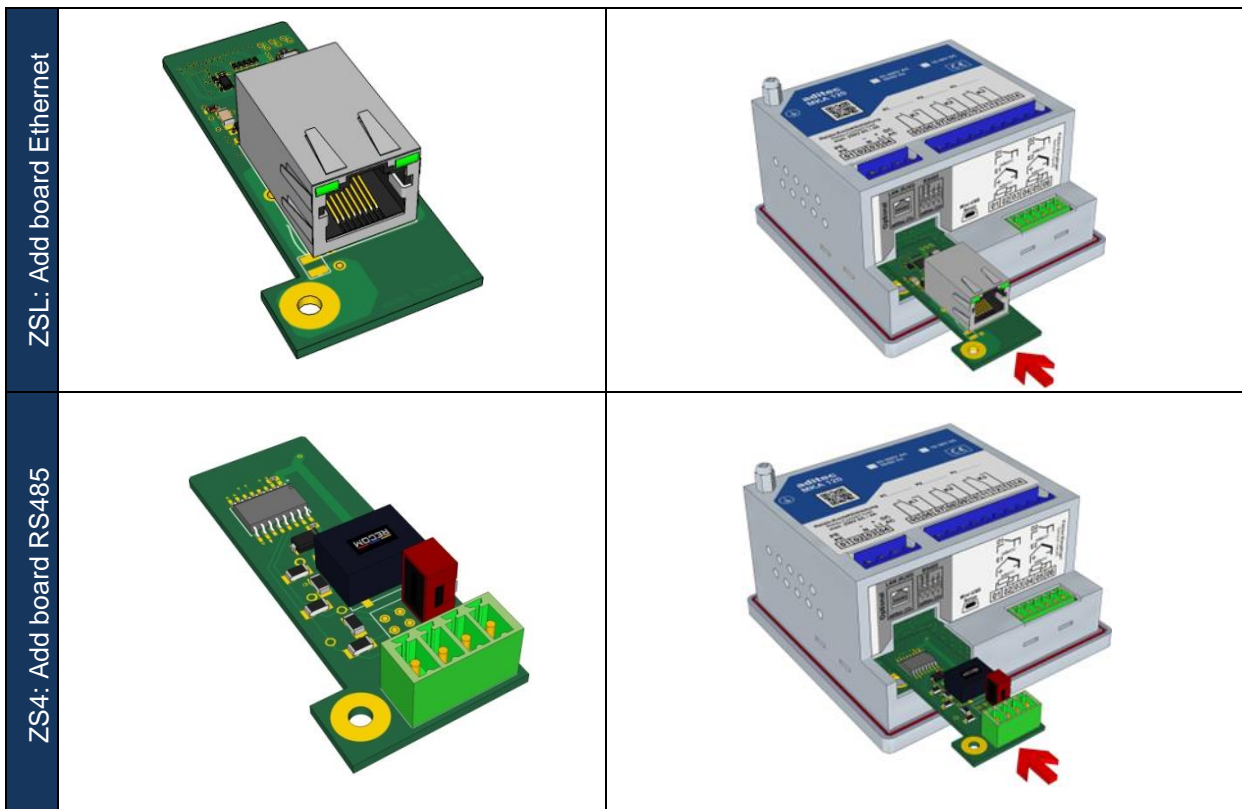
## 13 Technical data

See separate data sheet

## 14 Connection diagram



### 14.1 Expansion cards / Options



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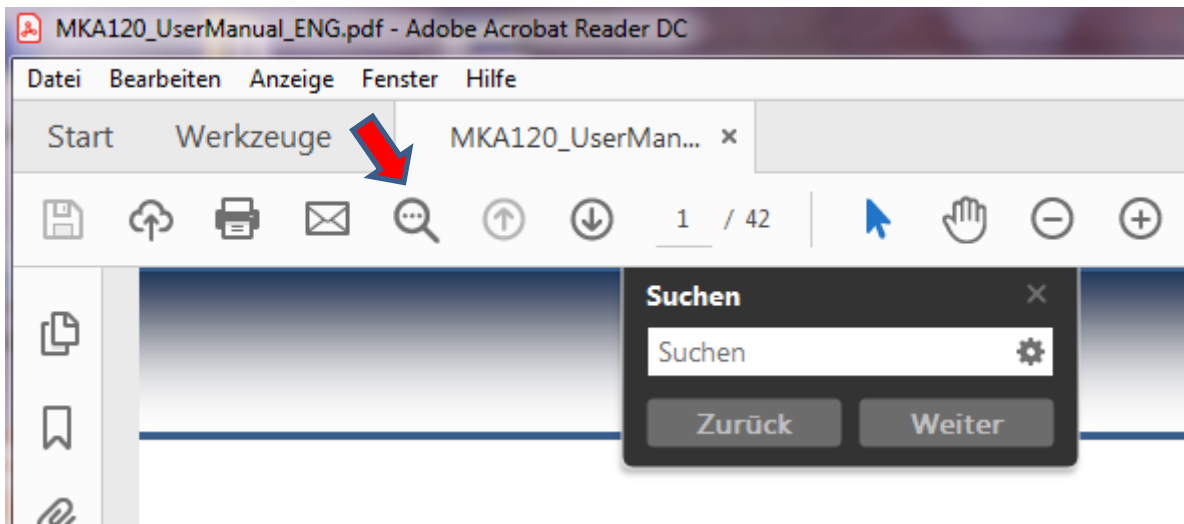
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	<p><b>Hint</b></p> <p>For further search terms not included in the index directory, please use the search function in Adobe Acrobat Reader.</p>
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## **16 Safety instructions**

To avoid any danger of electrocution, the housing must never be removed nor opened at the back. None of the parts inside can be serviced by the user himself. Leave the servicing to the experts! To avoid fire or electrocution this appliance must not be exposed to humidity or rain.

**1. Advice:** Read all safety instructions and all items in the user manual, before using the controller for the first time! Keep the safety instructions and the user manual in a safe place in case you need to refer back to them at a later date!

**2. Installation instructions:** The appliance should always be installed by authorized and experienced specialist. Please follow the specific safety instructions as well as the VDE guidelines during installation. The appliance should only be fitted in an approved and specifically designed waterproof switching cabinet (metal housing) and should only be used for the purpose it was designed for and within the limits of its technical data.

**We recommend that any down-streamed inductors (relays, contactors, signal transmitters, valves etc.) with RC elements should be checked for interference. These are available on the retail market (e.g. Siemens 3 RT1916, Klöckner-Moeller, etc.).**

**3. Analogue in- and outputs:** Do not apply separate source voltage to the in- and outputs (4-20mA / 0-10V and Pt100)

**4. Sensor leads as well as analogue in and outputs should be run separately from any voltage carrying leads, this also includes control wires carrying separate source voltage. It is vitally important that the sensor leads have a metal shielding and that this shielding is connected to the sensor housing itself.**

**5. Relay outputs:** The relay outputs are potential free and the maximum load of 250V AC and 4A must not be overshot.

**6. Water and humidity:** Never use the unprotected appliance near water, e.g. near a bath tub, water basin, sink, washing machine, a damp cellar or near a swimming pool. The appliance is only waterproof on the front (in compliance with IP65 or IP67). The back and side panels must not come into contact with water.

**7. Ventilation:** The appliance must have sufficient ventilation, the ventilation slits in the housing must never be covered up, or blocked by objects inserted into the slits.

**8. The effects of heat:** Keep the appliance away from heat sources, like radiators, heating conduits, ovens, and other elements that may radiate heat.

**9. Energy sources:** The appliance should only be connected to the power sources that are specified in the user manual or on the appliance housing itself.


**10. Cleaning:** Clean the display and the operator interface only with a damp, soft and clean cloth without any chemical and mechanical substances. Do not use sharp-edged tools or pointed objects or other mechanical aids.

**11. Appliance not in use:** When you know the appliance is not going to be used for a longer period of time, it should be disconnected from the mains.

**12. Contaminants:** You have to be extremely careful that neither liquids nor foreign objects can get into the appliance through the openings in the housing. If objects or liquids have contaminated the inside of the appliance, it has to be disconnected immediately and sent in to the manufacturer.

**13. Servicing after damage:** The appliance may only be serviced by a qualified specialist. The user should only do the servicing tasks he is meant to do according to the user manual. For servicing that exceeds his authority, a specialist should always be contacted.



Hint	
	<b>Never make any technical alterations to the appliances</b> , unless they were specifically approved by aditec GmbH. <b>Unauthorized alterations will invalidate your warranty.</b>

For enquiries, orders and repair enquiries, please contact us at the following address:

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