

memmert

AtmoCONTROL

SOFTWARE MANUAL



MADE IN GERMANY.

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We reserve the right to make changes

About this manual

Purpose and target group

This user manual describes the installation and use of the MEMMERT programming software AtmoCONTROL. It is intended for use by trained personnel of the operator, who have the task of programming/operating MEMMERT appliances.

If you intend to work with the software, please read this manual carefully before starting. Familiarise yourself with the software and simulate various tests before transferring programs to the appliance. Incorrect use could result in damage to the appliance and/or to the chamber load.

If there is something you do not understand, or certain information is missing, ask your superior or contact the manufacturer. Do not do anything without authorisation.

Other documents that have to be observed

Please also read the user manual for the respective appliance or appliances to be operated with AtmoCONTROL and familiarise yourself with it.

Storage and resale

This manual should always be kept in a place where those working with the software have access to it. It is the responsibility of the operator to ensure that persons who work with or will work with the software are informed as to the whereabouts of this user manual. We recommend that it is always stored in a protected location close to the computer on which the software is installed. Make sure that the manual is not damaged by heat or damp.

Update

The current version of AtmoCONTROL and this manual are available for download at www.memmert.com/de/service/downloads/software/.

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1. Introduction

1.1 Description

AtmoCONTROL is a software for programming and logging MEMMERT appliances of the generation 2012 of appliances (from October 2012) with Ethernet and/or USB interface and corresponding equipment.

With AtmoCONTROL, you can

- ▶ graphically create, modify and save programs on your computer with various parameters and transfer these to the appliance (description from page 13);
- ▶ read out, organise and document the internal log memory of appliances (description from page 29);
- ▶ configure user authorisations on USER ID USB sticks, with which the manual adjustment of individual or all parameters on the appliance can be prevented (description from page 37).

1.2 Supported MEMMERT appliances and parameters

Using AtmoCONTROL, programs can be created and transferred, protocols read out and USER IDs configured for the following appliances of the generation 2012 of appliances (from October 2012):

Appliance	Programmable main parameter								Inert gas
	Temperature	Humidity	Pressure	CO ₂	O ₂	Fan speed	Air flap	Light*	
UNplus	✓	–	–	–	–	–	✓	✓	–
UFplus	✓	–	–	–	–	✓	✓	✓	–
INplus	✓	–	–	–	–	–	✓	✓	–
IFplus	✓	–	–	–	–	✓	✓	✓	–
UFTS	✓	–	–	–	–	–	✓	–	–
HPP	✓	✓	–	–	–	–	–	✓	–
IPPplus	✓	–	–	–	–	–	–	✓	–
ICP _(eco)	✓	–	–	–	–	✓	–	✓	–
ICH _(eco)	✓	✓	–	✓*	–	✓	–	✓	–
ICO	✓	✓*	–	✓	✓*	–	–	–	–
HCP	✓	✓	–	–	–	–	–	–	–
VO	✓	–	✓	–	–	–	–	–	✓

* additional option

For all other MEMMERT appliances of the generation 2012 of appliances, protocols can only be read out using AtmoCONTROL via Ethernet (see page 30); parameters can only be set on the appliance itself.

2. Installation

2.1 System requirements

Category	Minimum system requirements
Processor	Pentium 1 GHz
Main memory	1 GB
Available free space on hard drive	4 GB
Graphics	Colour monitor with at least 1200 x 800 px resolution
Interfaces	an available USB or Ethernet interface
Operating system	Windows 7, Windows 8, Windows 10

2.2 Installing AtmoCONTROL

i You must have administrator rights to be able to install AtmoCONTROL.

Start the installation file AtmoControlSetup.exe from the USB storage medium provided. You are now guided through the installation process step by step.

3. Working with AtmoCONTROL

3.1 Starting AtmoCONTROL

AtmoCONTROL can be started in two ways:

- ▶ by double-clicking on the shortcut created on the desktop:
- ▶ in the Start menu (Start → Programs → AtmoCONTROL)



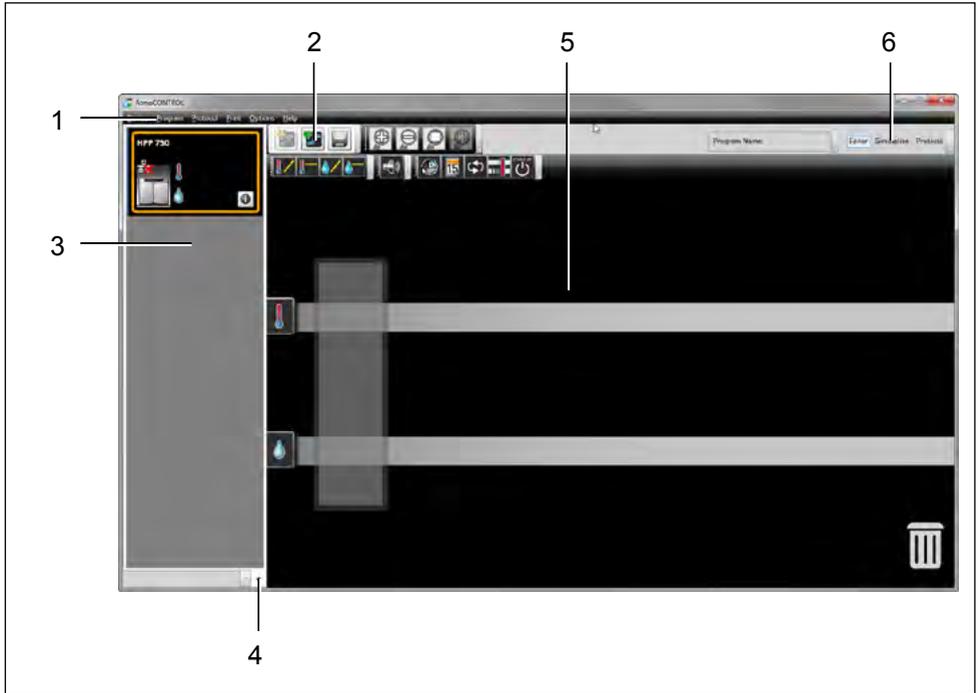
NOTICE



AtmoControl may only be started in one instance, nor can multiple Windows users operate in parallel on the same computer. The use of AtmoControl with multiple parallel instances can lead to uncontrolled behaviour.

3.2 Program interface

The main program interface window of AtmoCONTROL is divided into the following areas:



- 1 Menu bar (see section 3.2.1)
- 2 Toolbar (quick access to most important functions, see section 3.2.2)
- 3 Status bar (provides an overview of available appliances, see page 10)
- 4 Show/hide status bar
- 5 Editor, simulation and protocol window (only for appliances listed on page 6, otherwise only protocol window)
- 6 Programming mode switch (for editor/simulation/protocol, only for appliances listed on page 6)

1 You may change the language of the program interface at any time. German or English can be set (*Options* → *Language*).



3.2.1 Menu bar

Device	Program	Protocol	Print
① Connect online via Ethernet	⑦ New	⑭ Import...	⑰ Print document
② Connect offline from USB device	⑧ Load	⑮ Export...	⑱ Print document as table
③ Connect offline from database	⑨ Save	⑯ Temperature Statistics	
④ Disconnect device	⑩ Save As...		
⑤ Disconnect all devices	⑪ Upload to Device		
⑥ Recently registered devices	⑫ Export to USB drive		
	⑬ Most recent programs		

Options	Help
⑲ Language ▶	⑳ About...
⑳ Temperature Scales ▶	㉑ User Manual
㉑ Show device log in protocol	㉒ Upload license file to device
㉒ Define filter for the device log file	㉓ Display device log file
㉓ USER-ID	
㉔ Calibrate thermoshelves	
㉕ Email options	
㉖ Edit Backup Options	

- | | | |
|---|---|--|
| 1 <i>Connect to device via Ethernet (see page 10)</i> | 12 <i>Export program to USB storage medium (see page 24)</i> | 21 <i>Display device log file in the protocol window (see page 37)</i> |
| 2 <i>Connect device using USB storage medium</i> | 13 <i>Show most recently used programs</i> | 22 <i>Filter log file (see page 12)</i> |
| 3 <i>Connect device using database file (see page 11)</i> | 14 <i>Import protocol from USB storage medium (see page 30)</i> | 23 <i>Configure USER-ID (see page 37)</i> |
| 4 <i>Disconnect selected device (see page 13)</i> | 15 <i>Export protocol data (see page 31)</i> | 24 <i>Calibrate thermoshelves (vacuum oven VO)</i> |
| 5 <i>Disconnect all devices</i> | 16 <i>Show temperature statistics (see page 32)</i> | 25 <i>Automatic sending of emails (see page 39)</i> |
| 6 <i>Recently registered devices</i> | 17 <i>Print displayed document</i> | 26 <i>Set up data backup (see page 41)</i> |
| 7 <i>Create new program (see page 13)</i> | 18 <i>Print displayed document as table</i> | 27 <i>Program information</i> |
| 8 <i>Load a saved program (see page 24)</i> | 19 <i>Change program language (German/English)</i> | 28 <i>Open this manual in PDF format</i> |
| 9 <i>Save program</i> | 20 <i>Change the temperature unit (Celsius/Fahrenheit, see page 37)</i> | 29 <i>Install device licence (see page 10)</i> |
| 10 <i>Save program under a new name</i> | | 30 <i>Display the log file of the appliance (see page 12)</i> |
| 11 <i>Transfer program to device via Ethernet (see page 24)</i> | | |

3.2.2 Toolbar

The toolbar provides rapid access to the most important menu functions:



1

2

3

4

5

6

7

- 1 Create a new program
- 2 Load program from the data medium
- 3 Save new program
- 4 Enlarge view (zoom in)

- 5 Reduce view (zoom out)
- 6 Show full program/protocol
- 7 Choose the time range you would like to display

3.2.3 Status bar

The status bar gives an overview of the appliances logged on to AtmoCONTROL. Appliances can be added and removed again.

- 1 If the appliance is connected to the computer via Ethernet and it has already been logged on once, it is automatically recognised and the current operating state (temperature, alarms) is displayed (Fig. 1).

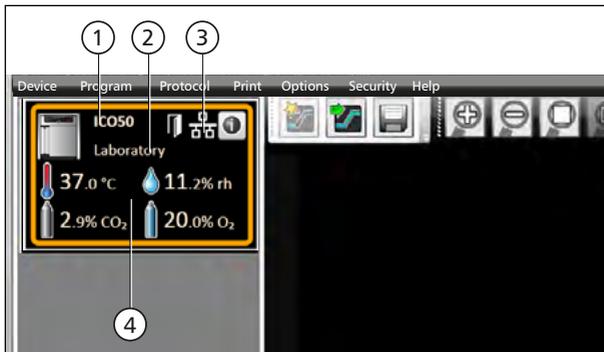


Fig. 1

An appliance of type ICO 50 (1), named "Laboratory" (2) by the user, is registered via Ethernet (3) in AtmoCONTROL; current operating status (4)

3.3 Installing device licence via Ethernet (Single Display Devices)

1. Click on *Help* → *Upload license file to device*.
2. In the window now opening, select the licence file (*.lic) and click *OK*.
3. Enter the IP address of the appliance you want to transfer the licence to.



A description of how to set the IP address is provided in the user manual of the corresponding appliance.



4. Click on *Upload* to start transferring the licence. The appliance can now be added (registered) in AtmoCONTROL as described in the following section.

3.4 Adding and disconnecting devices

3.4.1 Adding device connected via Ethernet

1. Click on *Device* → *Connect online via Ethernet*.
2. In the window opening now, enter the IP address of the device. Default setting is the standard IP address all devices have at delivery (192.168.100.100). The IP address entered here must correspond to that of the device.



A description of how to change the IP address of a device is provided in the user manual of the corresponding device.

If you click on *Connect* now, the device is added to the status bar and you can create programs for it or read out protocols.

3.4.2 Connecting device using USB storage

1. Export protocol data from the device to a USB storage medium.



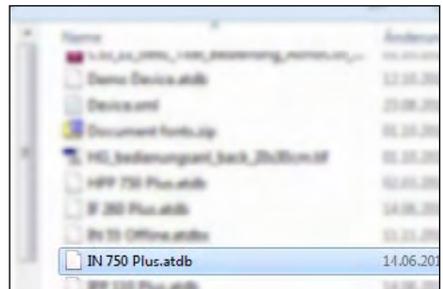
A description of how to export protocol data from a device is provided in the user manual of the corresponding device.

2. Connect the USB storage medium to your computer/laptop.
3. Click on *Device* and then on *Connect offline from USB device*. If several USB storage media are connected, select from which medium you want to import appliance data. All devices for which protocol data is available on the selected USB storage medium are displayed:
4. Select the device you want to connect and click on *Connect*. Hold down the CTRL key to click and select several of the listed devices or connect all listed devices by clicking *Select all*.

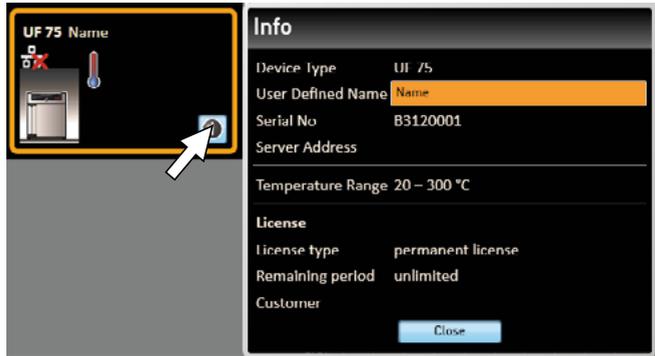


3.4.3 Connecting a device using database file

1. Click on *Device* → *Connect offline from database*.
2. A window opens, in which you can open the device database file of the (*.atdb) type.



As soon as the appliance has been added, you can have detailed appliance information displayed at any time. To do this, click on the ⓘ icon in the appliances view ("Device"). A window opens, displaying detailed information. Here, you can also enter a name of your choice for your appliance later on, if you have not already done so when logging on, or change the appliance name.



3.4.4 Log file

When a device is added – no matter whether using a USB stick or via Ethernet – or a protocol is imported, the log file is also transferred from the device controller. To view its content, select *Help* → *Display device log file*.

The log file is structured as shown:

- A Date and time of events
- B + Beginning of the event
– End of the event
i Information
- C Alarm / event code
- D Alarm / event description

A detailed list of all event codes is given from page 43.

Select *Options* → *Define filter for the device log file* to define which entries of the log file should be displayed.

	A	B	C	D
08.07.2015 08:07:15		i	211	Restauration Failed
08.07.2015 08:07:20		i	111	Restart 02.01.11
08.07.2015 08:07:41		+	303	Temp Limiter 28.5
08.07.2015 08:07:41		+	303	Temp Limiter 1000
08.07.2015 08:07:45		+	306	Com Err: 0100
08.07.2015 08:08:58		i	111	Restart 02.01.11
08.07.2015 08:09:19		+	303	Temp Limiter 28.4
08.07.2015 08:09:19		+	303	Temp Limiter 1000
08.07.2015 08:09:23		+	306	Com Err: 0100
08.07.2015 08:28:35		i	111	Restart 02.01.11

3.4.5 Disconnecting devices

If you want to remove a device from the status bar, select it and then click on *Device* → *Disconnect device*. In order to disconnect all connected appliances, use *Disconnect all devices*.

4. Program

4.1 Editor window

4.1.1 Overview

In the Editor window, programs can be created: sequences of various parameters (e.g. temperature, pressure and humidity), which the appliance then implements from a definable point in time.

To be able to create a program in AtmoCONTROL, the appliance which is to perform the program must be listed in the status bar and selected (clicked on). The appliance can, but does not have to, be connected to the computer via the network. If the appliance is not yet listed in the status bar, it must be added (see page 10).

4.1.2 Creating a program

Select the appliance that will later perform the program by clicking on it in the status bar (Fig. 2, No. 1). An icon bar with the available parameters (functions) for this appliance is shown (2, description from page 17). Additionally, one or two editor threads (3 and 4) are displayed, depending on the appliance. The program sequence is determined on these.

● Two editor threads are always shown for appliances with humidity or pressure control, **1** and one editor thread for all others.

Bear in mind that the two editor threads are not synchronised. This means that a specific X position on one thread does not match the same position on the other thread in time. If you want to see the parameter values for a specific point in time, you must change to the simulation mode (see page 22).

If you want to create a time correlation to a specific point, use the "Sync" function (see page 21).

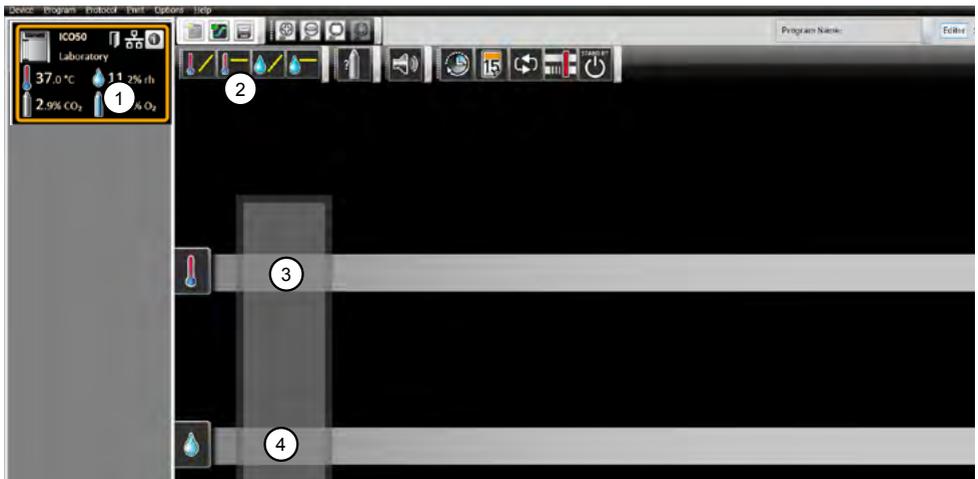


Fig. 2 Elements to create a program

- 1 Appliance selected
- 2 Available parameters (functions)
- 3 Editor thread
- 4 Additional editor thread for appliances with humidity or pressure control

To create a program, drag the individual parameter icons onto the editor thread one after another in the desired order, while holding down the left mouse button (Fig. 3 and Fig. 4). To assist the correct positioning, a red insertion mark is displayed at the insertion position. With the zoom icons in the toolbar list (see section 3.2.2 on page 10) or with the mouse wheel, you can zoom in or out of the display or have the entire program displayed. Keep the mouse button pressed and drag to reposition icons to another point of the respective thread.

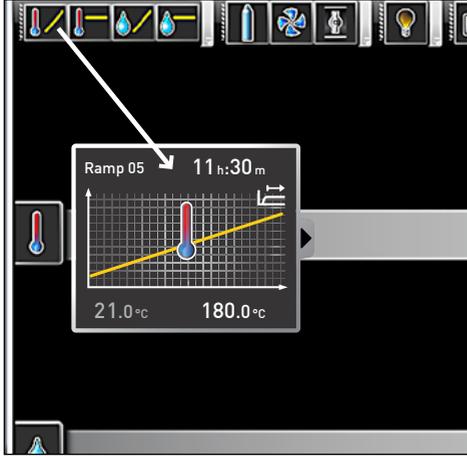


Fig. 3
 Drag the parameter icon (in this case a temperature change) onto the editor thread while holding the mouse button down

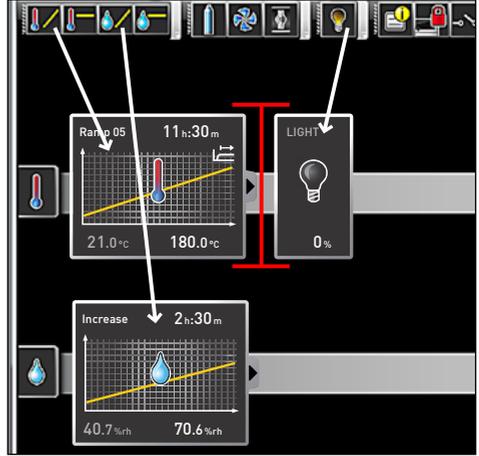


Fig. 4
 Drag other parameters – light and a humidity change in this case – onto the editor thread. A red insertion mark helps you to find the correct position.

i The temperature icons (change/hold temperature) may only be placed on the upper editor thread, humidity and pressure icons only on the lower one.

The meaning of the individual icons and the adjustment options are described from page 17. You can find some simple program examples from page 25.

Removing a parameter icon from the editor thread

To remove a parameter icon (and therefore its function) from an editor thread – if you have inserted it by mistake, for example – select it and, with the mouse button depressed, move it to the recycle bin symbol on the lower right (Fig. 5).

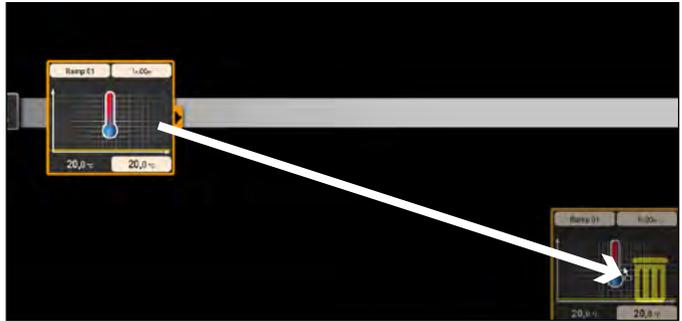
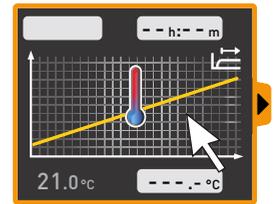


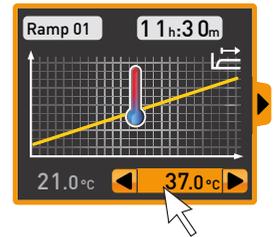
Fig. 5
To delete a parameter icon from an editor thread, drag the icon, with the mouse button depressed, to the recycle bin symbol.

4.1.3 Setting parameters

If a parameter icon is selected (clicked) on an editor thread, it is displayed with an orange frame. The adjustable values – in the example on the right, the ramp name, the duration of the ramp and the setpoint temperature – have a grey background.



To adjust values, click successively on the corresponding fields – in the example on the right, the setpoint temperature. The value is highlighted in colour and can be changed by keyboard entry or clicking on the arrow icons.



i The adjustment range depends on the appliance for which the program is created.

The main parameters have additional adjustment options, which can be displayed by clicking on the fold down icon (Fig. 6, No. 1). Here, the adjustable values – in the example below, the tolerance band and the setpoint dependency (SPWT) – also have a grey background (2) and can be adjusted after being clicked on (3).

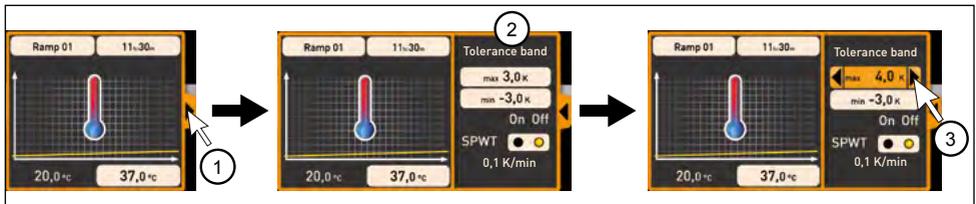


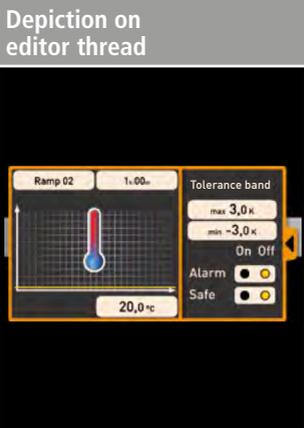
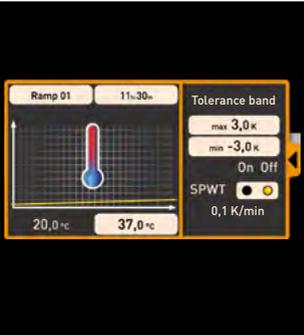
Fig. 6 Further adjustment options fold down after clicking on the arrow icon on the right edge of the window (1)

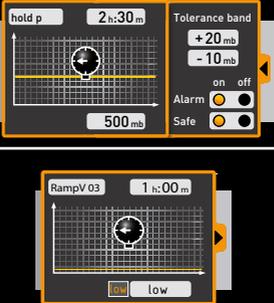
4.1.4 Available parameters

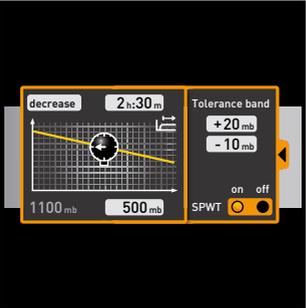
Below, all the parameter icons with their adjustment options are shown.

1 Which parameters are available to adjust the program depends on the appliance for which a program is to be created. Only those parameters are available that the appliance is able to implement. For appliances without humidity regulation, for example, no humidity icon is available. The respective adjustment options (temperature ranges etc.) are appliance-specific.

Broad parameter representation

Depiction in icon bar	Meaning	Depiction on editor thread	Function and adjustment options
	Hold temperature		<p><u>Function</u> Maintains a set temperature for a specific time.</p> <p><u>Adjustment options</u></p> <ul style="list-style-type: none"> • Name of program segment¹ • Duration (time or infinite ∞) • Temperature to be maintained • Tolerance value above/below • Alarm if limits are exceeded • Safe² <p>(For program example, see page 25)</p>
	Change temperature		<p><u>Function</u> Increases or decreases temperature over a specific time to a set value.</p> <p><u>Adjustment options</u></p> <ul style="list-style-type: none"> • Name of program segment¹ • Duration • Target (setpoint) temperature • Tolerance value above/below • SPWT³ <p>(For program example, see page 26)</p>

Depiction in icon bar	Meaning	Depiction on editor thread	Function and adjustment options
	<p>Hold humidity</p>		<p>Function Maintains a specific humidity for a specific time.</p> <p>Adjustment options</p> <ul style="list-style-type: none"> • Name of program segment¹ • Duration (time or infinite ∞) • Humidity value to be maintained • Tolerance value above/below • Alarm if limits are exceeded • Safe² • Humidification and dehumidification switch off ("Off")
	<p>Change humidity</p>		<p>Function Increases or decreases humidity over a specific time to a specific value.</p> <p>Adjustment options</p> <ul style="list-style-type: none"> • Name of program segment¹ • Duration • Target (setpoint) humidity • Tolerance value above/below • SPWT³
	<p>Hold pressure</p>		<p>Function Maintains a specific pressure for a specific time.</p> <p>Adjustment options</p> <ul style="list-style-type: none"> • Name of program segment¹ • Duration (time or infinite ∞) • Pressure to be maintained • Tolerance value above/below • Alarm if limits are exceeded • Safe² • Low⁴

Depiction in icon bar	Meaning	Depiction on editor thread	Function and adjustment options
	Change pressure		<p>Function Increases or decreases pressure over a specific time to a specific value.</p> <p>Adjustment options</p> <ul style="list-style-type: none"> Name of program segment¹ Duration Target (setpoint) pressure Tolerance value above/below SPWT³

¹ When run, this is displayed in the status bar of the appliance

² When Safe is “on”, it is ensured that the value really is maintained within the tolerance band as long as specified, and only then is the program continued (this is sensible for sterilisers, for example). If the actual values leaves the tolerance band, the clock timer starts again from the beginning.

³ SPWT: Setpoint wait. If this is “on”, the program sequence is not continued before the setpoint value is reached, even if the set time has already expired. If this is “off”, the program sequence is continued after the set time has expired, irrespective of whether the setpoint value was reached or not.

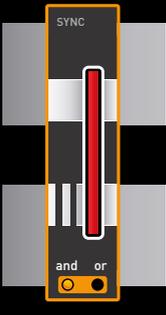
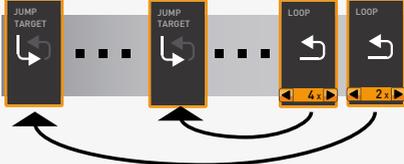
⁴Low: When setting a pressure value below the appliance-specific minimum, Low mode is activated, i.e. the vacuum pump operates continuously and reaches the maximum possible vacuum.

Narrow parameter representation

With the narrow parameter representation, no time progression can be set, in contrast to broad parameter representation. The setting made immediately becomes active at the respective position – and remains active until it is changed by the insertion of a new parameter icon of the same type.

Depiction in icon bar	Meaning	Depiction on editor thread	Adjustment options/ comments
	CO ₂		<p>0 to 20 percent</p> <p> For a setpoint ≠ 0.0, the fan is automatically set to 50 %.</p>
	O ₂		<p>1 to 20 percent</p>
	Fan speed		<p>0 to 100 percent in steps of 10 % (For program example, see page 27)</p>

Depiction in icon bar	Meaning	Depiction on editor thread	Adjustment options/ comments
	Air flap position		0 % (closed, recirculating operation) to 100 % (opened completely, fresh air operation) in steps of 10% (For program example, see page 27)
	Interior lighting		depends on appliance type <ul style="list-style-type: none"> • 0 or 100 % (off/on) • 0 to 100 % in steps of 1%
	UV light		on/off
	Horn		Adjustment options: none Appliance emits an acoustic signal at the position in the program at which the icon was inserted, for example if a specific setpoint value is reached or the program is finished.
	Door		Adjustment options: open/close Close/open door at the position in the program at which the icon was inserted. (For program example, see page 26)
	Switch		Switches a switching contact (A, B or C) on or off at the insertion position
	Defrost		Activates the defrosting function of the appliance at the insertion position
	Clock timer		Here, the day(s) and the time at which the program is to be performed, can be adjusted. The program is repeated each week at the specified times. (For program example, see page 25)

Depiction in icon bar	Meaning	Depiction on editor thread	Adjustment options/ comments
	Calendar		Here, the date and time at which the program is to be performed, can be adjusted. In contrast to the clock timer, the program is run only once.
	Synchronising		<ul style="list-style-type: none"> • Setting "and": The program is only continued when the preceding ramps are finished on both editor threads. • Setting "or": The program is continued as soon as one of the preceding ramps is finished.
	Loop	 	<p>The program jumps back from the insertion position to a position that can be freely selected and repeats the sequence between n times (adjustable). When inserting a loop function, an icon for the jump target is automatically inserted at the program start. Holding the mouse key down, move it to the beginning of the range that is to be repeated.</p> <p>Loops may be embedded inside one another:</p> <p>(For program example, see page 28)</p>
	Standby		Switches all appliance functions off at the insertion position
	Inert gas/ Fresh air		Switching between fresh air supply and inert gas (vacuum oven VO)

4.2 Simulating the program sequence (preview)

While creating the program, you can display the prospective progression of all parameters as a diagram at any time. To do this, click on *Simulation* (Fig. 7).

i Depending on the complexity of the program, it may take a few seconds for the simulation to be calculated and displayed.



Fig. 7 Program preview diagram (simulation)

i In simulation mode, no changes can be made to the program, as this mode is just for information purposes. Change to the editor window by clicking on the *Editor* button if you want to alter the program.

4.2.1 Working in the preview window

You have several options to zoom in, zoom out or move a section of the preview window:

▶ To evenly zoom in or out of a section, scroll with your mouse wheel in the line graph area or use the (+) or (-) zoom icon in the toolbar.



▶ To zoom in on a certain section, click and drag with the left mouse button to draw a rectangle over the section you want to see (Fig. 8). If the selection is shown in red, the section is too small to be shown. In this case, make the rectangle larger until its colour changes to light grey.

▶ If you want to see a time range longer than two days, click on the rightmost symbol of the top toolbar (Fig. 9). This will open a window in which you can select the time range you want to see.

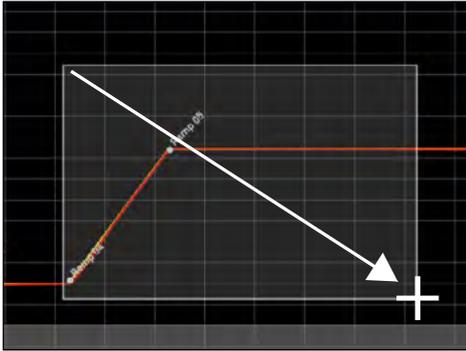


Fig. 8
Zooming into a time range by drawing a rectangle

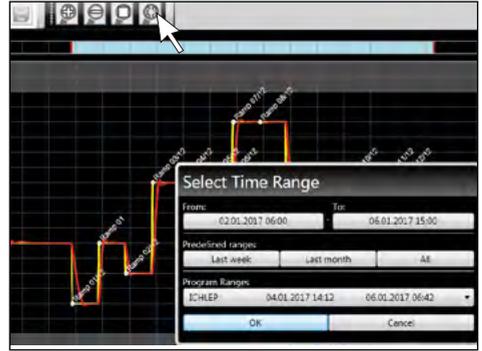


Fig. 9
Selecting the time range manually

- ▶ To move the displayed time range (x axis), move the mouse cursor to the right or left edge of the graph window. Arrows will appear with which you can move the displayed section to the left or to the right (Fig. 10).
- ▶ To only scale the time axis (x axis) or the value axis (y axis), move the cursor to the label of the respective axis. The cursor will turn into a double arrow. Scroll with the mouse wheel to scale the respective axis (Fig. 11).

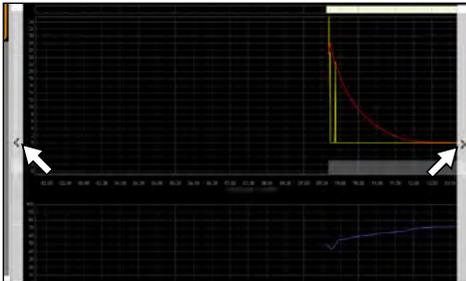


Fig. 10
Moving the time range to the left or right

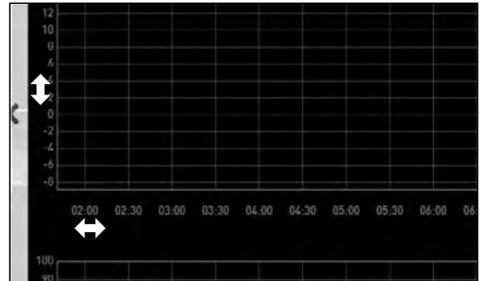


Fig. 11
Scaling the time or value axis by scrolling as soon as the mouse cursor turns into a double arrow

4.3 Saving, loading, transferring and running the program

4.3.1 Saving the program

Click *Program* → *Save as*. Enter a name for the program and click on *Save*.

- The name under which you save the program will be shown
- 1 in the program selection view on the display of the appliance once it was transferred to the appliance (file name in the example to the right: "Test 023.atpro").

A program file that has digital signatures of the AtmoCONTROL FDA edition cannot be overwritten with a file version that has fewer or no signatures later on.



4.3.2 Loading a saved program

Via *Program* → *Load*, you can reopen and continue editing the saved programs.

4.3.3 Transferring program via Ethernet

- To be able to transfer a program via Ethernet, the appliance and computer must be connected via Ethernet, the correct IP address set (see page 10) and the appliance switched on.

Click *Program* → *Upload to device*. The program is uploaded to the appliance and can be started there.

If a program with the same name already exists on the controller, it will be overwritten.

4.3.4 Transferring a program via USB storage medium

1. Click *Program* → *Export to USB drive*. The program is saved on the USB storage medium connected.
2. Connect the USB data medium to the appliance which is to run the program.

If a program with the same name already exists on the controller, it will be overwritten unless it is write-protected.

4.3.5 Selecting and starting a program on the appliance

If the program was transferred to the appliance via Ethernet or USB data medium, it can be selected and started there.



How programs are selected and started on the appliance is described in the user manual for the appliance.

If the appliance is connected to the computer via the network, the respective current operating status can be monitored in the status bar of AtmoCONTROL (see page 10).

- With appliances that have humidity control, make sure that the water supply tank of the appliance is filled before the program start. Check the level of the tank at regular intervals, especially for programs that run for long periods. The same applies for appliances with gas supply.

4.4 Program examples

For reasons of space, it is not possible to present program examples with all the available parameters for all MEMMERT appliances here. Instead, a number of simple example programs will be presented to familiarise you with how a program is structured.

Caution:

It is important that you run through a number of program examples to get to know AtmoCONTROL before you actually transfer and run programs on the appliance.

4.4.1 Program example with clock timer

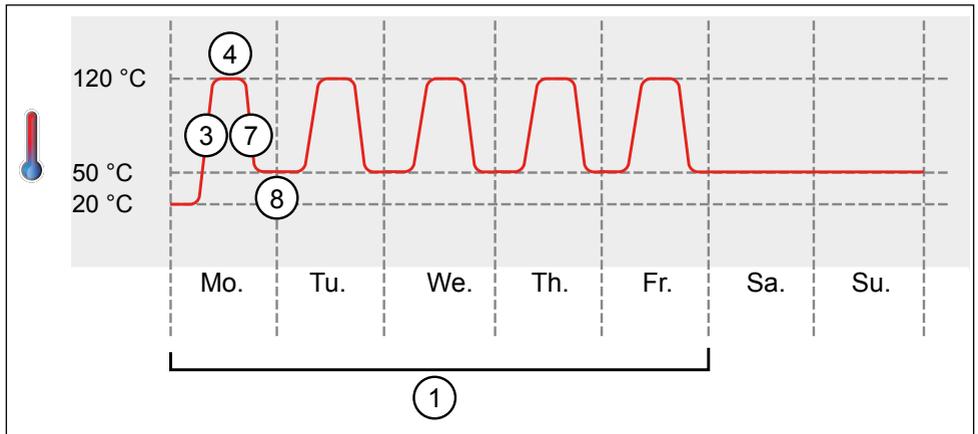
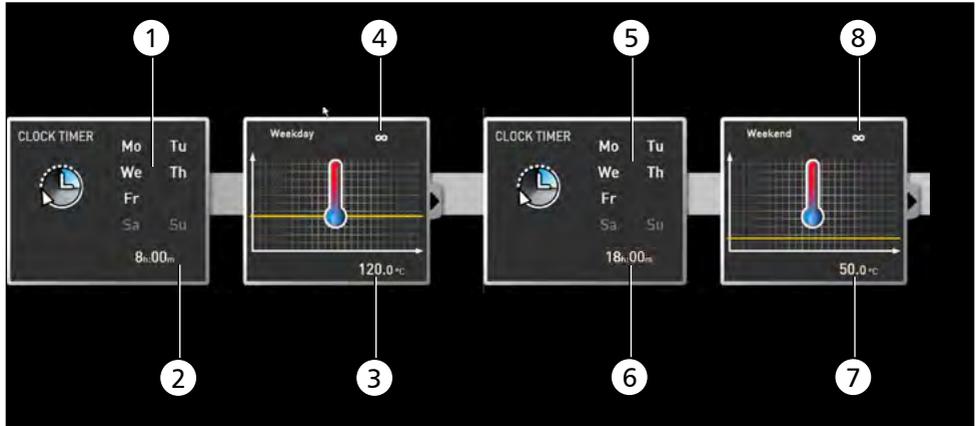


Fig. 12

The appliance heats up from Monday to Friday (1) at 8 am (2) to 120 °C (3) and continues to maintain this temperature (infinitely ∞) (4) until it is changed: also Monday to Friday (5) at 6 pm (6) to 50 °C (7) – again continued (infinitely ∞) (8) until it is changed again in the morning at 8 am (2).

4.4.2 Program example with door locking

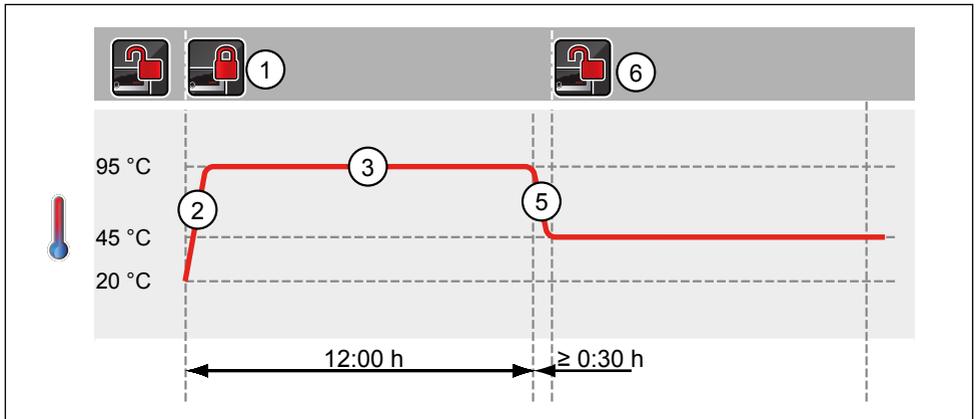
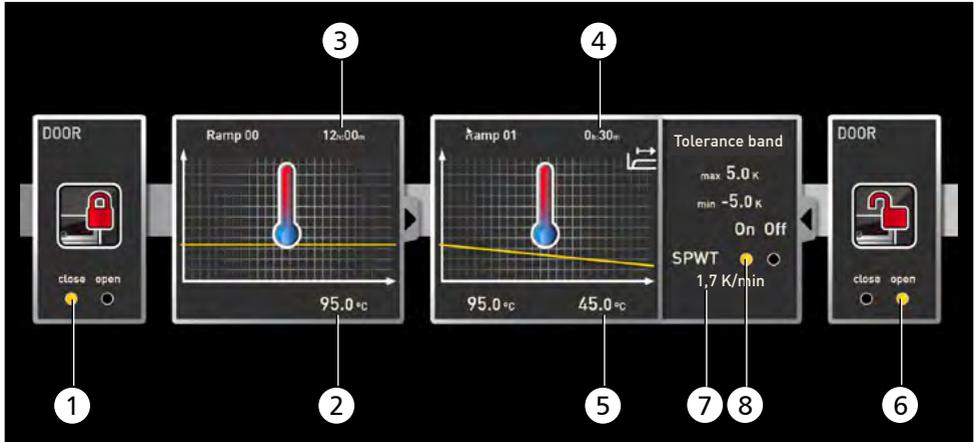


Fig. 13

The door is locked at the beginning of the program (1). Then, the appliance heats up to 95.0 °C (2) and maintains this temperature for 12 hours (3). Subsequently, the temperature is lowered (5) for 30 minutes (4) to 45.0 °C and then, the door is opened (6). The setting "SPWT on" (8) ensures that the door is opened only when the temperature really has dropped to 45.0 °C, even if this takes longer than 30 minutes. Below the temperature change is shown in K/min (7).

4.4.3 Program example sterilisation

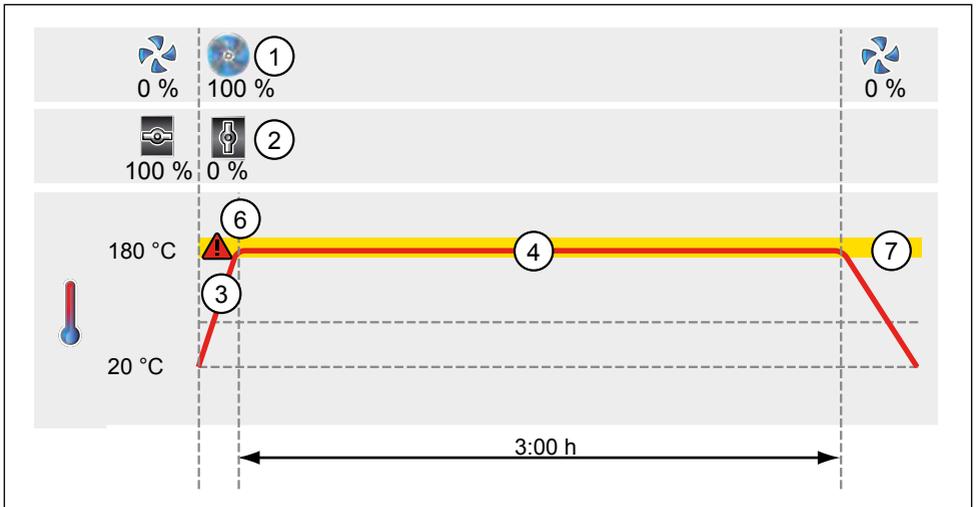
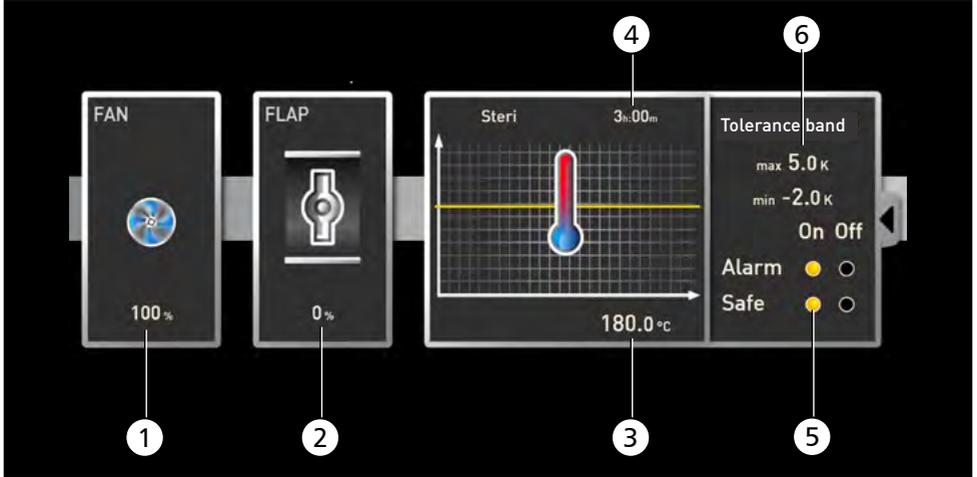


Fig. 14
 At the beginning, the fan is switched on to 100 % (1) and the air flap is closed (0 %) (2). Then, the appliance heats up to 180.0 °C (3) and maintains this temperature for 3 hours (4). The setting „Safe“ (5) ensures that the sterilisation time does not start (6) before the set tolerance band (7) is reached and is restarted if it is exceeded.

4.4.4 Program example loop

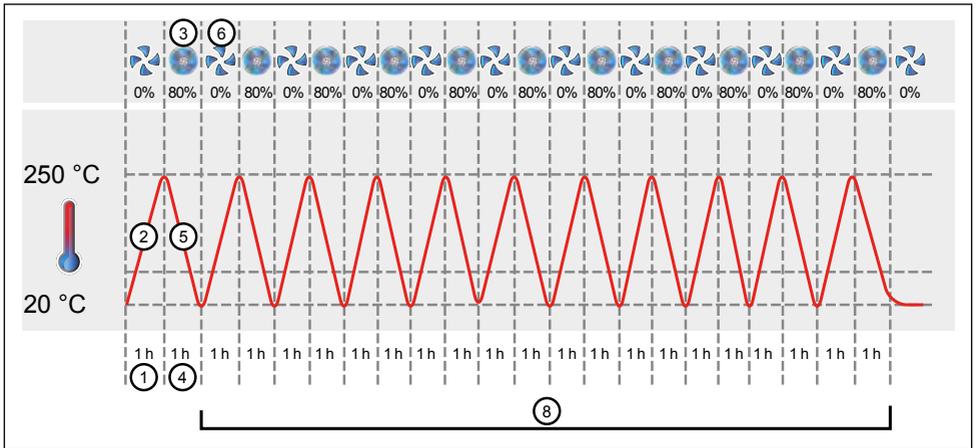
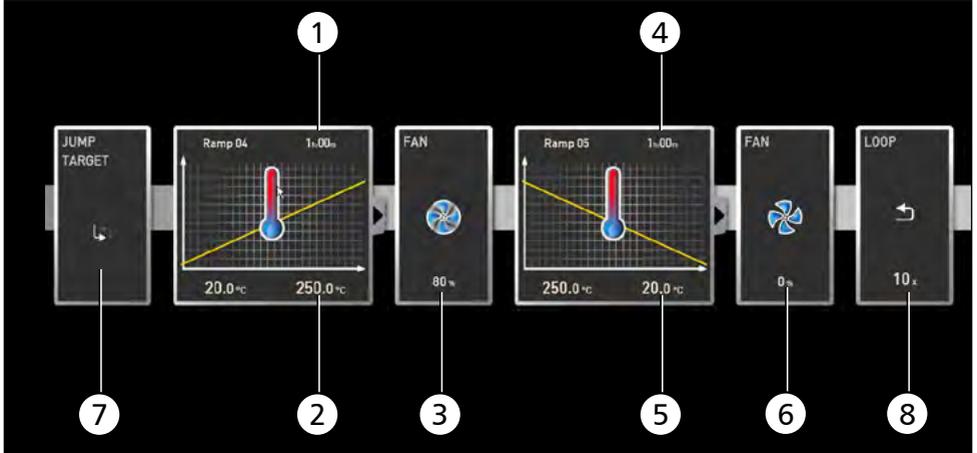


Fig. 15
First, the appliance heats up to 250.0 °C (2) for one hour (1). Then, the fan begins to run at 80 % power (3) and the temperature is lowered for one hour (4) to 20.0 °C (5). Subsequently, the fan is switched off (6). This sequence is repeated from the jump target (7) ten times (8).

5. Protocol

In the protocol window, you can now see a graphic representation of the chronological sequence of set and actual values of the appliance highlighted in the status bar (temperature, humidity, fan, etc.). The representation depends on the range of functions of the respective appliance.



Fig. 16 Protocol display (example)

- 1 Device of which the protocol is being displayed
- 2 Set value (yellow) and actual value (other colour) at the cursor position
- 3 Chronological sequence of the set temperature values (yellow) and actual temperature values (other colour)
- 4 Open protocol view
- 5 Entries in the log file of the appliance and program sections
- 6 Chronological sequence of other device functions (humidity, fan speed, air flap position, etc., depending on the device's functions)

1 In the protocol window, you will find the same functions (zoom, etc.) as in the program simulation (see page 22).

1 Measured values that are too small to be shown and seen normally, are represented as small circles. They are shown normally as you zoom in.

5.1 Load protocol

5.1.1 Importing protocol from network

- 1 To be able to import a protocol via network, the appliance and computer must be connected to the network, the correct IP address set (see page 10) and the appliance switched on and logged in to AtmoCONTROL.

Click on the *Protocol* button (Fig. 16); the protocol data of the appliance are transferred and displayed and can be further processed – e.g. exported to a spreadsheet file format (see Section 5.3).

5.1.2 Importing protocol from USB data medium

At the device, protocols can be exported to a USB storage medium and imported in AtmoCONTROL.



How protocols on the device are exported to USB storage media is described in the user manual of the appliance.

- 1 If the entire log period is not saved to the USB stick, data gaps may occur in AtmoControl under certain circumstances. This can be remedied by saving the log of the current year or the entire log of the device to a USB stick again and importing it into AtmoControl, depending on the size of the gap.

1. Connect the USB storage medium with the exported protocols to your computer/laptop.
2. Click on *Protocol* → *Import* and select the data medium or directory where the protocols are saved. All appliances (serial numbers) for which there is protocol data on the data carrier (and in its subfolders) are displayed.

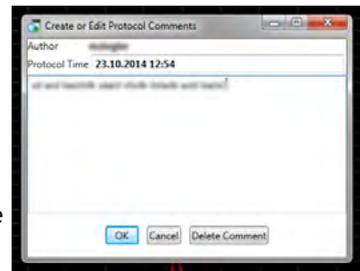
- 1 You can find the serial number of the appliance on its type plate.

3. Select the appliance or the appliances for which you want to import the protocols and click on *Import*. If you activate *Register after import*, the selected appliance will be automatically registered in AtmoCONTROL once the data has been imported. Otherwise, you will have to register the appliance manually (see page 11) to view and analyse the imported protocol data in AtmoCONTROL.



5.2 Comment protocol

You can add comments anywhere in a protocol's data curves. Right-click to open a window in which you can enter text. Click *OK* to close the window. The positions in the data curves where comments have been added are marked with an . Right-click to open the comment if you want to change or delete it. Comments are automatically saved with the protocol and included in the PDF export (see section 5.3).



5.3 Exporting a protocol

With *Protocol* → *Export*, you can export a freely definable protocol logging period into a *.csv or *.xlsx (Excel) file, which can be processed in spreadsheet programs, or as a PDF (Fig. 17). Measured values that have exceeded the alarm limits are displayed in red. The thus created PDF file is a standard PDF/A for long-term archiving.

When exporting log files, you can choose program sections. Program sections are periods of processed programs (profiles) or running times of the Simple Timer (Fig. 18). Each program area contains the name of the program and its duration (for example, Test Program, 09:30 - 12:30). If you select the blank field in the list displayed in the export dialog, the time shown in the log window is used.

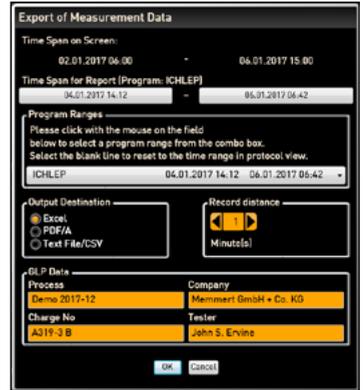


Fig. 17
Exporting a protocol

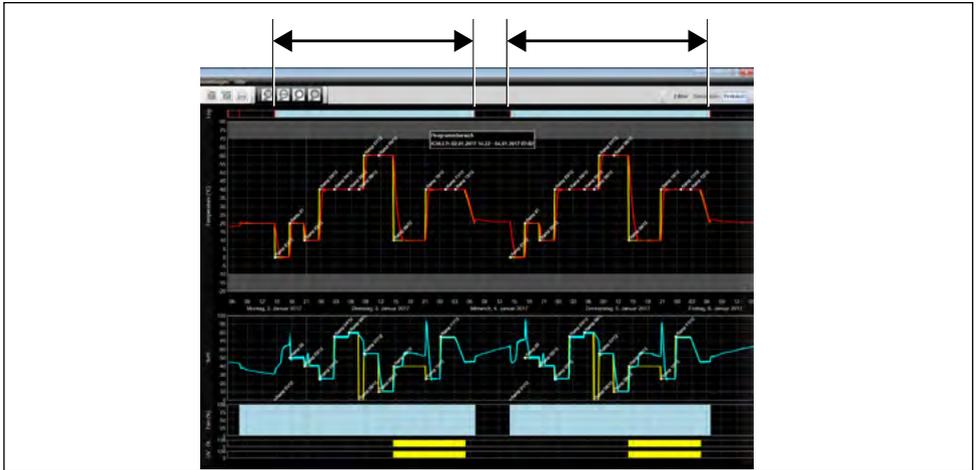


Fig. 18 Program sections

5.3.1 Export in PDF format

General notes on the table below:

- ▶ Temperature units are in ° Celsius or ° Fahrenheit depending on the setting and are displayed in the title bar.
- ▶ All values can in principle be undefined and are displayed as an empty field.
- ▶ Only columns that correspond to device properties are displayed.
- ▶ The temperature measurement values 2 to 4 and the alarm temperature are only displayed if they are activated in the AtmoCONTROL menu under Set visible measurement values in graphic view.

Spaltenname	Meaning
Date	Date and time
T Set	Temperature set point, if defined, otherwise empty
T	Actual temperature value
Al Low	Lower temperature alarm value
Al High	Upper temperature alarm value
Al T Real	Actual temperature value of the second PT100 sensor for the actually measured monitoring (= alarm) temperature or, in the case of vacuum devices, the temperature of the second heating plate
T2	Second temperature value or second heating plate
T3	Third temperature value or third heating plate
T4	Fourth temperature value or fourth heating plate
RH Set	Humidity set point
RH Real	Humidity measurement value or undefined
Al RH Low	Lower humidity alarm value
Al RH High	Upper humidity alarm value
Vac Set	Vacuum set point in mb
Vac	Vacuum measurement value
AlVac Low	Lower alarm value for vacuum
AlVac High	Upper alarm value for vacuum
CO2 Set	Set point for CO2 in per cent
CO2	CO2 measurement value
AlCO2 Low	Lower alarm value for CO2
AlCO2 High	Upper alarm value for CO2
O2 Set	Set point for O2 in per cent
O2	O2 measurement value
AlO2 Low	Lower alarm value for O2
AlO2 High	Upper alarm value for O2

Spaltenname	Meaning
Fan	Fan set point in per cent from 0 to 100
Flap	Flap position in 10% steps from 0 to 100, 0 = closed, 100 = fully open
Sw A	Switch A, 0 or 1
Sw B	Switch B, 0 or 1
Sw C	Switch C, 0 or 1
Sw D	Switch D, 0 or 1
DL	Illumination cassette for daylight, 0 or 100%
UV	Illumination cassette for UV light, 0 or 100%
LED	LED intensity in whole per cent
Inert Gas	Gas currently used, 0 = fresh air, 1 = inert gas
Door Open	Door status, 0 = closed, 1 = open
Door lock	Door lock, 1 = locked
Info T	Current ramp name for temperature during program sequence
Info RH	Current ramp name for humidity during program sequence
Info Vac	Current ramp name for vacuum during program sequence

5.3.2 Export in Excel format

Column name English	Column name German	Meaning
Date	Datum	Date and time
Temp. Set	Temp. Set	Temperature set point, if defined, otherwise empty
Temp. / Shelf1	Temp. / Shelf1	Actual temperature value or, in the case of vacuum devices, the temperature of the first heating plate
Alarm Low	Alarm Low	Lower temperature alarm value
Alarm High	Alarm High	Upper temperature alarm value
Alarm Temp	Alarm Temp	Actual temperature value of the second PT100 sensor for the actually measured monitoring (= alarm) temperature or, in the case of vacuum devices, the temperature of the second heating plate
Temp2 / Shelf2	Temp2 / Shelf2	Second temperature value or second heating plate
Temp3 / Shelf3	Temp3 / Shelf3	Third temperature value or third heating plate

Column name English	Column name German	Meaning
Temp4 / Shelf4	Temp4 / Shelf4	Fourth temperature value or fourth heating plate
Humidity Set	Feuchte Set	Humidity set point
Humidity Real	Feuchte Real	Humidity measurement value or undefined
Al. Hum. Low	Al. Feuchte Low	Lower humidity alarm value
Al. Hum. High	Al. Feuchte High	Upper humidity alarm value
Vacuum Set	Vacuum Set	Vacuum set point in mb
Vac.	Vak.	Vacuum measurement value
Al. Vac. Low	Al. Vak. Low	Lower alarm value for vacuum
Al. Vac. High	Al. Vac. High	Upper alarm value for vacuum
CO2 Set	CO2 Set	Set point for CO2 in per cent
CO2	CO2	CO2 measurement value
Al. CO2 Low	Al. CO2 Low	Lower alarm value for CO2
Al. CO2 High	Al. CO2 High	Upper alarm value for CO2
O2 Set	O2 Set	Set point for O2 in per cent
O2	O2	O2 measurement value
Al. O2 Low	Al. O2 Low	Lower alarm value for O2
Al. O2 High	Al. O2 High	Upper alarm value for O2
Fan	Lüfter	Fan set point in per cent from 0 to 100
Flap	Klappe	Flap position in 10% steps from 0 to 100, 0 = closed, 100 = fully open
Switch A	Schalter A	Switch A, 0 or 1
Switch B	Schalter B	Switch B, 0 or 1
Switch C	Schalter C	Switch C, 0 or 1
Switch D	Schalter D	Switch D, 0 or 1
Daylight	Daylight	Illumination cassette for daylight, 0 or 100%
UV	UV	Illumination cassette for UV light, 0 or 100%
LED	LED	LED intensity in whole per cent
Inert Gas	Inert Gas	Gas currently used, 0 = fresh air, 1 = inert gas
Door Open	Tür offen	Door status, 0 = closed, 1 = open
Door Lock	Tür-sperre	Door lock, 1 = locked

Column name English	Column name German	Meaning
Info Temp	Info Temp	Current ramp name for temperature during program sequence
Info Humidity	Info Feuchte	Current ramp name for humidity during program sequence
Info Vacuum	Info Vakuum	Current ramp name for vacuum during program sequence
Unit	Feld	If empty, data set is OK, otherwise "Error"
Comment	Kommentar	Window or graphic type where a comment is located. Possible values: Temp, humidity, vacuum, O2, CO2.

5.3.3 Export in CSV format

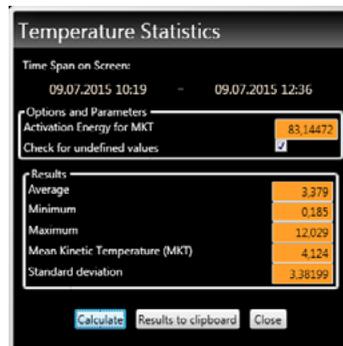
There are no language variants for Export-CSV.

Spaltenname	Meaning
Time	Date and time
Temp Set	Temperature set point, if defined, otherwise empty
Temp / Shelf1	Actual temperature value or first heating plate
AlTempLo	Lower temperature alarm value
AlTempHi	Upper temperature alarm value
AlTempReal	Actual temperature value of the second PT100 sensor for the actually measured monitoring (= alarm) temperature or, in the case of vacuum devices, the temperature of the second heating plate
Temp2 / Shelf2	Second temperature value or second heating plate
Temp3 / Shelf3	Third temperature value or third heating plate
Temp4 / Shelf4	Fourth temperature value or fourth heating plate
ToITMin	Temperature tolerance, minimum
ToITMax	Temperature tolerance, maximum
rH Set	Humidity set point
rH	Humidity measurement value or undefined
AlRHLow	Lower humidity alarm value
AlRHHi	Upper humidity alarm value
ToIRHin	Humidity tolerance, minimum
ToIRHax	Humidity tolerance, maximum
Vac Set	Vacuum set point in mb
Vac	Vacuum measurement value

Spaltenname	Meaning
AlVacLo	Lower alarm value for vacuum
AlVacHi	Upper alarm value for vacuum
TolVacMin	Vacuum tolerance, minimum
TolVacMax	Vacuum tolerance, maximum
CO2 Set	Set point for CO2 in per cent
CO2	CO2 measurement value
AlCO2Lo	Lower alarm value for CO2
AlCO2Hi	Upper alarm value for CO2
O2 Set	Set point for O2 in per cent
O2	O2 measurement value
AlO2Lo	Lower alarm value for O2
AlO2Hi	Upper alarm value for O2
Fan	Fan set point in per cent from 0 to 100
Flap	Flap position in 10% steps from 0 to 100, 0 = closed, 100 = fully open
Sw A	Switch A, 0 or 1
Sw B	Switch B, 0 or 1
Sw C	Switch C, 0 or 1
Sw D	Switch D, 0 or 1
DayL	Illumination cassette for daylight, 0 or 100%
UV	Illumination cassette for UV light, 0 or 100%
LED	LED intensity in whole per cent
Inert Gas	Gas currently used, 0 = fresh air, 1 = inert gas
Door open	Door status, 0 = closed, 1 = open
Door lock	Door lock, 1 = locked
Info T	Current ramp name for temperature during program sequence
Info H	Current ramp name for humidity during program sequence
Info V	Current ramp name for vacuum during program sequence
Location	Window or graphic type where a comment is located. Possible values: Temperature, humidity, vacuum, O2, CO2. Only for windows with line graphics.
Author	Author of a comment
LastChange	Date on which the comment was produced or last amended
Comment	Comment text

5.4 Statistics

With the function *Protocol* → *Statistics*, you can calculate the temperature statistics for the protocol period displayed on the monitor (minimum, maximum, average, mean kinetic temperature [MKT], etc.). With *Results to clipboard*, you can, for example, paste the values into a text editor.



6. Printing

With the *Print* function, you can print out programs in the editor window, as well as simulations and protocols – depending on what is currently displayed. You can print as a graph or a table.

7. Options

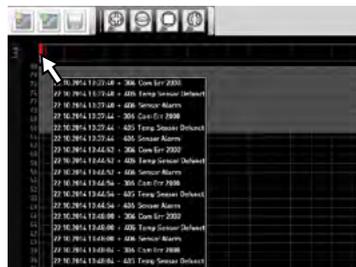
7.1 Set language and temperature unit

Select *Options* → *Language* or *Options* → *Temperature Scales* to set the user interface language (German or English) and the temperature unit (Celsius/Fahrenheit). To change the temperature scale, restart AtmoCONTROL.



7.2 Display device log file in the protocol window

If you activate this function, the periods for which there are entries in the device log file are marked with red indicators above the protocol view. Move the mouse cursor over them to see the corresponding entries and program sections.



7.3 USER-ID

7.3.1 Description

With the appliances listed in the table on page 6, it is possible, with the help of an encrypted "USER-ID" file on a special USB stick (Fig. 19), to lock functions of the appliance or to restrict them in their operation. You can configure which parameters are to be prevented from being adjusted when the USER-ID USB stick is removed.

- 1 AtmoCONTROL cannot generate a USER-ID file, but only change the authorisations of a purchased USER-ID file on a USER-ID data medium. If there is no valid USER-ID file on the USB data medium, configuration in AtmoCONTROL is also not possible.

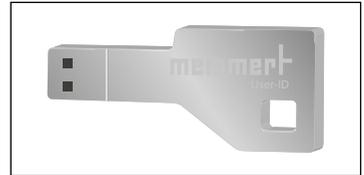


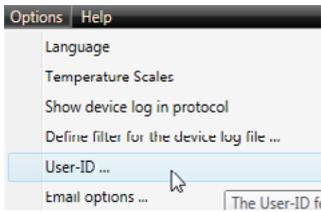
Fig. 19
USER-ID USB stick

There can be only one USER-ID on a USER-ID USB stick. The settings in this file then apply for all appliances configured.

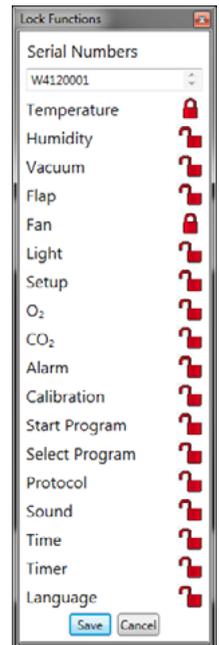
A USER-ID identifier on a USER-ID USB stick for one (or several) serial numbers can be purchased. This data medium contains a file with keys for one or more appliances. With the help of AtmoCONTROL, the function of the USER-ID key can be changed.

7.3.2 Use

1. Insert the USER-ID USB stick with the USER-ID file into the computer with AtmoCONTROL.
2. In the Options menu bar, click on *USER-ID*.



3. A window appears with the functions of the logged on appliance that can be blocked (depending on the appliance type).
4. Click on the lock icon next to the functions that should be blocked or released, and confirm this with OK.
5. Eject and remove the USER-ID USB stick, insert it in the appliance and activate.



How USER-IDs are activated and deactivated on the appliance is described in the operating instructions for the appliance.

- 1 If access to the "Delete program" controller function is to be blocked, this can be done by blocking "Select program".

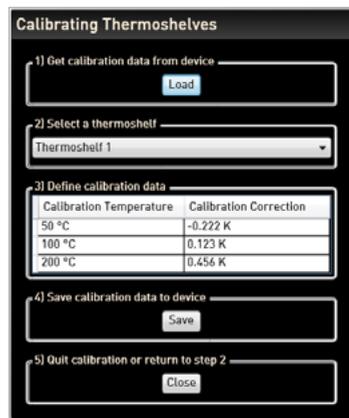
7.4 Calibrating thermoshelves (vacuum oven VO)

The thermoshelves of the VO vacuum oven can - if available and plugged in - be individually calibrated. The appliance to be calibrated must be registered online.

The calibration function is called up via *Options* → *Calibrate thermoshelves*.

The dialogue is divided into steps 1 to 5. First, the calibration settings are loaded from the appliance. Then the corrections can be indicated for each thermoshelf, if a flange socket is available. Finally, the data can be sent to the appliance.

Then restart the device so that the changes take effect.



7.5 Sending emails

AtmoCONTROL can automatically send an e-mail to one or more freely definable recipients, if – for example in the event of a temperature limit being exceeded – an alarm is triggered. The e-mail text cannot be modified and always specifies the alarm that has been triggered.

Sample e-mail text:

Device ICO150 (INCO2, O7170104) Temperature alarm: current temperature = 37.1°C alarm limit = 9°C

To edit the settings, select *Options* → *Email options*. The PC/laptop must have Internet access.

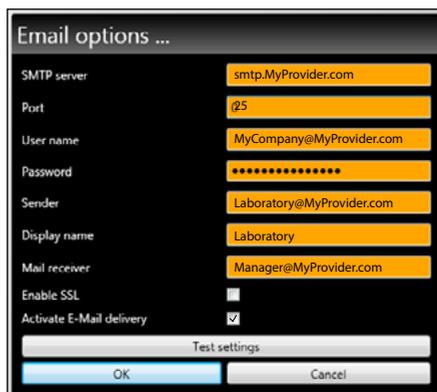


Fig. 20
Settings for the automatic sending of emails in case of alarm events

You get most of the necessary settings from your Internet service provider (ISP). In particular, the parameters mean:

Parameters	Description
SMTP Server	Outgoing mail server. Usually this address begins with "smtp." Example: smtp.memmert.com
Port	IP port number of the SMTP server; Number greater than 0 and less than 65536. Usually port 25, may also be 587. You will receive the information from your ISP. Port number 465 is out of date.
User name	Login name for the SMTP server. Provided by the ISP. This is not the login for the operating system nor the user name for AtmoCONTROL FDA. It is often an email address.

Parameters	Description
Password	Password for the SMTP server. Provided by the ISP, but may have been changed in a password change dialog box.
Sender	"From" or "Sender" of an e-mail. Possibly your ISP is expecting an e-mail address here.
Display name	User-friendly name, or short name for the "Sender". Often appears in e-mail programs instead of the sender's e-mail address. Example: Sender = atmocontrol@myISP.com, display name = AtmoCONTROL
Mail receiver	E-mail address(es) of the recipient(s) of AtmoCONTROL alarm messages. Multiple addresses can be specified, separated by a comma. Example: fred@mycompany123.com, control@cccom-pab.com
Enable SSL	SSL = Secure Sockets Layer. This is a cryptographic protocol to ensure data integrity and security between sender and receiver. Tick if possible.
Activate E-Mail delivery	Forwarding can be activated and disabled.
Test settings	When the button is clicked, a pseudo-e-mail will be sent.

7.5.1 Sequence

After receiving a log record online, the temperature, humidity, CO₂ and O₂ (if available), and alarm types are displayed or updated in the appliance list on the left side of AtmoCONTROL for the corresponding appliance. The system then checks whether e-mail forwarding is activated (tick box in the e-mail settings).

Then, if more than 10 minutes have passed since the last e-mail was sent, e-mail delivery is started. The 10-minute delay to prevent too many emails being sent. If the alarm disappears within 10 minutes, no email is sent.

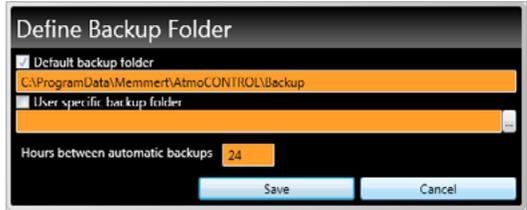
7.6 Backup Options

7.6.1 Backup of the protocol data/device database

You can specify a backup directory where AtmoCONTROL stores backup copies of programs, logs and user data. To do this, click *Options* → *Edit Backup options*.

You can use the preset standard directory and create a user-defined directory.

A device database is backed up as soon as an online connection to the cabinet is established. Whenever AtmoCONTROL has contact with the device, all new protocol data is transferred. During the online connection, the protocol data is backed up at the set interval. (See figure.) A backup is always created during the first online access.



i Without an online connection, there is no backup! When the online connection is re-established, the system checks whether the set time window has been exceeded since the last backup. If so, the backup is performed.

7.6.2 Backup of the program profiles *.atpro

Programs are not stored in the database, since they have no direct device reference. They are stored separately in the directory of the Windows user.

If an existing program is edited by the user and the previous version is overwritten by saving, the previous status is saved in the preset and, if necessary, also in the user-defined backup directory. The backup of the program profiles is not part of the automatic backup function.

7.6.3 Method

The log databases are backed up automatically in the backup directory at set intervals (in the above example every 24 hours, so daily). This is done after a multi-stage multi-generation backup process, which is also known as “Towers of Hanoi”. This results in only a few copies, but there are always backup copies, which are at the most 1, 2, 4, 8, 16,... intervals apart - so days old in the above example.

In this way, backup copies can be used for a basically arbitrary point in time, so that recovery is possible even for errors that have not been discovered for a long time. The database copies are identified by the appliance serial number and -L01 for level 1 (level L01). Example: B3120001-L01.atdb. The next copy receives the identifier L02, the third -L01 again, etc. (Fig. 21).

		Day or set interval of the backup															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
File suffix	L01			L01		L01		L01		L01		L01		L01		L01	
		'L02'					'L02'				'L02'				'L02'		
					'L03'								'L03'				
									'L04'								'L04'
		[...]															

Fig. 21 “Towers of Hanoi” data backup method

7.6.4 Restore

- When recovering database files (*.atdb), no appliance with the same serial number may be logged in, either online or offline.
1. Make backup copies in the backup directory in chronological order (sort by date modified).
 2. Select the backup copy of the day that is to be restored. Typically, this will be the last backup that was created before the period in which the error probably happened.
 3. Backup copy log into AtmoCONTROL offline and check the data.
 4. If the backup is not the one required, select the next older one and check it in AtmoCONTROL.
 5. If the appropriate backup has been found, log back out of the database in AtmoCONTROL.
 6. Copy the backup copy into the subfolder of the same name in the directory c:\Program-Data\Memmert\AtmoControl\ (example: Backup copy B3120001-L03.atdb in folder c:\ProgramData\Memmert\AtmoControl\B3120001).
 7. Delete the faulty original database file in the subfolder - i.e. the file that is named as the backup copy, but without the suffix "-Lxx".
 8. Rename the backup copy: Delete the "-LXX" suffix.
 9. It is advisable to register the appliance online, if sensible and possible, in order to reload the log data that has accumulated since it was backed up from the appliance.

Example:

On 27/11 an error is detected on appliance B3120001. The error probably happened on or after 24/11.

Backup files sorted by modification date (newest first):

B3120001-L01.atdb	26/11.
B3120001-L02.atdb	25/11.
B3120001-L03.atdb	23/11.
B3120001-L04.atdb	19/11

....

In this case the backup copy B3120001-L03.atdb of 23/11 restores the desired state, as it is the last one created before the suspected date of the error - 24/11.

- A direct backup of the log databases by copying the *.atdb files may only be performed if the associated appliances are not logged in - either online or offline - otherwise the consistency of the databases is not guaranteed. However, integrated automatic data backup is only performed during online connections and ensures the consistency of the database copies.

8. Event codes of the log file Log.txt

(see page 12)

Error code / status code	Description
101	Error in window management.
102	Error in the file system.
103	Error in the USB driver.
104	GUI error.
105	Error in the Internet Protocol.
106	Error on the I2C bus.
107	Error in the realtime clock (e.g. battery low or no battery).
108	RamDisk error; error in the power supply, voltage too low.
109	Controller internal monitoring routine has triggered a restart (watchdog reset).
110	Power supply error. The power supply is back in the allowed range.
111	The appliance control has been restarted.
112	Main memory overflow. No more heap available.
113	Unspecified operating system error.
114	An application task has been hung up and the operating system has been restarted.
201	Appliance configuration incorrect or missing.
202	Custom-specific calibration data missing or incorrect.
203	Factory calibration data missing or incorrect.
204	PID control parameters missing or incorrect.
205	User settings missing or incorrect.
206	No battery or battery empty.
207	Storage space on the SD card is running out; warning when used storage reaches 95%.
208	SD card full
209	SD card missing or incorrectly inserted.
210	Failed to copy the system and log files.
211	Error restoring the last system state (file 'Restore.bin').
212	The maximum number of programs/profiles on the SD card plus on the USB stick (currently 50) has been exceeded.
213	Note:The appliance log file has been archived because it has exceeded the maximum size under one date/time stamp.

Error code / status code	Description
214	The time zone has been changed.
215	The time has changed between summer and winter time.
216	Date and/or time have been adjusted.
301	Fan has not reached desired speed.
302	Heating control error.
303	Temperature limiter has triggered.
304	Door opened.
305	Heating error on power module. Details:
200000	"Optocoupler" component defect on heating module 1, power module 1.
020000	"Optocoupler" component defect on heating module 2, power module 1.
002000	"Optocoupler" component defect on heating module 1, power module 2.
000200	"Optocoupler" component defect on heating module 2, power module 2.
000020	"Optocoupler" component defect on heating module 1, power module 3.
000002	"Optocoupler" component defect on heating module 2, power module 3.
100000	"Triac" component defect on heating module 1, power module 1.
010000	"Triac" component defect on heating module 2, power module 1.
001000	"Triac" component defect on heating module 1, power module 2.
000100	"Triac" component defect on heating module 2, power module 2.
000010	"Triac" component defect on heating module 1, power module 3.
000001	"Triac" component defect on heating module 2, power module 3.
306	Error communicating with the power module. Details:
1000	Power module 1 not responding.
0100	Power module 2 not responding.
0010	Power module 3 not responding.
0001	Humidity power module not responding.
2000	Communication error (incorrect checksum) with power module No. 1.
0200	Communication error (incorrect checksum) with power module No. 2.
0020	Communication error (incorrect checksum) with power module No. 3.
0002	Communication error (incorrect checksum) with humidity power module.
307	Door locking via servo
401	Humidity sensor defective.
402	Humidity below minimum value.
403	Humidity maximum value exceeded.

Error code / status code	Description
404	Water tank empty.
405	Temperature sensor defective.
406	Monitoring sensor defective
407	Temperature below minimum value.
408	Temperature maximum value exceeded.
409	Temperature tolerance band violated.
410	Automatic light shut-off at high temperature.
411	PTC power of the steam generator too low or no voltage.
501	CO ₂ sensor is defective.
502	CO ₂ supply interrupted or CO ₂ gas bottles empty.
503	Note that appliance has switched to 2ndgas cylinder.
504	CO ₂ alarm limit undershot.
505	CO ₂ alarm limit exceeded.
506	CO ₂ sensor defective.
507	N ₂ supply interrupted or N ₂ gas bottles empty.
508	O ₂ alarm limit undershot.
509	O ₂ alarm limit exceeded.
510	CO ₂ configuration error.
601	Pressure sensor defective.
602	No shelf inserted.
603	Pressure alarm limit undershot.
604	Pressure alarm limit exceeded.
650	Pressure when first operating the appliance (R744)
651	Temperature on the power module No. 1 (R744)
700	Voltage below minimum limit.
701	Time of the power failure/switching off.
702	Time of restart.
703	Power failure; UPS (uninterruptible power supply) active.
801	Program start with timestamp.
802	Program aborted.
803	End of program.
804	Program not consistent with cabinet data.

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