



OPERATING INSTRUCTIONS

AUSTROMAT™ 624i™ G2

AUSTROMAT™ 654i™ G2

Version 12/2025



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We reserve the right to make changes



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1. Usage, data

1.1. Introduction

Dear customer,

You are in possession of a new, exceptional AUSTROMAT™ firing furnace.

DEKEMA's many years of experience in the field of firing furnace construction have gone into this equipment ensuring a very high level of quality, and exceptional performance and reliability. In order to take full advantage of the possibilities that your firing furnace offers and obtain superior results, we would like to ask you to spend a little time studying these operating instructions.

- The technical data and description of the usage of the firing oven can be found in section 1 Usage, data.
- Before you start using the firing furnace, it is essential that you read 2 Safety to prevent personal injury and property damage.
- Section 3 Design and function provides a short description of the firing furnace.
- How to set up and start the firing furnace is described in section 4 Start-up. Here you will find how to connect the firing furnace to a network or an individual computer.
- The menu control of the firing furnace is described in detail in section 5 User interface.
- The operation of the firing furnace is explained in section 6 Operation, from the first steps in to the creation of firing programs. Practical examples and tips will help you identify the sources of troubles and assist you in eliminating them.
- Follow the suggestions for the service and maintenance of the device in section 7 Maintenance and Service.
- Finally, the index enables you to quickly find specific functions or commands.



Fig. 1-1 AUSTROMAT™ 624i™ G2 (left) and AUSTROMAT™ 654i™ G2 (right)



1.2. Proper use

The firing furnace AUSTROMAT™ was designed for firing and pressing (only AUSTROMAT™ 654i™ G2) dental ceramic objects with and without vacuum. In every task that you perform with the firing furnace, observe the safety instructions in the section Safety.

Every use that goes beyond these instructions is held to be improper and can cause serious personal injury or property damage. We assume no guarantee when the device is improperly used handled or not used according to instructions. assumes no liability for damages that are thereby incurred.DEKEMA

In particular, materials may not be heated that may trigger explosions, implosions and hazardous or hazardous or flammable gases.

Proper use also includes the following:

- Read and following these instructions for use,
- Observe the technical data. See section 1.5.
- Perform service tasks in a timely manner. See section 7.



1.3. Scope of delivery

The following components are included in the delivery of the firing furnace:

- Firing furnace AUSTROMAT™ 624i™ G2 or AUSTROMAT™ 654i™ G2 with power cable,
- Vacuum pump with a vacuum hose and connecting cable,
- Insulation table and furnace tweezers,
- Operating instructions,
- Packaging material:
 - Cardboard boxes,
 - Foam material for protecting against impacts,
- Calibration set for calibrating the temperature.

Ensure that delivery is complete, and that the components have not suffered any visible damage in transport. If this is not the case, please immediately contact your service partner. Please store the packaging in case you need to ship the equipment at a later date.

1.4. Name plate

The information on the name plate describes the firing furnace and also offers potential customer-specific adaptations. In all correspondence with DEKEMA, please indicate all of the data that is on the name plate.

The name plate is on the back of the firing furnace.



Fig. 1-2 Example of name plate



1.5. Technical data

The technical data of the firing furnace are summarized in the following table. The cited connection values and tolerances must be maintained for the firing furnace to operate properly and for the warranty to take effect.

Dimensions and weight

- Dimensions: 383 x 653 x 343 mm (width x height x depth)
see Fig. 1-3
- Firing chamber useful dimensions: Firing function: 52 mm x 36 mm (diameter x height)
Press function: 80 mm x 83 mm (diameter x height)
(only AUSTROMAT™ 654i™ G2)
- Weight:
 - AUSTROMAT™ 624i™ G2: 19 kg
 - AUSTROMAT™ 654i™ G2: 24 kg
- Weight pump
 - 7.5 kg

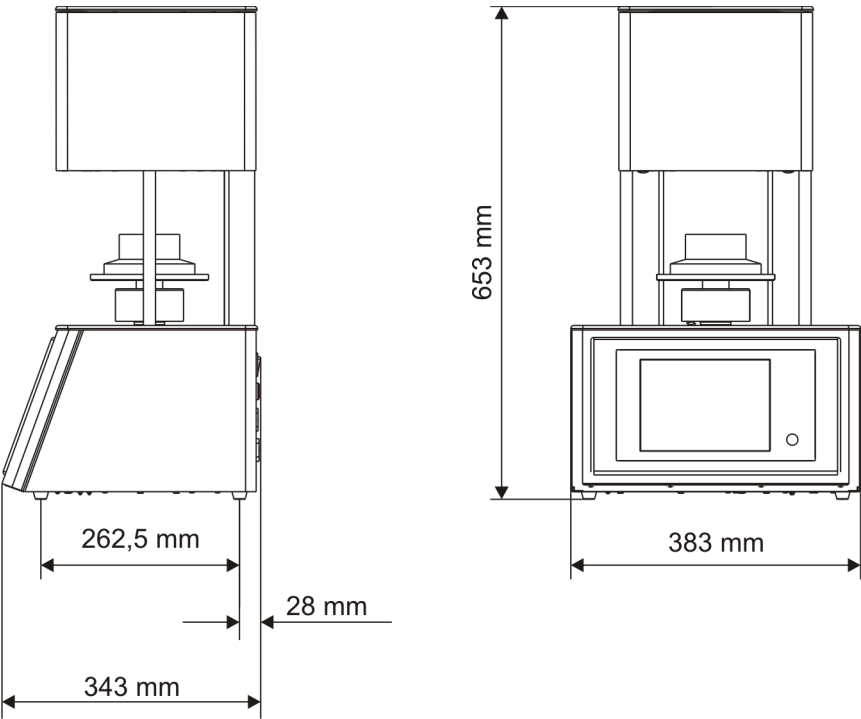


Fig. 1-3 Dimensions



Electrical supply data

NOTE:
Only use fuses with the indicated lag and nominal current.

- Supply voltage: depending on the type (name plate on the rear):
 - ~ 230 V, 50...60 Hz
 - ~ 120 V, 50...60 Hz
 - ~ 100 V, 50...60 Hz
- Fuses: depending on the type (name plate on the rear):
 - ~ 230 V: 2 x 6,3 A T 250 V
 - ~ 120 V: 2 x 16 A T 250 V
 - ~ 100 V: 2 x 16 A T 250 V
- Delivered vacuum pump: depending on the type (name plate on the rear):
 - ~ 230 V, 50...60 Hz
 - ~ 120 V, 50...60 Hz
 - ~ 100 V, 50...60 Hz

Service data

The indicated values are only valid when the delivered vacuum pump is used.

- Power consumption: including vacuum pump:
 - max. 1500 W at 230 V
 - max. 1400 W at 120 V
 - max. 1450 W at 100 V
- Firing temperature or Press temperature (only AUSTROMAT™ 654i™ G2): max. 1200 °C

Only for pressing furnace AUSTROMAT™ 654i™ G2

- Pressing path: max. 26 mm
- Pressure: approx. 30...350 N, electromechanically regulable in 10 steps

Interfaces

- USB interface
- Network interface



1.6. Ambient conditions

NOTE:

The firing furnace should not be operated for some time after sudden change of ambient temperature as otherwise condensation may occur in the electronic components, thus causing damage.

The data for the ambient temperature and humidity are designed for conditions at sea level.

- During operation:
 - Temperature: +15 °C...+35 °C
 - Humidity: max. 60%, non-condensing
 - Altitude above sea level max. 2000 m
- When not operating and during storage:
 - Temperature: +10 °C...+50 °C
 - Humidity: max. 80%, non-condensing
- During Transport:
 - Temperature: -10 °C...+55 °C
 - Humidity: max. 80%, non-condensing

2. Safety

2.1. This section must be read!

Read this entire section before you start working with the firing furnace! It contains important instructions for your personal safety.

This section must be read and understood by all persons who work with this firing furnace in any phase of the product life of the AUSTROMAT™ to prevent damage to persons and/or material.

2.2. Organization of the safety instructions

The following safety instructions Safety instructions refer to various hazard levels.

	 DANGER DANGER identifies a direct, high risk hazard that can cause death or serious bodily injury if it is not avoided.
	 WARNING WARNING identifies a potential, medium-level hazard that can cause death or serious bodily injury if it is not avoided.
	 CAUTION CAUTION identifies a low-risk hazard that can cause slight or moderate bodily injury or property damage if it is not avoided.

NOTE:
A note such as this refers to particularly important information that, however, does not concern safety.



2.3. General safety regulations

2.3.1. Personnel

All personnel who work with the AUSTROMAT™ must have the required technical qualifications and have received appropriate instruction and training. They must be informed about all dangers and risks in conjunction with this system.

2.3.2. Operating instructions

Read and learn

Anyone who works on or with the AUSTROMAT™ firing furnace in any phase of the product life must read these operating instructions and understand them. This concerns in particular chapter 2 Safety.

Retention

The operating instructions are delivered along with the firing furnace and are considered an essential component of the product. They must be stored with the firing furnace in a highly visible location and be directly accessible. You can order additional copies of the operating instructions from DEKEMA, see page 2.

Completeness

Always use the complete original version of these operating instructions. The instructions in the operating instructions contain cross-references to other sections containing important information. Incomplete copies or copies of individual pages can not provide all the necessary information of the operating instructions.

	⚠ WARNING
	Incomplete operating instructions. A lack of safety instructions due to incomplete operating instructions can cause serious injury and property damage. Always perform work with a complete copy of the operating instructions. Do not copy individual pages.



2.3.3. Operation

Use

The AUSTROMAT™ firing furnace may only be used for its intended purpose. See section 1.2. All instructions and procedures that can affect the safety of persons or the firing furnace are forbidden. The branch-specific and local regulations concerning accident prevention must be observed.

Please keep the lift closed when not in use. Due to increasing surface temperatures the furnace shall not operate for more than one hour with an open lift above 800 °C.

Condition

The firing furnace may only be operated when it is functioning properly, and with supervision. Observe the technical data in section 1.5.

If the firing furnace can no longer be operated safely, immediately unplug it and prevent it from being unintentionally operated. Reasons for assuming that the equipment cannot be used safely:

- An alarm message appears,
- Visible damage to the housing or power cable,
- Malfunctions,
- Frequently required fuse changes,
- Long storage in a problematic environment (moisture, see section 1.6).

Safety stickers

Safety stickers are affixed to the firing furnace and provide notification of residual danger. The safety stickers may not be removed. They must be replaced if they are lost or are no longer clearly legible.

Workplace

The operator must provide corresponding instructions and inspections to ensure order and cleanliness of the workplace and the surroundings of the AUSTROMAT™ firing furnace.

Waste

If polluting waste arises from use, the operator is responsible for the proper disposal.

2.3.4. Maintenance and Service

Spare parts

	⚠ WARNING
	Non-original spare parts. Malfunctions can arise if third-party parts are used. In certain circumstances, this can cause serious injury and substantial property damage. Always use original spare parts from DEKEMA. See section 7.6.

Retrofitting

Independent retrofitting and changes that affect the safety of the firing furnace are forbidden.

2.3.5. Disposal

The operator must carefully dispose of the firing furnace in accordance with regulations. He can give it to a licensed, private or public collection facility, or recycle it or dispose of it himself. See section 8.2.



2.4. Risks

Observe the following hazard instructions in all of your jobs with the firing furnace.

	 DANGER
	Electrical shock from voltage-conducting parts. The firing furnace is operated using mains voltage. Death may result due to electrical shock from touching voltage-conducting parts. Observe the following instructions: • Never contact voltage-conducting parts, • Do not use your hands or any objects to grasp things in the firing chamber, • Maintenance and service jobs may only be performed when a device is not powered. Turn off the firing furnace, and pull the power plug, • The protective conductor (inside and outside of the unit) must always be safe for operation and may never be disabled. The connection may never be intentionally severed.

NOTE:
Only personnel with electrotechnical training and experience with handling devices that operate on mains voltage may perform work on the electrical components.

Protection of personnel against electric shock
The equipment has to be connected with a supply source, which incorporates a circuit-breaker that interrupts the supply at a differential current of 30 mA or less.

The operator has to be protected against electric shock, including electric shock resulting from the possibility of simultaneous contact with hazardous live parts and parts connected to the protective conductor terminal. The following protective means are recommended:

- using insulated tools,
- wearing insulating clothing,
- standing on an insulating surface,
- shrouding of parts connected to the protective conductor terminal with which the operator might come into contact in normal use.



	⚠ WARNING Fire hazard. The firing chamber can reach temperatures above 1,000 °C during operation. Heat-sensitive materials close to the firing furnace can easily ignite and cause a fire. Observe the following instructions: • Never operate the firing furnace without the insulation table being mounted, • The vent holes in the cover of the firing chamber must be unobstructed, • Ensure that flammable materials (e.g., rubbing alcohol, wipes, etc.) or objects that can be damaged by heat are kept at a sufficient distance from the firing furnace, • Never operate the firing furnace without supervision.
 	⚠ WARNING Hot surfaces. The firing chamber can reach temperatures above 1,000 °C during operation. There is an extreme burning hazard from touching hot surfaces after the firing chamber is opened. Never directly contact hot parts of the firing furnace. The firing furnace requires several hours to cool after it is turned off. Observe the following instructions: • Do not use your hands or any objects to grasp things in the firing chamber, • Do not grasp the lift seat, insulation table or firing objects with your bare hands, • Use suitable tools (tweezers) to remove the firing objects, or wear safety gloves.
	⚠ WARNING The firing furnace is heavy. When the firing furnace is transported, there exists the danger of crushing, and the device may become damaged. At least two persons must transport the firing furnace. Wear safety gloves.





⚠ CAUTION

Ceramic dust from insulation materials.

The firing chamber and insulation table consist of ceramic insulating material. Inhaling ceramic dust can be hazardous to your health.

Do not inhale the dust. To remove ceramic dust, use a suitable vacuum cleaner. Only AUSTROMAT™ 624i™ G2: Read the safety data sheets for the insulation materials in section 9.

2.5. Access rights

Three levels are defined for accessing the user interface of the AUSTROMAT™ firing furnace via web browser or VNC software. Access levels 1 and 2 (see following table) are password-protected. The passwords are defined in the "Service" menu using the "Password" function.

The access rights should be issued to the users of the firing furnace based on their knowledge, experience and responsibility.

The firing furnace normally starts in the "Operation" menu. When "General Code" is used, it starts one level higher (level 0).

Access levels	Description
General Code (level 0)	• Restricted access to the "Setup" menu" • Selecting blocked programs and starting them • Edit and create unblocked programs • Unlocking the General Code
Operation (level 1)	• Select all programs and start them • Edit and create all programs • Access to the "Setup" menu
Service (level 2)	• Access to the "Service" menu

Tab. 2-1 Access levels

2.6. Stop function

Press the [ON/OFF] key next to the touchscreen. See section 3.2.2. All the commands that the firing oven is executing in standby mode, i.e. no program is running, are immediately interrupted without a query.



3. Design and function

3.1. Front of system

The following figure shows the front of the AUSTROMAT™ firing furnace and identifies the most important components.



Fig. 3-1 Front view of the firing furnace (example AUSTROMAT™ 654i™ G2)

- | | | | |
|---|------------------------------------|---|-----------------------------------|
| 1 | Firing chamber cover | 5 | Lift seat with sealing ring |
| 2 | Top of furnace with firing chamber | 6 | Bottom cover plate |
| 3 | Back column | 7 | Bottom oven part with electronics |
| 4 | Insulation table | 8 | User interface with touchscreen |

The top of the firing furnace contains the firing chamber with ventilation slots for cooling the firing furnace. The area in the bottom of the housing contains the electronic and mechanical furnace components. They are used to move the lift system comprising the lift rod, lift seat with sealing ring (O-ring), and the insulation table on which the objects to be fired are placed. The firing furnace is operated using a touchscreen and function keys.



3.2. Touchscreen and function elements



Fig. 3-2 Touchscreen and function elements

- 1

Touchscreen
- 2

Swiping bar for lift
- 3

On-Off-key

3.2.1. Touchscreen

NOTE:
Never use hard or sharp objects (such as screwdrivers, tweezers, etc.) to operate the touchscreen. This will scratch and damage the screen.

The touchscreen allows you to operate the firing furnace by fingers as known from a smartphone. The integrated swipe gestures allow e.g. scrolling lists.

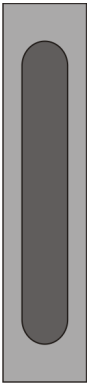
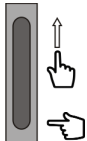
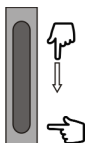
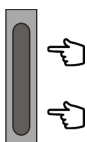
Please note: After the firing furnace is turned on, the control starts. This can take approximately 1 minute. Only then does the touchscreen appear.

The description of the user interface is found in section 5.



3.2.2. Function elements

You can use the swiping bar next to the touchscreen to move the lift up or down, and the ON/OFF button to terminate the current program or go to standby mode. When the firing furnace is connected to a network or an individual computer and is correspondingly set up (see section 4.4), you can execute these functions using the computer keyboard.

Element	Name	PC keyboard *)	Description	
	Swiping bar for lift	[F1]	- Swipe from bottom to top to move the lift upward. - Press again to stop the lift.	
		[F4]	- Swipe from top to bottom to move the lift downward. - Press again to stop the lift.	
			Move the lift in a defined position: - Press on the top of the swiping bar to move the lift in the top position (closing), - Press on the bottom of the swiping bar to move the lift in the bottom position (opening).	
	Swiping bar Parameter		Parameters can be set using the swiping bar once a parameter has been selected and the numeric keypad appears.	
	[ON/OFF]	[F9]	- Stop function: Press this to end all current commands. - On/off switch in standby mode: Press and hold the button for approx. 5 seconds. - For the first startup (see section 4.3) without any function.	

Tab. 3-1 Function elements
*) The function keys on the PC keyboard must be released to be used. See section 5.7.4.5



3.3. Rear of device

The following figure shows the back of the bottom part of the AUSTROMAT™ firing furnace and identifies the most important components.

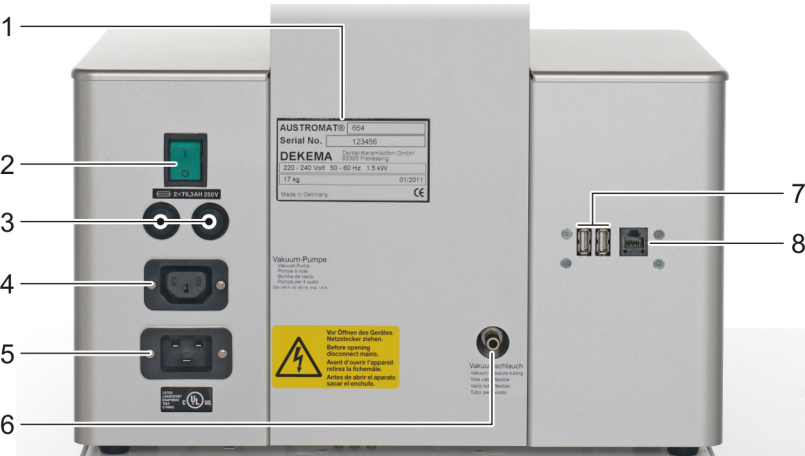


Fig. 3-3 Rear view of the firing furnace (example)

- | | | | |
|---|---------------------------------------|---|---|
| 1 | Name plate with serial number | 5 | Electrical connection for the vacuum pump |
| 2 | Main switch | 6 | Connection for vacuum hose |
| 3 | Fuse holder with fuses | 7 | USB interface |
| 4 | Connection socket for the power cable | 8 | Network interface |

The standard equipment on the back of the device comprises:

- The main switch for turning the device on and off,
- Two fuse holders with integrated fuses. See section 1.5.
- the electrical connection socket for the vacuum pump power cable,
- Connection socket for the power cable,
- Connection for vacuum hose,
- Three interfaces:
 - USB interface for connecting a USB device, e.g. USB stick, USB keyboard, or USB mouse,
 - Network interface for connecting an Ethernet cable (connecting the firing furnace to a network), or a crossed network cable (connecting the firing furnace to an individual computer).



4. Start-up

4.1. Unpacking and setting up



⚠ WARNING

The firing furnace is heavy.

When the firing furnace is transported, there exists the danger of crushing, and the device may become damaged.

Two persons must transport the firing furnace. Wear safety gloves.

Packaging symbols

The packaging can be labeled with the packaging symbols shown below. The symbols must be followed.

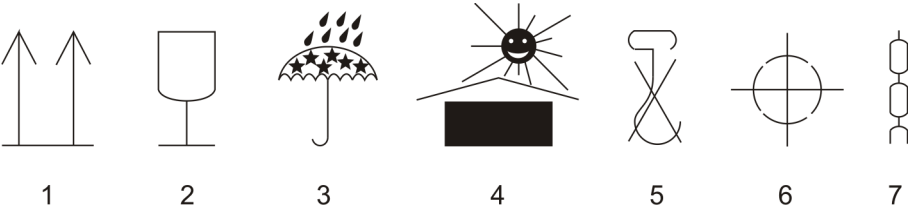


Fig. 4-1

Packaging symbols

- 1

Top
- 2

Fragile
- 3

Protect from moisture
- 4

Keep away from heat
- 5

Do not use hooks
- 6

Center of gravity
- 7

Lifting point

Unpacking

1.

Remove the packaging, and keep the packaging material for storing the firing furnace or for later transport.
2.

Make sure that all of the parts listed in the scope of delivery are in the delivered package. See section 1.3.
3.

Check the delivery for transportation damage. Notify immediately of any complaints.
4.

Transport the firing furnace to the provided setup site. See section 4.2.

NOTE:

It is possible that the firing furnace may not be safe to use when there is visible damage to the housing or power cable.



4.2. Requirements at the setup site

NOTE:
The following instructions must be followed each time the firing furnace is moved and repaired.

NOTE:
Set up the firing furnace on a place where you can easily remove the power cable.

Firing furnace

The setup site of the firing furnace must meet the following requirements:

- Set up the furnace on a dry, flat, solid, and fire-proof surface.
- The surface must be able to bear the weight of the firing furnace. See section 1.5.
- Materials and objects that can be damaged by heat must be sufficiently distant from the firing furnace.
- The vents in the firing furnace must not be obstructed to enable the circulation of cooling air.
- A power socket must be close to the device and easily accessible.
- The conditions in the environment at the setup site must meet the requirements in section 1.6.

Vacuum pump

The setup site of the vacuum pump must meet the following requirements:

- Set up the vacuum pump at a well-ventilated site protected from dust and dirt.
- Easily flammable and temperature-sensitive materials and objects must be sufficiently distant from the vacuum pump.
- The vents in the firing furnace must not be obstructed to enable the circulation of cooling air.



4.3. First Startup

4.3.1. Procedure

NOTE:

When connecting the firing furnace and vacuum pump, note the following:

- The firing furnace is operated using mains voltage.
- Ensure that the electrical connection values of the vacuum pump (nameplate!) match the supply data of the firing furnace.
- Use only suitable power sockets with ground contacts, and never use adapter plugs.
- Do not run the connection lines past places of the firing furnace that are hot, and especially avoid direct contact.

1. Make sure that the firing furnace is turned off. The ON/OFF switch is on the back of the furnace. See section 3.3.
2. Connect the vacuum pump to the firing furnace:
 - Slide the vacuum hose approximately 2 cm over the hose nozzle at the rear of the firing furnace.
 - Connect the pump plug to the vacuum pump and the corresponding connection socket on the rear of the firing furnace.
3. If you want to operate the firing furnace via a network (Ethernet): Connect a network cable to the interface on the back of the furnace. See section 3.3.
4. If you want to operate the firing furnace with a computer: Connect a crossover network cable to the interface on the back of the furnace. See section 3.3.
5. Plug in the power cable of the firing furnace into a power socket with a ground contact.
6. Turn on the firing furnace. The firing furnace control system starts up, duration approx. 1 min. This is followed by an internal check of the firing furnace's hardware and software, and the lift automatically moves down.
7. Make sure that the insulating table is mounted on the lift seat. Make sure that the insulating table is mounted on the lift seat. If not Turn the firing furnace off, and mount the insulating table.
8. If necessary: Remove any ceramic dust from the lift seat and the sealing ring. Brush the dust into a receptacle. Do not blow away the dust, and do not inhale it.
9. Approximately 3 minutes after the Program Manager appears, the firing furnace automatically heats up to the starting temperature for the preheating program.
10. The following ways exist to operate the firing furnace (control software):
 - Operation using the touchscreen and function elements. See section 3.2.
 - Operation using the touchscreen with the USB mouse and USB keyboard (via a USB hub). See section 3.2.
 - Optional operation using an individual computer: Connect the firing furnace to the network. See section 4.4.
 - Optional operation using an individual computer: Connect the firing furnace to the computer. See section 4.5.

4.3.2. Installation assistant (country-specific)

The (country-specific) Installation Assistant program is also activated in the factory before the delivery.

The installation assistant asks you to mount the insulation table, and runs an installation routine after you confirm by pressing the [START] button. The firing chamber is dried, and the firing furnace is checked. STOP. The installation assistant is started each time the furnace is turned on until the entire installation routine has run once.

NOTE:

After the installation routine is finished, a message appears and asks you to close the firing chamber to prevent wear. This message always appears when the firing chamber is opened for more than 15 minutes and the chamber temperature is above 200 °C.

- Acknowledge the message.
- Close the firing chamber.

4.4. Connect the firing furnace to the network

NOTE:

The unit shall not be connected directly to TNV networks.

Overview of the procedure

1. Determine the IP address of the firing furnace. See section 4.4.1.
2. Set up remote access to the firing furnace (operation):
Access through a browser. To do this, Java must be installed on a computer and the browser must be a Java-enabled. See section 4.4.2.
3. Set up a permanent IP address for the firing furnace. See section 4.4.3.
4. Establish access rights for users of the firing furnace. See section 4.4.4.

You can operate the firing furnace remotely using either the VNC program.

4.4.1. Determine the IP address

NOTE:
Consult your network administrator if you are uncertain.

- 1. Make sure that the firing furnace is connected to the Ethernet (interface for the network cable on the back of the unit).
- 2. Turn on the firing furnace and confirm any error messages.
- 3. Tap the gear icon  in the sidebar. The “Setup” menu appears.
- 4. Tap [Network]. The “Network Settings” window appears.



Fig. 4-2 Setup > Network (example)

- 5. Enable the DHCP functionality. The network server assigns an IP address to your firing furnace. The button appears with a colored border when DHCP is active.
- 6. Tap  in the sidebar. The window “Network settings” closes.



4.4.2. Setting up the operation of the firing furnace using a VNC program

NOTE:
To use the firing furnace via a VNC, a suitable VNC program needs to be installed on the computer.

- 1. Open a VNC program on a computer network (e.g. RealVNC or UltraVNC).

Creating a new connection (example VNC)

- 2. Select the menu item "File" > "New connection...".

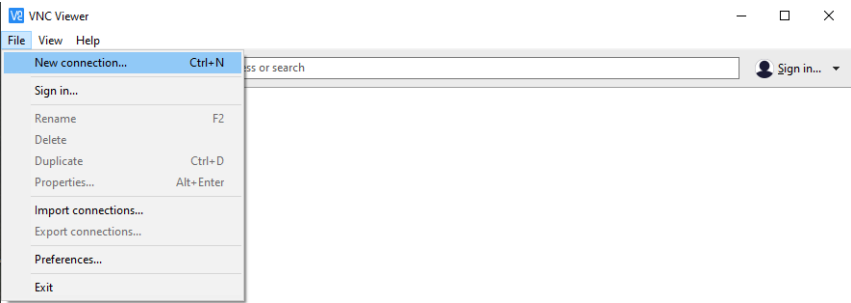


Fig. 4-3 VNC: New connection (example)

- 3. The "Properties" window appears.
 - a. Enter the noted IP address in the "VNC Server" entry line ("192.168.115.220" in the following example).
 - b. Enter a name for the firing furnace in the "Name" entry line ("AUSTROMAT" in the following example).
 - c. Click on [OK].

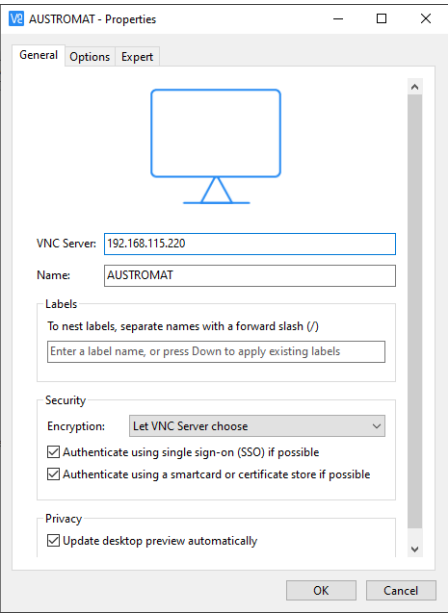


Fig. 4-4 VNC: Entering IP address and name (example)



Opening an existing connection (example VNC)

- 1. Double click on the icon of the existing connection.

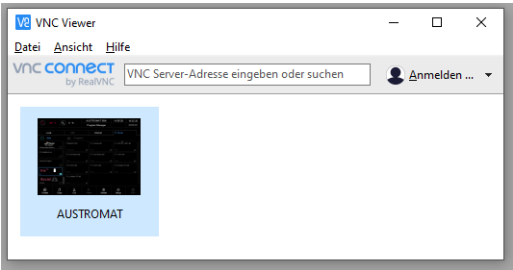


Fig. 4-5 VNC: Opening an existing connection (example)

- 2. The "Authentication" window appears.
 - a. Enter the password in the "Password" entry line. The standard password is "DEKEMA".
 - b. Click on [OK].

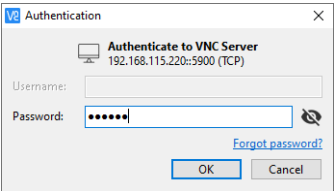


Fig. 4-6 VNC: Enter password (example)

- 3. The Program Manager appears in the VNC window. See section 5.3.
- Set up a permanent IP address for the firing furnace. See section 4.4.3.



4.4.3. Setting up a permanent IP address for the firing furnace

You can now operate the firing furnace using the VNC program. Depending on the network settings, a different IP address can be used each time the unit is started. So that you do not have to repeatedly find and enter the IP address, the firing furnace should be assigned a fixed IP address in the network.

- 1. Contact your network administrator, and have him assign an IP address and subnet mask and gateway address for the firing furnace.
- 2. In the "Setup" menu, open the "Network" function (> Setup > Network).

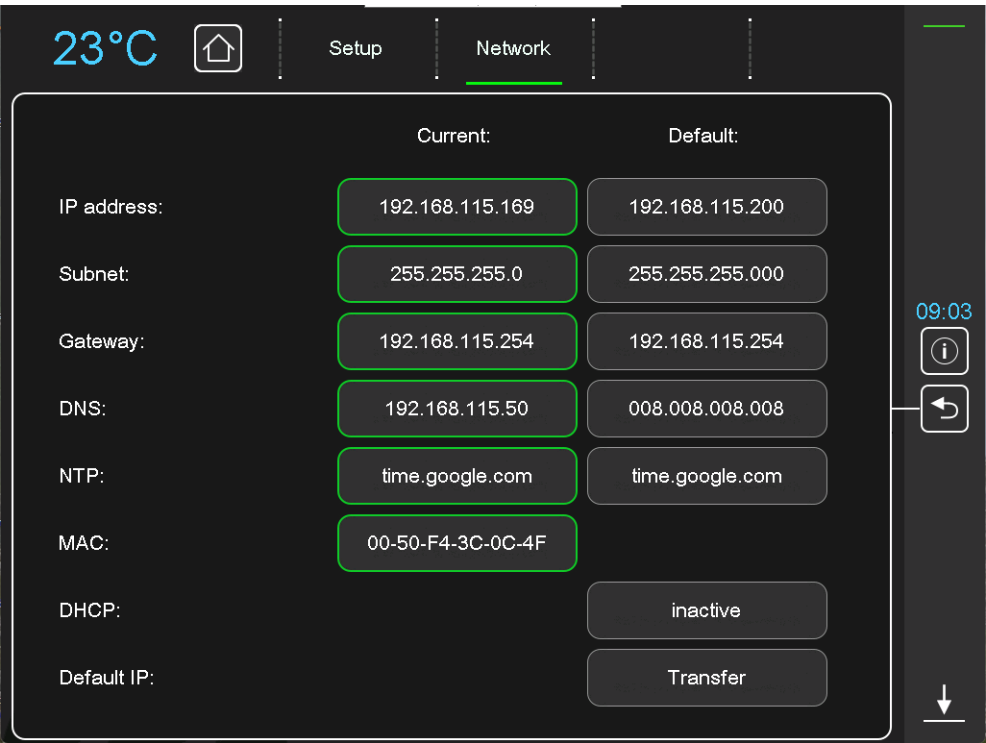


Fig. 4-7 Assign permanent IP address

- 3. Enter the values assigned to the firing furnace by the network administrator:
 - under "Default IP address,"
 - under "Default Subnet",
 - under "Default Gateway",
- 4. Deactivate the DHCP function.
- 5. Tap Default IP [Apply].
- 6. Tap . The window "Network settings" closes.

The firing furnace now has a fixed IP address and can be accessed using the VNC program at this address.

Now set up the authorizations for accessing the firing furnace. See section 4.4.4.



4.4.4. Specify authorizations

After connecting the firing furnace to a network or individual PC, every network participant or PC user can access the firing furnace's control system. You can restrict the access to the firing furnace to authorized persons by providing a password (the user name is always fixed).

- 1. Go to "Setup > Service > Additional Functions."

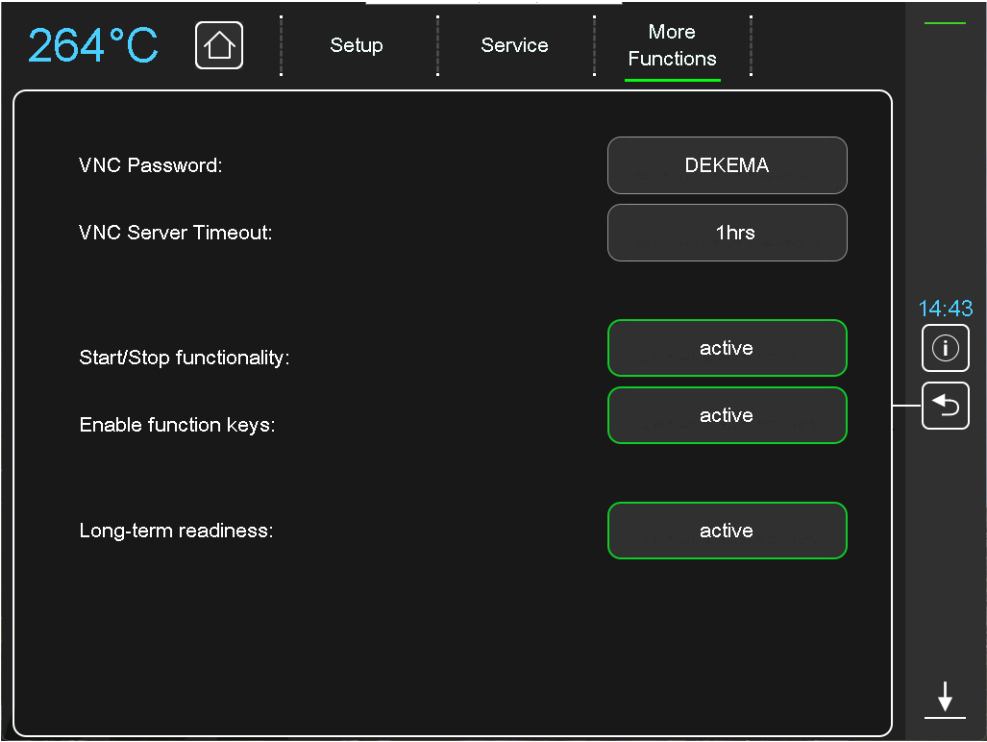


Fig. 4-8 Define password

- 2. Define the VNC password.
- 3. Activate the functions "Start/stop functionality" and "Unlock function keys".

When opening the firing furnace control through a VNC program, the password has to be entered to obtain access to the firing furnace, i.e., the firing furnace is password-protected. Communicate the password to the persons who are authorized to access the firing furnace.

NOTE:
If the password becomes lost, contact your service partner or directly contact DEKEMA (see page 2).



4.5. Connect the firing furnace to an individual PC

NOTE:

Consult your network administrator if you are uncertain.

1. Make sure that the firing furnace is connected to a computer with a network cable (interface on the back of the device).
2. In the plant, the firing furnace was assigned to DHCP by DEKEMA. You have to identify the present IP address of the firing furnace: See section 4.4.1.
3. If necessary, enter the correct IP address for your computer.

You can operate the firing furnace remotely using the VNC program.

4.5.1. Setting up the operation of the firing furnace using a VNC program

1. Section 4.4.2 describes the procedure to set up the operation of the firing furnace via a VNC program.
2. Now set up the authorizations for accessing the firing furnace. See section 4.4.4.

4.5.2. Setting up the operation of the firing furnace using a browser

NOTE:

Most modern browsers do not allow to run Java applications due to security reasons. Therefore, we recommend to set up the operation of the firing furnace via a VNC software. See section 4.4.2.

1. Section 4.4.2 describes the procedure to set up the operation of the firing furnace via a VNC program. If necessary, you may need to enable this IP address in your PC's firewall, refer to the operating system manual.
2. Now set up the authorizations for accessing the firing furnace. See section 4.4.4.
3. Activate the functions "Start/stop functionality" and "Unlock function keys".

Recommendation: Define bookmarks in the browser

You can define a bookmark in the browser for easily opening the firing furnace control: In the browser, enter the permanent IP address, and start the Java application. Wait until the Program Manager is displayed. Define the bookmark.

5. User interface

5.1. Basic information

5.1.1. Terms

The following table explains some of the basic terms that will make it easier to operate the AUSTROMAT™.

Term	Explanation
Program (Firing program)	Firing programs or other programs contain the individual control commands for the AUSTROMAT™. A typical example of a program is the preheating program that is the first program memory for most firing furnaces.
Program parameter (Firing parameters)	The individual values within a program are termed the program parameters or firing parameters. Program parameters are for example the starting temperature, drying time, and closing time.
Set	Compilation of all programs (program list) in the Program Manager.

Tab. 5-1 Definition of terms



5.1.2. Screen elements

The following table contains screen elements that are used in the user interface of the AUSTROMAT™.

Name	Example	Description
Button	active inactive	A button is associated with a function. An active function is indicated by a colored border.
Symbol		A symbol is associated with an action.
Query		A query requires confirmation
Dialog		A dialog displays information about the last action.
Keyboard window		On-screen keyboard for entering characters. - Numeric: See section 5.1.3. - Alphanumeric: See section 5.1.4. - Classic editor: See section 5.1.5.

Tab. 5-2 Screen elements



5.1.3. Numeric keyboard window

The numeric screen keyboard is used to enter numerical values, e.g. firing parameters. The keyboard automatically appears when the firing furnace control expects a number to be entered.

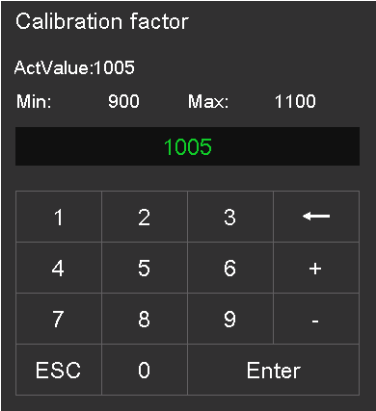


Fig. 5-1 Numeric keyboard window (example)

Valid values

When entering parameters, the following values are automatically displayed in the numeric keyboard:

- "Min" shows the smallest permissible value (minimum),
- "Max" shows the highest permissible value (maximum),
- the currently set value.

Entering the value

- Enter the desired value,
- Tap [Enter] to close your entry,
- The value is accepted when it lies within the valid range,
- The keyboard window is closed.

Terminating an entry

- Tap [ESC] to terminate the entry,
- An entered value is not accepted, the momentary value is retained,
- The keyboard window is closed.



5.1.4. Alphanumeric keyboard window

The alphanumeric screen keyboard is used to enter text, e.g. names of firing programs. The keyboard automatically appears when the firing window control expects text to be entered.

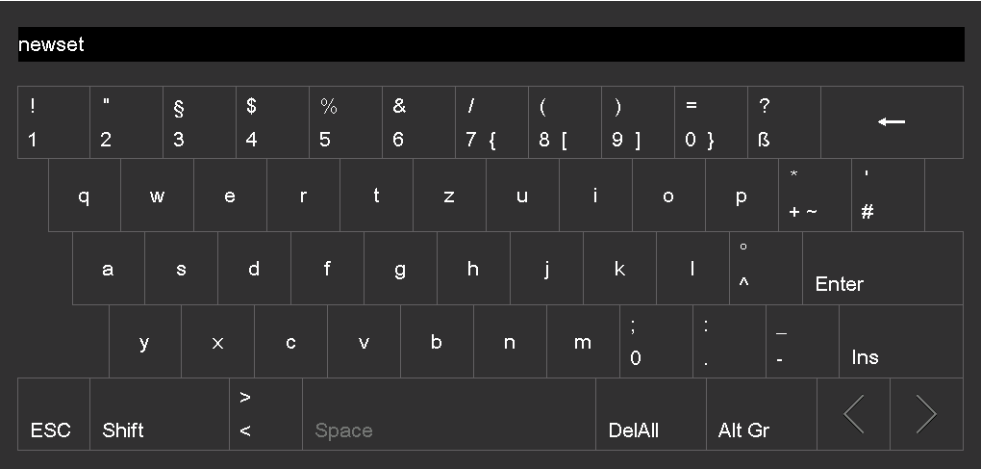


Fig. 5-2 Alphanumeric keyboard window

Entering text

- Enter the desired text. Use [Shift] to toggle between upper and lower case input,
- Tap [Enter] to close your entry,
- The alphanumeric keyboard window is closed.

Terminating an entry

- Tap [ESC] to terminate the entry,
- An entered text is not accepted,
- The alphanumeric keyboard window is closed.



5.1.5. Keyboard window for the classic editor

The keyboard window for the Classic Editor appears automatically when you type in the command line of a Classic program in the Program Editor.

Temperature [C]	1	2	3
Vacuum [V]	4	5	6
Time/Signal [T]	7	8	9
Lift [L]	0	.	DelAll
Autodry [A]	←		
Skip program [/]	<	>	

Fig. 5-3 Keyboard window for the classic editor

Editing the command line

- To edit, type in the command line. The text then appears in a colored frame,
- Use the Cursor keys to edit the command line at the desired place,

Finish input

- For example, type in the information bar (or press [Enter] on the keyboard) to finish entering text.
- The classic keyboard window is closed,
- Save the command line you entered.



5.2. Screen display

The screen display for operating the AUSTROMAT™ is divided into different areas.

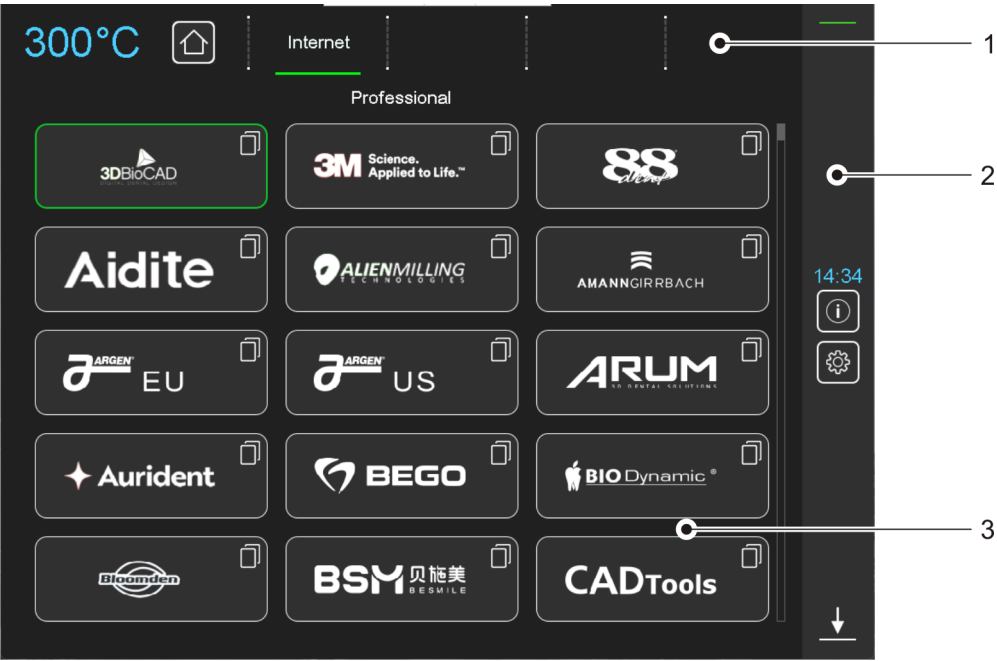


Fig. 5-4 Screen display (example of the Program Manager)

- 1 Information bar
- 2 Side bar
- 3 Display area

Information bar

The information bar remains visible at all times. It shows:

- The temperature in the firing chamber.

226°C

 Red = Heating on,

226°C

 Blue = Heating off.
Tap the temperature to turn off the heating. It can be switched on again by selecting a program.
- The folder structure of the Program Manager
(| Internet | ...). A green bar shows your current location and makes navigation easier.

Side bar

The sidebar remains visible at all times. It shows:

- Two arrows at the top and bottom symbolize the highest and lowest lift positions. By tapping, you can move the lift to the desired position. A green bar indicates when this position has been reached.
- 13:25

 Time,
- Info icon to open the “Info” window. This means that the most important information about the firing furnace is always accessible. See Fig. 5-5,



-  Gear icon to open the “Setup” menu. See section 5.7.
-  Back icon to close the corresponding window.

Additional icons in the Program Manager:

-  New icon for creating a new folder or program,
-  Paste icon to paste the contents of the clipboard.

Display area

The display area shows the current menu of the firing furnace control such as the Program Manager.

Info window

The info window summarizes the most important information about the firing furnace. They can be quickly accessed via the sidebar.

The QR code allows for easy online registration of firing furnace at DEKEMA. After successful registration, the QR code remains hidden.



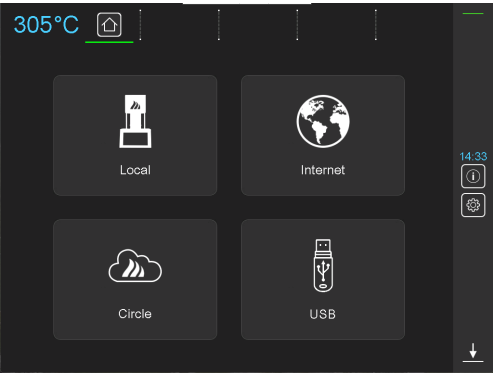
Fig. 5-5 Info window (example)



5.3. Program Manager

The Program Manager is used to manage firing programs and sets (e.g. copying, deleting) and for program navigation.

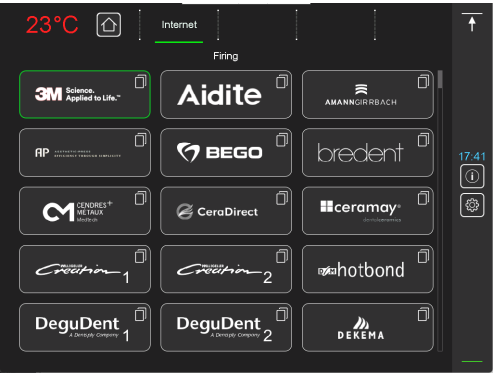
The following sequence of images shows an example of the program manager's masks when navigating through the folder structure.



Memory area

This allows you to select which memory area the firing furnace accesses for programs.

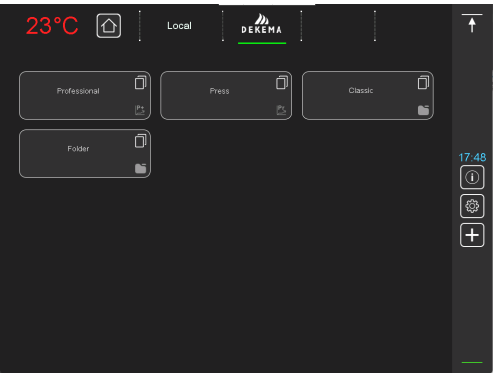
See section 5.3.1.



Set list

The set list shows all of the sets in the selected storage medium. Sets are indicated by a book icon in the button.

See section 5.3.2.



Program list

The program list "Programs" shows all of the firing programs in the loaded set. The program icon in the button indicates a firing program. The program list may contain folders for a more clear arrangement of programs.

See section 5.3.3.



Program display

The program display appears when you select a program. The display depends on the type of program that has been selected.

See section 5.4.



Navigation

The following figure shows an example of an information bar when a program is displayed.



Fig. 5-6 Information bar for navigation (example)

- Navigating between sets and folders:
Tap directly on the destination in the information bar. The selected set is displayed.
- Navigating to a firing program:
Select the desired firing program using the individual screens of the program manager.
- Exit firing program:
Tap anywhere in the information bar. The firing program is closed after a prompt, and the program list is displayed.



5.3.1. Memory area

Tap the corresponding icon to specify the memory area that the firing furnace accesses.

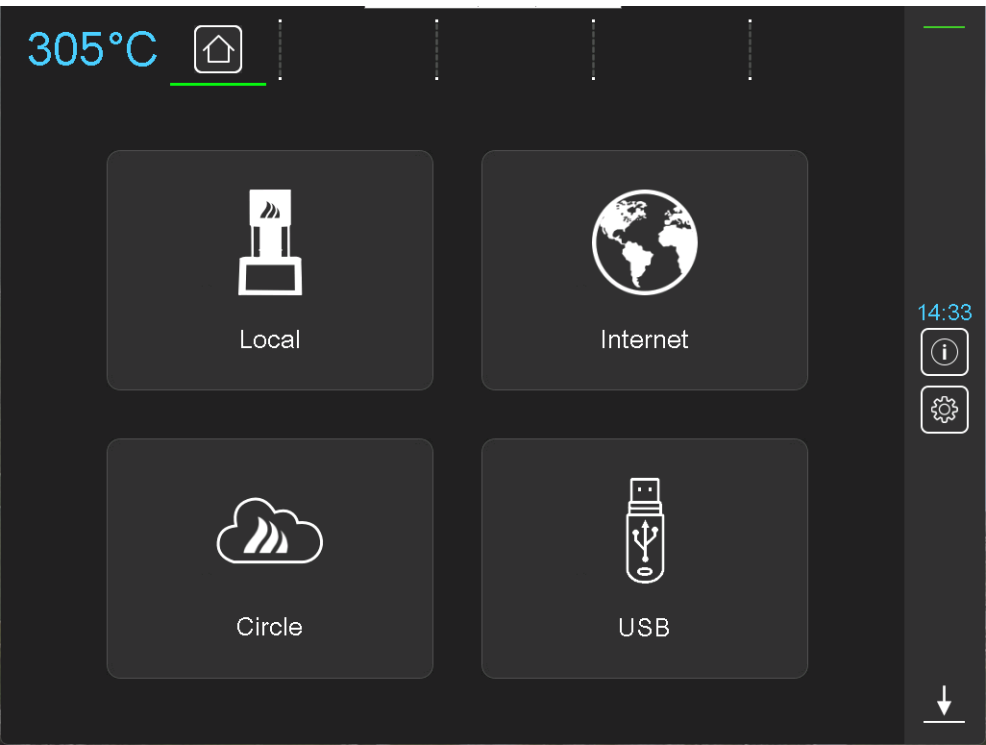


Fig. 5-7 Program Manager: Memory area (example)

- 

Local:
Programs and sets stored on firing furnace.
- 

Internet:
Programs and sets stored on the DEKEMA server. Only active when the firing furnace is connected with the Internet.
- 

Circle:
Programs and sets in the circle of all DEKEMA devices. See section 5.7.2.5. When the firing furnace is not connected with the circle the "Circle Login" window appears. See section 5.7.4.5
- 

USB:
Programs and sets stored on a USB stick. Only active when a memory stick is inserted in the interface of the firing furnace.



5.3.2. Set list

The set list shows all of the sets in the selected storage medium. Sets are indicated by a book icon  in the button. Tap on a set to open the corresponding program list.

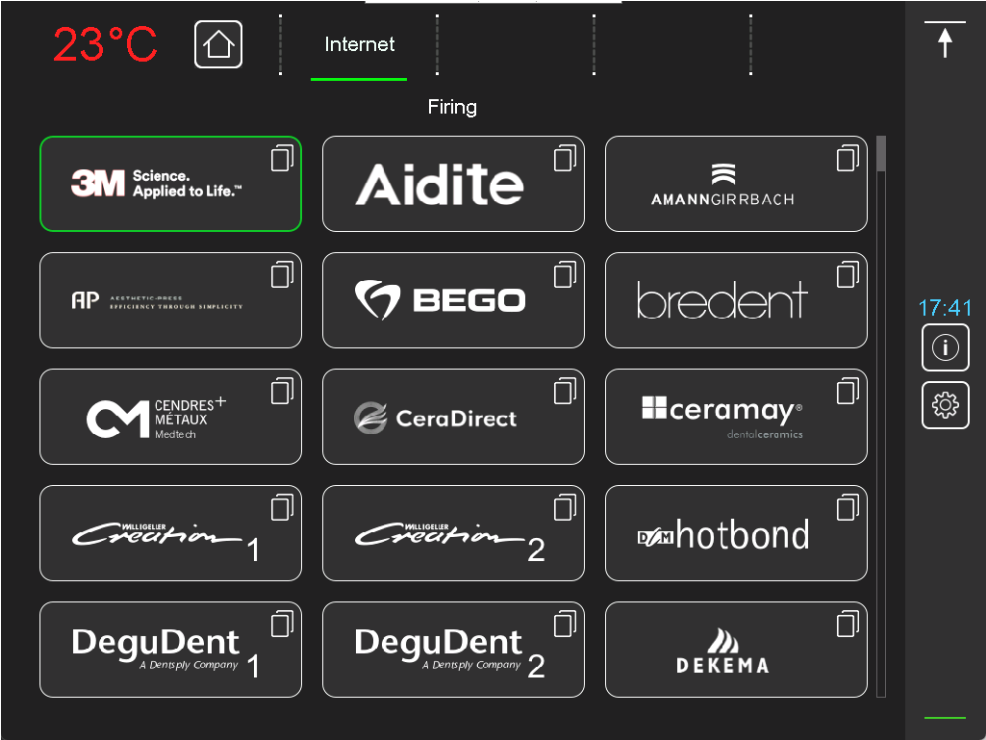


Fig. 5-8 Program Manager: Set list (example)

Action	Procedure
Create new	- Tap . The "Save as" window opens. Enter the name for the new set. - To save, tap .
Copy	- Tap briefly the book icon  for the desired set. The insert icon  appears in the sidebar. - Navigate to the destination and tap .
Delete	- Tap a book icon for about 2 seconds. A trash can appears instead of the folder icon for all sets.  - Tap  in the button for the desired set. - Confirm the prompt to delete the set.



Action	Procedure
Rename	• Navigate to the desired set. • Tap the name of the set in the information bar for about 2 seconds. • The "Save as" window opens. Enter the name for the new set • To save, tap .

Tab. 5-3 Actions for sets

5.3.3. Program list

The program list shows all of the firing programs in the loaded set. Burning programs are indicated by a program icon in the lower right corner of the button.
The program list may contain folders for a more clear arrangement of programs. These are marked with a folder icon.

Tap a firing program to open the program display. The last program opened is displayed with a green frame. This makes it easier to navigate and orientate yourself in the sequence of the program.

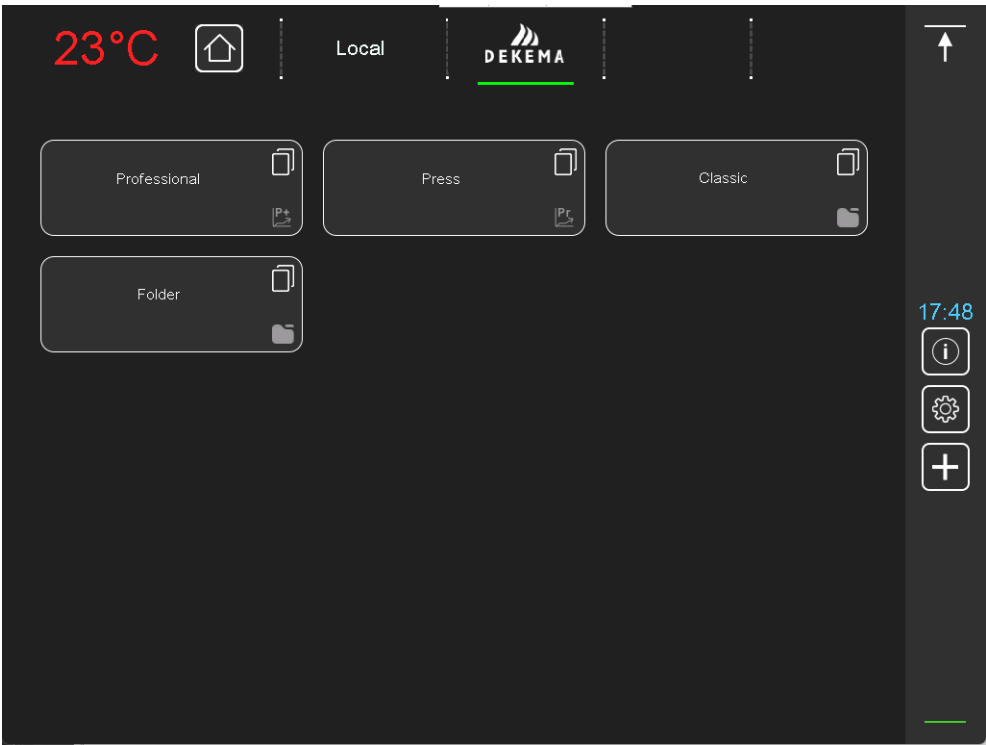
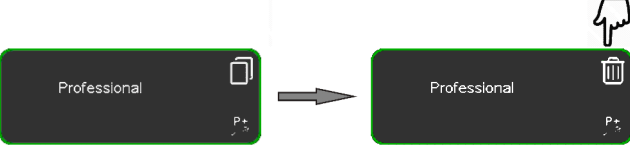


Fig. 5-9 Program Manager: Program list (example)

Action	Procedure
Create new	• Tap . • The "Program selection" window opens. See Fig. 5-10. • Select the desired program type. • Enter the name for the new program and confirm with .



Action	Procedure
Copy	- Tap and hold the book icon  for the desired program for about 2 seconds. The  ("Insert") icon appears in the sidebar. - Navigate to the destination and tap .
Delete	- Tap a book icon for about 2 seconds. A trash can appears instead of the folder icon for all programs.  - Tap  in the button for the desired program. - Confirm the prompt to delete the program.
Rename	- Navigate to the desired program. - Tap the name of the program in the information bar for about 2 seconds. - The "Save as" window opens. Enter the name for the new set - To save, tap .

Tab. 5-4 Actions for programs and folders

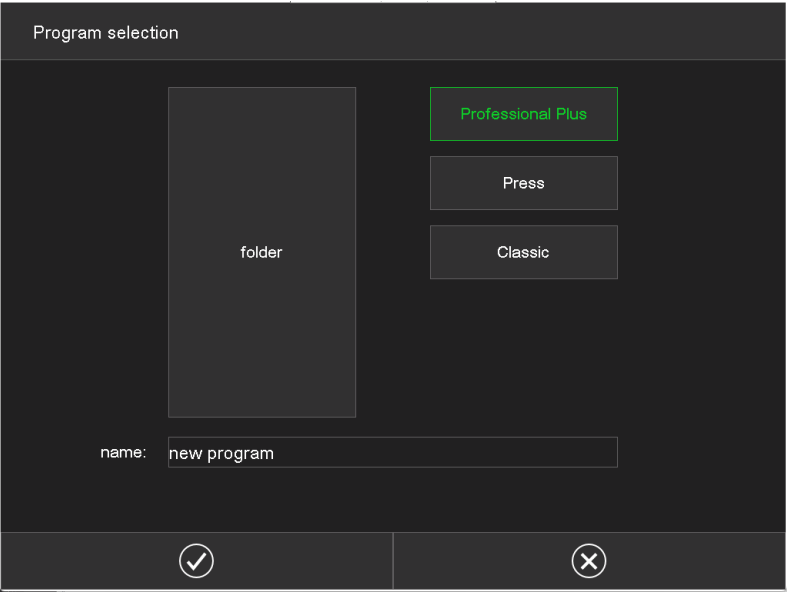


Fig. 5-10 "Program selection" window" (example)



5.4. Program display

The program display with the firing parameters appears when you select a program in the Program Manager. The display depends on the type of program that has been selected:

- Program display for professional plus programs. See section 5.4.1.
- Program display for classic programs. See section 5.4.2.
- Only AUSTROMAT™ 654i™ G2: Program display for pressing programs. See section 5.4.3.

5.4.1. Professional programs

The following illustration shows a typical program display for professional programs.

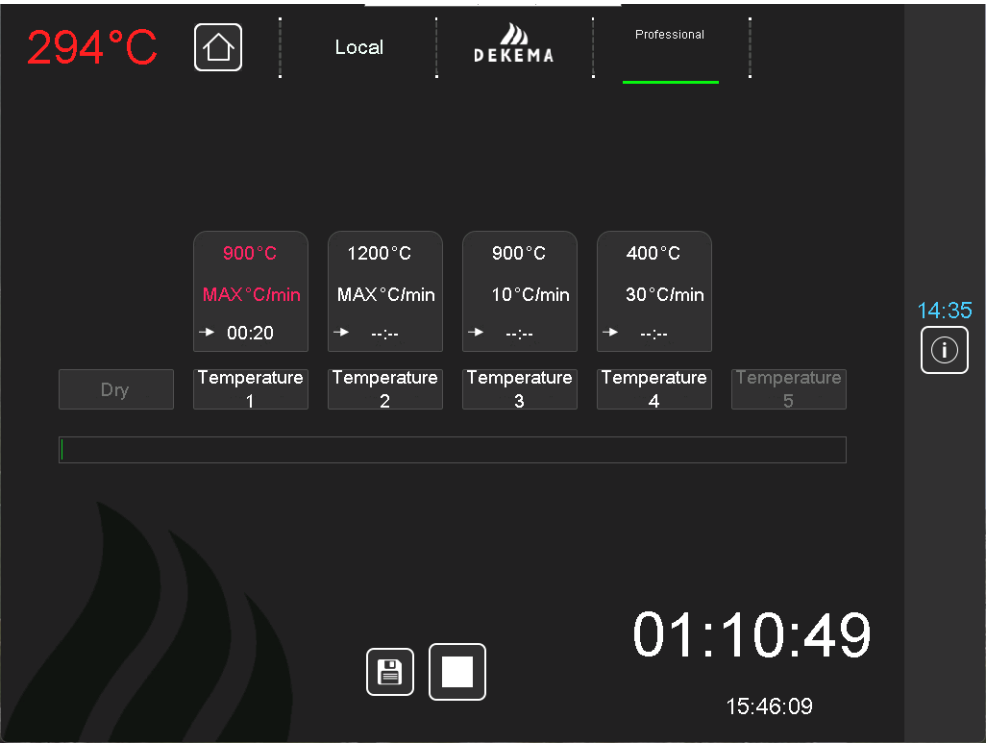


Fig. 5-11 Program display for professional programs (example)



The program display contains:

Information line	Displays the program name.
Input mask with firing parameters	900°C MAX °C/min → 00:20 Temperature 1 (example) • Tap a program step to activate/deactivate it. • The active program steps are executed sequentially from left to right. The available entry fields depend on the program step. See section 5.6.1. An empty entry cell means that the respective value is automatically specified by the program step or is not required.
Progress bar	A green progress bar indicates the current step in the program sequence.
[<]	Only active when no program is running.
[>]	The two sequence buttons scroll to the previous or next program. Or swipe the touchscreen rightward and leftward.
▶ ◻ 💾 🌙	Start and stop the program. See also the section 5.5. [Start] is automatically replaced by [Stop] after starting. After a program is stopped, the heating system turns off, and the firing furnace cools down. The firing is counted, i.e. the firing number is increased, when the program has run longer than 30 s. Only active if the program has been modified. Saves the program. Indicates that long-term standby is active/inactive. See also the section 5.7.2.4.
00:49:37 16:35:11 (example)	Program duration: • Estimated remaining duration of the current program step, • Time for the expected end of the program (current time in the sidebar).



5.4.2. Classic programs

The following illustration shows a typical program display for classic programs.

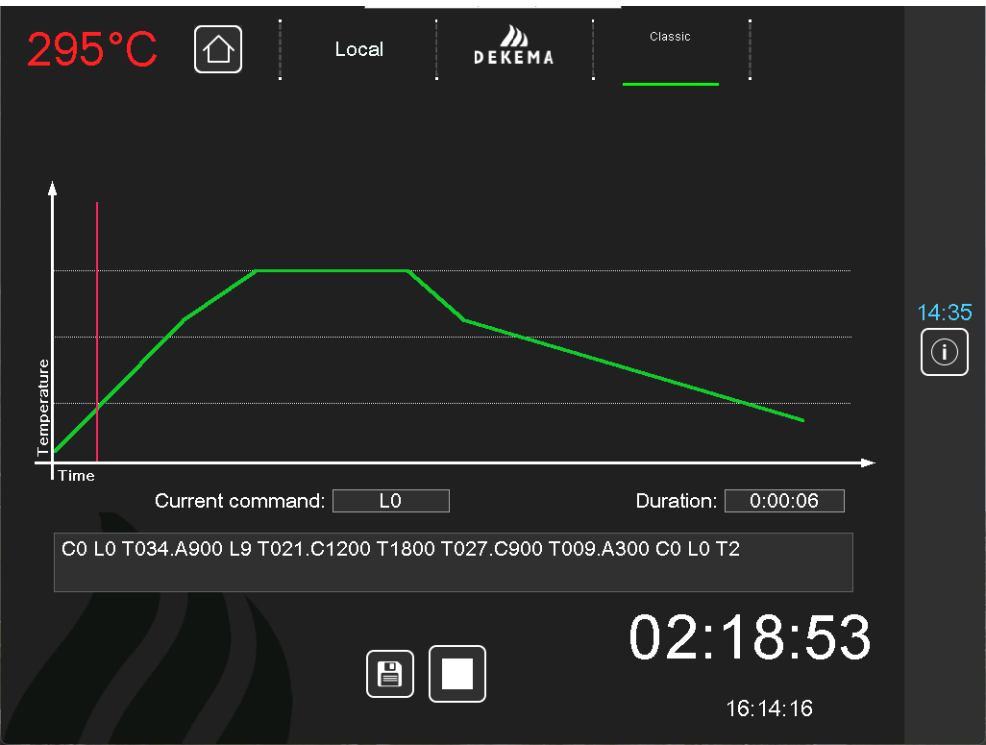


Fig. 5-12 Program display for classic programs (example)

The program display contains:

Information line	Displays the program name.
Graphic representation	The graphic display shows the progress of the program and contains the following elements: • The vertical axis shows the temperature. • The horizontal axis shows the time. • The cursor shows the current position (time) in the program. • The diagram shows the progress of the program as a colored curve. The temperature over time at the fired object is displayed. The current command and its duration so far are displayed below the graphical display.
Command line	Shows the individual program steps with the firing program in "CVTL" syntax. Tap on the command line to open the program editor to change the firing parameters. See section 5.6.2.
[<]	Only active when no program is running.
[>]	The two sequence buttons scroll to the previous or next program. Or swipe the touchscreen rightward and leftward.





Start and stop the program. See also the section 5.5.



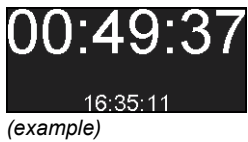
[Start] is automatically replaced by [Stop] after starting. After a program is stopped, the heating system turns off, and the firing furnace cools down. The firing is counted, i.e. the firing number is increased, when the program has run longer than 30 s.



Only active if the program has been modified.
Saves the program.



Indicates that long-term standby is active/inactive. See also the section 5.7.2.4.



Program duration:

- Estimated remaining duration of the current program step,
- Time for the expected end of the program (current time in the sidebar).



5.4.3. Pressing programs (only AUSTROMAT™ 654i™ G2)

NOTE:
This section applies only to the pressing furnace AUSTROMAT™ 654i™ G2.

The following illustration shows a typical program display for pressing programs.

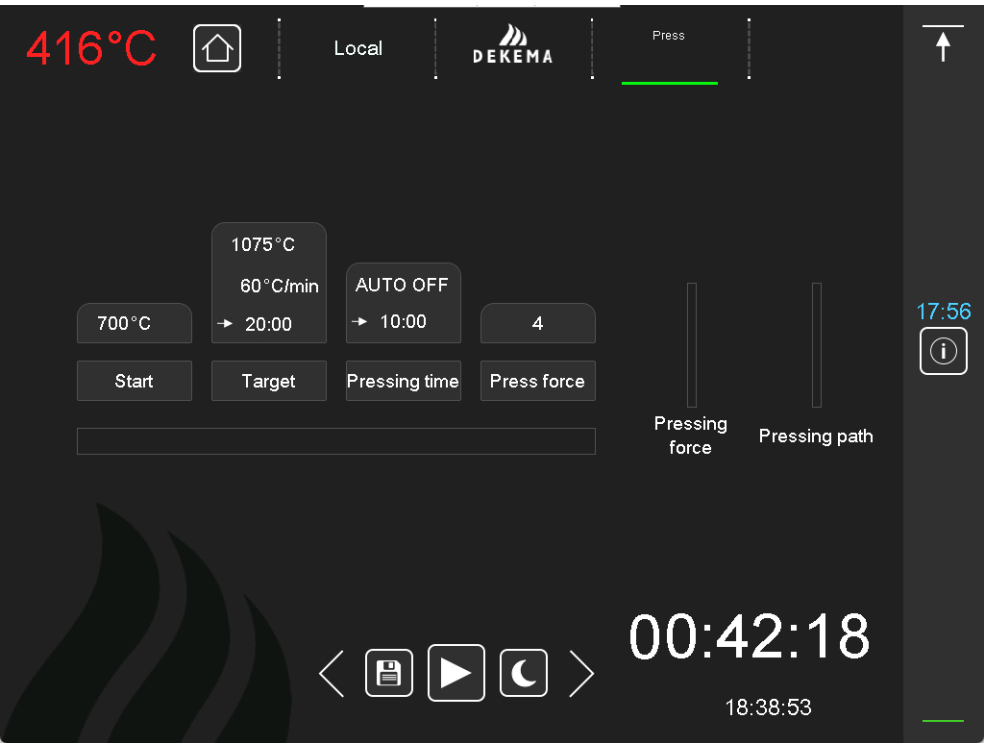


Fig. 5-13 Program display for pressing programs (example)

The program display contains:

Information line	Displays the program name.
Input mask with firing parameters	900 °C MAX °C/min → 00:20 Temperature 1 (example) • Tap a program step to activate/deactivate it. • The active program steps are executed sequentially from left to right. The available entry fields depend on the program step. See section 5.6.1. An empty entry cell means that the respective value is automatically specified by the program step or is not required.
Progress bar	A green progress bar indicates the current step in the program sequence.
[<]	Only active when no program is running.
[>]	The two sequence buttons scroll to the previous or next program. Or swipe the touchscreen rightward and leftward.





Start and stop the program. See also the section 5.5.



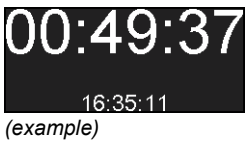
[Start] is automatically replaced by [Stop] after starting. After a program is stopped, the heating system turns off, and the firing furnace cools down. The firing is counted, i.e. the firing number is increased, when the program has run longer than 30 s.



Only active if the program has been modified.
Saves the program.

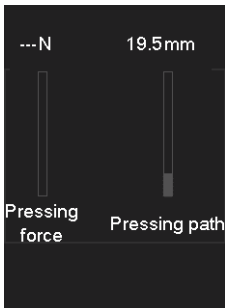


Indicates that long-term standby is active/inactive. See also the section 5.7.2.4.



Program duration:

- Estimated remaining duration of the current program step,
- Time for the expected end of the program (current time in the sidebar).



Pressing parameters:

- Actual pressing force while the program runs,
- Actual pressing path while the program runs.

Pressing programs in a trix™ set of a circle

Each trix™ user can automatically load the correct press programs, that are related to a created print process, into the Circle.



5.5. Program sequence

NOTE:
The available program types depend on the customer-specific design of your firing furnace.

A firing program is started from the program display by pressing . Please note:

- The program steps are executed in the specified sequence in the input mask. See section 5.4.
- Select  to prematurely terminate a running program. In this case, all the commands are stopped and the heat system is turned off. The firing furnace cools down. The firing is counted, i.e. the firing number is increased, when the program has run longer than 30 s.
- The QM information (if activated) will be displayed after the program run. See section 5.7.2.2.



Fig. 5-14 Example program sequence Classic



The example of Fig. 5-14 results in the following fire control:

Step 0: [Start]	"L0": Program start with the firing chamber open, i.e., the lift moves down if necessary. By default, the fire control system is only activated once the correct temperature for starting the selected program has been reached. Otherwise, the Tc indicator flashes and a message appears stating that the firing furnace is too hot or that the firing furnace is heating up first.
Step 1	"T030.A900": Set the object temperature (900 °C) with a ramp of 30 °C/min. The lift moves partially upward while the firing chamber is heated at the same time.
Step 2	"L9": Close (lift goes up).
Step 3	"T1200": Waiting time 1200 s.
Step 4	"T010.C1200": Set the firing temperature (1200 °C) with a ramp of 10 °C/min (900 °C to 1200 °C).
Step 5	"T4500": Waiting time 4500 s.
Step 6	"T010.A900": Set the object temperature (900 °C) with a ramp of 10 °C/min (1475 °C to 900 °C). The lift partially descends while the firing chamber cools down at the same time.
Step 7	"T030.A250": Set the object temperature (250 °C) with a ramp of 10 °C/min (900 °C to 275 °C). The lift partially descends while the firing chamber cools down at the same time.
Step 8	"C0": Switching off the heating.
Step 9	"L0": The lift moves all the way down.

The meaning of the individual program steps will be discussed in the following sections:

- For professional programs. See section 5.5.1,
- For classic programs. See section 5.5.2,
- Only firing furnace AUSTROMAT™ 654i™ G2: For press programs. See section 5.5.3.



5.5.1. Professional programs

Specifically, the program steps execute the following functions:

Program step	Definition
Drying	The firing object is dried for the specified holding time. In the "Drying" program step, the lift is automatically moved to the correct position. This position depends greatly on the temperature of the firing chamber. The lift may therefore move up and down several times in small steps.
Temperature 1	When the firing chamber is closed, temperature 1 is approached using the entered ramp 1. When temperature 1 is reached, the firing object is subjected to temperature 1 for the specified holding time.
Temperature 2	Starting from temperature 1, temperature 2 is activated at the specified heat-up rate 2 and held for holding time 2. The firing chamber may be open (e.g. cooling)
Temperature 3 ... Temperature 5	Starting from temperature 2, temperature 3 is activated at the specified heat-up rate 3 and held for holding time 3. The firing chamber may be open (e.g. cooling) The same applies to temperatures 4 and 5.

Tab. 5-5 *Meaning of the program steps for professional programs*

5.5.2. Classic programs

The individual program steps are displayed in the "CVTL" syntax and processed from left to right in the given sequence.

You can find a description of the "CVTL" syntax in section 5.6.2.



5.5.3. Pressing programs (only AUSTROMAT™ 654i™ G2)

NOTE:
This section applies only to the pressing furnace AUSTROMAT™ 654i™ G2.

Specifically, the program steps execute the following functions:

Program step	Definition
Start	The firing object is heated very quickly to the start temperature when the firing chamber is closed.
Target	When the firing chamber is closed, the target (final temperature) is approached using the entered ramp, starting from the start temperature. When the end temperature is reached, the firing object is subjected to the end temperature for the holding period.
Pressing time	The muffle is pressed against the ceramic plate of the firing chamber with the set pressing force for the duration of the pressing process. Click the [Auto] button to activate automated shortening of the pressing time. The pressing time is automatically shortened when the pressure does not have to be adjusted, i.e., it remains constant. Each change in force interrupts the shortening of the pressing time.
Pressure	The pressure is built up to the set value. The muffle is pressed against the ceramic plate of the firing chamber using the pressing force. The appendix contains a table with the vacuum values.

Tab. 5-6 Meaning of the program steps for pressing programs



5.5.4. Sleep mode (long-term ready mode)

NOTE:

Sleep mode is only available if long-term standby is activated in the “Setup” menu. See section 5.7.2.4.

"Sleep mode" procedure

The sleep mode status is indicated by the moon symbol  in the program display (colored = active). See section 5.4.

- After the program ends (lift moves up), an acoustic signal sounds,
- The heating is turned off. The firing furnace cools down to a firing chamber temperature of 100 °C:
 - During a firing program, the lift then closes and the firing chamber continues to cool down
 - During a pressing program the safe lift position is preferred (see chapter 5.7.4.4), the firing chamber does not close.
- The screen saver is activated after a set period. See section 5.7.2.3,
- The power consumption of the firing furnace in “sleep mode” is approximately 10 W.

Ending "Sleep mode"

"Sleep mode" is ended by pressing any key. The following actions automatically occur:

- The lift moves to the bottom position (L0).
- The furnace heats to the start temperature. The following message appears:
“Long-term readiness aborted. Remove the fired object. The firing chamber is set to the start temperature”.
- Confirm the message. The firing furnace defaults to the last program after a power failure or restart back to the start window.

NOTE:

Only operate the firing furnace under supervision!

5.6. Program editor

NOTE:
Locked programs cannot be edited. See also the section 5.7.2.4.

You can download programs for any program type from the data base area of the DEKEMA website (requires registration).

With the program editor, you can change existing programs or create new firing programs. Furthermore, it is possible to edit a firing program in progress.

When editing a firing program, note the following:

- The keyboard windows are described in sections 5.1.3, 5.1.4 and 5.1.5,
- An entered value must be confirmed by pressing [Enter]. Otherwise, the entry or change will remain ineffective.
- Incorrect values cannot be entered. The original value is retained. The permissible value range is displayed in the keyboard window.

Editing while the program is running
You can edit parameters while a firing program is in progress. However, you can only edit the values of the program steps that have not yet been processed.

5.6.1. Editing professional programs

Professional programs are characterized by:

- fast and easy programming,
- specified firing with an entry mask that provides the basic program steps,
- all individual firing parameters can be changed. The corresponding entry fields are displayed in the program display in color.

Opening the program editor

- In the Program Manager, select the desired firing program. The program display appears. See section 5.4.
- Click on a parameter field to edit it. The corresponding keyboard window is automatically opened.

Closing the program editor

- Tap on  to save the changes.
- Tap . The editor is closed.

The following table gives an overview of the permissible values for the individual program steps. The buttons in the sidebar correspond to the program display. See section 5.4.1.



Program step	Temperature in °C	Temperature rise in °C/min	Holding time in hours:minutes
Drying			00:00...99:59
Temperature 1	100...1200	0...MAX 1)	00:00...99:59
...			
Temperature 3			

Tab. 5-7 Permissible value range of the program steps for professional programs

1) maximum rise for input 0 °C/min

Examples of programming are found in the download area of the DEKEMA website <https://www.dekema.com/service-login/>

5.6.2. Editing classic programs

Classic programs are characterized by

- variable and flexible programming,
- unrestricted firing control
- all firing parameters can be changed as desired.

Opening the program editor

- In the Program Manager, select the desired firing program. The program display appears., See section 5.4.
- Tap on the command line below the program display to edit it. The keyboard window for the Classic editor appears.

The command line shows the commands in the sequence in which they are processed. However, you will need a bit of practice as well as an understanding of ceramics and firing techniques to program with the CVTL commands.

Closing the program editor

- Tap on  to save the changes.
- Tap . The editor is closed.



CVTL commands

In particular, the CVTL commands execute the following functions:

Temperature	"C" defines the temperature in °C in the firing chamber (degrees Celsius)
Vacuum	"V" defines the vacuum (Vacuum). The appendix contains a table with the vacuum values. • V0 = no vacuum or ventilate firing chamber. • V9 = maximum vacuum.
Lift	"L" and a single digit define the lift position (Lift): • L0 = bottom-most lift position, to • L9 = top lift position.
Time	"T" and at least a double-digit number define the time (Time) in seconds.
Autodry	"A" defines the temperature in °C on the insulation table (Autodry).
Pressure	"L9" and a single-digit number define the pressure. The appendix contains a table with the vacuum values. • L90 = contact pressure, • L99 = maximum pressure.
Audible signals	"T" and a single-digit number define the number of audible signals,
Jump command	" /x(x) " - causes a direct jump to a different memory with automatic continuation of the program. The program is continued without interruption. • xx defines the memory number of the program that is to continue, • Number of digits: 1 to 2-digit (0...99). No space may be inserted between the jump command "/" command and the program memory number.
Command connector	" . " connects two commands. Temperature ramps, lift ramps, press time shortening and active cooling are possible.
Temperature rise (temperature, firing chamber)	"T0xxx.Cxxxx" defines a temperature ramp in the firing chamber by means of a temperature gradient. • T defines the ramp in °C/min, • C defines the end temperature in °C in the firing chamber.
Temperature rise (time, firing chamber)	"T(x)xxx.Cxxxx", (x) <> 0, defines a temperature ramp in the firing chamber by means of time. • T defines the time in s, • C defines the end temperature in °C in the firing chamber.



Temperature rise (temperature, object)	"T0xxx.Axxxx" defines a temperature ramp of the firing object by means of a temperature gradient. • T defines the ramp in °C/min, • A defines the end temperature in °C on the insulation table (firing object).
Temperature rise (time, object)	"T(x)xxx.Axxxx", (x) <> 0, defines a temperature ramp of the firing object by means of time. • T defines the time in s, • A defines the end temperature in °C on the insulation table (firing object).
Lift ramp	"T(x)xx.Lx" defines a lift ramp. • T defines the time in s, • L defines the lift end position.
Press time shortening PTA	"TxxxxX.PTA" defines the press time reduction (Press Time Automatic). It must be entered directly after a press command. • T defines the press time in s, • The PTA is a single-digit number and defines the press time shortening in PTA × 10%. The remaining time shown in the PTA command is automatically shortened.
Active cooling	"V.Cxxxx" defines quick cooling when the firing chamber is slightly opened. Outside air is conducted through the firing chamber by means of the vacuum pump. Please note: To create a vacuum, firing chamber needs to be closed (command L9). • V defines the cooling air stream through the opening of an additionally integrated flooding valve, • C defines the Temperature in °C in the firing chamber.

Two sequential commands are separated by a space for clarity.

The syntax is checked when you confirm your entry. If the entered command line contains an error, then a warning appears. In this case, correct for the command line.

Examples

Examples of programming are found in the download area of the DEKEMA website <https://www.dekema.com/service-login/> or in the separate instructions for classic programming.



5.6.3. Edit pressing programs (only AUSTROMAT™ 654i™ G2)

NOTE:
This section applies only to the pressing furnace AUSTROMAT™ 654i™ G2.

Press programs are characterized by:

- fast and easy programming,
- specified firing with an entry mask that provides the basic program steps,
- only individual firing and pressing parameters can be changed. The corresponding entry fields are displayed in the program display (see Fig. 5-13) in color.

Opening the program editor

- In the Program Manager, select the desired firing program. The program display appears. See section 5.4.
- Click on a parameter field to edit it. The corresponding keyboard window is automatically opened.

Closing the program editor

- Tap on  to save the changes.
- Tap . The editor is closed.

Program step	Temperature in °C	Temperature rise in °C/min. or Pressing parameters	Holding time in min:sec
Start	100...700		
Target	700...1200	0...MAX 1)	00:00...99:59
Pressing time		[Auto] 2)	00:00...99:59
Pressure		0...9 3)	

Tab. 5-8 Permissible value range of the program steps for pressing programs

- 1) maximum rise for input 0 °C/min
2) Automatic shortening of the process time
3) The appendix contains a table with the vacuum values

Examples of programming are found in the download area of the DEKEMA website
<https://www.dekema.com/service-login/>



5.6.4. Creating a new program

Follow the procedure below to create a new program:

- 1. Open the program manager. See section 5.3.
- 2. Tap on the desired storage medium.
- 3. Tap on the set where you want to save the new program.
- 4. Tap . The "Program selection" window opens.

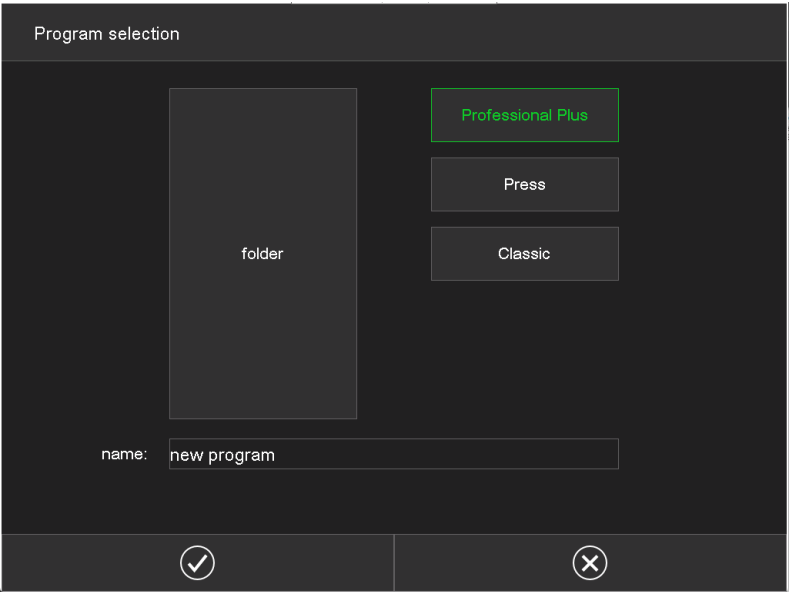


Fig. 5-15 "Program selection" window

- Select the desired program type,
 - Tap on the program name. The alphanumerical keyboard window opens. Enter a program name.
 - Tap on [OK]. The program editor opens.
- 5. Edit the new program. You can find programming suggestions in section 5.6.5.
 - 6. Tap on  to save the changes.

It is always possible to subsequently change the program name: In the program editor, tap the field for the program name. The alphanumeric keyboard window opens.



5.6.5. Programming Suggestions

You can find non-binding programming suggestions at <https://www.dekema.com/service-login>. The programs are firing programs converted according to manufacturer's instructions for DEKEMA dental ceramic furnaces of the AUSTROMAT™ series. You can load these programs into your firing furnace. See section 5.3.

The parameters such as heating rates, temperatures and hold times indicated by the respective manufacturer are transferred to the programs. These quantities depend on the conditions of use such as the size and material of the firing tray or soft firing cushion, the size and weight of the fired object, or the firing oven used when the ceramic manufacturer was determining the firing parameters.



5.7. Setup menu

NOTE:
Access to the setup menu can be restricted using the program lock. See also the section5.7.2.4.

The "Setup" menu is used for system control, to change global settings of the firing furnace, to launch maintenance programs, and to record data. You can access the "Setup" menu by tapping  in the sidebar. It is accessible to laboratory users if not blocked by the supplier for a specific customer.

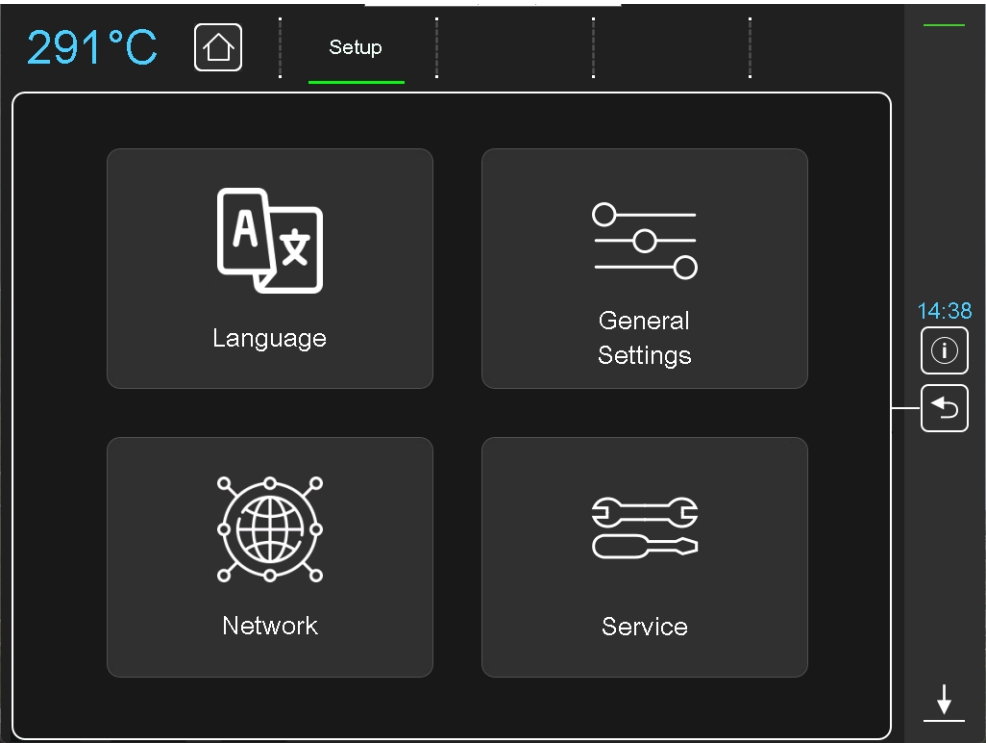
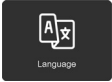
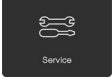


Fig. 5-16 "Setup" menu"

The following table lists the available functions in the "Setup" menu and provides a short description. A detailed explanation can be found in the indicated section in the column "See section".



Function	Description	See section
	Select a language for the user interface.	5.7.1
	The following settings are available:	5.7.2
	• Units, Time, Date	5.7.2.1
	• Quality management	5.7.2.2
	• Screen	5.7.2.3
	• Program lock	5.7.2.4
	• Circle	5.7.2.5
	Network settings	5.7.3
	The following service functions are available:	5.7.4
	• Backup, Update	5.7.4.1
	• CALIBRITE	5.7.4.2
	• Test programs	5.7.4.3
	• Lift settings	5.7.4.4
	• Additional functions	5.7.4.5
	• DEKEMA Service	Service Manual

Tab. 5-9 Functions in the "Setup" menu"



5.7.1. Language

Tap  → .
The following window appears for selecting the language of the user interface.

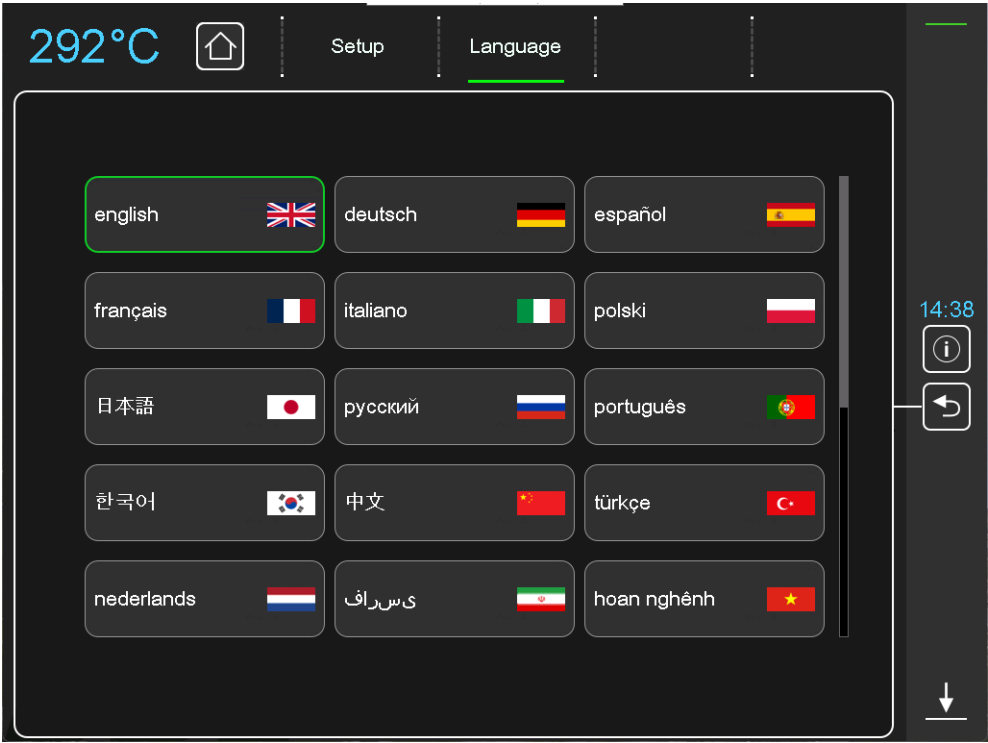


Fig. 5-17 Setup > Language

Tap on the button for the desired language. The highlighted button identifies the currently set language.



5.7.2. General settings

5.7.2.1. Units, Date, Time

Tap  →  → .
The following window appears for selecting the units and setting the date and time.

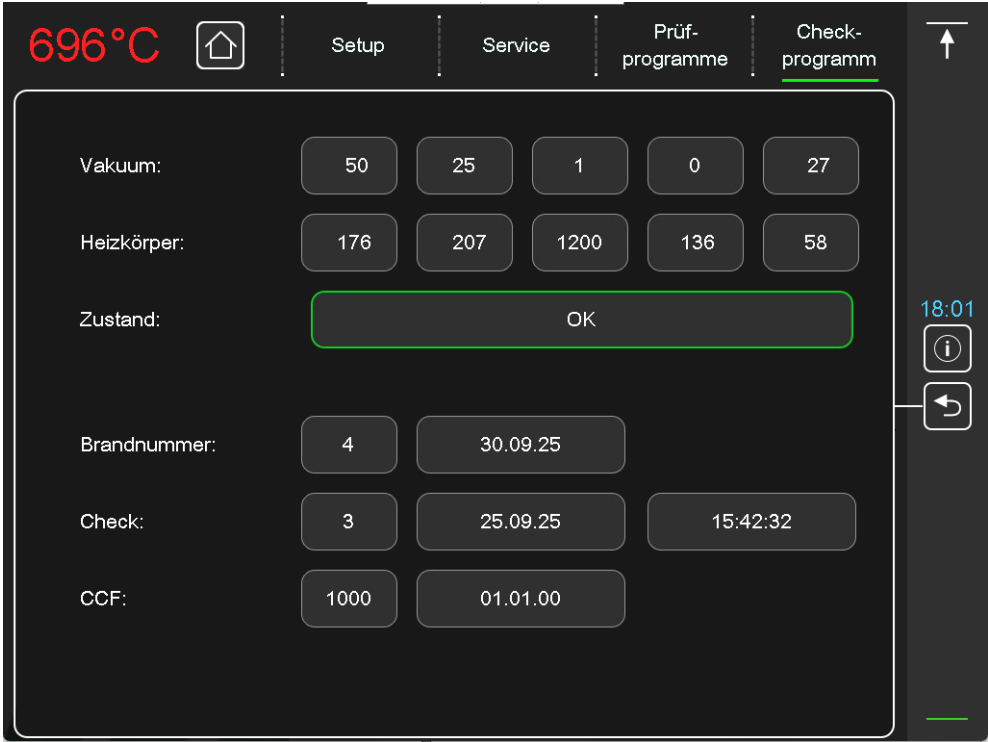


Fig. 5-18 Setup > Units
Tap the desired button. A color-coded button indicates the currently selected function.

Temperature	Conversion formula between °C and °F (Fahrenheit): $TF = TC \times 1.8 + 32$ or $TF = 9/5 TC + 32$
Vacuum	1 mbar = 1 hPa (international SI unit hPa)
Pressure	1 N (international SI unit) ↔ 0.1 kg (1 N = 1 kg × m / s ²)
Time	Only available when NTP is inactive.
Date	Only available when NTP is inactive.
GMT	This button can be used to make local adjustments to the time (deviation from Greenwich Mean Time).



Date format	You can switch between European and American formats. • European format, e.g. "14:29:12, and May 15.5.2025, 2005 for May 15, 2025. • American format, e.g. "02:29:12 p.m., and 05/15/2025 for May 15, 2025.
NTP	The time can be synchronized with an NTP server when the firing furnace is connected to the network. • The NTP server is defined in the network settings. See section 5.7.2.3. • The synchronization interval is defined by the "NTP Update Time".



5.7.2.2. Quality management

Tap  →  → .
The following quality management window appears.

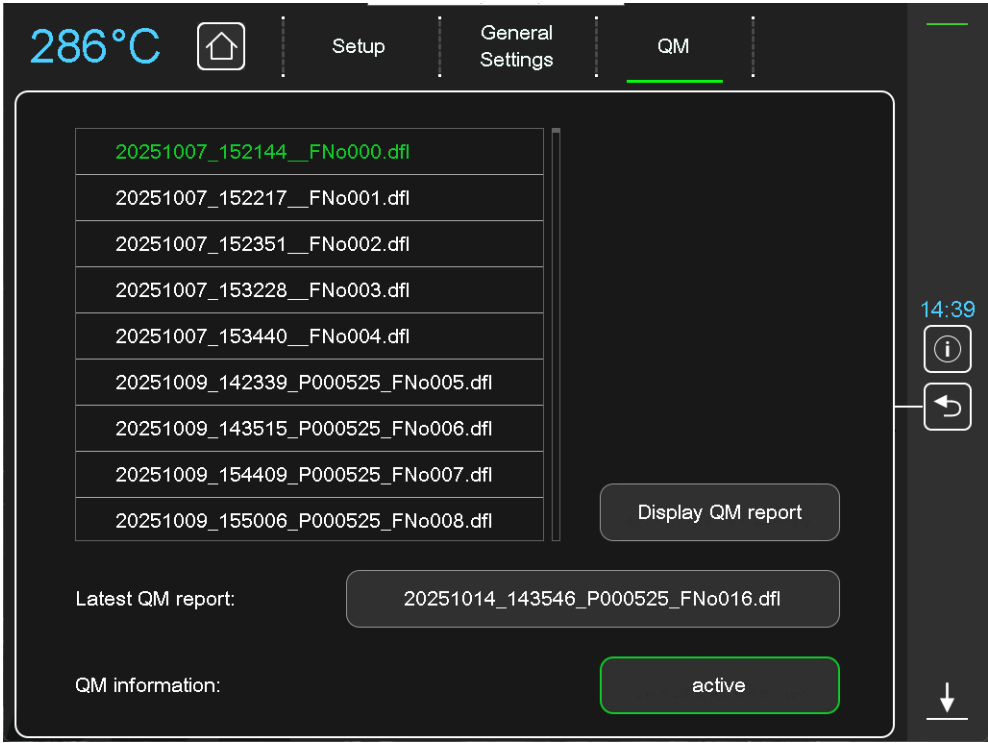


Fig. 5-19 Setup > Quality management

The firing furnace logs the ten last firing programs that have run. If more than ten firing programs have run, these QM files are overwritten starting with the last one.

QM list	List of logged QM reports.
Display QM report	Opens the selected QM report from the QM list. See section 6.9.1
Latest QM report:	Opens the QM report for the last completed firing program. See section 6.9.1
QM informations:	• Active: After a firing program is over, the related detailed firing information appears on the display. • inactive: QM information is logged but not displayed.



5.7.2.3. Screen

Tap  →  → .
The following window for adjusting the screen appears.

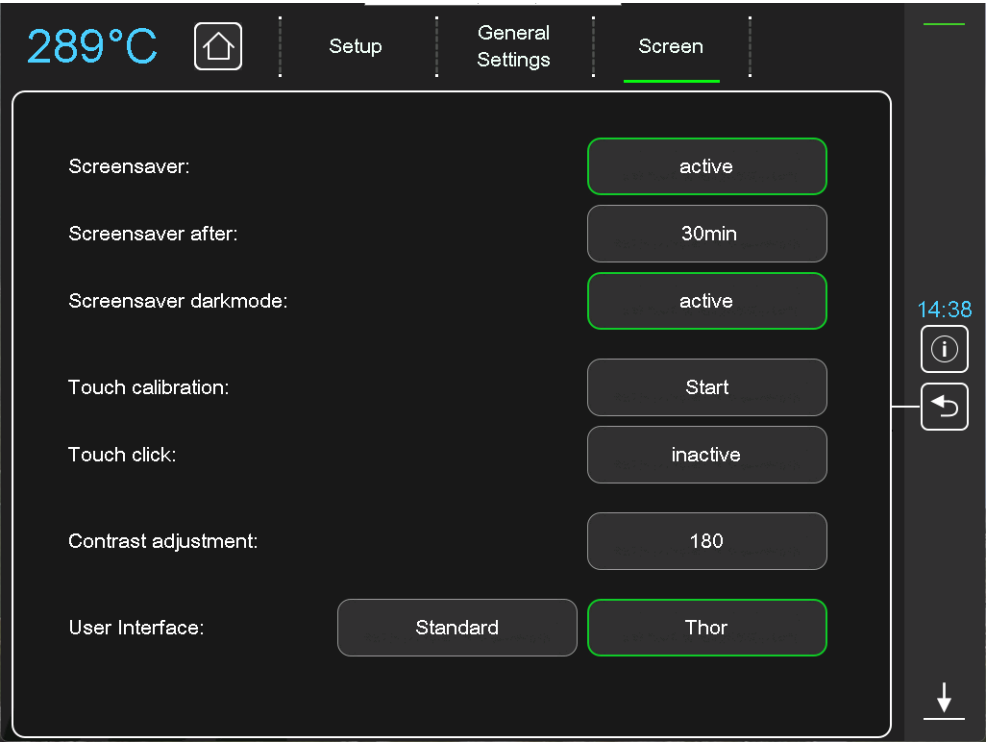


Fig. 5-20 Setup > Screen

- Screen saver:

You can activate and deactivate the screensaver with the button.
- Screen saver after:

The screen saver makes the screen go dark after the device has not been used for a while (less power consumption and longer screen life). When you press any key or touch the touchscreen, the original display appears. The screensaver starts after the indicated time without an entry (inactivity of the entry device). Change this time as follows:

- Tap on the time. The numeric keyboard window appears.
 - Enter the desired time.
- Touch calibration:

NOTE:

Calibrate the touchscreen only by touching the screen. Do not use a PC mouse or other pointing devices for this purpose.

Starts a process for calibrating the screen. Crosshairs are displayed on a black background. Tap the white dot in the middle of the crosshairs. The crosshairs change position. Again tap the white dot and continue until calibration is finished (a total of six crosshair positions).
- Touch click:

When touchclick is activated, the firing furnace emits a confirmation signal each time a key is pressed.



- Contrast setting:
- Higher value = stronger contrast,
 - lower value = weaker contrast.

5.7.2.4. Program lock

You can use this function to lock firing programs from changes(). See also section 2.5. Please note the following restrictions in operation before activating the program lock.

- The program lock can only be used to protect programs stored in the local memory “Local” of the firing furnace control system.
- The program lock protects or unlocks all programs. Individual usage of programs is not possible,
- Programs protected by the general code cannot be edited or changed. The program editor cannot be opened for these programs,
- Programs protected by the general code cannot be deleted (program manager),

Activate/deactivate program lock

- Tap  →  → .
The alphanumeric keyboard window appears.
- Enter your password. The following “Program Lock” window appears.

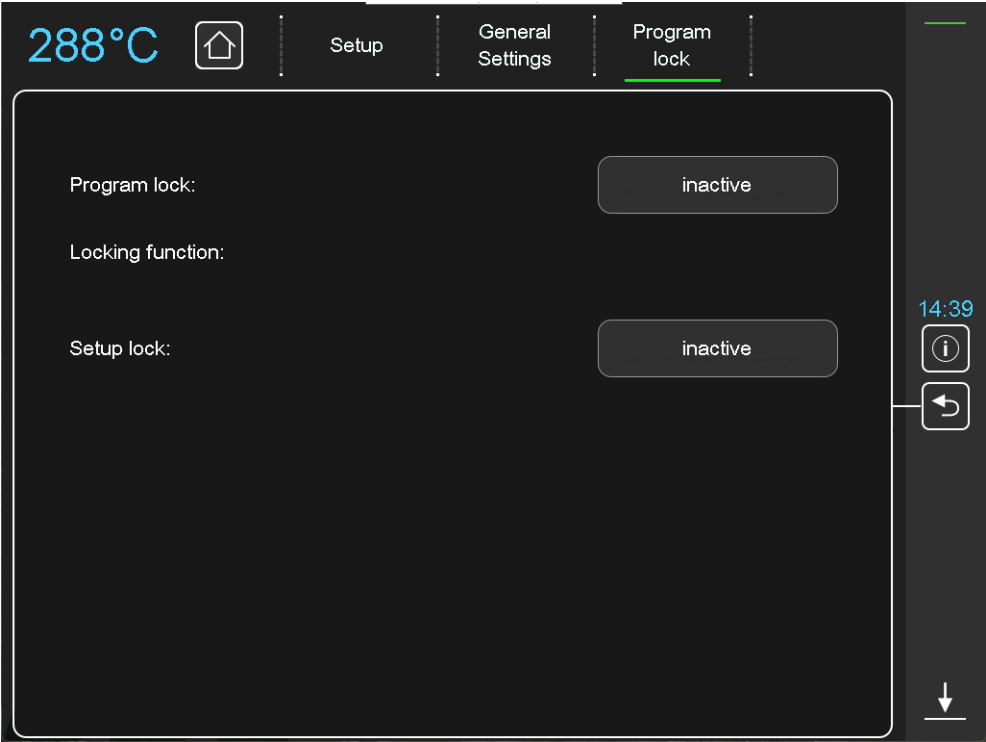


Fig. 5-21 Setup > Program lock



Program lock	Enables and disables the program lock (referred to as “General Code” in older DEKEMAmodels).
Lock function	Protects programs as follows: • Complete lock The burn programs can be executed but not changed. • Editable The firing parameters of these programs can be adjusted for a single program run, but they cannot be saved.
Setup lock	The functionality in the “Setup” menu is no longer available.

5.7.2.5. Circle

The DEKEMA devices trix™CAD, trix™print and firing furnacesAUSTROMAT™ i can communicate with each other directly in the "Circle". This enables access to personalized firing, press, and sinter programs. The programs can be uploaded into the circle via remote control, or directly via the firing furnace.

The communication of the DEKEMA devices requires that each device is connected with this circle.

Tap  →  → .
The following window appears to log-in the firing furnace into the circle.

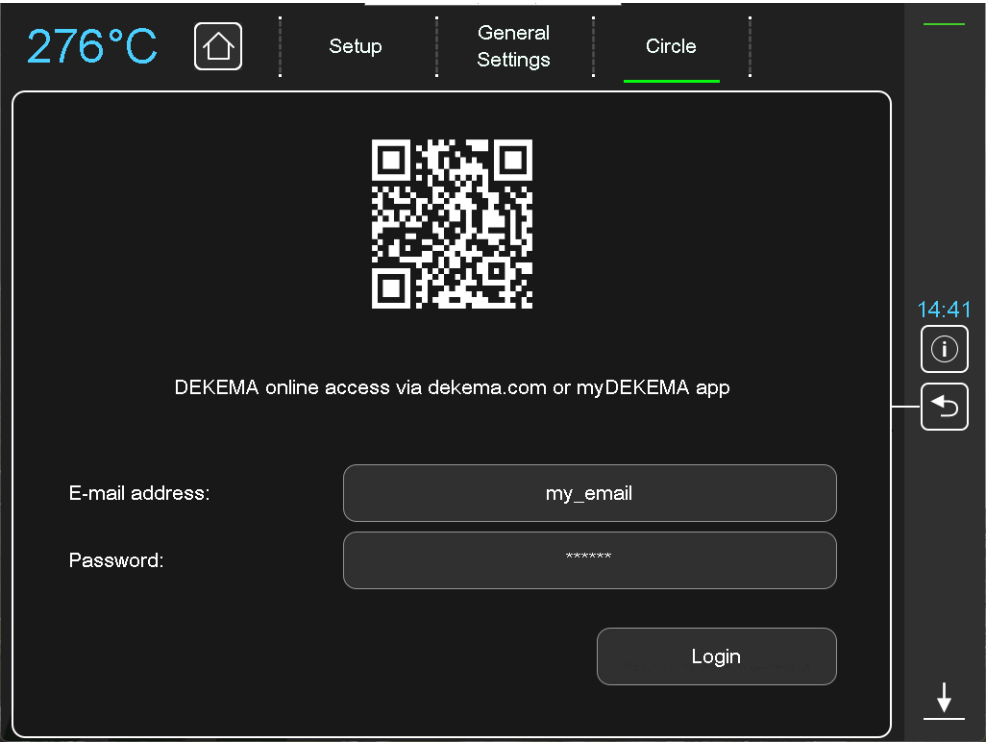


Fig. 5-22 Setup > Circle



QR code



Enables direct DEKEMA online access.

<https://online.dekema.com>

E-mail address:

E-mail address for connecting the firing furnace with the circle.

- Tap on the “E-mail address” entry field:. The alphanumeric keyboard window appears.
- Enter your E-mail address for the circle.

Password

Password with which the firing furnace has access to the circle.

- Tap on the “Password” entry field. The alphanumeric keyboard window appears.
- Enter your password.

Login / Logout

Login and logout the firing furnace at the Circle. The connection with the circle is only established if all access data (E-mail address, password) are correct.



5.7.3. Network

NOTE:
Consult section 4.4 about connecting the firing furnace with a network.

Tap  → .
The following window appears with the network settings for the firing furnace.

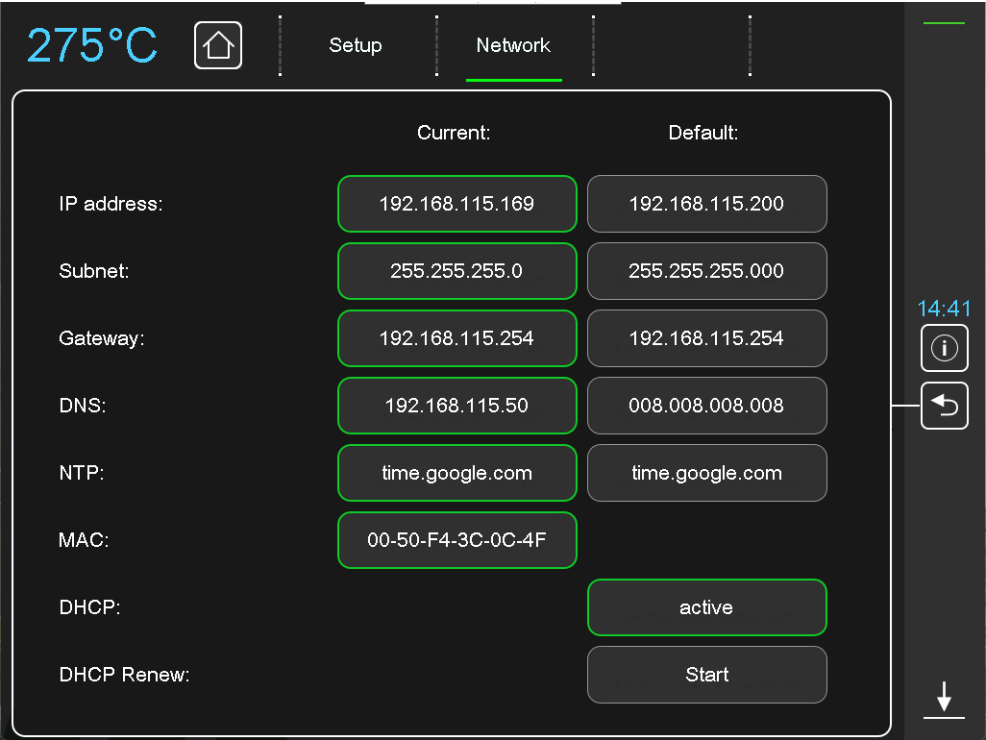


Fig. 5-23 Setup > Network

Change address:	Please note: The current addresses cannot be edited.
IP address	Change an address as follows:
Subnet	• Tap on the corresponding address. The alphanumeric keyboard window appears.
Gateway	• In the keyboard window, tap on [Edit].
DNS	• Enter the desired address.
NTP	
MAC	
DHCP	Use the button to assign an IP address to the firing furnace from your network server.
DHCP renew	Only available when DHCP is active. Use the button to automatically assign a new IP address to the firing furnace from your network server.



5.7.4. Service

5.7.4.1. Backup, Update

NOTE:
For reasons of data safety and to prevent the loss of firing furnace data, it is recommendable to regularly back up all your data.

Tap  →  → .
The following window for backing up and recovering data appears.

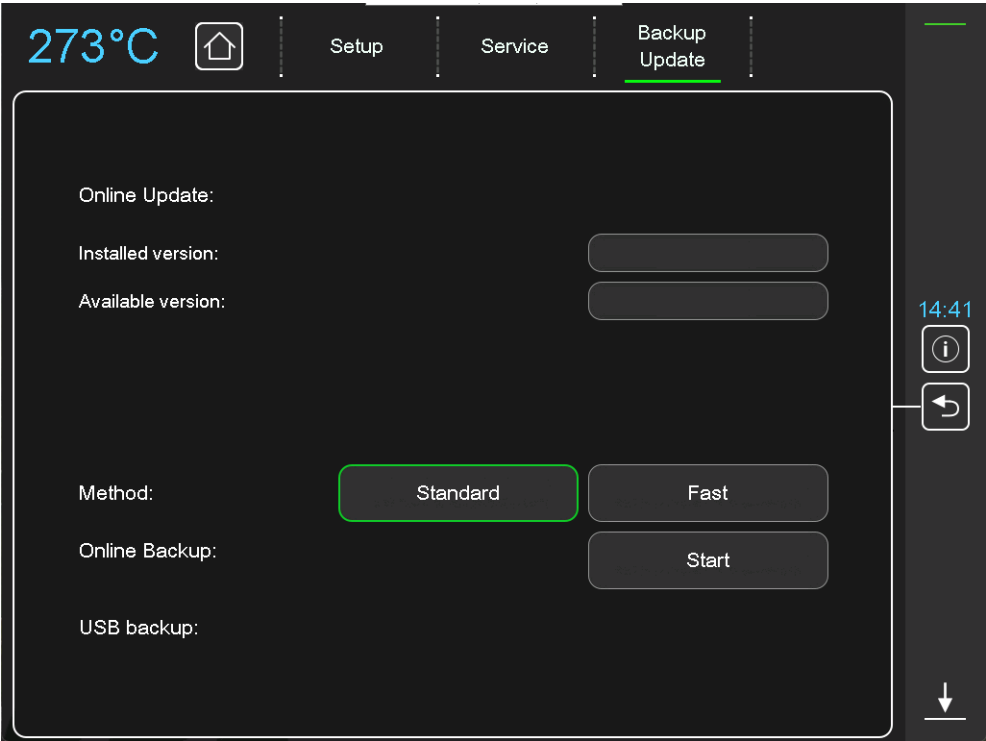


Fig. 5-24 Setup > Service > Backup / Update

Online Update	Starts an online update of the software of the firing furnace.
Online Backup	Starts backing up data using the selected method via the network connection (online).
USB backup	Starts backing up the data on a USB stick. Only active when a memory stick is inserted in the interface of the firing furnace.



USB backup

Follow the instructions under “USB Backup.”

NOTE:

All data on the USB stick are deleted at the start of the backup.

1. Insert a USB stick (make sure there is enough free memory) into the USB port in the back of the firing furnace.
2. Tap . All the data of the firing furnace (operating system, software, set parameters and firing programs) are written to the USB stick. A progress bar indicates the remaining time until the backup is completed.
3. Wait until an acknowledgment beep sounds. It signals the conclusion of the backup process.
4. Remove the USB stick.

You have successfully backed up the firing furnace data. If data is lost, you can restore the data with the USB stick. Be sure to carefully store the USB stick and do not accidentally overwrite the backed up data.

NOTE:

You can restore the data in the same manner as when updating the software (see section 7.5).

Proceed as follows:

1. Turn off the firing furnace,
2. Plug the USB stick with the backup data into the USB port.
3. Turn on the firing furnace. While booting up, the firing furnace restores the backup.
4. Withdraw the USB stick once a corresponding message appears on the screen.

The firing furnace then reboots and is ready to use.

Backup data – Online backup

NOTE:

An online backup requires an active internet connection. Note that only data backup and software update can be performed online, but no data recovery.

1. Tap .
2. All data of the firing furnace control (operating system, software, set parameters, and firing programs) are written to the DEKEMA server. A progress bar indicates the remaining time until the backup is completed.
3. Wait until the backing up is completed. This may last some minutes.

You have successfully backed up the firing furnace data.



Online Update

Proceed as follows to update the software of the firing furnace:

NOTE:

Updating the software of the firing furnace requires an active internet connection.

1. Tap the available version.
2. A message indicates that the firing furnace is searching for a new software version.
3. A message requests you to download the new firing furnace software version if there is one available.
4. Confirm the message.
5. Wait until the firing furnace has downloaded the new version. This may last some minutes.

The firing furnace then reboots and is ready to use.



5.7.4.2. CALIBRITE (Temperature calibration)

NOTE:
DEKEMA recommends performing an annual temperature calibration for the AUSTROMAT™. Please use only an original CALIBRITE calibration set.

Tap  →  → CALIBRITE.
The following temperature calibration window appears.

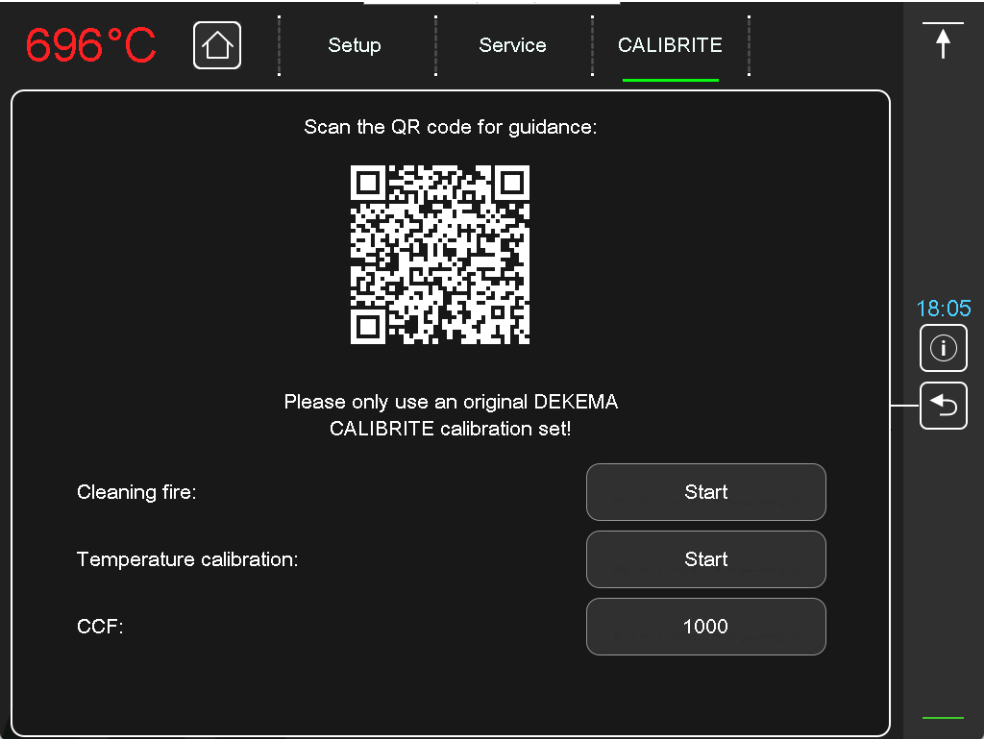


Fig. 5-25 Setup > Service > CALIBRITE

QR code	Scan the QR code to evaluate the temperature calibration. https://online.dekema.com
	
Temperature calibration	Starts the program sequence. Refer to section 7.2 for further information on temperature calibration .
CCF:	The set CCF value is shown. Change CCF value: • Tap on the CCF value. The numeric keyboard window appears. • Enter the desired CCF value.



5.7.4.3. Test programs

Tap  →  → .
The following window with the test programs appears.

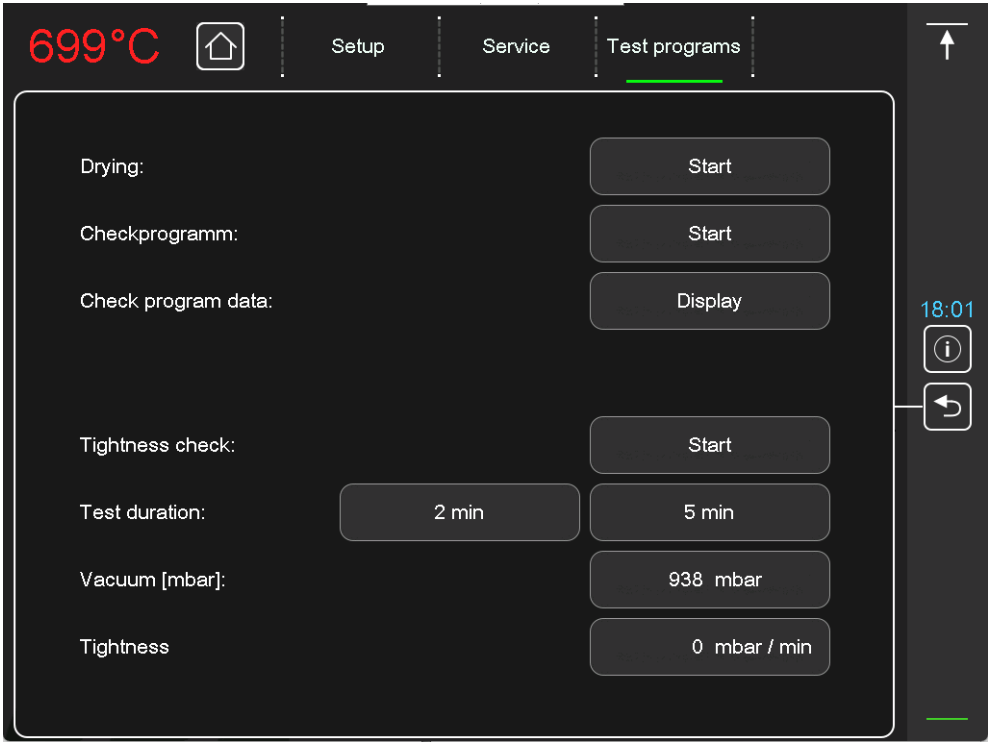


Fig. 5-26 Setup > Service > Test programs

- Drying

Use the drying program to dry the firing chamber, for example when the firing furnace has been exposed to a high-level of humidity for a long time.

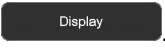
Set up the firing table and tap . The "Dry" window is displayed as long as the program is running.
Duration approx. 90 min.
- Check program

The AUSTROMAT™ 624i™ G2 /AUSTROMAT™ 654i™ G2 has an internal program—the check program—which checks the functionality of the most important assemblies. Regularly running this unchangeable program makes it easier for you and the responsible service personnel to identify aged components (e.g. radiator wear) and to remedy malfunctions. After approximately 500 firings, the firing oven displays a recommendation on the screen to start the self check program.

Tap on .
Duration approx. 180 min.
You can find instructions on the check program in section 7.3.



Check program data The diagnostic data are generated by the check program and stored in a diagnostic file. The values and interpretation of the diagnosis data are important for the service personnel. For remote diagnosis, you can output the diagnostic file on the screen or send it by e-mail (address see page 2). The data have little significance for the user. They are therefore not detailed here.

Tap .

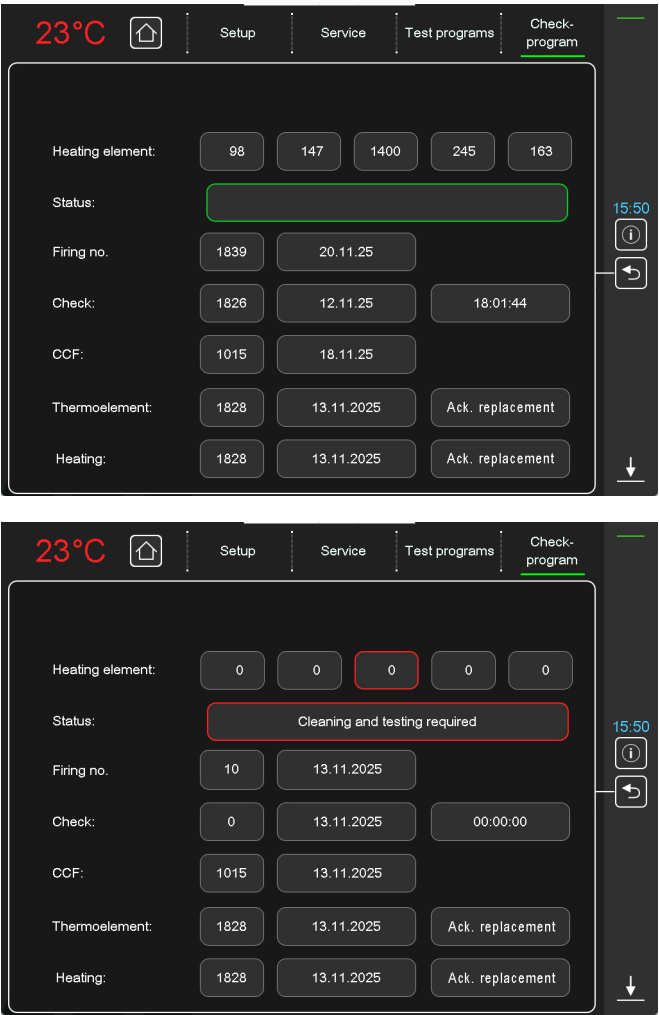


Fig. 5-27 Diagnostic data example: OK (top) and service case (bottom)



Seal check

The seal test checks all the components of the vacuum system and the firing chamber for a sufficient tightness and provides an error analysis. Run this program occasionally to prevent improper firing. We recommend cleaning the seals and lift seat before starting the seal test. See section 7.1.

Perform the seal test

After the program starts, the firing chamber is closed, heated and evacuated. When the maximum vacuum is achieved, the prompt "Flood chamber?" appears. Monitor the pressure display over approximately two minutes. A rise in pressure of about 20 mbar over two minutes (10 mbar/min) is normal and means that the firing furnace is vacuum-tight. You can now ventilate the firing chamber.

When you observe a much higher rise in pressure:

- Clean and check all the components of the vacuum system (replace the seals and hoses if necessary), and repeat the tightness test.

NOTE:

Always coat the sealing ring on the lift plate (O-ring) with talcum powder after cleaning. This prevents the lift seat does from holding to the firing furnace housing.



5.7.4.4. Lift settings

NOTE:
For safety reasons, we recommend not deactivating the hazard warning.

Tap  →  → .
The following window for the lift settings appears.

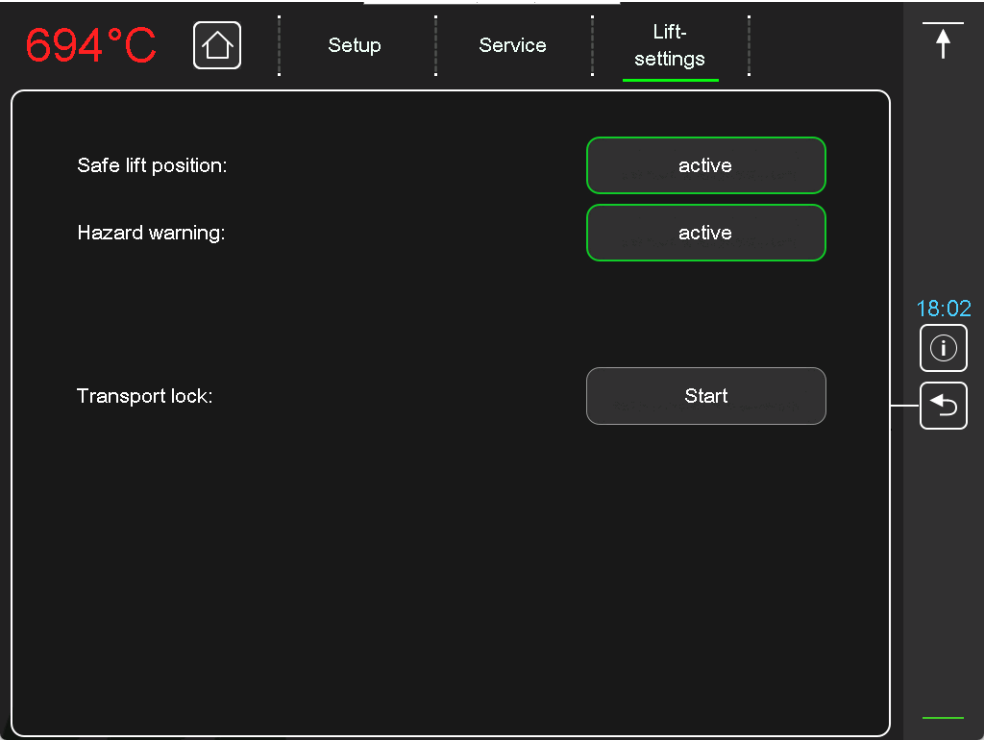


Fig. 5-28 Setup > Service > Lift settings

Safe lift position (only for AUSTROMAT™ 654i™ G2)	The “Safe Lift Position” is activated by default. The lift does not open completely after pressing in order to prevent parts from falling out and the risk of burns. After the pressing process, we recommend moving to the safe lift position and checking whether the punch or muffle is on the press table. The lift can then be opened manually.
Hazard warning	The “Hazard warning” is activated by default. A warning appears before the hot firing chamber (temperature higher than 200 °C) is opened. You are asked, "OPEN LIFT?". Confirm the query when you want to move the lift down and open the hot firing chamber.



Transportation lock

- NOTE:
Before transport:
- Allow the firing furnace and insulated table to cool down.
 - Remove the insulation table,
 - Close the firing chamber.

The "Transportation lock" function protects the components inside the firing furnace during transportation.

Run the function before transporting the firing furnace. Sensitive components are held in the firing furnace and protected from damage to a greater degree during transportation.

5.7.4.5. Additional functions

NOTE:
As long as no access rights are defined (i.e. the “Password” field is empty), any user of the PC can access the firing furnace.

NOTE:
If the password becomes lost, contact your service partner or directly contact DEKEMA (see page 2).

The access right entitles the user to remote access (web interface or VNC software) to the control system of the firing furnace. The password is defined in the “Additional Functions” window. This password must then be entered on the PC to gain access to the firing furnace. See also the section 4.4.



The following window with additional functions appears.



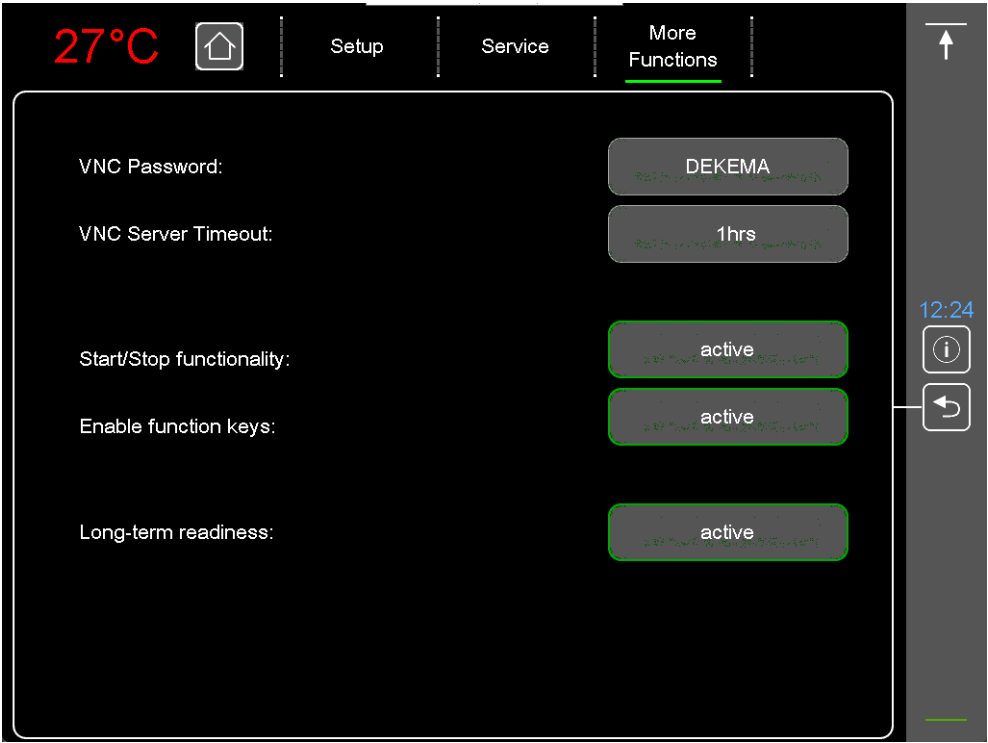


Fig. 5-29 Setup > Service > Additional functions

VNC password	Specify the password as follows: • Tap on the “Password” entry field. The alphanumeric keyboard window appears. • Enter your password.
VNC Server Timeout	The connection to the server is automatically disconnected if it has been inactive for longer than this period of time.
Start/Stop functionality	In order for you to use the firing furnace via the user interface on the PC (start firing programs, move lift, etc.), the start/stop function must be activated.
Activate function keys	In order for you to execute touchscreen functions (see section 3.2) via the Webserver, the function keys of the PC keyboard must be activated.



6. Operation

NOTE:

When using the firing furnace, observe section 2, Safety.

6.1. Turning on and off

NOTE:

Never operate the firing furnace without supervision.

Preparations

Check if:

- the AUSTROMAT™ is connected by a power cable to a socket with a protected contact. See section 4.3.
- the vacuum pump is correctly connected to the firing furnace. See section 4.3.
- the firing furnace is connected via a Web interface to an individual computer or network (option). See section 4.4.

Switching on

- Turn on the firing furnace:
 - Main switch on the back of the firing furnace: The firing furnace control system starts up, duration approx. 1 min. This is followed by an internal check of the firing furnace's hardware and software, and the lift automatically moves down. Or
 - On/off switch in standby mode next to the touchscreen if the firing furnace is already in standby mode. The firing furnace is immediately ready for use.
- Make sure that the insulating table is mounted on the lift seat. Make sure that the insulating table is mounted on the lift seat. Turn the firing furnace off, and mount the insulating table. Then turn on the firing furnace again.

Switching off

- Close the firing chamber before switching off the firing furnace to avoid any condensation in the ceramic furnace.
- Turn off the firing furnace:
 - Main switch on the back of the firing furnace, or
 - On/off switch in standby mode next to the touchscreen.

6.2. Mounting and removing a firing object

 	⚠ WARNING Hot surfaces. The firing chamber can reach temperatures above 1,000 °C during operation. There is an extreme burning hazard from touching hot surfaces after the firing chamber is opened. Never directly contact hot parts of the firing furnace. The firing furnace requires several hours to cool after it is turned off. Observe the following instructions: • Do not use your hands or any objects to grasp things in the firing chamber, • Do not grasp the lift seat, insulation table or firing objects with your bare hands, • Use suitable tools (tweezers) to remove the firing objects, or wear safety gloves.

Mounting the firing object

- Place the firing object on the firing tray, and place the firing tray in the middle of the insulation table.
- When placing the firing object or firing tray, ensure that no parts protrude above the upper edge of the insulating table. There is a danger of damaging the firing object and thermal insulation material when closing the firing furnace.

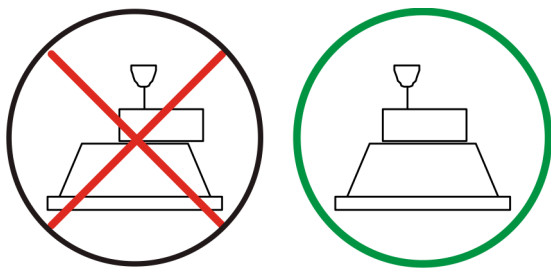


Fig. 6-1 Mounting the firing object

- The height of the firing tray including the firing object may not exceed the following dimensions. Otherwise, the thermocouple would be damaged in the firing chamber when the chamber is closed:
 - Firing function: 36 mm height,
 - Only AUSTROMAT™ 654i™ G2: Press function: 83 mm height.

Removing the firing object

- Use suitable tools (tweezers) to remove the firing objects, or wear safety gloves.



6.3. Select programs and start them

6.3.1. With the touchscreen

1. After turning on the firing furnace, the Program Manager automatically appears on the touchscreen. Select the desired program. See section 5.3.
The firing furnace heats up to a preheating temperature that depends on the type of program selected (see section 5.5).
2. The firing of the selected program is displayed (program display). See section 5.4.
3. Tap  in the program display. The program is processed automatically. See section 5.5.
4. While the program is running, the lift automatically moves up and down. Make sure that no objects are in the way that could hinder the lift movement. Also do not attempt to manually stop or accelerate the lift.
5. While the program is running, you can stop the program by tapping on .

6.3.2. With VNC program

NOTE:

To use the firing furnace via a VNC, a suitable VNC program needs to be installed on the computer. The VNC function of the firing furnace must be activated (section 5.7.2.3).

Start the VNC program

1. Start the VNC program on the computer.
2. Enter the IP address for the firing furnace and the password. See section 4.4.1. The program manager appears. See section 5.5.

The remaining procedure is the same as that in section 6.3.1.

6.3.3. With iOS device

NOTE:

To operate the firing furnace via a smartphone, the myDEKEMA-App must be installed. The App can be downloaded or updated free of charge from the Apple® App Store or from Google Play.

1. Start the App on the smartphone.

The remaining procedure is the same as that in section 6.3.1.

6.3.4. Operating layout for the menu control

The basic operating layout for the menu control is shown in the following illustration. It can help you become familiar with the operation of the firing furnace. The arrows in the diagram indicate how to get from one menu item to another. The individual menus are described in section 5.

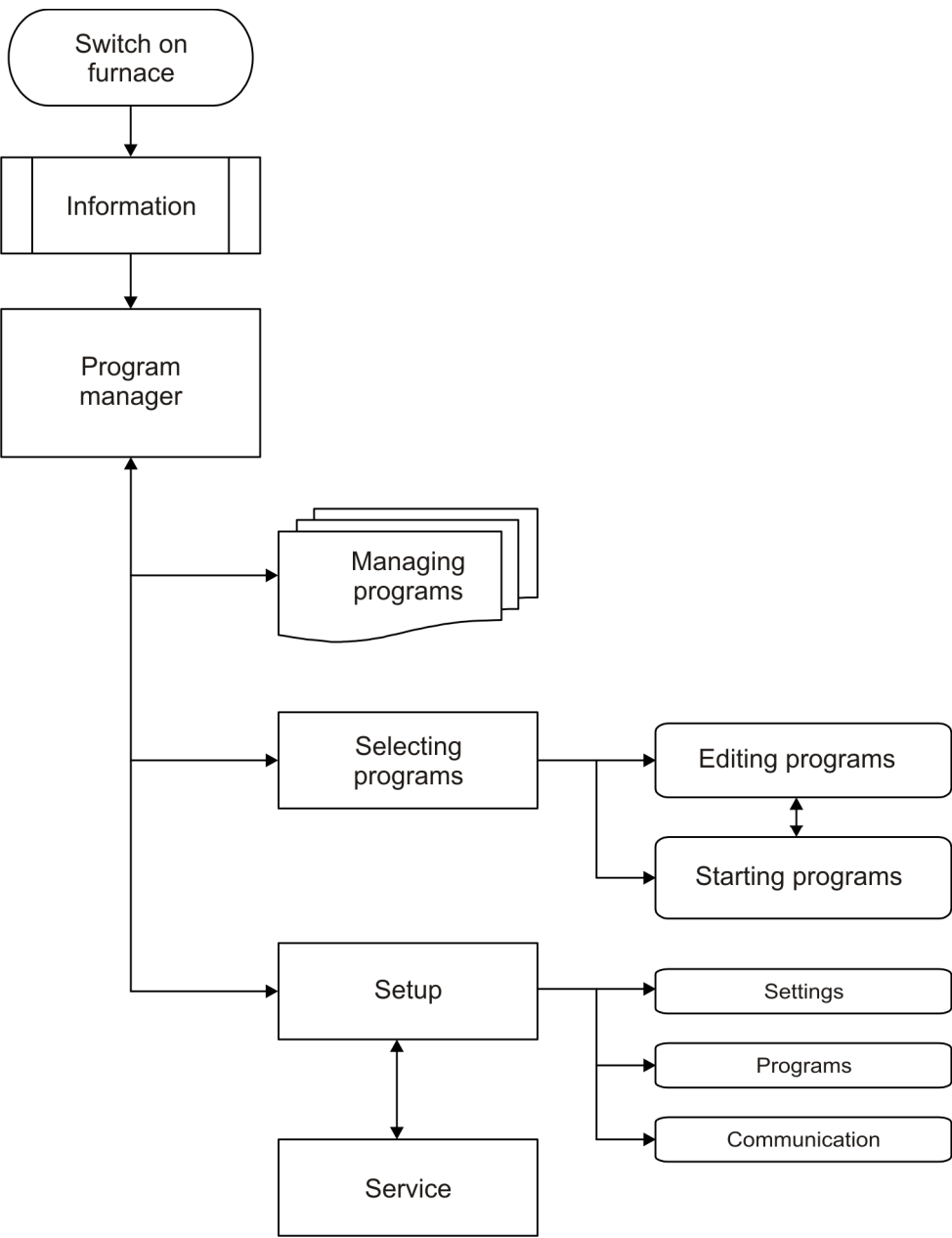


Fig. 6-2 Operating layout for the menu control



6.4. Program end

NOTE:

The firing chamber remains closed at a chamber temperature $T > 999^{\circ}\text{C}$. It can only be opened at a chamber temperature below 999°C .

- While the program is running, you can stop the program by tapping [Stop]. In this case, all the commands are stopped and the heat system is turned off. The firing furnace cools down. The firing is counted, i.e. the firing number is increased, when the program has run longer than 30 s.
- An acoustic signal sounds after a regular program end.
 - The lift moves down,
 - The firing number is automatically increased,
 - A log file for the firing is created and printed (if a printer is configured).
- You can remove the firing object. See section 6.2.

NOTE:

If, after the end of a firing program, the firing chamber is left open for longer than 15 minutes at a chamber temperature $> 200^{\circ}\text{C}$, a message appears prompting you to close the firing chamber to prevent wear ("Energy Safe").

- Acknowledge the message.
- Close the firing chamber.

6.5. Some practical tips

6.5.1. General operation of the furnace

Lift noise

After switching on the firing furnace, the lift moves down and performs automatic lift calibration. The brief buzzing noise is due to technical reasons and is completely normal. Please note that the firing furnace does not react to any commands during this calibration time.

Automatic heating

The firing furnace automatically heats to the temperature required to start the next program when standard and professional and pressing programs are selected. In general, it occurs when the firing chamber is open.

Save energy

Close the firing chamber in the event of prolonged breaks between firings. This will save energy and avoid unnecessary wear on the heating element and unnecessary warming of the lid.

Condensation

Close the firing chamber before switching off the furnace to avoid unnecessary condensation in the firing furnace.

6.5.2. Heating element

The heating elements are wear-sensitive parts, whose service life depends on how much it is used. Running the check program regularly makes it easier to identify the correct time to replace a heating element. Another way of identifying heating element wear is visual inspection. Look into the open firing chamber from below while the firing furnace is switched off and cold. If the heating strips are deformed or there is strong glass formation, the heating element should be replaced.

6.5.3. Thermocouple - temperature calibration

The thermocouples are wear-sensitive parts, whose service life depends on how much they are used. Visually inspect the thermocouples regularly - particularly before temperature calibration - while the firing furnace is cold and switched off and the firing chamber is open. A mirror held at an angle under the firing chamber can be very helpful. Ensure that they the thermocouples are not bent since this influences temperature measurement and hence the firing results.

6.5.4. Programming and program steps

Drying the firing object

The insulation table is still very hot immediately after firing. The temperature near the firing object may thus be too high for drying. Wait a few minutes until the insulation table has cooled down before placing the new firing object on the insulation table for drying.

6.5.5. Firing programs

Firing tray

Every type of firing tray and kiln furniture has an effect on the temperature of the firing object due to its color and composition. Using a standardized firing tray can thus ensure constant firing results.

Firing parameters and test firings

Care in creating firing programs and editing firing parameters has a significant effect on the quality of firing results. The recommended firing parameters are thus to be seen only as guidelines. Perform test firings to identify your individual firing parameters based upon these guidelines.

6.6. Backing up and restoring firing programs

NOTE:

When backing up data using the backup function in the "Setup" menu, all firing programs in the local memory of the firing furnace are also backed up. See section 6.7.

For reasons of data security and to prevent the loss of firing programs, it is recommendable to regularly back up your firing programs. Therefore, you should save your data on two different storage media. At least you should write down your firing program parameters on paper or print them out.

Use the "Copy" and "Paste" function of the program manager for backing up individual sets and firing programs. See section 5.3.

Backing up firing programs

Copy the sets or firing programs that are to be backed up (source) to the backup memory (destination).

For example, you can copy the firing programs on the local memory of the firing furnace control to a USB stick (USB interface at the firing furnace rear side).

Restoring firing programs

Copy the backed-up sets or burn programs (source) back to their original storage location (destination).

For example, you can copy the backed-up firing programs on a USB stick to the local memory of the firing furnace control.

6.7. Backing up and restoring data

You can back up or restore all the data for the firing furnace control (used operating system, software, set parameters and firing programs) with the backup function of the "Setup" menu". See section 5.7.4.1.

NOTE:

For reasons of data security and to prevent the loss of firing furnace data, it is recommendable to regularly back up all your data.

6.8. Loading sets and firing programs

NOTE:

The circle may contain programs, that your firing furnace type cannot process. You can only view but not start and edit these programs.

A “set” is a group of all manufacturer-related programs. The AUSTROMAT™ can access sets and firing programs on the following sources:

- "Local". The sets and firing programs are stored on the local memory of the firing furnace control. They are available to assist you at any time.
- "USB". The sets and firing programs are stored on a USB stick. They are available when a USB stick is inserted into the interface on the back of the firing furnace.
- "Internet". The sets and firing programs are stored on the DEKEMA server. They are available to you when the firing furnace is connected to the Internet.
- "Circle". The sets and firing programs in the Circle. They are available to you when the firing furnace is connected to the Circle.

Use the Program Manager to access the desired set or firing program. See section 5.3.

6.9. Quality assurance

6.9.1. QM logs

The AUSTROMAT™ allows you to log a completed firing program for quality assurance documentation.

The log is internally fixed and cannot be changed by the user. The log monitors and documents the progress of the set program, especially the target and actual values of the Firing parameters, as well as fluctuations in temperature during the holding periods (only when the firing chamber is closed).

A precise description of quality management can be found in section 5.7.2.2.

Example of a log:

QM record:

Print

Firing no.:

#

0000000001

Firing program:

Program no.:

001

Program name:

Erstinbetriebnahme

Start date:

25.09.2025

Start time:

14:27:24

Finish date:

25.09.2025

Finish time:

15:19:09

Duration of firing:

00:51:46

Program sequence:

L8 T070.C1000 T300 V9 T300 V0 T300 V9 T300 V0 T300 L9 T300 V9 T300 V0 L0

Lab information:

Order no.:

Type of work:

Furnace data:

Furnace id:

Last check program:

25.09.25

Temperature calibration:

1000

Firing completed correctly

X

Fig. 6-3 QM log (example)



6.9.2. OPC (option)

NOTE:

The requirements for using OPC are:

- **OPC is installed on the computer,**
- **the firing furnace is configured for a network connection,**
- **the firing furnace is configured for access via an FTP server.**

OPC ("OLE for Process Control") is a standardized software interface that allows you to exchange data between applications by different manufacturers.

By using the optional OPC program by DEKEMA , you can integrate quality management for the firing furnace into an ERP system ("enterprise resource planning").

For additional information, please contact DEKEMA. See section 7.6.

7. Maintenance and Service

	⚠ WARNING
	Non-original spare parts. Malfunctions can arise if third-party parts are used. In certain circumstances, this can cause serious injury and substantial property damage. Always use original spare parts from DEKEMA.

NOTE:
When performing all maintenance and service work, observe chapters 2,Safety.

If technical servicing or repairs are necessary, they should only be performed by authorized professionals.

- NOTE:**
After repair, the ceramic furnace must be checked for safety:
- Federal Republic of Germany: VDE 0701,
 - International: According to the legal requirements of your own country.

7.1. Care

NOTE:
Before each maintenance and service task: Read section 2 Safety. In particular, be aware of the hazards listed in section 2.4.

- Clean the housing and control elements with a soft cloth moistened with a mild cleanser. Do not use scouring agents, scouring pads or solvents such as alcohol, gasoline or acetone.
- Always keep the sealing ring of the lift seat free of dust to ensure a reliable seal. Use a brush with a receptacle (for ceramic dust), or a moist cloth.



7.2. Calibrate temperature

NOTE:
Before each maintenance and service task: Read section 2 Safety. In particular, be aware of the hazards listed in section 2.4.

A number of factors influence the temperature of the firing object. These can include: The color and shape of the firing tray, or the number and type of firing objects. Other major influences can be age-related effects such as heating element wear and changes to the thermoelectric properties of the temperature sensor. We therefore recommend calibrating the temperature of the firing furnace to adapt these factors and achieve the desired firing results. Calibrate the temperature whenever the firing results are inconsistent and at least once annually. Calibration is carried out by means of the calibration factor (CCF). Observe the following instructions:

- For new devices, we recommend performing a temperature calibration for the first time after approximately 6 months.
- An internal monitoring program notifies you when you should calibrate the firing furnace temperature.
- Make sure that the heating element and thermocouples are not damaged.
- Only use the DEKEMA calibration set that is for the specific furnace. This consists of a curved silver wire and a white ceramic firing tray.
- Always use the insulation table for calibration.
- Note that the temperatures of all the firing programs are adjusted when the CCF value changes. The firing temperatures of individual programs may have to be corrected.

Temperature calibration with calibration set:

1. The firing furnace must be thoroughly preheated before calibrating. Rule of thumb: The side walls of the top furnace housing must be warm to the touch.
We recommend to perform a cleaning fire program (see Fig. 7-2) before starting the calibration.
2. Insert the bent silver wire (silver sample) from the calibration set in the middle of the firing tray (see the following illustration). Place the firing tray on the insulation table.



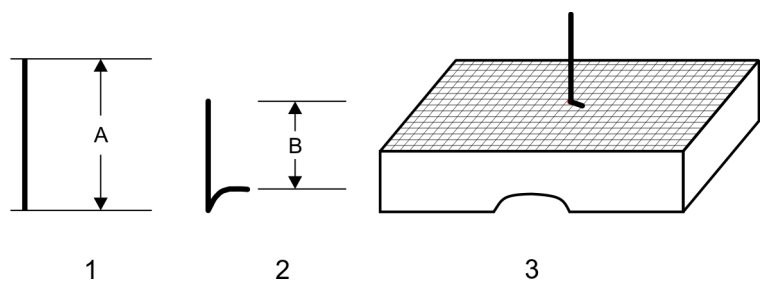


Fig. 7-1 Placing the silver sample

	AUSTROMAT™ 624i™ G2	AUSTROMAT™ 654i™ G2
1 Silver wire	A=25 mm	A=35 mm
2 Silver sample(bent silver wire)	B=15 mm	B=25 mm
3 Silver wire inserted into the middle of a honey comb tray		

3. Start the temperature calibration program:

Select the “Temperature Calibration” program from the “Setup” menu and tap Start. See section 5.7.4.2.

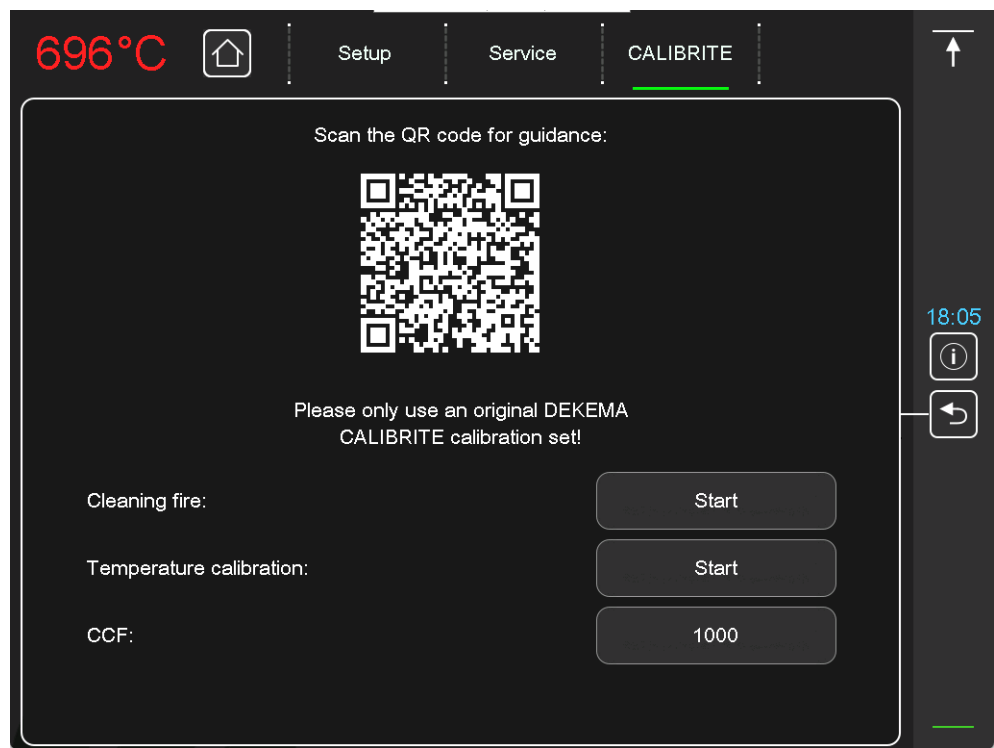


Fig. 7-2 Start temperature calibration

Evaluate the silver wire after the program using the illustration in Fig. 7-4.

4. Approach the correct CCF value in small steps of two to three points (e.g. 1004 to 1006).
- By increasing the CCF, you increase the firing temperature,
 - By reducing the CCF, you lower the firing temperature.



Changing the CCF value

Proceed as follows to change the CCF value:

1. Select **CALIBRITE** from the “Setup” menu.
2. In the Temperature Calibration window (see Fig. 7-2), tap the input field for the CCF value. The “Calibration Factor” numeric keyboard window opens, as shown in the following illustration.

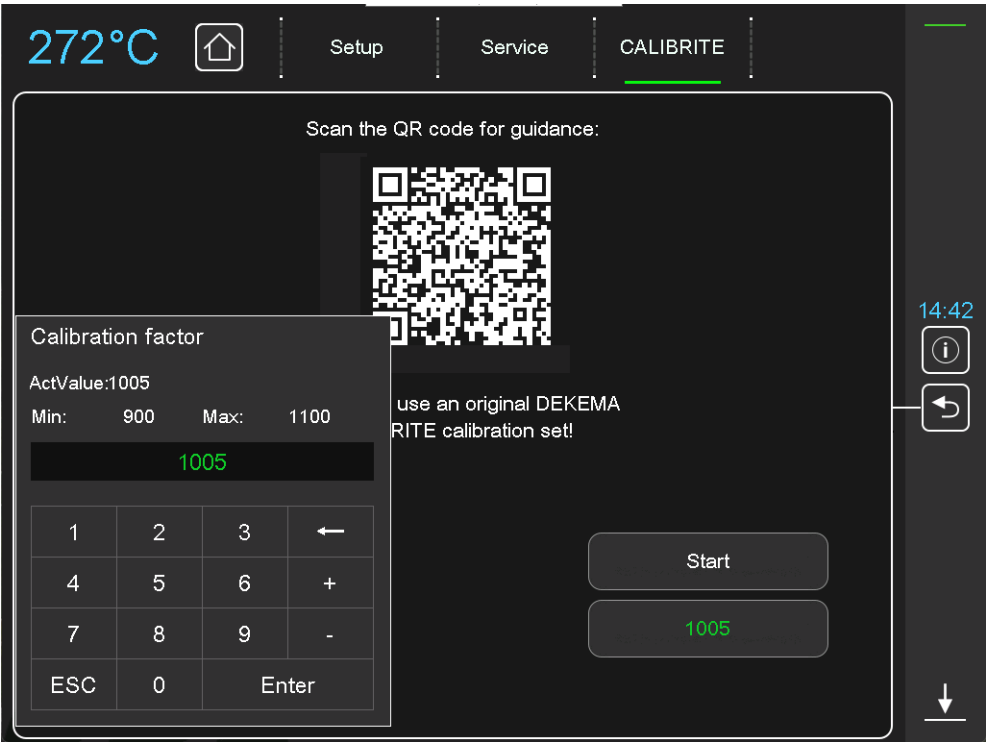


Fig. 7-3 Changing the CCF value

3. Enter the new CCF value.
 - An increase in the CCF value by one point corresponds to an increase in the firing temperature by 1 °C.
 - A reduction of one point in the CCF value corresponds to a reduction in the firing temperature of 1 °C.

If there are very large or sudden deviations from the original CCF, check for technical faults, and inform your service partner.



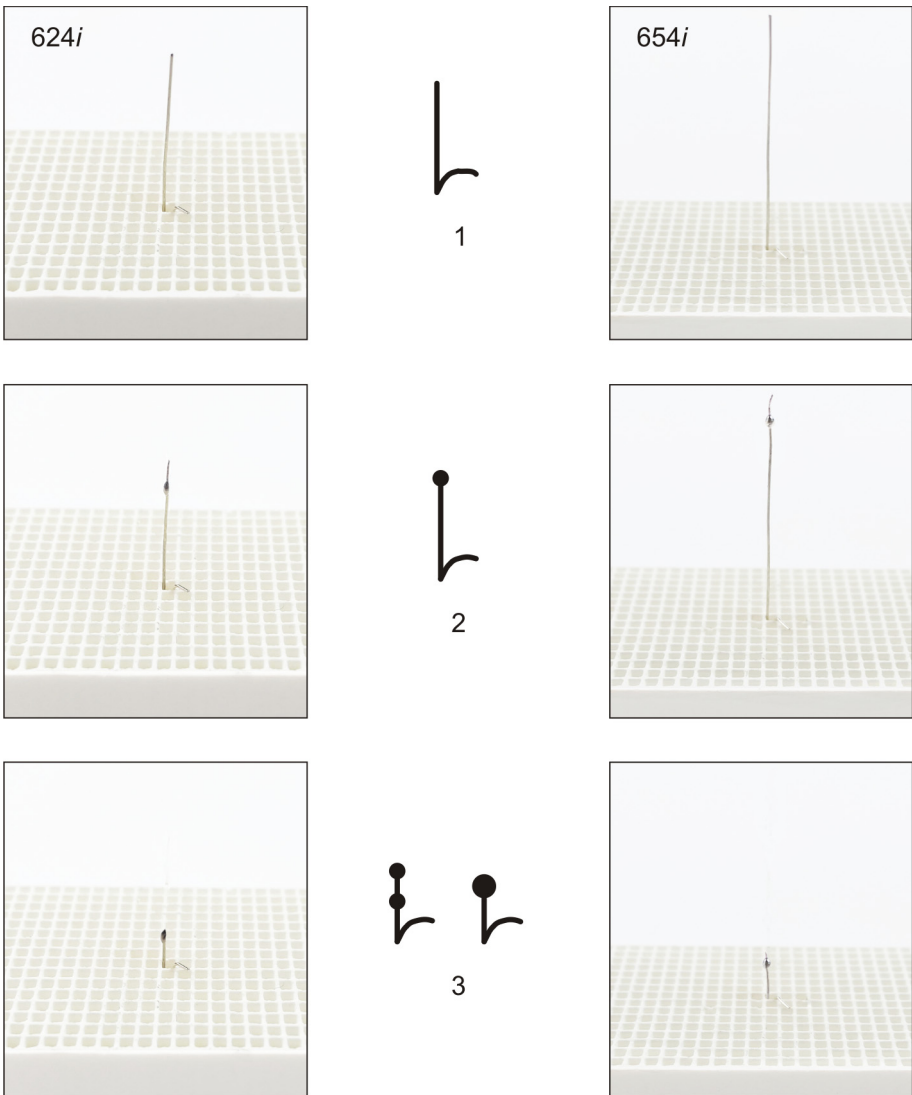


Fig. 7-4 Evaluating the silver wire

1 Effective temperature too low: increase CCF value by approx. 5

2 Effective temperature ok

3 Effective temperature slightly too high: reduce CCF value by approx. 3

7.3. Check program

NOTE:
Start the check program only after running several firing programs, or after a cleaning firing so that the firing furnace is warmed up.

The AUSTROMAT™ has an internal program, the check program, that checks the function of the major components: the check program Regularly running in this unchangeable program makes it easier on you and the responsible service personnel

- Identifying aged components, e.g. Heating element wear,
- and eliminates malfunctions.

Start check program
After approximately 2000 firings, the device will display a recommendation on the screen to start this self-test program (duration approx. 45 min).

- Always run a dry cycle before running the check program:
Setup > Service > Test programs, see section 5.7.4.3.
- In the "Setup" menu, select the "Check program", and tap on [Start].

Results of the check program
The results of the self-check are saved in a diagnosis file. See section 5.7.4.3. If the diagnostic data reveal that a firing program may not be able to be processed correctly, then the AUSTROMAT™ automatically points this out when a firing program is started. This is the case for example when the heating element is too old, and you want to reach a firing temperature quickly.

Error messages after running the check program

Error messages	Measures
1. "NO ERRORS FOUND"	No errors were found.
2. "CHANGE HEATING ELEMENT"	Contact your service partner. See section 7.6.

Tab. 7-1 Overview of error messages

The error message "CHANGE HEATING ELEMENT" can also arise when the heating element is technically functional. However, the check program requires a nominal power supply to operate. When the power supply is below the nominal value, the error diagnosis of the heating element can be incorrect. This problem generally only occurs in Asian countries. Consult your local power company.



7.4. Change the heating element

NOTE:

Before each maintenance and service task: Read section 2 Safety. In particular, be aware of the hazards listed in section 2.4.

NOTE:

If technical servicing or repairs are necessary, they should only be performed by authorized professionals (see section 7.6).

Over time, the heating element wears out from use. This can have a negative influence on your firing results. For this reason, change the heating element at the proper time. If the self-check program is run regularly (see section 7.3), a recommendation will be displayed when the heating element wear exceeds the permissible limit. Follow the accompanying installation and safety instructions to install the replacement heating element. See section 2. Heating elements should only be replaced by trained professionals.

7.5. Software Update

Contact DEKEMA to update the software program for your firing furnace. An update can be obtained in the following ways:

- by mail on a USB stick,
- by e-mail,
- by online update. See section 5.7.4.1.

The mail deliveries come with detailed step-by-step instructions to install the program update (on paper or in a PDF file).



7.6. Service and Transport

NOTE:
Before each maintenance and service task: Read section 2 Safety. In particular, be aware of the hazards listed in section 2.4.

NOTE:
These operating instructions are part of the documentation for the firing furnace AUSTROMAT™. Read the service instructions before servicing.

Service partners
We recommend regular maintenance of the firing furnace by your service partner. This will ensure superior firing results. Contact the responsible service partner if you need to replace wearing parts or if the firing furnace needs to further repairs.

Spare parts
Only use original DEKEMA parts for servicing and maintaining the firing furnace. Contact your service partner, or contact DEKEMA directly.

Manufacturer address
Please direct any questions for the manufacturer to the following address:

DEKEMA Dental-Keramiköfen GmbH
Industriestrasse 22
D-83395 Freilassing

- ☎ +49 (0) 8654-4639-0
- 📠 +49 (0) 8654-66195
- ✉ info@dekema.com
- 🌐 www.dekema.com

Transport

- Turn off to the firing furnace as described in section 8.1.
- To transport the firing furnace, only use the original box and the supplied packaging material.



8. Storage and disposal

8.1. Storage

Turn off the firing furnace

	⚠ WARNING
	Fire hazard. A fire hazard exists when the firing furnace is hot when packaged. Let the firing furnace cool for several hours to room temperature with the firing chamber open after turning it off.

Proceed as follows:

1. Turn the firing furnace off, and let it cool to room temperature. Note that the device needs several hours to cool down.
2. Turn the firing furnace on, and move the insulation table up to close the firing chamber.
3. Turn the device off, and fold the power cable from the plug.

Storage Requirements

The firing furnace may only be stored in the original packaging. Observe the packaging symbols (see Fig. 4-1), and maintain the storage conditions in section 1.6.



8.2. Disposal

8.2.1. Personnel qualifications

The operator can recycle or dispose the AUSTROMAT™ in accordance with legal provisions. A good knowledge of mechanics and how to differentiate between waste materials is required to properly disassemble the AUSTROMAT™ and separate the materials.

8.2.2. Legal guidelines

Responsibilities

The owner is responsible for proper disposal of the AUSTROMAT™. The owner can give the firing furnace to a licensed private or public collection facility, or the owner can recycle or dispose of the firing furnace himself.

NOTE:

If the owner gives the AUSTROMAT™ to a recycling facility, he must also provide the instructions for use. The operating instructions contain all the important instructions for disposal of the firing furnace.

Obligation to report

Companies that dispose of or recycle their own waste are subject to official approval and inspection. Under certain circumstances, they can be freed from the approval requirement if they take the requirements of environment protection into account. These companies are subjected to a reporting requirement. You can find out more information at the responsible office for environmental protection.

Environmental protection requirements

Wastes must be recycled or disposed of in such a manner that it does not pose a hazard to human health. Only those procedures or methods may be used that do not harm the environment. In particular, care must be taken that:

- The air, water and earth are not contaminated,
- Animals and vegetable life are not endangered,
- No excessive noise or odor arises,
- The surroundings and the landscape are not impaired.

Sort

After the firing furnace has been disassembled, the individual parts must be sorted into waste groups. This is done according to the list in the current European Waste Catalog (EWC) or comparable documents. The EWC catalog applies for waste independent of whether it is disposed or recycled.

8.2.3. Disposal: Electrical and electronic materials

WEEE
The European Commission has issued a directive on the disposal of electrical and electronic equipment (WEEE; 2002/96/EC). According to this directive, manufacturers have been responsible since August 2005 for returning and recycling electronic and electrical devices if no exception has been granted. As a manufacturer of laboratory equipment, DEKEMA Dental-Keramiköfen GmbH is freed from this requirement. Dental ceramic furnaces do not have to be returned to DEKEMA Dental-Keramiköfen GmbH.

	⚠ CAUTION
	Electrical and electronic materials Electrical and electronic materials can negatively influence the environment. Do not treat electrical and electronic trails as unsorted garbage. Collect old electrical and electronic devices separately.

8.2.4. Disposal: Other assemblies and components

The components of the AUSTROMAT™ are made of the following materials (examples are listed in parentheses):

- Metals and alloys
 - Aluminum (housing, cover panels, etc.)
 - Copper (cooling plates, electrical lines)
 - Steel (sections, fastening materials such as screws, etc.)
 - High-grade steel
- Glass and ceramic materials
 - Glass (screens and displays)
 - Ceramic insulation material (insulation table, firing chamber)
- Plastics and rubber
 - Plastics (hoses, covers, wheels, etc.)
 - Rubber (seals, silicone hoses)
- Composites
 - Electrical materials (cables, motors, components)
 - Electronic materials (printed circuit boards, computer, printer)
- Packaging
 - Styrofoam (cushion material)
 - Plastic (films)



9. Appendix

9.1. Safety data sheets (only AUSTROMAT™ 624i™ G2)

NOTE:
This section applies only to the firing furnace AUSTROMAT™ 624i™ G2.

The relevant safety data sheets for the firing furnace AUSTROMAT™ 624i™ G2 are on the following pages.

- Material "Kerform". See section 9.1.1.



9.1.1. "Kerform" safety data sheet



Safety Data Sheet

based on Regulation (EC) No 1907/2006

Kerform, Kerasetter, Kerheat

Print date: 16.06.2015

Page 1 of 12

SECTION 1: Identification of the substance/mixture and of the company/undertaking

Product identifier

Kerform, Kerasetter, Kerheat

Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture

Use of the products is restricted to “professional users” for application as thermal insulation, heat shields, heat containment, gaskets and expansion joints at temperatures up to 1400°C in industrial furnaces, ovens, kilns, boilers and other process equipment and in the aerospace and automotive industries. Products are not intended for direct sale to the general public.

• Primary Use: Manufacture of fibre (refers to the initial production of the fibre and is therefore not relevant to the downstream user, secondary and tertiary use are relevant to users)

• Secondary Use: Conversion into wet and dry mixtures and articles (refer to section 8)

• Tertiary Use: Installation, removal (industrial and professional) / Maintenance and service life (industrial and professional) (refer to section 8)

Uses advised against

Do not use for injecting or spraying.

Details of the supplier of the safety data sheet

Company name:

Rath GmbH

Mönchengladbach

Street:

Krefelderstrasse 680-682

Place:

D-41066 Mönchengladbach

Telephone:

+49 (2161) 9692 - 0

Telefax: +49 (2161) 9692 - 61

Contact person:

Heinz Wimmer

e-mail:

heinz.wimmer@rath-group.com

Internet:

www.rath-group.com

Emergency telephone:

+49 (2161) 9692 - 12

This number is serviced during office hours.

SECTION 2: Hazards identification

Classification of the substance or mixture

Indications of danger : Toxic

R-phrases:

May cause cancer by inhalation.

GHS classification

Hazard categories:

Carcinogenicity: Carc. 1B

Hazard Statements:

May cause cancer by inhalation.

Label elements

Signal word:

Danger

Pictograms:

GHS08







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Hazard statements

H350i

May cause cancer by inhalation.

Precautionary statements

P201

Obtain special instructions before use.

P202

Do not handle until all safety precautions have been read and understood.

P281

Use personal protective equipment as required.

P308+P313

IF exposed or concerned: Get medical advice/attention.

P405

Store locked up.

Special labelling of certain mixtures

Restricted to professional users.

Other hazards

The International Agency for Research on Cancer (IARC) reaffirmed in 2001 that group 2B (“possibly carcinogenic to humans”) remains the appropriate classification for RCF/ASW. In accordance with 31st adaptation to Technical Progress of Directive 67/548/ECC as published 15th January 2009 the classification as “irritant” has been removed for all types of man made vitreous fibres (MMVFs). Mild mechanical irritation to skin, eyes and upper respiratory system may result from exposure. These effects are usually temporary.

SECTION 3: Composition/information on ingredients

Mixtures

Chemical characterization

Refractory shape based on alumino-silicate wool.

None of the components are radioactive under the terms of European Directive Euratom 96/29.

Hazardous components

EC No	Chemical name	Quantity
CAS No	Classification	
Index No	GHS classification	
REACH No		
266-046-0	Alumino-silicate wools	> 10 %
142844-00-6	Carc. Cat. 2 R49	
	Carc. 1B; H350i	
01-2119458050-50		
231-668-3	sodium hypochlorite, solution ... % Cl active	< 0,2 %
7681-52-9	C, N R34-31-50	
017-011-00-1	Skin Corr. 1B, Aquatic Acute 1; H314 H400	

Full text of R- and H-phrases: see section 16.

SECTION 4: First aid measures

Description of first aid measures

After inhalation

If nose or throat becomes irritated move to a dust free area, drink water and blow nose. If symptoms persist, seek medical advice.

After contact with skin

After contact with skin, wash immediately with plenty of water and soap.

After contact with eyes

Rinse immediately carefully and thoroughly with eye-bath or water. Do not subject to friction.





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SECTION 5: Firefighting measures

Extinguishing media

Suitable extinguishing media

Extinguishing materials should be selected according to the surrounding area.

Additional information

The product itself is not combustible. Packaging and surrounding materials may be combustible. Fire class: 0

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

Avoid generation of dust. Wear personal protection equipment. Restrict access to the area to a minimum number of workers required.

Environmental precautions

Beat down dust with water spray. Do not empty into drains or the aquatic environment. Moreover, national legislation has to be observed!

Methods and material for containment and cleaning up

Use approved industrial vacuum cleaner for removal. High efficiency particulate air filter (HEPA filter). Absorb wet solids or soak them up. Don't use a brush or compressed air for cleaning surfaces or clothing. Do not allow to be wind blown.

SECTION 7: Handling and storage

Precautions for safe handling

Advice on safe handling

Avoid exposure - obtain special instructions before use.
In case of open handling equipment with built-in suction must be used. If suction of the immediate vicinity is impossible or insufficient, the entire working place must be sufficiently ventilated using appropriate machines.
Conditions to avoid: dust deposits

Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels

Keep/Store only in original container. Keep container tightly closed. Protect containers against damage.
Contaminated packing must be completely emptied and can be re-used following appropriate cleaning.
Packaging materials: Recyclable Cardboard and/or plastic films

Specific end use(s)

Specific use(s):
The product is intended for professional use.

SECTION 8: Exposure controls/personal protection

Control parameters





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Exposure limits (EH40)

CAS No	Chemical name	ml/m³	mg/m³	F/ml	Category	Origin
675106-31-7	Polycrystalline alumina wool			500000	TWA (8 h)	
					STEL (15 min)	
1344-28-1	Aluminium oxides, respirable dust	-	4		TWA (8 h)	WEL
		-	-		STEL (15 min)	WEL
-	Refractory Ceramic Fibres and Special Purpose Fibres	-	5	1	TWA (8 h)	WEL
		-	-		STEL (15 min)	WEL
9005-25-8	Starch, respirable	-	4		TWA (8 h)	WEL
		-	-		STEL (15 min)	WEL

Additional advice on limit values

The Scientific Committee on Occupational Exposure Limit Values (SCOEL) as set up by a Commission Decision (95/320/EC) have proposed an OEL for RCF/ASW of 0.3 f/ml.

DNEL/DMEL (DERIVED NO-EFFECT LEVEL/DERIVED MINIMAL EFFECT LEVEL) The calculation of DMELs for fibres alone is not possible; a precautionary value is assigned based on fibrosis. An inhalation DMEL of 0.5 mg/m3 with an assessment factor of 25 can be calculated based on repeated dose toxicity, this value in the correct units would give a DMEL of 4 f/ml.

Exposure controls

Occupational exposure controls

United Kingdom: MDHS 59 specific for MMVF: "Man-made mineral fibre - Airborne number concentration by phase-contrast light microscopy" and MDHS 14/3 "General methods for sampling and gravimetric analysis of respirable and inhalable dust". World Health Organisation Geneva 1997 ISBN 92 4 154496 1.

Protective and hygiene measures

Review your application(s) and assess situations with the potential for dust release. The use of products specially tailored to your application(s) will help to control dust. Some products can be delivered ready for use to avoid further cutting or machining. Some could be pre-treated or packaged to minimise or avoid dust release during handling. Consult your supplier for further details. Designate work areas and restrict access to informed and trained workers. Use operating procedures that will limit dust production and exposure of workers.

Avoid generation of dust. Beat down dust with water spray. Take up dust-free and set down dust-free. High efficiency particulate air filter (HEPA filter).

Respiratory protection

For dust concentrations below the exposure limit value, RPE is not required but FFP2 respirators may be used on a voluntary basis. For short term operations where excursions are less than ten times the limit value, use FFP3 respirators. In case of higher concentrations or where the concentration is not known, please seek advice from your company and/or your supplier. You may also refer to the ECFIA code of practice available on the ECFIA's web site: www.ecfia.eu

Hand protection

Suitable gloves type: Chromate-free leather. Used working clothes should not be used outside the work area. Wash hands before breaks and at the end of work. Wash contaminated clothing prior to re-use. Street clothing should be stored separately from work clothing.

Eye protection

Tightly sealed safety glasses. Dust protection goggles.





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Skin protection

INFORMATION AND TRAINING OF WORKERS: This should include: The applications involving RCF/ASW-containing products; The potential risk to health resulting from the exposure to fibrous dust; The requirements regarding smoking, eating and drinking at the workplace; The requirements for protective equipment and clothing; The good working practices to limit dust release; The proper use of protective equipment.

Environmental exposure controls

RCF/ASW is inorganic, inert and stable and it is not soluble in water (solubility <1mg/litre) and as such does not pose a detrimental effect on the environment.
Do not allow to be wind blown.





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Table of Uses and Risk Management Measures (RMM)

Intended use	RMM - Hierarchy of Controls
Secondary use – Conversion into wet and dry mixtures and articles. Process would include: Mixing forming operations, handling of RCF/ASW products, assembly of RCF/ASW containing products, machine and hand finishing of RCF/ASW products. Reference ES 2	- Where it is practical to do so, automatically feed RCF/ASW in to the process - Where practical to do so, segregate dry and wet processing - Enclose the process where practically possible. - Where practical to do so, segregate machine areas and restrict access to operators involved in the process. - Enclose Machines as far as practically possible. - Install LEV where possible, when machine finishing, handling, compressing and hand cutting to remove dust at source - Employ experienced personnel – trained in the correct use of fibrous products - PPE and RPE used for all dusty tasks - Provide vacuum cleaner connection point to central system where practical or use a portable HEPA vacuum - Regular clean up – using a wet scrubbing unit where practically possible and in general a HEPA vacuum should be used. - Dry brushing and use of compressed air should be prohibited - Waste materials to be contained at source, labelled and stored separately for disposal or recycling.
Intended use	RMM - Hierarchy of Controls
Tertiary use - maintenance and service life (Industrial or professional use) Process: Small scale repairs involving removal and installation of RCF/ASW products. Use of the product in an enclosed system, where there is occasional control access or no access. Reference ES 3	- Use pre-cut, pre-sized pieces where practically possible. - Allow access only to trained (authorised) operators - Where practically possible, perform all hand cutting in a segregated area, on a down draft bench. - Clean up work area regularly during the shift using a HEPA equipped vacuum cleaner. - Prohibit use of dry brushing and compressed air cleaning. - Bag and seal waste immediately at source. - Use PPE and RPE appropriate to task. - Employ good hygiene practices.
Intended use	RMM - Hierarchy of Controls
Tertiary use- installation and removal (industrial or professional). Large scale removal and installation of RCF/ASW from Industrial processes. Large scale removal and installation by professionals. Reference ES 4	- Where practically possible enclose or segregate the work area. - Allow only authorised personnel. - Pre-wet insulation prior to removal where practically possible. - Where practically possible use a water lance for removal or vacuum-truck. - Use down draft bench for hand cutting products. - Cover pre-cut section during transport and storage to prevent secondary exposure. - Where practically possible provide multiple vacuum hoses for convenient cleanup of spillage or use portable HEPA filtered vacuums. - Bag waste materials immediately at source - Prohibit use of dry brushing and or compressed air cleaning. - Experienced personnel only - Use appropriate PPE and RPE appropriate to expected concentrations





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SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Physical state:	solid	
Colour:	white	
Odour:	odourless	
pH-Value:		not applicable
Melting point:		> 1650 °C
Boiling point:		not applicable
Flash point:		not applicable
Flammability		
Solid:		not applicable
Explosive properties		
not applicable		
Auto-ignition temperature		
Solid:		not applicable
Vapour pressure:		not applicable
Density:		not applicable
Water solubility:		< 0.001 g/L
Partition coefficient:		not applicable

Other information

Length weighted geometric mean diameter of fibres contained in the product: 1.3 - 4 µm

These fibres are dense materials and so will settle rapidly from both air and liquid.

SECTION 10: Stability and reactivity

Possibility of hazardous reactions

Contact with acids liberates very toxic gas. Formation of: Chlorine (Cl₂).

Conditions to avoid

Avoid generation of dust.

Incompatible materials

No risks worthy of mention.

Hazardous decomposition products

Upon heating above 900°C for sustained periods, this amorphous material can begin to transform to mixtures of crystalline phases. For further information please refer to Section 16.

SECTION 11: Toxicological information

Information on toxicological effects

Toxicokinetics, metabolism and distribution

Exposure is predominantly by inhalation or ingestion. Man made vitreous fibres of a similar size to RCF/ASW have not been shown to migrate from the lung and/or gut and do not become located in other parts of the body. When compared to many naturally occurring minerals, RCF/ASW has a low ability to persist and accumulate in the body (half-life of long fibres (> 20 µm) in 3 week rat inhalation test is approx. 60 days). Human Toxicological data: In order to determine possible human health effects following RCF exposure, the University of Cincinnati has been conducting medical surveillance studies on RCF workers in the U.S. The Institute of Occupational Medicine (IOM) has conducted





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medical surveillance studies on RCF workers in European manufacturing facilities.

Pulmonary morbidity studies among production workers in Europe and USA have demonstrated an absence of interstitial fibrosis and no decrement in lung function associated with current exposures, but have indicated a reduction of lung capacity among smokers. A statistically significant correlation between pleural plaques and cumulative RCF exposure was evidenced in the USA longitudinal study . The USA mortality study did not show evidence of increased lung tumour development either in the lung parenchyma or in the pleura.

Acute toxicity

Short term inhalation: No data available. Short term tests have been undertaken to determine fibre (bio) solubility rather than toxicity; repeat dose inhalation tests have been undertaken to determine chronic toxicity and carcinogenicity. - Oral: No data available. Repeated dose studies have been carried out using gavage. No effect was found.

Specific effects in experiment on an animal

Germ cell mutagenicity: Method: In vitro micronucleus test; Species: Hamster (CHO); Dose: 1-35 mg/ml; Routes of administration: In suspension; Results: Negative.

Carcinogenicity: Method: Inhalation. Multi-dose; Species: Rat; Dose: 3 mg/m3, 9 mg/m3 and 16 mg/m3; Routes of administration: Nose only inhalation; Results: Fibrosis just reached significant levels at 16 and 9 mg/m3 but not at 3 mg/m3. None of the parenchymal tumour incidences were higher than the historical control values for this strain of animal.

Method: Inhalation. Single dose; Species: Rat; Dose: 30 mg/m3; Routes of administration: Nose only inhalation; Results: Rats were exposed to a single concentration of 200 WHO fibres/ml specially prepared RCF for 24 months. High incidence of exposure-related pulmonary neoplasms (bronchoalveolar adenomas and carcinomas) were observed. A small number of mesotheliomas were observed in each of the fibre exposure groups (Mast et al 1995a).

Method: Inhalation. Single dose; Species: Hamster; Dose: 30 mg/m3; Routes of administration: Nose only inhalation; Results: Hamsters were exposed to a single concentration of 260 WHO fibres/ml specially prepared RCF for 18 months and developed lung fibrosis, a significant number of pleural mesotheliomas (42/102) but no primary lung tumours (McConnell et al 1995).

Method: Inhalation. Single dose; Species: Rat; Dose: RCF1: 130 F/ml and 50 mg/m3 (25% of non fibrous particles) RCF1a: 125 F/ml and 26 mg/m3 (2% of non fibrous particles); Routes of administration: Nose only inhalation Results: Rats were exposed to RCF1 and RCF1a for 3 weeks. The objective of the study was to compare lung retention and biological effects of the original RCF 1 compared to RCF1a. The main difference of these 2 samples was the non fibrous particle content of respectively 25% versus 2%. The post treatment observation was 12 months. Alveolar clearance was barely retarded after RCF1A exposure. After RCF1 exposure , however, a severe retardation of clearance was observed. (Bellmann et al 2001)

After intraperitoneal injection of ceramic fibres into rats in three experiments (Smith et al 1987, Pott et al 1987, Davis et al 1984), mesotheliomas were found in the abdominal cavity 6 in two studies, while the third report (Pott et al 1987) had incomplete histopathology. Only a few mesotheliomas were found in the abdominal cavity of hamsters after intraperitoneal injection in one experiment (Smith et al 1987). However, the ceramic fibres tested were of relatively large diameter. When rats and hamsters were exposed via intraperitoneal injection, tumour incidence was related to fibre length and dose (Smith et al 1987, Pott et al 1987, Miller et al 1999, Pott et al 1989). (From SCOEL publication (EU Scientific Committee on Occupational Exposure Limits) publication SCOEL/SUM/165, October 2010)

Reproductive toxicity: Method: Gavage; Species: Rat; Dose: 250mg/kg/day; Routes of administration: Oral; Results: No effects were seen in an OECD 421 screening study. There are no reports of any reproductive toxic effects of mineral fibres . Exposure to these fibres is via inhalation and effects seen





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are in the lung. Clearance of fibres is via the gut and the faeces, so exposure of the reproductive organs is extremely unlikely.

Irritation and corrosivity

Irritation and etching: Not an irritant. Evaluation: OECD 404

Irritant effect on the eye: Not an irritant.

Sensitising effects

After skin contact: no danger of sensitization.

Carcinogenic/mutagenic/toxic effects for reproduction

Specific symptoms in laboratory animals

Additional information on tests

STOT-Single exposure: Not applicable; STOT-Repeated exposure: Not applicable; Aspiration hazard: Not applicable.

Further information

IRRITANT PROPERTIES: Negative results have been obtained in animal studies (EU method B 4) for skin irritation. Inhalation exposures using the nose only route produce simultaneous heavy exposures to the eyes, but no reports of excess eye irritation exist. Animals exposed by inhalation similarly show no evidence of respiratory tract irritation. Human data confirm that only mechanical irritation, resulting in itching, occurs in humans, Screening at manufacturers' plants in the UK has failed to show any human cases of skin conditions related to fibre exposure.

SECTION 12: Ecological information

Toxicity

Experience so far shows this product to be inert and not degradable. These products are insoluble in the natural environment and are chemically identical to inorganic compounds found in the soil and sediment.

Persistence and degradability

Inorganic product which is not eliminable from water through biological cleaning processes.

Bioaccumulative potential

Elimination from water is possible through precipitation or flocculation.

SECTION 13: Disposal considerations

Waste treatment methods

Advice on disposal

Waste containing > 0.1% RCF/ASW is categorised as a stable non-reactive hazardous waste, which can generally be disposed of at landfill sites licensed for this purpose Unless wetted, such a waste is normally dusty and so should be properly sealed in clearly labelled containers for disposal. At some authorised disposal sites, dusty wastes may be treated differently in order to ensure they are dealt with promptly to avoid them being wind blown. Please refer to the European list (Decision no 2000/532/CE as modified) to identify your appropriate European Waste Code (EWC) and ensure national and or regional regulation are complied with. When disposing of waste and assigning European Waste Code (EWC) any possible contamination during use will need to be considered and expert guidance sought as necessary.

When disposing of waste and assigning European Waste Code (EWC) any possible contamination during use will need to be considered and expert guidance sought as necessary.

Contaminated packaging

Cleaned containers may be recycled. Handle contaminated packaging in the same way as the substance itself.





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SECTION 14: Transport information

Land transport (ADR/RID)

UN proper shipping name:

Not a hazardous material with respect to these transportation regulations.

Inland waterways transport

UN proper shipping name:

Not a hazardous material with respect to these transportation regulations.

Marine transport

UN proper shipping name:

Not a hazardous material with respect to these transportation regulations.

Air transport

UN proper shipping name:

Not a hazardous material with respect to these transportation regulations.

Environmental hazards

Dangerous for the environment:

no

Other applicable information

Ensure that dust is not windblown during transportation.

SECTION 15: Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulatory information

Additional information

Product is classified and labelled in accordance with EC regulations or the corresponding national laws.

- Council Directive 67/548/EEC “on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances as modified and adapted to the technical progress” (OJEC L 196 of 16 August 1967, p.1 and its modifications and adaptations to technical progress).

- Council Directive 1999/45/EC of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations.

- Regulation (EC) No 1907/2006 dated 18th December 2006 on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

- Regulation (EC) No 1272/2008 dated 16th December 2008 on classification, labeling and packaging of substances and mixtures (OJ L 353).

- Commission Directive 97/69/EC of 5 December 1997 adapting to technical progress for the 23rd time Council Directive 67/548/EEC (OJEC of 13 December 1997, L 343).

- Commission regulation (EC) No 790/2009 of 10 August 2009 amending, for the purposes of its adaptation to technical and scientific progress, Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labeling and packaging of substances and mixtures.

- The 1st Adaptation to Technical Progress (ATP) to Regulation (EC) No 1272/2008 enters into force on 25 September 2009. It transfers the 30th and 31 st ATPs of Directive 67/548/EEC to the Regulation (EC) No 1272/2008.

INTEGRATION OF RCF/ASW IN TO ANNEXE XV OF THE REACH REGULATION: RCF are classified as a carcinogenic substance CLP 1B (See section 15 above). On the 13th of January 2010 ECHA updated the candidate list for authorisation (Annexe XV of the REACH regulation) and added 14 new substances in this list including aluminosilicate refractory ceramic fibres and zirconia aluminosilicate refractory ceramic fibres. As a consequence, EU (European Union) or EEA (European Economical Area) suppliers of articles which contain aluminosilicate refractory ceramic fibres and zirconia aluminosilicate refractory ceramic fibres in a concentration above 0.1% (w/w) have to provide sufficient

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information, available to them, to their customers or upon requests to a consumer within 45 days of the receipt of the request. This information must ensure safe use of the article and as minimum contains the name of the substance.

RESTRICTION ON MARKETING OF RCF/ASW: Marketing and use of RCF/ASW is controlled by Directive 76/769/EEC relating to restrictions on the marketing and use of certain dangerous substances and preparations as modified (21st amending, Directive 2001/41/EC, 19 June 2001) and is restricted to professional use only.

PROTECTION OF WORKERS: Shall be in accordance with several European Directives as amended and their implementations by the Member States:
- Council Directive 89/391/EEC dated 12 June 1989 “on the introduction of measures to encourage improvement in the safety and health of workers at work (OJEC (Official Journal of the European Community) L 183 of 29 June 1989, p.1).
- Council Directive 98/24/EC dated 7 April 1997 “on the protection of workers from the risks related to chemical agents at work” (OJEC L 131 of 5 May 1998, p.11).
- Council Directive 2004/37/EC of 29 April 2004 on the protection of workers from risks related to exposure to carcinogens mutagens and reprotoxics at work (OJEC L 158 of 30 April 2004).

OTHER EU REGULATIONS: Member states are in charge of implementing European directives into their own national regulation within a period of time normally given in the directive. Member States may impose more stringent requirements. Please always refer to national regulations.

SOURCE OF REFERENCE FOR OELs: UK: HSE EH40 Workplace Exposure Limit.

National regulatory information

Employment restrictions: Observe employment restrictions for young people. Observe employment restrictions for child bearing mothers and nursing.
Water contaminating class (D): -- not water contaminating

Chemical Safety Assessment

For this substance a chemical safety assessment has been carried out.

SECTION 16: Other information

Changes

Notice the directions for use on the label.

The above information describes exclusively the safety requirements of the product and is based on our present-day knowledge. The information is intended to give you advice about the safe handling of the product named in this safety data sheet, for storage, processing, transport and disposal. The information cannot be transferred to other products. In the case of mixing the product with other products or in the case of processing, the information on this safety data sheet is not necessarily valid for the new made-up material.

Abbreviations and acronyms

European Industry Association Representing HTIW (ECFIA): 3, Rue du Colonel Moll, 75017 Paris - Tel. +33 (0) 31 48 74 26 - www.ecfia.eu

Full text of R-phrases referred to under sections 2 and 3

- 31 Contact with acids liberates toxic gas.
- 34 Causes burns.
- 49 May cause cancer by inhalation.
- 50 Very toxic to aquatic organisms.

Full text of H-Statements referred to under sections 2 and 3

- H314 Causes severe skin burns and eye damage.
- H350i May cause cancer by inhalation.





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H400 Very toxic to aquatic life.

Further Information

USEFUL REFERENCES (the directives which are cited must be considered in their amended version):

- Hazards from the use of Refractory Ceramic Fibre. Health and Safety Executive: Information document, HSE 267 (1998).
- Working with Refractory Ceramic Fibres 2006
- ECFIA; Code of Practice.
- Maxim LD et al (1998). CARE – A European programme for monitoring and reducing Refractory Ceramic Fibre dust at the workplace initial results; Gefahrstoffe – Reinhaltung der Luft, 58:3,97-103.
- Recognition and control of exposure to RCF, ECFIA, April 2009

ADDITIONAL INFORMATION AND PRECAUTIONS TO BE CONSIDERED UPON REMOVAL OF AFTER SERVICE MATERIAL:

As produced, all Refractory Ceramic Fibres are vitreous (glassy) materials which, upon continued exposure to elevated temperatures (above 900°C), may devitrify. The occurrence and extent of crystalline phase formation is dependent on the duration and temperature of exposure, fibre chemistry and/or the presence of fluxing agents. The presence of crystalline phases can be confirmed only through laboratory analysis of the “hot-face” fibre. IARC’s evaluation of crystalline silica states “Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1)” and additionally mentioned “in making the overall evaluation, the Working Group noted that carcinogenicity in humans was not detected in all industrial circumstances studied...”.

As only a thin layer of the insulation (hot face side) is exposed to high temperatures, respirable dust generated during removal operations does not contain detectable levels of crystalline silica (CS). In applications where the material is heat soaked, duration of heat exposure is normally short and a significant devitrification allowing CS to build up does not occur. This is the case for waste mould casting for instance. Toxicological evaluation of the effect of the presence of CS in artificially heated RCF/ASW material has not shown any increased toxicity in vitro.

The lack of toxicological effects may be explained by the following factors ; Increased brittleness of fibres after service life, favours fast fibre translocation through macrophage. Microcrystals, including crystalline silica, are embedded in the glass structure of the fibre and are therefore not biologically available.

High concentrations of fibres and other dusts may be generated when after-service products are mechanically disturbed during operations such as wrecking. Therefore ECFIA recommends: a) control measures are taken to reduce dust emissions and b) all personnel directly involved wear an appropriate respirator to minimise exposure.

CARE PROGRAMME: ECFIA, representing the high temperature insulation wool (HTIW) industry, has undertaken an extensive industrial hygiene programme to provide assistance to the users of all products containing HTIW. The objectives are twofold: To monitor workplace dust concentrations at both manufacturers’ and customers’ premises and to document manufacturing and use of RCF products from an industrial hygiene perspective in order to establish appropriate recommendations to reduce exposures. If you wish to participate in the CARE programme, contact ECFIA or your supplier.

SPRAYING: ECFIA recommends that this fibre should not be used for spraying.

(The data for the hazardous ingredients were taken respectively from the last version of the sub-contractor’s safety data sheet.)



9.2. Pressing forces (only AUSTROMAT™ 654i™ G2)

NOTE:
This section applies only to the pressing furnace AUSTROMAT™ 654i™ G2.

Entry for		Corresponding guide value for	
Pressing programs	Classic programs	Pressing force	
0	L90	Contact Pressure	
1	L91	108 N	11 kg
2	L92	137 N	14 kg
3	L93	167 N	17 kg
4	L94	196 N	20 kg
5	L95	226 N	23 kg
6	L96	255 N	26 kg
7	L97	280 N	28 kg

Tab. 9-1 Pressures at different lift positions



9.3. Vacuum table

The values in the following table were measured at a surrounding pressure of 969 hPa.

1 hPa = 1 mbar = 0.015psi
1 psi = 69 mbar = 69 hPa

Entry for		Relative pressure ¹⁾ hPa / psi		Absolute pressure ²⁾ hPa / psi	
Professional/ Pressing programs	Classic programs				
0 %	V0	0	0	969	14.0
10 %	V1	52	0.75	917	13.3
20 %	V2	153	2.2	816	11.8
30 %	V3	264	3.8	705	10.2
40 %	V4	365	5.3	604	8.7
50 %	V5	472	6.8	497	7.2
60 %	V6	577	8.3	392	5.7
70 %	V7	685	9.9	284	4.1
80 %	V8	793	11.5	176	2.5
90 %	V9 minimum (= switching point)	866	12.5	103	1.5
100 %	V9 maximum (=45 s after V9 minimum)	> 934	13.5	< 35	0.51

Tab. 9-2 Pressures of the different vacuum levels

1) Difference between surrounding pressure and absolute pressure
2) Pressure in the firing chamber



9.4. Heating speed

Temperature range	Maximum temperature rise rate
400...500 °C	approx. 180 °C / min
500...600 °C	approx. 160 °C / min
600...700 °C	approx. 140 °C / min
700...800 °C	approx. 120 °C / min
800...900 °C	approx. 100 °C / min
900...1000 °C	approx. 80 °C / min
1000...1100 °C	approx. 60 °C / min
1100...1200 °C	approx. 40 °C / min
600...1200 °C	Ø approx. 100 °C / min

Tab. 9-3 Maximum heating speed (temperature rise rate)



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