

ORIGINAL OPERATING INSTRUCTIONS

E3



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1 Welcome

Thank you for purchasing this E3dental machine. These operating instructions were prepared to help you understand all functions of your new dental machine.

You may find updates to this document at: dentalportal.info/E3

1.1 Target group

These instructions are intended and released for the following groups of people:

- End users
- Authorized resellers
- Authorized service technicians

1.2 Used symbols

Calls to action

» Single or general calls to action

1. Numbered action step
- ✓ Result

Other symbols

↗ Cross reference

- List (first level)
 - List (second level)

1. *Numbered image labels*

✓ **Correct** or **Do this**

✗ **Incorrect** or **Do not let this happen** or **Don't do this**

1.3 Signal words

The following signal words may be used:



DANGER indicates a hazardous situation which will result in death or serious injury.



WARNING indicates a hazardous situation which can result in death or serious injury.



CAUTION indicates a hazardous situation which can result in minor injury.



NOTICE indicates a situation which can lead to physical damage of the product or in the surrounding areas.

1.4 Copyright

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2 General safety instructions

2.1 Intended use

The machine and the manufacturing software are designed for the commercial processing of thermoformed dental trays, primarily in the field of tooth correction (aligners). The finished objects may require further processing before they can be used with the patient.

The machine is designed for dry machining.

- » Process only blanks and objects whose types you can select in each case in the manufacturing software. Although you can also process any other objects and blanks, neither the manufacturing software nor the machine are designed for these other blanks and objects.
- » Under certain circumstances, the use of this machine may be subject to legal requirements. Observe applicable local and national regulations as well as the requirements of other authorized organizations or agencies (e.g., professional associations, health authorities) that have jurisdiction. Obtain authorization from the appropriate organization (e.g., professional associations, health authorities) as needed. For all materials machined with this machine, observe the material's instructions for use with respect to the intended use and all related software and machining procedure requirements.
- » Do not manufacture implants or parts of objects that will later touch implants. In the case of two-part abutments, this includes the part which has the connection geometry to the implant. Do not manipulate the connection geometry of prefabricated abutments and always check finished objects for correct connection geometries (i.e. connection geometries of finished jobs were not damaged).

2.2 User skills

Action	Necessary qualification
Using TrimCAM	Persons trained in dentistry
Use of machine / DentalCNC for manufacturing dental objects	Instructed persons Activity must be supervised by a person with dental training
Using the machine / DentalCNC for cleaning and maintenance	Instructed persons

Action	Necessary qualification
All other activities described in the operating instructions	Instructed persons
Service work / preventive maintenance*	vhf-authorized service technicians

* Further information on maintenance: [Maintenance and do-it-yourself – on page 32](#)

2.3 Incorrect operation of the machine

- » Before installation, putting into operation and maintenance of the machine, read all the documents provided for the machine.
- » If it is unclear how to operate the machine in any way, do not use the machine and contact customer service.
- » Ensure that every user has access to the operating instructions.
- » Instruct every user on safe and proper machine handling.

2.4 Personal injury

2.4.1 Electric shock

Electric shock due to touching live parts

- » Remove the housing of the machine only for necessary repairs. Keep the following order:
 1. Switch off the machine at the main power switch.
 2. Disconnect the machine from all lines.
 3. Remove the housing.
 4. Carry out the necessary repair.
 5. Install the housing.
 6. Connect the machine to all lines.
 7. Switch on the machine at the main power switch.
- » Only have qualified electricians work on any electrical equipment.
- » Ensure that an operational residual current device is installed on the electrical circuit of the machine.
- » Run electrical cables so that they cannot be damaged by sharp edges.
- » Check the power cable for damage before every startup.
- » In the following cases, disconnect the machine immediately from the electrical source and secure it against restarting:

- When machine connections or electrical cables are damaged
- Before you check or run electrical cables
- » Do not touch the machine and especially the cables with wet or damp hands.
- » Do not place any liquid containers on the machine.

Electric shock when disconnecting the power cable with the main power switch in “ON” position.

- » Follow the following sequence:
 1. Switch off the machine at the main power switch.
 2. Disconnect the power cable.

2.4.2 Fire hazard

Unattended operation

- » Do not operate the machine unattended unless:
 - The working chamber of the machine is completely cleaned.
 - Unauthorized persons have no access to the machine.
 - The room in which the machine is located has an automatic fire detection system.

2.4.3 Housing

Danger of becoming trapped due to moving housing parts

- Working chamber door
- Chip container
- » If you move these housing parts, use only the designated grip points.
- » Make sure that your hands do not become trapped during movement.

2.4.4 Working chamber

Crushing hazard due to moving machine parts in the working chamber

- » Only operate the machine with the working chamber door fully closed and intact.
- » Do not bypass or deactivate the safety devices of the machine.
- » Check the machine regularly for damage, especially the safety devices.

Danger of cutting and burning

- » Always wear gloves when performing manual work on the machine or with blanks / tools.
- » Only touch tools on the shaft.
- » Do not touch the spindle body after machining.

2.4.5 Operating noise

Hearing loss and tinnitus due to regular loud working noises

- » If loud working noises cannot be prevented, use an ear protector during machining.

2.4.6 Maintenance and troubleshooting

Risk of injuries from machine malfunctions due to inadequate or incorrect maintenance / troubleshooting

- » Perform the maintenance tasks according to the maintenance table.
- » Do not troubleshoot while the machine is running.

2.4.7 Spare parts, extra equipment and accessories

Risk of injuries due to unsuitable spare parts / extra equipment / accessories

- » Use only original spare parts, original extra equipment and original accessories for the machine.

2.5 Material damage

2.5.1 Spindle

Damage caused by the warm-up phase being omitted

When initially starting a machine or if it has not been used for at least 2 weeks, you must warm the spindle before use.

- » Use the warm-up process in DentalCNC.
The DentalCAM & DentalCNC user Information provides instructions on how to do this.

Damage due to poor maintenance

- » Clean and exchange the collet chuck according to the maintenance table.

Damage caused by unsuitable tools

- » Recommendation: Only use original tools from vhf.
- » Use tools only within the maximum tool life shown in DentalCNC.
- » See the requirements in the chapter Technical data.

Impact damage

- » When working in the working chamber, do not apply manual pressure against the spindle.

2.5.2 TrimCAM & DentalCNC software

Machine damage due to incompatibility, malfunctions and/or incorrect operation of the software

- » Always use the latest version of the program that your machine supports according to vhf.

- » Ensure that your CAM computer meets all system requirements.
- » Before installing or operating the machine, read the documentation for the applications.

2.5.3 Power

Damage to the control electronics due to strong mains voltage fluctuations and voltage peaks

- » Connect the machine to a dedicated current circuit or ensure that no devices are connected that can cause heavy voltage fluctuation when switched on.
- » If heavy voltage fluctuations cannot be avoided, install a surge protector that protects the machine from heavy voltage fluctuations.

2.5.4 Working chamber

Damage to tools and blanks as well as defective machining results due to job cancelations

- » Ensure that all operating parameters are within the permissible range during the entire machining process.
- » Ensure that your network is working without disruptions. WiFi connections are not as reliable as wired networks.

Machine damage caused by broken tool and blank parts

- » Carefully check all blanks and tools for damage.

2.5.5 Working chamber door

Damage caused by improper handling

- » Only open a locked working chamber door via emergency release.

3 Transportation and storage

WARNING Injuries caused by unsafe transportation

If you transport the machine unsafely, the machine may slip and cause injuries.

Parts that are not properly mounted can fall and injure you and/or be damaged.

- » Always transport **unpacked** machines individually and do not stack them.
- » Ensure that only trained personnel transport the machine to and from the installation site.
- » Always transport the machine in an upright position.
- » Transport and position the machine with as many people as required for the weight of the machine in accordance with local and / or national laws and regulations.
- » Grip unpacked machines only by the left and right handles at the bottom of the machine. **Do not tilt the machine when carrying it.**

NOTICE Machine damage due to improper transport and/or storage

- » Ensure that all conditions set forth in the chapter are met during the entire transport and/or storage period Technical data.

3.1 Transporting the machine in the carton

- » Grasp the carton by the recessed handles.
- » Always set the package down during transport so that the arrows on the transport position sticker are pointing upward.

3.2 Handles on the underside of the machine



FIG. 1

3.3 Preparing for transportation or storage

1. Remove all blanks from the working chamber.
2. Clean the working chamber. Ensure that the working chamber is completely dry.
3. Install the transport lock. For this, follow the corresponding steps on the attachment.
4. Ensure that the machine housing is closed as far as possible. While doing so, do *not* close the working chamber door.
5. Switch off the machine via the main power switch.
6. Disassemble the machine components by following the installation instructions in reverse order.
7. In case of overseas transport, take proper measures against corrosion.

3.4 Repackaging

To repack the machine after preparing its transportation or storage, the following steps are necessary:

1. If possible, use the original packaging. If the original packaging is not available, use a packaging of similar size and quality.
Original packaging is available from customer service.
2. Pack the machine and its accessories securely. Follow the instructions on the supplement.
3. Protect the packaging against slipping. If machines are properly packed and protected against slipping, they may be stacked.

3.5 Putting the machine back into operation after storage

» Follow the instructions for initial start-up.

[Commissioning – on page 22](#)

3.6 Unpacking and positioning of the machine

3.6.1 Choosing the installation site

The installation site must meet the limit values and requirements in chapter Technical data.

[Technical data \(page 17\)](#)

3.6.2 Unpacking the machine

- Place the transport carton on a surface that can carry the weight.
 - The arrows on the transport position sticker must be pointing upward.
 - You need a free space of at least 47 x 55 x 67 cm / 19 x 22 x 26 in (W/D/H) at the front of the carton.
- Cut the carton seal and open the carton.

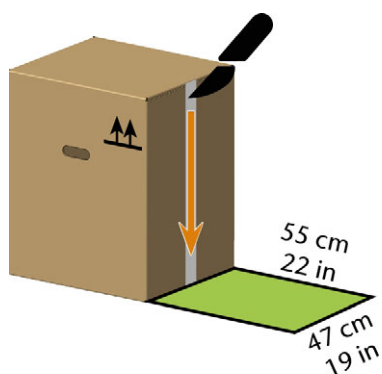


FIG. 2

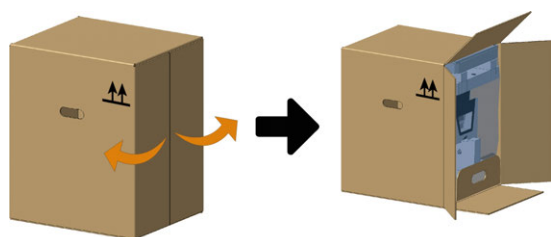


FIG. 3

NOTICE! Housing damage by pulling on the housing

- The machine stands on a separate insert. Grasp the insert by the handle and pull the machine out of the carton.

- Cut the fastener of the blue transport protection cover on the front of the machine.
- Pull the transport protection cover backwards over the machine and press it down on all sides until the top of the bottom cushion is exposed.

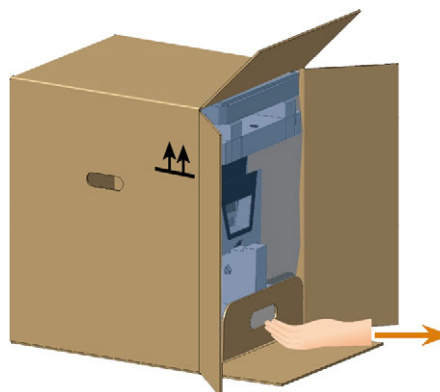


FIG. 4

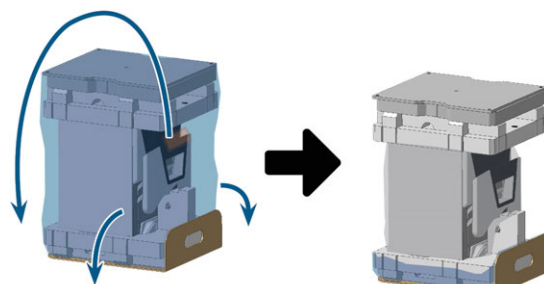


FIG. 5

- Remove the accessory pad from the machine.
- Remove the upper padding from the machine.
- Remove the support pad under the working chamber door.
- Open the working chamber door.

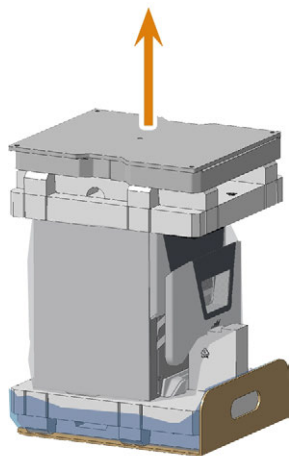


FIG. 6

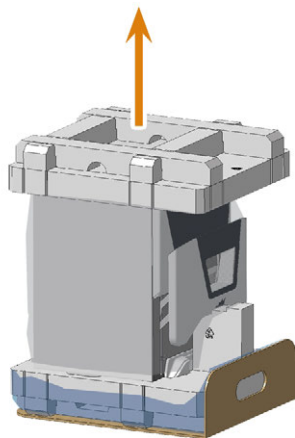


FIG. 7

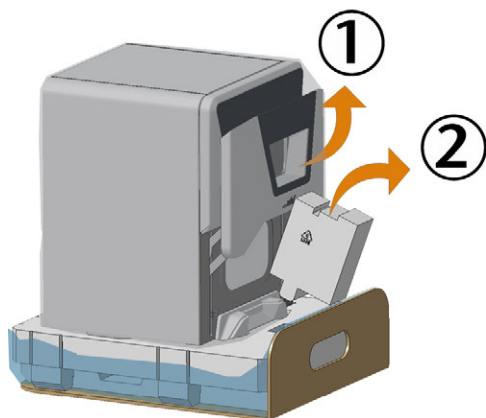


FIG. 8

10. Reach into the left and right recessed grips in the lower padding.
Slide your hands far enough under the machine to securely grasp the recessed grips on the underside of the machine.

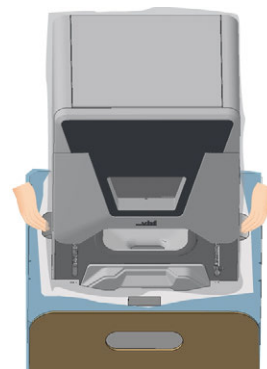


FIG. 9

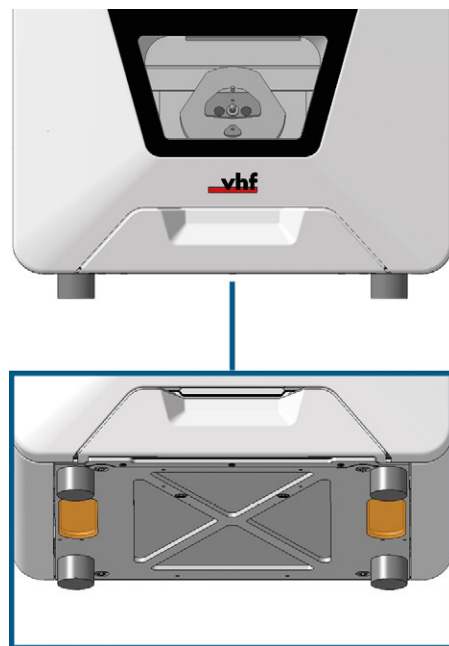


FIG. 10

11. Lift the machine out of the padding.
12. Place the machine on a surface that can carry the machine weight.

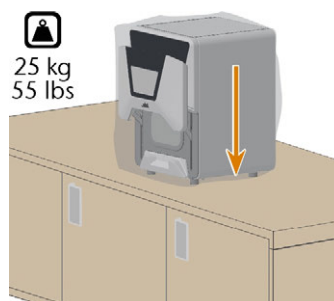


FIG. 11

13. **NOTICE!** Ensure that the following safety distances are always maintained.

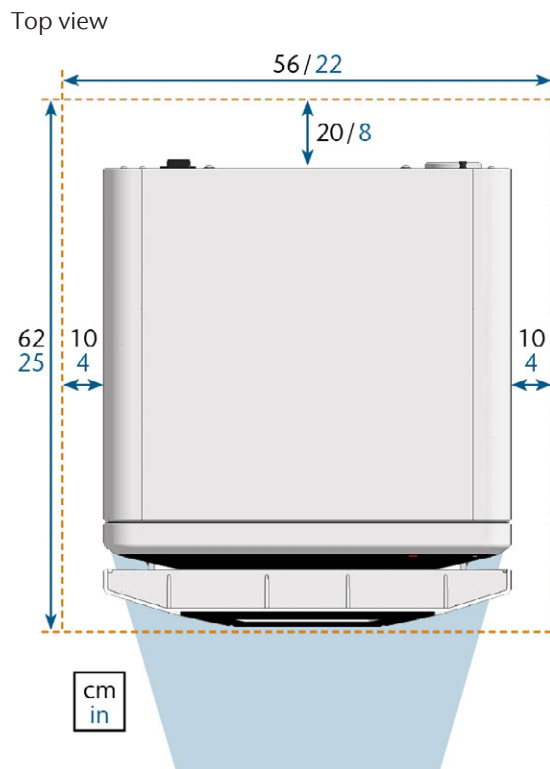


FIG. 12 BLUE AREA: WORKSPACE

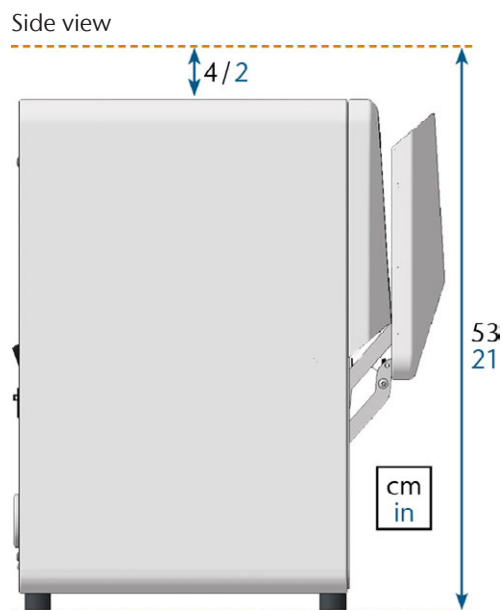


FIG. 13

14. Pull the protective housing cover upwards off the machine.
15. Remove the transport lock from the working chamber:

- a. Pull the vertically positioned parts of the transport lock out of the working chamber.
- b. Remove the rear part of the transport lock from the blank holder and pull it out of the working chamber.

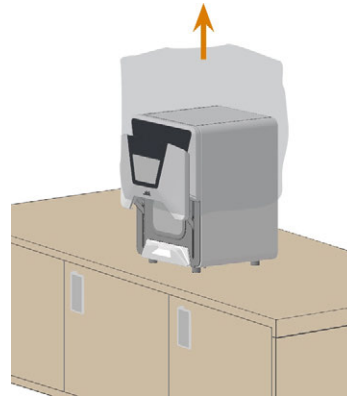


FIG. 14



FIG. 15



FIG. 16

16. Close the working chamber door.

Commissioning is only possible with the working chamber door closed.

17. The working chamber door is locked. You cannot open it again until after installation.

In case of emergencies: [🔗 Emergency opening of the working chamber door – on page 51](#)

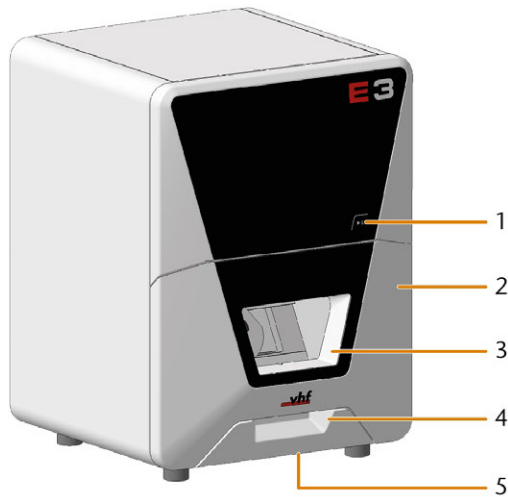
18. Keep all parts of the transport lock and the packing set for possible service returns.



FIG. 17

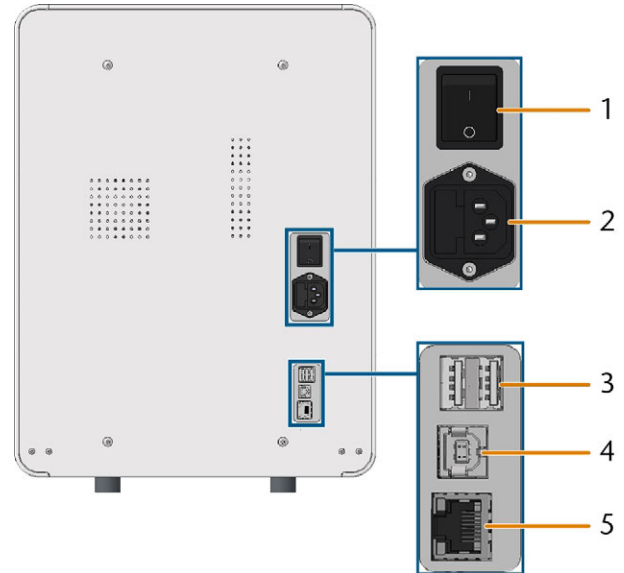
4 Get to know your machine

4.1 Front side of the machine



1. Start button
Start button (↗ page 15)
2. Working chamber door
Working chamber door (↗ page 15)
3. View window to the working chamber
Weekly cleaning of the working chamber (↗ page 35)
4. Recessed grip for opening the working chamber door
5. Chip container
Weekly cleaning of the working chamber (↗ page 35)

4.2 Rear side of the machine



1. Main power switch
Commissioning (↗ page 22)
2. Power connection including glass fuse T6,3A L250V
Establishing the electric connection (↗ page 20)
3. 2 x USB port 2.0 Type A (for future extensions)
4. 1 x USB port 2.0 Type B (for future extensions)
5. Network port (Ethernet RJ-45)
Connecting the CAM computer (↗ page 20)

4.3 Start button

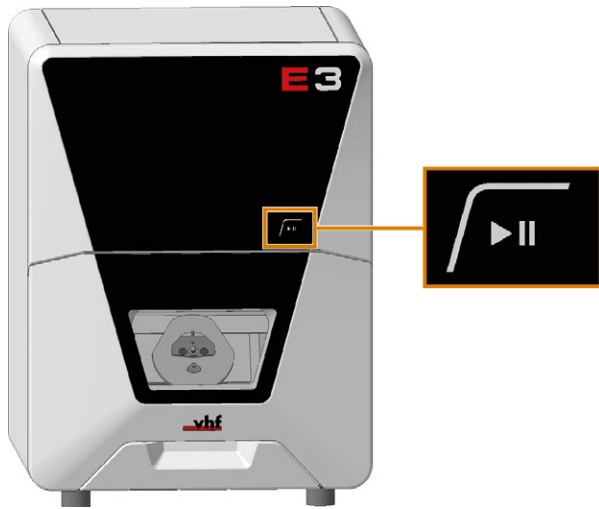


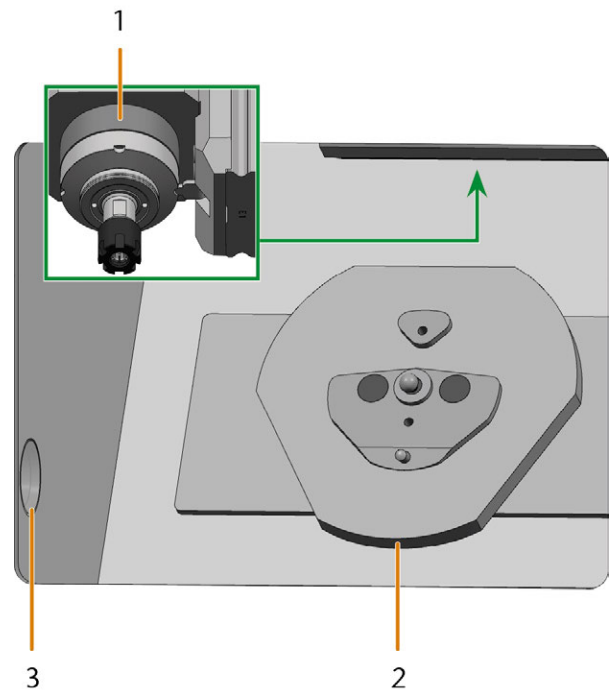
FIG. 18

The Start button is used to start and interrupt a job.

- » To press the Start button, place a finger on it.
Do *not* press.

[Starting jobs \(page 30\)](#)

[Interrupt and continue machining \(page 30\)](#)



1. Spindle with collet chuck for picking up tools
[Inserting and exchanging tools \(page 28\)](#)
2. Blank holder
[Mounting and removing blanks \(page 27\)](#)
3. LED for working chamber lighting

4.4 Working chamber door

The working chamber door locks the working chamber and protects the user from injuries during operation. You can open and close the working chamber door manually.

You *cannot* open the door when the machine is switched off or while the axes are moving.



Colors of the working chamber lighting

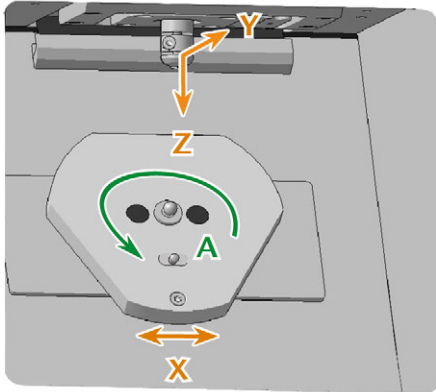
Color	Status	Working chamber door
Green	The machine is ready for operation.	unlocked
White	The machine is ready for operation.	unlocked
Blue	The machine is operating.	locked
Red	A machine malfunction has occurred.	locked

4.5 Working chamber

You can insert blanks and tools into the working chamber. This is where the blanks are processed.

4.6 Axes

This machine has 4 axes: 3 linear axes and 1 rotational axis.



4.7 Location of the identification plate and serial number

The identification plate of the machine contains identifying information such as the serial number. You can find the identification plate and machine serial number at the following location:

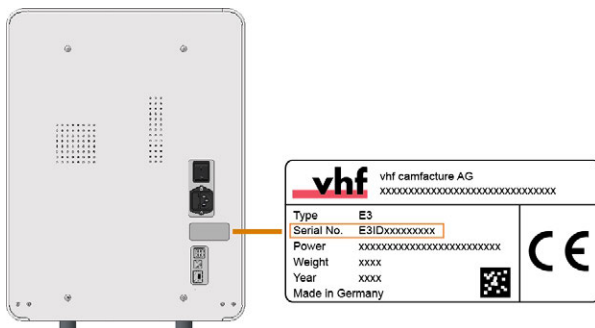


FIG. 19 SERIAL NUMBER ON THE IDENTIFICATION PLATE (MARKED ORANGE);
FIGURE SIMILAR

4.8 Technical data

Dimensions (W/D/H)

	Unit	Value
Footprint (approx.)	mm	260 x 260
	in	10.2 x 10.2
Housing fully closed (approx.)	mm	360 x 370 x 490
	in	14.2 x 14.6 x 19.3
Minimum required space for operation (approx.)	mm	560 x 620 x 530
	in	15 x 25 x 21

Base system

	Unit	Value
Weight (approx.)	kg	25
	lbs	55
Axes		4
– Rotational axis A		360°
Overvoltage category (IEC 60664-1)		II

Ambient conditions

	Unit	Value
Relative humidity		80 %, non-condensing
Ambient temperature for storage/transport	°C	-20 – 60
	°F	-4 – 140
Ambient temperature for operation	°C	10 – 35
	°F	50 – 95
Location type		Indoor
Maximum height above mean sea level	m	2000
	ft	6561
Ambient air (IEC 60664-1)		Dust free, pollution degree 2

Spindle

	Unit	Value
Model		SFE 300M (DC motor, brushless)
Maximum rotational speed	rpm	60,000
Nominal power under continuous operation (S1)	W	300
Peak power (P_{max})	W	800
Collet chuck diameter	mm	3

Tools

	Unit	Value
Maximum number of tools in the working chamber		1
Maximum tool length	mm	60

Standard blank holder

	Unit	Value
For dental splints on a dental arch model with vhf-specific base for attachment.		
Maximum thickness of the dental splint material		See TrimCAM
Maximum diameter of the dental splint material	mm	125

Sound emission

Operating condition	Unit	Value
Machining	dB(A)	69
All other operating conditions	dB(A)	<70

Measuring conditions	Value
Machined material	Standard tooth splint (aligner)
Condition of the tools	new
Measured value	Sound pressure level (distance: 1 m)
Measurement according to	ISO 3746, accuracy grade 3

Connections

	Unit	Value
Power connector (and maximum power consumption in watts)	V AC	100 – 240
	Hz	50/60
	W	320
		Glass fuse T6,3A L250V
Network connection – Speed		RJ-45
		10BASE/100BASE-TX/1000BASE-T (Auto-sensing)
USB port		2 x 2.0 A
		1 x 2.0 B

5 Installation

The installation steps to operation are:

1. [🔗 *Checking the scope of delivery*](#) – on the next page
2. [🔗 *Connecting the machine*](#) – on page 20
3. [🔗 *Commissioning*](#) – on page 22

5.1 Checking the scope of delivery

» Unpack the machine and ensure that you have received the following items:



1. 1 x Machine E3
2. 1 x Ethernet network cable
3. 1 x Power cable
4. 1 x *Machining tool* (P140-R1-60)
5. Clamping wrench ER 8
6. Fork wrench 8 mm

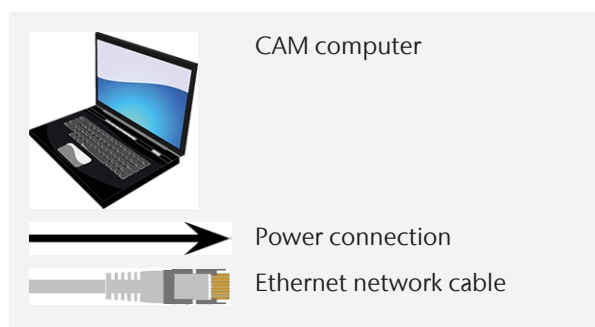
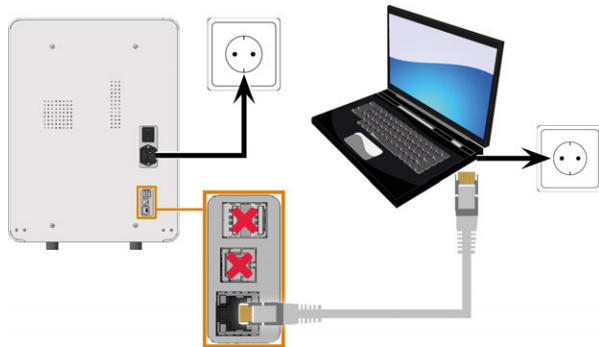
7. 1 x Torque screwdriver 1.5 Nm with hexagon bit TX10 (1/4", 2 mm)
8. 1 x Angle screwdriver TX20
9. 1 x Cleaning brush for the blank holder
10. 1 x Microfiber cloth
11. Cleaning brush for the spindle collet chuck
12. Cleaning cone for the spindle
13. 1 x Calibration set:
 - 1 x Micrometer
 - 5 x Calibration blank
 - 1 x Calibration tool (P300-R2-60)
 - Not depicted: 4 x Countersunk-head screw M3 x 8, for fastening the calibration blanks
14. 4 x Fastening elements for the housing cover
15. 1 x 10 mm wrench
16. 2 x Cover for the screws of the blank holder

Not depicted:

- 1 x Machine safety information
- 1 x Supplement for unpacking and installing the machine
- Transport lock
 - 1 x Foam insert, large, with recess
 - 2 x Foam insert, small
- Packing set
 - 1 x Transport carton including floor insert
 - 1 x Upper and lower padding
 - 1 x Working chamber door support
 - 1 x Transport protection cover
 - 1 x Housing protection cover

5.2 Connecting the machine

5.2.1 Machine installation scheme



5.2.2 Connecting the CAM computer

You connect the CAM computer to the machine with an Ethernet cable.

To avoid connecting errors, we highly recommend that you use the USB or Ethernet cable which was provided with the device. Original spare parts are available from customer service.

Connecting Ethernet

You can connect the machine either directly to your CAM computers or via the local network. For integrating the machine into your network, you will require the assistance of your IT specialist.

1. Plug the Ethernet cable into the network port at the connection panel of the machine.
2. For a direct connection, plug the other end of the Ethernet cable into the network port on the CAM computer.
3. To connect through your network, plug the other end of the Ethernet cable into a port on the local network (for example, hub, switch, network jack).
 - The CAM computer must also be connected to this network.

- The IP assignment in the network be performed by a DHCP server.

- ✓ You set up the connection between the machine and CAM computer using the software during the initial start-up.

[Commissioning](#) – on page 22

Minimum Ethernet cable requirements

- Performance class: CAT-6
- Screened/Foiled Twisted Pair (S/FTP)
- Maximum length of 55 m (approx. 180 ft)
- Premium quality

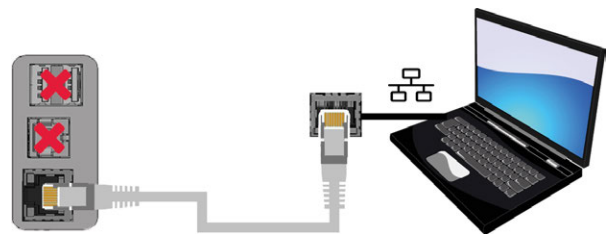


FIG. 20

5.2.3 Establishing the electric connection

The machine requires an uninterruptible power supply for proper operation.

1. Plug the provided power cable into the power connection at the connection panel of the machine.
2. **NOTICE!** To avoid job interruptions, install an uninterruptible power supply (UPS), type online / VFI (IEC 62040-3, Class 1) if there are regular power failures or frequent mains voltage fluctuations.
3. Insert the plug of the cable into a socket that is protected by a Residual Current Device / Ground Fault Circuit Interrupter.
4. Plug the power cord supplied with the CAM computer into the CAM computer's power socket. Insert the plug of the cable into a socket that is protected by a Residual Current Device / Ground Fault Circuit Interrupter.

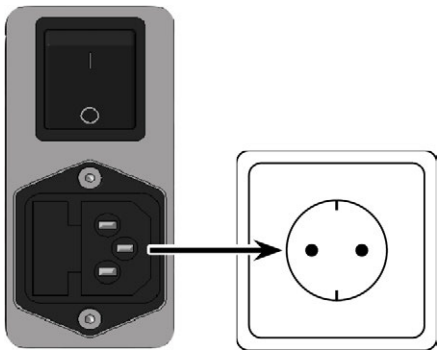


FIG. 21

5.3 Commissioning

5.3.1 Starting the machine

NOTICE Short-circuit hazard when the machine is too cold

If the machine is transported from a cold environment into a warmer environment, a short circuit may occur caused by condensate.

» **Before** switching on the machine after transportation, ensure the following:

- The ambient air has the allowed temperature.
- The machine has the same temperature as the ambient air. This will take **at least 48 hours**.
- The machine is completely dry.

1. Close the working chamber door.
2. Switch on the machine at the main power switch.
The working chamber lighting is on. The machine does not reference.



FIG. 22

5.3.2 Setting up a software connection to the machine


CNC interface installation and set up

1. Start the CAM computer.
 2. Install the newest version of DentalCAM & DentalCNC that is released for the machine.
 - Select **New** as the installation type.
 - Select the correct machine model.
- ✓ The following happens:
- a. During the installation, CNC interface will be installed. CNC interface establishes the connection between the machine and DentalCNC.
 - b. The CNC interface icon is displayed in the task bar info area on the right side of your Windows task bar. CNC interface will start in the

background every time Windows is started.



FIG. 23

3. Select the CNC interface icon in the task bar info area: 

If the icon is not displayed in the position shown above, open the grouped icons with the up arrow icon (highlighted in orange).

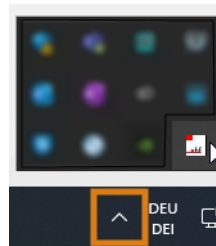


FIG. 24

4. The CNC interface window displays.

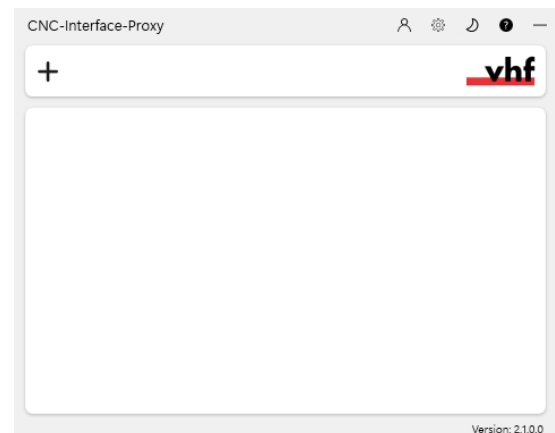





FIG. 25

5. If you want to change the language, do the following:
 - a. Select the following icon on the right side of the window's title bar: 
 - b. Select the desired entry from the topmost drop-down list.
 - c. Save your entry with the following icon: 
6. Create a new connection using the following icon: 

- ✓ The connection configuration view appears.

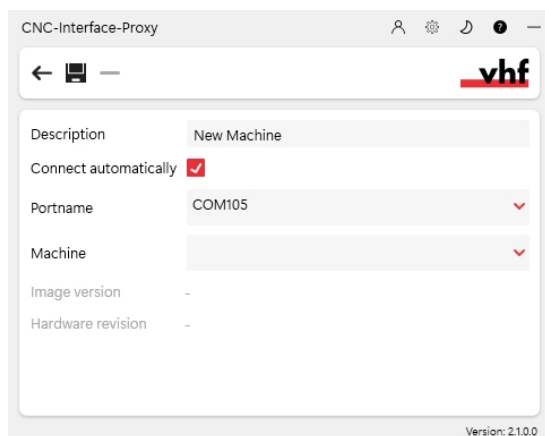


FIG. 26

7. In the **Description** input field, enter a description that identifies the connection.
8. Check the **Connect automatically** option.
9. Select the stored COM port from the **Port name** drop-down list.

Example: **COM105**

10. Select the machine to be connected from the **Machine** drop-down list.

The entries are structured as follows:

<machine model>ID<serial number><IP address>

Example: FOX-I E5ID300000000 (10.0.21.33)

- E5 is the machine model
- 300000000 is the serial number
- 10.0.21.33 is the IP address

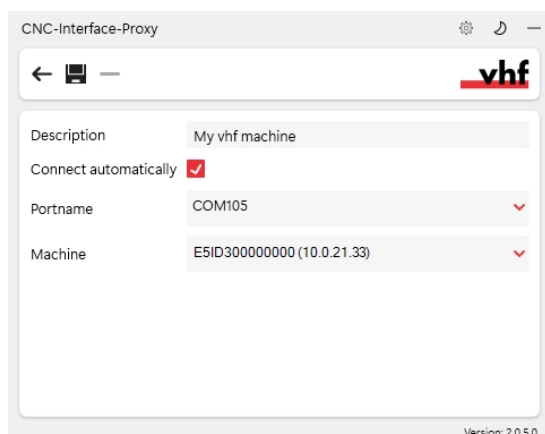


FIG. 27 A FULLY CONFIGURED CONNECTION WITH A UNIQUE DESCRIPTION (SERIAL NUMBER BY WAY OF EXAMPLE)

11. If the machine is not displayed, check the following:

- Is the machine on?
- If you are using a wired connection: Have you connected all Ethernet cables to the machine and the CAM computer?
- If you are using a WiFi connection: Is the signal sufficient? Recommendation: Try changing to a wired connection.
- Is a firewall blocking the connection between the machine and the CAM computer?

12. Save your entry with the following icon:

- ✓ The connection you have set up is shown in the connection overview. The green dot indicates a successful connection.

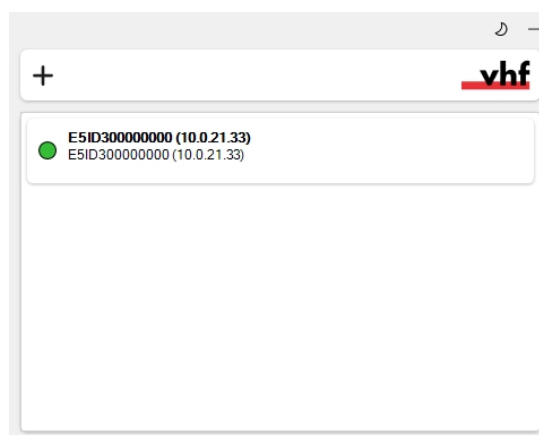


FIG. 28 A SUCCESSFUL CONNECTION

If the connection is lost, the display changes to red. CNC interface tries to reconnect regularly. A connection interruption can have the following causes:

- The network operates unreliably.
- Another CAM computer uses the machine.

13. If CNC interface indicates that there is an update, select the following icon:

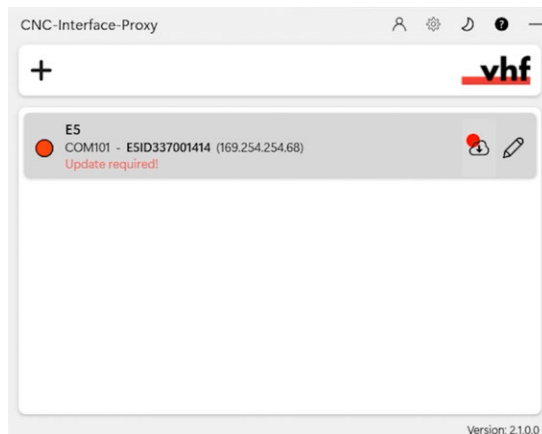






FIG. 29

- ✓ CNC interface updates your machine.
- 14. Minimize the CNC interface window with the following icon: 
- 15. Start DentalCNC.
- 16. Open the DentalCNC **Application settings** with the following icon in the main icon bar: 
- 17. Open the **General settings** with the following icon in the local icon bar: 
- 18. Select the following icon next to the **Port number** input field: 

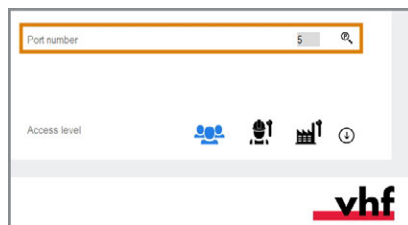


FIG. 30

- ✓ If DentalCNC is able to determine the port number, the number displays in the **Port number** input field. The machine references.
- 19. If the working chamber door was open during the previous step, close it. If the machine does not reference as a result, quit DentalCNC and restart the application.

Checking the connection and changing the connection settings

1. Open the task bar info area by clicking the up arrow (highlighted in orange) on the right side of your Windows task bar.

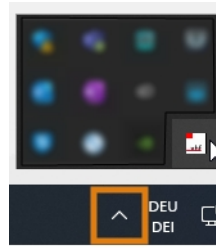




FIG. 31 EXAMPLE: RED DOT ON UNSUCCESSFUL CONNECTION

2. Select the CNC interface icon: 
- ✓ The CNC interface window displays.
3. Move the mouse pointer over the entry in the overview and select the following icon: 

5.3.3 Installing TrimCAM

- » Install the newest version of TrimCAM that is released for the machine.

5.3.4 Warming the spindle

- » Use the warm-up process in DentalCNC. The DentalCAM & DentalCNC user Information provides instructions on how to do this.

6 Operating the machine

The workflow for operation is as follows:

1. [Starting the machine \(page 26\)](#)
2. [Preparing the blanks \(page 26\)](#)
3. [Mounting and removing blanks \(page 27\)](#)
4. [Inserting and exchanging tools \(page 28\)](#)
5. [Starting, interrupting, canceling jobs \(page 30\)](#)
6. [Switching off the machine \(page 30\)](#)

6.1 Starting the machine

6.1.1 Starting the machine

1. Close the working chamber door.
 2. Switch on the machine at the main power switch.
 3. Start DentalCNC.
- ✓ The working chamber lighting is on. The machine references.

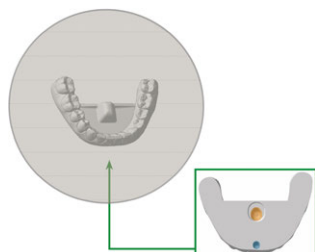


FIG. 32

6.2 Preparing the blanks

6.2.1 Suitable blanks

The machine can process the following blanks:



Thermoformed dental trays on a dental arch model with vhf-specific receptacle for attachment.

- The maximum thickness of the dental tray material is specified in TrimCAM .
 - » Use dental tray material according to the selection options in TrimCAM.
- The maximum diameter of the dental tray material is 125 mm. Excess dental tray material may need to be roughly removed prior to machining.

The blanks must be prepared individually before being mounted in the machine.

6.2.2 Preparing the blanks

Requirements for successful blank preparation

- Suitable dental arch model as STL file from a CAD application

- 3D printing equipment for creating the dental arch model
- Equipment for thermoforming dental trays

Preparation

1. Create a job in TrimCAM with the dental arch model from your CAD application. TrimCAM adds a vhf-specific receptacle to the bottom of the dental arch model, for fastening in the machine.
2. Using the 3D printer software, import the modified dental arch model from TrimCAM. The STL file is saved to the export directory that was assigned during the installation of TrimCAM.
3. Prepare for 3D printing in the software:
 - a. To ensure that the contact surface (marked in orange) on the underside of the finished dental arch model is completely flat and the holder (marked in red) is free of defects and residue, make sure of the following:
 - Support structures on the flat underside only if removable without residue
 - No support structures in the fixture for fastening
 - No raised lettering / markings

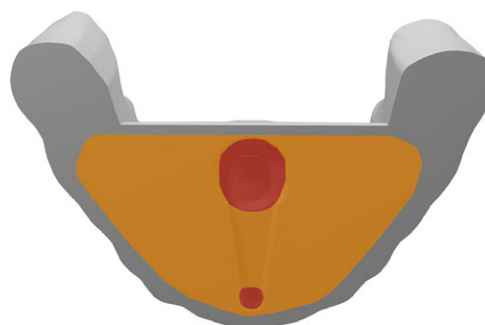


FIG. 33

- b. For hollow dental arch models, ensure that the wall thickness is at least 1.5 mm.
4. Print the dental arch model.
5. Prepare the dental arch model after printing:
 - a. *Resin printer:* To remove excess resin, wash the finished dental arch model with isopropyl before final curing. In particular, clean the mounting receptacle thoroughly until it is free of residue.
 - b. *Resin printer:* Allow the dental arch model to cure for the last time.
 - c. Remove the support structures completely. If necessary, grind the underside of the dental arch model flat.

- d. *Filament printer*: If necessary, remove residue from the transitions between contours.
- 6. Thermoform the dental tray.


6.3 Mounting and removing blanks

NOTICE Damage to tools and blanks as well as defective machining results due to incorrect fixing

If blanks move or vibrate during machining, the result may become unusable.

- » Make sure that the blank is firmly locked onto the blank holder and cannot move.

6.3.1 Mounting and removing blanks

1. Move the axes into the default position by selecting the depicted icon in the **Machining** view in DentalCNC. 
 2. Open the working chamber door.
 3. If present, pull the mounted blank straight off the blank holder.
 4. Pick up the blank that you want to mount.
 5. If necessary: Roughly cut off excess dental tray material from the blank so that you can easily mount the blank.
 6. Align the recesses in the base of the blank with the positioning pin (marked blue) and the pressure piece (marked orange) of the blank holder.
 7. Place the blank on the positioning pin at an upward angle. Tilt the blank down until it snaps onto the blank holder.
 8. **NOTICE!** Make sure that the blank is firmly locked onto the blank holder and cannot move. If necessary, repeat the previous step.
- ✓ You have successfully mounted the blank.

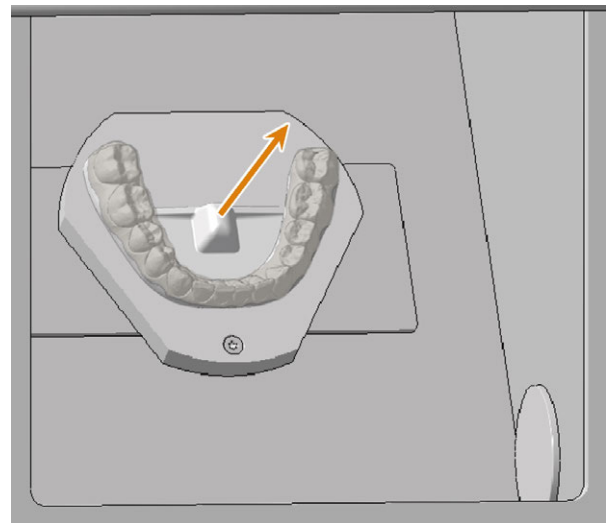


FIG. 34

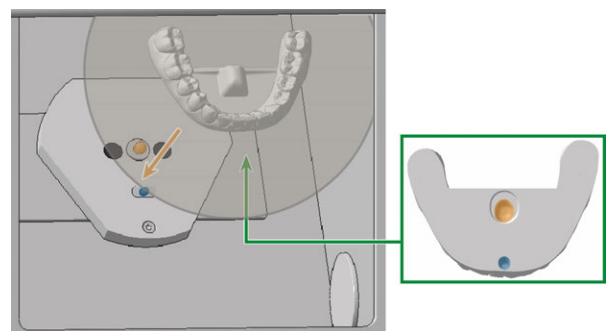


FIG. 35

6.4 Inserting and exchanging tools

NOTICE Damaging of the spindle or the tool positions if you use improper tools

Improper tools can damage the collet chuck of the spindle and / or the tool positions.

- » Only use tools with a sufficiently large chamfer at the tool shank.
- » Install a retaining ring as a stop ring according to DIN 471-A3.
- » See the further instructions in chapter Technical data.

The machine usually machines all jobs with the same tool. You need to insert or exchange tools in the following cases:

- Upon first use of the machine
- When the tool life of a tool has expired
- When the tool is damaged or worn
- If a tool other than the standard tool is required

In DentalCNC you can check the required tools and tool lives. A tool required for a job must be assigned to the virtual tool magazine, the tool life must be reset after exchanging a tool. To do this, use the views **Machining** and **Tool Management**:

- DentalCNC shows the tools (marked orange) needed for a job and their tool life in the **Machining** view.

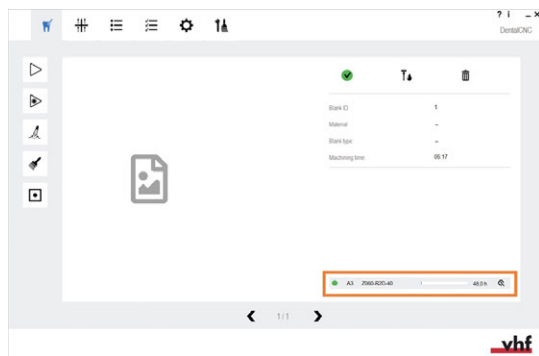


FIG. 36

- In the view for **Tool Management** in DentalCNC you add tools, assign them to the virtual tool magazine and reset the tool life.

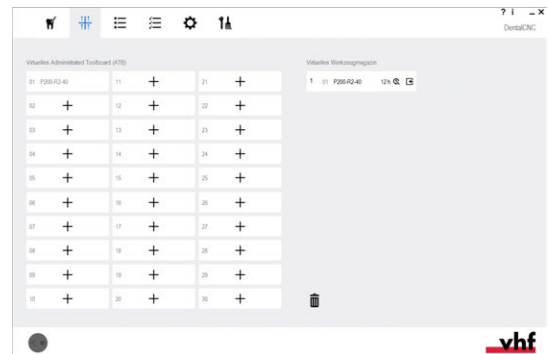


FIG. 37

6.4.1 Inserting tools into the collet chuck

1. **CAUTION!** Wear gloves.
2. Ensure the following:
 - ↳ [Removing tools from the collet chuck – on the next page](#)
 - The spindle is in the tool change position.
 - The working chamber door is open.
 - The clamping nut is loosened and the tool has been removed.
3. Insert the shaft of the new tool into the collet chuck as far as it will go. Hold the spindle and the tool in place with one hand.
4. Turn the clamping nut clockwise by hand until you feel resistance and the tool is held by the collet chuck.

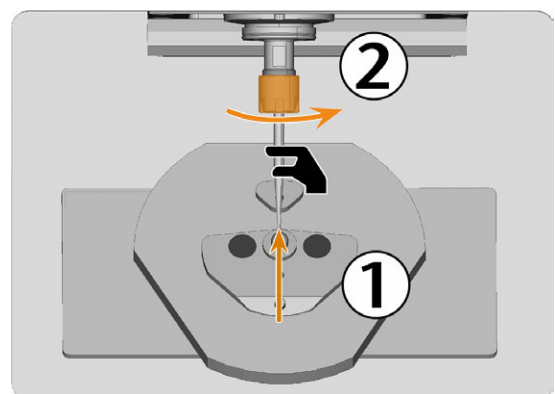


FIG. 38

5. Tighten the clamping nut (marked orange) completely:

NOTICE! The clamping nut is *not* fully tightened when initial resistance is reached. The tool may come loose during machining and cause damage.

 - a. Place the wrench on the flat surfaces (marked blue) on the spindle.

- b. Tighten the clamping nut clockwise with the clamping wrench. In doing so, turn the clamping nut beyond initial resistance and make sure that the clamping nut is completely tight.

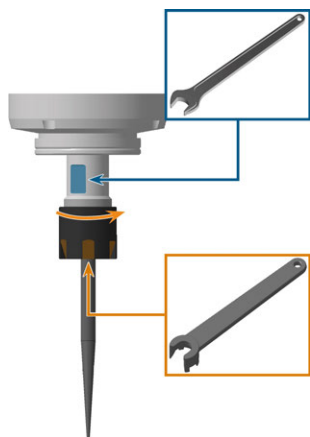



FIG. 39

6. If the tool is taking the place of an old tool of the same type, reset the tool life.
7. If you have inserted another tool from your inventory, assign it to the virtual tool magazine. If it is an additional new tool, first add it to the virtual ATB.

6.4.2 Removing tools from the collet chuck

1. Move the axes into the tool change position by selecting the depicted icon in the **Machining** view in DentalCNC. 
2. **⚠ CAUTION!** Wear gloves.
3. Open the working chamber door.
4. Loosen the clamping nut (marked orange):
 - a. Place the wrench on the flat surfaces (marked blue) on the spindle.
 - b. Turn the clamping nut with the clamping wrench approx. 1/4 turn counter-clockwise until the clamping nut can be moved by hand.

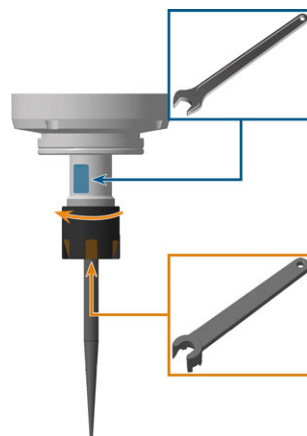


FIG. 40

5. Hold the tool and spindle with one hand and turn the clamping nut (marked orange) counter-clockwise with the other hand until the tool releases.
6. Remove the old tool from the collet chuck.

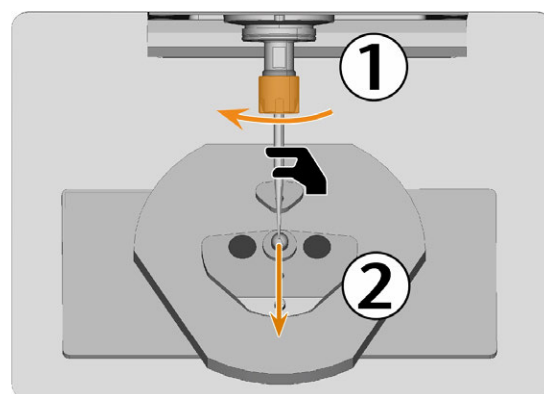


FIG. 41

7. If you put the tool back to your inventory or no longer use the tool type, configure DentalCNC accordingly.

6.5 Starting, interrupting, canceling jobs

You control and start manufacturing with DentalCNC. In this chapter, we will give you a brief overview. For the complete instructions, see the documentation for DentalCNC.

6.5.1 Starting jobs

1. Ensure the following:
 - You created a job on your CAM computer. It has been transferred to DentalCNC.
 - The required blank is mounted.
2. Close the working chamber door.
3. Proceed as follows:
Start machining via the depicted icon in DentalCNC.



or

Start the job with the start button.



3. Exit DentalCNC.
4. **⚠ DANGER!** Switch off the machine at the main power switch.
5. (Optional) Unplug the power cable.
6. (Optional) Switch off the main power switch of your workstation / facility.



FIG. 42

6.5.2 Interrupt and continue machining

Interrupting the machining process

1. Press the Start button.
 - ✓ DentalCNC interrupts the machining. A dialog window opens. You can open the working chamber door.
2. Recommendation: Leave the blank in the holder.

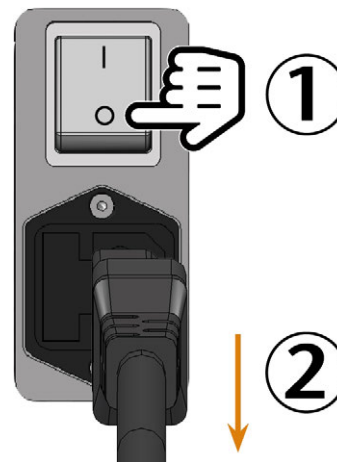


FIG. 43

Continuing the machining process

1. Close the working chamber door.
2. DentalCNC: Confirm the current message.



6.5.3 Aborting machining

1. DentalCNC: Select the depicted icon.
2. Confirm the current message.
- ✓ The following happens:
 - a. Machining stops immediately.
 - b. The spindle moves to its default position.
 You can open the working chamber door.



6.6 Switching off the machine

1. Ensure that the working chamber is clean.
2. Close the working chamber door.

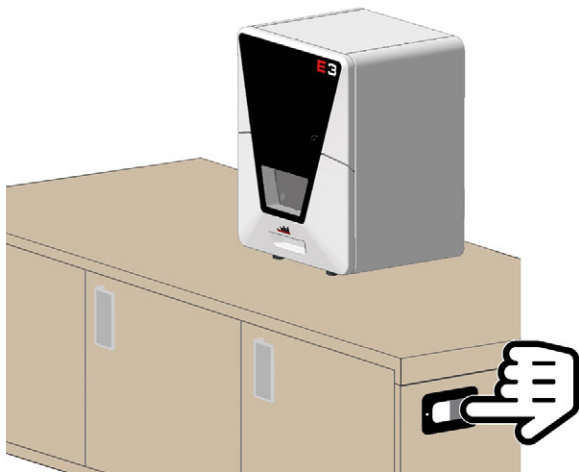


FIG. 44

7 Maintenance and do-it-yourself

scheduling the first preventive maintenance appointment at this point to ensure your machine gets proper maintenance.

Some day-to-day basic maintenance and preventive maintenance is essential to keep the machine mechanics and electric components in good condition for proper machining results.

It is your responsibility to make sure that preventive maintenance, as well as basic maintenance, is performed.

You are the only one who can ensure that your machine receives the proper maintenance care.

7.1 Basic maintenance

Basic maintenance includes tasks which are part of everyday operation. You are responsible to ensure that these tasks are carried out according to the maintenance table. You only need minimal manual skills for these tasks and most required tools are provided with the machine.

[Maintenance table](#) ([↗ page 33](#))

7.2 Preventive maintenance

Preventive maintenance for this machine has to be scheduled every 2 years, or after 2,000 operating hours at the latest.

» To schedule preventive maintenance, contact customer service.

7.3 Maintenance section

For your convenience, DentalCNC lists all basic maintenance tasks in the **Maintenance section**. In the **Maintenance section**, you can see when the individual tasks are due.

» When you have performed a maintenance task, mark it as complete in the **Maintenance section**. This will keep the list up-to-date.

7.4 Servicing

Customer service is your main contact for all service related questions. They will provide you with spare parts, maintenance tips and they will perform preventive maintenance for you on request.

» When your machine is delivered or installed, ask the service technician for contact details for the customer service team. We also recommend

7.5 Maintenance table

7.5.1 Once per week

Action	Recommended interval	Description
Performing the weekly cleaning	<ul style="list-style-type: none"> ▪ Once per week ▪ 1 operating hours 	Cleaning the machine – on page 35

7.5.2 Depending on the use of the machine (operating hours)

Action	Recommended interval	Description
Cleaning the collet chuck	<ul style="list-style-type: none"> ▪ 16 operating hours ▪ In the event of out-of-true running 	Cleaning the collet chuck – on page 37

7.5.3 Every 2 years

Action	Recommended interval	Description
Preventive maintenance	<ul style="list-style-type: none"> ▪ Every 2 years ▪ 2000 operating hours 	Contact customer service.

7.5.4 When necessary

Action	Recommended interval	Description
Updating the software and firmware	When an update is available	Updating the software and firmware – on page 40

7.6 Spare and wear parts

7.6.1 Definition of wear parts

Wear parts are bound to wear out or fail with use. They need to be exchanged within the time intervals which are given in the table below. Use these values to determine operating costs, to plan your spare part stock as well as to create individual maintenance and service plans.

7.6.2 Spare part list

In the table below you can find the most important spare parts for your machine.

- Many included accessories can be ordered as spare parts.
- Customer Service has an extended list of all spare parts.

1: Wear part – 2: Self-exchangeable spare part

1	2	Part	Recommended interval	Description
X	X	Collet chuck	500 operating hours* Every year*	Cleaning the collet chuck – on page 37
X		Spindle (including collet chuck)	2000 operating hours* Every 2 years*	Contact customer service.
	X	Fixing latch of the side panels	When necessary	Exchanging the fixing latches of the side panels – on page 48
	X	Machine housing	When necessary	Disassembling and assembling the machine housing – on page 42
	X	Main fuse	When necessary	Exchanging the main fuse – on page 40

*These are recommendation guidelines. Depending on the processing material and how well the machine is cleaned, these values may differ.

7.7 Cleaning the machine

CAUTION Breathing difficulties caused by processing dust

Processing dust that gets into your lungs can cause breathing difficulties.

- » Wear a face mask of class FFP2 during the entire cleaning.

NOTICE Damaging of the linear guides or the spindle when cleaning with compressed air

If you clean the working chamber with compressed air, material chips can reach the linear guides or the spindle bearings.

- » **Never** clean the working chamber with compressed air.

7.7.1 Weekly cleaning of the working chamber

1. Have ready:



A suction unit with category M filter



A mild cleaning agent (optional)



Cleaning cloth (optional)

2. Close the working chamber door.
3. Move the axes into the cleaning position by selecting the depicted icon in the **Machining** view in DentalCNC.
4. Open the working chamber door.
5. Suck up the coarse dirt in the working chamber with the suction unit.

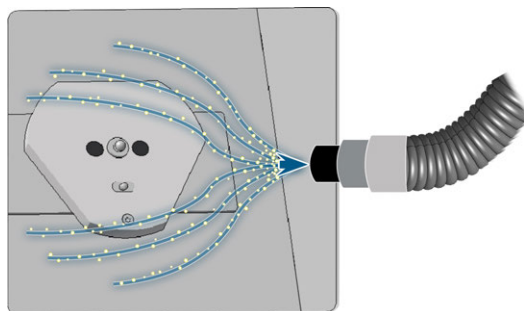


FIG. 45

6. Clean all surfaces and clearances in the working chamber thoroughly with the dry cloth. Use a mild cleaning agent if necessary.

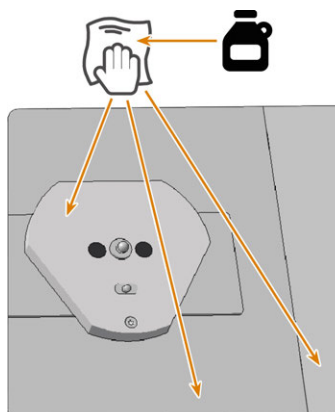


FIG. 46

7. Pull the chip container out of the machine towards the front.



You can only remove the chip container when the working chamber door is open.



FIG. 47

8. Empty the contents of the chip container into a collecting container.
9. Push the chip container completely back into the machine.

- If necessary, clean the view window with a cloth. Use a mild cleaning agent if necessary.





- Close the working chamber door.
- Clean the housing:

NOTICE! Housing damage caused by incorrect aids and cleaning

 - Clean the surface with a dry microfiber cloth. Be careful not to detach the symbol stickers. The adhesive foil is especially sensitive to friction and harsh cleaning agents.
 - If some dirt cannot be removed this way, moisten the cloth. Use a pH neutral cleaning agent if necessary.
 - Avoid exposing the surface to alkaline or acidic substances. Especially metallic powders show a highly sensitive reaction.
 - If a special cleaning agent is used to remove certain impurities, check the suitability of the agent in advance at a hidden location on the painted part.



- Move the axes into the default position by selecting the depicted icon in the **Machining** view in DentalCNC. 

- Open the **Maintenance section** window with the following icon in the main icon bar: 

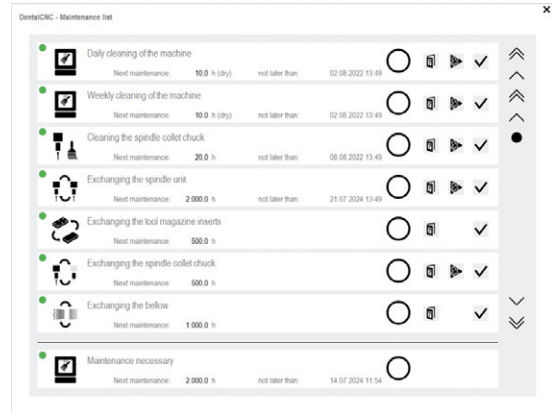



FIG. 48

- Select the icon shown for the **Weekly machine cleaning** entry. 

7.8 Cleaning the collet chuck

NOTICE Damaging of the spindle when cleaning with compressed air

If you clean the collet chuck with compressed air, the spindle bearings can be damaged.

» Clean the collet chuck **only** with the appropriate service set.

i This description applies to cleaning and replacing the collet chuck. A new collet chuck does not need to be cleaned with the brush before installation.

1. Have the following accessories ready from the accessories container of the machine:

- Cleaning cone
- Clamping wrench
- Cleaning brush for the collet chuck
- Collet chuck grease

2. Move the axes into the tool change position by selecting the depicted icon in the **Machining** view in DentalCNC.



3. **⚠ CAUTION!** Wear gloves.

4. Open the working chamber door.

5. Remove the tool from the collet chuck.

[↗ Removing tools from the collet chuck – on page 29](#)

6. Turn the clamping nut (marked orange) counter-clockwise completely off the spindle and remove it from the machine along with the collet chuck (marked blue).

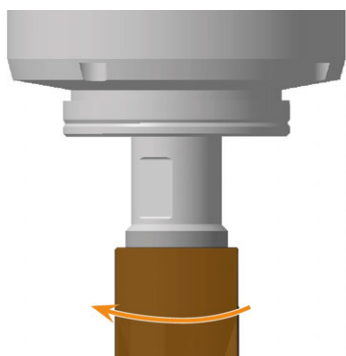


FIG. 49

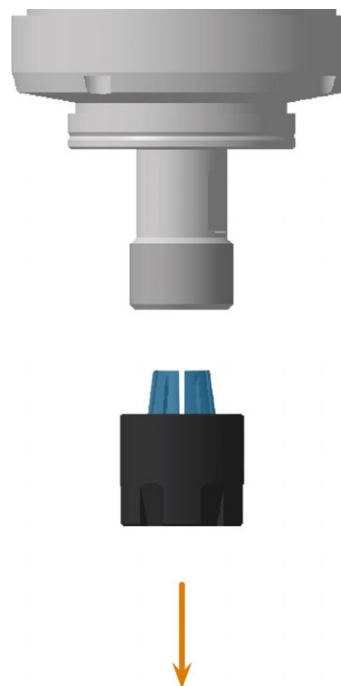


FIG. 50

7. Put the clamping nut and the collet chuck aside within reach.

8. Clean the inner cone of the spindle with the cleaning cone.

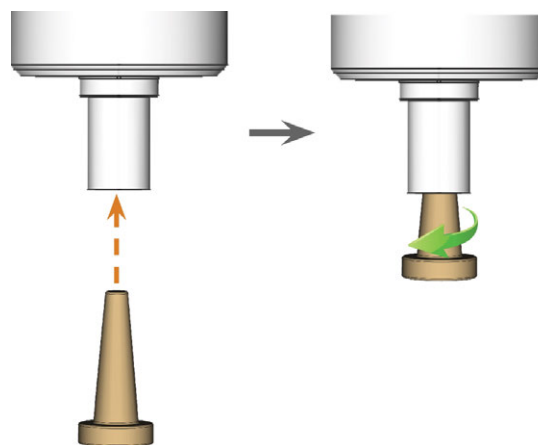


FIG. 51 CLEANING THE INNER CONE OF THE SPINDLE

9. Take the collet chuck (marked blue) out of the clamping nut.



FIG. 52

10. Clean the collet chuck with the cleaning brush:
 - a. Insert the brush into the collet chuck until the end of the brush aligns with the end of the collet chuck.



FIG. 53 END OF BRUSH MARKED WITH A VERTICAL ORANGE LINE

- b. *Rapidly* pull the brush out of the collet chuck and twist it at the same time.

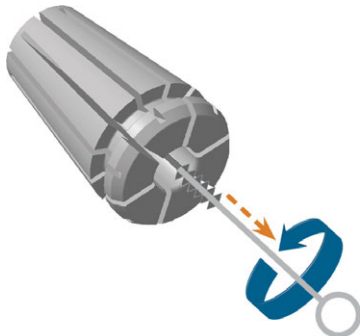


FIG. 54 CLEANING THE COLLET CHUCK

- c. Repeat the last 2 steps multiple times.
11. Thoroughly clean the complete outer surface of the collet chuck with a clean and dry cloth.



FIG. 55

12. Place the collet chuck (marked blue) in the clamping nut and turn the clamping nut (marked orange) by hand approx. 1 turn clockwise onto the spindle.

NOTICE! Turn the clamping nut just enough that it remains on the spindle. *Never* tighten the tension nut firmly without having a tool inserted.

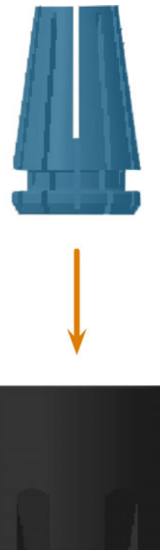


FIG. 56

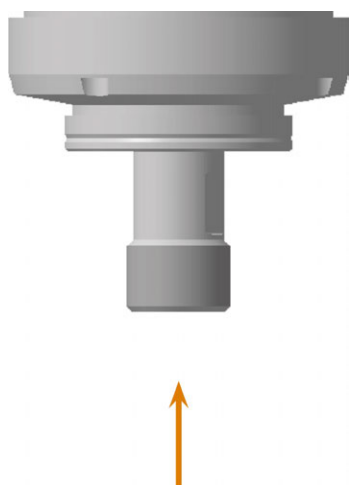


FIG. 57

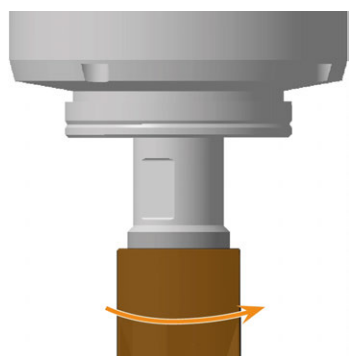



FIG. 58

13. Put the tool back into the collet chuck.
[↗ Inserting tools into the collet chuck – on page 28](#)
14. Open the **Maintenance** section window with the following icon in the main icon bar: 

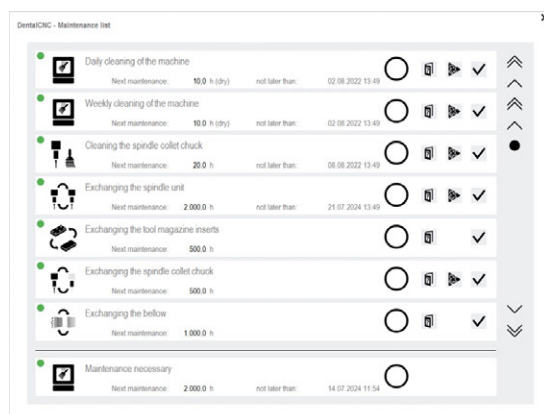



FIG. 59

15. Select the icon shown for the entry **Cleaning the collet chuck of the spindle.** 

7.9 Updating the software and firmware

7.9.1 Updating DentalCAM & DentalCNC

Instructions can be found in the DentalCAM & DentalCNC user information.

7.9.2 Updating the firmware of the machine

The firmware is the internal control software of your machine. New versions may introduce new functions and improve existing ones. New firmware versions come as part of new versions of DentalCNC.

For more information, see the DentalCAM & DentalCNC user information.

7.10 Exchanging the main fuse

The internal power supply of the machine has a main fuse that is accessible from the outside and can be exchanged if necessary.

» As a replacement fuse, only use a fuse of the following type: T6,3A L250V

i A new main fuse is available as spare part from customer service.

1. **⚠ DANGER!** Switch off the machine at the main power switch.
2. Remove the power cord from the connection panel.
3. Remove the cover of the fuse.

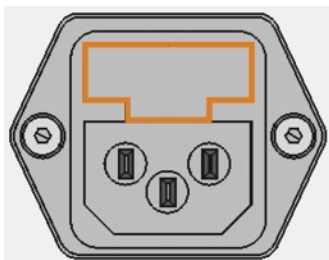


FIG. 60 COVER OF THE FUSE (MARKED ORANGE)

4. Remove the defective fuse and replace it with a new fuse.
5. If you do not have a replacement fuse ready, take the replacement fuse from the right side of the fuse cover and put it into the left side of the fuse cover.
6. Remount the fuse cover.

7.11 Calibrating the axes

NOTICE Deterioration of machining results caused by an incorrect calibration

At delivery, your machine is already calibrated. As long as your machining results are accurate, a new calibration is not necessary. A calibration takes much time and will deteriorate the machining results if it is improperly executed.

- » If the machining results are inaccurate, try adjusting the machining conditions first: Check the fixation and quality of the blank and the condition of the tool.
- » **Before** calibrating the machine, contact customer service.
- » **Be very careful** when measuring and entering data during calibration. When in doubt, abort the calibration.

By calibrating the machine with test and calibration specimens, it may be possible to improve the machining results.

The documentation for the manufacturing software contains all information on calibrating the machine. In this document, you will only find machine-specific information.

Your machine is delivered with a calibration set. It contains the following parts:

- Calibration blanks which are used to mill calibration and test specimens
- A tool for milling the calibration or test specimens
- A micrometer for measuring the machining precision

Calibration workflow:

1. **Have the calibration set readily available**
The set was provided with your machine.
2. **Manufacture and measure a test specimen**
If the measuring values are within tolerance, your machine mechanics are accurate and you do not need to calibrate the machine. If they are out of tolerance, continue with calibrating the machine.
3. **Manufacture and measure a calibration specimen and enter the measuring values into DentalCNC**

This data is used to calculate the required calibration.

4. **Check if calibration was successful with another test specimen**

Verify that the calibration has improved the machining results.

7.12 Disassembling and assembling the machine housing

i The figures in this description show the E4, but the relevant components of the E3 are identical or very similar. The described procedure applies for both machines.

To exchange some spare parts, you must disassemble parts of the machine housing.

7.12.1 The components of the machine housing

The machine housing consists of the following components:

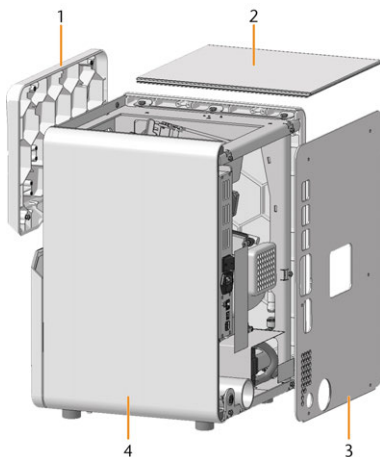


FIG. 61

1. Service cover
2. Top cover
3. Back panel
4. Side panel

i You must remove the back panel and top cover before removing other housing components.

7.12.2 Removing and installing back panel and top cover

Have ready:

1 x 10 mm wrench



FIG. 62

1 x TX20 angle screwdriver



FIG. 63

You remove the back panel and the top cover as follows:

1. Switch off the machine at the main power switch.
2. Disconnect the machine from all lines.
3. E4: Use the TX20 angle screwdriver to unscrew the 6 screws (marked orange) that secure the back panel.
4. E3: Use the TX20 angle screwdriver to unscrew the 4 screws (marked orange) that secure the back panel.
5. Slide the top cover back out of the machine.

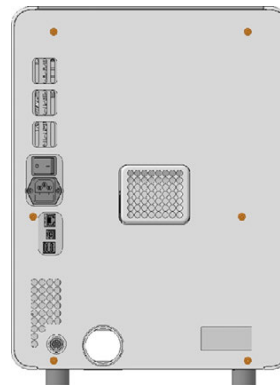


FIG. 64



FIG. 65

You attach the top cover and the back panel as follows:

1. Position the top cover between the side panels. Insert the profile of the top cover (marked orange) into the guide of the side panels. Make sure that the **Front** label on the inside of the top cover is facing the front of the machine.

2. Slide the top cover completely to the front of the machine.
3. *E4*: Use the TX20 angle screwdriver to screw the back panel to the machine with 6 screws (marked orange).
4. *E3*: Use the TX20 angle screwdriver to screw the back panel to the machine with 4 screws (marked orange).

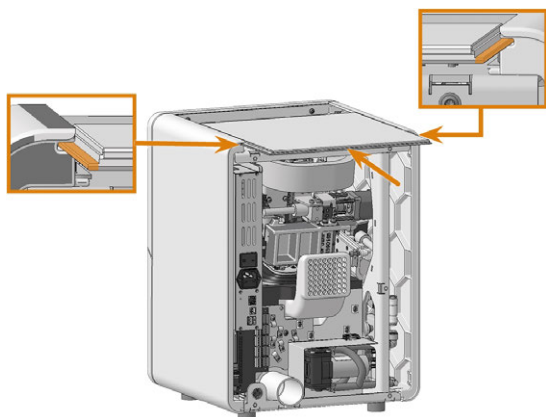


FIG. 66

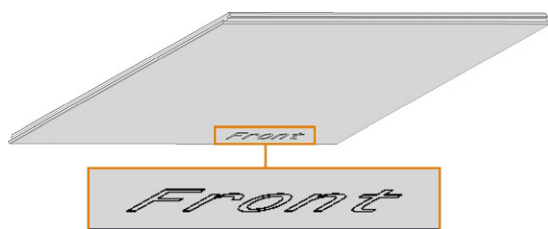


FIG. 67

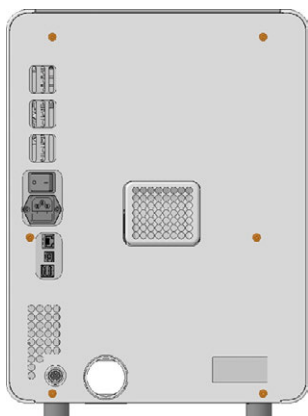


FIG. 68

7.12.3 Removing and installing the service cover

You remove the service cover as follows:

1. Using the TX20 offset screwdriver, unscrew the 2 screws (marked orange) that secure the service cover.
2. Hold the service cover on the left and right side.
3. Move the service cover upwards.
4. Remove the service cover.

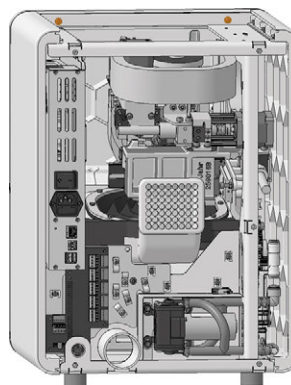


FIG. 69



FIG. 70



FIG. 71

You attach the service cover as follows:

1. Position the 2 screws (marked orange) in the service cover in the openings in the front panel.

2. Press the service cover lightly against the front panel and slide it down.
3. Using the TX20 angle screwdriver, screw the service cover in place with 2 screws (marked orange).

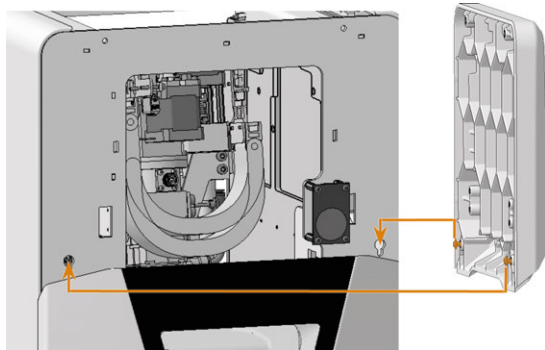


FIG. 72



FIG. 73

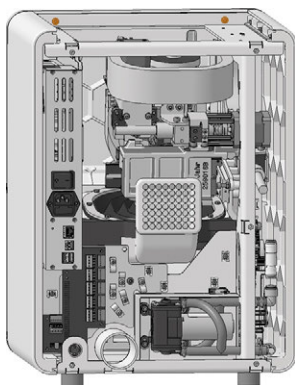


FIG. 74

4. Remove the side panel.

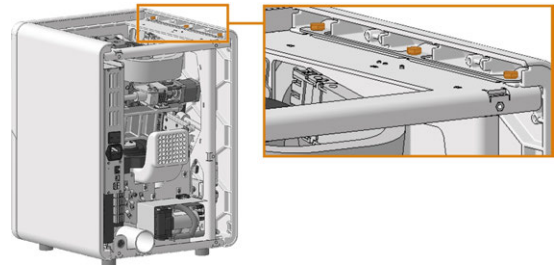


FIG. 75

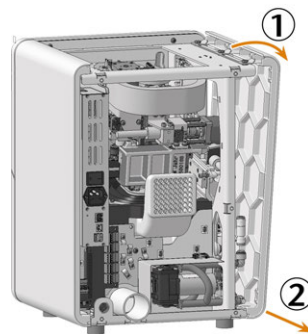


FIG. 76

If you are installing only 1 side panel, do the following:

1. Place the side panel at the bottom of the machine. Make sure that the top edge is tilted slightly outwards.
2. Slide the side panel cover towards the front of the machine until the plugs (marked orange) latch into the sockets (marked blue) of the fixing latches.
3. Move the upper edge of the side panel towards the machine until the screws are placed in the recesses. Make sure that the side panel is flush with the service cover.

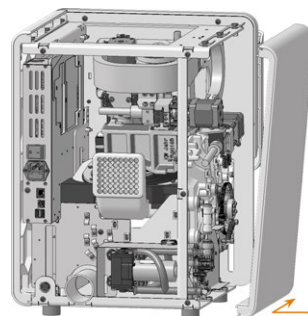


FIG. 77

7.12.4 Removing and installing side panels

You remove the side panel as follows:

1. Use the wrench to loosen the 3 screws (marked orange) on the side panel that you want to remove.
2. Tilt the side panel outward.
3. Slide the side panel to the rear out of the machine.

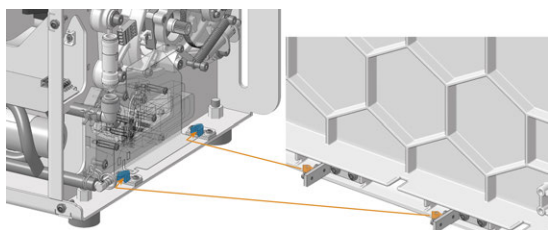


FIG. 78

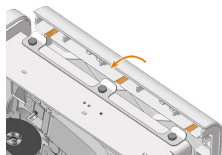


FIG. 79

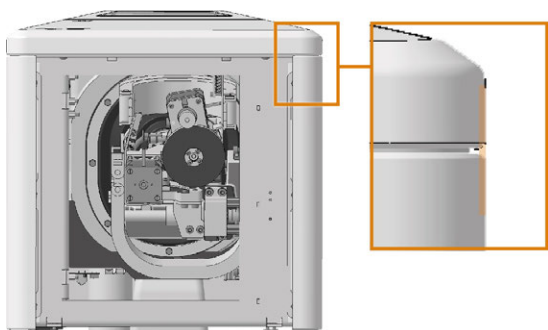


FIG. 80

4. Tighten the front screw (marked orange) by hand.
 5. Slide the top cover towards the front of the machine. Make sure that the *Front* label on the bottom of the cover faces the front of the machine. The cover must be easy to move.
- If not:
- a. Loosen the front screw.
 - b. Change the position of the side panel slightly.
 - c. Repeat step 4.
6. Tighten the rear screw (marked orange).
 7. Remove the top cover.
 8. Use the wrench to tighten the 3 screws (marked orange) of the side panel.



FIG. 81

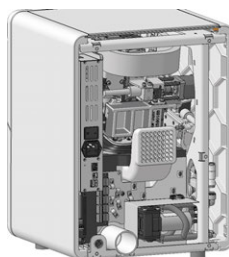


FIG. 82

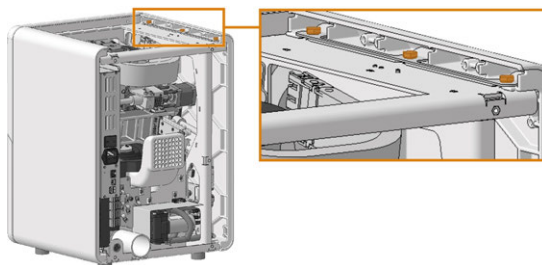


FIG. 83

If you are exchanging the housing / installing both side panels, do the following:

i If you are not exchanging the housing, start at step 2.

1. Exchange the sockets of the fixing latches on the machine body:
 - a. Loosen the 2 screws and remove the sockets and screws from the machine.
 - b. Screw on the spare sockets in the same position. Use the screws from the spare item.

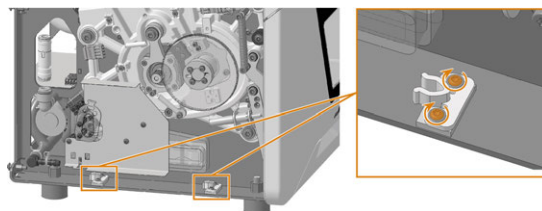


FIG. 84

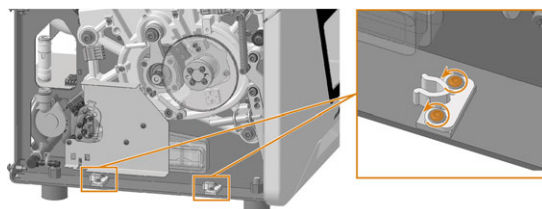


FIG. 85

2. Place 1 side panel at the bottom of the machine. Make sure that the top edge is tilted slightly outwards.

- Slide the side panel cover towards the front of the machine until the plugs (marked orange) latch into the sockets (marked blue) of the fixing latches.

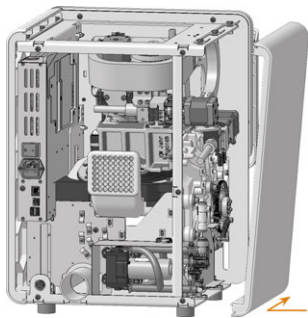


FIG. 86

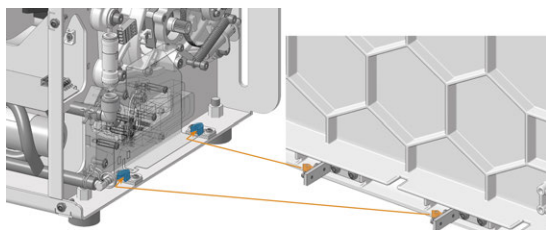


FIG. 87

- Move the upper edge of the side panel cover towards the machine until the screws are placed in the recesses. Make sure that the side panel is flush with the service cover.
- Tighten the front screw (marked orange) by hand.

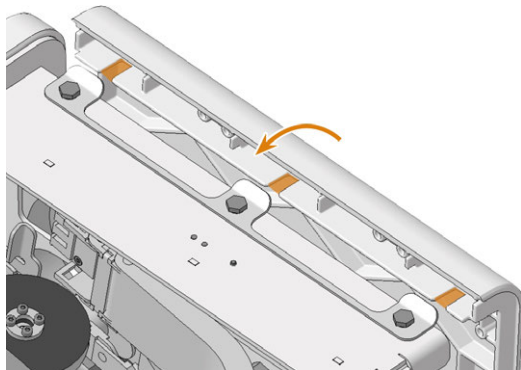


FIG. 88

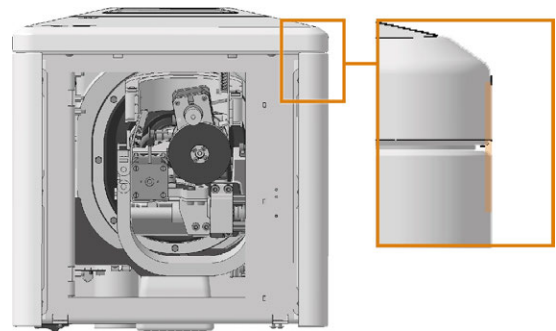


FIG. 89

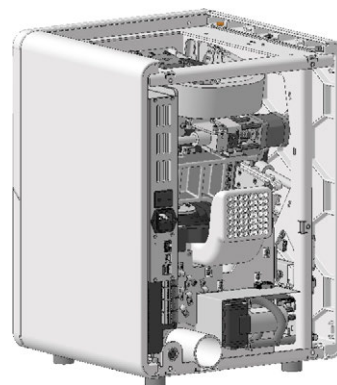


FIG. 90

- Install the side panel on the other side of the machine. Repeat steps 2 - 5.
 - Slide the top cover towards the front of the machine. Make sure that the *Front* label on the bottom of the cover faces the front of the machine. The cover must be easy to move.
- If not:
- Loosen the front screws.
 - Change the position of the side panels slightly. Make sure that the gaps between the top cover and the side panels are the same size.
 - Repeat step 4.
- Tighten the rear screw (marked orange).
 - Remove the top cover.
 - Use the wrench to tighten the 3 screws (marked orange) of the two side panels.



FIG. 91



FIG. 92

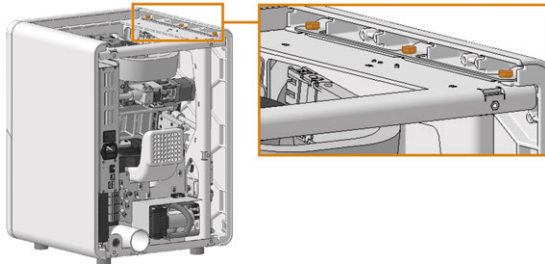


FIG. 93

7.13 Exchanging the fixing latches of the side panels

- i** The figures in this description show the E4, but the relevant components of the E3 are identical or very similar. The described procedure applies for both machines.

If the side panels no longer hold, exchange the fixing latches.

1. Have ready:
 - TX10 angle screwdriver



FIG. 94

- Spare fixing latch, quantity as required

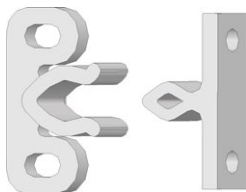


FIG. 95

2. Switch off the machine at the main power switch.
3. Disconnect the machine from all lines.
4. Remove the side panel whose fixing latches you want to exchange.

[Disassembling and assembling the machine housing – on page 42](#)
5. Exchanging the plugs of the damaged fixing latches on the side panel:
 - a. Loosen the 2 screws and remove the plug and screws from the machine.
 - b. Screw on the spare connectors in the same position. Use the screws from the spare item.

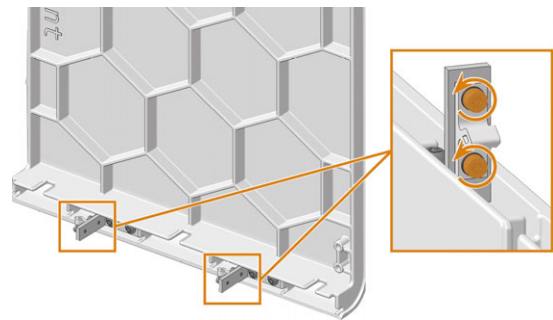


FIG. 96

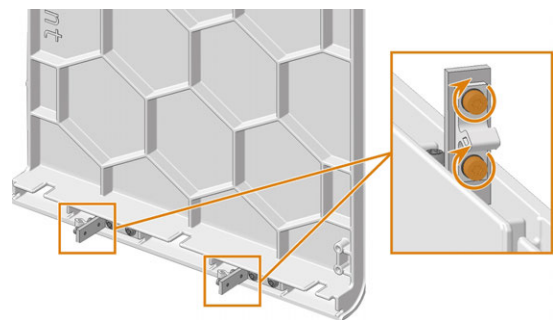


FIG. 97

6. Exchanging the sockets of the damaged fixing latches on the machine body:
 - a. Loosen the 2 screws and remove the sockets and screws from the machine.
 - b. Screw on the spare sockets in the same position. Use the screws from the spare item.

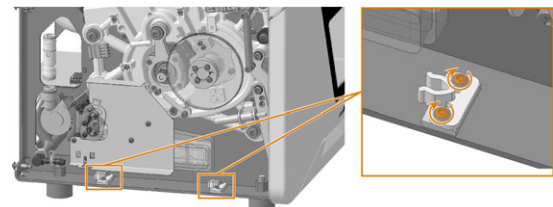


FIG. 98

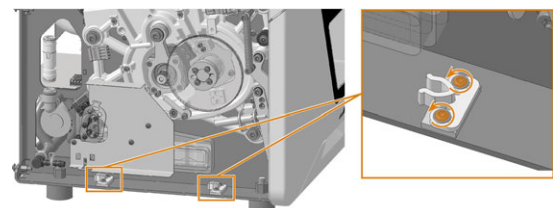


FIG. 99

7. Assemble the machine housing.

[Disassembling and assembling the machine housing – on page 42](#)

8 Troubleshooting

This chapter provides machine-specific troubleshooting information.

General interactive troubleshooting guides are available at [dentalportal.info](https://www.dentalportal.info).

There you will find help on error codes displayed by DentalCNC (E-2, E-6, E58, etc.). This includes the following topics:

- Problems with tools
- Inadmissible operating parameters during machining
- Problems with machine mechanics (axes, end switches, etc.)

8.1 Links to troubleshooting guides



https://www.dentalportal.info/en-us/Global_Troubleshooting/GLB_DEN_Troubleshooting.htm

8.2 Machine-specific notes

8.2.1 Loud machining noise

The actual sound emission of the machine varies heavily depending on the manufacturing material and the machining conditions.

» If the machine is exceptionally loud, check the following operating conditions:

- Cleanliness of the blank holder
- Condition of the tools
- Quality of the blank

» If loud noise cannot be avoided, wear ear protection during machining.

8.2.2 How to proceed in the event of a machine malfunction

A machine malfunction was recognized by the internal control unit in case of a critical event. The working chamber will be illuminated in red. DentalCNC displays the error code and error message that was sent by the control unit.

1. Record the error message and error code that is displayed.

2. Restart the machine and the CAM computer. If the problem persists, continue with the next step.
3. Disconnect the machine from the electrical source and prevent it from being restarted.
4. Contact customer service. Have the error message and error code readily available.
5. To remove a blank from the working chamber, open the working chamber door manually if necessary.

8.2.3 How to proceed in the event of a tool breakage

If a tool breaks during machining, the machine will not recognize this immediately. Instead, the spindle will continue to move with the broken tool. The tool breakage will be recognized upon the following events:

- The next regular tool change

A tool breakage can be caused by the following:

- The tool was damaged or worn
- The tool was put into the wrong tool position or was manually inserted into the spindle at the wrong time. As a consequence, it was not suitable for the processing step.
- The distribution of the objects in the blank (“nesting”) was not correct.

If a tool breaks, do the following:

1. Open the working chamber door.
2. Remove all parts of the broken tool from the working chamber and the collet chuck.
3. Re-add the tool to the virtual ATB *and* virtual tool magazine in DentalCNC.
4. If the spindle picked up the tool from the tool magazine, check if the tool was inserted into the correct position. Insert a backup tool into the correct position in the tool magazine.
5. If you manually inserted the tool into the collet chuck, check if the broken tool corresponds to the tool type which you were prompted to insert. Have a correct spare tool ready.
6. Close the working chamber door.
7. Resume the job.

i DentalCNC allows you to resume the job from the last tool change. For more information, see the corresponding documentation.

8.2.4 How to proceed in the event of a power failure

While the machine is not receiving power, you have no access to the working chamber.

- » After a short power failure, restart the machine and the CAM computer.
- » If you need to access the working chamber in case of a longer power failure, perform an emergency opening of the working chamber door.

8.3 Emergency opening of the working chamber door

i The figures in this description show the E4, but the relevant components of the E3 are identical or very similar. The described procedure applies for both machines.

CAUTION Cutting injuries when touching a rotating tool

If a power failure or a machine malfunction occurs during machining, the spindle including the inserted tool keeps rotating. If you touch the rotating tool, you will suffer from cutting injuries.

» Wait until the spindle has stopped rotating before performing an emergency opening.

Due to the safety interlock you can only open the working chamber door when the machine is supplied with power. In the event of a prolonged power failure, use the emergency release to access the working chamber.

The lever for the emergency release is located on the right underside of the machine.



FIG. 100

1. **⚠ DANGER!** Switch off the machine at the main power switch.
2. Disconnect the machine from the electrical source.
3. Pull the lever for the emergency release to the front up to the stop and hold it in this position.

4. Open the working chamber door.
5. Let go of the lever.
6. **⚠ CAUTION!** Wear gloves.
7. Carry out your work in the working chamber.
8. Close the working chamber door.

⚠ WARNING! If the working chamber door is unlocked during operation, beware of crushing hazard and cutting injuries

9. Check if the working chamber door is actually locked.
If this is not the case, try once again to lock the working chamber door.
10. If the working chamber door cannot be locked, secure the machine against being switched on again. Contact customer service.

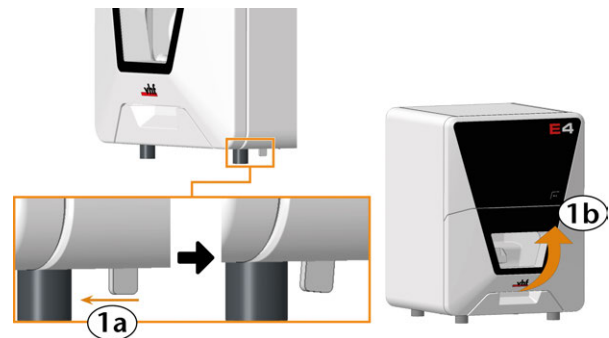


FIG. 101



FIG. 102

9 Disposal

9.1 Disposing machining residues


9.1.1 General

- » Avoid entry of hazardous machining residues into the soil, water or into sewers.
- » Keep a sample of the product to be disposed of for at least 6 months.
- » If required, have the products disposed of by an approved disposal company.

9.1.2 Solid machining residues

- » Dispose of the machining residues as described by the manufacturer of the material.

9.2 Disposing of the machine

The machine must not be disposed of with the residual waste. This is indicated by the icon  which depicts a crossed out trashcan. In the European Union (EU), this is in accordance with Directive 2012/19/EU.

We will dispose of the machine at no cost. The owner will bear the costs for disassembly, packaging and transport.

- » Before sending the machine in for disposal, contact your dealer's customer service or recycling@vhf.de.
- » Delete all personal data under your own responsibility from all data carriers of the internal and / or external devices.
- » If necessary, have the machine disposed of by an approved disposal company.

9.3 Dismantling, transport and packaging

[↗ Transportation and storage – on page 9](#)

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Original EC Declaration of Conformity

according to EC directive for machinery 2006/42/EC Annex II A

We,

vhf camfacture AG
Lettenstraße 10
72119 Ammerbuch
Germany

hereby declare expressly that the

Machine:	CNC milling machine
Type:	E3
Serial No.:	E3ID100000000 – E3ID299999999

fulfills all the relevant provisions of the following directives:

- **2006/42/EC** Machinery directive
- **2014/30/EU** EMC directive

References of the applied harmonized standards according to article 7 passage 2:

- | | | |
|----------------------------------|--------------------------------|----------------------------|
| - EN 614-1:2006 + A1:2009 | - EN ISO 13849-2:2012 | - EN 61326-1:2013 |
| - EN ISO 12100:2010 | - EN 60204-1:2018 | - EN 61326-2-1:2013 |
| - EN ISO 16090-1:2018 | - EN IEC 61000-3-2:2019 | |
| - EN ISO 13849-1:2015 | - EN 61000-3-3:2013 | |

References of other standards:

- **IEC 61010-1:2010 + COR:2011 + A1:2016, modified + A1:2016/COR1:2019**

The manufacturer undertakes to electronically transmit relevant information on the machinery in response to a reasoned request by the national authorities. Person established in the community who is authorized to compile the technical file:

Dipl.-Ing. (FH) Frank Benzinger
Vorstandsvorsitzender / Chief Executive Officer (CEO)
vhf camfacture AG
Lettenstraße 10
D-72119 Ammerbuch

Ammerbuch, 2022/11/14



(Frank Benzinger, CEO)

Original Declaration of Conformity

according to Supply of Machinery (Safety) Regulations 2008

We,

vhf camufacture AG
Lettenstraße 10
72119 Ammerbuch
Germany

hereby declare expressly that the

Machine:	CNC milling machine
Type:	E3
Serial No.:	E3ID100000000 – E3ID299999999

fulfills all the relevant provisions of the following directives:

Supply of Machinery (Safety) Regulations 2008
Electromagnetic Compatibility Regulations 2016

References of the applied harmonized standards:

- BS EN 614-1:2006 + A1:2009	- BS EN ISO 13849-2:2012	- BS EN 61326-1:2013
- BS EN ISO 12100:2010	- BS EN 60204-1:2018	- BS EN 61326-2-1:2013
- BS EN ISO 16090-1:2018	- BS EN IEC 61000-3-2:2019	
- BS EN ISO 13849-1:2015	- BS EN 61000-3-3:2013	

References of other standards:

- IEC 61010-1:2010 + COR:2011 + A1:2016, modified + A1:2016/COR1:2019

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Ammerbuch, 2022/11/14



(Frank Benzinger, CEO)

■ Made
■ in
■ Germany

vhf camfacture AG