

# ORIGINAL OPERATING INSTRUCTIONS

## E4





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# 1 WELCOME

Thank you for purchasing this E4dental 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/E4](https://dentalportal.info/E4)

## 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 machining of dental-technical objects. The processed objects require additional work before their use on patients.

The machine is designed for wet and dry machining.

- » Machine only blanks and objects whose types you can select in each case in the manufacturing software. Although you can also machine 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 are designed to have contact with implants. These parts include parts of two-part abutments which contain the connection geometry for 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 DENTALCAM	Persons trained in dentistry
Use of machine / DENTALCNC for manufacturing dental objects	Instructed persons Activity must be supervised by a persons trained in dentistry
Use 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 – on page 42](#)

### 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 by 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 electric equipment.
- » Ensure that an operational Residual Current Device / Ground Fault Circuit Interrupter is installed on the electric circuit of the machine.
- » Run electric 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 from the electrical source immediately and prevent it from being restarted:

- When machine connections or electric cables are damaged
  - When liquid is leaking
  - Before you check or run electric cables
- » Do not touch the machine and especially the cables with wet or damp hands.
- » Do not place any liquid containers on the machine.
- » Never put any machines or devices which are powered by electricity under 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**

- » Only allow unattended operation of the machine to occur if the following conditions are met:
- The working chamber of the machine is completely clean.
  - Unauthorized users cannot access the machine.
  - The room in which the machine is located has an automatic fire detection system.

### **2.4.3 Housing**

#### **Danger of entrapment by moving housing parts**

- Working chamber door
  - Cooling liquid tank
  - Dry tank
- » If you move these housing parts, use only the designated grip points.
- » Make sure that your hands are not trapped during movement.

### **2.4.4 Working chamber**

#### **Danger of crushing due to moving machine parts in the working chamber**

- » Only use the machine when the working chamber door is completely closed and undamaged during machining.
- » Do not circumvent or deactivate 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 Air extraction system**

#### **Respiratory diseases when processing harmful materials**

- » Always use a suitable air extraction system during dry machining.
- » Use a suction unit with fine dust filter class M.
- » Avoid materials which damage your health.

### **2.4.6 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.

### **2.4.7 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.
- » Never perform any troubleshooting while the machine is operating.

### **2.4.8 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 DENTALCAM & 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 Wet machining****Damage to machine, tools and blanks due to wet machining without or with unsuitable cooling liquid**

- » Always fill with sufficient cooling liquid that meets the requirements in the corresponding chapter.
- » Change the cooling liquid as described in the corresponding chapter and in the maintenance table.
- » If you use a cleaning agent to clean the tank, ensure that no residues of it remain in the tank.

**2.5.5 Air extraction system****Machine damage during dry machining without an air extraction system**

- » Always use a suitable external air extraction system during dry machining.

**2.5.6 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.

**2.5.7 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 Preparing transportation or storage

1. Remove all blanks from the working chamber.
2. If the machine was used for wet machining:
  - a. Rinse the cooling liquid system.
  - b. Empty and clean the cooling liquid tank. Ensure that the tank is completely dry.
3. Clean the working chamber. Ensure that the working chamber is completely dry.
4. Install the transport lock. For this, follow the corresponding steps on the supplement.

5. Ensure that the machine housing is closed as far as possible. While doing so, do *not* close the working chamber door.
6. Switch off the machine at the main power switch.
7. Disassemble the machine components by following the installation instructions in reverse order.
8. In case of overseas transport, take proper measures against corrosion.

### 3.3 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.

### 3.4 Putting the machine back into operation after storage

- » Follow the instructions for initial start-up.

[↗ Commissioning – on page 26](#)

## 4.1 Unpacking and positioning of the machine

### 4.1.1 Choosing the installation site

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

[Technical data](#) (↗ page 18)

### 4.1.2 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 60 x 80 x 80 cm / 24 x 32 x 32 in (W/D/H) at the front of the carton.
- Cut the carton seal and open the carton.

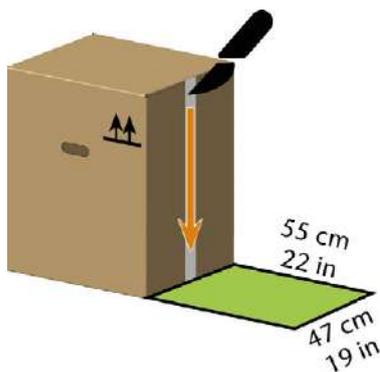


FIG. 1

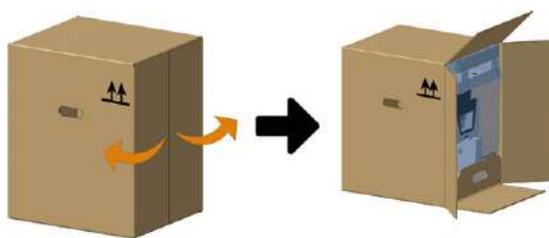


FIG. 2

#### **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. 3

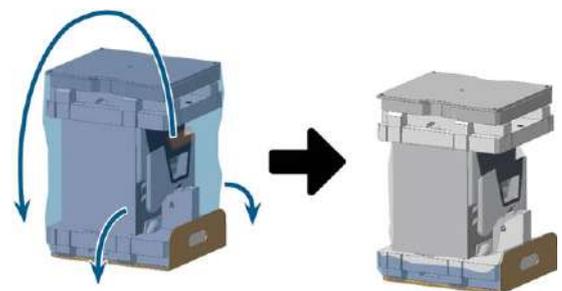


FIG. 4

- 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. 5

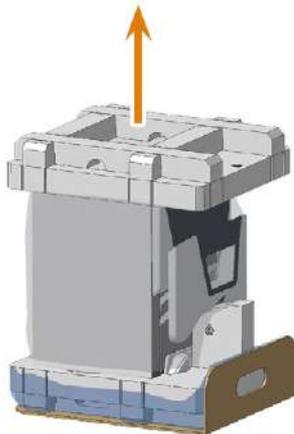


FIG. 6



FIG. 9

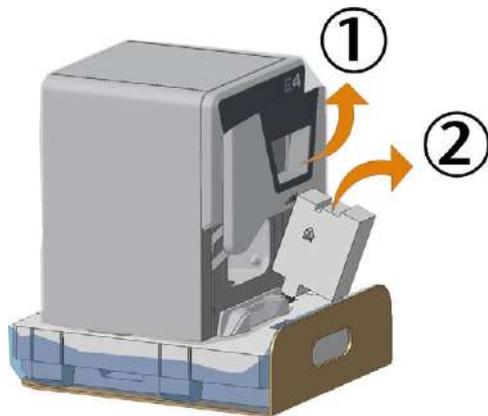


FIG. 7

10. Reach into the left and right recessed grips in the lower padding.  
Slide your hands under the machine until you have a firm grip on the underside of the machine.

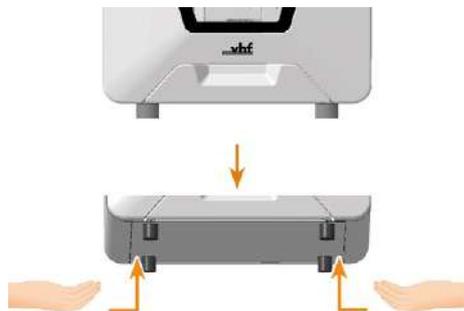


FIG. 8

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

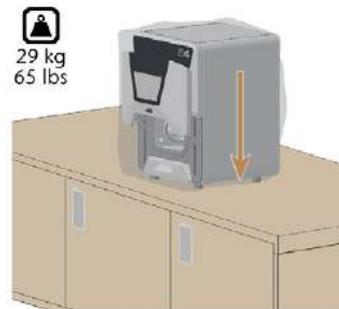


FIG. 10

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

Top view

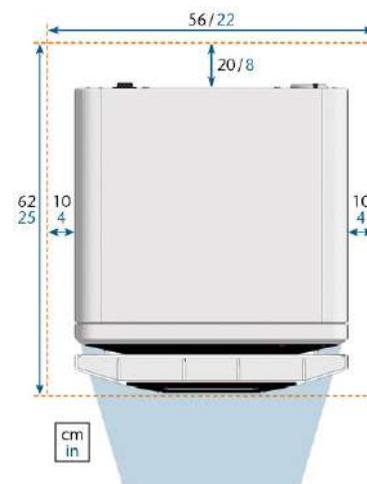


FIG. 11 BLUE AREA: WORKSPACE

Side view

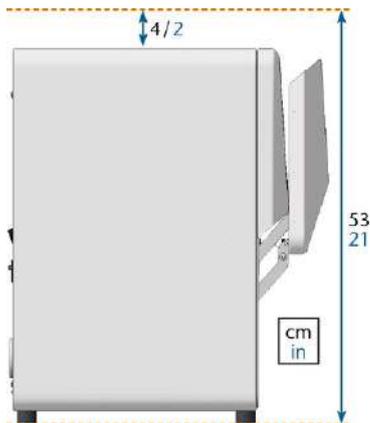


FIG. 12

12. Pull the protective housing cover upwards off the machine.
13. Remove the transport lock from the working chamber:
  - a. Push the plastic dowel downwards out of the transport lock.
  - b. Pull the lower part of the transport lock out of the machine.
  - c. Tilt the upper part down and remove it.



FIG. 13

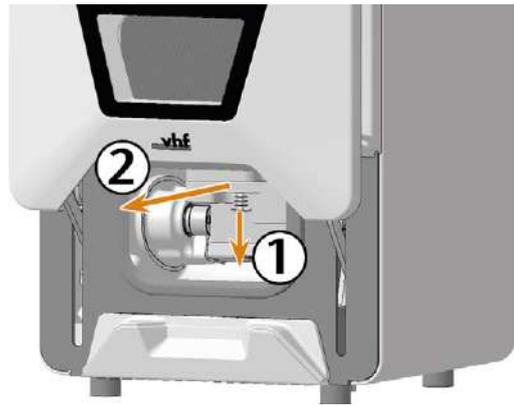


FIG. 14

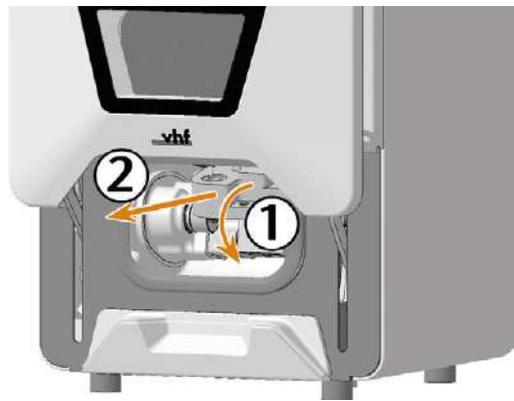


FIG. 15

14. Close the working chamber door.  
Commissioning is only possible with the working chamber door closed.



FIG. 16

- ✓ 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 82

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

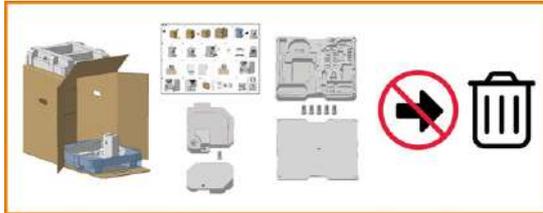


FIG. 17

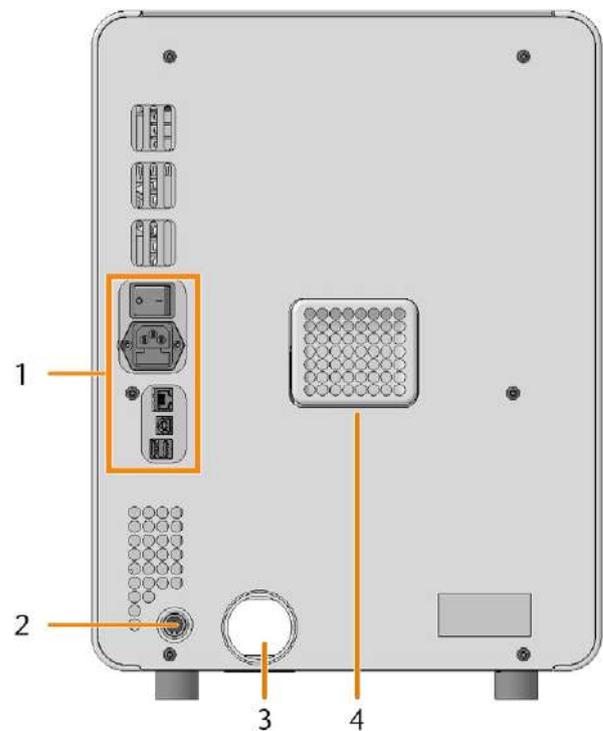
## 5 GETTING TO KNOW YOUR MACHINE

### 5.1 Front side of the machine



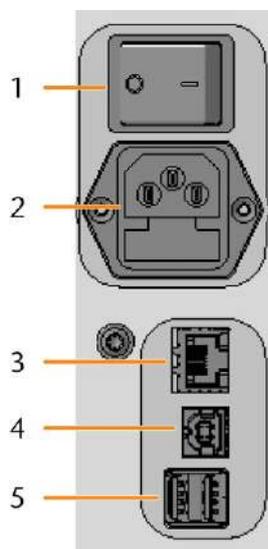
1. Service cover for access to the machine interior
2. Start button  
[Start button \(↗ page 15\)](#)
3. Working chamber door  
[↗ Working chamber door – on the facing page](#)
4. View window to the working chamber
5. Recessed grip for opening the working chamber door
6. Cooling liquid tank or dry tank  
[Cooling liquid tank and dry tank \(↗ page 16\)](#)

### 5.2 Rear side of the machine



1. Connection panel  
[Connection panel \(↗ page 15\)](#)
2. Air extraction interface (6 pins, IEC 61076-2-106)  
[Installing the air extraction system \(↗ page 22\)](#)
3. Hose connection for the air extraction system  
[Installing the air extraction system \(↗ page 22\)](#)
4. Openings for the ventilation of the working chamber

### 5.3 Connection panel



1. Main power switch  
[Commissioning \(page 26\)](#)
2. Power connection including glass fuse T6,3A L250V  
[Establishing the electric connection \(page 24\)](#)  
[Exchanging the main fuse \(page 77\)](#)
3. Network port (Ethernet RJ-45)  
[Connecting the CAM computer \(page 22\)](#)
4. 1 x USB port 2.0 Type B (for future extensions)
5. 2 x USB port 2.0 Type A (for future extensions)

### 5.4 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 \(page 39\)](#)

[Interrupt and continue machining \(page 39\)](#)

### 5.5 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.



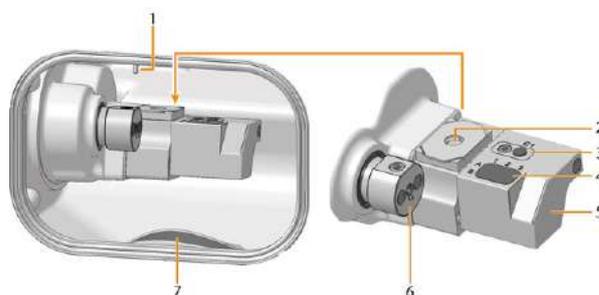
### 5.6 Lever for emergency release of the working chamber door

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

[Emergency opening of the working chamber door – on page 82](#)

### 5.7 Working chamber

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



1. Spindle with collet chuck for picking up tools  
[Inserting and exchanging tools \(page 36\)](#)  
[Cleaning or replacing the collet chuck of the spindle \(page 53\)](#)
2. Measuring key

[↗ page 46](#)

3. *Insert for the AirTool*  
*Inserting and exchanging tools* ([↗ page 36](#))
4. *Tool magazine insert*  
*Inserting and exchanging tools* ([↗ page 36](#))
5. *Tool magazine*  
*Exchange tool magazine inserts and associated holders*  
([↗ page 62](#))  
*Loosening a fixed tool magazine* ([↗ page 83](#))
6. *Blank holder*  
*Mounting & removing blanks* ([↗ page 34](#))
7. *Drain cover for wet machining*  
[↗ Switching between wet and dry machining – on page 31](#)

### 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

## 5.8 Cooling liquid tank and dry tank

Your E4 uses the following interchangeable tanks:

- Cooling liquid tank for wet machining
- Dry tank for dry machining (extra equipment)

Extra equipment can be obtained from your customer service provider.

Depending on the machining mode, the required tank must be located in the compartment below the working chamber.

Without a dry tank in place, a connected air extraction system does not generate the required vacuum in the working chamber.

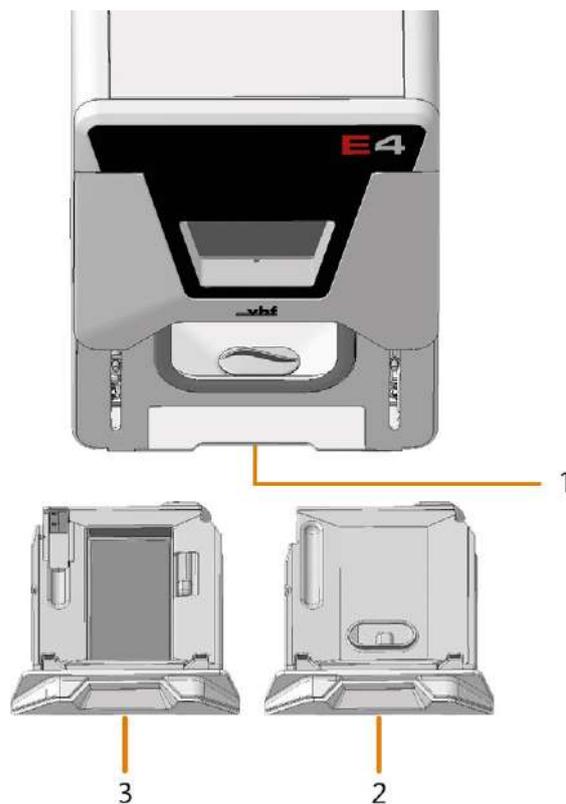


FIG. 19

1. *Compartment for the cooling liquid tank / dry tank*
2. *Dry tank*
3. *Cooling liquid tank*

*Von Trocken- auf Nassbearbeitung wechseln*

*Filling the cooling liquid* ([↗ page 33](#))

*Exchanging the cooling liquid and cleaning the cooling liquid tank* ([↗ page 57](#))



FIG. 20

## 5.9 Axes

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

- Linear axes X, Y, Z  
The spindle moves along these axes.
- Rotational axis A  
The blank holder rotates about this axis.

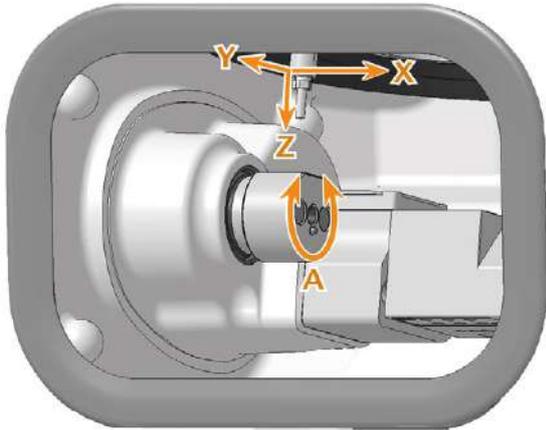


FIG. 21

## 5.10 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:

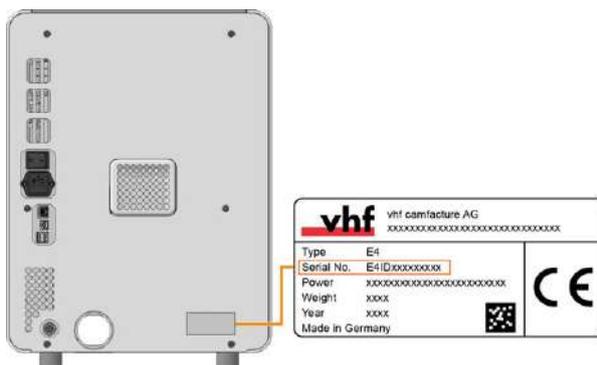


FIG. 22 SERIAL NUMBER ON THE IDENTIFICATION PLATE (MARKED ORANGE)

## 5.11 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	29
	lbs	64
Axes – Rotational axis A		4
		+190° bis -10°
Overvoltage category (IEC 60664-1)		II

### External air extraction system

	Unit	Value
Minimum extraction capacity	l/min	2.500 (at 220 hPa)
	cfm	88,3 (at 3.2 psi)
Suction unit		Designed for the commercial use in the dental sector Equipped with a filter of the filter class M

### Ambient conditions

	Unit	Value
Relative air moisture		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 300E (synchronous)
Maximum rotational speed	rpm	60.000
Nominal power under continuous operation (S1)	W	300
Nominal power under uninterrupted periodic operation (S6)	W	400
Peak power (P <sub>max</sub> )	W	816
Diameter collet chuck	mm	3

### Tool changer

	Unit	Value
Maximum tools in magazine		7
Maximum tool length	mm	40

### Standard blank holder

	Unit	Value
Maximum block dimensions (L/D/H)	mm	45 x 20 x 20

### Cooling liquid system

	Unit	Value
Cooling liquid		Drinking water
Maximum tank capacity	l	1,45
	qt	1,5

### Sound emission

Operating condition	Unit	Value
Processing	dB(A)	74,55
All other operating conditions	dB(A)	<70

Measuring conditions	Value
Machined material	Composite (VITA CAD temp block)
Condition of the tools	worn
Measured value	Sound pressure level (distance: 1 m)
Measurement according to	ISO 3746, survey method 3

### Connections

	Unit	Value
Power connection (and maximum power consumption in watts)	V AC	100 – 240
	Hz	50/60
	W	500
Network port – Speed		Glass fuse T6,3A L250V
		RJ-45 10BASE/100BASE-TX/1000BASE-T (Auto-sensing)
USB port		2 x 2.0 A 1 x 2.0 B

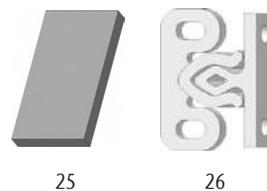
## 6 INSTALLATION

The installation steps to operation are:

1. [Checking the scope of delivery \(↗ page 20\)](#)
2. [Connecting the machine \(↗ page 22\)](#)
3. [Commissioning \(↗ page 26\)](#)
4. [Operating the machine \(↗ page 29\)](#)

## 6.1 Checking the scope of delivery

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



1. 1 x Machine E4
2. 1 x Cooling liquid tank
3. 1 x Drain insert
4. 1 x Ethernet network cable
5. 1 x Power cable
6. 1 x Torque screwdriver 1.5 Nm
7. 1 x TX10 bit for mounting blanks
8. 1 x TX20 bit for the tool magazine
9. 2 x Angle screwdriver
  - 1 x TX10
  - 1 x TX25
10. 1 x 10 mm wrench
11. 1 x Spindle service set
12. 1 x Calibration set:
  - 1 x Micrometer
  - 5 x Calibration blank
  - 1 x AirTool P250-F1-40-T
13. 1 x Cleaning brush for the blank holder
14. 1 x Microfiber cloth
15. 1 x Drill bit for tool positions (2.8 mm)
16. 1 x 5.5 mm wrench to remove a broken tool
17. 1 x Interdental brush for cleaning the nozzle plate
18. 3 x Bags of Tec Powder for cleaning the cooling liquid system (50 g per bag)
19. 1 x M4 cylinder screw for loosening a stuck tool magazine
20. 1 x Cleaning brush for cleaning the cooling liquid tank
21. 2 x Insert for the AirTool
22. 2 x Tool magazine insert
23. 2 x Grub screw (M5 x 10) for the blank holder
24. 1 x Cover cap for the tool magazine
25. 1 x Foam filter for the cooling liquid tank
26. 4 x Fastening element for the side panel

Not depicted:

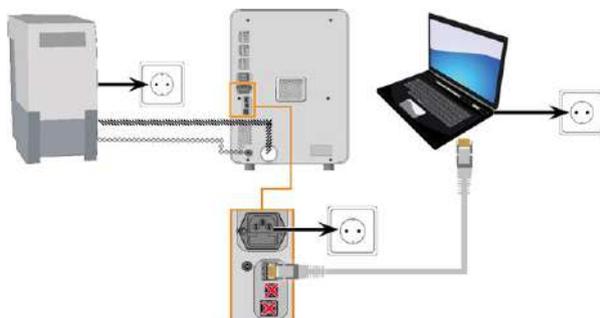
- Transport lock
  - 2 x Foam insert
  - 1 x Plastic dowel

- 2 x Accessory box
- Packing set
  - 1 x Transport carton including floor insert
  - 1 x Upper and lower padding
  - 1 x Support pad
  - 1 x Transport protection cover
  - 1 x Housing protection cover

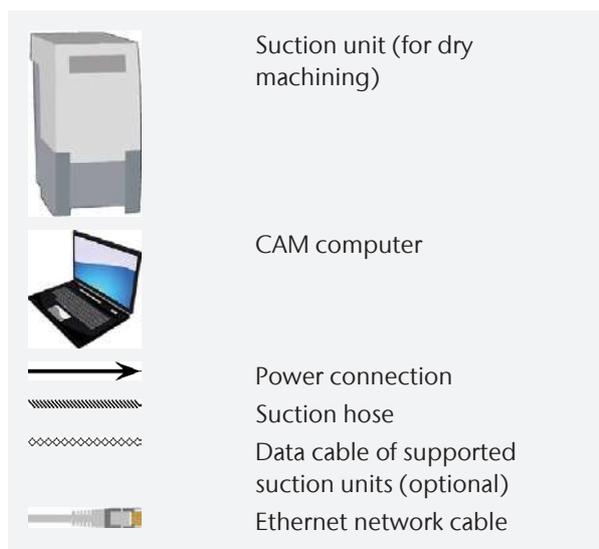
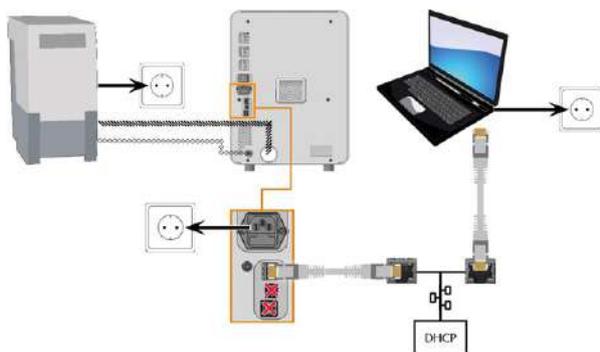
## 6.2 Connecting the machine

### 6.2.1 Machine installation scheme

#### Directly connecting the machine to the CAM computer



#### Connecting the machine to the CAM computer via a local network



### 6.2.2 Connecting the CAM computer

You connect the CAM computer via Ethernet network 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 26](#)

#### Minimum Ethernet cable requirements

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

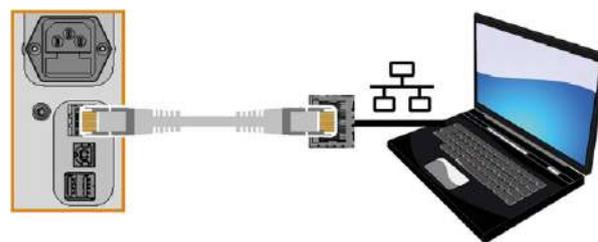


FIG. 23 DIRECT CONNECTION DIAGRAM

### 6.2.3 Installing the air extraction system

You only need the air extraction system for dry machining.

- » **⚠ WARNING!** Always use an air extraction system that meets the requirements of the chapter Technical data.

**Components of the air extraction system:**

Component	Source	Required?	Prerequisite
Suction unit incl. suction hose	Customer service, specialist dealers	Yes	–
Switching unit	Customer service*	No	Data cable <i>not</i> used
Data cable of supported suction units	Manufacturer of the suction unit	No	Supported suction unit; switching unit <i>not</i> used
Hose connection	Customer service	If the suction hose does not fit	–

\*The switching unit is not available worldwide.

You can install the suction unit as follows:

1. Read the documentation for the suction unit. Follow the operating and safety instructions at any time.
2. Check if the connection of the suction hose has an outer diameter of 45 mm.

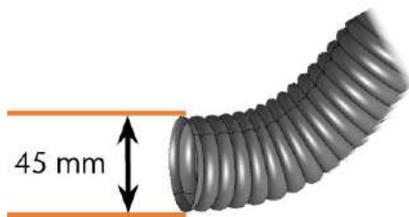


FIG. 24

3. If the diameter is different, adjust either the hose or the hose adapter supplied with the suction unit. Alternative: Use the optional hose connection of vhf.



FIG. 25 EXAMPLE: SUCTION HOSE WITH HOSE ADAPTER

or

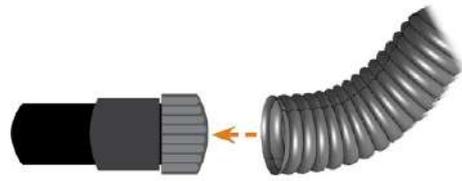


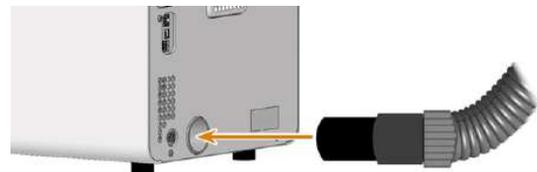
FIG. 26 HOSE CONNECTION

FIG. 27 CONNECTING THE SUCTION HOSE WITH THE OPTIONAL HOSE CONNECTION (PAGE 24)

4. Insert the suction hose into the opening for the suction unit on the machine. Ensure that the suction hose is properly seated.



or



5. If you want the machine to automatically switch the suction unit on and off, choose 1 of the following options:

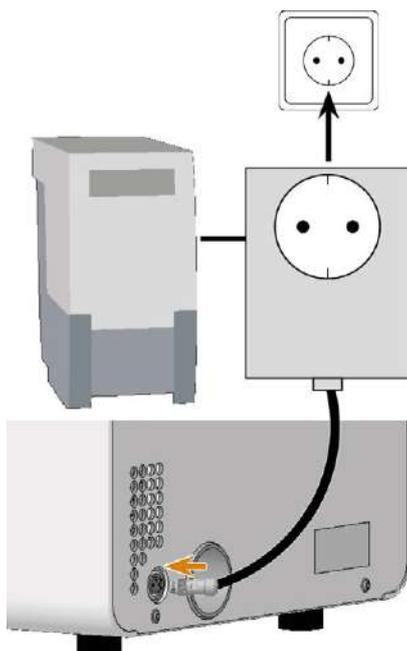
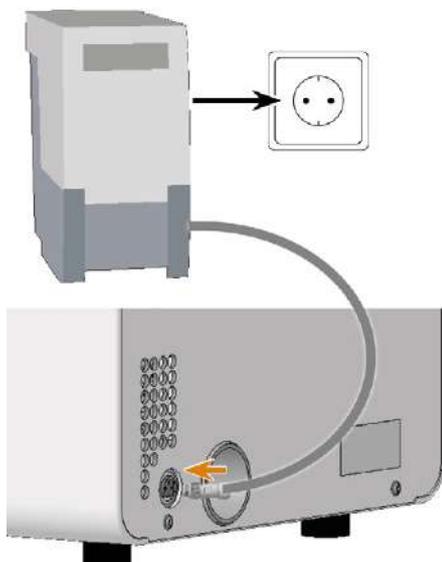


FIG. 28

or



- Continue with the installation of the suction unit as described in the documentation of the unit.

### Connecting the suction hose with the optional hose connection

If you cannot connect the suction hose of the suction unit directly to the machine, install the hose connection as follows:

- Obtain the hose connection from customer service.
- Turn the thread of the hose connection counter-clockwise until the connection is completely open. If the thread gets detached from the hose connection, place it onto the connection again and turn it clockwise once so that it is screwed to the connection again.
- Insert the suction hose of the suction device completely into the hose connection on the side of the thread.

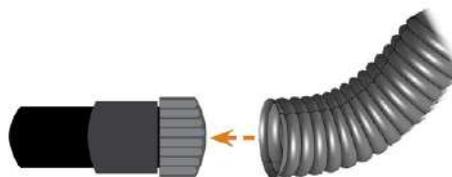


FIG. 29 INSERTING THE SUCTION HOSE INTO THE HOSE CONNECTION

- Turn the thread of the hose connection clockwise as far as you can.
- ✓ The suction hose is firmly attached to the hose connection.
- Insert the hose connection into the opening for the air extraction system of the machine. Ensure it is firmly connected.
- ✓ The installation of the suction hose with the optional hose connection is complete.

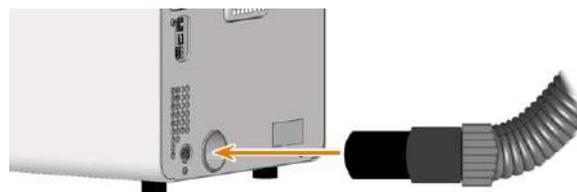


FIG. 30 INSERTING THE HOSE CONNECTION INTO THE OPENING FOR THE AIR EXTRACTION SYSTEM

### 6.2.4 Establishing the electric connection

The machine requires an uninterruptible power supply for proper operation.

- Plug the provided power cable into the power connection at the connection panel of the machine.
- 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.
- Insert the plug of the cable into a socket that is protected by a Residual Current Device / Ground Fault Circuit Interrupter.

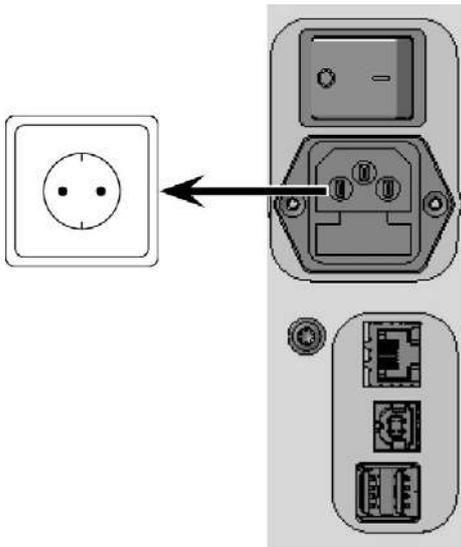


FIG. 31

## 6.3 Commissioning

### 6.3.1 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 references.

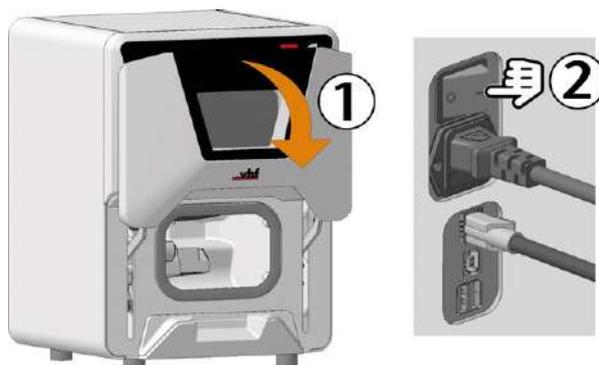


FIG. 32

### 6.3.2 Setting up a software connection to the machine

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.
3. Approve the device driver installation.
- ✓ During the installation, CNC-Interface-Proxy will be installed. CNC-Interface-Proxy establishes the connection between the machine and DENTALCNC.

The following window shows the installation status:

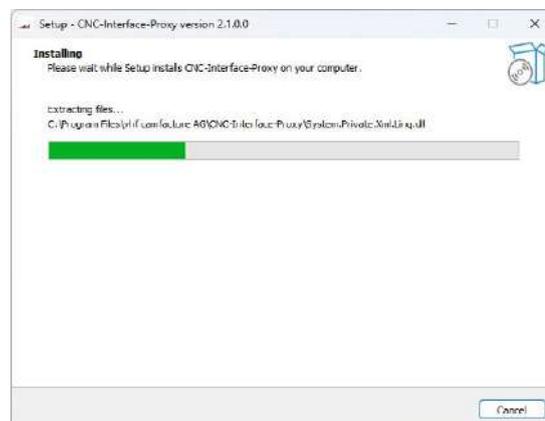


FIG. 33

4. If CNC-Interface-Proxy is *not* installed, do the following:
  - a. Complete the installation of DENTALCAM & DENTALCNC.
  - b. Continue with step 2.
- ✓ The CNC-Interface-Proxy icon is displayed in the task bar info area on the right side of your Windows task bar. CNC-Interface-Proxy will start in the background every time Windows is started.



FIG. 34

5. Select the CNC-Interface-Proxy 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. 35

6. The CNC-Interface-Proxy window displays.

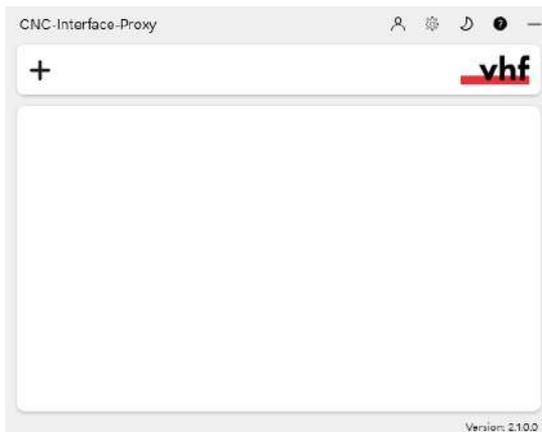


FIG. 36

7. 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:
  8. Create a new connection using the following icon:
- ✓ The connection configuration view appears.

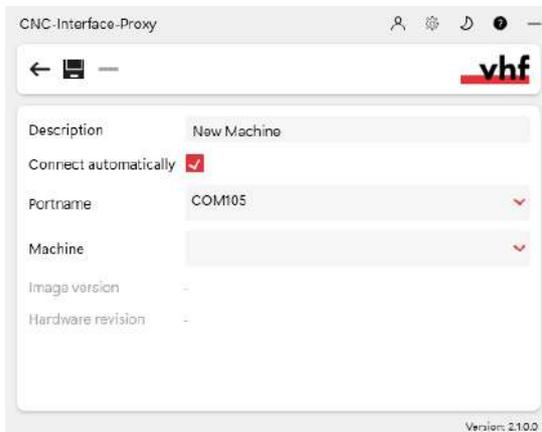


FIG. 37

9. In the **Description** input field, enter a description that identifies the connection.
10. Check the **Connect automatically** option.
11. Select the stored COM port from the **Port name** drop-down list.
  - Example: **COM105**
12. 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 E4ID300000000 (10.0.21.33)

- E4 is the machine model
- 300000000 is the serial number
- 10.0.21.33 is the IP address

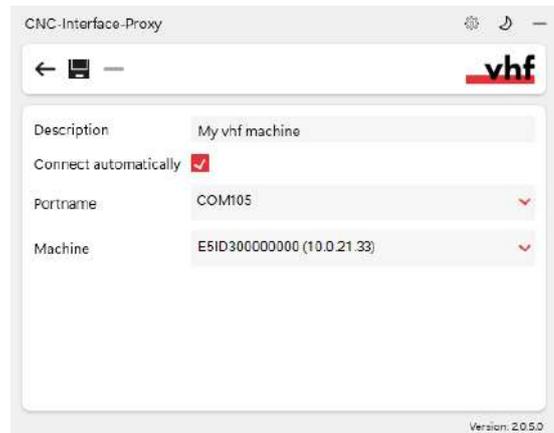


FIG. 38 A FULLY CONFIGURED CONNECTION WITH A UNIQUE DESCRIPTION (SERIAL NUMBER BY WAY OF EXAMPLE)

13. 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?
  14. 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.
- If the connection is lost, the display changes to red. CNC-Interface-Proxy tries to reconnect regularly.

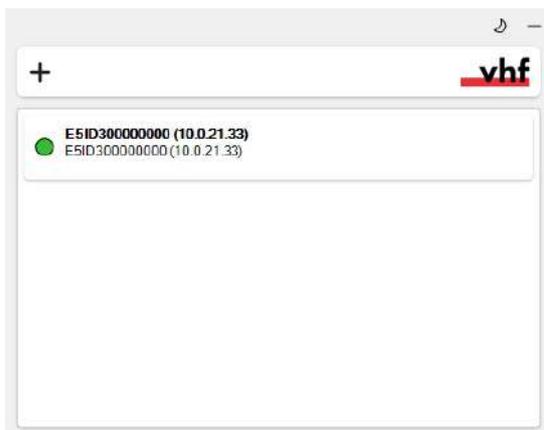


FIG. 39 A SUCCESSFUL CONNECTION

### 6.3.5 Filling the cooling liquid

This is necessary for wet machining.

[Filling the cooling liquid – on page 33](#)

15. Minimize the CNC-Interface-Proxy window with the following icon: 
16. Start DENTALCNC.
17. Open the DENTALCNC **Application settings** with the following icon in the main icon bar: 
18. Open the **General settings** with the following icon in the local icon bar: 
19. Select the following icon next to the **Port number** input field: 



FIG. 40

- ✓ If DENTALCNC is able to determine the port number, the number displays in the **Port number** input field. The machine references.
20. 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.

### 6.3.3 Warming the spindle

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

### 6.3.4 Drill tool magazine inserts

For detailed information, please refer to the user information on DENTALCNC.

## 7 OPERATING THE MACHINE

1. Starting the machine ([↗ page 30](#))
2. Switching between wet and dry machining ([↗ page 31](#))
3. Mounting & removing blanks ([↗ page 34](#))
4. Inserting and exchanging tools ([↗ page 36](#))
5. Starting, interrupting, canceling jobs ([↗ page 39](#))

## 7.1 Starting the machine

### 7.1.1 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.

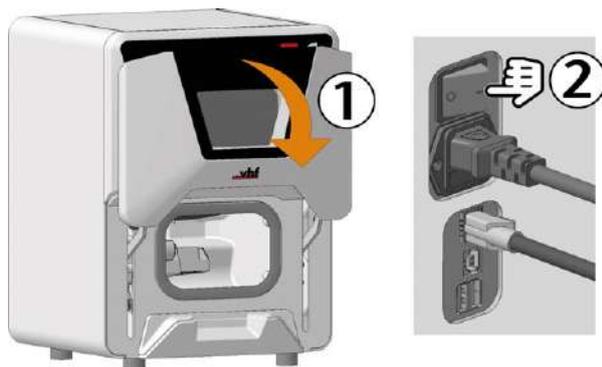


FIG. 41

### 7.1.2 Starting the machine with a tool in the collet chuck

Under some circumstances like a power failure, there can be a tool in the collet chuck of the spindle when you start the machine.

**NOTICE** Machine damage if you do not remove the tool

If the tool remains in the spindle after confirmation of the message, it will collide with and damage machine parts.

» Remove the tool as described below.

1. Start the machine.
- ✓ DENTALCNC displays that there is a tool in the collet chuck.
2. Open the working chamber door.
3. ⚠ **CAUTION!** Wear gloves.
4. Hold the tool in the collet chuck in place.



FIG. 42

5. Confirm the current message.
- ✓ The collet chuck opens.
6. Remove the tool from the collet chuck.



FIG. 43

7. Confirm the current message.
- ✓ The machine is ready for operation.

## 7.2 Switching between wet and dry machining

### 7.2.1 Switching from wet to dry machining

1. Open the working chamber door.
2. Pull the cooling liquid tank out of the machine.
3. Remove the drain insert from the working chamber.
4. Dry the working chamber.
5. Push the dry tank into the compartment until it clicks into place.
6. Connect the suction unit.  
[Connecting the machine](#) (↗ page 22)
7. If the machine controls the suction unit, turn it on and set it to the necessary level.

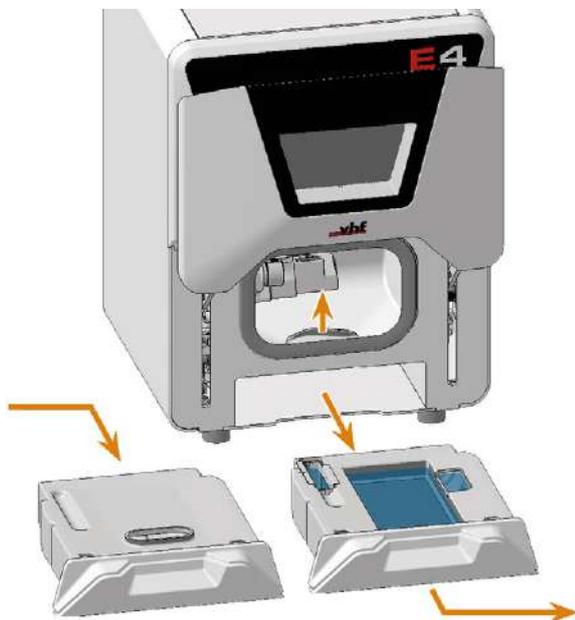


FIG. 44



FIG. 45

### 7.2.2 Switching from dry to wet machining

1. If the suction unit is running, switch it off.
2. Open the working chamber door.
3. Pull the dry tank out of the machine.
4. Place the drain insert on the opening in the working chamber.
5. Make sure that there is enough cooling liquid in the cooling liquid tank. If you want to fill or change cooling liquid:  
[Filling the cooling liquid](#) – on page 33  
[Exchanging the cooling liquid and cleaning the cooling liquid tank](#) – on page 57
6. Push the cooling liquid tank into the compartment until it clicks into place.

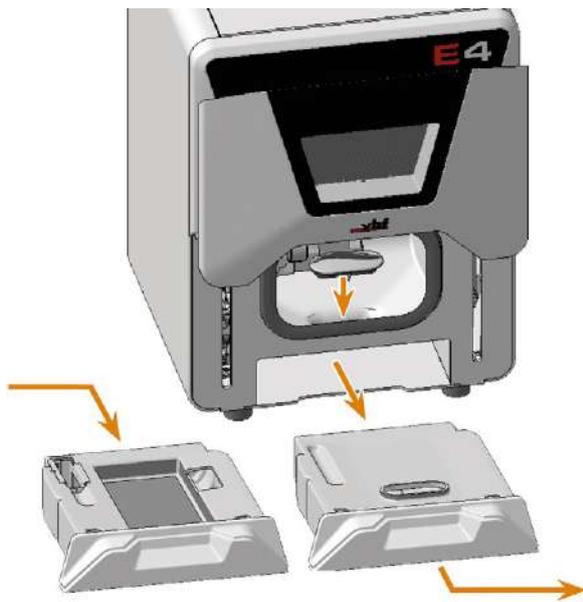


FIG. 46



FIG. 47

### 7.3 Filling the cooling liquid

**NOTICE!** Wet machining without sufficient cooling liquid will result in tool damage and poor machining results.

1. If you have previously used dry machining, switch to wet machining:  
[Switching from dry to wet machining – on page 31](#)
2. If there is cooling liquid in the cooling liquid tank, empty and clean the cooling liquid tank:  
[Exchanging the cooling liquid and cleaning the cooling liquid tank – on page 57](#)
3. **NOTICE!** Have cooling liquid on hand that meets the following requirements:
  - Drinking water
  - No added chlorine
  - No distilled water
  - No carbonated water
4. Open the working chamber door.
5. Pull the cooling liquid tank out of the machine.



FIG. 48

6. Fill the cooling liquid tank with cooling liquid until it reaches the **max** mark.
7. Push the cooling liquid tank into the machine until it clicks into place.

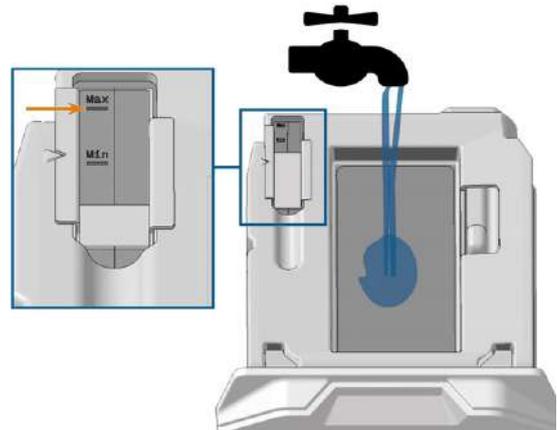


FIG. 49



FIG. 50

## 7.4 Mounting & 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. Tightening screws too much can damage blanks.

» Tighten the screws on the tensioning devices with the specified torque.

### 7.4.1 Suitable blanks

The machine can process the following blanks:

Blocks, max. size: 45 x 20 x 20 mm (L/T/H)

### 7.4.2 Overview of the blank holder

The blank holder must be in the default position for mounting blanks.

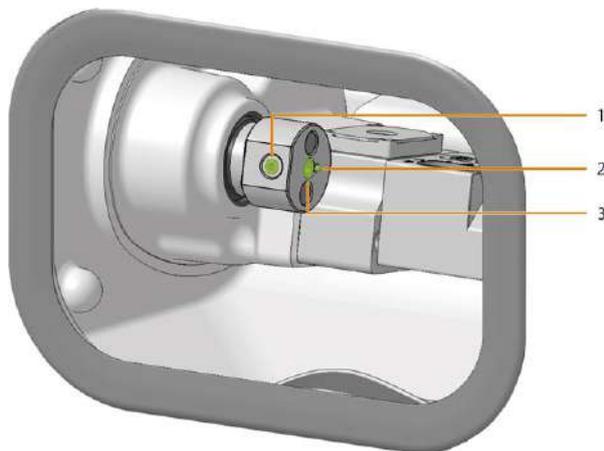


FIG. 51 BLANK HOLDER IN DEFAULT POSITION

1. Fixing screw of the blank holder
2. Opening of the blank holder
3. Positioning pin

### 7.4.3 Moving the axes to the default position

1. Close the working chamber door.
2. Move the axes into the default position by selecting the depicted icon in the **Machining** view in DENTALCNC.



### 7.4.4 Mounting & removing blocks

1. Open the working chamber door.
2. **CAUTION!** Wear gloves.

**NOTICE!** Tool breakages and defective machining results due to incorrect block assignment

3. The block type must correspond to the corresponding job in DENTALCAM.
4. Loosen the fixing screw of the blank holder without unscrewing it.

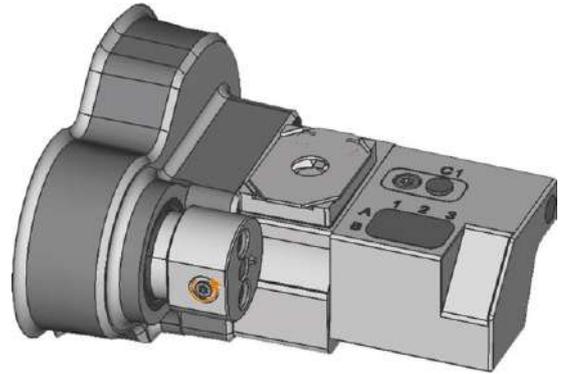


FIG. 52

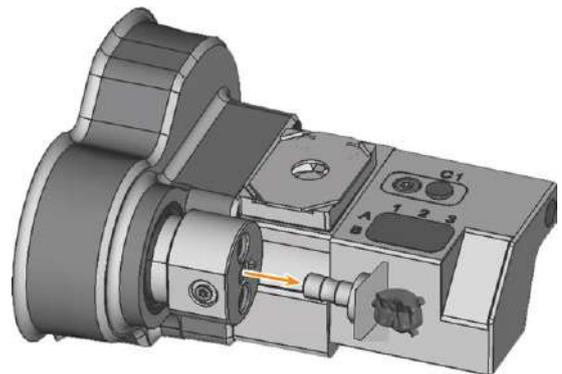


FIG. 53

5. Remove the blank from the blank holder if present.
6. If the block is multilayered, align the blank so that the top layer of color is on top.
7. Position the block so that the positioning pin at the blank holder lies in the groove in the block shaft.
8. Insert the shaft of the block into the blank holder as far as it will go.
9. Tighten the fixing screw with the supplied torque screwdriver (1.5 Nm) with bit TX10. Use the supplied torque screwdriver with bit TX10 to fix the block with the fixing screw.

FIG. 54

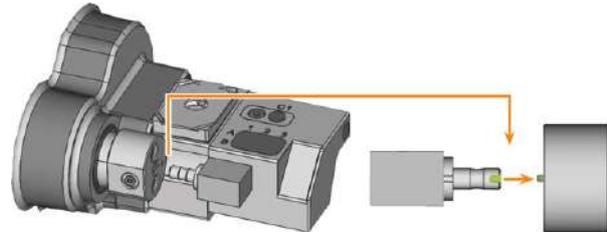
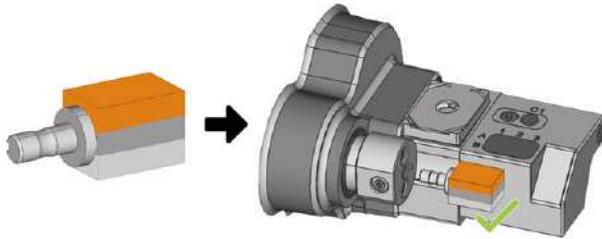


FIG. 55

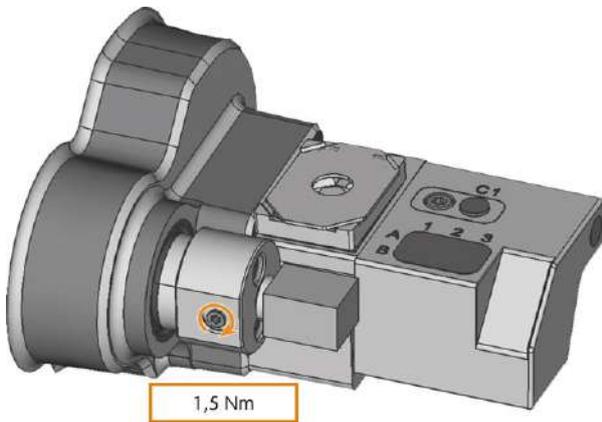


FIG. 56

## 7.5 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.  
This does not apply to AirTools.
- » See the further instructions in chapter Technical data.

The machine requires different tools for the different machining strategies during a job.

- DENTALCNC shows the tools (marked orange) needed for a job in the **Machining** view.

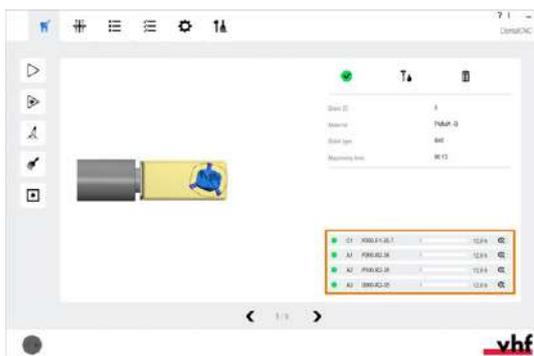


FIG. 57

- Tools are assigned via the Virtual Tool Magazine in DENTALCNC.



FIG. 58

### 7.5.1 Automatic or manual tool change

Tool change can take place automatically via the tool magazine or manually via the collet chuck. Since each tool position can be configured individually, automatic and manual changes are possible in parallel.

#### Automatic tool change properties

- The machine automatically loads the necessary tools from the magazine during machining.
- You must insert all required tools into the tool magazine before the order begins.
- Default case for all tool positions where no manual change is configured in DENTALCNC.

Automatic tool change is not possible in the following cases:

- A tool position is worn out and can no longer hold any tools properly.
- You use tools which do not fit into the tool magazine.

#### Manual tool change properties

- During the application, you manually insert the tools into the spindle's collet chuck at the request of DENTALCNC.
- You must configure this manual tool change for individual tool positions in DENTALCNC.
- This is described in the DENTALCNC manual.

### 7.5.2 Inserting tools into the tool magazine

You can equip the tool magazine of your machine in two ways:

- **By manual insertion into the tool magazine** – This is the fastest way. It is described below.
- **About the spindle** – You insert a tool into the collet chuck and the spindle places the tool in the tool magazine. This option takes more time, but might be more convenient for some. It is described in the documentation for the manufacturing software.



FIG. 59 TOOL MAGAZINE (MARKED ORANGE)

You insert tools manually as follows:

1. **⚠ CAUTION!** Wear gloves.
2. Open the working chamber door.
3. Remove the tool magazine from the working chamber.  
To do this, pull it to the right of the tool magazine holder.
4. **NOTICE!** Remove worn or damaged tools from the tool magazine if any. DENTALCNC shows tool life in the **tool management** view.

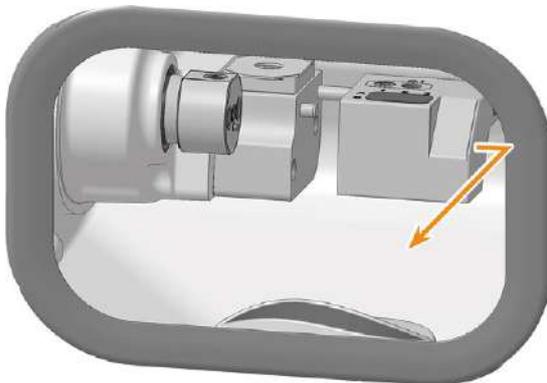


FIG. 60

5. Insert the new tools:
  - NOTICE! Tool breakage and defective machining results due to incorrect tool assignment**
  - Ensure that the positions of the tools in the tool magazine match the tool positions in DENTALCNC.



FIG. 61

- Insert the tools straight into the tool positions with the cutting edge pointing downwards. Push them in until the ring engages the tool magazine insert.

**i** The **vhftool** packaging helps you to insert the tools.  
Information on this is provided **vhfwith** tools.

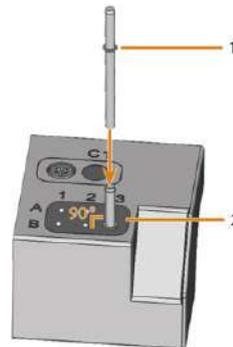


FIG. 62

1. Ring
2. Tool magazine insert

**NOTICE! Defective machining results when not using the AirTool**

- Insert the required AirTool into position **C1**. Slide it in until the propeller engages the tool magazine insert. DENTALCNC shows the tool match code with the suffix **-T** in position **C1**.

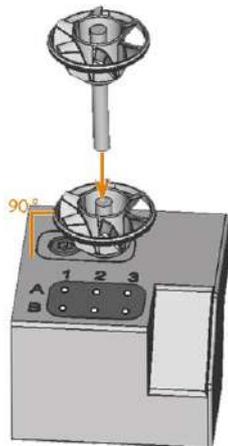


FIG. 63

6. If the new tool replaces an old tool of the same type, reset the tool life to DENTALCNC.
7. When you have inserted all the tools you need, position the tool magazine on the tool magazine holder.

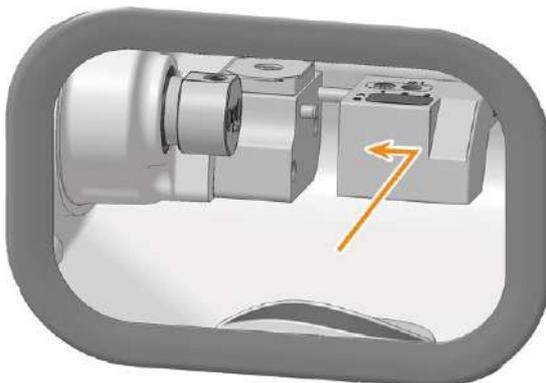


FIG. 64

### 7.5.3 Removing tools from the tool magazine

1. **⚠ CAUTION!** Wear gloves.
2. Open the working chamber door.
3. Remove the tool magazine from the working chamber.  
To do this, pull it to the right of the tool magazine holder.
4. Pull the tool upward out of the tool magazine.
5. Depending on whether you place the tool back in your inventory or no longer use the tool type, configure DENTALCNC accordingly:

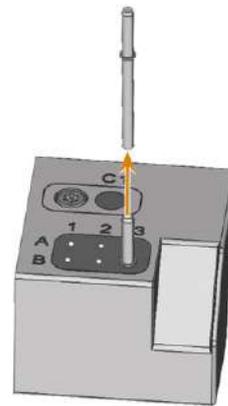


FIG. 65

### 7.5.4 Adding backup tools

If the tool life of a tool expires during machining, DENTALCNC can automatically load a backup tool from the tool magazine to continue machining.

1. Place backup tools in the tool magazine.
2. Configure the backup tools in DENTALCNC.

## 7.6 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.

### 7.6.1 Starting jobs

1. Ensure the following:
  - You created a job on your CAM computer. It has been transferred to DENTALCNC.
  - The tool magazine is inserted in the working chamber.
  - All required tools are in the right positions in the tool magazine and are neither worn nor damaged. They have also been added to the virtual tool magazine in DENTALCNC.
  - For dry machining: The dry tank is inserted.
2. Close the working chamber door.
3. If you manually control the suction device, switch it on and set it to the required level.
4. Proceed as follows:  
Start machining via the depicted icon in DENTALCNC.



or

Start the job with the start button.



- ✓ The suction unit is running.  
Machining starts.

### 7.6.2 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.



#### Continuing the machining process

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



### 7.6.3 Aborting machining

1. DENTALCNC: Select the depicted icon.
2. Confirm the current message.



- ✓ The following happens:
  - a. Machining stops immediately.
  - b. DENTALCNC asks whether the tool in the spindle can be safely inserted into the tool magazine.  
If inserting the tool would damage the tool magazine inserts, the tool must be removed manually.
- 3. If the spindle has moved into the tool change position, continue with the next step.
- 4. **⚠ CAUTION!** Wear gloves.
- 5. Open the working chamber door.
- 6. Hold the tool in the collet chuck in place.



FIG. 66

7. Confirm the current message.
- ✓ The collet chuck opens.
8. Remove the tool from the collet chuck.



FIG. 67

9. Close the working chamber door.
10. Confirm the current message.

- ✓ The following happens:
  - a. The collet chuck closes.
  - b. The spindle moves to its default position.

## 7.7 Switching off the machine

### 7.7.1 Switching off the machine

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

## 8 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.

### 8.1 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 43](#))

### 8.2 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.

### 8.3 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.

### 8.4 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 scheduling the first preventive maintenance appointment

at this point to ensure your machine gets proper maintenance.

### 8.5 Warranty

The machine and the extra equipment are warranted for a period of 24 months or 2,000 operating hours, whatever comes first. The warranty covers defects in materials or fabrication as long as the regulations for using the machine in all documents are followed.

Of course, the warranty also covers wear parts as long as their failure cannot be attributed to the function-related abrasion.

[↗ Spare parts and wear parts – on page 44](#)

## 8.6 Maintenance table

### 8.6.1 Once per week

Action	Recommended interval / Terms	Procedure / Tools
Cleaning the collet chuck	<ul style="list-style-type: none"> <li>▪ Once per week</li> <li>▪ 20 operating hours</li> <li>▪ In the event of out-of-true running</li> </ul>	<a href="#">↗ Cleaning or replacing the collet chuck of the spindle – on page 53</a>
Weekly cleaning of the working chamber	<ul style="list-style-type: none"> <li>▪ Once per week</li> <li>▪ 20 operating hours</li> </ul>	<a href="#">↗ Cleaning the machine – on page 46</a>
Exchanging the cooling liquid and cleaning the cooling liquid tank	<ul style="list-style-type: none"> <li>▪ Once per week</li> <li>▪ 20 operating hours</li> </ul>	<a href="#">↗ Exchanging the cooling liquid and cleaning the cooling liquid tank – on page 57</a>
Cleaning Nozzle plate	<ul style="list-style-type: none"> <li>▪ Once per week</li> <li>▪ 20 operating hours</li> </ul>	<a href="#">↗ Cleaning the nozzle plate – on page 56</a>

### 8.6.2 Every 4 weeks

Action	Recommended interval	Procedure / Tools
Cleaning the cooling liquid system	<ul style="list-style-type: none"> <li>▪ Every 4 weeks</li> <li>▪ 100 operating hours</li> </ul>	<a href="#">↗ Cleaning the cooling liquid system (↗ page 61)</a>

### 8.6.3 Every 2 years

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

### 8.6.4 When necessary

Action	Recommended interval	Procedure / Tools
Updating the software and firmware	When an update is available	<a href="#">↗ Updating the software and firmware – on page 79</a>

## 8.7 Spare parts and wear parts

### 8.7.1 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.

### 8.7.2 Spare part list

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

- Each supplied accessory can be ordered as a spare part.
- Customer Service has an extended list of all spare parts.

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

1	2	Part	Replacement interval or conditions	Procedure
X	X	[[[Nicht definierte VariableGLB_DEN-phrases-SL1.ExchangeTheWaterPump]]]	2000 operating hours*	
X	X	Collet chuck for spindle unit SFE 300E	500 operating hours*	<a href="#">↗ Cleaning or replacing the collet chuck of the spindle – on page 53</a>
X	X	Spindle unit SFE 300E (including collet chuck)	1000 operating hours*	
X	X	Tool magazine insert (A1 – B3)	500 operating hours*	<a href="#">↗ Exchange tool magazine inserts and associated holders – on page 62</a>
	X	AirTool insert (C1)	500 operating hours*	<a href="#">↗ Exchange tool magazine inserts and associated holders – on page 62</a>
	X	Blank holder	If defective	<a href="#">↗ Exchanging the blank holder – on page 68</a>
	X	Check valve	If defective	
	X	Cooling liquid tank	If defective	
	X	Drain insert	If defective	
	X	Dry tank	If defective	
	X	Fastening element for the side panel	If defective	
	X	Fixing screw for Blank holder	If defective	
	X	Holder for AirTool insert	If defective	<a href="#">↗ Exchange tool magazine inserts and associated holders – on page 62</a>
	X	Holder for tool magazine insert	If defective	<a href="#">↗ Exchange tool magazine inserts and associated holders – on page 62</a>

1	2	Part	Replacement interval or conditions	Procedure
	X	Main fuse T6,3A L250V	If defective	<a href="#">↗ Exchanging the main fuse – on page 77</a>
	X	Measuring key	If defective	<a href="#">↗ Exchanging the measuring key – on page 69</a>
	X	Measuring key cover	If defective	
	X	Nozzle plate	If defective	
	X	Replacement filter	If defective	
	X	Strainer basket	If defective	
	X	Suction hose	If defective	
	X	Tank cover	If defective	<a href="#">↗ Exchanging the tank cover – on page 72</a>
	X	Tool magazine	If defective	<a href="#">↗ Exchange tool magazine inserts and associated holders – on page 62</a>
	X	Top cover	If defective	<a href="#">↗ Disassembling and assembling the machine housing – on page 73</a>

## 8.8 Cleaning the machine

### **CAUTION** Breathing difficulties caused by processing dust

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

- » After dry machining, only clean the machine if the air extraction unit is properly installed and activated.
- » 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.

Cleaning the working chamber includes the following components:

- Measuring key
- Blank holder
- View window
- Tool magazines
- Tool magazine holder

### 8.8.1 Performing the weekly cleaning

#### If the machine was used for wet machining

1. Have ready:
  - 1 x Cleaning cloth



FIG. 68

- 1 x Mild cleaning agent (optional)



- 1 x Microfiber cloth



- 1 x Collet chuck grease



- 1 x Interdental brush



2. Close the working chamber door.
3. Clean the view window with a cloth. Use a mild cleaning agent if necessary.
4. Move the axes into the cleaning position by selecting the depicted icon in the **Machining** view in DENTALCNC. 
5. Open the working chamber door.
6. Clean all surfaces and cracks in the working chamber thoroughly with the dry cloth. Use a mild cleaning agent if necessary.
7. Clean the working chamber door seal thoroughly with the damp cloth. Use a mild cleaning agent if necessary.

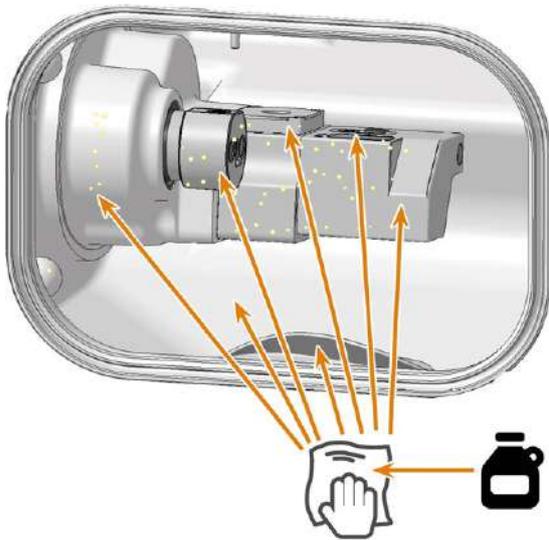


FIG. 69

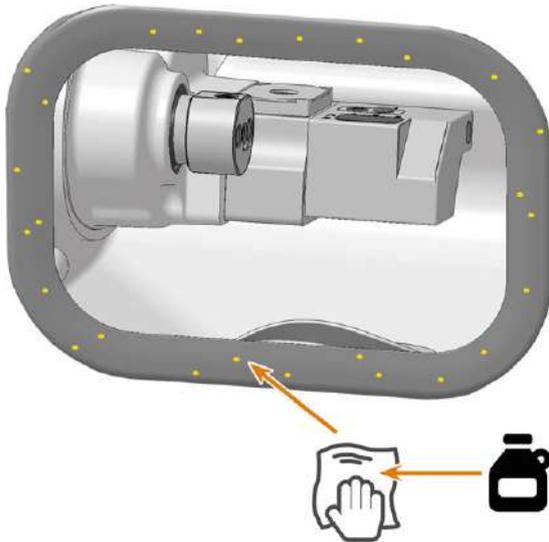


FIG. 70

8. Clean the blank holder from all sides with a damp brush. First of all, clean the opening of the blank holder.
9. Clean the measuring key:
  - a. Remove the measuring key cover.
  - b. Clean the measuring key and measuring key cover thoroughly with a damp cloth. Use a mild cleaning agent if necessary.
  - c. Reattach the measuring key cover:
    - The measuring key cover is attached magnetically.
    - The measuring key cover must be flush with the underlying surface and must not be twisted.

- Tools must be able to push the measuring key completely down through the opening in the measuring key cover.

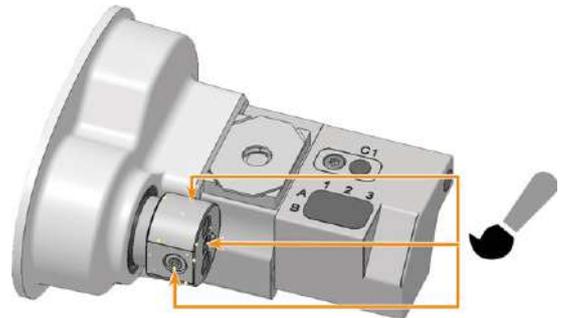


FIG. 71

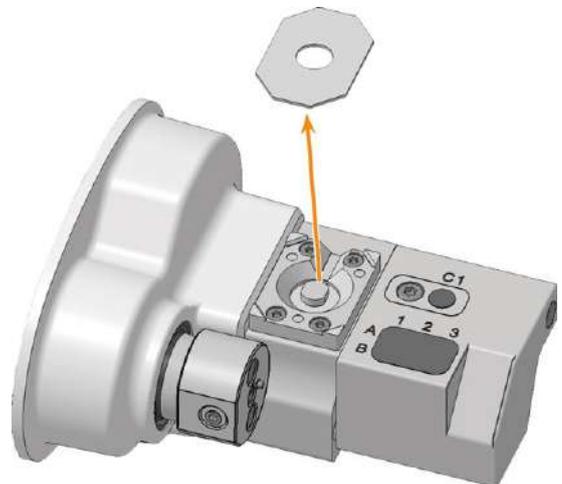


FIG. 72

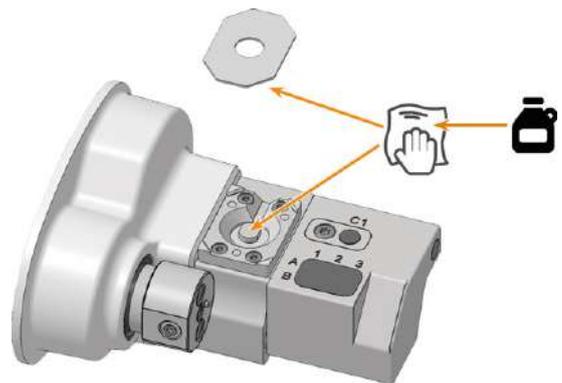


FIG. 73

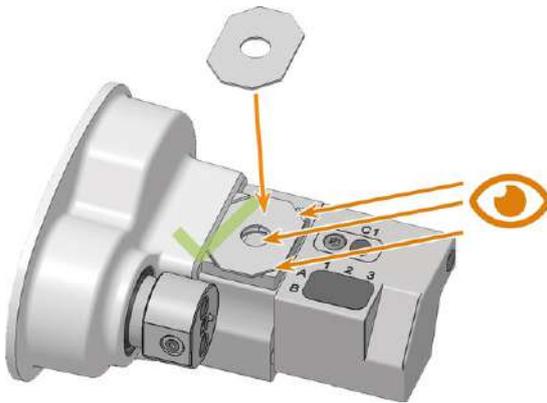


FIG. 74

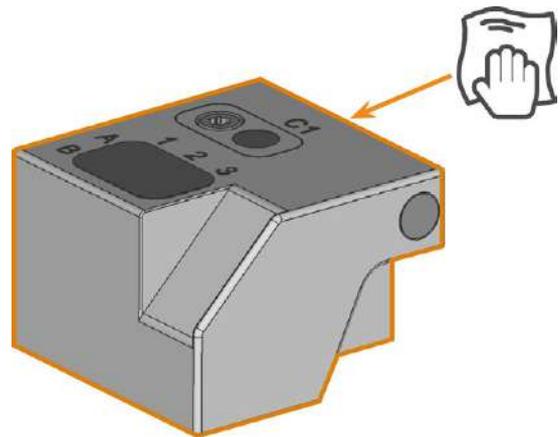


FIG. 76

10. Clean the tool magazine and the tool magazine holder:
- Remove the tool magazine from the working chamber.
  - Remove all tools from the tool magazine.
  - Clean the tool magazine thoroughly from all sides with the cloth.
  - Clean the drillings for the tool magazine holder with an interdental brush.
  - Clean the tool magazine holder thoroughly with the cloth.
  - Apply a bit of collet chuck grease to the bolts of the tool magazine holder.
  - Place the tool magazine on the tool magazine holder.

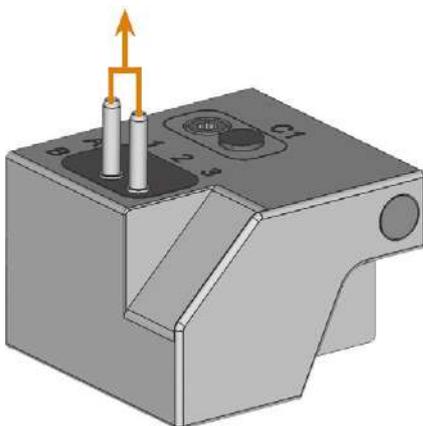


FIG. 75

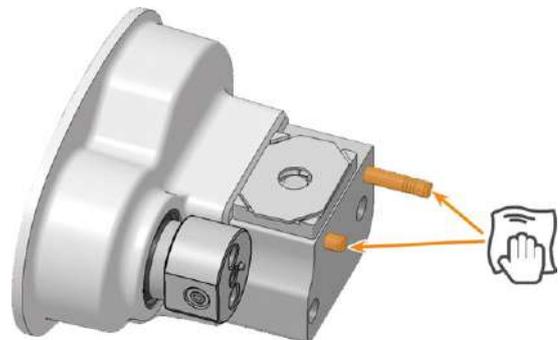


FIG. 77 TOOL MAGAZINE HOLDER MARKED ORANGE

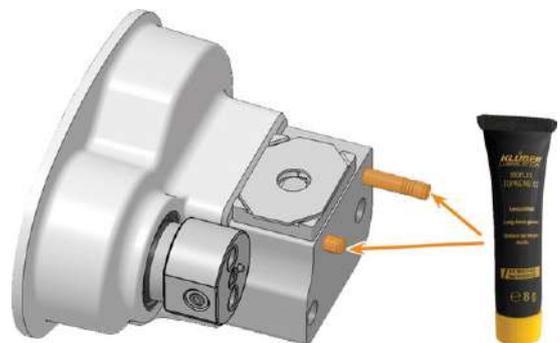


FIG. 78

- Close the working chamber door.
-



FIG. 79

13. Clean the housing:

**NOTICE!** Housing damage caused by incorrect aids and cleaning

- a. 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.
- b. 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.



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

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

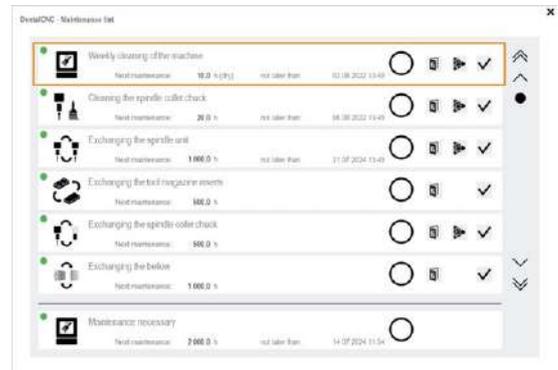


FIG. 80

**If the machine was used only for dry machining**

1. Have ready:

- 1 x Suction unit with category M filter

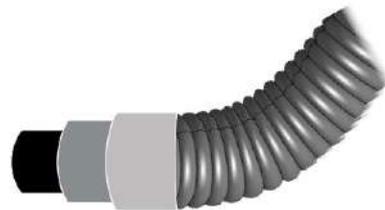


FIG. 81

- 1 x Brush



FIG. 82

- 1 x Cleaning cloth



FIG. 83

- 1 x Mild cleaning agent (optional)



- 1 x Microfiber cloth



- 1 x Collet chuck grease



- 1 x Interdental brush



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 vacuum cleaner.

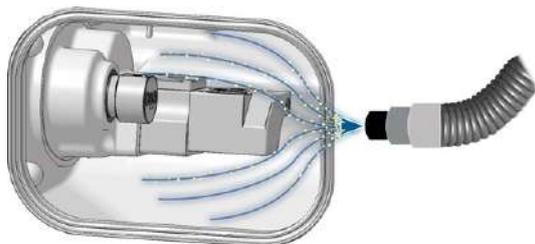


FIG. 84

6. Clean all surfaces and cracks in the working chamber thoroughly with the dry cloth. Use a mild cleaning agent if necessary.
7. Clean the working chamber door seal thoroughly with the damp cloth. Use a mild cleaning agent if necessary.

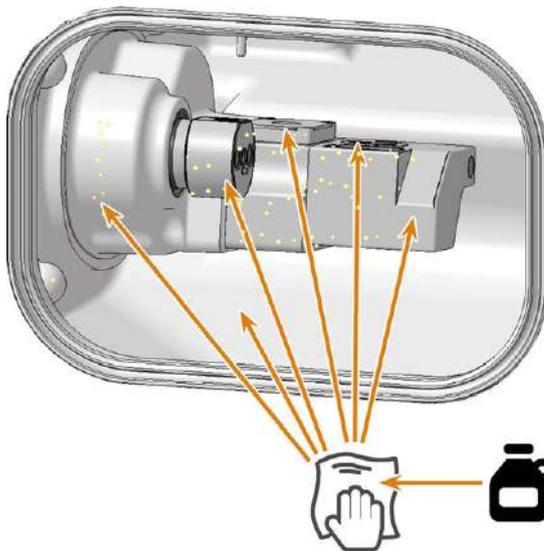


FIG. 85

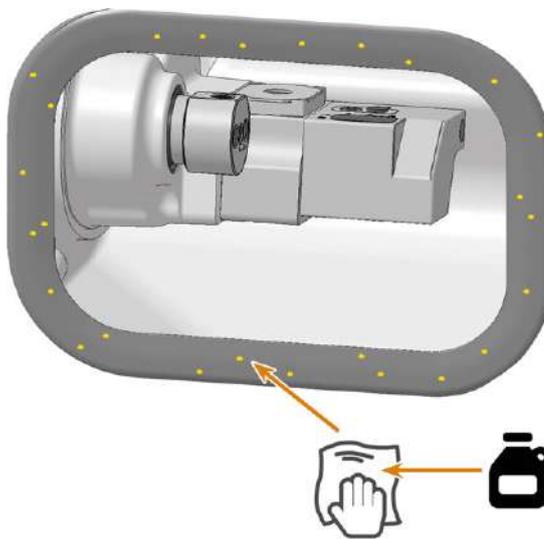


FIG. 86

8. Use the brush to clean the blank holder from all sides. First of all, clean the opening of the blank holder.
9. Clean the measuring key:
  - a. Remove the measuring key cover.
  - b. Suck the machining residues from the measuring key.

- c. Reattach the measuring key cover:
  - The measuring key cover is attached magnetically.
  - The measuring key cover must be flush with the underlying surface and must not be twisted.
  - Tools must be able to push the measuring key completely down through the opening in the measuring key cover.

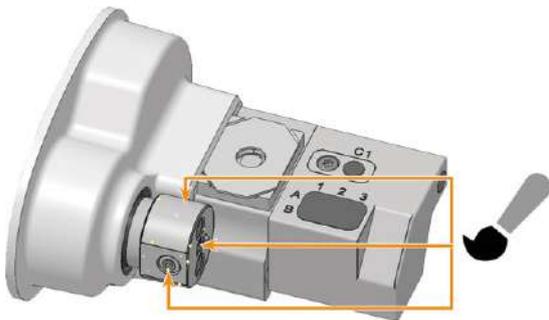


FIG. 87

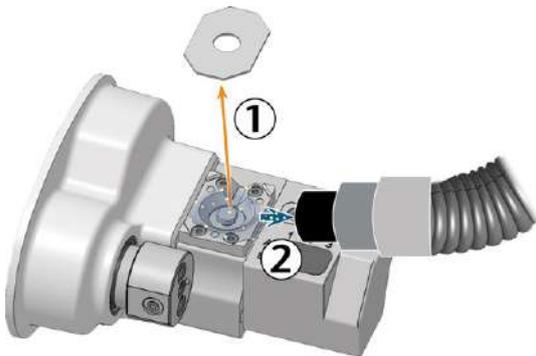


FIG. 88

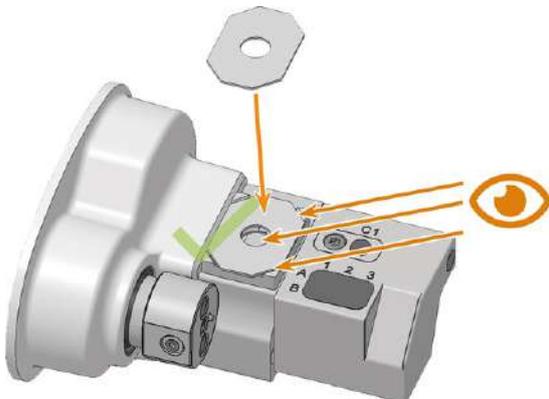


FIG. 89

- a. Remove the tool magazine from the working chamber.
- b. Remove all tools from the tool magazine.
- c. Clean the tool magazine thoroughly from all sides with the cloth.
- d. Clean the drillings for the tool magazine holder with an interdental brush.
- e. Clean the tool magazine holder thoroughly with the cloth.
- f. Apply a bit of collet chuck grease to the bolts of the tool magazine holder.
- g. Place the tool magazine on the tool magazine holder.

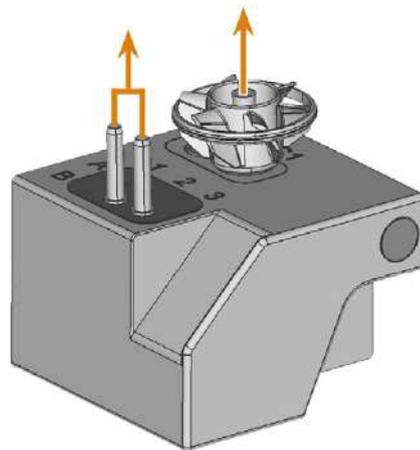


FIG. 90

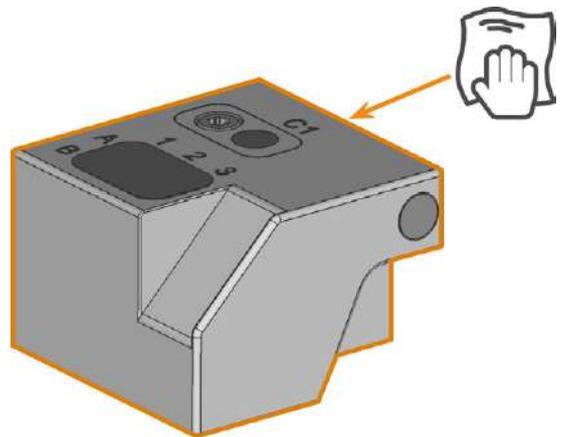


FIG. 91

- 10. Clean the tool magazine and the tool magazine holder:

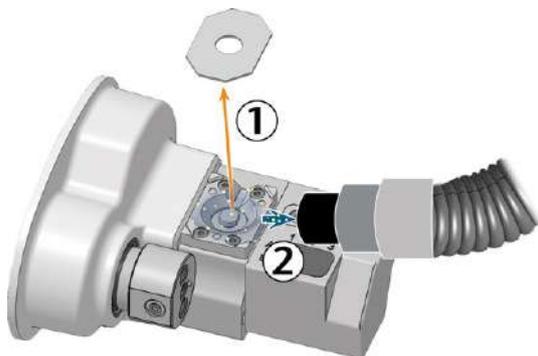


FIG. 92 TOOL MAGAZINE HOLDER MARKED ORANGE

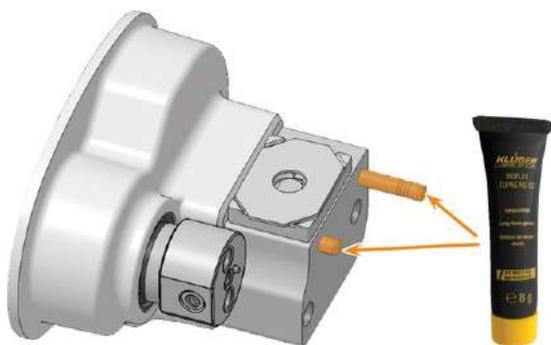


FIG. 93

11. Close the working chamber door.
12. Clean the view window with a cloth. Use a mild cleaning agent if necessary.



FIG. 94

13. Clean the housing:
  - NOTICE! Housing damage caused by incorrect aids and cleaning**
  - a. 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.

- b. 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.



14. Open the **Maintenance** section window with the following icon in the main icon bar:
15. Select the icon shown for the **Weekly machine cleaning** entry.

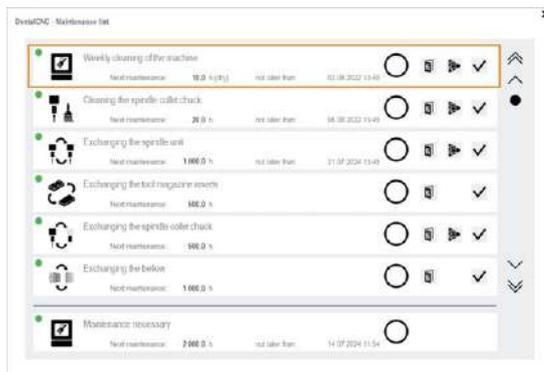


FIG. 95

## 8.9 Cleaning or replacing the collet chuck of the spindle

The collet chuck is cleaned and replaced in different steps:

Step	Cleaning	Replacing
Removing the collet chuck	Yes	Yes
Cleaning the collet chuck	Yes	No
Greasing the collet chuck	Yes	Yes
Inserting the collet chuck	Yes	Yes

**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.



FIG. 96 CURRENT SPINDLE SERVICE SET

1. Cleaning brush
2. Knurled nut
3. Tube of collet chuck grease
4. Cleaning cone

### 8.9.1 Removing the collet chuck

1. Have the spindle service set ready.
2. Close the working chamber door.
3. Open DENTALCNC's general application settings with the depicted icon in the main icon bar.



- ✓ The spindle moves into the position for collet chuck removal.
- 4. Open the working chamber door.
- 5. ⚠ **CAUTION!** Wear gloves.

6. Untighten the collet chuck with the knurled nut:
  - a. Insert the pin of the knurled nut into the collet chuck.
  - b. Ensure that the collet chuck is properly seated in the recess of the knurled nut.

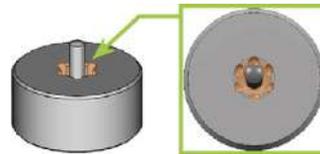


FIG. 97

- c. Twist the knurled nut counterclockwise.

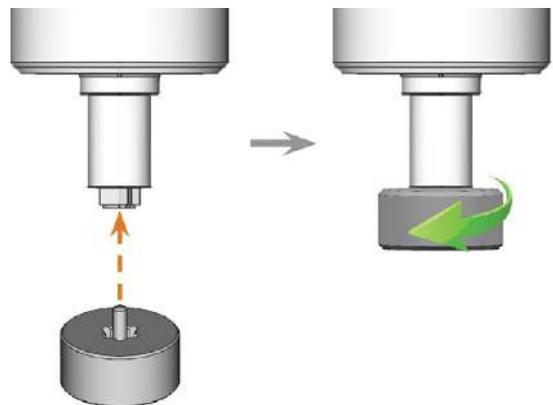


FIG. 98

7. Unscrew and remove the collet chuck with your hand.

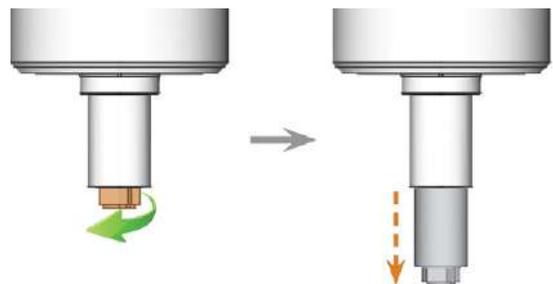


FIG. 99

8. Put the knurled nut and the collet chuck aside within reach.
9. Clean the inner cone of the spindle with the cleaning cone of the service set.

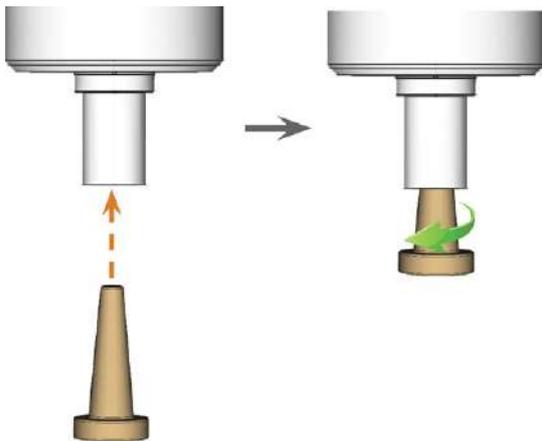


FIG. 100

### 8.9.2 Cleaning the collet chuck

1. Clean the collet chuck with the brush of the service set.
  - a. Insert the brush into the collet chuck until the end of the brush aligns with the end of the collet chuck.  
Do not push any further because otherwise dirt may get into the thread of the collet chuck.



FIG. 101

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

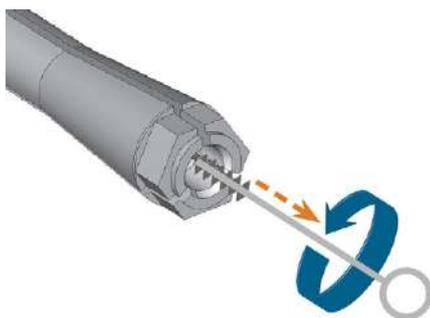


FIG. 102

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

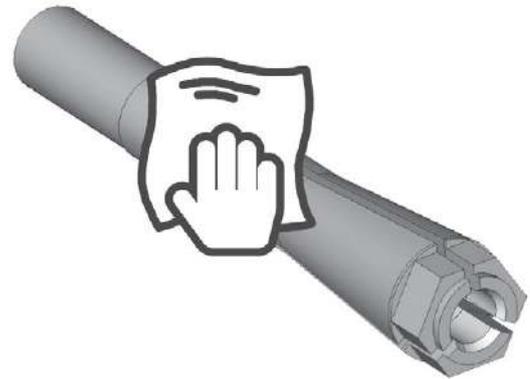


FIG. 103

### 8.9.3 Greasing the collet chuck

**NOTICE** Damaging of the spindle when using the wrong grease or applying the grease incorrectly

If you use unsuitable grease or if grease gets into the longitudinal slots of the collet chuck, the machine may get damaged.

- » Before applying the grease, ensure that the collet chuck is perfectly clean.
  - » Ensure that no grease gets into the longitudinal slots of the collet chuck.
  - » Only use a very small amount of grease, less than the size of a pinhead.
  - » Only use the provided grease of the service set.
1. Put a small amount of the collet grease on the index finger and smear it with the thumb.
  2. Apply the smeared collet grease to the flanks of the collet chuck.



FIG. 104

### 8.9.4 Inserting the collet chuck

1. Insert the collet chuck into the spindle. Screw in the collet chuck by twisting it clockwise with your

hand.

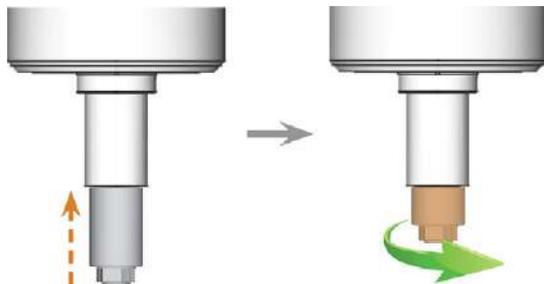


FIG. 105

**NOTICE!** Rotational imperfections when the collet chuck is not tightened properly.

2. Tighten the collet chuck with the knurled nut with pin:
  - a. Insert the pin of the knurled nut into the collet chuck.
  - b. Ensure that the collet chuck is properly seated in the recess of the knurled nut.

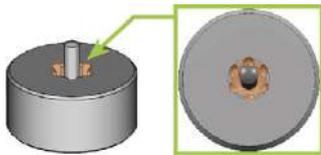


FIG. 106

- c. Turn the knurled nut clockwise until the collet chuck fits tightly in the spindle.

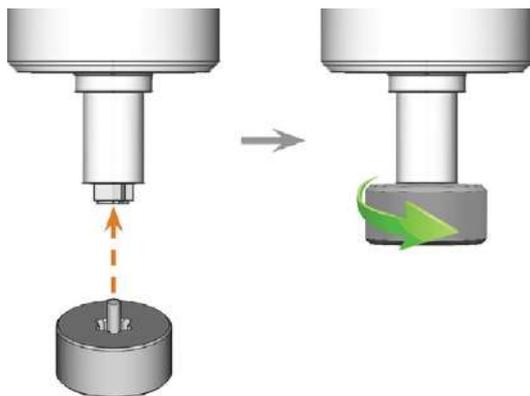


FIG. 107

3. Store the spindle service set in a safe place.

## 8.10 Cleaning the nozzle plate

You should clean the holes in the nozzle plate every time you clean the collet chuck.

1. Have the interdental brush ready.
2. Open DENTALCNC's general application settings with the depicted icon in the main icon bar. 
3. Open the working chamber door.
4. Clean the 2 opposite openings (marked orange) in the nozzle plate. For this, move the interdental brush up and down.

 If necessary, apply some water with a cleaning agent and let it sit for some minutes.

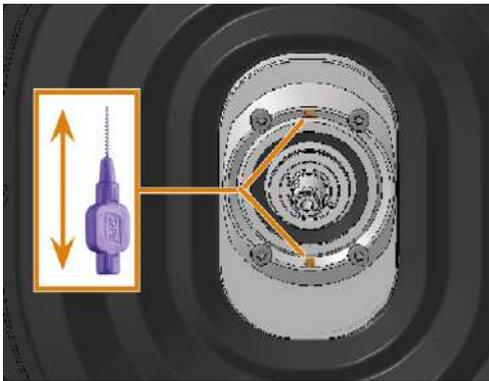


FIG. 108

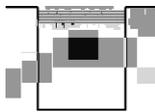
## 8.11 Exchanging the cooling liquid and cleaning the cooling liquid tank

You need to exchange the cooling liquid in the following cases:

- The change interval in the maintenance table has been exceeded.
- The cooling liquid is soiled.
- In case of a strong odor from or a biofilm on the cooling liquid.

1. Have ready:

- 1 x Collecting container with filter for machining residues (filter optional)



- 1 x Mild cleaning agent (optional)



- 1 x Cleaning brush



- 1 x Spare filter (optional)



2. Open the working chamber door.
3. Pull the cooling liquid tank out of the machine.
4. Remove the strainer basket from the cooling liquid tank.
5. Clean the strainer basket under running water.



FIG. 109

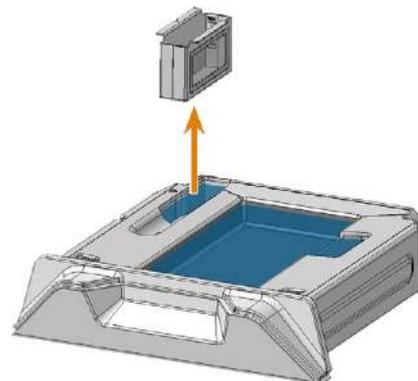


FIG. 110

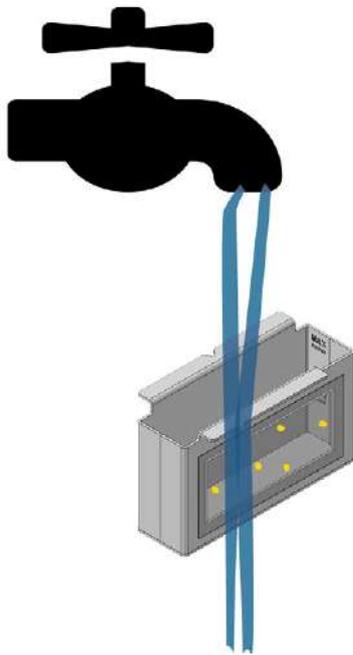


FIG. 111

6. Pour the cooling liquid into the collecting container.  
The use of a filter in the collecting container can simplify disposal.
7. Remove the filter from the cooling liquid tank.
8. Clean the filter under running water.  
If this does not allow you to clean the filter, have a spare filter ready and soak it in water.

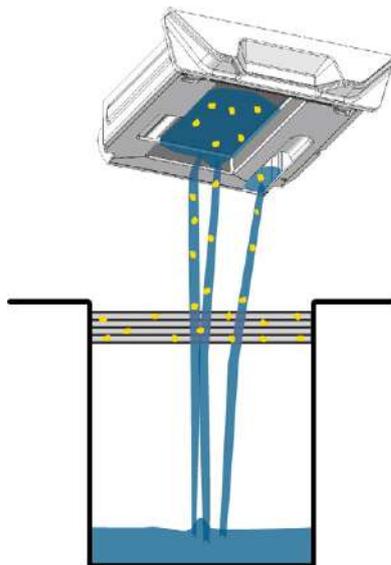


FIG. 112

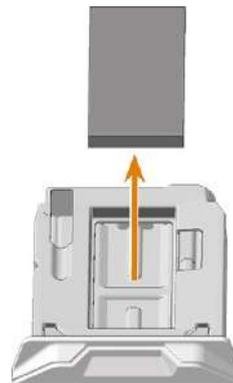


FIG. 113

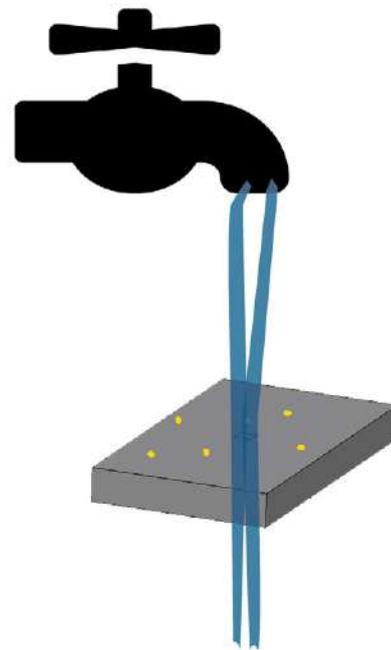


FIG. 114

9. Fill water into the cooling liquid tank for cleaning.  
Add a mild cleaning agent (optional).
  10. Thoroughly clean the tank with the cleaning brush.  
Pour the cleaning water into the collecting container.
  11. If you have used a cleaning agent, make sure that there is no residue of it in the cooling liquid tank.
- ✓ The cooling liquid tank is completely void of liquid, machining and cleaning agent residues.

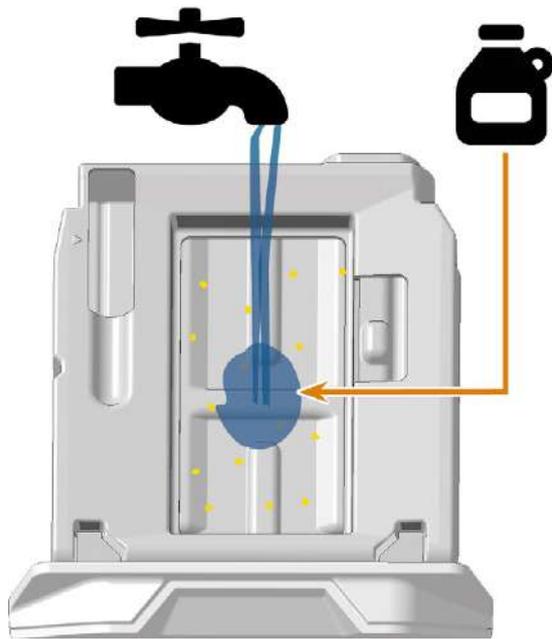


FIG. 115

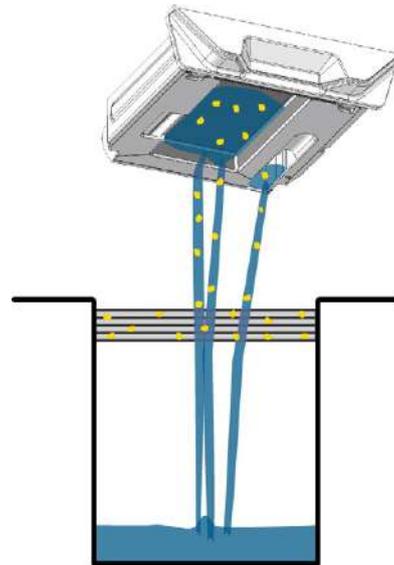


FIG. 117

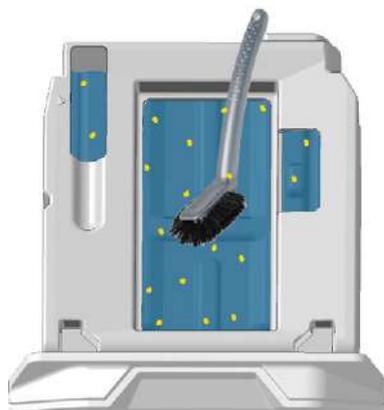


FIG. 116

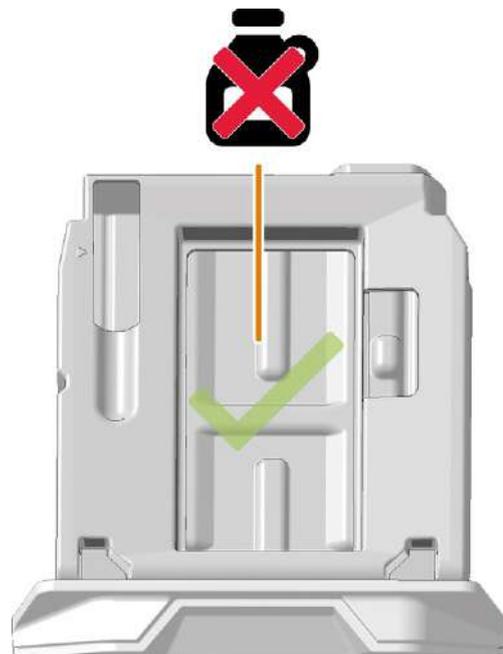


FIG. 118

12. Place the filter or spare filter in the cooling liquid tank.
13. Insert the strainer basket.

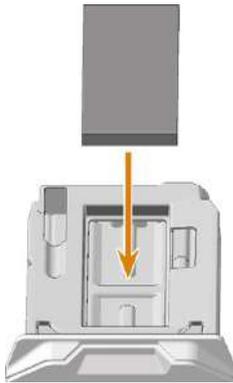


FIG. 119

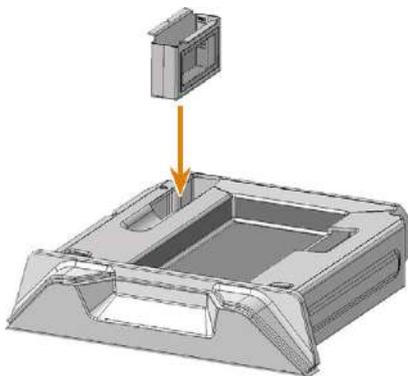


FIG. 120

14. Fill cooling liquid into the cooling liquid tank.

[🔗 Filling the cooling liquid – on page 33](#)

## 8.12 Cleaning the cooling liquid system

If the flow rate of the cooling liquid isn't sufficient or the corresponding interval in the maintenance table has been exceeded, you must clean the cooling liquid system.

The task consist of the following automated processes:

Process	Duration (approx.)
Cleaning	30 minutes
Rinsing	5 minutes

### **NOTICE** Material damage when cleaning the cooling liquid system incorrectly

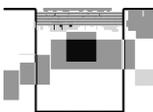
If you clean the cooling liquid system incorrectly, the machine, blanks and tools will be damaged.

- » Only use Tec Powder from vhf to clean the cooling liquid system.
- » Carefully follow the instructions below.

1. Have ready:
  - 1 x Tec Powder (50 g)



- 1 x collecting container with filter for machining residues (filter optional)



2. Start DENTALCNC.
3. Open the **Maintenance section** window with the following icon in the main icon bar: 
4. Select the **Cleaning the cooling liquid system** maintenance task.
- ✓ The on-screen guide displays.
5. Open the working chamber door.

6. Pull the cooling liquid tank out of the machine.
7. Remove the following items from the working chamber:
  - Any blank and holder
  - The tool magazines
8. Perform a weekly cleaning of the working chamber.
9. Empty and clean the cooling liquid tank.
  - ↗ [Exchanging the cooling liquid and cleaning the cooling liquid tank – on page 57](#)
10. Fill 1 l (1.1 qt) of drinking water into the container.
11. Add 25 g Tec Powder to the water. Stir the water until the powder is completely dissolved.
12. Insert the tank into the machine.
13. Go to the next step of the on-screen guide.
  - ✓ The cleaning process starts. The remaining time is displayed in the info area of DENTALCNC's main application window.
14. Wait until the process is finished.
15. Empty the cooling liquid tank. Fill it with drinking water.
16. Insert the tank into the machine.
17. Go to the next step of the on-screen guide.
  - ✓ The rinsing process starts. The remaining time is displayed in the info area of DENTALCNC's main application window.
18. Wait until the process is finished.
19. Go to the next step of the on-screen guide.
20. Open the working chamber door.
21. Dry the working chamber with a cloth.
22. Empty the cooling liquid tank.
23. Thoroughly clean the cooling liquid tank.
24. Fill in cooling liquid for processing.
  - ↗ [Filling the cooling liquid – on page 33](#)
25. Insert the tool magazine into the working chamber.

## 8.13 Exchange tool magazine inserts and associated holders

**NOTICE** Machine and tool damage if not all tools are removed

If a tool remains in the working chamber, a collision will ensue.

» Always remove *all* tools from the working chamber when exchanging inserts.

New inserts are delivered without holes for the tools. The holes must be drilled into the inserts with the machine.

In case of a defect, you can exchange the holders for the inserts separately.

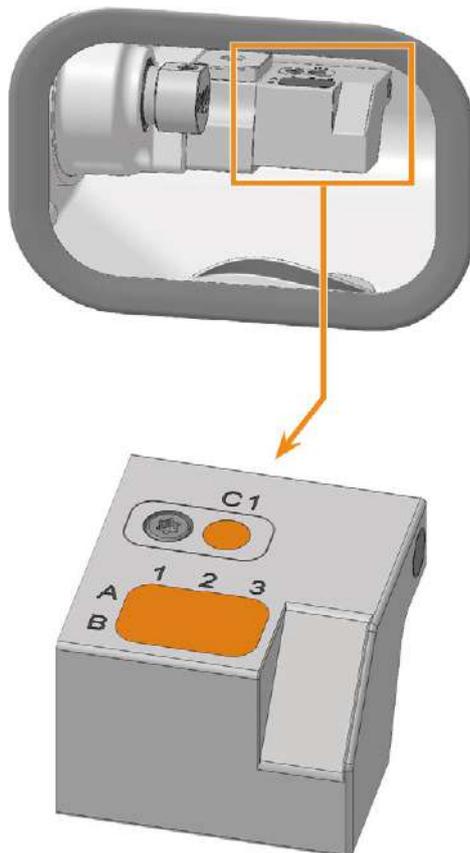


FIG. 121 TOOL MAGAZINE INSERT AND AIRTOOL INSERT (MARKED ORANGE)

1. Have ready:

- 1 x Torque screwdriver 1.5 Nm with TX20 bit



FIG. 122

- 1 x Drill bit for tool positions (2.8 mm)



FIG. 123

If you want to exchange the inserts:

- 1 x Tool magazine insert for 6 tools



FIG. 124

and

- 1 x AirTool insert

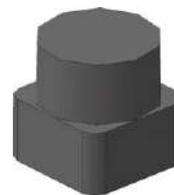


FIG. 125

If you want to exchange at least one of the holders:

- 1 x Holder for tool magazine insert

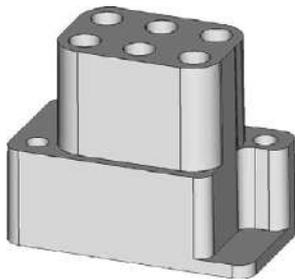


FIG. 126

and / or

- 1 x Holder for AirTool insert



FIG. 127

2. Quit DENTALCNC.
3. Open the working chamber door.
4. Switch off the machine at the main power switch.
5. **⚠ CAUTION!** Wear gloves.
6. Pull the tool magazine off the tool magazine holder.
7. **NOTICE!** Remove all tools from the tool magazine and remove the AirTool from the insert **C1**.
8. Unscrew the screw to the left of AirTool insert **C1**.
9. Pull the holder out of the opening with the insert pointing upwards.
10. Push the insert out of the holder.

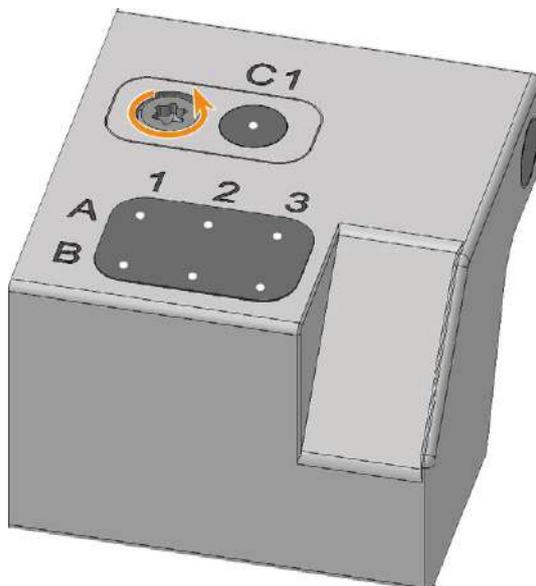


FIG. 128

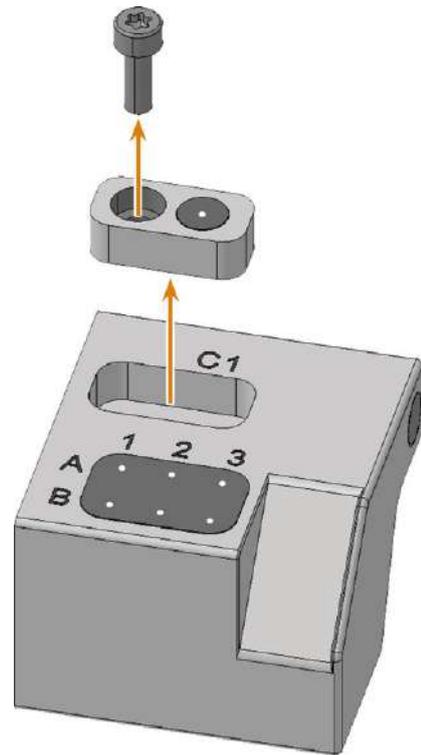


FIG. 129

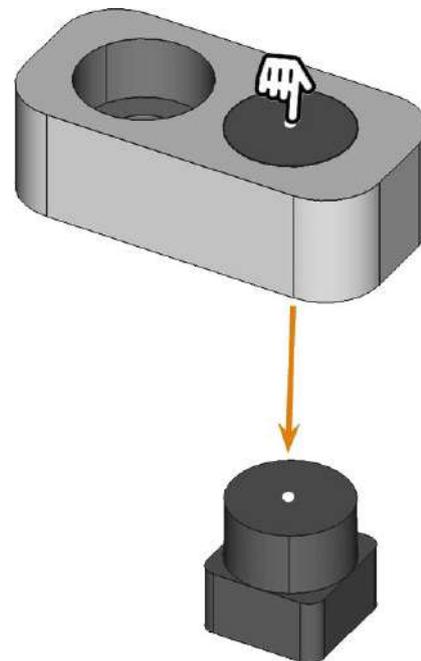


FIG. 130

11. Get the required spare parts.
12. Press the AirTool insert into the rectangular opening of the holder.  
Ensure that the top of the insert is flush with the surface of the holder.

13. Insert the holder into the opening and screw it down.

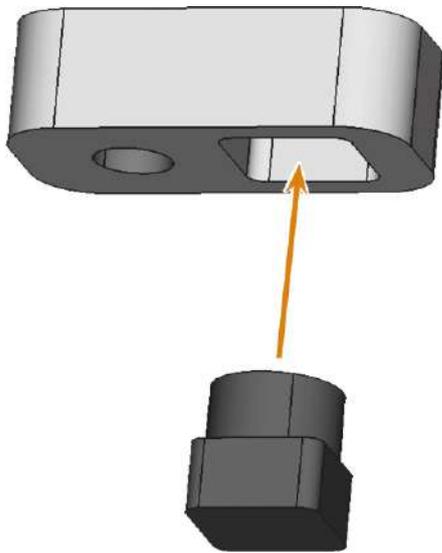


FIG. 131

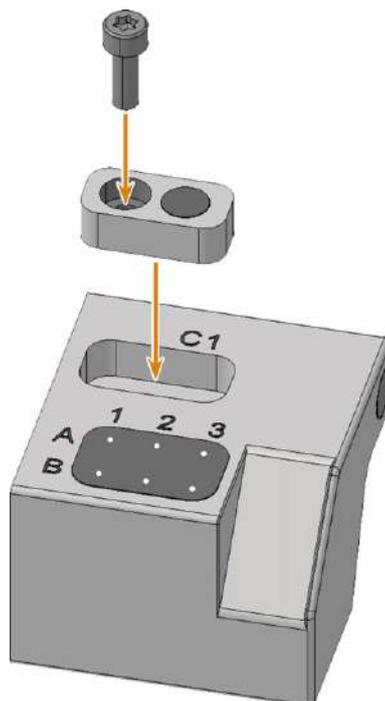


FIG. 132

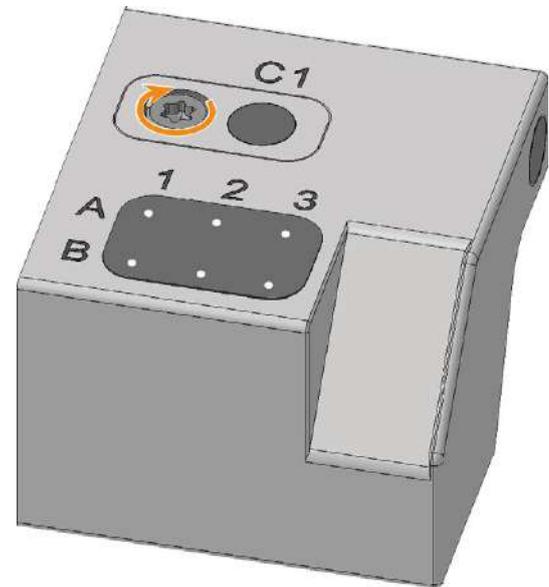


FIG. 133

14. Ensure that the top of the AirTool insert is 1 mm above the surface of the A-B axis module.  
If this is not the case, realign the insert or holder.

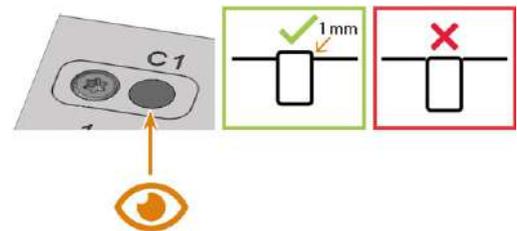


FIG. 134

15. Unscrew the 2 screws of the tool magazine insert holder on the underside of the tool magazine.  
 ✓ The tool magazine holder and the screws slide into your hand.
16. Press the tool magazine insert down out of the opening.

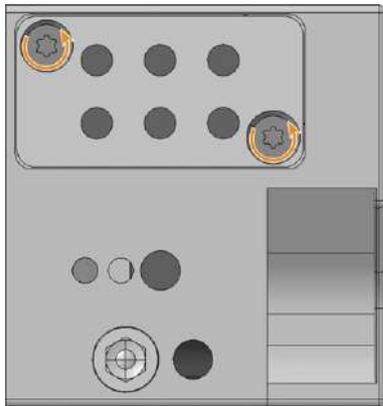


FIG. 135

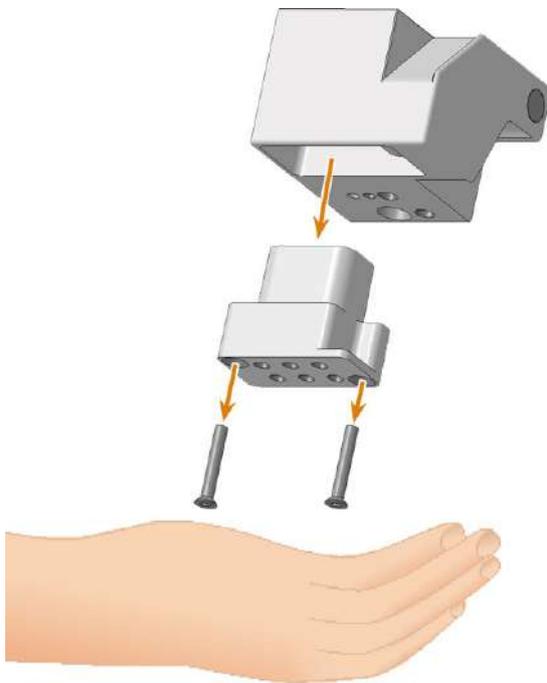


FIG. 136

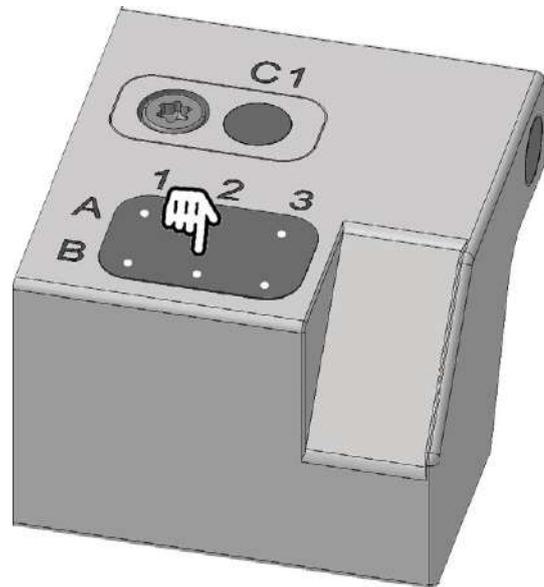


FIG. 137

- ✓ The tool magazine insert slides out of the opening into your hand.



FIG. 138

17. Get the required spare parts.
18. Insert the tool magazine insert from below into the opening and clamp it.  
When doing so, make sure that the top of the tool magazine insert is flush with the surface of the tool magazine.  
If this is not the case, correct the position of the insert.

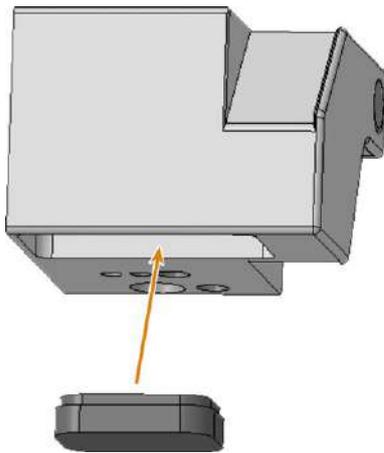


FIG. 139

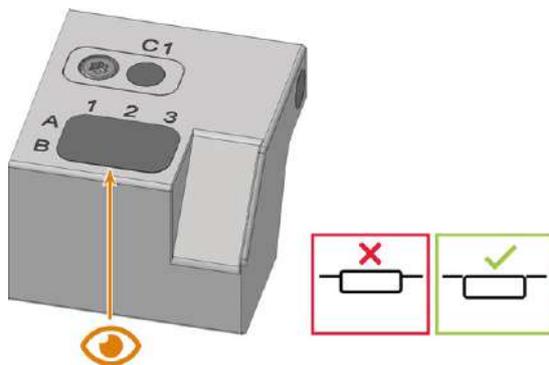


FIG. 140

19. Insert the holder into the tool magazine.
20. Insert the 2 screws into the screw holes in the holder and tighten it.
21. Place the tool magazine on the tool magazine holder.

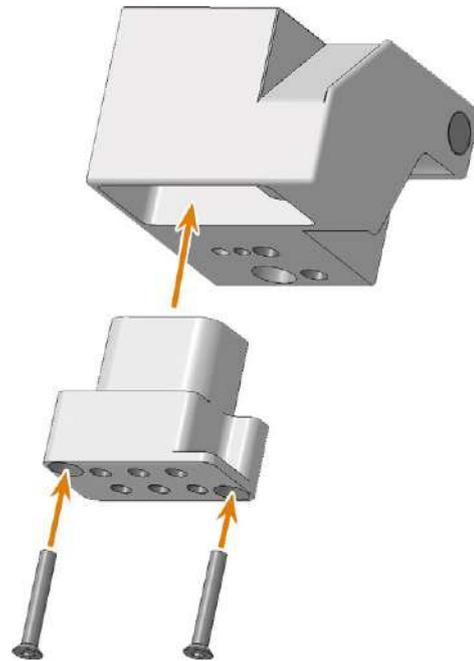


FIG. 141

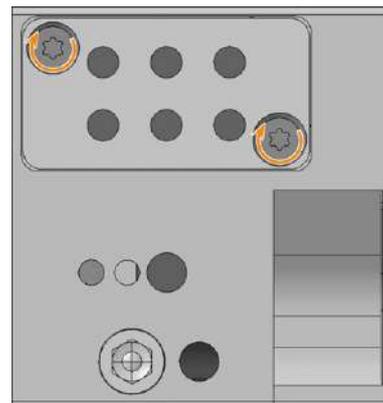


FIG. 142

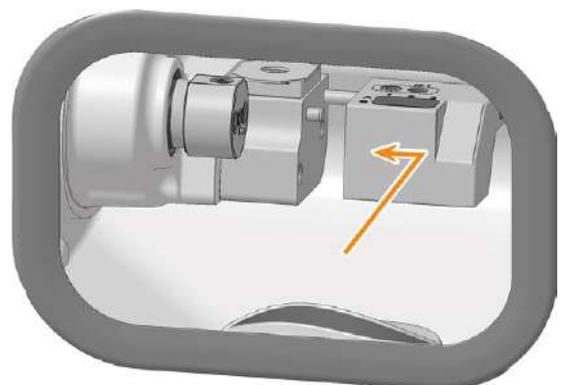


FIG. 143

22. Close the working chamber door.
23. Switch on the machine at the main power switch.
24. Start DENTALCNC.

1. Open the **Maintenance section** window with the following icon in the main icon bar: 
25. Select the following icon of the **Exchange tool magazine inserts** entry: 



26. Follow the instructions in the documentation for DENTALCNC and drill the tool positions using the provided drill bit.

## 8.14 Exchanging the blank holder

### 1. Have ready:

- 1 x Spare blank holder



- 1 x Torque screwdriver 1.5 Nm with TX10 bit



FIG. 144

- 1 x Blunt tool



2. Close the working chamber door.
3. Move the axes into the default position by selecting the depicted icon in the **Machining** view in DENTALCNC. 
4. Open the working chamber door.
5. Close DENTALCNC
6. **⚠ CAUTION!** Wear gloves.
7. Remove the blank from the blank holder if present. [↗ Mounting & removing blanks – on page 34](#)
8. Turn the blank holder by hand as far to the left as possible.
9. Remove the 2 cover caps with the blunt tool.
10. Unscrew the 2 screws (marked orange) that secure the blank holder.



FIG. 145

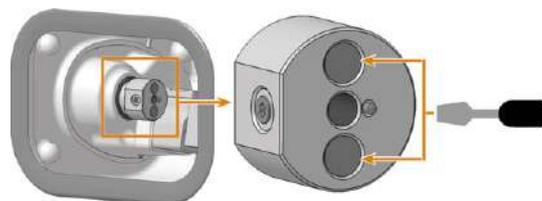


FIG. 146

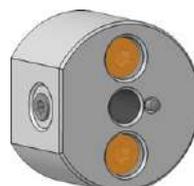


FIG. 147

11. Remove the blank holder and the screws from the working chamber.
12. Clean the surface with a damp cloth.
13. Position the spare blank holder. Make sure that the recess in the blank holder is seated on the positioning pin of the A axis.

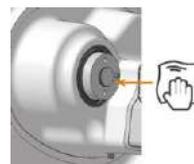


FIG. 148

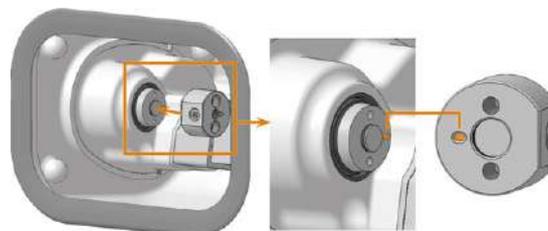


FIG. 149

14. Using the 1.5 Nm torque screwdriver, tighten the blank holder with 2 screws.
15. Cover the screws with the cover caps
16. Close the working chamber door.
17. Switch on the machine at the main power switch.
18. Start DENTALCNC.
19. Mill a test specimen and calibrate the machine as necessary.

[↗ Calibrating the axes – on page 78](#)

## 8.15 Exchanging the measuring key

The measuring key is located in the working chamber:



FIG. 150 MEASURING KEY IN THE WORKING CHAMBER (MARKED ORANGE)

1. Have ready:

- 1 x Spare measuring key

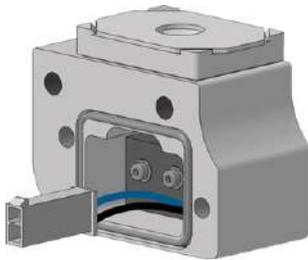


FIG. 151

- 1 x TX20 angle screwdriver



FIG. 152

2. Open the working chamber door.
3. **⚠ CAUTION!** Wear gloves.
4. Pull the tool magazine off the tool magazine holder.
5. **NOTICE!** Remove all tools from the tool magazine.
6. Close DENTALCNC.
7. Switch off the machine at the main power switch.
8. Use the TX20 angle screwdriver to remove the 2 screws holding the measuring key in place.
9. Carefully pull off the measuring key. Pay attention to the plugged-in measuring key cable.
10. Push in the side clip on the connector of the measuring key cable and pull the connector out of the socket.



FIG. 153



FIG. 154

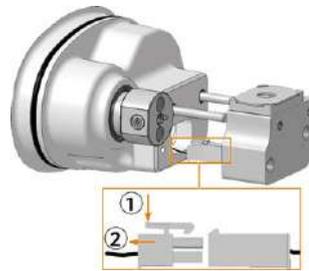


FIG. 155

11. Remove the measuring key with its cable from the working chamber.
12. Take the spare measuring key in your hand. Make sure that the gasket (marked orange) is properly inserted.
13. Insert the plug in the A-axis module into the socket of the measuring key cable.
14. Plug the spare measuring key onto the positioning pins. Make sure that the measuring key cable is not damaged.
15. Use the TX20 angle screwdriver to tighten the spare measuring key with the 2 screws.

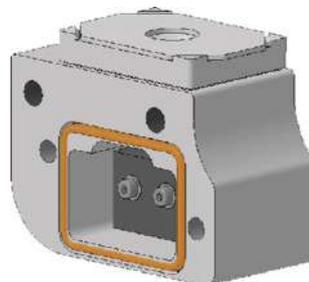


FIG. 156

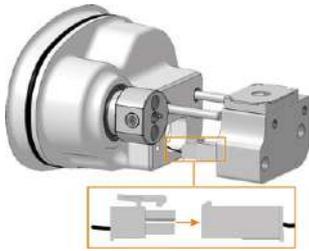


FIG. 157



FIG. 158



FIG. 159

16. Exchange the tool magazine insert and the AirTool insert (included in the spare measuring key scope of delivery).  
[↗ Exchange tool magazine inserts and associated holders – on page 62](#)
17. Close the working chamber door.
18. Switch on the machine at the main power switch.
19. Start DENTALCNC.
20. In DENTALCNC, do the following:
  - a. Measure the measuring key.
  - b. Drill the tool positions.
  - c. Calibrate the axes.

## 8.16 Exchanging the gasket of the working chamber door

1. Have ready:

- 1 x Spare gasket

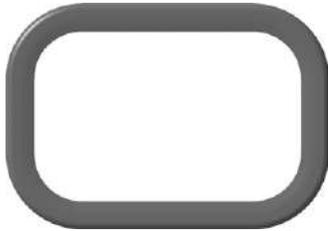


FIG. 160

- 1 x Cleaning cloth



FIG. 161

2. Open the working chamber door.
3. Remove the existing door gasket.
4. Clean the surface on which the gasket will be placed with the cloth.
5. Place the spare gasket so that it surrounds the opening to the working chamber:
  - a. Place the profile on the back of the gasket on the outside of the working chamber and press the corners into the recess.
  - b. Press the gasket firmly.  
Make sure that the entire gasket is firmly seated in the recess.

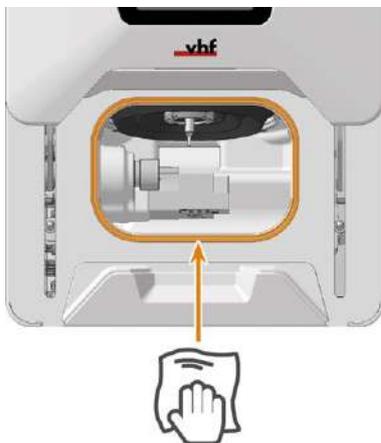


FIG. 162

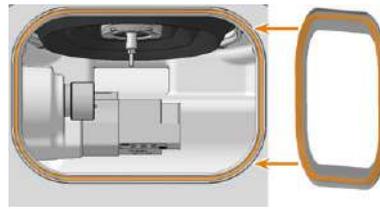


FIG. 163

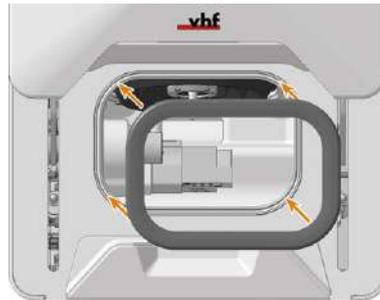


FIG. 164

6. Check whether the working chamber door opens and closes correctly and whether the working chamber door lies flat.
7. If this is not the case, adjust the placement of the gasket.

## 8.17 Exchanging the tank cover

1. Have ready:

- 1 x Spare tank cover



FIG. 165

- 1 x 10 mm wrench



FIG. 166

2. Pull the tank completely out of the machine.  
If you exchange the cooling liquid tank cover, drain and clean the cooling liquid tank.

[Exchanging the cooling liquid and cleaning the cooling liquid tank](#)

3. Use the wrench to unscrew the 2 screws (marked orange) that secure the tank cover to the tank.  
4. Remove the tank cover from the tank.



FIG. 167

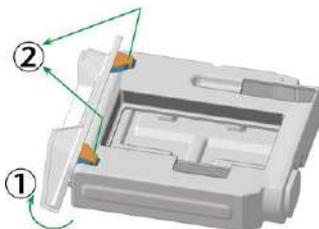


FIG. 168

5. Hook the tabs (marked orange) of the spare tank cover into the provided recesses (marked in blue) on the top of the tank.  
6. Use the wrench to tighten the 2 screws (marked orange) that secure the tank cover to the bottom of the tank.

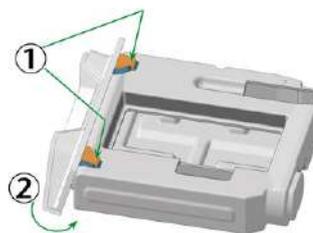


FIG. 169



FIG. 170

7. If you are exchanging the cooling liquid tank cover, insert the filter and strainer basket into the cooling liquid tank.

8. Fill cooling liquid into the tank.

[Exchanging the cooling liquid and cleaning the cooling liquid tank](#)

9. Insert the tank into the machine.

## 8.18 Disassembling and assembling the machine housing

### 8.18.1 The components of the machine housing

The machine housing consists of the following components:

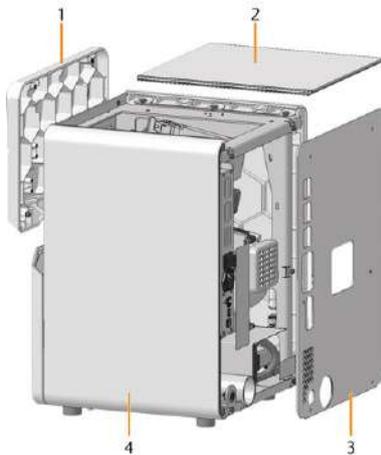


FIG. 171

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

You must remove the back panel cover and top cover before removing other housing components. After you have installed all other housing components, install the back panel cover.

### 8.18.2 Removing and installing back panel and top cover

**i** To preserve the appearance of the machine, treat all housing components with care and do not place them on rough surfaces.

1. Have ready:
  - 1 x 10 mm wrench



FIG. 172

- 1 x TX20 angle screwdriver



FIG. 173

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. Use the TX20 angle screwdriver to unscrew the 6 screws (marked orange) that secure the back panel.
4. Slide the top cover back out of the machine.

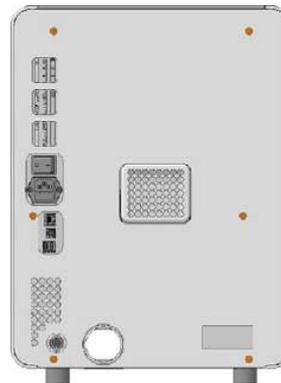


FIG. 174



FIG. 175

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

1. Position the top cover on the side panels. Insert the profile of the top cover (marked orange) into the guide of the side walls.
2. Slide the top cover completely to the front of the machine.
3. Use the TX20 angle screwdriver to screw the back panel to the machine with 6 screws (marked orange).

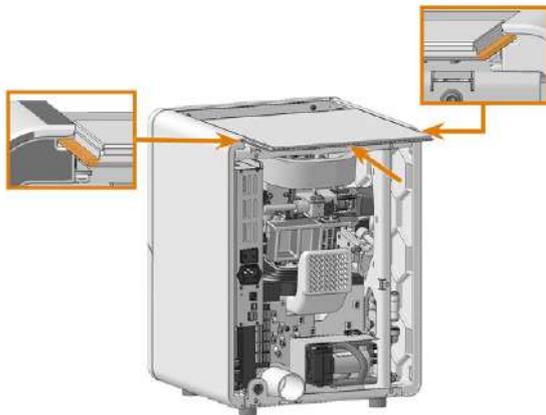


FIG. 176

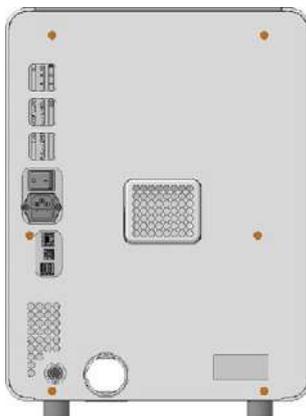


FIG. 177

### 8.18.3 Removing and installing the service cover

To expand the service cover, do the following:

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

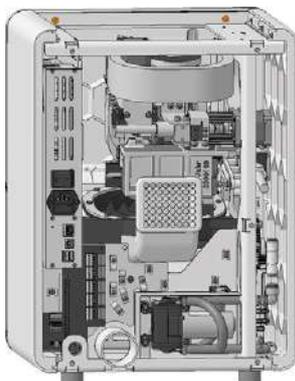


FIG. 178



FIG. 179



FIG. 180

To install the service cover, do the following:

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).

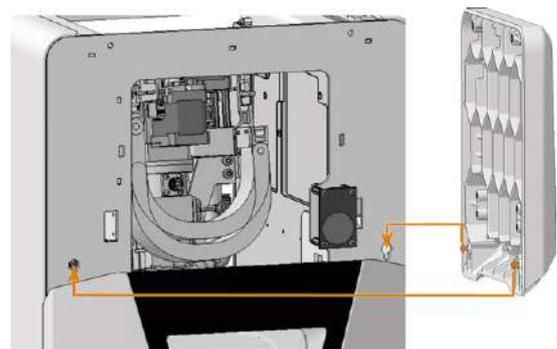


FIG. 181



FIG. 182

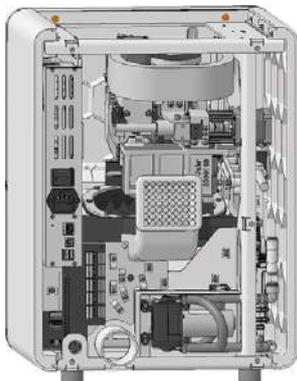


FIG. 183

### 8.18.4 Removing and installing side panels

To remove the side panel cover, do the following:

1. Use the wrench to loosen the 3 screws (marked orange) that secure the side panel cover.
2. Tilt the side panel cover outward.
3. Slide the side panel cover backwards out of the machine.
4. Remove the cover.

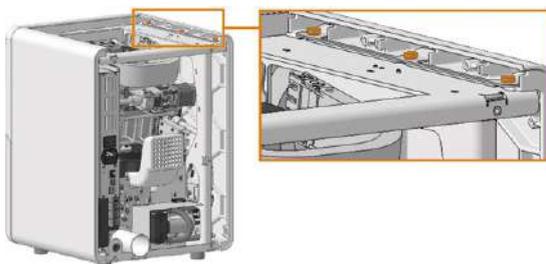


FIG. 184



FIG. 185

To install the side panels, 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) engage in the sockets (marked blue) of the fixing latches.
3. Move the upper edge of the side panel cover towards the machine until the screws are placed in the recesses.
4. Use the wrench to tighten the 3 screws (marked orange) of the side panel.



FIG. 186

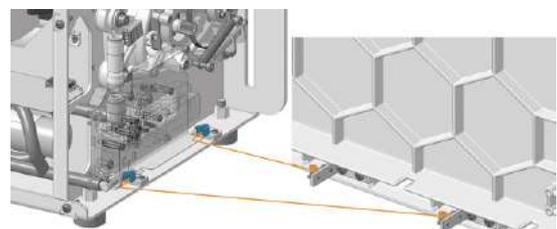


FIG. 187

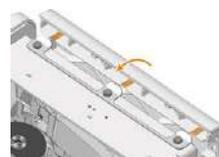


FIG. 188

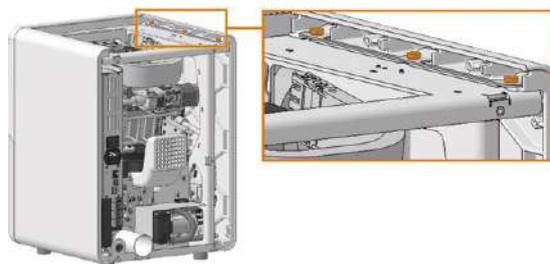


FIG. 189

## 8.19 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.

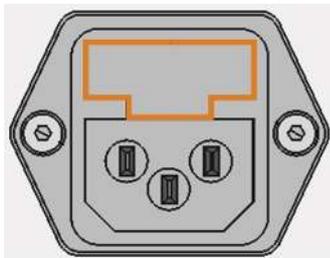


FIG. 190 COVER OF THE FUSE (MARKED ORANGE)

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.

## 8.20 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.

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.

## 8.21 Updating the software and firmware

### 8.21.1 Updating DENTALCAM & DENTALCNC

Instructions can be found in the DENTALCAM & DENTALCNC user information.

### 8.21.2 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.

## 9 TROUBLESHOOTING

This chapter provides machine-specific troubleshooting information.

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

### 9.1 Links to troubleshooting guides



[https://www.dentalportal.info/en-us/Global\\_Troubleshooting/GLB\\_DEN\\_Troubleshooting.htm](https://www.dentalportal.info/en-us/Global_Troubleshooting/GLB_DEN_Troubleshooting.htm)

### 9.2 Machine-specific notes

#### 9.2.1 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.

#### 9.2.2 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.

#### 9.2.3 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.

#### 9.2.4 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.

### 9.3 Emergency opening of the working chamber door

**⚠ 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. 191

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!** Danger of crushing and cutting injuries when the working chamber door is unlocked during operation
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.

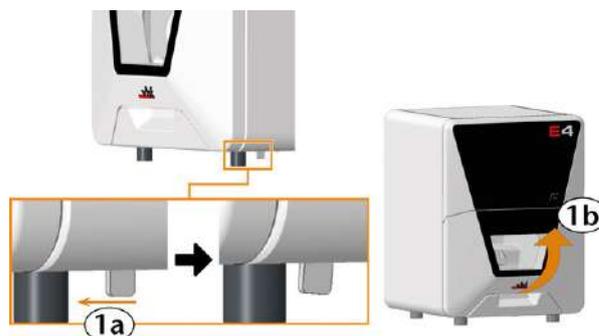


FIG. 192

### 9.4 Loosening a fixed tool magazine

If you can no longer pull the tool magazine from the holder:

1. Have ready:

- 1 x Cylinder screw M4 x 30



- 1 x Angle screwdriver TX 20



- 1 x Flat blunt tool



- 1 x Cover cap (optional)



2. Open the working chamber door.
3. Use the flat blunt tool to remove the protective cap and put the cap aside within reach.

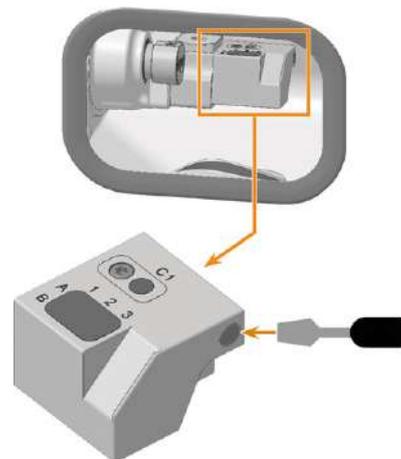


FIG. 193 EXAMPLE OF A FLAT BLUNT TOOL

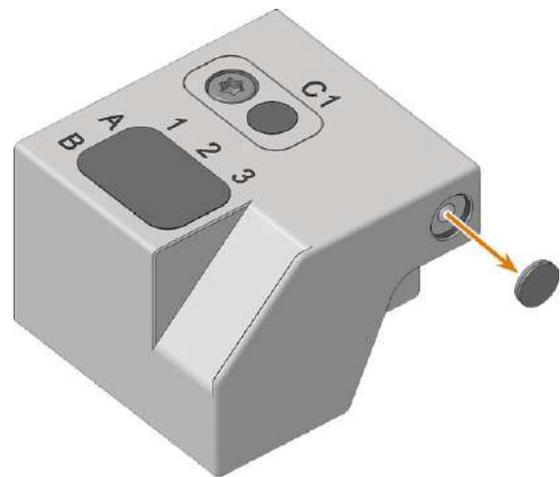


FIG. 194

4. Screw in the cylinder head screw with the angle screwdriver.
- ✓ The tool magazine is released.
5. Pull the tool magazine off the tool magazine holder.

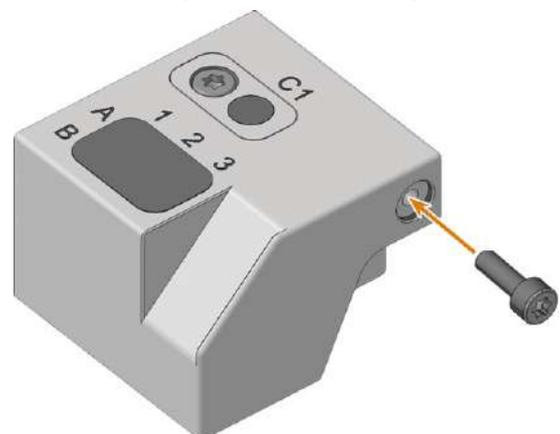


FIG. 195

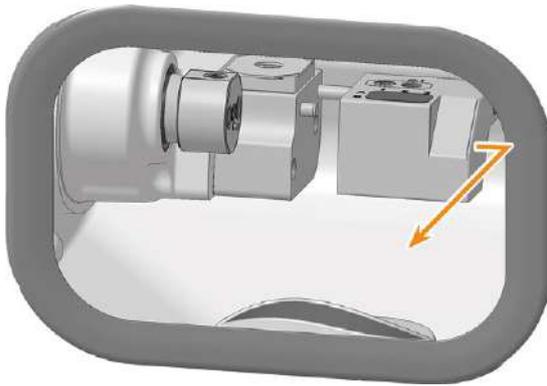


FIG. 196

weekly cleaning of the machine.

[↗ Performing the weekly cleaning – on page 46](#)

6. Use the angle screwdriver to loosen the cylinder head screw and remove it.
7. Cover the screw opening with the cover cap. If the cap is damaged, use a provided spare cap (7.5 mm).

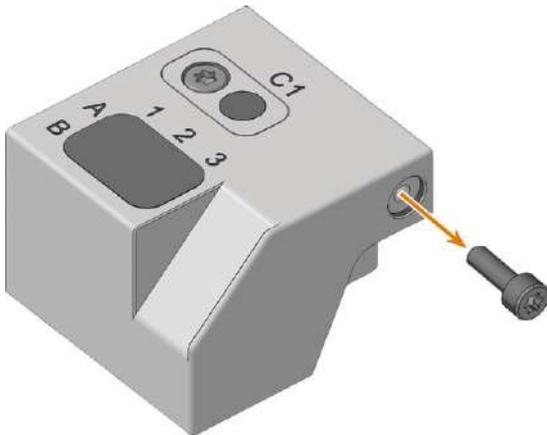


FIG. 197

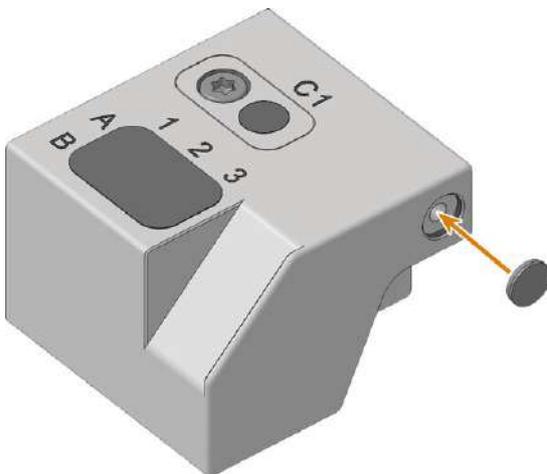


FIG. 198

8. Clean and grease the tool magazine and the tool magazine holder as described in the instructions for

## 9.5 Removing broken tools from the collet chuck

If parts of a broken tool are in the collet chuck, you must manually remove them.

**NOTICE!** The collet chuck may be damaged if you use the knurled nut *with* pin for removal

1. Have ready:

- 1 x Supplied wrench (5.5 mm)



- 1 x Spindle service set



2. Place the wrench on the spindle.
3. Loosen the collet chuck with the wrench. Unscrew the collet chuck by hand or with the wrench.  
If the collet chuck cannot be released because the collet chuck is spinning, follow the troubleshooting guide below: [Error code -24 – Abgebrochenes Werkzeug in der Spannzange](#)

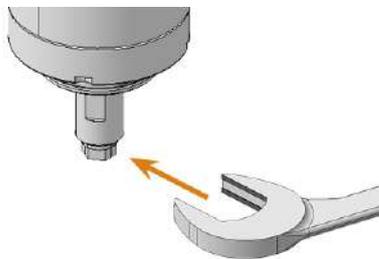


FIG. 199

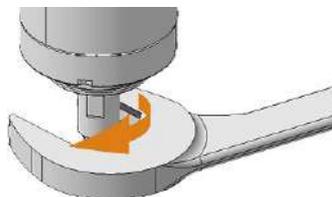


FIG. 200

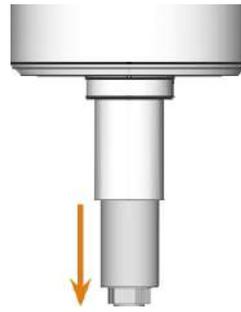


FIG. 201

4. Remove the cleaning brush from the spindle service set.
5. Insert the cleaning brush into the collet chuck and push the broken off part of the tool out of the collet chuck.



FIG. 202



FIG. 203

6. Clean and grease the collet chuck and reinstall it: [Cleaning the collet chuck – on page 54](#)

## 10 DISPOSAL

### 10.1 Disposing of the cooling liquid and machining residues

#### 10.1.1 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.

#### 10.1.2 Disposing of the cooling liquid

- » If you dispose of the cooling liquid yourself, do as follows:
  - » Completely filter the machining residues out of the used cooling liquid.
  - » Dispose of the liquid via the sewers.

#### 10.1.3 Solid machining residues

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

### 10.2 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.

### 10.3 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

<b>Machine:</b>	<b>CNC milling machine</b>
<b>Type:</b>	<b>E4</b>
<b>Serial No.:</b>	<b>E4ID300000000 – E4ID399999999</b>

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, 2023/02/06



(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

<b>Machine:</b>	<b>CNC milling machine</b>
<b>Type:</b>	<b>E4</b>
<b>Serial No.:</b>	<b>E4ID300000000 – E4ID399999999</b>

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

Ammerbuch, 2023/02/06



(Frank Benzinger, CEO)

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■ Germany

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