ORIGINAL OPERATING INSTRUCTIONS

E5

dentalportal.info

vhf
CREATING PERFECTION

Contents

1 Welcome

Thank you for purchasing this E5dental 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/E5

1.1 Target group

- 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

- 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

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

WARNING

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

CAUTION

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

NOTICE

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

1.4 Copyright

2 General safety instructions

2.1 Intended use

The machine and the manufacturing software are designed for the commercial processing of dental-technical objects. The finished objects require further processing before they can be used on the patient.

The machine is designed for dry machining.

» The machine is validated for use with DentalCAM & DentalCNC applications as manufacturing software.

vhf allows the use of a third-party software instead of DentalCAM. If you use third-party CAM software, the manufacturer of this software is solely responsible for the safe and proper calculation of the machining commands.

Do not use any other solution instead of DentalCNC .

» Under certain circumstances, the use of this machine may be subject to legal requirements. Observe the applicable local and national regulations, as well as the requirements of other appropriate authorized organizations or agencies (e. g., professional associations, health authorities). Obtain authorization from the appropriate organization (e.g., professional associations, health authorities) as needed. For all materials machined with this machine, observe the material's instructions for use with respect to the intended use and all related software and machining procedure requirements.

» Do not manufacture implants or parts of objects that will later touch implants. In the case of two-part abutments, this includes the part which has the connection geometry to the implant. Do not manipulate the connection geometry of prefabricated abutments and always check finished objects for correct connection geometries (i.e. connection geometries of finished jobs were not damaged).

2.2 Certification

The CNC milling machine E5 bears the CE mark in accordance with the provisions of the following directives:

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

The CNC milling machine E5 bears the UKCA mark in accordance with the provisions of the following directives:

Supply of Machinery (Safety) Regulations 2008

Electromagnetic Compatibility Regulations 2016

The complete declarations of conformity are enclosed with your machine.

2.3 Approved materials

» Use only the following materials, regardless of the display in the manufacturing software:

Composites
Sintered cobalt chrome
Wax and plastics (PMMA)
Zirconia

2.4 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 person trained in dentistry
Using the machine / DentalCNC for cleaning and maintenance	Instructed persons
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 48*

2.5 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.

» Make sure that every user has access to this document.

» Instruct every user on safe and proper machine handling.

2.6 Personal injury

2.6.1 Electric shock

Electric shock by touching live parts

» Do not remove the housing of the machine.

» Only have qualified electricians work on any electrical equipment.

» Ensure that an operational residual current device is installed on the electrical circuit of the machine.

» Run electrical cables so that they cannot be damaged by sharp edges.

» Check the power cable for damage before every startup.

» In the following cases, disconnect the machine immediately from the electrical source and secure it against restarting:

- When machine connections or electrical cables are damaged
- Before you check or run 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.

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.

2.6.2 Fire hazard

Unattended operation

» Do not operate the machine unattended unless:

- The working chamber of the machine is completely cleaned.
- Unauthorized persons have no access to the machine.
- The room in which the machine is located has an automatic fire detection system.

2.6.3 Housing

Danger of becoming trapped due to moving housing parts

- Working chamber door
- Upper and lower service cover

» If you move these housing parts, use only the designated grip points.

» Make sure that your hands do not become trapped during movement.

2.6.4 Working chamber

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

» Only operate the machine with the working chamber door fully closed and intact.

» Do not bypass or deactivate the safety devices of the machine.

» Check the machine regularly for damage, especially the safety devices.

Danger of cutting and burning

» Always wear gloves when performing manual work on the machine or with blanks / tools.

» Only touch tools on the shaft.

» Do not touch the spindle body after machining.

2.6.5 Air extraction system

Respiratory disease when machining harmful materials

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

» Use a suction unit with fine class M dust filter.

» Avoid materials that are hazardous to your health.

2.6.6 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.

2.6.7 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.

» Do not troubleshoot while the machine is running.

2.6.8 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.

2.7 Material damage

2.7.1 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.

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 force to the spindle in any way.

2.7.2 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 programs.

2.7.3 Power

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

» Connect the machine to a separately protected circuit or ensure that no devices are connected that cause severe mains voltage fluctuations when powered on.

» If strong voltage fluctuations cannot be avoided, install a surge protector to safeguard the machine against strong voltage fluctuations.

2.7.4 Air extraction system

Machine damage during dry machining without an air extraction system

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

2.7.5 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.

» Make sure your network is working without disruptions. Wireless 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.

2.7.6 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 become 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.

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 Handles on the underside of the machine

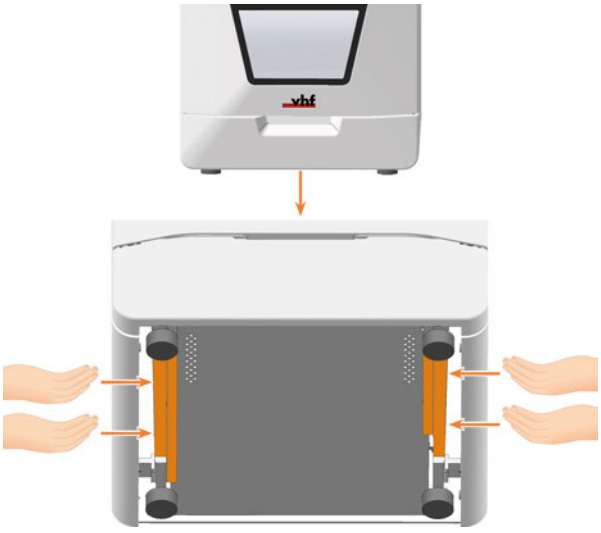


FIG. 1

3.2 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.

3.3 Storing the machine

1. Clean the machine.
2. Switch off the machine at the main power switch.
3. Disassemble the machine components by following the installation instructions in reverse order.

3.4 Putting the machine back into operation after storage

» Follow the instructions for initial start-up.

Commissioning – on page 28

3.5 Packing the machine

3.5.1 Preparing transport

1. Clean the machine. *Cleaning the machine* – on page 52
2. In case of overseas transport, take proper measures against corrosion.

3.5.2 Packing the machine

1. Have ready:
   - 1 x Transport box

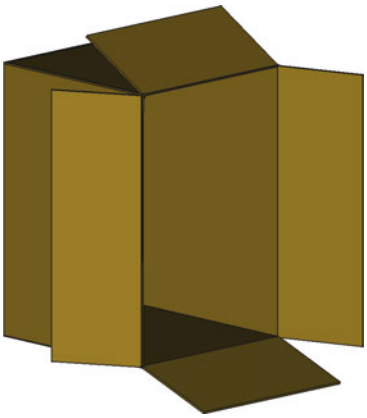


FIG. 2

   - 1 x Inserter

FIG. 3

- 1 x Top cushion

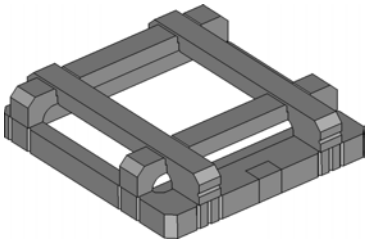


FIG. 4

- 1 x Bottom cushion

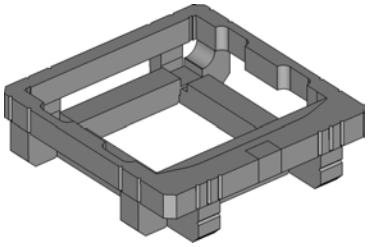


FIG. 5

- 1 x Piece of cardboard

FIG. 6

- 1 x Left transport lock

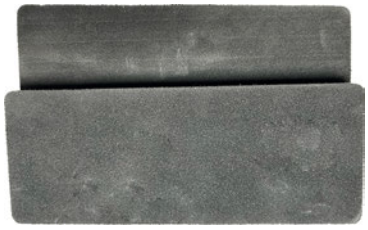


FIG. 7

- 1 x Right transport lock

FIG. 8

- 1 x Accessory box 1

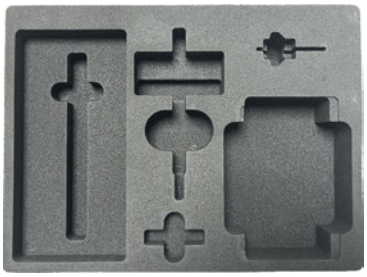


FIG. 9

- 1 x Accessory box 2

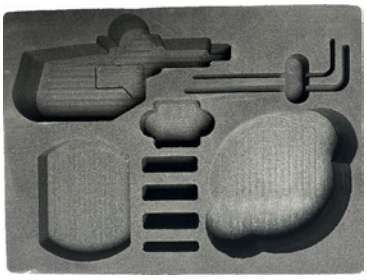


FIG. 10

- 1 x Accessory cover

FIG. 11

- 1 x Transport protection cover

FIG. 12

- 1 x Housing protection cover

FIG. 13

- 3 x Working chamber door stopper

FIG. 14

- 1 x Pallet (optional)

FIG. 15

- 2 x Strapping band incl. buckles, for pallet shipping

FIG. 16

- 4 x Edge protector corners, for pallet shipping

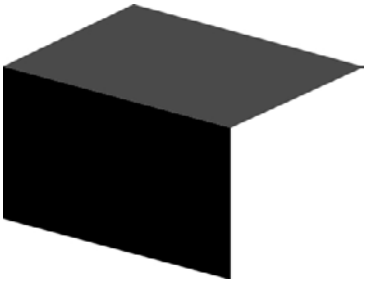


FIG. 17

- 1 x Spindle lock

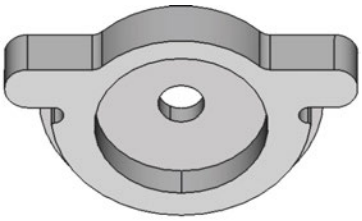


FIG. 18

- 1 x Scissors

FIG. 19

- 1 x Adhesive tape

FIG. 20

2. 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.
3. ⚠ **CAUTION!** Wear gloves.
4. Open the working chamber door.
5. Remove the blank from the blank holder if present.

FIG. 21

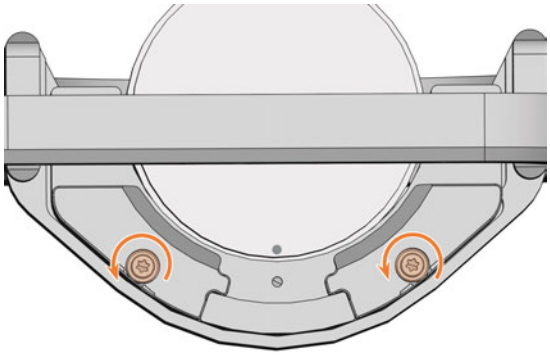


FIG. 22

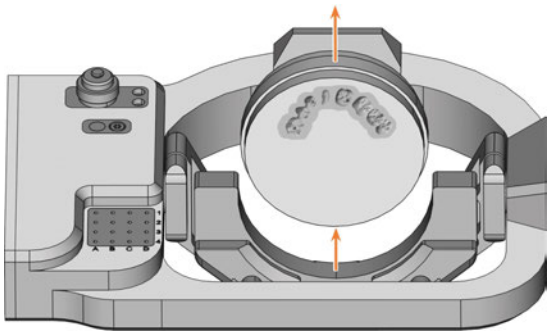


FIG. 23

6. Attach the spindle lock:
   a. Loosen the 2 fixing screws on the blank holder without unscrewing them.
   b. Insert the spindle lock into the blank holder from above.
   c. Tighten the fixing screws with the supplied torque screwdriver (1.5 Nm).
7. Close the working chamber door.

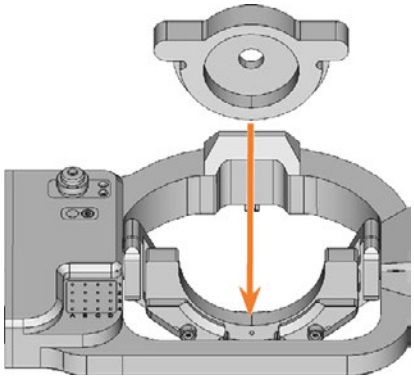


FIG. 24

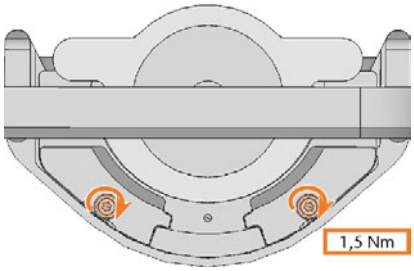


FIG. 25

FIG. 26

8. Start DentalCNC.
9. Move the spindle to the transport position.
   Spindel in Transportstellung bringen
10. Close DentalCNC.

FIG. 27

11. Open the working chamber door.
12. ⚠ **DANGER!** Switch off the machine at the main power switch.
13. Disconnect the machine from all lines.
14. Slide 3 working chamber door stoppers onto the edges of the working chamber door.

FIG. 28

FIG. 29

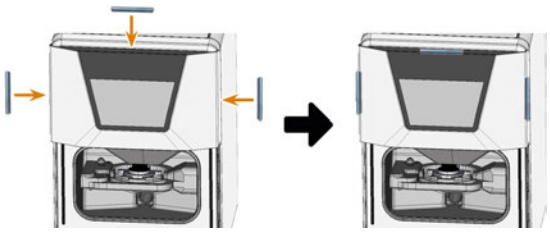


FIG. 30

15. If Customer Service has asked you to send in accessories, stow the items in the accessory boxes.

NOTICE! **Damage to the A-B axis module as well as the spindle due to rotation of the A-B axis module**

16. Push the 5 parts of the transport lock into the working chamber *without* turning the A-B axis module.
    a. Clamp the left transport lock on the left working chamber wall under the A-B axis module.
    b. Clamp the right transport lock on the right working chamber wall under the A-B axis module.
    c. Clamp the middle parts under the A-B axis module:
        - Accessory box 1 (bottom)
        - Accessory box 2 (center)
        - Accessory cover (top)

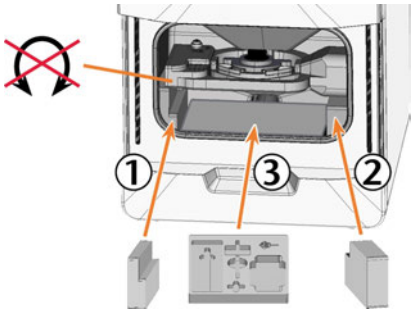


FIG. 31

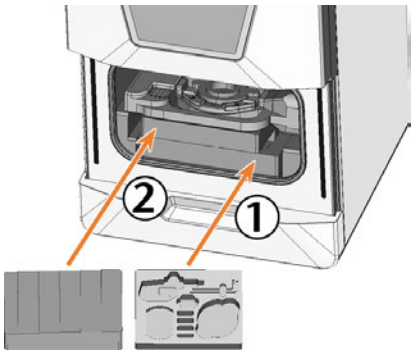


FIG. 32

17. Pull the working chamber door down.

✔ The working chamber door stoppers prevent the working chamber door from closing completely.

18. Place the protective housing cover over the machine from above.
19. Place the transport box on a surface that can support the machine weight including the packing set.

- Open the box at the front with the label **Open here**.
- Recommendation: The back of the box should touch a solid wall. Otherwise, you will need a 2nd person for inserting the machine.

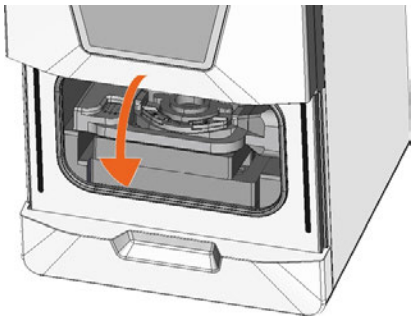


Fig. 33

Fig. 34

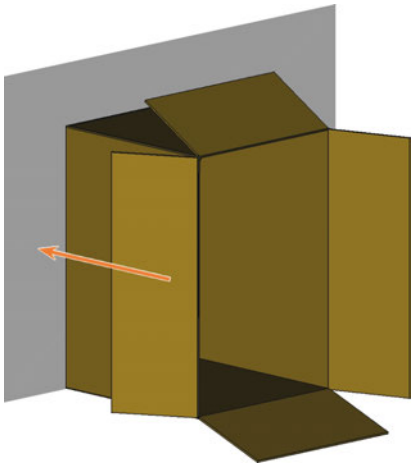


Fig. 35

20. Place the inserter in front of the transport carton such that the handle (marked in green) is on the opposite side of the carton opening.
21. Spread out the blue transport protection cover evenly on the inserter with the opening facing upwards.
22. Place the bottom cushion centrally in the transport protection hood.
23. Press down the transport protection hood on all sides such that the surface of the bottom cushion is exposed.
24. Place the piece of cardboard in the center of the bottom cushion.

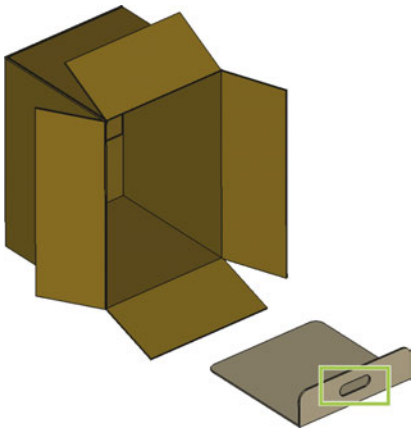


Fig. 36

Fig. 37

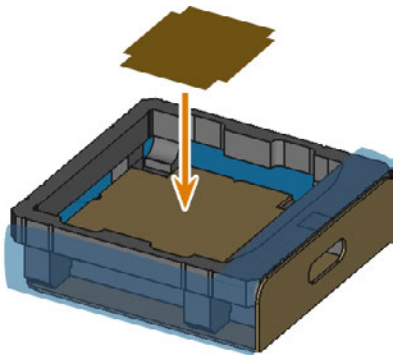


Fig. 38

25. Grasp the machine with 2 persons by the left and right handles on the underside of the machine.
26. Lift the machine into the bottom cushion:
    - The back of the machine points towards the carton opening.
    - The left and right grip recesses in the bottom cushion provide room for your hands.
27. Place the top cushion on the machine top.
28. Pull the transport protection hood over the machine on all sides until the ends meet in front of the working chamber door.

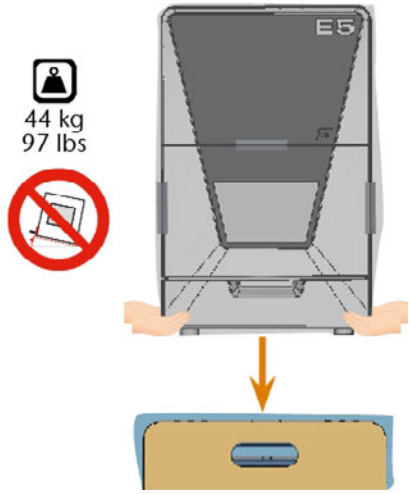


FIG. 39

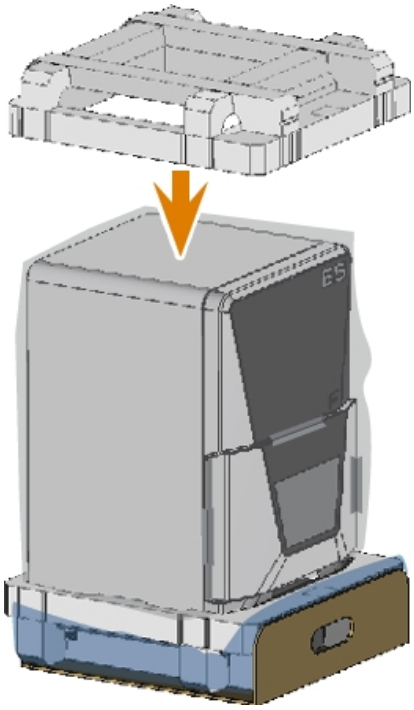


FIG. 40

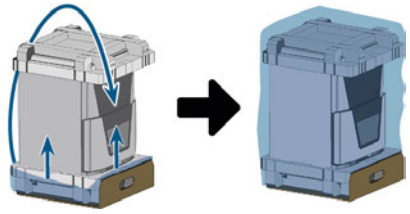


FIG. 41

29. Tape the ends of the transport protection hood together with adhesive tape.
30. If the back of the shipping carton is not in contact with a solid wall, have a 2nd person hold the carton in place.
31. Slowly slide the machine including the inserter into the transport box.

    The machine must not slip off the inserter.
32. Close the transport box.
33. Tape the closing flaps together with adhesive tape.

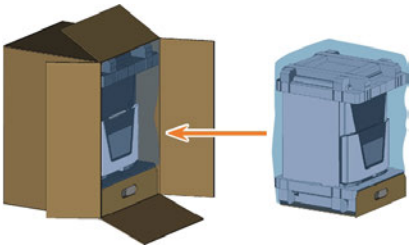


FIG. 42

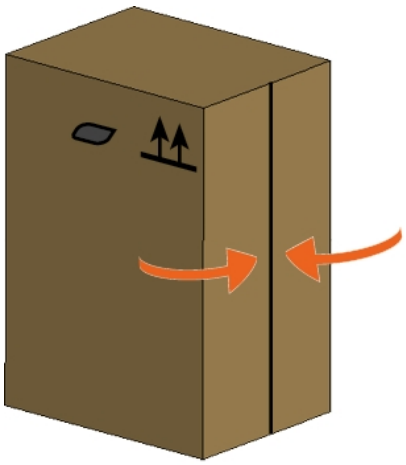


FIG. 43

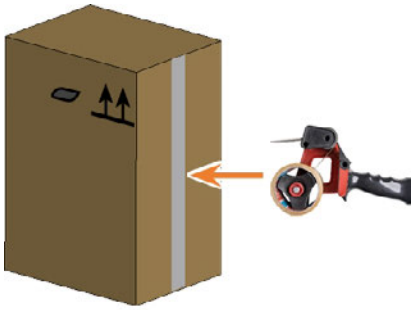


FIG. 44

34. To carry the transport box, grasp the box by the recessed grips with 2 persons.
35. To ship the machine with a shipping company, lift the shipping carton onto a pallet.

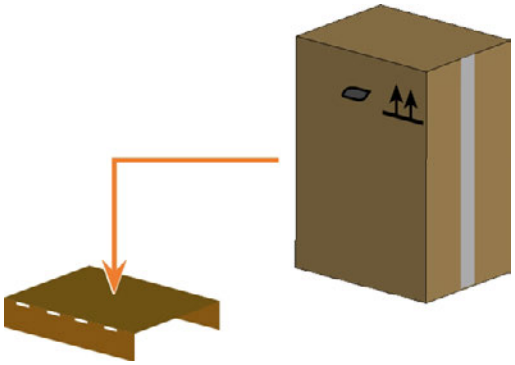


FIG. 45

36. Attach the transport box to the pallet:
    a. Attach 2 edge protection corners each to the left and right of the recessed grips.

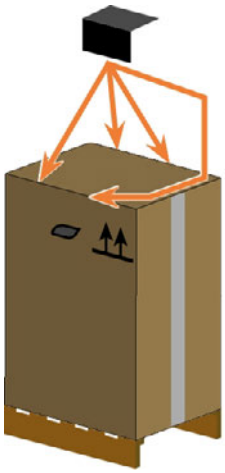


FIG. 46

    b. Strap the pallet and the transport box with the 1st strap.
        - Guide the strap over 2 opposite edge protection corners.
        - The ends of the strap must meet on the top of the carton.
    c. Create a loop with each end of the strap and guide each one through the buckle.
    d. Flip the two pins on the buckle over toward the buckle opening.
    e. Fix 1 loop to 1 pin at a time and tighten the loops.
    f. Pull both ends of the strap at the same time so that the strap is tight against the shipping carton.
    g. Shorten the protruding ends of the strap with scissors.
    h. Guide the 2nd strap over the 2 edge protectors corners and repeat the previous steps.

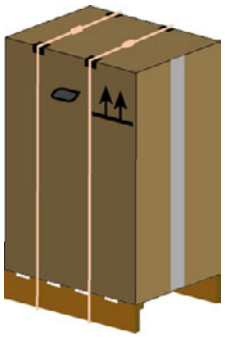


FIG. 47 2 STRAPS FASTEN THE TRANSPORT BOX TO THE PALLET

✔ The straps secure the transport box against slipping.

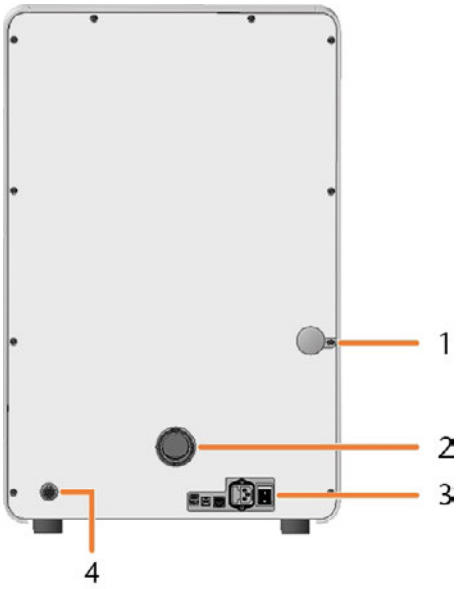
37. If you do not use the supplied straps, protect the shipping carton against slipping in some other way.

4 Get to know your machine

4.1 Front side of the machine

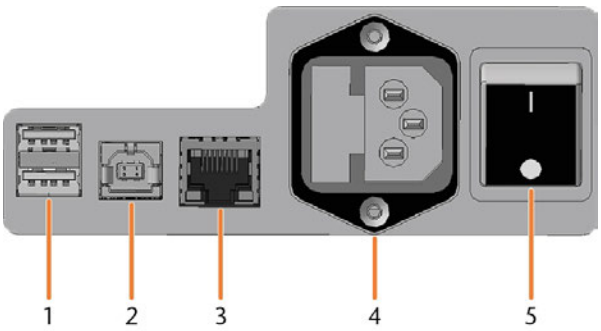
1. *Upper service cover for access to the machine interior*
2. *Start button*
   Start button (page 18)
3. *Working chamber door*
   Working chamber door (page 18)
4. *View window to the working chamber*
   Cleaning the machine (page 52)
5. *Recessed grip for opening the working chamber door*
6. *Lower service cover for access to the system module slot*
   Exchanging the system module (page 82)

4.2 Rear side of the machine



1. *Emergency opening mechanism for the working chamber door*
   Emergency opening of the working chamber door (page 110)
2. *Hose connection for the air extraction system*
   Installing the air extraction system (page 25)
3. *Connection panel*
   Connection panel (page 18)
4. *Air extraction interface (6 pins, IEC 61076-2-106)*
   Installing the air extraction system (page 25)

4.3 Connection panel



1. *2 x USB port 2.0 type A (for future extensions)*
2. *1 x USB port 2.0 type B (for future extensions)*
3. *Network port (Ethernet RJ-45)*
   Connecting the CAM computer (page 24)
4. *Power connection including glass fuse T6,3A L250V*
   Establishing the electric connection (page 27)
   Exchanging the main fuse (page 105)
5. *Main power switch*
   Commissioning (page 28)

4.4 Start button

FIG. 48

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

» To press the Start button, place a finger on it.

Starting jobs (page 45)
Interrupt and continue machining (page 45)

4.5 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.

FIG. 49

4.6 Working chamber

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

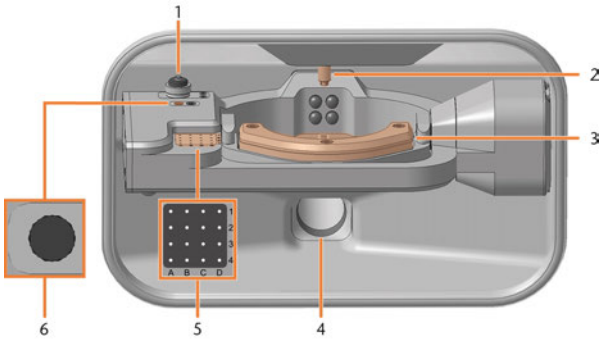


FIG. 50

1. *Measuring key*
   Cleaning the machine (page 52)
2. *Spindle with collet chuck for picking up tools*
   Inserting and exchanging tools (page 41)
3. *Blank holder*
   Mounting and removing blanks (page 34)
4. *Suction opening for the air extraction system*
   Installing the air extraction system (page 25)
5. *Tool magazine*
   Inserting and exchanging tools (page 41)
6. *Insert for the AirTool*
   Inserting and exchanging tools (page 41)

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 occured.	locked

4.7 Axes / A-B axis module

This machine has 5 axes: 3 linear axes and 2 rotational axes.

4.7.1 Linear axes

The spindle moves along these axes.

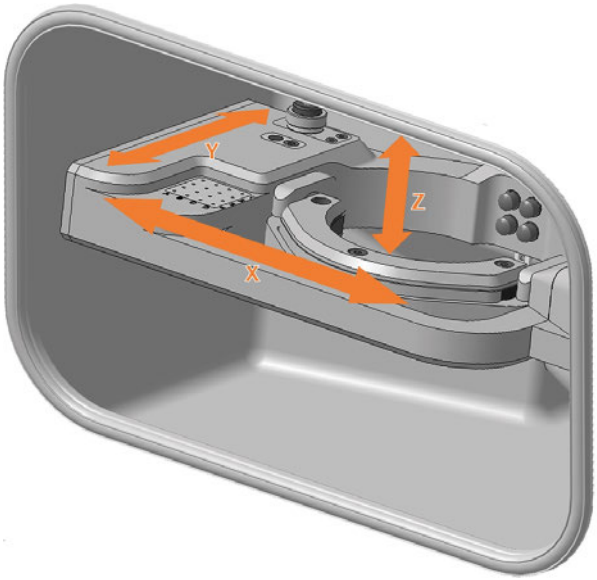


FIG. 51

4.7.2 Rotary axes

The blank holder rotates about these axes.

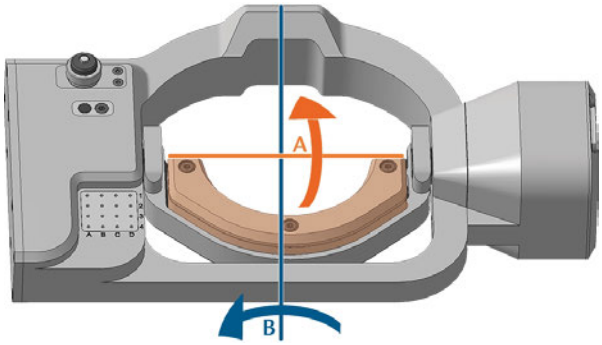


FIG. 52 A-B AXIS MODULE IDENTIFYING BOTH THE A AND B AXIS

4.8 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:

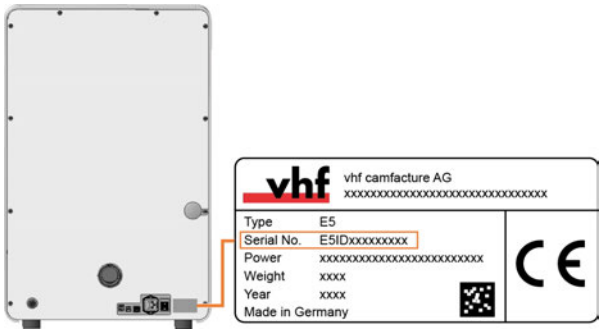


FIG. 53 SERIAL NUMBER ON THE IDENTIFICATION PLATE (MARKED ORANGE)

4.9 Technical data

Dimensions (W/D/H)

	Unit	Value
Footprint (approx.)	mm in	387 x 370 15.2 x 14.6
Housing fully closed (approx.)	mm in	472 x 484 x 734 18.6 x 19.1 x 28.9
Minimum required space for operation (approx.)	mm in	680 x 760 x 780 26.8 x 25.2 x 30.7

Base system

	Unit	Value
Weight (approx.)	kg lbs	43 95
Axes – Rotational axis A		5 360° / ± 35°
Overvoltage category (IEC 60664-1)		II

External air extraction system

	Unit	Value
Minimum extraction capacity	l/min cfm	2,500 (at 220 hPa) 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 humidity		80 %, non-condensing
Ambient temperature for storage/transport	°C °F	-20 – 60 -4 – 140
Ambient temperature for operation	°C °F	10 – 35 50 – 95
Location type		Indoor
Maximum height above mean sea level	m ft	2000 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_{max})	W	800
Collet chuck diameter	mm	3

Tools

	Unit	Value
Maximum number of tools in magazine		17
Maximum tool length	mm	40

Standard blank holder

	Unit	Value
Min. / max. disc diameter	mm	98.5 / 98.8
Maximum disc height	mm	40
Min. / max. height of the disc rim	mm	9.8 / 10.5
Maximum block dimensions (L/D/H)	mm	40 x 20 x 20 (requires block holder)

Sound emission

Operating condition	Unit	Value
Machining	dB(A)	82.98
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, accuracy grade 3

Connections

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

Pin assignment of the suction unit data port

FIG. 54

1. *+ 24 V, switched, output 1*
2. *+ 24 V, switched, output 2 (not used)*
3. *+24 V, continuous*
4. *Rear signal input, output 2 (not used)*
5. *Rear signal input, output 1 (not used)*
6. *Ground (PE)*

5 Installation

The installation steps to operation are:

1. Checking the scope of delivery (page 23)
2. Connecting the machine (page 24)
3. Commissioning (page 28)
4. Operating the machine (page 32)

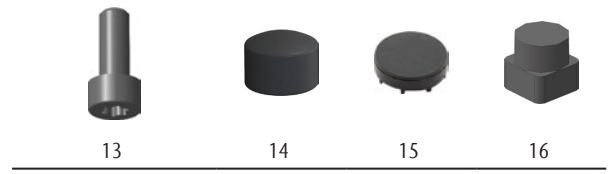
5.1 Checking the scope of delivery

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

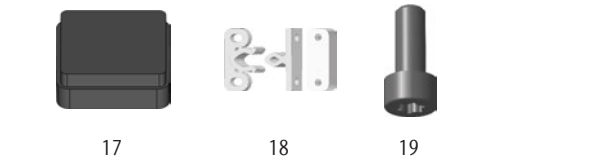
1 2 3 4

5 6 7 8

9 10 11 12



13 14 15 16



17 18 19

1. *1 x Machine E5*
2. *1 x Ethernet network cable*
3. *1 x Power cable*
4. *1 x Torque screwdriver 1.5 Nm with bit TX20*
5. *2 x Angle screwdriver*
   - *1 x TX10 (orange)*
   - *1 x TX25 (blue)*
6. *1 x 5.5 mm wrench to remove a broken tool*
7. *1 x Administrated Tool Board for tool storage*
8. *1 x Spindle service set*
9. *1 x Calibration set:*
   - *1 x Micrometer*
   - *3 x Calibration blank*
   - *1 x AirTool P250-F1-40-T*
10. *1 x Cleaning brush for the blank holder*
11. *1 x Microfiber cloth*
12. *1 x Drill bit for tool positions (2.8 mm)*
13. *2 x Spare screw for the blank holder*
14. *4 x Cover cap for fixing screws of the A-B axis module*
15. *6 x Caps for blank holder*
16. *1 x Insert for the AirTool*
17. *1 x Tool magazine insert*
18. *Fasteners for the top and bottom service covers*
    - *4 x Fixing latch plug*
    - *4 x Fixing latch socket*
    - *4 x Clamping block*

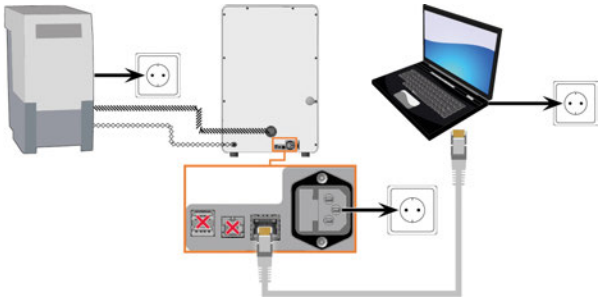
Not depicted:

- 1 x Supplement for unpacking and installing the machine
- Transport lock
  - 3 x Foam insert
  - 2 x Accessory box
  - 1 x Spindle lock
- Packing set
  - 1 x Transport carton including floor insert
  - 1 x Upper and lower padding
  - 3 x Working chamber door stopper
  - 1 x Transport protection cover
  - 1 x Housing protection cover
  - 2 x Straps incl. buckles
  - 4 x Edge protector corners

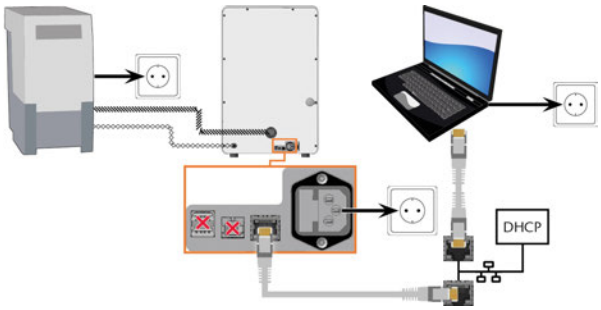
5.2 Connecting the machine

5.2.1 Machine installation scheme

Directly connecting the machine to the CAM computer



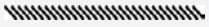
Connecting the machine to the CAM computer via a local network



Suction unit

CAM computer

Power connection



Suction hose

Data cable of supported suction units (optional)

Ethernet network cable

5.2.2 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 28

Minimum Ethernet cable requirements

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

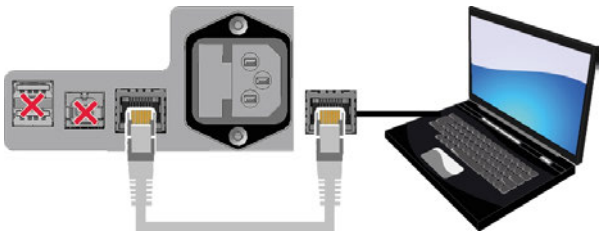


FIG. 55 DIRECT CONNECTION DIAGRAM

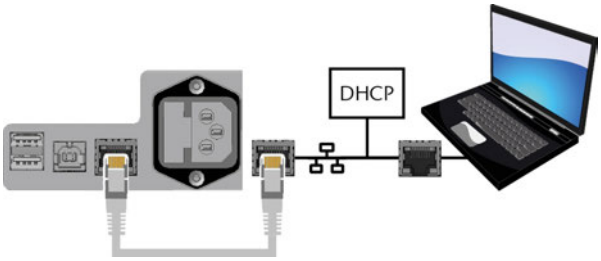


Fig. 56 Connection via a network diagram

5.2.3 Installing the air extraction system

» ⚠ **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 *not* used
Data cable of supported suction units	Manufacturer of the suction unit	No	Supported suction unit; switching unit *not* 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.

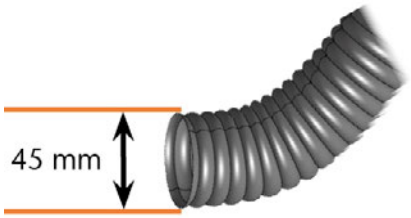


Fig. 57

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. 58 Example: Suction hose with hose adapter

or

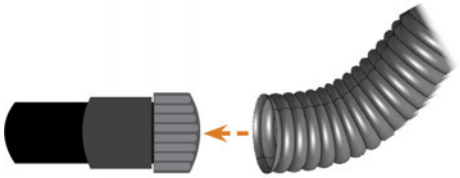


Fig. 59 Hose connection

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

Fig. 60

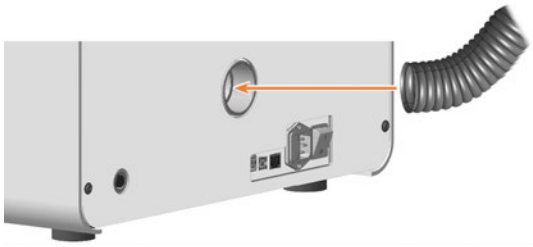


Fig. 61

or

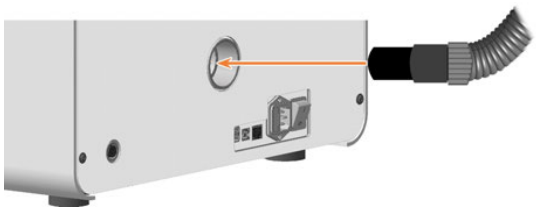


FIG. 62

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

   – Install the switching unit (extra equipment). The switching unit is not available worldwide.

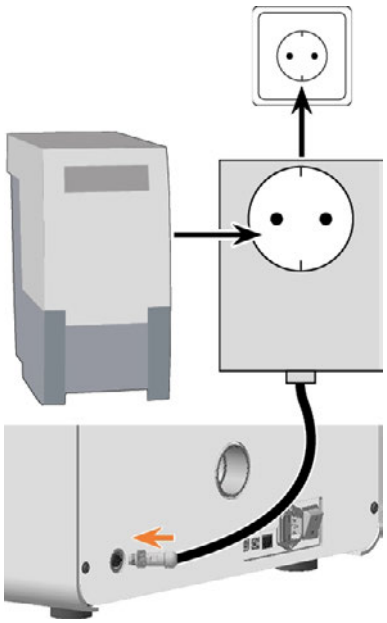
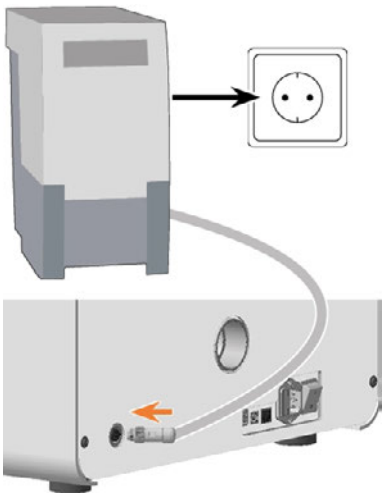


FIG. 63

or

   – Connect a data cable provided by the suction unit manufacturer to the machine's air extraction interface.



6. 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:

1. Obtain the hose connection from customer service.
2. Turn the thread of the hose connection counterclockwise until the connection is completely open.

   If the thread gets detached from the hose connection, place it onto the connection and turn it clockwise once to screw it to the connector.
3. Insert the suction hose of the suction device completely into the hose connection on the side of the thread.

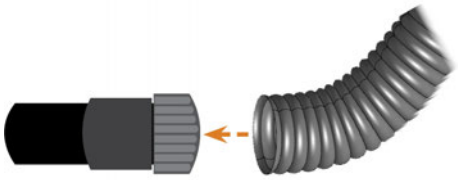


FIG. 64 INSERTING THE SUCTION HOSE INTO THE HOSE CONNECTION

4. Turn the thread of the hose connection clockwise as far as you can.

✔ The suction hose is firmly attached to the hose connection.

5. Insert the hose connector into the opening for the suction system on the machine. Ensure it is firmly connected.

✔ The installation of the suction hose with the optional hose connection is complete.

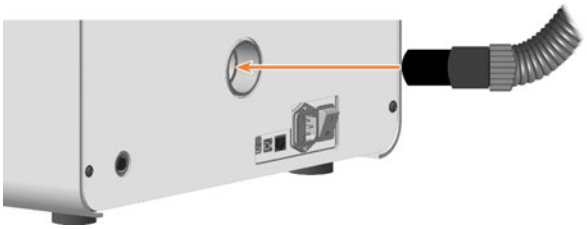


Fig. 65 Inserting the hose connection into the opening for the air extraction system

5.2.4 Establishing the electric connection

The machine requires an uninterruptible power supply for proper operation.

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

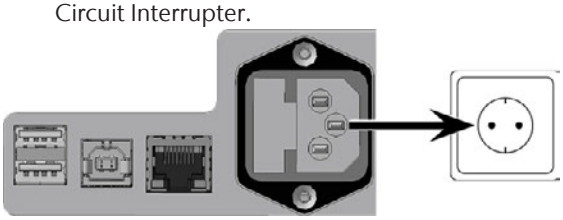


Fig. 66

5.3 Commissioning

5.3.1 Starting the machine

NOTICE **Short-circuit hazard when the machine is too cold**

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

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

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

1. Close the working chamber door.
2. Switch on the machine at the main power switch.

   The working chamber lighting is on. The machine does not reference.

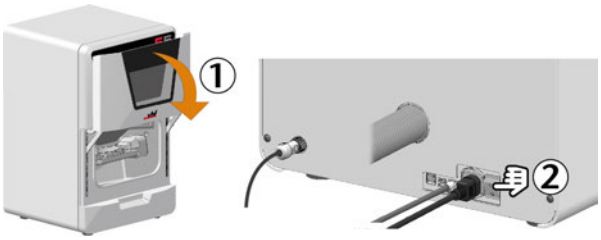


FIG. 67

5.3.2 Setting up a software connection to the machine

CNC interface installation and set up

1. Start the CAM computer.
2. Install the newest version of DentalCAM & DentalCNC that is released for the machine.
   - Select **New** as the installation type.
   - Select the correct machine model.

✔ The following happens:

   a. During the installation, CNC interface will be installed. CNC interface establishes the connection between the machine and DentalCNC.

   b. The CNC interface icon is displayed in the task bar info area on the right side of your Windows task bar. CNC interface will start in the background every time Windows is started.

FIG. 68

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

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

FIG. 69

4. The CNC interface window displays.

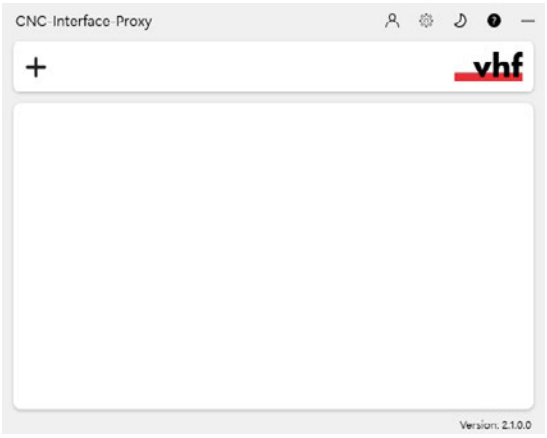


FIG. 70

5. If you want to change the language, do the following:

   a. Select the following icon on the right side of the window's title bar:

   b. Select the desired entry from the topmost drop-down list.

   c. Save your entry with the following icon:

6. Create a new connection using the following icon: +

✔ The connection configuration view appears.

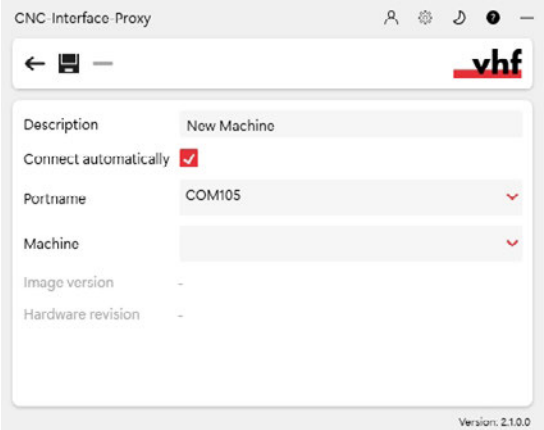


FIG. 71

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

   Example: **COM105**
10. Select the machine to be connected from the **Machine** drop-down list.

    The entries are structured as follows:

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

    Example: FOX-I E5ID300000000 (10.0.21.33)
    - E5 is the machine model
    - 300000000 is the serial number
    - 10.0.21.33 is the IP address

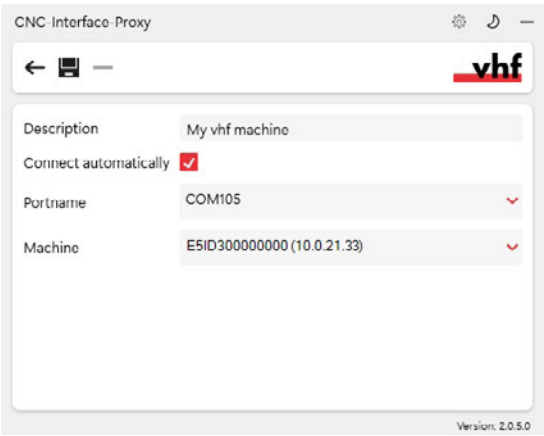


FIG. 72 A FULLY CONFIGURED CONNECTION WITH A UNIQUE DESCRIPTION (SERIAL NUMBER BY WAY OF EXAMPLE)

11. If the machine is not displayed, check the following:
    - Is the machine on?
    - If you are using a wired connection: Have you connected all Ethernet cables to the machine and the CAM computer?
    - If you are using a WiFi connection: Is the signal sufficient? Recommendation: Try changing to a wired connection.
    - Is a firewall blocking the connection between the machine and the CAM computer?
12. Save your entry with the following icon: 💾

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

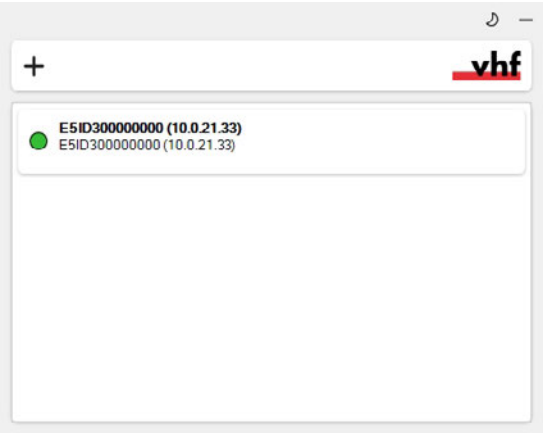


FIG. 73 A SUCCESSFUL CONNECTION

If the connection is lost, the display changes to red. CNC interface tries to reconnect regularly.

A connection interruption can have the following causes:

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

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

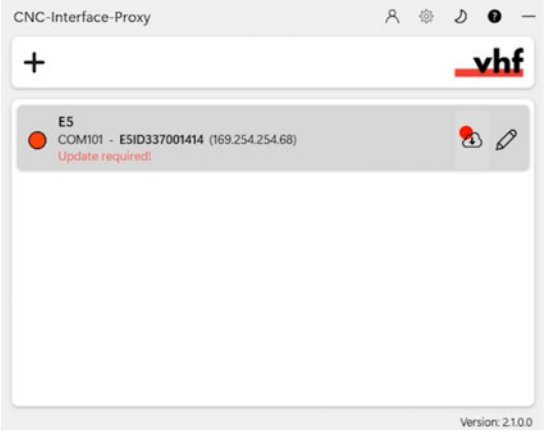


FIG. 74

✔ CNC interface updates your machine.

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

FIG. 75

✔ If DentalCNC is able to determine the port number, the number displays in the **Port number** input field. The machine references.

19. If the working chamber door was open during the previous step, close it. If the machine does not reference as a result, quit DentalCNC and restart the application.

Checking the connection and changing the connection settings

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

FIG. 76 EXAMPLE: RED DOT ON UNSUCCESSFUL CONNECTION

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

5.3.3 Removing the spindle lock

The spindle lock (marked orange) is located in the blank holder.

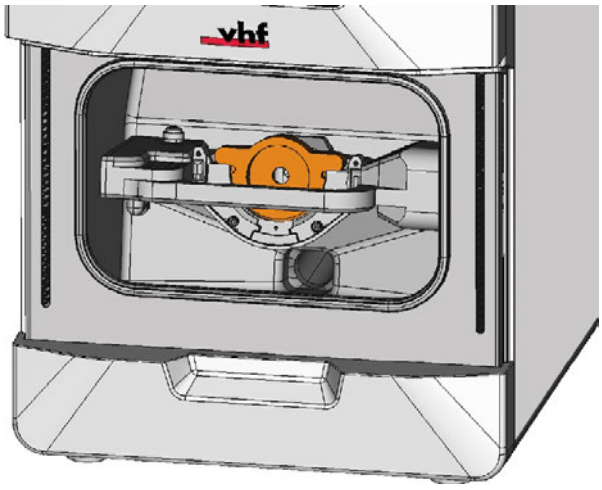


FIG. 77

1. ⚠ **CAUTION!** Wear gloves.
2. Open the working chamber door.
3. Loosen the 2 fixing screws on the blank holder without unscrewing them.
4. Remove the spindle lock from the blank holder.

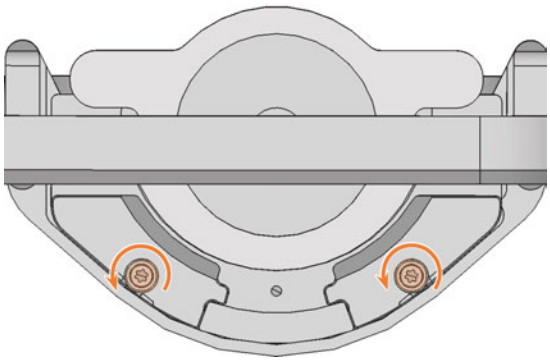


FIG. 78

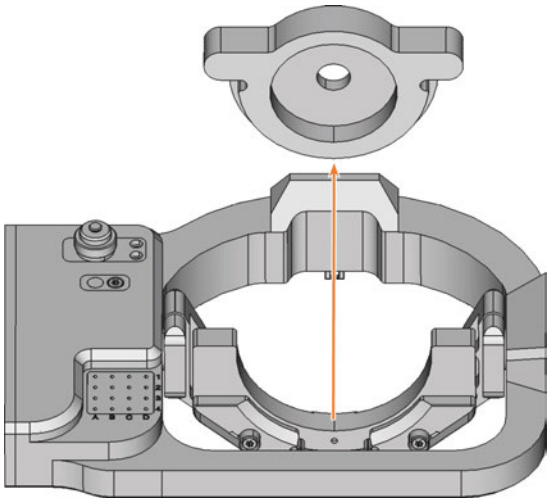


FIG. 79

5.3.4 Warming the spindle

» Use the warm-up process in DentalCNC.

6 Operating the machine

The workflow for restoration is as follows:

1. Starting the machine (page 33)
2. Mounting and removing blanks (page 34)
3. Inserting and exchanging tools (page 41)
4. Starting, interrupting, canceling jobs (page 45)

6.1 Starting the machine

6.1.1 Starting the machine

1. Close the working chamber door.
2. Switch on the machine at the main power switch.
3. Start DentalCNC.

✔ The working chamber lighting is on. The machine references.

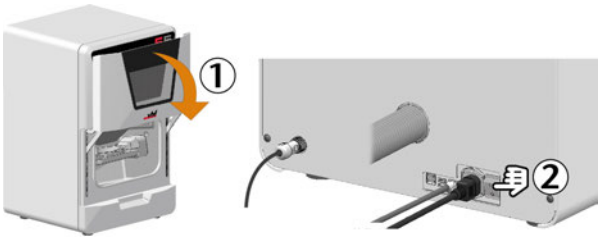


FIG. 80

6.1.2 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.

The following instructions require the tool in the collet chuck to be intact. If the tool is broken, remove it as described here: *Removing broken tools from the collet chuck* – on page 111

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. 81

5. Confirm the current message.

✔ The collet chuck opens.

6. Remove the tool from the collet chuck.

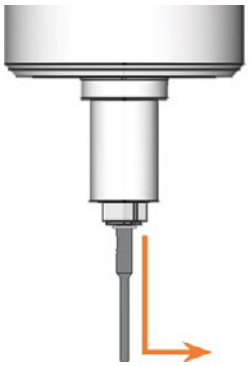


FIG. 82

7. Confirm the current message.

✔ The machine is ready for operation.

6.2 Mounting and removing blanks

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

If blanks move or vibrate during machining, the result may become unusable. Tightening screws too much can damage blanks.

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

6.2.1 Suitable blanks

The machine can process the following blanks:

- Discs with a diameter of 98.5 mm – 98.8 mm
- Blocks, max. size: 45 x 20 x 20 mm (L/D/H)*

*requires extra equipment

Extra equipment can be obtained from your customer service provider.

6.2.2 Overview of blank holders and standard clamping devices

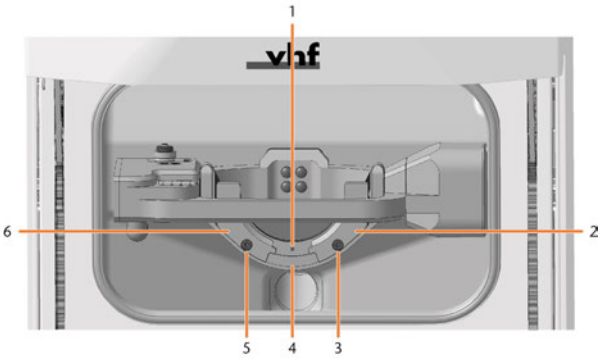


FIG. 83

1. *Marking for the safe remounting of discs*
2. *Right-hand clamping device*
3. *Fixing screw for right-hand clamping device*
4. *Blank holder*
5. *Fixing screw for left-hand clamping device*
6. *Left-hand clamping device*

6.2.3 How to mount the different blank types

Blank type	Holder required?	Mount like this
Standard Discs	No	Discs >> Blank holder
Blocks	Yes	Blocks >> Block holder >> Blank holder

6.3 Mounting discs in the working chamber

1. ⚠ **CAUTION!** Wear gloves.
2. Open the working chamber door.
3. Loosen the 2 fixing screws on the blank holder without unscrewing them.
4. Remove the blank from the blank holder if present.

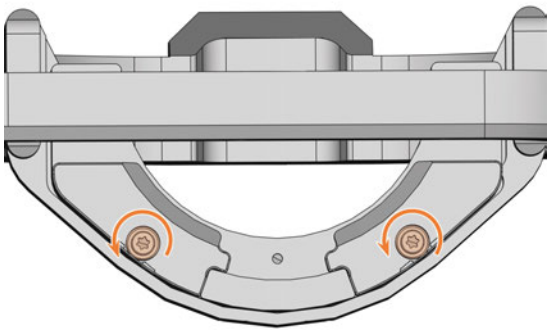


Fig. 84

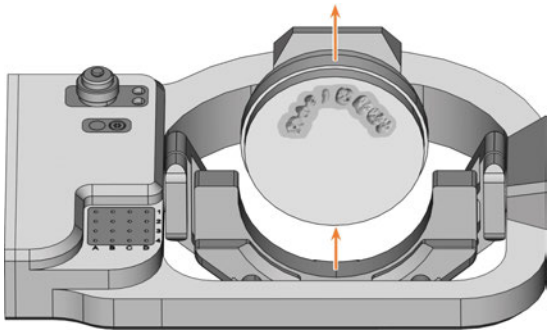


Fig. 85

5. Use the disc as follows:
   a. If the disc is multilayered, align the blank so that the top layer of color points to you.

Fig. 86 Multilayer blank

   b. If the disc was already machined, ensure that:
      - The original front faces towards the front.
      - If the disc has been marked for safer remounting via DentalCNC, ensure that the marking is in the position shown below.

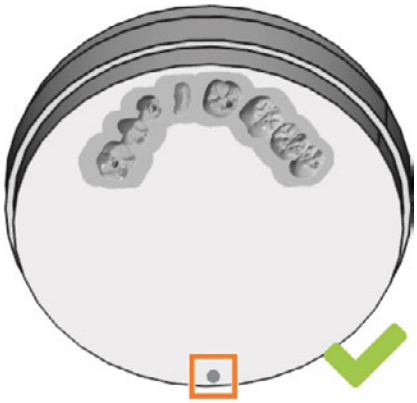


Fig. 87 Marking for safe remounting marked orange

   c. Insert the disc from above into the holder.

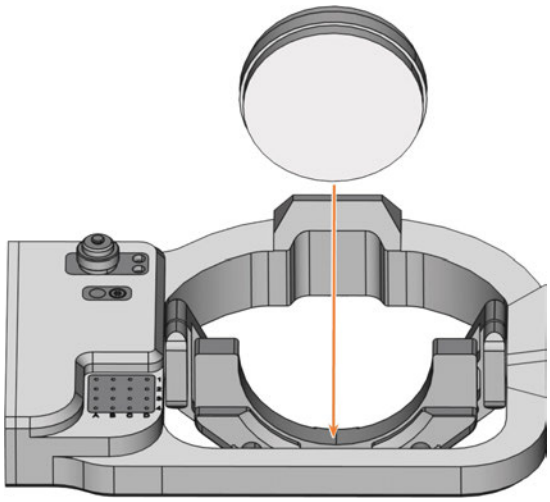


Fig. 88

6. Carefully rotate blanks that have already been machined so that the marking on the blank is exactly above the marking on the blank holder.

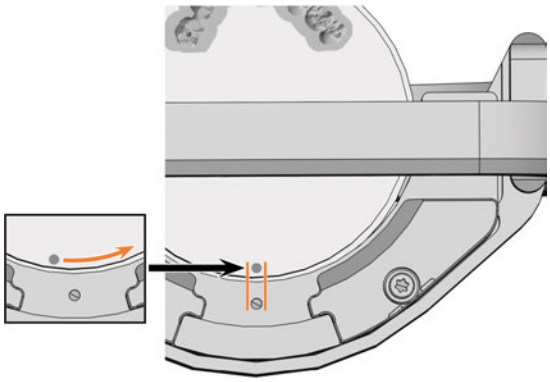


FIG. 89

***NOTICE!* Blank damage due to machining residue and incorrect fixing in place**

7. Remove machining residue from the back of the clamping elements with a brush. Do not use compressed air!
8. Tighten the fixing screws (marked orange) with the supplied torque screwdriver (1.5 Nm) as follows:
   a. Screw in the left screw *without* triggering the torque limitation.
   b. Screw in the right screw *without* triggering the torque limitation.
   c. Tighten the left screw.
   d. Tighten the right screw.

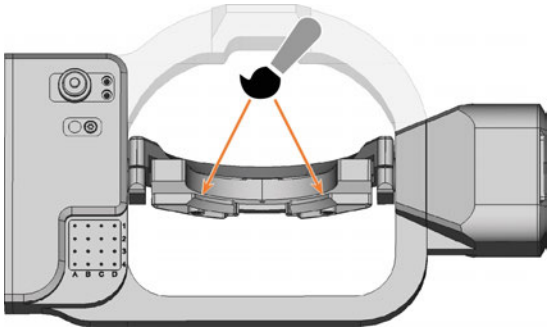


FIG. 90

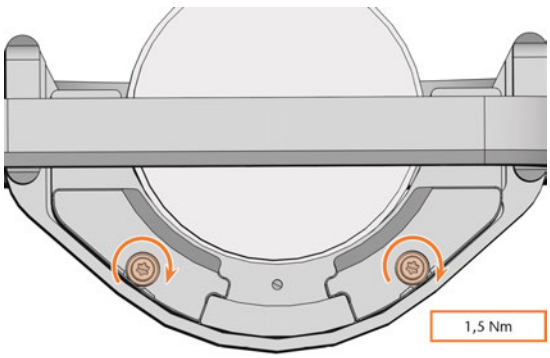


FIG. 91

6.3.1 Removing discs

1. ⚠ **CAUTION!** Wear gloves.
2. Open the working chamber door.
3. Loosen the 2 fixing screws without removing them.

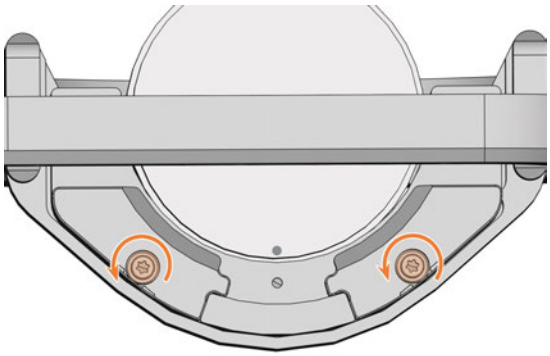


FIG. 92

4. Remove the disc from the blank holder.

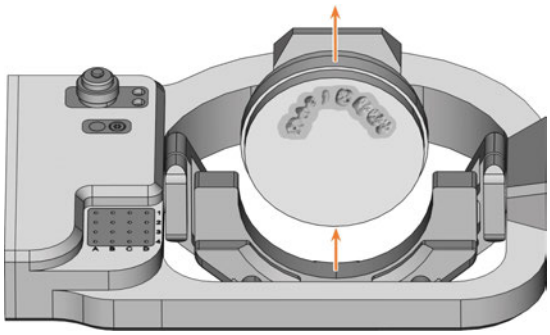


FIG. 93

6.4 Mounting blocks and block holders in the working chamber

6.4.1 Mounting blocks to the block holder

You can clamp up to 6blocks in the block holder.

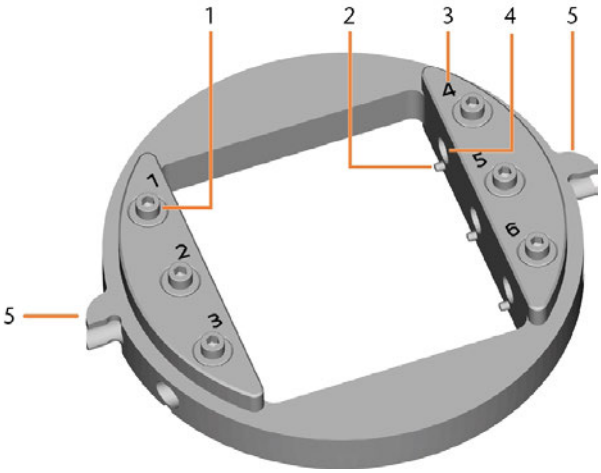


FIG. 94 THE E5 BLOCK HOLDER

1. *Fixing screws*
2. *Positioning pins*
3. *Item numbers*
4. *Holes for block shafts*
5. *Positioning aids of the block holder*

1. ⚠ **CAUTION!** Wear gloves.

   NOTICE! **Tool breakages and defective machining results due to incorrect block assignment**
2. The block type, the number of blocks and the block positions must correspond to the corresponding job in DentalCAM.
3. Loosen the fixing screw at the desired position with the torque screwdriver supplied.
4. If the block is multilayered, align the blank so that the top layer of color is on top.

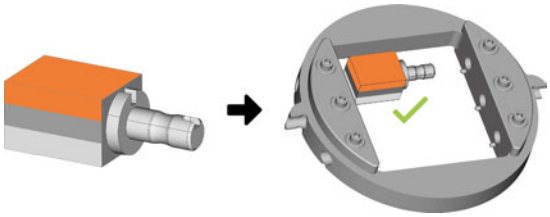


FIG. 95

5. Position the block so that the positioning pin at the block holder lies in the groove in the block shaft.
6. Insert the shaft of the block into the desired position in the block holder until it is firmly seated.
7. Use the torque screwdriver supplied to fix the block with the corresponding fixing screw. Tighten the screw firmly.

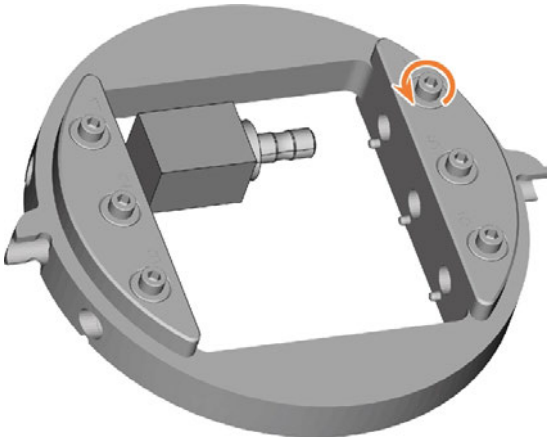


FIG. 96

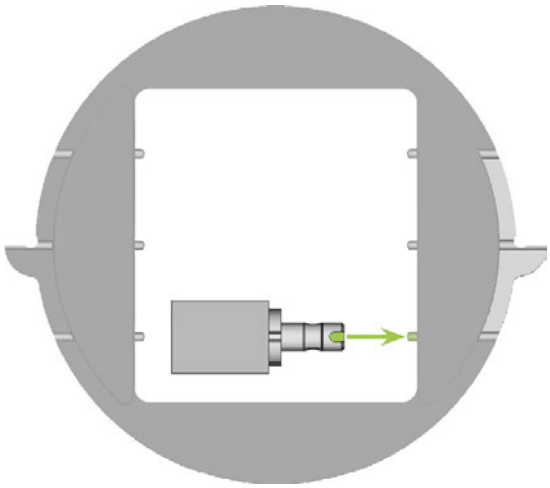


FIG. 97

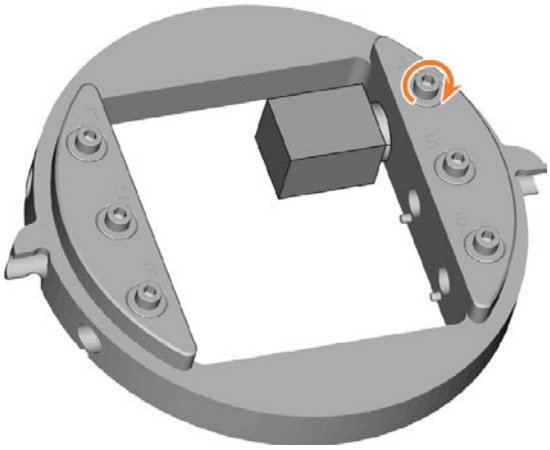


FIG. 98

✔ You can now mount the block holder.

6.4.2 Mounting the block holder in the working chamber

1. ⚠ **CAUTION!** Wear gloves.
2. Open the working chamber door.
3. Loosen the 2 fixing screws on the blank holder without unscrewing them.
4. Remove the blank from the blank holder if present.
5. Align the block holder so that the position numbers point in your direction.

   The flat sides of the positioning aids point downwards.
6. Insert the block holder from the top into the blank holder.
7. Tighten the fixing screws with the supplied torque screwdriver (1.5 Nm).

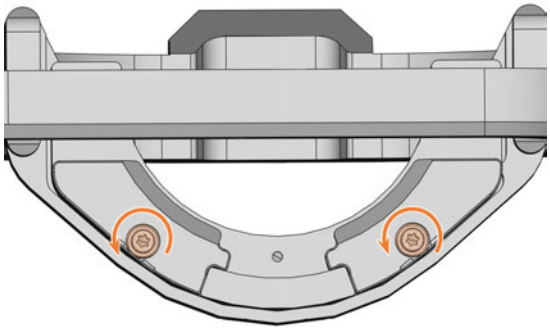


FIG. 99

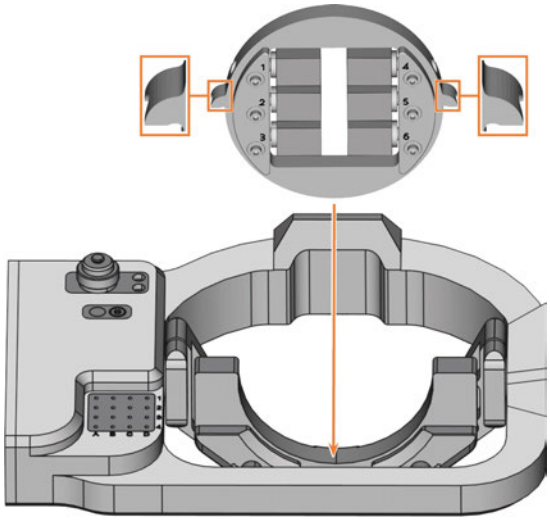


FIG. 100

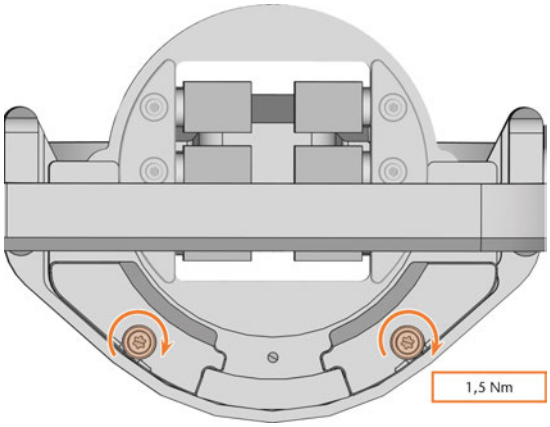


FIG. 101

6.4.3 Removing the block holder from the working chamber

1. ⚠ **CAUTION!** Wear gloves.
2. Open the working chamber door.
3. Loosen the 2 fixing screws on the blank holder without unscrewing them.
4. Remove the block holder from the blank holder.

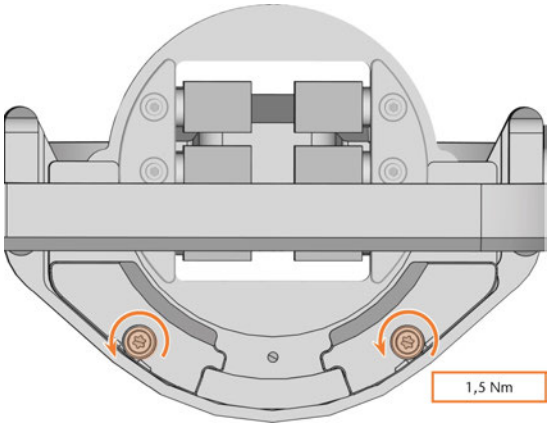


FIG. 102

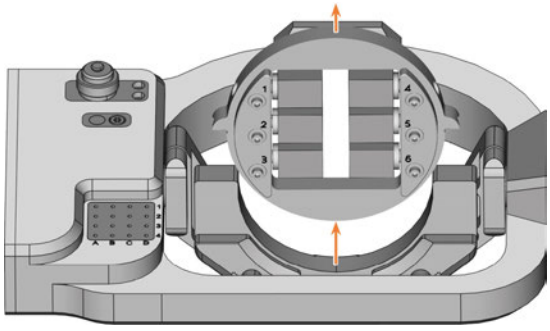


FIG. 103

6.4.4 Removing the blocks from the block holder

1. ⚠ **CAUTION!** Wear gloves.
2. Use the provided torque wrench to loosen the fixing screw at the desired position.
3. Remove the block from its holder.

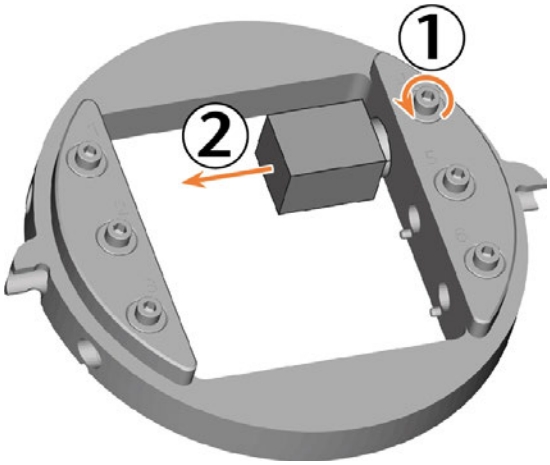


FIG. 104

6.5 Inserting and exchanging tools

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

Inappropriate tools may damage the spindle collet chuck and/or tool positions.

» Use only tools with a sufficiently large chamfer on the tool shaft.

» 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.

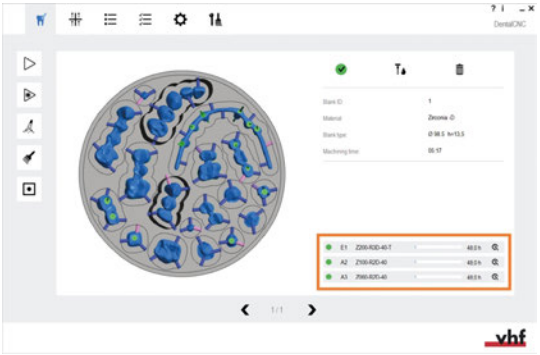


FIG. 105

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

FIG. 106

6.5.1 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 DentalCNCmanual.

6.5.2 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.

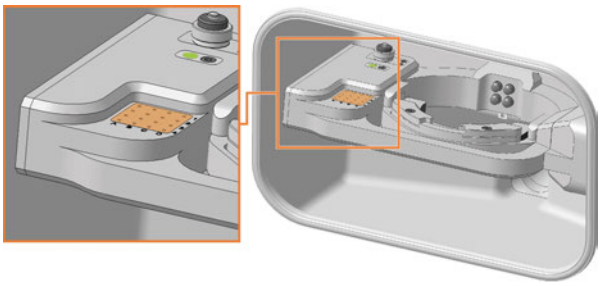


FIG. 107 (MARKED ORANGE) TOOL MAGAZINE AND INSERT FOR THE AIRTOOL (MARKED GREEN)

Manual tool insertion:

1. ⚠ **CAUTION!** Wear gloves.
2. Open the working chamber door.
3. ***NOTICE!*** Remove worn or damaged tools from the tool magazine. DentalCNC shows tool life in the **tool management** view.

   ***NOTICE!* Tool breakage and faulty processing results due to incorrect tool assignment**

   - Make sure that the positions of the tools in the tool magazine correspond to the positions in DentalCNC.

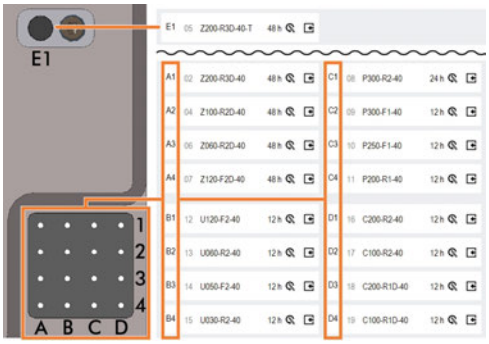


FIG. 108

- Insert the tools in the tool positions with the edge facing downward. Push them in until the ring engages the tool magazine insert.

  The vhftool packaging helps you to insert the tools.

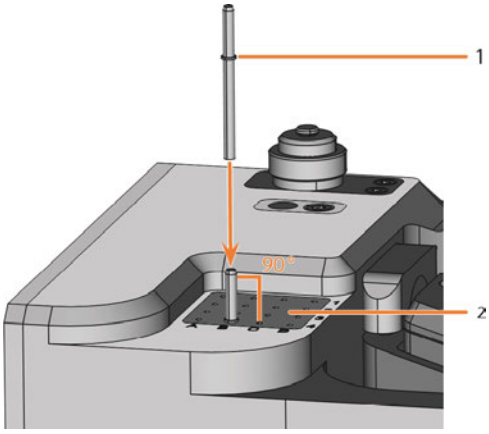


FIG. 109

1. *Ring*
2. *Tool magazine insert*

***NOTICE!* Incorrect processing results when not using the AirTool**

- Insert the required AirTool into position **E1**. Slide it in until the propeller engages the tool magazine insert.

  DentalCNC shows the tool match code with the suffix **-T** in position **E1**.

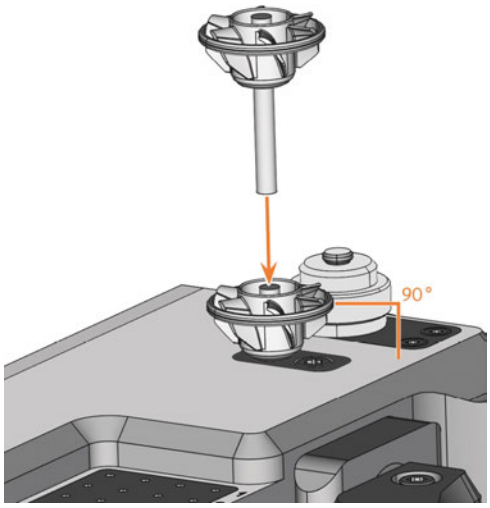


FIG. 110

4. If the new tool replaces an old tool of the same type, reset the tool life to DentalCNC.

6.5.3 Removing tools from the tool magazine

1. ⚠ **CAUTION!** Wear gloves.
2. Open the working chamber door.
3. Pull the tool upward out of the tool magazine.
4. Depending on whether you place the tool back in your inventory or no longer use the tool type, configure DentalCNC accordingly:

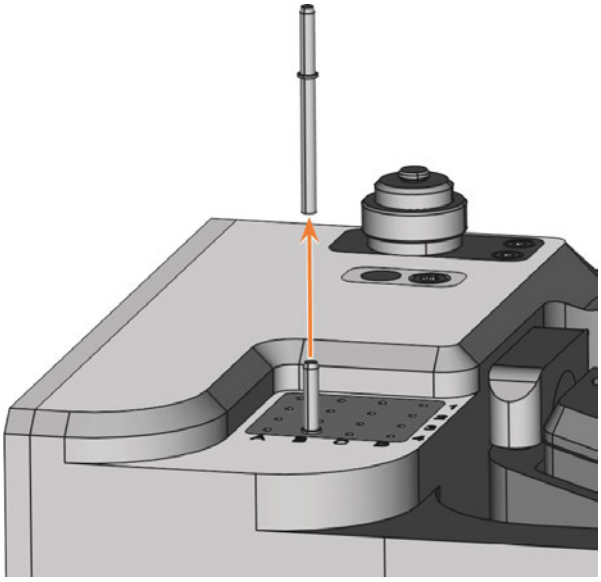


FIG. 111

6.5.4 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.

6.5.5 Using ATB

You can store your tools in the ATB (Administrated Tool Board) provided.

You can store your tools with the Administrated Tool Board (Administrated Tool Board) that comes with the dry set.

- Positions 1–9 and 14–22 can be used for conventional dental tools with retaining ring, which are suitable for your machine.
- Positions 10–13 are suitable for 1 AirTool each.

The virtual ATB in DentalCNC maps the structure of the physical ATB. Clearly assigning physical and virtual tools lets you easily track tool lives in DentalCNC.

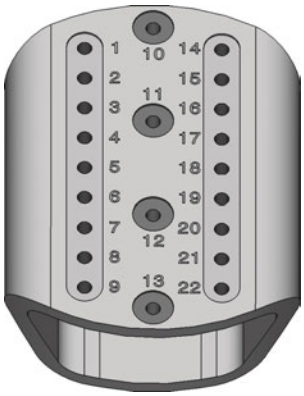


FIG. 112 EMPTY ATB

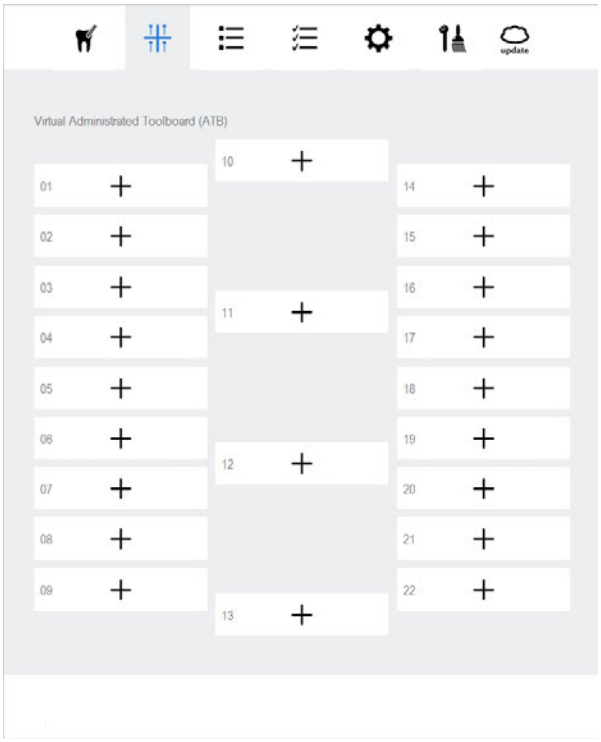


FIG. 113 EMPTY VIRTUAL ATB IN DENTALCNC

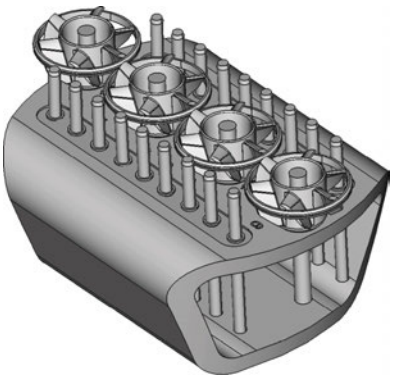


FIG. 114 FILLED ATB

6.6 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.

6.6.1 Starting jobs

1. Ensure the following:
   - It has been transferred to DentalCNC.
   - 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.
   - The required blanks are mounted.
2. Close the working chamber door.
3. If you manually control the suction unit, 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.

6.6.2 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.

6.6.3 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. Select one of the following icons:

   Automatically place the tool in the tool magazine

   Remove the tool manually from the collet chuck

4. If the spindle has moved into the tool change position, continue with the next step.
5. ⚠ **CAUTION!** Wear gloves.
6. Open the working chamber door.
7. Hold the tool in the collet chuck in place.

Fig. 115

8. Confirm the current message.

✔ The collet chuck opens.

9. Remove the tool from the collet chuck.

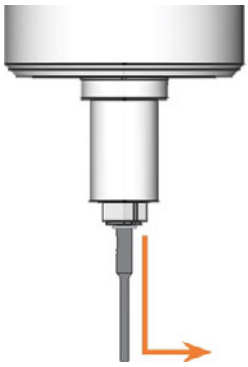


Fig. 116

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

✔ The following happens:

a. The collet chuck closes.
b. The spindle moves to its default position.

6.7 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.

7 Maintenance

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

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

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

7.1 Basic maintenance

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

Maintenance table (page 49)

7.2 Preventive maintenance

Preventive maintenance for this machine has to be scheduled every 2 years, or after 2.000 operating hours at the latest.

» To schedule preventive maintenance, contact customer service.

7.3 Maintenance section

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

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

7.4 Servicing

Customer service is your main contact for all service related questions. It provides you with spare parts, maintenance instructions and performs the preventive maintenance on request.

» When your machine is delivered or installed, ask the service technician for contact details of the customer service team. We recommend that you schedule the first preventive maintenance at this time to ensure proper maintenance of your machine.

7.5 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 50

7.6 Maintenance table

7.6.1 Once per day

Action	Recommended interval / Terms	Procedure / Tools
Performing the daily cleaning	■ After work ■ 10 operating hours ■ If soiled	*Performing the daily cleaning* – on page 52

7.6.2 Once per week

Action	Recommended interval / Terms	Procedure / Tools
Cleaning the collet chuck	■ Once per week ■ 20 operating hours	*Cleaning or exchanging the collet chuck of the spindle* – on page 55
Performing the weekly cleaning	■ Once per week ■ 20 operating hours	*Performing the weekly cleaning* – on page 53

7.6.3 Every 2 years

Action	Recommended interval	Procedure / Tools
Preventive maintenance	■ Every 2 years ■ 2000 operating hours	Contact customer service.

7.6.4 When necessary

Action	Recommended interval	Procedure / Tools
Updating the software and firmware	When an update is available	*Updating the software and firmware* – on page 107

7.7 Spare parts and wear parts

7.7.1 Definition of wear parts

Wear parts necessarily wear out or fail during use. They must be replaced within the time intervals specified in the table below. Use these values to determine operating costs, to plan your spare part stock as well as to create individual maintenance and service plans.

7.7.2 Spare part list

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

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

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

1	2	Part	Replacement interval or conditions	Description
X	X	AirTool insert (E1)	500 operating hours*	*Exchanging tool magazine inserts and associated holders* – on page 63
X	X	Bellow in the working chamber	1000 operating hours*	*Exchanging the bellow* – on page 68
X	X	Collet chuck for spindle unit SFE 300E	500 operating hours*	*Cleaning or exchanging the collet chuck of the spindle* – on page 55
X	X	Spindle unit SFE 300E (including collet chuck)	2000 operating hours*	*Exchanging the spindle unit* – on page 75
X	X	Tool magazine insert (A1 - D4)	500 operating hours*	*Exchanging tool magazine inserts and associated holders* – on page 63
	X	A-B axis module	If defective	*Exchanging the A-B axis module* – on page 99
	X	Bit TX20	If defective	
	X	Blank holder	If defective	*Exchanging the blank holder* – on page 58
	X	Cover cap for fixing screws of the A-B axis module	If defective	See *Exchanging the A-B axis module* – on page 99
	X	Cover cap for opening the emergency release	If defective	See *Emergency opening of the working chamber door* – on page 110
	X	Fixing latches and clamping blocks for upper and lower service covers	If defective	*Exchanging the fuser latches and clamping blocks on the upper service cover* – on page 90 *Exchanging the fuser latches and clamping blocks on the lower service cover* – on page 92

1	2	Part	Replacement interval or conditions	Description
	X	Gasket of the working chamber door	If defective	*Exchanging the gasket of the working chamber door* – on page 94
	X	Holder for AirTool insert	If defective	*Exchanging tool magazine inserts and associated holders* – on page 63
	X	Holder for tool magazine insert	If defective	*Exchanging tool magazine inserts and associated holders* – on page 63
	X	Locking bolt for system module	If defective	*Exchanging the system module locking bolt* – on page 85
	X	Main fuse T6,3A L250V	If defective	*Exchanging the main fuse* – on page 105
	X	Measuring key	If defective	*Exchanging the measuring key* – on page 88
	X	Measuring key protective cap	If defective	*Exchanging the measuring key protective cap* – on page 87
	X	Power cable	If defective	See *Establishing the electric connection* – on page 27
	X	Service cover, bottom	If defective	See *Exchanging the system module* – on page 82
	X	System module	If defective	*Exchanging the system module* – on page 82
	X	Top service cover	If defective	See *Exchanging the spindle unit* – on page 75
	X	Torque screwdriver 1.5 Nm	If defective	
	X	Transport package	If defective	*Transportation and storage* – on page 9
	X	Transport securing set ■ Spindle lock ■ Accessories boxes (without accessories) ■ Transport lock left/right	If defective	*Transportation and storage* – on page 9

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

7.8 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

7.8.1 Performing the daily cleaning

1. Have ready:
   - 1 x Suction unit with category M filter

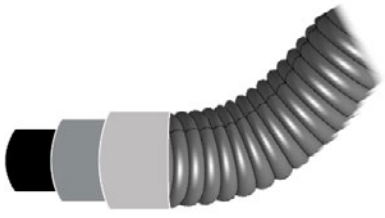


FIG. 117

   - 1 x Damp brush

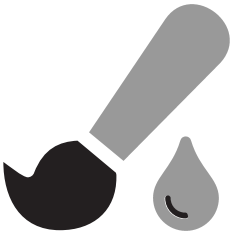


FIG. 118

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.

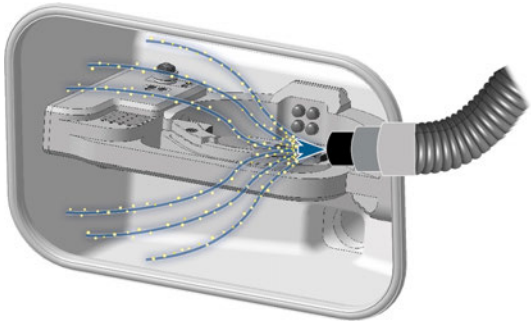


FIG. 119

6. Use the brush to clean the blank holder from all sides. Especially clean all openings and movable parts of the blank holder.
7. Suck the machining residues from the measuring key.

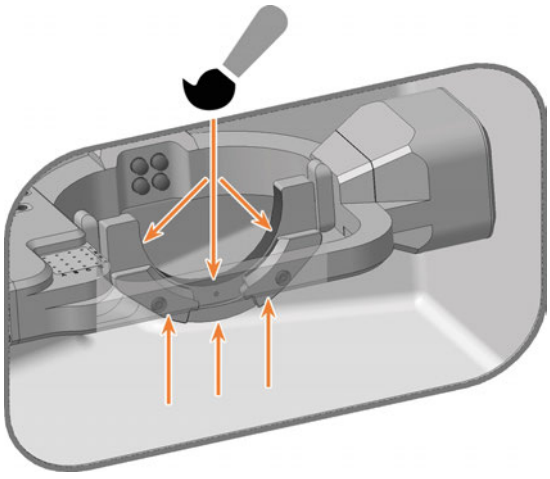


FIG. 120

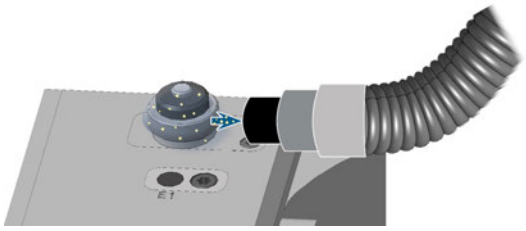


FIG. 121

8. If necessary, perform the weekly cleaning.
9. Close the working chamber door.
10. Move the axes into the default position by selecting the depicted icon in the **Machining** view in DentalCNC.
11. Open the **Maintenance section** window with the following icon in the main icon bar:
12. Select the icon shown for the **Daily machine cleaning** entry.

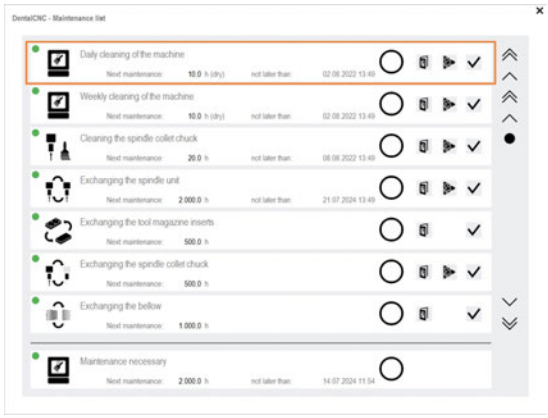


FIG. 122

7.8.2 Performing the weekly cleaning

1. Perform the daily maintenance.
2. Have ready:
   - 1 x Cleaning cloth

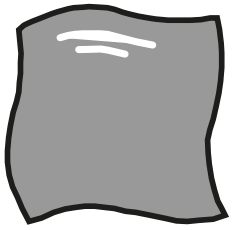


FIG. 123

   - 1 x Mild cleaning agent (optional)

FIG. 124

   - 1 x Microfiber cloth

3. Clean all surfaces and cracks in the working chamber thoroughly with the dry cloth. Use a mild cleaning agent if necessary.
4. Close the working chamber door.
5. If necessary, clean the view window with a cloth. Use a mild cleaning agent if necessary.

FIG. 125

6. Move the axes into the default position by selecting the depicted icon in the **Machining** view in DentalCNC.
7. 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.

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

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

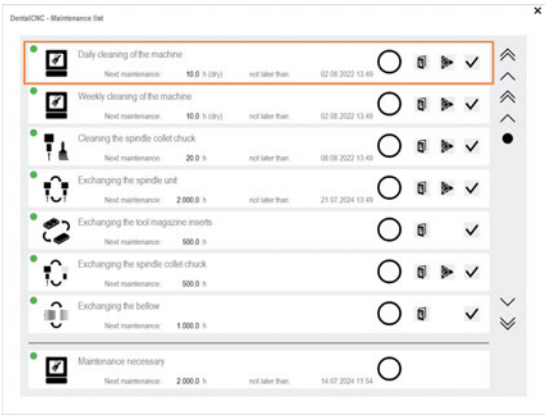


FIG. 126

7.9 Cleaning or exchanging the collet chuck of the spindle

The collet chuck is cleaned and exchanged in different steps:

Step	Cleaning	Exchanging
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.

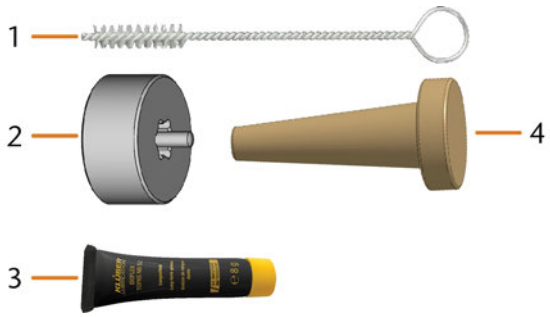


FIG. 127 CURRENT SPINDLE SERVICE SET

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

7.9.1 Removing the collet chuck

1. Have the spindle service set ready.
2. Close the working chamber door.

1. Open the **Maintenance section** window with the following icon in the main icon bar:
3. Select the following icon for the entry **Exchange spindle collet chuck**:

✔ The spindle moves into the position for collet chuck cleaning.

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.

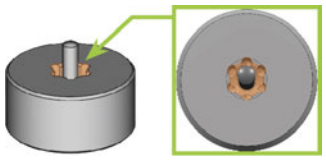


FIG. 128

   c. Twist the knurled nut counterclockwise.

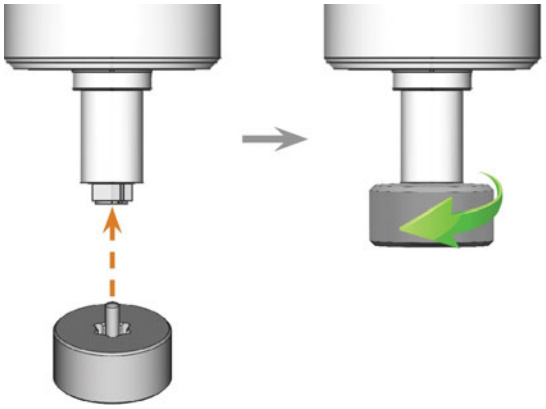


FIG. 129

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

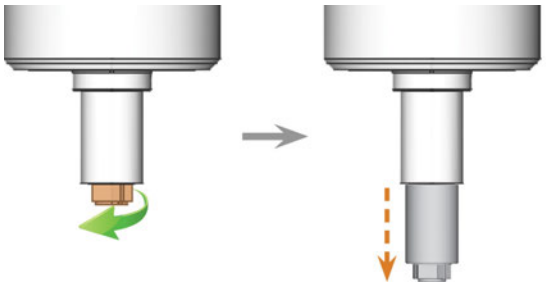


FIG. 130

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.

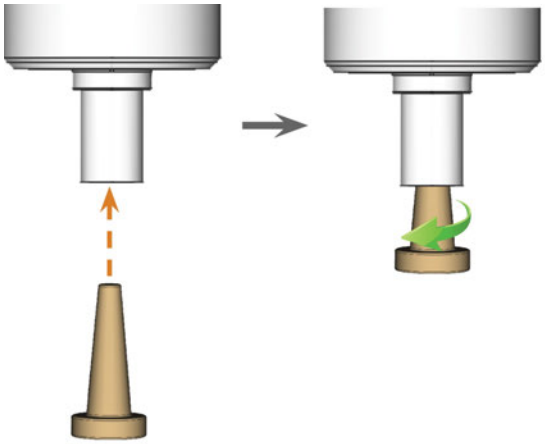


FIG. 131

7.9.2 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 my get into the thread of the collet chuck.

FIG. 132

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

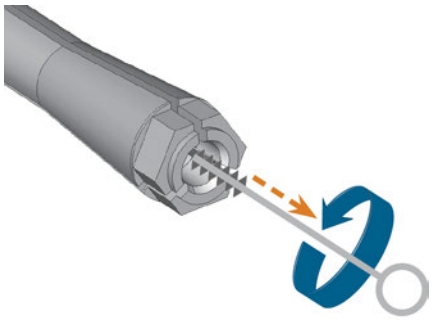


FIG. 133

   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.

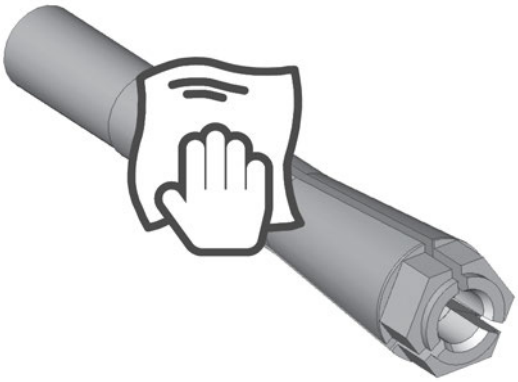


FIG. 134

7.9.3 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.

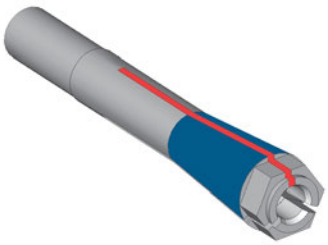


FIG. 135

7.9.4 Inserting the collet chuck

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

hand.

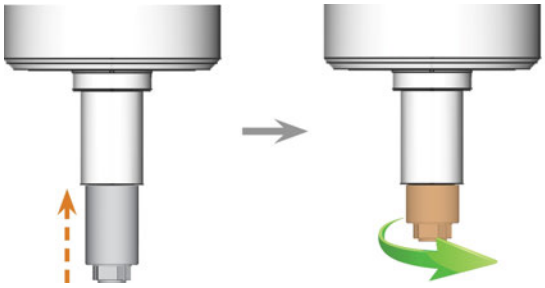


Fig. 136

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.

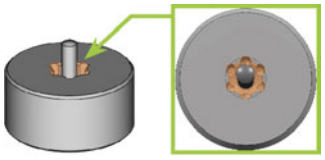


Fig. 137

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

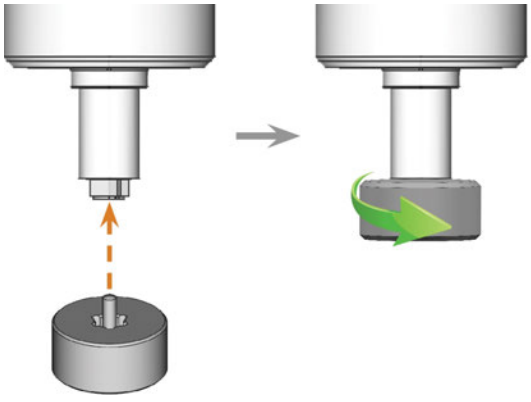


Fig. 138

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

7.10 Exchanging the blank holder

You can remove and install the blank holder and the clamping devices on the blank holder independently of each other.

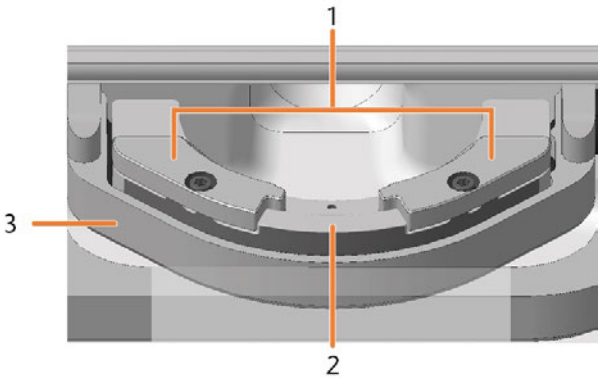


FIG. 139 COMPONENTS OF THE BLANK HOLDER

1. *Clamping devices*
2. *Blank holder*
3. *Blank holder support*

7.10.1 Exchanging the blank holder

The blank holder is screwed to the blank holder support.

Watch the video

YouTube video – When viewing this video, personal data is sent to YouTube, LLC, USA. Privacy statement

1. Have ready:
   - Spare blank holder

FIG. 140 STANDARD BLANK HOLDER – OTHER DESIGNS POSSIBLE

- 1 x Torque screwdriver 1.5 Nm with TX20 bit

FIG. 141

- 1 x Pointed tool (e.g. screwdriver) if the fixing screws are covered with caps

FIG. 142

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. Exit DentalCNC.
5. Open the working chamber door.
6. Switch off the machine at the main power switch.
7. ⚠ **CAUTION!** Wear gloves.
8. Gently turn the blank holder 180° upwards.

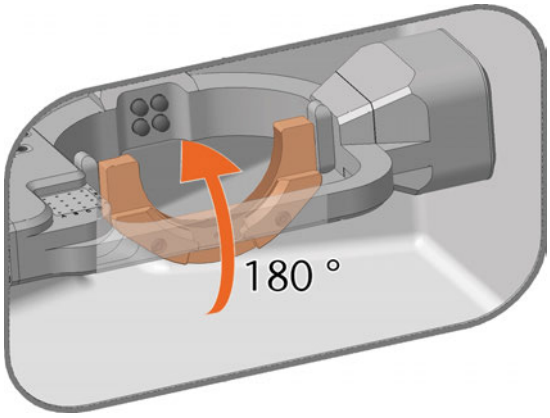


FIG. 143

9. If the 2 screws on the back of the blank holder are covered with caps (marked orange):
   a. Pierce the cover caps with the pointed tool.
   b. Pry out the cover caps.
10. Unscrew the 2 screws on the back of the blank holder.
11. Hold the blank holder. Gently turn the blank holder 180° down.

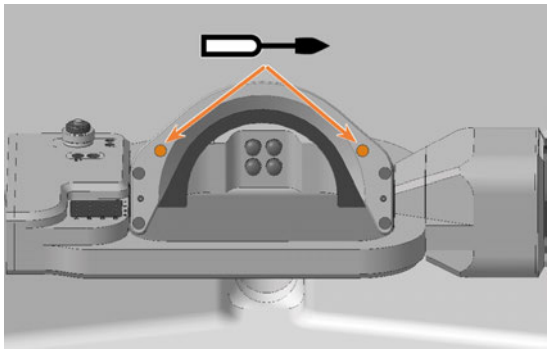


FIG. 144 COVER CAPS (MARKED ORANGE) ARE ONLY FITTED TO SOME MACHINES

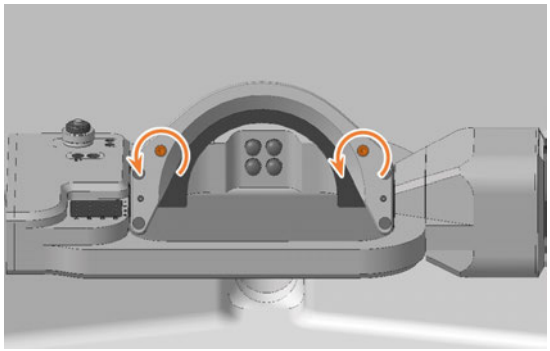


FIG. 145

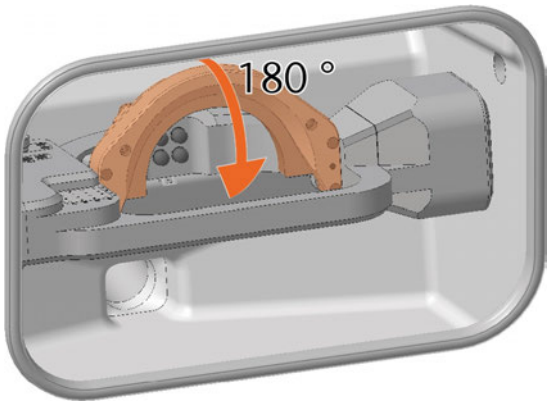


FIG. 146

12. Pull the blank holder forward from the positioning pin and remove it upward from the working chamber.

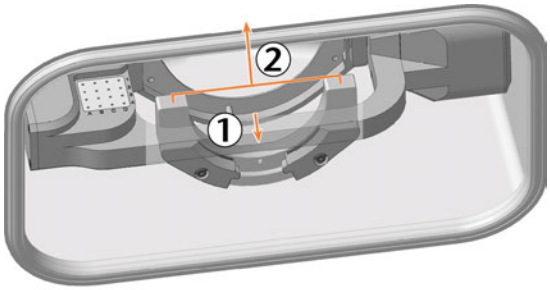


FIG. 147

13. A drilling for the positioning pin is located on the rear side of the blank holder.
    Slide the spare blank holder onto the positioning pin.

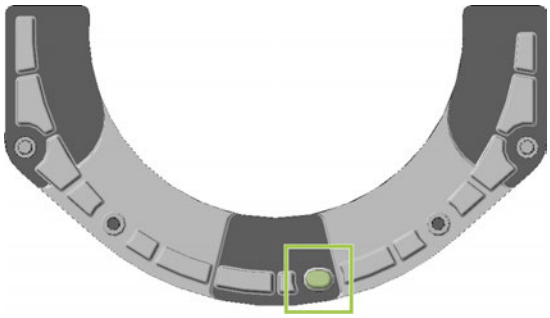


FIG. 148

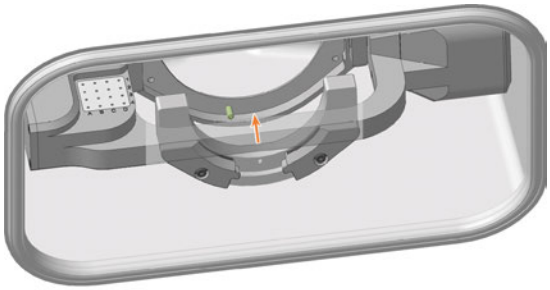


FIG. 149

14. Hold the blank holder. Gently turn the blank holder 180° upwards.
15. Screw the blank holder tight:
    a. Screw the 2 screws into the back of the blank holder without tightening them.
    b. Press the blank holder to the right and hold it in this position.
    c. Tighten the right screw.
    d. Tighten the left screw.
16. Gently turn the blank holder 180° down.

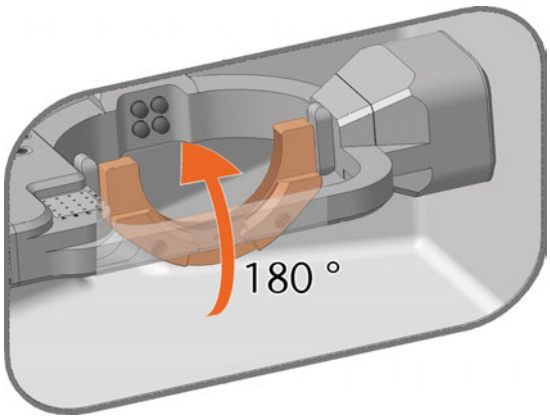


FIG. 150

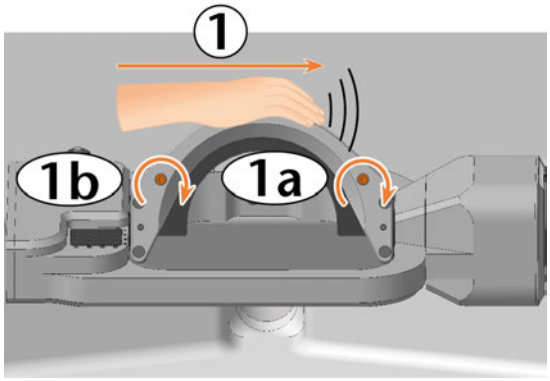


FIG. 151

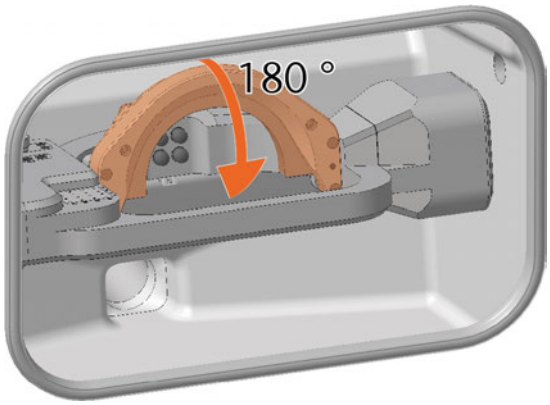


FIG. 152

***NOTICE!* Damage to tools, blanks and the machine if the blank holder is positioned incorrectly**

17. Check that the blank holder engages the contact surfaces of the support on the right side.

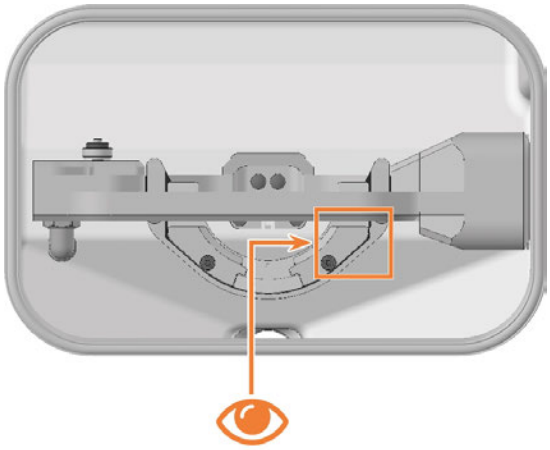


FIG. 153

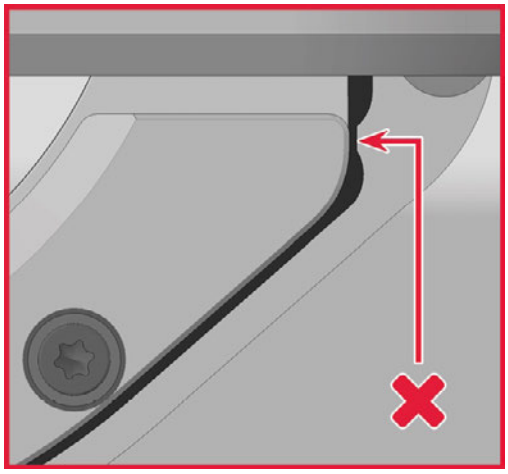


FIG. 154

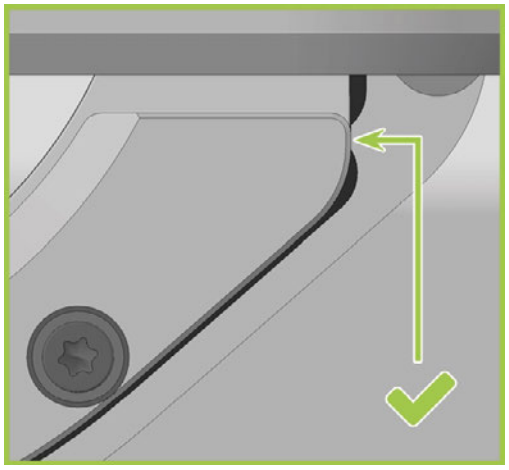


FIG. 155

18. If this is not the case, realign the blank holder:
    a. Gently turn the blank holder 180°.
    b. Loosen the 2 screws without unscrewing them.
    c. Continue with step 14 and follow the further steps.
19. Gently turn the blank holder 180° upwards.

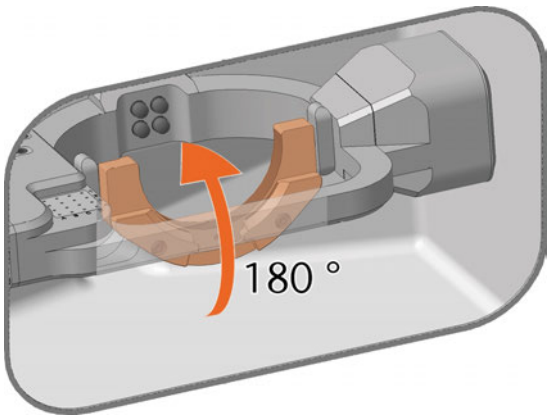


FIG. 156

20. Leave the 2 screws on the back of the blank holder uncovered.
21. Close the working chamber door.
22. Switch on the machine at the main power switch.
23. Start DentalCNC.

7.10.2 Removing and installing clamping devices

You can unscrew the clamping devices, e.g. for cleaning purposes.

» Have ready:

– 1 x Torque screwdriver 1.5 Nm with TX20 bit

FIG. 157

Removing the clamping device

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.
3. Open the working chamber door.
4. ⚠ **CAUTION!** Wear gloves.
5. Remove the blank from the blank holder if present.
   Mounting and removing blanks – on page 34
6. Unscrew and remove the 2 fixing screws from the 2 clamping devices.

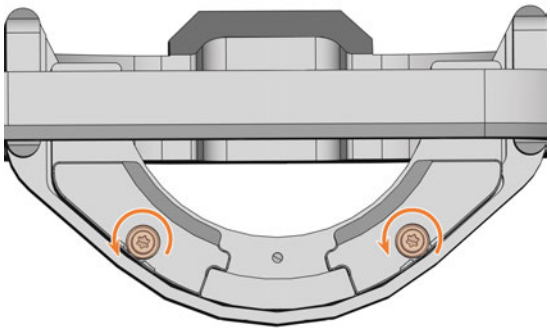


FIG. 158

7. Remove the 2 clamping devices.

Installing the clamping devices

1. ⚠ **CAUTION!** Wear gloves.
2. Position the 2 clamping devices on the blank holder. The screw holes in the holder and in the clamping devices shall be superimposed.
3. Insert the 2 fixing screws into the screw holes.

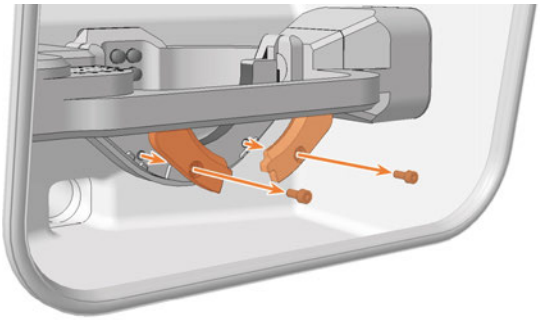


Fig. 159

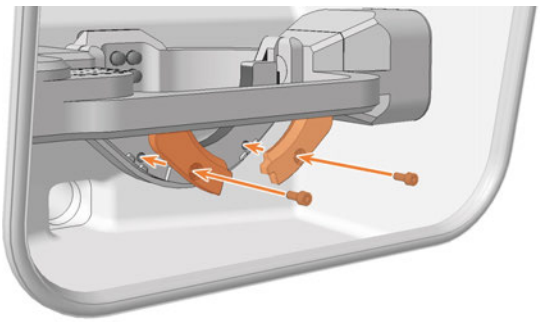


Fig. 160

4. Use the torque screwdriver (1.5 Nm) and screw down the 2 clamping devices with the 2 fixing screws.

7.11 Exchanging tool magazine inserts and associated holders

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 replace the holders for the inserts separately.

1. Have ready:
   - 1 x Torque screwdriver 1.5 Nm with TX20 bit

FIG. 161

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

FIG. 162

   If you want to exchange the inserts:
   - 1 x Tool magazine insert for 16 tools

FIG. 163

and

   - 1 x AirTool insert

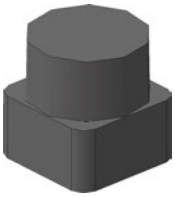


FIG. 164

   If you want to exchange at least one of the holders:
   - 1 x Holder for tool magazine insert

FIG. 165

and / or

   - 1 x Holder for AirTool insert

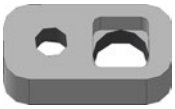


FIG. 166

2. Quit DentalCNC.
3. Open the working chamber door.
4. Switch off the machine at the main power switch.
5. ⚠ **CAUTION!** Wear gloves.
6. ***NOTICE!*** Remove all tools from the tool magazine and remove the AirTool from insert **E1**.
7. Remove the screw on the right side of the AirTool insert **E1**.
8. Pull the holder out of the opening with the insert pointing upwards.
9. Push the insert out of the holder.

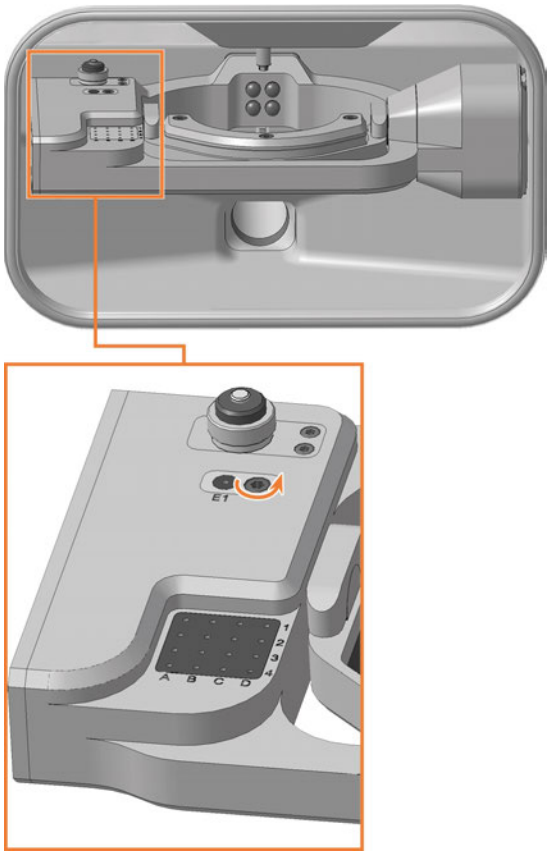


FIG. 167

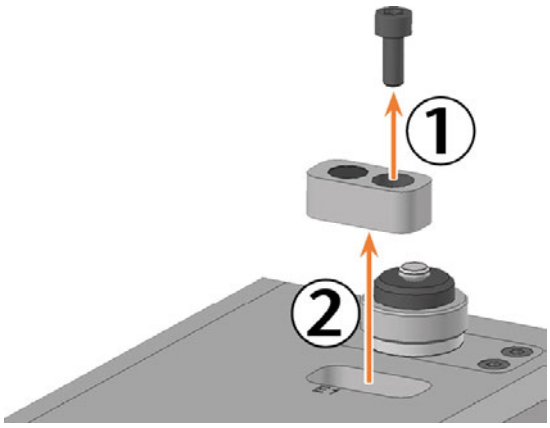


FIG. 168

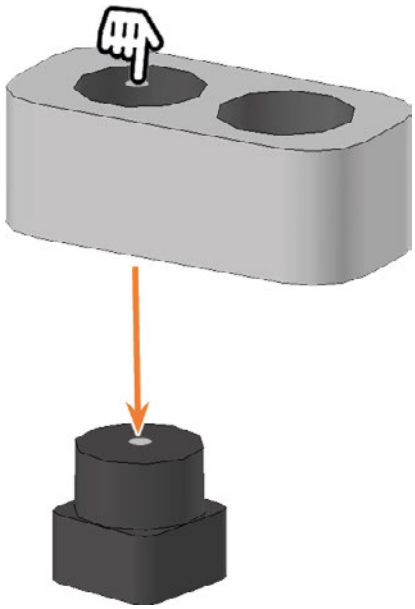


FIG. 169

10. Get the required spare parts.
11. Press the AirTool insert into the rectangular opening of the holder.
12. Insert the holder into the opening and screw it down.

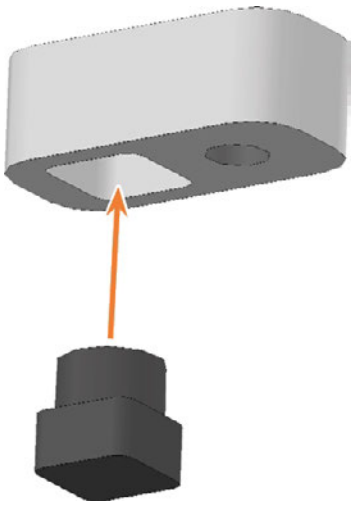


FIG. 170

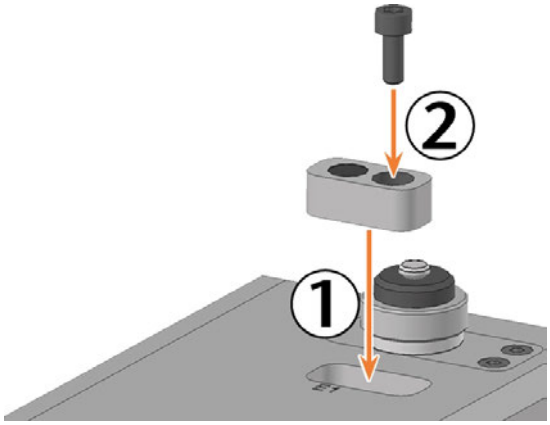


FIG. 171

FIG. 172

13. 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.

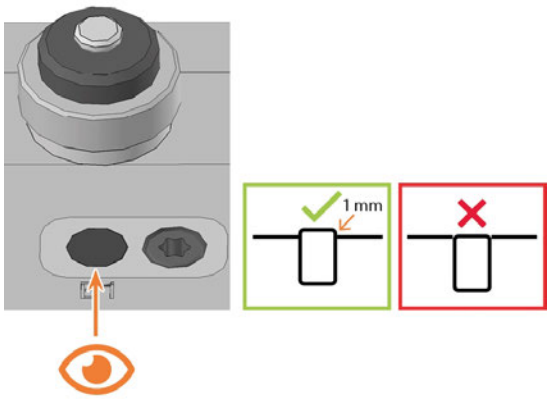


FIG. 173

14. Turn the A-B axis module clockwise by 35 °.

15. Unscrew the 2 screws on the tool magazine insert holder on the lower left side of the A-B axis module.

✔ The holder for the tool magazine insert and the screws slide into your hand.

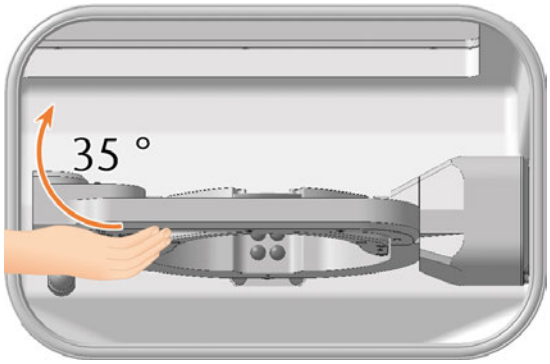


FIG. 174

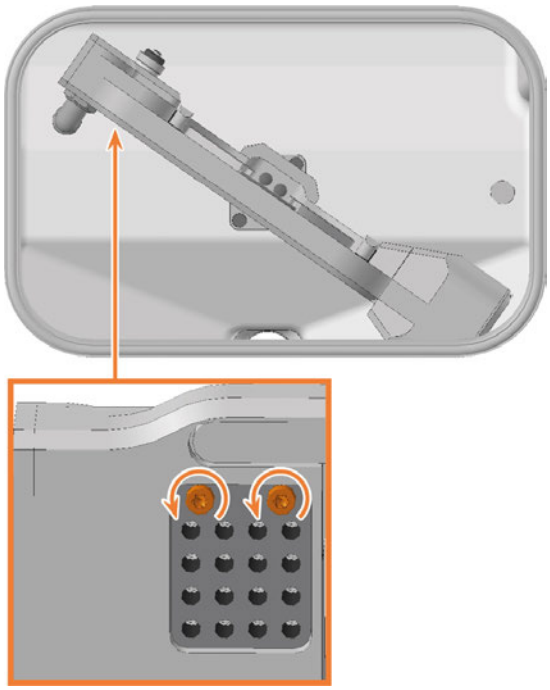


FIG. 175

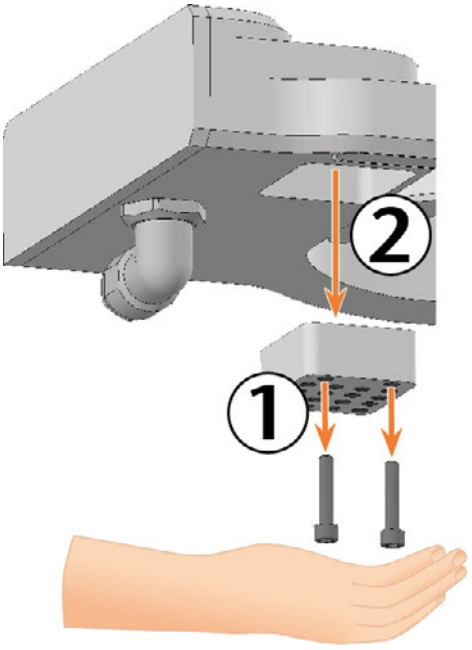


FIG. 176

16. Press the tool magazine insert down out of the opening.

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

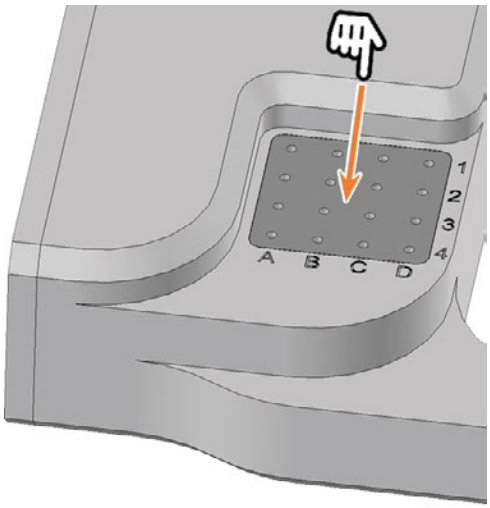


FIG. 177

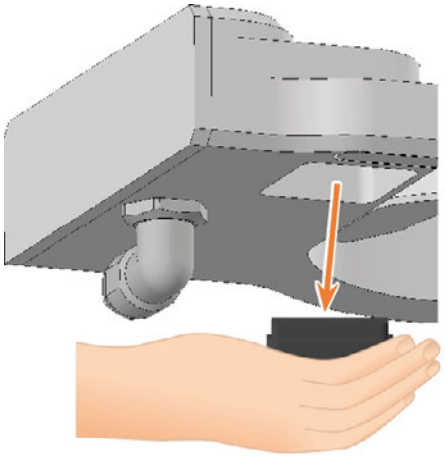


FIG. 178

17. Get the required spare parts.
18. Insert the tool magazine insert from below into the opening and clamp it.

    Ensure that the top of the tool magazine insert is flush with the surface of the A-B axis module.

    If this is not the case, correct the position of the insert.

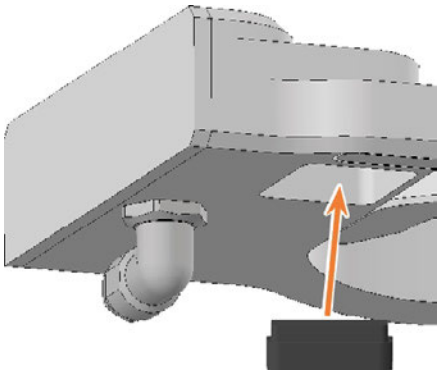


FIG. 179

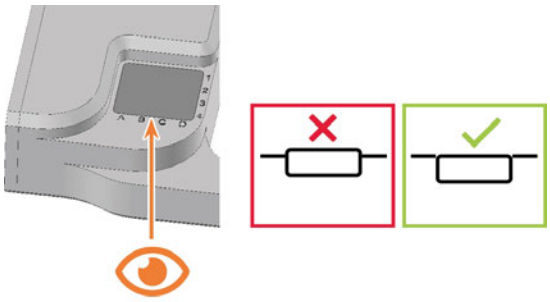


FIG. 180

19. Align the holder so that the screw holes are located at the front edge of the opening. Insert the holder into the opening.

20. Insert the 2 screws into the screw holes in the holder and tighten it.

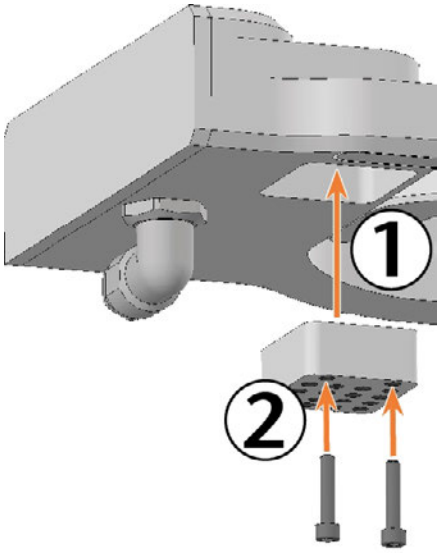


FIG. 181

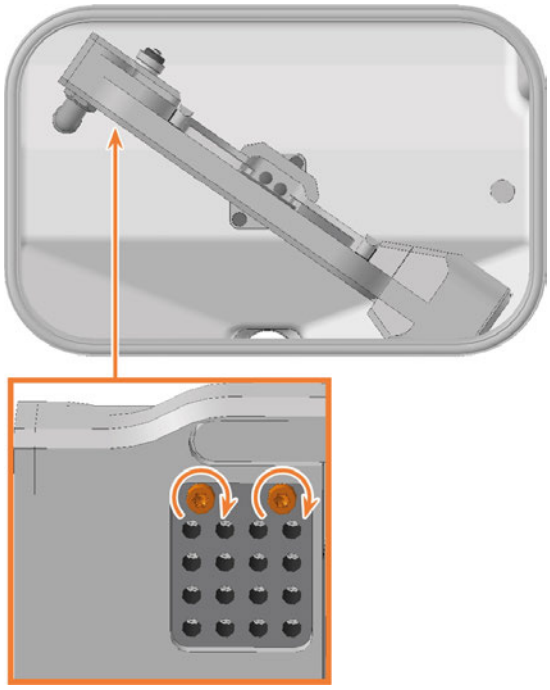
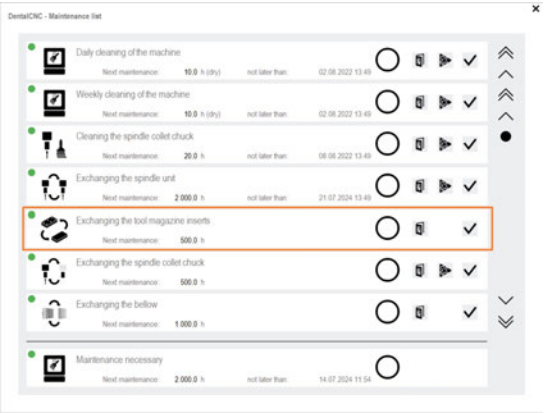


FIG. 182

21. Close the working chamber door.
22. Start DentalCNC.

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

23. Select the following icon of the **Exchange tool magazine inserts** entry: ✓



24. Follow the instructions in the documentation for DentalCNC and drill the tool positions using the provided drill bit.

7.12 Exchanging the bellow

Recommendation: When exchanging the bellow according to the table for wear and spare parts, exchange the spindle unit at the same time.

In that case we recommend the following sequence:

1. Detach the bellow from the spindle unit.
2. Remove the spindle unit.
3. Remove the bellow.
4. Install the spare bellow and attach the spare bellow frame.
5. Install the spare spindle unit.
6. Attach the spare bellow in the working chamber.

   Description steps 1, 3, 4, 6: This Help Article

   Description steps 2, 5: *Exchanging the spindle unit* – on page 75

In this Help Article, some images have components hidden for clarity.

1. Have ready:
   - 1 x Angle screwdriver TX10

FIG. 183

   - 1 x Angle screwdriver TX25

FIG. 184

   - 1 x Torque screwdriver 1.5 Nm with TX20 bit

FIG. 185

   - 1 x Spare bellow

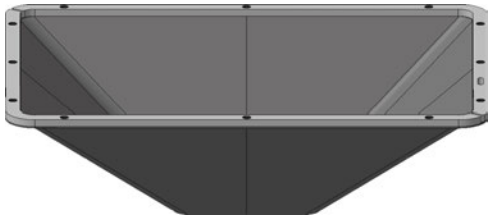


FIG. 186

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

3. Close DentalCNC.
4. Open the working chamber door.
5. Switch off the machine at the main power switch.
6. Carefully push the spindle unit upwards by hand until it reaches the stop.

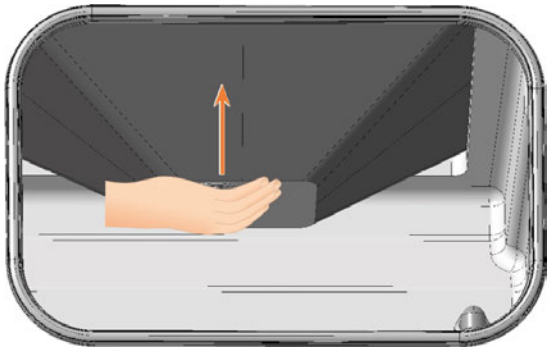


FIG. 187

7. Use the torque screwdriver 1.5 Nm with bit TX20 and loosen the 6 screws (marked orange) that fix the fastening washer to the bellows.
8. Pull the mounting washer downwards from the bellow.

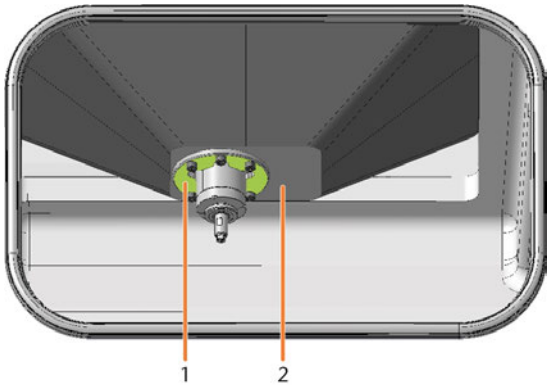


FIG. 188

1. *Mounting washer*
2. *Bellow*

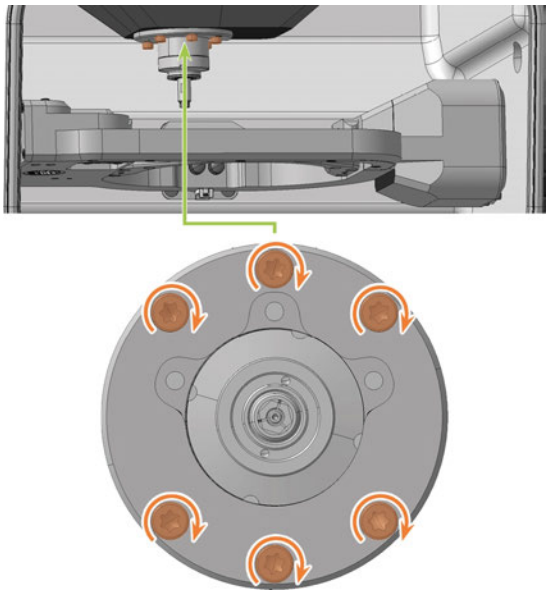


FIG. 189

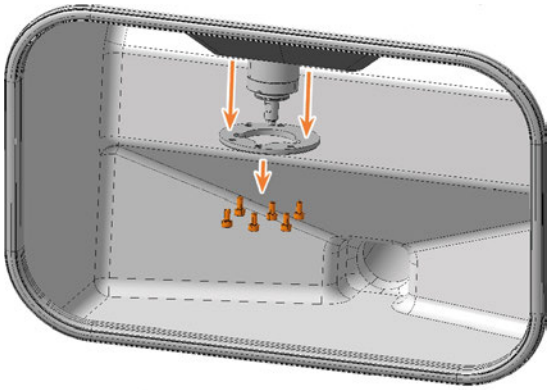


FIG. 190

9. Using the TX10 angle screwdriver, loosen the 3 screws securing the bellow.
10. Pull the bellow down over the spindle until the bellow has reached maximum expansion.
11. Close the working chamber door.

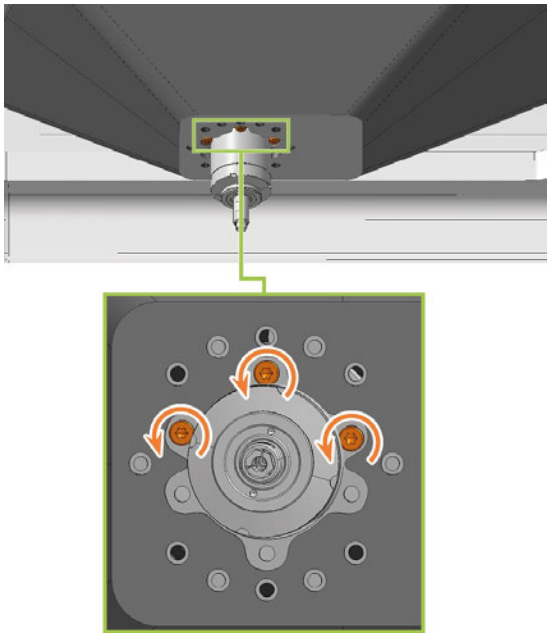


FIG. 191

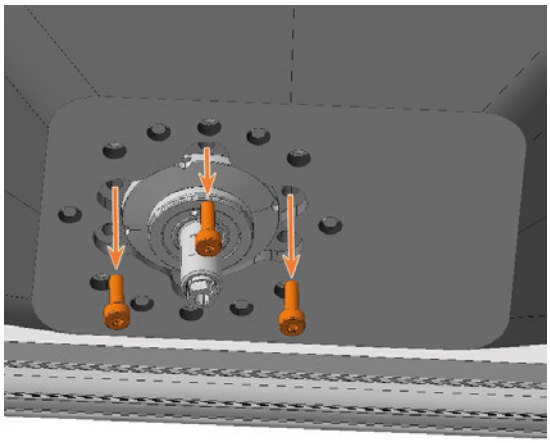


FIG. 192 SPINDLE SHOWN IN HIGHER POSITION FOR CLARITY

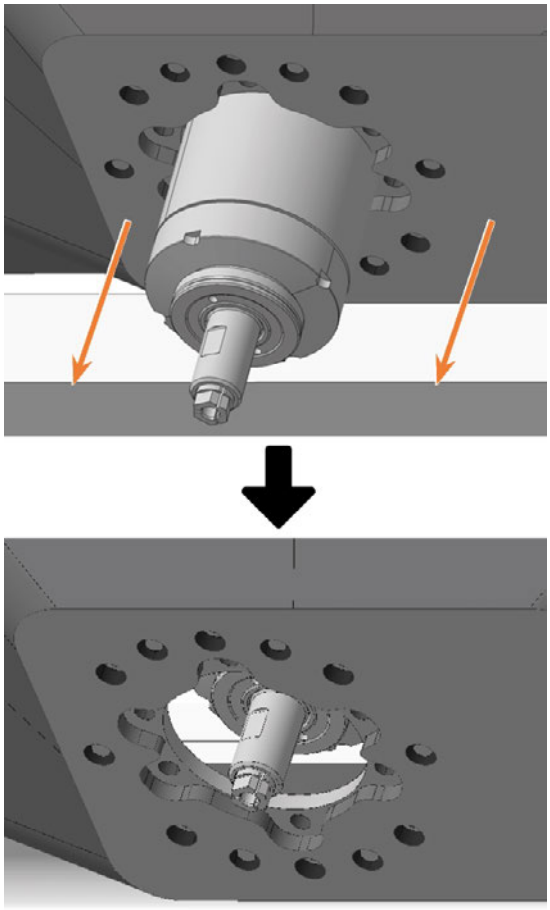


Fig. 193 Approximate representation of the maximum extension

12. Remove the upper service cover, the safety cover and, if necessary, the spindle unit.

Exchanging the spindle unit – on page 75

13. In the area behind the upper service cover, use the TX25 angle screwdriver to loosen the 12 screws that secure the bellow frame.
    - To reach each screw, carefully move the spindle unit or the spindle holder by hand in the X and Y directions.
    - To loosen the middle left screw (marked green), it must be in the recess.

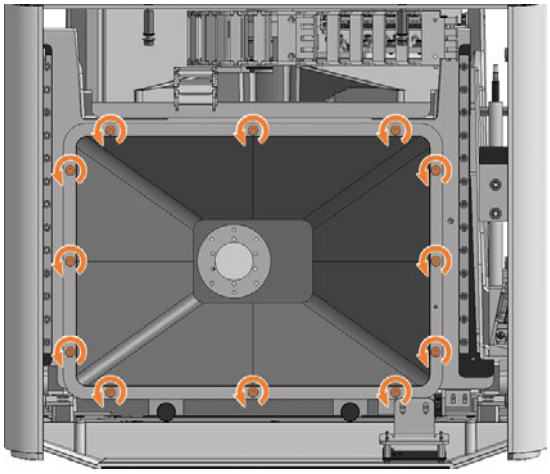


Fig. 194

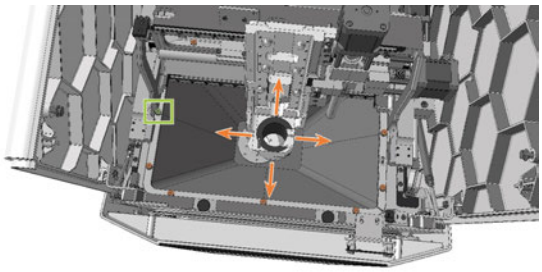


Fig. 195

14. Pull the bellow upwards out of the machine.

    If you did not remove the spindle unit, do the following:

    a. The frame of the bellows is divided into two parts. Lift the frame ends and move them to the inside.

    b. Turn the bellows and guide the rear part past the underside of the spindle unit.

    c. Tilt the front part of the bellow up and the rear part down.

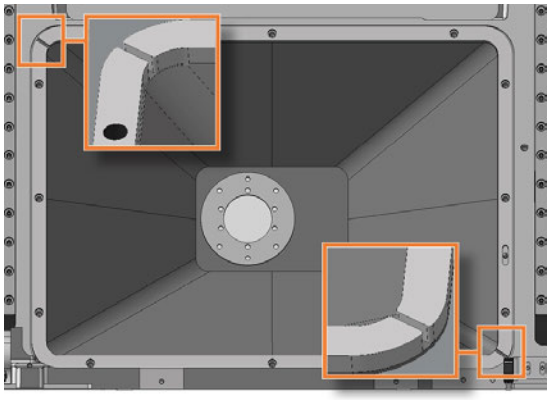


Fig. 196 Ends of the two-part frame marked in orange

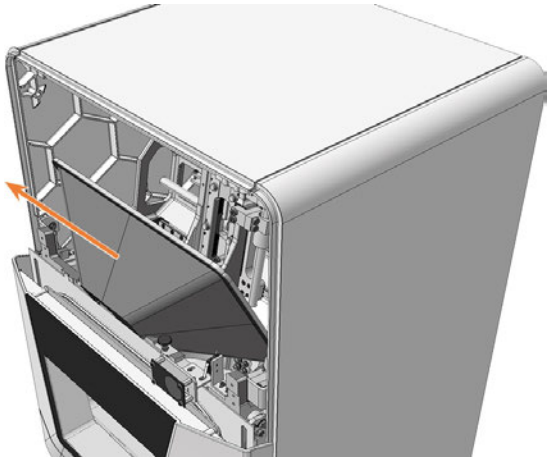


FIG. 197

15. Align the spare bellow so that the opening for the positioning pin (marked orange) in the frame is on the right-hand side.

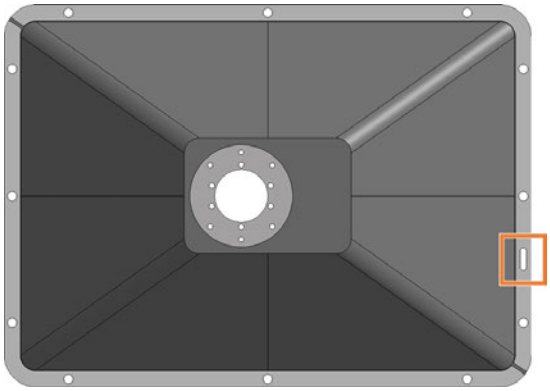


FIG. 198 TOP VIEW OF SPARE BELLOW: OPENING FOR THE POSITIONING PIN (MARKED ORANGE)

16. Insert the bellow into the machine. The positioning pin must be in the corresponding opening in the frame.
17. Use the TX25 angle screwdriver to tighten the frame of the bellow with 12 screws.

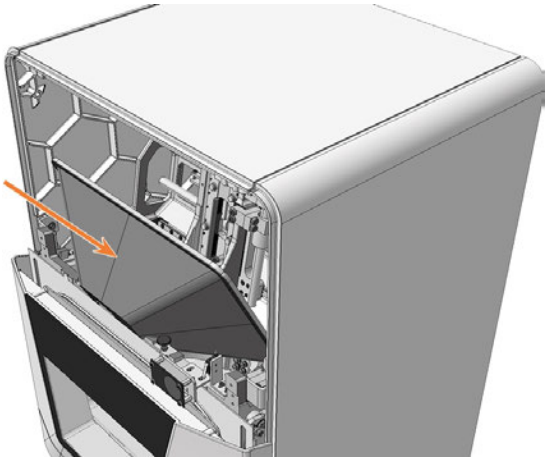


FIG. 199

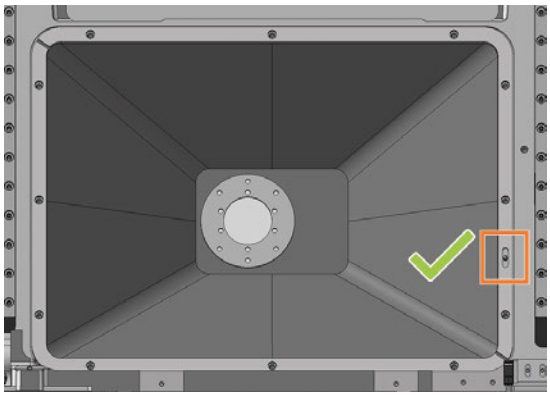


FIG. 200 POSITIONING PIN IN OPENING (MARKED ORANGE)

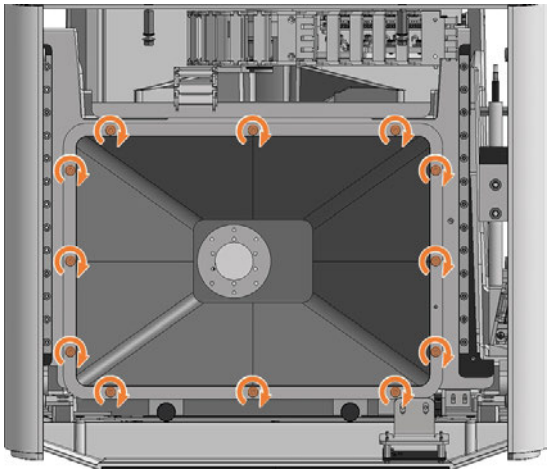


FIG. 201

18. If necessary, install the spindle unit.
Exchanging the spindle unit – on page 75
19. Install the upper safety cover and service cover.
20. Open the working chamber door using the emergency release.
Emergency opening of the working chamber door – on page 110

21. Pull the lower opening of the bellow upwards over the spindle *until it stops* and hold the bellow in this position.

    The holes for the screws used to fasten the bellow must be located on the corresponding screw holes in the spindle holder.

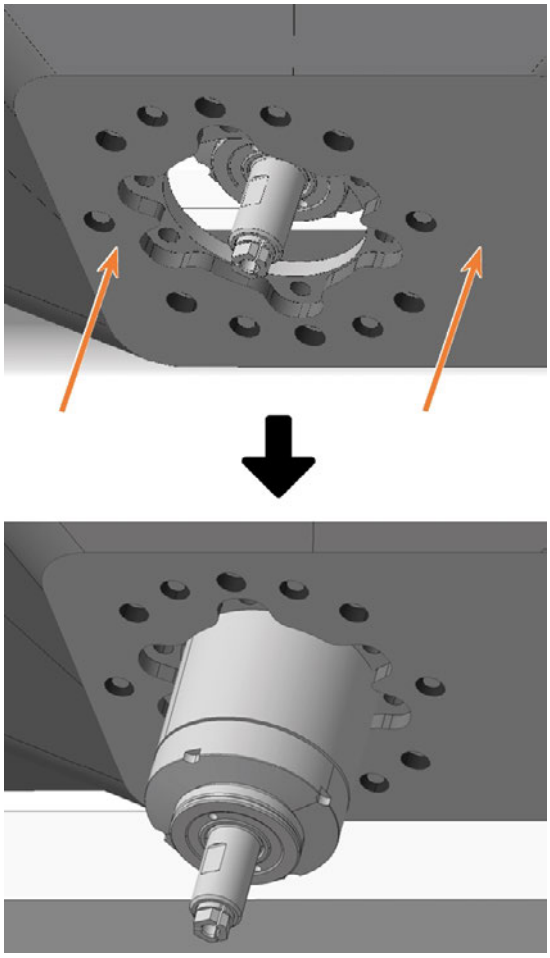


FIG. 202

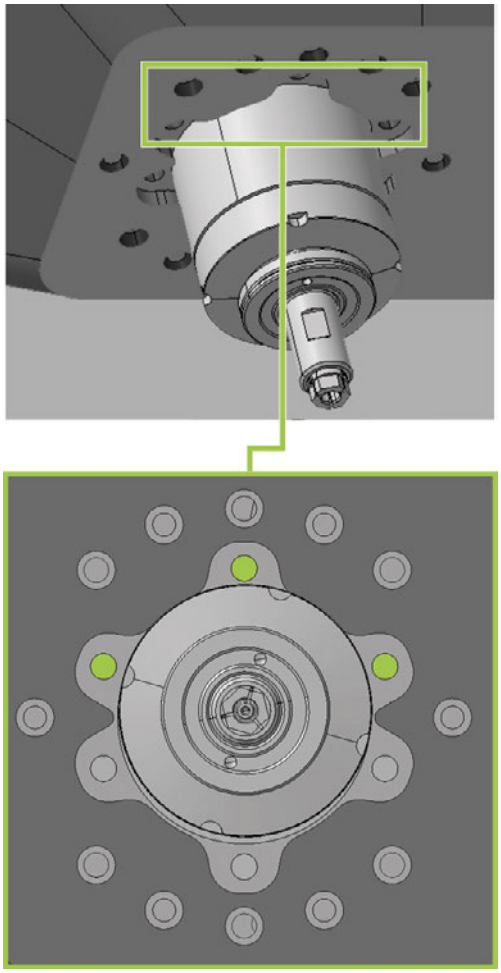


FIG. 203

22. Carefully move the spindle unit by hand in the X and Y directions until the bellow is not taut at any point.
23. Use the TX10 angle screwdriver to tighten the bellow with 3 screws in the front screw holes:
    a. Carefully place the first screw and check if you can screw it in. If this is not possible, correct the position of the bellow.
    b. Screw in all screws first *without* tightening them. This allows you to correct the position of the bellow.
    c. When you have properly screwed in all the screws, tighten them.

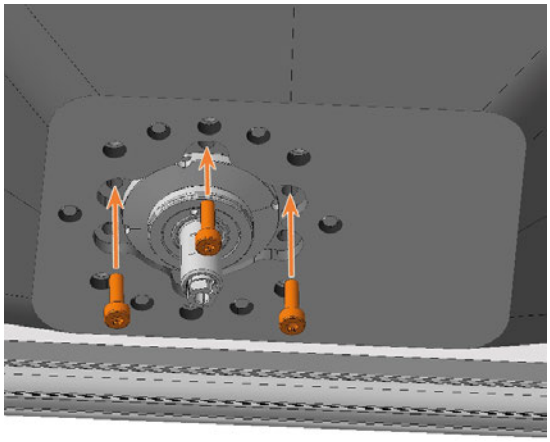


Fig. 204 Spindle shown in higher position for clarity

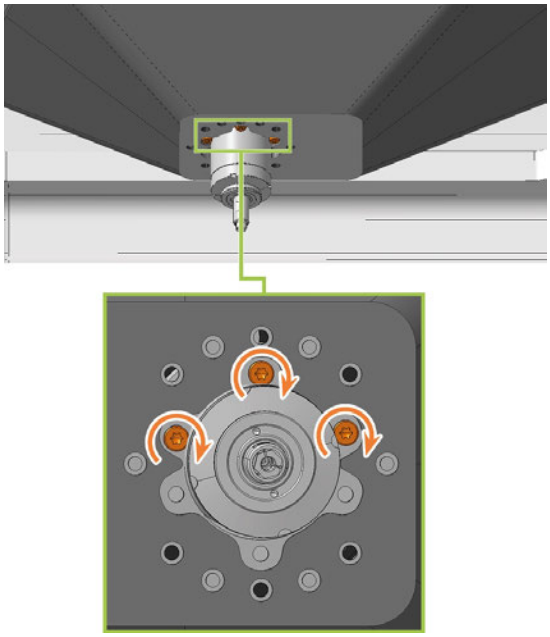


Fig. 205

24. Slide the mounting washer up over the spindle until it is properly seated on the bellow:
    - The heads of the 3 screws (marked orange) that you screwed in during the previous step are visible.
    - The holes for the 6 screws (marked in green) used to fasten the mounting washer are located on the corresponding screw holes in the bellow.

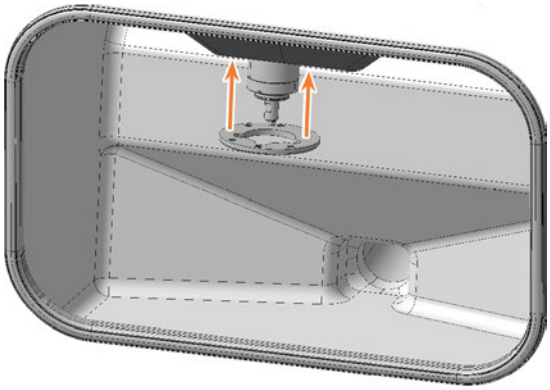


Fig. 206

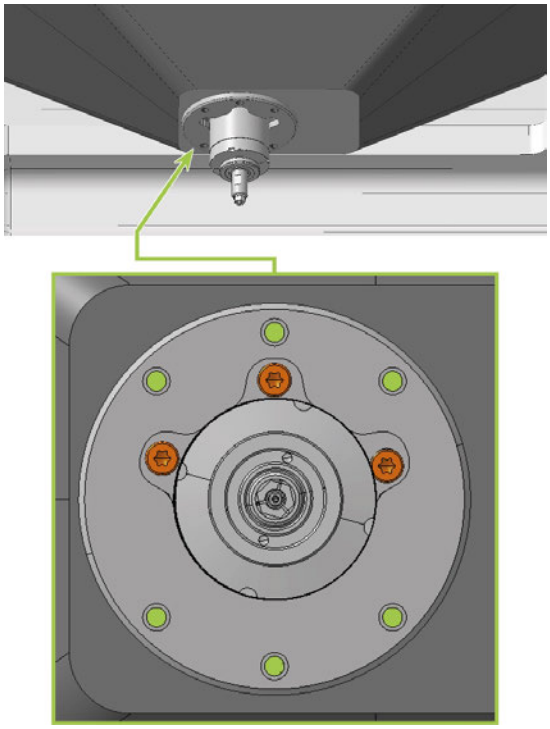


Fig. 207

25. Using the 1.5 Nm torque screwdriver with TX20 bit, tighten the fastening washer with 6 screws:
    a. Carefully place the first screw and check if you can screw it in. If this is not possible, correct the position of the mounting washer.
    b. Screw in all screws first *without* tightening them. This allows you to correct the position of the mounting washer.
    c. When you have properly screwed in all the screws, tighten them.

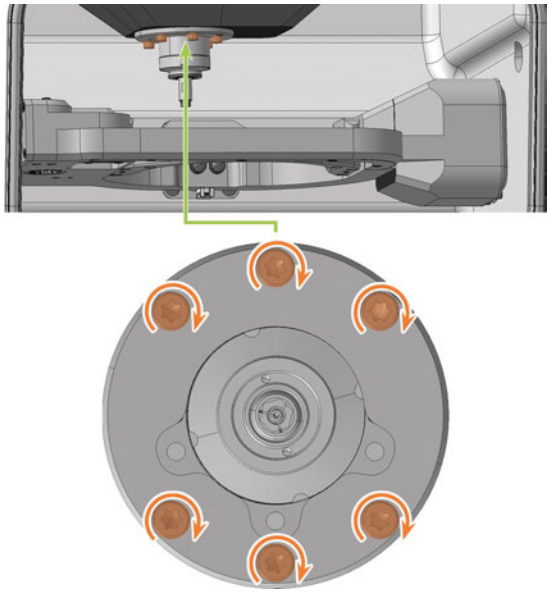


FIG. 208

26. Close the working chamber door.
27. Switch on the machine at the main power switch.
28. Start DentalCNC.
29. Check that the machine references properly and that the bellow does not graze at any point.
    In case of errors, contact customer service.
30. Open the **Maintenance section** window with the following icon in the main icon bar:
31. Select the following icon of the entry **Exchange bellow**:

FIG. 209

7.13 Exchanging the spindle unit

Recommendation: When exchanging the spindle unit according to the table for wear and spare parts, exchange the bellow at the same time.

In that case we recommend the following sequence:

1. Detach the bellow from the spindle unit.
2. Remove the spindle unit.
3. Remove the bellow.
4. Install the spare bellow and attach the spare bellow frame.
5. Install the spare spindle unit.
6. Attach the spare bellow in the working chamber.

   Description steps 1, 3, 4, 6: *Exchanging the bellow – on page 68*

   Description steps 2, 5: This Help Article

When exchanging the spindle, exchange the entire spindle unit, which consists of the following components:

- Spindle including collet chuck
- Collet chuck release unit including cable

The spindle unit is located behind the top service cover and the safety cover:

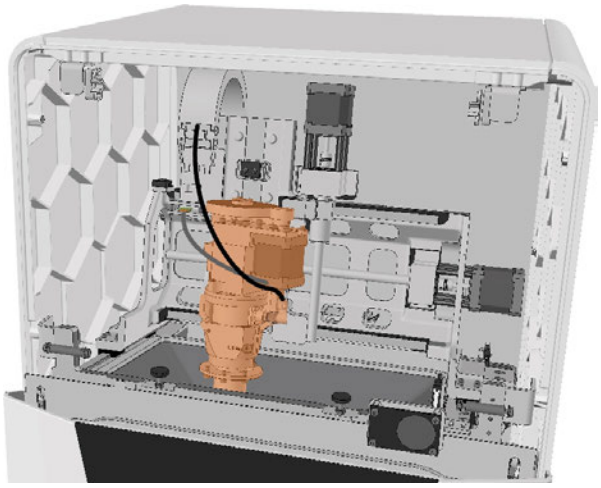


FIG. 210 SPINDLE UNIT IN THE MACHINE INTERIOR (MARKED ORANGE)

1. Have ready:
   - 1 x Spare spindle SFE 300E

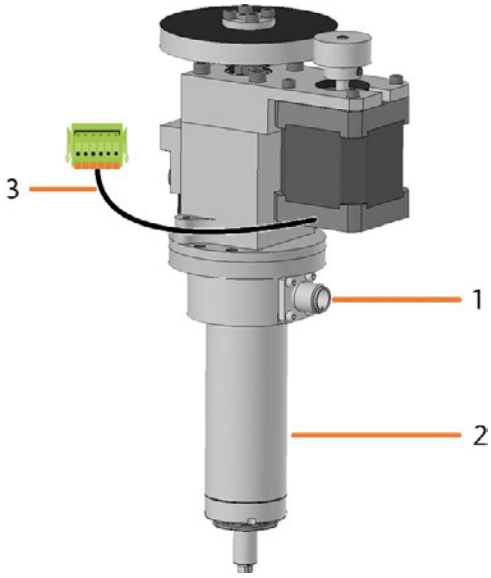


FIG. 211

1. *Connection for the spindle cable*
2. *Spindle including collet chuck*
3. *Cable of the collet chuck release unit with plug*

   - 1 x Torque screwdriver 1.5 Nm with TX20 bit

FIG. 212

2. Start DentalCNC.
1. Open the **Maintenance section** window with the following icon in the main icon bar:
3. Select the following icon for the **Exchange spindle** entry:

✔ The spindle moves into the spindle exchange position.

4. Close DentalCNC.
5. Switch off the machine at the main power switch.
6. Remove the top service cover:
   a. Grasp the recess on the left and right sides of the cover.
   b. Lift the cover out of the tabs.

FIG. 213

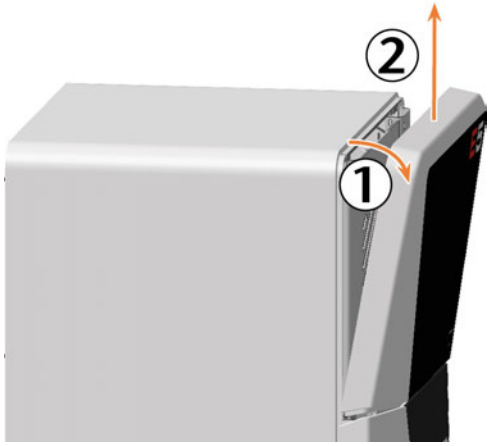


FIG. 214

7. Use the 1.5 Nm torque screwdriver to unscrew the 4 screws that secure the safety cover.
8. Remove the safety cover.

FIG. 215

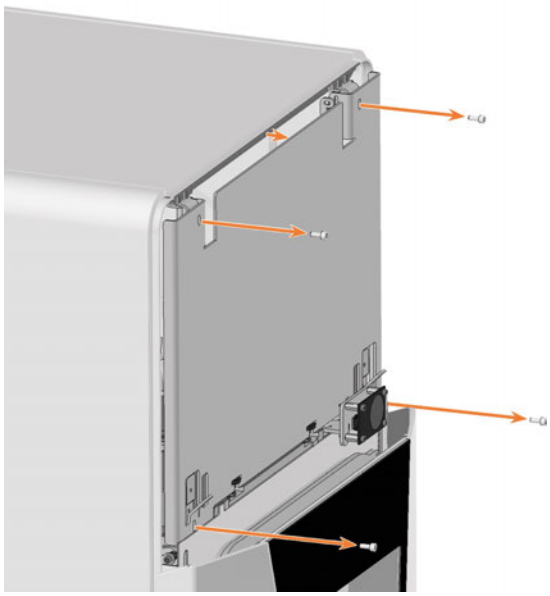


FIG. 216

9. Loosen the spindle cable by manually turning the knurled nut anti-clockwise.
10. Unplug the spindle cable from the spindle connector.
11. Remove the collet chuck release unit cable:
    Push both mounting clips on the connector toward the center and pull the connector out of the socket.

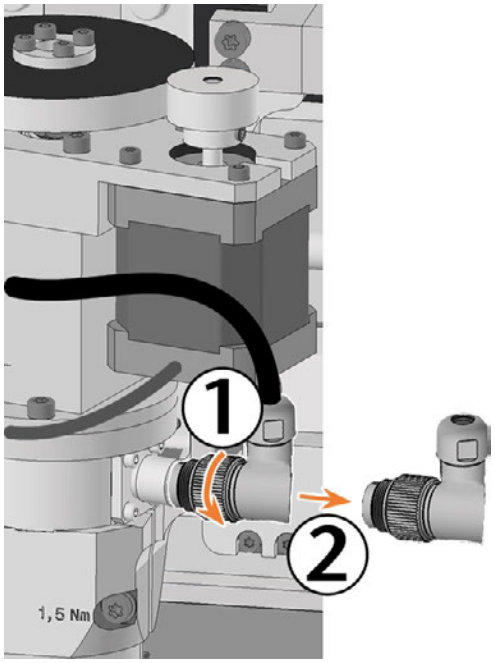


FIG. 217

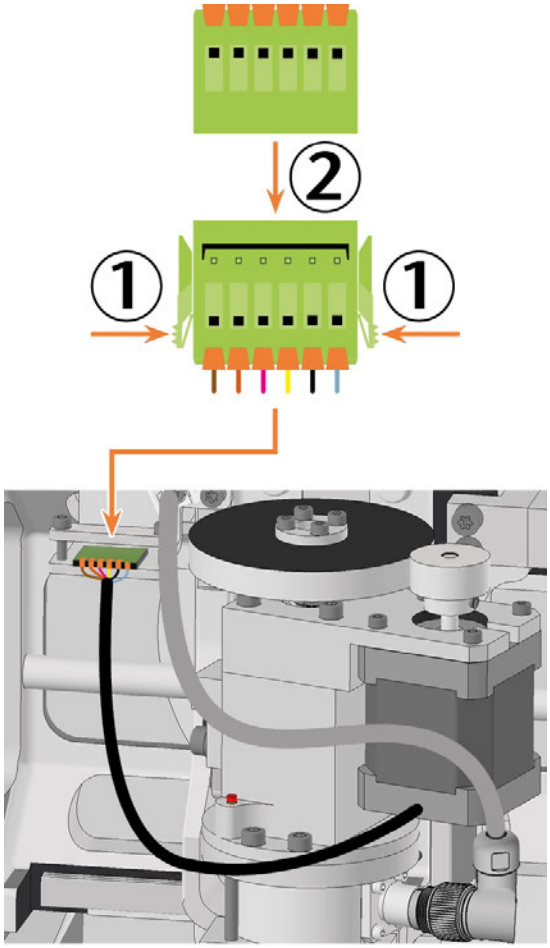


FIG. 218

12. Loosen the fixing screw with the torque screwdriver. Do not unscrew the screw completely.
13. Remove the spindle by pulling it upward out of the spindle holder.

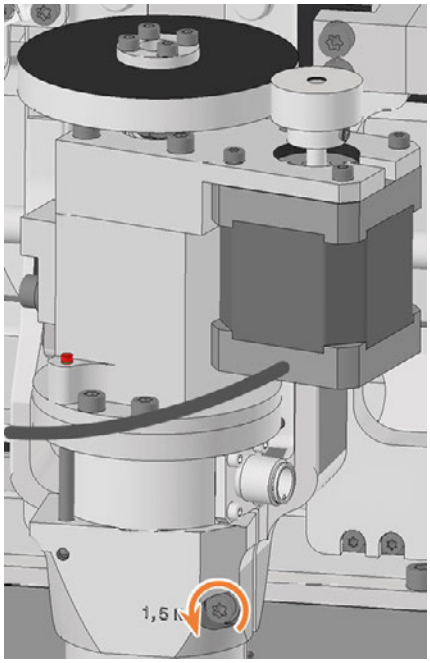


FIG. 219

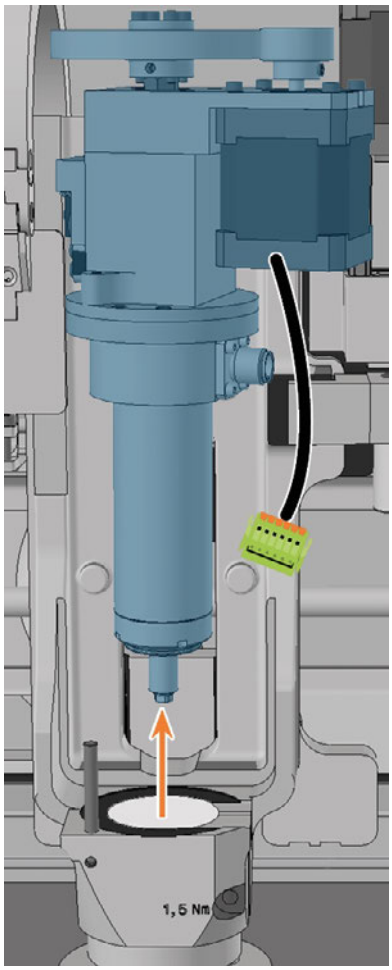
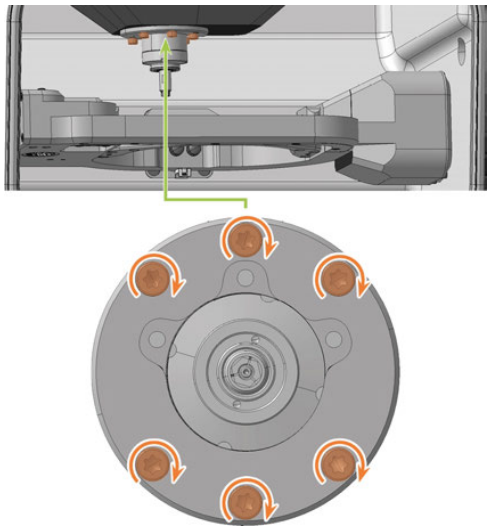


FIG. 220

14. If the spindle cannot be pulled out, do the following:
    a. Open the working chamber door using the emergency release.
    Emergency opening of the working chamber door – on page 110
    b. Loosen the screws securing the mounting washer to the bellow *without* unscrewing it.



    c. Close the working chamber door.
15. Pick up the spare spindle and locate the positioning pin hole (marked orange) on the bottom.
16. Rotate the spindle so that the positioning pin aperture (marked orange) is in the front left.

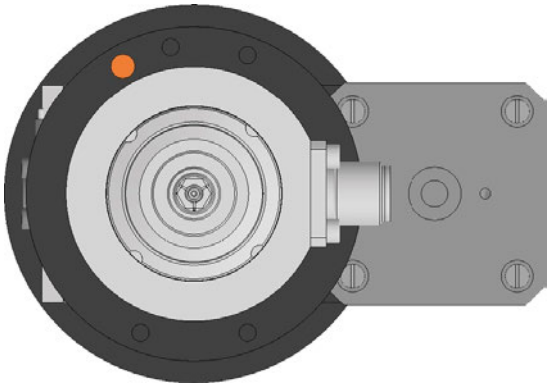


FIG. 221

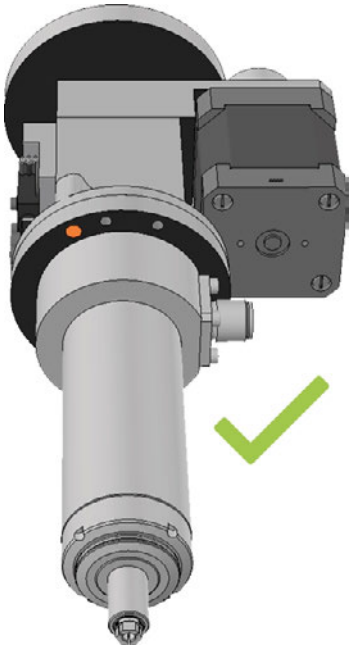


FIG. 222

17. Insert the replacement spindle from above into the spindle holder:
    a. Insert the positioning pin on the spindle bracket (marked in green) into the positioning pin opening (marked in orange) in the spindle.
    b. Gently push the spindle down, paying attention to the spindle height indicator.

✔ Once you have pushed the spindle down sufficiently, you will see the green ring on the spindle height indicator.

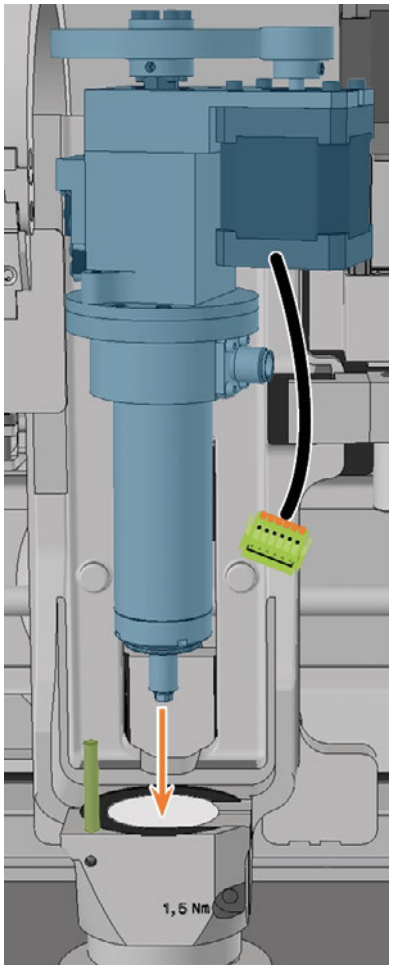


FIG. 223

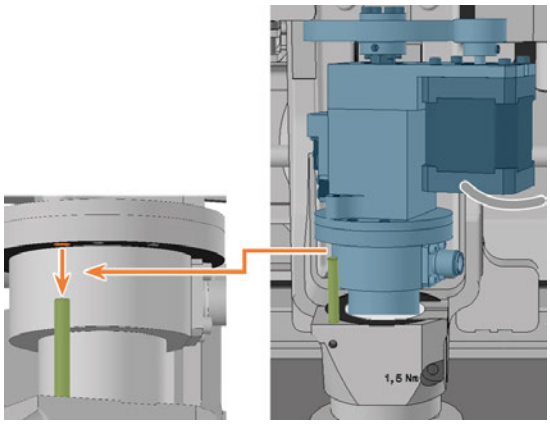


FIG. 224

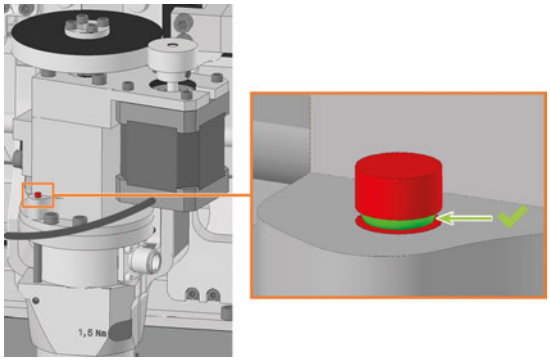


FIG. 225

18. Tighten the screw to fix the spindle using the torque screwdriver.
19. Plug the spindle cable into the spindle connector.
20. Tighten the spindle cable by manually turning the knurled nut clockwise.
21. Insert the collet chuck release unit cable into the corresponding connector in the machine.

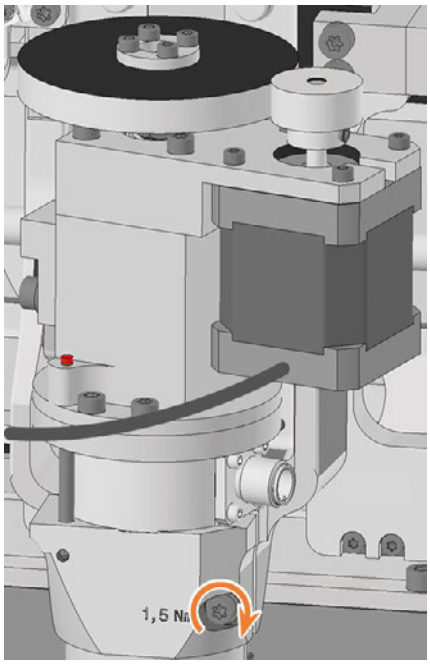


FIG. 226

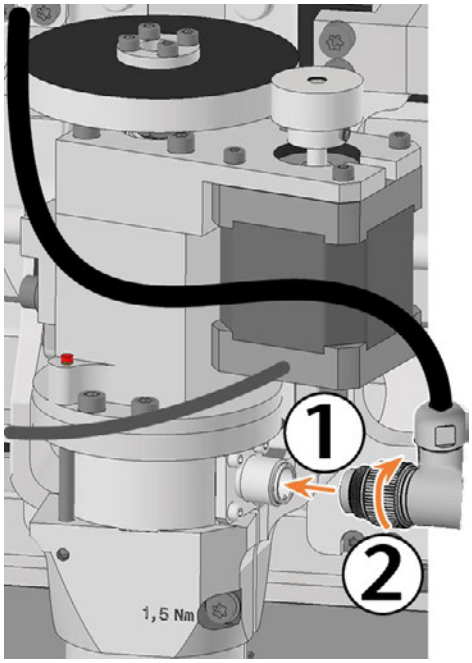


FIG. 227

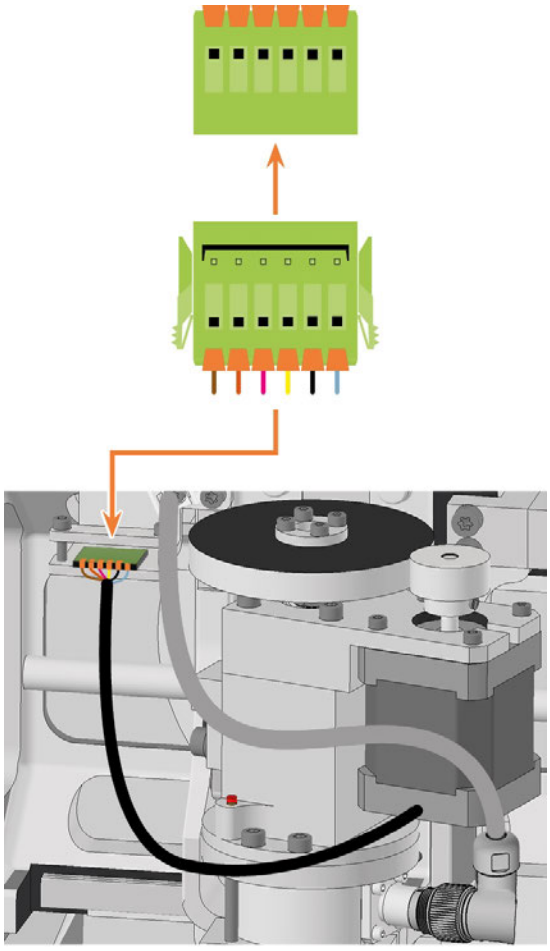


FIG. 228

22. Position the safety cover so that the 4 screw holes are located above the 4 screw holes in the machine housing.
23. Secure the safety cover to the machine housing using the 1.5 Nm torque screwdriver.

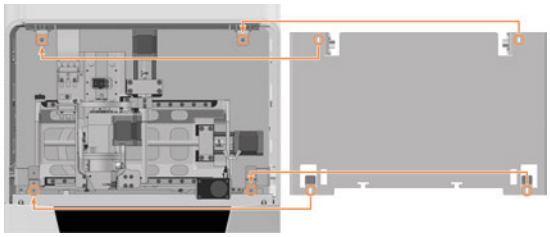


FIG. 229

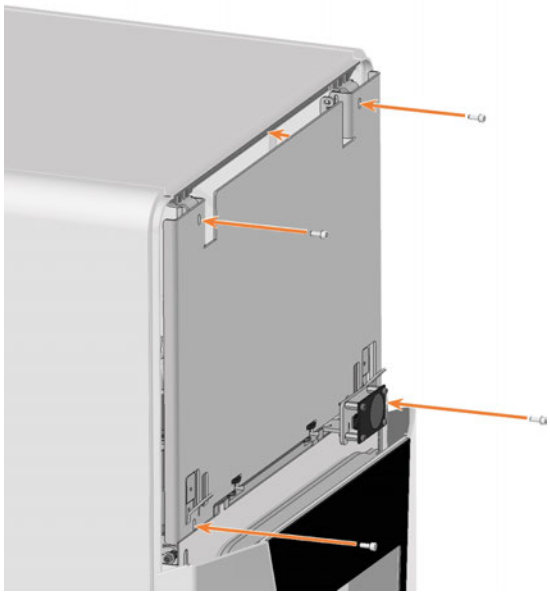


FIG. 230

FIG. 231

24. Attach the top service cover:

a. Insert the bolts (marked orange) of the service cover into the holders (marked green) on the safety cover.

b. Tilt the service cover towards the machine until it clicks into place.

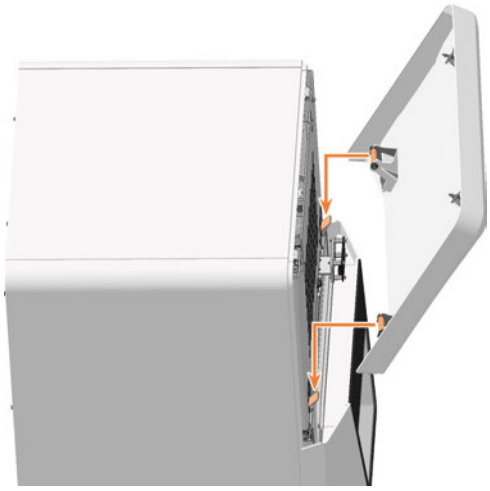


FIG. 232

FIG. 233

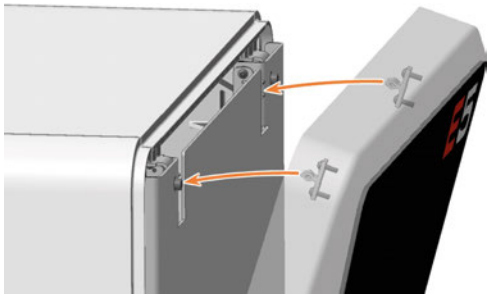


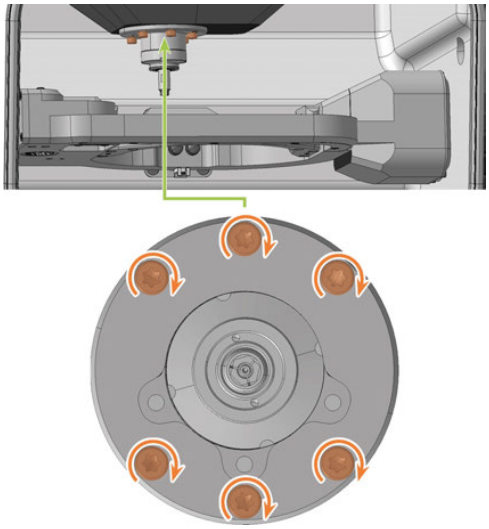
FIG. 234

25. Switch on the machine at the main power switch.

26. If you have loosened the screws securing the mounting washer to the bellow, do the following:

    a. Open the working chamber door.

    b. Tighten the screws.

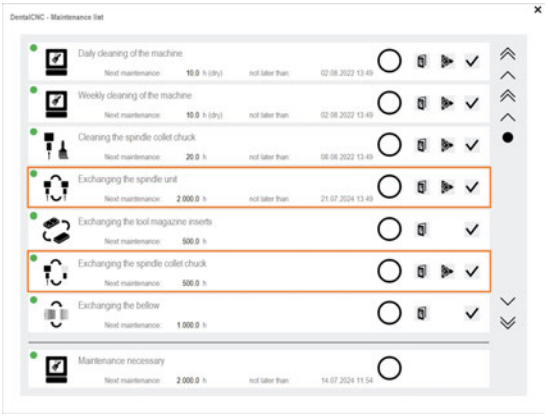


    c. Close the working chamber door.

27. Start DentalCNC.

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

28. Select the following icon of the entries **Exchange spindle** and **Exchange spindle collet chuck**: 



29. Mill a test specimen and calibrate the machine as necessary.

Calibrating the axes – on page 106

30. Contact customer service and have the spindle operating hours reset.

    This can be important for deciding warranty claims.

7.14 Exchanging the system module

NOTICE **Exchanging the system module requires Customer Service assistance**

The preparation for exchanging the system module and setup of the spare system module require Customer Service software configuration. Otherwise, your machine will not be operational.

The system module contains the following components:

- Power supply
- Control unit
- Connection panel

If one of these components is defective, replace the entire module.

Insert the module into the system module shaft.

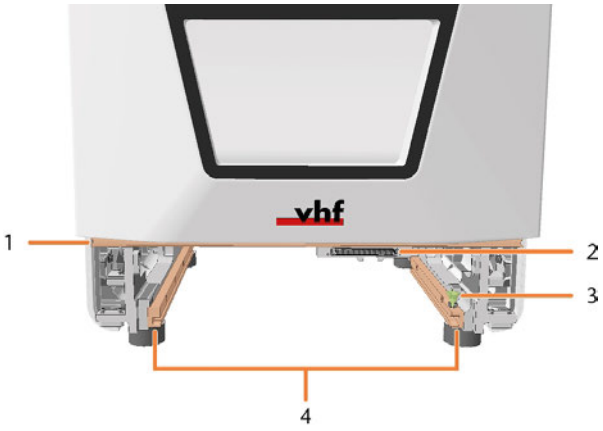


FIG. 235 EMPTY SYSTEM MODULE SHAFT

1. *Positioning bar for lower service cover*
2. *System module slot*
3. *Locking bolt**
4. *Guide rails*

*Exchange the locking bolt if required. *Exchanging the system module locking bolt* – on page 85

1. Contact customer service.

✔ Customer Service prepares the system module exchange.

2. Have ready:
   1 x Spare system module

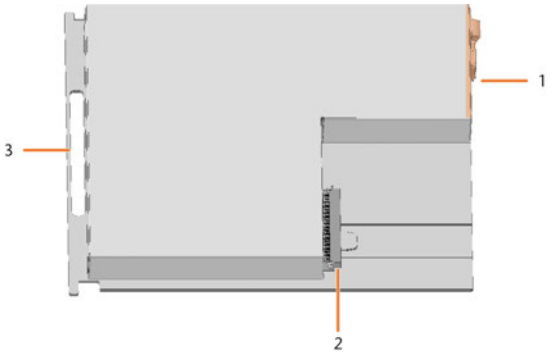


FIG. 236

1. *Connection panel*
2. *Connector for insertion into the system module slot*
3. *Handle*

3. Close DentalCNC.
4. ⚠ **DANGER!** Switch off the machine at the main power switch.

   NOTICE! **Damage to the cables and the system module if cables remain plugged into the module**
5. Disconnect the power and Ethernet cable.
6. Remove the lower service cover:
   a. Grasp the left and right sides of the cover.
   b. Pull the cover forward.

FIG. 237

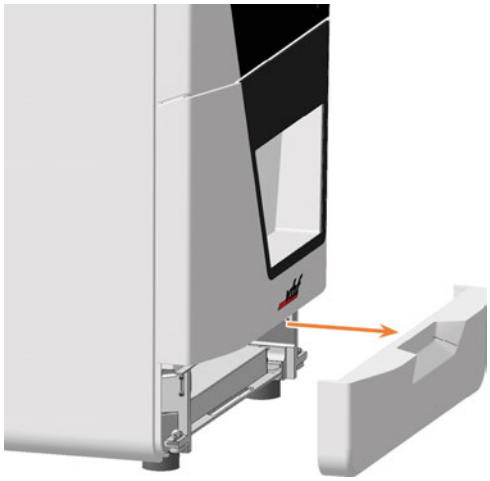


FIG. 238

7. Pull the locking bolt upwards and turn it clockwise.

✔ The locking bolt stays in position. The system module shaft is unlocked.

8. Pull the system module forward out of the shaft by the handle.

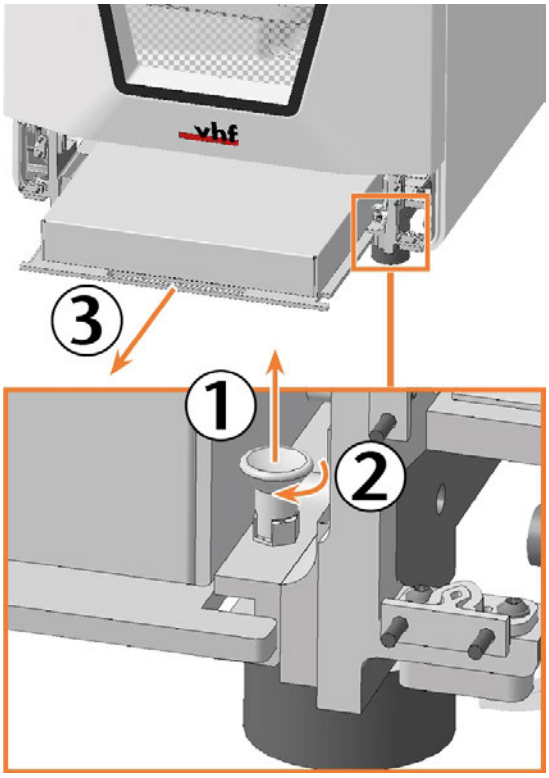


FIG. 239

9. Slide the spare system module with the connector on the right rear side into the system module shaft.

   Insert the base plate of the system module into the left and right guide rails.

FIG. 240

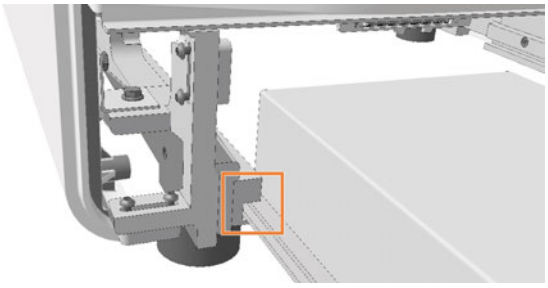


FIG. 241

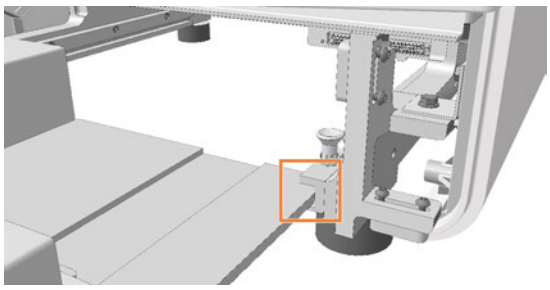


FIG. 242

✔ You can feel the connector sliding into the system module slot.

10. Turn the locking bolt counterclockwise.

✔ The locking bolt slides down. The system module shaft is locked.

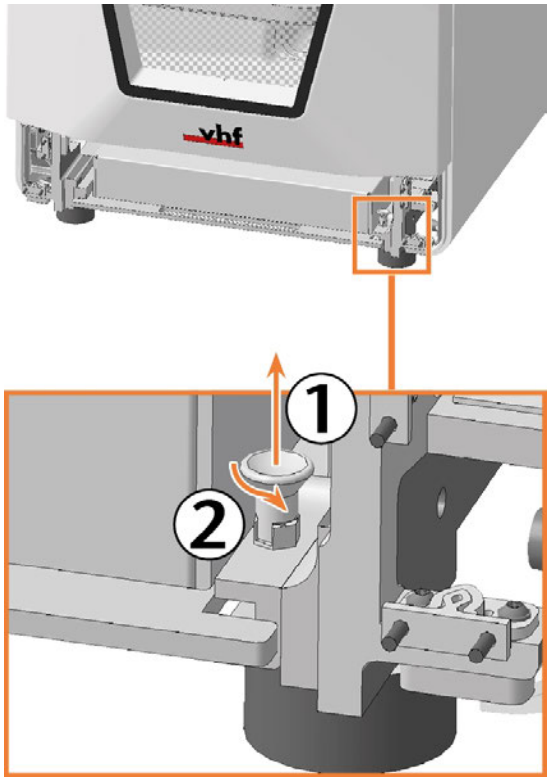


FIG. 243

11. Install the lower service cover:
    a. Place the top edge of the cover on the positioning bar above the system module shaft.
    b. Tilt the bottom half of the cover to the machine.
    c. Press the cover until it snaps into place.

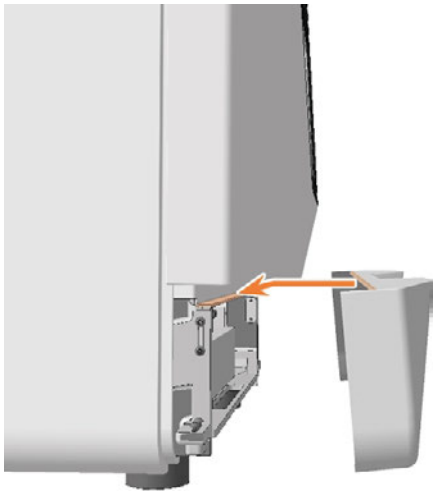


FIG. 244

FIG. 245

FIG. 246

12. Connect the Ethernet and power cables.
13. Switch on the machine at the main power switch.
14. Start DentalCNC
15. Contact customer service.

✔ Customer Service sets up the system module.

7.15 Exchanging the system module locking bolt

The locking bolt for the system module is fixed with a nut.

1. Have ready:
   - 1 x Spare locking bolt

FIG. 247

   - 1 x 8 mm wrench

FIG. 248

2. Remove the lower service cover and the system module.
   Exchanging the system module – on page 82
3. Loosen the nut with the wrench.
4. Remove the locking bolt.
5. Insert the spare locking bolt into the opening and tighten it with the nut.

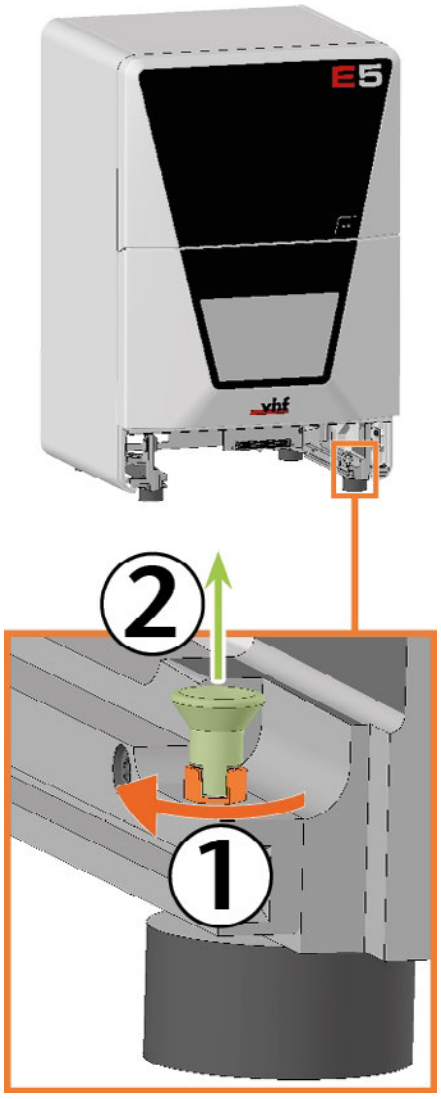


FIG. 249

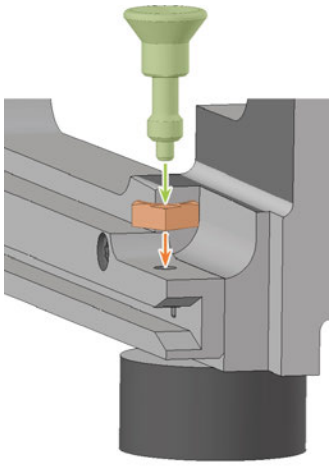


FIG. 250

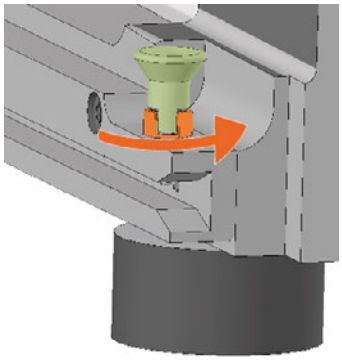


FIG. 251

6. Install the system module and the lower service cover.

Exchanging the system module – on page 82

7.16 Exchanging the measuring key protective cap

If the measuring key protective cap is torn or very soiled, exchange it.

1. Have ready:
   - 1 x Measuring key protective cap

FIG. 252

   - 1 x Suction unit with category M filter

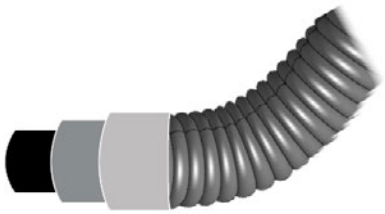


FIG. 253

2. ⚠ **CAUTION!** Wear gloves.
3. Remove the tool from position E1.
4. Suck the machining residues from the measuring key.

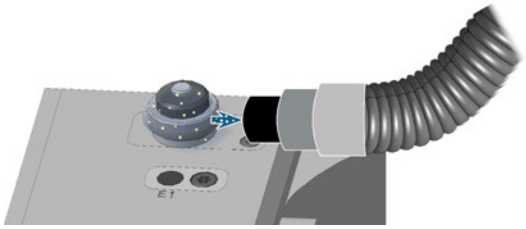


FIG. 254

5. Loosen the fixing ring by turning it by hand counter-clockwise. Pull the fixing ring up.
6. Remove the measuring key protective cap by pulling upward.

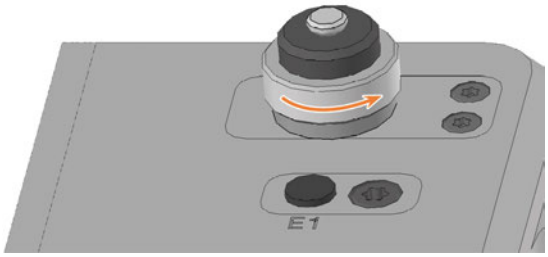


FIG. 255

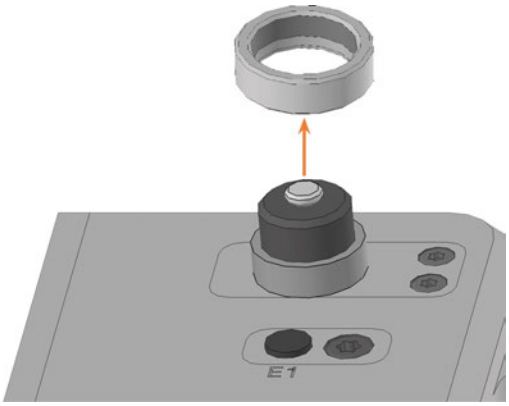


FIG. 256

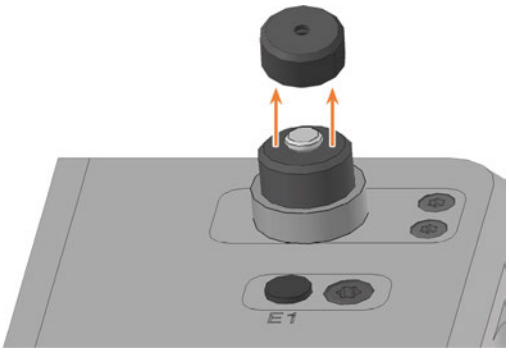


FIG. 257

7. Plug the replacement guard onto the measuring key pin.

   Make sure that the underside of the cap engages evenly at all points.
8. Replace the fixing ring by manually turning it in the clockwise direction.

7.17 Exchanging the measuring key

1. Have ready:
   - 1 x Spare measuring key

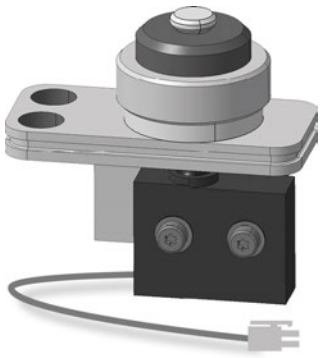


FIG. 258

   - 1 x Angle screwdriver TX10

FIG. 259

2. Open the working chamber door.
3. ⚠ **CAUTION!** Wear gloves.
4. Remove the tool from position E1.
5. Close DentalCNC.
6. Switch off the machine at the main power switch.
7. Use the TX10 angle screwdriver to remove the 2 screws holding the measuring key in place.
8. Gently pull the measuring key up a little. Pay attention to the plugged-in measuring key cable.
9. Push in the side clip on the connector of the measuring key cable and pull the connector out of the socket.

FIG. 260

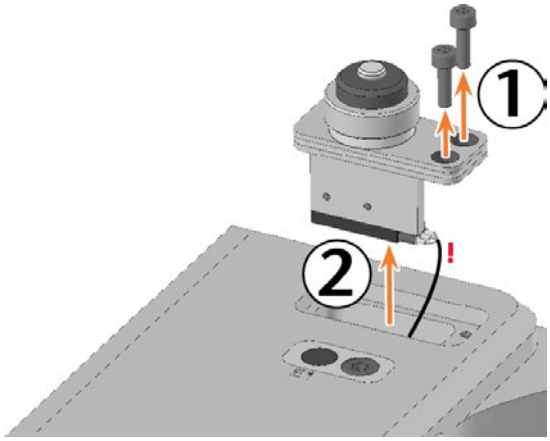


FIG. 261

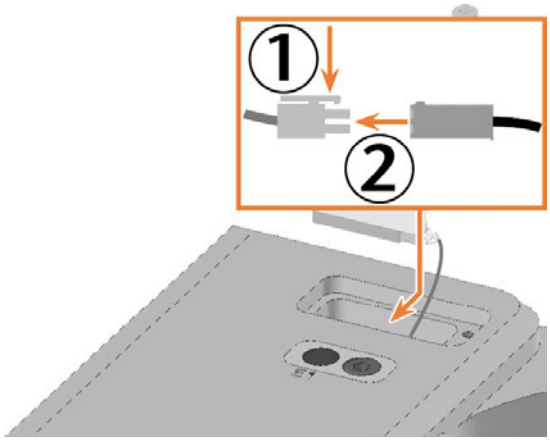


FIG. 262

10. Remove the measuring key with its cable from the working chamber.
11. Handle the spare measuring key.
12. Plug the measuring key cable connector into the socket in the A-B axis module.

13. Insert the spare measuring key into the opening as shown.
14. Use the TX10 angle screwdriver to tighten the spare measuring key with the 2 screws.

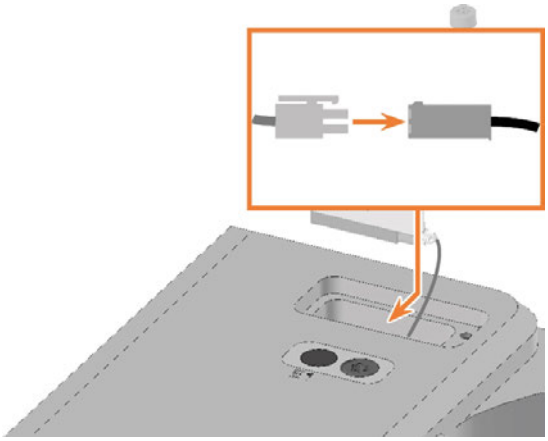


Fig. 263

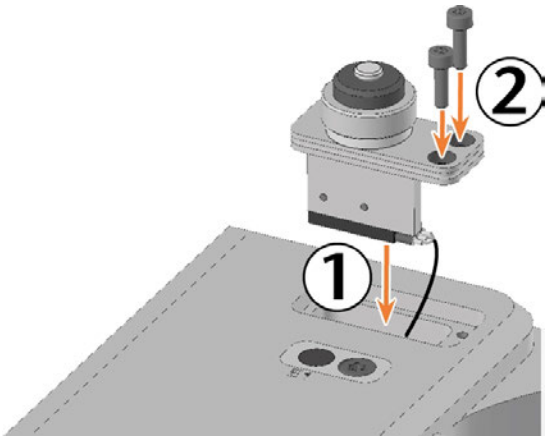


Fig. 264

Fig. 265

15. Close the working chamber door.
16. Start DentalCNC.
17. Switch on the machine at the main power switch.
18. Check that the measuring key is operational.
    See the DentalCNC manual.
19. If the measuring key does not work, check the wiring.
20. Measure the measuring key.
    See the DentalCNC manual.

7.18 Exchanging the fuser latches and clamping blocks on the upper service cover

If the top service cover no longer holds, exchange the fuser latches and the clamping blocks if necessary.

1. Have ready:
   - TX10 angle screwdriver

FIG. 266

   - Replacement fuser latch, number as required, maximum 2

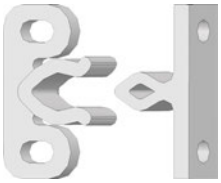


FIG. 267 SEPARATE LATCH: SOCKET LEFT, PLUG RIGHT

   - Spare voltage blocks (optional), number as required, maximum 2

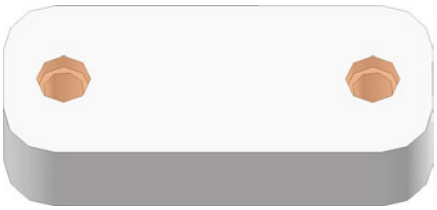


FIG. 268 SCREW HOLES MARKED ORANGE

2. Close the working chamber door.
3. Exit DentalCNC.
4. Switch off the machine at the main power switch.

1. Remove the upper service cover and safety cover.
   Exchanging the spindle unit – on page 75
2. Replace the connectors of the damaged fuser latches on the service cover:
   a. Loosen the 2 screws and remove the connectors.
   b. Screw on the spare connectors in the same position.

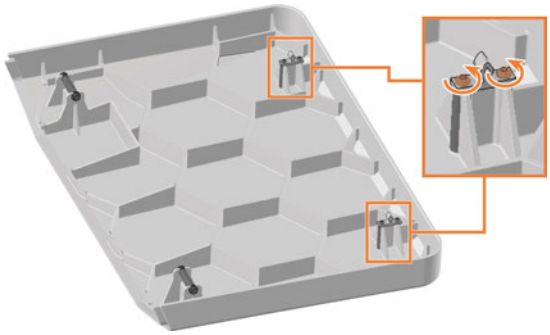


FIG. 269

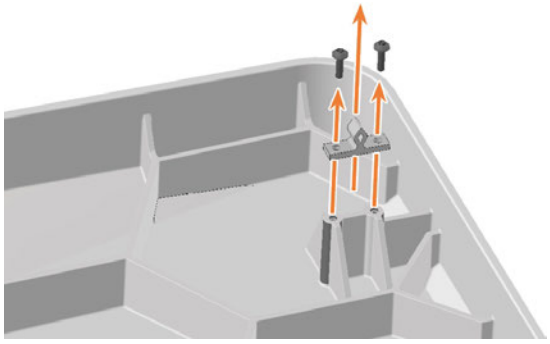


FIG. 270

3. Replace the sockets on the damaged fuser latches on the safety cover:
   a. Loosen the 2 screws and remove the jacks and clamping blocks.
   b. Screw on the spare sockets and clamping blocks in the same position.
      If necessary, use spare clamping blocks.

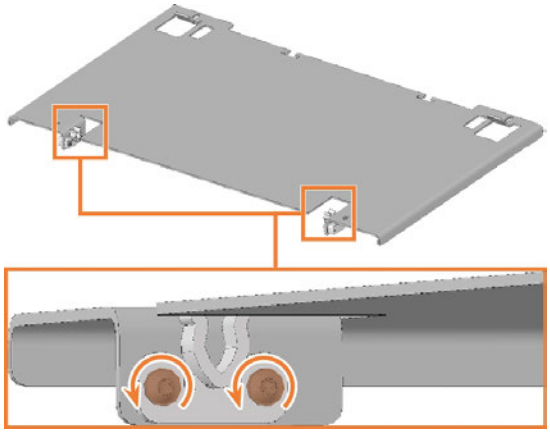


FIG. 271

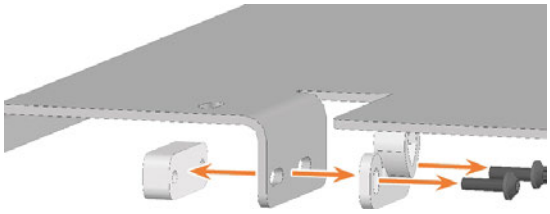


FIG. 272

4. Install the upper service cover and safety cover.
Exchanging the spindle unit – on page 75

7.19 Exchanging the fuser latches and clamping blocks on the lower service cover

If the lower service cover no longer holds, exchange the fuser latches and the clamping blocks if necessary.

1. Have ready:
   - TX10 angle screwdriver

FIG. 273

   - Replacement fuser latch, number as required, maximum 4

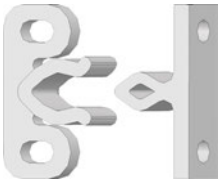


FIG. 274 SEPARATE LATCH: SOCKET LEFT, PLUG RIGHT

   - Spare voltage blocks (optional), number as required, maximum 4

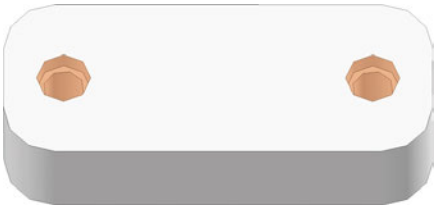


FIG. 275 SCREW HOLES MARKED ORANGE

2. Close the working chamber door.

1. Remove the lower service cover.
   Exchanging the system module – on page 82
2. Replace the connectors of the damaged fuser latches on the service cover:
   a. Loosen the 2 screws and remove the connectors.
   b. Screw on the spare connectors in the same position.

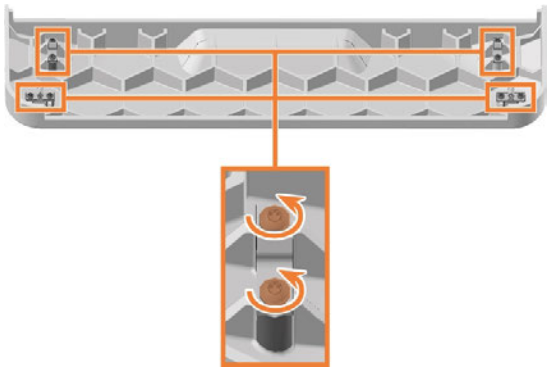


FIG. 276

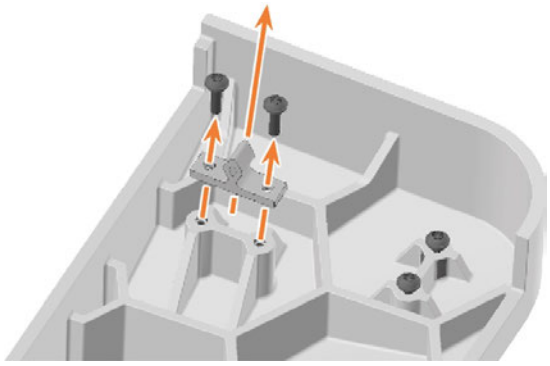


FIG. 277

3. Replace the sockets on the damaged fuser latches on the machine housing:
   a. Loosen the 2 screws and remove the jacks and clamping blocks.
   b. Screw on the spare sockets and clamping blocks in the same position.
      If necessary, use spare clamping blocks.

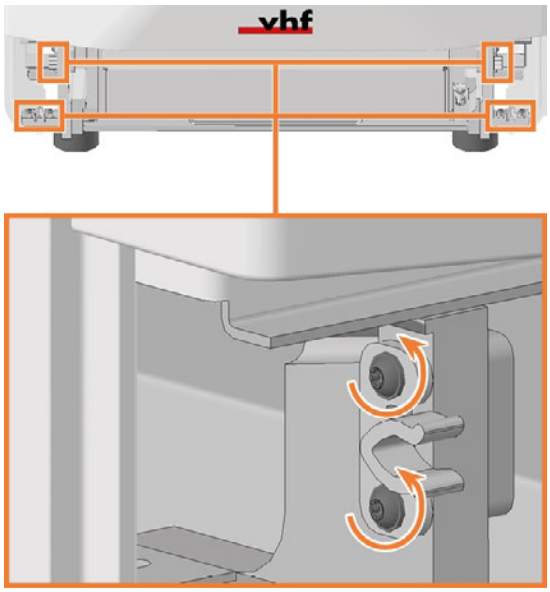


FIG. 278

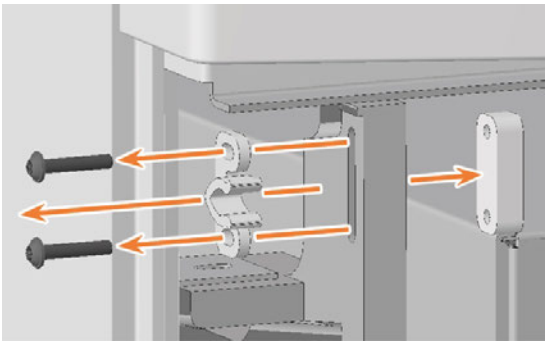


FIG. 279

4. Install the lower service cover.

Exchanging the system module – on page 82

7.20 Exchanging the gasket of the working chamber door

The gasket of the working chamber door is clamped to the edge of the machine housing which surrounds the opening to the working chamber.

Fig. 280 The gasket of the working chamber door (marked orange)

1. Have ready:
   - 1 x Spare gasket

Fig. 281

   - 1 x Cleaning cloth

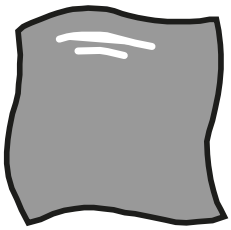


Fig. 282

   - 1 x Wire cutter

Fig. 283

2. Open the working chamber door.
3. Remove the existing door gasket. Start where the ends of the gasket meet.
4. Clean the surface on which the gasket is located with the cloth.

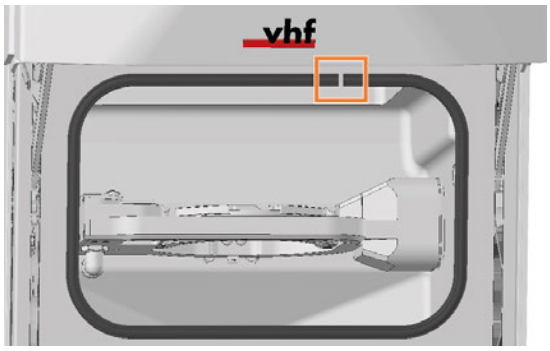


Fig. 284

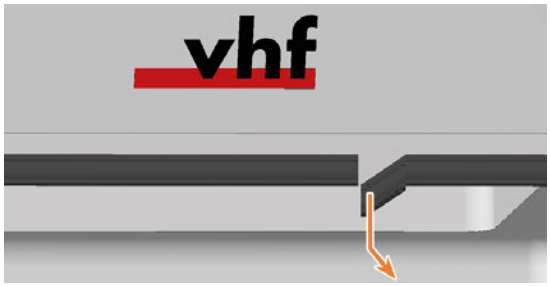


Fig. 285

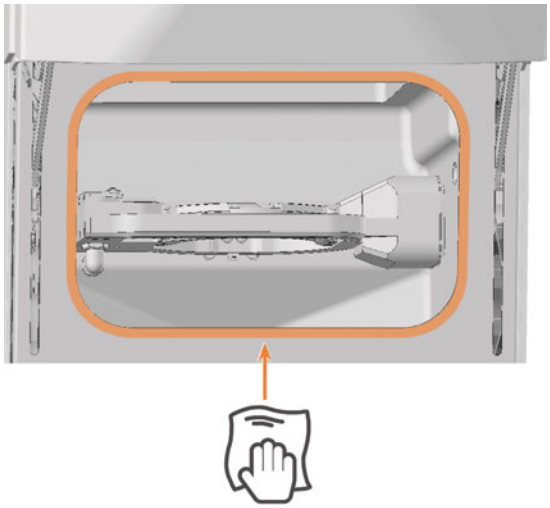


FIG. 286

5. Clamp the spare gasket to the edge surrounding the opening to the working chamber:
   a. Align the spare gasket such that the gap in the gasket is at the top.
   b. Clamp the 1st end of the gasket to the center of the upper edge.
   c. Clamp the remaining part of the gasket on in a clockwise direction until just before the 1st end.

      Ensure that the entire gasket is firmly clamped to the edge.
   d. Clamp the 2nd end at the opening:
      a. Use wire cutters to cut the gasket to length with a projection of approx. 5 mm to the 1st end.
      b. Clamp the 2nd end gap-free to the 1st end at the opening.

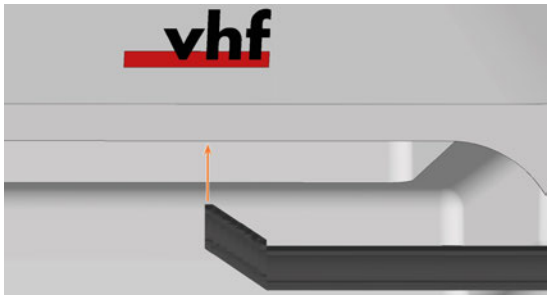


FIG. 287

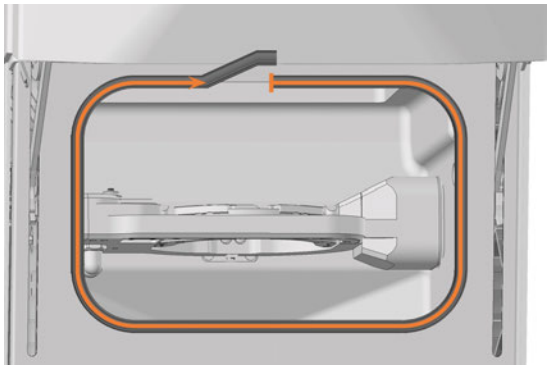


FIG. 288

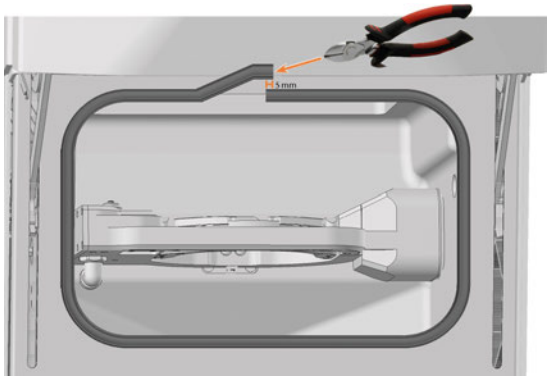


FIG. 289

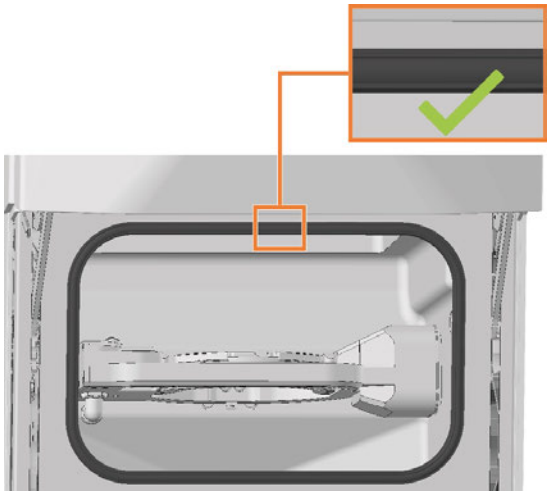


FIG. 290

6. Check whether the working chamber door opens and closes correctly and whether the working chamber door lies flat.
7. If one of the points does not apply, adjust the placement of the gasket.

7.21 Exchanging the A-B axis module cover caps

4 cover caps protect the 4 fixing screws of the machining unit from machining residues.

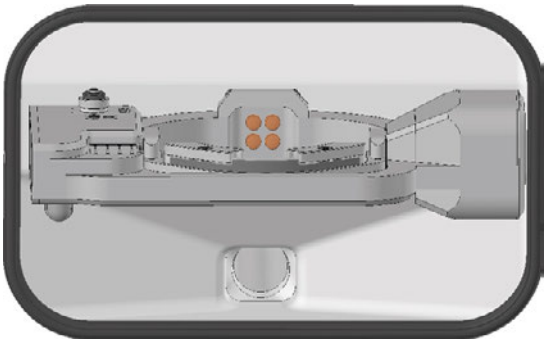


Fig. 291 Cover caps on the fixing screws of the A-B axis module (marked orange)

1. Have ready:
   4 x Spare cap

Fig. 292

2. Open the working chamber door.
3. ⚠ **CAUTION!** Wear gloves.
4. Pull the 4 cover caps (marked orange) off the 4 fixing screws on the A-B axis module.
5. Plug the spare caps onto the fixing screws.

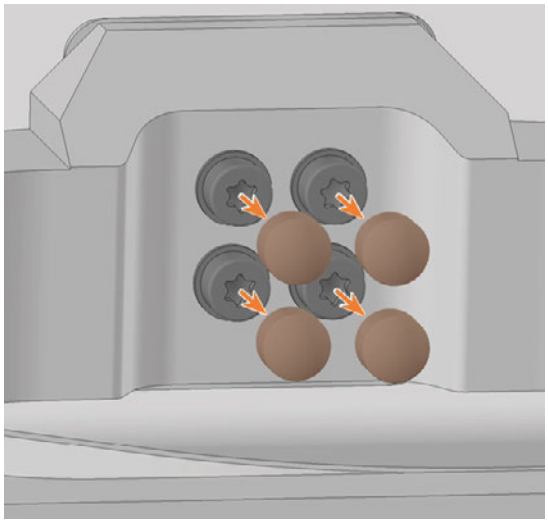


Fig. 293

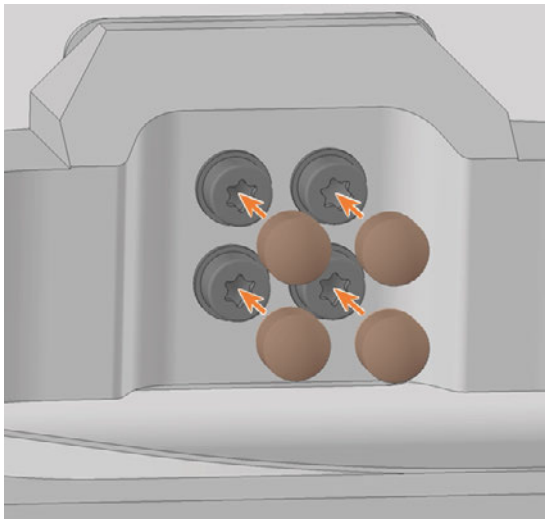


Fig. 294

7.22 Exchanging the working chamber door

1. Have ready:
   - 1 x Torque screwdriver 1.5 Nm with TX20 bit

FIG. 295

   - 1 x Spare working chamber door

2. Open the working chamber door so that the lower working chamber door handles (marked green) are aligned parallel to the machine floor.

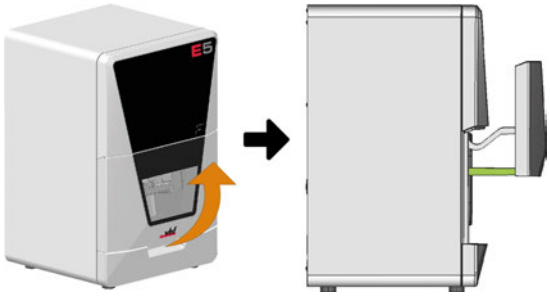


FIG. 296

3. Hold the working chamber door in place. Use the 1.5 Nm torque screwdriver to loosen the 4 screws (marked orange) that secure the working chamber door to the working chamber door bracket.
4. Remove the working chamber door.

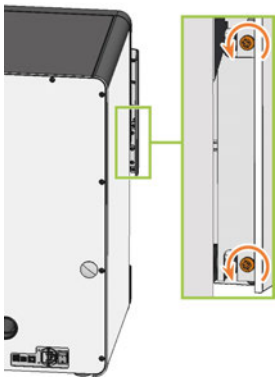


FIG. 297

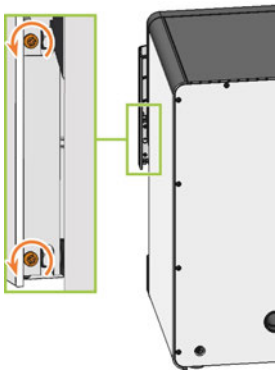


FIG. 298

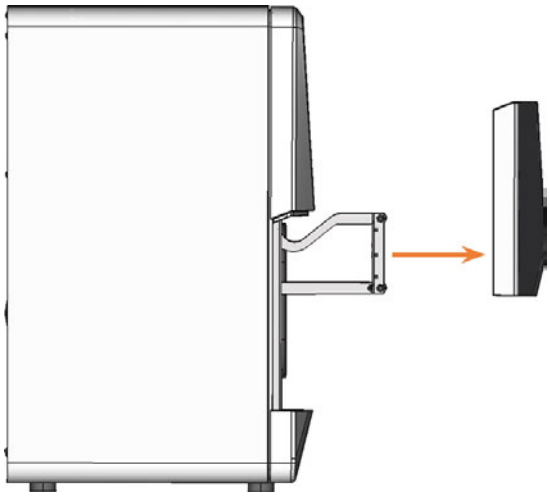


FIG. 299

5. Position the spare working chamber door so that the 4 screw holes on the rear of the working chamber door (marked orange) align with the 4 screw holes in the working chamber door bracket (marked green).

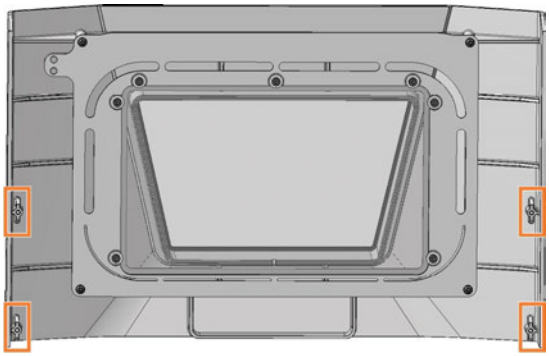


FIG. 300

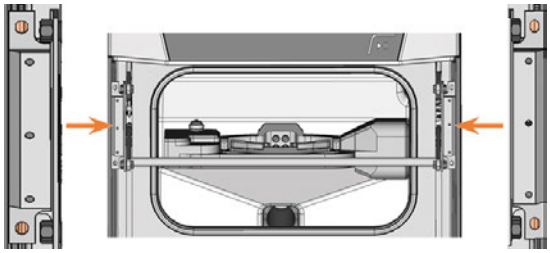


FIG. 301

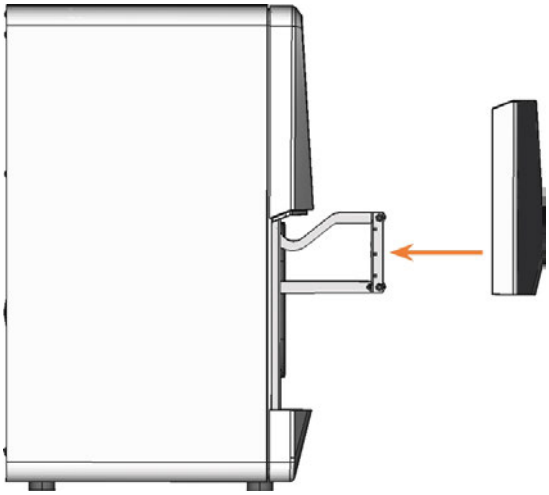


FIG. 302

6. Using the 1.5 Nm torque screwdriver, screw down the working chamber door with the 4 self-tapping screws (marked orange).
7. Test if the working chamber door opens and closes properly. If not, loosen the 4 screws and correct the position of the working chamber door.

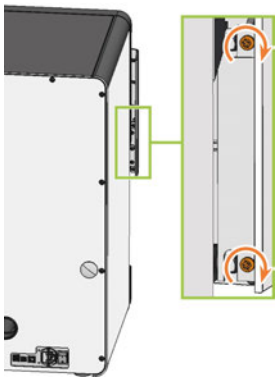


FIG. 303

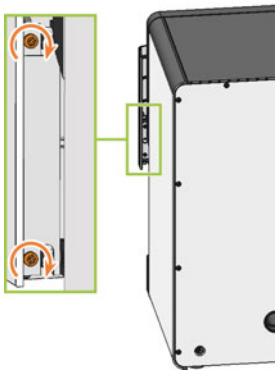


FIG. 304

FIG. 305

7.23 Exchanging the A-B axis module

1. Have ready:
   - 1 x Angle screwdriver TX25

FIG. 306

   - 1 x Torque screwdriver 5.0 Nm with TX25 bit (supplied with the spare part)

FIG. 307

   - 1 x Spare A-B axis module

FIG. 308

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

FIG. 309

   - 1 x Calibration set

FIG. 310

   - 1 x Side cutter

FIG. 311

2. Close DentalCNC.
3. Open the working chamber door.
4. Switch off the machine at the main power switch.
5. ⚠ **CAUTION!** Wear gloves.
6. ***NOTICE!*** Remove all tools from the tool magazine and remove the AirTool from the insert **E1**.
7. Disconnect the A-axis cable of the A-B axis module from the cable socket:

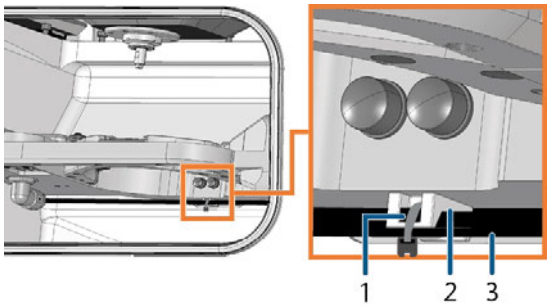


FIG. 312

1. *Cable ties*
2. *Cable socket*
3. *A-axis cable*

NOTICE! Damage to the A-axis cable if you apply the side cutter too deeply.

a. Carefully cut the cable tie at the cut line (marked green) with the side cutter. Do not damage the A-axis cable in the process.

b. Pull the A-axis cable downwards out of the cable socket.

c. Remove the cable tie.

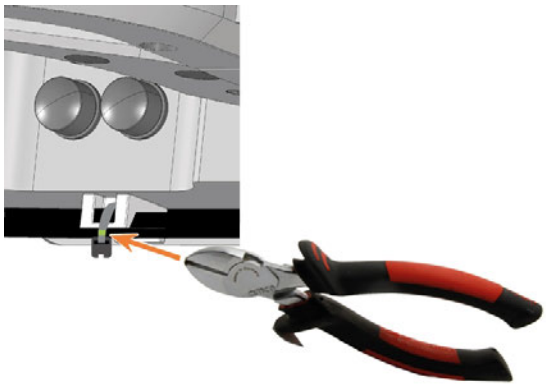


FIG. 313

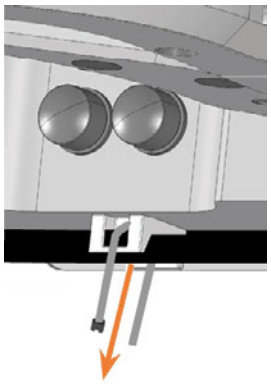


FIG. 314

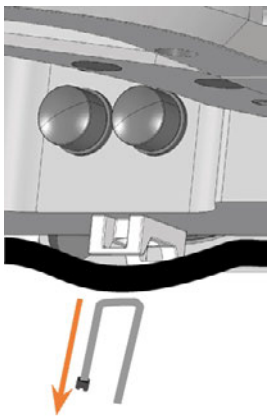


FIG. 315

8. Disconnect the A-axis cable of the A-B axis module:

   a. Open the knurled nut at the left on the underside of the A-B axis module.

   b. Pull the cable off downwards at the plug.

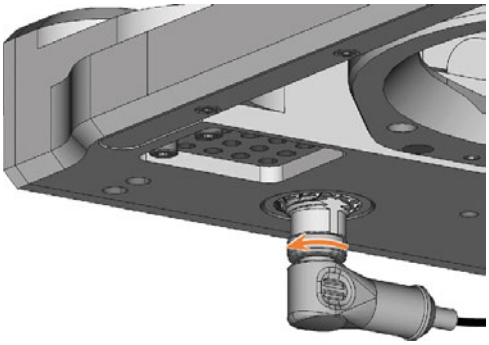


FIG. 316

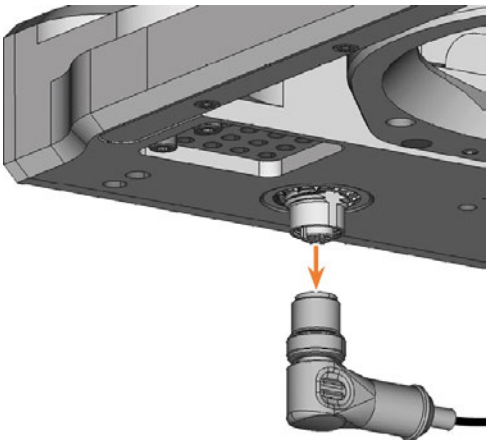


FIG. 317

9. Remove the blank from the blank holder if present.

Mounting and removing blanks – on page 34

10. Pull the 4 cover caps (marked orange) off the 4 fixing screws on the A-B axis module.

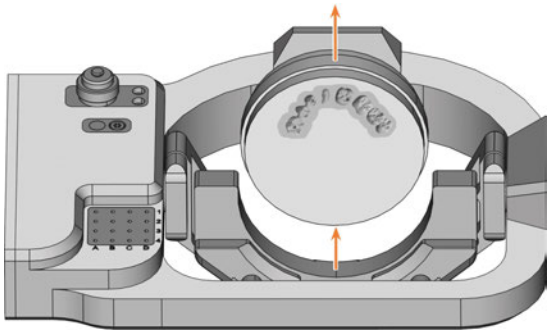


FIG. 318

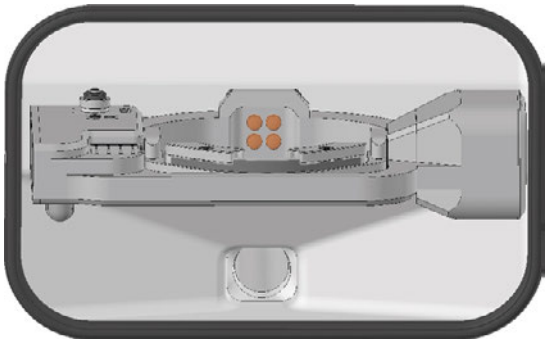


FIG. 319

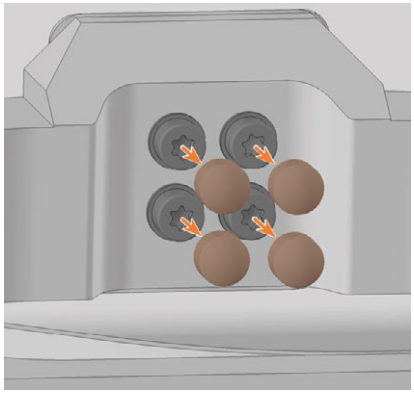


FIG. 320

11. Unscrew the 4 fixing screws of the A-B axis module with the angle screwdriver. Remove the fixing screws and washers.
12. Grasp the A-B axis module with both hands and pull it forwards off the driveshaft. Remove the A-B axis module from the working chamber.

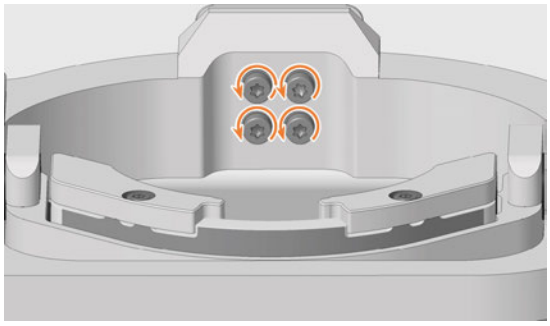


FIG. 321

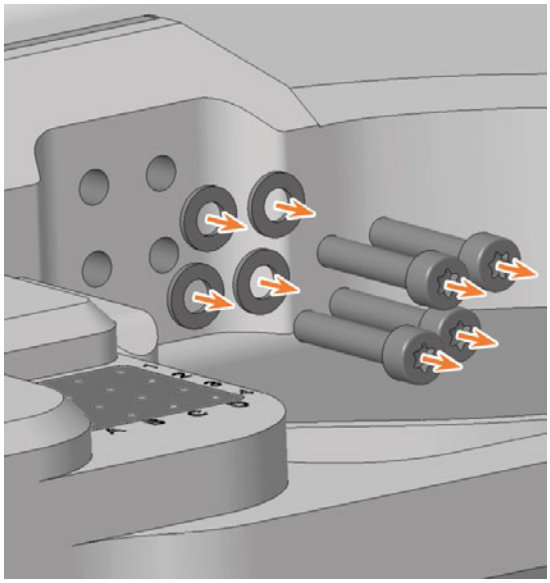


FIG. 322

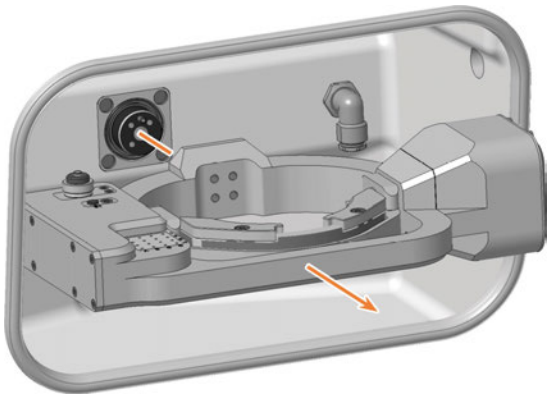


FIG. 323

13. Using both hands, slide the spare A-B axis module onto the driveshaft. Insert the positioning pin on the driveshaft (marked orange) into the opening at the rear of the A-B axis module (marked green).

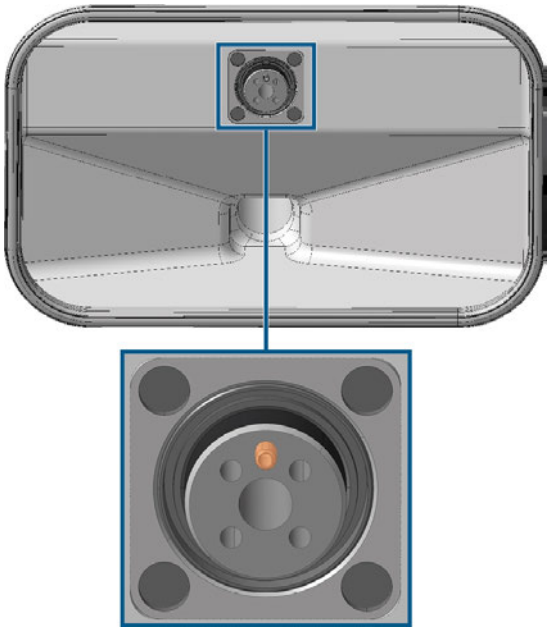


FIG. 324 POSITIONING PIN ON THE (MARKED ORANGE) DRIVESHAFT

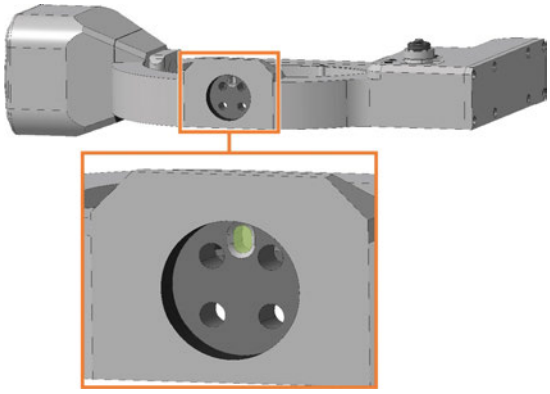


FIG. 325 POSITIONING PIN DRILLING AT THE REAR OF THE A-B AXIS MODULE (MARKED GREEN)

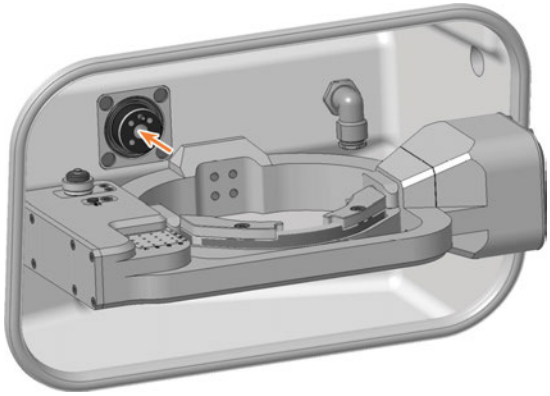


FIG. 326

14. Use the torque screwdriver (5.0 Nm with bit TX25): Screw on the A-B axis module crosswise with the 4 washers (marked orange) and the 4 fixing screws.

15. Attach the 4 cover caps to the 4 fixing screws of the A-B axis module.

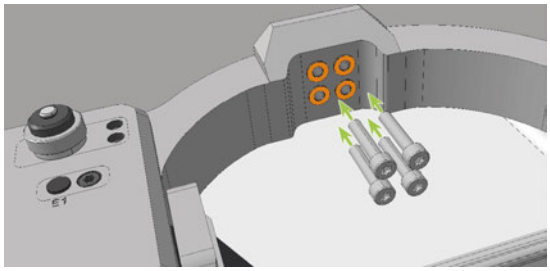


FIG. 327

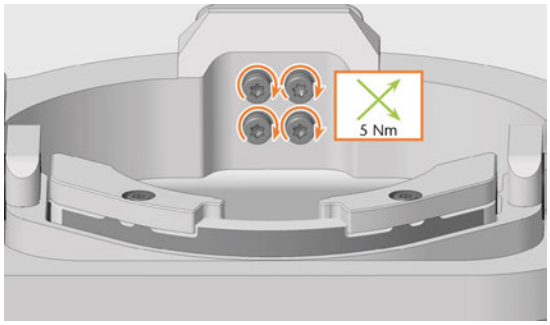


FIG. 328

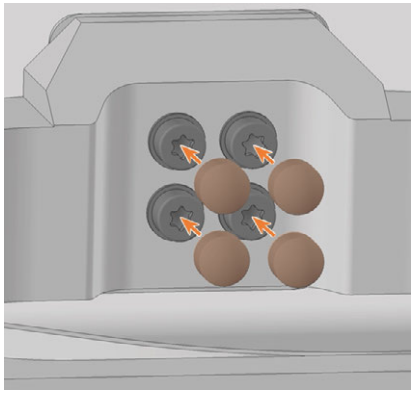


FIG. 329

16. Connect the A-axis cable to the connector at the left side of the underside of the A-B axis module:
    a. Plug in the connector of the cable.
    b. Screw the connector tight with the knurled nut.

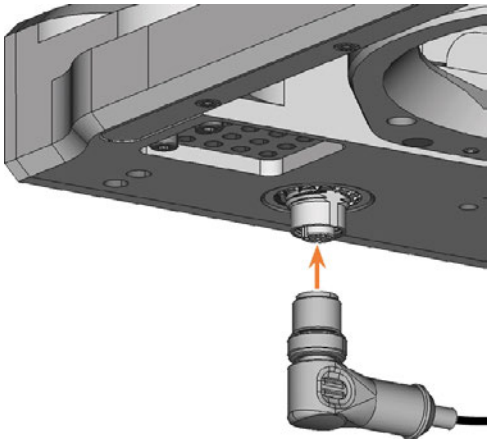


FIG. 330

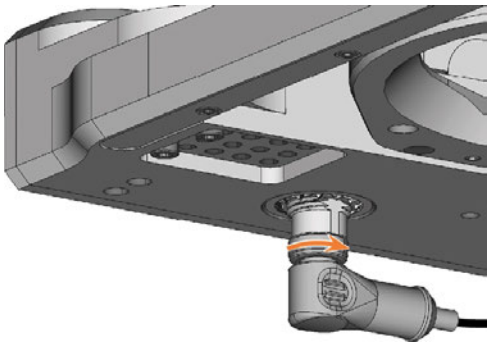


FIG. 331

17. Fasten the A-axis cable to the cable socket (marked green) with the cable tie:

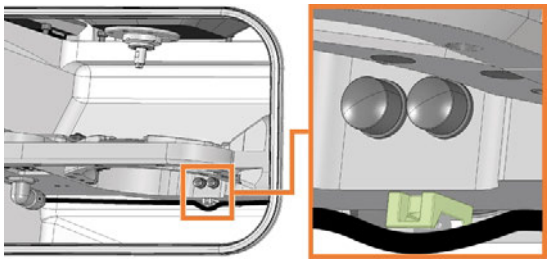


FIG. 332

FIG. 333 CABLE TIE; EYELET MARKED ORANGE

a. Insert the cable tie into the cable socket from below. Bend it around the brackets of the cable base.

b. Press the A-axis cable into the cable base and hold it in this position.

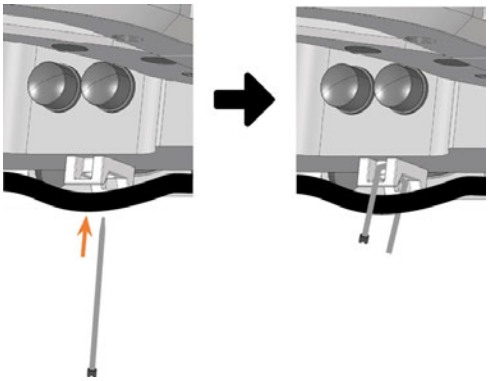


FIG. 334

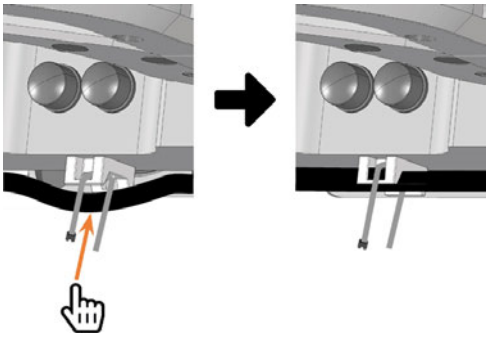


FIG. 335

c. Insert the end of the cable tie without the eyelet into the eyelet on the cable tie. Tighten the cable tie.

d. Cut off the protruding part of the cable tie with the side cutter.

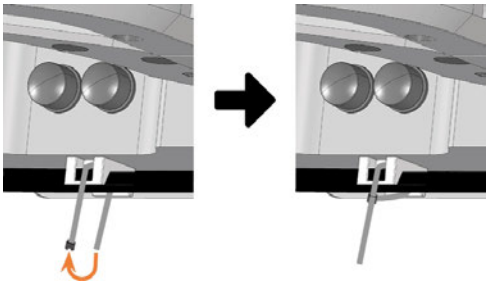


FIG. 336

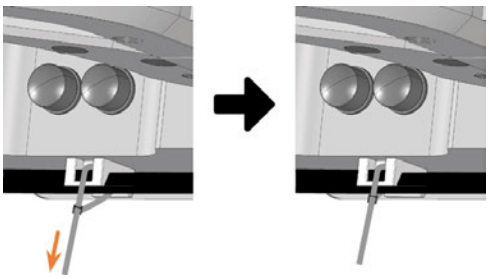


FIG. 337

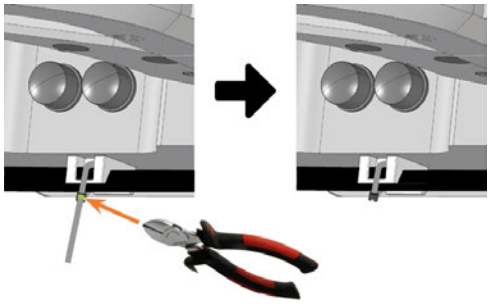


FIG. 338

18. Close the working chamber door.
19. Switch on the machine at the main power switch.
20. Start DentalCNC.
21. Calibrate the machine with manual tool change:
    a. In the **Machine data** view in DentalCNC, turn on the manual tool change for the **T17** position.
    b. Assign the calibration tool to the AirTool insert **E1** in the **tool management view**.
    c. Calibrate the machine with DentalCNC. When prompted, manually insert the calibration tool into the collet chuck.
    Calibrating the axes – on page 106
22. Measure the measuring key with DentalCNC.
23. Drill tool positions into the tool magazine inserts.
24. Calibrate the machine with automatic tool change:
    a. In the **Machine data** view in DentalCNC, turn on the manual tool change for the **T17** position.
    b. Insert the calibration tool into AirTool insert **E1**.
    c. Calibrate the machine with DentalCNC.
25. Use a test specimen to check the mechanical accuracy of the machine.
26. If the test specimen is out of tolerance, contact Customer Service.
27. Open the **Maintenance section** window with the following icon in the main icon bar:
28. Select the icon shown for the **Exchange tool magazine inserts** entry.

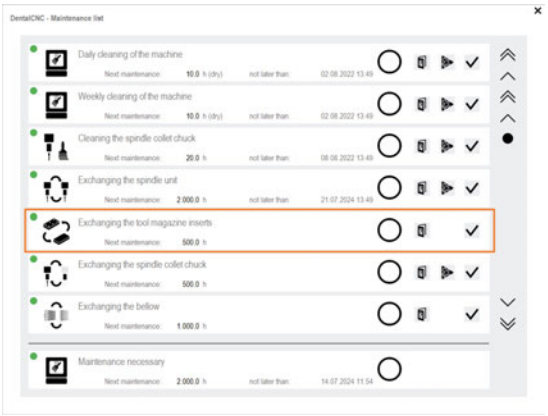


FIG. 339

7.24 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

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.

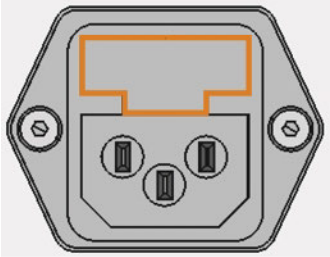


Fig. 340 Cover of the fuse (marked orange)

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

7.25 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.

Calibrating the machine with a test and calibration specimen may improve machining results.

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

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

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

7.25.1 Calibration workflow:

1. Have the calibration set readily available
   The set was provided with your machine.
2. Manufacture and measure a *test specimen*
   If the measuring values are within tolerance, your machine mechanics are accurate and you do not need to calibrate the machine. If they are out of tolerance, continue with calibrating the machine.
3. Manufacture and measure a *calibration* specimen and enter the measuring values into DentalCNC.
   This data is used to calculate the required calibration.
4. Check if calibration was successful with another *test* specimen
   Verify that the calibration has improved the machining results.

7.26 Updating the software and firmware

7.26.1 Updating DentalCAM & DentalCNC

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

7.26.2 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.

8 Troubleshooting

This chapter provides machine-specific troubleshooting information.

General interactive troubleshooting guides are available at dentalportal.info.

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

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

8.1 Links to troubleshooting guides

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

8.2 Machine-specific notes

8.2.1 Loud machining noise

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

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

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

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

8.2.2 How to proceed in the event of a machine malfunction

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

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

8.2.3 How to proceed in the event of a tool breakage

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

- The next regular tool change

A tool breakage can be caused by the following:

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

If a tool breaks, do the following:

1. Open the working chamber door.
2. Remove all parts of the broken tool from the working chamber and the collet chuck.
3. Re-add the tool to the virtual ATB *and* virtual tool magazine in DentalCNC.
4. If the spindle picked up the tool from the tool magazine, check if the tool was inserted into the correct position. Insert a spare 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.

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

8.2.4 How to proceed in the event of a power failure

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

» After a short power failure, restart the machine and the CAM computer.

» If you need to access the working chamber in case of a longer power failure, perform an emergency opening of the working chamber door.

8.3 Emergency opening of the working chamber door

⚠ 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 emergency release is located on the rear of the machine.

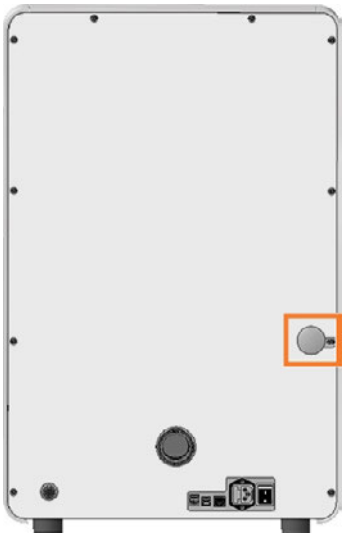


FIG. 341

1. ⚠ **DANGER!** Switch off the machine at the main power switch.
2. Disconnect the machine from the eletrical source.
3. Remove the protective cap from the emergency release opening.
4. Pull the ring up to the stop and hold it in this position.
5. Open the working chamber door.
6. Let go of the ring.
7. ⚠ **CAUTION!** Wear gloves.
8. Carry out your work in the working chamber.
9. Close the working chamber door.

   ⚠ **WARNING! Danger of crushing and cutting injuries when the working chamber door is unlocked during operation**
10. Check if the working chamber door is actually locked.

    If this is not the case, try once again to lock the working chamber door.
11. If the working chamber door cannot be locked, secure the machine against being switched on again. Contact customer service.
12. Close the opening for the emergency release again with the protective cap.

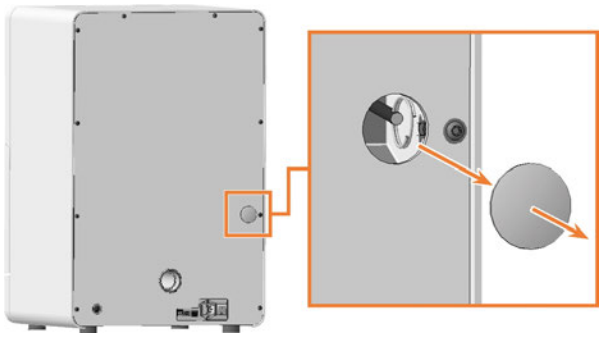


FIG. 342

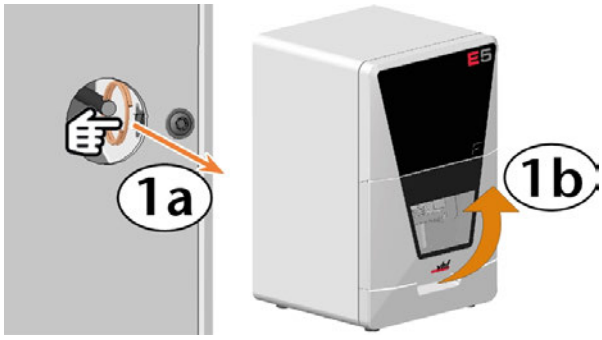


FIG. 343

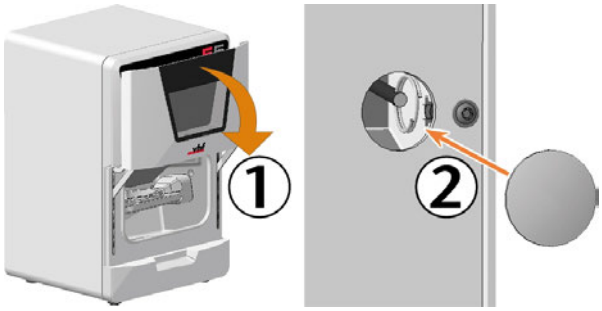


FIG. 344

8.4 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:

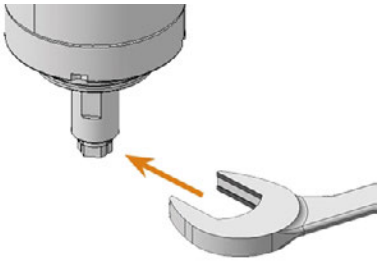


FIG. 345

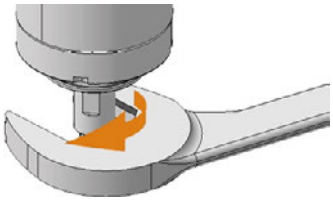


FIG. 346

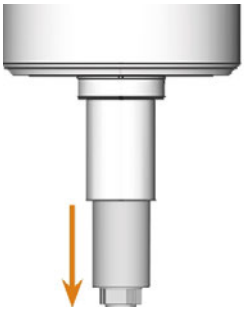


FIG. 347

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. 348

FIG. 349

6. Clean and grease the collet chuck and reinstall it:

Cleaning the collet chuck – on page 56

9 Disposal

9.1 Disposing machining residues

9.1.1 General

» Avoid entry of hazardous machining residues into the soil, water or into sewers.

» Keep a sample of the product to be disposed of for at least 6 months.

» If required, have the products disposed of by an approved disposal company.

9.1.2 Solid machining residues

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

9.2 Disposing of the machine

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

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

» Before sending the machine in for disposal, contact your dealer's customer service or recycling@vhf.de.

» Delete all personal data under your own responsibility from all data carriers of the internal and / or external devices.

» If necessary, have the machine disposed of by an approved disposal company.

9.3 Dismantling, transport and packaging

Transportation and storage (page 9)

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