

# Original Operating Instructions

## Z4



Originalbetriebsanleitung  
Instrucciones de uso originales  
Mode d'emploi d'origine  
Istruzioni d'uso originali  
**dentalportal.info**





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# 1 Welcome

Thank you for your purchase of this Z4 dental machine. The machine is delivered to you with pride and confidence. It was produced using the latest techniques and strict quality control.

These operating instructions were prepared to help you understand all functions of your new dental machine. It should also help you keep the machine in good conditions so that you may enjoy many hours of productive work.

You may find updates to this document at:  
dentalportal.info – search for Z4

## About this document

This document is designed and released for the following groups / individuals:

- Authorized resellers
- Authorized service technicians

## Used symbols

### Instructions

» Single or general instruction

1. Numbered action step

✓ Result

### Additional symbols

☞ Cross reference

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

1. Numbered image labels

✓ **Correct or Do this**

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



Information to make work more efficient



Important information without any danger for people or objects



Additional information

## Structure of safety notes



### SIGNAL WORD

#### Type and source of hazards

Further explanations and consequences when ignoring the hazard.

» Instructions to avoid the hazard.

#### 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 or moderate injury.

### NOTICE

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

## 2 General safety instructions



### DANGER


#### Incorrect operation of the machine

- » **Before** installing, maintaining and operating the machine, read **all** documents provided with the machine.
- » If it is unclear how to operate the machine in any way, do not use the machine and contact customer service.
- » Ensure that every user has access to the operating instructions.
- » Instruct every user on safe and proper machine handling.

#### Danger to life due to an electric shock



If you come into contact with electrically charged parts, you can suffer from an electrical shock. Water increases the risk significantly.

- » Do not remove the housing of the machine.
- » Only have qualified electricians work on any electric equipment.
- » Ensure that an operational Residual Current Device / Ground Fault Circuit Interrupter is installed on the electric circuit of the machine.
- » Run power cables so that they cannot be damaged by sharp edges.
- » **Before** switching on the machine, check power cables for damage.
- » **Before** unplugging the power cable, switch off the machine at the main power switch.
- »  In the following cases, disconnect the machine from the electrical source immediately and prevent it from being restarted:
  - When machine connections or electric cables are damaged
  - When water is leaking
  - **Before** you check or run electric cables
- » Replace damaged cables with original manufacturer's spare parts.
- » Never perform any troubleshooting while the machine is operating.
- » Only have authorized service technicians repair the machine.

- » Do not touch the machine and especially the cables with wet or damp hands.
- » Check the environment of the machine and all accessible internal areas daily for leaked liquid and remove any liquids near or in the machine immediately.
- » Never put any machines or devices which are powered by electricity under the machine.
- » Do not put any objects onto the machine.



### WARNING

#### Respiratory diseases when processing harmful materials

If you inhale harmful materials during their processing, your respiratory tracts may be damaged.

- » Avoid materials which damage your health.

#### Crushing hazard and risk of cutting injuries through moving machine parts

Through the moving axes and the rotating spindle you can suffer bruises and cuts.

- » Only use the machine when the working chamber door is completely closed and undamaged during machining.
- » Do not circumvent or deactivate safety devices of the machine.
- » Check the machine regularly for damage, especially the safety devices.
- » Have damaged safety devices repaired by customer service only.
- » Use only original manufacturer's equipment and original spare parts in the machine.
- » Keep children and animals away from the machine.
- » Do not remove the housing of the machine.

#### Service Mode: Risk of cutting injuries and bruises as well as hazards through ejected debris

If you operate the machine in any "Service Mode" with the working chamber door open, the risk of injury is increased significantly.

- » Operate the machine in "User" mode only unless you have been authorized by the machine's manufacturer to use other modes.
- » Even if you are an authorized user, use the "Service Modes" only when necessary.



- » While in any "Service Mode": Do not reach into the working chamber while the axes are

moving or during machining.



- » While in any “Service Mode”: Everyone within reach of the machine must wear protective eye wear.

### Hearing damage due to loud noise

If you are regularly exposed to loud machining noise, you may suffer from hearing loss and tinnitus.



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

### Health risks through constant malpositioning if your working environment is not sufficiently ergonomic

Over the long run, an improper or one-sided positioning can be a risk to your health.

- » Set up an ergonomic work environment.
- » Ensure the seat height and monitor position is ideal and the lighting is sufficient.



## CAUTION

### Risk of injuries when opening or closing the working chamber door

When you open or close the working chamber door, the moving working chamber door may crush your fingers. Objects on the machine may fall and cause injuries or damage.

- » While the door is moving, keep both hands away from the machine.
- » Do not place objects on the machine.

### Trip, fall and slipping hazards



- » Run cables in such a way that persons cannot trip over them.



- » Keep the working environment and installation site clean.

### Risk of cutting injuries and burns

If you touch tools or sharp edges on blanks or the machine, you may suffer from cuts. If you touch the hot spindle body or hot tools, you may suffer from burns.

- » Wear gloves when you perform manual work at the machine or with blanks / tools.

### Reduced ability to act with insufficient lighting

In case of an insufficient lighting your judgment and / or your precision may be reduced.

- » Ensure that the lighting in your working environment is sufficient.

### Risk of injury in case of malfunctions caused by insufficient maintenance

If you do not maintain the machine as required, malfunctions may occur which can lead to injuries.

- » Take note of the intervals and conditions mentioned in the maintenance table in the operating instructions. Carry out the respective maintenance tasks accordingly.

## 3 Operating regulations

If you violate the following regulations, you may lose your entitlement to benefits.

### NOTICE

#### Machine damage if you violate these regulations

If you violate the following regulations, your machine may get damaged and / or cause damage in the surrounding area(s).

- » Thoroughly follow all instructions and information in this section.

#### Intended use

The machine and the manufacturing software have been designed for the commercial creation of dental objects by specially trained persons. The objects require additional work before their use on patients.

- » Only process materials that you can select in the manufacturing software.
- » Only use the machine and manufacturing software in a commercial environment.
- » Before creating jobs, verify if the objects being prepared may be utilized at the place of use according to local and / or national regulations or other authorized organizations or entities (e.g. professional associations, health authorities). In particular, verify if the material is approved for the machined object type and if the object type is designed in accordance with applicable regulations. Neither the manufacturing software nor the machine will inform you about possible regulatory infringements, but will execute jobs in accordance with the preferences and materials set by the user.
- » Verify that each object type and each material in your jobs are authorized manufacturing materials. If mandated by local or national regulations, obtain relevant authorization from the responsible organizations or entities (e.g. professional associations, health authorities).
- » Only manufacture objects which correspond to the object types that you can select in the manufacturing software. While you can import / manufacture any other objects as well, neither the manufacturing software nor the machine are designed for these other objects and should not be used in this way.

- » Do not manufacture implants or parts of objects that are designed to have contact with implants. These parts include parts of two-part abutments which contain the connection geometry for the implant. Do not manipulate the connection geometry of prefabricated abutments (“prefab abutments”) and you must always check finished objects for accurate connection geometries (i.e. that connection geometries of finished jobs have not been damaged).

#### Controlling the machine through software

You control the machine through specially designed applications which are supplied with the machine.

- » Always use the latest program version that officially supports your machine.
- » Before installing or operating the machine, read the documentation for the applications.
- » Ensure that your CAM computer meets all system requirements.

#### Maintenance and cleaning

Maintenance and cleaning is part of standard machine usage.

- » Clean and maintain the machine as required. Only then can the machine reach a long service life.

#### Spindle

The spindle of your machine is a high-precision instrument.

- » Do not use unbalanced tools at high rotational speeds. Such an imbalance puts a great strain on the spindle’s ball bearings, which can cause the bearings to be damaged.
- » When working in the working chamber, do not apply manual pressure against the spindle.

#### Unattended operation

If the machine runs unattended, the risk of material damage is increased.

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



## Transportation and storage



### WARNING

#### Injuries caused by unsafe transportation

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



» Always transport **unpacked** machines individually and do not stack them.

- » Ensure that only trained personnel transport the machine to and from the installation site.
- » Ensure that the housing of the machine is completely closed.
- » Always transport the machine in an upright position.
- » Transport and position the machine with 2 people.
- » Before carrying an unpacked machine, install the carrying aid that was provided with the machine and ensure that all components are properly fixed.

#### Do not use a different carrying aid.



» Grab unpacked machines only at the handles of the carrying aid. **Do not tilt the machine when carrying it.**

**i** The supplement about the carrying aid and transport lock is delivered with the machine. It is also downloadable at [dentalportal.info/downloads](http://dentalportal.info/downloads).

- » Ensure that the following conditions are met during the whole transport and / or storage period:
  - Ambient temperature (storage / transport): between -20 °C and 60 °C
  - Relative air moisture: max. 80 %, non-condensing

#### Preparing transportation or storage

Before transporting or storing your machine, the following preparations are necessary:

1. Remove all blanks from the working chamber.
2. Remove the tool magazine from the working chamber.
3. Rinse the cooling liquid system.
4. Drain and clean the cooling liquid tank.
5. Clean the working chamber.
6. Install the transport lock. For this, follow the corresponding steps on the supplement in reverse order.
7. Ensure that the housing of the machine is completely closed.
8. Shut down the machine via the touchscreen.
9. Switch off the machine at the main power switch.
10. Disassemble the machine components by following the installation instructions in reverse order.
11. If you need to carry the machine, install the carrying aid. For this, follow the corresponding steps on the supplement in reverse order.
12. In case of overseas transport, take proper measures against corrosion.

#### Repackaging

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

1. If possible, use the original packaging. If the original packaging is not available, use a packaging of similar size and quality.



Original packaging is available from customer service.

2. Pack the machine and its accessories securely.
3. Protect the packaging against slipping. If machines are properly packed and protected against slipping, they may be stacked.

## 4 Machine overview

With your Z4 you can process blanks of different materials to create high quality objects for the dental sector. You can find a list of the materials which you can process with the machine in the manufacturing software.

The machine is designed for wet machining.

During wet machining, the tools and blanks are constantly being cooled by cooling liquid.

### Front side of the machine



FIG. 1 – FRONT SIDE OF THE MACHINE

1. Working chamber door
2. Touchscreen for controlling the machine
3. View window to the working chamber
4. Multi-purpose drawer

### Rear side of the machine

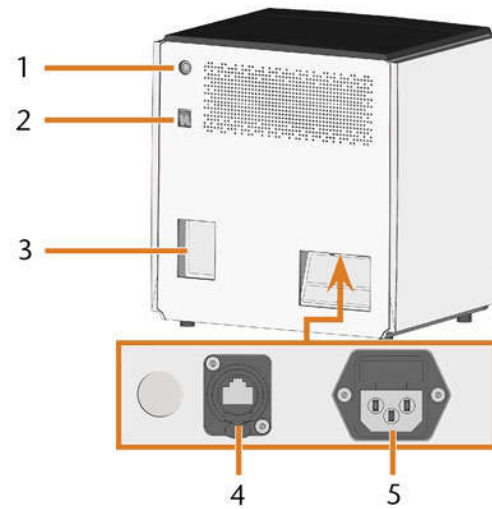


FIG. 2 – REAR SIDE OF THE MACHINE

1. Start button
2. Main power switch
3. CAM computer panel
4. Network port (Ethernet RJ-45)
5. Power connection

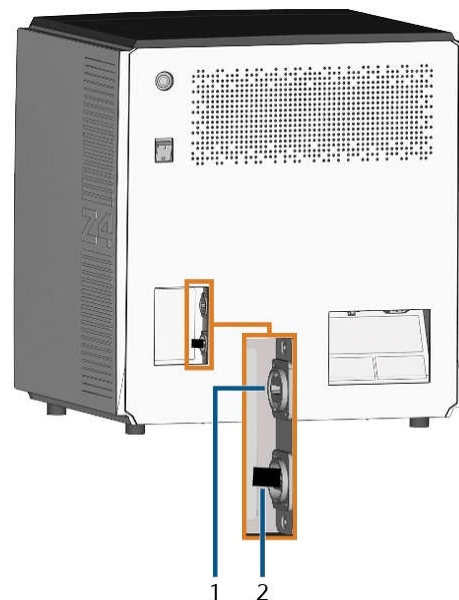


FIG. 3 – CAM COMPUTER PANEL

1. HDMI 1.4b port
2. USB 2.0 port with WiFi device

### Touchscreen

The screen in the working chamber door of your machine responds to touch. You can use it to operate the machine by selecting icons on the user interface and to receive information about jobs, tools and the machine status.

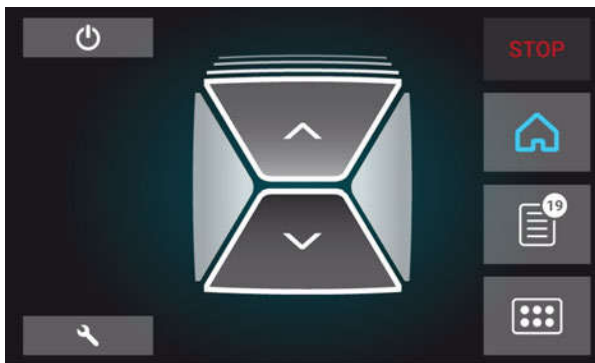


FIG. 4 – A SECTION OF THE USER INTERFACE

### Working chamber door

The working chamber door locks the working chamber and protects the user from injuries during operation.

The working chamber door is operated by electricity. You can open and close the door via the touchscreen or with DentalCNC. You *cannot* open the door when the machine is switched off or while the axes are moving.

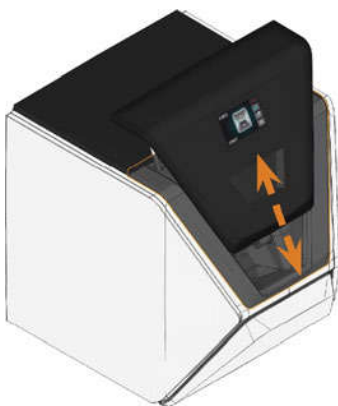


FIG. 5 – WORKING CHAMBER DOOR

### Working chamber

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

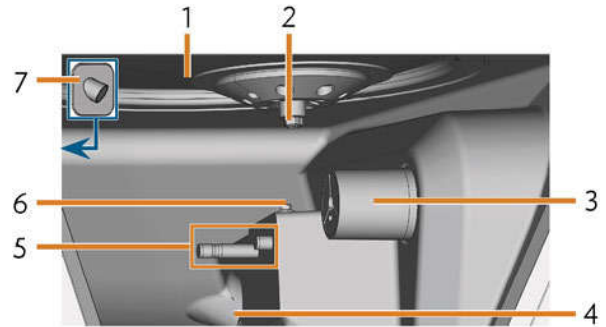


FIG. 6 – WORKING CHAMBER

1. Bellow/Nozzle plate
2. Spindle with collet chuck for picking up tools
3. Blank holder (with collet chuck); Rotational axis A
4. Outlet for the cooling liquid
5. Tool magazine holder
6. Measuring key
7. Webcam

### Colors of the working chamber lighting

**!** If the working chamber lighting is insufficient, provide additional lighting.

The machine illuminates the working chamber in different colors. The color will change depending on the state of the machine. You will find the colors and respective machine status in the following table:

Color	Status
White	The machine is ready for operation. You can open the working chamber door.
Blue	The machine is operating. The working chamber door is locked.
Red	A machine malfunction has occurred. The working chamber door is locked.

## Multi-purpose drawer

The multi-purpose drawer contains the cooling liquid tank and up to 5 tool magazines. You can unlock the multi-purpose drawer via the touchscreen and then pull it out manually.

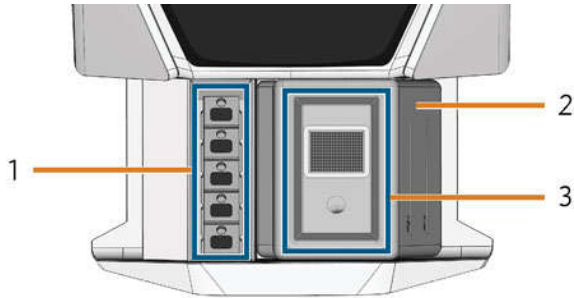


FIG. 7 – MULTI-PURPOSE DRAWER

1. Space for tool magazines
2. Cooling liquid tank
3. Cover of the cooling liquid tank with strainer basket

## Required computer hardware & software

This machine is designed for an integrated CAD / CAM workflow which allows you to manufacture restorations with the following components:

- The touchscreen of the machine
- A machine internal CAM computer running DentalCAM & DentalCNC ("manufacturing software")
- An external CAD computer\* running a supported CAD application\*

\*not provided

You can use the touchscreen for standard operation and basic maintenance.

If you do not use an integrated CAD / CAM workflow, you will need to access Windows® on the CAM computer during standard operation to directly work with DentalCAM & DentalCNC.

## Sound emission

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 blanks

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

## Sound measurement

Measuring conditions:

- Processed material: IPS e.max (block, C14)
- Tool status: new
- Measured value: sound pressure level (distance: 1 m)
- Measurement according to ISO 3746, survey method 3

Established sound emission:

Operating condition	A-weighted sound pressure level	A-weighted sound power level
Processing	81.8 dB(A)	92.3 dB(A)
All other operating conditions (tool change, movement of the axes etc.)	<70 dB(A)	–

## Location of the identification plate & 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:

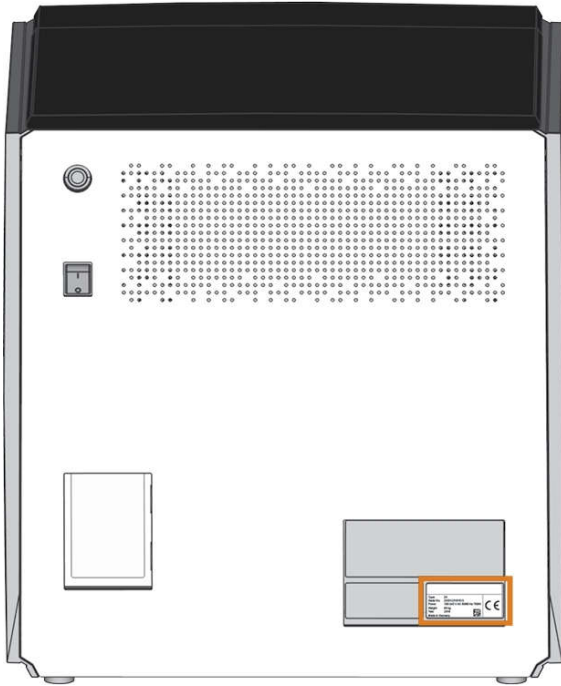


FIG. 8 – LOCATION OF THE IDENTIFICATION PLATE (MARKED ORANGE)



Type	Z4	 
Serial No.	Z4ID122181513	
Power	100-240 V AC 50/60 Hz 750W	
Weight	66 kg	
Year	2018	
Made in Germany		

FIG. 9 – SERIAL NUMBER ON THE IDENTIFICATION PLATE (MARKED ORANGE)

## Technical data

### Base system

- Dimensions: (W/D/H):
  - Footprint: approx. 400 x 305 mm
  - Housing fully closed: approx. 471 x 522 x 507 mm
  - Housing fully open: approx. 471 x 737 x 608 mm
- Weight: approx. 66 kg
- 4-axis mechanism
- Rotational axis A: +190° to -10°
- Working chamber
  - Complete housing of the working chamber
  - Working chamber lighting with different colors to indicate the machine state
  - Webcam for video transmissions to customer service
- Integrated compressed air production
- Permitted ambient temperature / air moisture:
  - Ambient temperature (storage / transport): between -20 °C and 60 °C
  - Ambient temperature (operation): between 10 °C and 32 °C
  - Relative air moisture: max. 80 %, non-condensing

### Spindle SFZ 170P

- Asynchronous spindle rotating up to 100,000 rpm
- Nominal power under continuous operation (S1): 170 W
- Nominal power under uninterrupted periodic operation (S6): 220 W
- Peak power ( $P_{max}$ ): 340 W
- Hybrid ceramic ball bearing
- 2-fold bearing
- Pneumatic collet chuck  $\varnothing$  3 mm
- Sealing air

### Standard blank holder

- For mounting blocks with round shafts
- Maximum number of blocks per job: 1
- Maximum block dimensions: 40 x 20 x 20 mm (L/D/H)
- Supports designated abutment holders

### Tool magazine

- Removable (5 provided)
- Maximum tools in magazine: 6
- Maximum tool length: 35 mm
- Automatic tool change with compressed air monitoring
- Automatic tool length measurement and tool breakage monitoring via a measuring key
- Material allocation through color code
- Automatic tool magazine recognition

### Cooling liquid system for wet machining

- Cooling liquid: Drinking water
- Integrated cooling liquid tank
  - Maximum amount of cooling liquid: 2 l
  - Integrated filter

- Removable
- Dishwasher-safe
- Flow sensor for monitoring the flow of the cooling liquid

### Connections

- Power connection: 100 – 240 V AC, 50/60 Hz including glass fuse T6,3A L250V
- Network port
  - RJ-45
  - Speed: 10BASE/100BASE-TX/1000BASE-T (Auto-sensing)

### Internal CAM computer

- Processor:
  - Intel® Atom™ E3950
  - 4 cores
  - 1.60 – 2.00 GHz
- RAM: 8 GB DDR3L-SDRAM
- Graphic:
  - GPU: Intel® HD Graphics 505
  - Display Interface: HDMI 1.4b up to 3840 x 2160 at 30 Hz<sup>1</sup>
- LAN: Intel® I211 GbE LAN controllers (RJ-45)<sup>2</sup>
- Audio: not available
- USB 2.0 interface with WiFi device<sup>1</sup>

1 wired to the CAM computer panel of the machine

2 wired to the connection panel of the machine

### WiFi

- Standards: IEEE 802.11 ac
- Data rate:
  - 802.11 ac: downlink up to 867 Mbps, uplink up to 867 Mbps (20/40 MHz)
  - 802.11 a/b/g/n/ac: downlink up to 300 Mbps, uplink up to 300 Mbps (20/40 MHz)
- Encryption:
  - 64-bit WEP
  - 128-bit WEP
  - WPA2-PSK
  - WPA-PSK
- Operating frequency: 2.4 GHz/5 GHz

## 5 Installing the machine

### Checking the scope of delivery

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



1. 1 x Machine Z4
2. 1 x Cleaning brush
3. 5 x Tool magazine inserts
4. 1 x Power cable
5. 1 x Ethernet network cable (type: straight)
6. 1 x Spindle service set
7. 1 x Interdental brush (for cleaning the nozzle plate)
8. 1 x Blank holder service set
9. 1 x Tube of collet chuck grease (for spindle, blank holder, tool magazine holder)
10. 5 x Tool magazines (in the drawer)
11. 1 x Measuring pin
12. 1 x Drill bit for tool positions (2.8 mm)
13. 1 x Calibration set: 1 micrometer, 5 blanks for manufacturing test and calibration specimen
14. 1 x Microfiber cloth
15. 1 x View window wiper
16. 1 x Container with activated carbon pellets
17. 1 x Fine filter
18. 3 x Fixing screw for the collet chuck of the blank holder
19. 5 x Tool magazine caps

Not depicted:

- This document
  - 1 x Carrying aid for transporting the machine
  - 1 x Transport lock in the working chamber
  - 1 x Supplement about removing the carrying aid and transport lock
  - 1 x Transport protection cover in the multi-purpose drawer
  - 1 x Allen key for the tool magazine release screw
  - 1 x Allen key for the holder of the view window wiper
- » Store the measuring pin and the calibration set safely near the machine. Customer service will need them for maintenance.
- » Keep the packaging of the machine, the carrying aid and the transport lock for future transports.

## Choosing the installation site

The installation site must meet the following criteria:

- Firm and even surface, must be able to carry the weight of the machine (66 kg)
- Minimum required space: 620 x 620 x 650 mm (W/D/H)
- Ambient temperature (storage / transport): between -20 °C and 60 °C
- Ambient temperature (operation): between 10 °C and 32 °C
- Relative air moisture: max. 80 %, non-condensing
- Machine location must be dust-free
- Alternating current source with 100 – 240 V AC, 50/60 Hz
- An operational Residual Current Device / Ground Fault Circuit Interrupter on the electric circuit of the machine
- Access to the internet and local computer network via cable / WiFi

## Distances to maintain

### NOTICE

#### Damaging of the machine if safety distances are not maintained

If you do not maintain the safety distances, the movable parts of the housing can collide with obstacles when being opened and get damaged. If the ventilation openings are covered, the machine may overheat and get severely damaged.

» Ensure that the following safety distances are always maintained.

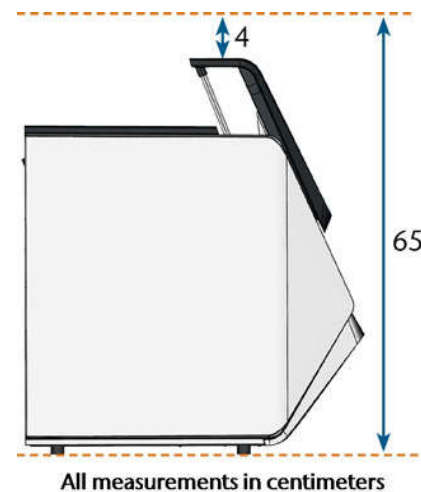
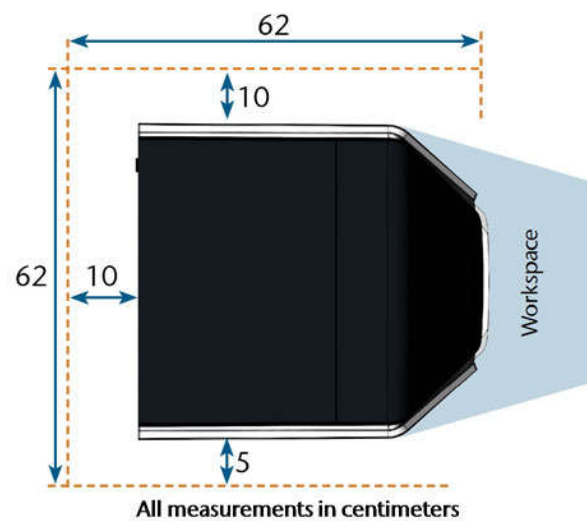
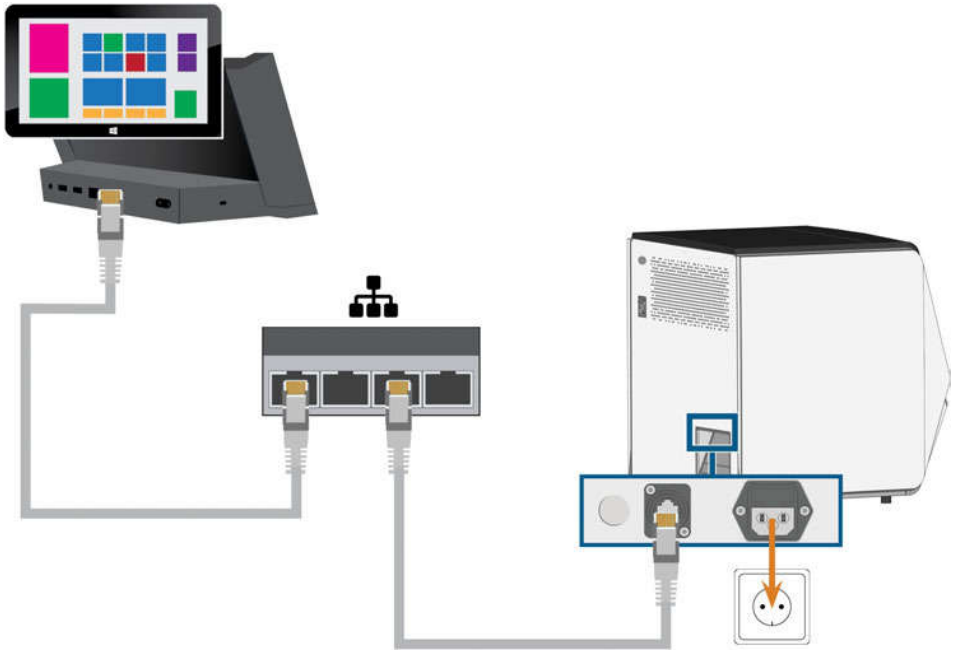


FIG. 10 – DISTANCES TO MAINTAIN



**Machine installation (schema)**

**Wired connection**



**WiFi connection**



## Establishing the electric connection

### NOTICE

#### Damaging of the machine through heavy voltage fluctuations

Heavy voltage fluctuations can disrupt the control unit and can cause system failures.

- » Plug the machine's power cable in a dedicated current circuit or ensure that no devices are connected that can cause heavy voltage fluctuation when switched on.
- » If heavy voltage fluctuations cannot be avoided, install a suitable device which protects the machine from heavy voltage fluctuations.

### 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.

The machine requires a continuous power supply for proper operation.

1. Plug the provided power cable into the power connection at the connection panel of the machine.
2. If power failures occur regularly at the installation location or if there are frequent voltage fluctuations, install an online Uninterruptible Power Supply (UPS).
  - ! If a power failure occurs during job execution, the tool may break and the blank may be destroyed.
3. Insert the plug of the cable into a socket that is protected by a Residual Current Device / Ground Fault Circuit Interrupter.


## Removing the transport lock

Before operating the machine for the first time, you must remove the transport lock. The transport lock prevents the spindle from getting damaged during transport.

1. Ensure the following:
  - The machine is connected to the electrical source.
2. Switch on the machine at the main power switch.
3. Press the start button.
- ✓ The machine references.
4. Open the working chamber door by selecting the upper arrow of the depicted icon on the touchscreen. 
5. Remove the transport lock as shown in the supplement.

## Checking the tool magazines in the drawer

After you have removed the transport lock, you should open the multi-purpose drawer and check the tool magazines.

1. To unlock the multi-purpose drawer, select the lower arrow of the depicted icon in the **Home** section of the touchscreen. 
- ✓ After a couple of seconds, the drawer will open.
2. Pull the drawer open.
3. Remove the transport protection cover from the tool magazines.
4. Verify that there are 5 tool magazines with different color codes in the drawer.
5. To close the multi-purpose drawer, push it until it locks back in place.
- ✓ You will hear a clicking sound.

**i** More information on tool magazines and managing tools: [Managing tools](#) – on page 41

## CAD computer & network integration

The CAD / CAM integration workflow is as follows:

1. Prepare the machine and the CAD computer (🔗 page 19)
2. Access the CAM computer (🔗 page 20)
3. (Optional) Set up WiFi access for the machine (🔗 page 23)
4. Integrate the CAD and CAM/CNC software (🔗 page 24)

### NOTICE

#### Danger caused by default passwords and network intrusions

The default passwords mentioned in this public document allow everyone to access the corresponding devices via the network and / or the internet. This can lead to data theft, data corruption and damaging of the machine and other devices.

- » Have the network integration of the machine and other connected devices carried out by a qualified network and IT specialist.
  - » Have the specialist change the default passwords after installation and secure your network against intrusion. Ensure that passwords are recorded and handed to you.
- 
- » Ensure that the user **camcomputer** is automatically signed-in at Windows® startup. Otherwise, the machine will not be operational. You must re-enable the automatic sign-in when you change the password for this user.
  - » Ensure that the user **camcomputer** has administrator privileges. Otherwise, the machine will not be operational.
  - » Be aware that changing the passwords for the predefined user accounts may require a re-configuration of the machine's network connection and the CAD/CAM integration.
  - » For remote maintenance, you can use TeamViewer. Start the application via the icon on the desktop of the CAM computer.

## Internal CAM computer

The machine is equipped with an internal CAM computer running the manufacturing software DentalCAM & DentalCNC. Manufacturing data is transferred as follows:

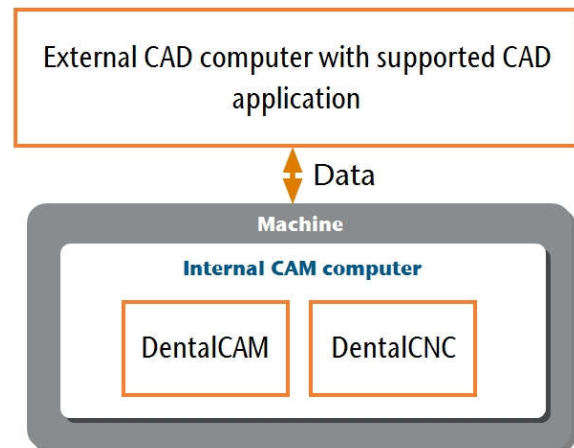



FIG. 11 – DIAGRAM: DATA TRANSFER IN CASE OF CAD / CAM INTEGRATION

## Preparing the machine and CAD computer

Before you can set up the CAD / CAM integration, you need to prepare all hardware and software components.

1. Shut down the machine.
2. Install the CAD application on the CAD computer. Ensure that the CAD application is licensed to use the Z4 for manufacturing.
3. Ensure that the CAD computer is configured for network connectivity. This includes WiFi access if desired.
4. To connect the machine to a wired network, connect the machine and the CAD computer to the local network with Ethernet cables. Do not directly connect the CAD computer to the machine.
- ✓ If a DHCP server is available in the local network, the integrated CAM computer will automatically try to obtain a valid IP address.
5. To connect the machine to a WiFi network, prepare the machine as follows.
  - a. Connect the CAD computer to the Ethernet port of the machine with an Ethernet cable.
  - b. For the moment, deactivate WiFi access on your CAD computer. Otherwise, the CAD computer will not find the CAM computer.

6. If a local network is not available, connect the CAD computer to the Ethernet port of the machine with an Ethernet cable.
7. Ensure that the internal CAM computer of the machine has access to the Internet.
  - If required, configure your network firewall accordingly.
  - If permanent Internet access cannot be guaranteed, ensure that the machine is connected to the Internet at least once per week.

 **The machine requires Internet access for important updates.**

8. Switch on the machine at the main power switch. Press the start button.
9. Wait until the machine has referenced.

### Accessing the CAM computer

#### NOTICE

#### Installing Microsoft® Office onto the CAM computer violates the Windows® License Agreements

The CAM computer runs Windows® 10 IoT Enterprise. If you install any version of Microsoft® Office onto the CAM computer, you will violate the Windows® License Agreement which may result in the following:

- You may lose the right to use the pre-installed Windows® on the CAM computer. Without Windows®, the machine will not work.
- You may become subject to civil and criminal prosecution.

» **Never** install any version of Microsoft® Office onto the CAM computer.

Once the machine is connected to the CAD computer and the network connection is established, the CAM computer can be accessed in 3 ways:

Access method	Access to CAM / CNC folder?	Access to Windows?
Remote Desktop application on the CAD computer	Yes	Yes
Connecting hardware to the machine	Yes	Yes
Windows® Explorer on the CAD computer	Yes	No


- Access via the Microsoft® Remote Desktop application allows you to use Windows® / DentalCAM & DentalCNC on the CAM computer without additional hardware.
- You can connect additional hardware to access the CAM computer to use Windows® / DentalCAM & DentalCNC
- Accessing the DentalCAM & DentalCNC installation folder via Windows® Explorer is usually only required for customer service.

If you do not use an integrated CAD / CAM workflow, you will need to access Windows® on the CAM computer during standard operation to directly work with DentalCAM & DentalCNC.

### Overview CAM computer access data

Following you find the access data for the internal CAM computer as a quick reference.

- Computer name: Serial number of the machine\*
- IP address: None specified, DHCP activated


\*  Location of the identification plate & serial number – on page 13

Administrator user with auto sign-in at Windows® startup:

- User: camcomputer
- Password: camcomputer

Standard user for accessing the DentalCAM & DentalCNC installation folder, which is shared by default:

- User: cnctransfer
- Password: cnctransfer

 When you disconnect from the CAM computer, never sign-out or shut down the CAM computer. If you do, the machine will not be operational until you restart it.

### Accessing Windows® on the CAM computer using a Remote Desktop connection

Microsoft® Remote Desktop allows you to work with the CAM computer from another computer as if you were using the CAM computer directly.

1. Start the **Remote Desktop Connection** desktop application. *Do not* start the Windows® store app **Remote Desktop**.

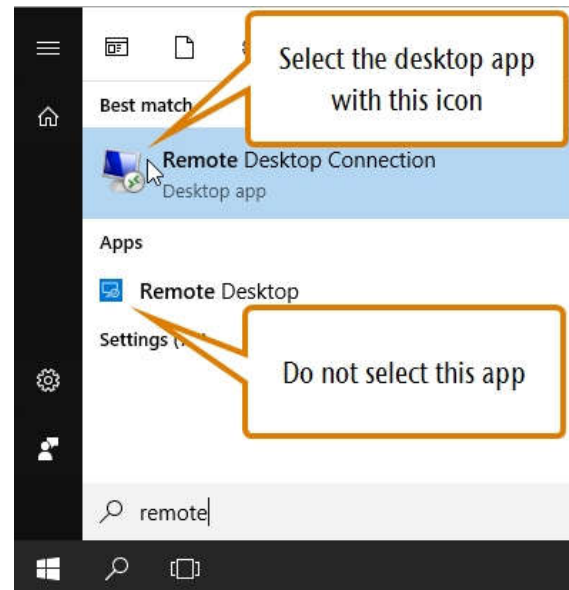


FIG. 12 – STARTING THE REMOTE DESKTOP CONNECTION APPLICATION

- ✓ The **Remote Desktop Connection** window opens.

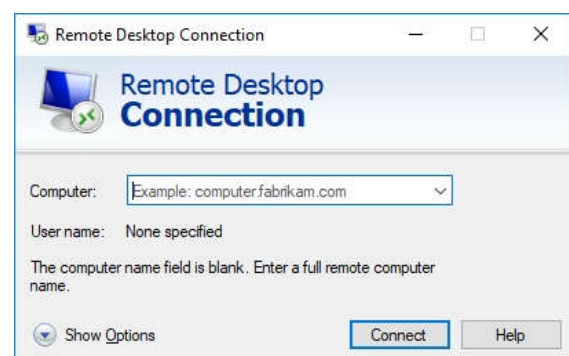


FIG. 13 – THE REMOTE DESKTOP CONNECTION APPLICATION

2. Enter the following into the **Computer** combo box: Machine serial number
  - Example: Z4ID212345678
3. Select [**Connect**].

- ✓ You are prompted to enter the login credentials.
  - 4. Enter the following login credentials:
    - User: camcomputer
    - Password: camcomputer
- If a different default user name displays that you cannot change, do the following:
- a. Select **More choices**.
    - ✓ Additional options display.
  - b. Select **Use a different account**.
    - ✓ You can enter the user name given above.
5. Select **[OK]**.
  - ✓ The desktop of the CAM computer displays in the remote desktop application window. Through it you can access files and start applications on the CAM computer.

### Accessing the CAM computer via hardware

You can directly connect a monitor and / or USB devices to the CAM computer.

Use the ports of the CAM computer panel for this:

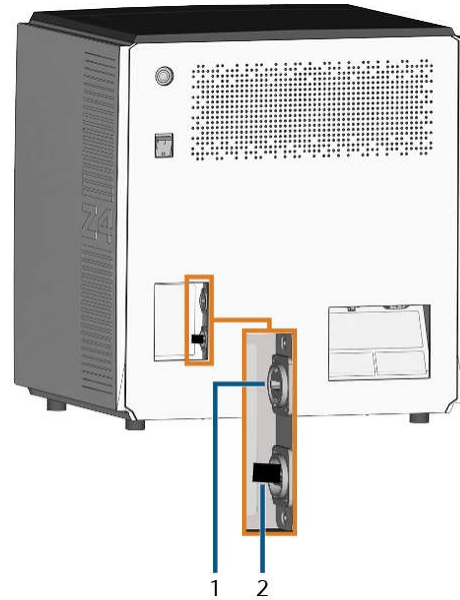


FIG. 14 – CAM COMPUTER PANEL

1. HDMI 1.4b port
2. USB 2.0 port with WiFi device

You can connect hardware to the internal CAM computer as follows:

1. Connect the monitor to the HDMI connector of the machine. If your monitor isn't equipped with an HDMI cable, use an adapter.
  - ⚠ Do not connect a laptop / tablet or similar to the HDMI port; only connect a monitor to the port.
2. If you want to install USB devices to the CAM computer, do as follows:
  - a. Remove the WiFi device from the USB port.
  - b. (Optional) Connect a USB hub to the USB port.
  - c. Connect the desired USB devices to the USB port or USB hub.
  - ⚠ You must reconnect the WiFi device to the USB port after removing the other devices.

3. Activate the interface of the CAM computer with the connected input device (e. g. mouse, keyboard, touch display).
- ✓ You are prompted to enter the login credentials.
4. Enter the following login credentials:
  - User: camcomputer
  - Password: camcomputer
5. Press <ENTER>.
- ✓ The desktop of the CAM computer displays on the connected display. You can access files and start applications on the CAM computer.

### Accessing the DentalCAM & DentalCNC installation folder

You can access the DentalCAM & DentalCNC installation folder via Windows® Explorer as follows:

1. Start Windows® Explorer on the CAD computer.
- ✓ In the folder and device list in the left column, the CAM computer name displays under the **Network** node. The name is identical to the serial number of the machine (↗ *Location of the identification plate & serial number* – on page 13).

■ Example: Z4ID212345678



FIG. 15 – THE CAM COMPUTER NAME DISPLAYS IN WINDOWS® EXPLORER

2. If there is no entry for the CAM computer, check whether the CAD computer is correctly integrated into the *same* network as the CAM computer.
3. Select the entry for the CAM computer.
- ✓ You are prompted to enter the login credentials.
4. Enter the following login credentials:
  - User: cnctransfer
  - Password: cnctransfer
5. Activate the **Save login credentials** option.
6. Access the files on the CAM computer as you would with any other device.

### Configuring the WiFi connection

The machine uses a pre-installed WiFi device to connect to your access point.

1. Ensure the following:
  - Your WiFi access point is operational.
  - You have fully prepared your CAD computer and the machine as described above (↗ *Preparing the machine and CAD computer* – on page 19).

2. Access the CAM computer via the Remote Desktop application or direct hardware connection.
3. Configure Windows® on the CAM computer for WiFi connectivity:
  - a. Open the Windows® network settings.
  - b. Activate WiFi for the corresponding adapter.
  - c. Select a WiFi network which can be accessed by the CAD *and* the CAM computer.
  - d. Configure the WiFi connection as required.
4. If you used the Remote Desktop application to configure the CAM computer, do the following:
  - a. Reactivate WiFi access on your CAD computer.
  - b. Remove the Ethernet cable that connects your CAD computer with the machine.

### Integrating the CAD with the CAM / CNC software

The integration details depend on the used CAD application. In addition, you must prepare the internal CAM computer accordingly.

**i** In the following, we assume that your computers *are not* part of a Windows® domain. If they are, you need to take this into consideration when following the instructions.

### Preparing the CAM computer

The following instructions apply independently of the used CAD application.




1. Access Windows® on the CAM computer (🔗 *Accessing Windows® on the CAM computer using a Remote Desktop connection* – on page 21).
2. Switch to DentalCNC.
3. Open the DentalCNC **Application settings**. For this, select the following icon in the main icon bar: 
4. Open the **Machine data** view. For this, select the following icon in the lower icon bar: 
5. Locate the **CAD/CAM integration unlocked for** label. To the right of this label, you will find a list of the supported CAD applications.



FIG. 16 – THE OPTIONS FOR UNLOCKING THE CAD / CAM INTEGRATIONS

6. Have the unlock code that you received for your CAD application readily available. If the unlock code is missing, contact customer service of the machine.
7. Activate the option for the desired CAD application.
  - ✓ A window opens. You are prompted to enter the unlock code for the selected CAD application.
8. Enter the unlock code and press **<ENTER>**.
- ✓ The current window closes. If the code was valid, the integration for the selected CAD application is unlocked.
9. Open the **General settings**. For this, select the following icon in the lower icon bar: 



10. Activate the **CAD/CAM integration activated** option.
11. Activate the **Integrated CAM computer** option.
12. If you want to change the language of the DentalCNC user interface *and* the touchscreen of the machine from English to another language, do the following:
  - a. Select the desired language from the **Language** drop-down list.
  - b. Quit and restart DentalCNC.

### TRIOS Design Studio

This CAD application uses the standard DentalCAM folder for sending objects to the machine.

Integration overview:

1. Map a new network drive on the CAD computer to the DentalCAM installation folder on the internal CAM computer.  
The required user account and network sharing settings have already been configured on the CAM computer.
2. Store the network drive letter in TRIOS Design Studio.

The integration in detail:

1. Access the *CAD computer*.
2. Access the DentalCAM & DentalCNC installation folder ([↗ Accessing the DentalCAM & DentalCNC installation folder](#) – on page 23).

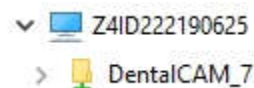


FIG. 17 – THE INSTALLATION FOLDER DISPLAYING IN WINDOWS® EXPLORER

3. Right-click onto the installation folder. From the context menu, select **Map network drive...**
- ✓ The **Map network drive** window opens.
4. (Optional) From the **Drive** drop-down list, select the desired drive letter for the new network drive.
5. Record the drive letter for the network drive.
6. Activate the **Reconnect at sign-in** option.
7. Select **[Finish]**.
- ✓ You have mapped the folder to a network drive.
8. Open TRIOS Design Studio.
9. In the menu bar, select **More**. In the drop-down menu, select the **Settings** icon ([↗ Fig. 18](#) – on the next page).

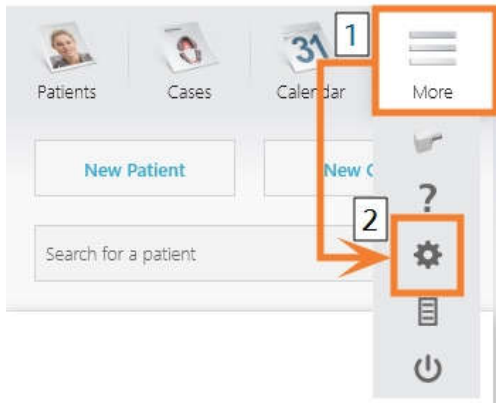


FIG. 18 – OPENING THE SETTINGS IN TRIOS DESIGN STUDIO

- ✓ The settings menu displays.
10. In the settings menu, open the **CAM** sub-menu.
  11. In the sub-menu, select **General**.



FIG. 19 – OPENING THE CAM SETTINGS IN TRIOS DESIGN STUDIO

- ✓ The general CAM settings display on the right side.
12. Locate the **Installed machines** section.
    - a. Check if the Z4 is already listed in this section.
    - b. If the Z4 is already listed, select **[Remove]**. Confirm your choice.
  13. Locate the **Supported mills and printers** section.
    - ✓ The Z4 must be listed in this section. If it isn't, you may need to obtain a license from 3shape for the Z4.

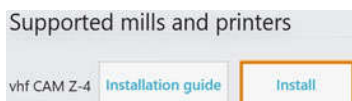


FIG. 20 – THE SUPPORTED MILLS AND PRINTERS SECTION IN TRIOS DESIGN STUDIO

14. In the line for the Z4, select **[Install]**. Confirm your choice.

- ✓ The **Connecting to your vhf Z4** window opens.
15. Select **[Select CAM folder]**.
  - ✓ A file browser opens.
  16. In the file browser, select the network drive to which you mapped the installation folder.

! *Do not select the **CNCTransfer** folder within the installation folder.*

17. Select **[Select folder]**.
  - ✓ The file browser closes. The Z4 is now listed in the **Installed machines** section.
18. In the line for the Z4, select **[Test]**.
  - ✓ If the CAM folder is set correctly, **Success** displays to the right of the **[Test]** button.

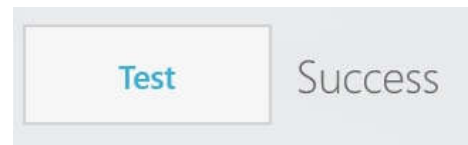


FIG. 21 – THE Z4 HAS BEEN SUCCESSFULLY ADDED TO TRIOS DESIGN STUDIO

19. Save your changes in TRIOS Design Studio. Restart the application.

### exocad ChairsideCAD

This CAD application uses a designated shared data folder on the CAM computer for sending jobs to the machine. The folder is already created and shared at delivery.

Folder path on the CAM computer:

C:\CADshare\DentalNestingObjToMDW

C: is the local hard drive on the CAD computer.

After integration, the **CADshare** folder will be accessible from the CAD computer via a network drive.

Integration overview:

1. Download the integration script from the following internet address to the CAD computer: dentalportal.info/downloads
2. Run the script on the CAD computer. Enter the required information.
3. Store the path to the shared data folder on the CAM computer in DentalCNC.
4. Store the path to the shared data folder on the CAD computer in exocad ChairsideCAD.

The integration in detail:

### Configuring the CAD computer

1. Access the *CAD computer*.
2. Open an internet browser.
3. Enter the following address into the address bar: dentalportal.info/downloads
4. Scroll down until you reach the **Z series** section.
5. Download the CAD/CAM integration script to the CAD computer.
  - ✓ The script is stored on the CAD computer inside a ZIP file.
6. Unpack the ZIP file (e.g. to the Desktop).
  - ✓ The script file is stored under the following name:  
**Install\_CADshare.bat**
7. Run the script.
  - ✓ A window opens. The script prompts you to enter the machine serial number.
8. Enter the machine serial number. Press **<ENTER>**.
  - 🔗 *Location of the identification plate & serial number* – on page 13





- ✓ The following happens:
  - a. A network drive is mapped to the shared data folder on the CAM computer.

For this, the first available drive letter on the CAD computer is used.

Example: If Z is the first available drive letter, you will be able to access the shared data folder on the CAM computer by opening the **Z:** drive on the CAD computer.

- b. The login credentials for the network share and remote desktop access are stored on the CAD computer.
9. Record the drive letter for the network drive.
- ❗ You will need this drive letter later.
10. Press any key.
- ✓ The current window closes. The script has finished.

### Setting up DentalCNC

1. Access the CAM computer.
2. Switch to DentalCNC.
3. Open the DentalCNC **Application settings**. For this, select the following icon in the main icon bar: 
4. Open the **General settings**. For this, select the following icon in the lower icon bar: 
5. Check if the following folder path displays under the **CAD/CAM integration: Data transfer folder** label:  
C:\CADshare\DentalNestingObjToMDW  
If it doesn't, do the following:
  - a. To store the data transfer folder in DentalCNC, select the depicted icon to the right of the **CAD/CAM integration: Data transfer folder** label. 
  - ✓ A window for selecting the folder opens.
  - b. From the drop-down list, select the drive letter **c:**.
  - c. Select the following folder:  
CADshare\DentalNestingObjToMDW
  - d. Select the depicted icon. 
- ✓ The selected folder displays below the

CAD/CAM integration: Data transfer folder label.

### Setting up exocad ChairsideCAD

1. In Windows® Explorer, open the exocad ChairsideCAD folder.
2. Change into the **config** folder.
3. Open the following file with a text editor:  
**settings-chairside.xml**
4. Inside the file, find the following expression (“tag”):  
**<NestingInterop2TemporaryFolder>**  
Directly behind the expression, you will find the exocad output path.
5. Replace the output path with the letter of the network drive that you recorded followed by a colon (:).

Example: You recorded the drive letter **Z**. The expression in the XML file must be (without line breaks):

```
<NestingInterop2TemporaryFolder>
Z:
</NestingInterop2TemporaryFolder>
```

6. Save and close the XML file.

### Dental Wings Chairside CAD

This CAD application uses a designated shared data folder on the CAM computer for sending jobs to the machine. The folder is already created and shared at delivery.

Folder path on the CAM computer:

C:\CADshare\DentalNestingObjToMDW

**C:** is the local hard drive on the CAD computer.


After integration, the **CADshare** folder will be accessible from the CAD computer via a network drive.

Integration overview:

1. Download the integration script from the following internet address to the CAD computer:  
dentalportal.info/downloads
2. Run the script on the CAD computer. Enter the required information.
3. Store the path to the shared data folder on the CAM computer in DentalCNC.
4. Store the path to the shared data folder on the CAD computer in Dental Wings Chairside CAD.

The integration in detail:

### Configuring the CAD computer

1. Access the *CAD computer*.
2. Open an internet browser.
3. Enter the following address into the address bar:  
dentalportal.info/downloads
4. Scroll down until you reach the **Z series** section.
5. Download the CAD/CAM integration script to the CAD computer.
- ✓ The script is stored on the CAD computer inside a ZIP file.
6. Unpack the ZIP file (e.g. to the Desktop).
- ✓ The script file is stored under the following name:  
**Install\_CADshare.bat**
7. Run the script.
- ✓ A window opens. The script prompts you to enter the machine serial number.
8. Enter the machine serial number. Press **<ENTER>**.  
 *Location of the identification plate & serial number – on page 13*

- ✓ The following happens:
  - a. A network drive is mapped to the shared data folder on the CAM computer.  
For this, the first available drive letter on the CAD computer is used.



**Example:** If Z is the first available drive letter, you will be able to access the shared data folder on the CAM computer by opening the **Z:** drive on the CAD computer.

- b. The login credentials for the network share and remote desktop access are stored on the CAD computer.
9. Record the drive letter for the network drive.

**!** You will need this drive letter later.



10. Press any key.
  - ✓ The current window closes. The script has finished.

### Setting up DentalCNC

1. Access the CAM computer.
2. Switch to DentalCNC.
3. Open the DentalCNC **Application settings**. For this, select the following icon in the main icon bar: 
4. Open the **General settings**. For this, select the following icon in the lower icon bar: 
5. Check if the following folder path displays under the **CAD/CAM integration: Data transfer folder** label:


C:\CADshare\DentalNestingObjToMDW

If it doesn't, do the following:

- a. To store the data transfer folder in DentalCNC, select the depicted icon to the right of the **CAD/CAM integration: Data transfer folder** label. 
  - ✓ A window for selecting the folder opens.
  - b. From the drop-down list, select the drive letter **c:**.
  - c. Select the following folder:  
CADshare\DentalNestingObjToMDW
  - d. Select the depicted icon. 
- ✓ The selected folder displays below the

**CAD/CAM integration: Data transfer folder** label.

### Setting up Dental Wings Chairside CAD

1. On the CAD computer, open Dental Wings Chairside CAD.
2. Open the settings by selecting the depicted icon in the left column. 
3. Select **Preferences**.

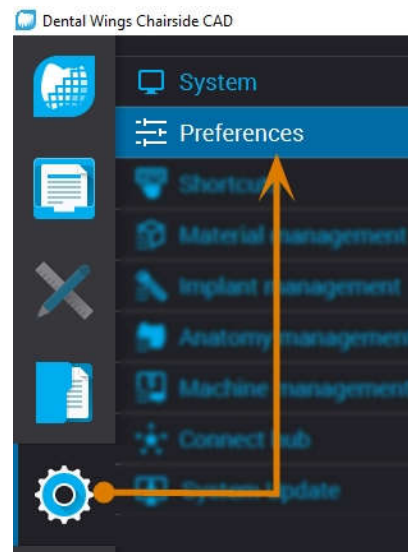


FIG. 22 – OPENING THE SETTINGS IN DENTAL WINGS CHAIRSIDE CAD

4. Open the **Milling** menu.
5. Enter the network path to the shared data folder into the **VHF Z4 Output directory** input field.
  - a. Select [...].
  - b. Access the mapped network drive by selecting the drive letter that you recorded.
  - c. On the network drive, select the following folder:  
DentalNestingObjToMDW

**Example:** If Z is the network drive letter, the network path is:

Z:\DentalNestingObjToMDW

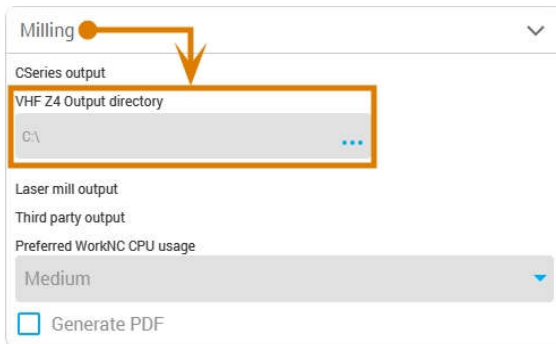


FIG. 23 – SPECIFYING THE OUTPUT PATH IN DENTAL WINGS CHAIRSIDE CAD

6. Save your changes.

- ✓ From now on, Dental Wings Chairside CAD automatically suggests exporting dental objects into the specified folder.

! Do not manually change the folder or else the CAM computer will not find the jobs.

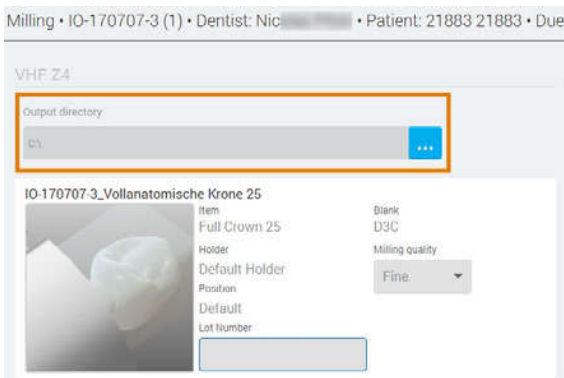


FIG. 24 – IN THE MARKED INPUT FIELD, THE SPECIFIED FOLDER WILL DISPLAY AT THE END OF A WORKFLOW

## 6 Operation: Preparing jobs

Before you can machine blanks, you need to prepare the machine. The corresponding jobs must have been transferred to the machine so that they display on the touchscreen.

### NOTICE

#### Damaging of the internal CAM computer

If you switch off the machine or disconnect it from the electrical source while the Windows® operating system on the internal CAM computer is shutting down or updating, the CAM computer may get damaged. Without the CAM computer, the machine will not be operational.

Updates may occur when you switch on the machine and when you shut it down via the touchscreen. In case of a major Windows® update, the update process may take several hours.

- » **Always** shut down the machine via the touchscreen **before** switching it off at the main power switch or disconnecting it from the electrical source.
- » **Always** wait until the machine has completely shut down before pressing the main power switch or disconnecting the machine from the electrical source.
- » When you switch on the machine, **always** wait until the machine is fully operational. **Do not** switch it off or disconnect it from the electrical source while it is starting up.

## 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. Ensure that the machine is properly installed.
  2. Switch on the machine at the main power switch.
  3. Press the start button.
- ✓ The machine indicates on the touchscreen that it is starting up.



FIG. 25 – THE MACHINE IS STARTING UP

4. Wait until the machine has started up. This usually takes up to 2 minutes, but can take significantly longer in case of a Windows® update.
- ✓ The following happens:
    - a. The touchscreen indicates that the internal CAM computer is connecting to the touchscreen.



FIG. 26 – THE INTERNAL CAM COMPUTER IS CONNECTING TO THE TOUCHSCREEN

- b. After a few seconds, the connection is established.
  - c. The machine references.
  - d. The working chamber is illuminated in white.
- ! The machine will not reference if the working chamber door is open.
5. If the working chamber door is open, confirm the respective dialog on the touchscreen to close the door.
- ✓ After the machine has referenced, the **Home** section displays on the touchscreen.



FIG. 27 – THE TOUCHSCREEN AFTER REFERENCING

If the touchscreen displays that there is a tool in the collet chuck which needs to be removed: [Starting the machine with a tool in the collet chuck](#) – see below  
 If the touchscreen displays that a software update is available: [Updating the software and firmware](#) – on page 68

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

Under some circumstances like a power outage, there can be a tool in the collet chuck of the spindle when you start the machine. You need to remove the tool from the collet chuck before you can use the machine.

### CAUTION

#### Danger of cuts and burns when touching tools with your bare hands

If you handle tools on the cutting surface, you may be injured. As the tool may be very hot, you may also suffer from skin burns.

- » Only touch tools at their shank.
- » When handling tools, wear protective gloves.

### NOTICE

#### Machine damage if you do not remove the tool

If the tool remains in the spindle after you have confirmed the message, it will collide with machine parts such as the measuring key and severely damage them.

- » **Always** follow the instructions below when you start the machine with a tool in the collet chuck.

1. Start the machine.
  - ✓ The touchscreen displays that there is a tool in the collet chuck. The working chamber door opens.
2. Hold the tool in the collet chuck in place.
3. Confirm the current message.
  - ✓ The following happens:
    - a. The collet chuck opens.
    - b. The current dialog window closes.
    - c. A dialog window opens.
4. Remove the tool from the collet chuck.



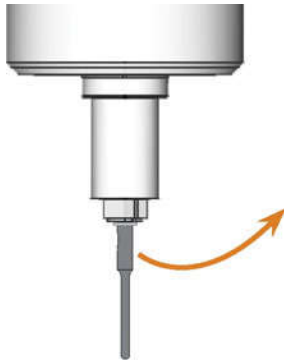


FIG. 28 – REMOVING THE TOOL FROM THE COLLET CHUCK

5. Confirm the current message.
  - ✓ The working chamber door closes. The machine is ready for operation.

## Shutting down the machine




### Danger of an electric shock if unplugging the power cable before switching off the machine

If you unplug the power cable while the main power switch is still in “ON” position, residual voltage in the power cable may cause you to suffer from an electric shock.

- » **Before** unplugging the power cable, switch off the machine at the main power switch.

You can shut down the machine when it is not processing.

1. Select the depicted icon in the **Home**  section of the touchscreen ([↗ The sections of the touchscreen – on page 36](#)).
  - ✓ The machine shuts down.
2. Wait until the touchscreen is switched off and the machine has completely shut down.
- ✓ You can restart the machine by pressing the start button of the machine.
3. (Optional) Switch off the machine at the main power switch.
  - ✓ The machine is no longer powered. Information on restarting it: [↗ Starting the machine – on page 31](#).

## If there is no connection to the CAM computer

If the connection to DentalCNC on the CAM computer gets lost or cannot be established at startup, the touchscreen displays the following image:

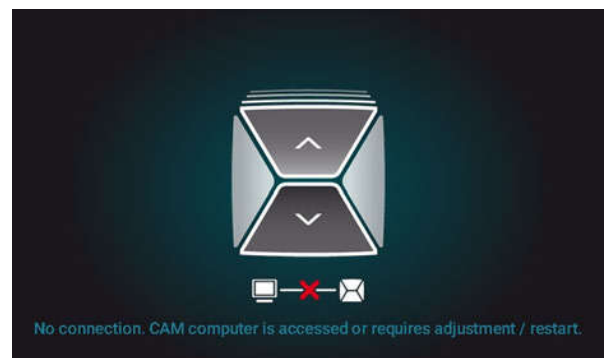


FIG. 29 – THE TOUCHSCREEN INDICATING THAT THERE IS NO CONNECTION TO DENTALCNC

The connection to DentalCNC may fail for the following reasons:

- The start of DentalCNC is delayed because of Windows® updates.
- The CAM computer encountered a hardware / software problem.
- The CAM computer is not correctly configured.

To (re-)establish the connection, you can do the following:

1. Try to access the CAM computer via a remote desktop connection (☞ *Accessing Windows® on the CAM computer using a Remote Desktop connection* – on page 21).
2. If you cannot establish a remote desktop connection, access the CAM computer by connecting additional hardware to it (☞ *Accessing the CAM computer via hardware* – on page 22).
3. Check if Windows® is installing updates. In this case, wait until the updates have been installed.
4. If DentalCNC is no longer running properly, restart Windows®.
- ✓ DentalCNC should automatically launch shortly after Windows® startup and establish the connection to the machine.
5. If Windows® is no longer running properly, do the following:
  - a. Switch off the machine at the main power switch.
  - b. Wait 10 seconds.
  - c. Switch on the machine at the main power switch.
6. If Windows® and DentalCNC seem to be running fine, check if the network configuration and CAD / CAM integration is set up according to the installation instructions (☞ *CAD computer & network integration* – on page 19).
7. If the problem persists, contact customer service.

## Opening & closing the working chamber door

### NOTICE

#### Damaging of the machine by operating the working chamber door inappropriately

The working chamber door is operated by electricity. If you manually open or close the working chamber door, you can damage the machine.

- » Manually open or close the working chamber door only in case of an emergency.
- » **Before** you manually open or close the working chamber door, read the respective information in the chapter *Operation: Executing jobs*.

- » To open or close the working chamber door, select the upper arrow of the depicted icon on the touchscreen.

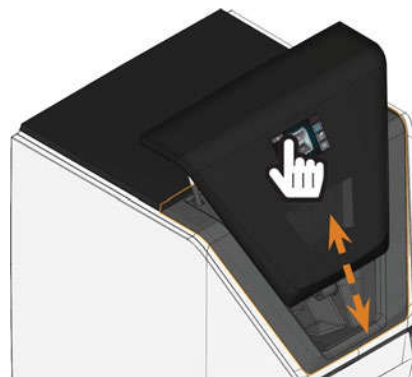


FIG. 30 – OPENING & CLOSING THE WORKING CHAMBER DOOR

## Opening & closing the multi-purpose drawer

### NOTICE

#### Damaging of the machine by operating the multi-purpose drawer inappropriately

If you open the multi-purpose drawer by force, if you do not maintain it properly or if you do not remove leaked cooling liquid, the machine may get damaged.

- » Before you pull out the multi-purpose drawer, unlock it.
- » Check regularly if the area below the cooling liquid tank is dry and remove leaked cooling liquid immediately.

1. To unlock the multi-purpose drawer, select the lower arrow of the depicted icon in the **Home** section of the touch-screen.



- ✓ After a couple of seconds, the drawer will open.
2. Pull the drawer open.



FIG. 31 – OPENING THE MULTI-PURPOSE DRAWER

3. To close the multi-purpose drawer, push it until it locks back in place.
- ✓ You will hear a clicking sound.

## The user interface on the touchscreen

With the touchscreen, you can operate the main functions of the machine:

- Controlling basic machine functions
- Managing and executing jobs
- Viewing the progress of the current job
- Managing tools
- Handling maintenance tasks

**i** Functions of the user interface may be added or changed via software and firmware updates. If some functions are not available on your machine, you may need to update DentalCAM & DentalCNC and / or the firmware ([Updating the software and firmware – on page 68](#)).

» Visit [dentalportal.info](http://dentalportal.info) for information on new or updated features.

### The sections of the touchscreen

The user interface is divided into the 3 main sections **Home**, **Jobs** and **Tools** which you can select via a menu at the right display border.

» To open the **Home** section, select the depicted icon.



» To open the **Jobs** section, select the depicted icon.



» To open the **Tools** section, select the depicted icon.



### The Home section of the touchscreen

The **Home** section has 2 modes which display depending on whether the machine is processing or not.

**Mode 1** displays when the machine is not processing:

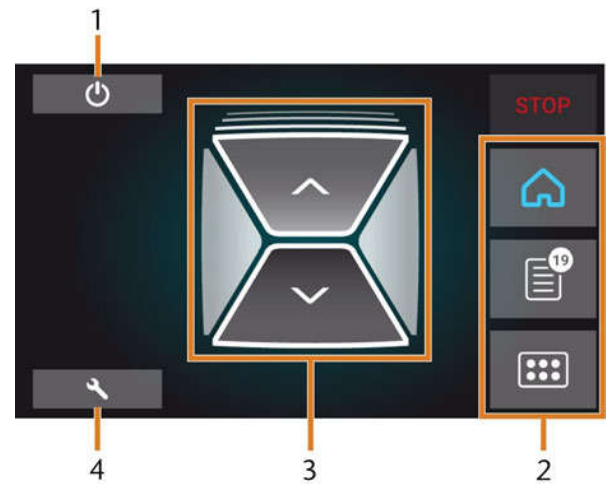


FIG. 32 – HOME SECTION IN MODE 1

1. Icon for shutting down the machine
2. Menu for selecting the individual user interface sections
3. Icons for operating the working chamber door and multi-purpose drawer
4. Icon for opening the **Maintenance** section

**Mode 2** displays during processing:

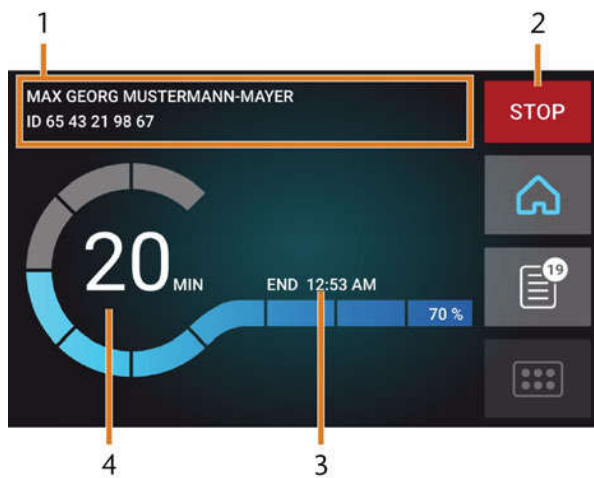


FIG. 33 – HOME SECTION IN MODE 2

1. Job details and patient information
2. Icon for aborting the job
3. Job end time
4. Prospective remaining job duration

**i** The remaining job duration is an estimation based on a self-learning function.

### The Jobs section of the touchscreen

In the **Jobs** section, you can view details of the available jobs. You can use this view to prepare and start machining. You can delete jobs that you do not need anymore.



FIG. 34 – JOBS SECTION

1. Job details and patient information
2. Required blank type
3. Check box for the required tool magazine
4. Check box for the tool life values
5. Prospective job duration
6. Arrows to browse through the available jobs
7. Number of current job / number of available jobs
8. Color code of the required tool magazine
9. Icon for starting the current job
10. Icon for deleting the current job

### The Tools section of the user interface

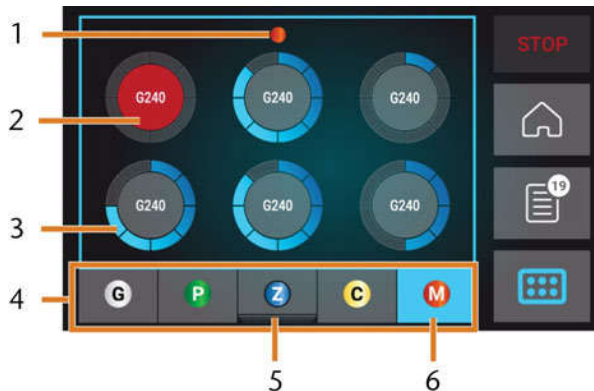


FIG. 35 – TOOLS SECTION

1. Color code of the currently selected tool magazine
2. Tool with expired tool life (red circle)
3. Tool life value indicator (blue outer circle)
4. Menu for selecting the tool magazine
5. Marking for the tool magazine currently inserted in the working chamber
6. Marking for the tool magazine currently shown on the touchscreen

### Exchanging the cooling liquid and cleaning the tank

#### NOTICE

#### Damages caused by wet machining with unsuitable cooling liquid

Wet machining without suitable cooling liquid can damage the machine, tools and blanks.

- » Before you execute a job, ensure that the cooling liquid is clean and the liquid level is sufficient.
- » Only use cooling liquid that meets the requirements listed below.
- » Exchange used cooling liquid according to the maintenance table. Clean the cooling liquid tank before refilling it.
- » If you use a cleaning agent to clean the tank, ensure that no residues of it remain in the tank.

The machine needs cooling liquid that meets the following requirements:

- Drinking water
- No added chlorine
- No distilled water
- No carbonated water

Without sufficient cooling liquid in the tank, wet machining is not possible. The machine regularly reminds you via the touchscreen to exchange the cooling liquid. You can find the appropriate interval in the maintenance table. Of course, you can exchange the cooling liquid at any time.

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

- The liquid level lies below the **min** mark.
- The change interval in the maintenance table has been exceeded.
- The cooling liquid is soiled.

Every time you exchange the cooling liquid, you must also clean the tank.

Before every job, you also have to check the strainer basket and empty it if required.

#### Emptying the strainer basket

You can empty the strainer basket into a collecting container as follows:

1. Lift the cover off the tank.
2. Remove the strainer basket by pushing it out of the cover from below.

3. Tap out the strainer basket into the collecting container. You can use water or compressed air to further clean the strainer basket.

✓ The strainer basket is completely void of machining residues.

### Exchanging or filling in the cooling liquid

You can fill in or exchange the cooling liquid as follows:

1. To *exchange* the liquid and *clean* the cooling liquid tank, have the following items readily available:
  - Collecting container that can hold approx. 10 l
  - Cleaning brush
  - Water for cleaning the cooling liquid tank
2. Ensure that sufficient cooling liquid is available.
3. Close the working chamber door.
4. Open the multi-purpose drawer.
5. Grab the cooling liquid tank at the positions marked in the following figure. Pull it out of the drawer in the direction indicated by the arrow (↗ see below).

! When you tilt the cooling liquid tank, the cover will not prevent the cooling liquid from leaking.

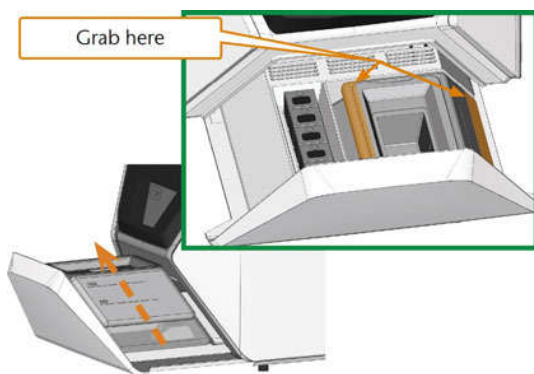


FIG. 36 – REMOVING THE COOLING LIQUID TANK FROM THE MULTI-PURPOSE DRAWER

i Information on the disposal of cooling liquid and machining residues: ↗ [Disposal](#) – on page 71

6. Lift the cover off the tank.

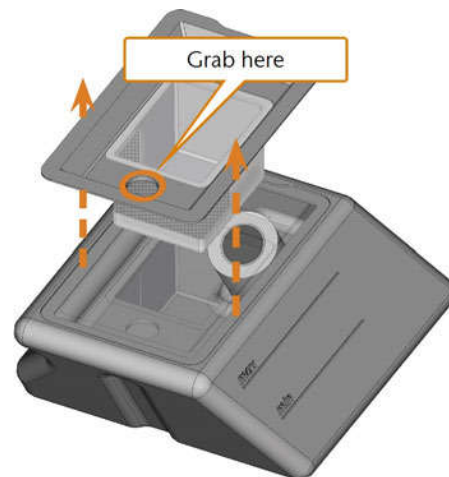


FIG. 37 – REMOVING THE COVER FROM THE COOLING LIQUID TANK

7. If there is cooling liquid in the tank:
  - a. Pour the cooling liquid into the collecting container.
  - b. Remove the strainer basket by pushing it out of the cover from below.
  - c. Tap out the strainer basket into the collecting container. You can use water or compressed air to further clean the strainer basket.

✓ The strainer basket is completely void of machining residues.

  - d. Rinse the filter in the cooling liquid tank under running water.

i If necessary, you can disassemble the cooling liquid filter to clean it thoroughly (↗ [Exchanging the carbon filter](#) – on page 63).

  - e. Thoroughly clean the tank with the cleaning brush. Pour the cleaning water into the collecting container.
  - f. If you have used a cleaning agent, ensure that no residues of it remain in the cooling liquid tank.

✓ The cooling liquid tank is completely void of liquid, machining and cleaning agent residues.
8. Fill the cooling liquid tank with cooling liquid until it reaches the **max** mark.
9. Insert the strainer basket into the tank cover and put the cover onto the tank.

10. Remove dirt and foreign bodies from the coupling of the cooling liquid tank and the counterpart in the machine.

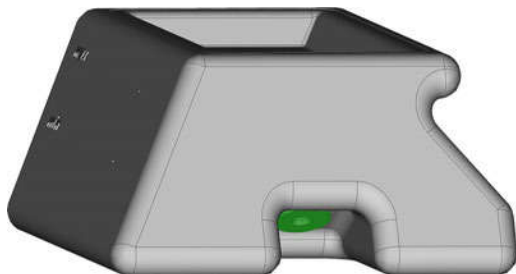


FIG. 38 – THE COUPLING OF THE TANK AND ITS COUNTERPART (COLORED GREEN)

11. Insert the cooling liquid tank with the help of the guide rail into the multi-purpose drawer.

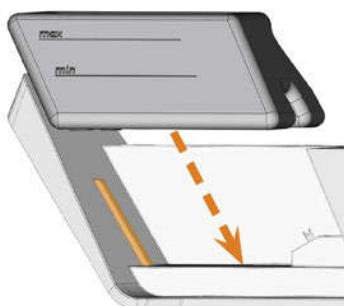


FIG. 39 – INSERTING THE COOLING LIQUID TANK INTO THE DRAWER (GUIDE RAIL COLORED ORANGE)

12. Push the tank into its end position until it is properly attached to the machine.
  - ✓ The cooling liquid tank is connected to the cooling liquid system via the coupling.
13. Close the multi-purpose drawer.



## Managing tools

### NOTICE

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

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

- » Only use tools with a sufficiently large chamfer at the tool shank.
- » Install a retaining ring as a stop ring according to DIN 471-A3.
- » Only insert tools with a maximum diameter of 3 mm at the thickest part into the collet chuck.
- » Only insert tools with a maximum cutting edge diameter of 2.6 mm into the tool magazine.



We recommend original tools as they are designed especially for the designated jobs.

The machine uses exchangeable tool magazines that can hold up to 6 tools each.



FIG. 40 – A TOOL MAGAZINE

For each job you need to mount the appropriate magazine into the working chamber.

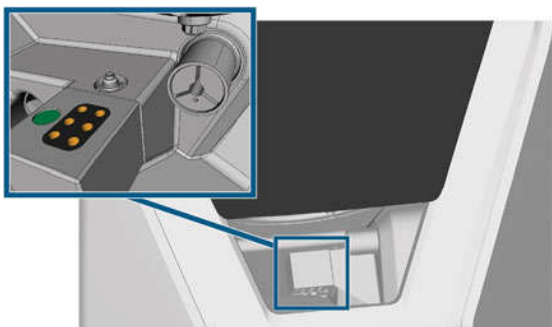


FIG. 41 – TOOL MAGAZINE WHICH IS MOUNTED TO THE TOOL MAGAZINE HOLDER; TOOL POSITIONS MARKED ORANGE

You can store magazines that are currently not needed in the multi-purpose drawer.

A sensor recognizes the tool magazine which is currently mounted into the working chamber. The

touchscreen displays the required magazine for each job and whether it is mounted into the working chamber.

The machine can change tools automatically during machining so that it executes jobs without your interference.



If tool magazine inserts are worn, you should replace them. (↗ [Replacing the tool magazine inserts](#) – on page 65)

#### Color codes of the tool magazines

The tool magazines have color codes for the individual materials. In the following table you find an overview:

Color code	Material	Letter
Green	Wax and plastics (PMMA)	P
Yellow	Composites	C
Blue	Zirconia	Z
Red	Non-precious metals (Cobalt chrome / Titanium)	M
White	Glass ceramics	G

#### Inserting and exchanging tools

You need to insert or exchange tools in the following cases:

- Upon first use of the machine
- After replacing a tool magazine (in case of loss or damage)
- After exchanging tool magazine inserts due to wear
- When the tool life of a tool has expired
- When tools are damaged or worn



When you select a job in the **Jobs** section, a check box indicates whether you need to replace tools before machining.

You can use the **Tools** section of the touchscreen for managing tools:

- To check the tool life values.
- To check which tool magazine positions the individual tools are assigned to.

- i** The maximum tool life values that you can actually achieve with your tools depend on many factors, such as the quality of the tools, the quality of the blanks, how well the machine is maintained and cleaned etc. Therefore, the tool life values that your machine is shipped with are default values. Due to a self-learning function, they will become more precise over time.

- To open the **Tools** section, select the depicted icon.



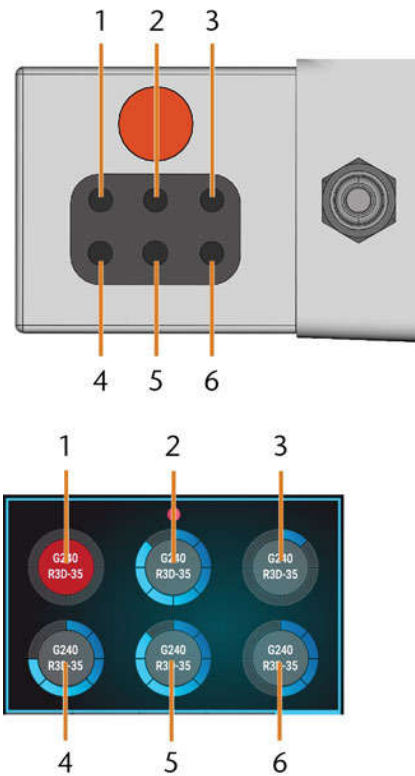
- ✓ The **Tools** section displays. One of the magazines is selected and the corresponding information displays.



FIG. 42 – TOOLS SECTION

- Color code of the currently selected tool magazine
  - Tool with expired tool life (red circle)
  - Tool life value indicator (blue outer circle)
  - Menu for selecting the tool magazine
  - Marking for the tool magazine currently inserted in the working chamber
  - Marking for the tool magazine currently shown on the touchscreen
- Select the desired tool magazine from the menu at the bottom display border.
- ✓ The tools of the corresponding tool magazine display as circles.
- In the middle of each circle, the tool match code displays.

- Tools with expired tool life values display in red.
- Each circle is assigned to a specific position of the corresponding magazine.

FIG. 43 – TOP: TOOL POSITION 1 – 6 IN THE TOOL MAGAZINE  
BOTTOM: TOOL POSITIONS 1 – 6 ON THE TOUCHSCREEN

- If tool life values have expired, remove the corresponding tools from the tool magazine.
- Insert the new tools:
  - Ensure that the positions of the tools in the tool magazine match the tool positions on the touchscreen.
  - Insert the tools straight into the tool positions with the cutting edge pointing downwards. Push them in until the ring touches the rubber.

- !** If the positions of the tools in the tool magazine do not match the tool positions on the touchscreen, the machine will use the wrong tool(s) during job execution and the job result will become unusable.



FIG. 44 – INSERTING TOOLS INTO THE TOOL POSITIONS

5. After replacing a tool, reset the tool life value. For this, select the corresponding element on the touchscreen.
6. Plug the tool magazine back onto the tool magazine holder if required.

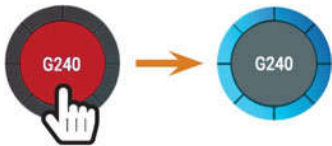


FIG. 45 – RESETTING THE TOOL LIFE VALUES

- ✓ The tool life value of the tool is reset. The circle displays in blue.

## Mounting & exchanging tool magazines

### NOTICE

#### Damage of the tool magazines and tool magazine holder

If you tilt tool magazines while mounting them, or if tool magazines or the tool magazine holder are not clean, the magazines will not slide smoothly onto the holder. If you mount or remove tool magazines by force, you can damage the tool magazine and the tool magazine holder.

- » Always keep the tool magazine holder and the holes in the tool magazines clean.
- » Grease the tool magazine holder according to the maintenance table.
- » Plug tool magazines straightly onto the holder. If necessary, remove the tool magazine and reposition it.

You exchange tool magazines by pulling them off and plugging them on the tool magazine holder.

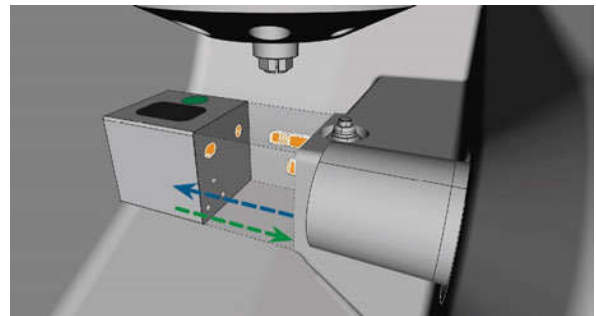


FIG. 46 – EXCHANGING THE TOOL MAGAZINE (TOOL MAGAZINE HOLDER AND HOLES IN THE TOOL MAGAZINE MARKED ORANGE)

In case a tool magazine got stuck on the holder, use the screw on the backside of the tool magazine:

1. Use the screw as follows:
  - a. Pick up a flat blunt tool (e. g. a slot screw driver)
  - b. Use the tool to remove the protective cap of the screw and put it aside within reach.
  - c. Using the provided allen key, turn the screw to the right.
  - ✓ The tool magazine moves backwards and is released.

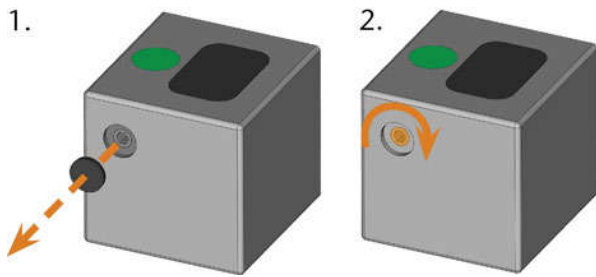


FIG. 47 – REMOVING THE PROTECTIVE CAP (LEFT) AND USING THE SCREW

2. Remove the tool magazine from the working chamber.
  3. To reset the screw, do the following:
    - a. Using the provided allen key, turn the screw to the left into its original position.
    - b. Cover the screw opening with the protective cap.
- ✓ The screw is reset and the tool magazine is ready to be mounted again.

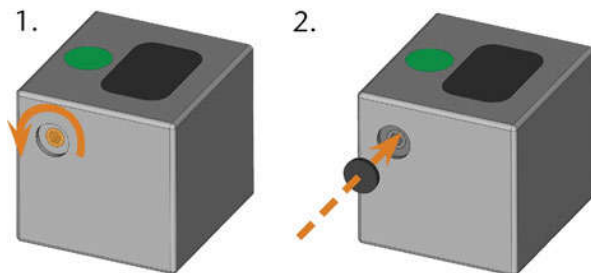



FIG. 48 – RESETTING THE SCREW (LEFT) AND PLACING THE PROTECTIVE CAP

You can use the touchscreen to choose the right tool magazine for the next job:

1. To open the **Jobs** section, select the depicted icon. 
- ✓ The **Jobs** section displays. The details of the next queued job display.
2. If necessary, switch to the desired job by using the left and right arrow in the left bottom corner of the touchscreen.

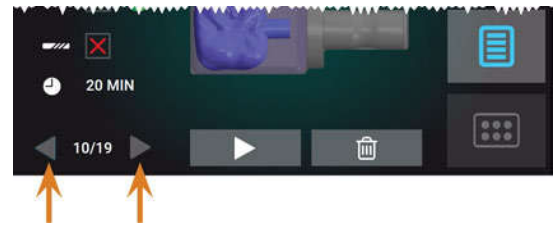


FIG. 49 – THE ARROWS TO SWITCH BETWEEN JOBS

- ✓ The touchscreen displays the required tool magazine and if it is mounted into the working chamber.

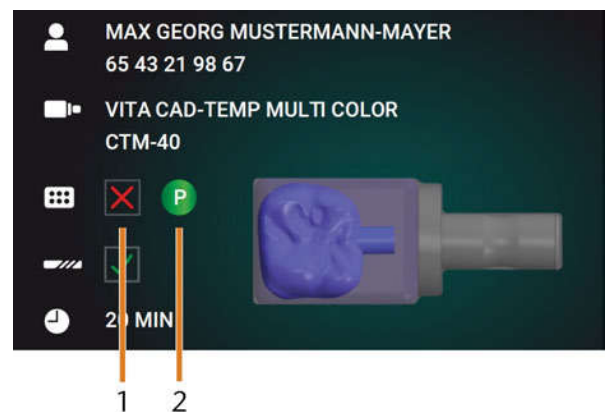




FIG. 50 – THE TOOL MAGAZINE DETAILS IN THE JOBS SECTION

1. Check box to indicate if the required tool magazine is mounted:
  -  means **not mounted**
  -  means **mounted**
2. The color code and letter of the required tool magazine ([↗ Color codes of the tool magazines – on page 41](#))
3. If an incorrect tool magazine is mounted, remove this magazine by pulling it off the tool magazine holder ([↗ Fig. 46 – on the previous page, blue arrow](#)).
4. To mount the required tool magazine, identify it by comparing the color code:

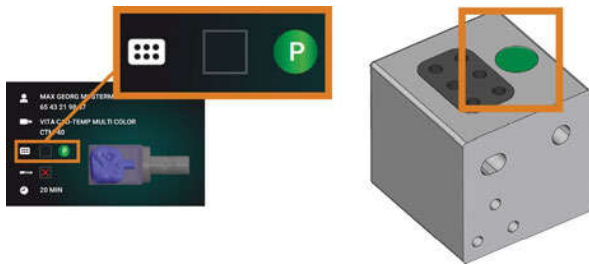


FIG. 51 – THE COLOR CODE ON THE TOUCHSCREEN (LEFT) AND ON THE TOOL MAGAZINE ARE IDENTICAL

5. Ensure that the contact surfaces of the tool magazine holder and the tool magazine are clean.

**!** You can only execute jobs when the machine recognizes the required tool magazine.

6. Plug the tool magazine onto the tool magazine holder (↗ Fig. 46 – on page 43, green arrow):

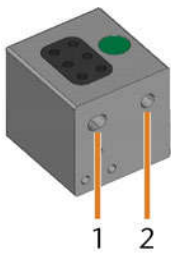


FIG. 52 – THE 2 HOLES IN A TOOL MAGAZINE

1. Larger front hole
2. Smaller rear hole

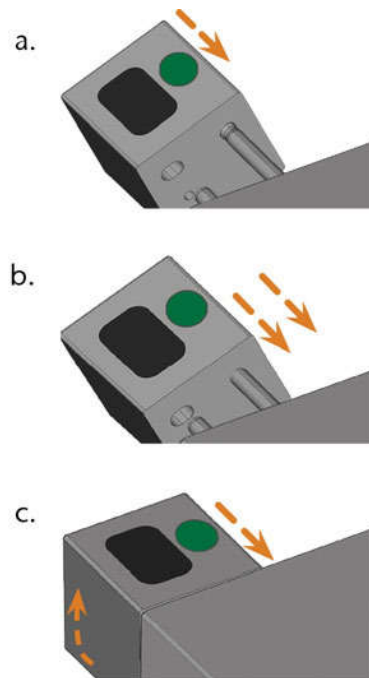


FIG. 53 – PLUGGING A TOOL MAGAZINE ONTO THE TOOL MAGAZINE HOLDER IN 3 STEPS

- a. Position the larger rear hole on the longer bolt of the tool magazine holder. Push it onto the bolt until you feel a resistance.
- b. Overcome the resistance by pushing the tool magazine harder onto the bolt.
- c. Align the smaller front hole with the shorter bolt of the tool magazine holder. Push the tool magazine onto the short bolt until it is properly seated on the tool magazine holder.

## Mounting & removing blanks

The machine can process the following blanks:

- Blocks, max. size: 40 x 20 x 20 mm (L/D/H)
- Prefabricated abutments\*

\*requires extra equipment

**i** You can obtain extra equipment from customer service.

## Mounting & removing blocks

You can mount blocks to the block holder where a collet chuck immobilizes them. The collet chuck opens and closes with the working chamber door.

1. Open the working chamber door.
- ✓ The working chamber door is open. The collet chuck is open.
2. Pull the block out of the holder if any.
3. Check the collet chuck for dirt.
4. If necessary, clean the collet chuck (☞ *Cleaning the collet chuck of the blank holder* – on page 60).
5. Place the required block in the collet chuck of the block holder: Align the groove of the block [1] with the positioning pin of the block holder [2].

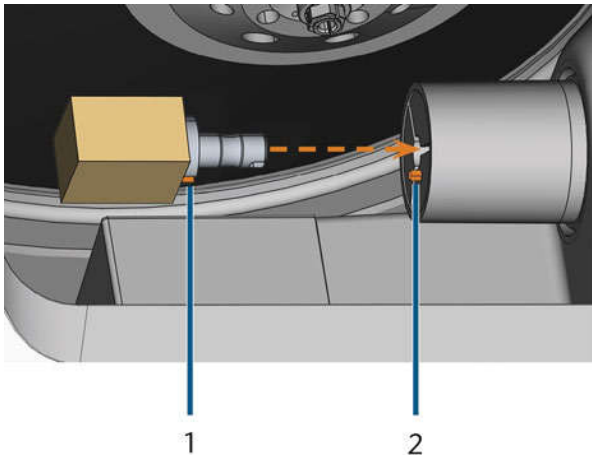


FIG. 54 – INSERTING THE BLOCK INTO THE BLOCK HOLDER (GROOVE AND POSITIONING PIN MARKED ORANGE)

1. Groove of the block
  2. Positioning pin of the block
6. Push the block into the block holder until it clicks in. If the block does not click in, twist it until the positioning pin lies in the groove.

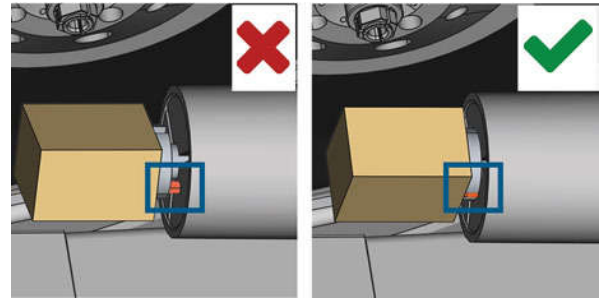


FIG. 55 – (A) BLOCK HAS ONLY PARTIAL CONTACT; (B) BASE SURFACE OF BLOCK HAS FULL CONTACT

7. Close the working chamber door.
- ✓ The working chamber door is closed. The collet chuck is closed. The block is mounted.

## 7 Operation: Executing jobs

### Overview

#### NOTICE

#### Damaging of the machine when using damaged tools or blanks

If tools or blanks are damaged, parts can break off and damage the machine during job execution.

» Check the blanks and tools **thoroughly** for damage before every job execution.

When you have prepared your jobs and your machine, you can start machining. Machining is a fully automated process and only requires your attention in case of unexpected events.

**!** Do not move the machine during job execution, otherwise the results may become imprecise.

- Ensure the following:
  - You created a job on your CAD computer. It has been transferred to the machine.
  - The correct tool magazine is inserted into the working chamber.
  - All required tools are in the right positions in the tool magazine and are neither worn nor damaged.
  - The required blank is mounted.
  - There is enough cooling liquid in the cooling liquid tank.
- Close the working chamber door.
- Start machining via the touchscreen.

### Starting jobs via the touchscreen

Following you find the workflow for selecting, checking and executing jobs.

- To open the **Jobs** section, select the depicted icon.



- ✓ The **Jobs** section displays. The details of the next queued job display.



FIG. 56 – JOBS SECTION

- Job details and patient information
  - Required blank type
  - Check box for the required tool magazine
  - Check box for the tool life values
  - Prospective job duration
  - Arrows to browse through the available jobs
  - Number of current job / number of available jobs
  - Color code of the required tool magazine
  - Icon for starting the current job
  - Icon for deleting the current job
- Use the arrows in the left bottom corner to select the desired job.

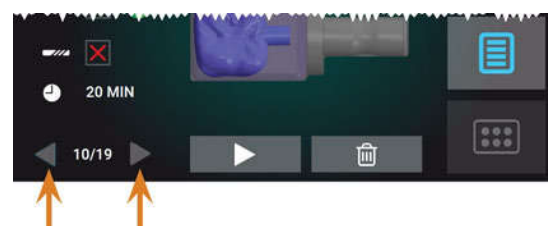



FIG. 57 – THE ARROWS TO SWITCH BETWEEN JOBS

3. Verify that the elements [2], [3], [4] display as required:
  - a. Ensure that the mounted blank corresponds to [2] (if not: [↗ Mounting & removing blanks](#) – on page 46).
  - b. If **✗** displays in [3], mount the correct tool magazine ([↗ Mounting & exchanging tool magazines](#) – on page 43).
  - c. If **✗** displays in [4], replace all worn tools ([↗ Managing tools](#) – on page 41).
4. To start machining, select the depicted 

✓ The following happens:

- a. If required, the working chamber door closes.
- b. The machine starts processing.
- c. The working chamber is illuminated in blue.
- d. The remaining machining duration displays on the touchscreen.

**i** If you are prompted that a firmware update exists: [↗ Updating the firmware of the machine](#) – on page 68

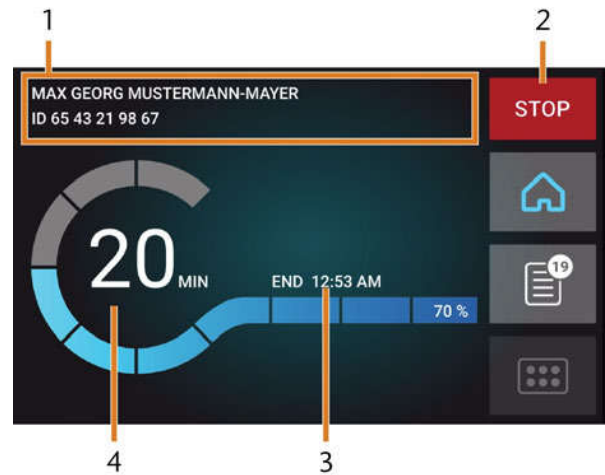


FIG. 58 – HOME SECTION IN MODE 2

1. Job details and patient information
2. Icon for aborting the job
3. Job end time
4. Prospective remaining job duration

**i** The remaining job duration is an estimation based on a self-learning function.

5. If using exocad ChairsideCAD, *do not* shut down your CAD computer or disconnect it from the network until machining has finished. Otherwise, you may have to restart your machine and the job.
6. Wait until the machine has finished.
- ✓ The working chamber door opens. The following dialog displays on the touchscreen.

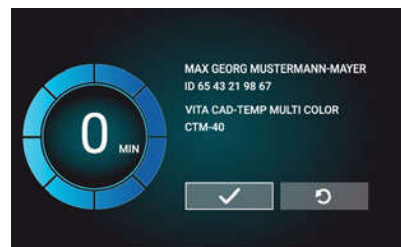




FIG. 59 – THE DIALOG AFTER A JOB HAS BEEN FINISHED

7. Remove the blank from the working chamber and check whether the job has been executed correctly.
8. If you are satisfied, select the depicted 



- ✓ The job is marked as finished and no longer displays in the **Jobs** section.


**i** You can restore finished jobs with DentalCNC. Read the corresponding documentation for more details.

9. If you need to repeat the job, select the depicted icon on the touchscreen. 
- ✓ The job continues to display in the **Jobs** section. You can restart it as required.
10. Leave the working chamber door open so that the working chamber can dry.


**!** After machining, air is blown into the working chamber for some time to help dry the working chamber, which causes air noise. This does not indicate that there is a malfunction.

## Aborting machining

You can cancel machining at any time. You need to restart the job with a *new* blank. You cannot continue the job with the used blank because the machine will not recognize this blank and you will receive an error message.

1. To cancel machining, select the depicted icon. 

- ✓ The machine prompts you to confirm the cancellation.

2. To confirm your choice, select the depicted icon. 

- ✓ The spindle puts the tool which is currently in the collet chuck into the tool magazine. The working chamber door opens.

3. If the working chamber is wet, leave the working chamber door open so that the working chamber can dry.

## Job interruptions and job abortions

A job will be *interrupted* in the following cases:

- The compressed air supply is not sufficient
- The cooling liquid flow rate is not sufficient

An *interrupted* job will normally be continued automatically after the error is corrected.

A job will be *aborted* in the following cases:

- In case of a machine malfunction
- In case of a tool breakage
- In case of a power failure

If a job was *aborted*, you have to restart it.

**!** You need to restart the job with a *new* blank. You cannot continue the job with the used blank because the machine will not recognize this blank and you will receive an error message.

### How to proceed in case of a job interruption

If the job was interrupted, the touchscreen displays a corresponding message.

#### If the compressed air is insufficient

1. Wait a couple of seconds. This may already solve the problem.
2. Restart the machine.
3. If the problem persists, contact customer service.

#### If the cooling liquid flow rate is insufficient

1. Check if there is enough cooling liquid in the tank.
2. Check if the cooling liquid and the tank including the filter are clean.

### How to proceed in case of a machine malfunction

A machine malfunction is recognized by the internal control unit in case of a critical event. The working chamber will be illuminated in red. The touchscreen 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. If you need to remove a blank from the working chamber, perform an emergency opening of the working chamber door.

### How to proceed in case 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
- The next check for broken tools, if activated in the application settings of DentalCNC.


A tool breakage can be caused by the following:

- The tool was damaged or worn
- The tool was put into the wrong tool magazine 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. 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.
4. 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.
5. Close the working chamber door. Restart the job.

 You need to restart the job with a *new blank*. You cannot continue the job with the used blank because the machine will not recognize this blank and you will receive an error message.

 If tools break regularly, you can find additional information in the troubleshooting section: [Troubleshooting – on page 72](#)

### How to proceed in case of a power failure

As long as the machine is not powered, you do not have access to the working chamber. You also have no access to the drawer.

- » 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.
- » If you need to access to the multi-purpose drawer, perform an emergency opening of the drawer.

## Emergency opening of the working chamber door

### WARNING

#### Crushing hazard and cutting injuries if the working chamber door is open

If the working chamber door is open during machining, it will not protect users from bruises and cuts.

- » **Do not** open or close the working chamber door during machining.
- » **Never** operate the machine with the working chamber door open.
- » Perform the emergency opening only if you are authorized to do so and if you have received training on it.

### 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.

### NOTICE

#### Improper opening or closing of the working chamber door

To avoid damage, heed the following instructions when you manually open or close the working chamber door.

- » Disconnect the machine from the electrical source.
- » Prevent the working chamber door from twisting by pushing or pulling it with **both** hands.
- » Only apply as much force as needed to overcome the resistance.

You can perform an emergency opening as follows:

1. Switch off the machine at the main power switch. Disconnect the machine from the electrical source.
- ✓ You can manually open the working chamber door.

- ! The working chamber door should move sluggishly, but evenly. If the movement is jerky or the working chamber door gets stuck, do not use excessive force.

2. Open the working chamber door by straightly and evenly pushing it upwards with both hands.
3. If the working chamber door can only be moved with very high effort, ensure that the guide rails at the back are clean.

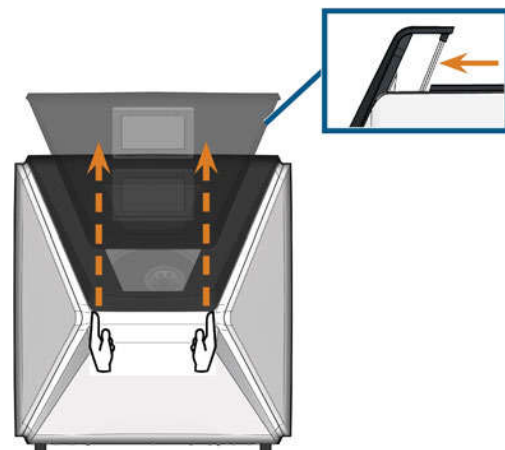


FIG. 60 – EMERGENCY OPENING OF THE WORKING CHAMBER DOOR AND CHECKING THE GUIDE RAILS

4. If the working chamber is wet, leave the working chamber door open so that the working chamber can dry.
5. Close the working chamber door by carefully pushing it downwards with both hands.

## Removing the back panel cover

You need to remove the back panel cover of the machine for an emergency release of the multi-purpose drawer.

You can remove the back panel cover as follows:

1. Switch off the machine at the main power switch.
2. Disconnect the machine from all lines.
3. Grab the bottom edge of the back panel cover and pull it towards you as indicated by the arrows:



FIG. 61 – REMOVING THE BACK PANEL COVER

4. To re-install the back panel cover, do the following:
  - a. Align the top edge of the machine and the cover so that the start button and main power switch lie in the center of the respective openings.
  - b. Push the cover against the machine housing.

✓ The cover is held in place by magnets.

## Emergency opening of the multi-purpose drawer

In case of a longer power failure, you can manually open the multi-purpose drawer as follows:

1. Remove the back panel cover (➤ *Removing the back panel cover* – see above).
2. Insert a screwdriver with 5 cm minimum length into the depicted opening at the backside of the machine.

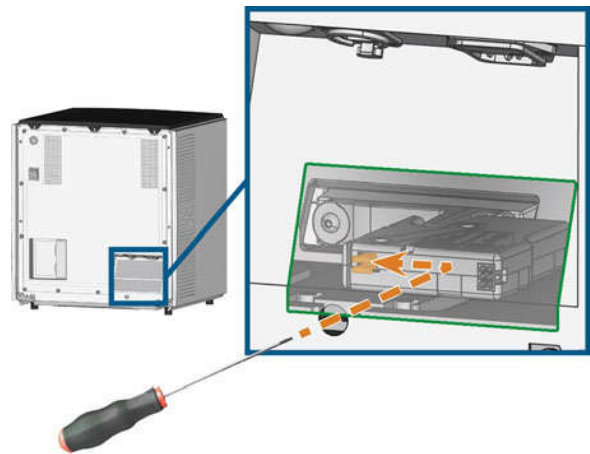


FIG. 62 – EMERGENCY RELEASE OF THE MULTI-PURPOSE DRAWER

3. Push the screw driver in the upper right direction until you encounter a resistance.
4. Use the screwdriver to push the lever for the emergency release to the left until the mechanism is unlocked.
5. Install the back panel cover.

## 8 Maintenance and do-it-yourself

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. You are a vital link in the maintenance chain.

### 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 section

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

When you have marked a maintenance task as complete, its time interval is reset and the list is updated accordingly.

### Preventive maintenance

Preventive maintenance for this machine has to be scheduled every 2 years, or after 1,000 operating hours at the latest.

- » To schedule preventive maintenance, contact customer service.

### Where to get service?

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

- » When your machine is delivered or installed, ask the service technician for contact details for the customer service team. We also recommend scheduling the first preventive maintenance appointment at this point to ensure your machine gets proper maintenance.

### Definition of wear parts

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. The wear parts that are mentioned in the maintenance table can already wear down within the warranty period due to their normal function. The average useful life of the wear parts can be seen in the maintenance table.

Use these values to determine operating costs, to plan your spare part stock as well as to create individual maintenance and service plans.

### Maintenance table

[🔗](#) page 69

## Using the maintenance section

For your convenience, the machine lists all basic maintenance tasks in the **Maintenance** section on the touch-screen. In the **Maintenance** section, you can see when the individual tasks are due.

When you have marked a maintenance task as complete, its time interval is reset and the list is updated accordingly.

You can open the maintenance section as follows:

1. To open the **Home** section, select the depicted icon.



2. To open the **Maintenance** section, select the depicted icon.



- ✓ The **Maintenance** section displays. The touch-screen lists all required maintenance tasks in order of their urgency.

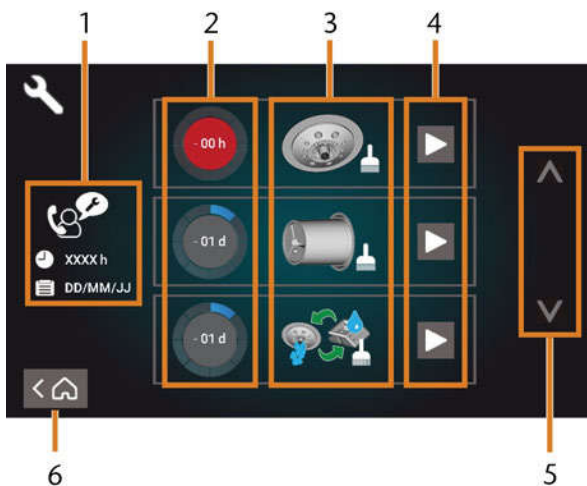


FIG. 63 – THE MAINTENANCE SECTION WITH THE LIST OF MAINTENANCE TASKS

1. Preventive maintenance: remaining operating hours / due date
2. Circles showing the urgency of the task
3. Illustrations depicting the individual tasks
4. Start icons to begin the individual tasks
5. Arrows to scroll through the list
6. Icon to go back to the **Home** section

In the center of the screen the list with all maintenance tasks displays. The higher a task is listed, the more urgent it is.

» Use the circles in the first column to determine how much time remains until the task is due:

- The numbers in the circles show how many operating hours (h) or days (d) are left before the task must be performed.
- The number of blue segments decreases over time.
- If a circle is red, the corresponding task is due.

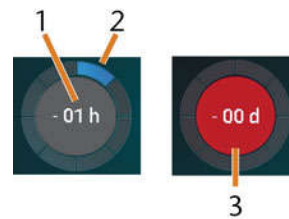



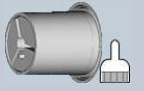


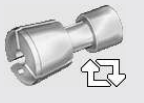





FIG. 64 – CIRCLES INDICATING WHEN A TASK IS DUE

1. The remaining time (here: 1 operating hour)
2. Only 1 segment remains because the task is due soon
3. The red circle indicates that this task is due

### List of all maintenance tasks

The following maintenance tasks and illustrations can display on the touchscreen:

Illustration	Task
	Daily cleaning (working chamber, cooling liquid tank)
	Weekly cleaning (webcam, tool magazines and holder)
	Cleaning the spindle collet chuck
	Cleaning the blank holder collet chuck
	Rinsing the cooling liquid system (rinsing, exchanging the carbon filter)
	Exchanging the view window wiper
	Exchanging the blank holder collet chuck
	Exchanging the cooling liquid coupling
	Preventive maintenance <sup>1</sup>
	Internet connection (Backup / Update) <sup>2</sup>


<sup>1</sup> Only customer service can complete this task and reset the time interval.


<sup>2</sup> This task only appears if the machine is not regularly connected to the internet. The task is completed automatically as soon as a connection is established.

### Performing maintenance tasks

The **Maintenance** section contains interactive on-screen guides for every maintenance task. To perform the maintenance tasks you need to use the respective guide. With the guides you can do the following:

- Read the basic steps required to perform individual maintenance tasks.
- Execute necessary machine functions for individual tasks.
- Mark individual tasks as complete.

 The on-screen guides do not replace the detailed information in this manual. Here you can find additional instructions and safety information.

» To start a maintenance task, select the depicted icon for the respective entry in the **Maintenance** section. 

✓ The corresponding on-screen guide opens. It has several pages which will guide you through the maintenance task.

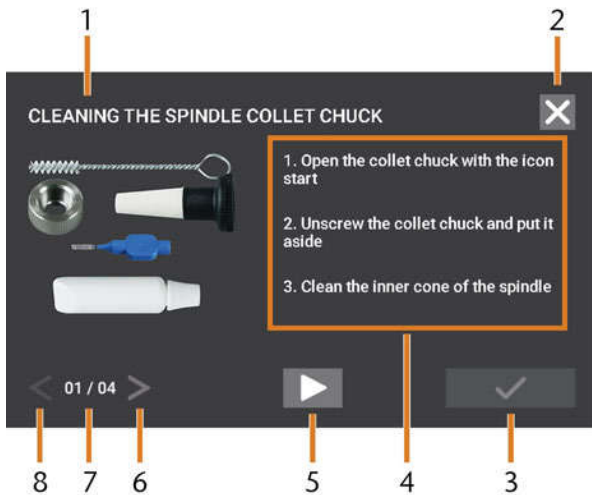




FIG. 65 – INTERACTIVE ON-SCREEN GUIDE FOR MAINTENANCE TASK

1. Title of the on-screen guide
2. Icon to close the guide without marking the task as complete
3. Icon to mark the task as complete
4. Numbered instructions
5. Icon for a required machine operation (e. g. open collet chuck – only for some tasks)
6. Go to next page
7. Current and maximum page of the guide
8. Go to previous page

You can use the on-screen guides as follows:

1. Select the arrows [6/8] to navigate through the guide.
2. Follow the instructions [4] on every page of the guide.
3. Perform the maintenance task as required.
4. If the depicted icon displays, select it to execute the required machine function for the maintenance task. 
- ✓ The icon changes its color as depicted and the machine function is executed. 
5. If you want to open the internet version of the detailed maintenance instructions, use the QR code. Alternatively, visit the following website and search for Z4 and maintenance:  
dentalportal.info




-  The internet version may contain newer information than this document.




FIG. 66 – QR CODE

6. To mark the task as complete, select the depicted icon. 
7. To close the guide without marking the task as complete, select the depicted icon. 

### Leaving the Maintenance section

To close the **Maintenance** section, do as follows:

1. Ensure that the list with maintenance tasks displays.
2. To go back to the **Home** section, select the depicted icon. 



## Cleaning the working chamber

Cleaning the working chamber includes the following components:

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

These components have different maintenance intervals according to the maintenance table. Therefore, you should perform a daily and a weekly cleaning of the working chamber and clean the components which need cleaning.

» When performing the weekly cleaning, also perform the daily cleaning.



We recommend cleaning the working chamber after all other required maintenance tasks.

### NOTICE

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

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

» **Never** clean the working chamber with compressed air or ultrasound.



Do not pour additional water into the working chamber. The cooling liquid tank may overflow.

1. Have ready:
  - A wet cloth
  - A mild cleaning agent (optional)
  - Cleaning brush for the blank holder
  - A wet brush for the measuring key
2. Open the working chamber door.
3. Clean all surfaces and cracks in the working chamber thoroughly with a wet cloth. Use a mild cleaning agent if necessary.
4. Clean the measuring key with the wet brush.

## Performing the weekly cleaning

1. Have ready: The cleaning brush for the blank holder.
2. Remove the tool magazine from the working chamber. Clean it with the cloth and the brush.
3. Open the multi-purpose drawer. Clean the other tool magazines.
4. Clean the blank holder with its respective brush.

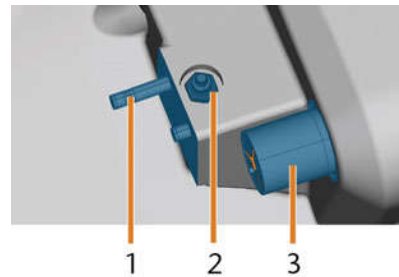


FIG. 67 – TOOL MAGAZINE HOLDER, MEASURING KEY, BLOCK HOLDER (IN BLUE)

1. Tool magazine holder
2. Measuring key
3. Blank holder
5. Screw the protective cap off the webcam and clean the inside of the cap with a dry cloth.

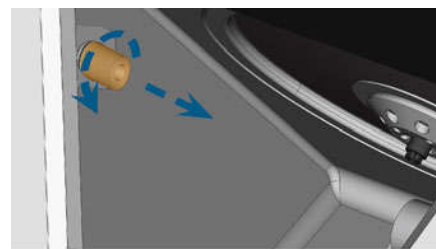


FIG. 68 – SCREWING THE PROTECTIVE CAP OFF THE WEBCAM

6. Clean the webcam with a wet cloth. Screw on the protective cap.
7. Clean the tool magazine holder thoroughly.
8. Apply a bit of collet grease to the bolts of the tool magazine holder.
9. To apply the collet grease to the holes of all tool magazines, mount *all* tool magazines once.

## Cleaning the collet chuck

- i** The grease for the collet chuck of the spindle and for the collet chuck of the blank holder is the same item.

### NOTICE

#### Damaging of the spindle when cleaning with compressed air or ultrasound

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

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



FIG. 69 – SPINDLE SERVICE SET

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

To clean the collet chuck do the following:

1. Have the spindle service set ready.
2. Start the maintenance by selecting the corresponding entry in the **Maintenance** section on the touchscreen.
- ✓ The following happens:
  - a. The on-screen quick guide displays.
  - b. The working chamber door opens.
3. Open the collet chuck using the quick guide.
4. Put the knurled nut to the spindle with one hand. With the other hand insert the measuring pin into the collet chuck and keep holding it.

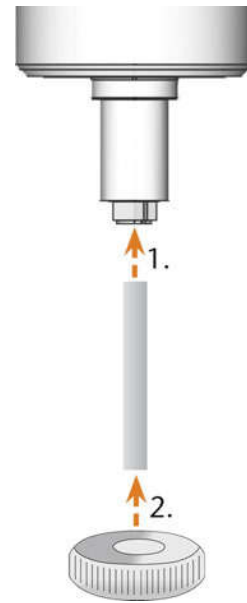


FIG. 70 – UNSCREWING THE COLLET CHUCK

5. Loosen the collet chuck with the knurled nut. Unscrew the collet chuck with your hand or with the knurled nut.
6. Remove the measuring pin from the collet chuck. Then put it aside within reach together with the knurled nut.
7. Clean the inner cone of the spindle with the cleaning cone of the service set.

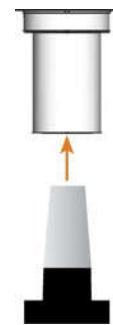


FIG. 71 – CLEANING THE INNER CONE OF THE SPINDLE

8. Clean the collet chuck with the brush of the service set.

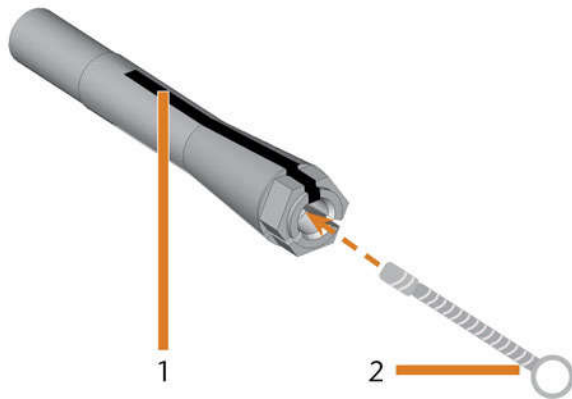


FIG. 72 – CLEANING THE COLLET CHUCK

1. Longitudinal slot
2. Cleaning brush

### 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.

- » Ensure that no grease gets into the longitudinal slots of the collet chuck.
- » Only use a very small, about pinhead-size amount of the grease.
- » Only use the provided grease of the service set.

9. Put a small amount of the collet grease on the index finger and smear it with the thumb.
10. Apply the smeared collet grease to the flanks of the collet chuck.

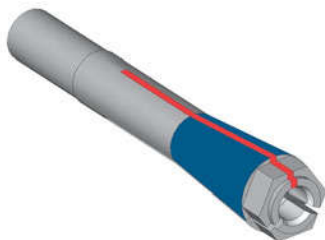


FIG. 73 – GREASING THE COLLET CHUCK; SURFACE IN WHICH GREASE IS TO BE APPLIED IS MARKED IN BLUE; SLOT THAT MAY NOT BE GREASED IS MARKED IN RED

11. Insert the measuring pin into the collet chuck with one hand and keep holding it. Screw the collet chuck with the knurled nut in your other hand tightly into the spindle.


**!** Turn the knurled nut as far as you can so that the collet chuck is properly seated in the spindle. Otherwise rotational imperfections can occur during operation which will worsen your processing results

12. Remove the measuring pin from the collet chuck and store it together with the other components of the spindle service set.
13. Clean the nozzle plate.

## Cleaning the nozzle plate

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

1. Have the interdental brush ready.
2. Open the working chamber door.
3. Clean the ring of 8 holes in the inner area of the nozzle plate. For this, move the interdental brush up and down.

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

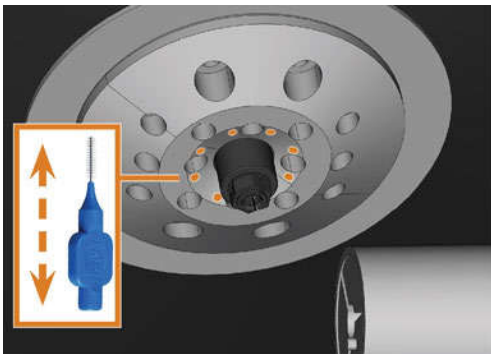



FIG. 74 – CLEANING THE NOZZLE PLATE; NOZZLES MARKED ORANGE

## Cleaning the collet chuck of the blank holder

 The grease for the collet chuck of the spindle and for the collet chuck of the blank holder is the same item.

1. Have ready:
  - Blank holder service set
  - Collet chuck grease



FIG. 75 – BLANK HOLDER SERVICE SET

1. Torque screwdriver (1.8 Nm)
2. Cleaning cone
3. Cleaning brush
4. Tube of collet chuck grease

### NOTICE

#### Damaging of the block holder when using the wrong torque screwdriver or performing the maintenance with the machine switched off

If you use a torque screwdriver other than the one included in the scope of delivery, or if you perform the maintenance with the machine switched off, the block holder can get damaged.

- » Ensure that the machine is switched on during the entire duration of the repair.
- » Only use the provided torque screwdriver.
- » Ensure that you apply a maximum torque of 1.8 Nm.

2. Switch on the machine at the main power switch.
3. Open the working chamber door.

4. Insert the bit of the torque screwdriver into the collet chuck and hold it in place.
5. Put the torque screwdriver on the bit and unscrew the screw by twisting the torque screwdriver.

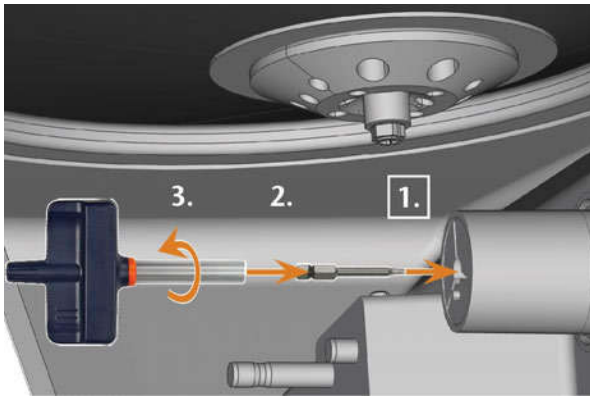


FIG. 76 – LOOSENING THE SCREW OF THE BLANK HOLDER COLLET CHUCK

6. Remove the collet chuck and the screw from the blank holder. Put both items aside within reach.

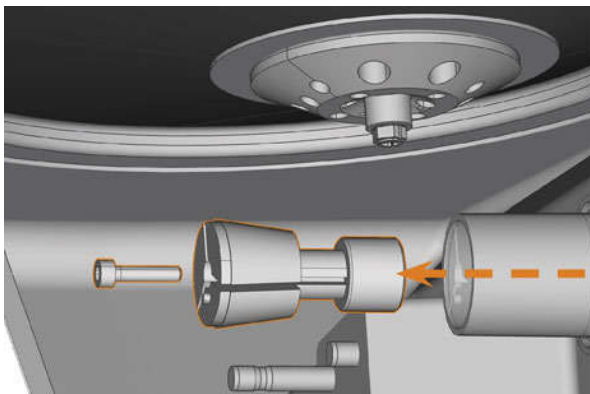


FIG. 77 – REMOVING THE COLLET CHUCK FROM THE BLANK HOLDER

7. Clean the inner cone of the blank holder with the cleaning cone of the service set.
8. Clean the collet chuck with the brush of the service set.

## NOTICE

### Damaging of the collet chuck 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.

- » Ensure that no grease gets into the longitudinal slots of the collet chuck.
- » Only use a very small, about pinhead-size amount of the grease.
- » Only use the provided grease of the service set.

9. Clean the outside of the collet chuck.
10. Grease the collet chuck. Apply the grease only to the conical surface of the collet chuck.

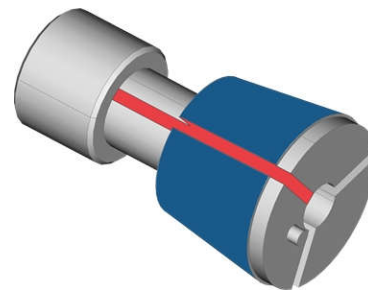


FIG. 78 – GREASING THE COLLET CHUCK; SURFACE IN WHICH GREASE IS TO BE APPLIED IS MARKED IN BLUE; SLOT THAT MAY NOT BE GREASED IS MARKED IN RED

11. Check the condition of the fixing screw and replace it by a spare screw if necessary.
12. Push the collet chuck with fixing screw into the blank holder as far as you can. Twist the collet chuck until it snaps in place and is properly seated. Depending on the position you may need to twist it up to 360°.

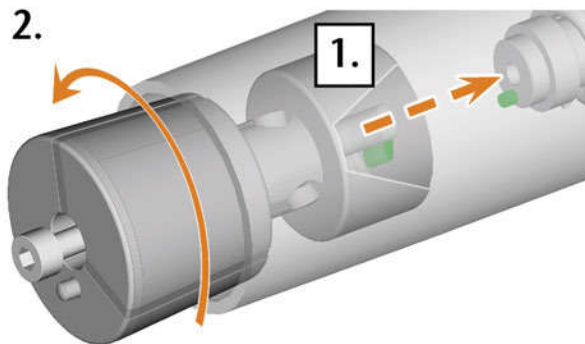


FIG. 79 – INSERTING THE COLLET CHUCK INTO THE BLANK HOLDER

13. Insert the bit of the torque screwdriver into the collet chuck and hold it in place.
14. Put the torque screwdriver on the bit and screw down the screw by twisting the torque screwdriver.

### Rinsing the cooling liquid circuit

To remove foreign bodies from the cooling liquid system of your machine, you need to rinse the system.

1. Start the rinsing program by selecting the corresponding entry in the **Maintenance** section on the touchscreen.
  - ✓ The following happens:
    - a. The on-screen guide displays.
    - b. The multi-purpose drawer opens.
2. Empty and clean the cooling liquid tank.
3. Refill the tank.
4. Close the multi-purpose drawer.
5. To start rinsing, confirm the dialog.
  - ✓ The rinsing program runs automatically.
6. Wait until the rinsing program has ended.
7. Exchange the carbon filter.

## Exchanging the carbon filter

The cooling liquid tank of your machine is equipped with a cooling liquid filter that consists of different filter components, including the carbon filter. The carbon filter contains activated carbon pellets that you need to exchange regularly.

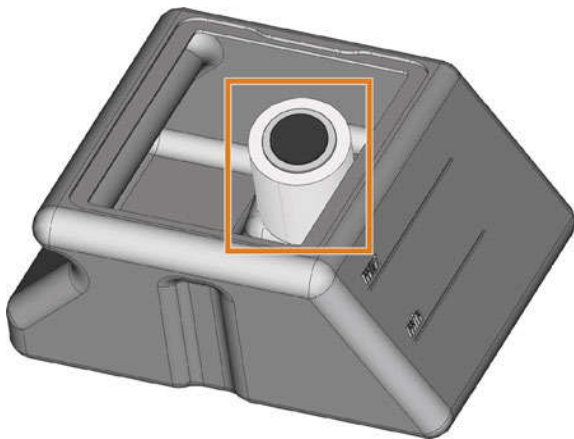


FIG. 80 – COOLING LIQUID FILTER IN THE TANK

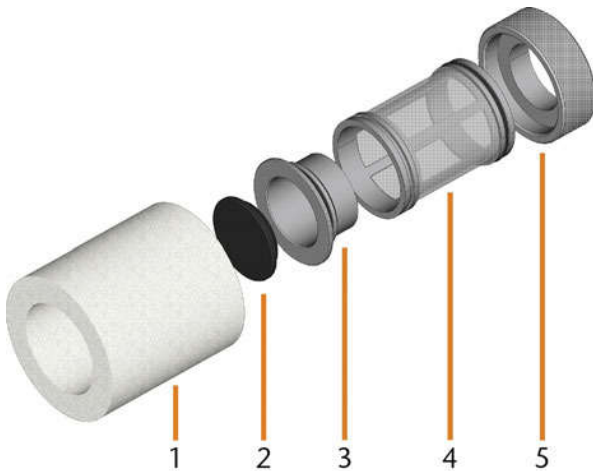


FIG. 81 – THE COMPONENTS OF THE COOLING LIQUID FILTER

1. Fine filter
2. Carbon filter cap
3. Carbon filter
4. Mesh filter
5. Filter socket

To exchange the activated carbon pellets in the filter, do the following:

1. Empty and clean the cooling liquid tank.

2. Remove the fine filter by stretching the top end a bit and straightly pulling it off the filter with both hands.

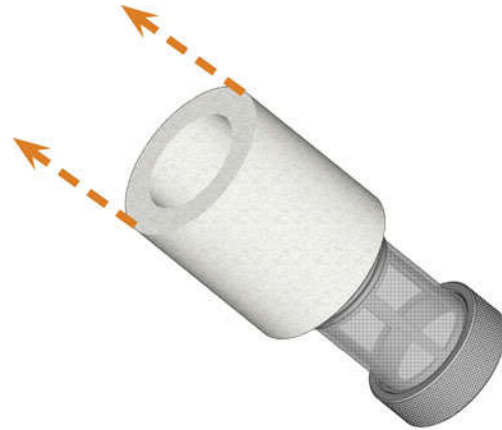


FIG. 82 – REMOVING THE FINE FILTER

3. Clean the fine filter under running water. If the fine filter is too soiled for proper cleaning, replace it with a new one when reassembling the filter.
4. Remove the carbon filter by straightly pulling it off the filter.

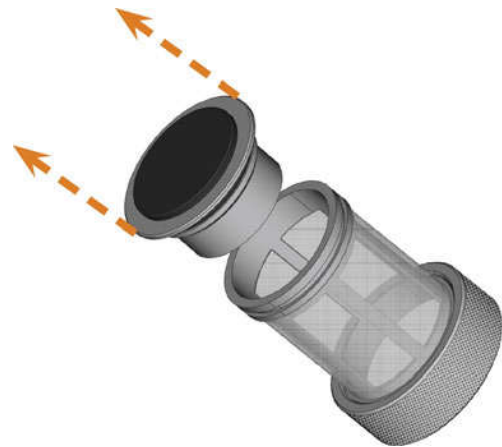


FIG. 83 – REMOVING THE CARBON FILTER

**!** If you tilt the filter or move it abruptly in the next step, you may spill the activated carbon pellets.

5. Carefully lift the carbon filter cap with your fingernail or a flat blunt tool and pull it off the carbon filter.



FIG. 84 – OPENING THE CARBON FILTER

6. Empty the filter and dispose of the activated carbon pellets.
7. Clean the carbon filter and dry it with a cloth.
8. Fill new activated carbon pellets into the carbon filter.

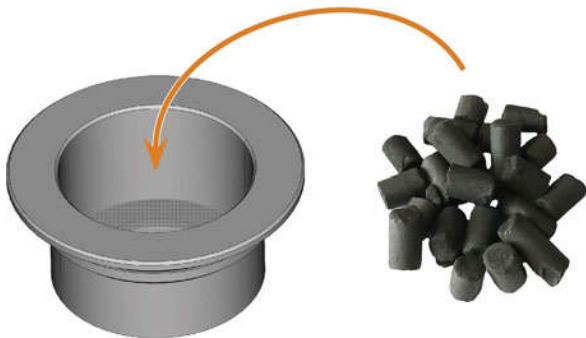


FIG. 85 – REPLACING THE ACTIVATED CARBON PELLETS

9. Firmly close the carbon filter with the cap.
10. If the filter mesh is soiled, pull it off the cooling liquid filter and rinse it under running water.
11. Reassemble the cooling liquid filter. Make sure that the fine filter covers the *complete* filter.
12. Fill new cooling liquid into the tank.

## Cleaning the housing

### NOTICE

#### Damaging of the housing when using an unsuitable cleaning agent

If you use an unsuitable cleaning agent and/or cleaning tool for cleaning the machine housing, the surface or the adhesive foil can get damaged.

- » To avoid scratches, only use a microfiber cloth to clean the housing.
- » Take care of the adhesive symbols so that they do not peel off. The adhesive foil is especially sensitive to rubbing and strong cleaning agents.
- » If the usage of a special cleaning agent is necessary to eliminate certain dirt, we recommend checking the suitability of the cleaning agent at a hidden place of the part first.

1. Clean the surface with a dry microfiber cloth.
2. If some dirt cannot be removed this way, moisten the cloth. Use a pH neutral cleaning agent if necessary.

## Exchanging the main fuse

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

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

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

1. 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.

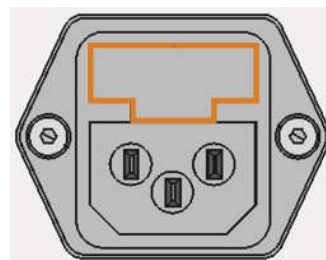


FIG. 86 – COVER OF THE FUSE (MARKED ORANGE)



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.

## 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.

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

By calibrating the machine with test and calibration specimens, it may be possible to improve the machining results. Customer service will assist you with this.

Your machine is delivered with a calibration set. Customer service will need this set for calibration. 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

## Replacing the tool magazine inserts

When tool magazine inserts are worn, they should be replaced. New inserts are delivered without holes for the tools. The holes must be drilled into the inserts with the machine.

- Your machine comes with tool magazine inserts as spare parts and with the drill tool.
- Additional inserts and drill tools are available via customer service.

Customer service exchanges the tool magazine inserts during preventive maintenance. If required, you can exchange tool magazine inserts yourself and have customer service drill the holes into the inserts via remote maintenance.

You can replace tool magazine inserts as follows:

1. Contact customer service. They will assist you with drilling the holes into the new inserts. Otherwise, you won't be able to insert tools into the tool magazines.
2. Remove all tools from the desired magazine.
3. Remove the screws from the bottom of the tool magazine and put them aside.
4. Firmly press against the tool magazine insert.
- ✓ The insert moves out of the magazine together with its retainer.

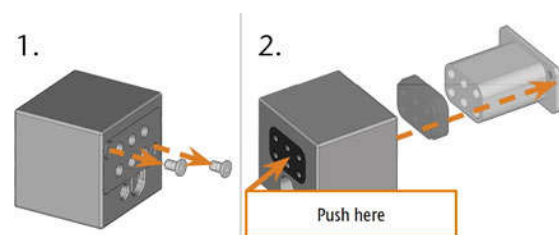


FIG. 87 – REMOVING AN INSERT FROM A TOOL MAGAZINE

5. Insert the new insert into the magazine together with its retainer. Position the insert with the smooth side pointing forwards so that it forms an even surface with the upper side of the tool magazine.
6. Insert the screws and screw them down.

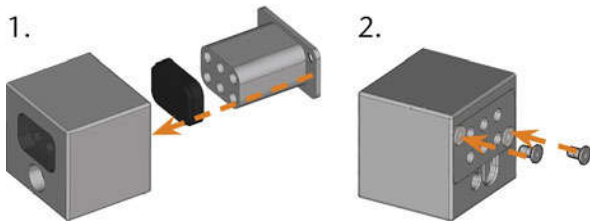


FIG. 88 – INSERTING AN INSERT INTO A TOOL MAGAZINE

7. Follow the instructions you receive from customer service and drill the tool positions in the new inserts.

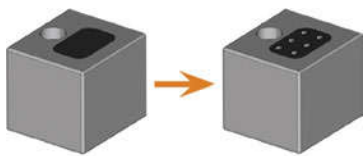


FIG. 89 – TOOL MAGAZINE BEFORE AND AFTER DRILLING THE TOOL POSITIONS

8. Insert the tools into the correct positions of the magazine (↗ *Inserting and exchanging tools* – on page 41).
9. Ensure that the correct tool magazine for the next job is mounted (↗ *Mounting & exchanging tool magazines* – on page 43).

## Exchanging the coupling of the cooling liquid tank

1. Empty the cooling liquid tank.
2. Unscrew the filter in the cooling liquid tank with your hand. Put the filter aside.



FIG. 90 – UNSCREWING THE FILTER IN THE COOLING LIQUID TANK

3. Push the coupling out of the tank.



FIG. 91 – PUSHING THE COUPLING OUT OF THE TANK

4. Thoroughly clean the cooling liquid tank. Especially clean the sealing surface around the opening for the coupling.

**!** If the surface around the opening for the coupling is soiled, the sealing ring on the coupling will not properly seal the tank and liquid will leak.

5. Insert the spare coupling into the designated opening as shown in the following figure.

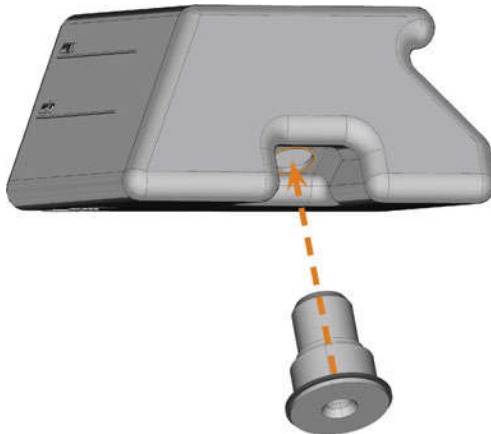


FIG. 92 – INSERTING THE SPARE COUPLING INTO THE COOLING LIQUID TANK

6. Screw down the filter onto the coupling with your hand. Do not tighten the filter completely yet.

**!** If you tighten the filter now, you may damage the new coupling when you attach the tank to the machine. As a result, the coupling will no longer be water tight.

7. Reinsert the cooling liquid tank until the tank is properly attached to the machine.
8. Pull the cooling liquid tank out of the machine again.
9. Tighten the filter completely.
10. Fill new cooling liquid into the tank.

## Exchanging the view window wiper

The view window wiper removes liquid from the back of the view window when the working chamber door opens and closes. You need to exchange it according to the interval given in the maintenance table or when the wiping effect is too low.

The view window wiper is fixated by a two-part holder.

You exchange the view window wiper as follows:

1. Open the working chamber door.
2. Unscrew the 3 screws (marked orange in the following figure) that attach the lower part of the holder to the upper part. Remove the lower part of the holder (marked blue in the figure).

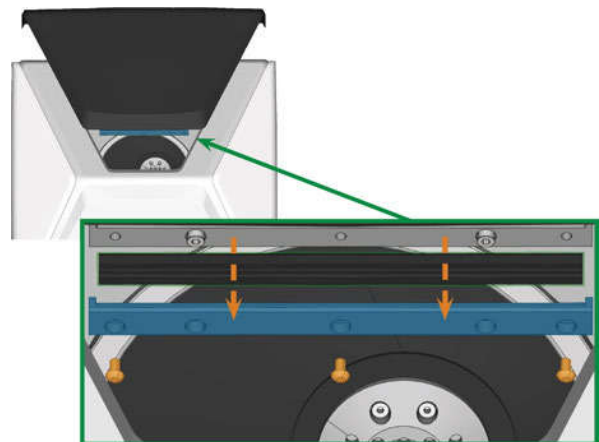


FIG. 93 – REMOVING THE VIEW WINDOW WIPER FROM THE MACHINE

3. Remove the view window wiper from the holder and dispose of it.
4. Clean the holder of the view window wiper with a wet cloth. Clean the part that you removed and the upper part in the machine.
5. Put the spare view window wiper into the lower part of the holder according to the following figure.

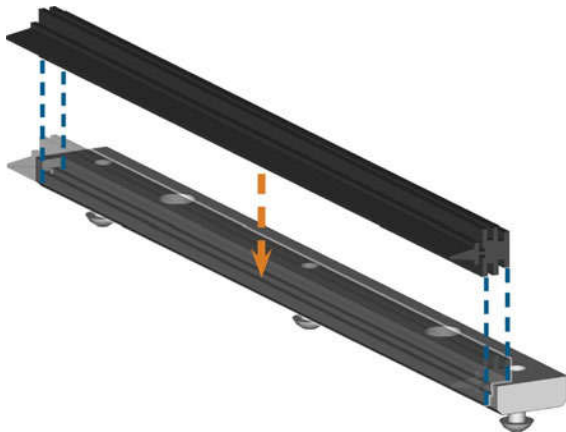


FIG. 94 – POSITIONING THE SPARE VIEW WINDOW WIPER

6. Place the lower part of the holder on the upper part in the machine with the wiper lying between the two parts. Hold it in place.
7. Screw down the holder with the 3 screws.

## Updating the software and firmware

### 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.

### NOTICE

#### Damaging of the control unit when a firmware update is interrupted

If the firmware update is interrupted, the control unit of the machine may become permanently damaged.

- » Only update the firmware if a permanent electrical supply of the machine and the computer is guaranteed.
- » Only update the firmware if the computer's operating system is stable and is free of malware.
- » Only update the firmware if the connection between the computer and the machine is stable. Always use a wired connection during the update.
- » Do not disconnect the machine or the computer from the electrical source nor switch off the machine or computer during a firmware update.
- » Do not close DentalCNC during a firmware update.

Only customer service can currently update the firmware.

- » If a firmware update is available, contact customer service.

### Updating DentalCAM & DentalCNC

Only customer service can currently update the internal CAM computer.


- » If you require an update for DentalCAM & DentalCNC, contact customer service.

## Maintenance table



### Several times per day

Task	Recommended interval	Procedure / Parts	Tool illustration
Checking the cooling liquid	If the flow rate is insufficient	Visual check; exchange liquid if necessary	


### Once per day

Task	Recommended interval	Procedure / Parts	Tool illustration
Exchanging the cooling liquid and cleaning the tank (☞ page 38)	3 operating hours After work	Brush, Water, Cooling liquid	
Daily cleaning of the working chamber (☞ page 57)	After work If soiled	Wet cloth	


### Once per week

Task	Recommended interval	Procedure / Parts	Tool illustration
Weekly cleaning of the working chamber (☞ page 57)	Once per week If soiled If tool magazines are no longer recognized or move sluggishly when mounted	Wet cloth, Dry cloth, Brush, Collet chuck grease	
Cleaning the collet chuck (☞ page 58)	Once per week In case of rotational imperfections	Spindle service set, Collet chuck grease, Interdental brush	
Cleaning the nozzle plate (☞ page 60)	Once per week In case of irregular spray patterns	Interdental brush	


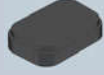


### Every 4 weeks

Task	Recommended interval	Procedure / Parts	Tool illustration
Cleaning the collet chuck of the blank holder (☞ page 60)	Every 4 weeks In case of bad machining results	Blank holder service set	
Rinsing the cooling liquid system (☞ page 62)	Every 4 weeks If the flow rate is insufficient		
Exchanging the carbon filter (☞ page 63)	Every 4 weeks	Exchange after rinsing the cooling liquid system	




**When necessary**

Task	Recommended interval	Procedure / Parts	Spare part illustration
Updating the software and firmware ( <a href="#">↗ page 64</a> )	When an update is available		
Cleaning the housing ( <a href="#">↗ page 64</a> )		Microfiber cloth, Water, Mild cleaning agent (optional)	
Exchanging the main fuse ( <a href="#">↗ page 64</a> )		Replacement fuse T6,3A L250V	

**Wear parts that you can exchange yourself**

Wear part	Recommended interval	Procedure / Parts	Spare part illustration
View window wiper ( <a href="#">↗ page 67</a> )	200 operating hours*		
Tool magazine inserts ( <a href="#">↗ page 64</a> )	1,000 operating hours* Every 2 years*		
Collet chuck (Blank holder) ( <a href="#">↗ page 60</a> )	1,000 operating hours* Every 2 years*	Blank holder service set; remove and insert collet chuck as when cleaning it	
Coupling of the cooling liquid tank ( <a href="#">↗ page 66</a> )	1,000 operating hours* Every year*		

**Wear parts that customer service exchanges for you**

Wear part	Recommended interval	Procedure / Parts	Spare part illustration
Cooling liquid pump	1,000 operating hours*		
Spindle bearings (requires spindle exchange by customer service)	1,000 operating hours*		
Air intake filter	1,000 operating hours*		

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

## 9 Disposal

### Disposing of the cooling liquid

When disposing of the cooling liquid / machining residues, obey the following regulations.

- » Avoid entry of hazardous machining residues into the soil, water or into sewers.
- » Obey the national and local laws of the disposal location in any case.
- » If necessary, have the cooling liquid and machining residues disposed of by an approved disposal company.
- » Keep a reference sample of the disposal product for at least 6 months.
- » If you dispose of the cooling liquid yourself, do as follows:
  - a. Completely filter the machining residues out of the used cooling liquid.
  - b. Dispose of the liquid via the sewers.
  - c. Dispose of the solid machining residues as described by the manufacturer of the material.

### Disposing of the machine

The machine must not be disposed of with the residual waste.



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

- » Before sending in the machine for disposal, contact customer service.
- » If you dispose the machine yourself, obey by the national and local laws of the disposal location.

### Dismantling, transport and packaging

🔗 page 9

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Lettenstraße 10

72119 Ammerbuch, Germany

dentalportal.info

# 10 Troubleshooting

In case something is not working as intended, take a look at the following troubleshooting guide.

## NOTICE

### Machine damage due to improper troubleshooting

In case of improper troubleshooting, your machine may get damaged.

- » If you are unsure of how to perform certain steps during troubleshooting or cannot solve the problems, abort the troubleshooting and contact customer service.

### Additional symbols in this chapter

- ❓ Question to narrow down the problem
- 💬 Suggested solution

### I cannot open the working chamber door

#### ❓ Is the machine operating?

While the axes are moving, you cannot open the working chamber door.

💬 If applicable:

- » Wait until the machine has finished.

#### ❓ Has a power failure occurred at the installation site of the machine?

💬 If applicable:

- » Depending on the duration of the power failure, restart the machine or perform an emergency opening.

#### ❓ Is electricity available at the installation site of the machine?

💬 If applicable:

1. Connect the machine to the electrical source.
2. Switch on the machine at the main power switch.
3. If the working chamber lighting does not illuminate, check if the power cable is properly seated in the machine and is connected to the electrical source.
4. Try connecting the machine to a different socket.

#### ❓ Is the door blocked?

💬 If applicable:

1. Check if the guide rails at the back of the working chamber door are free from dirt.
2. Switch on the machine at the main power switch.

3. If the working chamber lighting does not illuminate, check if the power cable is properly seated in the machine and is connected to the electrical source.
4. If the machine is not powered, perform an emergency opening when necessary.

### I have installed all components, started the software but the machine does not reference

#### ❓ Is the working chamber door open?

The machine does not reference with the working chamber door open.

💬 If applicable:

- » Confirm the corresponding dialog on the touchscreen to close the door.

#### ❓ Is an Ethernet cable connected to the machine?

💬 If applicable:

- » Check if the Ethernet cable is properly seated in the connector and is undamaged. If possible, use the provided cable.

#### ❓ Do you use WiFi?

💬 If applicable:

- » Check if the access point is properly set up and operational.

#### ❓ Is the working chamber illuminated in red?

In this case a machine malfunction occurred.

💬 If applicable:

1. Restart the machine.
2. If the working chamber continues to be illuminated in red, contact customer service.

### My machine doesn't execute any jobs although it is connected to the computer

#### ❓ Is the drawer open?

💬 If applicable:

- » Push the drawer into the machine until it snaps in place.

#### ❓ Is the wrong tool magazine mounted or didn't the machine recognize the magazine?

💬 If applicable:

1. In the **Jobs** section of the touchscreen, check which tool magazine is required and if the machine has recognized it (green check mark in the check box).



2. If there is no green check mark, follow the instructions for inserting tool magazines.
3. If there is no green check mark although the correct tool magazine is mounted, clean the magazine and the tool magazine holder.

### The machining results are not satisfactory and / or tools keep breaking

#### ? Do the tool positions in the Tools section correspond to the tools in the respective tool magazine?

If not, the machine uses the wrong tools during job execution.

How to check this:

1. Via the touchscreen, compare the tool positions in the **Tools** section with the tools in the corresponding tool magazine.
2. Replace the wrong tools in the tool magazine with the correct ones.

#### ? Is the blank properly mounted?

How to check this:

- » Remove the blank and remount it. The groove of blocks has to properly sit on the corresponding positioning pin.

#### ? Are bolts, fixing mechanisms, gaps and openings of the blank holder contaminated by processing dust?

If applicable:

- » Clean the mentioned components thoroughly.

#### ? Is the measuring key contaminated?

If applicable:

- » Clean the measuring key with a brush.

#### ? Are the tools worn?

How to check this:

1. Visually inspect all tools.
2. Check the tool life values via the touchscreen.
3. Replace worn tools with new ones.

#### ? Do rings on the tools sit in the groove on the tool shank?

How to check this:

- » Visually inspect all tools and push rings that have moved into the groove again.

#### ? Are the tool magazine inserts worn?

If applicable:

- » Replace the tool magazine inserts with new ones.

#### ? Do the parameters of the job in the software correspond to the parameters of the blank?

How to check this:

- » Make sure that the following parameters of the job and of the blank in the machine correspond to each other. Also make sure that they are suitable for the objects that you want to machine.

- Material type
- Blank dimensions
- Indications (types) of the individual objects

#### ? Are the object files of sufficient quality?

How to check this:

1. Check the quality of object files (STL files) in your CAD application or an STL viewer. Especially, consider the manufacturer information on wall thickness and border thickness.
2. If necessary, adjust the settings of your scanner and scan application.

#### ? Is the collet chuck of the spindle contaminated or is it loosely seated in the spindle?

If applicable:

1. Clean the collet chuck with the provided spindle service set.
2. When you insert the collet chuck into the spindle, make sure that it is properly seated.

#### ? Did you exchange the collet chuck at the recommended interval?

How to check this:

- » Verify the recommended interval for exchanging the collet chuck in the maintenance table. If necessary, exchange the collet chuck.

### The machine displays that the flow rate is too low

#### ? Is cooling liquid lacking in the tank? Is the cooling liquid soiled?

If applicable:

- » Clean the tank. Fill in clean cooling liquid.

#### ? Is the filter in the cooling liquid tank clogged?

If applicable:

- » Clean the filter and the tank. Fill in clean cooling liquid.

#### ? Are the liquid nozzles in the working chamber clogged?

If applicable:

- » Clean the nozzles with the inter-dental brush.

---

**I have exchanged the tool magazine inserts and now there are no holes for the tools anymore**

Tool magazine inserts are delivered without drilled holes for tools. You drill them with the machine.

» Contact customer service.

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