PrograMill Dry

Bedienungsanleitung | Operating Instructions | Mode d'emploi | Istruzioni d'uso | Instrucciones de uso

ivoclardigital.com

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1 Welcome

Thank you for your purchase of this PrograMill Dry 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:

www.ivoclarvivadent.com

About this document

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

- Operator
- Dental technician
- Qualified dental staff member
- CNC technician
- Authorized Ivoclar Vivadent service partner

Used symbols

Instructions

» Single or general instruction

1. Numbered action step

✔ Result

Other symbols

Cross reference

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

1. Numbered image labels

✔ Correct or Do this

✖ Incorrect or Do not let this happen or Don't do this

Information to make work more efficient

Important information without any danger for people or objects

Additional information

User interface description

[Buttons]

<KEYS>

User interface text

Text that you need to enter

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 your service partner.

» 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 electric 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
- **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 partners repair the machine.

» Do not touch the machine with wet or damp hands.

» Never put any machines or devices which are powered by electricity under the machine.

» Do not place objects on the machine.

WARNING

Respiratory diseases when processing harmful materials

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

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

» Use a suction device with an extra-fine particle filter.

» 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.

» Store the key for the emergency release in a place where only authorized persons have access.

» 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 authorized service partners 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 Ivoclar Vivadent 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.

Risk of injuries through loose pneumatic components under air pressure when connections are open

Loose pneumatic components can move extremely fast and unpredictably and may cause injury.

» **Before** you run the pneumatic hoses, close the compressed air supply valve.

» **Before** you check the pneumatic hoses and pneumatic connections, set the air pressure to a minimum value.

» In case of defective machine connections and pneumatic hoses, disconnect the machine from the external compressed air supply and the electrical source.

» Contact your service partner if connections are damaged or defective.

⚠ 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.

» When you open and close the working chamber door, use one hand and keep the other hand away from the machine.

» When you close the working chamber door, ensure your hands do not get caught between the door and the machine housing.

» 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 materials 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 materials / 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.

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.

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 processing of approved dental materials by specially trained persons. The processed objects require additional work before their use on patients.

» Only process materials that you can select in the manufacturing software.

» Only use the machine 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 import objects into the manufacturing software 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.

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 CNC 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 as many people as required for the weight of the machine in accordance with local and / or national laws and regulations.

» 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.**

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 supplement about the carrying aid and transport lock is delivered with the machine.
It is also downloadable at https://www.ivoclarvivadent.com.

» Ensure that the following conditions are met during the whole transport and / or storage period:

- Permitted ambient conditions for storage / transport:
  - Ambient temperature (storage / transport): between -20°C (-4 °F) and 60°C (140 °F)
  - 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 materials from the working chamber.
2. Clean the working chamber. Ensure that the working chamber is completely dry.
3. Install the transport lock. For this, follow the corresponding steps on the supplement.
4. Ensure that the housing of the machine is completely closed.
5. Switch off the machine at the main power switch.
6. Disassemble the machine components by following the installation instructions in reverse order.
7. If you need to carry the machine, install the carrying aid. For this, follow the corresponding steps on the supplement.
8. 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.
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 PrograMill Dry, you can process discs 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 dry machining.

Front side of the machine

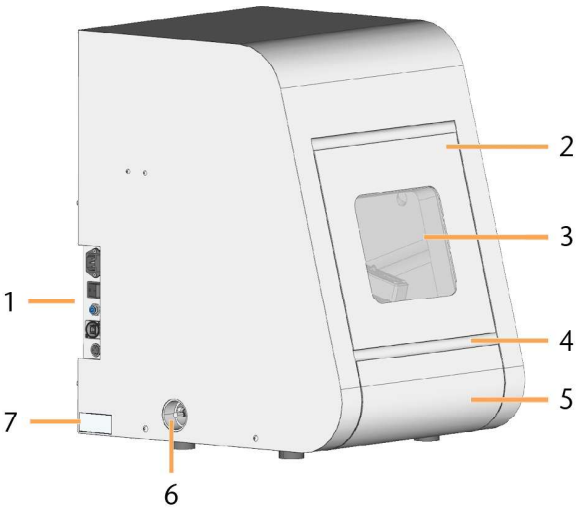

FIG. 1 - FRONT SIDE OF THE MACHINE

1. Connection panel
2. Working chamber door
3. View window to the working chamber
4. Recessed grip for opening the working chamber door
5. Accessories container
6. Suction opening for the air extraction system
7. Identification plate

Connection panel

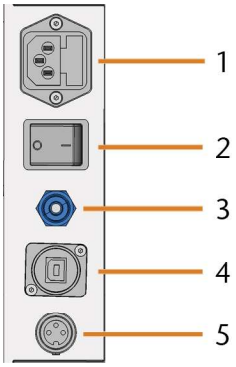

FIG. 2 - CONNECTION PANEL

1. Power connection including glass fuse T6.3A L250V
2. Main power switch
3. Pneumatic connection (6 mm push-in fitting)
4. USB port
5. Suction control connection

Working chamber door

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

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

» To open or close the working chamber door, pull it upwards or push it downwards with your hand. Use the recessed grip of the door.

FIG. 3 - WORKING CHAMBER DOOR

Working chamber

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

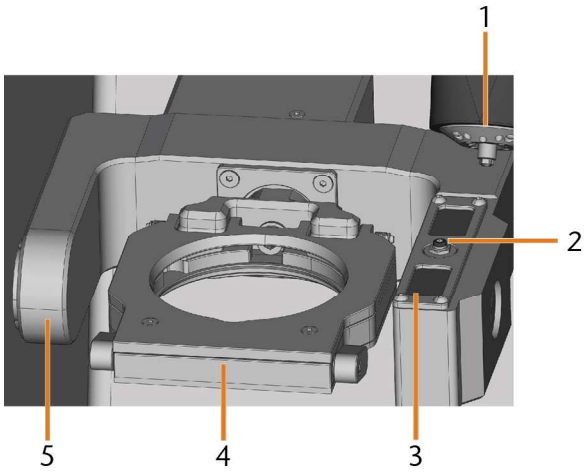

FIG. 4 - WORKING CHAMBER

1. Spindle with collet chuck for picking up tools
2. Measuring key
3. Tool magazine
4. Material holder; rotational axis A
5. Rotational axis B

Colours of the working chamber lighting

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

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

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

Accessories container

In the accessories container below the working chamber, you can store materials, tools, and the spindle service set.

» To access the accessories container, manually pull it out of the machine.

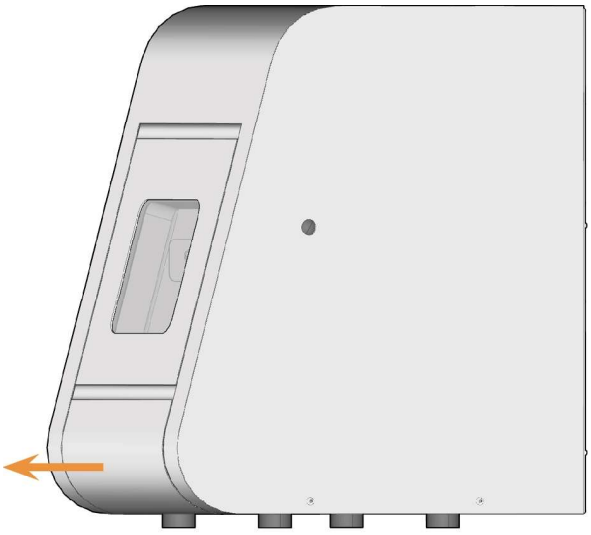

FIG. 5 - OPENING THE ACCESSORIES CONTAINER

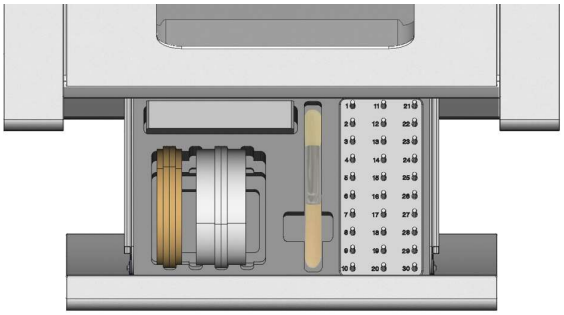

FIG. 6 - ACCESSORIES CONTAINER (MATERIALS AND TOOLS NOT PROVIDED)

» To close the accessories container, push it into the machine until it is completely closed.

Anti-soiling concept

The anti-soling concept decreases the soiling and wear of sensitive machine parts.

NOTICE

Machine damage when dry machining without an air extraction system

When dry machining, an operational external air extraction system must be installed. Otherwise, the machine will get soiled over time and become defective.

» Always use a correctly installed and operational external air extraction system during dry machining.

The anti-soiling concept consists of:

- **The external air extraction system |** An external suction unit creates a vacuum in the working chamber and extracts machining debris from it.
- **Air that is emitted into the working chamber |** Blows machining debris away from the spindle and other machine parts.
- **The internal vacuum sensor |** Constantly monitors the vacuum in the working chamber.

The anti-soiling concept does not replace the regular cleaning of the machine. Without regular cleaning, the machine life decreases significantly.

CNC computer

To work with the machine, use the PrograMill CAM PC with the PrograMill CAM software and PrograMill CNC:

- **PrograMill CAM |** A CAM application for creating and calculating virtual jobs.
- **PrograMill CNC |** A CNC application for machining jobs and maintaining the machine.

To create and design the dental objects you also need a CAD application (sold separately by specialist dealers).

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 material holder
- Condition of the tools
- Material quality

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

Sound measurement

Measuring conditions:

- Processing material: CoCr
- Tool status: new
- Measured value: sound power level (distance: 1 m)
- Measurement according to ISO 3746, survey method 3

Established sound emission:

Operating condition	A-weighted sound pressure level
Processing	71 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: *Front side of the machine* - on page 7

Axes

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

Linear axes

The spindle moves along these axes.

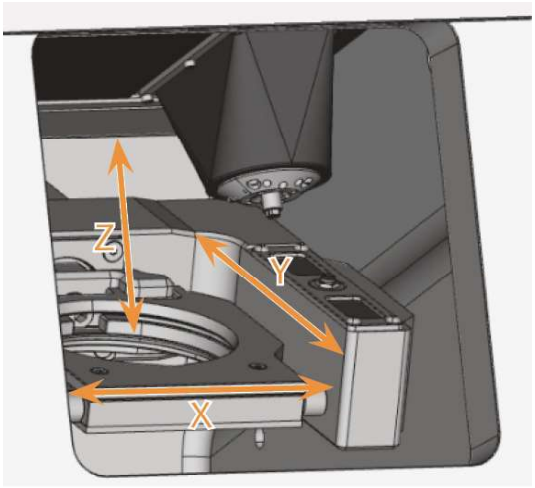

Fig. 7 - PrograMill Dry: Linear axes

Rotational axes

The material holder rotates about these axes.

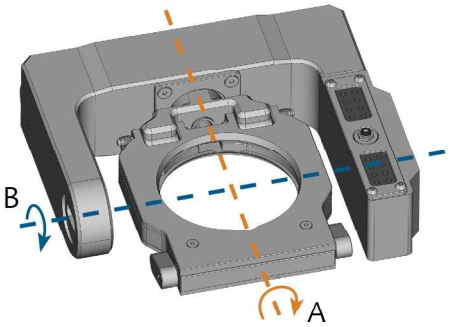

Fig. 8 - PrograMill Dry: Rotational axes

Technical data

Dimensions (W/D/H)

	Unit	Value
Footprint (approx.)	mm in	375 x 260 14.8 x 10.2
Housing fully closed (approx.)	mm in	450 x 545 x 630 17.7 x 21.5 x 24.8
Minimum required space for operation (approx.)	mm in	800 x 795 x 720 17.7 x 27.4 x 26.8

Base system

	Unit	Value
Weight (approx.)	kg/lbs lbs	91 201
Axes - Rotational axis A / B		5 360° / ± 35°
Overvoltage category (IEC 60664-1)		II

External compressed air supply

	Unit	Value
Min. / max. air pressure	bar psi	6 / 8 90 / 120
Recommended air pressure	bar psi	7 100
Air consumption (approx.)	l/min cfm	40/50 (at 6/8 bar) 1.4/1.8 (at 90/120 psi)
Air purity (ISO 8573-1:2010)		Solid matter particles: class 3 Water: class 4 Maximum oil content: class 3

External air extraction system

	Unit	Value
Minimum extraction capacity	l/min cfm	2,500 (at 220 hPa) 88.3 (at 3.2 psi)
Suction device		Designed for the commercial use in the dental sector, such as PrograMill Suction Unit; Equipped with a filter of the filter class M

Ambient conditions

	Unit	Value
Relative air moisture		80 %, non-condensing
Ambient temperature for storage/transport	°C °F	-20 - 60 -4 - 140
Ambient temperature for operation	°C °F	10 - 35 50 - 95
Location type		Indoor
Maximum height above mean sea level	m ft	2,000 6,561
Ambient air (IEC 60664-1)		Dust free, pollution degree 2

Spindle

	Unit	Value
Model		SFK 300P (synchronous)
Maximum rotational speed	rpm	60,000
Nominal power under continuous operation (S1)	W	300
Nominal power under uninterrupted periodic operation (S6)	W	450
Peak power (P_{max})	W	500
Diameter collet chuck	mm	3

Tool changer

	Unit	Value
Maximum tools in magazine		16
Maximum tool length	mm	40

Standard material holder

	Unit	Value
Min. / max. disc diameter	mm	98.5 / 98.8
Maximum disc height	mm	40
Min. / max. height of the disc margin	mm	9.8 / 10.5

Connections

	Unit	Value
Pneumatic connection, push-in fitting (diameter)	mm	6
Power connection	V AC Hz W	100 - 240 50/60 600 Glass fuse T6.3A L250V
USB port		2.0 B
Data port for supported suction unit or switching unit		Yes
Hose connection for external air extraction system (diameter)	mm	45

5 Installing the machine

Checking the scope of delivery

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

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1. 1 x PrograMill Dry machine
2. 1 x Spindle service set
3. 1 x Power cable
4. 1 x USB cable
5. 1 x Key for the emergency release of the working chamber door
6. 1 x Pneumatic hose
7. 1 x Administrated tool board (ATB) in the accessories container
8. 1 x Cleaning brush for the material holder
9. 1 x Crevice nozzle (for cleaning the working chamber)
10. 1 x Compressed air regulator
11. 1 x Calibration set: 1 micrometer, 3 calibration discs for manufacturing test and calibration specimen, 1 radius cutter with 2 teeth (P200-R2-40)
12. 1 x Measuring pin
13. 2 x Tool magazine inserts
14. 1 x Drill bit (2.8 mm) for tool positions

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
- 4 x Spare screw for the tool magazine cover
- Adapter connection to suction unit
- Zirconium oxide tools

» 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.
- Alternating current source.
- An operational Residual Current Device / Ground Fault Circuit Interrupter on the electric circuit of the machine.
- Machine requires an external air extraction system.
- Machine requires an external compressed air supply.
- Access to the internet.

You can find specific values and additional requirements in the chapter on technical data. *Technical data* - on page 11

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.

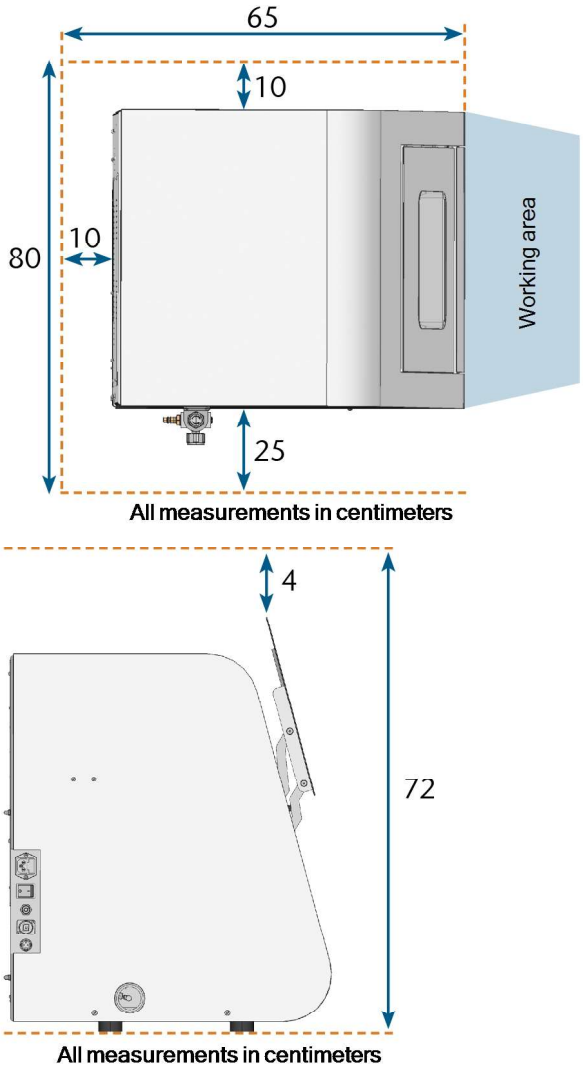

FIG. 9 - DISTANCES TO MAINTAIN

Machine installation (schema)

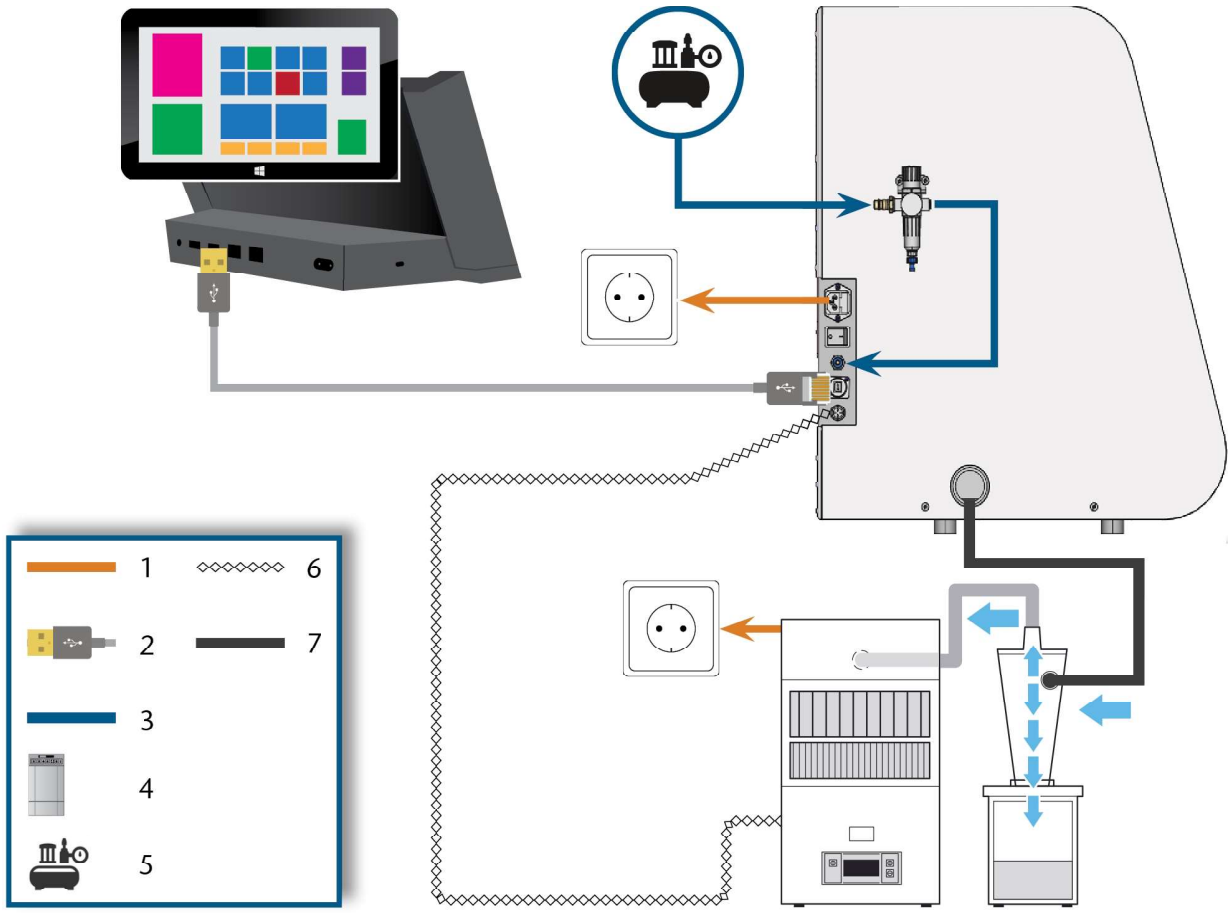

FIG. 10 - MACHINE INSTALLATION (SCHEMA)

1. Power connection
2. USB cable
3. Pneumatic hose
4. Suction device
5. External compressed air supply
6. Data cable for PrograMill Suction Unit
7. Suction hose

Establishing the electric connection

NOTICE

Damaging of the machine through heavy voltage fluctuations and power surges

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

» Connect the machine to a dedicated current circuit or ensure that no devices are connected that can cause heavy voltage fluctuation when switched on.

» If heavy voltage fluctuations cannot be avoided, install a surge protector that protects the machine from heavy voltage fluctuations.

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 Uninterruptible Power Supply (UPS).

   If a power failure occurs during job execution, the tool may break and the material 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 protection

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.
   - The CNC computer *is not* connected to the machine.
2. Switch on the machine at the main power switch.
3. Open the working chamber door.
4. Switch off the machine at the main power switch.

✔ You can now move the axes of the machine.

5. Remove the transport lock as shown in the supplement.

Installing the pneumatics

⚠ WARNING

Risk of injuries through leaking compressed air and lashing pneumatic hoses

Open or loose pneumatic connections can cause severe injuries.

» Ensure that **during installation and maintenance** of the pneumatic hoses and of the compressed air regulator compressed air is not conducted through the hoses and connections.

» **Before** conducting compressed air through the hoses and connectors, verify that the hoses are securely inserted into the correct connectors and that they are not damaged. This also applies to the compressed air regulator.

» Do not conduct compressed air through damaged hoses and connectors.

NOTICE

The spindle may suffer bearing damage and electrical damage if the compressed air is contaminated

The incoming compressed air must be dry and oil-free according to ISO 8573-1:2010 because the compressed air regulator only serves as an **indicator** for contaminated air.

Air purity according to ISO 8573-1:2010		
Solid matter particles	class 3	Filtration degree better than 5 µm for solid particles
Water	class 4	Maximum pressure dew point: +3 °C (37.4 °F)
Maximum oil content	class 3	Maximum oil content 1 mg/m³

» Ensure that the compressed air meets the above requirements.

» Only connect the machine to the compressed air supply if the compressed air regulator is properly installed.

» Connect the machine to the compressed air supply only via the provided compressed air regulator.

You can find specific values and additional requirements in the chapter on technical data. *Technical data* - on page 11

The machine requires the compressed air for the following tasks:

- For the opening and closing of the collet chuck during tool changes.
- For the spindle sealing air which prevents foreign bodies from entering the spindle.
- For the sealing air in the working chamber that keeps machining debris away from sensitive machine parts.

Overview compressed air regulator

The machine is connected to the external air supply via a compressed air regulator. You can use this regulator to monitor and regulate the pressure of the incoming air.

The compressed air regulator is supplied with the machine and needs to be mounted on the side of the machine housing when installing the machine. The regulator has the following connections:

- 1/8” internal thread, fitted with male compressed air connector to connect the external compressed air supply
- 6 mm push-in fitting to connect the machine.

NOTICE

Failure of the water separator caused by a wrong alignment of the compressed air regulator

The compressed air regulator must **always** be mounted **in an upright position** because otherwise the water separator will not work.

» Mount the compressed air regulator in an upright position.

On the left side of the machine are two bores which you can use to mount the compressed air regulator on the machine.

» Mount the compressed air regulator in an upright position, using the oval-head screws provided in the bores.

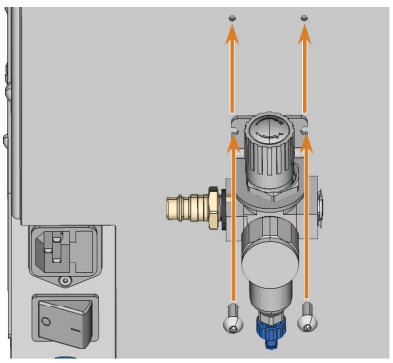

FIG. 11 - MOUNTING THE COMPRESSED AIR REGULATOR

Installing the pneumatic hose

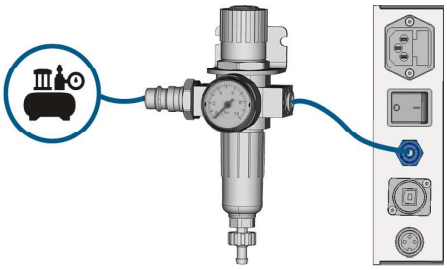

FIG. 12 - INSTALLING THE PNEUMATIC HOSE

1. Connect the main external compressed air supply.
2. Use the provided pneumatic hose to connect the *right* pneumatic connection of the compressed air regulator to the pneumatic connection of the machine.
3. Connect the external compressed air supply to the *left* pneumatic connection of the compressed air regulator.
4. Thoroughly verify that all external pneumatic hoses are properly seated in their corresponding connections and that the hoses and connectors are undamaged.
5. If all hoses and connectors are properly installed and undamaged, open the external compressed air supply valve.

Adjusting the air pressure with the compressed air regulator

Setting the air pressure is only necessary if the air pressure shown by the pressure gauge does not lie between the minimum and maximum air pressure. You can find specific values and additional requirements in the chapter on technical data.

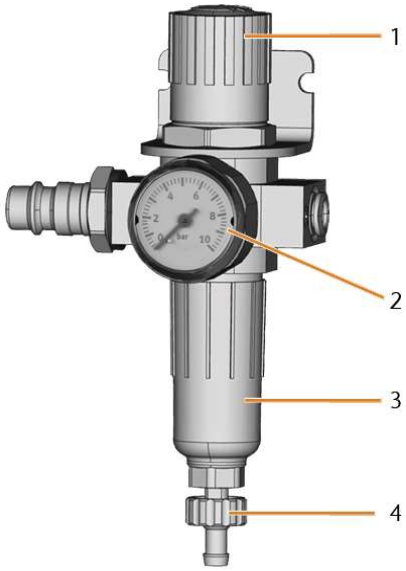

FIG. 13 - COMPRESSED AIR REGULATOR: REGULATING AND MONITORING THE AIR PRESSURE

1. Rotary knob for pressure regulation
2. Pressure gauge for monitoring the outgoing air pressure
3. Bowl of the water separator
4. Discharge screw

1. Pull the rotary knob on top of the compressed air regulator slightly upwards.
2. Turn the rotary knob in the desired direction:
   - Turn it towards "+" to increase the pressure
   - Turn it towards "-" to reduce the pressure
3. Push the rotary knob down again.

✔ The knob is locked and cannot be changed inadvertently.

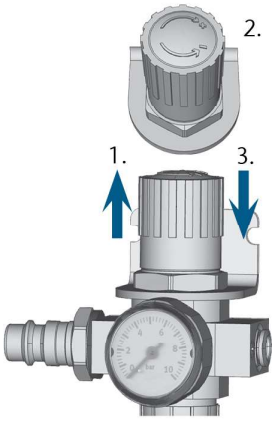

FIG. 14 - SETTING THE AIR PRESSURE

Installing the air extraction system

Ivoclar Vivadent recommends the use of the PrograMill Suction Unit.

Requirements for the suction unit

You can find specific values and additional requirements in the chapter on technical data. *Technical data* - on page 11

» Use a suction device with the following properties only:

- Designed for the commercial use in the dental sector, such as PrograMill Suction Unit
- Equipped with a filter of the filter class M
- Equipped with safety devices which protect you from static discharges (e. g. through an anti-static suction hose)
- Minimum extraction capacity: 2,500 l/min (88.3 cfm)

Installing the suction unit

You can install the suction unit as follows:

1. Read the documentation for the suction unit. Follow the operating and safety instructions at any time.
2. Check if the connection of the suction hose has an outer diameter of 45 mm. If the diameter is different, either adjust the hose or use the adapter delivered with the machine.
3. Insert the suction hose of the suction unit into the opening for the air extraction of the machine. Ensure that the suction hose is properly seated.

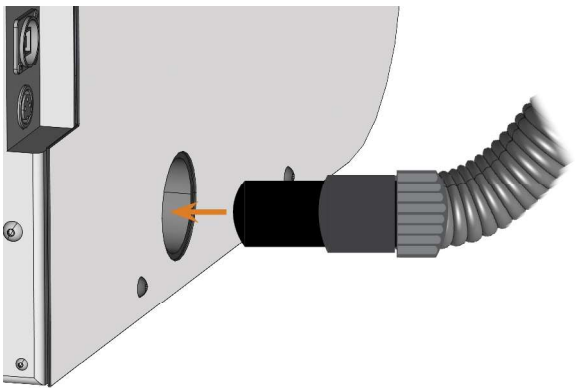

Fig. 15 - Inserting the suction hose into the machine

4. If you want the machine to automatically switch the suction unit on and off:

   Connect the data cable provided by the manufacturer of the suction to the suction control connection of the machine. The operating instructions of the suction unit contains further details.
5. Continue with the installation of the suction unit as described in the documentation of the unit.

Connecting the CNC computer

The transport lock *must not* be installed when you connect the CNC computer to the machine.
Removing the transport protection - on page 15

1. Switch on the machine at the main power switch.
2. Close the working chamber door.
3. Start the CNC computer.
4. Use the provided USB cable to connect a USB port of the CNC computer to the USB port at the connection panel of the machine.
5. Install the latest version of PrograMill CNC that is released for the machine.
6. To determine the USB port number and connect to the machine, select the depicted  icon in the **Application settings** view in PrograMill CNC.

✔ PrograMill CNC may try the following to connect to the machine: If this is successful, the application will display the port number beside the icon. The machine references.

The machine will not reference if the working chamber door is open.

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

6 Operation: Preparing jobs

Before you can machine materials, you need to switch the machine on. The corresponding jobs must have been transferred to PrograMill CNC where they display in the job list.

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.

You usually start the machine as follows:

1. Ensure that the machine is properly installed.
2. Switch on the machine at the main power switch.
3. If the machine controls the suction unit, switch on the unit and select the necessary extraction level.

✔ The suction unit is not running. If it is, the data cable of supported suction units is not properly installed.

ℹ If you control the suction unit manually, you will switch it on immediately before job execution.

4. Close the working chamber door.

❗ The machine will not reference if the working chamber door is open.

5. Start the CNC computer.
6. Start PrograMill CNC.

✔ The following happens:

   a. The machine references.
   b. The working chamber is illuminated in white.

7. If the machine doesn't reference because the working chamber door is open, close the door. Wait until the machine has referenced.

✔ After the machine has referenced, it is operational.

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.

✔ PrograMill CNC: The touchscreen displays that there is a tool in the collet chuck.

2. Open the working chamber door.
3. Hold the tool in the collet chuck in place.
4. Confirm the current message.

✔ The following happens:

   a. The collet chuck opens.
   b. The current dialog window closes.
   c. A dialog window opens.

5. Remove the tool from the collet chuck.

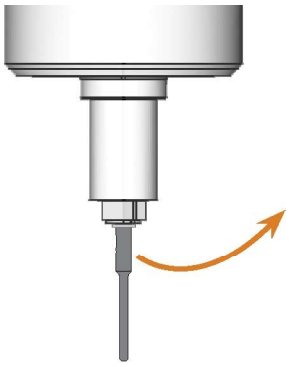

FIG. 16 - REMOVING THE TOOL FROM THE COLLET CHUCK

6. Confirm the current message.

✔ The machine is ready for operation.

Switching off the machine

DANGER

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.

To switch off the machine, do the following:

1. Ensure that the working chamber is clean.
2. Switch off the machine at the main power switch.
3. (Optional) Unplug the power cable.
4. (Optional) Switch off the main power switch of your workstation / facility.

Mounting and removing materials

The machine can process the following materials:

- Discs with a diameter of 98.5 mm - 98.8 mm

You can obtain extra equipment from your service partner.

For the Ivotion Denture System material, there is an additional Ivotion Denture material holder available. The Ivotoin Denture System allows you to fabricate customized complete dentures in only one milling procedure.

How to mount the different material types

Material type	Additional holder required?	How to mount
Discs	No	Discs >> material holder

Mounting discs in the working chamber

1. Open the working chamber door.
2. Unlock the material holder by pulling the left and / or right material holder lever (marked orange in the figure) towards yourself into the end position.

✔ The material holder cover moves upwards and the material holder opens.

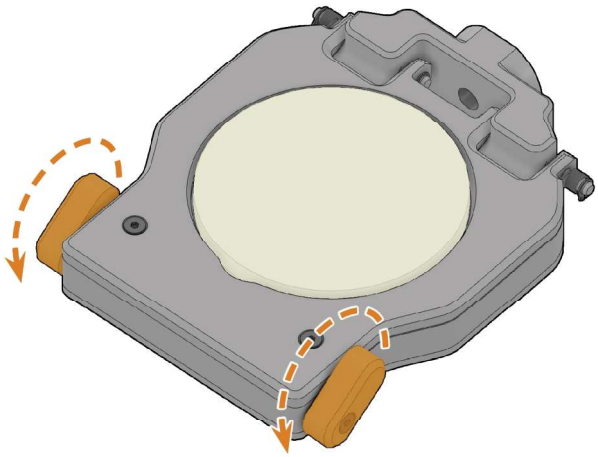

FIG. 17 - OPENING THE MATERIAL HOLDER

3. Remove material from the material holder if any.

4. To insert the material to be processed, do the following:
   a. If the material is a multilayer material, orientate the material so that the top shade layer is on top.
   b. If the disc has been processed before, ensure the following:
      - The original top side faces upwards.
      - If the disc has been marked for safe remounting in PrograMill CNC, make sure that the marking is in the position shown below.
   c. Position the material in the material holder.

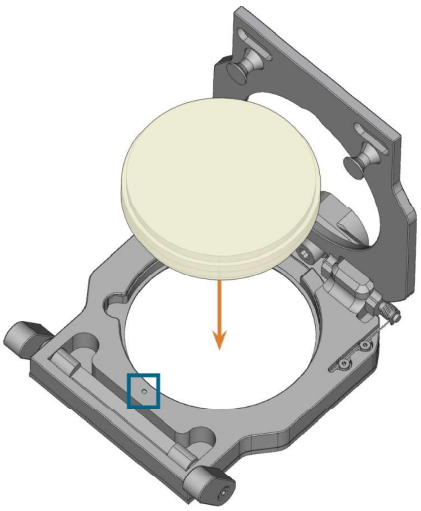

FIG. 18 - INSERTING A DISC INTO THE MATERIAL HOLDER (POSITION FOR SAFE REMOUNTING MARKED BLUE)

NOTICE

Damaging of the machine / tools or bad machining results due to improper material fixation

If the material holder is not closed correctly, the material will not be properly fixated and the material holder may get damaged. As a result, the machine and tools may get damaged and the machining results may not be satisfactory.

» **Always** close the material holder as it is described below.

» Ensure that the material holder levers are **firmly** closed.

» Do **not** apply excessive force when closing the levers.

5. To close the material holder, do the following:
   a. Make sure the material holder levers are in the front position, as indicated in the figure below.
   b. Push down the material holder cover and hold it in place.
   c. Lock the material holder by pushing the left and / or right material holder lever (marked orange in the figure) away from yourself until you notice a distinct resistance and the levers are firmly closed. Do not apply excessive force.

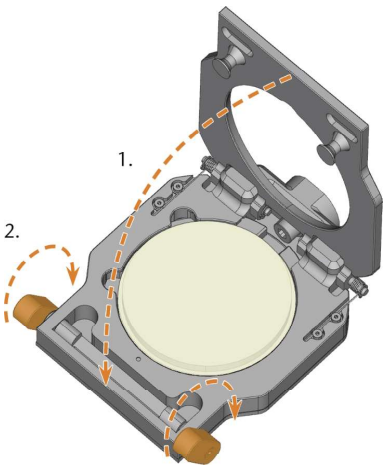

FIG. 19 - CLOSING THE MATERIAL HOLDER

✔ The disc is fixated in the material holder. The disc is mounted in the working chamber.

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.

You can insert up to 16 tools into the tool magazine.

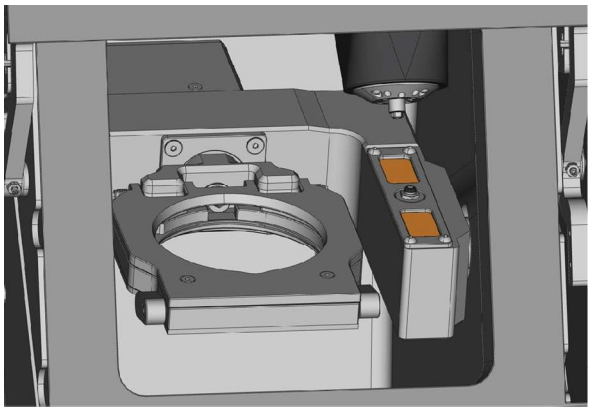

FIG. 20 - TOOL MAGAZINE IN THE WORKING CHAMBER (MARKED ORANGE)

Normally, the machine loads tools from the tool magazine of the machine. In the following cases, this might not be possible:

- A tool magazine position is worn so that it can no longer properly hold a tool
- You use tools which do not fit into the tool magazine

In these cases, you can force a manual tool change in PrograMill CNC (see the corresponding documentation).

If tool magazine inserts are worn, you should replace them. (*Replacing the tool magazine inserts* - on page 33)

Inserting and exchanging tools

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

- Upon first use of the machine
- After exchanging tool magazine inserts due to wear
- When the tool life of a tool has expired
- When tools are damaged or worn
- If the next jobs require additional / different tools than those in the tool magazine

You can check the remaining tool life of all tools in the **Tool management view** in PrograMill CNC.

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

- By manually inserting the tools into the tool magazine. This is the fastest way. It is described below.
- Via the spindle - you insert a tool into the collet chuck and the spindle will deposit the tool in the tool magazine. This option takes more time, but might be more convenient for some. It is described in the documentation for your machine.

You insert tools manually as follows:

1. Remove worn or damaged tools from the tool magazine if any.
2. Insert the new tools:
   a. Ensure that the positions of the tools in the tool magazine match the tool positions in PrograMill CNC.
   b. 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 in PrograMill CNC, the machine will use the wrong tool(s) during job execution and the job result will become unusable.

3. After replacing a tool, reset the tool life value. For this purpose, use the Tool management view in PrograMill CNC.

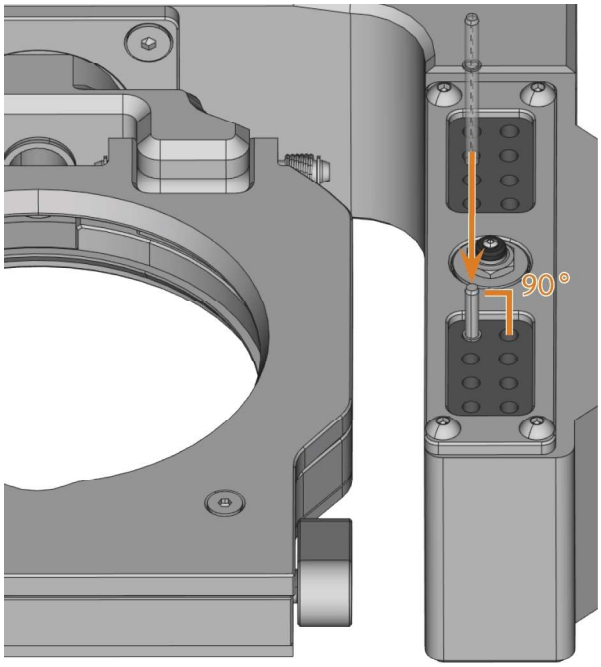

Fig. 21 - Inserting tools into the tool positions

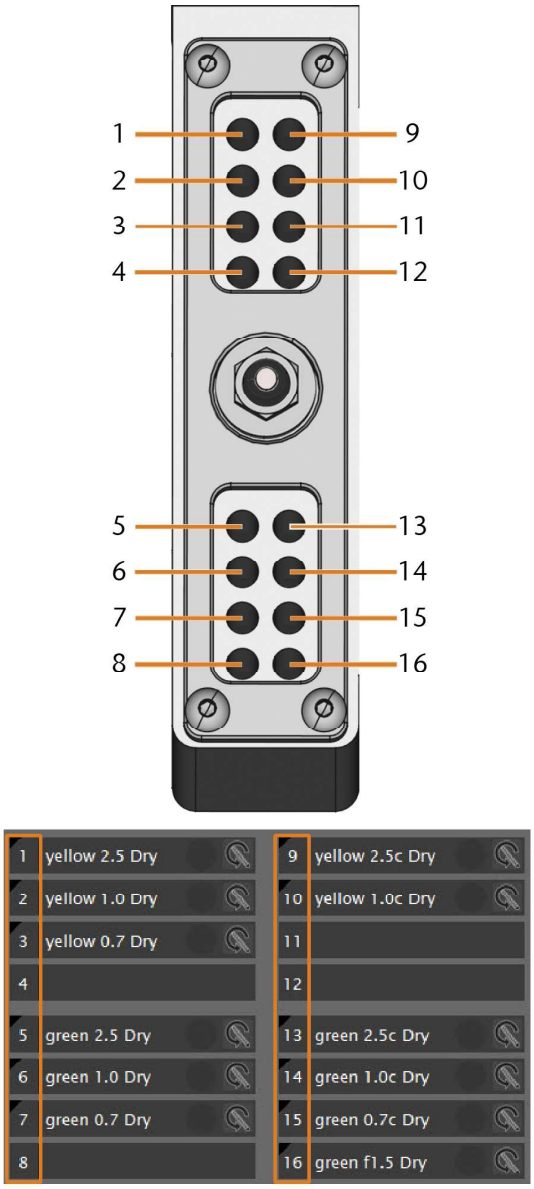

Fig. 22 - Top: Tool positions 1 - 16 in the tool magazine
Bottom: Tool positions 1 - 16 in PrograMill CNC

7 Operation: Processing jobs

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

NOTICE

Damaging of the machine when using damaged tools or materials

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

» Check the materials 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.

Starting jobs

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

Aborting milling

You can abort machining as follows:

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

✔ The following happens:

   a. Machining stops immediately.
   b. You are prompted to select whether the tool in the spindle can be inserted safely into the tool magazine.

3. If you want the machine to automatically put the tool into the tool magazine, confirm the dialog. If you want to remove the tool manually from the collet chuck, answer the question in the negative.

   Removing the tool manually is necessary in case that putting it into the tool magazine would damage the tool magazine inserts.

✔ Depending on your choice, the spindle either puts the tool into the tool magazine or moves into the tool change position. In the latter case, continue with the next step.

⚠ 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.

4. Open the working chamber door.
5. Hold the tool in the collet chuck in place.
6. Confirm the current message.

✔ The following happens:

   a. The collet chuck opens.
   b. The current dialog window closes.
   c. A dialog window opens.

7. Remove the tool from the collet chuck.

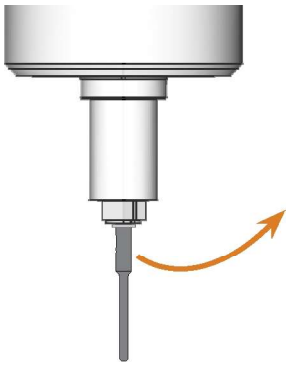

FIG. 23 - REMOVING THE TOOL FROM THE COLLET CHUCK

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

✔ The following happens:

   a. The collet chuck closes.
   b. The working chamber door closes.
   c. The spindle moves to its default position.

Job interruptions and job abortions

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

- The compressed air supply is not sufficient
- The vacuum in the working chamber 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.

How to proceed in case of a job interruption

If the job was interrupted, PrograMill CNC displays a corresponding message.

If the compressed air is insufficient

» Check the following:

- The manometer of the compressed air regulator
- The installation of the pneumatic hoses
- Your compressor

If the vacuum is insufficient

» Check the suction hose and your suction unit as well as the connection cable between the machine and the suction unit.

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. PrograMill CNC 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 CNC 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 your service partner. Have the error message and error code readily available.
5. If you need to remove a material 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 PrograMill CNC.

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 material (“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.

Troubleshooting guide - on page 38 (If tools break regularly, you can find additional information in the troubleshooting section.)

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.

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

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.

» Activate the safety interlock **immediately** after completing your work in the working chamber.

⚠ 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.

The working chamber door is equipped with a safety interlock that only allows you to open the door when the machine is powered. You can use the emergency release of the working chamber door if the working chamber door is permanently locked. There is an opening for the emergency release at the right side of the machine.

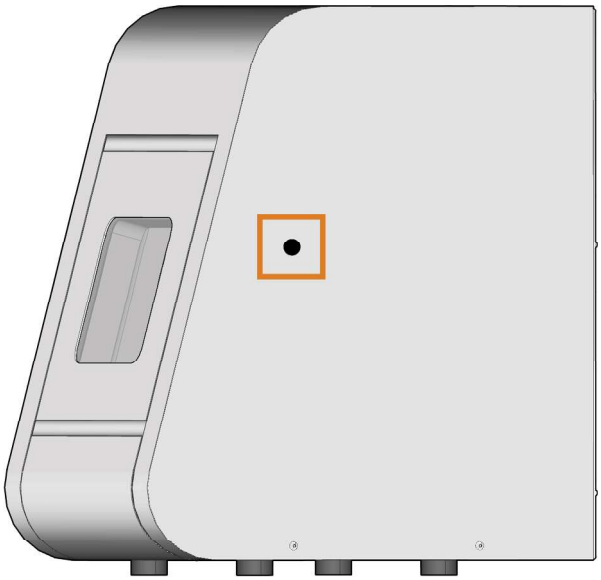

FIG. 24 - OPENING FOR THE EMERGENCY RELEASE

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.
2. Deactivate the safety interlock of the working chamber door, as shown in the figure (*Fig. 25* - on the next page):
   a. Remove the protective cap from the emergency release opening.
   b. Insert the key for the emergency release of the working chamber door through the opening.
   c. Deactivate the safety interlock of the working chamber door by turning the key counterclockwise by 90°

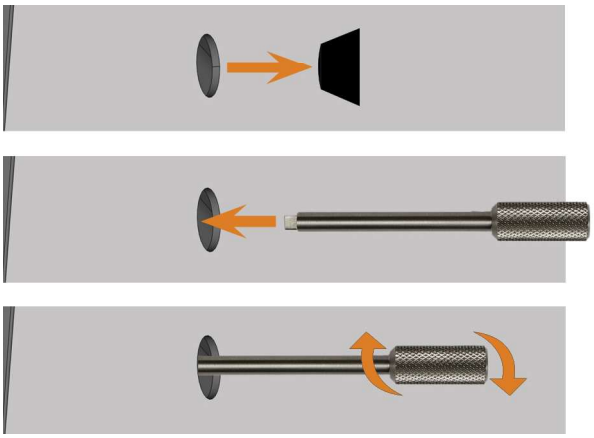

FIG. 25 - USING THE KEY FOR THE EMERGENCY RELEASE

Above: Removing the cap
Middle: Inserting the key
Below: Turning the key

3. Open the working chamber door.
4. Carry out your work in the working chamber.
5. Close the working chamber door.
6. Reactivate the safety interlock of the working chamber door by turning the key for the emergency release clockwise by 90°.
7. Check if the working chamber door actually is locked.
8. If you can still open the working chamber door, repeat the 3 previous steps.
9. Close the opening for the emergency release again with the protective cap.

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.

Preventive maintenance

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

» To schedule preventive maintenance, contact your service partner.

Where to get service?

Your service partner 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 service partner. We also recommend scheduling the first preventive maintenance appointment at this point to ensure your machine gets proper maintenance.

Cleaning the working chamber

Cleaning the working chamber includes the following components:

- Measuring key
- Material holder
- View window

NOTICE

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

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

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

⚠ CAUTION

Breathing difficulties caused by processing dust

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

» Clean the machine only if the air extraction system is properly installed and activated.

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

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

1. Have ready:
   - A dry cloth
   - A vacuum cleaner
   - A wet brush for the measuring key
2. Close the working chamber door.
3. Move the spindle to the cleaning position by selecting the depicted icon in the **Machining** view in PrograMill CNC.

4. Open the working chamber door.
5. Suck up the coarse dirt in the working chamber with the vacuum cleaner.
6. Clean all surfaces and cracks in the working chamber thoroughly with the dry cloth. Use a mild cleaning agent if necessary.
7. Clean the measuring key with the wet brush:
   a. Clean every opening of the protective cage (marked orange) with the wet brush.
   b. Clean the measuring key from all sides with the wet brush, reaching into the openings of the protective cage.
   c. Clean the protective cage with a cloth.

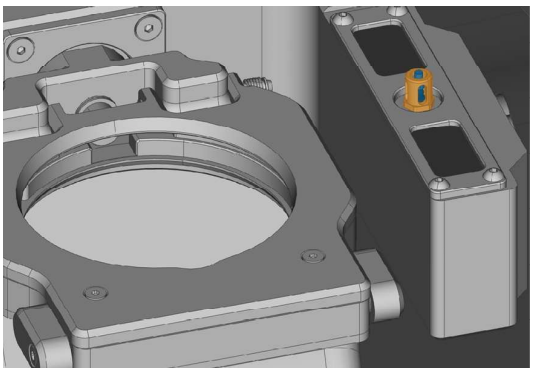

FIG. 26 - MEASURING KEY (MARKED BLUE) WITH PROTECTIVE CAGE (MARKED ORANGE)

8. Thoroughly clean the material holder from all sides with a brush. Especially clean all openings and movable parts of the material holder.
9. If necessary, clean the view window with a cloth. Use a mild cleaning agent if necessary.
10. Close the working chamber door.
11. Move the spindle to the default position by selecting the depicted icon in the **Machining** view in PrograMill CNC.

Cleaning the collet

NOTICE

Damaging of the spindle when cleaning with compressed air

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

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

» Never clean the spindle with compressed air.

FIG. 27 - 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. Open the working chamber door.
3. Open the collet chuck by selecting the depicted icon in the **Machining** view in PrograMill CNC.

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.

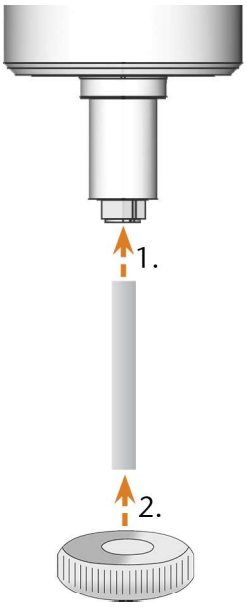

FIG. 28 - UNSCREWING THE COLLET CHUCK

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.

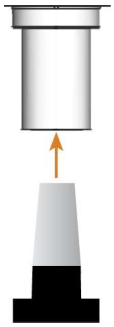

FIG. 29 - CLEANING THE INNER CONE OF THE SPINDLE

8. Clean the collet chuck with the brush of the service set. Make sure that the 3 buffers in the collet chuck do not fall out during cleaning.

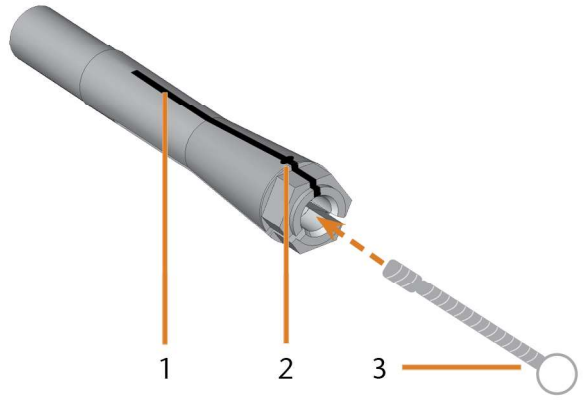

FIG. 30 - CLEANING THE COLLET

1. Longitudinal slot
2. Buffer
3. 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.

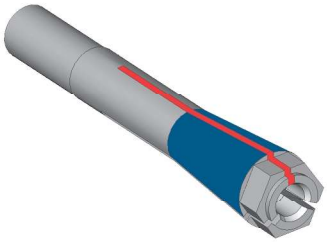

FIG. 31 - GREASING THE COLLET CHUCK; SURFACE IN WHICH GREASE IS TO BE APPLIED IS MARKED IN BLUE; SLOT THAT MAY NOT BE GREASED IS MARKED IN RED

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.

Checking the compressed air regulator

NOTICE

Damaging of the machine when compressed air is contaminated

Compressed air that does not fulfill the guidelines for purity according to ISO 8573-1 can damage the machine.

» Check the water separator of the compressed air regulator daily for contamination.

» **Never** use the machine if there is water, oil or solid particles in the water separator.

Checking the water separator for condensate

Condensate in the separator usually points to compressed air not being dry enough.

1. Check if water, oil or solid particles piled up in the water separator.
2. If this is the case, switch the machine off immediately and proceed as follows:
3. Disconnect the machine from the compressed air supply.
4. Check the compressed air supply and make sure that the compressed air fulfills the requirements for air purity according to ISO 8573-1. Do not use the machine until the compressed air fulfills this requirement.
5. Drain the water separator by turning the discharge screw counter-clockwise.

✔ The condensate is blown out downwards under pressure.

6. Close the discharge screw again by turning it clockwise.

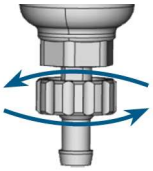

FIG. 32 - OPENING / CLOSING THE DISCHARGE SCREW OF THE COMPRESSED AIR REGULATOR

Exchanging / cleaning the contaminated filter cartridge

You have to clean or exchange the filter cartridge in the water separator in case of strong contamination.

A strongly contaminated cartridge can lead to a pressure loss.

If the compressed air fulfills the requirements for air purity according to ISO 8573-1, the filter cartridge usually does not have to be changed.

» If the filter cartridge is contaminated, check the purity of your compressed air.

You exchange or clean the filter cartridge as follows:

1. Disconnect the machine from the compressed air supply.
2. Unscrew the bowl of the water separator.
3. Unscrew the filter screw below the filter cartridge.
4. Pull out the filter cartridge and clean it if necessary.
5. Insert the new or cleaned filter cartridge and reassemble the water separator.

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 coated 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

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.

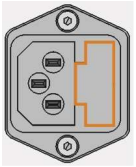

FIG. 33 - COVER OF THE FUSE (MARKED ORANGE)

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 material and the state of the tool.

» **Before** calibrating the machine, contact your authorized service partner.

» **Be very careful** when measuring and entering data during calibration. When in doubt, abort the calibration.

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

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

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

You can calibrate the machine as follows:

1. Have the calibration set readily available.
2. Mount the calibration disc into the material holder.
3. Follow the instructions on calibrating the machine in the documentation for PrograMill CNC.
4. Keep all parts of the calibration set except used calibration discs for further use.

Replacing the tool magazine inserts

If tool magazine inserts are worn, you should replace them. 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 authorized service partner.

You can replace tool magazine inserts as follows:

1. Have the spare tool magazine inserts readily available.
2. Open the working chamber door.
3. Remove all tools from the tool magazine.
4. Unscrew the 4 screws on the upper side of the tool magazine and lift the cover.

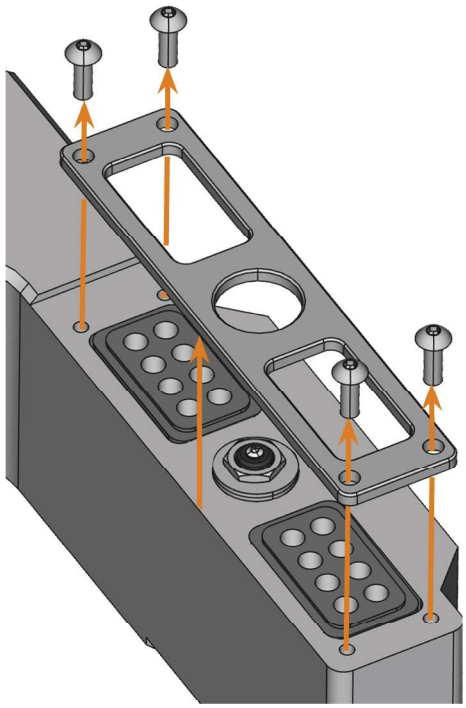

FIG. 34 - UNSCREWING THE SCREWS AND LIFTING THE COVER

5. Remove the 2 existing tool magazine inserts and replace them with 2 new ones.

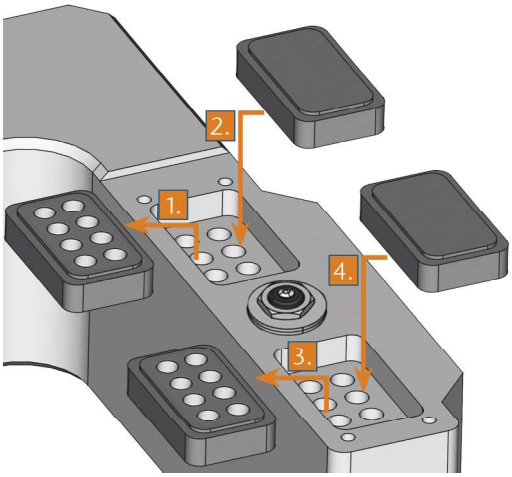

FIG. 35 - NEW TOOL MAGAZINE INSERTS (RIGHT, WITHOUT TOOL POSITIONS) REPLACE OLD INSERTS (LEFT, WITH TOOL POSITIONS)

6. Put the cover back onto the tool magazine and screw it down.
7. Insert the supplied drill bit for tool positions into the spindle and start the drilling process by clicking the flowing button PrograMill CNC.

Updating the software and firmware

Updating the manufacturing software and the firmware is an interdependent procedure.

» Be sure to read all information in this chapter.

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 PrograMill CNC during a firmware update.

Updating the manufacturing software

PrograMill CAM and PrograMill CNC are updated regularly.

Ask your service partner for the latest installation package.

» To update PrograMill CAM and PrograMill CNC, follow the instructions in the documentation for the manufacturing software.

1. Change to PrograMill CNC on the CNC computer.
2. Start PrograMill CNC

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 PrograMill CNC.

Maintenance table

Several times per day

Task	Recommended interval	Procedure / Parts	Tool illustration
Checking the external compressed air lines for damage	Before switching on the machine	Visual inspection	
Checking the suction hose for damage	Before switching on the machine	Visual inspection	

Once per day

Task	Recommended interval	Procedure / Parts	Tool illustration
Checking the compressed air regulator (page 32)	Before work Clean or exchange cartridge in case of visible contamination or every 2 years	If necessary, new filter cartridge	
Daily cleaning of the working chamber (page 29)	After work If soiled	Vacuum cleaner, brush, dry cloth	

Once per week

Task	Recommended interval	Procedure / Parts	Tool illustration
Cleaning the collet (page 30)	Once per week In case of rotational imperfections	Spindle service set	

When necessary

Task	Recommended interval	Procedure / Parts	Spare part illustration
Updating the software and firmware (page 34)	When an update is available		
Cleaning the housing (page 32)		Microfiber cloth, water, mild cleaning agent (optional)	
Exchanging the main fuse (page 33)		Replacement fuse T6.3A L250V	

Wear parts that you can exchange yourself

Wear part	Recommended interval	Procedure / Parts	Spare part illustration
Collet chuck (☞ page 30)	1,000 operating hours* Every year*	Removing & inserting the collet chucks (old/new) as during cleaning	
Tool magazine inserts (☞ page 32)	500 operating hours* Every year*		

Wear parts that your service partner exchanges for you

Wear part	Recommended interval	Procedure / Parts	Spare part illustration
Spindle bearings (requires spindle exchange by customer service)	2,000 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 machining residues

When disposing of the machining residues, obey the following regulations.

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

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

» Obey the national and local laws of the disposal location in any case.

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

» Keep a reference sample of the disposal product for at least 6 months.

Disposing of the machine

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

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

» Before sending in the machine for disposal, contact your service partner.

» If you dispose the machine yourself, obey the national and local laws of the disposal location.

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

Dismantling, transport and packaging

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This document is published by:

Ivoclar Vivadent AG

Bendererstrasse 2

FL-9494 Schaan, Liechtenstein

www.ivoclarvivadent.com

10 Troubleshooting guide

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 your authorized service partner.

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. Switch on the machine at the main power switch.
2. 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.
3. 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:

» Close the working chamber door.

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 your service partner.

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

Is the working chamber door open?

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

If applicable:

» Close the working chamber door.

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

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

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

How to check this:

1. In PrograMill CNC, compare the tool positions in the Tool management view with the tools in the corresponding tool magazine.
2. Replace the wrong tools in the tool magazine with the correct ones.

Is the material properly mounted?

How to check this:

» Remove the material and remount it.

Are bolts, fixing mechanisms, gaps and openings of the material 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 in PrograMill CNC.
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 corresponding to the parameters of the material?

How to check this:

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

- Material type
- Material measurements
- Application types of the individual objects

Do you use the latest version of the manufacturing software that is released for the machine?

» To update PrograMill CAM and PrograMill CNC, follow the instructions in the documentation for the manufacturing software.

1. Change to PrograMill CNC on the CNC computer.
2. Update the software by clicking the symbol shown in the lower right corner of the PrograMill CNC window.
3. Follow the instruction of the installation wizard.
4. Start PrograMill CNC

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 computer interrupts the job and displays that the air pressure is too low

You can resolve this problem while the job execution is interrupted. PrograMill CNC continues the job as soon as the problem is resolved.

Is the compressed air regulator properly set?

» Set the air pressure at the compressed air regulator to a correct value.

Adjusting the air pressure with the compressed air regulator - on page 17

Is the error caused by the external compressed air supply system?

How to check this:

1. Close the main external compressed air supply valve.
2. Check if all pneumatic hoses are properly seated in their connections and are undamaged.
3. Check if your compressor is switched on and set correctly.
4. Open all required valves of your compressed air supply system.

Does the air pressure fluctuate significantly so that jobs are frequently interrupted?

If applicable:

1. Verify that your compressor can *permanently* generate the required air pressure and volume flow.

   Not every compressor is designed for commercial use with dental machines.

2. If necessary, replace your compressor with one that meets the recommendations.

Installing the pneumatics - on page 16

The computer interrupts the job and displays that the vacuum is too low

You can resolve this problem while the job execution is interrupted. PrograMill CNC continues the job as soon as the problem is resolved.

Is the suction unit switched on and operating?

How to check this:

1. Check if the suction hose is properly seated in the corresponding opening and is undamaged.
2. If the machine controls the suction unit:
   a. Check if the switching unit or data cable is properly installed.
   b. For test purposes, run the suction unit without the switching unit or the data cable.
3. Switch on the suction unit.
4. Set the extraction level higher until the machine continues the job.

Is the filter or container of the suction unit full?

If applicable:

» Insert an empty filter into the suction unit or empty the container.

Does the suction unit have an automatic tapping function?

If applicable:

» Choose a shorter tapping interval.

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.

» Use PrograMill CNC to drill new holes into the new inserts.

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