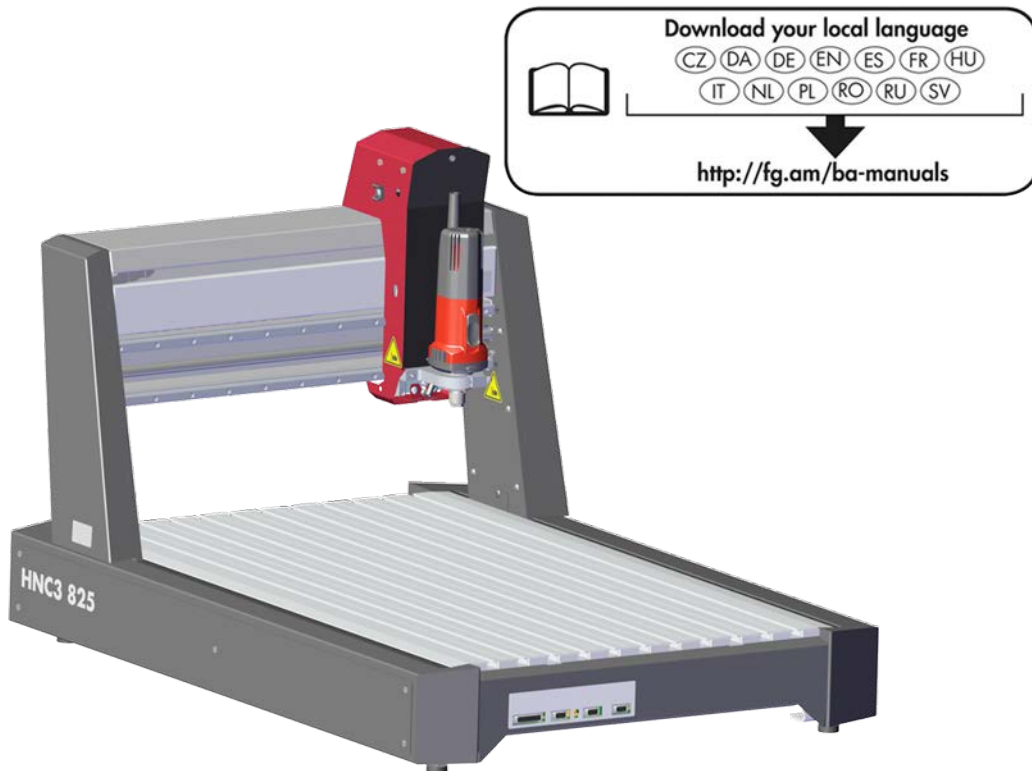


Hammer[®]

HNC3 825 / HNC3 825 perform

CNC Machining Centre



**Keep this manual to hand and in good condition for future reference.
Please read this operating manual carefully before using the machine.**

Translation of the original operating instructions

Operating instructions

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1 Information about the manual

1.1 Symbol legend

Safety instructions

Safety instructions in this manual are indicated with symbols. The safety instructions are introduced by key words which state in words the extent of the hazard.

Comply with safety instructions under all circumstances, and act with care in order to avoid accidents, personal injury, or material damage.



DANGER

... indicates a situation of immediate danger which will result in death or severe injuries if it is not avoided.



WARNING

... indicates a situation of possible danger which can result in death or severe injuries if it is not avoided.



CAUTION

... indicates a situation of possible danger which can result in minor or slight injuries if it is not avoided.



NOTICE



... indicates a situation of possible danger which can result in material damages if it is not avoided.

Tips and recommendations



... emphasises useful tips and recommendations as well as information for efficient and trouble-free operation.

OK / NOK

| Symbols | Explanation |
|---|--|
|  | Result is okay. |
|  | Result is not okay. Procedure when troubleshooting. |

1.2 Contents of the operating manual

- This operating manual describes the safe and proper use of the machine.
- All instructions in this manual must be strictly followed without exception.

- The operating manual is an integral part of the machine. It must therefore be kept in the direct vicinity of the machine and be accessible at all times.
- The operating manual must always accompany the machine.

1.3 Liability and warranty

- The contents and instructions in this manual have been compiled in consideration of current regulations and state-of-the-art technology as well as based on our know-how and experience acquired over many years.
- The manufacturer shall not be liable for damage and/or faults resulting from the disregard of instructions in the manual.
- The text and images do not necessarily represent the exact product that has been delivered. The images and graphics are not depicted on a 1:1 scale. The product that has been delivered, may have custom-built specifications, add-on options or recent technical modifications and may therefore deviate from the descriptions, instructions and images contained in the manual.
- We reserve the right to make technical changes to the product in order to improve the properties of use and further product development.
- The guarantee period is in accordance with national guidelines. Details may be found on our website, www.felder-group.com.
- Should any questions arise, please contact the manufacturer.

1.4 Copyright

- This instruction manual is to be treated as confidential. It is intended solely for those people who are to work on or with the machine.
- All descriptions, texts, drawings, photos and other depictions are protected by copyright and other commercial laws.
- Any unauthorised use is prohibited.
- This manual, in its entirety or parts thereof, may not be transferred to third parties or copied in any way or form, and its contents may not be used or otherwise communicated without the express written consent of the manufacturer. Infringement of these rights may lead to a claim for compensation. The right to further claims is reserved.
- We reserve all rights in exercising commercial protection laws.

1.5 Training

- All those appointed to work on or with the machine must have fully read and understood the manual before commencing any work. This requirement must be met even if the appointed person is familiar with the operation of such a machine or a similar one, or has been trained by the manufacturer.
- Knowledge about the contents of this manual is a prerequisite for protecting personnel from hazards and avoiding mistakes so that the machine may be operated in a safe and trouble free manner.
- It is recommended that the operator requests proof from the personnel that the contents of the manual have been read and understood.

2 Safety instructions

2.1 Intended use

- The machine described in this manual is intended solely for the processing of wood, synthetic materials, and similar machinable materials. Operational safety is only guaranteed when the machine is used for the intended purposes.
- Any use, other than that of the machine's intended purpose shall be considered improper and is therefore not permitted. All claims regarding damage resulting from improper use that are made against the manufacturer and its authorised representatives will be rejected.
- The operator is solely liable for any damage that results from improper use of the machine.
- The term "proper use" also refers to correctly observing the operating conditions as well as the specifications and instructions in this manual. The machine may only be operated with parts and accessories recommended by the manufacturer.
- The machine described in this manual is intended solely for private sector use and for individual or small production series in the commercial sector.

2.2 Responsibilities of the operator

- The machine may only be operated if it is in proper working order and in safe condition.
- The machine must be inspected for visible defects and damage each time before it is switched on.
- Do not leave the machine running unattended.
- Secure the switched-off machine against unauthorised operation (padlock on the main switch, remove the key from the operating mode selector switch, block off the area around the machine, pull out the mains plug etc.).
- In addition to the safety advice and instructions specified in this operating manual, any local accident prevention regulations and general safety regulations applicable to the machine's area of use, as well as any applicable environmental protection regulations, must be observed and complied with.
- The operator and designated personnel are responsible for the trouble-free operation of the machine as well as for clearly establishing who is in charge of installing, servicing, maintaining and cleaning the machine. Keep children away from machines, tools and accessories.

2.3 Requirements of the personnel

- Only authorised and trained personnel may work on and with the machine. "Qualified personnel" is a term that refers to those who – due to their professional training, know-how, experience, and knowledge of relevant regulations – are in a position to assess delegated tasks and recognise potential risks.
- Personnel must be briefed about all functions and potential dangers of the machine.
- If the personnel lack the necessary knowledge for working on or with the machine, they must be trained. Responsibility for working with the machine (installation, service, maintenance, overhaul) must be clearly defined and strictly observed.

- Only those people who can be expected to carry out their work reliably may be given permission to work on or with the machine.
- Personnel must refrain from working in ways that could harm others, the environment or the machine itself.
- It is absolutely forbidden for anyone who is under the influence of drugs, alcohol or reaction-impairing medication to work on or with the machine.
- When appointing personnel to work on the machine, it is necessary to observe all local regulations regarding age and professional status.
- The machine may only be operated by an adult, that is without mental limitations or under the supervision of such a person.
- The user is also responsible for ensuring that unauthorised people remain at a safe distance from the machine.
- Personnel are obliged to immediately report any irregularities with the machine that might compromise safety to the operator.

2.4 Making changes and modifications to the machine

- In order to avoid potential hazards and to ensure optimum performance, no modifications, alterations or changes may be made to the machine that have not been explicitly approved by the manufacturer.
- All the pictograms, signs and labels affixed to the machine must be kept visible, readable and may not be removed.
- Pictograms, signs and labels that have become damaged or unreadable must be replaced promptly.

2.5 Work safety

- Following the safety advice and instructions given in this manual can prevent bodily injury and material damage while working on and with the machine.
- Failure to observe these instructions can lead to bodily injury and damage to or destruction of the machine.
- Disregard of the safety advice and instructions given in this manual as well as the accident prevention regulations and general safety regulations applicable to the operative range of the machine shall release the manufacturer and their authorised representatives from any liability and from any compensation claims.



2.6 Personal protective equipment

When using the machine, the operator must wear suitable personal protective equipment, as there are machine elements or media that can be dangerous.

2.6.1 Prohibitions





It is forbidden to wear loose clothing, wide sleeves, too long and wide trousers, shirts etc. when working with the machine. It is forbidden to wear belts, scarves, ribbons, back straps, necklaces, bracelets, open long hair without a hairnet etc. when working with the machine. These elements may become caught in the moving parts of the machine and pose a considerable danger. Operators are strictly forbidden to wear moccasins, clogs, crocs, slippers or any other footwear which jeopardises their freedom of movement or stability.


When working on or with the machine, the following must be strictly observed:

| | Note |
|---|--|
|  | Long, loose hair is forbidden. With long hair and beards a hair net must be worn. |
|  | Wearing of jewellery (Necklaces, watches, rings, long earrings etc.) forbidden! |

2.6.2 Mandatory safety equipment

When working on or with the machine, the following must always be worn by personnel:

| | Note |
|---|---|
|  | Protective clothes: Sturdy, tight-fitting clothing (tear-resistant, no wide sleeves, etc.) |
|  | Protective footwear: To protect the feet from heavy falling objects and prevent sliding on slippery floors. |
|  | Heat-resistant and media-resistant protective gloves: Protection from cuts, skin damage and burns. <ul style="list-style-type: none"> • Handling of hot components. • Handling of working materials hazardous to health. • Handling of chemicals. |
|  | Respiratory protection: Protection from harmful fumes and dusts. Observe the safety data sheets of the media used. <ul style="list-style-type: none"> • Handling of diverse adhesives (e.g.: PUR). • Dust-producing activities. • Maintenance work. |

| | Note |
|---|--|
|  | <p>Ear protection: Protection from noise emissions by the machine.</p> |

2.7 Residual risks

The machine has undergone a hazard analysis. The design and construction of the machine are based on the results of this analysis and correspond to state-of-the-art technology.

The machine is considered operationally safe when used properly. Even if all of the safety measures are complied with, there are still certain associated risks that must be considered when working on the machine:

Improper operation of the machine

Serious injuries

- Work on the machine may only be carried out by authorised, trained personnel who are familiar with how to operate the machine and are in strict observance of all safety instructions.
- If possible, only perform work when the machine is disconnected from all energy sources and an unintentional restart is prevented.
- The machine has to be switched off when carrying out any work on the machine.
- Disconnect machine from power supply before carrying out work on electrical devices.
- Do not deactivate or bypass protective devices.

Missing personal protective equipment

Serious injuries

- Wear suitable personal protective equipment.

Pointy tools and sharp objects

Cuts and stab wounds

- Use protective gloves.

Dust-emitting activities

Beech- and oak wood dust are classified as carcinogenic. The dusts of other woods are under suspicion to be carcinogenic. Dust-emitting activities can cause severe health damage.

- Use dust mask during dust-emitting activities.
- Use low-dust cleaning methods.

Disorder at the workplace

Loose objects or objects that are lying around can cause severe injuries.

- Ensure that there is sufficient space to work around the machine.
- Remove loose objects from the working area.
- Keep the work area orderly and clean.

Insufficient lighting of the installation site

Serious injuries

- Light installation site sufficiently.

Standing on the machine

The covers or projecting components of the machine are not suitable for standing on them. If the machine falls down, severe breaks can occur.

- It is forbidden to climb onto the machine.

Noise pollution by machine operation

Severe hearing damage

- Use hearing protection.

Decommissioned safety devices

The machine is equipped with diverse protective devices with safety function. When protective devices are decommissioned, the safety function is no longer ensured. Decommissioned safety devices can cause severe injury.

- Do not deactivate or bypass protective devices.

Foreign bodies in the materials to be processed

Foreign bodies in the materials to be processed can cause sparks, which can lead to fire. These fires can cause severe burns or smoke poisoning.

- Use high-quality materials.
- Remove dust deposits in the machine and in the production area daily.

Disruption of the energy supply

The disruption of the energy supply can cause workpieces to rotate longer than the largest deceleration time. This can cause cuts or severed limbs.

- Wait for all parts to be still.
- Disconnect machine from all energy sources and secure against restarting.

Damage to electrical components or their insulation

Damaged electrical components or damage to their insulation cause deadly electric shocks.

- Work on electrical fittings may only be carried out by qualified personnel and in strict observance of the safety instructions.
- Disconnect machine from power supply and secure against restarting before carrying out work at electrical devices.

2.7.1 Transport, setup, installation and disposal

Improper transport

Improper transport can cause the machine to tilt or fall. This can cause severe crushing.

- Carry out transport according to the specifications in this instruction.
- Transport the machine as carefully as possible. Avoid mechanical vibration.
- Keep enough distance to the machine during transport.
- Move unauthorised people out of the area.
- Always clean and tidy the work area and cordon it off.
- Ensure that there is room to escape should the machine fall.
- Only use suitable lifting gear that has a sufficient load-carrying capacity.
- Chains, belts, ropes or other hoisting devices must be equipped with safety hooks.
- Do not use any torn, frayed or knotted chains, belts or ropes.
- Ensure that chains, belts and ropes do not lie against sharp edges.
- Only attach lifting equipment to the attachment points provided. Never lift the machine by its protruding parts.
- Keep the machine's centre of gravity in consideration.
- Take measures to prevent the machine from slipping.
- Never lift loads over a person.
- Do not stand below suspended loads.

Incorrect setup and installation

Serious injuries

- Machine may only be set up by authorised, trained personnel who are familiar with how to operate the machine and are in strict observance of all safety instructions.
- Before assembling and installing the machine, check to make sure it is complete and in good condition.
- Only assemble and install the machine if the machine and all of the parts are complete and intact.
- Do not setup machine in areas with high electromagnetic fields.
- Do not setup machine in escape routes.
- Only place machine within buildings.
- Place the machine on a level, sufficiently stable, non-slip and vibration-free surface.
- Use safety equipment according to regulations and check proper functionality.
- The load bearing capacity, the coating and the surface of the floor must not be affected in the long term.
- The working area must be adequately lit.

Deficient installation of the extraction hoses

The deficient installation of the extraction hoses can cause fire and explosions in the extraction system. This can cause severe personal and material damage.

- Only use flame-retardant extraction hoses.
- Only use electroconductive extraction hoses.
- Ground extraction hoses against electrostatic charge.

Improper work at the electrical units

Deadly electric shocks

- Work on electrical fittings may only be carried out by qualified personnel and in strict observance of the safety instructions.
- Disconnect machine from power supply and secure against restarting before carrying out work at electrical devices.

Indirect touch with residual currents

Deadly electric shocks

- Equip the machine's supply line with a fault-current circuit breaker.

2.7.2 Operate, maintain and troubleshoot**Improper adjustment and setup**

Serious injuries

- Adjustments to the machine or changing the tools may only be done once the machine has stopped.

Surpassing or falling below the allowed ambient temperature

Surpassing or falling below the allowed temperatures can cause malfunctions of the machine and unpredictable machine movements, which can lead to severe personal and material damage.

- Only operate machine within the listed temperature range.

Improper maintenance

Serious injuries

- Machine may only be maintained by authorised, trained personnel who are familiar with how to operate the machine and are in strict observance of all safety instructions.
- If possible, only perform maintenance work when the machine is disconnected from all energy sources and an unintentional restart is prevented.
- Wait for all the moving parts to come to a standstill.
- Maintenance technicians need to be fully aware of how the machine operates and moves, and they must be familiar with the exact operating sequence.
- Whilst maintenance work is being carried out, secure the area around the machine.
- Whilst maintenance work is being carried out, put up a sign that states "Machine under maintenance".
- To ensure quick and unmistakable communication, visual contact with the operators must be kept at all times.
- Operators should repeat and confirm instructions before they are carried out.
- Only start the machine when there is no one within the safety zone.
- Properly reinstall all components after the maintenance work and check functionality.
- As part of the machine maintenance, the whole machine, including the safety devices, must be checked regularly for damage.
- Keep a record of all maintenance work.

Improper replacement or reparation of safety devices with safety function

Serious injuries

- Only let safety devices be replaced or repaired by expert personnel of the Felder Group.

Dust deposits

Dust build-ups can ignite when in contact with hot parts or cause an explosive atmosphere due to resuspension. Fire or explosion events can cause serious injuries.

- Clean production area as needed.
- Open fire, smoking and cleaning with compressed air forbidden.
- Only carry out spark-producing work and hot work after work release process.

Improper correction of malfunctions

Serious injuries

- Wait for all parts to be still.
- Disconnect machine from all energy sources and secure against restarting.

2.8 Foreseeable misapplications

The examples given highlight possible dangers. This list makes no claim to completeness.

This information is intended to enable users to assess hazards and risks.


General misuse

- Disregarding operating instructions.
- Operating the machine, even if the operation manual is not complete or is not available in the language of the country it is being operated in.
- Placing objects or tools on the work surface.
- Use of tools or materials which are not intended for processing on the machine.
- Inserting tools that are either not allowed, or not authorised in the machine.
- Using modified tools.
- Using spare parts, accessories and equipment that have not been approved by the manufacturer.
- To change or modify the machine.
- To adapt, remove or bridge the safety equipment.
- Intentionally trigger safety equipment.
- Climbing on the machine.

Misuse during operation

- Operating the machine carelessly.
- Operating the machine without using the appropriate safety equipment.
 - Check the correct functioning of the safety equipment regularly.
- Processing of overly large or heavy workpieces.
- Processing very small workpieces without assistance.
 - Keep handling accessories at hand.
- Processing of unsuitable materials such as steel.
- Processing workpieces that are not fixed or insufficiently fixed.


3 Declaration of Conformity

| | |
|---|--|
|  | EG-Declaration of Conformity according to Machine Guidelines 2006/42/EC Machine number reference: The machine number is printed on the cover sheet of the operating manual. |
|---|--|

We hereby declare that the machine indicated below, which corresponds to the design and construction of the model we placed on the market, conforms with the health and safety requirements as stated by the EC guidelines (see table).

| | |
|---|---|
| Manufacturer | Felder KG KR-Felder-Straße 1 6060 Hall in Tirol |
| Product designation | CNC portal machine |
| Manufacturer | Hammer |
| Model type | HNC3 825 |
| The following EC guidelines were applied | 2006/42/EC 2014/30/EC |

This EC Declaration of Conformity is valid only if the CE label has been affixed to the machine. Modifying or altering the machine without the express written agreement of the manufacturer shall render the warranty null and void. The signatory of this statement is the appointed agent for the compilation of the technical information.

| | |
|---|--|
|  | Prof. h.c. Ing. Johann Georg Felder CEO Felder KG KR-Felder-Straße 1, A-6060 HALL in Tirol Date: 1.2.2022 |
|---|--|

UKCA - Declaration of Conformity

| | |
|------------------|---|
| UK CA | Declaration of Conformity according to UK Directive S.I. 2008/1597 Machine number reference: The machine number is printed on the cover sheet of the operating manual. |
|------------------|---|

We hereby declare that the machine indicated below, which corresponds to the design and construction of the model we placed on the market, conforms with the health and safety requirements as stated by the UK guidelines (see table).

| | |
|---|---|
| Manufacturer | Felder KG KR-Felder-Straße 1 6060 Hall in Tirol |
| Product designation | CNC portal machine |
| Manufacturer | Hammer |
| Model type | HNC3 825 |
| The following EC guidelines were applied | S.I. 2008/1597 - Supply of Machinery (Safety) Regulations 2008 S.I. 2016/1091 - Electromagnetic Compatibility Regulations 2016 |

This Declaration of Conformity is only valid if the UKCA label is affixed to the machine. Modifying or altering the machine without the express written agreement of the manufacturer shall render the warranty null and void. The signatory of this statement is the appointed agent for the compilation of the technical information.



Prof. h.c. Ing. Johann Georg Felder
CEO Felder KG
KR-Felder-Straße 1, A-6060 HALL in Tirol
Date: 1.2.2022

4 Technical information

4.1 Technical information

All technical information is for the standard equipment without spindle and extraction hood.

Machine

| Data | Value | Unit |
|---------------------------------|-------|------|
| Total length | 1111 | mm |
| Total width | 766 | mm |
| Total height | 685 | mm |
| HNC3 825 weight approx. | 85 | kg |
| HNC3 825 perform weight approx. | 103 | kg |

Packaging including machine

| Data | Value | Unit |
|---------------------------------|-------|------|
| Total length | 1150 | mm |
| Total width | 800 | mm |
| Total height | 861 | mm |
| HNC3 825 weight approx. | 112 | kg |
| HNC3 825 perform weight approx. | 130 | kg |

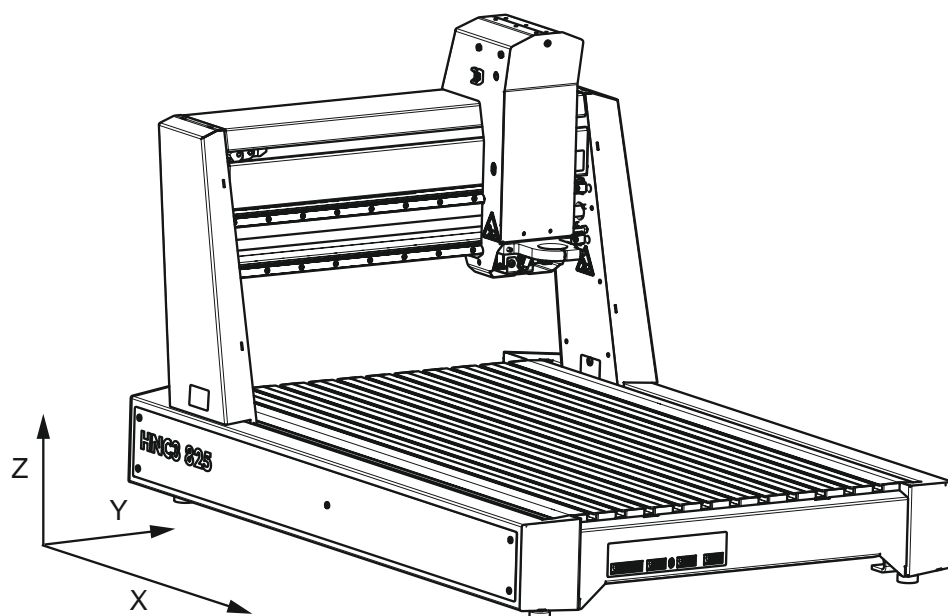


Fig. 1: Machine axes

| Data | Value | Unit |
|--------|-------|------|
| X-axis | 825 | mm |
| Y-axis | 479 | mm |
| Z-axis | 160 | mm |

Additional technical information

| Data | Value | Unit |
|---|------------|------|
| Portal clearance width | 625 | mm |
| Portal clearance height | 160 | mm |
| Table surface | 1005 x 574 | mm |
| T grooves in the table for M6 | 17.5 x 7.5 | mm |
| Drive spindle Z axis trapezoidal threaded spindle | 14 x 6 | mm |
| Drive spindle X- / Y-axis ball screw spindle | 16 x 10 | mm |

Axis drive

| Data | Value | Unit |
|------------------------|------------|------|
| Axis drive step motor | NEMA 24 | |
| Power supply | 2.8 | A |
| Step angle (full step) | 1.8 | ° |
| Holding torque | 1.06 | Nm |
| Step mode | 1/8 - 1600 | |

Reference point

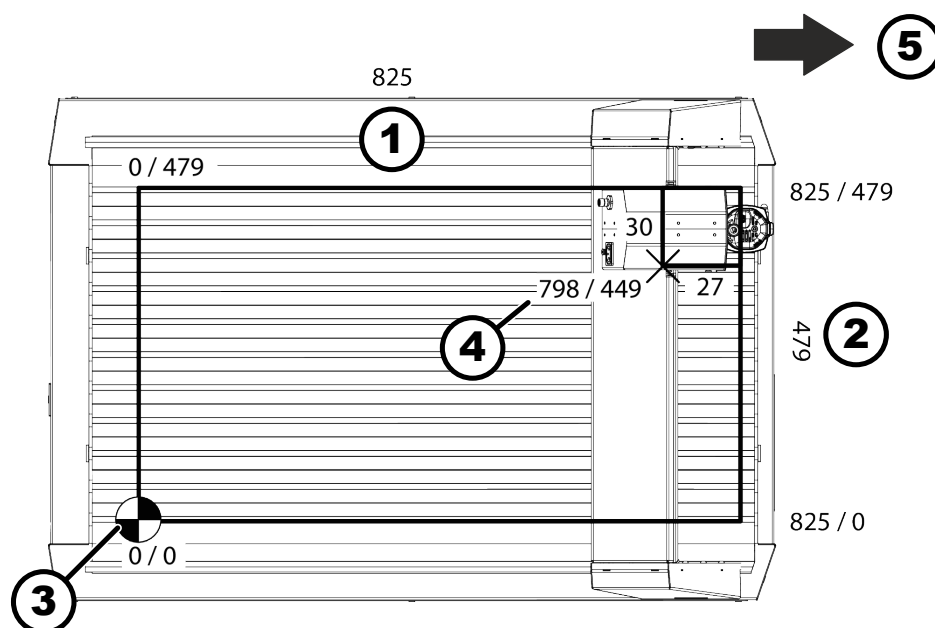


Fig. 2: Reference point

- 1 X-axis
- 2 Y-axis
- 3 Machine zero point
- 4 Reference point
- 5 Front of the machine

The machine zero point is situated at the rear, left hand corner (Rear: Main switch, power connection).

| | X-axis | Y-axis | Z-axis |
|-----------------|--------|--------|--------|
| Positive limit | 825.00 | 479.00 | 160.00 |
| Negative limit | 0.00 | 0.00 | 0.00 |
| Reference point | 798.00 | 449.00 | 160.00 |

Traverse

| Data | Value | Unit |
|-------------------------------|-------|-------|
| Travel speed X- / Y-axis max. | 7 | m/min |
| Travel speed Z axis max. | 5 | m/min |

Accuracy

| Data | Value | Unit |
|--|---------|------|
| Technical resolution in 1/8 step mode X- / Y axis | 0.00625 | mm |

| Data | Value | Unit |
|---|---------|------|
| Technical resolution in 1/8 step mode Z axis | 0.00375 | mm |
| Repeatability | ± 0.05 | mm |
| Backlash X- / Y-axis | ≤ 0.02 | mm |
| Backlash Z-axis | ≤ 0.1 | mm |
| Torsional stiffness (150 N) | 0.1 | mm |



Machine accuracy

In order to achieve these levels of accuracy, all of the technological parameters need to be correctly selected. Incorrect parameters lead to poor results. The performance of the machine indicated can only be achieved through the use of the Eding Controller and software. If using other controllers and software, the performance of the machine may be reduced.

4.2 Tools

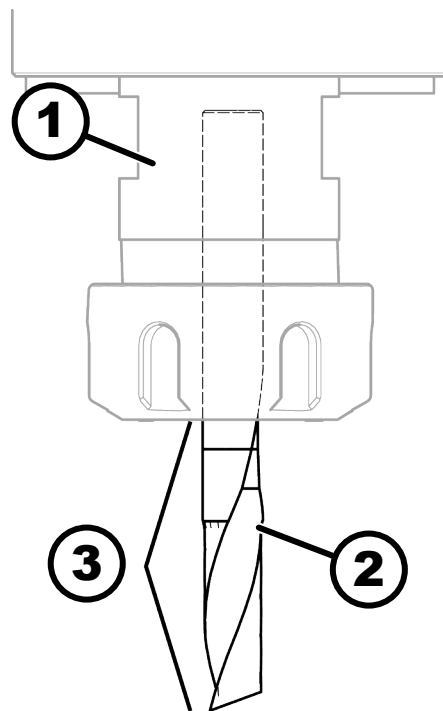


Fig. 3: Processing length

- 1 Tool holder
- 2 Tools
- 3 Processing length

| Data | Value | Unit |
|------------------------------------|-------|------|
| Processing length HFM 1000 | 85 | mm |
| Processing length HNC3 825 perform | 105 | mm |

| Data | Value | Unit |
|------------------------------------|-------|------|
| Ø tool max. | 36 | mm |
| Ø tool shaft max. HFM 1000 PV-WS | 8 | mm |
| Ø tool shaft max. HFM 1000 PV-ER | 10 | mm |
| Ø tool shaft max. HNC3 825 perform | 16 | mm |

- Router tools with a diameter greater than 16 mm must adhere to the standards DIN EN 847-1:2018-01 and DIN EN 847-2:2018-01.
- Follow the operating instructions of the tool manufacturer.
- Select the correct tool and use the recommended rotation speed for the respective material.
- Soldered tools and tools that have a diameter larger than 8 mm may only be used with protective housing. → *Chapter 5.1.3 'Protective housing' on page 30*
- Single component tools with a diameter of up to 8 mm can be used without a protective housing.
- With the HNC3 825 machine variant, with a 43 mm EURO collet, the customer is required to ensure the safe and proper usage of the motor or electrical tool.

Rotation speed of the drive spindle

| Data | Value | Unit |
|------------------|----------------|-------------------|
| HFM 1000 | 4,000 - 25,000 | min ⁻¹ |
| HNC3 825 perform | 6,000 - 24,000 | min ⁻¹ |

4.3 Operation and storage conditions

| Data | Value | Unit |
|----------------------------|------------|------|
| Operating/room temperature | +5 to +40 | °C |
| Storage temperature | -10 to +50 | °C |
| Humidity (non-wetting) | 90 | % |

4.4 Electrical connection

HNC3 825

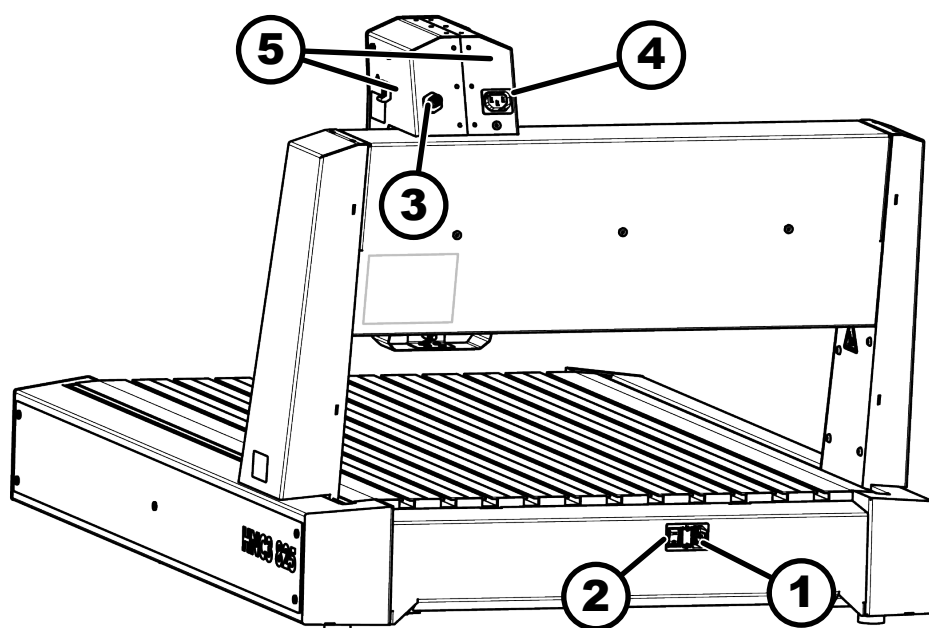


Fig. 4: Connect electrics

- 1 Mains connection C14
- 2 Main switch
- 3 Rotation speed control (0-10 volt)
- 4 Connection machine head
- 5 Extraction/cable guide

| Data | Value | Unit |
|---|-----------------------------------|------|
| Connection on the machine | C14 device plug | |
| AC input voltage machine | 88 - 264 | V |
| Frequency | 50 / 60 | Hz |
| Max. power consumption of the machine / incl. accessories | 460 / 2300 | W |
| Output voltage C13 device socket | same as the machine input voltage | |
| max. current connection to head cover | 8 | A |

HNC3 825 perform

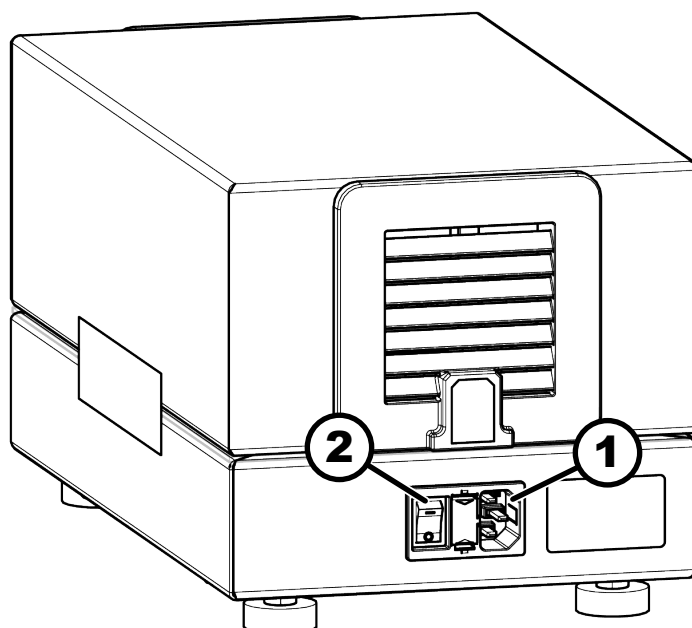


Fig. 5: Connection frequency converter HNC3 825 perform

- 1 Mains connection C14
2 Main switch

| Data | Value | Unit |
|--|-----------------|------|
| Connection | C14 device plug | |
| Input voltage frequency converter (HNC3 825 perform)* switch box | 200 - 240 | V |
| Frequency | 50 / 60 | Hz |
| Max. power consumption FC electrical cabinet (HNC3 825 perform) | 2300 | W |

The HNC3 825 perform must be equipped with a residual current circuit-breaker min. 300 mA, Type A (or higher).

4.5 Dust extraction

Standard extraction connection

| Data | Value | Unit |
|----------------------------------|--------|-------------------|
| Ø Standard extraction connection | 32 | mm |
| Air speed | 20 | m/s |
| Volume flow (at 20 m/s) | 60 | m ³ /h |
| Negative pressure | 20,000 | Pa |

Perform extraction connection

| Data | Value | Unit |
|---------------------------------|-------|------|
| Ø Perform extraction connection | 100 | mm |
| Air speed | 20 | m/s |
| Volume flow (at 20 m/s) | 565 | m³/h |
| Negative pressure | 1000 | Pa |

4.6 Dust emission

The working areas of this machine are considered dust-minimised according to DGUV Information 209-044. The maximum concentration level of 2 mg/m³ of inhalable dust in the air will not be exceeded. This only applies if the conditions that are specified in the section "Extraction" are adhered to.

4.7 Noise emissions

Note on measurement

If the stated noise emission values are to be checked, then the measurements must be taken following the same procedure and in the same operating and installation conditions as described.

All values in dB(A) and with a measurement uncertainty factor of 4 dB(A). Measurement conditions and additional information according to ISO 19085-1:2021, chapter 6.2.2.

The measurements are carried out in accordance with the following standards:

- EN ISO 3746, acoustic power level
- EN ISO 11202, workplace emission values

HNC3 825 (without tools)

| | Idle* |
|-----------------------|-----------|
| Noise level | 65 dB (A) |
| Measurement tolerance | 4 dB (A) |

*Machine measured values, noise emission HFM see separate operating manual.

HNC3 825 perform

This measurement was taken whilst the machine was idling without tool.

| | Idle |
|-----------------------|-----------|
| Noise level | 82 dB (A) |
| Measurement tolerance | 4 dB (A) |

- WARNING: The noise emission values stated are only valid, when the same operation and installation conditions apply.
 - Other operation and installation conditions, e.g. a different work process, can lead to higher noise emission values with the danger of underestimation.
 - WARNING: The noise emission values stated are not exposure level values.
 - Although there is a correlation between emission and exposure levels, the emission values can not be used to reliably determine whether increased safety measures are required.
 - Factors that influence the actual degree of exposure are the actual work process, the exposure time, the characteristics of the workplace and other neighbouring noise sources in the workshop.
-
- To keep the noise emission as low as possible, always use sharpened tools and operate the machine at the correct speed.
 - The machine's maintenance and the type of workpiece to be processed also affect the noise emission.
 - Ear protection must always be worn; however, such protection cannot be considered a substitute for properly sharpened tools or the correct speed.
 - The machine operator should find out about the normal level of noise emission and be attentive to any changes.
 - A different level of noise emission can be due to a defect.
 - If the stated noise emission values are to be checked, then the measurements must be taken following the same procedure and in the same operating and installation conditions as described.

5 Machine overview

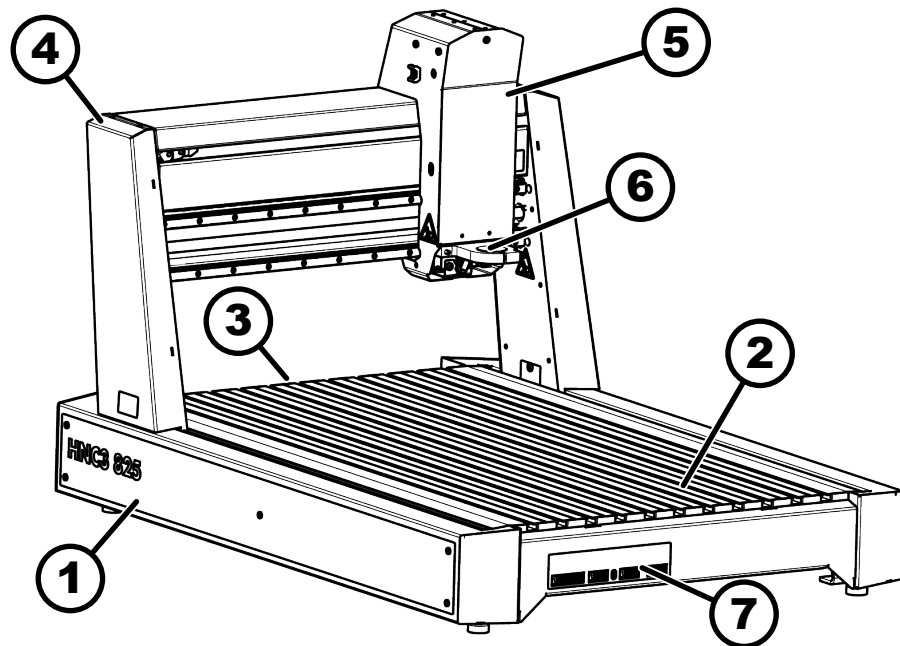


Fig. 6: Machine overview

- 1 Machine chassis
- 2 Workpiece support
- 3 Mains connection & main switch
- 4 Portal with machine head
- 5 Working head
- 6 Router spindle fixation
- 7 Emergency stop connection, PC, 4th axis, AUX

5.1 Safety devices

5.1.1 Main switch

The main switch separates the machine and the frequency converter from the power supply.

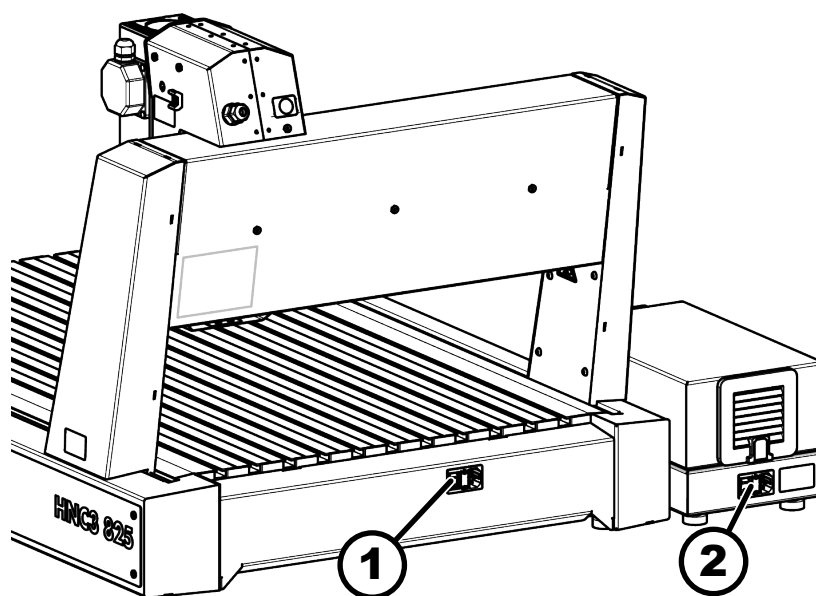


Fig. 7: Main switch

- 1 Machine main switch
- 2 Frequency converter* main switch

Two [main switches] for both the machine and the frequency converter* are located at the back of the machine.

Position "O" / "OFF"

Mains voltage OFF

Position "I" / "ON"

Mains voltage ON

* only HNC3 825 perform

5.1.2 Emergency stop button

With the [emergency stop] button, all of the machine movements will stop. The [emergency stop] button is unlocked by turning.

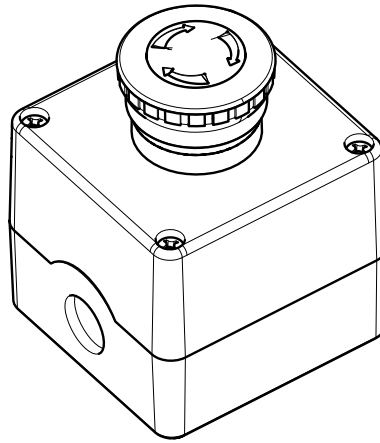


Fig. 8: Emergency stop button

5.1.3 Protective housing

In order to ensure that the machine can be safely worked with, the protective housing must be used. This housing must completely encompass the machine, on all four sides.

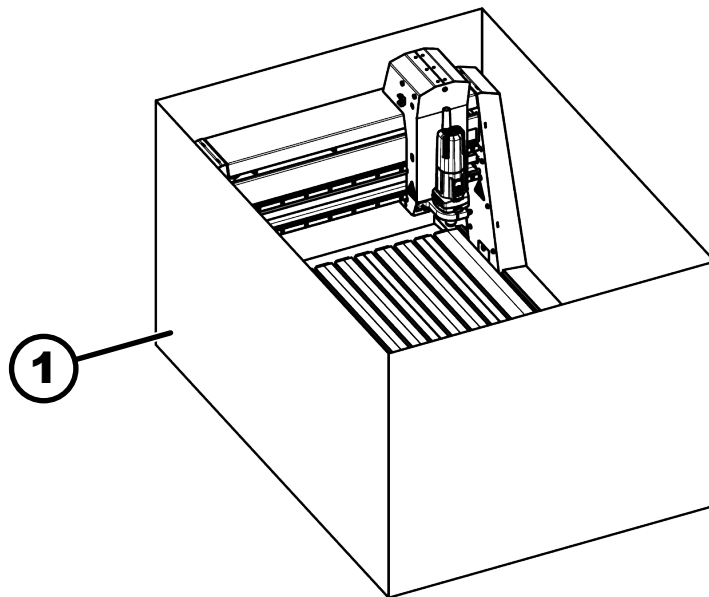


Fig. 9: Protective housing

| Data | Value | Unit |
|-----------|-------|------|
| Length | 1500 | mm |
| Width | 1000 | mm |
| Height | 800 | mm |
| Thickness | 19 | mm |
| Material | MDF | |

5.2 Pictograms, signs and labels

All the pictograms, signs and labels affixed to the machine must be kept visible, readable and must not be removed.

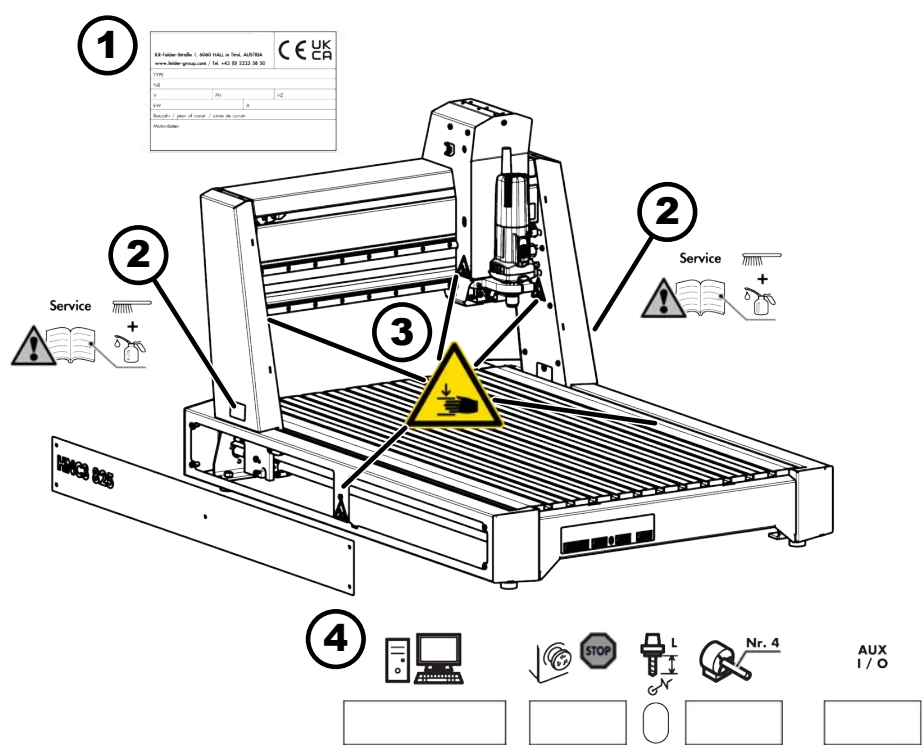


Fig. 10: Pictograms, signs and labels

- 1 Machine data plate
- 2 Attention maintenance / lubrication
- 3 Warning of hand injury
- 4 Connections

5.3 Information on the machine data plate


| | | | | |
|--|--------|-------|-----|---|
| Felder KG KR-Felder-Straße 1, A-6060 HALL in Tirol felder-group.com, info@felder-group.com +43 5223 58500, Fax +43 5223 56130 | | | | 1 |
| 2 | TYPE : | | |  |
| 3 | NR.: | Code: | | |
| 4 | V: | PH: | HZ: | A: |
| | KW: | | | |
| Baujahr / year of construction / ANNEE DE CONSTR.: | | | | |
| 5 | | | | |
| 6 | | | | |

Fig. 11: Machine data plate

- 1 Manufacturer information
- 2 Model type
- 3 Machine number
- 4 Electrical connection
- 5 Year of construction
- 6 Additional information (optional)

6 Transporting, packing, storing

6.1 Transport inspection

1. ➤ Upon arrival, inspect the shipment to ensure that it is complete and has not suffered any damage.
2. ➤ If any transport damage is visible from the outside, do not accept the delivery or only accept it with reservation.
3. ➤ Record the scope of the damage on the transport documents/hauliers delivery note.
4. ➤ Initiate the complaint process.
5. ➤ Any defects that are not discovered upon delivery, must be reported immediately once they have been identified as damage claims are only valid if claimed within the valid complaint period.

6.2 Packaging

If no agreement has been made with the supplier to take back the packaging materials, help to protect the environment by reusing the materials or separating them according to type and size for recycling.

When using overseas transport the machine must be tightly packed and protected from corrosion. Use desiccant.

Environmental protection

Packaging materials are valuable raw materials and in many cases they can be used again, reprocessed or recycled.



Keep transport brackets / packaging

It is recommended to store the packaging and transport brackets, once removed. If the machine has to be returned to the manufacturer then the original packaging and transport locks should be used.

Overseas transport: Machine must be tightly packed and protected from corrosion. Use desiccant.



ENVIRONMENT

Dispose of the packaging in an environmentally friendly manner

- Dispose of packaging materials in an environmentally friendly manner and in accordance with the applicable local disposal regulations.
- Contract a recycling company.

6.3 Storage

Keep items sealed in their packaging until they are assembled/installed and be sure to observe the stacking and storage symbols on the outside of the packaging.

Storage conditions

- Do not store outdoors.
- Store in a dry and dust-free environment. Use desiccant if necessary.
- Protect from direct sunlight.
- Avoid mechanical vibration.
- Avoid extreme temperature fluctuations (condensation build-up).
- Apply a coat of oil to all exposed machine parts (corrosion protection).
- Regularly check the general condition of all parts and the packaging during longer storage (> 3 months). If necessary, refresh or re-apply the coat of anti-corrosive agent.

7 Setup and installation

7.1 Unpack machine

Video tutorial



Scan the QR code and watch the video instructions.

Or alternatively you can use this link: <http://fg.am/hncfirststeps>

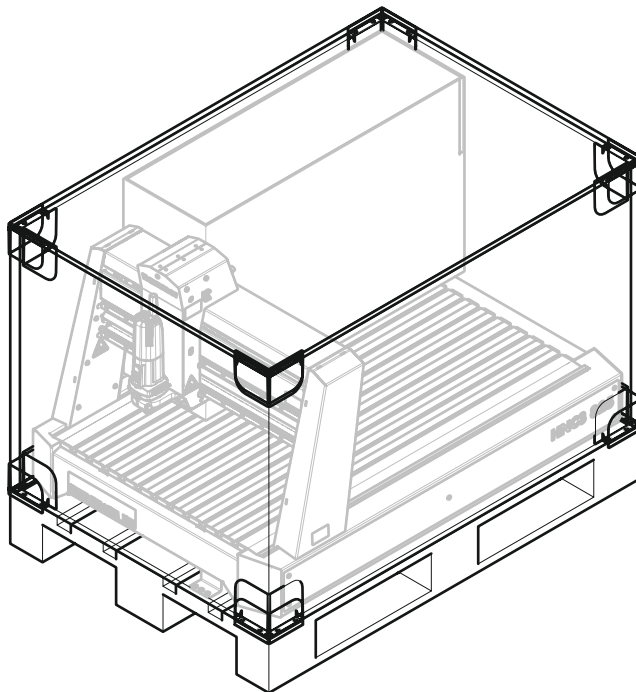


Fig. 12: Packaging

Personnel:

- Trained machine operator

Protective equipment:

- Protective clothing
- Protective gloves
- Protective footwear

Tool:

- Cutter knife

1. ➞ Carefully remove the packaging.
2. ➞ Retain the packaging, if required to dispose, then do so in accordance with national regulations.



Keep transport brackets / packaging

It is recommended to store the packaging and transport brackets, once removed. If the machine has to be returned to the manufacturer then the original packaging and transport locks should be used.

7.2 Remove transport bracket

The machine is attached to the pallet with 2 transport brackets.

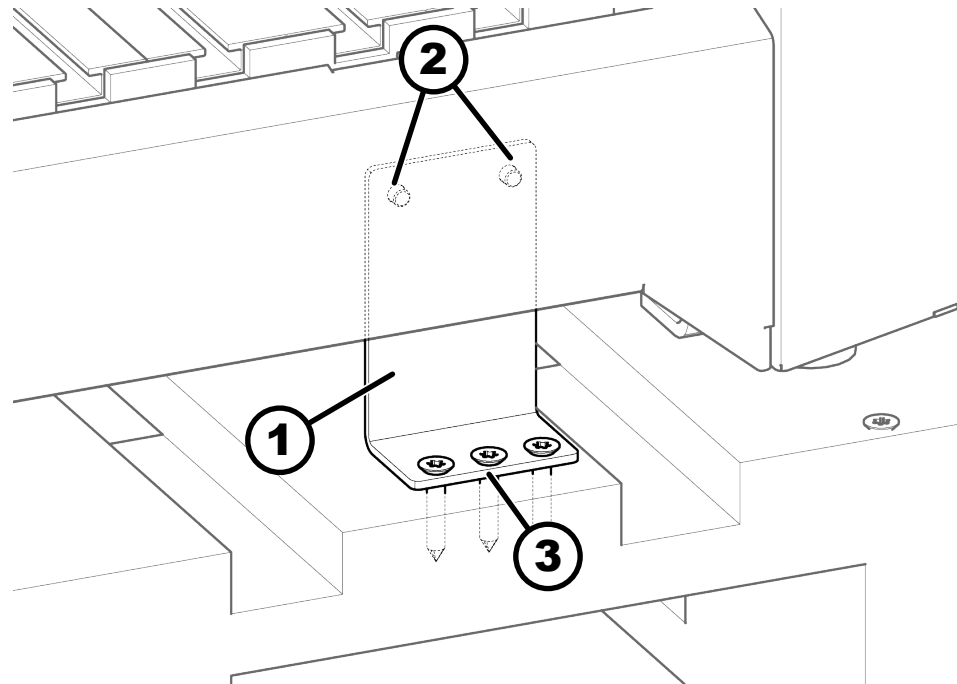


Fig. 13: Transport bracket

- 1 Transport bracket
- 2 Screws
- 3 Screws

Personnel:

- Trained machine operator
- Additional assistant

Protective equipment:

- Protective clothing
- Protective gloves
- Protective footwear

Tool:

- Hexagon socket screwdriver T30

An additional assistant is required.

1. ➤ Remove the transport brackets from the pallet.
2. ➤ Lift the machine off the transport pallet.
3. ➤ Tilt the machine upwards and remove the transport brackets from the machine.

7.3 Commission the machine



WARNING

Improper transport

Severe crushing due to falling or tipping loads

- Always clean and tidy the work area and cordon it off.
- Move unauthorised people out of the area.
- Ensure that there is room to escape should the machine fall.
- Only use suitable lifting gear that has a sufficient load-carrying capacity.
- Keep the machine's centre of gravity in consideration.
- Take measures to prevent the machine from slipping.
- Never lift loads over a person.
- Do not stop below suspended loads.
- Keep enough distance to the machine during transport.
- Transport the machine as carefully as possible.
- Chains, belts, ropes or other hoisting devices must be equipped with safety hooks.
- Do not use any torn, frayed or knotted chains, belts or ropes.
- Ensure that chains, belts and ropes do not lie against sharp edges.



WARNING

Improper setup

Serious injuries

- Observe minimum distances.
- Do not setup machine in areas with high electromagnetic fields.
- Do not setup machine on escape routes.
- Ensure that sufficient lighting is available.



NOTICE

Improper setup

Material damage

- Place machine on an even, vibration-free surface capable of bearing the load of the machine.
- Only place machine within buildings.

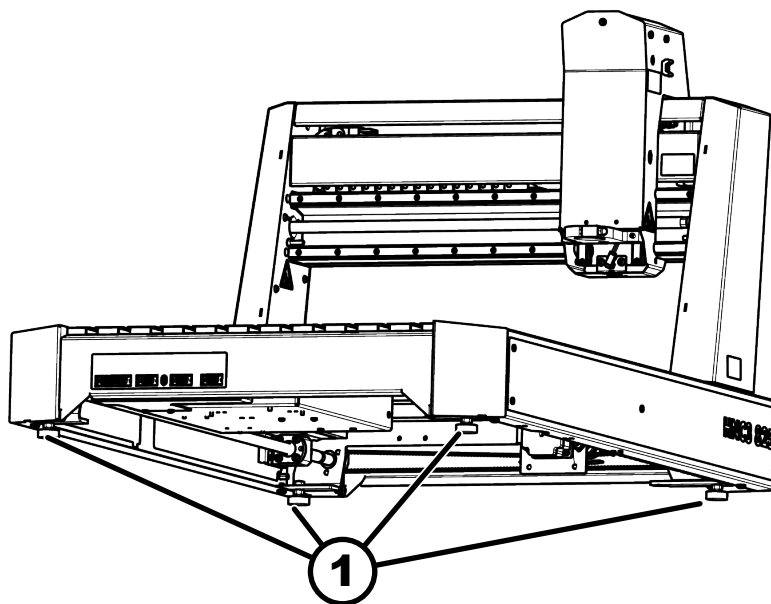


Fig. 14: Levelling the machine

1 Levelling feet

Personnel:

- Trained machine operator
- Additional assistant

Protective equipment:

- Protective clothing
- Protective gloves
- Protective footwear

Tool:

- Spirit level

An additional assistant is needed.

1. Bring the machine to the site of installation.
2. Level the machine in longitudinal and transverse direction with leveling screws.
 - ➔ Machine table is level.

7.4 Mount the extraction hood

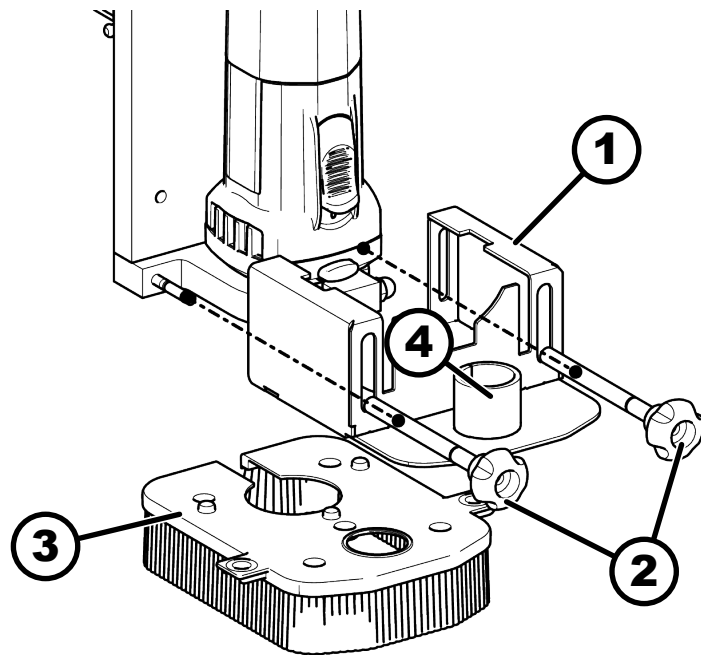


Fig. 15: Dust extraction hood HFM

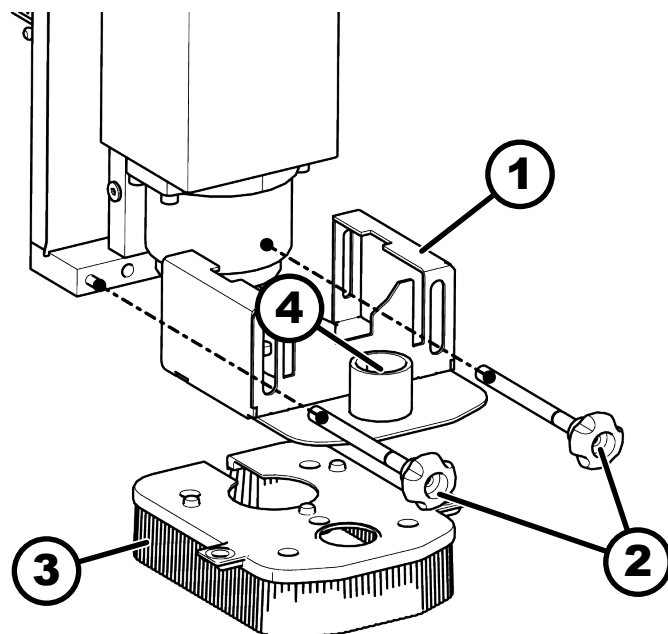


Fig. 16: Dust extraction hood HNC3 825 perform

- 1 Dust extraction hood
 - 2 Height adjustment screw
 - 3 Magnetic dust brush
 - 4 Extraction connection
1. ➤ Mount the extraction hood to the machine head using the height adjustment screws.
 2. ➤ Mount the magnetic dust brush to the extraction hood.
 3. ➤ Adjust the dust extraction hood height.

7.5 Mount the perform extraction hood

1. ➔ Remove the screws from the working head.

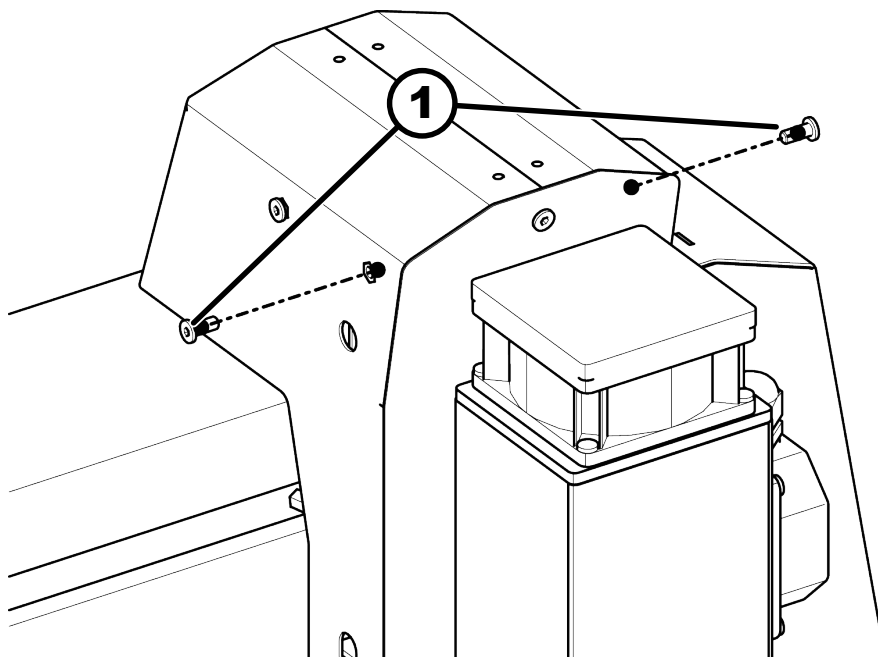


Fig. 17: Remove screws

1 Working head screws

2. ➔ Remove the hexagon socket screws.

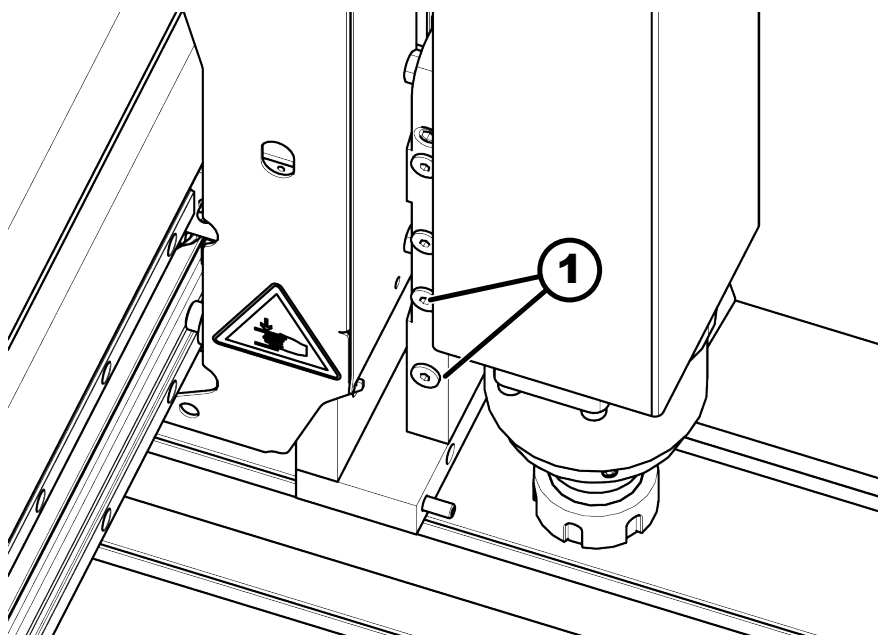


Fig. 18: Remove hexagon socket screw

1 Allen key

3. ➔ Loosen the knurled screws and open the extraction hood perform completely.

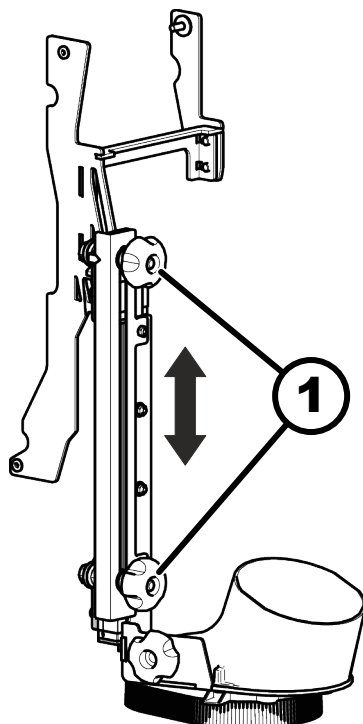


Fig. 19: Open the extraction hood perform

1 Thumb screws

4. ➔ Thread the extraction hood perform with the crossbeam between the portal and the spindle housing and align it with the portal.

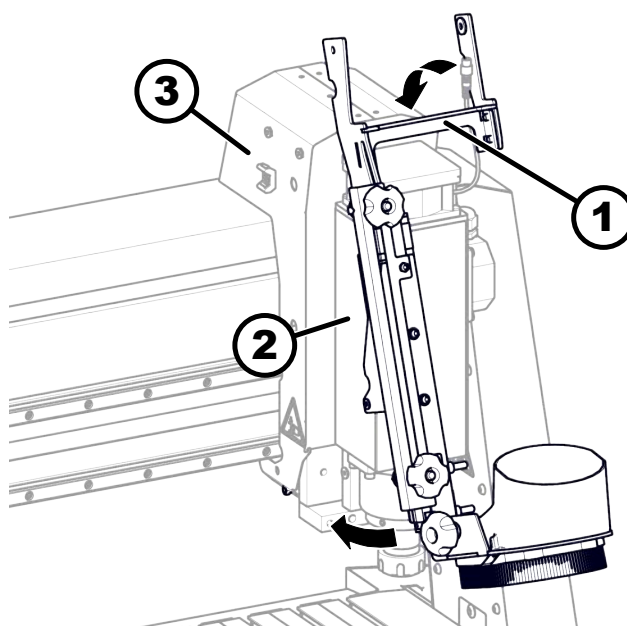


Fig. 20: "Perform" extraction hood

1 Pneumatic clamp frame

2 Spindle housing

3 Portal

5. ➔ Tighten the screws on the top of the working head.

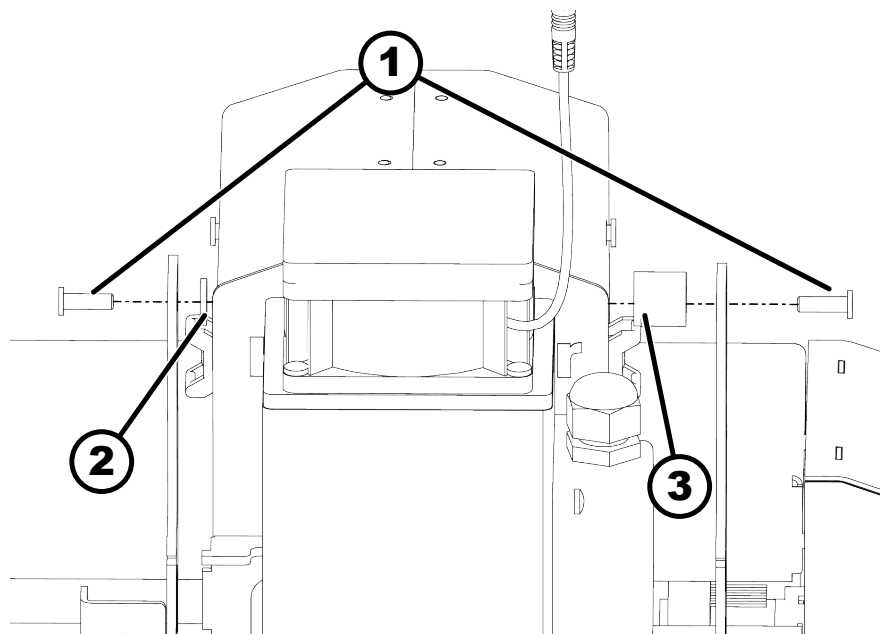


Fig. 21: Working head screws

- 1 Screws
- 2 Serrated washers
- 3 Spacer sleeve

6. → On the underside of the portal: fasten the bolt with the nut. Place a washer between the two panels and a washer between the panel and the nut.

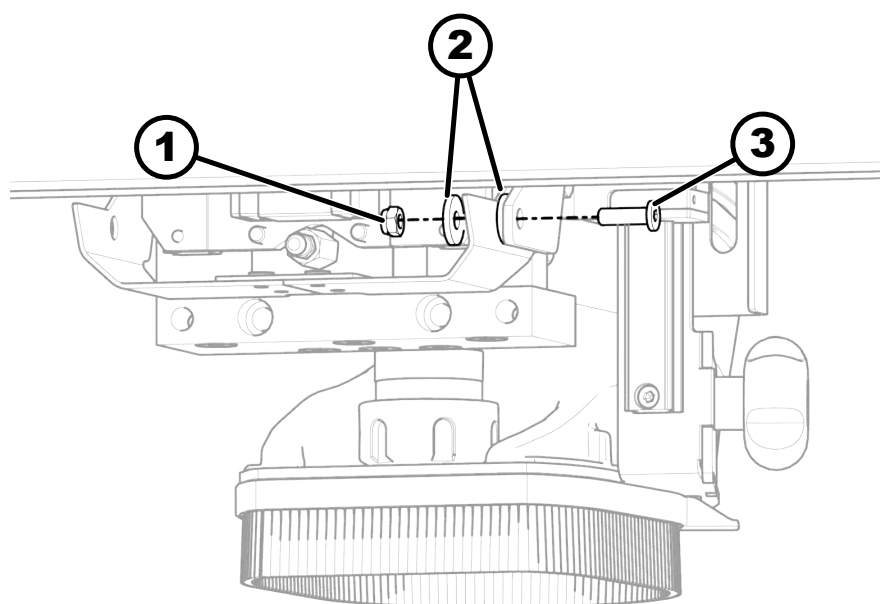


Fig. 22: Mount the perform extraction hood

- 1 Nut
- 2 Serrated washers
- 3 Screw

7. → Thread spacer sleeves between the portal and the extraction hood perform and fasten with hexagonal bolts, serrated lock washers and washers.

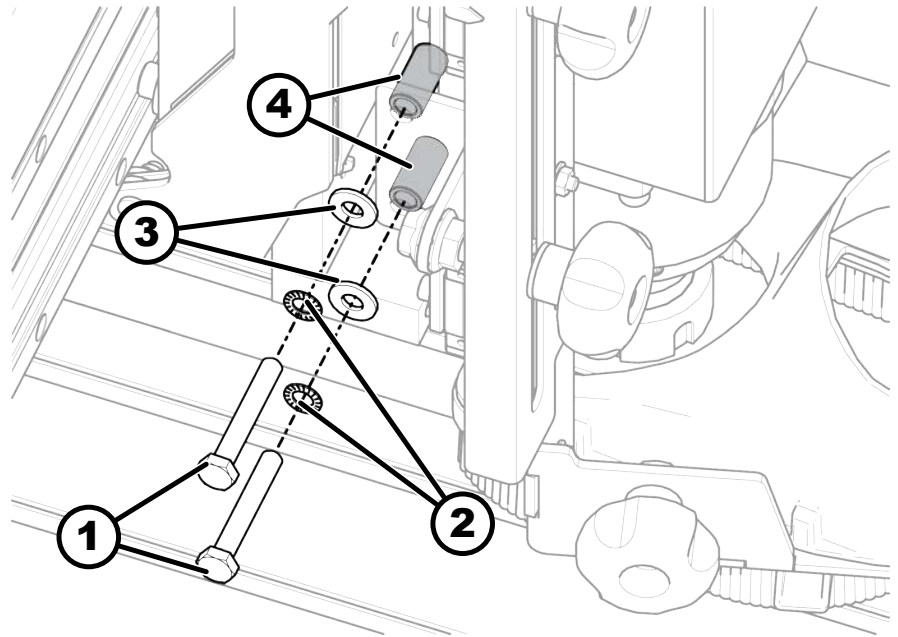


Fig. 23: Tighten the hex bolts

- 1 Six sided screws
- 2 Serrated washer
- 3 Serrated washers
- 4 Spacer sleeves

➡ Perform extraction hood mounted.

7.6 Attach the dust extraction hose

- The machine may only be used in combination with a functioning extraction system.
- Check before running for the first time, or after any significant changes that the air speed complies with the requirements.
- The dust extraction setup must be checked before the machine is put into operation for the first time. Check for obvious defects on a daily basis and the efficiency on a monthly basis.
- Use extraction with reduced dust emission to clean dust from the machine.

Connection to the dust extraction system

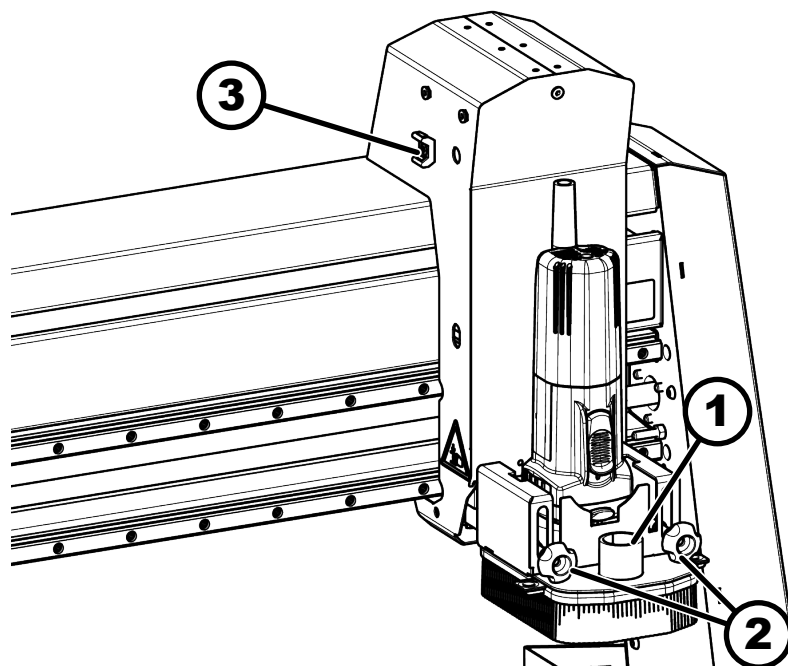


Fig. 24: Connect standard extraction

- 1 Extraction connection (Ø 32 mm)
- 2 Height adjustment screw
- 3 Extraction / cable guides

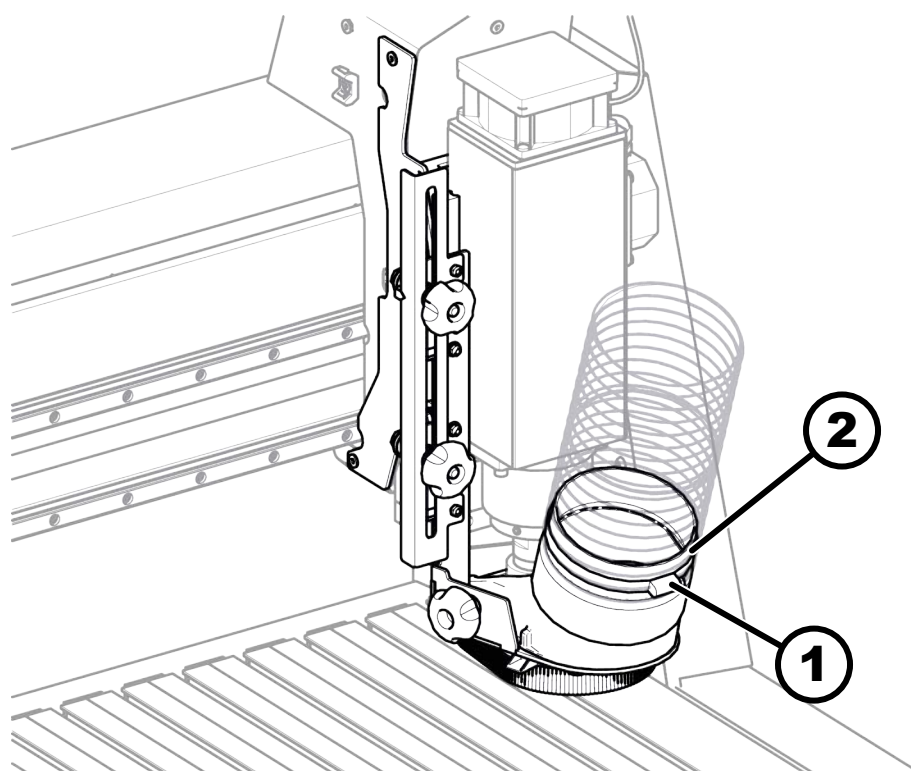


Fig. 25: Connect perform extraction hood

- 1 Hose Clamp
- 2 Extraction connection (Ø 100 mm)

Personnel:

- Trained machine operator

Protective equipment:

- Protective clothing
- Protective gloves
- Protective footwear

Material:

- Cable ties
- Hose clamp

1. ➤ Connect the extraction hose to the machine extraction connector using a hose clamp.
2. ➤
 - Standard extraction hood: Fasten the extraction hose to the guide on the portal with cable ties.
 - Perform extraction hood: Mount the extraction hood in such a way (e.g. from the ceiling), that the extraction hose does not hang into the processing area of the machine. When working, there must be no pulling strain on the working head.

7.7 Connect electrics

- The electrical outlet must have the appropriate socket.
- Before connecting or removing accessories, the machine must be switched off.

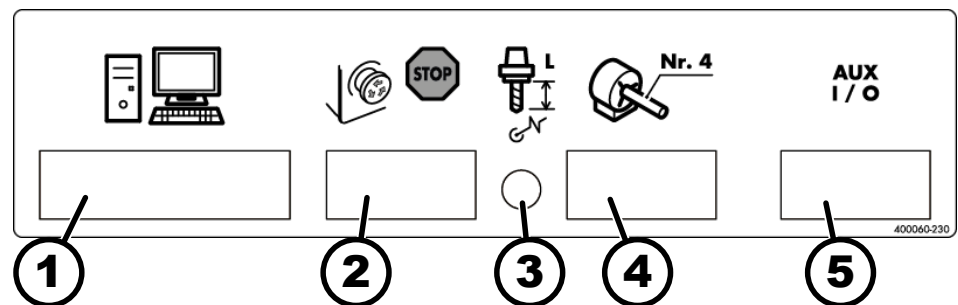
Overview

Fig. 26: Machine connections at the front

- 1 PC-Port (25 Pin)
- 2 Emergency stop
- 3 Tool length measuring system
- 4 4th axis
- 5 AUX-Port

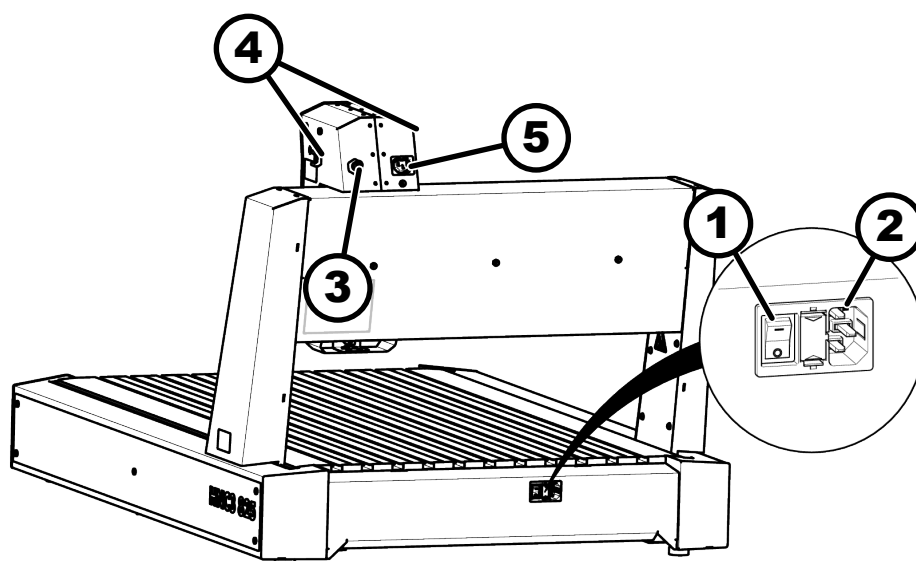


Fig. 27: Connect electrics

- 1 Main switch
- 2 Mains connection C14
- 3 Rotation speed control (0-10 volts) (not with HNC3 825 perform)
- 4 Extraction/cable guide
- 5 Connection for the machine head (not with HNC3 825 perform)

Connect machine

1. → Compare the information on the nameplate with that of the power supply. Only connect the machine if the two sets of data correspond to each other.
2. → Connect the machine using the C13 plug at the rear of the machine to the power supply.

Connect frequency converter HNC3 825 perform

The HNC3 825 perform HF spindle is premounted and connected to the machine.

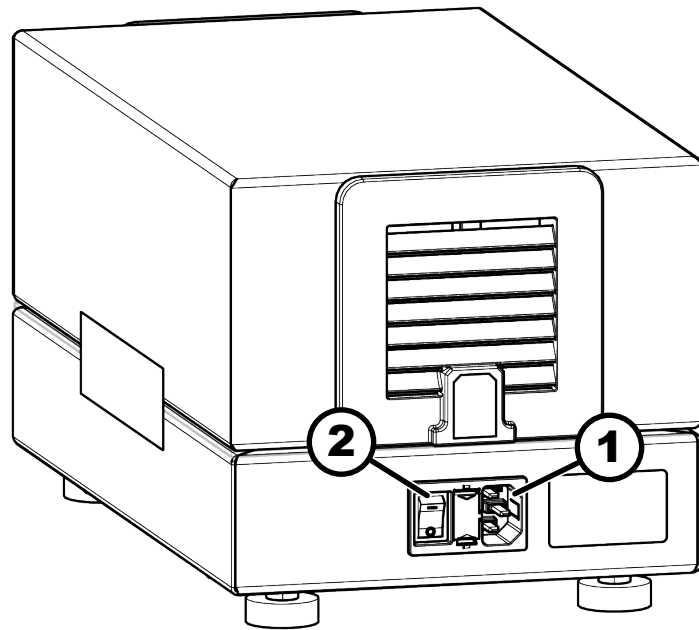


Fig. 28: Connect frequency converter HNC3 825 perform

- 1 Mains connection C14
- 2 Main switch



NOTICE

Incorrect mains frequency

Damage to the HF spindle

- The HF spindle must always have a 230 volt supply. If necessary, a frequency converter must be used.

1. Place the frequency inverter on a flat, stable surface, next to the machine.
2. Compare the information on the nameplate with that of the power supply. Only connect the machine if the two sets of data correspond to each other.
3. Connect the machine using the C13 plug at the rear of the machine to the power supply.

Emergency stop button

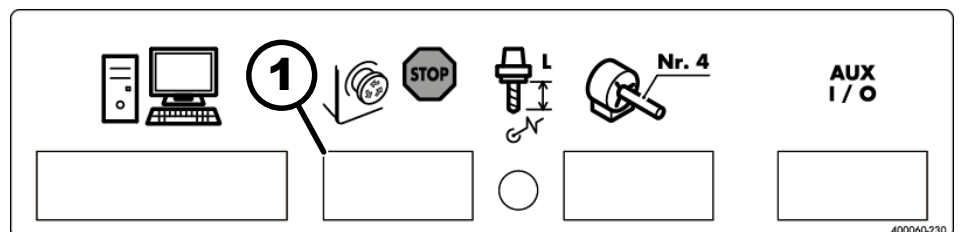


Fig. 29: Connection emergency stop

- 1 Connection emergency stop

1. Switch off the machine at the main switch, disconnect the power supply.
2. Connect the emergency stop button to the emergency stop connection.

Connect the PC (for Eding CNC)

The PC must be connected to the machine using the PC-Port (25 pin).

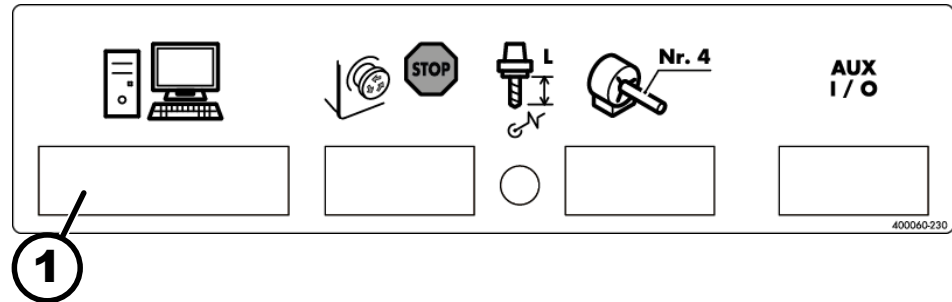


Fig. 30: Connect the PC

1 PC-Port (25 Pin)

1. ➤ Switch off the machine at the main switch, disconnect the power supply.
2. ➤ Connect the machine to the controller with the 25 PIN cable.
3. ➤ Connect the controller to the PC using the USB cable.

7.8 Mount the router motor

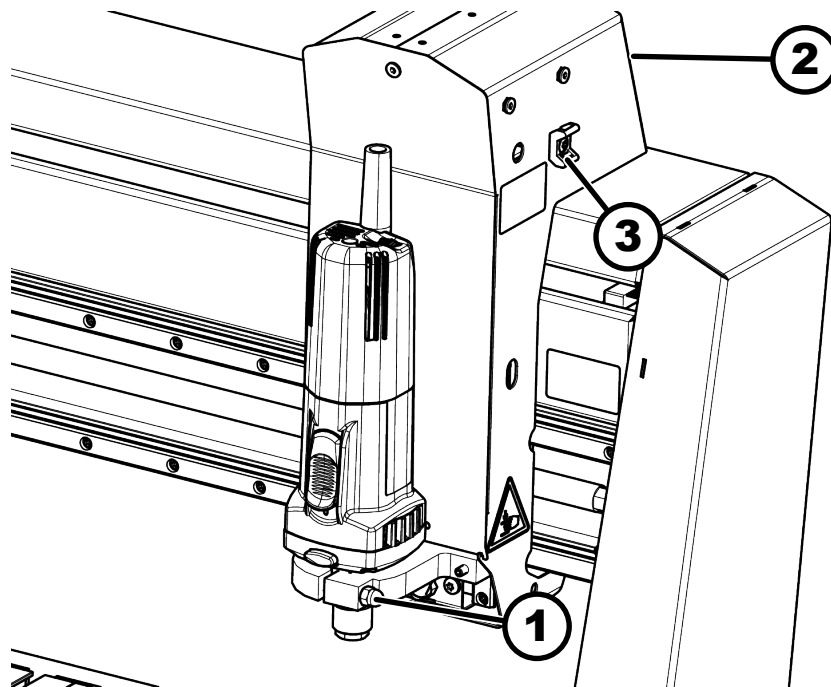


Fig. 31: Mount the router motor

- 1 Fixation of the router motor
- 2 Mains connection router motor (rear side)
- 3 Extraction / power cable guide

Personnel:

- Trained machine operator

Protective equipment:

- Protective clothing
- Protective gloves
- Protective footwear

Tool:

- Hex key

Material:

- Cable ties

The operating voltage is the same as the input voltage of the machine.

1. ➤ Place the router motor in to the 43 mm collar and clamp using the nut (10-11 Nm).
2. ➤ Connect the power cable and rotation speed control (optional) to the portal.
3. ➤ Fix the cable to the extraction / power cable guide using cable ties.

7.9 Install software

1. ➤ On the Eding CNC website ➡ <https://www.edingcnc.com/> under 'Software → Download' it is possible to download the current version from EdingCNC.



Fig. 32: Eding CNC

1 Download

2. ➤ Under 'Software → Manuals' it is possible to download the installation and operation instructions from EdingCNC.
3. ➤ Install the Eding CNC software on to the PC following the manufacturers instruction manual. Important: The USB drivers must be installed at the end of the installation process.

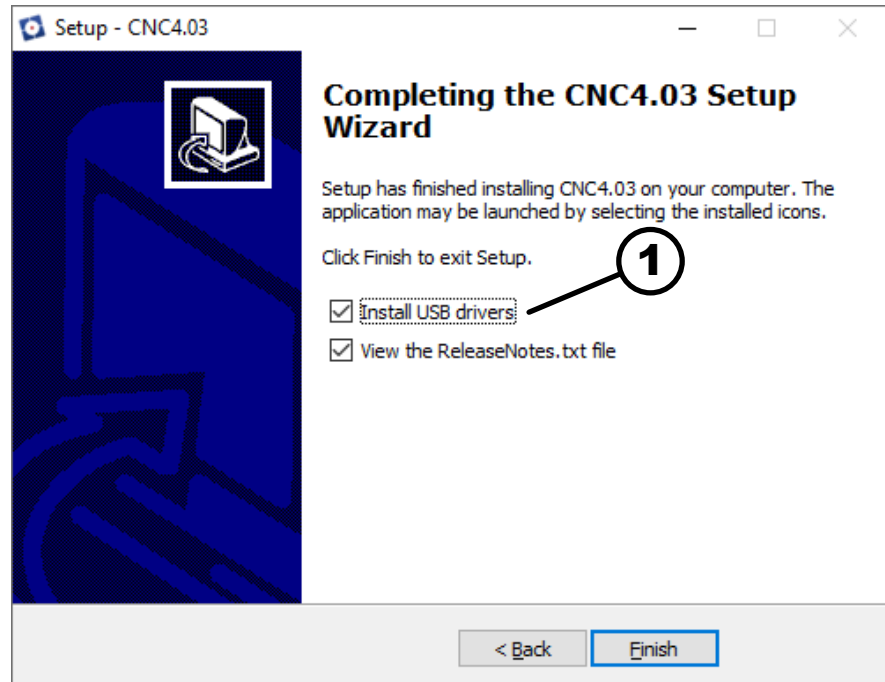


Fig. 33: Installing the USB drivers

1 USB driver checkbox

4. Download configuration file (→ <http://fg.am/hncini>).
5. Extract Zip folder.
6. "...\\English\\EdingCNCFiles" Select folder according to the machine equipment (HFM or HF spindle):
7. Move "cnc.ini" "Spindle-0-pwmCompTable.txt", "Joint X pitchCompTable.txt" and "Joint Y pitchCompTable.txt" to the installation directory (default: "C:\\CNC4.03"). Replace existing files.
8. Adjust individual axis parameters for axis compensation in "Joint-X-pitchCompTable.txt" and "Joint-Y-pitchCompTable.txt" according to the enclosed information sheet.

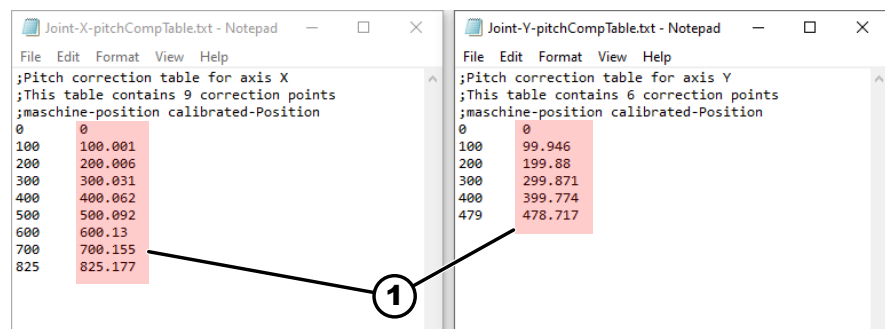


Fig. 34: Axle compensation

1 Individual axle parameters

7.10 Integrate external software

The machine can be controlled with controllers and software of various manufacturers. However, the machine performance stated, can only be achieved with Eding CNC. The correct functioning cannot be guaranteed, if controllers or software from other suppliers are used.

- The stated performance of the machine can only be achieved through the use of the EdingCNC Controller and software. If using other controllers and software, the performance of the machine may be reduced.
- If another software other than EdingCNC and as such a different controller is to be used, then the following parameters in the software must be adjusted.
- Additional parameters: ➔ *Chapter 4 'Technical information' on page 19*

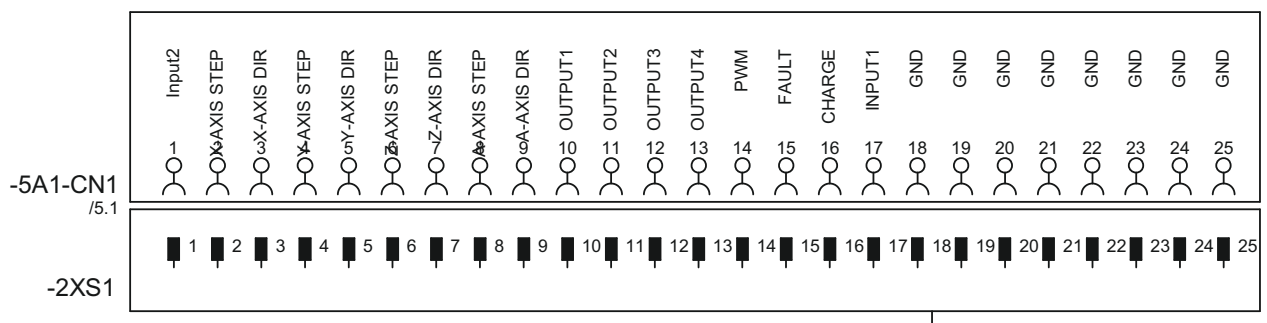


Fig. 35: Pin assignment (details see wiring diagram)

8 Adjustments and tool changes

8.1 Mounting the router tool

Router motor HFM 1000

See HFM operating manual.

HNC3 825 perform



WARNING

Risk of cuts and collision between machine components

Severe injuries caused by rotating or colliding tools

- Adjustments to the machine or changing the tools may only be done once the machine has stopped.
- Beware of any possible collisions with stops and workpieces.
- Wear protective gloves. Tools can become hot when being used. Tools can have sharp edges.



WARNING

Flying/ejected tools

Severe injuries and damage to property

- Clamp tools with the appropriate operating tool and torque.

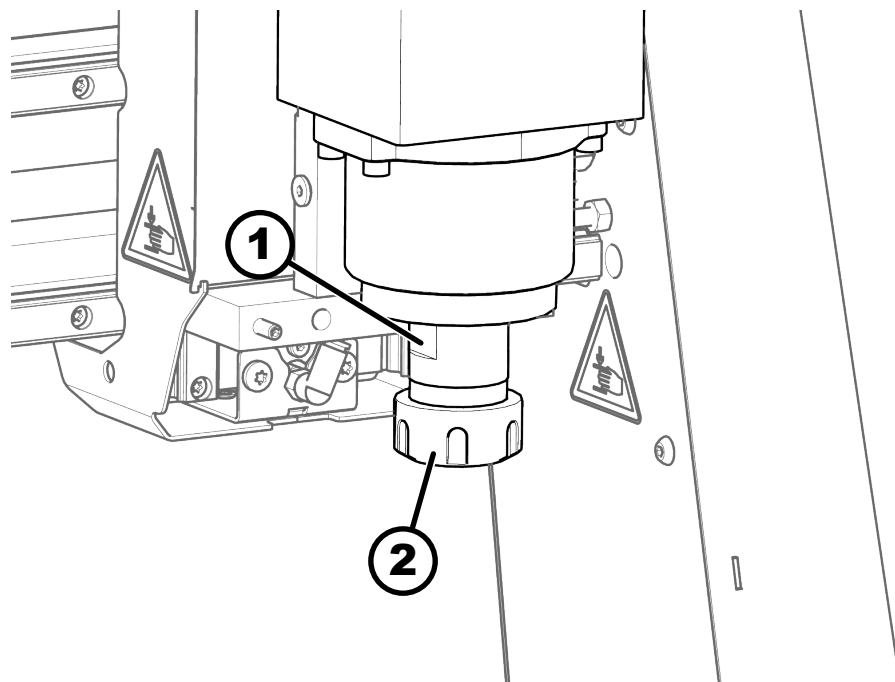


Fig. 36: Mount the tools

- 1 Fix the spindle
- 2 Sleeve nut

Tighten the router tool in the HNC3 825 perform

Personnel:

- Trained machine operator

Protective equipment:

- Protective gloves

Tool:

- Spanner 22 mm
- Collet chuck key

- Set the switch [Tool change HF spindle] to O / OFF.

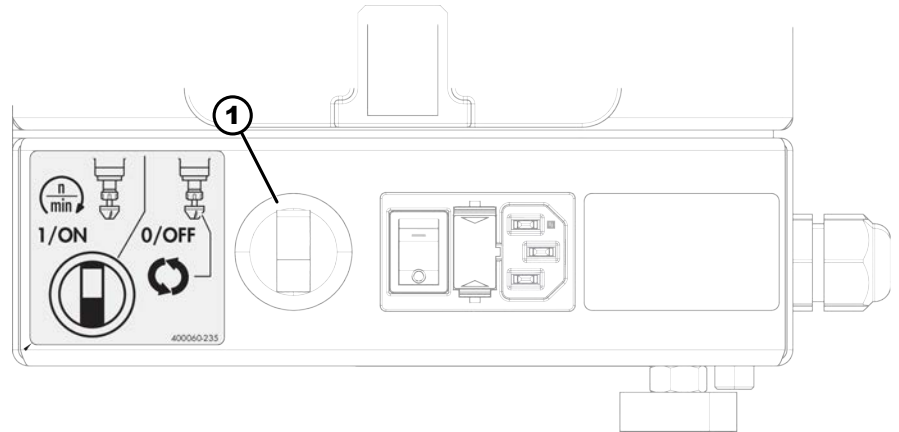


Fig. 37: Switch on control box HF spindle

1 Switch Tool change HF spindle

➡ HF spindle switched off.

- Clean the collet chuck, sleeve nut and mounting.
 - Insert the collet chuck into the sleeve nut.
 - Insert the router tool and move it until it reaches the stop in the tool socket.
 - Tighten the HF spindle with a spanner.
 - Tighten the locking nut and check that the router tool is inserted correctly.
 - Set the switch [Tool change HF spindle] to I / ON.
- ➡ HF spindle ready for operation.

8.2 Adjust the extraction hood

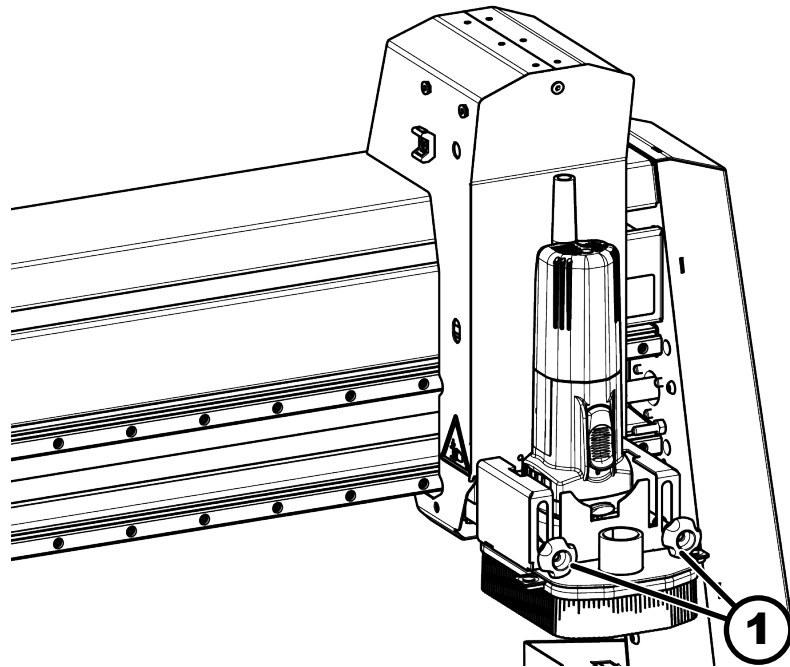


Fig. 38: Adjust the extraction hood

1 Height adjustment screw

Adjust the extraction hood

1. ➤ Release height adjustment screw.
2. ➤ Set the extraction hood in such way, that the dust brush is positioned several millimetres above the tool.
3. ➤ Tighten height adjustment screw.

8.2.1 Adjust the perform extraction hood

The perform extraction hood can be set to a fixed height, or can move together with the working head.

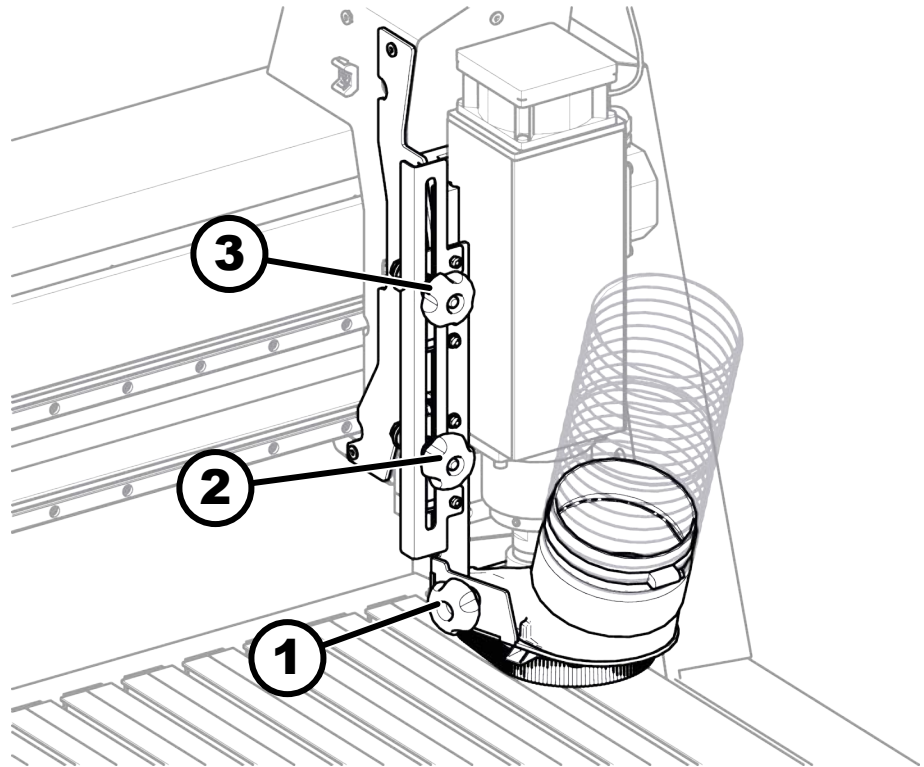


Fig. 39: Adjust the perform extraction hood

- 1 Hand grip
- 2 Thumb screw adjustable height
- 3 Thumb screw fixed height



NOTICE

Clamped extraction hood

Collision between tool and machine table.

- Only one knurled screw (moving with height or fixed height).

1. ➤ Hold the perform extraction hood securely using the handle.
2. ➤ Release both of the thumb screws.
3. ➤ Adjust the dust extraction hood height.
4. ➤ Tighten one of the two thumb screws, in order to select a setting of the extraction hood. The other knurled screw must be loosened!
 - Thumb screw adjustable height: perform extraction hood moves up and down with the working head.
 - Thumb screw fixed height: perform extraction hood stays at the height set.

8.3 Assemble and load the grease gun

Scope of delivery

- Grease gun
- Lubricant set

Personnel:

- Trained machine operator

Material:

- Interflon Grease HD2 100ml cartridge art. no. 10.2.008

1. ➤ Unscrew the mounted attachment.
2. ➤ Screw on the thin, long attachment from the lubrication set.



Fig. 40: Long attachment with hollow mouthpiece

3. ➤ Screw on the hollow mouthpiece (concave attachment).
4. ➤ Unscrew the protective tube of the grease gun.



Fig. 41: Grease gun

1 Protection tube

5. ➤ Screw in grease cartridge.
6. ➤ Screw in the grease gun protective tube.
7. ➤ Pump and press the cartridge from below, in order to pump air out of the grease gun.
 - ➡ Grease comes out of the tip.
 - ➡ Grease gun is ready for use.

9 Use

9.1 Switch on the machine

1. ➤ Unlock the [emergency stop] button.
2. ➤ Turn the machine on using the main switch I / ON.
3. ➤ Turn on PC.
4. ➤ Select reference run in the software.
 - Reference run is carried out.
 - Axes are referenced.
 - The machine is ready to operate.

Warm up the HNC3 825 perform

The spindles of the HNC3 825 perform must be warmed up, if the

- ambient temperature is below 17°C.
- machine is new: Within the first 5 days of operation.
- machine has not been in operation for more than one month.

1. ➤ Removing the tool from the spindle.

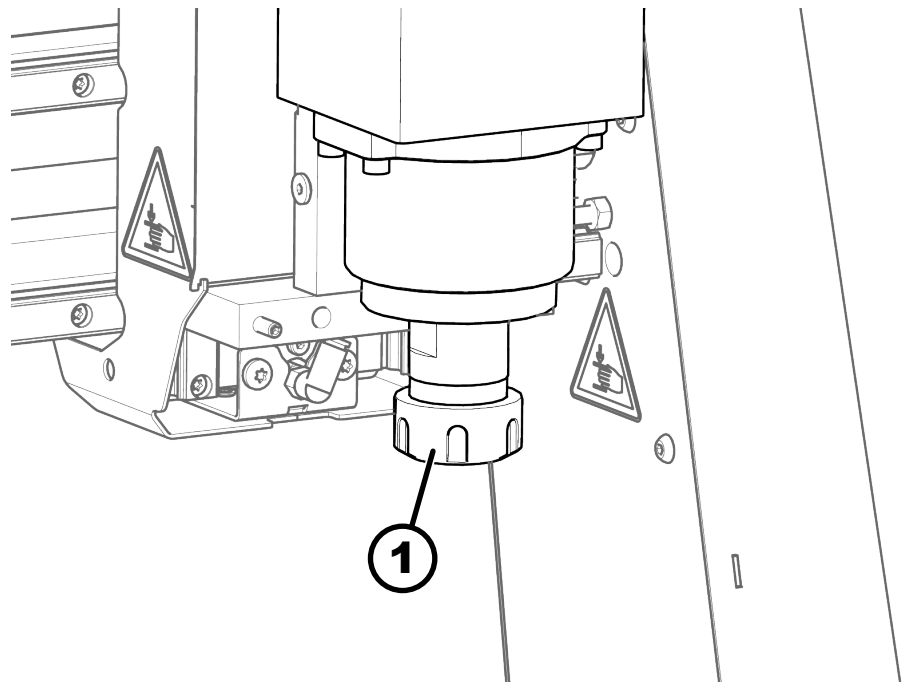



Fig. 42: Sleeve nut

- 1 Sleeve nut
2. ➤ Remove the spindle sleeve nut.
3. ➤ Start machine.
4. ➤ Open  <MDI> in Eding-CNC.
 - Input window opens.

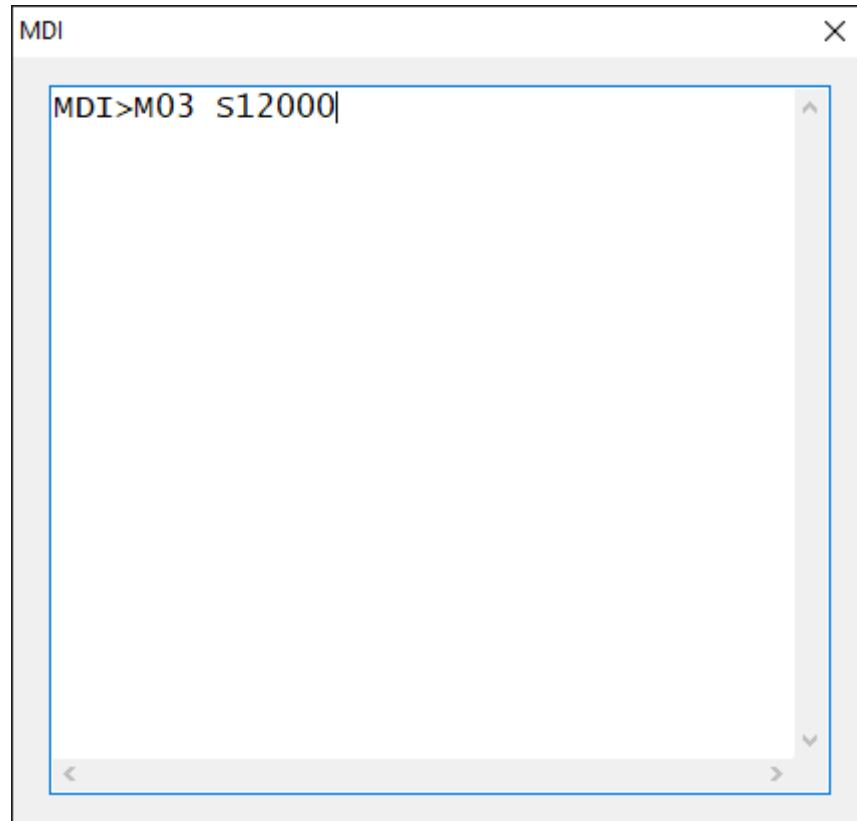


Fig. 43: MDI input window

5. Enter M03 S12000 and confirm with [Enter].
6. Warm up the HNC3 825 perform for 5 minutes in idle mode at 12,000 min⁻¹.
7. Enter M05 and confirm with [Enter].
 - ➔ Spindle stops.
 - ➔ The machine is ready to operate.

9.2 Operate machine



WARNING

Flying/ejected pieces

Severe injuries and damage to property

- Use appropriate clamping devices to fasten the workpieces to the machine table.

1. Loading G-Code in the operation software.
2. Fix workpieces to the machine table using suitable clamping devices. If necessary, use a spoil board (e.g. when through routing). Use clamping devices according to the manufacturers manual.
3. Move to the workpiece zero point (see software instructions).
4. Zero the axes specific to the workpiece. (X and Y).
5. Mark the upper edge of the of the workpiece in the Z direction.
6. Start the program and process the workpiece.


Tip: Bridging for nesting applications

When nesting is being carried out, it is recommended to leave material bridges between smaller components. As otherwise the final edge of the loose workpiece will be routed and this can lead to dimensional deviations.

9.3 Move axes manually

Moving the axes

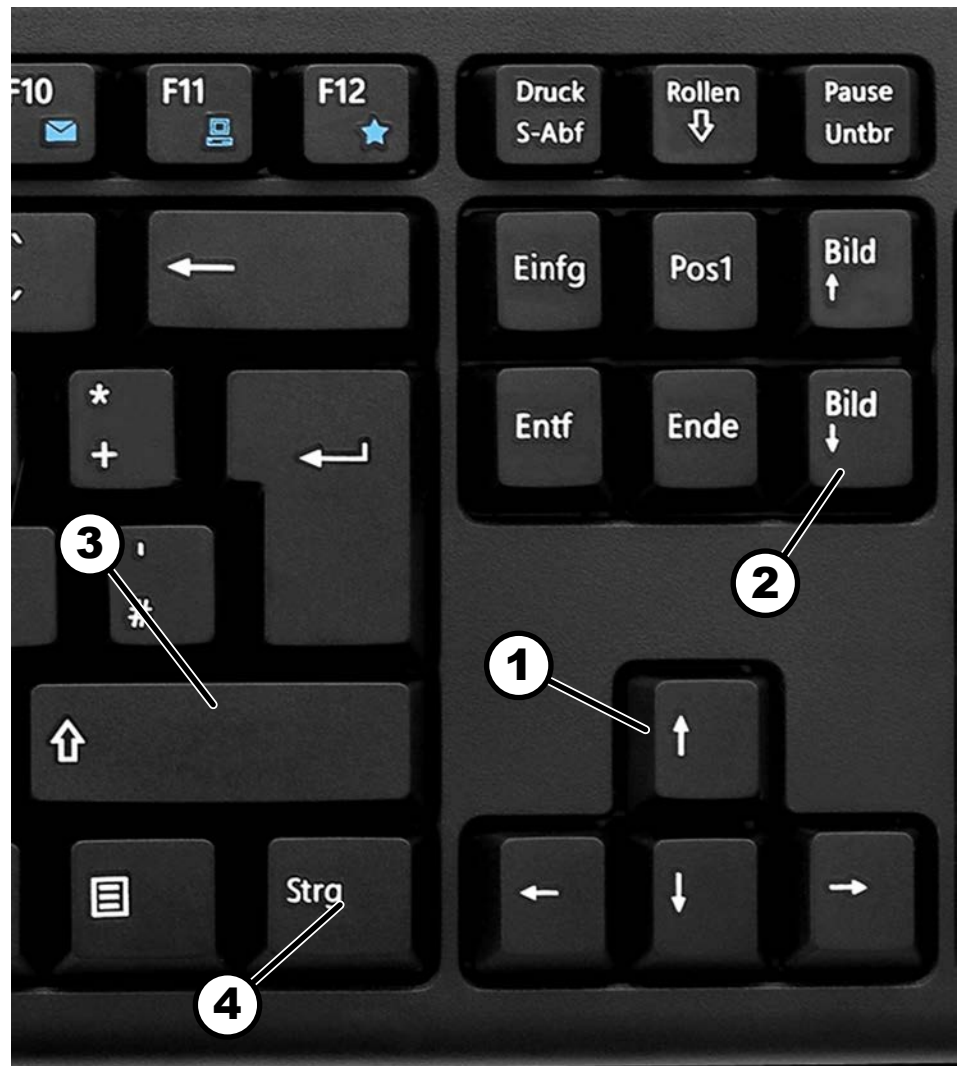


Fig. 44: Keyboard

- 1 Arrow buttons
- 2 Picture up / down
- 3 Shift
- 4 Control (Ctrl)

X axis: [Arrow right] / [left]

X axis: [Arrow up] / [down]

Z axis: [Picture up] / [Picture down]

Movement speed

[Arrow key]: 10 % (0.5 m/min)

[Arrow key] + [Ctrl]: 50 % (2.5 m/min)

[Arrow key] + [Shift]: 100 % (5 m/min)

Move axes in increments

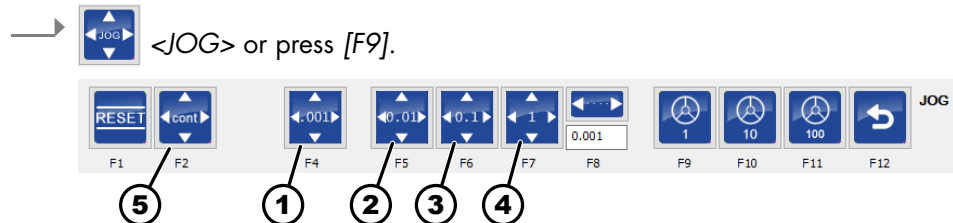


Fig. 45: Jog mode settings

- 1 0.001 mm per button press
- 2 0.01 mm per button press
- 3 0.1 mm per button press
- 4 1 mm per button press
- 5 Standard mode (traverses for as long as the button remains pressed)

➔ Move axes in increments using the direction buttons (jog mode).

9.4 Switch off the machine

Stop the machine in an emergency

- ➔ Push the [Emergency stop].
 - ➔ Machine movements will stop.
 - ➔ Machine is in emergency state.

Switch off the machine

- ➔ Switch off the machine and if applicable the frequency converter.

9.5 Processing information

9.5.1 Compensate for any bend in the workpiece

If the workpiece is bowed, then clamp it with the bow facing upwards. If locking holes are drilled for groove nuts, then they have to be chosen in such a way, that the bow will be optimally compensated against.

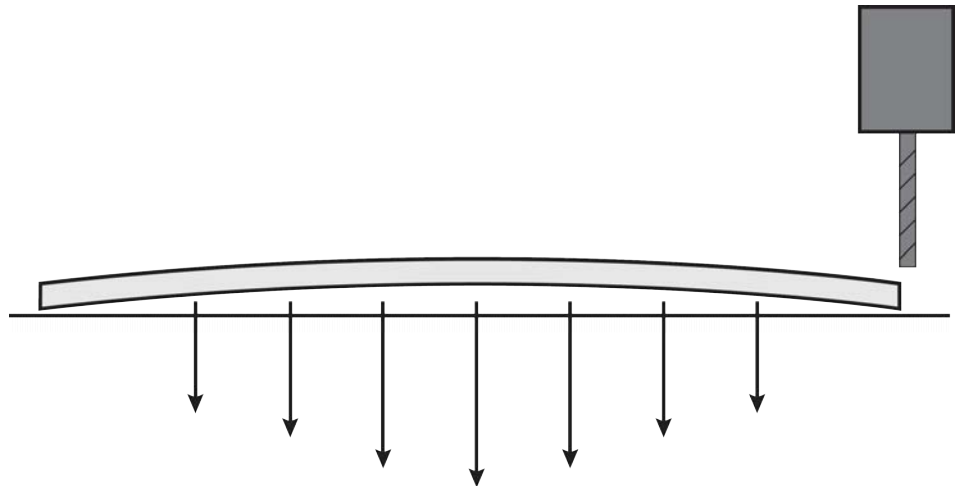


Fig. 46: Workpiece bow

9.5.2 Influence of the tool on working accuracy

The length, number of edges, cutting angle and diameter of the tool influence the working accuracy that is achievable. The tools differ greatly from manufacturer to manufacturer.

- Use sharp tools.
- Select the feed rate appropriate to the application.
- Observe mechanical load limits of the tool.

10 Maintenance

10.1 Maintenance schedule

| Chap. | Task to execute | Every 20 operating hours | Every 60 operating hours | Every 100 operating hours | Monthly | Page |
|-------|--|--------------------------|--------------------------|---------------------------|---------|------|
| 10.2 | X-axis: Lubricating the ball screw drive | | X | | | 62 |
| 10.2 | X Axis: Lubricate guiding carriage | | | X | | 64 |
| 10.2 | Y-axis: Lubricating the ball screw drive | | X | | | 66 |
| 10.2 | Y Axis: Lubricate guiding carriage | | | X | | 67 |
| 10.2 | Z axis: Trapezoidal threaded spindle | X | | | | 70 |
| 10.2 | Z Axis: Lubricate guiding carriage | | | X | | 71 |
| 10.4 | Check protective equipment | | | | X | 77 |
| 12.8 | Maintaining the laser | | | X | | 105 |

10.2 Lubricate the drive spindles and guiding carriage

The drive spindles and guides must be lubricated at regular intervals. If there is a lot of dust or noise then the lubrication interval is shortened.



NOTICE

Incorrect lubricant, lack of lubrication

Material damage, defect bearings, machine does not function as it should.

- Use lubricant Interflon Grease HD2.
- Comply with the lubrication intervals. The lubrication interval can be shortened if required.
- Pay attention to any changes in the machine noise. Clean and lubricate as necessary.

X-axis: Lubricating the ball screw drive

The lubrication nipple of the X axis ball screw drive is located under the side cover.

Personnel:

- Trained machine operator

Protective equipment:

- Protective clothing
- Protective gloves
- Protective footwear
- Safety goggles

Tool:

- Grease gun
- Cleaning cloths
- Hex key

Material:

- Lubricant Interflon Grease HD2

Interval: Every 60 operating hours or if irregular noise occurs.

1. ➤ Loosen the screws and remove the cover.

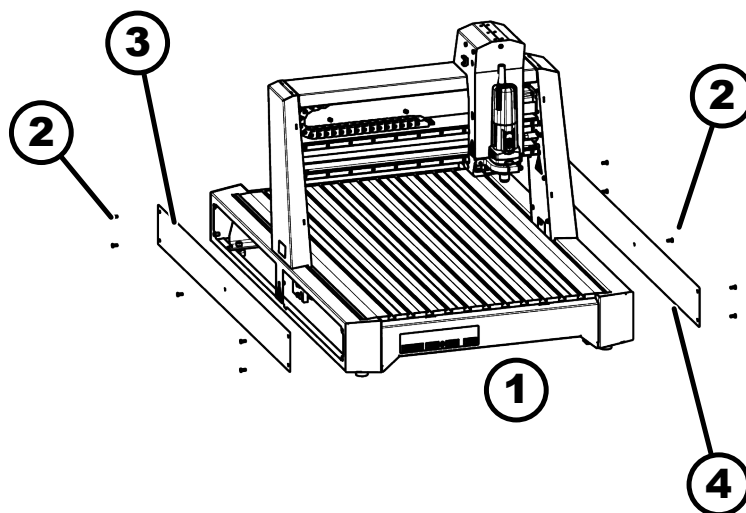


Fig. 47: X-axis cover

- 1 Front side of the machine
- 2 Screws
- 3 Cover left
- 4 Cover right

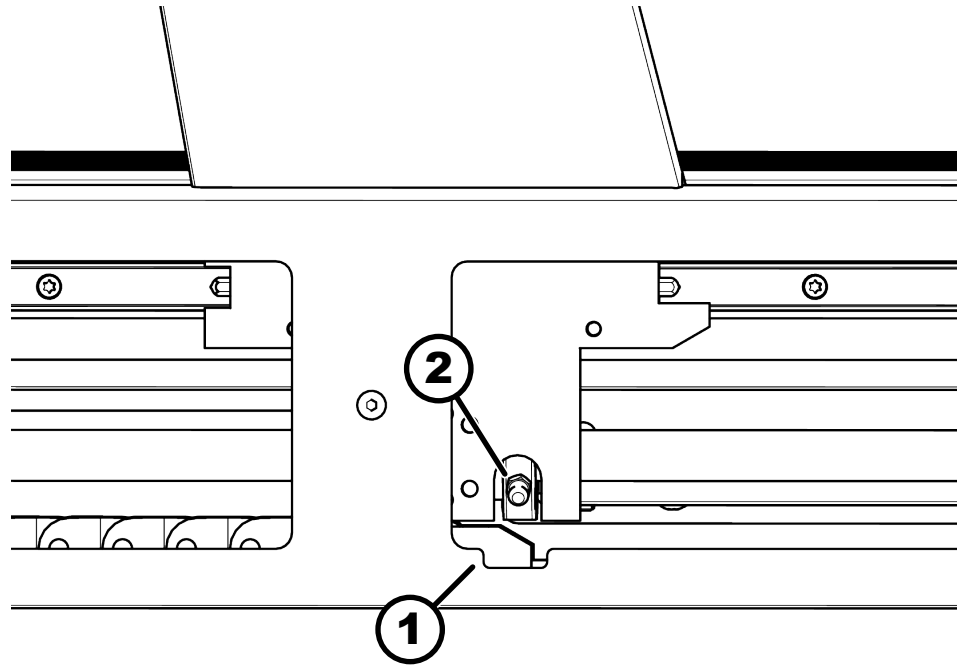


Fig. 48: Lubricating nipple X-axis ball screw drive left side

- 1 Slot
 - 2 Lubricating nipple X-axis
2. ➤ Position the portal in such a way that the lubrication nipple on the left side is in the recess.
CAUTION! Open, rotating drive spindles. Do not reach into the area of the open spindle covers.
 3. ➤ Switch off the machine at the main switch, disconnect the power supply.
 4. ➤ Remove dirt or grease.
 5. ➤ Clean all lubricating nipples.
 6. ➤ Place the pressure grease gun onto the nipple and pump 3 times.
➔ A small amount of lubrication will come out of the seals.
 7. ➤ Lubricate all (2) lubricating nipples.
 8. ➤ Attach cover.
 9. ➤ Switch machine on.
 10. ➤ Move several times over the entire length of the axle to distribute the grease.
➔ Axis is covered with a thin film of grease.

X Axis: Lubricate guiding carriage

Both of the lubrication nipples are located under the side cover. Both X axes guiding carriages have two lubricating nipples.

Personnel:

- Trained machine operator

Protective equipment:

- Protective clothing
- Protective gloves

- Protective footwear
- Safety goggles

Tool:

- Grease gun
- Cleaning cloths
- Hex key

Material:

- Lubricant Interflon Grease HD2

Interval: Every 100 operating hours or if irregular noise occurs.

1. ➤ Switch off the machine at the main switch, disconnect the power supply.
2. ➤ Loosen the screws and remove the cover.

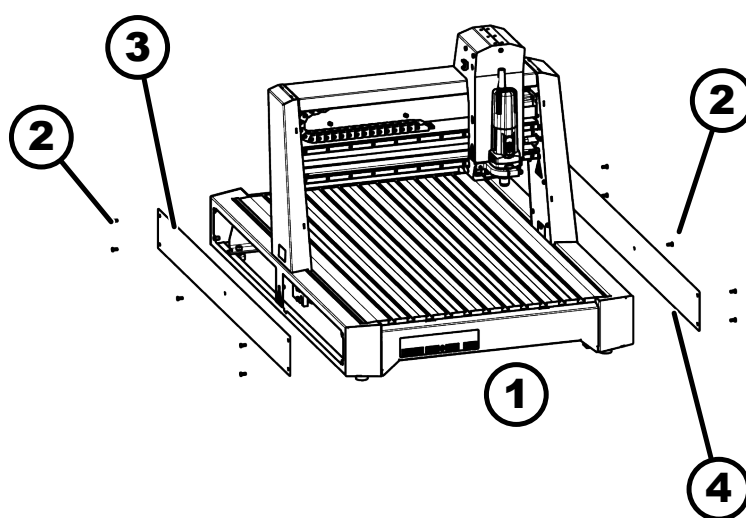


Fig. 49: X-axis cover

- 1 Front side of the machine
- 2 Screws
- 3 Cover left
- 4 Cover right

3. ➤ Remove dirt or grease.

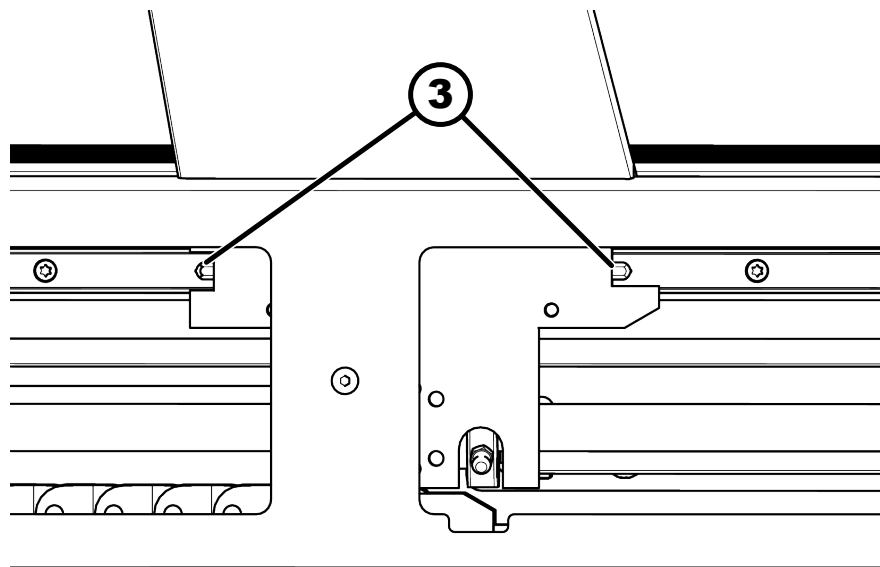


Fig. 50: Lubricating nipple X-axis left side

3 Lubricating nipple guiding carriage

4. ➤ Clean all lubricating nipples.
5. ➤ Place the pressure grease gun onto the nipple and pump 3 times.
➔ A small amount of lubrication will come out of the seals.
6. ➤ Lubricate all (4) lubricating nipples.
7. ➤ Attach cover.
8. ➤ Switch machine on.
9. ➤ Move several times over the entire length of the axle to distribute the grease.
➔ Axis is covered with a thin film of grease.

Y-axis: Lubricating the ball screw drive

The lubrication nipple of the Y axis ball screw drive, is situated at the rear side of the machine on the portal.

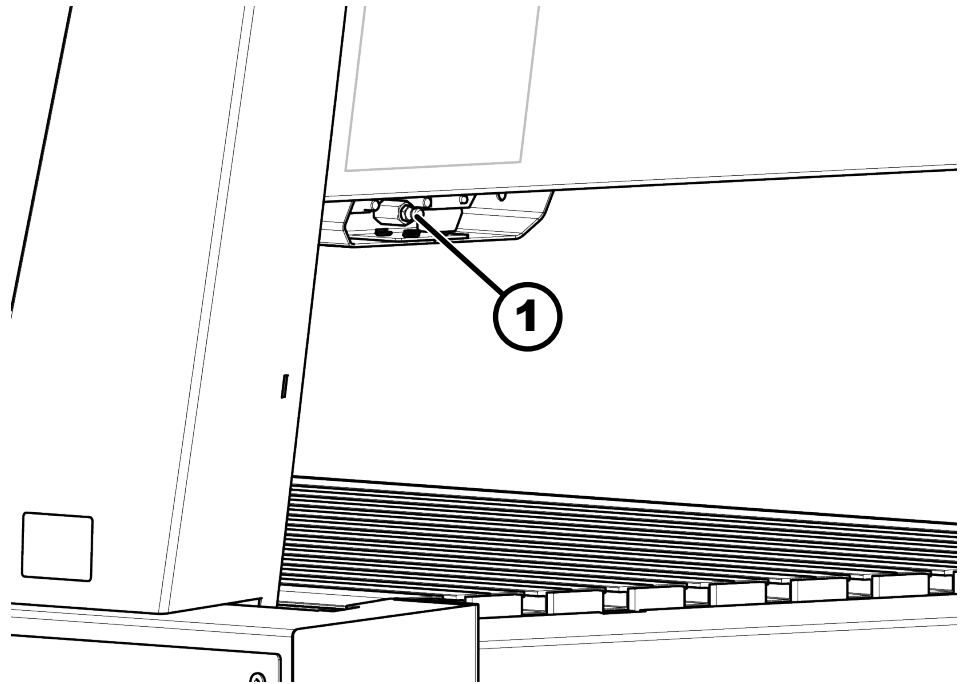


Fig. 51: Lubricating nipple Y-axis ball screw drive

Personnel:

- Trained machine operator

Protective equipment:

- Protective clothing
- Protective gloves
- Protective footwear
- Safety goggles

Tool:

- Grease gun
- Cleaning cloths

Material:

- Lubricant Interflon Grease HD2

Interval: Every 60 operating hours or if irregular noise occurs.

1. ➤ Switch off the machine at the main switch, disconnect the power supply.
2. ➤ Remove visible dirt or grease.
3. ➤ Clean lubricating nipple.
4. ➤ Place the pressure grease gun onto the nipple and pump 3 times.
 - ➡ A small amount of lubrication will come out of the seals.
5. ➤ Switch machine on.
6. ➤ Move several times over the entire length of the axle to distribute the grease.
 - ➡ Axis is covered with a thin film of grease.

Y Axis: Lubricate guiding carriage

On the side of the portal there are two lubricating nipples for each of the Y axis guides.

Personnel:

- Trained machine operator

Protective equipment:

- Protective clothing
- Protective gloves
- Protective footwear
- Safety goggles

Tool:

- Grease gun
- Cleaning cloths
- Hex key

Material:

- Lubricant Interflon Grease HD2

Interval: Every 100 operating hours or if irregular noise occurs.

1. ➤ Position the working head on the right.
2. ➤ Switch off the machine at the main switch, disconnect the power supply.

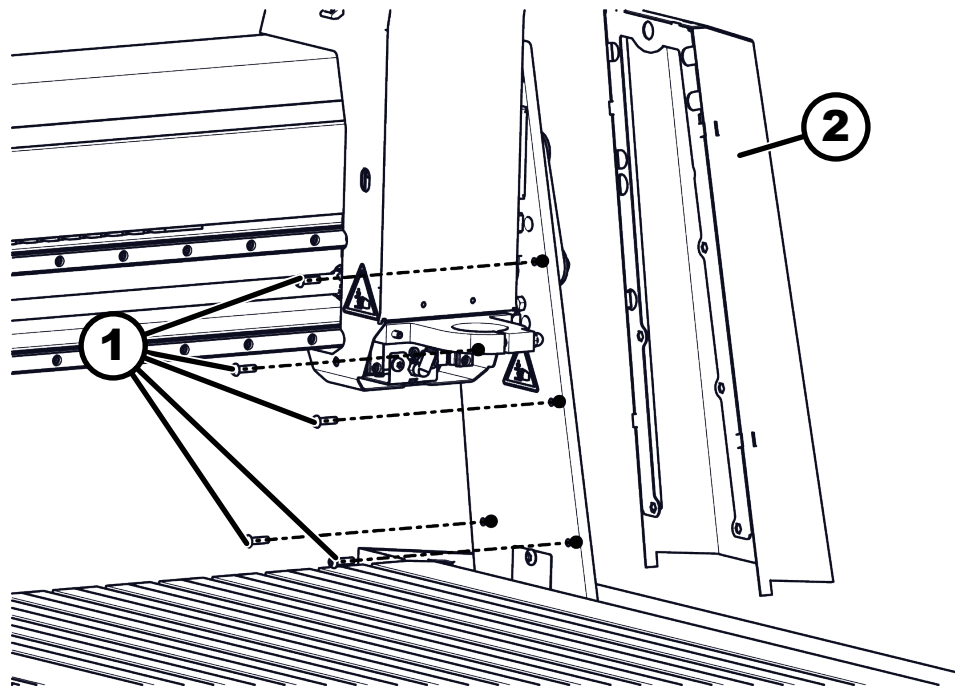


Fig. 52: Remove the cover

- 1 Remove the cover screws
- 2 Cover

3. ➤ Remove five screws from the right cover.
4. ➤ Remove the cover.

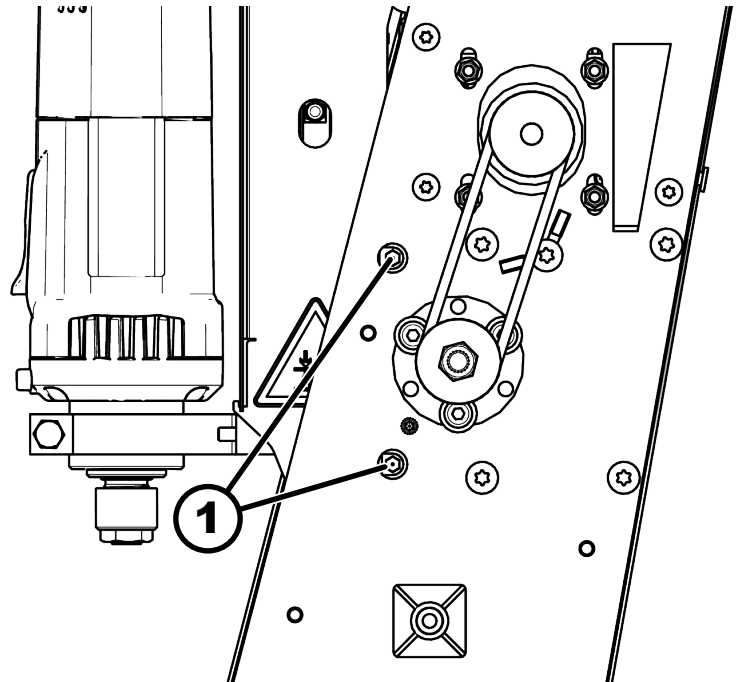


Fig. 53: Lubricating nipple guide Y-axis

1 Lubricating nipple

5. ➤ Clean lubricating nipple.
6. ➤ Place the pressure grease gun onto the nipple and pump 3 times.
 - ➡ A small amount of lubrication will come out of the seals.
7. ➤ Repeat the process for both lubricating nipples.
8. ➤ Attach cover.
9. ➤ Switch machine on.
10. ➤ Position the working head on the left and repeat the process.
11. ➤ Move several times over the entire length of the axle to distribute the grease.
 - ➡ Guide is lubricated with a thin film of grease.

Z axis: Trapezoidal threaded spindle

The Z-axis trapezoidal spindle must be lubricated regularly with a brush.

Personnel:

- Trained machine operator

Protective equipment:

- Protective clothing
- Protective gloves
- Protective footwear
- Safety goggles

Tool:

- Cleaning cloths
- Brush

Material:

- Lubricant Interflon Grease HD2

Interval: Every 20 hours or if noises occur.

1. ➤ Move the machine head into the lowest position.
2. ➤ Switch off the machine at the main switch, disconnect the power supply.

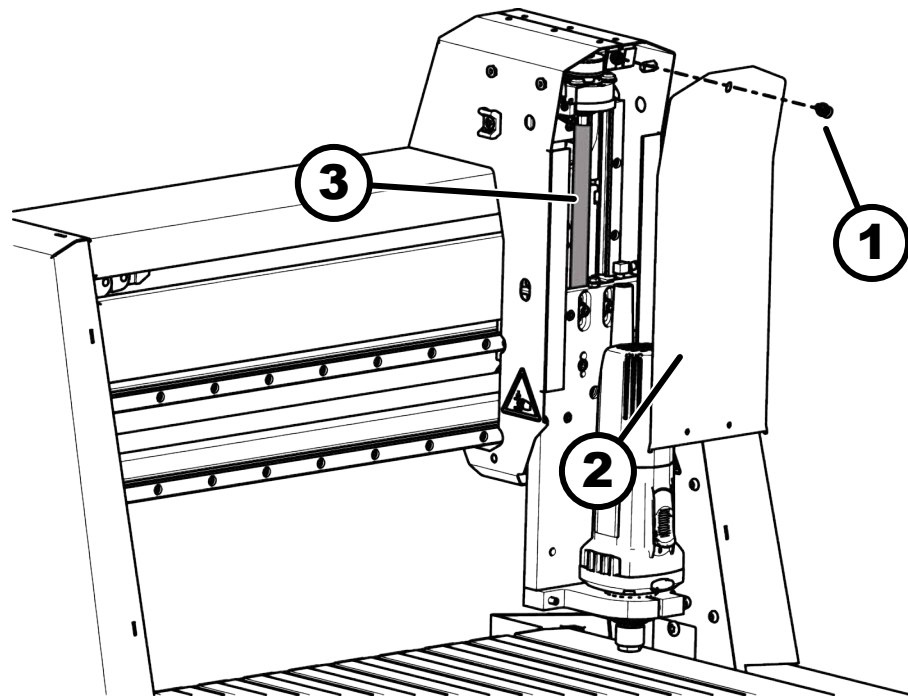


Fig. 54: Lubricate Z-axis

- 1 Allen key
- 2 Cover
- 3 Z-axis

3. ➤ Loosen the hex screw.
4. ➤ Remove the cover.
5. ➤ Clean the trapezoidal spindle with a lint-free cloth. Remove excess grease.
6. ➤ Apply lubricating grease evenly to the entire trapezoidal spindle with a brush.

7. ➤ Remove any bristles that have fallen out.
8. ➤ Put everything back together in reverse order.
9. ➤ Switch machine on.
10. ➤ Move several times over the entire length of the axle to distribute the grease.

Z Axis: Lubricate guiding carriage

On the side of the portal there are two lubricating nipples for each of the Z axis guiding carriages.

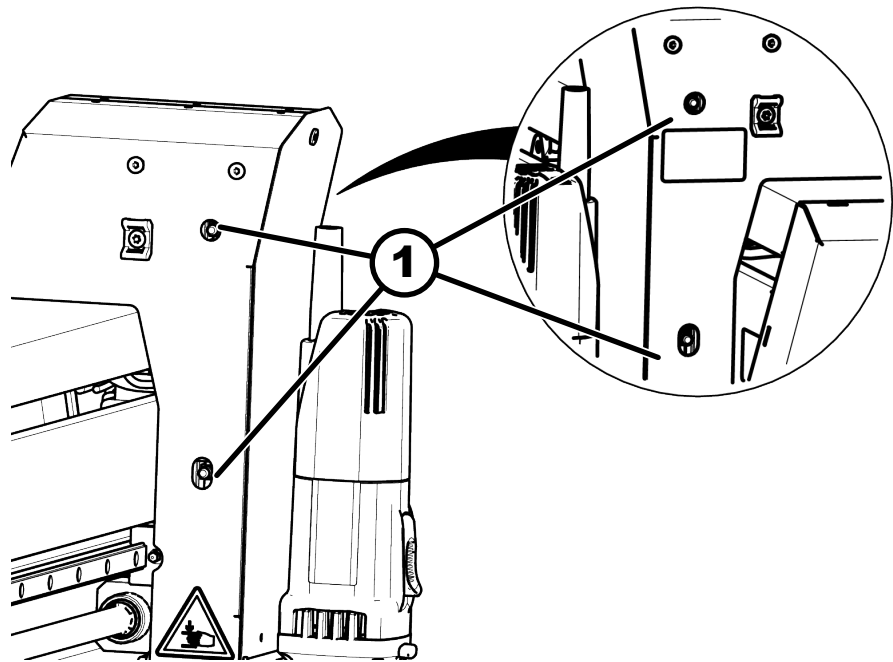


Fig. 55: Lubricate guiding carriage

1 Lubricating nipple

Personnel:

- Trained machine operator

Protective equipment:

- Protective clothing
- Protective gloves
- Protective footwear
- Safety goggles

Tool:

- Grease gun
- Cleaning cloths

Material:

- Lubricant Interflon Grease HD2

Interval: Every 100 operating hours or if irregular noise occurs.

1. ➤ Position the Z axis in such a way, that the lubricating nipples can be reached through the holes in the housing.
2. ➤ Switch off the machine at the main switch, disconnect the power supply.

3. ➤ Clean lubricating nipple.
4. ➤ Place the pressure grease gun onto the nipple and pump 3 times.
➔ A small amount of lubrication will come out of the seals.
5. ➤ Repeat the process for all four lubricating nipples.
6. ➤ Switch machine on.
7. ➤ Move several times over the entire length of the axle to distribute the grease.
➔ Axis is covered with a thin film of grease.

10.3 Check / replace the drive belt

The drive belts are wear and tear parts and must be checked regularly. The belt tension must be checked regularly. If the belt tension is too high or too slack, it could lead to damage on the machine.

Drive belt Y-axis

Personnel:

- Trained machine operator

Protective equipment:

- Protective clothing
- Protective gloves
- Protective footwear
- Safety goggles

1. ➤ Switch off the machine at the main switch, disconnect the power supply.

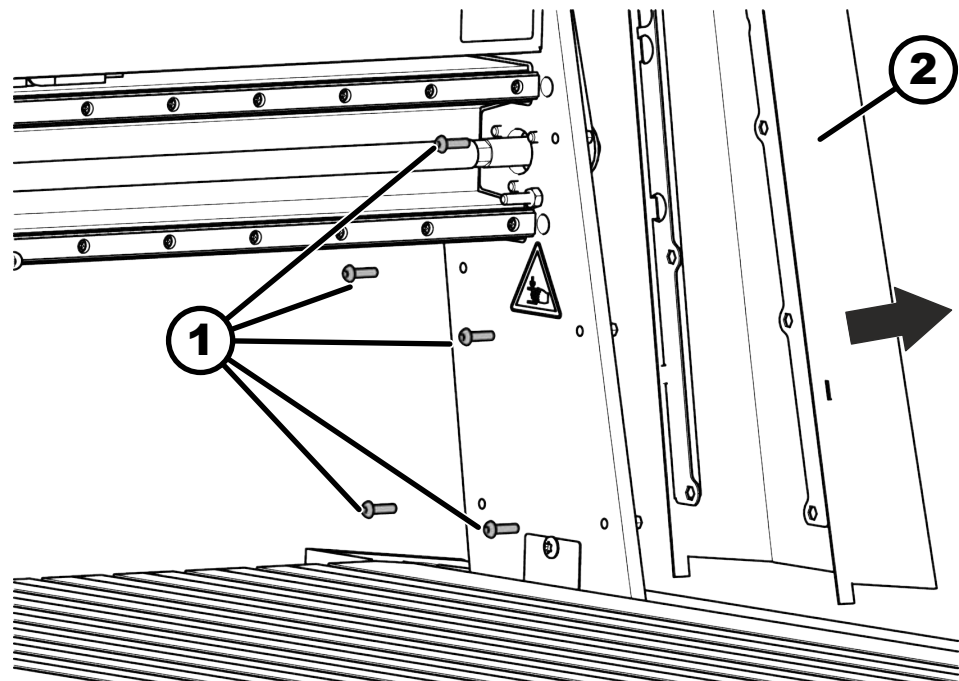


Fig. 56: Remove the cover

- 1 Remove the cover screws
- 2 Cover
2. ➤ Remove five screws from the right cover.

3. ➔ Remove the cover.
4. ➔ Check for wear and tear of the belts.

OK

Belts are in good condition and the belt tension is correct. Belt tension: 200 to 220 Hz

NOK

Belts are worn out, belt tension is wrong.

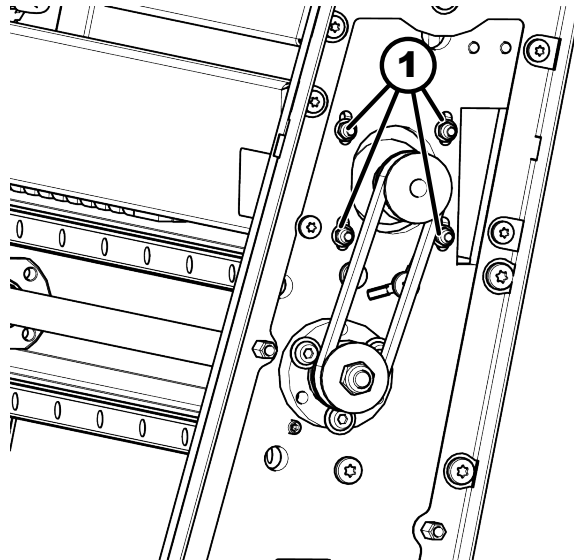


Fig. 57: Locking screws

1 Locking screws

1. ➔ Loosen the 4 motor fixing screws (do not remove them). Support the opposite side.
 2. ➔ Remove worn out / damaged belts and dispose of correctly.
 3. ➔ Fitting a new belt.
 4. ➔ Move the motor with one hand away from the axis and then fix the locking screws. The belt tension needs to be between 200 to 220 Hz.
5. ➔ Screw the cover back on.

Drive belt X-axis

Personnel:

- Trained machine operator

Protective equipment:

- Protective clothing
- Protective gloves
- Protective footwear
- Safety goggles

Tool:

- 2x clamps

1. ➔ Move the machine portal against the rear stop.
2. ➔ Switch off the machine at the main switch, disconnect the power supply.

- 3.** ➤ Clamp the machine portal using clamps.
➔ This will ensure that the portal remains parallel.

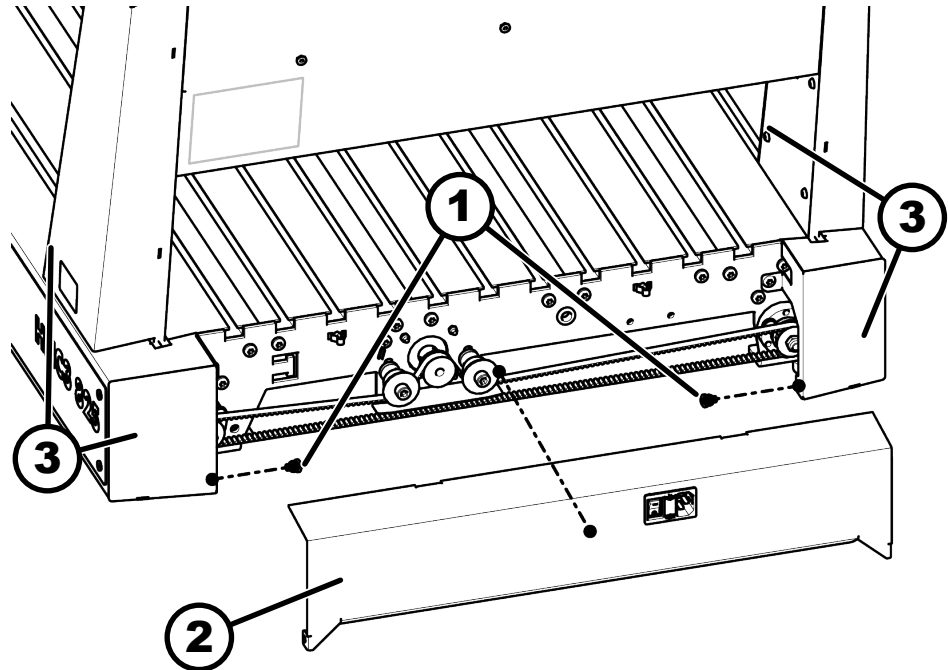


Fig. 58: X-axis cover

- 1 Screws
 - 2 Cover
 - 3 Clamp position
- 4.** ➤ Remove the cover screws and carefully detach the cover. Pay attention to the electrical connections.
- 5.** ➤ Check for wear and tear of the belts.

OK

Belts are in good condition and the belt tension is correct. Belt tension: 37 to 41 Hz

NOK

Belts are worn out, belt tension is wrong.

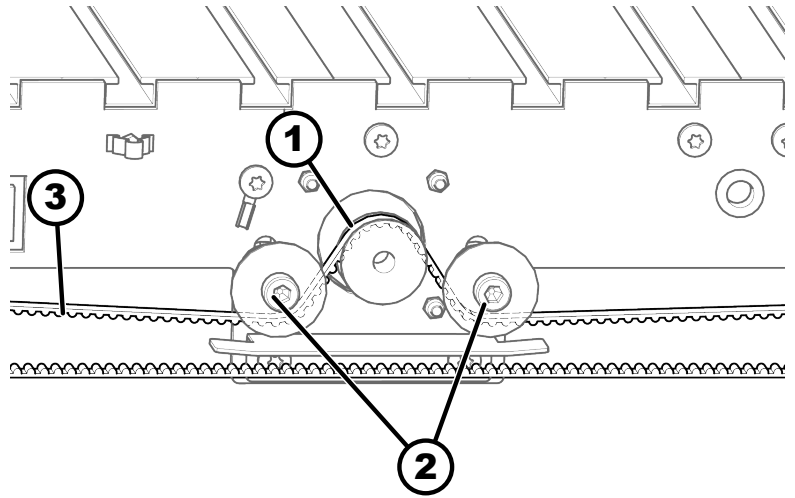


Fig. 59: X axis belt

- 1 Drive motor
- 2 Locking screws
- 3 Drive belt

1. ➤ Remove the old belt and dispose of correctly.
2. ➤ Place a new belt over the outer wheels and insert into the drive motor as shown.
3. ➤ Loosen the belt tensioning screws and tighten the belt. The belt tension needs to be between 37 to 41 Hz.
4. ➤ Fix belt tensioner.
6. ➤ Screw the cover back on and remove the clamps on the portal.

Drive belt Z axis

Personnel:

- Trained machine operator

Protective equipment:

- Protective clothing
- Protective gloves
- Protective footwear
- Safety goggles

1. ➤ Switch off the machine at the main switch, disconnect the power supply.

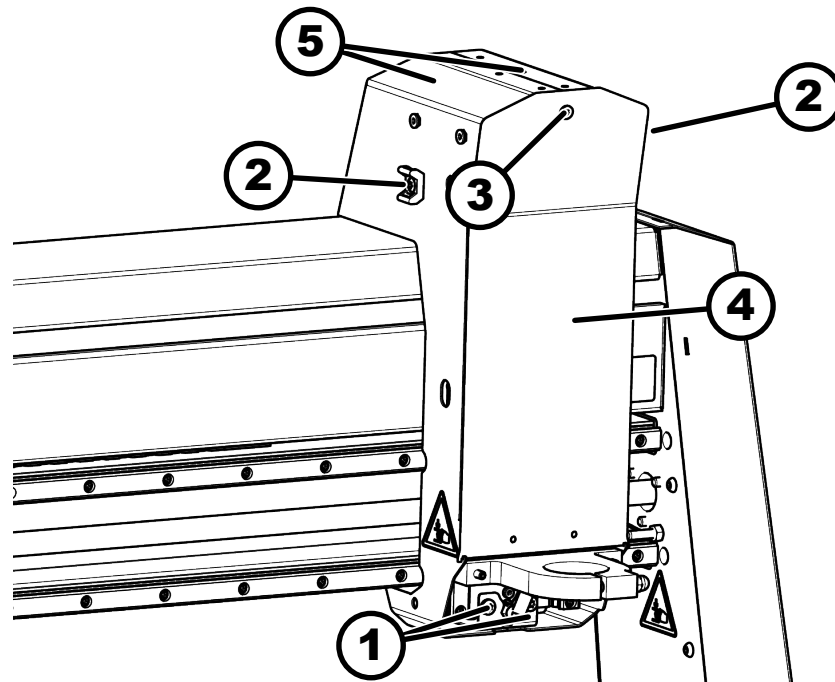


Fig. 60: Portal cover

- 1 Portal screws
- 2 Cable guide
- 3 Allen key
- 4 Z-axis cover
- 5 Portal cover

- 2. ➤ Loosen the hex screw and remove the Z-axis cover.
- 3. ➤ Remove the portal screws and cable guide.
- 4. ➤ Remove the portal cover.
- 5. ➤ Check for wear and tear of the belts.

OK

Belts are in good condition and the belt tension is correct. Belt tension: 200 to 220 Hz

NOK

Belts are worn out, belt tension is wrong.

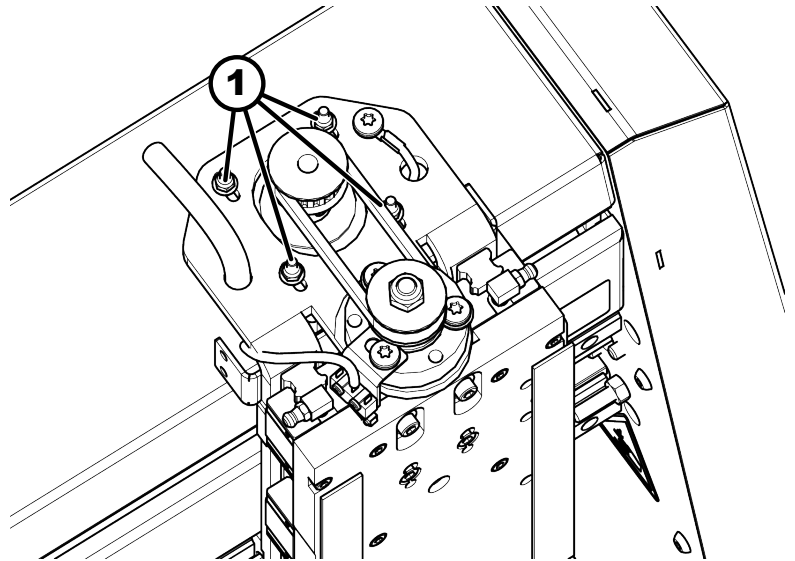


Fig. 61: Locking screws

1 Locking screws

1. ➤ Loosen the 4 motor fixing screws (do not remove them). Support the opposite side.
2. ➤ Remove the old belt and dispose of correctly.
3. ➤ Fitting a new belt.
4. ➤ Move the motor with one hand away from the axis and then fix the locking screws. The belt tension needs to be between 200 to 220 Hz.
6. ➤ Screw the cover back on.

10.4 Check protective equipment

1. ➤ Prepare the machine to operate.
2. ➤ Switch machine on.
3. ➤ Push the [Emergency stop].
 - ➡ Stop machine movements.
 - ➡ Machine cannot be put into operation.

11 Troubleshooting

11.1 What to do in the event of a malfunction



WARNING

Improper troubleshooting

Severe injuries and damage to property

- Troubleshooting may only be carried out by authorised, trained personnel who are familiar with how to operate the machine and are in strict observance of all safety instructions.

In the event of malfunctions that pose an immediate threat to persons, equipment or operational safety:

1. ➔ Stop the machine immediately pressing either the [Emergency Stop] or the red [Stop] button.
2. ➔ Disconnect the machine from the mains and ensure it can not be switched on again.
3. ➔ Have an authorised specialist determine the cause and repair the malfunction.

11.2 What to do after rectifying the fault

Check,

1. ➔ if the malfunction and cause of the malfunction have been professionally remedied.
2. ➔ whether all safety equipment has been installed in accordance with regulations and are technically and functionally in perfect condition.
3. ➔ whether, there are no individuals located within the danger area of the machine.

11.3 Troubleshooting

| Fault description | Cause | Remedy |
|--|--|--|
| Machine does not start | Error in the electrical connection | Check the electrical connection (connecting lead, fuses) |
| | Main switched off (setting "0") | Switch on the main switch ("I" position) |
| | Emergency stop has been pressed | Unlock emergency stop |
| | Emergency stop is not connected to the machine | Connect emergency stop to the machine |
| Axis are not moving, but the step motor is running | The drive belt is broken. | Replace the drive belt |
| Axes movement incorrect /dimensional deviations | Belt tension is too high or too low | Check and set belt tension |
| | Do not carry out reference run | Carry out reference run |

| Fault description | Cause | Remedy |
|---|---|---|
| Axes movement incorrect /dimensional deviations | Other controller / software than Eding CNC is being used. | <ul style="list-style-type: none">• Check the parameter and adjust.• Use EdingCNC controller / software. |
| Unusual noises, vibrations | Drive spindles not lubricated / dirty | Lubricate / clean drive spindles |

12 Laser

12.1 Overview / Technical information

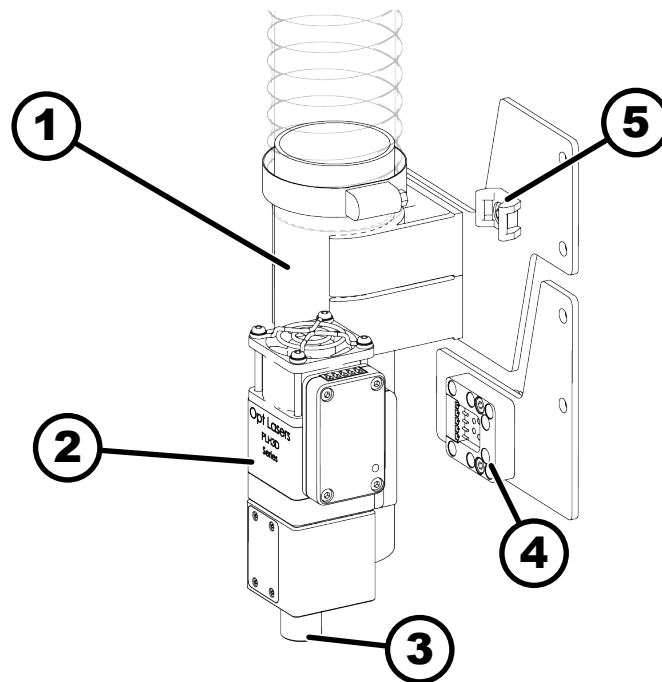


Fig. 62: Overview

- 1 Dust extraction
- 2 Laser housing
- 3 Laser outlet aperture
- 4 Machine magnetic dock
- 5 Cable guide

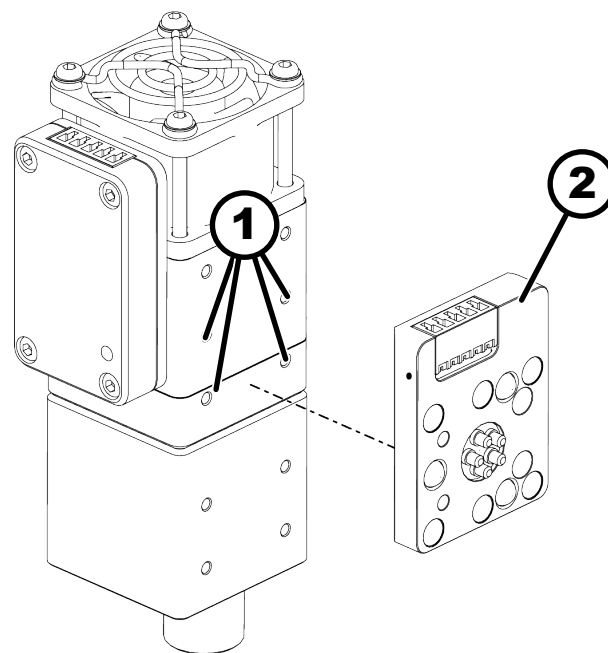


Fig. 63: Overview rear side

- 1 Assembly holes
- 2 Magnetic dock laser

General

| Data | Value | Unit |
|--------------------------|----------------|------|
| Dimensions (L x W x H) | 40 x 55 x 140 | mm |
| Weight | 300 | g |
| Max. ambient temperature | 40 | °C |
| Assembly holes (4 holes) | 24 x 15 | mm |
| Hole type | M3 x 0.5 x 4.5 | mm |
| Laser category | 4 | |

Laser beam

| Data | Value | Unit |
|---|------------|--------------------|
| Optical output | 6 | W |
| Optical power density | 2500 | kW/cm ² |
| Wavelength | 450 (± 10) | nM |
| Laser beam size | 50 x 4 | µm |
| Resolution | 50 (>500) | µm (DPI) |
| Distance from the material (standard value, adapt if necessary) | 60 | mm |

Fan

| Data | Value | Unit |
|-------------|---------|--------------------------|
| Volume flow | 43 (25) | m ³ / h (CFM) |
| Fan noise | 58 | dBA |

Electrical connection

| Data | Value | Unit |
|--------------------------------|-------------------|------|
| Analogue modulation input | 0-5 / 0-10 | V |
| PWM modulation input | 0-5 / 0-10 / 0-24 | V |
| Recommended PWM base frequency | 5-10 | kHz |
| Power supply unit voltage | 12-24 | V |
| Max. power consumption | 30 | W |

Compressed air for compressed air nozzles

Actual values may vary depending on the application.

| Data | Value | Unit |
|---|-------|-------|
| Compressed air consumption when cutting | 10-15 | l/min |
| Compressed air consumption when engraving | 1-3 | l/min |
| Compressed air tank capacity min. | 50 | l |

Machinable materials

The laser can process many different materials. The materials must be tested individually depending on the application.

| Material | Cutting | Engraving | Tested maximum cut thickness |
|--|---------|-----------|------------------------------|
| Paper | x | x | 0.1 mm |
| Cardboard (hard) | x | x | 3 mm |
| Cardboard (wavy, corrugated) | x | x | 6 mm |
| Balsa wood | x | x | 10 mm |
| Plywood (soft) | x | x | 6 mm |
| Plywood (hard) | x | x | 3 mm |
| Wood | x | x | 3 mm |
| Rubber (dark) ¹ | x | x | 1.5 mm |
| Cotton | x | x | 0.5 mm |
| Denim | x | x | 0.8 mm |
| Perspex (coloured) ³ | x | x | 3 mm |
| Plastic (dark) | x | x | 1 mm |
| Artificial leather | x | x | 2 mm |
| Real leather | x | x | 2 mm |
| Felt | x | x | 3 mm |
| Nylon | x | - | 0.2 mm |
| Glass fibre reinforced foil ² | x | - | 0.5 mm |
| Heat pad (foam) | x | - | 3 mm |

| Material | Cutting | Engraving | Tested maximum cut thickness |
|--------------------------|---------|-----------|------------------------------|
| Thermopad (textile) | x | - | 0.3 mm |
| Stretch film (dark) | x | - | 0.005 mm |
| Lead foil | x | - | 0.5 mm |
| Kapton foil | x | - | 0.2 mm |
| Foam (dark) | x | - | 25 mm |
| PCB | - | x | - |
| Carbon | - | x | - |
| Glass (painted) | - | x | - |
| Metal (painted) | - | x | - |
| Stainless steel | - | x | - |
| Titanium | - | x | - |
| Aluminium, copper, brass | - | - | - |

x = possible, - = not possible

- ¹ There are many different types of rubber. High temperature resistant rubber cannot be cut. In this situation, the laser may leave marks on the surface.
- ² It depends on the density of the glass fibres and their thickness.
- ³ It depends on the colour. Darker colours are easier to cut. Transparent Perspex cannot be cut.

12.2 Declaration of conformity - laser

EU Declaration of Conformity

| | |
|----------------------------------|---|
| Manufacturer: | Tomorrow's System Sp. z o.o. |
| Brand: | Opt Lasers |
| Address: | Pułaskiego 125/35 15-337 Białystok Poland |
| Object(s) of Declaration: | PLH3D-Series |
| Type: | Subassembly |

This declaration of conformity is issued under the sole responsibility of the manufacturer. The object of the declaration described above is in conformity with the relevant harmonization legislation:

| | |
|------------------------------|-------------------|
| Low Voltage Directive | 2014/35/EU |
|------------------------------|-------------------|


Conformity of the product with the requirements of the EU directives is established through full compliance with the following standards:

Low Voltage Directive Test Standards

| | |
|----------|--|
| EN 61010 | Electrical Equipment for Measurement, Control and Laboratory Use Safety Requirements. |
|----------|--|

Authorized on behalf of Tomorrow's System, z.o.o.:

| | |
|-------------------|-------------------|
| Name: | Mateusz Szymanski |
| Function: | CEO |
| Date: | 15/10/2021 |
| Signature: | |



Tomorrow's System Sp. z o.o.
15-337 Białystok, ul. Pułaskiego 125/35
NIP: 542-323-85-56, REGON: 200866868

12.3 Safety

General

- The laser may only be operated by authorised and trained personnel.
- The laser must always be mounted correctly.
- Do not stare into the laser beam even with the use of optical instruments.
- Avoid exposure to skin or eyes of direct or scattered rays.
- Do not direct the laser beam at flammable materials. Do not point the laser beam at reflective surfaces.
- Keep the laser out of reach of children. Unauthorised persons must not have access to the system on which the laser is mounted.

Dust extraction

- The machine must be connected to a fume cleaning and filter system that is suitable for extracting contaminated vapours and dust particles that are produced during laser processing.
- The filtered extracted air must be discharged into the outside air to a safe place and must not be discharged directly into the recirculated air.

Safety devices

- Only operate the laser with suitable protective housing and safety goggles (OD7+).
- The doors of the protective housing must be secured with limit switches.

Adjustment and maintenance

- Before starting the adjustment or maintenance work, switch off the machine and secure it against being switched on again.

12.4 Installing the laser

Mount the laser holder

Tool:

- Hex key
- Ring spanner set

1. ➞ Mount the magnetic dock on to the mounting plate.

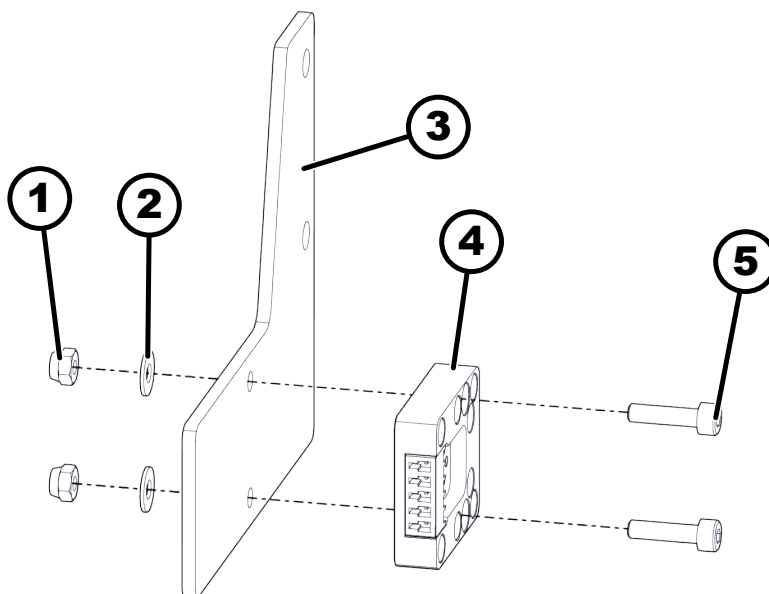


Fig. 64: Mount the magnetic dock

- 1 Safety nut
- 2 Serrated washers
- 3 Mounting plate
- 4 Machine magnetic dock
- 5 Allen key

2. → Mount the extraction holder and cable guide on to the mounting plate.

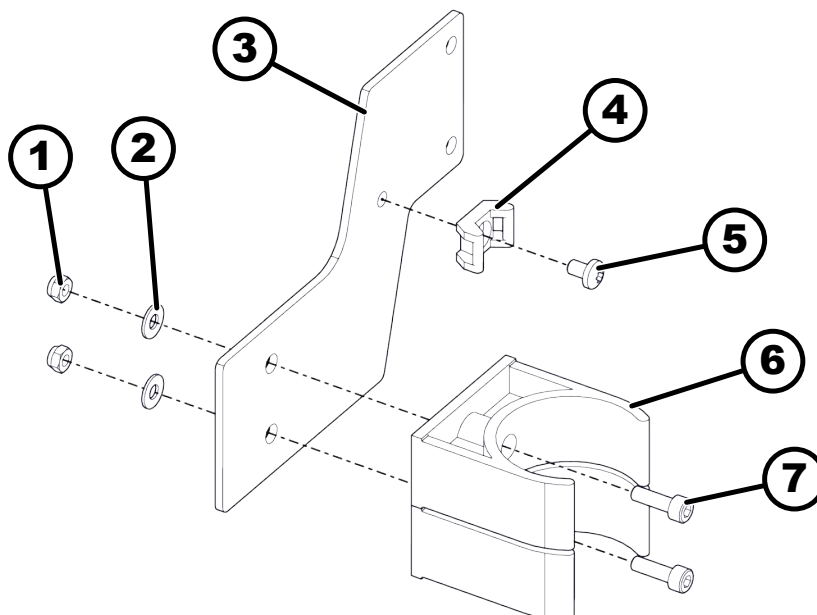


Fig. 65: Mount the extraction holder

- 1 Safety nut
- 2 Serrated washers
- 3 Mounting plate
- 4 Cable holder
- 5 Oval head screws
- 6 Extraction holder
- 7 Allen key

3. ➔ Remove the cover screws on the machine portal.

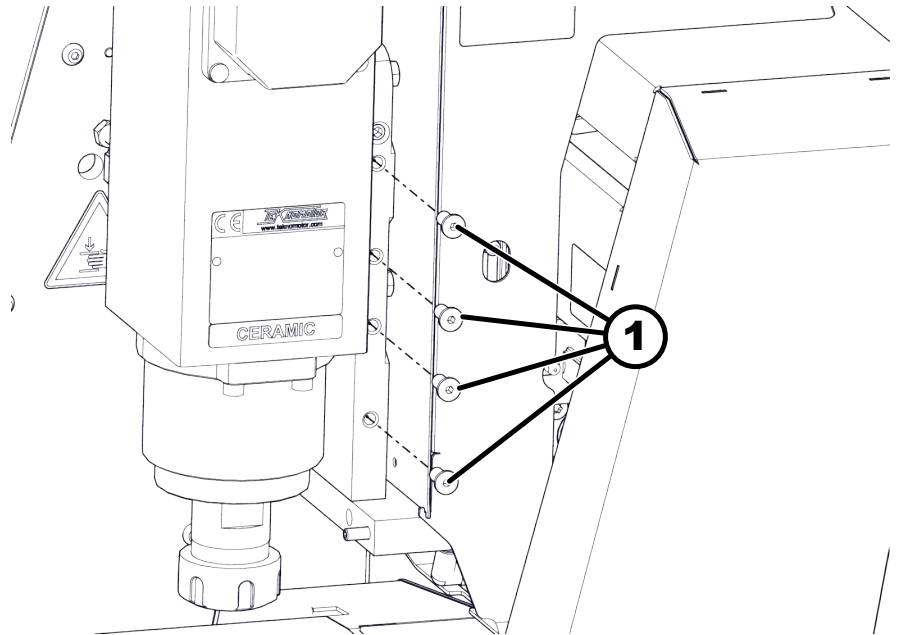


Fig. 66: Remove the cover screws

1 Cover screws

4. ➔ Mount the extraction and holder for the laser on the machine.

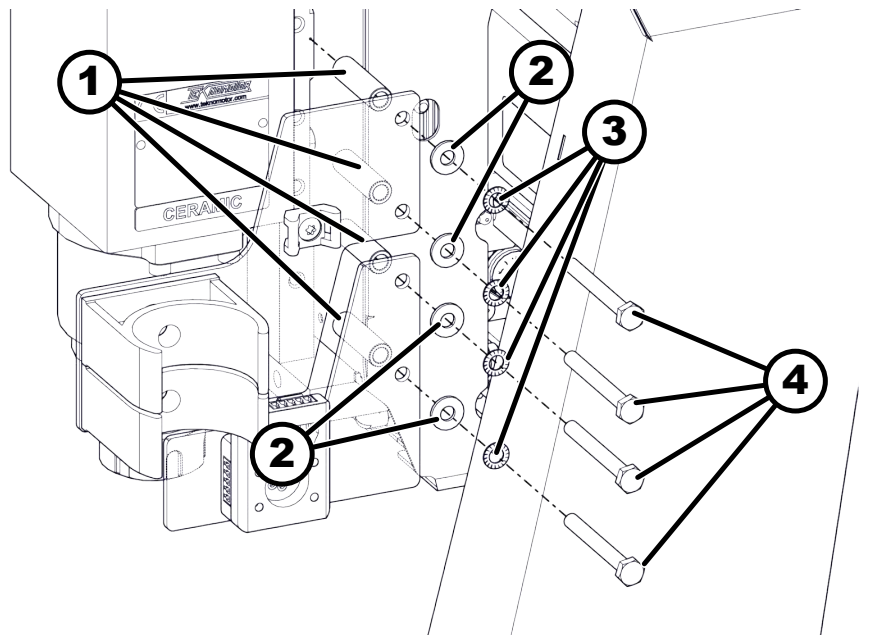


Fig. 67: Mount the extraction holder and magnetic dock

1 Spacer sleeve
2 Serrated washers
3 Serrated washer
4 Hexagon screw

5. ➔ Connect the laser to the mounting plate with a cable.

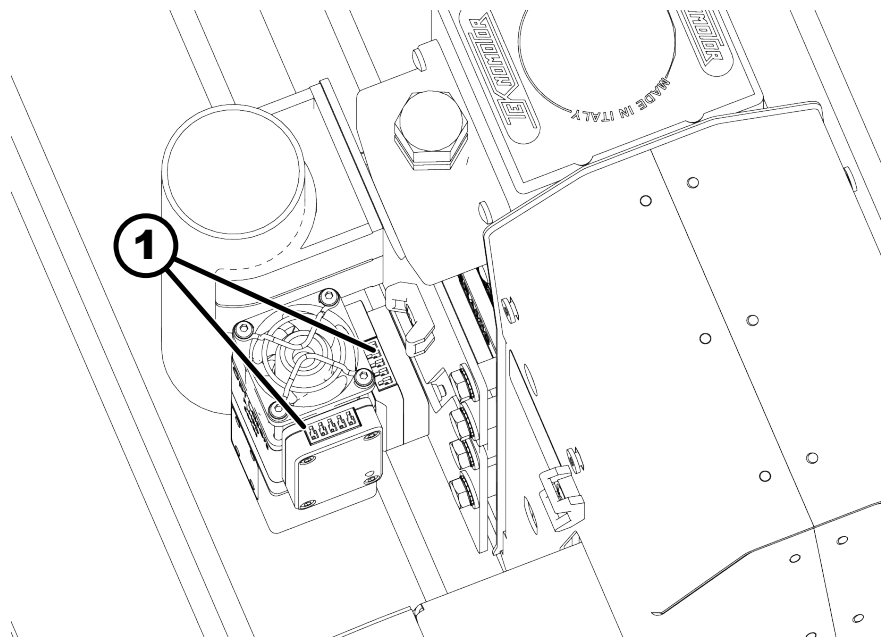


Fig. 68: Connect the laser

1 Plug

Mount the cable track

Tool:

- Hex key
- Ring spanner set

1. ➤ Fit the cable track to the mounting plate with the screw, washer and nut.

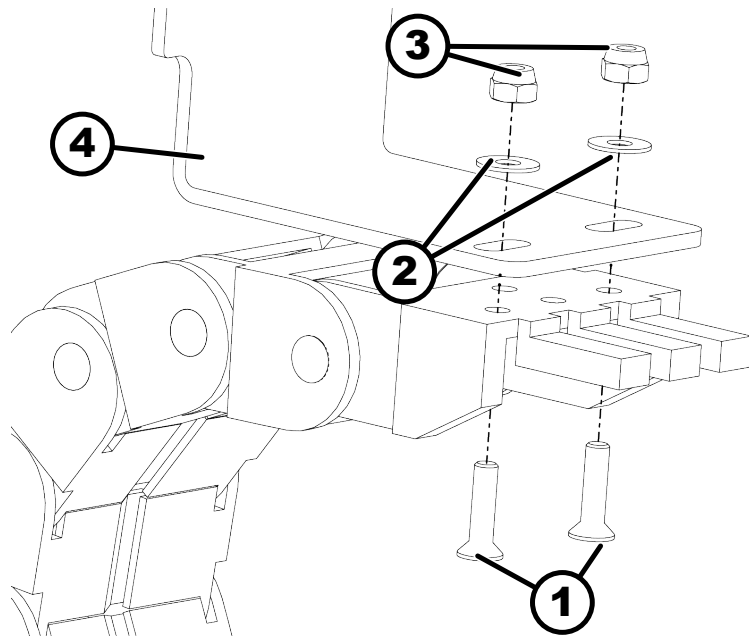


Fig. 69: Cable track X axis

- 1 Screw
- 2 Serrated washers
- 3 Nut
- 4 Mounting plate

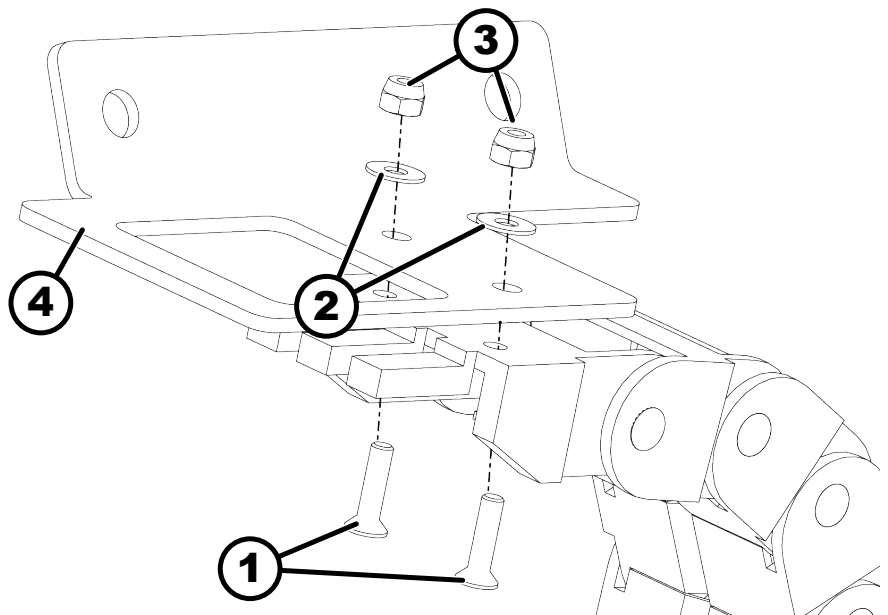


Fig. 70: Cable track Y axis

- 1 Screw
- 2 Serrated washers
- 3 Nut
- 4 Mounting plate

2. ➔ Remove the screws/nuts on the machine base, working head and portal.

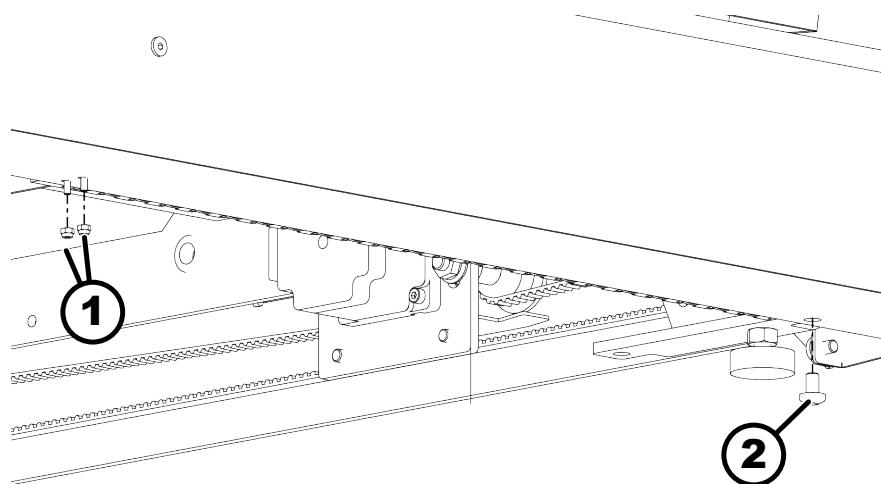


Fig. 71: Machine base

- 1 Nut
- 2 Screw

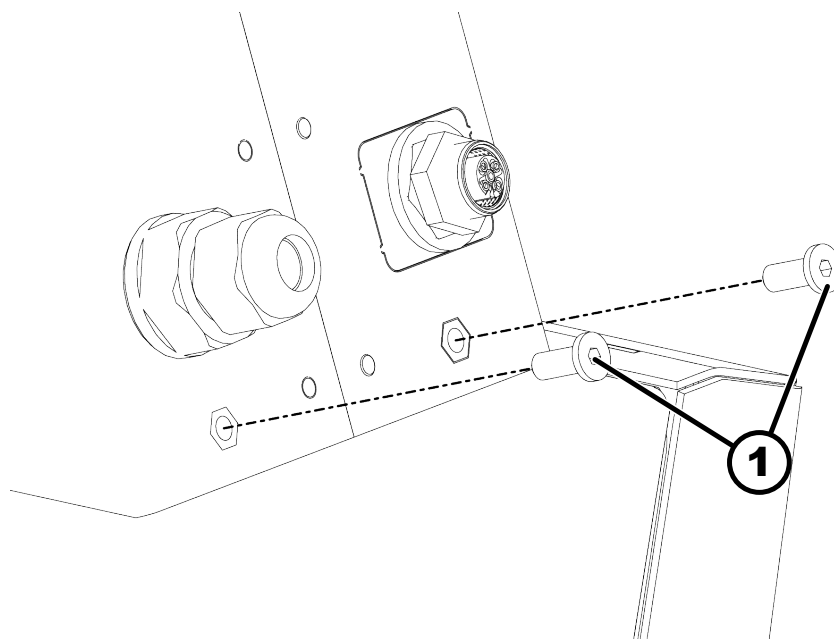


Fig. 72: Working head

- 1 Screw

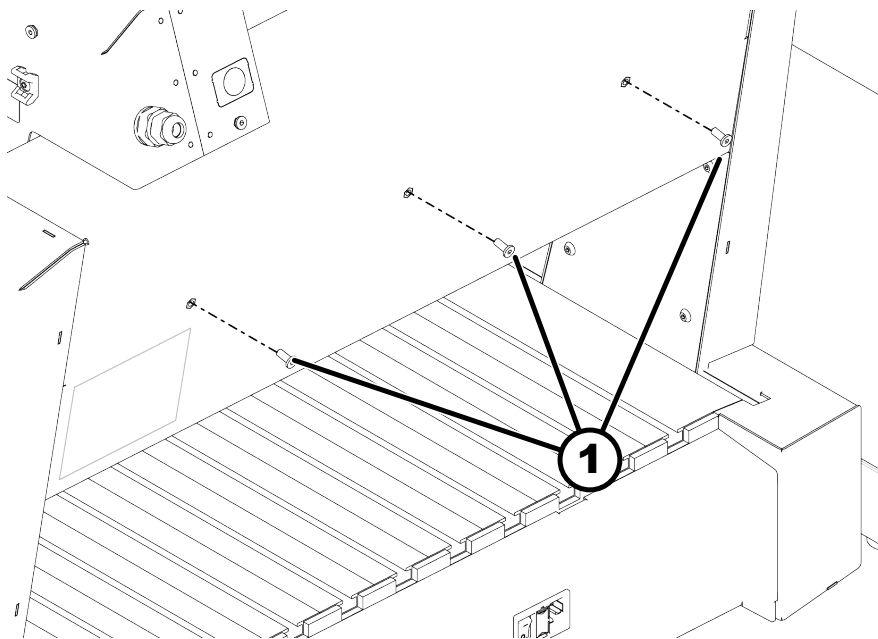


Fig. 73: Portal
1 Screw

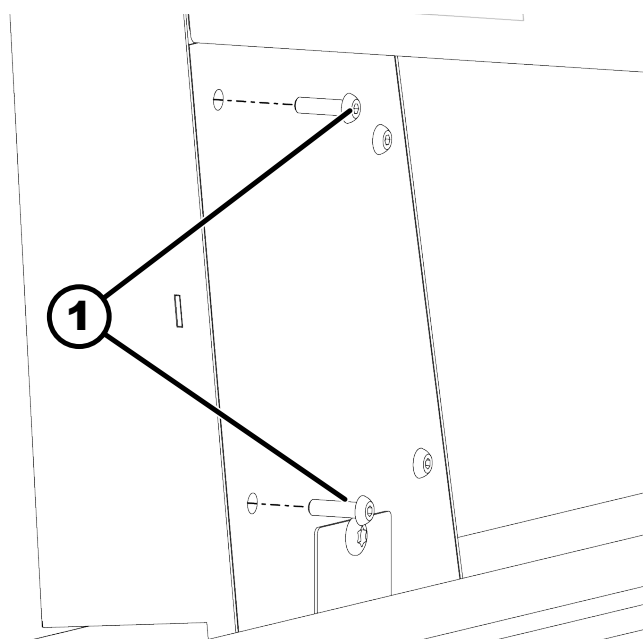


Fig. 74: Portal
1 Screw

3. ➔ Mount the cable track on the portal.

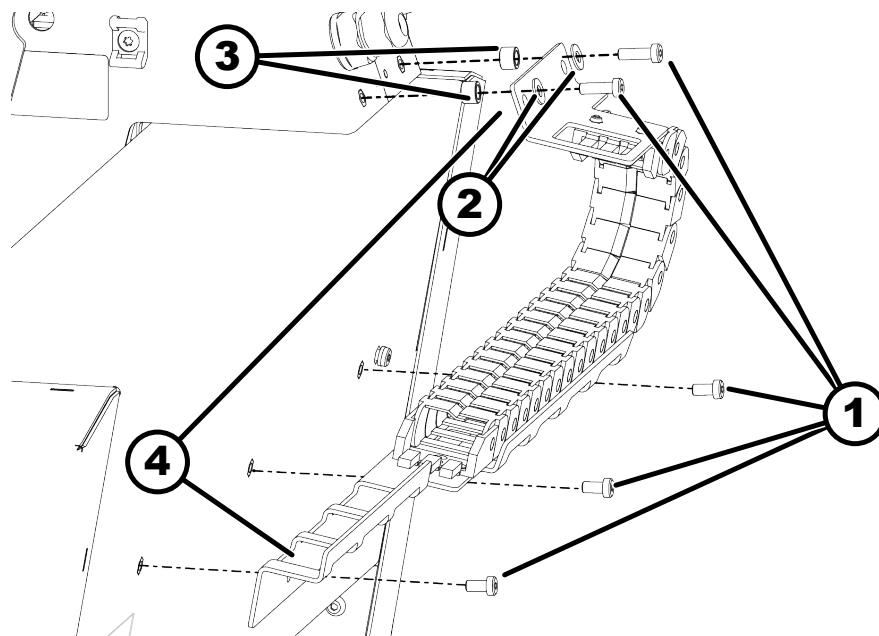


Fig. 75: Cable track

- 1 Screw
- 2 Serrated washers
- 3 Spacer sleeve
- 4 Cable track mounting plate

4. → Mount the cable track to the machine base.

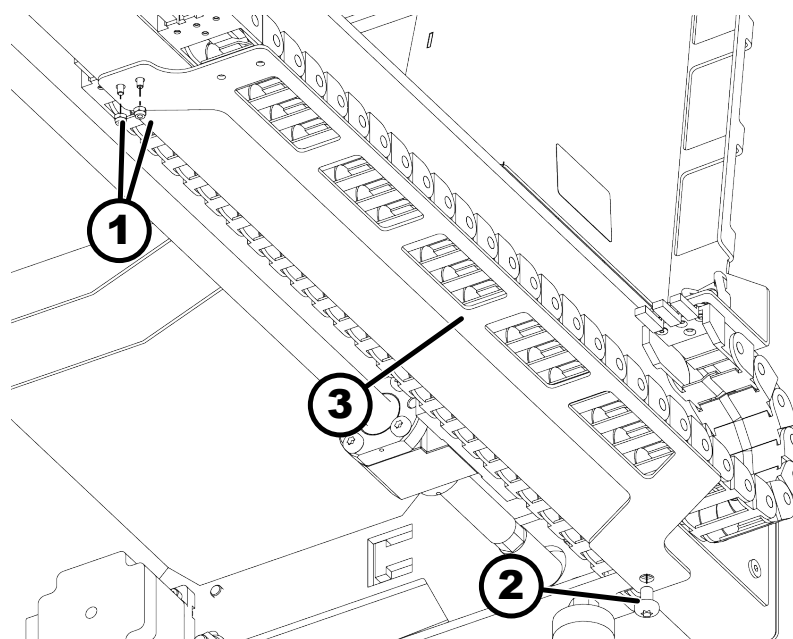


Fig. 76: Cable track on the machine base

- 1 Nut
- 2 Screw
- 3 Cable track mounting plate

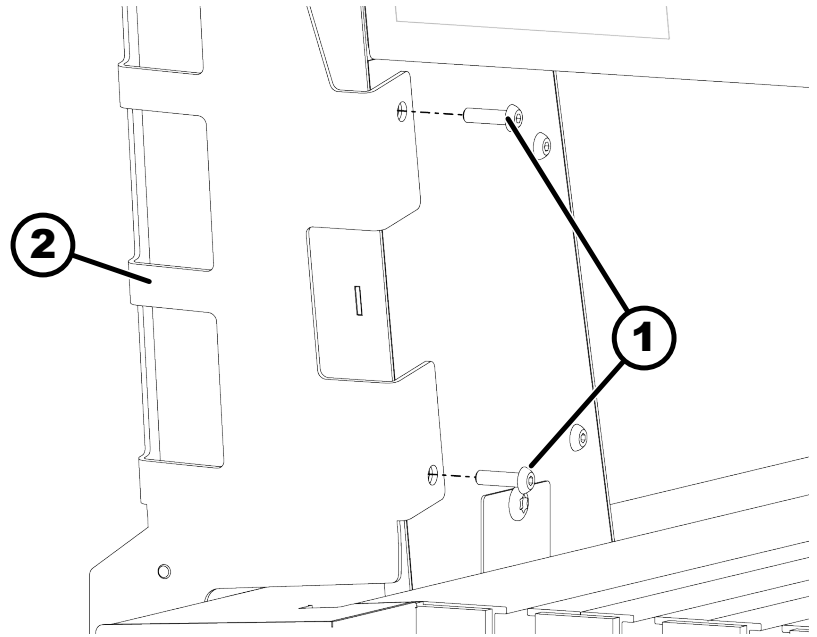


Fig. 77: Cable track on the portal

1 Screws

2 Cable track mounting plate

5. ➔ Place the cable and compressed air hose into the cable track and fix in place if required.

12.5 Mount the compressed air nozzle

- The compressed air nozzle cools the workpiece.
- The settings of the compressed air nozzle are material dependent.
- Compressed air compressor technical information: ➔ Chapter 12.1 'Overview / Technical information' on page 80

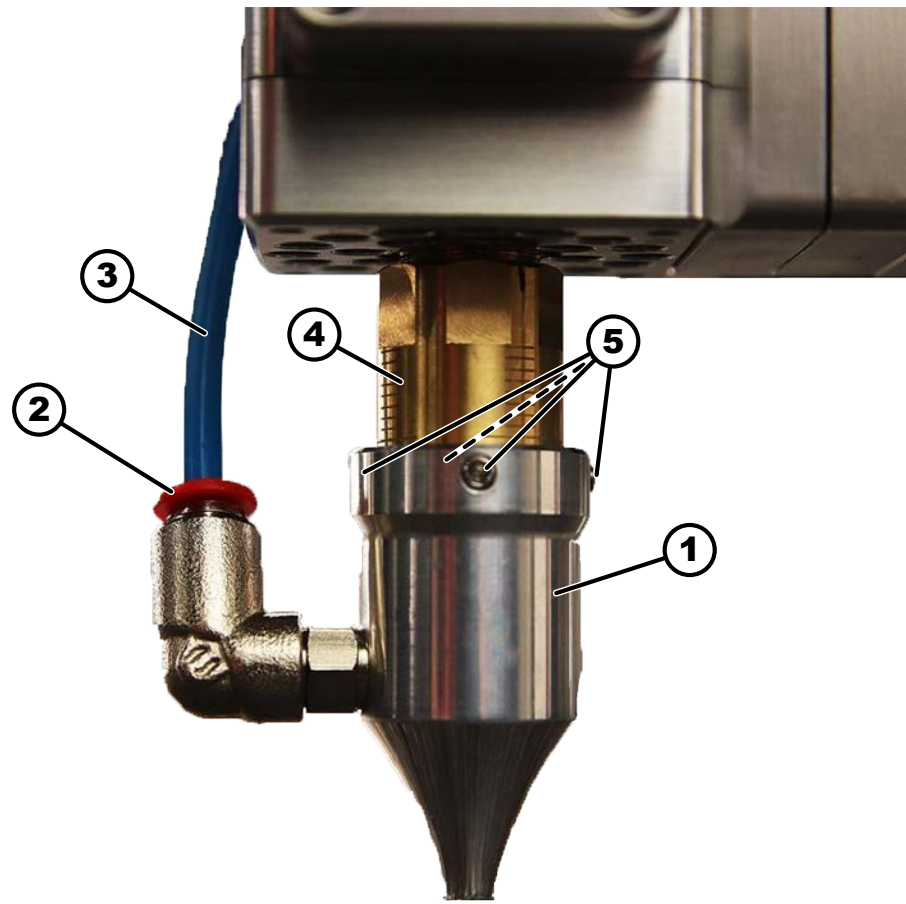


Fig. 78: Overview

- 1 Compressed air nozzle
- 2 Compressed air connection red ring
- 3 Compressed air hose
- 4 Laser outlet aperture
- 5 Clamping screw

Tool:

- Hex key

1. Slide the compressed air nozzle over the laser outlet opening. The ideal position of the compressed air nozzle is 2-3 mm above the workpiece. The laser beam must not contact with the compressed air nozzle.

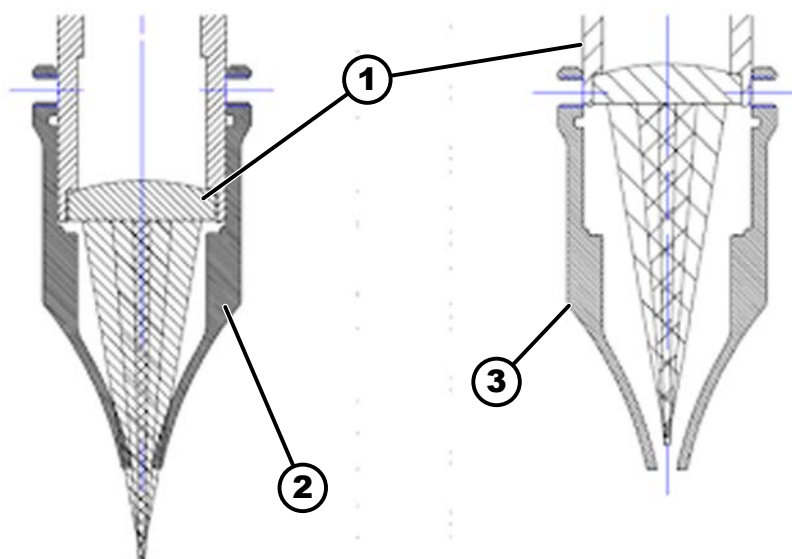


Fig. 79: Position of the compressed air nozzles

- 1 Laser
- 2 Compressed air nozzle mounted too high
- 3 Compressed air nozzle mounted too low

2. ➤ Tighten the 4 clamping screws.
3. ➤ Slide the compressed air connection red ring backwards.
4. ➤ Insert the compressed air hose and release the red ring.
 - ➡ Compressed air hose is fixed in place.

Troubleshooting

OK

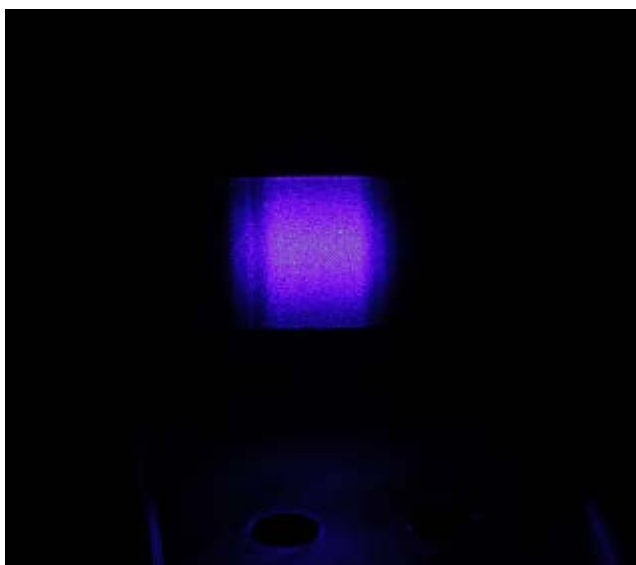


Fig. 80: Laser profile when the compressed air nozzle is set correctly

NOK

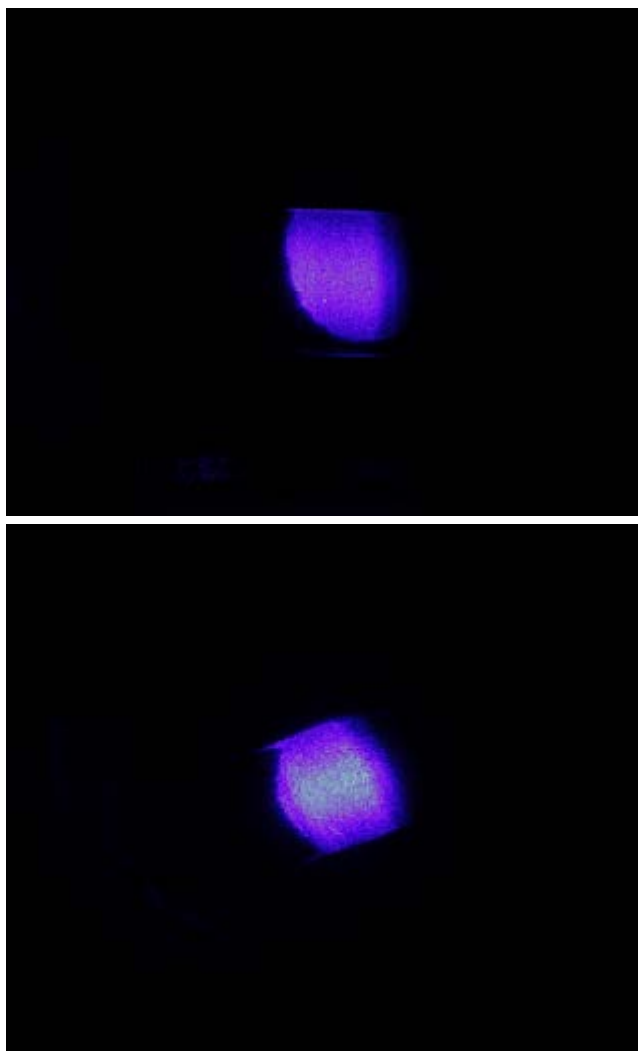


Fig. 81: Laser profile when the compressed air nozzle is set incorrectly

| Fault description | Cause | Remedy |
|---|--|--|
| Laser beam interrupted. | Compressed air nozzle not levelled correctly. | Mount the compressed air nozzle so that it is straight on the laser. |
| | Compressed air nozzle mounted too high. This will reduce the laser power. Depending on the application, ghost images (double lines) may occur. | Attach the compressed air nozzle further down on the laser. |
| Focus point inside the compressed air nozzle. | Compressed air nozzle mounted too low. This will reduce the laser power. | Attach the compressed air nozzle further up on the laser. |

12.6 Calibrating the laser

- The tool paths of the laser are exported to a separate file using the corresponding postprocessor.
 - Vectric VCarve Desktop or Pro is required to use the laser. The laser module is not available from Felder and must be purchased separately.
 - During calibration, the laser processes the material at different heights. This involves engraving several lines into the material. The working height of the laser is set to the thinnest visible line.
1. ➤ Set up the laser according to the HNC operating instructions.
 2. ➤ Download new "cnc.ini" and "Spindle-laser-pwmCompTable.txt" files from ➔ <http://fg.am/hncini> and install them.
 3. ➤ Place the laser on the docking station and plug in the cable.
 4. ➤ Connect the compressed air and switch on.
 5. ➤ Close the protective housing doors.
 6. ➤ Connect the power supply unit of the laser controller.
 7. ➤ Switch on the controller using the key supplied.
 - ➔ Power LED lights up.
 8. ➤ Press the red *[Start]* button on the controller.
 - ➔ Laser is on.
 - ➔ Compressed air is on.
 - ➔ Armed-LED lights up.
 - ➔ Laser fan starts.
 9. ➤ Press the red *[Start]* button on the controller.
 - ➔ Laser is off.
 - ➔ Compressed air is off.
 - ➔ Armed-LED does not light up.
 - ➔ Laser fan stops.

| Fault description | Cause | Remedy |
|--------------------|----------------|---|
| Armed-LED flashes. | External error | <ul style="list-style-type: none"> • Check the emergency stop button and if necessary, release it. • Check the housing door and if necessary, close it. |

Determine the X and Y offset



CAUTION

Laser beam

Eye injuries, skin injuries

- Use safety goggles (OD7+) and protective housing.
- Avoid exposure of skin and eyes to direct and indirect scattered radiation.

Material:

- Wooden board min. 200 mm x 200 mm

1. ➤ Clamp the wooden board in the centre of the worktable.
2. ➤ Manually move the X and Y axes to the centre of the workpiece.
 - ➔ There should be at least 100 mm of space around the laser in all directions.
3. ➤ Set the X and Y axes to 0.
4. ➤ Unclamp the router and bring the laser to the correct focus height. To do this, place the supplied reference angle under the laser and approach it slowly manually.

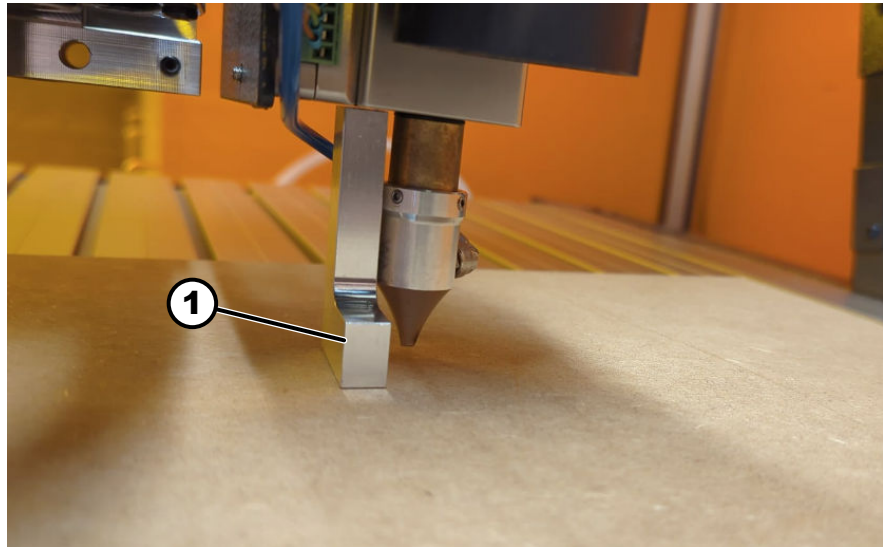


Fig. 82: Reference bracket 60 mm

1 Reference bracket

- ➔ Laser housing contacts reference bracket as shown.

5. ➤ Set Z axis to 0.
6. ➤ Remove bracket.
7. ➤ Load the program "Offset Test.nc" (in the download folder).

8. ➤ Start program.
➡ Laser will start to engrave.



Fig. 83: Engraved workpiece

9. ➤ Clamp in the tip router and move the tip into the centre of the crosshairs.

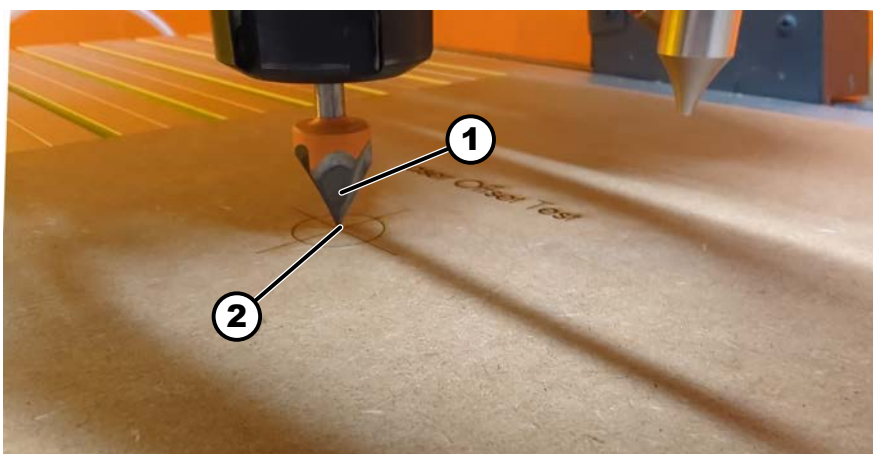


Fig. 84: Move to the crosshairs

- 1 Tip router
2 Crosshairs

10. ➤ Take a note of the coordinates from Eding CNC.

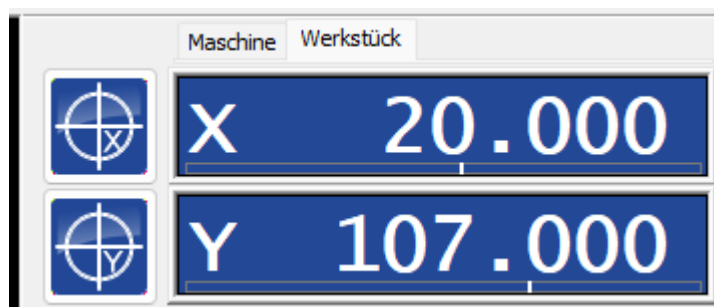


Fig. 85: Example coordinates

- 11.** Enter both of the values with a negative sign in the "cnc.ini" in [SPINDLE_1]. The "cnc.ini"-file can be found in the Eding CNC installation directory (Standard: "C:\CNC4.03").

```
[SPINDLE_1]
;2nd spindle M91
xOffset = -20.0000
yOffset = -106.4000
zOffset = 0.0000
onOffOutputPortID = 1 ;0: Standard tool output, 1-10: AUX1-AUX10
directionOutputPortID = 0 ;0: Standard tool dir output, 1-10: AUX1-A
pwmOutputPortID = 1 ;0: Standard PWM output, 1-8: PWM1-PWM8 Output
spindleReadyPortID = 0 ;0: not used 1-10 AUX Input 1 - 10
spindleReadyPortMode = 0 ;0: ready wit m3/m5, 1 ready with m3 not re
spindleRampUpTime = 0.00
spindleRampDownTime = 0.00
spindleNmax = 1000.00
spindleNmin = 0.00
spindleUserRPMsensor = 0
stepperMotorMode = 0
countPerRev = 1
smoothCountMode = 0
pwmCompensationOn = 0
pwmCompensationFileName = "Spindle-laser-pwmCompTable.txt"
maxAvgSpeedFilterTimeMillisecs = 3000
sensorSpeedControlOn = 0
```

Fig. 86: cnc.ini-file

- 1 Offset
2 pwmCompensationFileName

- 12.** Check, whether "Spindle-laser-pwmCompTable.txt" exists in pwmCompensationFileName.

OK cnc.ini has been correctly overwritten.


NOK Old cnc.ini-file existing.

- 1.** Save the current cnc.ini-file in the folder as per the instructions in the operating manual.

- 13.** Save and then restart Eding CNC.

➔ The zero point will be shifted automatically when using the laser.

Focus test



CAUTION

Laser beam

Eye injuries, skin injuries

- Use safety goggles (OD7+) and protective housing.
- Avoid exposure of skin and eyes to direct and indirect scattered radiation.

Material:

- Wooden board min. 200 mm x 200 mm

- 1.** Clamp the wooden board in the centre of the worktable.

2. Load the program "Focus Test.nc" (in the download folder).
3. Set the X/Y/Z zero point and start the program.
 - ➡ 9 lines in an area of 100 mm x 100 mm will be lasered. At the same time the Z axis will move up and down in increments of 0.1 mm. This changes the focus.

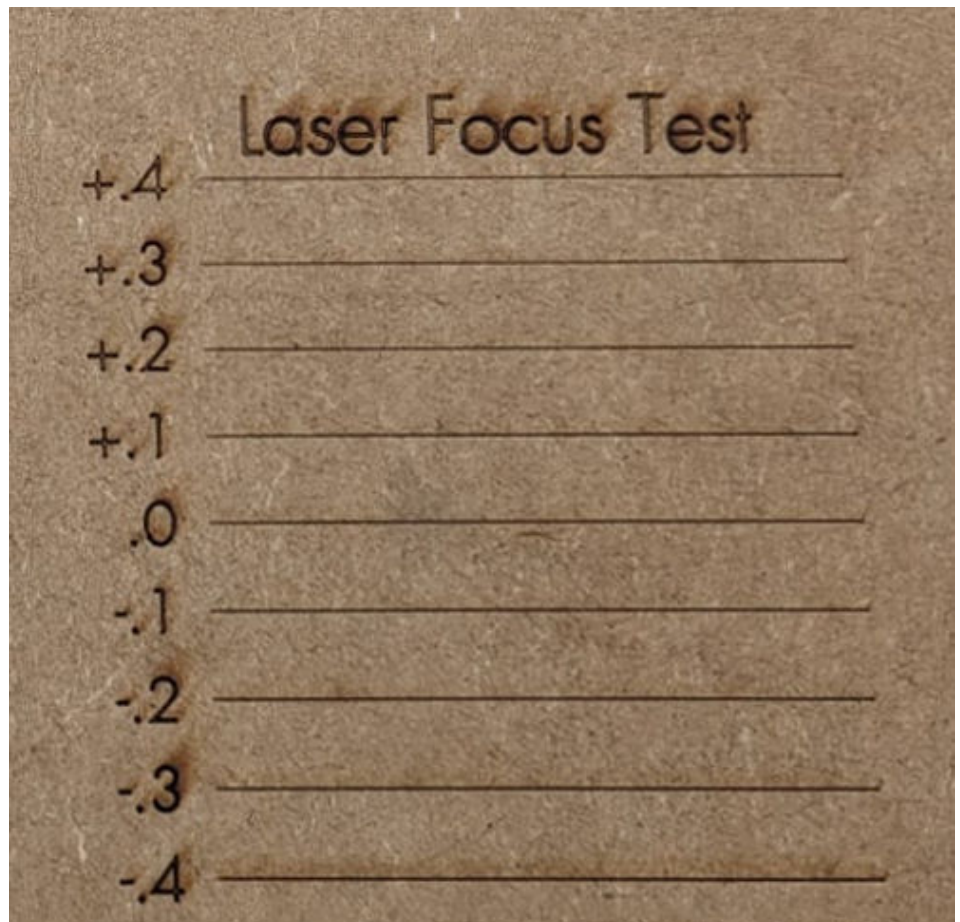


Fig. 87: Focus test

4. Set the Z axis manually to the required focus height (= width of the lasered line) and set the X/Y/Z zero point.

Material test



CAUTION

Laser beam

Eye injuries, skin injuries

- Use safety goggles (OD7+) and protective housing.
- Avoid exposure of skin and eyes to direct and indirect scattered radiation.

A new material test should be carried out for each new material. As such, the feed rate and intensity of the laser are checked.

Material:

- Wooden board min. 200 mm x 200 mm

1. ➤ Clamp the wooden board in the centre of the worktable.
2. ➤ Load the program "Material Test Line.nc" (in the download folder).
3. ➤ Set zero point and start program.
 - ➡ One table with outer lines and one table with areas will be lasered. The feed speed can be ascertained on the X-axis and the intensity of the laser on the Y-axis.

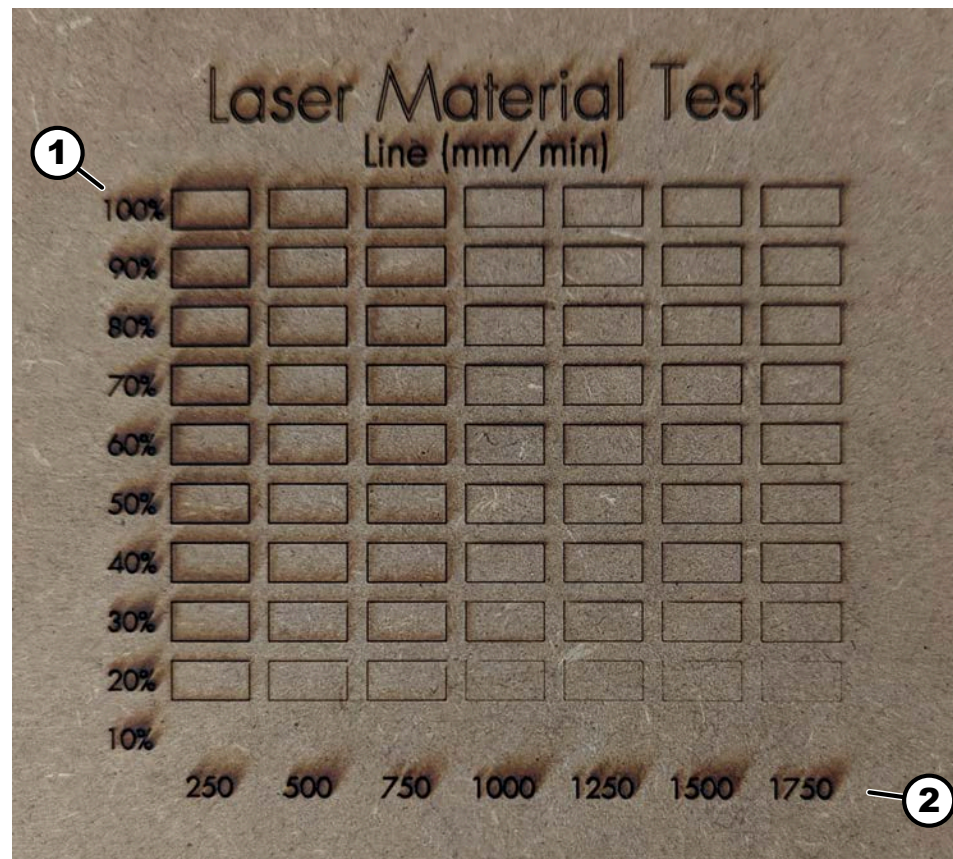


Fig. 88: Material test lines

- 1 Intensity
- 2 Feed speed

4. ➤ Repeat the procedure with the program "Laser Material Test Fill.nc" (in the download folder).

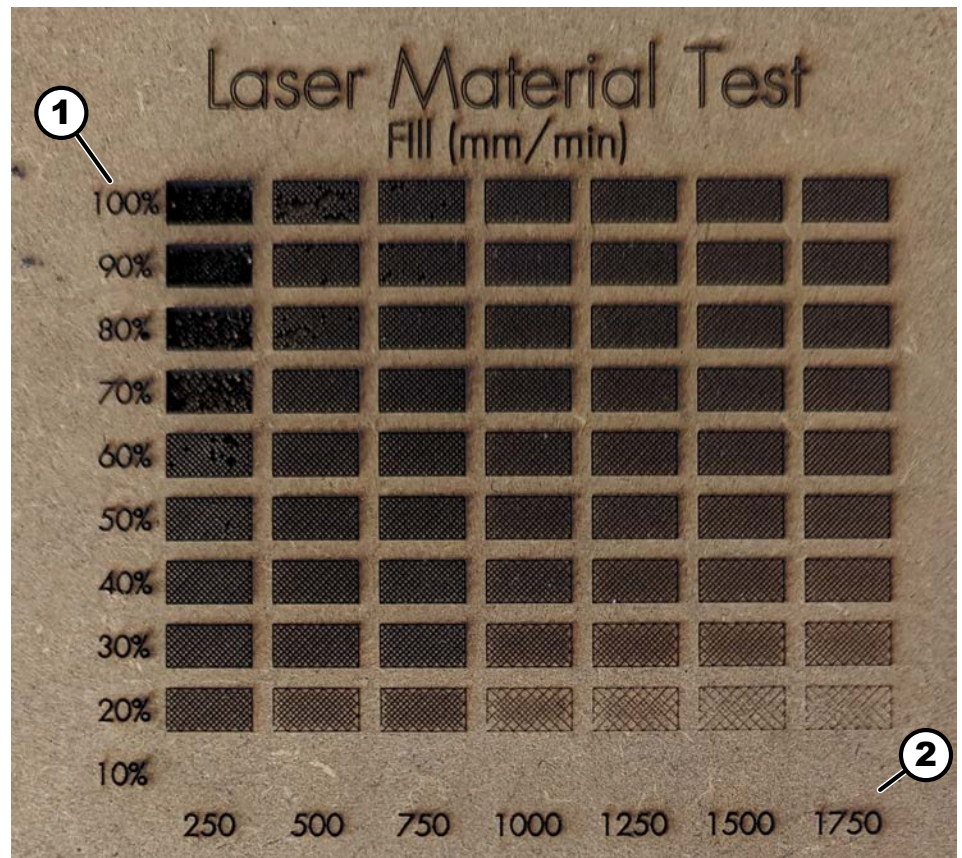


Fig. 89: Filling material test

- 1 Intensity
2 Feed speed

5. ➤ Adjust the feed rate and intensity of the laser appropriate to the application.

12.7 Operating the laser

Before using the laser for the first time, it must first be calibrated. ➔ Chapter 12.6 'Calibrating the laser' on page 97

Preparation

1. ➤ Set up the laser according to the HNC operating instructions.
2. ➤ Download new "cnc.ini" and "Spindle-laser-pwmCompTable.txt" files from ➔ <http://fg.am/hncini> and install them.
3. ➤ Place the laser on the docking station and plug in the cable.
4. ➤ Connect the compressed air and switch on.
5. ➤ Close the protective housing doors.
6. ➤ Connect the power supply unit of the laser controller.
7. ➤ Switch on the controller using the key supplied.
 - ➔ Power LED lights up.

8. ➤ Press the red *[Start]* button on the controller.

- ➔ Laser is on.
- ➔ Compressed air is on.
- ➔ Armed-LED lights up.
- ➔ Laser fan starts.

9. ➤ Press the red *[Start]* button on the controller.

- ➔ Laser is off.
- ➔ Compressed air is off.
- ➔ Armed-LED does not light up.
- ➔ Laser fan stops.

Operate

1. ➤ Load g code for laser application.

- ➔ Command M91 will be called up. This changes the tool to laser and shifts the zero point.
- ➔ The router spindle will no longer start.
- ➔ The notification will appear in Eding CNC, that tool 90 must be inserted.

2. ➤ Mount the laser.

3. ➤ If necessary: Mount the compressed air nozzle and adjust the to the required application accordingly. Connect the compressed air supply.
➔ *Chapter 12.5 'Mount the compressed air nozzle' on page 93*

4. ➤ Remove the tool from the router spindle.

5. ➤ Start laser processing.

6. ➤ At the end of the process remove the laser and insert the router tool.

Instructions for operation

- Clamp reflective materials at an angle between 4° and 7°. This prevents reflected light from reaching the laser diode and increases the operating life of the laser.
- When engraving and cutting thin workpieces, mount the compressed air nozzle approx. 2 mm above the workpiece.
- If thicker materials are being cut, mount the compressed air nozzle higher (approx. 5-10 mm above the workpiece).
- For cuts with several passes, we recommend cutting approx. 1 mm per pass.
- If materials thicker than 5-6 mm are to be cut, the height of the compressed air nozzle must be readjusted after a few passes. As otherwise a collision with the workpiece may occur.

12.8 Maintaining the laser

**NOTICE**

Incorrect cleaning agents, glasses cleaning cloths with a high water content

Scratched or dirty lens

- Only use the specified cleaning agents.

Tool:

- Cleaning cloths
- Compressed air

Material:

- Isopropyl alcohol

- 1.** ➤ Clean the lens and housing with isopropyl alcohol at regular intervals.
- 2.** ➤ If necessary, clean the fan gently with compressed air.

13 Information relating to spare parts



NOTICE

Wrong or faulty spare parts

Material damage, malfunction, machine failure

- Only use spare parts approved by the manufacturer (see spare parts list).

If unauthorised spare parts are fitted into the machine, all warranty, service, compensation and liability claims against the manufacturer and their contractors, dealers and representatives will be rejected.



Use original spare parts

The original spare parts that have been authorised for use are listed in a separate spare parts catalogue, enclosed in the documentation package supplied with the machine.

Spare part order

| Pos. | Teilenummer | Teilebezeichnung |
|------|-------------|---|
| 1 | 418E-J | SKT SCHRAUBE M10X80 SCHWARZ |
| 2 | 404E | SCHEIBE M10 |
| 3 | 401F | SKT MUTTER M10 VERZINKT |
| 4 | 214AO | KUGELPFANNEN UNTERTEIL LT. Z. 75-07-136 |
| 5 | 214AN | KUGELPFANNEN OBERTEIL LT. Z. 75-07-135 |
| 6 | 402K | SKT MUTTER M10 FLACH |

| | | | | |
|--|------------|--------------------|--------|--|
| Feiler KG KRRelder-Strasse 1, A-6060 HALL in Tirol feiler-group.com, info@feiler-group.com +43 3 7223 58500, Fax +43 3 7223 56130 | | | | |
| TYPE: XXXXXXXX | | | | |
| NR.: XXX.XX.XXX.XX | Code: XXXX | | | |
| V: XXX | PH: X | HZ: XX | A: X.X | |
| KW: X.X | SX-XX% | XXX (machine type) | | |
| Baujahr / year of construction / ANNEE DE CONSTR.: 20xx | | | | |

Fig. 90: Spare parts - Order

- 1 Model type
- 2 Machine number
- 3 Article number
- 4 Article description

The following information is required when ordering spare parts:

- Type description and machine number according to the identification plate
- Article number, article description and required quantity
- Shipping address
- Shipping mode (mail, freight, sea, air, express)

Orders for spare parts, which do not include the required details, will not be processed. Unless specific dispatch instructions are given, the manufacturer / supplier standards shall apply.

14 Disposal



ENVIRONMENT

Disposal of machine components

Used electrical materials, electronic components, lubricants and other auxiliary substances must be treated as special waste and may only be disposed of by specialised, licensed firms.

The machine consists of many different materials for which different disposal conditions may apply depending on national legislation.

1. ➤ Before disposing of the machine, contact the manufacturer.
The machine must be disposed of at a suitable recycling station. It is not permitted to dispose via household waste.
2. ➤ Separate all machine components into material groups.
3. ➤ When disposing, pay attention to international regulations, standards and environmental protection norms.



ENVIRONMENT

Disposing of batteries

Batteries are subject to special waste treatment regulations and must be disposed of in accordance with locally enforced regulations.

The improper handling of batteries, can due to their potentially dangerous substances, have a negative environmental effect and consequences for human health.

For this reason, follow the advice relating to batteries exactly:

- do not open or short circuit
- do not throw them into fire or expose them to high temperatures
- protect from getting wet and do not place them in water
- do not store them together with electroconductive items (e.g. chains, screws, metal waste etc.)

Hammer®

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