

## OPERATING AND MAINTENANCE MANUAL

# m20 series

M20 / M20 BEAUTY CUBE / M20 ABC / M20 PIX / M20 JEWEL  
Electronic engraving machine



M\_M20 series\_EN\_C - Last updated: 03/2018 - Translation of the French original document

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# A. Foreword

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## 1. Appreciation

Thank you for choosing M20 series - Gravograph.

Gravotech is pleased to count you among the users of its engraving and traceability solutions.

For help, contact Gravotech.

For more information on products, visit [www.gravograph.com](http://www.gravograph.com) website.

## 2. Information



**To ensure security and productivity, read this manual before starting-up the equipment. It provides details about the installation and use of the equipment.**

**Keep this manual in case you need to refer to it.**



**For the attention of users having an individual cardiac assist device fitted:**

**Our equipment is designed and manufactured with the greatest care in order to guarantee their compliance with the EMC Directive currently in force. This means that the levels of electromagnetic emissions produced by this equipment when in operation are limited and do not exceed the thresholds defined by the Directive.**

**However, multiple factors make it impossible to guarantee the total absence of risk for users having a cardiac assist device fitted. Consequently, it is recommended that standing for a prolonged period within less than 1 m (3.281 ft) of an operating machine should be avoided.**

# B. Legal notices

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Last updated: 10/15

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The Product's specifications are altered by (i) any Product's modification or alteration, (ii) any adaptation and installation of accessories that are not recommended by Gravotech, (iii) the integration of a control system and (iv) the connection to an external device. Such specifications' alterations may lead to the non-compliance of the Product with applicable rules and standards. Shall the Product be non-compliant, the person in charge of the Product's installation shall be responsible of the final workstation's compliance. In no event, Gravotech shall be liable for any damages arising from such non-recommended or unauthorized Product's alterations. It is precised that the warranty shall not apply in such case.

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# C. Regulation observance

Last updated: 02/2018

EC declaration of conformity or declaration of incorporation supplied with the machinery

Type of machine	Directives - Standards
<p>Dot peen marking: Machine XF500p, XF500m, Impact p, Impact eZ p, Impact m, Impact eZ m P5000PN, P5000EM</p> <p>Scribing marking: Machine B-Engraver, M10, M10 Jewel, M20 Pix, M20 Energy RingCube, TagCube</p> <p>Sharpening by grinding: Machine CG30</p> <p>Bevelling: Machine B4, B6</p> <p>Engraving by milling: Machine IM3, IF3 M20, M20 Jewel, M20 ABC, M20 Pen, M20 Beauty Cube, M20 V3 M40, M40G, M40 ABC IS200, IS400, IS400 Volume IS6000, IS7000, IS8000 - XP - XP Milling</p> <p>Hot foil stamping: Machine M20 Artfoil</p> <p>Dot peen marking: Transportable machinery - Partly completed machinery XF530p, XF530m, XE320Cp, XE320Cm</p> <p>Dot peen marking: Partly completed machinery XF510Cp-Sp-Dp, XF510Cm-Sm-Dm, XE310Cp-Sp</p> <p>Scribing marking: Partly completed machinery XF510Cr-Sr-Dr, SV510</p> <p>CCU, Rack, TouchPad UC500, UC500 SV, UC300, UC Laser Racks IS</p> <p>Laser fume extractor ES10, ES20, ES30, ES40, ES50 LE120HP, LE140HP, LE150HP, LE190HP, LNI900</p> <p>Accessory: Partly completed machinery APF Rotary, APF Laser PFD500 TAG3500 Cylinder attachment DMC15, DMC25, DMC25PN, DP3500, DP4500, DP4500PN RD1, RD2, RDM</p>	<p>- Low voltage: 2014/35/EU - EMC: 2014/30/EU - RoHS 2: 2011/65/EU</p>
<p>Dot peen marking: Portable machine XM700</p>	<p>- Low voltage: 2014/35/EU - EMC: 2014/30/EU - RoHS 2: 2011/65/EU - Cells and batteries: 2006/66/EC</p>
<p>CO2, Yag and fiber laser marking: Machine (gantry) LS100 Energy, LS100 Ex Energy, LS900 Energy LS100, LS100 Ex, LS900, LS900 XP, LS1000XP LS100 Ex Fibre, LS900 Fibre LS900 Edge</p> <p>CO2, Yag and fiber laser marking: Machine (galvo) LW1, LW2 Laser Solution Hybrid-Series (Energy), Laser Solution Green-Series (Energy), Laser Solution CO2-Series (Energy)</p>	<p>- Machinery: 2006/42/EC - Low voltage: 2014/35/EU - EMC: 2014/30/EU - RoHS 2: 2011/65/EU</p> <p>- Safety of laser products - Part 1: Equipment classification and requirements: EN 60825-1:2008 - Safety of laser products - Part 4: Laser guards: EN 60825-4+A1+A2:2006</p>
<p>CO2, Yag and fiber laser marking: Partly completed machinery (galvo) – Class 4 Laser Solution Fiber-Series (Energy)</p>	<p>- Low voltage: 2014/35/EU - EMC: 2014/30/EU - RoHS 2: 2011/65/EU</p> <p>- Safety of laser products - Part 1: Equipment classification and requirements: EN 60825-1:2008 - Safety of laser products - Part 4: Laser guards: EN 60825-4+A1+A2:2006</p>

# D. Introduction

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## 1. Presentation

The M20 series machines are electronic engraving machines.

- They are provided with a keypad for controlling the machine.
- The files to be engraved are transferred from the software to the engraving machine.
- Engraving is performed by the tool holder assembly.

**The IQ+ (Intelligence Quotient +) concept increases movement and machine/PC communication speeds.**

	Function	Engraving area
<b>M20 / M20 BEAUTY CUBE</b>	flat engraving pen engraving (optional)	maximum: 100 mm (3.937 in) x 100 mm (3.937 in)
<b>M20 ABC</b>	flat engraving	maximum: 120 mm (4.724 in) x 100 mm (3.937 in)
<b>M20 PIX</b>	flat engraving	maximum: 100 mm (3.937 in) x 100 mm (3.937 in)
<b>M20 JEWEL</b>	flat engraving wedding ring engraving pen engraving (optional)	maximum: 100 mm (3.937 in) x 100 mm (3.937 in)

## 2. Identification of the marking equipment

The marking equipment is identified by:

- 1 identification plate on the rear face

Have the model and serial number of the equipment available when contacting Gravotech.

# Introduction

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## 3. Work station safety

**Turn off the machine before beginning any cleaning, maintenance or repair procedure.**

### ■ Handling the machine

- Any operations on the machine must be carried out under the responsibility of an adult. Do not allow children to touch the machine, leads or cables.
- Never move the tool holder manually, except in the event of a mechanical blockage of the machine.
- In the event of an extended period of non-use, unplug the power cable and protect the machine.
- Never pour or spill liquid on the machine (drinks, cleaning products, etc.) except where recommended by Gravotech.
- Do not place any object on the machine other than the object to be engraved.
- Use the machine with Gravograph tools only.
- This machine is designed for a single user only. Do not allow its operation by multiple users at the same time.

### ■ M20 ABC: precautions for use of the touch-screen

- Do not touch the surface of the screen with hard materials (metal, glass or finger nails).
- Keep the touch-screen out of direct sunlight.
- Avoid extended exposure to a high temperatures and/or an excessively damp environment.
- The liquid in the touch-screen is a hazardous substance. In the event of contact with this substance, wash immediately with soap and water.

# E. Unpacking



Unpack the machine with 1 operator.

## 1. Unpacking

1. Remove the accessories package, protective wrappers and cardboard box.
2. Remove the machine from the packaging.
3. Check that nothing is missing from the parcel. If anything is missing, contact Gravotech.

Keep the packaging in order to move the machine safely. This packaging is designed to protect the machine during shipping (return for repair...).

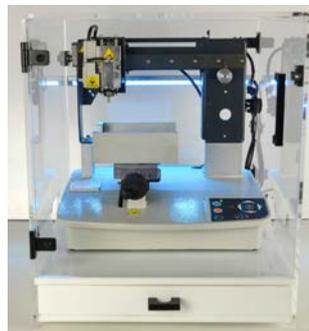
The packaging complies with European recycling standards.

## 2. Package contents

- For all machines



M20



M20 BEAUTY CUBE



M20 PIX



M20 ABC



M20 JEWEL

# Unpacking

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DVD containing the instruction manual



Power cable



Machine power supply unit (24 V - 100 W)



USB cord

## ■ M20 / M20 BEAUTY CUBE / M20 PIX



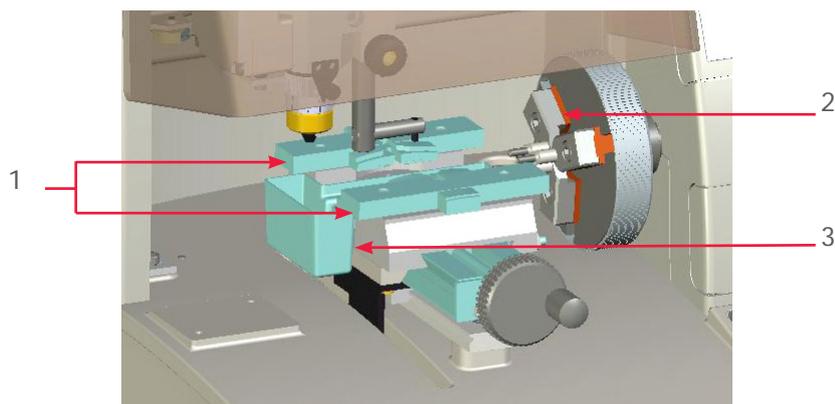
Jig(s) (100 mm (3.937 in))

# Unpacking

## ■ M20 ABC

	Touch Pad: Touch-screen PC + Touch screen pen
	- Touch Pad mount - Power cable
	Accessories box
	Aluminum jigs (120 mm (4.724 in))
	Gravogrip table

## ■ M20 JEWEL



1. Jewelry jigs
2. Machine-mounted aluminum jaws (x3)
3. Chain bracelet protection

# Unpacking

## 3. Toolbox: content

### ■ For all machines

	Driver (2 mm (0.079 in))
	Brush
	Allen key (1.5 mm (0.059 in))
	Allen key (2 mm (0.079 in))

### ■ M20 / M20 BEAUTY CUBE

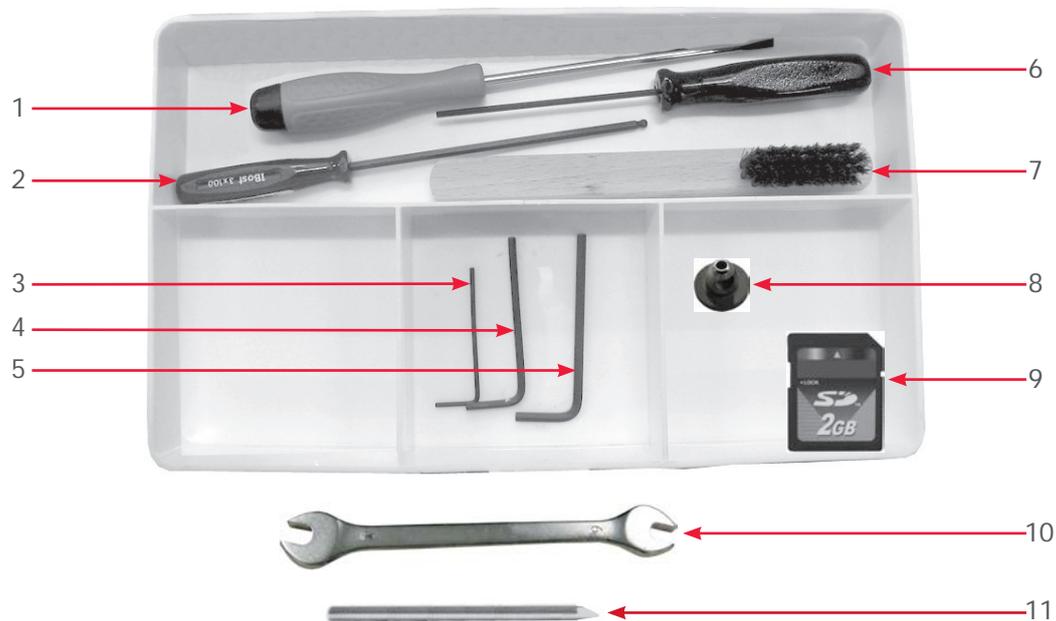
	Cutter(s) $\varnothing$ 3.17
	Depth regulating nose

### ■ M20 JEWEL

	Cutter(s) $\varnothing$ 3.17
	Reference ring(s) (x3): - internal diameter: 21 mm (0.827 in) - external diameter: 24 mm (0.945 in) - width: 6 mm (0.236 in)
	Allen key (4 mm (0.157 in))
	Plastic jigs (90 mm (3.543 in))
	Plastic jaws (x3) + Mounting screw(s) (x3)
	Allen key (5 mm (0.197 in))
	Spare diamond tip mounting screw
	Depth regulating nose

# Unpacking

## ■ M20 ABC



1. Screwdriver (ø 3.5 mm (0.138 in))
2. Driver (3 mm (0.118 in))
3. Allen key (1.5 mm (0.059 in))
4. Allen key (2.5 mm (0.098 in))
5. Allen key (3 mm (0.118 in))
6. Driver (2 mm (0.079 in))
7. Brush
8. Depth regulating nose
9. SD card
10. Open-ended spanner (6 mm (0.236 in))
11. Cutter(s) ø 3.17

# F. Safety

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## 1. Recommendations and safety

### ■ Personnel safety

The machine is designed for light engraving only and under no circumstances should it be used for other applications.

Do not use this marking equipment in an explosive environment.

Do not use this machine for routing or intensive cutting operations. Do not use this machine for wood work.

Never hold the materials for engraving by the hands. Use only Gravograph clamping systems designed for the machine.

During engraving operations, use this machine with a (regulating or suction) nose in order to prevent flying swarf.

Do not start engraving without first ensuring that the object to be engraved is securely clamped.

Never take hold of the material for engraving when engraving is in progress.

Interrupt engraving by means of the function provided for this purpose on the machine control panel.

Keep away from the area above the machine.

Ensure that people are kept clear of the area of travel of the moving parts of the machine and that no objects risk obstructing their movement.

During engraving, the rotation of the spindle could present risks of burns and cuts. To prevent any risk of cuts, the machine's protective cover must be kept closed except for adjustment operations.

**Warning: hazardous moving parts - Keep fingers and other body parts away.**  
To prevent any risk of crushing, avoid placing the hands in the locations identified.

Keep clear of the tool-holder.

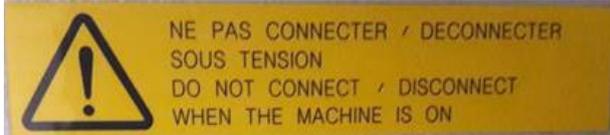
### ■ Wearing safety glasses

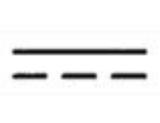


The use of safety glasses is recommended for protection against flying swarf.

# Safety

## ■ Required safety labels

	<p><i>Do not connect / disconnect when the machine is on.</i></p>
	<p>CAUTION LASER RADIATION</p> <p><i>Do not stare into beam.</i></p> <p>Laser diode Wavelength: 630-680 nm Output (maximum) &lt; 1 mW</p> <p>CLASS 2 LASER PRODUCT</p>

	<p><i>Warning: Hot surface</i></p>		<p><i>Warning: Laser beam</i></p>
	<p><i>Warning: Crushing of hands</i></p>		<p><i>General warning</i></p>
	<p><i>Warning: Rotation of the spindle</i></p>		<p><i>Refer to instructions manual/booklet.</i></p>
	<p><i>Direct current</i></p>		

# G. Description of the machine

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## 1. M20 / M20 ABC: front view of the machine

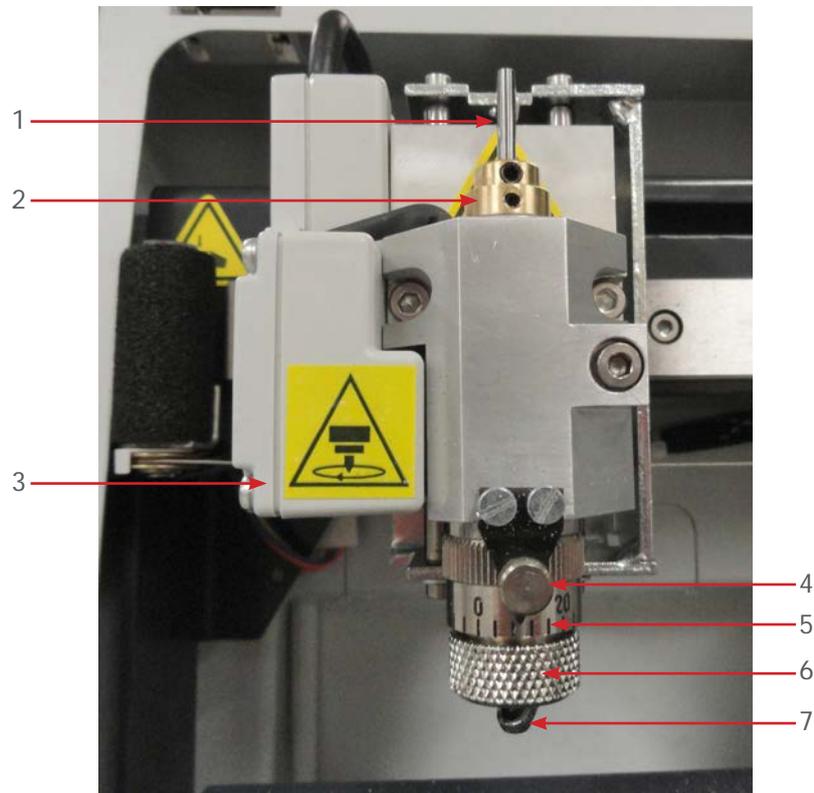
### ■ Engraving table



1. Protective cover
2. Tool holder assembly
3. Pen attachment tailstock
4. Jig(s)
5. Vice
6. Pen attachment chuck (option available on machines M20 only)
7. Jaw opening and closing adjustment knob
8. Spindle pressure adjustment button (4 position(s))
9. Frame
10. Accessories drawer
11. Control panel (9-key flexible keypad)
12. General stop button

# Description of the machine

## ■ Tool holder



1. Engraving tool(s) (cutter(s))
2. Cutter button(s)
3. Laser diode
4. Index pin
5. Scaled knob
6. Nose nut
7. Depth regulating nose

## ■ M20 ABC: Touch Pad



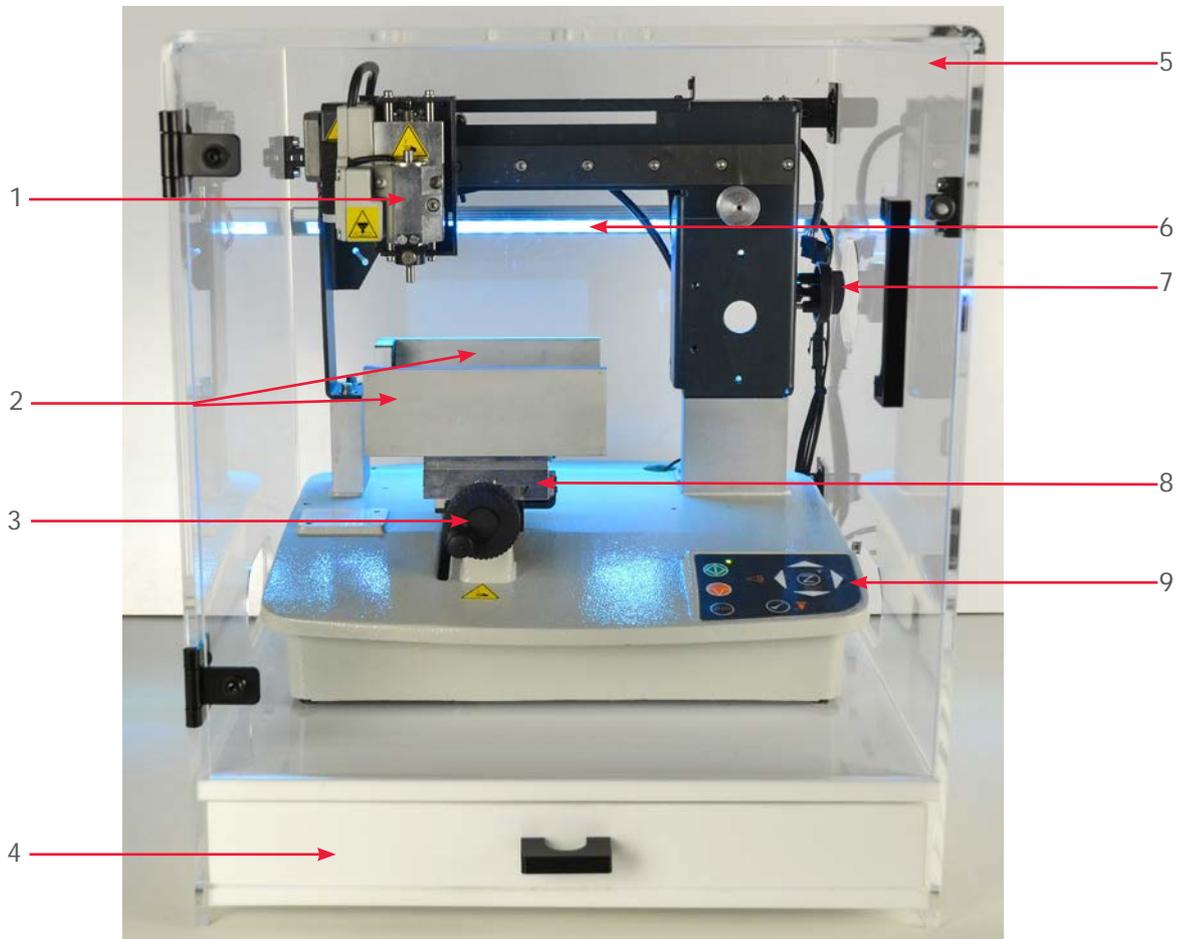
1. Power cable
2. CCU/USB connection cable
3. Touch Pad mount
4. Touch screen pen
5. Color touch screen

# Description of the machine

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## 2. M20 BEAUTY CUBE: front view of the machine

### ■ Engraving table

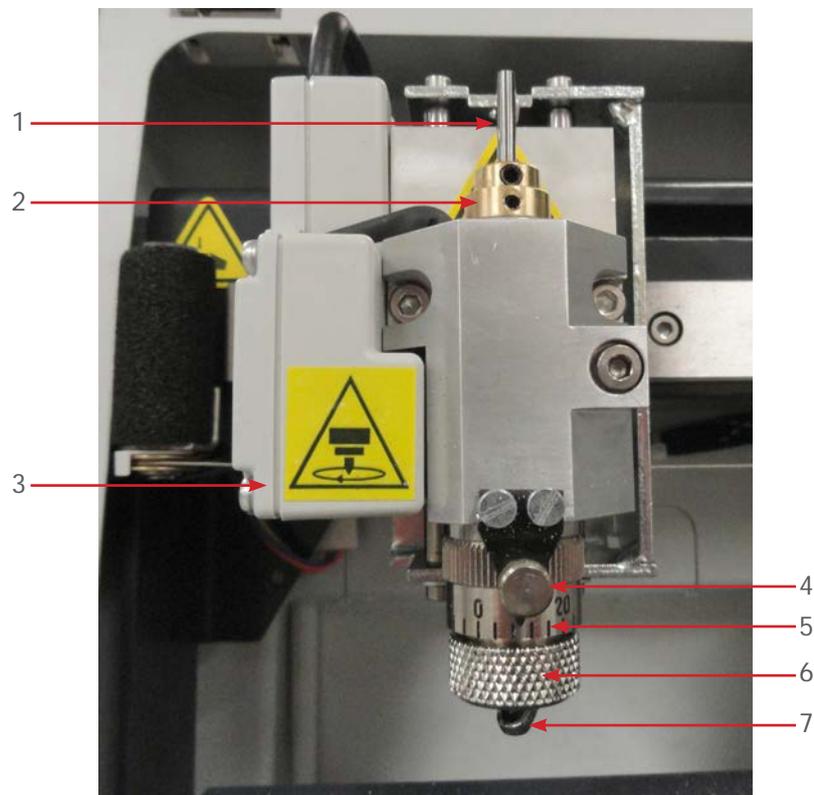


1. *Tool holder assembly*
2. *Jig(s)*
3. *Jaw opening and closing adjustment knob*
4. *Accessories drawer*
5. *Transparent cube*
6. *Light*
7. *Spindle pressure adjustment button (4 position(s))*
8. *Vice*
9. *Control panel (9-key flexible keypad)*

# Description of the machine

---

## ■ Tool holder



1. *Engraving tool(s) (cutter(s))*
2. *Cutter button(s)*
3. *Laser diode*
4. *Index pin*
5. *Scaled knob*
6. *Nose nut*
7. *Depth regulating nose*

# Description of the machine

## 3. M20 PIX: front view of the machine

### ■ Engraving table

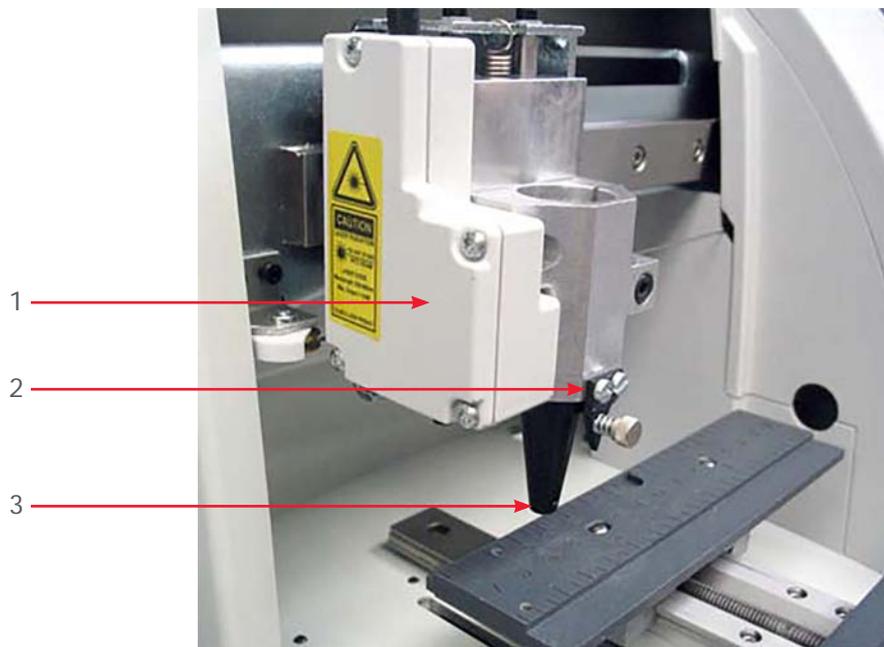


1. *Protective cover*
2. *Tool holder assembly*
3. *Jig(s)*
4. *Vice*
5. *Jaw opening and closing adjustment knob*
6. *Frame*
7. *Spindle pressure adjustment button (4 position(s))*
8. *Accessories drawer*
9. *Control panel (9-key flexible keypad)*
10. *General stop button*

# Description of the machine

---

## ■ Tool holder



1. *Laser diode*
2. *Index pin*
3. *Diamond point*

# Description of the machine

## 4. M20 JEWEL: front view of the machine

### ■ Engraving table

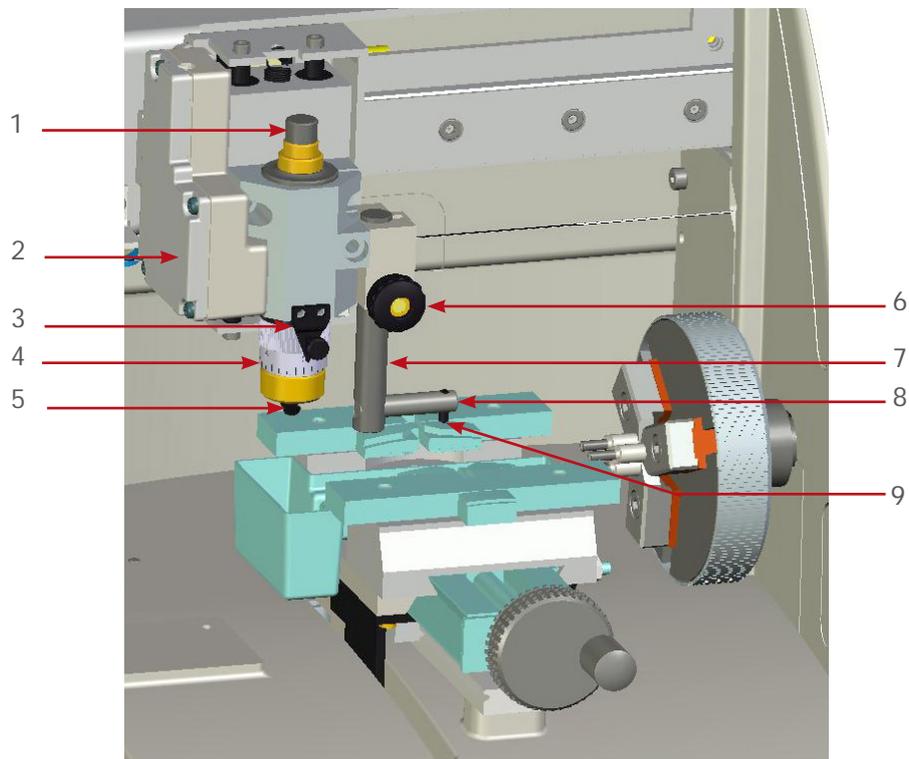


1. Protective cover
2. Tool holder assembly
3. Diamond holder
4. Jewelry jigs
5. Jewelry vice
6. Jaw opening and closing adjustment knob
7. Frame
8. Spindle pressure adjustment button (4 position(s))
9. Chain bracelet protection
10. Chuck with 3 multifunctional jaws in aluminum
11. Accessories drawer
12. Control panel (9-key flexible keypad)
13. General stop button

# Description of the machine

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## ■ Tool holder

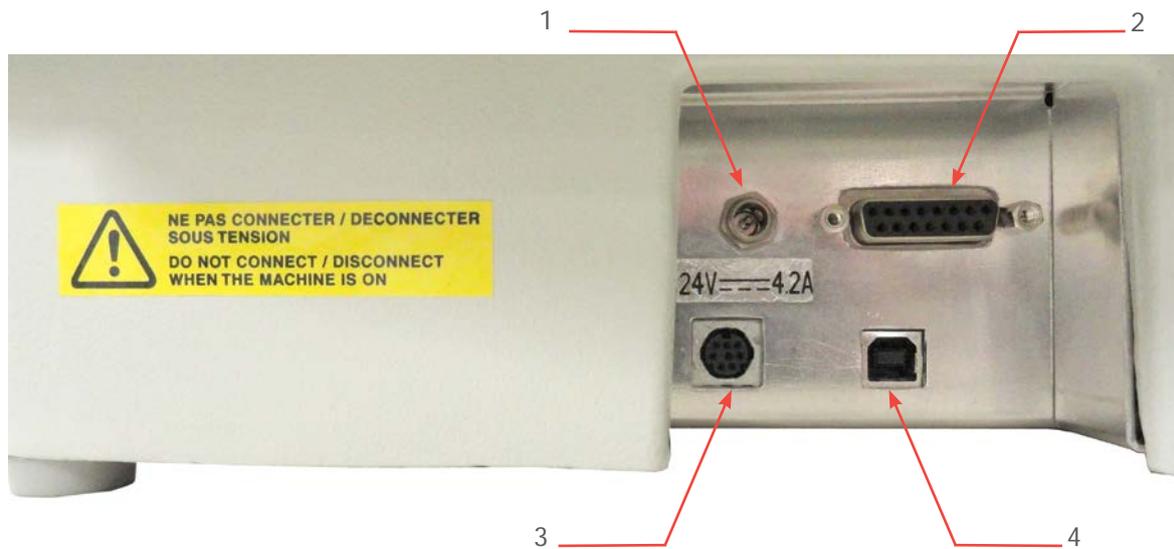


1. *Cutter button(s)*
2. *Laser diode*
3. *Index pin*
4. *Scaled knob*
5. *Engraving tool(s) (Cutter(s))*
6. *Diamond holder shaft mount locking button*
7. *Diamond holder shaft mount*
8. *Diamond holder shaft*
9. *Diamond point*

# Description of the machine

## 5. Rear view of the machine

	<p><b>Each connection meets one of the following safety levels:</b></p> <ul style="list-style-type: none"> <li>- Dangerous voltage</li> <li>- SELV (Safety extra-low voltage)</li> </ul>
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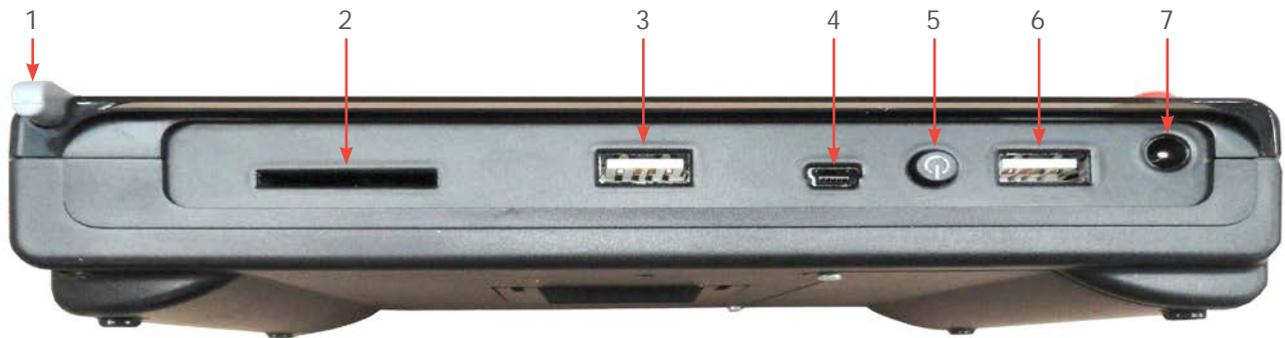


1. Power inlet / outlet (24 V - 100 W) - SELV
2. Standard input/output link - SELV
3. Pen attachment - SELV
4. Port: USB - SELV

	M20 / M20 BEAUTY CUBE	M20 ABC	M20 PIX	M20 JEWEL
1 Power inlet / outlet (24 V - 100 W) SELV	Available	Available	Available	Available
2 Standard input/ output link SELV	Available	Available	Available	Available
3 Pen attachment SELV	Available	Not available	Not available	Available
4 Port: USB SELV	Available	Available	Available	Available

# Description of the machine

## ■ M20 ABC: Touch Pad (rear view)



1. Touch screen pen
2. SD card connector
3. USB connector - USB external keyboard (not supplied)
4. Connector
5. On / Off switch
6. USB connector - Connection with the machine
7. Power supply

## 6. Control panel

	Start	Engraving start
	Pause	Marking suspended
	"Check" key	
	Z	Activation/deactivation of Z axis travel
	Joystick	Head movement (X, Y, Z)
	Shift	

# Description of the machine

 + 		Adjustment: machine (X, Y)
 + 		Adjustment: machine (Z)
 + 		Continuous cycle
 + 		Rotation of the spindle (On/Off) (function not available for the M20 PIX machine)
 + 		Automatic ZRef.
 + 		Positioning pointer (On/Off)

## ■ Indicator light function



1. Indicator light on = machine powered on
2. Indicator light on = travel of the Z axis

# H. Recommendations for installation

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**Turn off the machine before any intervention (put the On/Off switch in the "O" (Off) position).**

## 1. Physical installation

- Place the machine on a horizontal, stable and clean surface that can support 100 kg (220.462 lb) or more.
- Place the machine in a clean, ventilated environment.
- Ambient light is enough to light the equipment properly.
- Arrange the work surface for rapid and easy access to each external part of the machine and, if necessary, to the main machine stop button.
- Do not obstruct the movement of the moving parts of the machine.



**Make sure the connector screws are properly tightened to prevent the cables from becoming disconnected while the machine is switched on. This could cause permanent damage to the circuit boards.**

**The power cable must always be easily accessible (power shut-off device).**

- Protect the equipment against:
  - damp (rain, snow, condensation etc.)
  - heat (exposure to full sun, heating etc.)
  - sudden changes in temperature
  - dust (extraction duct)
  - spillages of liquids onto the electrical unit, cables and connections, and all other parts of the machine; except in situations recommended by Gravotech (lubrication)
  - vibrations
  - electrical/electronic radiation

# Recommendations for installation

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## 2. Electrical installation



**The connection to the single phase power supply is made with a standard, 3 pin plug with grounding. Grounding must be done according to the regulations in effect to ensure the safety of the personnel.**

To avoid interference problems due to the external environment, observe the following:

- Use the link cables supplied. They comply with EMC radio-frequency interference emission standards and provide protection from external electrical interference (compliant with EMC immunity and susceptibility standards).
- Bring the items of equipment to be linked as close together as possible to reduce the length of cable to be used.
- Separate the power cable from the link cable and make sure the power and link cables do not run through the same cable tray.
- Connect the machine direct to a mains power line and avoid connecting more than one device to that line (by plugging several devices into the same mains socket or into a multi-way adapter). Exception: where equipment is connected, such as a computer and the machine, supply power to the devices through the same mains power line.
- Do not allow inductive or capacitive devices to be connected to the same mains power line as the machine (motors, solenoid valves, chargers, etc.).
- Avoid the installation of manual or automatic switching systems on the same mains power line as the machine (relays, timers, programmers, automatic circuit-breakers, automatic switches, etc.).
- Check that devices in the vicinity of the machine meet the standards for electromagnetic interference. Read the technical data sheet for each device. If they are non-compliant, move them as far away from the machine as possible.
- Use the Gravograph accessories.



**Always switch the machine off before connecting or disconnecting a cable or optional accessory.**

# I. Connections - Installation

---

## 1. Connections

### ■ Power supply connection

*Rear view of the machine*

*M20 / M20 ABC / M20 PIX / M20 JEWEL*



1. Power inlet / outlet

*M20 BEAUTY CUBE*



1. Connect the power supply unit mains lead to the socket connection on the machine.

2. Connect the power supply unit mains lead to the mains socket connection.

To cut off the power to the machine if there is a serious problem, unplug the power cable or operate the On/Off switch (general stop button).

# Connections - Installation

- Using the PLC function (user standard inputs/outputs)

## Function not available for the M20 ABC machine

	<p>Before making any "user standard input/output" connections, check that the electrical and electronic characteristics of the different inputs and outputs are respected. Incorrect connection could permanently damage the machine electronics.</p> <p>Using the PLC function means that it is not just a matter of considering the machine on its own in order to ensure operator safety. The machine becomes part of a larger process (automated line). When completely assembled, the entire work station must meet the regulatory safety requirements. In this case, the machine and equipment installer is responsible for the final work station's compliance.</p>
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The "Inputs/Outputs" function activation menu is accessed via the engraving software installed on the PC.

- 4 inputs can be defined (IN1 - IN4).
- 4 outputs can be defined (OUT1 - OUT4).

### Input / Output characteristics

	Voltage and current	Active state	Minimum signal duration (active status)
<b>Input</b>	TTL-compatible	Low	200 ms
<b>Output</b>	Open commutator	-	-

### Wiring of the female 15 SubD connector

Number	Name	Function	Description
1	O1	Output	Output 1
2	O2	Output	Output 2
3	O3	Output	Output 3
4	O4	Output	Output 4
5	5 V		5 V power supply
6	I1	Input	Floating contact 1
7	I3	Input	Floating contact 3
8	0 V		Grounding
9	-		Not available
10	-		Not available
11	0 V		Grounding
12	0 V		Grounding
13	0 V		Grounding
14	I2	Input	Floating contact 2
15	I4	Input	Floating contact 4

# Connections - Installation

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- The inputs can activate various functions according to their configuration:

Function	Description
1	Start marking
2	Pause
3	Return to origin (0,0)

- The outputs can be activated according to their configuration:

Function	Description
1	Spindle in operation
2	Machine paused
3	Machine at the origin (0,0)
4	Tool in the lowered position (in the material)
10	Spindle stopped

Example:

OUT1 = 2: the 1 (Pin 1) output is activated when the machine is paused.

IN2 = 3: the machine returns to the origin when the input 2 (Pin 14) receives a pulse.

## 2. Machine / PC connection

The machine installation and usage procedure is based on a PC-type computer running Windows®. For help, contact Gravotech.

- 1. Switch off the PC and the machine.**
- 2. Follow the connection procedure for the type of link cable supplied with the machine.**

The machine is supplied with a USB cable.

### ■ Machine / PC connection (USB connection)

- 1. Connect the USB cable to the machine's USB port.**
- 2. Connect the USB cable to the PC's USB port.**

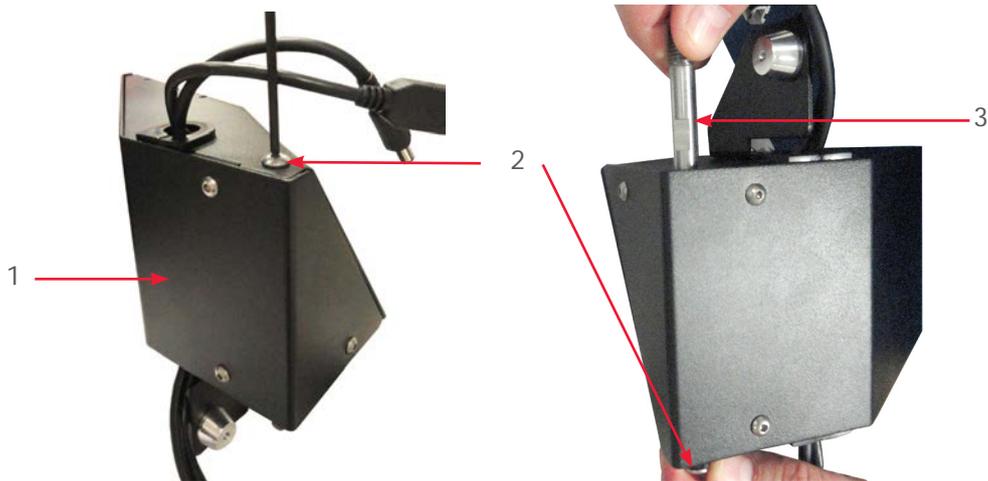
# Connections - Installation

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## 3. M20 ABC: installation and wiring of the Touch Pad

### ■ Installation on the machine

1. Put the On/Off switch in the "O" (Off) position.
2. Remove the screw on the mount Touch Pad and remove the shaft.



1. Touch Pad mount
2. Screw
3. Shaft

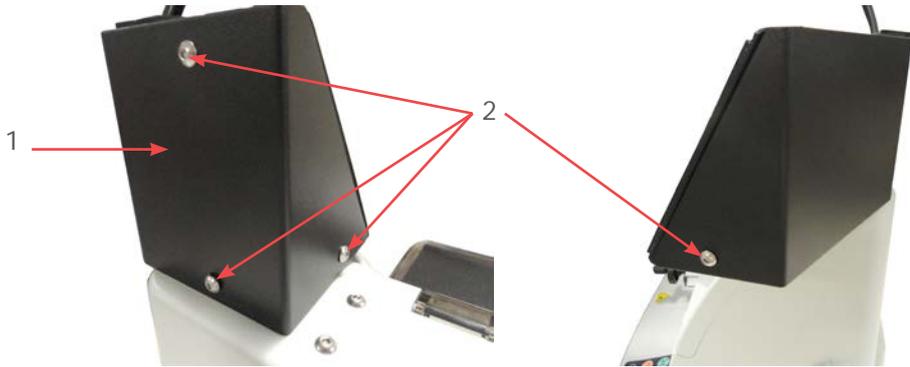
3. Screw the shaft to the machine. Tighten with the open-end spanner.



# Connections - Installation

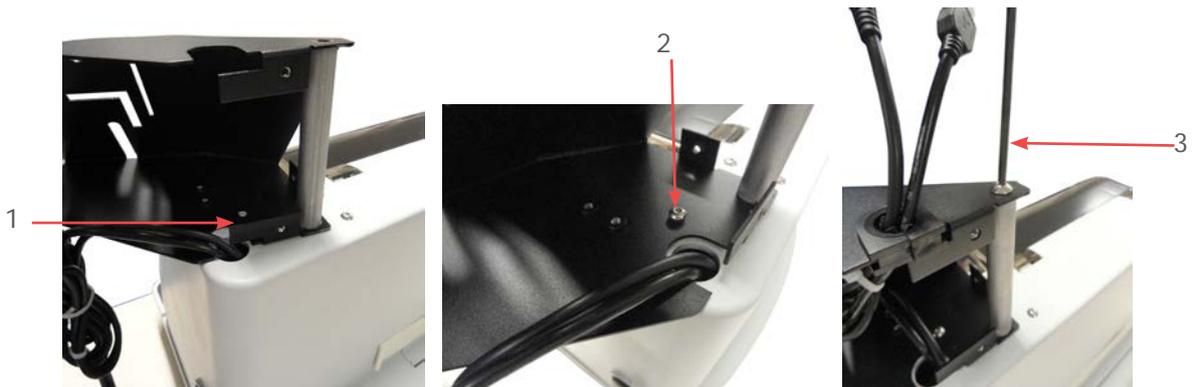
---

4. Remove the 4 screws and the cover from the mount Touch Pad.



1. Cover
2. Screw

5. Position the mount on the shaft mounted on the machine. Orient the mount in line with the mounting hole. Tighten the mounting hole/shaft screw.



1. Fastening holes
2. Screw
3. Shaft

6. Replace the cover. Mount with the 4 screws.

7. Connect the Touch Pad connection and power supply leads at the back of the machine.

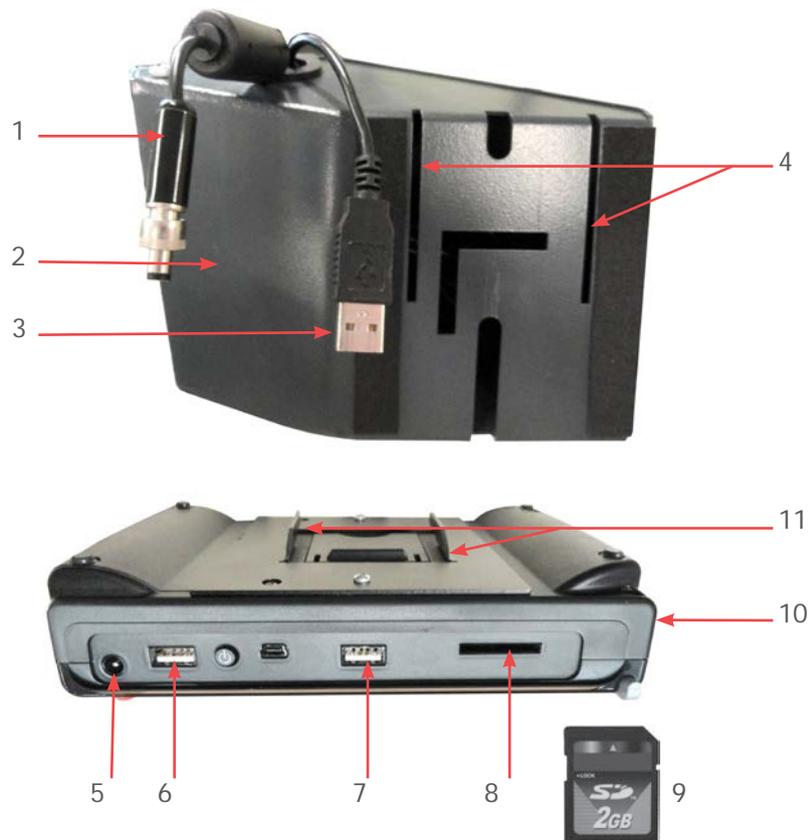


1. CCU/USB connection cable
2. Power cable

# Connections - Installation

---

## ■ Connections and cabling



1. *Power cable*
2. *Touch Pad mount*
3. *CCU/USB connection cable*
4. *Slot*
5. *Power supply*
6. *USB machine connector*
7. *USB port for external keyboard (not supplied)*
8. *SD card reader*
9. *SD card*
10. *Touch Pad*
11. *Hook(s)*

- 1. Position the Touch Pad on the mount by sliding the hooks into the slots.**
- 2. Connect the CCU/USB connection lead to the Touch Pad.**
- 3. Connect the power supply lead to the Touch Pad.**
- 4. Connect the external keyboard to the USB port (not supplied).**
- 5. Insert the SD card into the reader.**

# Connections - Installation

---

## 4. Installation

### ■ Switching on the machine

#### 1. Machine: place the switch in the "I" position (On).

The machine emits an audible signal.

The power LED lights up.

#### 2. M20 ABC: switch on the Touch Pad by pressing and holding the Start/Stop button.

**Always switch on the machine before starting up the Touch Pad.**



**Leave the machine powered on, even if it is only going to be used at intervals.**

### ■ Resolution of the problems

If the machine does not switch on:

- check that the power cord is correctly plugged in to both the machine and the power supply.
- check that there is power to the mains plug.



**If the machine emits a long beep followed by a short beep and there is no movement, call a Gravotech technician.**

# Connections - Installation

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## ■ Power down

### 1. Set the general stop button to the "O"(Stop) position.

**M20 ABC: always switch off the Touch Pad before powering down the machine.**

Switch off the machine in the following situations:

- when the operator is permanently leaving the machine
- in the event of physical damage (something is dropped on the machine, fire, a liquid is spilled on the machine, etc.)
- mechanical/electrical/electronic faults suggesting a breakdown
- if there is a major problem or the machine is jammed mechanically
- the machine is jammed on the part to be engraved/marked
- the machine is jammed on an object in the work area
- forced restart
- external/internal cleaning

## ■ Restarting

If the machine or the operating program locks, the machine may need to be restarted.

### 1. Switch off the machine.

### 2. Wait approximately 30 s.

This waiting time must be respected. It prevents an electric surge likely to damage the machine's power supply.

### 3. Switch on the machine.

## ■ Program installation

Refer to the user manual for the program.

# J. Using the machine

## 1. Transfer of the composition to the machine

### 1. Switch on the machine.

### 2. Select:

	ZRef auto function
	Center origin - engraving with vice
	Center origin - wedding ring engraving (M20 JEWEL)
	Floating origin - Point and Shoot function

### 3. From the program, transfer the composition to the machine.

#### ■ M20 JEWEL: engraving parameters - wedding ring engraving

Enter the data below:

	Width	
	Inside engraving	Internal diameter: 12.5 mm (0.492 in) - 24 mm (0.945 in)
		Width (maximum): 9 mm (0.354 in)
	Outside engraving	External diameter: 12.5 mm (0.492 in) - 27 mm (1.063 in)
		Width (maximum): 18 mm (0.709 in)

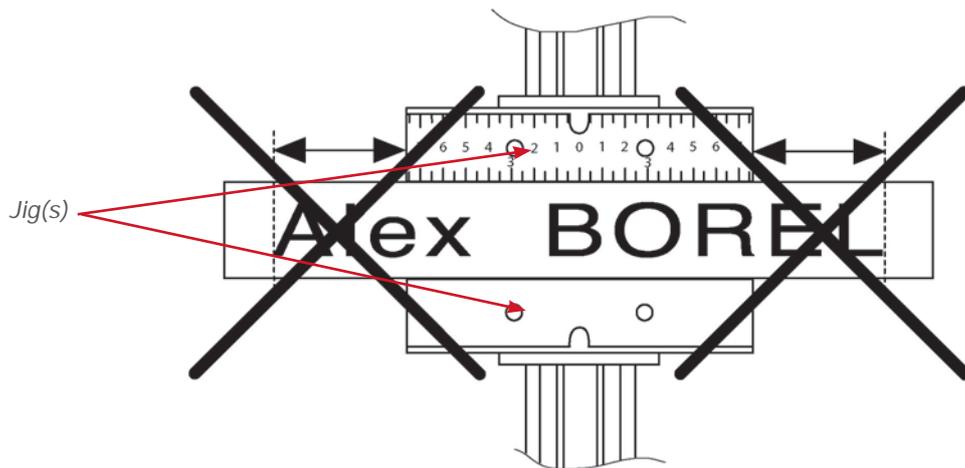
	<b>For good engraving quality on wedding rings, limit the engraving speed to 5 mm (0.197 in)/s.</b>
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# Using the machine

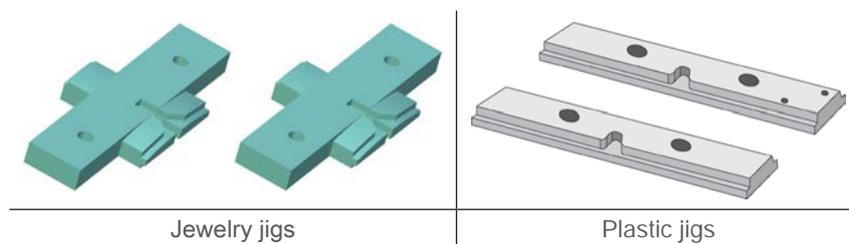
## 2. Positioning the object to be engraved

1. Choose the jigs according to the length of the object to be engraved. Consult a Gravotech retailer to find out about the various jigs available.

The length of the object to be engraved must never exceed that of the jigs:

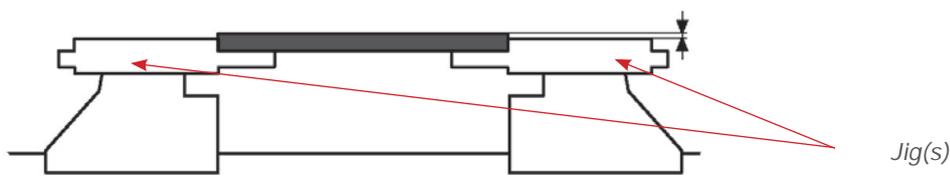


M20 JEWEL: choose jewelry jigs or plastic jigs according to the object to be engraved and the length of the plate.



2. Choose the appropriate side of the jig according to the object to be engraved or the thickness of the plate.

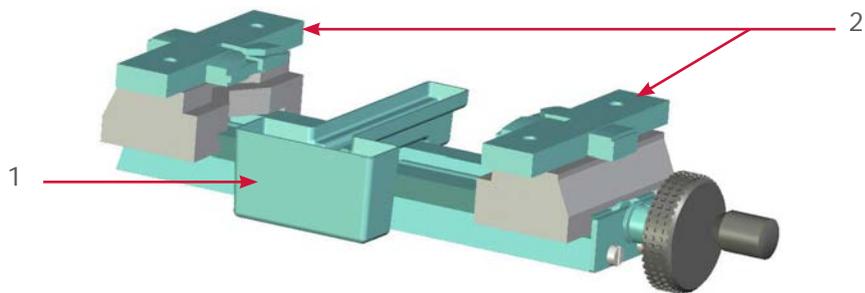
The plate must be slightly higher than the jigs in order to prevent the regulating nose from striking the jig:



# Using the machine

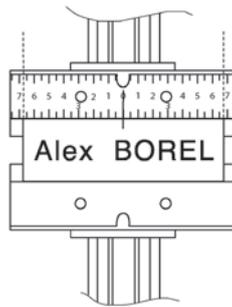
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M20 JEWEL: to engrave a chain bracelet, place the chain bracelet protection on the vice.



1. Chain bracelet protection
2. Jewelry jigs

3. If the "Set Corners" (PnS Corners) function is not used, mark the mid-point of the length of the object to be engraved.
4. Center the object to be engraved such that the mark on the object is aligned with the 0 notch on the jig (center origin).



5. Using the tightening knob, clamp the object so as to immobilize it during engraving.

Correct clamping helps to reduce the noise of the machine and to minimize vibration during engraving.



**Check that the object is clamped such that it cannot be ejected during engraving.**

# Using the machine

- M20 / M20 JEWEL (optional): positioning a pen on the pen attachment



**Always remove the jigs and open the vice to the fullest extent before changing to pen attachment mode.**

**Check that the object is clamped such that it cannot be ejected during engraving.**

**Check that the locking button and the thumb wheel are firmly securing the elements before starting work.**

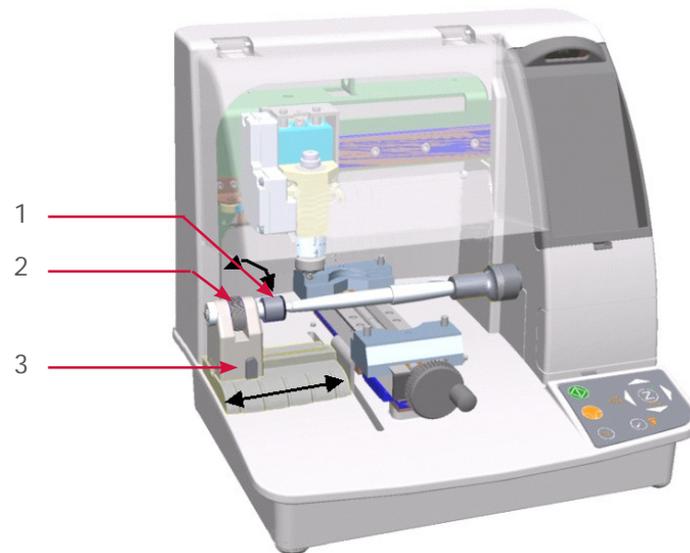


1. *Jig(s)*
2. *Right hand cone*
3. *Chuck (optional)*
4. *Jaw opening and closing adjustment knob*

1. **Remove the jigs from the vice.**
2. **Open the vice to the fullest extent using the jaw opening and closing knob.**
3. **Place the object against the right hand cone or secure it in the chuck.**

# Using the machine

---



1. *Tailstock*
2. *Thumbwheel*
3. *Locking button*

**4. Hold the object horizontally and slide the tailstock by pressing the locking button.**

Engage the object such that it is held securely by the cone or the tailstock.

**5. Lock the tailstock mount by releasing the locking button.**

**6. Adjust the clamping with the thumb wheel if necessary.**

# Using the machine

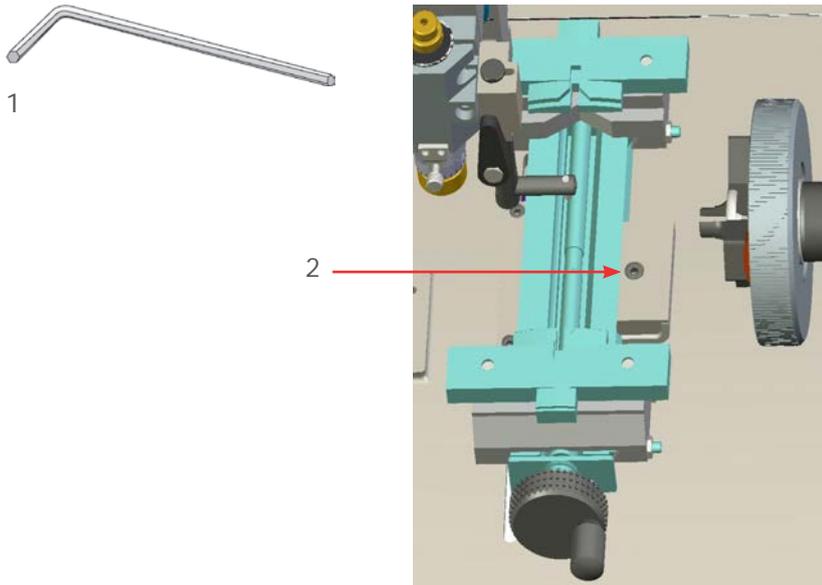
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- M20 JEWEL: positioning a wedding ring on the chuck



**Always remove the vice before changing to wedding ring engraving mode.**

**Always raise the diamond holder to the raised position before changing to flat engraving mode.**



1. Allen key (4 mm (0.157 in))
2. Screw

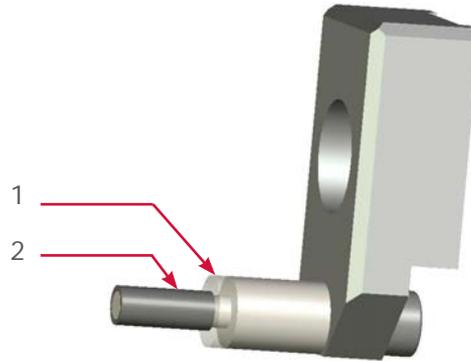
1. Open the machine protection cover.
2. Remove the vice, loosening the screw without removing it, using the wrench.

# Using the machine

---

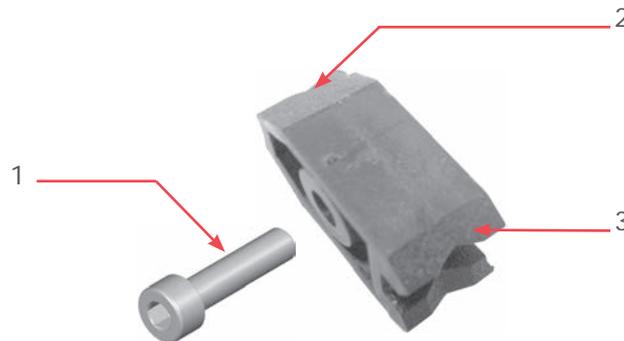
## 3. Choose appropriate jaws:

- Jaws:
  - Inside engraving: width (maximum) = 9 mm (0.354 in)  
internal diameter = 12.5 mm (0.492 in) - 24 mm (0.945 in)
  - Outside engraving: width (maximum) = 18 mm (0.709 in)  
internal diameter = 12.5 mm (0.492 in) - 27 mm (1.063 in)



1. *Support ring*
2. *Sleeve*

- Plastic jaws:
  - Inside engraving: width (maximum) = 9 mm (0.354 in)  
internal diameter = 12.5 mm (0.492 in) - 24 mm (0.945 in)



1. *Mounting screw(s)*
2. *Impression for common wedding rings*
3. *Impression for narrow wedding rings*

The plastic jaws must be mounted to the chuck with the mounting screws.

The plastic jaws have 2 impressions:

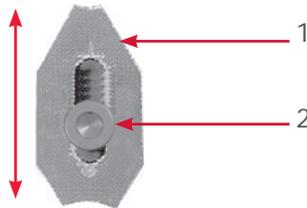
- Impression for common wedding rings
- Impression for narrow wedding rings with a U-shaped slot which has 12 clamping points for rigid securing without any deformation

# Using the machine

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- Adjustable jaw (optional):

It is possible to use an adjustable jaw with plastic jaws (allows the clamping of stone or signet rings for inside engraving).

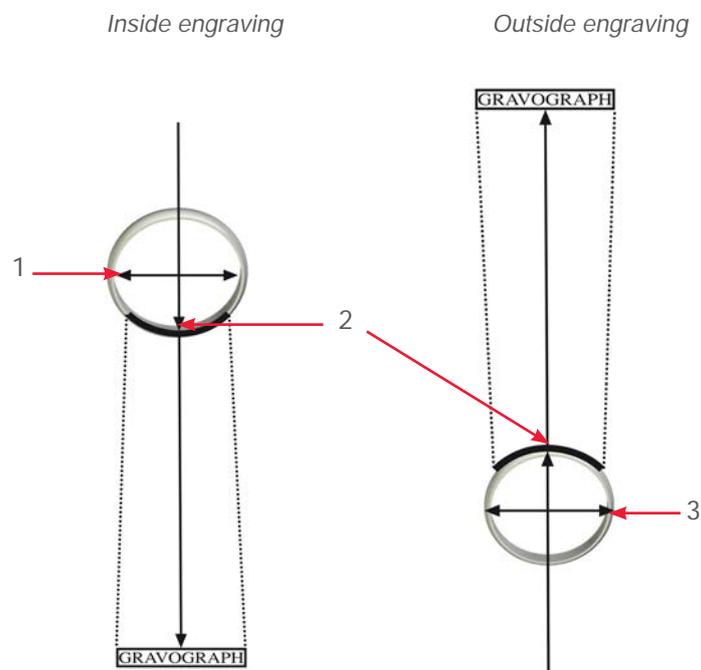


1. Adjustable jaw (optional)
2. Mounting screw(s)

- To use the adjustable jaw, selection the manual ZRef. mode.
- Position the adjustable jaw opposite the positioning aid arrow indicated on the chuck.
- Mount the adjustable jaw to the chuck with a mounting screw.
- Adjust the adjustable jaw according to the shape of the rings by loosening the mounting screw and centering the ring.

Before retightening the mounting screw, ensure that the guide has entered the centering groove.

#### 4. Locate the mid-point of the length of the text to be engraved on the ring.



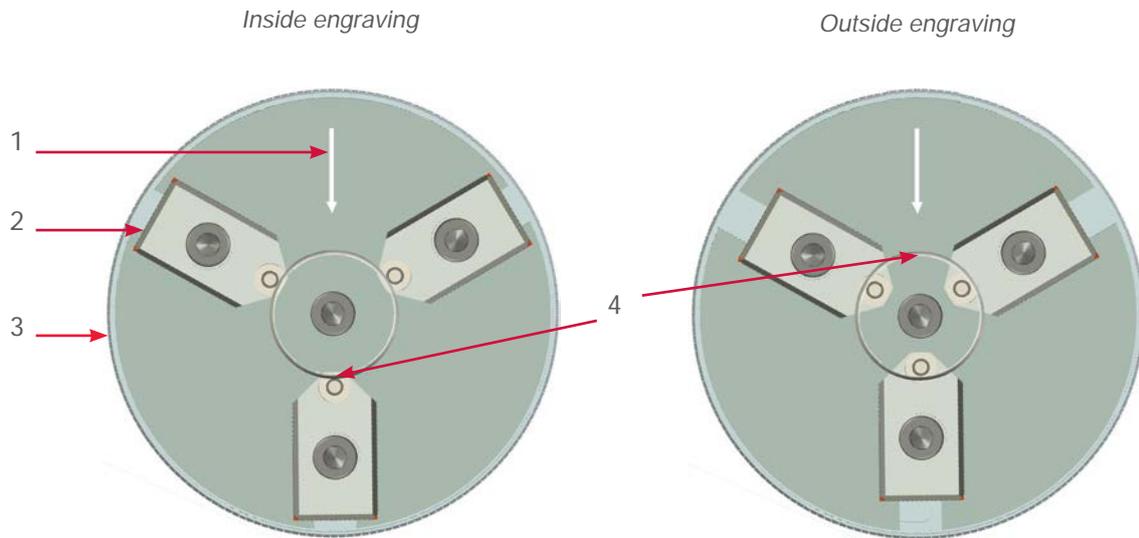
1. Internal diameter
2. Mid-point of the length of the text
3. External diameter

# Using the machine

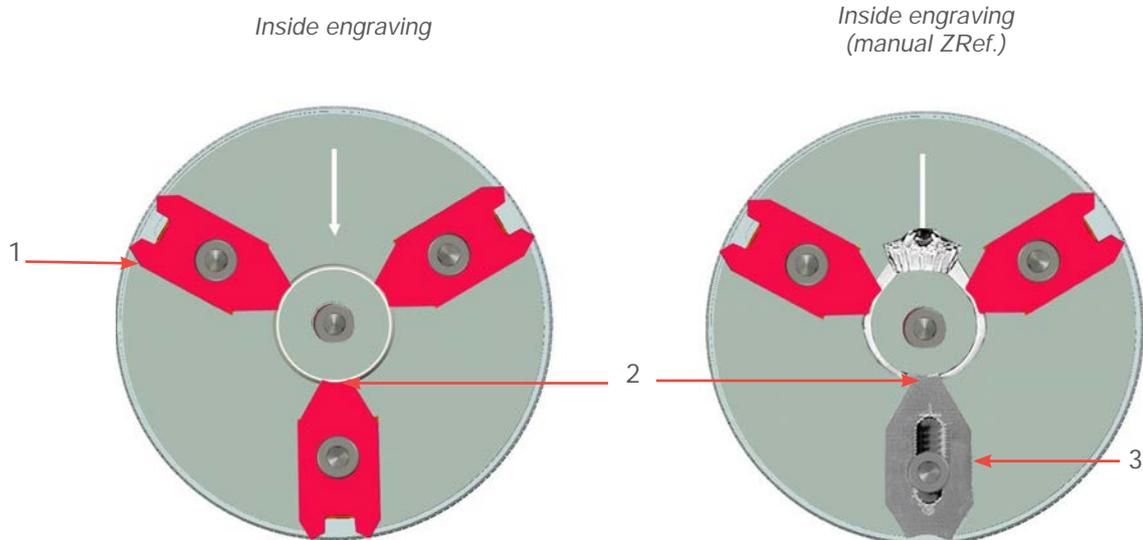
## 5. Place the wedding ring in position such that the mid-point of the engraving area is aligned with the positioning aid arrow:

- down for inside engraving
- up for outside engraving

The positioning aid arrow must be perfectly vertical and pointing downwards.



1. Positioning aid arrow
2. Jaws
3. Chuck
4. Mid-point of the length of the text



1. Plastic jaws
2. Mid-point of the length of the text
3. Adjustable jaw

## 6. Using the chuck clamping ring, clamp the wedding ring so as to immobilize it during engraving.

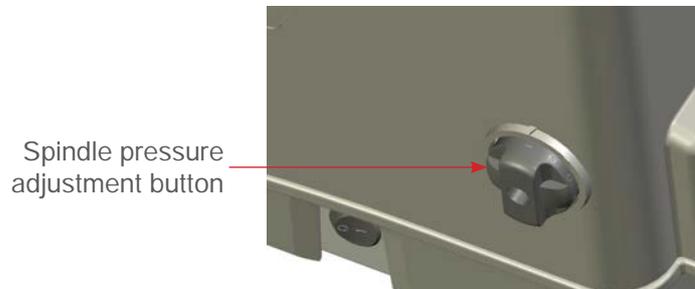
Correct clamping helps to reduce the noise of the machine and to minimize vibration during engraving.

# Using the machine

---

## 3. Adjustment on the tool holder (flat engraving)

### ■ Spindle pressure adjustment



#### 1. Press on the arrow keys in succession: Start - Pause.

The tool holder stops above the material to be engraved at the point at which engraving is to start.

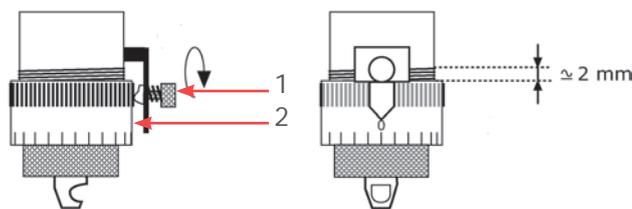
#### 2. Adjust the spindle pressure with the button (Position 4 = Rigid spindle / Position 1 = Flexible spindle).

For engraving without a nose, set the spindle pressure adjustment button to the 4 position, to ensure a rigid spindle.

To engrave a photograph, set the spindle pressure adjustment button to the 2 position.

### ■ Engraving with a regulating nose (function not available for the M20 PIX machine)

For engraving with a nose, adjustment is carried out according to the hardness of the material, the width of the cutter and the state of the surface of the plate. If there is any risk that the nose might scratch the surface of the object, reduce the spindle pressure.

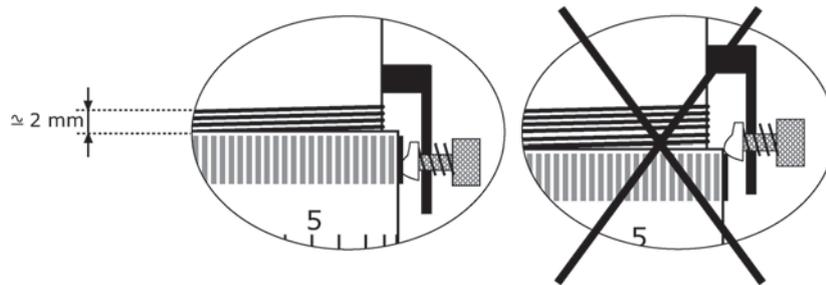


1. Index pin
2. Scaled knob

#### 1. Place the regulating nose in its recess on the spindle. Tighten the nose nut.

#### 2. Loosen the index pin. Loosen the scaled knob. Align the 0 of the scaled knob with the index pin.

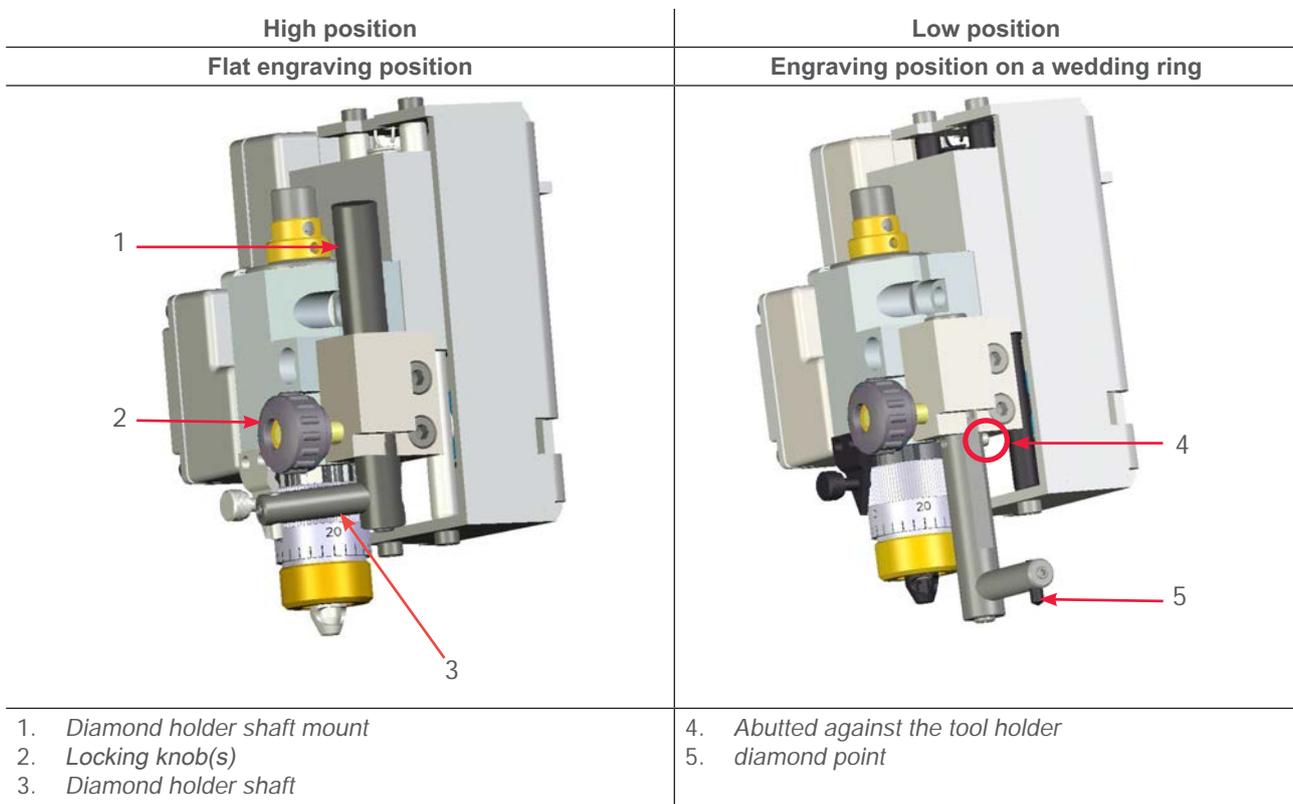
# Using the machine



The scaled knob must be loosened such that the index pin can lock it.

## ■ M20 JEWEL: adjustment on the tool holder (wedding ring engraving)

### 1. Adjust the spindle pressure with the button (Position 2).



2. Loosen the shaft mount locking knob while holding the diamond holder.
3. Lower and place the diamond holder in the wedding ring engraving position (low position).
4. Tighten the locking knob while holding the diamond holder in the pin.
5. Close the machine protection cover.
6. Launch the marking cycle.

# Using the machine

---

4. Mounting the cutter on the tool holder (function not available for the M20 PIX machine)



Because the tool is sharp, use personal protective equipment when handling it.

It is advisable to have as many cutter buttons as you have cutters, so that they can be left assembled and the settings saved if necessary (materials of the same thickness). Save the configuration and the ZRef.

1. After adjusting the spindle pressure and/or mounting the regulating nose, press the "Check" key on the machine.

The tool holder is lowered until the depth regulating nose touches the plate to be engraved.

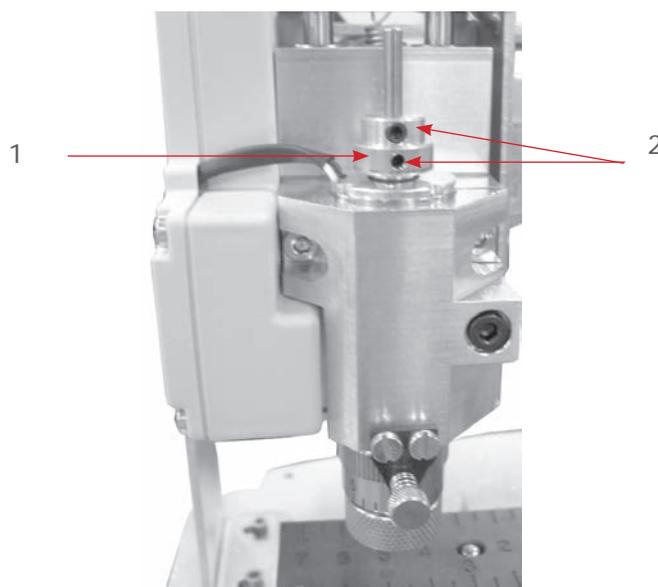
The following message is displayed:

Insert the cutter into the spindle until tip of tool touches material. Press CHECK

2. Open the machine protection cover.

3. Place in position and screw the cutter button to the spindle using the following wrench:

- allen key (1.5 mm (0.059 in))



1. Cutter button(s)
2. Screw

# Using the machine

---

- 4. Insert the cutter into the spindle until it comes into contact with the material to be engraved. In order to facilitate the passage of the cutter, slightly loosen the screw on the upper part of the cutter button.**

Carbide cutters are fragile.

Program 0.5 mm (0.020 in) to a depth of 1 mm (0.039 in) in order to compensate for any flatness defects in the plate.

- 5. Tighten the upper screw of the cutter button in order to immobilize it, using the following wrench:**
  - driver (2 mm (0.079 in))

5. Setting the origin of the tool carrier (function not available for the M20 PIX machine)

## ■ M20 / M20 BEAUTY CUBE / M20 JEWEL

**Store the position of the Z zero point by pressing the "Check" key for 3 seconds. The machine emits an audible signal.**

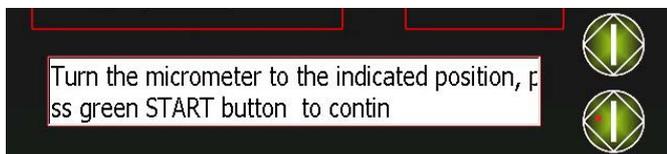
The tool holder is raised.

## ■ M20 ABC

**Store the position of the tool carrier by pressing the "Check" key. The machine emits an audible signal.**

The tool holder is raised.

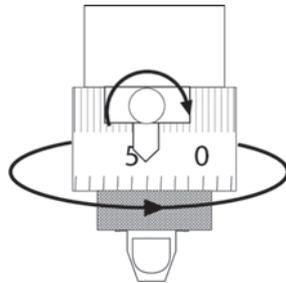
The following message is displayed:



# Using the machine

## 6. Adjusting the engraving depth (function not available for the M20 PIX machine)

1. Turn the scaled knob a few notches to the right to obtain the desired engraving depth.  
1 division = 0.025 mm (0.001 in)



The number of notches depends on the engraving depth and the material:

Material to be engraved	Type of cutter	Depth	Number of notches
Anodized aluminum	carbide point	0.1 mm (0.004 in)	4
Silver	carbide point	0.2 mm (0.008 in)	8
Chrome	diamond point	0.025 mm (0.001 in)	1
Gravometal	carbide point	0.1 mm (0.004 in)	4
Gravoply II	carbide point	0.06 mm (0.002 in)	2
Gravoxal	carbide point	0.1 mm (0.004 in)	4
Stainless steel	diamond point	0.2 mm (0.008 in)	8
Brass	carbide point	0.2 mm (0.008 in)	8
Metallex	carbide point	0.06 mm (0.002 in)	2
Gold	carbide point	0.2 mm (0.008 in)	8
Plastic	carbide point	0.35 mm (0.014 in)	14

2. Tighten the index pin in order to secure the scaled knob in this position.
3. Close the machine protection cover.

# Using the machine

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## 7. Start-up engraving

Engraving is launched from the control panel on the machine.

- 1. Check that the object is correctly positioned in the engraving area.**
- 2. Press the key: Start (control panel).**

The tool holder moves at a safe movement speed to the first engraving point and starts the engraving.

Automatic ZRef: the spindle moves down until the diamond tip touches the plate. When the position of the ZRef. has been stored, engraving starts.

In order to achieve a faster movement speed, press the Start key until the first engraving point is reached.

- In the event of a problem, press the Pause button.  
The machine pauses momentarily.  
To resume engraving, press the Start key.
- To stop engraving completely, press one of the arrows on the joystick.
- To accelerate the movement speed of the spindle during engraving, press the Up arrow.
- To slow down the movement speed of the spindle during engraving, press the Down arrow.

# K. Preventive maintenance

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## 1. General maintenance



**Unplug the power supply plug before beginning any cleaning or maintenance operation.**

**The mains power cable must be replaced immediately if it is cut or crushed, cracked or a conductor is stripped bare.**

The machine's maintenance needs depend on the type of material used, the quantity of material removed, frequency of operation, environment and the effectiveness of the air extraction system. It is the user's responsibility to define them.

Dust and debris that accumulate on the machine's components can cause irregular or imprecise engraving, or the loss of the engraving position and the premature failure of components.

Regularly cleaning the machine improves its operation, extends the life of parts and reduces the risk of failure.

Recommendations: Check and, if necessary, clean the machine every 8 hours of engraving/marketing or cutting.

For help, contact Gravotech.

No internal parts of the machine require user intervention. Routine maintenance only involves external cleaning of the engraving area.

To clean other parts of the machine, call a Gravotech technician.

### ■ M20 ABC: color touch screen (Touch Pad)

Wipe with a soft cloth slightly dampened with alcohol.

Do not use organic solvents.

# Preventive maintenance

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## 2. Adjusting the machine

The center of the engraving area of the machine must be aligned with the clamping system.

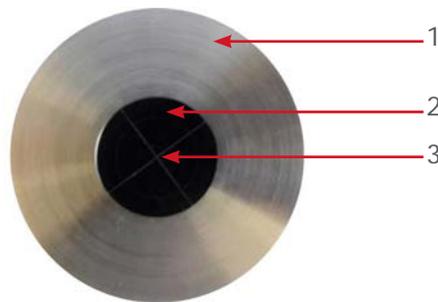
The M20 series machines have a machine reference point adjustment system which can be deployed by the user.

M20 ABC: to restore the factory-set zero point of the SD card, consult the user manual for the program.

Adjust these settings every 3 months or whenever the machine has been moved.

### ■ XY setting of the machine with vice

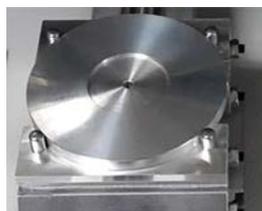
To set the XY zero point, use 2 centering washers (supplied with the machine).



1. *Centering washer(s)*
2. *Washer for centering the diode zero point*
3. *Zero point*

**1. Switch on the machine.**

**2. Place the centering washer between the jaws of the vice. Tighten using the tightening knob.**



**3. Press simultaneously on the 2 keys: Pause - Left arrow.**

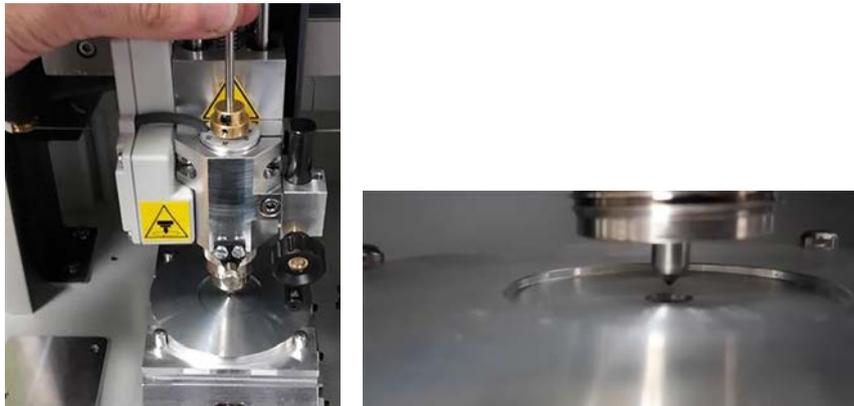
M20 ABC: refer to the user manual for the ABC program.

The tool holder moves to the center of the vice in order to set the zero point of the tool. It must match the zero point hole in the centering washer.

# Preventive maintenance

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4. Place the tool in the spindle. This must slide easily into the centering washer.



If not, remove the tool and adjust the position of the tool holder using the joystick:

Zero point axis	Control panel
Y	Up - Down arrows
X	Left arrow - Right arrow

5. Remove the tool from the spindle once the adjustment is complete.
6. Store the position of the XY zero point by pressing the "Check" key for 3 seconds. The machine emits an audible signal.

The tool holder moves to the center of the vice in order to set the zero point of the diode. It must match the zero point hole in the centering washer.



7. Set the diode zero point in the X axis of the machine using the following keys: Left arrow - Right arrow.
8. Store the position of the X diode zero point by pressing the "Check" key for 3 seconds. The machine emits an audible signal.

# Preventive maintenance

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## ■ Adjusting the machine in Z

1. **Switch on the machine.**
2. **Use the spindle with a nose, without a cutter and without pressure (Position 1).**

M20 PIX: use the spindle with the diamond tip.

3. **Place a 2.4 mm (0.094 in) thick plate for engraving in the vice.**

4. **Press simultaneously on the 2 keys: Pause - Z.**

M20 ABC: refer to the user manual for the ABC program.

The tool holder moves to the center of the vice.

The spindle moves down until the tool touches the plate.

5. **Set the zero point in the Z axis of the machine using the following keys: Up - Down arrows.**
6. **Store the position of the Z zero point by pressing the "Check" key for 3 seconds. The machine emits an audible signal.**

## M20 ABC

It is possible to restore a previously set zero point that has been saved to a SD card (supplied with the machine).



**Save these settings. They are specific to each machine.**

**The new settings must be saved to another SD card.**

Refer to the user manual for the ABC program.

# Preventive maintenance

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## ■ M20 JEWEL: adjusting the machine (wedding ring engraving)

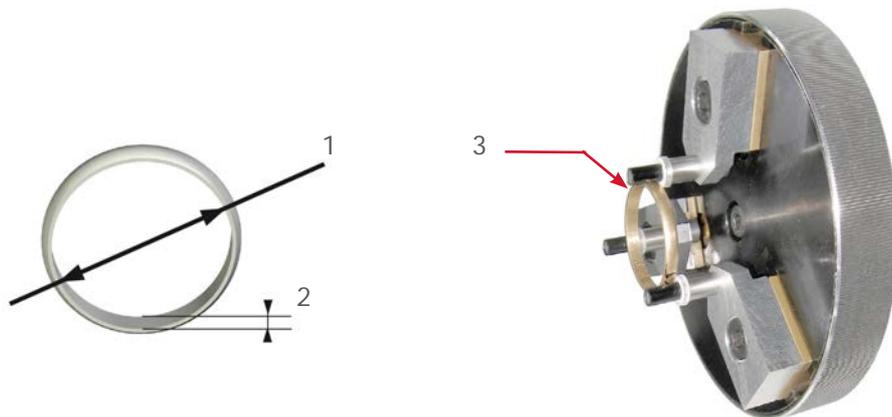
The machine needs to be adjusted after the diamond tip has been changed or after any change to the electronics.

**Adjust these settings every 3 months or whenever the machine has been moved.**

### • Adjusting the machine in XY:

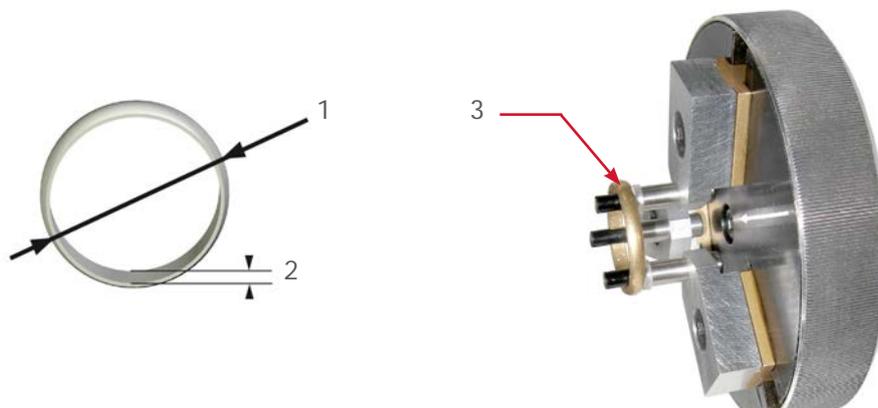
1. Place a reference ring in position on the chuck according to the desired marking (exterior or interior).

*Inside engraving*



1. *Internal diameter*
2. *Width*
3. *Reference ring(s)*

*Outside engraving*



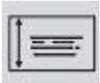
1. *External diameter*
2. *Width*
3. *Reference ring(s)*

2. **Switch on the machine.**

# Preventive maintenance

## 3. Execute a composition in the engraving software, indicating the parameters of the reference ring.

Select outside or inside engraving. Indicate the diameter and width of the reference ring according to the desired marking.

	Width	6 mm (0.236 in)
	External diameter	23 mm (0.906 in)
	Internal diameter	21 mm (0.827 in)

## 4. Ensure that the ZRef. auto functions and center origin are selected in the engraving program.

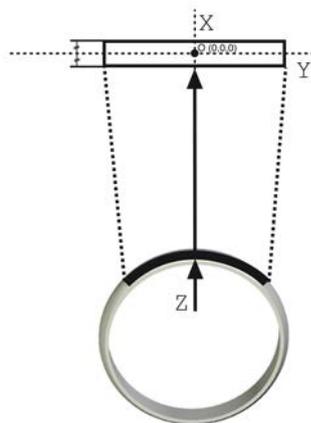
## 5. Transfer the composition to the machine from the program.

## 6. Press simultaneously on the 2 keys: Pause - Left arrow.

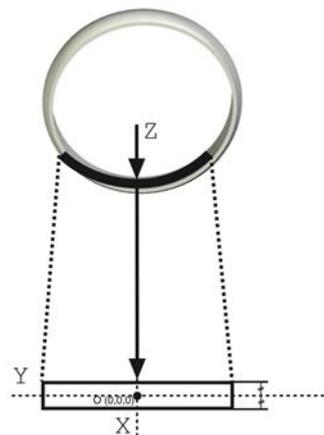
The diamond holder moves to the zero point.

## 7. Set the zero point in the X axis of the machine using the following keys: Right arrow /Left arrow.

*Outside engraving*



*Inside engraving*



# Preventive maintenance

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The zero point must be located at the mid-point of the width along X of the reference ring (6 mm (0.236 in)):

- engrave O with a height of 4 mm (0.157 in) on the ring with the diamond tip.
- visually check that the margin above and below the engraved "O" is the same (1 mm (0.039 in)). If not, move the diamond tip along the X axis with the keys: Left arrow - Right arrow.
- perform another engraving for verification Use the arrows to rotate the ring to avoid engraving over the top of the first O (Up - Down arrows)

## **8. Set the zero point in the Y axis of the machine using the following keys: Up - Down arrows.**

Check that the positioning aid arrow on the chuck is perfectly vertical and pointing downwards.

## **9. Store the position of the XY zero point by pressing the "Check" key for 3 seconds. The machine emits an audible signal.**

The diamond tip returns to the origin.

### • **Adjusting the machine in Z**

#### **1. Press simultaneously on the 2 keys: Pause - Z.**

The diamond holder moves to the zero point.

#### **2. Bring the diamond tip into contact with the reference ring.**

#### **3. Store the position of the Z zero point by pressing the "Check" key for 3 seconds. The machine emits an audible signal.**

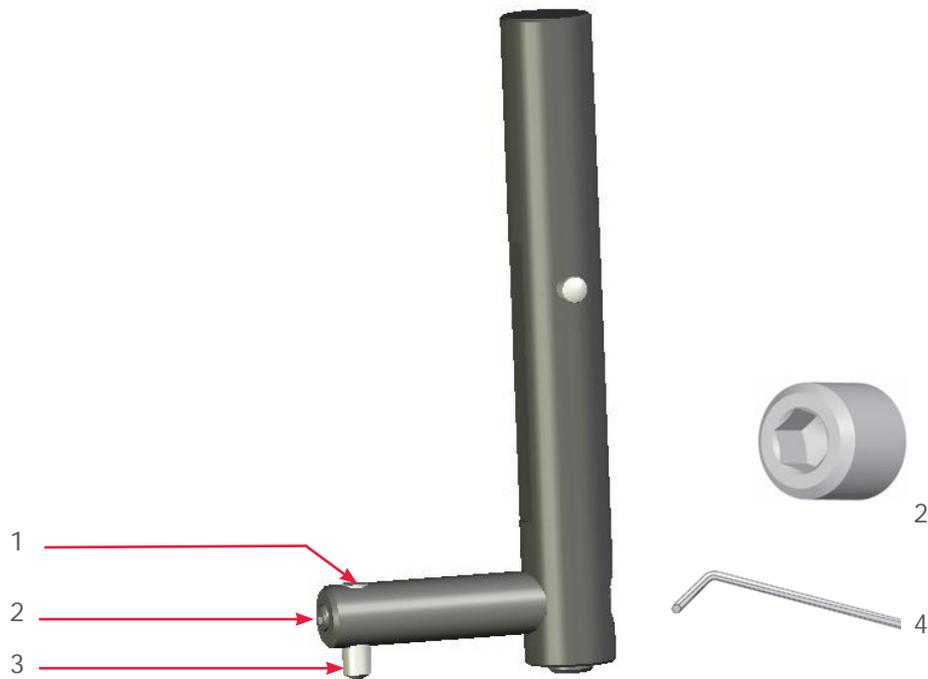
The diamond tip returns to the origin.

# Preventive maintenance

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## 3. M20 JEWEL machine(s) only

### ■ Changing the diamond tip



1. *Half flat*
2. *Screw (a spare screw is supplied with the machine)*
3. *Diamond point*
4. *Allen key (1.5 mm (0.059 in))*

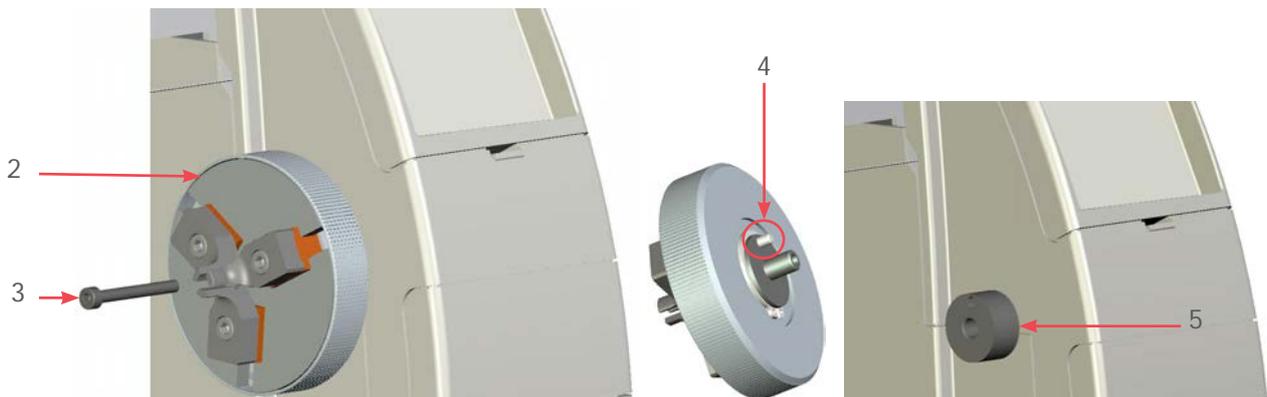
1. **Loosen the screw with the wrench. Remove the diamond tip.**
2. **Place the new diamond tip in position. Tighten the screw with the wrench.**
3. **Adjust the machine for wedding ring engraving.**

# Preventive maintenance

## ■ Removal and fitting of the chuck



The chuck should always be removed for flat engraving of an object of more than 85 mm (3.346 in) along Y. Otherwise, there is a risk that the tool holder might strike the jaws or the chuck.



1. Allen key (4 mm (0.157 in))
2. Chuck
3. Center screw
4. Dowel
5. Axis

### Removing the chuck:

1. Loosen and remove the center screw of the chuck with the wrench.

If necessary, open the jaws with the chuck clamping ring.

2. Remove the chuck.

### Fitting the chuck:

1. Position the chuck on the shaft, with the dowel.
2. Place in position and tighten the center screw of the chuck with the wrench.

# L. Technical specifications

## 1. Physical characteristics

	M20	M20 PIX	M20 JEWEL	M20 BEAUTY CUBE	M20 ABC
<b>Dimensions (L x w x h): machine</b>	345 mm (13.583 in) x 315 mm (12.402 in) x 310 mm (12.205 in)			380 mm (14.961 in) x 438 mm (17.244 in) x 446 mm (17.559 in)	490 mm (19.291 in) x 315 mm (12.402 in) x 430 mm (16.929 in)
<b>Net weight: machine (no accessories)</b>	10 kg (22.046 lb)			19.8 kg (43.652 lb)	12 kg (26.455 lb) (TouchPad + vice)
<b>Dimensions (L x D x H): with packaging</b>	430 mm (16.929 in) x 430 mm (16.929 in) x 400 mm (15.748 in)			800 mm (31.496 in) x 600 mm (23.622 in) x 750 mm (29.528 in)	420 mm (16.535 in) x 420 mm (16.535 in) x 610 mm (24.016 in)
<b>Weight: with packaging</b>	12 kg (26.455 lb)			37 kg (81.571 lb)	16 kg (35.274 lb)
<b>Engraving area (useful surface area)</b>	100 mm (3.937 in) x 100 mm (3.937 in) (maximum)				120 mm (4.724 in) x 100 mm (3.937 in) (maximum)
<b>Engraving area (with chuck)</b>	-	-	Maximum: 100 mm (3.937 in) x 85 mm (3.346 in) to 100 mm (3.937 in) x 95 mm (3.740 in) (according to the position of the chuck)	-	-
<b>Object to be engraved: dimensions</b>	180 mm (7.087 in) x 110 mm (4.331 in) (Maximum)				
<b>Pen: Diameter: - maximum</b>	28 mm (1.102 in)	-	28 mm (1.102 in)	-	-
<b>Length: - maximum</b>	140 mm (5.512 in)	-	140 mm (5.512 in)	-	-
<b>- minimum</b>	70 mm (2.756 in)	-	70 mm (2.756 in)	-	-
<b>Travel distance Z</b>	30 mm (1.181 in)			40 mm (1.575 in)	30 mm (1.181 in)
<b>Surface flatness</b>	< 0.1 mm (0.004 in) (vice)				

# Technical specifications

## 2. Engraving characteristics

	M20 / M20 JEWEL / M20 ABC	M20 BEAUTY CUBE	M20 PIX
<b>Opening the vice (maximum)</b>	105 mm (4.134 in)		
<b>Passage under spindle Z (maximum)</b>	40 mm (1.575 in)	100 mm (3.937 in)	40 mm (1.575 in)
<b>Passage under spindle Z: with jigs + standard nose (maximum)</b>	18 mm (0.709 in) - scaled knob fully tightened	78 mm (3.071 in)	-
<b>Passage under spindle Z: with jigs - no nose (maximum)</b>	25 mm (0.984 in) - scaled knob fully tightened	85 mm (3.346 in)	-
<b>Passage under spindle Z (total): standard nose (maximum)</b>	38 mm (1.496 in)	98 mm (3.858 in)	-
<b>Passage under spindle Z (total): no nose (maximum)</b>	45 mm (1.772 in)	105 mm (4.134 in)	-
<b>Automatic adjustment of the Z origin (automatic ZRef.)</b>	Yes		
<b>Red pointer</b>	Laser diode		
<b>Engraving precision along XY (maximum)</b>	< 0.1 mm (0.004 in)		
<b>Type of spindle(s)</b>	Rotating spindle / through spindle with cutter button		-
<b>Diameter (tool)</b>	3.17 mm (0.125 in)		-
<b>Speed of rotation (maximum)</b>	19200 rpm		-
<b>Power</b>	20 W		-
<b>Depth regulating nose</b>	Compatible with all the depth regulating noses Gravograph		-

# Technical specifications

## ■ Movement speed

	Axis	For all machines
Movement speed: no load (maximum)	X,Y	50 mm (1.969 in)/s
	Z	40 mm (1.575 in)/s
Movement speed: engraving (maximum)	X,Y	25 mm (0.984 in)/s
	Z	40 mm (1.575 in)/s
Movement speed: diamond engraving (maximum)	X,Y	35 mm (1.378 in)/s
	Z	40 mm (1.575 in)/s
Speed of acceleration: engraving (maximum)	X,Y	1000 mm (39.370 in)/s <sup>2</sup>
	Z	1000 mm (39.370 in)/s <sup>2</sup>
Speed of acceleration: PIX mode (maximum)	X,Y	5000 mm (196.850 in)/s <sup>2</sup>
	Z	15000 mm (590.550 in)/s <sup>2</sup>
Repeatability	-	< 0.05 mm (0.002 in)

## ■ M20 JEWEL (wedding ring engraving)

Internal diameter (minimum - maximum) Width (maximum)	12.5 mm (0.492 in) - 24 mm (0.945 in) 9 mm (0.354 in)
For interior clamping: External diameter (minimum - maximum) Width (maximum)	12.5 mm (0.492 in) - 27 mm (1.063 in) 18 mm (0.709 in)
For exterior clamping (plain band wedding ring): External diameter (minimum - maximum) Width (maximum)	12.5 mm (0.492 in) - 26 mm (1.024 in) 18 mm (0.709 in)

## 3. Noise emission of the machine (ISO 11201 standard)

L <sub>Aeq</sub> - when awaiting engraving	51 dB (A) +/- 1
L <sub>Aeq</sub> - during nominal engraving	69 dB (A) +/- 2
L <sub>pc</sub> peak - Peak at rated engraving	< 89 dB (C)

## 4. Electrical characteristics

Electronics	Integrated
Nominal voltage / Type of current	External power supply unit Input: AC 100 - 240 V Output: 24 V
Absorbed current	Maximum: 1.7 - 0.75 A
Frequency	50-60 Hz
Absorbed power	180 W
Protection(s)	-

# Technical specifications

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## 5. Environment

<b>Operating temperature</b>	5 °C (41 °F) - 40 °C (104 °F)
<b>Storage temperature</b>	-5 °C (23°F) - 45 °C (113 °F)
<b>Humidity level</b>	20 - 80 %

## 6. Point and shoot

<b>Type</b>	Laser diode
<b>Wavelength</b>	630 - 680 nm
<b>Power</b>	1 mW (maximum)
<b>Class</b>	Class 2

## 7. Connection(s)

<b>Connection to computer</b>	USB - 1.1
<b>Input/output link</b>	Sub-D 15 (female)
<b>Control panel</b>	Tactile dome membrane
<b>Number of keys</b>	9
<b>Screen</b>	No

### ■ M20 ABC

<b>Connection to the Touch Pad</b>	USB
<b>Touch Pad power connection</b>	MiniDin 8 point(s) (female)
<b>Control panel</b>	Tactile dome membrane
<b>Number of keys</b>	9
<b>Screen</b>	Color touch screen
<b>Input/output link</b>	Sub-D 15 (female)

# Technical specifications

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## 8. TouchPad (M20 ABC)

<b>Dimensions</b>	200 mm (7.874 in) x 122 mm (4.803 in) x 153 mm (6.024 in)
<b>Net weight</b>	1 kg (2.205 lb)
<b>Dimensions (Touch Pad only)</b>	186 mm (7.323 in) x 122 mm (4.803 in) x 45 mm (1.772 in)
<b>Weight: Touch Pad (without power)</b>	0.555 kg (1.224 lb)
<b>Control interface</b>	Color touch screen TFT 5.7" (640 mm x 480 mm) - backlit with leds - type: resistor
<b>Master USB</b>	x 2
<b>SD card reader</b>	FAT 32 - SD HC-compatible
<b>Power connector</b>	Jack
<b>Keyboard</b>	USB
<b>On/Off</b>	Yes
<b>Battery</b>	li-ion - autonomy: 1 hour

## 9. Accessories available upon request

### ■ Tailstock (pen engraving: M20 - M20 JEWEL)

<b>Pen: diameter</b>	28 mm (1.102 in) (maximum)
<b>Pen: length</b>	70 mm (2.756 in) (minimum) 140 mm (5.512 in) (maximum)