FPD 60

DRILLING MACHINE WITH OPPOSED DRILLING HEADS

MACHINE SERIAL NUMBER	800
MANUAL CODE	2169N

GB ENGLISH

Edition 02/06

This manual must be kept for the entire life cycle of the machine to which it refers

378.010

SCHIATTI ANGELO
TRADITION, EXPERIENCE, INNOVATION

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Carefully consult this manual before doing any adjustment or maintenance services.

1.1. PURPOSE OF THIS MANUAL

This manual has been prepared by the Manufacturer and should be considered an integral part of the machine.It has been written in Italian (manufacturer's original) and translated into the language of the Country where the machine is to be used.
The manual defines the purpose for which the machine has been designed and built.
The information contained in the manual is aimed at all operators who may come into contact with the machine during the whole of its foreseeable life cycle.
This information is aimed especially at the operators who install the machine, those who use it and those who carry out routine maintenance operations.
If the instructions contained in this manual are correctly followed, the safety of personnel, operational cost effectiveness and longer machine life will be guaranteed.
In order to avoid carrying out incorrect manoeuvres with the consequent risk of accidents, this manual should be read carefully, especially when using the machine for the first time so as to allow the reader to familiarise himself with the main controls and functions of the machine.
To make this manual easier to consult, it has been divided into chapters and subchapters with the aim of keeping each subject independent according to operating procedures.
The analytical index at the beginning of the manual makes it easy to find the various subjects.
Keep this manual in its special container so that it is always within easy reach for rapid consultation.
Parts of the text that must not be disregarded are printed in heavy type and preceded by the symbols that are illustrated and defined as follows:

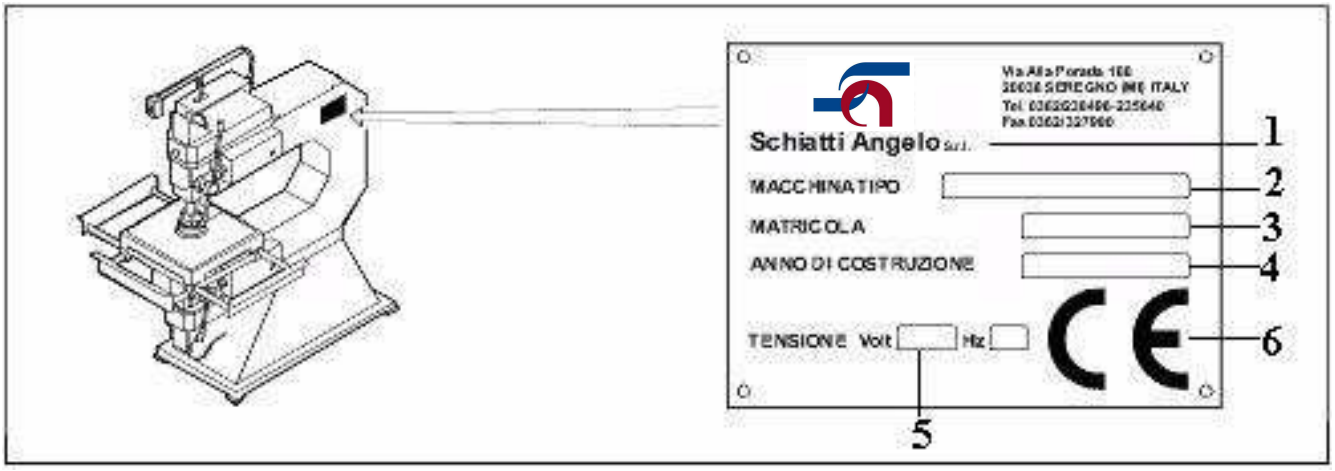
DANGER-WARNING: This symbol indicates that attention must be paid in order not to create situations that could harm the operator.

CAUTION: This symbol indicates that attention must be paid in order not to create situations that could damage objects.

INFORMATION: Particularly important information.

1.2. IDENTIFICATION OF MANUFACTURER AND MACHINE

Plate shows all the information regarding the marking of the machine.



Key:
1) *Name and address of manufacturer.*
2) *Machine type/model.*
3) *Series number.*
4) *Year of construction.*
5) *Mains voltage and frequency.*
6) *CE conformity mark.*

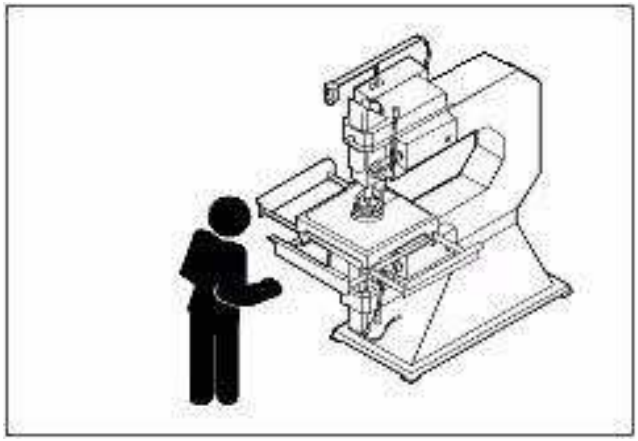
INFORMATION: Please quote these references whenever requesting information and/or spare parts. It is also important to send detailed information regarding any faults found and indicate the approximate number of machine working hours.

1.3. LIST OF APPENDICES

The following documents are attached to this manual:
Wiring diagram: essential to enable the skilled operator to carry out work on the electrical system.
Pneumatic diagram: essential to enable the skilled operator to carry out work on the pneumatic system.
Hydraulic diagram: essential to enable the skilled operator to carry out work on the water system.
Spare parts catalogue: for ordering original spare parts.

2.1. GENERAL DESCRIPTION OF THE MACHINE

The **FPD 60** series drilling machine has been designed and built to drill holes using tools with opposed heads in sheets of glass.



It is a multi-purpose machine as it can work in different modes (manual, semiautomatic, automatic).

Two different versions have been built to satisfy the various requirements of the glass industry.

A series of safety devices have been incorporated into the machines so as to prevent danger to operators and other personnel that may come into contact with the machine during its foreseeable life cycle.

It must always be remembered that glass by nature presents risks that the operator must bear in mind when using the machine.

These types of machine can drill holes in sheets of glass from 2 to 28 mm thick.

It is equipped with 2 speed motors and prismatic pulleys that can be selected according to the kind of work to be carried out.

These machines are normally used in areas specifically equipped for working glass; they can be used by just one operator who can be helped by a second person for loading and unloading sheets of glass.

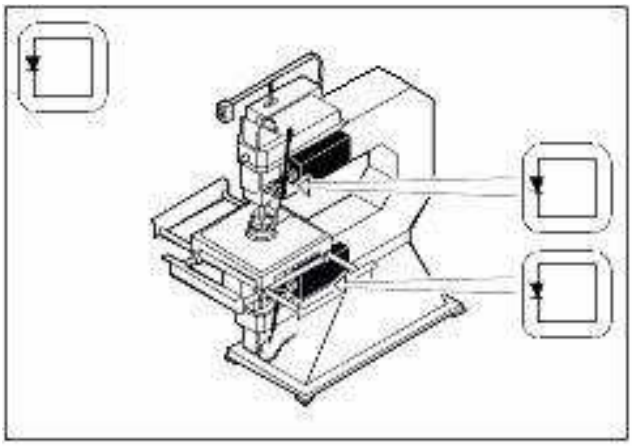
If the sheets of glass are very large and heavy (over 30 kg), they must be moved with suitable equipment.

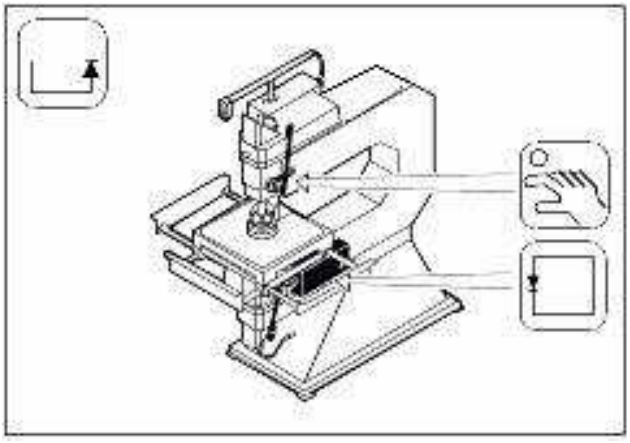
The operator, as well as being professionally prepared and possessing specific skills in the sector of machines for working glass, must also be suitably self-trained.

2.2. DESCRIPTION OF THE MODELS

Two different models of the machine are available according to the type of processing to carry out. The diagram shows the layout of each model.

FPD 60 Semiautomatic
This is equipped with an automatic pneumatic mechanism on the lower spindle and a manual device on the upper spindle.It is also equipped with automatic mechanisms for the glass clamp and the head cover.





FPD 60 Automatic
This is equipped with an automatic pneumatic mechanism on the upper and lower spindles.
It is also equipped with automatic mechanisms for the glass clamp and the head cover.

2.3. DESCRIPTION OF MAIN UNITS

A - Base; main machine structure.

B - Work surface with extensions; this is the surface on which the sheet of glass is placed during processing; it is equipped with extensions to allow the glass to be perfectly positioned.

C - Upper spindle; this is a belt driven rotating element to which the upper drilling head is fixed.

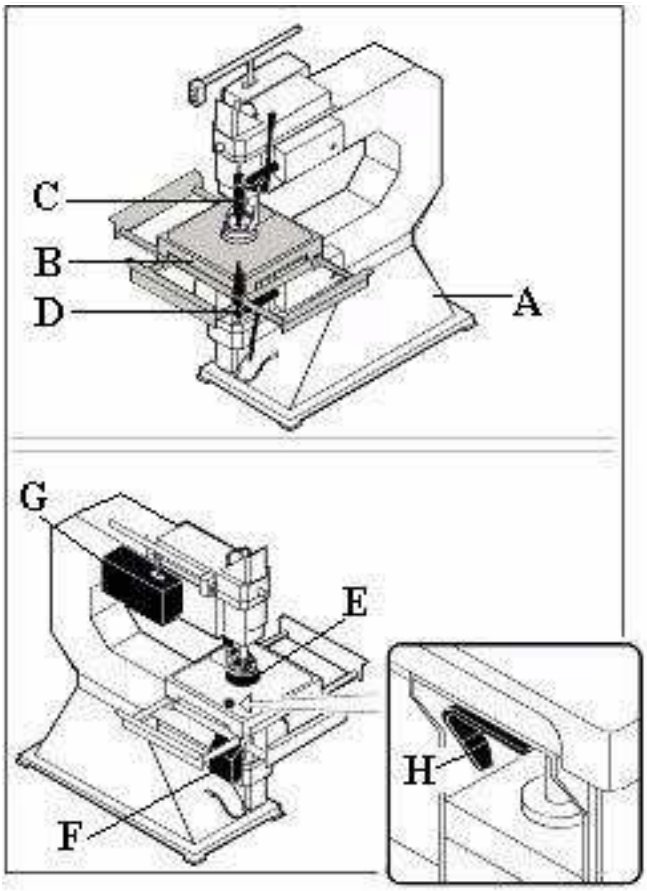
D - Lower spindle; this is a belt driven rotating element to which is fixed the lower drilling head.

E - Glass clamp; this is a pneumatically controlled device that clamps the sheet of glass to the work surface during processing.

F - Glass refuse container; this is the container where residue material (glass residue) is collected.

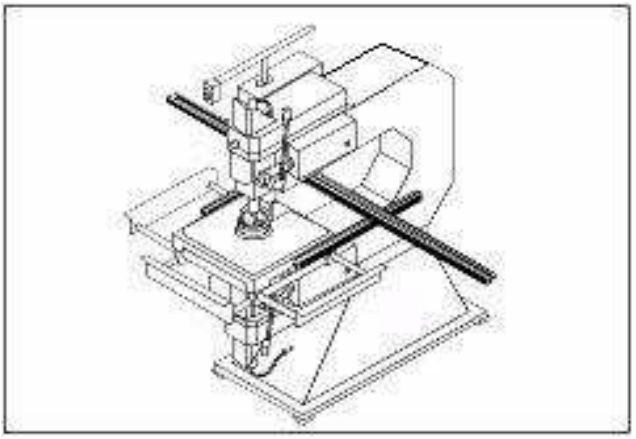
G - Control panel; this includes a button panel that controls all functions.

H - Lower head cover; this is a pneumatic device that prevents the glass-refuse from enter in the lower head.

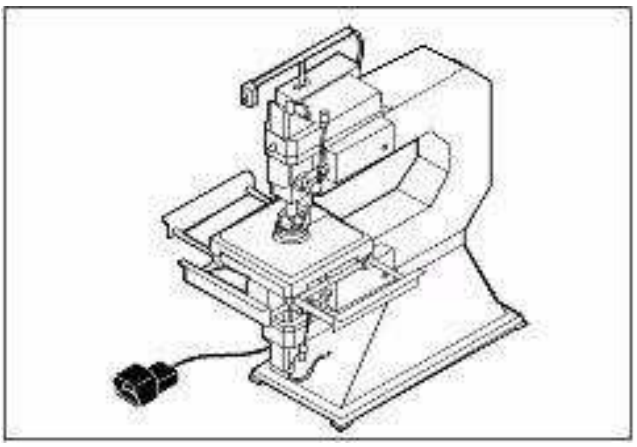


2.4. OPTIONAL UNITS

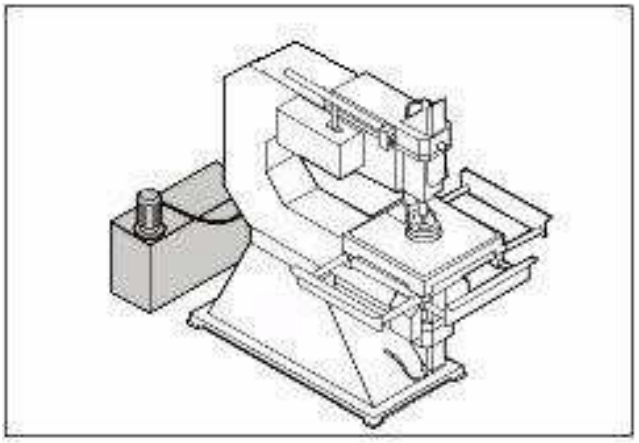
A - Glass support line with mobile support points. Allows the sheet of glass to be positioned and multiple drilling operations to be carried out.

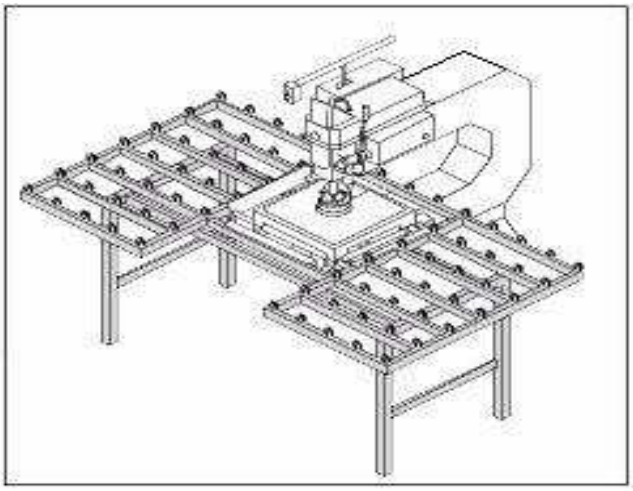


B - Foot switch for starting the automatic drilling cycle.

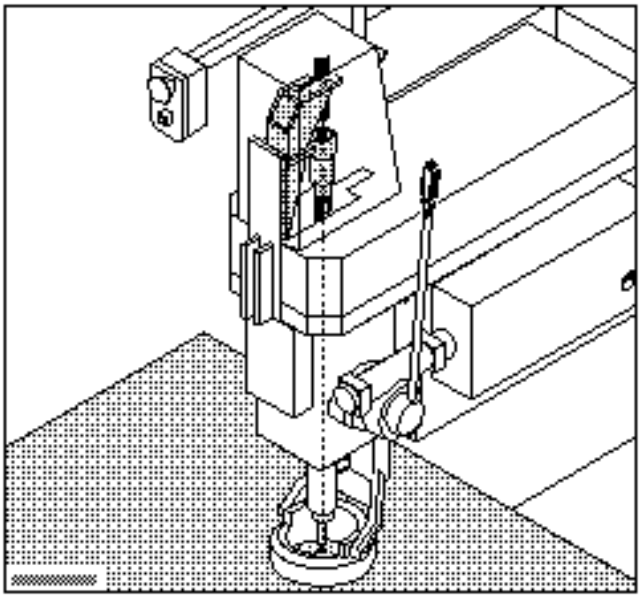


C - Pump and tank for water; contains the water for cooling the heads.





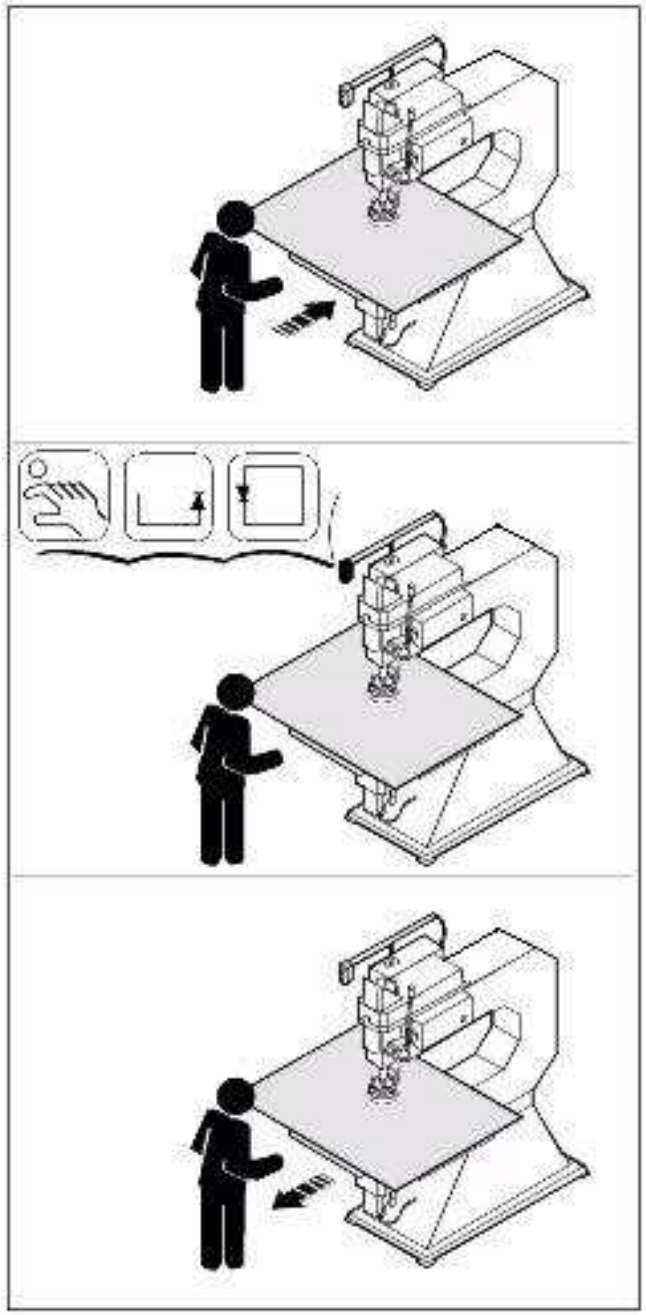
D - Supporting table for glass with castors; this allows large pieces of glass to be positioned. A pneumatic command automatically raises and lowers the table.



E - Laser device; a laser aiming device which helps the operator to position and centre the glass sheet to be worked.

2.5. WORK CYCLE

The main phases of a complete work cycle are described and illustrated in chronological order as follows:



In this area the operator loads the sheet of glass to be processed. The sheet of glass is loaded manually or with suitable equipment onto the supporting surface.

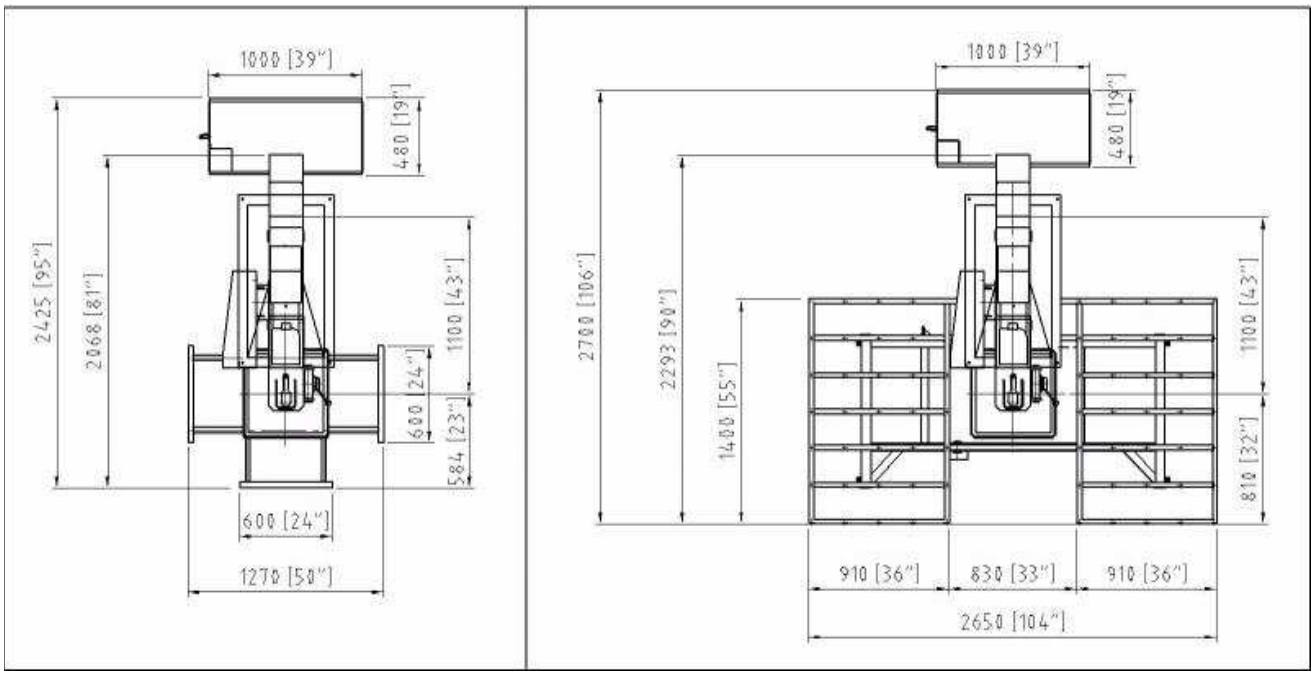
The operator starts the work cycle in one of the following modes: manual, semiautomatic, automatic, and the sheet of glass is drilled.
It is possible to drill single or multiple holes.

At the end of the cycle the operator unloads the sheet of glass manually or with suitable equipment.

2.6. TECHNICAL SPECIFICATIONS

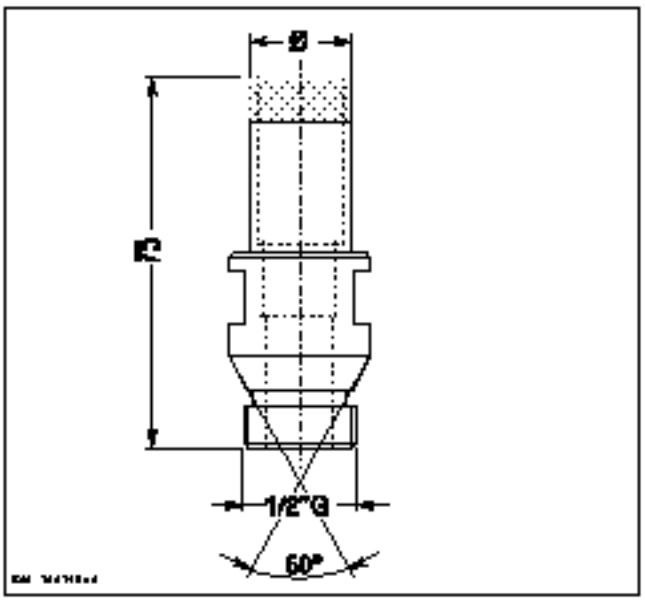
Useful thickness of glass	minimum 2 mm, maximum 28 mm.
Depth of arm	1030 mm
Total power	Kw 2.6
Tank capacity	lt 88
Air consumption	Nl/min 55 (with table) Nl/min 45 (without table)
Overall dimensions	width 1270 mm length 1905 mm height 1750 mm
Work surface	1050 mm
Weight	Kg. 470
Speed of spindles	r.p.m. 450/2450 max. 50 Hz r.p.m. 550/2900 max. 60 Hz with two motor speeds and three speeds with prismatic pulleys.
Drilling capacity (diameter)	automatic cycle from 2 to 100 mm, manual cycle up to 200 mm.

INFORMAZIONI: Only on specific request, some components are supplied to drill diameters higher than 130 mm up to a maximum of 200 mm.



2.6.1 Specifications of heads

The machine is supplied with heads to install on the lower and upper spindles. Heads must be replaced by those available on the market with the specifications shown in the diagram (thread, taper, height, etc.).



P.S.: Use the suitable tool for the processing of laminated glass.

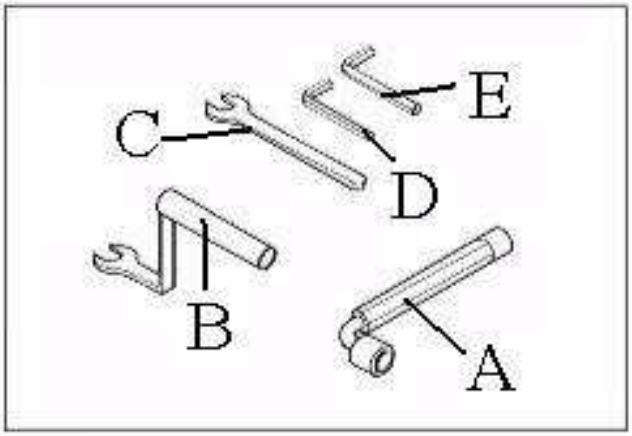
Legend: **ø)** *Variable diameter*

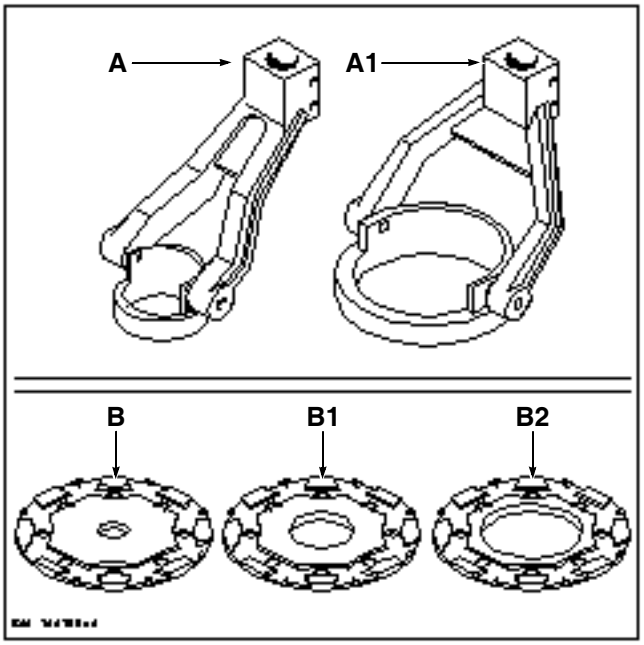
2.7. MACHINE EQUIPMENT

Equipment

The machine is supplied with a tool kit containing:

A - Socket wrench 17 mm USAG 289N
B - Wrench 22 mm USAG 248
C - Wrench 30 mm USAG 248
D - Allen wrench 6 mm USAG 280
E - Allen wrench 8 mm USAG280





Supplied components

A - Small fork complete with glass clamp support disk (hole 65 mm); to place on the upper spindle

A1- Large fork complete with glass clamp support disk (hole 120 mm); to place on the upper spindle.

B - Rubber disk (hole 30 mm) to place on the support table.

B1- Rubber disk (hole 65 mm) to place on the support table.

B2- Rubber disk (hole 130 mm) to place on the support table.

2.8. NOISE LEVEL

Measurement of the average noise level carried out under operating conditions according to current law.
Dry run noise ..... < 70 dB (A)
During operation the noise level depends on many factors such as the wear and tear of the wheels and the spindle bearings, the kind of work being carried out, etc..

DANGER-WARNING: a prolonged exposure to noise levels exceeding 85 dB(A) may be hazardous to your health. The use of individual hearing protection devices (headset, ear plugs, etc.) is recommended.

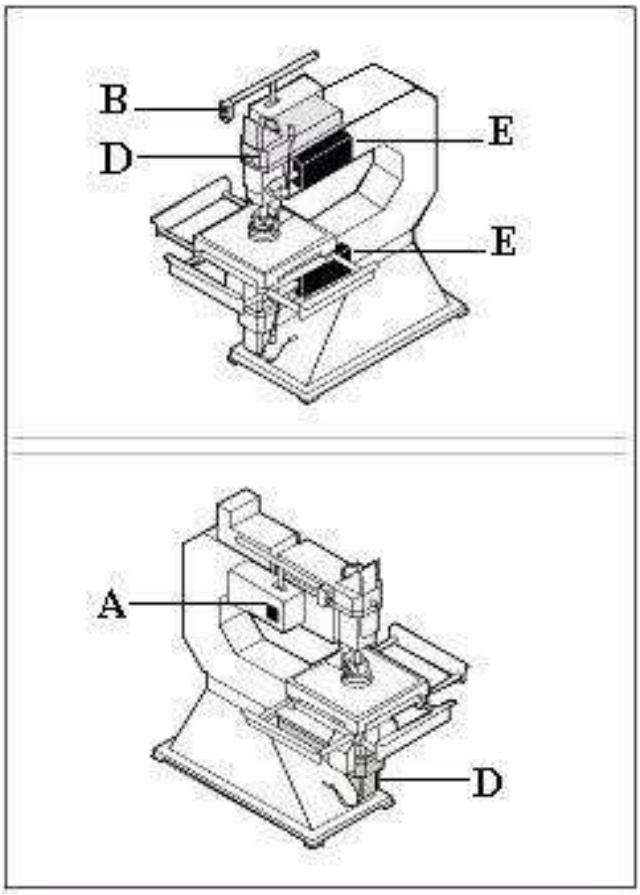
2.9. SAFETY DEVICES

A - Main switch with padlock; this disconnects the machine from the mains supply and can be locked to prevent other people from tampering with it.

B - Emergency stop button; this stops the machine immediately in case of danger.
It must be reset before work can be resumed.

D - Interlocked mobile covers; these are two protection coverings that protect the spindle drive. When it opens the machine stops immediately. The interlocking device prevents the cycle from being started until the covers have been closed.

E - Fixed covers; these prevent the operator from entering the area of the spindle drive cylinders.



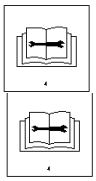
2.10. SAFETY AND INFORMATION SIGNS

1 -  **Read the manual carefully** before working on the machine

2 -  **Wear protective gloves.**

3 -  **Wear protective shoes.**

4 -  **Danger of electric shock!**
Do not enter this area if the machine is connected to the mains supply.

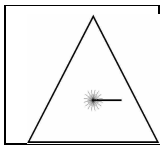
5 -  **Generic danger!**
Read the manual carefully before working on the machine.

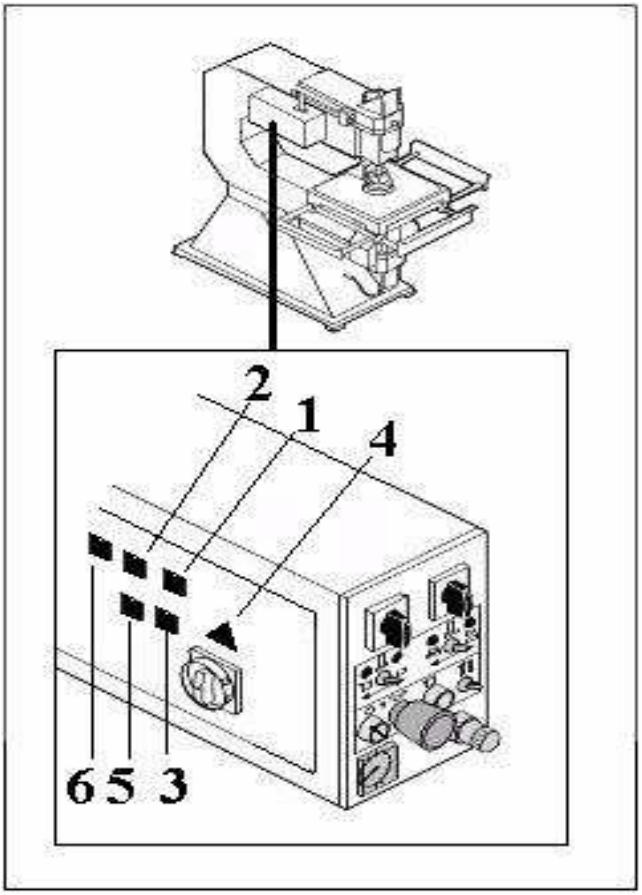
6 - 

While handling and using the products, personnel must wear goggles.

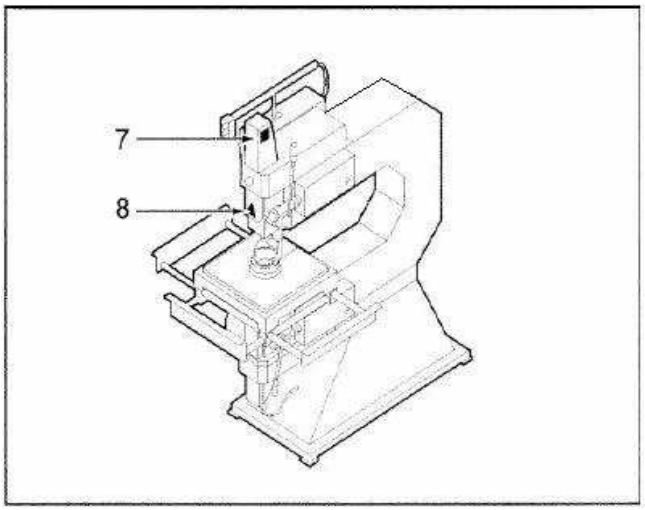
7 - 

Laser radiation information sign; do not stare into the beam with the naked eye or with any optical instrument.

8 -  **Danger sign!** Laser beam.



With laser device (optional extra)



3.1. GENERAL SAFETY REGULATIONS

Carefully read this instructions and maintenance manual before starting up and using the machine, performing maintenance or any other operation.

- ❏ The manufacturer declines all the responsibilities for the damages caused to persons or objects deriving from the non-observance of safety regulations.
- ❏ The operator must be qualified to use a complex machine.
- ❏ Do not allow unauthorised people to repair or work on the machine.
- ❏ Experience teaches that people wear various objects that can cause serious injury: before starting work remove all necklaces, watches, etc..
- ❏ Button up the sleeves of work clothes around your wrists.
- ❏ Do not wear loose clothes that could get caught up in MOVING PARTS.
- ❏ Always use strong work shoes as envisaged in accident prevention laws all over the world.
- ❏ Handle the sheets of glass using appropriate protective gloves that do not reduce finger sensitivity.

DANGER-WARNING: scrupulously observe all the attention, danger and caution notes contained in this manual and the safety plates located directly on the machine.

3.2. SAFETY WHEN LIFTING AND INSTALLING

- ❏ To machine shall only be moved and loaded on vehicles in strict compliance with the instructions provided in chapter 4.
- ❏ Always be careful not to harm people or to damage the machine or parts of it.
- ❏ The machine should only be moved and installed by technically competent personnel. The presence of an assistant is very important for signalling during transport and physical help during installation and removal of bulky and/or heavy objects.
- ❏ Take all the necessary precautions, as indicated in the safety regulations, when lifting and transporting the machine so as to avoid harming people or damaging objects.

- ❏ No-one may approach the machine when it is raised or enter the area of movement of the crane, fork-lift truck or any other instrument used for lifting and transport.
- ❏ The work area shall be well lighted, with outlets available for compressed air, electrical power, and recycling water.
- ❏ Connection to the main supply and preliminary testing of the machine may only be carried out by a qualified electrical installer using suitable equipment and with proven experience in the specific sector. Any work on the electrical circuit must only be carried out by specialized technical personnel, expert in the sector.
- ❏ The earthing system must be checked and approved by a specialized installer using appropriate specific instruments.

3.3. SAFETY WHEN USING THE MACHINE

- ❏ The operator may not be disturbed or distracted in any way while the machine is working.
- ❏ The safety guards that protect the operator and the machine must always be installed and in perfect working order.
- ❏ Carry out the operating cycle start up sequence scrupulously following the instructions shown in this manual.
- ❏ Do not enter the operating area of the machine while it is working.
- ❏ Do not place your hands or other objects near or inside moving or live parts of the machine or in the electrical control panel.
- ❏ Make sure that the work place is kept clean and free of any obstruction to allow the loading, unloading and the correct stacking of the sheets of glass, without causing obstructions and danger.
- ❏ Do not use bent or broken tools. Always use well sharpened tools that are suitable for the job to be carried out. Fix each tool safely.
- ❏ Before starting work check the working area for any dangerous conditions.
- ❏ Do not work without sufficient illumination: use all the available lights making sure they work well.
- ❏ Before starting work make sure there is no-one in the working area.
- ❏ Never leave the machine unguarded while it is working.
- ❏ Do not use the controls or hoses as supports.
- ❏ Always have a clear view of the whole working area.
- ❏ Never open hatches or safety guards while the machine is working.
- ❏ When stopping work, switch off the machine. In case of prolonged interruptions, turn the main switch to the **O** (OFF) position.
- ❏ Concentrate well and take all necessary precautions before using the machine.
- ❏ Before starting the machine make sure that no foreign bodies have been left on it.
- ❏ If the machine should stop for any reason that requires access to be made to the electrical control cabinet, turn the main switch to the **O** (OFF) position. Inform the factory manager and the production line manager of the problem and the conditions in which it occurred. The emergency controls must be activated by the operator to check they are in perfect working order.
- ❏ Before starting the machine make sure no maintenance or cleaning operations are being carried out.
- ❏ It is absolutely forbidden for the operator to use the machine for any purposes other than that for which it has been built.

- ❏ Although the electrical panel is equipped with its own protection system, it is absolutely forbidden for the operator to open it if he does not possess the authorisation guaranteeing his proven experience in operations of this kind.

3.4. SAFETY WHEN CARRYING OUT MAINTENANCE WORK

Do not allow unauthorised personnel to make repairs or carry out maintenance operations. Carefully read the Use and Maintenance Instructions Manual before carrying out maintenance operations on the machine.

- ❏ Turn the main switch to **O** (OFF) and padlock it before carrying out maintenance work.
- ❏ Do not lubricate, repair or adjust the machine while it is working.
- ❏ Whenever parts of the machine must be dismounted or installed, make sure they are supported by lifting equipment sufficiently strong for the weight it must sustain. Transfer the load onto appropriate supports or stands.
- ❏ Do not work underneath or near a piece of equipment that is not adequately supported and fixed.
- ❏ Keep people away from equipment when it is being lifted so as to avoid dangerous situations.
- ❏ Do not use matches, lighters or torches.
- ❏ When repairs or maintenance work must be carried out in areas that cannot be reached from the ground, use a ladder or a platform with steps complying with local or national laws to reach the working area.
- ❏ Carry out all repairs and maintenance operations with care.

INFORMATION: periodic cleaning and maintenance operations are indispensable if the machine is to work properly and have a long life.

4.1. PACKING AND DELIVERY

To make transport easier the machine is supplied with its external components disassembled.

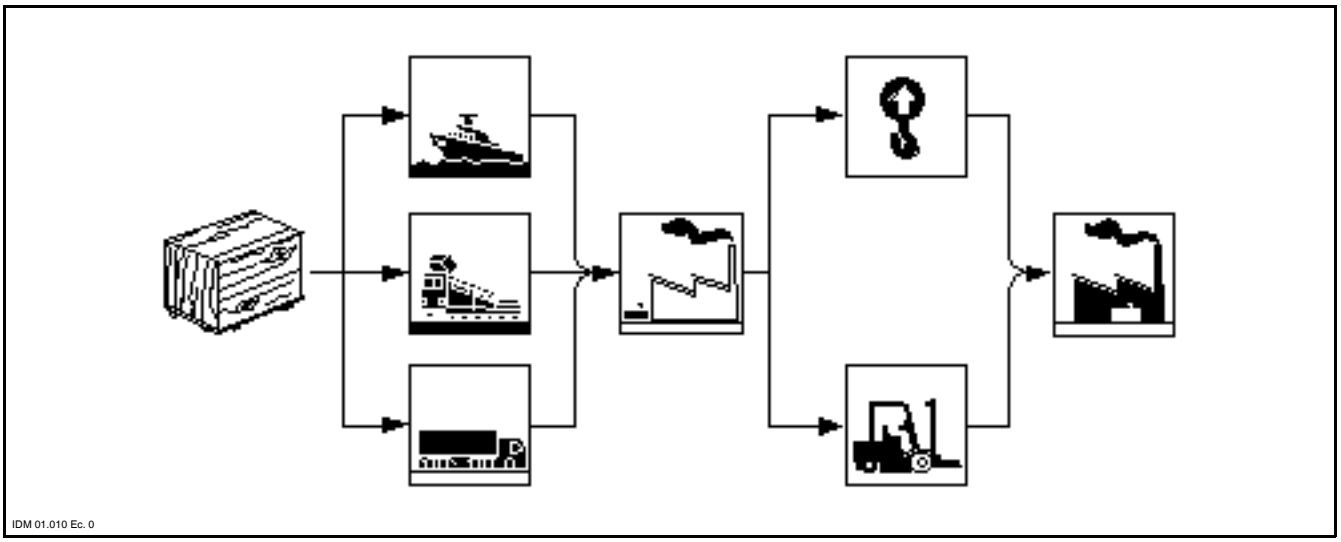
It is covered with waterproof material and packed in a wooden crate or cage.

All the components, suitably covered and fastened, are placed inside the crate.

The crate is normally delivered with the following means of transport:

- *road;*
- *rail;*
- *sea.*

The crate is marked with all the information necessary for loading and unloading operations.



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Loading and unloading

The crate can be loaded and unloaded by lifting it with a forklift truck or with a hook.

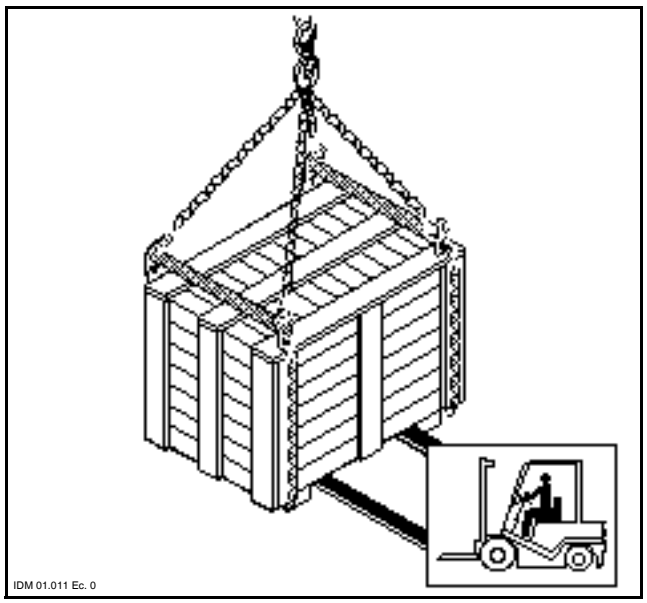
CAUTION: the persons who load, unload and move the crate must have proven capacity and experience in these specific sectors and be perfectly acquainted with the relative lifting equipment.

Unpacking

The crate must be opened as follows:

- *remove the upper cover;*
- *remove the sides;*
- *remove the waterproof material and the components fixed to the machine taking care to support them while they are being removed.*

INFORMATION: the machine does not require cleaning. In no case should solvents or corrosive substances be used.



4.2. INSTALLATION - SURROUNDING AREA

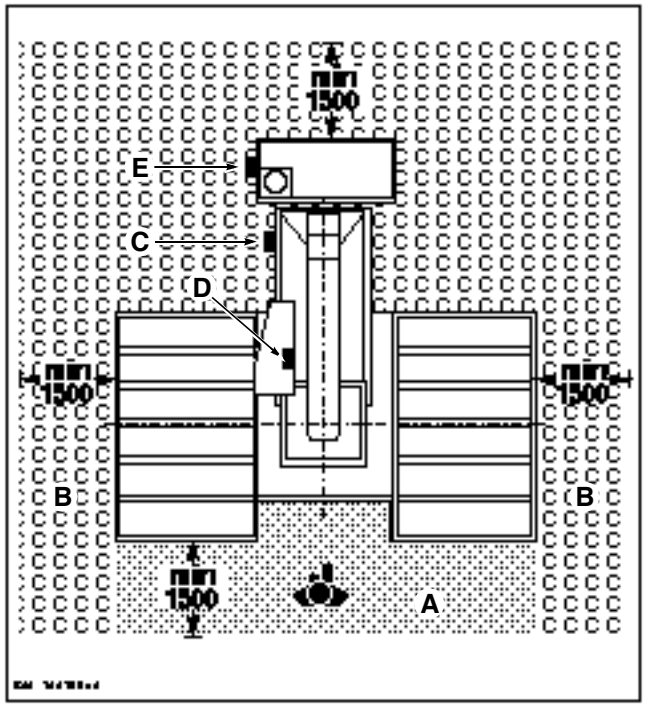
Designate an area of adequate size for the sheets of glass to be worked.

The working area must be suitably delimited so as to prevent collisions between the operator and vehicles.

The chosen area must be well illuminated and a mains supply socket, a compressed air outlet and a water tap must be nearby.

Check the load and the surface of the floor as the base of the machine must lie perfectly level.

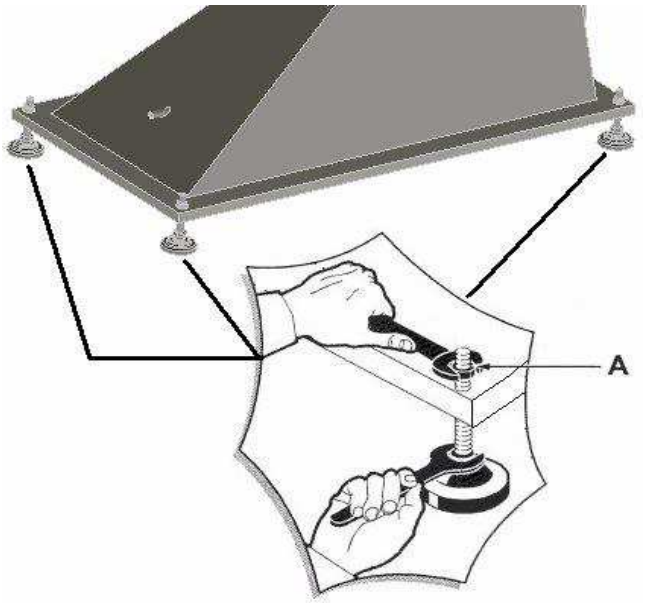
This operation shall always be performed in compliance with current work safety laws and regulations.



Legend:
A) *Operator position.*
B) *Surrounding inspection area.*
C) *Compressed air connection point.*
D) *Mains supply connection point.*
E) *Recycled water drain point.*

4.3. LIFTING AND PLACING THE MACHINE

DANGER-WARNING: movement and lifting operations must be carried out with suitable equipment by expert operators trained for these kinds of manoeuvres.

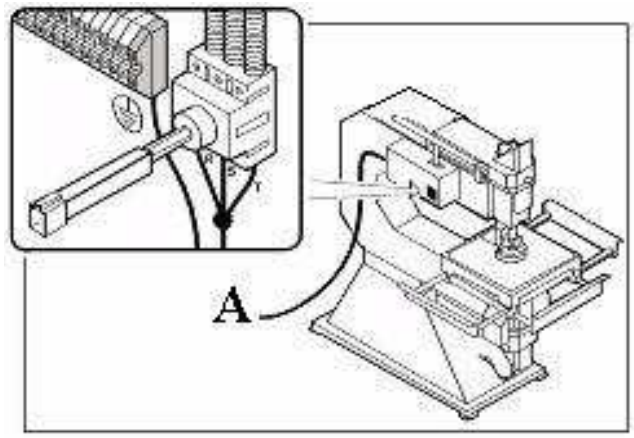


Lifting with hooks

- *Lift the machine with a crane or a bridge crane using cables of adequate diameter.*
- *Place the machine in the required area.*
- *Check that the base rests perfectly on the floor.*
- *Level the machine lengthwise and transversely using screws **A**.*

4.4. ELECTRICAL CONNECTIONS

DANGER-WARNING: the panel must be connected to the mains supply by a specialised electrical installer.

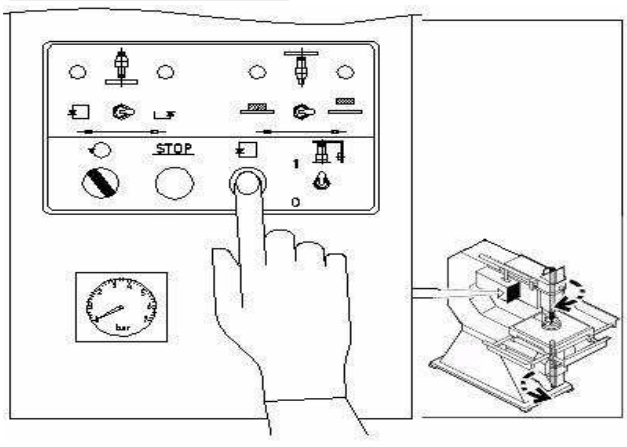


Use appropriate instruments to make sure that both the factory earthing system and that of the section of the line to which the machine will be connected is in perfect working order.

Check that voltage (V) and frequency (Hz) correspond to that of the machine. (See identification plate and wiring diagram).

Turn the main switch to **O** (OFF).

Lay the mains supply cable **A** near the electrical control cabinet.



Introduce the cable into the supplied cableholder.

Open the door of the control cabinet containing the electrical equipment and connect the supply cables to the isolator terminals (**R-S-T**).

The green and yellow earth cable should be connected to the screw marked with the symbol ⏚

Start the cycle and check that the spindles rotate in the correct direction; if not, invert two of the three phases on the terminal board of the isolating switch.

4.5. PNEUMATIC CONNECTIONS

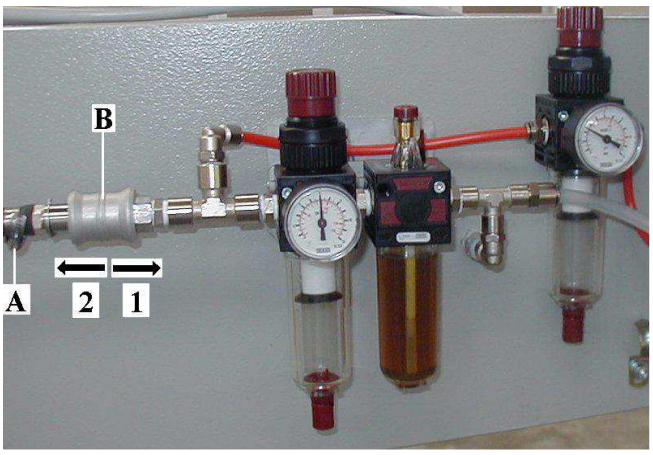
Compressed air working pressure ..... min 6 bar

Compressed air connecting socket ..... 1/4”

The air must be dry and well filtered.

The pneumatic tube must be attached to the hose connection located at the filter/lubricating unit entrance, and tightened with a screw clamp **A**.

The valve **B** must be in the **1** position to feed the machine.
With the valve in the **2** position the machine is not fed.

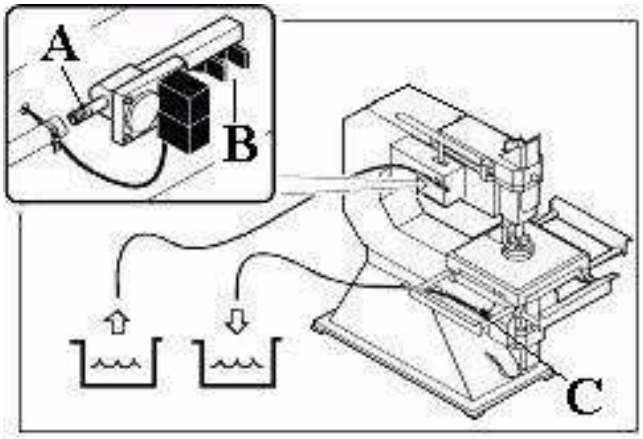


4.6. HYDRAULIC CONNECTIONS

INFORMATION: prepare a water supply to connect to the machine.

- *Connect the machine to the water supply with a hose that must be attached to the hose connector **A** and tightened with screw clamps.*
- *Taps **B** adjust the quantity of water that flows onto the heads.*
- *Fix a hose to the discharge mouth **C** and connect it to an external drain.*

DANGER-WARNING: observe all laws in force regarding water pollution.

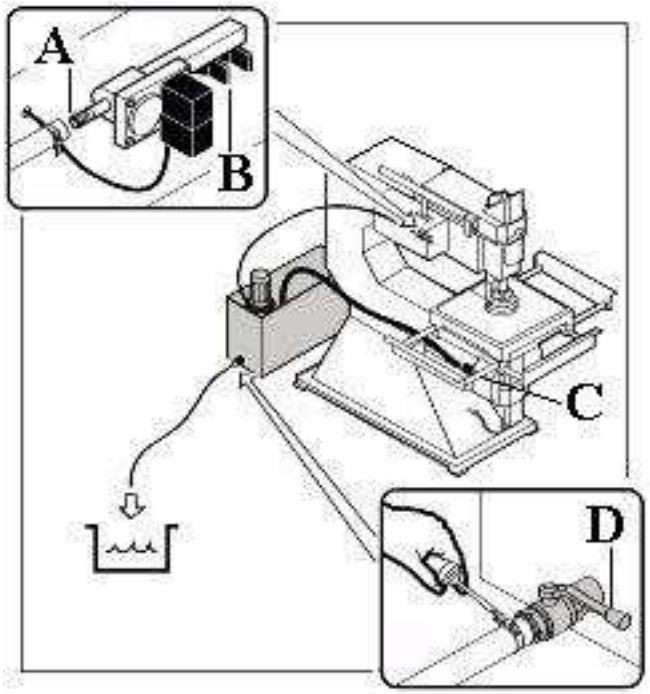


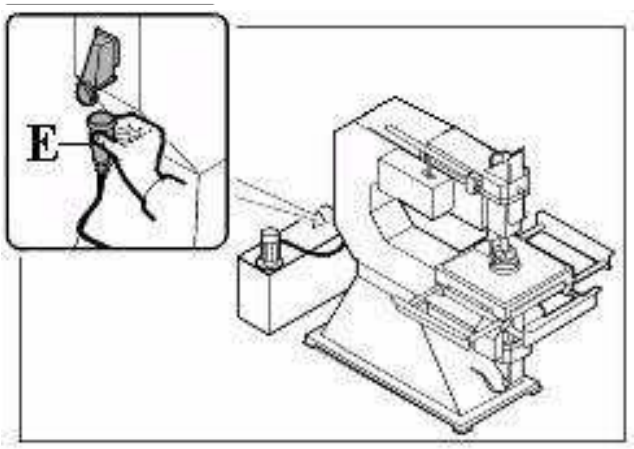
4.7. WATER TANK - INSTALLATION (OPT)

- *Place the water recycling tank at the rear of the machine.*
- *Connect the intake hose to the hose connector **A** and tighten with a screw clamp.*
- *Taps **B** adjust the quantity of water that flows over the heads.*
- *Fix a hose to the discharge mouth **C** and connect it to the tank.*

DANGER-WARNING: observe all laws in force regarding water pollution.

- *Attach a drain pipe to tap **D** of the tank and connect it to an external drain.*



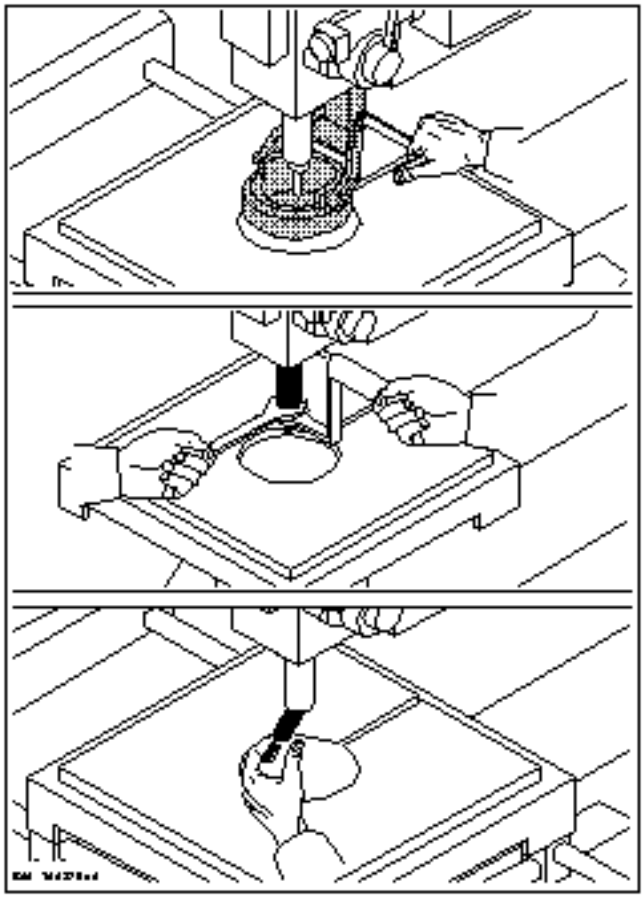


- *Connect plug **E** from the motor to the socket located on the frame.*

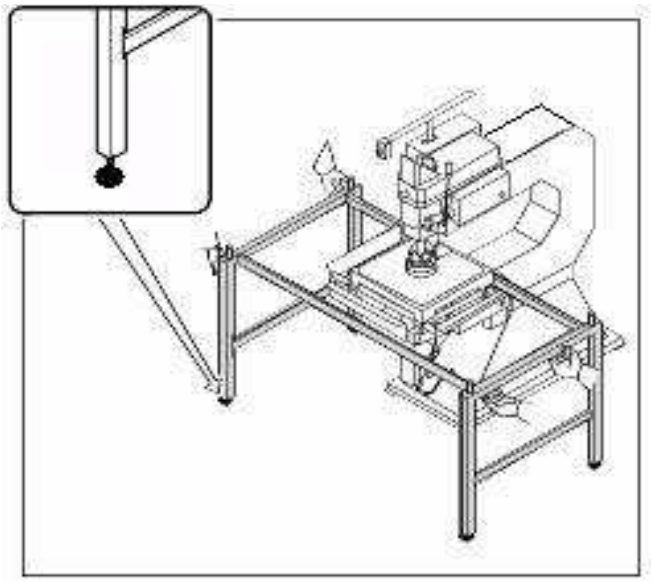
4.8. GLASS SUPPORT TABLE - INSTALLATION

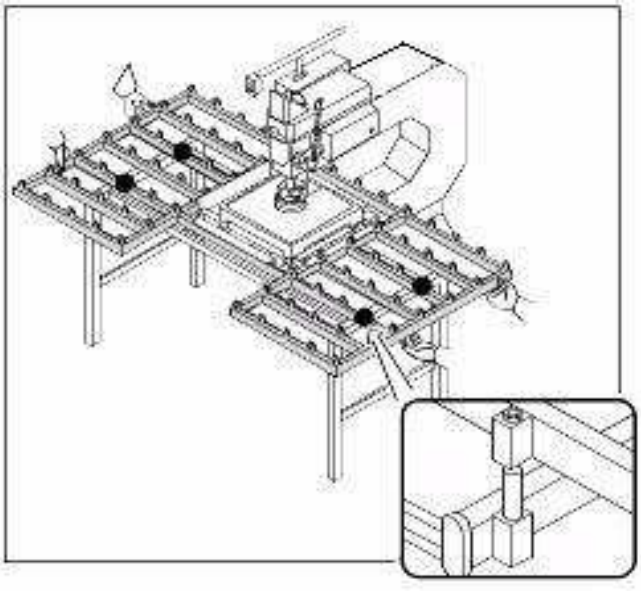
INFORMATION: mount and position the table with the help of another person.

- *Dismount the glass clamp unit and disk (See paragraph 6.5).*
- *Use the supplied wrenches to release the bit and remove it.*



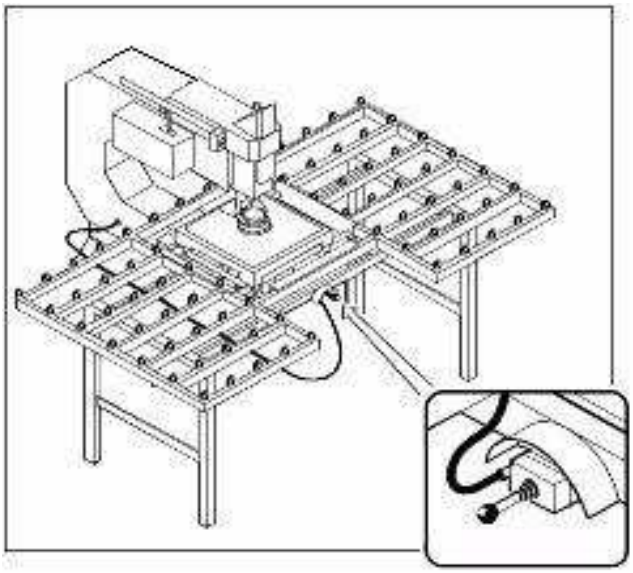
- *Fit the frame of the base as centre it with the support table of the drilling machine.*
- *Attach the adjustable feet to the legs of the frame.*

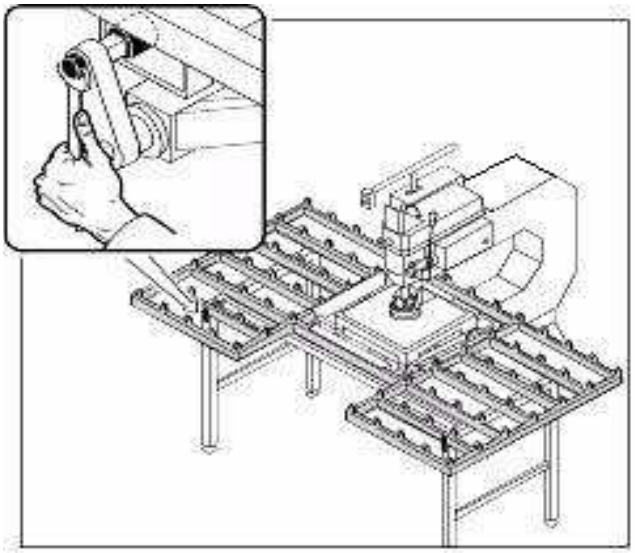




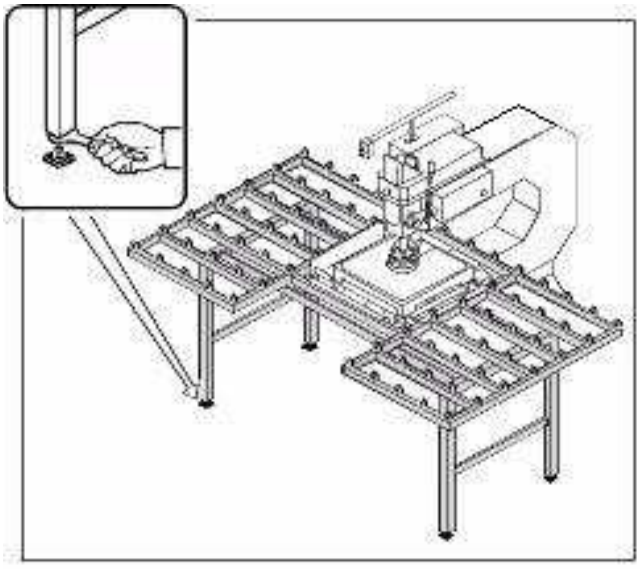
- *Fit the support table into the frame guides.*

- *Connect the compressed air tube to the rapid coupling of the valve located under the frame, making sure that the cylinder rod is fully withdrawn.*





- *Mount the bearings on the levers using the relative pins, making sure that these rest on the lower surface of the frame.*

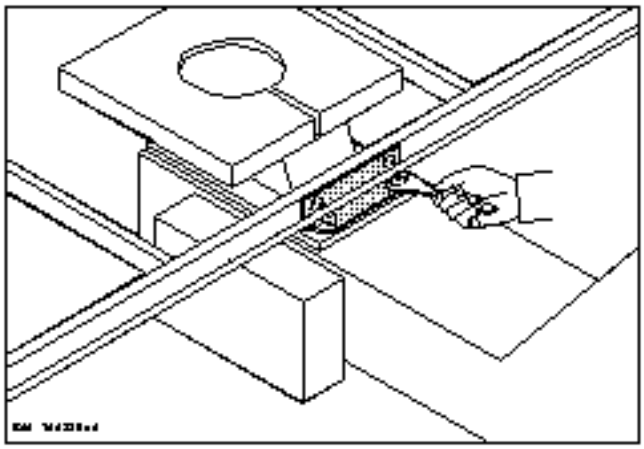


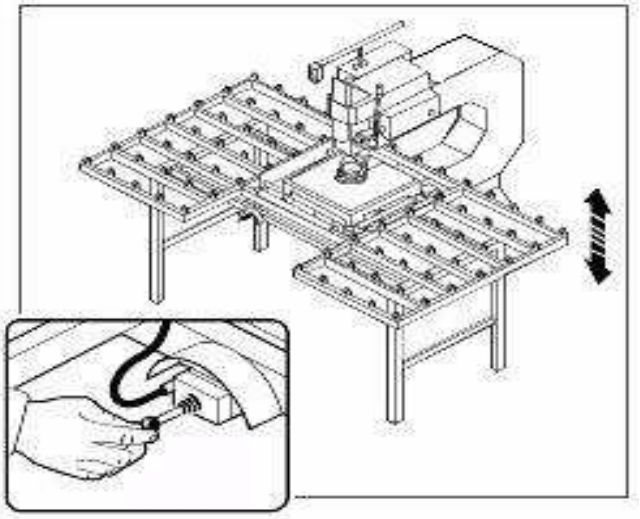
- *Level the support by moving the adjustable feet.*

INFORMATION: the support table must be on the same level or slightly lower than the drilling machine.

- *For fine adjustment place a sheet of glass on the surface and check that it is flush with the surface of the drilling machine.*

- *Fix the base structure to the body of the machine with the supplied bracket screws.*





- *Mount the ball bearings on the lever using the appropriate pin and making sure that this lies on the lower side.*
- *Remount the bit on the upper spindle and tighten by hand.*
- *Remount the glass clamp unit*

5.1. CONTROL PANEL

All the machine controls are located on the front panel; the electropneumatic controls are described as follows.

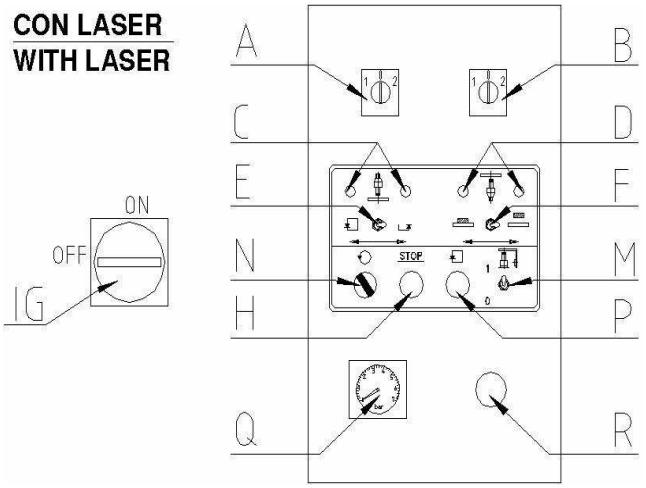
IG - General switch; this connects and disconnects the machine mains supply.
- *Pos. **0** (OFF) - the machine is disconnected*
- *Pos. **1** (ON) - the machine is connected*

A - 3 position switch; this selects the speed of rotation of the upper spindle.
- *Pos. **0** - spindle stopped*
- *Pos. **1** - minimum speed of spindle (refer to table located on the front of the machine for the number of revs)*
- *Pos. **2** - maximum speed of spindle (refer to table located on the front of the machine for the number of revs)*

B - 3 position switch; this selects the speed of rotation of the lower spindle.
- *Pos. **0** - spindle stopped*
- *Pos. **1** - minimum speed of spindle (refer to table located on the front of the machine for the number of revs)*
- *Pos. **2** - maximum speed of spindle (refer to table located on the front of the machine for the number of revs)*

C - Pilot lights; these signal the work phases of the upper head.
- *Green pilot light: upper head drilling phase begun.*
- *Red pilot light: drilling phase terminated.*

D - Pilot lights; these signal the work phases of the lower head.
- *Green pilot light: lower head drilling phase begun.*
- *Red pilot light: drilling phase terminated.*



E - 2 position switch; this selects the drilling cycle:
- Automatic cycle selected
- Semiautomatic cycle selected.

F - 2 position switch; this selects the glass clamp function.
- Glass clamp on
- Glass clamp off.

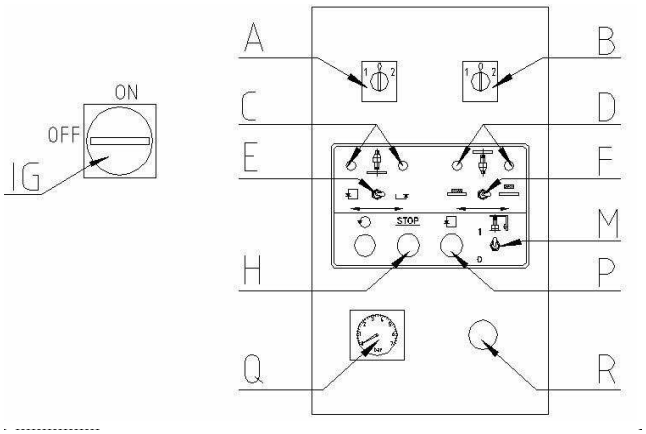
H - Mushroom head stop button; mushroom head button to stop the machine immediately.
- *Push to stop the machine*
- *Turn clockwise to reset*

M - 2 position selector; this selects the operation of the head cover.
- *Pos. **0** - Head cover off*
- *Pos. **1** - Head cover on*

N - 2 position red switch selector; activates the laser.
- *Pos. **0** - Laser off*
- *Pos. **1** - Laser on*

P - Green luminous button; starts the automatic cycle. Push to start the cycle; the button then lights up.

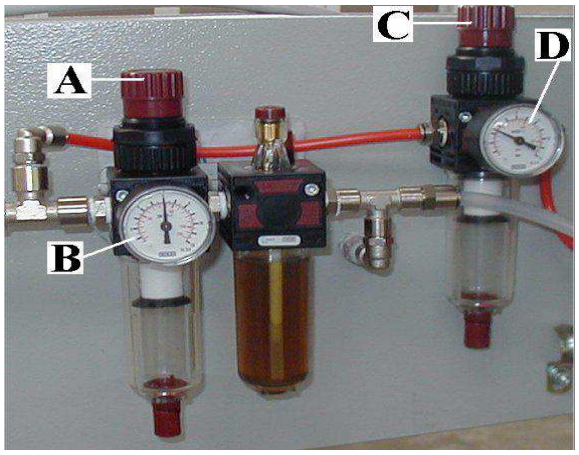
Q - Pressure gauge; this shows the pressure of the glass clamp (max 4 bar).
R - Regulator; this adjusts the working pressure of the glass clamp that can be seen on the pressure gauge.



5.2. WORKING PRESSURE CONTROL - ADJUSTMENT

In the frame of the drilling machine there are controls for the working pressure adjustment of the pneumatic circuit and the laser, if installed.

A - Regulator; this adjusts the working pressure of the pneumatic circuit that can be seen on the pressure gauge.
B - Pressure gauge; this shows the pressure of the pneumatic circuit (min 6 bars).
C - Regulator; this adjusts the working pressure of the laser.
D - Pressure gauge; this shows the pressure of the laser (max 4 bars).

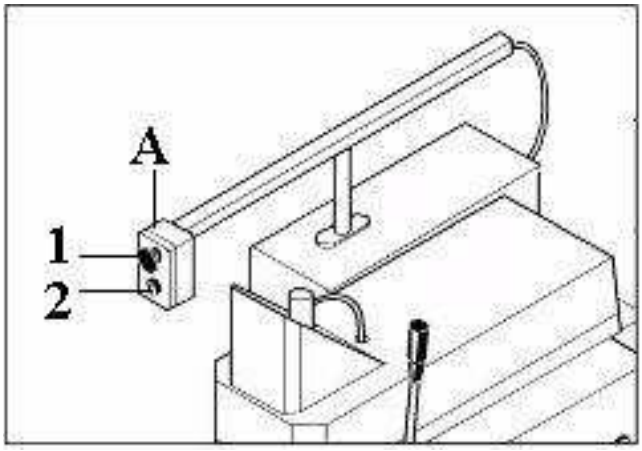


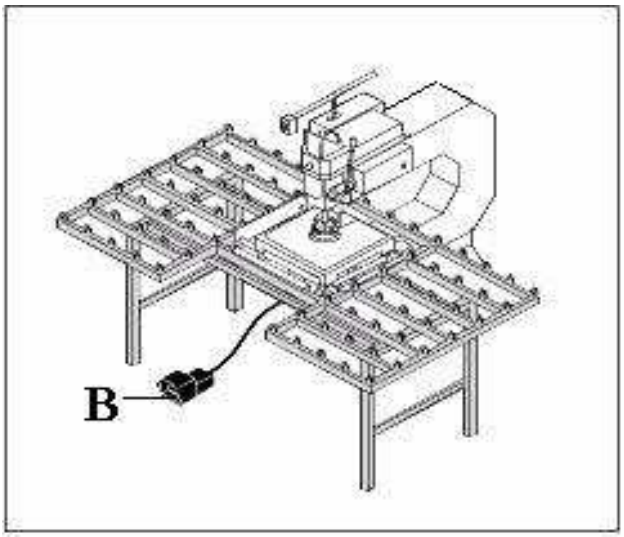
5.3. OPTIONAL CONTROLS

A - Supplementary push button panel
This push button panel allows the operator to start and stop the machine cycle from an accessible position; it is in fact installed on an adjustable telescopic support.

1 - Mushroom head stop button; this stops the machine immediately.
- *Push to stop the machine*
- *Turn clockwise to reset*

2 - Green button; this starts the automatic/semiautomatic machine cycle.
- *Press to start the cycle, the white pilot light on the control panel will light up.*

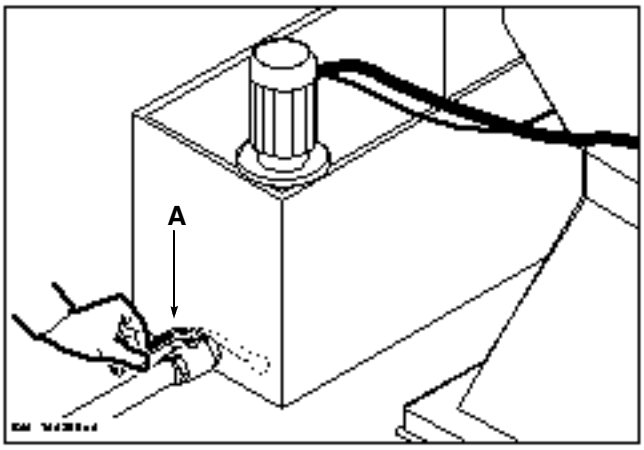


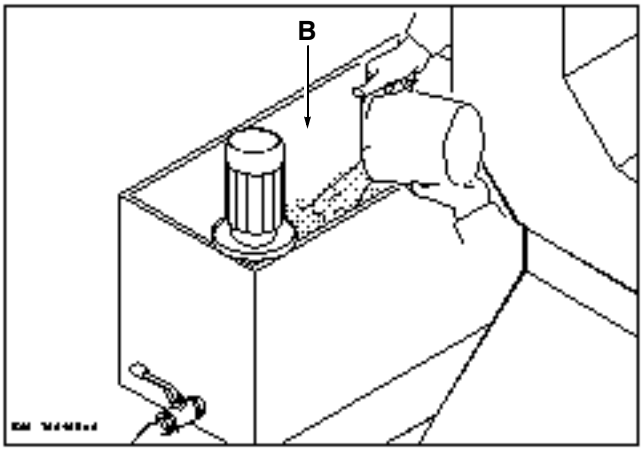


B - Foot switch
This starts the automatic drilling cycle; the operator's hands are free to hold the sheet of glass if necessary.

5.4. FILLING THE TANK (OPTIONAL)

- *Close drain tap **A**.*

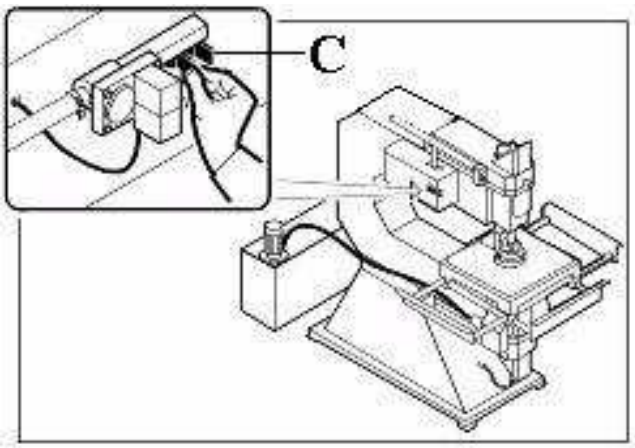




- *Fill tank **B** with water up to the level mark.*

- *Open intake taps **C** to the spindles.*
- *Start the cycle from the control panel; when the cycle starts water flows onto the heads through the spindles.*
- *Check that the correct quantity of water flows onto the heads.*
- *If necessary, move taps **C** to adjust the flow of water.*

INFORMATION: clean the tank periodically to guarantee good performance.

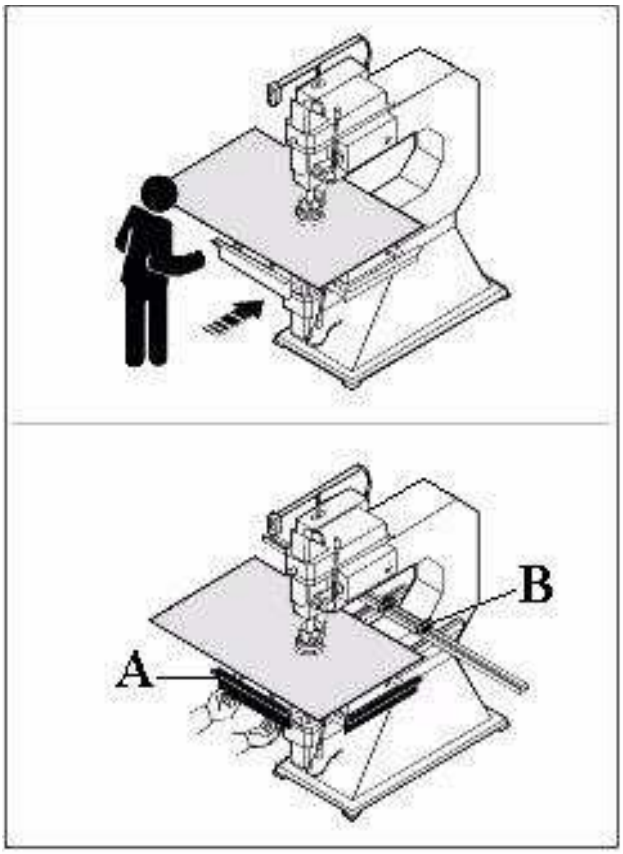


5.5. PLACING THE GLASS ON THE SURFACE

Load the sheet of glass onto the surface; if the sheet of glass is large use suitable lifting equipment.

If the glass is placed off balance with respect to the surface, adjust the extensions **A** according to the position of the glass.

When the machine is supplied with a glass support line it is possible to adjust the mobile supports **B** for multiple drilling operations.



5.6. PLACING THE GLASS ON THE TABLE (OPTIONAL)

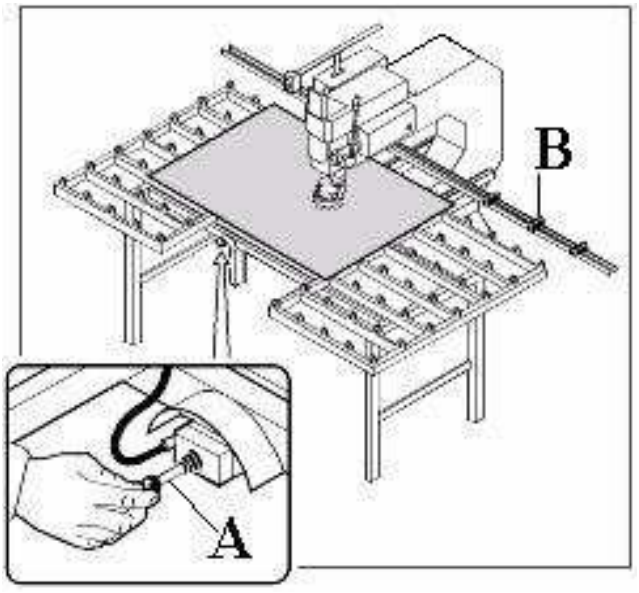
Make sure that the table is in its upper position by moving the lever **A**.

Load the sheet of glass onto the surface; if the sheet of glass is large use suitable lifting equipment.

Position the glass to be drilled with respect to the tool making it run with the castors.

When the glass is positioned, move lever **A** to lower the table.

The glass support line is equipped with mobile supports **B** that allow multiple drilling operations to be carried out on the glass.

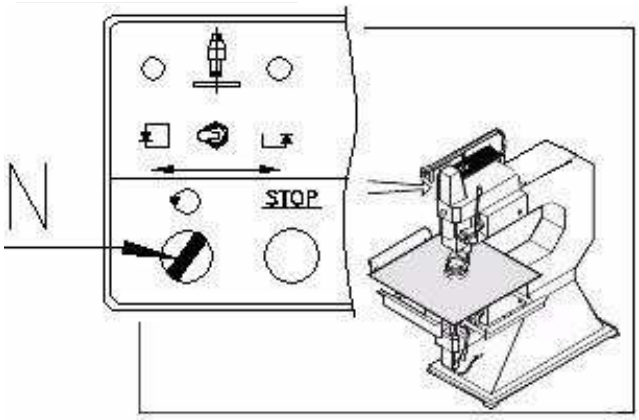


5.7. USE OF THE LASER (OPTIONAL)

Activate the electricity supply to the machine by turning the general switch to **1** (ON).

Load the glass sheet (paragraphs 5.5. - 5.6.) on the cutting table.

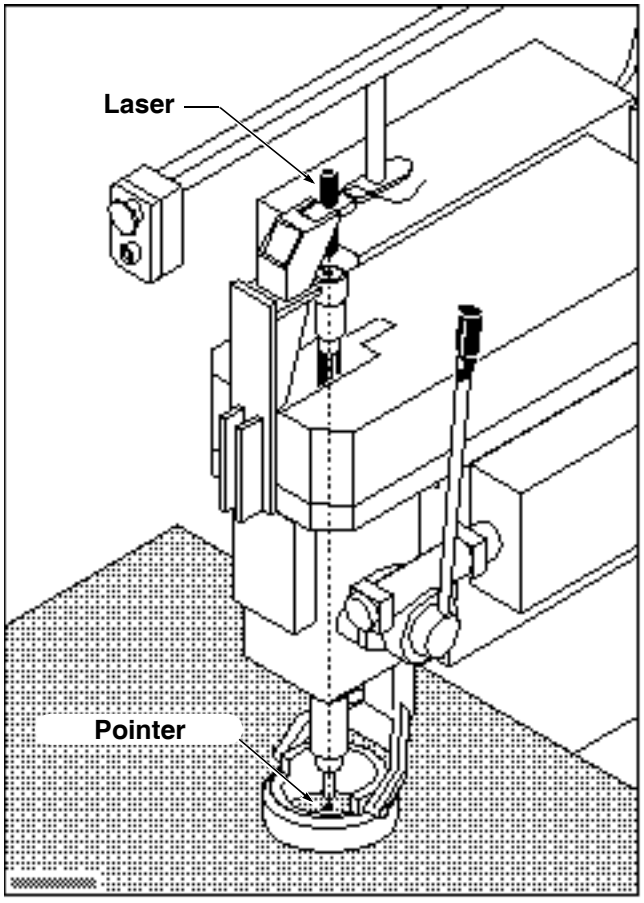
Activate the laser by turning the button, **N**; the button then lights up.



Check the sharpness of the laser beam on the glass sheet .

If the pointer should for any reason not be sharp, adjust as described in chapter 6.

The sequence for the start up of the cycle is described in paragraphs 5.8. ÷ 5.12.



5.8. AUTOMATIC CYCLE

Turn the general switch to **1** (ON) to supply mains power to the machine.

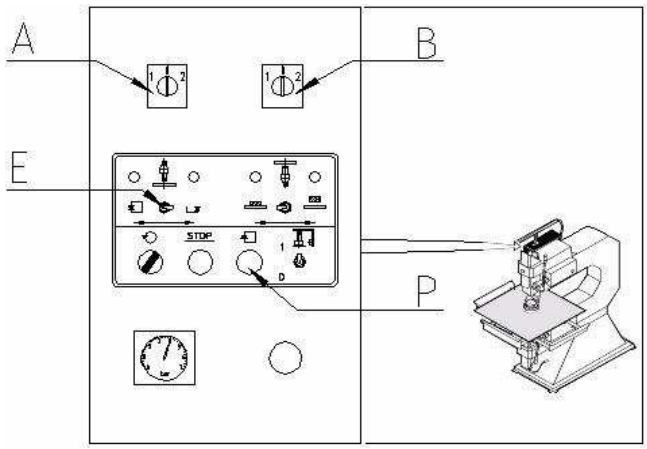
Load a sheet of glass (paragraphs 5.5.-5.6.) onto the surface.

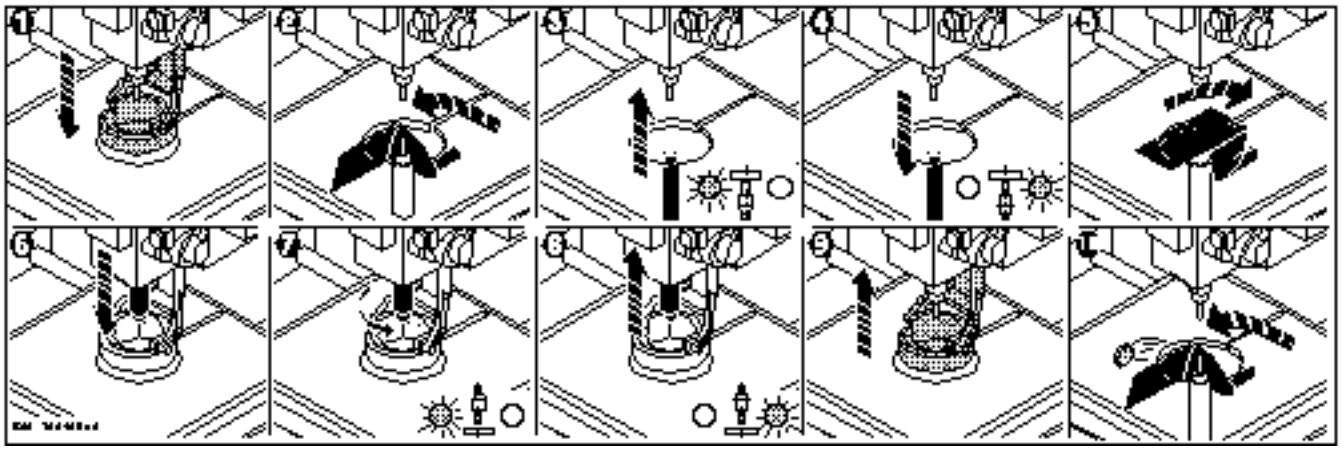
Selector **E** must be in the "Automatic" position.

Switches **A** and **B** must be turned to “1” and “2” according to the speed required of the spindles.

Press button **P**. The green led will light up and the automatic cycle will begin together with the spindles and the flow of water.

INFORMATION: it is also possible to start the cycle using the supplementary push button panel or the foot switch.





❑ **Description of cycle**

1 - The glass clamp lowers until it touches the sheet of glass.
2 - The head cover moves to its lower position.
3 - The lower head rises until it cuts the lower part of the glass (the green pilot light lights up to indicate the cutting phase).
4 - When cutting has finished (signalled by the red pilot light) the lower head descends.
5 - The head cover rises again.
6 - The upper head lowers rapidly.
7 - Drilling is carried out slowly (signalled by the green pilot light)
8 - When drilling has finished the red pilot light lights up and the head rises again.
9 - The glass clamp rises to its initial position.
10 - At the same time the glass-refuse falls onto the head cover and is conveyed to the inside of the container.

INFORMATION: at the end of the cycle all functions stop and the sheets of glass may be unloaded.

5.9. SEMIAUTOMATIC CYCLE (AUTOMATIC DRILLING MACHINE)

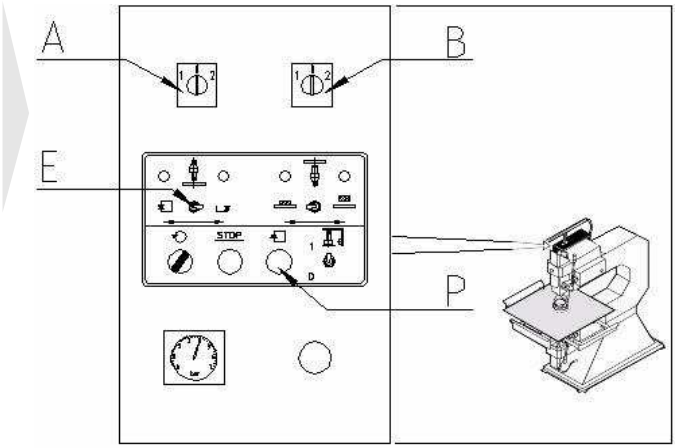
Turn the general switch to **1** (ON) to supply mains power to the machine.

Load a sheet of glass (paragraphs 5.5.-5.6.) onto the surface.

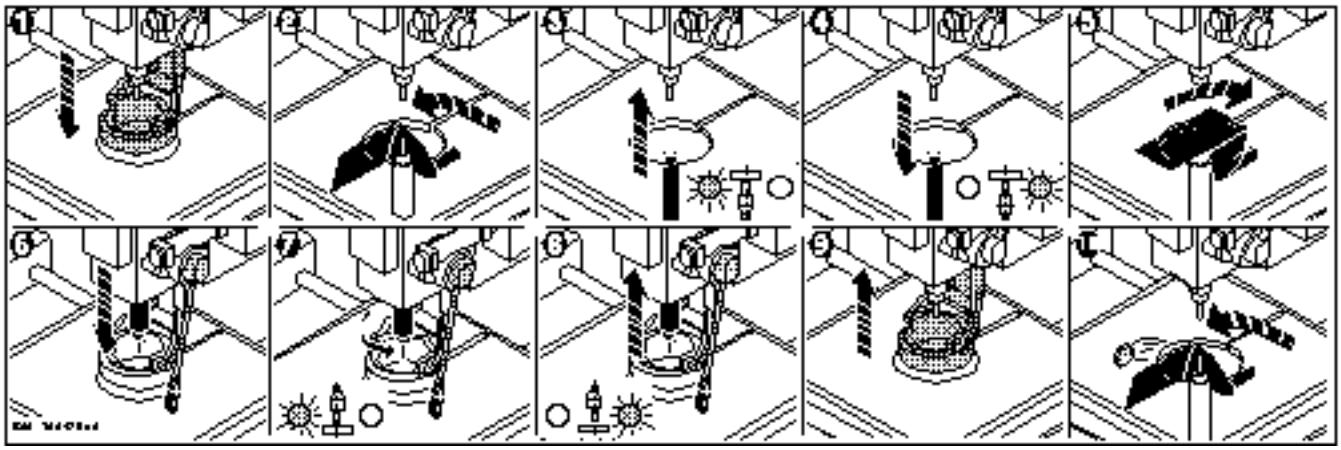
Selector **E** must be in the "Semiautomatic" position.

Switches **A** and **B** must be turned to “1” and “2” according to the speed required of the spindles.

Press button **P**. The green led will light up and the semiautomatic cycle will begin together with the spindles and the flow of water.



INFORMATION: it is also possible to start the cycle using the supplementary push button panel or the foot switch.



❑ Description of cycle

1 - The glass clamp lowers until it touches the sheet of glass.
2 - The head cover moves to its lower position.
3 - Just the lower head cuts the sheet of glass (the green pilot light lights up to indicate the cutting phase).
4 - When cutting has finished (signalled by the red pilot light) the lower head descends.
5 - The head cover rises again.
6 - Lower the upper head manually with the lever of the spindle.
7 - Drilling is carried out by gradually lowering the lever (signalled by the green pilot light)
8 - When drilling has finished the red pilot light lights up. Release the lever until it reaches its travel stop.
9 - The glass clamp rises to its initial position.
10 - At the same time the glass-refuse falls onto the head cover and is conveyed to the inside of the container.

INFORMATION: at the end of the cycle all functions stop and the sheets of glass may be unloaded.

5.10. SEMIAUTOMATIC CYCLE (SEMIAUTOMATIC DRILLING MACHINE)

Turn the general switch to **1** (ON) to supply mains power to the machine.

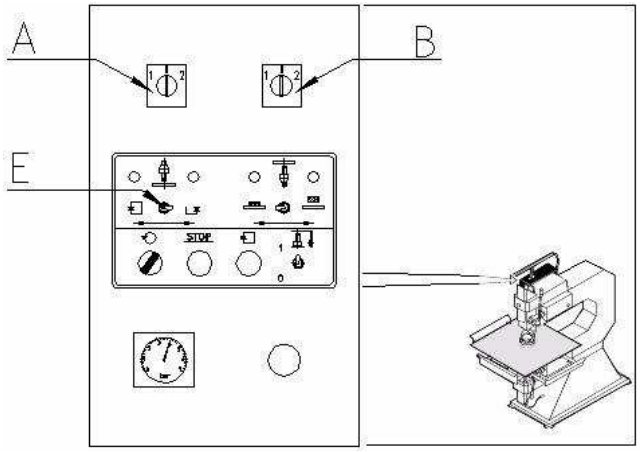
Load a sheet of glass (paragraphs 5.5.-5.6.) onto the surface.

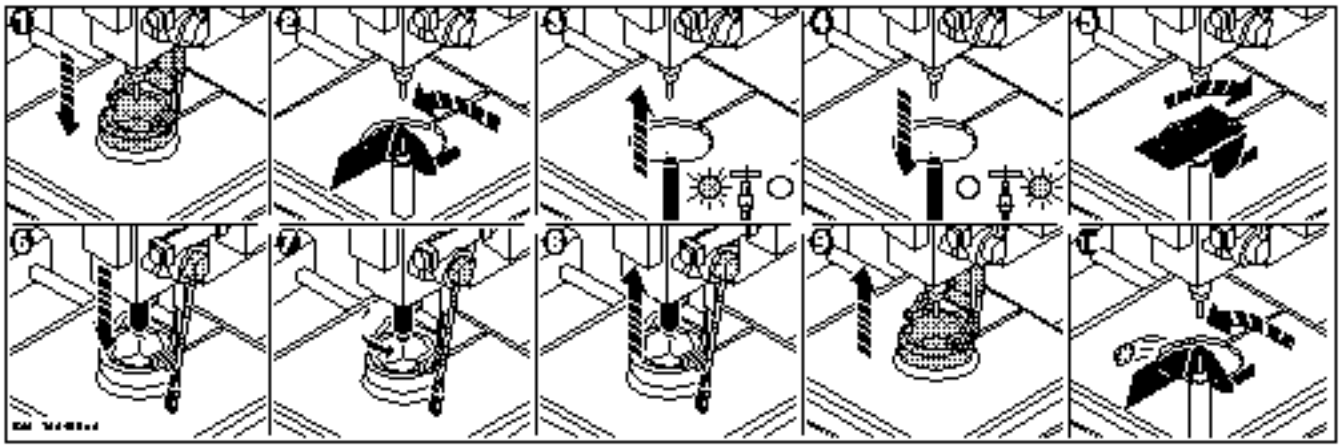
Selector **E** must be in the "Semiautomatic" position.

Switches **A** and **B** must be turned to “1” and “2” according to the speed required of the spindles.

Lower the upper lever and the semiautomatic cycle will begin together with the spindles and the flow of water.

INFORMATION: the lever must be kept down until the lower head drills a hole.





❑ **Description of cycle**

1 - The glass clamp lowers until it touches the sheet of glass.
2 - The head cover moves to its lower position.
3 - The lower head rises until it cuts the lower part of the glass (the green pilot light lights up to indicate the cutting phase).
4 - When cutting has finished (signalled by the red pilot light) the lower head descends.
5 - The head cover rises again.
6 - Lower the upper head manually with the lever of the spindle.
7 - Drilling is carried out by gradually lowering the lever (signalled by the green pilot light)
8 - When drilling has finished release the lever until it reaches its travel stop.
9 - The glass clamp rises to its initial position.
10 - At the same time the glass-refuse falls onto the head cover and is conveyed to the inside of the container.

INFORMATION: at the end of the cycle all functions stop and the sheets of glass may be unloaded.

5.11. MANUAL CYCLE (AUTOMATIC DRILLING MACHINE)

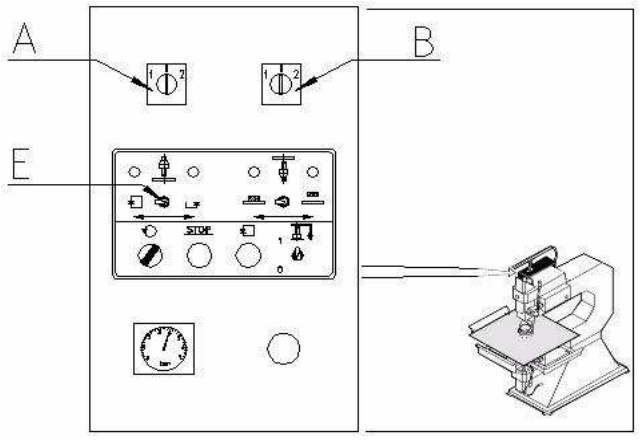
Turn the general switch to **1** (ON) to supply mains power to the machine.

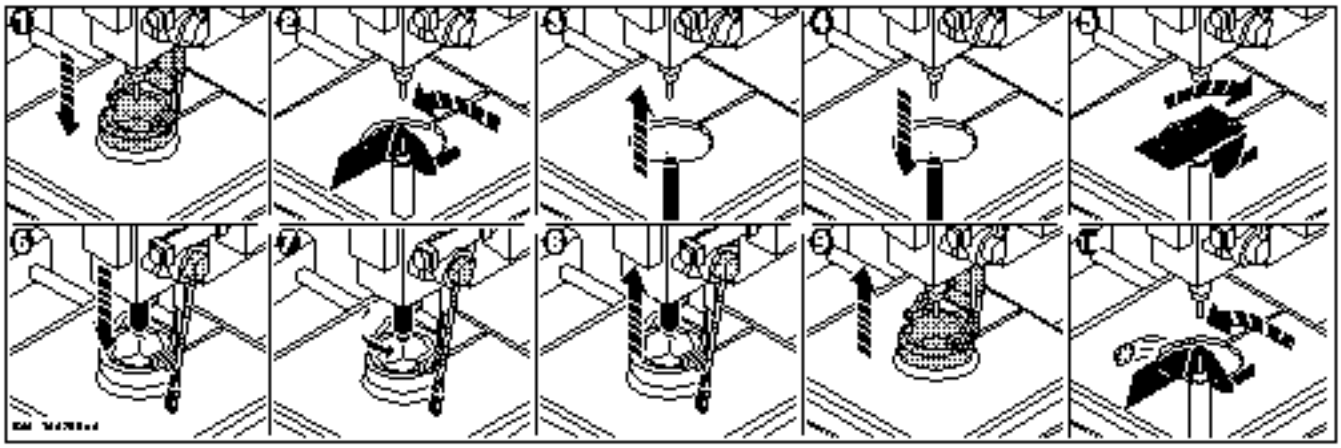
Load a sheet of glass (paragraphs 5.5.-5.6.) onto the surface.

Selector **E** must be in the "Automatic" position.

Switches **A** and **B** must be turned to “1” and “2” according to the speed required of the spindles.

Lift the lower spindle lever manually until it starts together with the flow of water.





❑ **Description of cycle**

1 - The glass clamp lowers until it touches the sheet of glass.
2 - The head cover moves to its lower position.
3 - Continue to lift the lever gradually and cut the lower part of the glass.
4 - After cutting release the lever until it touches the travel stop.
5 - The bit cover rises again and the lower spindle stops.
6 - Move the spindle lever manually to lower the upper bit until it starts together with the flow of water.
7 - Drilling is carried out by gradually lowering the lever (signalled by the green pilot light)
8 - When drilling has finished release the lever until it reaches its travel stop.
9 - The glass clamp unit rises to its position of rest and the upper spindles and the flow of water stop.
10 - At the same time the glass-refuse falls onto the head cover and is conveyed to the inside of the container.

INFORMATION: at the end of the cycle all functions stop and the sheets of glass may be unloaded.

5.12. MANUAL CYCLE (SEMIAUTOMATIC DRILLING MACHINE)

Turn the general switch to **1** (ON) to supply mains power to the machine.

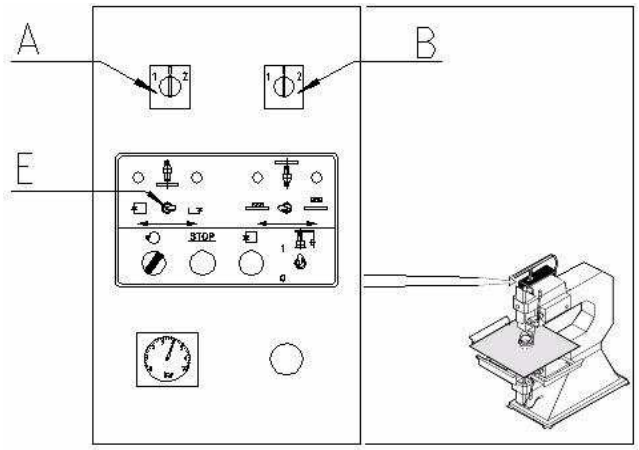
Load a sheet of glass (paragraphs 5.5.-5.6.) onto the surface.

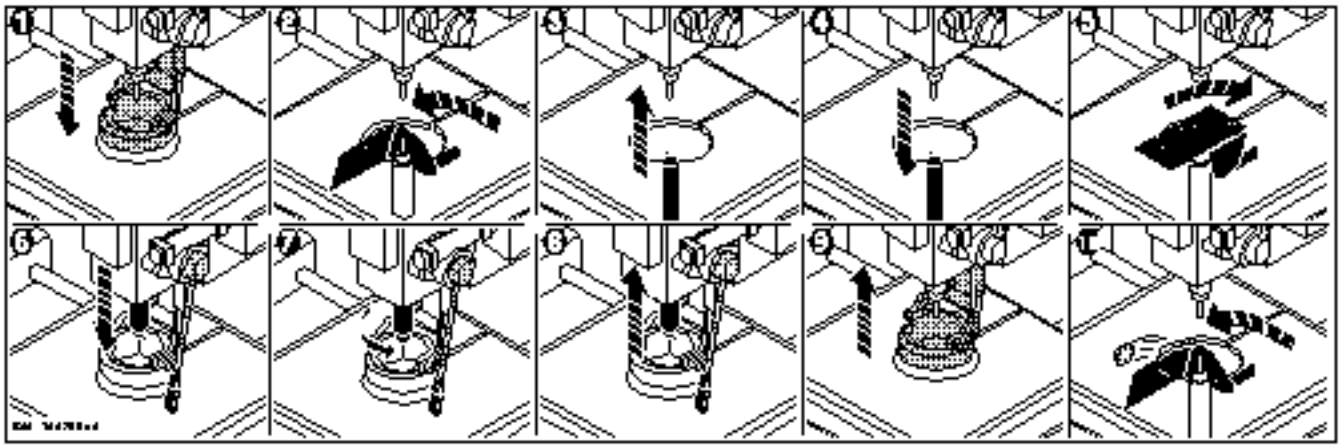
Selector **E** must be in the "Semiautomatic" position.

Switches **A** and **B** must be turned to “1” and “2” according to the speed required of the spindles.

Lift the lower spindle lever manually until it starts together with the flow of water.

INFORMATION: for the manual drilling of holes with considerable diameters, do not force excessively on the spindle lever, but release it often in order to allow the exhausting of the glass waste.





❑ **Description of cycle**

1 - The glass clamp lowers until it touches the sheet of glass.
2 - The head cover moves to its lower position.
3 - Continue to lift the lever gradually and cut the lower part of the glass.
4 - After cutting release the lever until it touches the travel stop.
5 - The bit cover rises again and the lower spindle stops.
6 - Move the spindle lever manually to lower the upper bit until it starts together with the flow of water.
7 - Drilling is carried out by gradually lowering the lever (signalled by the green pilot light)
8 - When drilling has finished release the lever until it reaches its travel stop.
9 - The glass clamp unit rises to its position of rest and the upper spindles and the flow of water stop.
10 - At the same time the glass-refuse falls onto the head cover and is conveyed to the inside of the container.

INFORMATION: at the end of the cycle all functions stop and the sheets of glass may be unloaded.

5.13. MANUAL CYCLE (MANUAL DRILLING MACHINE)

Turn the general switch to **1** (ON) to supply mains power to the machine.

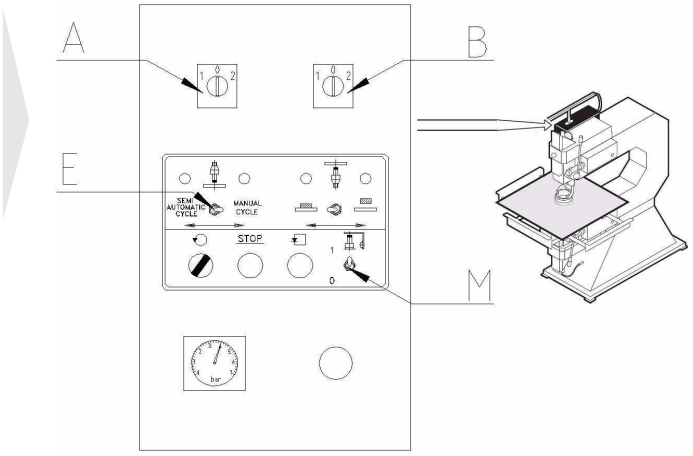
Load a sheet of glass (paragraphs 5.5.-5.6.) onto the surface.

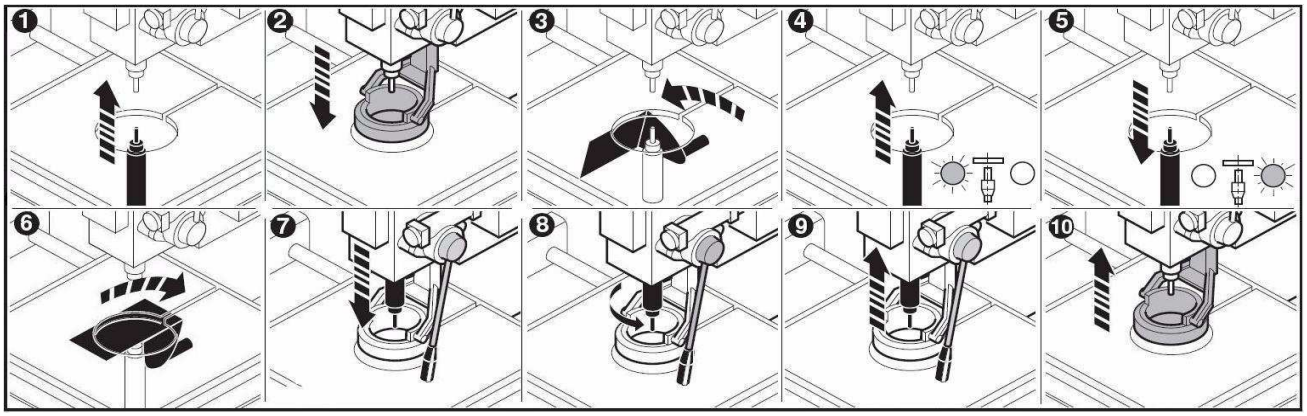
Selector **E** must be in the "Manual" position.

Selectors **A** and **B** must be turned to “1” and “2” according to the speed required of the spindles.

Selector **M** must be turned to “1”

INFORMATION: for the manual drilling of holes with considerable diameters, do not force excessively on the spindle lever, but release it often in order to allow the exhausting of the glass waste.





❑ Description of cycle

1 - Move the spindle lever manually to lower the upper bit until it starts.
2 - Wait the descent of the glass clamp and the flow of water.
3 - The head cover moves to its lower position.
4 - Continue to lift the lever gradually and cut the lower part of the glass (the green pilot light lights up to indicate the cutting phase).
5 - When cutting has finished (signalled by the red pilot light) the lower head descends.
6 - The bit cover and the glass clamp rise again and the lower spindle stops.
7 - Move the spindle lever manually to lower the upper bit until it starts. Wait the descent of the glass clamp and the flow of water.
8 - Drilling is carried out by gradually lowering the lever.
9 - When drilling has finished release the lever until it reaches its travel stop and the upper spindles and the flow of water stop.
10 - The glass clamp unit rises to its position of rest.
11 - At the same time the glass-refuse falls onto the head cover.

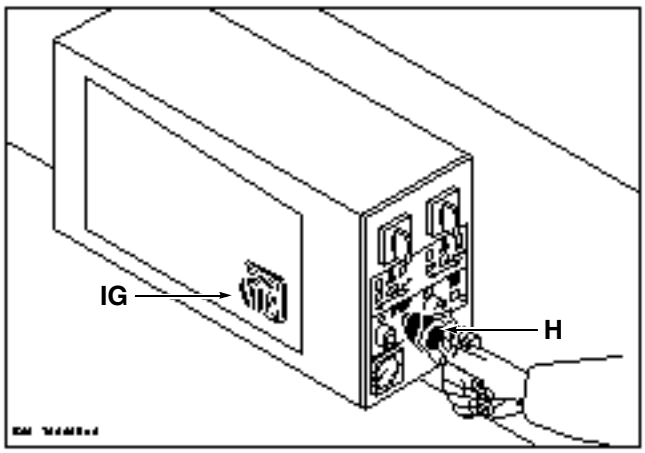
INFORMATION: at the end of the cycle all functions stop and the sheets of glass may be unloaded.

5.14. STOPPING THE MACHINE

To stop the machine after work press the mushroom head button **H** and turn the main switch to "**O**" (OFF).

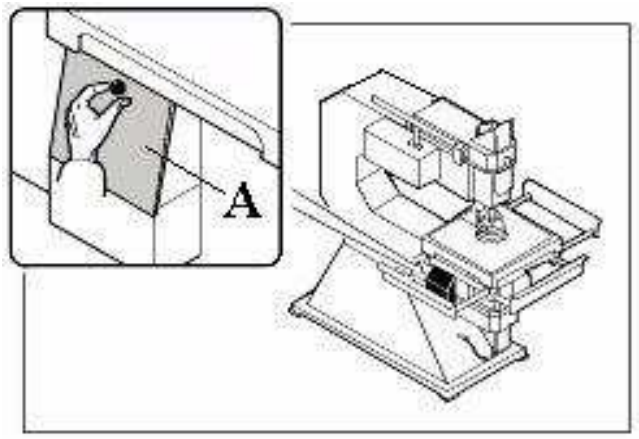
In case of emergency, always press the mushroom head button; turn the button clockwise to reset.

INFORMATION: stop the machine at the end of the cycle.



5.15. EMPTYING THE GLASS-REFUSE CONTAINER

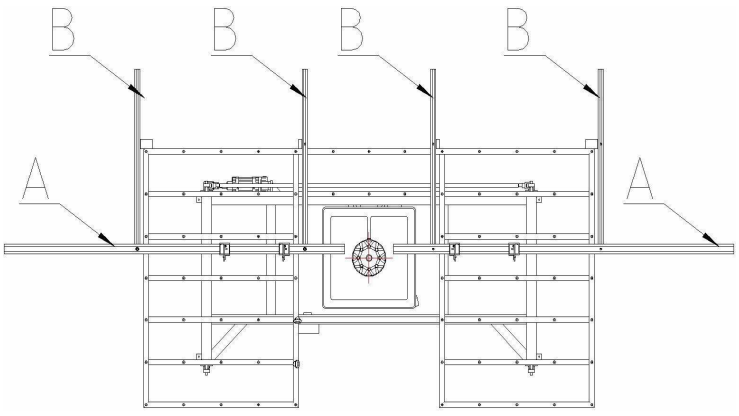
Empty the glass-refuse container regularly; to do this remove protection covering **A** from its housing.



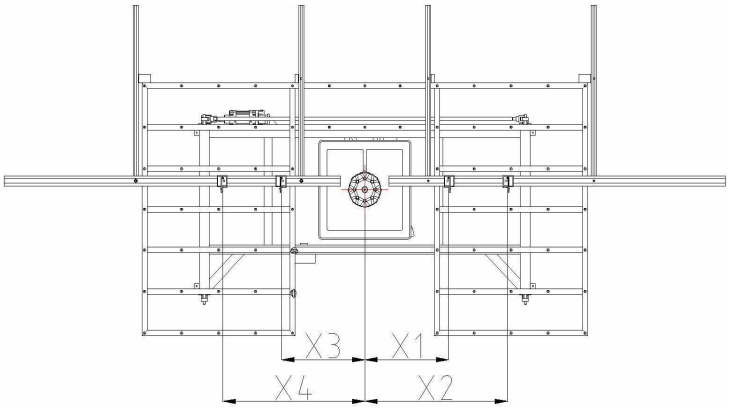
5.16. MASS PRODUCTION DRILLING

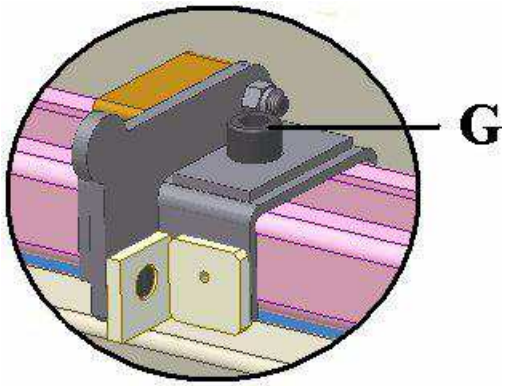
For a mass production drilling, do as follow:
Example:

- *how to carry out four holes in series.*
- *fix the **A** reference lines on the **B** slide.*



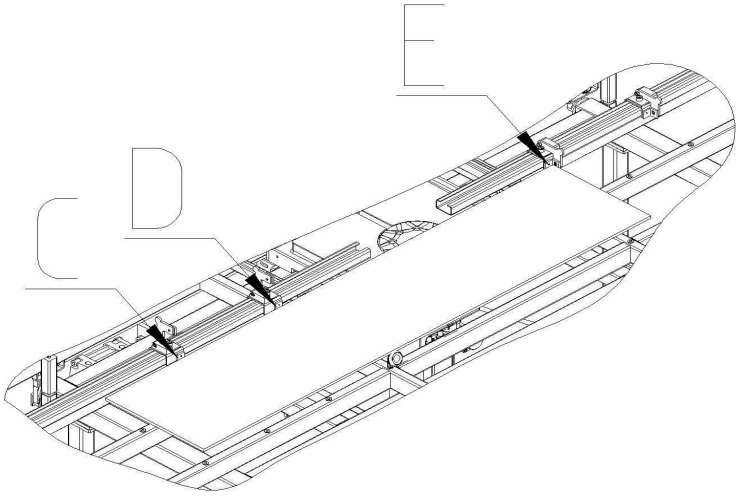
- *measure the distance between the centre of the drill bit and the stops of the four **C**, **D**, **E**, **F** mobile supports according to the position of the hole to be drilled off.*

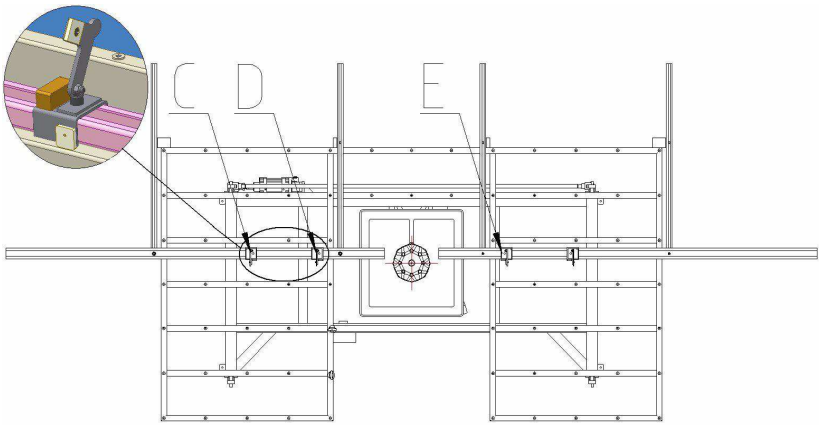




- *keeping the **E** mobile support as point of reference, lift up the stops of the **C** and **D** mobile support.*

- *tighten the four **G** screws of mobile support.*

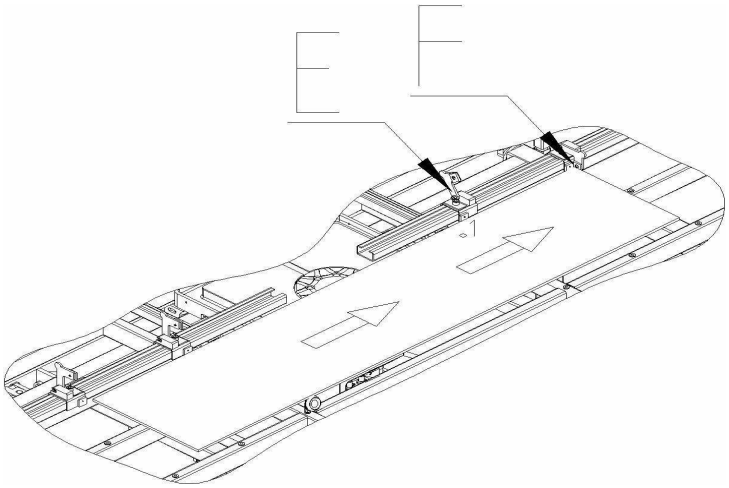




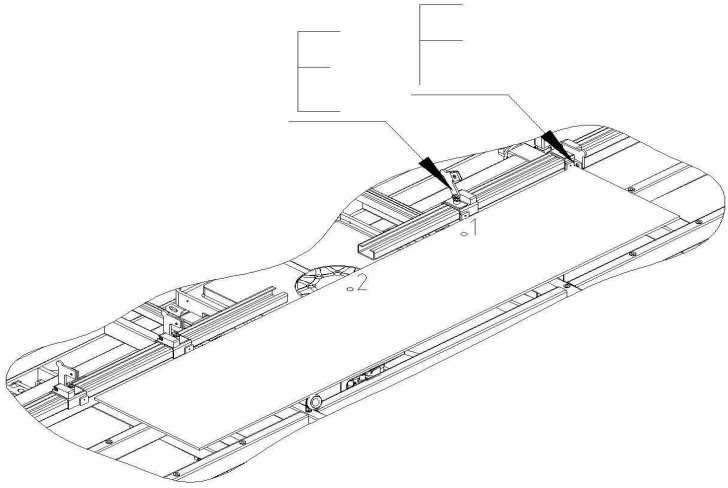
- *load the glass sheet up to the table and lean it against the mobile support **C**, **D** and **E**.*

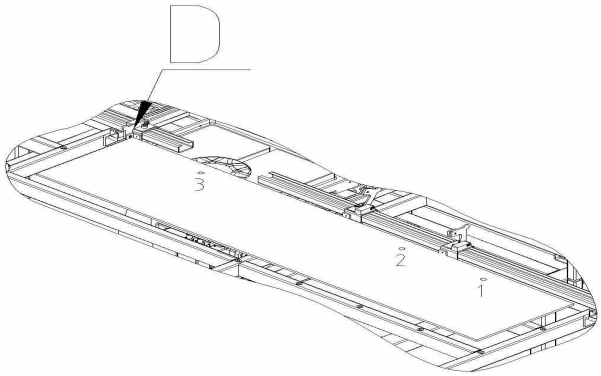
- *perform the drilling cycle for the first hole (1).*

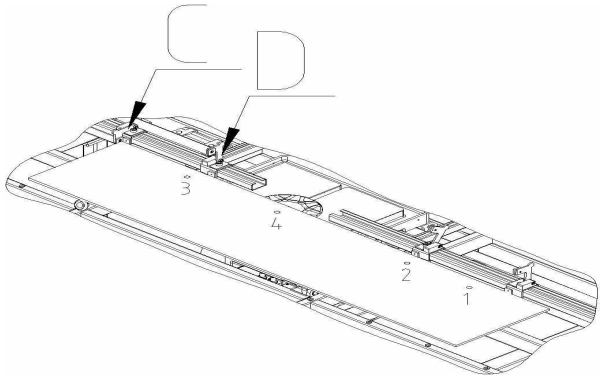
At the end of the drilling cycle, rise up the **E** stop, move the glass sheet and lean it against the **F** mobile support of reference.



- *perform the drilling cycle for the second hole (2).*







- *To set the following holes 3 and 4, proceed likewise taking as point of reference the mobile support **D** and **C**.*
- *perform the drilling cycle.*

At the end of the working cycle the drilling process in series is completed.

6.1. GENERAL REGULATIONS

CAUTION: all adjustments, whether with the machine switched off or switched on, must be carried out in conditions of total safety.

Make adjustments using only the supplied equipment and following the procedures shown in the following Use and Maintenance manual.

The adjustments to make are principally the following:
- *adjustments for the speed of the spindles;*
- *adjustments for the thickness of the glass;*
- *adjustments for the diameter of the tool;*
- *adjustments for the working speed of the heads.*

6.2. CHANGING HEADS

DANGER-WARNING: make sure the machine is electrically and pneumatically isolated.

• Choosing tools

CAUTION: never use bent or broken tools;
- *make sure the tools are perfectly balanced and that they are well sharpened and suitable for the job to be carried out;*
- *never allow tools to turn faster than the speed limit stamped on them or in any case indicated by the makers;*
- *before installing each tool in its housing, make sure it is clean;*
- *tools used must comply with the specifications described in paragraph 2.6.1.*

INFORMATION: after replacing the heads they must be timed as described in paragraph 6.5.

• Upper head

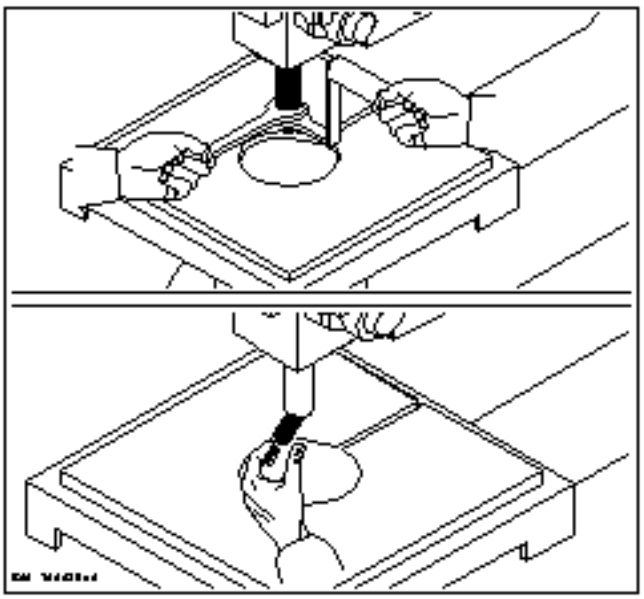
The glass clamp and the support disk should be dismounted as described in paragraph 6.5.

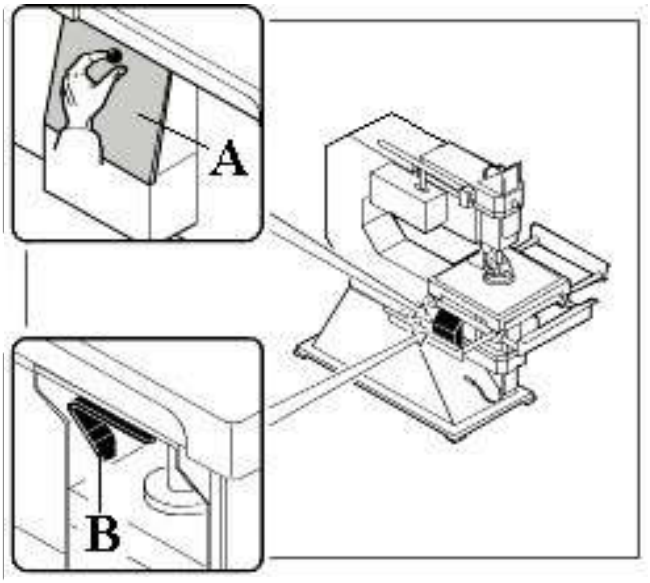
Unlock the head and remove it using the supplied wrenches.

Insert a new head and screw it in by hand.

INFORMATION: do not tighten the head excessively so as not to damage the thread on the spindle.

Remount the disk and the glass clamp unit.





• Lower head

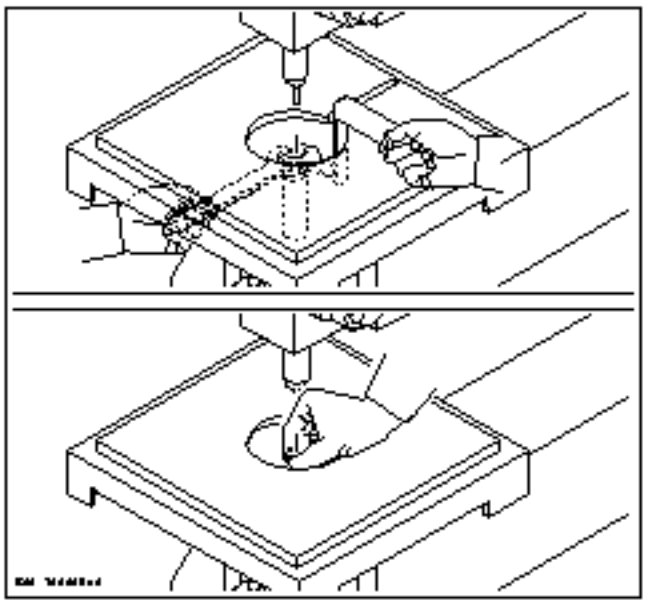
To remove the lower head, remove protection covering **A** and tip over cover **B**.

Unlock the head and remove it using the supplied wrenches.

Insert a new head and screw it in by hand.

INFORMATION: do not tighten the head excessively so as not to damage the thread on the spindle.

NOTE: in case of belt slipping for adjustment or replacement, see chapter 9.1.



6.3. TIMING OF HEADS

DANGER-WARNING: the following operation must be carried out with the machine connected electrically and pneumatically; make sure operating conditions are perfectly safe!

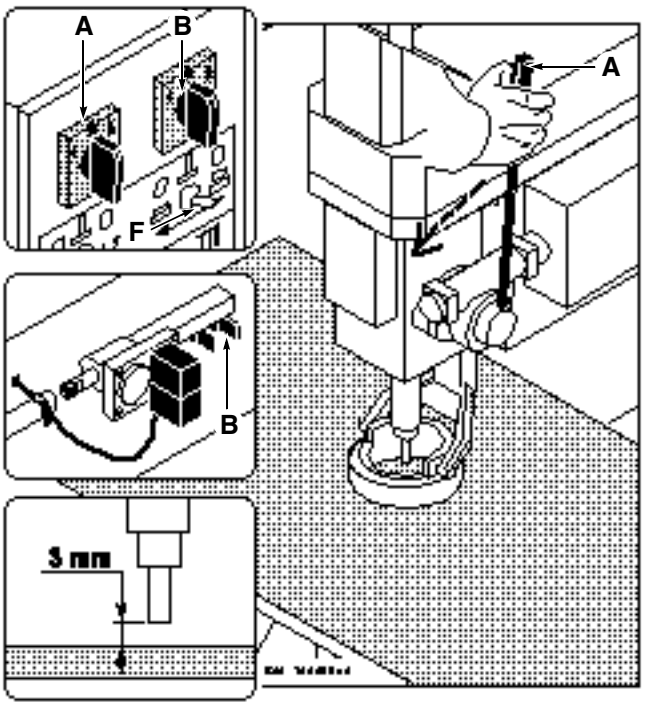
6.3.1 Upper head (Automatic drill)

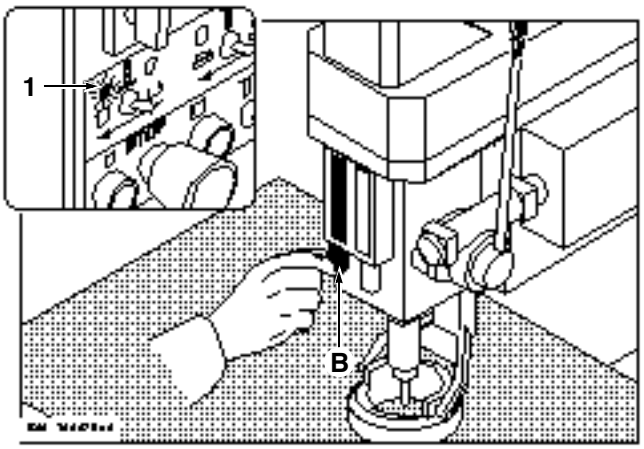
Switches **A** and **B** must be at position “0”.
Taps **B** must be closed.
Override the glass clamp unit with switch **F**.
The upper head must be timed in the following cases:

- *changing heads*
- *worn head*
- *different thickness of glass being processed*

Green microswitch

- *Place a piece of glass of the thickness to be drilled onto the surface of the drilling machine.*
- *Lower lever **A** to lower the head until it is 3 mm from the glass.*

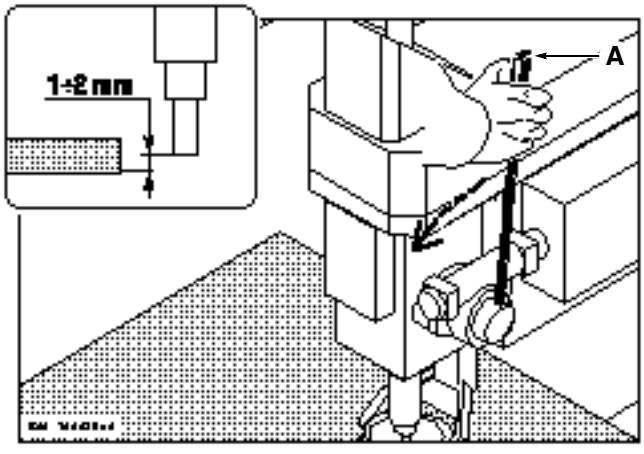




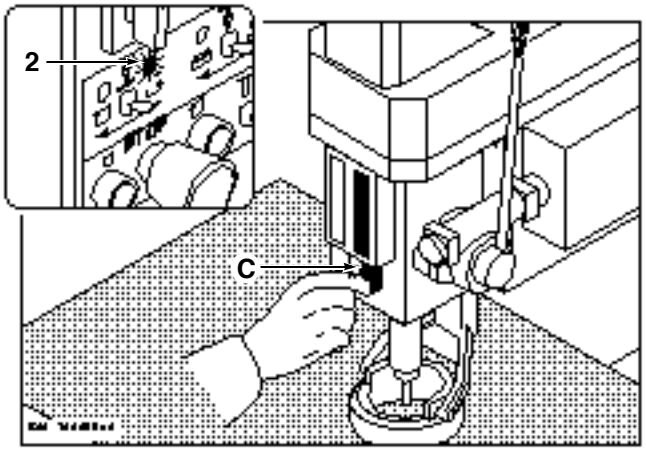
- *Keeping this position, move the regulator **B** (green index) until the green pilot light **1** on the control panel lights up to indicate the beginning of the drilling phase.*

Red microswitch

- *Lower lever **A** further until the head is 1÷2 mm from the lower edge of the glass.*



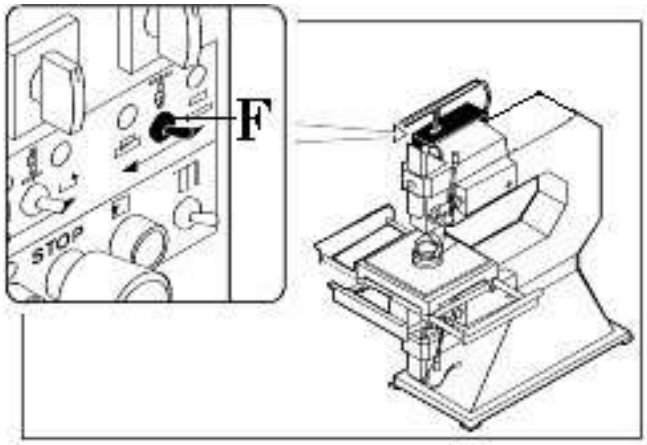
- *Keeping this position, move the regulator **C** (red index) until the red pilot light **2** on the control panel lights up to indicate the end of the drilling cycle.*

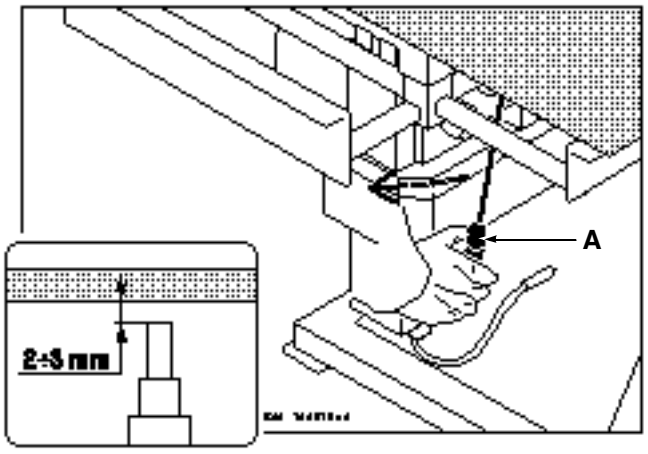


6.3.2 Lower head

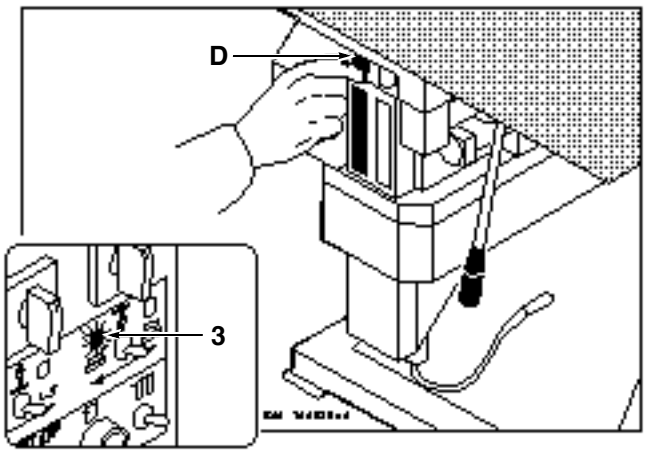
The lower head must be positioned in the following cases:
- *changing head*
- *worn head*

To time the lower head, the head cover must be excluded by means of switch **F**.





Green microswitch
- *Place a piece of glass on the surface of the drilling machine.*
- *Raise lever **A** to raise the head until it is 2÷3 mm from the glass.*

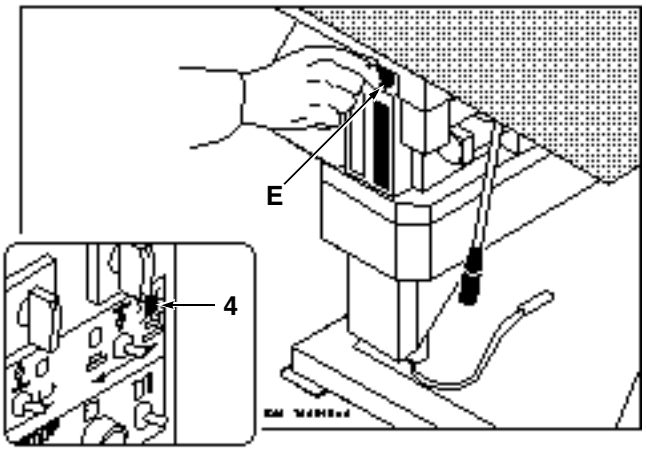


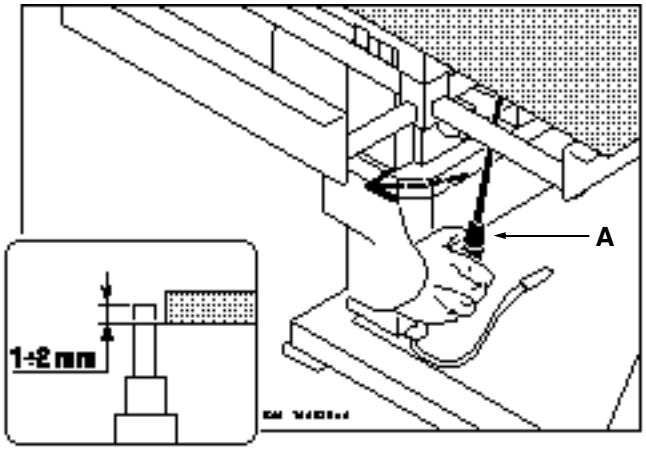
- *Keeping this position, move the regulator **D** (green index) until the green pilot light **3** on the control panel lights up to indicate the beginning of the drilling cycle.*

Red microswitch

- *Raise lever **A** further until it penetrates the glass for about 1÷2 mm (for thin sheets of glass) and at least 3÷4 mm (for thick sheets of glass).*

- *Keeping this position, move regulator **E** (red index) until the red pilot light **4** on the control panel lights up to signal the end of the drilling phase.*





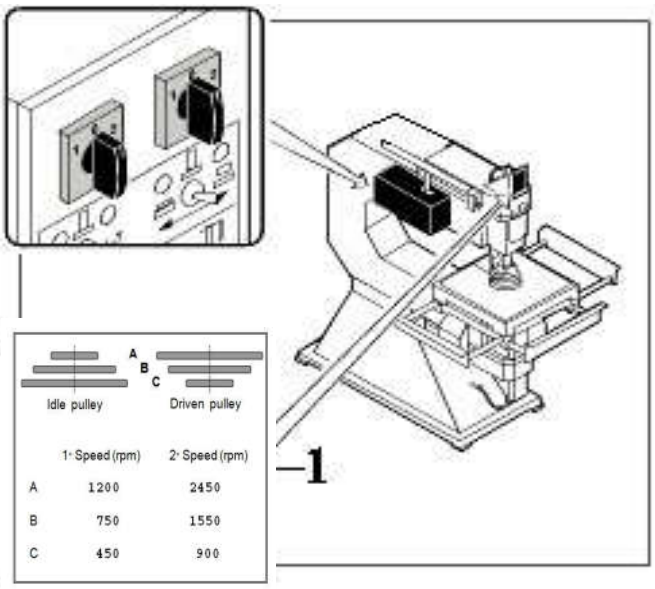
Conclusion

Check that, in the automatic cycle and with a piece of glass placed beside to the heads, during the rapid approach phase the heads do not hit the glass.
If this should occur or if the heads are too far from the glass surface, repeat the adjustment more carefully.
Move switches **A** and **B** to their original positions.
Open taps **B**.
Activate the glass clamp unit with switch **F**.

6.4. CHANGING SPINDLE SPEED

DANGER-WARNING: make sure the machine is isolated electrically and pneumatically.

The speed of the spindles can be selected according to the type of tool installed, the thickness of the glass and the quality of processing that must be obtained.
The spindles rotate thanks to a pulley drive and trapezoidal belts.
The different speeds of the spindles are obtained by changing the position of the belt on the prismatic pulleys.
The three speeds given by the pulleys are combined with the double rotation of the motors thus giving a choice of six different speeds.
To select the speed of the spindles please refer to plate **1** located on the protection covering.

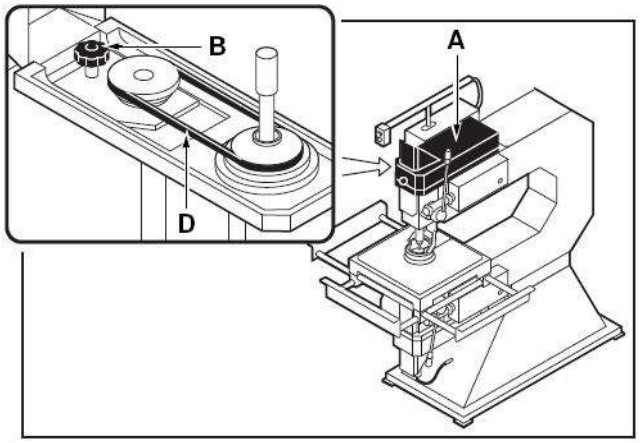


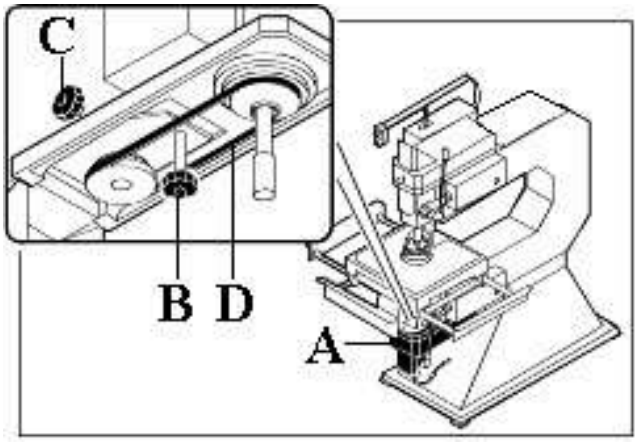
Spindle speed RPM/Min. according to the hole diameter

ø 4- 18	2450
ø 20- 55	1550
ø 60- 75	1200 / 900
ø 80-100	900 / 750
ø 120-200	450

Upper spindle

- *Open protection covering **A**.*
- *Unscrew knob **B** that locks the guide plate.*
- *Loosen the drive belt **D**.*
- *Reposition the belt on the pulley races.*
- *Tighten the belt and tighten knob **B**.*
- *Close protection covering **A** after this operation.*





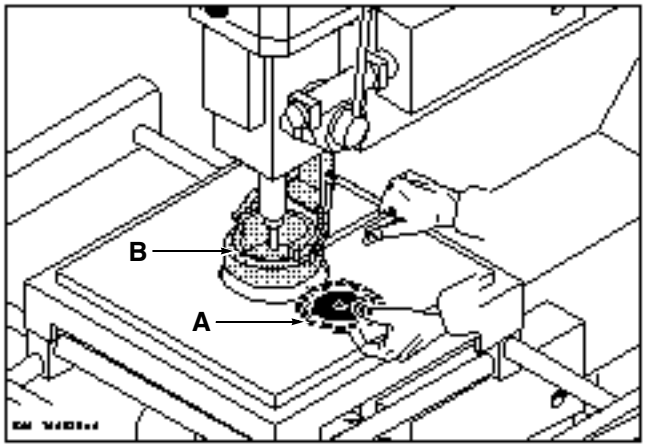
Lower spindle

- *Open protection covering **A**.*
- *Unscrew knob **B** that locks the guide plate.*
- *Move knob **C** to loosen the drive belt **D**.*
- *Reposition the belt on the pulley races.*
- *Tighten the belt and tighten knob **B**.*
- *Close protection covering **A** after this operation.*

6.5. CHANGING THE GLASS CLAMP AND SUPPORT DISK

Glass clamps and rubber disks are supplied for different diameters (ø 20-55-120) to mount on the surface according to the diameter of the tool mounted on the spindles.

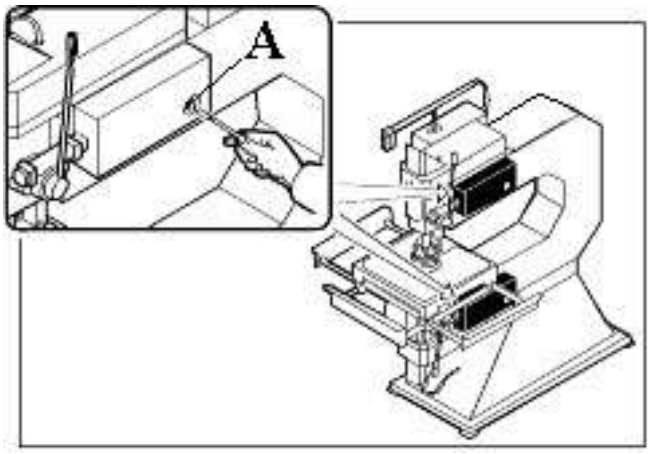
- *Remove disk **A**.*
- *Unscrew the glass clamp fixing screw and remove glass clamp **B**.*
- *Mount a glass clamp and disk of a suitable diameter.*



6.6. ADJUSTING THE APPROACH SPEED OF HEADS

The speed of ascent and descent of the heads when approaching the glass can be varied by moving the regulator **A** located on the end of the cylinder.

INFORMATION: it is possible to carry out adjustments on both the upper and lower spindles.



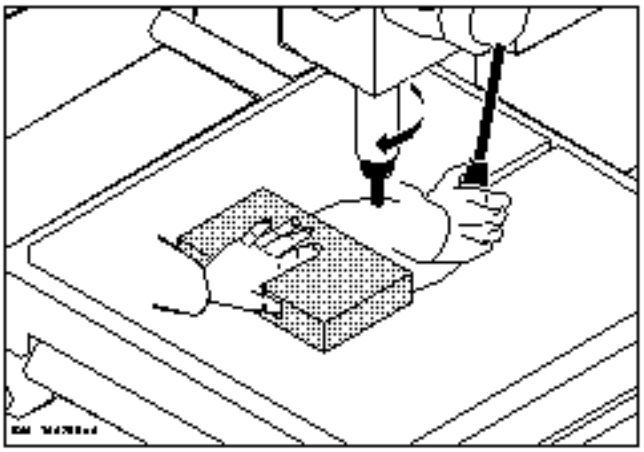
6.7. SHARPENING THE HEADS

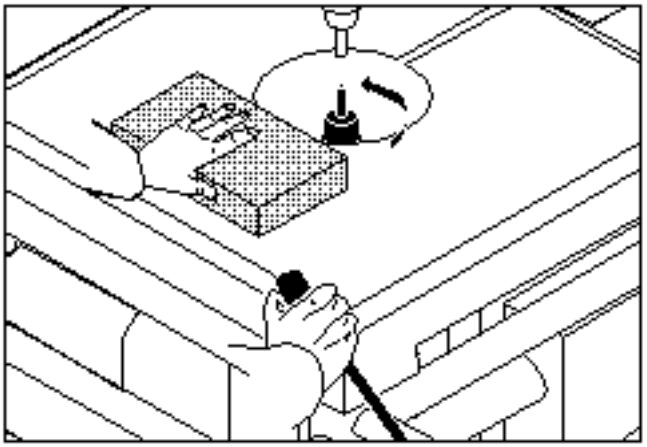
DANGER-WARNING: the following operation must be carried out with the machine connected electrically and pneumatically; make sure operating conditions are perfectly safe!

INFORMATION: sharpen the heads when they are scratched and/or blunt and when new heads are mounted!

Upper bit

- *Select the semi-automatic cycle.*
- *Override the glass clamp unit.*
- *Place an abrasive plate on the table.*
- *Move the upper lever manually until the bit touches the abrasive plate and is dressed.*





Lower bit

- *Override the glass clamp unit.*
- *Move the lower lever manually until the bit touches the abrasive plate and is dressed.*
- *Activate the bit cover and the glass clamp unit.*
- *Select the automatic cycle.*

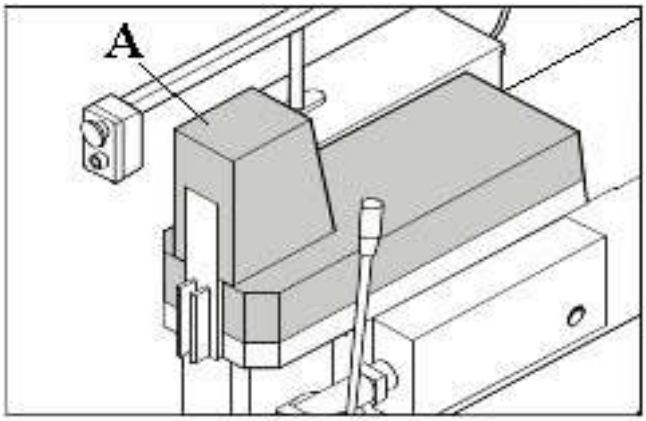
6.8. ADJUSTMENT OF THE LASER (OPTIONAL)

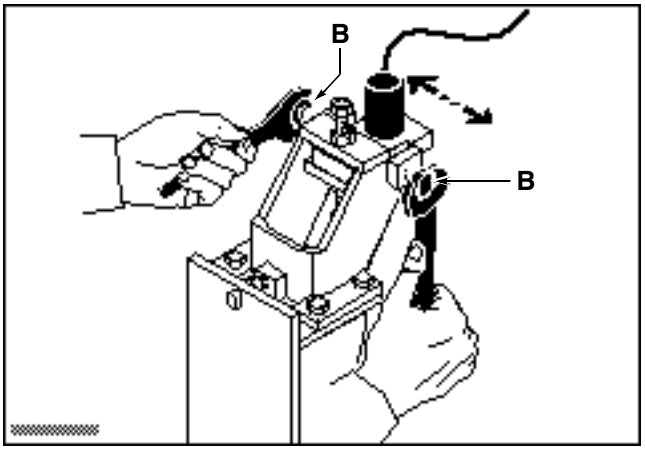
Load a glass sheet onto the cutting table.

Activate the laser device from the control panel.

Check the sharpness of the laser beam on the glass sheet . If the pointer should for any reason not be sharp, switch off and re-start the laser device; if the problem continues, make the following adjustments.

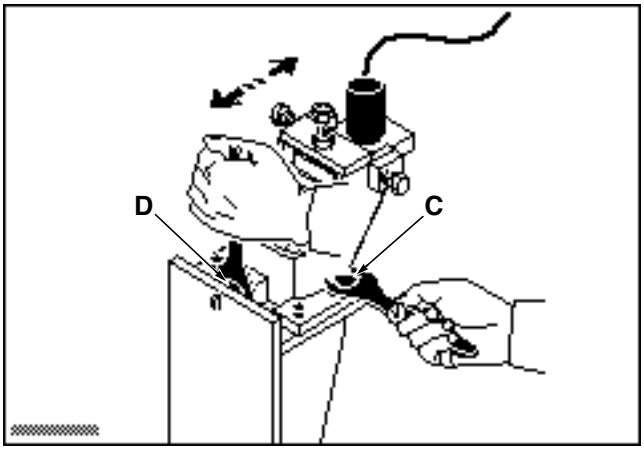
- *Open the protection covering **A**;*

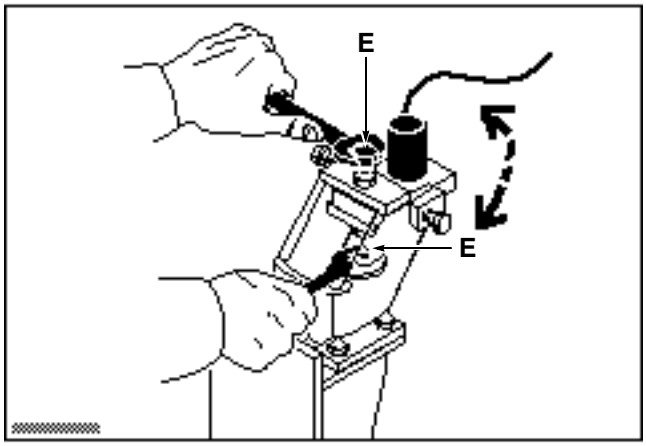




- *Adjust the screws **B** to centre the laser;*

- *Loosen the screws **C** and adjust the screws **D** to centre the laser;*





- *Loosen the fixing nuts and adjust the screws **E** to get the laser vertical.*

INFORMATION: carry out the adjustments described, then do a trial drilling checking that the beam on the glass corresponds to the centre of the hole made by the upper bit.

DANGER-WARNING: maintenance operations must be carried out by expert operators in this specific sector, with experience and technical and legislative preparation.
Maintenance operations must be carried out with the machine disconnected from the mains and pneumatic supplies.

7.1. CLEANING THE MACHINE

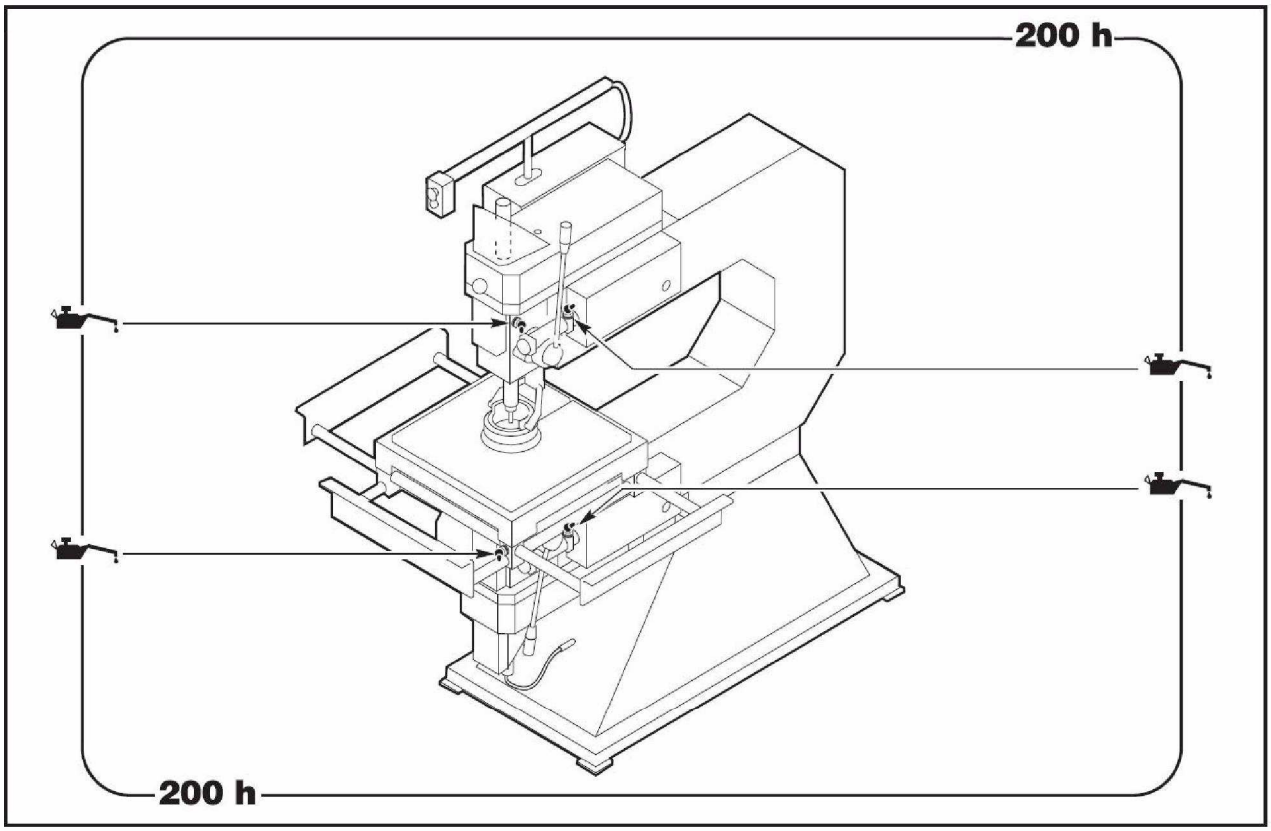
Routine cleaning lengthens the life of the machine and is an important safety factor.

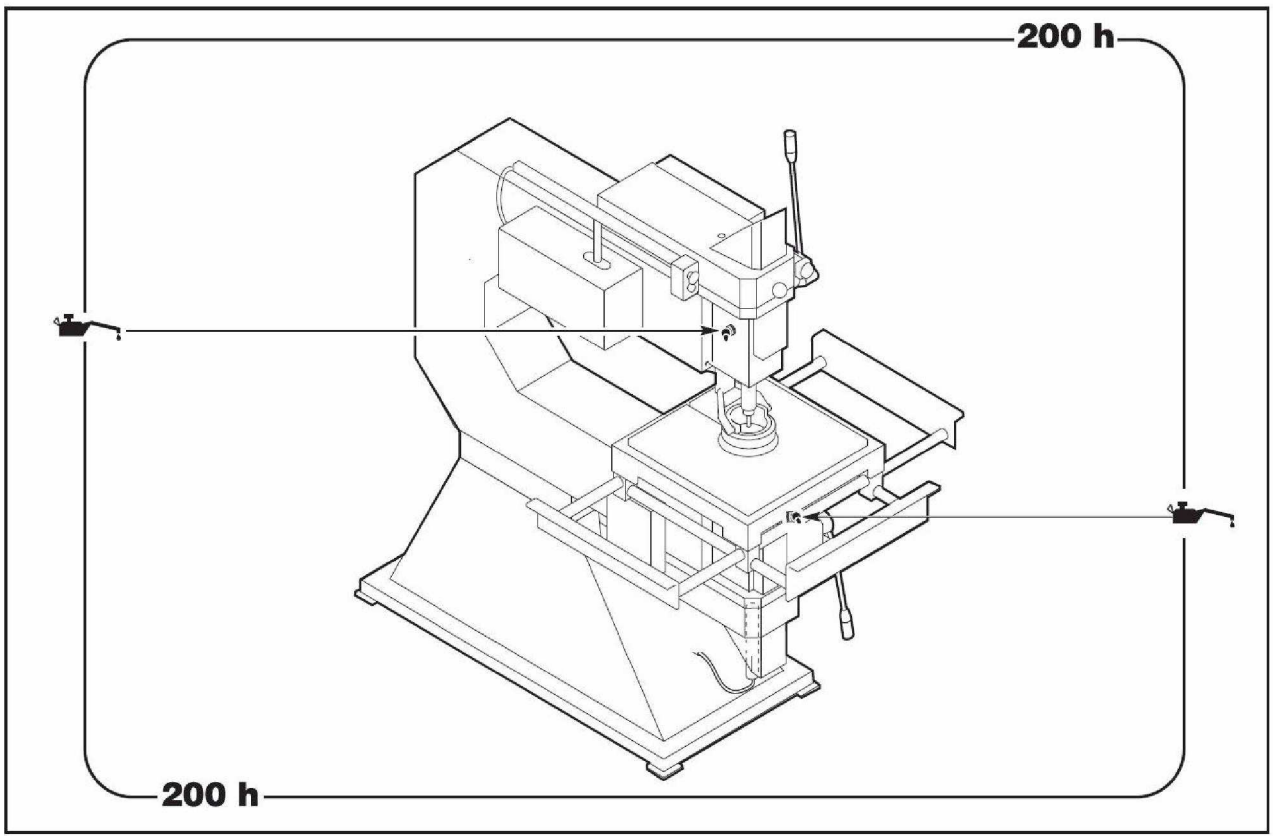
To clean the machine correctly proceed as follows:

- *remove the safety guards and clean all the areas where dust and scraps could get in with a jet of compressed air;*
- *keep the work surface clean;*
- *keep the water recycling tank clean;*
- *do not use solvents on painted surfaces;*

To protect the machine during long periods of inactivity, disconnect the mains and the pneumatic supply, empty the water tank and cover the machine with a suitable piece of material.

7.2. DIAGRAM OF LUBRICATING POINTS





Oil

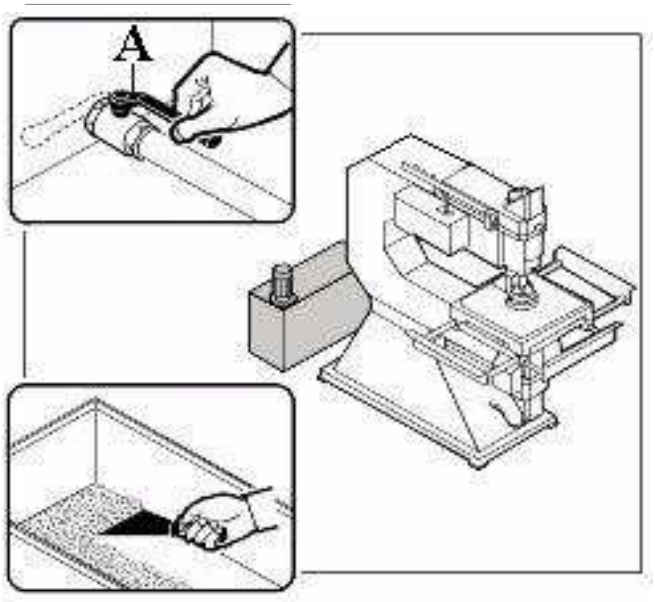
7.3. PERIODIC MAINTENANCE - TABLE

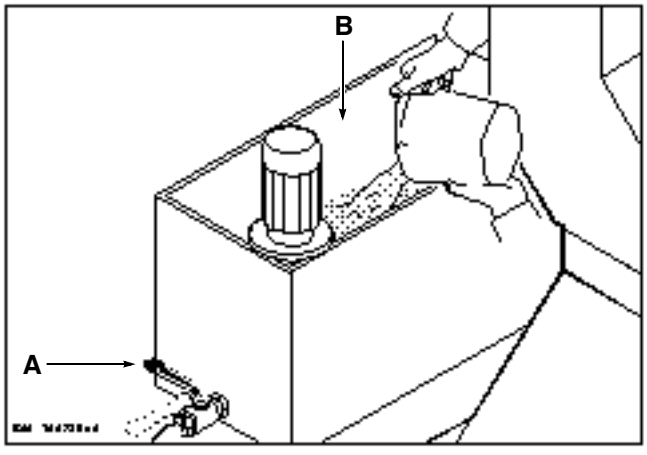
Machine part	*Operation to carry out*	*Frequency (hours)*			*Paragraph*
		50	*200*	*2000*	
Air filter unit	Check	•			7.3.2
Water recycling tank	Clean and change water	•			7.3.1
Heads	Sharpen	•			6.7.
Glass clamp	Lubricate with oil	•			/
Rack remover	Lubricate with oil	•			/
Head cover	Lubricate with oil	•		•	/
Spindles	Lubricate with oil	•	•		/
Oleopneumatic circuit	Fill-up with oil			•	7.3.4

7.3.1 Cleaning tank

Change the refrigerating water in the tank and clean as follows.

- *Drain off water by opening tap **A**.*
- *Scrape the inside of the tank and collect the glass powder in a container.*



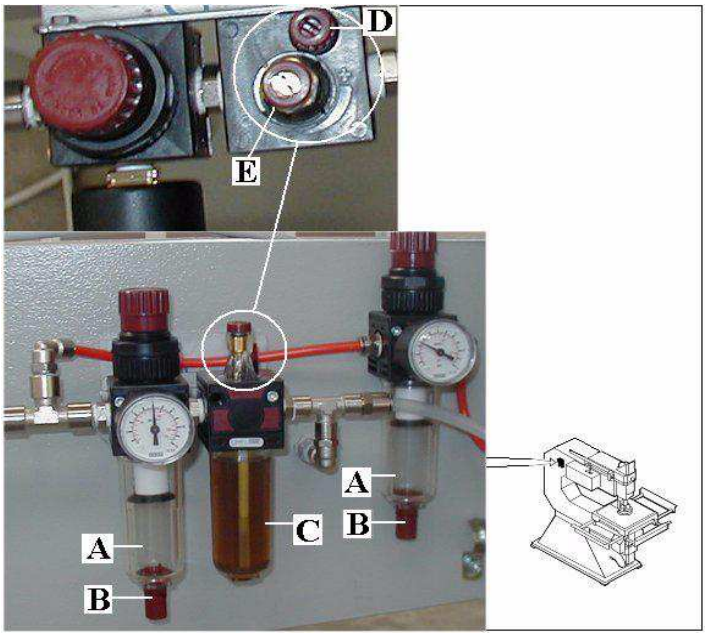


- *Turn off tap **A** and fill tank **B** with water.*

P.S.: When processing laminated glass, clean daily the filter tank (optional).

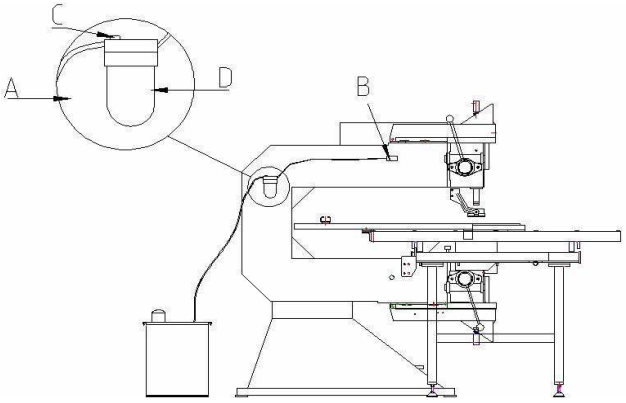
7.3.2 Air filtering group - Control

- *Turn off the tap up line from the filter group.*
- *Check that the condensation level does not exceed the maximum level in the tank **A**.*
  *Open the valve **B** to drain off the condensation.*
- *Check the oil level in the bell **C**.*
  *Top up if necessary by removing the cap **D** and pouring in lubricating oil of a type indicated in the table of paragraph 7.4.*
- *If necessary adjust the quantity of oil absorbed by turning the regulator **E**.*



7.3.3 Water filtering group - Cleaning

The cleaner **A** filters the water from the impurity to keep the solenoid valve **B** clean.
The cleaner filter must be periodically cleaned:



- *Remove the pressure unscrewing the exhasting valve **C**.*
- *Disassemble the box **D** manually without wrench.*
- *Disassemble the filter.*

The filter cleaning is depending on:

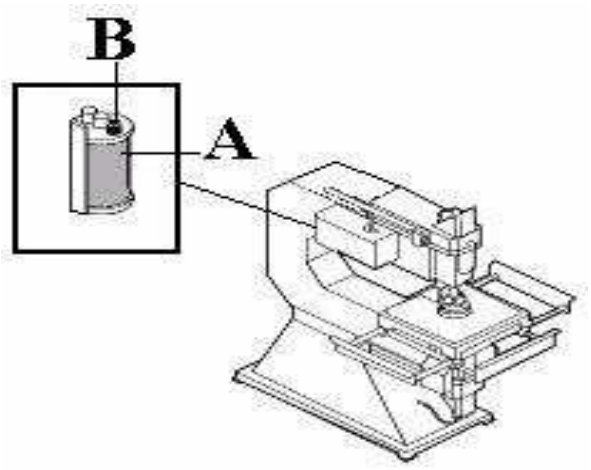
- *Water hardness.*
- *Water consumption.*
- *Water impurity.*

- *The maximum working pressure is 15 bar.*
- *The water temperature must be comprises between +5°C and + 50°C.*
- *The water temperature must be comprises between +5°C and + 40°C.*

DANGER-WARNING: The filter must be assembled by teflon gel and fitters with cylindrical threading only.

7.3.4 Oleopneumatic circuit - Filling-up with oil

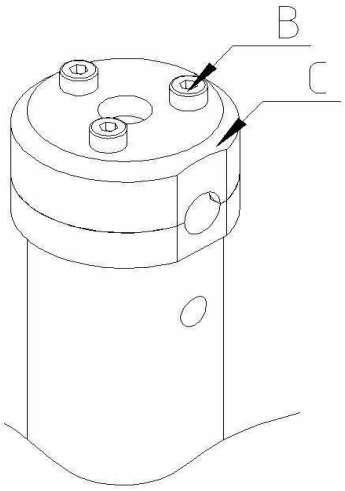
The unit shown is a circuit working with air and oil. Regularly check that the oil in cup **A** is always present.
If necessary add oil of the type indicated in the table in paragraph *7.4.* through filling plug **B**.



7.3.5 Glass cleaning of the water distributor (Opt)

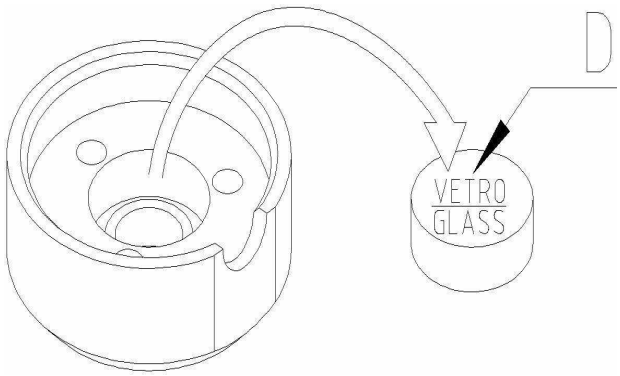
DANGER-WARNING: make sure the machine is electrically and pneumatically isolated.

- *Undo and remove the support **A**.*



- *Loosen and remove the screws **B**.*
- *Remove the flange **C**.*

- *Remove the glass **D** from the flange and clean it with care.*



- *Reinstall the glass **D** in the flange **C**.*
- *Reinstall the flange **C**.*
- *Reassemble and tighten the screws **B**.*
- *Reassemble and tighten the support **A**.*

7.4. LUBRICATING TABLE

KIND OF LUBRICANT	NAME	MANUFACTURER	REFERENCE
Synthetic oil	MOBIL FLUID 200J	MOBIL	Oleopneumatic circuit
	AUTOMATIC TRANSMISSION FLUID	ESSO	
	AUTOMATIC TRANSMISSION FLUID	GULF	
	HYDROMATIC DX	ROLOIL	
Oil	HAYDIN 46	Q8	Air filtering group
	AWH 46	CASTROL	
	LI 46	ROLOIL	
	DTE/24	MOBIL	
	TELLUS/46	SHELL	
	NUTO H46	ESSO	
Oil	VAN GOGH 46	Q8	
	MAGNA BD 68	CASTROL	
	ARM 68/V	ROLOIL	
	DTE/H MEDIUM	MOBIL	
	VITREA/68	SHELL	
	NUTO/68	ESSO	

8.1. TROUBLE SHOOTING

FAULT	REASON	SOLUTION
The refrigerating water flows constantly onto the spindles.	The membrane of the electrovalve is dirty.	Clean the membrane.
The tool whistles when drilling a sheet of glass.	The speed of rotation of the spindles is too high.	Reduce speed from the control panel.
	Blunt tool.	Dress the tool.
The glass breaks or splinters.	Blunt tool.	Dress the tool.
	Insufficient flow of water to the spindles.	Adjust the flow of water.
	Working speed too high.	Reduce the descent speed of the spindle.
	Spindle progress speed inadeguate.	Adjust the spindle progress speed.
	The sheet of the glass does not lie flat.	Clean the supporting surface of the glass.
	Tool worn.	Replace tool.
	Motor revs not suitable for the size of the hole being drilled.	Adjust the number of motor revs with the switches.
	No cooling water.	Check the water level in the tank, any obstructions and the flow of the water into the drill heads.
A spindle motor stops.	The thermal switch of the motor has tripped.	Open the electrical panel and rest the thermal switch.
Glass breakage.	The upper and bottom drill bits are not lined up.	Time up the drilling heads.

FAULT	REASON	SOLUTION
Machine doesn't start.	No electrical tension.	Check the electrical system.
	Electrical connection not correct.	Check the connection.
Irregular forwarding speed of the spindle.	There is air in the oleo-pneumatic circuit.	Bleed the circuit.
No arrival of the water to the drill bits.	The water system is clogged.	Clean the tank and the system.
	The pump is out of order.	Replace the pump.
		Reset the termic relay.
	The rolling joint is damage.	Replace the joint.
Blocking of the raising and lowering of the spindles.	The electrovalve is damage.	Replace the electrovalve.
	Insufficient automatic lubrication.	Check the level of the oil.
	The cylinder is faulty.	Replace the cylinder.
Blocking of the spindle rotation bearing.	The bearing are worn.	Replace the bearing.
	The belt is broken.	Replace the belt.
	The motor is out of order.	Replace the motor.
	The thermic relay is on.	Reset the thermic relay.

Foreword

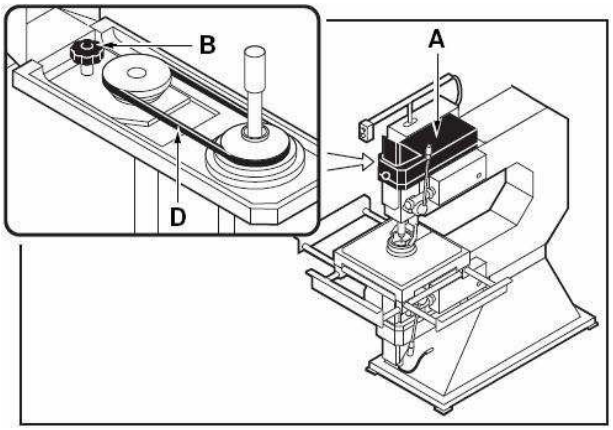
Some parts of the machine are subject to frequent wear; they must be replaced as shown below. Schiatti original spare parts must always be used as replacements in order to guarantee long machine life.

CAUTION: all replacements must be made with the machine disconnected from the mains and pneumatic supplies and with the safety systems activated.

9.1. SPINDLE DRIVE BELT - REPLACEMENT

UPPER SPINDLE

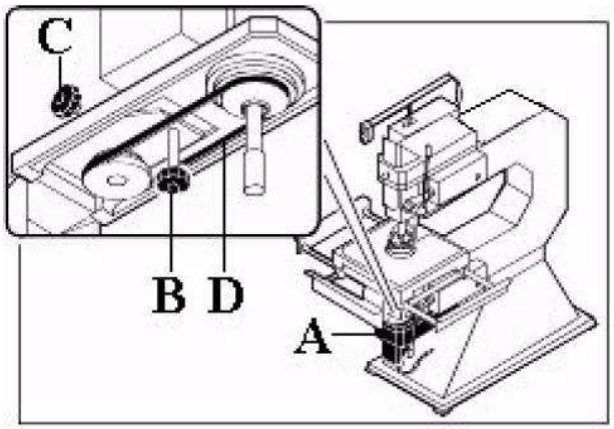
- *Open the protection covering **A**.*
- *Unscrew knob **B** that locks the guide plate.*
- *Loosen belt **D**.*
- *Replace the belt and suitably tighten.*
- *Use Zx36 notched Goodyear type belts.*
- *Tighten the knob **B**.*
- *Close the protection covering **A**.*



LOWER SPINDLE

- *Open the protection covering **A**.*
- *Unscrew knob **B** that locks the guide plate.*
- *Move knob **C** to loosen the drive belt **D**.*
- *Replace the belt and suitably tighten.*
- *Use Zx36 notched Goodyear type belts.*
- *Tighten the knob **B**.*
- *Close the protection covering **A**.*

INFORMATION: replace on both spindles.

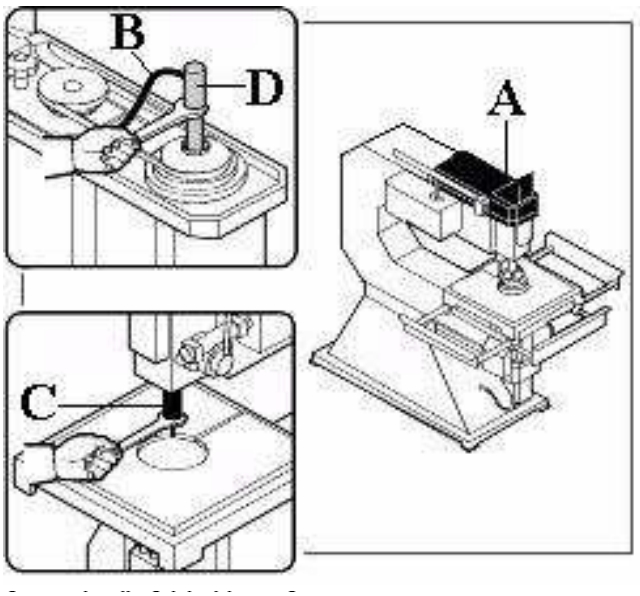


9.2. WATER DISTRIBUTOR - REPLACEMENT

If it is necessary to replace a distributor, proceed as follows:

- *open protection covering **A**.*
- *disconnect water hose **B**.*
- *insert a 30 mm wrench on spindle **C** and with a 24 mm wrench unscrew the cover of distributor **D**. Attention! Left-hand thread.*
- *replace the distributor with original spare parts.*
- *reconnect the water hose and close the protection covering.*

INFORMATION: carry out the same operation for the lower spindle.



9.3. LASER DEVICE- REPLACEMENT

If for any reason the laser should need to be replaced, contact **Schiatti's Technical Assistance Service**.

Once the laser has been replaced, carry out the adjustments described under paragraph 6.8.

10.1. DISPOSAL OF THE MACHINE

The user must check that the machine and its components / materials are disposed in accordance with EC directives and / or the laws in force in his country. So in case of disposal of the whole equipment, the necessary precautions must be taken to avoid the risks arising from the operations of demolition of industrial machinery and to protect the health of people and the environment in which we live.
Pay attention to the following steps:

- *Dismantling of the machine from the operating area*
- *Transport and handling of the machine*
- *Separation of different materials that make up the machine*
- *Demolition of the machine*

In the event that the materials used in the work cycle of the machine (condensed water, lubricants, etc.) are not removed in accordance with the EC and / or applicable law directives, resulting risks are:

Environmental pollution

Intoxication of the people assigned to the disposal of the machine

Cables, hoses, plastic components (non-metallic) must be disposed separately.

Pneumatic and electrical components, such as valves, solenoid valves, pressure regulators, circuit breakers, transformers, etc., must be removed and reused (in case they are still in good condition) or recycled.

The structure of the machine and all metal components must be removed and grouped by type of material. Homogeneous groups of materials can thus be scrapped, merged or recycled.

DANGER-WARNING: The elimination of the products classified as harmful / toxic, such as oil and grease, even the smallest residual, must be carried out in accordance with the EC rules and / or the laws of the country in which the machine is installed, charging companies authorized to eliminate them.