PERTICI
Via delle Città (SS. 429) 41/43
P.O. BOX 196 - 50052 CERTALDO (FI) ITALY
TEL. **+39 0571 651204** - FAX **+39 0571 652991**
e-mail: pertici@pertici.it - http://www.pertici.it

INSTRUCTION MANUAL

FOR USE AND MAINTENANCE

AUTOMATIC CORNER CLEANER

CM4/S

Ver.: 2.0

TABLE OF CONTENTS

1. INTRODUCTION

This manual is intended for the operator and in particular for the personnel responsible for safety in the use of the machine.
It is therefore recommended to carefully read the contents of this manual, and in particular those sections on precautions and methods of use, and to keep the manual in its holder in a safe place near the machine to facilitate future consultation as and when required.
To make the manual easier to follow reference is made to diagrams from the enclosures. The general reference is **DWG. Ax.y** whereby:
A indicates that the diagram is from an enclosure,
x indicates the number of the enclosure,
y indicates the page number of the enclosure.

2. GENERAL PRECAUTIONS

2.1 To use the machine correctly, the user must have a thorough knowledge of these user instructions and of all the hazards related to an improper use of the machine. Only expert and authorised personnel must therefore use the machine.

2.2 Safety in the use of the machine can only be guaranteed for the functions and materials listed in this instruction manual. PERTICI S.p.A. declines all liability if the machine is used for purposes other than those stated and in ways that do not conform to the user instructions.

2.3 PERTICI S.p.A. declines all liability for any matters relating to the safety, reliability and performance of the machine if the instructions and recommendations given in this manual are not observed, with particular reference to: assembly, use, routine and non-routine maintenance and repair work.

2.4 The user's electrical system must comply with 64-8 EEC Standards (CENELEC HD 384, 364 - 4/41 IEC).
The manufacturer accepts no liability if the machine is not correctly connected to the unipotential ground circuit and if protective devices co-ordinated in such a way as to guarantee the automatic breaking of the circuit in accordance with the above stated specifications are not installed upstream of the machine.

2.5 Only original spare parts must be used for non-routine maintenance and repair work.

2.6 For all repair work, contact the technical assistance service designated by the supplier of the machine. Responsibility for the perfect working order of the machine rests entirely with the user if it is repaired or maintained incorrectly by non-specialist or unauthorised personnel.

2.7 In particular, maintenance work on the electrical equipment must be performed by specialist or authorised personnel using original spare parts. The machine must be disconnected from the electrical power supply before performing any of these operations.

2.8 The automatic corner cleaning machine is designed for the use in covered industrial environments; any use in other areas relieves PERTICI S.p.A. of all liability.

2.9 The person in charge of the machine must be trained in the correct use of the machine itself, the safety devices and accessory equipment.

2.10 The safety devices provided with the machine are already correctly installed and attached. Both the safety devices and the entire machine must be submitted to routine and non-routine maintenance procedures at the specified intervals.

2.11 Before starting each job and switching on the machine, make sure that there are no chips or waste material from previous jobs on the work surface.

2.12 The operator must wear suitable clothing and use the correct safety equipment for the type of work being performed (protective gloves, soundproofed ear guards, safety goggles).
Never wear bracelets or other articles, which may be caught up in the machine.

2.13 Before starting any job with the machine, ensure that there are no persons or other potential sources of danger in the vicinity of the machine (an area of 150 cm around the machine) **(DWG. A1.9)**

2.14 Make sure the electricity mains connection cable is undamaged and correctly positioned.

2.15 Do not place or use inflammable substances near the machine, as the sparks produced may cause fires or explosions.

2.16 The operator must exercise the utmost care when, by entering the edge to be polished, the locking device is activated.

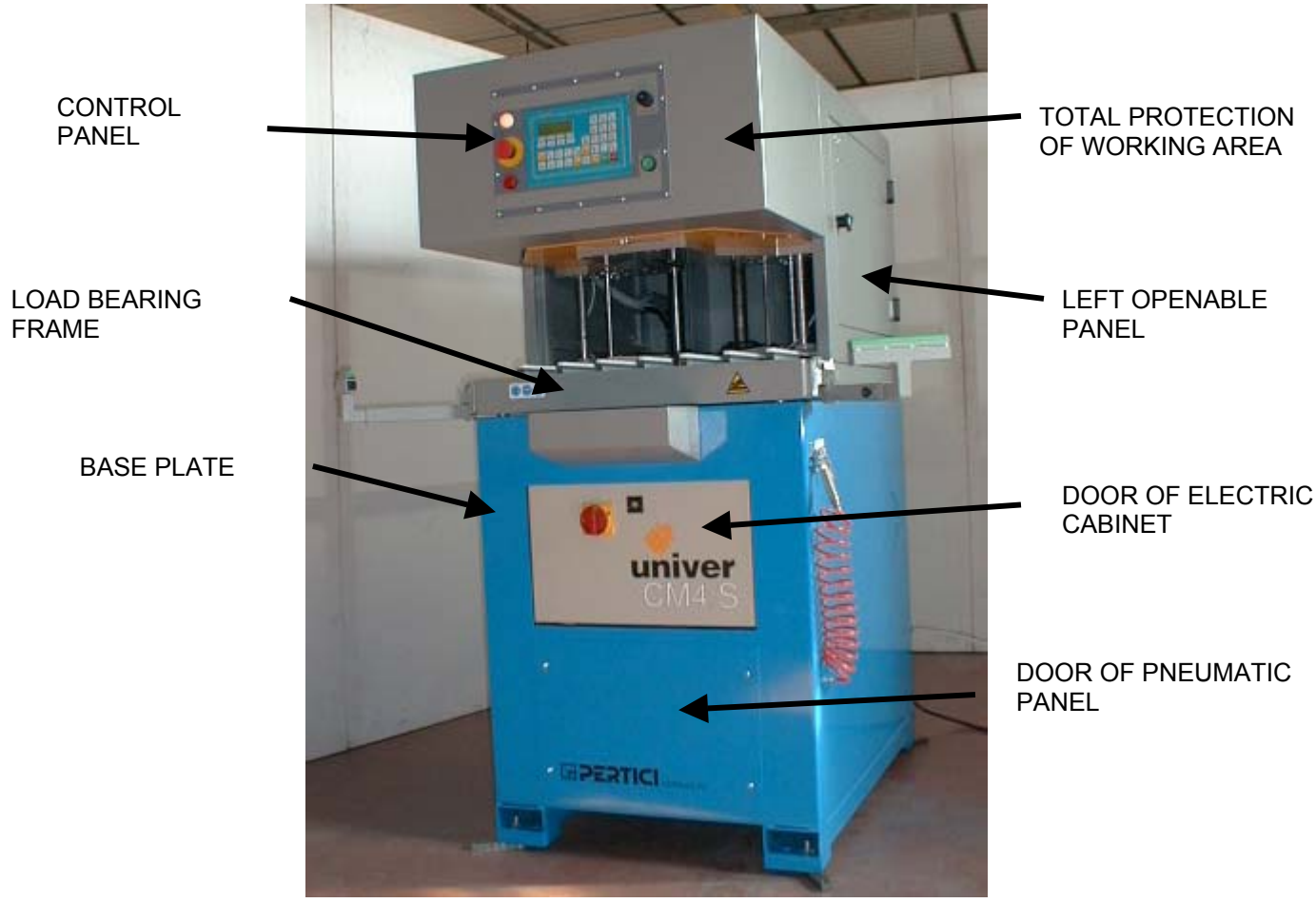
2.17 Always consider the possible consequences before approaching any of the more dangerous zones (locking zone and milling zone) with your hands.

3. CHARACTERISTICS

The CM4/S produced by PERTICI S.p.A. must be used to remove the rests of PVC that have been generated during the thermowelding process of the frame and door angles, for the construction of window and door fixtures.
- Possibility to mount a maximum of 4 groups of milling cutters to remove the welding seals from the external angle.
- Cutting devices to remove the upper and lower welding seals
- Automatic device for frame positioning
- Automatic device to start the working cycle.
- Working cycle controlled by an electronic unit (PLC)
- Independent adjustment of the milling (polishing) depth on the external side of the angle.
- Low-pressure safety device for frame locking.
- Possibility to modify the working cycle, excluding some machining.

3.1 Description of the machine

A) Base plate **(DWG. A1.1)**
The base plate consists of a 3-mm thick sheet bed.
The elements of the base plate are bent in order to obtain the maximum rigidity and are assembled by means of an intermittent weld. The control cabinet is mounted on the base plate by means of commercial bolts and nuts, while the panel of pneumatic components is connected to the base plate by welding.
The machine is also supplied complete with four vibration-damping feet, which are fixed to the lower part of the base plate and permit to place the machine on the floor.



Dwg. A1.1

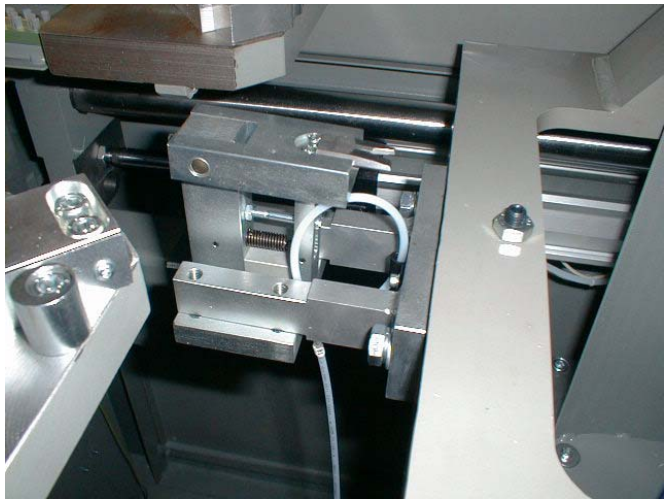
B) Load bearing frame **(Dwg. A1.1)**
It consists of a structure of steel plates and tubular.
The elements composing the frame are assembled by intermittent weld in order to obtain the maximum rigidity. The following groups are connected to the holding frame by means of commercial bolts and nuts:
- holding surface and automatic frame positioning
- group for lifting and forward movement of cutter's packs
- motor and cutter pack support group
- locking device with upper knife for welding seal removal
- total safety guards for moving parts and working area

C) - Holding surface and automatic frame positioning group **(Dwg. A1.2)**
It is composed of a sheet structure connected to the holding frame, on which have been fixed brushes with short and hard bristles, turned upwards, which permit to support the frame to be processed at the same height of the reference horizontal surfaces for working on the load bearing frame and on which have been fixed the reference shoulders which permit to obtain the proper frame position. In order to obtain this position, the operator has to put the frame by hand onto the machine and push it into contact with the two shoulders. In this way, the mobile part of the shoulders is able to activate the microswitches placed in the fixed part and to start the working cycle. Automatically a mechanical device controlled by pneumatic cylinders is activated, to position the frame in the right position to be processed.

Dwg. A1.2

D) Group for lifting and forward movement of cutter's pack and lower cutting device for welding seal removal **(Dwg. A1.3) - (Dwg. A1.4)**
It consists of a structure made of iron casting details, steel sheet assembled by means of intermittent weld, steel plates and rods. This structure works as a support for the motor group, for the support of the milling cutter's packs and for the lower cutting device. On this structure are mounted the pneumatic actuator for lifting of the milling cutter's packs, the pneumatic actuator for the forward movement of the cutter's packs and the actuator for the movement of the lower cutting device. The pneumatic actuators for lifting, permit the vertical positioning of the 4 cutter groups, the pneumatic actuator for the forward movement permit the movement of the cutter's packs in the frame direction to allow the external milling (polishing) processing. At the same time, the actuator for the movement of the lower cutting device for welding seal removal controls the movement upwards, thus permitting to inhibit or to activate the same cutting device.

Dwg. A1.3

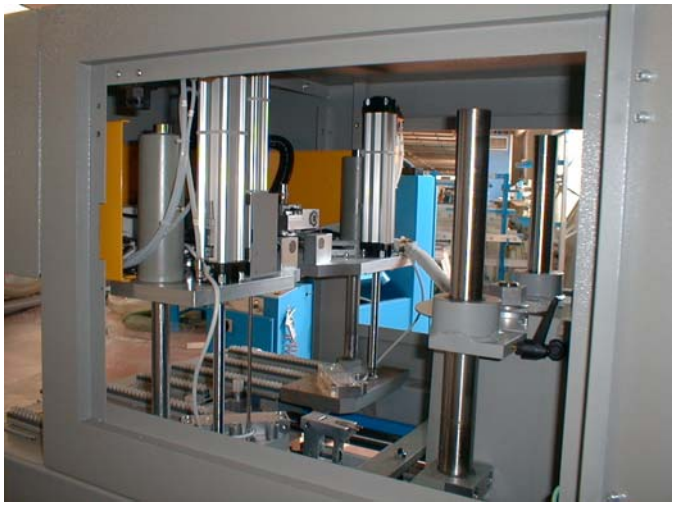


Dwg. A1.4

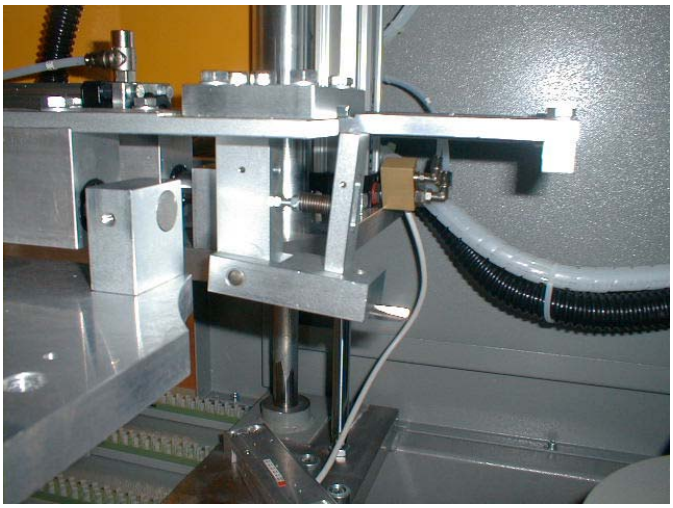
E) Motor and milling cutter pack holding group **(Dwg. A1.3)**
It consists of a structure made of steel sheet details, assembled by means of intermittent weld, aluminium plates and steel rods. A special electric motor with a long shaft has been fixed on this structure, in order to permit to place up to 4 milling cutter packs. The milling cutter packs are mounted directly on the motor shaft without any transmission. The motor shaft is supported at the end to give a bigger rigidity and to eliminate the possible vibrations during the rotation and processing phases. On the same structure has been mounted a safety guard for the milling cutter packs made of electro-welded sheet, which can be opened in order to enable the replacement of the milling cutter packs and that works also as exhaust hood for the chips produced during processing.

F) Group with locking device and upper cutting device for welding seal removal **(Dwg. A1.5) - (Dwg. A1.6)**

It consists of a structure made of aluminium sheet details with steel plates and rods. This structure is used to carry out the frame locking, first at a low pressure for the operator's safety and then at a high pressure for the machining. It works also as a support for the upper cutting device for welding seal removal and for the automatic profile recognition (optional). On this structure are assembled: the pneumatic actuators for the vertical blocking, the pneumatic actuator for the forward movement of the upper cutting device and, if the above mentioned optional is present, all relevant limit switch sensors and linear potentiometers, which permit to read the form and the dimensions of the profile composing the frame to be processed.



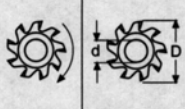
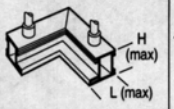
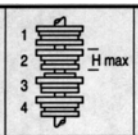
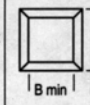
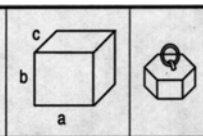
Dwg. A1.5



Dwg. A1.6

G) Total safety guards for moving parts and working area **(Dwg. A1.1)**
It consists of a structure made of steel sheet, assembled by means of intermittent weld, which protects the working area and all other dangerous zones of the machine. On this safety guard have been placed the electronic control unit of the machine as well as some control push buttons and some signalling lamps. Limit switch controlled Inspection doors have been made to carry out the replacement of the cutter's packs, of the knifes for welding seal removal and to accede to the internal components in case of maintenance works.

3.2 Technical features

TYPE										PVC	ALLUM	WOOD
CM4/S	1,1 Kw	220 v 380 v	n [1/min.] 2830	D) 250 mm. d) 32 mm.	H mm. 200 L mm. 200	H mm. 0,5 L mm. 3	H mm. 97	A-B 200 mm.	a 1250 mm. b 1650 mm. c 740 mm.	540 Kg.	●	○	○

IMPORTANT !!!!: USE ONLY MILLING CUTTERS WITH THE CHARACTERISTICS SPECIFIED IN THIS MANUAL.

3.3 Use limits

The corner cleaning machines type UNIVER CM4/S, produced by PERTICI S.p.A. are used for the processing of plastic profiles, mainly of PVC (Polyvinyl chloride).
The machines have been designed and built to be used in covered industrial environments.
Conditions of use:
Ambient temperature range: from 10°C to 40°C.
Humidity up to 90% at a temperature of 20°C

The maximum diameter of the cutter to be mount on these models in order to work in safety conditions is:

Ø = 250 mm

The maximum dimensions of the profile composing the frame that can be processed in safety conditions are:

Max. profile height = 200 mm

Max. profile width = 140 mm

WARNING !!!!! ANY USE OF THE MACHINE FOR PURPOSES OTHER THAN THOSE INTENDED AND STATED BY THE MANUFACTURER IN THIS USER INSTRUCTION MANUAL AND IN THE PROMOTIONAL BROCHURE WILL BE CONSIDERED AS IMPROPER.
PERTICI S.p.A. DECLINES THEREFORE ANY LIABILITY IF THE OPERATOR HAS NOT OBSERVED THE MANUFACTURER'S SPECIFICATIONS.

3.4 Standard kits

UNIVER CM4/S
Couple of knifes for upper and lower welding seal removal on not coated profiles
Safety guard of milling cutter groups with arrangement for exhaust coupling

3.5 Optional/Spare parts

UNIVER CM4/S
Adjustable supporting arms for profiles
Device for the automatic profile recognition (with limit switches and linear potentiometers)
Couple of knife for welding seal removal on coated profiles
Industrial dust exhaust three-phase unit (standard) – 2 bags – KW. 1,5 with accessories
Device for the automatic turning on of exhaust unit
Set of milling cutters (by sample)

3.6 Tools to be used

To execute the corner cleaning the CM4/S uses two types of tools.

- Packs of milling cutters
- Knifes for welding seal removal

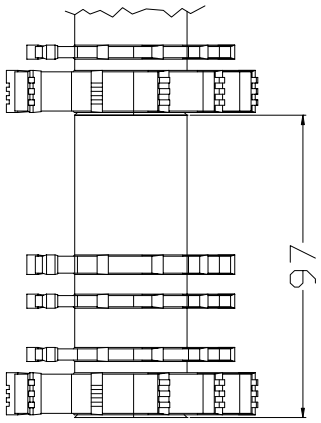
3.6.1 Groups of milling cutters

This tool is used to remove the welding seal from the frame external angle.

The milling cutter pack is realised joining various milling cutters with different diameters and thickness with the aim to “copy” the profile shape.

3.6.2 Height of milling cutter groups

The machine allows seating 4 groups of milling cutters.
Each pack must have a height of 97 mm.



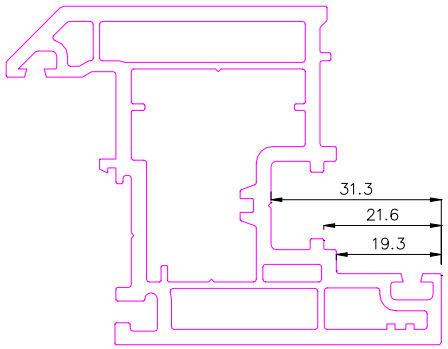
If the milling cutters composing the group reach a lower height, some spacers with the proper height must be added.

3.6.3 Base diameter of the milling cutters

To make up the groups it is necessary to determine the diameters of the single milling cutters composing each group.
All milling cutter diameters have a direct ratio with a reference diameter (base diameter).
The base diameter for the CM4/S is of 80 mm and refers to the milling cutter, which has to polish the profile part in contact with the holding shoulders.

Starting from the base diameter of the milling cutters, act as follows to calculate the diameter of the other milling cutters.

Examining a straight profile piece, measure the distance from the surface resting on the shoulders and the other surfaces to be polished.



Multiply each measure by 2 (to calculate the diameter and not the ray). The result must be multiplied by 1.414 (to calculate the effective dimension at 45°) and finally added to the base diameter (80-mm).

Ex. The milling cutter immediately above the base one must have a diameter of:

80 + (19.3 x 2 x 1.414) =134.58 so approximately 134.6 mm

3.6.4 Quantity of cutting bits

To obtain a good quality of the machining, the PERTICI SPA company suggests the use of milling cutters with at least 8 (eight teeth) cutting bits.

3.6.5 Max. diameter of milling cutters

The CM4/S permits to install milling cutters with a max. diameter of 260 mm

3.6.6 Min. diameter of milling cutters

The CM4/S permits to install milling cutters with a min. diameter of 70 mm.

3.6.7 Connecting hole of milling cutter pack

The diameter of the milling cutter holding shaft of the CM4/S is Ø 32 h6 (tolerance 0 / -0.016).

The optimum coupling happens when the connecting hole of the milling cutter has a diameter of Ø 32 G7 (tolerance +0.009 /+0.034).

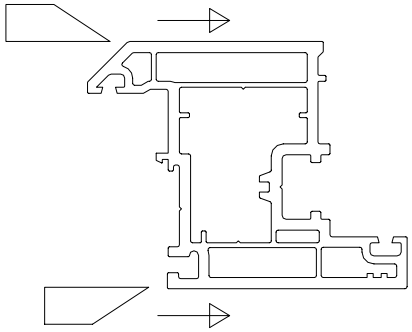
3.6.8 Balancing of milling cutter packs

Before using a milling cutter pack, it is very important to check its balancing.
The milling cutter pack at the rotating speed of 3000 rounds per minute must not operate a transversal force greater than 1 gram-force.

ATTENTION: THE USE OF NOT BALANCED MILLING CUTTER PACKS INVOLVES DAMAGES TO THE BEARINGS OF THE MOTOR SUPPORTING THE MILLING CUTTER HOLDING SHAFT.

3.6.9 Knifes for welding seal removal

The CM4/S is equipped with two knifes to remove the upper and lower welding seal.



The machine permits the machining of almost all types of commercial profiles.

The standard kit of the machine consists in knifes producing a 3-mm width and 0.5 mm depth trace.

As optional can be supplied knifes with a “ZERO PROFILE”, which do not cut the profile very deep. These knifes are suitable for coloured and/or coated profiles.

3.7 Conformity with safety standards

The corner cleaner machines type **UNIVER CM4/S** have been designed and built in compliance with the following directives:

EEC STANDARD 89/392 and following modifications (Machine directive).
EEC STANDARD 89/336 and following modifications (Electromagnetic Compatibility).

The following standards and technical specifications have been used:

D.P.R. N°547 (27.4.1955)
EN 60240-1 standards (September 1993) IEC 44-5/IInd edition.
EN 292-1 (1991)and UNI EN 292, part 1, standards.
EN 292-2 (1991) UNI EN 292, part 2, standards.
EN 50081 - 1 (1992) standards.
EN 50082 - 1 (1992) standards.

4. COMMISSIONING

4.1 Transport

The corner cleaner machines type UNIVER are shipped fully greased and wrapped in heat-shrink nylon.
The sturdy design and form of the machines guarantee their safe and damage-free shipment and storage.
A forklift truck can lift the machines by inserting the forks at the points marked on the machine packaging. **(DWG. A1.7)**

DWG. A1.7

If the machine is packed in a wooden crate, the fork insertion points are marked on the crate itself.

Take great care when performing these operations in order to avoid injury to persons and damage to the machine or property.

4.2 Positioning

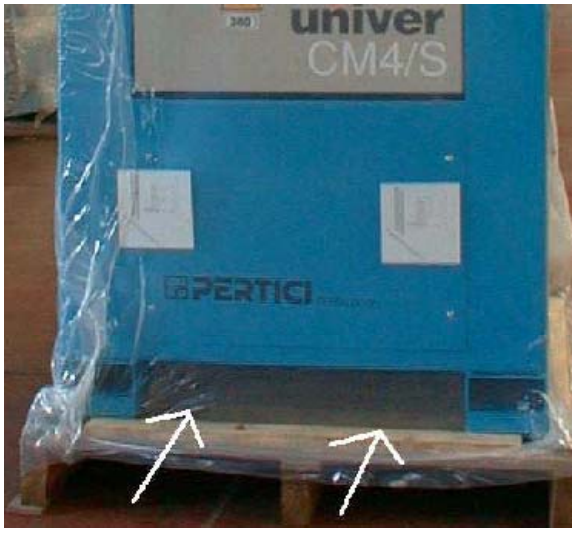
The machine must be positioned on a stable floor. Do not install the machine near to areas containing gas or flammable substances, as the sparks and glowing fragments produced and scattered may cause explosions or fires.
Position the machine in a place that is easily accessible for the various works and various hook-ups to:

1) The electric equipment
2) The compressed air circuit

3) The chip exhaust equipment

Make sure the lighting is adequate for the whole machine

Remove the machine from its packaging and make sure it has incurred no damage during shipment.
Remove the packaging: a forklift truck can now lift the machine. If transferred by forklift truck, the forks must be inserted in the lower part of the base plate. **(DWG. A1.8)**



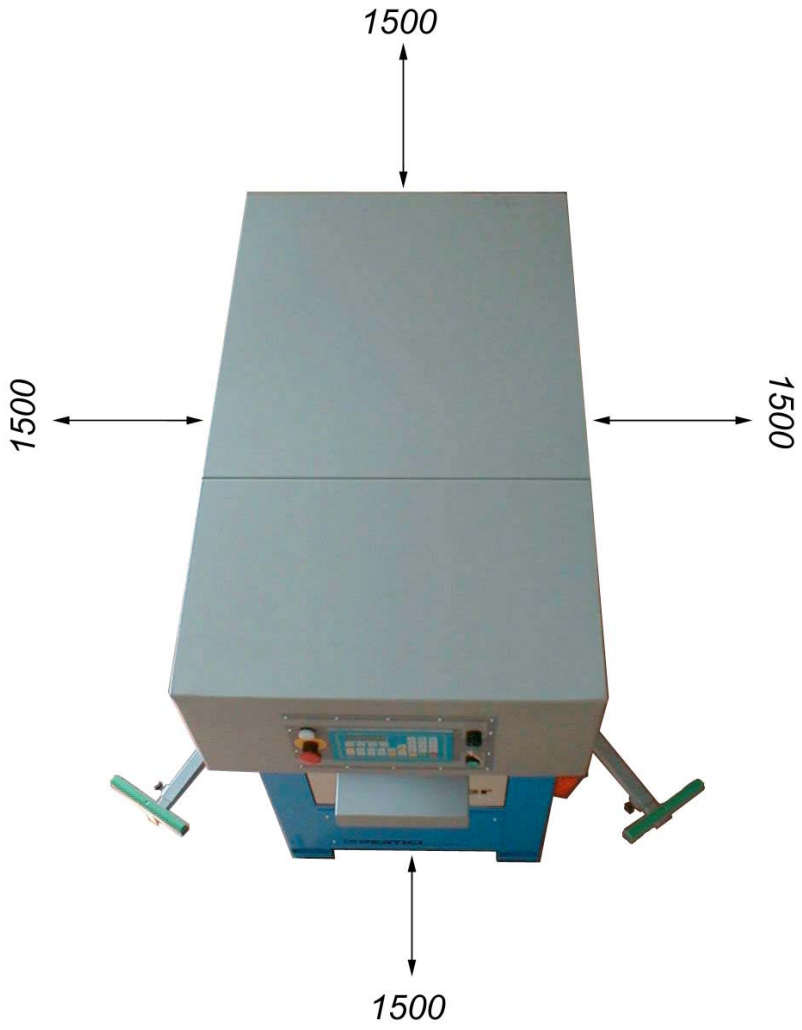
DWG. A1.8

Before placing the machine definitely on the floor, it is necessary to mount the four vibration-damping feet supplied together with the machine.
Avoid knocks, jolts and sudden movements when handling the machine.

PERTICI SPA declines all liability for damages caused during shipment. It is therefore important to check the state of the packaging at the time of purchase.

4.3 Safety zones and dimensions

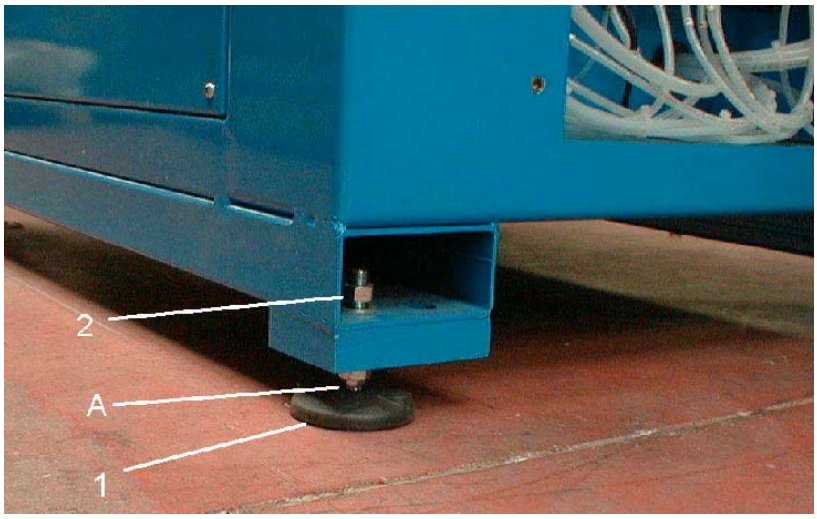
Once the machine has been moved to the place of its definitive installation and the packaging has been removed, proceed with the installation. Take care to leave around the machine the necessary space for the personnel for normal operations and for inspection and maintenance works.
The space required to work correctly is of 150 cm all around the machine.
In the following picture are indicated the safety areas around the machine where the utmost care must be taken to people or objects, which may constitute obstacles or hazards during work. **(DWG. A1.9)**



DWG. A1.9

4.4 Setting up for work

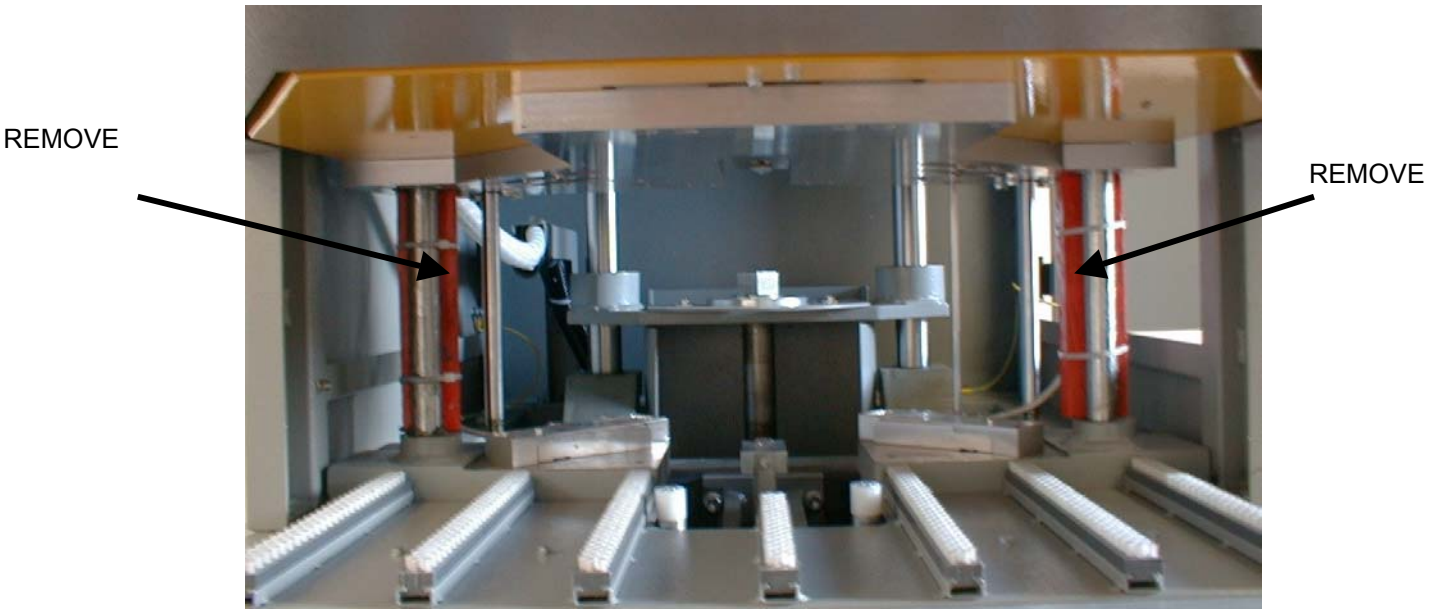
Levelling. Position a spirit level on the frame support surface and verify that the machine is levelled both lengthwise and crosswise. To level the machine act as follows:
- screw or unscrew the four vibration-damping feet 1 **(Dwg. A1.10)** by inserting the 12 mm key, supplied with the machine, into point (A).
- Tighten the four nuts 2 **(Dwg. A1.10)** using the 19 mm key supplied with the machine.



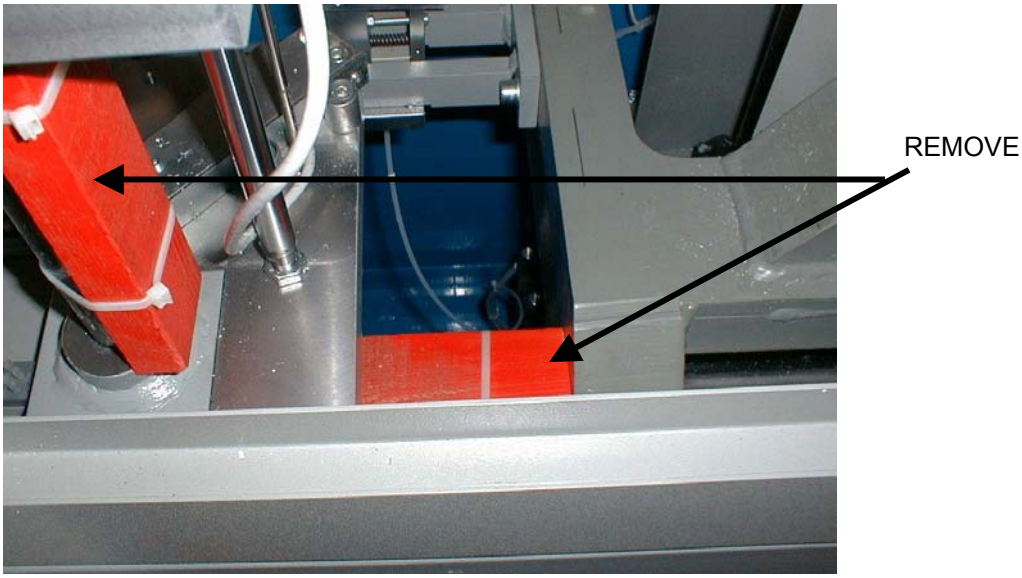
DWG. A1.10

The support surface of this machine model is wide enough to ensure a good stability and to avoid the machine tilting. The machine does not need, therefore, a permanent anchoring to the floor.

After placing and levelling, remove the blocking elements (wooden details) of the moving parts of the machine that have been placed to carry out the transport and moving operations in safety conditions. **(DWG. A1.11) - (DWG. A1.12)**



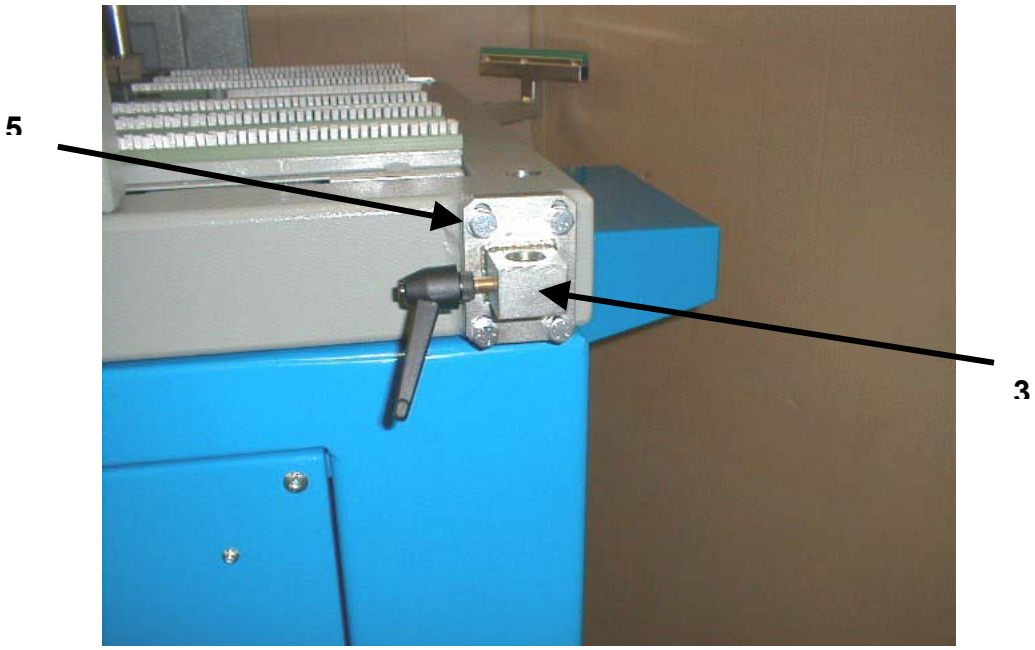
DWG. A1.11



DWG. A1.12

At this moment, the operations to be done concern the connection of the various systems as described in chapters 4.5 and 4.6.
Before setting the machine to work, especially if it is the first start-up or when it is installed in a new working place, it is necessary to consider the following technical information and the indications concerning the various connection types.

Mounting of profile holding arms (optional). The mounting and adjustment of this device (optional) is carried out in our workshop during the machine mounting phase, but it is partly removed by the machine to facilitate the packaging and shipment operations. To mount this device during the installation phase, proceed as follows:
- Put arm (1) and (2) **(DWG. A1.14)** into supports (3) **(DWG. A1.13)** fixed on the base plate of the machine.
- Mount the bush (6) **(DWG. A1.14)** and the self-locking nut (7) **(DWG. A1.14),** using the 24 mm key supplied. Do not lock the nut completely, but screw it enough to remove the clearance between the arm and the support, in order to allow the rotation of the same arm.
- The height adjustment of the arm is carried out during the machine mounting phase. Anyway, it is always better to proceed with a check in the following way:
- carry out a working cycle to block a frame on the working surface;
- check that the parts made of plastic material of the profile supporting arms (4) **(DWG. A1.14)**, are on the same level of the lower face of the profiles;
- in case the parts made of plastic material result higher or lower, proceed with the height regulation by loosing screws (5) **(DWG. A1.13)** only in part, with the 13 mm key supplied. These screws fix the supports on the base and move the supports upwards and downwards (3) **(DWG. A1.13)**;
- find the correct position and tighten the screws completely (5) **(DWG. A1.13)**. Carry out this operation on both sides.



DWG.A1.13

DWG.A1.14

4.5 Compressed air circuit hook-up

Connection to the line can be made by means of a rubber or Rilsan (Din 74324) hose with a suitable fitting. We recommend to use a supply hose with an internal diameter of not less than 10 mm.
The working pressure of the user's net must be, with full load not less than 8 bar/atm.
Hook up the line to the slide valve mounted on the FRL air treatment unit and check by moving the black collar, that the pressure on the gauge reads 8 bar/atm.
If necessary, turn the knob on the FRL air treatment unit **(DWG. A1.19)** to bring the pressure to the indicated level.

The filter's function is to filter the dust and moisture out of the air, which may otherwise damage the valves and pneumatic actuators. When condensate and impurities reach the maximum level in the container, empty the container by means of the relevant breather.
The approximate air consumption, calculated on the maximum work load is 11 lt/work cycle.
During the first few jobs, check that the pressure reading on the gauge does not fall below 6 bar/atm.

4.6 Connection of the electric equipment

Do not hook up the machine to the electricity mains until it has been properly positioned and fully assembled.
The machine is supplied with the net power supply characteristics requested by the customer.
Before connecting to the mains, check the voltage on the machine ratings plate.

CAUTION:

CHECK THE MACHINE POWER SUPPLY VOLTAGE CAREFULLY

TO AVOID CAUSING DAMAGE TO THE ELECTRONIC-ELECTROTECHNICAL COMPONENTS, THE VOLTAGE MUST COMPLY WITH THE FOLLOWING CONDITION:

Va = Vt +/- 5% Vt.

Whereby: Va = actual power supply voltage
Vt = machine rating plate voltage

The user's electricity network must comply with 64-8 IEC standards (CENELEC HD 384, 364-4/41 IEC).
The network must have:
- a unipotential ground circuit;
- a protective device installed upstream of the machine that is set in such a way as to guarantee the automatic breaking of the circuit in accordance with the above stated specifications.

We recommend hooking up with an EEC-standard interlocked plug and socket with safety fuses, of suitable capacity for the machine power input (see rating plate).
We recommend the use of fuses suitable for the motor start (AM).
Information about the machine's electrical system are given in the enclosure 3.
The motor has electrical overload protection and cuts out automatically in case of overheating. Allow the motor to cool and act on the thermal relay SM1 reset button

CHECKING THE DIRECTION OF ROTATION OF THE MILLING CUTTERS

To verify that the connection has been made properly, act as follows:
- Turn the main selector switch to position "1" to turn the machine on.
- Check that the pneumatic equipment is under pressure
- Press on RESET push button (the EMERGENCY signalling lamp must be off).
- Enter the angle of a frame on the machine in order to rest on the reference shoulders, the machine will start the milling cutter motor.
- Pay attention to the direction of rotation of the milling cutter and press immediately the emergency push button.
- The direction of rotation of the milling cutter must be the same indicated by the arrow **(DWG. A1.15)**

Should the direction of rotation be opposite, invert the connection of two phases on the terminal board in the power supply circuit.

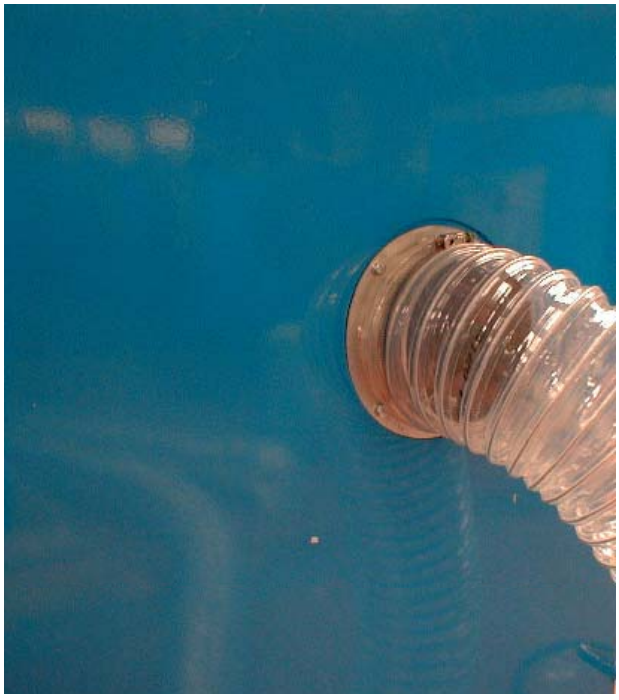
ATTENTION: DO NOT MODIFY ANY CONNECTION INSIDE THE ELECTRIC CABINET

DWG. A1.15

4.7 Connection to the exhaust system

An electrically independent exhausting device can be connected to the machine. In case the machine is supplied with the optional “Device for automatic starting of exhauster” this can be connected directly to the electric socket arranged on the machine.

DWG. A1.16



DWG. A1.17

The machine has been prearranged so to be able to connect any type of exhauster, to see the external connecting mouth of the pipe **(DWG. A1.17)** and the internal connection of the pipe to be able to exit the machine base plate **(DWG. A1.16).**
The dimensions of the circular lateral socket are:
- Internal diameter 108 mm
- External diameter 115 mm (suitable to be connected to a Øi = 120 mm tube) **(DWG. A1.17).**

Attention: the PERTICI SPA supplies upon request (optional) an exhausting device with 2 bags, a power of KW. 1,5 – an exhausting mouth with a diameter of 200 mm, complete with the connection accessories.

Should the final customer refuse the supply of this optional, PERTICI SPA recommends the use of an exhausting device with at least the same characteristics.

5. USE

5.1 Checks before use

The following precautions must be taken each time before using the machine:
- Check that the work surface is free of waste materials and cuttings.
- Check the state of the milling cutters before each use of the machine:
WORN MILLING CUTTERS. Sharpen or replace, following the procedure described in chapter MAINTENANCE – section 8.3 – REPLACEMENT OF MILLING CUTTER PACKS.
MILLING CUTTERS WITH MISSING TEETH. Replace.
- Check that the pressure on the gauge reads 8 (bar/atm)
- Check the electrical connection of the plug to the interlocked socket.
- Check that the emergency button (PE) is not engaged.

5.2 Description of controls

Electric controls and signals:

SIGNALLING LIGHT indicating that the POWER IS ON **(DWG. A1.18)**
When this signalling lamp is on, means that the machine is energised (main switch turned to position “1”).

EMERGENCY SIGNALLING LIGHT **(DWG. A1.18)**
When this signalling light is on, it means that the machine is in emergency conditions.
Verify then, that the emergency push button is not engaged and that the pneumatic circuit is powered with enough pressure.

KEY SELECTOR SWITCH FOR PROGRAMMING **(DWG. A1.18)**
This key selector switch is used during the setting phase of the automatic recognition.
The key must be kept by the personnel responsible for maintenance.

RESET PUSH BUTTON **(DWG. A1.18)**

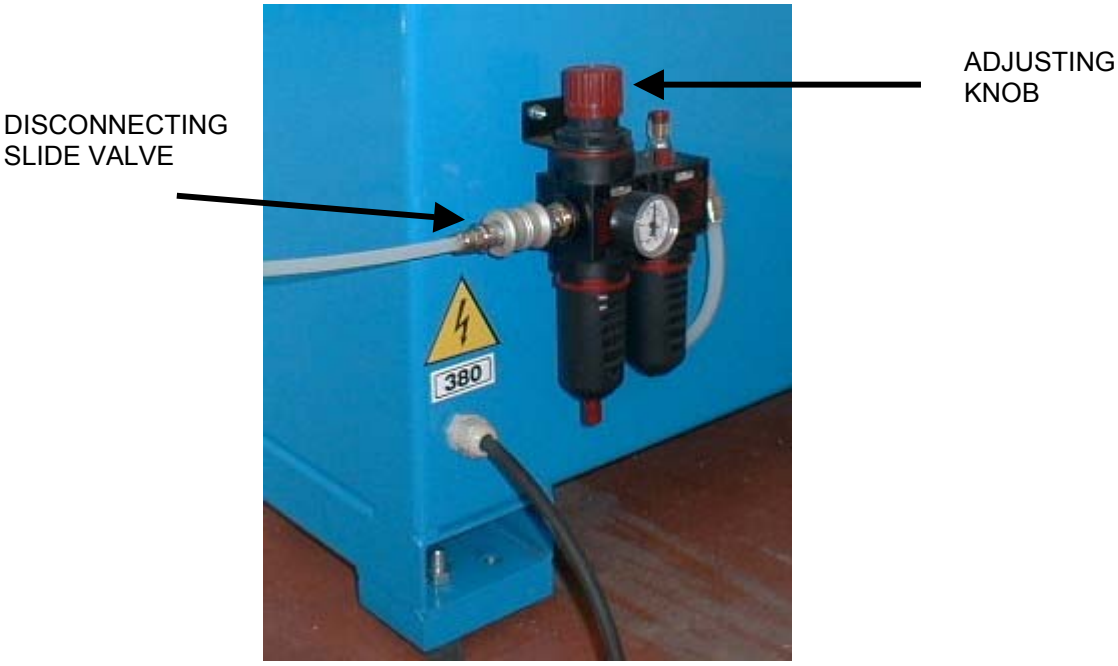
This push button is used to come out from the emergency condition. If the red signalling lamp is on, check the emergency push button and the air pressure and then act on the RESET push button.

EMERGENCY PUSH BUTTON **(DWG. A1.18)**
The push button for the emergency stop is easy recognisable thanks to the characteristic red mushroom shape. The push button is of the type with “mechanical hook-up“: to bring it back to working conditions pull the mushroom in the operator’s direction.

DWG. A1.18

Pneumatic controls:

DISCONNECTING SLIDE VALVE
It is connected to the lubricator-filter group, pushing the collar towards the group the machine is energised, moving it in the opposite direction the machine is disconnected and the pneumatic circuit is unloaded, thus making all cylinders free for the manual movement.



DWG. A1.19

5.3 Operating cycle

To carry out the angle polishing, the operator has to observe the following procedure:

1) Turn the machine on and act on RESET push button
   On the display appears:

```
F1 UPP.CUT.DEV. ON
F2 LOW.CUT.DEV. ON
F3 MILL. CUTTER  MAN
SET MIL.CUT:1
```

2) Act on keys F1 and F2 to include or exclude the processing of the lower and upper knifes for welding seal removal.

3) Act on key F3 to include or exclude the milling cutter from processing.
   If the machine is provided with the optional “automatic recognition”, acting on F3 it is possible to set the milling cutter to the position “AUTO”. In this case the machine selects automatically the milling cutter to be used, using the data entered during the programming procedure (see chapter 6.4 Programming of the automatic profile recognition system)
   If the milling cutter has been set to “MAN”, it is necessary to indicate the number of milling cutter to be used.

   ATTENTION: the milling cutter group No.1 is positioned at the upper end of the shaft, the number two and three immediately underneath, and the fourth group is the lowest.

4) Enter the frame with the angles to be polished.
   The machine activates the device for automatic positioning and pushes the window to the holding shoulders.
   Should the angle be not correctly positioned, the controller will send an error on the display:
   Press any key to release the device and repeat the cycle.

5) If the positioning results correct, the machine activates the low pressure vertical locking (to avoid squashing to the hands).

6) The controller verifies that the locking has been carried out correctly and automatically starts the automatic working cycle with the following sequence:
   - Forward movement of the upper cutting device (welding seal removal) and return into home position
   - Forward movement of the required milling cutter pack (external polishing operation) and of the lower knife for welding seal removal.
   - Return of the milling cutter group into home position, activating the lower cutting device, which carries out its working (welding seal removal) during the return stroke.

7) After that the automatic cycle is ended, the locking plate opens and it is possible to remove the frame and proceed to the processing of the following angle.

5.4 Emergency device

At any time it is possible to stop the machine operations acting on the emergency push button PE **(Dwg. A1.18)**. With this action, the milling cutter returns immediately into its home position inside the protection and the motor stops. To re-activate the machine, turn the push button in order to let it raise upwards.
To re-start the working cycle press the RESET push button and act as during a normal working cycle.

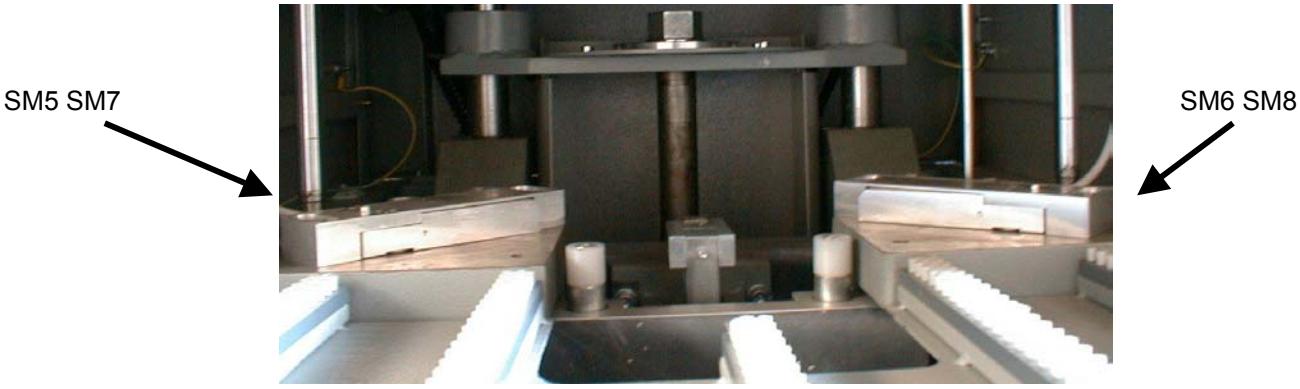
5.5 Functionality of sensors

The machine uses three types of components to monitor the machine status:

1) microswitches (mechanically activated)
2) reed sensors (which start in the proximity of the magnetic elements of the cylinders)
3) resistive linear transducer (give a different resistance value as the length varies)

5.5.1 Microswitches for holding shoulders

The holding shoulders shown in the figure are used as a reference to position the frame to be polished on the machine. **(DWG. A1.20)**

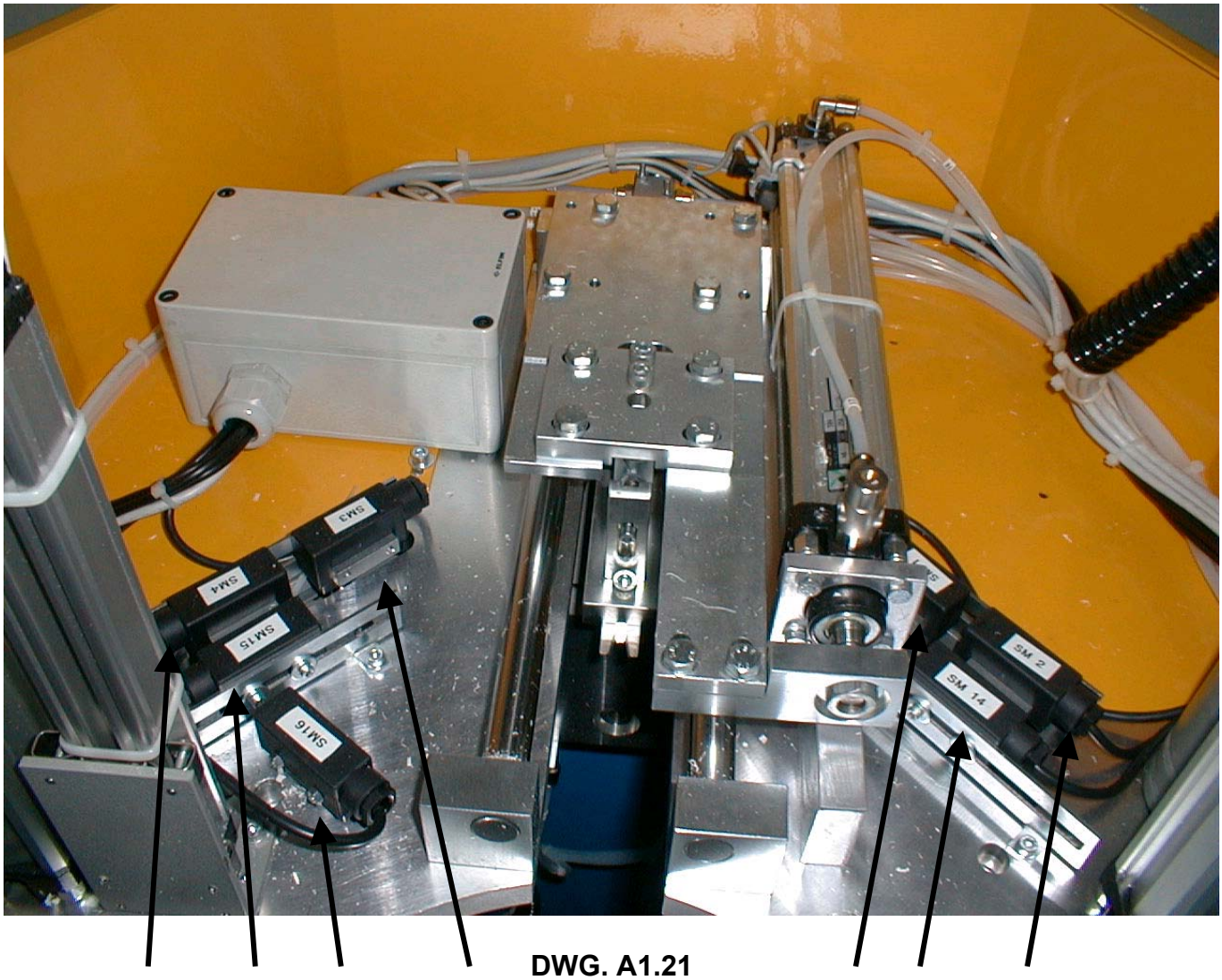


DWG. A1.20

Each shoulder contains two microswitches. Entering the frame, the PLC of the machine activates the automatic activation device which positions the angle against the references. By means of the microswitches, the PLC controls that the window is perfectly positioned, otherwise an error message appears on the display.
If the positioning results correct, the working cycle starts.

5.5.2 Microswitches for safety of the locking plate

The locking plate contains 4 or 7 microfiches (7 if the option for the automatic profile recognition device has been installed). **(DWG. A1.21)**



DWG. A1.21

SM4 SM15 SM16 SM3 SM1 SM14 SM2

The SM1 SM2 SM3 SM4 microswitches are used as a locking safety,
After having positioned the angle against the reference shoulders, the plate goes down to lock the fenster and at least one microswitch for each side (SM3 or SM4) (SM1 or SM2) must result engaged.
If the just described condition happens, it means that the machine has not been activated by chance, but a frame to be polished was effectively positioned.
The positioning of such microswitches has been carried out by the PERTICI company during the official acceptance and is suitable to the greater part of profiles that can be found on the market. Should it not be suitable to the profile to be processed, see the chapter concerning the adjustments.
The SM14 SM15 SM16 microswitches are used for the automatic profile recognition (optional) see chapter (**6.4 – Programming of the automatic profile recognition system**).

5.5.3 Reed sensors

The Reed sensors are installed on the cylinders for the forward movement of the milling cutter, of the positioner and of the upper cutting device.
These sensors do not need regulation in any case. In case of malfunction, the PLC will send a message on the display.

5.5.4 Resistive linear transducers

These components are installed only if the machine has been provided with the optional "automatic profile recognition".
They are similar to pneumatic cylinders and are used to measure width and length of the profile under process in order to be able to choose the proper milling cutter.

The transducers do not need any regulation.

5.6 Precautions to ensure safety during use

ATTENTION: DURING THE WORKING CYCLE PAY ATTENTION TO THE AREA WHERE THE PIECE IS MOVED AND ANY OTHER OPERATION IS CARRIED OUT. THE OPERATOR MUST ALWAYS BE SURE THAT NO OTHER PERSON IS WITHIN THE SAFETY ZONE OF THE MACHINE.

- Never remove the safety guards.
  - The profile interlock happens automatically soon after having entered the frame in the machine and the device for automatic centering has brought it into working position.

ATTENTION: EVEN IF THE MACHINE IS PROVIDED WITH A LOW PRESSURE SAFETY DEVICE ON THE INTERLOCK, DURING THIS OPERATION THE OPERATOR MUST TAKE GREAT CARE FOR THE POSITION OF HIS HANDS ON THE FRAME DURING THE INSERTION IN THE MACHINE.

- The machine is completely protected against the materials and residues thrown up during processing. However, the operator is still advised to wear personal safety equipment such as **goggles** and **gloves**, to protect against flying splinters and fragments.

- The operator must think and be aware of all the possible consequences before approaching the more dangerous parts of the machine (electric cabinet – milling cutter unit and welding seal removal unit - interlock plate) with the hands.
- Always disconnect the machine from the power supply when not in use.
- Never leave the already cut workpiece on the work surface: remove it immediately, to avoid leaving loose pieces of profile lying around on the work surface.

6. ADJUSTMENTS FOR TOOLS OPERATIONS

IMPORTANT! ALL OPERATIONS DESCRIBED IN THIS CHAPTER MUST BE CARRIED OUT BY AUTHORISED PERSONNEL, WHICH MUST STRICTLY OBSERVE THE INDICATED PROCEDURE.

6.1 Adjustment of milling cutter packs height

The corner cleaning machine type CM4-S can host up to 4 milling cutter packs (with a 97 mm height each) mounted at the same time (one upon the other) on the milling cutter holding shaft. If there are less than four milling cutters installed, relevant spacers must be mounted to reach the height of four milling cutters anyway (97 mm x 4).

In the following sections we explain the procedure for the height adjustment of the milling cutter packs.

6.1.1 Adjustment of the height of the milling cutter pack 3

If the machine uses all 4 milling cutter packs, it is necessary to start the adjustment from group No. 3 (the third starting from the top) otherwise observe the following indications valid for groups 1 and 2 and 4.

1) Turn the machine on and act on key RESET. The display shows:

```
F1 UPP. CUT. DEV.ON
F2 LOW. CUT. DEV.ON
F3 MILL. CUTT.  MAN
SET MILL. CUT.:1
```

2) In case the milling cutter has been set to “AUTO” or to “OFF” act many times on F3 to enter “MAN”

3) Press 3 to enter the position of the third milling cutter.

4) Enter an angle to be polished and wait for the machine to block the piece and position the milling cutters vertically.

5) As soon as the milling cutter starts approaching to the piece, press the emergency push button to lock the cycle.

6) Close the disconnecting slide valve of the pneumatic circuit (Picture 3)

7) Turn the main section switch to position 0

8) Open the upper right panel. The lower side of the milling cutter 3 is near the lower side of the profile.

To verify this alignment, it is possible to move by hand the milling cutter carriage to bring it close to the angle to be polished.

To change the height of the milling cutter group act as follows:

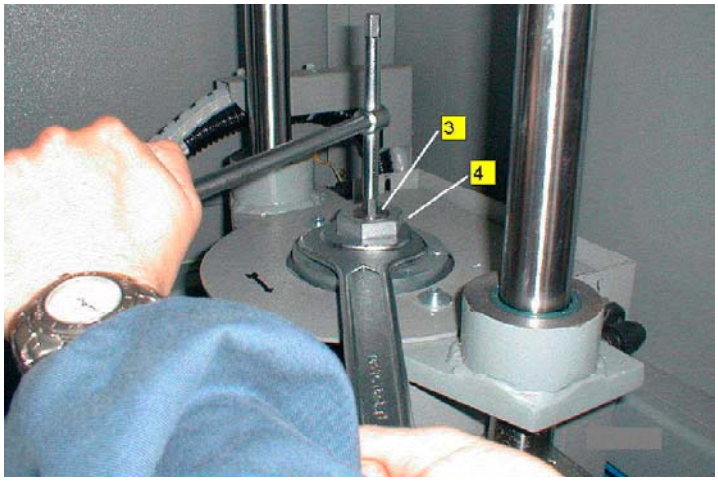
9) Enter the 10 mm Allen wrench (T-shaped wrench, supplied with the machine) in the relevant seat of the milling cutter holding shaft with ref. 3 **(DWG. A1.22)**

10) Enter the 46 mm wrench into the nut with ref. 4 **(DWG. A1.22)**
Loosen the nut by turning the wrench in the arrow direction.

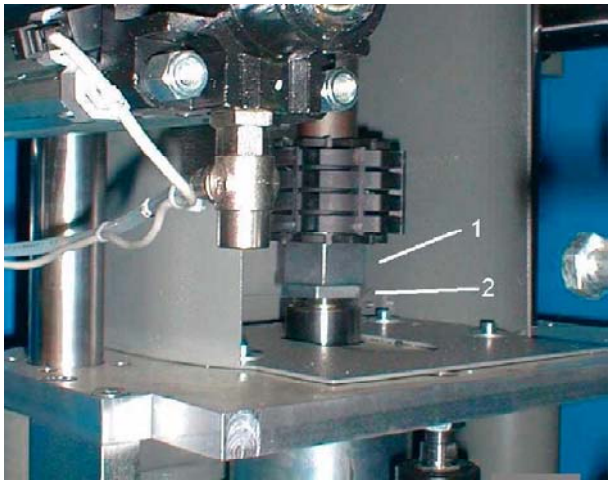
11) At this point use the two 50 mm wrenches supplied with the machine to lock the nut 1 and to loosen the counter nut 2 **(DWG. A1.23)**

12) Now act on nut 1 to adjust the height of the milling cutter pack.

13) At the end of the adjustment, tighten counter nut 2 **(DWG. A1.23)** and nut 4 **(DWG. A1.22)**.



DWG. A1.22



DWG. A1.23

6.1.2 Adjustment of the height of the milling cutter pack 1

Repeat the above described operations from point 1 to point 8 (setting the milling cutter 1)

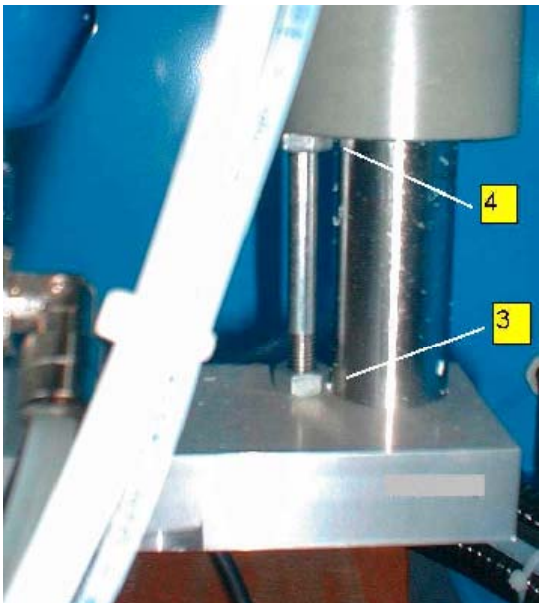
14) Use the 4 mm Allen wrench to remove the 4 screws from the lateral lower panel on the left and then remove the panel.

15) Use the 17 mm wrench to loosen nuts with ref. 1 **(DWG. A1.24)** and ref. 3 **(DWG. A1.25)**.

16) By means of the 17 mm key (supplied together with the machine) adjust screws with ref. 2 **(DWG. A1.24)** and ref. 4 **(DWG. A1.25)** (the milling cutter goes down as the screw is tightened and goes up as the screw is loosened)
(Set the two screws at the same height)

17) At the end of the adjustment tighten nuts 1 and 3.

DWG. A1.24



DWG.A1.25

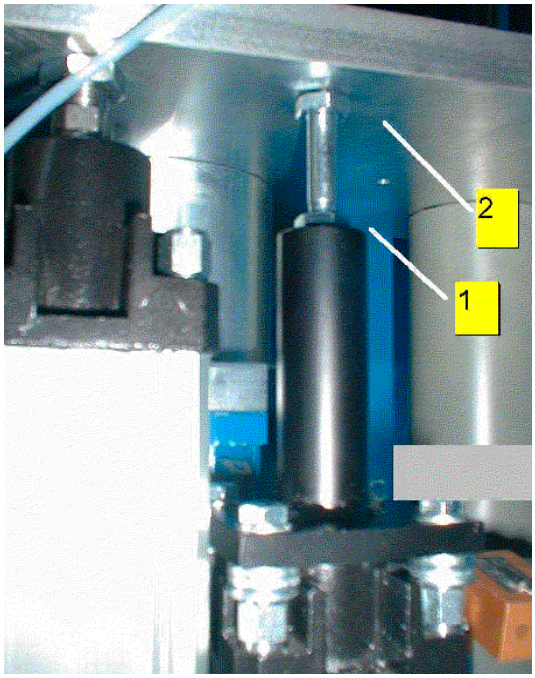
6.1.3 Adjustment of the height of the milling cutter pack 2

Repeat the above described operations from point 1 to point 8 (setting milling cutter 2).

18) Use the 17 mm wrench to loosen the nut with ref. 1 **(DWG. A1.26)**.

19) By means of the 17 mm Allen wrench (supplied with the machine) adjust the screw with ref. 2 **(DWG. A1.26)** (the milling cutter goes down as the screw is tightened and goes up as the screw is loosened).

20) At the end of the adjustment tighten the nut 1.



DWG.A1.26

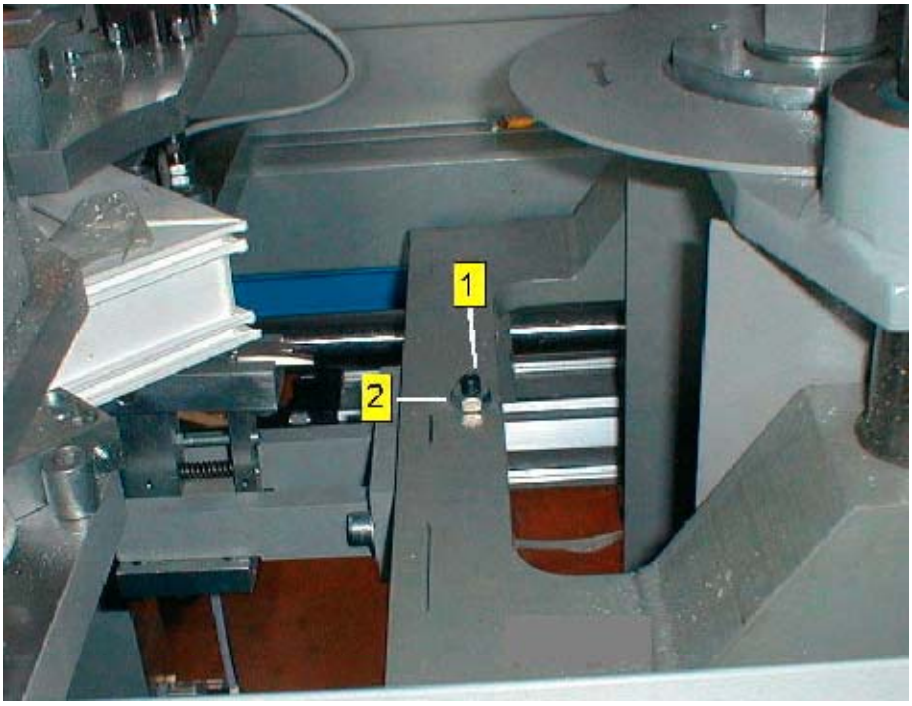
6.1.4 Adjustment of the height of the milling cutter pack 4

Repeat the above described operations from point 1 to point 8 (setting milling cutter 4).

21) Use the 17 mm wrench to loosen the nut with ref. 2 **(DWG. A1.27)**.

22) By means of the 5 mm Allen wrench (supplied with the machine) adjust the screw with ref. 1 **(DWG. A1.27)** (the milling cutter goes down as the screw is tightened and goes up as the screw is loosened).

23) At the end of the adjustment tighten the nut 2.

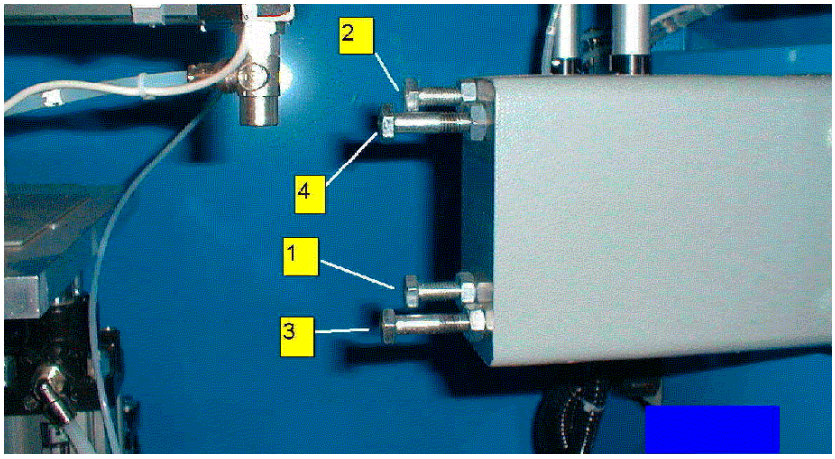


DWG. A1.27

6.2 Adjust of the milling depth

The corner cleaning machine type CM4-S has a device permitting to adjust the milling depth independently for each single milling cutter group. **(DWG. A1.28)**
The machine is regulated by PERTICI SPA in such a way that the 80 mm guide disc has a milling depth of 2 mm with respect to the theoretical angle root (whose two external surfaces rest on the positioning shoulders).

In the following pages we indicate the 4 screws to carry out a further adjustment for each single milling cutter pack (to carry our this operation and to accede to this device, it is necessary to remove the lateral lower panel on the left of the base plate).

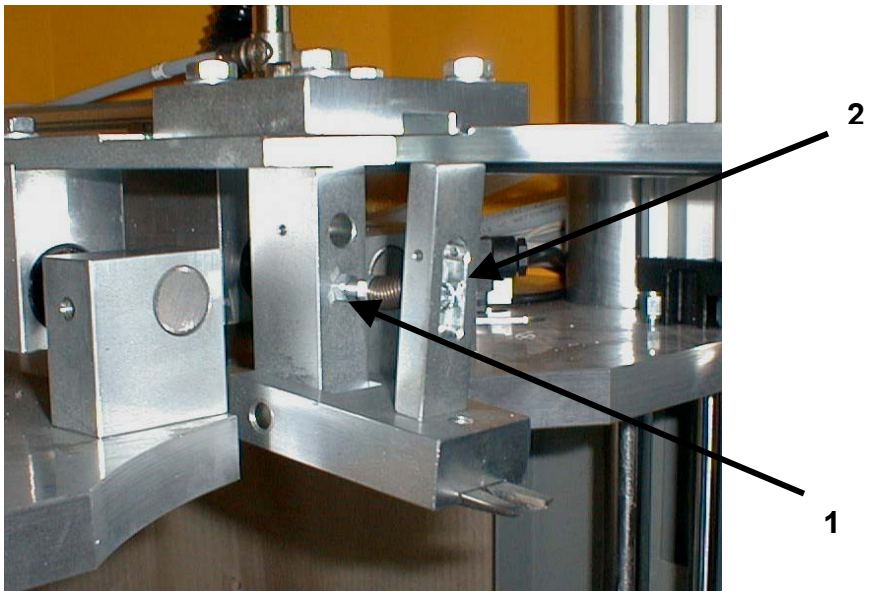


DWG. A1.28

The number given in the drawing **(DWG. A1.28)** indicates the number of the milling cutter pack being regulated.

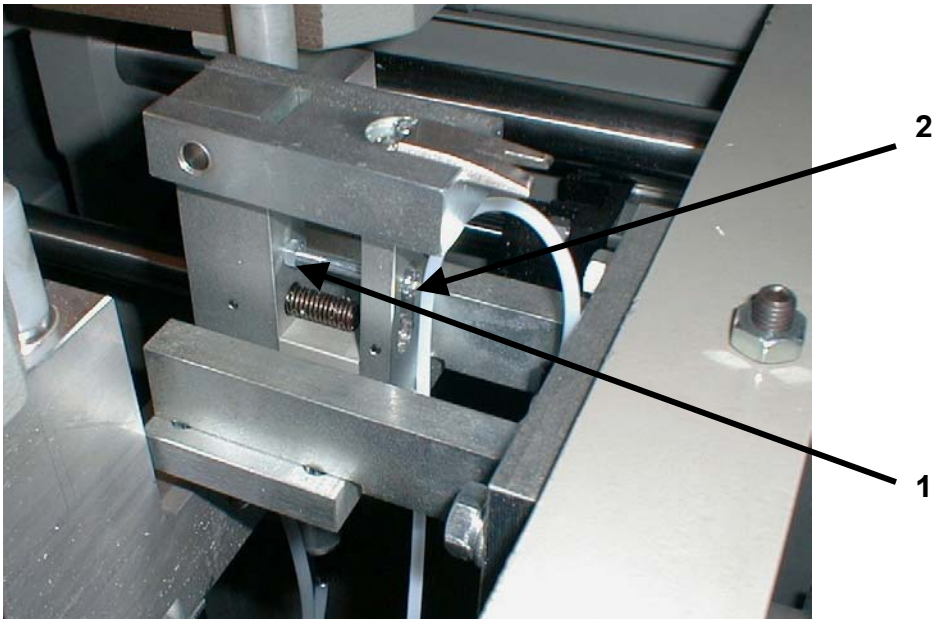
6.3 Adjustment and replacement of knifes for welding seal removal

The CM4-S has two knifes for the welding seal removal (an upper and a lower one), which are regulated by the PERTICI SPA during the acceptance test, and that should not need any further regulation. Anyway, should it be necessary to carry out the adjustment of their working depth, proceed as follows:
- turn the main switch to position “0” to remove power from the machine;
- act on the disconnecting valve to cut the air off from the pneumatic equipment;
- Upper knife:
- open the upper right lateral panel **(DWG. A1.1)** and move the support of the upper knife manually in the direction of the milling pack groups.
- partially loosen the nut 1 **(DWG. A1.29)** and carry out the regulation by turning the screw 2 **(DWG. A1.29).** By turning it clockwise the working depth diminishes, while by turning it counter clockwise the working depth increases.
- screw the nut completely 1 **(DWG. A1.29),** to fix the adjustment that has been carried out.



DWG. A1.29

- Lower knife:
- open the upper right lateral panel **(DWG. A1.1)** and move the support of the upper knife manually in the direction of the milling pack groups.
- partially loosen the nut 1 **(DWG. A1.30)** and carry out the regulation by turning the screw 2 **(DWG. A1.30).** By turning it clockwise the working depth diminishes, while by turning it counter clockwise the working depth increases.
- screw the nut completely 1 **(DWG. A1.30),** to fix the adjustment that has been carried out.



DWG. A1.30

6.4 Programming of the automatic profile recognition system

The corner cleaning machine type CM4-S can be equipped with an electronic system for the automatic recognition of the profile to be polished. With this optional it is not necessary to enter the type of milling cutter that has to be used.

This device needs an initial programming.

1) Prepare four or more welded angles (with different profiles).

2) From main menu enter the key supplied in the key selector switch for programming **(DWG. A1.18)** and turn the selector.

3) The display shows:

```
POSITION WINDOW


F1 PROG DATA EDITOR
```

Enter an angle to be polished following the positioning example of the following figure. The machine blocks the angle.

4) The display shows:

```
POSITION LIMIT SW.
14 15 16
 1  1  1 -1998-3008
PRESS ANY KEY
```

Open the lateral right door and move the limit switches SM14 ,15, and 16 **(DWG. A1.21)** so that only 15 and 16 will be pressed (see the example in the figure).
On the third line of the display appears the status of each limit switch sensor: engaged (1) or not (0).
The two numeric values are the measure for the horizontal and vertical locking.

After having adjusted the limit switches press any key.

The machine controller memorises the limit switch status (0 or 1) and the value of the potentiometers.

5) The display shows:

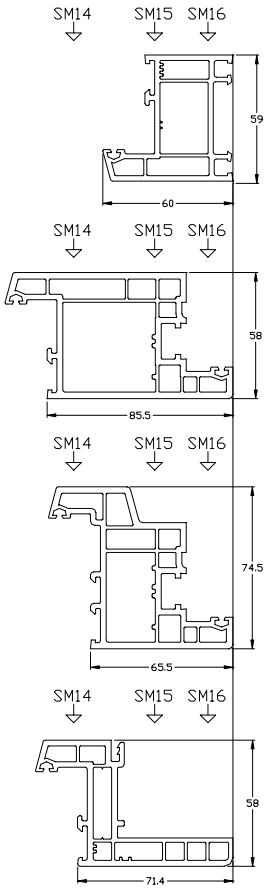
```
MILL. CUTTER No.:

```

Enter the number of the milling cutter to be used (from 1 to 9).

ATTENTION
The machine can control a maximum of 9 milling cutter packs, while on the milling cutter holding shaft can be mounted only 4 groups at the same time.
The controller memorises which milling cutter packs are mounted at every moment on the machine and asks the operator to mount a different milling cutter should it be necessary.

Repeat the same acquisition cycle from point 1 to point 5 for all profiles to be processed adjusting the limit switch sensors.



In case of a wrong acquisition cycle, it is possible to cancel it from the memory.

6.4.1 Modification of the data for the automatic recognition

To modify the data acquired from the previously described programming procedure or to cancel them act as follows:

1) From the main menu enter the key supplied in the programming key selector switch **(DWG. A1.18)** and turn the selector.

2) Press F1

The display shows:

R.	N	1	4	1	5	1	6	A.1	A.2
1	9	1	1	1				1998	3014
2	0	0	0	0	0			0	
3	0	0	0	0	0			0	

On the R column appears the number of the memorised line.
(99 different profiles can be memorised)

On the N column appears the number of the milling cutter to be used (from 1 to 9)

The columns 14, 15 and 16 indicate the status of the limit switch sensors 14 15 and 16.

On columns A.1 and A.2 are given the values of the potentiometers for the horizontal and vertical locking.

To cancel a line move the cursor on that line by means of the arrow and press on F3, then confirm moving the cursor to YES and pressing ENTER.

To cancel the whole archive press F4, then confirm moving the cursor to YES and pressing ENTER.

IMPORTANT! ALL THE ACQUIRED DATA WILL BE LOST.

7. NOISE

Tests were carried out in conformity with the specifications of Directive 89/392 Encl. I, Article 1.7.4, point f, with measurements made in accordance with ISO 3746 standards
The test conditions and results are given in the enclosure 7 of this instruction manual.
The operator is advised to use protective equipment, such as good quality soundproofed ear guards.
To prevent the exposure level from increasing beyond the test values over time, check the sharpening status of the milling cutter groups constantly.
In relation with the use of the machine, it is not possible to be sure that the level of personal exposition be less than 85 dB(A). It is necessary to carry out some internal tests, directly in the place where the machine works, on the acoustic emission with relation to the exposure time as this limit value could be overcome.
In the ENCLOSURE 7 is given, as well as the test conditions and the resulted values, information material concerning the sound, in conformity with the article 46 of the Leg. Decree 277/91.

8. MAINTENANCE

The corner cleaning machines type UNIVER CM4/S do not require any special maintenance operation.
The technical solutions, the materials used and the protective paints have been specially developed and selected to reduce maintenance work.
However, we do recommend a series of operations, divided up into *ordinary* and *extraordinary maintenance* operations, aimed at guaranteeing the safety, reliability and efficiency of the machines over time.

8.1 Ordinary maintenance

The following operations should be carried out on a daily basis, at the end of work.
- Clean the work surface.
- Clean the rods for sliding and vertical blocking.
- Blow with compressed air to remove dirt, scrap or material wastes more or less great from the frame positioning and locking area.
- Check that there are no cuts or scratches on the mains power supply lead.
- Check the condense level in the collecting container of the FR filter unit: should it be high unload the container by means of the relevant valve placed under it.

8.2 Extraordinary maintenance (weekly)

- Verify the state of wear of the milling cutters.
- Blow whit compressed air to remove dust and scraps if any from the motor safety grid.
- Verify the safety of the electric equipment:
    a) isolation of cables
    b) working order of circuit breaker
    c) continuity of ground conductor (ground)
- Verify the locking of the various mechanic components.
- Periodically grease and oil all joints prone to seizing,

8.3 – Replacement of milling cutters

From the main menu act on key F4, on the display appears:

```
1 – PARAMETERS
2 – CHANGE MIL.CUTT.
3 – INP. TEST
4 – OUT. TEST
```

Act then on key 2 to proceed to the replacement of the milling cutters on the milling cutter holding shaft.

```
CHANGE OF MILL.CUTT.
ARR. UP LIFT MIL.CUT
ARR. DW LOW.MIL.CUT.
START – CHANGE MADE
```

1) Act on key ↑ to move the milling cutters holding shaft upwards.

2) Open the left lateral door and, by means of the 10 mm Allen wrench and of the 46 mm wrench remove the nut 2 **(DWG. A1.31)** (unscrew by turning the key in the direction indicated by the arrow)

3) Tighten the levers 3 **(DWG. A1.32)**, the other lever is on the opposite side.

4) Loosen knobs 4 and 5 **(DWG. A1.32)**, two of which are on the opposite side.

5) Remove the rear carter.

6) Close the side door and act on key ↓ to move the milling cutter holding shaft downwards.

7) Replace the milling cutter packs and mount the rear carter again.

8) Loosen levers 3 to let the upper plate go down.

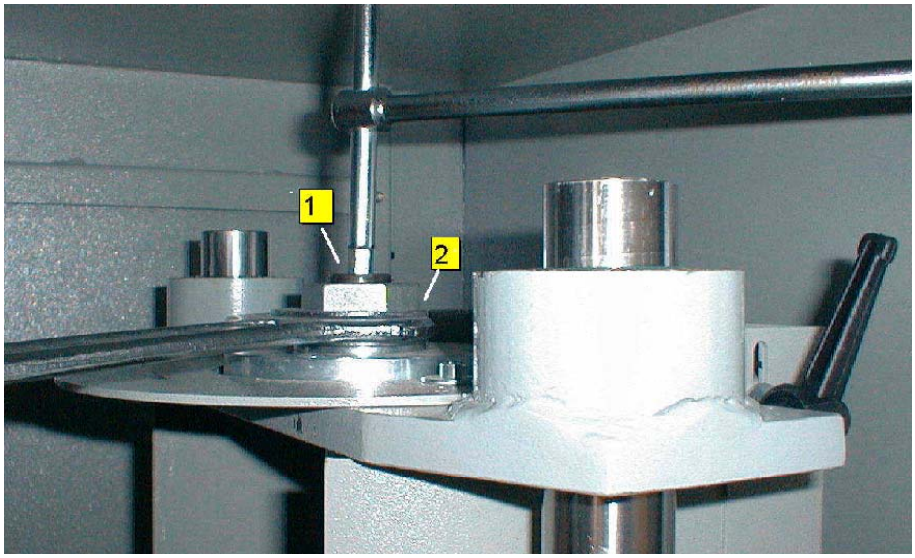
9) Tighten knobs 4 and 5.

10) Act on key Start, the controller displays:

```
POSIT.1 MIL.CUT.N. 1
POSIT.2 MIL.CUT.N. 2
POSIT.3 MIL.CUT.N. 3
POSIT.4 MIL.CUT.N. 4
```

Should it be necessary to install the milling cutter No. 5 on position 1, you just have to bring the cursor onto the first line and press key 5.
The controller memorises that the milling cutter is installed on position 1 and considers it when the milling cutter has to be used.

11) Act on key ESC to save the entered data and go back to the previous menu.



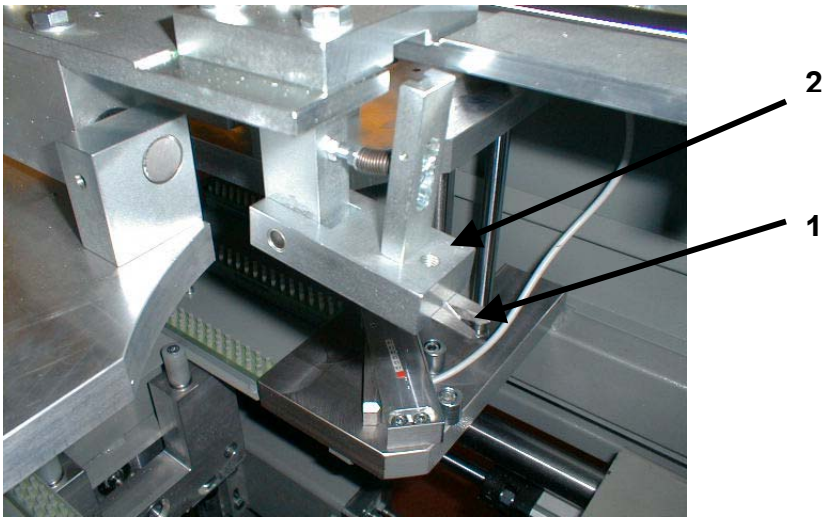
DWG. A1.31

DWG. A1.32

IMPORTANT!!! PERTICI S.p.A. ACCEPTS NO LIABILITY IN CASE TOOLS ARE USED, WHICH DO NOT HAVE THE SPECIFICATIONS DESCRIBED AND REQUIRED IN THIS INSTRUCTION MANUAL.

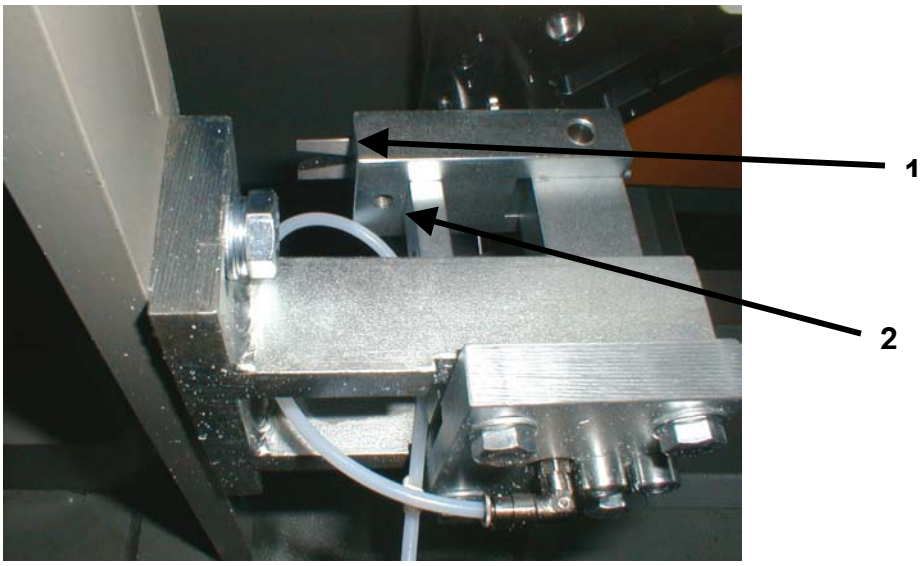
8.3 – Replacement of knifes for welding seal removal

To replace the knife for the welding seal removal, turn the main switch to position “0” and disconnect the pneumatic equipment by acting on the disconnecting valve.
- Upper knife 1 **(DWG. A1.33):** open the right openable panel **(DWG. A1.1)** and manually move the upper knife support towards the milling packs. Loosen the headless screw 2 **(DWG. A1.33),** using the 4 mm hexagonal key supplied.



DWG. A1.33

- Lower knife 1 **(DWG. A1.34)**: open the right openable panel **(DWG. A1.1)** and manually move the upper knife support towards the milling packs. Loosen the headless screw 2 **(DWG. A1.34),** using the 4 mm hexagonal key supplied.



DWG. A1.34

9. SPARE PARTS

For the coding and identification of the various components to be considered as spare parts, refer to all the technical drawings attached to this manual and to the relevant lists.

10. LIST OF ENCLOSURES TO THE INSTRUCTION MANUAL

ENCLOSURE 1

(DRAWINGS)

ENCLOSURE 2

(DISEGNI ESPLOSI PARTI MECCANICHE)

INTRODUZIONE

EXPLODED DRAWINGS OF MECHANICAL PARTS

HOW TO USE THE DOCUMENTATION

THE DOCUMENTATION IS SET OUT AS FOLLOWS:

TABLE OF CONTENTS
EXPLODED DRAWINGS OF MECHANICAL PARTS
LISTS OF MECHANICAL COMPONENTS WITH RELEVANT CODE

EXPLODED DRAWINGS OF MECHANICAL PARTS
In each page you can find the progressive numbers which give the position of each single component. These numbers are placed on the part lists of the mechanical components and refer to the code number of each single detail.

LIST OF MECHANICAL COMPONENTS
In each page there are: first, the progressive numbers referring to the position, then the relevant descriptions and the code numbers of each single detail. Should you need to request a detail, you just have to indicate the code number.

THE LIST OF MECHANICAL COMPONENTS IS SET OUT AS FOLLOWS:

MACCHINE TIPO	(DESCRIPTION OF MACHINE TYPE)
DWG.	(DRAWING REFERENCE NUMBER)
POS.	(POSITION)
DESCRIZIONE	(DESCRIPTION OF COMPONENTS)
CODICE	(PERTICI CODE)

MACCHINE TIPO This permits to know to which machine type a list refers
DWG. Reference number linking a mechanical part list to a specific exploded drawing.
POS. In this column is given the progressive number referred to each single component. These numbers are the same that are written in any exploded drawing.
DESCRIZIONE In this column is given a short description of the component.
CODICE This indicates our code or detail, that is the only reference to give when ordering spare parts. **Attention**: in case of order, put the letter (P) when it is indicated on the list.

LIST OF EXPLODED DRAWINGS OF MECHANICAL PARTS AND LIST OF COMPONENTS

ENCLOSURE 3

(ELECTRICAL EQUIPMENT)

ELECTRICAL EQUIPMENT

HOW TO USE THE DOCUMENTATION

THE DOCUMENTATION IS SET OUT AS FOLLOWS:

CONTENTS
ELECTRIC DIAGRAMS
ELECTRIC COMPONENTS ASSEMBLY DRAWINGS
LIST OF ELECTRIC COMPONENTS

ELECTRIC DIAGRAMS

Each page provides the co-ordinates of a symbol through letters along the horizontal axis and numbers along the vertical axis.

The reference ---> Drwg. A3.5-a1 indicates that the conductor is continued in drawing A3.5 at co-ordinates a1 (top left).

The reference >--- Drwg. A3.4-q1 indicates that the conductor continues from drawing A3.4 at co-ordinates q1 (top right).

The connectors used are illustrated in the diagrams together with the corresponding connector number (C 2) and position of the conductor inside (12).

C 2

12

LIST OF ELECTRIC COMPONENTS

THE LIST OF ELECTRIC COMPONENTS IS SET OUT AS FOLLOWS:

RIF. (REFERENCE)
TAV. (DRAWING)
DESCRIZIONE (MATERIAL DESCRIPTION)
NUM. (NUMBER OF PIECES)
TIPO (TYPE OR CODE- MATERIAL MANUFACTURER)
FORNITORE (MATERIAL SUPPLIER)
NS. CODICE (PERTICI CODE)

RIF. This column lists the part references used in the electrical diagram in alphanumerical order (e.g. C1 ,F2)
If the component comprises several elements, the relevant reference is given on several lines, with each line describing the individual element making up the component.
If the component is different in terms of supply voltage, several lines indicate the voltages for which said component is used.

DWG. This column lists the pages in which the component is used and also the component drawing page (to facilitate identification and replacement of the part).

DESCRIZIONE This column provides a brief description of the part and its function within the electrical system.

NUM. This column indicates the number of pieces of the component.

TIPO In This column indicates the type of component, the fuse current or the manufacturer's article number in order to facilitate the independent purchase of said part or identification of its specifications in the supplier's catalogue.

FORNITORE This column indicates the component supplier.

NS. CODICE This column indicates our code or part which must be quoted when ordering spare parts. When placing orders, enter the letter (P) where specified.

ELECTRIC COMPONENTS ASSEMBLY DRAWINGS

These pages contain the electrical part assembly drawings (control panel, limit switches, electric cabinet).
These drawings help to locate a part if it has to be inspected or replaced.

ENCLOSURE 4

(PNEUMATIC EQUIPMENT)

PNEUMATIC EQUIPMENT

HOW TO USE THE DOCUMENTATION

THE DOCUMENTATION IS SET OUT AS FOLLOWS:

TABLE OF CONTENTS
FUNCTIONAL DIAGRAM
DIAGRAM OF CONNECTIONS AND COMPONENTS
LIST AND POSITION OF CONNECTIONS AND COMPONENTS

FUNCTIONAL DIAGRAM
This diagram provides the co-ordinates of a component through letters along the horizontal axis and numbers along the vertical axis and helps explaining its function on the machine.

DIAGRAM OF CONNECTIONS AND COMPONENTS
This diagram provides references for connections and components of the pneumatic equipment. The reference on the electrovalves indicates only the valve body while the electromagnetic coils have the same denominations used in the electric equipment.

LIST OF PNEUMATIC COMPONENTS
The list of components is set out as follows:

RIF. (REFERENCE) Components and connections are listed in this column in alphanumerical order, while the pipes are listed according to their diameter.

PAG. (PAGE) In this column are given the pages where the component is used and the page on which it is physically represented (in order to facilitate its finding and, if necessary, its replacing).

DESCRIZIONE A short description of the component and of its function is given in this column.

NUM. The amount of pieces of the components appears in this column.

TIPO The component type, or its features appear in this column, so that you will be able to find the material by yourself.

FORNITORE The component's supplier is indicated in this column.

NS. CODICE Our code or detail to be indicated in case of order of spare parts, appears in this column. In case of order bring letter P where indicated.

ENCLOSURE 5

(DOCUMENTATION OF COMPONENTS)

ENCLOSURE 6

(ELECTRICAL TESTS)

The following tests have been performed and passed:

PERFORMED TESTS	CM4/S
CONTINUITY.....…….....	Passed
ISOLATION .....…….....	Passed
DIELECTRIC STRENGTH.....… ….....	Passed
ELECTROMAGNETIC COMPATIBILITY …….....	Passed
FUNCTIONAL TESTS.....…….....	Passed
CONSUMPTION WITHOUT LOAD (VOLT. 400 – HZ. 50)	2.1 A
CONSUMPTION WITH LOAD (VOLT. 400 – HZ. 50)..	2.7 A

The test conditions and instruments used are described in the **TECHNICAL BROCHURE** referring to this manual.

ENCLOSURE 7

(NOISE TESTS)

The acoustic emission of this model is linked to the machine type, but also to the mechanical characteristics and to the type of profile to be processed and to its length. In case of no precise indications it has been decided to follow the recommendations given by **UNCSAAL** (Unione Nazionale Costruttori Serramenti Alluminio Acciaio Leghe). The test method is therefore referred to the **ISO - 3746** standard and to the use of the R40 profile of the firm Metra for a cutting length of 2000 mm.

SOUND LEVELS ACCORDING TO THE ISO - 3746 STANDARD

The results shown in the tables below were obtained from the tests performed:

AVERAGE ACOUSTIC PRESSURE LEVEL IN THE ATMOSPHERE

	CM4/S
LpAm	dB(A): 78.8

ACOUSTIC POWER LEVEL

	CM4/S
LwA	dB(A): 108.4

ACOUSTIC PRESSURE LEVEL AT OPERATOR STATION

	CM4/S
LpAm	dB(A): 81.2

The test conditions and instruments used are described in the **TECHNICAL BROCHURE** referring to this manual.

ENCLOSURE 8

(TEST SHEET)