TRANSLATION OF ORIGINAL INSTRUCTIONS

CE

USE AND MAINTENANCE INSTRUCTIONS

BAND SAW MACHINE FOR METALS

TYPE: **Semiautomatic H27**

MODEL: **OMEGA+VHZ**

SERIAL NUMBER: ABo251

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DECLARATION OF CONFORMITY EU

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Machine: **Band saw machine for metals cut**
Serie: **Semiautomatic** H27
Model: **OMEGA+VHZ**
Serial No: AB0251

The manufacturer STATES under its own responsibility that the machine, which the present declaration refers to, is in compliance with the following provisions:

- **2006/42/EC Directive** (Machinery Directive) and of the National accomplishment provisions;
- **2014/30/UE Directive** (Electromagnetic Compatibility Directive) and of the National accomplishment provisions.

Dalmine, 21/03/2019

Massimo Magoni
Massimo Magoni

General Contents

1 Guide to the Instructions

1.1 Introduction to our company

FMB S.r.l. was born in 1982. It was one of the first to propose band saws on a market dominated by disk sawing machines.

Thanks to its ability to evolve, to find new products and to adapt the machine characteristics to Customer's exigencies, it has rapidly become one of the leaders on the market of its business sector.

The experience acquired in the sawing machine field has enabled to create new types of machines using the most modern technological discoveries: lines for drilling beams.

Today the FMB performs the activities of: design, production, sales and after-sales service.

FMB s.r.l. proposes innovative services and products and it aims at satisfying every Customer's expectations as well as at forecasting at the right moment the development trends of the markets in which it works.

Our purpose is to enable every Customer, also through our staff members' coherent behaving, to check FMB s.r.l. service and product quality.

By offering the new "Customer Care" service we are convinced that it is no longer enough to offer a good product, useful for the Customer at a good price, but it is fundamental to enrich it with a full specific technical assistance before, during and after sale.

With this documentation we would like to make you understand our company philosophy and we are open to our potential interlocutors' ideas and needs to find together "made to measure" solutions.

The management

Dear Customer,

Thank you for choosing a FMB machine.

FMB s.r.l. is a leading reference point in the field of systems and machines for blade cutting. Strong of the experience gained over the years, we have developed this new line of products for drilling.

All FMB s.r.l. machines have been designed and manufactured to ensure always the best performance.

All FMB s.r.l. machines have been designed and manufactured to ensure always the best performance.

To maintain high quality standards and lasting reliability, we recommend using only original spare parts.

On the machines you will find the identification plate in compliance with CE standards. Moreover, the enclosed instructions manual and the conformity with the European Directive 2006/42/EC and all its amendments will allow you to sell FMB s.r.l. machines all over Europe.

We are certain we have met all safety requirements and have further improved working standards.

The management

1.2 Persons involved

Mentioned in this manual are the professionals to whom this manual is dedicated.

1. **Customer:** the company's owner, the legal representative, the person who bought a FMB machine, the responsible for relations with the operator.

2. **Operator/ the person in charge:** the person who uses the machine (regardless of the type of contract).

3. **Maintenance worker:** operator who takes care of routine maintenance of the machine (regardless of the type of contract).

4. **Installer / Qualified technician:** the one who installs for the first time the machine inside the company premises and/or making the extraordinary maintenance.

5. **Manufacturer:** the F.M.B. S.r.l. (or FMB)

The professionals cited in steps 2/3/4 may coincide provided that the person in question is:

- skilled,
- in possession of the technical and professional requirements appropriate to the work he will go to do,
- has consulted this manual.

1.3 Accompanying documentation

Each machine is supplied with an instruction for use and maintenance manual.

It has to be kept in a sheltered and accessible place.

The use and maintenance manual is the document accompanying the machine from its manufacture untill its dismantling. Therefore, it is an integral part of the machine itself.

The technical data contained in this manual are relative to the machine which the manual is provided with and they can be subject to change without previous notice.

The manual must be read before starting ANY ACTIVITY involving the machine, including its handling.

For better reference the manual is divided into sections:

- **Use and maintenance manual**
  - which also contains the Declaration of Conformity EU,
- **Pezzi di ricambio / Spare parts**
  - containing images and codes of machine components,
- **Allegato tecnico / Technical annex**
  - containing electrical / pneumatic diagrams for installation of the machine.

To request copies of this manual quote data shown on the cover (series, model, serial number).

The purpose of this manual is to deal with topics specific to the installation, the setting up and maintenance of the machine, integrating the experience and skill of qualified staff.

For further information please contact us directly.

Upon request we can arrange training for installation, operation and maintenance of the machine.

1.4 Rights

This manual may not be copied or circulated without the written authorisation of **FMB**.

The contents of this document may be modified without prior warning.

Every care has been taken in the collection and verification of the documentation contained in this manual and to make it as complete and understandable as possible.

1.5 Conventions, symbols and warnings

The operations which, if not carried out correctly, can results in risks and/or for which particular attention must be paid are indicated by a triangle.

PIC. 1

The operations which MUST be performed are indicated by a circle.

PIC. 2

The operations which are forbidden are indicated by a circle with a line through it.

PIC. 3

We reccomend to devote a particular care to the training of the personnel who is going to operate on the machine and also to verify that the instructions are realized and put into practice.

1.6 Terminology and abbreviations

Head

It's the top of the machine containing the cutting device.

Blade

It's the part that cuts.

Motor wheel

It is the disk on which the blade rotates driven by the blade motor and the gear box.

Idle wheel

It is the disk that, with the aid of the blade tensioner, allows the blade rotation.

Blade tensioner

It's a dynamometric mechanical device which allows the blade through the blade wheel permitting its rotation.

Fixed blade guide

It's the blade guide placed before the motor blade wheel.

Movable blade guide

It's the blade guide placed after the loose blade wheel.

Vice

It's a mechanical device locking the material.

Lubricant / coolant liquid

It's the mixture water/oil that lubricates and cools the blade during the cut.

Guard or protection / barrier

Shaped protection plate. It can be fixed or movable.

Limit switch

Electrical device with switch function.

Machine surface

It's the work top where the piece to be cut is placed.

Speed variator

It's an electronic device that can vary the frequency of the supply current of an electric motor and, consequently, the blade rotation speed, even during the cycle.

Rotary stand

It is the part of the machine permitting the head degrees rotation.

2 Safety

2.1 Intended use

The machine is designed for cutting drawns or metal profiles.

It is forbidden to use the machine for working materials other than those specified in this instructions book.

The **FMB** declines all liability arising from installation and use of the machine not in accordance with law and with what described in this manual.

2.2 Warranty

The machine has a 12-month warranty from the date of receipt of the machine.

The warranty covering any replaced or repaired part will expire on the same date as the machine warranty.

FMB may not be held responsible in the event of faults due to:

- wear of parts which are subject to wear during normal use,
- failure to comply with the instructions given in this manual,
- negligence or incorrect use of the machine,
- localisation/installation which does not comply with the instructions given in this manual.

Within 15 days of receipt of the machine the Customer must:

1. inspect and test the machine,
2. if defects are found, notify FMB of the defects, in detail in writing,
3. allow a check to be made (if requested by FMB),
4. dispatch the parts considered defective (if requested by FMB),

The warranty is no longer valid if the Customer does not comply with this procedure.

After checking the existence of the fault/defect on the machine, FMB may at its own discretion:

- send free all faulty parts or;
- carry out the repair at its own expense.

Except in the case of fraud (or serious fault) by **FMB**, compensation for any damage incurred by the Customer may not, in any event, exceed the value of the spare parts.

FMB may not be held responsible for loss of income and/or production.

2.3 Conformity

2.3.1 Noise

The noise measurement of the level of sound pressure emitted on the workplace was carried out according to the standard norms UNI EN ISO 16093:2017, UNI EN ISO 11204, UNI EN ISO 3746:2011.

The obtained values are:

TABLE 1: [test results].

Machine	Measure	LpA [Db(A)]	extended U uncertainty [Db(A)]	Lw [Db(A)]	extended U uncertainty [Db(A)]
Omega, Omega+VHZ Centauro, Centauro+VHZ Sirius, Sirius+VHZ Calipso, Calipso+VHZ	Workstation	89,36	3,60	105,48	4,00
Galactic+VHZ Mercury+VHZ Saturn+VHZ Major+VHZ		80,95	3,60	93,11	4,00

The reports of the entire test process are available on request.

The functioning conditions of the machines by the test were following the conditions indicated in the annex B of the norm UNI EN ISO 16093:2017. The test was conducted with mounting and operating conditions as indicated below:

All the auxiliary units and the protections were positioned and functioning, following the conditions indicated below.

Specifications for the Omega+VHZ machine:

- blade development 2700 mm,
- blade height 27 mm (standard),
- toothed of the blade 5/7 (standard),
- blade speed (during the test) of 120m/min.,
- lowering speed blade selector 1 turn,

Specifications for the tested material (samples)

✔ The workpiece was fixed on fastening systems of the machine.

- Rolled flat C45E steel 100x100mm with the following certified chemical composition:
  - C=0,44%
  - Si=0,23%
  - Mn=0,69%
  - P=0,012%
  - S=0,005%
- The tested machine is the model Omega+VHZ.
- The Omega model is similar to the Centauro, Sirius and Calipso models.
- **We are rationally able to declare that the noise values emitted from the machines models Centauro, Sirius and Calipso are equal or lower as the ones emitted from the machine model Omega+VHZ.**

Specifications for the Galactic+VHZ machine:

- blade development 3420 mm,
- blade height 27 mm (standard),
- toothed of the blade 5/7 (standard),
- blade speed (during the test) of 100m/min.,
- lowering speed blade selector 2 turn,

Specifications for the tested material (samples)

– The workpiece was fixed on fastening systems of the machine.

- Rolled flat C45E steel 150x150mm with the following certified chemical composition:
  - C=0,44%
  - Si=0,34%
  - Mn=0,7%
  - P=0,023
  - S=0,024%
- The tested machine is the model Galactic+VHZ.
- The Galactic model is similar to the Saturn, Mercury and Major models.
- **We are rationally able to declare that the noise values emitted from the machines models Saturn, Mercury and Major are equal or lower as the ones emitted from the machine model Galactic+VHZ.**

2.3.2 Electromagnetic compatibility

The machine has been designed and manufactured in such a way that:

- the electromagnetic disturbances produced do not reach an intensity which would prevent normal operation of radio and telecommunication equipment;
- there is a level of immunity to electromagnetic disturbances which could be expected in the planned conditions of use so that its normal operation is protected against unacceptable deterioration.

On the basis of the tests performed at our factory, in accordance with EU Directive 2014/30/EU, the values of irradiated emissions and conducted emissions fall within the limits specified in the following reference standards (used also for the test measurements):

- EN 61000-6-2: 2005
- EN 50370-2:2003
- EN 50370-1:2005

2.3.3 Electric tests

All the electrical tests have been performed in advance by FMB.

2.3.4 Mechanical vibrations (only for machines equipped with "manual cut")

According to the tests effected in our premises the values of the stress transmitted both to the system arm-hand and to the whole body of the user are in compliance with the 2006/42/EC European Directive. The vibration total value to which the hand-arm system is subjected, it's lower at 2,5 m/s^2). These tests have been carried out referring to the norms: EN ISO 5349-1:2001 and EN ISO 5349-2:2001.

2.4 General safety instructions

TO USE the machine COMPLY WITH the following precautions and safety criteria.

WARNING

Unpacking

Injuries.

- ▶ Always wear protective gloves.
- ▶ Always pay attention to any projecting nails.
- ▶ Use a suitably sized forklift truck or gantry crane to move the machine (see chapter 4.2 "Transport", page 65)

WARNING

Improper installation

Fire, explosions, machine overturning, increase in vibrations/noise, troubles during the movements of the material.

- ⊘ Do not position the machine close to inflammable substances, sources of heat, water or other free liquids.
- ⊘ Do not position the machine in environments where there is a risk of explosions or fire.
- ▶ The machine must be installed by a qualified technician.
- ▶ Firmly the machine to the floor.
- ▶ During the movements, the maximum length of the material to be cut must not collide with other machines / equipment.
- ▶ Make a preliminary assessment of any impediments with other processes, transit and handling.

DANGER

Incorrect electrical installation

Electrocution

- ▶ The protection against insulation faults must be fitted by the installer. **This protection is NOT supplied by FMB!**

NOTE The checking of the conditions for protection by means of automatic switching OFF of the power supply, in accordance with the requirements of point 18.2 of CEI EN 60204-1:2006, must be carried out by the end user; the end user must, in particular, perform test 2 of point 18.2.2 of CEI EN 60204-1:2006 for the TN supply system.

WARNING

Improper installation of the rollers

The material loaded causes friction, locks, falls from the rollers, creates hindrances.

Crooked cut.

- ▶ Roller tables added later by the Customer must be in accordance with the regulation EN 619:2002.
- ▶ Leave adequate free space around the rollers for the loading and unloading
- ▶ The rollers must be perfectly aligned and generate continuity with the machine plane.
- ▶ Regularly check the alignment.
- ▶ Fix the rollers to the machine with the screws supplied by FMB.
- ▶ Place a container at the end of the rollers to collect the dripping of the lubricating-cooling liquid.

WARNING

Improper installation in the company layout

Problems due to the sum of the machines present in the company (environmental pollution etc.).

- ▶ Ventilate the room in which the machine is installed and/or provide adequate systems for the extraction of fumes/harmful suspensions.

WARNING

Excessive acoustic pressure on the operator

Problems of acoustic pressure on the operator due to the sum of various factors: workplace, characteristics of the material, tools, used lubricating-cooling liquid etc.

- ▶ The noise of the machine increases if it is not correctly fixed to the floor.
- ▶ The Customer must assess the exposure of the workers to the noise after the installation and putting into service of the machine in the production unit and adopt adequate protection and prevention measures.

DANGER

Incorrect use of the machine

Injuries due to cut and crushing, death

- ⊘ Do not use the machine for purposes other than those indicated in this manual.
- ⊘ Do not use the machine to cut explosive or toxic products, wood.
- ⊘ Do not work pieces without the use of adequate support / containment systems.
- ⊘ Do not use the rollers before fixing them to the floor.
- ⊘ Do not move the parts to be cut above the machine using cranes or other equipment.
- ⊘ Do not use the machine without the personal protection equipment.
- ⊘ Do not operate the machine if there are persons close to the unprotected areas.
- ⊘ Do not place hands between the moving parts.
- ⊘ Do not touch the dangerous parts constructively impossible to protect (Ex.: part of the blade involved in the cut).
- ⊘ Do not touch the parts of the machine involved in the cut and in the moving of the material.
- ⊘ If you do not use the flip up guard, a portion of the blade remains uncovered endangering the work of the operator.
- ⊘ Do not operate with broken or deteriorated blade.
- ⊘ Do not work with the blade tensioned uncorrectly.
- ⊘ Do not adjust the tension of the blade while cutting.
- ⊘ Do not use the emergency button to stop the machine at the end of the cycle.
- ⊘ Do not rest objects on the machine.
- ▶ One only operator may use the machine at a time.
- ▶ Only operate the machine by trained operators.
- ▶ The operator must be in front of the control panel when the machine is in operation. Only during loading / unloading of the material, the operator can be located laterally to the machine.
- ▶ Depending on the weight and on the overall dimensions of the material to be cut, loading can be done manually or by gantry crane.
- ▶ Follow the instructions in this manual and operate with care.
- ▶ Before starting the working cycle, place the blade guides as close as possible to the work piece.
- ▶ When necessary, according to the dimensions of the work piece, use the flip-up guard. The flip-up guard is to be placed as close as possible to the workpiece.
- ▶ Secure the workpiece into the vices before you start the cut.

- ▶ Release the workpiece from the vices when cut is finished.
- ▶ Wear the personal protection equipment.
- ▶ In relation to the type of use of the machine, assess the necessity of positioning some containers for collecting the coolant liquid at the end of the roller table.
- ▶ Use the NB cooling system to prevent the leakage of cooling liquid on the floor.

ATTENTION

Daily cleaning

Injuries and falling caused by leakage of cooling liquid, malfunctions.

- ⊘ Do not clean the machine with compressed air.
- ⊘ Do not clean the machine when it is switched ON or in operation.
- ⊘ Do not disconnect compressed air hoses before switching OFF electricity/compressed air supply.
- ▶ Wear protective gloves and transparent visor during cleaning.
- ▶ Disconnect the machine from the electrical/pneumatic power supply before any intervention.
- ▶ Place bowls to collect residual fluids present in the hoses.
- ▶ Follow the instructions indicated in the section "Maintenance and care".
- ▶ Keep the floor around the machine clean.

DANGER

Improper use of the washing gun

Electric shock, damage to the machine, slipping on the floor.

- ⊘ Do not point the gun at people or electrical components.
- ⊘ Do not shed the coolant liquid on the floor.
- ▶ Direct the jet in the cutting area where the chips accumulate.

DANGER

Maintenance

Injuries or deaths.

- ⊘ Do not operate on the machine when it is switched ON or in operation.
- ⊘ Do not clean the machine with compressed air.
- ▶ Before any intervention, the maintenance worker must make sure that the machine cannot be accidentally put into operation. To do that he must disconnect all the supplies (electric/pneumatic) locking them for example with padlocks.
- ▶ The maintenance worker must keep the keys until the maintenance is finished
- ▶ The keys for opening the electrical cabinets, the doors and the padlocks closing the power switches (electric, pneumatic...) must be given in custody only to the maintenance worker.
- ▶ Use the personal protection equipment appropriate to the operations that are taking place.
- ▶ All guards and safety devices must be reassembled on the machine before operating it again.

DANGER

Blade replacement

Injuries

- ⊘ Do not replace the blade when machine is on.
- ⊘ Do not remove the protective plastic from the blade until assembly is completed.
- ▶ A maintenance worker must do the blade change.
- ▶ Wear personal protective equipment needed and required by law.

DANGER

Modifications to the machine safety component

Serious injury or death

- ⊘ Do not tamper with or remove the guards.
- ⊘ Do not tamper with or remove the safety component.
- ⊘ Do not alter/remove the safety plates fixed to the machine.

DANGER

Modifications to the machine configuration

Serious injury or death

- ⊘ Do not modify/add devices to the machine without the written authorisation of FMB.
- ⊘ Do not alter, tamper with or move the nameplates fixed to the machine.

DANGER

Falling of material during positioning

Injuries by crushing, damage to the machine.

- ⊘ Do not wait in the part movement area.
- ▶ Free the movement area of people and objects.
- ▶ Check that the parts are securely attached/harnessed before lifting them.

DANGER

Deteriorated and unreadable plates / stickers on the machine eggibili

Injuries.

- ▶ Replace plates / stickers.

DANGER

Fire

- ⊘ Do not use water to exstinguish any fire.

2.5 Customer's responsibilities

The Customer is responsible for providing its personnel with work tools and equipment in accordance with EU product requirements, adequate for the work to be performed, and suitable for heath and safety requirements.

The Customer must therefore assess:

- ✔ the specific conditions and characteristics of the work to be performed;
- ✔ the risks present in the working environment;
- ✔ the risks deriving from the use of the tools and equipment:
- ✔ the risks deriving from interferences with other tools and equipment in use:

In particular, the Customer must take the necessary measures in order for the tools and equipment to be:

- ✔ installed in compliance with the operating instructions;
- ✔ adequately maintained to ensure the required safety over time;

Only specifically appointed personnel who have received adequate and specific training must use the work tools and equipment.

In the case of installation, repairs or maintenance, the appointed operators must be specifically qualified to perform the relative activities.

Clothes

Use the personal protection equipment appropriate to the operations that are taking place.

2.6 Safety component

Emergency stop push-button

(see chapter "Emergency stop push-button", page 26).

Electrical system protection

Screws close the electrical board. For opening it you need an allen wrench.

Safety key limit switch

Safety component for the control of the guards protecting the dangerous parts of the machine. If they intervene, the machine stops. Only when they are restored, the machine can be put back into operation.

Blade breakage limit switch

Safety device that interrupts the working cycle/the blade rotation if the blade should break.

Protection guards (carter)

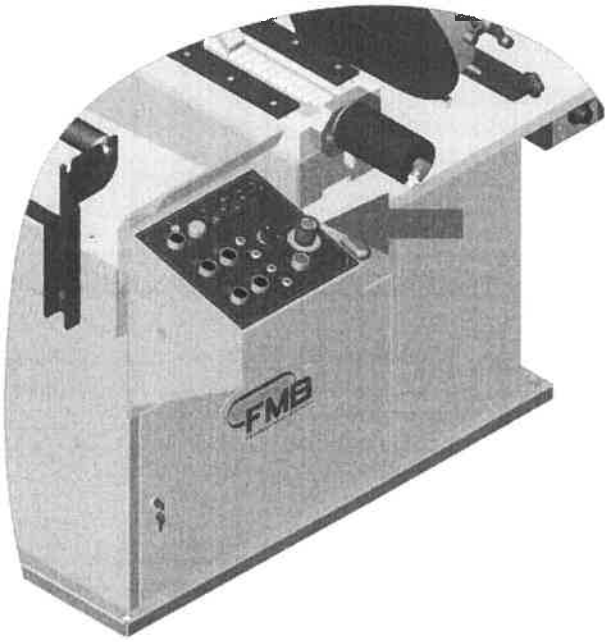
The machine is equipped with metal protections to avoid:

1. that the swarf could hurt the operator,
2. that parts not involved in the cut, remain uncovered.

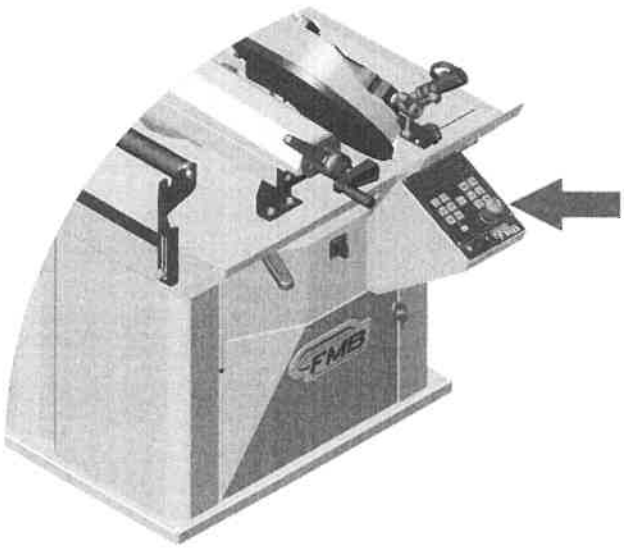
2.7 Emergency stop push-button

In case of emergency, press the red button on the control panel (see Pic. 4).

- ↳ All machine movements are blocked.
- – The machine cannot work with the emergency button pressed.
- – To unlock the emergency pushbutton turn it clockwise.



PIC. 4



PIC. 5

2.8 Safety labels

Intuitive pictograms (see following images) indicating the areas in which the operator must pay particular attention are applied to some parts of the machine.

Safety have been the main consideration in the design/manufacturing of the machine. However, there are always residual risks even when all the measures have been adopted to avoid risks during use.

The safety pictograms indicate the following conditions:

- danger areas and/or types of danger,
- possible consequences of the danger,
- how to avoid the danger,
- prohibited or mandatory,

TABLE 2: (Nameplate)

Pos.	Nameplate	Description
1		Blade hazard – keep hands clear
2		Climbing on the machine forbidden
3		Do not place hands in area indicated
4		To signify that safety footwear must be worn
5		It is obligatory to read and understand the "Instructions for use and maintenance"
6		Danger of crushing in the vice
7		Voltage danger

2.9 Residual risks

ATTENTION

Burns

Some of the machine's components (motors, bearings and tools) stay hot at the end of the operations.

⦸ Do not touch the parts until the heat has dissipated (below approx. 40°C/104° F).

The swarf produced by the operations can be very hot.

⦸ Do not touch the swarf until it has cooled down.

► Always use personal protective equipment.

DANGER

Operational parts which it is IMPOSSIBLE to protect

Injuries and death due to cut and crushing

⦸ Do not insert hands in areas without guards as they cannot be protected (e.g. part of the blade involved in the cut).

► The dangerous areas are highlighted by special pictograms.

DANGER

Risks related to handling

Injuries to the operator, damages to the machine.

► The operator must assess the condition of the material and of the machine **before** switching it on (risks and dangers due to obstruction with persons/things during manual handling, etc..).

DANGER

Moving parts

Injuries or death by cutting, crushing, pinching, dragging.

It is impossible to protect some areas of the machine.

- ⊘ Do not wear accessories or clothes which can become entangled (necklaces, bracelets, scarves, long-sleeved sweaters etc.).
- ⊘ Do not insert hands in the vice whilst it is being closed.
- ⊘ Do not place hands between the part and the roller.
- ⊘ Do not put your hand between the rollers of the roller tables by moving the material.
- ⊘ Do not climb on the machine.
- ⊘ Do not climb on the roller tables.
- ▶ Long hair must be tied behind back.

ATTENTION

Irritation due to contact / inhalation with lubricants/coolants

Prolonged contact with lubricants/coolants/oils accompanied by poor personal hygiene can cause irritations.

- ⊘ Do not ingest and inhale, avoid contact with skin/eyes and lubricants.
- ▶ Wash skin with soap and water.
- ▶ Rinse eyes with plenty of water.
- ▶ You can request the safety data sheet of the different products to the FMB.

DANGER

Collateral damage due to cooling liquid used

Intoxication from fumes or hazardous suspensions in the environment, risk of fire.

- ▶ Analyse the fumes if necessary.
- ▶ Ventilate the room if necessary.

ATTENTION

The length of the parts to be cut is defined by the operator

Hindrance of the part at inlet or outlet.

- ▶ Take into consideration adequate transit areas when installing the machine

DANGER

Pressurised fluid residue in the pipes

Injuries or deaths

- ⊘ Do not disconnect compressed air and/or hydraulic before switching OFF electricity/compressed air supply.
- ⊘ Do not disconnect compressed air hoses before checking for the presence of pressurised fluids inside.
- ▶ Before disconnecting compressed air hoses switch OFF electricity/compressed air supply to the machine and wait 2 minutes.
- ▶ Provide a bowl suitable to collect any residual fluids present in the pipes.

DANGER

Presence of machining waste, tools, liquids and miscellaneous materials in the work area

Injuries, hindrance to the loading/unloading operations

- ▶ Keep the area adjacent to the machine clean and free from obstructions

DANGER

Injury to persons/damage to objects during manual movements

Injuries to persons close to the machine, damage to the machine during machining/movements

- ▶ The operator must assess the implications resulting from operation of the machine in manual mode.

DANGER

Thickening of electrostatic charges during the cutting of some materials

Fire

- ▶ The Customer is responsible for the analysis and neutralization of this risk.

DANGER

Residual current in the switch cabinet after turning off

Electrocution

- ⊘ Do not touch the electrical components as soon as power is turned off.
- ▶ As soon as the machine is turned off, wait a few minutes so that the residual current dissipates.

ATTENTION **Electric shock due to the use of welding machine on the band saw**

Damage / irreparable failure to electrical/electronic parts

⊘ Do not use any welding machine on the band saw

ATTENTION **Degrees cutting with DOTM optional mounted**

During rotation, head and blade may bump against the optional DOTM, damaging the machine.

⊘ Do not perform degrees cutting with the optional DOTM mounted

► **Before** degrees cutting, take the optional DOTM away

ATTENTION **Damage to the machine during degrees cutting with the DM/DMI optionals assembled**

Cutting of the vice

⊘ Do not perform degrees cutting with the optional assembled

► Before making degrees cuttings remove the optional

ATTENTION **Cutting of materials with refrigerant that actually should be cut dry**

Blade damage /breakage.

► Some materials need dry cut (without cooling/lubrication)

2.10 Oils toxicological information

All the lubricants listed below, if correctly employed, are not dangerous for the user.

Follow normal personal hygiene standards.

3 Description machine and functioning

3.1 Identification plate

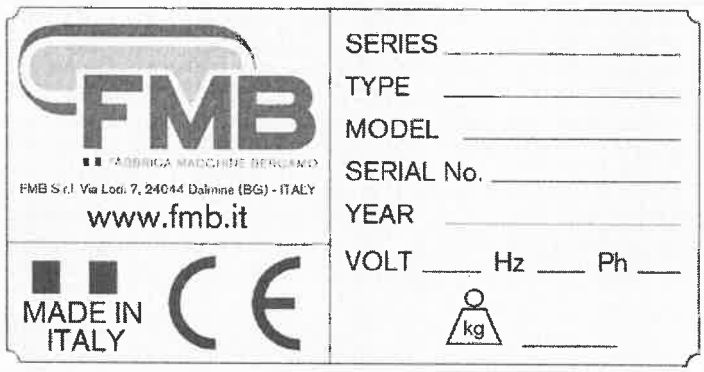
On the machine there is the identification plate in compliance with European Directive 2006/42/EC.

The nameplate must not be removed, even if the machine is re-sold.

When contacting the manufacturer always quote series, model and serial no. written on the nameplate.

TABLE 1: [nameplate legend].

Wording	Meaning
SERIES	Machine group
TYPE	Machine type
MODEL	Machine name
SERIAL No.	Unique product ID number
YEAR	Machine year of production
VOLT / Hz / Ph	Electric potential / electric frequency / number of phases
kg	Machine weight



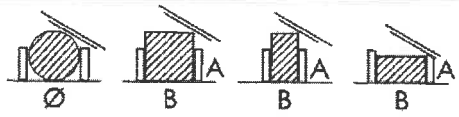
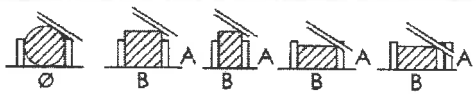
PIC. 6

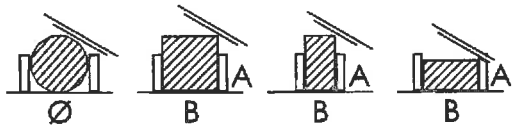
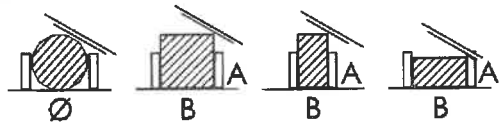
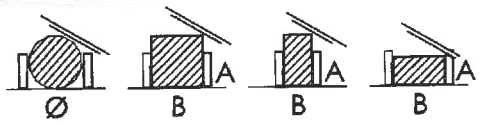
3.2 Technical features

All FMB machines are provided with high precision components and are carefully assembled. A skilled staff repeatedly checks every assembling stage in order to ensure a high quality standard during each cycle phase.

TABLE 2: [Technical features].

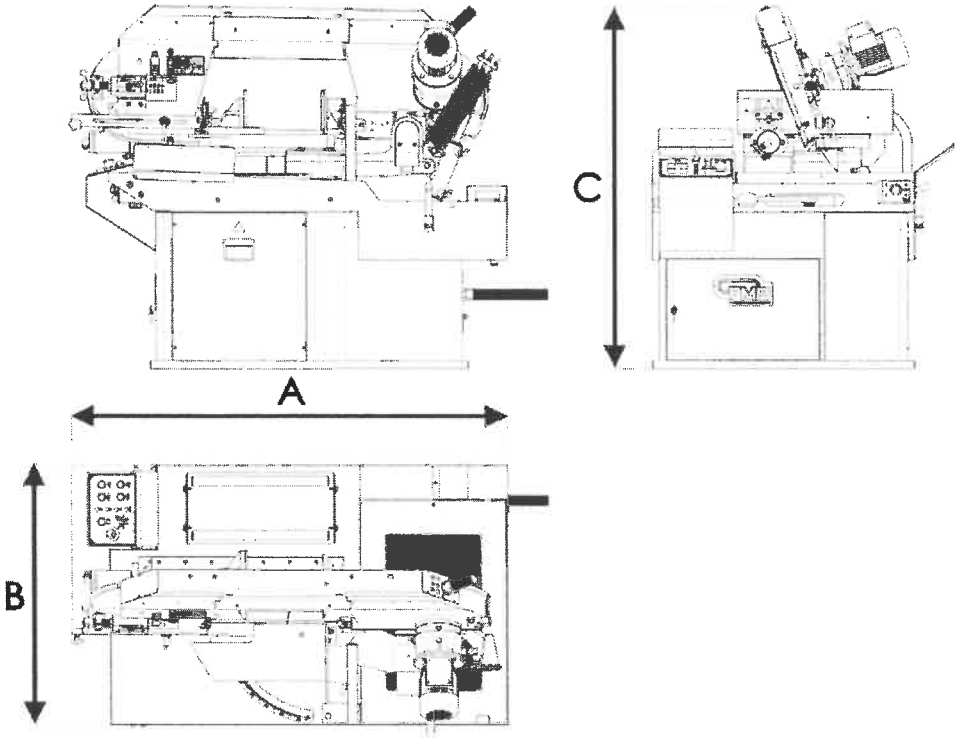
Feature	Value	Machine
Cooling system power	kW 0,08	All
Hydraulic motor power	kW 0,36	All
Blade motor power	kW 1,3÷0,7	Versions without VHZ
	kW 1,5	Versions with VHZ
Hydraulic system pressure	18 bar	Galactic
	20 bar	Centauro Calipso Omega
	22 bar	Sirius
	24 bar	Major Mercury
Air inlet pressure	6 bar	
Blade rotation speed	16 ÷ 100 m/minute	Galactic+VHZ Major+VHZ Mercury+VHZ Saturn+VHZ
	16 ÷ 120 m/minute	Calipso+VHZ Centauro+VHZ Sirius+VHZ Omega+VHZ

Feature	Value	Machine
	35 or 70 m/minute	Calipso Centauro Sirius Omega
Blade development	3420x27x0,9	Galactic+VHZ Mercury+VHZ Saturn+VHZ
	3300x27x0,9	Major+VHZ
	2700x27x0,9	Calipso Calipso+VHZ Centauro Centauro+VHZ Sirius Sirius+VHZ Omega Omega+VHZ
Cutting dimensions	 AxB AxB AxB 0° 240 240x240 240x260 210x280 45° 185 175x175 220x165 140x180 60° 115 110x110 110x110 110x110	Centauro Centauro+VHZ Sirius Sirius+VHZ
	 AxB AxB AxB AxB -45° 150 135 240x65 125x145 0° 240 240 240x270 200x280 200x310 45° 175 170 240x155 170x170 60° 110 105 140x100 105x105	Calipso Calipso+VHZ Omega Omega+VHZ

Feature	Value				Machine
					Major+VHZ
		Ø	B	AxB	AxB	AxB
	0°	260	260	260x370	260x370
	45°	260	260	260x260	120x290
	60°	180	180	180x180	90x190
					Mercury+VHZ
		Ø	B	AxB	AxB	AxB
	0°	305	300	300x370	300x370
	45°	260	240	300x220	155x260
	60°	170	160	255x150	160x170
					Saturn+VHZ
		Ø	B	AxB	AxB	AxB
	-45°	280	255	300x245	180x280
	0°	305	300	300x375	300x375
	45°	260	240	300x220	155x260
	60°	170	160	265x150	160x170
					Galactic+VHZ
		Ø	B	AxB	AxB	AxB
	0°	305	300	260x410	240x420
	45°	260	260	260x260	120x290
	60°	180	180	180x180	90x190
Tank capacity of the hydraulic circuit	9 l				

3.3 Dimensions and weight

The dimensions indicated below are the sizes of the machines:



PIC. 7

TABLE 3: [Dimensions and weight].

Machine	A (cm)	B (cm)	C (cm)	Weight (kg)
Centauro/ Centauro+VHZ	140	80	150	365
Calipso/ Calipso+VHZ	140	90	150	490
Sirius/Sirius+VHZ	140	80	150	370
Omega/Omega+VHZ	140	90	150	490
Major+VHZ	160	110	150	515
Mercury+VHZ	150	86	150	560
Saturn+VHZ	160	97	157	780
Galactic+VHZ	175	106	147	710

All the dimensions have a tolerance of ± 10 mm/0.4 in.

3.4 General description of the machine

The machine dealt with in this manual is a semi-automatic band saw with tilting head. Head and blade facilitate the cutting: the blade, having less contact surface, penetrate the material more easily.

The machine consists of a base made in high rigidity welded carpentry. This solution gives considerable strength and stability to the whole machine, minimizing vibrations and mechanical stress.

In the basement are located: the support surface of the work piece, the vice and the head.

On the basement there is the plane bearing the material to be cut.

The head is moved by a large hydraulic cylinder allowing its going up and down.

The head is placed in the front position with respect to the operator.

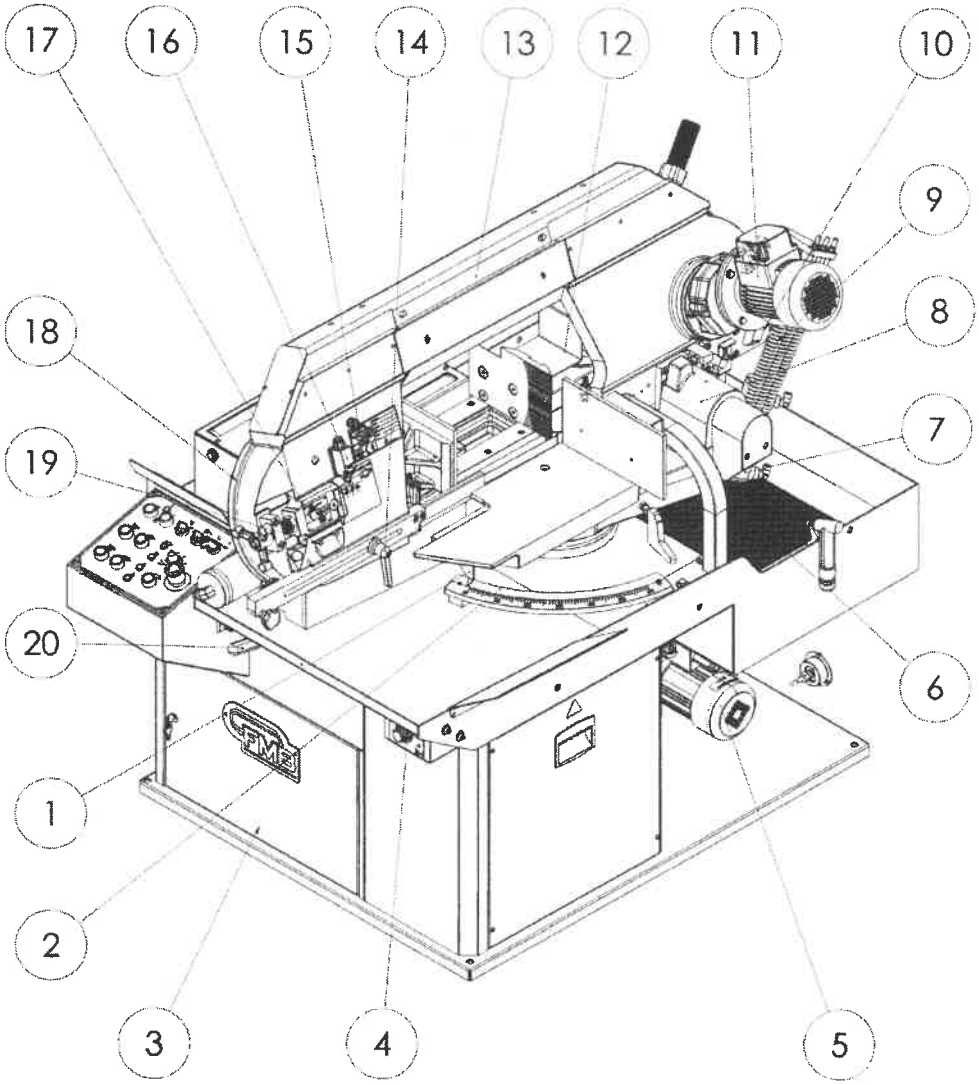
The material is clamped by a hydraulic locking vice on models Sirius, Omega, Major, Mercury, Saturn and Galactic.

For Centauro and Calipso the material is blocked by 1 manual vice.

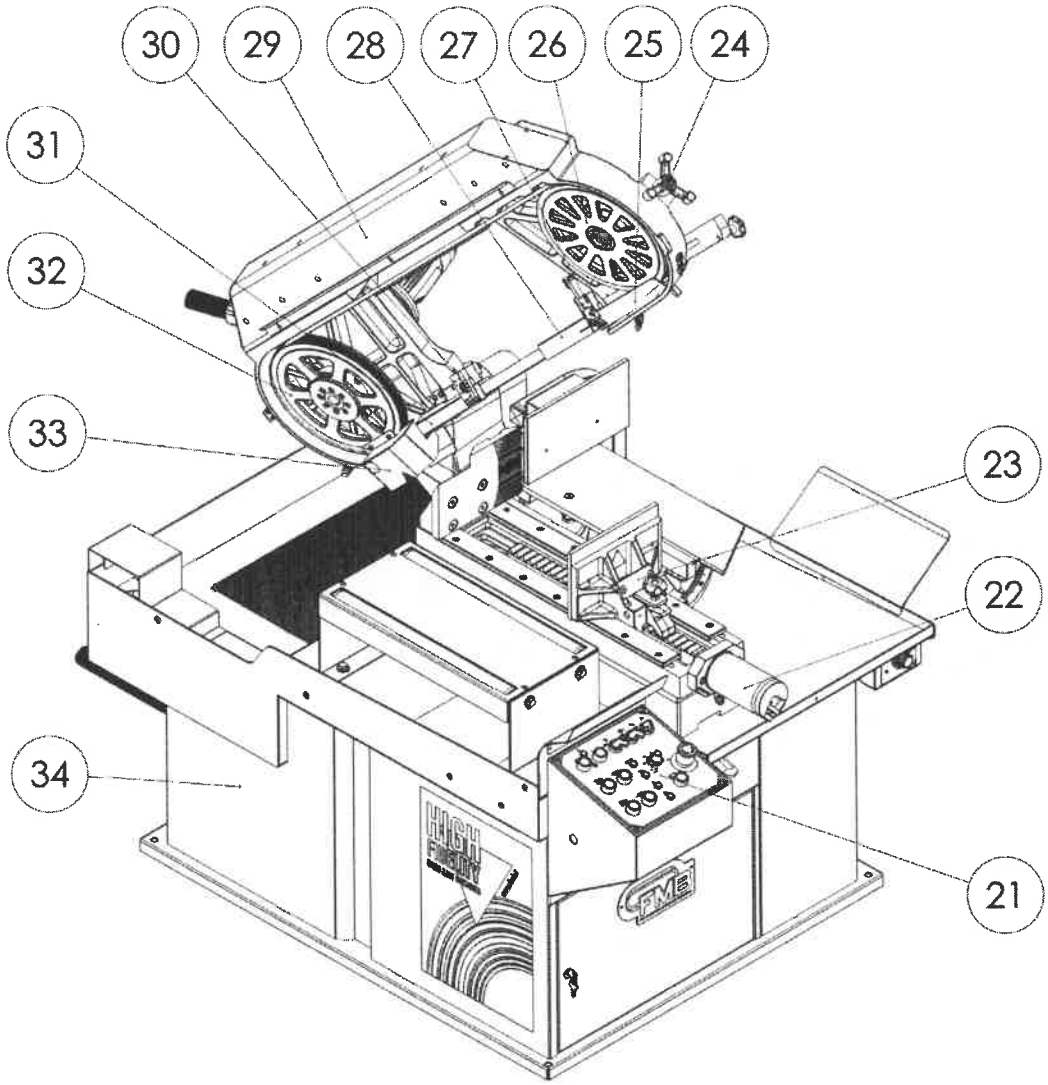
The material locking is done by 4 vertical pneumatic vices indipendent from one another. Vices closing pressure can be adjusted by the operator.

Blade feeding is obtained by means of a hydraulic system. The movement is so gradual, precise and soft, with a remarkable performance. Blade rotation and feeding speed can be adjusted, even during the cut, from the control panel.

Several parts of the machine require no maintenance and those requiring maintenance are easily accessible.



PIC. 8



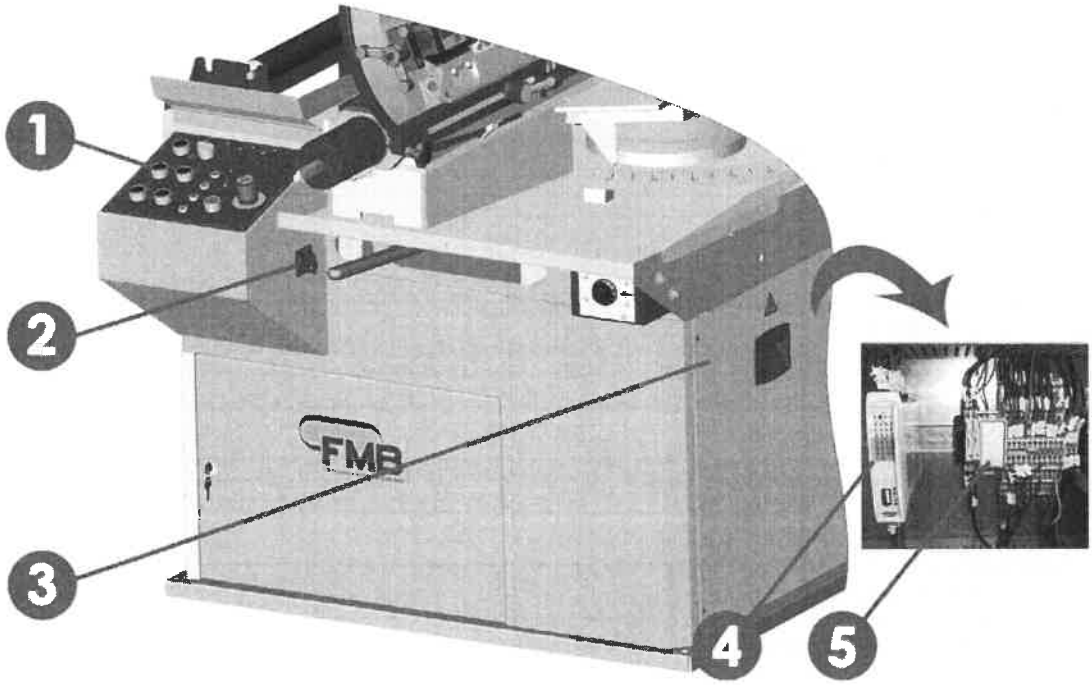
PIC. 9

TABLE 4: [main components of the machine model Galactic+VHZ].

Pos.	Description
1	Indicating arrow of the preset cutting angle
2	Graduated scale for cutting angle reading
3	Instruction and maintenance manual housing
4	Cutting drop valve
5	Hydraulic power plant
6	Coolant collecting tank

Pos.	Description
7	Hydraulic cylinder
8	Rotating support
9	Balance spring
10	Key limit switch
11	Blade motor
12	Guard (or carter)
13	Coolant plug
14	Pick up handle
15	Identification plate
16	Blade breakage limit switch
17	Blade tensioner
18	Head guard (or head carter)
19	Adjustment grains
20	Head rotation stopping lever
21	Control panel – electrical part
22	Vice hydraulic cylinder
23	Vice
24	Blade tensioner hand wheel
25	Blade safety guard (or blade carter)
26	Movable blade wheel
27	Movable blade guide
28	Flip-up guard
29	Head
30	Fixed blade guide
31	Blade guard
32	Motor blade wheel
33	Blade cleaning brush guard
34	Machine base

3.5 Electric system Mercury-Saturn-Galactic



PIC. 10

TABLE 5: [electrical system description Mercury-Saturn-Galactic].

Pos.	Description
1	Control panel
2	Main switch ► [I=ON] (machine on) ▷ [0=OFF] (machine off)
3	Electrical cabinet
4	PLC
5	Head down/up position setting switch button

The electrical cabinet is located in the basement and contains the electrical panel.

On the electrical panel there is the head down/up position setting switch button. The control panel receives power from the factory electric line.

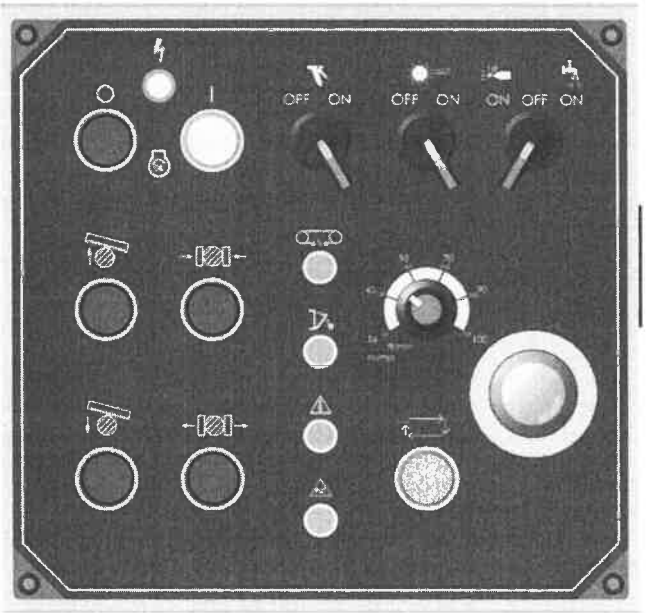
The control panel is located in a frontal position with respect to the machine. The control panel is the interface between operator and machine.

On the side of the control panel there's the main switch.

3.5.1 Control panel Mercury-Saturn-Galactic

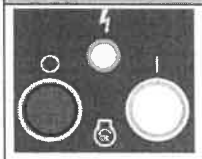
The interface between operator and machine is a control panel (vedi Pic. 11).

The control panel is located in a frontal position with respect to the work area.



PIC. 11

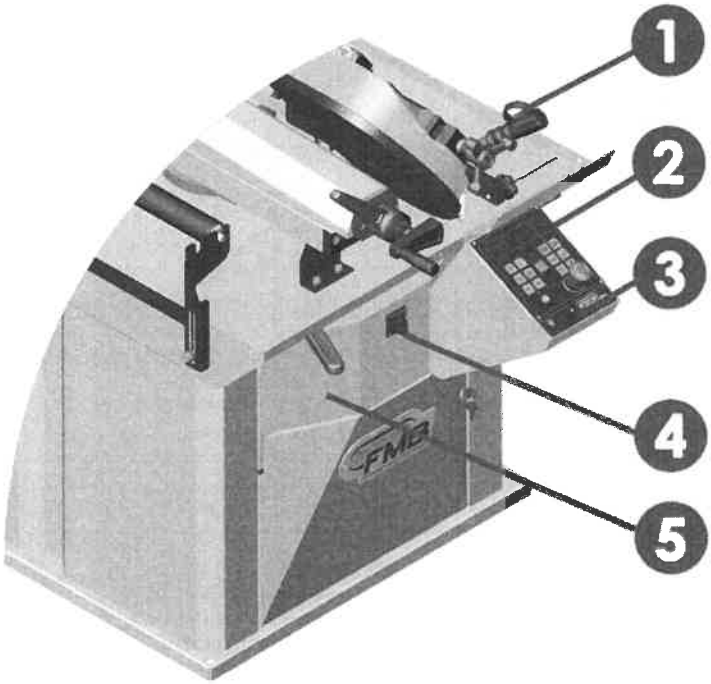
TABLE 6: [Mercury-Saturn-Galactic control panel description].

Object	Function	Description
	Hydraulic unit enabling /disabling	▶ Press [I] ↳ The button lights up ↳ The control unit is enabled. ▷ Press [O] ↳ The control unit is disabled
	Voltage presence indicator light	▶ Light On: it indicates presence of voltage ▷ Light Off: no voltage in the control panel
	Washing gun enabling/disabling	▶ [ON]: Washing gun enabled ↳ The selector ligths up ▷ [OFF]: Washing gun disabled

Object	Function	Description
	LASER option enabling /disabling	▶ [ON]: enabled ↳ The selector ligths up ▷ [OFF]: disabled
	Cooling/ NB optional enabling /desabling	▶ [ON]  : lubro-cooling with optional NB on ▷ [OFF]: disables cooling – [ON]  : enables standard cooling
	Blade rotation speed adjustment	▶ If turned clockwise. ↳ Increases the blade rotation speed. ▷ If turned anticlockwise. ↳ Decreases the blade rotation speed
	Cycle start button	▶ Press to start the cycle. ↳ The button lights up
	Blade breaking warning light	▶ On: blade broken ▷ Off: no warning
	Head guard open warning light	▶ On: guard open ▷ Off: no warning
	PLC error warning light	▶ Light on: PLC in alarm ▷ Light off: no warning
	Blade motor thermal or hydraulic unit intervention warning light	▶ When on it indicates the intervention of the thermal ▷ Off: no warning
	Vice closing	▶ Press to close the vices

Object	Function	Description
	Vice opening	▶ Press to open the vices
	Blade rise	▶ Press to make the blade go up
	Blade descent	▶ Press to make the blade go down

3.6 Electric system Centauro-Calipso-Sirius-Omega-Major



PIC. 12

TABLE 7: [Centauro-Calipso-Sirius-Omega-Major electrical system description].

Pos.	Description
1	Cycle start button (not for Major)
2	Control panel
3	Functioning type selector (not for Major) ▶  Manual functioning ▷  Semi-automatic functioning
4	Main switch ▶ [I=ON] (machine on) ▷ [0=OFF] (machine off)
5	Electrical cabinet

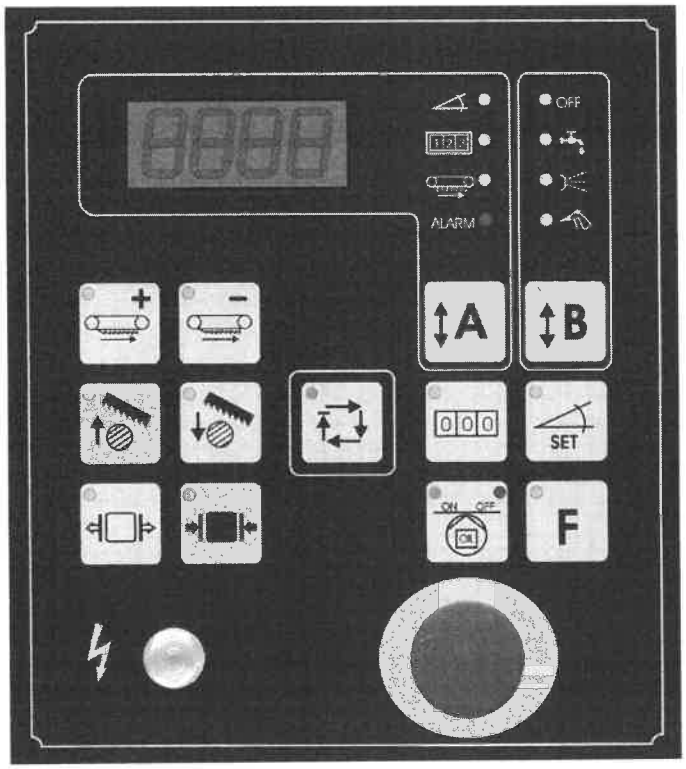
The electrical cabinet is located in the basement and contains the electrical panel. The control panel is located in a frontal position with respect to the machine. The control

panel is the interface between operator and machine. Under the control panel, there is a selector for manual mode or semiautomatic mode. On the side of the control panel there's the main switch.

3.6.1 Control panel Centauro-Calipso-Sirius-Omega-Major

The interface between operator and machine is a control panel (see Pic. 13).

The control panel is located in a frontal position with respect to the work area.

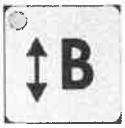
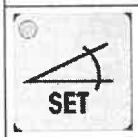
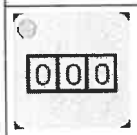


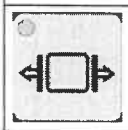
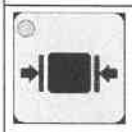
PIC. 13

TABLE 8: [Centauro-Calipso-Sirius-Omega-Major control panel description]

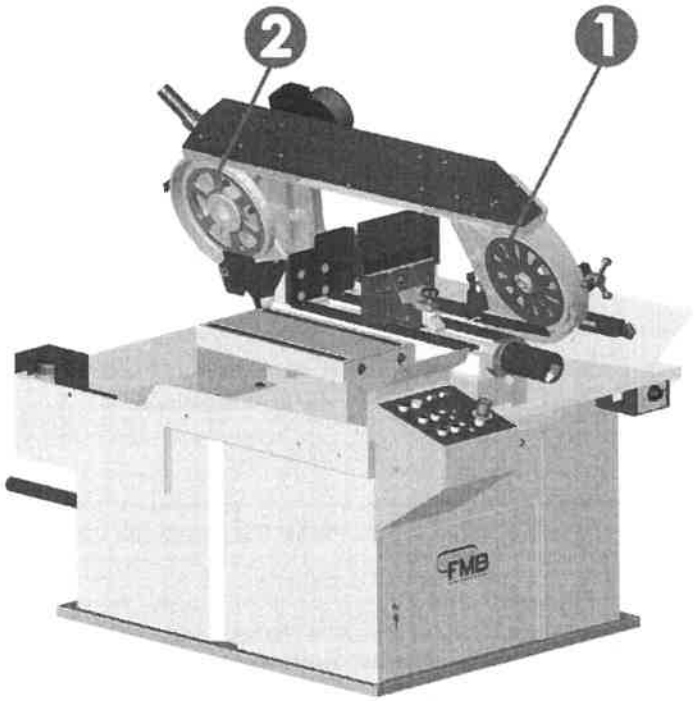
Object	Function	Description
	Indicates presence of tension	▶ Indicator on: signals tension presence in the control panel ▷ Indicator off: there is no tension in the control panel
	Display	Shows the informations according to the selected option

Object	Function	Description
	Browse	To move among options: 1. Pressed once. ✔ Only if the machine has the VAT optional. ↳ The relevant led turns on  . ↳ the display shows the set cutting angle. 2. Pressed twice. ↳ The relevant led turns on  . ↳ The display shows the number of pieces just cut. 3. Pressed 3 times. ↳ The relevant led turns on  . ↳ The display shows the set cutting speed. 4. Pressed 4 times. ↳ The relevant led turns on  . The display shows eventual alarm messages.

Object	Function	Description
	Browse	✔ Only if the machine has the NB optional. 1. Pressed once. ↳ The relevant led turns on  . ↳ Nebulisation is disactivated. 2. Pressed twice. ↳ The relevant led turns on  . ↳ Cut refrigeration is active. 3. Pressed 3 times. ↳ The relevant led turns on  . ↳ Nebulisation is active. 4. Pressed 4 times. ↳ The relevant led turns on  . Water gun is active (If installed on the machine).
	Angle cut reset	▶ Pressed for about 3 seconds. ↳ The relevant led turns on. ↳ Angle cut is reset
	Pieces counter reset	▶ Pressed for about 3 seconds. ↳ The relevant led turns on. ↳ Piece counter is reset.
	Delete	▶ Pressed for about 3 seconds. ↳ The relevant led turns on. ↳ The alarm on the display is cancelled.
	Hydraulic unit activation/disactivation	▶ Pressed once ↳ The green led turns on [ON]. ↳ The unit is activated. ▷ Pressed twice ↳ The red led turns on [OFF]. ↳ The unit is disactivated.

Object	Function	Description
	Start cycle	▶ Push to start cycle. ↳ Led turns on.
	Blade rotation speed increase	▶ Push to increase blade rotation speed ↳ Led turns on.
	Blade rotation speed decrease	▶ Push to decrease blade rotation speed. ↳ Led turns on.
	Head rise	▶ Push to rise up the blade. ↳ Led turns on.
	Head descent	▶ Push to make the head go down ↳ Led turns on.
	Vice open	▶ Push to open the vice. ↳ Led turns on.
	Vice closed	▶ Push to close the vice. ↳ Led turns on.

3.7 Head and its components



PIC. 14

TABLE 9: [head description].

Pos.	Description
1	Idle wheel
2	Motor wheel

The head consists of 3 parts: 1 idle head, 1 motor head and a cross connection between the 2 parts. On models Major, Mercury, Saturn and Galactic the idle head is made of aluminium to reduce the weight of the assembly; the cross connection between the parts is in steel, while the motor head is in cast iron to reduce vibrations. On models Centauro, Calipso, Sirius and Omega the head is a single aluminum casting.

The idle head includes the idle wheel.

The motor head includes the motor wheel.

On the motor wheel is mounted the motor allowing the movement of the blade.

The blade is stretched between the 2 flywheels by a tensioning system with Torque.

2 blade-guides slides keep the blade perpendicular to the work top.

All the assembly è protetto da ripari (o carter).

3.8 Cooling system

The machines has a blade cooling/ lubricating system

The coolant collecting tank is on the basement on models Mercury-Saturn-Galatic and inside the basement for models Centauro-Calipso-Sirius-Omega-Major.

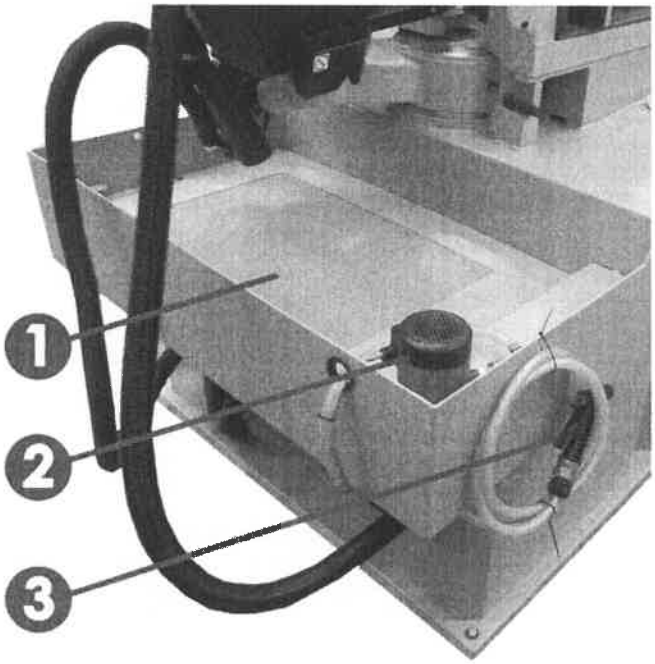
The coolant-collecting tank must be filled with a water-oil emulsion.

The percentage of oil must be minimum 5% of the emulsion, but it has to be mixed according to the type of material to be worked.

The pump sends the liquid to the blade guide slides and to the washing gun.

To exclude a nozzle close the tap on it.

Cooling system Mercury-Saturn-Galactic

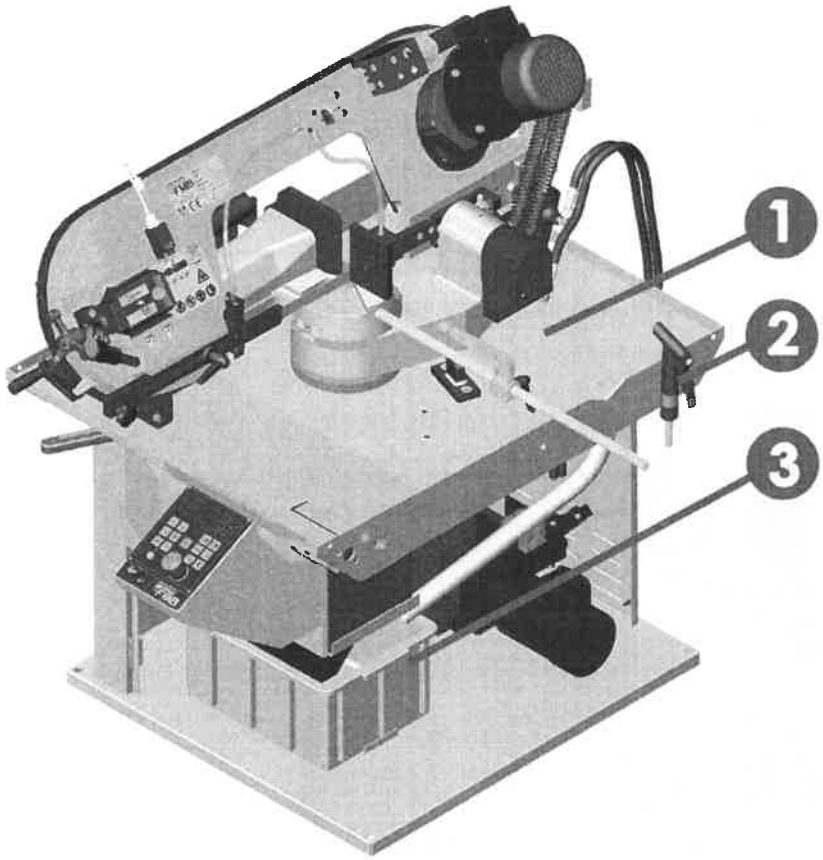


PIC. 15

TABLE 10: [cooling system Mercury-Saturn-Galactic].

Pos.	Description
1	Collecting tank
2	Coolant pump
3	Washing gun

Cooling system Centauro-Calipso-Sirius-Omega-Major



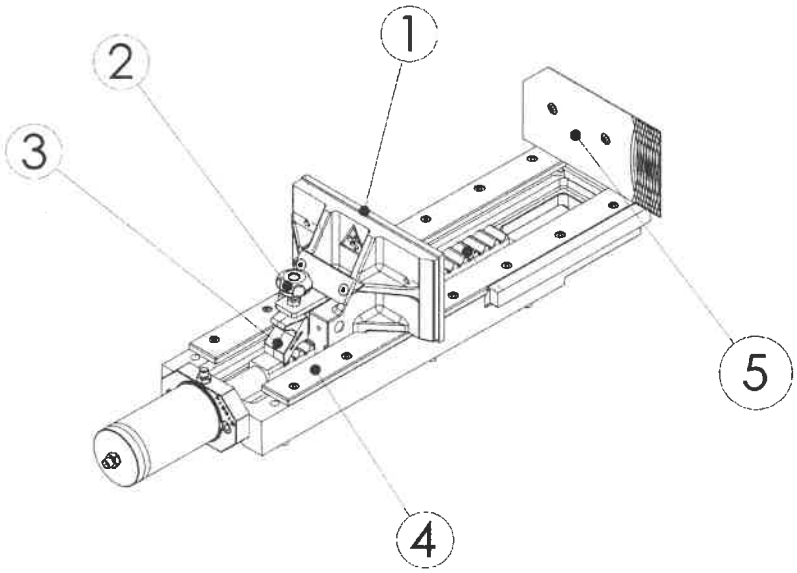
PIC. 16

TABLE 11: [cooling system Centauro-Calipso-Sirius-Omega-Major].

Pos.	Description
1	Chips collector tank
2	Washing gun
3	Collecting tank

3.9 Vice

Galactic vice



PIC. 17

TABLE 12: [Galactic vice description].

Pos.	Description
1	Mobile jaw
2	Knob
3	Mechanical stop
4	Vice base
5	Fixed vice

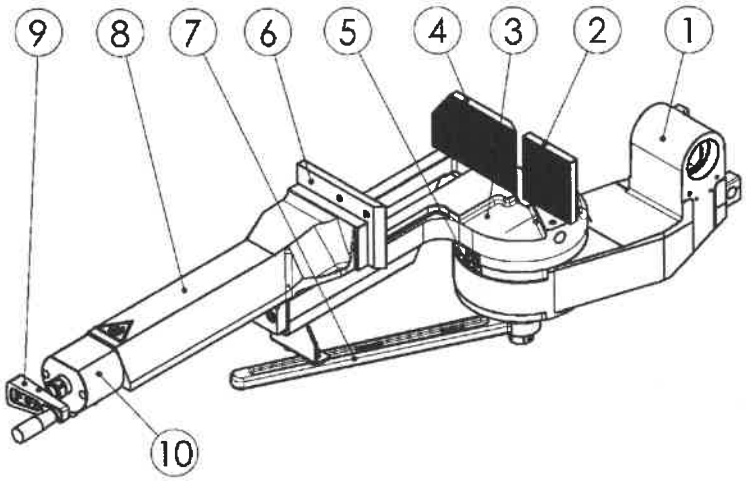
✔ Close the vice be closed on the workpiece before starting the cutting cycle.

The first approach of the vice to the material to be cut is to be done manually:

1. Unscrew the knob.
   ↳ The stop can move.
2. Move the vice placing it near the material to be cut.
3. Tighten the knob.
   ↳ The stop is locked.

The final approach must be done through the control panel using the open/close vice pushbuttons.

Sirius-Mercury vice

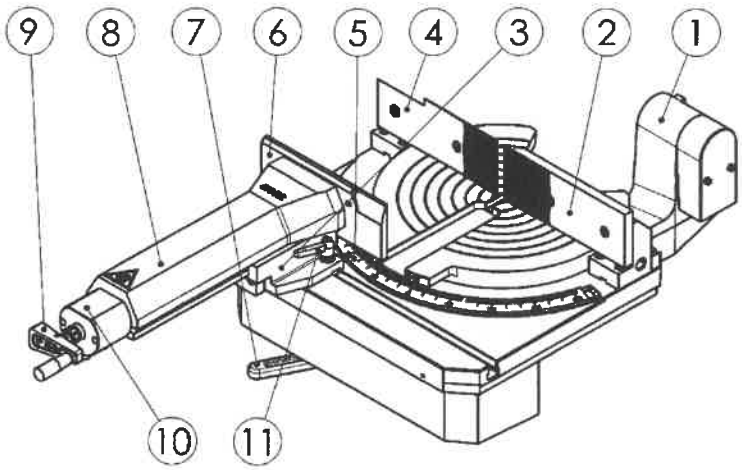


PIC. 18

TABLE 13: [Sirius-Mercury vice description].

Pos.	Description
1	Revolving support
2	Support vice
3	Vice base
4	Fixed vice
5	Degrees plate
6	Moving vice
7	Degrees lever
8	Vice carriage
9	Vice handwheel
10	Hydraulic cylinder

Omega-Saturn vice

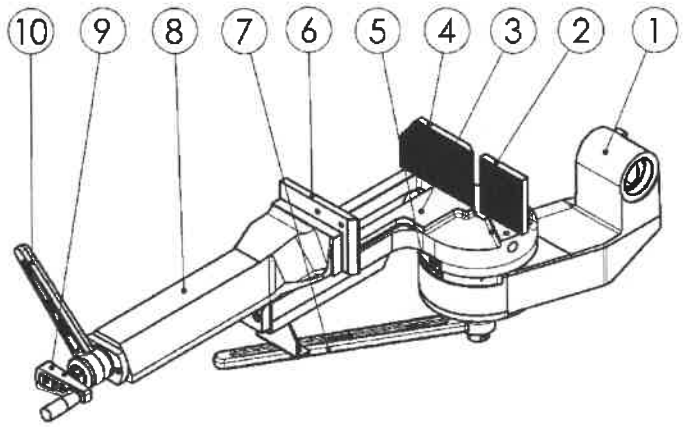


PIC. 19

TABLE 14: [Omega-Saturn vice description].

Pos.	Description
1	Revolving support
2	Support vice
3	Vice base
4	Fixed vice
5	Degrees plate
6	Moving vice
7	Degrees lever
8	Vice carriage
9	Vice handwheel
10	Hydraulic cylinder
11	Closing handle (x2)

Morsa Centauro-Calipso



PIC. 20

TABLE 15: [Centauro-Calipso vice description].

Pos.	Description
1	Revolving support
2	Support vice
3	Vice base
4	Fixed vice
5	Degrees plate
6	Moving vice
7	Degrees lever
8	Vice carriage
9	Vice handwheel
10	Lock/unlock lever

✔ Close the vice be closed on the workpiece before starting the cutting cycle.

The first approach of the vice to the material to be cut is to be done manually:

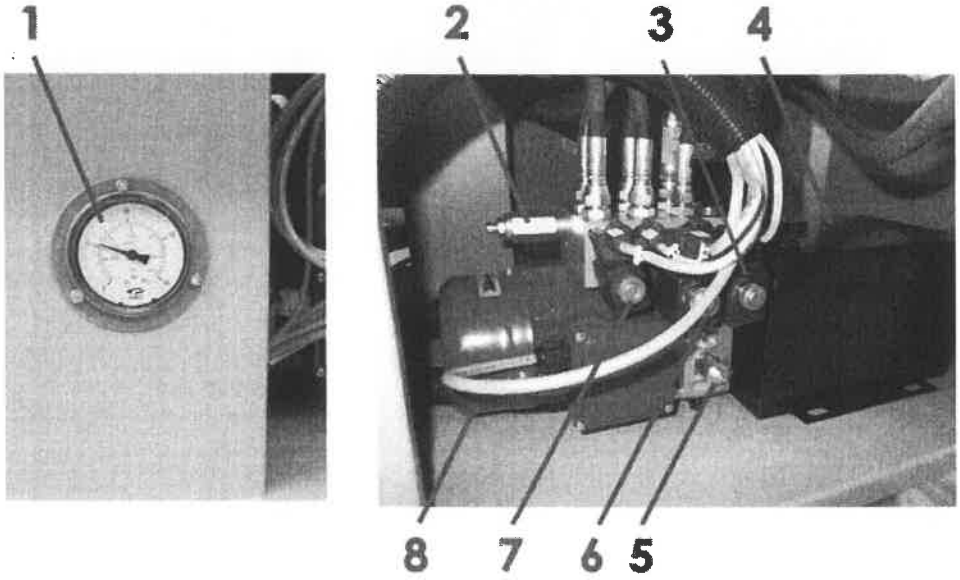
1. Turn the wheel clockwise.
   ↳ The vice gets close to the workpiece.
2. Turn the wheel anti-clockwise.
   ↳ The vice moves away from the workpiece.

The final approach must be done through the control panel using the open/close vice pushbuttons.

3.10 Hydraulic system

The hydraulic unit is placed inside the basement of the machine. This unit allows the head and the vice movements.

Galactic hydraulic system

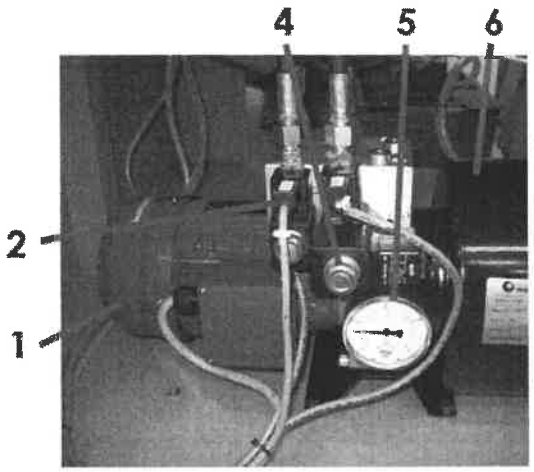


PIC. 21

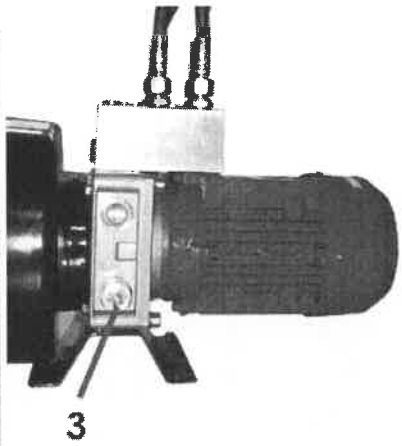
TABLE 16: [Galactic hydraulic system description].

Pos.	Description
1	Manometer
2	Cutting pressure adjustment
3	Vice open/close solenoid valve
4	Tank
5	Hydraulic unit pressure adjustment
6	Head up/down solenoid valve
7	Head fast approach solenoid valve
8	Motor

Centauro-Calipso hydraulic system



PIC. 22

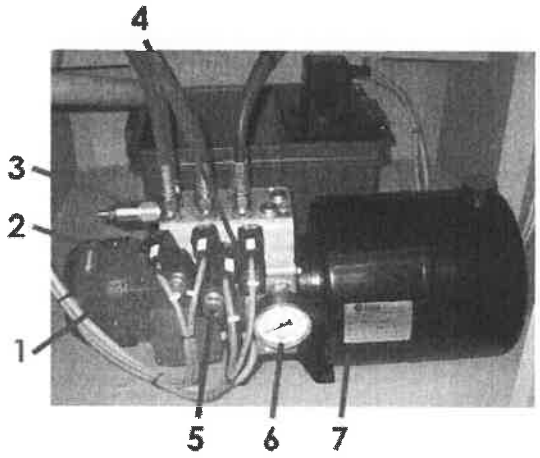


PIC. 23

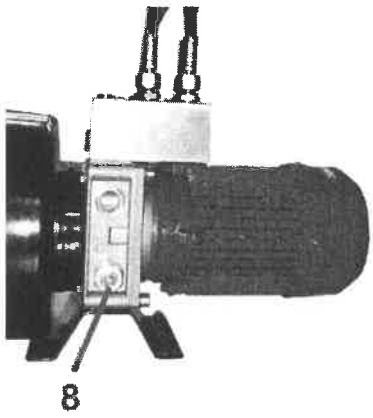
TABLE 17: [Centauro-Calipso hydraulic system description].

Pos.	Description
1	Motor
2	Head fast approach solenoid valve
3	Cutting pressure adjustment
4	Head up/down solenoid valve
5	Manometer
6	Tank

Sirius-Omega-Major-Mercury-Saturn hydraulic system



PIC. 24



PIC. 25

TABLE 18: [Sirius-Omega-Major-Mercury-Saturn hydraulic system description].

Pos.	Description
1	Motor
2	Head fast approach solenoid valve
3	Cutting pressure adjustment
4	Vice open/close solenoid valve
5	Head up/down solenoid valve
6	Manometer
7	Tank
8	Cutting pressure adjustment

3.11 Standard equipment

The machine is supplied with:

- Use and maintenance manual with EU Conformity Declaration included
- Cutting blade
- Washing gun

3.12 Option

Availaible options (see Pic. 26):

- Blade frequency changer VHZ
- Manual working cycle M
- Double vice DM
- Hydraulic double vice DMI
- NB1, NB2, NB1-BOX or NB2-BOX nebulizer
- RPM1 vice pressure adjusting
- Vertical vices for bundle cutting (0°) DOTM
- SENS control blade rotation
- LX Cutting line lighting by means of laser
- Cutting angle display VAT
- Fast approach TM
- RFP2, RE1G, RE2G, RP1G, RP2G Loading/unloading support roller conveyor
- One roller stand C2
- FM-RSP, FM-RS, FM-RSE mechanic measure stop with articulated striker
- Hydraulic measure stop system with articulated stroke FM-RI
- Connections CRC, CRS, RRS, CREC, CRES
- Device for the interrupted cut DTI

	VHZ	M	DM	DMI	DOTM	SENS	LX	VAT	TM	NB1	NB2	NB1-BOX	NB2-BOX	DTI
Centauro		✓				O	O	O	O	O	O			O
Centauro+VHZ	✓	✓				O	O	O	O	O	O			O
Calipso		✓	O			O	O	O	O	O	O			O
Calipso+VHZ	✓	✓	O			O	O	O	O	O	O			O
Sirius		✓			O	O	O	O	O	O	O			O
Sirius+VHZ	✓	✓			O	O	O	O	O	O	O			O
Omega		✓		O	O	O	O	O	O	O	O			O
Omega+VHZ	✓	✓		O	O	O	O	O	O	O	O			O
Major+VHZ	✓				O	O	O	O	O	O	O			O
Mercury+VHZ	✓				O	O	O	O	O	O	O			O
Saturn+VHZ	✓			O	O	O	O	O	O	O	O			O
Galactic+VHZ	✓				O	O	O	O	O			O	O	O

	RFP2	FM-RSP	FM-RI	FM-RS	FM-RSE	RPM1	CRC	CRS	RRS	C2	CREC	CRES	RE1G/2G	RP1G/2G
Centauro					O				O	O	O	O	O	
Centauro+VHZ					O				O	O	O	O	O	
Calipso					O				O	O	O	O	O	
Calipso+VHZ					O				O	O	O	O	O	
Sirius					O	O			O	O	O	O	O	
Sirius+VHZ					O	O			O	O	O	O	O	
Omega					O	O			O	O	O	O	O	
Omega+VHZ					O	O			O	O	O	O	O	
Major+VHZ			O	O		O	O	O	O	O				O
Mercury+VHZ			O	O		O	O	O	O	O				O
Saturn+VHZ			O	O		O	O	O	O	O				O
Galactic+VHZ	O	O				O				O				

PIC. 26

O = Optional

✓ = Standard equipment

4 Transport, installation, storage and dismantling

4.1 Unpacking

Upon receipt of the machine check that:

- the machine has not been damaged during transport,
  - if it has, submit the claim to the courier and notify FMB,
- the supply corresponds to the order specification.

In the case of non-compliance, the Customer must notify FMB within 15 days of receipt of the machine.

▶ If the machine is received in a wooden crate, open the top of the crate first and then remove the side panels.

NOTE Dispose of the packaging in accordance with the current regulations.

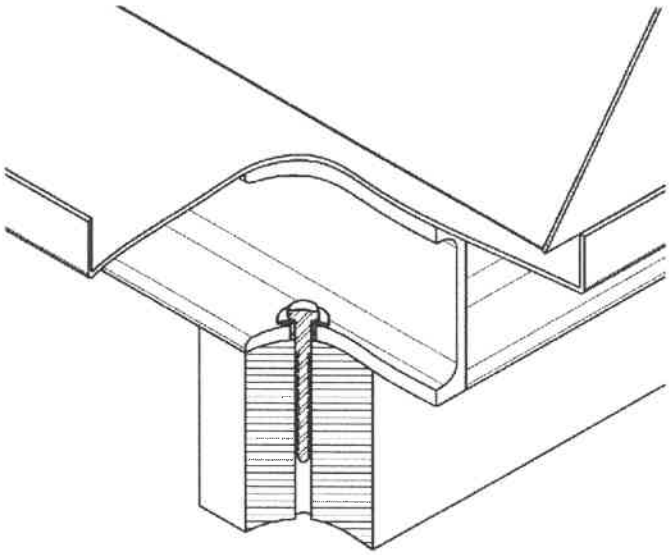
4.2 Transport

Before shipping the machine is packed in:

- Wooden crate or cage proportional to the size of the machine,
- Pallet proportional to the size of the machine,
- Two 12x8 cm / 4.7x3.1 inches cross-pieces positioned beneath the base.

The machine must be fixed to the cage/crate/ cross-pieces with self-tapping screws inserted in the holes in the base of the machine (see Pic. 27).

The machine must be covered with a protective plastic cloth.



PIC. 27

4.3 Handling

Handling the machine for positioning in the work place may be carried out by:

- Forklift truck,
- Gantry crane.

4.3.1 Handling with forklift truck fitted with forks

Make sure that the fork lift is adequate for the weight and the overall of the machine.

To prevent injury to persons and damage to objects clear the handling area and an adjacent safety area.

Place the forks in a barycentric position.

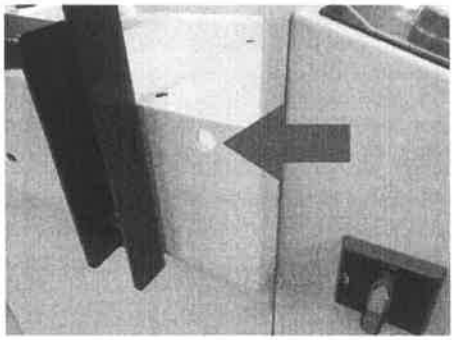
Always proceed very slowly during the handling phase.

Prevent the machine from oscillating during handling: move it very carefully and always raise it above ground only as much as necessary.

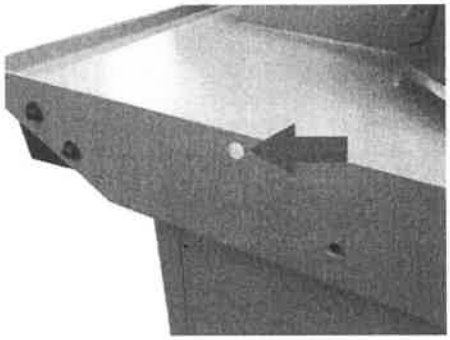
When the machine is close to the positioning area:

- Loosen the screws which fix the machine to the pallet (or to the cross-beams).
- If necessary use an overhead crane for final positioning.

4.3.2 Handling with gantry crane



PIC. 28



PIC. 29

On the machine there are some holes to which hang the lifting accessories.

Make sure that the gantry crane, the ropes and the lifting accessories have a capacity suitable to the weight of the machine.

To avoid damages to persons or things clear the area of handling and an adjacent area of security.

Act slowly while handling.

Avoid swinging the machine while handling: move it carefully and lift it a few centimetres from the ground.

When the machine has been positioned, remove the lifting accessories.

4.4 Installation conditions

Follow the instructions provided below.

The floor on which the machine will be installed must be of industrial type and capable of supporting the weight of the machine and any of its accessories.

Machine voltage, frequency and phases are indicated on the nameplate (see (see chapter 3.1 "Identification plate", page 33)).

- Check that:
  - the power supply line to which the machine is to be connected is:
    - protected, in accordance with the current regulations, by a safety device which trips automatically in the event of a fault,
    - is able to correctly power the machine,
    - has the same voltage and frequency required for operation of the machine,
    - the company's power supply line switch is in the [OFF] position.
- the machine's main switch is in the [OFF] position,
- the power supply cable, provided with the machine, is in perfect condition,
- the connection cables have a minimum cross-section selected on the basis of the machine's voltage and power and the distance between the source and the use.

4.5 Place of installation

The machine should be installed in an area in which there is a good air circulation in order to prevent potentially dangerous fumes resulting from the production process.

If necessary (according to the product to work) arrange some suction systems near the machine.

The minimum suggested luminosity for the installation area is 400 lux.

The electric and pneumatic systems must be sheltered as much as possible from dust, noxious vapours and humidity.

The machine is to be placed in a sheltered place out of bad weather and not left in rain.

The room temperature inside the machine room must be kept between 5 and 40° C (41 and 104 °F).

Leave an adequate free working space around the machine so as to be able to operate, load/unload material, equip the machine and carry out maintenance.

4.6 Storage

If the machine is not used it must be stored in a dry location with a temperature of -5° ÷ + 50° C / 23° ÷ 122° F.

1. Disconnect the machine from the power supply sources.
2. Drain the lubrication liquids.
3. Clean the machine.
4. Cover the machine with a length of cloth so to protect it from dust/dirt.

4.7 Disposal

NOTE Directive 2012/19/EC does not apply to the FMB machine.

WARNING

Hazardous substances contained in the electrical/electronic components

Dangerous for the environment and personal health if disposed of incorrectly.

- ⊘ Do not dispose of electrical/electronic waste with household waste.
- ▶ Collect different materials separately.
- ▶ Transport materials to specialised collection centres.

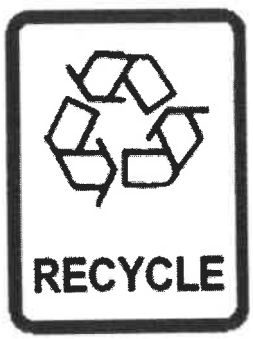
The machine must be prepared for disposal/demolition by authorised and skilled personnel.

1. Disconnect the machine from the power supply sources.
2. Drain the lubrication liquids (see Pic. 30).
3. Clean the machine of any machining residue.
4. The machine may be disposed of in its entirety or the various parts may be dismantled for recycling (see Pic. 31).

These activities must be carried out in compliance with the regulations of the country in which the machine is installed.

For the demolition, contact a firm skilled in disposal operations.

PIC. 30



PIC. 31

5 Installation and connection

Provide adequate free space, around the machine, for loading/unloading cross-workpiece, opening hatches and carrying out regular maintenance.

Fix the machine and the rollers to the floor using steel pegs with bolts, fitted in the holes in the base.

WARNING

Improper installation

The warranty is no longer valid in the event of improper installation.

5.1 Electric connection

✔ The user must connect the machine to a power supply system fitted with a protection device which trips automatically in the event of a fault.

The devices can be:

- over-current protection devices which ensure that the power supply is automatically switched OFF in the event of a fault to the insulation or differential current protection devices to start the automatic switching OFF of the power supply in the event of a fault to the insulation of an active part towards earth or to ground in the TN systems,

or

- differential current protection devices to start the automatic switching OFF of the power supply in the event of a fault to the insulation of an active part towards earth or to ground in the TT systems,

or

- insulation controllers or differential current protection devices to start the automatic switching OFF of the power supply of the EN systems,

The adjustment of the tripping current of the devices for protection against insulation faults - when devices are used for protection against over-currents or differential current protection devices - must comply with the requirements of CEI EN 60204-1:2006 and/or IEC 60364.

The devices for protection against insulation faults must trip in a sufficiently short time to limit the duration of the contact voltage to a period within which they are not hazardous (in accordance with Annex A of CEI EN 60204-1:2006).

NOTE The protection against insulation faults must form part of the machine's power supply system: it is not supplied by FMB!

NOTE The checking of the conditions for protection by means of automatic switching OFF of the power supply, in accordance with the requirements of point 18.2 of CEI EN 60204-1:2006, must be carried out by the end user; the end user must, in particular, perform test 2 of point 18.2.2 of CEI EN 60204-1:2006 for the TN supply system.

1. Turn the main switch to [0-OFF].
2. Connect the machine to the electricity supply line using a standard plug in accordance with the regulations in force in the country of installation.
3. Turn the main switch to [I-ON].
   ↳ The light indicating tension presence turns on: presence of electric supply tension.
4. Push the button [I] enabling the hydraulic unit.
5. Check the pressure gauge of the hydraulic unit:
   ↳ If it reports 18 bar: **the electrical connection is properly done.**

↳ If it does not report 18 bar: **the phases of the power plug are reversed!**

6. Push the head rise button.

   ↳ If the head rises: **the electrical connection is correct.**

   ↳ If the head does not rise: **the phases of the power plug are inverted!**

   ▷ Turn the main switch to [0-OFF].

   ▷ Unplug the machine from the power line.

   ▷ Reverse the phases of the electricity supply plug.

   ▷ Repeat from point 3.

6 Preparating the machine

6.1 Blade choice

The blade should be selected according to the type and shape of the material to be cut

To choose the tooth pitch of the blade, measure the contact length of the blade on the work piece.

In case of cutting of 2 or more tubes placed one beside the other sum the thicknesses of of the tube sides.

The cutting result depends also on the cutting parameters set by the operator.

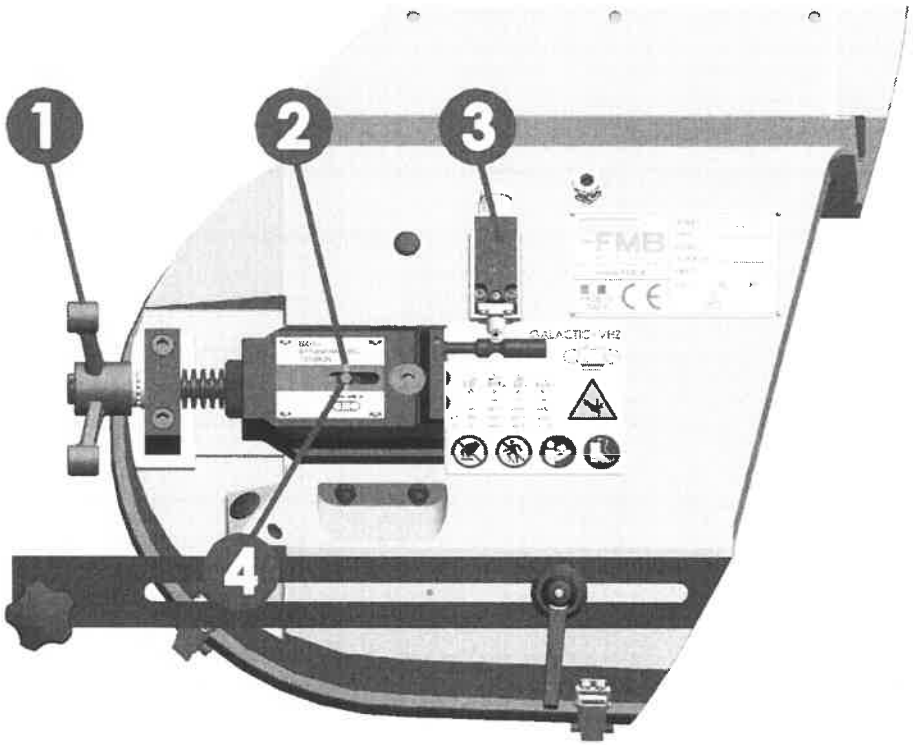
TABLE 1: [tooth pitch of the blade].

Teeth per inch [t.p.i.]	**Contact length [mm] Min.**	**Max.**
10/14	-	20
8/12	10	30
6/10	20	50
5/8	30	60
4/6	50	90
3/4	80	150

TABLE 2: [general guidelines on the choice of the teeth of the blade].

Material shape	**Thickness [mm]**	**Teeth per inch [t.p.i.]**
	1 ÷ 2	10/14
	2 ÷ 5	8/12
	5 ÷ 10	6/10 – 5/8
	10 ÷ 30	5/8
	30 ÷ 80	4/6
	80 ÷ 150	3/4
	150 ÷ 230	3/4

6.2 Blade tension adjustment



PIC. 32

TABLE 3: [tensioner description].

Pos.	Description
1	Blade tension adjustment hand wheel
2	Green band indicating the correct blade tension
3	Blade breakage limit switch
4	Slot screw

The use of a blade correctly tensioned increases the duration of the blade itself and improves the cutting perfomance of the band saw machine.

The blade breakage limit switch (see Pic. 32) interrupts the blade rotation in case the blade breaks during the cycle. The broken blade must be replaced.

- ▶ Turn the hand wheel clockwise to tighten the blade.
  - ▷ Turn the hand wheel anticlockwise to loosen the blade.
  - ↳ When the slot of the screw is aligned with the green band the blade is correctly tensioned (see Pic. 32).

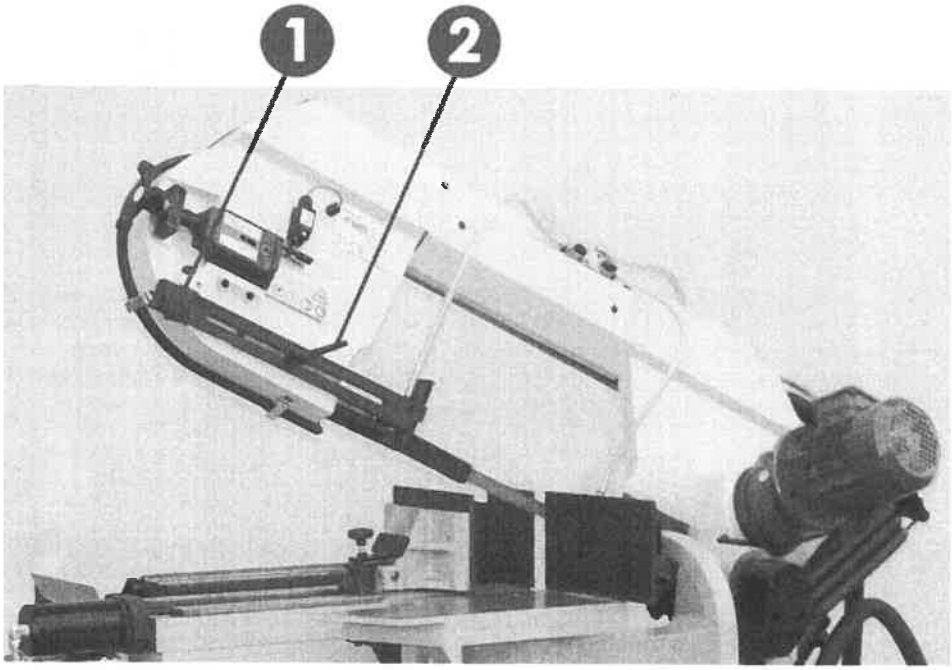
6.3 Choice of the blade rotation speed

The blade rotation speed is to be chosen according to the material to be cut.

m/min	UNI	BS	AFNOR	DIN	UNE	AISI
80-100	Fe37-42 C10-15 CF 10S Pb20	40/43 045M10 230 Mo7Pb	E24 E20XC10 S 250 Pb	St 37-42 C10-15 10S Pb20	F1120	A36-70a 1010 11L37
60-75	Fe50-60 C35-45	50 060M35	A50 XC35	St 50-60 C35-45	F1150	A306-64 1035
40-65	16 Mn Cr5 20NiCrMo2 16NiCrMo12 18CrMo4	805 A15 815 M17	18CD4 20MC5 14NC11 20NCD2	16Mn Cr5 21NiCrMo4 40Mn4 42CrMo4 36NiCr6 50CrV4 56NiCrMoV7	F1516 F1522 F1252 F128 F520-B	8615 8620 4320
40-60	100Cr6 100CrMo7 UC95KU UC85KU	534A99 BW2	100C6 100CD7 Y100 Y85	100Cr6 100CrMo7 C80W1 C125W1	F5230 F131 F514	52100 W1-0,8C W1-1C
25-45	HS6-5-2 HS18-0-1 X205 Cr 12KU	BM2 BT1 BD2 BD3	18-04-01 Z80WCV Z200C12	S6-5-2 S18-0-1 X165CrV12 X210Cr12	F1150 F554 F521	M2 T1 D2 D3
25-40	X5CrNi18 10	304S15	Z6CN18-09	X5CrNi18 9 X10CrNiMoTi1810	F314 F321	304
30-50	G30 GS500/7 CM840	GRADO 300 500/7 W410/4	FT30 FGS 500/7 MB 40-10	GG30 GTW40 GGG 50	F114	GRADO 45 80-55-06 40010
90-120	Al Cu Pb			NON FERROUS METALS		

PIC. 33

6.3.1 Movable blade guide positioning



PIC. 34

TABLE 4: [movable blade guide lock/unlock system].

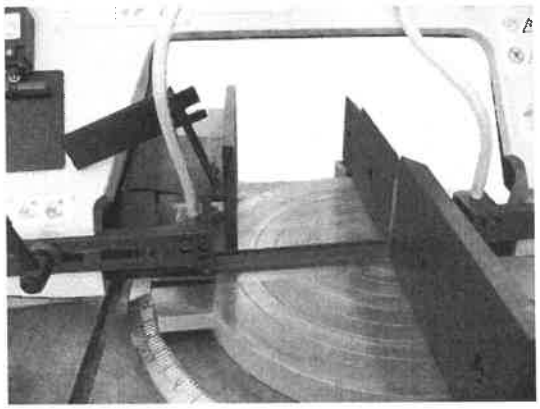
Pos.	Description
1	Knob
2	Adjustment handle

On the head there is an adjustment handle.

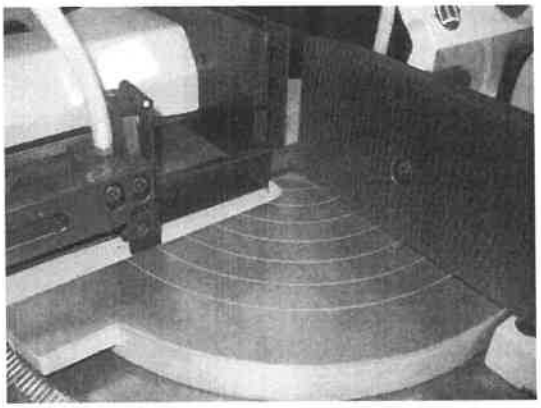
The adjustment handle allows you to lock/unlock the movable blade guide.

1. Turn the adjustment handle anticlockwise.
   ↳ The blade guide is unlocked.
2. Holding the knob, move the movable blade guide and get it as close as possible to the work piece.
3. Turn the adjustment handle clockwise.
   ↳ The blade guide is locked.

6.4 Use of the flip-up guard



PIC. 35



PIC. 36

PIC. 37

PIC. 38

A tip-up guard is fastened on the movable slide holder.

According to the dimensions of the work piece, the guard must be lifted/removed (**big dimensioned pieces**) (see Pic. 35) or lowered (see Pic. 36) (**small pieces**).

To cut big dimensioned pieces:

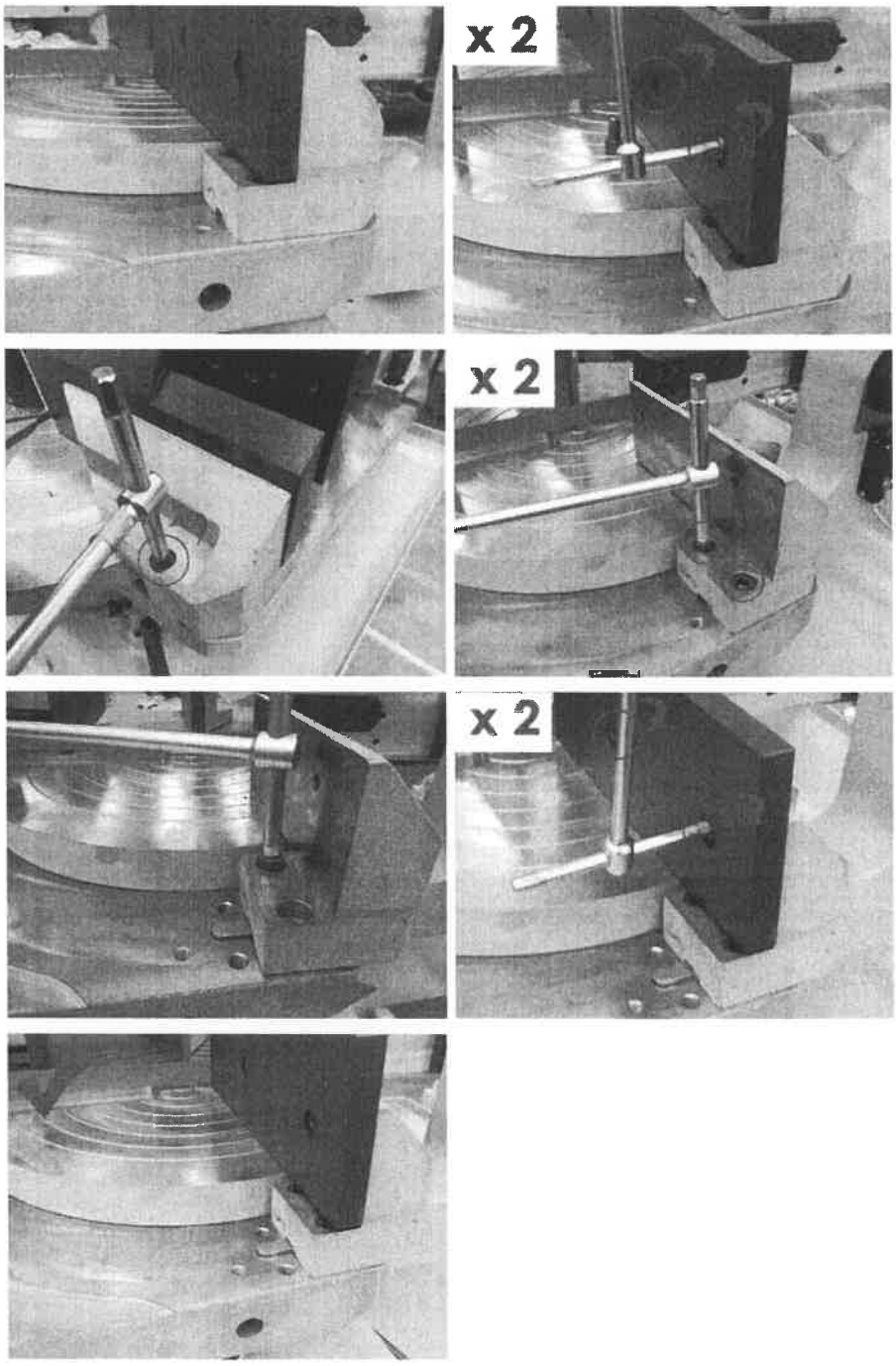
1. unscrew the knob locking the guard (see Pic. 37),
2. hook the guard to the coolant liquid tube (see Pic. 38),

   ↳ now the piece can be cut.

To cut at the maximum capacity the tip-up guard is to be taken away.

Once the cut has been performed, the tip-up guard has to be put at its place once again.

6.5 Procedure to increase cutting capacity up to 310mm (only for Calipso and Omega):



PIC. 39

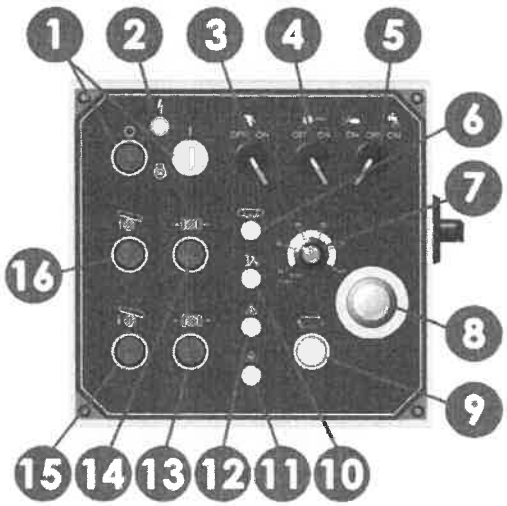
↳ It is now possible to cut up to 310 mm.

NOTE In this mode, during degrees cut, it will be no longer possible to measure the length of the pieces by the length stop. The center of rotation moves back and the length stop would not indicate a correct measure!

7 Machine use (Galactic-Mercury-Saturn)

What better indicates if the cut is correct or not is the form of the chips produced by the cut. This metal chips should be soft, open and light (see Pic. 40).

PIC. 40



PIC. 41

1. Start the machine: turn the main switch to [I-ON].
   ↳ The tension presence light switches on (Pos. 2).
2. Switch on the hydraulic unit pushing the button [I] (Pos. 1).
   ▷ For machines equipped with VAT optional, calibration is to be done before use. With the head locked at 0°, push the [RESET] button for a few seconds.
   ↳ The VAT is calibrated.
3. Choose whether to enable or disable the cutting cooling system standard or with the NB optional placing the relevant selector on [ON] or [OFF] (Pos. 5).
4. Adjust the blade rotation speed (Pos. 7).
   – The speed can be changed even during the cycle.

5. Adjust the blade descent speed by the cutting drop valve  .
   - The speed can be changed even during the cycle.
6. Open the vices as much as necessary to make the workpiece enter (Pos. 13).
7. Place the work piece on the work top between the jaws of the vice.
   - The work piece must be perpendicular to the blade and to the jaws.
8. Approach the vice as indicated in the dedicated chapter (see chapter 3.9 "Vice", page 55)
9. Close the vices until the workpiece is steadily locked (Pos. 14).
10. Approach the blade to the piece pushing the head down button (Pos.15). Bring the blade to a distance of approximately 2 cm from the workpiece.
    - This position will be stored automatically as position of the head at the end of the cut.
11. Start the work cycle pressing the cycle start button (Pos. 9).
    - ↳ The blade starts to rotate and to lower performing the cutting.
    - ↳ At the end of the cut, the blade is positioned to the stored position and the vice opens.

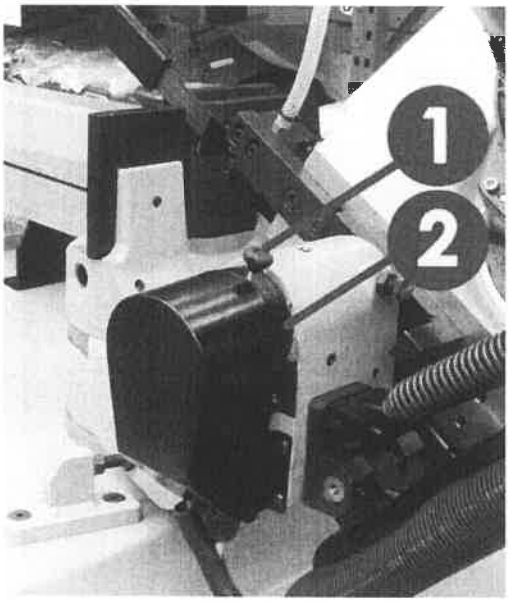
▶ To stop the cycle push the button [O] (Pos.1).

7.1 Interrupted cut (Galactic-Mercury-Saturn)

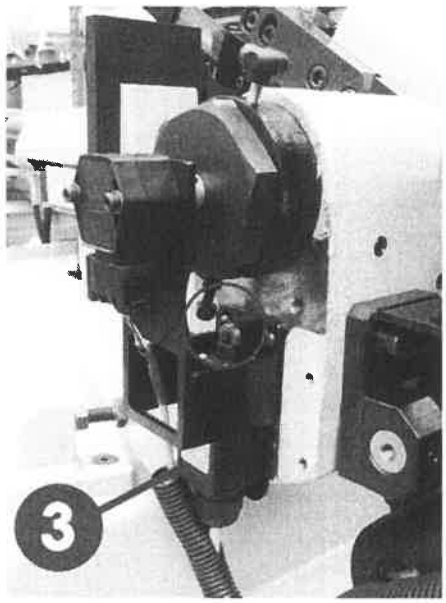
You can stop the cut before the end of the cycle to perform the so-called "interrupted cut".

1. **During** the semi-automatic cycle push the head-lift button.
   - ↳ The blade stops turning.
   - ↳ The head goes up and places itself at cutting start.

7.2 Interrupted cut with DTI optional (Galactic-Mercury-Saturn)



IMM. 42



IMM. 43

DTI optional allows to stop the cutting operation before the end of the working cycle in order to realize the so-called "interrupted cut". In order to realize it, define the end position of the cut using the provided limit switch (vedi Imm. 43, Pos.3).

1. Unscrew the grip (vedi Imm. 42, Pos.1).
2. Turn the ring in order to reach the wished position (vedi Imm. 42, Pos.2).
3. Screw the grip.

   ↳ The end position of the cut is confirmed.

7.3 Mitre sawing (Galactic-Mercury-Saturn)

✔ Before degrees cutting, take the optional DOTM away.

✔ The degrees are readable on the plate fixed on the rotary support.

✔ Positions at 0° / 45° / 60° are provided with mechanical stops.

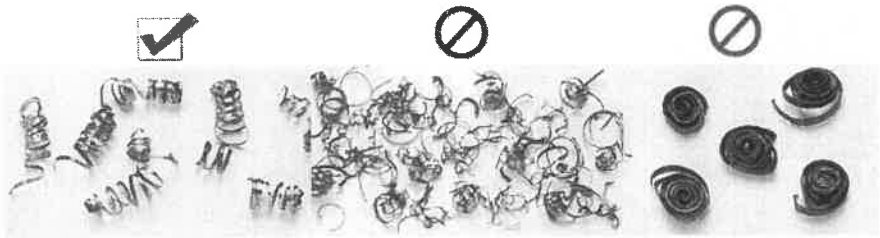
1. Place the head on cut end position,
2. Turn left the head rotation locking lever.

   ↳ It is now possible to move the head.
3. Turn the head manually up to the angle to be set.
4. Turn right the head rotation locking lever.

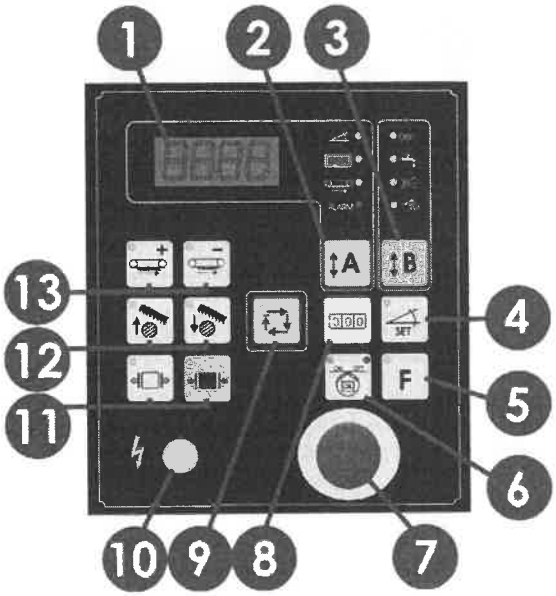
   ↳ The head is locked to the set degrees.

8 Machine use (Calipso-Centauro-Sirius-Omega-Major)

What better indicates if the cut is correct or not is the form of the chips produced by the cut. This metal chips should be soft, open and light (see Pic. 40).



PIC. 44



PIC. 45

8.1 Semiautomatic work cycle

1. Start the machine: turn the main switch to [I=ON].
   - ↳ The tension presence light switches on (Pos.10).
   - ↳ Control panel display turns on.
2. Put the selector in semiautomatic mode [].
3. Turn on the hydraulic control unit pressing once the concerned button (Pos.6).
   - ↳ Green led turns on.
4. Choose among the NB options: off, refrigeration, nebulisation or water gun.

5. Adjust the blade rotation speed (Pos.13).
   - The speed can be changed even during the cycle.
6. Open the vice pressing the button.
7. Rotate the handwheel to open the vice as necessary to put the work piece.
8. Place the work piece on the work top between the jaws of the vice.
   - The work piece must be perpendicular to the blade and to the jaws.
9. Close the vice turning the handwheel.
10. Put to the right the head rotation-locking lever.
    ↳ The workpiece is locked.
11. Approach the blade to the piece pushing the head down button. Bring the blade to a distance of approximately 2 cm from the workpiece.
12. Start the work cycle pressing the cycle start button.
    ↳ The blade starts to rotate and to lower performing the cutting.
    ↳ At the end of the cut, the blade goes back to its starting position, the vice opens.

► To stop the cycle push the shutdown button of the hydraulic control unit [OFF].

8.2 Manual work cycle

1. Start the machine: turn the main switch to [I=ON].
   ↳ The tension presence light switches on.
   ↳ The control panel display turns on.
2. Put the selector in manual mode [].
3. Turn on the hydraulic unit pressing once the relevant button [ON].
   ↳ The green led turns on.
4. Choose among the NB options: off, refrigeration, nebulisation or water gun.
5. Adjust the blade rotation speed.
   - The speed can be changed even during the cycle.
6. Turn the handwheel to open the vice as necessary to put in the work piece.
7. Place the work piece on the work top between the jaws of the vice.
   - The work piece must be perpendicular to the blade and to the jaws.
8. Close the vice turning the hand wheel.
9. Put to the right the head rotation-locking lever.
   ↳ The work piece is blocked.

10. Push the cycle start button on the handle.

    ↳ The blade keeps turning as long as the button is pressed.

11. Lower the head manually.

12. Execute the cut.

    – Rise the head back to its starting position manually.

▶ To stop the cycle, push the off hydraulic unit button [OFF].

To go back to the semi-automatic working cycle:

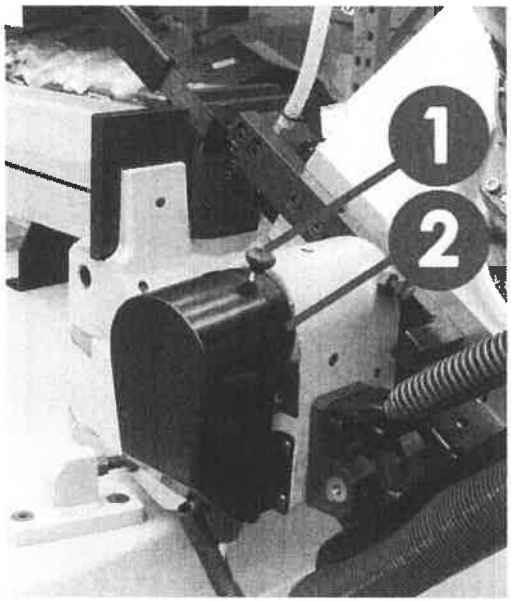
1. Rotate the cycle selector in semi-automatic mode [].

    ↳ Button [A] and [B] leds start blinking:

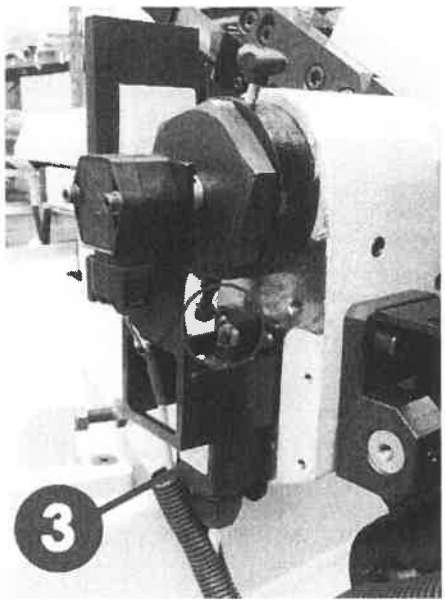
2. Push for 5 seconds, contemporarely both buttons [A] and [B].

    ↳ The head rises.

8.3 Interrupted cut with DTI optional (Calipso-Centauro-Sirius-Omega-Major)



IMM. 46



IMM. 47

DTI optional allows to stop the cutting operation before the end of the working cycle in order to realize the so-called "interrupted cut". In order to realize it, define the end position of the cut using the provided limit switch (vedi Imm. 47, Pos.3).

1. Unscrew the grip (vedi Imm. 46, Pos.1).
2. Turn the ring in order to reach the wished position (vedi Imm. 46, Pos.2).
3. Screw the grip.

   ↳ The end position of the cut is confirmed.

8.4 Mitre sawing (Omega-Calipso)

✔ The degrees are readable on the plate fixed on the rotary support.

✔ Positions at 0° / 45° / 60° are provided with mechanical stops.

For cutting between -45° and 0°:

1. Place the head on cut end position,
2. Turn left the head rotation locking lever.

   ↳ It is now possible to move the head.
3. Loose the 2 adjustable handles.
4. Move the movable vice group from left to right as for the work top.

5. Tighten the 2 adjustable handles.
6. Turn the head manually up to the angle to be set.
7. Push to the right the head rotation-locking lever.

   ↳ The head is locked to the set degrees.

For cutting between 0° and +60°:

1. Place the head on cut end position,
2. Turn left the head rotation locking lever.

   ↳ It is now possible to move the head.
3. Loose the 2 adjustable handles.
4. Move the movable vice group from right to left as for the work top.
5. Tighten the 2 adjustable handles.
6. Turn the head manually up to the angle to be set.
7. Push to the right the head rotation-locking lever.

   ↳ The head is locked to the set degrees.

9 Optional

9.1 DM

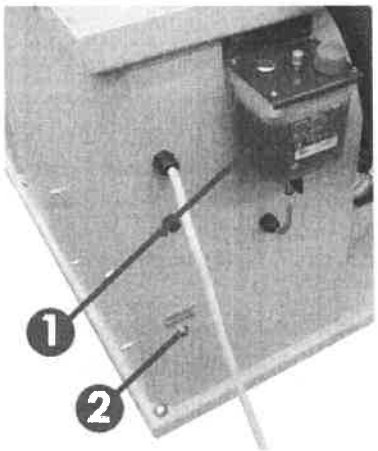
Additional vice for material locking.

9.2 DMI

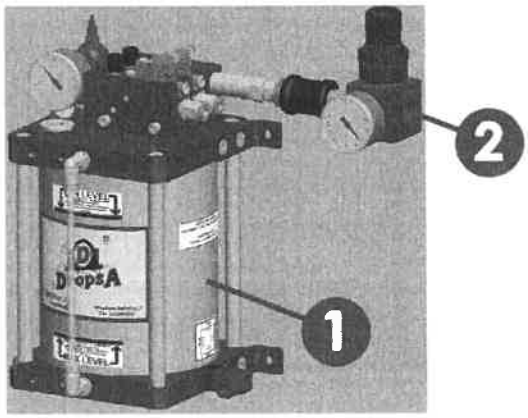
Hydraulic additional vice for material locking.

9.3 NB1 / NB2 / NB1 BOX / NB2 BOX

Minimal lubricating-cooling unit.



PIC. 48



PIC. 49

TABLE 1: [NB/NB BOX minimal lubricating-cooling unit description].

Pos.	Description
1	NB tank
2	NB feeding tube inlet

The machine is fitted with a minimal lubrication and cooling system to improve the cut, reduce pollution, and avoid the formation of puddles on the floor (possible cause of injury).

A small amount of lubricant injected in a low-pressure airflow proved effective in carrying out high impact lubricant-coolant functions. This is obtained by means of positive displacement micro-pumps injecting the oil through a capillary tube to a final nozzle. At

the same time, the low-pressure air flowing inside another tube, coaxial to the first one, reaches the final nozzle as well.

The lubricant atomizes into the airflow that leads it to the desired area by means of a well-aimed spout, without producing polluting fumes.

9.4 RPM1

The RPM1 optional is very useful for cutting tubes with thin thickness and so easily deformable. The vice locking pressure may be reduced in cutting materials with thin thickness or increased the more the thickness is greater.

9.5 DOTM

Additional vertical vice specific for bundle cutting at 0°.

9.6 SENS

Electrical sensor controlling the rotation of the flywheel.

In case of undue effort during the cut or if the blade is not correctly tensioned, the optional SENS intervenes.

For Mercury, Saturn and Galactic:

1. the error indicator light of the PLC on the control panel lights up,
2. the head goes up and stays up until the blade rotation speed is not adjusted.
3. If the blade rotation speed is not adjusted within 5 seconds, the cycle stops.

To temporarily disable the SENS and to continue to use the machine:

1. Press [O].
   ↳ The hydraulic unit is disabled.
2. Press, within 5 seconds, for 3 consecutive times the button [O] and then [I].
   ↳ The SENS is disabled.

To enable the SENS:

1. Press, within 5 seconds, for 3 consecutive times the button [O] and then [I].
   ↳ The SENS is active again.

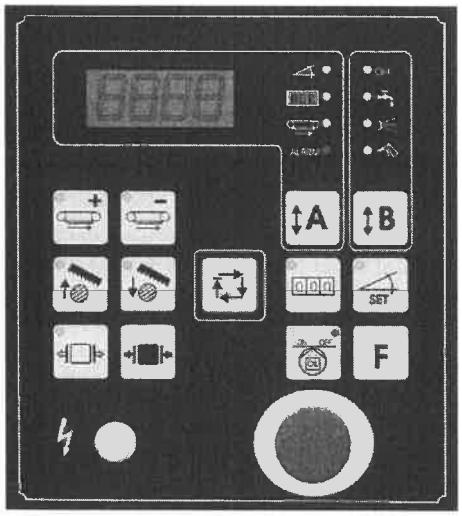
▶ To use the machine start the hydraulic unit again.

9.7 LX

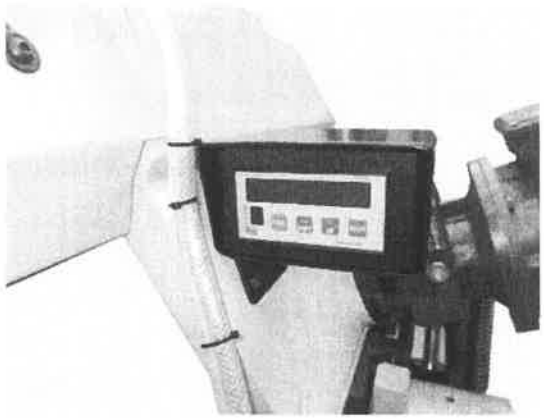
A light beam illuminates the cutting line on the workpiece.

9.8 VAT

With the VAT optional the preset cutting angle value is easily readable from the display. Centauro, Calipso, Sirius, Omega, Major (see Pic. 50). Mercury, Saturn e Galactic (see Pic. 51).



PIC. 50



PIC. 51

9.9 TM

This option allows a considerable reduction in working times: it speeds up the descent of the blade and decreases its lifting speed.

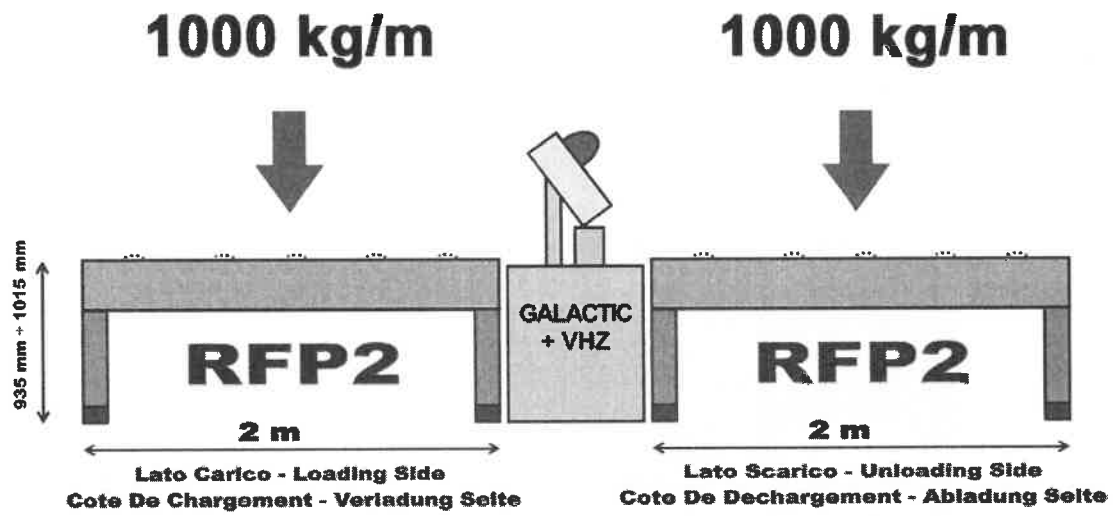
On the head there is a fast approach device allowing the rapid approach of the blade when this is near the work piece to be cut.

After cutting, the blade goes back only what is strictly necessary out of the piece and it is immediately ready for the next cut.

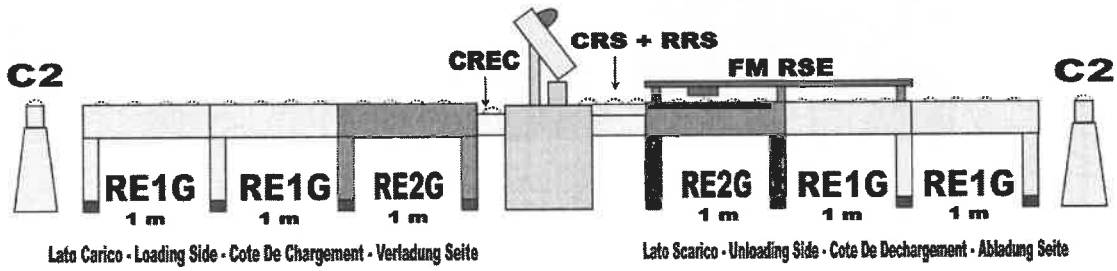
9.10 RFP2 / RE1G / RE2G / RP1G / RP2G

The roller tables are to be placed in the lateral areas of the machine and have the function to support the workpiece on the loading (input) and on the unloading (output) sides.

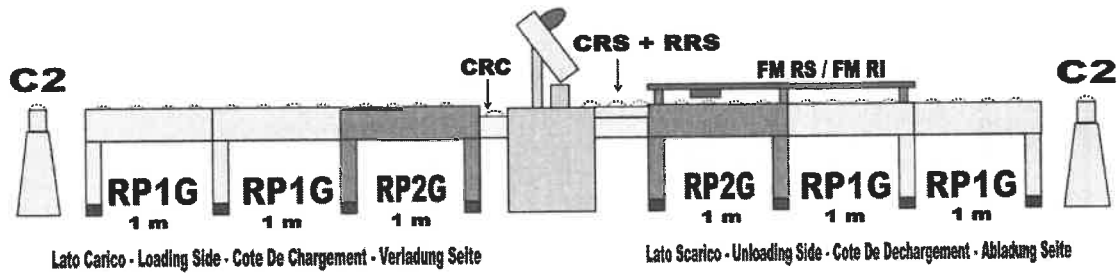
They are made of a support frame and a series of idle rollers.



PIC. 52



PIC. 53



PIC. 54

9.11 C2

It's a bar bearing support equipped with a roller. It can be used in addition to the roller table. It should be suitably ballasted or fixed to the floor.

9.12 FM-RSP / FM-RS / FM-RSE

Mechanical measure stops with articulated stroke. Used to cut pieces to a predetermined measure chosen by the operator, in a range between1 and 6 m.

These optionals are to be placed on the output (unloading side).

9.13 FM-RI

Measure stop with hydraulic stroke. Used to cut pieces to a predetermined measure chosen by the operator in a range between 1 and 6 m.

This optional is to be placed on the output (unloading side).

9.14 CRC

It's the loading side connection between machine and roller table.

9.15 CREC

It's the loading side connection between machine and roller table specific for RE1G – RE2G roller tables.

9.16 CRS / RRS

It's the unloading side connection between machine and roller table.

9.17 CRES

It's the unloading side connection between machine and roller table specific for RE1G – RE2G roller tables.

9.18 DTI

This optional allows to stop the cutting operation before the end of the working cycle in order to realize the so-called "interrupted cut".

10 Maintenance and care

10.1 Maintenance

An adequate periodical maintenance of the machine helps to ensure greater durability, the best operation and safety.

It is advisable that a skilled and authorized staff carry out maintenance operations.

For any intervention such as repairs, maintenance, equipment replacement, which are not provided in this manual, please contact the support service in advance to have all the information you may need.

Use only original FMB spare parts.

When performing maintenance on the machine it is required:

1. Put a warning notice: "**DO NOT USE: MACHINE UNDER REPAIR**".
2. Disconnect power and pneumatic supply.
3. Wait a few minutes.
4. Turn the main switch to [0] and padlock it.
5. Check there are no pressurized circuits. In this case, discharge the circuit with appropriate care. Do not wear rings, watches, chains, bracelets, clothes particularly large etc..
6. Do not wear rings, watches, necklaces, bracelets, particularly baggy clothing etc.
7. Do not use naked flames, points or pins for cleaning.
8. Do not smoke.

   ↳ You can now start maintenance.
9. After maintenance reset all guards and safety components before restarting the machine.
10. The table below contains a simple CHECK - LIST of the maintenance controls to be carried out.

TABLE 1: [Maintenance check-list]

Frequency	Type of control	Equipment to be used	Activity
DAILY	Blade check	Visual inspection	Replace if necessary (see chapter 10.1.1 "Blade replacement", page 96)
DAILY	Check level of lubricant in NB tank	Visual inspection on indicator	Add if necessary
WEEKLY	Hydraulic unit pressure check	Visual inspection of the pressure gauge on the hydraulic unit	Adjust inlet pressure when the oil is cold.
MONTHLY	Check of the head springs condition	Visual inspection	Replace if yelded
MONTHLY	Check operation of safety microswitches/ emergency pushbutton	By hand with machine switched ON, before starting use	Replace if necessary
EVERY 3 MONTHS	Check tightness of bolts	Keys	Tighten if necessary
EVERY 3 MONTHS	Check for leakages in the pneumatic and/or cooling circuit	Visual inspection	▶ Tighten if necessary ▶ Replace gaskets if necessary ▶ Replace the tubes if necessary
EVERY 3 MONTHS	Control of the linear guides self-lubricating cartridge	Visual inspection	Replace cartridge when exhausted
YEARLY OR AT THE SAME TIME YOU CHANGE THE OIL OF THE HYDRAULIC UNIT	Filter replacement in the hydraulic unit	Manually	Replace the filter inside the hydraulic unit
EVERY 500 WORKING HOURS	Visual inspection of the wear level of the blade guide slides bearings	Visual inspection	Replace bearings if necessary

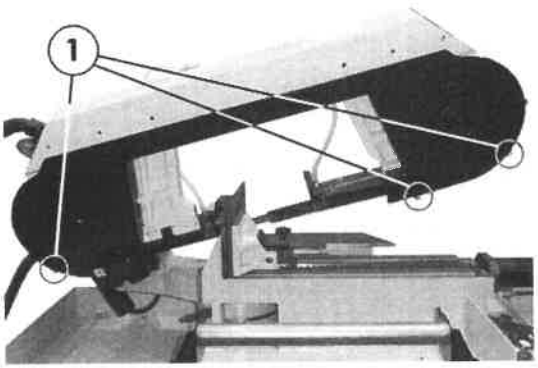
10.1.1 Blade replacement

A broken or worn blade should be replaced.

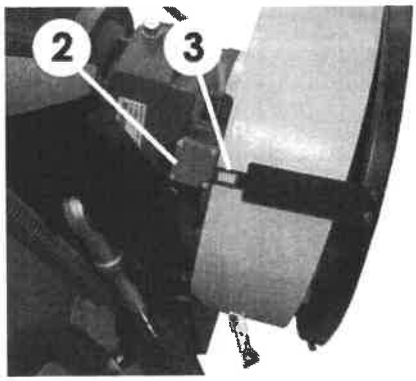
Necessary:

- Allen wrench,
- Rubber hammer,
- Tongs (if the blade is broken),

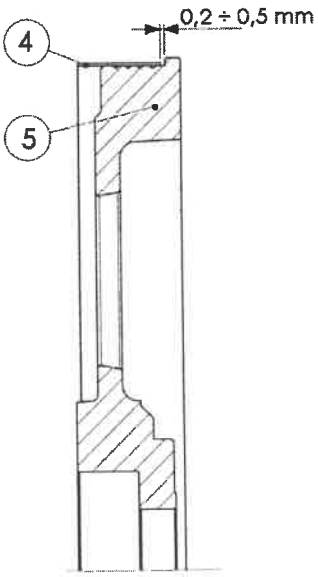
✔ Before turning off the machine, set the head up so that the head guard opening could be easier.



PIC. 55



PIC. 56



PIC. 57

TABLE 2: [pictures description].

Pos.	Description
1	Head guard locking levers
2	Head guard closing hooks
3	Bladeguide slides knob
4	Blade
5	Wheel

Procedure:

✔ If the blade is stuck in the piece: pull it up with tongs and clockwise as to its rotation.

1. Follow the directions of the Maintenance section (see chapter 10.1 "Maintenance", page 94).
2. Remove the fixed slide guard.
3. Open the closing hooks of the head guard.
4. Remove the head guard.
   ↳ The safety key of the head guard micro will come out.
5. Lower the cleaning blade brush to prevent it hinders the operations.
6. Turn the setting wheel to loosen the blade (see the proper section in this manual).
7. Take off the blade from the flywheel first and then from the motor wheel and, at the end, from the bladeguide slides.
8. Properly clean the wheels and the slides.
9. **The teeth of the blade should face the outside of the wheel. Position the back of the blade on the support edge of the wheels (see** Pic. 57**).**
10. Put the new blade between the bladeguide slides first, then on the motor wheel and, at the end, on the flywheel.
11. Tap the blade with a rubber hammer to settle it in place.
12. Tighten the adjustment hand wheel for pre-tensioning the blade.
13. Lift up the blade cleaning brush to bring it back to the right position.
14. Reassemble the head guard, put the safety key in the head guard micro housing.
15. Reassemble the guards of both the movable and the fixed slides.
16. Tighten the hand wheel to fully stretch the blade.
    ↳ When the slot of the screw is aligned to the green band, the blade is correctly tensioned.
17. Remove the protective plastic seal from the teeth of the blade.

18. Close the head guard with the hooks.
19. Turn the main switch to the position [I-ON].
20. Start a semi-automatic cutting cycle blank (**without material**), beginning with a blade speed of 16 m/minute to arrive then to a speed of 100 m/minute.

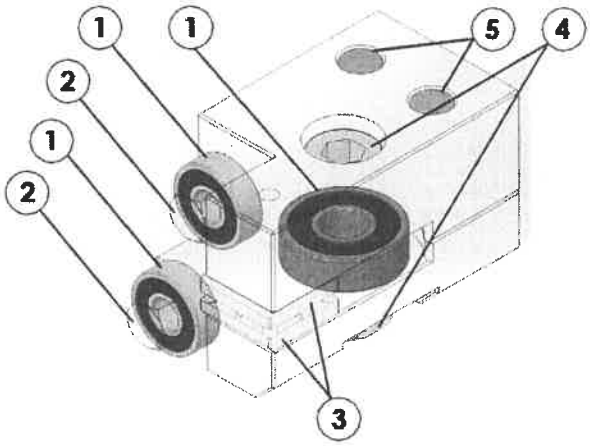
    ↳ In this way, the blade will settle on the wheels.

21. At this point, execute the running in of the blade so to ensure its long life and correct cutting performances. For the first effective cutting half hour reduce by 50% the head feeding speed, this will give way to the teeth of the blade to blunt without splintering.

    ↳ The machine is ready for use.

10.1.2 Replacement of the blade guides slides bearings and carbide plates

When the bearings and the carbide plates are worn they should be replaced.



PIC. 58

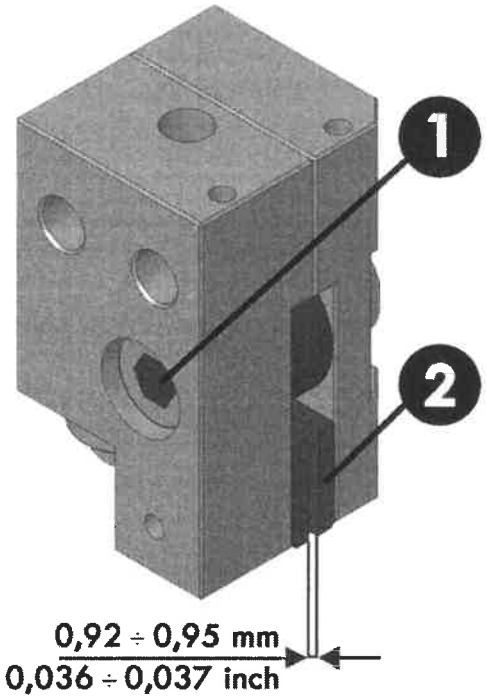
TABLE 3: [bladeguide slides components].

Pos.	Description
1	Bearings
2	Hexagonal head screws
3	Carbide plates
4	Fixing /adjusting screw
5	Screws to fix the slide to the slide-holder

1. Take off the blade following steps from 1 to 7 (see chapter 10.1.1 "Blade replacement", page 96).
2. With an Allen wrench, loosen the screws fixing the slide to the slide-holde (pos.5).
3. Remove the slides from the slide holders.
4. Loosen the slide fixing screw (pos.4).
5. Loosen the hexagonal head screws.
6. Pull out the bearings, check their condition and replace them if necessary.
7. Pull out the carbide plates, check their condition and replace them if necessary.
8. Tighten the hexagonal head screws.
9. Tighten the slide fastening screw (pos.4).
10. Tighten the screws fixing the slide to the slide-holder (pos.5).

11. Re-assemble the blade following steps from 8 to 14 (see chapter 10.1.1 "Blade replacement", page 96).

10.1.3 Adjustment of the bladeguide slides carbide plates



PIC. 59

TABLE 4: [bladeguide slide].

Pos.	Description
1	Fixing /adjusting screw
2	Carbide plates

The distance between the carbide plates must be the one indicated in the picture (see Pic. 59).

To adjust the distance between the plates tighten/loosen the slide fixing screw:

► Clockwise rotation.

↳ The carbide plates get near.

▷ Anti-clockwise rotation.

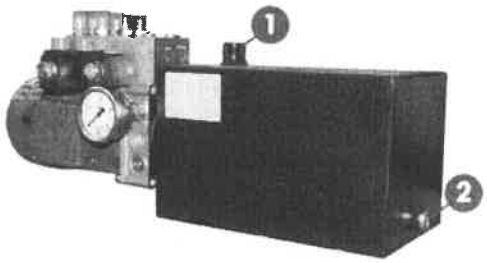
↳ The carbide plates get far.

10.1.4 Change the oil in the hydraulic unit

After the first 500/600 working hours, you must make the first change of the hydraulic oil. The succeeding changes are to be made after 2000/4000 working hours or, in any case, every 3/4 years.

✔ Do the hydraulic oil change as soon as the machine is turned off.

✔ Take a bowl to collect the used oil.



PIC. 60

TABLE 5: [hydraulic unit].

Pos.	Description
1	Plug for the oil loading
2	Plug for the oil drain

Procedure:

1. Follow the directions of the Maintenance section (see chapter 10.1 "Maintenance", page 94).
2. Place the collecting bowl under the drain plug.
3. Open the plug for draining.
4. Drain the oil.
5. Close the plug.
6. Open the plug for oil loading.
7. Pour the new oil in the hydraulic unit (see chapter 10.3.1 "Recommended lubricators/oils", page 104).
8. Close the plug.

   ↳ The operation is terminated.

10.2 Care

Routine clearing of the machine must be done daily. This allows to keep the machine in the best conditions. To clean, simply use a soft cloth dipped in alcohol and a vacuum cleaner for shavings / liquid.

The areas to be cleaned are:

- Machine protection doors and panels
- Control panel
- Inlet and outlet transport rolls
- Sliding guides (only sucktion)
- Vices
- Machine top
- Blade guide

10.2.1 Chip and coolant discharge

At the end of the working day or every 100 cuts, empty the chip tray on the bottom of the machine.

The filtering network on the tank should be thoroughly cleaned from chips/scraps.

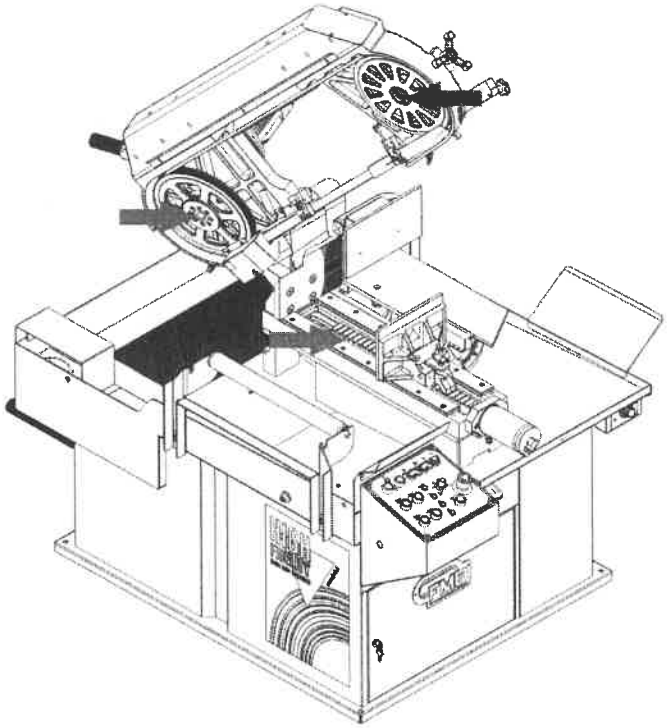
10.2.2 Use of the washing gun

✔ Close the tap on the head.

1. Turn the main switch to [I-ON],
2. Place the washing gun selector to [ON].
   ↳ The washing gun is ready to use.
3. After using, place the selector on [OFF].

10.3 Greasing/ oiling

After about 500 working hours it is necessary to lubricate the wheels and the vice sliding guides with a greaser:



PIC. 61

NOTE Be careful not to use too much lubrication.

An excess can cause mechanical deformation and damage of the seals.

10.3.1 Recommended lubricators/oils

TABLE 6: [Recommended lubricators].

Type of lubricant	Brand	ISO Code	Place of use
SLIDE 68	DOMUS	ISO VG 220	Feed screws Linear guides
AT COMPLEX CCS 2	CAD-OIL	ISO VG 460	Head pin bearings
NEBULA OIL	FMB	-	NB minimal lubricating-cooling unit
TIVELA OIL S 320	SHELL	ISO VG 320	Reduction gear
FLUIDO 46	DOMUS	-	Hydraulic unit
GRASSO C EP2	-	-	Wheels bearings Vices

The suppliers of lubricant products have comparative tables with other marks.

Do not use non corresponding products; the machine could be seriously damaged.

Choose high viscosity for hot areas and vice versa.

11 Troubleshooting

In this section, there are useful suggestions to eliminate some problems/product malfunctions.

If the problem continues, contact the technical assistance service.

12 Generic malfunctions (all models)

The blade is uncorrectly stretched

Wrong blade dimensions.

- ▶ Check that the blade development complies with the technical features (see chapter 3.2 "Technical features", page 34).

The blade drops from the wheel

Wrong blade dimensions.

- ▶ Check that the blade development complies with the technical features (see chapter 3.2 "Technical features", page 34).

Blade incorrectly tensioned.

- ▶ Check the blade tension (see the relevant section in this manual).

Wheels bearings deteriorated.

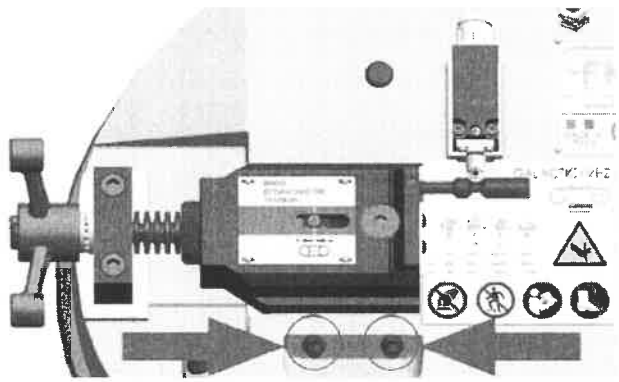
- ▶ Replace the wheels bearings (see "Parti di ricambio / Spare parts").

Deteriorated wheels.

- ▶ Replace the wheels (see "Parti di ricambio / Spare parts").

Tensioner adjustment grains loosen

- ▶ Tighten the grains (see Pic. 62).



PIC. 62

Crooked cutting

Blade consumed

- Replace the blade.

Carbide plates/bearings of the blade-guide slides worn.

- Replace the carbide plates/bearings.

Blade uncorrectly stretched.

- Check blade tension (see the relevant section in this manual).

Wrong cutting parameters.

- *Teeth of the blade not suitable to the type of material to be cut (see chapter 6.1 "Blade choice", page 74).*
- Check that the blade rotation speed is correct according to the type of material to be cut.
- Adjust the head descent speed in relation to the type of material to be cut.

Roller tables/supporting frames not well aligned as to the machine.

- Align roller tables/frames to the machine plane.

Blade breakage at the welding

Blade welding defective.

Blade breakage

Natural wear if it occurs after several hours of work.

Wrong running in.

- Replace the blade and perform the first cuts without subjecting the blade to considerable strain/high rotation, to ensure balancing of the various mechanical components.

Use of an insufficient amount of lubricant or wrong ratio in the mixture fluid/water.

- Adjust the quantity and the mixture of the lubricant according to the type of material to be cut.

Blade teeth unsuitable to the material to be cut.

- See chapter (see chapter 6.1 "Blade choice", page 74).

The blade is not perpendicular to the cut.

- See chapter (see chapter 10.1.1 "Blade replacement", page 96).

Wrong cutting speed/pressure.

- See chapter (see chapter 3.2 "Technical features", page 34).
- (see chapter 10.1.3 "Adjustment of the bladeguide slides carbide plates", page 100)

The bearings/carbide plates of the blade-guide slides are consumed.

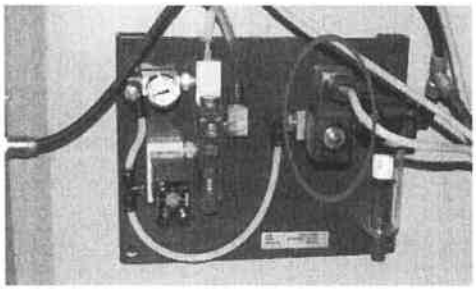
- Replace them (see chapter 10.1.2 "Replacement of the blade guides slides bearings and carbide plates", page 99).

Head does not go up/go down

- The main switch must be in [I=ON] position.

Lubrication does not work

- The level of the lubricant in the NB tank must be over the notch "Min".
- The cycle start light button must be on.
- Check that the compressed air supply tube is connected to the nebulizer circuit.
- Check that the inlet pressure is as shown (see chapter 3.2 "Technical features", page 34).
- Check that the nebulizer solenoid valve is energized (see Pic. 63).



PIC. 63

Difficult head rotation

Dirt /rust on the sliding surfaces of the machine.

- Use a cooling proportioned mixture as previously indicated (see chapter 3.8 "Cooling system", page 53).

13 Malfunctions related to models: Galactic-Mercury-Saturn

Lubrication does not work

▶ NB selector must be in [ON] position.

The blade breakage light on the control panel switches on

Blade broken.

▶ Replace the blade.

Incorrect position of the blade breakage limit switch.

▶ With the blade correctly tensioned, check that the small wheel of the blade breakage limit switch is in place (see Pic. 64).

PIC. 64

Limit switch broken

▶ With a tester check that the contact of the limit switch works.
↳ If it does not work, replace it.

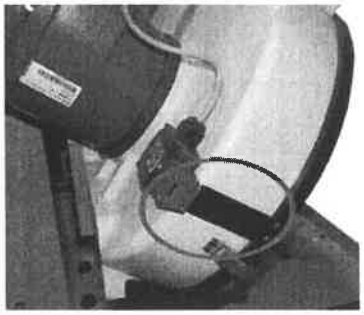
The light of the head guard open switches on

The key of the safety limit switch is not correctly inserted (see Pic. 65, (see Pic. 66) (see Pic. 66)).

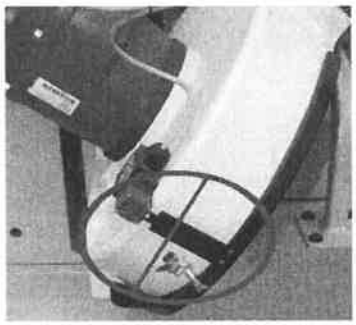
► Correctly insert the key of the safety limit switches.

Limit switch broken

► With a tester, check the functionality of the contacts of the limit switches.
  ↳ If they do not work, replace them.



PIC. 65

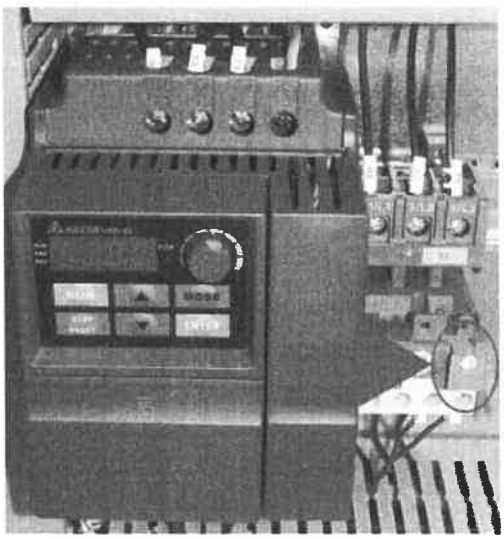


PIC. 66

The light indicating the action of the hydraulic unit or the blade motor thermal switches on

Hydraulic unit "T3" thermal action

► If it happens occasionally, press reset button (see Pic. 67).



PIC. 67

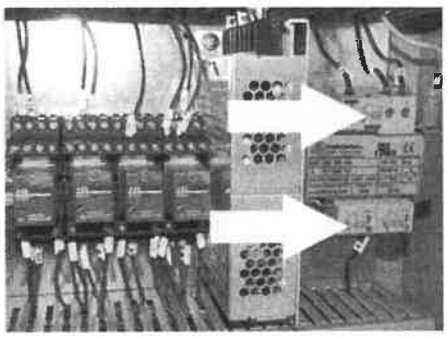
► If it happens often, this means that one or more motors are overloaded.
► Hydraulic pump is damaged and must be replaced.

Blade motor inverter action

- Swith off the machine using the main switch [0=OFF],
- Wait a minute and then switch on the machine again [I=ON] (see chapter 3.5 "Electric system", page 42).

Head does not go up/go down

- The main switch must be in [I=ON] position.
- If the voltage presence indicator is off, check the transformer fuses (see Pic. 68).



PIC. 68

- If the voltage presence indicator is on, press the button [I] to activate the hydraulic unit.
  - Check if the pressure gauge of the hydraulic unit shows the correct pressure (see chapter 3.2 "Technical features", page 34).
  - ▷ If it does not show the correct pressure:
  - ▷ The hydraulic unit motor turns in the opposite.
  - Invert the phases of the power plug of the machine.
  - ▷ The motor or the hydraulic pump are broken.

13.1 PLC error signaling light switches on

The lights on or blinkling do not prevent the machine to function.

To clear the alarms:

1. Turn the main switch to [OFF].
2. After, turn the main switch to [ON].

   ↳ The alarm is cleared, the light stops blinking.

The following table explains the meaning of the light and the relevant solutions (see *TABLE 1*).

TABLE 1: [Meaning of the light].

Light status	Meaning
Light on	**The blade is stuck into the piece (with optional SENS)** 1. The head lifts up and stays up until the blade rotation speed is not adjusted. 2. If within 5 seconds the blade rotation speed is not settled, the cycle stops.
1 intermittent flash	**Consent missing in the terminals "I.5"** ▶ The cause is external to the machine (for example measure striker in the wrong position).
2 intermittent flashes	**Blade height sensor broken** ▶ Replace the sensor ▶ **Connection with the blade height sensor interrupted** ▶ Check the conditions of the connecting wires to the sensor
4 intermittent flashes	**Blade height sensor not calibrated** ▶ Calibrate the sensor

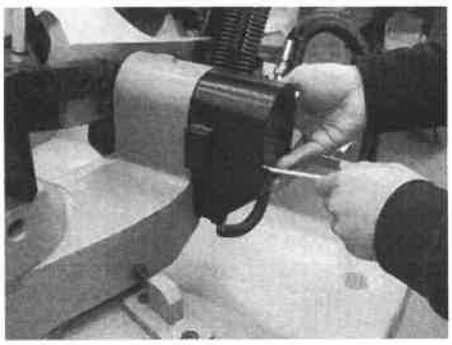
13.2 Head height sensor calibration

The machines are supplied with the head up/head down positions already set.

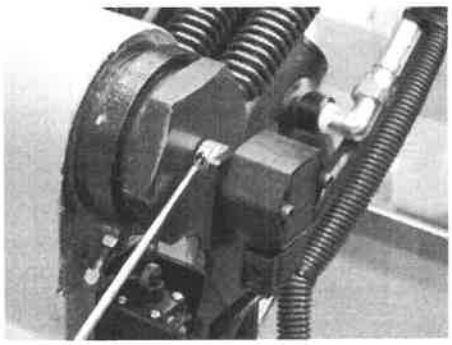
Subsequent calibrations should be done only when absolutely necessary.

Head down position (cutting end)

1. Push the button [O].
   ↳ The hydraulic unit is switched off.
2. Press for 8 seconds at the same time the button  and  .
3. Push the button [I].
   ↳ The hydraulic unit is switched on.
4. With the button  , lower the head to the "cutting end" position.



PIC. 69



PIC. 70

5. Remove the protection guard of the head pin (see Pic. 69).
6. Unscrew the grub screw of the flexible coupling (see Pic. 70).
7. Turn the coupling clockwise or anticlockwise until the PLC light steady switches on.
8. Push downwards the position setting switch  .
   ↳ The head down position is set.

Head up position

1. Pushing the button  make the head go up to the cutting maximum capacity.
   ↳ as the head lifts up, the PLC light flashes frequency increases.
   – If the light flashes immediately quickly this means that the sensor must be rotated of 180°:
   ▷ Bring back the head down.
   ▷ Turn the sensor of 180°.
   ▷ Push downwards the switch of position setting.
   ↳ The head down position is newly set.
2. When the head up position is reached, push upwards the switch of position setting  .
   ↳ The head up position is set.
3. Screw the fixing grub screw (see Pic. 70).
4. Reassemble the guard (see Pic. 69).

► To exit the calibration mode, push the button [O].
   ↳ The hydraulic unit switches off.

14 Malfunctions related to models: Centauro-Calipso-Sirius-Omega-Major

Head does not go up/go down

▶ The main switch must be in [I=ON] position.

Lubrication does not work

▶ A refrigeration option must be chosen.
  – The related led must be turned on.

14.1 Alarms/Messages on the control panel

In case of anomalies the display of the control panel shows blinking messages.

14.1.1 Alarms

In case of malfunction, the light of the button [ALARM] turn on.

Keeping the button [F] pushed for 3 seconds the alarm can be erased.

If the condition causing the alarm is not solved, after 5 seconds the led starts blinking.

If more than one alarm is contemporarily activated, just the alarm shown on the display can be erased.

Alarms and relevant solutions are listed and described in the table below (see *TABLE 16*).

TABLE 1: [Alarms].

Display Alarm	Description	Solution
A01	Emergency button pushed	▶ Release the emergency button
	Blade guard open	▶ Check if the blade guard is closed ▶ Check if the blade guard micro is broken
A02	Blade guard open	▶ Check if the blade guard is closed ▶ Check if the blade guard micro is broken
A03	Broken blade limit switch intervention	▶ The limit switch small wheel must be inside the stretcher small shaft slot.

Display Alarm	Description	Solution
A04	Blade motor thermal intervention	**2 speed band saw:** ▶ Wait some minutes that the thermal automatically restores. ▶ If the problem continues, call the assistance. **Band saw + VHZ:** 1. switch off the electric box for 1 minute. 2. switch it on again. ▶ If the problem continues, call the assistance.
A05	Oil pump thermal intervention	▶ Wait some minutes that the thermal automatically restores.
A07	The SENS indicates the blade has stopped	▶ Check the SENS proximity is not damaged or dirty.

14.1.2 Messages

In the table below, the alarms and their relevant solutions (see *TABLE 2*).

TABLE 2: [Messages].

Display messages	Description	Solution
H01	Attempt to start a semiautomatic cycle without the cycle habilitation	▶ Call the assistance.
H03	Attempt to start a semiautomatic cycle with the selector in manual position	▶ Check the selector is in semiautomatic cycle. ▶ If the problem continues, call the assistance.
H04	Blade height proximity not calibrated	▶ Execute the head up and down calibration (see procedure in the instructions manual).
H05	Attempt of cycle starting with the hydraulic unit off	▶ Push the button [ON] on the control panel.
H07	Attempt of cycle starting with the blade too low	1. Lift the head up, 2. Push the button of the cutting cycle.

Display messages	Description	Solution
H08	During the cycle the head remained down for too long	1. Check there is no mechanical impediment. 2. Check the head down limit switch is pressed. 3. Check wires B17 and B1 (see ELECTRIC SCHEMES).
H11	Blade height beyond limit	▶ Execute the head up and down calibration (see relevant procedure).
H12	No signal that the head is up from the relevant sensor	▶ Check there is no mechanical impediment.
H13	Wrong calibration of the cut angle visualization (VAT) encoder	▶ Call assistance.
H17	Demand of zero setting execution from the the cutting angle visualisation (VAT) encoder	During machine start: 1. put the head on 0 degrees. 2. press key [SET] for three seconds.
H18	Washing cycle on	All other functions of the machine are inhibited
H19	Head maximum height not calibrated	▶ Execute the head up and down calibration (see relevant procedure).

14.2 Head up and down position calibration procedure

1. Put the handle of the balanced valve on 7.
2. To enter calibration area press at the same time the keys [↕A] and [SET].
   ↳ The light of the key [F] will start blinking
3. Rapidly press the following keys one after the other:

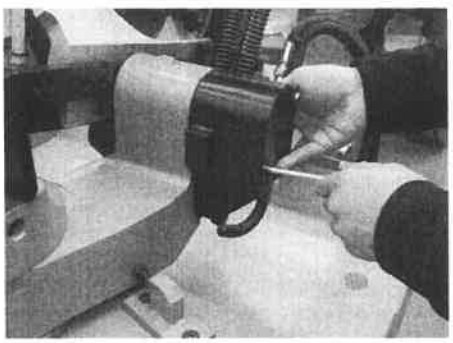
   [SET] [F] [ON OFF] [000]

   ↳ On the display the note "**t01**" will appear. This means that you entered in the head up/down calibration area.
4. Press the key [↕B]
   ↳ On the display the note "**L**" will appear: the position head down (cutting end) is calibrating.
5. Press the key [F] to display the proximity programmed value.

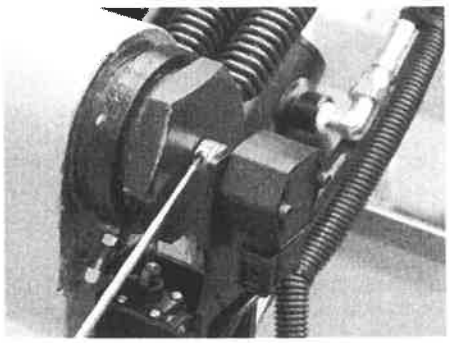
WARNING The value of the proximity is to be approx. 2000.

As the head goes up this value should increase.

– **If the value is <u>not</u> 2000, set the grub screw of the flexible coupling following the procedure below:**



PIC. 71



PIC. 72

6. Remove the protection guard of the head pin (see Pic. 71).
7. Unscrew the grub screw of the flexible coupling (see Pic. 72).

8. Turn the coupling clockwise to increase the value.
9. Turn the coupling anticlockwise to decrease the value.
10. Screw the fixing grub screw (see Pic. 72).
11. Reassemble the guard (see Pic. 71).
12. Place the head using the keys  and 
13. To memorize the reached position press the key 
14. On the display the letter "**H**" will appear: this means the position head up is calibrating.
15. Press the key  to display the proximity programmed value.

WARNING Read the maximum cutting value on the plate "cutting capacity".

16. Place the head on its maximum capacity using the keys  and 
17. To memorize the position press key 
    - On the display the note "**t01**" will appear. This means that you entered in the head up/down calibration area.
18. To exit the calibration area keep the key  pressed until the note "**t01**" is cancelled from the display.

14.3 Customer care technical service

FMB provides a telephone technical support service free of charge: a highly qualified technician is at your disposal for any clarification so to minimize the machine downtime and consequent costs.

Note bene: in order to prevent injury to persons and /or machine, Customer is responsible to make sure that those who contact our Technical Support are qualified technicians.

The machine can be also be connected to internet to get the support of FMB technicians remotely (remote assistance).

Finally FMB has a team of highly skilled and qualified technicians for the repair of the machine. There is a daily cost for the visit, to which it is necessary to add the travel costs and the living expenses during this period (ask us for the rates for this service).

The details shown on the machine nameplate must be provided.

PIC. 73

14.4 Spare parts supply service

An **FMB** machine will operate satisfactorily for many years if a regular control program is implemented.

We hold the necessary spare parts. The "Spare Parts" catalogue contains exploded views of the machine indicating the codes of the various machine components.

If necessary, send the fully completed order form (see chapter "Order form", page 121), to **FMB** s.r.l.

PIC. 74

Order form

Company	Mr/Ms
Address	
Phone _____ Fax	_____ E-mail _____

Machine model	Serial number

Table No.	Spare part No.	Spare part code	Description	Q.ty

Stamp here your company details in full (name, address, VAT no, phone, fax, etc).

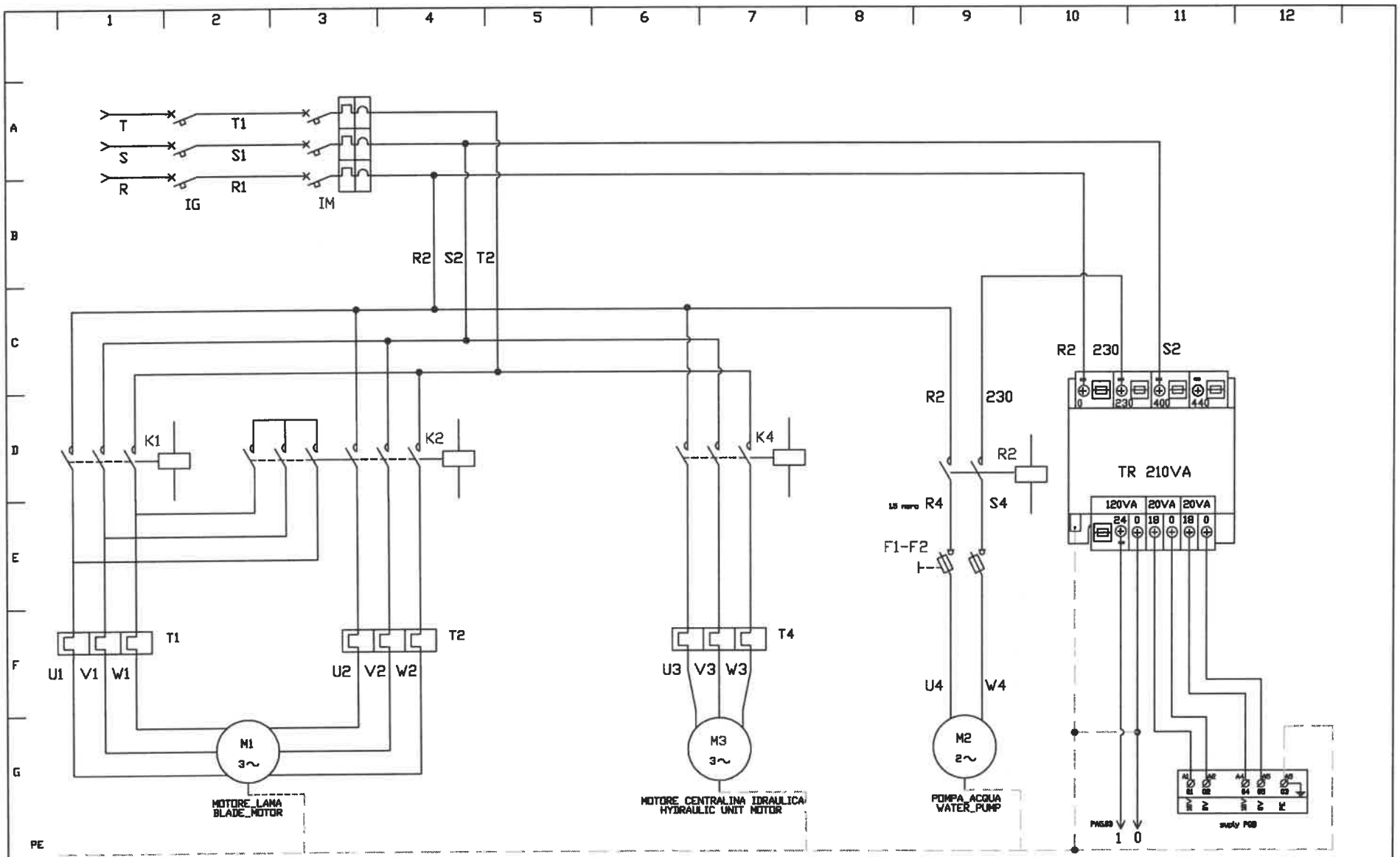
15 Annexes

See "**Allegato Tecnico – Technical annex**" and "**Pezzi di ricambio – Spare parts**" in annex.

Ed.No **03**– Rev. **00**

ALLEGATO TECNICO
TECHNICAL ANNEX

SEMIAUTOMATICHE H27 – H27 SEMIAUTOMATIC



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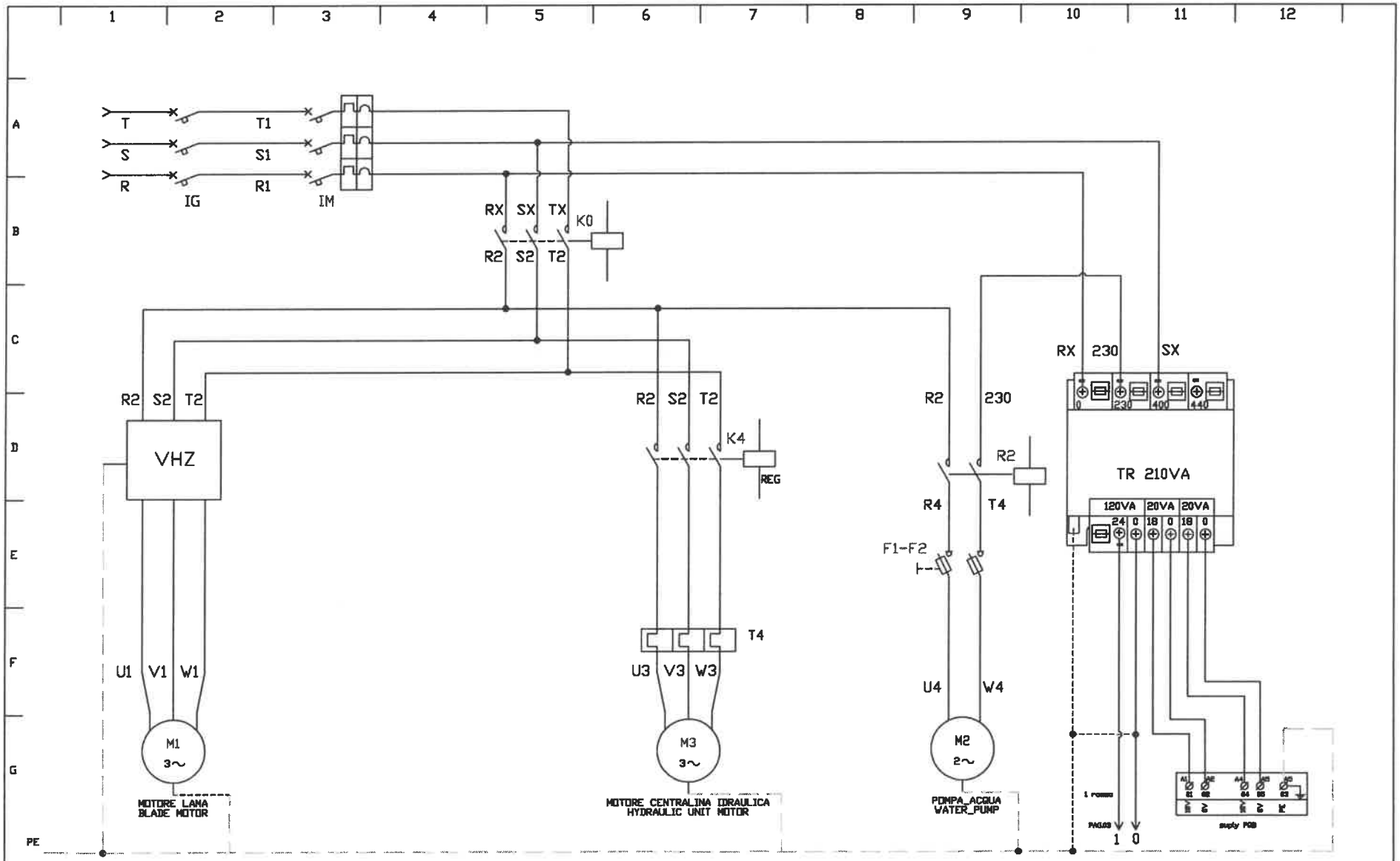
FMB Srl Via Lodi, 7 Dalmine 24044 (Bergamo) ITALY Tel (+39)035370555 Fax (+39)035370668 info@fmb.it www.fmb.it					PG./SH. 01 SUCC. 02



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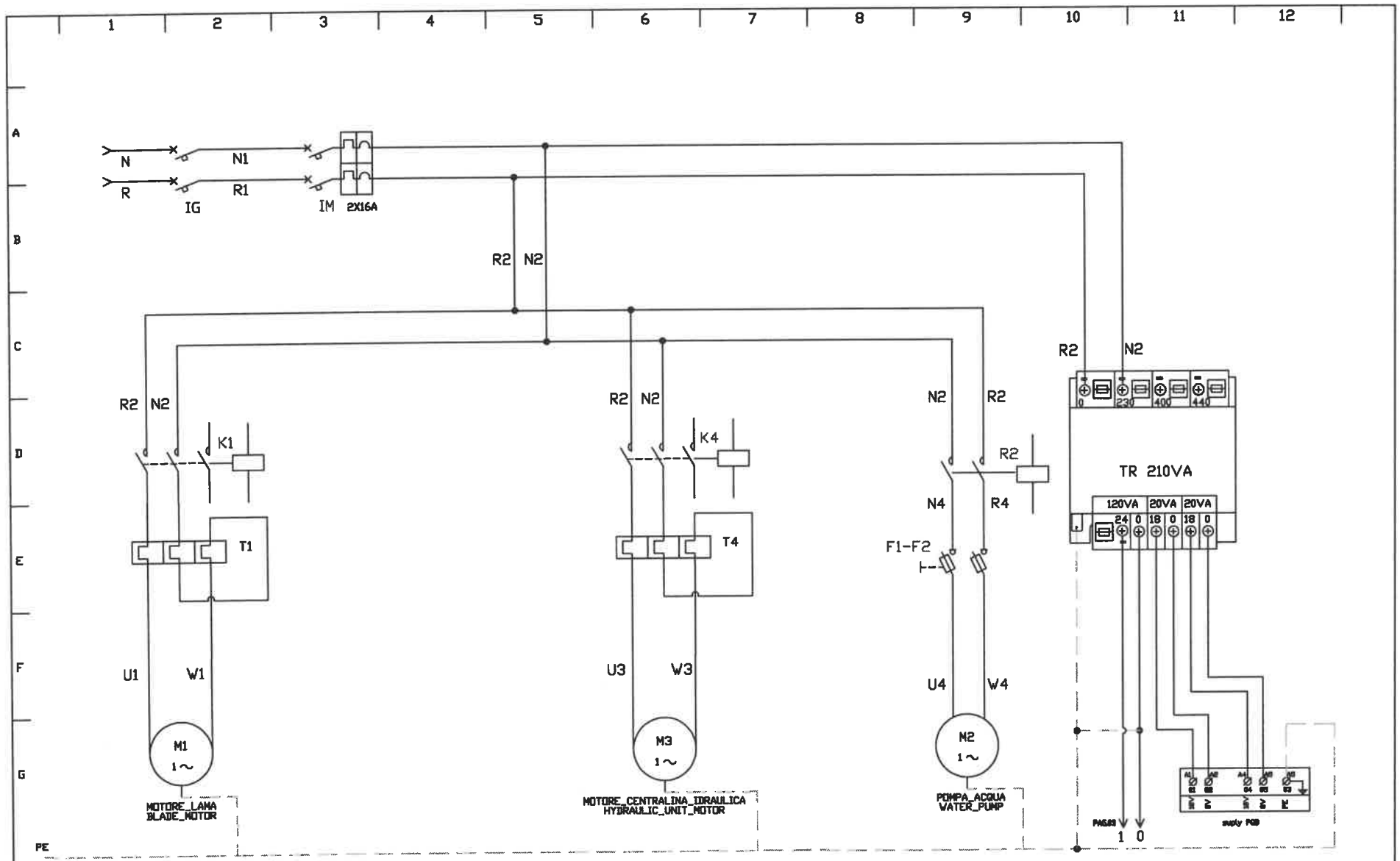
FMB Srl Via Lodi, 7 Dalmine 24044 (Bergamo) ITALY Tel (+39)035370555 Fax (+39)035370668 info@fmb.it www.fmb.it					PG./SH. 02 SUCC. 03



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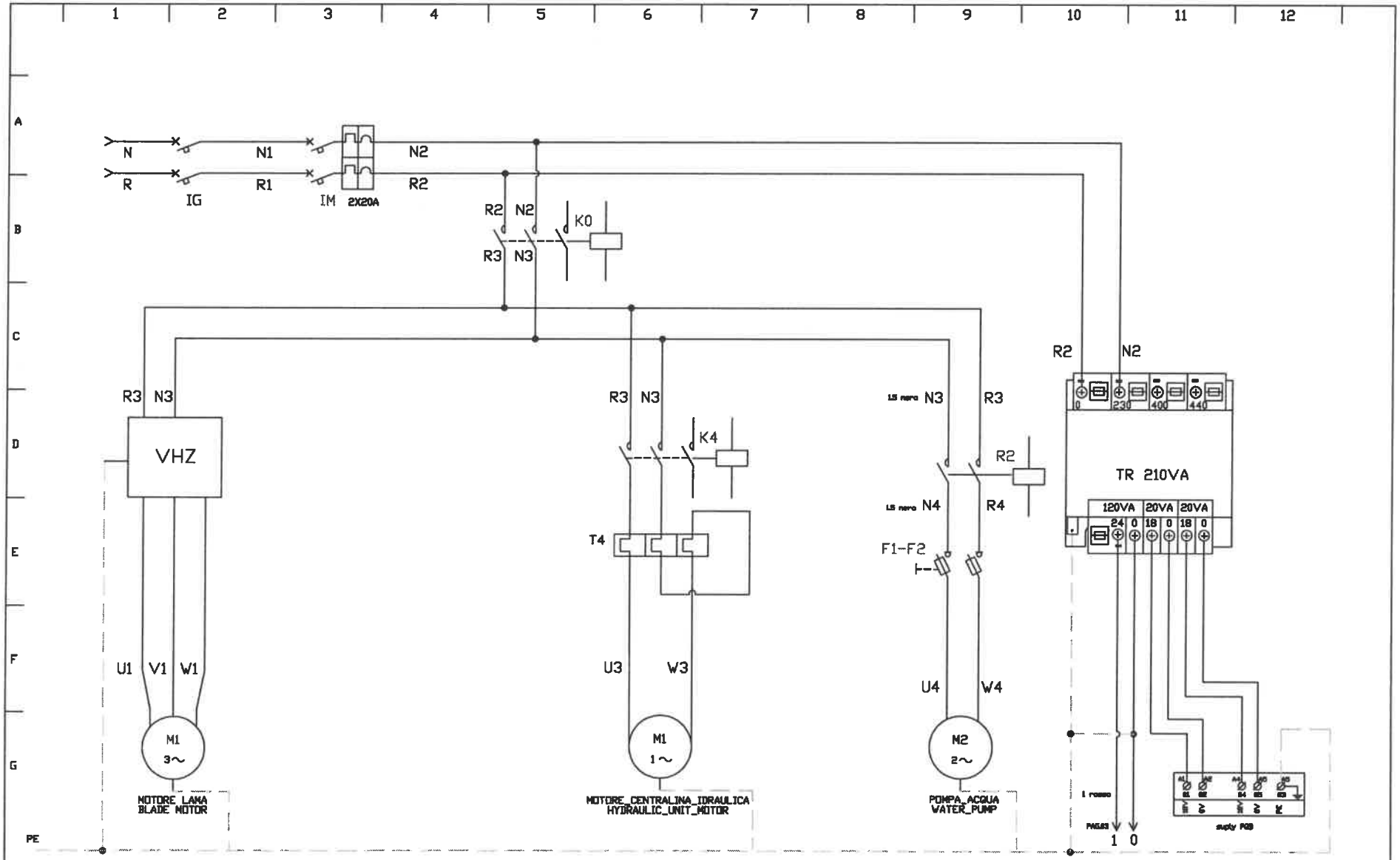
FMB Srl Via Lodi, 7 Dalmine 24044 (Bergamo) ITALY Tel (+39)035370555 Fax (+39)035370668 info@fmb.it www.fmb.it				PG./SH. 03 SUCC. 04



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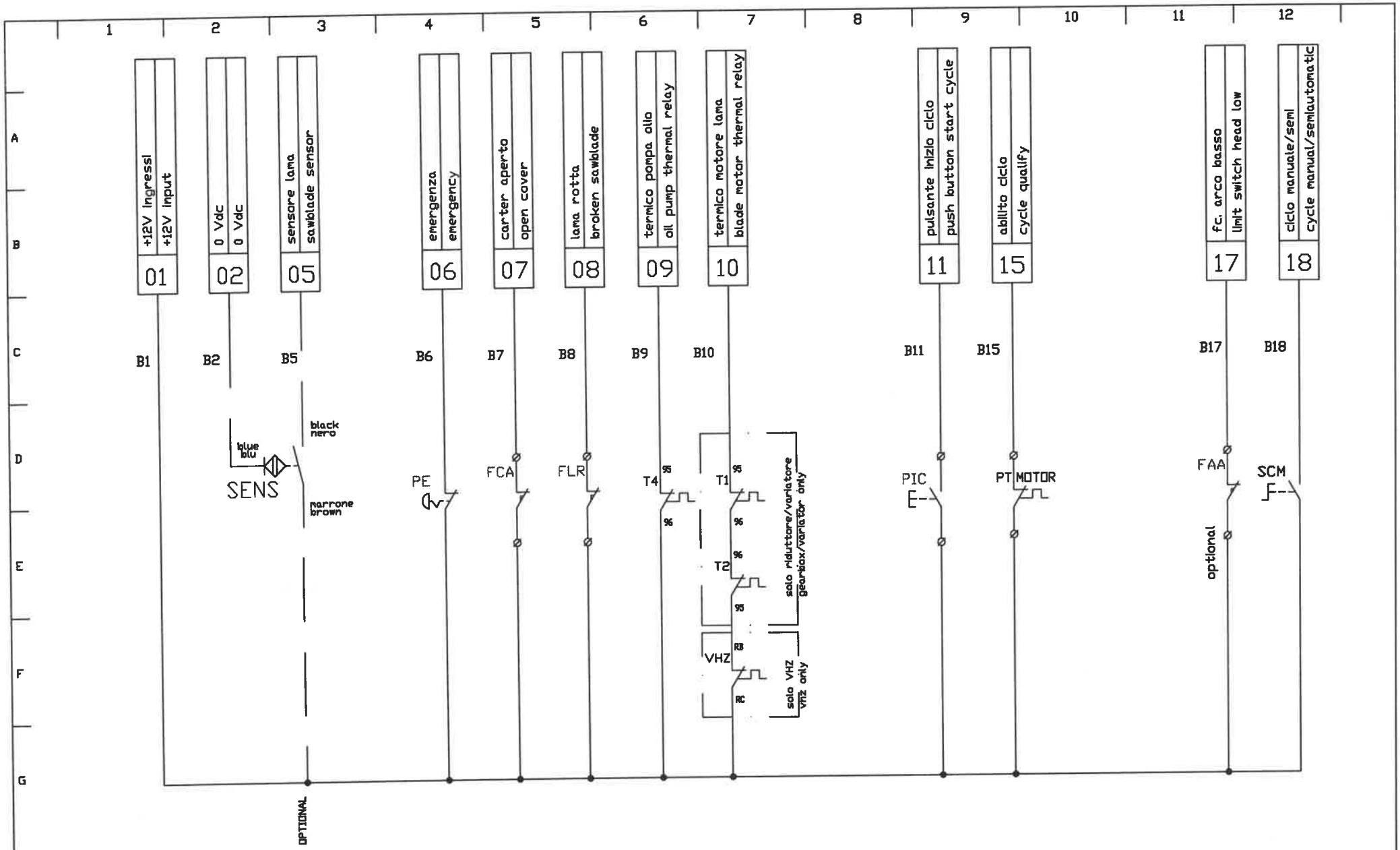
FMB Srl Via Lodi, 7 Dalmine 24044 (Bergamo) ITALY Tel (+39)035370555 Fax (+39)035370668 info@fmb.it www.fmb.it				PG./SH. 04	SUCC. 05



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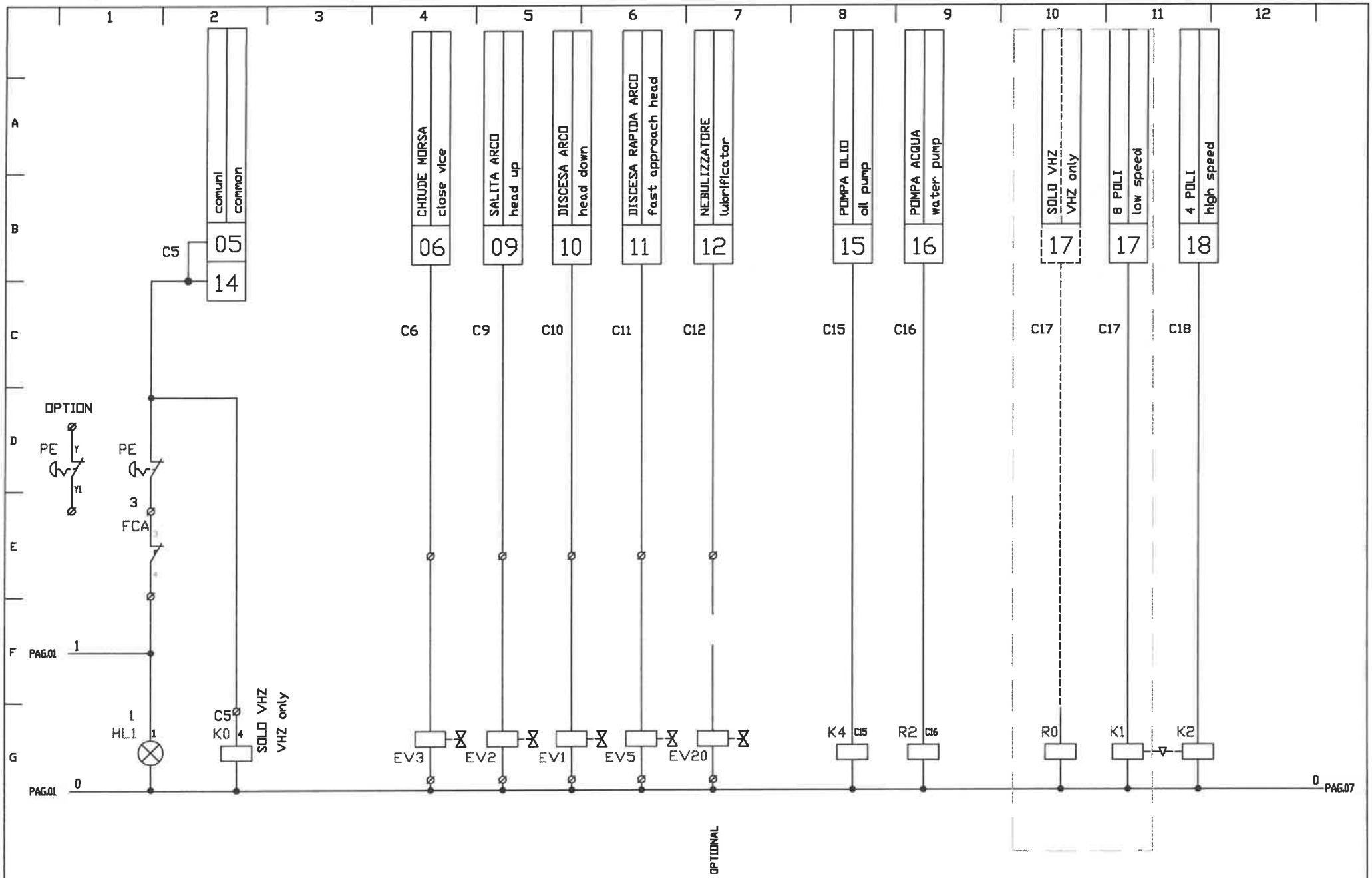

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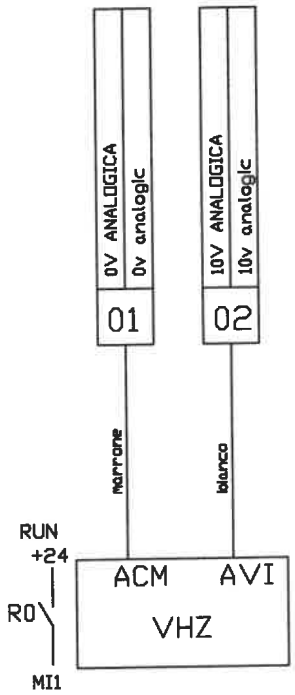
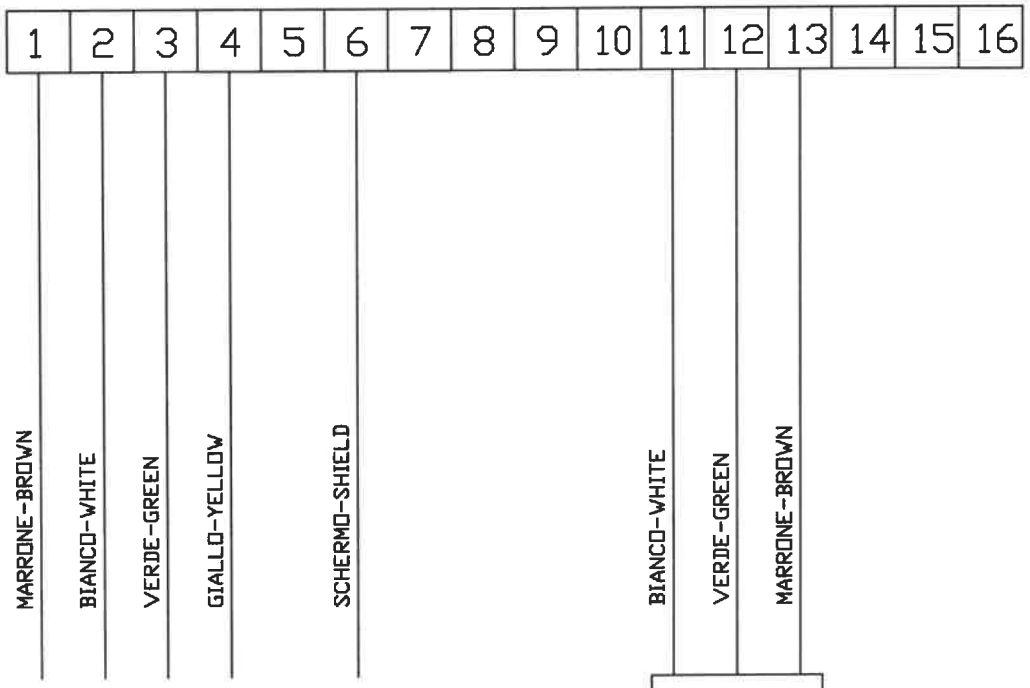
FMB Srl Via Lodi, 7 Dalmine 24044 (Bergamo) ITALY Tel (+39)035370555 Fax (+39)035370668 info@fmb.it www.fmb.it					PG./SH. 06 SUCC. 07



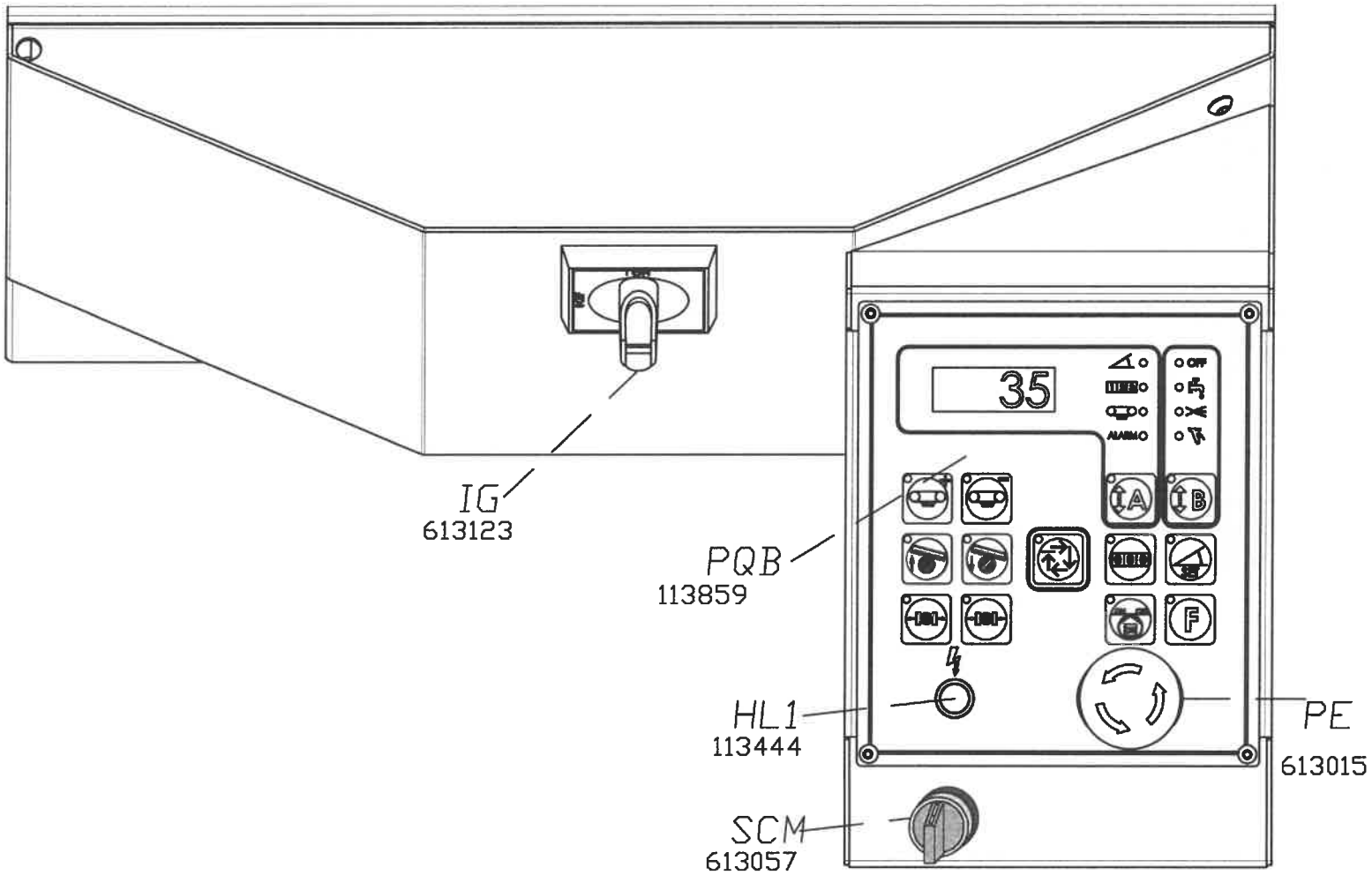
PQB 03



ENCODER ANGOLO DI TAGLIO
ANGLE OF CUT ENCODER
V.A.T. optional

SENSORE ALTEZZA LAMA
BLADE HEIGHT SENSOR

data 25-09-2017	file 711116/17/92-R03	I.C.C. 10kA	macchina CENTAURO - CALIPSO - SIRIUS - OMEGA	parte ROLLERCUT CN	
FMB Srl Via Lodi, 7 Dalmine 24044 (Bergamo) I. . Tel (+39)035370555 Fax (+39)035370668 info@fmb.it www.f.				PG./SH. 07	.C. 08



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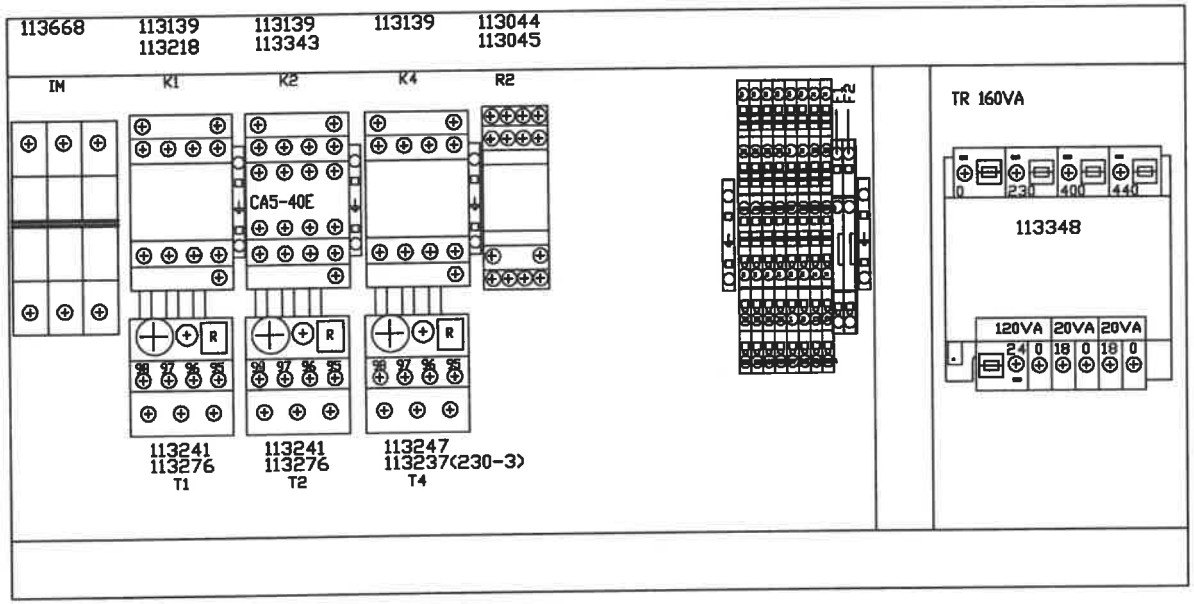
FMB Srl Via Lodi, 7 Dalmine 24044 (Bergamo) ITALY Tel (+39)035370555 Fax (+39)035370668 info@fmb.it www.fmb.it				PG./SH. 08	SUCC. 09



1 B	1	CHIUDE MORSA VICE CLOSE	0						
2 B	1	SALITA ARCO HEAD UP	0						
3 B	1	DISCESA ARCO HEAD DOWN	0						
4 B	1	DISCESA RAPIDA ARCO FAST APPROACH HEAD	0						
5 B	1	NEBULIZZATORE NEBULIZER	0						
6 B			0						
7 B									
8 B									

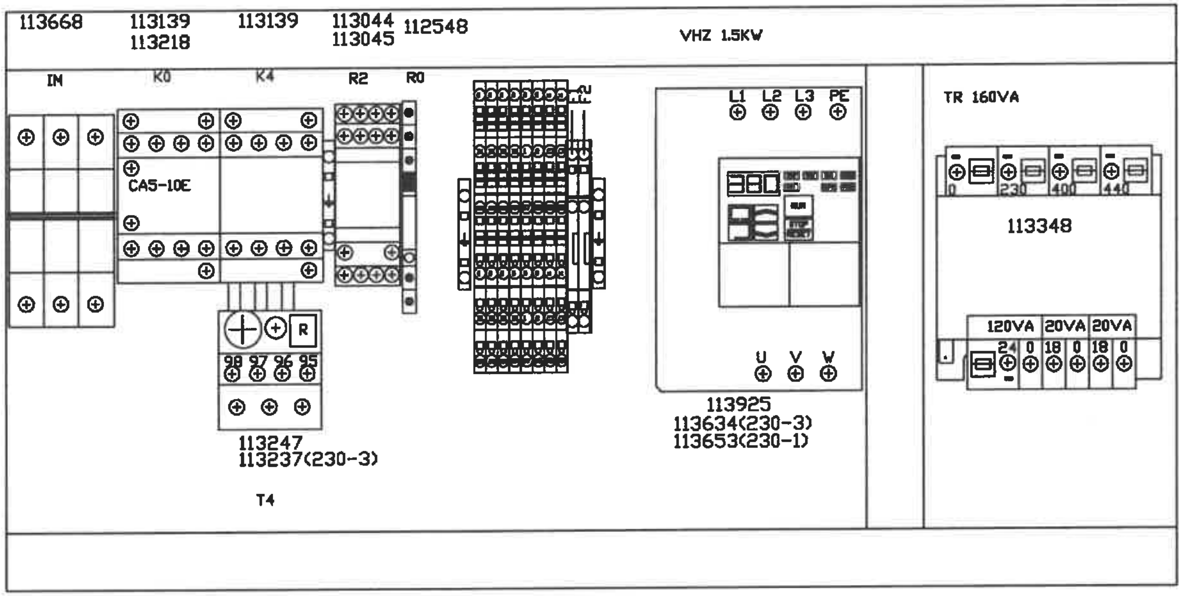
1 M	1	CARTER GUARD	B1						
2 M	2	FC. LAMA ROTTA L.S. BLADE BROKEN	B1						
3 M		PULSANTE INIZIO CICLO BUTTON START CYCLE	B1						
4 M			B1						
5 M	3	CARTER GUARD	3						
6 M	4		4						
7 M	2	CHIUDE MORSA VICE CLOSE	C6						
8 M	2	SALITA ARCO HEAD UP	C9						

1 A	2	DISCESA ARCO HEAD DOWN	C10						
2 A	2	DISCESA RAPIDA ARCO FAST APPROACH HEAD	C11						
3 A	2	NEBULIZZATORE NEBULIZER	C12						
4 A									
5 A	2	CARTER GUARD	B7						
6 A	2	FC. LAMA ROTTA L.S. BLADE BROKEN	B8						
7 A	2	PULSANTE INIZIO CICLO BUTTON START CYCLE	B11						
8 A		ABILITO CICLO CYCLE QUALIFY	B15						

data 25-09-2017	file 711117-R03	I.C.C. 10kA	macchina CENTAURO - CALIPSO - SIRIUS - OMEGA	parte TOPOGRAFICO RIDUTTORE

FMB Srl Via Lodi, 7 Dalmine 24044 (Bergamo) ITALY Tel (+39)035370555 Fax (+39)035370668 info@fmb.it www.fmb.it

DELTA
VFD-EL
01.00 83
01.09 1
01.10 0.5
02.00 1
02.01 2
03.00 8
07.00 I-MOTOR



1	B		1	CHIUDE MORSA VICE CLOSE	0
2	B		1	SALITA ARCO HEAD UP	0
3	B		1	DISCESA ARCO HEAD DOWN	0
4	B		1	DISCESA RAPIDA ARCO FAST APPROACH HEAD	0
5	B		1	NEBULIZZATORE NEBULIZER	0
6	B				0
7	B				
8	B				

1	M		1	CARTER GUARD	B1
2	M		2	FC. LAMA ROTTA L.S. BLADE BROKEN	B1
3	M		1	PULSANTE INIZIO CICLO BUTTON START CYCLE	B1
4	M				B1
5	M		3	CARTER GUARD	3
6	M		4		4
7	M		2	CHIUDE MORSA VICE CLOSE	C6
8	M		2	SALITA ARCO HEAD UP	C9

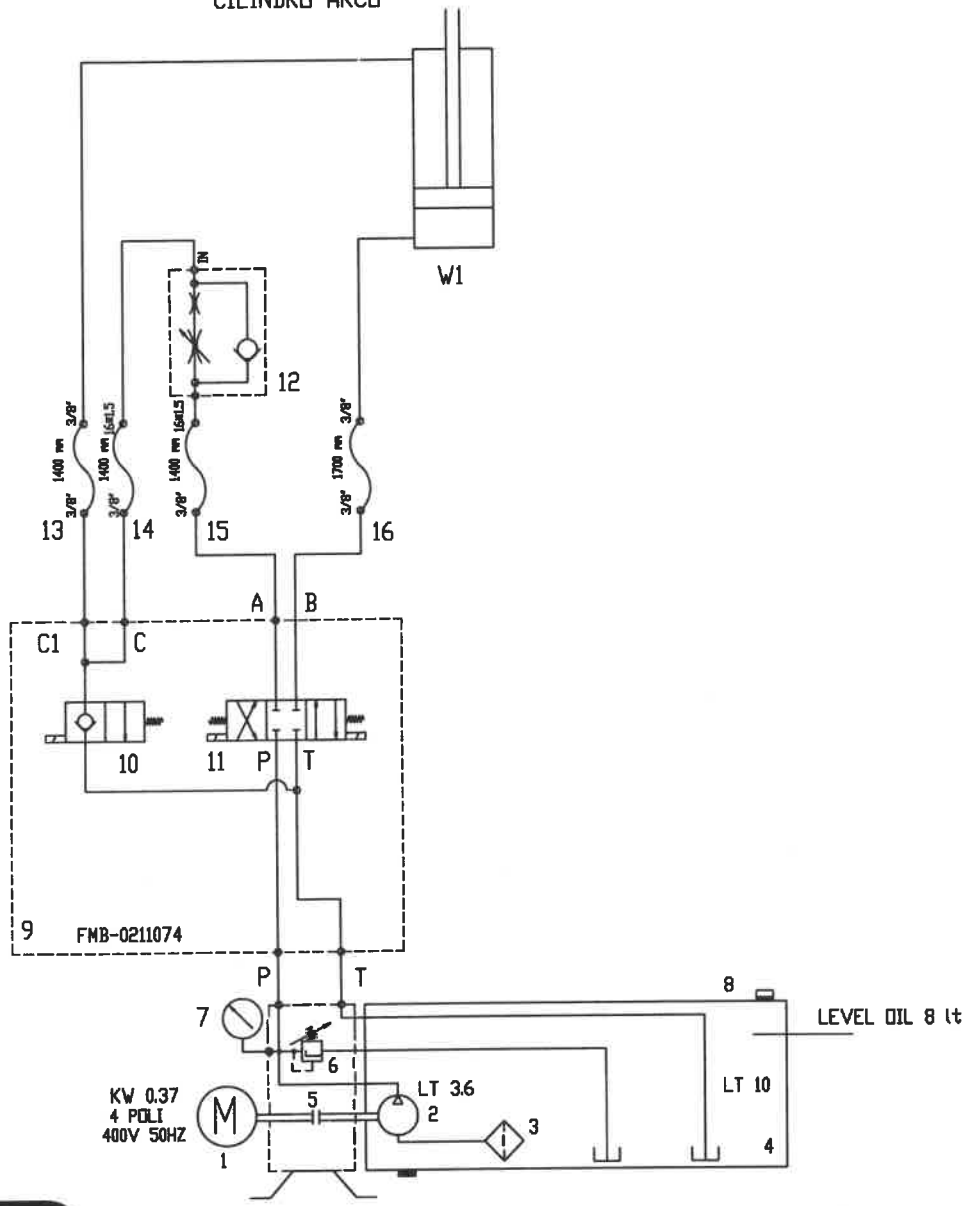
1	A		2	DISCESA ARCO HEAD DOWN	C10
2	A		2	DISCESA RAPIDA ARCO FAST APPROACH HEAD	C11
3	A		2	NEBULIZZATORE NEBULIZER	C12
4	A				
5	A		2	CARTER GUARD	B7
6	A		2	FC. LAMA ROTTA L.S. BLADE BROKEN	B8
7	A		2	PULSANTE INIZIO CICLO BUTTON START CYCLE	B11
8	A		2	ABILITO CICLO CYCLE QUALIFY	B15

data	file	I.C.C.	macchina	parte
25-09-2017	711116-R03	10kA	CENTAURO - CALIPSO - SIRIUS - OMEGA	TOPOGRAFICO VHZ

FMB Srl Via Lodi, 7 Dalmine 24044 (Bergamo) ITALY Tel (+39)035370555 Fax (+39)035370668 info@fmb.it www.fmb.it

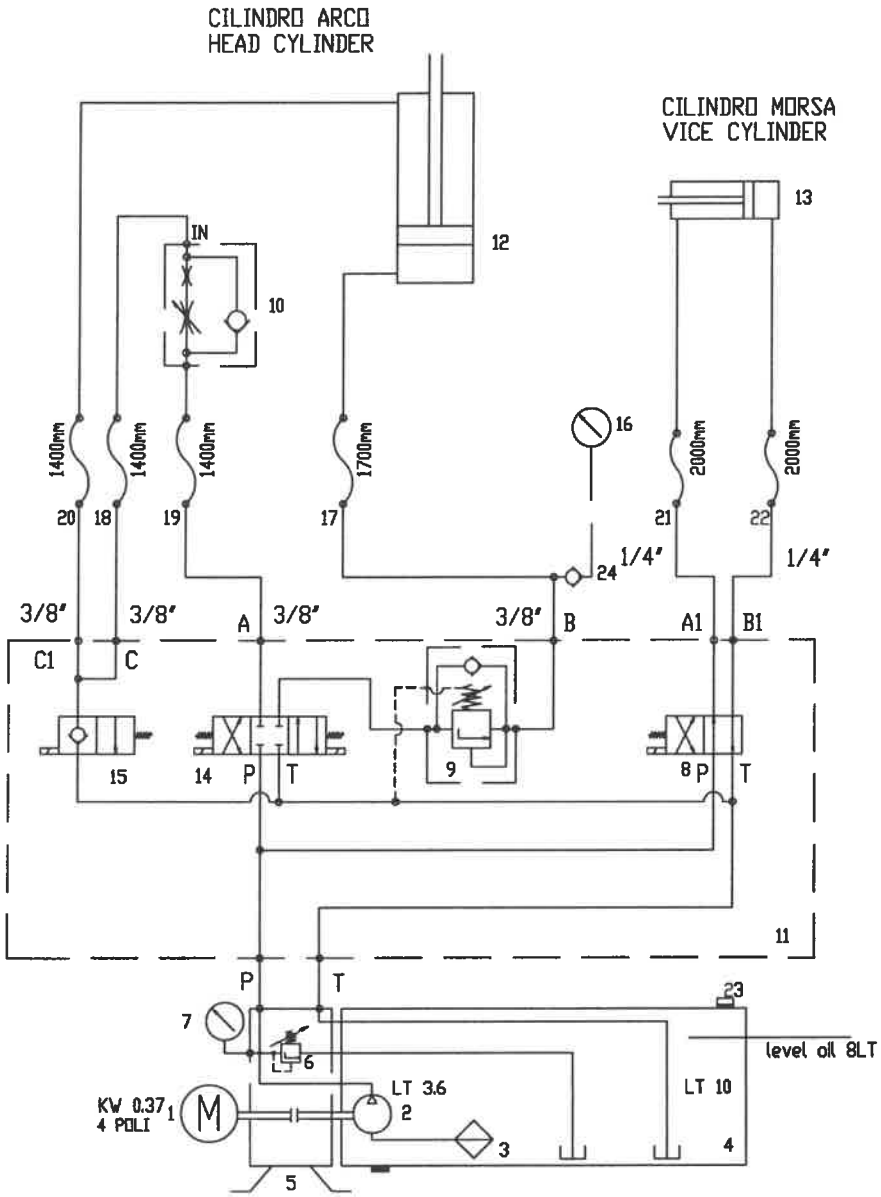
W1	CILINDRO ARCO	ARC CYLINDER
W2	CILINDRO MORSA TAGLIO	CUTTING VICE CYLINDER
W3	CILINDRO MORSA CARRO	CARRIAGE VICE CYLINDER
W4	CILINDRO AVANZAMENTO CARRO	CARRIAGE ADVANCE CYLINDER
W5	CILINDRO MORSA VERTICALE TAGLIO	VERTICAL CUTTING VICE CYLINDER
W6	CILINDRO MORSA VERTICALE CARRO	VERTICAL CARRIAGE VICE CYLINDER
W7	CILINDRO TENDITORE LAMA	SAWBAND TIGHTENING CYLINDER
W8	CILINDRO BLOCCAGGIO ROTAZIONE	ROTATION BLOCKING CYLINDER
W9	ROTAZIONE	ROTATION

POS.	DESCRIZIONE	
1	MOTORE 1.1 KW	
2	POMPA	
3	FILTRO IN ASPIRAZIONE	
4	SERBATOIO DA 10 Lt	
5	GIUNTO MOTORE	
6	VALVOLA DI MAX PRESSIONE	
7	MANOMETRO	
8	TAPPO SERBATOIO	
9	MASSELLO TIPO A	
10	ELETTROVALVOLA A CARTUCCIA EV5	
11	ELETTROVALVOLA A CARTUCCIA EV1-2	
12	REGOLATORE DI FLUSSO UNIDIREZION.	
13	GRUPPO TUBI IDRAULICI	
14		
15		
16		
W1	CILINDRO ARCO	



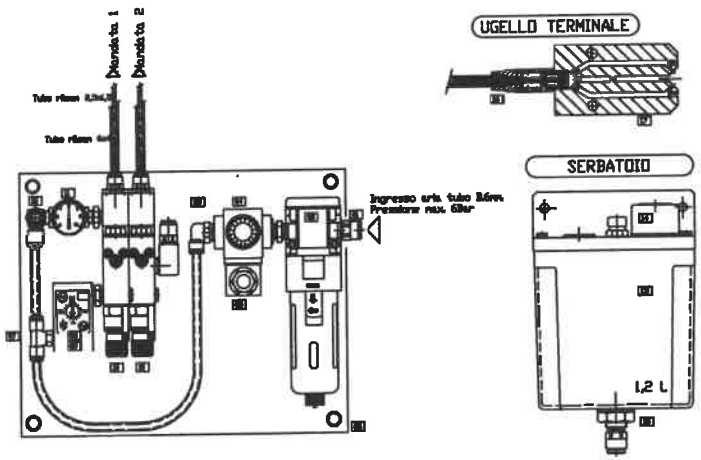
data 25-09-2017	file 711116/17/92-R03	macchina CENTAURO-CALIPSO	parte FUNZIONALE

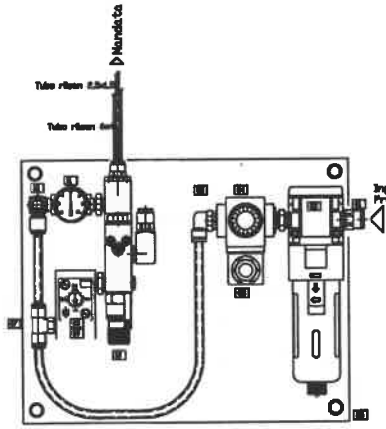
FMB Srl Via Lodi, 7 Dalmine 24044 (Bergamo) Tel (+39)035370555 Fax (+39)035370668 info@fmb.it www.f

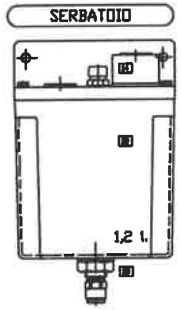


W1	CILINDRO ARCO	ARC CYLINDER
W2	CILINDRO MORSA TAGLIO	CUTTING VICE CYLINDER
W3	CILINDRO MORSA CARRO	CARRIAGE VICE CYLINDER
W4	CILINDRO AVANZAMENTO CARRO	CARRIAGE ADVANCE CYLINDER
W5	CILINDRO MORSA VERTICALE TAGLIO	VERTICAL CUTTING VICE CYLINDER
W6	CILINDRO MORSA VERTICALE CARRO	VERTICAL CARRIAGE VICE CYLINDER
W7	CILINDRO TENDITORE LAMA	SAWBAND TIGHTENING CYLINDER
W8	CILINDRO BLOCCAGGIO ROTAZIONE	ROTATION BLOCKING CYLINDER
W9	ROTAZIONE	ROTATION

01	motore elettrico	220/440-50/60hz 3ph	
01	motore elettrico	230/60/ 1ph	
02	pompa	3.6lt - K2.7	E60604005
03	filtro	C5410000/PP02E77	
04	serbatoio olio	10lt - 10B	E60303011
05	flangia	PPC TIPO A 3 CAVITA'	XB1471-1
06	regolatrice di pressione		VMDC35L1
07	manometro	40 bar - M3A-ABS63	PB3240 D F00
08	elettrovalvola	chiusura morsa	CT412 / BOBINA CT9200-24VDC
09	riduttrice di pressione	CT123 - 5/30bar	0123200000
10	regolatrice di flusso	controllo discesa arco	AIRCONTROL
11	massello	tipo B	FMB-0211064-1
12	cilindro arco	tipo A	
12	cilindro arco	tipo B	
13	cilindro morsa	tipo A	
13	cilindro morsa	tipo B	
14	elettrovalvola	salita / discesa arco	CT462 SCH.2/ BOBINA CT9200-24VDC
15	elettrovalvola	discesa rapida arco	CT4552/ BOBINA CT9300-24VDC
16	manometro	controllo pressione arco (optional)	7PE364414LF+MCS6400X500
		raccordi	801.50.204.00 + 801.10.162.00
17	tubo idraulico	100-R1T-5/16" X1700 2RF 3/8	
18	tubo idraulico	100-R1T-5/16" X1400 RF 3/8 RF16=1550	
19	tubo idraulico	100-R1T-5/16" X1400 RF 3/8 RF16=1550	
20	tubo idraulico	100-R1T-5/16" X1400 2RF 3/8	
21	tubo idraulico	100-R1T-1/4" X2000 2RF 1/4	
22	tubo idraulico	100-R1T-1/4" X2000 2RF 1/4	
23	tappo olio	C86100001	
24	minipresa	620.01.204.20	
---	olio idraulico	46xxxxxxxx	



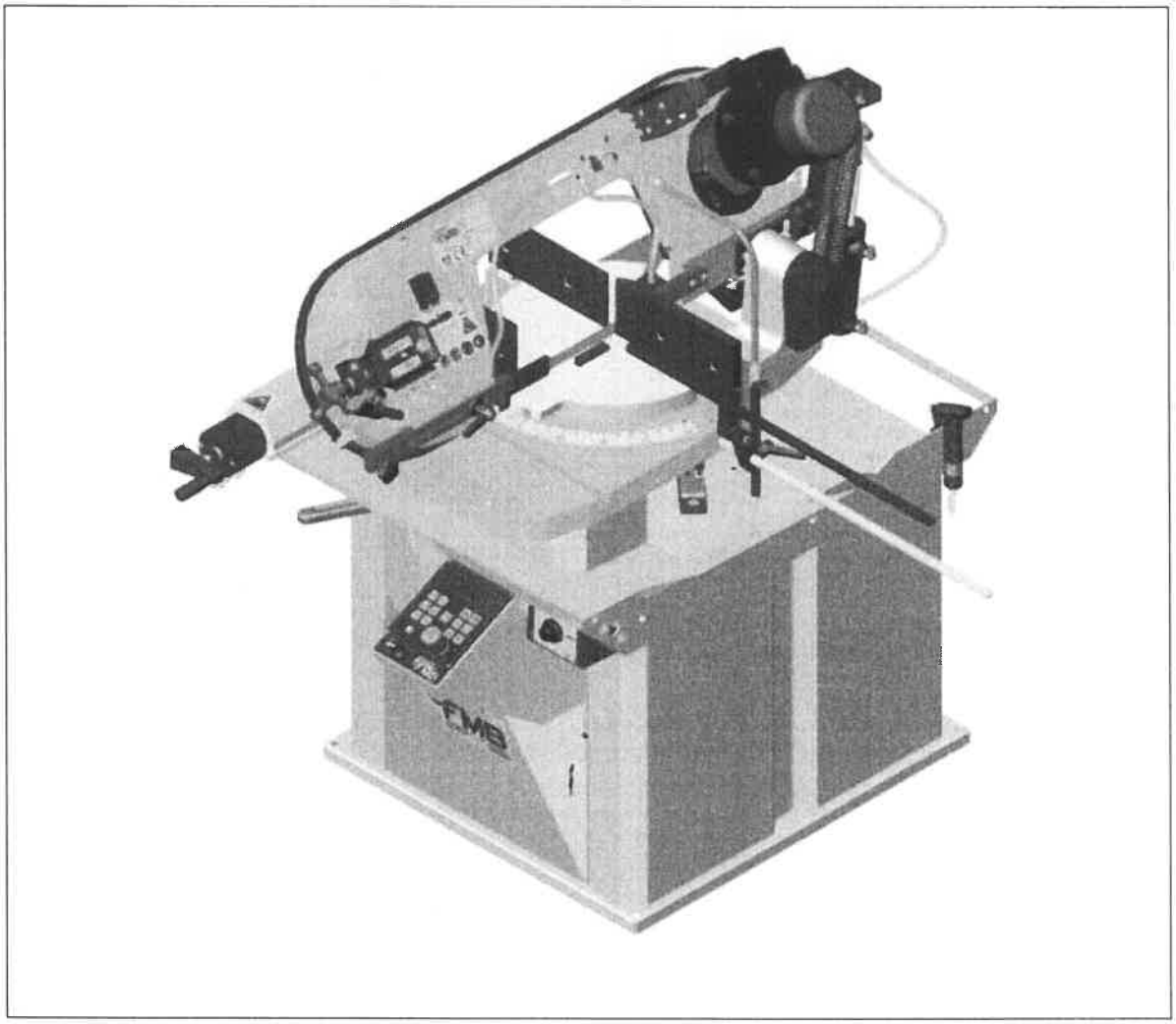


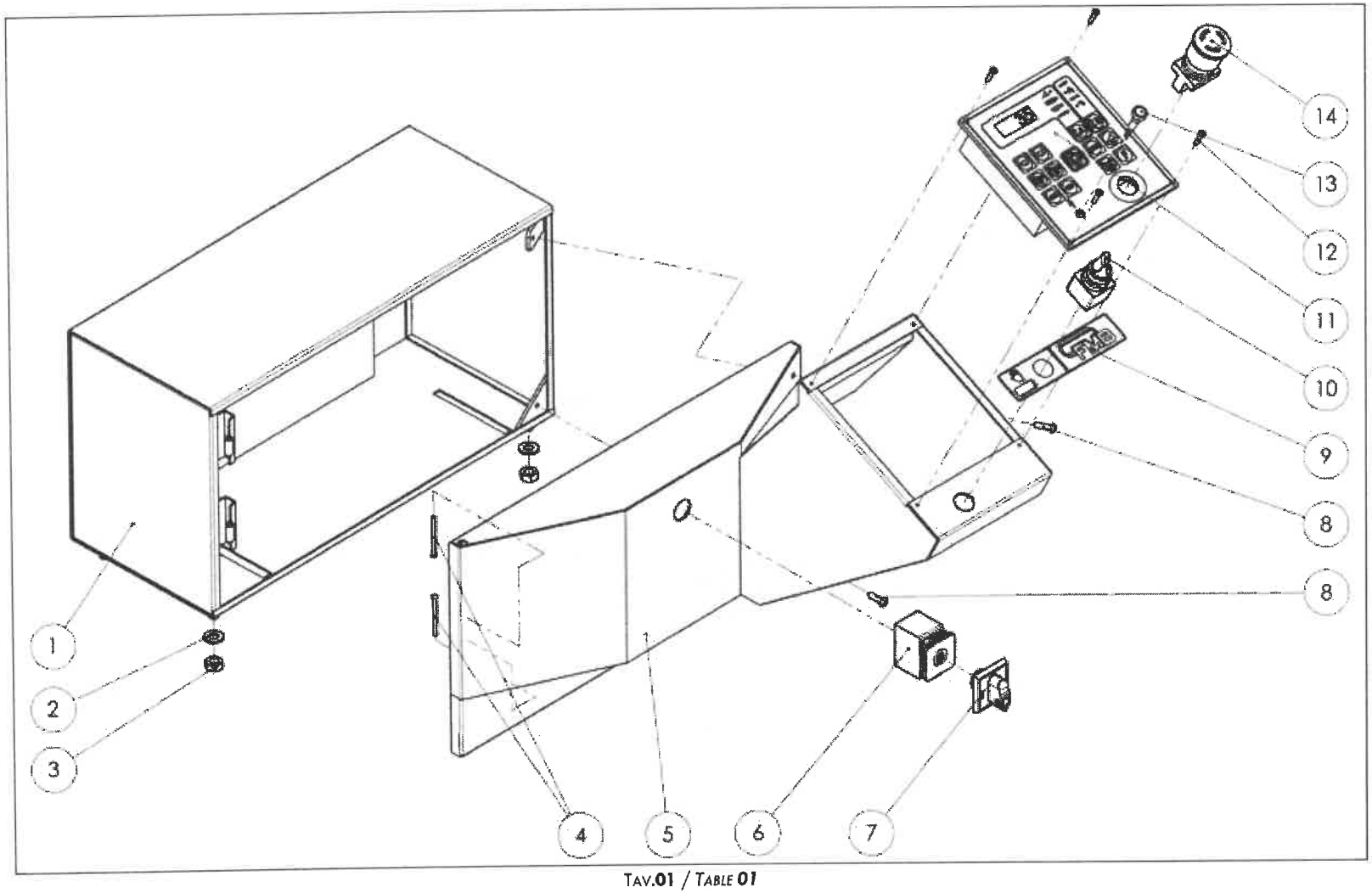


FMB	data 25-09-2017	file 711116/17/92-R03	I.C.C. 10kA	macchina CENTAURO - CALIPSO - SIRIUS - OMEGA	parte NB1-NB2
FMB Srl Via Lodi, 7 Dalmine 24044 (Bergamo) ITALY Tel (+39)035370555 Fax (+39)035370668 info@fmb.it www.fmb.it					PG./SH. 13 SUCC. --

PEZZI DI RICAMBIO / *SPARE PARTS*

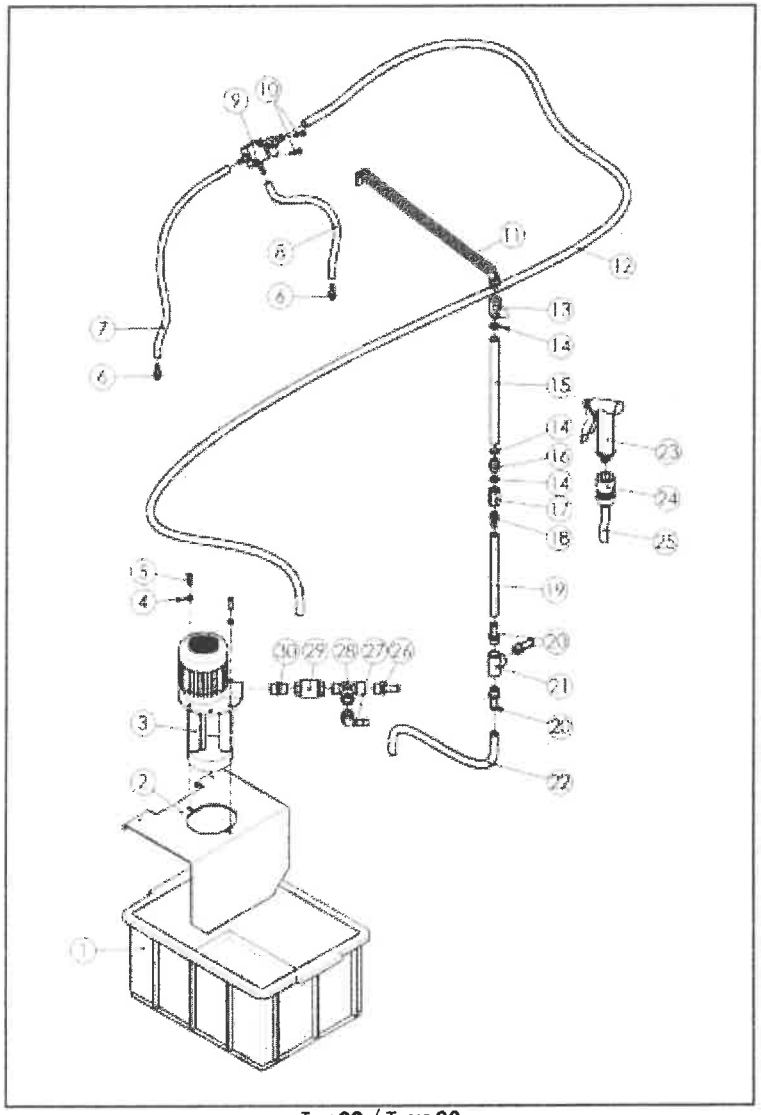
OMEGA





POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	511359
2	2	212705
3	2	212601
4	2	513455
5	1	512864
6	1	112624
7	1	112627
8	2	212466
9	1	413020
10	1	613057
11	1	113859
12	4	212837
13	1	112515
14	1	613015

TAV.01 / TABLE 01

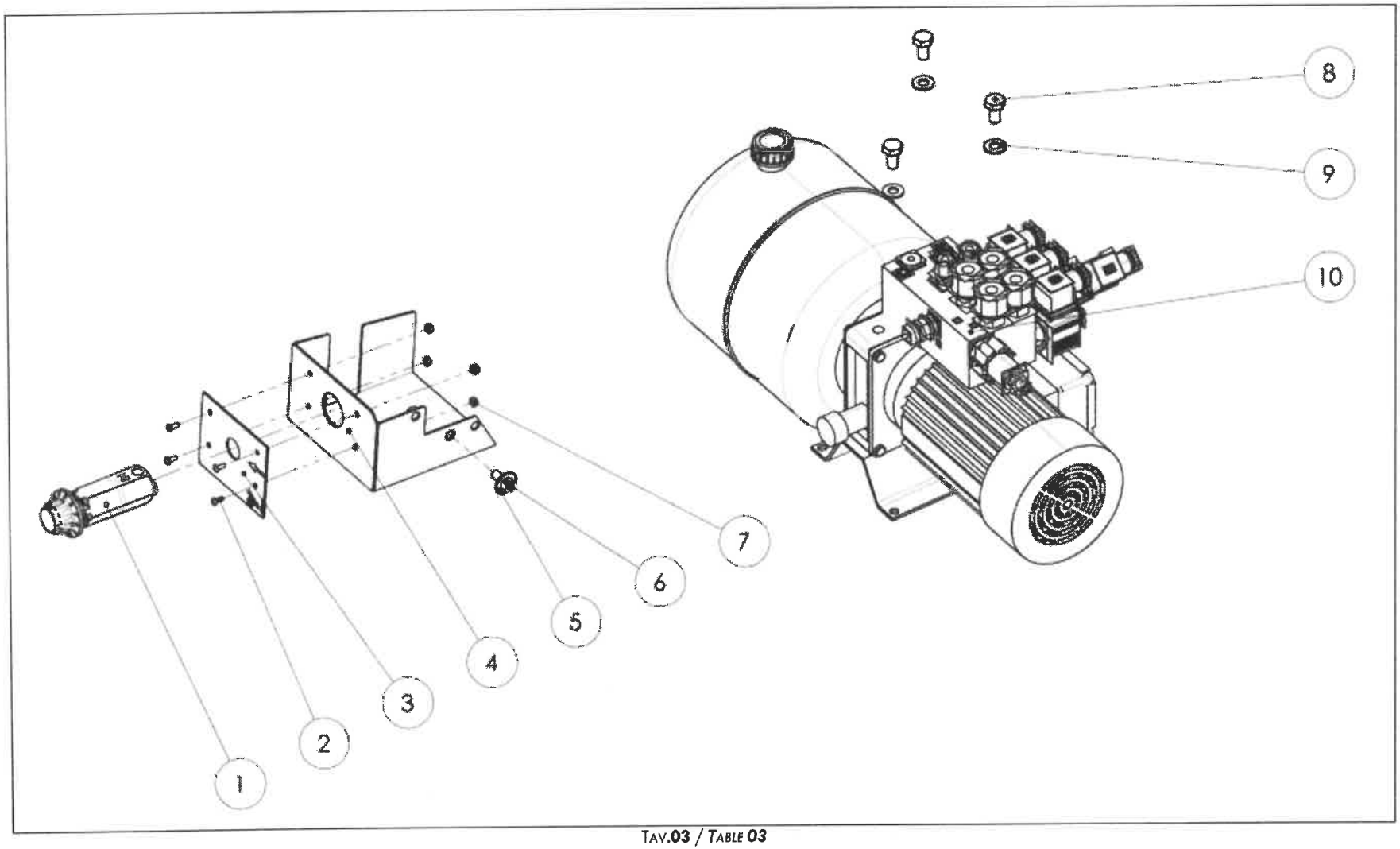


TAV.**02** / *TABLE* **02**

POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	412160
2	1	512562
3	1	385211
4	2	212701
5	2	212301
6	2	412165
7	1	412166
8	1	412166
9	1	612106
10	2	212401
11	1	612922
12	1	412167
13	1	412163
14	3	412302
15	1	520318
16	1	412301
17	1	412346
18	1	412164
19	1	412167
20	3	112620
21	1	413278
22	1	412167
23	1	412225
24	1	412226
25	1	412167
26	1	112760
27	1	112786
28	1	413250
29	1	413789
30	1	112693

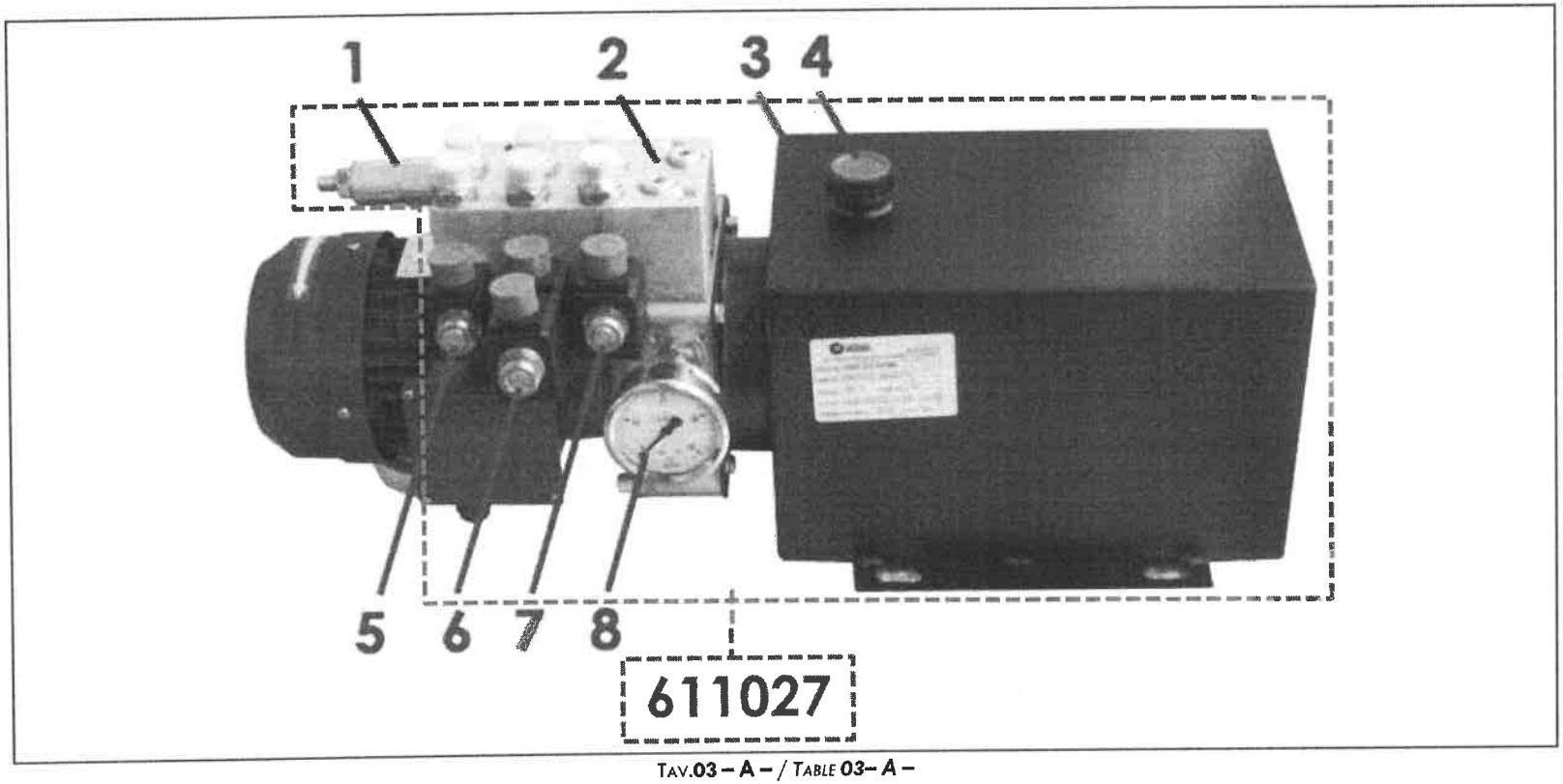
PEZZI DI RICAMBIO / *SPARE PARTS*

OMEGA



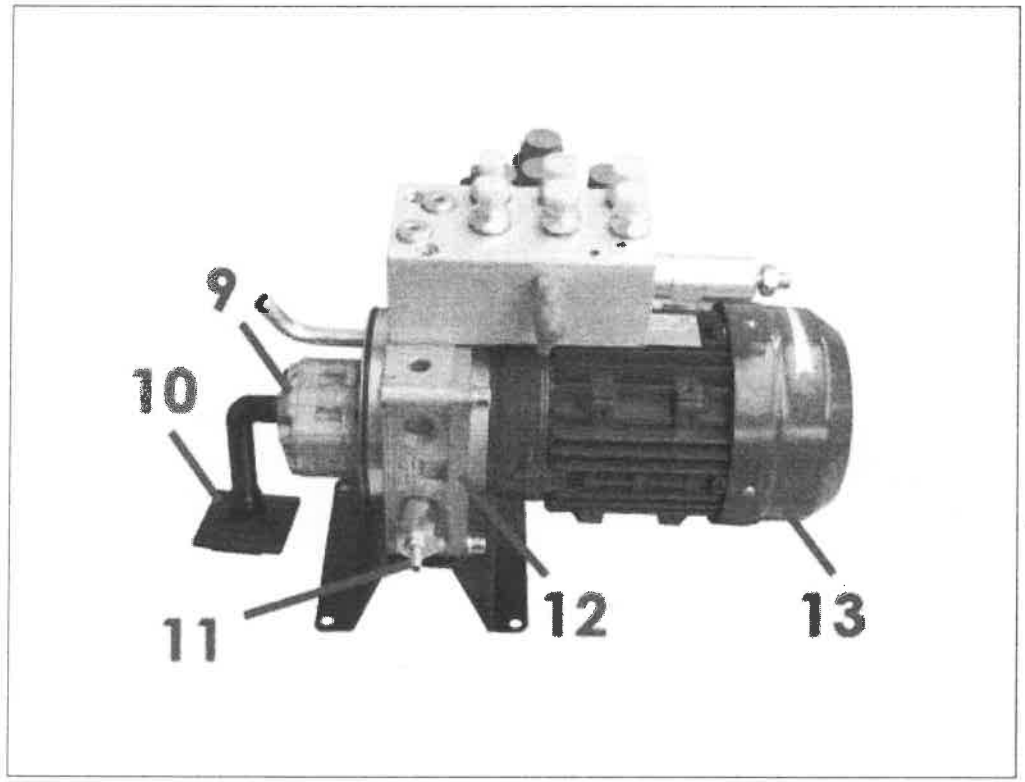
TAV.03 / TABLE 03

POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	413019
2	4	212455
3	1	511364
4	1	514102
5	1	212748
6	1	212306
7	4	212618
8	3	212263
9	3	212705
10	1	612991



TAV.03 – A – / TABLE 03– A –

POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	411110
2	1	411111
3	1	512439
4	1	112711
5	1	411113
6	1	411112
7	1	411108
8	1	411107

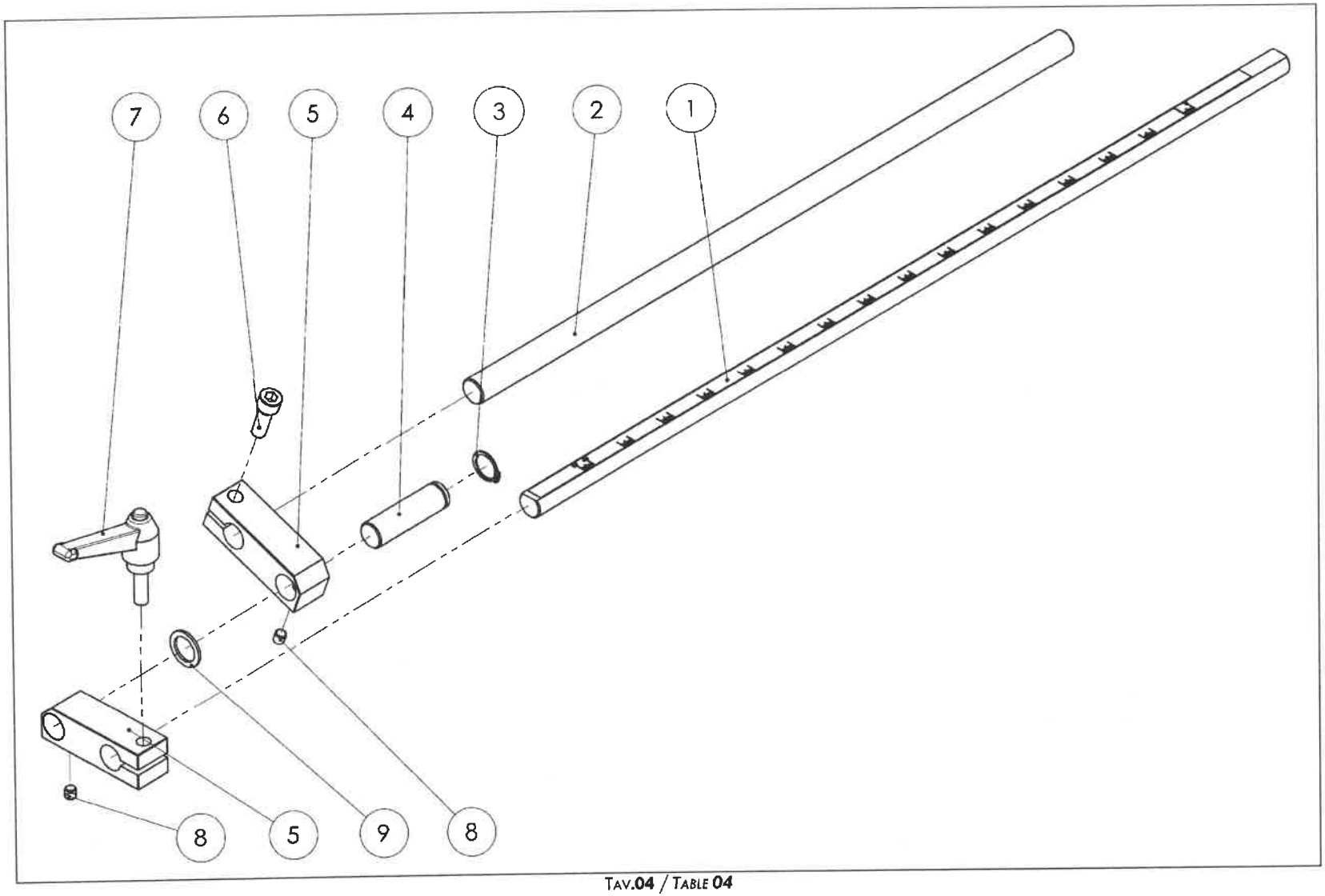


TAV.03 – B –/ *TABLE 03– B –*

POS.	Q.TA'/ Q.TY	CODICE/ CODE
9	1	410516
10	1	410519
11	1	410521
12	1	410520
13	1	TAB.J / *TABLE J*

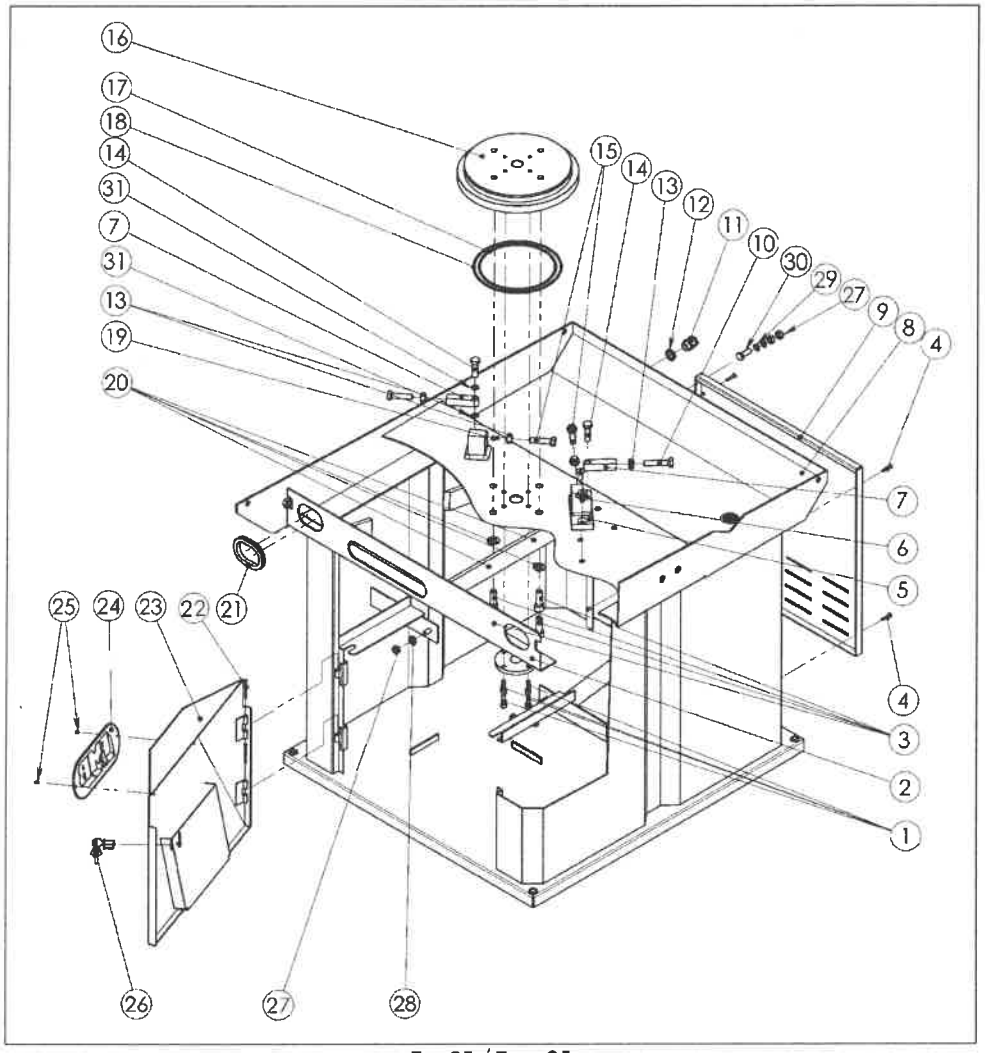
POS. / REF.	POLI / POLES	KW	ATTACCO / CONNECTION	TENSIONE / *TENSION*	CODICE / CODE
13	4	0,36	B14	230/400V 50/60Hz 3ph	383210
				600V 60Hz 3ph CSA	383250
				220V 50Hz 1ph	383260
				110V 60Hz 1ph	383270

TAB.J / *TABLE J*



POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	612104
2	1	512245
3	1	312152
4	1	512646
5	2	512313
6	1	212303
7	1	112172
8	2	212504
9	1	212731
1 ➔ 9	1	**712196**

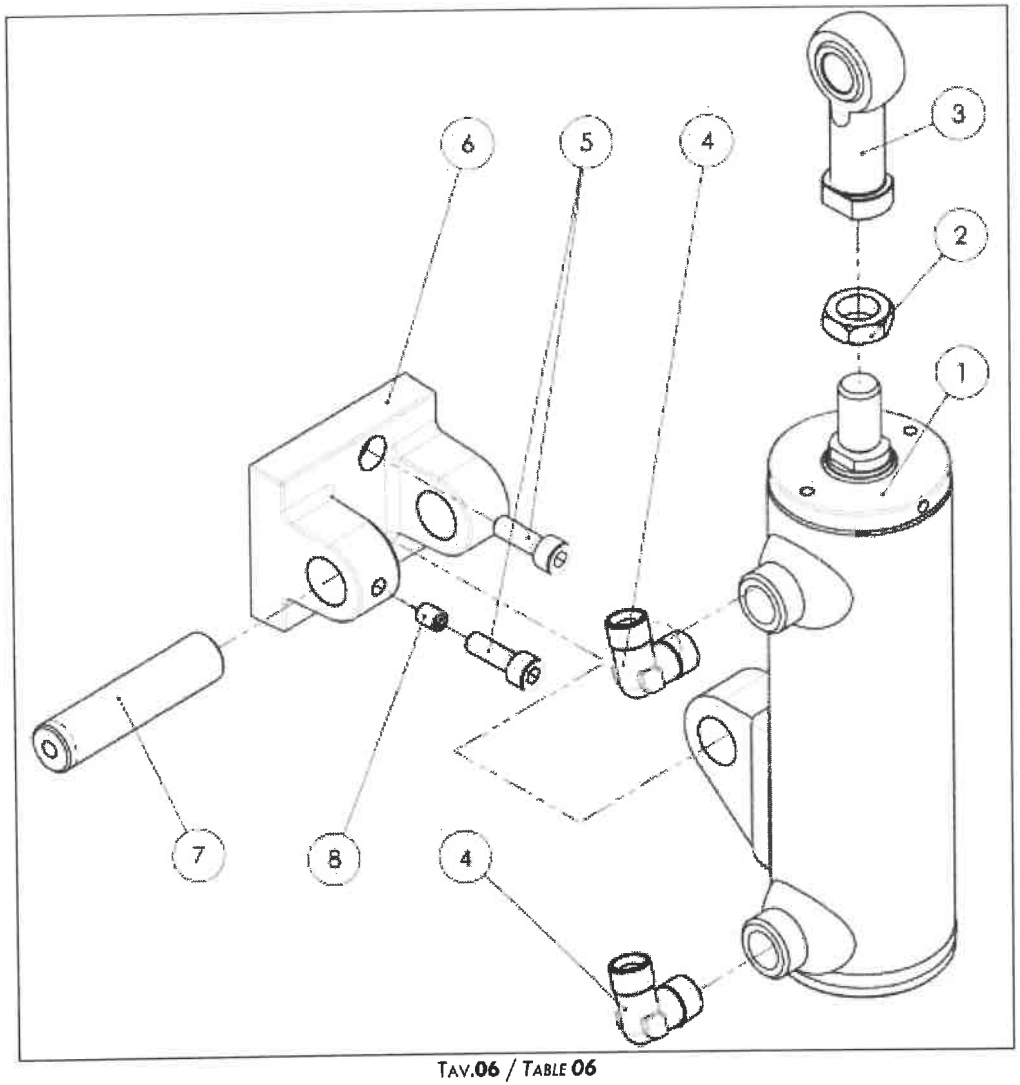
TAV.**04** / TABLE **04**



TAV.05 / TABLE 05

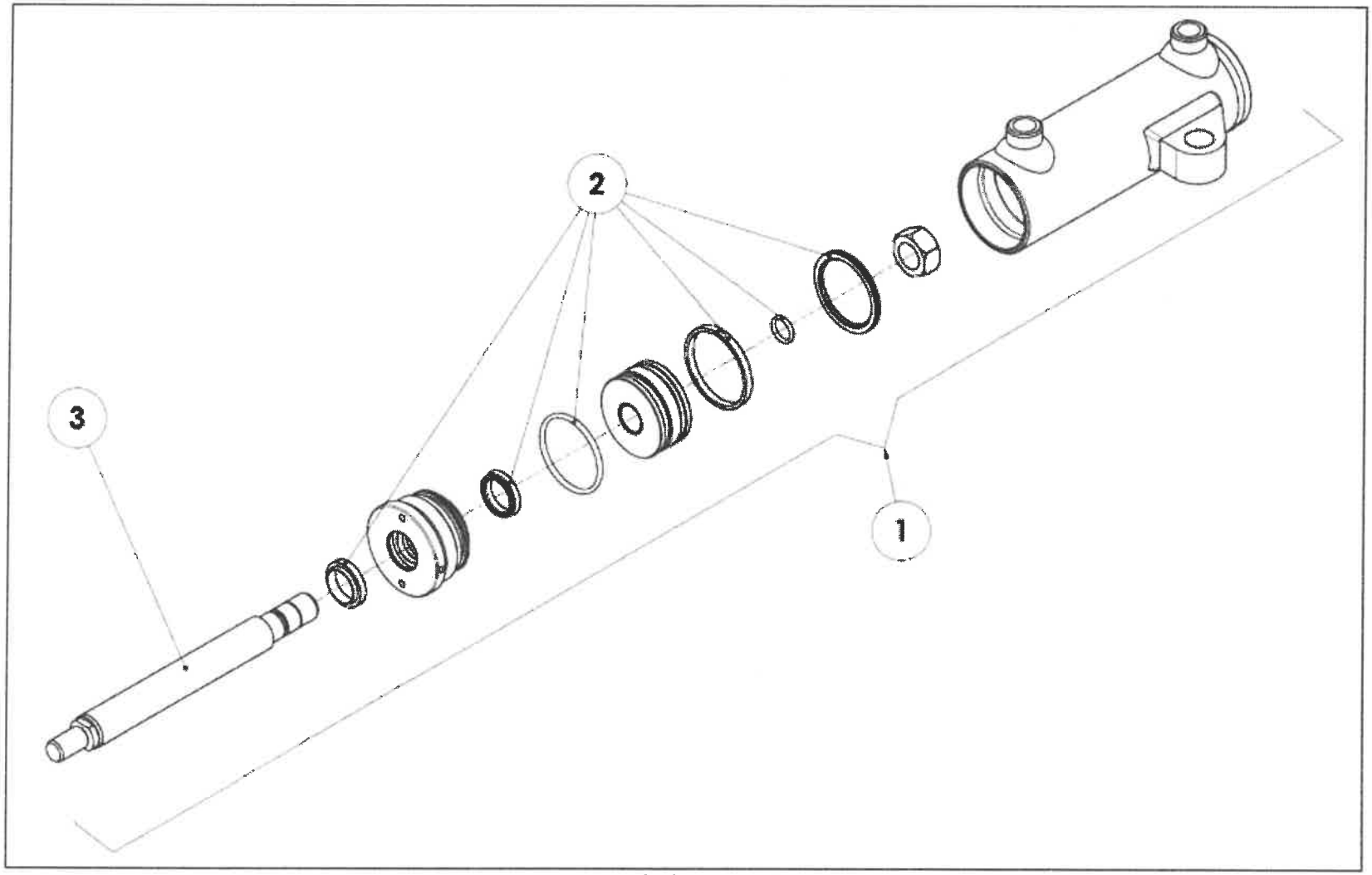
POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	4	212309
2	1	512115
3	4	212394
4	4	212454
5	1	514124
6	2	212406
7	2	514115
8	1	512796
9	1	512806
10	1	212217
11	1	112415
12	1	112455
13	4	212608
14	2	212257
15	3	212248

POS.	Q.TA'/ Q.TY	CODICE/ CODE
16	1	513641
17	1	312487
18	1	312488
19	1	212517
20	4	212708
21	1	512124
22	2	513455
23	1	512797
24	1	514120
25	2	212191
26	1	412150
27	4	212601
28	2	212705
29	2	212776
30	1	212241
31	2	222019



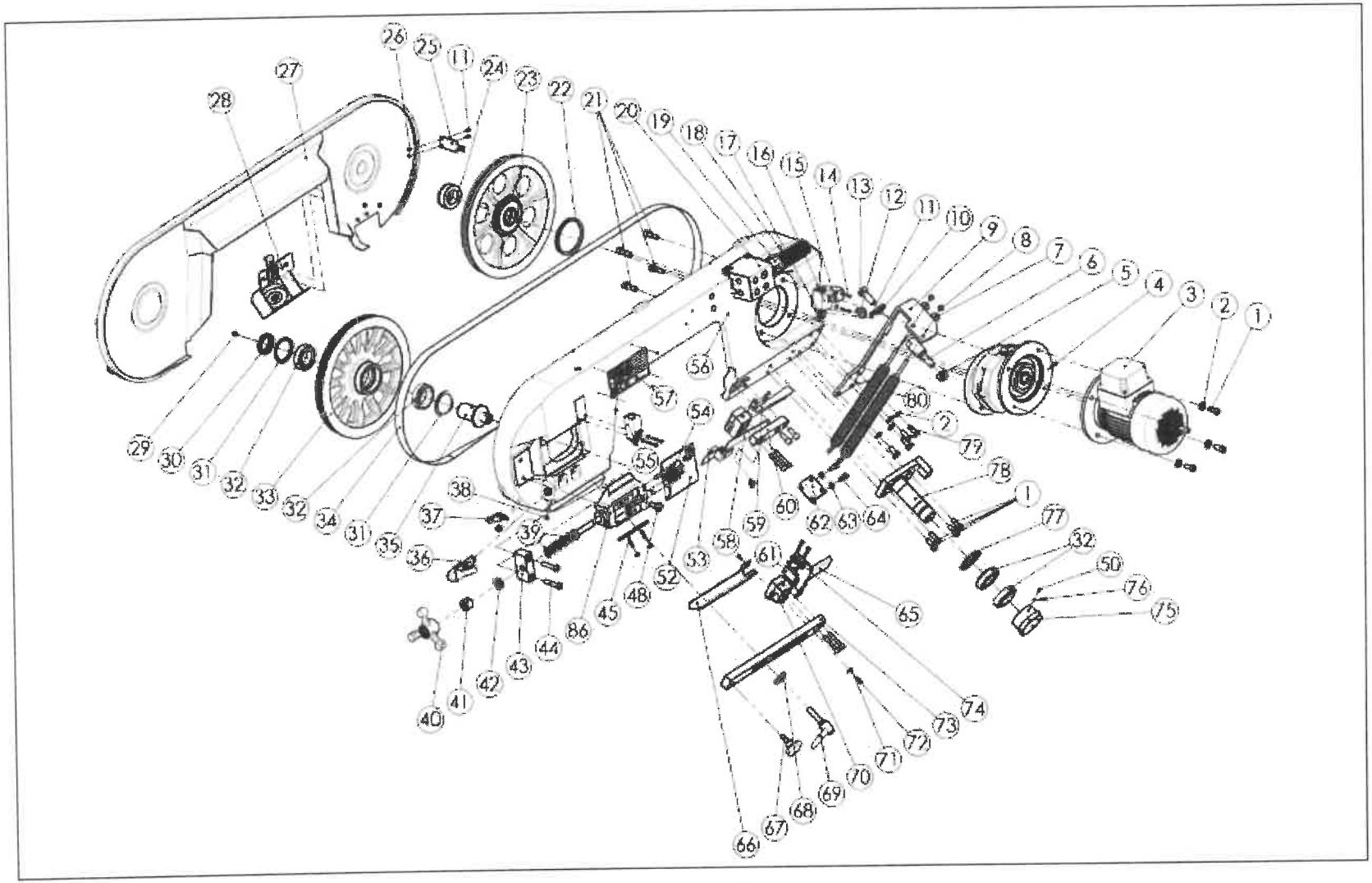
TAV.06 / TABLE 06

POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	TAV.06 - A -
2	1	212612
3	1	412235
4	2	412323
5	2	212309
6	1	513439
7	1	510643
8	1	212524
1 → 8	-	**712140**



POS.	CODICE/ *CODE*
1	**712148**
2	612832
3	511372

TAV.**06 – A –**/ *TABLE* **06 – A –**



TAV.07 / TABLE 07

POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	10	212314
2	8	212705
3	1	TAB.Y / TABLE Y
4	1	112494
5	1	212650
6	1	511750
7	2	212748
8	2	212634
9	1	511751
10	1	213111
11	6	212455
12	1	412417
13	1	212233
14	4	212367
15	4	212712
16	1	112358
17	1	112415
18	1	112556
19	1	112558
20	1	510862
21	4	212348
22	1	312498
23	1	512426
24	1	412787
25	1	613373+213056
26	2	212603
27	1	510626
28	1	TAV.07 - D -
29	1	412109
30	1	213006
31	2	520311
32	4	312301
33	1	TAV.07 - E -
34	1	112204
35	1	512544
36	1	TAV.07 - F -
37	1	412417
38	1	212516
39	6	212721
40	1	112110
41	1	512138
42	1	312313
43	1	520345
44	2	212319
45	1	520371
46	2	212604
47	2	212506
48	1	212403
49	1	212509
50	1	212509
51	2	212451
52	1	412924
53	1	510228
54	1	520207
55	1	112353
56	1	514105
57	1	413037
58	1	TAV.07 - A -
59	1	510227
60	1	514151
61	1	510591
62	1	513422
63	2	212703
64	2	212306
65	1	510589
66	1	510131
67	1	112592

511508 with NB2

POS.	Q.TA'/ Q.TY	CODICE/ CODE
68	1	512328
69	1	112111
70	1	TAV.07 - B -
71	1	212898
72	6	212307
73	1	520327
74	1	413678
75	1	510489
76	1	512561
77	1	312373
78	1	520314
79	4	212205
80	2	512791
81	4	212190
82	2	212459
83	2	212477
84	1	112557
85	2	212456
86	1	TAV.07 - C -

OMEGA STANDARD

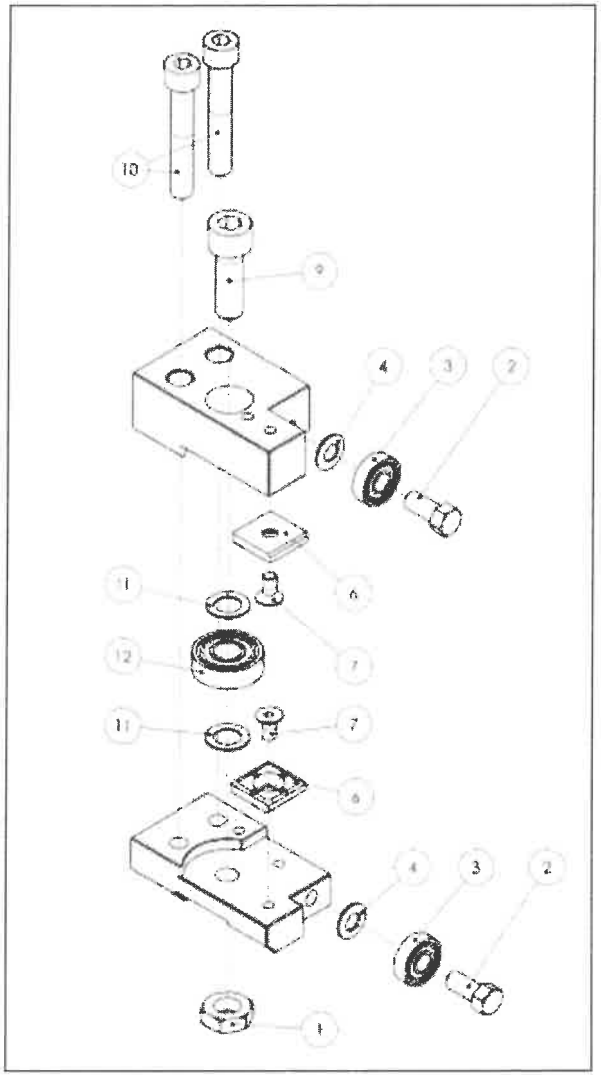
POS. / REF.	POLI / POLES	KW	TENSIONE / TENSION	CODICE / CODE
3	4/8	1,3 – 0,7	400V 50Hz 3ph	382310
			230V 50Hz 3ph	382320
			220V 60Hz 3ph	382330
			440V 60Hz 3ph	382340
	4	1,5	220V 50Hz 1 ph	380360
			110V 60Hz 1 ph	380370

TAB.Y / TABLE Y

OMEGA + VHZ

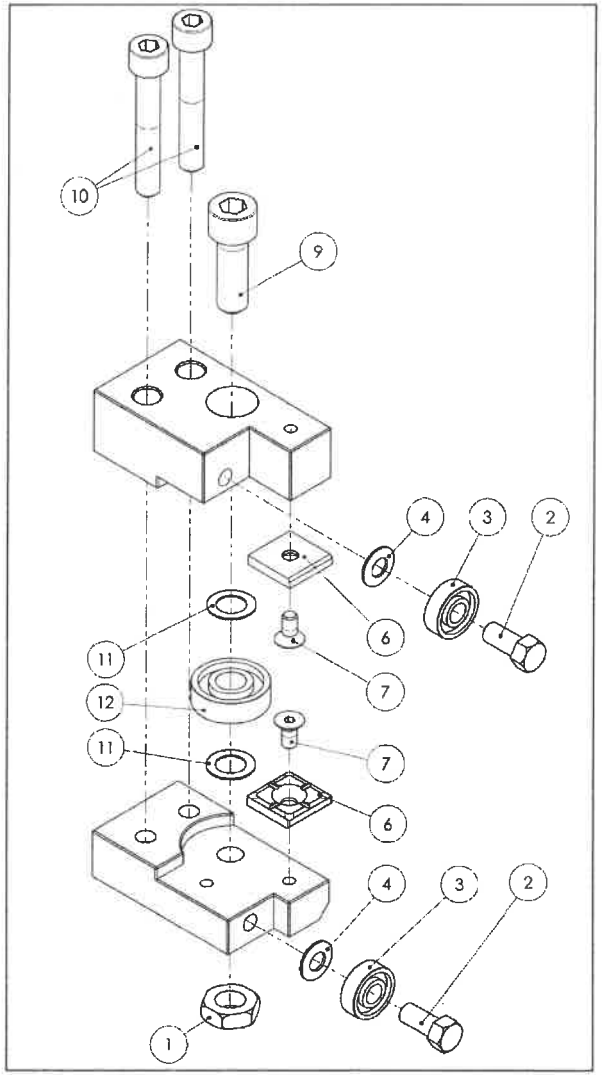
POS. / REF.	POLI / POLES	KW	TENSIONE / TENSION	CODICE / CODE
3	4	1,5	230-400V 50Hz 3ph 440V 60Hz 3ph 220V 50/60Hz 1ph	382910

TAB. Y / TABLE Y

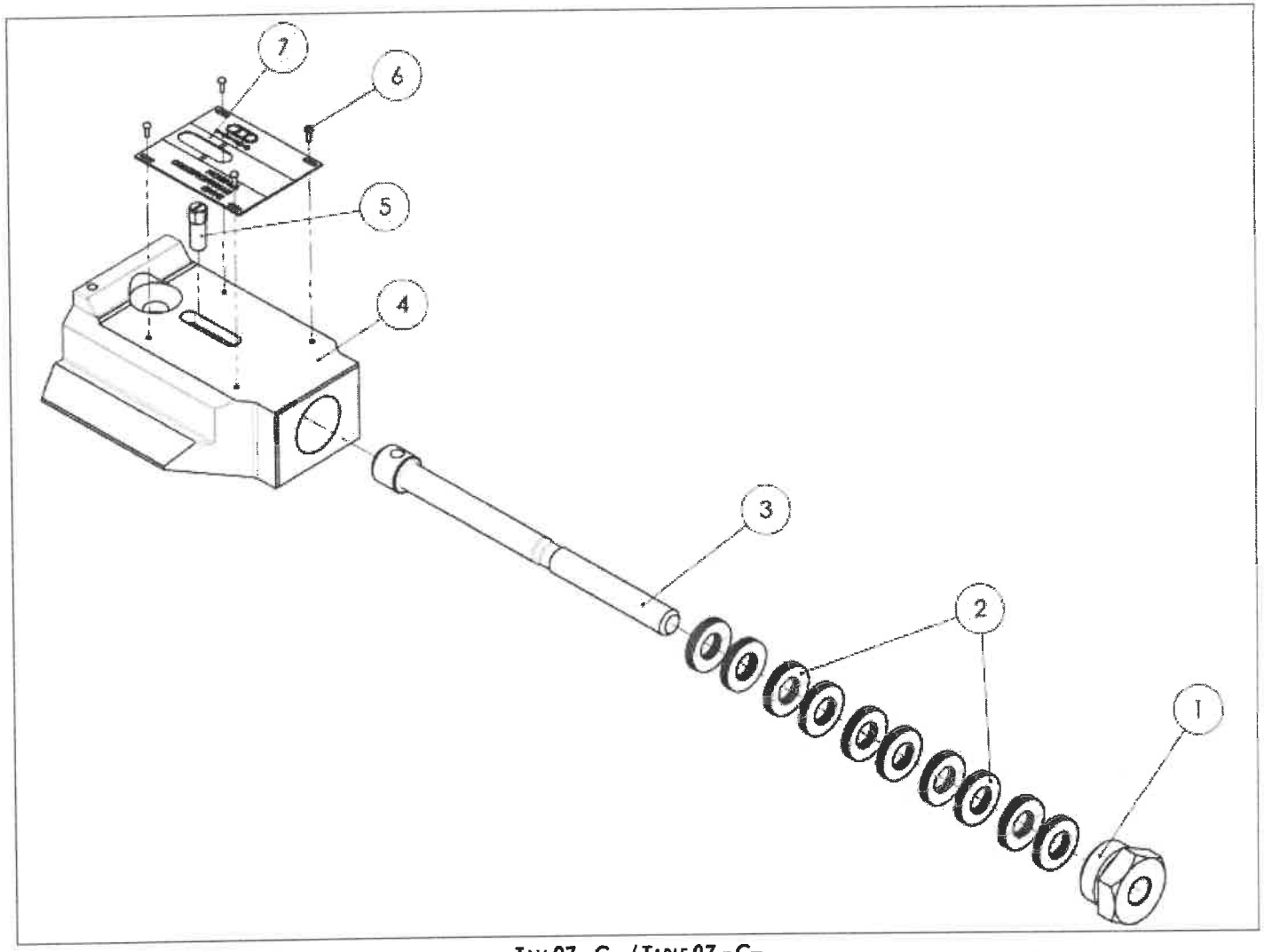


TAV.07 - A / *TABLE 07 – A* -

POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	212622
2	2	512321
3	2	312306
4	2	212722
6	2	412104
7	2	212404
9	1	212303
10	2	212311
11	2	212734
12	1	312325
1➔12 **A**	1	**612585**
1➔12 **B**	1	**612584**

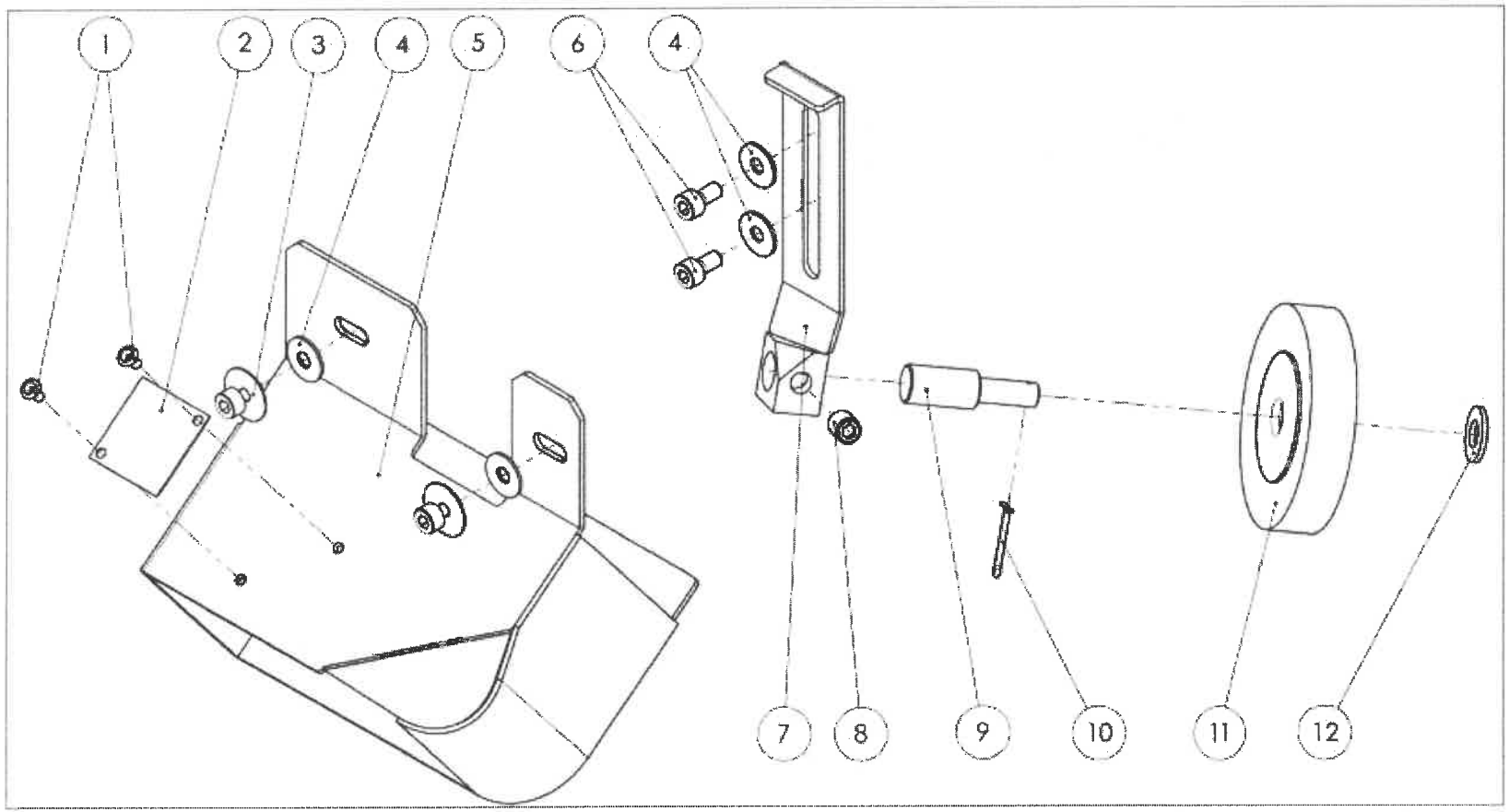


TAV.07 - B / *TABLE 07 – B*



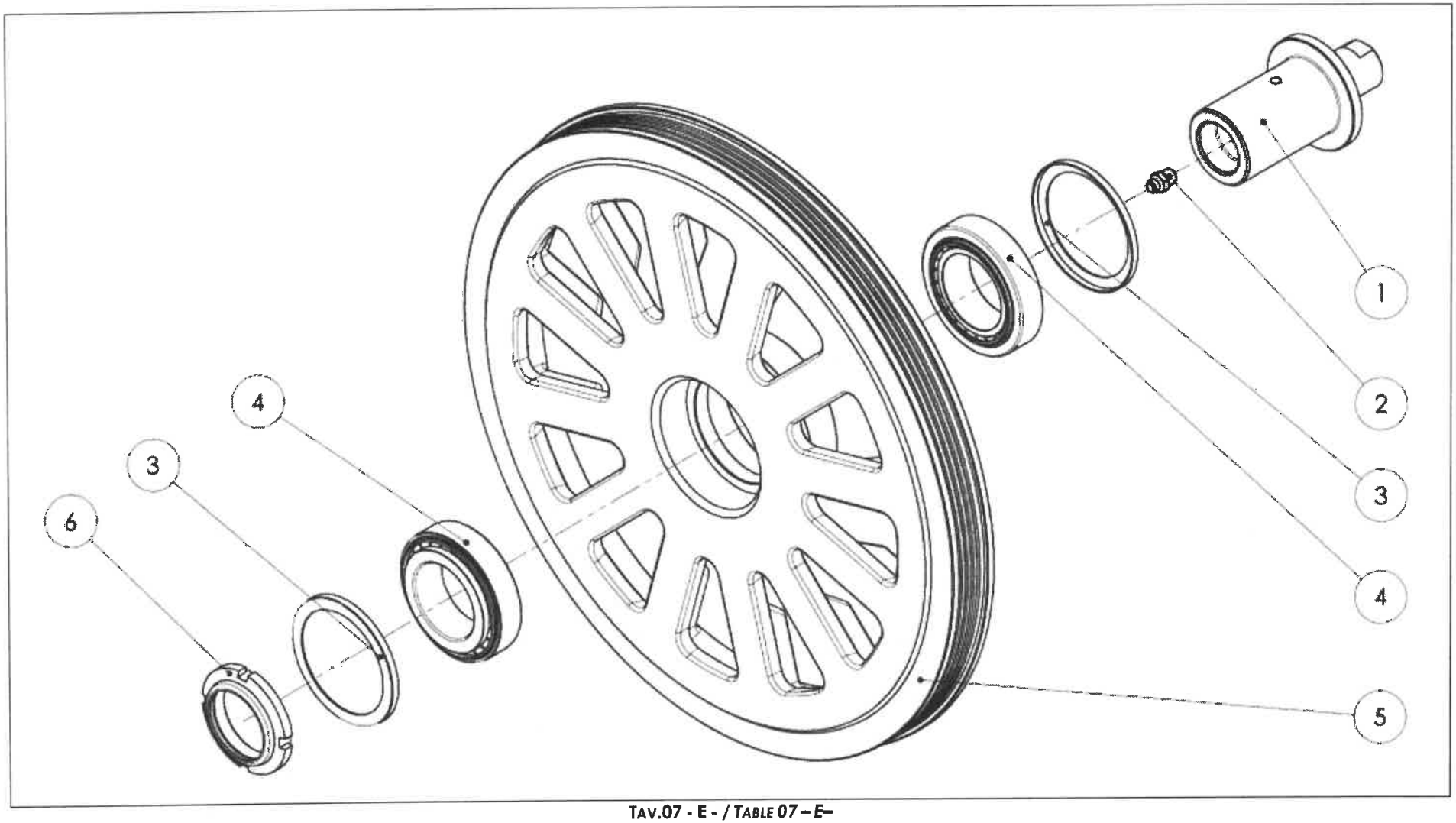
POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	520344
2	30	212721
3	1	520343
4	-	-
5	1	520346
6	4	212190
7	1	520210
1 ➔ 7	1	**612108**

TAV.07 - C - / *TABLE 07 – C–*



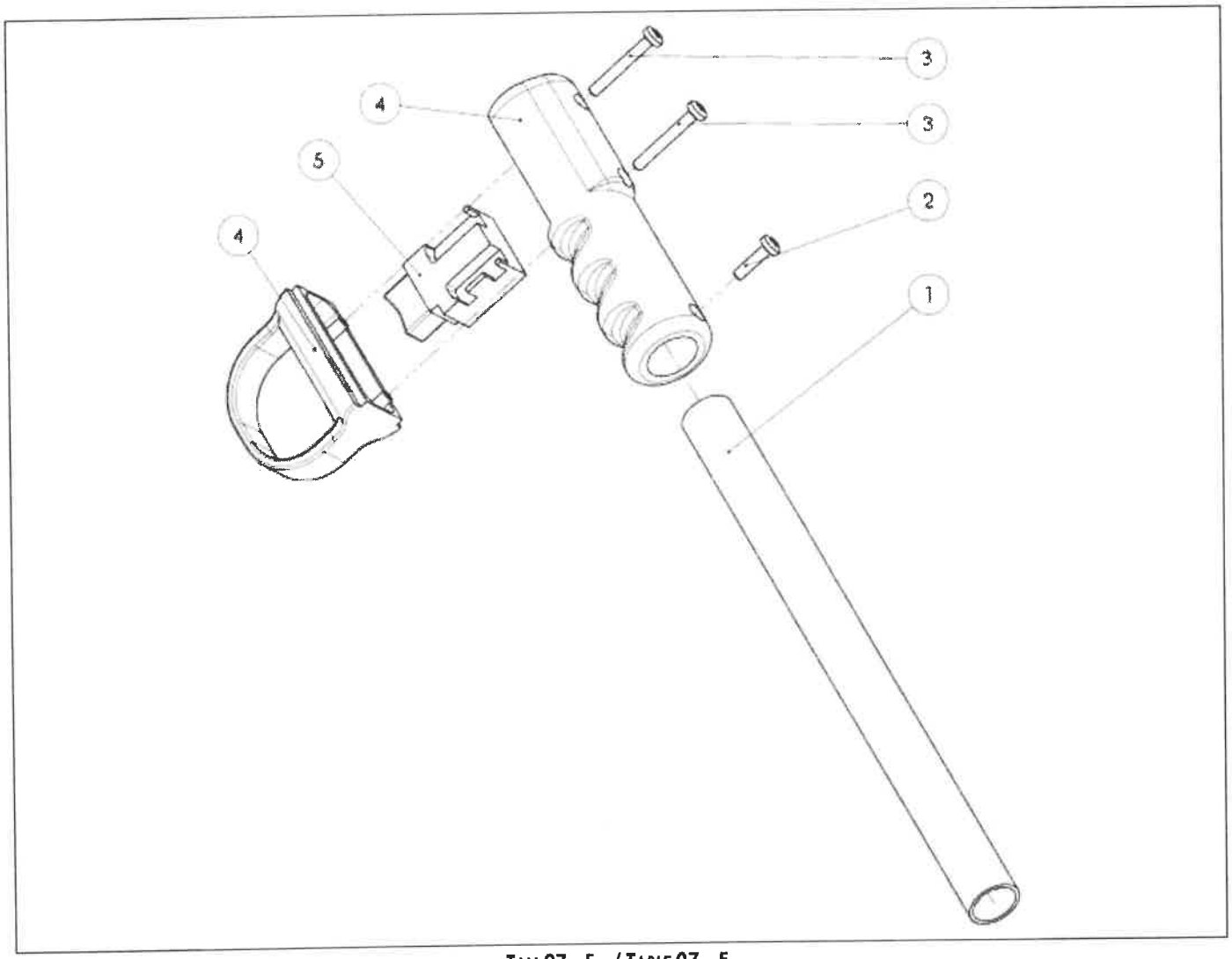
POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	2	212191
2	1	412539
3	2	213030
4	4	212898
5	1	514108
6	2	212307
7	1	514109
8	1	212524
9	1	514110
10	1	212192
11	1	112206
12	1	212703
1➔12	-	**612659**

TAV.07 - D - / *TABLE 07 – D–*



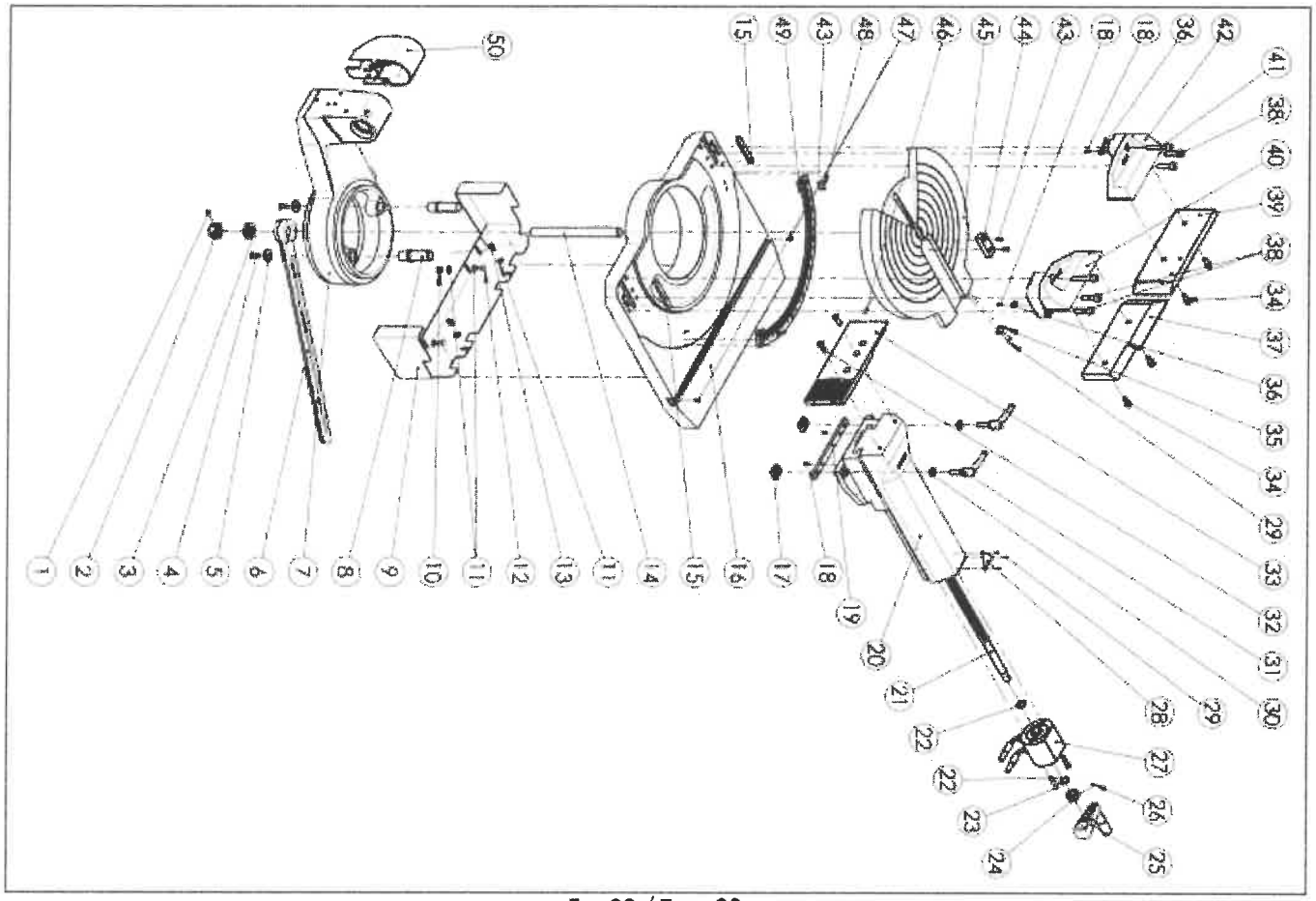
TAV.07 - E - / TABLE 07 – E–

POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	512544
2	1	412109
3	2	520311
4	2	312301
5	1	512545
6	1	213006
1 ➔ 6	-	**612127**



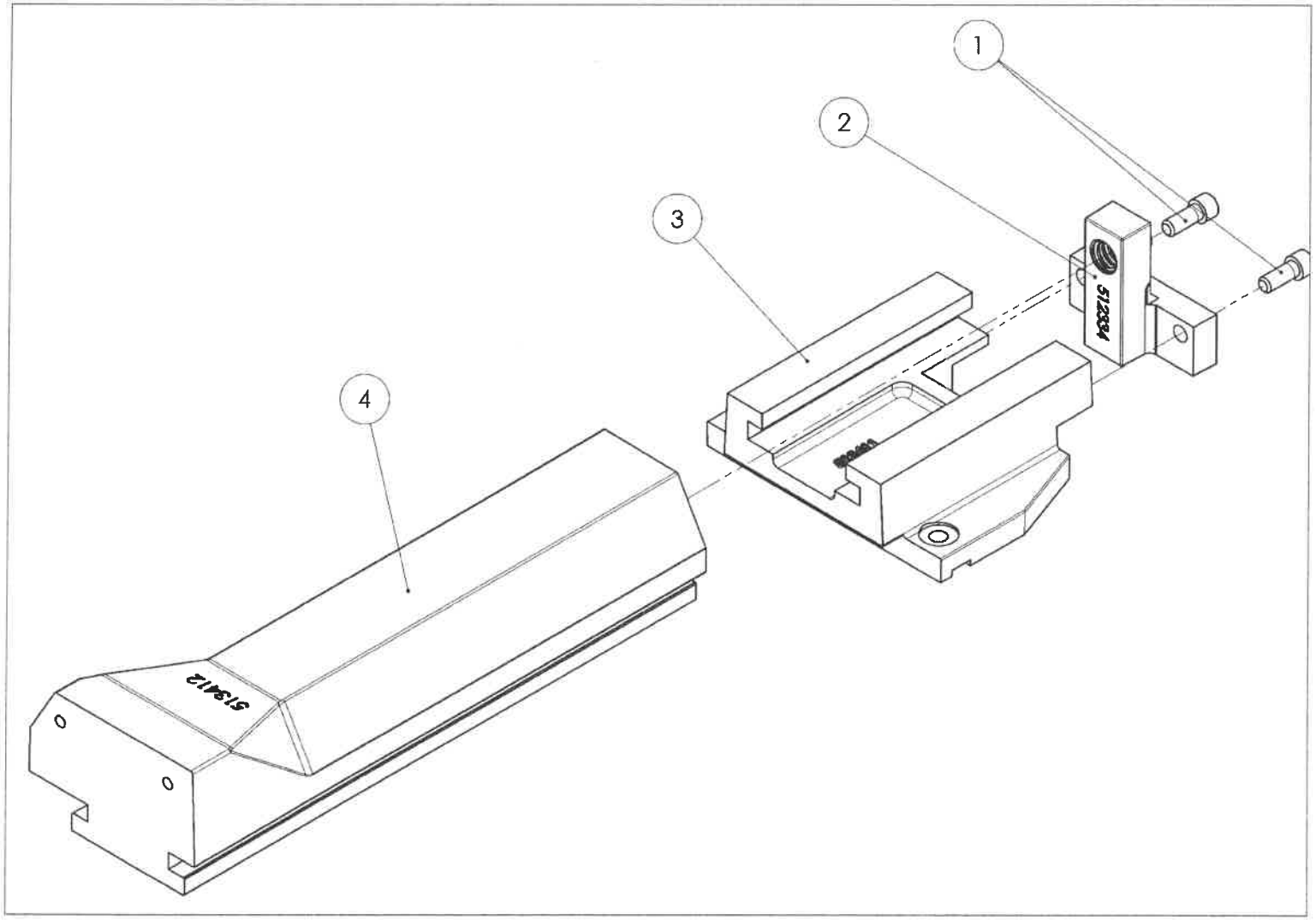
POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	512608
2	1	212162
3	2	212158
4	1	112308
5	1	112314
1 → 5	-	**612418**

TAV.07 - F - / TABLE 07 – F–



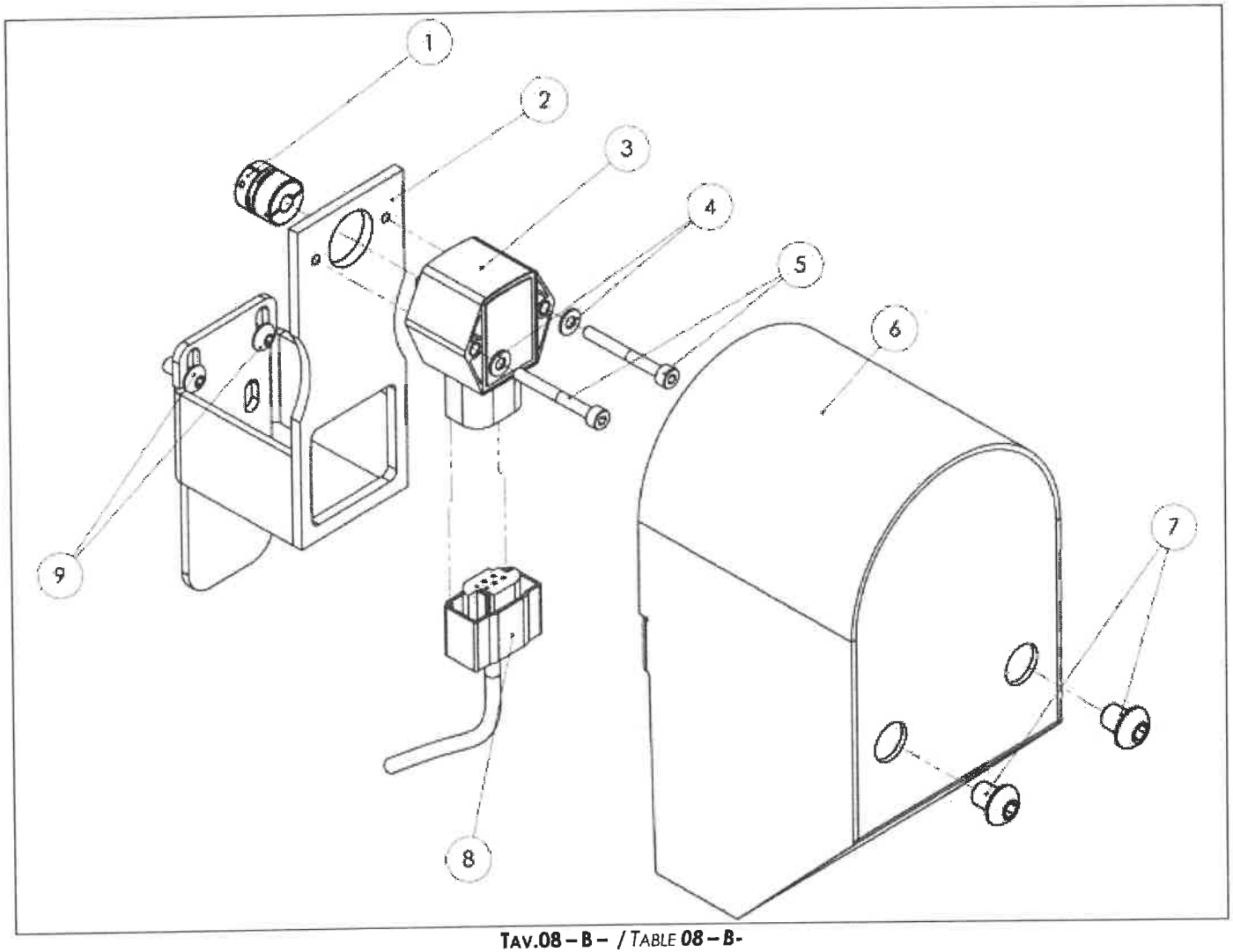
TAV.08 / *TABLE 08*

POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	212501
2	1	213017
3	1	312688
4	2	212417
5	2	512370
6	1	513340
7	1	513404
8	2	513568
9	1	510622
10	2	212602
11	6	212703
12	2	212228
13	2	212308
14	1	212807
15	2	312238
16	1	510621
17	2	212677
18	4	212307
19	1	513442
20	-	TAV.**08 - A -**
21	1	510203
22	2	212731
23	2	212336
24	1	212857
25	1	612148
26	1	212521
27	-	TAV.**08 - C -**
28	1	412131
29	5	212190
30	2	212707
31	2	112195
32	2	212314
33	1	513614
34	4	212302
35	1	512349
36	2	312234
37	1	513615
38	4	212369
39	1	513616
40	1	513406
41	2	212331
42	1	513405
43	4	212312
44	1	511368
45	1	513402
46	1	212507
47	2	212323
48	2	212906
49	1	529055
50	-	TAV.**08 - B -**
1 → 49	**-**	**712893**



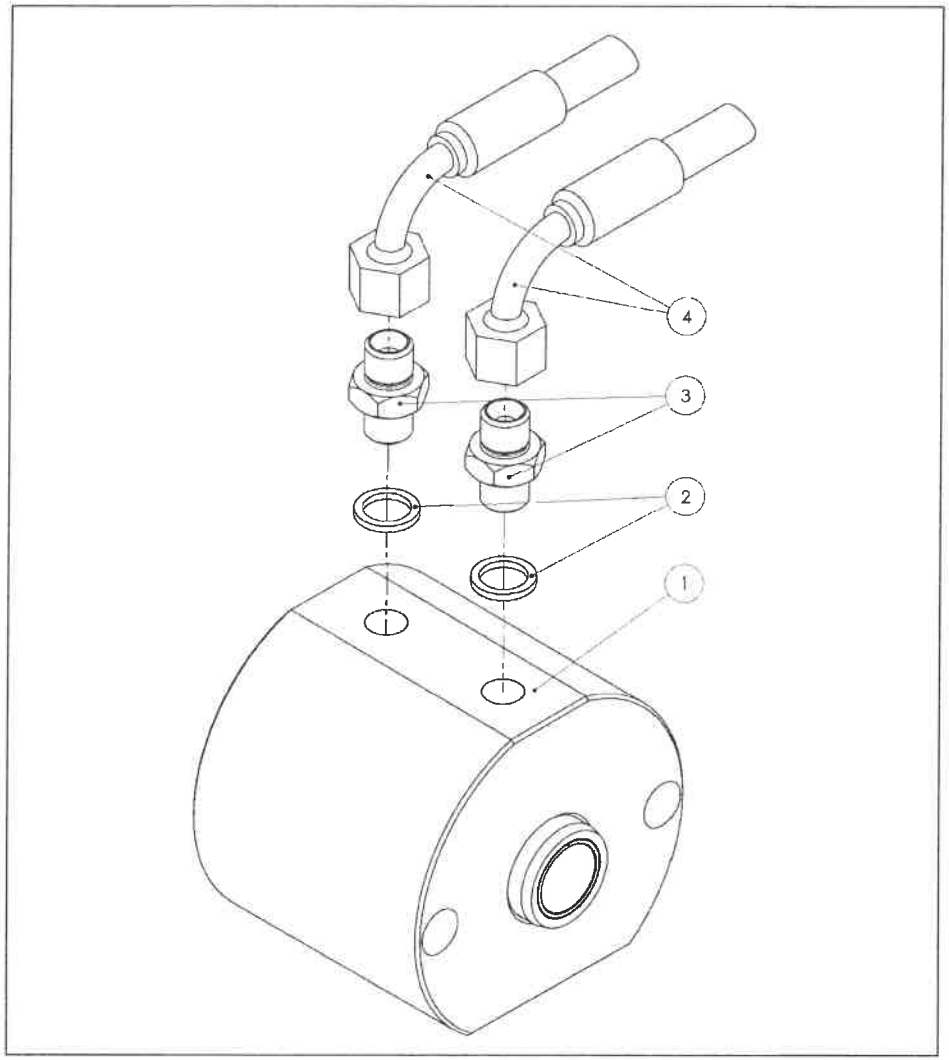
POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	2	212330
2	1	513440
3	-	-
4	-	-
1 ➔ 4	-	**612217**

TAV.08 – A – / TABLE 08 – A -



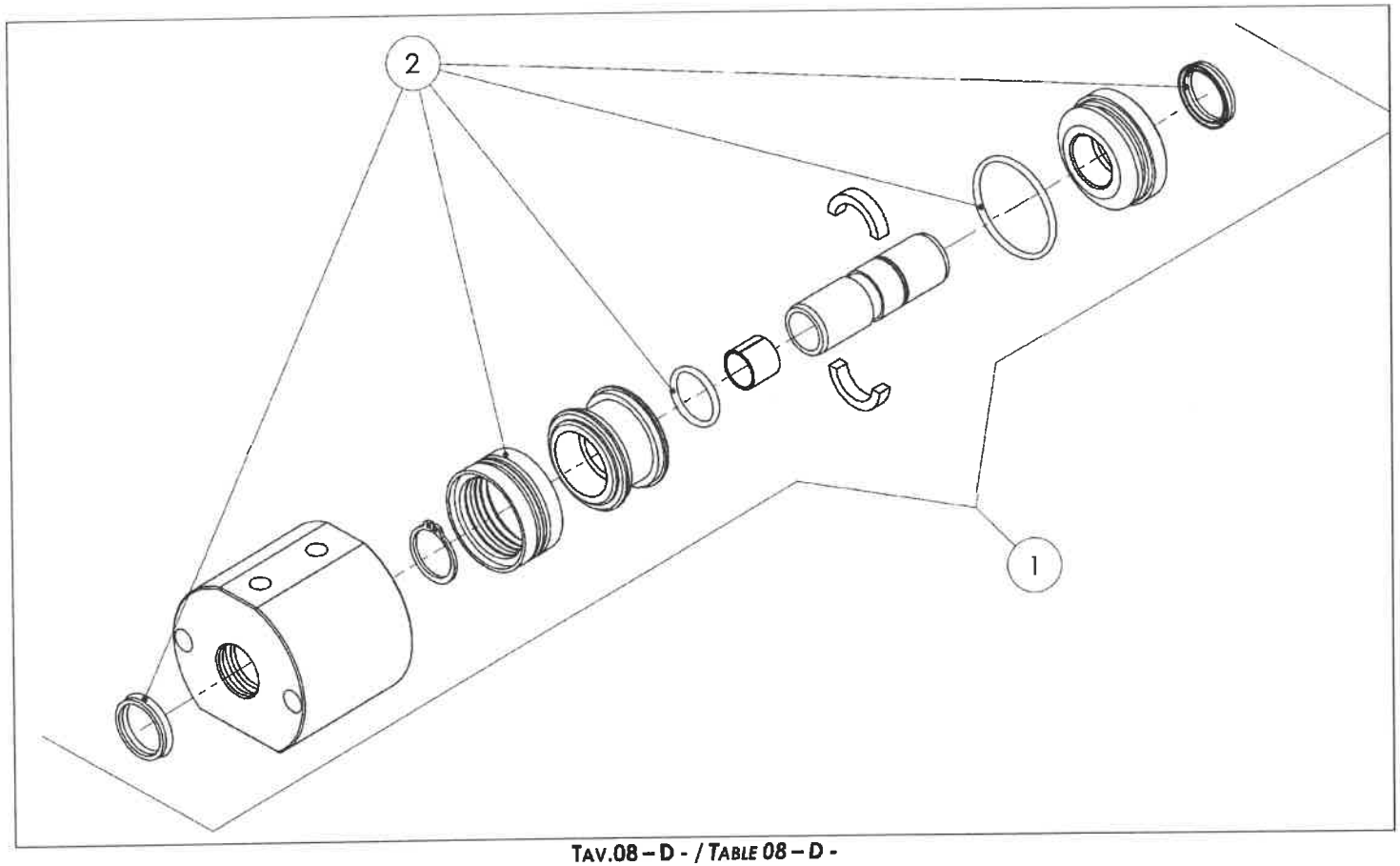
TAV.08 – B – / *TABLE 08 – B-*

POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	412590
2	1	510538
3	1	113815
4	2	212712
5	2	212367
6	1	511498
7	2	212431
8	1	112655
9	2	212451
1 → 2 + 4 → 9	-	**612768**



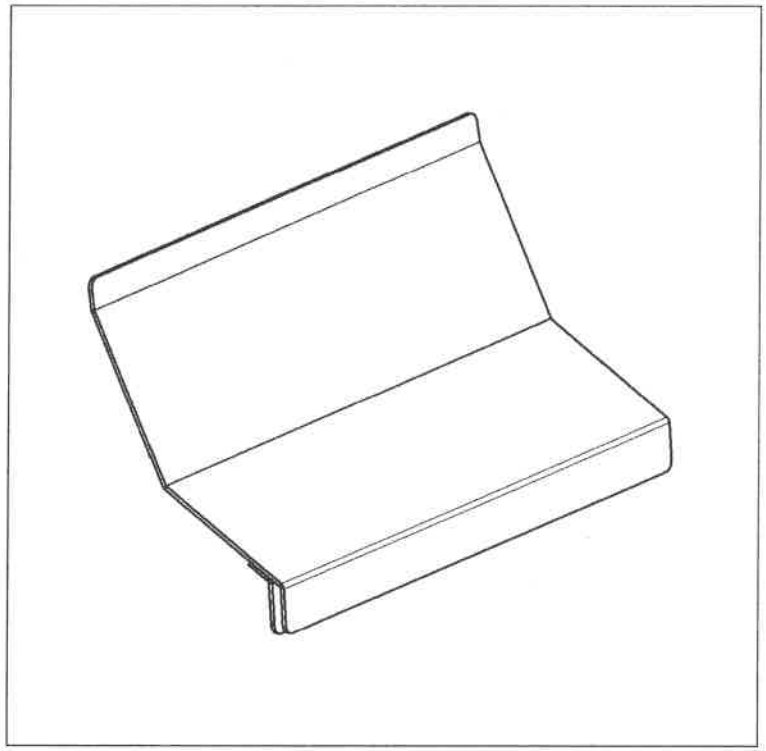
POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	TAV.08 – D –
2	2	412302
3	2	412301
4	2	413054
1 ➔ 3	-	**712130**

TAV.08 – C - / *TABLE 08 – C -*



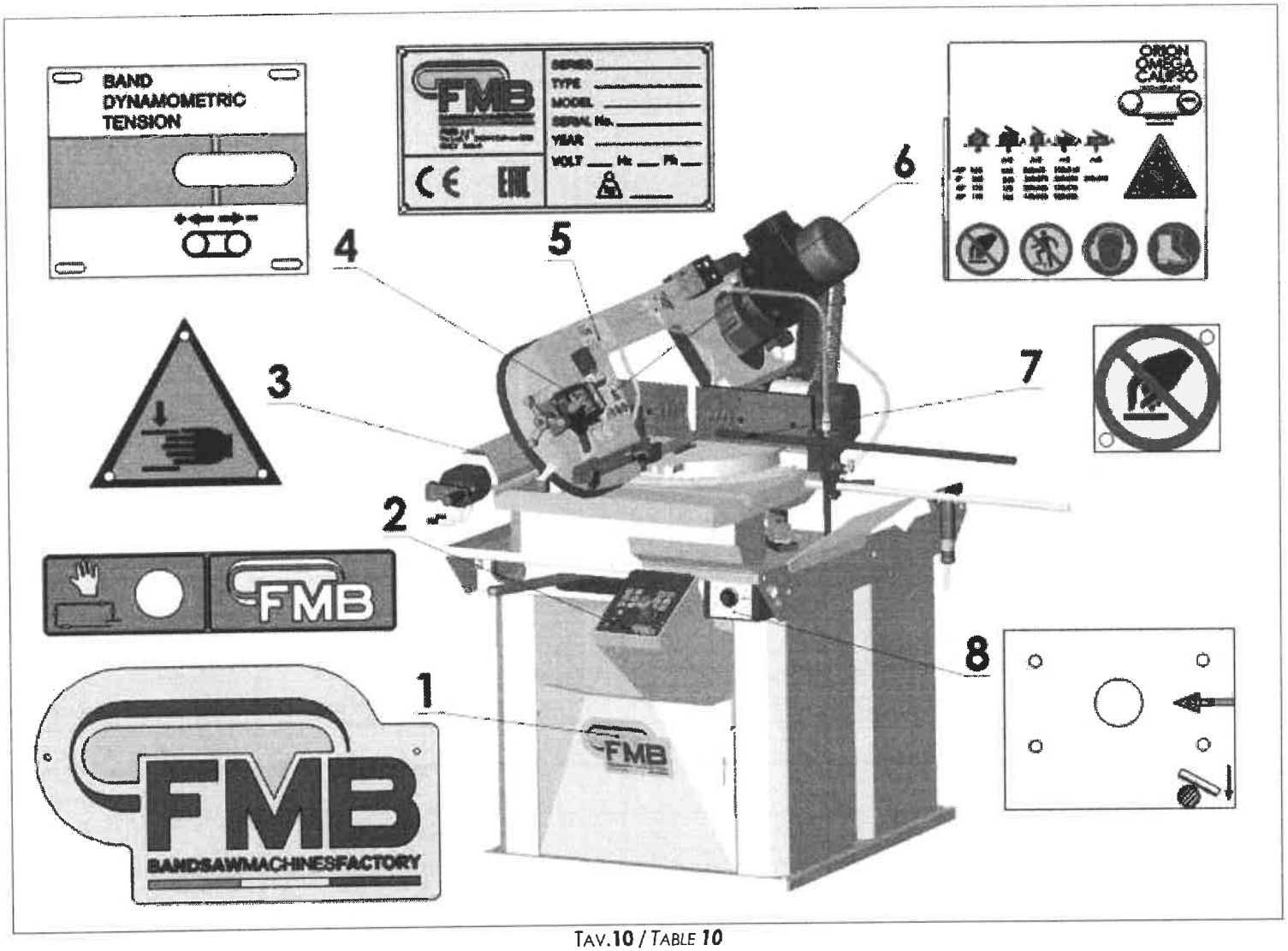
POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	-	**612680**
2	-	612681

TAV.08 – D - / *TABLE 08 – D -*



TAV.09 / TABLE 09

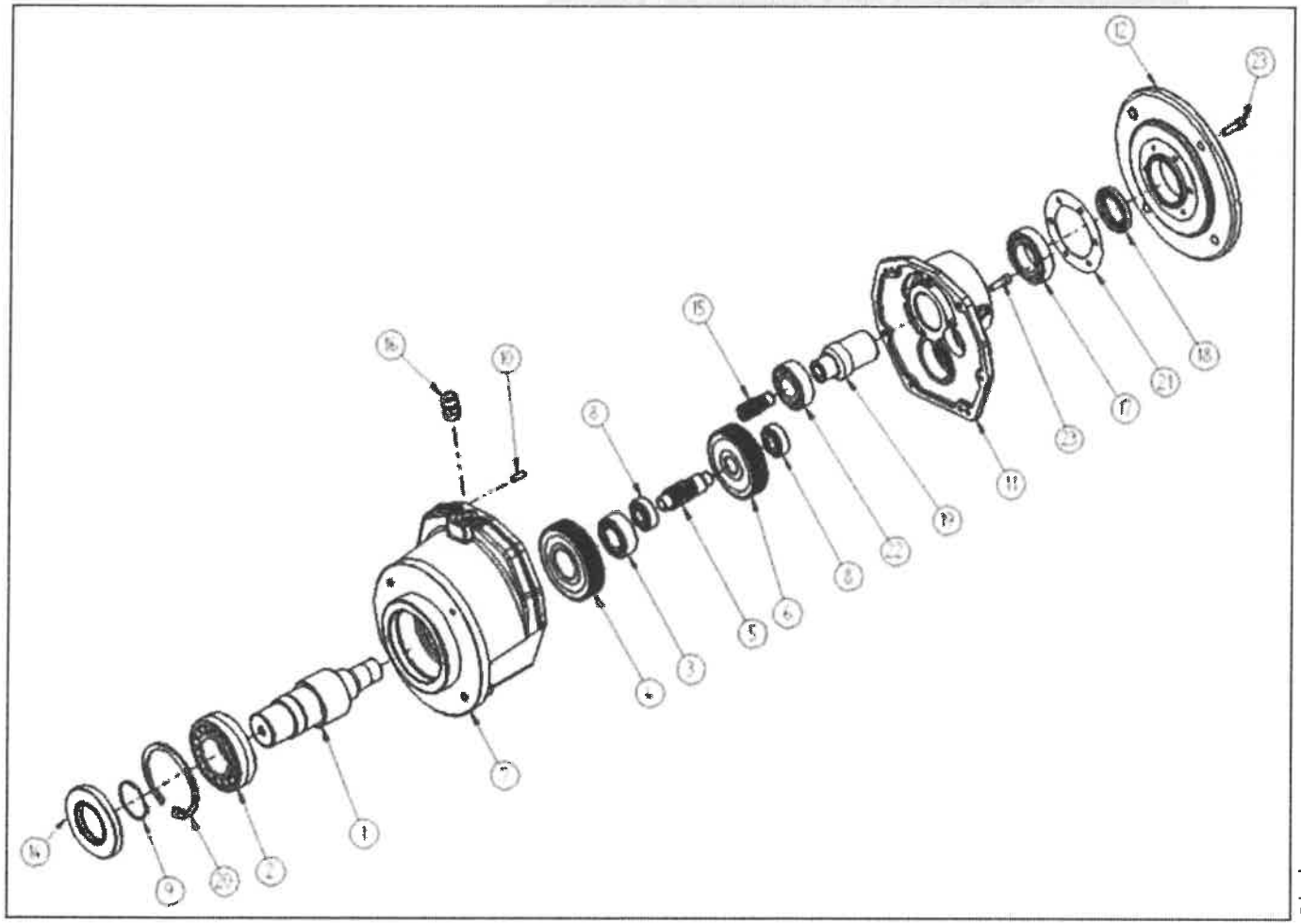
Q.TA'/ Q.TY	CODICE/ CODE
-	514101



POS.	CODICE/ CODE
1	413824
2	413020
3	412131
4	520210
5	413823
6	412924
7	412539
8	511364
9	412094

TAV.10 / TABLE 10

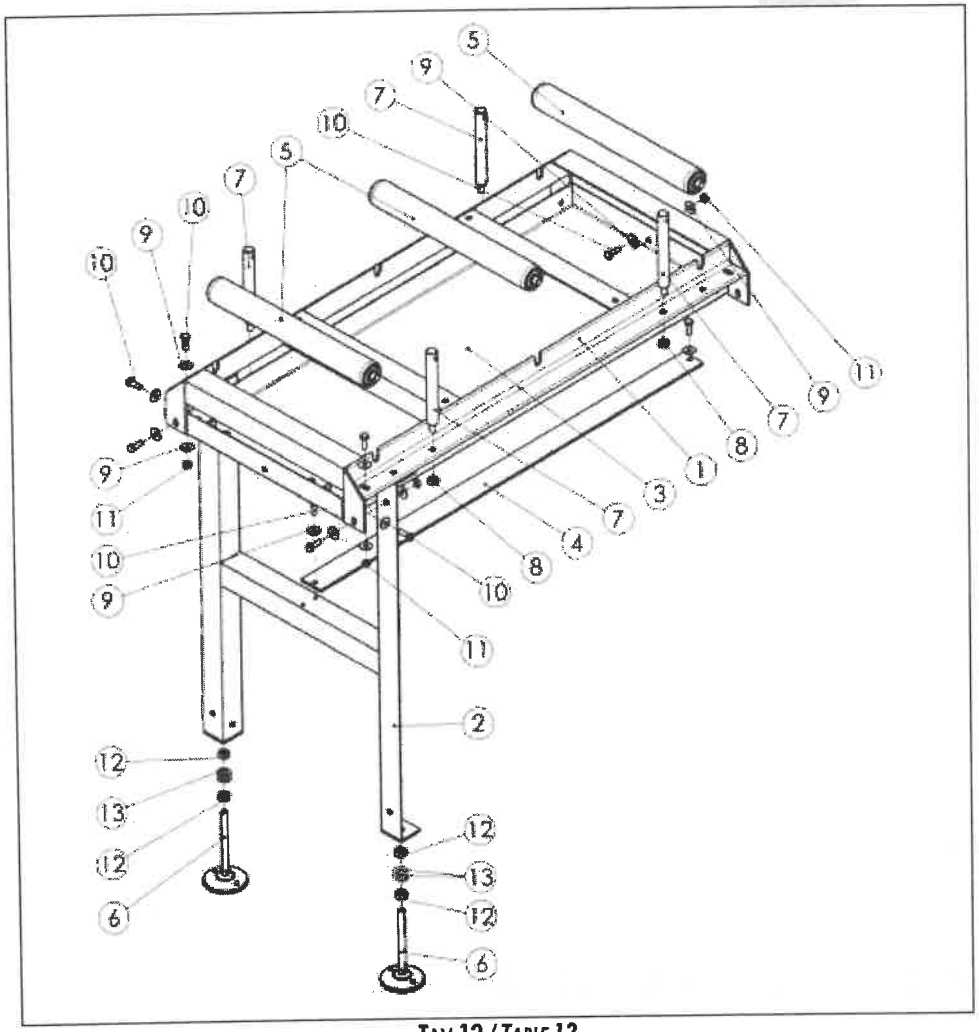
RIDUTTORE RP 888 - *RP 888 GEARBOX*



POS.	CODICE/ *CODE*
1+4	412073
2	312367
3	312368
5+6+8 (x2)	512109
7	511042
8	312369
9	312164
10	212434
11	514000
12	511046
14	312376
15+19	512178
16	412007
17	312375
18	312457
20	312177
21	412074
22	312377
23	212423
1 ➔ 23	**112494**

TAV.**11** / *TABLE **11***

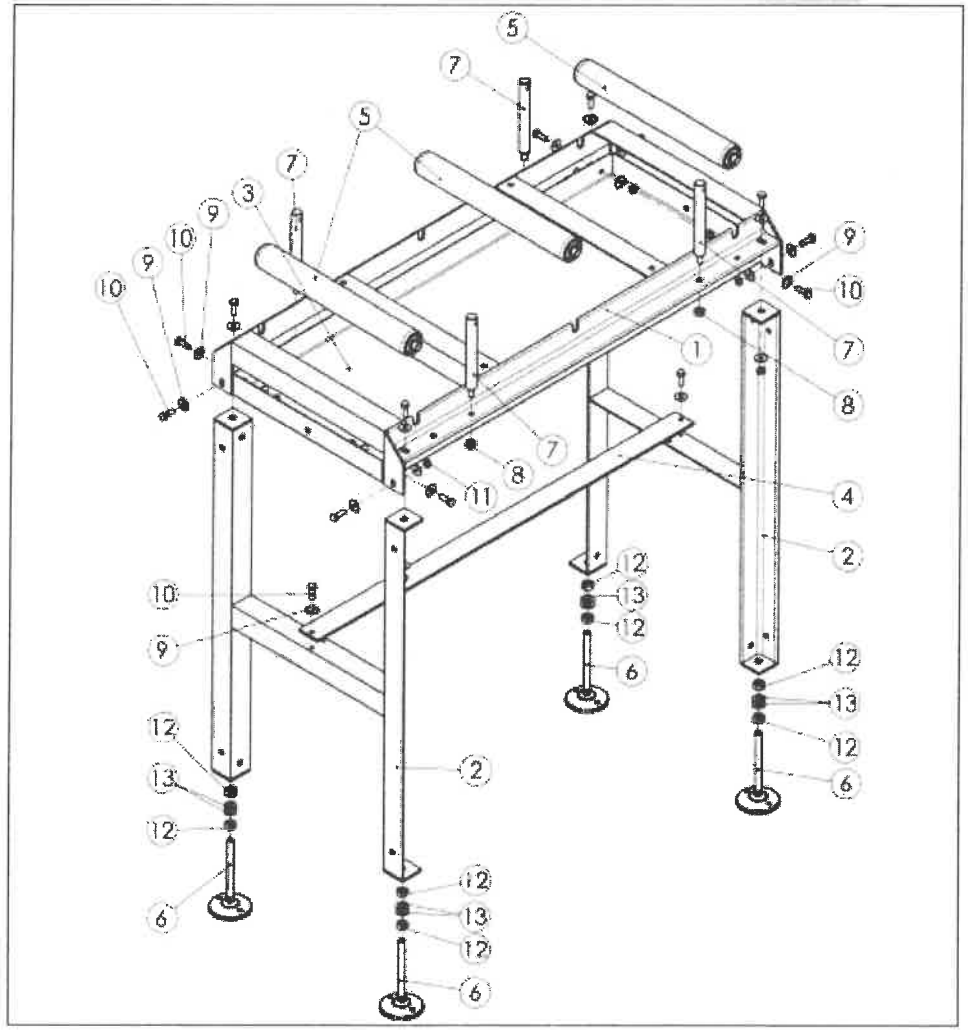
RE1G



TAV.12 / *TABLE 12*

POS.	Q.TA' / Q.TY	CODICE/ CODE
1	1	511401
2	1	511403
3	1	511404
4	1	511405
5	3	412265
6	2	112137
7	4	522112
8	4	212601
9	16	212748
10	9	212207
11	7	212602
12	4	212608
13	4	212707
1 → 13	-	**922127**

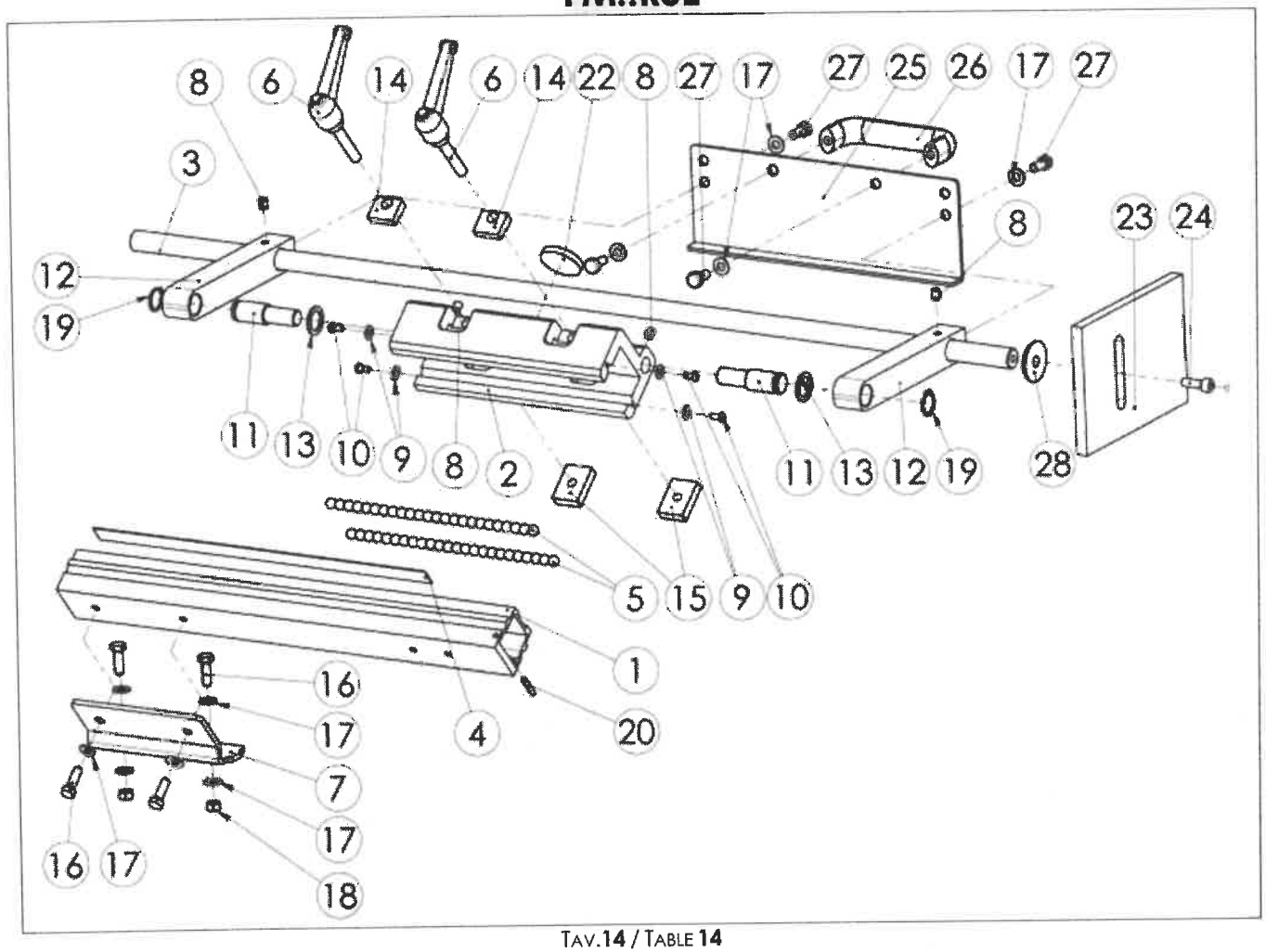
RE2G



TAV.13 / *TABLE 13*

POS.	Q.TA' / Q.TY	CODICE/ CODE
1	1	511401
2	2	511403
3	1	511404
4	1	511405
5	3	412265
6	4	112137
7	4	522112
8	4	212601
9	26	212748
10	14	212207
11	12	212602
12	8	212608
13	8	212707
1 ➔ 13	-	**922126**

FM..RSE

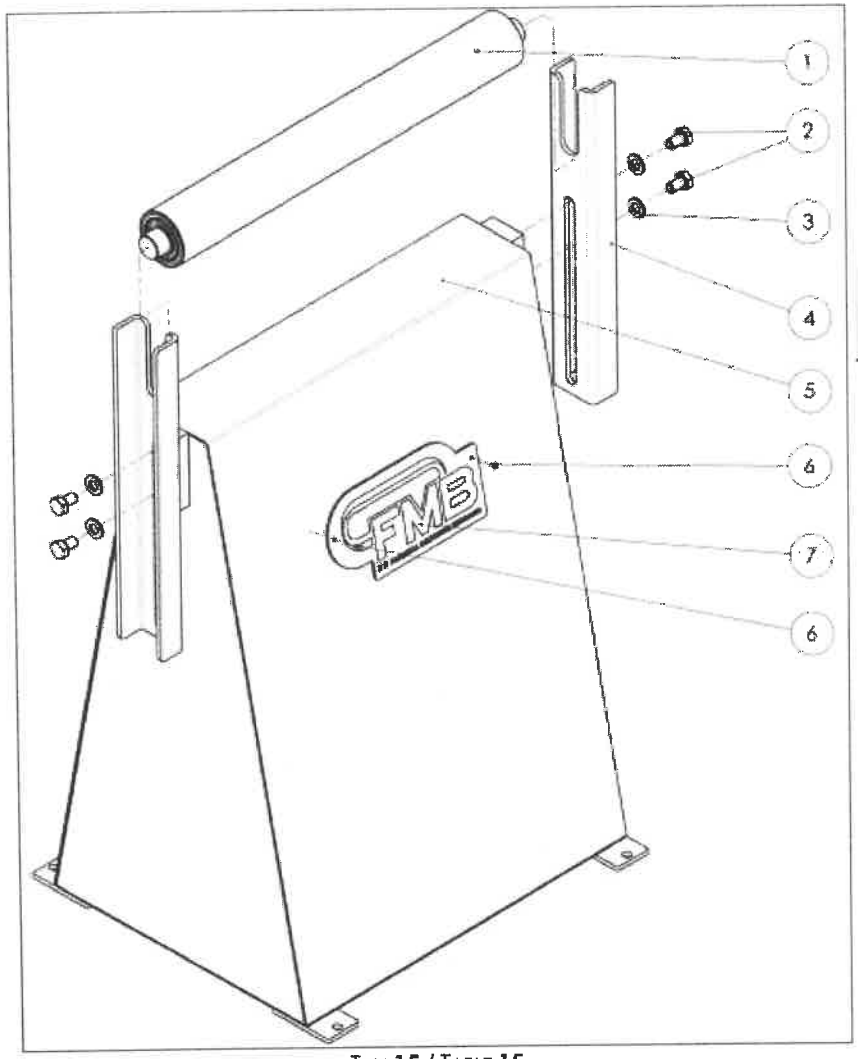


TAV.**14** / TABLE **14**

POS.	Q.TA'/ Q.TY	CODICE/ CODE	
1	1,5 m	512920	FM1RSE
	2,5 m		FM2RSE
	3,5 m		FM3RSE
	4,5 m		FM4RSE
	5,5 m		FM5RSE
	6,5 m		FM6RSE
2	1	526016	
3	1	512287	
4	1	412773	FM1RSE, FM2RSE, FM3RSE
		412416	FM4RSE, FM5RSE, FM6RSE
5	48	412205	
6	2	112153	
7	1	511406	FM1RSE
	2		FM2RSE
	3		FM3RSE
	4		FM4RSE
	5		FM5RSE
	6	+	FM6RSE
7	1	511408	FM1RSE, FM2RSE, FM3RSE, FM4RSE, FM5RSE, FM6RSE
8	4	212524	
9	4	212722	
10	4	212451	
11	2	512645	
12	2	526057	
13	2	212731	
14	2	512643	
15	2	512644	
16	10	212207	FM1RSE
	14		FM2RSE
	18		FM3RSE
	22		FM4RSE
	26		FM5RSE
	30		FM6RSE
17	10	212703	FM1RSE
	14		FM2RSE
	18		FM3RSE
	22		FM4RSE
	26		FM5RSE
	30		FM6RSE
18	4	212602	FM1RSE
	6		FM2RSE
	8		FM3RSE
	10		FM4RSE
	12		FM5RSE
	14		FM6RSE
19	2	312152	
20	2	212902	
21	2	212191	
22	1	526070	
23	1	526071	
24	1	212309	
25	1	526074	
26	1	112109	
27	2	212212	
28	1	513155	

POS.	CODICE/ CODE
FM1RSE	913251
FM2RSE	913252
FM3RSE	913253
FM4RSE	913254
FM5RSE	913255
FM6RSE	913256

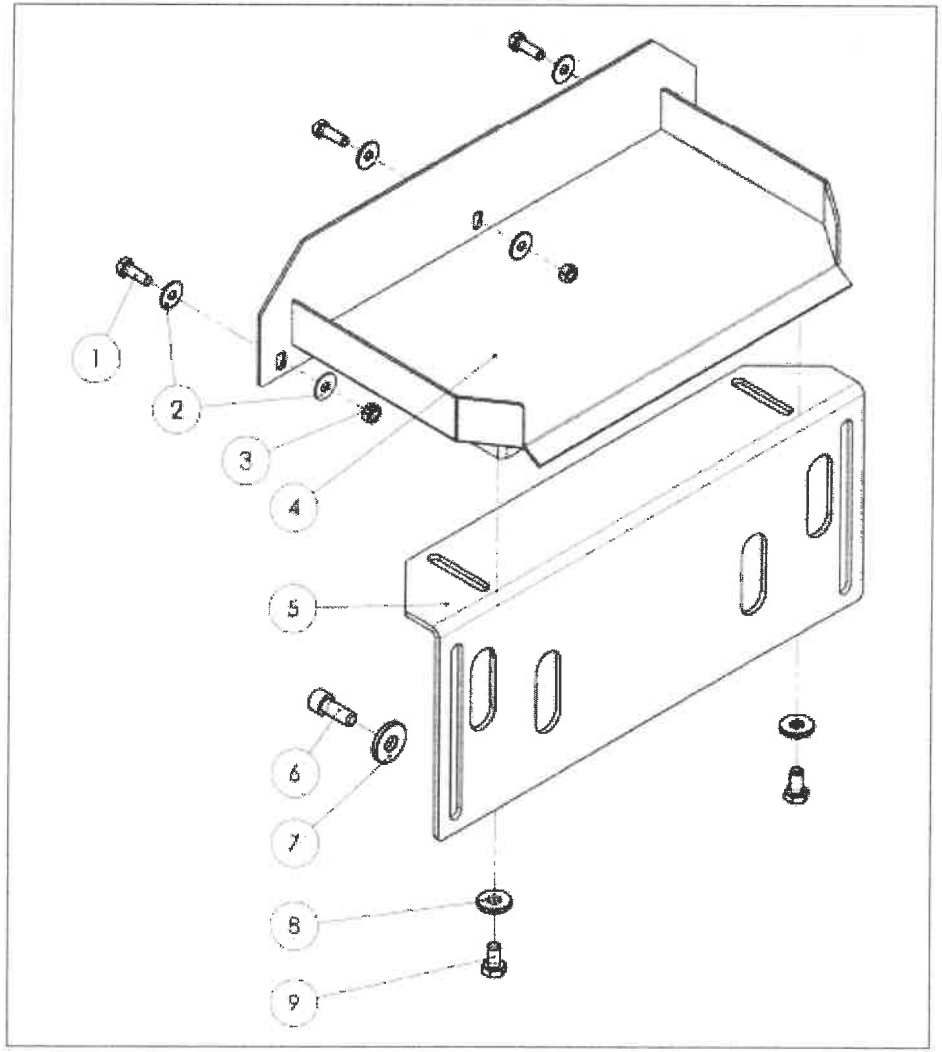
C2



POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	412198
2	4	212218
3	4	212707
4	2	512369
5	1	612580
6	2	212191
7	1	413031
1 → 5	-	**913104**

TAV.**15** / TABLE **15**

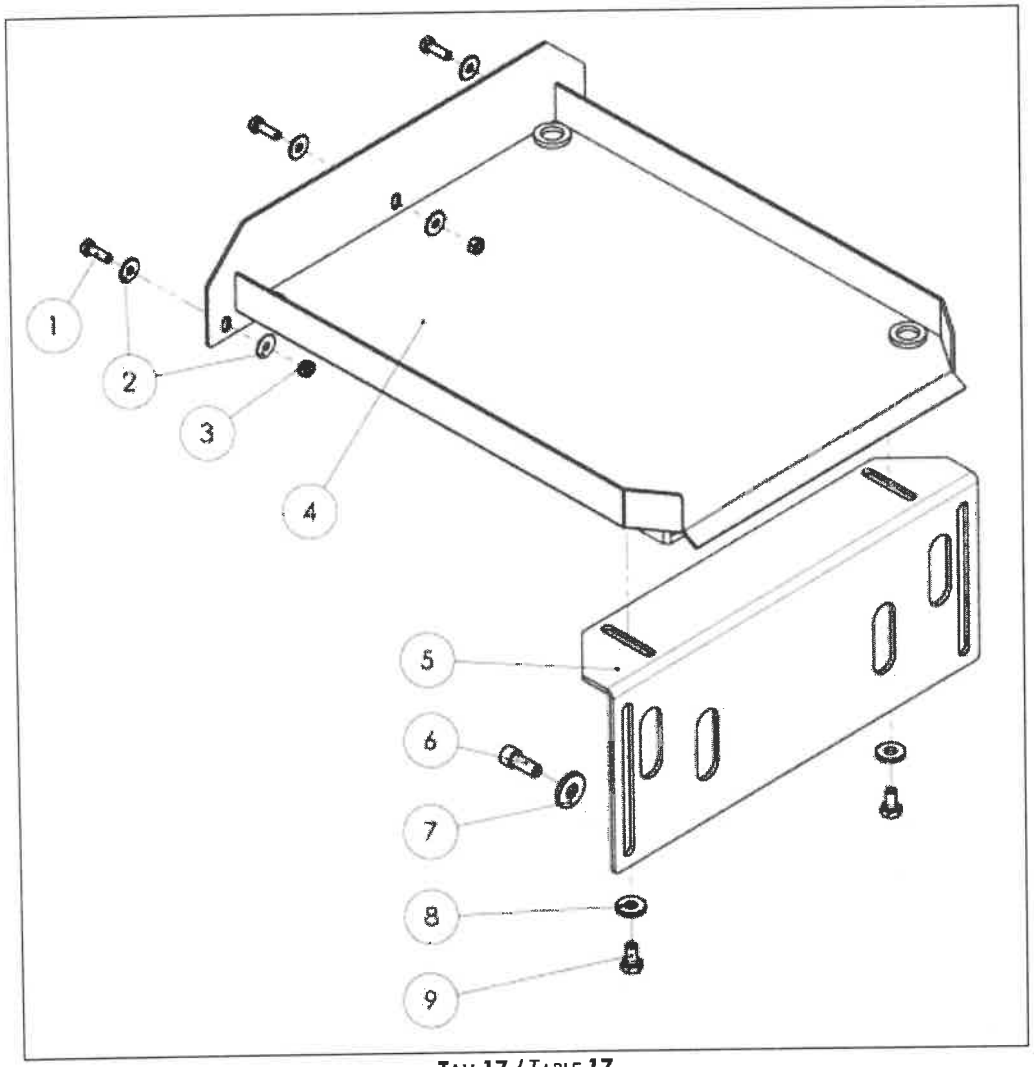
CREC



POS.	Q.TA' / Q.TY	CODICE/ CODE
1	1	511419
2	1	526115
3	2	213114
4	2	212263
5	3	212207
6	6	212748
7	3	212602
8	2	213112
9	2	212330
1 → 6	-	**613118**

TAV.**16** / *TABLE* **16**

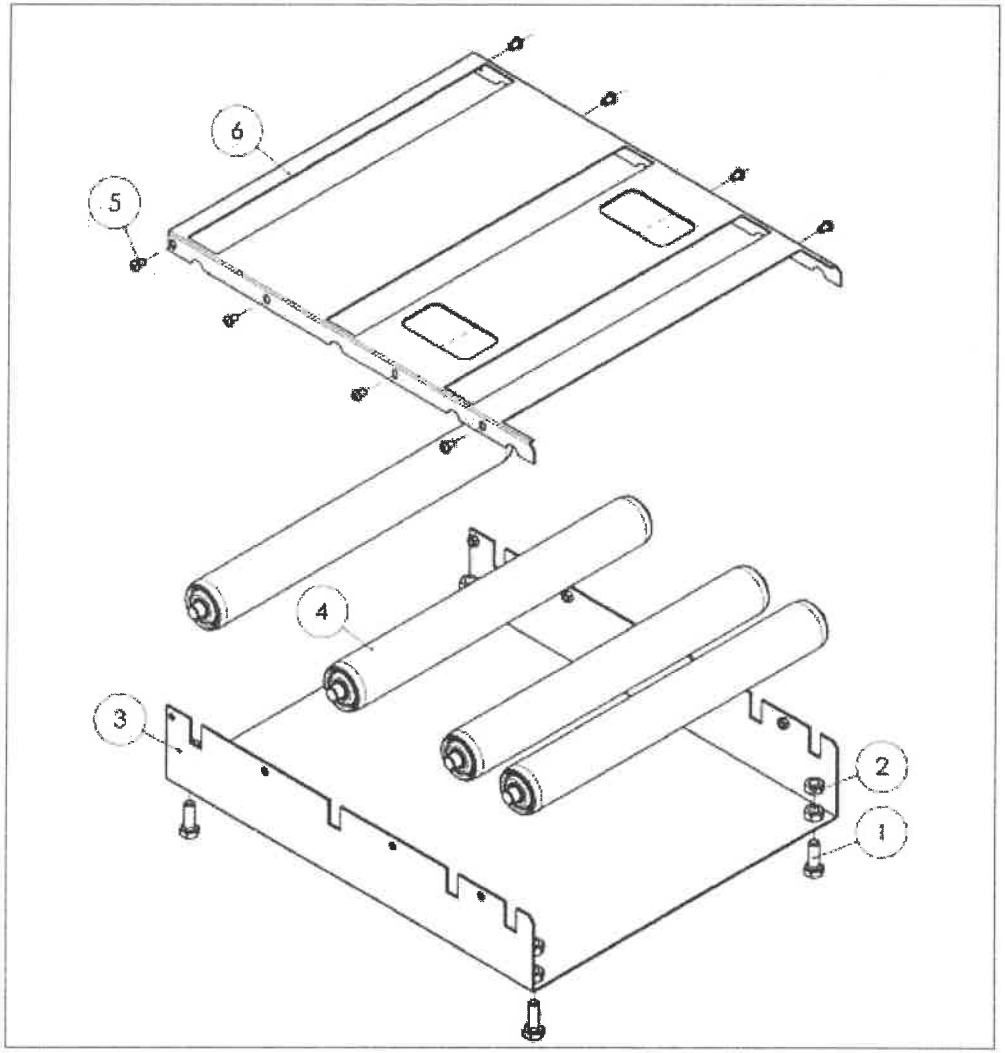
CRES



POS.	Q.TA' / Q.TY	CODICE/ CODE
1	1	511418
2	1	526115
3	2	213114
4	2	212263
5	3	212207
6	6	212748
7	3	212602
8	2	213112
9	2	212330
1 → 6	-	**613117**

TAV.17 / TABLE 17

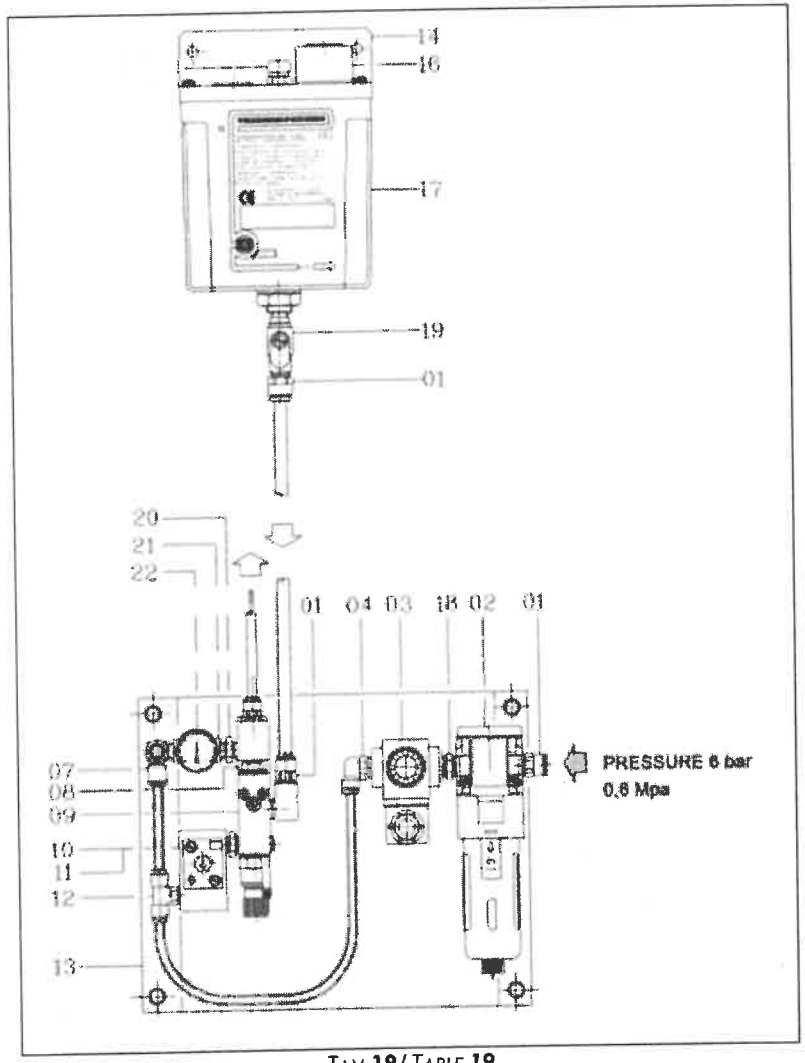
RRS



POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	4	212241
2	4	212601
3	1	526118
4	4	412265
5	8	212453
6	1	526119
1 → 6	-	**922116**

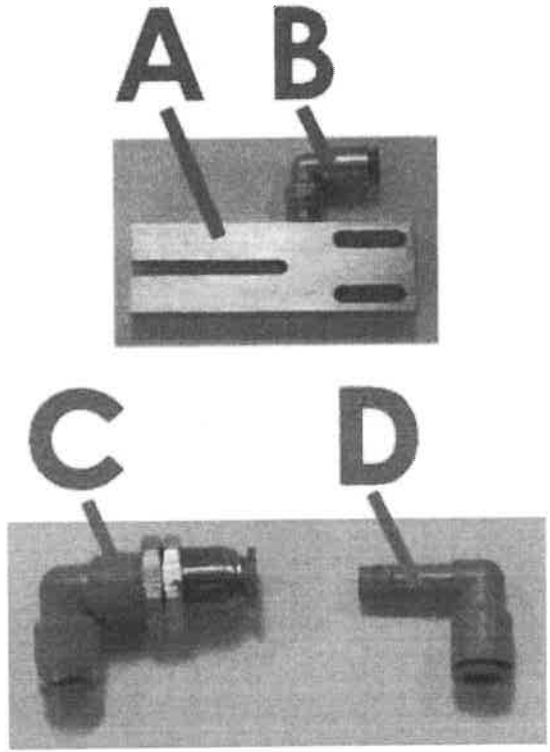
TAV.**18** / *TABLE* ***18***

NB1



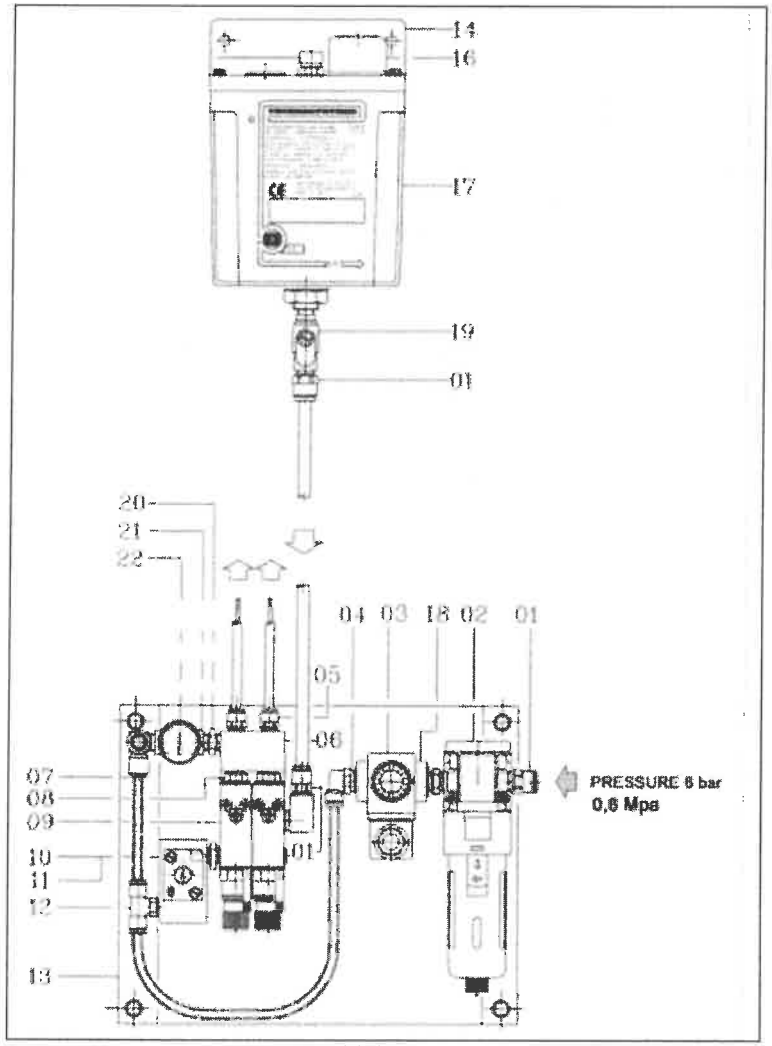
TAV.19/ TABLE 19

POS.	CODICE/ CODE
1	411030
2	411020
3	411006
4	411031
7	411028
9	411016
10	411011
11	411012
12	411027
13	411026
16	411003
17	413554
18	411009
19	412440
20	412447
21	412448
22	412449



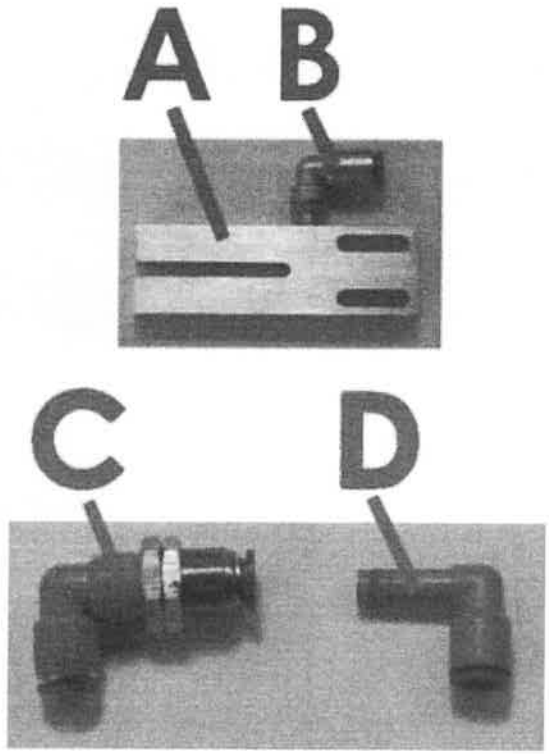
POS.	CODICE/ CODE
A	412396
B	413521
C	413041
D	413042

NB2



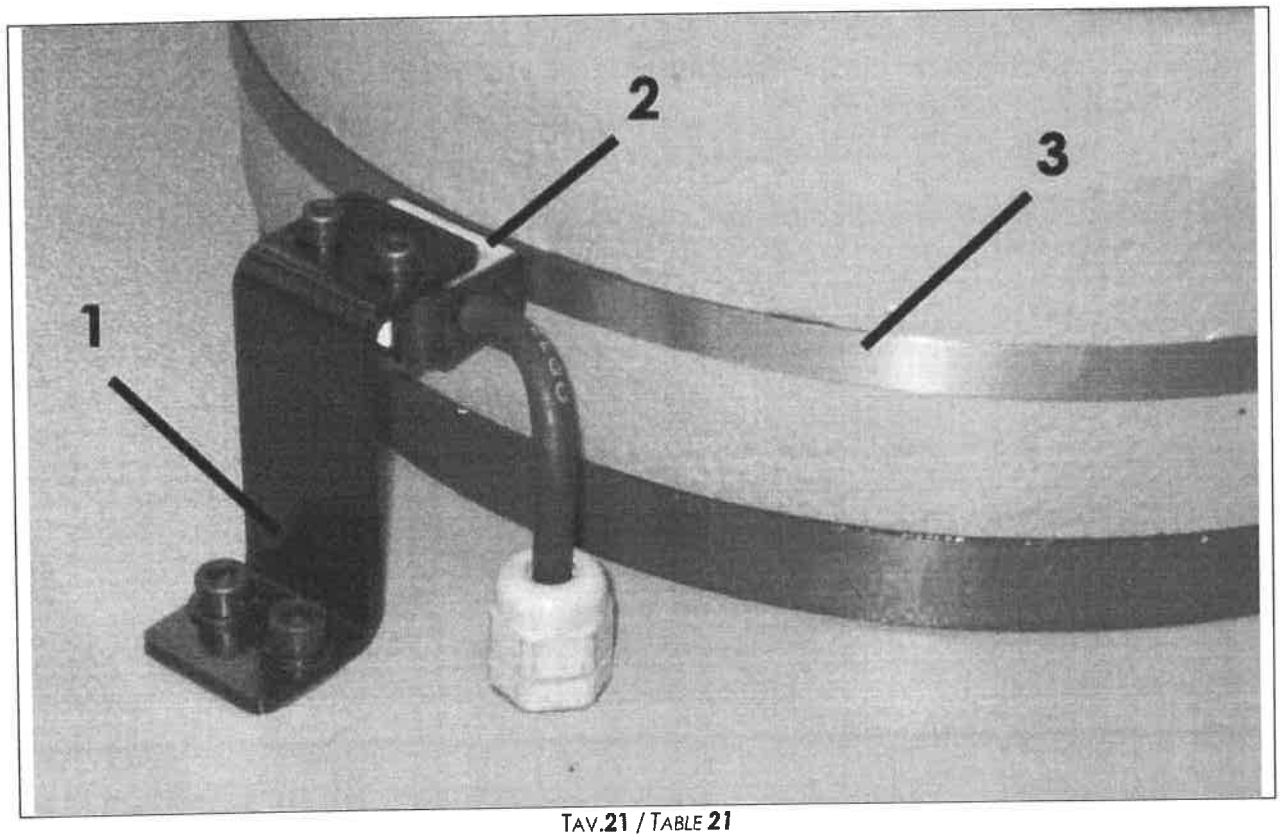
TAV.**20** / *TABLE* **20**

POS.	CODICE/ *CODE*
1	411030
2	411020
3	411006
4	411031
5	411029
6	411028
9	411016
10	411011
11	411012
12	411027
13	411026
16	411003
17	413554
18	411009
19	412440
20	412447
21	412448
22	412449



POS.	CODICE/ *CODE*
A	412396
B	413521
C	413041
D	413042

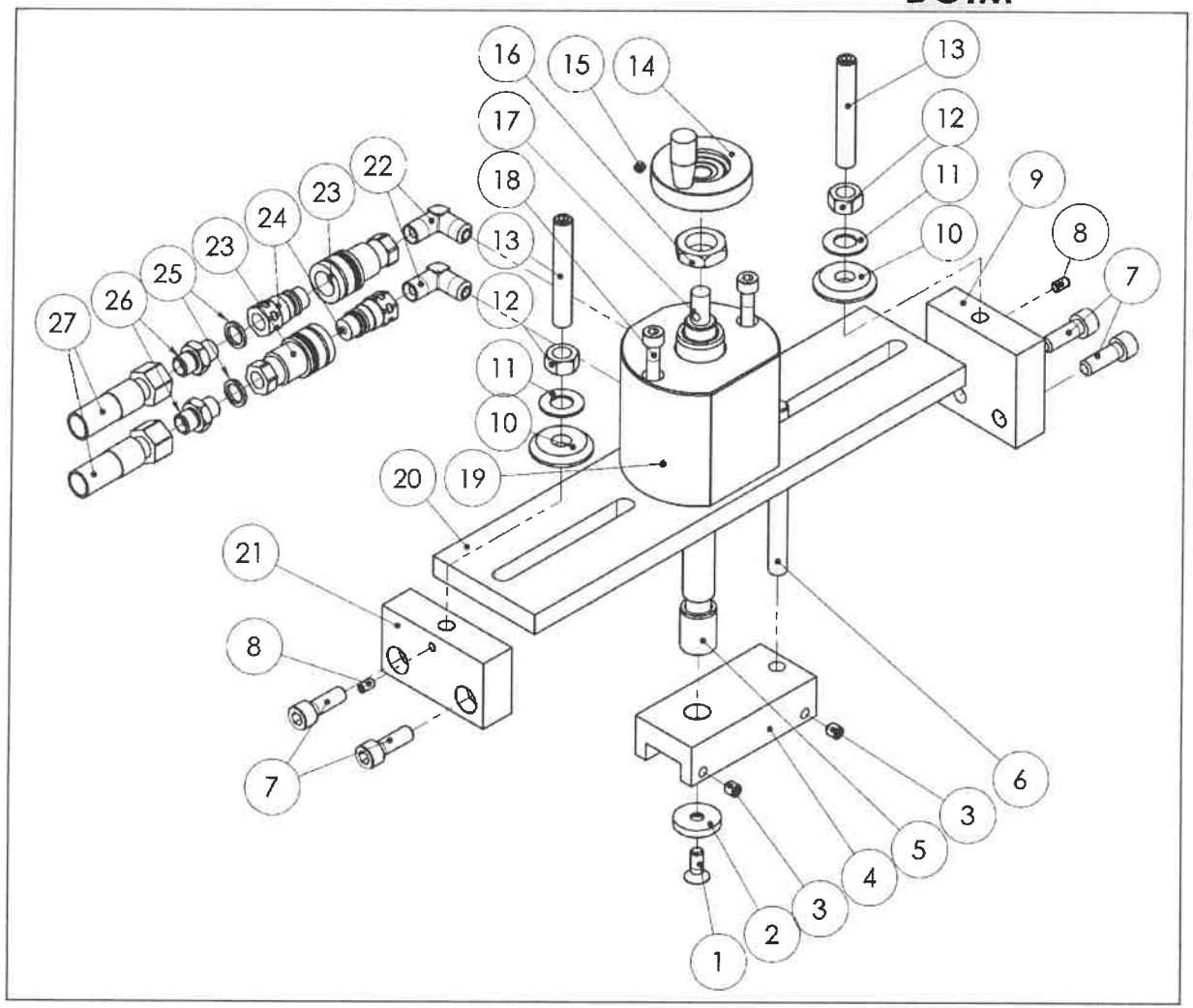
VAT



TAV.21 / TABLE 21

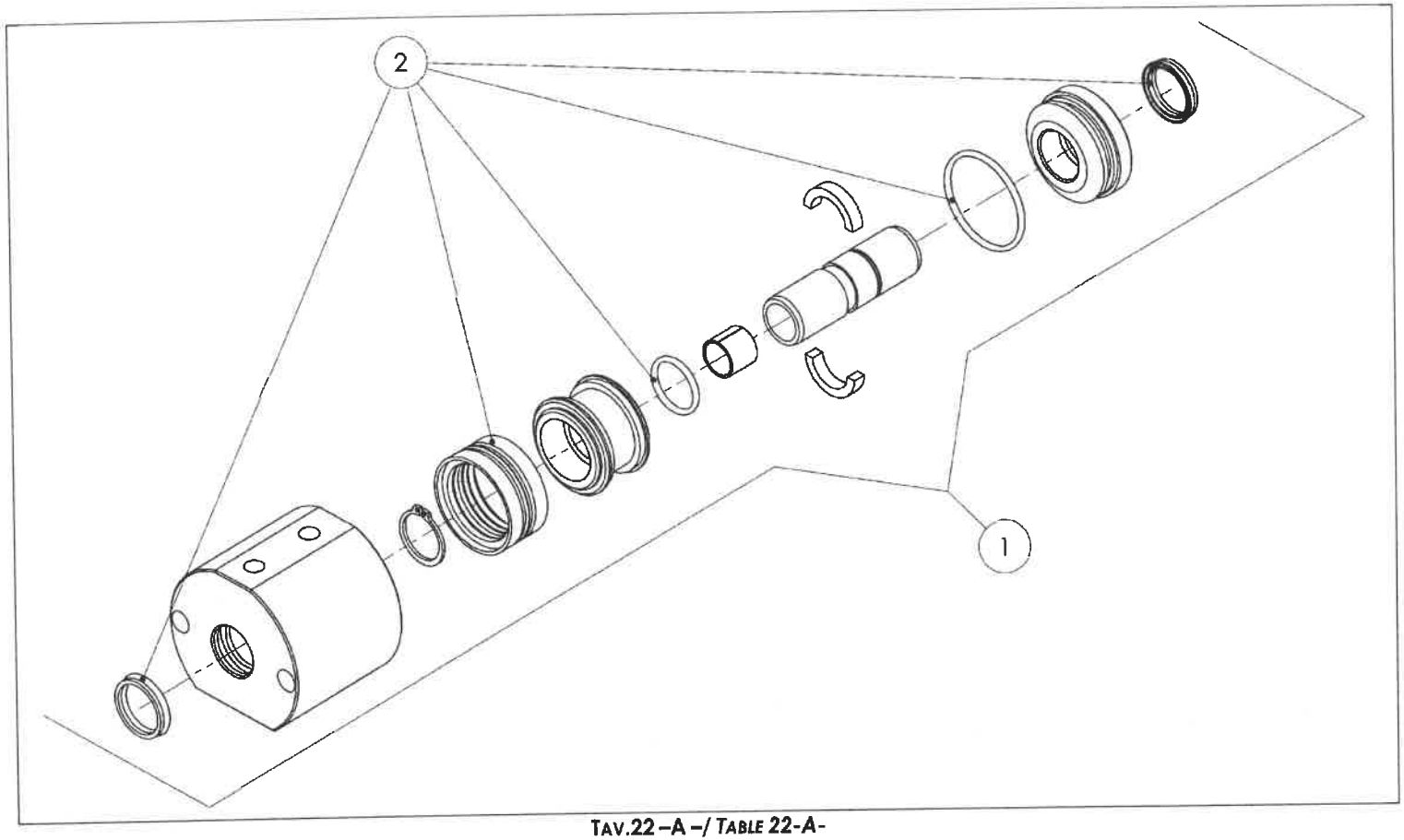
POS.	CODICE/ CODE
1	514156
2	113816
3	113726
1 → 3	**913153**

DOTM



TAV.22 / TABLE 22

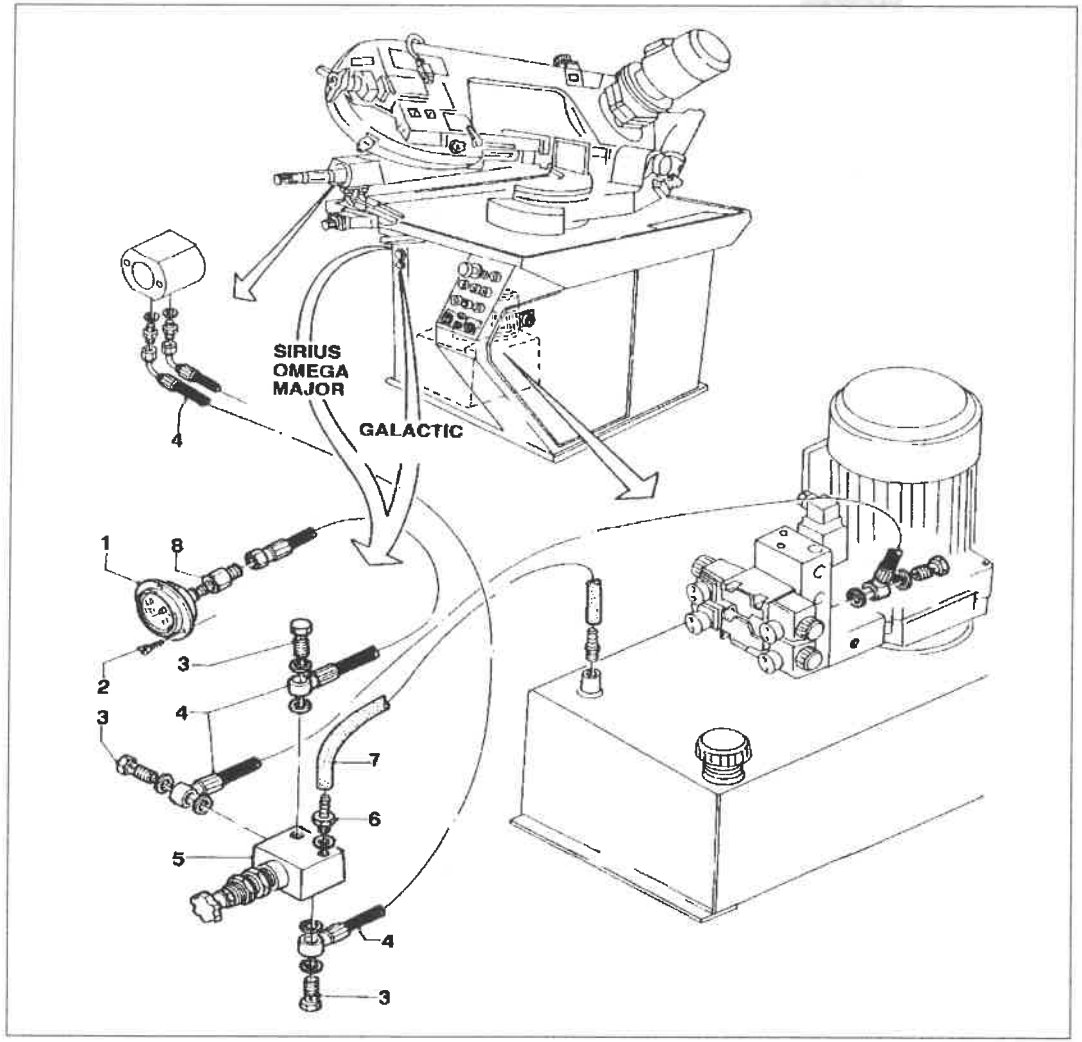
POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	212405
2	1	512370
3	2	212501
4	1	520422
5	1	412468
6	1	520426
7	4	212303
8	2	212509
9	1	520415
10	2	512328
11	2	212721
12	2	212608
13	2	212503
14	1	112102
15	1	212555
16	1	212614
17	1	520424
18	2	212321
19	1	TAV.22-A- / TABLE 22-A
20	1	520405
21	1	520416
22	2	413121
23	2	413164
24	2	413124
25	2	412302
26	2	412301
27	2	413380
1 → 27	-	913051



POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	-	**612680+412468**
2	-	612681

TAV.22 –A –/ TABLE 22-A-

RPM1



POS.	CODICE/ CODE
1	412407
2	212151
3	412305
4	612298
5	413825
6	412191
7	412167
8	413122
1 → 8	**913003**

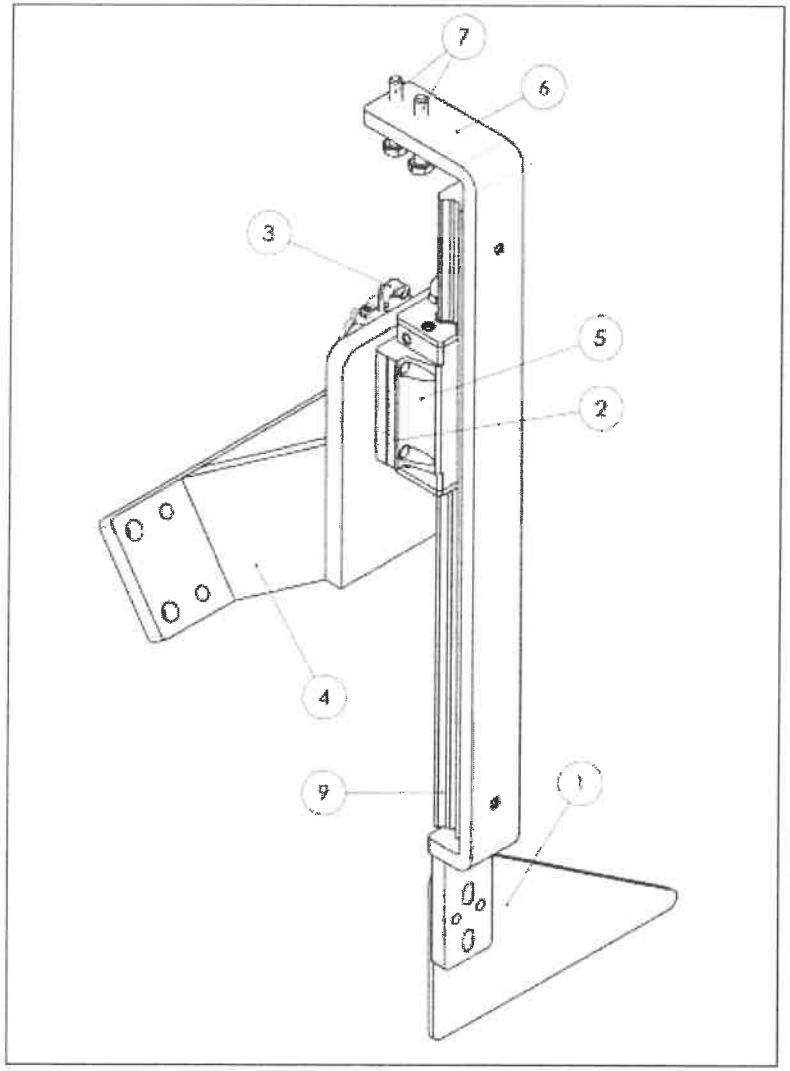
TAV.23 / *TABLE 23*

SENS

TAV.24 / TABLE 24

POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	113035
2	2	112423
1 → 2	-	**913155**

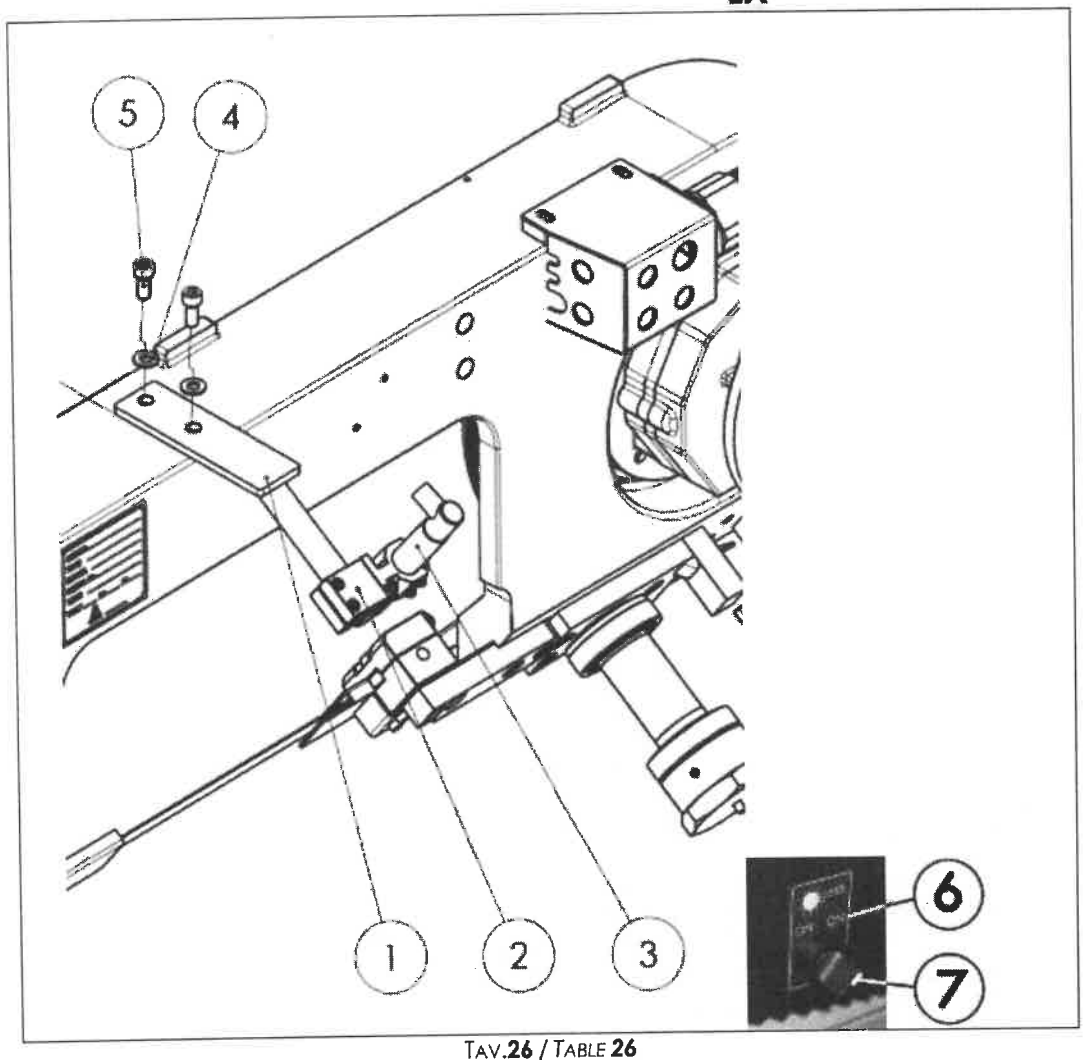
TM



TAV.**25** / *TABLE* **25**

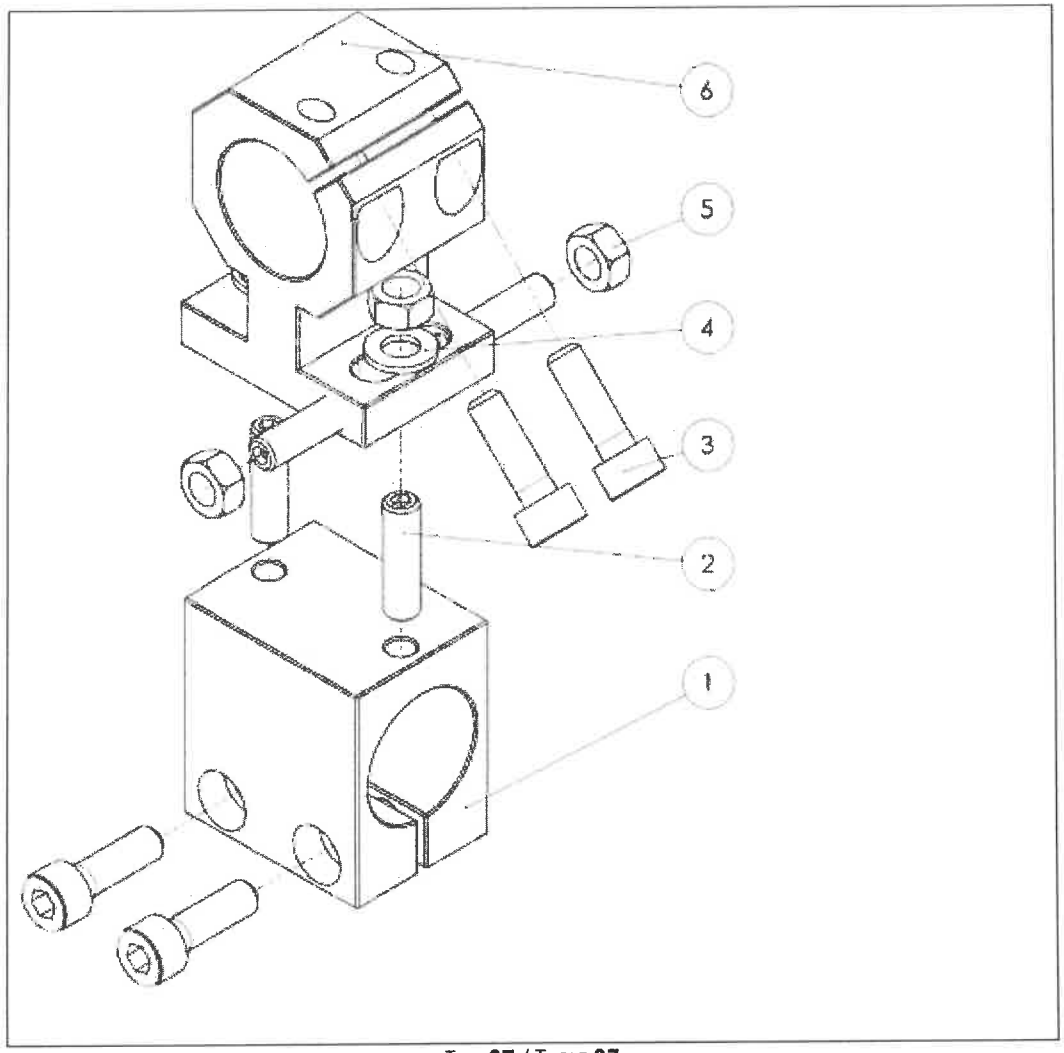
POS.	Q.TA' / Q.TY	CODICE/ CODE
1	1	512507
2	1	112415
3	1	112353
4	1	512856
5	1	528052
6	1	512857
7	2	212276
8	2	212301
9	1	512501
10	2	212712
11	4	212703
12	4	212309
13	2	212363

LX



TAV.26 / TABLE 26

POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	511809
2	1	TAV.27
3	1	113872
4	2	212703
5	2	212306
6	1	412832
7	1	613057



TAV.27 / TABLE 27

POS.	Q.TA'/ Q.TY	CODICE/ CODE
1	1	511744
2	4	213049
3	4	212312
4	2	212702
5	4	212618
6	1	511745
1 → 6	-	**613230**