THOMAS

USE AND MAINTENANCE MANUAL

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Here at Trick Tools we believe that our customers deserve the best value in their tool and equipment purchases. We are constantly at work searching out a variety of high quality, high performance tools to offer at the best prices possible. Our commitment to you is that we will not offer “cheap junk” anywhere on our website. You, the customer, help us to evaluate our products constantly and as soon as an ongoing quality issue is uncovered we will correct it or discontinue that product immediately. We hope to earn your continued trust.

Certificate of Conformity

We hereby certify that the Metal Sawing Machine described on the frontpage of this manual was manufactured according to the following directives as far as the safety and health of users is concerned

EC-Directives
EC-Machines Directive (2006/42/EC)
EMV-Directive (2004/108/EC), (2002/44/EC)
Direttiva Comando a Bassa Tensione 2006/95/EC

Harmonised Regulations
DIN EN ISO 12100: 2011-03
EN 60204, Art 1

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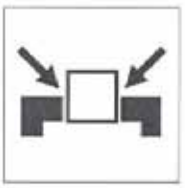
Lesen Sie die Sicherheitshinweise und die Betriebsanleitung aufmerksam und vollständig durch!
Read the safety instructions and operating instructions carefully and thoroughly!

Augenschutz tragen!
Keep eyes protected!

Gehörschutz tragen!
Keep ears protected!

Geeignete Arbeitskleidung tragen!
Wear suitable working clothes!

Tragen sie bei langen Haaren ein Haarnetz!
Wear protective hair covering to contain long hair!



Werkstücke sicher spannen!
Secure workpieces firmly!

Vor umlaufenden Teilen schützen!
Take care of rotating parts!

Bei Wartungs- und Instandhaltungsarbeiten grundsätzlich den Netzstecker ziehen!
In case of maintenance and service work disconnect from mains!

Contents

Ordering spare parts

- When ordering spare parts you must state:
  MACHINE MODEL
  SERIAL NUMBER
  PART REFERENCE NUMBER

Without these references WE WILL NOT SUPPLY the spares. See point 10.1 - list of spare parts -

Guarantee

- The Company guarantees that the machine to which this manual refers has been designed and built to comply with safety regulations and that it has been tested for functionality in the factory.
- The machine is guaranteed for 12 months: the guarantee does not cover the electric motors, electric components, pneumatic components or any damage due to dropping or to bad machine management, the failure to observe maintenance standards or bad handling by the operator.
- The buyer has only the right to replacement of the faulty parts, while transport and packing costs are at his expense.
- The serial number on the machine is a primary reference for the guarantee, for after-sales assistance and for identifying the machine for any necessity.

1 REFERENCE TO ACCIDENT- PREVENTION REGULATIONS

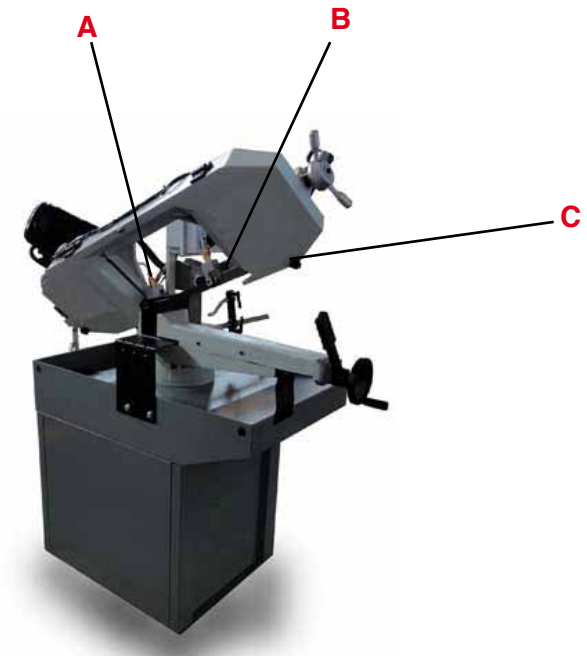
This machine has been built to comply with the national and community accident-prevention regulations in force. Improper use and/or tampering with the safety devices will relieve the manufacturer of all responsibility.

1.1 - Advice for the operator

- Check that the voltage indicated on the plate, normally fixed to the machine motor, is the same as the line voltage.
- Check the efficiency of your electric supply and earthing system; connect the power cable of the machine to the socket and the earth lead (yellow-green in colour) to the earthing system.
- When the saw frame is in suspend mode (up) the toothed blade must not move.
- Only the blade section used for cutting must be kept unprotected. Remove guarding by operating on the adjustable head.
- It is forbidden to work on the machine without its shields (these are all blue or grey in colour).
- Always disconnect the machine from the power socket before blade change or carrying out any maintenance job, even in the case of abnormal machine operation.
- Always wear suitable eye protection.
- Never put your hands or arms into the cutting area while the machine is operating.
- Do not shift the machine while it is cutting.
- Do not wear loose clothing with sleeves that are too long, gloves that are too big, bracelets, chains or any other object that could get caught in the machine during operation; tie back long hair.
- Keep the area free of equipment, tools or any other object.
- Perform only one operation at a time and never have several objects in your hands at the same time. Keep your hands as clean as possible.
- All internal and/or internal operations, maintenance or repairs, must be performed in a well-lit area or where there is sufficient light from extra sources so as to avoid the risk of even slight accidents.

1.2 - Location of shields against accidental contact with the tool

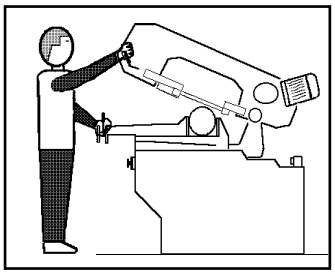
- Blue, grey right and left hand metal shields, fastened with screws onto the guide blade stationary head (REF. A).
- Blue or grey metal shield fastened with screws onto the blade guide adjustable head, ensures covering of blade section not used in cutting operation (REF. B).
- Grey metal guard, fastened with knobs onto the saw frame, to protect from flywheels (REF. C).



2 RECCOMENDATIONS AND ADVICE FOR USE

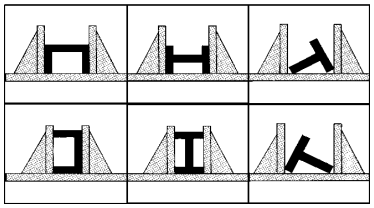
2.1 - Recommendations and advice for using the machine

- The machine has been designed to cut metal building materials, with different shapes and profiles, used in workshops, turner's shops and general mechanical structural work.
- Only one operator is needed to use the machine, that must stand as shown in the picture.



- Before starting each cutting operation, ensure that the part is firmly gripped in the vice and that the end is suitably supported.

These figures show examples of suitable clamping of different section bars, bearing in mind the cutting capacities of the machine in order to achieve a good efficiency and blade durability.



- Do not use blades of a different size from those stated in the machine specifications.
- If the blade gets stuck in the cut, release the running button immediately, switch off the machine, open the vice slowly, remove the part and check that the blade or its teeth are not broken. If they are broken, change the tool.
- Check saw frame return spring to ensure proper balancing.
- Before carrying out any repairs on the machine, consult the dealer or apply to Sthemma Srl.

3 TECHNICAL DATA

3.1 - Cutting Capacity and Technical Data

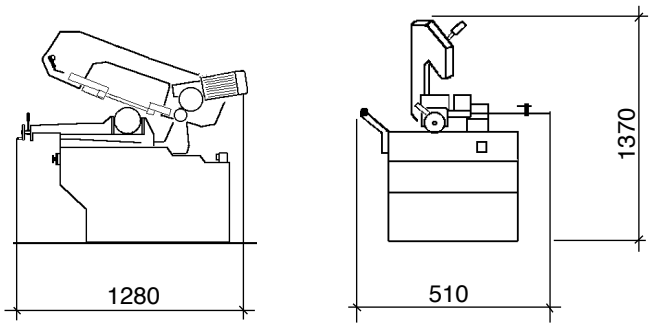
Round 0° ..... ø mm 180
Round 45° ..... ø mm 115
Round 60° ..... ø mm 70

Square 0° ..... mm 180x180
Square 45° ..... mm 110x110
Square 60° ..... mm 70x70

Technical Data

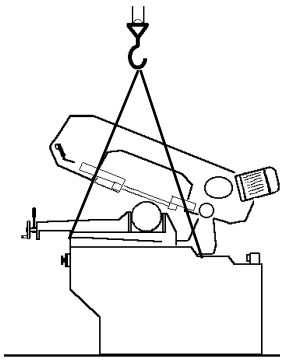
Electric Motor ..... kW 0,37/0,75
Electropump, Coolant Liquid ..... kW 0,07
Sawband, Dimensions..... mm 2095x20x0,9
Flywheel, Diameter..... mm 270
Sawband, Cutting Speed..... m/min 35/70
Vice Opening..... mm 215
Working Table, Heigth ..... mm 970
Mitre cutting..... 45°÷ 60°
Machine-Dimensions..... mm 1280x510x1370
Machine-Weight..... kg.180
Voltage..... V 400
Frequency..... Hz 50
Max. power Absorption..... A 2,5
Coolant tank, Capacity ..... l 16

4 MACHINE DIMENSIONS TRANSPORT INSTALLATION DISMANTLING



4.2 - Transport and handling of the machine

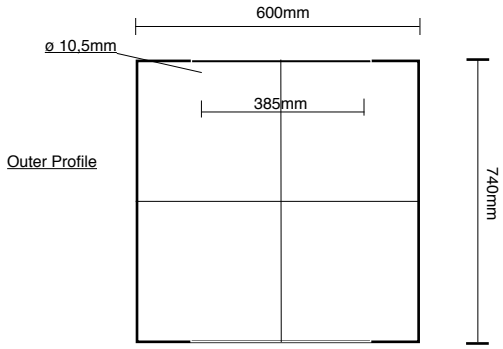
If the machine has to be shifted in its own packing, use a fork-lift truck or sling it with straps as illustrated.



4.3 - Minimum requirements for the premises housing the machine

- Mains voltage and frequency complying with the machine motor characteristics.
- Environment temperature from -10 °C to +50 °C.
- Relative humidity not over 90%.

4.4 - Anchoring the machine

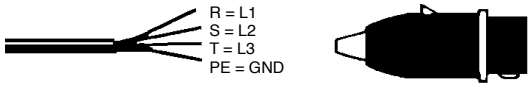


- Position the machine on a firm cement floor, maintaining, at the rear, a minimum distance of 800 mm from the wall; anchor it to the ground as shown in the diagram, using screws and expansion plugs or tie rods sunk in cement, ensuring that it is sitting level.

4.5 - Instructions for electrical connection

- The machine is not provided with an electric plug, so the customer must fit a suitable one for his own working conditions:

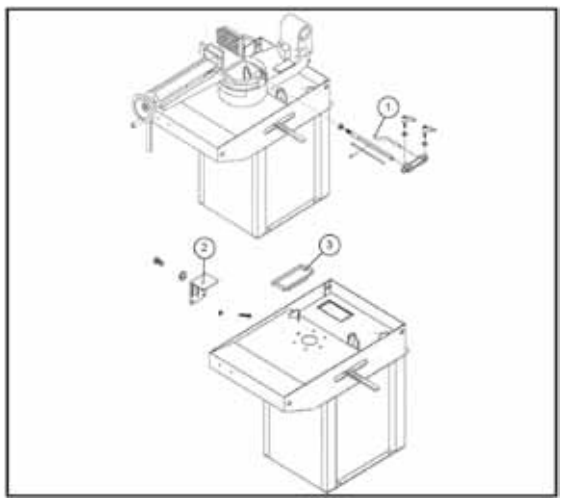
1 - WIRING DIAGRAM FOR 4-WIRE SYSTEM FOR THREE-PHASE MACHINE - SOCKET FOR A 16A PLUG



4.6 - Instructions for assembly of the loose parts and accessories

See following picture

1) Mount Bar-Stop n.1.
2) Material-Support n.2 should be set according to working table level and fixed to the position.
3) Splash-Guard n.3 should be set in place to avoid coolant liquid dropping down to the floor.



4.7 - Disactivating the machine

- If the sawing machine is to be out of use for a long period, it is advisable to proceed as follows:

1) detach the plug from the electric supply panel
2) loosen blade
3) release the arch return spring
4) empty the coolant tank
5) carefully clean and grease the machine
6) if necessary, cover the machine.

4.8 - Dismantling

(because of deterioration and/or obsolescence)

General rules

ATTENTION: This symbol indicates that this product shall not be treated as household waste. Instead it should be handed over to the applicable collection point for the recycling of electrical equipment. For more detailed information about recycling of this product, please contact your local Civic Office, your household waste disposal service or the shop where you purchased the product.

5 *MACHINE FUNCTIONAL PARTS*

5.1 - Operating head or sawframe

- Machine part consisting of the members that transfer the motion (gearmotor, flywheels), and tension/guide (blade-guides, blade tension slide) and sawframe dowfeed control.

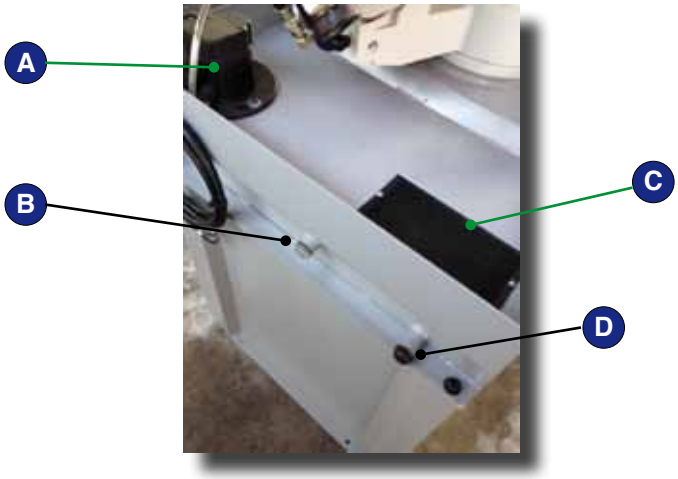
5.2 - Vice

- System for clamping the material during the cutting operation, operated with approach handwheel and quick locking lever.

5.2 - Machine Bed

- Support structure for the OPERATING HEAD OR SAW FRAME (rotating arm for gradual cutting, with respective blocking system), the ELECTRIC BOX, the VICE, the BAR STOP, the material support PLATE and the housing for the coolant liquid TANK and pump.

The coolant liquid consisting of 8-10% emulsion oil diluted in water contained in the tank (C) filled up to the level shown through the sight glass (B). **CAUTION**: do not overfill for the electropump (A) could fail. Liquid can be drained by removing the plug (D).



6 DESCRIPTION OF THE OPERATING CYCLE

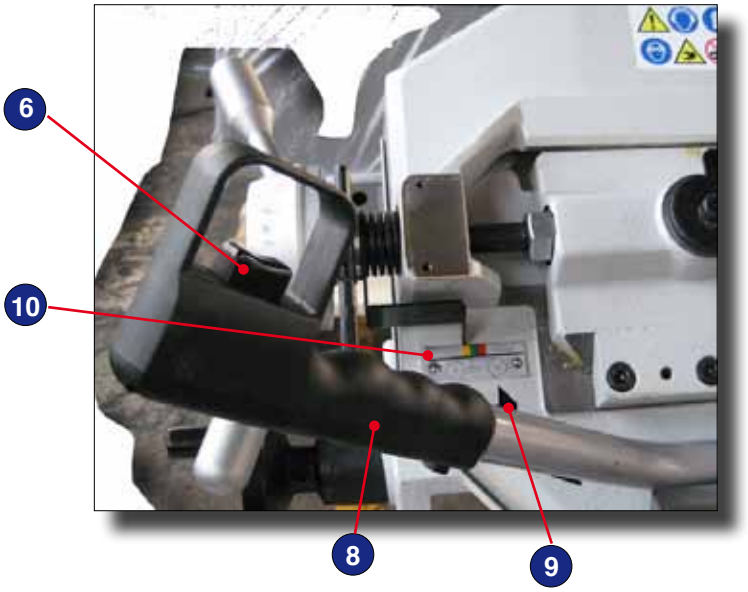
Before operating, all the main organs of the machine must be set in optimum conditions (see the chapter on **Regulating the machine**

6.1 - Start-up and Cutting Cycle

- Make sure that the emergency Stop has been released. Relevant red button (**5**) should be turned anti-clockwise to get the electric connection on stand-by mode.
- Turn clockwise the handwheel to put the blade under tension according to the scale (**10**) showing 20, 30 and 35.000 psi (pounds per square inch). Bi-metal M42 blades need to be tensioned to 30-35.000 psi, whilst for Carbon blades the tension should be 20.000 psi. Select desired blade rotation speed on the Commutator (**4**) :
  Position 1 (turtle) = 33 m/min.
  Position 2 (rabbit) = 66 m/min.
- Grab the Lever (**8**) and raise the sawframe manually to the top position. Usually, the sawframe is held up by a special return spring.
- Load the material to cut on the vice and appraoch the vice jaw to 3 - 4 mm from the material; lock the material safely by means of the quick lock lever.
- Press the Push-button (**1**) and the READY Pilot Light will illuminate. Press GRIPSWITCH (**6**) to start both blade rotation and coolant liquid flow making the motor running as long as your finger keeps pressing on it. Release your finger off the switch to stop the motor. Keep pressing your finger on the switch and pull down the sawframe to cut your material. Once the cut is completed release your finger off the switch and gently move the sawframe to the top position.

CAUTION: *In case of danger or trouble, press the red emergency Push-button* (**5**) *to stop any function.*

6) <u>Dead man's Switch</u>
A dead man's switch is a switch that is automatically operated if the human operator becomes incapacitated, such as though death, loss of consciousness or being bodily removed from control. This switch merely brings back the machine to a safe state while leaving the machine ready to resume normal operation once control is reestablished.



7) <u>Sawframe holder Spring</u>
This is a set of of one or two springs to hold up the sawframe to the top position before introducing the material to cut into the vice. Successively, once the preliminary operations have been completed such as:
- The Blade has been tensioned
- The Blade rotation speed has been selected
- The Material to cut has been loaded and clamped in the vice
- The Motor has been started to run the blade and the coolant liquid.
The operator can pull down the sawframe at the recommended feed rate and cut the material.
Once the cut is completed, the sawframe raises to the top position through the spring pull.

- Make sure that the blade rotates in the sense shown by the arrow (**9**) located on the sawframe and that the electropumps delivers the coolant liquid properly. The coolant liquid should be consisting of water and 8-10% emulsion oil.
Now the machine is ready to use. Pay attention to the following CUTTING PARAMETERS:
- BLADE SPEED, SAWFRAME DOWNFEED SPEED and BLADE TOOTH PITCH. These are fundamentals which guarantee proper cutting quality and machine performance.
For more information see Chapter:
MATERIAL CLASSIFICATION and TOOL CHOICE
- In case of danger or trouble, press the red emergency push-button to stop any function.

<u>CAUTION:</u>
<u>Keep away both Hands and Arms from the cutting area !</u>

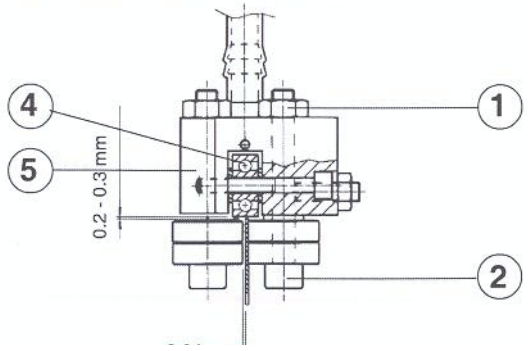
7 REGULATING THE MACHINE

7.1 - Blade tension assembly

-Turn clockwise the handwheel to put the blade under tension according to the scale (10) showing 20, 30 and 35.000 psi (pounds per square inch). Bi-metal M42 blades need to be tensioned to 30-35.000 psi, whilst for Carbon blades the tension should be 20.000 psi. At the end of each working day, it is reccomended to loose the blade tension to a minimum. This will preserve the flexibility of the blade and guarantee longer durability.

7.2 - Blade guide blocks

The blade is guided by means of adjustable rollers set in place during inspection as per the thickness of the blade with minimum play as shown in the figure.
In case the blade needs to be replaced, make sure to always



install 0.9 mm thick blades for which the blade guide rollers have been adjusted. In the case of toothed blades with different thicknesses adjustment should be carried out as follows:

- Loosen the nuts (1) and rotate the pin (2) widening the passage between the rollers.
- Mount the new blade, place the rollers and rotate the pin (2) leaving 0,04mm clear to allow the blade sliding smoothely. Secure the Nut (1).
  - Make sure that 0,2-0,3mm clear between the blade back and the roller (4); Just in case, loosen the screws that fastens the heads (5) and carry out final adjustment.

7.3 - Vice

- The device does not require any particular adjustment; in case of excess play of the sliding guide, tighten slide screw more.
- Place material to be cut in the vice. Close jaws against piece, keeping a distance of approx. 3 - 4 mm then clamp with lever.

7.5 - Cutting angle adjustment

- Unlock lever (6) and rotate the saw frame arm until you reach mechanical stop and check if the index corresponds to 60°; if not operate on the set screws to make measures meet.

BEFORE PERFORMING THE FOLLOWING OPERATIONS, THE ELECTRIC POWER SUPPLY AND THE POWER CABLE MUST BE COMPLETELY DISCONNECTED.

7.6 - Changing the blade

To change the blade:
- Lift the saw frame.
- Loosen the blade with the handwheel, remove the mobile blade-guard cover, open the flywheel guards and remove the old blade from the flywheels and the blade guide heads.
- Assemble the new blade by placing it first between the bearings of the heads and then on the seat of the flywheels, paying particular attention to the cutting direction of the teeth (page 10).
- Tension the blade and make sure it perfectly fits inside the seat of the flywheels.
- Assemble the mobile blade-guide and the flywheel guard and fasten it with the relative knobs.

WARNING: always assemble blades having dimensions specified in this manual and for which the blade guide heads have be set: otherwise, see chapter on “Description of the operating cycle” in the section Starting-up.

8 ROUTINE AND SPECIAL MAINTENANCE

THE MAINTENANCE JOBS ARE LISTED BELOW, DIVIDED INTO DAILY, WEEKLY, MONTHLY AND SIX-MONTHLY INTERVALS. IF THE FOLLOWING OPERATIONS ARE NEGLECTED, THE RESULT WILL BE PREMATURE WEAR OF THE MACHINE AND POOR PERFORMANCE.

8.1 - Daily maintenance

- General cleaning of the machine to remove accumulated chips.
- Clean the lubricating coolant drain hole to avoid excess fluid.
- Top up the level of lubricating coolant.
- Check blade for wear.
- Rise of saw frame to top position and partial slackening of the blade to avoid useless yield stress.
- Check functionality of the shields and emergency stops.

8.2 - Weekly maintenance

- More accurate general cleaning of the machine to remove chips, especially from the lubricant fluid tank.
- Removal of pump from its housing, cleaning of the suction filter and suction zone.
- Clean the filter of the pump suction head and the suction area.
- Cleaning with compressed air the blade guide heads (guide bearings and drain hole of the lubricating cooling).
- Cleaning flywheel housings and blade sliding surfaces on flywheels.

8.3 - Monthly maintenance

- Check the tightening of the motor flywheel screws.
- Check that the blade guide bearings on the heads are perfect running condition.
- Check the tightening of the screws of the gearmotor, pump and accident protection guarding.

8.4 - Six-monthly maintenance

- Continuity test of the equipotential protection circuit.

8.5 - Maintenance of the operating machine members

The worm drive gear box mounted on the machine is maintenance-free guaranteed by its manufacture.

8.6 - Oils for lubricating coolant

Considering the vast range of products on the market, the user can choose the one most suited to his own requirements, using as reference the type SHELL LUTEM OIL ECO.
THE MINIMUM PERCENTAGE OF OIL DILUTED IN WATER IS 8 - 10 %.

8.7 - Oil disposal

The disposal of these products is controlled by strict regulations. Please see the Chapter on **Machine dimensions - Transport - Installation**

9 MATERIAL CLASSIFICATION AND CHOICE OF TOOL

Since the aim is to obtain excellent cutting quality, the various parameters such as **hardness of the material, shape and thickness, transverse cutting section** of the part to be cut, **selection of the type of cutting blade, cutting speed** and **control of saw frame lowering**.These specifications must therefore be harmoniously combined in a single operating condition according to practical considerations and common sense, so as to achieve an optimum condition that does not require countless operations to prepare the machine when there are many variations in the job to be performed. The various problems that crop up from time to time will be solved more easily if the operator has a good knoledge of these specifications.
WE THEREFORE RECOMMEND YOU TO ALWAYS USE GENUINE "THOMAS" SPARE BLADES THAT GUARANTEE SUPERIOR QUALITY AND PERFORMANCE.

9.1 - Definition of materials

The table at the foot of the page lists the characteristics of the materials to be cut, so as to choose the right tool to use.

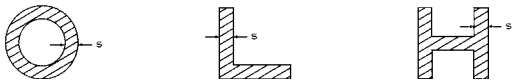
9.2 - Selecting blade

First of all the pitch of the teeth must be chosen, in the other words, the number of teeth per inch (25,4 mm) suitable for the material to be cut, according to these criteria:
- parts with a thin and/or variable section such as profiles, pipes and plate, need close toothing, so that the number of teeth used simultaneously in cutting is from 3 to 6;
- parts with large transverse sections and solid sections need widely spaced toothing to allow for the greater volume of the chips and better tooth penetration;
- parts made of soft material or plastic (light alloys, mild bronze, teflon, wood, etc.) also require widely spaced toothing;
- pieces cut in bundles require combo tooth design.

9.3 - Teeth pitch

As already stated, this depends on the following factors:
- **hardness of the material**
- **dimensions of the section**
- **thickness of the wall.**

Thickness in mm (S)	Continuous Toothing	Alternate Toothing
up to 1,5mm	Z=14	Z=10/14
from 1 to 2	Z=8	Z=8/12
from 2 to 3	Z=6	Z=6/10
from 3 to 5	Z=6	Z=5/8
from 4 to 6	Z=6	Z=4/6
more than 6	Z=4	Z=4/6



Standard / Materialien	*(I) UNI*	*(D) DIN*	*(F) AFNOR*	*(GB) SB*	*USA AISI-SAE*	*Brinell Härte HB*	*Rockwell Härte HRB*	*R=N/mm2*
Construction steel	Fe360 Fe430 Fe510	St37 St44 St52	E24 E28 E36	43 50		116 148 180	67 80 88	360÷480 430÷560 510÷660
Non Alloy Steel	C20 C40 C50 C60	CK20 CK40 CK50 CK60	XC20 XC42H1 XC55	060 A 20 060 A 40 060 A 62	1020 1040 1050 1060	198 198 202 202	93 93 94 94	540÷690 700÷840 760÷900 830÷980
Spring Steel	50CrV4 60SiCr8	50CrV4 60SiCr7	50CV4	735 A 50	6150 9262	207 224	95 98	1140÷1330 1220÷1400
Alloy Steel for Hardening	35CrMo4 39NiCrMo4 41CrAlMo7	34CrMo4 36CrNiMo4 41CrAlMo7	35CD4 39NCD4 40CADG12	708 A 37 905 M 39	4135 9840	220 228 232	98 99 100	780÷930 880÷1080 930÷1130
Alloy Einsatzstahl	18NiCrMo7 20NiCrMo2	21NiCrMo2	20NCD7 20NCD2	En 325 805 H 20	4320 4315	232 224	100 98	760÷1030 690÷980
Steel for Bearings	100Cr6	100Cr6	100C6	534 A 99	52100	207	95	690÷980
Tool Steel	52NiCrMoKU C100KU X210Cr13KU 58SiMo8KU	56NiCrMo C100W1 X2210Cr12	Z200C12 Y60SC7	BS 1 BD2 - BD3	S-1 D6 - D3 S5	244 212 252 244	102 96 103 102	800÷1030 710÷980 820÷1060 800÷1030
Stainless Steel	X12Cr13 X5CrNi1810 X8CrNi1910 X8CrNiMo171	4001 4301 4401	Z5CN18.09 Z6CDN17.1	304 C 12 316 S 16	410 304 316	202	94	670÷885 590÷685 540÷685 490÷685
Kupferlegierung Spezialmessing Bronze	Aluminium-Kupferlegierungen G-CuAl11Fe4Ni4 UNI 5275 Spezialmessing mit Mangan/Silizium G-CuZn36Si1Pb1 UNI 5038 Manganbronze SAE43 - SAE430 Phosphorbronze G-CuSn12 UNI 7013/2a					220 140 120 100	98 77 69 56,5	620÷885 375÷440 320÷410 265÷314

Full Material ø	Continuous Toothing	Alternate Toothing
up to 30mm	Z=8	Z=5/8
from 30 to 60	Z=6	Z=4/6
from 60 to 80	Z=4	Z=4/6
more than 90	Z=3	Z=3/4

9.4 - Cutting and advance speed

The cutting speed (m/min) and the advance speed (cm^2/min = area travelled by the disk teeth when removing shavings) are limited by the development of heat close to the tips of the teeth.
- The cutting speed is subordinate to the resistance of the material (R = N/mm^2), to its hardness (HRC) and to the dimensions of the widest section.
- Too high an advance speed (= lowering of the saw frame) tends to cause the disk to deviate from the ideal cutting path, producing non rectilinear cuts on both the vertical and the horizontal plane.

The best combination of these two parameters can be seen directly examining the chips.

Long spiral-shaped chips indicate ideal cutting.

Very fine or pulverized chips indicate lack of feed and/or cutting pressure.

Thick and/or blue chips indicate overload of the blade.

9.5 - Blade running-in

When cutting for the first time, it is good practice to run in the tool making a series of cuts at a low advance speed (= 30-35 cm^2/min on material of average dimensions with respect to the cutting capacity and solid section of normal steel with R = 410-510 N/mm^2), **generously spraying the cutting area with lubricating coolant.**

9.6 - Blade structure

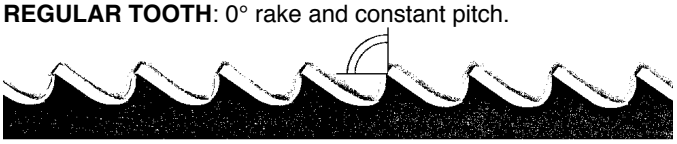
Bi-metal blades are the most commonly used. They consist in a silicon-steel blade backing with electron beam or laser welded high speed steel (HHS) cutting edge. The type of stocks are classified in M2, M42, M51 and differ from each other because of their major hardness due to the increasing percentage of Cobalt (Co) and molybdenum (Mo) contained in the metal alloy.

9.7 - Blade type

They differ essentially in their constructive characteristics, such as:
- **shape** and cutting **angle** of tooth
- **pitch**
- **set**

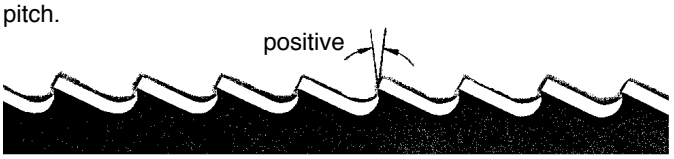
Shape and angle of tooth

REGULAR TOOTH: 0° rake and constant pitch.



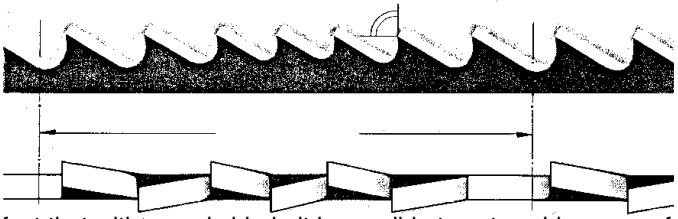
Most common form for transversal or inclined cutting of solid small and average cross-sections or pipes, in laminated mild steel and grey iron or general metal.

POSITIVE RAKE TOOTH: 9° - 10° positive rake and constant pitch.



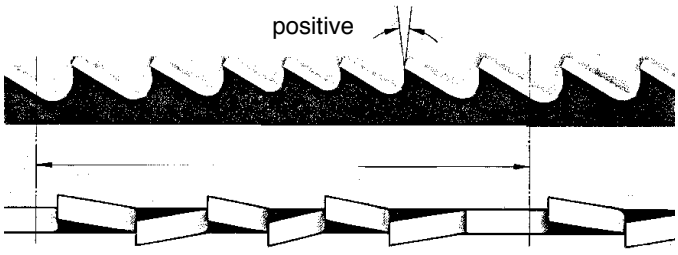
Particular use for crosswise or inclined cuts in solid sections or large pipes, but above all harder materials (highly alloyed and stainless steels, special bronze and forge pig).

COMBO TOOTH: pitch varies between teeth and consequently varying teeth size and varying gullet depths. Pitch varies between teeth which ensures a smoother, quieter cut and longer blade life owing to the lack of vibration.
Another advantage offered in the use of this type of blade in the



fact that with an only blade it is possible to cut a wide range of different materials in size and type.

COMBO TOOTH: 9° - 10° positive rake.



This type of blade is the most suitable for the cutting of section bars and large and thick pipes as well as for the cutting of solid bars at maximum machine capacity. Available pitches: 3-4/4-6.

Set
Saw teeth bent out of the plane of the saw body, resulting in a wide cut in the workpiece.

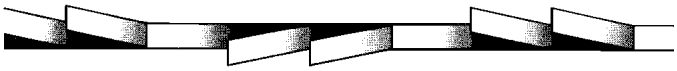
REGULAR OR RAKER SET: Cutting teeth right and left, alternated by a straight tooth.

Of general use for materials with dimensions superior to 5 mm. Used for the cutting of steel, castings and hard nonferrous materials.

WAVY SET: Set in smooth waves.

This set is associated with very fine teeth and it is mainly used for the cutting of pipes and thin section bars (from 1 to 3 mm).

ALTERNATE SET (IN GROUPS): Groups of cutting teeth right and left, alternated by a straight tooth.



This set is associated with very fine teeth and it is used for extremely thin materials (less than 1 mm).

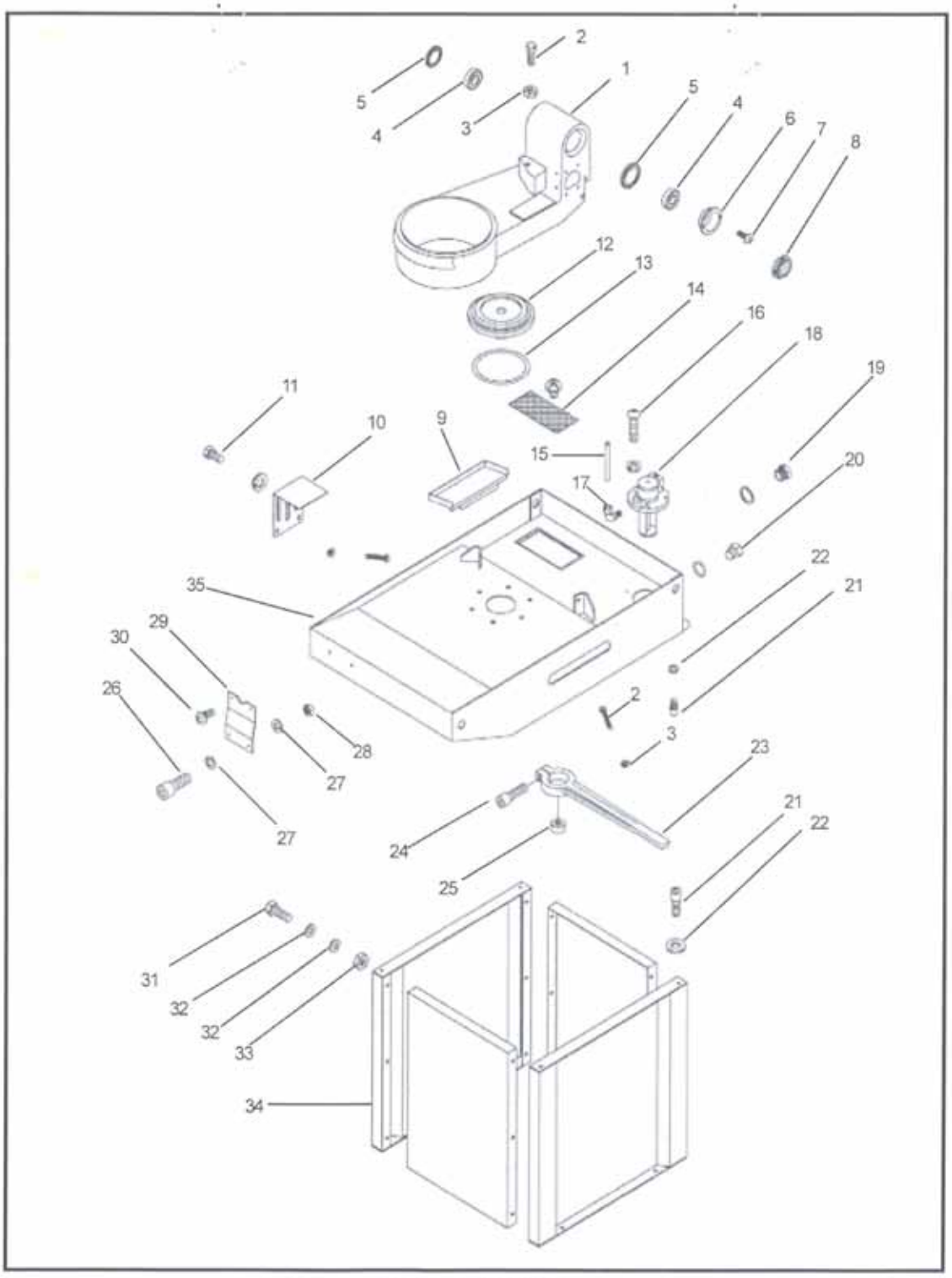
ALTERNATE SET (INDIVIDUAL TEETH): Cutting teeth right and left.

This set is used for the cutting of nonferrous soft materials, plastics and wood.

9.7.1 - CUTTING PARAMETERS

Steel Type	*Cutting Speed m/min.*	*Coolant Liquid*
Construction Steel	60÷80 m/min	Oil Emulsion
Einsatzstahl	40÷50 m/min	Oil Emulsion
Non Alloy Steel	40÷60 m/min	Oil Emulsion
Vergüteter Stahl	40÷50 m/min	Oil Emulsion
Steel for Bearings	40÷60 m/min	Oil Emulsion
Steel for Springs	40÷60 m/min	Oil Emulsion
Tool Steel	30÷40 m/min	Oil Emulsion
Steel for Valves	35÷50 m/min	Oil Emulsion
Stainless Steel	30÷40 m/min	Oil Emulsion
Cast-Iron	20÷40 m/min	Oil Emulsion
Stahleisen	40÷60 m/min	Oil Emulsion
Aluminium	80÷600 m/min	Kerosene
Bronze	70÷120 m/min	Oil Emulsion
Hartbronze	30÷60 m/min	Oil Emulsion
Messing	70÷350 m/min	Oil Emulsion
Kupfer	50÷720 m/min	Oil Emulsion

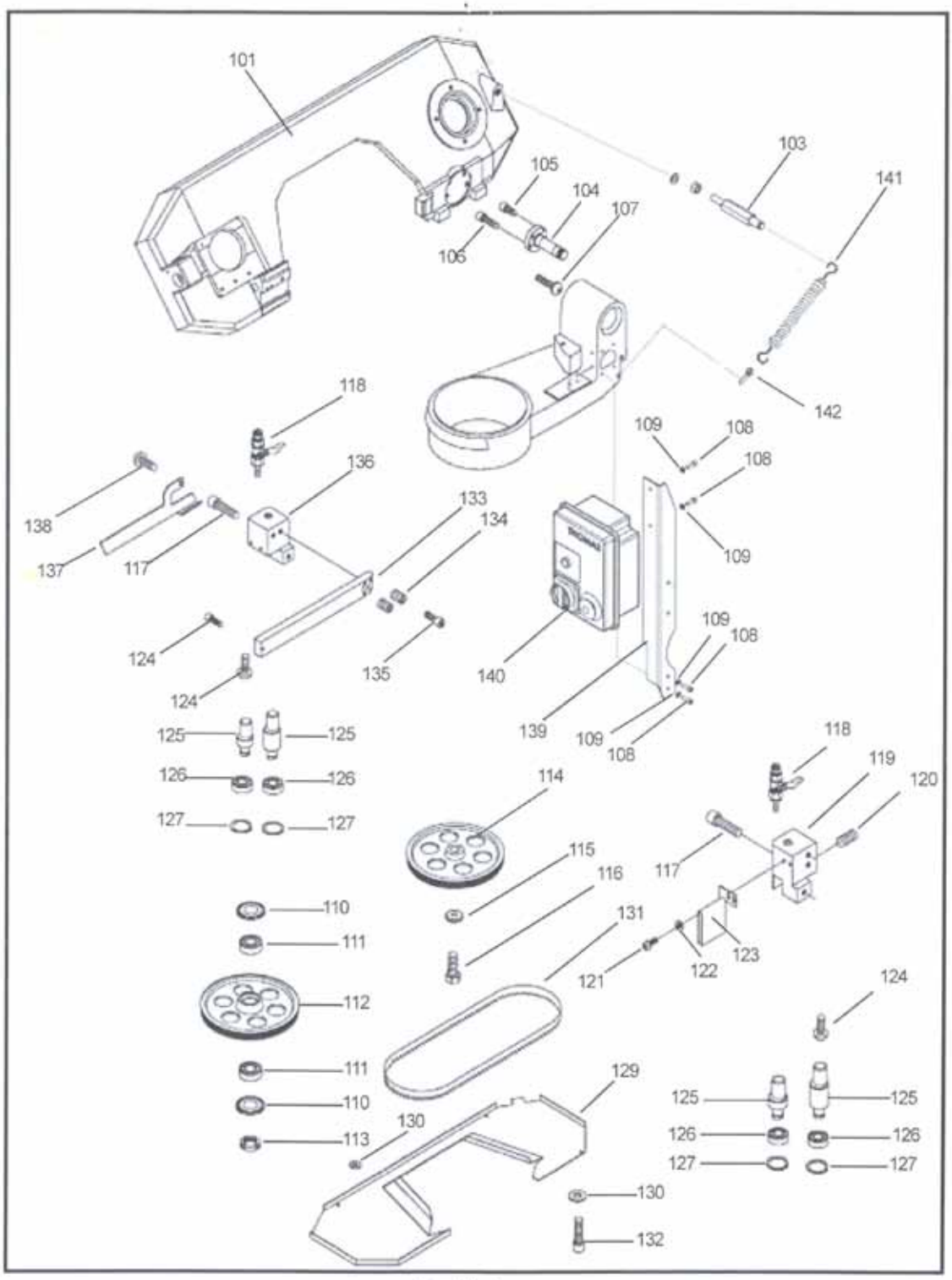
Figure 1 - Base



Tav. 1 - Basamento

Figure 1 - BASE	Qty
1) Sawframe Support, revolving	1
2) Screw TE M10x45	2
3) Nut M10, exagonal	2
4) Bearing 32007X	2
5) Sleeve	2
6) Bushing	1
7) Screw TBEI M5x16	2
8) Nut GUK M35	1
9) Splash Guard	1
10) Material Support, infeed	1
11) Screw TCEI M8x25	3
12) Round Plate	1
13) O-ring ID195X5.7W	1
14) Filter, coolant liquid	1
15) Tube	1
16) Screw TBEI M6x20	1
17) Connection 3/8”, coolant liquid	1
18) Electropump, coolant liquid	1
19) Glass 3/8”, coolant liquid level	1
20) Plug, coolant liquid drain	1
21) Screw M10x20	4
22) Washer M10	4
23) Lever, Sawframe miter lock/unlock	1
24) Screw TCEI M8x25	1
25) Washer d.18-8,5x1,6	2
26) Screw TCEI M6x15	1
27) Washer M6	1
28) Nut M6, exagonal	1
29) Vice Support	1
30) Screw TBEI M6x10	1
31) Screw TE M8x20	12
32) Washer M8	24
33) Nut M8, exagonal	12
34) Pedestal	1
35) Bench/Reservoir, coolant liquid	1

Figure 2 - Sawframe

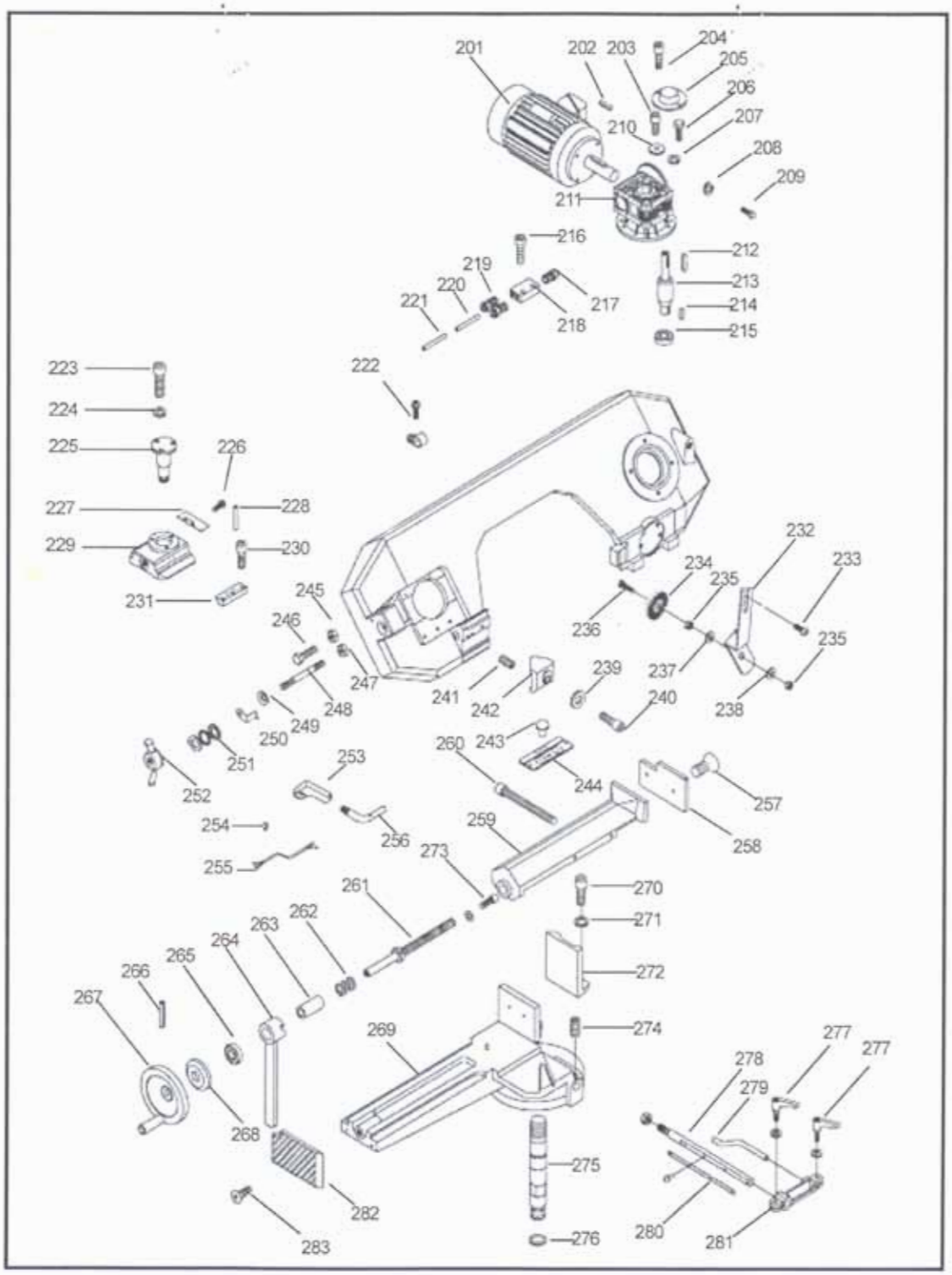


Tav. 2 - Arco

Figure 2 - SAWFRAME Qty

101) Sawframe 1
103) Bar, attachment for return spring 1
104) Shaft, sawframe articulation 1
105) Screw TCEI M10x25 2
106) Screw TCEI M10x40 2
107) Screw TCEI M8x30 2
108) Screw TCEI M6x20 4
109) Washer M6 2
110) Ring Nilos 32006X AV 2
111) Bearing 32006X 2
112) Flywheel, return 1
113) Nut GUK M30 1
114) Flywheel, motor 1
115) Washer, Large 1
116) Screw TE M12x20 1
117) Screw TCEI M6x10 2
118) Valve 1/8” 2
119) Block, blade tension 2
120) Screw M6x6 2
121) Screw TBEI M5x12 2
122) Washer 12-5,5x0,8 3
123) Blade Guard, blade-guide fixed 1
124) Screw TBEI M6x30 4
125) Pin, short eccentric 2
126) Bearing 608 2RS 4
127) Ring S10 4
129) Sawframe Cover 1
130) Washer 1
131) Blade 1
132) Screw M6x10 4
133) Bar, mobile blade-gurad 1
134) Screw M6x15 1
135) Screw TCEI M8x20 1
136) Block, mobile blade-guide 1
137) Blade Guard, blade-guide mobile 1
138) Screw TBEI M6x10 1
139) Support, electric box 1
140) Electric Box 1
141) Spring, sawframe return 1
142) Pin, spring attachment 1

Figure 3 - Sawframe and Vice

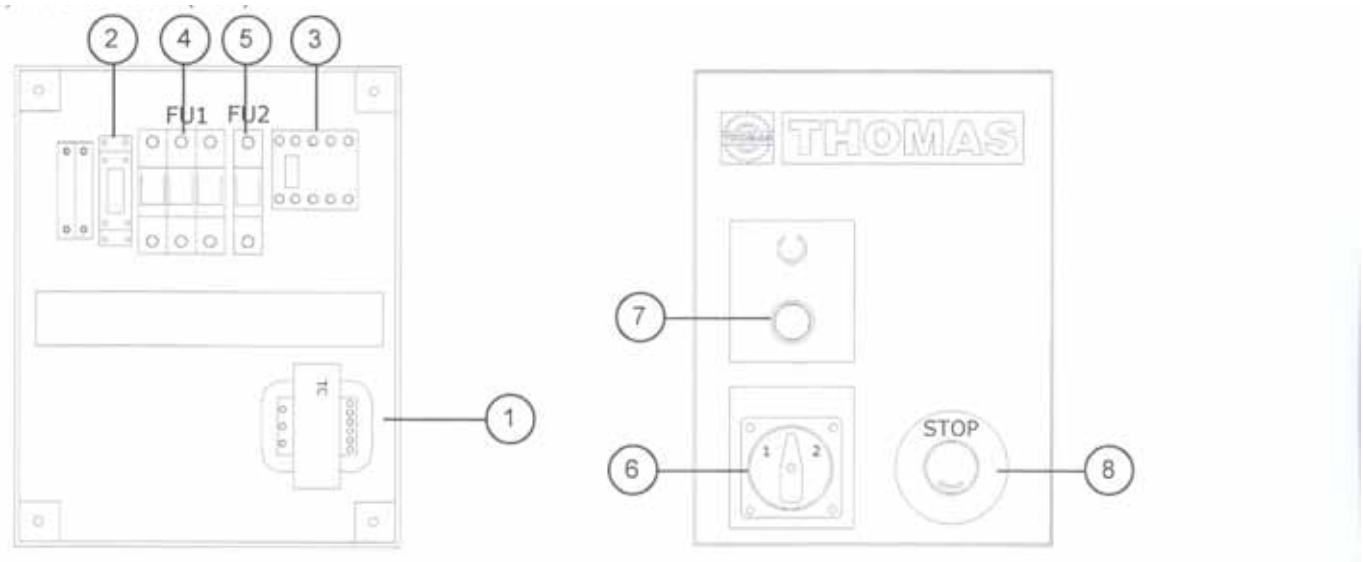


Tav.3 - Arco e morsa

Figure 3 - SAWFRAME and VICE	Qty
201) Motor 0,37/0,75 kW - 50Hz - 400V – 4P	1
202) Spline 6x6x40	1
203) Screw TCEI M10x20	1
204) Screw TCEI M10x25	2
205) Plastic Cover	1
206) Screw TCEI M10x25	4
207) Washer M10, elastic	4
208) Washer M6, elastic	4
209) Screw TE M6x20	4
210) Washer, large	1
211) Gear-Box G5A i=1/40	1
212) Spline 8x7x50	1
213) Shaft, motor flywheel	1
214) Spline 8x7x25	1
215) Bearing 6208 2RS	1
216) Screw TCEI M6x15	2
217) Connection 8x1/4"	1
218) Coolant Distributor, 3 ways	1
219) Connection 6x1/8"	4
220) Tube Ø 6 L=240	1
221) Tube Ø 6 L=800	1
222) Screw TBEI M5x16	1
223) Screw TCEI M8x20	3
224) Washer M8, elastic	3
225) Shaft, return flywheel	1
226) Screw TBEI M5x10	2
227) Plate, blade tension	1
228) Pin Ø 5x38	2
229) Block, bkade tension	1
230) Screw TCEI M8x20	3
231) Block, fixed	1
232) Support, brush	1
233) Screw TBEI M6x10	2
234) Brush 50-14x6, blade cleaning	1
235) Nut M6, exagonal	1
236) Screw TE M6x30	1
237) Washer 18-6,5x1,5	2
238) Washer 13-6,5x0,8	2
239) Washer M10-20x2	1
240) Screw TCEI M10x50	1
241) Screw senza testa M8x5	1
242) Block	1
243) Rivet	1
244) Scale	1

continued

245) Nut M8, exagonal 1
246) Screw TE M8x45 1
247) Nut M16, exagonal 1
248) Pin M16, blade tension 1
249) Cup Spring Ø 31,5-16,3x1,8 14
250) Notch, reference 1
251) Bearing 51203 1
252) Handwheel M12, blade tension 1
253) Grip, sawframe lever 1
254) Push-Button, motor start 1
255) Cable, push-button connection 1
256) Lever, sawframe movement 1
257) Screw TSEI 6X12 2
258) Vice Jaw 1
259) Vice 1
260) Screw TCEI M6X110 2
261) Screw, vice lead 1
262) Spring 1
263) Bushing, vice 1
264) Vice Lever 1
265) Bearing AX3047XCP 1
266) Pin Ø 5x35, elastic 1
267) Handwheel, vice lead 1
268) Protection, bearing 1
269) Countervice 1
270) Screw TCEI M10X30L 1
271) Washer M10 1
272) Right Jaw 1
273) Screw TCEI M6X15 1
274) Screw M8X10, exagonal 1
275) Shaft, sawframe revolving 1
276) O-ring 19,8x2,4 1
277) Handle, bar-stop 1
278) Rod, bar-stop 1
279) Pointer, bar-stop 1
280) Scale, bar-stop 1
281) Body, bar-stop 1
282) Left Jaw 1
283) Screw TSEI M6x15 1



ELECTRIC COMPONENTS

1) Tranformer TC1
2) Aux. Relay ..... KA
3) Remote Switch..... KM1
4) Fuse cartridge FU1
5) Fuse cartridge FU2

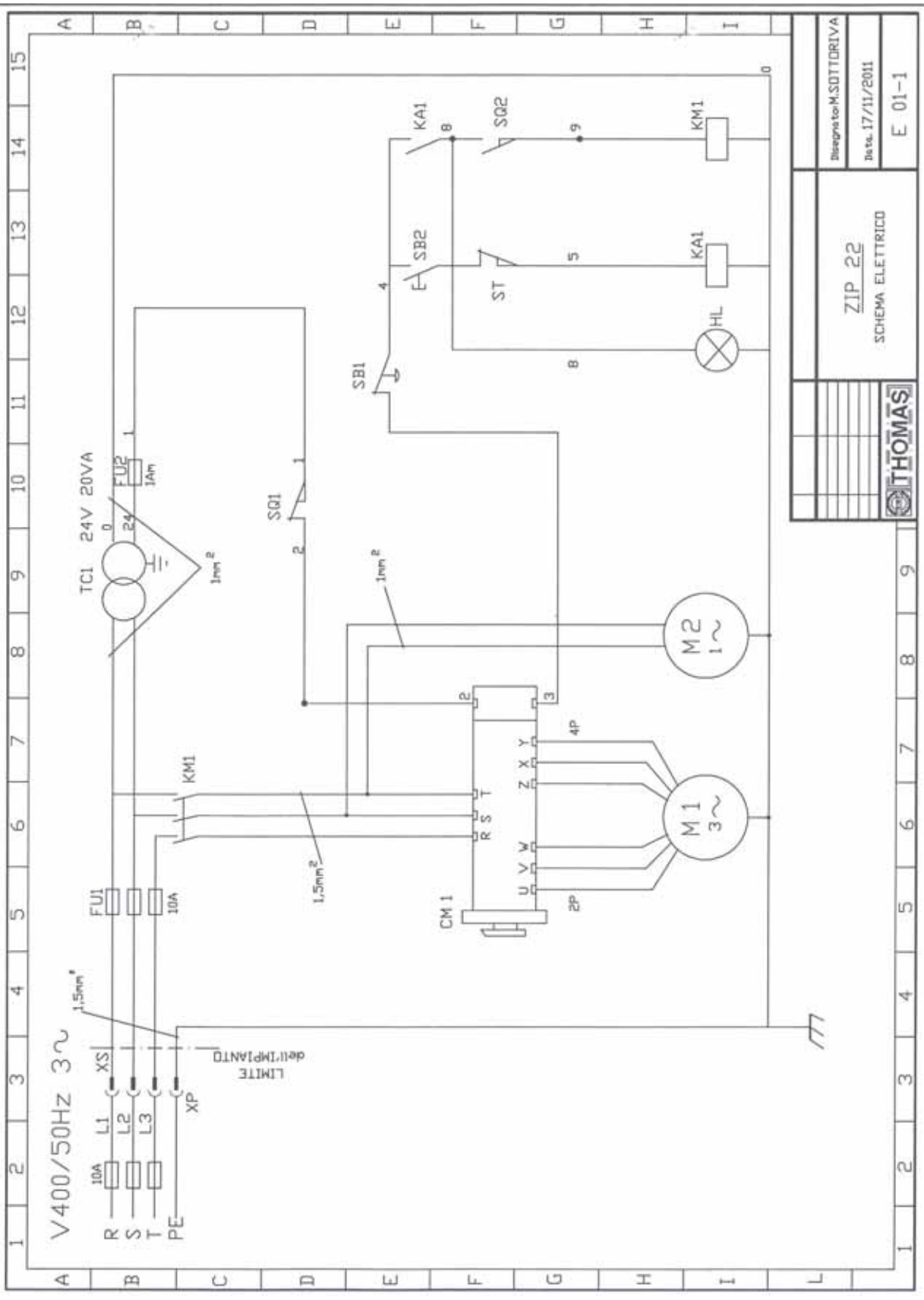
6) Blade Speed Switch.
7) Push-Button, Ready.
8) Emergency Push-Button.

11 ELECTRIC PLANS

LIST OF ELECTRIC COMPONENTS

ZIP 22 - Three-phase 400 Volt 50Hz. Drw E01-1. dd 17/11/2011.

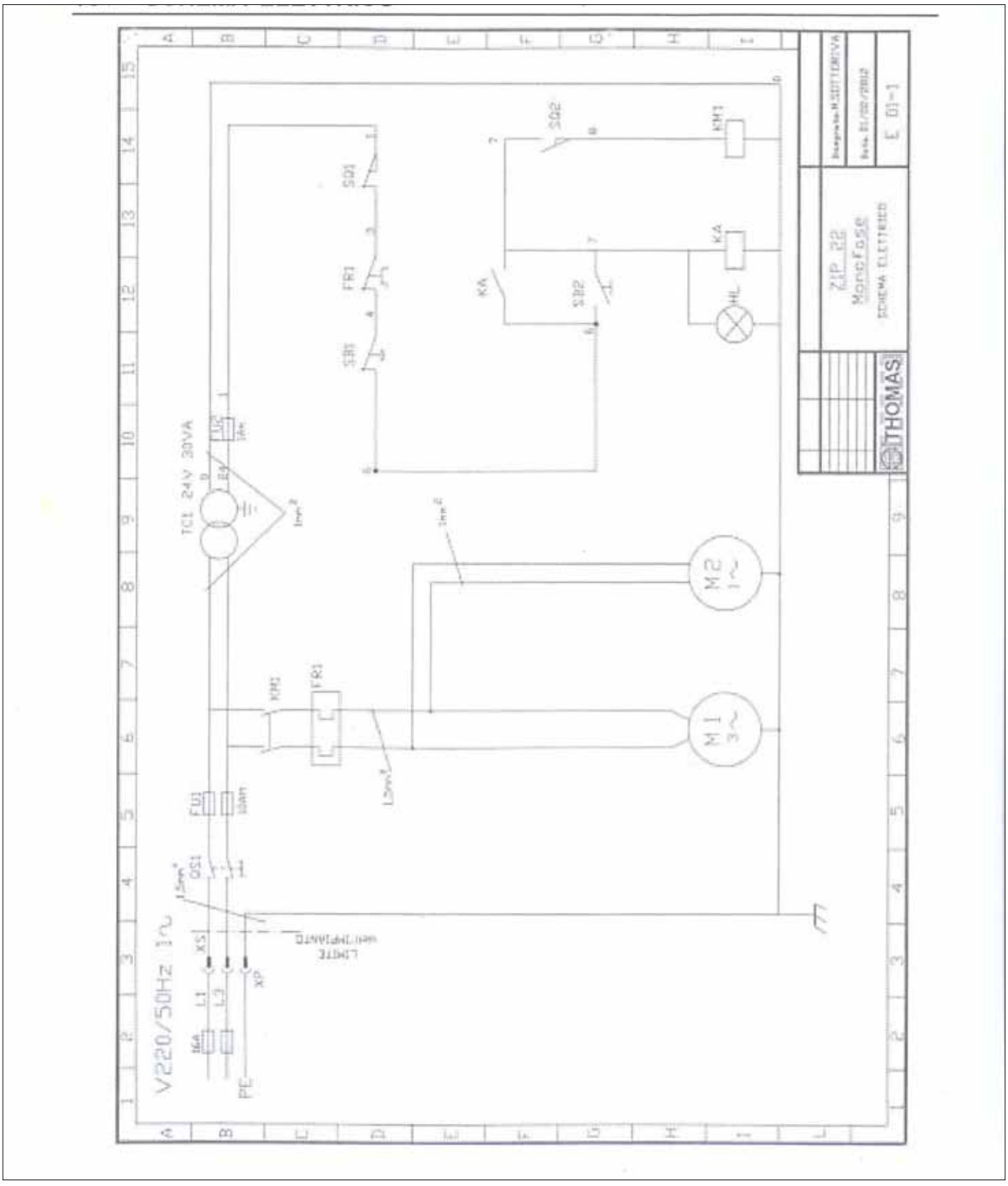
Ref.	*Description*	*Technical Data*	*Qty*	*Make*	*Code*
FU1	Fuse Cartridge	3 Pole 32A 600V	1	Weber	PCH 3X38
	Fuse, Line Protection	FUS CH 10X38 12AGG	3	Weber	CH10X38 10A AM
FU2	Fuse Cartridge	1 Pole 32A 600V	1	Weber	PCH 1X38
	Fuse, Aux. Protection	FUS CH 10X38 1 600V	1	Weber	CH10X38 1A AM
TC1	Transformer	20VA OUT 24 V	1	METH	P 330/400 S0-24
C.M.	Pole Commutator	16A 690V	1	Giovenzana	P01606360S009
KM1	Remote Switch	9A NO 24VAC	1	A.B.	100-K09KJ10
FR1	Thermal Relay, Motor Protection	3,5 - 4,8A	1	A.B.	193-KB48
KA	Aux. Relay	1 CONTACT 250V 10A +base	1	FINDER	ART 403180024 VAC
-	Base, Finder Relay	for FINDER Relay	1	FINDER	ART. 40-9563
HL1	Pilot Light	2W BAS 9	1	REER	30V 2Watt
SB1	Emergency Push-Button	with Lock	1	A.B.	800 FP-MT 44
-	Base of Push-Button	D.22	1	A.B.	800F-ALP
-	N.C. Contact	10A 600V	1	A.B.	800F-X01
SQ1	Micro-switch, sawframe protection	6A 250V.	1	LOVATO	KB N2 L02PV155
SQ2	Micro-switch, Gripswitch	4A 250V.	1	CROUZET	E.F. 83161.1
M1	Motor, Blade Drive	kW 0,55-1 1400/2800 rpm	1	JIUH DAH	
M2	Motor, Electropump	kW 0,05 H85 single-phase	1	SAP	2 poles
X1	Terminals, connection	Section 2,5	3	CONTACLIP	1574 2
	Plastic Box, Elettrocablaggi	230E0097/10	1	STANPLAST	
	Film, Control Panel	220X0181	1	Tecnotarghe	220X0181
	Box, Electric Components	Elettrocablaggi	1		TIPO D.SPECIAL


ZIP 22
SCHEMA ELETTRICO
E 01-1
Data 17/11/2011
Disegnato M.SDTTORIVA
THOMAS
V400/50Hz 3~
R
S
T
PE
L1
L2
L3
XS
XP
10A
FU1
KM1
SQ1
SB1
SB2
ST
KA1
SQ2
HL
TC1 24V 20VA
FU2
1Am
M1 3~
M2 1~
CM 1
4P
2P
1,5mm²
LIMITE dell'IMPIANTO

LIST OF ELECTRIC COMPONENTS

ZIP 22 - Single-phase 400 Volt 50Hz. / 110 Volt 60 Hz. dd 12/03/2012.

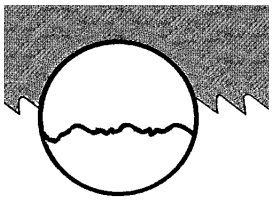
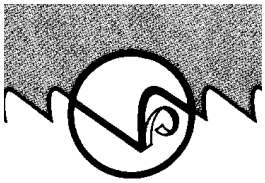
Ref.	*Description*	*Technical Data*	*Qty*	*Make*	*Code*
FU1	Fuse Cartridge	2 Pole 32A 600V	1	Weber	PCH 2X38
	Fuse, Line Protection	10X38 16A 600V	2	Weber	CH10X38 16A AM
FU2	Fuse Cartridge	1 Pole 32A 600V	1	Weber	PCH 1X38
	Fuse, Aux. Protection	10X38 1A 600V	1	Weber	CH10X38 1A AM
TC1	Transformer	30VA OUT 24 V	1	F.M.T.	P 0/110 60 Hz S24
C.M.	Pole Commutator	20A 690V	1	Giovenzana	P0200003R010
KM1	Remote Switch	25A NO 24VAC	1	A.B.	100-C23 KJ10
KA	Aux. Relay	1 CONTACT 250V 6A	1	FINDER	ART 403180024 VAC
-	Base, Finder Relay	for FINDER Relay	1	FINDER	ART. 40-9563
S.B. 2	Push-Button, Light		1	A.B.	AB 800 LF7
HL1	Pilot Light	2W BAS 9	1	REER	30V. 2 WATT
SB1	Emergency Push-Button	with Lock	1	A.B.	800FP-MT 44
"	Base, Push-Button	D.22	2	A.B.	800F-ALP
"	Contact N.C.	10A 600V.	1	A.B.	800F-X01
SB2	Contact N.O.	10A 600V.	1	A.B.	800F-X10
SQ1	Micro-switch, sawframe protection	8A 400V.	1	Q.k.S 8	
SQ2	Micro-switch, Gripswitch	4A 250V.	1	CROUZET	E.F. 83161.1
M1	Motor, Blade Drive	kW 0,91400rpm	1	TESSARO	FC B 14 80 IP54
M2	Motor, Electropump	kW 0,05 H85 single-phase	1	SAP	SH2 IP54
X1	Terminals, connection	Section 2,5 twin	2	A.B.	
	Plastic Box, Elettrocablaggi	230E0009/10	1	STANPLAST	
	Film, Control Panel	220X0340	1	Tecnotarghe	220X0340
RIF.	Gear-Box	1/15 80 B14	1	S.T.M.	RMI 50
C.	Condenser	50mf/31mf	1+1	TESSARO	

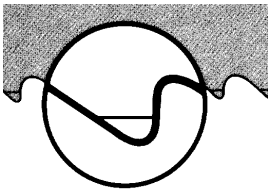
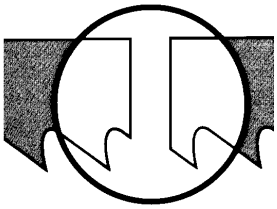
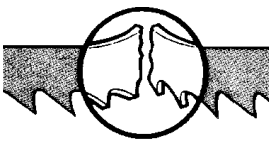

ZIP 22
Monofase
SCHEMA ELETTRICO
THOMAS
E 01-1
V220/50Hz 1~
TC1 24V 30VA
M2
1~
M1
3~
SQ1
SQ2
SB1
SB2
FR1
KM1
KA
HL
FU1
QS1
XS
XP
L1
L2
PE

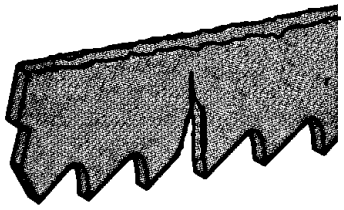
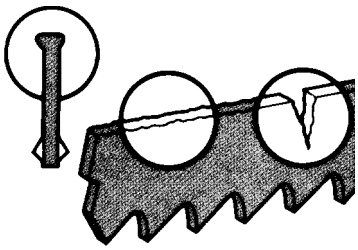
12 TROUBLESHOOTING

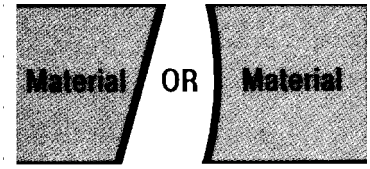
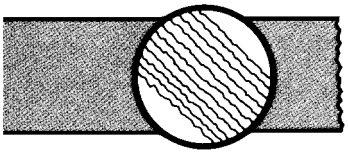
This chapter lists the probable faults and malfunctions that could occur while the machine is being used and suggests possible remedies for solving them.
The first paragraph provides diagnosis for TOOLS and CUTS, the second for ELECTRICAL COMPONENTS.

12.1 - Blade and cut diagnosis

FAULT	PROBABLE CAUSE	REMEDY
TOOTH BREAKAGE 	Too fast advance	Decrease advance, exerting less cutting pressure. Adjust the braking device if mounted on the machine.
	Wrong cutting speed	Change blade speed and/or diameter. See Chapter **Material classification and blade selection**
	Wrong tooth pitch	
	Chips sticking onto teeth and in the gullets or material that gums	
	Defects on the material or material too hard	
	Ineffective gripping of the part in the vice	
	The blade gets stuck in the material	
	Starting cut on sharp or irregular section bars	
	Poor quality blade	
	Previously broken tooth left in the cut	
	Cutting resumed on a groove made previously	
	Vibrations	
	Wrong tooth pitch or shape	
	Insufficient lubricating refrigerant or wrong emulsion	
	Teeth positioned in the direction opposite the cutting direction	

FAULT	PROBABLE CAUSE	REMEDY
PREMATURE BLADE WEAR	Faulty running-in of blade	See Chapter **"Material classification and blade selection"** in the *Blade running-in* section.
	Teeth positioned in the direction opposite the cutting direction	Turn teeth in correct direction.
	Poor quality blade	Use a superior quality blade.
	Too fast advance	Decrease advance, exerting less cutting pressure. Adjust the braking device if mounted on the machine.
	Wrong cutting speed	Change blade speed and/or diameter. See Chapter **Material classification and blade selection**
	Defects on the material or material too hard	
	Insufficient lubricating refrigerant or wrong emulsion	
BLADE BREAKAGE	Faulty welding of blade	
	Too fast advance	
	Wrong cutting speed	
	Wrong tooth pitch	
	Ineffective gripping of the part in the vice	
	Blade touching material at beginning of cut	

FAULT	PROBABLE CAUSE	REMEDY
	Blade guide heads not regulated or dirty because of lack of maintenance	Check distance between bearings (see Chapter **"Machine adjustments"** in the *Blade Guide Heads* section): extremely accurate guiding may cause cracks and breakage of the tooth. Clean carefully.
	Blade too slack	Check that the tightening handwheel is against the set screw that ensures ideal tightening.
	Blade guide head too far from material to be cut	Approach head as near as possible to material to be cut so that only the blade section employed in the cut is free, this will prevent deflections that would excessively stress the blade.
	Improper position of blade on flywheels	The back of blade rubs against the support due to deformed or poorly welded bands (tapered), causing cracks and swelling of the back contour.
	Insufficient lubricating refrigerant or wrong emulsion	Check level of liquid in the tank. Increase the flow of lubricating refrigerant, checking that the hole and the liquid outlet pipe are not blocked. Check the emulsion percentage.
STREAKED OR ETCHED BANDS	Damaged or chipped blade guide bearings	Replace them.
	Tight or slackened blade guide bearings	Adjust them (see Chapter **"Machine adjustments"** in *Blade guide* section).
CUTS OFF THE STRAIGHT	Blade not parallel as to the counter-vice	Check fastenings of the blade guide heads as to the counter-vice so that they are not too loose and adjust heads vertically; bring into line the position of the degrees and if necessary adjust the stop screws of the degree cuts.
	Blade not perpendicular due to the excessive play between the guide bearings and maladjustment of the heads	Check and vertically re-adjust the blade guide heads; reset proper side guide play (see Chapter **"Machine adjustments"** in *Blade guide* section).
	Too fast advance	Decrease advance, exerting less cutting pressure. Adjust the braking device if mounted on the machine.
	Blade guide head too far from material to be cut	Approach head as near as possible to material to be cut so that only the blade section employed in the cut is free, this will prevent deflections that would excessively stress the blade.
	Blade too slack	Check that the tightening handwheel is against the set screw that ensures ideal tightening.
	Worn out blade	Replace it.
	Wrong tooth pitch	Blade with major density of teeth is being used, try using one with less teeth (see Chapter **"Material classification and blade selection"** in the *Blade Types* section).

FAULT	PROBABLE CAUSE	REMEDY
	Broken teeth	Irregular work of the blade due to the lack of teeth can cause deflection in the cut; check blade and if necessary replace it.
	Insufficient lubricating refrigerant or wrong emulsion	Check level of liquid in the tank. Increase the flow of lubricating refrigerant, checking that the hole and the liquid outlet pipe are not blocked. Check the emulsion percentage.
FAULTY CUT 	Worn out flywheels	The support and guide flange of the band are so worn out that they cannot ensure the alignment of the blade, causing faulty cutting; blade rolling and drawing tracks can have become tapered. Replace them.
	Flywheel housing full of chips	Clean with compressed air.
	Blade too slack	Check that the tightening handwheel is against the set screw that ensures ideal tightening.
STREAKED CUTTING SURFACE 	Too fast advance	Decrease advance, exerting less cutting pressure. Adjust the braking device if mounted on the machine.
	Poor quality blade	Use a superior quality blade.
	Worn out blade or with chipped and/ or broken teeth	Replace it.
	Wrong tooth pitch	Blade with not enough teeth is being used, try using one with major density (see Chapter **"Material classification and blade selection"** in the *Blade Types* section).
	Blade guide head too far from material to be cut	Approach head as near as possible to material to be cut so that only the blade section employed in the cut is free, this will prevent deflections that would excessively stress the blade.
	Blade too slack	Check that the tightening handwheel is against the set screw that ensures ideal tightening.
	Insufficient lubricating refrigerant or wrong emulsion	Check level of liquid in the tank. Increase the flow of lubricating refrigerant, checking that the hole and the liquid outlet pipe are not blocked. Check the emulsion percentage.
GUIDE BEARINGS PRODUCING NOISE	Chipped bearings	Dirt and/or chips between blade and guide bearings. Replace them.
	Worn out or damaged bearings	Replace them.

12.2 - Electrical components diagnosis

FAULT	PROBABLE CAUSE	REMEDY
MACHINE DOES NOT WORK	Power supply	Check: - phases - cables - socket - plug Voltage must arrive upstream from the fuses (terminal board).
	Fuses FU 1	Check electrical efficiency and check for shorts that trigger such protections. Check closing of the flywheel guard. Check the efficiency of the device; replace it if damaged. It must be turned to position 1 or 2. Ensure that it is off and that its contacts are unbroken. Check mechanical efficiency; replace if damaged. Check that thermal relay protecting band motor is correctly cennected. Check that the supply voltage is the same as the line voltage and that it gives a value of 24 V at output. Check fuse efficiency and ensure there are no short circuits causing the protection to trip.
MOTOR STOPPED WITH PILOT LIGHT HL		Check operation and/or efficiency; replace if broken. Check that phases are present at both input and output; ensure that it is not blocked, that it closes when fed, that it does not cause short circuits; otherwise change it. Check that it is not burnt and that it turns freely. It may be rewound or changed.

13 NOISE TESTS

In accordance with point 1.7.4.f of the Machines Directive EEC 98/37

2 measurements with the machine operating unloaded.
- The microphone was been located close to the operator's head, at medium height.
- The weighted equivalent continuous acoustic pressure level was 68,1 dB (A).
- The maximum level of the WEIGHTED instantaneous acoustic pressure C was always less than 130 dB.

NOTE: with the machine operating, the noise level will vary according to the different materials being processed. The user must therefore assess the intensity and if necessary provide the operators with the necessary personal protection, as required by Law 277/1991.

PLATES AND LABELS