



# THOMAS

## *USE AND MAINTENANCE MANUAL*



**SAR 331 SA  
GDS**

**THOMAS**



01/2003



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## 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.



**THOMAS**

**SAR 331 SA GDS**

***Machine certification and identification marking***

**MACHINE LABEL**

<b>THOMAS S.p.A.</b>		<b>CE</b>
via Pasubio, 32 36033 ISOLA VIC. - ITALIA		
<b>MODEL</b>	SAR	
<b>TYP</b>	331 SA GDS	
<b>SERIAL NUMBER</b>		
<b>YEAR OF MANUFACTURE</b>		

(Space reserved for the NAME and STAMP of the DEALER and/or IMPORTER)

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# 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.

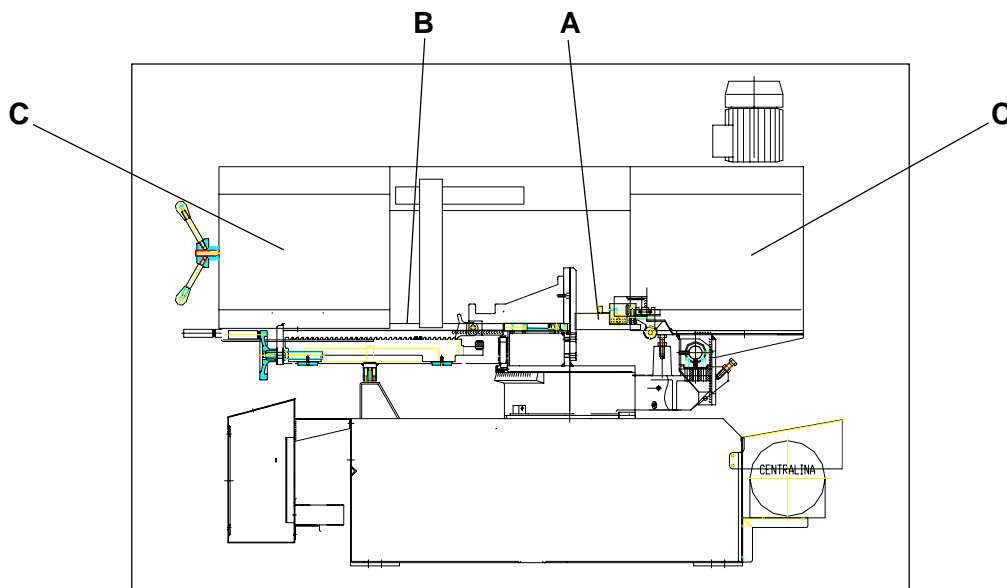
## 1.1 - Advice for the operator



- 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).
- Do not use any artful system or device (for ex. shim) to prevent the vice from locking the workpiece. Do not hold the workpiece with your hand during the cutting process.
- Do not charge the workpiece from the right to the left-hand side with respect of the machine front.
- 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 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 or grey metal shield fixed frontally with screws to the fixed blade-guiding block (Ref. A).
- Blue or grey shield fixed with screws to the adjustable blade-guiding block. Guarantees that the section of blade which exceeds the piece to be cut is covered (Ref. B).
- Grey metal casing fixed with hooks to the frame. Protects the flywheels from blade dragging (Ref. C).



### 1.3 - Electrical equipment according to European Standard "CENELEC EN 60 204-1" which assimilates, with some integrating modifications, the publication "IEC 204-1"

- The electrical equipment ensures protection against electric shock as a result of direct or indirect contact. The active parts of this equipment are housed in a box to which access is limited by screws that can only be removed with a special tool; the parts are fed with alternating current at low voltage (24 V). The equipment is protected against splashes of water and dust.
- Protection of the system against short circuits is ensured by means of rapid fuses and earthing; in the event of motor overload, protection is provided by a thermal relay.
- In the event of a power cut, the specific start-up button must be reset.
- The machine has been tested in conformity with point 20 of EN 60204.

### 1.4 - Emergencies according to European Standard "CENELEC EN 60 204-1"

- In the event of incorrect operation or of danger conditions, the machine may be stopped immediately by pressing the red mushroom button.
- The casual or voluntary removal of the protection shield of the flywheels causes the stepping-in of a microswitch that automatically stops all machine functions.
- In case blade breaks, the band tightening microswitch/pressure switch disconnects all machine.

NOTE: Resetting of machine operation after each emergency stop is achieved by reactivating the specific restart button.

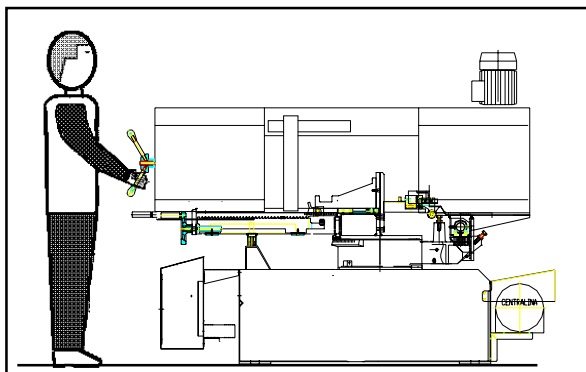
### 1.5 - OTHER RISKS

- As the machine is running, any intervention from the operator within the "dangerous zone" or cutting area must be considered a risk for his own safety.

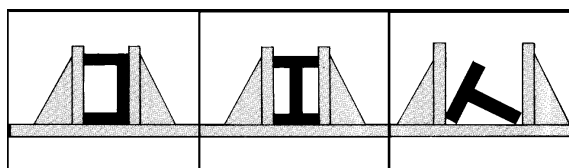
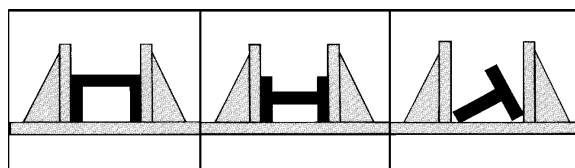
## 2 RECOMMENDATIONS AND ADVICE FOR USE

### 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 THOMAS.



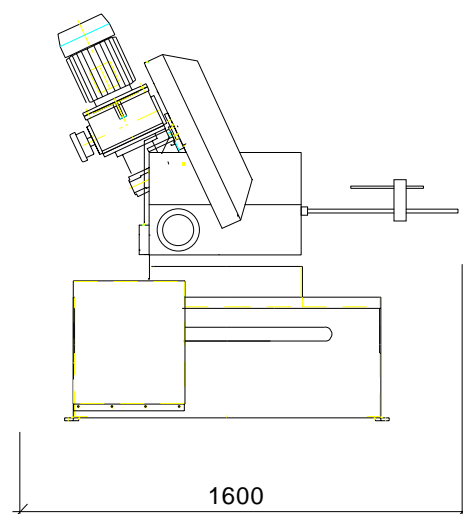
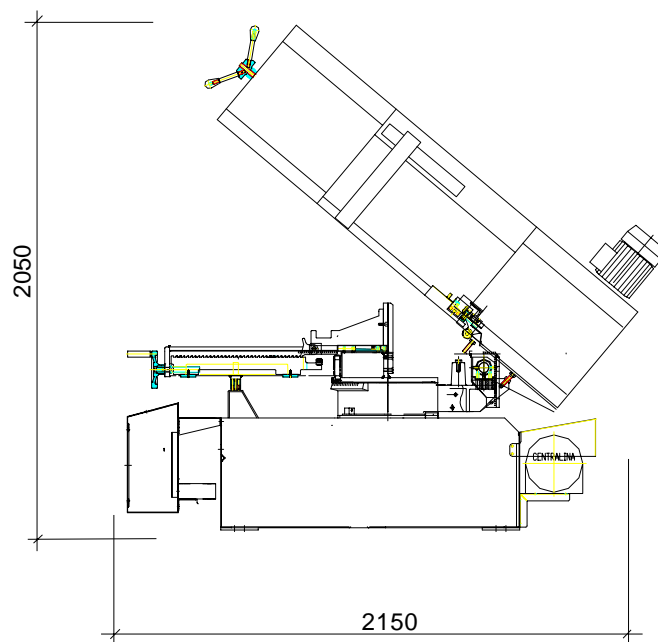
### 3 TECHNICAL CHARACTERISTICS

#### 3.1 - Table of cutting capacity and technical details

CAPACITA' DI TAGLIO			
0°	330	330x330	480x130
45° DX	310	280x280	300x250
45° SX	300	250x250	280x250
60°	200	180x180	180x200

### 4 MACHINE DIMENSIONS TRANSPORT INSTALLATION DISMANTLING

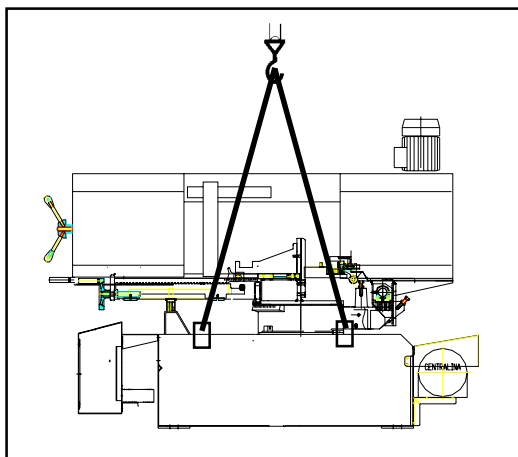
#### 4.1 - Machine dimensions



Blade motor	KW	1.5
Hydraulic motor	KW	0.37
Pump electric	KW	0.18
flywheel diameter	mm	390
Blade dimensions	mm	3810x27x0.9
Cutting speed	m/1'	21 ÷ 116
Vice opening	mm	485
Saw frame inclination	°	25
Height of pieces bearing surface	mm	740
Machine weight	Kg	720

### 4.2 - Transport and handling of the machine

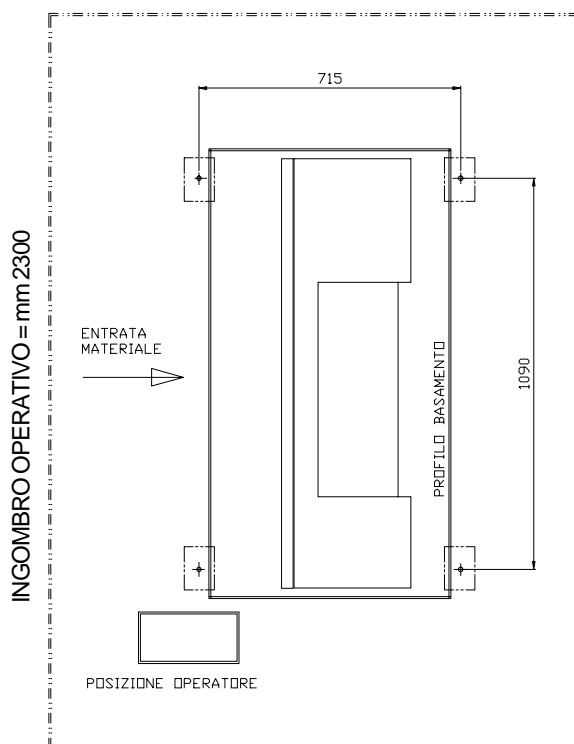
If the machine has to be shifted in its own packing, use a fork-lift truck or sling it with straps as illustrated.



### 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 - Anchorage of standard machine

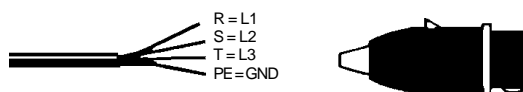


- Position the machine on a firm cement floor, maintaining, at the rear, a minimum distance of 1000 mm from the wall; anchor it to the ground as shown in the diagram, using screws and expansion plugs or tie rods sunk in cement, ensuring that it is sitting level.

### 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

Fit the components supplied as indicated in the photo:

- Mount the stock stop.
- Mount the coolant liquid holder.

### 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

If the machine is to be permanently demolished and/or scrapped, divide the material to be disposed of according to type and composition, as follows:

- 1) Cast iron or ferrous materials, composed of **metal alone**, are **secondary raw materials**, so they may be taken to an iron foundry for re-smelting after having removed the contents (classified in point 3);
- 2) electrical components, including the cable and electronic material (magnetic cards, etc.), fall within the category of material classified as being **assimilable to urban waste** according to the laws of the European community, so they may be set aside for collection by the public waste disposal service;
- 3) old mineral and synthetic and/or mixed oils, emulsified oils and greases are **special refuse**, so they must be collected, transported and subsequently disposed of by the old oil disposal service.



NOTE: since standards and legislation concerning refuse in general is in a state of continuous evolution and therefore subject to changes and variations, the user must keep informed of the regulations in force at the time of disposing of the machine tool, as these may differ from those described above, which are to be considered as a general guide line.

## 5 MACHINE FUNCTIONAL PARTS

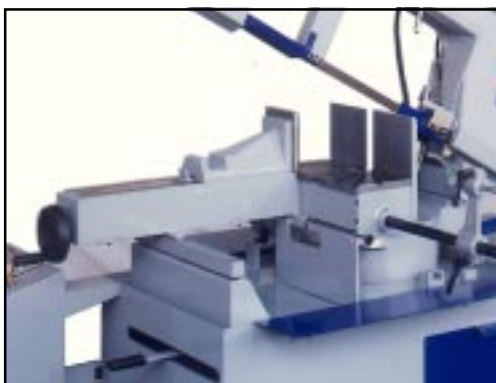
### 5.1 - Operating head or saw frame

- Machine part consisting of the members that transfer the motion (gearmotor, flywheels), the tightening/guiding (blade guide arms, blade tightening slide) and the tool lowering control.



### 5.2 - Vice

- Manual locking system for cutting material using the hand wheel. This device allows for the quick shifting of the vice and the possibility to cut inclinations to the left and right.



### 5.3 - Bed

- Structure supporting the HEAD OR SAW FRAME, the VICE, the SWIVEL DEVICE with relative locking system, the ELECTRICALS, the BAR STOP and housing the coolant TANK for cut and pump.



## 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 - Getting started

DESCRIPTION OF THE CUTTING CYCLE:

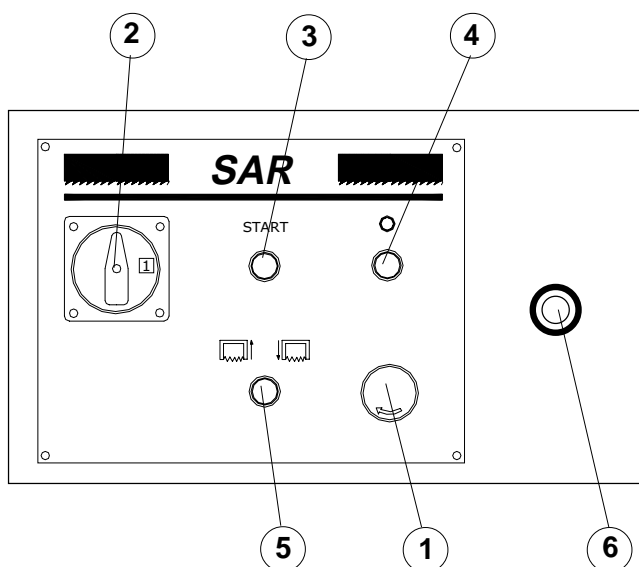
- Manual closing of the vice;
- Activation of the cutting cycle;
- Independent lowering of the blade-carrying frame;
- Frame raising (with selector);
- Manual opening of the vice.

PRELIMINARY OPERATIONS:

- Make sure that the machine is equipped with all the protections described in paragraph 1.2 of chapter 1.
  - Position the side draining system (supplied with the machine) on the base.
  - Make sure that the machine is not in an emergency stop. If it is, release the red mushroom pushbutton (1) on the command panel.
  - Rotate the belt-tightening handwheel (8) until the relative microswitch activates.
  - Rotate the main switch (2) to position 1.
  - Press the pushbutton with light (4) and make sure that the relative indicator lights up.
  - Use the selector (5) to raise the frame.
- NB: invert the electric supply phases if the frame does not rise (this should only be done during installation).



- Open the vice according to the dimensions of the material to be cut.
- Place the material to be cut in the vice and lock using the handwheel. Make sure that the relative pawl is interlocked with the rack.
- Free the hand lever and move the mobile belt-guiding arm as close as possible to the piece to be cut (up to approx. 10mm) then lock the hand lever.
- Make sure that the cutting angle corresponds to the desired inclination and that the angling device is locked using the relative lever (see paragraph 7.4 of chapter 7).
- Make sure that the hydraulic regulator (6) is fully closed, then rotate counter clockwise to set the most suitable lowering speed for the characteristics of the material to be cut. It is advisable to always start from a cautionary speed and increase subsequently if necessary.



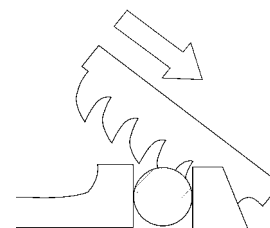
- Always make sure that the vice is positioned at the extreme right or left of the countervice to avoid accidental contact with the frame.
- Before starting the cutting cycle it is advisable to move the blade to approx. 10mm from the piece to be cut, using the selector (5) if necessary.
- Press the pushbutton (3) to start the cutting cycle. Make sure that the belt turns in the correct direction and that a sufficient quantity of cooling liquid exits.  
NB: The weight of the blade-carrying frame causes it to lower automatically without needing the intervention of Operator. If greater cutting pressure is necessary, modify the tightness of the frame return spring (see paragraph 7.8 of chapter 7).
- Use the variator group handwheel to set the most suitable cutting speed for the material to be cut. This operation must always be carried out while the motor is running). To set the necessary speed, refer to the plate applied on-board the machine or shown below.
- Press the emergency pushbutton if incorrect manoeuvres are made, or if the cutting cycle is to be stopped.
- When finished cutting, the frame stops in the lower position. Use the selector (5) to raise the frame.

**NB: Do not use the sawing machine at full material discharge speed during the first 50 working hours.**



**Keep a safe distance from the cutting area during machine operation.**

### CUTTING DIRECTION



The sawing machine is now ready to start working. Please remember that the CUTTING SPEED and the TYPE of blade when combined with suitable frame lowering have a determinate effect on the cutting quality and machine return (for more information on this topic, refer to the "**Material classification and blade choice**" chapter)

- **When starting to cut with a new blade, it is necessary to exert a light pressure on the piece during the first two or three cuts, in order to use a cutting time that is almost double the normal one** (refer to the *Blade breaking-in* paragraph in the "**Material classification and blade choice**" chapter further on in this manual).
- Use the red emergency pushbutton (1) when dangerous conditions or faults in general arise. Doing so immediately interrupts machine operation.

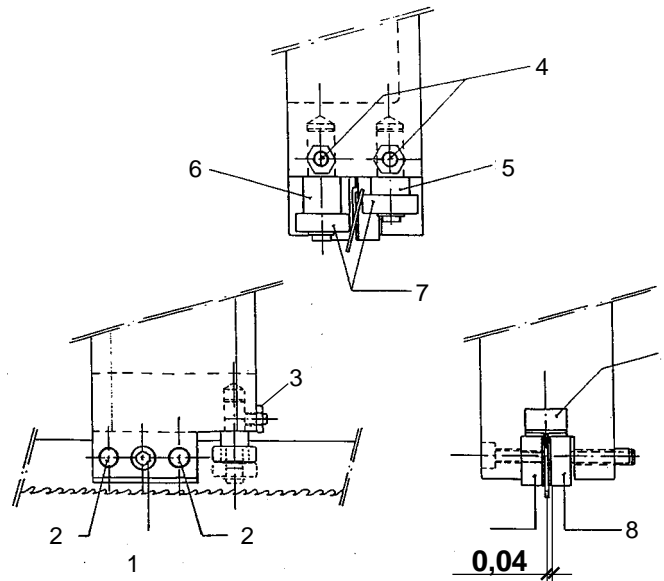
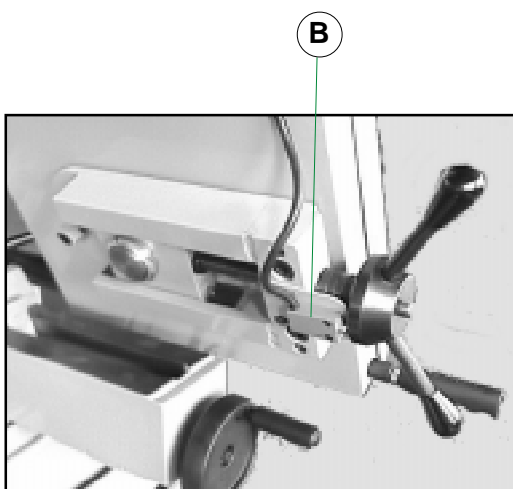
# 7 REGULATING THE MACHINE

## 7.1 - Blade tension assembly

The ideal blade tension is obtained by turning the belt-tightening handwheel until the relative microswitch activates (B). The position of the microswitch is established by an instrument that measures the blade stretch. This regulation must not be modified.

NB: it is advisable to loosen the blade tension when the saw is not being used.

It is advisable to always use blades having the dimensions declared in this manual.



## 7.2 - Blade-guiding arms and plates

The blade is guided by plates that are regulated during the testing phase according to the thickness of the blade. The minimum clearance indicated in the figures should be maintained. When the blade is to be replaced, make sure to always fit belts with a 0.9 mm thickness because the blade-guiding plates have been regulated for this thickness. If using toothed belts with different thicknesses a new regulation must be carried out as follows:

- Loosen the screw (1) and unscrew the grub screws (2), widening the space between the plates.
- Loosen the nuts (3) and the grub screws (4) and rotate the pins (5 - 6) to widen the space between the bearings (7).
- Insert the new blade, then place the plate (8) against it. Tighten the grub screws (2), leaving a 0.04 mm clearance to ensure that the toothed belt slides well. After this, tighten the relative nuts and the screw (1).
- Rotate the pins (5 - 6) until the bearings lean against the blade, as indicated in the figure. Lock the grub screws (4) and the nuts (3).

## 7.3 - Vice

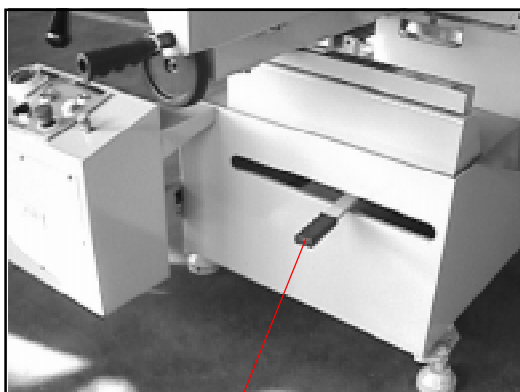
- The vice can be made to move rapidly towards the piece to be cut by keeping the hand lever (C) raised and moving the vice manually. Before using the handwheel to lock the material to be cut, make sure that the hand lever is interlocked with the rack.
- The vice group can be positioned to the right or left of the blade. If positioning is not fully completed, the sawing machine can be permanently damaged by the lowering movement of the frame.
- Always keep the vice guide and relative thread clean and oiled.



C

### 7.4 - Regulating the cutting angle

- Raise the frame to a position that avoids contact with the piece supporting surface and the material to be cut.
- Push the lever (D) to the left in order to free the rotation device.
- Rotate the frame group to the necessary angle, referring to the graduated sector.
- Use the mechanical stops on the machine base to make positioning at 45° / 60° easier. If necessary, rotate the mechanical stops to permit movement of the rotating arm.
- When finished, push the lever (D) to the right in order to lock the rotation device.



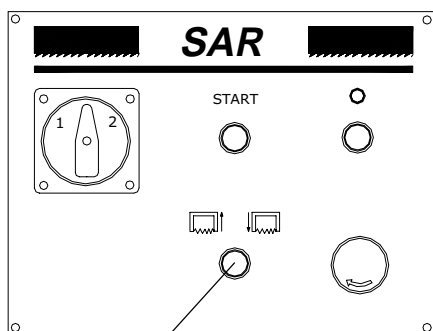
D

### 7.5 - Blade-cleaning brush

This is an excellent accessory for cleaning the blade during the cutting cycle. Periodically check brush integrity and if necessary regulate further to guarantee perfect blade cleaning.

### 7.6 - Regulating the cutting height

- With this accessory it is possible to raise the frame and/or move it closer to the piece to be cut.
- Use the selector (E) to move the frame to the necessary position.
  - It is advisable to position the blade at a distance of 10mm from the material to be cut.
  - To permit the frame lowering movement, open the hydraulic regulator on the command panel.

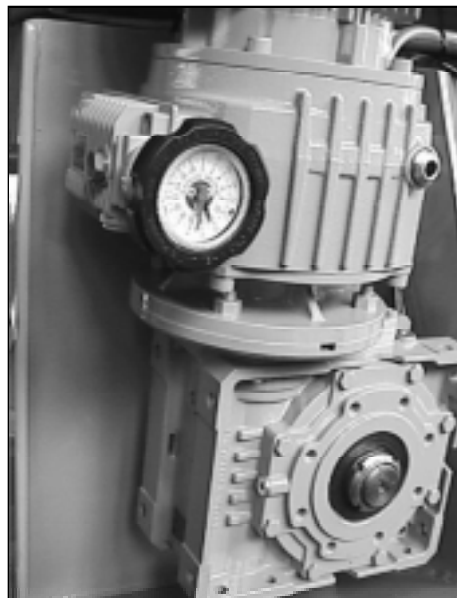


E

### 7.7 - Regulating the cutting speed

The cutting speed should only be regulated while the belt rotation motor is running.

Use the relative handwheel and refer to the relative plate in order to set the necessary speed.



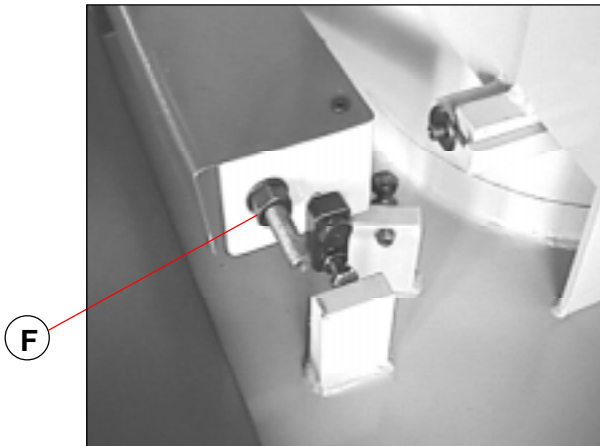
POS. N°	m/min.
0	21
1	23,5
2	26
3	28,5
4	31
5	33,5
6	36
7	38,5
8	41
9	43,5
10	46
11	48,5
12	51
13	53,5
14	56
15	58,5
16	61
17	62,5
18	64,5

POS. N°	m/min.
19	66
20	68
21	71,5
22	74,5
23	78
24	81,5
25	85
26	87,5
27	90
28	93
29	96
30	99
31	102,5
32	105,5
33	108,5
34	111
35	113,5
36	116



### 7.8 - Regulating the frame raising spring

- It is possible to modify the tension of the frame return spring in order to obtain increased cutting pressure while lowering to cut.
- Loosen the nut (F) to remove tension from the spring until the desired tension has been reached.
- NB: the spring tension should not be loosened in an exaggerated manner. Doing so can influence the balance of the blade-carrying frame.



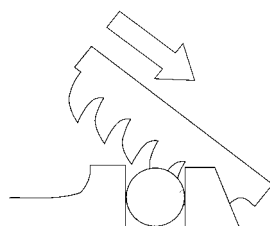
**BEFORE PERFORMING THE FOLLOWING OPERATIONS, THE ELECTRIC POWER SUPPLY AND THE POWER CABLE MUST BE COMPLETELY DISCONNECTED.**

### 7.9 – Replacing the blade

- Raise the frame to the high position.
- Use the handwheel to loosen the blade, remove the mobile blade-guiding shield and the belt-cleaning brush shield.
- Open first the rear then the front flywheel casing and extract the old blade from the flywheels and the blade-guiding blocks.
- Position the new blade, placing it firstly among the plates and then on the flywheel seats. Make sure that the teeth are positioned in the correct direction for cutting (see drawing below).
- Tighten the blade, making sure it adapts perfectly to the flywheel seats.
- Reposition the mobile blade-guiding shield, the belt-cleaning brush shield and close the flywheel casings. Make sure that the safety microswitch activates, otherwise the machine will not start when powered again.

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

**CUTTING DIRECTION**



### 7.10 – Replacement of the return spring arch

- During the entire operation, it will be necessary to keep the arch lifted and secured.
- First loosen the tension spring and unhook it from the supporting spring immediately behind.

**PROBABLE REPLACEMENT OF OTHER PARTS – REDUCTION GEAR OR SPEED CONTROL, MOTOR PUMP AND ELECTRICAL COMPONENTS – TO BE EXECUTED BY SPECIALISED AND COMPETENT PERSONNEL.**

## 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 shavings.
- 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 shavings, 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 of blade guide arms (guide bearings, pads and drain hole of the lubricating cooling).
- Cleaning flywheel housings and blade sliding surfaces on flywheels.
- Check condition of the blade cleaning brushes.
- Greasing of motor flywheel bearings.



### 8.3 - Monthly maintenance

---

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

### 8.4 - Six-monthly maintenance

---

#### REDUCER:

- It is advisable to carry out the first oil change after around 300 working hours. Wash the internal parts accurately. Use synthetic lubricant of the SHELL TIVELA OIL SC 320 type or similar.
- The next oil change should be carried out after approx. 2000 working hours.

#### VARIATOR:

- Replace the variator oil after approx. 2000 working hours. Use SHELL DONAX TA oil or similar.
- NB: never mix synthetic oil with mineral oil.
- Completely replace the hydraulic switchboard oil at least once every year. Use SHELL HYDRAULIC OIL 32 or similar.
- Carry out a continuity test on the unipotential protection circuit.

### 8.5 - 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 a reference the SHELL LUTEM OIL ECO type.

THE MINIMUM PERCENTAGE OF OIL DILUTED IN WATER IS 8 - 10 %.

### 8.6 - Oil disposal

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

### 8.7 - Special maintenance

---

Special maintenance operations must be carried out by skilled personnel.

However, we advise contacting THOMAS or their dealer and/or importer. Adjusting the protective and safety equipment and devices, the reducer, the motor, the motor pump and electric components are classed as special maintenance operations.

# 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 knowledge of these specifications.

**WE THEREFORE RECOMMEND YOU TO ALWAYS USE GENUINE 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 shavings 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.**


BLADE TEETH SELECTION TABLE		
THICKNESS MM	Z CONTINUOUS TOOTH DESIGN	Z COMBO TOOTH DESIGN
TILL 1.5	14	10/14
FROM 1 TO 2	8	8/12
FROM 2 TO 3	6	6/10
FROM 3 TO 5	6	5/8
FROM 4 TO 6	6	4/6
MORE THAN 6	4	4/6

S = THICKNESS


TYPES OF STEEL						CHARACTERISTICS		
USE	I UNI	D DIN	F AF NOR	GB SB	USA AISI-SAE	Hardness BRINELL HB	Hardness ROCKWELL HRB	R=N/mm <sup>2</sup>
Construction steels	Fe360 Fe430 Fe510	St37 St44 St52	E24 E28 E36	---- 43 50	---- ---- ----	116 148 180	67 80 88	360÷480 430÷560 510÷660
Carbon steels	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 steels	50CrV4 60SiCr8	50CrV4 60SiCr7	50CV4 ----	735 A 50 ----	6150 9262	207 224	95 98	1140÷1330 1220÷1400
Alloyed steels for hardening and tempering and for nitriding	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
Alloyed casehardening steels	18NiCrMo7 20NiCrMo2	---- 21NiCrMo2	20NCD7 20NCD2	En 325 805 H 20	4320 4315	232 224	100 98	760÷1030 690÷980
Alloyed for bearings	100Cr6	100Cr6	100C6	534 A 99	52100	207	95	690÷980
Tool steel	52NiCrMoKU C100KU X210Cr13KU 58SiMo8KU	56NiCrMoV7C100K C100W1 X210Cr12 ----	---- ---- 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 steels	X12Cr13 X5CrNi1810 X8CrNi1910 X8CrNiMo1713	4001 4301 ---- 4401	---- Z5CN18.09 ---- Z6CDN17.12	---- 304 C 12 ---- 316 S 16	410 304 ---- 316	202 202 202 202	94 94 94 94	670÷885 590÷685 540÷685 490÷685
Copper alloys Special brass Bronze	Aluminium copper alloy G-CuAl11Fe4Ni4 UNI 5275 Special manganese/silicon brass G-CuZn36Si1Pb1 UNI5038 Manganese bronze SAE43 - SAE430 Phosphor bronze G-CuSn12 UNI 7013/2a					220 140 120 100	98 77 69 56,5	620÷685 375÷440 320÷410 265÷314
Cast iron	Gray pig iron G25 Spheroidal graphite cast iron GS600 Malleable cast iron W40-05					212 232 222	96 100 98	245 600 420



SOLID Ø OR L MM	Z CONTINUOUS TOOTH DESIGN	Z COMBO TOOTH DESIGN
TILL 30	8	5/8
FROM 30 TO 60	6	4/6
FROM 60 TO 80	4	4/6
MORE THAN 90	3	3/4



$\varnothing$  = DIAMETER      L = WIDTH



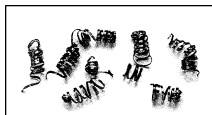
### 9.4 - Cutting and advance speed

The cutting speed (m/min) and the advance speed (cm<sup>2</sup>/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<sup>2</sup>/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 (HSS) 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**

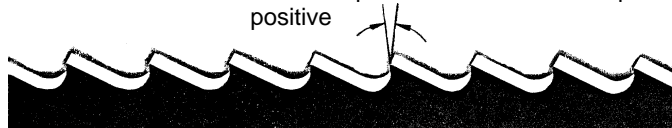
#### Shape and angle of tooth

**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.

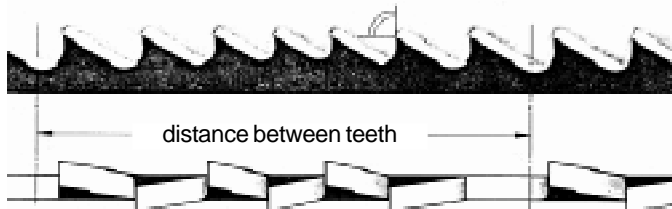
**POSITIVE RAKE TOOTH:** 9° - 10° positive rake and constant pitch.



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).

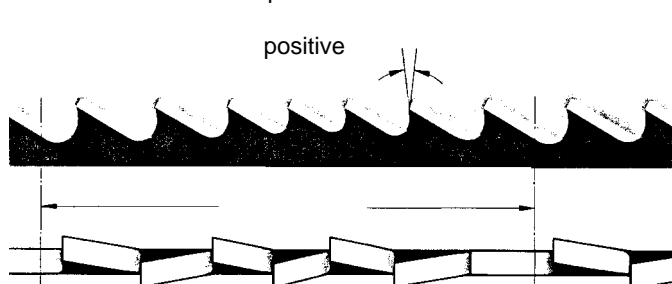
**COMBO TOOTH:** pitch varies between teeth and consequently varying teeth size and varying gullet depths. Pitch varies between teeth which ensures a smoother, quieter cut and longer blade life owing to the lack of vibration.

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.



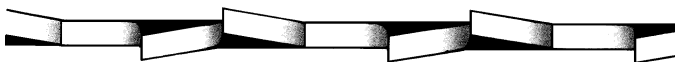


### Set

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 - RECOMMENDED CUTTING PARAMETERS

STEEL	CUTTING SPEED	LUBRICATION
CONSTRUCTION	60/80	EMULSIFIABLE OIL
CEMENTATION	40/50	EMULSIFIABLE OIL
CARBON STEEL	40/60	EMULSIFIABLE OIL
HARDENING AND TEMPERING	40/50	EMULSIFIABLE OIL
BEARINGS	40/60	EMULSIFIABLE OIL
SPRINGS	40/60	EMULSIFIABLE OIL
FOR TOOLS	30/40	EMULSIFIABLE OIL
FOR VALVES	35/50	EMULSIFIABLE OIL
STAINLESS STEEL	30/40	EMULSIFIABLE OIL
SPHEROIDAL GRAPHITE	20/40	EMULSIFIABLE OIL
CAST IRON	40/60	EMULSIFIABLE OIL
ALUMINIUM	80/600	KEROSENE
BRONZE	70/120	EMULSIFIABLE OIL
HARD BRONZE	30/60	EMULSIFIABLE OIL
BRASS	70/350	EMULSIFIABLE OIL
COPPER	50/720	EMULSIFIABLE OIL



# 10 MACHINE COMPONENTS

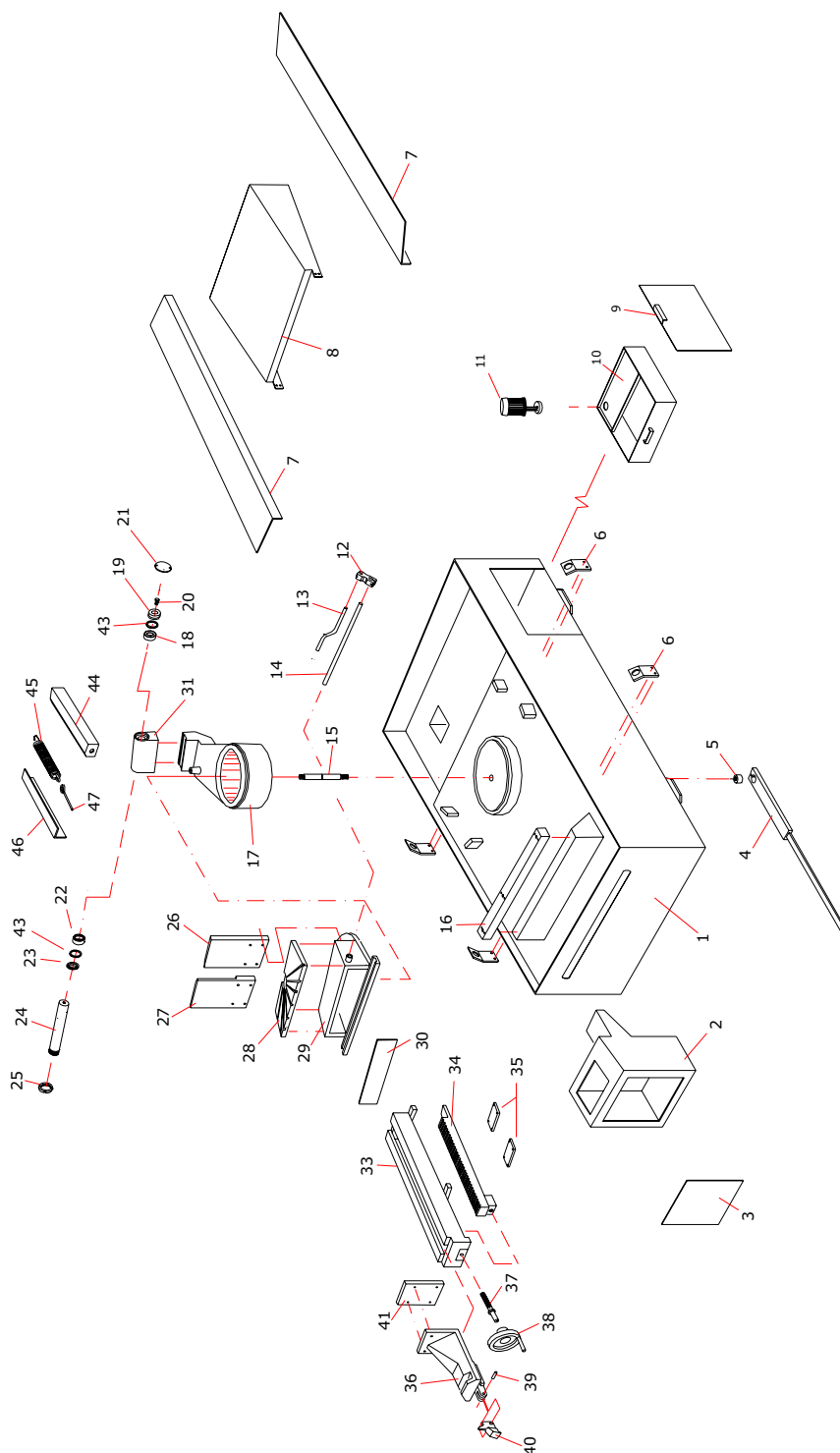
## 10.1 - List of spare parts

REFERENCE NUMBER	DENOMINATION
1	Bedframe
2	Electric box
3	Electric box cover
4	Revolving arm lock lever
5	Arm lock bush
6	Machine hoisting hook
7	Crucible
8	Hydraulic unit cover
9	Cover
10	Refrigerating liquid tank
11	Electropump
12	Bar stop body
13	Bar stop push rod
14	Bar stop rod
15	Revolving arm pin
16	Vice support
17	Revolving arm
18	Bearing 32008 X
19	Bushing
20	Screw
21	Hinge pin protection
22	Bearing 32008 X
23	Spacer
24	Hinge pin
25	Ring nut Guk M 40 x 1,5
26	Countervise r.h. jaw
27	Countervise l.h. jaw
28	Interchangeable plate
29	Countervise
30	Countervise anterior guard
31	Hinge pin support
32	
33	Vice support
34	Rack
35	Rack support
36	Vice
37	Vice screw
38	Vice handwheel
39	Pin
40	Pawl
41	Vice jaw
42	
43	Ring NILOS 32008 XAV
44	spring support
45	Spring
46	

REFERENCE NUMBER	DENOMINATION
60	Saw frame
61	Electric motor
62	Speed variator
63	Speed variator handwheel
64	Ring nut M 35 x 1,5
65	Speed reducer
66	Spacer
67	Cylinder sawframe superior attachment
68	Spacer flange
69	
70	Microswitch
71	Cylinder sawframe inferior attachment
72	Pin
73	Pin
74	Hydraulic cylinder ( SA GDS version )
75	Adjustable screw
76	Transmission flywheel pin
77	Ring nut Guk M 30 x 1,5
78	Blade tightening slide
79	Microswitch
80	Microswitch support plate
81	Handgripp
82	Blade tightening handwheel pin
83	Blade tightening handwheel
84	Blade tightening pin
85	Spring
86	Bracket
87	Ring NILOS 32006 XAV
88	Bearing 32006 X
89	Transmission flywheel
90	Ring nut Guk M 30 x 1,5
91	Bearing 6308 2RS
92	Ring NILOS 6308 AV
93	Bearing guard
94	Motor flywheel shaft
95	Motor flywheel
96	Cone clamping EURONIC CN 54/S
97	Blade guide protection
98	Microswitch
99	R.h. flywheel protection
100	L.h. flywheel protection
101	Blade guide arm guide
102	Blade guide arm
103	
104	Hand lever



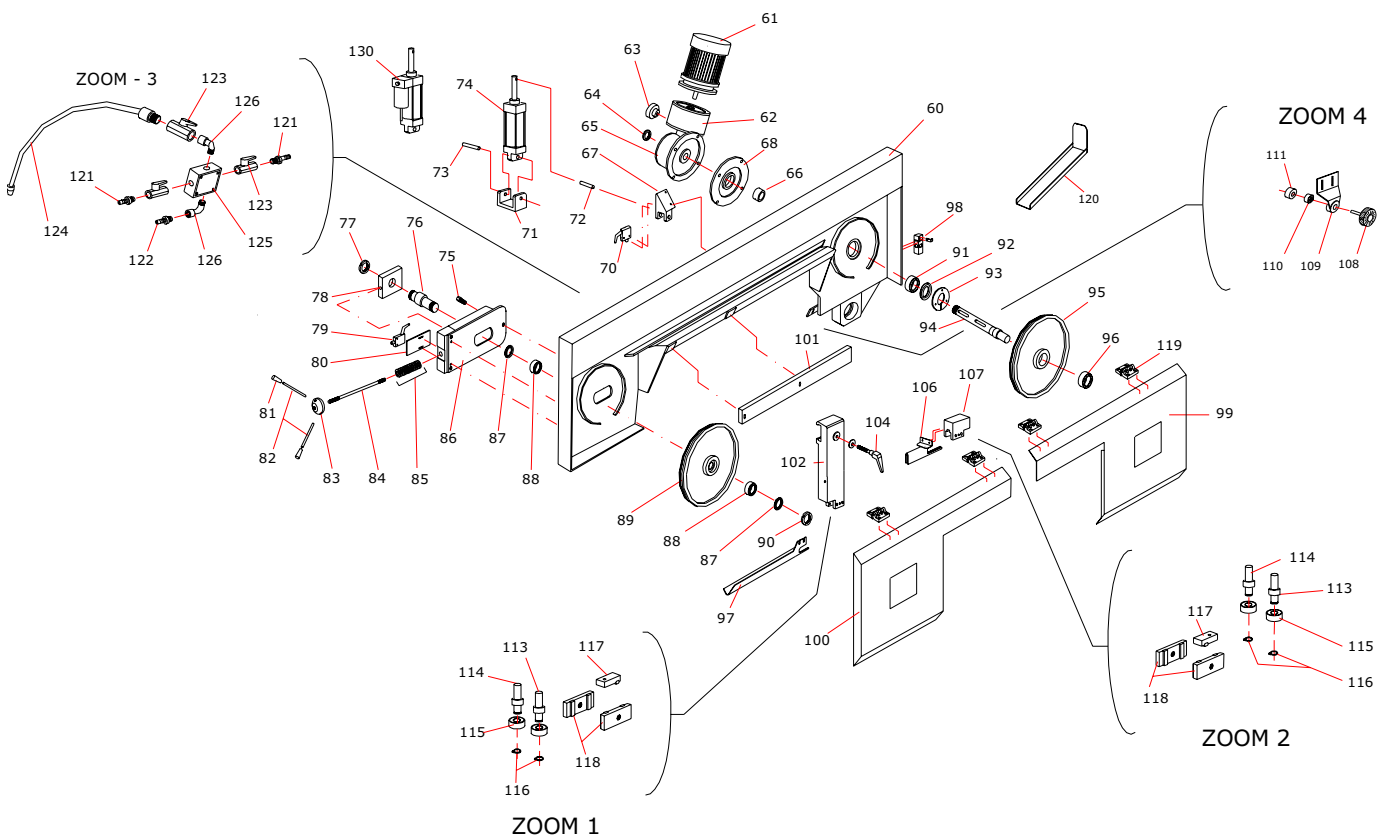
REFERENCE NUMBER	DENOMINATION
105	
106	Additional protection
107	Fixed blade guide block
108	Blade cleaning brush
109	Brush support
110	Bearing 626
111	Bush
112	
113	Short eccentric pin
114	Long eccentric pin
115	bearing 608 2RS
116	ring seeger
117	Upper blade guide pad
118	Side blade guide pad
119	
120	Crucible
121	Coupling
122	Coupling
123	Cooling liquid cock
124	Flexible tube
125	Cooling distributor
126	Coupling
127	
128	
129	
130	Bracke cylinder ( GDS version )





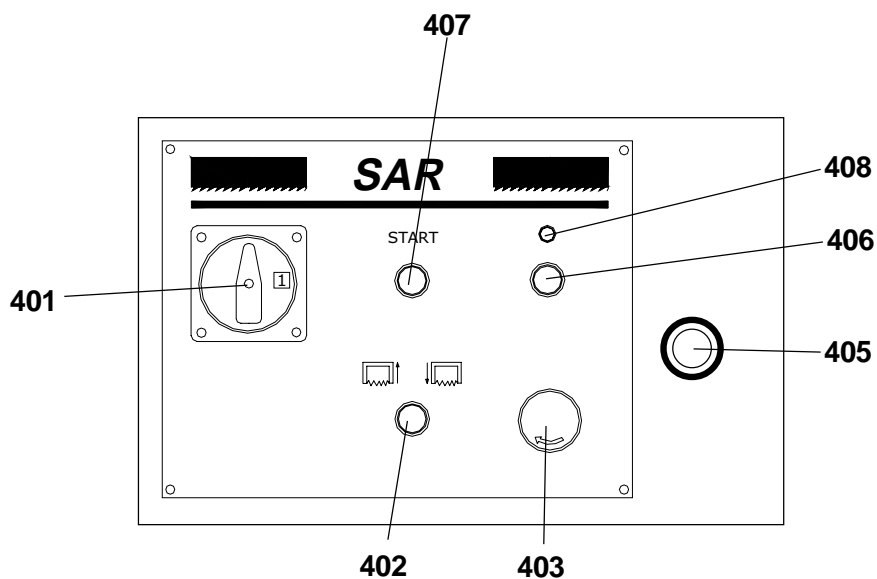
**THOMAS**

**SAR 331 SA GDS**



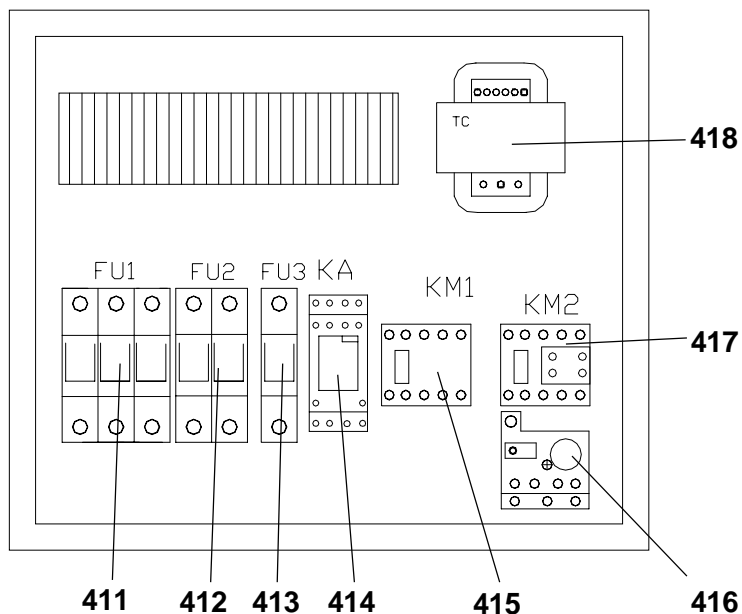
### KEY:

- 401 Main switch
- 402 Frame movement selector
- 403 Emergency pushbutton
- 404
- 405 Frame lowering regulator
- 406 Line pushbutton
- 407 Cycle start pushbutton
- 408 Indicator light



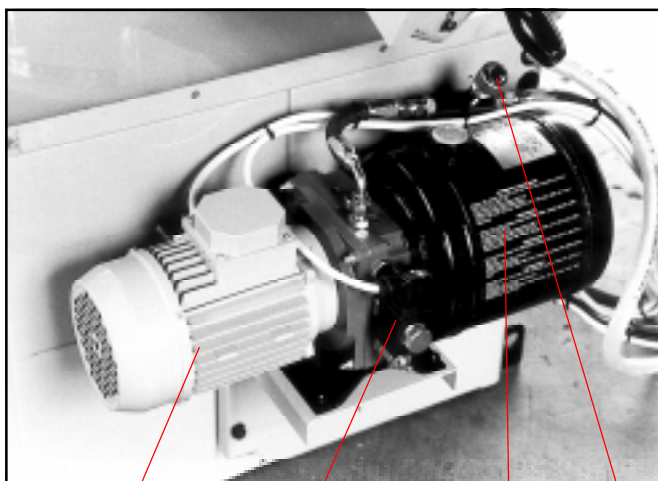
### KEY:

- 411 Fuse holders (FU 1)
- 412 Fuse holders (FU 2)
- 413 Fuse holders (FU 3)
- 414 Relay
- 415 Hyd. switchboard motor teleswitch
- 416 Belt motor circuit breaker
- 417 Belt motor teleswitch
- 418 Transformer



### KEY:

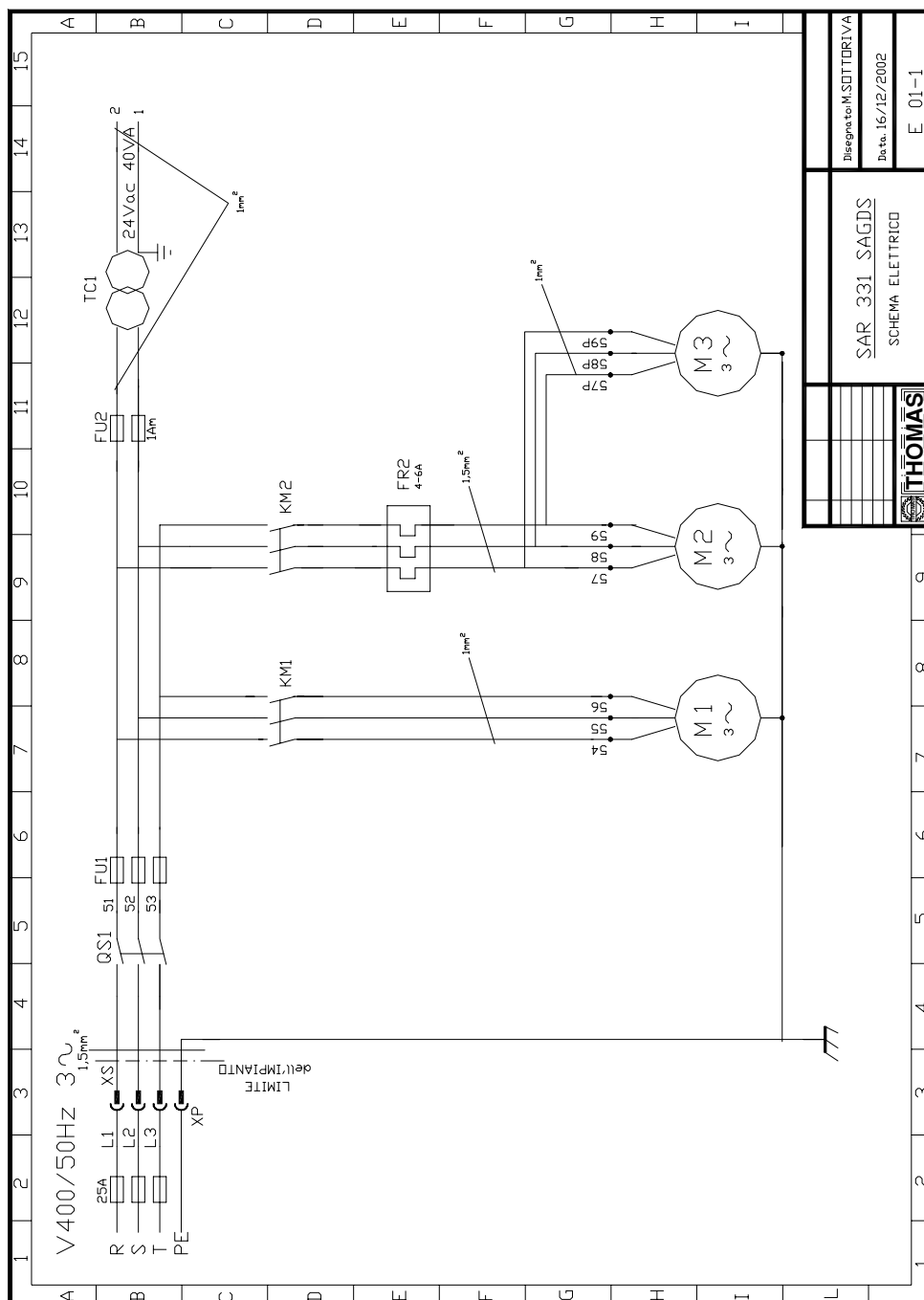
- 421 Hyd. switchboard motor
- 422 Solenoid valve
- 423 Hyd. switchboard casing
- 424 Regulator



421 422 423 424

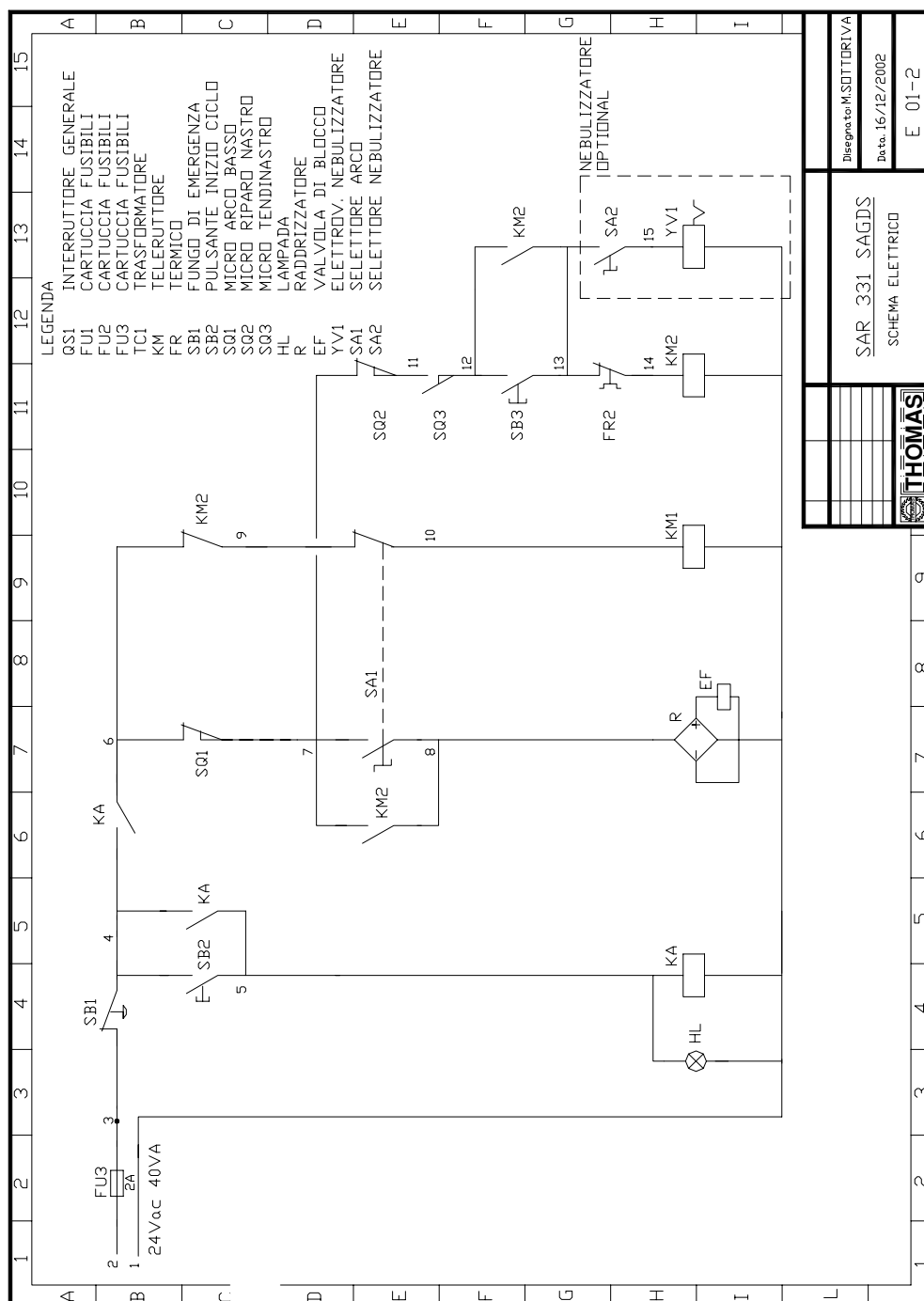
# 11 ELECTRIC DIAGRAM

## 11.1 - Three-phase electric diagram



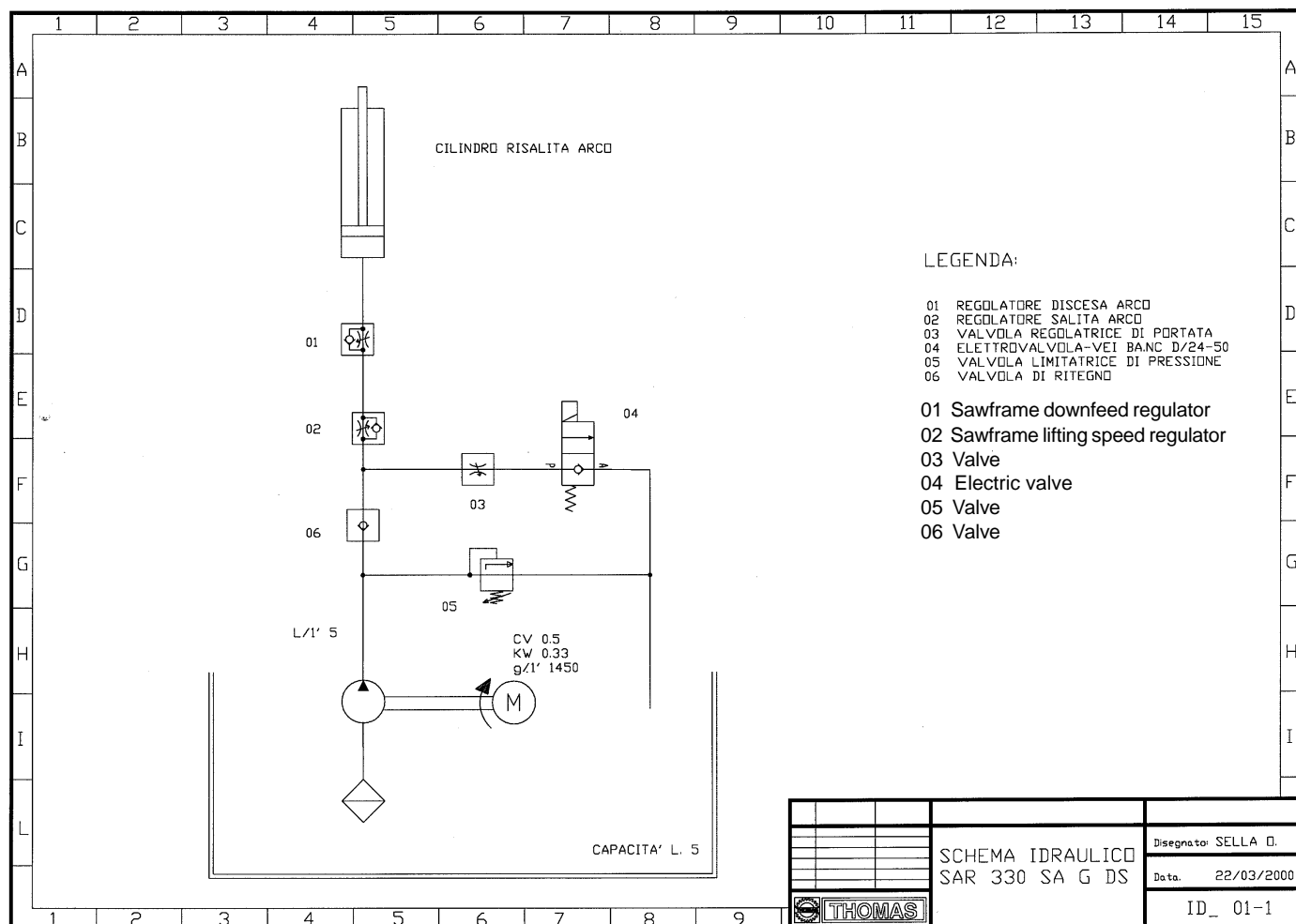
- |     |                                  |     |                     |
|-----|----------------------------------|-----|---------------------|
| QS1 | Main switch                      | M1  | Motor gear case id. |
| FU1 | Fuse cartridge                   | M2  | Belt motor          |
| KM1 | Central motor control switch id. | M3  | Motor pump          |
| KM2 | Motor belt control switch        | FU2 | Fuse cartridge      |
| FR2 | Thermal motor belt               | TC1 | Transformer         |





FU3 Fuse cartridge  
SB1 Emergency switch  
SB2 On-line switch  
KA Relay  
HL Pilot light

SQ1 Dip-switch  
SA1 Arch selector  
EF RC coil  
SQ2 Dip-switch  
SQ3 Dip-switch

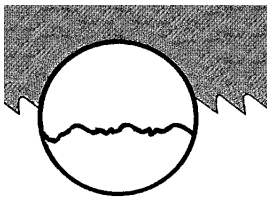
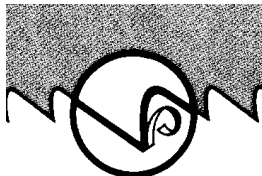


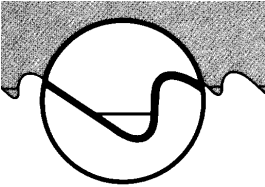
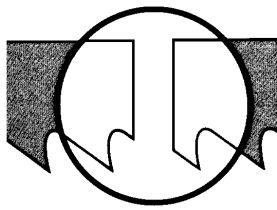
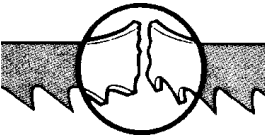
# 12 TROUBLESHOOTING

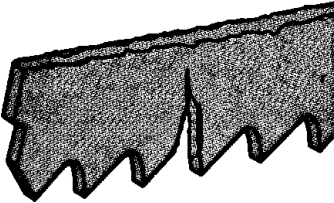
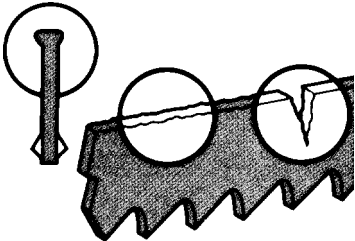
This chapter lists the probable faults and malfunctions that could occur while the machine is being used and suggests possible remedies for solving them.

The first paragraph provides diagnosis for TOOLS and CUTS, the second for ELECTRICAL COMPONENTS.

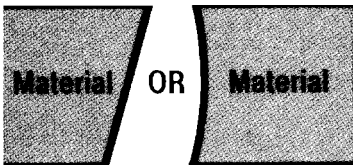
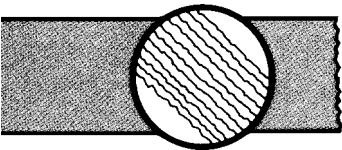
## 12.1 - Blade and cut diagnosis

FAULT	PROBABLE CAUSE	REMEDY
<b>TOOTH BREAKAGE</b>    	Too fast advance	Decrease advance, exerting less cutting pressure. Adjust the braking device if mounted on the machine.
	Wrong cutting speed	Change speed and/or type of blade. See chapter on <b>"Material classification and blade selection"</b> , in the section <i>Blade selection table according to cutting and feed speed</i> .
	Wrong tooth pitch	Choose a suitable blade. See Chapter <b>"Material classification and blade selection"</b> .
	Chips sticking onto teeth and in the gullets or material that gums	Check for clogging of cooling liquid drain holes on the blade-guide pads and that flow is plentiful in order to facilitate the removal of chips from the blade.
	Defects on the material or material too hard	Material surfaces can be oxidised or covered with impurities making them, at the beginning of the cut, harder than the blade itself, or have hardened areas or inclusions inside the section due to productive agents used such as casting sand, welding wastes, etc. Avoid cutting these materials or in any case perform cutting with extreme care, cleaning and removing such impurities as quickly as possible.
	Ineffective gripping of the part in the vice	Check the gripping of the part.
	The blade gets stuck in the material Starting cut on sharp or irregular section bars	Reduce feed and exert less cutting pressure. Pay more attention when you start cutting.
	Poor quality blade	Use a superior quality blade.
	Previously broken tooth left in the cut Cutting resumed on a groove made previously	Accurately remove all the parts left in. Make the cut elsewhere, turning the part.
	Vibrations Wrong tooth pitch or shape	Check gripping of the part. Replace blade with a more suitable one. See <b>"Material classification and blade selection"</b> in the <i>Blade Types</i> section. Adjust blade guide pads.
	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.
	Teeth positioned in the direction opposite the cutting direction	Turn teeth in correct direction.

FAULT	PROBABLE CAUSE	REMEDY
<p><b>PREMATURE BLADE WEAR</b></p> 	<p>Faulty running-in of blade</p> <p>Teeth positioned in the direction opposite the cutting direction</p> <p>Poor quality blade</p> <p>Too fast advance</p> <p>Wrong cutting speed</p> <p>Defects on the material or material too hard</p> <p>Insufficient lubricating refrigerant or wrong emulsion</p>	<p>See “<b>Material classification and blade selection</b>” in the <i>Blade running-in</i> section.</p> <p>Turn teeth in correct direction.</p> <p>Use a superior quality blade.</p> <p>Decrease advance, exerting less cutting pressure. Adjust the braking device if mounted on the machine.</p> <p>Change speed and/or type of blade.</p> <p>See chapter on “<b>Material classification and blade selection</b>”, in the section <i>Blade selection table according to cutting and feed speed</i>.</p> <p>Material surfaces can be oxidised or covered with impurities making them, at the beginning of the cut, harder than the blade itself, or have hardened areas or inclusions inside the section due to productive agents used such as casting sand, welding wastes, etc. Avoid cutting these materials or in any case perform cutting with extreme care, cleaning and removing such impurities as quickly as possible.</p> <p>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.</p> <p>Check the emulsion percentage.</p>
<p><b>BLADE BREAKAGE</b></p>  	<p>Faulty welding of blade</p> <p>Too fast advance</p> <p>Wrong cutting speed</p> <p>Wrong tooth pitch</p> <p>Ineffective gripping of the part in the vice</p> <p>Blade touching material at beginning of cut</p>	<p>The welding of the blade is of utmost importance. The meeting surfaces must perfectly match and once they are welded they must have no inclusions or bubbles; the welded part must be perfectly smooth and even. They must be evenly thick and have no bulges that can cause dents or instant breakage when sliding between the blade guide pads.</p> <p>Decrease advance, exerting less cutting pressure. Adjust the braking device if mounted on the machine.</p> <p>Change speed and/or type of blade.</p> <p>See chapter on “<b>Material classification and blade selection</b>”, in the section <i>Blade selection table according to cutting and feed speed</i>.</p> <p>Choose a suitable blade. See Chapter “<b>Material classification and blade selection</b>”.</p> <p>Check the gripping of the part.</p> <p>At the beginning of the cutting process, never lower the saw frame before starting the blade motor.</p>

FAULT	PROBABLE CAUSE	REMEDY
 	Blade guide pads not regulated or dirty because of lack of maintenance	Check distance between blocks (see “ <b>Machine adjustments</b> ” in the <i>Blade Guide Blocks</i> section): extremely accurate guiding may cause cracks and breakage of the tooth. Clean carefully.
	Blade guide block 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 pad	Replace it.
	Tight or slackened blade guide bearing	Adjust it (see Chapter “ <b>Machine adjustments</b> ” in <i>Blade guide</i> section).
CUTS OFF THE STRAIGHT	Blade not parallel as to the counter-vice	Check fastenings of the blade guide blocks as to the counter-vice so that they are not too loose and adjust blocks 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 pads and maladjustment of the blocks	Check and vertically re-adjust the blade guide blocks; reset proper side guide play (see Chapter “ <b>Machine adjustments</b> ” in <i>Blade guide</i> section).
	Too fast advance	Decrease advance, exerting less cutting pressure. Adjust the braking device if mounted on the machine.
	Blade guide block too far from material to be cut	Approach it 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.
	Worn out blade Wrong tooth pitch	Replace it. Blade with major density of teeth is being used, try using one with less teeth (see Chapter “ <b>Material classification and blade selection</b> ” in the <i>Blade Types</i> 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.
<b>FAULTY CUT</b>	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.
<b>STREAKED CUTTING SURFACE</b>	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 used probably has too large teeth; use one with more teeth (see " <b>Material classification and blade selection</b> " in the <i>Blade Types</i> section).
	Blade guide block too far from material to be cut	Approach it 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.
	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.
<b>NOISE ON GUIDE BLOCKS</b>	Chipped bearings	Dirt and/or chips between blade and guide bearings. Replace them.
	Worn out or damaged pads	Replace them.

### 12.2 - Electrical components diagnosis

FAULT	PROBABLE CAUSE	REMEDY
MACHINE DOES NOT WORK	Power supply	Check: <ul style="list-style-type: none"> <li>- phases</li> <li>- cables</li> <li>- socket</li> <li>- plug</li> </ul> Voltage must arrive upstream from the fuses (terminal board). It must be turned to ON position. Check electrical efficiency. Check power line connections and relative terminals.
	Main disconnect switch	Check electrical efficiency and check for shorts that trigger these protections on the power side of the circuit.
	Fuses "FU 1 "	Check closing of the flywheel guard. Check the efficiency of the device; replace it if damaged.
	" SQ 1 " safety microswitch	Make sure to have tightened the blade with the relevant handwheel and to have actuated the microswitch.
	Blade tightening microswitch	Ensure that it is off and that its contacts are unbroken.
	Emergency button " SB 1 " on	Check mechanical efficiency; replace if damaged.
	Cycle reset or line button " SB 2 "	Check that thermal relay protecting main motor is correctly connected.
	Thermal relay of main motor	
	Transformer " TC 1 "	Check that the supply voltage is the same as the line voltage and that it gives a value of 24 V at output.
	Fuse " FU 2 - FU 3 "	Check fuse efficiency and ensure there are no short circuits causing the protection on the control side of the circuit.
MOTOR STOPPED WITH PILOT LIGHT "HL" LT	Microswitch " SQ 2 "	After having raised the saw frame, check that the microswitch is not engaged and if necessary check operating efficiency.
	Remote-control switch " KM "	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.
	Motor " M 1 "	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 89/392

2 measurements with the machine operating unloaded.

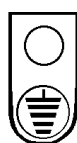
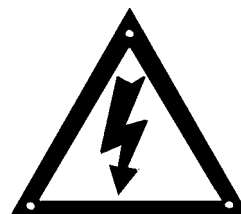
- The microphone was been located close to the operator's head, at medium height.
- The weighted equivalent continuous acoustic pressure level was 66,1 dB (A).
- The maximum level of the WEIGHTED instantaneous acoustic pressure C was always less than 130 dB.

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





**THOMAS**

**SAR 331 SA GDS**

