



# THOMAS

***USE AND MAINTENANCE MANUAL***  
***AUTOMATIC BAR - FEEDING SYSTEM***  
***FOR MOD.***

**SUPER TECHNICS**  
**350 SA**

**THOMAS**



07/2001



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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.



## 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>	<b>SUPER TECHNICS 350</b>
<b>TYP</b>	
<b>SERIAL NUMBER</b>	
<b>YEAR OF MANUFACTURE</b>	

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

# 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 tool head is in rest position (raised), the toothed disk must be stationary.
- It is forbidden to work on the machine without its shields (these are all white, blue or grey in colour).
- Always disconnect the machine from the power socket before changing the disk 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

- Grey metal shield screwed onto the disk head.
- Self-regulating mobile blue aluminium shield, fitted coaxially with the fixed shield.
- Blue metal protection on the feeding system.

### 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 probe.
- 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"

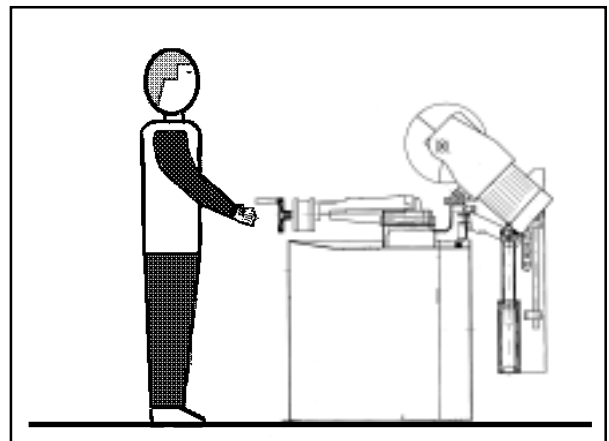
- In the event of incorrect operation or of danger conditions, the machine may be stopped immediately by pressing the red mushroom button.

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

# 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.

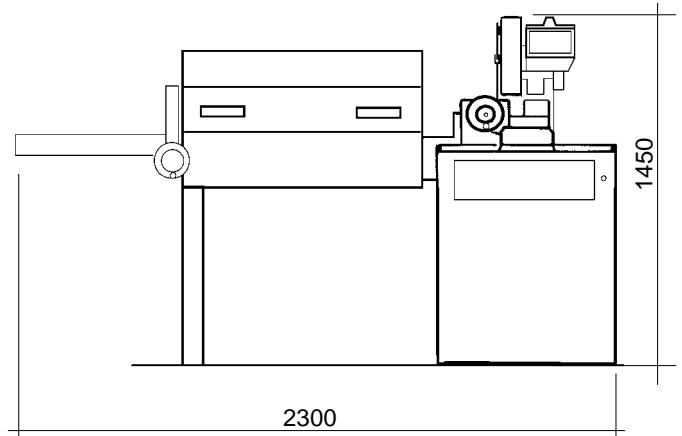


- To obtain good running-in of the machine it is advisable to start using it at intervals of about half an hour. This operation should be repeated two or three times, after which the machine may be used continuously.
- Before starting each cutting operation, ensure that the part is firmly gripped in the vice and that the end is suitably supported.
- Do not use disks of a different size from those stated in the machine specifications.
- If the disk 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 disk or its teeth are not broken. If they are broken, change the tool.
- 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

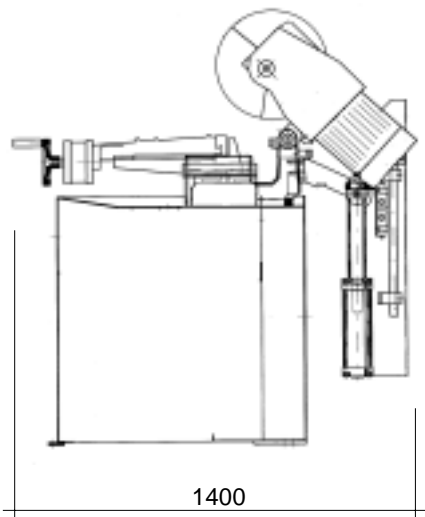
CUTTING CAPACITY				
90°	60	120	105x105	160x90
45° DX - SX	60	100	85x85	85x70



2-speed three-phase electric motor	KW	1,35 - 1,7
Oil-bath reduction unit	i	32 : 1
Max. blade diameter	mm	350
Blade rotation speed	rpm	22 - 44
Vice opening	mm	170
Machine Weight	KG	220
Coolant liquid	L	5
Working table height with base	mm	940

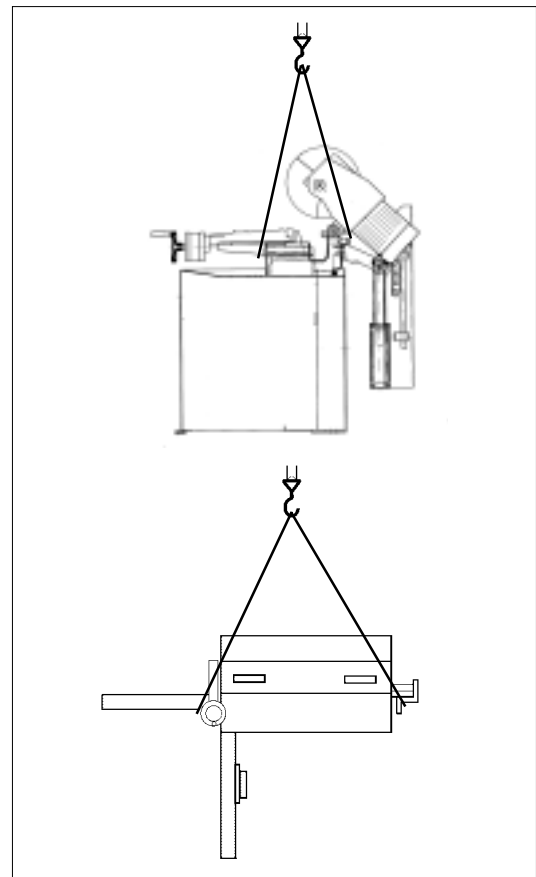
### 4 MACHINE DIMENSIONS TRANSPORT INSTALLATION DISMANTLING

#### 4.1 - Machine dimensions



#### 4.2 - Transport and handling of the machine

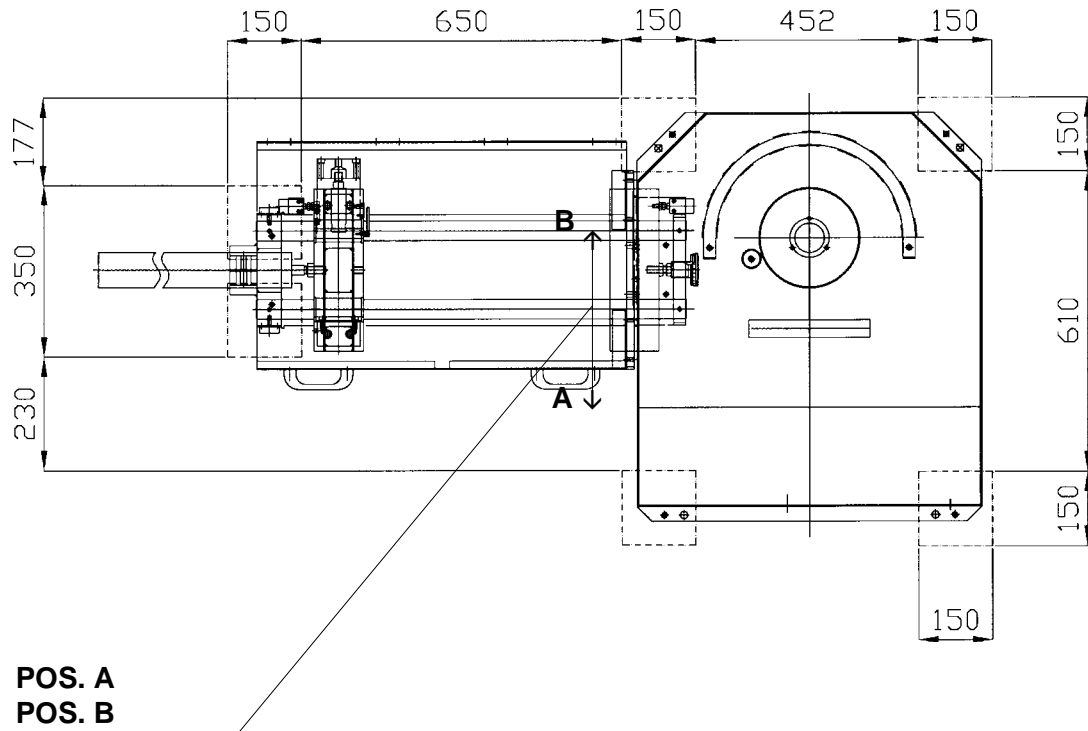
If the machine has to be shifted use a fork-lift truck or sling it with straps as illustrated.



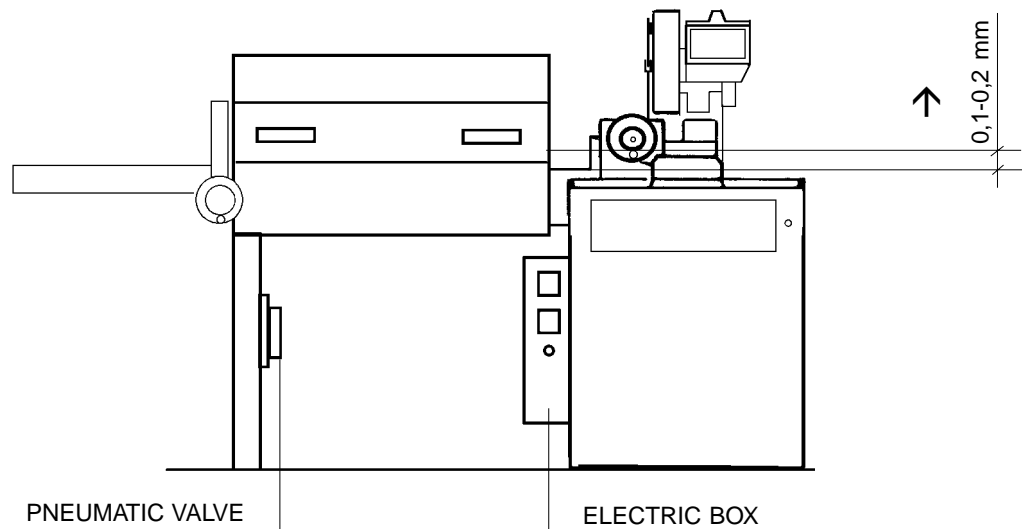
#### 4.3 - Minimum requirements for the premises housing the machine

- 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 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.
- Adjust with a calibrated bar the level between the machine vice bed and the input roller by means of the screws located on the supporting leg of the feeding system. The feeding system level should be 0.1- 0.2mm higher than the machine vice bed.



### 4.5 - Feeding system alignment

- The feeding system can be mounted to the machine base in two different positions:

**POSITION A** : allows mitre cutting 45° right and left. This is the position recommended to cut solid and shapes material up to 60 mm diameter.

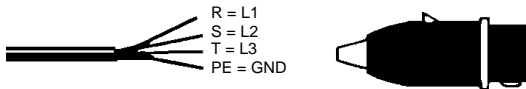
**POSITION B** : allows rectangle cutting up to 160x90mm. (max.)

**ATTENTION:** make sure that the material supporting rollers are correctly aligned to the machine working table level.

### 4.6 - 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



### 4.7 - Instructions for assembly of the loose parts and accessories

Fit the components supplied:

- part. 1 Fit the feeding system

### 4.8 - 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) empty the coolant tank
- 3) carefully clean and grease the machine
- 4) if necessary, cover the machine.

### 4.9 - 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

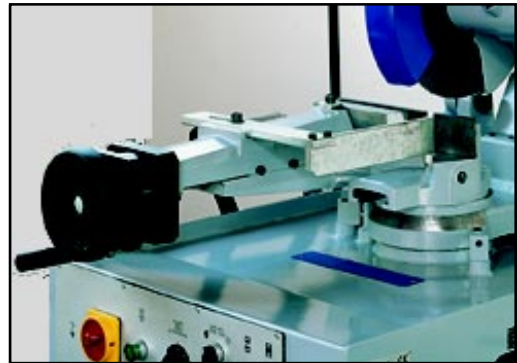
### 5.1 - Operating head

- Machine part composed of the parts that transmit movement (motor, reduction unit).



### 5.2 - Machine bed and Vice

- Support structure for the OPERATING HEAD (rotating arm for gradual cutting, with respective blocking system), the VICE, and the housing for the cutting coolant TANK.  
- System for gripping material during the cutting operation, by means of the approach handwheel and pneumatic locking. It is provided with an anti-burr device for blocking the part that is to be cut.



### 5.3 - Material feeding system

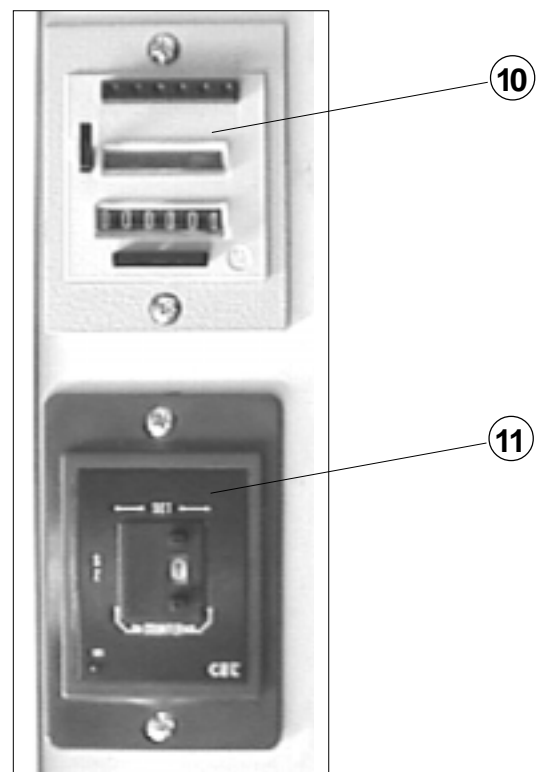
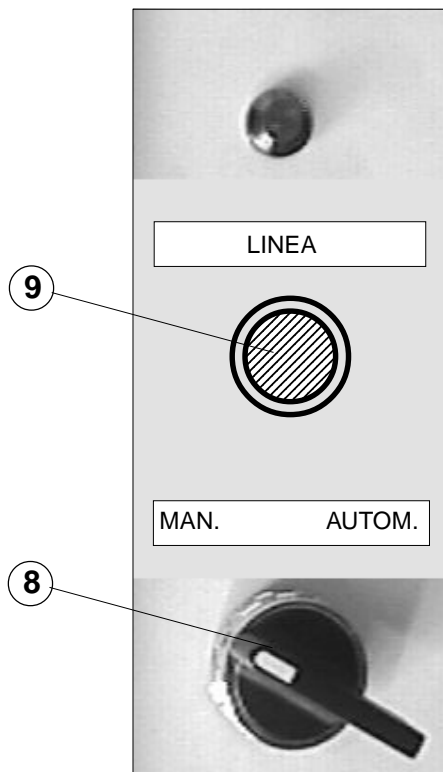
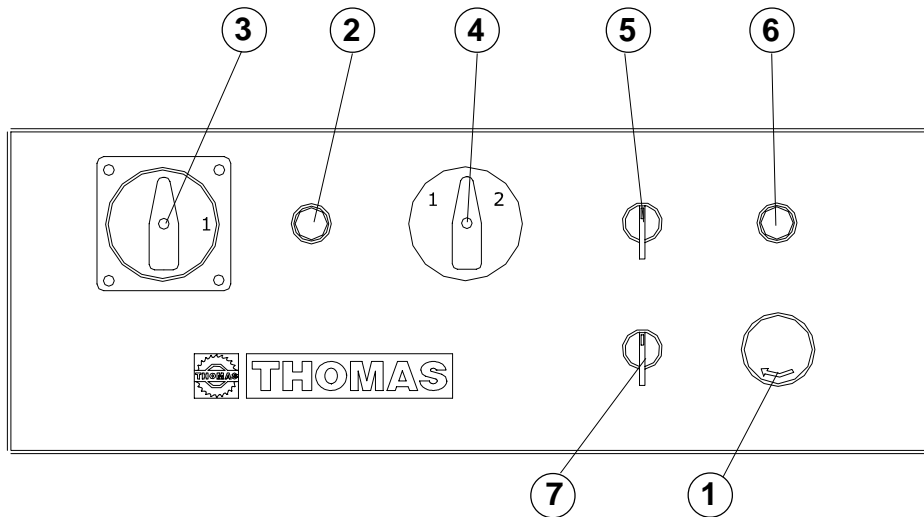
- Pneumatic device for material feeding.



### 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 - Starting up and cutting cycle



### CUTTING CYCLE:

- Vice locking;
  - Head downfeed;
  - Head lifting;
  - Vice opening;
  - Material feeding.
- Ensure that the machine is not in emergency stop condition; if it is, release the red mushroom button ( 1 ).
  - Make sure that the connection to the pneumatic system has been carried out according to the chapter 7 paragraph 7.7.
  - Ensure that the selector ( 8 ) is in "MANUAL" mode.
  - Turn the main switch ( 3 ) in position ON.
  - Press the start/reset button ( 2 ): its green light will go on.
  - Select the cutting speed on the switch ( 4 ):

position 1 = 22 rpm  
position 2 = 44 rpm

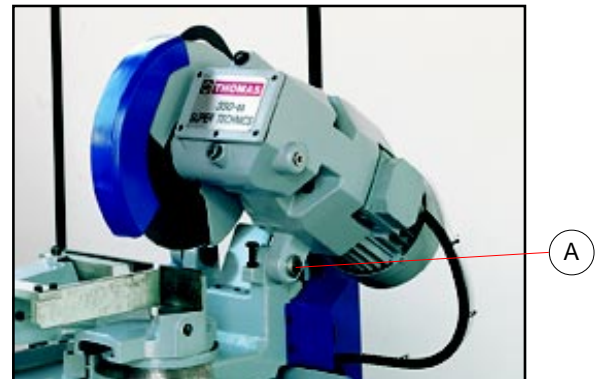
- Set the number of pieces to be cut on the piece-counter (10) (see chapter 7 paragraph 7.5).
  - Set the number of feed repetition on the feed repeater (11) just in case the cutting length required is longer than the mechanical stroke of the feeding system (see chapter 7 paragraph 7.6). Note: set "1" if no feed repetition is required.
  - Place material to be cut in the vice. Close jaws against piece, keeping a distance of approx. 3 - 4 mm.
  - Adjust the cutting stroke by means of the selector ( 5 ) approaching the blade upto 10 mm from the workpiece. Position the relevant mechanical endstroke.
  - Set the required cutting length ( see chapter 7 para. 7.8 ).
  - Adjust the vice of the feeding system ( see chapter 7 para. 7.10 ).
  - Set the blade downfeed speed on the regulator according to the specifications of the workpiece.
  - Press **Cycle Start** and verify the following functions: vice clamping, blade rotation anticlockwise, coolant liquid flow and cutting cycle execution.  
Turn the selector ( 8 ) to the "AUTOMATIC" mode while the machine is performing the initial cutting cycle end press the push button ( 9 ). The machine will feed the material to the preset cutting length.
  - The machine will go on performing more cutting cycles as long as the material to be cut is finished.
- **In case of wrong operation press Emergency Push-button ( 1 ).**

- **When starting to cut with a new disk, in order to safeguard its life and efficiency, the first two or three cuts must be made while exerting a slight pressure on the part, so that the time taken to cut is about double the normal time** (see below in the chapter on "**Material classification and choice of disks**" in the section on *Running in the disk*).
- Press the red emergency button ( 1 ) when there are conditions of danger or malfunctions in general, so as to stop machine operation immediately.

## 7 REGULATING THE MACHINE

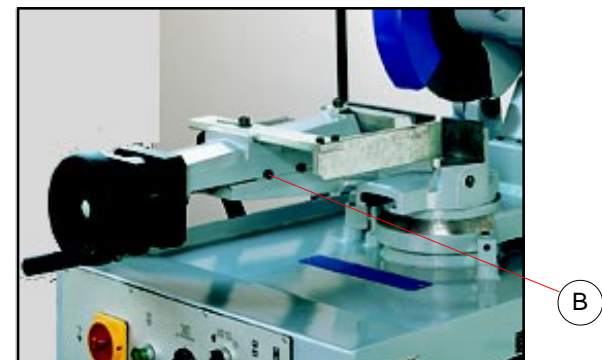
### 7.1 - Cutting head

- If excessive axial play is found on the hinge, it will be sufficient to tighten the ring nuts ( A ), paying attention not to make the joint too tight.

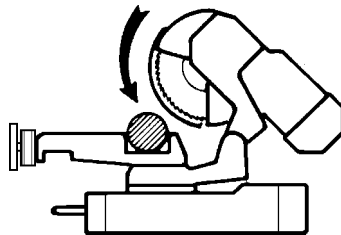


### 7.2 - Vice

- The device does not require any particular adjustment; in the event of excessive play in the sliding guide, tighten the dowels ( B ) for adjusting the gib inside the slide.
- Approach the vice jaw upto 4-5mm from the material to be cut.



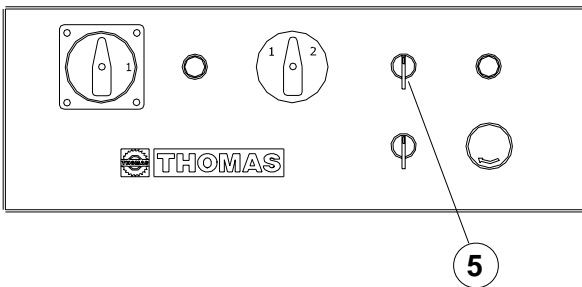
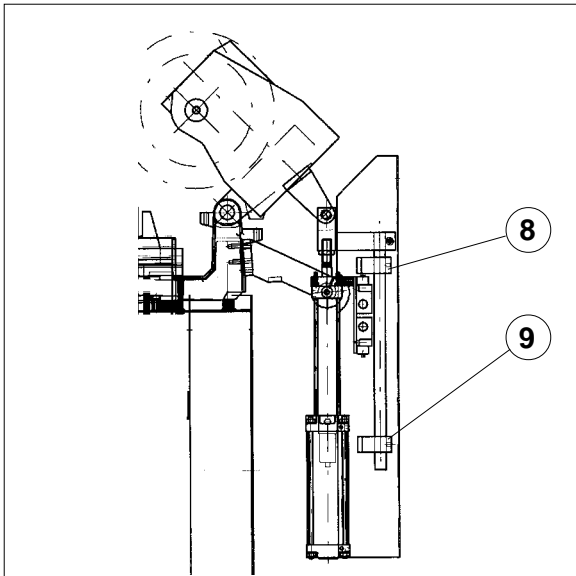
### CUTTING DIRECTION



The cropper is now ready to start work, bearing in mind that the **CUTTING SPEED** and the **TYPE** of **DISC** - combined with a suitable descent of the head - are of decisive importance for cutting quality and for machine performance (for further details on this topic, see below in the chapter on "**Material classification and choice of disks**").

### 7.3 - Head return stroke limiting device

It consists in a mechanical adjustment system, mounted parallel to the head rise cylinder, to reduce the passive phases of the operating cycle, in other words to eliminate the idle stroke that takes place when the size of the part to be cut is much smaller than the maximum cutting capacity. Practically, you adjust the starting position of the disk in proximity of the part, independently of its dimensions.



To carry out this operation you must:

- slightly open regulator.
- Rotate the selector ( 5 ) either to the right or left to lower or lift the motorhead.
- position and secure the mechanical stop ( 8 ) against upper plate of the cylinder, so as to press the upper limit microswitch.
- the lower limit switch ( 9 ) is set during inspection and limits the lower stroke of the motorhead. Do not change this setting.

**ATTENTION:**

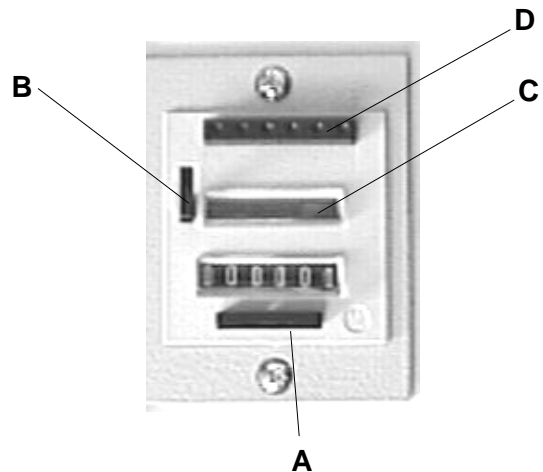
- It is not necessary to adjust the upper end-stroke everytime; one can bring the disk near to the workpiece by means of selector ( 5 ) and then start the automatic cutting cycle wich will take place from the actual position of the disk. Do notice that, once the cut is completed, the motorhead will go to the upper end-stroke ( against the relevant microswitch ).
- operate on regulator to modify motorhead return speed.

### 7.4 - Restoring oil level in motorhead compensation cylinder tank

- Braking fluid in the cylinder controlling the head, may consume through the time.
- It is therefore important to restore the oil quantity inside the compensation tank by removing the plug and then using a syringe type injector to fill the tank.
- **First, take the head to the upper position and disconnect airs apply from the pneumatic system (disconnect the air pipe from the machine). Switch on the machine and push the Line button.**
- Add oil making sure that the selector ( 5 ) is switched to the right (head downfeed).
- Add oil until the rod, corresponding to the second mark on the stem, has come out completely.
- Air must be bled from the tank by loosening the screw located on the side of the cylinder (see arrow) until some oil pours out (always keep the selector ( 5 ) to the right); when this has been done, secure the screw, remove the injector and put back the plug.
- Connect the machine to the pneumatic system.
- Use SHELL hydraulic oil 32 or similar.

### 7.5 - Piece-Counter

- Press Reset (A) and hold to release the Lever (B).



- Move the Lever (B) to the direction shown by the arrow and leave it in this position. Release the Reset button (A). Now the numbers appear on the window (C).
- Hold the Lever (B) and set the number required by pressing the keys (D) starting from the left operating the two keys at the same time.
- As soon as you set the first figure, you can go on towards the right with more figures. On the surface of each key there is a grooved area to set a single figure by means of a pencil.
- Release the Lever (B) as soon as the setting is completed.

### 7.6 - Feed repeater

- You can set the number of feed repetition on the feed repeater just in case the cutting length required is longer than the mechanical stroke of the feeding system. Set "1" if no feed repetition is required.
- Take into account the blade thickness and set the mechanical stroke of the feeding system accordingly.

For example:

In case you need 1500mm cutting length

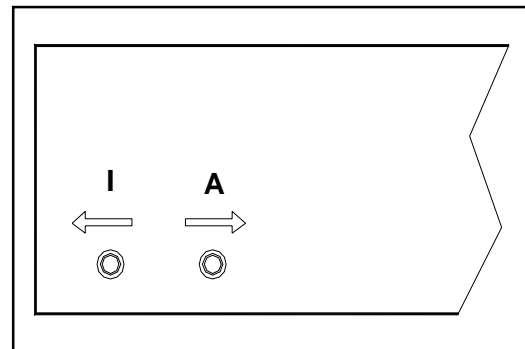
$$\frac{1500 - 6}{3} = 498$$

- 1500 = cutting length.
- 6 = blade thickness ( 3 x 2 )
- 3 = number of required feeding runs
- 498 = this is length the feeding stroke must be set to on the metric scale .



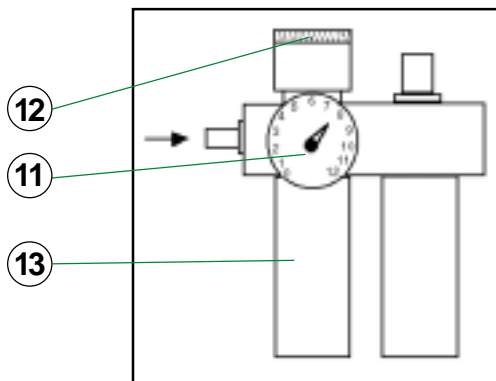
- Set the regulators **A = forward**  
**I = backward**

to absorb the mechanical stop of the feeding system during the cutting cycle.



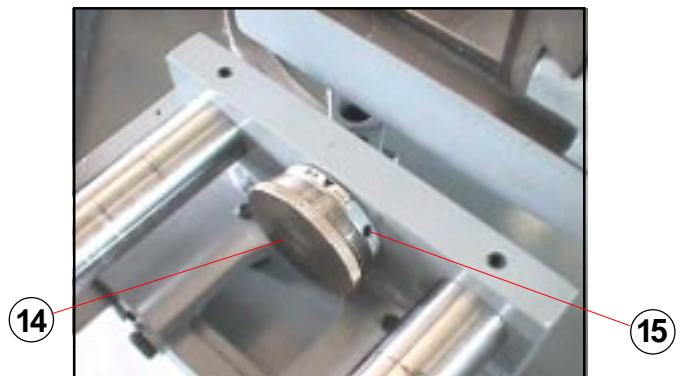
### 7.7 - Adjustment of pneumatic system pressure

- The pressure in the pneumatic system necessary for the proper operation of the sawing machine must be equal to 6 - 7 Bar.
- Check on pressure switch (11) the exact correspondence and if necessary operate on regulator (12) to set the ideal pressure.
- Make sure that a drop of oil runs through the lubricator bulb ( 13 ) every 4/5 work cycle.



### 7.9 - Decimal adjustment

- This is a fine cutting length adjustment by means of a Vernier (14).
- Release the screw (15) and turn the vernier as much as you need with reference to the engraved marks.
- One mark is 0.05mm (metric system).
- One mark is 1/500 of a inch (English system)
- Lock the screw (15).

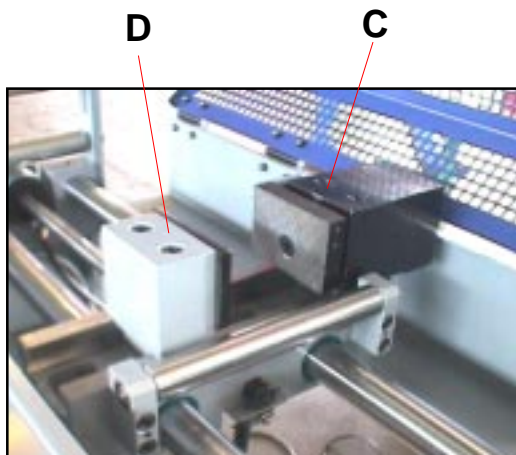


### 7.8 - Adjustment of cutting length

- Proceed as follows to adjust the cutting length:
- Loose screw ( A ).
- Turn handwheel ( B ) to set the required cutting length on the metric scale.
- Lock screw ( A ).

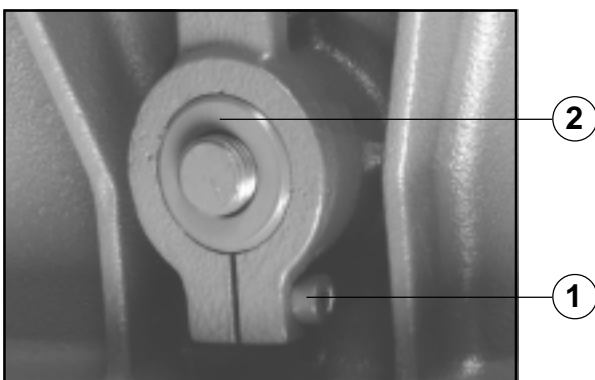
### 7.10 - Adjusting the feeding system

- Adjust the feeding vices as follows:
  - Load the workpiece and clamp it in the bench vice by means of the relevant handwheel.
  - Loose the vice screw ( **C** ), approach the relevant jaw upto **4-5 mm** from the material to be cut. Tight the screw.
  - Loose the vice screw ( **D** ), approach the relevant jaw upto **0,5 mm** from the material to be cut. Tight the screw.
- NOTE: carefully adjust the vices ( C ) and ( D ). On the contrary, the microswitch controlling the presence of the workpiece will stop the machine.**
- Loose the bench vice allowing 4-5mm clearance from the vice jaw and the workpiece.



### 7.11 - Regulating arm blockage

- If there is insufficient blockage of the head arm in the desired position, slacken the screw ( 1 ) on the lever, hold the bush ( 2 ) in position, turn the lever to the left and tighten the screw.

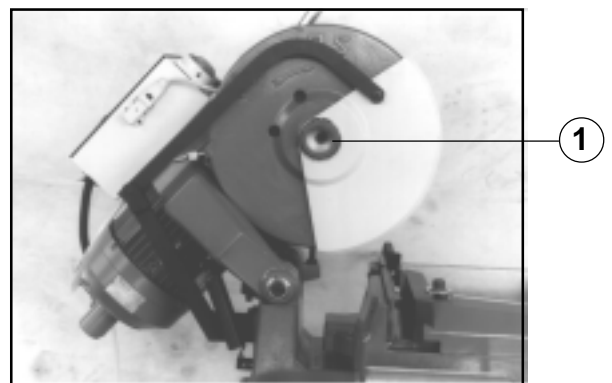


**BEFORE PERFORMING THE FOLLOWING OPERATIONS, THE ELECTRIC POWER SUPPLY AND THE POWER CABLE MUST BE COMPLETELY DISCONNECTED.**

### 7.12 - Changing the disk

To change the disk:

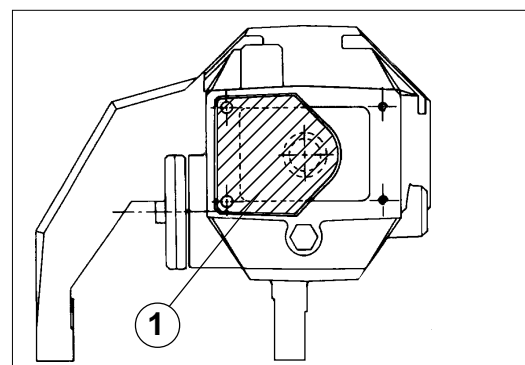
- Release the mobile yellow, white or orange guard and turn it back.
- Block a piece of wood in the vice and lean the disk on it.
- Insert the special spanner provided and remove the screw ( 1 ), slackening it in a clockwise direction because it has a left-handed thread, then slip off the flange that holds the disk.
- Fit the new disk, checking the cutting direction of the teeth, then replace the flange, the screw and the mobile white, yellow or orange guard.



### 7.13 - Clutch adjustment

Inside the head there is a clutch device which has already been adjusted during assembly. If, after long use, further adjustment is necessary, proceed as follows:

- remove the cover
- fit the template provided
- turn the motor shaft so that the ring nut ( 1 ) is in a convenient position to allow it to be tightened or slackened enough to calibrate the clutch system.



ANY REPLACEMENTS OF OTHER PARTS - SUCH AS THE COMPONENTS OF THE REDUCTION GEAR, MOTOR AND VARIOUS ELECTRIC PARTS - MUST BE CARRIED OUT BY SKILLED OR 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.
- Top up the level of lubricating coolant.
- Check the disk for wear.
- Lift the head into a high position to avoid yield stress on the return spring.
- Check functionality of the shields and emergency stops.

#### 8.2 - Weekly maintenance

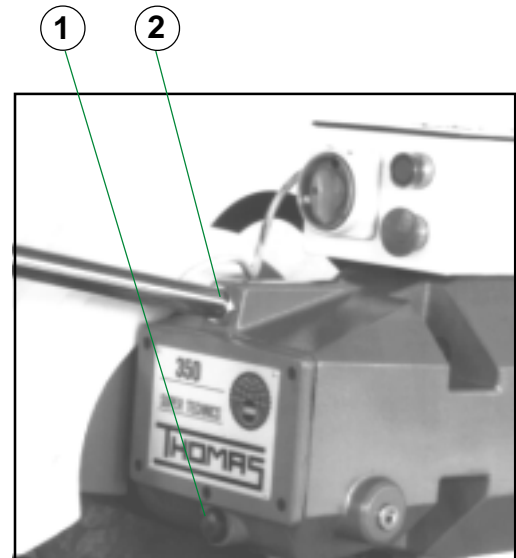
- More accurate general cleaning of the machine to remove shavings, especially from the lubricant fluid tank.
- Clean the filter of the pump suction head and the suction area.
- Clean and grease the screw and the sliding guide of the vice.
- Clean the disk housing.
- Sharpen the disk teeth.

#### 8.3 - Monthly maintenance

- Check tightness of the screws on the motor, the pump, the jaws and shields.
- Check that the shields are unbroken.
- Grease the head hinge pin.

#### 8.4 - Six-monthly maintenance

- Change the oil in the reduction unit using oil type GEARCO 85W-140 by NATIONAL CHEMSERACH or MOBIL GLYCOLE 30 or KLUBER SINTHESO 460 EP or an equivalent oil, proceeding as follows:
  - Remove the connecting plug from the electric box and unscrew the head moving lever.
  - Drain off the old oil from the cap ( 1 ).
  - Pour in new oil up to the mark ( 1 ), through the lever fixing hole, keeping the head in upper position ( 2 ).
  - Reassemble all the parts.
- Check continuity of the equipotential 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 reference the type SHELL LUTEM OIL ECO.  
THE MINIMUM PERCENTAGE OF OIL DILUTED IN WATER IS 8 - 10 %.

## 8.6 - Oil disposal

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. The term special maintenance also covers the resetting of protection and safety equipment and devices.

# 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, **choice of the type of cutting disk, cutting speed and control of head descent**, must be suitably combined. 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 ADVISE YOU ALWAYS TO CHOOSE ORIGINAL SPARE DISKS 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.

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/mm2
Construction steels	Fe360	St37	E24	----	----	116	67	360÷480
	Fe430	St44	E28	43	----	148	80	430÷560
	Fe510	St52	E36	50	----	180	88	510÷660
Carbon steels	C20	CK20	XC20	060 A 20	1020	198	93	540÷690
	C40	CK40	XC42H1	060 A 40	1040	198	93	700÷840
	C50	CK50	----	----	1050	202	94	760÷900
	C60	CK60	XC55	060 A 62	1060	202	94	830÷980
Spring steels	50CrV4	50CrV4	50CV4	735 A 50	6150	207	95	1140÷1330
	60SiCr8	60SiCr7	----	----	9262	224	98	1220÷1400
Alloyed steels for hardening and tempering and for nitriding	35CrMo4	34CrMo4	35CD4	708 A 37	4135	220	98	780÷930
	39NiCrMo4	36CrNiMo4	39NCD4	----	9840	228	99	880÷1080
	41CrAlMo7	41CrAlMo7	40CADG12	905 M 39	----	232	100	930÷1130
Alloyed casehardening steels	18NiCrMo7	----	20NCD7	En 325	4320	232	100	760÷1030
	20NiCrMo2	21NiCrMo2	20NCD2	805 H 20	4315	224	98	690÷980
Steel for bearings	100Cr6	100Cr6	100C6	534 A 99	52100	207	95	690÷980
Tool steel	52NiCrMoKU	56NiCrMoV7	----	----	----	244	102	800÷1030
	C100KU	C100W1	----	BS 1	S-1	212	96	710÷980
	X210Cr13KU	X210Cr12	Z200C12	BD2 - BD3	D6 - D3	252	103	820÷1060
	58SiMo8KU	----	Y60SC7	----	S5	244	102	800÷1030
Stainless steel	X12Cr13	4001	----	----	410	202	94	670÷885
	X5CrNi1810	4301	Z5CN18.09	304 C 12	304	202	94	590÷685
	X8CrNi1910	----	----	----	----	202	94	540÷685
	X8CrNiMo1713	4401	Z6CDN17.12	316 S 16	316	202	94	490÷685
Copper alloys Special brass Bronze	Aluminium copper alloy G-CuAl11Fe4Ni4 UNI 5275					220	98	620÷685
	Special manganese/silicon brass G-CuZn36Si1Pb1 UNI5038					140	77	375÷440
	Manganese bronze SAE43 - SAE430					120	69	320÷410
	Phosphor bronze G-CuSn12 UNI 7013/2a					100	56,5	265÷314
Cast iron	Gray pig iron		G25			212	96	245
	Spheroidal graphite cast iron		GS600			232	100	600
	Malleable cast iron		W40-05			222	98	420

## 9.2 - Choosing the disk

First of all the pitch of the teeth must be chosen, 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.

## 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.**

	S (MM)	PICTH	SHAPE	SPEED
	up to 2	4 - 6	B shaped	3
	2 ÷ 5	8	C solid	3 - 2
	5 ÷ 10	8	C solid	2
	over 10	8	C solid	2
	up to 20	8	C solid	2
	20 ÷ 50	10	C solid	1
	50 ÷ 65	13 ÷	C solid	1

## 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 (= disk descent) tends to cause the disk to deviate from the ideal cutting path, producing non rectilinear cuts on both the vertical and the horizontal plane.

## 9.5 - Running in the disk

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 - Disk structure

The most commonly used disks are made of extra high speed steel (HHS) of **normal quality** (HHS/DMo5) or **superior quality** (HHS/Mo5 + Co5) with a treated tooth, which differentiates them from the former on account of the high value of structural resistance, greater resistance to seizing, absence of stress in the mass and a better holding of lubricating coolant during work.

## 9.7 - Type of disks

The disks differ essentially in their constructive characteristics, such as:

- **Tooth shape**
- **Tooth cutting angle**

### Tooth shape

The profile of the toothing depends on the size, shape and thickness of the section to be cut, either straight or at an angle. It may also vary according to the pitch, but not so distinctly as to make this an element for classification.

- Fine toothing is to be chosen for cutting small sections with a profiled shape and tubular sections with thin walls (2-5 mm depending on the material).
- Large toothing is suitable for cutting medium and large solid sections or fairly thick profiled or tubular sections (over 5 mm).

"A" toothing:  
normal fine toothing



"AW" toothing:  
fine toothing with alternate side rake



"B" toothing:  
normal large toothing with or without shaving breaking incision



"BW" toothing:  
large toothing with alternate side rake



"C (HZ)" toothing:  
large toothing with roughing tooth with rake on both sides, alternating with a finishing tooth without rake. The roughing tooth is 0.15-0.30 mm higher



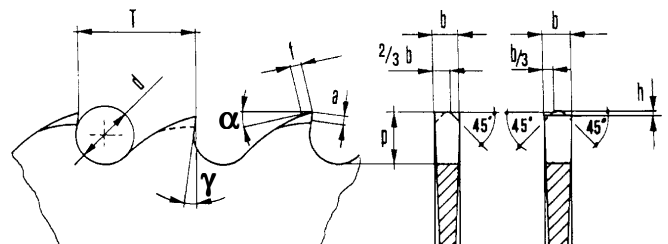
Added toothing:  
disks made in this way are used for cutting non-ferrous metals, such as light alloys, and plastics, and above all in wood-working. The teeth are hard metal (HM) plates brazed onto the body of the disk; there are various types and shapes and, considering the vastness of the field, the topic is not developed further here.

### Tooth cutting angle

Each tooth has two cutting angles:

- $\alpha$  : front rake angle
- $\gamma$  : rear rake angle

### SHARPENING CIRCULAR SAWS



T	3	4	5	6	7	8	9	10	12	14	16
p	1,3	1,6	2,1	2,5	2,9	3,4	3,8	4,2	5,1	5,9	7,2
d	1,5	2	2,5	3	3,5	4	4,5	5	6	7	8
h = 0,2 mm						h = 0,3 mm					

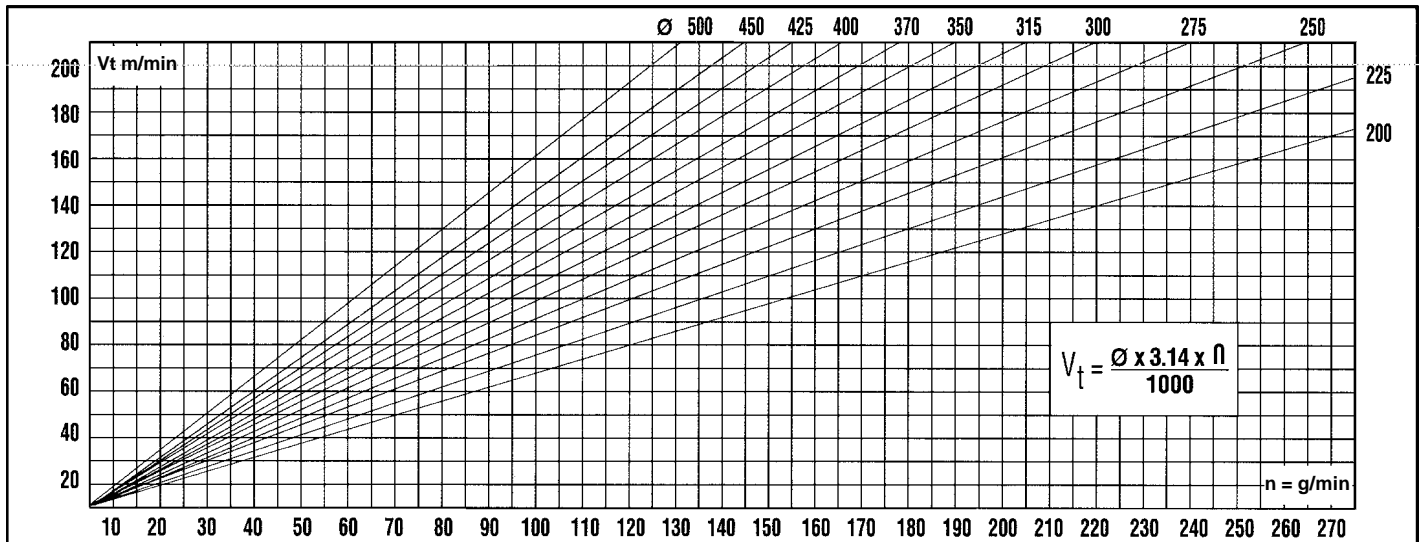
The rake varies especially according to the type of material to be cut.



## 9.7.1 - RECOMMENDED CUTTING PARAMETERS

CUTTING ANGLES		γ	Material																	
			20°	18°	15°	12°	10°	12°	15°	12°	22°	20°	20°	15°	12°	16°	12°	18°	18°	15°
		α	Mild steel R = 350-500 N/mm <sup>2</sup>	Semi-hard steel R = 500-700 N/mm <sup>2</sup>	Hard steel R = 750-950 N/mm <sup>2</sup>	Extra-hard steel R = 950-1000 N/mm <sup>2</sup>	Heat-treated steel R = 950-1300 N/mm <sup>2</sup>	Austenitic stainless steel R = 500-800 N/mm <sup>2</sup>	Martensitic stainless steel R = 500-800 N/mm <sup>2</sup>	Grey cast iron	Aluminium and alloys R = 200-400 N/mm <sup>2</sup>	Aluminium and alloys R = 300-300 N/mm <sup>2</sup>	Copper R = 200-350 N/mm <sup>2</sup>	Phosphor bronze R = 400-600 N/mm <sup>2</sup>	Hard bronze R = 600-900 N/mm <sup>2</sup>	Brass R = 200-400 N/mm <sup>2</sup>	Alloyed brass R = 400-700 N/mm <sup>2</sup>	Titanium and alloys R = 300-800 N/mm <sup>2</sup>	Tubes and beams 0.05. D R = 300-600 N/mm <sup>2</sup>	Tubes and beams 0.025. D R = 300-600 N/mm <sup>2</sup>
SECTION TO BE CUT (IN MM)	10 - 20	*T mm	5	4	4	3	2	4	4	4	6	5	6	5	4	5	5	4	3	2
		Vt m/1'	50	30	20	15	9	20	20	25	1100	200	400	400	120	600	500	50	19	35
		Av mm/1'	160	130	110	60	35	50	50	100	1800	400	600	800	160	1100	700	160	130	130
	20 - 40	*T mm	7	6	6	4	3	6	6	6	8	7	8	7	8	6	7	4	4	3
		Vt m/1'	45	30	20	15	9	19	19	23	1000	180	350	400	110	600	400	45	18	33
		Av mm/1'	150	120	110	60	33	45	45	100	1700	400	600	700	150	1100	600	150	120	120
	40 - 60	*T mm	10	9	8	6	4	8	8	8	12	10	11	10	8	10	10	6	5	4
		Vt m/1'	45	25	18	14	9	18	18	22	900	160	300	350	100	550	350	45	18	30
		Av mm/1'	140	110	100	50	30	45	45	90	1600	350	550	700	140	1000	600	140	110	110
	60 - 90	*T mm	12	12	11	9	6	11	11	11	16	12	14	12	10	12	12	10	6	5
		Vt m/1'	40	25	17	14	8	17	17	20	800	160	250	300	90	550	350	45	17	30
		Av mm/1'	130	110	50	50	28	40	40	80	1400	300	550	600	130	900	500	130	110	110
	90 - 110	*T mm	14	14	14	12	8	14	14	14	18	14	17	14	12	16	16	12	6	5
		Vt m/1'	40	20	15	13	8	15	15	19	700	140	200	250	70	500	300	40	16	28
		Av mm/1'	110	100	80	45	25	40	40	880	1300	300	500	600	110	900	500	110	100	100
	110 - 130	*T mm	16	16	16	14	10	16	16	16	20	16	18	16	14	18	18	14	8	6
		Vt m/1'	35	20	14	13	7	14	14	17	600	130	150	200	60	500	300	35	16	26
		Av mm/1'	100	90	70	45	25	35	35	70	1100	250	500	500	100	800	400	100	90	90
130 - 150	*T mm	18	16	16	14	12	16	16	16	20	16	20	18	16	18	18	16	10	6	
	Vt m/1'	30	15	12	12	7	12	12	16	500	130	120	150	50	450	200	30	15	24	
	Av mm/1'	90	80	60	40	22	35	35	60	900	250	400	400	90	800	400	90	80	80	
RECOMMENDED LUBRICANTS			Emulsion - Cutting oil							Dry	Kerosene Dry	Emulsion			Cutting oil			Emulsion		

## 9.7.2 - DIAGRAM OF CUTTING SPEEDS ACCORDING TO DISK DIAMETER



### KEY

T	Tooth pitch in millimetres	d	Diameter of the tooth fillet cone distance
Av	Advance in millimetres per minute	h	Tooth protrusion
Vt	Cutting speed in metres per minute	γ	Front rake
Az	Tooth advance	α	Rear rake
Ng/min	Number of revs per minute	N/mm	Ultimate tensile stress
Z	Number of teeth on the disk	a-f	Flat parts of the cutting edge
p	Tooth depth	Ø	Tube diameter or profile width



## 10 MACHINE COMPONENTS

### 10.1 - List of spare parts

REFERENCE N°	DESCRIPTION	REFERENCE N°	DESCRIPTION
2	Revolving arm	39	
3		40	Screw M8
4		41	
5		42	
6		43	
7	Countervice	44	
8	Mobile countervice	45	
9	Countervice jaws	46	
10	Burr-free jaws	47	Oiler Ø 8
11	Countervice rotation locking pin	48	Grain M8
12		49	
13		50	
14		57	Extra shield
15		58	Spring connection
16		59	Head return spring
17		60	Nut M12
18	Vice jaws	61	Screw M12
19	Vice jaw washer	62	Head
20	Screw M12	63	3/8 gas tap
21	Washer	64	GUK M25x1,5 ring nut
22	Screw M12	65	Spring thrusting washer
23		66	Oil level and drain plug 1/2 gas
24		67	Hinge cylindrical pin
25		68	GUK M25x1,5 ring nut
26		69	Hinge eccentric pin
27		70	Eccentric bush
28		71	Bearing 6202
29		72	
30		73	
31		74	
32	Vice gib	75	Bush
33	Grain M8	76	Bearing 32008X
34	Nut M8		
35	Vice thread		
36	Quick lock vice spring		
37	Burr-free transverse plate		
38	Burr-free plate		



REFERENCE N°	DESCRIPTION
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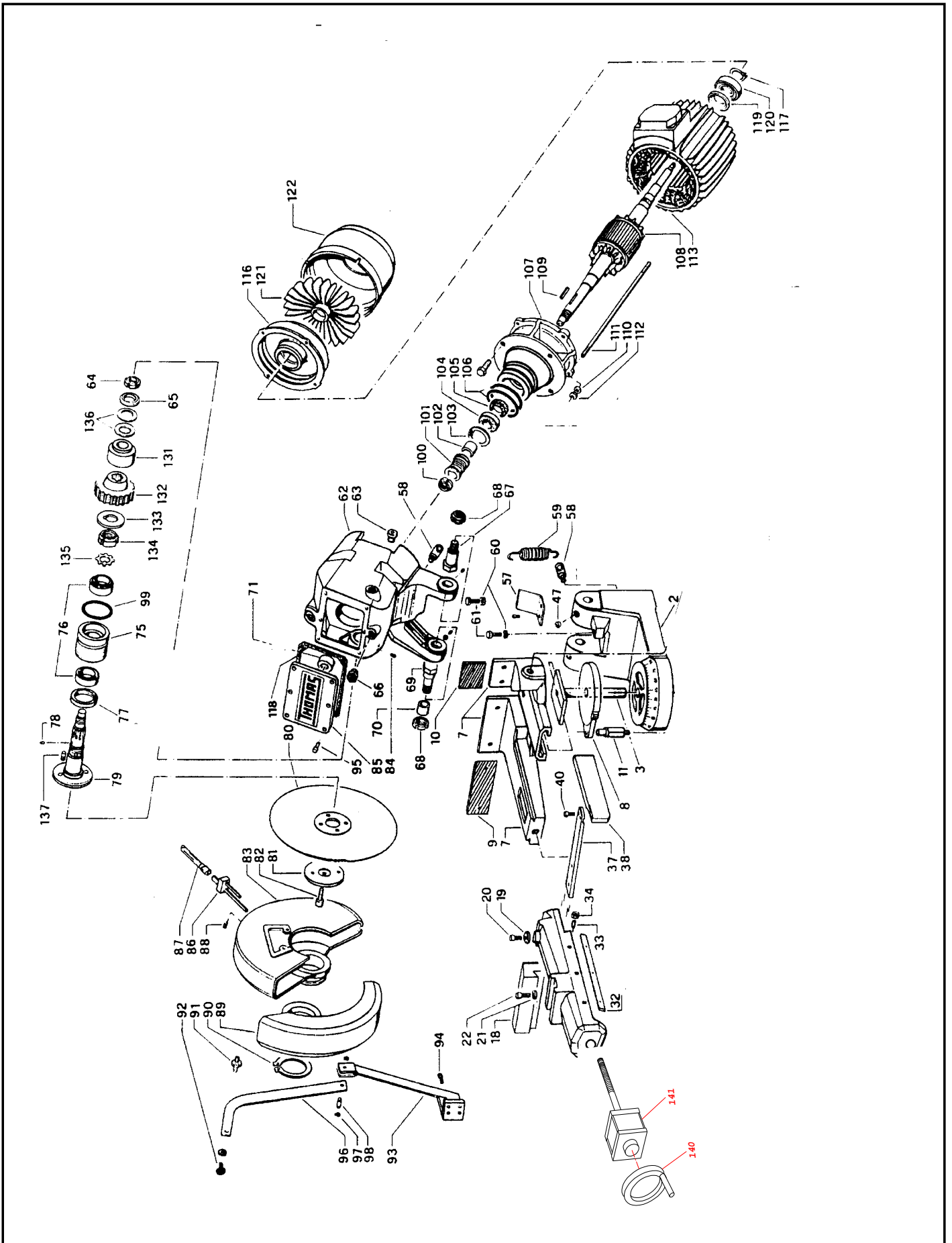
77	Ring DPSM 50728
78	Cylindric pin Ø 5x12
79	Disk shaft
80	Disk
81	Disk shaft flange
82	TCCE M12x35 l.h. Screw
83	Fixed blade guard
84	Grain M8
85	Front head cover
86	Cooling distributor
87	Coolant tube
88	Grain M6
89	Mobile blade guard
90	Ring seeger Ø 60E
91	Pin
92	
93	Tie rod support
94	Screw M6
95	Screw M6
96	Tie rod
97	Ring seeger Ø 10E
98	Tie rod support pin
99	Ring OR 4205
100	GUK M20x1 ring nut
101	Worm screw
102	Worm screw spacer
103	Ring seeger Ø 62I
104	Bearing 3305
105	Ring SM 32527
106	OR-Rings 4312
107	Front motor flange
108	Motor shaft (rotor)
109	Key 5x6x35
110	Washer
111	Stud bolt
112	Nut
113	Motor housing and stator
114	
115	Ring OR 3081
116	Motor rear cover
117	Ring seeger Ø 25E
118	Head cover gasket

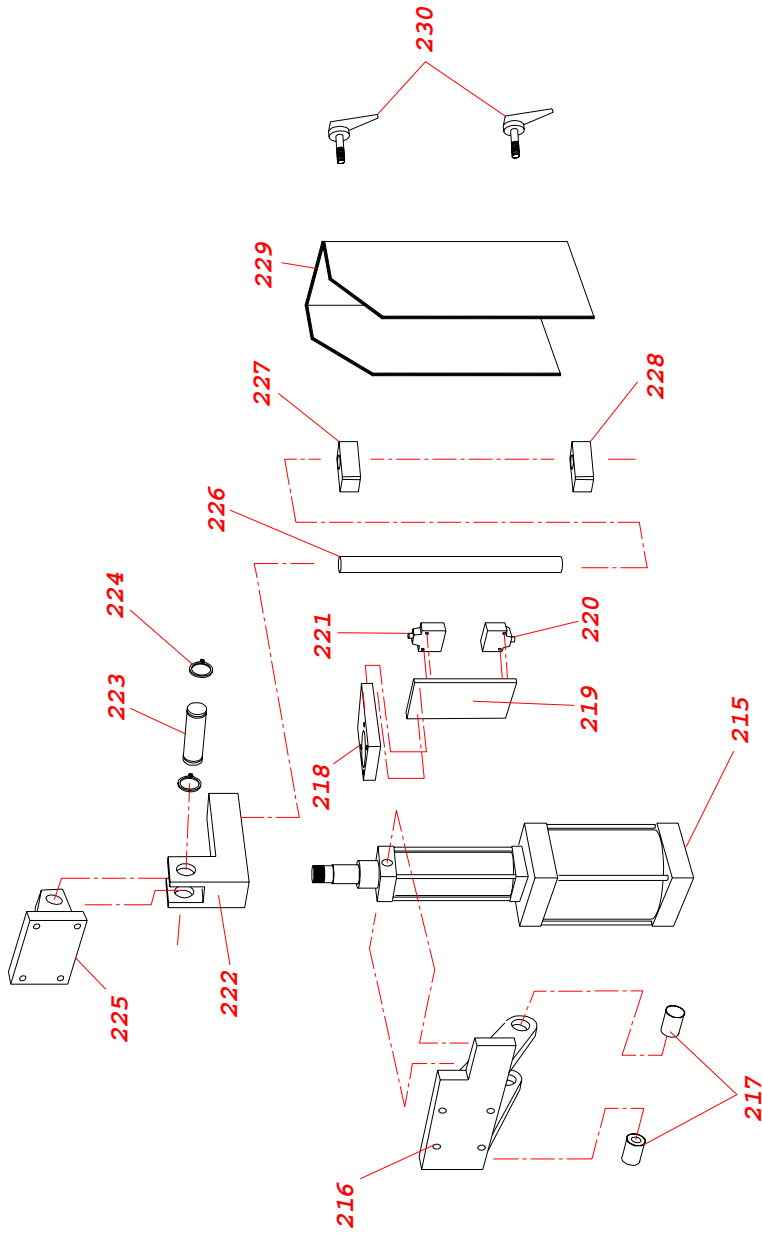
REFERENCE N°	DESCRIPTION
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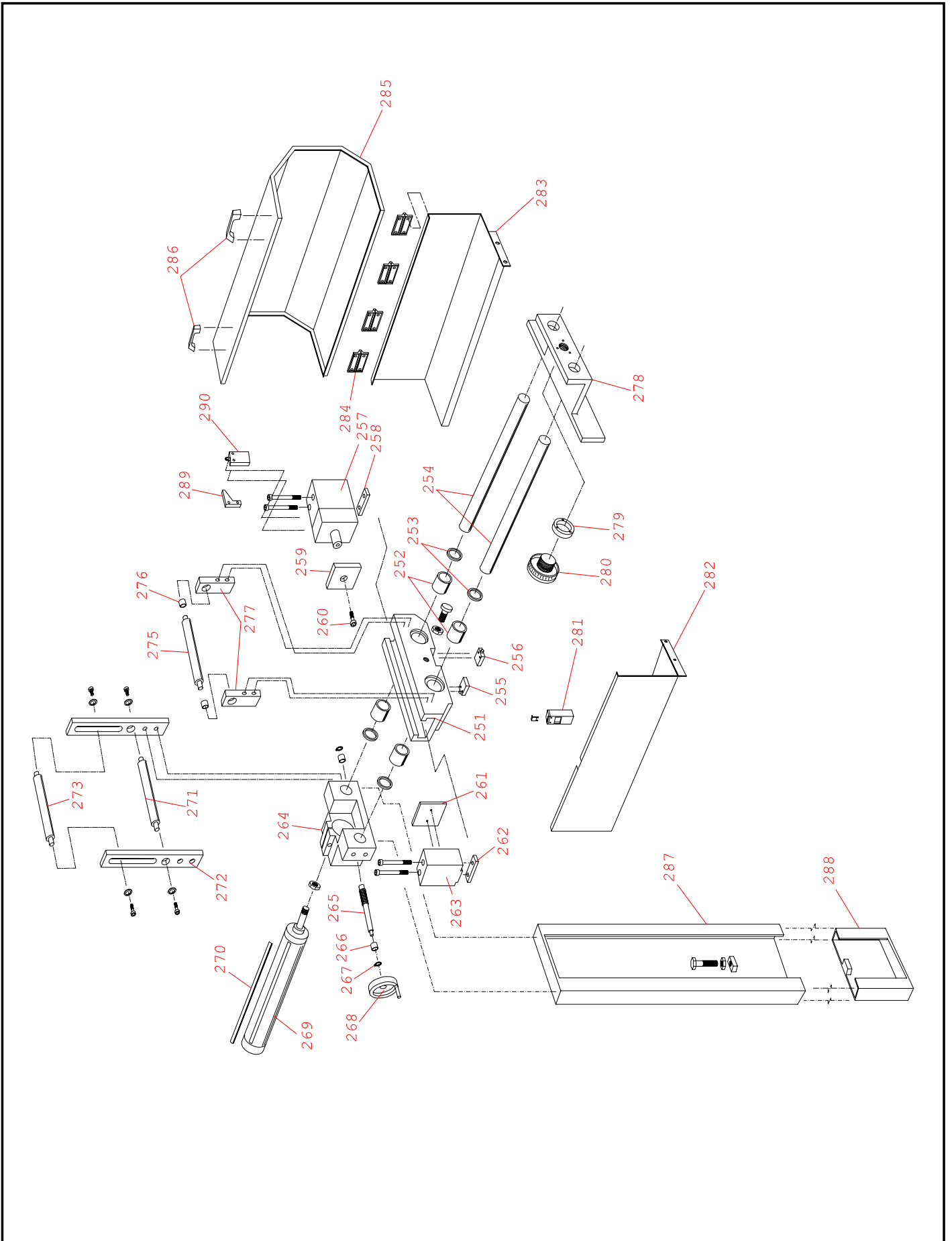
119	Nilos Ring 4205 AV
120	Bearing 4205
121	Motor fan
122	Fan cover
131	Clutch cone
132	Worm wheel
133	Clearance adjustment ring
134	KM8 M40x1,5 ring nut
135	Safety washer MB8
136	Cup springs 50x25 - 4x3
137	Disk shaft flange pin
140	Vice handwheel
141	Pneumatic vice cylinder
215	Cylinder head
216	Cylinder support
217	Hinge bush
218	Upper plate
219	Microswitch support plate
220	Microswitch
221	Microswitch
222	Cylinder coupling fork
223	Pin
224	Ring seeger
225	Cylinder anchoring dowel
226	Stop bar
227	Adjustable stop
228	Adjustable stop
229	Cylinder guard
230	Knob
251	Feed carriage
252	Bushing
253	Ring
254	Carriage guide gibs
255	Microswitch
256	Microswitch
257	Carriage countervice cylinder
258	Guide nut
259	Carriage countervice jaw
260	Screw

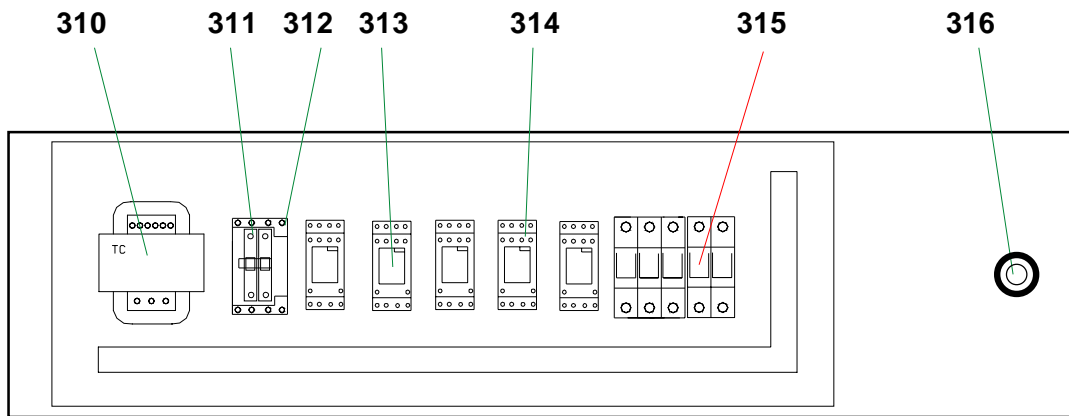


REFERENCE N°	DESCRIPTION
261	Carriage vice jaw
262	Guide nut
263	Carriage vice
264	Cylinder support
265	Shaft
266	Bushing
267	Ring
268	Handwheel
269	Material feed Cylinder
270	Plate
271	Roller
272	Support
273	Roller
275	Roller
276	Bearing
277	Support
278	Support
279	Vernier support flange
280	Vernier
281	Microswitch
282	Front guard
283	Rear guard
284	Hinge
285	Mobile guard
286	Handle
287	Supporting leg
288	Foot
289	Limit switch
290	Microswitch

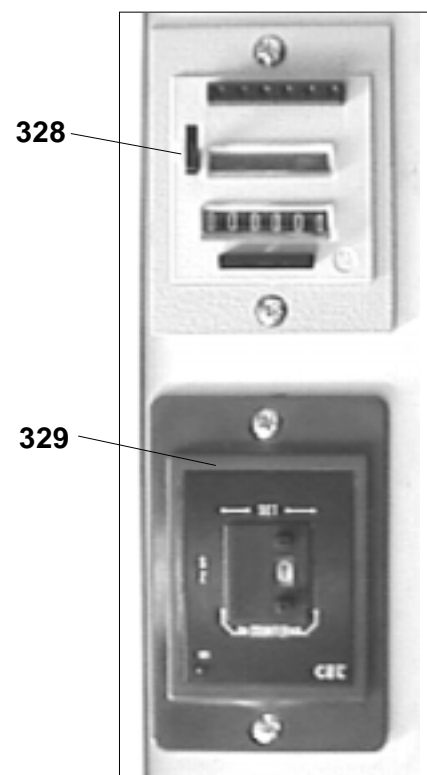
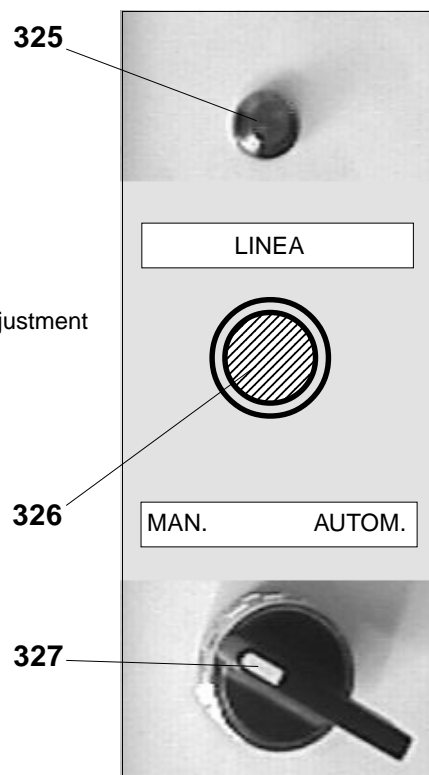




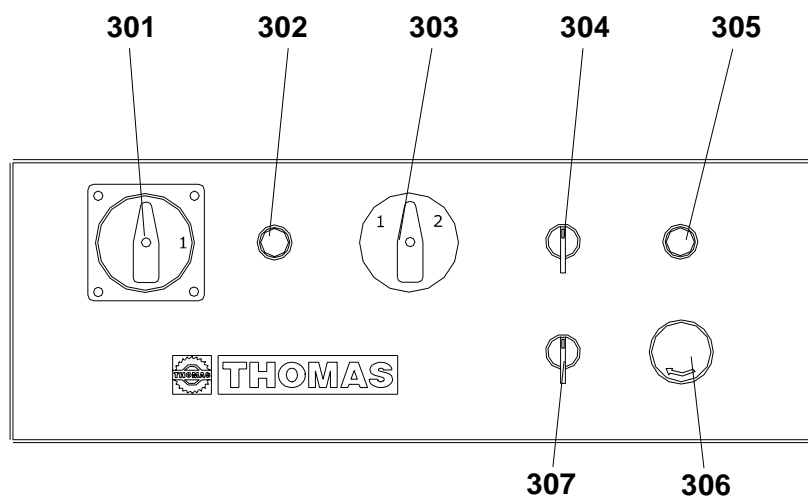


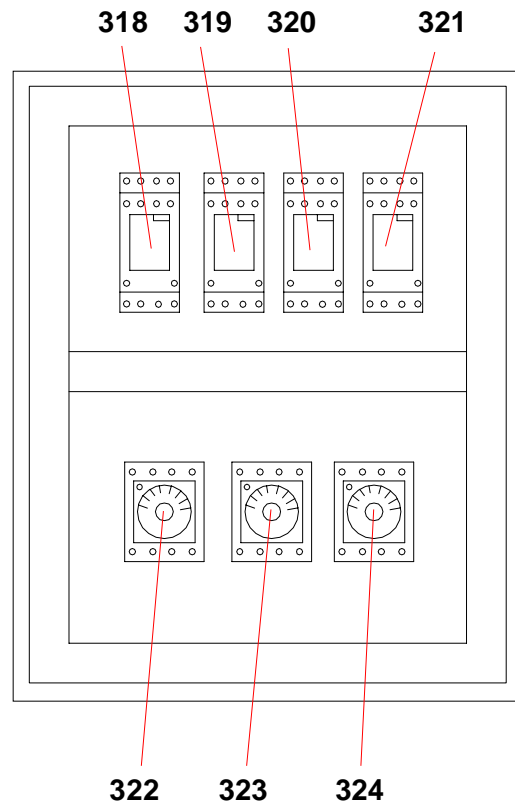


- 310 Transformer
- 311 Auxiliary contact
- 312 Remote control switch
- 313 Auxiliary relay
- 314 Auxiliary relay
- 315 Fuses cartridges
- 316 Head descent speed adjustment
- 325 Light
- 326 Light Push button
- 327 Selector
- 328 Piece counter
- 329 Feeding repeater



- 301 Main disconnect switch
- 302 Start push-button
- 303 Speed switch
- 304 Head selector
- 305 Cycle start push-button
- 306 Emergency push-button





- 318** Aux. relais
- 319** Aux. relais
- 320** Aux. relais
- 321** Aux. relais
- 322** Timer
- 323** Timer
- 324** Timer

- 330** Filter
- 331** Vice Electrovalve
- 332** Head Electrovalve
- 333** Avance Electrovalve
- 334** Vice avance electrovalve

**330**

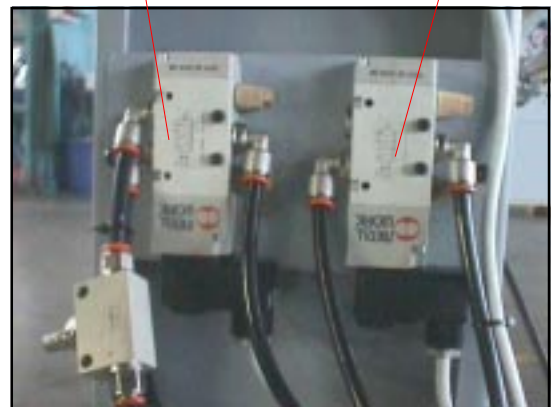
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**332**



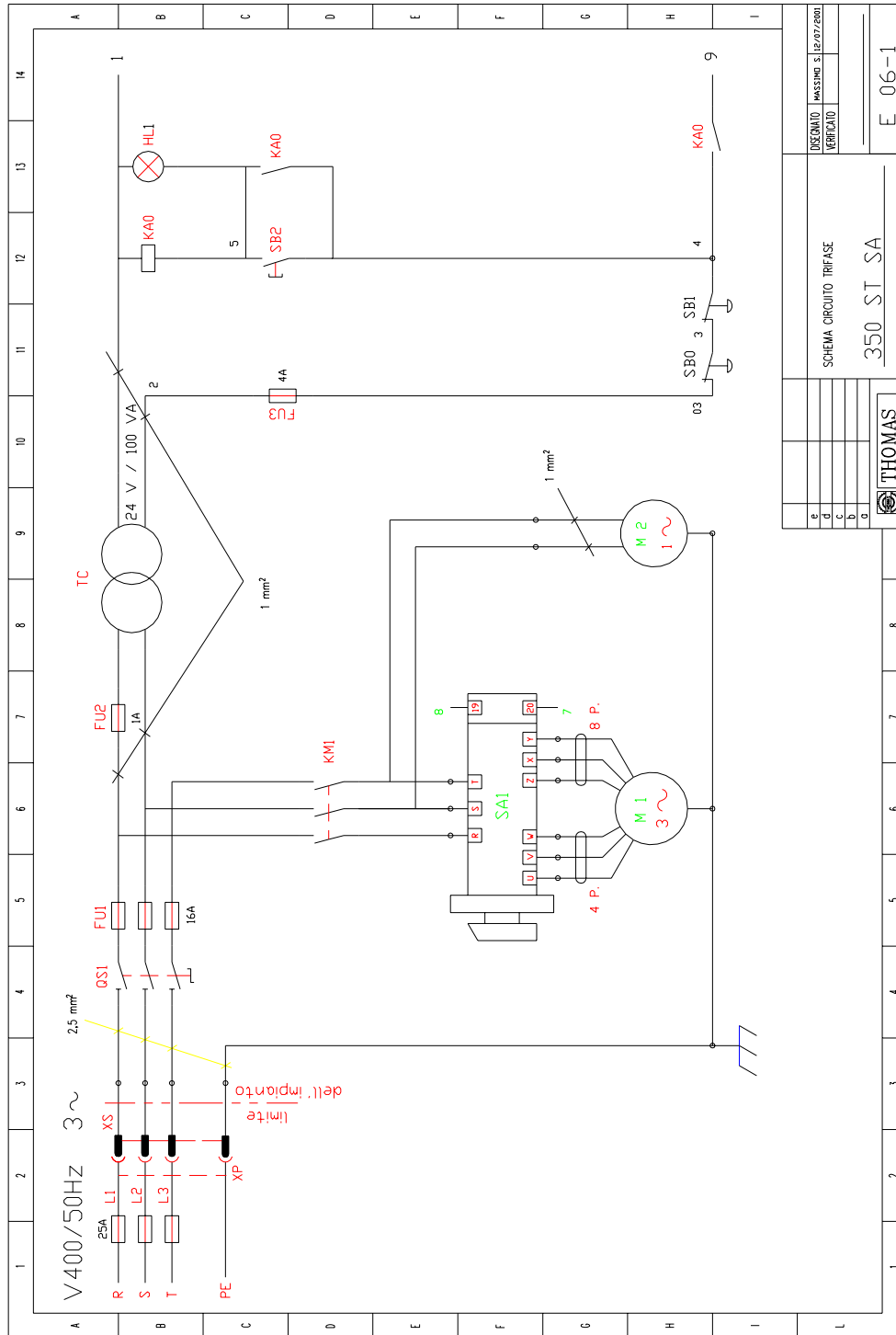
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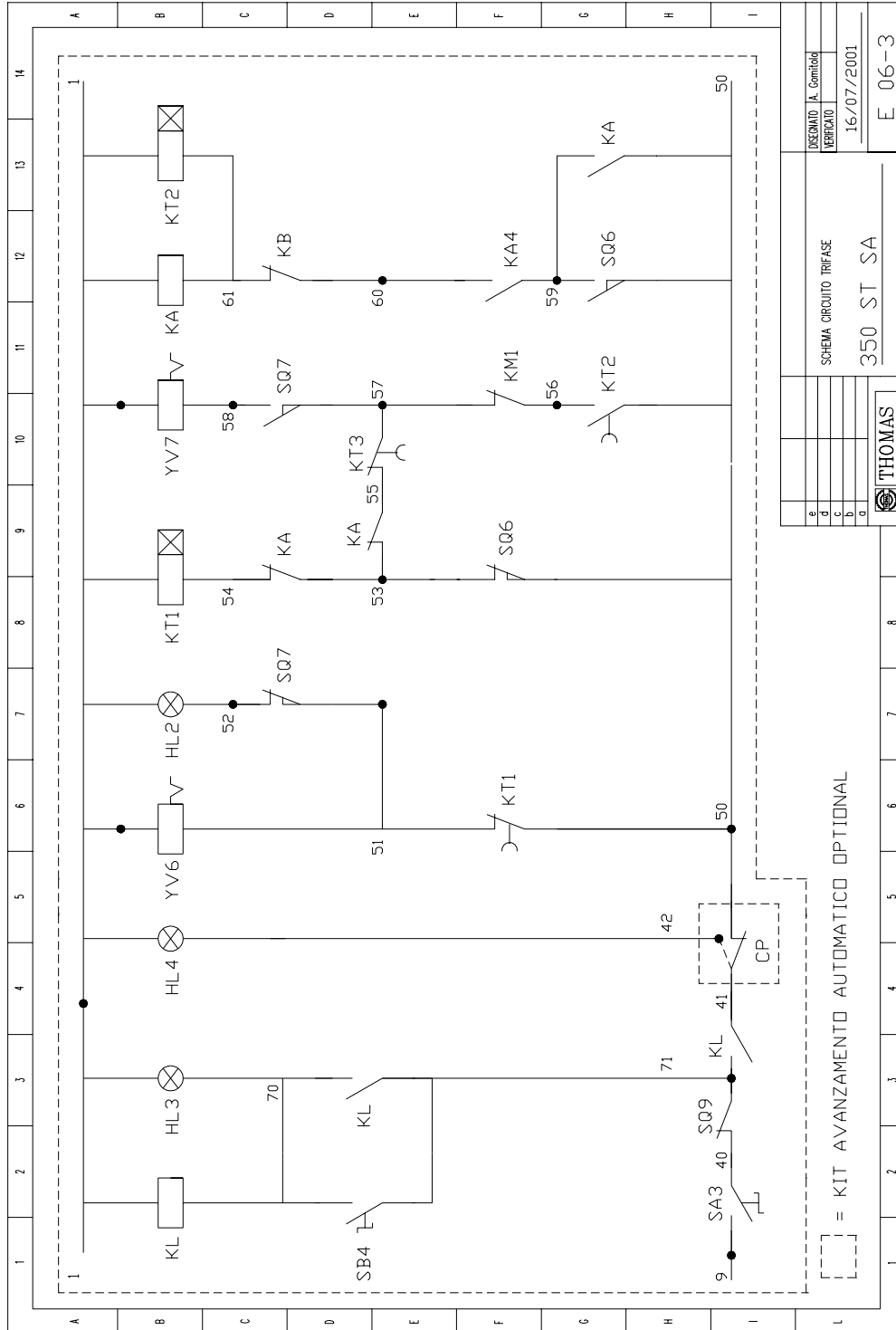


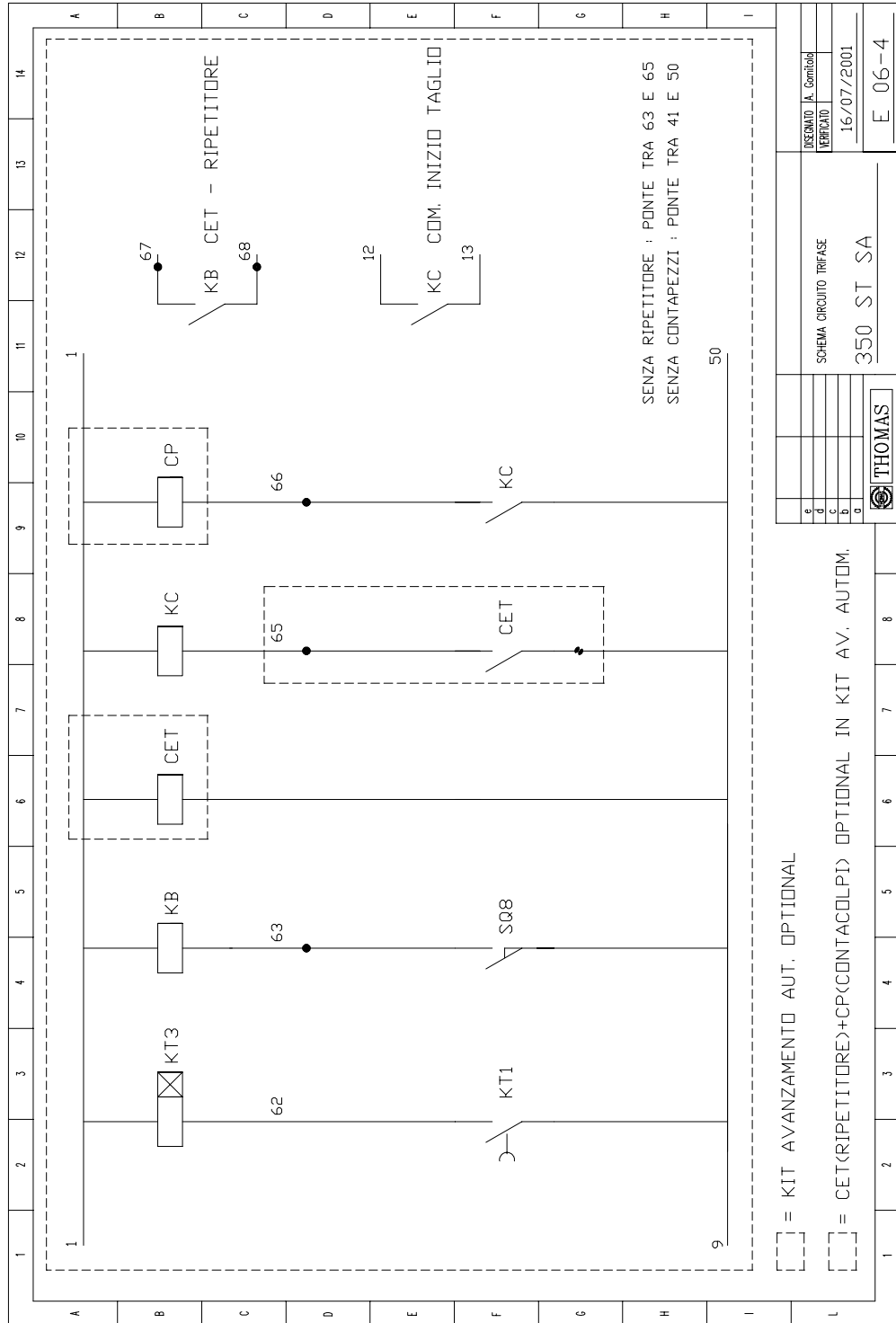
## 11 WIRING DIAGRAMS

### 11.1 - Three-phase electric diagram








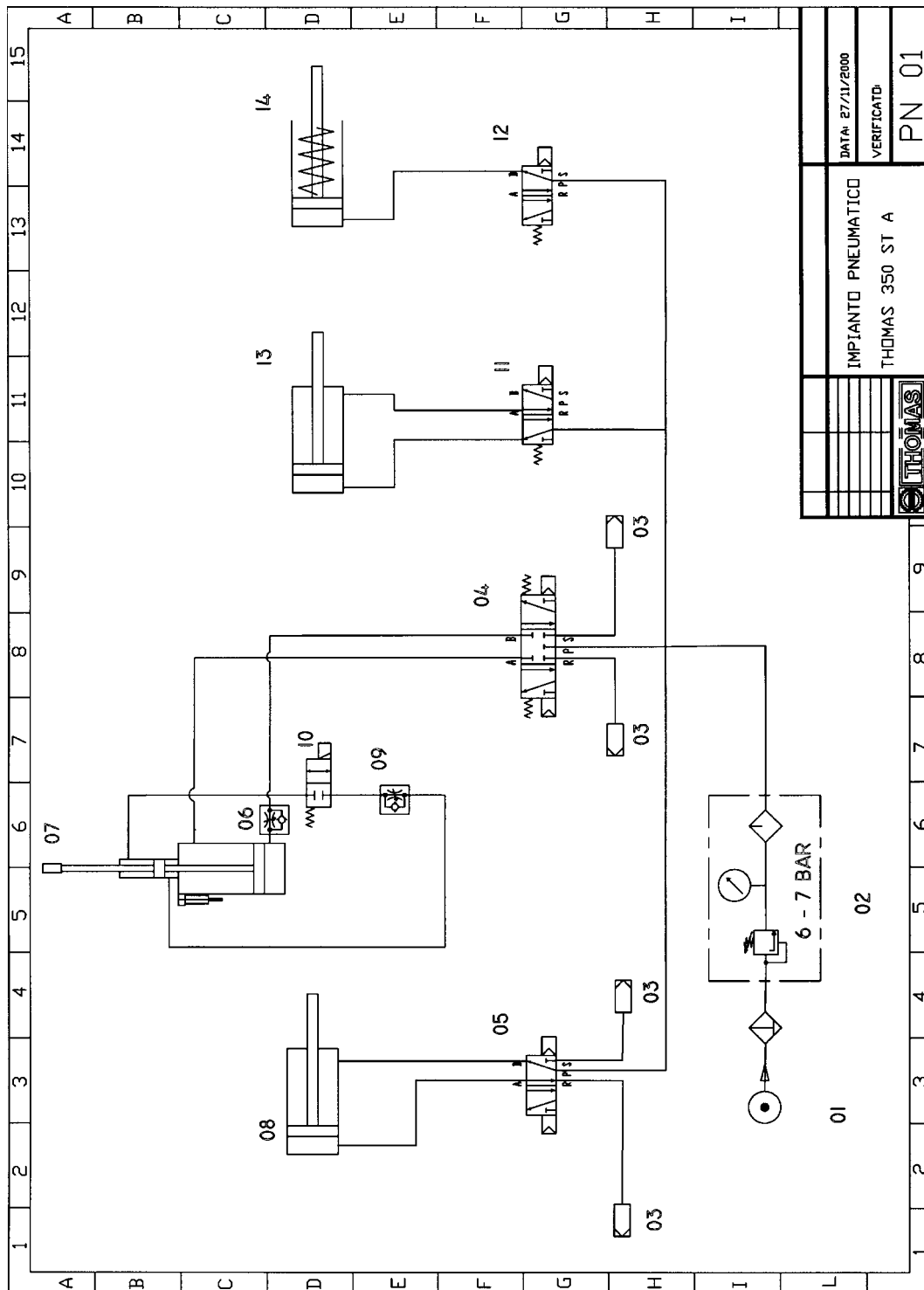


LEGENDA 350 ST SA										
SIGLA DESCRIZIONE										
14										
13										
12										
11										
10										
9										
8										
7										
6										
5										
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1										
	A	B	C	D	E	F	G	H	I	L

DESCRIZIONE		A. Corniolo	
MATERIALE		18/07/2001	
SCHEMA CIRCUITO TRIFASE		350 ST SA	
E		06-5	
			

### 11.2 - Pneumatic diagram



DATA: 27/11/2000	PN 01
VERIFICATO:	
IMPIANTO PNEUMATICO	
THOMAS 350 ST A	

#### PNEUMATIC UNIT

- 01 Pneumatic pressure source
- 02 Filter - pressure regulator - lubricator assembly
- 03 Silencer
- 04 Head cylinder solenoid - valve
- 05 Vice cylinder solenoid - valve
- 06 Capacity regulator
- 07 Head cylinder

#### PNEUMATIC UNIT

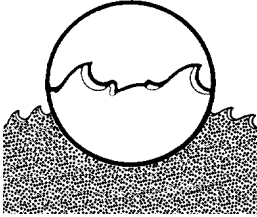
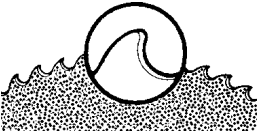
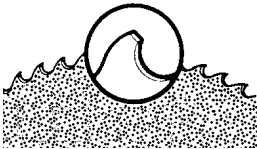
- 08 Vice cylinder
- 09 Head lowering adjustment solenoid - valve
- 10 Carriage cylinder solenoid - valve
- 11 Carriage vice solenoid - valve
- 12 Carriage vice cylinder
- 13 Carriage cylinder
- 14 Carriage vice cylinder

## 12 TROUBLESHOOTING

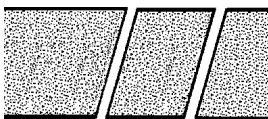
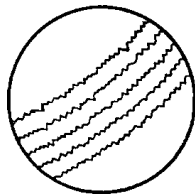
This chapter lists the probable faults and malfunctions that could occur while the machine is being used and suggests possible remedies for solving them.

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

### 12.1 - Blade and cut diagnosis

FAULT	PROBABLE CAUSE	REMEDY
<p><b>TOOTH BREAKAGE</b></p> 	<p>Too fast advance</p> <p>Wrong cutting speed</p> <p>Wrong tooth pitch</p> <p>Low quality disk Ineffective gripping of the part in the vice. Previously broken tooth left in the cut Cutting resumed on a groove made previously. Insufficient lubricating refrigerant or wrong emulsion</p> <p>Sticky accumulation of material on the disk.</p>	<p>Decrease advance, exerting less cutting pressure Change disk speed and/or diameter. See Chapter "<b>Material classification and choice of disks</b>" and the <i>Table of cutting speeds according to disk diameter</i>. Choose a suitable disk. See Chapter "<b>Material classification and choice of disks</b>". Use a better quality disk. Check the gripping of the part.</p> <p>Accurately remove all the parts left in. Make the cut elsewhere, turning the part.</p> <p>Check the level of the liquid in the tank. Increase the flow of lubricating refrigerant, checking that the hole and the liquid outlet pipe are not blocked. Check the blend of lubricating coolant and choose a better quality disk.</p>
<p><b>PREMATURE DISK WEAR</b></p> 	<p>Wrong running in of the disk</p> <p>Wrong cutting speed</p> <p>Unsuitable tooth profile</p> <p>Wrong tooth pitch</p> <p>Low quality disk Insufficient lubricating refrigerant</p>	<p>See Chapter "<b>Material classification and choice of disks</b>" in the paragraph on <i>Running in the disk</i>. Change disk speed and/or diameter. See Chapter "<b>Material classification and choice of disks</b>" and the <i>Table of cutting speeds according to disk diameter</i>.</p> <p>Choose a suitable disk. See Chapter "<b>Material classification and choice of disks</b>" in the paragraph on <i>Type of disks</i>. Choose a suitable disk. See Chapter "<b>Material classification and choice of disks</b>". Use a better quality disk. Check the level of the liquid in the tank. Increase the flow of lubricating refrigerant, checking that the hole and the liquid outlet pipe are not blocked.</p>
<p><b>CHIPPED DISK</b></p> 	<p>Hardness, shape or flaws in the material (oxides, inclusions, lack of homogeneity, etc..) Wrong cutting speed</p> <p>Wrong tooth pitch</p> <p>Vibrations Disk incorrectly sharpened</p> <p>Low quality disk</p>	<p>Reduce the cutting pressure and/or the advance.</p> <p>Change disk speed and/or diameter. See Chapter "<b>Material classification and choice of disks</b>" and the <i>Table of cutting speeds according to disk diameter</i>. Choose a suitable disk. See Chapter "<b>Material classification and choice of disks</b>". Check gripping of the part. Replace the disk with one that is more suitable and correctly sharpened. Use a better quality disk.</p>

FAULT	PROBABLE CAUSE	REMEDY
	Incorrect emulsion of the lubricating refrigerant	Check the percentage of water and oil in the emulsion.
<b>DISK VIBRATION</b>	Wrong tooth pitch	Choose a suitable disk. See Chapter " <b>Material classification and choice of disks</b> ".
	Unsuitable tooth profile	Choose a suitable disk. See Chapter " <b>Material classification and choice of disks</b> " in the paragraph on <i>Type of disks</i> .
	Ineffective gripping of the part in the vice.	Check the gripping of the part.
	Dimensions of the solid section too large with respect to the maximum admissible cutting dimensions	Abide by the instructions.
	Disk diameter incorrect and/or too large	Decrease the disk diameter, adapting it to the dimensions of the part to be cut; the cutting part of the disk must not be too large for the shape of the part to be cut.
<b>RIDGES ON THE CUTTING SURFACE</b>	Disk diameter incorrect and/or too large	Decrease the disk diameter, adapting it to the dimensions of the part to be cut; the cutting part of the disk must not be too large for the shape of the part to be cut. Check the gripping of the part.
	Ineffective gripping of the part in the vice.	Decrease advance, exerting less cutting pressure.
	Too fast advance	Sharpen the tool.
	Disk teeth are worn	Check the level of the liquid in the tank.
	Insufficient lubricating refrigerant	Increase the flow of lubricating refrigerant, checking that the hole and the liquid outlet pipe are not blocked.
	Toothing does not unload shavings well	Choose a blade with a larger tooth pitch that allows better unloading of shavings and that holds more lubricating refrigerant.
<b>CUTS OFF THE STRAIGHT</b>	Too fast advance	Decrease advance, exerting less cutting pressure.
	Ineffective gripping of the part in the vice	Check the gripping of the part which may be moving sideways.
	Disk head off the straight	Adjust the head.
	Disk sides differently sharpened.	Choose tool quality carefully in every detail as regards type and construction characteristics.
	Disk thinner than the commercial standard.	Carefully clean the laying and contact surfaces.
	Dirt on the gripping device	



# 13 NOISE TESTS

In accordance with point 1.7.4.f of the Machines Directive EEC 89/392

PRECISION PHONOMETER MOD. CEL-LUCAS 275-2B  
INTEGRATING METER CLASS 1 IEC 651 - IEC 804 REGULATIONS  
PRECISION GAUGE CEL-LUCAS 284/2 IEC 942 REGULATIONS

4 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 81,5 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 there-fore assess the intensity and if necessary provide the operators with the necessary personal protection, as required by Law 277/1991.

## PLATES AND LABELS

