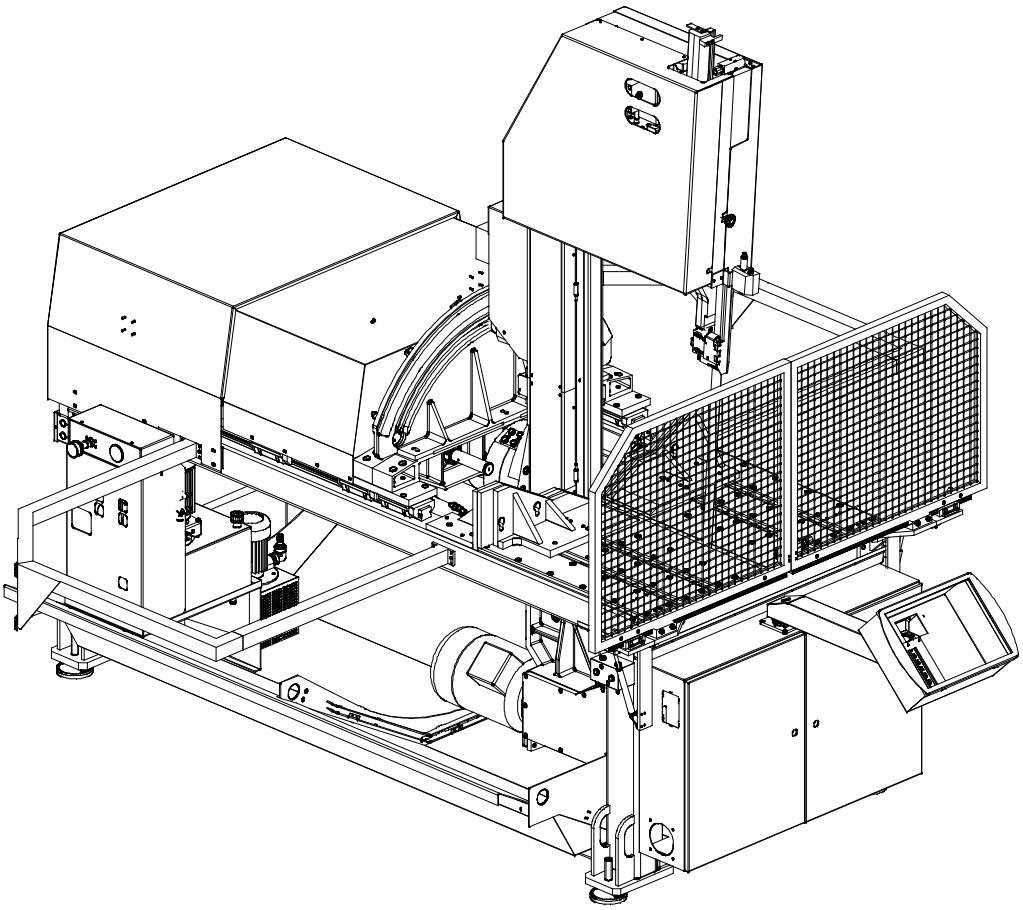

USE AND MAINTENANCE MANUAL

EN **V 20 PT**

YEAR OF MANUFACTURE: _____

"CE" CONFORMITY DECLARATION
(according to EEC MACHINES DIRECTIVE 2006/42/CE annex II A)

The manufacturer:

MEP S.p.A.
Via Enzo Magnani, 1
61045 Pergola (PU) ITALIA
Tel. 072173721 - Fax 0721734533

Hereby declares that the bandsawing machine:

Machine Type:	**SAWING MACHINE**
Machine model:	**V- 20 PT**
Serial number:	
Year of manufacture:	

is in specification with the following directives:

- **EEC MACHINES DIRECTIVE 2006/42/CE**
  - **EN 16093:2017**
- **DIRECTIVE 2014/30/UE "EMC"**
  - **EN 50370-1:2005 Emission**
  - **EN 50370-2:2003 Immunity**

Responsible of a Technical File
(Walter Di Giovanni)

c/o MEP SPA
Via Enzo Magnani, 1
61045 - Pergola - PU - ITALY

Managing Director
(William Giacometti)

Pergola, lì _____

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Introduction and technical specifications

1

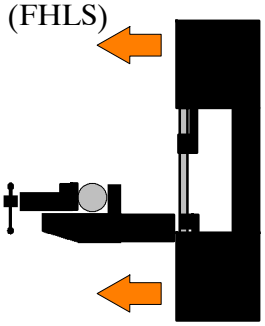
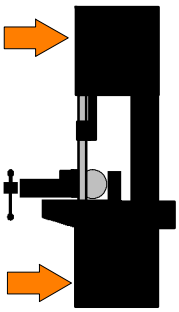
Foreword

MEP SPA, in response to modern production techniques, has developed the new **V 20 PT**.
This work tool has been designed to satisfy the wide range of cutting needs of a modern workshop with simplicity and reliability, while at the same time complying with all EEC safety standards.
The **V 20 PT** is structurally rigid, silent and safe: it produces a minimum of waste while its great versatility makes it suitable for cutting various materials such as stainless steel light alloys, aluminium, copper and bronze at high speed and with high precision.
Its high cutting capacity enables it to handle both single workpieces and bundles, which, combined with the possibility of making inclined cuts from 60° left to 45° right, make this machine the ideal solution for satisfying the wide range of cutting needs of machine shops, turneries, structural steel shops and engineering workshops.
Congratulations for having chosen this product which, by following the **instructions** contained in this user and maintenance handbook, will guarantee years of dependable service.

Warning This band saw has been exclusively designed to cut metals.

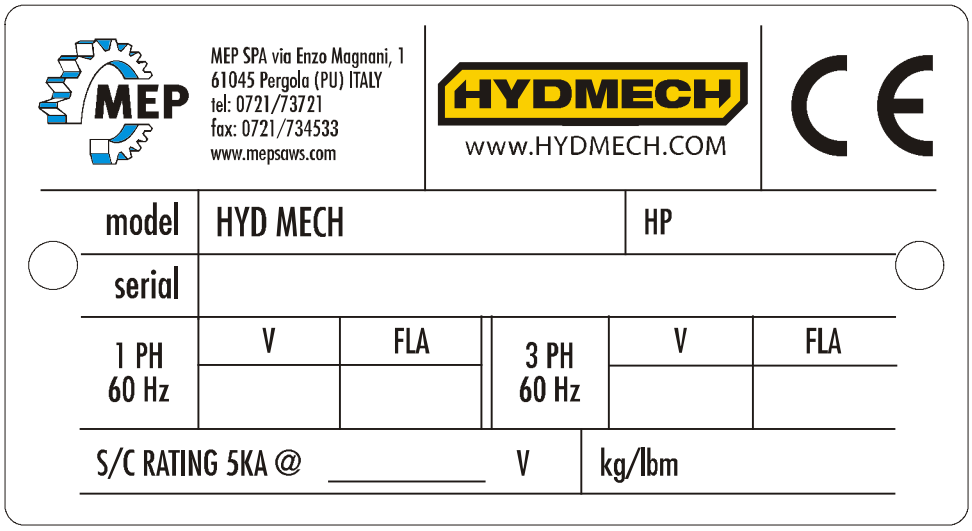
Machine presentation

Machine operation is semi- automatic.
In the working cycle, the operator, after having set the front head limit switch, the cutting angle and the head feeding speed on the control board, presses the vice closing push button and starts the cutting cycle; the band starts rotating and the bow moves forward till the end of the cut, then the band stops and the head returns to the starting position.

1. The cutting vices close	The head moves forward till the end of the cut (FHLS)	2. The head returns to start position (FCTI)	3. The cutting vices remain closed
			

Machine specification

The anodised aluminium name plate is riveted on the side of the machine; the same data are reproduced on the declaration of conformity included with this use and maintenance manual.



N.B. When communicating with the Technical Service department, the model, serial number and year of manufacture of the machine must be quoted.

General technical data table

CUTTING SPEEDS		
Speed	mt/min ft/min	20÷118 65.6÷387.04

BAND SAW		
Rated size	mm in	5880 x 41 x 1,3 231.50x1.61 x0.05
Max/min blade length	mm in	5760÷6000 226.77 ÷ 236.22
Blade height	mm in	41 1.61
Blade width	mm in	1,3 0.05
Band saw tension	kg /lbs	2200 4840

Attention When choosing the cutting tool, if its dimensions do not correspond to those included in the ”Rated size” section, check that the dimensions at least fall within the admissible max/min specifications.

INSTALLED ELECTRICAL POWER		
Spindle motor	kW hp	7,5 10.05
Monobloc hydraulic power pack motor	kW hp	1,3 1.74
Lubricant/coolant fluid electric pump motor	kW hp	0,37 0.49

INSTALLED ELECTRICAL POWER		
Blade tensioning motor	kW hp	0,25 0.33
Blade- guide head motor	kW hp	0,6 0.80
Chip ejector motor	kW hp	0,9 1.20
Transformers	kW hp	0,5 0.67
Max. installed electrical power	kW hp	11,42 15.30

WORKING PRESSURE		
Vice working pressure during opening/closure phase	Bar psi	20 290.08

LUBRICANT/COOLANT FLUID AND OIL		
Oil for monobloc hydraulic power pack	capacità Lt	16,87
Lubricant/coolant fluid (oil concentration 5- 6%)	capacità Lt	76

VICE		
Vice max. opening	mm in	515 20.27

SPINDLE MOTOR
4- pole, three- phase, asynchronous; frequency 50 Hz.

No.of poles	Current (Volts)	Absorption (Amps)	Power (Kw) (hp)	rpm	Band saw speed
4	400	16	7,5 10.05	1450	20- 118 m/min 65.6- 158.12 ft/ min
Stator wound with enamelled copper wire, class H 200° C.					
Class F insulation (limit temperature TL 155° C).					
IP 55 protection rating (total against contact with live parts, water sprayed from all directions, with shaft oil seal).					
Conforming to CEI- EN 60034- 1:2011					

N.B. Example of class F insulation: in air- cooled machines at an ambient temperature of 40° C, the allowable overtemperature is 100° C (where 100 C represents the allowable DT).

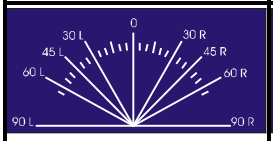
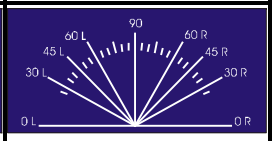
ELECTROPUMP MOTOR
Single phase; Frequency 50 Hz.

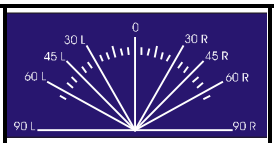
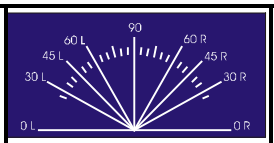
Voltage (Volts)	Absorption (Amps)	Power (Kw) (hp)	rpm	Delivery rate lt/min min/max	Head (mt.) ft
230	1	0,18 0.24	2800	33/95	16/0 52.48/0
400	0,85	0,18 0.24	2800	33/95	16/0 52.48/0

HYDRAULIC POWER PACK MOTOR SPECIFICATIONS 4- pole, three- phase, asynchronous; frequency 50 Hz.				
Nr. of poles	**Voltage (Volts)**	**Absorption (Amps.)**	**Power (Kw) (hp)**	**RPM**
2/4	230/400	4,70/2,70	1,10/1,30 1.47/1.74	1420/1700
Protection rating IP 54.				

HYDRAULIC POWER PACK MOTOR SPECIFICATIONS 4- pole, three- phase, asynchronous; frequency 50 Hz.				
Nr. of poles	**Voltage (Volts)**	**Absorption (Amps.)**	**Power (Kw) (hp)**	**RPM**

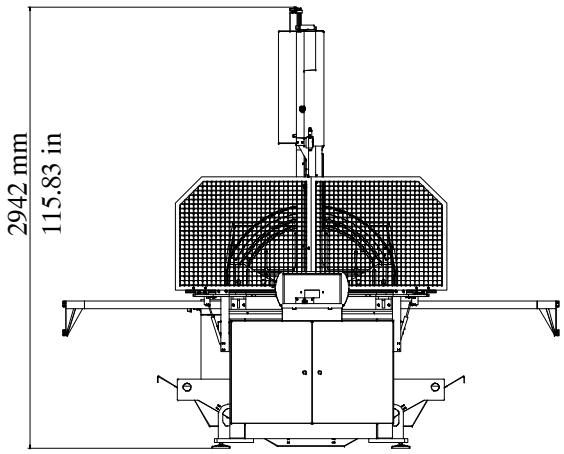
Conforming to CEI- EN 60034- 1:2011

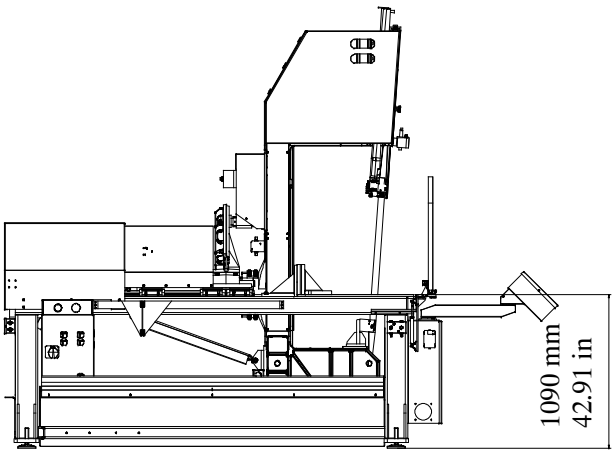
CUTTING CAPACITY with standard vice jaws				
Cutting angle (MKS - SI)	**Cutting angle (Imperial)**	○	H	□
				
0°	90°	350 13.78	508 20	635 x 508 25 x 20
45° ◖	45° ◖		445 17.52	
60° ◖	30° ◖		305 12.00	
45° ◗	45° ◗		445 17.52	
60° ◗	30° ◗		305 12.00	

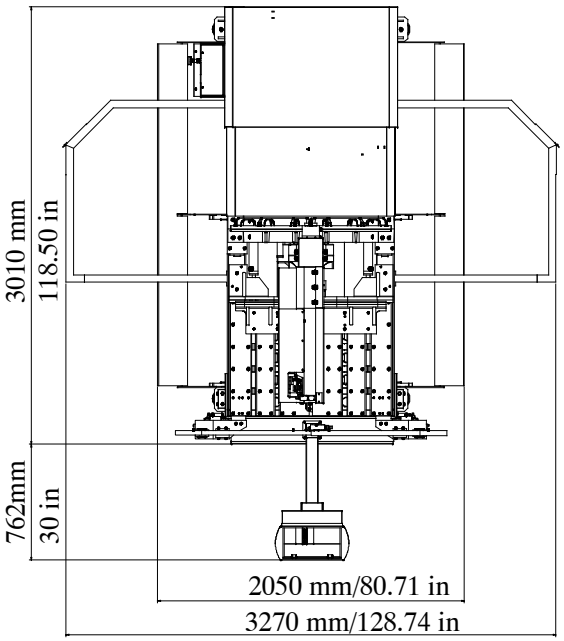
CUTTING CAPACITY with optional vice jaws				
Cutting angle (MKS - SI)		**Cutting angle (Imperial)**		○
0°		90°		508 20

Dimensions

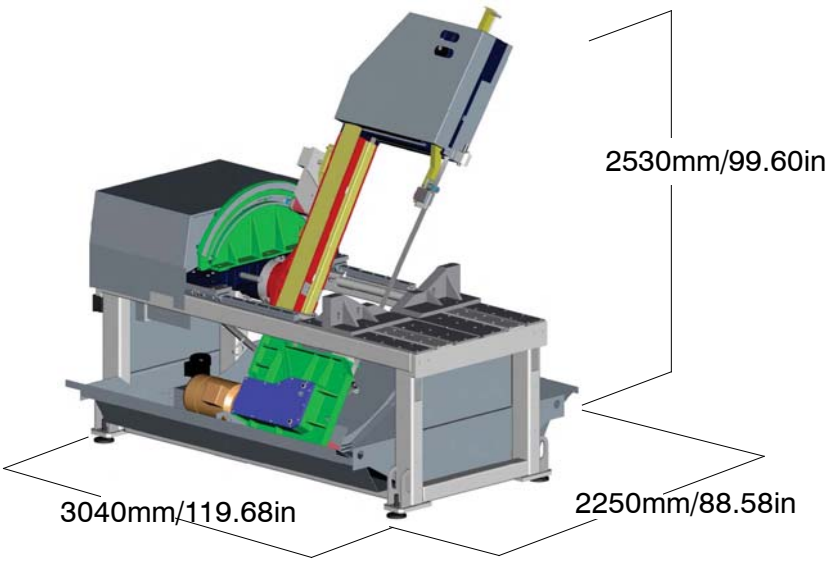
MACHINE INSTALLED		
Work table height	mm in	1090 42.91
Weight	kg lbs	3.500 7700







MACHINE PACKAGING

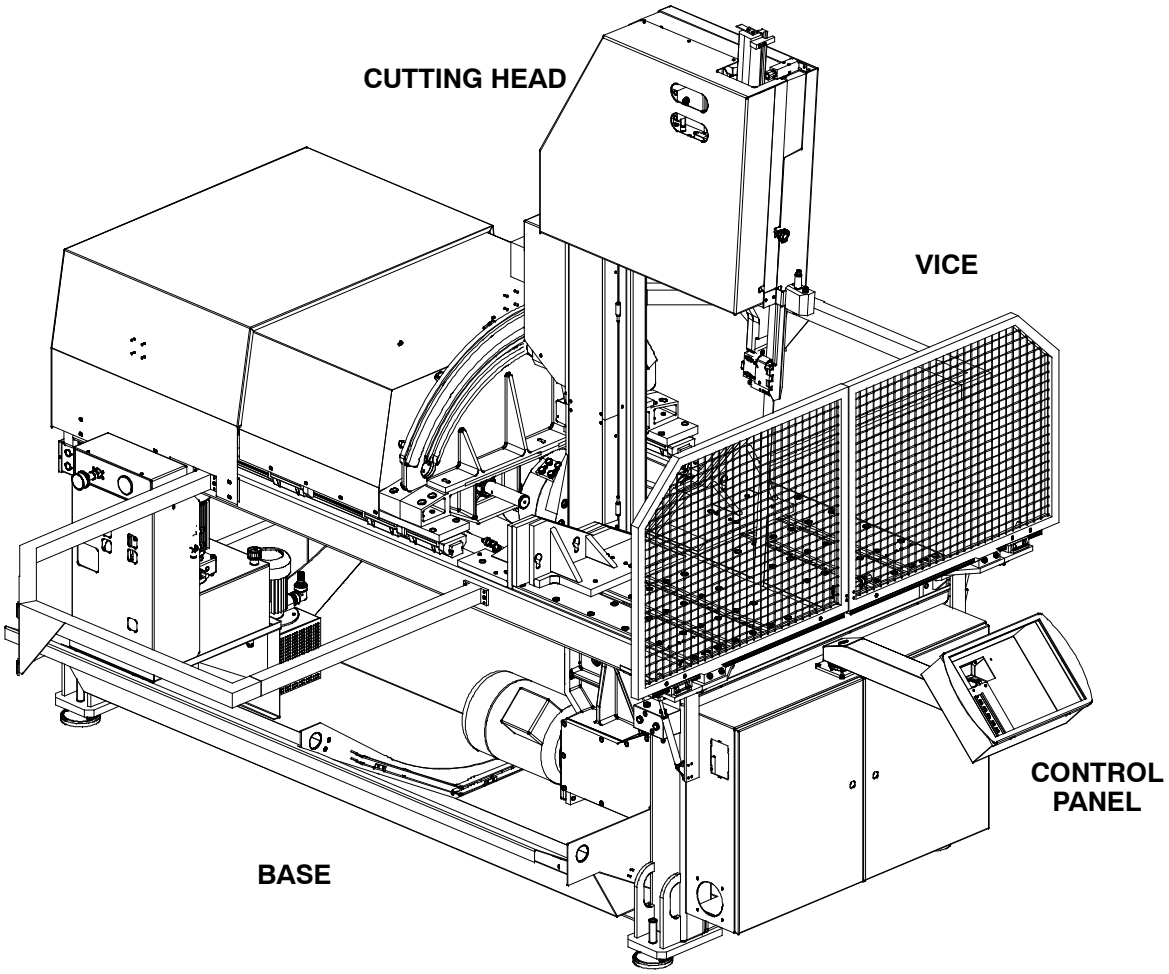


Functional parts

2

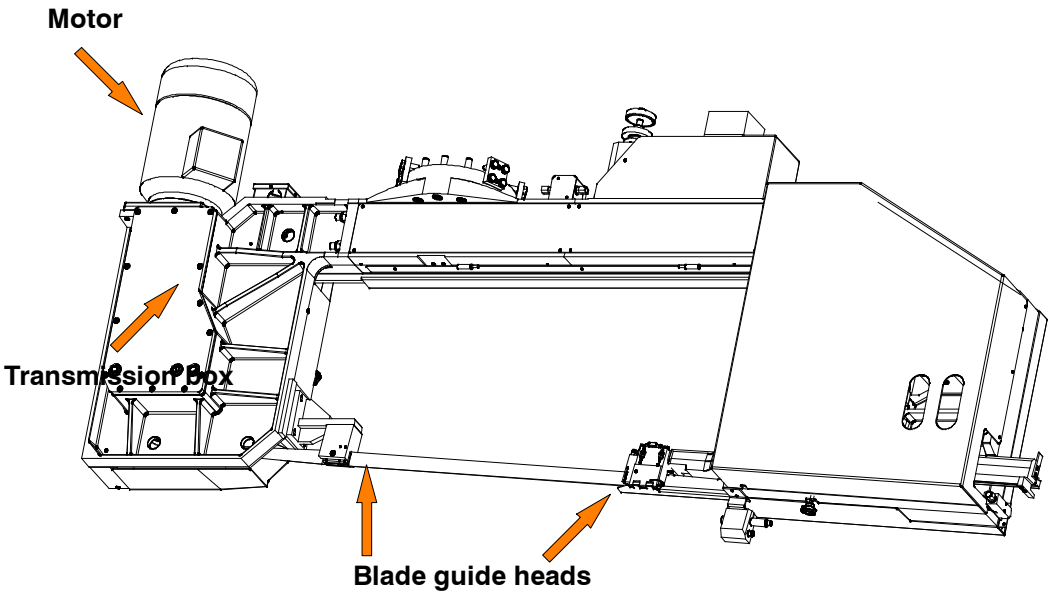
V 20 PT model

In order for the user to move towards a full understanding of how the machine works, which is described in detail in the chapter 5, this chapter deals with the main units and their locations.



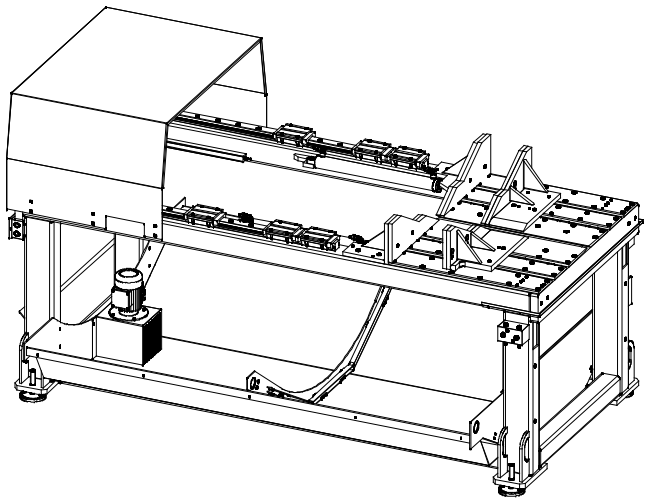
Cutting head

The operating head is the cutting component and is made up of a bow from cast iron on which the following elements are installed: band, band guide components, band tensioning unit, worm screw reducer and spindle motor.
The electro- mechanically operated cutting bow runs horizontally on linear guides and slides and rotates on the feeding axis from 60 on the left to 60 on the right.
The machine is equipped with a laser system to position the bar accurately to carry out non- standard or facing cuts.



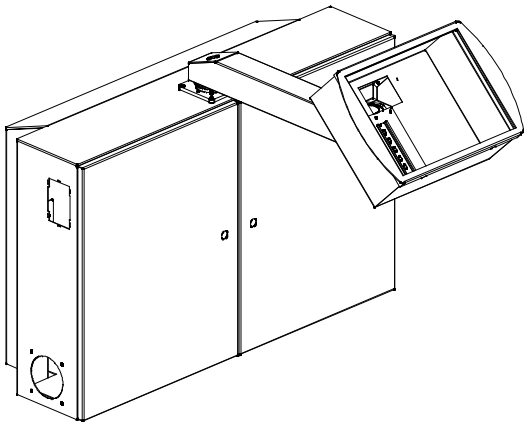
Optional vertical vices and cutting vices

The shearing vices lock the material being machined and are made up of two fixed squares and two movable jaws.
Vertical vices can be optionally installed and are used to hold the material adhering to the cutting plane.



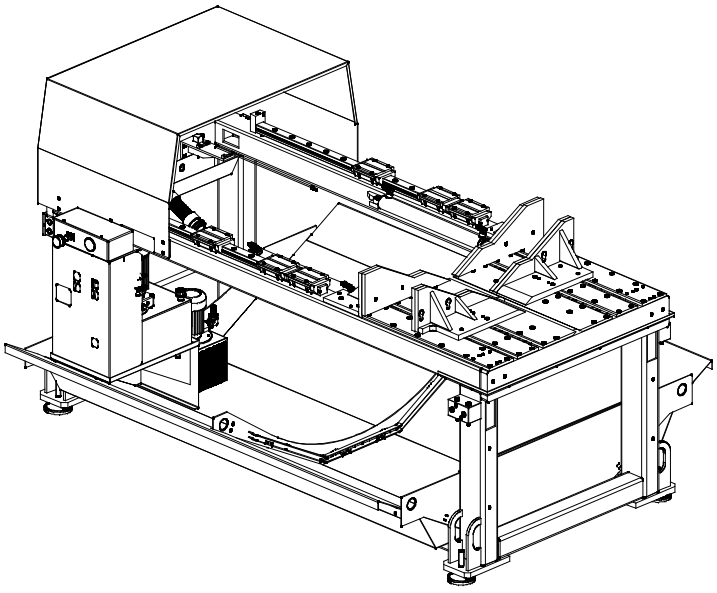
Control Panel

The control panel features an IP 54 protection and houses the electronic equipment. Its access is limited by a door installed on pintles and fastened by screws, to prevent every intentional tampering.
The control panel swivels on two articulated joints so that it can be positioned by the operator for greater ease- of- use and safety.



Base

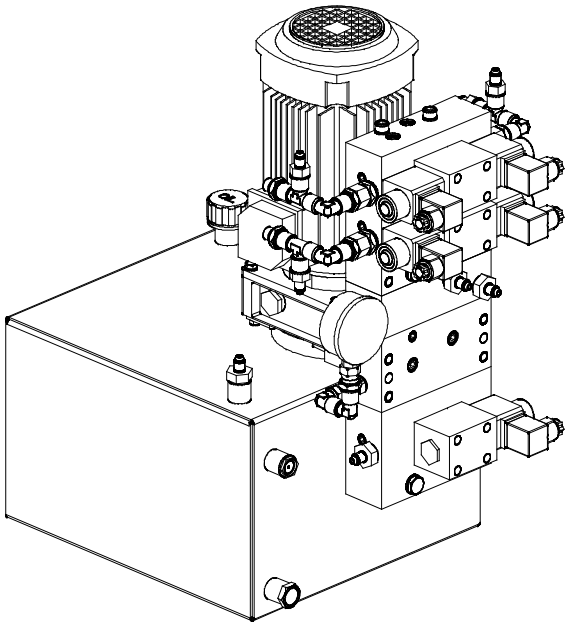
The structure includes a large collection tank of the cooling fluid.The pump is housed inside the tank.



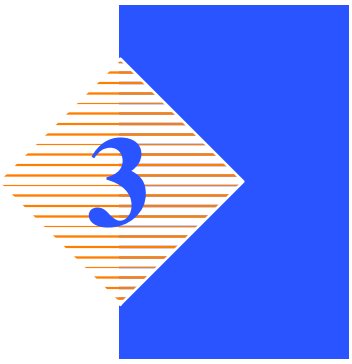
On the right side there is the coolant gun and on the left side the vice pressure adjuster.

Hydraulic power pack

The hydraulic power pack operates the shearing vices, the vertical vices and the optional pop- up rollers, as well as the head rotation brake.
The oil exchange in the circuits is operated by solenoid valves driven by the machine controller.



Safety and accident prevention



The **V 20 PT** has been designed and produced in accordance with European standards. For the correct use of the machine we recommend that the instructions contained in this chapter are carefully followed.

Use of the machine

The **V 20 PT** band saw cutting machine is intended exclusively for cutting metallic materials, ferrous or non- ferrous, in section or solid.
Other types of material and machining are not compatible with the specific characteristics of the saw.
The employer is responsible for instructing the personnel who, in turn, are obliged to inform the operator of any accident risks, safety devices, noise emission and accident prevention regulations provided for by international standards and national laws regarding the use of the machine. The operator must be perfectly aware of the position and function of all the machine's controls.The instructions, warnings and accident prevention standards in this manual must be respected without question by all those concerned.The following definitions are those provided for by **MACHINES DIRECTIVE 2006/42/CE**

- "Danger zone": any zone in and/or around a machine in which the presence of a person constitutes a risk for the safety and health of that person.
- "Person exposed": any person finding himself either completely or partly in a danger zone.
- "Operator": the person or persons given the responsibility of installing, operating, adjusting, maintaining, cleaning, repairing or transporting the machine.

Attention

The manufacturer declines any responsibility whatsoever, either civil or criminal, should there be unauthorised interference or replacement of one or more parts or assemblies on the machine, or if accessories, tools and consumable materials are used that are different from those recommended by the manufacturer itself or if the machine is employed in a plant system and its proper function is thereby altered.

General recommendations

LIGHTING

Insufficient lighting for the types of operation envisaged could constitute a safety hazard for the persons concerned. For this reason, the machine user must provide lighting in the working area sufficient to eliminate all shadowy areas while also avoiding any blinding light concentrations. (Reference standard EN 12464- 1:2011“Lighting in work environments”).

CONNECTIONS

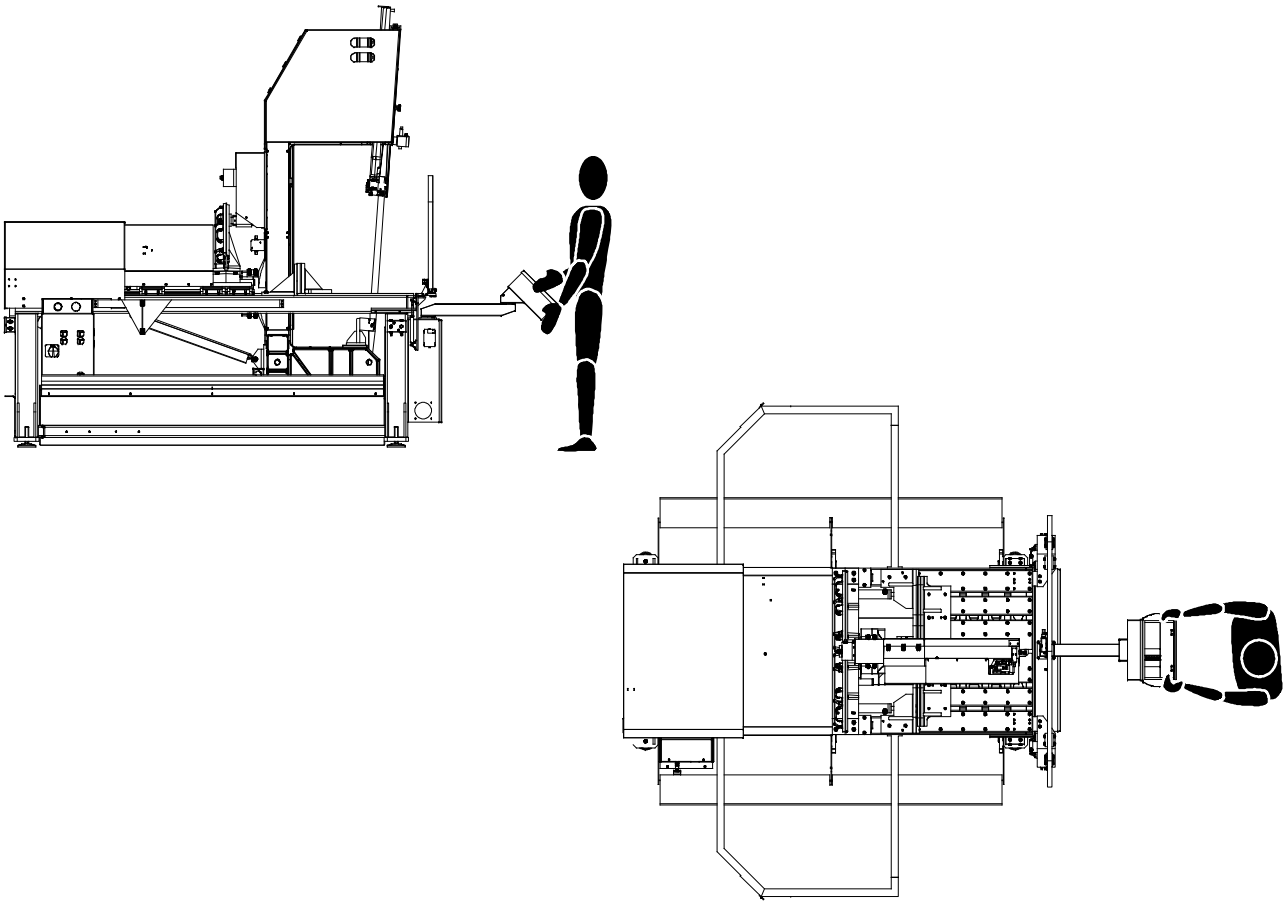
Check that the power supply cables and pneumatic feed systems comply with the maximum machine absorption values listed in the “Machine Specification” tables; replace if necessary.

EARTHING

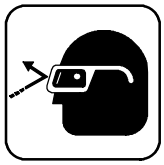
The installation of the earthing system must comply with the requirements set out in EN 60204- 1:2006/AC:2010.

OPERATOR POSITION

The position of the operator controlling machine operations must be as shown in the diagram below.



Recommendations to the operator



Always wear proper goggles or protective glasses.

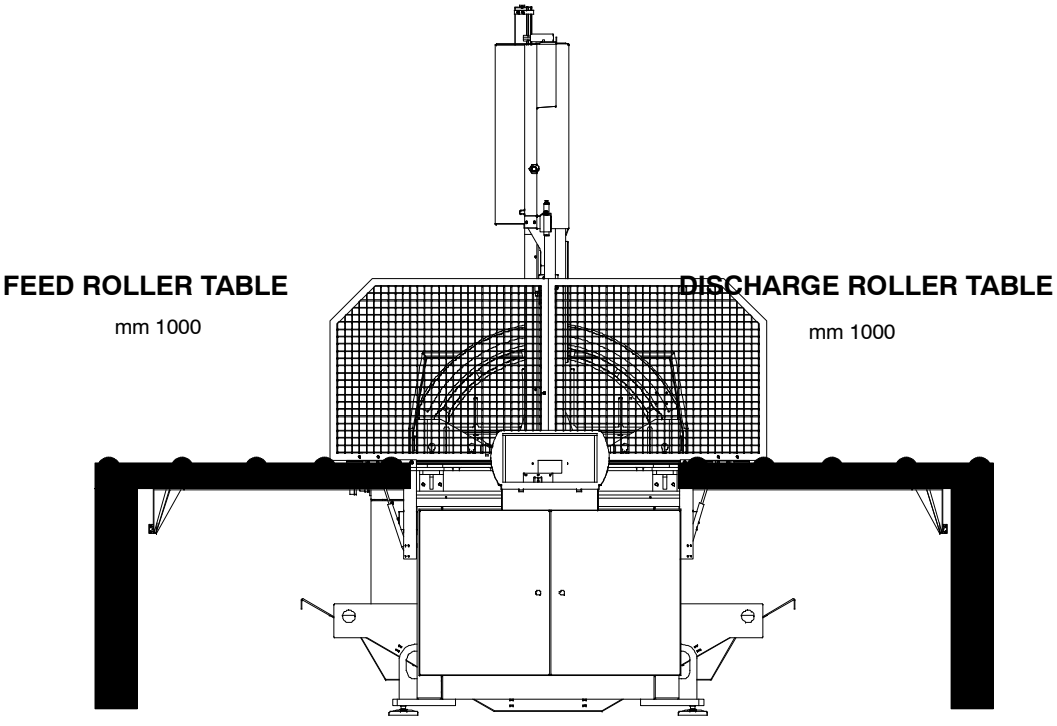
Do not use the machine without the guards in position. Replace the polycarbonate windows , if subject to corrosion.

Do not allow hands or arms to encroach on the cutting zone while the machine is in operation.

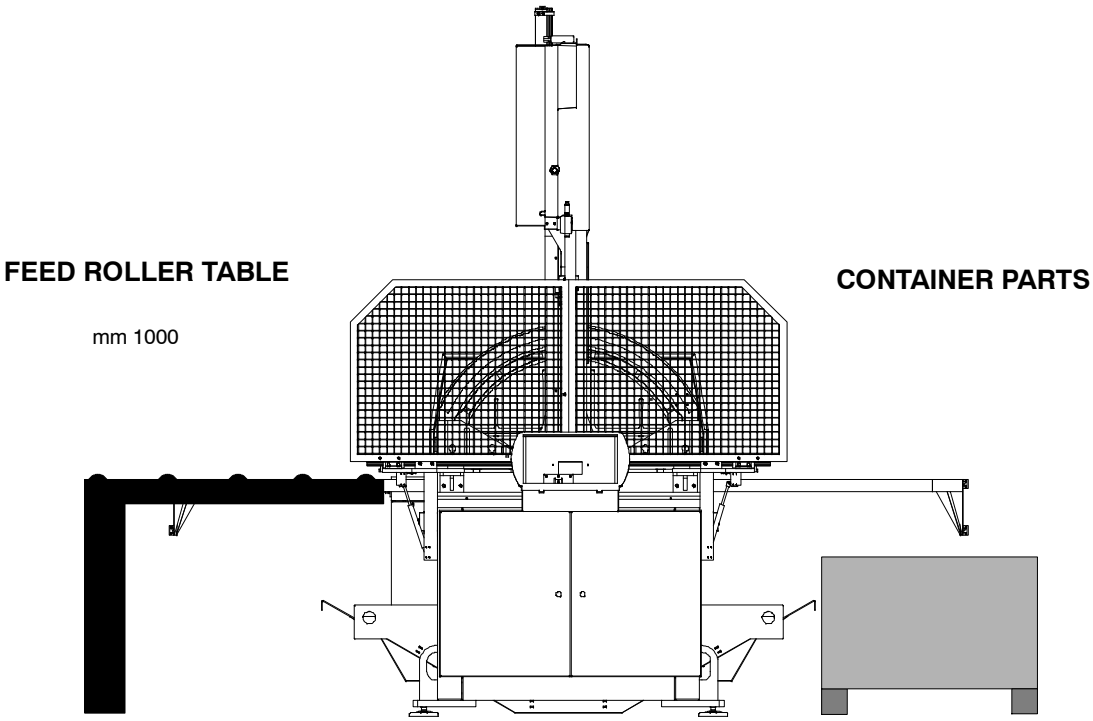
Do not wear oversize clothing with long sleeves, oversize gloves, bracelets, necklaces or any other object that may become entangled in the machine during working; long hair must be tied back and bunched.

Always disconnect the power supply to the machine before carrying out any maintenance work whatsoever, including in the case of abnormal operation of the machine.

Before starting cutting operations, support the material at both ends of the machine using the support arm - standard, or OPTIONAL accessories such as the feed and discharge roller tables shown in the diagram below. Before removing the devices supporting and moving the material, fasten the latter in place using the machine's clamping devices or other suitable equipment.



Arrange recovery/collection systems for the cut pieces, such as metal baskets, for example.

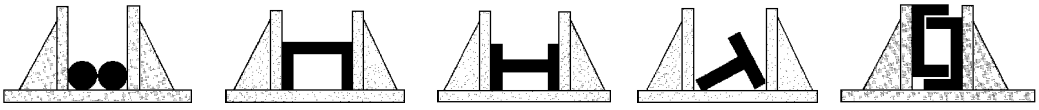


Any maintenance work on the hydraulic or pneumatic systems must be carried out only after the pressure in the system has been released.

The operator must not perform any risky operations or operations not required for the machining operation under way (e.g. remove swarf or metal shavings from the machine while cutting).

Remove equipment, tools or any other objects from the cutting zone; always keep the working area as clean as possible.

Before starting any cutting operations, ensure that the workpiece is securely held in the vice and the machine has been set correctly. A number of examples of how to clamp different profiles correctly in our machines are shown below.



Do not use the machine to cut pieces that exceed the capacity of the machine as listed in the machine specifications.

Never move the machine while it is cutting.

Do not use blades of different sizes to those recommended in the machine specifications.

When cutting very short pieces, make sure that they are not dragged behind the support shoulder, where they could jam in the blade.

When the hydraulic vice is used automatically, check it actually locks the piece and that the tightening pressure is correct.

When working on the band saw, wear gloves only when handling materials and for tool changing or adjustment operations. Only perform one operation at a time and do not hold more than one item or operate more than one device simultaneously. Keep hands as clean as possible.

Warning: if the blade jams in the cut, press the emergency stop push- button immediately. If this does not free the blade, slowly loosen the vice, remove the piece and check the blade or blade teeth for breakage. Replace the blade if necessary.

Before carrying out any repair work on the machine, consult the HYD-MECH Technical Assistance Service: this can be done through a representative in the country of use of the machine.

Adjustment of the blade- guide head must only be carried out with the machine at a standstill.

Machine safety devices

This use and maintenance manual is not intended as purely a guide for the use of the machine in a strictly productive environment, it is instead an instrument providing information on how to use the machine correctly and safely. The following standards are those specified by the EEC Committee in the directives regarding safety of machinery, health and safety at work, personal protection and safeguarding of the environment. These standards have been applied to the **V 20 PT** band saw.

Reference standards

MACHINE SAFETY

- MACHINES DIRECTIVE 2006/42/CE;
- Directive 2014/30/UE "EMC - Electromagnetic Compatibility";
- Directive 2014/35/UE known as "Low voltage directive".
- EN 16093:2017 Machine tools - Safety - Sawing machines for cold metal
- EN ISO 12100:2010 "Safety of machinery - General principles for design - Risk assessment and risk reduction".

HEALTH AND SAFETY AT WORK

- D.lgs 81/08 and subsequent amendment D.lgs 106/09 ;Directive 91/382/CE;2003/10/CE for the protection of workers against risks caused by exposure to physical, chemical and biological agents during working;
- Directive89/391/CE and Special EEC Directives No. 89/654/CE 2009/104/CE for improvements in health and safety at work;
- Directive 2004/37/CE for the protection of workers against risks deriving from exposure at work to carcinogenic substances;
- Directive 92/58/CE and No. 79/640/CE on safety signs at work.

PERSONAL PROTECTION

- Directive89/656/CE and Regulation 2016/425/UE on the use of personal protection devices.

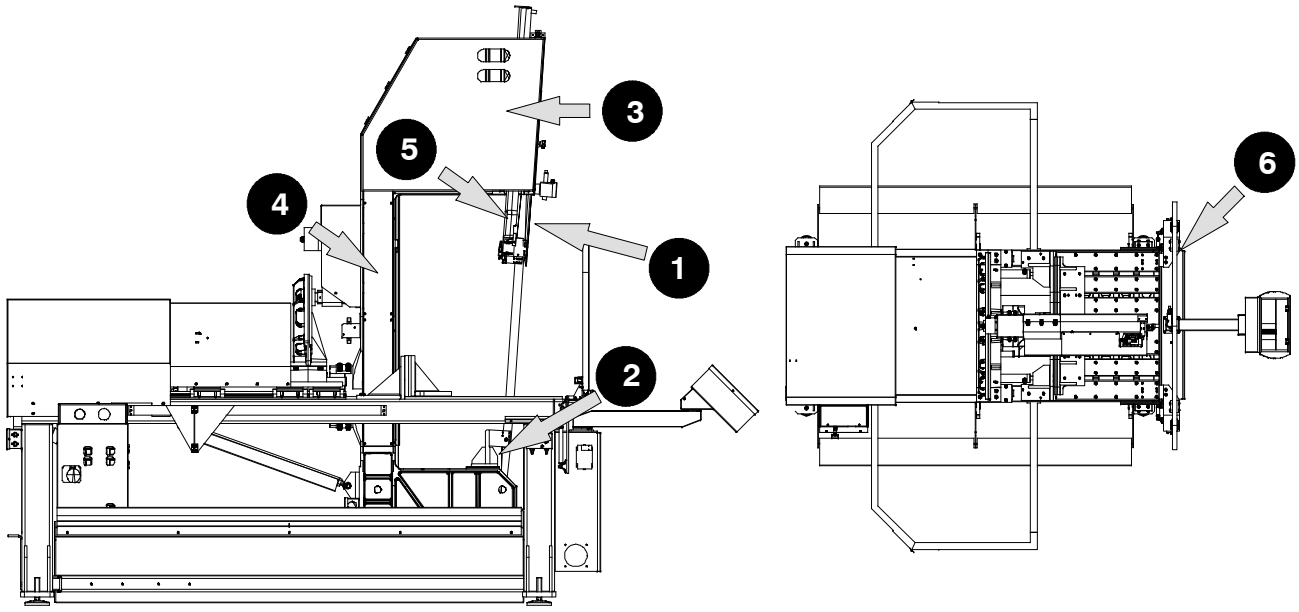
ENVIRONMENTAL PROTECTION

- Directive 2006/12/CE on waste disposal;
- Directive 2008/98/CE on the disposal of used oil.
- Directive 2011/65/CE on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

Protection against accidental contact with the blade

1. Metal protection screwed on the movable blade- guide head;
2. metal protection screwed on the drive pulley section;
3. metal protection screwed on the idle pulley section;
4. metal protection screwed on the cutting bow centre;
5. front head sliding support: when the head is at maximum aperture, the support ensures that the blade is covered, leaving free only the part of the blade engaged in the actual cutting, in accordance EN 16093:2017 ;

6. front guard rail on the right section at the rear of the head ensures a safe distance between the operator and the machine's moving parts.



Electrical equipment

In accordance with Italian standard EN 60204- 1:2006/AC:2010.

- Access to electrical control panel limited by screws and panel- lock device, allowing panel to be opened only after the electricity supply has been turned off;
- 24 Vac Control voltage for actuators, in accordance with chapter 6 or European Standard "Control and indication circuits", paragraph 2 "Control Circuits" sub- section 1 "Preferential voltage values for control circuits";
- plant short- circuit protection by means of rapid fuses, earthing of all plant parts connected with work as well as all foreseeable accidental contact; a thermal- magnetic overload cutout switch shuts down the motor;
- protection from accidental start- up by a minimum voltage relay in case of power failure.

Emergency devices

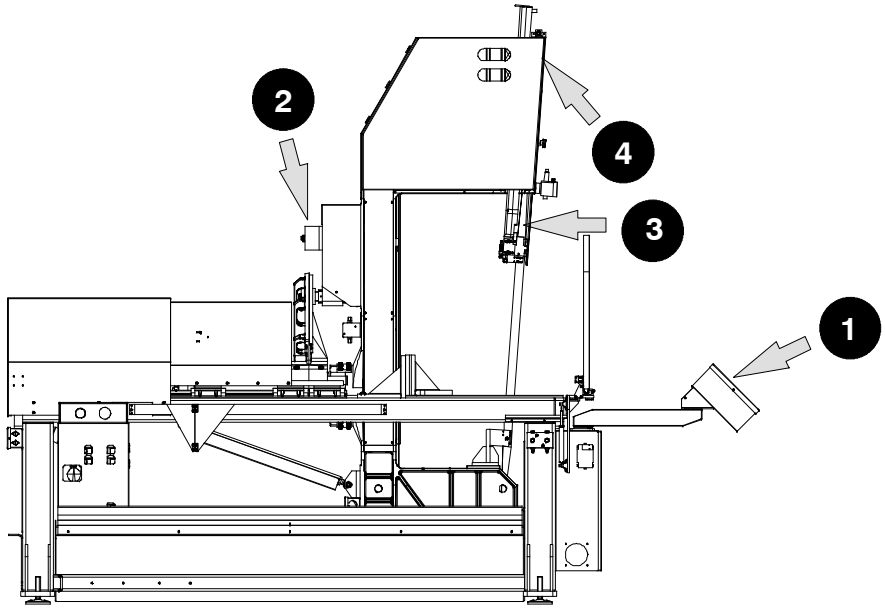
In accordance with Italian standard EN 60204- 1:2006/AC:2010.

- **Chapter 5 Section 6 Sub- section 1 "Emergency stop device"**: «the emergency stop device immediately stops all the dangerous and other functions of the machine»;
- **chapter 6 Section 2 Sub- section 4 Point 7 "Protective guards":** «the removal of protective guards designed to prevent access to dangerous parts or zones causes the machine to stop immediately; replacing the guards does not restart the functions, which must be reset».

...Emergency devices applicable to the V 20 PT:

1. **Emergency stop**: a non- return mushroom- head pushbutton, colour red on yellow background, is located on the control panel of the machine. To release the pushbutton, the actuator must be rotated 45°. After the emergency situation has been resolved, the machine must be reset.

2. **Automatic thermal- magnetic cutout switch with thermal- magnetic relay:** the machine auto switch, has two protection systems against voltage drops. In the case of a voltage drop, all electrical components are disengaged, the machine stops immediately, and automatic restart when the power supply returns is inhibited. Another function is that of resetting the thermal relay provided to protect against overcurrents.
3. **Strain gauge to meter the belt tension:** if the blade breaks or runs off its pulley the machine is immediately stopped.
4. **Protective guard for blade:** a coded key microswitch is operated if the blade covers is accidentally or intentionally opened during the machine operating cycle, immediately shutting down all functions.



Noise level of the machine

Noise can cause hearing damage and represents one the problems faced by many countries who adopt their own standards. In accordance with the**MACHINES DIRECTIVE 2006/42/CE** , we are listing the standards that specify noise levels for machine tools.
The following paragraph explains the modes and the detected sound power and pressure values released by the sawing machine.
These values comply with norm EN 16093:2017, EN ISO 12100:2010 and EN ISO 4871:2009,concerning the rules for drawing and presenting a procedure for noise tests and the declaration and check of sound emission values by machines and equipment.

Noise level measurement

Noise levels are measured using an instrument known as an Integrator noise- meter which registers the equivalent continuous acoustic pressure level at the work station.The damage caused by noise depends on three parameters: level, frequency and duration. The equivalent level concept Leq combines the three parameters and supplies just one indication. The Leq is based on the principle of equal energy, and represents the continuous stationary level containing the same amount of energy, expressed in dBA, as that actually fluctuating over the same period of time.This calculation is made automatically by the integrator noise- meter. The measurements are taken every 60 seconds, in order to obtain a stabilised value. The reading stays on the display for a sufficient time to enable a

reading to be taken by the operator.Measurements are taken by holding the instrument at approximately 1 metre from the machine at a height of 1.60 metres above the platform at the operator's work station.
Two measurements are taken: the first while the machine operates without cutting anything, the second while cutting in manual mode.

Noise level values

Identification		
Machine type		Band saw for metal applications
Model		**V 20 PT**
Reference standard		EN ISO 3746:2010
Results		
Test 1st	**Description**	C 40 steel cut - pipe 350 mm Bimetal band 5880x41x1,3 S.GLB Z 5/7
	Results	**Mean sound level (Leq) 72,45 dB (A)** Environmental correction (K) 3,84 dB(A) Peak sound power (Lw) 83,60 dB(A)
Test 2nd	**Descriprion**	C 40 steel cut - beam H 400 mm Bimetal band 5880x41x1,3 M42 Z 3/4
	Results	**Mean sound level (Leq) 70,33 dB(A)** Environmental correction (K) 3,84 dB(A) Peak sound power (Lw) 81,48 dB(A)
Test 3rd	**Description**	U- beam 300x100 mm. mm diameter solid tube in chromed stainless steel Bimetal band 5880x41x1,3 S.GLB Z 10/14
	Results	**Mean sound level (Leq) 71,95 dB(A)** Environmental correction (K) 3,84 dB(A) Peak sound power (Lw) 83,11 dB(A)

Vibration emission

This sawing machine complies with the norms EN 1299:1997 + A1:2008 and EN ISO 20643:2008/A1:2012, as the machine vibration emission on the devices controlled by the operator does not exceed the threshold of 2.5 m/s^2

Electromagnetic compatibility

As from 1 January 1996 all electrical and electronic appliances bearing the CE marking that are sold on the European market must conform to Directive 2014/30/UE e 2014/35/UE and **MACHINES DIRECTIVE 2006/42/CE**. The prescriptions regard two specific aspects in particular:

1. "EMISSIONS: during its operation, the appliance or system must not emit spurious electromagnetic signals of such magnitude as to contaminate the surrounding electromagnetic environment beyond clearly prescribed limits";
2. "IMMUNITY: the appliance or system must be able to operate correctly even when it is placed in an electromagnetic environment that is contaminated by disturbances of defined magnitude".

The following text contains a list of the applied standards and the results of the electromagnetic compatibility testing of machine model **V 20 PT**.

Emissions

- EN 61000- 6- 4:2007 + A1:2011 Electromagnetic Compatibility (EMC) - Generic standard regarding emissions. Part 6- 4: Industrial Environment.
- EN 55011:2009 + A1:2010 Industrial, scientific, and medical radio frequency appliances (ISM). Characteristics of radio frequency disturbance - Limits and methods of measurement.
- EN 50370- 1:2005 Electromagnetic compatibility (EMC) - Product family standard for machine tools - Part 1: Emission

CONDUCTED EMISSIONS				
Gate A	**Freq. (MHz)**	**Q- peak limit (dBuV)**	**Mean value limit (dBuV)**	**Result**
A.C. power supply input	0.15 - 0.5 0.5 - 5 5 - 30	79 - 73 (linear reduction with log of frequency) 73 73	66 - 60 (linear reduction with log of frequency) 60 60	Complies

CONDUCTED EMISSIONS - ANALYSIS OF INTERMITTENT DISTURBANCES	
Gate	**Result**
A.C. power supply input	Not applicable

IRRADIATED EMISSIONS			
Gate	**Freq. (MHz)**	**Q- peak limit (10 m) (dBuV/m)**	**Result**
Enclosure	30 - 230 230 - 1000	40 47	Complies

Immunity

- IEC 61000- 6- 2:2005 + AC:2005 Electromagnetic Compatibility (EMC) - Generic standard on immunity. Part 6- 2: Industrial Environment.
- EN 61000- 4- 2 + A1 (1996- 1999) Electromagnetic Compatibility (EMC) - Part 4: Test and measurement techniques - Section 2: Electrostatic discharge immunity tests - Basic publication.
- IEC 61000- 4- 3:2006 + AMD1:2007 + AMD2:2010 Electromagnetic Compatibility (EMC) - Part 4: Test and measurement techniques - Section 3: Radiated, radio-frequency, electromagnetic field immunity test.
- IEC 61000- 4- 4:2012 Electromagnetic Compatibility (EMC) - Part 4: Test and measurement techniques - Section 4: Fast transients/bursts immunity tests - Basic publication.
- IEC 61000- 4- 5:2014 + AMD:2017 Electromagnetic Compatibility (EMC) - Part 4: Test and measurement techniques - Section 5: Surge immunity test.
- IEC 61000- 4- 6:2013 Electromagnetic Compatibility (EMC) - Part 4: Test and measurement techniques - Section 6: Immunity to conducted interference, induced by radio frequency fields.
- IEC 61000- 4- 11:2006 Electromagnetic Compatibility (EMC) - Part 4: Test and measurement techniques - Section 11: Voltage dips, short interruptions and voltage variations immunity tests.

- EN 50370- 2:2003 Electromagnetic compatibility (EMC) - Product family standard for machine tools - Part 2: Immunityzr

IMMUNITY TO ELECTROSTATIC DISCHARGES			
Gate	**Test levels**	**Evaluation criterion**	**Result**
Enclosure	contact 4 kV steel plate 4 kV in air 8 kV	B	Complies

IMMUNITY TO VOLTAGE (BURSTS)			
Gate	**Test levels**	**Evaluation criterion**	**Result**
A.C. power supply input	2 kV	B	Complies

IMMUNITY TO CONDUCTED ELECTROMAGNETIC FIELDS			
Gate	**Test levels**	**Evaluation criterion**	**Result**
A.C. power supply input	10V	A	Complies

IMMUNITY TO IRRADIATED ELECTROMAGNETIC FIELDS			
Gate	**Test levels**	**Evaluation criterion**	**Result**
Enclosure	10 V/m	A	Complies

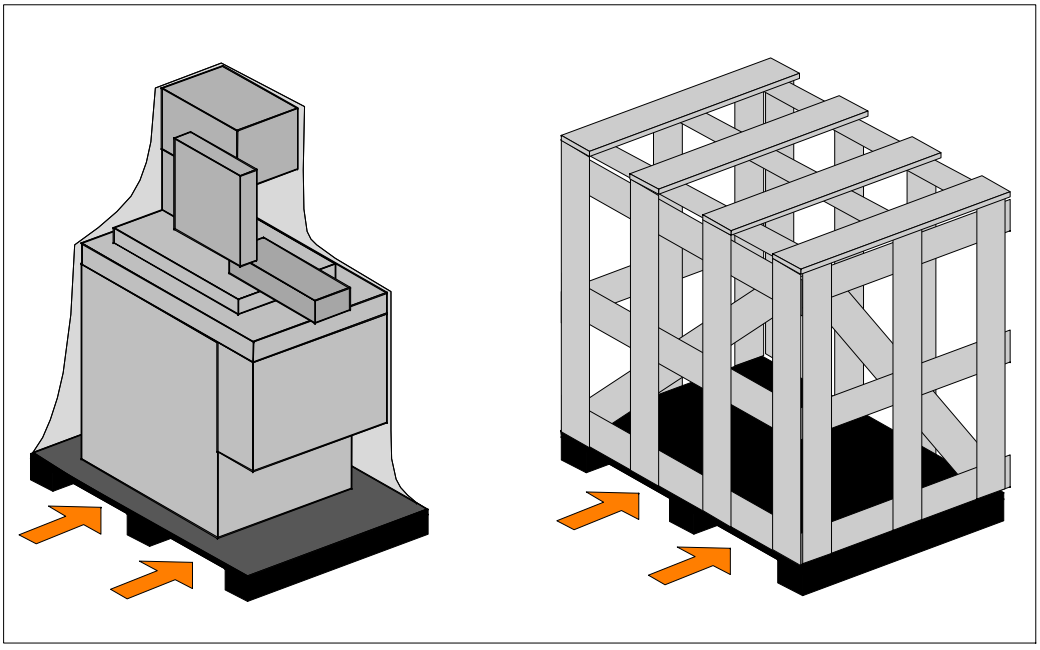
Machine installation

4

Packaging and storage

Hydmceh use packing materials that guarantee the integrity and protection of the machine during its transport to the customer.

The type of packing differs according to the size, weight and destination. Therefore the customer will receive the machine in one of two following ways:

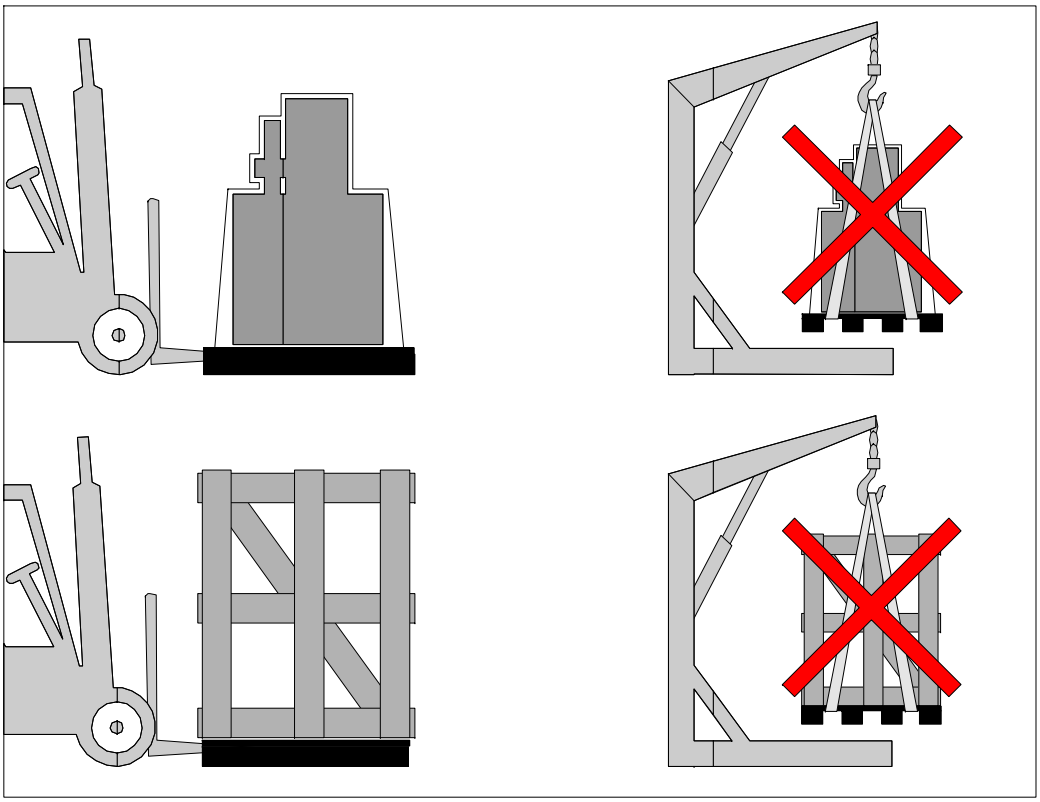


1. on a pallet with straps and heat- shrink plastic;
2. on a pallet with straps, heat- shrink plastic and a wooden crate.

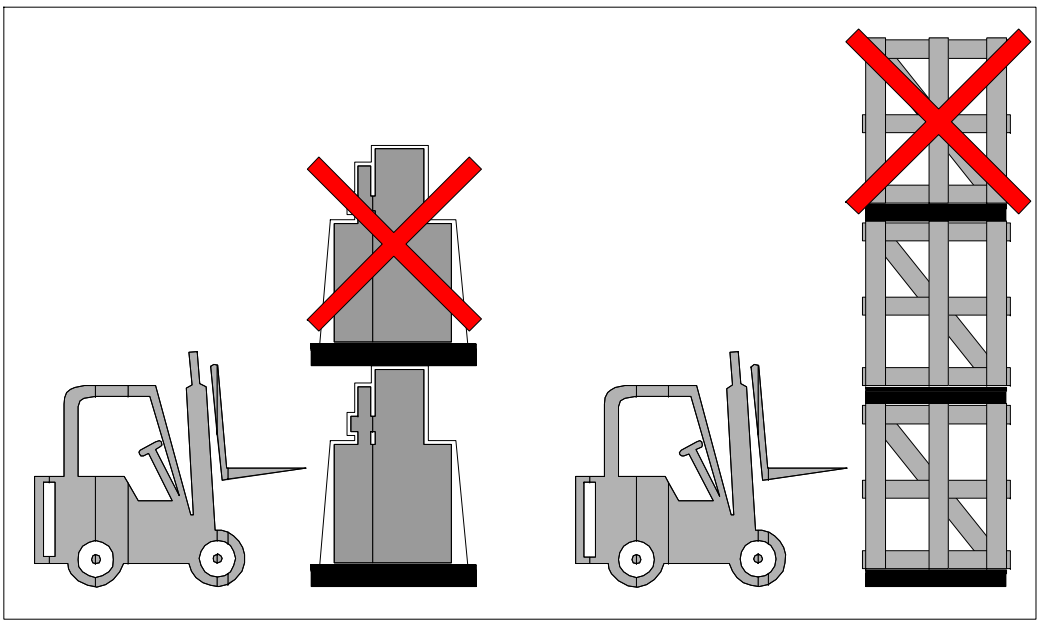
Warning In both cases, for correct balancing the machine must be handled using a fork- lift truck, inserting the tines at the points indicated by the arrows, using the reference marks on the crate itself.

Attention Before carrying out lifting operations, make sure that the weight of the machine, as indicated on the crating or other packaging, is within the forklift truck load limit.

Attention Do not handle the packed machine using slings.

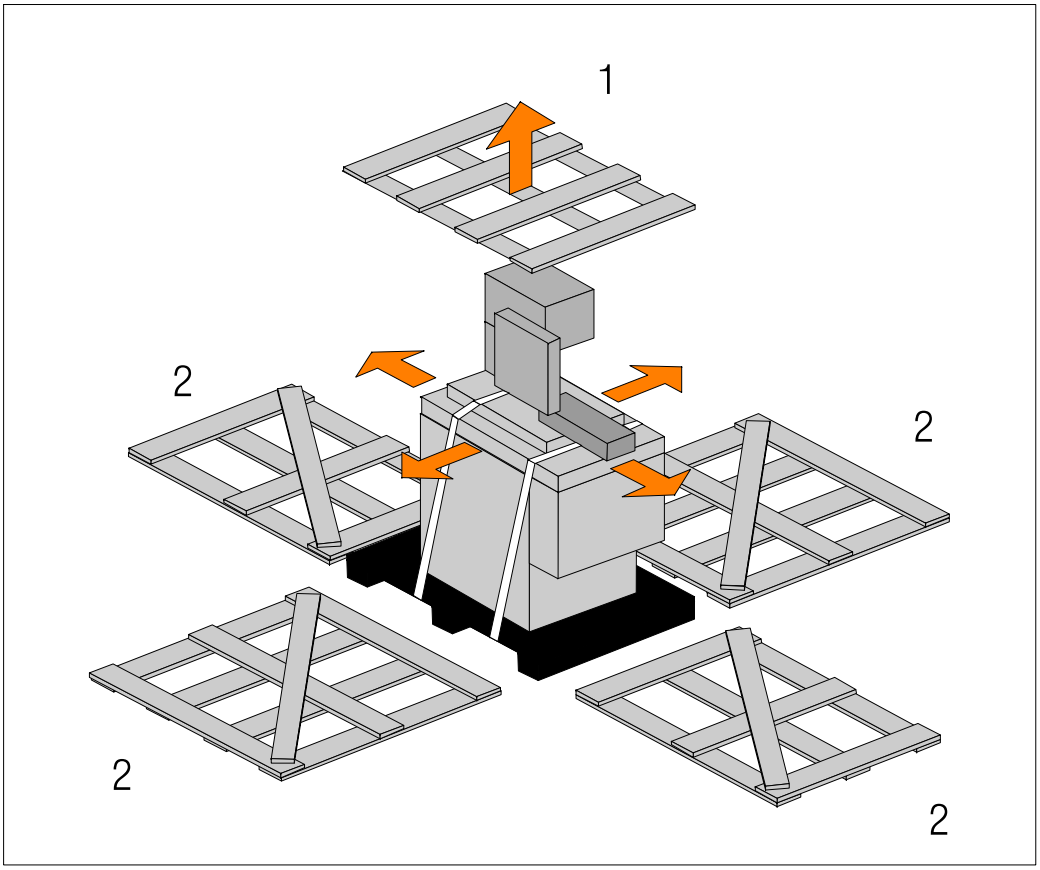


Attention When storing, machines palletized and shrink- wrapped must not be stacked two high, and machines pallettized and crated must not be stacked three high.

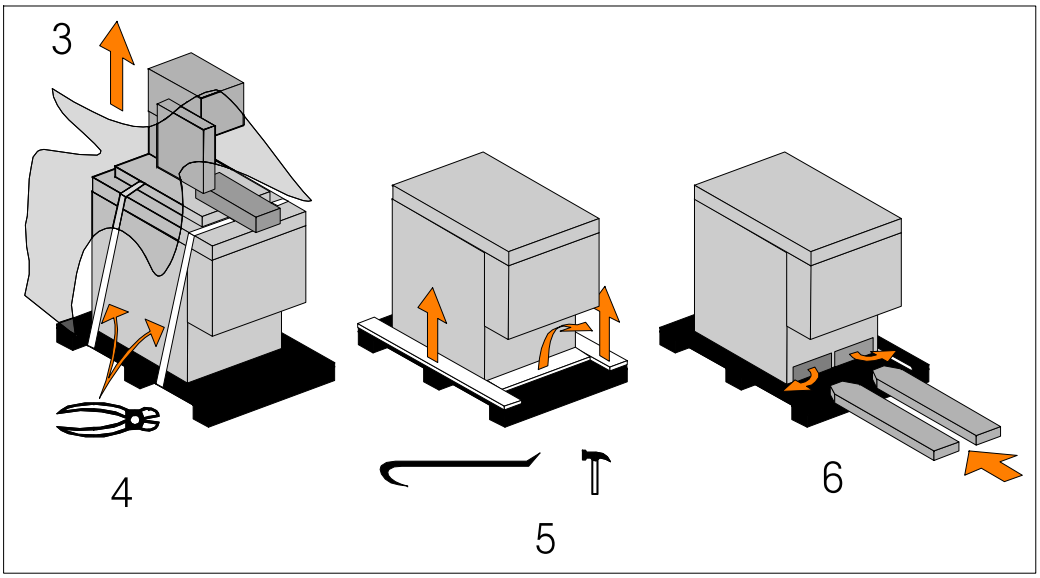


To install the machine, first remove the packing, paying particular attention not to cut any electric wires or hydraulic hoses; if necessary use pliers, a hammer and a cutter.
Open crate in the illustrated order:

1. remove nails and lift the top of the cage;
2. remove nails and lower walls;



3. remove heat- shrink covering;
4. remove the straps;
5. remove nails from pallet securing planks and remove planks;
6. remove the front panel and insert fork tines.



To locate the machine in the workplace, **the machine dimensions** and necessary operator working space, including **the spaces laid** down in safety standards, **must be taken into account.**

Minimum requirements

For the machine to function correctly, the room in which it is to be installed must satisfy the following requirements:

- power supply voltage/frequency: refer to the values on the rating plate;
- temperature of machine location: from - 10 to + 50° C;
- relative humidity: not more than 90%;
- lighting: not less than 500 Lux.

Warning The machine is already protected against voltage variations, but will only run trouble-free if the variations do not exceed ± 10%.

Check list

Before starting installation, check that all the accessories, whether standard or optional, supplied with the machine are present. The basic version of the **V 20 PT** machine is supplied complete with:

CHARACTERISTICS	STANDARD	OPTIONAL
Structure in sturdy cast iron, to absorb vibrations and give the machine a better cutting stability and longer blade life.	✓	
Coolant tank incorporated in the stand, with electric pump to lubricate the band	✓	
Motor- driven chip ejector*		✓
Bimetal blade for solid and section materials	✓	
The head stroke is set directly from the control panel according to the dimensions of the bars to be cut	✓	
Simplified touchscreen control panel managed by next- generation Hydmech controlled designed exclusively for hydmech sawing machines	✓	
Automatic setting of cutting angle on instrument panel with automatic hydraulic clamping	✓	
Blade cleaning brush	✓	
Preset for the movement with lifter or crane	✓	
Working lamp and laser projector to position the bar to be cut accurately	✓	
Blade protection behind and below blade guide heads	✓	
Electro- mechanically operated head horizontal transfer on linear guides and slides	✓	
Electro- mechanically operated head rotation	✓	
Accessory kit	✓	
Pulleys locked with spliners to ensure a strong fastening still allowing axial adjustment	✓	
Electronic transducer for belt tensioning	✓	
Console diagnostics	✓	
Message display	✓	
Hydraulic fastening system with two independent vices on the left and on the right of the cut and vertical vice	✓	
Adjustable blade- guide heads in steel, with roller- slide combined device in widia, with adjusters for the traditional lubrication, preset to install the optional mist lubrication devices	✓	
Electronic speed control (inverter) 20÷118 mt/min (65.6÷387.04 ft/min)	✓	

CHARACTERISTICS	STANDARD	OPTIONAL
Console -set- up	✓	
Band rotation control with stop in real time in case of locked tool	✓	
New latest generation hydraulic control unit, with high efficiency and low energy consumption	✓	
Servocontrol to move the pulley and replace the band	✓	
Pump to feed high cutting liquid quantities to cool, to wash the working table continuously and convey the evacuated chips	✓	
Head pressure control	✓	
Semi- automatic working cycles	✓	
Display of belt rotation speed	✓	
Preset to be equipped with the blade minimal lubrication kit*		✓
Presetting for loading/unloading roller plane with sectional module POP- UP mm 1000 (39.37 in)*		✓
Bimetallic band blade 5880x41x1.3 mm (231.50x1.61 x0.05 in) M42		✓
Presetting for loading/unloading roller plane with sectional module idle rollers mm 1000 (39.37 in)*		✓
Rectangular jaws for cutting round pieces		✓
Right hydraulic vertical vice		✓
Left hydraulic vertical vice		✓

***ACCESSORIES AVAILABLE ON REQUEST**

The bag of accessories is enclosed in the machine before being packed and contains:

- 3,4,5,6 and 10 mm Allen keys (0.12/0.16/0.20/0.24/0.39 in);
- pipe wrench 10 mm (0.39 in);
- 36 mm (1.42 in) wrench;
- manual pump for topping up the oil in the pneumatic cylinder.

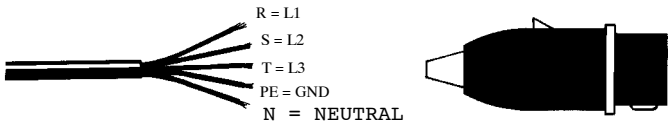
Connection to the power supply

Before connecting the machine to the power supply, check that the socket is not connected in series with other machines. This requirement is fundamental for the good operation of the machine.

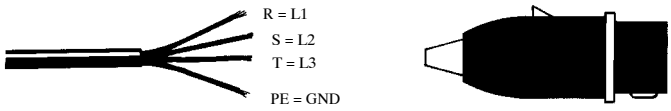
To connect the machine to the power supply, proceed as follows:

▶ connect the power supply cable of the machine to a plug which matches the socket to be used. (EN 60204- 1; par. 5.3.2)

CONNECTION FOR **"5-CORE"** WIRE SYSTEMS WITH NEUTRAL



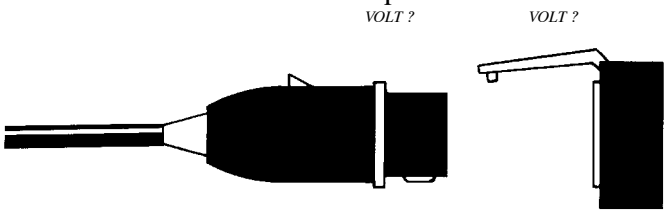
CONNECTION FOR **"4-CORE"** WIRE SYSTEMS WITH NEUTRAL



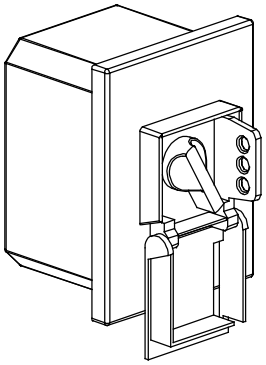
Attention When using systems with a neutral wire, special care must be taken when connecting the **blue** neutral wire, in that if it is connected to a phase wire it will

discharge the **phase voltage** to the equipment connected for **voltage: phase - neutral.**

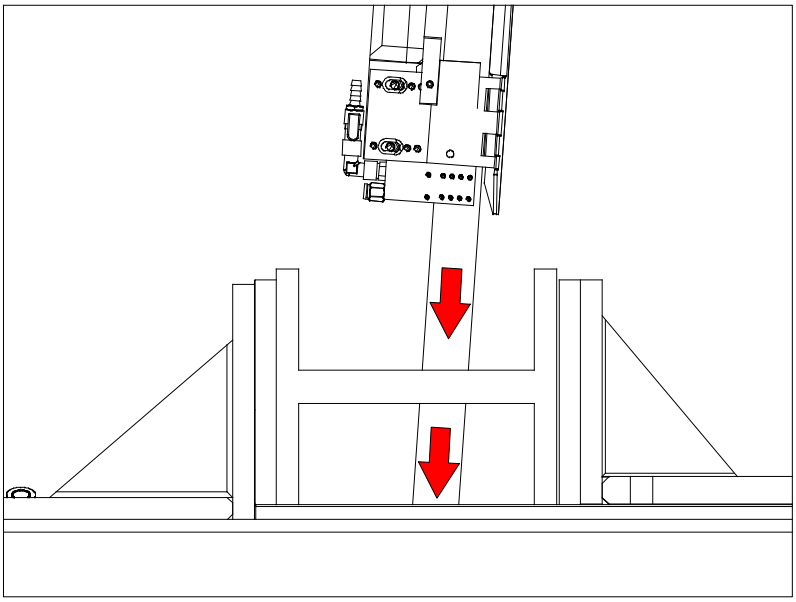
▶ Insert the plug in the socket, ensuring that the mains voltage is the same as that for which the machine has been setup.



▶ Power the machine, rotating the main switch on the console left side (the control console lights up).



Attention **Ensure that the blade moves in the correct direction as shown in the above figure.** If it does not, simply reverse two of the phase wires on the machine power supply input.



The sawing machine is now ready to start the work for which it was designed. Chapter 5 provides a detailed description of the various functions of the machine and its operating cycles.

Description of machine operation

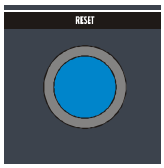
5

This chapter analyses all the machine functions. We begin with a description of the pushbuttons and other components on the control panel.

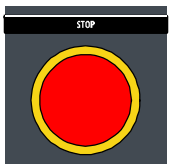
Description of the control panel

The control console is housed inside the control panel, a tamperproof IP 54 protection class housing sealed against dust and moisture. The control panel swivels on two articulated joints so that it can be positioned as required by the operator for greater ease- of- use and safety. The control board of the **V 20 PT** is shown in the picture below:

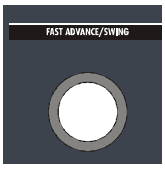
Key of control console keyboard



RESET:
Press to reactivate machine functions after an alarm.

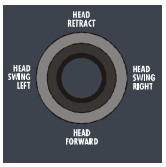


EMERGENCY STOP:
This button will stop both the hydraulic and blade motors. The head motion will cease. The vises remain as they are, but if closed, they will lose gripping force. For this reason all long stock should be supported so that it will not fall.
To reset the button, simply rotate through 45°.

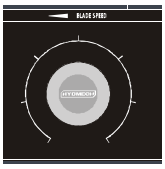


ENABLE COMMANDS:
Hold pressed to enable machine commands.

FAST ADVANCE/SWING:
Button for enabling the fast advancing and head rotation.



JOYSTICK:
This moves the head upwards- downwards and rightwards- leftwards while the enable commands button is pressed.



BLADE SPEED POTENTIOMETER:
Potentiometer for the continuous adjustment (inverter) of the band rotation speed.

FEED RATE POTENTIOMETER:
Adjusts the head feeding speed.

FEED FORCE POTENTIOMETER:
Potentiometer for adjusting the blade motor max. absorption.

USB PORT:
Communication port for the software update and the machine diagnostics

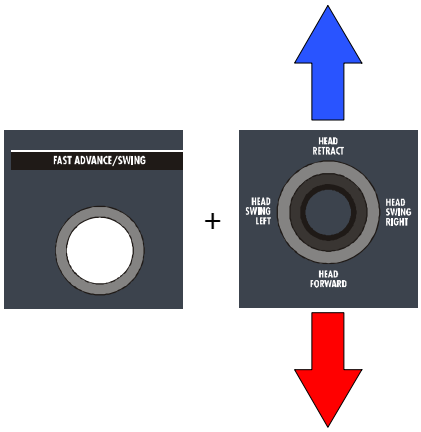
THERMAL - MAGNETIC CIRCUIT - BREAKER WITH UNDERVOLTAGE COIL

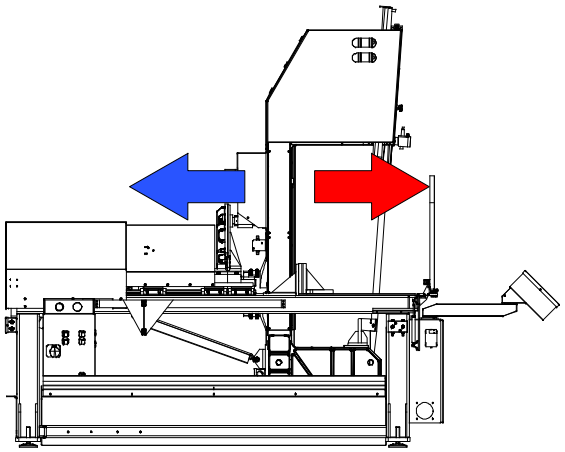
On the left side of the electric board, the machine is equipped with a main switch that, when set ON (1), powers the machine.
The main switch is fitted with three power failure protection systems. In fact, in the event of a power failure, this switch disconnects all the electrical devices, causing the machine to immediately shut down, and prevents it from automatically starting up again when power is restored. This device also resets the thermal relay fitted to protect against current overloads.

Basic instructions for carrying out a cutting operation cycle

Cutting head feeding and backing

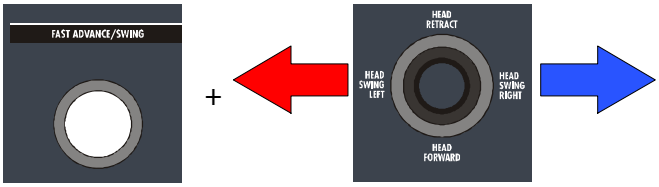
The cutting head can be moved forward and backward using the control enabling button and the joystick together, as shown in the key of the control console keyboard in this chapter.

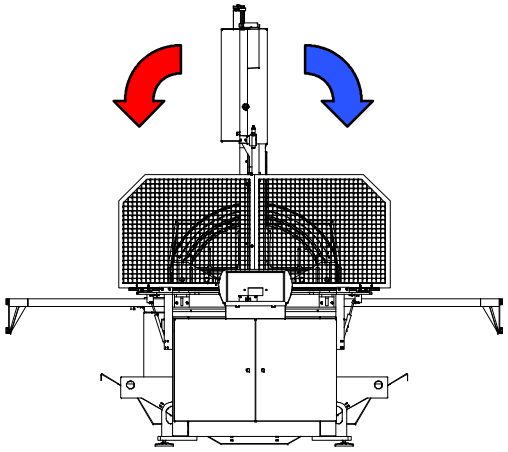




Turning the cutting head

The cutting head can be turned rightwards and leftwards in similar manner.
The head may be turned in two ways: either directly from the control panel using the joystick while the enable commands button is pressed (the current angle is shown on the display);



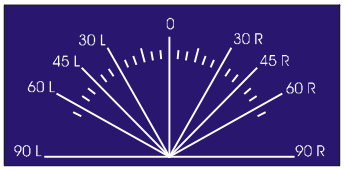


or by programming on the console which allows to set one or two cutting angles.

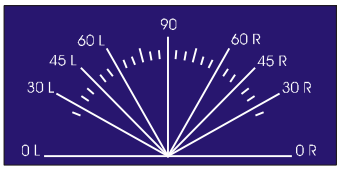
Warning

The wished measurement system can be set in the machine Set- Up: the International system (MKS) or the Imperial system (Imperial).

MKS

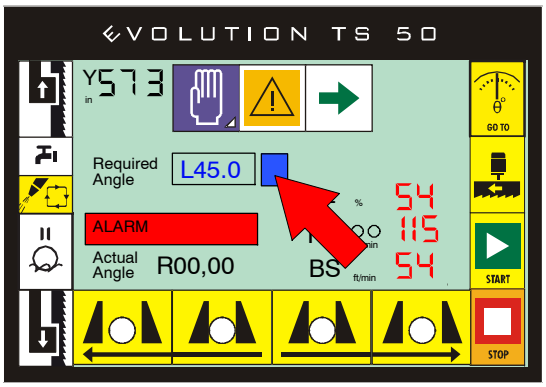


IMPERIAL

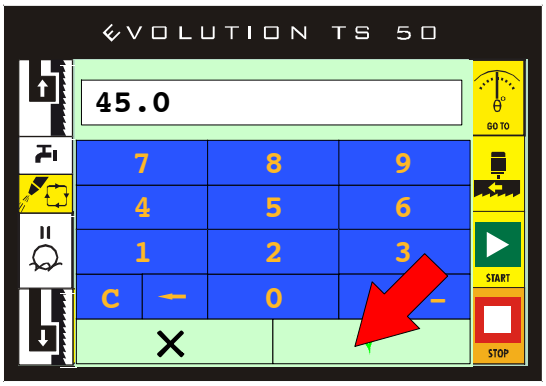


Programming a cutting angle

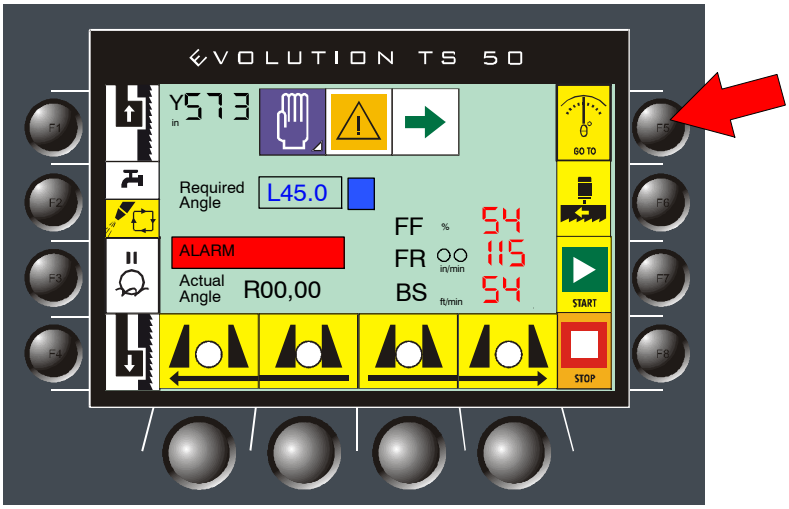
▶ Tap the cutting angle box (R= right, L= left) on the touchscreen to open the keypad.



▶ Enter the required angle (with minus "- " for leftward angles) and press the confirmation button indicated by the arrow.



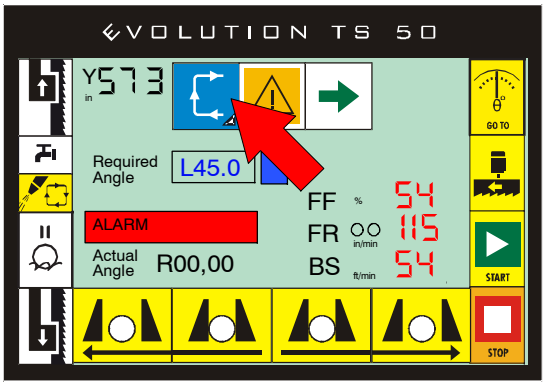
▶ press the rotation button. The head now backs completely and rotates till the set angle.



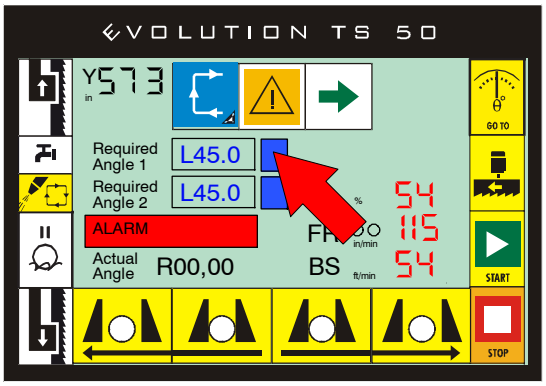
N.B. The rotary movement is allowed only if the head is completely backwards. Even if the rotation is automatic, the machine controller takes first the head completely backwards and then starts the rotation to the programmed angle. If the cutting angle is higher than 55 degrees (SI) or lower than 35 degrees (Imperial), the controller moves the head completely upwards to avoid any interference.

Programming two cutting angles

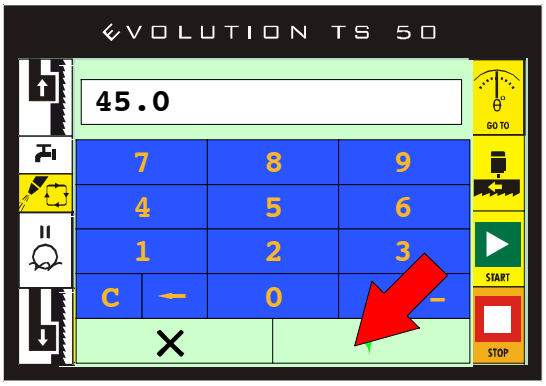
▶ Tap the semi- automatic cycle box shown in the figure on the touchscreen.



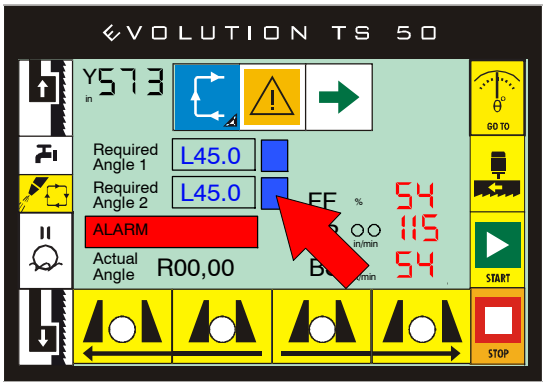
▶ Tap the first cutting angle entry box (R= right, L= left) on the touchscreen to open the keypad.



▶ Enter the required angle (with minus "- " for leftward angles) and press the confirmation button indicated by the arrow.

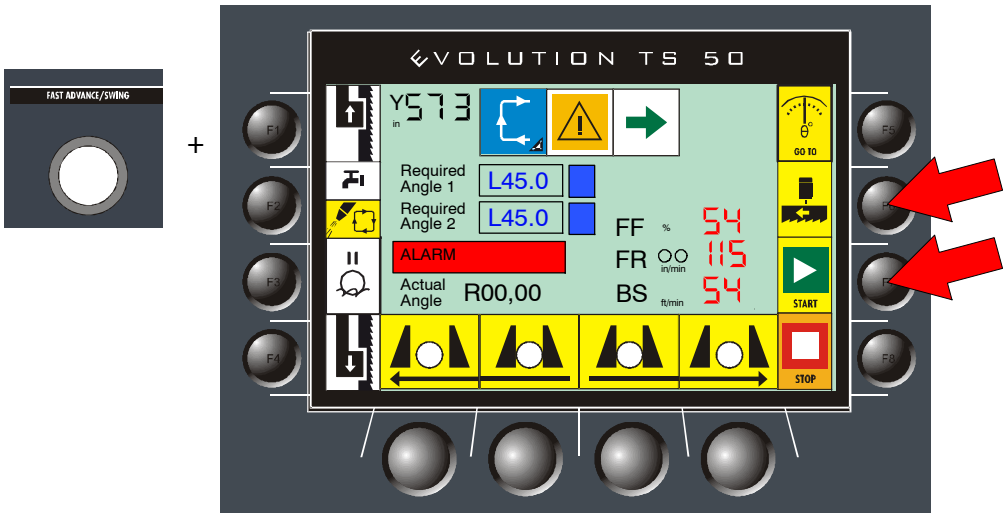


▶ Tap the second angle entry box on the touchscreen and repeat the same operations to set it.



▶ Now if the operator wants to start the cutting cycle he has to press the control enabling button, and press at the same time the band rotation start button, then press the cycle start button.
The machine performs:
- the head complete backing,
- the rotation to the first set angle,
- the cut,
- the complete head backing and the positioning to the second set angle.

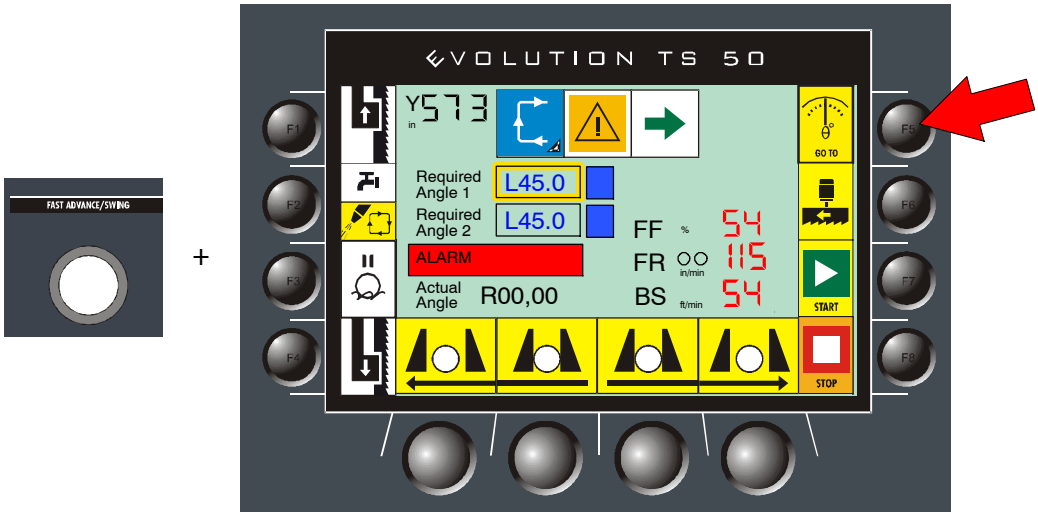
Now the machine stops holding the vices closed, waiting for the control by the operator.



N.B. In this step the operator has the possibility of supplying the material being machined, opening the vices by the relevant keys on the console for performing the second angle cut.

▶ After having supplied the material being machined, close the vices and start the cutting cycle by pressing, in sequence and simultaneously, the control enabling key and the cycle start key. At the cut end the head comes back and rotates till positioning to the first set angle, waiting for the control by the operator, holding the vices closed.

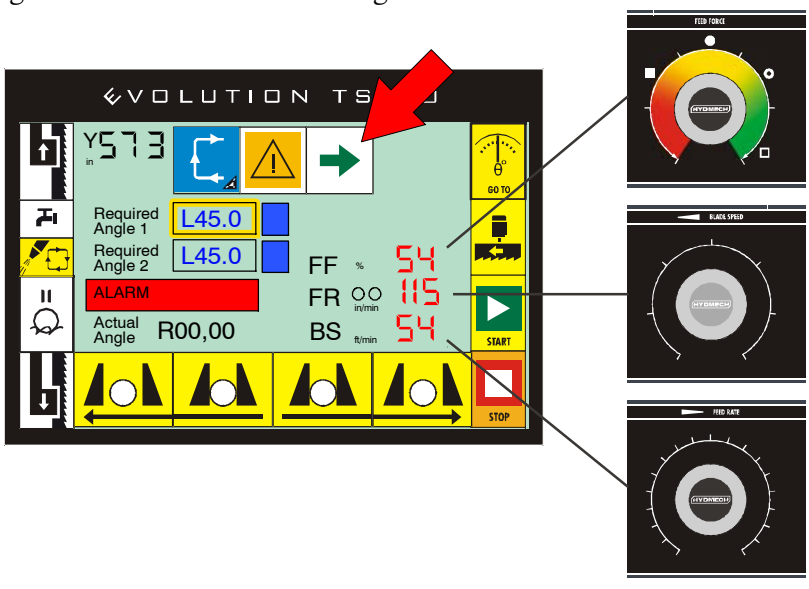
▶ Pressing simultaneously the control enabling key and the head rotation key it is possible to select from which angle the cut must start; the relevant box lights up to indicate its selection.



N.B. The angles may be both positive (i.e. rightwards) or both negative (i.e. leftwards) or alternating.

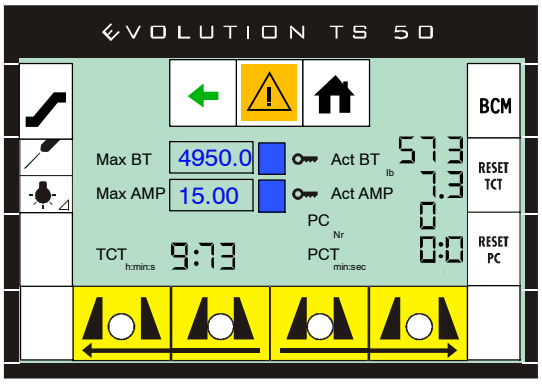
Operating parameters

During the machining cycle, by pressing the box in the figure, it is possible to check the machine operating parameters:
FF = Feed Force, value of the cutting force that can be set through the potentiometer from the control board.
FR = Feed Rate, value of the cutting head lowering speed that can be set through the potentiometer from the control board.
BS = Blade Speed, value of the band rotation speed that can be set through the potentiometer from the control board.
Required Angle 1 = value of the first cutting angle that can be set through the keypad from the touch screen.
Required Angle 2 = value of the second cutting angle that can be set through the keypad from the touch screen.
Actual Angle = value of the current angle.



Pressing the arrow key shown in the figure the second page of the operating parameters can be displayed:

Max BT = Max. Blade Tension, this value can be set through the keypad from the touch screen.
Max AMP = Max. Ampere, value of the set max. motor absorption, that can be set through the keypad from the touch screen.
Act BT = Actual Blade Tension, current value of blade tension;
Act AMP = Actual Ampere, current value of motor absorption;
PC = Pieces Counter, number of cut pieces;
PCT = Partial Cutting Time;
TCT = Total Cutting Time.

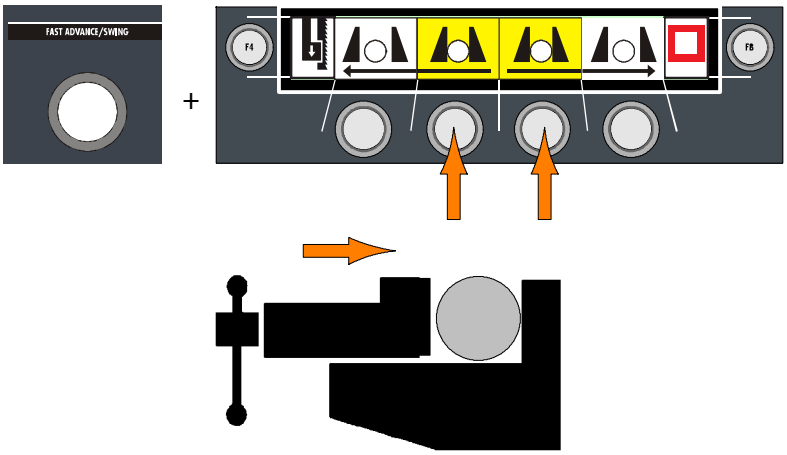


Attention The Max BT and Max AMP values can be set, but are password protected. Refer to the Technical Service to change them.

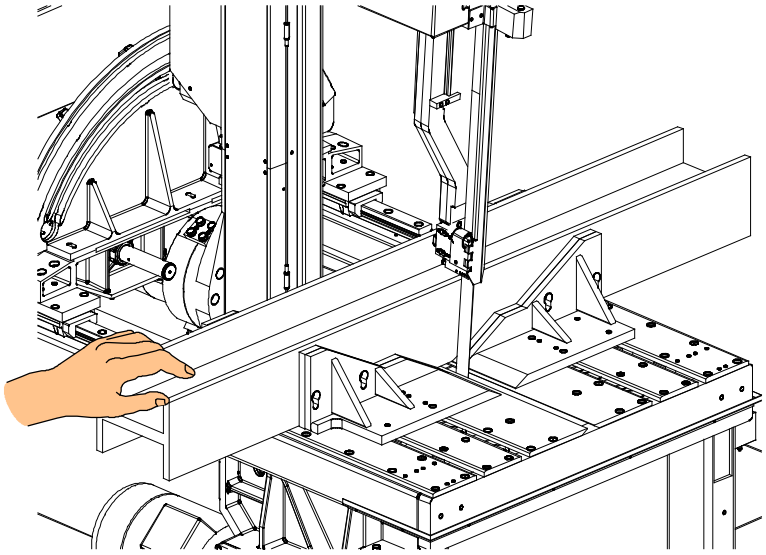
Clamping the work piece in the vice

Vice opening and closure is controlled by the corresponding buttons on the control console. However, to ensure that the workpiece is securely clamped in the vice, proceed as follows:

- Make sure the workpiece dimensions do not exceed the machine's cutting capacity;
- make sure the piece is correctly supported on both sides of the machine;
- enter the material to be cut inside the vices;
- Close one or both vices by holding the enable command button press and then pressing the close left and right vice button.

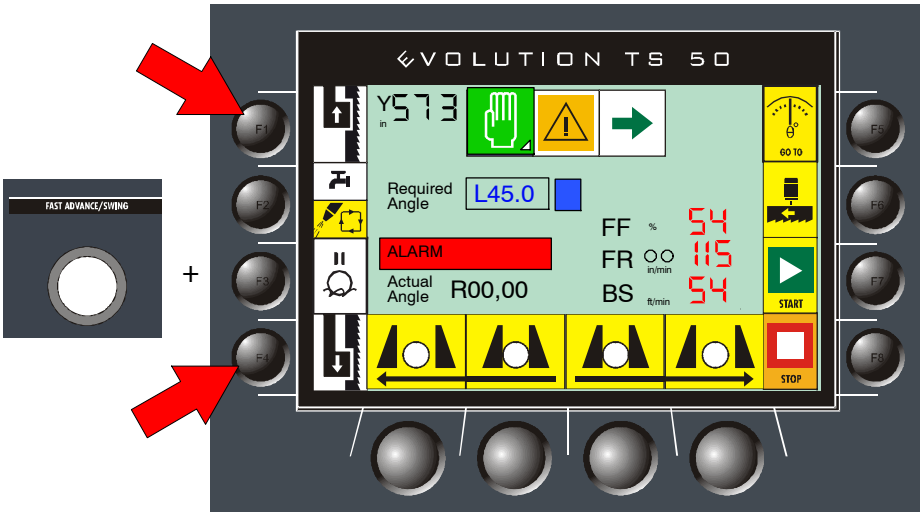


▶ make sure the workpiece is securely clamped in the vice by trying to move it manually.

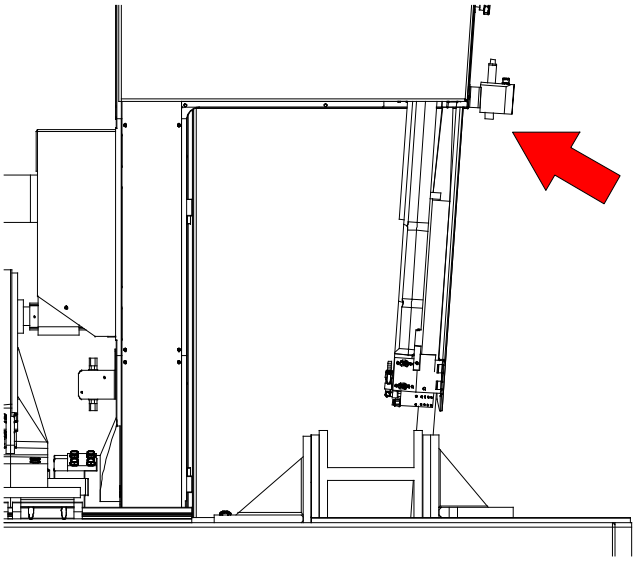


Width of cut

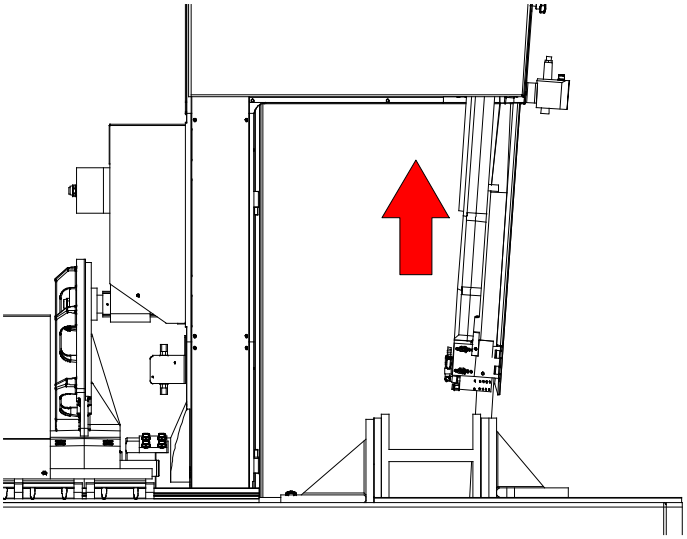
The machine is fitted with protections that protect the entire blade stroke leaving only the part of the blade required to make the cut itself exposed. This includes the rear (fixed) head and the front (mobile) head, as required by current standards.
The cutting width is adjusted by the operator that holds the control enabling button pressed, by the keys F1/F4, positions the movable head according to the size of the material being processed.



N.B. The machine is equipped with a laser projector for positioning the material in line with the blade path.



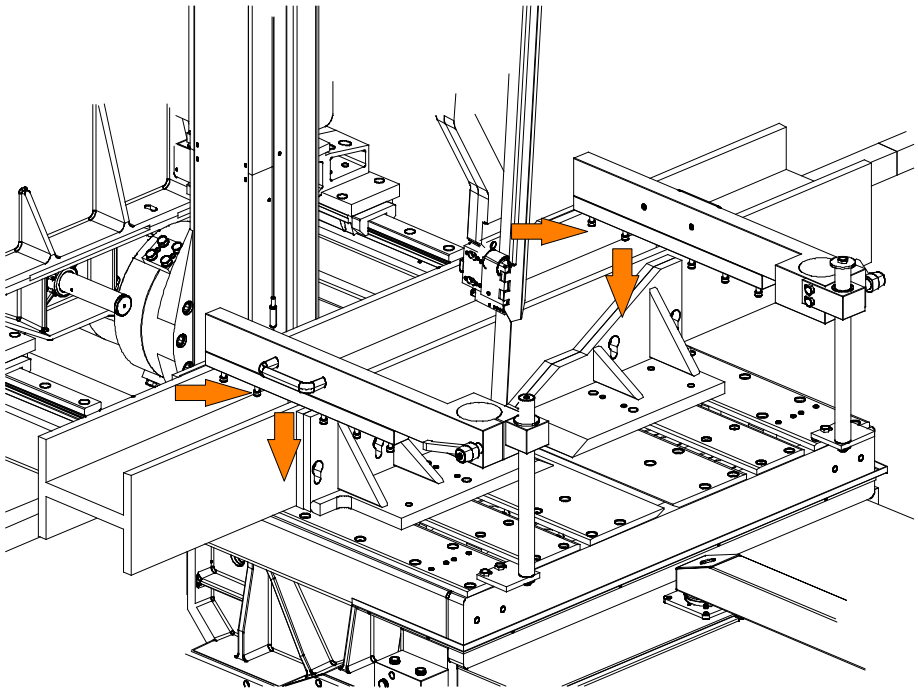
Warning Care must be devoted to the dimensions and geometry of the workpiece because the cutting head is inclined by 4 degrees with respect to the cutting plane and therefore the end of the cut will vary according to the distance from the square. For this reason, the FHLS (forward head limit switch) point must be changed whenever the material is changed.



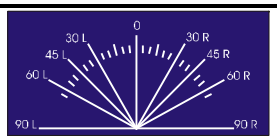
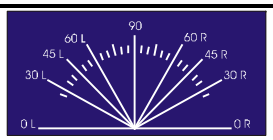
N.B. When cuts sloped by more than 55 degrees are made (if the measuring system in the setup is MKS = International System) or lower than 35 degrees (if the measuring system in the setup is Imperial = Imperial System), the blade guide head is moved automatically and totally upwards.

Optional vertical vices

The optional vertical vices are used also separately and hold still the material being machined, both in bundles or single pieces, against the cutting plane.



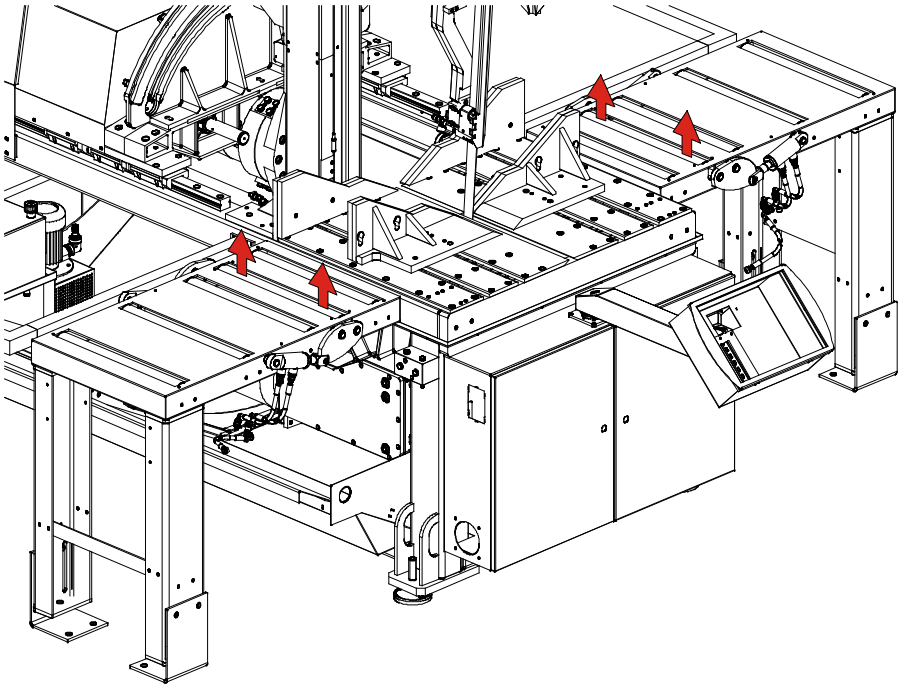
Attention The cutting capacities, with optional vertical vices, are limited, as shown below.

CUTTING CAPACITY with optional vice jaws		
Cutting angle (MKS - SI)	**Cutting angle (Imperial)**	
		H
0°	90°	280
45° ◖	45° ◖	280
60° ◖	30° ◖	155
45° ◗	45° ◗	280
60° ◗	30° ◗	160

Roller plane with pop- up rollers to lift the cutting material (optional)

The machine can be equipped with two planes with hydraulic roller devices, that can be positioned on the loading and unloading side, for lifting the cutting material. These accessories prove very useful while feeding, to aid the material loading or unloading and to prevent any interference with the cutting plane.

▶ The pop- up rollers are operated at the same time as the vices: opening the vices the rollers lift, closing the vices the rollers lower.



Warning When the machine is equipped with both pop- up rollers and optional vertical vices remember that these devices are operated simultaneously with the cutting vices and that the cutting capacity of the vertical vices must not be exceeded.

Preliminary check list for cutting operation

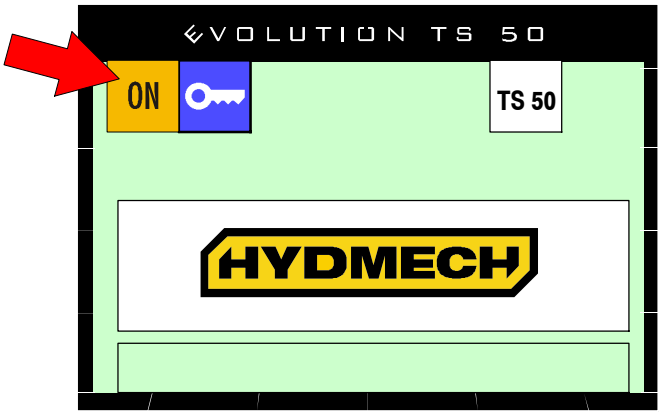
To guarantee complete safety during cutting cycles, the operator should work through a check list of the entire apparatus, checking:

- ▶ blade tension;
- ▶ that the work piece is properly clamped in place;
- ▶ that the blade teeth are correct for the job to be begun;
- ▶ that the speed selected is right for the kind of piece to be cut;
- ▶ that all protections are in place and correctly locked;
- ▶ the level of lubricant/coolant and that the electropump is activated;
- ▶ that the blade downstroke speed and the cutting pressure are correct.

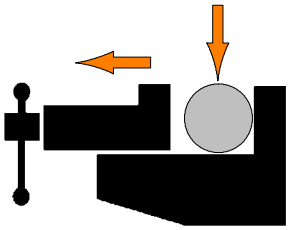
Semi- automatic operating cycle with one cutting angle

The operation sequence for running a semi- automatic cutting cycle with only one angle is:

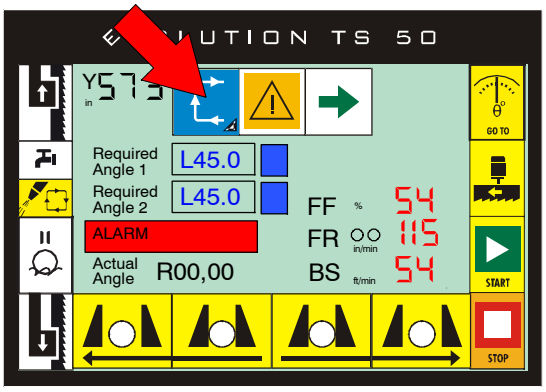
- power up the machine by turning the main switch;
- Tap on the box with the on symbol on the touchscreen.



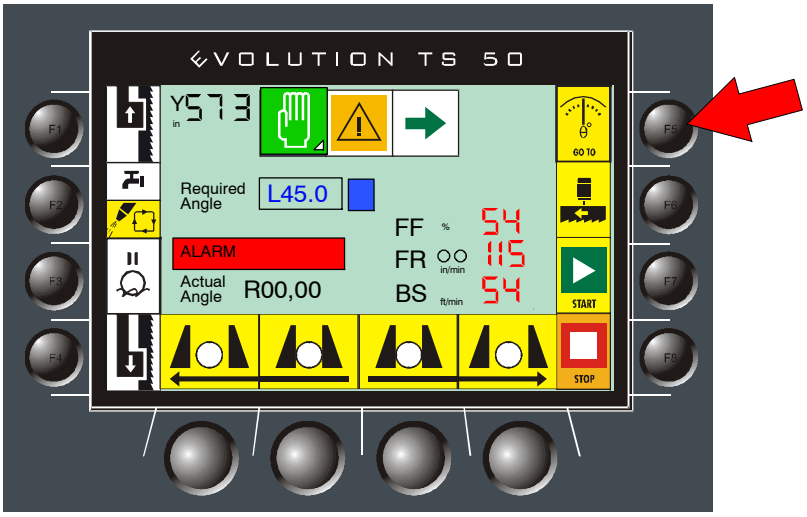
- Press reset.
- Position the material inside the vices and calculate the cut length.



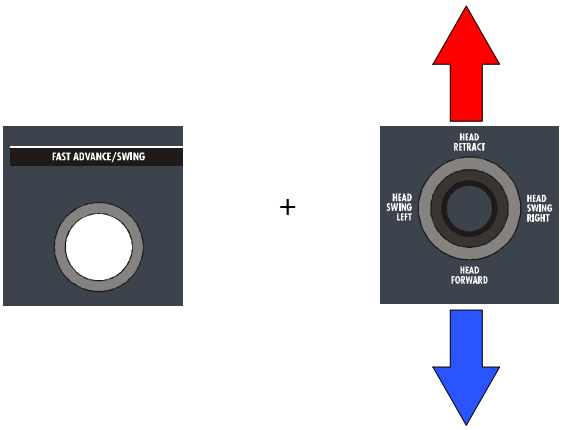
- Press the box shown on the touch screen to select the manual working mode;



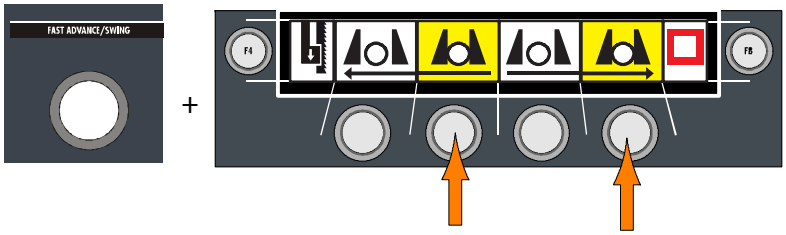
- Set the required cutting angle as explained above.
- Press the GO- TO key: the head rotates to the programmed angle.



- Approach the blade to the piece holding the control enabling key pressed and moving the cutting head with the joystick.

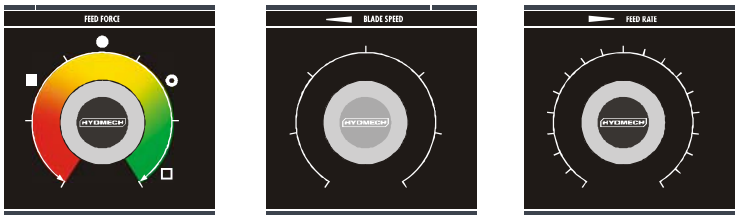


- Adjust the head position to the size of the material being machined. Hold the control enabling key pressed and press keys F1/F4 pressed for moving the heads.
- Close one or both vices by holding the enable command button press and then pressing the close vice button.

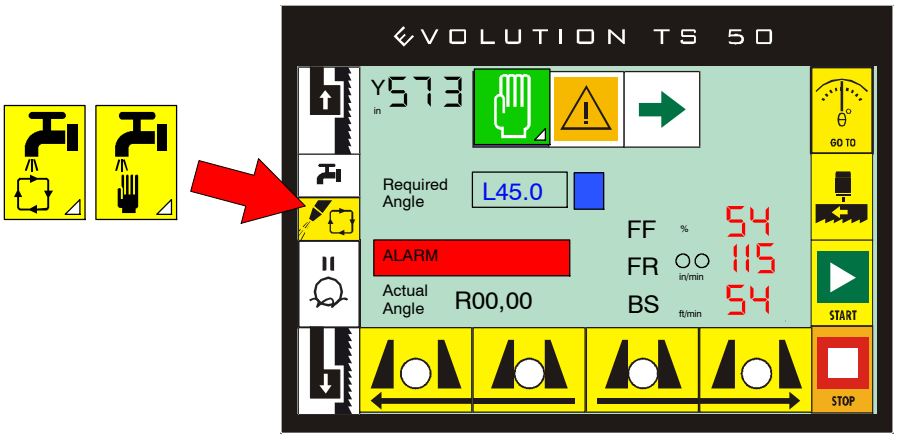


Attention When cuts sloped by more than 45 degrees are made (if the measuring system in the setup is MKS = International System) or lower than 45 degrees (if the measuring system in the setup is Imperial = Imperial System), both vices must be closed.

▶ Select the geometry of the material being machined by the “Feed Force” potentiometer, the band rotating speed and the cutting head lowering speed suitable for the material type.

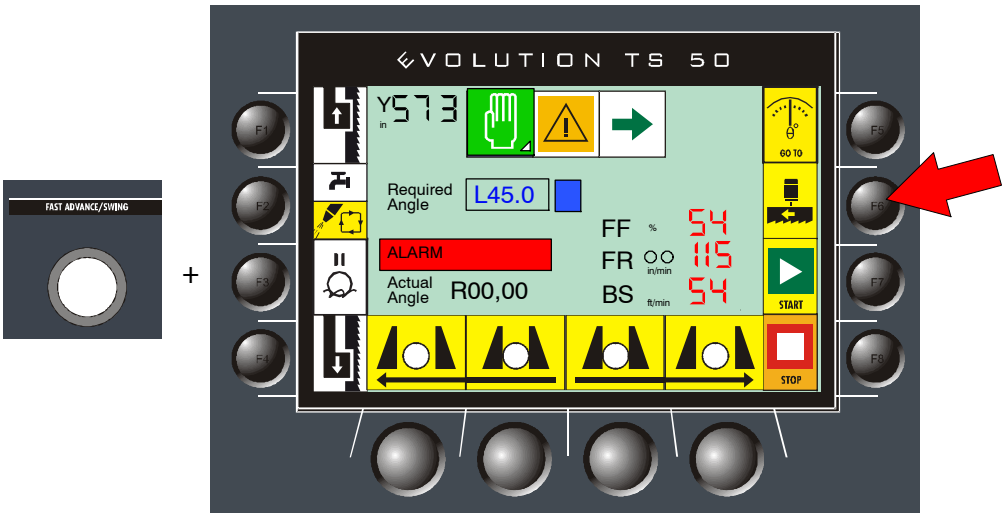


▶ Set the fluid jet by pressing the button shown in the figure. The box will light up to indicate that it is selected. Adjust the amount using the valves on the blade guide head. Press the button repeatedly to select the dispensing mode (automatic or manual).

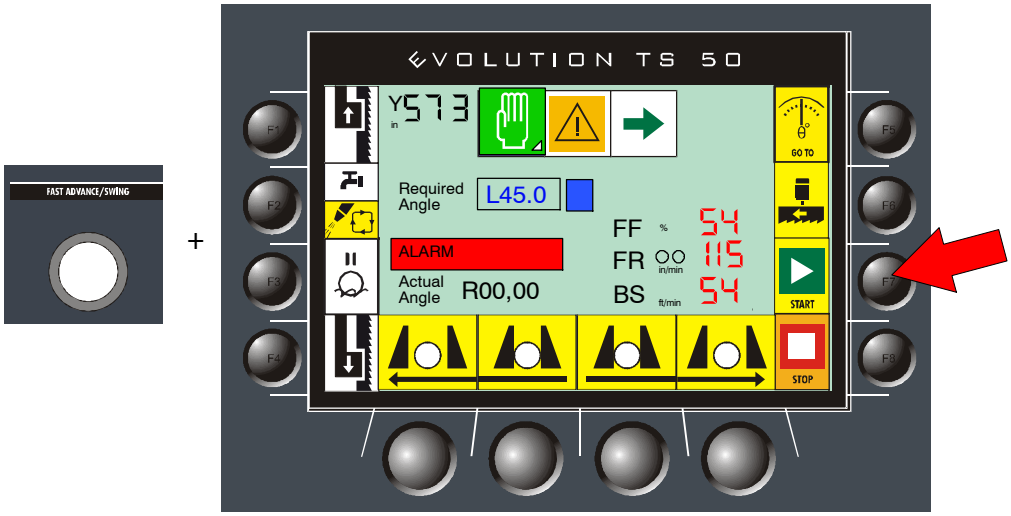


N.B. The machine can be equipped with the Mist Lubrication option to lubricate the tool while cutting.

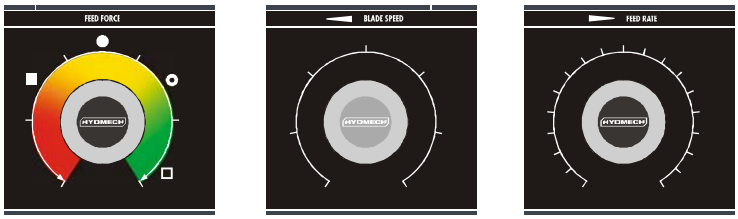
▶ Press the start band button holding the enable commands button pressed at the same time.



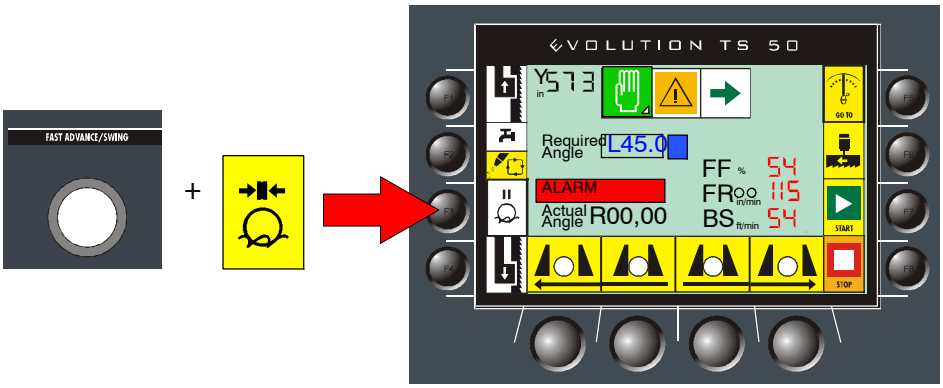
▶ Press the start cycle button holding the enable commands button pressed at the same time.



▶ The head starts moving forwards at the set rotation and feeding speeds. In this step the cutting parameters must be adjusted as explained above.

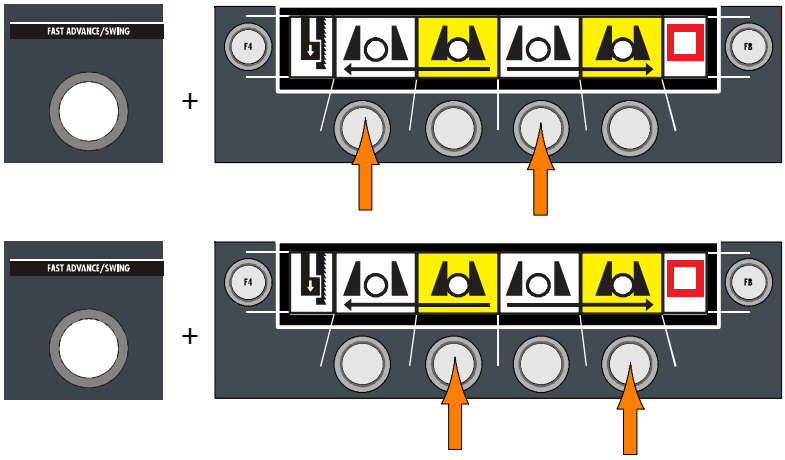


N.B. Now, if you want to delete the existing FHLS point, hold the control enabling key pressed and move the joystick downwards: the FHLS setting box starts flashing to indicate that the FHLS point has been deleted.
When the head reaches the required end of cutting point, press the FHLS setup button shown in the figure together with the enable commands button. The corresponding box will light up to indicate that it was selected.

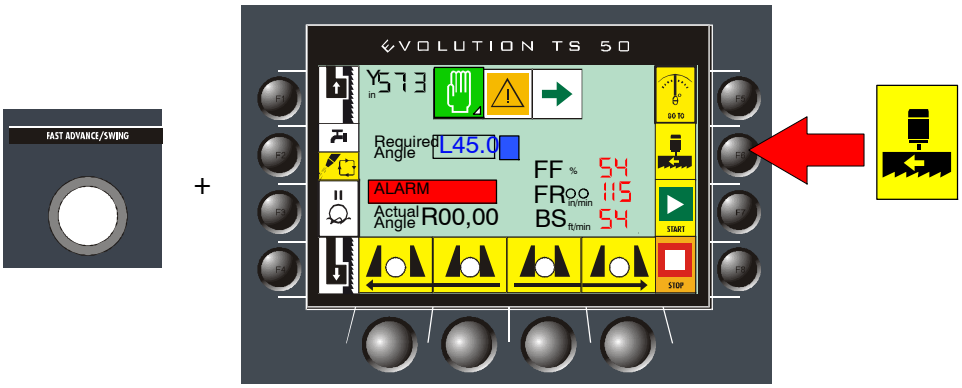


▶ The band stops and the head goes back completely, ready to make a new cutting cycle.

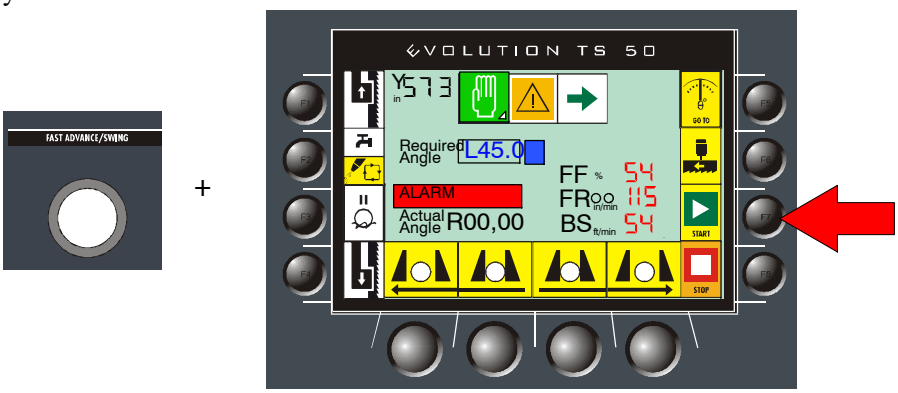
▶ Open one or both vices by holding the enable commands button pressed together with the open vices button. Then feed the workpiece and finally close one or both vices by pressing the enable commands button and the close vices button at the same time.



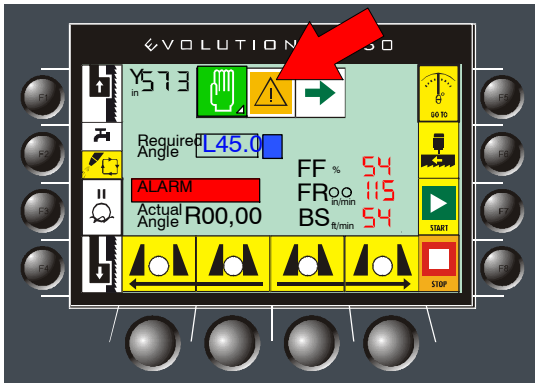
▶ Enable band rotation by pressing the button shown in the figure together with the enable commands button. The box will light up to indicate that its was selected.



▶ Press the button shown in the figure to start the cutting cycle holding the enable commands button pressed at the same time. The band will be start turning and the machine will start cutting.
At the cut end the head goes back completely, ready to make a new working cycle.



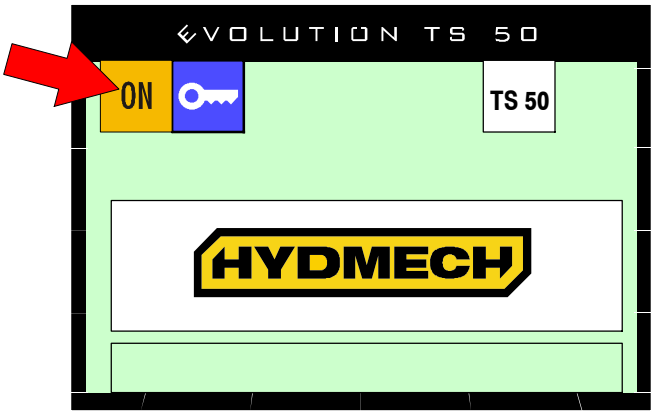
N.B. Tap on the touchscreen box shown in the figure to see problems during operation. The box will turn blue to indicate caution and red to indicate a machine alarm. See chapter 10 for a complete list of alarms.



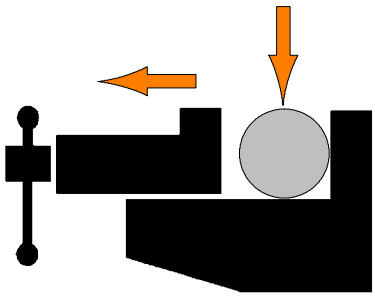
Semi- automatic operating cycle with two cutting angles

The operation sequence for running a semi- automatic cutting cycle with two angles is:

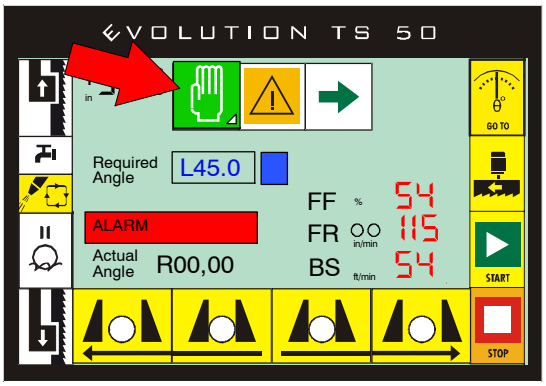
- power up the machine by turning the main switch;
- Tap on the box with the on symbol on the touchscreen.



- Press reset.
- Position the material inside the vices and calculate the cut length.

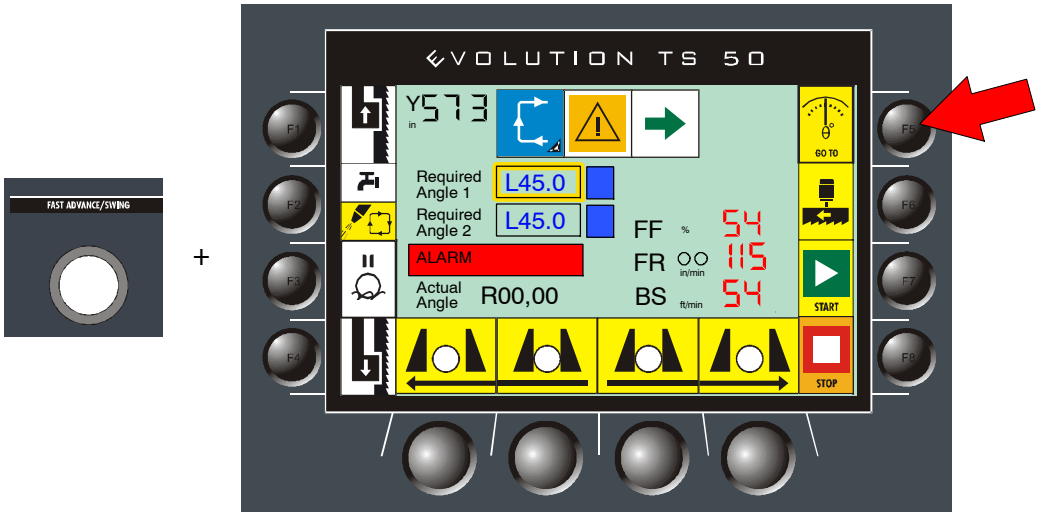


- Select the box shown in the figure on the touchscreen.



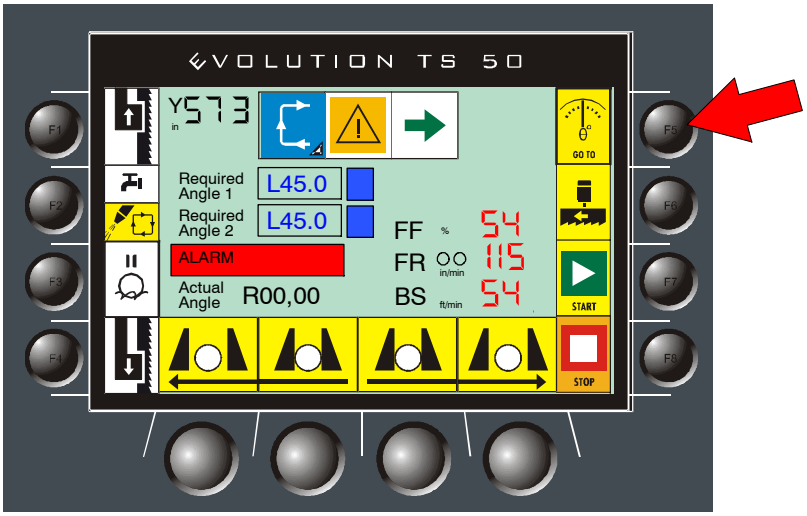
- Set the required cutting angles as explained above.

▶ Pressing simultaneously the control enabling key and the head rotation key it is possible to select from which angle the cut must start; the relevant box lights up to indicate its selection.



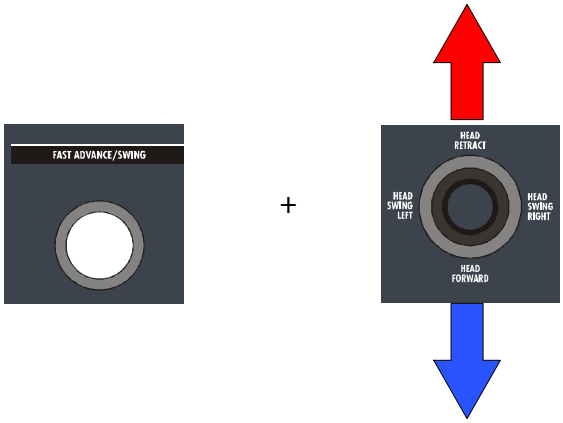
N.B. The angles may be both positive (i.e. rightwards) or both negative (i.e. leftwards) or alternating.

▶ Press the GO- TO key: the head rotates to the first programmed angle.



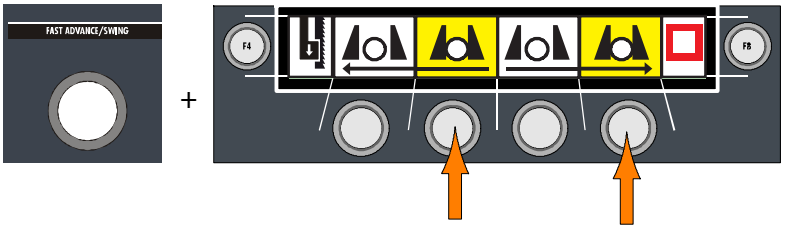
Warning Pay attention to the dimensions and geometry of the material being machined, as the cutting head has a sloping of 4 degrees to the cutting plane, therefore the end of the cut depends on the distance to the square. For this reason, the FHLS (forward head limit switch) point must be adjusted every time the material being machined changes.

▶ Approach the blade to the piece holding the control enabling key pressed and moving the cutting head with the joystick.



▶ Adjust the head position to the size of the material being machined. Hold the control enabling key pressed and press keys F1/F4 pressed for moving the heads.

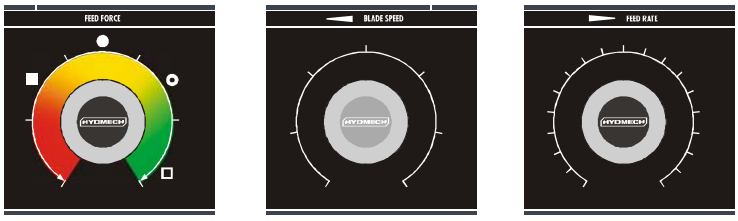
▶ Close one or both vices by pressing the control enabling button and the vice closing button at the same time;



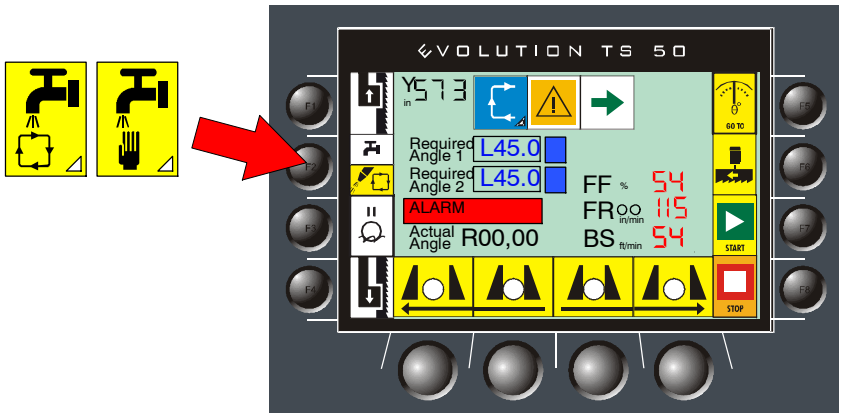
Attention

When cuts sloped by more than 45 degrees are made (if the measuring system in the setup is MKS = International System) or lower than 45 degrees (if the measuring system in the setup is Imperial = Imperial System), both vices must be closed.

▶ Select the geometry of the material being machined by the “Feed Force” potentiometer, the band rotating speed and the cutting head lowering speed suitable for the material type.

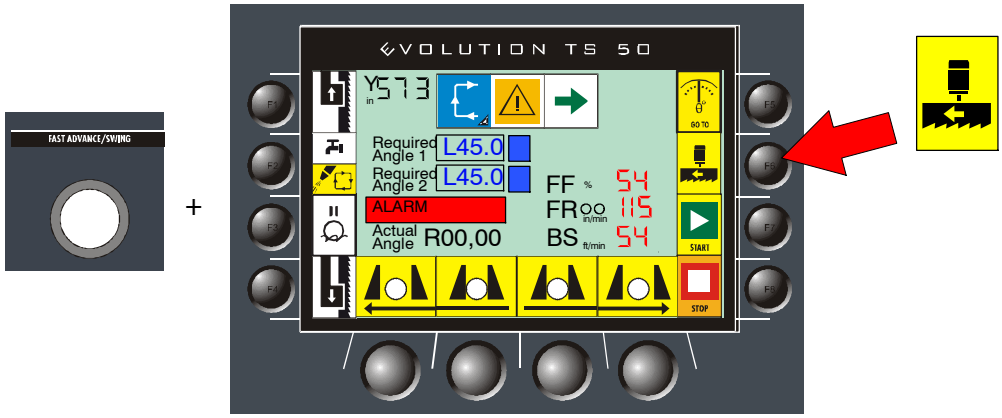


▶ Set the fluid jet by pressing the button shown in the figure. The box will light up to indicate that it is selected. Adjust the amount using the valves on the blade guide head. Press the button repeatedly to select the dispensing mode (automatic or manual).

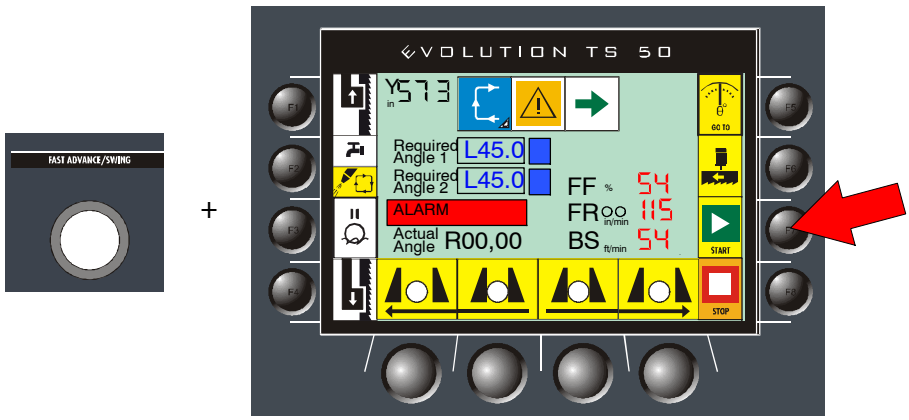


N.B. The machine can be equipped with the Mist Lubrication option to lubricate the tool while cutting.

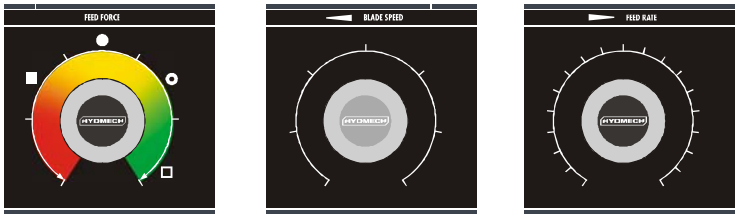
▶ Press the start belt button holding the enable commands button pressed at the same time.



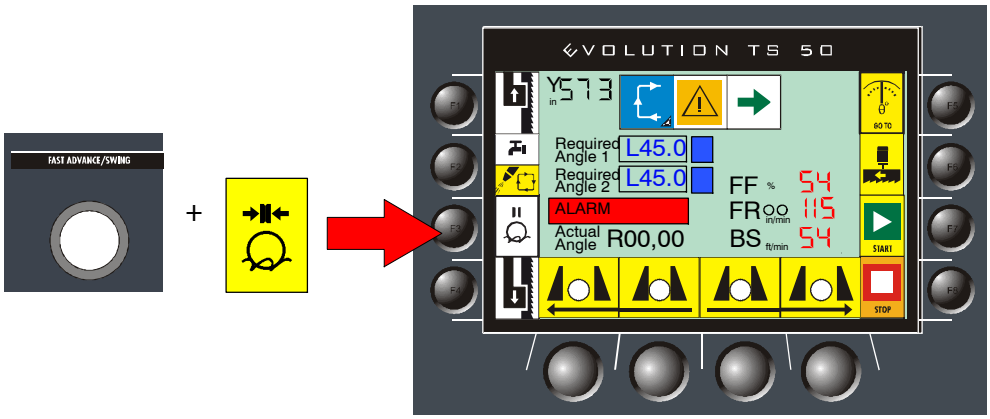
▶ Press the start cycle button holding the enable commands button pressed at the same time.



▶ The head starts moving forwards at the set rotation and feeding speeds. In this step the cutting parameters must be adjusted as explained above.



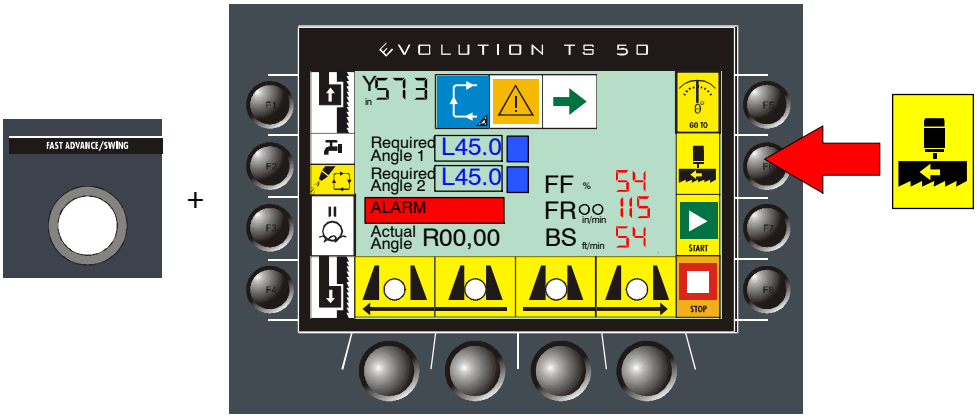
N.B. Now, if you want to delete the existing FHLS point, hold the control enabling key pressed and move the joystick downwards: the FHLS setting box starts flashing to indicate that the FHLS point has been deleted.
When the head reaches the required end of cutting point, press the FHLS setup button shown in the figure together with the enable commands button. The corresponding box will light up to indicate that it was selected.



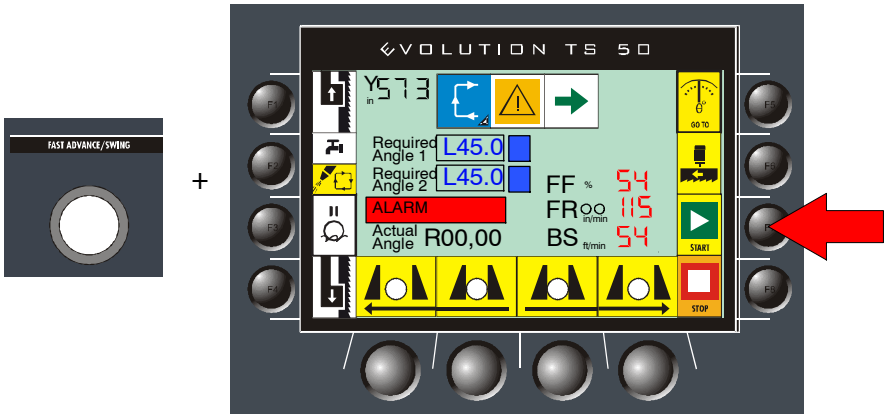
▶ Now the band stops and the head goes back completely, positioning at the second set angle, waiting for the control by the operator for opening the vices.

▶ Open the vices, feed the material being machined to the wished cut dimension and then close one or both vices.

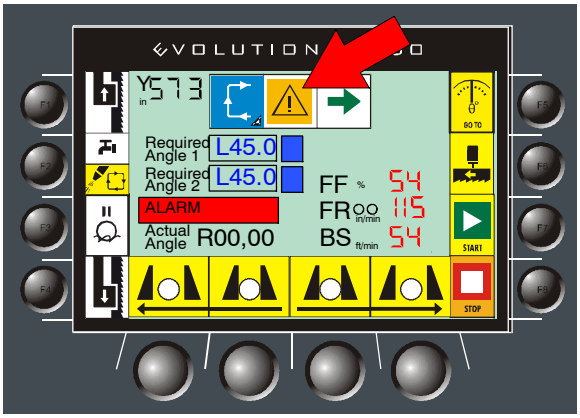
▶ Press the start belt button holding the enable commands button pressed at the same time.



▶ Start the cutting cycle pressing the key shown in the figure, holding the control enabling key pressed; the machine cuts.



N.B. Tap on the touchscreen box shown in the figure to see problems during operation. The box will turn blue to indicate caution and red to indicate a machine alarm. The machine alarms and their meanings are listed in chapter 10 of this manual.



Adjustments

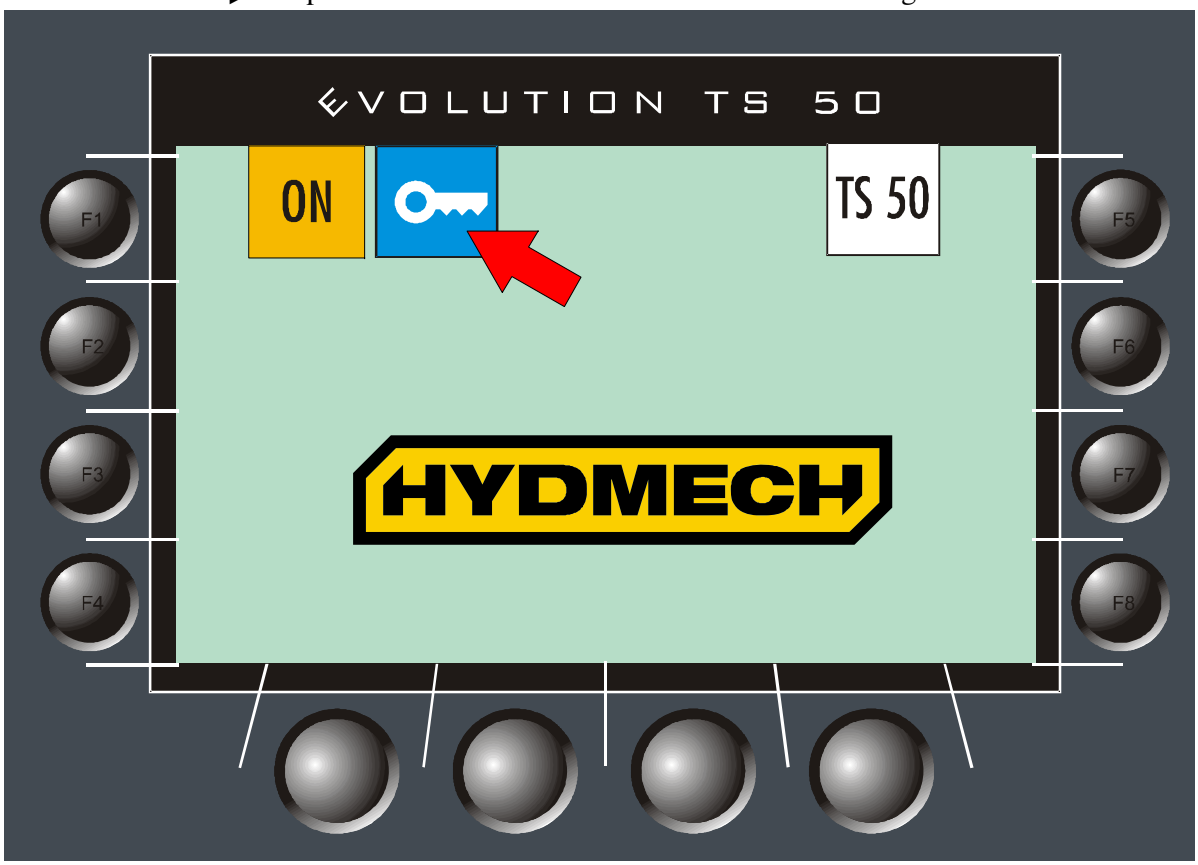
This chapter describes the operations required to adjust the electronic, mechanical and the hydraulic systems. By following these instructions, you can "customise" your machine to suit the type of cut required, thereby optimising cutting times.

Displaying and editing the set- up parameters

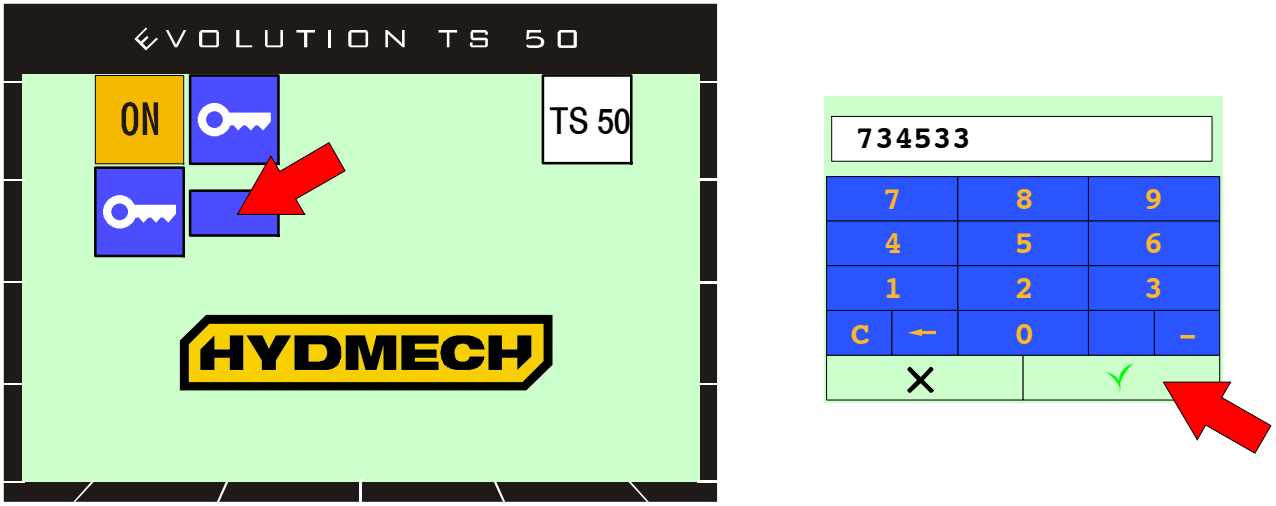
The machine set- up parameters may be programmed directly from the control console.

Attention To set the set- up parameters, refer to the Technical Service.

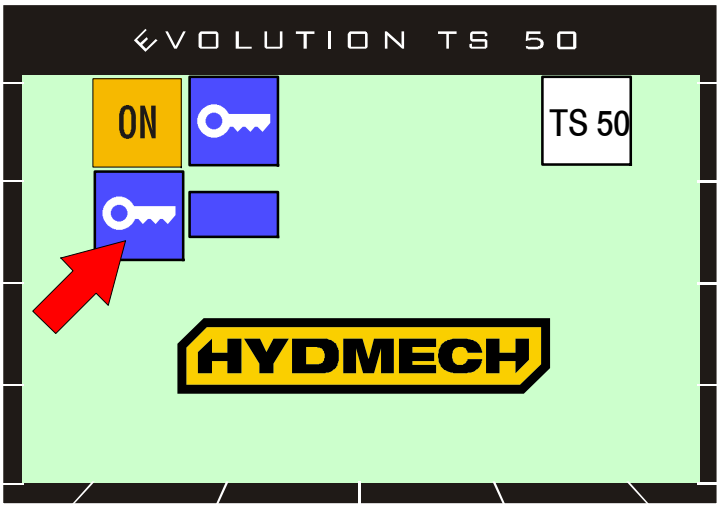
- ▶ Power the machine by turning the main switch on the left of the control board.
- ▶ Tap on the box on the touchscreen shown in the figure.



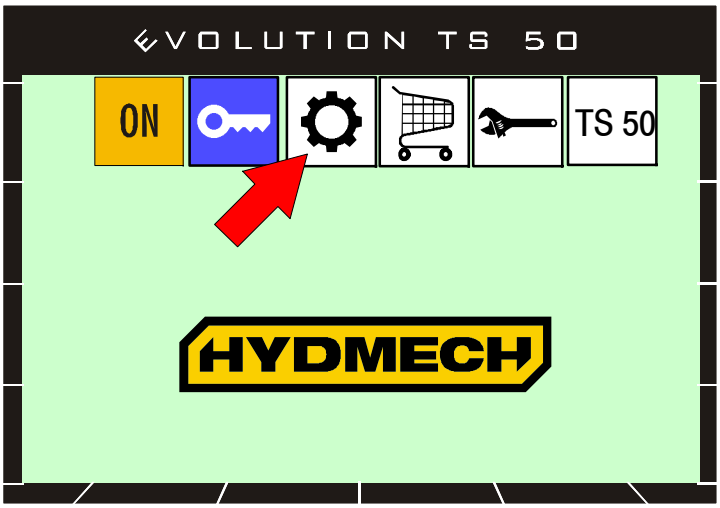
▶ The password entry box will open. Tap the box to open the keypad. Enter 734533.



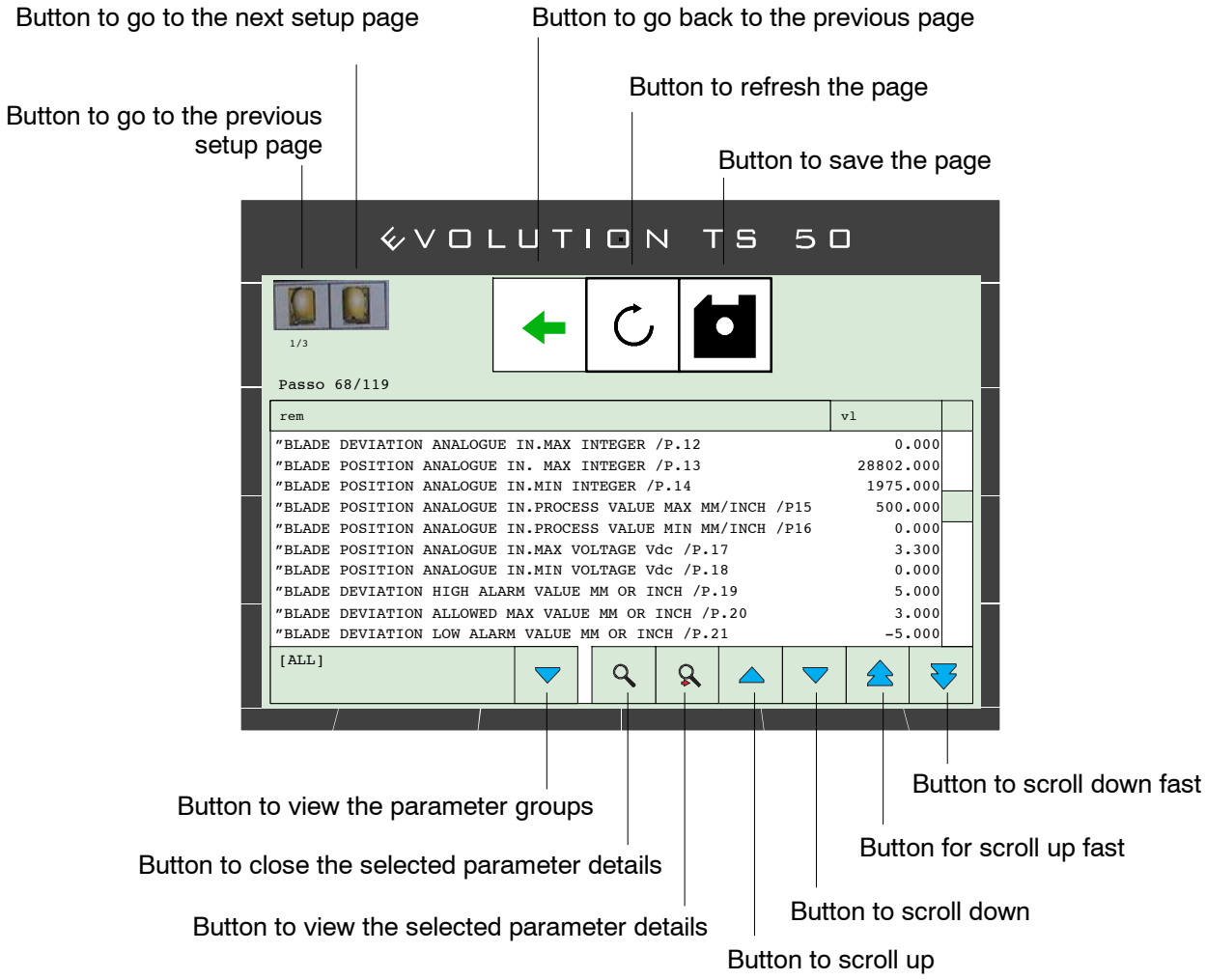
▶ Tap on the box shown in the figure.



▶ Tap on the box shown in the figure.



▶ Once inside the SET- UP menu, use the following three keys to navigate through the different menu screens:



Setup parameters

The machine setup parameters divided by topic are shown below.

BLADE MOTOR		
Nr.	**Parameter / Description**	**Value**
P.0	**Blade Ampere Analogue In Max Integer** Analogue input counter value corresponding to the maximum ampere.	4256.0000
P.1	**Blade Ampere Analogue In Min Integer** Analogue input counter value corresponding to the minimum ampere.	0.0000
P.2	**Blade Ampere Analogue In Process Value Max Ampere:** Ampere corresponding to maximum analogue input value.	6.4000
P.3	**Blade Ampere Analogue In Process Value Min Ampere:** Ampere corresponding to minimum analogue input value.	0.0000
P.4	**Blade Ampere Analogue In Process Max Voltage:** Voltage corresponding to maximum analogue input value.	10.0000
P.5	**Blade Ampere Analogue In Process Min Voltage:** Voltage corresponding to minimum analogue input value.	0.0000
P.23	**Blade Ampere Control Check Time Period sec:** Control execution time (sec).	0.5000

BLADE MOTOR		
P.24	**Blade Ampere Control Before Enabling On Delay sec:** Activation delay in seconds (if 0 is off).	3.0000
P.25	**Blade Ampere Control Feed Reduction Step M/min:** Correction step.	82.0300
P.26	**Blade Ampere Control Max Allowed Ampere:** Maximum allowed current.	100.0000
P.27	**Blade Ampere Control Max Ampere Allarm On Delay sec:** Alarm time for reaching the motor max. current (sec).	1.0000
P.28	**Blade Ampere Control Set Point Ampere:** Motor current set point	15.0000
P.29	**Blade Speed Control Max Allowed M/min:** Speed set point maximum value	400.0000
P.30	**Blade Speed Control Min Allowed M/min:** Speed set point minimum value	65.6160
P.31	**Blade Speed Control An In Max Integer Value:** Speed reference maximum value (analogue input maximum value).	32767.0000
P.32	**Blade Speed Control An In Min Integer Value:** Speed reference minimum value (analogue input minimum value).	0.0000
P.33	**Blade Speed Control Before Stopping On Delay sec:** Stop delay for cleaning cut (sec).	4.0000
P.34	**Blade Speed Encoder Counting Direction Inverting:** Blade speed encoder counter inversion.	0.0000
P.35	**Blade Speed Encoder Max Counter Valve M/min:** Blade speed maximum value.	400.0000
P.36	**Blade Speed Encoder Min Counter Valve M/min:** Blade speed minimum value.	65.6160
P.37	**Blade Speed Encoder Pulse Scaling Resolution MM or INCH/Pulse:** Relationship between impulses and rotation measure.	1.0000
P.38	**Blade Speed Encoder Speed To Pulse Adding Enabling = 1:**	1.0000
P.39	**Blade Speed Encoder Max Pulse Speed Limitation Fwd Dir:**	10.0000
P.40	**Blade Speed Encoder Min Pulse Speed Limitation Rev Dir:**	0.0000
P.41	**Blade Speed Encoder Scaling Proportional Constant:**	1.0000
P.42	**Blade Speed Encoder Counter Value Retention Enabling = 1,0:**	0.0000
P.97	**Blade Motor Status On Man Cycle End Motor On = 1,0** Blade motor on time at end of manual cycle	1.0000
P.105	**S potentiometer analogue input fs max**	32767.0000
P.106	**S potentiometer analogue input fs min**	0.0000
P.117	**S transducer type: 0=encoder,1=potentiometer**	1.0000

BLADE DEVIATION		
Quantity	**Parameter / Description**	**Value**
P.06	**Blade Deviation Enabled: (1=Enabled)**:	1.0000
P.07	**Blade Deviation Count at zero position (count):**	1020.0000
P.08	**Blade Deviation Count for division (count):**	15000.0000
P.09	**Blade Deviation scan time (sec)**	5.0000
HEAD ENCODER		
Quantity	**Parameter / Description**	**Value**
P.13	**Blade Position Analogue In. Max Integer:** Maximum counter value	24772.0000
P.14	**Blade Position Analogue In. Min Integer:** Minimum counter value	868.0000
P.15	**Blade Position Analogue In. Process Value Max MM or INCH:** Max. value in mm or inches of the totally up position of the head.	22.8350
P.16	**Blade Position Analogue In. Process Value Min MM or INCH:** Min. value in mm or inches of the totally down position of the head.	0.0000
P.17	**Blade Position Analogue In. Max Voltage Vdc:** Voltage value corresponding to the totally up position of the head.	8.0000
P.18	**Blade Position Analogue In. Min Voltage Vdc:** Voltage value corresponding to the totally down position of the head.	0.0000
P.119	**Enabled Blade Minimun Speed Control (1=Enabled):** Blade speed proximity enable	1.0000
P.132	**Frequency meter scaling feed y:**	1.0000
HEAD ROTATION:		
Quantity	**Parameter / Description**	**Value**
P.43	**Blade Speed Monitoring Before Enabling On Delay sec:** Activation delay in seconds (0 is disabled) (initial blade start wait time to check minimum speed)	7.0000
P.44	**Blade Speed Monitoring Wheel Diameter MM or Inch:** Pulley diameter (mm or inch)	24.0160
P.45	**Blade Speed Monitoring Number of Pick- up Pulses for Round:** Number of pulses per revolution	6.0000
P.46	**Blade Speed Monitoring Watch Dog On Delay sec:** Watch dog in sec (0 disabled) control between pulses	3.0000
P.47	**Blade Speed Monitoring Min Speed Watch Dog Value M or FT/Min:** Minimum watch dog speed in m/min or foot/min. Alarm is emitted if watch dog time threshold is not exceeded with watch dog enabled	49.2220
P.83	**XB Braking Status Rises After Specified SECs Form Command:**	0.5000
P.84	**XB Tolerance Position MM:** XB axis positioning tolerance (mm or in). The axis is considered positioned when the error is less than the set tolerance	0.0020
P.85	**XB Unbraking Status Rises After Specified SECs From Command:** Rotation brake time after reaching position	0.5000

HEAD ROTATION:		
P.133	**Angle position 90 degrees with blade vertical (1=enabled; 0=disabled):**	1.0000
P.171	**Software limit positive Rotation axis (in the mode set in P133)**	30.0000
P.172	**Software limit negative Rotation axis (in the mode set in P133)**	- 30.0000
BLADE TENSION		
Quantity	**Parameter / Description**	**Value**
P.48	**Blade Tension Control Large Pulse Width sec:** Adjustment pulse used for rough adjustment (sec)	20.0000
P.49	**Blade Tension Control Off Betwen Pulses Awaiting sec:** Pause time between adjustment pulses (sec)	0.7000
P.50	**Blade Tension Control Small Pulse Width sec:** Adjustment pulse used for fine adjustment (sec)	0.0250
P.51	**Blade Tension Control Max Alarm Tension Lb o KN:** Maximum voltage allowed to apply adjustment.	7700.0000
P.52	**Blade Tension Control Min Alarm Tension Lb o KN:** Minimum voltage allowed to apply adjustment.	2200.0000
P.53	**Blade T. Control Error Large to Small Pulse Change Over Threshold KN:** Error threshold which determines adjustment variation from rough to fine	440.0000
P.54	**Blade Tension Control Max Error Tolerance Lb o KN:** Maximum error for adjustment tolerance	154.0000
P.55	**Blade Tension Control Min Error Tolerance Lb o KN:** Minimum error for adjustment tolerance	154.0000
P.56	**Blade Tension Control Setpoint KN:** Required set point for calculating adjustment error	4950.0000
P.57	**Blade Tension Control An. In. Load Cell Max Integer Value:** Maximum counter value from load cell analogue input.	4961.0000
P.58	**Blade Tension Control An. In. Load Cell Min Integer Value:** Minimum counter value from load cell analogue input.	0.0000
P.59	**Blade Tension Control An. In. Load Cell Process Value Max KN:** Load cell analogue input maximum value allowed for acquisition.	2310.0000
P.60	**Blade Tension Control An. In. Load Cell Process Value Min KN:** Load cell analogue input minimum value allowed for acquisition.	0.0000
P.61	**Blade Tension Control Enabling: (1=enabled):** Automatic blade tension adjustment enable	1.0000
P.62	**Blade Tension Control An. In. Load Cell Voltage Value Max Vdc:** Load cell analogue input voltage maximum value.	10.0000
P.63	**Blade Tension Control An. In. Load Cell Voltage Value Max Vdc:** Load cell analogue input voltage minimum value.	0.0000
CLAMPS ENCODER:		
Quantity	**Parameter / Description**	**Value**

CLAMPS ENCODER:		
P.64	**Clamps Locking Status Rises After Specified Secs From Command:** Time needed to allow clamp closed	3.0000
P.65	**Clamps Unlocking Status Rises After Specified Secs From Command:** Time needed to allow clamp open	2.0000
P.124	**Y Position Anti- Crushing Activated:** Head position under which the blade anti- crushing function is activated	1.0000
P.124	**Anti- Crushing Blade Enabled (1= enabled):** Enables the blade anti- crushing function	50.0000
MISC		
Quantity	**Parameter / Description**	**Value**
P.66	**Cooling Pump Control Enabling = 1,0:** Water pump enable	1.0000
P.80	**MKS Imperial Unit System Switchover Enabling:** Imperial = 0.0: sets measuring system MKS (0) or IMPERIAL (1).	0.0000
P.101	**Type machine (1=V20APC; 2=V20PT)** Defines the machine type (set automatically by loading the machine .cns file).	2.0000
P.102	**Absolute Trasducer Encoder Offset:** This determines the absolute transducer offset for setting zero in required position (automatically set on maintenance menu)	92.9773
P.103	**Enable pushbutton (2=only for vises; 1=bypassed; 0=for all)**	2.0000
P.104	**Angular position display sessagesimal / centesimal:**	2.0000
P.115	**Angle measure display 1 or 2 decimals:**	0.0000
P.147	**Work unit system selected (Imperial=0; MKS=1):**	1.0000
CUTTING HEAD		
Quantity	**Parameter / Description**	**Value**
P.67	**Feed Encoder Counting Direction Inverting = 1.0:** Enables the reversal of the reading for the F value scale.	0.0000
P.68	**Feed Encoder Max Counter Value M/Min:** Max. speed that can be set by encoder F.	16.9290
P.69	**Feed Encoder Min Counter Value M/Min:** Min. speed that can be set by encoder F.	0.0390
P.70	**Feed Encoder Pulses Scaling Resolution MM or Inch/Pulse:** Relationship between impulse and supply measure.	0.1570
P.71	**Feed Encoder Speed to Pulse Adding Enabling = 1.0:**	0.0100
P.72	**Feed Encoder Max Pulse Speed Limitation FWD DIR :**	100.0000
P.73	**Feed Encoder Max Pulse Speed Limitation REW DIR :**	0.0000
P.74	**Feed Encoder Scaling Proportional Constant:**	0.0100
P.75	**Feed Encoder Counter Retention Enabling = 1.0:** Enables the retentive memory of the encoder F.	0.0000
P.82	**UY Feed Axis Full Stroke Width MM or Inch:** U axis maximum stroke (mm or inch).	11.8110

CUTTING HEAD		
P.86	**Y Cutting Axis Maximun Position MM or Inch:** Y axis maximum limit switch (mm or inch).	22.7160
P.87	**Y Cutting Axis Minimun Position MM or Inch:** Y axis minimum limit switch (mm or inch).	0.0000
P.88	**Y Cutting Axis After Piece Detection Run Biefore Stopping MM or Inch:**	0.0000
P.89	**Y Cutting Axis ½ Auto Cycling Slow Down From Targhet MM or Inch:** Deceleration space (mm or inch): distance from target position at which slow descent is set.	0.0000
P.90	**Y Cutting Axis Cuttting Feed PID Control Error MM or Inch:** Check of the head advancing tolerance.	0.0010
P.91	**Y Cutting Axis Jog Mode Downgoing Feed MM or Inch:** Y descent speed in jog mode (mm/min or inch/min)	0.0000
P.92	**Y Cutting Axis Jog Mode Downgoing Feed MM or Inch:** Y descent speed in jog mode (mm/min or inch/min)	62.9920
P.93	**Y Cutting Axis ½ Auto Cycling Slow Down Feed MM or Inch:** Slow Y position speed (mm/min or inch/min).	31.4960
P.94	**Y Cutting Axis All Mode Upgoing Feed MM or Inch:** Y upward speed (mm/min or inch/min).	90.5510
P.98	**Y Cutting Axis U Opening Y Feed Curve Bypass = 1.0:** Descent speed linearizing curve enable (F)	0.0000
P.107	**F potentiometer analogue input fs max:**	32767.0000
P.108	**F potentiometer analogue input fs min:**	0.0000
P.109	**H potentiometer analogue input fs max:**	32406.0000
P.110	**H potentiometer analogue input fs min:**	0.0000
P.111	**H encoder counting direction inverting = 0.0**	0.0000
P.112	**H encoder max counter value m/min:**	100.0000
P.113	**H encoder min counter value m/min:**	0.0000
P.114	**H encoder scaling proportional constant:**	0.6000
P.116	**F transducer type 0 = encoder; 1 = potentiometer**	1.0000
P.118	**H transducer type 0=encoder,1=potentiometer:**	1.0000
P.127	**Minimum speed variation yu for current control (mm/min inc/min):**	0.0790
P.131	**Zero on y maximum up position (1=enabled):**	0.0000
OPTIONAL:		
Quantity	**Parameter / Description**	**Value**
P.76	**RESERVED**	5.0000
P.78	**Minimal Lubrification Enabling = 1.0:** Workpiece search laser enable (fast approach)	1.0000
P.81	**Trim Handling Device Enabling = 1.0:**	1.0000
P.95	**Piece Handling Positioned Status Rises After Specified Secs From Command:**	3.0000

OPTIONAL:		
P.120	**Chip Conveyor Enabled (1=Enabled):** Chip ejector enable	1.0000
P.123	**Blade deviation enabled (1=enabled):**	1.0000
P.125	**Enable Encoder Lika (1=Enabled):** Encoder type selection: 1 = Lika 2 = Stegmann	1.0000
P.146	**Shuttle orientation (0 = left; 1 = right)**	0.0000
P.152	**Blade chamber cut offset (mm or inch)**	0.2756
P.159	**Blade forward offset position in chamber cut (mm or inch)**	2.5000
P.160	**Micro FCTA present (1 = yes; 0 = no)**	0.0000
P.161	**Chip ejector type (0 = micro; 1 = toothed wheel)**	1.0000
P.162	**Time for locked ejector alarm (sec)**	60.0000
RESERVED		
Quantity	**Parameter / Description**	**Value**
P.79	**RESERVED**	0.0350
TIMER		
Quantity	**Parameter / Description**	**Value**
P.96	**Hydraulic Pump Off Delay Awaited Before Stopping Sec:** Hydraulic pump off delay before stopping (seconds).	120.0000
P.121	**Chip Conveyor Time On In Auto (M in):**	0.5000
P.122	**Chip Conveyor Time Off In Auto (M in):**	0.5000
P.148	**Time Forward/Reverse retractable jaws (sec)**	0.5000
P.149	**Loader Rising time (sec)**	2.0000
P.150	**Loader Lowering time (sec)**	2.0000
P.151	**Time Forward/Reverse retractable squaring jaws (sec)**	0.5000
	MMI Debug View	0.0000
PASSWORD		
Quantity	**Parameter / Description**	**Value**
P.99	**User password value** Password value setting.	7210721.0000
P.100	**Admin password value** Password value setting.	734533.0000
APC		
Quantity	**Parameter / Description**	**Value**
P.134	**BPX mm or inch**	0.0000
P.135	**DPY mm or inch**	0.0000
P.136	**Minimum Distance Between Pieces mm or inch**	0.0000
P.137	**Kerf mm or inch**	0.0000

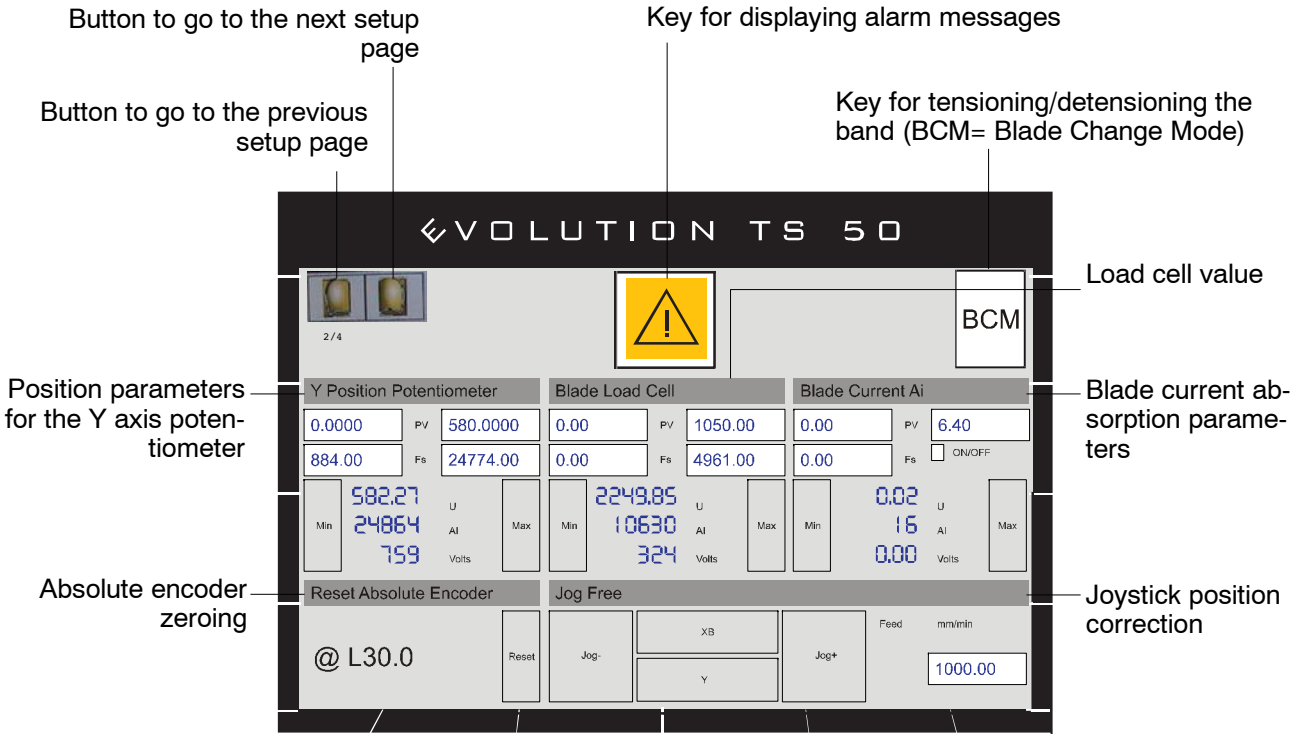
SHUTTLE AXIS		
Quantity	**Parameter / Description**	**Value**
P.138	**X Positive software limit (mm - inch)** Feeder max. Stroke.	64.9607
P.139	**X Negative software limit (mm - inch)** Feeder min. Stroke.	0.0000
P.140	**X Joystick feed slow (mm/min o inch/min):** Slow feeding.	19.6850
P.141	**X Joystick feed fast (mm/min o inch/min):** Fast feeding.	59.0551
P.142	**Over Stroke X** X axis beyond zero mm or inch.	0.0000
P.143	**Micro Engagement Speed (mm/min o inch/min):** Speed of search for microswitch while the trolley is zeroed.	78.7401
P.144	**Micro Disengagement Speed (mm/min o inch/min):** Speed of release from the search while the trolley is zeroed.	11.8110
P.145	**Speed X on Cycle mm/min o inch/min:** Feeder speed in cutting cycle.	196.8504
P.158	**Push Pull Speed mm/min o inch/min:**	110.8110

GUIDE ARM		
Quantity	**Parameter / Description**	**Value**
P.153	**Guide Arm Encoder Pulse**	4218.0000
P.154	**Guide Arm Encoder Linearized Travel in or inch**	16.3386
P.155	**Guide Arm Offset Position in or inch**	0.0000
P.166	**Guide Arm Offset Position mm or inch**	23.8977
P.157	**Guide Arm Half Width mm or inch**	1.0237
P.169	**Check Direction Guide Arm Movement (1=enabled)**	1.0000

LUBRIFICATION		
Quantity	**Parameter / Description**	**Value**
P.163	**Enable XB Lubrification (1 = Enabled)**	0.0000
P.164	**Period Lubrification XB (min)**	0.0000
P.165	**Length Lubrification XB (sec)**	0.0000
P.166	**Enable Y Lubrification (1 = enabled)**	0.0000
P.167	**Period Lubrification Y (min)**	0.0000
P.168	**Length Lubrification Y (sec)**	0.0000

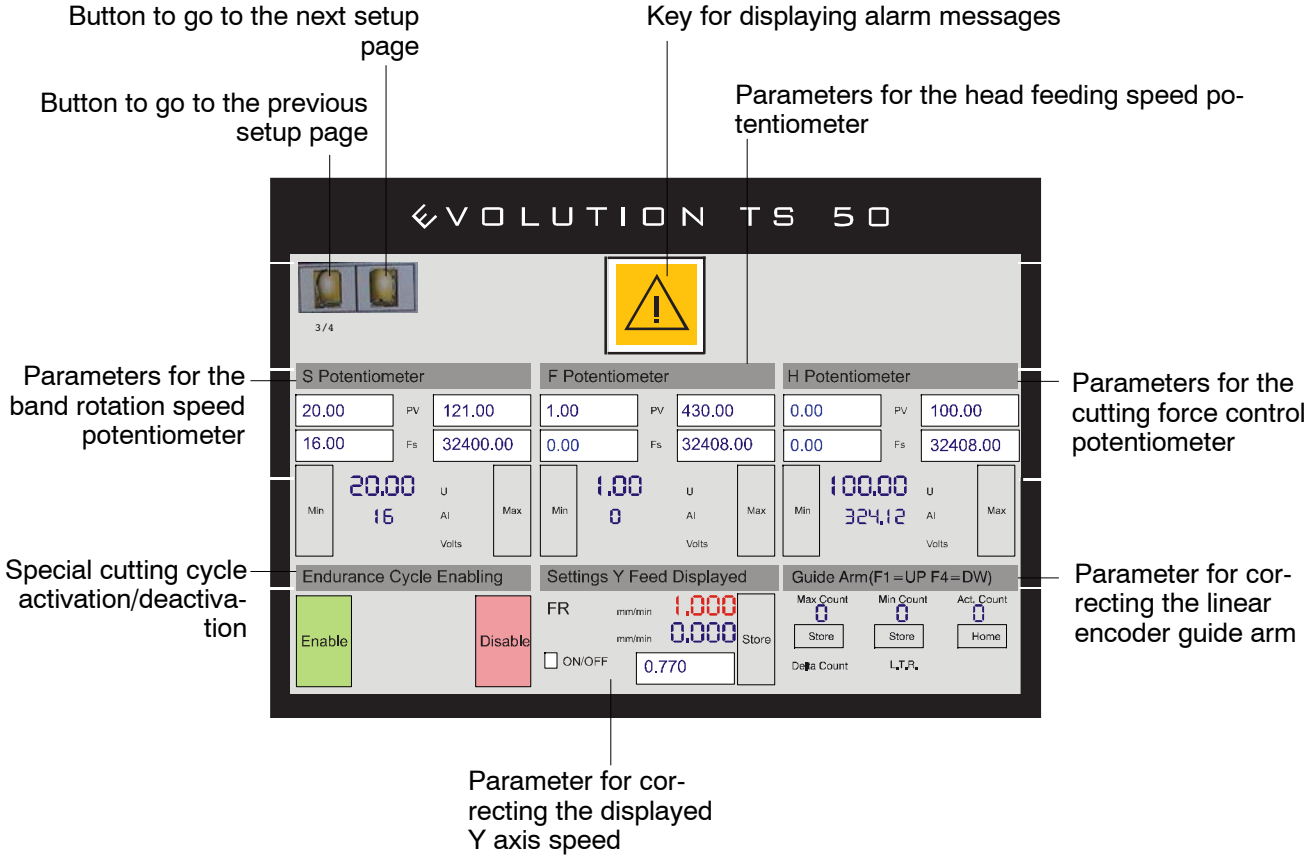
Cutting head parameter setup (1/3)

On page 2 of the Setup section, you can calibrate the cutting head devices: Y shaft potentiometer, blade load cell and blade motor absorption.



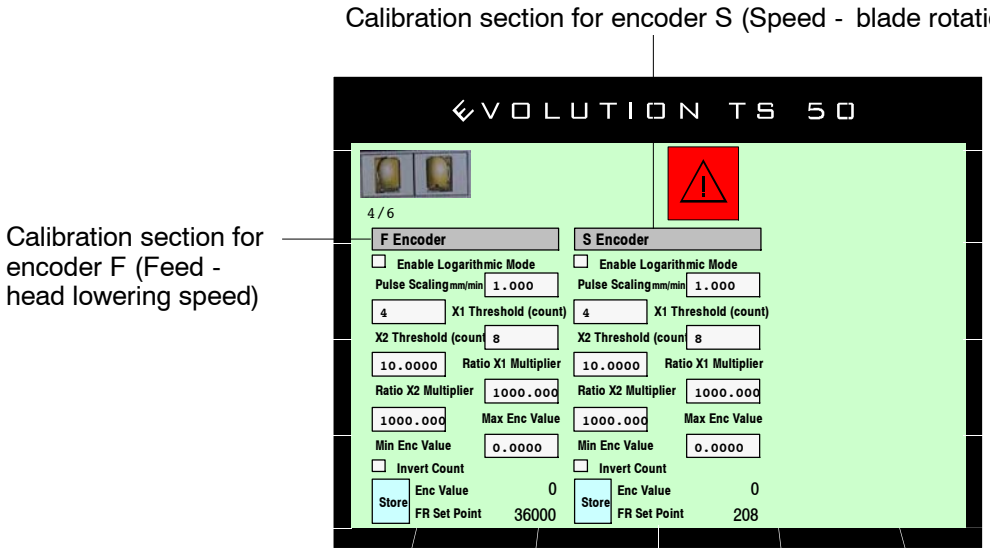
Cutting head parameter setup (2/3)

On page 3 of the Setup section, you can calibrate the blade H absorption potentiometer, the disc rotation speed (Speed 1- 2 for disc machines only) and the blade deviation device.



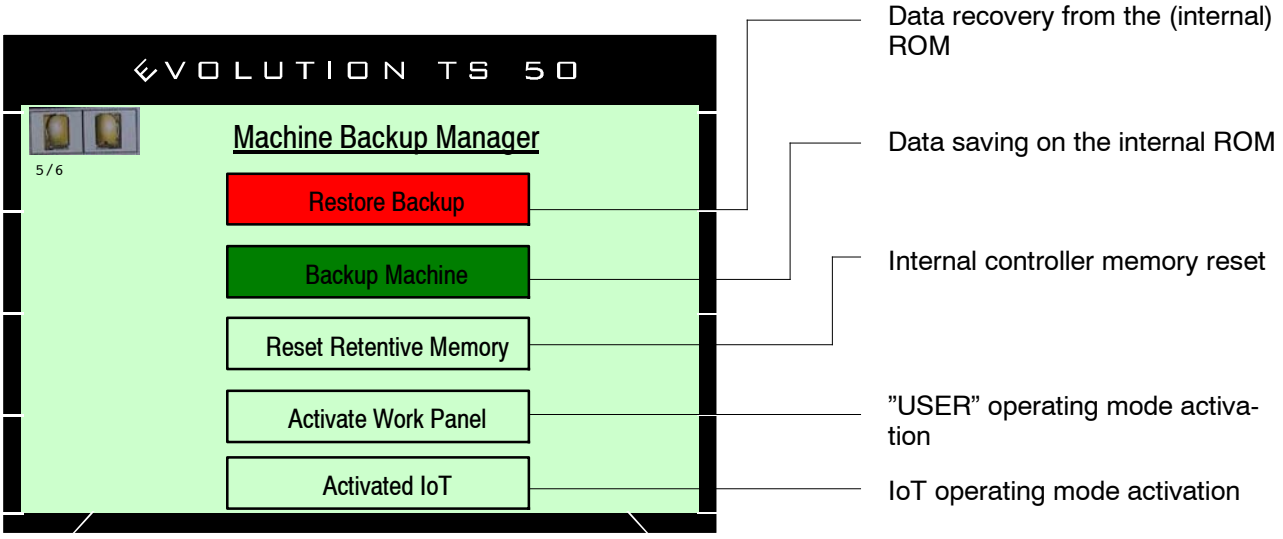
Cutting head parameter setup (3/3)

On page 4 of the Setup section, you can calibrate the encoders: F (Feed) for head lowering adjustment and S (Speed) for blade rotation speed adjustment.



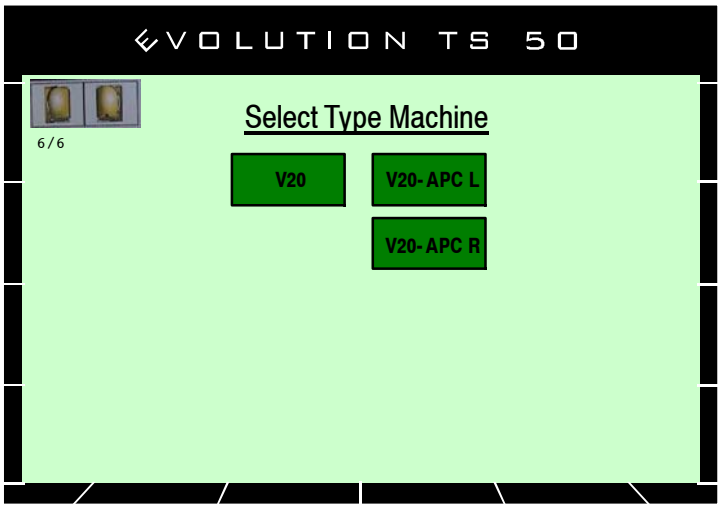
Control memory management

On page 5 of the Setup section, you can manage the control memory data by saving it (backup) or resetting it (restore) on a USB storage device.



Machine type selection

On page 6 of the Setup section, you can choose the model of the sawing machine, each one customised with its own parameters.



Attention To set the set-up parameters, refer to the Technical Service.

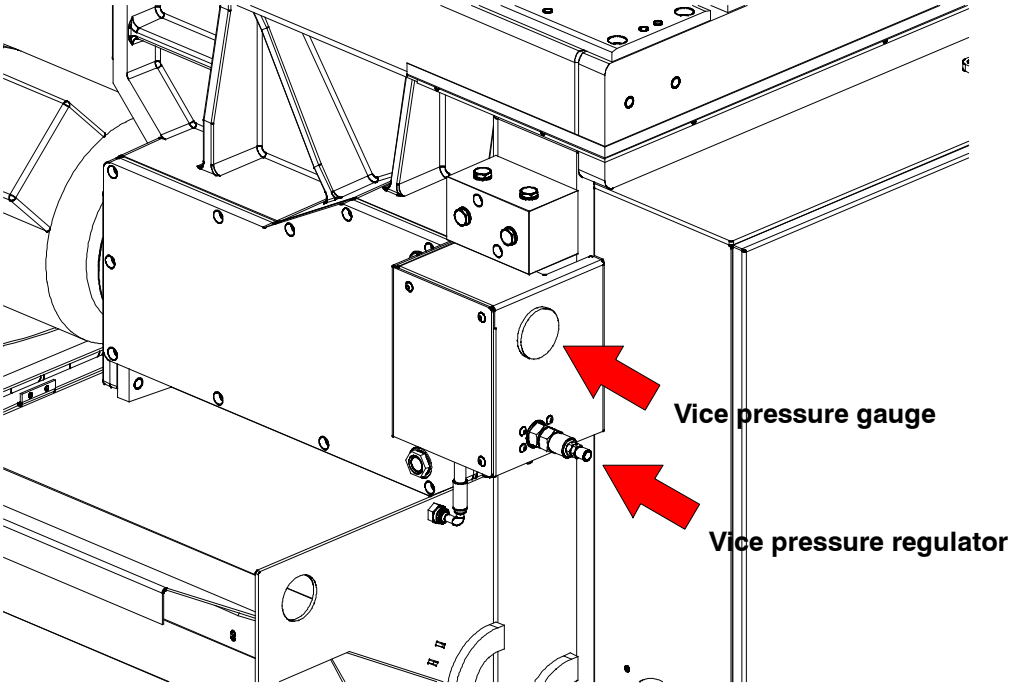
Hydraulic systems

Machine working pressures

This section describes the procedures for adjusting the clamping pressure of the horizontal and vertical vices and the cutting head descent.

N.B. The vice working pressure is tightly bound to the type of material being worked and can be set if the material could be deformed or results unstable during cutting.

Both pressures can be adjusted by adjusting the regulator shown in the figure.



Blade guide components

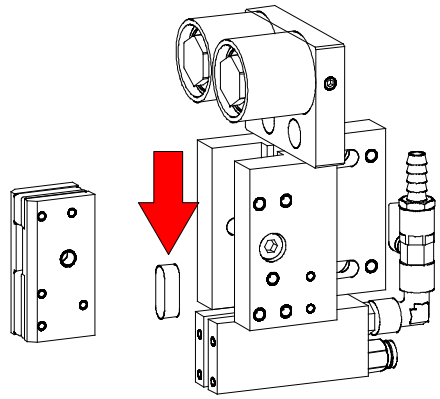
Band saw blades offer enormous advantages to cutting applications, without requiring any special skills by the operator. A description follows of the blade guide adjustments required to ensure correct operation of the saw.

Blade guide heads

The first blade adjustment involves adjustment of the heads. The blade guide heads comprise the blade guide plates which ensure correct longitudinal alignment, the blade steady buttons which control vertical blade flexure and the coolant delivery cocks.

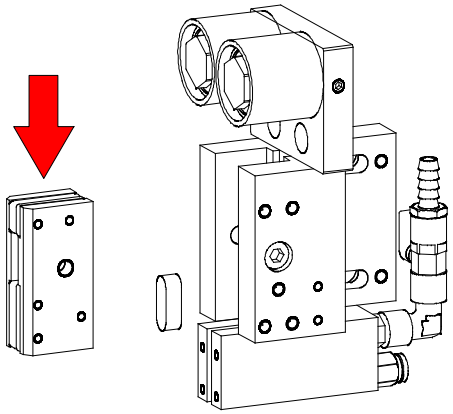
Blade steady torque pins

The blade steady torque pins prevent upward blade flexure caused by the vertical action of the cutting force. These buttons are fitted on both the front and rear heads and need no adjustment.



Blade guide plates

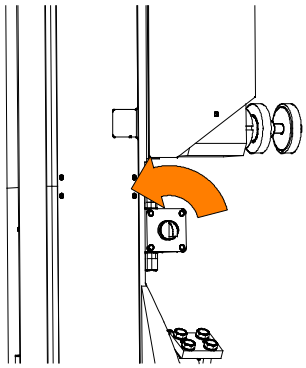
The plate contact points feature widia inserts which guide the blade longitudinally. A small amount of play must exist between the plates and blade to ensure that the blade runs smoothly and perpendicular to the work table.



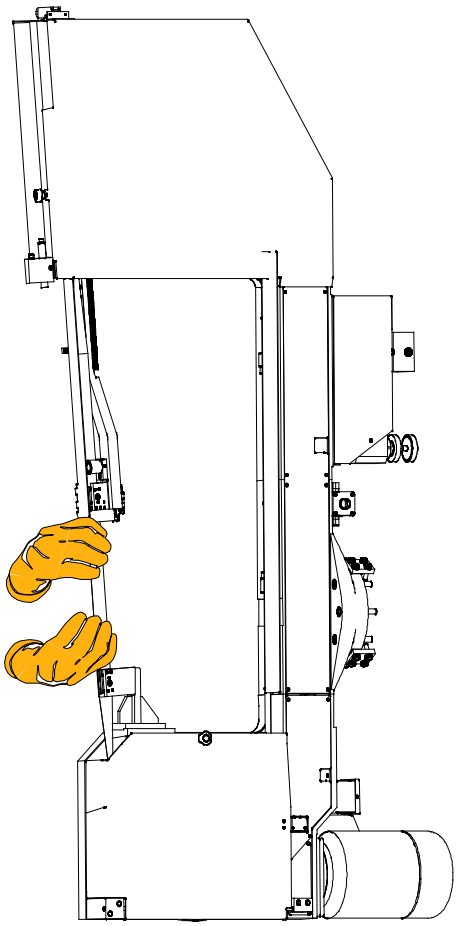
Thanks to the widia inserts, the working life of the guide plates is practically the same as that of the machine itself. However, if due to wear or the assembly of a new blade with a different thickness, the following adjustments must be made:

▶ Take the head completely backwards.

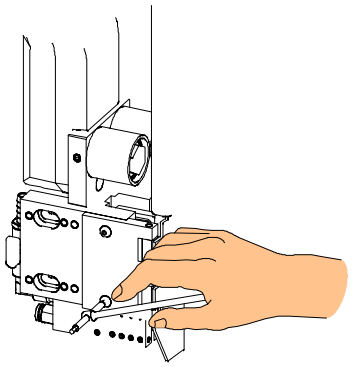
- De- tension the band rotating the suitable switch inside the cutting bow.



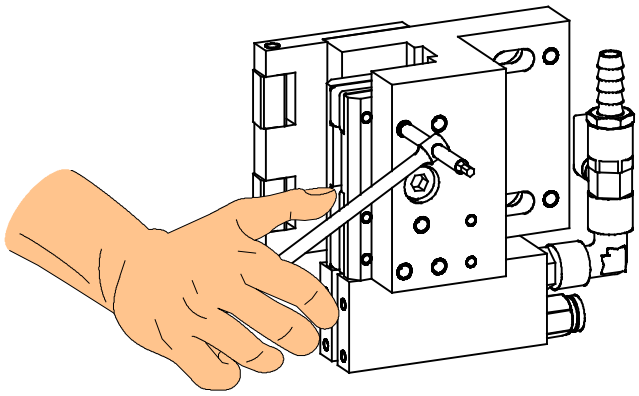
- Cut the machine off.
- Wear protective gloves when changing the blade;
- Make sure there is a small amount of play between the blade and guide plate inserts;



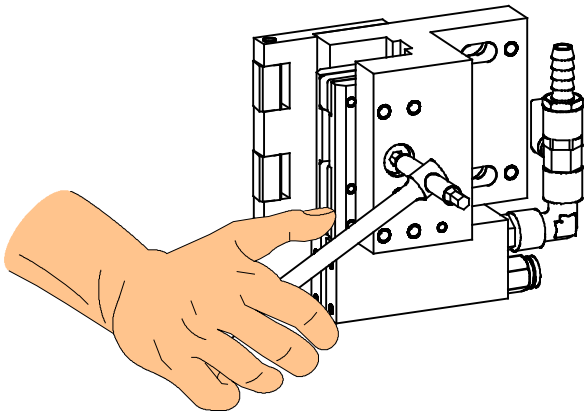
▶ Remove the blade protections from the heads by loosening the fastening screws.



▶ if the amount of play is not sufficient for the blade to run smoothly, adjust the locking torque of the two grub screws with a hex wrench;



▶ replace any worn plates by replacing the plate fixing screw:



▶ repeat the above sequence on the front blade guide head;
▶ Restore the blade protections of the front and rear heads.
▶ Close the blade cover and power the machine again.

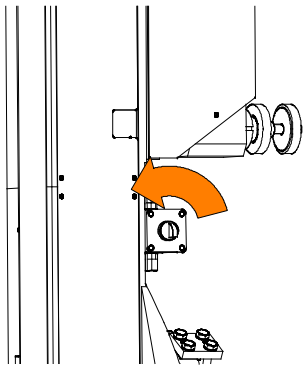
Blade

The adjustments required to ensure correct operation of the blade are described below. For further information regarding band saw blades, refer to Chapter 9 which provides a more detailed description of the different types of blade.

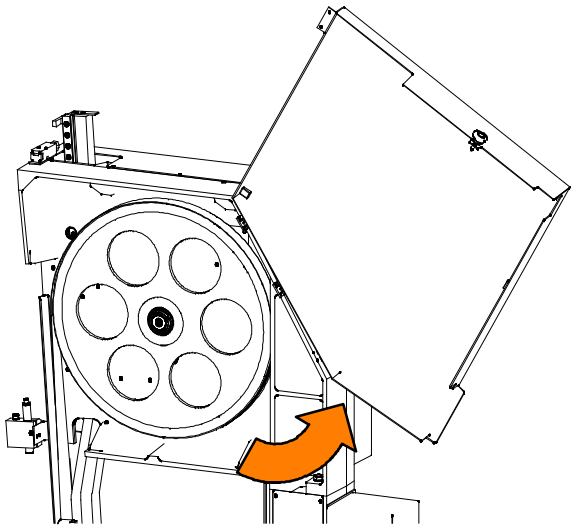
Tool changeover

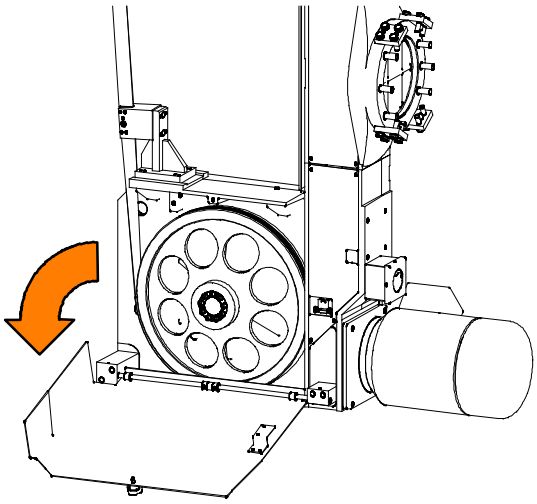
Optimum working conditions both enhance operator safety and extend the tool service life. The cutting tool should in any case be replaced when poor cutting performance starts to affect productivity. The tool changeover procedure is described as follows:

- Take the head completely backwards.
- De- tension the band rotating the suitable switch inside the cutting bow.

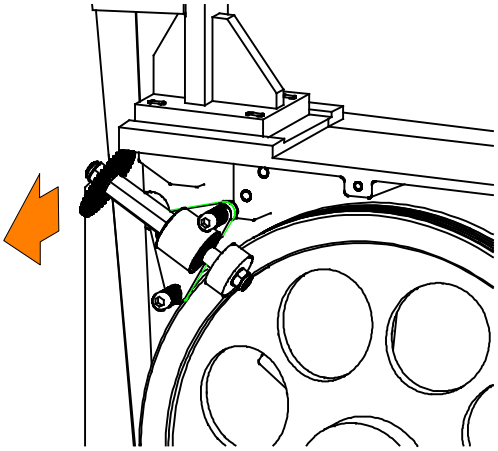


- Wear protective gloves when changing the blade;
- Cut the machine off.
- Open the upper and lower protection covers.

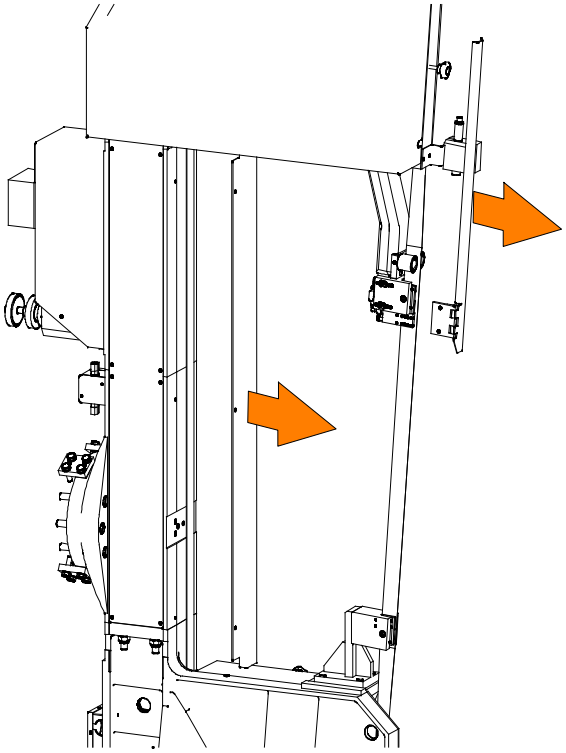




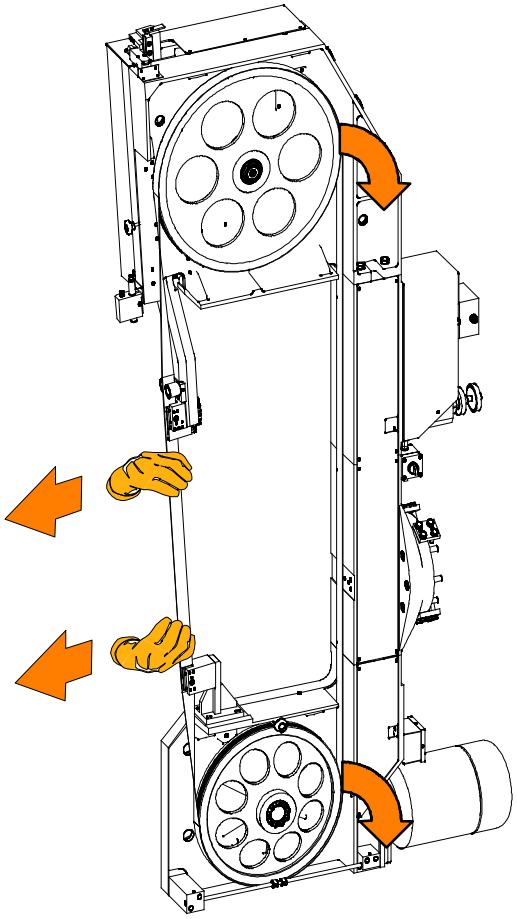
▶ Move away the motorized blade- cleaning brush by loosening the screws shown in the figure.



▶ remove the blade protections, either from the mobile head that by the beam of bow, by loosening the fixing screws.



- Remove the blade to be replaced pulling it out first from the pulleys, then from the upper and lower heads;

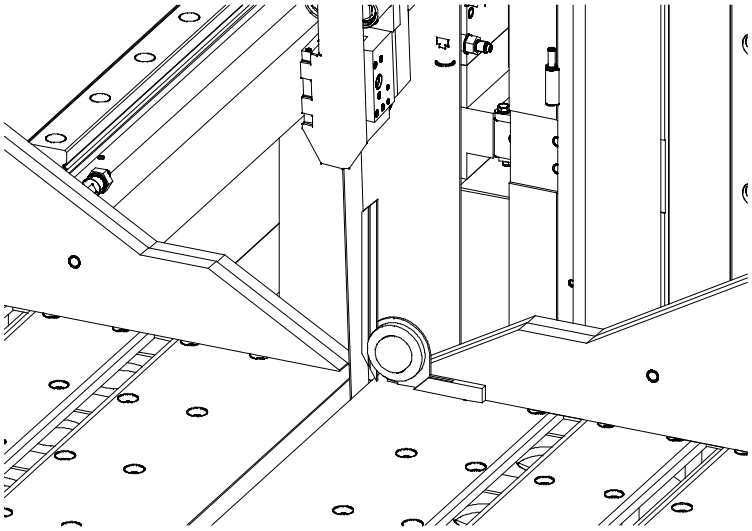


- fit the new blade into the blade guide heads and make sure there is a minimum amount of play between the blade and the plates;
- restore the blade protections of the front and rear heads and reposition the blade- cleaning brush correctly.
- Close the blade cover and power the machine again.

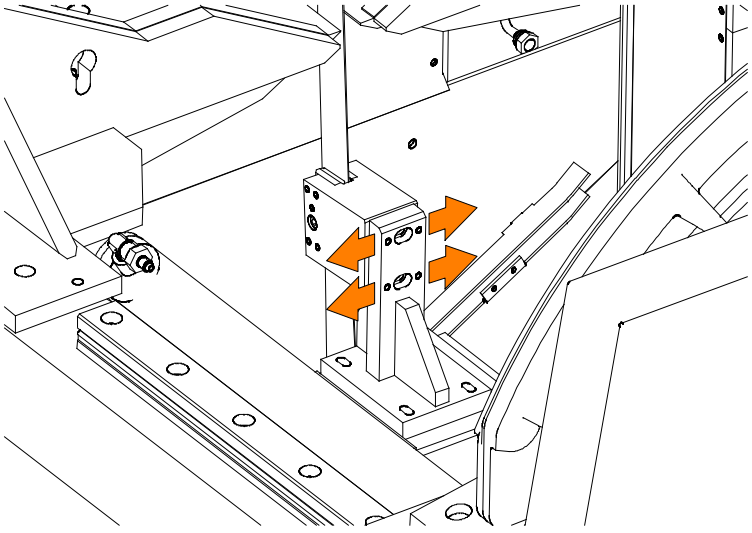
Blade perpendicularity

The procedures for correcting and adjusting the band at 0 degrees (if the set measuring system is MKS) or at 90 degrees (if the set measuring system is Imperial) to make cuts perpendicular to the working table are described below. To adjust the blade perpendicularly, it is advisable to use a workshop goniometer or a simple 90- degree square.
Operation sequence:

- Open the cutting vices;
- move the head forwards so that the band is beyond the fixed vices;
- cut the sawing machine off and wear protection gloves;
- Lay a grounded plate on the feeder rollers;



- check if the band is adjacent to the square: if the upper or lower part is shifted, loosen the two screws of the lower blade guide head, shown in the figure, and make little horizontal movements to balance the shifting.

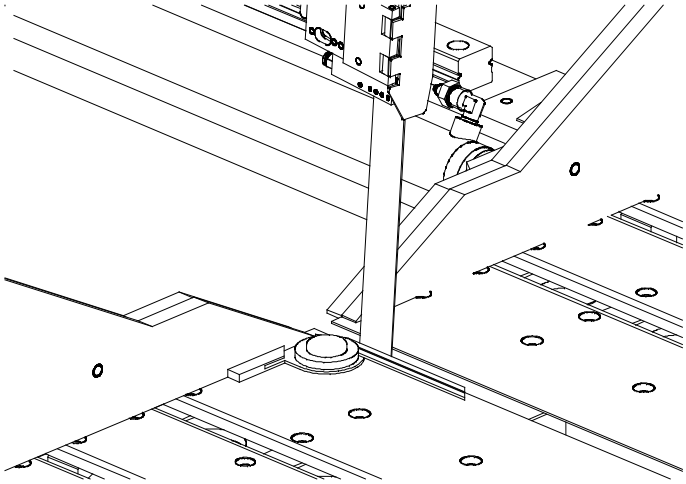


- After having correctly adjusted the head, tighten the two locking screws.

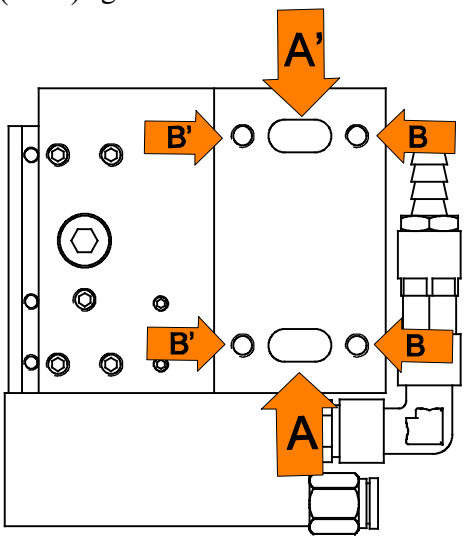
Blade orthogonality

For getting straight cuts it is fundamental to have the band at right angle to the reference plane, consisting in the fixed vices, and to have a correct tensioning. This adjustment is carried out with the aid of a goniometer or of a workshop square, that is adjacent to the band and laid to the fixed vices.

- Open the cutting vices;
- Lift the movable head completely upwards.
- Check that the head is in the position of 0 degrees (if the set measuring system is MKS) or at 90 degrees (if the set measuring system is Imperial) thenmove the head forwards so that the band is beyond the fixed vices;
- cut the sawing machine off and wear protection gloves;
- position the square, resting it on the fixed vices, adjacent to the band.



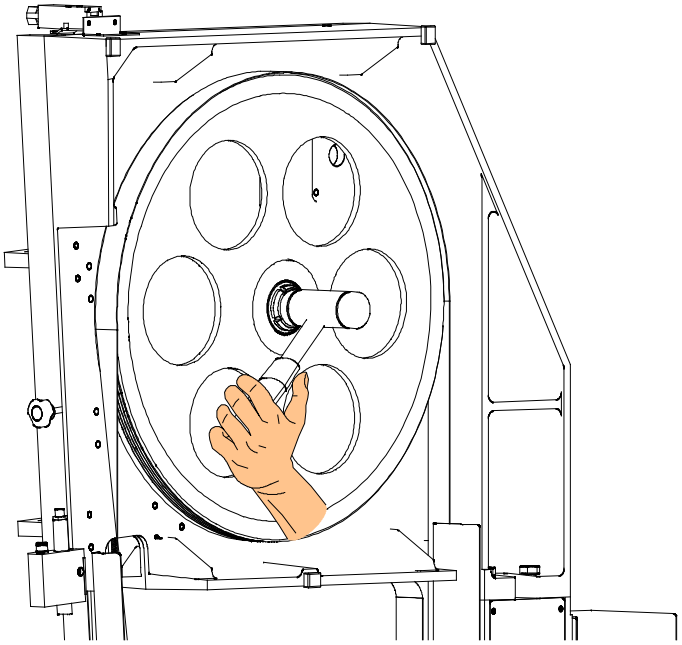
- If the square has the contact point in the toothed part of the blade: slightly loosen the socket head screws (A and A') fixing the head, loosen the two dowels (B') and tighten the two dowels (B); after having corrected the error, tighten the socket head screws (A- A') again. If instead the contact point is in the band back: slightly loosen the socket head screws (A and A'), loosen the two dowels (B) and tighten the dowels (B') till the band is perpendicular to the square; at the end, tighten the socket head screws (A- A') again.

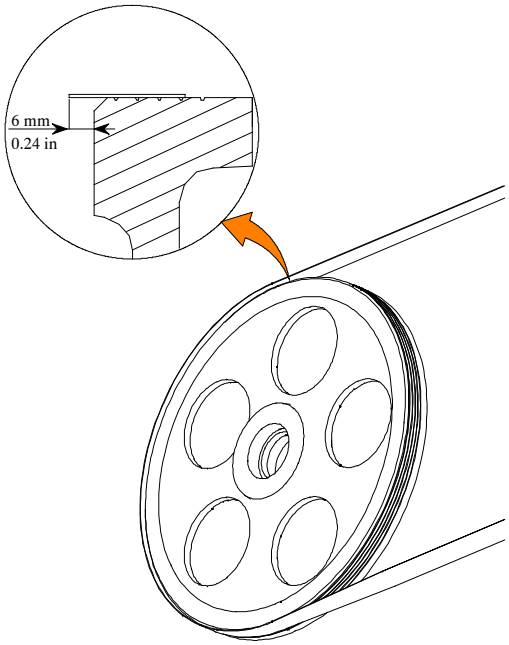


Rotation axis control

Pulleys must be adjusted in their coplanarity. The adjustment is aimed at ensuring the belt rotation, keeping approx. 6 mm (0.24 in) of distance from the point of the belt teeth to the pulley machined surface. This prevents an early wear of the belt.

- ▶ De- tension the band and remove the blade protection;
- ▶ slacken the grub screw and, using a mallet, tap the shaft in or out;
- ▶ Position again the blade protection and make the blade turn;
- ▶ check the distance between the blade and edge of the wheels;

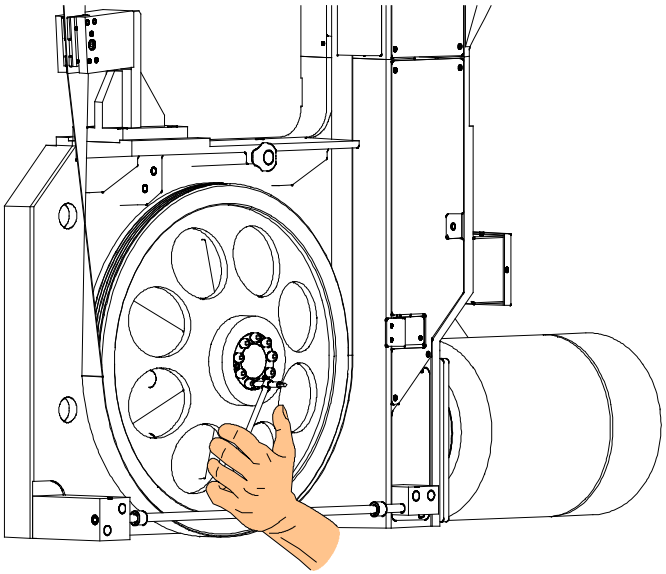




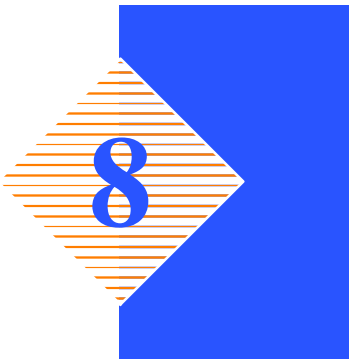
- ▶ if necessary, repeat the operation till getting the correct position.

Rear flywheel alignment is closely linked to adjustment of the front flywheel.

- ▶ Adjust by loosening all pulley locking screws and moving the pulley manually inwards or outwards according to the distance of the blade from the pulley machined surface. Tighten the screws again and check the coplanarity making the belt turn a few times.



Maintenance and choice of consumables



V 20 PT is built to be sturdy and long- lasting It has no need of any special maintenance, though, like all other tools, it needs adjusting from time to time, especially if not regularly looked over or used without due care.

This chapter, therefore, is intended as a guide for those who want to look after the machine and get the most out of it for as long as possible.

The role of the operator

The person operating and maintaining the machine must follow these instructions for his own safety, as well as for the safety of other personnel, and in the interests of machine productivity:

- check that his own work and that of the other operators of the machine always complies with the relevant safety standards. Therefore, check that the safety devices are in position and work perfectly and that personal safety requirements are complied with.
- Ensure that the working cycle is efficient and guarantees maximum productivity, checking:
  - the functions of the main components of the machine;
  - the sharpness of the blade and coolant flow;
  - the optimum working parameters for the type of material.
- Check that the quality of the cut is that required and that the final product does not have any machining defects.

Maintenance requirements

- All ordinary and extraordinary maintenance must be carried out with the power switched off and the machine in emergency condition.
- To guarantee perfect operation, all spare parts must be Hydmech originals.
- On completion of maintenance works, ensure that the replaced parts or any tools used have been removed from the machine before starting it up.
- Any behaviour not in accordance with the instructions for using the machine may create risks for the operator.
- Therefore, read and follow all the instructions for use and maintenance of the machine and those on the product itself.

General maintenance

Daily

- ▶ remove all swarf from the machine (preferably with a non- fibrous cloth);
- ▶ empty the swarf drawer (this is located on the right side of the base);
- ▶ top up the lubricant/coolant level;

- ▶ check state of blade wear and replace if necessary;
- ▶ check the blade cleaning brush, clean and relocate; if worn, replace;

Weekly

- ▶ remove all swarf;
- ▶ clean the vices and lubricate all articulation points and sliding surfaces, preferably with a good quality oil;
- ▶ check the oil level in the hydraulic power pack and, if necessary, top up. Check for oil leaks in the hydraulic hose connections and make sure the hoses are free of kinks.

Monthly

- check the blade perpendicularity to the reference plane of the fixed vices; if it needs to be restored operate as described in Chapter 7;
- check the blade perpendicularity to the working table; if it needs to be restored operate as described in Chapter 7;
- check the state of the widia inserts and the blade steady button; replace if worn or chipped; check their positions and adjust if necessary (see Chapter 7);
- thoroughly clean the bottom of the water tank and the electropump filter.

Maintenance of working parts

The machine maintenance operator must pay special attention to the sliding mechanical systems and to the hydraulic circuit power pack. No maintenance intervention is required for the worm screw reducer installed on the machine.

Consumable materials

It is essential to use specific oils for the pneumatic and lubricant/coolant circuits. The oils suitable for each of these circuits are listed below.

Oil for transmission box

The machine can be equipped with a worm gear which is permanently lubricated and therefore maintenance- free. This gear type has no filler cap, level checker and drain, as it already contains the correct quantity of synthetic oil, guaranteeing perpetual lubrication of the crown and worm gear. Otherwise, the machine can be equipped with a worm gear having filler cap, level checker and drain to top the oil up if necessary. Below, there is a short list of synthetic oils for permanent lubrication:

SHELL Omala Oil 460 - AGIP Blasia 460 - API DT 460 - BP Energol GR XP 460 - CASTROL Alpha SP 460 - FIAT EPZ 460 - MOBIL Mobilgear 634 - Q8 Goya 460

- reducer capacity 10 litres

Oils for hydraulic circuit

The machine is supplied with FOX YE 32 oil. This oil is used by the head cylinder and hydraulic power packs. The following oils may also be regarded as compatible or having equivalent specifications:The machine is supplied with FOX YE 32 oil. This oil is used by the head cylinder and hydraulic power packs. The following oils may also be regarded as compatible or having equivalent specifications:

API Cis 22 - ARAL Dural SR 22 - CASTROL Hyspin AWS 22 - ESSO Spinesso 22 - IP Hydrus oil 22 - TOTAL Azolla ZS 22 - VALVOLINE ETC 22 - MOBIL Velocite oil D - Mobil DTE 22 - MOBIL ATF 220 - OLIO FIAT HTF 22 - Q8 Haydn 22 - SHELL Tellus oil 22 - BP AUTRAN GM- MP.

- reservoir capacity 16,87 litres

Oil for lubricant/coolant fluid

The oil used for the machine lubricant/coolant fluid is CASTROL Syntolin TFX. Though there are no specific standards for these types of oils, hydmech considers that the above product has the best price/quality rapport. The following oils can also be said to have similar characteristics and are therefore compatible:

AGIP NB 200 - SHELL Lutem TT - IP Utens Fluid- F

Finally, a lubricant/coolant guaranteed and distributed by a band saw manufacturer (LENOX) is BAND- ADE SAWING FLUID LENOX.

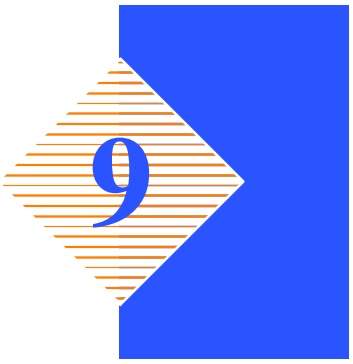
- tank capacity Lt.76
- oil concentration 5- 6 %

Oils for spray mist system (optional)

The oil type used for the machine spray mist system is the cutting oil: Blaser Vascomill F 22.
Though there are no specific standards for these types of oils, hydmech considers that the above product has the best price/quality rapport. The following oils can also be said to have similar characteristics and are therefore compatible:

SHELL MACROM 401 F22 - AGIP ESTRAMET F20

Cutting speed and choice of tools



The cutting speed is determined by the blade speed and the head feed speed. While the head speed is provided by the downstroke movement of the head, the blade rotation speed can either be fixed or variable. This chapter describes the cutting speeds the machine can operate at in the standard version, as well as the speeds for which the optional electronic speed controller (inverter) is necessary. When using the **V 20 PT**, it is important to select the correct type of blade for the material to be cut. This chapter explains the limitations and specific applications of the different types of blades.

Cutting speed

Standard machine

The basic version with 4 pole motor, is provided with the following cutting speeds:

- 1st speed = 20 ÷ 118 m/min/ 65.6÷378.04 ft/min (4 pole)

The inverter is an electronic instrument fitted to the **V 20 PT** for varying spindle motor rpm. The inverter makes life easier for the operator carrying out special cutting tasks by enabling a changing of rotation speed to suit the kind of material being cut. Blade use can thus be optimised, inasmuch as a blade not especially suitable for cutting a certain material can be adjusted all the same to the task, and premature wear is avoided.

Inverter technical specifications	
Protection rating	IP 31
Vibration and shock resistance (EN50178)	0.6 gn from 10 to 50 Hz 2 gn from 50 to 150 Hz
Max. relative humidity	93% without condensation or drop-forming
Acceptable Temperature Range (EN 50178)	For warehouse storing: from -25° C to +65° C For operating purposes: from -10° C to +40° C
Max. altitude	1000mt. (3242.5 ft) with no derating
Supply	- single phase: 200V - 15% to 240V + 10%
	- three phase: 200V - 15% to 230V + 10% 380V - 15% to 460V + 10%
Frequency	50/60 Hz ± 5%
Output voltage	Maximum voltage equal to the supply voltage
Output frequency range	0,5 a 320 Hz
Max. transients	150% of electronic speed control rated current for 60 secs.
Frequency resolution	- Display: 0.1 Hz - Analog inputs: 0.1 Hz per 100 Hz max.
Switching frequency	Adjustable from 2.2 to 12 Hz max.

Inverter technical specifications	
Electronic speed control protection and safety devices	Galvanic insulation between power and control panel
	Short circuit protection: - of available internal supplies; - between U- V- W output phases between phase and earth for calibres from 5.5 to 15Kw
Motor protections	Thermal protection against overheating and overcurrents
Motor protections	Protection integrated in the electronic speed control with 1^2t calculation
	Protection integrated in the electronic speed control with 1^2t calculation
Motor protections	Protection integrated in the electronic speed control with 1^2t calculation

Choice of blade

When using band saws to cut metals, an important factor is the choice of pitch, i.e. the number of teeth per inch (25.4 mm.), which must be suitable for the workpiece material. The following recommendations may be taken as general guidelines:

- thin- walled materials, such as sheet steel, tubes and profiles require a fine pitch frequency. 3 to 6 teeth should be engaged in the breadth of the material at any one time;
- large section cutting requires a coarse pitch to cope with the higher volume of swarf and optimal tooth penetration;
- soft materials (aluminium alloys, soft bronze etc.) also require a coarse tooth pitch.

Saw tooth pitch

The choice of teeth per inch, therefore, depends on various factors:

- the size of the section;
- the hardness of the material;
- workpiece wall breadth.

Very large dimensions require coarse teeth, while small dimensions require finer teeth. Whatever the case, ensure that there are always at least six teeth engaged in the cut, with reference to the thinnest vertical walls positioned transversally to the blade.
Concerning the type of Shark machine, a first broad distinction can be made according to the hardness of materials:

	Mild steels < 61 HRB	Hard steels > 65 HRB
	NR. TEETH/INCH	**NR. TEETH/INCH**
MINIMUM	3 / 4	5 / 8
OPTIMUM	4 / 6	6 / 10
MAXIMUM	8 / 12	10 / 14

Cutting speed and downstroke speed

The cutting speed (m/min or ft/min) and the downstroke speed (cm^2/min or in^2/min) are limited by the heat generated around the points of the teeth. If the

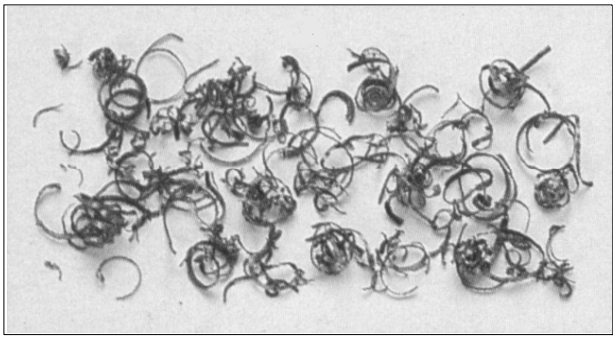
downstroke speed is too high, the cut will not be straight, either vertically or horizontally.

The cutting speed depends, as indicated above, on the tensile strength of the material (kg/mm^2 or lbs/in^2), its hardness (HRB) and the thickness of largest sections. The downstroke speed depends on the material thickness. Therefore, large- section, solid or thick- walled materials (s > 5 mm or 0.20 in), can be cut at high speeds, providing there is sufficient swarf removal from the blade; thin- walled materials, such as slim piping or profiles, must be cut using low and especially constant downstroke speeds.

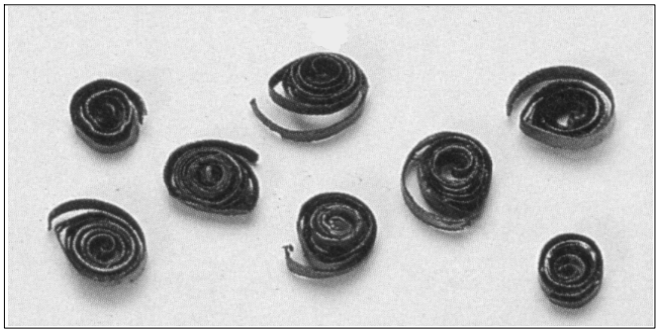
A new blade must be worn in, which in effect means lowering the downstroke speed to about half that of normal (from 60 to 70 cm^2/min or 9.3 to 10.85 in^2/min on normal steels), equal to a removed surface area of about 300 - 600 cm^2 (46.50- 93 in^2).

Types of swarf:

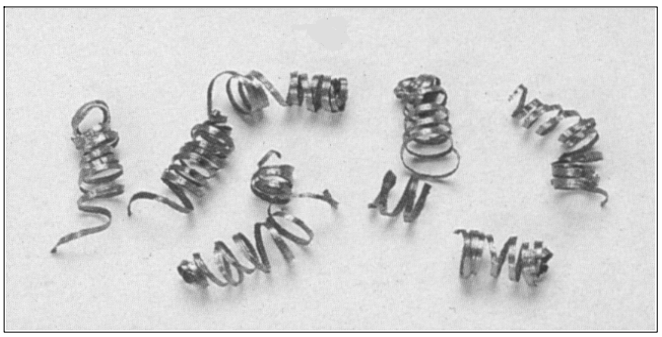
- Very fine or fragmented swarf indicates that the downstroke speed and/or cutting pressure is too low.



- Thick and/or blue swarf indicates that the blade is overloaded.

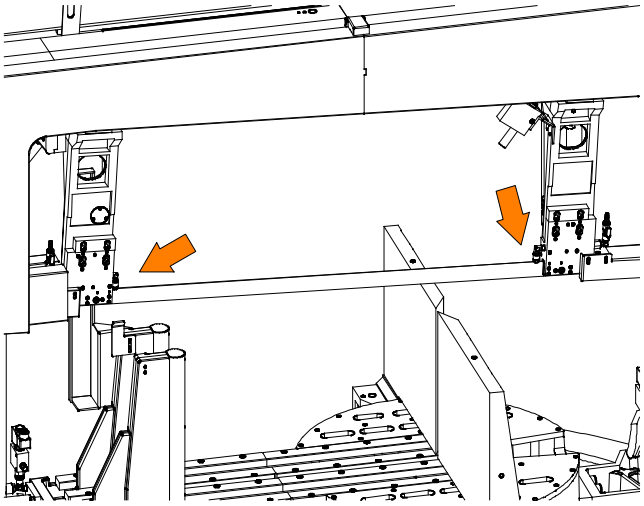


- Long coils of swarf indicate ideal cutting conditions.



Lubricant/coolant fluid (optional)

The lubricant/coolant fluid must ensure so that neither the saw teeth nor the work piece material in the cutting zone overheat. Furthermore, there must be a sufficient quantity and pressure of lubricant/coolant to remove swarf from the cutting zone. The lubricant/coolant fluid must be of the highest quality in order to prevent tooth abrasion and welding of swarf to the teeth themselves (seizing).



Blade structure

The most commonly used blades are the bimetal types, i.e. manufactured with a silicon steel body and having a high fatigue strength, and super high- speed steel teeth; the two parts are welded by electronic or laser- welding.

Standardised teeth types are termed M2 and M42; the difference being that M42 teeth are harder due to the addition of cobalt to the steel used to make the teeth.

Key									
Mo	Molybdenum	Ni	Nickel	Si	Silicon	V	Vanadium	W	Tungsten
Al	Aluminium	C	Carbon	Co	Cobalt	Cr	Chromium	Mn	Manganese

TYPE OF BLADE	*C*	*Mn*	*Si*	*Cr*	*W*	*Mo*	*V*	*Ni*	*Co*	*Al*	*HRC*
	0,47	0,75	0,22	1,00		1,00	0,12	0,52		0,08	45- 50
HSS M2 HRC 65- 66 / HRC 45- 50	0,85	0,25	0,30	4,15	6,37	5,00	1,92				64- 66
HSS M42 HRC 67- 68 / HRC 45- 50	1,07	0,25	0,20	3,75	1,50	9,50	1,15		8,00		67- 69

N.B. The numbers in the columns indicate the % content of the element in the steel.

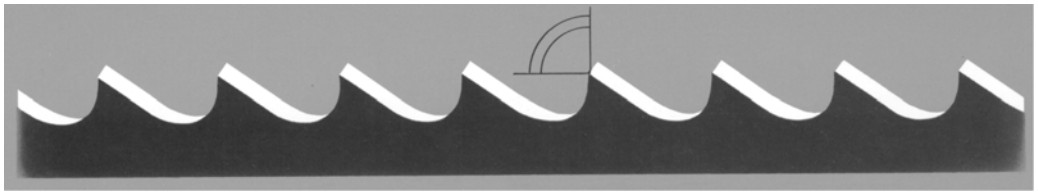
Blade types

The blades mounted on the **V 20 PT** are 5880x41x1,3 mm.(231.50x1.61 x0.05 in); the length can vary between 5850 mm. and 5900 mm. (226.77 ÷ 236.22 in), thanks to the blade tensioner device. The blades, however, apart from size and tooth pitch, are differentiated by other geometrical characteristics which determine their specialised uses:

- tooth cutting angle (rake), can be 0° or positive;
- the tooth pitch can be constant or variable;
- the set, i.e. the various teeth alignments, have many possible configurations.

Conventional rake

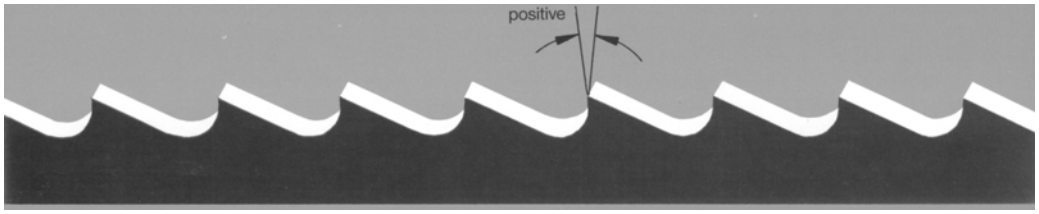
Cutting angle 0°, constant pitch.



In general use, for small or medium section cast iron or steels and rolled materials, for straight or angled cuts.

Positive rake

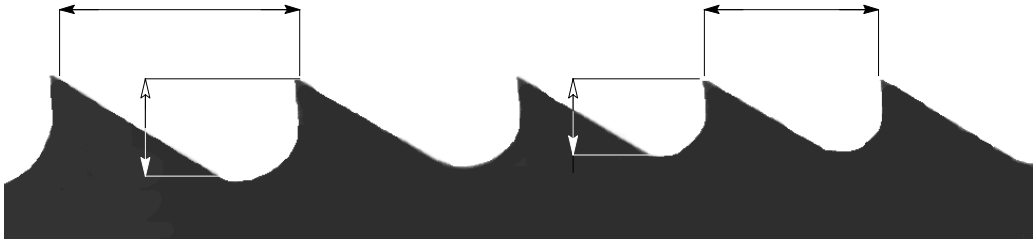
Positive cutting angle 9- 10°, constant pitch.



Can be used for cutting all types of materials, and is particularly suited to low- carbon and non- ferrous steels. Used for cutting very large sections and diameters.

Variable pitch

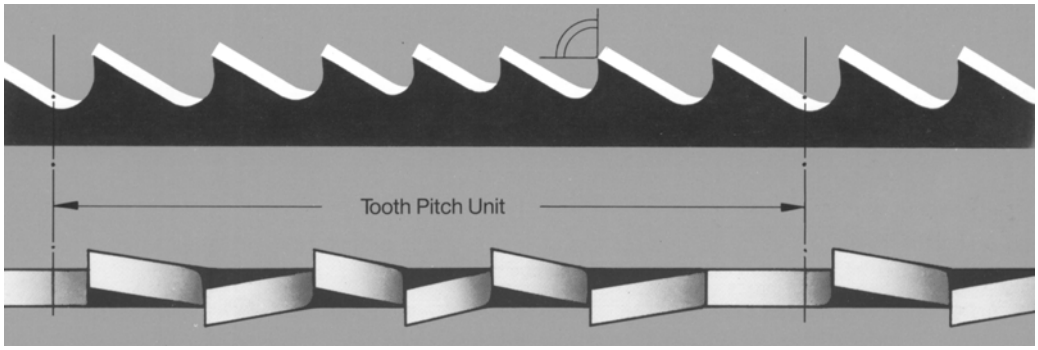
These blades have groups of teeth having different pitches and, as a consequence, have various tooth dimensions and differing relief angles. These are also available in M2 and M42 types with zero and positive rakes. The alternation of the different types of teeth helps to prevent vibration and noise. Elimination of vibration increases the useful life of the tool and improves the cut surface finish.



A further advantage in using these types of blades lies in the fact that a wide range of different material types and dimensions can be cut with the same blade.

Variable pitch blades with 0° cutting angle

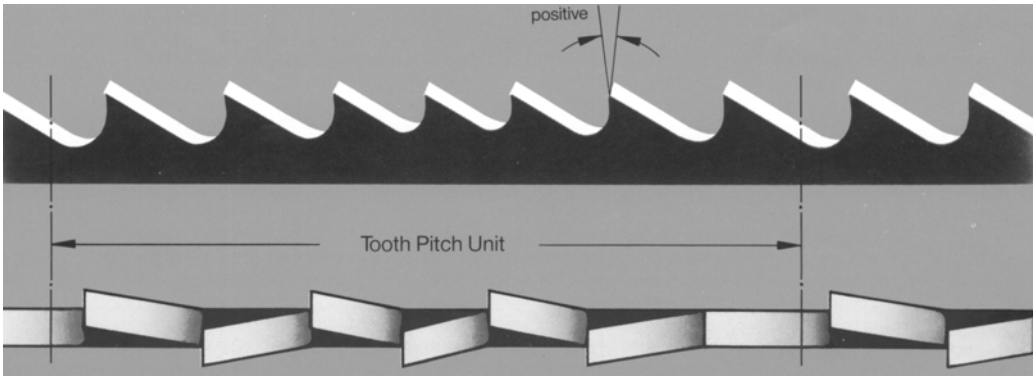
This type of tooth formation is ideal for cutting single pipes or medium size bundles, in accordance with the capacity of the machine.



Pitches available: 3- 4 / 4- 6 / 5- 7 / 5- 8 / 6- 10 / 8- 12 / 10- 14.

Variable pitch with positive rake (from 9 to 10 degrees)

This toothing type is the most suitable for cutting large dimension pipes and profiles, including large sections, as well as for cutting solid sections up to the machine capacity limit.



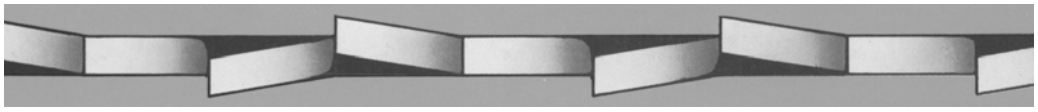
Pitches available: 3- 4 / 4- 6.

Set:

The term set refers to the section of material removed by the blade during the cutting operation, i.e. relating to width of cut and the offset position of the teeth with respect to the blade back.

Standard or splayed set

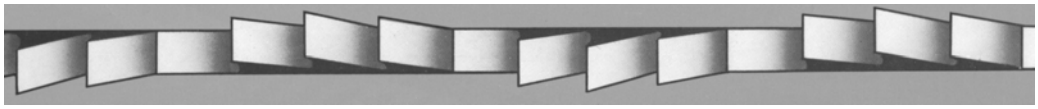
This term is used to describe an alternated angling of the teeth: one to the right, one to the left and one straight.



For general use on materials over 5 mm. (0.20 in) thick. Suitable for cutting steels, castings and non- ferrous hard materials.

Undulated set

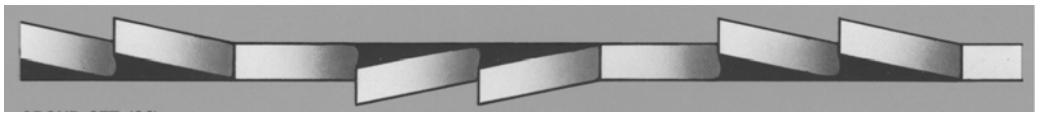
Used to describe groups of teeth undulating alternatively to the right and left.



This type of set is used with very fine teeth for cutting thin pipe walls and small- section profiles (from 1 to 3 mm or from 0.04 to 0.12 in).

Alternating grouped sets

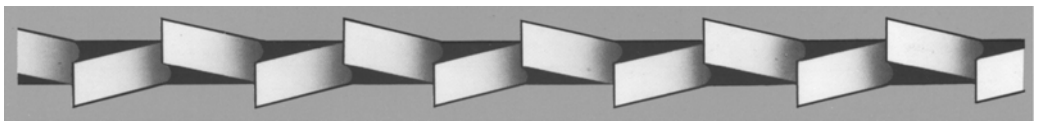
These are groups of teeth angled to the right, one straight tooth, then a further group angled to the left.



This set is used for very fine teeth for cutting very thin sections (less than 1 mm).

Alternating set

This set is one tooth to the right followed by one to the left.



This set is used for soft non- ferrous materials, plastics and wood.

Blade selection table relating to cutting speed and downstroke speed

Cutting material	Cutting speed mt./min	Dimensions of the cutting section S (mm) S10	10S30	30S50	50S80	80S120	120S230	Lubrication	sq. mt./min. cut
Structural steel Casehardened steel Steel for turning Mild steel	50 / 70	14 10 / 14	10 10 / 14	8 6 / 10	6 5 / 8	4 4 / 6	3 3 / 4	Emulsible oil Cutting fluid	60 - 70
High- duty cast iron Rolled steel Spring steel	40 / 50	14 10 / 14	10 10 / 14	8 6 / 10	6 5 / 8	4 4 / 6	3 3 / 4	Emulsible oil	50 - 60
Alloy steel Tool steel Valve steel	30 / 40	14 10 / 14	10 10 / 14	8 6 / 10	6 5 / 8	4 4 / 6	3 3 / 4	Emulsible oil Cutting fluid	15 - 20
Stainless steel Nodular cast iron	30 / 40	14 10 / 14	10 10 / 14	8 6 / 10	6 5 / 8	4 4 / 6	3 3 / 4	Emulsible oil	15 - 20
Copper Soft bronze	90 / 150	14 10 / 14	10 10 / 14	6 5 / 8	4 4 / 6	3 3 / 4	3 3 / 4	Emulsible oil	75 - 90
Brass	90 / 300	14 10 / 14	10 10 / 14	6 5 / 8	4 4 / 6	3 3 / 4	3 3 / 4	Emulsible oil	80 - 90
Hard bronze	20 / 40	14 10 / 14	10 10 / 14	6 5 / 8	4 4 / 6	3 3 / 4	3 3 / 4	Emulsible oil	25 - 40
Aluminium	80 / 800	14 10 / 14	6 10 / 14	4 4 / 6	3 3 / 4	3 3 / 4	3 3 / 4	Emulsible oil	70 - 80
Plastics	90 / 400	14 10 / 14	6 10 / 14	4 4 / 6	4 4 / 6	3 3 / 4	3 3 / 4	Emulsible oil	80 - 90

Blade pitch **Number of teeth per inch**

Classification of steels

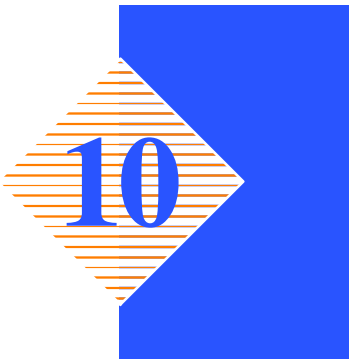
This page provides a table giving the user specific information on the cutting materials, in order that they can be classified on the basis of their hardness, and thus the correct tool can be selected for the task in hand.

Types of steel				Hardness		
UNI	DIN	BS	AISI	Brinell HB	HRB	Kg/mmq
C 22 - C 35	CK 22 - CK 3	En 2 C - En 6	1022 - 1035	160 - 170	34 - 87	55 - 59
C 45	CK 45	En 8	1040	160 - 180	84 - 89	55 - 61
C 10 - C 15	CK 10 - CK 15	En 32 C - En 328	1010 - 1015	150 - 175	81 - 87	51 - 59
C 60	CK 60	En 9	1060	160 - 180	84 - 89	55 - 61
		4360 - 50 A		160 - 180	84 - 89	55 - 61
	17100	3706 - 1.2.3.	ASTMA - 36/68	160 - 180	84 - 89	55 - 61
45 Cr Si 9	17115	4360		160 - 180	84 - 89	55 - 61
		En 20 A		190 - 215	91 - 97	64 - 73
34 Cr Mo 5	17221	970 - 1955	1065	180 - 205	89 - 94	61 - 69
		En 18 B	5135 - 5145	180 - 200	89 - 93	61 - 67
35 Cr Mo 4	34 Cr Mo	En 19 B	4135	200 - 230	93 - 99	67 - 77
	36 Ni Cr 6	En 111	3135	190 - 230	91 - 99	64 - 77
		En 36	3310 - 3315	200 - 230	93 - 99	67 - 77
20 Nc Cr Mo 2		En 362	4315	200 - 225	93 - 98	67 - 75
		En 100 D	8645	190 - 220	91 - 97	64 - 74
	1880 X C 95	DX	W 1	150 - 190	80 - 91	51 - 64
100 Cr 6	100 Cr 6	En 31	52100	210 - 230	96 - 99	71 - 77
		B 2	L 6	190 - 230	91 - 99	64 - 77
52 Nc Cr Mo KU	56 Ni Cr Mo V 7			217 - 248	97 - 102	73 - 83
	2750 (280W18)	18 % W	T 1	217 - 248	97 - 102	73 - 83
		1507 - 825	1310	160 - 220	84 - 91	55 - 64
		A 2	M 13	200 - 230	93 - 99	67 - 77
	210 Cr 46	A 1	D 3	215 - 240	97 - 101	73 - 81
	4845	En 58 G	309 S	150 - 200	80 - 93	51 - 67
X 12 Cr 13	4001	En 56 A	410	150 - 200	80 - 93	51 - 67
X 6 Cr Ni 1810	4301	En 58 E	304	130 - 170	74 - 86	45 - 58
X Cr Ni 1910						
X 8 Cr Ni Mo 1713	4401	1501 - 845	316	160 - 200	84 - 93	55 - 67
Phosphor bronze				60 - 100	56,5	36
Aluminium bronze				70 - 90	49	32
Manganese bronze				95 - 120	51 - 69	34 - 42
Silicon bronze				70 - 100	56,5	36

Classification of steels

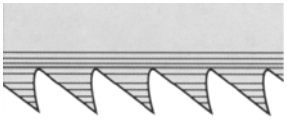
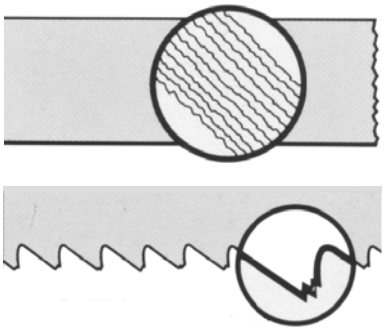
Material	SS Svezia	AISI U.S.A.	DIN Germania	BS Inghilterra	UNI Italia	AFNOR Francia
Carbon steels	1311	1015 - 1035	C 22 - C 35	050 A 20	C 15 - C 35	XC 18
			20 Mn 5 - 28 Mn 6	080 M 46 - 50	C 22 Mn	XC 38 H 1
	1572		CK 22 - CK 50	120 M 19	C 28 Mn	20 M 5
				150 M 28		
Carbon steels	1650	1040 - 1064	CK 60 - CK 101	060 A 40 - 060 A 96		XC 60 - XC 75
			36 Mn 5	070 M 55		40 M 5
	1880	1770 - 1880	Cm 45 - Cm 55	080 A 40 - 080 A 62	C 45 - C 60	XC 42 H 1
						XC 55 H 1
Alloy steel	2120	1335 - 1345		1717 CDS 110		25 CD 4
			25 Cr Mo 4 - 42 Cr Mo 4	708 A 37	25 Cr Mo 4 - 42 Cr Mo 4	
	2255	4130 - 4140		708 M 40		42 CD 4
Alloy steels	2541	4337 - 4340	40 Ni Cr Mo 6	735 A 50, 534 A 99	40 Ni Cr Mo 2 - 40 Ni Cr Mo 7	35 NCD 6
	2230	50100 - 52100	40 Ni Cr Mo 73	817 M 40	30 Ni Cr Mo 8 - 35 Ni Cr Mo 6 KB	50 CV 4
	2258	6145 - 6152	34 Cr Ni Mo 6, 100 Cr 6	311 rodzaj 6, 7	50 Cr V 4, 100 Cr 6	100 C 6
		8630 - 8645				
Tool steels	2310 - 12	D - 2, D - 3	X 210 Cr 12	BD 2, BD 3	X 205 Cr 12 KU	Z 160 CVD 12
	2754 - 55		X 155 Cr V Mo 121		X 155 Cr V Mo 121 KU	Z 200 C 12
Tool steel	2550	S - 1	60 W Cr V 7	BS 1	55 W Cr V 8 Ku	55 NCVD 7
	2710		55 Ni Cr Mo V 6		55 Ni Cr Mo V 6	
Stainless steels	2324	201, 202	X 2 Cr Ni 189	304 S 15	X 2 Cr Ni 18.11	Z 2 CN 18.10
	2333	302, 304	X 5 Cr Ni 189	304 C 12	X 5 Cr Ni 18.10	Z 6 CN 18.09
			G - X 2 Cr Ni 189	304 S 12	G - X 2 Cr Ni 19.10	Z 3 CN 19.10
Stainless steel	2343	314, 316	X 15 Cr Ni Si 2520	316 S 16	X 16 Cr Ni Si 2520	Z 12 CNS 25.20
			X 5 Cr Ni Mo 1812		X 5 Cr Ni Mo 1713	
	2353	317	X 5 Cr Ni Mo 1713	317 S 16	X 5 Cr Ni Mo 1815	Z 6 CND 17.12

Troubleshooting

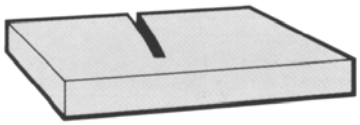


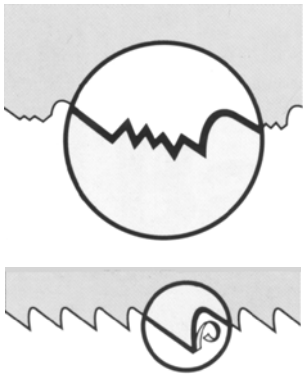
This chapter describes the inspection and troubleshooting procedures for the **V 20 PT**. Regular inspections and efficient maintenance are essential to ensure your machine gives you a long, trouble- free service life. The chapter is divided into two sections: the first being dedicated specifically to TROUBLESHOOTING BLADE AND CUTTING PROBLEMS, while the second TROUBLESHOOTING section concerns troubleshooting general machine operating faults. Taken together they form a comprehensive troubleshooting guide which will enable you to follow a methodical procedure for solving any problem.

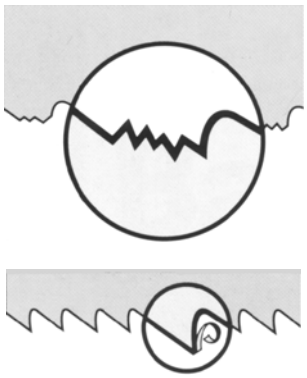
Troubleshooting blade and cutting problems

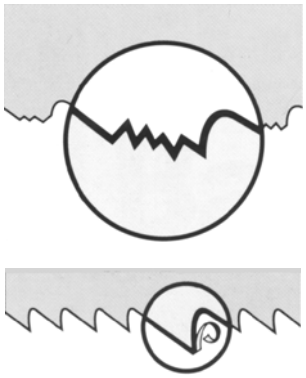
PROBLEM	PROBABLE CAUSE	SOLUTION
Blade scored or scratched 	◗ Widia inserts chipped or worn	☞Replace
	◗ Widia inserts loose or tight	☞Adjust
	◗ Widia inserts dirty	☞Clean and re- adjust correctly
Cutting surfaces scored 	◗ Blade teeth worn	☞Replace blade
	◗ Head downstroke speed too fast	☞Reduce downstroke speed
	◗ Cutting speed too slow	☞Increase cutting speed
	◗ Blade teeth too wide	☞Change for wider teeth
	◗ Free blade guide head too far away	☞Move blade guide head closer so as to leave only that part of the blade free which is needed to effect the cut
	◗ Blade tension low	☞Reset tension to rated tension
	◗ Broken teeth on blade	☞Check and replace blade

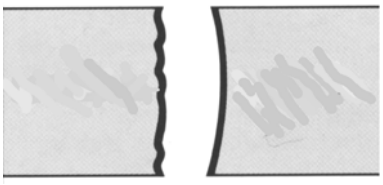
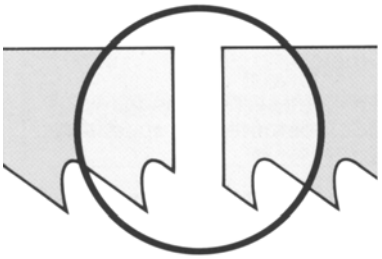
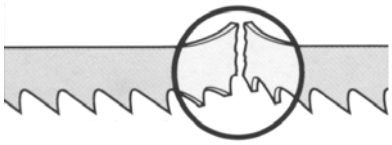
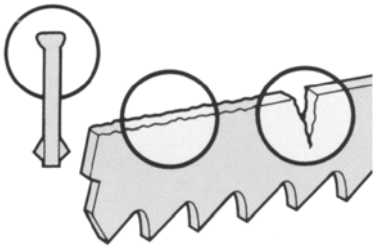
PROBLEM	PROBABLE CAUSE	SOLUTION
Rapid tooth wear 	◗ Teeth pointing in the wrong direction	☞Set teeth in correct direction
	◗ Blade worn in wrongly	☞With a new blade cutting should be done at half- speed and with downstroke speed also at half normal speed. After the blade has been worn in (about 300 cm^2 of work for hard cutting materials and about 1000 cm^2 for soft cutting materials) the cutting and downstroke speeds can be brought up to rated levels
	◗ Material too hard	☞Check cutting speed, downstroke speed and blade pressure, as well as type of band saw being used
	◗ Material defective	☞Surface defects: oxides, sand, surface hardening. Hardened inclusions in section. Reduce cutting and downstroke speeds or clean surface.
	◗ Cutting speed too high	☞The teeth slide on the material without cutting: reduce cutting speed
	◗ Head downstroke speed too slow	☞The band saw runs over the material without removing it: increase downstroke speed
	◗ Insufficient coolant	☞Check coolant level and clean pipes and jets
	◗ Incorrect fluid concentration	☞Check and use the correct concentration
	◗ New blade inserted into a partially- made cut	☞The cutting surface might have been subject to a localised heat- induced alteration, making it harder: recommence cut using a slower cutting and downstroke speed. There may be a broken tooth from the old blade lodged in the cut: check and remove before recommencing work
	◗ Flutter	☞Blade tension too low: tighten. Tooth shape or pitch unacceptable: change type of blade used. Widia blade steady buttons too far from the blade back: adjust guide heads, rotating them slightly to bring them closer to the blade back.

PROBLEM	PROBABLE CAUSE	SOLUTION
Cuts not orthogonal or inclined 	◗ Head downstroke speed too fast	☞Reduce head downstroke speed
	◗ Widia inserts worn	☞Replace
	◗ Inserts loose	☞Adjust width
	◗ Blade guide head positioned wrongly	☞Move mobile head up to the workpiece using the guide plate to leave free only that part of the blade actually needed to make the cut
	◗ Orthogonality between band and working table	☞Check and re- align the blade- guide heads, then re-store the orthogonality between the band and the working table
	◗ Perpendicularity of the band and of the reference plane of the fixed vices	☞Check and re- align the blade- guide heads, then re-store the perpendicularity between band and reference plane of the fixed vices
	◗ Blade tension incorrect	☞Bring pressure up to 60 Bar
	◗ Blade worn	☞Replace blade
	◗ Tooth pitch unsuitable	☞Probably a blade with too many teeth per inch is being used; change for a coarser blade
	◗ Cutting speed too slow	☞Increase the cutting speed
	◗ Wrong coolant	☞Check the water and oil emulsion; check that none of the holes or hoses are blocked; direct the jets correctly
	◗ Broken teeth	☞Check the hardness of the material being cut

Broken teeth 	◗ Cutting speed too high	☞Reduce cutting speed
	◗ Downstroke speed too high	☞Reduce downstroke speed

PROBLEM	PROBABLE CAUSE	SOLUTION
Broken teeth 	◗ Cutting pressure too high	☞Check and set to correct pressure
	◗ Tooth pitch unsuitable	☞Teeth too close together: change blade for one with a coarser tooth pitch
	◗ Swarf welded to teeth and gullets	☞Check blade- cleaning coolant jets. Check the blade-cleaning brush. If the swarf is not removed from the blade it will be drawn back into the cut and weld to the teeth, causing tooth breakage
	◗ Swarf welded to teeth and gullets	☞Check blade- cleaning fluid jets. Check blade- cleaning brush. If the swarf is not removed from the blade it will be drawn back into the cut and weld to the teeth, causing the teeth to break.
	◗ Material defects	☞The material may have altered surface areas, such as oxides or sand, or subcooled inclusions in the section. These areas are much harder than the blade and will cause the teeth to break: scrap or clean these materials.
	◗ Workpiece not clamped	☞The blade may break if the workpiece moves during cutting: check the vice, jaws and clamping pressure
	◗ The blade stops in the cut	☞Cutting pressure too high: check and restore to rated pressure. Downstroke speed too fast: reduce speed. Cutting speed too slow: increase. The blade slips on the flywheels: either the wheels are worn and need to be replaced or the blade tension is incorrect (too low) and must be re- adjusted.
	◗ New blade inserted in a partially made cut	☞The cutting surface may have been subjected to a localised heat- induced alteration, making it harder: recommence cut using a slower cutting and downstroke speed. A tooth from the old blade may be left in the cut: check and remove before restarting work.

PROBLEM	PROBABLE CAUSE	SOLUTION
Broken teeth 	◗ Widia inserts positioned incorrectly	☞Adjust the position of the inserts, especially the width, since blade thicknesses can exceed the manufacturer's declared tolerance ratings
	◗ Widia blade steady buttons	☞Two widia blade steady buttons are located in the top of the blade guide heads which press on the back of the blade to transmit cutting pressure. If these buttons are too far from the blade, the blade may be prone to an up and down undulating action or abnormal vibrations, liable to cause the teeth to break: adjust the position of the heads by rotating them downwards so as to bring the blade steady buttons up against the back of the blade
	◗ Sections with large thickness variations	☞The cutting speed and downstroke speed must be chosen to suit the most critical part of the cut
	◗ Teeth angled in the wrong direction	☞Fit blade so that teeth point in the right direction
	◗ Blade run in wrongly	☞When using a new blade, the cutting and downstroke speeds must be reduced to half the normal operating speed. After the blade has been worn in (about 300 cm2 for hard materials and about 1000 cm2 for soft materials) the cutting and downstroke speeds may be returned to their rated levels
	◗ Insufficient coolant	☞Check coolant level and clean fluid lines and jets
	◗ Incorrect fluid concentration	☞Check and use the correct concentration
	◗ Blade tension too high or too low	☞Check and reset to rated tension

PROBLEM	PROBABLE CAUSE	SOLUTION
Blade path fault 	◗ Front flywheel position incorrect	☞Check that the band saw is correctly positioned on the flywheel. Adjust the position of the flywheel under the blade, moving the shaft of the flywheel
	◗ Flywheels worn	☞Replace
	◗ Gaps full of swarf	☞Clean inside machine using blown air.
	◗ Blade guide head alignment	☞Check and adjust
Blade broken    	◗ Cutting speed too high	☞Reduce cutting speed
	◗ Head downstroke too fast	☞Reduce head downstroke speed
	◗ Cutting pressure too high	☞Check and set to correct pressure
	◗ Tooth pitch unsuitable	☞Teeth too close together: change the blade for one with coarser tooth spacings
	◗ Workpiece not clamped properly	☞The blade may break if the workpiece moves during cutting: check the vice, jaws and clamping pressure.
	◗ Widia inserts positioned incorrectly	☞Adjust inserts position, especially the width, since blade thickness can exceed the manufacturer's declared tolerance ratings
	◗ Widia blade steady buttons	☞Can have a milling action on the back of the blade if worn or chipped, causing cracks from the back towards the teeth.
	◗ Position of blade on flywheels incorrect	☞The blade may be scraping on the edges of the flywheels: this problem is generally caused by blades which are deformed or wrongly welded (conical) Adjust the position of the front flywheel by moving the pin, or change the blade
	◗ Blade tension incorrect	☞If the blade tension is too high or too low, the blade will be subjected to abnormal stress: set the tension back to the rated value.

PROBLEM	PROBABLE CAUSE	SOLUTION
	◗ Blade weld fault	☞The point at which a blade is welded is its most critical point; problems could be caused by welds which are not aligned perfectly or have inclusions or blowholes
	◗ Free blade guide head	☞The head is too far away from the workpiece: move the head closer, leaving free only that part of the blade actually needed to make the cut
	◗ Teeth in contact with the material before starting the cut	☞Always check the position of the blade before starting a new job, especially for the semi- automatic cycle
	◗ Widia inserts	☞If worn, the inserts can score the blade, weakening it even to breaking point. If the inserts are too far apart, the blade will whip, striking both the inserts and the material. Replace or adjust
	◗ Insufficient coolant	☞Check coolant fluid level; clean pipes and jets
	◗ Incorrect fluid concentration	☞Check and use the correct concentration
	◗ The blade stops in the cut	☞Cutting pressure too high: check pressure and reset to rated pressure. Head downstroke speed too fast: reduce. Head downstroke speed too slow: increase. The blade slips on the flywheels: incorrect or low blade tension; readjust or increase.

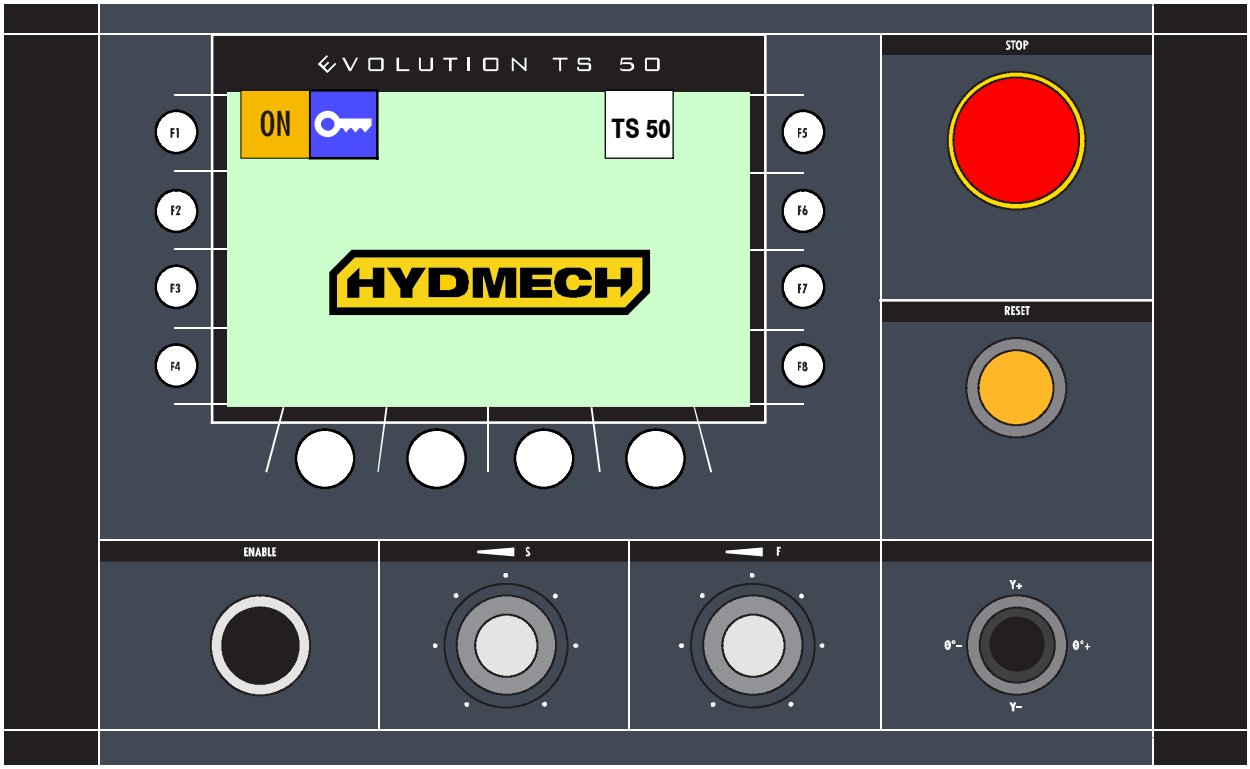
Troubleshooting

This section deals with the problems which may occur during machine operation. Hydmech 50 controller allows you to test all the machine's electric and electronic devices by checking the status of the input and output signals on the IUD/IUV card (see Chapter 6).

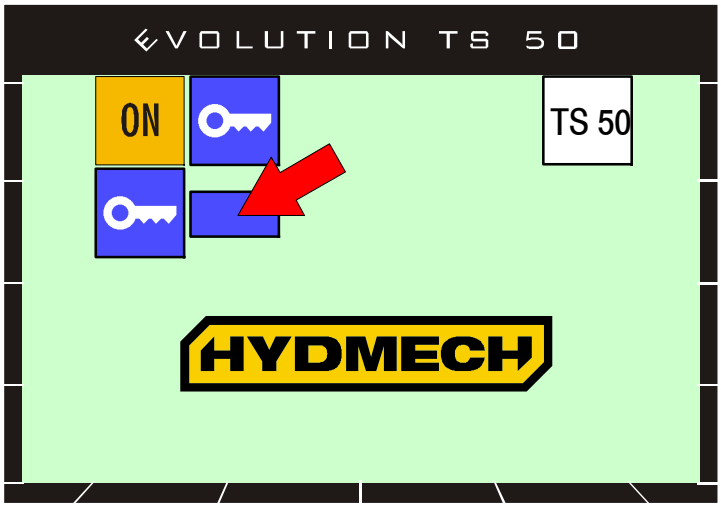
The board IUD/IUV is inside the electric board.

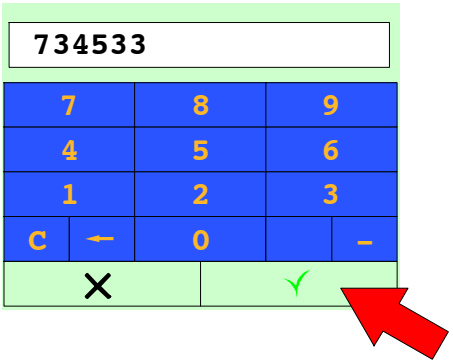
Displaying the diagnostics menu

- ▶ Power the machine by turning the main switch on the left of the control board.
- ▶ Tap on the box on the touchscreen shown in the figure.

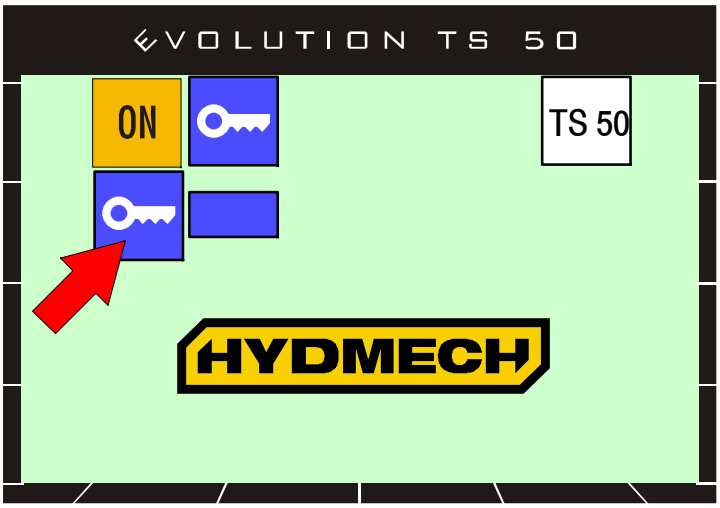


- ▶ The password entry box will open. Tap the box to open the keypad. Enter 734533.

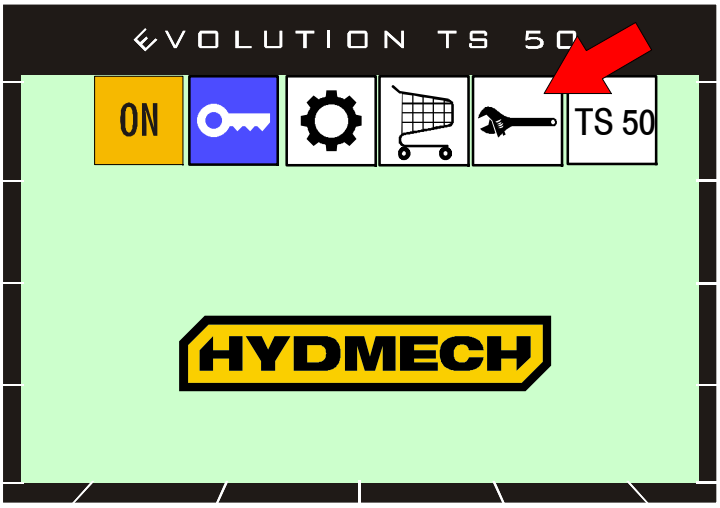




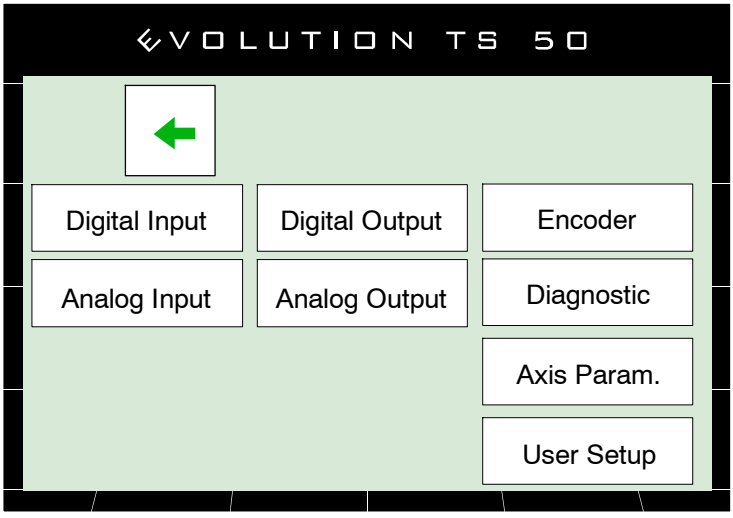
▶ Tap on the box shown in the figure.



▶ Tap on the box shown in the figure.

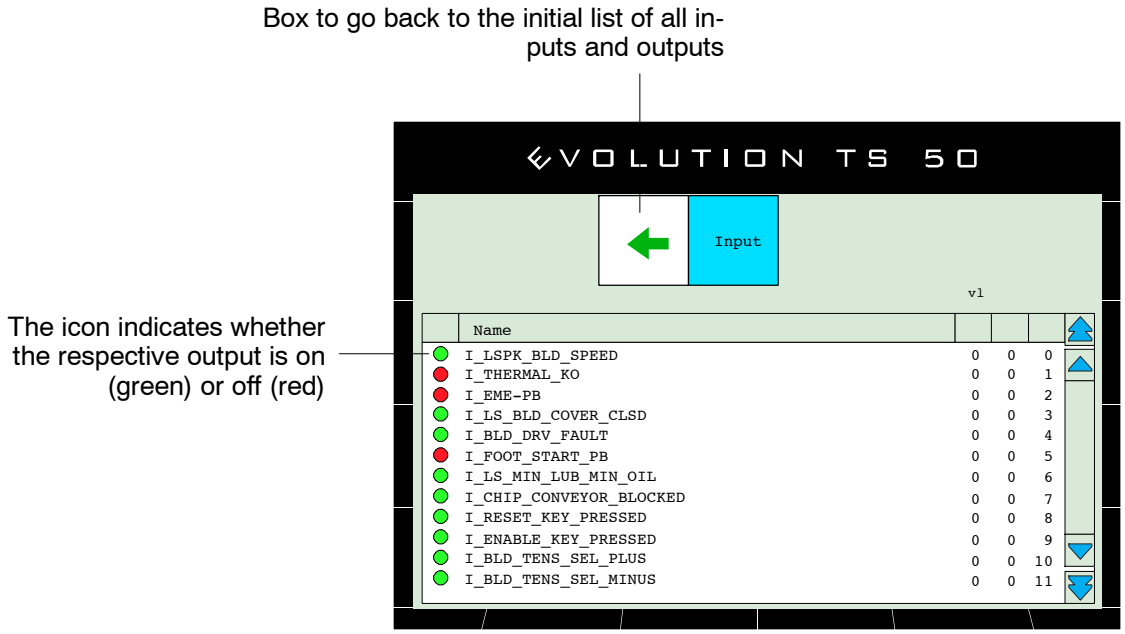


▶ In the Troubleshooting menu, select the type of input/output to be checked by tapping on the corresponding box:



Digital Input

This page can be used to check the state of digital inputs. Information is organised in a table:

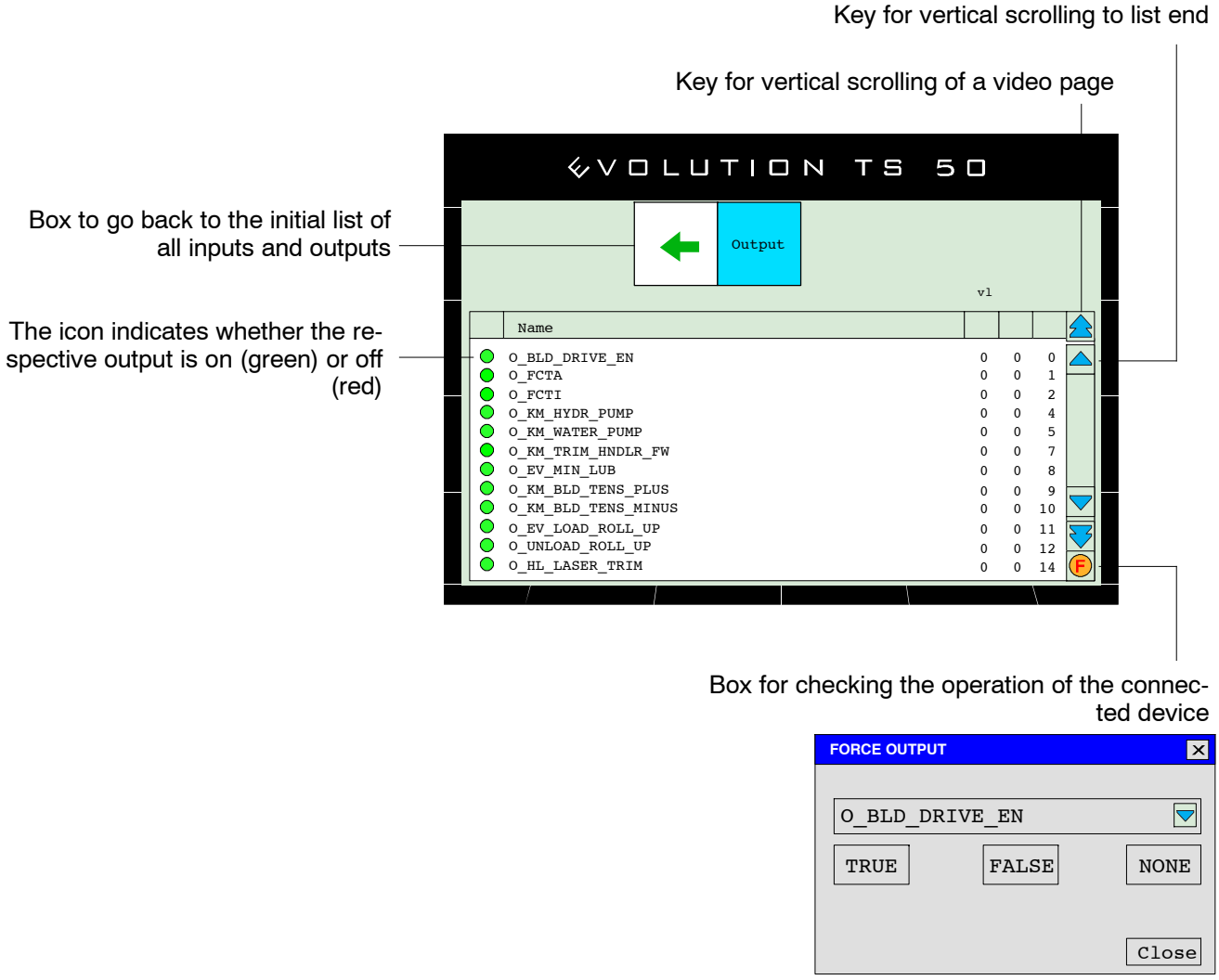


Digital INPUT list

CN15- 1	**INP 0**	I_LSPX_BLD_SPEED	**BLADE SPEED PROXI**
CN15- 2	**INP 1**	I_THERMAL_KO	**THERMAL SWITCHES TRIPPED**
CN15- 3	**INP 2**	I_EME_PB	**EMERGENCY STOP BUTTON OK**
CN15- 4	**INP 3**	I_LS_BLD_COVER_CLSD	**BLADE GUARD CLOSED LIMIT SWITCH**
CN15- 5	**INP 4**	I_BLD_DRV_FAULT	**ALARM INVERTER**
CN15- 6	**INP 5**	I_START_FROM_PEDAL	**START FROM PEDAL BOARD**
CN15- 7	**INP 6**	I_LS_MIN_LUB_MIN_OIL	**LOW OIL LEVEL**
CN15- 8	**INP 7**	I_CHIP_CONVEYOR_BLOCKED	**EVTR BLOCKED**
CN18- 1	**INP 8**	I_RESET_KEY_PRESSED	**RESET BUTTON**
CN18- 2	**INP 9**	I_FAST_JOG_KEY_PRESSED	**SLOW/FAST BUTTON**
CN18- 3	**INP 10**	I_BLD_TENS_SEL_PLUS	**BLADE TENSIONING SWITCH+**
CN18- 4	**INP 11**	I_BLD_TENS_SEL_MINUS	**BLADE TENSIONING SWITCH-**
CN18- 5	**INP 12**	I_XB_JStckMinus	**JOYSTICK X-**
CN18- 6	**INP 13**	I_Y_JStckMinus	**JOYSTICK Y-**
CN18- 7	**INP 14**	I_Y_JStckPlus	**JOYSTICK Y+**
CN18- 8	**INP 15**	I_XB_JStckPlus	**JOYSTICK X+**

Digital Output

This page can be used to check the state of digital outputs. Information is organised in a table:

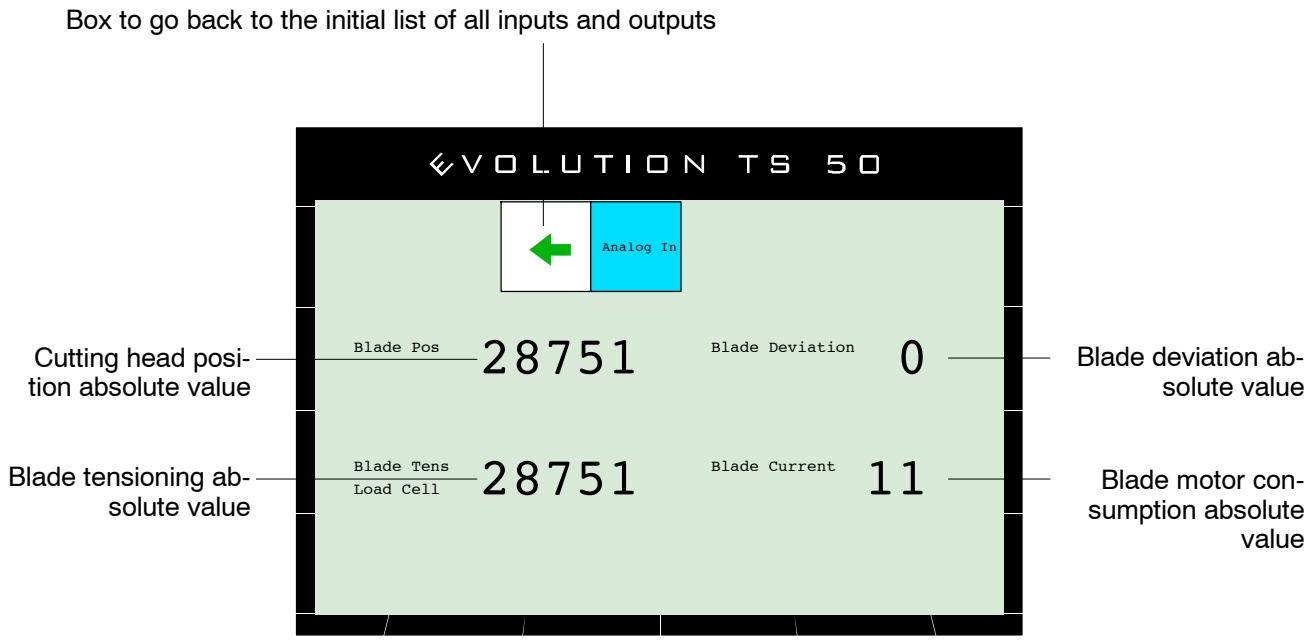


Digital OUTPUT list

CN2- 8	**OUT 1**	O_BLD_DRIVE_EN	**START INVERTER**
CN2- 6	**OUT 2**	O_FCTA	**RHLS**
CN2- 4	**OUT 3**	O_FCTI	**FHLS**
CN3- 5	**OUT 4**	O_KM_HYDR_PUMP	**UNIT START KM**
CN3- 4	**OUT 5**	O_KM_WATER_PUMP	**WATER PUMP START KM**
CN3- 2	**OUT 6**	O_KM_HNDLR_FW	**Free**
CN3- 2	**OUT 7**	O_EV_MIN_LUB	**LOW LUBRICATION SOLENOID VALVE**
CN4- 5	**OUT 8**	O_KM_BLD_TENS_PLUS	**TENSIONING + KM**
CN4- 4	**OUT 9**	O_KM_BLD_TENS_MINUS	**TENSIONING - KM**
CN4- 3	**OUT 10**	O_EV_LOAD_ROOL_UP	**Free**
CN4- 2	**OUT 11**	O_UNLOAD_ROLL_UP	**Free**
CN5- 3	**OUT 14**	O_HL_LASER_TRIM	**LASER PROJECTOR**
CN5- 2	**OUT 15**	O_HL_CUTTING_AREA	**CUTTING ZONE LIGHT**

Analog Input

This page can be used to check the state of analogue inputs. Information is organised in a table:



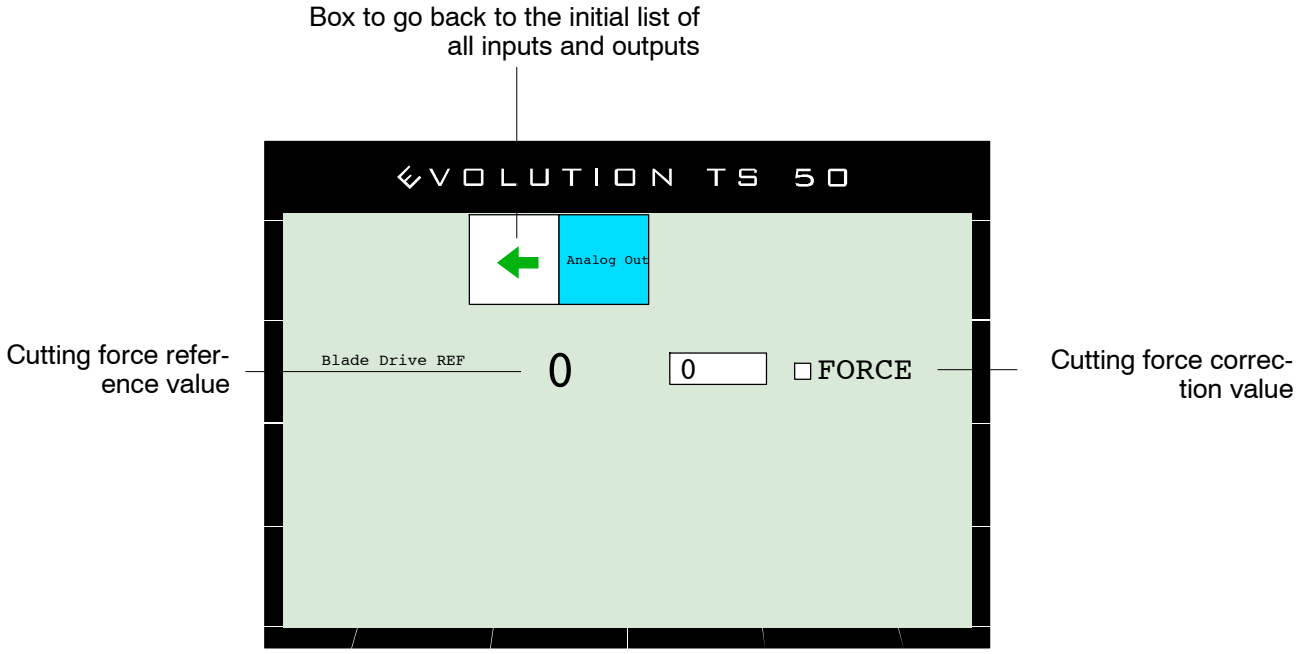
Analog INPUT list

CN11	**INP 0 (16B)**	BLADE POS	**HEAD POSITIONING POTENTIOMETER**
CN24	**INP 1**	BLADE CURRENT	**BLADE MOTOR CONSUMPTION**

CN7	**INP 0**	BLADE TENS LOADCELL	**BLADE TENSIONING CELL**
CN16	**INP 1**	BLADE DEVIATION	**BLADE DEVIATION PROXI**

Analog Output

This page can be used to check the state of analogue outputs. Information is organised in a table:



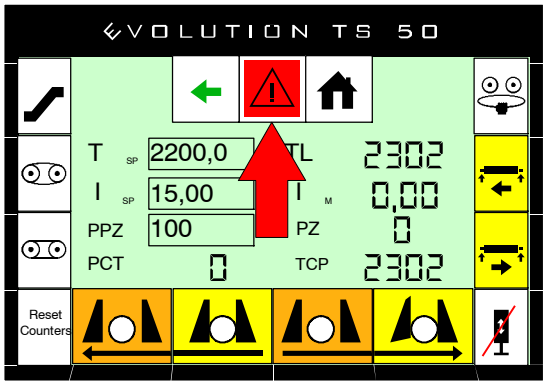
Analogue output list

CN10	**OUT 1**	BLADE DRIVE REF	**BLADE SPEED REFERENCE**
CN10	**OUT 2**	OUT 2	**SPARE**

Machine alarms and warning messages

Alarms

The machine's controller notifies the operator of any alarm or emergency condition which may occur during production by way of acoustic and visual signals. This section lists the messages shown on the display.



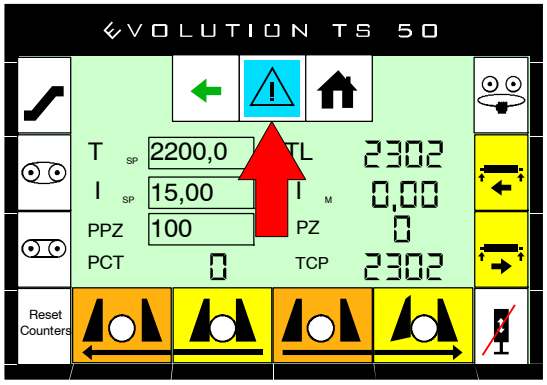
AL1: EMERGENCY: ONE OR MORE ALARMS HAVE TRIPPED	This appears in case of a generic emergency. A specific message follows
AL2: BLADE TENSIONING OUT OF MIN-MAX LIMITS	It is displayed when a mechanical problem occurs in the blade tensioning

AL3: BLADE MOTOR OVERCURRENT	It is displayed during the cutting when the value of the motor absorption is too high
AL4: INSUFFICIENT BLADE REVOLUTION SPEED	This appears when the blade jams in the cut or breaks ▶ Check blade integrity ▶ Check cutting parameters
AL5: HMI EMERGENCY - LOGO OR RESERVED PAGE	This appears in case of controller malfunction
AL6: EMERGENCY STOP BUTTON OR UNIT OPERATED	It is displayed when the emergency mushroom button is pressed
AL7: U AXIS NOT AVAILABLE OR FAULTY OR NOT REFERENCED: CLOSE THE LOGO PAGE AND GO BACK TO THE OPERATIVE PAGE	This appears when the head descent speed adjustment valve is not reset
AL8: XB AXIS NOT AVAILABLE OR FAULTY	This is shown when the pop- up rollers interfere with head revolution ▶ Position the pop- up rollers correctly as shown in Chapter 5
AL9: U AXIS DRIVE FAULTY	This appears in case of head descent adjustment valve malfunction
AL10: XB AXIS DRIVE FAULTY	This appears when there is a head revolution drive malfunction ▶ Check the error code Code: 99/89 = tx/rx failed or no reply Code: 98/88 = rx inconsistent Code: 97 = input over zero X axis off (limit over zero) Code: 96 = X axis limit switch always off Code: 95 = X axis limit switch always on Code: 94 = X axis limit switch inconsistent Code: 93 = short circuit on X axis motor phases Code: 92 = overtemperature on X axis motor phases Code: 91 = driver stepper supply out of range Code: 90/80 = reset phase not existing/blade motor inverter output always off
AL11: LOW MINIMUM LUBRICATION	It is displayed when the oil level in the min. lubrication system lowers. ▶ Top the oil up in the tray till restoring the level.
AL12: BLADE GUARD OPEN @ BLADE CHANGE SEQUENCE DEACTIVATED	This message is displayed if the blade guard is opened, for example, to change the blade. ▶ Make sure the blade guard is closed. ▶ Check the safety limit switch. ▶ Check the connections.
AL13: XB AXIS ENCODER REVOLUTION BLOCKED	This appears in case of head revolution problem

AL14: BLADE DRIVE OR MOTOR FAULTY	This is shown when the blade motor inverter does not work correctly ▶ Check the error code Code: 89 = tx failed or missing Code: 88 = rx failed Code: 87 = rx inconsistent Code: 83 inverter input failed
AL15: CUTTING HEAD VICE VERTICAL INTERFERENCE LIMIT SWITCH	This appears when an attempt is made to close the vice must be head is not all up ▶ Take the head all up This appears when an attempt is made to move the head down and the vice is not all up ▶ Open the vices completely
AL16: FORWARD SOFTWARE LIMIT SWITCH UNDER STARTING POSITION (RHLS < YPOS)	This message is displayed when the cutting start position is lower than the previous position saved for the cutting end position. ▶ Save both the RHLS and FHLS positions again.
AL17: PARAMETER LOADING FAILED: RESTART THE MACHINE	This appears when the parameter reading procedure is not successful
AL18: BLADE POSITION ERROR: CHECK ANALOGUE INPUT	This appears when the potentiometer is broken or sends a message which is not compatible with the machine
AL19: LASER ENGAGED AT START OF CYCLE	This is shown when the cutting cycle is started and the fast approach laser is busy

Warning messages

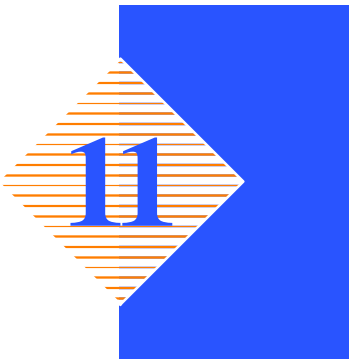
Tap on the box shown on the figure to see warning messages:



WR1: MANUAL CUTTING UNDERWAY	This appears when the manual cycle is underway
WR2: SEMI-AUTOMATIC CUTTING UNDERWAY	This appears when the semi- automatic cycle is underway
WR3: POSITIONING UNDERWAY	This appears when the head positioning is underway

WR4: MINIMUM LUBRICATION: MINIMUM OIL LEVEL REACHED	This appears when there is no oil for minimum lubrication
WR5: SOFTWARE LIMIT SWITCH FORWARD UNDER REVERSE POSITION (RHLS > RHLS)	This appears when the RHLS and RHLS are not coherent
WR6: HYDRAULIC PUMP AUTO-OFF	This appears when the machine switches to power save mode after a given time
WR7: COMMAND INHIBITED	This appears when an incorrect operation is attempted
WR8: CHECK START CUT CONDITIONS: NO ALARMS, BLADE ENABLED, BENCH BRAKED, VICES CLOSED, RHLS < RHLS	This appears when an attempt is made to start the cutting cycle without having checked that the cutting conditions are correct
WR9: AUTOMATIC DESCENT SPEED REDUCTION FOR HIGH CURRENT	This appears when the blade motor current exceeds the setting and correction is applied
WR10: BLADE AT ZERO CUTTING FEED SPEED: CANNOT CUT	This appears when the blade setting is too low
WR11: THERMAL SWITCHES NOK	This appears when a thermal switch trips in the control panel
WR12: CHIP EJECTOR BLOCKED	This appears when the chip ejector is blocked

Accessory Installation



This chapter provides a list of the available accessories that can be fitted to this machine, along with assembly instructions.

Optional

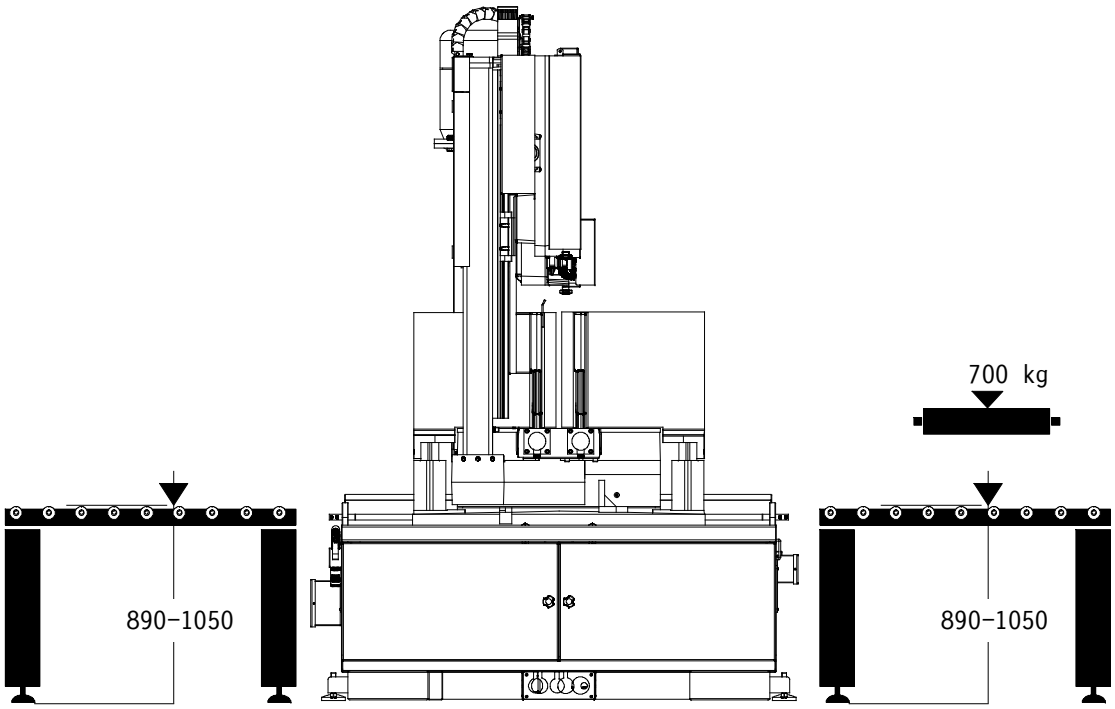
Blade

The blades that can be used on this machine include:

- 5880 x 41 x 1,3 bimetal blade for solid and section materials;

Loading/unloading side planes with pop- up rollers

- Loading/unloading side roller plane with sectional module pop- up rollers mm 1000 (39.37 in).



▶ Fit the adapter supplied with the roller ways on the loading/unloading side fixing it with screws in the holes on the machine.

▶ Remove the cover of the roller way removing the 6 fixing screws.

▶ Engage the roller way to the adapter and fix it by the socket head screws.

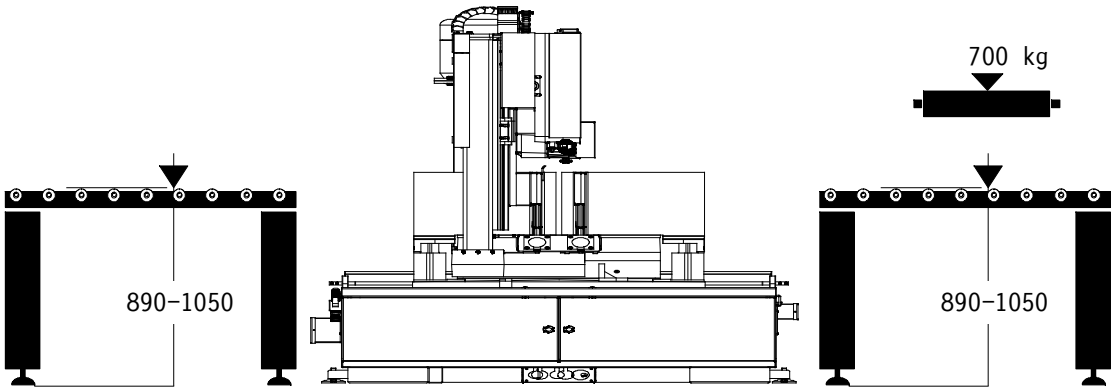
▶ Adjust the roller conveyor coplanarity to the cutting plane, using a ground workshop ruler or a straight section bar, operating on the dowels inside the roller conveyor, on one side, and on the supporting feet of the leg on the other side.

N.B. Considering that the cutting material, during the feeding, must just touch and not scrape on the machine working table, check that the height of the roller way is at least 0.5 mm (0.02 in) higher than the cutting plane.

▶ Position again the cover of the roller conveyor fixing it with the screws.

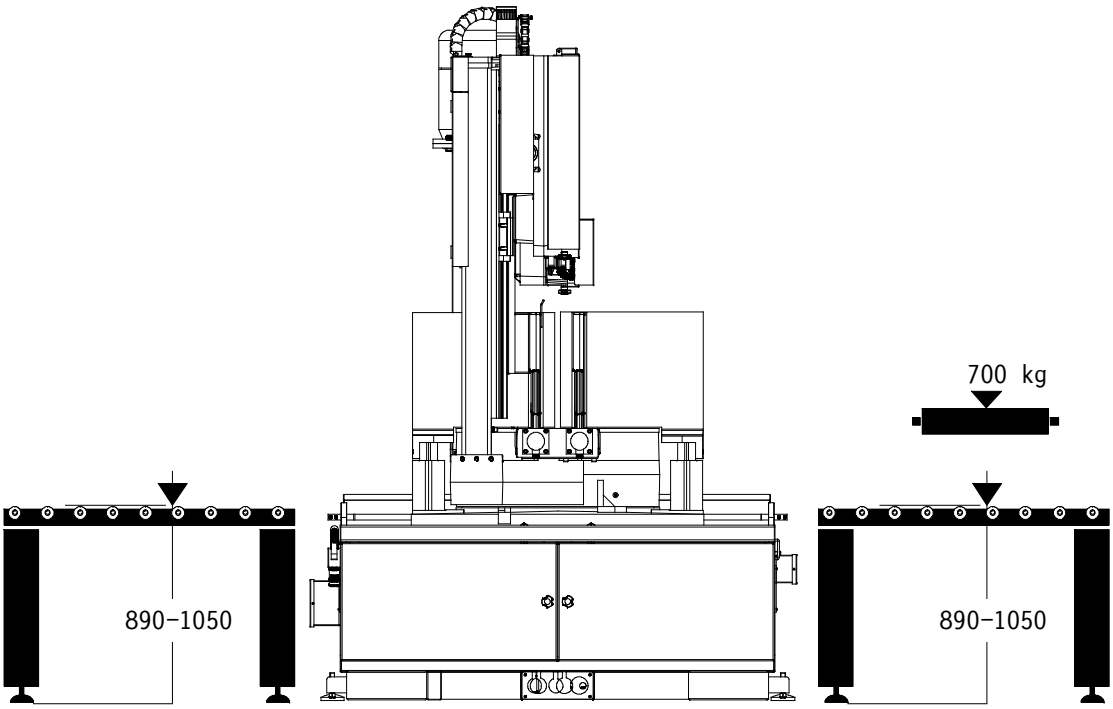
▶ Remove the upper plugs of the hydraulic distribution block in aluminium, then tighten the fast couplings in the same holes.

▶ Insert the hydraulic pipes of the pop- up roller conveyor.



Loading/unloading side planes with idle rollers

- Loading/unloading side roller plane with sectional module idle rollers mm 1000 (39.37 in);



▶ Fit the adapter supplied with the roller ways on the loading/unloading side fixing it with screws in the holes on the machine.

▶ Remove the cover of the roller way removing the 6 fixing screws.

▶ Engage the roller way to the adapter and fix it by the socket head screws.

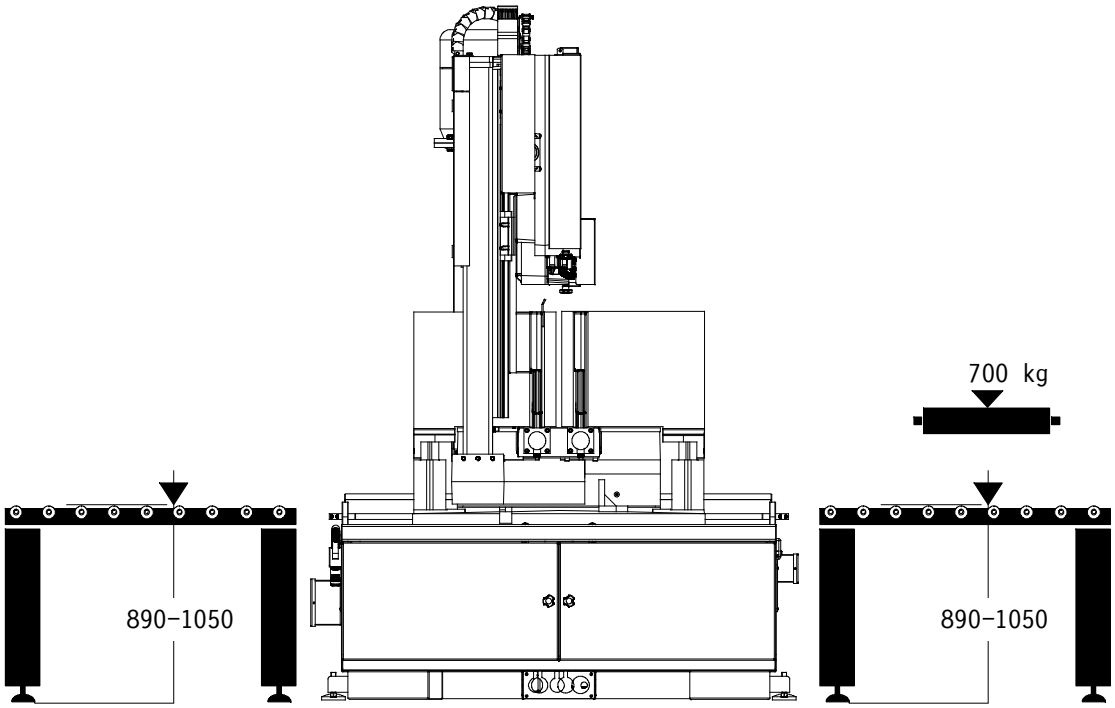
▶ Adjust the roller conveyor coplanarity to the cutting plane, using a ground workshop ruler or a straight section bar, operating on the dowels inside the roller conveyor, on one side, and on the supporting feet of the leg on the other side.

N.B. Considering that the cutting material, during the feeding, must just touch and not scrape on the machine working table, check that the height of the roller way is at least 0.5 mm (0.02 in) higher than the cutting plane.

▶ Position again the cover of the roller conveyor fixing it with the screws.

Right and left hydraulic vertical vices

- Right hydraulic vertical vice and left hydraulic vertical vice.

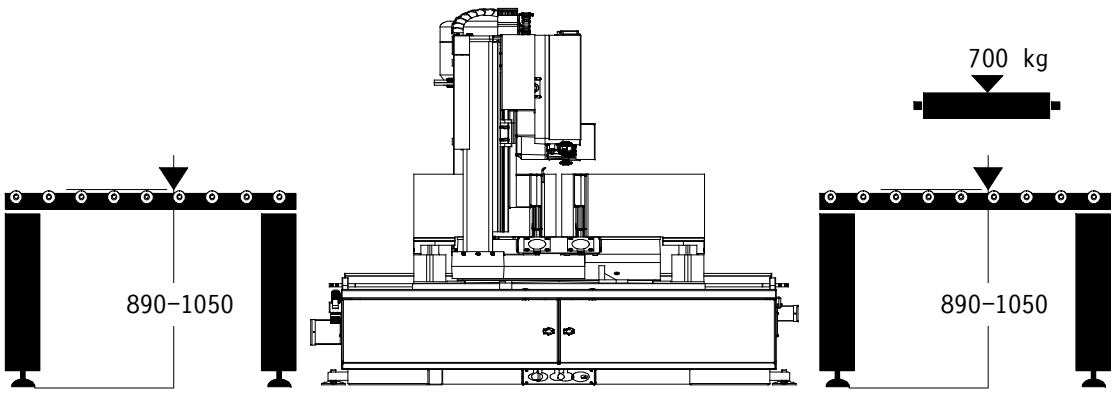


▶ To apply the (right or left) hydraulic vertical vice, fasten it on the cutting plane by the holes already present on the same plane.

▶ Remove the plugs from the hydraulic distribution block.

▶ To apply the right hydraulic vertical vice, position it on the unloading side and fasten it on the cutting plane by the holes already present on the same plane.

▶ Then connect the arranged hydraulic pipes.



Can of emulsible oil

5 l can of emulsible oil.

Minimal lubrication system

This device was designed to improve lubrication of the tool during cutting.

▶ An instruction book is supplied with the kit to explain how to install this optional unit.

Warranty

Hydmech Group warrants each new sawing machine to be free from failure resulting from defective material and workmanship under proper use and service for a period of two years following the date of shipment to the user. Hydmech's sole obligation under this warranty is limited to the repair or replacement without charge, at Hydmech's factory, warehouse, or approved repair shop, of any part or parts which Hydmech's inspection shall disclose to be defective. Return freight must be prepaid by the user.

This warranty, in its entirety, does not cover maintenance items, including but not limited to lubricating grease and oils, filters, V- belts, saw blades, etc, nor any items herein which show sign of neglect, overloading, abuse, accident, inadequate maintenance or unauthorized altering.

Liability or obligation on the part of Hydmech for damages, whether general, special or for negligence and expressly including any incidental and consequential damages is hereby disclaimed. Hydmech's obligation to repair or replace shall be the limit of its liability under this warranty and the sole and exclusive right and remedy of the user.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, WRITTEN OR ORAL, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

This warranty may be not changed, altered, or modified in any way except in writing by Hydmech Group.

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