



# INSTRUCTION MANUAL

TRANSLATION OF THE ORIGINAL INSTRUCTIONS

Machine name:

**Boring - Mill**

Name type:

**HB 130T**

Serial number:

**R059918**

Year of manufacture:

**2018**

Revision:


**1.0**

Customer:

**Alfleth Engineering AG**



LAZZATI S.p.A.  
20027 - Rescaldina - Via Rugareto, 7 - (MILAN) Italy  
Phone: +39 0331 465200 Fax: +39 0331 464151  
[www.lazzati.eu](http://www.lazzati.eu)

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THIS MANUAL IS AN INTEGRAL PART OF THE MACHINE AND THEREFORE MUST BE STORED AND KEPT INTACT FOR THE ENTIRE SERVICE LIFE OF THE MACHINE. IT MUST BE PROVIDED TO ANY OTHER USER OR SUBSEQUENT OWNER.

<b>LAZZATI</b> High-Performance Boring-Mills	Machine name Boring-Mill	Name type T-Type HB 130T	Serial number <b>R059918</b>	Rev. 1	Page 3 of 334
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# Introduction

Revision matrix of the instruction manual and its parts

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	11	1.0				
Manual revision		1.0				
Date		MAY 2018				

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## 0. Introduction

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## 0.1. PURPOSE OF THE INSTRUCTION MANUAL

This INSTRUCTION MANUAL represents a guide for the INSTALLATION, USE, MAINTENANCE and DECOMMISSIONING of the machine, and was prepared in compliance with the following regulations and documents:

- European Machine Directive - 2006/42/EC
- Low Voltage Directive - 2014/35/EC
- Electromagnetic Compatibility Directive - 2014/30/EC
- Safety of Machinery Directive - UNI EN ISO 12100:2010
- WEEE disposal directive, Italian Leg. Decree - 151/05 2002/96/EC
- Harmonised standards EN 60204-1:2006  
(Machine safety - Electrical equipment of machines - Part 1: General requirements)
- Harmonised standards ISO 12100:2010 (Machine safety)
- Harmonised standards ISO 14121-1:2007 (Safety of machinery - risk assessment)
- Customer technical specifications

**Note:** The information preceded by the symbol  must be carefully followed.

Carefully follow all the instructions they contain, as the proper operation and long service life of the machine depend on the correct use and methodical application of the maintenance instructions provided below.


The “ORIGINAL INSTRUCTIONS” contained in this manual were prepared in the language of the manufacturer (Italian). All other versions translated into other languages must be considered a “TRANSLATION OF THE ORIGINAL INSTRUCTIONS”.

If there are any discrepancies between the original Italian version and the relative translation, the original Italian version shall have priority.

Please remember if there are any difficulties or problems, the manufacturer's CUSTOMER SUPPORT SERVICE is available for all clarifications or possible intervention.



Therefore, the manufacturer shall not accept any liability due to the incorrect machine use or insufficient machine maintenance.

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The INSTRUCTION MANUAL is an integral part of the machine: keep this manual for the entire service life of the machine and make sure that all updates sent by the manufacturer after its release are integrated into this document.

Provide this instruction manual to any other user or subsequent owner of the machine.



This manual must be read: by operators who use the machine during production cycles at the company where it is installed as well as by operators who periodically perform maintenance operations at the company.

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## 0.2. HOW TO USE THE INSTRUCTION MANUAL

This instruction manual consists of:

- COVER PAGE WITH MACHINE IDENTIFICATION
- INDEX
- INSTRUCTIONS AND/OR NOTES ABOUT THE MACHINE
- ANNEXES

The COVER PAGE indicates the machine model covered by the manual as well as the serial number of the machine in your possession.

The INDEX can be used to find the CHAPTER and the PARAGRAPH that contains all the information regarding a certain topic.

All of the INSTRUCTIONS AND/OR NOTES are provided in order to identify safety warnings, the correct procedures and the operative skills necessary for proper machine operation.

The ANNEXES contained in this publication are an integral part of this manual



All observations regarding this manual represent an important contribution in order for LAZZATI S.p.A. to improve the service it can offer its customers

Please address these suggestions to:

**LAZZATI S.p.A.**  
**Via Rugareto, 7**  
**20027 Rescaldina (MI) - Italy**


or, via e-mail to:

**[lazzati@lazzati.eu](mailto:lazzati@lazzati.eu)**



The descriptions and illustrations are provided for explanatory purposes only. LAZZATI S.p.A. reserves the right, without changing the essential features of the parts described and illustrated in this manual, to make changes to its machines at any moment that it considers necessary for reasons of improvement and for all constructive and commercial requirements.



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### 0.3. STORING THE INSTRUCTION MANUAL

Use the manual in a manner that does not damage its contents.

Do not remove, tear or rewrite any part of the manual for any reason.


Store the manual in a dry and cool location.

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## 0.4. UPDATING THE INSTRUCTION MANUAL

If any changes are made to the machine installed at the customer site that have been agreed upon with the manufacturer and that involve a change to one or more chapters in the instruction manual, the manufacturer will use the distribution list it has on file to send to the holders of the instruction manuals the chapters impacted by the change with the new revision, the new first page and the new introduction that indicates the new global revision level of the instruction manual based on the revision level of the chapters.

It is the responsibility of the user, following the instructions provided with the updated documentation, to replace the old chapters in all the copies of the documentation with the new chapters, as well as the first page and introduction with those with the new revision level.

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# 1. Machine identification

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## 1.1. PURPOSE OF THE MACHINE

### WORK CENTRE: BORING MACHINE WITH MOBILE COLUMN AND ROTARY TABLE

The **work centre** is a numerically controlled tool machine.

The machine described has a horizontally oriented spindle and is able to perform one or two types of machining: milling and/or boring.

The machine may be fit with the different types of heads described in this manual.

The machine permits automatic tool change from a loader and/or from a storing unit according to the machine's machining program.

The machine has different devices that anchor the part being machined.

The machine includes different functions for different degrees of manual control.

The machine is equipped with **computerised numerical control CNC**: it automatically controls the process by making a constant comparison with the entered numerical data while the operation is in progress.

The machine is designed to perform **milling operations**: the cold forming of metals using a rotating cutting tool.

The machine is designed to perform **boring operations**: fine finishing of the holes previously cold formed in the metal, normally using a single rotating bit.

The machine is able to perform axial movements according to the **operating mode**:

- Manual: the axis is controlled by the combination of a consent device and the actuation of a command using the hand wheel
- Automatic: the movements are programmed and take place on multiple axes

The machine has one or two **work areas**: space where the metal cutting process takes place.

The cutting is performed as a result of the combined rotation and advancing of the spindle on which the tool is secured: the tool has different forms and geometries based on the work being performed.



Refer to the following manual chapters for a detailed description of the machine, its units and their purpose.

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## 1.2. MACHINE COMPOSITION

The machine mainly consists of the following units:

- |                       |                                 |
|-----------------------|---------------------------------|
| 1. Column bed         | 9. Temperature stabilising unit |
| 2. Column             | 10. Coolant tank                |
| 3. Head               | 11. Telescopic covers           |
| 4. Table bed          | 12. Fixed guards                |
| 5. Work surfaces      | 13. Mobile guards               |
| 6. Chip conveyor      | 14. Control cabin               |
| 7. Electrical cabinet | 15. Tool magazine               |
| 8. Hydraulic unit     | 16. Tool pick-up                |



The composition of the units can be implemented according to specifications during the machine design phase: the final layout provided by the manufacturer shall prevail.

L932023-10-00



The design and assembly of the machine shall always comply with the essential requirements on safety and the protection of health indicated by the DIRECTIVE 2006/42/EC "Machine Directive"

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### 1.3. MAP OF THE WORK GROUPS AND AREAS

The machine is mainly divided into the following units:

1. Tool magazine
2. LH work bay
3. RH work bay
4. Scrap/chip conveyor
5. Area for positioning scrap/chip boxes
6. Carriage movement area
7. Control cabin
8. Passage area for accessing the control cabin and the electrical panel
9. Maintenance area for the hydraulic, pneumatic and coolant systems.



Access to the work areas (with the exception of area 5) requires an access request and the opening of mobile guards or deactivation of photosensitive barriers.

Refer to the following chapters for more information regarding the access methods.




The division of the areas can be agreed upon during the machine design phase: the final layout provided by the manufacturer shall prevail.

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The design of the machine work areas and their access methods shall always comply with the essential requirements on safety and the protection of health indicated by the DIRECTIVE 2006/42/EC “Machine Directive”



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## 1.4. DEFINITION OF THE REGULATED RELATIONSHIPS

This instruction manual has been prepared for the machine described herein.

Any use that is different and does not comply with the requirements of the manufacturer shall be considered improper.

This manufacturer does not provide warranty coverage for damage deriving from improper use or use that does not comply with the requirements.

### General warnings

This instruction manual informs the user about the correct and safe methods for transporting, handling, installing, commissioning, servicing and repairing the machine.

Please keep in mind that, with the exception of the essential features of the machine, it is possible that some parts of the instruction manual have been changed due to design improvements. Based on these improvements and changes, it is possible that the illustrations and descriptions do not exactly correspond to your machine.

LAZZATI reserves all the reproduction rights related to the machine.

It is prohibited to reproduce, even partially, diagrams, drawings, procedures, texts prepared and provided by LAZZATI without the prior written authorisation of the manufacturer.

LAZZATI reserves the right to make changes to the machine's technical features, diagrams, drawings and procedures at any moment.

### The manufacturer shall not be held responsible:

- If the transport, handling, installation, commissioning, maintenance and repair procedures are not carried out, or are carried out in a manner that differs from what is indicated in this instruction manual.
- In the case the machine has been assembled or used in different conditions than what is indicated by this instruction manual.
- In case the installation and maintenance has been carried out by non-authorized personnel.
- For damage due to wear, force majeure and/or connections with non-original devices or accessories or in any case devices that have not been approved by the manufacturer.
- For damage caused to third parties or property, due to improper use or abuse of the machine or tampering with protections and/or safety devices fit on the machine.

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## 1.5. IDENTIFICATION OF THE MACHINE AND CE PLATE

The machine's identification data are provided on the cover page of this manual.

The machine identification plate is applied on the machine frame.

The plate displays the following information:

1. MANUFACTURER NAME AND LOGO
2. "CE" MARK
3. MACHINE MODEL
4. MACHINE SERIAL NUMBER
5. YEAR OF MANUFACTURE

The serial number must always be indicated when contacting the manufacturer when reference must be made to the machine.



It is absolutely prohibited to remove or tamper with the identification plates.

<b>LAZZATI</b>		<b>CE</b>
LAZZATI s.p.a. - Via Rugareto, 7 - 20027 Rescaldina (MI) Italia		
DESIGNAZIONE MACCHINA	<input type="text"/>	
DESIGNAZIONE TIPO	<input type="text"/>	
MATRICOLA	<input type="text"/>	
ANNO DI COSTRUZIONE	<input type="text"/>	

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A machine data plate that identifies the technical specifications of the electrical system is applied on the machine's electrical panel

The plate displays the following information:

1. MANUFACTURER NAME AND LOGO
2. "CE" MARK
3. NOMINAL VOLTAGE
4. FREQUENCY
5. NO. OF PHASES
6. WIRING DIAGRAM CODE
7. WEIGHT
8. YEAR OF MANUFACTURE
9. EFFECTIVE ABSORBED CURRENT
- 10.TOTAL INSTALLED POWER
- 11.BREAKING CAPACITY
- 12.MACHINE SERIAL NUMBER
- 13.REFERENCE STANDARD
- 14.DEGREE OF PROTECTION




It is absolutely prohibited to remove or tamper with the identification plates.

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## 1.6. COPY OF THE DECLARATION OF CONFORMITY

COPY

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## 1.7. MANUFACTURER IDENTIFICATION DATA

LAZZATI S.p.A.

Registered office:

Viale Monte Santo 1/3 – 20124 Milan (MI) – Italy

Offices and plant:

Via Rugareto, 7 - 20027 Rescaldina (MI) Italy


### Contacts

Telephone: +39 - 0331 – 465.200 (4 lines)  
 Fax: +39 - 0331 – 464.151  
 Website: <http://www.lazzati.eu>  
 E-mail:  
 Webmaster: [lazzati@lazzati.eu](mailto:lazzati@lazzati.eu)  
 Marketing Dept.: [marketing@lazzati.eu](mailto:marketing@lazzati.eu)  
 Service Dept.: [service@lazzati.eu](mailto:service@lazzati.eu)  
 Technical Dept.: [tech@lazzati.eu](mailto:tech@lazzati.eu)  
 Purchase Dept.: [acqui@lazzati.eu](mailto:acqui@lazzati.eu)  
 Administrative Dept.: [amm@lazzati.eu](mailto:amm@lazzati.eu)

## 2. Health and safety information

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## 2.1. WARNINGS

This chapter must be read carefully before performing any work on the machine.

The machine is built according to the latest technology and complies with applicable safety and health protection laws.

The precautions to be observed to ensure safe operations of the machine are described herein. The machine must not be operated until these precautions have been thoroughly understood. Any failure to observe the basic rules and precautions about safety may cause accidents during operation, maintenance or repair of the machine. The machine may only be used, repaired and serviced by qualified personnel, who must have read and understood the following instruction manual.

The operator must pay maximum attention to potential hazards and have received the proper training and have the proper skills and tools necessary to carry out his tasks correctly.

Structural damage or improper changes, alterations or repairs could change the machine limits.

In any case, changes to the safety devices are prohibited.

Installation of the machine in explosive environments is prohibited.

The operator must not climb on the machine or cross it except if using the specific passages that may be provided: these passages must always be kept unobstructed and clean of any oily residues.

Scheduled and non-scheduled maintenance must be carried out on the machine when stationary and disconnected from the electrical power supply.

Any work performed on the hydraulic and pneumatic systems may only be carried out after releasing the pressure inside the systems.

The electrical systems may only be repaired after the voltage has been disconnected and the emergency button pressed.


Tools may only be replaced when the machine is not operating or moving.

It is absolutely prohibited to use screwdrivers, hands or anything else on moving parts or use containers of liquids near electrical parts.

The work station must always be kept clean and well ordered.

The operators must not perform operations that are not specified in this manual and not foreseen for the work being performed, as they may jeopardise their health.



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Operators are recommended to use, as required, protective goggles, gloves, masks and personal protective equipment against noise as well as suitable footwear and, in general, to wear suitable garments, as indicated in the following paragraphs.

A different use of the machine that does not comply with the requirements of the manufacturer is considered not regular.

For damages that result, the manufacturer does not respond within the framework of its warranty.

The customer must ensure the provision of facilities for proper installation of the machine with normal and emergency lighting, appropriate for avoiding the presence of shadows, preventing annoying glare and dangerous stroboscopic effects, and adequate for the planned operation, as the lack of lighting could lead to serious risks.

Suitable ventilation and aspiration, emergency escape routes, emergency devices and rooms and systems for accident prevention and worker protection shall be guaranteed in accordance with regulatory provisions. It will also be necessary to provide connection lines for supply and discharge as well as for emergency power supplies. Suitable devices shall be provided for handling the parts to be machines and the machine parts, as well as suitable devices for the collection and subsequent disposal of residues, even special material (oils and grease, broken or waste material, etc..).


Access shall be prohibited for non-authorised individuals by providing warnings for specific situations, such as people with prosthetics or pacemakers, etc..

The customer will be equipped with adequate systems and equipment for anti-fire and weather protection against lightning and electromagnetic interference.

The customer must ensure the provision of personal protective equipment for employees and visitors.

Operators and maintenance personnel must also be trained, and in particular they must be provided with basic training as well as training suitable for their relative tasks.

Operators and maintenance personnel must also be provided instructions, which includes reading and understanding the operating and maintenance manuals, diagrams, signalling signs, reproduction of parts of manuals with local sheets for special situations (for example, emergency stop, restart, behaviour if safety devices are tripped).

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## 2.2. TECHNICAL STANDARDS OF REFERENCE

UNI EN ISO 12100:2010 Safety of machinery -

General principles for design - Risk assessment and risk reduction

UNI EN ISO 13849-1:2008 Safety of machinery -

Safety-related parts of control systems -Part 1: General principles for design

UNI EN ISO 13850:2008 Safety of machinery -

Emergency stop - Principles for design

UNI EN ISO 13857:2008 Safety of machinery -

Safety distance to prevent danger zones being reached by the upper and lower limbs

UNI EN 349:2008 Safety of machinery - Minimum gaps to avoid crushing of parts of the human body

UNI EN 953:2009 Safety of machinery -

Guards - General requirements for the design and construction of fixed and movable guards

UNI EN ISO 14119:2013 Safety of machinery -

Interlocking devices associated with guards - Principles for design and selection

UNI ISO/TR 14121-2:2010 Safety of machinery - Risk assessment –

Part 2: Practical guide and examples of methods

CEI EN 60204-1:2006 – Safety of machinery– Electrical equipment of machines

UNI EN 12417:2009 Machine Tools - Safety - Machining Centres

UNI EN 13128:2009 Safety of machine tools - milling machines (including boring machines)

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## 2.3. SAFETY INSTRUCTIONS

- In the case of faults, only let specialised personnel authorised by the factory manager work on the machine

In any case, contact the manufacturer's technical support service.

- The machine was built in accordance with the most recent safety regulations; however it is recommended to keep in mind that all moving components can represent a hazard. Therefore, it is recommended never to work on any moving parts.

- The machine is equipped with fixed and mobile protections that enclose the machine movements.

To protect operator safety, a magnetic safety microswitch is applied on the mobile guards (doors) that does not permit their opening as long as the machine is moving. The machine can only be operated with the doors closed.

- The mobile/openable guards that require a key are not protected with microswitches, therefore their opening will not stop machine operation. Therefore it is recommended to press the emergency button and disconnect the voltage to the machine to stop its motion before opening them.

- Machine handling, operating, adjustments, maintenance and repairs must be entrusted to personnel who are qualified and skilled in carrying out these functions. Do not have these tasks carried out by operators who are under the influence of alcohol, narcotics, sedatives or people who are clearly fatigued.

It may be risky for people with personal medical prostheses, such as pacemakers and hearing aids, to come near the machine as it produces electromagnetic emissions due to some of its components, although they lie within the maximum limits by law and current regulations.

- The machine may only be used by qualified personnel and by the number of operators indicated in the specific paragraphs.

- Personnel assigned to machine use and maintenance must wear CLOTHING that is suitable for the work environment and according to the specific situation. In particular, operators must not wear loose clothing, chains, bracelets, rings or anything that could become caught in moving components.

- Before starting to work, personnel must be perfectly aware of the position and function of all the controls and the specifications of the machine

- It is absolutely prohibited to operate the machine in automatic mode with safety and/or mobile controls disassembled.

- It is absolutely prohibited to inhibit the safeties installed on the machine.

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- It is absolutely prohibited to carry out any maintenance, setting or adjustment operation on moving components; before carrying out any of these operations follow the specific instructions in each paragraph.
- Do not attempt to start the machine if damaged.
- Inform the maintenance manager of any operating irregularity.
- Only use original spare parts from the manufacturer.
- During all maintenance, repair or adjustment operations it is recommended to place a sign on the control panel on the machine or on the main power switch (depending on the case) that indicates the following:


ATTENTION! DO NOT TOUCH - SERVICE PERSONNEL WORKING.

All maintenance work must be carried out only when the machine is stationary and by qualified personnel. To isolate the machine from the power, disconnect the voltage using the main switch (a padlock can be inserted to lock the main switch) and close the pneumatic circuit before performing any maintenance work.

- After performing adjustment work with reduced safeties, the machine status with active guards must be restored as soon as possible.
- Operators are required to inform their direct supervisors immediately of any defect and/or potentially dangerous situation detected on the machine; this must be done after stopping the emergency button and switching the main switch to "0".
- Never change any part of the machine (such as connections, perforations, finishes, ....) for any reason in order to adapt it to additional devices; if there is a malfunction resulting from the failure to comply with the above the manufacturer shall not be responsible for the consequences.

We recommend making a direct request to the manufacturer's CUSTOMER SUPPORT SERVICE if changes are required.

- The operations regarding the use and maintenance of commercial components fit on the machine, if not indicated in this manual, are contained in the attached publications.
- Observe the environmental installation conditions
- When carrying out loading, adjusting, part change, cleaning, repair and maintenance work, adopt the necessary measures and precautions so that the machine or its parts are not placed in operation, even accidentally, by third parties.

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## 2.4. THE MANUFACTURER SHALL NOT BE HELD RESPONSIBLE:

- In the case the machine has been transported, handled, installed, commissioned, serviced and repaired in a different way than as indicated in this instruction manual.
- In the case the machine has been assembled or used in different conditions than indicated by this instruction manual.
- In the case the installation and maintenance has been carried out by non-authorized personnel.
- For damage due to wear, force majeure and/or connections with non-original devices or accessories or in any case devices that have not been approved by the manufacturer.
- For damage caused to third parties or property, due to improper use or abuse of the machine or tampering with protections and/or safety devices fit on the machine.

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## 2.5. GLOSSARY

<b>Hazard:</b>	Potential source of hazard
<b>Damage:</b>	Physical injury or damage to health
<b>Hazardous area:</b>	all the spaces inside and/or around the machine where a person could be exposed to a hazard
<b>Exposed person:</b>	Any person located fully or partially in a hazardous area.
<b>Operator:</b>	The operator must be a person who has received training regarding machine operation.
<b>Risk:</b>	A combination of the probability that damage will occur and the seriousness of that damage
<b>Intended use:</b>	Machine use in compliance with the user information provided in the instructions
<b>Reasonably foreseeable incorrect use:</b>	Use of the machine in a manner other than that indicated in the operating instructions which could derive from easily foreseeable human behaviour.
<b>Man - machine interaction:</b>	Any situation in which an operator interacts with the machine in any operating phase and at any moment during its service life.
<b>Operator qualification:</b>	Minimum skill level that the operator must have to carry out the described operation.
<b>Number of operators:</b>	Suitable number of operators for carrying out the described operation, deriving from a careful analysis carried out by the "manufacturer", therefore using a different number of operators could prevent reaching the expected result or place the safety of the people involved in danger.
<b>Machine status:</b>	<p>operative condition of the machine</p> <ul style="list-style-type: none"> <li>- the operating mode: automatic operation, with maintained action control (jog), stop, etc.</li> <li>- the condition of the safeties on the machine: included guards, excluded guards, emergency stop pressed, type of power source insulation, etc.</li> </ul>
<b>Protective measures:</b>	Measure foreseen for reducing the risk
<b>Guard:</b>	Physical barrier, designed as a part of the machine to provide protection

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- Interlocked guard:** A guard associated with an interlocking device to ensure, together with the machine control system, that the following functions are carried out:
- the hazardous machine functions "covered" by the guard cannot be activated until the guard has been closed
  - if the guard is opened while the hazardous machine functions are in operation, a stop command is sent; and
  - when the guard is closed, the hazardous machine functions "covered" by the guard can operate (closing the device does not automatically start the hazardous machine functions)
- Protective device:** Means of protection other than a guard
- Consent device:** A manually-activated supplementary device that is used in combination with a start command and that, when continuously activated, provides consent for the machine to operate.
- Maintained action control device:** A control device that starts and maintains the machine functions only as long as the control (actuator) is activated
- Emergency stop:** A function foreseen for:
- avoiding the occurrence or reducing the hazards that exist for people, damage to machinery or work in progress;
  - being started by a single human action
- Residual risk:** Risk that remains after implementing the protective measures.

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## 2.6. PICTOGRAMS

The SYMBOLS indicated below are used in this publication to attract the attention of the operators regarding behaviours to be adopted in every operating situation.


They are divided into the following categories:

### 2.6.1. Number of operators









The symbols indicated above indicate the suitable number of operators for carrying out the described operation: the selection of the number of operators is derived from a careful analysis carried out by the "manufacturer", therefore using a different number of operators could prevent reaching the expected result or place the safety of the people involved in danger.



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### 2.6.2. Operator qualification











The following symbols are provided to indicate the minimum level of operator qualification during the machine operation/maintenance phases.

PICTOGRAMS	QUALIFICATION
	<b>Machine operator:</b> trained employee able to use all machine potentialities: he is responsible for cleaning and scheduled maintenance, loading the parts to be machined, configuring the machine for the production process and carrying out the machining.
	<b>Expert and authorised machine operator:</b> an expert and authorised employee able to use all machine potentialities: he may carry out machine operating operations and also is assigned the task of performing machining operations in conditions with reduced protections (if required)
	<b>Mechanical maintenance technician:</b> a qualified technician able to carry out the tasks of the operator and, in addition, is able to work on mechanical components in order to carry out adjustments, perform necessary maintenance and repair operations. Typically this technician is not authorised to work on live electrical systems.
	<b>Machine operator:</b> a qualified technician able to carry out the tasks of the operator and, in addition, is able to carry out electrical adjustment, maintenance and repair work. This technician is able to work on the cabinets and junction boxes while the power is connected.
	<b>Manufacturer's technician:</b> a qualified technician available to carry out complex operations in particular situations or when agreed upon with the user.
	<b>Operator of lifting and handling vehicles</b> Operator authorised to use vehicles for lifting and handling materials and machinery (carefully following the manufacturer instructions), in compliance with the laws in force in the country where the machine is used.

### 2.6.3. "SAFETY" RELATED PICTOGRAMS






The SAFETY symbols indicated below are used to draw the operator's attention to the dangers related to his safety.

- The pictograms contained in a triangle indicate HAZARDS

<i>SYMBOLS</i>	<i>DESCRIPTION</i>
	General operative note
	Generic hazard situation
	Hazard situation of an electrical nature
	Hazard situation due to the presence of hot surfaces
	Cutting or crushing hazard situation
	Pinching or clamping hazard situation
	Slipping hazard situation
	Hazard situation due to suspended loads
	Hazard situation due to load handling with fork lifts
	Hazard situation due to harmful or irritating substances










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- Those contained in a red crossed-out circle indicate a PROHIBITION.

SYMBOLS	DESCRIPTION
	Never insert hands in this area
	Never intervene with moving parts
	Do not remove the safety devices
	Do not use water to put out fires
	Do not climb on surfaces

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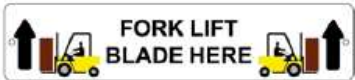







- Those contained in a blue circle indicate an OBLIGATION

<b>SYMBOLS</b>	<b>DESCRIPTION</b>
	Generic obligation, for operator safety
	Obligation, for operator safety, to use the indicated protection (gloves)
	Obligation, for operator safety, to use the indicated protection (glasses)
	Obligation, for operator safety, to use the indicated protection (protective footwear)
	Obligation, for operator safety, to use the indicated protection (overalls)
	Obligation, for operator safety, to use the indicated protection (mask)
	Obligation, for operator safety, to use the indicated protection (hearing protection)
	Obligation, for operator safety, to use the indicated protection (helmet)
	Obligation, for operator safety, to disconnect the machine

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- Those contained in a square/rectangle provide INFORMATION

“Information” pictograms refer to the plates applied on the machine or above the individual units or above the packages that provide useful information for carrying out the relative activities in a manner that is safe for the operators as well as for the devices themselves.

<b>SYMBOLS</b>	<b>DESCRIPTION</b>
	Mandatory position for lifting the machine or other equipment
	Contains data identification data
ELECTRICAL PANEL PLATE	Contains data regarding the electrical characteristics of the machine
	Fragile, handle with caution (ISO 7000/ N°0621) Indicates that the package contents are fragile and must be handled with extreme caution.
	Sling here (ISO 7000/ No. 0625) Indicates where the slinging equipment must be applied for lifting the package.
	Keep dry (ISO 7000/ No. 0626) Indicates that the package must be kept in a dry environment.
	Centre of gravity (ISO 7000/ No. 0627) Indicates the centre of gravity of a package (approx.).
	Top (ISO 7000 /No. 0623) Indicates the correct upright position of the package.
	Fork insertion Indicates the point of fork insertion for the forklift.





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#### 2.6.4. "MACHINE STATE" PICTOGRAMS

"MACHINE STATE" is understood as the machine operating conditions:

- the operating mode: automatic operation, with maintained action control (jog), stop, etc.
- the condition of the safeties on the machine: included guards, excluded guards, emergency stop pressed, type of power source insulation, etc.

The possible operating "STATES" are indicated below (for a detailed explanation of the individual "MACHINE STATES" see chapter 6):

<b>SYMBOLS</b>	<b>DESCRIPTION</b>
	<b>MACHINE OFF</b> Machine off with power sources disconnected
	<b>OPERATING MODE NO. 1</b> Normal use (AUTOMATIC): this is the safe operating mode that is standard for production and makes full use of machine performance
	<b>OPERATING MODE NO. 2</b> Machine adjustment: permits the operator to make adjustments for the subsequent machining processes, with the interlocked mobile guards open.
	<b>OPERATING MODE NO. 0</b> Normal use (MANUAL): this is the safe operating mode that is standard for production and makes full use of machine performance

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3. Technical data

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### 3.1. MAIN TECHNICAL DATA

#### Rotary Table Cross X Axis

Rotary Table Cross Travel X	mm.	4.000
Feeds Infinitely Variable	mm/1'	1 ÷ 18.000
Kinematic	mm.	Precision ball screw 80
Max. Axial Thrust	N.	25.000
Measuring System		Heidenhain Optical Scale ±5μ

#### Headstock Vertical Y Axis

Vertical Travel Y	mm.	2.600
Feeds Infinitely Variable	mm/1'	1 ÷ 18.000
Kinematic	mm.	Precision ball screw 63
Max. Axial Thrust	N.	25.000
Measuring System		Heidenhain Optical Scale ±5μ

#### Column Longitudinal Z Axis

Column Longitudinal Travel Z	mm.	2.000
Feeds Infinitely Variable	mm/1'	1 ÷ 18.000
Kinematic	mm.	Precision ball screw 63
Max. Axial Thrust	N.	25.000
Measuring System		Heidenhain Optical Scale ±5μ

#### Live Boring Spindle W Axis

Spindle Diameter	mm.	Ø150
Spindle Travel W	mm.	900
Feeds Infinitely Variable	mm/1'	1 ÷ 7.500
Kinematic	mm.	Precision ball screw 40
Max. Axial Thrust	N.	25.000
Measuring System		Heidenhain Encoder

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Table surface B	mm.	1.800 x 2.200
Diameter of bearing surface	mm.	1.100
Height of table	mm.	245
<u>Max. admitted load in the center</u>	<u>Ton.</u>	<u>15</u>
Tilting moment admitted	Nm.	50.000
"T" slots	mm.	160
"T" centerline	mm.	28 H7
Table centering hole	mm.	100 H6
Kinematic Axes B		Lazzati Preloaded Double Pinion DPS 15 + DAS
Feeds Infinitely Variable Axes B	RPM	0,001 ÷ 3
Measuring System		Heidenhain Encoder ROD 780

#### **Main Technical Specification of Basic Machine:**


- Live Boring Spindle.....Ø150mm
- Spindle Max RPM – Power – Torque.....4.000RPM – 70kW – 1.100Nm
- Cross Travel X(Table).....4.000mm
- Vertical Travel Y(Headstock).....2.600mm
- Longitudinal Travel Z(Column).....2.000mm
- Longitudinal Travel W(Spindle).....900mm
- Fixed Extended Ram Headstock Section.....515 x 510mm
- Rotary Table Max Admitted Load in the center.....15Ton
- Rotary Table Surface B.....1.800 x 2.200mm
- CNC.....Siemens 840D SolutionLine
- Coolant.....High Pressure Coolant Pump 35Bar for Internal & External CNC Managed

#### **Hydraulic and Coolant Plant:**

- LH – Separate Hydralic Oil Tank with Thermostabilization
- LA 1.000 – Separate Coolant Tank 1.000Lt. with Thermostabilization
- LA 35 – High Pressure Coolant Pump 35Bar for Internal & External CNC Managed
- LA C – Coolant Tank with Cartridge Filter 60micron

#### **Electrical Plant:**

- CNC Siemens 840D SolutionLine Operate with Hand Wheel HT2, 10,4" Flat screen
- Optical scales, Encoder Heidenhain
- Motors and Drives Siemens
- Air Conditioned Electrical Cabinet and CNC

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### **LAZZATI Technology:**

- **DCE – Digitalized Control of Endpoints**
- **DPS – Double Pinion System with automatic backlash recovery for B Axis**
- **DAS – Dynamic Axis Set-up**
- **LAS – LAZZATI Active Stabilization System**
- **LES – LAZZATI Energy Saving**
- **LFC – LAZZATI Feed Control**
- **LHI 4.0 – Mechatronic Technologies**
- **LHS-T – LAZZATI Hydrostatic System for T-Type**
- **O CM – LAZZATI Collision Monitoring System**
- **TCS EVO Boring – Thermal Control System Evolution for Boring-Mills**

### **Safety Systems:**

- **G T – Complete closure of the machine's periphery so to satisfy entirely the Directive on Machinery 2006/42/EC and subsequent integrations.**
- **G A – Telescopic Protection for X – Y – Z**

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### 3.2. ELECTRICAL TECHNICAL DATA

DESCRIPTION		VALUE	UNIT OF MEASURE
Nominal voltage		400	V
Nominal voltage variability		0.9 - 1.1	Volts
Number of phases		3	
Frequency		50	Hz
Maximum tolerated voltage interruption time		3	ms
Maximum interval tolerated between two subsequent interruptions		1	s
Fuses:			
n.3 Wöhner	I1754125	125	A
n.3 Siemens	3NW80051	40	A
n.3 Siemens	3NW80031	16	A
Nominal higher load current		120	A
Maximum current at 400V		115	A
Installed power		86	kW
Utilised power		64	kW
Breaking capacity		10	kA
Temperature range		5 - 40	°C
Ambient temperature for continuous use > 24h		< 35	°C
Air conditioned electrical cabinet		YES	
Humidity range		30 - 95	%
Maximum altitude		1000	m.a.s.l.
Protective conductor PE		50	mm <sup>2</sup>
Alternating or direct current power circuit cables		BLACK	
Alternating current control circuit cables		RED	
Direct current control circuit cables		BLUE	
Grounding and protection circuit cables		YELLOW-GREEN	
Cables not disconnected by the main switch		ORANGE	

An example of a plate is shown below:

MACHINE TYPE	Boring machine HB130T		
SERIAL No.	R059918		
YEAR OF CONSTRUCTION	2018	WEIGHT	800 kg
NOMINAL VOLTAGE	400 V	PHASES	3 50 Hz
NOMINAL HIGHER LOAD CURRENT			76 A
MAXIMUM CURRENT	106 A	AT	400 V
MAXIMUM CURRENT	* A	AT	* V
INSTALLED POWER	86 Kw	USED	64 kW
BREAKING CAPACITY			
MAIN SWITCH			10 kA
MINIMUM CABLE SECTION			50mm <sup>2</sup>
FUSES ON MASTER SWITCH			160 A

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### 3.3. DECLARATION OF EMISSION OF AIRBORNE NOISE

The declaration of emission of airborne noise is provided below

SEPARATE DECLARED SOUND EMISSION VALUES in compliance with UNI EN ISO 4871:2009	
	Operating mode 1
A-weighted sound power level, $L_w$ [dBA] Uncertainty [dBA]	92 4
A-weighted sound emission pressure level, $L_{pf}$ in the operator position [dBA] Uncertainty [dBA]	69 4
Values determined in compliance with the noise test procedure indicated in UNI EN ISO 3746:2011	
Note - The sum of the sound emission value and the uncertainty associated with it represents the upper limit of the field of values that can be realistically determined by the measurements	

The indicated values are emission levels but are not necessary safe work levels. Although the emission levels and exposure levels are correlated, this relationship is not a reliable method of determining whether additional protective measures are required. The factors that influence the effective exposure level of the work force include the characteristics of the room where the work is performed, other noise sources as well as the number of nearby machines and other processes. Also the admissible exposure level can vary from country to country. Nevertheless, this information will help the user of the machine to better assess the dangers and risks involved



The noise measurement was carried out for a similar machine in compliance with what is stated by DIRECTIVE 2006/42/EC "Machine Directive"

## 4. Transport and handling

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## 4.1. GENERAL WARNINGS



The handling of the loads must be conducted exclusively following the procedures described in detail in the following paragraphs; in general it is necessary to use:

- the provided lifting points
- suitable equipment (not included in the supply)




Prevent the lifting accessories from exercising force and tension on pipes and components.

Before handling the machines the following checks must be performed:

- check the stability of the system and that the radius of operation is free from persons and / or obstacles
- ensure that the lifting device is suitable to lift the weight declared
- check the integrity of ropes, chains, rings, hooks, shackles and eyebolts
- check that the ropes will not strike or damage the components



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## 4.2. PRELIMINARY CHECKS



The following checks must be performed before positioning the machine:

1. Verify that the foundations of the machine are in accordance with the supplied foundation diagram
2. Check that the foundations surface is clean and perfectly level.
3. Check that all holes for the foundation bolts are empty and clean.
4. Verify that the installation area of the machine and the surrounding areas are free in order to easily operate with cranes and forklifts.
5. Verify that all utilities needed for the starting of machine are available according to specifications indicated in this chapter.
6. Check that the foundation bolts and the levelling plates are at available in the required quantities and lubricated.
7. Verify that the lifting and assembly materials are available to the workers.
8. Check the availability of a water level and a rule for the first levelling of the machine.
9. Verify that the machine has been unpacked, cleaned and greased in order to be sure it was not damaged during transport.



The layout and requirements of the foundations are provided 3 (three) months before the delivery of the machine. We recommend a careful control of the specifications prior to placement of the machine.

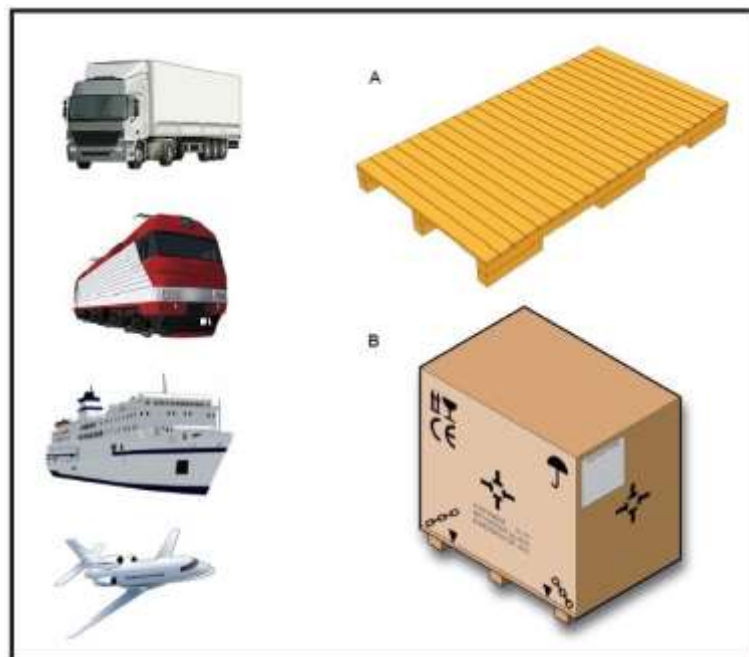
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### 4.3. PACKAGING

The methods for packaging the machine vary based on the type of transport, destination, planned storage time, etc..


Normally, the following methods are used:

- Shipping without packaging: for short distance transportation
- Shipping on a wooden pallet (A): for direct deliveries within Europe using covered trucks.
- Shipping with packaging in a closed crate, with complete structure in wood with various thicknesses and reinforcement boards (B): for long distance shipment when there is a need for greater packaging protection and resistance due to long storage periods in critical ambient conditions (outdoor storage, very cold temperatures, humidity,etc.)



The machine can be (upon request) shipped inside a cage or in a crate. If the machine is shipped by sea, it is wrapped in a barrier bag and salt bags are placed inside to prevent oxidation. Everything is placed inside a wooden crate. The following is indicated on the crates:

address - crate number - net and gross weight – dimensions - top side - gripping and lifting points - packing list.

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#### 4.3.1. Packaging features

The packaging consists of a number of crates defined based on the machine dimensions

Each crate consists of the following:

- Support platform (transportable with a fork lift)  
This is the base on which the machine , the disassembled and suitably protected parts, the provided accessories and any parts requested by the customer are fixed.  
It consists of beams to which the wooden bed is fixed.
- Side and upper walls  
These consist of a wooden frame that is covered with plywood assembled together.  
In order to lift the crate, wood beams are placed under and flush with the cover, that are nailed between the front and rear wall.
- Heat sealed housing with laminated barrier  
This type of protection guarantees the perfect storage of materials subject to deterioration due to humidity.  
The bottom of the barrier bag is placed on the wooded bed before positioning the machine and spreading the drying salt.  
The air inside the heat sealed housing has an air intake, which additionally reduces the risk of the formation of humidity and/or condensation.  
The sharp edges and parts of the machine are protected by expanded polythene or bubble wrap.

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#### **4.3.2. Fastening the machine to the base of the crate**

The machine is fastened to the base of the package using brackets.

These brackets must be kept after removal if the machine must be moved in the future.


The brackets are fastened to the base of the package: this positioning makes it possible to lift the machine off the base using the forks of a lifting and transport device or using a crane

It must be lifted in the indicated points.

#### **4.3.3. Shipping composition and packaging dimensions**

The machine consists of multiple blocks and for technical reasons, is divided for transport: the parts are inserted in various packages that can be identified on the attached packing list.

The dimensions (length, width, height) and weight of the packages are indicated on the packing list as well as on the package.

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## 4.4. LIFTING AND HANDLING THE PACKAGED MACHINE



### 4.4.1. Package dimensions and weight



The lifting and handling operations must be performed by qualified personnel using proper CE certified devices.

The packaged machine must be handled using a fork lift or suitable lifting devices (a bridge crane or crane using a harness and a possible “balance”).



Note: The dimensions and weights (net weight and gross weight) of the package are indicated in the packaging list document attached to the package.

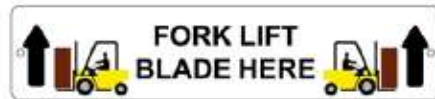


Before carrying out any operation, check that the lifting capacity of the hoisting and/or handling device is suitable for the load to be lifted.

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#### 4.4.2. Handling with a forklift

Lift the machine being careful to insert the forks in a transversal direction with respect to the machine support base in correspondence of the symbols shown



Insert the forks below the base in the area inside the support feet, try to keep them as far apart from each other as possible.



Use a forklift with a suitable lifting capacity and with fork dimensions that are suitable for supporting the support base for at least 3/4 of its width.



Check (visually with the carrier) that the package is in perfect condition and report any anomalies to a manager. Any damage to the containment crate could in fact create doubts about the condition of its content.



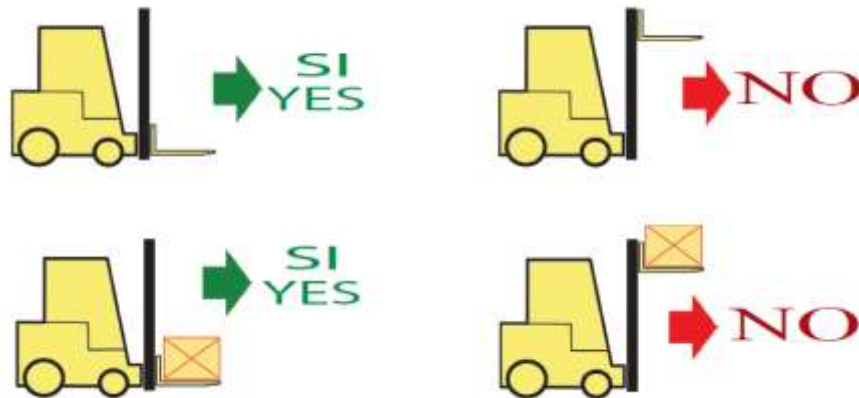
The driver of the forklift must be assisted by another person who has received suitable training regarding the manoeuvre to be carried out when the dimensions of the crate obstruct the necessary visual range.



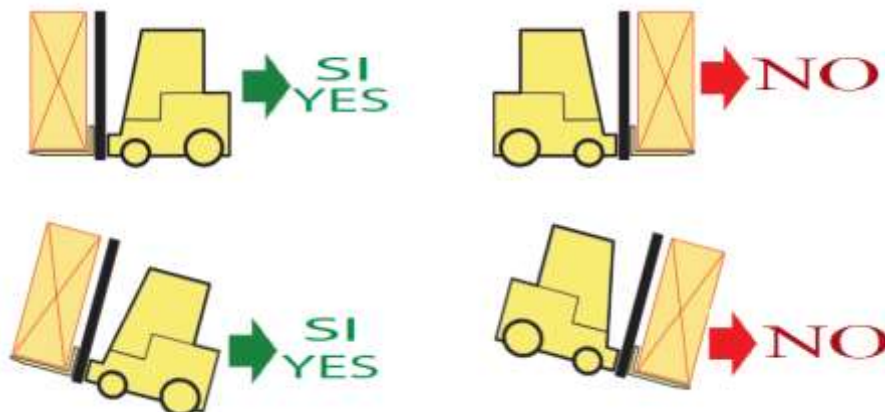
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Transport must be performed for short distances, trying to avoid bumpy movements as much as possible.

keep the load as low as possible while moving it, both to increase stability as well as to have better visibility



if you must drive on a road downhill, it is recommended to move in reverse gear, keeping the load upstream;



The speed of the mechanical transport devices must be adjusted based on the specific route, the nature of the load and the possibilities for stopping the device. The route inside the company must be prepared in order to reduce the risks related to traffic, based on the type of vehicles, the space available and the location of other transit paths and their intersections;

When operating the lifting and transport devices, adopt all the measures necessary for ensuring the stability of the device and its load, based on the type of device, its speed, accelerations when starting and stopping and the specific nature of the route.

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#### 4.4.3. Handling with ropes



In order to sling and lift the packaged machine using ropes, comply with the safety standards indicated by the supplier of the ropes and the lifting devices (hoists, bridge crane, etc.) and check in particular that the lifting capacities are suitable for the weights to be lifted

Apply the ropes on the packaging in the points indicated by the symbols and take into consideration any symbols that indicate the position of the barycentre.

Apply the ropes correctly in order to equally distribute the weight across all ropes.



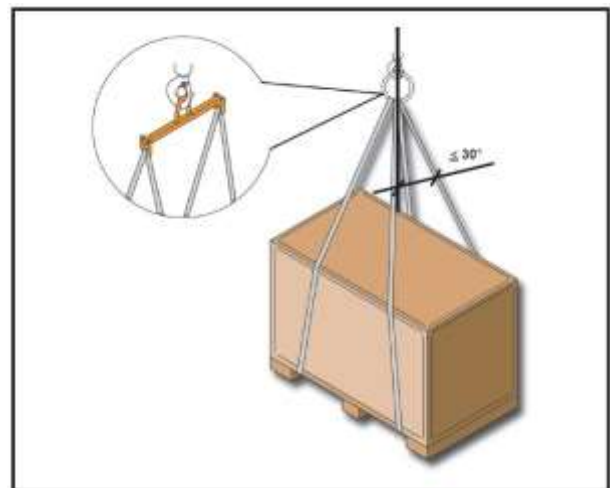
Select a suitable length of rope so that the maximum angle between the ropes and the vertical of the lifting hook does not exceed 30°

Do not use non-standard or worn ropes or cables.



With the package on the base, check that the tensioned ropes do not damage the delicate parts of the machine (guards, mechanisms, electrical devices, etc.).

If possible, use a sling with a “balance”.



Transport must be performed for short distances, trying to avoid bumpy movements as much as possible.



Check (visually with the carrier) that the package is in perfect condition and report any anomalies to a manager. Any damage to the containment crate could in fact create doubts about the condition of its content.



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## 4.5. STORING THE PACKAGED AND UNPACKAGED MACHINE

### 4.5.1. Packaged machine

Store the packaged machine in a dry environment with very low humidity. The packaged machine must be stored in areas protected against bad weather and the sun.

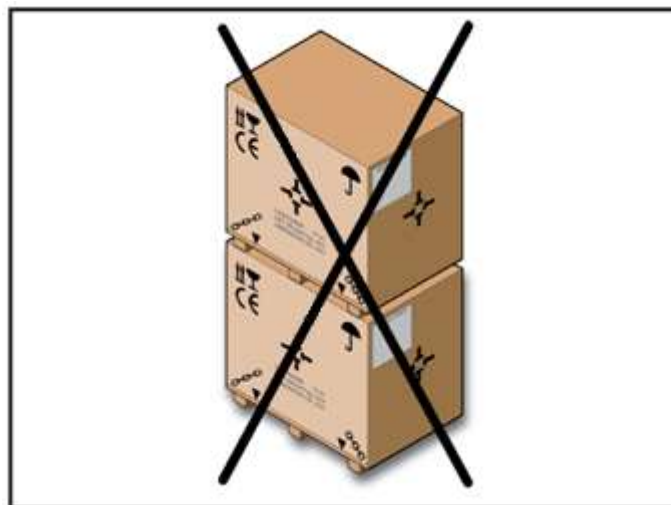
The packaged machine must be stored for the shortest period of time possible: for machines protected by a "vacuum" casing the storage time is 1 month, whereas those protected only with a plastic sheet, the time must be minimised (EC or surrounding countries).if the transport is by sea, the packaged machine must be stored for the shortest period of time possible.



The manufacturer does not guarantee the condition of the contents for periods that exceed those indicated



The crates may not be stacked. The closing structures of the shipping crates (side panels, headpieces, covers) are not designed to support the weight of packaged machinery



### 4.5.2. Unpackaged machine

The machine may be seriously damaged if it is kept in an area with critical temperatures while waiting to be installed.



Do NOT expose the machine to temperatures below -10 °C or higher than 60 °C.

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The manufacturer does not guarantee the condition of the contents for temperatures higher than or lower than those indicated

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## 4.6. UNPACKING

The operators assigned to handling and opening the packaging must wear all the personal protective equipment (gloves, helmet, safety shoes) in compliance with the current safety regulations in force within the applicable work area.

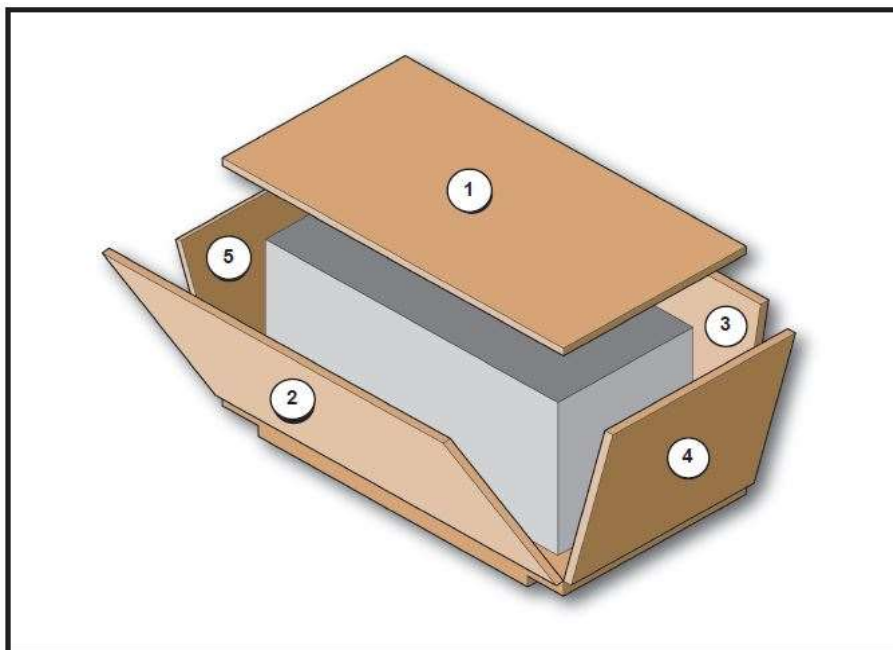


### Methods for package disassembly

The wooden crate for the machine with complete packaging must be opened in the order shown in the figure



Check that the material that was received complies with the shipping documents and was not damaged during transport. If there is any damage to the package that leads to believe that the contents are damaged, immediately inform the manufacturer, leaving everything as was found.



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## 4.7. DISPOSAL OF THE PACKAGING



The elements of the crates must be freed of dangerous elements such as pegs, screws, nails, sharp parts or cutting edges, etc.



The manufacturer shall not be liable for any damage resulting from using the packaging again for further transporting of the machine or other material.

The packaging elements (boards, wood walls, waterproof enclosures) can be recovered and reused as loose material.

The packaging components must NOT be disposed of in the environment; in particular the waterproof enclosures must NOT be burned.

These components must be disposed of at sites authorised for the separate waste collection of waste material.

Before shipping the machine, it can be treated against corrosion by spraying antioxidant products on it; it is then covered with the waterproof enclosures, with bags of hygroscopic salt placed inside.


In this case, after removing the packaging and the waterproof enclosures, carefully clean all parts in order to remove the antioxidant: perform this operation using cloths soaked in solvent.



The personnel assigned to this operation must use all the necessary precautions (personal protection such as: gloves, goggles, respiratory masks) depending on the toxicity of the solvent used.

Do not release the liquid used for cleaning to the environment but contact a company authorised to dispose of it.

Do not use the solvent on parts that could be corroded or damaged by it; in particular, do not use the solvent on rubber parts, on the transparent safety protections or on the lenses of the optical sensors.

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## 4.8. DESIGN OF THE MACHINE TO FACILITATE THE HANDLING

The machine was designed and built to be safely and easily handled and transported; it is equipped with devices that enable the machine to be properly handled.



Follow the specifically created procedures described in this chapter



Tables with examples of lifting accessories to be used are attached to this manual. Check the compliance of the lifting accessory tables that are **used** with those **supplied**.

These procedures must be performed only by competent and qualified personnel, according to the instructions and regulations for the prevention of accidents and safety in force in the country where the product will be used.



The lifting points must be checked before each use and, in particular, check the tightness of the screws, any corrosion, wear, deformation, etc..

The lifting points were selected so that the support material can withstand the induced forces without deforming.

The lifting rings should be placed on the load so as to avoid any unintended adverse movement during lifting (such as inversion, reversal, etc.):

1. For lifting with a single-arm, the lifting point must be placed vertically above the centre of gravity of the load;
2. For lifting with two arms, the lifting points must be placed on both sides and above the centre of gravity of the load;
3. For lifting with three and four arms, the lifting points must be placed on the same level, on a regular basis, around the centre of gravity of the load.



Check that the tensioned ropes do not damage the delicate parts of the machine (guards, mechanisms, electrical devices, etc.).

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## 4.9. LIFTING AND HANDLING THE UNPACKAGED MACHINE



The lifting and handling operations must be performed by qualified personnel using proper CE certified devices.

Make sure that multiple workers are on the ground and able to control and signal the various movements when transported load does not provide a sufficient field of vision for the machine operator (Italian Presidential Decree 574/55, art. 228).



Before carrying out any operation, check that the lifting capacity of the hoisting and/or handling device is suitable for the load to be lifted.



Lift the load following what is described in the following chapters

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#### 4.9.1. LIFTING THE COLUMN BED LINE T –TYPE



The column bed is balanced by design at the centre of the bed. Therefore, it needs 2 proportioned ropes/chains with 2 arms of the same length, having at the end 4 shackles.



Protect the guides from the ropes by inserting soft material such as wood or rubber .



Always place the bed on a flat surface using numerous wooden beams.



Do not lift using criteria that are different than what is described



WEIGHT Kg.	<b>6000</b>
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#### 4.9.2. LIFTING THE COLUMNLINE T-TYPE/FLOOR – TYPE (Y >2500)



Insert 2 steel bars in the holes provided in the surface: the column will be balanced in this way.

Hook the 4 lifting chains to the previously inserted bars.

Place the column in a horizontal position;



Pay attention while it is overturning.




Do not lift using criteria that are different than what is described



WEIGHT Kg.	5500
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#### 4.9.3. LIFTING THE TABLE BED LINE - T - TYPE



The column bed is balanced by design at the centre of the bed. Therefore, it needs 2 proportioned ropes/chains with 2 arms of the same length, having at the end 4 shackles.



Protect the guides from the ropes by inserting soft material such as wood or rubber .



Always place the bed on a flat surface using numerous wooden beams.



Do not lift using criteria that are different than what is described



WEIGHT Kg.	11000
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#### 4.9.4. HEAD LIFTING LINE T - TYPE




The head must be lifted using 2 chains/ropes with 2 arms which pass through 4 eyebolts.



Do not lift using criteria that are different than what is described



WEIGHT Kg.	3000
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#### 4.9.5. LIFTING THE CHIP-CONVEYOR LINE T - TYPE



The lifting of the chip conveyor needs 4 ropes/chains with 4 hooks at the extremity, that have to be inserted in the proper holes.



Do not lift using criteria that are different than what is described



WEIGHT Kg.	1000
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#### 4.9.6. HOISTING THE ELECTRICAL CABINET



The electrical cabinet must be lifted by connecting the 6 chains with 6 hooks at their ends to be inserted through the 6 mounted eyebolts



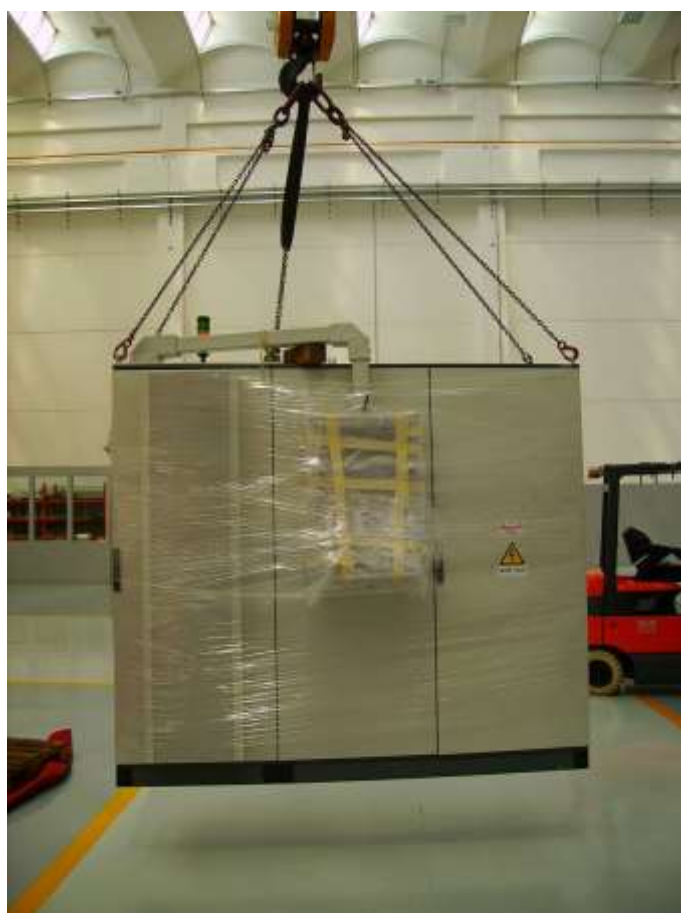
The side with the main switch has the greater weight



When lifting the electrical cabinet pay attention not to damage the cable protecting covers connected to the cabinet.




Do not lift using criteria that are different than what is described



WEIGHT Kg.	1500
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#### 4.9.7. LIFTING THE HYDRAULIC UNIT



The hydraulic unit must be lifted by connecting the 2 chains to the 2 arms that have 4 hooks at their ends to be inserted through the 4 mounted eyebolts.



Do not lift using criteria that are different than what is described



WEIGHT Kg.	1000
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#### 4.9.8. LIFTING THE TEMPERATURE CONTROL UNIT




The temperature control unit must be lifted with 2 chains connected to the 2 arms that have 4 hooks at their ends to be inserted through the 4 mounted eyebolts.



Do not lift using criteria that are different than what is described



WEIGHT Kg.	800
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#### 4.9.9. LIFTING THE COOLANT TANK



The coolant tank must be lifted by connecting the 2 chains to the 2 arms that have 4 hooks at their ends to be inserted through the 4 mounted eyebolts.



Do not lift using criteria that are different than what is described



WEIGHT Kg.	1500
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#### 4.9.10. LIFTING THE TELESCOPIC COVER



Insert 2 steel bars in the holes provided in the cover: the part will be balanced in this way.

Hook the 4 lifting chains to the previously inserted bars.




Do not lift using criteria that are different than what is described



WEIGHT Kg.	1000
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#### 4.9.11. LIFTING THE TOOL MAGAZINE



The tool magazine must be lifted by hooking 2 chains/ropes of the same length that have 2 rings/shackles at their ends.

No. of tools	60	Kg. 2,500
	80	Kg. 3,000
	100	Kg. 3,500
	120	Kg. 4,000



Do not lift using criteria that are different than what is described



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#### 4.9.12. LIFTING THE AUTOMATIC UNIVERSAL HEAD A UA 360°



When the machine is not equipped with an automatic loading system of the accessories, it is necessary to lift the head always with a rope or a chain passing through the relevant U-bolt.



Do not try to apply the head to the centring ring with different slings.



Before inserting the accessory on the ring clean and lubricate the ring itself and its seat.


Put the head on the ring accurately controlling the coupling of the fittings, then operate the accessory locking switch.



Do not lift using criteria that are different than what is described



WEIGHT Kg.	500
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#### 4.9.13. A FH – Andrea UT5/XXX S head



When the machine is not equipped with an automatic loading system of the accessories, it is necessary to lift the head always with a rope or a chain passing through the relevant U-bolt.



Do not try to apply the head to the centring ring with different slings.



Before inserting the accessory on the ring clean and lubricate the ring itself and its seat.

Put the head on the ring accurately controlling the coupling of the fittings, then operate the accessory locking switch.



Do not lift using criteria that are different than what is described



WEIGHT Kg.	500
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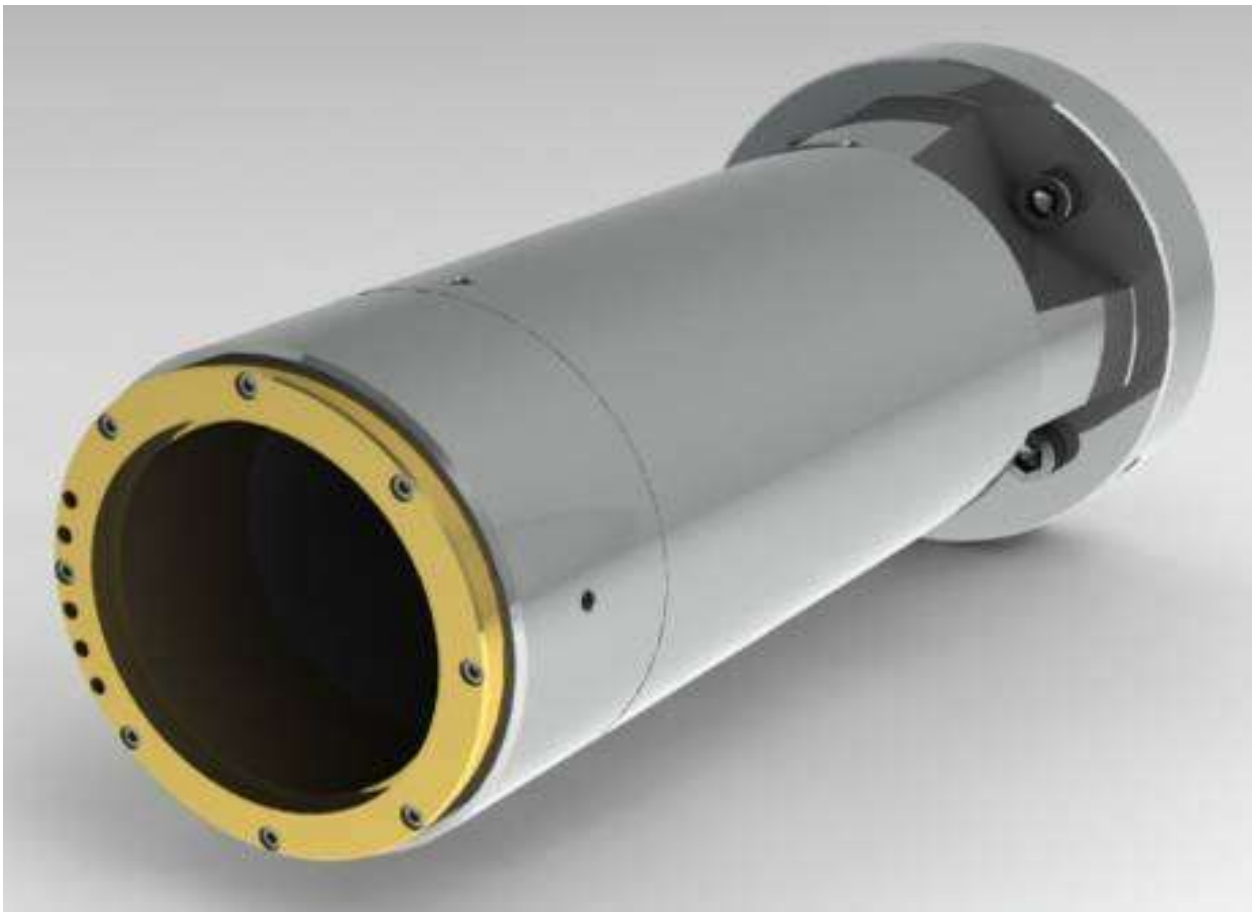
#### 4.9.14. A SC/L- SPINDLE SUPPORT




The spindle support is lifted using a rope or a chain passing through the proper eyebolt.



Do not lift using criteria that are different than what is described



WEIGHT Kg.	500
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#### 4.9.15. WORK SURFACES MM



Insert 2 steel bars in the holes provided in the surface: the part will be balanced in this way.

Hook the 4 lifting chains to the previously inserted bars.



Do not lift using criteria that are different than what is described



WEIGHT Kg.	$\approx 1,000 \text{ Kg./m}^2$ (e.g. surface 2000mm x 3000mm = 6 m <sup>2</sup> $\approx$ 6000 Kg.)
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## 5.1. GENERAL WARNINGS AND SAFETY WARNINGS



When using industrial machinery and systems, be aware that the moving mechanical parts (linear or rotary), the high voltage electric parts, any parts at a high temperature, etc. can cause serious damage to people and property.


The people responsible for plant safety shall ensure the following:

- All improper uses and manoeuvres are avoided.
- The safety devices are not removed or tampered with;
- The maintenance operations are carried out regularly;
- The machine parts (connections, perforations, etc.) must not be changed for any reason to adapt them for additional devices;
- Only original spare parts are used, especially for the components that perform safety functions (e.g. guard microswitches, emergency buttons, differentials, etc.);
- The washing/cleaning operations performed by the operator must be carried out with the electric and pneumatic power supplies disconnected;
- The coverings and panels must be cleaned using soft and dry cloth or cloth soaked in a mild detergent solution and not with solvents such as alcohol or benzene that could damage the surfaces.

In order to ensure the above, the following is necessary:

- The documents regarding machine operation, maintenance, etc. is located at the worker station for consultation;
- This documentation must be carefully read and the instructions must be carried out as a result;
- Only suitably trained personnel are assigned to work on the machine or electrical equipment.



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The operations described below must be carried out by personnel who are specialised as a result of:

- training and experience;
- knowledge of accident prevention standards, requirements and operations;
- knowledge of the machine service conditions;

They must also be able to recognise and avoid all dangerous conditions and have been authorised by the system safety officer to perform all operations.

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## 5.2. BUILDING THE FOUNDATION

The machine good operation and accuracy directly depend on its installation in perfectly level conditions. These instructions permit the customer to build the foundation properly. If the foundation will be executed according to the following prescriptions , it shall be possible to obtain and maintain in the future the best performances of the machine.



The machine must be installed on foundations built specifically for it in the building of installation at the customer site.



The foundations must be built with the characteristics described in this chapter in order to guarantee the safety of people and property as well as to ensure proper machine operation

The foundation where the machine is installed must:

- be rigid and not be affected by vibrations deriving from the operation of other machines.
- be positioned in order to respect the overall dimensions of the machine and its accessory parts



The foundations must be built taking the required machining tolerances into account. The foundation drawing is only indicative and must be reviewed by the customer for a correct location in his workshop and regarding its perfect correspondence with the operating requirements.


- The surface of the foundation must be levelled and perfectly smoothed.



During the preparation of the foundation it is necessary to provide holes for the fixing of the machine foundation bolts. The tiebolts and bolts and the levelling plates are not included in the supply and must be provided before the intervention of our servicemen according to the drawings provided on the following pages.



The manufacturer shall not be held responsible for any damage and/or effects caused due to the failure to build the foundation according to the provided specifications.

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### 5.2.1. PURPOSE OF THE FOUNDATION

The foundation of the machine tools perform two functions:

- Increase the machine bed rigidity;
- Act as a vibration absorption mass thus increasing the main mass of foundation – machine system.



The foundation must be calculated by evaluating the factors indicated below:

- The forces affecting the foundations: static, quasi static and dynamic;
- The max. admissible deformations;
- The ground type where the foundation shall be built, the environmental factors which might influence the stability such as temperature and humidity;
- The possible causes of disturbance due to nearness of other machines or systems generating vibrations.

### 5.2.2. INSULATION

#### Vibrations

The machine foundations shall not be in contact with those of other machines or with plant piers subjected to crane vibrations in order to prevent the vibrations transmission.



It is suggested to use specific materials, such as Angst+Pfister products.

#### Temperature

If the foundation shall be located near an external wall it is suggested to properly insulate the foundations in order to prevent the variations of temperature.

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### 5.2.3. FOUNDATION DEPTH

The foundation depth depends on the loading capacity of the ground below the foundation. Generally, the foundations are calculated for an admissible pressure on the ground of 12 N/cm<sup>2</sup>. If the ground has lower resistance, the foundation shall be supported with reinforcement piles. Piles with 5 ton capacity and 5 m length must be used.

The number of piles shall be calculated using the following formula:

$$Z = \frac{(Gm + Gf) - 0.7q \cdot F}{5000}$$

where:

Gm = machine weight (Kg)

Gf = foundation weight (Kg)

F = foundation surface (cm<sup>2</sup>)

q = effective loading capacity of the ground (Kg/cm<sup>2</sup>)

A table is provided below with the values of the admissible pressures according to the type of ground. This data shall only to be used as indicative data, because the loading capacity of the ground must be calculated using the experimental data obtained from the load and penetrometric tests carried out with proper procedures.

FOUNDATION LAYER	Permitted pressure DaN/cm <sup>2</sup>
Mobile sand and flooded ground	0.5
Soft or wet clay, min. thickness 5 m	1 - 2
Soft clay with wet sand	1 - 1.5
Clay and sand, mixed or layered	2
Compact clay	2
Wet sand	2
Wet fine grained sand	2
Soft clay, contained	2
Almost dry, very thick clay	2 - 4
Dry clay, not fractured	3
Silt, clay or fine grained sand, dense and dry	2.5 - 3
Dense and dry silt	1 - 3
Dense and dry sand	2 - 4
Hard clay	3 - 4
Wet fine grained sand, well graduated	3
Sharp sand, very thick	3 - 6
Gravel	3 - 6
Dry hard clay	4
Very thick clay, always dry	4 - 6
Dry fine grained clay	2 - 3
Dry fine grained sand, well graduated	4
Sharp sand and thickened gravel	4
Gravel and sharp sand, very thick	5 - 8
Sharp or medium graded sand, wet or dry	4 - 5
Sharp sand, dense or gravel	6
Gravel, dense sand and compact yellow clay	6 - 10
Mixed glacial compact	10
Compact shale, not exposed	6
Shale and compact mixture	10
Soft rock	8

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#### 5.2.4. SUB-FOUNDATION

The foundation plinth of machine tools, as all the civil foundations, is not laid on the ground but on a surface of lean concrete. This layer is necessary to compact the foundation bearing surface and also to obtain a levelled floor at the starting height to start to build the foundation. This layer has a thickness of 30 cm approx.

#### 5.2.5. IRON REINFORCEMENT

The iron reinforcement shall be positioned on the sub-foundation surface before casting in order to be at a distance of a few centimetres from it. This permits the concrete to well incorporate the steel bars thus assuring the correct functioning of the mixed reinforced concrete section.

#### 5.2.6. CONCRETE CASTING

Pay attention to take all precautions during the execution of the concrete casting in order to obtain full monolithic concrete. To increase the compactness of the casting is essential to dip a vibrator in the freshly cast cement, paying attention the same does not come into contact with iron reinforcement to avoid the detachment of the conglomerate iron.

Pay attention, especially for very long machines, to obtain a final surface that is perfectly levelled to avoid having to add dangerous shims under the levelling points.

The ambient temperature influences the rapidity of the concrete setting, the speed of hardening and therefore the reaching of the desired resistances.

For a normal anchorage it would be appropriate to cast the concrete at a temperature around 20°C.

Higher temperatures accelerate the setting, lower temperatures slow it down.

Characteristic resistance:  $R_{ck} \geq 250 \text{ kg/cm}^2$

Cement type: **R 325**

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### 5.2.7. POSITIONING THE MACHINE

To implement the machine is necessary to:

- Remove from the foundation surface any deteriorated or soft concrete taking care that the surface remains sufficiently hard.
- Clean the surface from all residual traces of oils, grease, dirt, etc.
- Check the bottom part of the bed, clean it carefully and lift the adjustment screws or clamp them in position, carefully lubricated.
- Lift the machine, position and align it on shims in such way that the foundation bolts are at the centre of the fixing pits and the machine is levelled with a precision level.
- Immediately before casting the cement, remove the residual water with compressed air and sponges.
- Cast the cement or better very fluid mortar, without shrinkage, with a high mechanical resistance and adhesive power around the foundation bolts. Cast the mortar quickly and continuously. The mortar has to be poured from only one side and pushed from here to the other end to avoid the formation of air pockets.
- Later (not the same day) cast cement around the levelling devices.
- Keep the casted points wet for a few days.



Do not proceed with the levelling of the machine if it is not sure that the cement has reached a considerable degree of mechanical resistance.

### 5.2.8. ANCHORING THE FOUNDATION BOLTS

The anchorage of the foundation bolts must be performed with premixed, shrinkage compensated, neoplastic mortar, such as Emaco S55



The manufacturers' instructions of casting mortar are to be duly observed.

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### 5.2.9. WARNINGS



1. It is important that when the work is finished, the foundation of the machine is a single monolithic block.
2. The connection of the foundation with the surrounding structures must be built and calculated considering all the static and dynamic loads on the plant floor.
3. The foundations have to correspond to the dimensions marked on the drawing with tolerances  $\pm 1$  cm. In addition, a horizontal level of the foundations must be guaranteed with tolerance max. of 0.5 cm.
4. The foundation bolts, adjustment plates and cover sheets are not supplied and must be provided by the customer.

### 5.2.10. FOUNDATION REINFORCEMENT

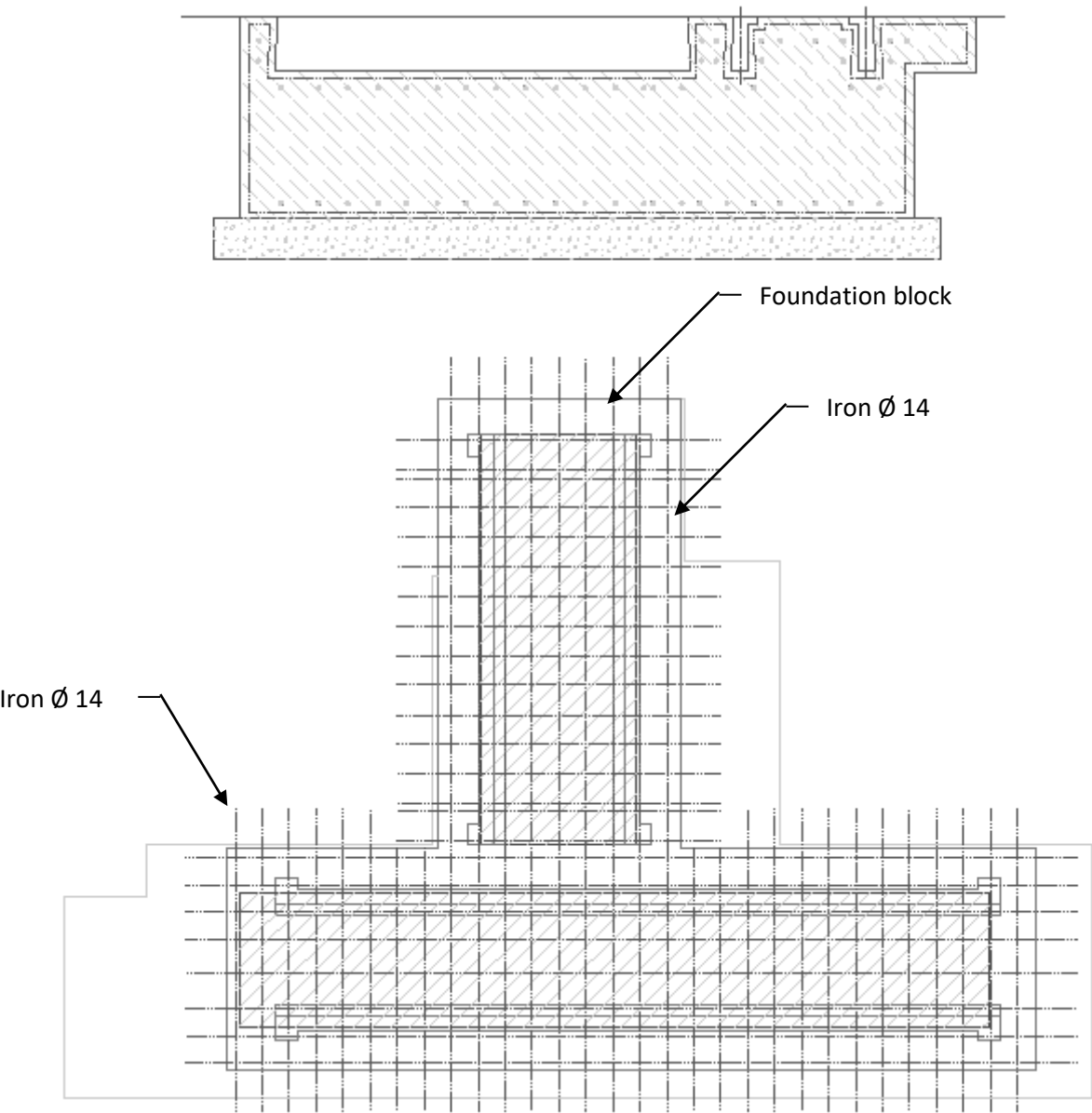
The foundation needs an iron reinforcement .

The reinforcement material to be used shall be :

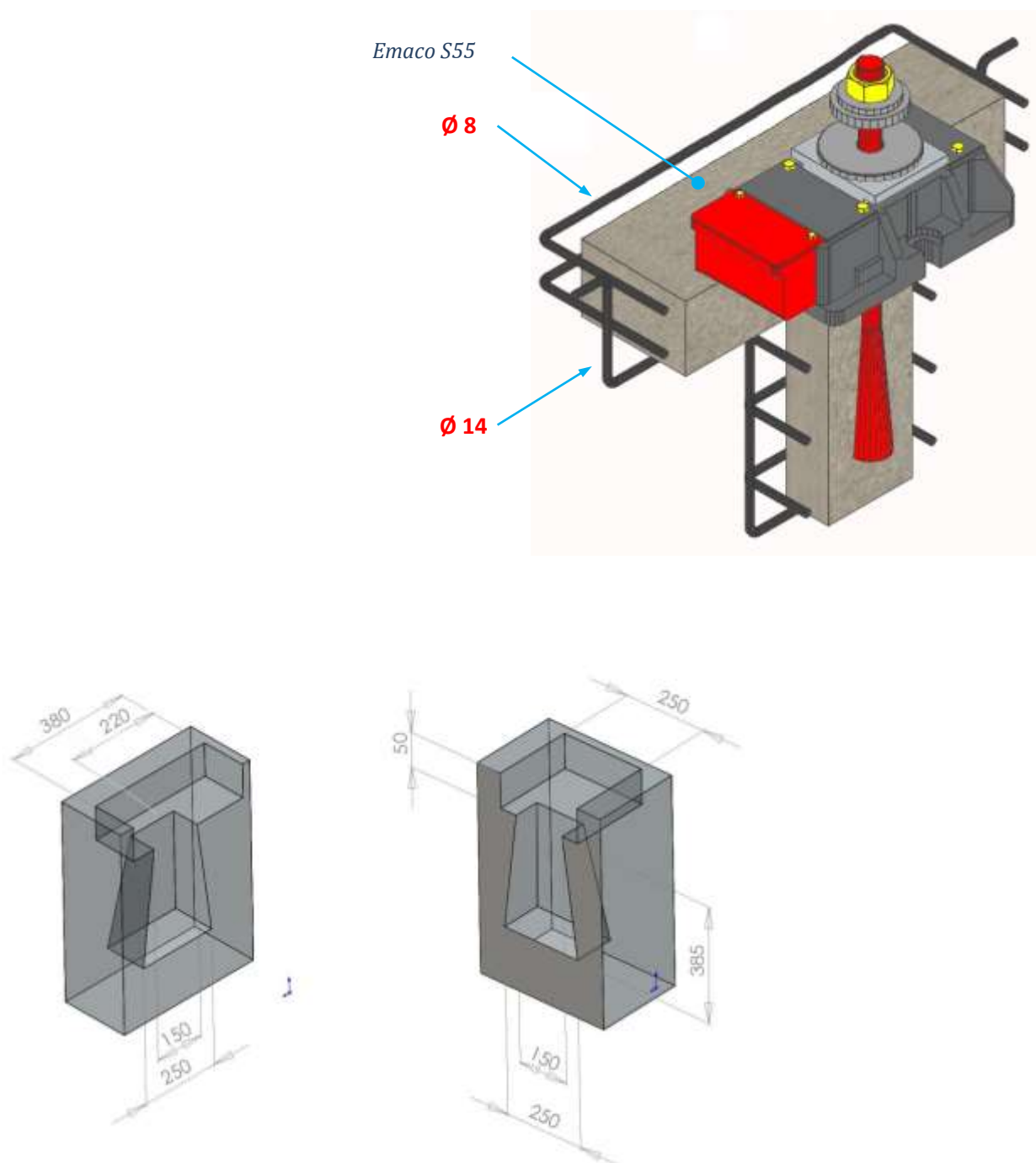
- Iron Fe b 38 K controlled
- Iron Fe b 44 K not controlled
- $\sigma_{am} = 2200 \text{ kG/cm}^2$

For the machine bearing surfaces can be used as reinforcement a double net having 6 mm diameter and 15 x 15 mm mesh. The reinforcement does not consider external or special loads that can affect the foundations. In case of possible loads the customer shall modify the reinforcement of foundation.

**5.2.11. EXAMPLE OF REINFORCEMENT OF FOUNDATION T**





**5.2.12. EXECUTION OF FOUNDATION HOLES FOR FIXATORENBAU EK III**

The formwork for the foundation holes can be built with glued expanded polystyrene plates. After the polystyrene can be burnt.

### 5.2.13. SUGGESTIONS FOR THE RECOVERY OF LIQUIDS

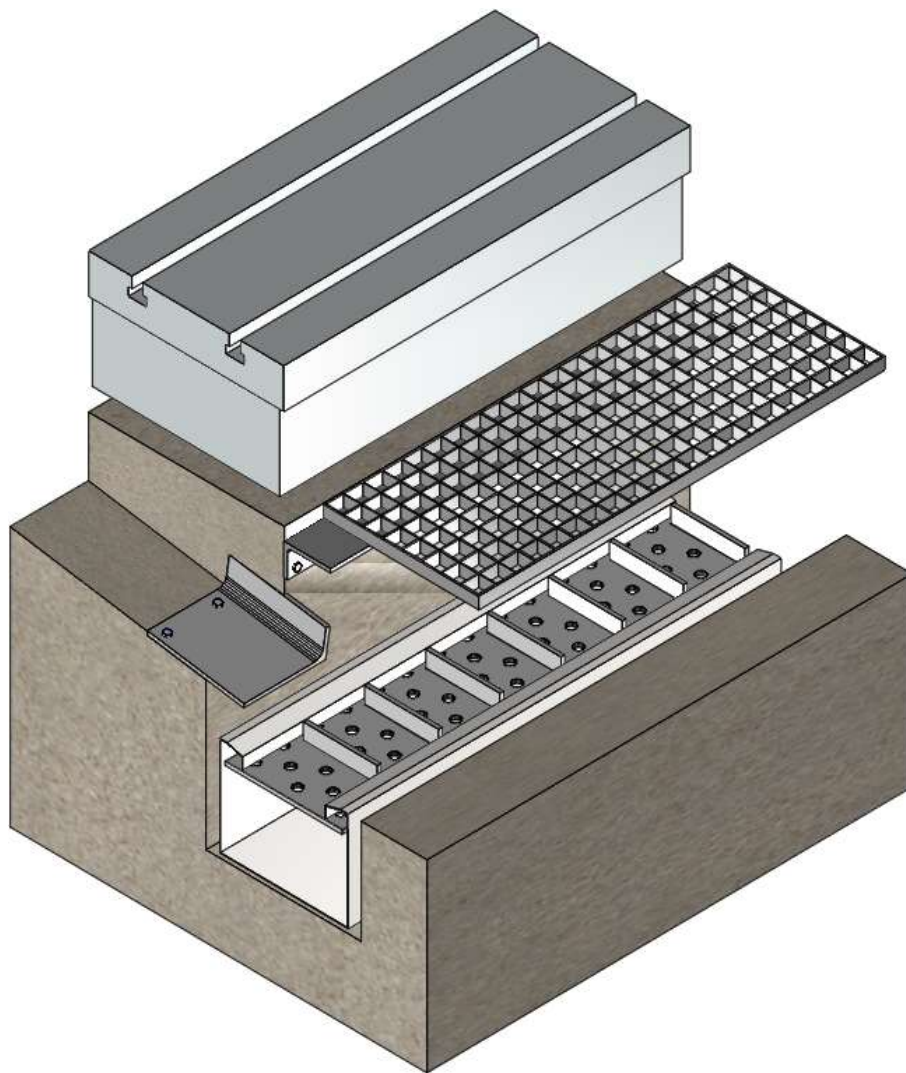
Various useful images are provided below as a suggestion for recovering liquids, the solutions are not binding



It is understood that the support structure of the grating and the grating itself must be sized by the customer according to the applicable regulations and the weight they must support.

The grating determined by customer will be the anti-slip grating type.

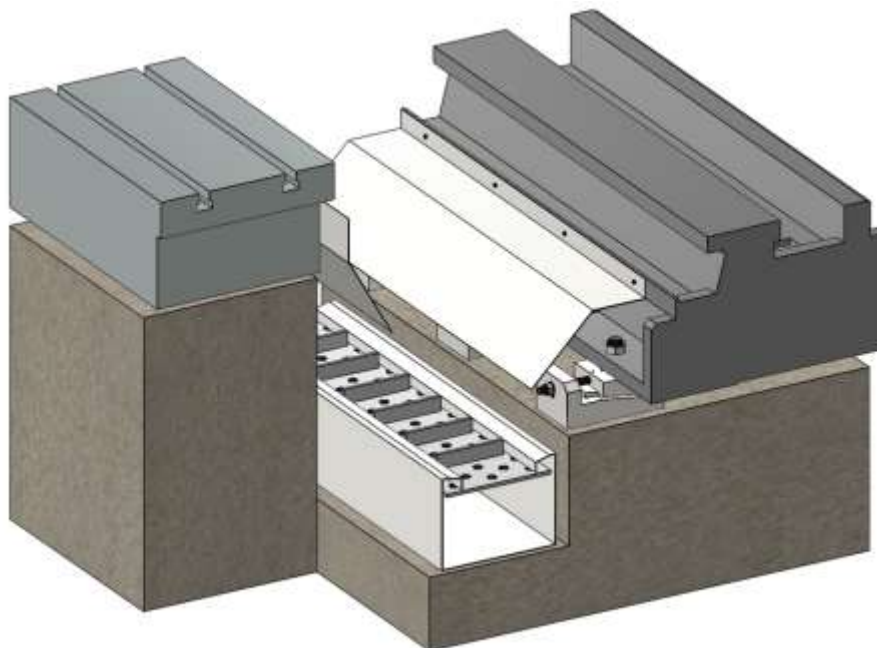
The structure on which the grating is supported must be removable in order to allow the removal of the chip conveyor in case of maintenance.



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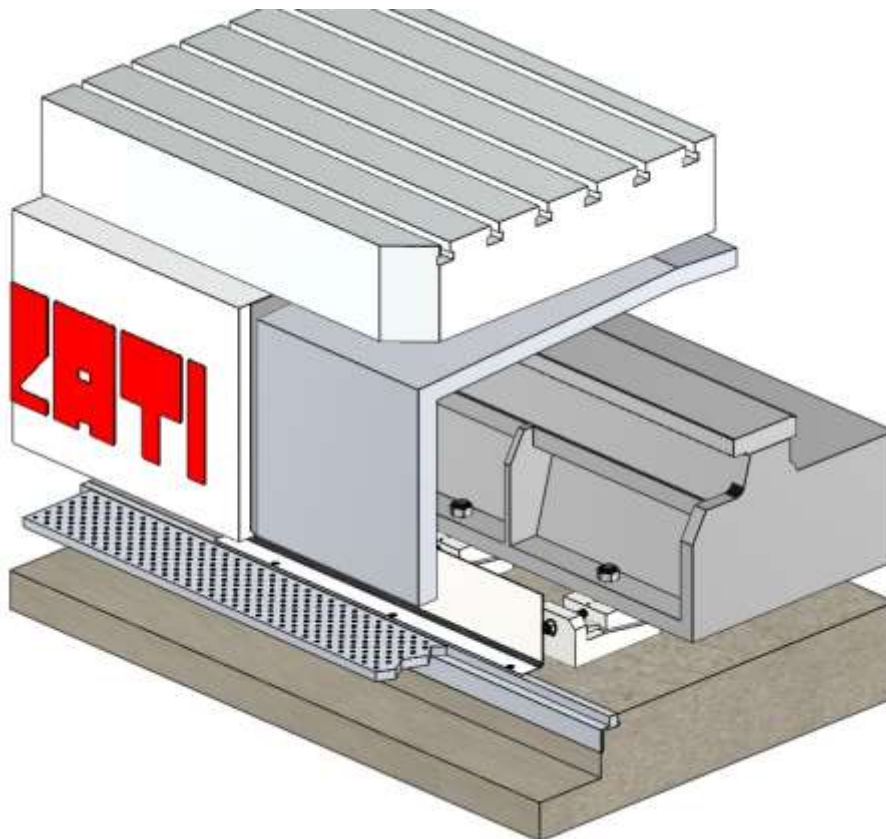
The drawing shows the correct machine layout for the recovery of liquids.





In order to recover the largest quantity of chemical water used for machining and to prevent it from being dispersed in the machine installation area, we recommend applying a plate near the telescopic cover of the table, as shown in the figure. The figure also shows that it is recommended to use the steel corners that delimit the water recovery channels for fastening the plate.

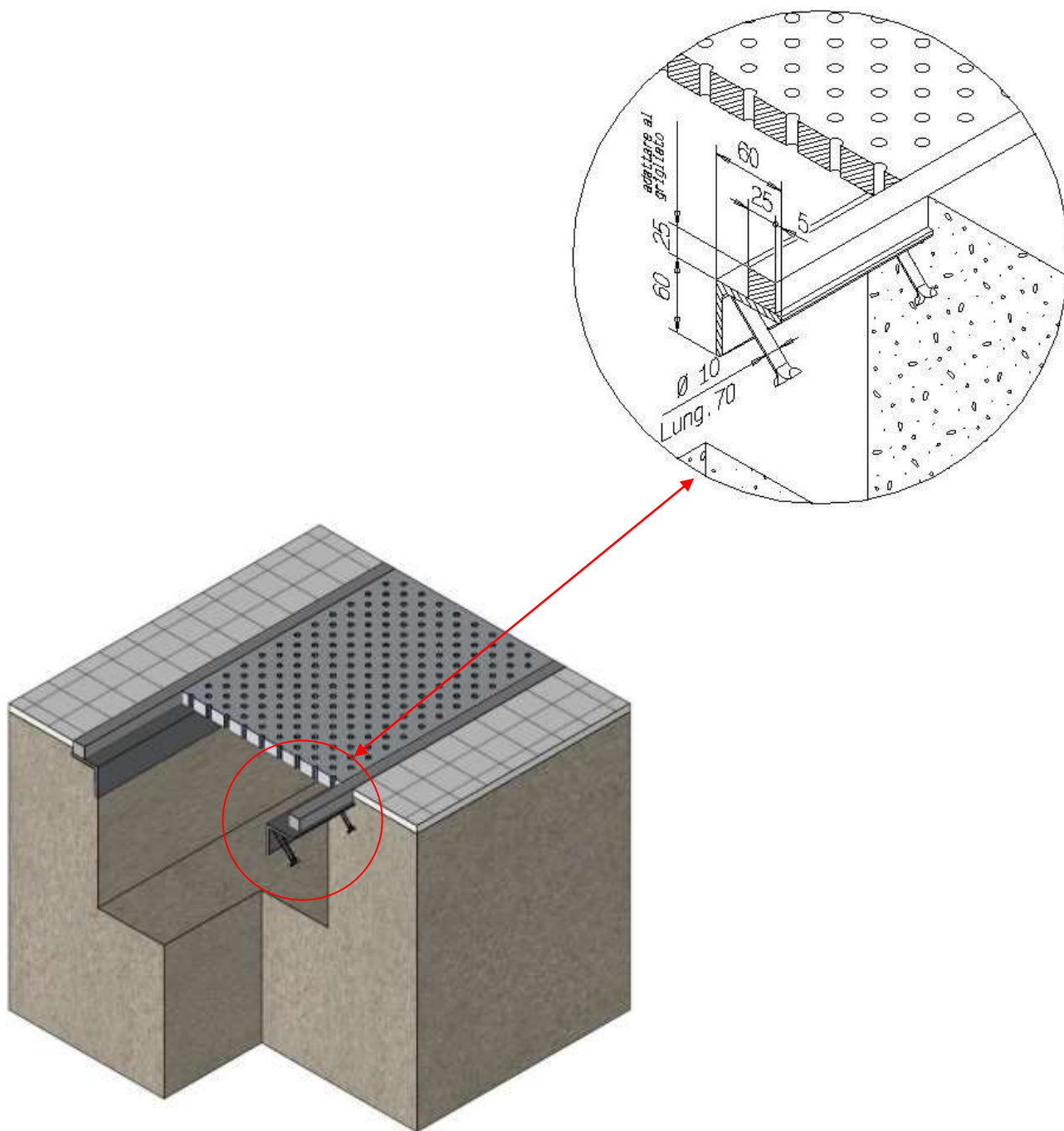
The customer will determine the fastening system to use and once completed, everything should be caulked with silicone or sealed with another method.





The tank and all the channels for the recovery of the chemical water must be waterproof and covered with special grating sheets.

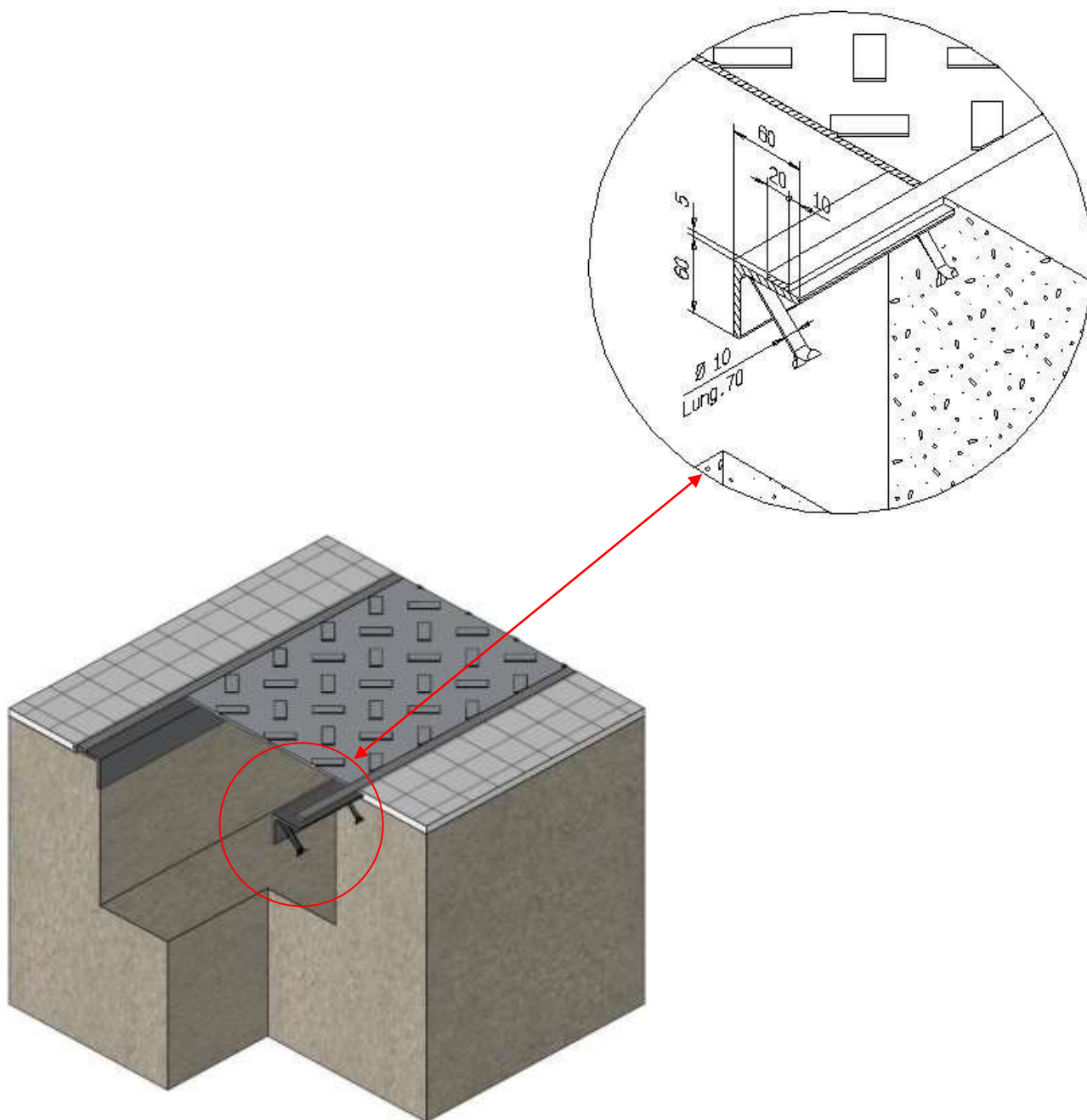
To install the above sheets it is necessary to position steel angle plates on all edges as shown in the figure.







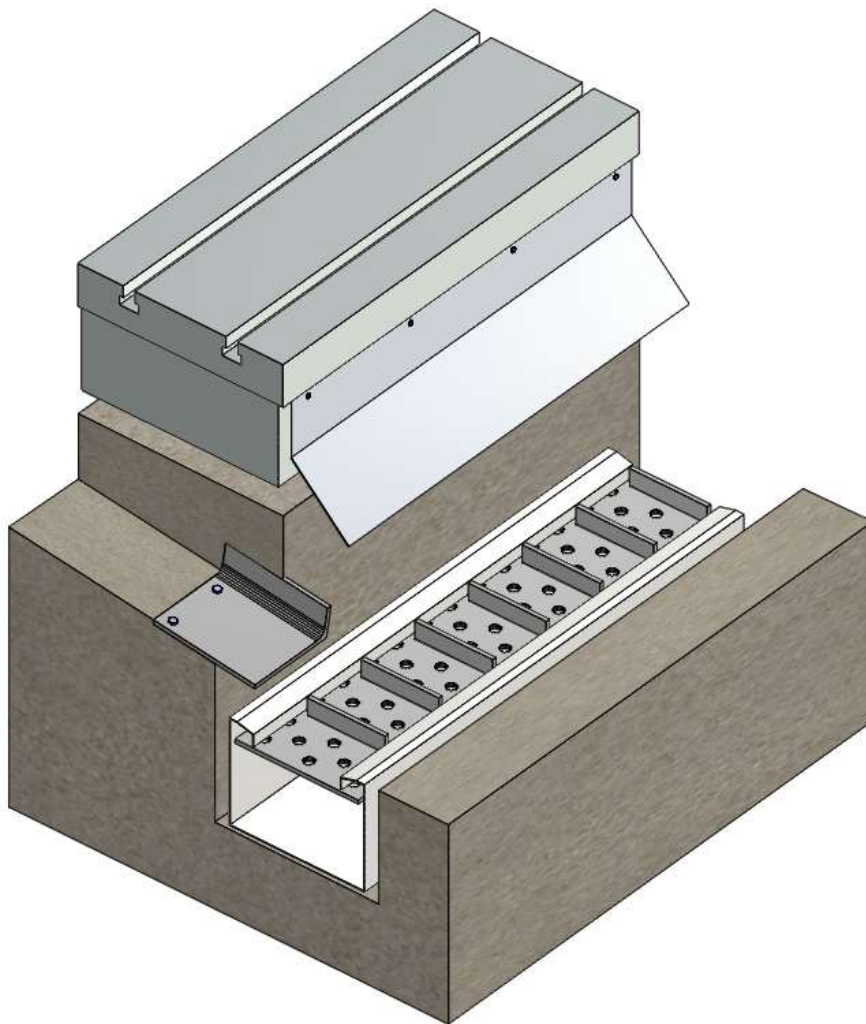
All the channel and pits for the hydraulic hoses and electrical cables must be covered by chequered non-slip plates. To install the above sheets it is necessary to position steel angle plates on all edges as shown in the figure.



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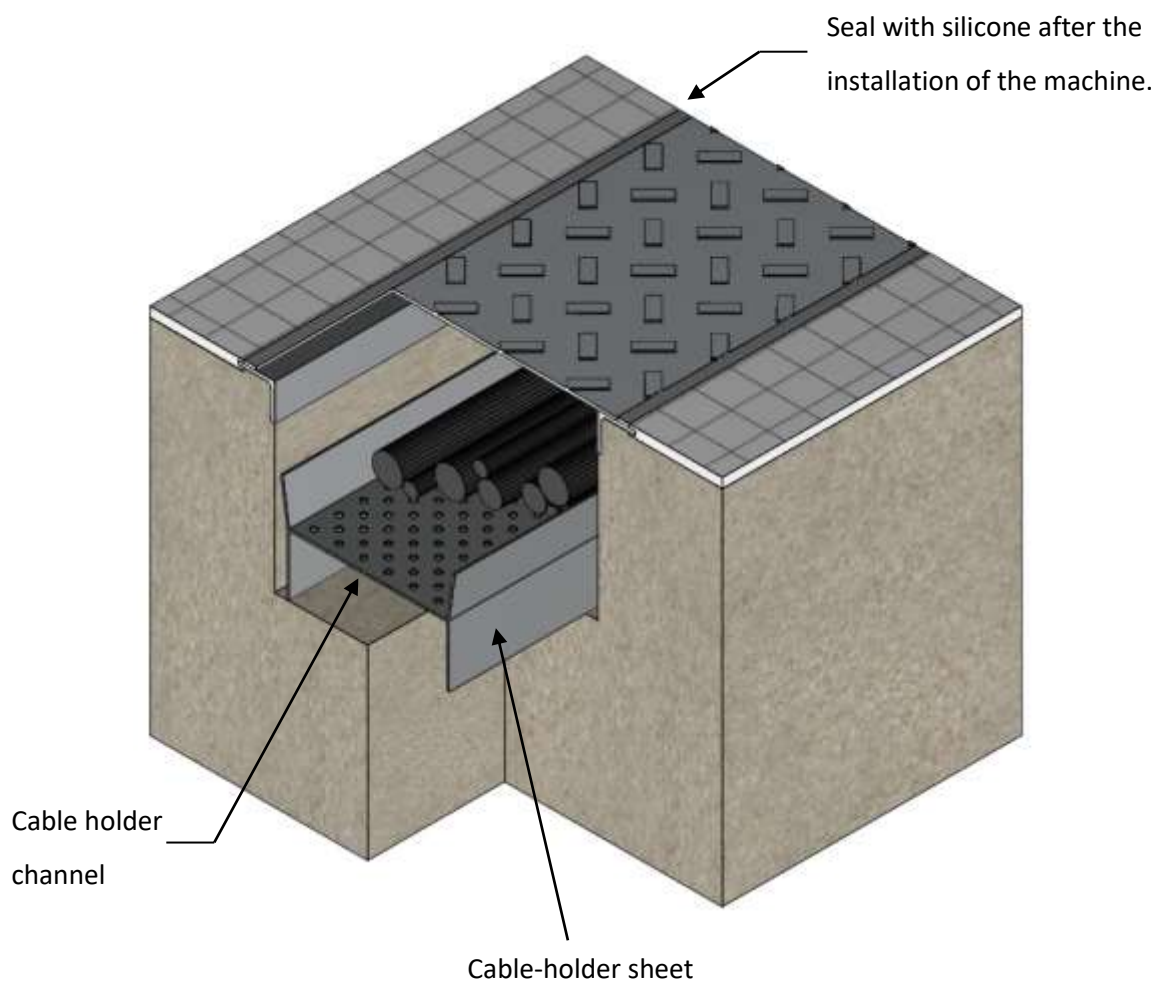
In order to avoid the fluids dispersion inside the seats of the recovery systems, we suggest the application to the channels of a folded sheet which conduct the fluids directly inside the same systems as shown in the above photo.




#### 5.2.14. PROTECTIONS FOR ELECTRICAL CABLES AND HYDRAULIC PIPES



In order to protect the electrical and hydraulic cables from water leaks, it is recommended to place a perforated plate along the bottom of the cable holding channels that is folded as shown in the figure.





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### 5.2.15. SET-UP FOR MACHINES WITH TOOL CHANGE TW ON THE GROUND

The user must provide the following material.

4 vials of chemical cement/anchors

2 - 14 threaded bars - length 1 m

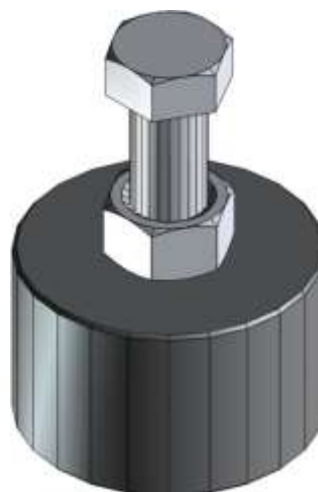
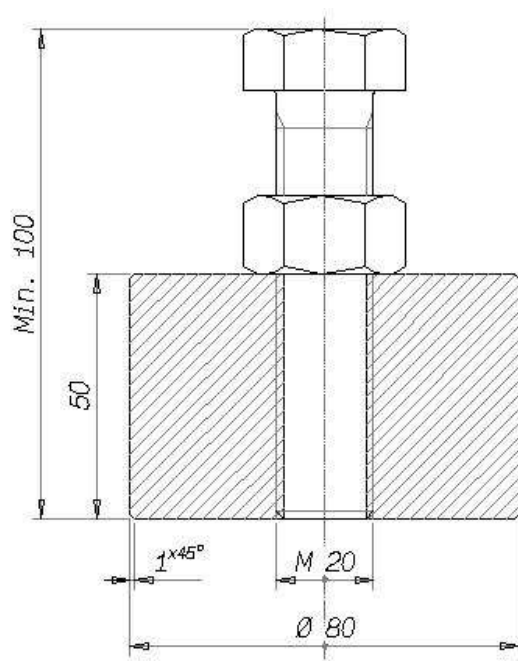
16mm bit and electric cement drill.

### 5.2.16. SET-UP FOR TRANSFER PUMP PROTECTION

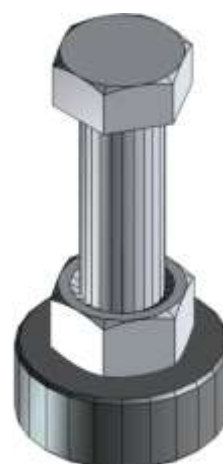
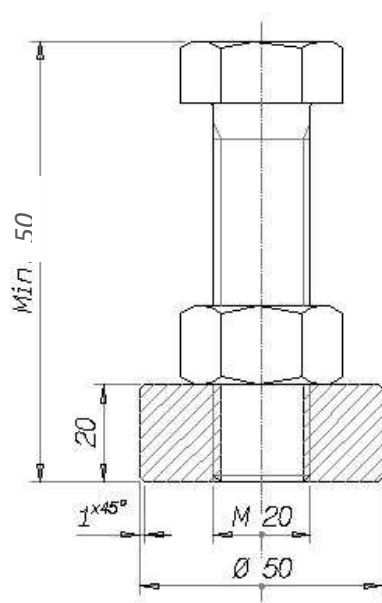
The user must provide an anti-chip protective net for the transfer pump ( M36 ) from the tank in the foundation to the coolant tank.

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### 5.2.17. BLOCKS TO LAY THE MACHINE BED



Number of pieces: **12**  
Material: Fe 360



Number of pieces: **12**  
Material: Fe 360

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### 5.3. RULES TO BE FOLLOWED FOR MACHINE INSTALLATION



The machine must be installed on the foundations (prepared by the customer) described in this chapter.

The assembly of the removed parts as well as the electrical and mechanical connections are complex operations that require thorough knowledge of the machine.



These operations must be performed by manufacturer technicians



Any subsequent movement of the machines must be carried out by manufacturer technicians. If the machines or their systems are tampered with due to movements that have not been approved or agreed upon or performed by manufacturer technicians, the warranty provided by the manufacturer for the products he supplied will no longer be valid.

The installation technician will proceed as indicated below:

1. Use steel-sheets or grating for protecting any protrusions or holes in the foundation, which might be dangerous for the operator or for other persons exposed to this risk.
2. Utilize barriers or warning plates to hinder any deposit of workpieces in such a position that could injure the operator or damage the machine.
3. Instruct the operators about the correct operation of the machine, providing them with proper and precise knowledge of the controls in order to avoid any incorrect handling in the future.
4. Make sure that any hoisting of heavy workpieces on the machine is carried out using suitable cables or other means for the load so to avoid any falling of workpieces on the machine structure.

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## 5.4. REQUIRED AMBIENT CONDITIONS

Unless otherwise specified in the order, it is understood that the machine must operate regularly in the ambient conditions indicated in the following points:

### MACHINE POSITIONING

Place the machine on the foundations prepared according to what is indicated in this chapter; otherwise the manufacturer shall not be liable for any problems that may arise.

### TEMPERATURE

The machine can operate at room temperatures between + 5°C and + 40°C

### HUMIDITY

The machine can operate with relative humidity between 30% and 95% without condensation.

### ILLUMINATION

The machine was designed according to legislative provisions and trying to minimise the shadowed areas to make it easier for the operator to use the machine.

If necessary, a lighting system can be provided at the control positions.

The installation environment must guarantee a lighting level equal to at least 500 Lux

Furthermore, the lighting must not cause any shadowed areas, blinding light or stroboscopic effects.

### ATMOSPHERE AT RISK OF EXPLOSION AND/OR FIRE

The machine is not designed to operate in areas with an explosive atmosphere or with a risk of fire.

## 5.5. ELECTRICAL CONNECTION



Perform the following controls before connecting the machine to the electrical system:

It is important to connect the machine to an electrical power supply line that is efficiently grounded.

Check that the frequency (Hz) and voltage (V) of the machine power supply comply with the values of the power supply network.

The standard voltages and frequencies are the following :

Frequency [Hz]	Voltage [V]		
50	220	400	500
60	230	440	

The variation of the network voltage has to be contained between 90% and 110% of the nominal value

The variation of the network frequency has to be contained between 98% and 102% of the nominal value

The electrical power supply must be delivered on the inlet terminals of the network filter by means of a 3 phase + ground cable connected directly to the plant network.

The machine's connection to the network must be performed in accordance with the current regulations of the country of use.



Connect the electrical power supply using a cable with a suitable cross section, as shown in the wiring diagram



Do not connect the power distribution panel for connecting with any cables that may cause disturbance to the line (for example, welding machines and high frequency hardening machines).

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Perform the following additional checks:

1. The power supply cable must be securely fastened to the appropriate terminals.
2. Verify that all cables are well tightened in their respective terminals. It is required to repeat the operation of closing cables in their respective terminals, for all the wires connected to the outside cabin.
3. Check that all fuse caps are well tightened.
4. Ensure that all connectors are securely fastened and that all the respective clamping levers are in place.



Check that the technical data indicated in this manual and in the attached wiring diagram correspond with the plate data and the effective machine data

The machine has a main cut-off switch that, when opened, interrupts all active wires.



Some circuits are excluded from the main cut-off switch.

The circuits excluded from the main cut-off switch are powered upstream of the main cut-off switch and the insulation on the wires is orange

These have the function of powering the sockets and lighting circuits used for maintenance or the circuits that require uninterrupted power because they are connected to control instruments.



Specific plates indicate the presence of circuits excluded from the main cut-off switch.

When the main cut-off device is closed, no part of the machine will move.

### 5.5.1. TEMPERATURE CONTROL INSIDE THE ELECTRICAL CABINET

The supplied electrical cabinet is equipped with a thermal system that maintains the internal temperature within the established values.

It is necessary to guarantee the electrical connection to the heating switch both if the machine is turned off or if its dedicated line is completely cut-off.

We suggest two solutions:

- Always keep the cut-off switch powered with the  $\varnothing 70 \text{ mm}^2$  cable (fig 1-A)

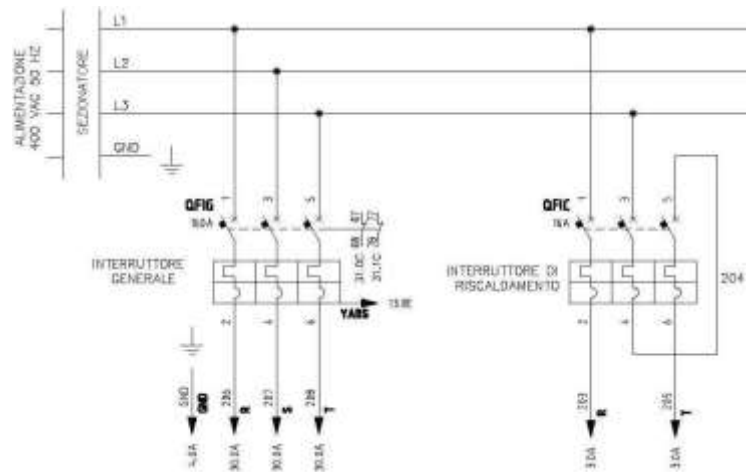


fig 1-A

- Create a parallel line, also with a  $\varnothing 4 \text{ mm}^2$  section, exclusively dedicated to the anticondensation circuit (fig 1-B);

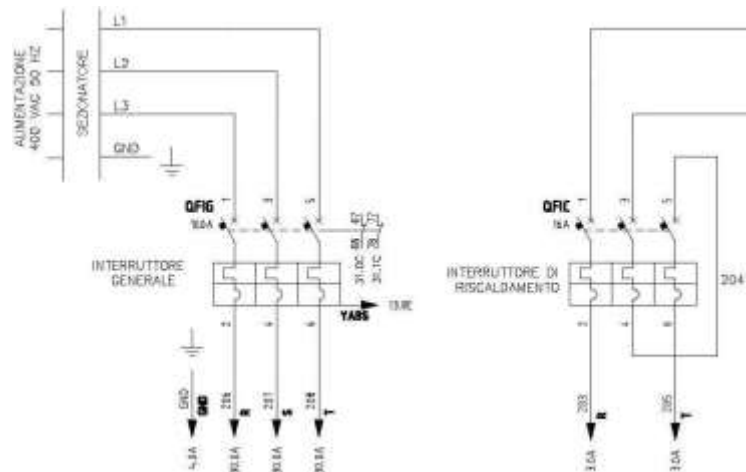


fig 1-B

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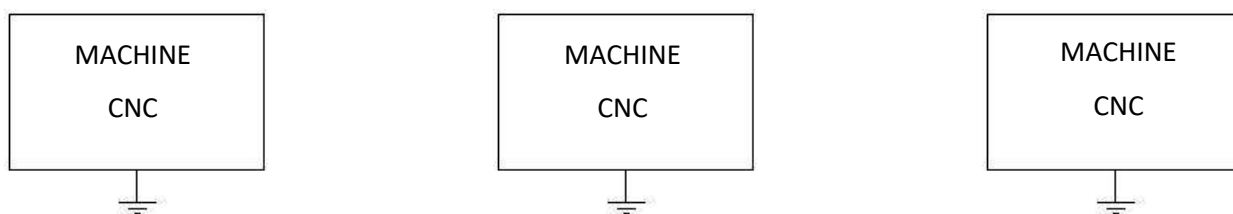
### 5.5.2. GROUNDING CONNECTION

Use a grounding cable of 50 mm<sup>2</sup> and a resistance to ground lower than 100 Ω. Generally, the CNC machine must have been grounded by means of a separate grounding device. If an independent system cannot be provided, the grounding must be carried out as follows:

- Connect one only wire to its own grounding terminal. This avoid any serious accident due grounding currents that otherwise might flow into the CNC machine, if any peripheral units do not work properly
- Do not use the reinforcing tierod or the grounding terminals of other machines for the grounding. This might cause disturbances on the line similar to those produced by electrical welding machines and high-frequency hardening machines.
- Use a grounding terminal with proper electrical power ensuring a long lifetime.
- Use a separate grounding cable with the minimum required length.

Verify the resistance of the grounding with an effective measurement. This measurement should have a value lower than 100 Ω if only one device is connected to the grounding rod.

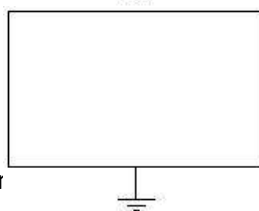
#### Ideal grounding:



Resistance to ground < 100 Ω.

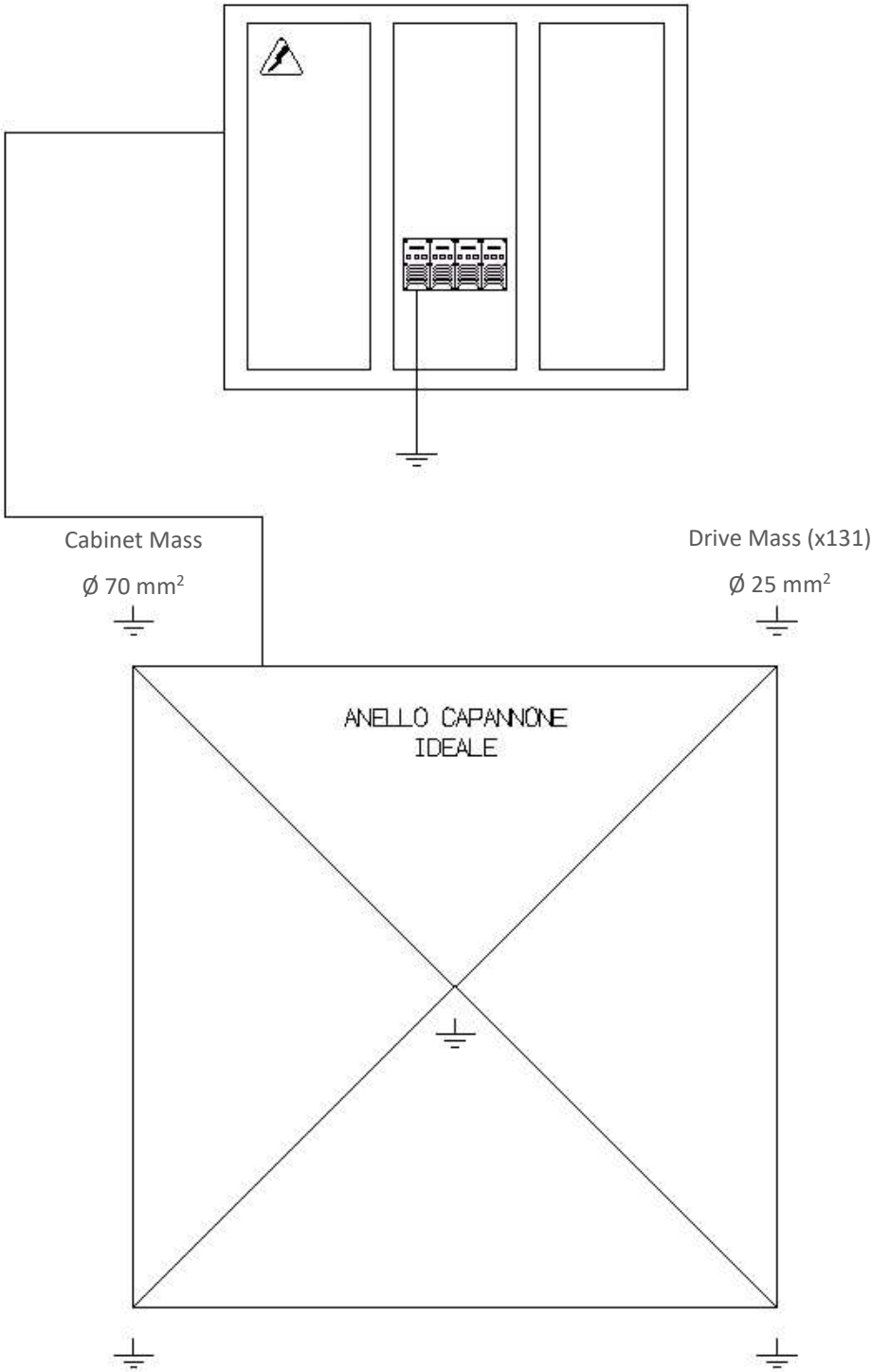


Grounding with common cor  
possible.



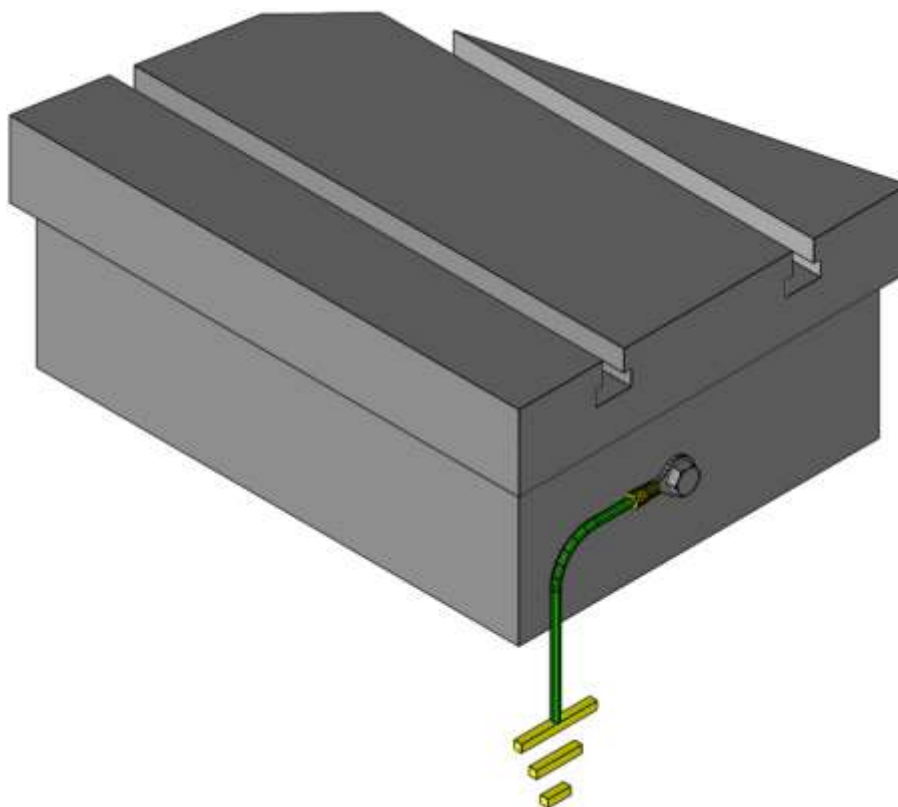
em only if independent grounding is not






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### 5.5.3. PART HOLDING SURFACE GROUNDING



In the case of a part holding surface, provide a 50 mm<sup>2</sup> cable to be connected to the bar in the electrical cabinet.

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## 5.6. PNEUMATIC CONNECTION



Before connecting the machine to the pneumatic system, provide a distribution system that guarantees the supply of filtered and dehumidified compressed air.



The machinery is provided with only one junction from the distribution network. The user must provide the following devices listed below outside of the perimetric enclosure:

- Manual device for quick cut-out (cock) located at the entrance to the machine, near to which a perfectly visible plate must be fitted indicating “AIR SUPPLY”.
- A hand-operated shut-off valve for quick release, which can be padlocked in the air-discharge position. This must permit shutting the air delivery to the machine and discharging completely the residual air.

The machine is equipped with a pressure regulator and filter unit with a pressure gauge that makes it possible to adapt the supply characteristics



In case of air with excessive condensate, it is suggested to fit a condensate discharger upstream of the machine connection.



In order to implement the compressed air supply system, it is recommended to use rigid galvanised steel pipes.

However, in case of hoses these must permit a ratio between burst pressure and maximum operation pressure not less than 4:1. It must have an internal part resisting to oil and an external part resisting to oil and ozone.

No quick couplings must be used for connecting the machine to the supply network.



Do not operate the machine if the connection was not made according to what is required by the manufacturer.

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The functions of the pneumatic system are:

- It separates the carriage guides during their motion by means of an air film in order to prevent any contact between the two surfaces.
- It cleans the spindle taper in case of machines provided with automatic tool changer.
- It controls the coolant valves.

Proper machine operation requires the supply of compressed air with the following characteristics:

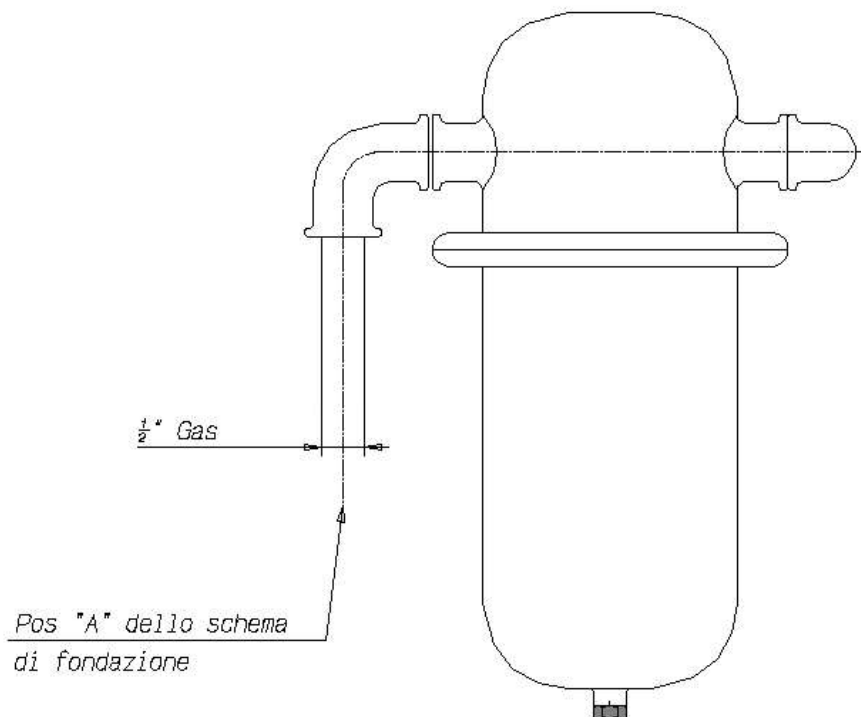
Minimum pressure      6      bar  
Minimum flow-rate      300 litres/min


The proper operation of the taper cleaning device requires the supply of compressed air with the following characteristics:

Minimum pressure      6      bar  
Minimum flow-rate      50 litres/min



The solenoid valve used for taper cleaning must be operated manually: refer to the dedicated section for information regarding its intended use.



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## 5.7. HYDRAULIC UNIT CONNECTION



The following checks must be performed on the hydraulic unit before operating the machine.

1. Tank check
2. Filling of the fluid with prior filtering
3. Check the system before start-up
4. Bleeding of the air from system components
5. Calibration of the pressure limiting valves
6. Calibration of the pump pressure regulators
7. Compliance with the flow time of the servosystems
8. Check for any abnormal noise of the pump (cavitation index, poor intake sealing , excess air in the fluid)
9. Check for any assembly errors: these could cause transversal stress on the cylinder stems
10. Bleed the cylinders to prevent damaging the gaskets
11. Check the position of the limit switches
12. Check the calibration of the pressure switches
13. Fill the bodies of the pumps and motors with hydraulic fluid
14. Write down the calibration values
15. Lead seal or lock the valve calibration screws
16. Fence off the work area during start up



To check the required procedures, refer to the *HYDRAULIC UNIT MANUAL* and/or the *USER AND MAINTENANCE* chapter in this manual

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## 5.8. COOLANT SYSTEM CONNECTION



The coolant tank must be filled before starting the machine.



Refer to the following chapters in this manual and/or the attached diagram for more details.

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## 5.9. CHECK OF CORRECT INSTALLATION



After performing the installation and the necessary connections, with the machine in correct operating conditions, perform the following checks



The checks must be performed after installation to ensure the tolerances indicated in the test certificate (refer to the test certificate)

1. Perfectly level the bed and column.
2. Check perpendicularity and parallelism of the parts.



Check the machine with a sequence of adjustments and slowly tightening of the foundation bolts and taper gibs in order to obtain a correct levelling of the machine.

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### 5.9.1. Taper ISO/50 7388 Big Plus Ready

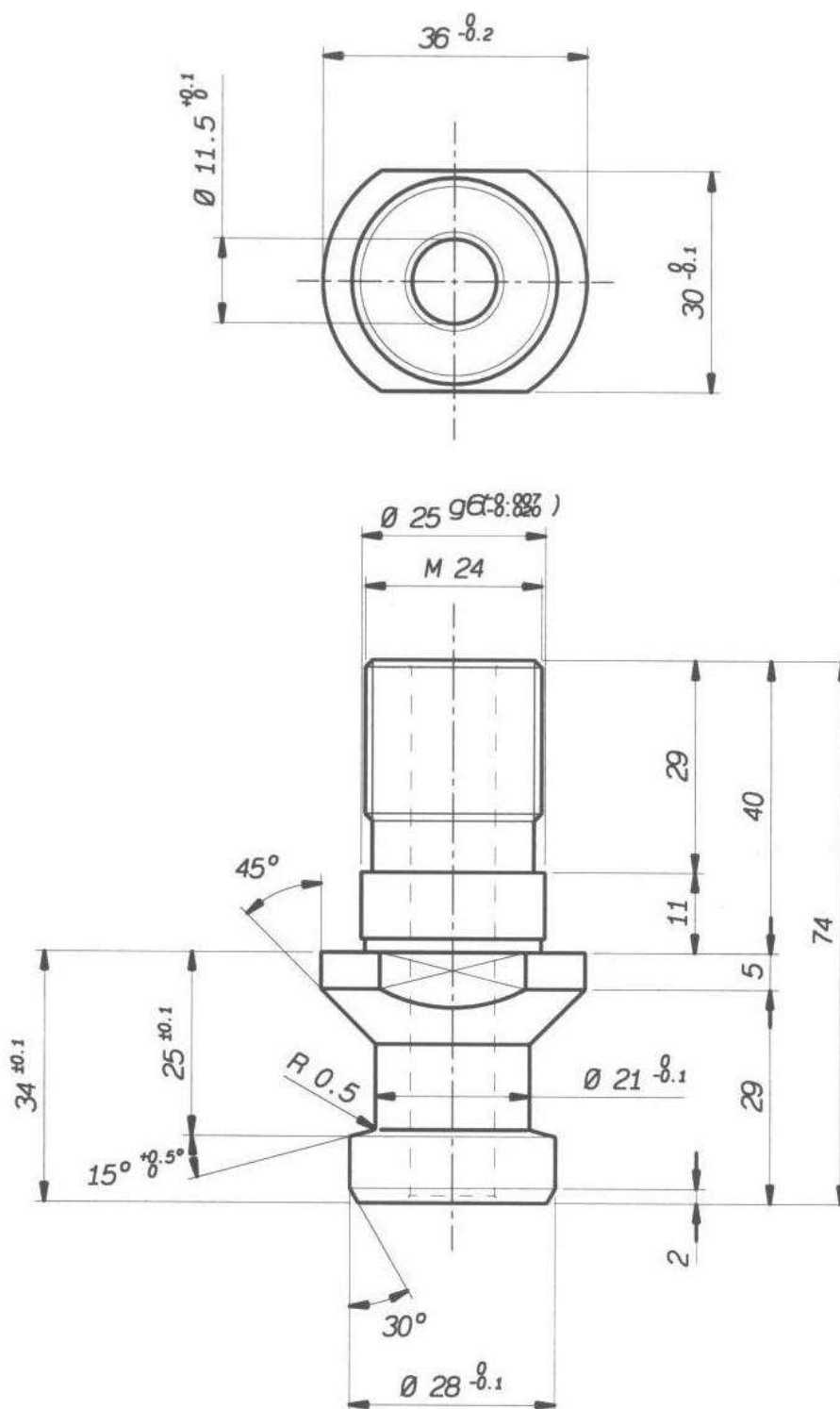






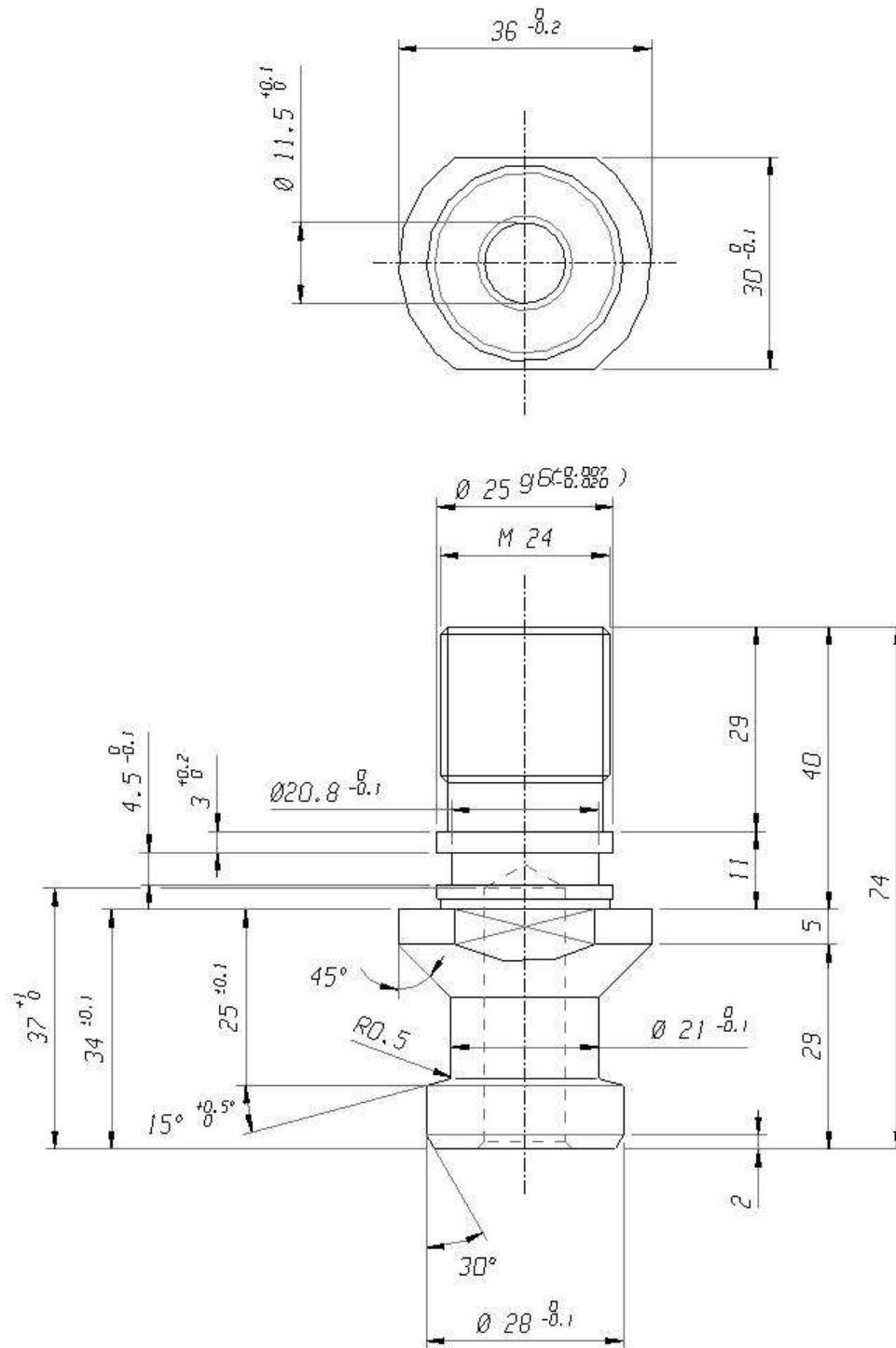


**5.9.4. Tang DIN 69872-50**

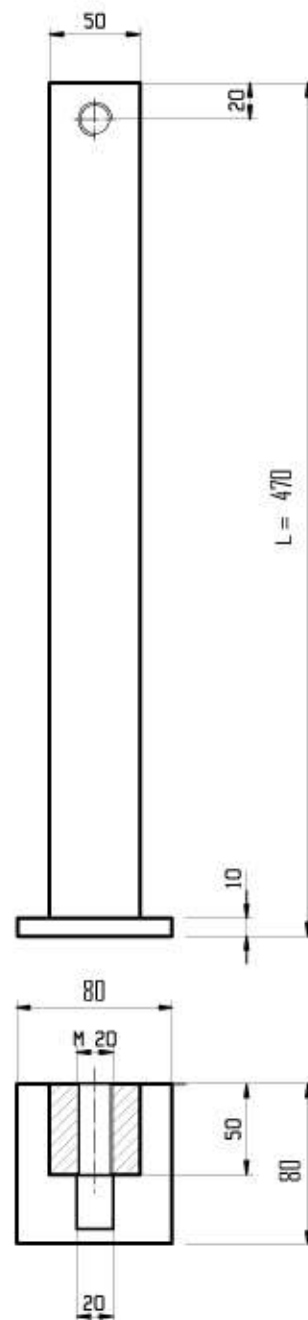
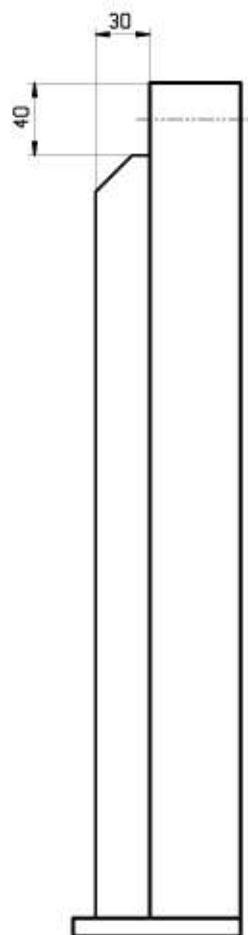
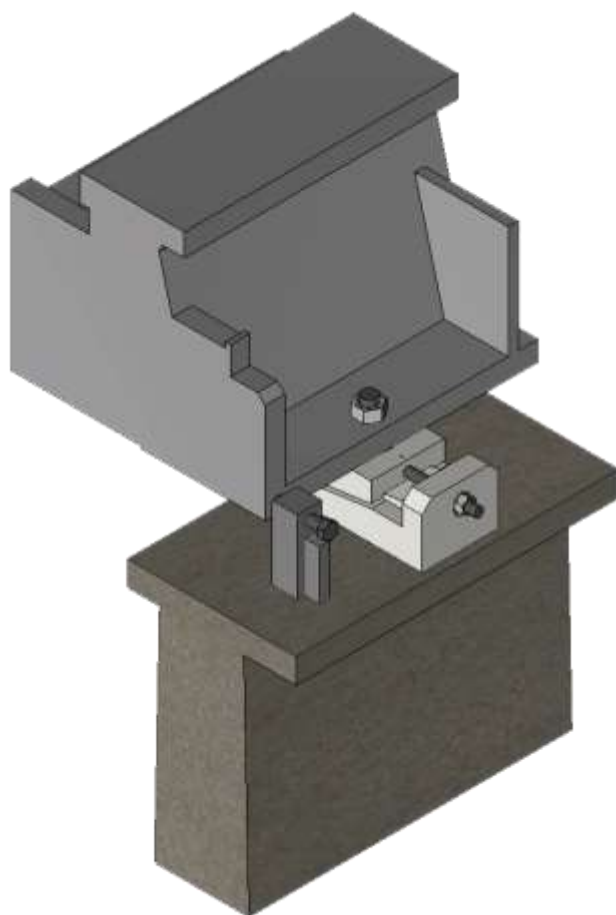


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### 5.9.5. Tang DIN 69872- Form B-50



### 5.9.6. LEVELLING PLATES T



Number of pieces:

**8**

Material:

**Fe 360**

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## 5.10. EQUIPMENT FOR STARTING AND TESTING



The proper operation and the accuracy of machine tools depend directly on its installation in perfect conditions.

Installation requires the tools, gauges and instruments of good quality as described in the following pages.



The purchaser shall take care to prepare these devices before starting the positioning operations.


In addition to the materials listed in the following pages, the following is required:

- Cleaning materials like wipers, petroleum and solvents;
- Alcohol and wadding to clean the optical components;
- Special liquids for the cleaning of the electrical cabinets;
- Oils as prescribed in the Instruction Manual, required for the fillings of tanks in order to allow the machine functioning.
- Proper turpentine
- Silicon
- Cutting oil type Dormer Blue
- SKF Grease type SKF LGMT3/1
- Probe for electricians Spiroidal polyester three wires Arnocanali Anguila Item AP45.030 (Ø4,5mm.x30m.)

If the starting of the machine will be made by a LAZZATI technician, the filling will be made in his presence and he could decide not to use oils that should not suitable for a correct functioning of the machine. If the start-up of the machine will be complicated it should be suggestible to have at disposal spares filter cartridges foreseen by LAZZATI.

Spare fuses as described in the electrical diagram.

For the start-up of the CNC machines Please be advised that our technicians cannot know all the numerical controls that exist, therefore it is required that one customer operator attends the special courses provided by the manufacturers of CNC.

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### 5.10.1. Tools and Gauges

Description	Qty
Tilting Arm R=800 according to LAZZATI drawing	1
ISO 50 tool with sphere to check spindle	1
Supporting foot for headstock according to LAZZATI drawing	2
Supporting foot for machine beds according to LAZZATI drawing	12
Dial indicator, reading to 0,01 mm. ISO/R463	1
Complete Set for Internal dial gauge adjustable stylus dial indicator, reading to 0.01 mm.	1
Magnetic base, rotating for dial gauges	1
Digital Vernier reading to 0.01 mm	1
Digital depth gauge reading to 0.01 mm	1
Control cylinder, length 300mm, with taper ISO 50 Certified precision = 0,001-0,003 mm. according to ISO/R230	1
Mitutoyo Item 960-703 – Angular bar precision level 250X250 sensibility 0,02 mm/m ISO/R230	1
Diabase Control straight hedge L= 1100 mm. with levelling points, tolerance of parallelism and planarity DIN 874 = +/- 0,005mm - ISO/R230	1
Diabase Square block H = 1.000 mm. tolerance of normality =0,003mm. ISO/R230	1
Measuring tape shock-resistant bimaterial ABS casings, steel tapes, precision class II L=8000mm	1
Spirit levels made from anodized profile aluminium, with 2 unbreakable vials, accuracy: 1 mm/m L=400mm	1
Set of combination wrenches, open and offset ring ends, bright chrome-plated 6÷32 mm.	1
Combination wrenches, open and offset ring ends, heavy series 46 mm.	1
Set of double open end wrenches, bright chrome-plated 6÷32 mm.	1
Set of offset hexagon key wrenches chrome-plated 1,5÷12 mm.	1
offset hexagon key wrenches chrome-plated 3/16", 3/8"	2
Offset hexagon key wrenches chrome-plated 14-17-19 mm.	3
Set of T-handle wrenches with three hexagon male ends 2÷14 mm.	1
1" hexagon hand socket 36 mm.	1
1" drive reversible ratchet, 72 teeth	1
1" drive extension bars L=200 mm.	1
1" drive extension bars L=400 mm.	1
1" hexagon hand socket 46 mm.	1
Twist drills with cylindrical shanks, short series HSS, rolled 1÷13 mm.	1
Twist drills with cylindrical shanks, short series HSS, rolled 14 mm.	1
Twist drills with cylindrical shanks, short series HSS, rolled 16 mm.	1
Helical cylindrical masonry drill bits, short series, made from milled steel with hard metal plates 3÷12 mm.	1
Set of Machine taps for blind holes, coarse pitch threads, HSS M4-5-6-8-10-12-14-16-20-24	1
Adjustable tap wrenches, steel body M9÷M27	1
Reversible ratcheting tap wrenches M5÷M12	1
Set Pin Punches Ø4-5-6-8-10 mm.	1
Set of Pins Extractor with insert for M5-6-8 mm.	1
Bonding gun varnished metal sheet + N°2 Silicon Tubes	1
Plastic pressure oil cans flexible spouts 200cc	1
Utility knife, 18 mm, 6 spare blades	1
High-brightness LED torch, made from sturdy anodized aluminium, up to 450 lumens	1
Engineer's hammers, wooden shaft	1
Soft face hammer, wooden shafts	1
half-round and flat files, plastic handles	1
Abrasive Stone	1
Crow bars with closed and pointed edges L=1.600mm	1
metric feeler gauges S= 0,05÷1,00 mm	1
Hand Driller two-speed combi compact battery with battery charger	1
Digital multimeter	1
Set of insulated screw drivers 1000 V for electricians	1
Electrician's scissors, straight blades	1
Electrical extension 220V up to 15mt.	1
fitting tool for ties with assortment of 400ties	1
RUD chain type VIP 10 complete with N°2 (two) legs L=2.000mm, end link VSAK 2-10/190, shortening VMVK 10, final hook VCGH 10	2
Ring round nylon ropes, development 8000 mm. and load 10.000 Kg	2
Ring round nylon ropes, development 3000 mm. and load 2000 Kg.	2
Load ring FIXED, thread M8	4
Load ring FIXED, thread M12	4
Load ring RUD type VWBG-V 1.3, thread M16	4
Load ring RUD type VWBG-V 3.5, thread M24	4
Shackles 1-1/4" 12tons	4
Steel Bar d.65mm L=2.000mm	2

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### 5.10.2. Lubricants and coolants T

Your machine has been designed considering the chemical and structural features of special oils and coolants. Therefore, we suggest to use the following oils and coolants according to applicable requirements of ISO/TC/39/WG6, in order to obtain a correct operation of all components of the machine.

<b>HYDROSTATIC GUIDES; GUIDE LUBRICATION</b>	MOBIL VACTRA OIL N°2 or PANNOLIN SLIDEWAYS 68
<b>UNIVERSAL HEAD GLEASON PAIRS AND BEARINGS; HYDRAULIC CLAMPING; TOOL CHANGER</b>	MOBIL DTE 25 or PANOLIN HLP PLUS 46
<b>ZF RANGE CHANGE (IF PRESENT)</b>	MOBIL DTE MEDIUM – ISO VG 46 or PANOLIN HLP SYNTH 46
<b>LUBROCOOLANT</b>	BLASOCUT 2000 Universal art.870 or ROCOL ULTRACUT 370

It is extremely important to maintain the levels of oil to the suitable height of the special level controls and periodically to check the cleaning of the fluids and relative filters.

The technical service LAZZATI is at your complete disposal to furnish the whole assistance and the necessary information to effect all the operations of maintenance of the machine.



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## 5.11. MACHINE SET-UP FOR THE FIRST START-UP



The first machine start-up must only be carried out by personnel authorised by the manufacturer.



Failure to comply with these instructions could cause permanent damage to the machine.

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## 5.12. MACHINE SET-UP FOR START-UP AFTER A LONG PERIOD OF INACTIVITY



The setting up of the machine after a long period of inactivity requires the checks indicated in the maintenance chapter of this manual.



The support of a technician authorised by the manufacturer is required in order to assess the actual condition of the machine


### 5.12.1. Stop of the hydraulic unit

A stop of less than two months, requires no special precautions if the system is kept clean and protected.

If the stop is over two months, we recommend reducing the precharge of the accumulators and drain water from the heat exchangers.

Start the system every two months at minimum pressure, for a few minutes, ensuring lubrication to the components.

To restart the work cycle after a long stop, check the integrity of the fluid and replace it if necessary, check all the seals, replace the gaskets and tighten the fittings.

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## 6. Machine operation and use

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## 6.1. DESCRIPTION OF THE OPERATION OF THE INSTALLED DEVICES



The machine may only be used by qualified personnel who must have read and understood this manual

The descriptions of the installed devices that make up the machine are provided below

It is prohibited to modify the devices or use them for a purpose other than what is described and specified by the manufacturer.




Any use other than what is indicated is considered incorrect: the manufacturer is not liable for behaviours and uses other than those intended.



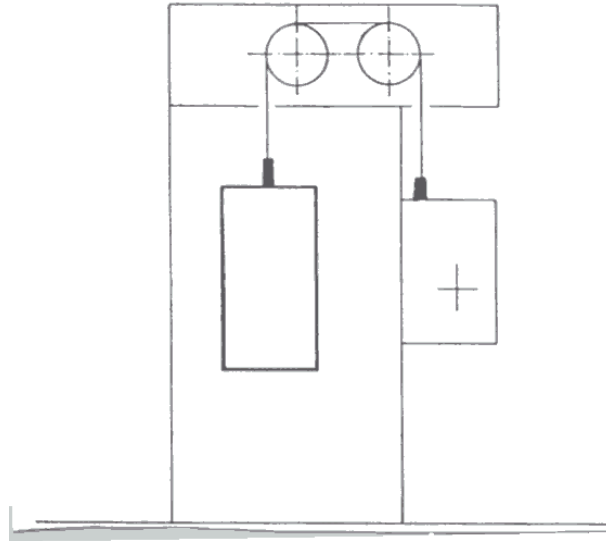
If the instructions are not understood, refer to the attached documentation for the installed devices: in the case of doubt, contact the manufacturer.

Dimensions and data of this chapter are indicative. Please contact the manufacturer for more details.



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### 6.1.1. HEADS BALANCING




Head balancing is obtained with a mechanical or hydraulic counterweight that runs inside the column and balances the head weight. The counterweight is driven inside the column by a guide system. This guide method makes the balancing rigid even under the forces caused by horizontal and vertical accelerations. The balancing system comprises:

1. Driven mechanical or hydraulic counterweight
2. Pulleys for the wire rope sliding.
3. Wire ropes screwed in the head and in the counterweight .

In accordance with the current Machinery Directive (2006/42/EC), the safety coefficient of the ropes used for lifting is equal to 5, in the case of the sets and terminal metal rope, while it is equal to 7, in the case of use of ropes or belts of textile fibres.

According to the EC Directive mentioned above, there is a traceability code firmly fixed on the end of the ropes that contains the data necessary for identifying the relative "CE" declaration of conformity.

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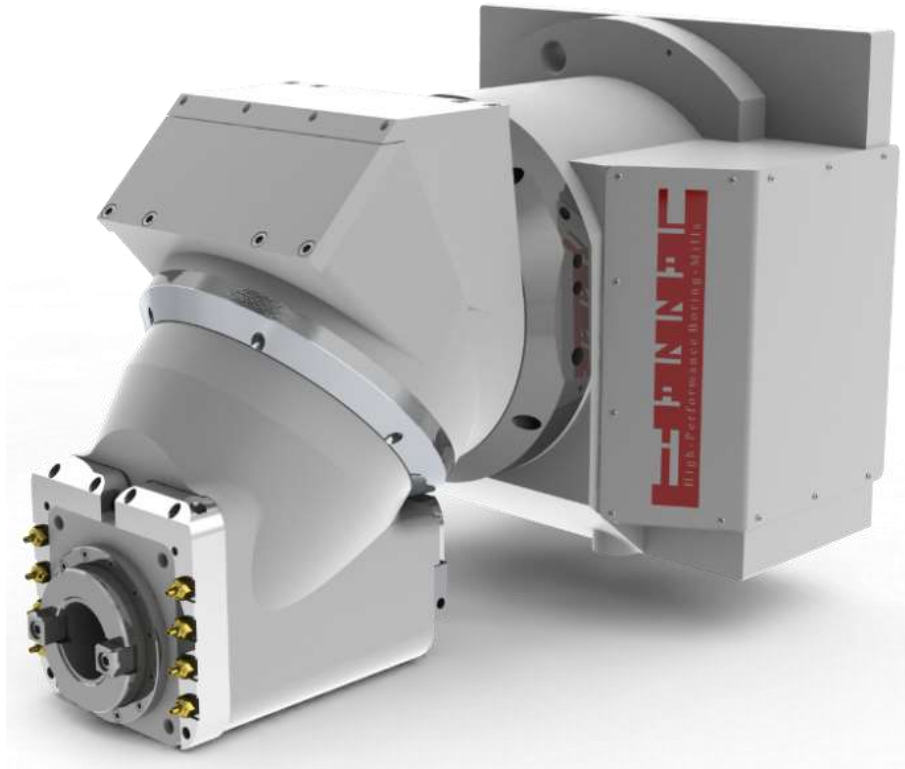
The implementation of the rope includes operations to be performed, mounting, attachment of the fixed head and adaptation to working conditions that must be performed correctly, in order to ensure the optimum conditions of use and to avoid premature breakage or reductions in the duration.

The assembly or replacement of the ropes must only be performed after carefully checking the throats of the pulleys or drums to make sure that they are not worn or deformed and after checking that the pulleys rotate freely without excessive play.

In case of using steel rope, remember the need to avoid overlapping of the rope and any abnormal twists that may affect the duration of the rope or cause leakage. To ensure the best performance and durability, ensure that the rope works while maintaining the structural parameters. In particular, it is necessary that the ends are connected to an attachment that prevents the rotation induced by the system.

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### 6.1.2. A UA 360 - AUTOMATIC UNIVERSAL HEAD 1° x 1°: (APPLIES ALSO TO VA ISO50)



#### Description

The birotative universal head permits the spindle automatic positioning in all positions of the space by means of 360° rotation of both swivel-head elements. The clamping and unclamping of the components is done hydraulically and the numerical control unit directly controls the swivel angle. A lubrication and cooling circuit is provided for keeping the temperature constant in the head so to maintain the geometrical tolerances equal to those obtained during the acceptance test. The spindle rotation is obtained by using of taper gears casehardened, hardened and precision ground.

Thanks to the modern RTCP software, which LAZZATI has developed together with the producers of the CNC, it is possible to manage the handling and the positioning of the head in the space. Every kind of machining is completely managed by the CNC as regards the compensations on the axes; therefore can make machining in the space programming as on the X -- Y axes. Both bodies rotate 360°.

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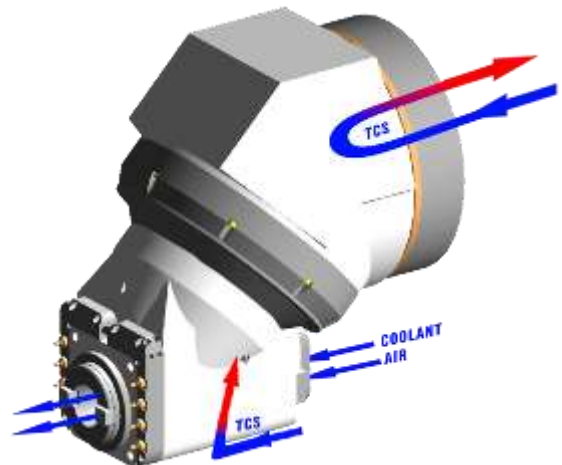
The particular head features are:

- Reaching a high rotation speed of 4,500 RPM with low temperature delta essentially due to the system for cooling the lubrication oil, which is made to circulate inside the head by the pumps.
- Oblique contact bearings with high precision "Class G7"
- Positioning of two bodies making up the head (A and C) with resolution of 1°.
- A temperature control circuit controls the temperature of the universal head to prevent it from lengthening.
- It is possible to use drilled tools for the passage of the coolant with ISO 50 DIN 69871/A – Big Plus Ready type tapers.
- During the tool change, a jet of air automatically cleans the attachment taper of impurities and the coolant.

The positioning precision of the head is ensured by large Hirth type front teeth coupling that ensures its positioning with a maximum angle error of  $\pm 5''$ , that is 0.015 mm. along a distance of 300 mm. The tapered gears have Gleason teeth that are ground on the involute; the spindle is made of 18 Ni Cr Mo 5 steel that is casehardened, hardened and ground and supported by high precision taper roller bearings. The locking of the tool is obtained by means of clamp and cup springs which lock the tool even when the machine stops. The release takes place hydraulically. Safety devices do not allow the release of the spindle in motion. The lubrication is continuous circulation of oil in order to ensure a constant temperature of the head allowing the maintenance of the foreseen level of accuracy.

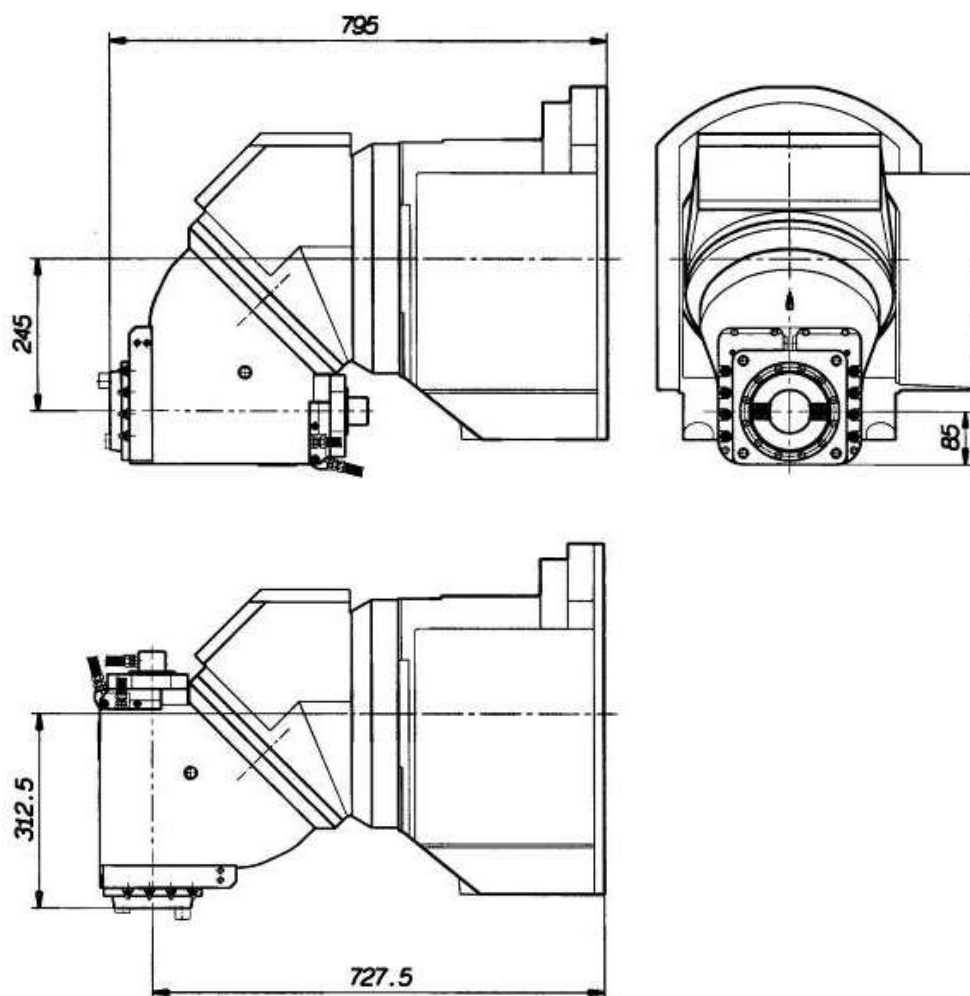
The follow is also provided standard:

1. Air for taper cleaning
2. Coolant through spindle
3. External coolant
4. Automatic tool changer



## Technical Characteristic A UA 360:

Constant torque	Nm.	1,500
Top speed	RPM	3,000 - 5,000
Input-output ratio		1-1
Spindle attachment	ISO50 – Big Plus Ready	
Axial thrust	N.	20,000
Head rotation in space	Axis A	360°
	Axis C	360°
Rotating surface	Degrees	45°
Positioning via CNC	Degrees	1°
Positioning accuracy	Sec.	± 5"
Approx. net weight	Kg.	350



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### 6.1.3. A UM – MANUAL UNIVERSAL HEAD if present



#### Description

The universal manual head allows the positioning of the spindle in all positions of the space thanks to the 360 ° rotation of the two elements of the head.

The rear body is provided with a reference pin for the positions 0 ° - 90 ° - 180 ° - 270 °.

The front body has a reference pin at 0 ° - 180 °

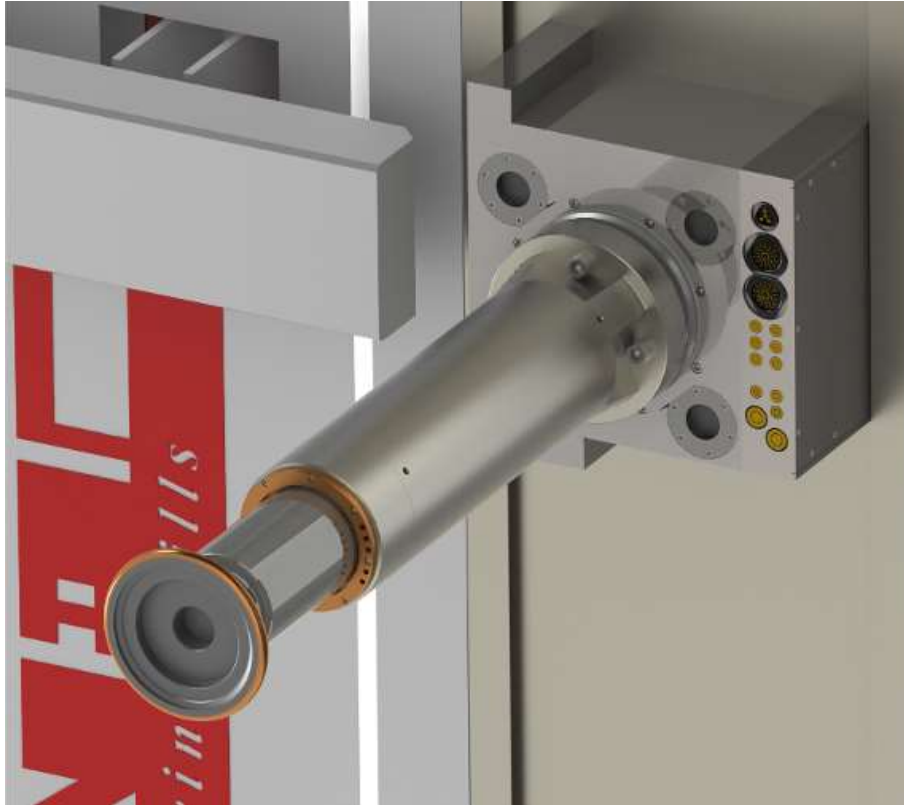
The spindle rotation takes place via hardened and tempered bevel gears.

The locking and unlocking of the tool is similar to that of the head of the boring machine.

Technical specifications:		
Taper attachment	ISO	50
Maximum torque	Nm.	1,000
Top speed	RPM	2,000
Input-output ratio		1-1
Axial thrust	N.	15,000
Head rotation in space	Axis A	manual
	Axis C	manual
Position	Degrees	Continued
Approx. net weight	Kg.	350

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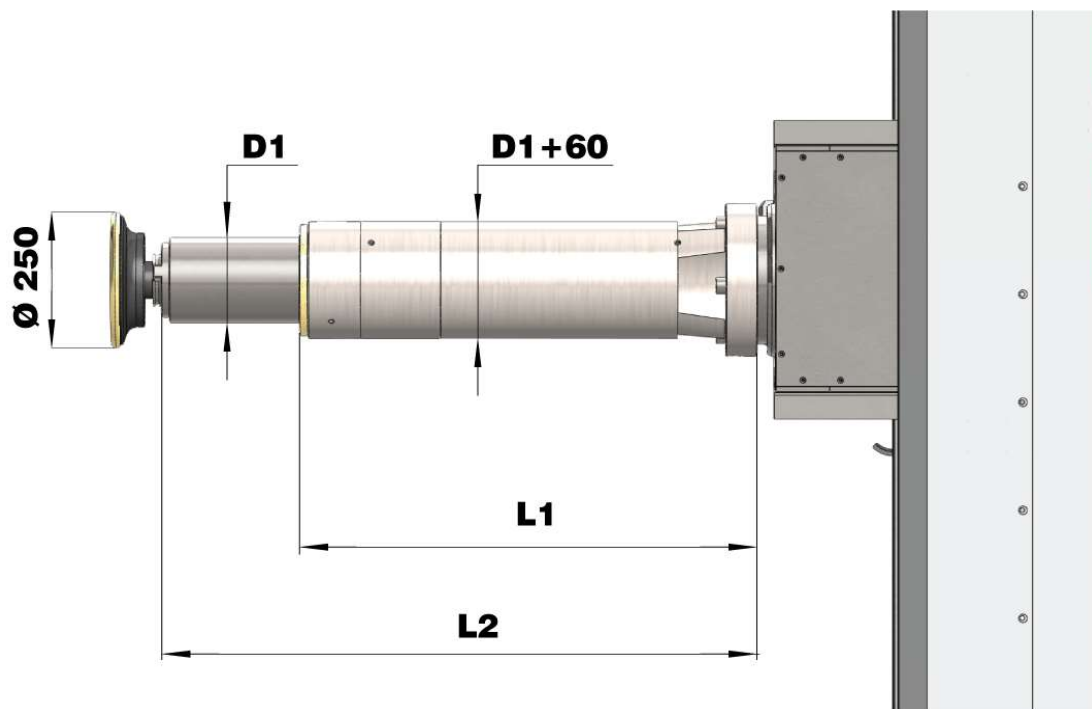
#### 6.1.4. A SC/L- SPINDLE SUPPORT if present



#### Description


The spindle support serves to stiffen the spindle during machining. It is screwed to the spindle support sheath and the spindle is locked to the support by means of a hydraulically deformable sleeve. It is furnished with mounting screws and lifting eyebolts.

It is also possible to automatically change the tools.

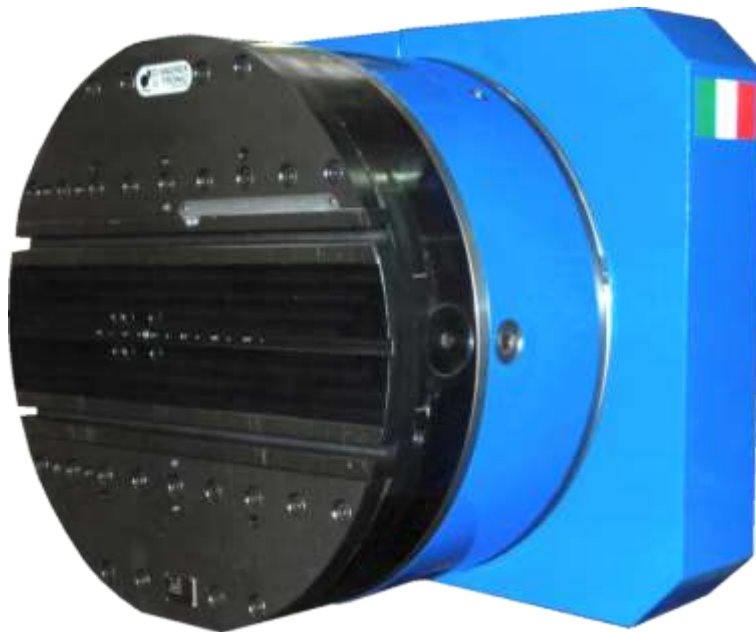


TECHNICAL DATA:			
D1 [mm]	D1 + 60 [mm]	L1 [mm]	RPM Max.
A SC 130	190	300	2,500
A SL 130	190	600	1,750
A SC 150	210	300	2,500
A SL 150	210	600	1,500
A SC 160	220	300	2,000
A SL 160	220	600	1,500
A SL 180	240	750	1,250
A SL 200	260	900	1,000



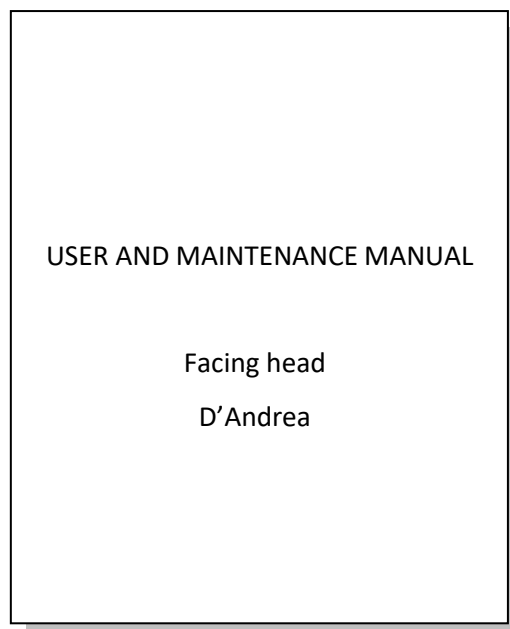
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#### 6.1.5. A FH - D'ANDREA FACING HEAD UT5/XXX S if present



#### Facing head

All information regarding the use of the facing head, its start-up and correct maintenance is described in the device manual:



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#### 6.1.6. TC/TW – AUTOMATIC TOOL CHANGER




This is an automatic tool change system that can be adapted for milling machines and / or boring machines with different structures, denoted by the generic name of "Tool Magazine".

All information regarding the use of the automatic tool changer, its start-up and correct maintenance is described in the device manual:

USER AND MAINTENANCE MANUAL

Automatic tool changer

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The Tool Magazine is composed of two basic modules:

**Magazine:** structure for housing the tool holder

**Mechanical hand:** module for handling tools


#### Magazine:

This is a mechanically-welded structure that supports a chain with a linear movement provided by an electromechanical drive (servo-motor and reduction unit). Each link of the chain has a support conveniently designed to receive and retain a tool.

The chain can be attached to a vertical plane, so that the tools remain housed in a horizontal position, or arranged in the foundation.

Its function is to move the tools required for the machining process to the "change" position, in line with the mechanical hand, and to bring the housing cells for the tools that are picked up by the machine spindle to the correct position at the end of machining.

In both functions, the tool is taken or placed in its cell by means of "double arm" of the mechanical hand. Thus, the function of the magazine is to place the cells housing the tools in the change point. These functions are controlled by means of an encoder, while the change position is ensured by a hydro-mechanical system in order to ensure the accuracy of positioning.

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## Mechanical hand

This is a module with a double-arm system that slides over a support-guide between the magazine and the head or the spindle of the machine, all driven by a hydraulic system with regard to the movement of the arm and by an electrical system for the handling of the truck.

Its function is to take the tool from the magazine, remove the tool from the spindle and, interchanging them, deposit the removed tool from the spindle in the store and the one from the store in the spindle. The mechanical hand of the tools is performed by the double-arm through the following functions:

- **Arm in:**

Waiting position of the tool, in the extraction phase from the magazine or from the spindle.

Position of tool in its cell or in the spindle during the phase to introduce the tool in the spindle or in the store.

- **Arm out:**

Position of the tool taken from the magazine or from the spindle.

Position for interchange of tools (position 0 ° 180 °).

- **Arm 0 °:**

Waiting position of the tool during extraction or introduction into the magazine and in the spindle.

- **Arm 180°**

Position for the extraction or introduction of the tool in the magazine and in the spindle.

The double arm is positioned above a carriage which, sliding on a support-guide, performs the following functions:

- **Warehouse-side arm**

Position for loading/unloading the tool in the magazine


- **Spindle side arm:**

Position for loading / unloading the tool in the spindle

- **Intermediate position arm:**

Position of security and origin of the whole tool changing process.

Thus, the function of the mechanical hand is to perform the exchange of the tools between the magazine and the spindle.

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### 6.1.7. CHARACTERISTICS AND MAXIMUM DIMENSIONS OF THE TOOLS

The machine is designed to function with different types of tools.



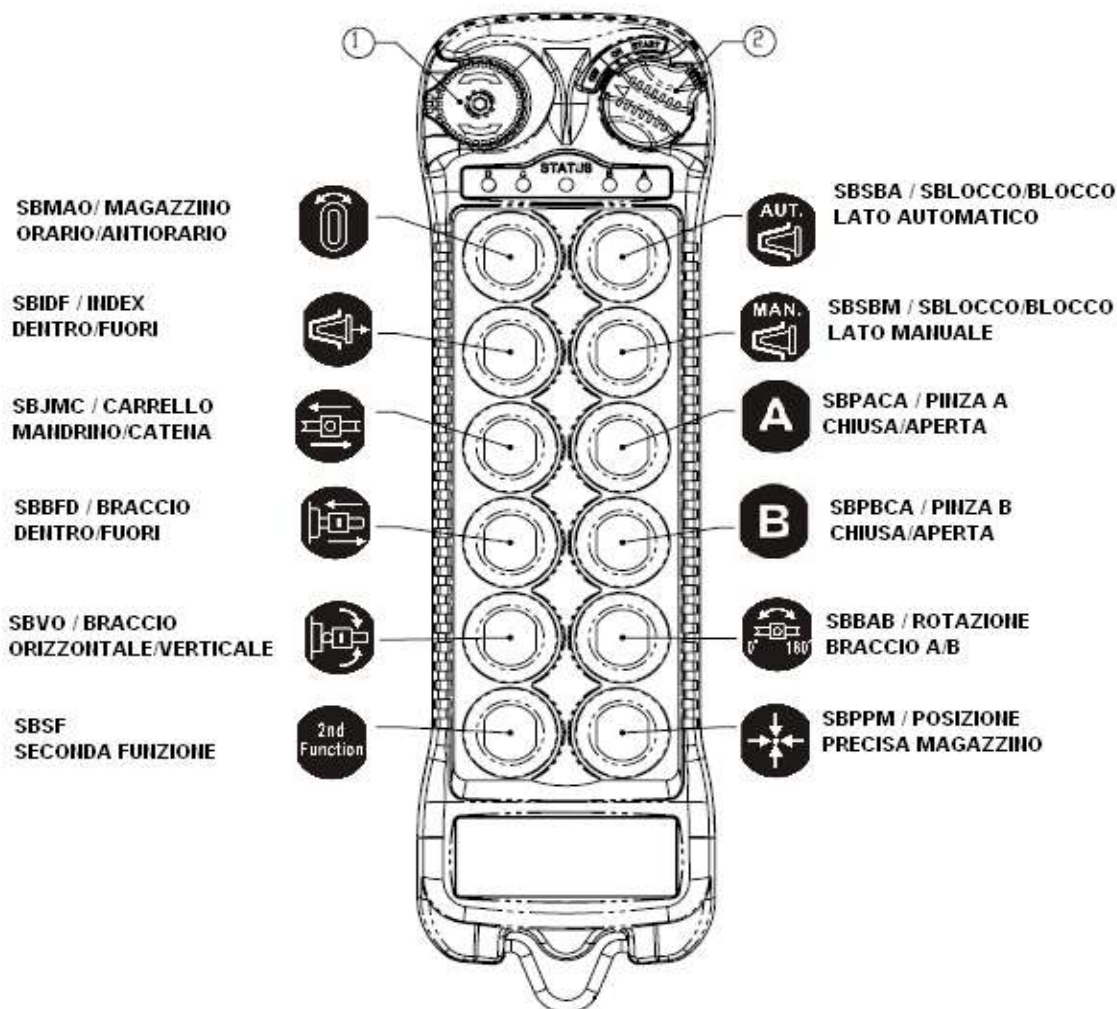
For the limits of tool use, refer to the tool changing device manual attached to this manual

USER AND MAINTENANCE MANUAL

Tool changer


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## TRASMETTITORE MODELLO FLEX 12X



1. Pulsante stop emergenza

2. Chiave alimentazione (rimovibile)

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### 6.1.8. PROBE SYSTEMS

The probe systems are easy to be used and are planned to work many hours without giving any problem. They allow a more reliable production without rejects and consequent damages. The measures to increase production by automation only make sense if a high and constant quality level of workpiece is assured

#### Main use of the probes

When the probe touches a surface, a signal records the contact point and the Numerical Control gives to the machine the instruction to stop and in the same time provides data regarding the stop position. The best is to have high inspection speeds but always permitting the machine to stop within the stylus stroke. After the probe has touched the surface, it comes back.

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### 6.1.9. O BS – BALLUFF TYPE IDENTIFICATION SYSTEM BIS C – if present

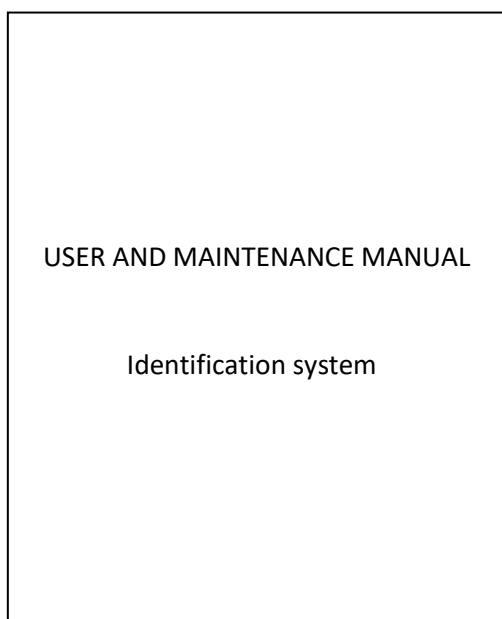
The current series of work performed with the automatic tool changer are facilitated by the exchange of information between the tool and the machine, allowing also a significant reduction of manufacturing defects. The data transfer between memory and reading head, takes place without any contact with the parts and, therefore, without wear. Both the data and the energy necessary for the code support is transferred in an inductive way by the reading - writing head. The code support does not need battery backup for the data retention. An exact position is not necessary. The code support can also be read or programmed in a dynamic way. The integrity of the transmission is ensured by a special control algorithm. The identification system for BIS provides a reliable exchange of information between the tool and the machine operating:

1. Tool coding
2. Tool geometry: Length, radius, etc..
3. Tool life


#### Specifications

1. Miniaturized code support
2. Memory capacity up to (kBytes)
3. High noise immunity
4. Immune to dirt and liquids
5. No maintenance required

All information regarding the use of the identification system, its start-up and correct maintenance is described in the device manual:





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#### 6.1.10.O SP – WORKPIECE PROBE



#### Description:

The workpiece inspection probe is a system generally used on numerical controlled machine tools for:

1. Measuring the pieces in process with automatic cycle correction.
2. The determination of the thermal expansion
3. The detecting of the position of the workpiece to machine
4. The effect of the tool wear on the workpiece with possible tool change and cycle correction

The complete measurement system comprises:

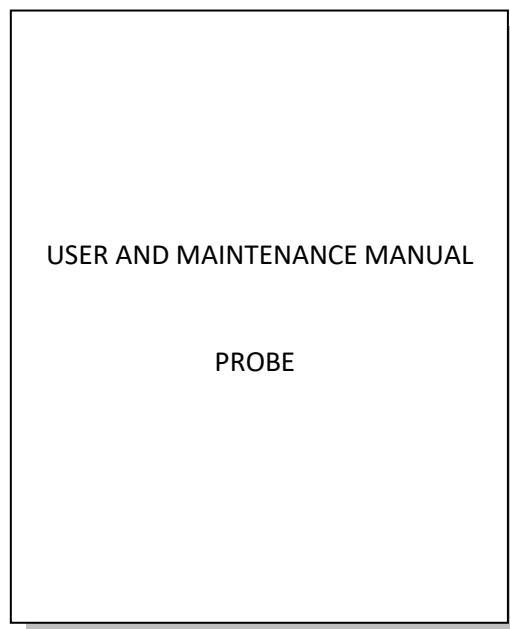
1. The measuring probe
2. The signal receiver located in a fixed position on the machine
3. The electronic interface with connection cables to the receiver and the CNC.

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The measuring system functions according to the principle of the switching point and interacts with the CNC. The probe is mounted on a tool holder and stored in a tool magazine. The device power supply voltage is provided by a rechargeable accumulator. If the power supply voltage is not sufficient, a specific alarm on the CNC screen will warn the operator. The probe is required to implement the concept of a machine not manned by an operator. In fact, the workpiece probe system allows the machine automatically to determine the presence of the workpiece and its set-up, to correct the machining start point in order to minimize the use of high precision instruments and to avoid costly problems.



Read the user and maintenance instructions for the device inserted in the probe container.



Also consult the Numerical Control machine manufacturer to determine how many automatic cycles are possible with your control in order to use it better.



The maximal feed for the inspection must not exceed 2000 mm/min.

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### 6.1.11.O SU – TOOL PROBE



#### Description:

During the machining with numerical controlled machine tools, the production quality and the consequent elimination of rejects mainly depends on the tools status used for machining. The regular and constant, and above all automatic, control of the tools is a condition for obtaining a rational and good quality production. The tool measurement system is connected with a cable to the machine tool and by means of this to the Numerical Control and therefore is able to provide it with information about the condition of the tool, with a possible alarm or replacement, or information regarding wear, with processing by the CNC for the correction of the set measurements.

The system can operate in two 90° directions in order to permit the tool inspection on two opposite coordinates.


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#### **6.1.12.O CM – LAZZATI Collision Monitoring System if present:**

The machine must be equipped with a collision monitoring system.

This system protects the machine tools from collisions: highly sensitive sensors recognise production irregularities and react quickly.

If necessary, a stop signal is sent to the control centre, which stops the machine as soon as possible.

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### 6.1.13.J – CHIP CONVEYOR if present



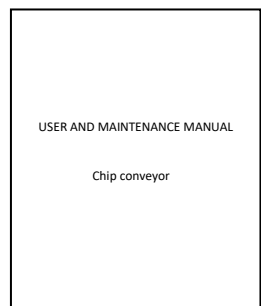
The machine is equipped with a chip conveyor with a hinged belt for the removal of the chips that are created during processing. The chip conveyor, made of sturdy structure of welded steel, is provided with a hinged and drilled plate belt for the removal of the coolant.



A safety microswitch stops the advancement of the conveyor belt in case of operator presence and/or overloads caused by clogging of chips or pieces that fell on the conveyor belt.


The command of the conveyor is equipped for reversing the direction of advancement of the belt to facilitate removal of obstructions or clogged chips.

All information regarding the use of the chip conveyor, its start-up and correct maintenance is described in the device manual:







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#### 6.1.15. LAZZATI Line TR – Rotary travelling tables 15-120Ton if present:



The table surface is made out of reinforced cast iron with numerous “T” slots for fastening the parts, the table is subjected to two stress relieving heat treatments before and after roughing the slots.

The design was optimised in order to minimise the support surface deformations, also with the maximum loads placed in peripheral points.

The table is supported by a large bearing surface, the centring is ensured by a highly precise tapered roller bearing.

Motion is transmitted by a dual clearance recovery pinion that engages with a rack with inclined and ground teeth. This excellent solution was designed to obtain maximum positioning precision and also makes it possible to perform contouring work with very strict tolerances.

All LAZZATI tables in the TR line are equipped standard with:

- LHS – LAZZATI Hydrostatic System on the V and B axes
- DPS – Double Pinion System for maximum precision and soft rotation of the B axis
- DSR – Dynamic Setting of axes Drives for maximum performance in different load situations
- ELC – Eccentric Load Compensation for maintaining maximum precision also with eccentric loads on the B axis



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**TR 15 – Rotary travelling table 15Ton if present:**



Main technical data		
Min. Table surface	mm.	1,600 x 2,000
Max. Table surface	mm.	1,840 x 2,400
Max. permitted load at the centre	Ton.	15
Diameter of bearing surface	mm.	1,100
Table thickness	mm.	245
Max. permitted tilting moment	Nm.	50,000
V axis linear travel	mm.	1,500 - 4,000
DSR – Dynamic Setting of Rotation		
LHS – LAZZATI Hydrostatic System		
Table slots:		
No. of T slots	No.	10 – 12
T slot dimensions	mm.	28 H7
T slot centreline	mm.	160
Table centring	mm.	100 H6
Continuous work progress variation		
Linear	mm/1'	1 ÷ 10,000
Rotary	RPM	0.001 ÷ 3
Fast		
Linear	mm/1'	10,000
Rotary	RPM	3
Kinematic:		
V axis– Precision ball screw	mm.	63
B axis – Lazzati dual preloaded pinion with clearance recovery		DPS 15 + DSR
Measuring system		
Linear axis - Heidenhain optical rule – precision $\pm 5 \mu\text{m}$		
Rotary axis – Encoder Heidenhain ROD 780		
Weight:		
Approx. net weight	Ton.	11 - 13



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**TR 30 – Rotary travelling table 30Ton if present:**



Main technical data		
Min. Table surface	mm.	2,000 x 2,500
Max. Table surface	mm.	2,500 x 3,000
Max. permitted load at the centre	Ton.	30
Diameter of bearing surface	mm.	1,400
Table thickness	mm.	350
Max. permitted tilting moment	Nm.	80,000
V axis linear travel	mm.	2,000
DSR – Dynamic Setting of Rotation		
LHS – LAZZATI Hydrostatic System		
Table slots:		
No. of T slots	No.	10 – 12
T slot dimensions	mm.	28 H7
T slot centreline	mm.	200 – 250
Table centring	mm.	100 H6
Continuous work progress variation		
Linear	mm/1'	1 ÷ 10,000
Rotary	RPM	0.001 ÷ 2
Fast		
Linear	mm/1'	10,000
Rotary	RPM	2
Kinematic:		
V axis– Precision ball screw	mm.	80
B axis – Lazzati dual preloaded pinion with clearance recovery		DPS 30 + DSR
Measuring system		
Linear axis - Heidenhain optical rule – precision $\pm 5 \mu\text{m}$		
Rotary axis – Encoder Heidenhain ROD 780		
Weight:		
Approx. net weight	Ton.	13 - 15

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**TR 50 – Rotary travelling table 50Ton if present:**



Main technical data		
Min. Table surface	mm.	2,500 x 2,500
Max. Table surface	mm.	3,000 x 3,500
Max. permitted load at the centre	Ton.	50
Diameter of bearing surface	mm.	1,850
Table thickness	mm.	420
Max. permitted tilting moment	Nm.	120,000
V axis linear travel	mm.	2,000 - 6,500
DSR – Dynamic Setting of Rotation		
LHS – LAZZATI Hydrostatic System		
Table slots:		
No. of T slots	No.	10 – 12
T slot dimensions	mm.	28 H7
T slot centreline	mm.	250
Table centring	mm.	100 H6
Continuous work progress variation		
Linear	mm/1'	1 ÷ 5,000
Rotary	RPM	0.001 ÷ 1.5
Fast		
Linear	mm/1'	5,000
Rotary	RPM	1.5
Kinematic:		
V axis– Precision ball screw	mm.	100
B axis – Lazzati dual preloaded pinion with clearance recovery		DPS 80 + DSR
Measuring system		
Linear axis - Heidenhain optical rule – precision $\pm 5 \mu\text{m}$		
Rotary axis – Encoder Heidenhain ROD 780		
Weight:		
Approx. net weight	Ton.	25 - 35

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**TR 80 – Rotary travelling table 80 Ton if present :**



Main technical data		
Min. Table surface	mm.	3,000 x 3,000
Max. Table surface	mm.	4,000 x 4,000
Max. permitted load at the centre	Ton.	80
Diameter of bearing surface	mm.	2,100
Table thickness	mm.	420
Max. permitted tilting moment	Nm.	200,000
V axis linear travel	mm.	2,500 - 6,500
DSR – Dynamic Setting of Rotation		
LHS – LAZZATI Hydrostatic System		
Table slots:		
No. of T slots	No.	12 – 16
T slot dimensions	mm.	28 H7
T slot centreline	mm.	250
Table centring	mm.	100 H6
Continuous work progress variation		
Linear	mm/1'	1 ÷ 5,000
Rotary	RPM	0.001 ÷ 1.5
Fast		
Linear	mm/1'	5,000
Rotary	RPM	1.5
Kinematic:		
V axis– Precision ball screw	mm.	100
B axis – Lazzati dual preloaded pinion with clearance recovery		DPS 80 + DSR
Measuring system		
Linear axis - Heidenhain optical rule – precision $\pm 5 \mu\text{m}$		
Rotary axis – Encoder Heidenhain ROD 780		
Weight:		
Approx. net weight	Ton.	30 - 40

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**TR 120 – Rotary travelling table 120Ton if present:**



Main technical data		
Min. Table surface	mm.	3,500 x 3,500
Max. Table surface	mm.	4,000 x 4,500
Max. permitted load at the centre	Ton.	120
Diameter of bearing surface	mm.	2,800
Table thickness	mm.	600
Max. permitted tilting moment	Nm.	300,000
V axis linear travel	mm.	2,500 - 6,500
DSR – Dynamic Setting of Rotation		
LHS – LAZZATI Hydrostatic System		
Table slots:		
No. of T slots	No.	14 – 18
T slot dimensions	mm.	28 H7
T slot centreline	mm.	250
Table centring	mm.	100 H6
Continuous work progress variation		
Linear	mm/1'	1 ÷ 5,000
Rotary	RPM	0.001 ÷ 1
Fast		
Linear	mm/1'	5,000
Rotary	RPM	1
Kinematic:		
V axis– Precision ball screw	mm.	100
B axis – Lazzati dual preloaded pinion with clearance recovery		DPS 120 + DSR
Measuring system		
Linear axis - Heidenhain optical rule – precision $\pm 5 \mu\text{m}$		
Rotary axis – Encoder Heidenhain ROD 780		
Weight:		
Approx. net weight	Ton.	55 - 70

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### 6.1.16. HYDRAULIC UNIT

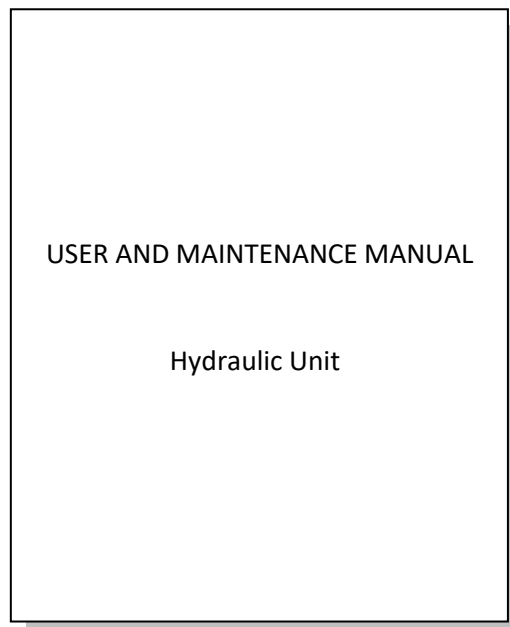
The hydraulic power units mounted on LAZZATI boring milling machines are designed for optimum energy efficiency, are made with high quality components and available all over the world.

They meet the latest standards of safety and noise pollution.

Each unit undergoes a complete test in the factory with the issuance of a certificate of inspection.

The control unit is mounted on a sturdy tank made of sheet steel, equipped with a level indicator with thermometer, filling filter and ventilation filter.

All information regarding the use of the collision monitoring system, its start-up and correct maintenance is described in the device manual:



It is recommended to clean the unit properly to determine the existence of any losses due to leakage caused by vibration or thermal expansion.

It is also recommended to check the oil temperature in the tank and in particular, if the temperature is higher than ambient temperature, check the operation of the temperature control unit.

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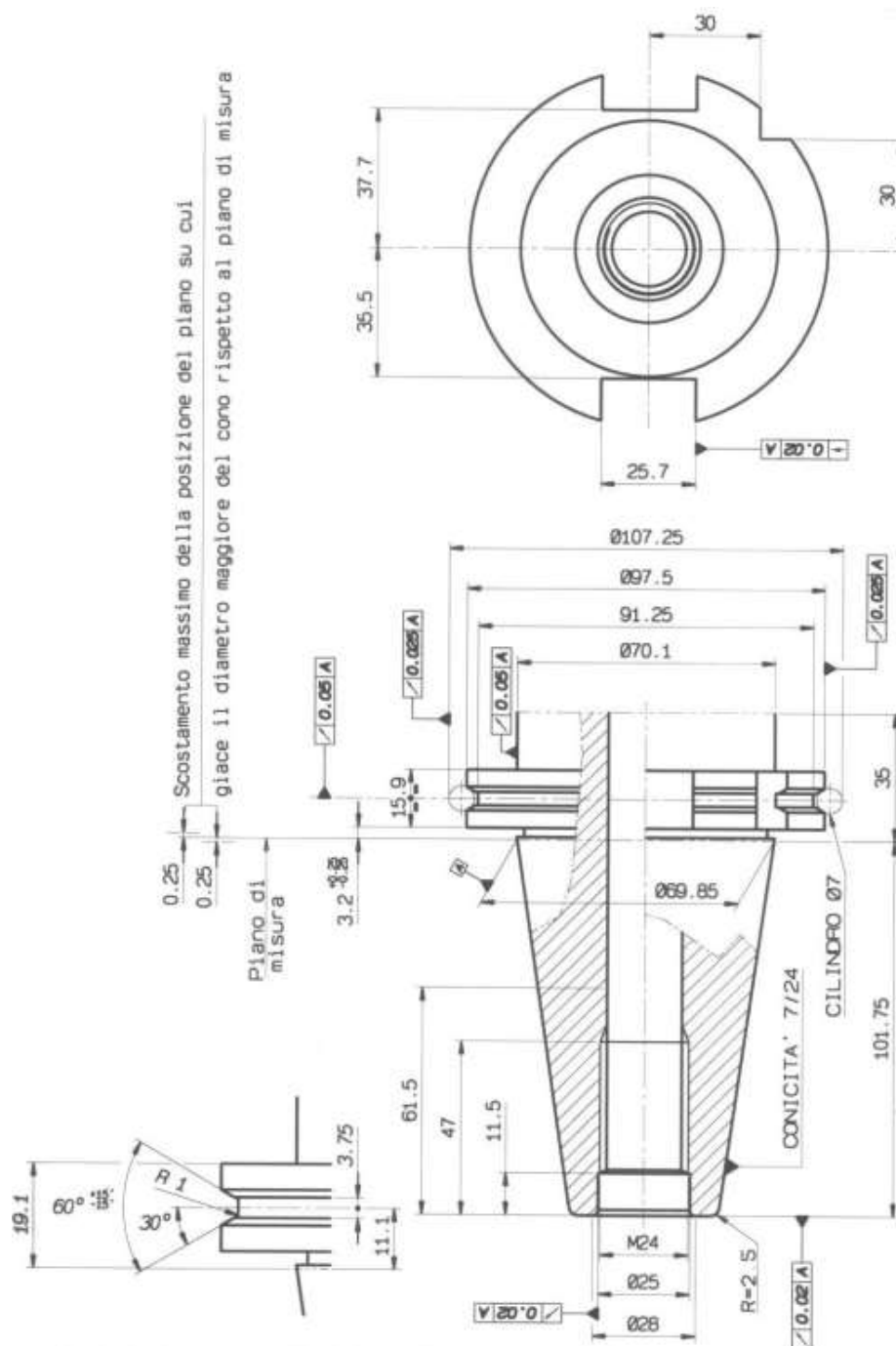
### 6.1.17.COOLANT SYSTEM



- A.** Supply of liquid refrigerant from the spindle for perforated rotating tools. Program from the control panel entering the function M08.
- B.** Attachment of the coolant for cooling the fixed tools. Program from the control panel entering the function M07.

## Coolant in the spindle

DIN69871-A+D - ANSI B5-50



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### **Filtration of coolant through the cartridge filter**

In the fight against waste, saving coolant is very important.

Large quantities of cooling oils can be lost due to lack of filtering and cleanliness.



Therefore, careful cleaning and filtration of the circulating liquid is indispensable.

Careful filtering is required particularly for those machines where the coolant circulates inside of the spindle. In this manner, serious damage to the mechanical parts can be avoided. The recovery of the coolant is carried out by the chip conveyor located to the side of the machine.

The centrifugal pump on the chip conveyor delivers the pressurised coolant through the cartridge filter located in the main tank until this tank is completely full.

The filtering tank is provided with a minimum level indicator that stops the machine in order to avoid any interruption of coolant when the machine is running. Simultaneously it sends an alarm message to the monitor. The tank furthermore is provided with a maximum level indicator that stops the centrifugal pump on the conveyor for a determined period of time.

From the filtering tank, the high-pressure pump delivers the coolant either to an external collector or inside the spindle depending on the required M function. (See the list of M functions described in this manual).



In order to avoid any downtime, it is advisable to use two filters to replace the dirty filter with a clean one without losing time.



Never open the filter container when the machine is still running. A complete cleaning of the tank is recommended every 2000 hours of operation.



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### 6.1.18.ELECTRICAL SYSTEM



The electric machinery and equipment are instruments used in industrial high voltage systems. During operation, these devices have dangerous parts, both because they are powered and not insulated as well as because they have a linear and/or rotary motion. The unauthorized removal of the necessary covers, improper use, incorrect operations or insufficient maintenance could lead to severe personal injury or property damage.

Those responsible for safety of the installation must therefore ensure that:

- Only qualified personnel are assigned to work on the machine or electrical equipment.
- These persons always have at their disposal the operating instructions and other product documentation supplied when they do such work, and that they undertake to follow consistently any such instructions.
- Non-qualified personnel are not permitted to work on or near the machine or equipment.

Before starting any maintenance work on the machine adopt these safety measures:

1. Disconnect the machine
2. Do not permit the machine from being restarted.
3. Verify the absence of voltage.
4. Ground and short circuit the system
5. Cover or separate live parts located nearby

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The electrical equipment is located in a separate cabinet of the machine, so that the machining vibrations do not affect the proper operation of the machine. It is recommended to position the cabinet in a clean and easily accessible site. Before connecting the cabinet to the network, check if the transformers and the motors are connected at the right voltage. The connection of the machine to the electrical network is done by connecting a cable with a suitable section between the main switch and the workshop supply line.




See the power required and the suggested minimum cable section in the specifications attached to foundation drawing.

Check if the correction was made correctly, making sure that the AC motors are rotating in the correct direction, otherwise invert the two line phases.



Please have always at disposal a set of spare fuses and replace them in case of use.

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### Protection against electromagnetic disturbance

The electrical equipment has been designed so that:

1. All coils excited by DC power have a varistor with reverse polarity, parallel connected and mounted directly on the coil itself.
2. All the coils excited by AC power have an RC device parallel connected and mounted directly on the coil itself.
3. The wiring diagram shows for each active element mounted in the electrical components and also mounted on the machine, such as brakes, clutches, ac motors, etc., the most suitable anti-disturbance device to be used. We recommend to mount the anti-disturbance device as close as possible to the source of the disturbance, in order not to reduce its effectiveness.
4. The signals of all the measuring elements as speedometer dynamos, measuring systems, etc., are transmitted via shielded cables and in any case their wiring on the machine was run with maximum attention to that there are no pairs of capacitive and inductive.
5. Signal cables are particularly exposed to coupling are wound with magnetic core (at least n.3 coils before being used in electronic equipment).
6. All transformers mounted inside the electrical room have a cable connection directly to the ground rail.
7. All enclosures containing electrical equipment and electrical equipment installed inside have a cable connection directly connected to the ground rail.
8. The frame is connected to the ground rail with No. 1 or No.2 single core cables (minimum = 6 sq. mm). The max. length of these conductors does not exceed 200-300 mm. . .

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## 6.2. OPERATIONAL LIMITS - INTENDED AND UNINTENDED USE



The safe operating modes intended for machine use are indicated below.

### 6.2.1. OPERATING MODE NO. 0:



#### Manual operating mode

When OPERATING MODE 0 is selected, the following requirements apply:

- a) The spindle is started manually by the control device provided for this purpose when the guards are closed and locked. The movements of the spindle without a spindle guard are started and kept by actuating the enabling device. Releasing the enabling device stops the spindle in compliance with IEC 60204-1, 9.2.2 in relation to the method used.
- b) The movements of the linear axes and the quick movements can be selected manually and are only possible when using a continuous action command.
  - The speed of the transversal movements is limited to 6 m/min, unless the risk assessment and/or adoption of complementary measures permit other speeds.

NOTE the maximum speed does not exceed 10 m/min.

Only one axis may be moved at a time. The spindle may rotate at the same time. Releasing the enabling device stops the motion of the axes and the spindle in compliance with IEC 60204-1:2006, 9.2.2 in relation to the method used.

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### 6.2.2. OPERATING MODE NO. 1 :



#### Normal use (AUTOMATIC)

This is the safe operating mode that is standard for production and makes full use of machine performance. When OPERATING MODE 1 (automatic mode) is selected, the following conditions are applied before the machine starts:

- a) The interlocked mobile guards that permit access to the work area must be closed and the protective devices must be active to permit and maintain operation in automatic mode.
- b) No person must be present in the hazardous areas of the machine. If it is not possible to guarantee that all people are visible from the position where the start/restart devices are located, additional protective measures must be foreseen.
- c) When multiple main cycle start devices are provided, only one can be activated at any moment
- d) The following requirements must be satisfied for starting/restarting:
  - The start/restart controls are activated by a control located where there is no risk;
  - All safety devices including the relative safety functions are prepared and active;
  - It is guaranteed that operation cannot be started/restarted unintentionally;

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### 6.2.3. OPERATING MODE NO. 2 :



#### Machine adjustment

Safe operating mode 2 is an operating mode that permits the operator to make adjustments for the subsequent machining processes, with the interlocked mobile guards open. In this mode, it is possible to align the part or use a probe to assess the reciprocal tool/part position.


The spindle does not rotate.

When a maintained action control device or handwheel is used, the movements of the axes and spindle are started and maintained only while the enabling device is actuated.

Releasing the enabling device performs a stop, in compliance with IEC 60204-1:2006, 9.2.2 in relation to the method used.

The movements required in OPERATING MODE 2 can be limited to a series of pre-selected sequential steps that do not, however, represent full automation.

In the case of a power loss or errors in the control or cut-off devices, the drift of the spindle operation cannot be excluded. Furthermore, the slight lowering of the axes subject to gravity cannot be prevented, due to the response time of the mechanical brake.

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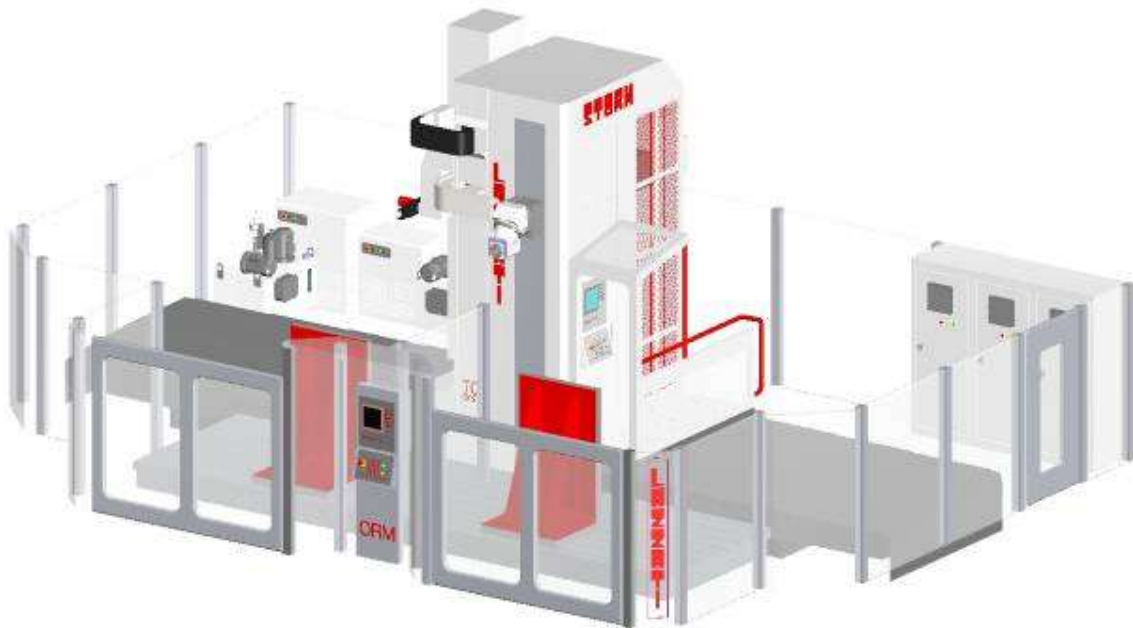
When any of the interlocked mobile guards are opened or any protective device suspended, the dangerous motorised machine movements are only permitted under the following conditions:

- a) movement of the linear axes:
  - is limited to a maximum of 2 m/min; or
  - movements are in steps, with a maximum increase of 10 mm.
- b) The movements of one axis at a time are started and maintained by one of the following devices:
  - a maintained action control device, or
  - an electronic handwheel
- d) the speed limits of the axes or the incremental distances (defined in a) and b) above) are monitored, when the limit speed is exceeded the operation is stopped (controlled stop of movement in compliance with IEC 60204-1:2006, 9.2.2, in relation to the method used).
- e) To prevent hazardous movements due to the gravity of the vertical axes, counterweights or a hydraulic compensation are provided (based on the dimensions).
- f) The movements that are not protected by the chip conveyor are started and maintained by a continuous action device.
- g) If the machine has more than one control station, measures are adopted to ensure that the activation of commands from different control stations will not lead to dangerous situations.
- h) The automatic tool and part change mechanisms remain inhibited if there are operations in progress within the work space. The start of their automatic movements are only possible after reselecting OPERATING MODE 1. Individual manually controlled movements of the tool changer mechanisms are possible together with an enabling device. Each movement must be started by a start control.

In any case, after 180s of continuous use the command is deactivated: the command must be pressed again to continue the activities.

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### 6.3. OPERATOR POSITION



The machine may have one or two operator positions: the operation of one control area excludes the other.

The machine CNC plays a fundamental role in controlling and managing the machine itself; based on the model and installed version, it carries out safety functions.



The machine CNC monitors, checks and intervenes in order to guarantee operator safety, compatibly with the foreseen device limits.

Check the functionality described in this manual.

Carefully read the CNC manual attached to this manual.



It is prohibited to perform operations on the machine to change the use intended by the manufacturer



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## 6.4. HAZARDOUS AND ACCESS AREAS



The areas are identified in Chapter 1 of this manual.

All hazards identified during machine design have been assessed and reduced in accordance with the state of the art as of the moment of the design.

In spite of the attention given to this, there are still residual risks, which are described in this chapter of the manual: they are mainly associated with reasonably foreseeable incorrect uses by the operator.

The operator is advised of the presence of residual risks: there are yellow, triangular shaped hazard signs.

The operator is discouraged from using the machine improperly: there are red, circular prohibition signs with a white background and red border.

The operator is required to use personal protective equipment: there are circular, blue obligation signs



The signs must be respected

Access to the areas is possible according to the logic described in this chapter




Access to the hazardous areas must only be possible in safe conditions: the triggering of protective devices must put the machine into a safe state



If the intervention of the protective devices does not have an effect on the machine:

- stop all the operations
- switch off the machine
- contact the manufacturer

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## 6.5. SAFETY DEVICES

### 6.5.1. Principles - machine design and construction guide

#### Risk assessment – RES and TS

Documented and overall assessment and of all the essential safety and health protection requirements: aimed at identifying appropriate prevention and protection measures and to develop the program of measures to ensure the improvement over time of health and safety levels.

The machine was built in full compliance with the essential applicable safety and health protection requirements based on Machine Directive 2006/42/EC (implemented in Italy by Leg. Decree 17/2010) and also with the harmonized standards UNI EN ISO 12100, EN 12417 and EN 13218.

In accordance with the provisions of current regulations, LAZZATI has assessed the risks to safety and health protection, with reference to the design and construction of the machine.

LAZZATI has identified measures of prevention and protection, in respect of which has been formalized special procedures, later internally adopted and implemented by LAZZATI, specific for each phase of design and construction of the machine, in order to prevent potential risks presented by the machine.

#### Reliability


For the power systems, the control systems, the safety functions and other machine functions, certified, high performance components were used: in particular, the components used for the control circuits relevant for safety were selected in order to obtain maximum reliability in accordance with the state of the art.

#### Ergonomics

The observance of the ergonomic principles during the design phase of this machine has contributed to increase the safety, thus reducing any nervous tension and physical efforts of the operator. In this way the execution and the reliability of the operation are improved and therefore any possibility of committing errors during any step of utilization of the machine is reduced to a minimum level.

#### Operator-machine interface

All elements of the interface between the operator and the machine, such as controls, signalling devices or data displaying devices, have been designed to ensure a clear and unequivocal interaction between the operator and the machine tool

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### 6.5.2. List of the installed devices and/or safety functions

1. Emergency stop, by means of electrical power shut-off, when opening a door that permits access to the dangerous areas.
2. A main switch controls the power supply line of the machine.
3. The electrical installation has a special terminal where is connected the earth cable
4. The machine has a safety limit switch and overtravel switch on all travel.
5. All axes are provided with electronic current limiters in order to prevent damage in case of faulty handling.
6. A diagnostic system of machine checks all problems, stops the machine in case of danger and sends messages to the screen.
7. A tool cannot be released if the spindle is not stopped and the power supply cut-off.
8. The manual replacement of tools in the chain of the tool changer is possible only if the machine is not operating.

To rotate the tool holder chain during the replacement of tools in the pockets it is necessary to push two different pushbuttons in order to have both the operator's hands engaged.

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### 6.5.3. Rules to follow in order to prevent accidents during machine operation



Failure to comply with the information provided below can cause serious damage to operator health: the operator must understand the machine limits and the permitted uses

1. It is seriously prohibited to walk on the telescopic covers.
2. Before starting the machine be sure that its start-up is not dangerous for operators or other persons.
3. Be sure that the workpieces and tools are well clamped.
4. When the machining with facing heads, make sure that the tool holder protrusion does not damage the workpiece and/or the operator.
5. Before applying any equipment, always insert the safety related to the equipment.
6. Absolutely do not touch the moving machine parts with your hands.
7. If you need to go away from the machine for a period of time, turn off the machine using the emergency mushroom-head button.
8. In the case of an emergency stop, always press the mushroom-head button.
9. It is prohibited to clean, lubricate, position or remove parts during machine operation.
10. If the machine's electrical equipment is faulty, it is necessary to call authorised personnel.
11. It is absolutely prohibited for non-authorised personnel to carry out repairs on the electrical equipment.
12. The work station and the access to the electrical cabinet must never be obstructed.
13. Before overhauling or repairing the machine's electrical equipment, first turn off the main switch and position the warning plate:

**“DO NOT TURN ON, SERVICE PERSONNEL AT WORK”.**

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#### 6.5.4. Emergency buttons

Each pushbutton panel has an emergency stop . These devices have a mechanical retention and cause immediate opening of the auxiliary circuits and stopping of the spindle.

The resetting of the stopping conditions does not restart the machine automatically. In order to re-start the machine, the usual starting procedures must be repeated. This will be possible only when the guards are in the "CLOSE GUARDS" position and all protections are active.

Furthermore, the machine is provided with 4 additional emergency buttons so that the operator, wherever he is standing, can stop the machine in case of need.

#### 6.5.5. Safety enclosure

The tool change area is enclosed by panels that prevent this sector from being accessed by the operator. Switches or microswitches positioned on the panels make sure that when a door is opened, the movement of the axes as well as the rotation of the spindle are stopped.

In the case of operations to be conducted within the protected area, the axes of the machine tool are allowed to move only by means of the control panel of the electronic handwheel, or by means of a non-retentive power button: refer to the specified safe operating modes

To access the protected area, turn the key switch "OPEN SAFEGUARDS". Then you will see the message "PROTECTIONS OPEN" and you will have access to all protected areas to do the necessary placement.

The ORANGE and GREEN lamps will be illuminated on the upper indicator.

#### Risks due to ejected objects

During machining, the operator and any bystanders within a radius of approx. 10 meters of the machine area may be exposed to the projection of objects (chips, splinters, fragments, residuals, coolant, etc.) which may cause injuries (the parts of the human body which are mainly exposed are the head, the face and the eyes).

In order to avoid this danger, the machine is equipped with an enclosure, in addition to which workers are required to wear the specified personal protective equipment ( PPE).

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### **Persons inside of the safety enclosure**

It is necessary to wear the following personal protective equipment:

### **Persons outside of the safety enclosure**


The machine shield (which has an open top, in order to facilitate the introduction of the workpieces to the machine table) creates a residual risk due to possible projection of chips through the upper part of the shield.

These chips can injure people located outside the safety enclosure within a radius of approx. 10 metres.

All personnel exposed to this risk must wear light-weight headgear, with a visor and protective goggles.



Hazards such as cuts, crushing and entrapment do not exist if the machine operating rules are followed: no person must be located inside the work area during automatic machine operation and the operator is closed in the platform.

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### 6.5.6. Protection against vibration risks

Vibrations are among the most common complaints in the boring mill and they occur when the frame of the machine enters in resonance with the frequency of cutter teeth insertion (or a multiple thereof). These induced vibrations can be avoided by applying additional masses to the frame, or by varying the frequency of the teeth insertion by reduction or increases the number of cutter revolutions. The self-excited vibrations are caused mainly by the movements of the tool with respect to the part due to stress involved: this is due to the inadequate formation of chips.

The characteristic frequencies are normally between 200 and 400 Hz and they coincide with the natural frequency of the component in question.

It is possible to eliminate these vibrations by suitably varying the cutting speed, depth of cut, the geometry of the cutting edges, and also improving chip evacuation.

Sometimes you just need to switch from the discordant milling to concordant milling. If the vibration is caused by the piece, the yielding areas must be constrained with suitable clamping and support devices.



It is recommended to use personal protective equipment.

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### 6.5.7. Protection against direct contacts

All parts of the electrical components that have a voltage higher than 24 Vdc are protected from any accidental contact, through appropriate casings of insulating material (Plexiglas) duly accompanied by labels of warning of the presence voltage.

The drives operate at voltages of about 600/650 Vdc.


The presence, within them, of large capacitors, means that after removing the power to the cabinet, the voltage decreases slowly up to Ø.

In particular, with regard to the SIEMENS devices, the plate data declare about 5 minutes before the time to remove the covers and to be able to act on the drives.



It is recommended to use personal protective equipment.



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### 6.5.8. Protection against indirect contacts

All asynchronous motors are protected by circuit breakers.

All voltages used in electrical equipment are protected by circuit breakers.

All circuits of the electrical equipment have a ground connection to the equipotential protection circuit.

The primary of the auxiliary circuits power supply transformer TC1 and the switching power supply for 24 VDC are protected by a 6A fuse.



It is recommended to use personal protective equipment.

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### 6.5.9. Protection against over-speed of the motors

The motor over-speed protection systems are digital. Via a PWM signal, the CN controls the drives which, in turn, control the motors.

The entire system is continuously monitored (time loop from 4 to 6 m/s) from two different channels:


1. motor encoder → monitors, in real time, speed, temperature, and the position of the engine;
2. measuring system → monitors the position of the axis.

All data is processed by the CNC which immediately stops the machine in the event of malfunctions.

All axes of the machine tool are still provided with overtravel switches that, when pressed, cause the immediate stop of the axes (sheet 17 D/C - 7/6).



In the case of overtravel, refer to the specific procedure described in this manual.

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#### 6.5.10.Prevention of risks related to changes in operating conditions

The speed of rotation of the spindle is set digitally by the operator and a possible override of the speed allows variations up to a minimum of 5 RPM.

In the case of electrical failure, the speed loop of the control shall immediately put the machine in emergency mode.

Now the technology allows to close the space loop in less than 10 ms. Therefore, in case of malfunctions or failures of connections, the system locks instantly and permanently.

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### 6.5.11.Prevention of risk related to moving elements

The risk of contact with moving parts is eliminated with guards and/or safety devices.

The guards and protection devices shall meet the following characteristics:

- are of robust construction
- are firmly attached
- cannot cause additional hazards
- be not easily circumvented or rendered ineffective
- be located far enough away from the danger zone
- do not restrict more than necessary the view of the work cycle

They are designed to allow operations necessary for the installation and/or replacement of tools and for maintenance work, limiting the access only to the area where the work must be done.

In particular, the contact with the drives or their parts is eliminated by the use of fixed guards, that cannot be disassembled without tools; they are fixed, in fact, by screws.




Refer to the instructions in the operating mode sections of this manual in order to understand the functional limits of the machine.

In any case, the protection devices have been designed and incorporated into the control system, so that:

- Putting into moving parts is not permitted while they are within the operator's reach
- People cannot reach moving parts , and
- The lack or failure of one of their components prevents starting or stops the moving parts.

Their regulation requires necessarily an intentional action.

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### 6.5.12. Cut-off device to prevent accidental start-ups

The cut-off device QFIG - which is located at a height of approx. 1700 mm from floor level is equipped with a control handle.

This switch is provided with a release coil. Each cabinet door is equipped with a microswitch that signals its opening. Once the cabinet is turned on, the possible opening of a door causes the activation of the release coil, which turns on the main switch.




In case of maintenance, the overtravel return key also permits switching on the cabinet with the doors open.

Furthermore, in order to move the machine, the external protection systems must be active and interlocked.



It is prohibited to change the protective devices: any tampering will cause an immediate stop


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### 6.5.13.Stop

Stopping of class "0" in case of blackout or due to the opening of the network cut-off switch QFIG.

When stopping of class "0" takes place, the machine enters into a total emergency state for the following reasons:

- A. Due to the absence of network voltage also the auxiliary voltages will be cut-off, with complete switching off of the auxiliary power supply to the machine. The contactors KMM1, KMM2 are de-energized. For energizing them again, the SBON button must be pressed. So any immediate return of the network voltage will not have impact on the current emergency.
- B. When 24 VDC has failed, the brakes on the axes YBSX, YBSY, YBSZ, YBSW, YBSB enter into action and stop immediately all axes.
- C. When the auxiliary voltages 110 VAC and 24 VDC fail, the respective contactors for the hydraulic power unit are de-energised so to immediate cut off voltage to the hydraulic circuits. All solenoid valves are de-energised and prevent the oil and the air from flowing into the bearing circuits.
- D. The spindle motor stops by inertia. The motor may turn provided that all protections for accessing the dangerous areas are active. Therefore, NO ONE can be present in the immediate adjacency of the spindle when it is rotating.

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#### 6.5.14. Category 1 stop

The category "1" stop is the stop which will be used in most cases, as all protections and emergency devices are connected to this stop category.

All mushroom-head pushbuttons on the different control panels immediately interrupt the contactors KMM1 and KMM2 with opening of the auxiliary power supply lines 110 VAC and 24 VDC.

Stopping of machine axes and the tool chain is a controlled stop.

The opening of the power contactors for axes and spindle (in module 6SN1145 - 80 kW) is controlled by the contacts of contactors KMM1 and KMM2, whose coil is controlled by safety control unit KM2.

Any emergency stop due to activating the red mushroom-head button or tripping of any of the circuit breakers also causes the immediate stopping of the spindle. This tripping opens contactor KTDM.

Any accidental opening of a fence to the protected area will cause a category 1 stop.

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### 6.5.15.Protected area



The work area can be reached only under specific conditions.

In the case of operations to be conducted within the protected area, the axes of the machine tool are allowed to move only through the control panel of the electronic handwheel, or by a non-retentive power button. The speed of the axes will be limited and for a continuous period of time equal to max. 3 min. Turn the key selector "**OPEN GUARDS**" to access the protected area. Then you will see the message "PROTECTIONS OPEN" and you will have access to all protected areas to do the necessary placement.


The ORANGE and GREEN lamps will be illuminated on the upper indicator.



Refer to the instructions in the operating mode sections of this manual in order to understand the functional limits of the machine.

Then set the selector-switch again to the "CLOSE GUARDS" position and energise again the machine by turning the key-type selector-switch for enabling the machine run.



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#### 6.5.16. Protection

The electrical equipment was built with a degree of protection equivalent to IP55 so that dust and splashing water can not damage the content.

The main pushbutton panel, the electronic handwheel pushbutton panel and the manual tool changer pushbutton panel also have a degree of protection equivalent to IP55,.

#### 6.5.17. Displays

A series of diagnostic messages, the texts of which are listed in the appropriate listings, are clearly monitored.

Even if multiple messages are active simultaneously, you can always see them one by one.

Only when the cause or causes that have generated these messages are removed, it stops displaying pages based on the CNC.

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### 6.5.18.Prevention from risk related to the emission of dangerous substances

Based on the risk assessment, please note that in the design and construction of the machine hazardous materials or substances were not used. In particular, there are no risks related to carcinogens and mutagens or biological agents. With regard to the risk from chemicals, this appears to be very low.


With reference to the results obtained from the risk assessment relating to the use of products, such as fluids and lubricants, we recommend the use of PPE such as gloves (waterproof or rubber ), masks and safety boots, appropriate garments.

In any case, remember that the fluids used in hydraulic systems must be accompanied by technical cards, illustrating the risks arising from the use thereof. These cards must be kept by the user, who is required to know the risks deriving from their use. With regard to the mineral oils, if used correctly there is no significant health risk. We indicate, for informational purposes, the necessary countermeasures in case of overexposure:

1. **Inhalation:** move the over-exposed person to fresh air, loosen clothing, keep warm and at rest.
2. **Ingestion:** do not induce vomiting and seek medical advise.
3. **Aspiration:** above 40 °C and with a viscosity below 7 cs + can cause pneumonia, while lower temperatures and higher viscosities, the risk is low. Have the person taken to the hospital by ambulance equipped with oxygen.
4. **Contact with eyes and skin:** splashes in the eyes may cause irritation, rinse thoroughly, prolonged contact with skin may cause dermatitis, wash frequently with soap and water.



It is recommended to use personal protective equipment.

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## 6.6. RESIDUAL RISKS

When the machine is operating in the provided safe operating modes, there are no residual risks: in particular conditions, however, there may be the following hazards for the operator

### 6.6.1. Risks due to slipping

The exit of lubro-refrigerant fluids and lubricants may make the working place and the adjacent area slippery.

This risk can be eliminated by using footwear of the low dielectric type, without any perforation on the upper leather, with Nylon tip, sole of nitrile rubber, with test certificate against electric perforation at a rate of not lower than 10,000 Volt, vulcanized between sole and upper leather (protection class S3).

The footwear must be completely free from metal parts (such as holes for the straps and strings, safety tips or any metal labelling).

The sole between the tread and the heel must show the letter "E" in electric blue and the size of the shoes.

The shoes must be replaced at least once a year or in case of heavy penetration of water.



It is indispensable to keep the machine and the working area clean and free from any foreign bodies such as chips, splinters, deposits, oil, tools and fixtures or other objects, which could alter the correct standing position of the operator.


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### 6.6.2. Risk of falling or stumbling

The personnel permitted in the work area may be subject to the risk of falling or stumbling, as there are differences in height between the machine and the work surface for the operator during any job directly on the machine.



To overcome these risks is recommended to place appropriate warning signs in the working area and to wear the necessary personal protective equipment, such as industrial grade protective safety footwear, that meet the requirements of sole slip resistance. Footwear must have closed area heel, antistatic properties, dielectric properties, resistance to water penetration and absorption of uppers, puncture resistance of the bottom of the shoe and sole with relief.

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### 6.6.3. Risk caused by noise

With reference to applicable law, the machine has been designed and built so to reduce the noise level to a minimum. The detected noise level is lower than 80 db (the value refers to a machine installed in the manufacturer's workshop)

If the machine is installed in a reverberant environment or in the presence of other noise sources, the level of daily personal exposure (which represents the average value over time of the sound pressure levels to which the worker is subjected while working) could be greater than 80 dB. This is a noise risk condition for the worker.

In this case, the employer will be required to implement the necessary measures to reduce noise (screens, sound absorbing wall covering, protection of operator position) and / or provide the worker's personal protective equipment (such as earplugs, headsets, helmets).

In certain conditions of operation the noise of the machine may cause alterations or injuries to the auricular system, among others:

- alteration of auditive acuteness
- ear humming
- tiredness
- stress
- loss of balance or consciousness.



It is necessary to insist that the operators in the working area use ear protectors (headsets, earplugs or helmets).

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## 6.7. PERSONAL PROTECTIVE EQUIPMENT

The workers are obliged to:



- Wear suitable work overalls without any belts and pockets (if there are any, they must be closed by a zipper). The sleeves must be retained by elastic cuffs. For the same reason, the operator shall not wear any rings or bracelets.



- Wear protective gloves when carrying out operations when the tools are stationary which might represent a risk of cuts, abrasions, etc., for example when loading and unloading workpieces with sharp edges.



- Wear industrial grade protective safety footwear that meet the requirements of sole slip resistance. It is recommended to use footwear that has a closed area heel, antistatic properties, dielectric properties, resistance to water penetration and absorption of uppers, puncture resistance of the bottom of the shoe and sole with relief.



- Wear protective masks in the presence of chemical agents.



- In order to reduce risks related to exposure to noise for certain types of machining operations, the workers must wear some of the following PPE:
  0. earplugs
  1. full helmet
  2. pads that can be adapted to industrial protective helmets
  3. headsets with connection low frequency reception
  4. noise protection devices with communication device.

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## 6.8. CONTROLS



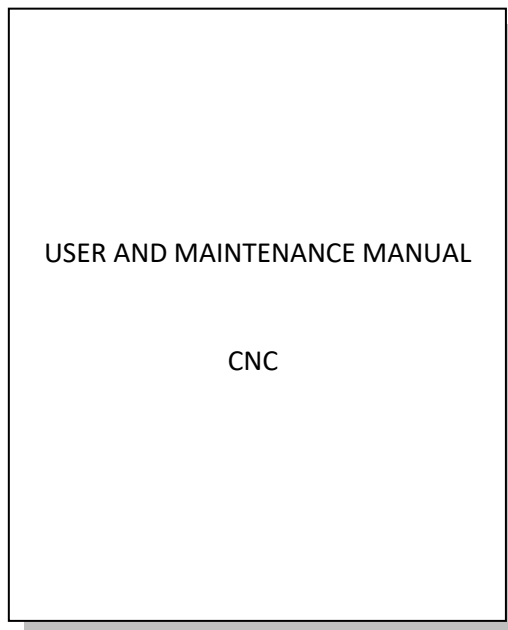
The instructions the operator must follow for controlling the machine are provided below.




The operator must read and understand these instructions



To make the operator's work easier, it is recommended to read the numerical control user and maintenance instructions.



Use that differs from what is specified could jeopardise the health of the operator and the functionality of the machine: contact the manufacturer in the case of doubt.

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### 6.8.1. SYSTEM CONSOLES

The interaction between the operator and the machine takes place via a console that permits the following:

- controlling its operation during machining
- intervening in the work programs
- add new programs
- perform manual operations
- activate the other manual pushbutton panels on the machine.

The system console has three main areas:

1. Display area located on the upper part and comprising the colour monitor in different versions.
2. Control area comprising an alphanumeric keyboard to enter the controls and data.
3. Manual control area comprising all on/off keys, auxiliary pushbuttons, potentiometers and measurement instruments. The control panel is incorporated in the control in the most advanced versions.



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### 6.8.2. ORIGIN RESET B AXIS TABLE

The table rotation control (axis B) is made via an optical transducer type ROD 780/880-36.000i. This measuring system is the incremental type that means the CNC after any switch on of the machine does not know the axis position in relation with the encoder absolute zero. Therefore, when switching on the machine the first sequence to execute will be the zero reset by inserting the axis name in the proper CNC window (AXES SET).



Please be sure that the tool is not engaged in the piece and the axes movement can be performed without risks.

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### 6.8.3. AXIS JOG MOVEMENT


This makes it possible to move the axes at the maximum speed of 5 m/min, both in continuous and incremental modes, by using +or - keys (rapid).

The axes feed speed can be controlled through rapid feed potentiometer and also input on the control panel.

It is possible to choose the JOG MODE when the machine is not in automatic cycle and when the pushbutton panel is not enabled in MANUAL MODE.



The JOG MODE is the only possible choice after switching on the machine. Besides, it is the only possible mode to return with an axis from OVER TRAVEL in case it has been activated.

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#### 6.8.4. M FUNCTION FOR PROGRAMMING THE TOOL CHANGER

##### LOAD OF TOOLS IN THE CHAIN

The tools can be loaded in the chain according to any distribution.



When you put the tools in the chain, remember to carefully clean them.

After placement of the tools, it is necessary to update the control tool table.



Do not load any tool whose size, weight or length is greater than those permitted.  
Refer to large tool use

##### MANAGEMENT [FIXED STATION]

It is the type of logic used for programming the tool changer. Normally fixed station tool management is used, , i.e. the tool is loaded and unloaded in the same cell.

##### PROGRAMMED TOOL

The tool will be inserted in the spindle when the instruction Txx M06 is activated (TOOL CALL xx for Heidenhain controls).

When reading the instruction Txx - (TOOL DEF xx), the tool will be put into the standby position to be picked up by the tool holder carriage.

##### LARGE TOOLS

A tool is called large when it exceeds the permitted diameter; it means that the adjacent places must remain empty and the exchange must take place in fixed place.

##### GROUND TOOL

Special tools or tools with a size not allowed can be loaded by hand into the spindle. These tools will be always defined in the list, but not positioned in the magazine. The CNC will automatically start the manual loading procedure after launching the **M6 (TOOL CALL)** function.

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### RESET DURING THE TOOL CHANGE

In the case of a reset of the control during a tool change the control loses the memory of the tool position. The tools can be repositioned and the table tools must be manually updated and the position must be confirmed (M45 with Heidenhain).



When programming the tool change position pay attention to the dangers of collision.


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#### 6.8.5. OVERTRAVEL RETURN

During manual handling, if AXES SET is not carried out, an overtravel movement is possible



In this case, proceed as follows:

1. Turn the key on the electrical cabinet;
2. Press the button  on the CNC;
3. press **CE** or RESET;
4. Move the axis in the direction of travel;
5. Put in place the key on the electrical cabinet.

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### 6.8.6. AXIS POSITIONING

An axis that moves from point P1 to point P2 will move starting from a speed  $\emptyset$  mm/min. reaching the speed F programmed to arrive to point P2 at speed  $\emptyset$ .

If to reach the point P2 it is needed the simultaneous movement of two or more axes, the axes reach simultaneously the programmed point by covering a straight line between P1 and P2 at feeding speed F.

During the program execution it is possible to modify the feed by acting on potentiometer control.



The programmed feed movement is not possible when the protection are open.


### POSITIONING SPEED



Read the user and maintenance instructions for the numerical control.

USER AND MAINTENANCE MANUAL

CNC

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#### 6.8.7. RESET PROCEDURE A UA 360


The encoders of the A UA 360 heads are absolute systems (ENDAT), therefore it is not necessary to proceed with the execution of the set A UA 360, when starting the CNC operations.

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### 6.8.8. SIEMENS SINUMERIK 840D





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#### 6.8.8.1. M functions with CNC Siemens 840D: M BAG 1 functions


The following M functions are available to the operator

M function:	Description:
03	Clockwise spindle rotation
04	Counter-clockwise spindle rotation
05	Spindle rotation stop
06	Automatic tool change cycle recall (L6)
07	Internal coolant start
08	External coolant start
09	Coolant stop
10	Operation with axes clamped
11	Operation with axes unclamped
17	Subroutine end
26	Tool probe on
27	Tool probe off
28	Workpiece probe on
29	Workpiece probe off
30	Program end
31	Probe collision control enable
32	Probe collision control disable
35	Coolant pump stop
36	Reset M 35
38	Enable tool change
39	Disable tool change
41	Range 1 on
42	Range 2 on
43	Power range
48	Open shutter pick-up
49	Close shutter pick-up
65	Ram fall compensation cycle
66	Piston Y recharge cycle
M2=80	Delete M2=81
M2=81	Request axis B clamped
89	Air Tool ON
195	Table rotation safety by-pass
196	Table rotation safety by-pass reset
M300	Table low speed (axis B)
M301	Table medium speed (axis B)
M302	Table high speed (axis B)
M320	Table 2 low speed
M321	Table 2 medium speed
M322	Table 2 high speed
350	Start Column Compensation
777	Heads at zero preset
778	Current position head reset

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### 6.8.8.2. Digital Input in machine Siemens 840D:

Inputs:	Description:
\$A_IN[9]	Tool changer at rest
\$A_IN[10]	Pick-up cycle in progress
\$A_IN[11]	One accessory mounted (head)
\$A_IN[12]	Half-body A unclamped and ready to move
\$A_IN[13]	Magazine chain positioned
\$A_IN[14]	Half-body C unclamped and ready to move
\$A_IN[15]	Spindle safety selector pushed
\$A_IN[16]	T00 requested
\$A_IN[17]	Finger arm turned at 0°
\$A_IN[18]	Finger arm turned at 180°
\$A_IN[19]	Manual tool change requested
\$A_IN[20]	Vertical tool changer
\$A_IN[21]	Identification Head 1 on pick-up (universal)
\$A_IN[22]	Identification Head 2 on pick-up (vertical head)
\$A_IN[23]	Identification Head 3 on pick-up (d'Andrea)
\$A_IN[24]	Identification Head 4 on pick-up (ISO 40 head)
\$A_IN[25]	Identification plate on pick-up (head 5)
\$A_IN[27]	Accessory in exchange station
\$A_IN[28]	Tool unloading cycle in progress
\$A_IN[29]	Half-bodies A and C clamped
\$A_IN[30]	Shutter raised, identification FC pushed
\$A_IN[31]	Identification vertical head on exchange station
\$A_IN[32]	Identification D'Andrea head on exchange station
\$A_IN[33]	Identification ISO 40 head on exchange station
\$A_IN[1]	= 1> Universal head mounted
	= 2> C2 head mounted (vertical)
	= 3> D'Andrea head mounted
	= 4> C3 head mounted (ISO 40)
	= 5 > Flange mounted

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### Digital Output in machine Siemens 840D:

Inputs:	Description:
\$A_OUT[11]	From p.p.: Universal head mounted
\$A_OUT[12]	From p.p.: Vertical head mounted
\$A_OUT[13]	From p.p.: D'Andrea head mounted
\$A_OUT[14]	From p.p.: ISO 40 head mounted
\$A_OUT[15]	From p.p.: Flange mounted
\$A_OUT[16]	From p.p.: Vertical head deposited on exchange station
\$A_OUT[17]	From p.p.: D'Andrea head deposited on exchange station
\$A_OUT[18]	From p.p.: ISO 40 head deposited on exchange station
\$A_OUT[20]	Spindle torque and limit reached

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### 6.8.8.3. Siemens 840D programs


Name	Description:
CAT_MAND	= Traverse of magazine carriage from chain or middle to magazine. Used for automatic tool change programs.
COMP_Z	= Ram fall compensation cycle. Z axis compensation program. Called through M65
COMP_TES	= Head rotation compensation
HEAD (x,y)	= Head movement cycle. The program requires two parameters: X (measure/size required for half-body A) and Y (measure/size required for half-body C) . For the head with only half-body C, the X value to input will be always = 0
AREA 1	The machine moves in area 1 and it activates the limit switches of the active area
AREA 2	The machine moves in area 2 and it activates the limit switches of the active area
HEAD_UP_1	= Cycle for the application to the machine of universal head
HEAD_UP_2	= Cycle for the application to the machine of vertical head (moves only half-body C)
D_ANDREA_UP	= Cycle for the application to the machine of D'Andrea head (axis U activated)
HEAD_UP_4	= Cycle for the application to the machine of ISO 40 head (moves only half-body C)
HEAD_DW_1	= Cycle to deposit the universal head in the pick-up station
HEAD_DW_2	= Cycle to deposit the vertical head in the pick-up station
D_ANDREA_DW	= Cycle to deposit the D'Andrea head in the pick-up station
HEAD_DW_4	= Cycle to deposit the ISO 40 head in the pick-up station
COVER_UP	= Cycle for the application of the flange to the machine
COVER_DW	= Cycle to deposit the flange in the pick-up station
MAN_DW	= Service subroutine for the accessories manual unloading to execute in single block with accessory slung up with a crane
ADAPTIVE	=Subroutine for the control of spindle couple limitation in connection with the accessory applied. The program must be recalled inside the main program.
L59	= Subroutine deleting the control of spindle couple limitation.
L6	= Cycle of automatic tool change. It is recalled in the pieces programs through function M6 after having requesting a T.
ATC_DATA	= Subroutine containing the measurements of automatic/manual tool change concerning the accessory applied (axes measures and spindle orientation)
GETPOSIDX	= Subroutine to verify the accessory applied, recalled in the automatic tool change cycle. The verification of the machine status allows the correct recall of the axes measurements during the tool change.
MAND_INTER	= Subroutine for the positioning of the tool change carriage in the middle position. Recalled in cycle L6.
CUAMAN	= Subroutine for the axes positioning during a manual tool change. Recalled by cycle L6.
MIN_ATC	= Subroutine for service purpose.
AREA_ON	= Activate expansion of working limits for the machine whose program is activated.
AREA_OFF	= Activate narrowing of working limits for the machine whose program is activated.

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Name	Description:
HEAD_DW_2_OUTSIDE	= Subroutine for releasing the accessory vertical head on the exchange station.
HEAD_UP_2_INSIDE	=Subroutine for loading the accessory vertical head from the exchange station
D_ANDREA_DW_OUTSIDE	= Subroutine for releasing the accessory D'Andrea head on the exchange station
D'ANDREA_UP_INSIDE	= Subroutine for loading the accessory D'Andrea head from the exchange station.
HEAD_DW_4_OUTSIDE	= Subroutine for releasing the accessory ISO 40 head on the exchange station
HEAD_UP_4_INSIDE	= Subroutine for loading the accessory ISO 40 head from the exchange station.



The R parameters between R480 and R499 are reserved for manufacturer cycles.

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#### 6.8.8.4. Release of axes A UA 360 for manual control (Siemens) (if present)

Put the CNC in JOG MODE, with the spindle stopped.

Press the button corresponding to the axis of the head (A or C) to be released.

At this point, the LED on the button pressed will light to indicate the released axis.

It is possible to move the axis with the + or buttons.

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#### 6.8.8.5. Pushbutton panel

The machine is equipped with two programming stations.

The selection is made using a selector located on both stations.

Turning the selector activates one of the two stations, the guards are opened that make it possible to enter/exit from the machine station.

The keyboard/monitor is activated by pushing any key.



The selectors have to be obviously discordant (only one ON)

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#### 6.8.8.6. Area - Guards

The machine has two working areas: AREA 1 and AREA 2.

AREA 1 – Composed of table 1 and pick-up

AREA 2 – Composed of table 2 and the 2nd tool changer (on the ground)

Switching takes place via the special AREAx program.


One only AREA at once is active as a work area on channel 1 of Siemens CNC; the other is active on channel 2, it is possible to move in JOG mode from external controls as a piece loading zone.

The gate of the piece loading zone is opened using external controls SAC4 (AREA 1), SAC5 (AREA 2), SAC6 (TW) only if the concerned zone is not managed by the CNC on Channel 1.



If the program requires the transit of the machine in an area with a guard open, the program will stop; vice versa, it is not possible to open an external guard gate when the machine is operating in the relative area. The selectors must obviously be



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#### 6.8.8.7. Tool Changer (if present):

The machine can be equipped with up to 3 automatic tool changers.


1. TC – On board tool changer on the machine with positions for 60 - 120 standard tools (see the max. permitted weight in the Sidepalsa instruction manual)
2. TW – On ground tool changer with 60 / 120 tool capacity.
3. KF T – Special tool changer for long tools. It has six fixed positions that are not interchangeable with TC or TW.

The CNC automatically recognises the position and the type of tool required by the program by means of the tool table and directs the machine to one of the 3 magazines.



Do not insert unsuitable tools in positions that cannot hold them.

The operator is responsible for checking the correct housing of the tools.

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#### 6.8.8.8. TOOL changer programs:

Standard tool changer :

1. Txx (Tool number) or T “Tool name”
2. M6
3. Refreshing program TC/TW
4. T (“Tool Name/Number”, No. Double)

Activation ATC wireless remote control panels:

4. TC – In JOG mode select using the selector SAPC and move through wireless remote control KC1.
5. TW –While the machine is working it is also possible to control TW by activating the same using the selector SAPC2 and using wireless remote control KC2.

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#### 6.8.8.9. Power monitor (Siemens)

Instructions to charge the adaptive control of axes feed speed in relation with spindle charge.

<b>MAX_SFORZO</b>	= maximum spindle load allowed over which the alarm 65000 appears. (value in % )
<b>LIM_INF_OVR</b>	= min. overfeed possible to reach when the max load is obtained
<b>LIM_SUP_OVR</b>	= max. overfeed at optimal spindle load
<b>CARICO_OTT</b>	= spindle absorption in optimal condition (value in %)
<b>CARICO_MAX</b>	= maximum spindle absorption (value in %)

The correct format of the instruction is the following:

**ADAPTIVE (MAX\_SFORZO, LIM\_INF\_OVR , LIM\_SUP\_OVR, CARICO\_OTT, CARICO\_MAX )**

##### Example:

Alarm load	85%
Optimal load	65%
Maximum load	80%
Lower overfeed limit	0
Upper overfeed limit	120

The text is as follows:

**ADAPTIVE (85,0,120,65,80)**


Finally the function L59 deletes the synchronous adaptive control process.

##### Programming example

```


N10 G0 G90 X1000 Z10
N20 G96 M3 S80 F0.2
N30 ADAPTIVE( 85,0,120,65,80)
N40 G1 X500 Z-100
N50 G0 Z10
N60 L59 [deactivate the power control]
N70 M30

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#### 6.8.8.10. Teleservice Procedure LRD – Lazzati Remote Diagnosis (Siemens)

1. Use a PC with two network cards: 1 for internet and 1 one for the CNC Siemens
2. Install the Siemens software for the teleservice
3. Connect with the web site <https://www.gotomypc.com> or teamviewer

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#### 6.8.8.11. Automatic loading cycle of the accessory after HEAD-UP instruction - A UA 360 (Siemens)

If the machine is equipped with a pick-up station, accessory loading is fully automatic.

Once the desired function is launched, the machine will move in the loading position and finalize the cycle in a completely automatic way.



Clean the contact surfaces between the various accessories and the ram.



The user must release the machine from any obstruction for the automatic loading of the accessories.

To load / unload an accessory it is always necessary to have T Ø.

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#### 6.8.8.12. Automatic unloading cycle of the accessory after HEAD-UP instruction - A UA 360 (Siemens)

If the machine is equipped with a pick-up station, accessory loading is fully automatic.

Once the desired function is launched, the machine will move in the loading position and finalize the cycle in a completely automatic way.




Clean the contact surfaces between the various accessories and the ram.



The user must release the machine from any obstruction for the automatic loading of the accessories.

To load / unload an accessory it is always necessary to have T Ø.

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### 6.8.8.13. Manual loading of the accessory after HEAD-UP instruction – A UA 360 (Siemens) (if present)

The instruction HEAD\_UP can be given to the control in MANUAL mode.



Disengage the machine from any collisions with the workpiece before programming HEAD-UP: the machine is automatically positioned first on the W axis and then on the Y axis in the change position.

#### PHASES OF ASSEMBLY:

1. Download the tool from the spindle in AUTOMATIC or SEMI-AUTOMATIC mode: **M6 Ø (START)**
2. Introduce in AUTOMATIC or MANUAL mode: **HEAD\_UP (START)**. The machine automatically positions itself with the axes Y Z W and orients the spindle to the loading position and displays the message: "POWER DOWN THE SPINDLE".
3. Move the spindle rotation safety selector SACU to the position Ø.
4. Open the entry door to the work area
5. Move the accessory 150 mm from the head
6. Engage the electrical connectors.
7. Press the accessory pick-up clamp release button SBAS on the pushbutton panel.



Clean the surfaces

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8. Insert the head after the contact surfaces are at a distance of approx. 3 mm.
9. Exit the work area
10. Reclose the door
11. Activate the auxiliaries from the pushbutton panel
12. Lock the accessory with the **SBAB** button.
13. Press **EMERGENCY**
14. Go to the **EXCESS RATIOS** page
15. Turn on the auxiliaries: the TNC will automatically perform **AXIS set** (the control inhibits any W axis movement).



Remove the lifting eyebolts



The coolant will come out now from the centre of the spindle of head (Internal Coolant M7) or from the sides (M8 External).



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#### 6.8.8.14. Manual unloading cycle of the accessory after HEAD-UP instruction - A UA 360 (Siemens)

The instruction **HEAD\_DW** can be given to the control in MANUAL mode.



Disengage the machine from any collisions with the workpiece before programming HEAD-DW: the machine is automatically positioned first on the W axis and then on the Y axis in the change position.

#### DURING DISASSEMBLY:

1. Unload the tool from the accessory in AUTOMATIC or SEMI-AUTOMATIC mode: **M6 Ø (START)**.
2. Enter in MANUAL mode: **HEAD\_DW (START)**. The machine automatically moves with the axes A C Y Z to the unload point of the accessory and the message: "**POWER DOWN THE SPINDLE**" appears
3. Move the spindle rotation safety selector SACU to the position Ø.
4. Open the entry door to the work area
5. Fit the eyebolts
6. Sling the accessory
7. Confirm.
8. Press the accessory release button SBAS
9. Extract the head approx. 150 mm
10. Disengage the electrical connectors.
11. Remove the head from the work area
12. Mount the protective front plate
13. Close the guards
14. Activate the auxiliaries from the pushbutton panel
15. Delete the messages



The unloading cycle is completed

The tool change takes place automatically on the main spindle and the refrigerant restarts to exit the spindle or the nozzles of the machine.


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#### 6.8.8.15. Axes reset procedure A UA 360 (Siemens) (if present)

The rods are absolute, therefore they never need to be reset.



In case of a serious error, please contact the LAZZATI technicians.

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#### 6.8.8.16. Automatic loading cycle of the accessory after HEAD-UP- instruction A UM (Siemens) (if present)

The machine, once the function is launched, will move into place and require the installation of a special tool (broached tool). Once mounted, the cycle will continue and the machine will load the accessory.

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#### 6.8.8.17. Automatic unloading cycle of the accessory after HEAD-DW- instruction A UM (Siemens) (if present)

The machine will move into position and deposit the manual head in the pick-up station.

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#### 6.8.8.18. Manual loading cycle of the accessory after HEAD-UP- instruction A UM (Siemens) (if present)

Once the function is launched, the machine goes into position and orients the spindle, the operator must:

1. Shut off the power to the spindle
2. Open the guards
3. Insert the special tool (broached tool)
4. Release the accessories with button **SBAS**
5. Move the head until it is 3 mm from the machine surface
6. Lock the accessories with button **SBAS**
7. Use the handwheel to move the sleeve to the end stop



Make sure the engage the broached shaft in the head.  
In that case, slowly move the spindle with your hands.

8. Close the guards
9. Confirm the end of the cycle.

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#### 6.8.8.19. Manual unloading cycle of the accessory after HEAD-DW - instruction A UM (Siemens) (if present)

The instruction HEAD\_DW can be given to the control in MANUAL mode.



Disengage the machine from any collisions with the workpiece before programming HEAD-DW: the machine is automatically positioned first on the W axis and then on the Y axis in the change position.

#### DURING DISASSEMBLY:


1. Unload the tool from the accessory in automatic or semi-automatic mode: **M6 Ø (START)**.
2. Enter in manual mode: **HEAD\_DW (START)**. The machine automatically moves with the Y Z axes on the discharge point of the accessory and comes out the message: "Power down the spindle".
3. Activate the spindle rotation safety selector **SACU**.
4. Open the entry door to the work area
5. Fit the eyebolts
6. Sling the accessory
7. Confirm.
8. Press the accessory release button SBAS
9. Extract the head approx. 150 mm
10. Disengage the electrical connectors.
11. Remove the head from the work area
12. Mount the protective front plate.
13. Close the guards
14. Activate the auxiliaries from the pushbutton panel
15. Delete the messages



The unloading cycle is completed

The tool change takes place automatically on the main spindle and the refrigerant restarts to exit the spindle or the nozzles of the machine.

16. Remove the manual tool.

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#### 6.8.8.20. Semi-automatic loading cycle A SC/L after RGD1-UP or RGD2- UP instruction (Siemens) (if present)

Using the functions **RGD1\_UP** or **RGD2\_UP** (second spindle support), the CNC will load the spindle support through a SEMI-AUTOMATIC cycle to load the spindle support positioned in the pick-up station.



The use of a crane is not needed to perform the loading/unloading operations.



An operator must be present who must:

6. tighten the locking screws
7. manually position the loading point

Proceed as follows for the SEMI-AUTOMATIC loading cycle:

1. Launch the desired function: The CNC moves the axes and loads the spindle support in the pick-up station
2. Once loaded, the X-axis is disengaged and the message “**INSERT SCREWS**” is displayed. The operator must insert the screws
3. Press **START** to confirm
4. The operator must fit the spindle support down to the bottom and the fastening screws on the sheath.
5. Press **START** to confirm that the operation occurred



The CNC, once confirmation is received with **START**, will end the cycle.

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#### 6.8.8.21. Semi-automatic unloading cycle A SC/L after RGD1-UP or RGD2- UP instruction (Siemens) (if present)

Proceed as follows for the SEMI-AUTOMATIC unloading cycle:


1. Launch the desired function: The CNC brings the machine into position in front of the pick-up station and displays the following message: "REMOVE THE SCREWS" → **PUT SPINDLE SUPPORT IN POS. ACCURATE! → START!**"
2. The operator must perform the following steps:
  8. Remove the screws on the spindle support
  9. Using the special tool supplied (supplied by LAZZATI), move the spindle support manually, to leave space between the spindle and the sheath of the spindle support for the passage of the single tool
  10. Press START to confirm that the operation occurred



The cycle continues and the CNC requests visual confirmation that everything is correct for the deposit: "VISUAL INSPECTION OK? **FOR CONFIRMATION: START!**"

3. Press START: The machine deposits the spindle support and ends the cycle.



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#### 6.8.8.22. Manual loading cycle A SC/L after RGD-UP instruction (Siemens) (if present)

Once the function is launched, the axes move into position and request the installation of the spindle support



The operation must be performed manually with the help of a crane

The CNC will wait for the end of cycle confirmation, displayed on the monitor, by pressing the START button.

The operator will have to tighten the fixing screws of the spindle support on the spindle sheath.

The TNC will activate a second end-travel switch + software, so as NOT to allow the sleeve to enter into the space behind the spindle support.

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#### 6.8.8.23. Manual unloading cycle A SC/L after RGD-DW instruction (Siemens) (if present)

The axes are in position and the CNC disables the second end-travel switch Software + so as to restore normal travel.

The user must loosen the fixing screws and remove the spindle support .



The operation must be performed manually with the help of a crane

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#### 6.8.8.24. Working area (AREA) – (Siemens)

The machine can be equipped with one or more working areas, separate and independent between them. If there are multiple tables, the machine can work on one, while on the other you can load the piece, handling them manually.

The work areas are surrounded by guards and protected by safety gates and end-travel software




The access to AREA is regulated by an external control panel.



The functions that allow the machine to switch from one AREA to another are AREA1 and AREA2.

The CNC through a series of hardware safeties (electromechanical limit switch on the doors) and software (memories), monitors access to the work areas.


During the change of work area, the CNC moves the axes to disengage in sequence Z+V+W+Y, then X + or - depending on the AREA call.

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#### 6.8.8.25. Loading cycle AFH with Pick-up after D-ANDREA-UP instruction (Siemens) (if present)

Once you launch the desired command, the machine disengages, in sequence V+Z+W+Y.

The machine then goes to the loading position and performs the operation.

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#### 6.8.8.26. Unloading cycle AFH with Pick-up after D-ANDREA-DW instruction (Siemens) (if present)

Once you launch the desired command, the machine disengages, in sequence V+Z+W+Y.

The machine then goes to the loading position and performs the operation.

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#### 6.8.8.27. Manual loading cycle AFH after D-ANDREA-UP instruction (Siemens) (if present)

Proceed as follows to perform the manual loading cycle:

1. Launch the desired function (the machine goes into position)
2. Power down the spindle with the selector (**SACU**)
3. Open the guards
4. Engage the head connectors.
5. Unlock the accessories (SBAS)
6. Insert the **HEAD**



Move it to max. 5 mm from the machine edge


7. Close the guards
8. Auxiliaries **ON**
9. Lock the accessories (the head is locked on the machine and the CNC activates the appropriate kinematics)
10. Confirm HEAD MOUNTED with the ACCESSORY LOCK button (SBAB)
11. Spindle ON.



Both the procedures for loading / unloading are documented on the monitor



Do not press the EMERGENCY button during loading / unloading. The machine with opened guards is inhibited in any movement or rotation.

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#### 6.8.8.28. Manual unloading cycle AFH after D-ANDREA-DW instruction (Siemens) (if present)

Proceed as follows to perform the manual unloading cycle:

1. Launch the desired function (the machine goes into position)
2. Power down the spindle with the selector (**SACU**)
3. Open the guards
4. Sling the head



The operation must be performed manually with the help of a crane

5. Confirm **HEAD SLUNG** with the **ACCESSORY LOCK** button (**SBAB**)
6. Unlock accessories (**SBAS**)
7. Disconnect the connectors
8. Disengage the head
9. Position the protective plugs/plate
10. Close the guards
11. Auxiliaries **ON**
12. Lock the accessories (**SBAB** button), the CNC loads the spindle kinematics



Both the procedures for loading / unloading are documented on the monitor



Do not press the EMERGENCY button during loading / unloading. The machine with opened guards is inhibited in any movement or rotation.

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#### 6.8.8.29. Special procedure for unloading cycle of the accessory with Pick-up (Siemens) (if present)



##### General conditions

- The accessory head must be positioned in the unloading position and without a tool in the TAPER
- There must not be any obstructions or breakage that could lead to incorrect positioning in the station
- The procedure must be performed by qualified personnel, as it could be possible, in case of mishandling, to cause the breakage of mechanical or electrical parts
- It is always advisable to contact the LAZZATI technicians so they can follow you in teleservice

Proceed as follows to perform the manual unloading cycle:

1. sling the accessory with the crane



Head lifting and moving must be done manually with the help of a lifting crane: refer to the INSTALLATION section for the selection of the lifting devices

2. Open the gate using the command **M48**
3. Place a weight on the microswitch corresponding to the accessory that you want to manually remove for repair (microswitch simulation pressed)
4. Press the EMERGENCY button
5. Open the cover of the electrical box located at the end of the ram
6. Turn the selector (SQTM) to position Ø
7. Shut off the power to the spindle



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8. press **MENU SELEC**, then **DIAGNOSIS** and then **PLC STATUS**

9. enter in the table:

Universal Head:	M198.0
Head 2:	M198.1
D'Andrea Head	M198.2
Head 3	M198.3
Cover Plate	M198.4

10. set to  $\emptyset$  the MARKER of the head which is to be removed manually

11. set to 1 the MARKER 92.0 and M193.7 = 1 (AXIS HEAD IN PARKING)

12. go to **MDA**

13. launch **M76** and **M78**: In this way, both the 4 accessories as well as the tool are locked.

14. put the M92.0 =  $\emptyset$

15. go to **MDA**

16. launch \$ A\_INA [1] =  $\emptyset$  (NO ACCESSORY INSTALLED)

17. other MARKER to keep in mind: **M198.7= Head 2 or 3 installed** (reset if necessary)

18. Turn the SQTm selector to position 1

19. Close the guard

20. At this point you can load another accessory.

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#### 6.8.8.30. DSR - Dynamic Setting of Rotation (Siemens) (if present)

LAZZATI has included in its park of innovations the new DSR (Dynamic Setting of Rotation).

Very often it happens that a workpiece of large size but of relatively small weight or in any case lower than the maximum capacity of the table is fixed on the table.

In this case, the weight, size and speed of rotation, it may alter the performance of the digital axis, necessitating a continuous calibration.

LAZZATI has solved the problem by introducing the DSR system.

Through the M predetermined functions, the operator can vary with a START the dynamic calibration of the axis, such as speed, Kw, acceleration, and so on, so that a piece of 24 tons, of dimensions 5m x 5m x 3m can run on a table of 25 ton with a surface of 3x3.

The DSR is composed of 3 M functions and for each group table, namely:

M300 - M301 - M302 on table 1

M303 - M304 - M305 on Table 2

Each function can be customized based on customer needs.

Normally, the speed of rotation assigned are:


M300: calibration heavy workpiece - F180 Fast transverse axis B F5000

M301: calibration medium workpiece - F360 Fast transverse axis B F7500

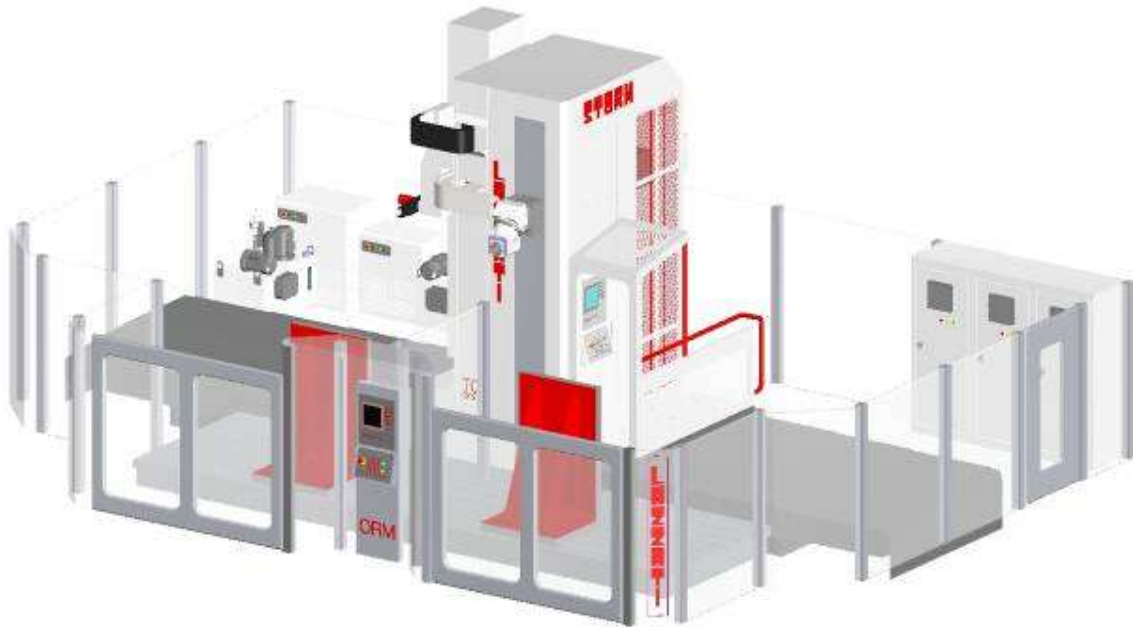
M302: calibration small workpiece- F720 Fast transverse axis B F10000



The operator, as needed, may decide in manual or MDI which kind of optimization may use.

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#### 6.8.9. O RM – REMOTE OPERATOR PANEL (if present)



The enabling of the work areas and the passage through them takes place via the **AREAX** instruction (where X is the number of the AREA to be reached).

Passage is possible only if the following requirements are met:

1. The access guard to the area to be reached must be closed.
2. With the machine in automatic mode, it is possible to move the AREA axes not occupied by the machine in JOG mode.
3. By launching a program in automatic mode from the main pendant pushbutton panel and placing the CNC on **HOLD**, enabling the external pendant pushbutton panel using the specific selector, it is possible to exit the machine area (reclosing the gates) and restart the cycle with **START** from the outside, with all controls available.

### 6.8.10.ELECTRONIC HANDWHEEL



The machine is equipped with a manual impulse generator (handwheel) that enables the manual micrometric positioning of all axes.

The manual handwheel is the only control that can be used to move the machine when the operator is located outside of the control platform or with the protective door open in order to perform machining controls, part alignment, maintenance, etc.

The rotation sense of the hand wheel establish the axes feed direction.


A selector is used to select the increment value of the handwheel.

Perform the following operations to control the machine using the handwheel:

1. Turn the Numerical Control to the “ MANUAL/JOG “ position.
2. Turn the handwheel enabling key on the pushbutton panel
3. Open the guards.
4. Go to the required position and select the axis to move on the handwheel (X,Y,Z,W,B,).
5. Select on the hand wheel the required increment value (0.001, 0.01, 0,1).
6. Keep the button 3 “Hand wheel insertion” pushed for the entire period of operation.



If the operation in manual movement requires more than 3 minutes the machine stops.  
In this case release the button and push it again after a few seconds.

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Once you have performed the necessary manual operations:

1. Return to the operator platform
2. Close the doors.
3. Turn the key on the main panel in vertical position (main pushbutton panel enabled).
4. Turn the Numerical Control to the “AUTOMATIC” position. The machine can start for machining cycles.



The EMERGENCY pushbutton on the handwheel is always active.

### 6.8.11.BUTTONS ON THE ELECTRICAL CABINET



QF.1	Main switch
HLPT	Lamp 24 Vdc auxiliary line
SARE	Auxiliary selector
	Overtravel return
	Opening of electrical cabinet doors
<b>SOCKET</b>	40 Volt Max 1A
<b>SOCKET</b>	Ethernet
<b>SABF</b>	Photocell by-pass
<b>SACO</b>	Air conditioner On/Off
<b>EKS</b>	KEY with code for service and safety functions


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The selector must be used only by authorized personnel.

When the electrical cabinet is under voltage with the door opened the lamps HLP are lighted.

Closing the doors with the selector inserted the machine does not function.

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### **6.8.12.COLOURS OF THE LIGHT INDICATORS LOCATED ON THE COLUMN AND THEIR MEANING WITH RESPECT TO THE MACHINE CONDITIONS**


The flashing light indicators located on the column top provide the following information:

GREEN - Normal condition:  
- Machine in work cycle or in stand-by.


YELLOW - Critical condition:  
- Machine in feed hold for intervention to be executed.  
- Machine in maintenance with protections deactivated.

RED - Dangerous conditions:  
- Machine in emergency, overtravel or locked  
- Gates opened without consent.



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## 7. Maintenance and safety functions

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## 7.1. MECHANICAL MAINTENANCE



*Regular inspections and maintenance are essential to maintain high accuracy for a long period. In addition to hydraulic, pneumatic and electrical maintenance described on the following pages, the machine also requires constant mechanical maintenance. Maintenance scheduled times are coded in the attached tables and the operations are described on the following pages. P Read the described instructions carefully before performing any operation on the machine. LAZZATI technicians are at your complete disposal for any information required for the operations to perform on the machine.*

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The maintenance summary tables are provided below



The maintenance activities must be carried out:  
by qualified personnel according to what is indicated in the specific instructions  
according to what is indicated in the specific instructions



The methods and times indicated for the maintenance activities are the result of  
manufacturer experience; for this purpose the use must:  
respect the instructions provided  
provide feedback

**LEGEND:**

CG	Geometry control	M	Maintenance
P	Cleaning	CV	Visual control
L	Lubrication	R	Adjustment
C	Control	T	Axes calibration
	S		Replacement

MAINTENANCE TABLE			
COMPONENT TO BE CONTROLLED	OPERATING INTERVAL		
	200 HOURS	600 HOURS	2,000 HOURS
MACHINE	P		
"	L		
"			C
GUIDES		P	
"		L	
OIL SCRAPER			S
TAPER GIBS			R
ROLLER PADS			R
TRANSMISSION BELTS			R
SPINDLE	P		
"	L		
"			CV
TELESCOPICS		P	
"		L	
OVERTRAVEL		C	
HYDRAULIC COUNTERWEIGHT – Ropes / Chain	M		S
HYDRAULIC COUNTERWEIGHT - Pressure		C	
MECHANICAL COUNTERWEIGHT – Ropes / Chain	M		S
MECHANICAL COUNTERWEIGHT - Sliding		V	
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MAINTENANCE TABLE			
COMPONENT TO BE CONTROLLED	OPERATING INTERVAL		
	200 HOURS	600 HOURS	2,000 HOURS
HYDRAULIC SYSTEM - Levels	C		
HYDRAULIC SYSTEM - Return filters		P	
HYDRAULIC SYSTEM - Oil			S
HYDRAULIC SYSTEM - Tank			P
HYDRAULIC SYSTEM - Filters			P
HYDRAULIC SYSTEM - Accumulator			C
HYDRAULIC SYSTEM - Magnetic plugs			P
HYDRAULIC SYSTEM - Air filter			P
PNEUMATIC SYSTEM - Pressure	C		
PNEUMATIC SYSTEM - Filters		P	
PNEUMATIC SYSTEM - Filters			P
PNEUMATIC SYSTEM - Filters			R
LUBRICATION - Tank and filter			P
COOLANT SYSTEM- Emulsion		C	
COOLANT SYSTEM - Tank and filter			P
TEMPERATURE CONTROL UNIT	I		
"		I	
"			I
ELECTRICAL CABINET	CV		
ELECTRICAL CABINET filters		P	
"			C
ELECTRICAL CABINET inside			P
MOTORS	CV		
PENDANT PUSHBUTTON PANEL	CV		
Internal PENDANT PUSHBUTTON PANEL			P
DRIVES			T



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### 7.1.1. TAPER GIBS ADJUSTMENT

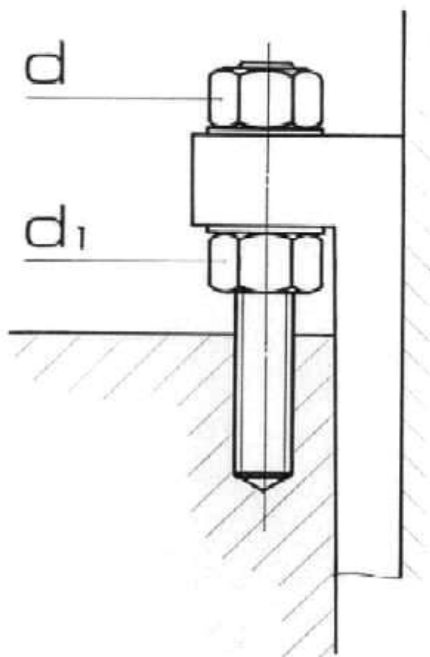


Proceed as follows to adjust the taper gibs:

1. loosen the nut “d”
2. tighten the nut “d” until eliminating the play
3. lock the nut “d<sub>1</sub>”
4. perform a manual command to check regular sliding.



Any overclamping of the gibs may impede the correct functioning of the machine.





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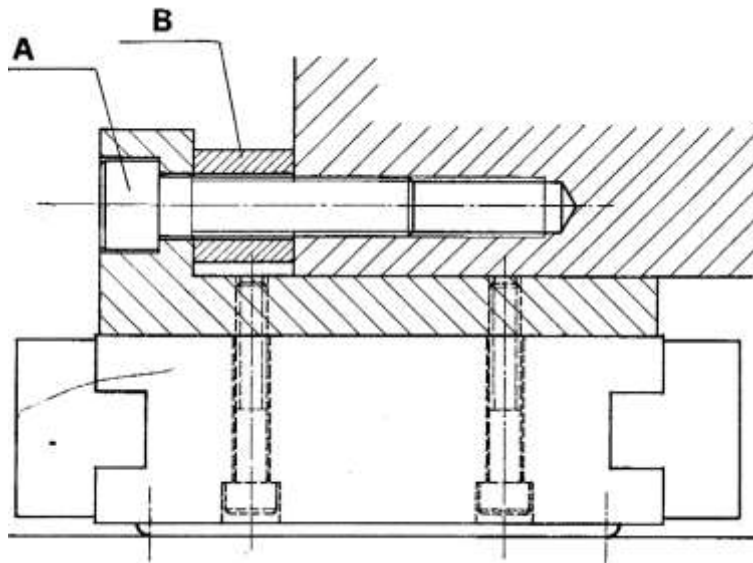
### 7.1.2. ROLLER PADS ADJUSTMENT



The roller pads are adjusted in the workshop in order to obtain the best tolerances and are not subject to wear.

If they need to be adjusted, proceed as follows:

1. loosen the screw A
2. remove the spacer B
3. lower it 1 mm for every 0.01 mm to be recovered
4. refit the spacer B
5. tighten the screw A



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### 7.1.3. SPINDLE MAINTENANCE




INTERVAL: 200 hours

LUBRICANT: Kluber Altemp QNB 50 grease

Clean the spindle carefully and lubricate it with a film of grease (4/5 gr. for the entire spindle).



Do NOT use air or solvents for cleaning

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### 7.1.3.1. Spindle bearings

The bearings mounted on the spindle line are high precision angular contact type (Class G7). The bearings are mounted and preloaded in the workshop. The spindle bearings are grease lubricated.



The bearings do NOT require maintenance



The spindle line bearings are designed to operator for 20,000 hours.  
Afterwards they must be replaced



In case of disassembling it is necessary to lubricate the bearings with grease that has the following characteristics:

PENETRATION	ASTM 26 5-295
CONSISTENCY	NLG1 2
SPEED FACTOR	Ndm 1,000,000
DYNAMIC TENACITY	CP 3,000
TEMPERATURE RANGE	°C -60/130



We recommend KLUBER grease type: **TOPAS NB 52**

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#### 7.1.4. BELT ADJUSTMENT



Proceed as follows to replace the rotation drive belts:

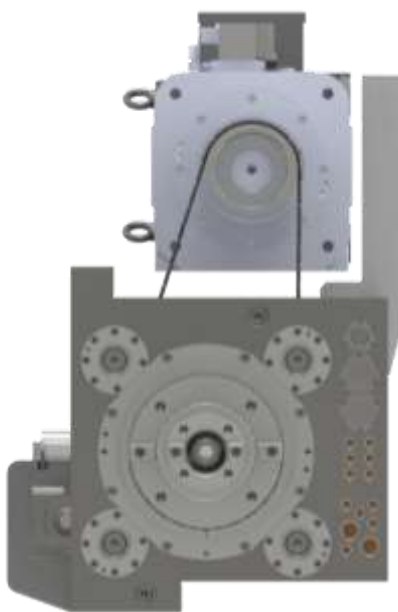
1. loosen the screws locking the motor
2. lower the motor until it is possible to insert the V belts
3. tighten the adjustment nuts until obtaining a belt tension so that a thrust of **100 N** causes a belt deflection of **6 – 6.5 mm**.
4. tighten the screws locking the motor
5. recheck the deflection




Periodically control the tension of the belts, checking their deflection



It is recommended to have the operation performed by a manufacturer authorised technician



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### 7.1.5. Y AXIS BELT TENSIONING PROCEDURE



Proceed as follows to adjust the Y axis belt tension:

1. Loosen and lift the upper bellows of the Y axis in order to reach the upper cap of the spindle motor pulley
2. Remove the front cap of the spindle pulley
3. Loosen the 5 screws fastening the spindle motor
4. Use the tie rods to adjust the height of the motor and to tension the belts
5. Check that the motor is perfectly aligned



Imprecise alignment could cause the drive shaft to break

6. lock the 5 screws fixing the spindle motor
7. Insert the pulley cap



The cap must enter manually, without forcing the diameter or the clamping screws

8. Close everything



If the cap will not enter manually, it means that the adjustment is at the limit position.

We recommend replacing the belts.

If the belts are new, turn the external diameters of the cap and enlarge the fastening holes

In any case, it is recommended to request service by a **LAZZATI** technician.

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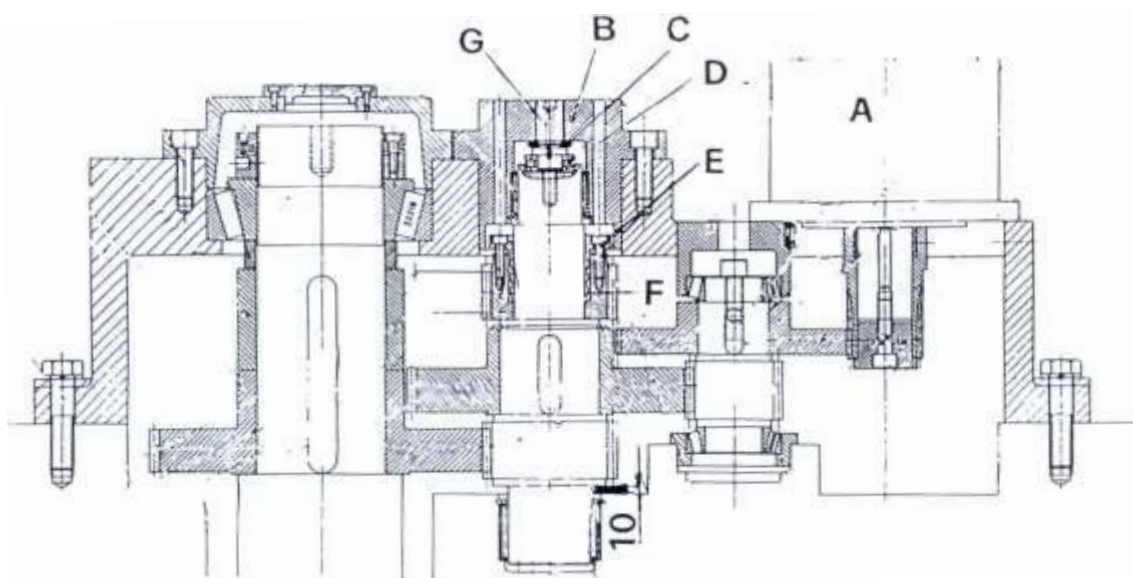
### 7.1.6. DOUBLE PINION ADJUSTMENT X AXI




The play existing in the double pinion must be checked and adjusted, if the machine has been subject to an impact during machining and the movement of the axis is no longer continuous.

With the machine on and the X axis released, proceed as follows:

1. Remove motor A that controls the feed of the X axis without disconnecting the power supply cables
2. Check for any play by moving the drive gear manually through the opening left by the motor.
3. If play is discovered, perform the adjustment as described on the following page



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### Adjustment:

1. Disconnect the lubrication pipe
2. Remove bush B.
3. Remove the cup springs C
4. Remove the thrust bearing D
5. Loosen the 6 screws E that adjust the bush that pushes the locking rings
6. Make sure that gear F is free with respect to the shaft
7. Through the hole left by the motor create a distance with respect to the gear using a 10 mm shim.
8. Make sure that the gear F is against the stop
9. Tighten the screws E evenly by cross-tightening them as follows:
  - Tighten the screws manually until the bush is up against the tightening rings.
  - Tighten the screws approximately to half of the tightening torque.
  - Tighten the 6 screws crosswise using a torque of 14 Nm.
  - Check the tightening torque on the screws in the same order as these were tightened.
10. Replace the thrust bearing D,
11. Replace the cup springs C
12. Fit the bush B making sure the springs are centred.
13. Remove the 10 mm shim.
14. Recheck the play of the drive gear.
15. Adjust the cup springs by putting the screw G in contact with them. Then, tighten them by a 1/5 of a turn.
16. Tighten the lateral screw that locks the screw G.
17. Connect the oil pipe
18. Mount again the motor. As it has a play on the centring position, it can be pushed against the drive gear in order to eliminate any play between the two gears.

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### 7.1.7. CLEANING OF THE BED AND GUIDES



INTERVAL: 1 year

Clean the bed, guides and all collection channels in order to remove oil and dirt deposits of coolant spilled from the telescopic covers.



Carefully inspect the condition of the guides in order to ensure the smooth operation of the hydrostatic lubrication.

Check the guide cleaning oil scrapers: with the use, they accumulate dirt and chips that, with the movement, can damage the surface of the guides.



For a complete cleaning it is suggest to disassemble and clean with suitable cleaning liquid (Fulcron or similar).



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### 7.1.8. ROPE MAINTENANCE



Carry out the following instructions before performing any work on the head balancing device.

#### Machine with mechanical counterweight:

Before performing maintenance work on the ropes of the Y axis motor, put the counterweight in the rest position:

- Insert a bar in the specific holes
- Support the head with a wood support to prevent it from falling.



The Y movement ball screw is restrained by a brake on the engine, but if the motor must be removed the system becomes reversible and the head falls.

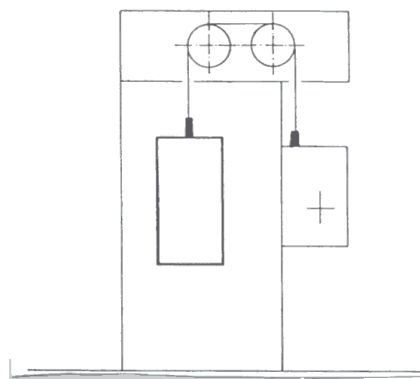
#### Machine with hydraulic counterweight:

Before performing maintenance work on the ropes of the Y axis motor, put the head in the rest position:

- Support the head with a wood support to prevent it from falling.



The Y movement ball screw is restrained by a brake on the engine, but if the motor must be removed the system becomes reversible and the head falls.



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#### 7.1.8.1 Maintenance of ropes applies also for machines with a Hydraulic counterweight




Rotating pulleys and belts can cause serious accidents. Never place any body part near to moving or rotating parts. Always ensure that protections are positioned correctly before starting the machine. Turn off the power before performing maintenance on the machine.

The implementation of the rope includes operations to be performed, mounting, attachment of the fixed head and adaptation to working conditions that must be performed correctly, in order to ensure the optimum conditions of use and to avoid premature breakage or reductions in the duration. The assembly or replacement of the ropes must only be performed after carefully checking the throats of the pulleys or drums to make sure that they are not worn or deformed and after checking that the pulleys rotate freely without excessive play. In case of using steel rope, remember the need to avoid overlapping of the rope and any abnormal twists that may affect the duration of the rope or cause leakage. To ensure the best performance and durability, ensure that the rope works while maintaining the structural parameters. In particular, it is necessary that the ends are connected to an attachment that prevents the rotation induced by the system. When installing a new rope on a system it is necessary to ensure that, for a short time, the loads used are less than normal working conditions. This break-in procedure ensures the adaptation of the cable and prevents the premature breakage of the same. Maintenance of the steel rope must be carried out in function of the lifting equipment, its use, the environment and type of rope. Maintenance lubrication must be compatible with the original lubricants used by the rope manufacturer. The steel rope must be clean and protected by coating it with grease or oil. The service life of the rope can be shortened in fact by incorrect maintenance, especially when the equipment operates in a corrosive environment and, in some cases, due to service reasons, the maintenance lubrication cannot be performed.

The rope checking and replacement criteria, in compliance with standard ISO4309, must be guaranteed by the correct assessment of the following factors:

- Number of breakages and their position
- Wear of the wires
- Internal and external corrosion
- Rope damage and deterioration.

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These checks must be performed by competent personnel and with a frequency that depends on:

- Legal provisions in force in the country of use
- Device type and environmental conditions
- Results of previous checks
- Period of time in which the rope has been in service

The design of a lifting device is such that it does **NOT PERMIT** the **UNLIMITED** duration of the ropes. The breakage of the wires, in the case of ropes with 6 or 8 strands, are determined in most cases, on the outer surface. In the case of ropes with multiple strand layers, the breakage normally takes place inside and therefore are “not visible”. The wear of the rope is caused by not lubricating them or not lubricating them correctly as well as due to the presence of dust or sand. The wear determines the reduction in the resistance of the cables, due to the decrease of their metal cross-section. The corrosion can not only decrease the resistance to breakage, but also accelerate the phenomena due to fatigue.

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### 7.1.8.2. Cleaning

Clean the rope carefully to eliminate any altered lubricant.



Pay attention not to use petroleum or solvents but only use mechanical devices such as metals brushes or similar.

### 7.1.8.3. Visual inspection

After the cleaning the rope, check its conditions and connection terminals, checking:

- external diameter to make sure that it has not been reduced 7% or more with respect to the nominal diameter
- Absence of broken wires, areas of wear, crushing, corrosion, elongation (check the entire length of the rope)
- Absence of broken wires near the rope terminals



A simple way to check for broken wires is to pass a cotton cloth on the rope in both directions: if there are wires, the cloth will catch on them



If the controls do not have a positive result, replace the rope.

### 7.1.8.2. Lubrication

After cleaning and performing the visual inspection, the ropes must lubricated by using high viscosity lubricant for ropes or with grease, not-emulsifiable with water.

### 7.1.8.3. Pulley control and lubrication

It is very important to control the conditions of the pulleys throat and correct pulley rotation.

If the pulley rotation is not free, it cause an increasing of the rubbing and consequently the rope wear.



When replacing the ropes, always grind the pulley throats.

The pulleys must be lubricated with grease.

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### 7.1.9. TELESCOPIC COVER MAINTENANCE



INTERVAL: from once a day to once a week (depending on the machining)

OPERATION cleaning

During operation, the covers require little maintenance.

It is recommended to remove dirt from the cover as follows:

- spread out the cover completely
- free the surfaces of any dirt
- rub with a cloth soaked in oil to protect against the formation of rust.

INTERVAL: 1 time a month

OPERATION lubrication

Free one connection side and assemble the cover.

It is recommended to:

- examine the machine guides
- spray oil on the lower side of the cover to provide sufficient lubrication on all its sliding parts

All information regarding the use of the facing head, its start-up and correct maintenance is described in the specific manual:

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## USER AND MAINTENANCE MANUAL

### Telescopic covers



Do NOT use compressed air to clean the machine.

This would blow the dirt under the cover and in the bearings, causing wear and a decrease in machine precision in a short period of time



If spare parts for the cover are required after a long period of time, when requesting them it is necessary to indicate the order number indicated on the cover plate.

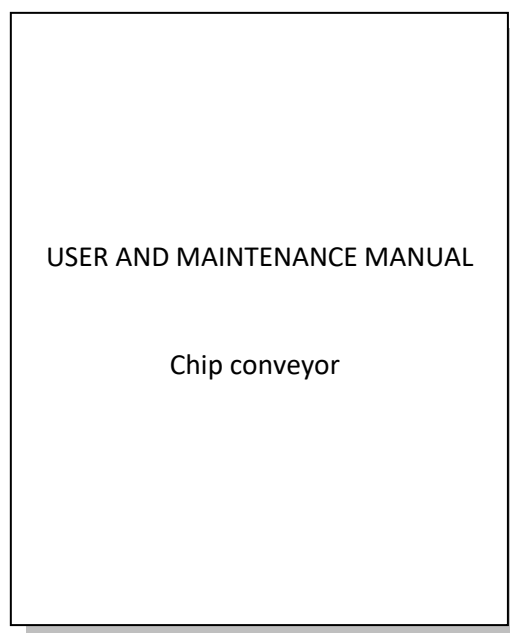
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#### 7.1.10. CLEANING THE CHIP CONVEYOR



Remove all chips that were not evacuated and check for accumulated chips

All information regarding the use of the facing head, its start-up and correct maintenance is described in the specific manual:



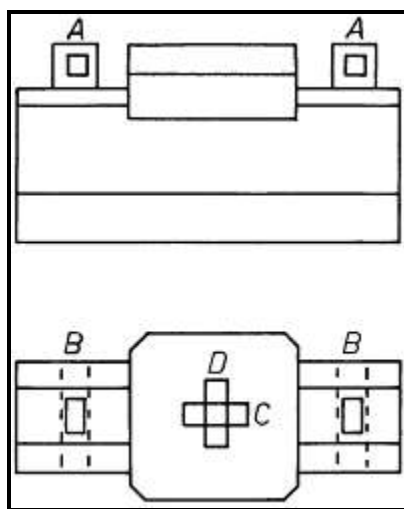
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### 7.1.11. POSITIONING AND LEVELLING (TR TABLES)



For the positioning, the foundations and the electrical and hydraulic power supplies for the table, carefully following the instructions provided with the machine with which the table is coupled.

### LEVELLING



INTERVAL: 1 time a month

Proceed as follows to perform the levelling:

- Clean the bed guides
- With the level in position A, carry out a rough longitudinal levelling
- With the level in position B and with the use of a precision rule used as a bridge, level the bed transversely.
- Check the level of the table with the spirit level in position C and D.
- Continue to adjust the level until correct levelling is obtained.



Use a level with a sensitivity of at least 0.05 mm/m



It is recommended to have the operation performed by a manufacturer authorised technician



### 7.1.12. TR TABLE LUBRICATION



The operator must be responsible for a correct lubrication of the table.

It is very important to keep the oil at the level indicated by the indicator lamp, therefore it is recommended to perform the checks required in the following lubrication table, topping up when necessary and not topping up too much.

OPERATIONS	CONTROL TIMES
Control	Every 8 hours
Top-up	Every 40 hours
Replace and clean	Every 2,000 hours



Top-up carefully and pay attention to cleaning during the operation

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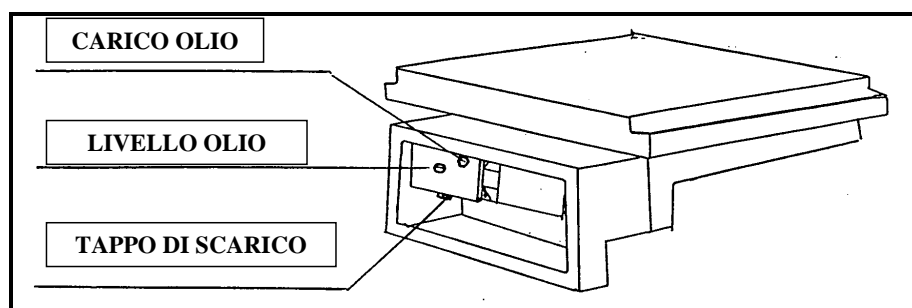
### 7.1.13. TABLE GEARBOX LUBRICATION



The lubrication of the worm-gear unit which controls the table rotation is carried out by splash oil in the gearbox.

For checking the oil level, remove the front side metal sheet from the table.

For correct lubrication, drain the residual oil and top it up with the oil indicated in this chapter.



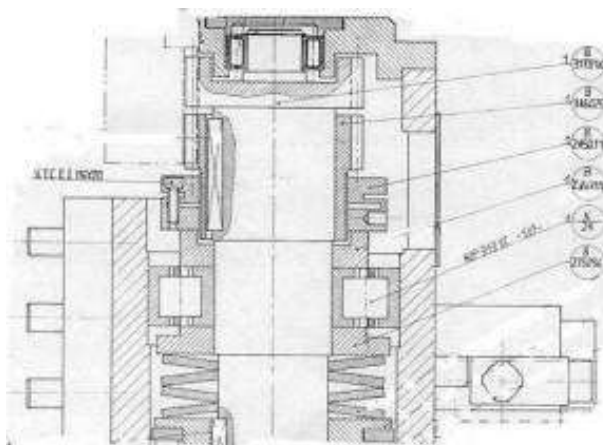
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#### 7.1.14. DOUBLE PINION ADJUSTMENT B AXIS



Proceed as follows to adjust the B axis double pinion:

1. Remove the casing covering the slide - table
2. Remove the cover B736001 that closes the double pinion (this cover is fixed with 4 M4 screws)
3. Loosen the screws that lock the ring nut B245001 (6 M6 screws). As it is possible to loosen one screw at a time: after loosening the first screw, turn the table slowly, stop and then loosen the second screw, etc. up to the sixth screw.
4. Turn the ring nut where the 8 mm diameter holes are located using a pin with dia. 7/8 mm and use a tube to tighten the ring nut  $\frac{1}{4}$  of a turn, starting from the springs that are positioned but not tightened.
5. When tightening is complete, do not move the table but tighten the first ring nut fastening screw, turn the table slowly, tighten the second screw, etc. up to the sixth screw.
6. Test the movement of the B axis.



If the table is not excessively loaded control that the air pressure gauge is about 0.5 bar. If the table is loaded more than 75% of the capacity, bring the pressure gauge to 1-1.5 Bar

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### 7.1.15. HYDRAULIC CLAMP ADJUSTMENT.



The hydraulic clamping devices of the rotary table are of the positive type with locking of spring and unlocking with the oil pressure. The table remains always locked, even when the machine stops, so as to maintain the positioning accuracy even under considerable strains or induced voltages.

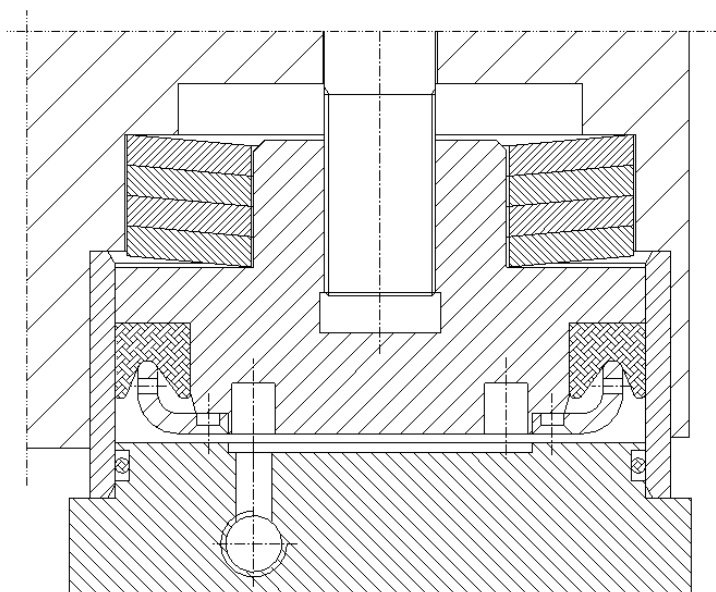
A specific pressure switch does not allow the rotation of the table with the machine stopped.


The materials needed for maintenance of locks are:

- 4 cup springs 100x51x6
- 1 gasket UM105 75
- 1 gasket OR4387 SB 90 + BK 4387



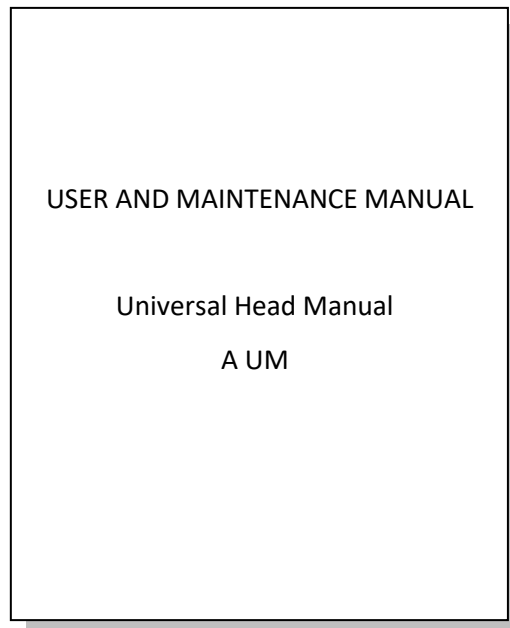
The preloading of the springs must be 20,000 N corresponding to a deflection of 0.2 mm with a tightening torque of 340 Nm



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### 7.1.16. MAINTENANCE OF THE A UM HEAD

All information regarding the use of the manual universal head, its start-up and correct maintenance is described in the specific manual:



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### 7.1.17. MAINTENANCE OF THE A UM HEAD

Clean and lubricate the connection seats.

Check the integrity and cleanliness of the hydraulic and electrical fittings.

In case of leakage replace the rotary seal ring of the spindle.

The spindle bearings do not normally require adjustment.

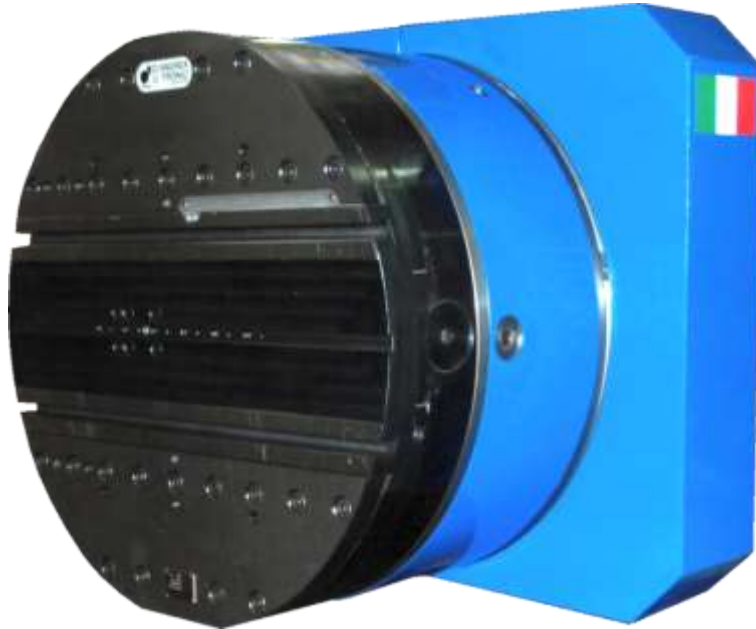


After every 40 hours with the universal head accessory mounted, unclamp the accessory, move and lubricate the spindle of the machine.

For the lubrication of the spindle use Kluber Altemp QNB 50 grease (4/5 gr. for the entire spindle).

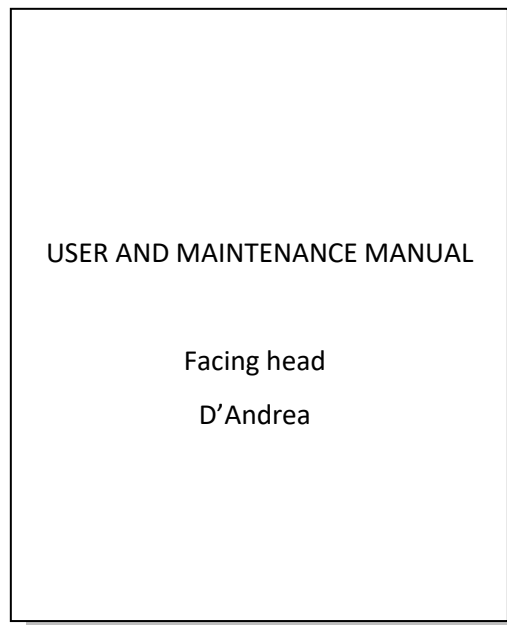
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### 7.1.18. MAINTENANCE OF THE A FH HEAD - ANDREA UT5/XXX S HEAD



#### Facing head

All information regarding the use of the facing head, its start-up and correct maintenance is described in the specific manual:



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### 7.1.19. TAPER CLEANING AIR



The machine is equipped with a special device for the automatic cleaning of the ISO 50 taper during the automatic tool change. For operation, a supply of compressed air of at least 6 bar is required with a flow rate of approx. 50 l/min. The machine has an air filter

INTERVAL: 1 time a month

Clean the air filter to prevent serious problems inside the spindle.



It is recommended to supply the system with dry and clean air to prevent the accumulation of moisture or dirt inside the spindle



Do not activate the taper cleaning solenoid valve when the operator is present and without the tool.



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## 7.2. SAFETY DEVICE MAINTENANCE

### 7.2.1. External Protection Maintenance



INTERVAL: 1 time a day

The external protections require careful maintenance by the operators.

Check the condition of the microswitches and the electronic protective devices on the openings.



If they do not function properly, they must be replaced immediately.

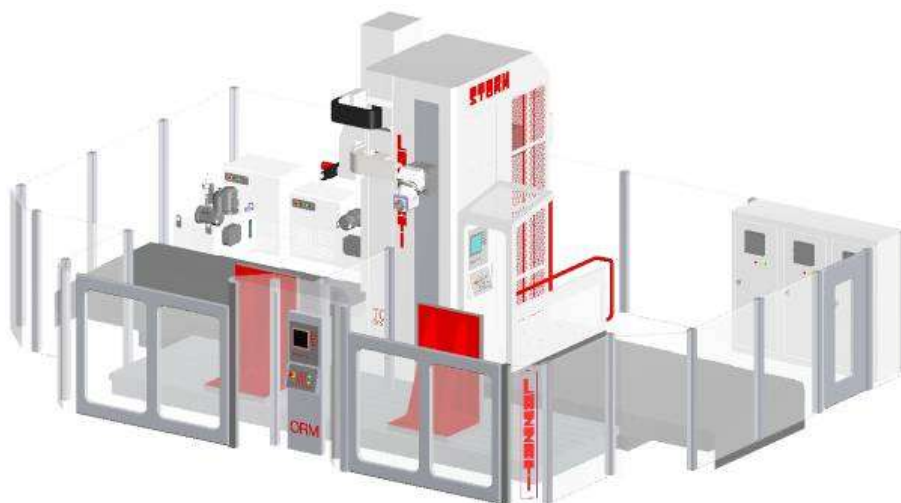
INTERVAL: 2 years and/or 2000 work hours

The polycarbonate plates located on the protections are subject to ageing, which cannot be seen visibly, but that substantially decreases their impact resistance.

Replace them within the indicated period of time.



It is recommended to periodically check the bolts that fasten the protections and lubricate to protect them.



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### 7.2.2. Functionality check of safeties



INTERVAL: 1 time every 3 months

Check the effectiveness of the safeties (the tests must be performed unloaded):

- Emergency stop
- Door opening
- Photoelectric barriers (if present)
- Handwheel controls (if present)




The tripping of a protective device must stop the machine



If they do not function properly, assistance is required by the electric maintenance technician.



If it is impossible to restart operations in safe conditions, contact the manufacturer

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### 7.3. HYDRAULIC UNIT MAINTENANCE



The user must continuously control the quality and state of the power transmitting fluid: make sure there are no impurities in the circuit, which is necessary for the reliability of the hydraulic circuit.

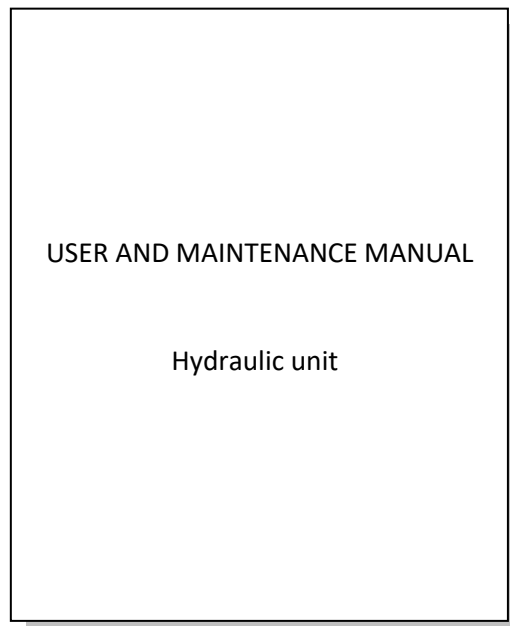
After starting up the system, maintenance consists of small operations that must be carried out regularly to be effective.



The operator must follow the specified maintenance schedule



In the case of doubts or if anything is not understood, refer to the device manual



**Note:**

One of the main causes of breakdowns or faults is the locking of equipment due to seizing or breakage, due to wear and ageing of the power transmission fluids, which causes them to lose their chemical-physical properties. The main cause of all these problems is due to the presence of particles and microparticles that continuously circulate in the fluid and represent a reason for wear. If these microparticles are allowed to circulate in the system, they act as an abrasive mixture, scratching the surfaces with which they are continuously in contact and circulating additional contaminants.

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Follow the recommended maintenance schedule:

#### Seal and pipe check:

INTERVAL: 1 time a week

Fluid leaks, especially when originating from pipes that are not visible, underground or hidden, do not only cause the loss of fluid, but also various types of hazards, such as fires, damage to cable components or concrete floors.

Leaks from areas with gaskets cannot be eliminated by tightening, as these leaks are due to the ageing, hardening or deterioration of the gaskets.

The seal can only be restored by replacing it.

#### Pressure check:

INTERVAL: 1 time a week

Check the main and secondary pressure: take note of any changes in the record and restore the required value if necessary.

Frequent spontaneous changes in pressure indicate probable wear of the pressure relief valve or the pump.

#### Oil filter check:

INTERVAL: 1 time a week

The installed filters make this check easy, making it extremely quick as they are equipped with an obstruction indicator.

#### External cleaning:

INTERVAL: 1 time a month

External cleaning makes it possible to easily find small leaks and fix them immediately.

#### Air filter check:

INTERVAL: 1 time a month

Replace the cartridge if necessary.

The control period may be varied based on direct experience and the ambient conditions.

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### Oil top-up:

INTERVAL: 1 time a day

It must be carried out every time the oil level goes down to minimum.

The oil must be topped up with the same oil used when filling the system, and which must be indicated directly on the unit tank.



It is very dangerous to mix different brands of oils, which could cause operating problems and must be avoided.

High quality oil must be used in compliance with international classifications.

Any topping up that is required must be done using a mesh  $\leq 0.06$  mm or through the system filter, using the same fluid already present in the system.



Pay attention not to exceed the maximum level

The fluid must be stored in watertight containers stored in suitable locations; they may only be collected by companies authorised to dispose of them, in compliance with current regulations.

### Continuous oil temperature control:

INTERVAL: constant control

Fluid alteration caused by temperature is a reason for system pollution and degradation. Pollution product formation on hydro-carbons is particularly affected by the temperature: oxidation speed is linear up to 60°C; after this value the oxidation is double for each 10°C increment.

The presence of deposits and sediments in the oil gives the oil a turbid appearance, signalling the degraded state of the oil.

### Oil change:

INTERVAL: Every 3000 hours

Frequent chemical-physical checks and checks of the degree of pollution permit timely intervention. When changing the oil, it is also necessary to carefully clean the tank and if necessary wash the system.

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### Heat exchanger maintenance:

INTERVAL: 1 time a month

For air exchangers, it is important to keep the radiant pack clean so its efficiency will not be reduced: at the foreseen interval clean it with compressed air, blowing in the direction opposite of the normal flow.

INTERVAL: 1 time every 6 months

For water exchangers, eliminate the limescale deposits on the water side that limit its efficiency, using specific fluids or 10% hydrochloric acid solutions.

### Accumulator precharge check:

INTERVAL: 1 time a month

Using specific precharge control instruments that are commercially available

Operations on the systems that include accumulators may only be performed after completely zeroing the hydraulic pressure.



It is not permitted to perform welding or mechanical operations of any type on the accumulators

Unauthorised repair work could cause serious damage and accidents.




All repair work on the accumulators may only be performed by a support service authorised by the manufacturer. To restore the precharge only use nitrogen, which must be loaded using the specific device and carefully following the instructions provided by the manufacturer

### Pumps, solenoid valves and adjustment components:

INTERVAL: refer to the specific instructions.

It is difficult to fix an average life of these components beyond which is more economical to replace them. However also in this case, it is possible to program a series of tests at predefined intervals that can be of considerable help in identifying if it is economic to perform the operation.

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The task of the maintenance service must be a continuous, prolonged test of the system and its compliance with the functional requirements of the machine.

For this purpose, all operators must be perfectly aware of all the diagrams, technical tables and functional descriptions of the system and be periodically updated regarding the features of the components making up the system.



It is also very important, already at start-up, for the system to have a set of initial spare parts that must be continuously renewed and a suitable quantity of each installed component must be made available.

With regard to the instructions for the assembly and/or replacement of the electric motor, pump and couplings, refer to the specific instructions of the manufacturer.

In any case, remember to check that the half-couplings on the motor side and on the pump side slide freely on the shaft. In the case of pumps with a tapered shaft, block the coupling using the provided nut.

Before mounting the engine verify that, between the surface of the bracket and the pack of the couplings, there is a gap of 1 to 3 mm with the various components coupled.

Mounting the motor or the pump, check the alignment and the absence of axial or radial loads on the bearings.

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### 7.3.1. HYDROSTATIC SYSTEM MAINTENANCE

The hydrostatic system has a very long life without problems and does not need specific maintenance if it has been accurately operated during the starting of the machine.



It is recommended to use the oils indicated in this chapter.



The operator must continuously check the quality and state of the fluid as well as check that there are no impurities in the hydraulic circuit.

It is essential that the maintenance department controls the system starting from machine commissioning and directly attends to the correct performance of all the filling and cleaning operations.



It is prohibited to top up or replace the circuits using oil that is dirty or that has a different quality than what was specified for topping up, as well as for filling, which must be done using filling and filtering units

When repairing or replacing parts pay attention to operate in conformity with the following rules:

- the rigid pipes must be made out of weld-free drawn steel and the flexible pipes must withstand pressures of at least 10 MPa.
- Before mounting, the pipes have to be pickled, passivated and washed with oil. The pickling operation is needed to eliminate rust and different incrustations.
- When mounting the pipe fittings not to use tow or Teflon tape, but use only liquid sealing in order to avoid that small particles obstruct the throttling valves.
- In case of relevant repairs or disassembling, carefully wash the hydrostatic circuit.



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### Oil change and cleaning

INTERVAL: 2000 hours

Change the oil and carefully clean the tank and the filters.



The continuous control of the oil temperature is recommended

The fluid alteration with the temperature is a cause of pollution and degradation of the device. The oil oxidation speed can be considered constant up to 60°C, while from this temperature it increases quickly.

The presence of deposits and sediments signals the state of oil degradation.

INTERVAL: 1 time a month

Remove the telescopic covers and clean the bed in the points dampened by the oil.

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### 7.3.2. HYDROSTATIC CONTROL UNIT OIL LEVEL CONTROL



INTERVAL: 1 time a week

The oil level can be checked by the electronic indicator displayed by the CN

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### 7.3.3. LUBRICATION CONTROL UNIT OIL LEVEL CONTROL



INTERVAL: 1 time a week

Check the oil level on the visual indicator on the side of the tank.

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#### 7.3.4. TABLE GEAR BOX OIL LEVEL CONTROL



INTERVAL: 1 time a month

Check the oil level on the visual indicator on the gear box.

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### 7.3.5. HYDRAULIC FILTERS



The filters of oil circulating in the machine are provided with an electrical obstruction indicator.

This involves that, in case of filter obstructed the concerned pilot lamp will be lighted or a message will appear on the screen for the CNC machines.

It is suggested not let the electrical indicator arrive to the alarm level, as when the filter is completely obstructed, the by-pass opens that permits dirty oil to pass so the machine will not be stopped during a cycle, with obvious danger for the machine guides.

Therefore, precautionary maintenance is useful by proceeding to the filter cleaning when the obstruction indicator is YELLOW.

It is also advisable to have in stock the spare cartridges for all filters applied to the machine.

The use of specific detergents is recommended for cleaning.



It is very important to have always the spare cartridges for all filter applied on the machine.

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### 7.3.6. HYDRAULIC ACCUMULATOR



Only for machine with hydraulic counterweight

The hydraulic accumulator is used for the following:

- Compensating the loss due to leakage
- Supplying instantaneous high power in order to reduce the tripping time
- Absorbing the water hammering.

The machine has bag-type accumulators consisting of a forged steel body, a bag of synthetic rubber and a group of safety devices.


All accumulators are designed and tested according to the safety standards in force.

Any other special certifications must be established with the purchase order.



Precharging is carried out using an appropriate device at the pressure specified. For this purpose, use industrial nitrogen.

The use of oxygen and/or air is forbidden

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### 7.3.7. HYDRAULIC COUNTERWEIGHT MAINTENANCE



Only for machine with hydraulic counterweight

The hydraulic counterweight has been calibrated at the factory.

INTERVAL: 2000 hours

Check the accumulator pressure on the NC, in particular on the page dedicated to pressure visualization.

If, due to leaks of oil or elasticity of the materials, the pressure would decrease, the pressure switch SPCP will stop the machine and send a message on the screen of the numerical control.

To restore the original pressure:

1. Give the command **M66**
2. wait for at least 2 minutes
3. put Y axis into **JOG MODE** up to software limit switch +
4. give again the command **M66**
5. check that the pressure remains at the previous values.



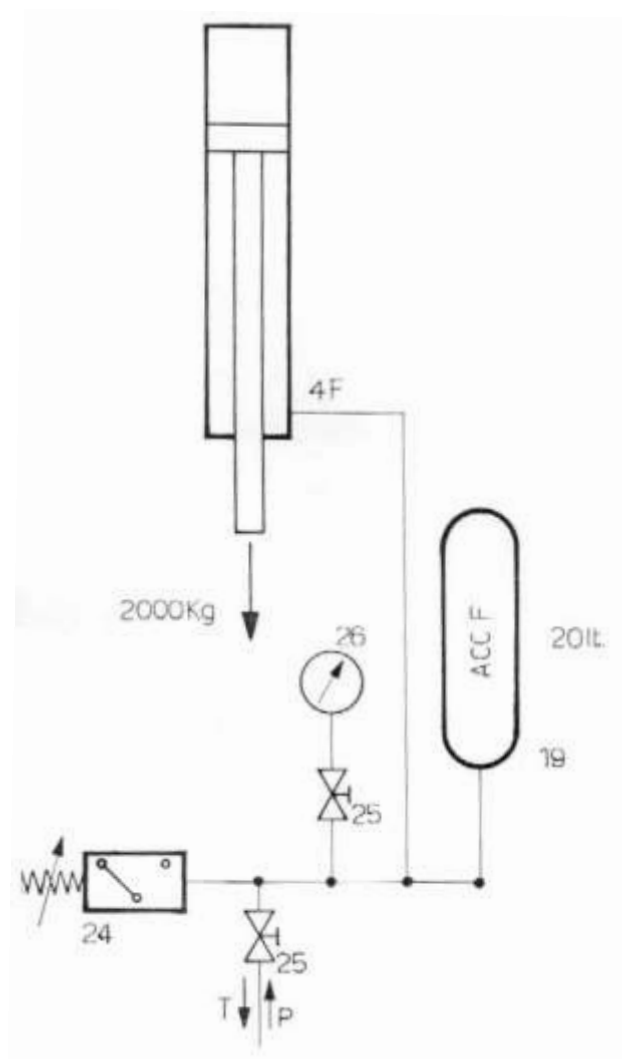
Any obvious changes in values may denote the presence of air in the counterweight.

6. Remove the air and repeat the operation.


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In the case of operations on complex hydraulic counterweight always drain the hydraulic circuit by attaching the hose into the rapid "T" and opening the tap DRAF.





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### 7.3.8. GEAR PUMP MAINTENANCE



Normally the gear pumps do not require any maintenance.

Only the following suggestions must be observed:

1. Never let the pump run dry.
2. Keep the supply filter clean.
3. Check the shaft gaskets, which are normally are made of Teflon or rubber. In case of any leakage from the gaskets, they must be replaced with other gaskets of the same size.



The right direction of rotation and flow can be seen by the arrow on the pump body. The standard pumps are irreversible. Therefore check the sense of rotation of the same when any change is carried out on the electric system.



In the case of doubts or if anything is not understood, refer to the device manual

USER AND MAINTENANCE MANUAL

Gear pump

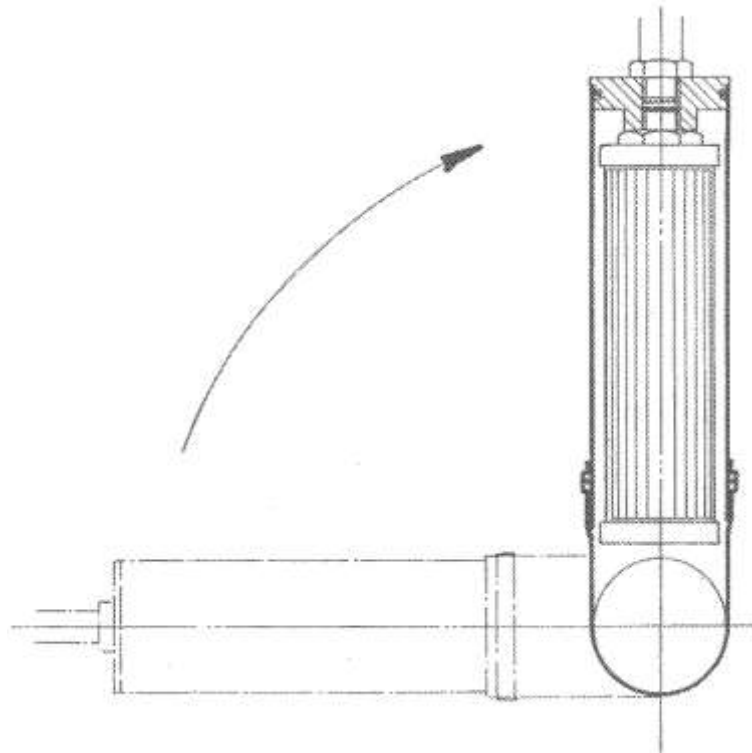
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### 7.3.9. CLEANING OF HYDROSTATIC LUBRICATION DRAINAGE FILTER:



Before cleaning the filter always:

1. switch off the machine
2. turn the pipe containing the filter 90° in order to avoid oil leaks.
3. Unscrew the flexible pipe
4. Disconnect the cover that bears the filter.
5. Clean it carefully with diluent
6. Refit everything



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### 7.3.10. LUBRICATION SYSTEM

It is very important to keep the oil at the level indicated by the indicator lamp, therefore it is recommended to perform the checks required in the lubrication table, topping up when necessary and not topping up too much.

The type of oil to be used in the machine is indicated in the table of lubrication according to the standards ISO/TC/39/WG6.

#### 7.3.10.1. Guides, ball screws and bearings

INTERVAL: 1 time a week

The oil for lubricating these parts originates from the lubrication unit and is not recovered. Therefore the oil in the unit will decrease progressively.

Top-up according to the indicated frequency.

The time of lubrication is predetermined at testing, but can be easily varied according to the needs of the user.



It is recommended to use MOBIL VACTRA OIL N°2 for the best lubrication of the sliding guides.

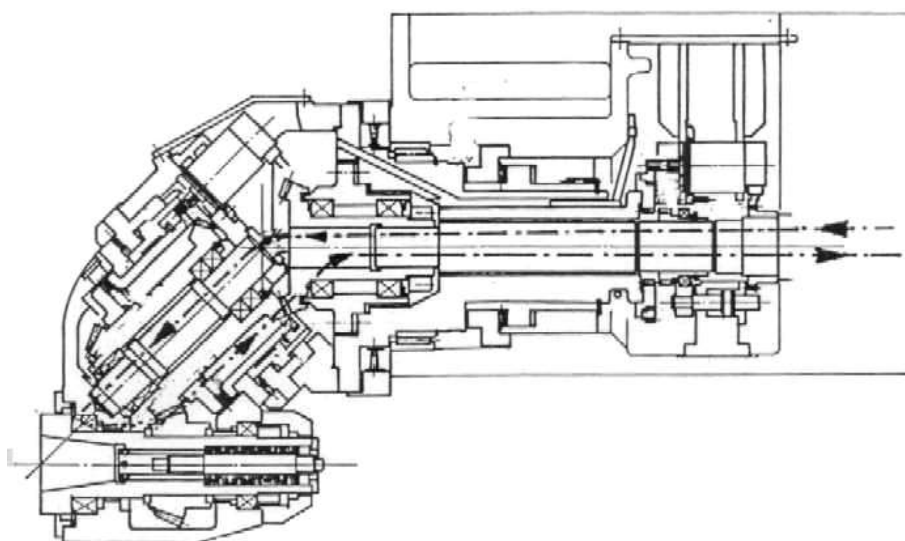
#### 7.3.10.2. Rotary table reducer


The reducer is lubricated in an oil bath and requires a visual check of the level.

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### 7.3.10.3. Lubrication of the universal head

A gear pump permits the circulation of hydraulic unit oil into the two elements composing the universal head. The pressurised oil that is delivered has the dual function of lubricating the bearings and gears as well as removing the heat generated by rotation and machining. A centrifugal pump collects the returned oil and delivers it again to the hydraulic unit where it is filtered and cooled.



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#### 7.3.10.4. ZF gearbox lubrication (if present)

The lubrication of the ZF gearbox is carried out in an oil bath.

For correct lubrication, completely drain the gearbox of all oil and then fill with the type of oil indicated in this chapter.

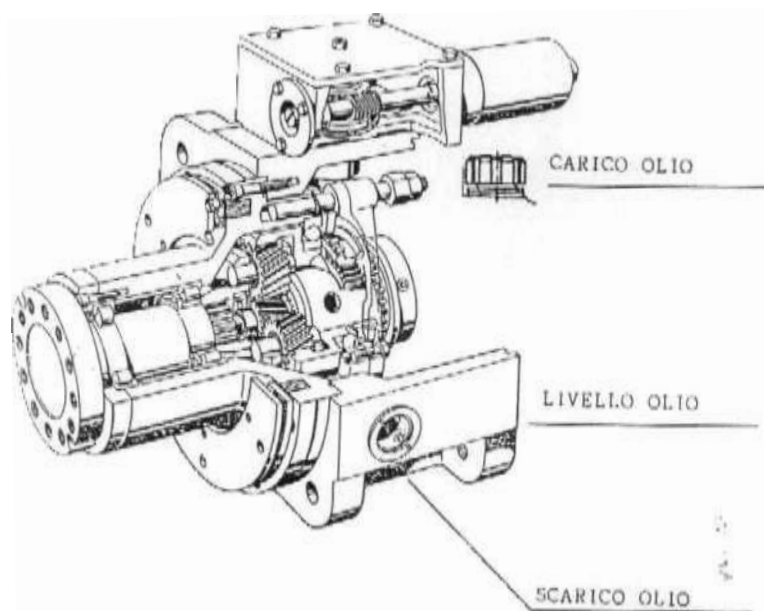
If replacing the spindle motor, when the motor is refit on the ZF gearbox, in addition to the gasket that is present, it is recommended to seal with a layer of silicone seal (max. thickness 0.1 mm) for 'Motorsil D' type motors or similar.



Pay attention to the oil quantity to put in the reducer housing.

The system is an oil recirculation system: therefore, circulate the oil in the system for one minute, then stop and verify the level visually and top up if necessary.

In the following days for a period of one week, make a daily verification to the oil visual level pay attention there are no leakages due to faulty assembly.



In the case of doubts or if anything is not understood, refer to the device manual

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## 7.4. COOLANT SYSTEM MAINTENANCE

### 7.4.1. COOLANT LEVEL CONTROL



INTERVAL: 1 time a week

The level of the coolant can be controlled using the visual level provided on each main tank.

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### 7.4.2. LUBROCOOLANT

In the metalworking process a high quantity of heat is generated:

- Due to friction between tool and workpieces
- Due to plastic deformation of material to be machined.

The heat must be quickly eliminated:

- By reducing its formation via a lubricant.
- By removing it via a coolant.

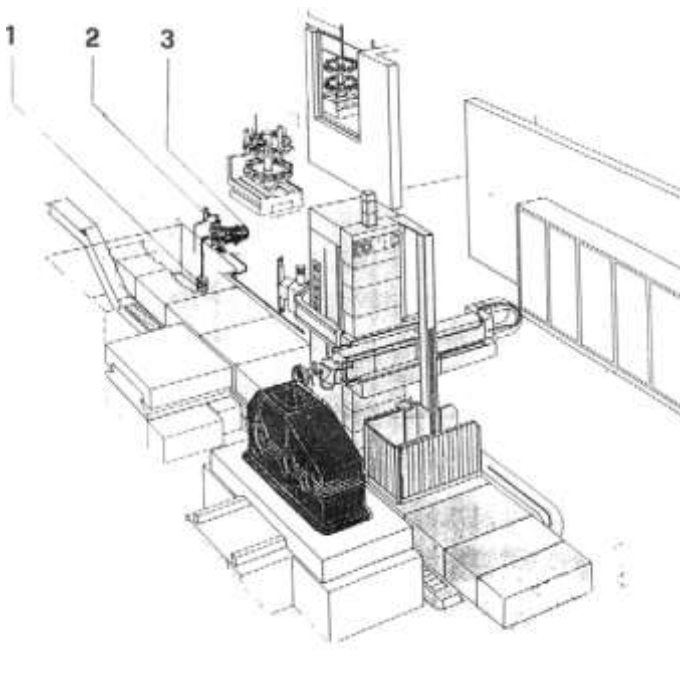
Therefore, a combined action of lubrication and cooling are needed.

When performing operations that require more lubrication, use a lubro-refrigerant with a high oil content or, in exceptional cases, neat oil.

Instead, where cooling is more important, a lubro-refrigerant will be use that contains a low percentage of oil.

The lubro-refrigerant must also provide corrosion protection during machining.

The emulsion comes into contact with all the material making up the machine tool and it must not damage them. Particularly, the supplier of lubro-refrigerant fluids have to assure the full compatibility of fluids with glues used for the guide plastic linings.



1. Intake network filter
2. Pressure regulation valve
3. Electric pump

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### 7.4.3. FILTRATION OF THE COOLANT WITH PAPER FILTER

All information relating to the filtration of the coolant with a paper filter, the start and the correct maintenance are described in the manual.

USER AND MAINTENANCE MANUAL

Filtration of the coolant with paper  
filter



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#### 7.4.4. HOW TO PREPARE THE EMULSION

##### 1. Water to prepare the emulsion

According to EC standards, the water for the preparation must have the following chemical-physical characteristics.

<b>pH</b>	6.5 – 8.5
<b>CONDUCTIVITY</b>	400 MS \ cm
<b>CHLORIDE</b>	25 mg \ 1 max
<b>SULPHATE</b>	25 mg \ 1 max
<b>NITRITES</b>	0.1 mg \ 1 max
<b>NITRATES</b>	25 mg \ 1 max
<b>NUMBER OF GERMS</b>	max. at 37°/ 22° C 100 \ 1 max

Therefore, it is recommended to use only drinking water.

For any other kind of water this should be subject to analysis beforehand.

Especially the hardness of the water must be considered:

<b>HARDNESS REQUIRED</b>	12 – 45° fh.
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##### 2. Concentrated lubro-refrigerant

Maximum attention must be paid to the storage of the concentrate fluid.

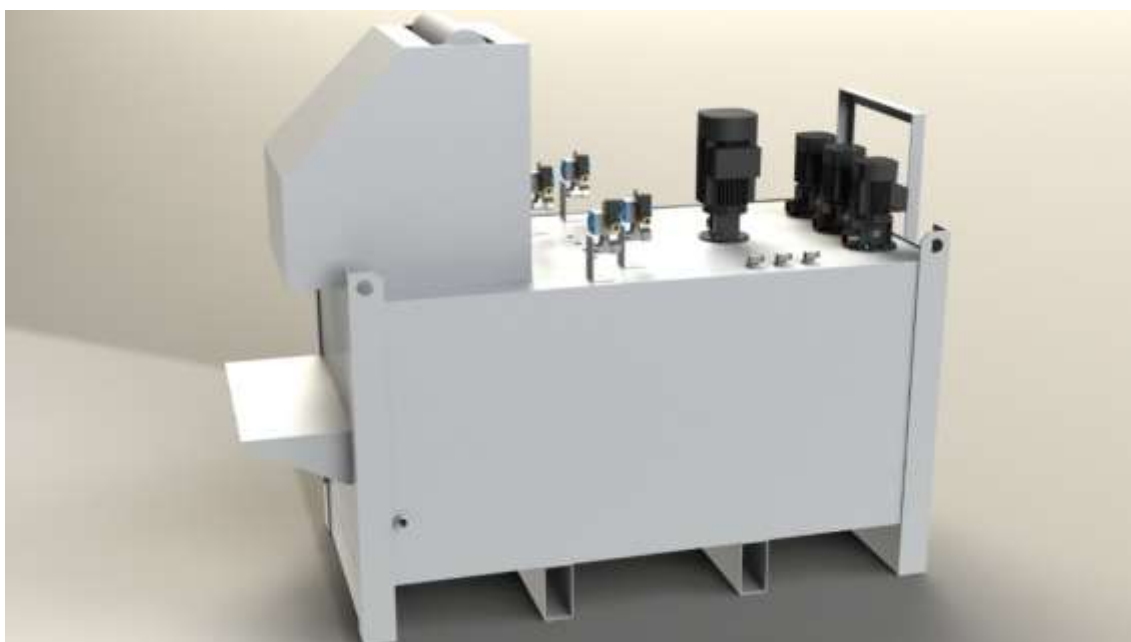
- Never expose it to sun rays or temperatures over 30°C.
- Never store it at temperatures below 0° C.
- Carry out mixing at a temperature of at least +10°C.
- Always stir it before any use.


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### 3. Mixing

A good mixture is important for a good stability of the emulsion.

The purpose of mixing is to fraction the oil into very small particles in order to create the maximum contact surface between oil and water. For obtaining a good stability, the oil must be fractionated into drops with a maximum diameter of 0.1-0.3 micron . Any emulsion obtained by means of automatic batchers/mixers is always preferable



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#### 7.4.5. REMOVAL OF EXTRANEIOUS OIL

INTERVAL: 1 time a week

We recommend the use of an oil separator disk, in order to eliminate all traces of the lubricating oil that is deposited in the liquid refrigerant.

Apply the oil separator possibly after a rest period when the oil, due to the difference in specific weight, is afloat.

The removal of the oil is extremely important for the fact that the extraneous oil accumulating in the tank produces problems of smoke during processing with damage to the health of the operator. The oil also alters the system of bacteria, preventing its control.

The lubricating oil, when mixed with the water of the emulsion by chemical reaction causes the formation of calcium soap, a very thick substance that can cause numerous drawbacks to the machine tool.



Therefore, always control in the tank the absence of surface layers of soap

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## 7.5. ELECTRICAL MAINTENANCE



The electrical components are fit on panels that in turn are fixed inside the electrical equipment in order to make maintenance easier.

No special tool is required to open the doors on the electrical cabinet.

A specific wrench must be used.



The electric devices that can require adjustment are all positioned at a height at least 0.4 m above the service level. Only manoeuvring (QFIG handle) and signalling (panel voltage lamp, etc.) devices are fit on the doors of the housings.

The interconnection between the automatism panel and the machine tool was creating using connectors that are tightly anchored on the electrical equipment.

The electrical equipment was designed in order to permit escape routes for the maintenance service, therefore the door openings have a width of approx. 0.7 m and a height of approx. 2 m.

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A proper maintenance schedule will permit the best use of the machine at low operating costs. It is recommended to follow at least the following basic maintenance schedule, which is based on normal use, in order to prevent large scale failures that can result in long downtimes.



Also check the maintenance requirements for the electronic parts.

#### **7.5.1. SYSTEM ON BOARD THE MACHINE**

INTERVAL: 4000 hours

- A. Tightening of connections terminals, paying particularly attention to power connections, cleaning with compressed air dust deposits or using the special liquid if the dust is sticky.
- B. Check the perfect tightening of connectors.
- C. Check the conditions of the protective sheaths; particularly make sure that the terminal unions are well tightened and no large dents exist.
- D. Check the connection terminal boards or the connectors making sure that there are no traces of overheating or burns.

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### 7.5.2. ELECTRICAL EQUIPMENT

INTERVAL: 2000 hours

- A. Do not let a large amount of dust accumulate, especially on the electronic parts. Clean using compressed air or wash with FREON.
- B. Check that there are no loose connections.

### SEPARATION

The interior of the electrical device is occupied solely by electrical, electronic and electromechanical systems. Enclosures such as drives for spindle and axis motors, CNC and PLC boxes are firmly anchored to the panels.



It is strictly forbidden to house non-electrical components (hydraulic, pneumatic, etc.) inside the electrical equipment .

### HEATING

The caloric dissipation inside the electrical equipment is ensured by the use of an air conditioner, which is mounted on the left door of the electrical equipment.

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## 7.6. Lubricants and coolants T

Your machine has been designed considering the chemical and structural features of special oils and coolants. Therefore, we suggest to use the following oils and coolants according to applicable requirements of ISO/TC/39/WG6, in order to obtain a correct operation of all components of the machine.

<b>HYDROSTATIC GUIDES; GUIDE LUBRICATION</b>	MOBIL VACTRA OIL N°2 or PANNOLIN SLIDEWAYS 68
<b>UNIVERSAL HEAD GLEASON PAIRS AND BEARINGS; HYDRAULIC CLAMPING; TOOL CHANGER</b>	MOBIL DTE 25 or PANOLIN HLP PLUS 46
<b>ZF RANGE CHANGE (IF PRESENT)</b>	MOBIL DTE MEDIUM – ISO VG 46 or PANOLIN HLP SYNTH 46
<b>LUBROCOOLANT</b>	BLASOCUT 2000 Universal art.870 or ROCOL ULTRACUT 370

It is extremely important to maintain the levels of oil to the suitable height of the special level controls and periodically to check the cleaning of the fluids and relative filters.

The technical service LAZZATI is at your complete disposal to furnish the whole assistance and the necessary information to effect all the operations of maintenance of the machine.

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## 8. Diagnostics and troubleshooting

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## 8.1 FAILED AUXILIARY ACTIVATION (POWER)



In case of non-insertion of the power auxiliary, make sure that the perimeter guards are closed

It must be verified that the beam of infrared photocells is not blocked by some obstacle, and that all control emergency devices are not pressed.



If everything is in order as described above, turn the key on the electrical cabinet and proceed to open the cabinet doors.

Locate the 2 safety control units called KM1 and KM2: check that both have 4 functioning LEDs.

The first two leds located at the top indicate that the guards (KM1) and emergencies (KM2) are OK: the control loop is closed.

If the LEDs are off on one of the 2 control units, this means that the corresponding enabling circuit is open.

Use the wiring diagram to check the source of the failed auxiliary activation.

Once the problem is solved, reclose the door of the electrical cabinet and return the its key to the correct position.

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## 8.2. ERROR MESSAGES GENERATED BY NUMERICAL CONTROL



If the CNC generates error messages please contact LAZZATI SERVICE

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### 8.3. HYDRAULIC SYSTEM TROUBLESHOOTING TABLE

DEFECTS	POSSIBLE CAUSES
1. Air entrainment in the circuit or excessive formation of foam	<ul style="list-style-type: none"> <li>a) Oil level in tank too low</li> <li>b) Cracks in the intake pipe or faulty seal in the pump</li> <li>c) Excessive rate of return or the oil return pipe is not drowned in oil</li> </ul>
2. Pump does not supply oil	<ul style="list-style-type: none"> <li>a) see 1.a</li> <li>b) Excessive intake height</li> <li>c) Wrong direction of pump rotation</li> <li>d) Ducts or intake filters clogged</li> <li>e) Slow side pump rotation</li> <li>f) Air infiltration in the intake pipe</li> <li>g) Oil too viscous</li> <li>h) Shaft or organs of the pump broken or blades stuck in their seat</li> </ul>
3. Pump does not provide pressure	<ul style="list-style-type: none"> <li>a) see 1.a</li> <li>b) See 2.b</li> <li>c) See 2.c</li> <li>d) See 2.d</li> <li>e) See 2.e</li> <li>f) See 2.f</li> <li>g) See 2.g</li> <li>h) See 2h</li> <li>i) By pass of the oil in the circuit</li> </ul>
4. Low and non-constant circuit pressure	<ul style="list-style-type: none"> <li>a) See 1b</li> <li>b) Leaks in pressurised pipes</li> <li>c) Restrictions in the inlet pipes</li> <li>d) Pump worn or blades partially stuck in their seats</li> </ul>

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DEFECTS	POSSIBLE CAUSES
5. Excessive noisy pump	<ul style="list-style-type: none"> <li>a) see 1.a</li> <li>b) See 1.b</li> <li>c) See 1.c</li> <li>d) See 2.c</li> <li>e) See 2.g</li> <li>f) See 4.d</li> <li>g) irregular oil flow to the pump, due to insufficient filter surface or for excessive devices</li> <li>h) intake speed too high due to the intake pipes with a section that is too small</li> <li>i) number of pump revolutions too high</li> <li>j) faulty alignment of the pump components</li> </ul>
6. Excessive operating temperature	<ul style="list-style-type: none"> <li>a) See 2.g</li> <li>b) See 4d</li> <li>c) Pump operating pressure pump too high</li> <li>d) Excessive leakage through the valves and cylinders</li> <li>e) The intake pipe too close to the return pipe</li> <li>f) Operating in continuous overload</li> <li>g) High ambient temperature</li> </ul>

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DEFECTS	POSSIBLE CAUSES
7. Leaks in correspondence of the gaskets	<ul style="list-style-type: none"> <li>a) see 1.a</li> <li>b) See 4.d</li> <li>c) See 6.c</li> <li>d) See 6.d</li> <li>e) See 6.e</li> <li>f) See 6.f</li> <li>g) See 6g</li> <li>h) abrasives substances penetrated in the oil</li> <li>i) damaged or defective gasket</li> <li>j) faulty training between the shaft of the pump and motor</li> </ul>
8. The pump overloads the engine	<ul style="list-style-type: none"> <li>a) See 2.d</li> <li>b) See 2.g</li> <li>c) See 4.c</li> <li>d) See 5i</li> <li>e) Excessive internal leakage at the pump</li> <li>f) Engine not suitable to the application of pressure and the pump</li> </ul>



Access for adjustment and maintenance operations must only be permitted for authorised, informed and trained personnel.

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## 9. Commercial components and spare parts


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## 9.1. RECOMMENDED SPARE PARTS:


No.	DESCRIPTION	TYPE	CODE	MANUFACTURER	COMPONENT
2	SPINDLE KEY		B490001	LAZZATI	SPINDLE
4	BELTS	11M1500-1600-1650	M234003	GATES	SPINDLE
1	TOOL LOCKING CLAMP	SSK 50 DIN	M011050	BERG	SPINDLE
120	CUP SPRINGS	60X30.5X2.75	M291302	BAUER	SPINDLE
1	GASKET	OR6200	M914090	ANGST PFISTER	SPINDLE
1	GASKET	LRC144	M188102	ANGST PFISTER	SPINDLE
1	GASKET	OR4050	M913010	ANGST PFISTER	SPINDLE
1	GASKET	LRP6212/65	M188002	ANGST PFISTER	SPINDLE
1	GASKET	LRP6287/65	M186001	ANGST PFISTER	SPINDLE
1	GASKET	LRC6200/50	M186101	ANGST PFISTER	SPINDLE
1	ROTATING COUPLING	255000-452-368	M599912	DEUBLIN	SPINDLE
1	CYLINDER PISTON		B225064	LAZZATI	SPINDLE
1	PUSHER		B243010	LAZZATI	SPINDLE
12	SPRINGS		B601004	LAZZATI	SPINDLE
1	FLANGE		B225065	LAZZATI	SPINDLE
1	CYLINDER PISTON	BRW 53	M599901	ENERPAC	SPINDLE
1	BEARING	NATR20A	M124912	SKF	SPINDLE
1	BEARING	SEB190	M109001	SNFA	SPINDLE
1	BEARING	SEB180	M109002	SNFA	SPINDLE
1	BEARING	SEB100	M109003	SNFA	SPINDLE
1	BALL SCREW BEARING	ZARF50140TN	M126110	INA	
1	BALL SCREW BEARING	ZARN50110	M126110	INA	
1	BALL SCREW BEARING	3585	M124007	INA	
1	BALL SCREW BEARING	4090	M126008	INA	
1	ROLLER SLIDING BLOCK	38206	M922126	INA	
1	ROLLER SLIDING BLOCK	26126	M922126	INA	
3	PROXIMITY SWITCH	3RG4011		SIEMENS	
3	PROXIMITY SWITCH	EGT1-4A		EUCHNER	
3	LIMIT SWITCH	N01 R550		EUCHNER	

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RECOMMENDED SPARE PARTS:					
No.	DESCRIPTION	TYPE	CODE	MANUFACTURER	COMPONENT
3	INJECTOR SERIES	IRD 1-2-3-4-5	M709001	ILC	LUBRICATION SYSTEM
1	PUMP	DRAGON 11 LT		DROPSA	LUBRICATION SYSTEM
1	LOCKING PISTON		B116002	LAZZATI	TABLE TR25
1	LOCKING SCREW		B164003	LAZZATI	TABLE TR12
4	TABLE LOCKING CYLINDER		B209001	LAZZATI	TABLE TR12
4	LOCKING RING		B225009	LAZZATI	TABLE TR12
16	CUP SPRINGS	100X51X6	N031135	BAUER	TABLE TR12
4	GASKET	UM10575	N127014	ANGST PFISTER	TABLE TR12
4	GASKET	OR4387/OR4487	N913062	ANGST PFISTER	TABLE TR12
1	CENTRAL TABLE BEARING	NN3030	M123024	SKF	TABLE TR12
2	BEARING	32208	M129208	SKF	TABLE TR12
1	MIM	A60100-10	M161363	LAZZATI	TABLE TR12
1	BALL SCREW BEARING	ZARN50110TN	M126010	INA	TABLE TR12
1	GEAR/WORM SCREW		B369002	LAZZATI	TABLE TR12
1	BEARING PAIR	EX807 CE3 DDM		SNFA	UNIVERSAL HEAD
1	BEARING PAIR	SEB 75 7CE1 DDL		SNFA	UNIVERSAL HEAD
1	BEARING TRIO	EX857CE3T/EX857CE1D50daN		SNFA	UNIVERSAL HEAD
1	PAIR OF BEVEL GEARS	B356001-002		LAZZATI	UNIVERSAL HEAD
72	SPRINGS	50X24X3	N031100	BAUER	UNIVERSAL HEAD
1	SHAFT		B315004	LAZZATI	UNIVERSAL HEAD
1	SPINDLE CONE		B259024		UNIVERSAL HEAD
1	GEAR		B343002		UNIVERSAL HEAD
2	SPINDLE KEY				UNIVERSAL HEAD

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RECOMMENDED SPARE PARTS:					
No.	DESCRIPTION	TYPE	CODE	MANUFACTURER	COMPONENT
3	KNIFE FUSE 00 160A (FU1)	7999.1607		LINDNER	ELECTRICAL CABINET
3	FUSES (10.3X38) FU4	10-130 02 2A		LEGRAND	ELECTRICAL CABINET
3	FUSES (10.3X38) FU3	10-130 16 16A		LEGRAND	ELECTRICAL CABINET
3	FUSES (14X51) FU2	10-140- 40 40A		LEGRAND	ELECTRICAL CABINET
3	24V CONTACTOR	3RT10161BB42 (KM)		SIEMENS	ELECTRICAL CABINET
1	110V CONTACTOR	3RT10241AF04 (KM)		SIEMENS	ELECTRICAL CABINET
1	24V CONTACTOR	CA3DN31DB (KT)		TELEMECANIQUE	ELECTRICAL CABINET
1	SAFETY CONTROL UNIT	3TK282121CB30		SIEMENS	ELECTRICAL CABINET
1	THREE-PHASE RECTIFIER BRIDGE	IXYS VUO-62N07 (VC1)		ICEM	ELECTRICAL CABINET
4	RELAY	G2R1 24V=10A		OMRON	ELECTRICAL CABINET
4	RELAY	G2R2 24V=10A		OMRON	ELECTRICAL CABINET
2	BULBS	BA9S 24 V		SIEMENS	ELECTRICAL CABINET
1	FAN	W2S130AA0301 230 VAC		SIEMENS	ELECTRICAL CABINET

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RECOMMENDED SPARE PARTS:					
No.	DESCRIPTION	TYPE	CODE	MANUFACTURER	COMPONENT
1	PUMP	PLP20.8+PLP10.3.15		CASAPPA	HYDRAULIC SYSTEM
1	HALF COUPLING	SGE-A20-M05-058		CASAPPA	HYDRAULIC SYSTEM
1	HALF COUPLING	SGE-A20-B10-024 2A		CASAPPA	HYDRAULIC SYSTEM
1	ELASTIC WHEEL	EGE-2		CASAPPA	HYDRAULIC SYSTEM
1	FILTERING ELEMENT	STR 070/1 S M090 G1 ½" 6L		MP FILTRI	HYDRAULIC SYSTEM
1	FILTERING ELEMENT	STR 070/4 S M090 G1 1" 25L		MP FILTRI	HYDRAULIC SYSTEM
1	FILTERING ELEMENT	MPF180-1-AG1 p025NBS P01		MP FILTRI	HYDRAULIC SYSTEM
1	FILTERING ELEMENT	FMP065-3-B-AG1- A25N/S		MP FILTRI	HYDRAULIC SYSTEM
1	FILTERING ELEMENT	SA 115 G1 L40A 1"			HYDRAULIC SYSTEM
1	SOLENOID VALVE	V.4WE06 CXX/EG24		REXROTH	HYDRAULIC SYSTEM
1	SOLENOID VALVE	V.4WE06 DXX/EG24		REXROTH	HYDRAULIC SYSTEM
1	LEVEL INDICATOR	RL/G2F2S1S1		GIACOMELLO	HYDRAULIC SYSTEM




The spare parts indicated above may vary based on the material used during the machine construction phase. Therefore it is recommended to contact LAZZATI customer service before replacing the materials.

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# 10. Demolition and dismantling

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## 10.1 GENERAL WARNINGS

The machine disposal and scrapping operations must be carried out by qualified personnel who are aware of the safety standards related to the type of work to be performed.

- As the machine is disconnected from the various energy sources, the operator must wear the personal protections considered appropriate based on the type of residual risk or risk intrinsic to the dismantling of the parts.
- During disassembling, make sure that the weight of the machine parts to be removed can be lifted individually by the operator and that there is no risk of falling parts during detachment.
- If toxic materials have been used in the past for dismantling, it is recommended to use protections for respiratory paths and for exposed areas.
- The user must be specifically aware of the treatment to be carried out in this case and must apply the most severe safety standards.



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## 10.2 DECOMMISSIONING AND DISMANTLING

### 10.2.1 WASTE DISPOSAL

The user is responsible for ensuring, according to the applicable laws in the country of use, the correct disposal of the waste that the machine produces during a specific production.

Furthermore, the user must manage the oils used for machine operation.

### 10.2.2 INSTRUCTIONS FOR DECOMMISSIONING, DISMANTLING AND ELIMINATION

If you want to dismantle the machine, separate its components by material type and then proceed with disposal in compliance with law and the standards in force in the country of machine use.

Emptying the tanks

Empty the cases containing oil and the tank containing the coolant.

These and all other fluids used in the machine must be delivered to authorised collection centres



The exhausted lubricant and the used oils must be disposed of in full compliance with the current laws of the country of machine installation.



It is prohibited to dispose of them in the sewage system


#### - Electrical system

Recovery of electrical cables, channels and terminals.

Possible partial reuse or delivery to centres authorised for the separate collection of industrial waste.

#### - Plastic materials

Recovery of plastic material, in particular the polycarbonate panels applied to the safety protections. It must be delivered to centres authorised for the separate collection of industrial waste.

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- Other materials  
Recovery of sound absorbing panels.  
It must be delivered to centres authorised for the separate collection of industrial waste.
  
- Commercial components  
Recovery of motors, transformers, electro-pneumatic components (solenoid valves, cylinders), electro-mechanical components (contactors, circuit breakers, relays), electronic boards, etc.  
Possible partial reuse or delivery to centres authorised for the separate collection of industrial waste.
  
- Highly polluting materials  
PLC buffer battery  
Do NOT throw the buffer battery in a fire and do not perform brazing on its cells: there is a danger of explosion (max. temperature 100°C).  
Do NOT open lithium batteries or batteries containing mercury and do not recharge them.  
Buffer batteries must NOT be disposed of in the environment as they belong to the category of highly polluting materials.  
Used lithium batteries are considered special waste. They must be delivered to the authorised collection centres after placing them in a strong plastic bag.
  
- Machine body  
The machine body and all other machine components (coolant module, pump etc.) can be disassembled; this makes it possible to recover the frame and all the other metal machine parts.
  
- All the ferrous material must be scrapped at authorised demolition centres.

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## 10.3 INSTRUCTIONS FOR EMERGENCY SITUATIONS

The possible emergency situations that can occur in the machine are mainly caused by:

- Initial fires.
- Exhalation of harmful gases for accidental reasons.

### 10.3.1 Initial fires



In the case of fire, the operator must immediately clear the area to provide access to trained personnel equipped with suitable protection and operative devices.

If a fire starts in the machine, remember that water may not be used to put it on. ONLY USE POWDER OR CARBON DIOXIDE EXTINGUISHERS.

### 10.3.2 Exhalation of harmful gases for accidental reasons


With regard to the above, remember that:

- The machines may not operate in explosive environments.


In the case of a fire that could come into contact with the machined product, use masks with a breathing apparatus when approaching the machine.

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## 11. Annexes

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A list of the manual annexes is provided below:

- LAYOUT
- FOUNDATION DRAWING